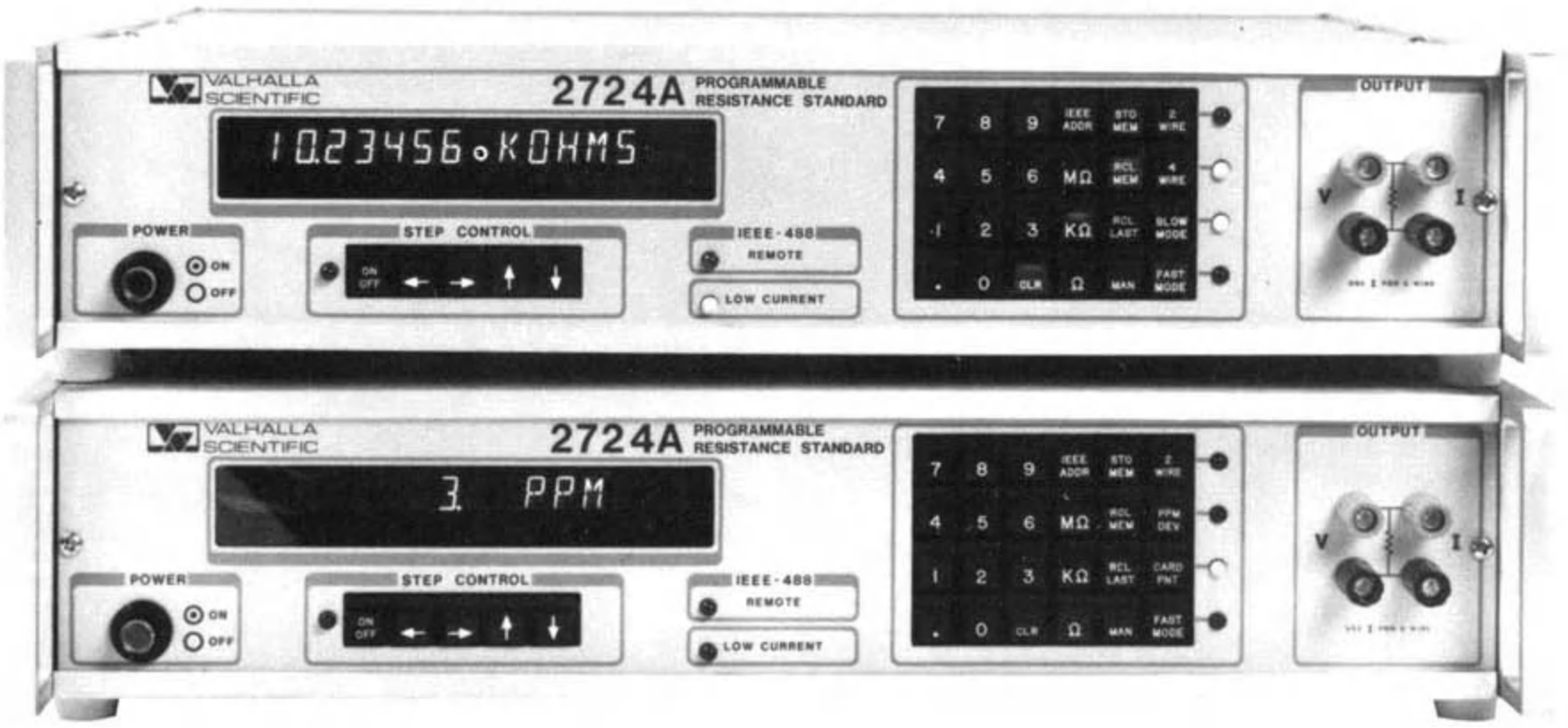
GPIB



The 2724 A-1 PPM Resolution, Fully Variable Programmable Resistance Standard

Valhalla's 2724A Programmable Precision Resistance Standard has created a whole new "State-of-the-Art" in resistance calibration methodology. Valhalla has the first and only fully variable, microprocessor based resistance synthesizer in the world. At last, metrologists are free from the hit and miss approach of calibrating resistance at discrete cardinal points only and can now test full resistance linearity in increments as low as 1 PPM either manually or over the GPIB. Don't be fooled by products that look like Valhalla's 2724A High Resolution Resistance Standard; unless you can actually increment the output it's probably just a whale's tale.

The 2724A provides over 10 million lab standard resistance values ranging from 100 micro-ohm increments on the 120 ohm full scale range up to 11 gigohms maximum output. This vast array of precision resistance is made possible through the 2724A's synthesized output format which has been exhaustively field tested for full compatibility with virtually all types of digital and analog multimeters and ohmmeters. The 2724A is also ideal for automatic in-circuit precision resistance substitution.

2PPM/10PPM 24 Hour and 1 Year Stability

The 7ppm basic accuracy of the 2724A is good, good enough to calibrate resistance on virtually all 4½, 5½, and 6½ digit multimeters, even after one full year. However, the inherent stability and digital setability of the 2724A is so great that the 2724A can be calibrated to local standards to provide traceable accuracy good enough to calibrate the best 7½ digit DMMs available.

Covers On "Auto-Cal" With Built-In Diagnostics

The 2724A is fully loaded with user conveniences. To start with, calibration of the 2724A is accomplished with the covers on via front panel data entry or over the GPIB. Calibration correction data is stored in NOVRAM memory and is fully protected from unauthorized entry via a rear panel mounted calibration keylock switch. Extensive diagnostics capability is standard on the 2724A including a full accompaniment of user prompting error codes which assist in fault diagnosis to the assembly or component level.

2-Wire/4-Wire, Fast or Filtered

All are standard operating modes available on the 2724A. True four wire input is recommended on DVM's having this facility to totally eliminate lead wire resistance errors. The two wire compensation mode is available as a calibration constant to eliminate internal two wire resistance errors or even a prescribed amount of lead resistance. In the fast mode, the 2724A is capable of synthesizing resistance at frequencies up to 3KHz. The filtered mode provides maximum resolution and accuracy with a minimum amount of noise.

Option "CPR"

For applications requiring the utmost accuracy and full compatibility with spiking and switching type current sources (i.e., JF 8502A) the option "CPR" is recommended. "CPR" stands for cardinal point resistance and is available in decade values from 100 ohms to 10 megohms. The "CPR" option includes UUT error computation capability as displayed on the lower of the two units shown above. Maximum current sink capability is reduced to 15 mA in the active mode with CPR installed.

Specifications

GPIB

Accuracies below are relative to NBS traceable standards and are valid at ± 5°C from calibration temperature within 15°C to 30°C.

2724A Standard Mode Operation

Resistance (Ohms)	Current Min.	Current Max.	Accuracy (for 90 days ± 5°C)	Stability (DC to 1Hz) 24 Hr.	Stability (DC to 1Hz) 1 Year	Temperature Coefficient (ppm/°C)	Settling Time (seconds) Change in Current	Settling Time (seconds) Change in Value
0 to 120	500uA	120mA	7ppm + 2mΩ	2ppm	10ppm	1.5	2	2
120 to 1.2K	50uA	12mA	7ppm + 7mΩ	2ppm	10ppm	1.5	2	2
1.2K to 12K	5uA	1.2mA	7ppm + 50mΩ	2ppm	10ppm	1.5	2	2
12K to 120K	500nA	120µA	7ppm + 500mΩ	2ppm	10ppm	1.5	2	2
120K to 1.2M	50nA	12µA	12ppm + 5Ω	2ppm	10ppm	3	2	2
1.2M to 12M	5nA	1.2µA	20ppm + 50Ω	2ppm	15ppm	5	3	2
12M to 120M	500pA	120nA	40ppm + 1KΩ	500Ω	50ppm	15	4	2
120M to 1.2G	50pA	12nA	0.1% + 50KΩ	50KΩ	0.05%	15	6	3
1.2G to 11G	5pA	1.2nA	0.1% + 5MΩ	5MΩ	0.05%	15	15	5

2724A Fast Mode Operation

Resistance (Ohms)	Current pk. max.	One Year Absolute Accuracy (Ohms)	Temperature Coefficient (Ohms/°C)	Settling Time (milliseconds) Change in Current	Settling Time (milliseconds) Change in Value	0.05% Error Frequency
0 to 120	120mA	0.04	0.006	0.1	5	3KHz
120 to 1.2K	12mA	0.4	0.06	0.1	5	3KHz
1.2K to 12K	1.2mA	4	0.6	0.1	5	3KHz
12K to 120K	120µA	40	6	0.2	5	2KHz
120K to 1.2M	12µA	400	60	1	5	500Hz
1.2M to 12M	1.2µA	6K	600	10	10	50Hz
12M to 120M	120nA	60K	6K	500	100	—
120M to 1.2G	12nA	600K	60K	5 Sec.	2 Sec.	—
1.2G to 11G	1.2nA	6M	600K	15 Sec.	5 Sec.	—

2724A CPR Mode Operation

Resistance (Ohms)	Current Max.	Accuracy (for 90 days ± 5°C)	Stability (DC to 1Hz) 24 Hr.	Stability (DC to 1Hz) 1 Year	Temperature Coefficient (ppm/°C)	Settling Time (milliseconds) Fast Mode	Settling Time (milliseconds) Std. Mode
100	120mA	7ppm + 2mΩ	2ppm	10ppm	1.5	0.1	100
1K	12mA	7ppm + 7mΩ	2ppm	10ppm	1.5	0.1	100
10K	1.2mA	7ppm + 50mΩ	2ppm	10ppm	1.5	0.1	100
100K	120µA	7ppm + 500mΩ	2ppm	10ppm	1.5	0.1	100
1M	12µA	12ppm + 5Ω	2ppm	10ppm	3	0.3	1 Sec.
10M	1.2µA	20ppm + 50Ω	2ppm	15ppm	5	3	5 Sec.

Output Configuration: 2-wire/4-wire, front and rear terminals standard.

Leakage Current: ± 2pA ± 0.2pA/°C.

Resolution: 0.8ppm standard, 1ppm CPR, 8ppm fast mode

Power Coefficient: 0.15ppm/mW

Noise and Thermals: (DC to 10Hz, 4-terminal)
CPR Mode ± 2uV Maximum
Standard Mode ± 4uV Maximum
Fast Mode ± 30uV Maximum
2 terminal mode ± 20uV Maximum

Maximum Input: 25V peak or 120mA (if option CPR installed 15mA max in active modes)

Operating Temperatures: 0°C to 50°C

Warm-up Time: 15 minutes to within 5ppm of final value

Size: 89mm H × 432mm W × 432mm D (3.5" × 17" × 17")

Weight: 8.2 Kg (18 lbs.) net, 11.4 Kg (25 lbs.) shipping

Power: 115/230 VAC ± 10%, 50-60Hz, 30 Watts

Ordering Information

Model 2724A	Precision Resistance Standard	$3,995.00
Option "CPR"	Cardinal Point Resistance Mode	195.00
Option "TL-1"	Talk/Listen GPIB Interface	395.00
Option "RX3"	Rack Mount Kit	30.00
Option "BBL"	Low Leakage Dual Banana Leads	25.00
Option "GP-1"	1 Meter GPIB Cable	95.00
Option "GP-2"	2 Meter GPIB Cable	115.00
Option "SP-2"	2 Year Spare Parts Kit	195.00
Option "M24"	Calibration Kit	345.00
Additional	Operation/Maintenance Manual	35.00