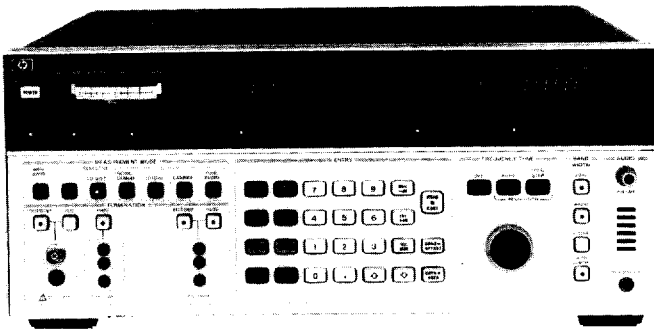


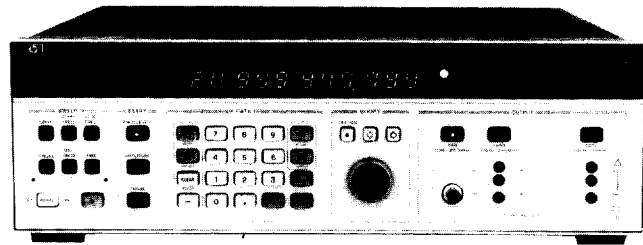
# TELECOMMUNICATIONS TEST EQUIPMENT

## Selective Level Meter and Synthesizer

Models 3586A/B & 3336A/B



HP 3586A Selective Level Meter (CCITT)



HP 3336A Synthesizer/Level Generator (CCITT)



### General

The HP 3586A/B Selective Level Meters and HP 3336A/B Tracking Synthesizers offer the high performance necessary to meet the demanding requirements in the design, manufacture, commissioning and maintenance of Frequency Division Multiplex (FDM) systems. The HP 3586 and HP 3336 "A" models meet CCITT requirements, and the "B" models meet North American (Bell) standards. Both are fully programmable over the HP Interface Bus. The HP 3586A & B Selective Level Meter provides a unique combination of features, including wideband power and optional telephone impairment measurement of impulse noise, phase jitter, noise with tone, and signal-to-noise with tone ratio. The HP 3586A & B's wide frequency coverage to 32.5 MHz allows measurements to be made at both voice channel and carrier frequencies. Microprocessor control adds many ease-of-use features such as amplitude offset measurements of tone and noise level in units of dBmO, dBmCO, or dBpWO. Convenience features include simultaneous analog and digital level displays, precise frequency setting with HP's fractional N synthesized local oscillator, accurate frequency counter and tone measurements with automatic channel alignment for 800 Hz (CCITT) or 1004 Hz (Bell) test tone or carrier frequency reference.

The HP 3336 A/B Synthesizer/Level Generator is an excellent precision tracking signal source for the HP 3586A and B Selective Level Meter. When the Selective Level Meter and Synthesizer are in the tracking mode, the frequency of the synthesizer is automatically set to the frequency of the SLM. Frequency coverage is 10 Hz to 20.9 MHz, making the HP 3336 A and B useful for telephone circuit loop testing on most FDM systems, transfer function and distortion measurements in telecommunications manufacturing.

### Carrier Frequency and Voice Channel

The HP 3586A & B can make both carrier frequency measurements to 32.5 MHz and voice channel measurements from 50 Hz to 100 kHz.

You can measure tone levels, idle channel noise or weighted noise at voice channel, then compare at carrier frequency.

### Transmission Impairments

The Transmission Impairments capability permits phase jitter, weighted noise, noise-with-tone, signal-to-noise-with-tone ratio, and single level impulse noise measurements. The HP 3586A's capability to make these transmission impairment measurements at both FDM voice channel and carrier frequencies is unique.

### Frequency and Amplitude Precision

The HP 3336 A/B provides frequency resolution of one microhertz (.000001 Hz) up to 100 kHz and one millihertz (.001 Hz) to 20.9 MHz. Level accuracy is  $\pm 1.5$  dB at full output over the full frequency range with  $\pm 1.2$  dB optional. Harmonic levels are more than 60 dB down up to 1 MHz and more than 50 dB down up to 20.9 MHz, performance not previously available in a synthesizer.

### FDM Testing

The flexible output section allows different connectors to be provided either by option or special request. Frequency entry is accomplished by keyboard or analog control for manual tuning or frequency stepping of any digit.

The Amplitude Blanking feature allows testing of operational FDM systems without disturbing adjacent channels while the frequency is changed. The output is blanked to less than  $-85$  dBm until the next desired frequency is reached.

### General Purpose Features

The HP 3336 A/B Synthesizer provides wide band sweep capability—sweep the full frequency range (or as little as two microhertz), log or linear, single or continuous. Single phase lock loop design means the sweep is phase continuous and you can modulate with AM to 50 kHz or PM to 5 kHz. Ten storage registers can be used to keep different test settings available for repetitive test. All necessary functions on the HP 3336 A/B can be remotely programmed by HP-IB control for automatic testing.

### Designed-In Serviceability

The HP 3586 A/B Selective Level Meter and the HP 3336 A/B Synthesizer/Level Generator have been designed for reliable operation and excellent accessibility with many useful service features.

### North American (Bell) and CCITT Requirements

The HP 3586A & B Selective Level Meter and HP 3336 A & B Synthesizer/Level Generator are designed to meet most world-wide connector and impedance requirements for both carrier and voice channel measurements. Special or regional connectors can be provided by option or special request.

### Input Configuration

#### CCITT Requirements

HP 3586A SLM	75 $\Omega$ /10 k $\Omega$ Unbalanced 150 $\Omega$ , 600 $\Omega$ /10 k $\Omega$ Balanced
HP 3336A Synthesizer	75 $\Omega$ Unbalanced 150 $\Omega$ , 600 $\Omega$ Balanced

#### North American (Bell) Requirements

HP 3586B SLM	75 $\Omega$ /10 k $\Omega$ Unbalanced 124 $\Omega$ , 135 $\Omega$ , 600 $\Omega$ /10 k $\Omega$ Balanced
HP 3336B Synthesizer	75 $\Omega$ Unbalanced 124 $\Omega$ , 135 $\Omega$ , 600 $\Omega$ Balanced

### Fully Programmable

HP-IB control is standard, allowing automatic operation to be controlled by a desktop calculator such as the HP Model 85B, HP 9816A, Series 200, or by a main frame computer, such as the HP 1000. FDM tests such as surveillance can be made from a remote location to reduce maintenance costs and increase troubleshooting efficiency. See page 144 for information on HP 3046 A/B selective level measuring system.

### High Impedance Accessory Probes

Models HP 15580A and HP 15581B unbalanced high impedance probes and model HP 15576A balanced high impedance probe are available for use with the HP 3586A/B to facilitate bridging measurements.



# TELECOMMUNICATIONS TEST EQUIPMENT

## Selective Level Meter and Synthesizer

Models 3586A/B & 3336A/B (con't)

### Frequency

Signal Input	HP 3586A	HP 3586B
75 $\Omega$ Unbalanced	50 Hz to 32.5 MHz	
124 $\Omega$ Balanced		4 kHz to 10 MHz
135 $\Omega$ Balanced		4 kHz to 1 MHz
150 $\Omega$ Balanced	4 kHz to 1 MHz	
600 $\Omega$ Balanced	50 Hz to 108 kHz	

The 124  $\Omega$ , 135  $\Omega$ , 150  $\Omega$  and 600  $\Omega$  inputs are usable over wider frequency ranges, but are not specified in under and overrange operation.

**Frequency resolution:** 0.1 Hz.

**Center frequency accuracy:**  $\pm 1 \times 10^{-5}$ /year ( $\pm 2 \times 10^{-7}$ /year with option 004).

**Counter accuracy:**  $\pm 1.0$  Hz in addition to center frequency accuracy for signals within the 60 dB bandwidth of the IF filter chosen or greater than -100 dBm (largest signal measured).

**Frequency display:** 9 digit LED.

### Selectivity

**3 dB Bandwidth,  $\pm 10\%$**

HP 3586 (CCITT)	HP 3586B (N. American)
20 Hz	20 Hz
400 Hz	400 Hz
3100 Hz	3100 Hz
Psophometric	C-Message
Noise Weighting	Noise Weighting

**Adjacent channel rejection:** 75 dB minimum at  $\pm 2850$  Hz, 3100 Hz BW.

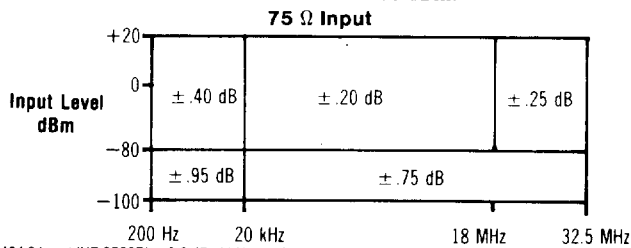
**Passband flatness:**  $\pm 0.3$  dB.

### Amplitude

**Measurement range:** +20 to -130 dBm.

**Amplitude resolution:** .01 dB.

**Level accuracy:** 10 dB autorange, low distortion mode, after calibration. 20 Hz and 400 Hz BW below -80 dBm.



124  $\Omega$  Input (HP 3586B):  $\pm 0.6$  dB, 4 kHz to 10 kHz;  $\pm .35$  dB, 50 kHz to 5 MHz;  $\pm .50$  dB, 10 kHz to 50 kHz, and 5 MHz to 10 MHz for +20 to -80 dBm.

135  $\Omega$ /150  $\Omega$  Input (HP 3586A or B):  $\pm 0.6$  dB, 4 kHz to 10 kHz;  $\pm .35$  dB 50 kHz to 1 MHz,  $\pm .50$  dB 10 kHz to 50 kHz for +20 to -80 dBm.

600  $\Omega$  Input (3586 A/B):  $\pm .35$  dB 200 Hz to 108 kHz for +20 to -80 dBm.

**Level accuracy: 100 dB range (after calibration):** add correction to 10 dB auto-range accuracy for dB below full scale. (Not required when in 10 dB autorange).

dB Below Full Scale	Accuracy Correction
0 to -20 dB	$\pm .25$ dB
-20 to -40 dB	$\pm .50$ dB
-40 to -80 dB	$\pm 2.0$ dB

### Dynamic Range

#### Spurious Responses

**Image rejection (100-132 MHz):** -80 dBc.

**IF rejection:** 15625 Hz, -80 dBc; 50 MHz, -60 dBc.

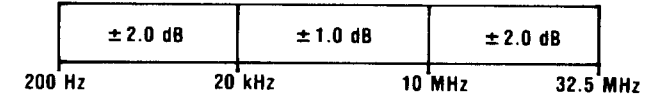
**Non-harmonic spurious signals:** >1600 Hz offset, -80 dBc; 300 Hz to 1600 Hz offset, -75 dBc.

#### Distortion

**Harmonic distortion:** -70 dB below full scale (>4 kHz on 75  $\Omega$  and 600  $\Omega$  inputs), low distortion mode.

**Intermodulation distortion:** 60 dB below full scale, 200 Hz to 50 kHz offset; 70 dB below full scale, 50 kHz to 1 MHz offset.

**Wideband power accuracy:** after calibration, 100 dB range, averaging on, -45 to +20 dBm.



**Noise Floor (full scale setting -35 to -120 dBm)**

Frequency	Bandwidth	Noise Level
100 kHz to 32.5 MHz	3100, 1740, 2000 Hz	-116 dBm
	20 Hz, 400 Hz	-120 dBm
10 kHz to 100 kHz	All	-105 dBm

The noise floor for full scale settings of -30 to +24 dBm will be 80 dB below full scale for >100 kHz, or 60 dB below full scale for <100 kHz.

### Signal Inputs

HP Model	Impedance	Frequency	Mating Connector
3586A	75 ohms unbalanced	50 Hz to 32.5 MHz	BNC
	150 ohms balanced	4 kHz to 1 MHz	Siemens 3-prong
	600 ohms balanced	50 Hz to 108 kHz	9 Rel 6 AC
3586B	75 ohms unbalanced	50 Hz to 32.5 MHz	WECO 439/440A
	124 ohms balanced	4 kHz to 10 MHz	WECO 443A
	135 ohms balanced	4 kHz to 1 MHz	WECO 241A
	600 ohms balanced	50 Hz to 108 kHz	WECO 310

### Connector Options

**Opt 001 (HP 3586A):** 75 ohms mates with Siemens 1.6/5.6 mm coaxial.

**Opt 001 (HP 3586B):** 75 ohms mates with WECO 358A. 124 ohms mates with WECO 372A.

(Contact local sales office for other special connectors.)

**Return loss:** -30 dB (50/75  $\Omega$ ); -25 dB (600  $\Omega$ ).

### Balance

Input	Frequency	Balance
124 $\Omega$	10 kHz to 10 MHz	-36 dB
135 $\Omega$ or 150 $\Omega$	10 kHz to 1 MHz	-36 dB
600 $\Omega$	50 Hz to 108 kHz	-40 dB

### Demodulated Audio Output

Output Level: 0 dBm into a 600  $\Omega$  load, adjustable.

Output Connector: mates with WECO 347A.

**HP-IB Interface Functions:** SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP1, DC1, DT1, C1, C3, C28.

### Additional Options

#### HP 3586A (CCITT)

**Opt 001:** 75  $\Omega$  input connector option. Siemens 1.6/5.6 mm coaxial connector replaces BNC.

**Opt 004:** High Stability Frequency reference 10 MHz oven stabilized reference oscillator improves frequency stability to  $\pm 2 \times 10^{-7}$ /year.

#### HP 3586B (N. American)

**Opt 001:** 75  $\Omega$  and 124  $\Omega$  input connector option. Changes 75  $\Omega$  input connector to mate with WECO 358A and 124  $\Omega$  input to mate with WECO 372A.

**Opt 004:** High Stability Frequency reference. Same as Opt 004-HP 3586A.

### Auxiliary Signal Inputs/Outputs

**Tracking generator:** 0 dBm rear panel tracking output.

**External reference input:** 1 MHz, 10 MHz or sub-harmonic input.

**Reference output:** 10 MHz, +8 dBm output.

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## Selective Level Meter/Synthesizer

Models 3586A/B and 3336A/B (cont.)

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**Probe power:** front panel dc output for HP active high impedance accessory probes.

**HP-IB Interface Functions:** rear panel interface meeting IEEE 488-1978 for remote operation. Used for tracking synthesizer interface. SH1, AH1, T6, L3, SR1, RL1, PP0, DC1, C0, E1.

**Additional outputs:** rear panel demodulated audio; phase jitter meter.

### General

#### Operating Environment

**Temperature:** 0° to 55°C.

**Relative humidity:** 95%, 0° to 40°C.

**Altitude:** ≤15,000 ft; ≤4600 metres.

#### Storage Environment

**Temperature:** -40°C to 75°C.

**Altitude:** ≤50,000 ft; ≤15,240 metres.

**Power:** 100/120/220/240 V, +5%, -10% 48 to 66 Hz, 150 VA.

**Weight:** 23 kg (50 lb) net; 30 kg (65 lb) shipping.

**Size:** 177 mm H x 425.5 mm W x 466.7 mm D (7" x 16.75" x 18.38").

### HP 3336 A & B Abbreviated Specifications

(See data sheet or manual for complete specifications)

#### Frequency

##### Frequency Range of Signal Outputs

Signal Output	HP 3336A	HP 3336B
75 Ω Unbalanced	10 Hz to 20.999 999 999 MHz	
124 Ω Balanced		10 kHz to 10.999 999 999 MHz
135 Ω Balanced		10 kHz to 2.099 999 999 MHz
150 Ω Balanced	10 kHz to 2.099 999 999 MHz	
600 Ω Balanced	200 Hz to 109.999 999 kHz	

All balanced outputs are usable over wider frequency ranges but are not specified in under and overrange operation.

**Resolution:** 1 μHz for frequencies < 100 kHz, 1 mHz for frequencies ≥ 100 kHz.

**Aging rate (instruments without option 004):** ±5 x 10<sup>-6</sup>/year (20° to 30°C).

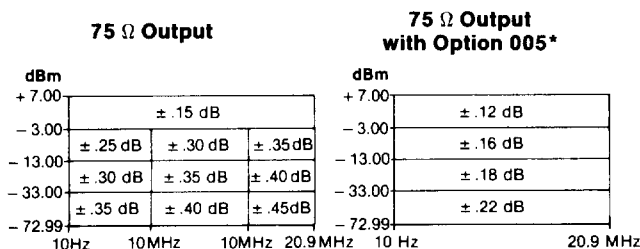
**Warm-up time:** 30 minutes.

#### Amplitude

**Range:** 75 and 600 Ω outputs: -72.99 to +7.00 dBm.

124, 135 and 150 Ω outputs: -78.23 to +1.76 dBm.

**Level accuracy, 20° to 30°C**



\*high accuracy attenuator

124 Ω output: 50 kHz to 10.9 MHz ±.15 dB -8.23 to 1.76 dBm, ±0.3 dB -18.23 to -8.24 dBm, ±.35 dB -38.23 to -18.24 dBm ±.4 dB -78.23 to -38.24 dBm.

135 Ω/150 Ω output: 10 kHz to 2.09 MHz, ±.17 dB -8.23 to +1.76 dBm, ±.32 dB -18.23 to -8.24 dBm, ±.37 dB -38.23 to -18.24 dBm, ±.42 dB -78.23 to -38.24 dBm.

600 Ω output: 200 Hz to 109.9 kHz, ±.30 dB -3.00 to +7.00 dBm/ ±.40 dB -13.00 to 2.99 dBm, ±.45 dB -33.00 to -12.99 dBm ±.50 dB -72.99 to -32.99 dBm.

1. Add ±.03 dB for 0° to 55°C operation.

2. Warm-up time is 30 minutes.

**Amplitude blanking:** <-85 dBm output during blanking

#### Spectral Purity

**Phase noise:** <-72 dB, HP 3336A and HP 3336B, for a 3 kHz band, 2 kHz either side of a 20 MHz carrier.

**Harmonic level:** -35 dB, 10 Hz to 30 Hz; -50 dB, 30 Hz to 50 Hz; -60 dB, 50 Hz to 1 MHz; -55 dB, 1 MHz to 5 MHz; -50 dB, 5 MHz to 20 MHz.

**Spurious:** all non-harmonically related signals will be more than 70 dB below the fundamental or -100 dBm (-115 dBm with option 005 except 150 or 600 Ω), whichever is greater.

#### Phase Offset

**Range:** ±719.9° with respect to arbitrary starting phase or assigned zero phase.

**Resolution:** 0.1°.

**Increment accuracy:** ±0.2°.

**Ambient stability:** ±1.0 degree of phase per degree C.

#### Frequency Sweep

**Sweep time:** linear sweep, 0.01 s to 99.99 s; single log sweep, 2 s to 99.99 s; continuous log sweep, 0.1 s to 99.99 s.

**Maximum sweep width:** specified frequency range of selected output.

**Minimum sweep width:** log sweep, 1 decade; linear sweep, minimum sweepwidth (Hz) = 0.1 (Hz/s) x sweep time(s).

**Phase continuity:** sweep is phase continuous over full frequency range.

**Sweep flatness:** ±0.15 dB, fast leveling, 10 kHz to 20 MHz, 0.03 s sweep time; ±0.15 dB, normal leveling, 50 Hz to 1 MHz, 0.5 s sweep time.

**Amplitude modulation:** modulation depth, 0 to 100%. Modulation frequency range, 50 Hz to 50 kHz.

**Phase modulation:** range, 0 to ±850°. Linearity, ±0.5% from best fit straight line. Modulation frequency range, dc to 5 kHz.

**External leveling:** input from an external voltage source to regulate the signal amplitude at a remote point.

**HP-IB Interface Functions:** rear panel interface meeting IEEE 488-1978 for remote operation. Used for tracking synthesizer interface. SH1, AH1, T6, L3, SR1, RL1, PP0, DC1, C0, E1.

#### Options

##### Option 001, HP 3336A/B Synthesizer/Level Generator

1.6/5.6 mm 75 Ω input, (HP 3336A). 75 Ω mates with WECO 358A, (HP 3336B). 124 Ω connector mates with WECO 372A, (HP 3336B).

##### Option 004, High Stability Frequency Reference

**Aging rate:** ±5 x 10<sup>-8</sup>/week after 72 hours continuous operation ±1 x 10<sup>-7</sup>/month after 15 days continuous operation.

**Ambient stability:** ±5 x 10<sup>-7</sup> maximum, 0° to 55°C.

**Option 005, high accuracy attenuator:** improves level accuracy and spurious level. See main specifications.

#### General

##### Operating Environment

**Temperature:** 0° to 55°C.

**Relative humidity:** ≤85%, 0° to 40°C.

**Altitude:** ≤15,000 ft., ≤4600 metres.

##### Storage Environment

**Temperature:** -50° to +65°C.

**Altitude:** ≤50,000 ft., ≤15,240 metres.

**Power requirements:** 100/120/220/240 V, +5%, -10%, 48 to 66 Hz, 60 VA, (100 VA with all options), 10 VA standby.

**Size:** 132.6 mm high x 425.5 mm wide x 425.5 mm deep (5¼" x 16¾").

**Weight:** Net wt., 10 kg (22 lb). Shipping wt., 15.5 kg (34 lb).

#### Ordering Information

#### Price

##### HP 3586A Selective Level Meter (CCITT)

**Opt 001:** 1.6/5.6 mm 75 Ω Connector add \$100

**Opt 004:** High Stability Frequency Reference add \$675

##### HP 3586B Selective Level Meter (N. American)

**\$10125**

**Opt 001:** 75 Ω Connector mates with WECO 358A add \$100

and 124 Ω Connector mates with WECO 372A add \$675

**Opt 004:** Same as HP 3586A add \$675

##### HP 3336A Synthesizer/Level Generator (CCITT)

**\$4600**

**Opt 001:** 1.6/5.6 mm 75 Ω Connector add \$100

**Opt 004:** High Stability Frequency Reference add \$600

**Opt 005:** High Precision Attenuator add \$600

##### HP 3336B Synthesizer/Level Generator

(N. American) **\$4600**

**Opt 001:** 75 Ω WECO 358A, 124 Ω WECO 372A add \$100

**Opt 004, 005:** Same as HP 3336A