

HP 8921A Cell Site Test Set

- HP 11807B Cell Site Test Software
- HP 83204A TDMA Cellular Adapter
- HP 83205A CDMA Cellular Adapter

A Total Solution for Cellular Wireless Infrastructure Test

The HP 8921A cell site test set family has the flexibility needed to meet analog and digital wireless infrastructure test challenges. Leveraging the performance of the HP 8921A for new digital technologies gives you a common platform with the advantages of user familiarity and low-cost upgrades.

Build on the Strengths of the HP 8921A

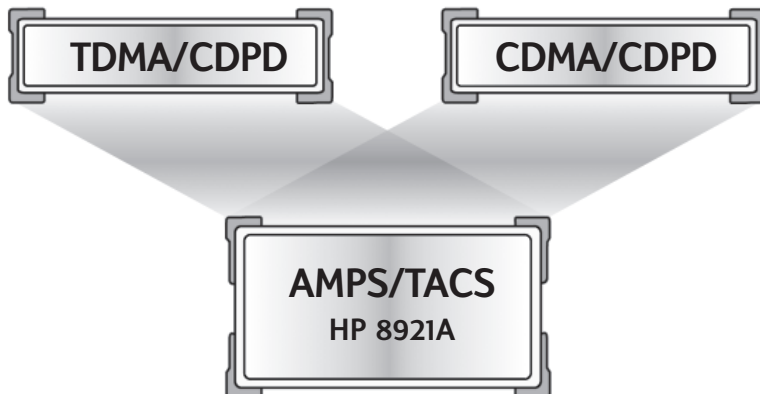
- High performance measurement capabilities to ensure thorough testing.
- Built-in controller and automated measurements for standardized testing in less time.
- Common instrument base to reduce technician training and instrument pool needs.
- World-wide training and support across all technologies to give you a single contact for all your technical questions.

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Add capabilities as your system grows!

- AMPS/NAMPS
- CDMA
- CDPD
- TACS/ETACS/UTACS
- TDMA



HP 8921A Cell Site Test Set Family

AMPS/NAMPS/TACS/ETACS/UTACS — HP 8921A, HP 11807B

Install and maintain AMPS, NAMPS, TACS, ETACS, and UTACS cell site radio equipment with the HP 8921A cell site test set and the HP 11807B cell site test software.

The HP 8921A + HP 11807B test solution uses the HP 8921A's built-in IBASIC controller to fully automate base station test procedures with the HP 11807B software test packages.

Developed from manufacturer's recommended maintenance procedures, the HP 11807B cell site test software ensures complete test and adjustment of cell sites as recommended by the manufacturers. By using the standardized maintenance procedures, each cell site receives the same high-quality analysis and adjustment.

Coverage for Analog and Digital Cellular Systems

Besides testing AMPS and TACS base stations, the HP 8921A is ready to grow with your measurement needs for future cellular systems.

TDMA — HP 8921A Option 500

(HP 8921A + HP 83204A Option 001)

The HP 83204A TDMA cellular adapter adds a complete $\pi/4$ DQPSK signal generator, modulation analyzer, and BER analyzer to the HP 8921A while maintaining all analog measurements for dual-mode testing of IS-136 digital cellular formats. HP 11807B software fully automates TDMA test procedures recommended by manufacturers to optimize system performance.

CDMA — HP 8921A Option 600

(HP 8921A + HP 83205A Option 001)

Test IS-95A/97A base stations with the HP 8921A Option 600 CDMA cell site test system. This system consists of an HP 8921A cell site test set and the HP 83205A CDMA cellular adapter. Existing HP 8921As can be upgraded for CDMA digital testing by adding the HP 83205A. The HP 8921A retains its full capabilities for testing AMPS/NAMPS base stations.

CDPD — HP 8921A + HP 83204A or HP 83205A

The HP 8921A has optional cellular digital packet data (CDPD) test capability for installing and maintaining CDPD mobile data base station (MDBS) RF infrastructure equipment. CDPD capability can be ordered with TDMA, CDMA, or analog test systems; or CDPD test features can be retrofit to existing HP 8921As.

Analog Specifications - HP 8921A

Specifications describe the instrument's warranted performance after a 30-minute warm up period and are valid over the entire operating and environmental range unless otherwise noted.

Supplemental Characteristics are intended to provide additional information useful in applying the instrument by giving typical, but non-warranted performance parameters. These are shown in italics or labeled as "typical," "usable to," or "nominal."

Signal Generator

RF Frequency

Range:

Standard: 30 MHz to 1000 MHz

Option 055: 250 kHz to 1000 MHz

Accuracy and Stability: same as reference oscillator ± 0.015 Hz

Switching Speed: < 150 ms to be within 100 Hz of carrier frequency

Resolution: 1 Hz

Output

RF In/Out Connector

Level Range:

Standard: -137 to -20.5 dBm into 50Ω

Option 055: -137 to -19 dBm into 50Ω

Level Accuracy: ± 1.8 dB (level ≥ -127 dBm)

Typically ± 1.0 dB for all levels

Reverse Power: 60 watts continuous

100 watts for 10 seconds per minute

SWR: $< 1.5:1$

Duplex Out Connector

Level Range:

Standard: -127 to $+5$ dBm into 50Ω

Option 055: -127 to $+7$ dBm into 50Ω

Level Accuracy: ± 1.5 dB,

Typically ± 1.0 dB for all levels

Reverse Power: 200 mW maximum

SWR: $< 2.0:1$ (level < -4 dBm)

Resolution: 0.1 dB

Spectral Purity

Spurious Signals

Standard: (for ≤ -2.5 dBm output level at Duplex Out or ≤ -27 dBm output level at RF In/Out)

Option 055: (for $\leq +1$ dBm output level at Duplex Out or ≤ -25 dBm output level at RF In/Out)

Harmonics: < -30 dBc

Non-Harmonic Spurious: < -60 dBc (at > 5 kHz offset from carrier)

Residual FM (CCITT, rms):

< 7 Hz for $250 \text{ kHz} \leq f_c \leq 1000 \text{ MHz}$

< 4 Hz for $249 \text{ MHz} \leq f_c \leq 501 \text{ MHz}$

SSB Phase Noise: < -110 dBc/Hz (for > 20 kHz offsets at a 500 MHz carrier frequency)

FM

FM Deviation (rates > 25 Hz):

100 kHz; $30 \text{ MHz} \leq f_c < 249 \text{ MHz}$

Option 055: 100 kHz; $100 \text{ kHz} \leq f_c < 249 \text{ MHz}$

50 kHz; $249 \text{ MHz} \leq f_c < 501 \text{ MHz}$

100 kHz; $501 \text{ MHz} \leq f_c < 1000 \text{ MHz}$

(FM not specified for $(f_c \text{ minus FM dev.}) < 250$ kHz)

FM Rate (1 kHz reference):

Internal: DC to 25 kHz (1 dB BW)

External AC Coupled: 20 Hz to 75 kHz (typical 3 dB BW)

External DC Coupled: DC to 75 kHz (typical 3 dB BW)

FM Accuracy (1 kHz rate):

≤ 10 kHz dev: $\pm 3.5\%$ of setting ± 50 Hz

> 10 kHz dev: $\pm 3.5\%$ of setting ± 500 Hz

FM Distortion (THD + Noise, 0.3 to 3 kHz BW):

$< 0.5\%$ at > 4 kHz deviation and 1 kHz rate

Center Frequency Accuracy in DC FM Mode

(external source impedance $< 1 \text{ k}\Omega$):

± 500 Hz (after DC FM zero), typically ± 50 Hz

Ext. Mod Input Impedance: 600 Ω nominal

Resolution:

50 Hz for < 10 kHz deviation

500 Hz for ≥ 10 kHz deviation

Audio Source (both internal sources)

Frequency

Range: DC to 25 kHz

Accuracy: 0.025% of setting

Resolution: 0.1 Hz

Output Level

Range: 0.1 mV to 4 Vrms

Maximum Output Current: 20 mA peak

Output Impedance: $< 1 \Omega$ (at 1 kHz)

Accuracy: $\pm 2\%$ of setting plus resolution

Residual Distortion (THD + Noise, level ≥ 200 mVrms):

$< 0.125\%$; 20 Hz to 25 kHz in an 80 kHz BW

Resolution:

Level ≤ 0.1 V: $\pm 50 \mu\text{V}$

Level ≤ 0.1 V: ± 0.5 mV

Level ≤ 1 V: ± 5 mV

Level > 1 V: ± 50 mV

Offset in DC Coupled Mode: < 50 mV

RF Analyzer

RF Frequency Measurement

Measurement Range:

Standard: 10 MHz to 1000 MHz

Option 055: 400 kHz to 1000 MHz

Level Range:

RF In/Out: 1 mW to 60 W continuous (0 dBm to 48 dBm)
100 W for 10 seconds per minute

Ant In: -36 dBm to $+20$ dBm

Accuracy: ± 1 Hz plus timebase accuracy

Resolution: 1 Hz

Analog Specifications - HP 8921A

Continued

RF Analyzer *Continued*

RF Power Measurement

Frequency Range: 30 MHz to 1000 MHz

Measurement Range:

RF In/Out: 1 mW to 60 W continuous (0 dBm to 48 dBm)
100 W for 10 seconds per minute

Accuracy: $\pm 5\%$ of reading ± 0.01 mW (at $25^\circ\text{C} \pm 10^\circ\text{C}$)
 $\pm 10\%$ over full temperature range

SWR: $< 1.5:1$

Resolution:

Power < 10 W: 1 mW

Power ≥ 10 W: 10 mW

FM Measurement

Frequency Range:

Standard: 10 to 1000 MHz

Option 055: 5 to 1000 MHz (*usable to 400 kHz*)

Deviation Range: 20 Hz to 75 kHz

Sensitivity (30 kHz IF BW; high sensitivity mode, 0.3 to 3 kHz BW):
 $2 \mu\text{V}$ (12 dB SINAD, $f_c \geq 10$ MHz)

Typically $< 1 \mu\text{V}$

Accuracy (20 Hz to 25 kHz rates, deviation ≤ 25 kHz): $\pm 4\%$ of reading
plus residual FM and noise contribution

Bandwidth (3 dB): 2 Hz to 70 kHz (DCFM measurements also
available)

THD + Noise: $< 1\%$ for ≥ 5 kHz deviation and 1 kHz rate in a 0.3
to 3 kHz BW

Input Level Range for Specified Accuracy: -18 to $+47.8$ dBm
at RF In/Out (0.04 mW to 60 W continuous) 100 W for 10 sec./min.
 -54 to $+14$ dBm at Ant In

Residual FM and Noise (0.3 to 3 kHz, rms): < 10 Hz

Resolution:

Deviation < 10 kHz: 1 Hz

Deviation ≥ 10 kHz: 10 Hz

Spectrum Analyzer

Frequency Range: 10 kHz to 1000 MHz

Frequency Span/Resolution Bandwidth (coupled):

Span	Bandwidth
< 50 kHz	300 Hz
< 200 kHz	1 kHz
< 1.5 MHz	3 kHz
< 18 MHz	30 kHz
≥ 18 MHz	300 kHz, Plus full span capability

Display: Log with 1, 2, and 10 dB/div

Display Range: 80 dB

Reference Level Range: $+50$ to -50 dBm

Residual Responses: < -70 dBm (no input signal, 0 dB attenuation)

Image Rejection: > 50 dB

Non-harmonic Spurious Responses: > 70 dB down (for input
signals < -30 dBm)

Level Accuracy: ± 2.5 dB

Displayed Average Noise Level:

< -114 dBm for < 50 kHz spans

Log Scale Linearity: ± 2 dB (for input levels ≤ -30 dBm and/or
60 dB range)

Other Features: Peak hold, marker with frequency and level
readout, marker to peak, marker to next peak, trace comparison A-B,
trace averaging

Tracking Generator

Frequency Range:

Standard: 10 MHz to 1000 MHz

Option 055: 400 kHz to 1000 MHz

Frequency Offset: Frequency span endpoints \pm frequency offset
cannot be < 400 kHz or ≥ 1000 MHz

Output Level Range: Same as signal generator

Sweep Modes: Normal and inverted

Other Features: Normalize

Adjacent Channel Power

Relative Measurements

Level Range:

Ant In: -40 dBm to $+20$ dBm

RF In/Out: 0.16 mW (-8 dBm) to 60 W (47.8 dBm) continuous; or up to
100 W (50 dBm) for 10 seconds per minute

Dynamic Range: *Typical values for channel offsets*

Channel Offset	Channel BW	Dynamic Range
12.5 kHz	8.5 kHz	-65 dBc
20 kHz	14 kHz	-68 dBc
25 kHz	16 kHz	-68 dBc
30 kHz	16 kHz	-68 dBc
60 kHz	30 kHz	-65 dBc

Relative Accuracy: ± 2.0 dB

Absolute Level Measurements

Level: Results of absolute power in watts or dBm are met by adding the
adjacent channel power ratio from the spectrum analyzer to the carrier
power from the input section RF power detector

Level Range

Ant In: N/A

RF In/Out: 1 mW (0 dBm) to 60 W (47.8 dBm) continuous; or up to
100 W (50 dBm) for 10 seconds per minute

Dynamic Range: *Typical values for channel offsets*

Channel Offset	Channel BW	Dynamic Range
12.5 kHz	8.5 kHz	-65 dBc
20 kHz	14 kHz	-68 dBc
25 kHz	16 kHz	-68 dBc
30 kHz	16 kHz	-68 dBc
60 kHz	30 kHz	-65 dBc

Absolute Accuracy: Equals the sum of RF power measurement
accuracy found in the RF analyzer section and the adjacent channel power
relative accuracy of ± 2.0 dB

Analog Specifications - HP 8921A

Continued

AF Analyzer

Frequency Measurement

Measurement Range: 20 Hz to 400 kHz

Accuracy: $\pm 0.02\%$ plus resolution plus reference oscillator accuracy

External Input: 20 mV to 30 Vrms

Resolution:

$f < 10$ kHz: 0.01 Hz

$f < 100$ kHz: 0.1 Hz

$f \geq 100$ kHz: 1 Hz

AC Voltage Measurement

Measurement Range: 0 to 30 Vrms

Accuracy (20 Hz to 15 kHz, inputs ≥ 1 mV): $\pm 3\%$ of reading

Residual THD + Noise (15 kHz BW): 150 μ V

3 dB Bandwidth: Typically 2 Hz to 100 kHz

Nominal Input Impedance: 1M Ω in parallel with 76 pF or 600 Ω floating

Resolution:

4 digits for inputs ≥ 100 mV

3 digits for inputs < 100 mV

DC Voltage Measurement

Voltage Range: 100 mV to 42 V

Accuracy: $\pm 1.0\%$ of reading plus DC offset

DC Offset: ± 45 mV

Resolution: 1 mV

Distortion/SINAD Measurement

Fundamental Frequency: 1 kHz ± 5 Hz

Input Level Range: 30 mV to 30 Vrms

Display Range: 0.1% to 100% for distortion mode, 0 to 60 dB for SINAD mode

Accuracy: ± 1 dB (0.5 to 100% distortion, 0 to 46 dB SINAD)

Residual THD + Noise (15 kHz BW): -60 dB or 150 μ V, whichever is greater

Resolution: 0.01% distortion or 0.01 dB SINAD

Audio Filters

High-Pass Filters: < 20 Hz, 50 Hz, and 300 Hz

Low-Pass Filters: 300 Hz, 3 kHz, 15 kHz, > 99 kHz

Other Filters: 750 μ s De-emphasis, 1 kHz Notch Filter, C-Message Weighting Filter and 6 kHz Bandpass Filter

Optional Filter: CCITT Weighting Filter (Option 011) can be substituted for C-Message Weighting Filter

Audio Detectors

RMS, RMS SQRT2, Pk+, Pk-, Pk+ hold, Pk-hold, Pk \pm /2, Pk \pm /2hold, Pk \pm max, Pk \pm maxhold

Oscilloscope

Frequency Range (3 dB): 2 Hz to 50 kHz

Scale/Division: 10 mV to 10 V

Amplitude Accuracy (20 Hz to 10 kHz): $\pm 1.5\%$ of reading ± 0.1 div.

Time/Division: 1 μ s to 200 ms

3 dB Bandwidth: Typically > 100 kHz

Internal DC Offset: ≤ 0.1 div. (≥ 50 μ V/div. sensitivity)

Signaling

Capability for Generating and Analyzing the Following

Formats: CDCSS, DTMF, 1 Tone, 2 Tone, 5/6 Tone, Sequential, RPC1 (POCSAG), EIA, CCITT, CCIR, ZVEI, DZVEI, GOLAY, EEA, AMPS, NAMPS, TACS, NTACS, NMT-450, NMT-900, LTR, EDACS, MPT 1327

Function Generator Waveforms: Sine, square, ramp, triangle, dc, White Gaussian and White Uniform noise

Function Generator Frequency Range and Level:

Same as audio source

DC Current Meter Specifications

Measurement Range: 0 to 10A (usable to 20A)

Accuracy: $\pm 10\%$ of reading after zeroing (levels > 100 mA)

Remote Programming

GPIOB: Implementation of IEEE Standard 488.2

Functions Implemented: SH1, AH1, T6, L4, SR1, RL1, LEO, TEO, PPO, DC1, DT1, C4, C11, E2

RS-232: 6-wire RJ-11 connector provides two 3-wire serial ports for serial data in and out, no hardware handshake capability

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, and 19200 selectable

Parallel Interface is provided for output to a printer

Reference Oscillator

Temperature: 0.05 ppm (0 to $+55$ $^{\circ}$ C)

Aging: < 0.5 ppm/year (< 1 ppm in first year)

Warm Up Time: < 15 minutes to be within ± 0.1 ppm of final frequency

Rear-Panel BNC Connectors:

Input Frequency: 1, 2, 5, 10 MHz

Input Level: > 0.15 Vrms

Output Frequency: 10 MHz

Output Level: > 0.5 Vrms

Save and Recall Registers

Available RAM: Approximately 640 kB of RAM are available for save/recall of instrument settings or IBASIC programs. This typically will hold hundreds of sets of instrument settings depending on the type of information saved and the size of any IBASIC programs used. When running the HP 11807B cell site test software, approximately 256 kB of RAM are available for save/recall use.

TDMA Specifications – HP 8921A Option 500 or 503 (HP 8921A with HP 83204A Option 001 or 003)

CDMA Specifications – HP 8921A Option 600 or 603 (HP 8921A with HP 83205A Option 001 or 003)

TDMA

CDMA

TDMA Signal Generator

Frequency Range: 824 MHz to 894 MHz

Output Level Range:

RF In/Out:

Standard: -23.5 dBm to -127 dBm

Option 055: -22 dBm to -127 dBm

Duplex Out:

Standard: +2 dBm to 127 dBm

Option 055: +4 dBm to -127 dBm

Residual Error Vector Magnitude: < 3.0%

Residual Phase Error: < 3°

Residual Magnitude Error: < 3.0%

I/Q Origin Offset: < -30 dBc within ± 15 °C of the temperature at the last calibration

Frequency Error: ± 4 Hz plus reference

TDMA Analyzer

Frequency Range: 824 MHz to 894 MHz

Input Level Range:

RF In/Out: 1 mW to 60 W (0 to +47.78 dBm)

Ant In: -36 dBm to +17 dBm

Input Frequency Setting Error: 1 kHz

RX DSP Level Setting Range: 0 dB to -23 dB full scale

Residual Error Vector Magnitude: < 2.0%

Error Vector Magnitude Measurement Accuracy: 0.4% + 2% of reading

Residual Phase Error: < 1.5°

Residual Magnitude Error: < 1.4%

I/Q Origin Offset Accuracy: ± 0.5 dB for values to -40 dBc

Frequency Error Accuracy: ± 2 Hz plus reference

CDMA Signal Generator

Frequency/Amplitude

Frequency Range: 824 to 894 MHz *usable from 800 MHz to 1000 MHz and from 30 MHz to 200 MHz with degraded rho (ρ) and carrier feedthrough performance.*

Frequency Resolution: 1 Hz

Output Level Range:

RF In/Out:

Standard: -20.5 dBm to 137 dBm

Option 055: -19 dBm to -137 dBm

Duplex Out:

Standard: +2 dBm to 127 dBm

Option 055: +4 dBm to -127 dBm

Output Level Accuracy:

RF In/Out: ± 2.0 dB, *typically ± 1.0 dB*

Duplex Out: ± 1.7 dB, *typically ± 1.0 dB*

Modulation

Reverse Link Source Modulation: OQPSK per TIA IS-95

Reverse Link Source Modulation Data¹: Internal data buffer, Idle (all zeroes)

Forward Link Source Modulation: QPSK per TIA IS-95

Forward Link Source Modulation Data¹: Internal (Pilot channel)

Residual Rho (ρ): Better than 0.96 *typically > 0.98*

Carrier Feedthrough: *Typically < -35 dBc*

Adjacent Channel Noise: *Typically < -50 dBc measured in a 30 kHz BW filter relative to the total carrier power at $f \pm 900$ kHz for output levels < -29 dBm at the RF In/Out connector (< -3 dBm when using the Duplex Out connector)*

PN Offset: Adjustable from 0 to 511 units (1 unit equals 64 chips)

PN Offset Resolution: 0.0156 units (1 chip)

Data Buffer

Size/Length: 5400 frames

Modes: Single, Continuous Looping, and Idle

Coding: IS-95 CDMA full rate reverse link channel coding, interleaving and spreading

Long Code Mask: 42 zeros

Input Data Rate: 9600 bps; 14,400 bps

Data Source: For each rate set, 300 frames factory loaded, 1800 frames additional user definable data can be entered via GPIB

¹ May also be modulated with external encoded data. External data must be properly coded and ready for short sequence spreading at 1.2288 Mb per second.

CDMA Specifications – HP 8921A Option 600 or 603

Continued

CDMA Signal Generator *Continued*

AWGN Source

(Added White Gaussian Noise)

Bandwidth: 2 MHz nominally, Gaussian to > 3 sigma

Modes: Noise only, data only, and user selectable E_b/N_0 settings

E_b/N_0 Resolution: 0.1 dB

E_b/N_0 Range: -5 to 25 dB

E_b/N_0 Accuracy: ± 0.5 dB, for E_b/N_0 of 5 to 20 dB, *typically ± 1 dB, for E_b/N_0 of -5 to +5 dB and +20 dB to +25 dB*

CDMA Analyzer

Waveform Quality Measurement Rho (ρ)

IS-95 forward or reverse link formats (QPSK or OQPSK)

Input Frequency Range: 10 MHz to 1000 MHz

Input Level Range:

RF In/Out: -10 dBm to +48 dBm

Ant In: -46 dBm to +17 dBm

Rho (ρ) Measurement Interval Range: 0.25 to 1.25 ms

Rho (ρ) Measurement Range: 0.50 to 1.00

Rho (ρ) Measurement Accuracy: $< \pm 0.005$

Input Frequency Error Range: ± 900 Hz

Frequency Error Measurement Accuracy²: ± 30 Hz using a measurement interval ≥ 0.5 ms

Other Reported Parameters: Pilot Time Offset, Carrier Feedthrough, Error Vector Magnitude, Amplitude Error, and Phase Error

Pilot Time Offset Measurement Accuracy: *Typically $< \pm 500$ ns from even-second signal to start of PN sequence*

Average Power Measurement

Input Frequency Range: 30 MHz to 1000 MHz

Input Connector: RF In/Out

Measurement Bandwidth: Provides an accurate measure of the total power for signals within 2 MHz of the operating frequency. If other signals are present outside this frequency range, reduced measurement accuracy will result.

Maximum Input Level: 60 W continuous

Measurement Range: 1 mW to 60 W (0 to +48 dBm)

Measurement Accuracy³:

$\pm 5\% \pm 1 \mu\text{W}$, at $25^\circ\text{C} \pm 10^\circ\text{C}$

$\pm 10\% \pm 1 \mu\text{W}$, from 0° to 55°C

Measurement Period: 0.25 ms to 5 ms

Channel Power Measurement

Input Frequency Range: 10 MHz to 1000 MHz

Input Connector: RF In/Out (usable on Ant In with reduced measurement accuracy)

Measurement Bandwidth: Measures the total power in a 1.23 MHz bandwidth centered on the selected frequency

Measurement Range: -10 dBm to +48 dBm

Measurement Accuracy³: ± 1 dB over a range of $\pm 5^\circ\text{C}$ from the temperature at the last calibration

Code Domain Analyzer

Code Domain Power Measurement

Input Frequency Range: 10 MHz to 1000 MHz

Input Connector: RF In/Out or Ant In

Input Frequency Error Range: ± 900 Hz

Input Level Range:

RF In/Out: -10 dBm to +48 dBm

Ant In: -46 dBm to +17 dBm

Measurement Dynamic Range: 40 dB

Measurement Accuracy: ± 0.5 dB using a measurement interval ≥ 0.5 ms

Measurement Resolution: 0.01 dB

Carrier Frequency Offset Accuracy²: ± 30 Hz using a measurement interval ≥ 0.5 ms

Pilot Time Offset Measurement Accuracy: *Typically < 500 ns from even-second signal to start of PN sequence*

Code Domain Timing Measurement

(Pilot to Code Channel Time Tolerance)

Input Frequency Range: 10 MHz to 1000 MHz

Input Connector: RF In/Out or Ant In

Input Frequency Error Range: ± 900 Hz

2 Accuracy can be improved by averaging a number of measurements. Error is reduced by the square root of the number of averages.

3 When measuring power at the RF In/Out port, the internal signal generator's level must be 60 dB below the measured power or less than -20 dBm at the Duplex Out port.

CDMA Specifications – HP 8921A Option 600 or 603

Continued

Code Domain Analyzer *Continued*

Input Level Range:

RF In/Out: -10 dBm to $+48$ dBm

Ant In: -46 dBm to $+17$ dBm

Measurement Range: ± 4 ns to ± 200 ns

Measurement Accuracy: ± 10 ns using a measurement interval of 1.25 ms and ≥ 10 averages

Measurement Resolution: 0.01 ns

Code Domain Phase Measurement

(Pilot to Code Channel Phase Tolerance)

Input Frequency Range: 10 MHz to 1000 MHz

Input Connector: RF In/Out or Ant In

Input Frequency Error Range: ± 900 Hz

Input Level Range:

RF In/Out: -10 dBm to $+48$ dBm

Ant In: -46 dBm to $+17$ dBm

Measurement Range: ± 4 mrad to ± 200 mrad

Measurement Accuracy: ± 20 mrad using a measurement interval of 1.25 ms and ≥ 10 averages

Measurement Resolution: 10 mrad

RF Time Base

(For proper operation, this reference must be locked to a high-quality external reference)

Locking Range: ± 10 ppm

Input Frequencies: 19.6608 MHz, 15 MHz, 10 MHz, 9.8304 MHz, 5 MHz, 4.9152 MHz, 2.4576 MHz, 1.2288 MHz, and 1 MHz

Input Level: ≥ 0 dBm (into 50Ω)

Output Frequency: 10 MHz

Output Level: TTL

CDMA Reference

(For proper operation, this reference must be locked to the internal RF timebase or a high-quality external reference)

Locking Range: ± 10 ppm

Input Frequencies: 19.6608 MHz, 15 MHz, 10 MHz, 9.8304 MHz, 5 MHz, 4.9152 MHz, 2.4576 MHz, 1.2288 MHz, and 1 MHz

Even Second Sync Input: (BNC) accepts a rising edge to reset the internal short sequences and CDMA clocks. Periodic inputs should have a period of 2 seconds and a minimum pulse width of > 50 ns

Input Level: ≥ 0 dBm (into 50Ω)

Outputs:

Coaxial BNCs:

19.6608 MHz (TTL levels)

1.2288 MHz (TTL levels)

TTL Sub Min D:

20 ms frame clock

26.67 ms short sequence clock

80 ms clock

Every even second

CDPD Specifications – HP 83204A, HP 83205A

Specifications apply to HP 8921A when fitted with HP 83204A Option 002 or 003 or HP 83205A Option 002 or 003 cellular adapters and when running the provided CDPD MDDBS cell site test software. (Software is included with each of these cellular adapters.)

CDPD Signal Generator (at HP 8921A Duplex Out)**Output:**

Level Range and Level Accuracy: Same as HP 8921A

Reverse Power: Same as HP 8921A

Frequency Range: Same as HP 8921A

Frequency Accuracy: ± 500 Hz, typically ± 50 Hz

Spectral Purity:

Spurious Signals, Adjacent Channels: < -26 dBc

Spurious Signals, First Alternate Channel: < -45 dBc

Spurious Signals, Second Alternate Channel: < -60 dBc

Switching Speed: Typically < 150 ms to be within 1 kHz

Transmitter On/Off Level and Timing: > 15 dB down in < 1 ms

Modulation Type: GMSK with BT=0.5

Modulation Accuracy: $< 5\%$ error in modulation index

CDPD Analyzer

RF Frequency Range: Same as HP 8921A

Input Level Range: Same as HP 8921A

RF Power Measurement:

Accuracy: RF In/Out: 5% , ± 0.01 mW (at 25 ± 10 °C) for single signal > 200 mw, 10% over full temperature range

Frequency Error Accuracy: Time base accuracy ± 1 Hz

Modulation Index Accuracy: $< 0.1\%$ error in modulation index

Adjacent Channel Power measurement floor:

Typically -45 dBc

Alternate and Second Alternate Channel Power measurement noise floor⁴: Typically -60 dBc

CDMA

CDPD

⁴ For RF input signal levels > -38 dBm.

Common Specifications

Dimensions:

(HxWxD)

HP 8921A: 188 x 330 x 456 mm (7.4 x 13 x 18 inches)

HP 83204A: 62 x 330 x 456 mm (2.4 x 13 x 18 inches)

HP 83205A: 62 x 330 x 456 mm (2.4 x 13 x 18 inches)

HP 8921A Opt. 500, 502, 503:

250 x 330 x 456 mm (9.8 x 13 x 18 inches)

HP 8921A Opt. 600, 602, 603:

250 x 330 x 456 mm (9.8 x 13 x 18 inches)

Weight:

HP 8921A: 17.27 kg (38 lbs) net
29.55 kg (65 lbs) shipping

HP 83204A: 6.36 kg (14 lbs) net
11.36 kg (25 lbs) shipping

HP 83205A: 6.36 kg (14 lbs) net
11.36 kg (25 lbs) shipping

HP 8921A Opt. 500, 502, 503:
23.18 kg (51 lbs) net
38.64 kg (85 lbs) shipping

HP 8921A Opt. 600, 602, 603:
23.18 kg (51 lbs) net
38.64 kg (85 lbs) shipping

Power:

HP 8921A:

AC: 100 V to 240 V; 48 to 440 Hz; *nominally 100 watts*

DC: 11 to 28 V; *nominally 120 watts*

HP 83204A: AC: 100 to 240 V, 48 to 440 Hz; 120 VA max

HP 83205A: AC: 100 to 240 V, 48 to 440 Hz; 120 VA max

HP 8921A Opt. 500:

AC: 100 to 240 V, 48 to 440 Hz, *nominally 140 watts*

HP 8921A Opt. 600:

AC: 100 to 240 V; 48 to 440 Hz, *nominally 140 watts*

Miscellaneous:

HP 8921A CRT Size: 7 x 10 cm

Operating Temperature: 0 to +55 °C

Storage Temperature: -55 to +75 °C

Calibration Interval: Two years

Leakage: Conducted and radiated interference meets CISPR 11.

Typical HP 8921A radiated leakage at signal generator output frequency is < 1.0 μV (2.0 μV for HP 8921 Options 500 or 600) induced in a resonant dipole antenna 25 mm (1 inch) from any surface except the rear panel for RF output levels < -40 dBm. Spurious leakage levels are typically < 1 μV in a resonant dipole antenna.

HP 11807B Cell Site Test Software Specifications

Option 040 – Motorola AMPS, NAMPS Test Software

Models Tested: HDII, HDII (NAMPS), LD

- **RS-232 Interface to Base Station**
(with base station firmware 4.3.2.1 or later)

Tests Performed:

- **URDM or RDM Frequency and Level**

- **Voice Transceiver**

- **Receiver**

- Audio Output
 - SINAD for each antenna
 - Audio Distortion
 - Hum and Noise
 - Expander Response
 - Audio Response
 - Signal and No Signal SAT/DSAT
 - Signal and No Signal ST/DST Detect

- **Transmitter**

- Frequency Error
 - Power at Level 0
 - SAT Frequency Error
 - SAT/DSAT Peak Deviation
 - JK Output
 - Peak Voice Limiting
 - Voice Deviation
 - Audio Distortion
 - Hum and Noise
 - Combandor Track Error
 - Audio Frequency Response
 - Peak Data Deviation

- **Signaling Transceiver Manual Mode**

- Frequency Error
 - Power
 - Data Deviation
 - SINAD
 - SSI Calibration and Linearity

- **Scanning Receiver Manual Mode**

- Scan Sensitivity for each Antenna
 - SAT/DSAT Detect
 - SSI Calibration and Linearity

- **Combiner Adjustment**

- **Wideband Data**

- **Manual Switch and Calibration Aid**

- **Calculate Transmitter Power**

- **Voice Channel Manual Test Mode**

Option 041 – General Electric AMPS Test Software

Models Tested: G.E. RCU, Compact RCU

- **RS-232 Interface to RCU**

Tests Performed:

- **Transmitter Tests**

- RF Power
 - RF Frequency Error
 - SAT Modulation
 - Data Modulation
 - Voice Deviation Limiting
 - Audio Frequency Response
 - Audio Distortion
 - Hum and Noise
 - Combandor Response

- **Receiver Tests**

- Audio Line Output Level
 - RX1 and RX2 Audio Level
 - Audio Loopback
 - RX1 and RX2 Sensitivity
 - RX1 and RX2 RSSI
 - RX1 and RX2 SAT Detection
 - RX1 and RX2 ST Detection
 - RX1 and RX2 SAT and ST Falsing
 - RX1 and RX2 Audio Frequency Response
 - RX1 and RX2 Audio Distortion
 - RX1 and RX2 Hum and Noise
 - Expander

- **RF Measurement Tools**

- Swept Frequency Insertion Loss
 - Swept Frequency Return Loss
 - Discrete AMPS Channel Return Loss Test
 - Cable Fault Test (Return Loss versus Distance)
 - PC Data Transfer

Option 042 – Ericsson AMPS, and TDMA Test Software¹

Models Tested: **Model 882, 882M (Microcell), 882D (DTRM), 882DM (DMTM)**

- **RS-232 Interface to Radio**

Tests Performed:

- **AMPS Transmitter Tests**

- Frequency Offset
- Output Power
- Audio Level Adjustments
- Voice Deviation
- Voice and SAT Deviation
- Max. Voice Deviation
- Data Deviation
- SAT Tone Deviation
- SAT Frequency Error

- **TDMA Transmitter Tests**

- TDMA Power
- TDMA Modulation Accuracy
- Error Vector Magnitude (EVM)
- Magnitude Error
- Phase Error
- Origin Offset
- Frequency Error
- Peak Error Vector Magnitude
- TDMA Adjacent Channel Power

- **AMPS Receiver Tests**

- Line Level
- Sensitivity
- Diversity Sensitivity
- Squelch
- Desense
- RF Level Calibration
- Loop Gain
- SAT Detector

- **TDMA Receiver Tests**

- TDMA RSSI
- TDMA Sensitivity (BER)

- **Combiner Alignment**

- Cavity Adjustment
- Output Power to Antenna

- **General Tests**

- Laptop Emulator
- Memory Card Initialization
- Local Control File Transfer
- Internal Test DTRM/LVM
- DTRM/DMTM Product Information
- Calculate ERP

- **RF Measurement Tools**

- Swept Frequency Insertion Loss
- Swept Frequency Return Loss
- Discrete AMPS Channel Return Loss Test
- Cable Fault Test (Return Loss versus Distance)
- PC Data Transfer

Option 043 – AT&T AMPS, and TDMA Test Software¹ Lucent

Models Tested: **Autoplex Series II, LMT, Universal Microcell**

- **RS-232 Interface to MSC via External Modem**

Tests Performed:

- **Automated Frequency Plan Testing**

- AMPS Active and Growth Radios
- TDMA Active and Growth Radios
- Setup Radios

- **AMPS FCC Transmitter Tests**

- Frequency Error
- Output Power
- Voice Deviation at –16 and 0 dBm
- SAT Deviation
- Data 10 kHz Deviation
- Residual FM
- Voice Distortion
- SAT Frequency Error

- **TDMA FCC Transmitter Tests**

- Frequency Error
- Output Power
- Error Vector Magnitude (including magnitude and phase error)
- I/Q Origin Offset
- Adjacent/Alternate Channel Power

- **Setup Channel FCC Tests**

- Frequency Error
- Output Power
- Data 10 kHz Deviation

- **Adjust Output Power**

- **Download/Diagnose Voice Channel**

- **Download/Diagnose Setup Channel**

- **RF Measurement Tools**

- Swept Frequency Gain Test
- Swept Frequency Insertion Loss Test
- Swept Frequency Return Loss Test
- Discrete AMPS Channel Return Loss Test
- Cable Fault Test (Return Loss versus Distance)
- Store and Retrieve Plots
- Plot Two Plots at Once
- PC Data Transfer

- **LMT/Universal Microcell Tests**

¹**Note:** HP 11807B Options 040, 042, 043, 044, 045, 050, 052, 070, and 120, are for use with equipment operating in the 800 MHz cellular bands.

Option 044 – Nortel AMPS, and TDMA Test Software¹

Models Tested: **TRU and "P" series**

- **RS 232 Interface to Base Station**

Tests Performed:

- **Transmitter Tests**

- **"P" Series and TRU Tests**

- Frequency Error
 - Maximum Power and Power Level
 - SAT Frequency and Deviation
 - Wideband Data Deviation
 - Residual FM

- **"P" Series Tests**

- Voice Modulation/Limiting/Adjustment

- **TRU Tests**

- TDMA Power
 - TDMA Adjacent Channel Power
 - Residual AM
 - Modulation Accuracy
 - Error Vector Magnitude (EVM)
 - Magnitude and Phase Error
 - Origin Offset
 - Frequency Error
 - Peak Error Vector Magnitude

- **Receiver Tests**

- **"P" Series and TRU Tests**

- Receiver A/B SINAD Sensitivity
 - Receiver A/B SAT Detection
 - Receiver A/B ST Detection
 - Receiver A/B Audio Level
 - Receiver A/B RSSI Linearity
 - Receiver A/B RSSI Offset

- **TRU Tests**

- RSSI/MC Gain Offset and Gain
 - BER

- **General Tests**

- Laptop Emulator
 - Manual Switch Control
 - PA LED Alarm and TRU Display

- **RF Measurement Tools**

- Swept Frequency Insertion Loss
 - Swept Frequency Return Loss
 - Discrete AMPS Channel Return Loss Test ("P" Series)
 - Cable Fault Test—Return Loss versus Distance ("P" Series)
 - PC Data Transfer

Option 045 – Hughes AMPS Test Software¹

Models Tested: **Hughes GMH 2000 AMPS**

Tests Performed:

- **Transmitter Tests**

- Min/Max Output Power
 - Output Power
 - Frequency
 - Voice Deviation/Audio Level
 - SAT Frequency and Deviation
 - Maximum Voice Deviation
 - Spectrum Analyzer ATC Power and Intermodulation
 - Path Insertion Loss (for NGA)

- **Receiver Tests**

- Sensitivity/SINAD
 - Deviation/Audio Level
 - RSSI
 - Path Gain
 - Path Insertion Loss

- **Single Channel Amplifier Tests**

- Frequency Response and Min/Max
 - Frequency Response, Min/Max and Receiver

- **RF Measurement Tools**

- Swept Frequency Insertion Loss
 - Swept Frequency Return Loss
 - Discrete AMPS Channel Return Loss Test
 - Cable Fault Test (Return Loss versus Distance)
 - PC Data Transfer

¹Note: HP 11807B Options 040, 042, 043, 044, 045, 050, 052, 070, and 120, are for use with equipment operating in the 800 MHz cellular bands.

Option 050 – Motorola TACS, ETACS, UTACS, and EUTACS Test Software¹

- **RS-232 Interface to Base Station**

Tests Performed:

- **RDM Frequency and Level**

- **Voice Transceiver**

- **Receiver**

- Audio Output
 - SINAD for each antenna
 - Audio Distortion
 - Hum and Noise
 - Expander Response
 - Audio Response
 - Signal and No Signal SAT/DSAT
 - Signal and No Signal ST Detect

- **Transmitter**

- Frequency Error
 - Power at Level 0
 - SAT Frequency Error
 - SAT/DSAT Peak Deviation
 - JK Output
 - Peak Voice Limiting
 - Voice Deviation
 - Audio Distortion
 - Hum and Noise
 - Compandor Track Error
 - Audio Frequency Response
 - Peak Data Deviation

- **Signaling Transceiver Manual Mode**

- Frequency Error
 - Power
 - Data Deviation
 - SINAD
 - SSI Calibration and Linearity

- **Scanning Receiver Manual Mode**

- Scan Sensitivity for each Antenna
 - SAT/DSAT Detect
 - SSI Calibration and Linearity

- **Combiner Adjustment**

- **Manual Switch and Calibration Aid**

- **Voice Channel Manual Test Mode**

- **Return Loss**

- VSWR Discrete and Swept Return Loss
 - VSWR versus Distance (cable fault location)

Option 052 – Ericsson TACS, ETACS Test Software¹

Models Tested: Model 883, 883M (Microcell)

- **RS-232 Interface to Radio**

Tests Performed:

- **Transmitter Tests**

- Frequency Offset
 - Output Power
 - Audio Level Adjustments
 - Voice Deviation
 - Voice and SAT Deviation
 - Maximum Voice Deviation
 - Data Deviation
 - SAT Tone Deviation
 - SAT Frequency Error

- **Receiver Tests**

- Line Level
 - Sensitivity
 - Diversity Sensitivity
 - Squelch
 - Desense
 - RF Level Calibration
 - Loop Gain
 - SAT Detector

- **Combiner Alignment**

- Cavity Adjustment
 - Output Power to Antenna

- **General Tests**

- Laptop Emulator
 - Memory Card Initialization
 - Local Control File Transfer
 - Calculator ERP

- **RF Measurement Tools**

- Swept Frequency Insertion Loss
 - Swept Frequency Return Loss
 - Discrete AMPS Channel Return Loss Test
 - Cable Fault Test (Return Loss versus Distance)
 - PC Data Transfer

Option 120 – AMPS Call Analysis, Logging, and Monitoring Software

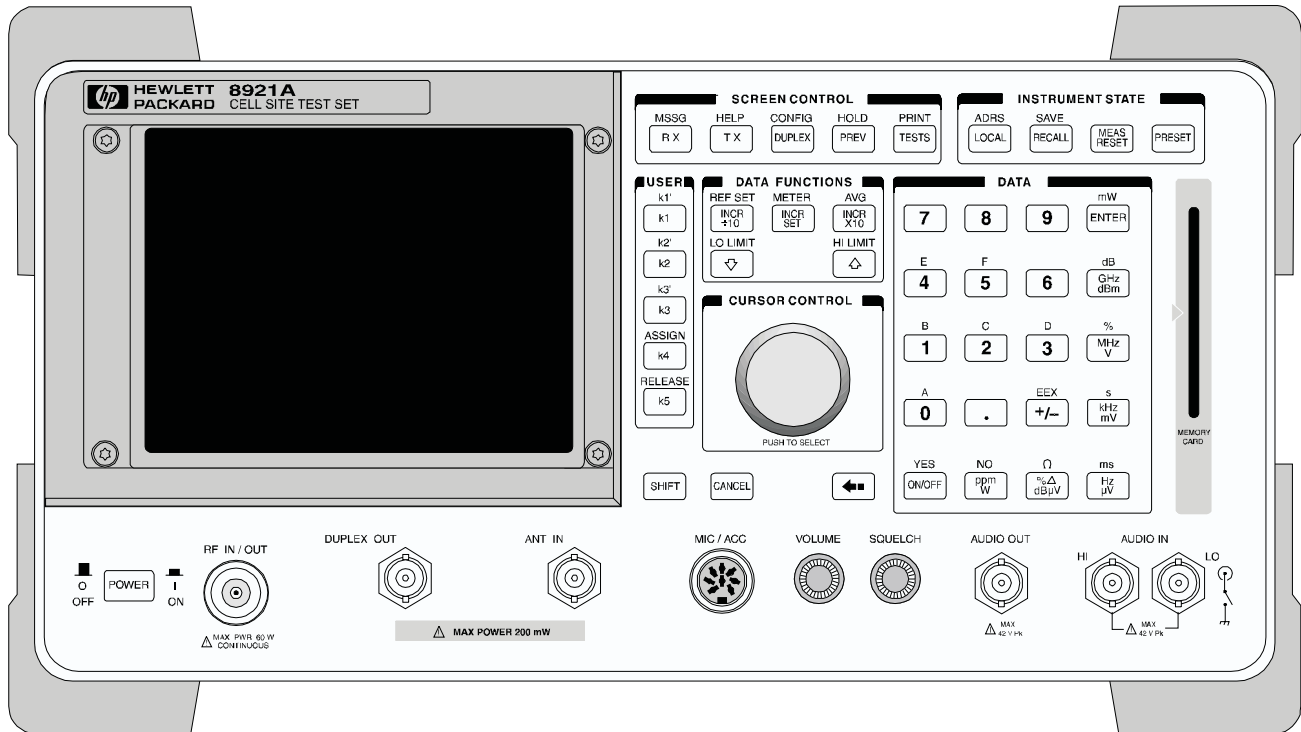
Tests Performed:

- Find local AMPS control channels
- Display system information from forward control channel
- Count orders by type on forward control channel
- Display mobile identification numbers and orders on forward control channel
- Follow call setups to voice channels and through subsequent handoffs
- Display mobile data transmissions on reverse control channel
- Measure cell site transmitter performance off-the-air
- Measure mobile transmitter characteristics off-the-air

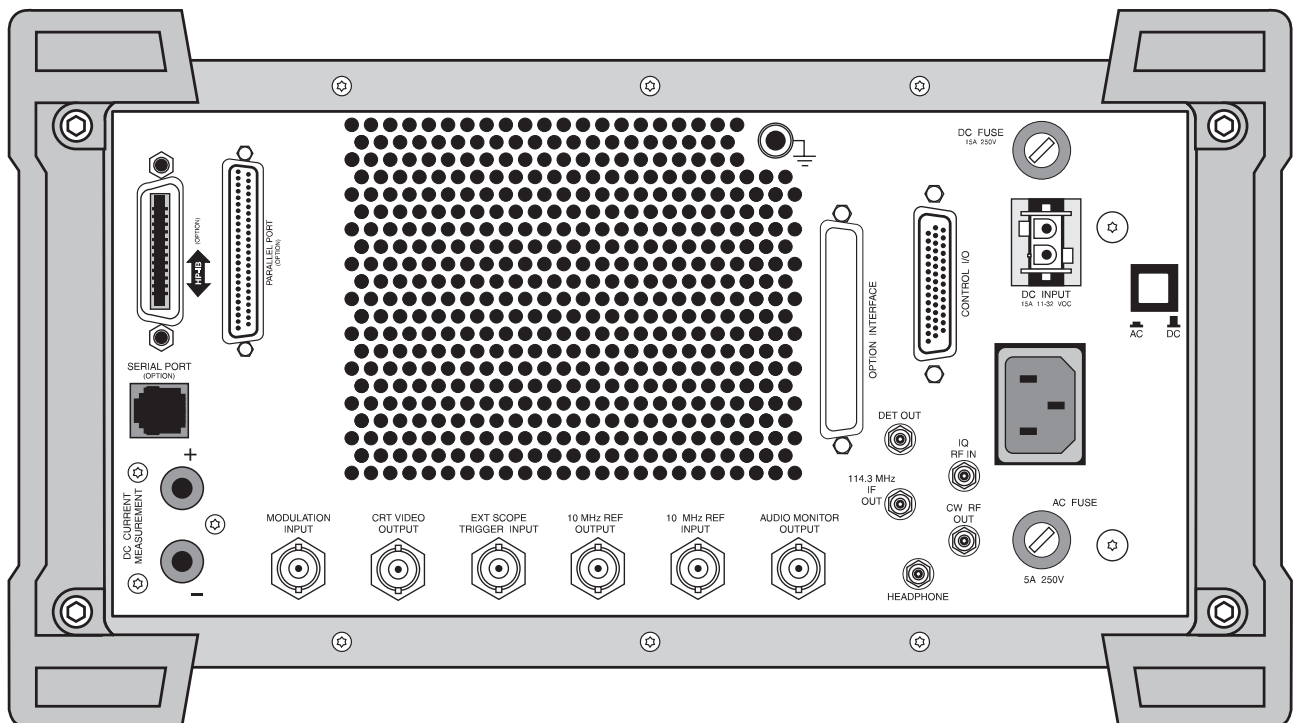
¹Note: HP 11807B Options 040, 042, 043, 044, 045, 050, 052, 070, and 120, are for use with equipment operating in the 800 MHz cellular bands.

HP 8921A Cell Site Test Set

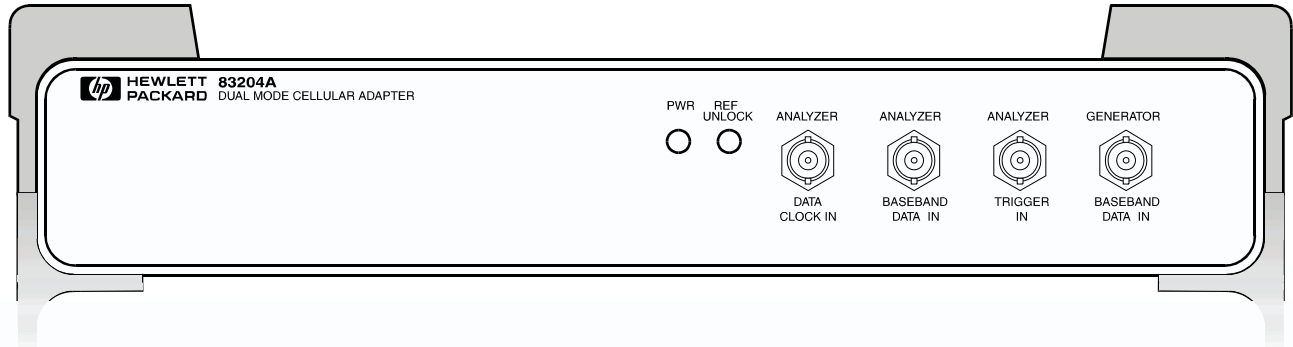
Front Panel



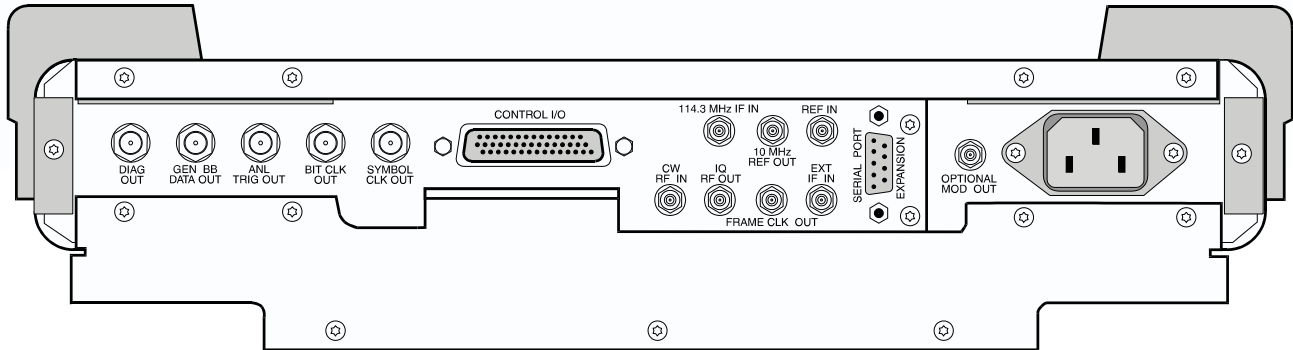
Rear Panel



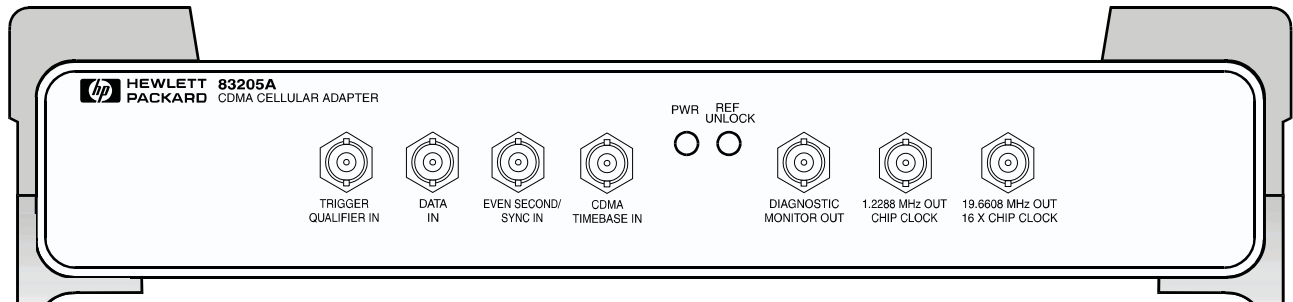
Front Panel



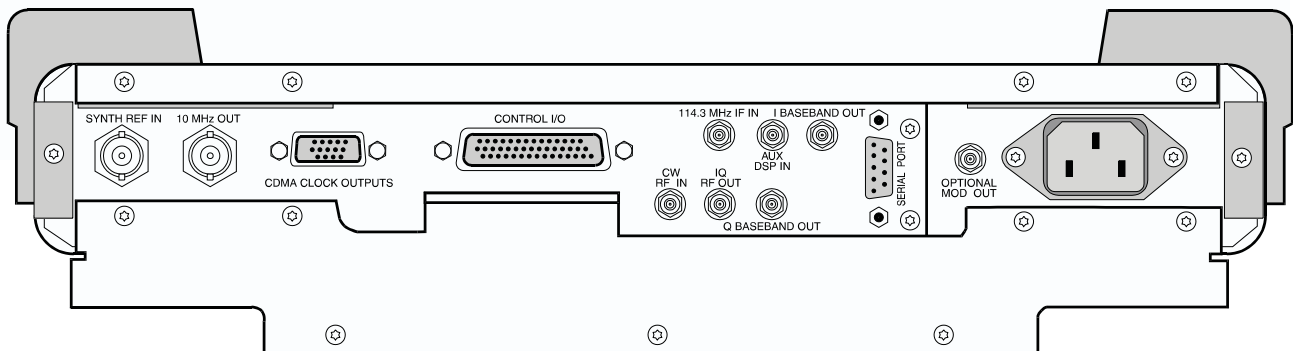
Rear Panel



Front Panel



Rear Panel





For more information about Hewlett-Packard test and measurement products, applications, services, and a current sales office listing, visit our web site at:

<http://www.hp.com/go/tmdir>

You can also contact one of the following centers and ask for a test and measurement sales representative.

United States:

Hewlett-Packard Company
Test and Measurement Call Center
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Englewood, CO 80155-4026
(tel) 1 800 452 4844

Canada:

Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
(tel) 1 877 894 4414

Europe:

Hewlett-Packard Company
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(tel) (31 20) 547 9999

Japan:

Hewlett-Packard Japan Ltd.
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For more information about the HP 8921A Cell Site Test Set visit our web site at:

<http://www.tmo.hp.com>

Available literature includes: brochure, product overview, product note, and configuration guide.

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