
Step by Step Testing Procedure for PCSI CDPD MDBS Radios

Product Note

Introduction

This document is intended to be used prior to and during demonstrations and training. After studying this material and the referenced supporting documents (p/n 5965-7060E, 5965-6326E, 5965-5187E) you should be able to test a PCSI MDBS. Step-by-step procedures are included for the following tests:

- **TX RF Parameters**
- **RX Sensitivity (iterative)**
- **Sniffer Sensitivity (iterative)**
- **Sniffer Activation Time**
- **Display PDUs**

Some tests, such as Cable Loss tests, are straightforward and are not described in this document.

Before you go to the site **Overview of hardware, software, and technology**

Familiarize yourself with the following hardware, software, system features and concepts:

Hardware

HP 8921A Test Set and HP 8320nx CDPD Adapter

- TESTS screen operation
- RF IN/OUT and ANT IN selection criteria
See "Test Parameters" for the "TX Port" step 2, page 6 for details about choosing the Test Set's input port.
- Firmware version (A.17.00 or above required)

- Interconnections
 - Demo mode interconnections display
 - Interconnect kit
 - Cellular adapter to Test Set connections
 - MDBS connections

CDPD MDBS Software*

- Using demo mode
 - Understanding the tests
 - Setting pass/fail limits
 - Setting parameters
 - Setting test sequence
 - Data collection
 - Saving test setups
- * See the *CDPD MDBS Cell Site Test Software* manual (HP p/n 83204-90014) for details about these and other operations/features.

Data Collection*

- Laptop with terminal emulator
 - RJ-11/DB-9 cable
- * See the *CDPD MDBS Cell Site Test Software* manual (HP p/n 83204-90014) for details about data collection to a PC.

CDPD Basics

- Busy/Idle operation
- Decode status operation
- Sniffer operation
- Acronyms and terms
- CDPD operations and terminology

PCSI MDBS Basics

- Power levels
- Location of transmitter connections
- Location of receiver connections
- Location of sniffer connections

Site Configuration

Hopping

- Dwell time _____
- Certain tests require at least 1 minute dwell time. Some require only 30 seconds. If dwell times are always less than 1 minute, use "set and measure" tests (see the *CDPD MDBS Cell Site Test Software User's Guide* for details.)
- Sniffer tests may reports inaccurate results if the radio hops channels during a test.
- Heavy AMPS traffic may cause short dwell times.

Busy/Idle set threshold

Dedicated PAs

Sniffer*

- Sniffer connected
- Sniffer connected to AMPS equipment but disabled
- Sniffer disconnected from AMPS equipment
- Sniffer diagnostics enabled

* See "Sniffer Basics" on page 3 of this document for more specific information about sniffer operation.

Pass/Fail limits for PCSI MDBS site

Reference Documents

- CDPD Troubleshooting Guide (5965-7060E)
- CDPD Technical Conceptual Overview (5965-6326E)
- CDPD MDBS Cell Site Test Software User's Guide (83204-90014)

Sniffer Basics Universal Sniffer

The Universal Sniffer input is used by the MDBS to shut down the transmitter when AMPS traffic comes up on the current MDBS channel. This port is sensitive and should be terminated with a 50 ohm load when not being used.

NOTE: Sniffer diagnostics may be enabled. If the transmitter shuts down when you disconnect the Sniffer from the AMPS equipment, you will need a work-around. A Directional Coupler (in the Return Loss and Cable Fault Test Kit) may be used in the sniffer input path. The software interconnect diagrams do not include a drawing for this setup (see Figure 1).

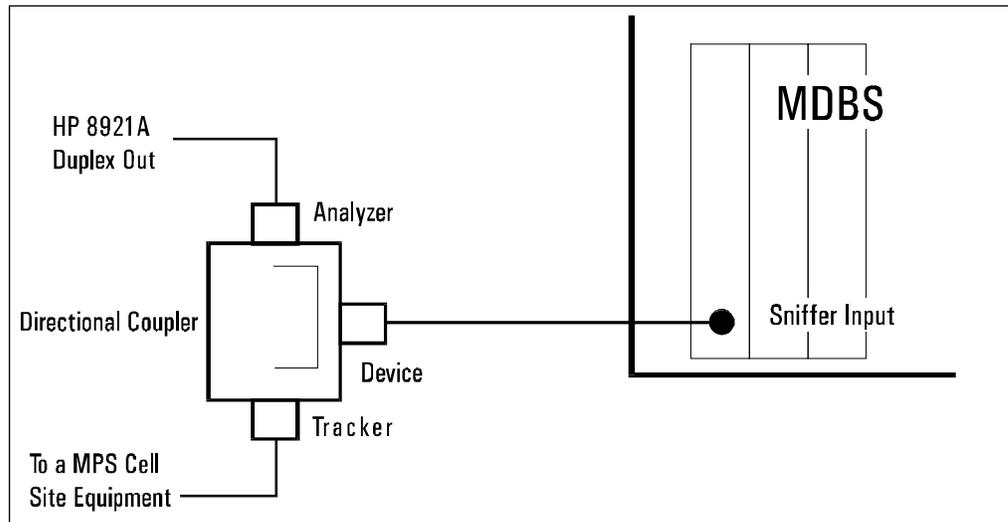


Figure 1: Interconnection Diagrams

Always follow this general rule: Never disconnect the Sniffer input with a cable attached between the MDDBS TX output and the AMPS/PA/Antenna equipment. Extremely serious interference may occur because the Sniffer cannot shut down the transmitter when AMPS traffic comes up at the site. Some sites may be hopping (for test purposes) in a generally dedicated-channel CDPD system.

PCSI MDDBS Basics

This section minimally describes what you need to know about the PCSI radios so you can test them. The PCSI MDDBS operates as a standalone set of radios (sometimes called "SNODEMs"). Each radio provides a single channel CDPD receive, transmit, and sniffer capability. The MDDBS radio takes up a vertical slot in a rack panel. There are typically at least three MDDBS radios in each rack; one radio is used for each of the antenna faces. One hopping or dedicated channel is assigned to each radio. Each radio usually provides a single channel stream to a group of M-ESs.

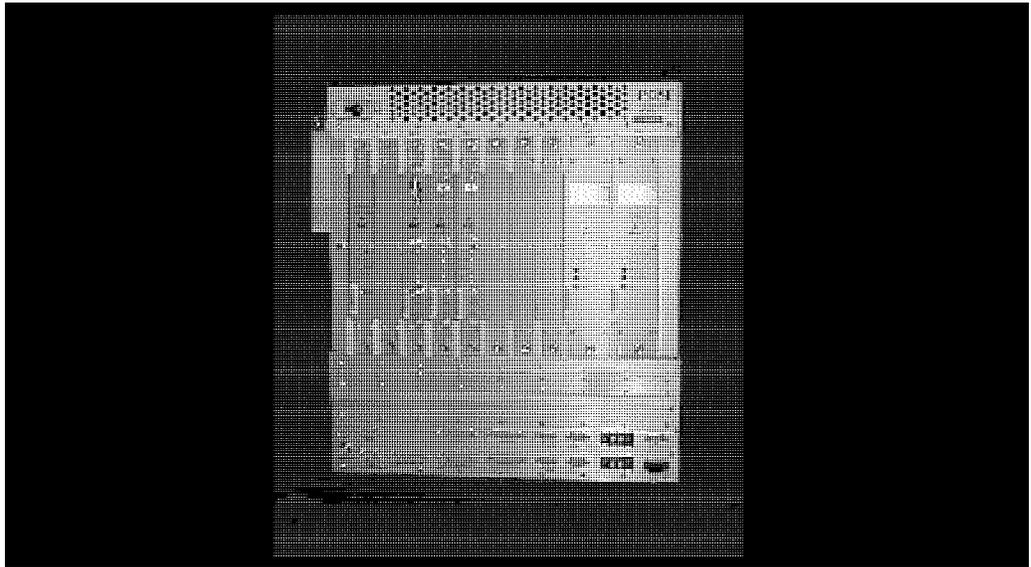


Figure 2: PCSI MDBS

Antenna face out of service

You will be taking the antenna face out of service, and you need to make connection at a point where only one signal is present. Typically, this is the MDBS TX SMA connector. The MDBS down-time may be as short as a few minutes for TX tests only; about five minutes for RX tests; about ten minutes for sniffer tests.

Things to take with you to the site

- CDPD software memory card (A.01.02 or greater)
- Antenna Sweep and Cable Fault test software memory card
- Laptop PC with terminal emulator program for data collection
- RJ-11/DB-9 cable (to use with terminal emulator)
- CDPD interconnection kit

Step-by-Step Procedure:

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General

Before you begin at the cell site:

- Disconnect cables from the HP 8921A Test Set that lead to the MDBS.
- Verify that the MDBS radio is operating properly while in service.
- Verify that you have the RF cables supplied with the CDPD interconnect kit, so the following procedure can be performed with default (or your own) cable loss values. This prevents having to spend time running cable loss tests.
- Load the CDPD software from the software memory card. Make sure that the factory-supplied procedure named CDPD is actually loaded, so default parameters and order of tests are properly chosen.
- If you want to use measured cable loss values, enter them into the RX Cable Loss and TX Cable Loss parameters now. Be careful to not subsequently overwrite your cable loss parameters by selecting the default CDPD procedure from the card. You can prevent this from inadvertently happening by not re-selecting a procedure in the main test screen.

Test Parameters:

TX port

Step-1

Decide which TX port of the base station you plan to test. Tests performed at the TX port of the MDDBS are straightforward. Verify that only one signal (the MDDBS TX signal) is present at the measurement point. Determine the TX combining and routing if you are testing at the output of a PA.

Step-2

Determine the power level at which you will run the test, then connect the Test Set to the cellular adapter as follows:

If Power level is 200 mW or greater;

If you are testing at a power level above 200 mW (typical at the PA) route the blue jumper cable between the HP 8921A's RF IN/OUT connector and the cellular adapter's RF IN/OUT to test set connector.

If Power level is below 200 mW;

If you are testing at a power level below 200 mW (typical at MDDBS SMA connector) route a gray jumper cable between the HP 8921A's ANT/ IN connector and the Cellular Adapter RF IN/OUT to test-set connector.

NOTE: Be extremely careful with subsequent connections to the cellular adapter RF IN/OUT. The attenuation between the two type N connectors is less than 1 dB. High power applied to the cellular adapter can damage the ANT IN port of the HP 8921A Test Set.

GN test set input port

Step-1

Set parameter 4, GN Test Set Input Port, to match the selection of the port you chose in the previous steps.

Busy/Idle parameter setup

Step-1 RX Busy/Idle setup (needed for receiver test)

Determine what the Busy/Idle set thresholds are for the antenna face you are testing. The values need to be referenced to the Busy/Idle threshold set level to the MDBS RX MAIN port. Default maximum and minimum levels are set from -90 dBm and -130 dBm. If you do not know this level, skip step 2 - 3, and proceed to RX Sensitivity parameter setup.

Step-2

Change parameter 6, RX Busy Set Threshold max level to test, to be 5 dB greater than the Busy/Idle Set threshold in parameter 7 , RX Busy Set Threshold min level to test.

Step-3

Set RX Busy Set Threshold min level to test, to be 5 dB less than the Busy/Idle Set Threshold.

RX sensitivity parameter setup

Step-1 RX Sensitivity parameter setup (needed for receiver test)

Change the parameters 14 RX Sensitivity max level to test to match parameter 6 (Busy Set parameter setup).

Change the parameters 15 RX Sensitivity min level to test to match parameter 7 (Busy Set parameter setup).

NOTE: If the actual MDBS Busy Set level is not in the range of the minimum to maximum parameters, the test will return a message. Read the message; it may indicate which parameter to change. Try other min and max values. See the *Troubleshooting Guide (p/n 5965-7060E)* if problems occur.

CDPD test procedure:

Software setup

Step-1

Run the CDPD software by selecting (k1) Run Test.

Software power calibration procedure

Step-1

If the software starts a power calibration procedure, make connections as shown on the screen.

Step-2

If the test fails ("F" in the right column), stop the test, check connections, and re-run the software.

Step-3

Proceed with testing only when power calibration passes.

Transmitter tests

Step-1

Select (k1) Transmitter Tests when the Main Menu of tests appears on the display.

Step-2

Select (k1) RF Parameters (power, frequency, and so forth).

Step-3

Make connections as shown in the connection diagram displayed by the software.
Press (k2) Continue.

Step-4

Disconnect the MDDBS TX output from the AMPS equipment.

Step-5

Disconnect the MDDBS Sniffer input from the AMPS equipment. Do not disconnect any cables from any other MDDBS radios.

Transmitter shut down

Step-1

If the transmitter shuts down with the Sniffer disconnected, if a red fault light illuminates, or operation seems to change with the Sniffer disconnected, see the *Troubleshooting Guide* (HP p/n 5965-7060E) for resolution.

Step-2

Repeat the "Transmitter Tests" steps and operate the test set manually to verify that power is being shut down by the Sniffer disconnection.

Step-3

Leave the Sniffer connected if the problem persists. You will be able to perform all tests except Sniffer tests.

Finding a signal

Step-1

The test will iterate to first find a signal. Verify that it is a valid CDPD signal, and then measure RF parameters.

Step-2

If you do not see test results, look up the potential problem in the *Troubleshooting Guide*.

Step-3

If you cannot fix the problem, try another MDBS radio.

Step-4

When the software has displayed several iterations of transmitter tests, press Menu (k1) and select (k5) Previous Menu.

RX sensitivity

Step-1

Select (k2) Receiver Tests.

Step-2

Select (k4) RX sensitivity (iterative method).

Step-3

Make connections as shown in the connection diagram displayed by the software. Follow the connection diagrams exactly; you may be asked to first disconnect connections for a GMSK calibration.

Step-4

Check the progress of the program as the binary scheme determines the final value for sensitivity. This information will be displayed in the top-left line of the CRT display.

Step-5

If the test does not return a sensitivity measurement, see "Busy/Idle parameter setup" page 7. Also consult the *Troubleshooting Guide*.

NOTE: The busy set level in the PCSI MDBS may not have immediately "taken." The measurement of Sensitivity may be better than the level the provider has set into the Busy Set threshold. See the *Troubleshooting Guide* for details.

Step-6

When the software has displayed several iterations of receiver sensitivity, press (k1) Menu.

Step-7

Select (k5) Previous Menu.

Sniffer sensitivity

Step-1

Select (k3) System Tests.

Step-2

Select (k1) Sniffer Tests.

Step-3

Select (k2) Sniffer Sensitivity (iterative method).

Step-4

Connect cables as shown in the connect diagram displayed by the software. The Sniffer should already have been disconnected and the input terminated, if Sniffer diagnostics are not enabled. See the *Troubleshooting Guide* if Sniffer diagnostics are enabled.

NOTE: If you are applying high power to the Test Set, using the RF IN/OUT port, some of the Sniffer tests will run differently, for example, RF IN/OUT TX Power before and after shutdown are not reported. If possible, use the ANT IN port when performing Sniffer tests. The isolation between the DUPLEX OUT and ANT IN port is much better. If you use the RF IN/OUT port, see the *Troubleshooting Guide* for comments about Sniffer tests; you may need to use a 50 dB pad.

Step-5

Observe the measurement results.

Step-6

When the test has displayed at least one iteration of Sniffer Sensitivity, press (k5) Menu.

NOTE:

1. If frequency hopping is being used, that is, the CDPD channel hops after Sniffer-induced shutdown, the "TX Power after hopping" measurement result may report a higher than expected power. This is because RF power is still being applied to the Test Set and the noise floor of the measurement is degraded.

2. If frequency hopping is being used, this test may report an incorrect Sniffer Sensitivity because the software interprets the MD-IS-commanded channel hop as Sniffer-induced.

Sniffer activation time

Step-1

Select Sniffer Activation Time.

Step-2

Make connections. The drawings in the software are schematic only. Place the BNC tee on either the External Modulation Input or the External Scope Trigger Input so you do not need a BNC barrel.

Step-3

When the test has displayed at least one iteration of Sniffer Sensitivity, press (k1) Menu.

Step-4

Restore the connections to the original configuration. Follow the connection drawing and instructions.

Step-5

Select (k5) Previous Menu.

Display PDUs

Step-1

Select Display PDUs.

Step-2

Make connections.

Step-3

Select "All of the above PDUs" from the PDU Display Menu. All received PDUs (except Switch Channels PDU) will be displayed. Press the CANCEL key if you want to look at the contents of a message. Then press (k2) Continue.

NOTE:

1. The software will only display PDUs included in CDPD System release 1.1. Revision 1.0 messages such as XID are not displayed.

2. The software does not recognize a second CSI on a face; the Next CSI softkey is reserved for a possible future release that handles multiple CDPD signals on a face.

Step-4

Press (k1) Menu.

Step-5

Select (k5) Previous Menu.

Step-6

Select (k5) End this Program.

Reconnect the base station to the AMPS equipment

Step-1

Restore the equipment to the correct state.

NOTE: Reconnect the Sniffer to the AMPS equipment before reconnecting the CDPD TX to the AMPS equipment.

For more information on Hewlett-Packard Test & Measurement products, applications or services please call your local Hewlett-Packard sales offices. A current listing is available via Web through **AccessHP** at <http://www.hp.com>.

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