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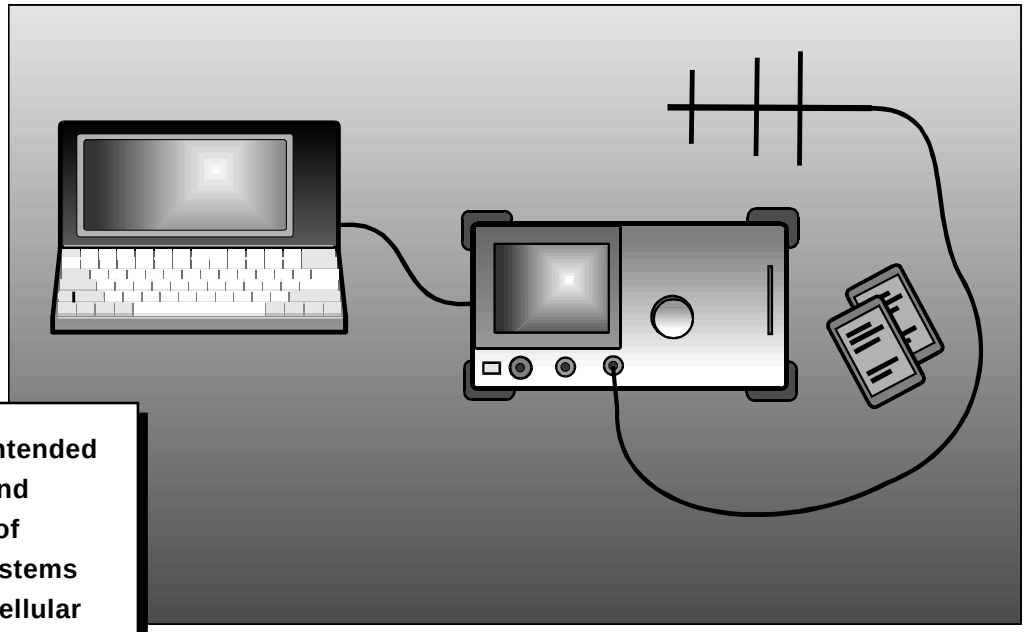
HP 8921A/D Cell Site Test Sets

HP 11807B Option 120 Call Analysis Logging and Monitoring Software

Product Overview

Software for AMPS System Analysis and Monitoring



This product is intended for the support and troubleshooting of AMPS cellular systems by providers of cellular services.

Hewlett-Packard sells this product only to service providers, manufacturers of cellular equipment, and law enforcement organizations.

Today's cellular networks present many challenges for those supporting these complex systems. Users of these services demand consistent operation with good voice quality. Constantly growing geographic coverage introduces new unknowns. Outside sources of interference jeopardize your revenue stream and customer satisfaction. You must provide regular maintenance and periodic troubleshooting yet keep your overall maintenance costs down.

The HP 8921A Cell Site Test Set has quickly become the standard in portable and rugged test equipment for cell site maintenance. Its automation of base station maintenance and optimization tests has dramatically decreased test times and improved repeatability. The high performance spectrum analyzer rivals many stand-alone units. Now even more capability is available with a software option that provides a wealth of AMPS data to the user.

Software for AMPS System Analysis and Monitoring

Overview

The HP 11807B Option 120 software is an IBASIC application that runs on the HP 8921A/D. It uses the sensitive receiver of the HP 8921 to monitor, decode, and display forward and reverse control channel data. Message content is continuously updated and used in following calls through setup and handoff sequences on voice channels.

Primary Functions of the Software

- Search for and list local AMPS control channels and their signal levels.
- Read and display system information from Forward Control Channel (FOCC) wideband data streams.
- Keep a running count of orders on the FOCC.
- Decode MIN information and associated orders from the FOCC.
- Follow call setups to a voice channel and through subsequent handoffs.
- Monitor mobile data transmissions on the reverse control channel (RECC).
- Measure cell site transmitter performance off-air.
- Measure phone transmitter characteristics off-air.

See the detailed descriptions beginning on page 3 for more information.

Benefits

- Gather valuable data to assist in system planning.
- Increase confidence in system performance.
- Measurement modes to reduce site maintenance time.
- Mobile measurements to improve customer satisfaction.

Software Features

Multiple Test Modes

The software provides seven different test modes for monitoring and troubleshooting various system problems. Use one or more to verify system performance or identify problems. The menu-driven interface allows you to change modes quickly.

Parametric Measurements

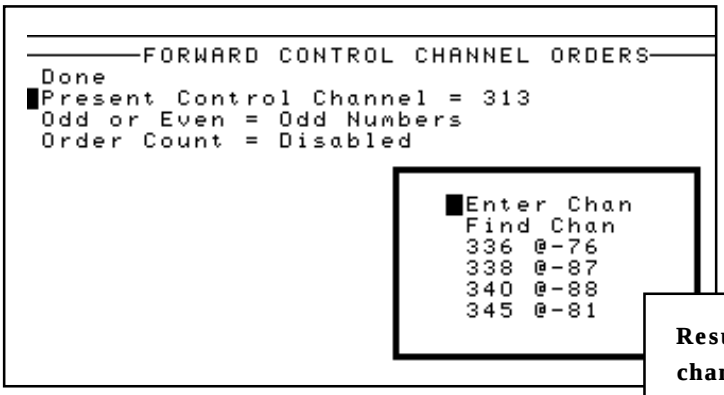
In addition to the decoded data displays, two of the test modes return parametric measurements of key transmitter performance for mobiles and base stations. These measurements help you identify performance problems on both base stations and mobile phones remotely.

Logging of Retrieved Data

Several test modes support logging of retrieved data. You may send results to a printer or log to a PC for archival and analysis. Results can be imported into many popular spreadsheet and database programs for post-processing.

Remote Control of the Test Set

For drive-around environments the test set can be accessed remotely via its serial port. It then presents the system menus on a terminal or PC with terminal software.



Results of control channel scan.

Forward Control Channel Information

This mode allows you to quickly identify control channels in your area. The HP 8921 scans either A or B spectrum, finding any control channels that meet a signal strength limit that you provide. The channels are displayed by number and level and are then selectable from any other screen.

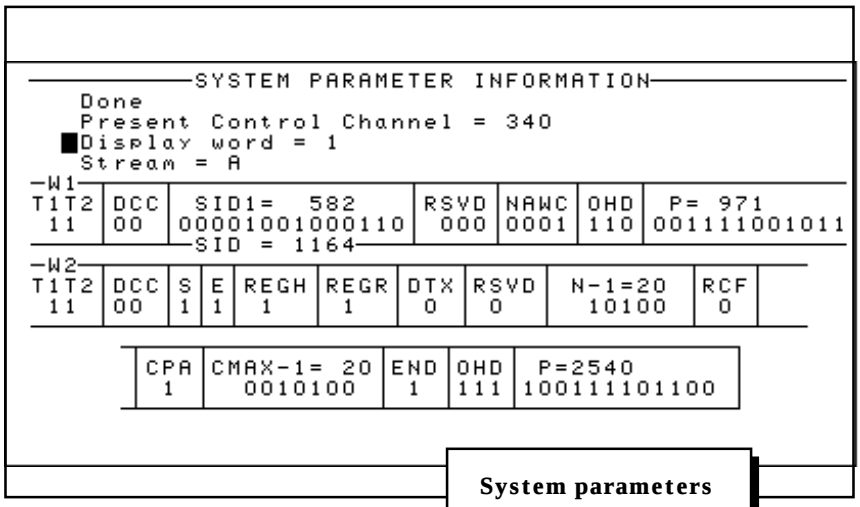
Once control channels are identified, you can select from any on the list and monitor the wide-band data stream. The software allows you to select specific types of data to monitor and then displays only the message content. Key fields are translated into decimal notation for easy reading. View stream A or stream B data and individual word content while a timer display shows the rate at which various message types are sent. You can select from the following message types:

System Parameters -

System ID (SID), digital color code (DCC), combined paging/ access (CPA), etc.

Control Filler -

Control mobile attenuation code (CMAC), overhead message type (OHD), and reserved bits.



System parameters message results - one of several message types available.

Registration ID -

(REGID) in decimal and binary, DCC, and END.

Global Action Messages -

Choose from re-scan, registration increment, new access channels, overload control, access type, and access attempt message types.

Test Modes

Forward Control Channel Order Count

It is often useful to monitor the *rate* at which various types of orders are being sent across the forward control channel. This order rate information helps you identify loading on system elements and can be used as a check for other analysis tools that study usage. The order count mode presents a single screen that tabulates the messages by type. A running total of pages, registrations, channel assignments, and other message types is maintained while a counter shows elapsed time.

```
————————FORWARD CONTROL CHANNEL ORDERS————————
    Done
    Present Control Channel = 340
    Odd or Even = Even Numbers
   █Order Count = Enabled
                                        ΔT=     2926  Secs
--------Forward Control Channel Activity----------
Page:    1687            Alert:
Local:     20            Other:
Reorder:        1        Audit:
DMS Page:                Release:
Intercept:        1      Stop Alert:
Maintenance:             Send Called-address:
Registration:■   247     Directed Retry-last:
FVC Assignment:    143
Directed Retry-not last:
```

Sample of order rate on FOCC after approximately 45 minutes.

You can quickly change from one control channel to another or re-enable the count on the same channel. Select from Stream A or Stream B data (not both).

Printed results from Log MIN function

		Initial voice channel = 173	14.48 030995
9)	555-1460	Registration	14.48 030995
09)	555-0776	Registration	14.48 030995
09)	555-3920	Registration	14.48 030995
509)	555-8176	Page	14.48 030995
509)	555-4372	Registration	14.48 030995
(509)	555-9232	Registration	14.48 030995
(509)	555-0138	Registration	14.48 030995
(125)	555-0076	Registration	14.48 030995
(509)	555-4898	Initial voice channel = 89	14.48 030995
(509)	555-9104	Page	14.48 030995
(509)	555-6532	Initial voice channel = 253	14.48 030995
(509)	555-5436	Page	14.48 030995
(509)	555-6748	Registration	14.48 030995
(509)	555-6350	Registration	14.48 030995
(509)	555-6068	Initial voice channel = 190	14.48 030995
(509)	555-6748	Initial voice channel = 5	14.49 030995
(509)	555-1828	Initial voice channel = 5	14.49 030995
(509)	555-0026	Registration	14.49 030995
(509)	555-4514	Page	14.49 030995
(509)	555-0544	Initial voice channel = 68	14.49 030995
(509)	555-0676	Initial voice channel = 295	14.49 030995
(509)	555-0544	Page	14.49 030995
(509)	555-2726	Registration	14.49 030995
(509)	555-8310	Registration	14.49 030995
(509)	555-6282	Registration	14.49 030995
(509)	555-6555	Registration	14.49 030995
(509)	555-9454	Registration	14.49 030995
(206)	555-3250	Registration	14.49 030995
(509)	555-5216	Registration	14.49 030995
(509)	555-3506	Registration	14.49 030995
(509)	555-0730	Registration	14.49 030995
(509)	555-8338	Initial voice channel = 274	14.49 030995
	555-2488		

Forward Control Channel Log MINs

This mode functions very much like the order count mode, except that rather than displaying a count of the orders it shows the order data in a running list. View the MIN along with the associated order information in a running stream of numbers. As this mode can generate much data, it has a logging function that allows you to print or store the results for archival or later analysis.

User Options in this Mode Include:

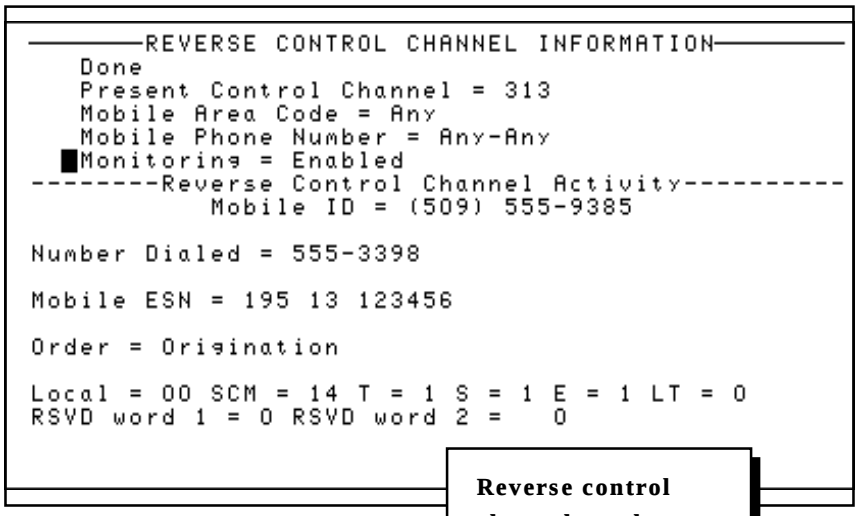
- Viewing of stream A or stream B orders (not both) and MINs.
- Choose to view all activity, specific area codes, phone prefixes, or even a specific MIN.
- Instant access to the spectrum analyzer, which then displays the control channel centered on-screen.
- Quick changes to other control channels.
- Logging output including time and date stamp.

Reverse Control Channel Data

This mode monitors the Reverse Control Channel (RECC) looking for responses from local mobiles. These responses are then decoded and the data is displayed on-screen. The information returned allows you to analyze local usage patterns and the mobile types in a given area (for example, power class and whether they support extended AMPS channels). This mode, too, can deliver a large amount of data so printouts and logging are available. Note: Voice following is not provided in this mode.

User Options in this Mode Include:

• Display of all recovered data or selection by area code, prefix, or even a specific MIN.

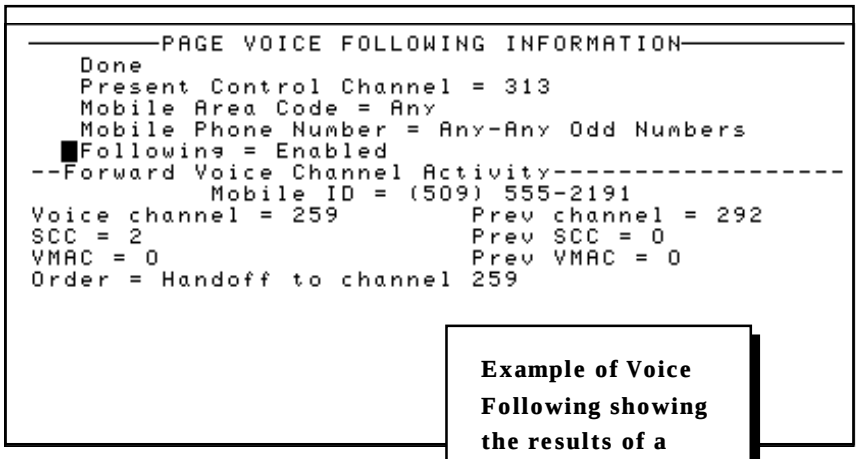


Reverse control channel result example from a mobile origination sequence

• Quick changes to other control channels.

• Logging mode setup for printer or file format.

• Quick selection of spectrum analyzer screen.



Example of Voice Following showing the results of a handoff sequence

Voice Following

For situations where voice quality is a concern, the software has a voice following mode to track call setup and monitor voice once established on a channel. It will follow calls through channel reassignments and handoffs and display the system data while the user monitors voice.

User Options in this Mode:

• Monitor stream A or stream B orders (not both).

• Follow all activity, a specific area code, phone prefix, or even a specific MIN. This can be particularly useful when used with your own phone to monitor your call setups and handoff activity.

• Quick switching between forward and reverse channels once a call is established.

• Instant access to the spectrum analyzer, which then displays the transmitter signal centered on-screen.

• Quick changes to other control channels.

Test Modes

Cell Site Measurements

This unique mode uses the call setup process to find active forward voice channels. Once on a channel, the test set makes key measurements of the cell site transmitter's performance and displays the results. After measurements are taken the test set returns to the control channel for the next frequency assignment. Using this mode you can perform checks on all voice channels at a given site — even multiple sites. Transmitters that are out of adjustment or having problems can be identified before visiting the site for maintenance.

Measurements Returned Are:

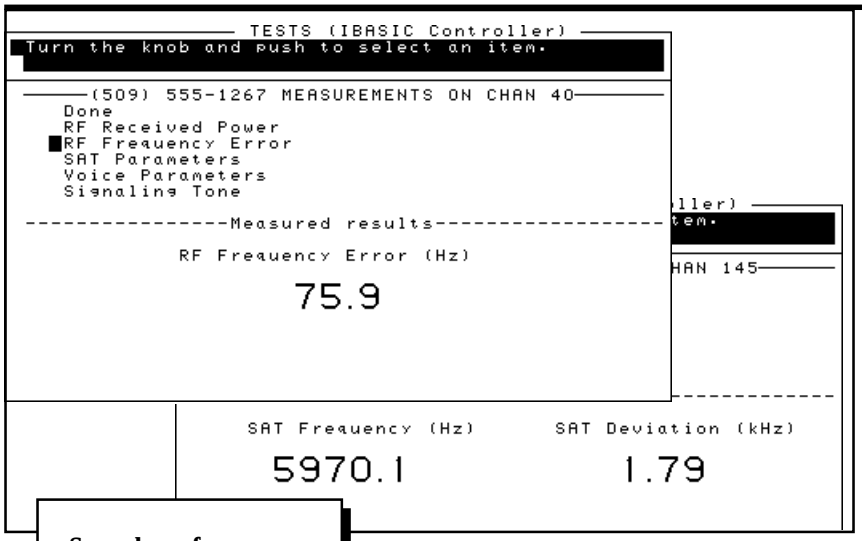
- Voice channel number
- Transmitter RF frequency error
- Transmitter RF level
- SAT frequency
- SAT deviation

Channel	SAT Freq (Hz)	SAT Dev (kHz)	Freq Error (Hz)	RF level (dBm)	Time	Date
1	6030.2	2	-11	-70	8.44	30895
1	6030.1	2	-9	-70	8.46	30895
1	6030.1	2	-9	-69	8.54	30895
1	6030.2	2	-18	-69	9.06	30895
1	6030.2	2	-26	-69	9.15	30895
1	6030.1	2	-26	-69	9.16	30895
1	6030.1	2	-31	-70	9.28	30895
1	6030.2	2	-31	-70	9.35	30895
5	6030.2	1.9	-3	-67	8.07	30895
5	6030.2	2	-105	-68	8.27	30895
5	6030.1	1.9	-126	-68	8.57	30895
5	6030.2	1.9	-104	-68	9.13	30895
5	6030.2	2	-80	-67	9.22	30895
5	6030.1	2	-84	-68	9.36	30895
5	6030.1	1.9	-85	-68	9.39	30895
5	6030.1	2	-79	-68	9.53	30895
22	6030.1	2.1	22	-69	6.34	30895
22	6030.1	2.1	26	-69	8.18	30895
22	6030.1	2	29	-72	8.31	30895
22	6030.2	2.1	30			30895
22	6030.2	2.1	19			30895
26	6030.1	2	144			30895

Results logged from Cell Site Measurements mode

User Options in this Mode:

- Channel selection by next assignment or manual entry (user enters channel number).
- Automatic or manual measurement mode (the test set can stay on a channel of interest and continually monitor transmitter performance).
- Quick selection of other control channels.
- Logging of data to a printer or PC.



Samples of measurements available for Mobile Phone testing

Mobile Phone Measurements

This parametric mode looks at mobile, rather than cell site, performance. It allows you to follow a mobile call setup and then make key measurements off-air of the phone's transmitter performance (reverse voice channel). This is useful when troubleshooting a phone and when a phone is newly-programmed for a system. The system will track the call setup and then allow you to select from several available measurements.

Measurements Available Are:

- Transmitter RF frequency error
- Transmitter RF level
- SAT frequency and deviation
- Voice deviation and distortion
- Signaling tone frequency and duration (on END of call)

User Options in this Mode:

- Call tracking by specific MIN or by area code or MIN prefix.
- Quick access to spectrum analyzer to see the phone's transmitted signal.

Specifications

A full set of specifications for the HP 8921A/D Cell Site Test Sets can be found in the HP 8921A/D Product Overview (p/n 5962-8091E).

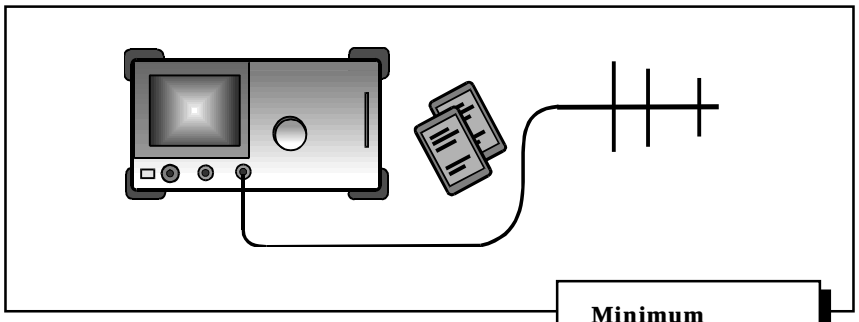
Configuration

Minimum Requirements for AMPS Call Analysis Are:

- HP 8921A/D Cell Site Test Set[1]
- HP 11807B Option 120 Call Analysis Logging and Monitoring Software.
- Antenna

Software Product Includes:

- AMPS Call Analysis, Logging, and Monitoring software on ROM card.
- 32k RAM card for storage of setup configuration.
- Reference manual (p/n 11807-10035).
- Firmware upgrade kit for HP 8921A (HP 8921A Option R58).
- Serial cable for logging or remote control use (p/n 08921-61038, RJ-11 to DB-9(f)).



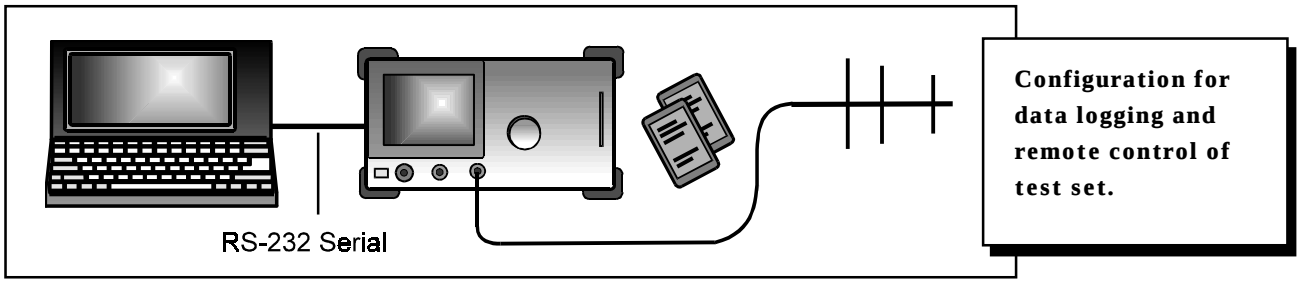
Minimum configuration for AMPS call analysis

Antenna(s)

The test mode performance can be enhanced by choosing an appropriate antenna. For example, a directional (Yagi) antenna works well for cell site measurements, while an omnidirectional antenna may be preferable when scanning for control channels. A simple telescoping BNC antenna often works in strong signal areas.

See the table on page 8 for examples of omni and directional antennas.

[1] Test set must have firmware revision of A.14.14 or greater.



Configuration for data logging and remote control of test set.

Optional Equipment

Printer

HP-IB, RS-232 or parallel[2] and interface cable for making records of recovered data.

PC

With at least one serial port[3] and interface cable (08921-61038; included with the Option 120 software) required for logging of results to a file and for remote control of the test set.

PC Software for Terminal Emulation

For use in logging of data to file and remote control applications. Examples: "Terminal" program under Windows™, ProComm, AdvanceLink for Windows™.

PC Software for Spreadsheet and/or Database Applications

For use in post-collection analysis and presentation. Examples: Lotus® 1-2-3®, Microsoft® Access 2.0, Excel®.

[2] Parallel interface provided on HP 8921As shipped after January 1995. Earlier units require adapter for parallel printer use.

[3] Two serial ports and two cables are required for *simultaneous* remote control and logging to PC.

Ordering Information Summary

This summary includes only products and options related to AMPS call analysis. Details on related base station test products, including solutions for TDMA and CDMA digital cell site equipment, can be found in the HP 8921A/D Product Overview (p/n 5962-8091E).

HP 8921A Cell Site Test Set

HP 11807B Cell Site Test Software

Option 120 AMPS Call Analysis Logging and Monitoring software

Related Products

For Automated Tests of Cell Site Equipment

Refer to the HP 8921A/D Cell Site Test Set product overview (p/n 5962-8091E) for complete information. This document describes other HP 11807B software options for automated tests of Motorola, GE, Ericsson, AT&T, and Northern Telecom AMPS, TACS, and TDMA cell-site transceivers.

For System Spectrum Monitoring

See the HP E4900 Spectrum Monitoring Systems designed for automatic spectrum monitoring and interference identification. These systems provide a number of measurement tools and many report formats. Literature: HP E4900A Spectrum Monitoring Systems Brochure (p/n 5962-9972E) and Technical Specifications (p/n 5963-2103E).

Typical antennas for use with AMPS call analysis software:

Type	Gain	Freq. Range	Size	Model/Supplier	Phone
4-element Yagi	6 dB	806-896 MHz	1 foot	Cushcraft PC804N	1-800-258-3860
3-element Yagi	6 dB	824-896 MHz	1.5 feet	Maxrad MYA-8783	For more info call 1(708) 372-6800
Small omni	3 dB	824-896 MHz	2.2 feet	Maxrad MFB-8823	
Portable omni	3 dBd	806-896 MHz	1.25 feet	Larsen FB2 800	For more info call 1-800-426-1656
Portable omni	5 dBd	806-896 MHz	1.80 feet	Larsen FB2 5T 800	

Accessories

08920-61051	CRT Sunshade
08920-61060	Antenna (BNC (m) telescoping)
08920-80027	DC Battery Pack (24V)
08920-80028	Battery Charger
1540-1130	HP 8921A Padded Carrying Case
08920-61147	HP 8921D Padded Carrying Case
08921-61039	Serial Printer Cable (RJ-11 to DB-25 (m); 3 meters)
C2950A	Parallel (Centronics) printer cable (2 meters)

Printers

Partial list of some supported printers in common use:

Model No.	Printer's Name
C2003A	LaserJet Series 4L
C2005A	LaserJet Series 4P
C2170A	DeskJet 520
C2633A	DeskWriter 320
C2114A	DeskJet 500C
C2168A	DeskJet 560C

Requesting a Demonstration

If you are interested in seeing a demonstration of the HP 11807B Option 120 software, contact your local Hewlett-Packard sales representative or call 1-800-344-3802 for assistance.

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