



OPERATING AND SERVICE MANUAL

-hp- Part No. 00427-90004

MODEL 427A VOLTMETER

Serials Prefixed: 947-

Appendix C, Manual Backdating Changes,
adapts manual to serials prefixed 550-, 621-, 731-

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Figure 1-1. Model 427A Voltmeter

Table 1-1. Specifications

DC VOLTMETER

Voltage Ranges: ± 100 mV to ± 1000 V full scale in a 1, 3, 10 sequence (9 ranges).

Accuracy: $\pm 2\%$ of full scale on any range (0°C to 50°C).

Input Resistance: 10 megohms on all ranges.

AC Rejection: Superimposed peak ac voltages (60 Hz and above) 100 times greater than full scale affects reading less than 1%. Maximum 450 volts peak.

Overload: 1200 Vdc on any range.

AC VOLTMETER

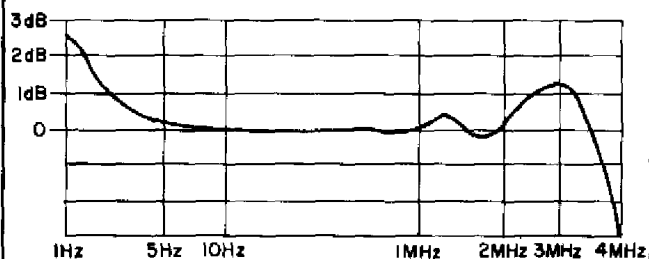
Voltage Ranges: 10 mV to 300 V rms full scale in a 1, 3, 10 sequence (10 ranges).

Frequency Range: 10 Hz to 1 MHz.

Accuracy: (0°C to 50°C).

RANGE	$\pm 2\%$ OF FULL SCALE
0.01 V - 30 V	10 Hz - 1 MHz
100 V - 300 V	10 Hz - 100 KHz

Frequency Response:



Frequency response 10 mV to 30 V ranges.

AC VOLTMETER (Cont'd)

Input Impedance: 10 megohms shunted by 40 pF on 10 mV to 1 V ranges; 20 pf on 3 V to 300 V ranges.

Response: Responds to the average value of the input; calibrated in rms volts for a sine wave input.

Overload: 300 V/rms momentarily, 1 V range and below.
425 V/rms maximum above 1 V range.

OHMMETER

Resistance Ranges: 10 ohms center scale to 10 megohms center scale (7 ranges).

Accuracy: $\pm 5\%$ of reading at midscale (0°C to $+50^\circ\text{C}$).

Polarity: Common terminal negative.

Source Current:

RANGE	OPEN CIRCUIT VOLTAGE	SHORT CIRCUIT CURRENT
X10	0.1 V	10 mA
X100	0.1 V	1 mA
X1K	1 V	1 mA
X10K	1 V	100 μA
X100K	1 V	10 μA
X1M	1 V	1 μA
X10M	1 V	0.1 μA

GENERAL

Floating Input: May be operated up to 500 Vdc above ground. (Ohms input open in any function except ohms--volts input open when instrument is in off position.)

Power: 22-1/2 volt dry cell battery. (Eveready No. 763 or RCA VS102.)

Option 01: Battery operation and ac line operation (selectable on rear panel). 115 or 230 V $\pm 20\%$, 50 Hz to 400Hz, 1/2 W.

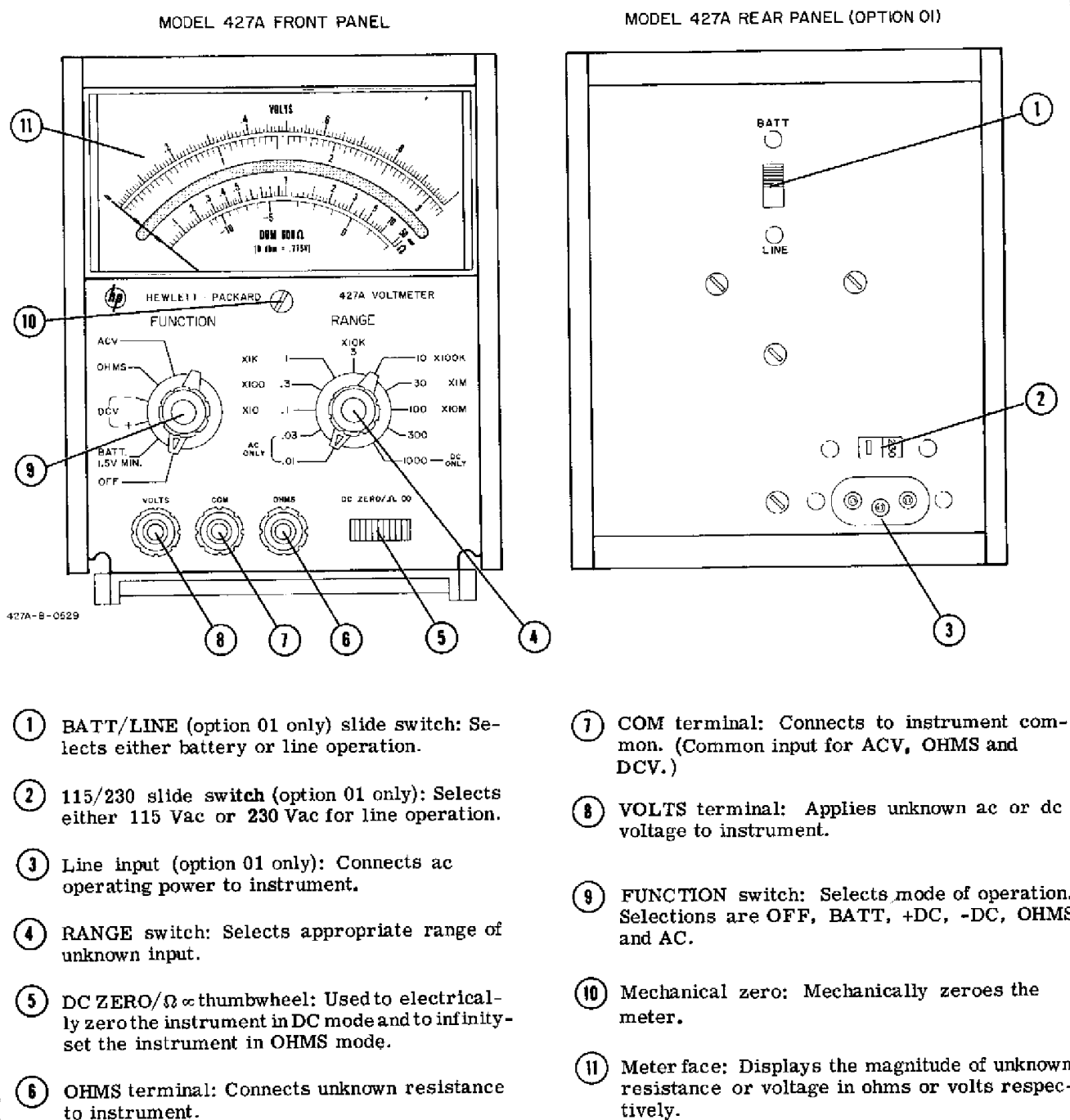


Figure 3-1. Location of Front Panel Controls and Indicators

- c. Connect the unknown resistance across the OHMS and COM terminals. Read the resistance value on the ohms scale.

————— NOTE —————

For best accuracy, select an ohms range that will place the meter pointer near the center of the scale.

3-13. AC MEASUREMENTS.

3-14. The Model 427A responds to the average value of the ac input and is calibrated in rms volts for a sine wave input. Since the average value and the rms value of a non-sinusoidal signal are different, any distortion on the input will affect the accuracy of the reading. Table 3-1 shows the effect of harmonic distortion on a reading.

————— NOTE —————

The following table is universal in application since these errors are inherent in all average-responding voltmeters. The error shown above may vary with the phase relationship between the harmonic and fundamental.

Table 3-1. Effects of Harmonic Distortion

INPUT VOLTAGE CHARACTERISTICS	TRUE RMS VALUE	METER INDICATION
Fundamental = 100	100	100
Fundamental + 10% second harmonic	100.5	100
Fundamental + 20% second harmonic	102	100 - 102
Fundamental + 50% second harmonic	112	100 - 110
Fundamental + 10% third harmonic	100.5	96 - 104
Fundamental + 20% third harmonic	102	94 - 108
Fundamental + 50% third harmonic	112	90 - 116

3-15. Use the following steps to make an ac measurement.

- a. Rotate FUNCTION switch to ACV.

————— NOTE —————

With the input shorted, there may be a zero offset of about two minor divisions. This is caused by the bias current through the meter bridge and does not affect the accuracy of ac measurements as the meter moves upscale.

- b. Rotate RANGE switch to approximate range of input voltage.



DO NOT APPLY MORE THAN 425V RMS WHEN THE INSTRUMENT IS ON RANGES ABOVE 3, OR MORE THAN 300V RMS ON RANGES BELOW 3.

- c. Connect the signal to be measured to the VOLTS and COM terminals and read the magnitude on the voltage scale.

3-16. DB MEASUREMENTS.

- a. Making a dB or dBm measurement is essentially the same as making an ac voltage measurement. Follow the steps in Paragraph 3-13, but read the magnitude on the dB scale.
- b. The 1 volt position of the RANGE switch is the 0 dBm range. Each position above 1 volt is a 10 dB increase, and each position below 1 volt is a 10 dB decrease. Table 3-2 lists the dB value of each range.

Table 3-2. DB Range Identification

RANGE	DB	RANGE	DB
300	+50	1	0
100	+40	0.3	-10
30	+30	0.1	-20
10	+20	0.03	-30
3	+10	0.01	-40

- c. A given dB reading is equal to the algebraic sum of the range and the meter reading. For example, if the meter reading were -6 and the instrument were on the 10 volt (+20 dB) range, the final reading would be 20 dB - 6 dB = 14 dB.
- d. The 427A meter is calibrated in dBm. 0 dBm is equivalent to 0.775 volt dropped across a 600Ω load. Consequently, any dBm measurements must be made across a total impedance of 600Ω. Measurements across other impedances will be in dB, not dBm.
- e. To convert a dB reading to dBm, use the Impedance Correction Graph (Figure 3-2). For example, to convert a +30 dB reading made across a 50Ω load to dBm, locate the 50Ω load impedance on the bottom of the graph. Follow the impedance line to the heavy black line and read the meter correction at that point. The correction for 50Ω is +10.5 dBm, and the corrected reading is +40.5 dBm.

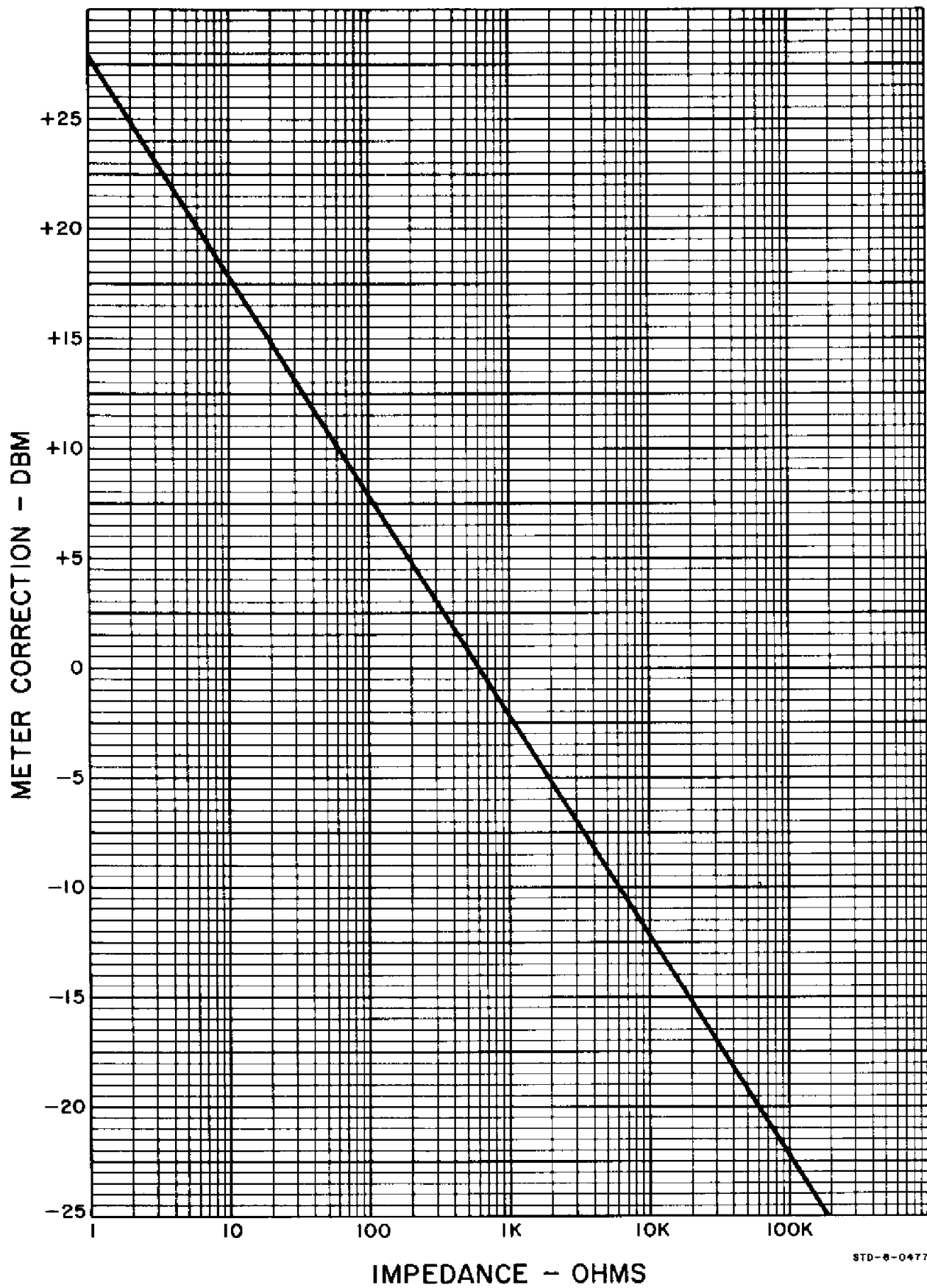
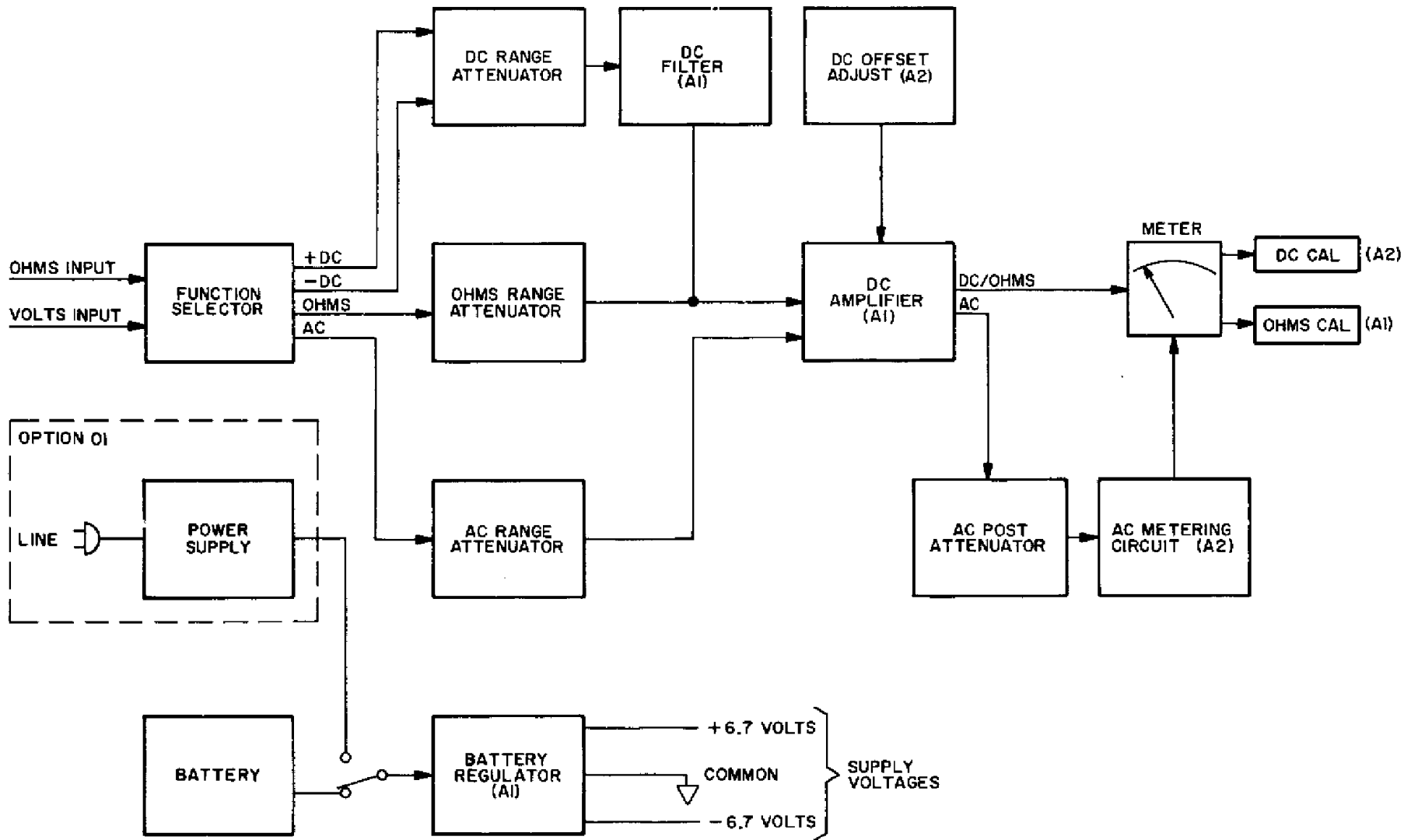


Figure 3-2. Impedance Correction Graph



427A-ROA

Figure 4-1. Simplified Block Diagram