

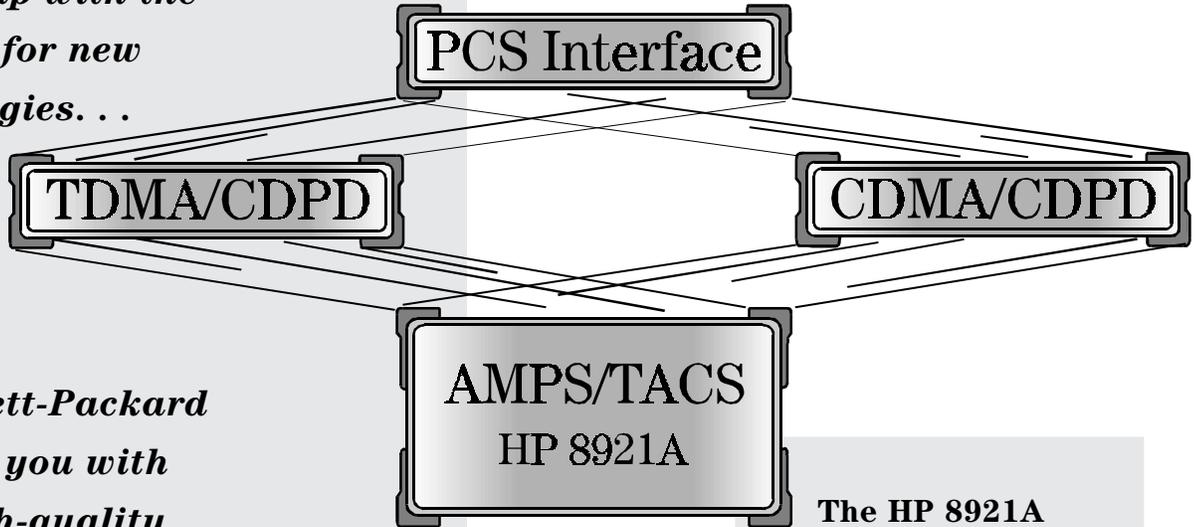
HP 8921A Cell Site Test Set
HP 11807B Cell Site Test Software
HP 83204A TDMA Cellular Adapter
HP 83205A CDMA Cellular Adapter
HP 83236A PCS Interface

Brochure



**Install and
Optimize Cell Sites
Faster!**

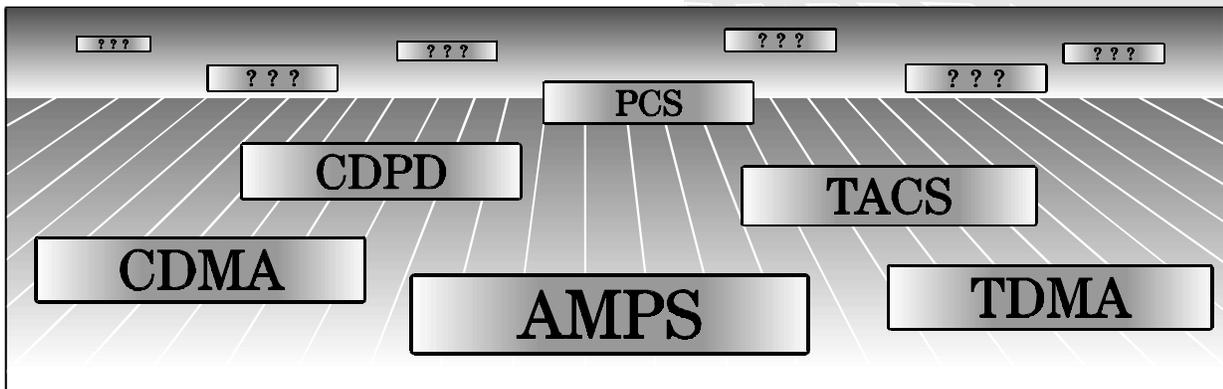
*As a service provider,
 manufacturer or
 installer, you know
 how difficult it is
 to keep up with the
 demand for new
 technologies. . .*



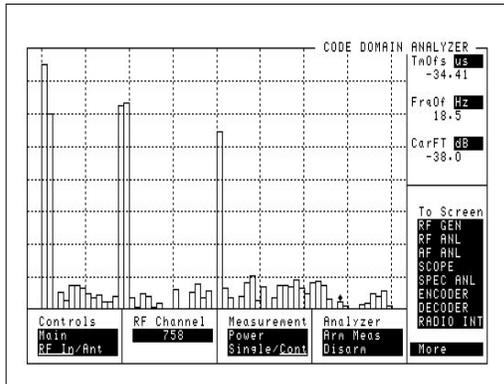
*. . .Hewlett-Packard
 can help you with
 fast, high-quality,
 installation and
 maintenance testing*

**The HP 8921A
 RF Test Set
 Family —
 a total solution
 for wireless
 infrastructure
 test**

*A partner you
 can count on*



Test equipment with performance and automation advantages to help you establish and maintain customer preference for your system's quality -



CDMA

HP pioneered the waveform quality measurement rho (ρ) for CDMA base stations to indicate the overall performance level of CDMA transmitters. Rho and code domain analysis (a new measurement concept to measure power in each code channel) give Hewlett-Packard's CDMA solution a clear performance advantage for base station maintenance.



AMPS/TACS/TDMA

Proven Performance in Infrastructure Test

Hewlett-Packard's fully-automated installation and maintenance test solution has freed technicians from hours of tedious manual testing. Our customers have found the HP 8921A/11807B increases technician efficiency for base station maintenance while improving cellular system reliability.

Worldwide training and support to help you manage your support organization more effectively -

- On-site training
- 1-800 technical phone support
- Worldwide support

HP 8921A Cell Site Test Set

The HP 8921A Cell Site Test Set combines over twenty high performance instruments with an internal controller to automate installation and maintenance testing on base stations.

HP 8921A Standard Features

- Synthesized AM/FM signal generator
- AM/FM modulation analyzer
- Duplex offset generator
- RF power meter
- RF frequency counter/error meter
- Synthesized spectrum analyzer
- Tracking generator
- Audio frequency counter
- AF power meter
- AC voltmeter
- DC voltmeter
- DC current meter
- Distortion meter
- SINAD meter
- Signal-to-noise meter
- Two synthesized variable audio sources
- Function generator
- Cellular signaling encoder/decoder
- Digital oscilloscope
- Built-in IBASIC controller
- IEEE 488.2, parallel printer, and RS-232 interfaces

High Performance Spectrum Analyzer and Tracking Generator

The spectrum analyzer of the HP 8921A has the wide dynamic range and synthesized frequency accuracy found in expensive stand-alone spectrum analyzers.

- Wide dynamic range to locate low-level signals in the presence of high-power transmitters
- Synthesized accuracy for high confidence that you've located the correct signals
- Adjacent channel power screen for transmitter measurements
- Built-in tracking generator with performance features optimized for measuring duplexers
- Flexible display
 - 1/2/10 dB per division scale
 - Markers
 - Display averaging
 - Trace normalization

Reliability

A large percentage of technician time is spent getting to and from remote cell sites. Reliable test equipment is essential to make sure each visit is productive. The HP 8921A is tested to stringent MIL-STD environmental specifications; operating temperatures from 0 to 55 degrees C, humidity up to 95% and shock forces as great as 30 g's.

Cell Site Troubleshooting Simplified

Streamline cell site troubleshooting with the HP 8921A using HP 11807B or HP 11807A Option 100 system support test software.

Measurements on cell-site cables, antennas, filters, and attenuators can be automated for faster, more consistent troubleshooting.

Measurement routines include:

- Cable fault
- AMPS channel return loss
- Swept gain and loss
- Swept return loss
- Field strength
- Frequency scanner

Cellular Phone Test

HP 8921A performance includes cellular phone test capability in addition to cell site test. Several HP 11807A cellular phone test software packages are compatible with HP 8921As, providing a fast, fully-automated phone test solution.

Compatible HP 11807A packages include:

AMPS/EAMPS/NAMPS: Option 004

TACS/ETACS: Option 005

JTACS/NTACS: Option 007

TDMA Dual-Mode using TIA adapter (IS-54) DAMPS: Option 008

AMPS/EAMPS/NAMPS/TDMA (IS-54) DAMPS over-the-air: Option 009

For more information on HP 11807A software, refer to the HP 11807A/E product overview, part number 5965-2783E. For configuration information, refer to the HP 8921A configuration guide, part number 5965-1577E.



PCS Interface



HP 8921A with TDMA or CDMA Adapter



HP 8921A Performance Features

- High-power input tests transmitters up to 60 watts (to 100 W intermittently)
- 2 μ V sensitivity at the antenna input allows over-the-air signal monitoring
- Power meter with 5% accuracy
- Signal-to-noise ratio meter for audio signals
- Easy printout of measurement results, test results, and spectrum analyzer and scope screens to external RS-232, parallel, or HP-IB printers
- Store test results, spectrum analyzer and scope screens to RAM cards or to your PC for retrieval and printing at a convenient time

User Features

- SAVE/RECALL saves entire instrument states and can be stored internally, or to a memory card for quick retrieval of custom measurement setups
- Quick and easy instrument control with front-panel control knob

HP 11807B Automation Benefits for AMPS, TACS, and TDMA

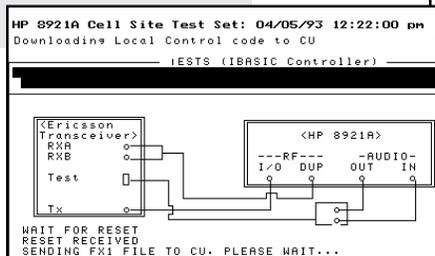
Thorough Testing in Less Time

The fast measurement speed of the HP 8921A coupled with HP 11807B automated software results in less time off-line for each transceiver during maintenance work.

Since all cell sites are uniformly tested with the same procedures, problems are detected earlier. Errors due to test variability are eliminated and human errors are reduced. **Standardizing system maintenance increases system integrity.**

Measurement data can be output to an external printer or stored on memory cards for future reference. **By analyzing measured data, suspect transceivers can be identified and failures anticipated.**

The end result is a cellular system that provides more reliable service with fewer unexpected problems.



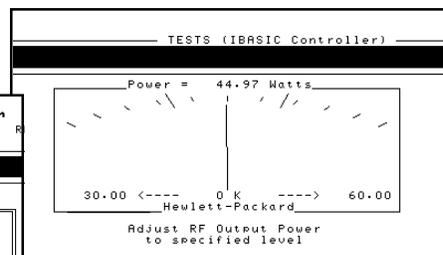
Easy Setup

The HP 11807B software guides you through each step of optimizing your cell site. When connection changes are required, the HP 8921A graphically displays the connection diagram. The HP 11807B follows the test and adjustment procedures recommended by the manufacturers. Clear labeling on the connection diagram eliminates errors and reduces the need to refer to the base station documentation.

Spec#	Description	Lower Limit	Upper Limit	Units
1	GN return loss			
2	TX frequency error			
3	TX output power			
4	TX audio level			
5	TX voice channel deviation			
6	TX voice and SAT deviation	±3.00000	±10.0000	kHz
7	TX maximum voice deviation			
8	TX constant symbol data frequency			
9	TX constant symbol data deviation			
10	TX SAT deviation			
11	TX SAT frequency error			
12	RX line level			

Test Function
IBASIC

Test conditions	Measured value	Lower limit	Upper limit	P/F
Frequency error	-356.59 Hz	-900.00	900.00	
Transmitter power	45.92 Watts	40.00	50.00	
TX audio level	775.6 mV	770.0	780.0	
Voice channel deviation	8.2 kHz	6.6	9.4	
TX data (const. symbol) freq.	10.000 kHz	9.995	10.005	
TX data (const. symbol) dev.	8.0 kHz	6.6	9.4	
TX SAT freq. error @ 5970	0.1 Hz	-3.0	3.0	



Visual and Audio Feedback

The HP 11807B Cell Site Test Software gives both visual and audible feedback when adjustments are required. A large analog meter displays the current reading while highlighting the specified tolerance range. Audible feedback in the form of audio tones allows adjustments to be made when the HP 8921A display cannot be seen. High and low tones indicate high or low measurements while a repetitive tone indicates proper adjustment.

Flexible Configuration

Customize the HP 11807B software to fit your cell site test and maintenance needs. Once specific setups are developed that fit your needs, store them for further use on rugged, non-volatile memory cards. With personalized procedures, maintenance can be standardized to improve network quality and technician efficiency.

Test Results

The HP 11807B Cell Site Test Software displays measurement results on the HP 8921A screen. Alternatively, send results to an HP-IB, RS-232, or parallel printer to document test results. Dual serial ports enable the HP 8921A to control the base station under test via the HP 11807B software as well as send test results to a serial printer. If archiving test results is desirable, use optional battery-backed RAM cards to save test results or store them to your PC.

AMPS / TACS

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.

Complete Testing

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

TDMA - 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 AMPS/TACS/TDMA Cell Site Test Software

Installation/maintenance test procedures are available for manufacturer base stations listed below:

Motorola:

- HDII/AMPS, HDII/NAMPS, LD AMPS
- TACS/ETACS/UTACS/EUTACS
- Micro C-I-T-E AMPS/NAMPS

General Electric RCU:

- Analog, Extended Frequency Analog, and Compact RCU AMPS

Ericsson:

- 882, 882M, 882D AMPS Analog, Microcell and TDMA
- 883, and 883M TACS/ETACS Analog and Microcell

Lucent (formerly AT&T) Autoplex Series II:

- AMPS Analog, LMT and Universal Microcell AMPS and TDMA

Nortel:

- AMPS Analog, TDMA Digital DRU and Analog P-Series

Hughes:

- GMH 2000 AMPS

For universal use:

- AMPS Call Analysis, Logging and Monitoring Software. See HP 11807B Option 120 Product Overview, part number 5963-6891 for more information.

CDMA - For test and support of IS-95A/97 CDMA base station equipment, add the HP 83205A CDMA Cellular Adapter for signal generation and analysis of QPSK/OQPSK signals.

The HP 8921A retains its full capabilities for testing the analog performance of dual-mode CDMA base stations.

CDPD - 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. Select CDPD test

as an option to the HP 83204A TDMA Cellular Adapter or the HP 83205A CDMA Cellular Adapter.

PCS - Adding the HP 83236A PCS Interface to HP 8921A TDMA and CDMA systems is a cost-effective way to extend TDMA and CDMA measurements to the 1850 to 1990 MHz frequency band (Contact your local Hewlett-Packard sales representative for PCS solutions at other frequencies). The HP 83236A can be combined with existing HP 8921A systems without returning them to the factory.

For additional information, refer to other sections in this brochure as well as the following literature:

- Technical Specifications: p/n 5965-1576E
- Configuration Guide: p/n 5965-1577E
- Price List: p/n 5965-1578EUS

TDMA

The HP 83204A TDMA Cellular Adapter adds TDMA (IS-136) digital measurement capability to the HP 8921A. It can be ordered stand-alone to add to an existing HP 8921A or as an HP 8921A Option 500 (HP 8921A/83204A Option 001).

The HP 8921A/83204A retains all analog functions, plus adds the following digital features:

- $\pi/4$ DQPSK signal generator
- $\pi/4$ DQPSK analyzer
- Bit Error Rate (BER) meter
- Adjacent/alternate channel power measurements

Digital Measurements

TDMA measurement modes and settings are accessed on a single test screen. User setups provide quick configuration of the test set to measure key TDMA performance parameters. The following measurements can be performed:

Transmitter Tests:

- RF power
- Frequency error
- Modulation accuracy
 - Error Vector Magnitude (EVM) including phase error and magnitude error
 - I/Q origin offset
- Adjacent and alternate channel power

Receiver Tests:

(dependent on receiver being tested)

- TDMA sensitivity (BER)
- TDMA RSSI



Automation

HP 11807B software fully automates TDMA test procedures recommended by equipment manufacturers to optimize system performance. Time-intensive setups are eliminated through powerful IBASIC programs. Iterative tests such as receiver sensitivity are completed in a minimal amount of time.

CDPD

The HP 83204A TDMA Cellular Adapter has optional CDPD test capability for installing and maintaining CDPD MDBS RF infrastructure equipment. HP 8921A Option 503 (HP 8921A plus HP 83204A Option 003) configures the test set for both TDMA and CDPD test.

PCS

Adding the HP 83236A PCS Interface to the HP 8921A Option 500 is a cost-effective way to extend TDMA measurement capabilities to the 1850 to 1990 MHz frequency band (Contact your local Hewlett-Packard sales representative for PSC solutions at other frequencies). The HP 83236A can be combined with existing HP 8921A systems without returning them to the factory.

For additional information , refer to other sections in this brochure as well as the following literature:

- Technical Specifications: p/n 5965-1576E
- Configuration Guide: p/n 5965-1577E
- Price List: p/n 5965-1578EUS

CDMA

Test IS-95A/97 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 Option 001 CDMA Cellular Adapter. Existing HP 8921As can be upgraded for CDMA digital testing by adding the HP 83205A. (Older HP 8921As require the Option G21 upgrade for complete CDMA capabilities.) The HP 8921A retains its full capabilities for testing the analog performance of dual-mode CDMA base stations.

The HP 83205A CDMA Adapter for the HP 8921A embodies a new measurement concept called code-domain analysis. Because multiple users share the same transmit frequency, CDMA signals appear as pseudo-random, noise-like waveforms. Conventional analyzers display signals by frequency and cannot display individual code channels. The HP 8921A/83205A measures power in each code channel, as well as measuring code-channel timing and code-channel phase relative to the pilot.

Power measurements are made with a true-average power detection scheme to optimize characterization of CDMA system performance. Another significant contribution of the HP 8921A/83205A is its measurement of waveform quality ρ for CDMA base stations. This new measurement was developed by Hewlett-Packard to indicate the overall performance level of the CDMA transmitter.



Digital Measurements

The HP 83205A adds the following capabilities to the HP 8921A:

- Measurements of waveform quality ρ , frequency error, and pilot time offset
- Code domain power, timing and phase analysis
- True-average power and CDMA channel power measurements
- CDMA QPSK/OQPSK RF source with data buffer and IS-95 reverse link coding
- Built-in Added White Gaussian Noise (AWGN) source provides calibrated E_b/N_0 settings
- Flexible RF and CDMA reference sections

CDPD

The HP 83205A CDMA Cellular Adapter has optional CDPD test capability for installing and maintaining CDPD MDBS RF infrastructure equipment. HP 8921A Option 603 (HP 8921A plus HP 83205A Option 003) configures the test set for both CDMA and CDPD test.

PCS

Adding the HP 83236A PCS Interface to the HP 8921A Option 600 is a cost-effective way to extend CDMA measurement capabilities to the 1850 to 1990 MHz frequency band (Contact your local Hewlett-Packard sales representative for PSC solutions at other frequencies). The HP 83236A can be combined with existing HP 8921A systems without returning them to the factory.

For additional information, refer to other sections in this brochure as well as the following literature:

- Technical Specifications: p/n 5965-1576E
- Configuration Guide: p/n 5965-1577E
- Price List: p/n 5965-1578EUS

CDPD

The HP 8921A has optional Cellular Digital Packet Data (CDPD) capabilities 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 by selecting the desired "500" or "600" option to the HP 8921A. Existing HP 8921As can be retrofitted with CDPD measurement capability by adding an HP 83204A or HP 83205A with the appropriate option.

CDPD Test

CDPD MDBS test capability is designed to quickly and accurately test key RF parameters on both the forward channel transmitter and the reverse channel receiver. In addition, a sniffer receiver test verifies proper sniffer functionality. Measurement procedures and default pass/fail limits are taken directly from the CDPD system specification 1.1.

To perform tests on the MDBS, it is necessary to tap into both the forward channel TX path and the reverse channel RX path directly, or with couplers. All RX tests and sniffer tests require the RX antenna be disconnected.



HP 8921A with HP 83204A
TDMA/CDPD Adapter



HP 8921A with HP 83205A
CDMA/CDPD Adapter

Tests Performed with CDPD Software:

Transmitter Tests:

- Output power
- Carrier frequency accuracy
- 0.5 GMSK modulation index accuracy
- Adjacent and alternate channel power

Receiver Tests:

- Block error rate sensitivity
- Busy set and busy clear flag performance
- Sniffer functionality

System Level Tests:

- Decode and display the following packet data units:
 - Channel stream identifier
 - Channel configuration
 - Channel quality
 - Channel access
 - Switch channel

To assure high accuracy power and sensitivity measurements, the software allows you to enter cable loss and coupler loss associated with connecting the test set to your MDBS.

The software, included with HP 8921A CDPD options, guides the operator to make the proper connections prior to each test. Calibration factors such as cable loss and coupler loss can be saved to a memory card and quickly retrieved when testing different sites.

Measured results and pass fail information for each test can be saved to a card or to a portable computer file via RS-232.

For additional information, refer to other sections in this brochure as well as the following literature:

- Technical Specifications: p/n 5965-1576E
- Configuration Guide: p/n 5965-1577E
- Price List: p/n 5965-1578EUS

PCS

PCS test solutions for TDMA and CDMA build on the successful cellular-band HP 8921A test solutions by adding the HP 83236A PCS Interface to extend testing to the U.S. PCS band (1850 to 1990 MHz)¹. (For GSM-based PCS infrastructure equipment testing, refer to HP 85722B literature [Special Option H19] part number 5091-9025E).

The HP 83236A PCS Interface translates 1850-1990 MHz PCS signals to the RF range of the HP 8921A, enabling the same TDMA and CDMA measurements performed by the solutions in the cellular band. Power measurements are performed directly in the HP 83236A to maximize power measurement accuracy and speed.

Adding the HP 83236A to existing HP 8921A systems is a cost-effective solution for PCS-band measurement capability. The HP 83236A can be combined with existing HP 8921A systems without returning them to the factory.

¹ Contact your local Hewlett-Packard sales representative for PSC solutions at other frequencies.



The HP 83236A is controlled via HP-IB for base station test. For manufacturing test, HP-IB commands written by the operator can be executed from an external controller, or from the IBASIC controller built into the HP 8921A. The HP 83224A IBASIC Developers Tool Kit is available for programmers who are new to IBASIC language programs for the HP 8921A. For more information on the Developers Tool Kit, refer to HP 83224A product overview, part number 5964-3897E.

PCS Test Solutions

U.S. PCS CDMA:

- HP 8921A
- HP 83205A Option 001
- HP 83236A

U.S. PCS TDMA:

- HP 8921A
- HP 83204A Option 001
- HP 83236A
- OR
- HP 8921D plus HP 83236A

For additional information, refer to other sections in this brochure as well as the following literature:

- Technical Specifications: p/n 5965-1576E
- Configuration Guide: p/n 5965-1577E
- Price List: p/n 5965-1578EUS

Application Support

Worldwide Support

The HP 8921A Cell Site Test Solution is backed with Hewlett-Packard warranty and worldwide support services. With Hewlett-Packard sales and service centers worldwide you can be assured of getting the global support you need.

On-line Support

In the U.S. and Canada, on-line technical support is a direct toll-free call to a factory technical representative. Outside the U.S.,

on-line support is obtained through your local Hewlett-Packard representative.

Training

Assure productive testing upon receipt of the HP 8921A/11807B with customer Start-up Assistance. Start-up Assistance (HP11807B +36H) should be ordered with the HP 8921A/11807B for all first-time operators. Start-up Assistance is a one-day, on-site class taught by an HP 8921A/11807B specialist. Course material demonstrates use of the software and hardware to ensure operators are productive from the time they receive the test equipment. HP 11807B Start-up Assistance should be scheduled with your

Hewlett-Packard field engineer to coordinate training with de-livery of hardware and software. Class size is limited to five or less students for efficient learning in a cell site environment.

Software Update Service

To be assured that you always have the most current version of the HP 11807B test software, order Software Update Services. With these services a new software card will be shipped to you whenever a revision to the package occurs. This service is ordered on a yearly basis. The advantage of the update service is knowing you will automatically receive the latest version of software as revisions are made.

Videos

Call the HP 8921A Information Line (1-800-344-3802) to get one of our free 40 minute videos showing AMPS/TACS/TDMA cell site testing with the HP 8921A/11807B.

- "Install and Maintain AT&T Cell Sites Fast" – p/n 1000-1304E
- "Optimize Motorola Cell Sites Fast" – p/n 1000-1307E
- "Install and Maintain Ericsson Cell Sites Fast" – p/n 1000-1297E

Literature

- "HP 8921A Cell Site Test Set, HP 11807B Cell Site Test Software, HP 83204A TDMA Cellular Adapter, HP 83205A CDMA Cellular Adapter, HP 83236A PCS Interface":
 - Technical Specifications – p/n 5965-1576E
 - Configuration Guide – p/n 5965-1577E
 - Price List – p/n 5965-1578EUS
- "HP 8921A/11807B Option 120 Call Analysis, Logging, and Monitoring Software" Product Overview – p/n 5963-6891EUS
- "HP 83236A PCS Interface" Product Overview – p/n 5964-9655E
- "HP 83224A IBASIC Developers Tool Kit for RF Communication Test Sets" Product Overview – p/n 5964-3897E
- "HP 8921A Cell Site Test Set for AMPS Base Station Testing" Product Note 8921-1 – p/n 5962-9475E
- "HP 8921A Cell Site Test Set for TACS Base Station Testing" Product Note 8921-2 – p/n 5962-0157E

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