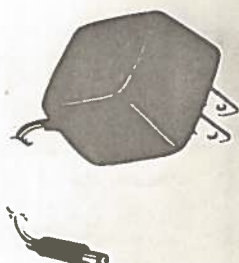


ACCESSORIES AVAILABLE FOR THE MODEL 2000 DMW KIT

Part No.	Description	Price ea.
TL-36P	Test Lead Kit. Includes high-quality red and black probes (4" body length), red and black banana plugs and 36" red and black rubber insulated test lead wire (rated 10kv). Probes and plugs are solderless types.	\$3.50 set.
EP-12V	External Power Adapter Kit. Enables the Model 2000 to operate on an external 8.5 to 15 VDC (unregulated) power source. Current required is 150 to 200mA. Kit consists of a P.C. board, input jack and components for voltage regulation and battery charging (if rechargeable batteries are used).	\$3.95 kit.
AC-115 or AC 230	AC Power Adapter/Charger. Preassembled wall plug mounting type power supply. Delivers 10 VDC at 150mA. Model AC-115 is for 110-120 VAC and Model AC-230 is for 220-240 VAC. Both have 2-pin U.S. type plugs. Output plug matches EP-12V jack.	\$6.95 ea.
NB-1200	Ni-Cad Battery Pack. Consists of 4 "Sub-C" size cells in a pack with red and black leads. Will operate the meter for 10-12 hours. Recharging takes about 16 hours. (EP-12V and AC-115 or AC-230 required to recharge battery pack).	\$13.95 pak.
NB-500	Ni-Cad Battery Pack. Consists of 4 "AA" size cells and a 4-cell battery holder. Will operate the meter for 4-6 hours. (EP-12V and AC-115 or AC-230 required to recharge battery pack).	\$6.95 set.
RMS-2000	True RMS Kit. Contains parts necessary to upgrade all AC functions from sine wave calibrated average sensing to True RMS. Features a precalibrated, laser-trimmed, high-accuracy IC. 0.5% error up to 20 KHz. 100 KHz bandwidth. Full specifications will be published when kit becomes available. Price not determined at this time, however we hope to sell it for less, much less than the \$100 asked for this feature in DMW's sold by other manufacturers.	

ORDERING INFORMATION

Include check or money order for total value of accessories ordered. We regret we cannot make C.O.D. shipments. Please add 10% (minimum \$0.50 - maximum \$5.00) of the total order value for shipping and handling for delivery within the U.S. Texas residents add 5% Sales Tax. Customers outside U.S.A. please write for shipping and handling (varies by country).



AC-115 & AC-230

EP-12V

NB-1200

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Qty.	Part No.	Description	Unit Price	Total
	TL-36P	Test Lead kit	\$3.50	
	EP-12V	External Power Adapter kit	\$3.95	
	AC-115	AC Power Adapter /Charger	\$6.95	
	AC-230	AC Power Adapter /Charger	\$6.95	
	NB-1200	Ni-Cad Battery Pack (Sub-C)	\$13.95	
	NB-500	Ni-Cad Battery Pack (AA-size)	\$6.95	

IMPORTANT

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TOTAL FOR GOODS	
5% SALES TAX (Texas Res. only)	
10% shipping/handling (Minimum 50¢. Max. \$5)	
TOTAL ENCLOSED	

PAGE 1 - Change the last line at the bottom right of this page to read: Maximum Voltage \pm 1400 VDC or 1000 VRMS (sine), except 100 mV and 1000 mV which is \pm 160 VDC or 120 VRMS (sine).

PAGE 12 - The last line in the boxed-in print at the bottom of this page should be changed to read "1N4004 rectifier diode, 10uf/250V electrolytic capacitor, and two alligator clips."

PAGE 15 - The first sentence on this page should read, "Refer to fig. 1 and fig. 4 (below) for the following steps".

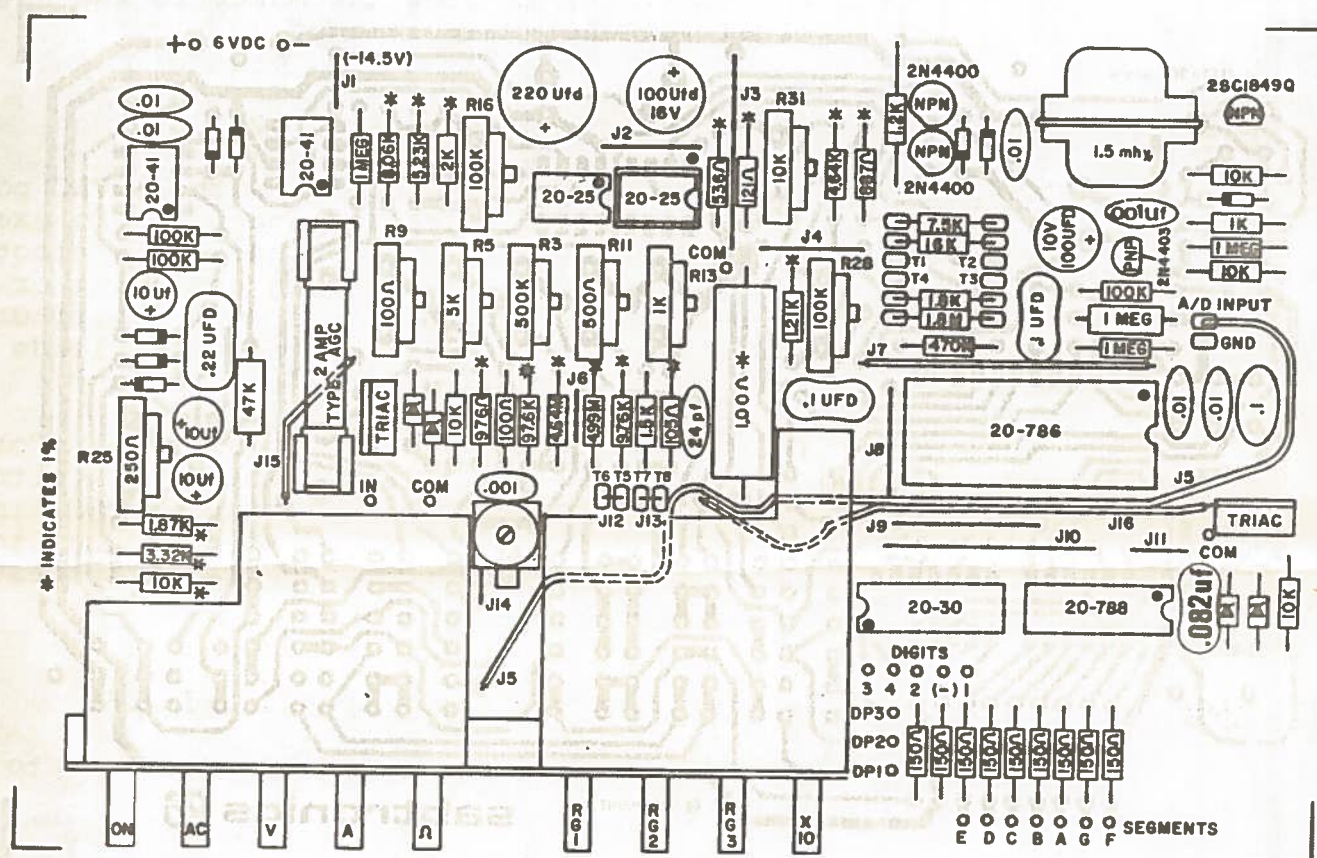


FIGURE 4

PAGE 15 & 16 - NOTE: The illustration of the 1N4148 diode at the bottom right corner of page 15 and the 9.1V zener diode illustration in the first step on page 16 shows that the banded end of the diode is the cathode and the other end is the anode.

PAGE 20 - Add this note at the very top of the page. NOTE: The MC1403 or AD580J installed in the I.C. socket at location Z4 must be the one packaged with the calibration numbers and R35, R36, R37 and R38. There are two MC1403's or AD580J's in each kit; however, only the one packaged with the calibration numbers will properly calibrate the meter with these numbers when installed at location Z4. We recommend that you mark the MC1403 or AD580J in the calibration parts bag so it can always be identified from the other one.

PAGE 31 - Add the following statement at the end of step #4. NOTE: The minus (-) sign will always be displayed when the ohm function switch is depressed; this indicates to you that the RED (V_ΩA) terminal of the meter is the negative (-) terminal for ohms measurements.

PAGE 34 - Add the following caution notes to step #28:

Caution #1: This peak detector operates with 117VAC power and will stay charged after it is disconnected. So exercise care as this circuit can produce a hazardous electrical shock. DO NOT touch the circuit when operating or after it is disconnected until the 10ufd 250V capacitor is discharged by shorting its positive and negative leads with a well-insulated screw driver.

Caution #2: DO NOT substitute a bench power supply for the batteries whenever the meter is connected to a circuit powered by the 117VAC line or when measuring 117VAC line unless it is the AC-115 or AC-230 power adaptor supplied by us. Serious damage to the Model 2000 Meter may result that we will not warranty or repair.

PAGE 36 - Add this additional step between step #25 and #26.

Step #25A: Connect a precision 10.000 MA DC source to the input jacks.

SCHEMATIC DIAGRAM - Make the following corrections to the Schematic Diagram:

- 1) Change the value of L1 from 2.2uh to 1.5uh
- 2) Change CR6, CR7, CR8 from 1N914 to 1N4148
- 3) Change C10 from 470pF to .001ufd
- 4) Change the number 18 at the X10 switch to 16
- 5) Change the number 16 at the X10 switch to 18

C-10
A D D E N D U M

Please make the following corrections in the assembly manual before proceeding with the construction of this kit:

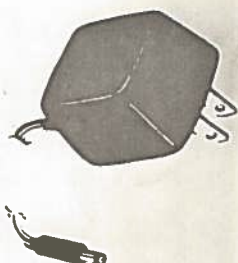
- PAGE II - The 1/4" wide tape (wrapped around the PCB) is not black as described in the parts list but off-white color.
- PAGE 21 - C10, 470pF Disc capacitor has been changed to a .001uF mylar. Do not use the 470pF if it is included in your kit. Use the .001uF mylar which is attached to this sheet.
- PAGE 22 - C20, .082uF Mylar capacitor is now installed on the top (components side) of the main P.C. board. The location of C20 is printed on the actual board between Z7 and VR1 and is not in Figs. 1 or 2.
- MAIN PCB - The 220pF Disc capacitor C21 shown on the main P.C. board has been deleted from the kit.
- PAGE 23 - First step should read "Install Z1, (20-25 or AD580J or MC1403) in the same direction as Z4 previously installed".
 NOTE: Z1 may be soldered directly on the board while Z4 must be installed in the 8-pin socket provided. Do not solder Z4 or interchange it with Z1, as Z4 has been measured with the four resistors (also measured) as a calibration set. Soldering Z4 may alter its electrical value and render the calibration numbers supplied invalid.
- PAGE 34, - The 10uF capacitor should be a 250-volt type instead of a 150-volt type as specified.
- CASE - Included with this kit, but not listed in the manual is a strip with two pieces of black tape. These tape pieces are for the decorative trim on the side of the case and should be attached after the meter is assembled, calibrated and the top and bottom halves are assembled.
- PAGE 11 - The front panel is now supplied with the display stand-offs as built-in parts. Therefore no display standoffs are included with the kit. Also disregard the reference made to the standoffs on page 26.
- FRONT PANEL - The front panel now has a window in which the red lens should be installed. To mount the lens, apply epoxy around the ridges on all four sides and attach it to the opening in the front panel.
- PAGE 7 - Z6, The segment driver IC, may either be marked
 number MC14511B or 20-788

ACCESSORIES AVAILABLE FOR THE MODEL 2000 DMM KIT

Part No.	Description	Price ea.
TL-36P	Test Lead Kit. Includes high-quality red and black probes (4" body length), red and black banana plugs and 36" red and black rubber insulated test lead wire (rated 10kv). Probes and plugs are solderless types.	\$3.50 set.
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AC-115 & AC-230

EP-12V

NB-1200

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Qty.	Part No.	Description	Unit Price	Total
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	EP-12V	External Power Adapter Kit	\$3.95	
	AC-115	AC Power Adapter /Charger	\$6.95	
	AC-230	AC Power Adapter /Charger	\$6.95	
	NB-1200	Ni-Cad Battery Pack (Sub-C)	\$13.95	
	NB-500	Ni-Cad Battery Pack (AA-size)	\$6.95	
TOTAL FOR GOODS				
5% SALES TAX (Texas Res. only)				
10% shipping/handling (Minimum 50¢. Max.\$5				
TOTAL ENCLOSED				

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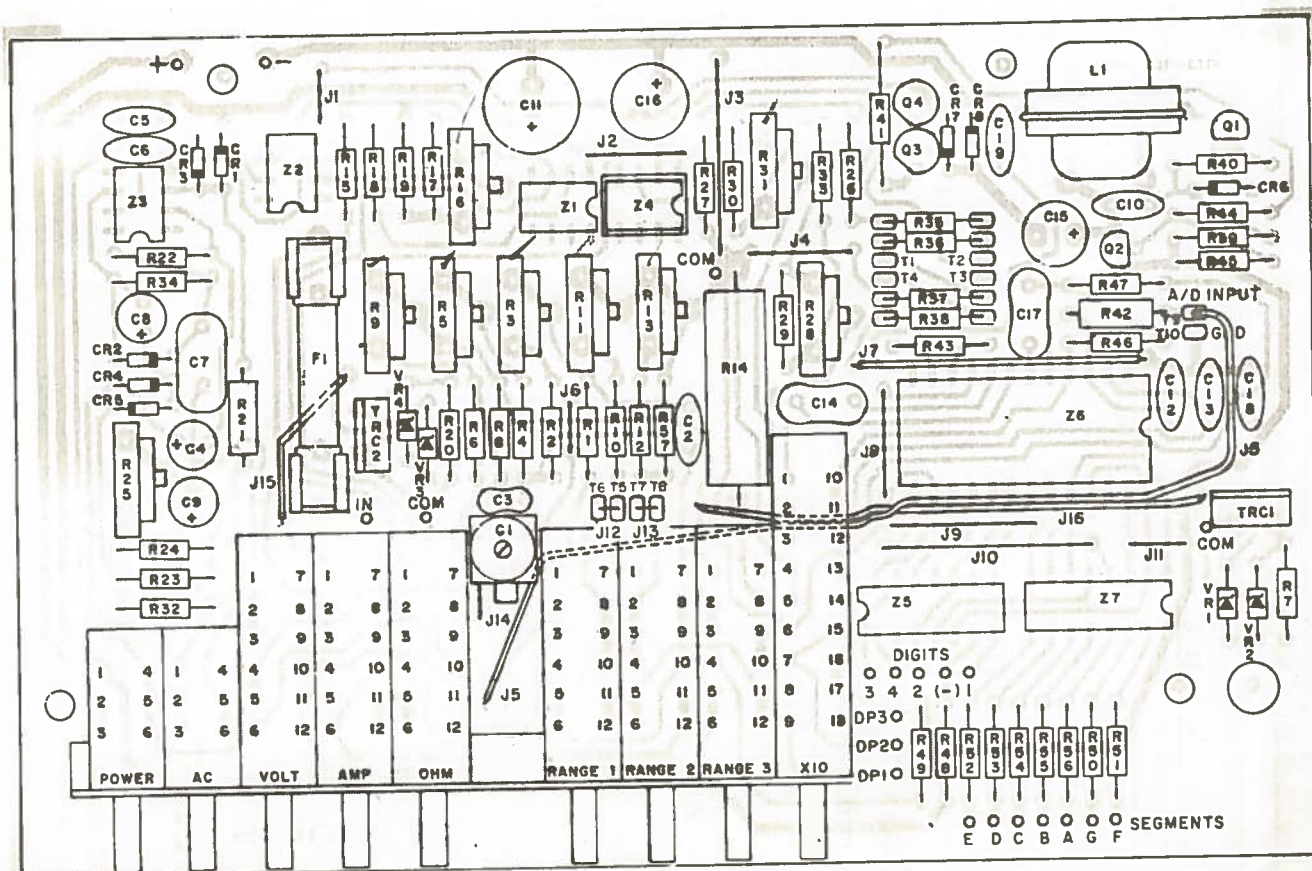


FIGURE 2

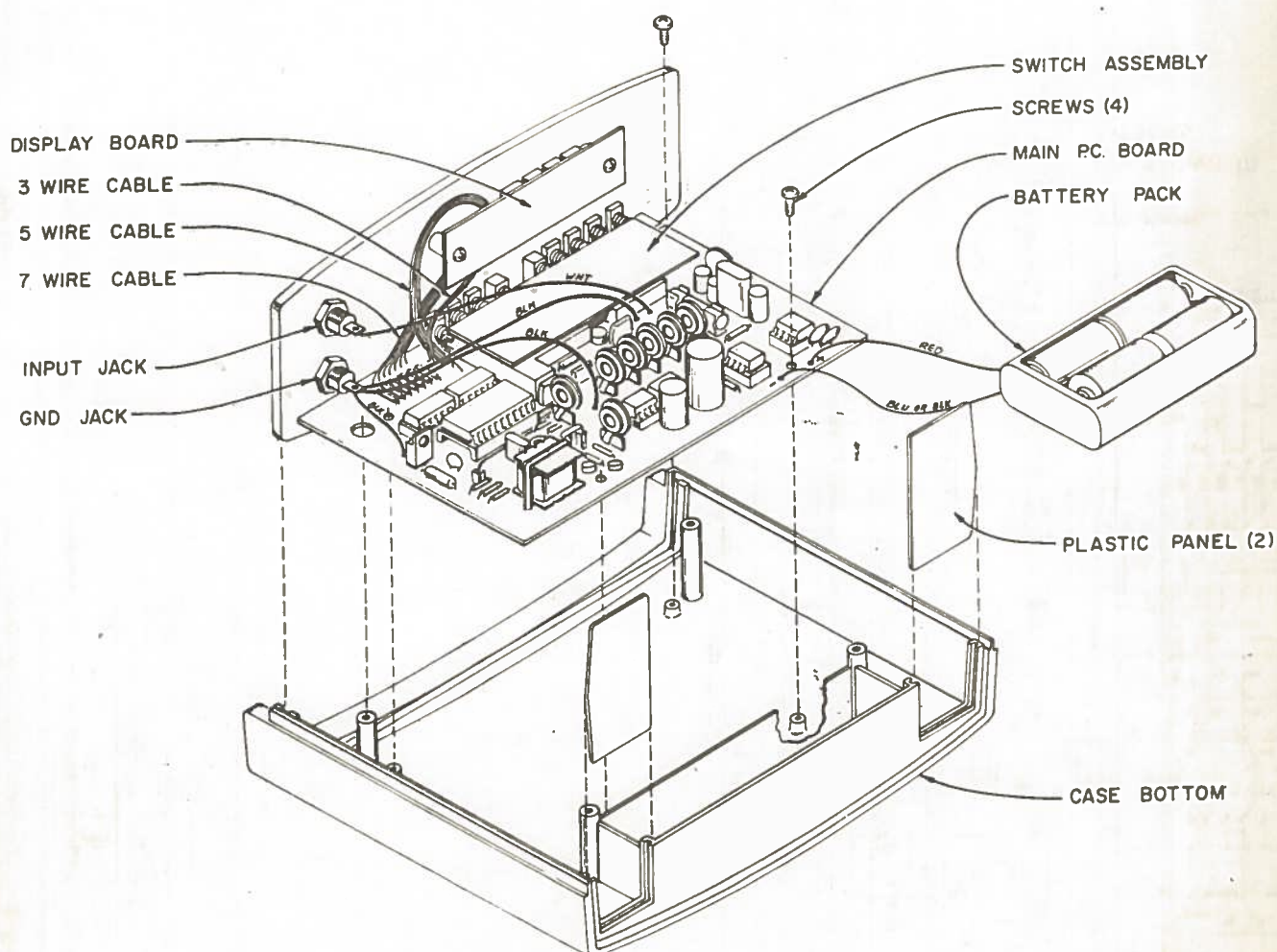


FIGURE 3

The multiplexed outputs of the A/D IC are fed to the digit driver Z5 and segment driver Z7 to drive the LED display. R50 through R56 control the display current.

Decimal Point Selector. Current limited by R49 is directed by switch contact and light the appropriate decimal point.

Over Voltage and Over Current Protection. TRC1 and zener diodes VR1 and VR2 form a crowbar circuit which short out damaging current and voltages during the time it takes for the fuse to blow. TRC1 protects the Range 3 ohms section which does not have high enough circuit resistance to limit current to a safe value. TRC2 and zener diodes VR3 and VR4 operate in a similar manner to TRC1 but protect the meter Range 1 and Range 2 current shunts. R15, R21, CR1, CR2, R42 and C12 also provide overload protection to their associated circuits by limiting overload current to a safe value.

referred to input.

Solution - Found that -7.5 & -14 voltages were missing. Replaced Q3 & Q4 but no change. Noticed that Z-3 was very hot to the touch. Replaced Z-3 & Z-2. Replaced Z-1 to removed Z-3 & Z-2 from -14 volt bus. Power supply voltages were now okay. Replaced Z3 & Z2. Note functioned normally. Rtd 9/20/58

CIRCUIT DESCRIPTION

Power Supply. Basic power required for the meter circuit is +4.5 to 6.5 VDC at 120 Ma. It is supplied by batteries or the optional external power circuit. -14.5 VDC and -7.5 VDC are produced by a blocking oscillator Q1, Q2 and associated components; frequency of oscillation is approximately 25KC. Q3 and Q4 base emitter junctions are reversed and act as low leakage zener diodes which regulate the output voltage of the power supply by starving base current from Q1.

Input Range Switching. R1 through R6 form a voltage divider network used for input scaling. Range switches 1, 2, and 3 select divide ratio by 1, 100 or 1000 respectively. C1, C2, C3 and C20 are used to compensate for circuit high frequency AC variations and have no effect on DC and low frequency input signals.

Ohm Converter. Z1 and Z2 form a precision current source. The input scaling voltage divider is used in ohm mode to program the current. This constant current is applied to the unknown resistance at input terminals; the voltage dropped by the resistance is displayed by the A/D converter as ohms.

Current Shunts and Switching. R10 through R13 form three current shunt resistances. In the amp mode current through the input terminals produces a voltage drop across the selected shunt; this voltage is displayed by the A/D converter as current.

AC Converter. Z3 and associated components form a precision rectifier circuit which produces a DC output scale factored to the AC input. Calibration adjustment R25 sets the scale factor for sine wave inputs.

Reference Supply and Calibration. Z4 is a precision integrated circuit voltage regulator. The 2.5V output of Z4 is applied to voltage divider R26 through R31 to develop the 2V and .2V reference needed by the A/D converter. R35 through R38 and Z4 provide a self-calibration method. Although the resistors are 5%, they have been measured to .1% of their exact value and voltage divider output with Z4. R35 through R38 and Z4 are supplied as a set with accompanying calibration numbers. These parts are installed in sockets to prevent soldering heat from changing their value.

A/D and Display Drive. Z6 is an integrated dual slope A/D converter circuit. Input voltages to be displayed feed into pin-3 through low pass filter C12 and R42. X1-X10 switch selects the appropriate .2V or 2V reference and slope time constant R46 or R47 and C17. R43 sets the clock frequency to approximately 80 KHz. C14 is used in the auto zero function.

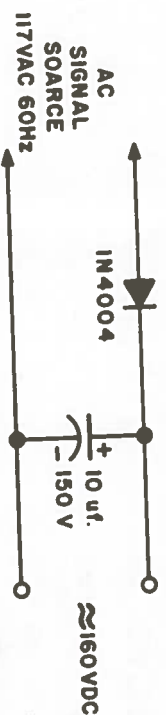
12. Depress Power, Ohm, 100 and X10 switches.
13. All the following precision resistance measurements require a .01% or better resistance source including lead resistance.
14. Connect a precision 1000.0 resistance to the input jacks.
15. Adjust trimmer R9 to obtain a display of -1000.
16. Depress Power, Ohm, 10K and X10 switches.
17. Connect a precision 100.00K resistance to the input jacks.
18. Adjust trimmer R5 to obtain a display of -100.0.
19. Depress Power, Volt, 10V and X10 switches.
20. Connect a precision 100.00 VDC to the input jacks.
21. Adjust trimmer R3 to obtain a display of 100.0.
22. Depress Power, Amp, 10 μ A and X10 switches.
23. Connect a precision 100.00 μ A DC source to the input jacks.
24. Adjust trimmer R11 for a display of 100.0.
25. Depress Power, Amp, 1mA and X10 switches.
26. Adjust trimmer R13 for a display of 10.00.
27. Depress Power, AC, Volt, 100mV and X10 switches.
28. Apply a precision 1.0000V 60Hz sinewave signal to the input jacks.
29. Adjust trimmer R25 to obtain a display of 1000.
30. Depress Power, AC, Volt and 10V switches.
31. Apply a precision 10.00 VAC 10KHz sinewave signal to the input jacks.
32. Adjust trimmer capacitor C1 until the Model 2000 displays a reading as close to 10.05 as possible. This gives the meter the best linearity over this range.

Calibration is now complete.

27. Reinstall the wire jumpers from Test Points T5 and T6 and Test Points T7 to T8.

The AC volts will now be calibrated. This is accomplished by peak detecting 117 VAC 60 Hz and measuring this peak with the already calibrated DC scale. Once this DC peak is measured, the RMS equivalent may be calculated and will be used as the AC calibration number for the line voltage applied to the Model 2000 meter.

28. It will be required that an AC peak detector circuit be built as shown in the figure below. It will be used to obtain the peak DC voltage of the 117 VAC line.



29. Depress switches: Power, Volt, 10V, and X10.
30. Install test leads into the Model 2000 input jacks and measure the DC voltage across the 10 μ f capacitor in the peak detector circuit shown above. Record this voltage. This voltage is AC_{peak} . 176.0
31. Convert the measured DC voltage to the equivalent AC voltage using the following equation: $AC_{rms} = (AC_{peak} + .7) / 1.414$. 124.5
32. Depress switches: Power, AC, Volt, 10V, and X10.
33. With test leads, apply AC line voltage to the input terminals of the Model 2000.
34. Find and adjust R25 while observing the display. R25 should be adjusted until the display reads the value calculated in Step 31.
35. Find and adjust trimmer capacitor C1 to mid-range. This is a calibration of the high frequency AC response.

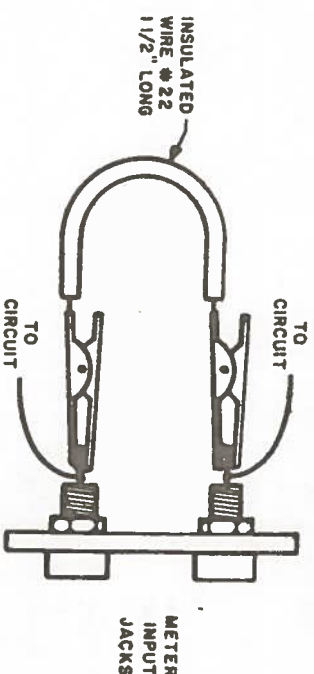
The calibration procedure is now complete. It is very important that the above calibration procedure be followed in order specified. If the procedure is performed out of sequence, errors will result.

CALIBRATION PROCEDURE #2

This Calibration Procedure is used to calibrate the Model 2000 with Test equipment normally found in an average calibration lab.

Calibration Procedure

1. Install the batteries into the battery holder and depress Power, Volt and 100mV switches.
2. Connect the input of the Model 2000 to a precision 100.00mV DC source.
3. Adjust trimmer R31 to obtain a display of 100.0.
4. Depress Power, Volt, 100mV and X10 switches.
5. Connect the input of the Model 2000 to a precision 1000.0mV DC source.
6. Adjust trimmer R28 to obtain a display of 1000.
7. Depress Power, Ohm, 10K and X10 switches.
8. Short the input jacks with a jumper as shown below. If necessary, assemble an alligator clip lead as shown.

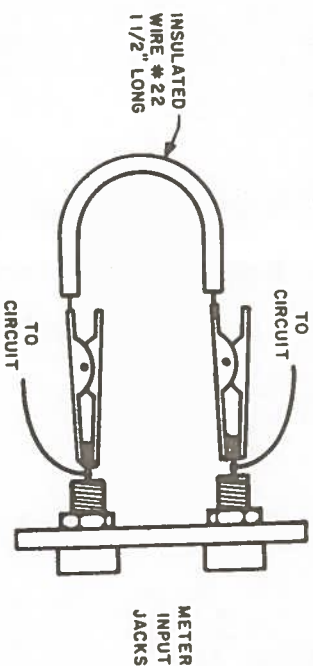


9. Remove white wire from Test Point T9 (A/D input) and install a jumper wire between Test Point T9 and Test Point T3.
10. Adjust trimmer R16 until display of 1000 is obtained.
11. Remove clip leads from input jacks and remove jumper wire from T9 and T3. Install the white wire from the switch assembly back into Test Point T9.

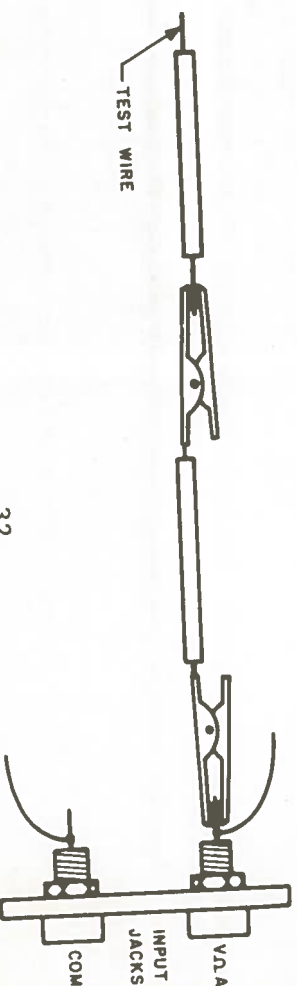
6. Move test wire from Test Point T1 to Test Point T2. Then adjust R28 for a display reading corresponding to calibration number B. 1792. This adjustment calibrates the internal 2 Volt reference voltage.

This completes the calibration of the two reference voltages used by the A/D converter. The following steps are used to calibrate the ohms circuitry.

7. Remove the test wire from Test Point T2 and install in Test Point T3. Then short the two input jacks labeled V Ω A and common. To short the two jacks together, assemble an alligator clip lead and connect as shown in the figure below.



8. The following switches should be depressed: Power, Ohm, 100 Ω , and X10.
9. Adjust R16 until the display jumps equally between (-) 999 and (-) 1000.
10. Remove the test wire from the meter and disconnect the clip lead jumper shorting the input jacks. Attach the clip lead to the test wire as shown in the figure below.



11. Install the jumper wire coming from the switch assembly to Test Point T9. This connects the A/D converter input to the switch assembly which is necessary for normal operation.

12. Depress the following switches: Power, Ohm, 100 Ω , and X10.

13. Locate and remove R35 (7.5K Ω) from the socket that it is installed in.

14. Install the test wire in Test Point T1 and adjust trimpot R9 for a display reading corresponding to the calibration number C. 1781.

15. Depress the following buttons: Power, Ohms, and 10K.

16. Remove the test wire from Test Point T1 and insert in Test Point T2. Monitor the display while adjusting R5 to correspond to calibration number D 1792.

17. Depress the following buttons: Power, Ohm, and 1 meg ohm.

18. Remove the test wire from Test Point T2 and install in Test Point T4. While monitoring the display, adjust R3 to obtain the calibration number E. After adjusting R3, wait a few seconds for the display to stabilize. Now that the DC Volts and Ohms circuitry is calibrated, the current shunt resistors will be calibrated. 1796=E

19. Reinstall R35 (7.5K Ω) in its socket and remove the jumper connecting Test Point T5 to Test Point T6 and the jumper connecting Test Point T7 to Test Point T8.

20. Remove the test wire from Test Point T4 and install in Test Point T5.

21. Depress the following switches: Power, Ohm, and 10K.

22. Locate and adjust trimpot R11 for a display reading of (-) 10.00.

23. Remove the test wire from the Test Point T5 and install in Test Point T8.

24. Depress the following switches: Power, Ohm, 100 Ω .

25. Find and adjust trimpot R13 until the display reads (-) 100.2.

26. Remove the test wire and the clip leads from the input jacks. They will not be required for the rest of the calibration procedure.

CALIBRATION PROCEDURE #1

This Calibration Procedure has been prepared for the Kit Builder that has no other test equipment other than the Model 2000 digital multimeter just assembled. To get the best calibration accuracy, it is recommended that the Model 2000 be calibrated using Calibration Procedure #2. Calibration Procedure #2 will allow the calibration of the Model 2000 to within published specifications.

Calibration Procedure #1 uses data supplied by Sabtronics on four resistors and a voltage reference. Accompanying these five components will be five calibration numbers: A through E. These numbers, when used with the following calibration procedure, will allow reasonably accurate calibration of the Model 2000.

Z4 which is a voltage reference and the four resistors: R35, R36, R37, and R38 are used to provide both premeasured calibration voltages and premeasured resistance values. The premeasured voltages allow calibration of the voltage scales. The premeasured resistances allow calibration of the ohm scales and the current shunts for the amp scales.

Calibration Procedure

1. Cut a 3" (75mm) length of white or black insulated wire and strip off insulation about $\frac{1}{4}$ " (6mm) from each end. This will be referred to as the Test Wire in the following steps.

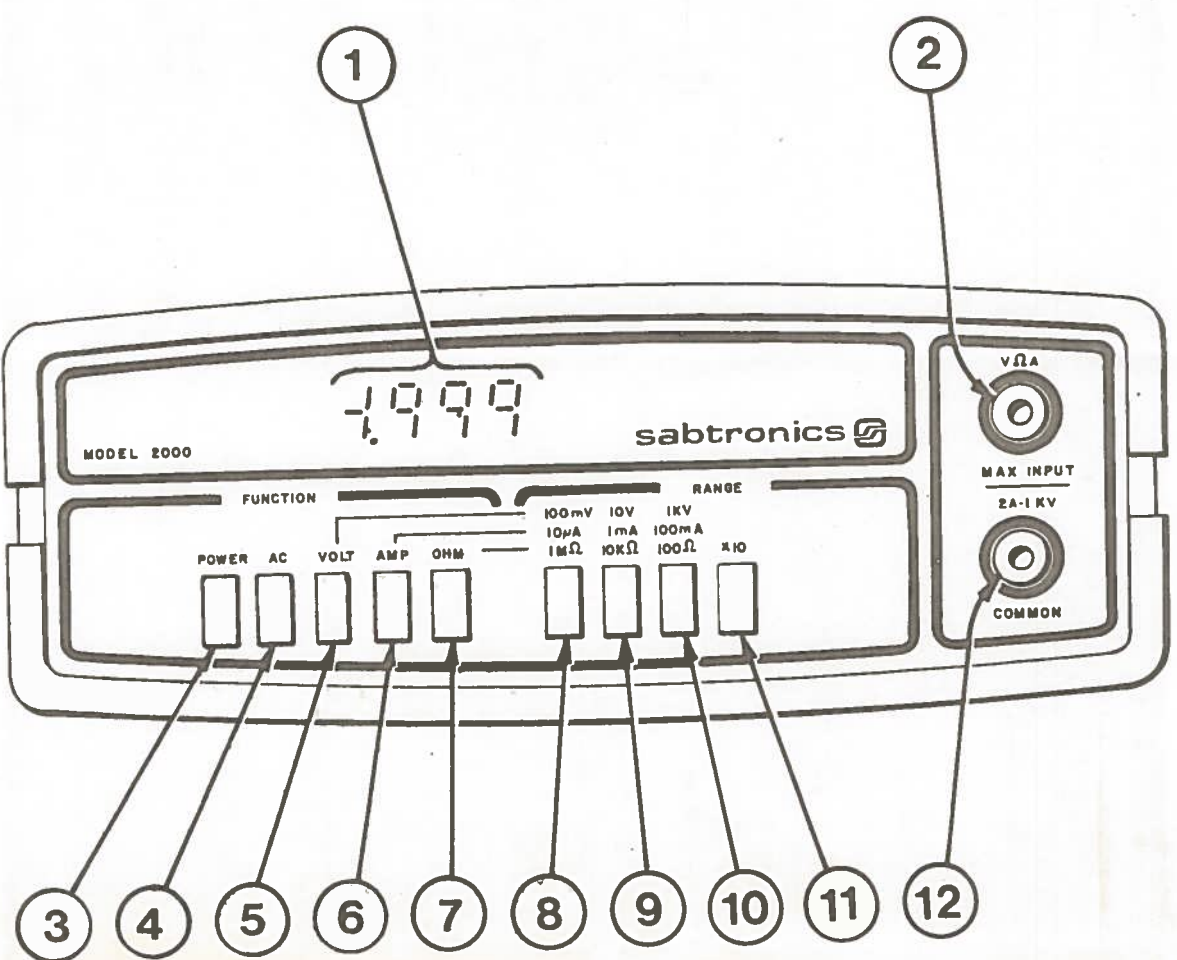
2. Remove the jumper wire (J5) running from the switch assembly to Test Point T9. Install one end of the Test Wire described above into Test Point T9 and install the other end into Test Point T1.

3. Install the batteries into the battery holder and depress POWER, VOLT and 100mV switches.

4. Adjust R31 for a display reading that matches calibration number A. This adjustment is used to calibrate the 200 millivolt reference voltage at Test Point T1. Do not pay attention to the decimal point placement at this time.

5. Depress Power, Volt, 100mV, and X10.

- ☒ Slip the front panel, with the jack and display board installed, over the switch assembly:
- ☒ Solder the three black common wires from the main P.C. board assembly to the black common input jack.
- ☒ Solder the white input wire from the main P.C. board assembly to the red input jack.
- ☒ Mount the display board onto the two plastic stand-offs on the rear of the front panel as previously shown.
- ☒ Find the plastic battery holder with blue or black and red wires.
- ☒ Install the red wire in the hole labeled + and the blue or black wire in the hole labeled - at the rear of the main P.C. board.
- ☒ Install the main P.C. board assembly, that has the front panel assembly attached, to the bottom case half as shown in Figure 3.
- ☒ Mount the P.C. board to the bottom case half with the four short screws provided.
- ☐ Install battery holder with batteries into battery compartment of the case.
- ☐ Perform Calibration Procedure, #1 or #2.
- ☐ The top cover is attached to the bottom cover with the four long screws provided.



ITEM NUMBER	NAME	DESCRIPTION
1	Display	A 3½ digit display (1999 maximum) of the measured input, including decimal point and polarity sign when appropriate.
2	V Ω A	Jack for high (red) lead connection to Model 2000 for voltage, current, (AC or DC) and resistance measurements.
3	Power Switch	Turns meter ON and OFF. AC adapter still charges batteries while Power Switch is off.
4	AC	This switch, when depressed in conjunction with item 5 or 6, selects AC voltage or alternating current measurement capability.
5	Volt	Works in conjunction with the AC and range switches to select voltage function (AC or DC).
6	Amp	Works in conjunction with the AC and range switches to select current function (AC or DC).
7	Ohm	Selects resistance measurement mode of operation. Common lead is positive.
8	Range 1	Selects 100mV, 10uA, or 1MΩ full scale ranges. May be used in conjunction with item 11 (X10) to select 1V, 100uA, or 10MΩ full scale ranges.
9	Range 2	Selects 10V, 1mA, or 10KΩ full scale ranges. May be used in conjunction with item 11 (X10) to select 100V, 10mA, or 100KΩ full scale ranges.
10	Range 3	Selects 1KV, 100mA, or 100Ω full scale ranges. May be used in conjunction with item 11 (X10) to select 1A and 1KΩ full scale ranges.
11	X10	Used in conjunction with items 8, 9, and 10 to raise the full scale capability by a factor of 10.
12	Common	Jack for low (black) lead connection to Model 2000 for all functions.

GENERAL

DC CURRENT

Range	Overrange	Resolution	Accuracy
10uA	19.99uA	10nA	.1% ± 2 Digits
100uA	199.9uA	100nA	.1% ± 2 Digits
1mA	1.999mA	1uA	.1% ± 2 Digits
10mA	19.99mA	10uA	.1% ± 1 Digit
100mA	199.9mA	100uA	1% ± 1 Digit
1000mA (1A)	1999mA	1mA	1% ± 1 Digit

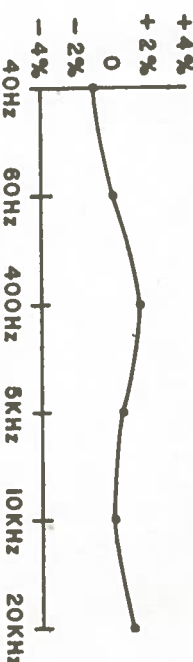
Input Impedance: 1000mA, 1000mA Ranges - 1 ohm
1mA, 10mA Ranges - 100 ohm
10uA, 100uA Ranges - 10K ohm

Temperature Coefficient: ±(0.03% of Reading + .005% F.S.) / °C
Response Time: 5 Sec. Typical
Maximum Input Current: All Ranges 2 AMP (Fuse Protected!)

AC CURRENT SINE WAVE

Range	Frequency Range	Accuracy at 60 Hz
10uA	40 Hz to 500 Hz	1% ± 5 Digits
100uA	40 Hz to 500 Hz	.1% ± 2 Digits
1mA	40 Hz to 20 KHz	.1% ± 2 Digits
10mA	40 Hz to 20 KHz	.1% ± 1 Digit
100mA	40 Hz to 20 KHz	.8% ± 2 Digits
1000mA	40 Hz to 20 KHz	.8% ± 2 Digits

Deviation
From 60Hz
Accuracy



Typical AC Current Frequency Response

Input Impedance: Same as DC Current
Overrange: Same as DC Current
Resolution: Same as DC Current

Temperature Coefficient: ±(0.03% of Reading + 0.005% F.S.) / °C
Response Time: 5 Sec. Max. to 5 Digits of Reading
Maximum Input Current: All Ranges 2 AMPS (Fuse Protected!)

OHMS

Range	Overrange	Resolution	Measuring Current	Accuracy
100 ohm	199.9 ohm	1 ohm	1mA	.1% ± 1 Digit
1000 ohm	1999 ohm	1 ohm	1mA	.1% ± 1 Digit
10K ohm	19.99K ohm	10 ohm	10uA	.1% ± 1 Digit
100K ohm	199.9K ohm	100 ohm	10uA	.1% ± 1 Digit
1M ohm	1.999M ohm	1K ohm	100nA	.2% ± 2 Digits
10M ohm	19.99M ohm	10K ohm	100nA	.5% ± 5 Digits

Response Time: 100 ohm, 1K ohm - 5 Sec. Typical
10K, 100K ohm - 2 Sec. Typical
1M ohm, 10M ohm - 5 Sec. Max. to
5 Digits of Reading

Temperature Coefficient: ±(0.02% of Reading + 0.005% F.S.) / °C
Voltage across unknown "R" at 1000 display indication
100 ohm, 10K, 1M (X1) Ranges, 100mV
1K, 100K, 10M (X10) Ranges, 1 Volt

Maximum Input Voltage: 250 VDC or RMS All Ranges (2 AMP Fuse Protected!)

GENERAL

Operating Ranges: -0°C to +55°C
Storage Temperature Range: -40°C to +75°C
Humidity Range: 0 to 80% RH
Display: 7-Segment LED
Size: 7.62 CM x 20.32 CM x 16.38 CM
Sample Rate: 4 per second
Power: 4 VDC to 6.5 VDC, 120mA Nominal

Typical Operating Time on Batteries:

Battery Size	Type	Hours
"C" 4 Cells	Alkaline (heavy duty)	25
"C" 4 Cells	Carbon Zinc (standard)	8
"C" 4 Cells	Nicad (rechargeable)	15
"Sub C" 4 Cells	Nicad (rechargeable)	10
"AA" 4 Cells	Nicad (rechargeable)	4

Input Power

Operating power for the standard Model 2000 comes from four non-rechargeable, alkaline (heavy duty) "C" size batteries. This power source typically provides 25 hours of instrument operation. Optionally available power sources include rechargeable Ni Cad batteries and an AC Power Adapter. To use these power sources, the meter must be fitted with an external power kit. The instrument equipped with rechargeable batteries (4 "C" cells) will typically operate for 15 hours; recharging, using the AC Power Adapter, takes approximately 16 hours. If the batteries measure below 4.4V under load, they need to be replaced or recharged. Don't leave low voltage batteries in the meter; acid corrosion may result. The first indication of low batteries will be a dim display.

Fuse Replacement

The Model 2000 is equipped with a current overload fuse to protect the instrument circuitry from inadvertent applications of current in excess of 2 amps. This fuse is located in fuse clips on the main P.C. board. Replace with a 2 amp AGC or AGX fuse by removing the four screws holding the case halves together and lifting off the top case half.

Overrange Indication

When the full scale capability of the selected range for any function is exceeded, the display will be blank. The overrange indication does not necessarily mean that the instrument is being exposed to a damaging input condition. The exact overload conditions for each range is contained in the specifications.

SPECIFICATIONS

The Model 2000 is a portable, battery-operated 3½-digit, five function digital multimeter featuring capabilities of more sophisticated bench instruments but at the economy required for the kit builder/hobbyist. A total of 28 ranges is provided: five each for AC and DC volts, six each for AC and DC current, and six for resistance measurements. Input over-load protection, auto polarity and auto zero are provided on all ranges.

Both the AC and DC voltage functions include ranges from 100mV to 1000V. Resolution on the 100mV range is 100µV per digit. Input protection up to 1000V is provided on all voltage ranges.

The AC and DC current functions measure ranges from 10nA on the 10uA range scale to 2A full scale on the 1A range. Protection against input current exceeding 2A is provided by an easily replaceable fuse.

The resistance function measures ranges from .1 ohm on the 100 ohm range to 20 Megohms full scale on the 10 Megohm range. In circuit resistance measurements can be made using the normal resistance ranges. Errors due to effects of parallel semiconductor junctions are avoided by impressing less than 200mV across the unknown resistance on all 1x ohm ranges.

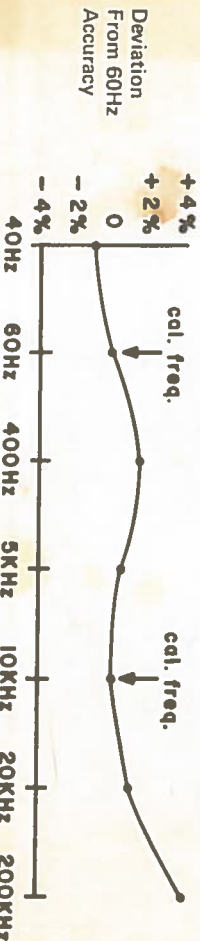
DC VOLTS

Range	Overrange	Resolution	Accuracy
±100mV	±199.9mV	±100µV	±.1% ± 1 Digit
±100mV (1V)	±1999mV	±1mV	±.1% ± 1 Digit
±10V	±19.99V	±10mV	±.1% ± 2 Digits
±100V	±199.9V	±100mV	±.2% ± 2 Digits
±1000V	±1000V	±1V	±.5% ± 2 Digits

Input Impedance: 10M - All Ranges
Response Time: 0.5 Sec. Typical
Maximum Voltage (All Ranges): ±1400VDC or 1000 VRMS
Temperature Coefficient: ±(0.02% of Reading + 0.01% F.S.)/°C

AC VOLTS SINE WAVE

Range	Frequency Range	Accuracy at 60 Hz
100mV	40 Hz to 50 KHz	.3% ± 2 Digits
1000mV	40 Hz to 50 KHz	.3% ± 1 Digit
10V	40 Hz to 20 KHz	.3% ± 2 Digits
100V	40 Hz to 2 KHz	1% ± 1 Digit
1000V	40 Hz to 500 Hz	1% ± 2 Digits



Typical AC Volts Frequency Response

Input Impedance: 10M and 25 pF - All Ranges
Overrange: Same as DC Volts
Resolution: Same as DC Volts
Temperature Coefficient: ±(0.02% of Reading + .01% F.S.)/°C
Response Time: 5 Sec. Max. to 5 Digits of Reading
Maximum Input: ±1400 VDC or 1000 VRMS (Sine)