

Section 3  
CALIBRATION

Data Precision 2000 Series Digital Multimeters (DMM) are extremely precise and stable instruments. Their 6-month specified accuracy should last for longer than the specified period. It is advised to check the instrument periodically. When doing so, follow all procedures carefully and observe all precautions.

### 3.1 CALIBRATION VERIFICATION

Data Precision Company recommends establishing and maintaining a performance history log of the 2000 Series DMM. Transfer the certified factory performance test data as the initial entry. In order to have a locally available test performance for comparison, it is suggested that the instrument be tested against an available standard as soon as it is unpacked and the test results be recorded at that time. The instrument should be checked thereafter at least every six months.

### 3.2 PRELIMINARY SET UP CONDITIONS

a. Establish a solid ground connection from the case to the power source ground. If the third wire of the three-wire power cord does not carry through to main power ground, ground the meter case with a clip lead attachment.

b. Accuracy of standards used to calibrate the multimeter should be verified before recalibrating the instrument.

Errors of standards should be no worse than 20% of the tolerances specified for the multimeter.

### 3.3 CALIBRATING EQUIPMENT TABLE

The equipment in the table below is recommended for use in the calibration procedure. Substitute units may be employed provided they meet the specified accuracy characteristics.

### 3.4 ACCESS TO CALIBRATION ADJUSTMENTS

All calibration adjustments are accessible after the top cover has been removed (see Figure 3-1). The actual calibration potentiometers are mounted on the circuit board, but may be reached through an opening provided in the Guard shield. A summary table of Calibration procedure is located on the inside top cover of the instrument.

#### CAUTION

Do not remove the Guard during Calibration Process.

### 3.5 CALIBRATING SEQUENCE

Perform the calibration in the following sequence of measurement modes:

1. DC Voltage Measurement Mode
2. Resistance Measurement Mode
3. AC Voltage Measurement Mode
4. Ratio Measurement Mode.

Procedure	Type/Model No.	Performance Specs/Acc. Require.
DC Volts Measurement	COHU/Model 355	10V range $\pm .001\%$ rdg $\pm 5$ uV 100V range $\pm .001\%$ rdg $\pm 20$ uV 1000V range $\pm .001\%$ rdg $\pm 40$ uV
AC Volts	HP/Model 745A  and 746A	1mV to 100V: 50Hz-20kHz $\pm .02\%$ rdg $\pm .002\%$ range $\pm 10$ uV 20Hz-100kHz $\pm .05\%$ rdg $\pm .005\%$ range $\pm 50$ uV 100V to 1000V: 50Hz-20kHz $\pm .04\%$ rdg 20Hz-50kHz $\pm .08\%$ rdg
Resistance	JULIE/DMR-105A (.001%) JULIE/NB-106-1M (.0015%) JULIE/NB-107-10M (.003%)	1 kilohm to 10 megohm $\pm .001\%$ in decades

Table of Calibrating Equipment

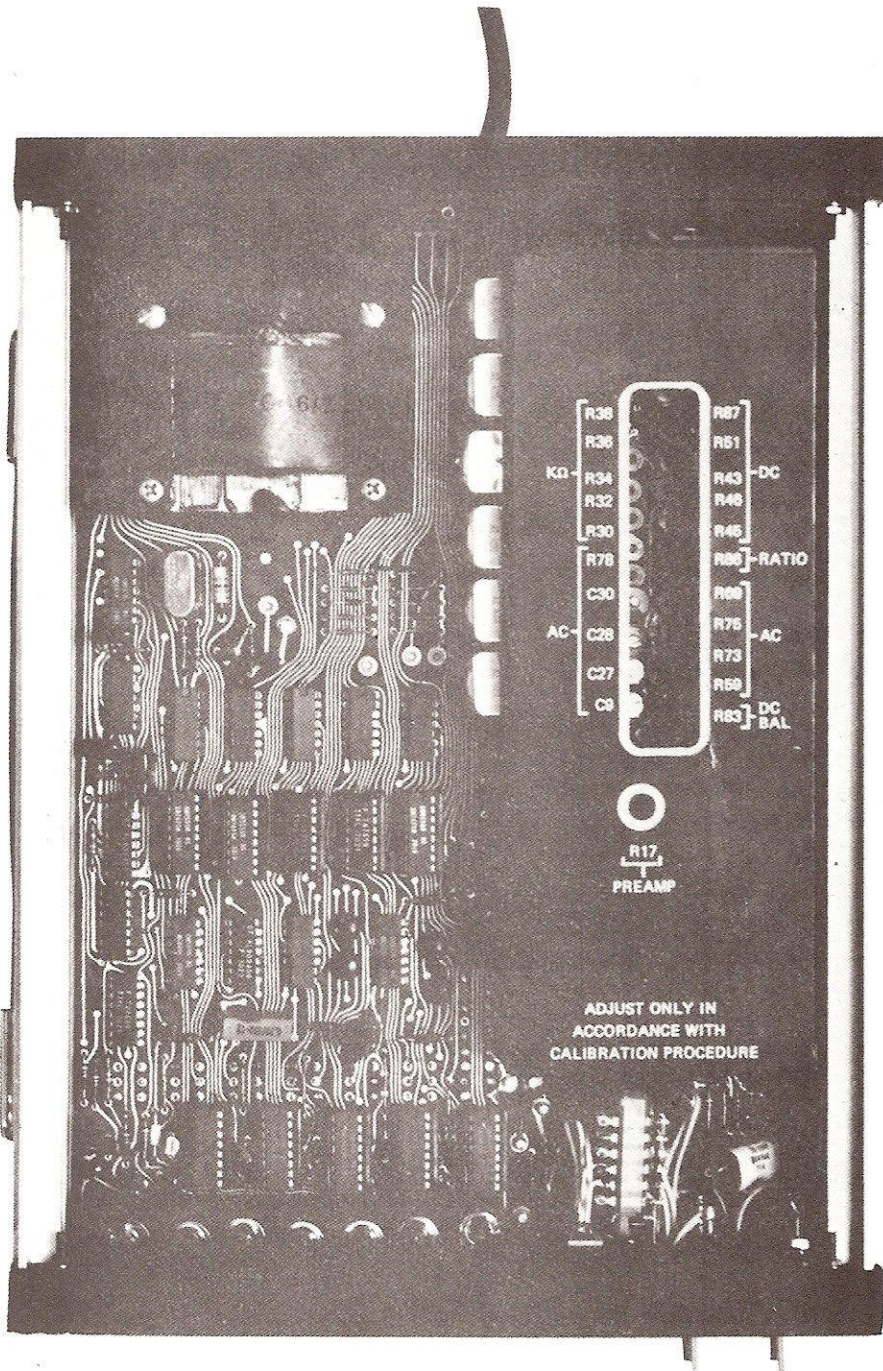


Figure 3-1. Series 2000 DMM Interior Showing Access to Adjustments

3.6 DC VOLTAGE MEASUREMENT MODE

Depress "ON" switch; wait one hour for calibration.

a. Zero Adjust: R45, R46

1. Set range to 10V Full Scale
2. Select DC Volts mode
3. Connect (approx.) 10 megohm resistance across input Vx
4. Adjust R45 for +0.00000 display value
5. Connect shorting bar across input Vx
6. Adjust R46 for +0.00000 display value
7. Repeat steps 3. through 6. as necessary

b. Balance Adjust: R83

1. Set Range to 1V Full Scale
2. Apply approximately 1V to input Vx
3. Read display. Record
4. Reverse input polarity. Record. Compare with step 3. above
5. Adjust R83 until values of 3. and 4. are exactly same on display
6. Repeat steps 3. through 5. as necessary

c. Reading Adjustments

For each full scale range, apply positive full scale voltage and adjust the appropriate potentiometer for full scale value on the display.

Set F.S. Range to	Adjust	To Read
1) 1-Volt Range	R87	+1.00000
2) 10-Volt Range	R51	+10.0000
3) 100-Volt Range	R43	+100.000

3.7 RESISTANCE MEASUREMENT MODE

Turn unit "ON." Depress kΩ mode switch.

NOTE

Calibration is accomplished using the 4-wire resistance set-up (Figure 2-4). Adjust until display reads known value of resistor.

Set F.S. Range to	Range Switch	Connect R Value of ohms	Adjust	For Reading of
1 k ohm	1	1.00000 k	R30	1.00000
10 k ohm	10	10.0000 k	R32	10.0000
100 k ohm	100	100.000 k	R34	100.000
1,000 k ohm	1k	1.00000 M	R38	1000.00*
10,000 k ohm	10k	10.000 M	R36	10000.0*

\*Noise may obliterate last decade.

3.8 AC VOLTAGE MEASUREMENT MODE

NOTE

Connect LO voltage input to Guard. Check signal source to assure that it is free of harmonics.

a. Select AC-Volt Mode

b. Zero Adjust: R59

1. Select 100V full scale range
2. Connect shorting bar across Vx
3. Adjust R59 for display reading of 000.000

c. Low Frequency Full Scale Adjustments

At a frequency of approximately 100 Hz, apply the designated voltage to terminals Vx, and adjust the appropriate calibrating potentiometer for the indicated display reading.

Set F.S. Range to	Apply VRMS to Vx	Adjust	To Read
1V	1.00000	R69	1.0000
10V	10.0000	R73	10.000
100V	100.000	R75	100.00
1000V	500.00	R78	0500.0

d. High Frequency Full Scale Adjustments

Change frequency of signal generator to approximately 50 kHz, apply the designated voltage to terminals Vx, and adjust the designated calibrating adjustment for the designated display reading. Use insulated H.F. type tweaking tool.

Set F.S. Range to	Apply VRMS to Vx	Adjust	To Read
1000V	0200.00	C9	0200.0
100V	100.000	C30	100.00
10V	10.0000	C28	10.000
1V	1.00000	C27	1.0000

3.9 RATIO DC VOLTAGE MEASUREMENT MODE

a. Select DC voltage mode at the front panel and push the RATIO button at the rear panel.

b. Apply full scale (+10V DC) simultaneously to the Vx input and to the Rx input in parallel to front panel.

c. Adjust calibrating potentiometer R86 for a reading of +10.0000.

3.10 POST-CALIBRATION

As calibration is completed, enter date below and initial. Turn off power. Reassemble unit by replacing cover.

CALIBRATION RECORD

Date	Calibrated By (Name)	Date	Calibrated By (Name)