

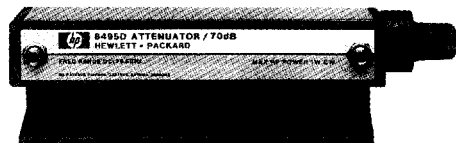
# MICROWAVE TEST ACCESSORIES

## Coaxial Step Attenuators

HP 355 Series, 8494/5/6/7 Series, 11716 Series

- Excellent repeatability
- Manual and programmable

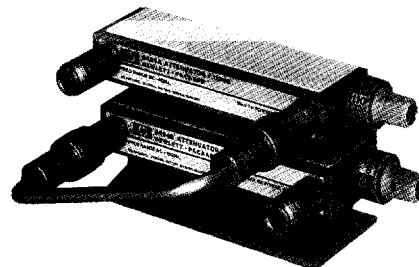
- Calibration data available
- Five million cycles per section reliability



HP 8495D



HP 8495K



HP 11716A

### DC to 1000 MHz Programmable and Manual Step Attenuators

#### HP 355C/D/E/F

- Precision attenuation from dc to 1000 MHz
- 355C/E provide 0 to 12 dB in 1 dB steps
- 355D/F provide 0 to 120 dB in 10 dB steps
- All standard models use standard BNC RF connectors
- Programmable models (E/F) use 7-pin connectors

### DC to 4, 18, and 26.5 GHz Programmable and Manual Step Attenuators

#### HP 8494A/B/G/H (0 to 11 dB, 1 dB steps)

#### HP 8495A/B/D/G/H/K (0 to 70 dB, 10 dB steps)

#### HP 8496A/B/G/H (0 to 110 dB, 10 dB steps)

#### HP 8497K (0 to 90 dB, 10 dB steps)

Hewlett-Packard attenuators offer exceptional repeatability and reliability in a wide range of attenuation, frequency, and connector options.

- SMA (f), Type-N (f), APC-7 and 3.5 mm RF connectors
- DC to 4 GHz, dc to 18 GHz, and dc to 26.5 GHz models
- Permanent magnet latching design and automatic dc current interrupts simplify programmable model drive circuit design

Each attenuator contains three or four cascaded attenuator sections; edge-line contacts insert and remove attenuator sections as needed. Precision gold-plated leaf springs ensure long life (over 5 million cycles) and very high attenuator repeatability (typically 0.01 dB). Programmable models (G, H, and K suffixes) feature fast-switching solenoids; attenuation programming is done through a 12-pin connector.

To improve measurement accuracy in manual and automated test systems, NIST traceable calibration data (SWR and attenuation) is available as Option 890. Generated on an HP 8510 network analyzer, this option offers swept data for each attenuator step in 250 MHz steps from 1500 MHz to 26.5 GHz (upper frequency varies by model).

To simplify connecting programmable attenuators to the drive circuit, each unit is supplied with a 5-ft cable assembly. With an HP 11713A attenuator driver, or an HP 70611 driver for MMS-based systems, the attenuators are easily integrated into a Hewlett-Packard Interface Bus (HP-IB) automated system.

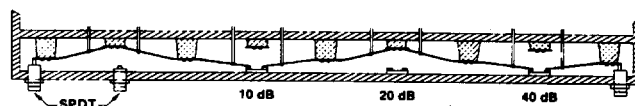


Figure 1. 70 dB plus SPDT.

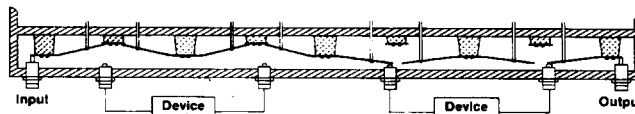


Figure 2. Dual transfer switch showing device #2 inserted in signal path.

### Custom Attenuator and Switch Combinations

Custom step attenuator/switch combinations are possible with the HP 8494/5/6/7 attenuator family. Examples can be as simple as adding a SPDT switch section to a standard 70 dB attenuator (Figure 1) or creating a dual transfer switch (Figure 2).

### HP 11716A/B Attenuator Interconnect Kits

Quickly and conveniently connect 1 dB step and 10 dB step attenuators together to achieve greater dynamic range with 1 dB steps. The 11716A/B interconnect kits contain a rigid RF cable, mounting bracket, and necessary hardware to connect any pair of HP 8494/5/6/7 attenuators in series (see photo above). Attenuators must be ordered separately.

### Key Literature

*Microwave Test Accessories Catalog*, p/n 5091-4269E.

### Ordering Information

HP 11716A Interconnect Kit (Type-N)

HP 11716B Interconnect Kit (APC-7)

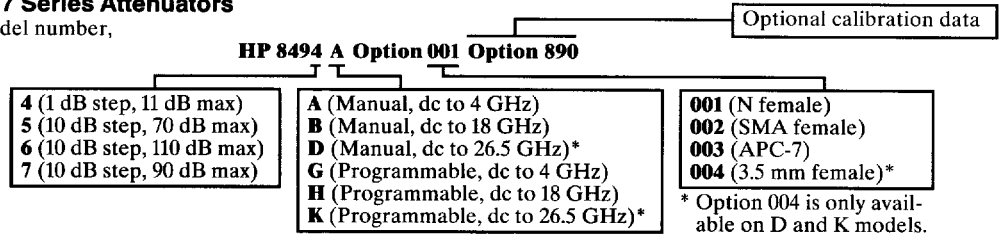
**Price**  
\$260  
\$420

# MICROWAVE TEST ACCESSORIES

## Ordering HP 355 Series and 8494/5/6/7 Series Attenuators

### How to Order the HP 8494/5/6/7 Series Attenuators

Each order must include basic model number, suffix letter, and connector option.



### HP 355 Series, 8494/5/6/7 Series Specifications

HP model (switching model)	Frequency range (GHz)	Incremental attenuation (dB)	SWR maximum (50 Ω nominal)	Insertion loss (0 dB setting)	Attenuation accuracy	Power rating, minimum life	Solenoid voltage speed power	Size, shipping weight	Connector options available	Price
355C (Manual)	dc to 1	0 to 12 1 dB steps	dc to 0.25 GHz: 1.2 dc to 0.5 GHz: 1.3 dc to 1.0 GHz: 1.5	0.11 dB + 1.39 dB/GHz	± 0.1 dB @ 1000 Hz ± 0.25 dB: dc to 0.5 GHz ± 0.35 dB: dc to 1.0 GHz	0.5 W avg 350 W peak 0.3 million cycles per section	—	67 mm H × 70 mm W × 152 mm D (2.6 in × 2.75 in × 6 in)	BNC (f) See Note 1	\$905
355E (Programmable)										15 to 18 V <65 ms 3.0 W
355D (Manual)	dc to 1	0 to 120 10 dB steps	dc to 0.25 GHz: 1.2 dc to 0.5 GHz: 1.3 dc to 1.0 GHz: 1.5	0.11 dB + 1.39 dB/GHz	± 0.3 dB @ 1000 Hz ± 1.5 dB to 90 dB, and ± 3 dB to 120 dB @ 1 GHz	0.5 W avg 350 W peak 0.3 million cycles per section	—	67 mm H × 70 mm W × 152 mm D (2.6 in × 2.75 in × 6 in)	BNC (f) See Note 1	\$905
355F (Programmable)										15 to 18 V <65 ms 3.0 W
8494A (Manual)	dc to 4	0 to 11 1 dB steps	1.5	0.6 dB + 0.09 dB/GHz	± 0.2 dB: 1 to 2 dB ± 0.3 dB: 3 to 6 dB ± 0.4 dB: 7 to 10 dB ± 0.5 dB: 11 dB	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 159 mm D (1.7 in × 2.9 in × 6.2 in)	001 002 003 See Note 2	\$715
8494G (Programmable)										20 to 30 V <20 ms 2.7 W
8494B (Manual)	dc to 18	0 to 11 1 dB steps	dc to 8 GHz: 1.5 dc to 12.4 GHz: 1.6 dc to 18 GHz: 1.9	0.6 dB + 0.09 dB/GHz	dc to 12.4 GHz ± 0.3 dB: 1 to 2 dB ± 0.4 dB: 3 to 4 dB ± 0.5 dB: 5 to 6 dB ± 0.6 dB: 7 to 10 dB ± 0.7 dB: 11 dB dc to 18 GHz ± 0.7 dB: 1 to 5 dB ± 0.8 dB: 6 to 9 dB ± 0.9 dB: 10 to 11 dB	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 159 mm D (1.7 in × 2.9 in × 6.2 in)	001 002 003 See Note 2	\$1,030
8494H (Programmable)										20 to 30 V <20 ms 2.7 W
8495A (Manual)	dc to 4	0 to 70 10 dB steps	1.35	0.4 dB + 0.07 dB/GHz	± 1.7% of setting or ± 0.4 dB, whichever is greater	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 130 mm D (1.7 in × 2.9 in × 5.1 in)	001 002 003 See Note 2	\$600
8495G (Programmable)										20 to 30 V <20 ms 2.7 W
8495B (Manual)	dc to 18	0 to 70 10 dB steps	dc to 8 GHz: 1.35 dc to 12.4 GHz: 1.5 dc to 18 GHz: 1.7	0.4 dB + 0.07 dB/GHz	± 3%: dc to 12.4 GHz ± 4%: dc to 18 GHz % in dB from Atten. Setting	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 130 mm D (1.7 in × 2.9 in × 5.1 in)	001 002 003 See Note 2	\$765
8495H (Programmable)										20 to 30 V <20 ms 2.7 W
8495D (Manual)	dc to 26.5	0 to 70 10 dB steps	dc to 6 GHz: 1.25 6 to 12.4 GHz: 1.45 12.4 to 18.0 GHz: 1.6 18.0 to 26.5 GHz: 1.8	0.4 dB + 0.09 dB/GHz	± 0.3 dB at 6 GHz 10 dB attenuation to ± 2.8 dB at 26.5 GHz 90 dB attenuation.	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 52 mm W × 159 mm D (1.7 in × 2.1 in × 6.2 in)	004 3.5 mm See Note 2	\$990
8495K (Programmable)										20 to 30 V <20 ms 2.7 W
8496A (Manual)	dc to 4	0 to 110 10 dB steps	1.5	0.6 dB + 0.09 dB/GHz	± 1.7% of setting or ± 0.4 dB, whichever is greater	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 159 mm D (1.7 in × 2.9 in × 6.2 in)	001 002 003 See Note 2	\$715
8496G (Programmable)										20 to 30 V <20 ms 2.7 W
8496B (Manual)	dc to 18	0 to 110 10 dB steps	dc to 8 GHz: 1.5 dc to 12.4 GHz: 1.6 dc to 18 GHz: 1.9	0.6 dB + 0.09 dB/GHz	± 3%: dc to 12.4 GHz ± 4%: dc to 18 GHz % in dB from Atten. Setting	1 W avg 100 W peak 10 μs max 5 million cycles per section	—	43 mm H × 73 mm W × 159 mm D (1.7 in × 2.9 in × 6.2 in)	001 002 003 See Note 2	\$1,050
8496H (Programmable)										20 to 30 V <20 ms 2.7 W
8497K (Programmable)	dc to 26.5	0 to 90 10 dB steps	dc to 6 GHz: 1.25 6 to 12.4 GHz: 1.45 12.4 to 18.0 GHz: 1.6 18.0 to 26.5 GHz: 1.8	0.6 dB + 0.09 dB/GHz	± 0.3 dB at 6 GHz 10 dB attenuation to ± 2.8 dB at 26.5 GHz 90 dB attenuation.	1 W avg 100 W peak 10 μs max 5 million cycles per section	5 V or 24 V	43 mm H × 52 mm W × 143 mm D (1.7 in × 2.1 in × 5.6 in)	004 3.5 mm See Note 2	\$1,465
Option 890 Calibration data		Option 890 frequency list (MHz) DC to 4 GHz models: 100, 300, 500, 700, 900, 1000, 1250, 1500, 1750, 2000, 2500, 3000, 3500, 4000. DC to 18 GHz models: Same as above to 4000 MHz, every 500 MHz to 16000 (plug 12400 MHz), every 250 MHz from 16000 to 18000.				DC to 26.5 GHz models: every 500 MHz 2 to 16 GHz, every 250 MHz 16 to 26.5 GHz.		Models 8494A/G, 8496A/G 8495A/G  8494B/H, 8496B/H 8495B/H 8495D/K, 8497K		Option 890 + \$26 + \$26  + \$36 + \$36 + \$51
Note 1: 355C/D/E/F connector options (BNC (f) standard): Option 001 N(f) Option 005 TNC(f) Option 007 Transistor protection (355E/F only)				Price + \$36 + \$36 + \$66	Note 2: 8494/5/6/7 orders must specify connector option. See ordering example above. Option 001 N(f) Option 002 SMA(f) Option 003 APC-7 Option 004 3.5 mm (HP 8495D/K, 8497K only)				Price N/C N/C \$170-315 N/C	

☎ For off-the-shelf shipment, call 800-452-4844.

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 691.

