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## Accessories Available

The following accessories are available and may have been ordered with the HP 4934A:

|           |  |
|-----------|--|
| HP 18182A | 1.5m (60-inch) test cord with a 310 male connector and alligator clips.                        |
| HP 15678A | 19-inch rack mount kit.  |
| HP 15677A | Ladder bracket.  |
| HP 18134A | Soft vinyl carrying case with handles and shoulder strap and space for manuals and test cords. |

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## Specification

Except where otherwise stated the following parameters are warranted performance specifications. Parameters described as "typical" or "normal" are supplemental characteristics which provide a useful indication of the typical, but non-warranted, performance characteristics.

Measurement methods meet IEEE Std 743-1984

### Transmitter Frequency

| Range          | Resolution | Accuracy      |
|----------------|------------|---------------|
| 20 to 99999 Hz | 1 Hz       | $\pm 50$ ppm  |
| 100 to 110 kHz | 10 Hz      | $\pm 120$ ppm |

### Receiver Frequency

| Range         | Resolution | Accuracy     |
|---------------|------------|--------------|
| 20 to 9999 Hz | 1 Hz       | $\pm 0.5$ Hz |
| 10 to 110 kHz | 10 Hz      | $\pm 5$ Hz   |

### Additional Transmitter Functions

**SF Skip:** Transmitter skips  $2600 \pm 150$  Hz.

**Four Pre-set Frequencies:** Normally 404, 1004, 2804 and 2713 Hz.

User can temporarily change these and the SF Skip center frequency.

### Transmitter Level

**Range:** -40 to +13 dBm.

**Resolution:** 0.1 dB.

**Accuracy at 1004 Hz, 0 to -19 dBm:** Typically  $\pm 0.1$  dB.

**Flatness (dB relative to 1004 Hz):**

| Level<br>(dBm) | Frequency (Hz) |        |        |        |        |      |
|----------------|----------------|--------|--------|--------|--------|------|
|                | 20             | 200    | 15k    | 60k    | 25k    | 110k |
| +10 to +13     | +1 - 2.5*      | ± 0.2* | ± 0.5* | ± 0.7* | ± 1.5* |      |
| -40 to +10     | ± 1.0          | ± 0.2  | ± 0.5  | ± 0.5  | ± 1.5* |      |

\*Typical

Distortion (dB down from fundamental):

| Level<br>(dBm) | Frequency (Hz) |        |        |      |
|----------------|----------------|--------|--------|------|
|                | 30             | 100    | 4k     | 110k |
| < +13          | 20 typ         | 45 typ | 40 typ |      |
| < +10          | 20 typ         | 55     | 40     |      |
| < 0            | 40 typ         | 50     | 40     |      |
| < -30          | 40 typ         | 50     | 40 typ |      |

At 1004 Hz, 0 dBm: THD typically > 65 dB down from fundamental.

### Receiver Level

Range: -60 to +13 dBm.

Resolution: 0.1 dB.

Detector type: Average.

Accuracy (dB):

| Level<br>(dBm) | Frequency (Hz) |        |        |        |        |        |      |
|----------------|----------------|--------|--------|--------|--------|--------|------|
|                | 20             | 50     | 200    | 15k    | 60k    | 25k    | 110k |
| +13 to -40     | ± 1.0          | ± 0.5  | ± 0.2  | ± 0.5  | ± 0.5  | ± 2.0* |      |
| -40 to -60     | ± 1.0*         | ± 0.6* | ± 0.4* | ± 0.8* | ± 1.0* | ± 2.0* |      |

\*Typical

At 1004 Hz, -20 to +10 dBm: ± 0.1 dB.  
Receiver accuracy is specified from 500 Hz when using the 135 or 150Ω terminations.

### Message Circuit Noise

RECEIVER (Transmitter: off and terminated).

Range: 0 to 100 dBm (135 & 150Ω: 7 to 100 dBm).

Resolution: 1 dB.

Detector Type: Quasi-RMS.

Accuracy: ± 1 dB from 10 to 100 dBm, ± 3 dB from 0 to 10 dBm.

Filters: C-Message, 3 kHz Flat, 15 kHz Flat, Program, 50 kbit.

### Noise-with-Tone

RECEIVER (Transmitter: 1004 Hz tone).

Notch Filter: > 50 dB rejection from 995 to 1025 Hz.

Range (at 600, 900 and 1200Ω): 10 to 100 dBm.

Resolution: 1 dB.

Accuracy: ± 1 dB from 20 to 100 dBm, ± 3 dB from 10 to 20 dBm.

Detector Types (noise): Quasi-RMS; (tone): Average.

Filters: C-Message, 3 kHz Flat, 15 kHz Flat, Program, 50kbit.

### Signal-to-Noise Ratio

RECEIVER (Transmitter: 1004 Hz tone).

Signal Level Range (600, 900 and 1200Ω): -40 to +10 dBm.

Ratio Range: 10 to 45 dB.

Ratio Resolution: 1 dB.

Accuracy (signal > -30 dBm), S/N 10 to 40 dB:

± 1 dB; S/N 40 to 45 dB: ± 2 dB.

Detector Types (noise): Quasi-RMS; (tone): Average.

### 3-Level Impulse Noise

TRANSMITTER C-Msg or 3 kHz Flat receive filter selected: 1004 Hz tone. Any other receive filter: off and terminated.

RECEIVER

Level Range: -40 to +10 dBm.

Notch Filter: > 50 dB rejection from 995 to 1025 Hz.

Threshold Ranges (at 600Ω): Low 30 to 109 dBm, Mid and High 4 and 8 dB higher respectively, up to 109 dBm.

Threshold Accuracy for Threshold Above 40 dBm (threshold above 60 dBm for program filter): ± 1 dB.

Loss of Holding Tone: "-" sign in right display, latching.

Count Timer: Nominally 5, 15, 60 minutes or non-stop.

Count Range: 0 to 9999.

Max Count Rate: Nominally 8 per second.

### Noise-to-Ground

RECEIVER (Transmitter: off and terminated)

Range (600, 900 and 1200 $\Omega$ ): 50 to 130 dBm.

Resolution: 1 dB.

Accuracy:  $\pm 1.5$  dB.

Filters & Detector: See message circuit noise.

### P/AR

#### TRANSMITTER

Signal: 16 frequencies in range 140 to 3890 Hz.

Level Range: -40 to 0 dBm.

Resolution: 1 dB.

#### RECEIVER

P/AR Range: 0 to 120 units.

Resolution: 1 unit.

Accuracy (30 to 110 units):  $\pm 2$  units.

Level Range: -40 to +3 dBm RMS. (135 & 150 $\Omega$ :

-30 to +3 dBm RMS).

Resolution: 1 dB.

### General

Maximum DC Blocking: 200V nominal.

Impedances: Nominally 135, 150, 600, 900 and

1200 $\Omega$ . Transmit and receive impedances are independently selectable.

Receiver Return Loss (600, 900 and 1200 $\Omega$ : 50 Hz to 4 kHz): typically  $>30$  dB.

Bridging Loss (up to 20 kHz): Typically  $<0.2$  dB.

Longitudinal Balance (typical)  $>80$  dB at 60 Hz,  $>70$  dB at 540 Hz,  $>60$  dB up to 4 kHz.

decreasing at 6 dB per octave up to 20 kHz.

Hold Circuits: 2, each drawing 23 mA nominal.

AC Power Requirement: Nominally 90 to 126 V RMS, 48 to 66 Hz, 20VA max.

Battery Supply (Option 001): Nominally 6 hours (4 hours minimum) operation at 25°C. Complete recharge typically in 14 hours with unit in standby mode.

Temperature Range (without batteries)

Operating: 0°C to +50°C;

Storage: -40°C to +75°C.

Temperature Range (with batteries),

Operating: 0°C to +40°C;

Storage: -20°C to +55°C.

Dimensions (including handle): 105 mm high.

280 mm wide, 355 mm deep (4.1 in x 11.0 in x 14.0 in).

Weight (without batteries): 3.7 kg (8.2 lb).

Weight (with batteries): 5.0 kg (11.0 lb).

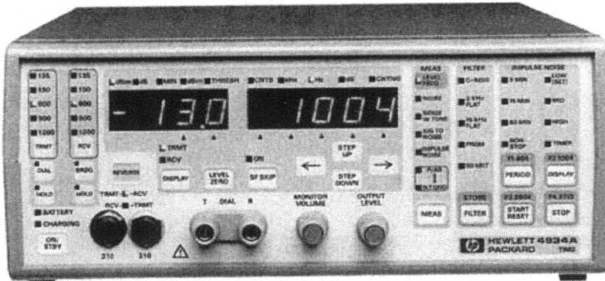
# DATA COMMUNICATIONS TEST EQUIPMENT

## Transmission Impairment Measuring Sets (TIMS)

HP 4934A, 4935A, 4935S, 4936A, 4947A, 4948A

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- Complete analog testing to North American and CCITT standards
- Testing of voice-grade data circuits, program circuits, metallic digital circuits



HP 4934A

### HP 4934A TIMS

The HP 4934A transmission impairment measuring set (TIMS) increases installation and maintenance productivity for telephone companies and service providers through its ease of use, portability, and ruggedness. Hewlett-Packard offers versions of the HP 4934A that perform measurements to either IEEE 743 or CCITT specifications, including:

- Level/frequency up to 110 kHz
- Noise and noise-to-ground
- Noise-with-tone and signal-to-noise ratio
- 3-level impulse noise
- P/AR (North American version only)

Battery power is available as an option.

### HP 4947A TIMS

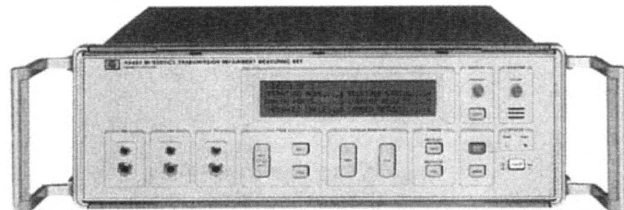
The HP 4947A is a full featured transmission impairment measuring set with HP-IB remote control for use in installation, maintenance, and manufacturing. The HP 4947A provides measurements to IEEE 743 (North American) standards, supplemented by a special option for a psophometric noise filter, and level/frequency to 5 kHz.

### HP 4935A/4936A TIMS

The HP 4935A/4936A transmission impairment measuring sets are rugged, portable test sets that provide the basic analog tests to isolate faults and to qualify circuits for voice, data, and broadcast services. The HP 4935A performs measurements compatible with the Bell (BSTR 41009) and IEEE (IEEE 743-1984) standards. The HP 4936A is compatible with CCITT recommendations. The HP 4935S data transmission test system consists of the HP 4935A TIMS plus the HP 4925B bit error-rate test set.

The HP 4935A/4936A measure: Level, frequency, circuit noise, noise-with-tone, signal-to-noise ratio, 3-level impulse noise (quiet) (HP 4936A), 3-level impulse noise (quiet or tone) (HP 4935A), noise-to-ground (HP 4935A), and P/AR (HP 4935A option).

- Wide choice ranging from rugged portables to systems instruments, including unique in-service TIMS



HP 4948A

DESIGNED FOR  
HP-IB  
SYSTEMS

### HP 4948A In-Service TIMS

The HP 4948A transmission impairment measuring set provides unique in-service measurements (North American and CCITT) on voice-grade modem circuits using the live traffic signal. It is ideal for preventive maintenance and use in network monitoring systems. The HP 4948A measures:

- Level/frequency
- Signal-to-noise ratio
- Phase and amplitude jitter
- Dropouts, gain hits, phase hits
- Impulse noise
- Attenuation and delay distortion

### Ordering Information

**HP 4934A TIMS**, including front-panel cover, power cord, 2 HP 15513A test cords (with WECO 310 jack plugs)

**Price**  
\$2,790

**Opt 001** Battery Pack with Built-In Charger + \$300

**Opt 010** Delete Test Cords - \$100

**Opt J01** Replaces North American Features and Connectors with CCITT; 820 Hz Hold Tone; Deletes Test Cords + \$700

**Opt J02** same as J01, Except 1020 Hz Hold Tone + \$700

**HP 4947A TIMS** \$11,800

**Opt 908** 19-in. Rackmount Kit + \$41

**HP 4935A TIMS (North American)** \$3,830

**Opt 001** Rechargeable Batteries + \$380

**Opt 002** Add P/AR Measurement, Delete Noise-to-Ground + \$155

**Opt 003** Add Options 001 and 002 + \$465

**HP 4936A TIMS (CCITT)** \$4,880

**Opt 001** Include 820 Hz Tone, Add Rechargeable Batteries + \$535

**Opt 002** 1020 Hz Tone Replaces 820 Hz \$0

**Opt 003** Add Options 001 and 002 + \$535

**HP 4935S data transmission test system** + \$5,405

**Opt 001, 002, 003** Same as HP 4935A

**Opt 101** RS-232C/V.24 on HP 4925B + \$420

**Opt 102** V.35 Interface and 115 V Power Module (HP 18185A) on HP 4925B + \$620

**Opt 104** V.35 Interface and 220 V Power Module (HP 18194) on HP 4925B + \$660

**HP 4948A In-Service TIMS** \$13,690

**Opt 006** 14.4 kb/s V.33 Capability + \$1,010

**Opt 908** 19-in. Rack Mount Kit + \$35

**Accessories**

**HP 15513A** 1 m Cable, WECO 310 Jack Plug Each End \$62

**HP 18134A** Vinyl Carrying Case for HP 4934A, HP 4935A \$144

**HP 18182A** 1.5 m Cable, WECO 310 Jack Plug to Alligator Clips \$67