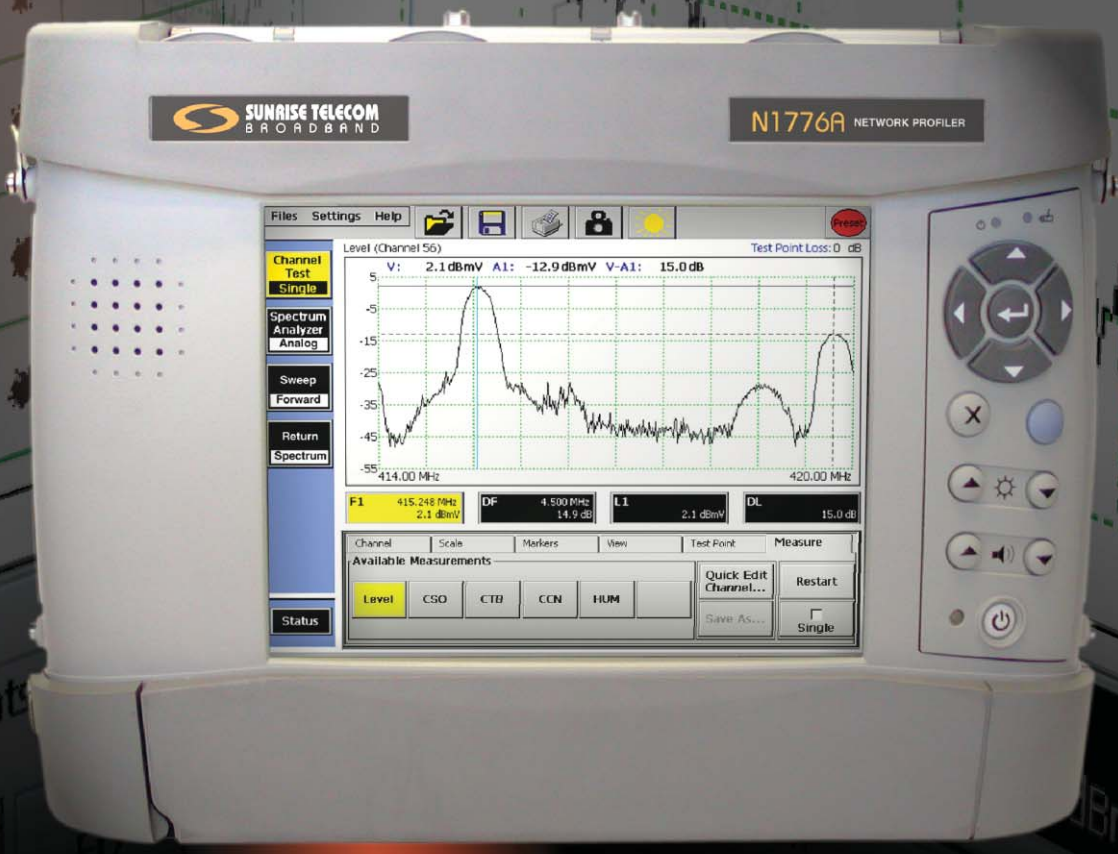
CaLan N1776A Network Profiler



SUNRISE TELECOM BROADBAND

User Manual

CaLan N1776A
Network Profiler

User Manual

Version 2.1
November 2003

SUNRISE TELECOM
BROADBAND

Part number: N1776A-M01

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Warning!

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Safety Notices

Observe the following safety precautions whenever you operate the CaLan N1776A Network Profiler. Failure to comply with these and other specific warnings and cautions in this manual is a violation of Sunrise Telecom Broadband's safety standards of design, manufacturing, and intended use of the test module.

Sunrise Telecom Broadband assumes no liability for the operator's failure to comply with these precautions.

Product Damage

Danger! Do not use this product if it shows visible damage, fails to perform, has been stored in unfavorable conditions, or has been subject to severe transportation stresses. Make the product inoperative and secure it against any unintended operation. Contact your Sunrise Telecom Broadband representative for assistance.

Explosion Hazard

Danger! Do not operate the instrument in the presence of flammable gases or fumes.

Electric Shock Hazard

Danger! To avoid the possibility of severe injury or death, observe the following precautions when using the N1776A CaLan Network Profiler:

Do not remove the system covers, and do not perform electrical tests if there are signs of shipping damage to the outer enclosure.

When connecting test cables to a line, do not touch the cable's metal contact points, or allow the cable leads to touch each other.

Symbols

The following are general definitions of safety symbols used on equipment and in manuals.

 Dangerous voltage.

 Protective ground.

 Frame or chassis ground.

 Alternating current.

 Direct current.

 Alternating or direct current.

 Caution! Read the manual.

Warranty

Sunrise products are warranted against defects in materials and workmanship for a period of 2 years from date of sale. Sunrise agrees to repair or replace any assembly or component found to be defective under normal use during this period. The obligation under this warranty is limited solely to repairing the instrument that proves to be defective within the scope of the warranty when returned to the factory. Transport costs to the factory are to be prepaid by the customer.

Sunrise assumes no liability for secondary charges or consequential damages and, in any event, Sunrise's liability for breach of contract, shall not exceed the purchase price of the products shipped and against which a claim is made.

Any application recommendation made by Sunrise for the use of its products are based upon tests believed to be reliable and accurate, but Sunrise makes no warranty for the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Sunrise any liability in connection with the sale of our products other than set forth herein.

Repairs and/or calibration is typically completed in 5 to 10 working days. Shipping costs are paid by the factory only when returning equipment to a customer following warranty repair. It is the responsibility the customer to notify the factory technical support persons prior to shipping products for servicing, since many times problems may be solved over the telephone, saving the user more precious time and shipping costs. Sunrise maintains regular office hours from 8:00 AM to 5:00 PM Eastern time, Monday through Friday. A toll free 800 number and e-mail address for technical and sales support are provided below:

North America Toll Free: (800) 297-9726
International: 1-514-725-6652

E-mail address for Sales or Technical Support: catv@sunrisetelecom.com

Typical warranty on our products covers all parts and labor, as well as software and required hardware updates. The warranty period starts from the day the equipment is delivered, however, Sunrise extends a grace period of 60 days after the end of the official warranty period to cover any contingencies. Please note that the warranty period for rechargeable batteries is three months and the grace period does not apply.

GETTING STARTED

Receiving & Unpacking

The CaLan N1776A Network Profiler is carefully packed at the factory in a shipping container specially designed to prevent damage during transportation.

The original Sunrise shipping container and packing materials should be saved since they may be needed for long-term storage and for protecting the unit if it must be moved long distances.

1. Inspect the shipping container prior to accepting delivery. If any exterior damages are present, notify the transport carrier immediately. Sunrise is not responsible for damage caused during shipping.

2. Carefully open the shipping container without destroying it. Verify the contents of the package. Each container should have the following:

    1 N1776A Network Profiler

    1 AC/DC adapter with power cord

    1 User's Manual

    1 Soft protective carrying case

    1 Stylus

    1 RS232 Null modem cable

3. Unpack the N1776A and inspect it for damage.

4. Test the operability of the N1776A. If you discover damage or operational defects, notify your Sunrise representative for instructions on how to proceed.

Note: If the equipment has to be returned to an authorized Sunrise service center, carefully repackage it in the original shipping container and then contact Sunrise's customer service department to obtain a Return Materials Authorization (RMA) number and proper shipping instructions.

SUNRISE TELECOM
INCORPORATED

DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name:	Sunrise Telecom Inc.
Manufacturer's Address:	Corporate Head Office 302 Enzo Drive San Jose, CA 95138 USA
Manufacturer's Telephone Number:	TEL: (408) 363-8000 FAX: (408) 363-8313
Equipment Type/Environment:	Measurement, Control and Laboratory Equipment
Trade Name/Model Number:	Calan Network Profiler N1776A

Standard(s) to which Conformity is Declared:

Safety:	IEC 1010-1:1990+A1/EN 61010-1:1993 Can/CSA-C22.2 No. 1010.1-92
EMC:	CISPR 11:1990/EN 55011:1991 Group 1, Class A IEC 801-2:1984/EN 50082-1:1992 4kV CD, 8 kV AD IEC 801-3:1984/EN 50082-1:1992 3V/m, 27-500 MHz IEC 801-4:1988/EN 50082-1:1992 0.5kV Signal Lines, 1kV Power Lines IEC 1000-3-2:1995/EN 61000-3-2:1995 IEC 1000-3-3:1994/EN 61000-3-3:1995

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE-marking accordingly.

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Declared By

Signature:

Full Name: Dennis Koo

Position: VP, Quality

Company: Sunrise Telecom Inc.

Address: 302 Enzo Drive
San Jose, CA 95138 USA

Telephone: (408) 363-8000

Facsimile: (408) 363-8313

Date: 13 August 2002

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Chapter 9, *Maintaining and Managing Your Data*

How to store and review test data, make screen captures, back up data, and communicate with other instruments and equipment.

Chapter 10, *Test points, Locations, and Channel Plans*

How to use the Channel Plan, Test Point File, and Location File editors.

Chapter 11, *Using Windows CE*

How to use essential components of the Windows CE operating system, including Windows Explorer, the Start menu, and the Taskbar.

Chapter 12, *Power Management*

How to use the external power adapters, set power-conservation ("idle-time") delays, recharge the battery, and replace the battery.

Chapter 13, *Maintenance and Care*

How to recalibrate the stylus, self-calibrate the Network Profiler, and take care of the unit and its accessories.

About this Version

This version of the *CaLan N1776A Network Profiler User's Manual* applies to Firmware Release 2 units only. Be sure to refer to any user's manual supplements or release notes that came with your unit. For assistance, call Sunrise Telecom Customer Care: in North America at 1-800-297-9726; from other countries at 1-514-725-6652. You may also consult our website at www.sunrisetelecom.com/broadband

Printing history

Version	Release date	Notes
Sunrise edition 1.0		*jmg*
Release 2		*jmg*
2.1		

What you should know before you start

You should be familiar with the basic functions of the Windows interface: the mouse and its pointer; directories and folders; menus; saving, opening, copying, and moving files.

Typographic conventions used in this manual

Equipment labels, touchscreen and keypad button labels, and text displayed on the screen are shown in **boldface**.

Menu item selection is shown in boldface as a sequence of steps separated by right angle brackets. Example:

select **File > Open**

means "touch the **File** menu heading, then touch **Open**".

1

The Network Profiler at a Glance

Purpose and functions

The CaLan N1776A Network Profiler is a portable instrument that combines the functions of a spectrum analyzer and a digital modulation analyzer for measuring levels, distortion, and other aspects of both analog and digital channels in a CATV network. It is powered by a lithium-ion “smart” battery, and has a built-in battery charger. An external AC adapter supplies DC power for Network Profiler operation and for the internal charger. (A 12 Vdc car adapter is also available.)

Measurement Modules

The Network Profiler’s functions comprise a spectrum analyzer and two software modules for performing these additional measurements:

CATV module:

- Analog channel signal levels, distortion, and hum
- Digital channel average power, QAM modulation, and equalizer taps
- Multi-channel carrier levels
- Channel scan of visual and aural carrier levels

Dual-path Sweep module (Option 052):

- Forward and reverse sweep
- Return spectrum

Note: The Dual-path Sweep module is now standard on the Network Profiler. If you have an older unit on which this module is not enabled, you must return the unit to Sunrise Telecom Broadband for recalibration, at which time the module will be enabled. This can also be done on 3010H and 3010R units with firmware version 4.0 or later.

The channel-test measurements can use predefined or user-defined channel plans, test point files, and location data. You can save test results at any point to preserve a record of your work.

Digital IF Annex Options

The following three hardware options are available for the Network Profiler:

- Option 011 Annex A
- Option 010 Annex B
- Option 012 Annex C

Supporting functions

The screen-capture utility allows the user to take a snapshot of the display at any time, automatically saving it internally or on an inserted PC Card.

A serial link allows the Network Profiler to exchange files and data with a computer.

Internet or LAN access allows the Network Profiler to exchange information with other stations on a computer network.

Built-in editors allow the user to modify a channel plan and to create or modify test point files and location data.

Operating environment

The Network Profiler runs in the Windows CE® operating system. Channel plans, test point files, location files, and test results are stored in an internal memory, whose state is maintained by the battery between uses. Additional

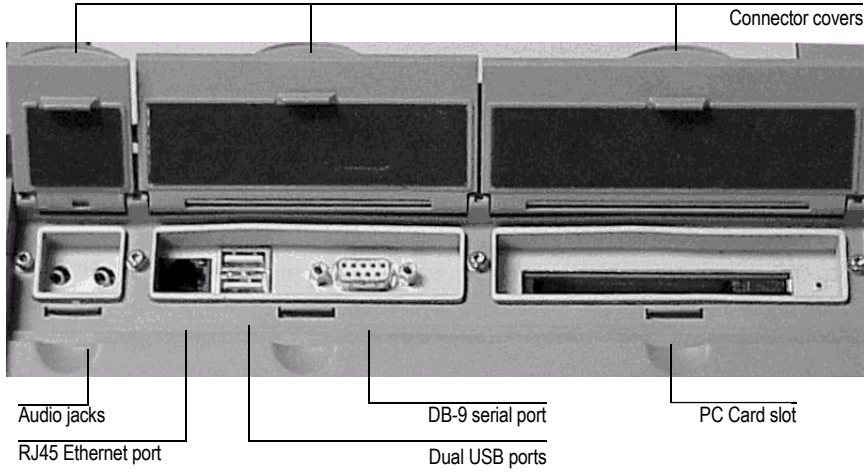
data files can be stored on a flash-memory card inserted in the PC card slot on the top of the unit.

A selection of Windows CE applications is accessible from the START menu, as described in Chapter 11, *Using Windows CE*.

Connectors and ports

There are two rows of connectors on the top of the Network Profiler. Those in front are protected by hinged, gasketed covers.

Front row



Audio in and out

The audio jacks are under the left cover. Plug a set of headphones into the **Audio Out** jack to monitor the aural carrier. (The **Audio In** jack is currently in reserve.)

10baseT Ethernet connector (RJ-45)

This is the leftmost connector under the middle cover. It is used to connect to a LAN or other network.

Dual USB port

Use these connectors for accessories such as a keyboard, mouse, external disk drive, or printer.

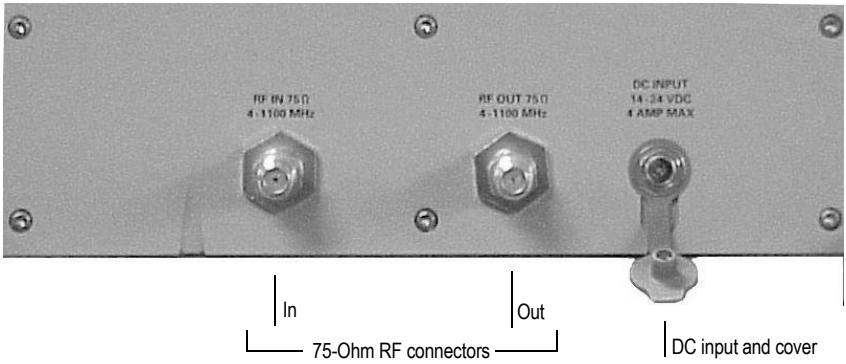
RS-232 serial port (DB-9)

Use this to connect to a serial COM port on a PC.

PC Card (PCMCIA) slot

Under the right cover is a Type II PC Card slot, which can hold a flash-memory card for storing test results, screen captures, and ordinary Windows files.

Back row



RF In and RF Out

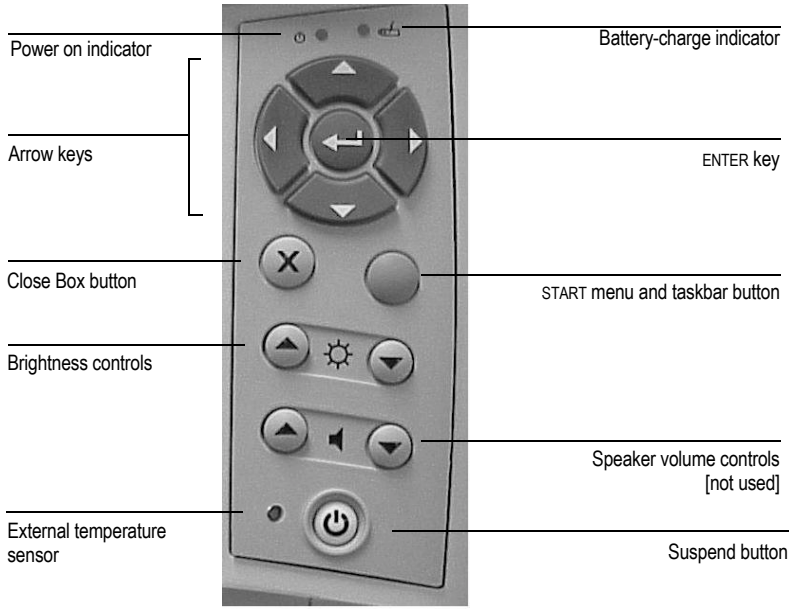
These are the RF test connections. They accept standard 75-ohm Type F connectors. Field-replaceable 75-ohm BNC connectors (Part No. SB155) are available as an option.

DC Input

Plug a power adapter into this connector to recharge the battery or to operate the unit from external power. An attached cover protects the connector when it's not in use.

Keypad controls and indicators

These are to the right of the display screen.



Power (⏻) and battery-charge ( ) indicators

The green Power indicator is lit when the unit is on. The red battery-charge indicator is lit only when the unit is in Suspend mode. It flashes while the battery is being charged, and is steady when the battery is fully charged.
See *Maintaining the battery*, page 12–9, for information.

Arrow (◀ ▶ ▲ ▼) and ENTER (↵) keys

During a test, use the arrow keys to precisely position markers
(see *Navigating with the keypad*, page 2–3).

Use the **ENTER** key as an alternative whenever a box with an ENTER or OK button is active.

In the Windows CE environment, use these keys as you would the arrow and ENTER keys on a PC keyboard.

Windows CE buttons

Start/Taskbar

Pressing this blue button brings up the Windows CE **Start** menu and, if it is hidden, the taskbar. You can then use the stylus or the arrow and ENTER keys to select and execute a Windows CE application. The taskbar and basic Windows CE operations are described in the section, *Start Menu and Taskbar*, page 2–11.

Close Window (×)

Pressing this button will close most Windows CE dialog boxes, and is equivalent to touching the × in the upper right corner of the box. (You can't, however, use this button to close an application window.)

Brightness (☼) adjustment

These buttons control the brightness level of the display.

Note: The **Volume** buttons (🔊), formerly used to control the loudness of demodulated audio, are no longer functional. Volume is now controlled by a software slider on the Spectrum Analyzer's Marker tab. See *Other test controls*, page 4–7

Suspend button (⏻)

In normal use, the Network Profiler never shuts off completely. Instead, pressing this button puts the unit into Suspend Mode: the backlight and power-supply board are turned off, but the battery continues to maintain the state of internal RAM. This requires only a tiny bit of energy, so the Network Profiler can remain in Suspend mode for up to 60 days before the battery needs to be recharged. You may press **Suspend** at any time; it isn't necessary to exit the Profiler application.

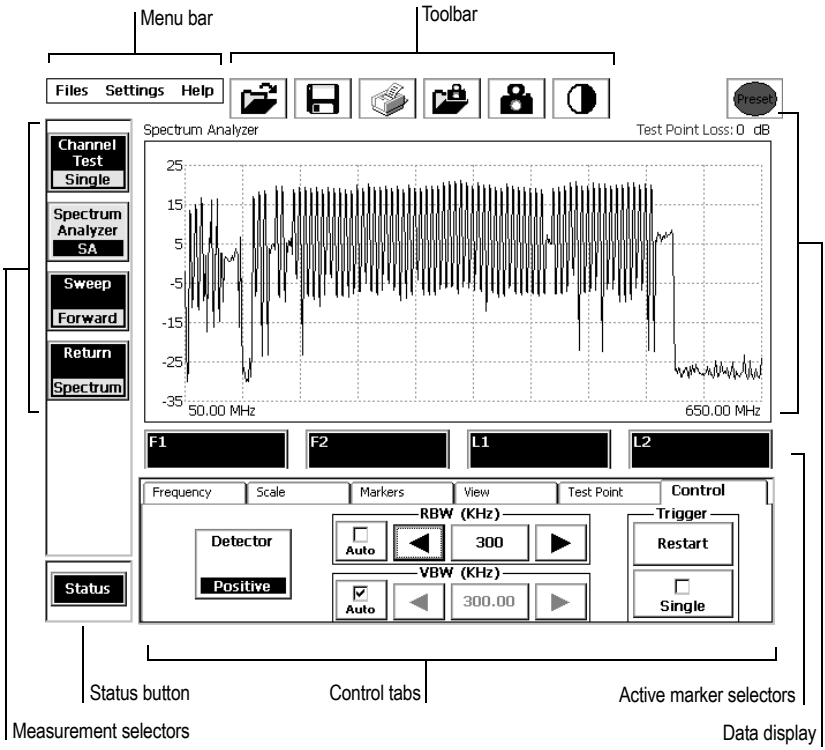
When you press the Suspend button again, the Network Profiler automatically returns to its last previous state, usually the last test it was running.

External temperature sensor

The external temperature is reported, along with the internal temperature of the unit, in the **About...** box. See *About the N1776A*, page 3–7.

Touchscreen display

The backlit LCD display incorporates a resistive touchscreen that allows you to use the included stylus, a finger, or any other suitable pointing tool to control the Network Profiler's operation.



Menus

The three menu headings at the top left of the screen give access to functions that apply to the operations of the Network Profiler as a whole, rather than just one test or measurement group. They are described in Chapter 3, *Getting Started: The Test Display*.

Toolbar

To the right of the menus are six buttons with icons. From the left, the first five buttons let you view test results, save test results, print screen data, view screen captures, and make a screen capture. The fifth button switches the

data display between the normal white-on-black color palette and the black-on-white “daylight” palette for use in bright sunlight.

Preset

Touching the red **Preset** button in the upper right corner of the screen restores most test controls to their default state. For a detailed description, see *When you have to start over*, page 3–20.

Measurement selectors

The buttons at the left edge of the screen select the type of measurement: **Channel Tests**, **Spectrum Analyzer**, **Sweep**, or **Return Spectrum**. The **Channel Test** button gives you a menu of three choices: **Single**, **Multi**, and **Scan**. The **Sweep** button gives you a menu of two choices: **Forward** or **Return**.

All these measurements are described in Chapters 3, 4, and 5.

Status toggle

Touching this button clears a space below the data display for status information related to the current measurement.

Data display

The top line identifies the current measurement type (and channel, when applicable) and test-point loss setting. If a test-point file is in use, its name appears at the right.

The main display area consists of the current test data and results. The data may be in the form of a signal trace, a digital QAM constellation, a bar graph, or a carrier scan. Markers can be positioned to provide measurement data at precise points in the display.

Active marker selectors

Each of the large buttons below the main data display selects one of the markers to make it active. A marker can be moved only when it is active.

Control tabs

These tabs provide controls for all test parameters, which vary according to the test in progress. Their uses aredescribed in Chapters 3, 4, and 5.

Windows CE taskbar and Start menu

These (not shown in the figure) are described in *Start Menu and Taskbar*, page 2–11, and in Chapter 11, *Using Windows CE*.

Other components and accessories

Speaker

The speaker is in the left front panel. It provides the “click” when you touch the screen, and lets you hear the demodulated audio carrier when running the spectrum analyzer.

Battery

The Network Profiler is powered by a 10.8V, 5000 mA-hr, Lithium-ion “Smart” battery that fits into a compartment in the lower left side of the Network Profiler. See Chapter 12, *Power Management*, for instructions on charging, removing, and replacing the battery.

Desktop charger (optional)

A standalone charger and reconditioner that can accommodate two Network Profiler batteries is available separately. Its use is described in Chapter 12, *Power Management*.

External power adapters

Two adapters for using external power are available:

AC adapter: This plugs into a 100-240 Vac outlet. It is supplied with the Network Profiler.

Car (12V) adapter: This optional adapter plugs into a 12 Vdc outlet, such as the accessory socket of an automobile or truck.

Use of these adapters is described in Chapter 12, *Power Management*.

Carrying strap

Use the attached strap to remove the Network Profiler from its case and carry it about.

Carrying case

The carrying case is designed so that the Network Profiler can be used without removing it from the case. A drop-down panel, secured with hook-and-loop fasteners, gives access to the front of the unit:

An opening in the top of the case allows cables to be attached to the RF connectors and the AC adapter socket. The top itself may be unzipped to gain access to the other I/O ports and PC Card slot, or to remove the unit from the case:

At the rear of the case is a large compartment with pockets for the external charger, cables and connectors, papers, and other useful items:

On the lower left side of the case, a cover secured with hook-and-loop fasteners drops down for access to the battery compartment.

There is a sheath for the stylus on the right side of the case.

The included karrabiner (snap-link) makes it easy to carry the unit as a back-pack or to hang it securely over a cable:

2

Getting Started: Touchscreen Basics

"Clicking" and navigating the screen

The Network Profiler's touchscreen is resistive; you can use it when wearing gloves, with the included stylus, or with any other suitable non-abrasive pointing device, such as the eraser end of a pencil or even a toothpick. Keep in mind, though, that a pointer with a smaller tip requires less pressure; take care not to use anything that could damage or mark the face of the screen.

Caution: Do not use metal objects such as a ball point pen or a screwdriver as a pointing device. These could damage the touchscreen.

Your pointing device, whether it's a finger or a stylus, has some of the properties of a computer's mouse pointer (the little arrow that runs around the screen as you move your mouse). Whenever and wherever you touch the screen, you will hear a click from the speaker.

Touching a button, menu, or tab is equivalent to clicking a mouse button with the pointer over that item. Examples:

- To select a control tab, touch its label.
- To select a menu item, touch the menu label, then the item. In the following chapters, an instruction to select a menu item is shown in boldface as a sequence of steps separated by right angle brackets, thus:

  "select **File > Open**"
- This means "touch the **File** menu heading, then touch **Open**".
- To reposition an active marker, touch the data display; the marker will instantly move to that point.

To confirm the touch, a button will look as though it has been pressed, while a menu item will be *highlighted*, that is, it changes appearance to show that it has been selected. In most cases, this means that its colors will be reversed (see example on page 2–5).

Almost all Network Profiler operations take effect with a single touch.

The touchscreen in Windows CE

When you touch an icon, menu, or filename in a Windows CE application such as Explorer, the item is highlighted. "Double-tapping" an item, that is, touching it twice in quick succession, is equivalent to double-clicking a mouse button – it executes the action associated with the item.

If the touchscreen fails to respond normally, you can recalibrate it. See Chapter 13, *Maintenance and Care*, for instructions.

Navigating with the keypad

In a Windows CE application, the arrow and ENTER keys on the keypad behave like those on a standard computer keyboard. Use the arrows to scroll through menus and other lists, and ENTER to perform the action associated with a highlighted item.

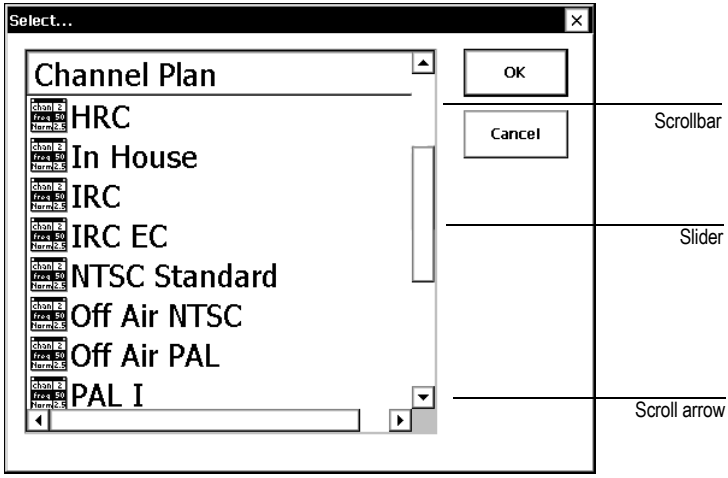
In the Network Profiler application, you can use the arrow keys to fine-tune the position of the active marker, and to scroll through lists when using the channel-plan, test point, and location editors. Use ENTER to execute the action indicated by an **Enter**, **Save**, **Close**, **Done**, or **OK** button in a dialog box, as described in the next section.

Dialog boxes

Many Network Profiler actions involve *dialog boxes*, small windows that may contain lists, text boxes, buttons, and other controls.

List boxes and scrollbars

A List Box is just that – a dialog box that contains a list of items to choose from. The following example shows the list of standard channel plans:

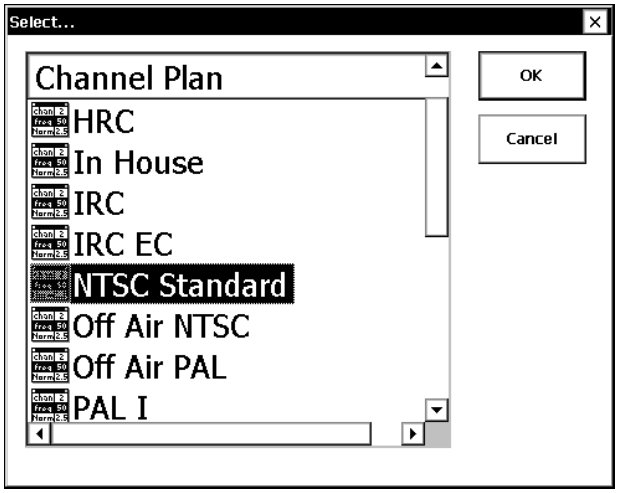


Along the bottom and right side of the list are two *scrollbars*, each containing a slider and two directional arrows. Use the right scrollbar to see the rest of the list. (The bottom slider is useful only to see a filename that is too long to fit in the box.) You can scroll through the list in several ways:

- by touching the up or down arrows to scroll the list one line at a time;
- by touching and holding a scrollbar arrow to make the list scroll continuously;
- by dragging the slider, that is, by touching and holding the slider, then moving your pointer—the slider will follow;
- by touching anywhere in the blank area between the slider and the arrows. This will scroll the list one page (screenful) at a time.

In general, the right scrollbar will appear only when the list is too long to fit in the list window.

To select an item in a list box, touch it; the item will be highlighted:



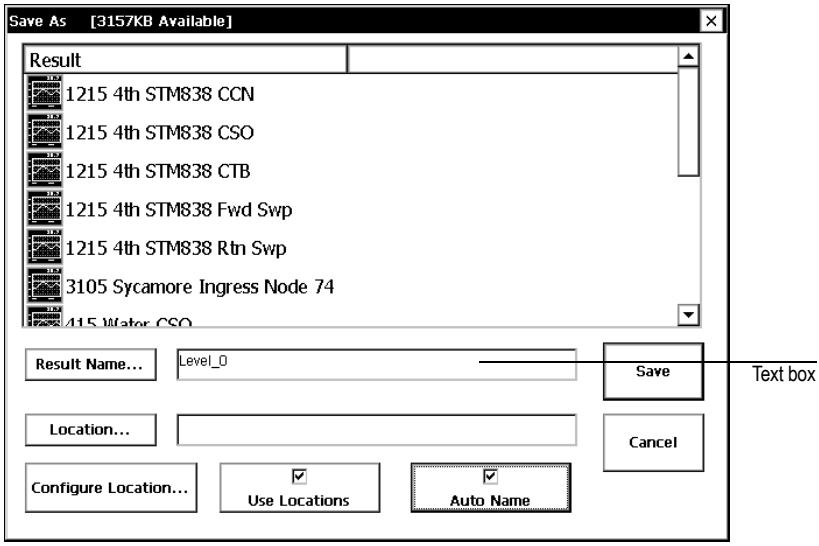
The two action buttons, **OK** and **Cancel,** appear in almost every dialog box. Touch **OK** to carry out whatever action you have selected (in this example, to open the highlighted file).

Note: In some boxes, this button is labeled **Enter, Save, Done,** or **Close.** Each performs the indicated action, then closes the dialog box.

Touch **Cancel** to close the box without taking any action. (You can also cancel and close a dialog box by touching the ✕ in the upper right corner or, in most cases, by pressing the ✕ key on the keypad.)

Text boxes

Some dialog boxes contain one or more lines for entering text, such as a filename or a channel identifier. For example, the **Save as...** dialog box provides a line for entering the name of a new results file:



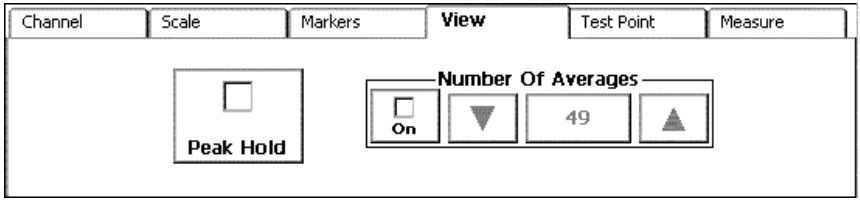
When you touch the **Result name...** button, a keyboard appears on the screen (see *Using the "soft" keyboards*, page 2–8). The name you type will appear in the text box.

Check boxes and step controls

Check boxes and step controls appear on almost all control tabs (see *Control tabs*, page 3–15); use them to modify test parameters and the display of results.

Using check boxes

A check box can turn a test function on or off, or enable a control. You can see both uses on the **View** control tab:



To activate the Peak Hold function, touch the check box; a check mark will appear in the empty white square:

Similarly, touch the **On** check box to enable the **Number of Averages** control.

Using step controls

A step control is a group of three buttons, as shown in the following illustration: a left ◀ or down ▼ arrow, a right ▶ or up ▲ arrow, and between them a button with a number on it:

Pressing ◀ or ▼ will decrease the associated value; pressing ▶ or ▲ will increase it. Successive values appear on the center button. On certain buttons, only those values that are valid for that control will appear. For example, only four values are valid for the RBW control in the spectrum analyzer: 30, 100, 300, and 3000 KHz.

Using the "soft" keyboards

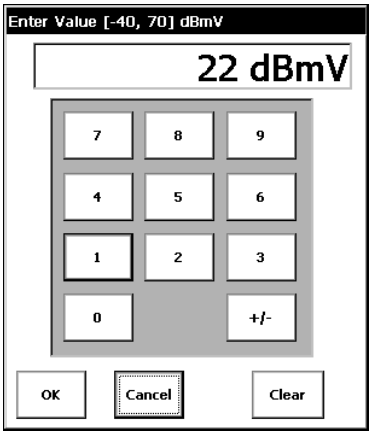
Stepping through a long list such as a channel plan can be tedious, so the Network Profiler gives you a way to enter a value directly. If you press the center button of a step control (the one with the number on it), you will bring up a "soft keyboard", which you can use to enter the desired value.

There are two soft keyboards: a number pad and an alphanumeric keyboard. These have most of the features you find on a real keyboard. When you press the middle step control button, only the keyboard appropriate to that parameter is displayed; you won't get an alphanumeric keyboard for a numeric control.

Note: A separate alphanumeric keyboard for use with other Windows CE applications is available from the START menu. See Chapter 11, *Using Windows CE*, for a description of this keyboard.

Numeric keyboard (number pad)

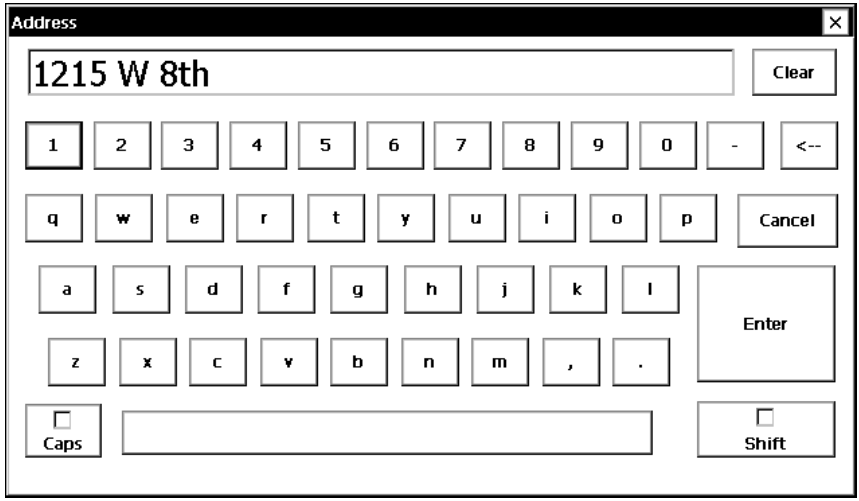
When you touch the middle button on a numeric step control such as **Full Scale** on the **Scale** tab, the following keyboard appears:



The title bar shows the limits of the value, while the current value appears with the appropriate units in the text-entry box. To change the value, touch the number keys (and the sign key if you want a negative value); your entry will appear in the text box. Touch **OK**; the keypad disappears, and the new value appears on the middle button.

Alphanumeric keyboard

This keyboard is used primarily to edit Channel plans, test point files, and location files:



A blinking vertical-line cursor in the text-entry box indicates the point at which the next character will appear. Type your entry, then press **Enter** to save the new entry and close the keyboard. If you make a mistake, you can touch **Clear** and begin again, or you can use the left and right keypad arrows to move the cursor to the point where you want to make a change.

The control buttons have the following functions:

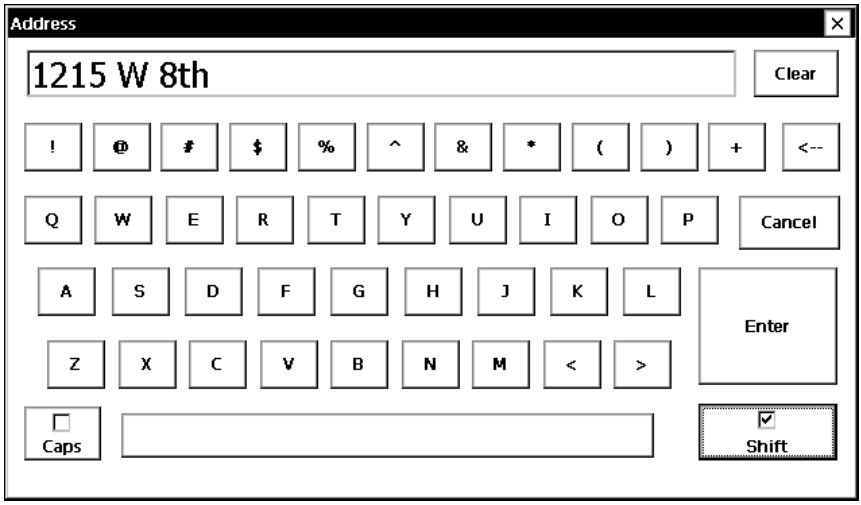
Clear: Erases whatever is in the text-entry box

Backspace (<–): deletes the character to the left of the cursor.

Cancel: Closes the keyboard without making any changes

Enter: Saves the changes typed in the entry box, then closes the keyboard.

Shift: Works like the "Shift" key on a normal keyboard. Touch it to change the letter keys to capitals and the number keys to symbols:



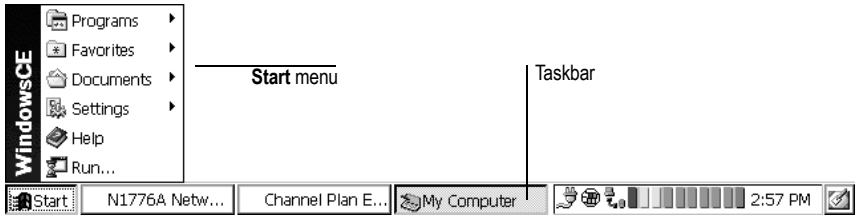
As soon as you touch a key, the key caps return to lower case and numerals.

Caps Lock: Works like the Shift button, except that the keys do not return to lower case until you touch **Caps Lock** again.

Start Menu and Taskbar

The **Start** Menu and Windows CE Applications

If the taskbar is visible, touch the **Start** button to bring up the menu. If the taskbar is not visible, press the blue button on the keypad to bring the taskbar and Start menu into view:



The ▸ arrow indicates that this item has a submenu. Touch the item to display the submenu, from which you can choose an item to work with. The menus, submenus, and programs are described in Chapter 11, *Using Windows CE*.

Programs

This submenu includes the Network Profiler, Windows Explorer, the Windows CE "soft" keyboard, and Internet Explorer®.

Favorites and **Documents**

These are standard Windows CE menus listing "favorite" web sites and recently-opened documents. Use **Favorites** to store the addresses of frequently-used Internet connections. In normal use, **Documents** will likely remain empty.

Settings

This submenu has two entries: **Control Panel** and **Taskbar**. The first is a collection of utilities for configuring the Windows CE environment. The second lets you set certain properties of the taskbar.

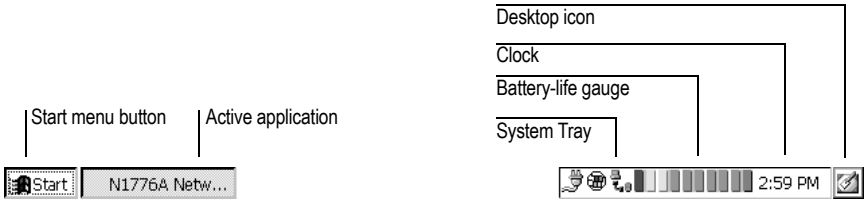
Help

Touch this item to display the Windows CE Help system.

Run...

Touch this menu item to display a list box containing several programs that can be run directly.

The Taskbar



The Windows CE **Taskbar** appears at the bottom of the screen. The START button is at the left end. Next is the task space, containing buttons for whatever Windows applications are open at the time. Most of the time, this will show only the Network Profiler button.

At the right of the taskbar is the System Tray, containing icons representing various Windows CE functions that are active; in the figure, these are the AC power adapter and the serial port. To the right of these is a segmented battery-life gauge and a digital clock.

The battery-life gauge shows how much charge is left in the main battery. As the battery drains, the segments turn black one by one, starting from the right.

Note: The last item on the taskbar is a small pad-and-pencil icon. When you touch this icon, the Windows CE desktop appears. Touching the icon again (you may have to double-tap) restores the previous application.

3

Getting Started: The Test Display

As easy as...

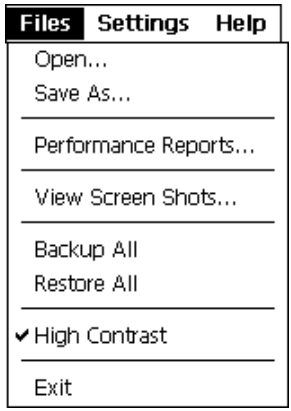
It takes just three steps to begin any test:

1. Connect the RF signal leads to the RF input and output (if doing return-path tests) of the Network Profiler.
2. Turn on the Network Profiler.
3. Select the test.

This chapter will get you familiar with the components of the test display common to all the Network Profiler's tests and measurements. The special requirements of each test are described in Chapters 4-8.

Menus

Files menu



From this menu, you can open, save, and export test results, create performance reports, back up and restore the data stored in memory, view screen captures, control the screen contrast, and exit the Network Profiler. For detailed instructions on using all these commands (except **High Contrast** and **Exit**, described below), see Chapter 9, *Maintaining and Managing Your Data*.

Note: **Open**, **Save as...**, **View Screen shots... and High Contrast** are also available as icons on the toolbar. See *Toolbar*, page 3–8.

Open...

Displays a list of test results that you can select for viewing on the Network Profiler screen.

Save as...

Displays a dialog box for saving the current test data in a named file.

Performance reports...

Allows you to create pass/fail and 24-hour performance reports from stored channel-scan results.

View Screen Shots...

Displays a Windows Explorer screen showing the file names of any screen captures you have made.

Backup all

Makes a backup copy in flash memory of all test points, location files, test results, and channel plans.

Restore all

Replaces the data currently in working memory with previously backed-up data.

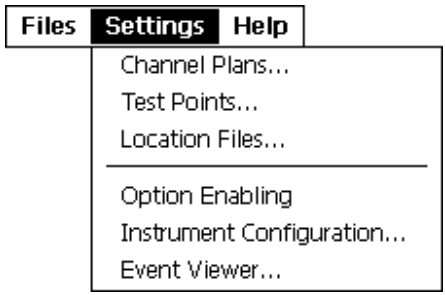
High Contrast

Toggles the display between the normal black-background data display and a white background for better visibility in direct sun.

Exit

Closes the Network Profiler application and returns you to the Desktop or to the previous Windows CE application.

Settings menu



This menu provides access to the channel plan, test point file, and location file editors; tools for configuring the Network Profiler; and a screen for reviewing and clearing error events.

Channel Plans

Displays the current channel plan and provides access to the editor. For each channel, the number, name, type, and frequency boundaries are shown. Channel data are viewable from within the channel-plan editor. The Channel Plan Editor is described in Chapter 10, *Test points, Locations, and Channel Plans*.

Test Point

Opens the Test Point Editor, allowing you to create and edit scale and limit-line settings for a test point, and save them in a file. The Test Point Editor is described in Chapter 10, *Test points, Locations, and Channel Plans*.

Location Files

Displays information about a test site or device. Use this command also to select a different location file, and to access the Location File Editor for modifying and creating location files. The Location File Editor is described in Chapter 10, *Test points, Locations, and Channel Plans*.

Option Enabling

Displays a list of currently-enabled modules.

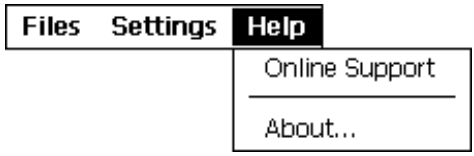
Instrument Configuration

Displays a dialog box containing tools for configuring the Network Profiler. Use of these tools is described in Chapter 13, *Maintenance and Care*.

Event viewer

The Event Viewer displays diagnostic messages for use by a Sunrise Telecom service representative or when discussing a problem with Sunrise Telecom Customer Care.

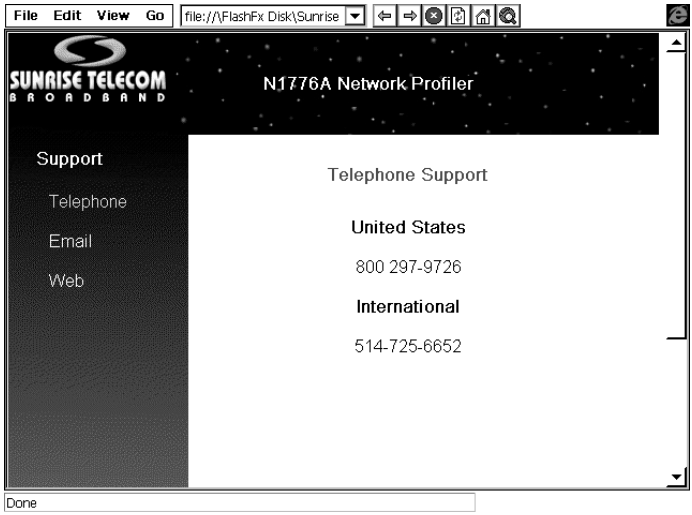
Help menu



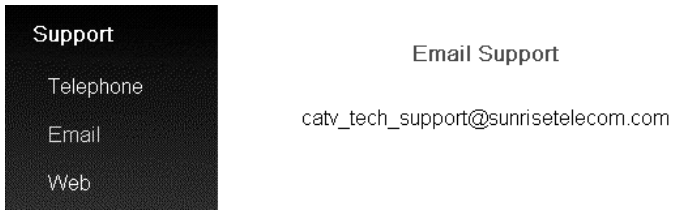
This menu gives access to information about your Network Profiler, and to Sunrise Telecom's on-line support when the Network Profiler is connected to the Internet).

On-line support

Select **Help > Online Support** to see information on contacting Sunrise Telecom. You will see the two Customer support telephone numbers and a list of other choices at the left:



Touch **email** to see the e-mail address:



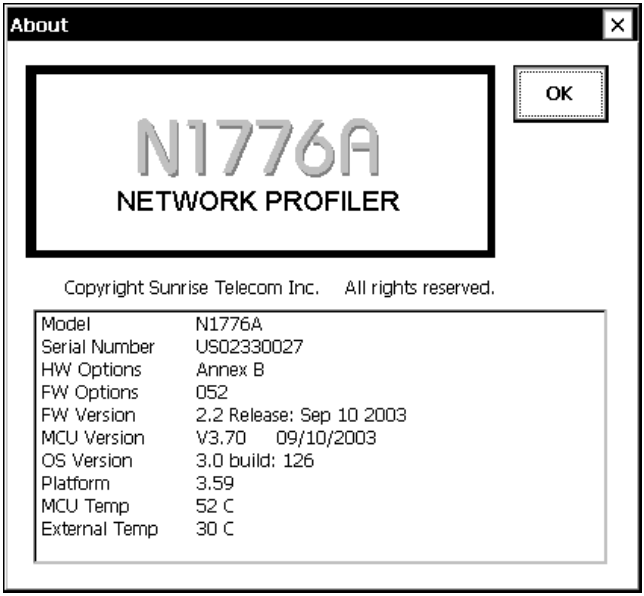
Touch **Web** to see the address for the Sunrise Telecom website:

If you are connected to the Internet, touching the address will take you directly to the website.

To close the Online Support display, select **File > Close**.

About the N1776A

Select **Help > About...** to display the "About" dialog box containing information about the currently installed options and versions of your Network Profiler's hardware and software:



This box also shows the current internal (MCU) and external temperatures.

Toolbar

The toolbar comprises several buttons for frequently-used operations.

Open... () and Save as... ()

These two buttons perform the same functions as their equivalent commands in the File menu: **Open...** and **Save as...**, described on page 3–3.

Print ()

When a printer is connected to one of the USB ports, touching this button is equivalent to sending a screen capture (see below) to the printer instead of saving it in a file.

View screen shots ()

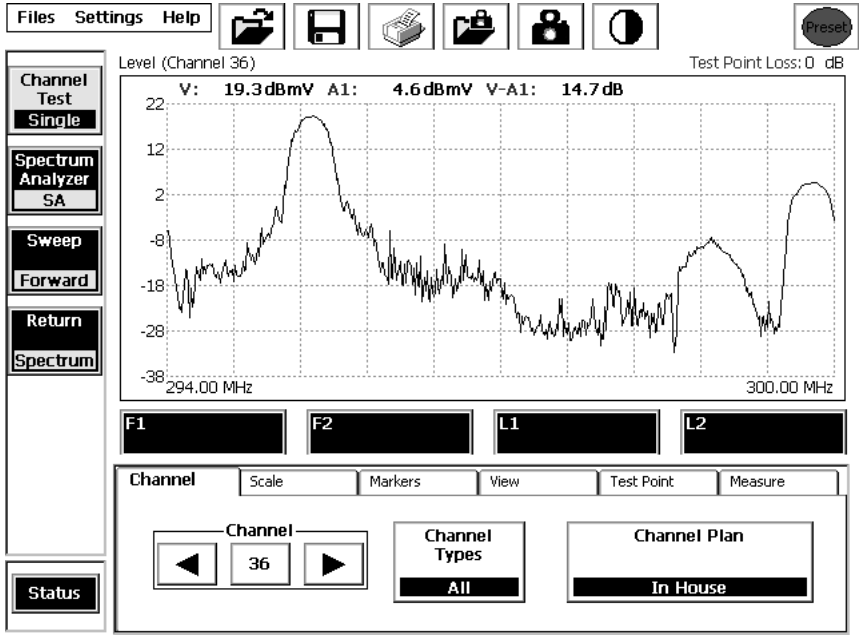
Touch this button to open the Windows CE explorer in the Captures folder. If any captures have been made, you will see them listed. For procedures, See *Viewing a capture file*, page 9–9.

Make a screen capture ()

Touch this button to save the current data display, marker selectors, and (if displayed) the status panel, as a graphics file, either internally or on a Flash Memory Card. Screen Capture is described in Chapter 9, *Maintaining and Managing Your Data*.

High Contrast( )

The normal data display shows a white trace on a dark background. For greater visibility in bright sunlight, touch the **High Contrast** button. This changes the display to show a dark trace on a white background:



Touching the button again returns the display to normal colors.

Note: For clarity, all examples in this manual are shown in the high-contrast mode, using the Windows CE color scheme "High Contrast White". See *A note on screen contrast*, page 11–13, for more information on Windows color schemes.

Preset ( )

Touching this button restores the control tab parameters to their default conditions. See *When you have to start over*, page 3–20, for details.

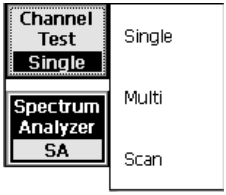
Test Selectors and Status Button

Test selectors

These buttons select the type of test to be performed.

Channel Test

When you touch this button, a menu of test choices appears to its right:



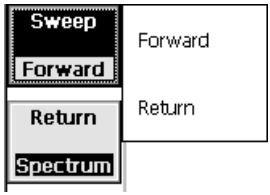
Touch one of the choices to begin. For analog channels, the **Single** channel test can measure signal levels, distortion, and hum. For digital channels, this test can measure average power and distortion performance, and display QAM constellations and Equalizer taps. The **Multi**-channel test displays six bars representing the visual carrier levels (analog channels) or channel power (digital channels) of the designated channels. The Channel **Scan** test measures the carrier levels or channel power of all channels in the currently enabled channel plan. You may set the starting and ending channels to adjust the range of channels displayed. The channel tests are described in Chapters 5, 6, and 7.

Spectrum Analyzer

The Spectrum Analyzer measures response over all or a portion of the spectrum, and provides controls for setting RBW and VBW, detector trigger, and the range of measurement. This test is described in Chapter 4.

Sweep

When you touch the **Sweep** button, two choices appear:



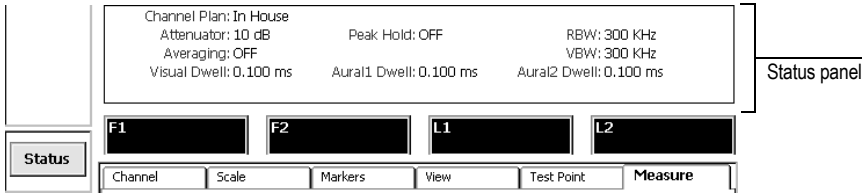
Touch **Forward** or **Return** to measure the frequency response of the forward and return paths, respectively. Both tests require a Sunrise CaLan 3010H Sweep/Ingress Analyzer installed at the headend. The Forward Sweep test will also work with a CaLan 1777 Integrated Sweep Transmitter. These tests are described in Chapter 8, *Sweep and Return Spectrum Tests*.

Return Spectrum

This test requires a Sunrise CaLan 3010H Sweep/Ingress Analyzer installed at the headend. The test displays the spectrum response measured by the 3010H. This test is described in Chapter 8, *Sweep and Return Spectrum Tests*.

Status button

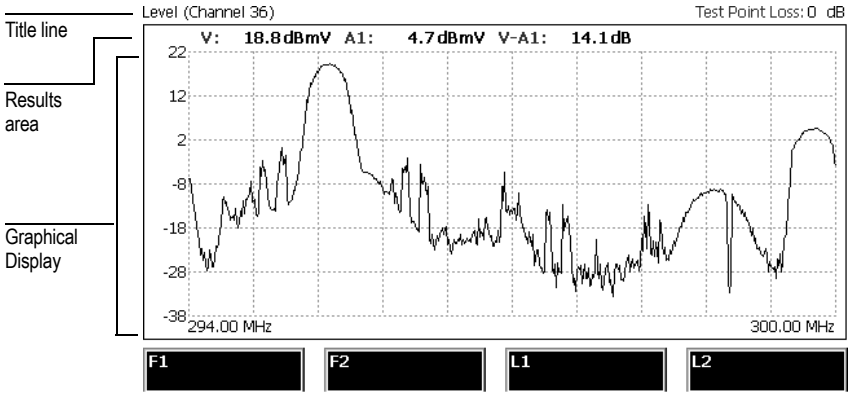
Pressing this button once displays the status panel. The control tabs collapse to a single line and the marker buttons move downward:



The measurement configuration for the current test appears in the resulting space. The information displayed depends on the test; the status panel for the single-channel level measurement is shown.

To close the status panel and restore the original view, touch the status button again, or touch a control tab.

Data display



The title line

The test or type of measurement is shown at the left. For a single channel test, as in the illustration above, the type of measurement (examples: Level, CCN, Constellation) is followed by the channel number in parentheses. For the other tests, the title will read **Multi Channel**, **Channel Scan**, **Spectrum Analyzer**, **Forward** or **Reverse Sweep**, or **Return Spectrum**.

The current setting of the Test Point Loss step control is shown at the right of the title line. If a test-point file is enabled, its name appears at the right, with its preset test-point loss in parentheses.

The results area

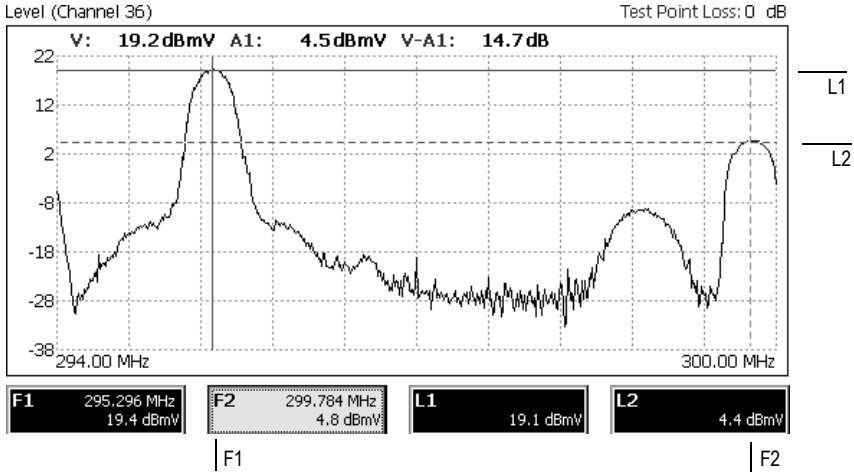
Where applicable, calculated measurement results are shown here, directly below the title line. Examples include visual carrier level, CCN, hum percentage (for single-channel tests); design frequency levels (forward sweep test).

The graphic display

The information shown in the main part of the data display depends on the measurement being made. Examples: Spectrum response of the channel, QAM constellation, time-domain distortion response, forward sweep.

Markers

Two pairs of markers, one horizontal and one vertical, accompany most test displays, as in this single-channel test:



The first marker of each pair is a solid line, the second a dashed line. Markers can be placed at any point on the display grid. The vertical markers, here F1 and F2, show the signal levels at the frequencies where they appear. The horizontal markers, L1 and L2, provide reference levels for interpreting the trace.

Markers in other tests will have different uses; please refer to the test descriptions for their functions.

Active-marker selectors

When you first turn on the Network Profiler, you won't see any markers, and the active marker selector buttons will be blank. To display a marker and make it active, touch its button; the button will turn yellow, and you will a yellow line will appear at a predefined position (see the test descriptions in Chapters 4-8 for specifics). At the same time, the pertinent data for that marker appear on the button.

You can now move this active marker, either by touching the screen at the desired location, or by pressing the arrow keys on the keypad. When you touch the screen, the active marker moves instantly to that position. In general, touch the screen to make a rough placement, then use the keys to fine-tune the location. Use the left and right arrow keys to move the Frequency or Channel markers, the up and down arrows to move the Level markers. If you press

and hold an arrow key, the marker will continue to move in that direction until you release the key.

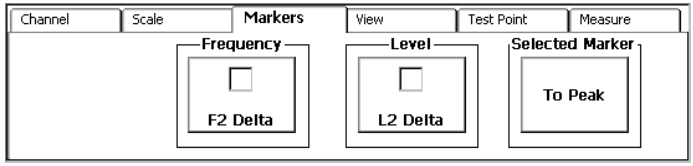
To remove a marker from the screen, first make it active, then touch it again. The marker will disappear. The next time you activate that marker, it will appear at its last previous location.

Marker tab controls

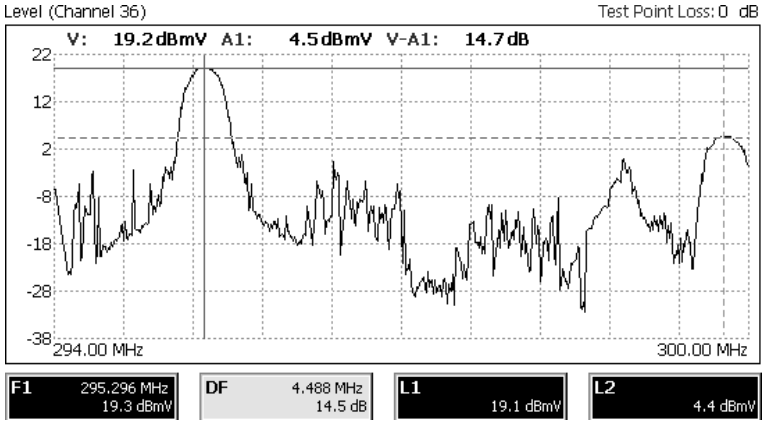
Absolute and delta settings

When first activated, the second marker of a pair (F2 and L2 in the example) indicates the actual (absolute) value at that point on the display. You can set the second marker (F2 and L2 in the figure) to show the "delta", or difference between it and the value at the first marker, as follows:

1. Touch the **Marker** control tab (see *Control tabs*, page 3–15) to display the Delta check boxes:



2. Touch either check box. The label on the associated marker changes to show that the differential reading is enabled. In this example, **F2** changes to **DF:**

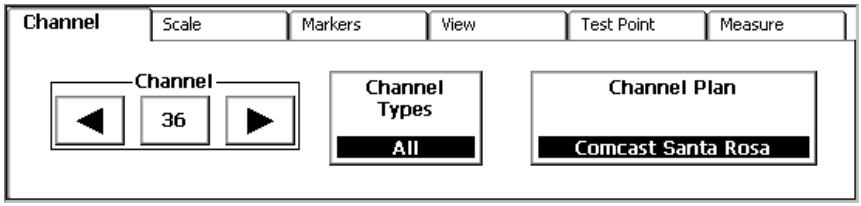


Notice that you can switch between delta and absolute indications at any time; the marker does not have to be active.

Selected Marker to Peak

Touching this button sends the active marker to the peak level of the trace.

Control tabs



These panels at the bottom of the display provide controls for modifying the measurement configuration of any test, for selecting types of measurements, and for enabling channel plans and test points. Some control tabs vary from test to test; their functions, summarized in the next sections, are described in detail for each test in Chapters 4-8.

Channel

This tab, shown in the figure above, appears only when the Channel Test group is selected. What it displays depends on the test selected:

Single-channel test: Channel control, channel-type selector, channel plan selector

Multi-channel test: Active-bar and channel-assignment controls, channel plan selector

Channel scan test: Starting and stopping channel-number controls, channel plan selector

Frequency

This tab appears when the Spectrum Analyzer, Sweep, or Return Spectrum tests are selected. It contains selectors to control the frequency range of the measurement, by setting either the start and stop frequencies or the center and span frequencies. A center-stepping control allows you to set the increment by whcih you can move the center frequency in either direction.

Scale

This tab provides controls for setting the vertical Full Scale reference and scale interval of the graphical display. In the Spectrum Analyzer and Sweep tests, the Scale tab includes a control for setting or auto-coupling the RF input attenuator.

Markers

This tab, described in the previous section, contains the “delta” check boxes and, where applicable, a **To Peak** button that moves the active marker to the peak signal of the displayed trace.

View

This tab controls various visual aspects of the measurement, among them peak hold, trace-averaging, and smoothing.

Test point

This tab allows the user to set the level compensation at the test point, and to select and enable a pre-defined test point file.

Measure

This tab appears only when the Single-Channel test is active. It contains the buttons for selecting a measurement according to the channel type (analog or digital). At the right on this tab are controls for making single traces, restarting a test, and gaining quick access to the channel plan so you can change test parameters to suit the test conditions.

Control

This tab appears when the Spectrum Analyzer, Sweep, or Return Spectrum tests are active. Its contents depend on the test:

Spectrum analyzer: Step controls for setting the Resolution bandwidth (RBW) and Video bandwidth (VBW), a selector for the type of detection, and trigger controls for single sweep and sweep restart.

Forward sweep: Buttons to set the communications pilot frequency (to match that being transmitted), and to view and clear the sweep table.

Return sweep: Controls to set up the forward and return communications pilots, and view the sweep table.

Return spectrum: Controls to set up the forward and return communications pilots.

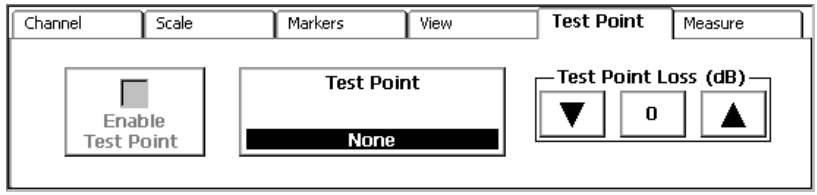
Enabling a test point file

A test point file is a convenient way to set up consistent measurements at a frequently used test point. When you enable a test point file, the following values are set automatically:

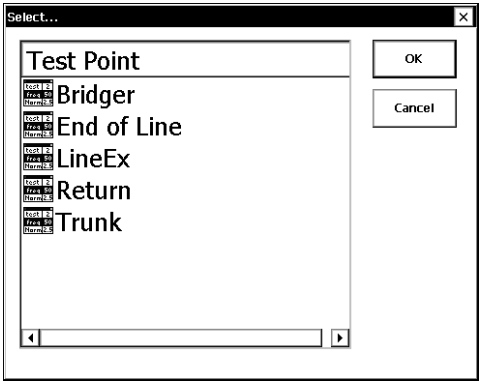
- the name of the test point
- the test point loss compensation in dB
- the Full Scale reference and verctical scale resolution in dB/Div (set separately for each measurement). When auto-coupling is enabled, the Full Scale reference also controls the RF input attenuation.
- limit-line settings and channel assignments for each bar of the multi-channel test
- forward sweep design levels used for offset and slope compensation
- forward and return sweep peak-to-valley frequency limits
- return sweep forward pilot full scale reference
- return sweep insertion point loss and slope

To enable a test point file

1. Select the **Test Point** control tab.



2. Touch the **Test Point** button to display a list of existing test point files:



3. Highlight the desired test point name, then touch **OK** to select it. **Enable Test Point** will automatically be checked, enabling the test point. The name appears on the Test Point button, and the loss-compensation value on the middle button of the Test Point Loss control. The display will show the full-scale and dB/Div values.

4. To disable the test point, touch the **Enable Test Point** button; the check mark will disappear.

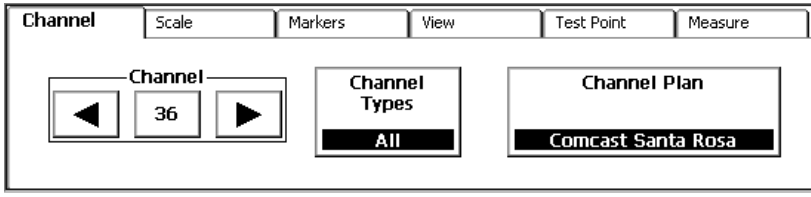
Creating and editing test point files are described in Chapter 10, *Test points, Locations, and Channel Plans*.

Enabling a channel plan

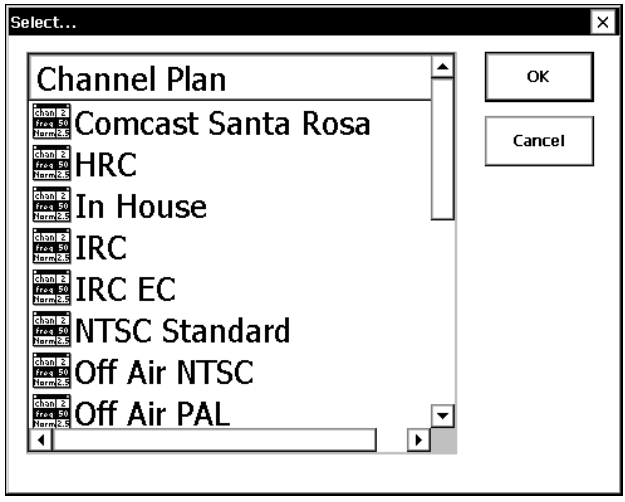
The Network Profiler comes with eight channel plans stored internally:

PAL UK
PAL I
Off-air PAL
Off-air NTSC
NTSC Standard
IRC
IRC EC
HRC

Normally, the appropriate channel plan will already be enabled; to verify this, turn on the Network Profiler, select **Channel > Single**, and touch the **Channel** tab. The name of the current plan appears on the **Channel Plan** button:



To select a different plan, touch the button to bring up a list of those available:



Touch the name of the desired plan to highlight it, then **OK** to enable it.

When you have to start over

In normal use, stopping the Network Profiler means pressing the Suspend button at the bottom of the keypad:

All your settings remain in active memory, so that when you press the Suspend button again, you can return to the exact point at which you left off.

There are times, however, when you will want to restore your instrument to a known state, in which one or more sets of parameters are reset to their default values. This can be as mild as restoring default measurement settings, or as drastic as doing a “hard reset”. The following sections describe the results of various ways to return the Network Profiler to an earlier known state.

Preset

When you first start the Network Profiler, the measurement controls have the following default values:

Control	Default setting
Channel Type	All
Full Scale	25 dBmV
db/Div	10
Marker deltas	disabled
Peak Hold	disabled
Number of Averages	Off; 10
Test Point Enable	disabled
Test Point Loss	0 dB
Measurement	Level (analog), Power (digital)
Single	disabled
Aural Offsets	off; 0 dB

Control	Default setting
Start and Stop frequencies	10 MHz, 100 MHz
Center and Span frequencies	55 MHz, 90 MHz
Attenuator	Auto-coupled on; 10 dB
Detector	Positive
RBW	Auto on; 300 KHz
VBW	Auto on; 300 KHz

In the course of making measurements, you are likely to change several of these. If you then want to start a new set of tests using the default values, touch the red **Preset** button in the upper right corner of the screen. All the measurements listed above will revert to their default values, while leaving all other settings (markers, channel plan, location file, channel assignments) as they were. The Network Profiler returns to the single-channel test (a digital channel returns to the average-power measurement). Test results, screen captures, channel plans and test point assignments are unaffected, though the test point is disabled.

Restarting the Network Profiler application

To reset all controls and most other parameters, exit and restart the Network Profiler as follows:

1. Select **Files > Exit**.
2. Double-tap the **N1776A** icon on the Windows CE desktop:

or

From the Windows CE **Start** menu, select **Programs > Sunrise Telecom > N1776A**.

When the Network Profiler restarts, the measurement controls return to default values as listed above. The following user controls are also reset:

Control	Default setting
Test	Single channel
Channel	lowest channel in the channel plan
Markers	off
Test Point	None
Multi-channel bars, each	lowest channel in the channel plan
Channel-scan Start and Stop	lowest channel in the channel plan

Test results and location data already in memory are not affected, and remain available to the restarted session.

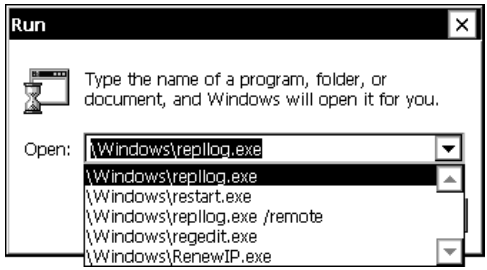
Rebooting WindowsCE (Soft Restart)

Because the Network Profiler gives you full access to the WindowsCE operating system, you have the flexibility not only to manage files, but also to install applications unrelated to the Network Profiler or other software supplied by Sunrise Telecom Broadband. As with any computer operating system, such "third-party" applications can cause problems with the stability of WindowsCE, which could make it necessary to reboot WindowsCE.

Note: Sunrise Telecom Broadband cannot guarantee the performance of third-party applications running on the Network Profiler.

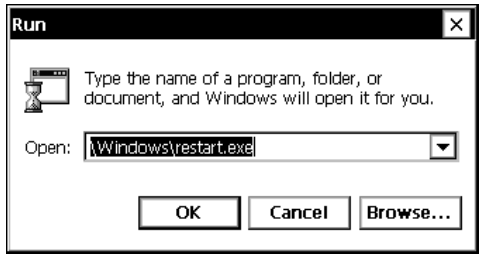
If WindowsCE becomes unstable, do a "soft restart". This reboots WindowsCE but does not erase any data or user-installed programs stored in RAM.

1. Press the blue button on the keypad to bring up the Start menu.
2. Select **Start > Run** to display the program list box:



3. Press the keypad down arrow until the program "\Windows\restart.exe"

appears:



4. Touch **OK**. WindowsCE will reboot to the desktop. To restart the Network Profiler, double-click the **N1776A** icon.

Doing a Hard Reset

This is more drastic than simply rebooting Windows CE. Everything described in the previous two sections takes place, but any data in active memory will be lost. If possible, you should back up your data by selecting **Files > Backup All** before doing a hard reset.

On the top of the Network Profiler, to the right of the PC Card slot, is a small hole. Carefully insert a push pin or the end of a paper clip into this hole until it stops, then withdraw it. The screen will go dark, and after a few seconds you will see the Windows CE startup screen asking if you want to set the date and time. Go to *Restarting Windows CE*, page 11–10, and follow the steps shown.

Any results files in the "My Documents" folder will be lost after a hard reset. You can recover previously saved data in several ways:

- To recover data backed up to the FlashFx disk, select **Restore All** from the Network Profiler's **Files** menu.
- To recover the last set of files backed up to a PC Card, follow the procedure described in *Using a PC Card*, page 9–11.
- To restore files synchronized with a computer, follow the procedures described in *Synchronizing files*, page 9–15.

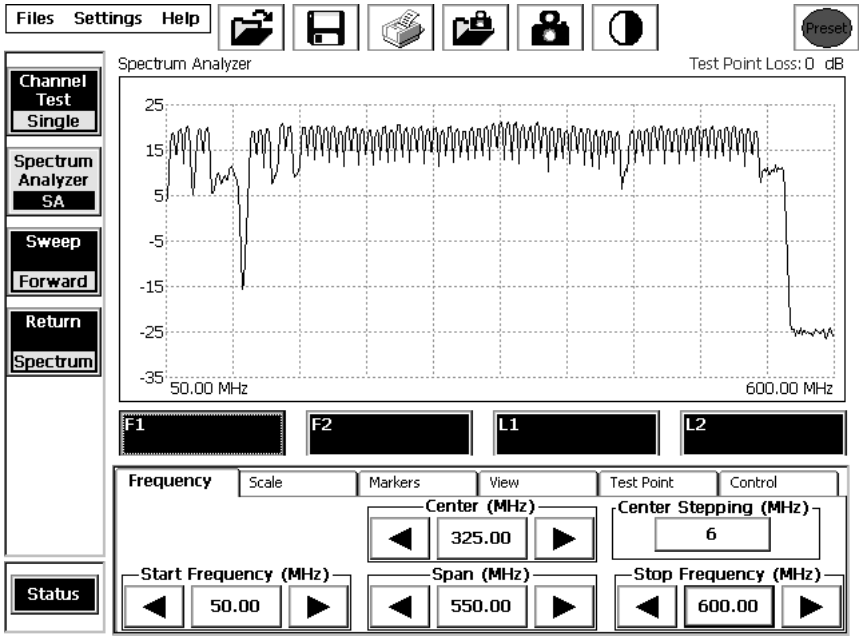
When you have to start over

4

The Spectrum Analyzer

Setting up the test

The Spectrum Analyzer shows a continuous trace of the RF spectrum between the selected start and stop frequencies. To begin testing, touch the **Spectrum Analyzer** selector:



Setting the frequency range

Select the **Frequency** tab, as shown in the figure above, then set the frequency range in one of the following ways:

- Set the range boundaries using the **Start** and **Stop** controls. Either control may be set to any frequency between 0 and 1100 MHz.

  or

- Set the center frequency and width of the sweep using the **Center** and **Span** controls. Either may be set to a value between 0 and 1100 MHz.

When you change any of the four frequencies, the others automatically adjust.

Note: The range of either the **Start** or the **Stop** control is limited by the setting of the other; if, for example, you set **Start** to 50 MHz you cannot set **Stop** below that value.

Center Stepping

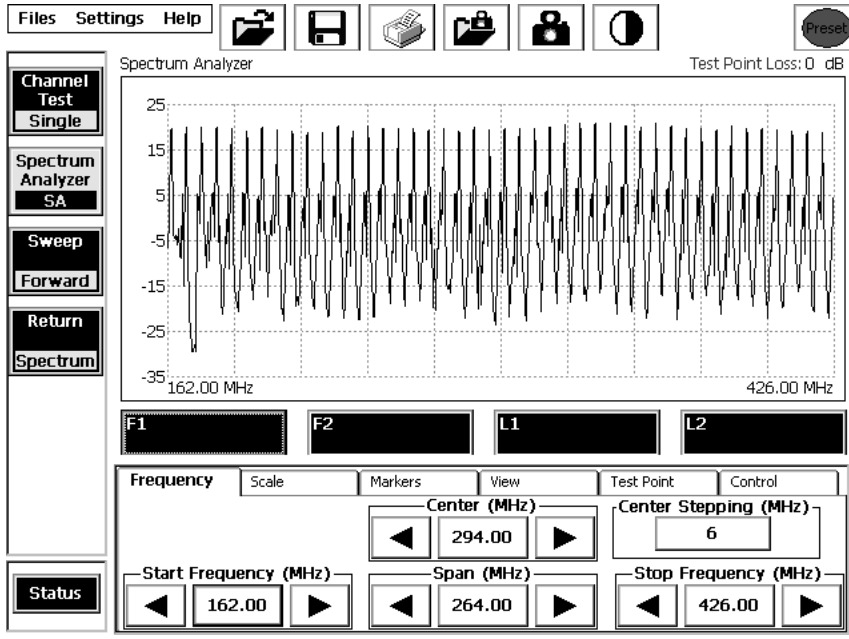
This button sets the interval by which the frequency changes when you touch either arrow on the Center step control. For example, if the center frequency is 100 MHz and Center Stepping is set to 6 MHz, touching the Center right arrow changes the frequency to 106 MHz, 112 MHz, and so on. Likewise, touching the left arrow decreases the center frequency by 6 MHz. The stepping frequency can be set between 1 and 100 MHz. The stepping control makes it easy to move along the spectrum using only the center step control arrows.

Using the Frequency controls

You can use the range controls to concentrate on either the analog or digital portions of the spectrum, or to take measurements at zero span, as in the following examples:

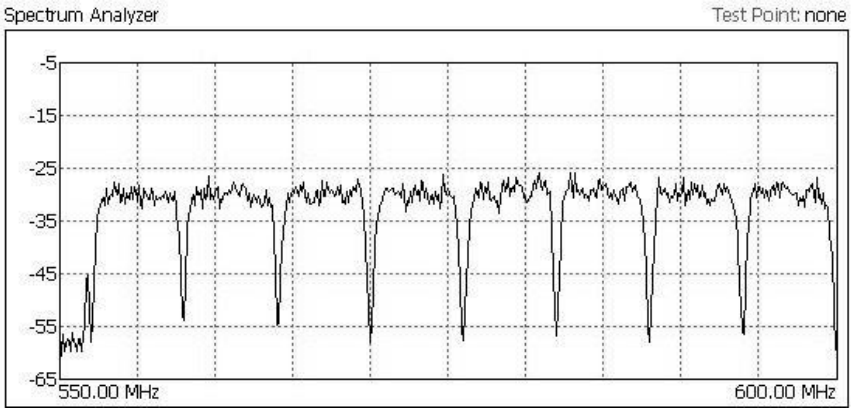
Example 1: Analog channels

In this example, the range is 162-426 MHz, which contains only analog channels.



Example 2: Digital channels

In this example, the range is 550-600 MHz, which includes only digital channels.



You can use the center-stepping control to quickly view adjacent channels without having to set up the single-channel test:

Example 3: Channel-by-channel display

Because NTSC channels are 6 MHz wide, set the **Center Stepping** control to 6 MHz. Then set the start and stop frequencies to those of any channel. To move from one channel to the next, just touch the right or left arrows on the **Center** step control.

Using a test point file

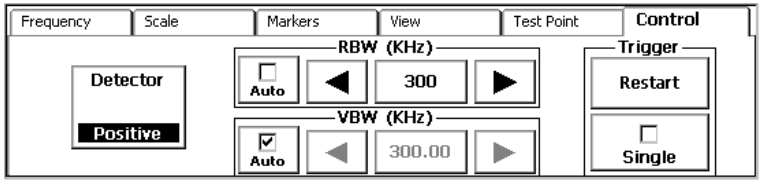
To enable a test point file:

1. Select the **Test Point** tab;
2. touch the **Test Point** button to display the file list;
3. highlight a filename, then touch **OK** to select it; **Enable Test Point** will automatically be checked, enabling the test point.

See *Enabling a test point file*, page 3–17 for more information.

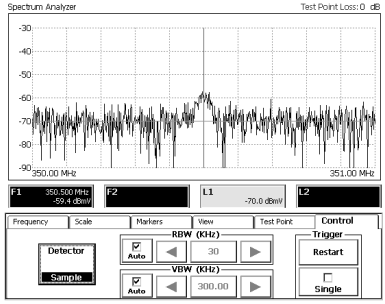
Detector, Bandwidth, and Trigger controls

To use these measurement controls, select the **Control** tab:

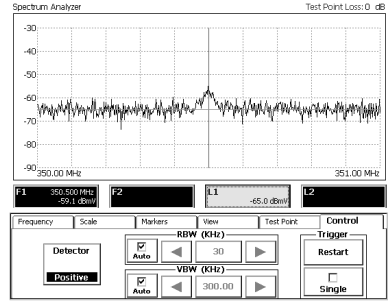


Detector

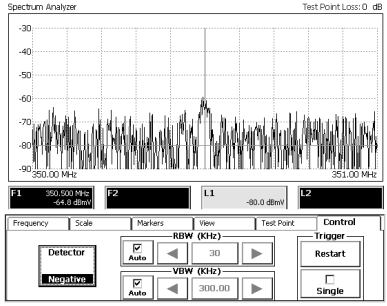
The IF video detector can be set to one of three modes: Sample, Positive, or Negative. **Sample** takes a random sample of each displayed data point. The **Positive** and **Negative** peak detectors capture the positive or negative peak of the signal over a pre-defined period of time. The following examples demonstrate the impact of using the different detectors when measuring a beat in the noise floor:



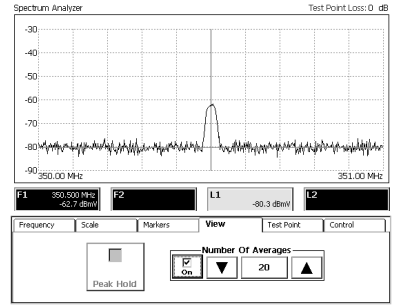
Detector in Sample mode



Detector in Positive mode



Detector in Negative mode



Negative mode with averaging

Sample is used to make noise-like measurements. **Positive** is used for normal analog level measurements. **Negative** is used for displaying low level signals in the presence of noise.

Bandwidth

These controls set the analyzer's IF resolution bandwidth (RBW) and video bandwidth (VBW). When you first use the Spectrum Analyzer, the controls are set to **Auto** (as shown by the checked boxes next to the controls), to ensure optimum sweep time and to minimize measurement errors; the controls are disabled. To enable a bandwidth control, touch the **Auto** box next to it, then set the bandwidth manually using the control.

Resolution Bandwidth (RBW): You can set the Resolution Bandwidth to one of four values: 30, 100, 300, and 3000 kHz.

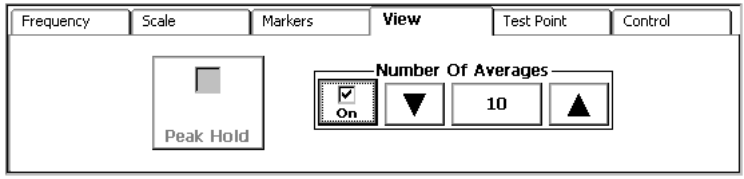
Video Bandwidth (VBW): You can set the Video Bandwidth to one of two values, depending on the Resolution Bandwidth. For RBW < 3000kHz, VBW can be set to .01 or 300 kHz. At RBW=3000 kHz, VBW can be set to .01 or 1000 kHz.

Trigger

To enable a single trace, touch the **Single** check box. Touch the **Restart** button for each successive trace. If averaging is enabled, the Network Profiler will average the results of successive sweeps to produce the final trace.

Other test controls

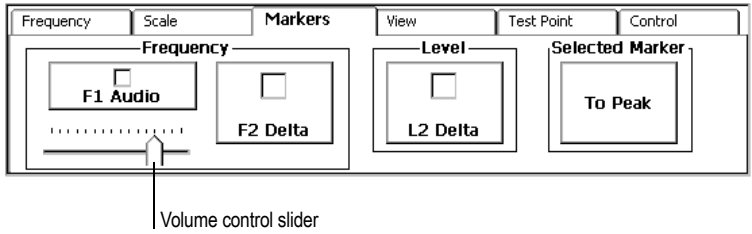
Averaging: To average the results of successive displayed traces, select the **View** tab. If **Peak Hold** is enabled, uncheck it, then touch the **On** check box under **Number of Averages**. Use the **Number of Averages** step control to set the number of trace results to be averaged. The allowable range is 1-100.



Peak hold: To capture and hold peak values of successive traces, select the **View** tab**;** if the **On** box is checked, touch it to disable averaging, then touch **Peak Hold**. To restore the normal sweep, uncheck **Peak Hold**. To clear the current peaks but continue the Peak Hold function, touch **Restart** on the **Control** tab.

Markers: At any time, you may activate and position the markers F1, F2, L1, and L2; see *Markers*, page 3–13, for instructions.

The Spectrum Analyzer's **Markers** tab contains three additional controls: **F1 Audio**, a volume control slider, and **To Peak.**



F1 Audio is a check box; if you check it to enable the control, you will hear the demodulated audio signal present at the F1 marker's location. Use the slider to adjust the sound level. You can do this one of two ways:

1. Touch the slider bar to the right or left of the indicator to move it in that direction a fixed amount. If you hold your pointer on the screen, the slider will continue to move until it is under the pointer.

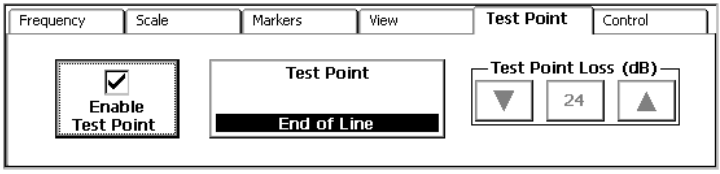
2. For finer control, touch and hold the indicator itself (which changes color), then "drag" it to the desired point. When you lift your pointer, the indicator returns to its normal color.

Note: The spectrum trace is not updated while F1 audio is enabled. If you move the F1 marker while audio is enabled, there is a brief but detectable delay before you hear the audio at the new location.

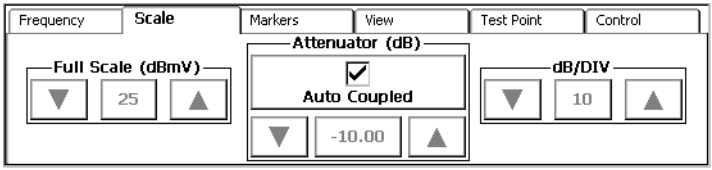
If you touch the **To Peak** button, the active marker will move to the peak level on the spectrum. You can move any marker to the peak as long as it is active.

Note: To change any of the following settings, you must first disable the Test Point file.

Test Point Loss: To set the test-point loss, select the **Test Point** tab, then set the loss using the **Test Point Loss** control.



Vertical Scale and dB/Div: To set the full-scale reference level and grid interval of the vertical axis, select the **Scale** tab, then use the **Full Scale** and **dB/Div** controls to set the values:



Attenuator: Normally, the internal attenuator is coupled to the full-scale setting, as indicated by the checked **Auto Coupled** box. This ensures an optimum displayed dynamic range, and prevents overdriving the RF input section of the Network Profiler's receiver. To set the attenuator manually, touch the **Auto-coupled** check box; the check will disappear, and the **Attenuator** control will be enabled.

Status panel – spectrum analyzer

You can see the following information at any time by touching the **Status** button:

- RF input attenuator setting
- State of Peak-hold and Averaging controls
- Resolution and Video bandwidths
- Video detector setting

A Note on Averaging

When Averaging is selected for a test, the Network Profiler calculates the average of measurement results of the *N* preceding traces, where *N* is the number set by the **Number of Averages** step control on the **View** control tab.

When Averaging is first enabled, the results of successive sweeps are averaged according to the following formula:

$$A_{AVG} = \left(\frac{M-1}{M}\right)A_{M-1} + \left(\frac{1}{M}\right)A_M$$

where

A_{AVG} = new average value
A_{M-1} = average value from previous measurement
A_M = current measured value
M = number of current sweep

M increases by 1 with each successive calculation, until *M*=*N*, at which point *M* remains at that value, so that subsequent calculations include the current and preceding *N-1* sweeps, thus generating a weighted rolling average.

If *N* or any other measurement parameter (for example center span, full scale, or test point loss) is changed, *M* resets to zero (it is incremented to 1 before the calculation is made), and a new average is accumulated.

5

Single-Channel Tests: Analog

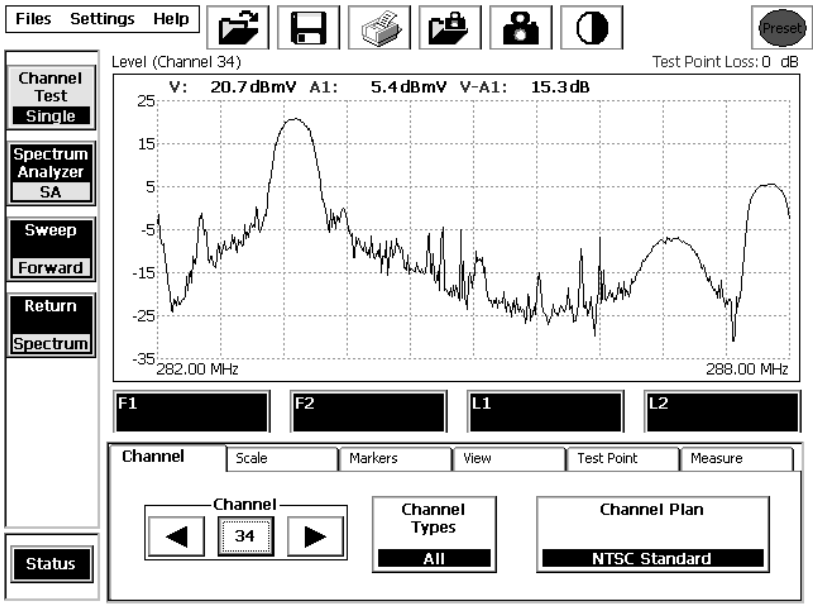
Setting up the tests

There are five analog single-channel measurements:

- Visual and aural carrier levels of a channel, using the peak detector dwell times specified in the active channel plan.
- Composite Second-Order (CSO) and Discrete Frequency Interference (DFI)
- Composite Triple Beat (CTB)
- Carrier-to-Composite Noise (CCN)
- Hum and low-frequency disturbance (HUM)

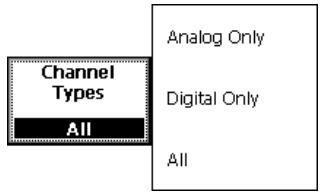
The following procedures apply to all these measurements.

1. Select **Channel Test > Single** to show the single-channel test screen:



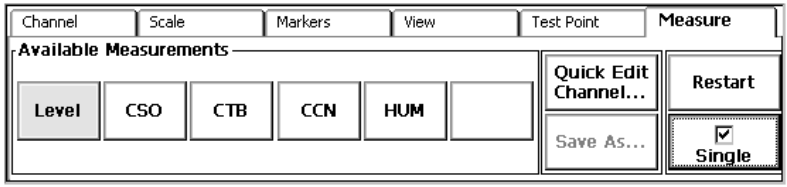
2. Select the **Channel** tab. Check that the correct channel plan is enabled. If not, touch **Channel Plan**, and select the appropriate plan from the list. See *Enabling a channel plan*, page 3–19, for more detailed instructions.

3. If you wish, select **Channel Types > Analog only** to skip over digital channels:



4. Use the **Channel** step control to select the channel you want to test. The arrows step up or down through the channels in the current plan. To move to a non-adjacent channel, touch the middle button, enter the channel number (as defined in the channel plan) in the text box of the displayed keyboard, then touch **Enter**. The new channel's number will appear on the middle button of the control.

To see a single trace instead of a continuous scan, select the **Measure** tab, then touch the **Single** check box:



Using a test point file

To enable a test point file:

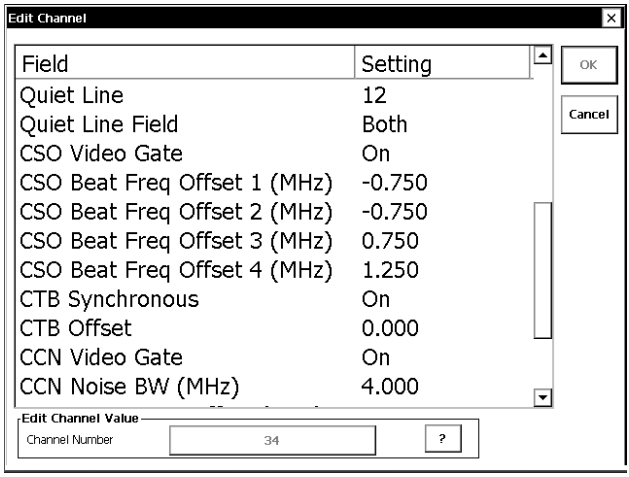
1. Select the **Test Point** tab;
2. touch the **Test Point** button to display the file list;
3. highlight a filename, then touch **OK** to select it; **Enable Test Point** will automatically be checked, enabling the test point.

For more information, see *Enabling a test point file*, page 3–17.

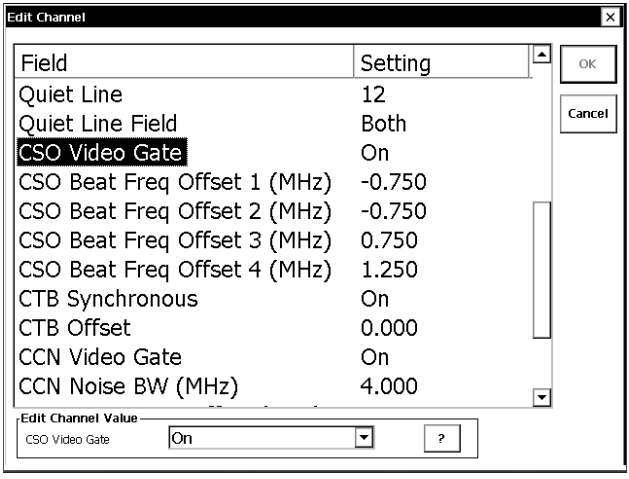
Using the Channel Plan Quick-Edit

The **Quick Edit Channel...** button on the **Measure** tab takes you directly to the channel-plan data for the current channel, so that you can change settings quickly. For example, to turn the CSO video gate off, touch the **Quick Edit**

Channel... button. Scroll down the resulting list box until the line **CSO Video Gate** appears:



To change the setting, touch anywhere on that line to highlight it and display the list box at the bottom of the screen:

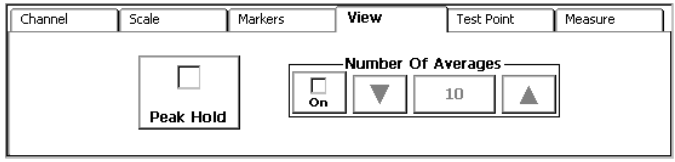


Touch the list box arrow and select **Off**, then **OK** to make the change and return to your test.

For more detailed information on editing channel plans, see *Channel plans*, page 10–11.

Other controls

Averaging: To average the results of several successive traces, select the **View** tab, then touch the **On** check box. Use the **Number of Averages** step control to set the number of measurements to be averaged. The allowable range is 1-100.



See *A Note on Averaging*, page 4–10, for more information.

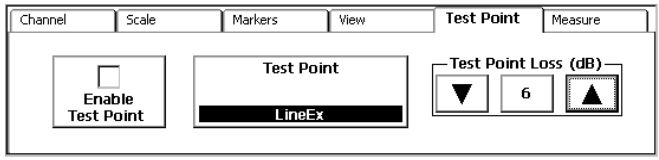
Peak hold: To capture and hold peak values, select **View**, then touch the **Peak Hold** check box. Note that averaging is disabled when Peak Hold is activated. To restore the normal scan, uncheck **Peak Hold**. To clear the current peaks but continue the Peak Hold function, touch **Restart** on the **Measure** tab.

Markers: You may activate and position the markers F1, F2, L1, and L2 at any time; see *Markers*, page 3–13, for instructions.

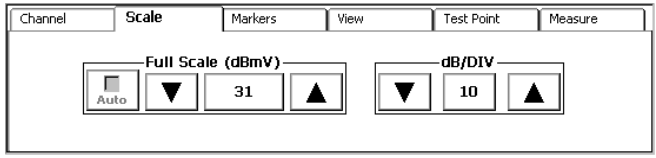
When you first activate them, markers F1 and F2 will appear at the visual and aural carrier frequencies, respectively.

Note: To change any of the following settings, you must first disable the Test Point file.

Test Point Loss: Select the **Test Point** tab, then set the loss using the **Test Point Loss** control.



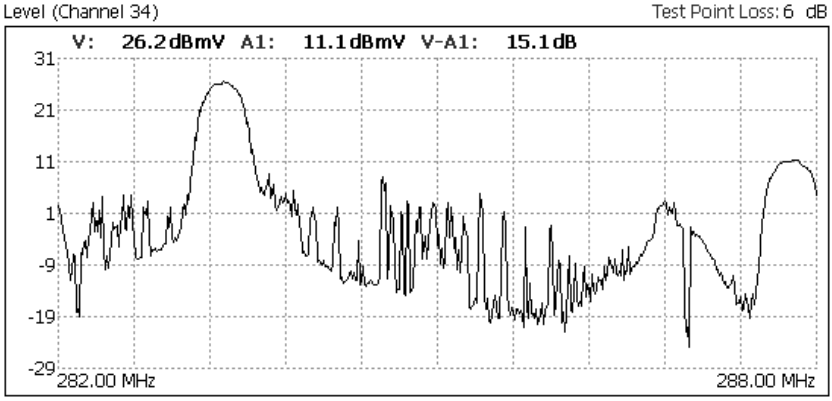
Vertical scale and grid interval: To set the full-scale reference point and grid interval of the vertical axis, select **Scale**, then use the **Full Scale** and **dB/Div** controls to set the values.



To enable auto-scaling, touch the **Auto** check box. The Network Profiler will set the appropriate scale automatically.

Signal levels

On the **Control** tab, touch **Level**. The display shows the spectrum analyzer response of the channel between its lower and upper frequencies. The visual and aural carrier peak levels and the difference between them are reported in the results area:

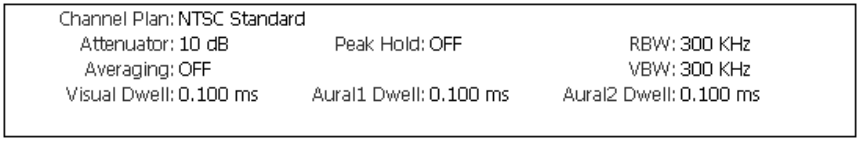


These carrier levels are measured during the retrace, using the peak detector dwell times defined in the channel plan.

Note: Because auto-scaling is not used in this test, the control (on the **Scale** tab) is grayed out.

Status panel – level measurement

To view the settings of the following test parameters, touch the **Status** button:



- Currently-enabled channel plan
- RF input attenuator setting
- State of Peak-hold and Averaging controls
- Visual and aural carrier dwell times
- Resolution bandwidth (RBW) and Video Bandwidth (VBW)

Noise floor correction in distortion tests

At the beginning of a distortion measurement the RF input is disconnected using an internal relay, and the noise floor of the instrument is measured. The level of the measured distortion beat is compared to the noise floor and a correction factor applied to the result to compensate for beats near the noise floor. The maximum correction is 4.3 dB, corresponding to a beat (in CSO and CTB tests) or to noise (in the CCN test) 2 dB above the noise floor. When the measured beat or noise is within 2 dB of the noise floor, the CSO or DFI value is only approximate; it's shown as being greater than (">") the displayed value, to indicate that the beat or noise is too close to the instrument noise floor to get an accurate result. You may be able to improve the dynamic range by entering a lower **Full Scale** reference value (on the **Scale** tab).

Composite Second Order (CSO), Discrete Frequency Interference (DFI)

CSO and DFI are calculated as the ratio of the rms voltage level of the visual carrier, measured during the sync pulse, divided by the rms amplitude of the coherent disturbance. This ratio is expressed in dBc.

CSO can be measured with the Video Gate on or off, according to the type of channel being tested. In both cases, the visual carrier level is measured using these settings: 300 KHz RBW, positive peak detector, and dwell time as defined in the channel plan. The two methods differ in how they measure the undesired signals, giving the user flexibility in optimizing measurement accuracy, dynamic range and interference.

For best results, set up the test as follows:

1. Enable trace averaging. Touch the **View** tab, then the **On** check box. Set **Number Of Averages** to at least 10 to stabilize the results.
2. If auto-scaling has not been enabled (**Auto** check box on the **Scale** tab), set the vertical scale (**Scale** tab, **Full Scale** step control) so that the visual carrier peak is at the top of the display (the peak may even be a little above the top—but by no more than 5 dB).

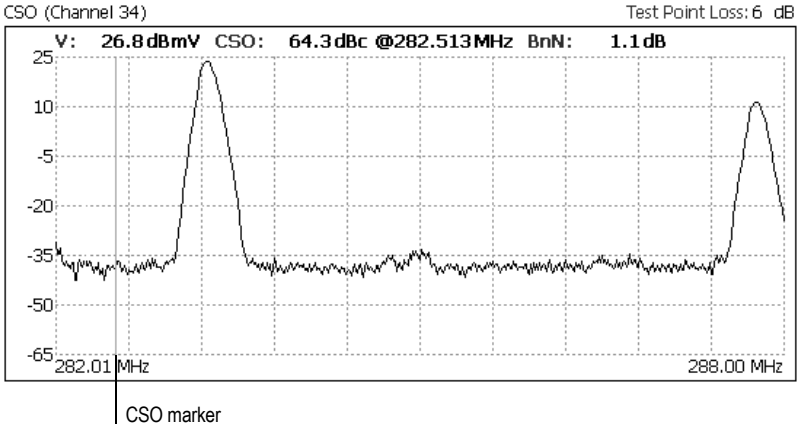
Video Gate On

This is the preferred (non-interfering) method for measuring CSO on modulated, non-scrambled channels.

The Video Gate setting is defined in the channel plan; its default state is **On**. You can check this by touching the **Quick Edit Channel...** button on the

Measure tab. Scroll down the resulting list box until the line **CSO Video Gate** appears. Verify that this is set to **On**. If not, edit the line as described in *Using the Channel Plan Quick-Edit*, page 5–3.

Select the desired channel; the spectrum analyzer will update the trace, search for the maximum beat, and calculate the CSO result only during the retrace. When averaging is enabled, the trace will gradually settle:



(When averaging is not enabled, the CSO calculation is made continuously.)

The results area displays the following:

V: Visual carrier level

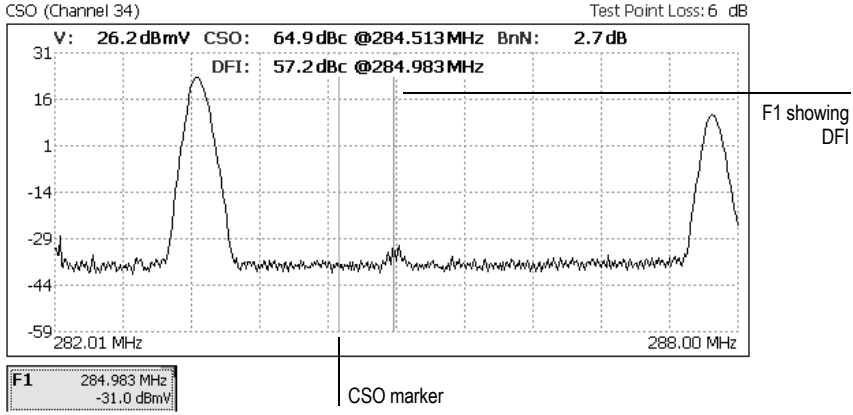
CSO: Value in dBc of CSO, and the frequency, at the marker

BnN: Beat-near-Noise correction, in dB, incorporated into the result.

The vertical marker (blue in the normal display palette, red in the bright-sunlight palette) is automatically positioned at the point of greatest CSO, within 15 KHz of the frequencies defined in the channel plan.

Discrete Frequency Interference

To see the amount of DFI at any frequency, touch the **F1** marker button:



The DFI at the marker's location is read out at the top of the graph. You can move the marker (yellow in normal view, blue in bright-sunlight view) in the usual way to find the DFI at any point on the trace.

Video Gate Off

This method will produce the best dynamic range. It can be used when video gating is not possible, and is the only method for testing a scrambled channel. The test can be performed either in channel with the video modulation off, or out-of-band in a quiet portion of the spectrum.

In-channel measurement

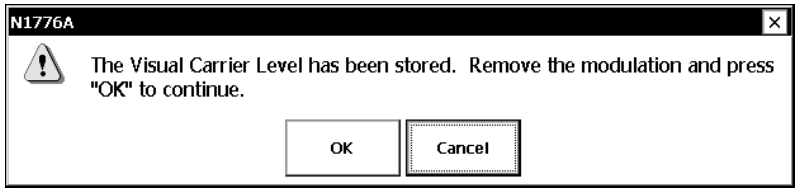
For this test, you must have an unmodulated carrier, or be able to temporarily turn the modulation off at the headend.

1. Select the channel. If the video gate is on and the modulation is turned off, you will see the message

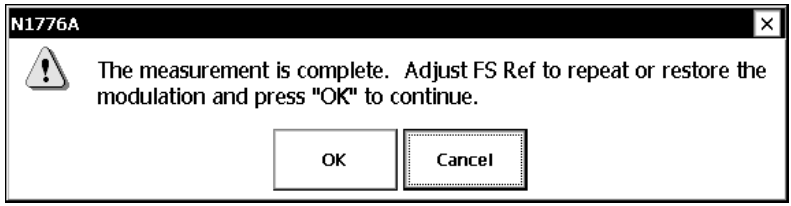
   Gating signal not found

2. Turn the video gate off as described in *Using the Channel Plan Quick-Edit*, page 5–3. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time

defined in the channel plan, then display the following message

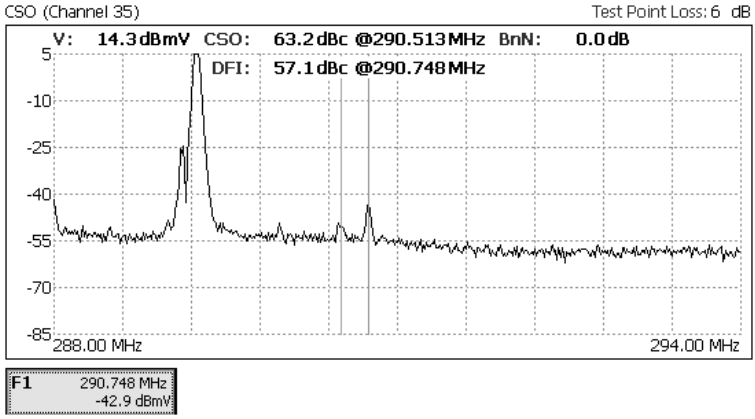


3. Turn the modulation off, then touch **OK**. The Network Profiler will run the test for the selected number of averages, pause, then display the message:



At this point, you may adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging.

4. When you have finished your measurements, restore the modulation, then touch **OK**. The results of the test remain frozen on the screen so that you can observe the data, save it in a test file, or make a screen capture file:



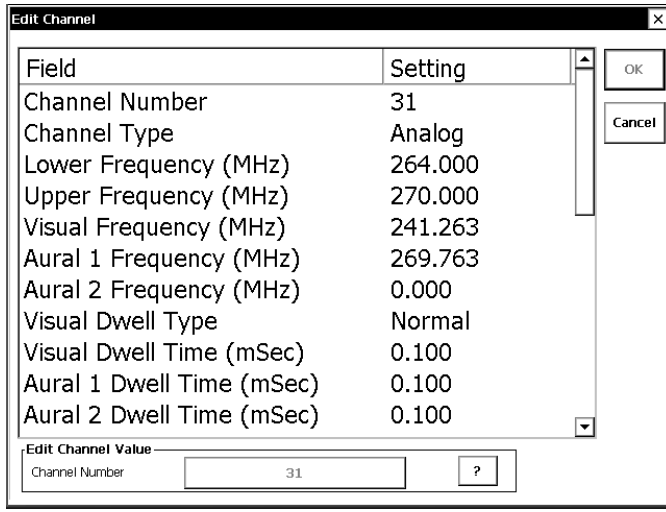
5. Use the F1 marker to measure the level of DFI at any point.

6. Restart the measurement ny touching **Restart** on the **Measure** tab.

Out-of-band measurement

This test measures the distortion products in a quiet part of the spectrum, using the visual carrier from a nearby analog channel as a reference. Use this method for a quick check of performance, or when turning off modulation is not possible.

1. Using the Spectrum Analyzer or a copy of your channel plan, find a quiet portion of the spectrum.
2. Select an analog reference channel not too far from the quiet portion (adjacent is best).
3. On the **Measure** tab, touch **Quick Edit** to open the channel plan. Record the Visual carrier frequency:



4. Close the editor.
5. On the **Channel** tab, select a channel in the quiet portion of the spectrum.
6. On the **Measure** tab, touch **Quick Edit** to open the channel plan for the quiet channel.
7. Set **Visual Freq** to that of the visual carrier in the reference channel.
8. Calculate an offset using this equation:

$$Offset = (Visual\ freq_{\text{quiet channel}} - Visual\ freq_{\text{reference channel}})\ MHz$$

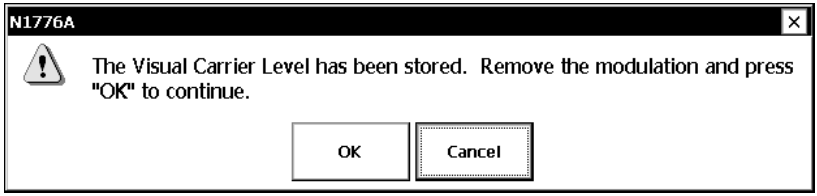
9. Add this value to each of the quiet channel's CSO Beat Frequency offsets (if the quiet channel is below the reference channel, this value will be negative).

   Here's an example using the NTSC Standard channel plan. The reference channel is 27; the quiet channel 31. The difference between the two visual frequencies is 265.35 – 241.25 = 24. This is your offset.

   Add this offset to each of the CSO beat frequencies (all values are MHz):

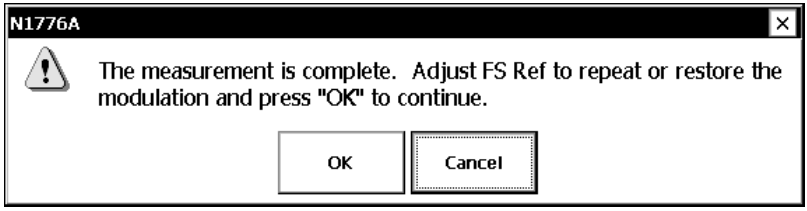
   CSO Beat Freq Offset 1: –0.75 + 24.00 = 23.25
   CSO Beat Freq Offset 2: –0.75 + 24.00 = 23.25
   CSO Beat Freq Offset 3: 0.75 + 24.00 = 24.75
   CSO Beat Freq Offset 4: 1.25 + 24.00 = 25.25

10. Turn the video gate off as described in *Using the Channel Plan Quick-Edit*, page 5–3. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time defined in the channel plan, then display the message



   At this point, you can install a bandpass filter for the quiet channel.

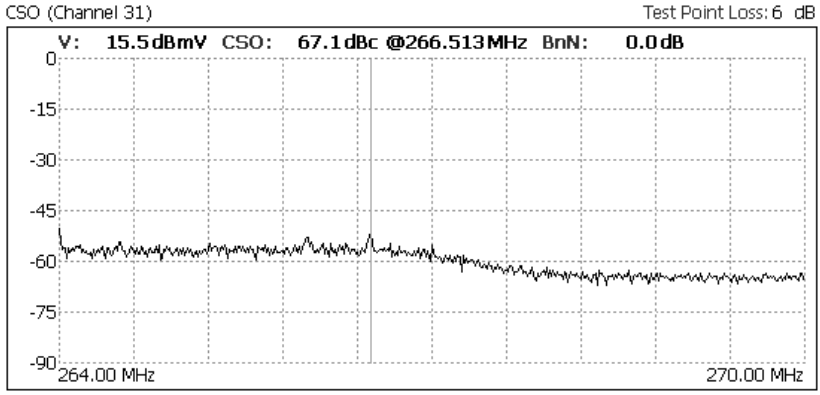
11. Touch **OK**. The Network Profiler will run the test for the selected number of averages, pause, then display the message:



   You may now adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging.

12. When you have finished your measurements, remove the bandpass filter if you have installed it, then touch **OK**. The results of the test remain frozen on the screen so that you can observe the data, save it in a test file,

or make a screen capture file:



13. Use the F1 marker to measure the level of DFI at any point.
14. Restart the measurement by touching **Restart** on the **Measure** tab.

Status panel – CSO and DFI tests

To view the settings of the following test parameters, touch the **Status** button:

Channel Plan: NTSC Standard *		
Attenuator: 0 dB	Detector: Sample	RBW: 100 KHz
Averaging: 13	Video Gate: ON	VBW: 300 KHz
Visual Dwell: 0.100 ms	Field: Both	Line: 12

- Currently-enabled channel plan

  Note: An asterisk after the plan name indicates that data have been changed (as when the Video Gate is turned off), but not saved.

- RF input attenuator setting
- Number of averages taken
- Detector and video gate settings
- Visual carrier dwell time
- Resolution bandwidth (RBW) and Video Bandwidth (VBW)
- Quiet Line Field (frame) used for test
- Quiet Line location

Composite Triple Beat (CTB)

CTB is the ratio of the rms voltage level of the visual carrier, measured during the sync pulse, divided by the rms amplitude of the coherent disturbance. This ratio is expressed in dBc.

CTB can be measured with Synchronous on or off, according to the type of channel being tested. In both cases, the visual carrier level is measured using these settings: 300 KHz RBW, positive peak detector, and dwell time defined in the channel plan. The two methods differ in how they measure the undesired signals, giving the user flexibility in optimizing measurement accuracy, dynamic range and interference.

For best results, set up the test as follows:

1. Enable trace averaging. Touch the **View** tab, then the **On** check box. Set **Number Of Averages** to at least 10 to stabilize the results.

2. If auto-scaling has not been enabled (**Auto** check box on the **Scale** tab), set the vertical scale (**Scale** tab, **Full Scale** step control) so that the visual carrier peak is at the top of the display (the peak may even be a little above the top—but by no more than 5 dB).

Synchronous on

This measurement requires that an IF gate be installed at the headend to blank the IF signal to the modulator or processor during the vertical interval. This is the only available in-channel measurement that does not interrupt the signal during the test.

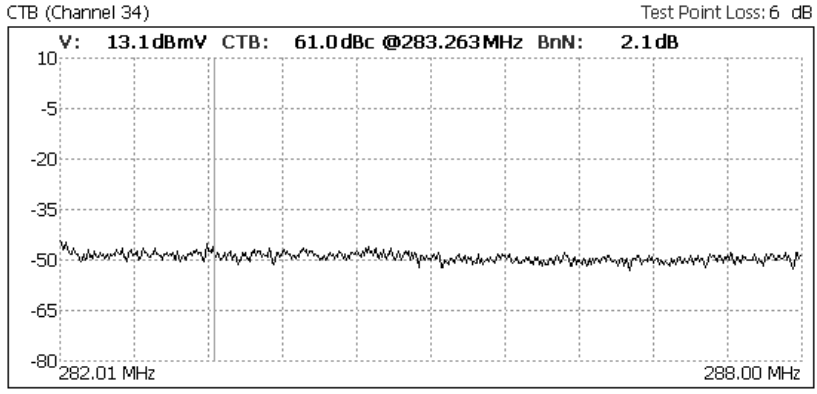
Note: You can find more information about IF gate signal processors at these web sites:
www.tvms.net/products/info 4200.htm (For TVMS Model 4200);
www.comsonics.com (for Comsonics Cybertek Examiner)

The Synchronous setting is defined in the channel plan; its default state is **On**. You can check this by touching the **Quick Edit Channel...** button on the **Measure** tab. Scroll down the resulting list box until the line **CTB Synchronous** appears. Verify that this is set to **On**. If not, edit the line as described in *Using the Channel Plan Quick-Edit*, page 5–3.

1. Turn the IF gate on at the headend to suppress the visual carrier during the vertical interval.

2. Select the desired channel; the spectrum analyzer will update the trace, search for the maximum beat, and calculate the CTB result only during

the retrace. When averaging is enabled, the trace will gradually settle:



The results area shows

V: Visual carrier level

CTB: Value in dBc of CTB at the CTB Offset frequency

BnN: Beat-near-Noise correction, in dB, incorporated into the measurement

The vertical marker (blue in the normal display palette, red in the bright-sunlight palette) is automatically positioned at the CTB offset frequency defined in the channel plan. For most channels, this offset is 0, as in the example above.

When averaging is enabled, the spectrum analyzer calculates the average and refreshes the display only during the retrace.

Synchronous off

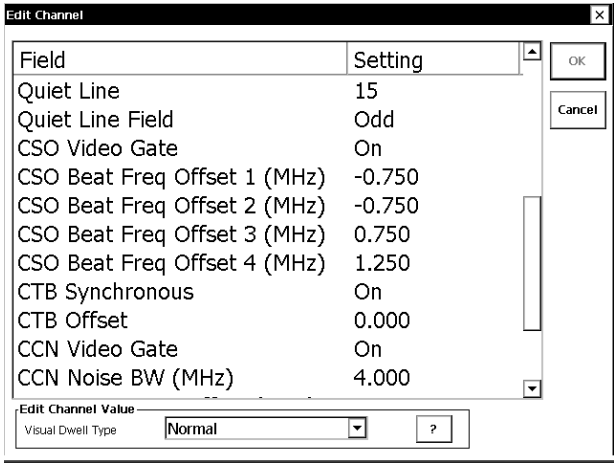
This test can be done with the visual carrier off or on; for most channels, it is done in-channel with the carrier off.

Carrier off, in channel

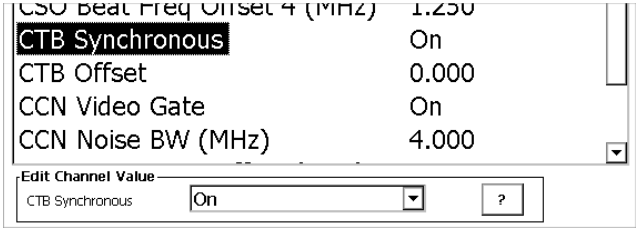
For this test, you must be able to turn the visual carrier off.

1. Select the channel to be tested.
2. Touch the **Quick edit** button on the **Measure** tab to display the channel

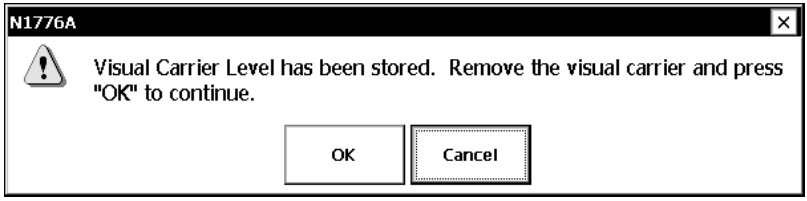
plan data, and scroll down until **CTB Synchronous** appears:



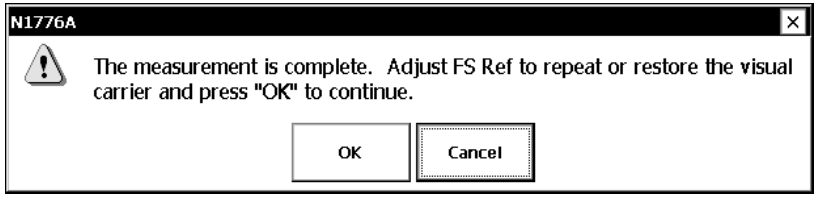
3. Touch that line to highlight it, then use the list box at the bottom to set the value to **Off**:



4. Close the edit window. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time defined in the channel plan, then display the following message



5. Turn the carrier off, then touch **OK**. The Network Profiler will run the test for the number of averages you have specified, pause, then display the request



   At this point, you may adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging.

6. When you have finished your measurements, restore the carrier. The results of the test are frozen on the screen so that you can observe the data, save it in a test file, or make a screen capture file.

7. To restart the test, touch **Restart** on the **Measure** tab.

Carrier on – out-of-band

This test measures the distortion products in a quiet channel, using the visual carrier from a nearby analog channel as a reference. Use this method for a quick check of performance, or when turning off modulation is not possible.

1. From your channel plan, find a quiet channel with an analog channel not far away (adjacent is best). The analog channel's visual carrier is your reference frequency.

2. On the **Channel** tab, select the quiet channel.

3. On the **Measure** tab, touch **Quick Edit** to open the channel plan for the quiet channel. Make the following changes using the procedure described in *Using the Channel Plan Quick-Edit*, page 5–3.

   Set **Visual Freq** to the value of the visual carrier in the reference channel.

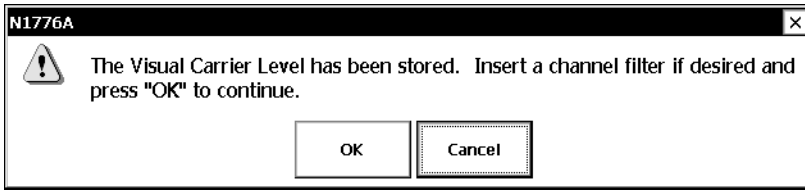
   Set **CTB Synchronous** to **Off**.

   Calculate the CTB Offset according to the location of the quiet channel relative to the reference channel, using the equation

   $$Offset = (Visual\ freq_{\text{quiet channel}} - Visual\ freq_{\text{reference channel}})\ MHz$$

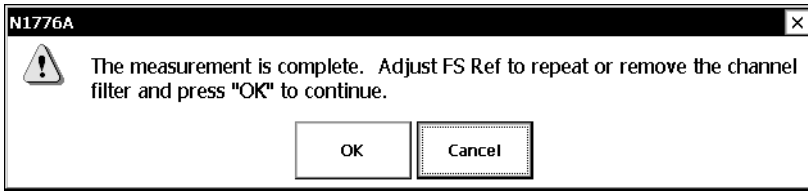
   Here's an example using the NTSC Standard channel plan. The reference channel is 27; the quiet channel 31. The difference between the two visual frequencies is 265.35 – 241.25 = 24. Set **CTB Offset** to this value.

4. Close the Channel-plan editor. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time defined in the channel plan, then display the following message



   At this point, you can install a bandpass filter for the quiet channel.

5. Touch **OK**. The Network Profiler will run the test for the selected number of averages, pause, then display:

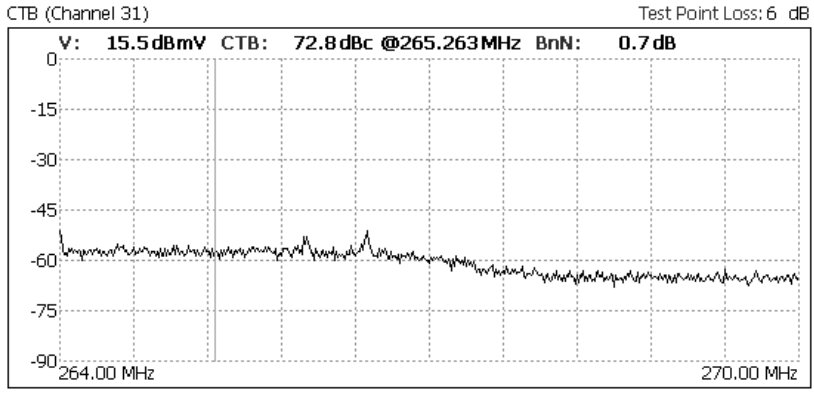


   You may now adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging.

   When averaging is enabled, the spectrum analyzer calculates the average and refreshes the display only during the retrace.

6. When you have finished your measurements, remove the bandpass filter if you have installed it, then touch **OK**. The results of the test remain frozen on the screen so that you can observe the data, save it in a test file,

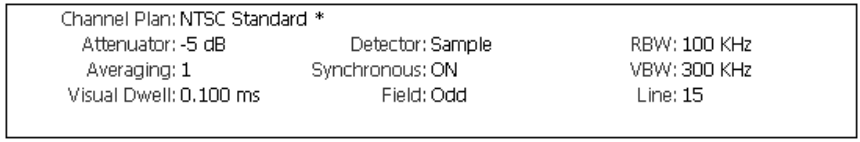
or make a screen capture file:



7. To restart the test, touch **Restart** on the **Measure** tab.

Status panel – CTB test

To view the settings of the following test parameters, touch the **Status** button:



- Currently-enabled channel plan

  Note: An asterisk after the plan name indicates that data have been changed (as when the Video Gate is turned off), but not saved.

- RF input attenuator setting
- Number of averages taken
- Visual carrier dwell time
- Detector setting
- RBW and VBW settings

Carrier-to-Composite Noise (CCN)

The carrier-to-composite noise measurement is the ratio of the rms voltage produced by the visual signal during the transmission of synchronizing pulses, divided by the associated system composite noise power in a user-selected noise bandwidth. This ratio is expressed in dBc.

Composite noise comprises thermal noise (CTN) and the noise-like intermodulation products created by beat products of analog and digital signals (CIN). This combination has traditionally been called carrier-to-noise (C/N), but that term is valid only for systems with no digital channels.

CCN can be measured with the Video Gate on or off, according to the type of channel being tested. The two methods differ in how they measure the undesired signals, giving the user flexibility in optimizing measurement accuracy, dynamic range and interference. With the gate off CCN can be measured in channel or out-of-band.

In all tests, the visual carrier level is measured using these settings: 300 KHz RBW, positive peak detector, and dwell time defined in the channel plan.

For best results, set up the test as follows:

1. Enable trace averaging. Touch the **View** tab, then the **On** check box. Set **Number Of Averages** to at least 10 to stabilize the results.
2. If auto-scaling has not been enabled (**Auto** check box on the **Scale** tab), set the vertical scale (**Scale** tab, **Full Scale** step control) so that the visual carrier peak is at the top of the display (the peak may even be a little above the top—but by no more than 5 dB).

Setting the noise parameters

To make an accurate CCN measurement, three channel plan parameters must be configured properly: Noise Bandwidth, CCN measurement start offset, and CCNmeasurement stop offset. You can set all three using the **Quick Edit Channel...** function on the **Measure** tab.

Noise bandwidth

CCN Noise BW defines the reference video bandwidth used to calculate the noise result. The default for this value is 4 MHz in NTSC systems and 5 MHz in PAL systems.

CCN start and stop offsets

CCN Meas Start Offset and **CCN Meas Stop Offset** define the noise measurement frequency range relative to the visual carrier frequency. The instrument will integrate the linear power across this frequency range after the spectrum scan is complete and calculate the CCN result. If Video Gate is ON, the offsets must not be set further from the visual carrier than -1.25 MHz or +8.75 MHz.

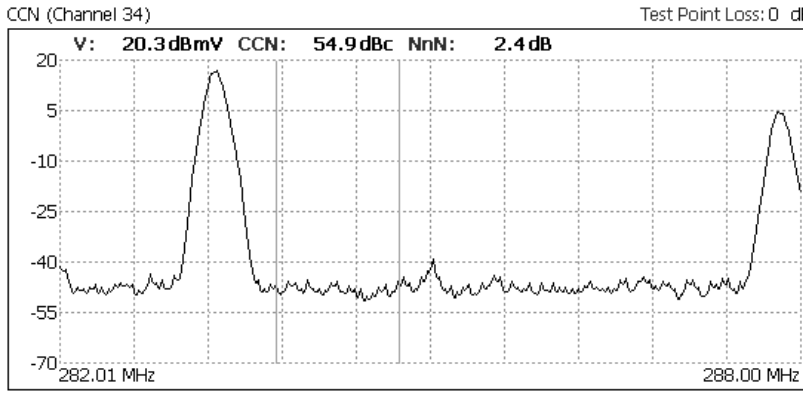
Video Gate On

This is the preferred, non-interfering, method for measuring CCN on modulated, non-scrambled, channels. It measures the combined baseband signal noise and broadband RF noise, which is what the viewer actually sees. This test does not require modulation to be turned off

The Video Gate setting is defined in the channel plan; its default state is **On**. You can check this by touching the **Quick Edit Channel...** button on the **Measure** tab. Scroll down the resulting list box until the line **CCN Video Gate** appears. Verify that this is set to **On**. If not, edit the line as described in *Using the Channel Plan Quick-Edit*, page 5–3.

To run the test:

1. Touch **CCN** on the **Measure** tab.
2. Select the desired channel; The Network Profiler will run the test for the selected number of averages, at which time you will see a trace like the following:



When averaging is enabled, the Network Profiler updates the spectrum analyzer response and and measurement results only during retrace.

The results area shows the values calculated for the following:

V: Visual carrier level

CCN: Value in dBc of CCN, as calculated by integrating the samples between the CCN Measurement Start and Stop offset frequencies, which are indicated by blue (orange in bright-sunlight display) vertical markers.

Note: It is important to visually check the displayed noise integration span for spurious signals that can degrade the measurement. The effects of such signals can be minimized by adjusting the CCN Measurement Start and Stop offset frequencies.

NnN: Noise-near-Noise correction, in dB, incorporated into the measurement.

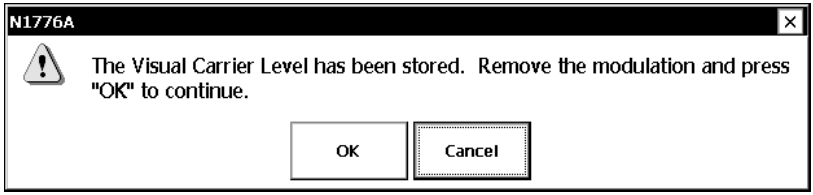
Video Gate Off

This test can be performed either in channel with the video modulation off, or out-of-band in a quiet portion of the spectrum.

In-channel measurement

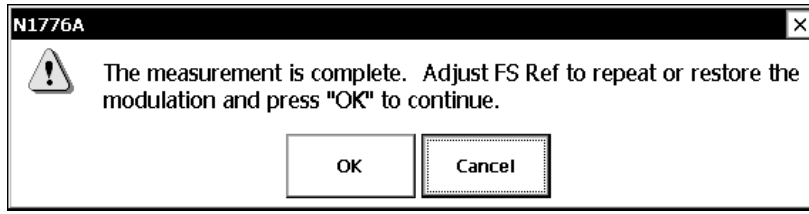
This will produce the highest absolute accuracy and the widest dynamic range, but you must have an unmodulated carrier, or be able to temporarily turn the carrier modulation off at the headend.

1. Turn the video gate off as described in *Using the Channel Plan Quick-Edit*, page 5–3. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time defined in the channel plan, then display the following message:



2. Turn the video modulation off, then touch **OK**. The Network Profiler will run the test for the specified number of averages, then display the

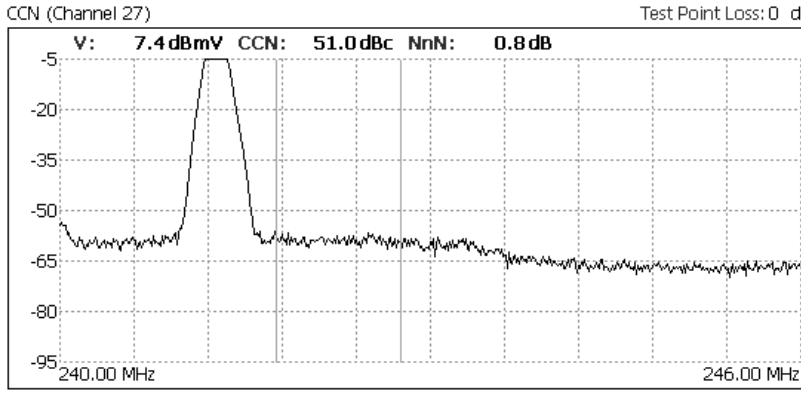
request:



At this point, you may adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging.

When averaging is enabled, the spectrum analyzer calculates the average and refreshes the display only during the retrace.

3. Restore the modulation, then touch **OK**. The results of the test remain frozen on the screen so that you can observe the data, save it in a test file, or make a screen capture file:



4. To restart the test, touch **Restart** on the **Measure** tab.

Out-of-band measurement

This test measures the noise in a quiet part of the spectrum, using the visual carrier from a nearby analog channel as a reference. Use this method for a quick check of performance, or when turning off modulation is not possible.

1. From your channel plan, find a quiet channel with a modulated analog channel not far away (adjacent is best). The analog channel's visual carrier frequency is your reference.
2. On the **Channel** tab, select the quiet channel.
3. On the **Measure** tab, touch **Quick Edit** to open the channel plan for the quiet channel.
4. Following the steps described in *Using the Channel Plan Quick-Edit*, page 5–3, set **Visual Freq** to the value of the visual carrier in the reference channel.
5. Set **Video Gate** to **Off**.

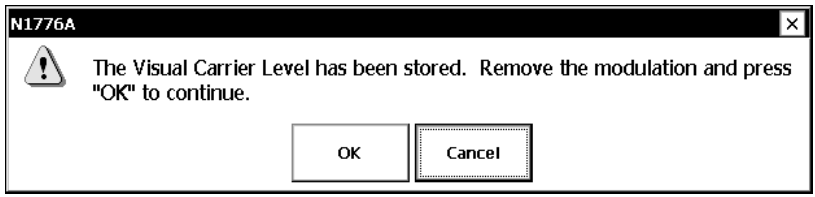
   Calculate the **CCN Meas Start** and **Stop** according to the location of the quiet channel relative to the reference channel, using the equation

   $$Offset = (Visual\ freq_{\text{quiet channel}} - Visual\ freq_{\text{reference channel}})$$

   Add the result to the two parameters in the channel plan.

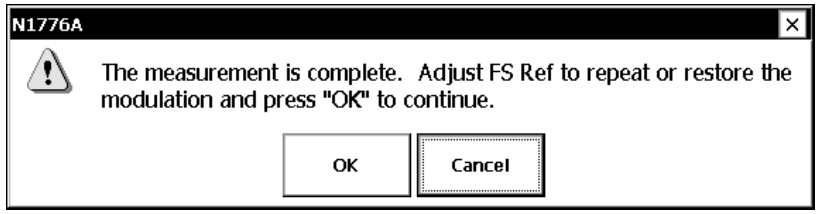
   Here's an example using the NTSC Standard channel plan. The reference channel is 27; the quiet channel 31. The difference between the two visual frequencies is 265.35 – 241.25 = 24. Set the two offsets as follows:

   CCN Meas Start Offset (MHz): 1.0 + 24.00 = 25.00 MHz
   CCN Meas Stop Offset (MHz): 3.0 + 24.00 = 27.00 MHz
6. Close the Channel-plan editor. When you return to the test, the Network Profiler will measure the visual carrier level using the peak detector dwell time defined in the channel plan, then display the following message:



   At this point, you can install a bandpass filter for the quiet channel.

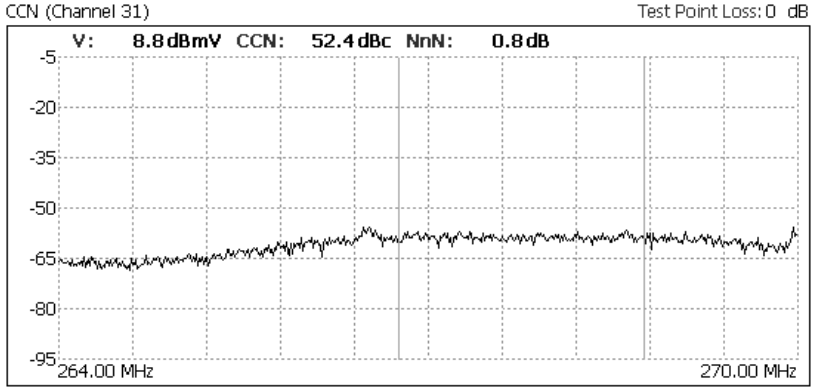
7. Turn the modulation off, then touch **OK**. The Network Profiler will run the test for the selected number of averages, then display the request:



   You may now adjust the full scale reference to maximize the dynamic range. If you do so, the Network Profiler will restart averaging. You may also repeat the test by touching **Restart** on the **Measure** tab.

   When averaging is enabled, the spectrum analyzer calculates the CCN result and refreshes the display only during the retrace.

8. Remove the bandpass filter if you have installed it, then touch **OK**. The results of the test remain frozen on the screen so that you can observe the data, save it in a test file, or make a screen capture:



9. To restart the test, touch **Restart** on the **Measure** tab.

Status panel – CCN test

To view the settings of the following test parameters, touch the **Status** button:

Channel Plan: NTSC Standard *		
Attenuator: 5 dB	Detector: Sample	RBW: 100 KHz
Averaging: 20	Video Gate: ON	VBW: 300 KHz
Visual Dwell: 0.100 ms	Field: Both	Line: 12
NM Start: 283.76 MHz	NM Stop: 284.76 MHz	Noise BW: 4.00 MHz

- Currently-enabled channel plan

  Note: An asterisk after the plan name indicates that data have been changed (as when the Video Gate is turned off), but not saved.

- RF input attenuator setting
- Number of averages taken
- Visual carrier dwell time
- Detector and video gate settings
- RBW and VBW settings
- Quiet Line Field (frame) used for test
- Quiet Line location
- Measurement range start and stop frequencies
- Noise bandwidth

Hum

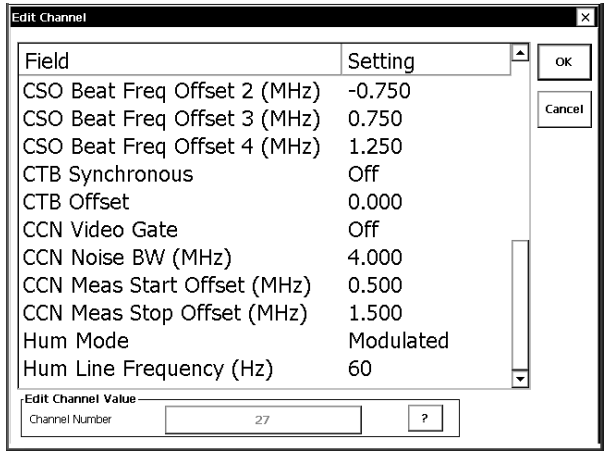
Low frequency disturbance ("hum") is the amplitude distortion of the signal caused by components of the power source. The Network Profiler measures hum as the ratio of the peak-to-peak interference to the peak level of the desired picture carrier, and is expressed in percent.

Hum can be measured in either of two modes: **Modulated** or **CW**. The mode is defined in the channel plan; the default is **Modulated**. Both modes sample the signal at the horizontal sync rate and display a trace of the demodulated AM signal, together with the AM result as a percentage of the peak-to-peak. The only difference between the two modes is that in **Modulated** mode using a modulated signal, the A/D sampling signal is generated from the video sync strip circuitry and the sample occurs at the peak of the horizontal sync pulse. In CW **mode**, using a CW signal, the A/D sampling signal (15.731 kHz for NTSC or 15,620 kHz for PAL) is generated from the internal system clock.

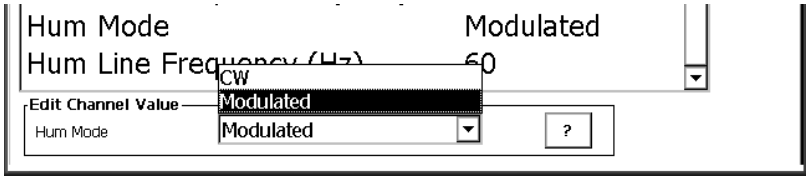
In either mode, the Network Profiler displays a graphical response of the AM time domain signal, with the calculated hum percentage from the peak-to-peak detector of the AM signal presented in the results area.

Measuring hum

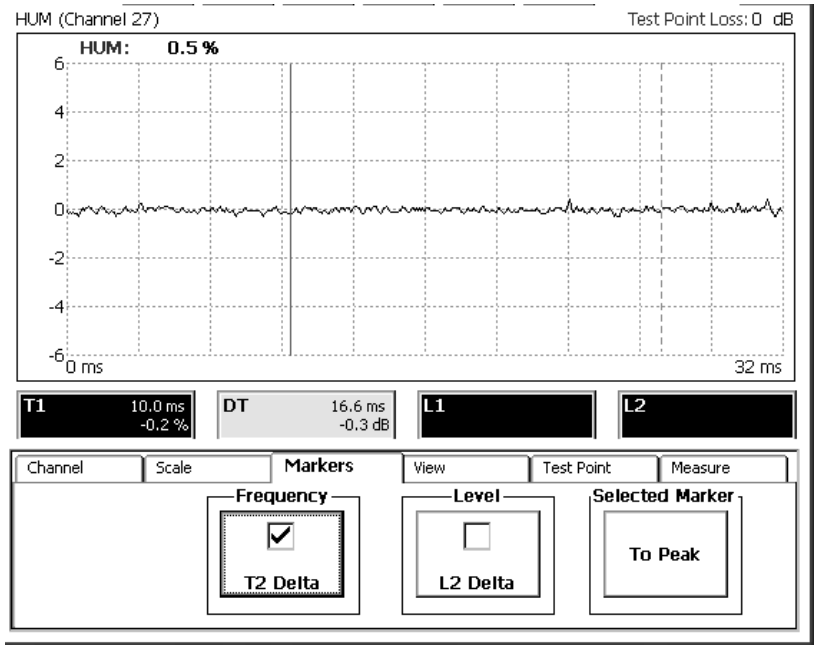
1. Select the channel to be tested.
2. To verify that the test mode is correct for the type singal being used, touch the **Quick Edit** button on the **Measure** tab, and scroll down the list until **Hum Mode** appears:



3. To change the mode, highlight the line, and select your choice from the list box that appears:



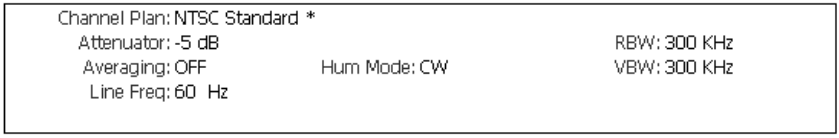
4. Close the Edit window to return to the test. The resulting trace shows the AM component of the signal as a function of time sampled at the horizontal sync rate. The peak-to-peak hum measurement over the interval is shown in the results area:



The vertical markers **T1** and **T2** show the instantaneous hum measurement at those points in time.

Hum status panel

To view the settings of the following test parameters, touch the **Status** button:



- Currently-enabled channel plan

  Note: An asterisk after the plan name indicates that data have been changed (as when the Hum mode is changed), but not saved.

- RF input attenuator setting
- Number of averages taken
- RBW and VBW settings
- Hum mode setting
- Power line frequency

6

Single-Channel Tests: Digital

Overview

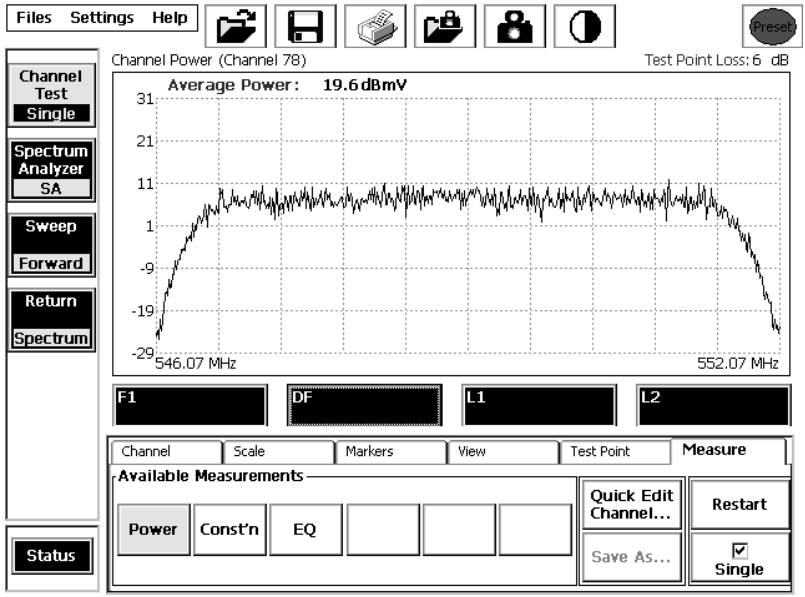
There are three digital channel measurements: Channel Power, Constellation, and Equalizer. The Constellation and Equalizer tests include error reporting.

To run these tests, you must select a digital channel:

1. Select **Channel test > Single**.
2. Select the **Channel** tab. Check that the correct channel plan is enabled. If not, see *Enabling a channel plan*, page 3–19, for instructions on changing the plan.
3. Use the **Channel** control to select a channel (you can restrict your selection to digital channels by touching the **Channel Types** control and selecting **Digital Only)**. Use the arrows to step up or down through the channels in the current plan. To move to a non-adjacent channel, touch the middle button, enter the channel number (as defined in the channel plan) in the text box of the displayed keyboard, then touch **Enter**. The new channel's number will appear on the middle button of the control.

Channel Power

When you first display a digital channel, the channel power measurement is selected by default:



This is an integrated measurement which samples the signal across its entire bandwidth. Depending on how the TDMA parameters are set in the channel plan, this will show continuous channel, TDMA threshold, or TDMA burst power.

The Lower and Upper Band Edges in the channel plan determine the displayed frequency range; the Center Frequency and Channel Bandwidth determine the frequency range over which the channel power is measured.

The display shows the spectrum of the channel, with the measured channel power shown in the results area. For best results, adjust the full-scale value so that the trace is 10-20 dB below the top of the data display (see page 6–5 for instructions).

To see a single trace instead of a continuous one, select the **Measure** tab, then touch the **Single** check box.

Using a test point file

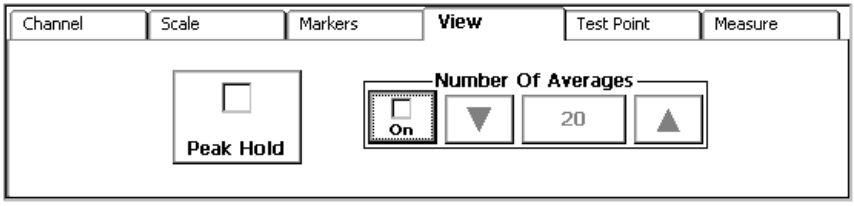
To enable a test point file:

1. Select the **Test Point** tab;
2. touch the **Test Point** button to display the file list;
3. highlight a filename, then touch **OK** to select it; **Enable Test Point** will automatically be checked, enabling the test point.

See *Enabling a test point file*, page 3–17, for more information.

Other controls

Averaging: To average successive measurements, select the **View** tab, then touch the **On** check box under **Number of Averages**. Use the **Number of Averages** step control to set the number of measurements to be averaged. The allowable range is 1-100.



Note: Only the measured power shown in the results area is averaged; the displayed trace is not affected.

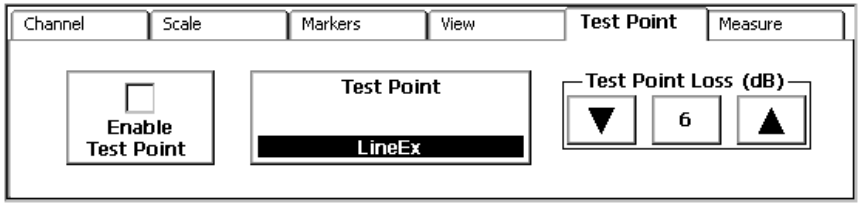
See *A Note on Averaging*, page 4–10, for more information.

Peak hold: To capture and hold peak values, select **View**, then touch the **Peak Hold** check box. Note that averaging is disabled when Peak Hold is activated. To restore the normal sweep, uncheck **Peak Hold**. To clear the current peaks but continue the Peak Hold function, touch **Restart** on the **Measure** tab.

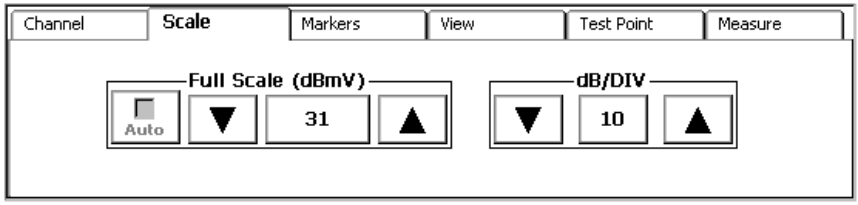
Markers: At any time, you may activate and position the markers F1, F2, L1, and L2; see *Markers*, page 3–13, for instructions.

Note: To change any of the following settings, you must first disable the Test Point file.

Test Point Loss: Select the **Test Point** tab, then set the loss using the **Test Point Loss** control.



Vertical Scale and dB/Div: To set the full-scale reference level and dB/Div of the vertical axis, select the **Scale** tab, then use the **Full Scale** and **dB/Div** controls to set the values.



(The **Auto** check box is active only for Constellation and Equalizer measurements. See page 6–7.)

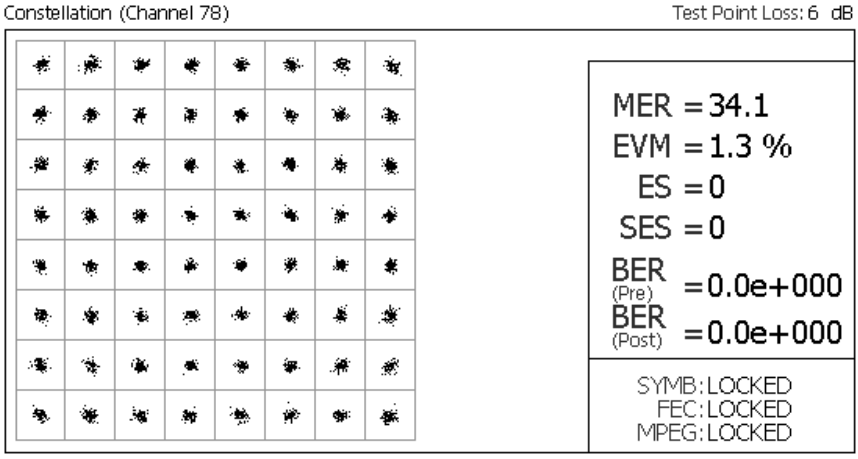
Status panel – digital channel power

You can view the test configuration at any time by touching the **Status** button:

- Currently-enabled channel plan
- RF input attenuator setting
- State of Peak-hold and Averaging controls
- Channel center frequency (CF) and bandwidth (BW)
- Resolution bandwidth (RBW) and Video Bandwidth (VBW)

Constellation

For this test, select the **Measure** tab, then touch **Const'n**:



The demodulated QAM constellation (64QAM shown) appears at the left of the data display. To the right of the constellation are the results of the measurements made by the test: Modulation Error Ratio (MER), Error Vector Magnitude (EVM), Errored Seconds (ES), Severely Errored Seconds (SES), and Bit Error Rate (BER), both pre- and post-FEC. The time frame for updating ES and SES is 1 minute.

Below these measurements is a panel showing the status of three locking parameters: Symbol (SYMB), Forward Error Correction (FEC), and MPEG transport stream.

The Network Profiler can display the following constellations:

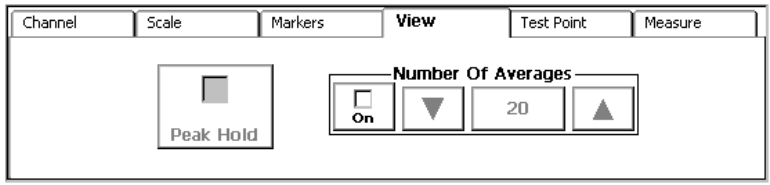
With Annex B: 64 and 256QAM
With Annex A: 32, 64, 128, and 256QAM

The QAM constellation is continuously updated, accumulating displayed points. To clear the display and start over, select the **Measure** tab, then touch the **Restart** button.

Other controls

Averaging: To average successive measurements, select the **View** tab, then touch the **On** check box under **Number of Averages**. Use the **Number of**

Averages step control to set the number of measurements to be averaged. The allowable range is 1-100.

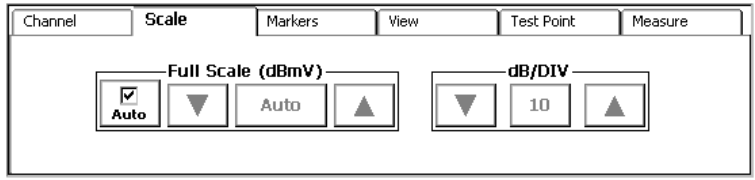


Note that the **Peak Hold** button is not active.

Note: Only the measurement results are averaged; the constellation display is not affected.

See *A Note on Averaging*, page 4–10, for more information.

Scale: The **Full Scale** step control is set to **Auto** by default; the Network Profiler measures the channel power and sets the RF Input and IF attenuator to maximize the dynamic range of the distortion measurement. If you wish to modify the setting, select the **Scale** tab, and uncheck the **Auto** box to enable the **Full scale** control:



Because the user does not have direct control of the IF attenuator, it may not be possible to duplicate the same dynamic range in manual mode.

Status panel – digital channel QAM

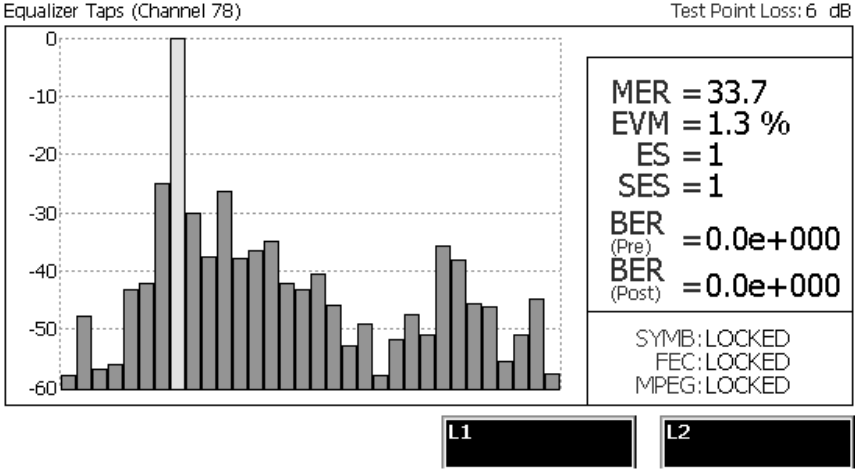
You can view the test configuration at any time by touching the **Status** button:

- Currently-enabled channel plan
- RF input attenuator setting
- Channel center frequency and bandwidth
- Modulation type
- Symbol rate
- Polarity
- Full-scale value

Equalizer

This measurement displays the response of the adaptive equalizer.

For this test, select the **Measure** tab, then **EQ:**



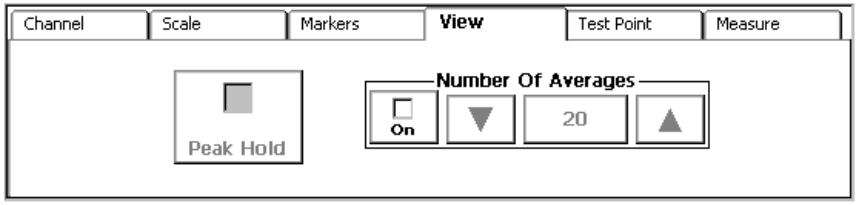
Each bar in the display represents one equalizer tap; the number of bars depends on which ITU J.83 Annex option is installed in the Network Profiler. The yellow bar represents the zero tap. The zero tap and those to the left are Feed-forward (FFE) taps; those to the right are Feed-back (DFE) taps. Annex B (shown) provides 8 FFE and 24 DFE taps.

Markers

Only the L1 and L2 markers are available. You can position them to compare levels at two different taps.

Other controls

Averaging: To average several successive measurements, select the **View** tab, then touch the **On** check box under **Number of Averages**. Use the **Number of Averages** step control to set the number of measurements to be averaged. The allowable range is 1-100.

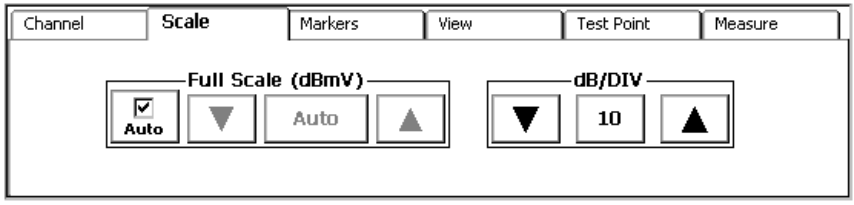


Note that the **Peak Hold** button is not active.

Note: Only the measurement results shown at the right of the display are averaged; the taps displayed are not affected.

See *A Note on Averaging*, page 4–10, for more information.

Scale: The **Full Scale** step control is set to **Auto** by default; the Network Profiler measures the channel power and sets the RF Input and IF attenuator to maximize the dynamic range of the distortion measurement. If you wish to modify the setting, select the **Scale** tab, and uncheck the **Auto** box to enable the **Full scale** control:



Because the user does not have direct control of the IF attenuator, it may not be possible to duplicate the same dynamic range in manual mode.

Status panel – Equalizer taps

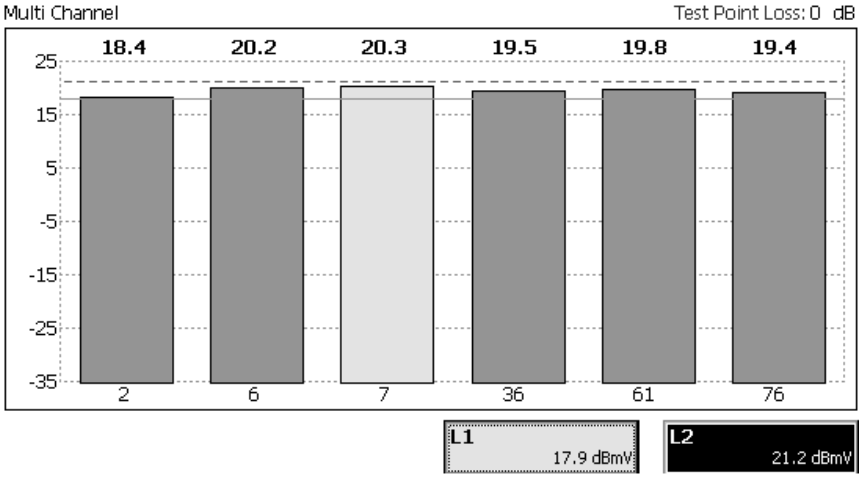
The status information displayed for the equalizer measurement is the same as for the constellation – see page 6–7.

7

Multi-Channel and Channel Scan Tests

Multi-channel test

To run the multi-channel test, Select **Channel Test > Multi**. You will see a bar chart of six channels:



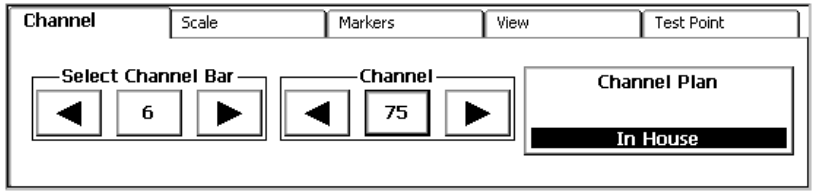
Each bar shows either the visual carrier level (analog) or channel power (digital) of the assigned channel. For analog channels, the test uses the dwell times defined in the channel plan; for digital channels, the test uses the center frequency and channel bandwidth to calculate the channel power. The measurement for each channel appears in the results area, directly above its bar.

Assigning channels

When you first run the multi-channel test, the lowest channel in the active channel plan will be assigned to each of the bars. There are two ways to assign different channels to the bars: by enabling a test point file with preset assignments (see *Enabling a test point file*, page 3–17), or by using the controls on the **Channel** control tab to assign channels individually. You can assign a channel only to the active bar, which is shown in yellow.

To assign channels individually, follow these steps:

1. Select the **Channel** tab. Check that the correct channel plan is enabled. If not, see *Enabling a channel plan*, page 3–19, for instructions on changing the plan.



2. Use the **Select Channel Bar** step control to make the desired bar active.
3. Use the **Channel** control to select a channel. This channel is automatically assigned to the active bar.
4. Repeat Steps 2 and 3 for each bar.

To assign channels with a test point file, you must use the Test Point Editor to create or edit the file, as described in *Test Point files*, page 10–2. To enable the file, follow the instructions below.

Using a test point file

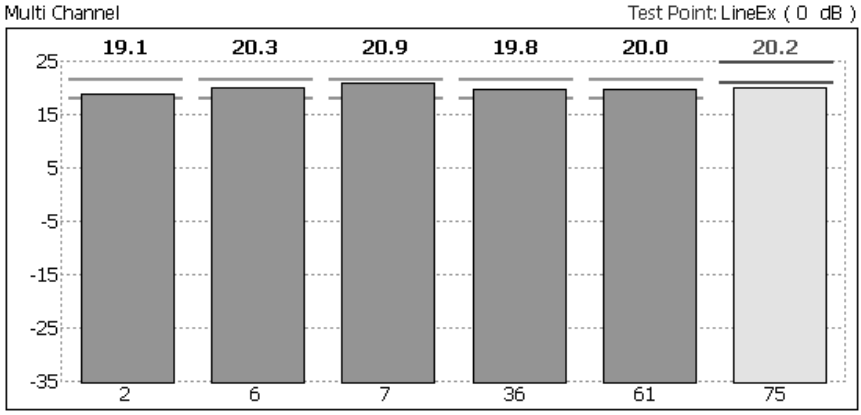
To enable a test point file:

1. Select the **Test Point** tab;
2. touch the **Test Point** button to display the file list;
3. highlight a filename, then touch **OK** to select it; **Enable Test Point** will automatically be checked, enabling the test point.

See *Enabling a test point file*, page 3–17 for more information.

Limit lines

When a test point file is enabled, each channel bar is associated with a pair of limit lines marking the acceptable upper and lower bounds of the visual carrier level or channel power for that channel:

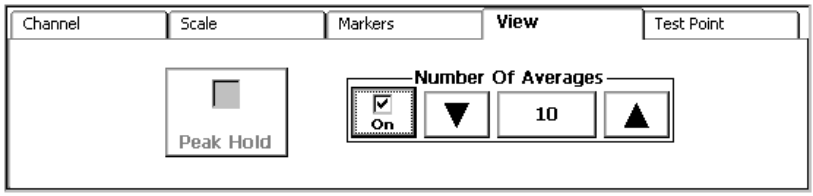


As long as the level or power remains within these limits, the lines are blue and the measurement shown in the results area is white (black in bright-screen view). If the peak rises above the upper limit or drops below the lower limit, both lines and displayed measurement result turn red.

If no test point file is enabled, you can use the level markers, L1 and L2, as a rough guide.

Other test controls

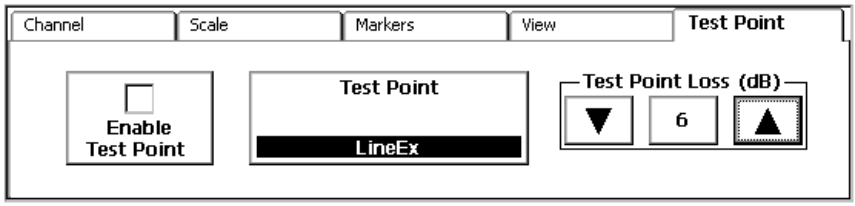
Averaging: To show the average of several successive measurements, select the **View** tab, then touch the **On** check box under **Number of Averages**. Use the **Number of Averages** step control to set the number of measurements to be averaged. The allowable range is 1-100.



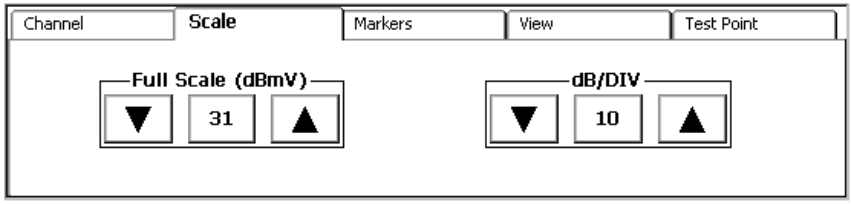
Peak hold: To capture and hold the peak levels of each bar, select **View**, then touch the **Peak Hold** check box. Note that averaging is disabled when Peak Hold is activated. To restore normal updating, uncheck **Peak Hold**.

Note: To change any of the following settings, you must first disable the Test Point file.

Test Point Loss: To set the test-point loss, select the **Test Point** tab, then set the loss using the **Test Point Loss** control.



Vertical Scale and dB/Div: To set the full-scale reference point and dB/Div of the vertical axis, select the **Scale** tab, then use the **Full Scale** and **dB/Div** controls to set the values.



Status panel – multi

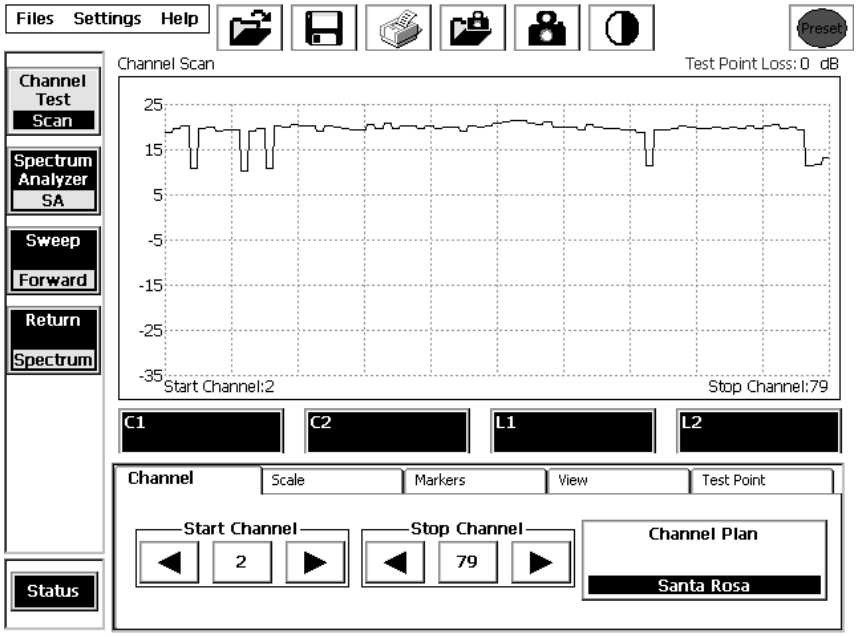
You can view the test configuration at any time by touching the **Status** button:

- Currently-enabled channel plan
- RF input attenuator setting
- State of Peak Hold and Averaging controls

Channel scan

The Channel Scan test provides an overall view of the network by showing the (analog) visual or aural carrier levels, or (digital) channel powers of a range of channels. For analog channels, the test uses the dwell times defined in the channel plan; for digital channels, the test uses the center frequency and channel bandwidth to calculate the channel power.

To run this test, select **Channel Test > Scan**:



Select the **Channel** tab. Check that the correct channel plan is enabled. If it isn't, see *Enabling a channel plan*, page 3–19, for instructions on changing the plan.

Setting the range

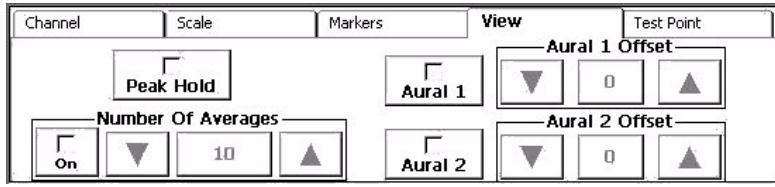
To set the range of the scan, select the **Channel** tab, and use the **Start Channel** and **Stop Channel** step controls, shown above.

Note: Because digital channels take longer to scan than analog channels, a full-spectrum scan update could be too slow. One solution is to make separate channel plans for analog and digital channels, then enable only the one you need for the channel-scan test.

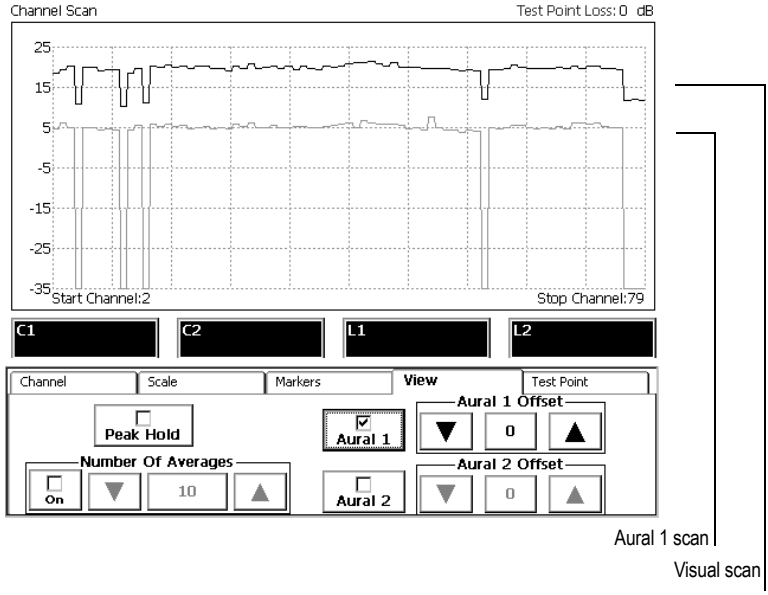
Viewing the aural carriers (analog channels)

For analog channels, the default view shows the visual carrier levels only (if there are digital channels in the scan, the channel power is shown). Controls on the View tab let you see the aural carrier(s) as well.

1. Select the **View** tab. The first time you do this, the aural offset controls will be grayed out (disabled).



2. Touch the **Aural 1** check box; the **Aural 1 Offset** step control turns from gray to black, indicating that it is enabled. The aural scan will appear in blue, about 15 dB below the visual scan:



3. To superimpose the aural scan over the visual scan, set **Aural 1 Offset** to the desired value. Maximum offset is 30 dB.
4. Follow steps 2 and 3 for **Aural 2** (Typically used only in PAL frequency configurations). The Aural 2 trace is orange, and appears about 10 dB below Aural 1; if no channels in the active plan transmit a second aural channel, the scan appears as a straight line at the bottom of the data display.

Using a test point file

To enable a test point file:

1. Select the **Test Point** tab;
2. touch the **Test Point** button to display the file list;
3. highlight a filename, then touch **OK** to select it; **Enable Test Point** will automatically be checked, enabling the test point.

See *Enabling a test point file*, page 3–17 for more information.

Other test controls

Averaging: To average several successive measurements, select the **View** tab (see figure, page 7–7), then touch the **On** check box under **Number of Averages**. Use the **Number of Averages** step control to set the number of measurements to be averaged. The allowable range is 1-100. Both the displayed trace and the measurement results are averaged.

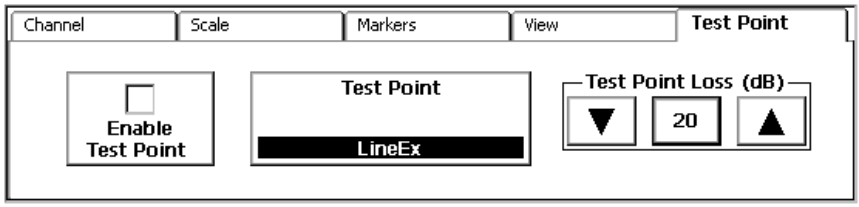
See *A Note on Averaging*, page 4–10, for more information.

Peak hold: To capture and hold peak values, select **View**, then touch the **Peak Hold** check box. Note that averaging is disabled when Peak Hold is activated. To restore normal updating, uncheck **Peak Hold**.

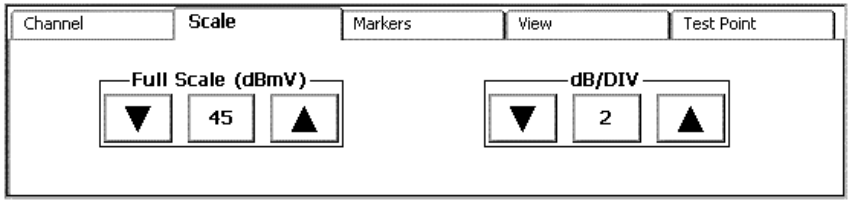
Markers: At any time, you may activate and position the markers C1, C2, L1, and L2; see *Markers*, page 3–13, for instructions.

Note: To change any of the following settings, you must first disable the Test Point file.

Test Point Loss: To set the test-point loss, select the **Test Point** tab, then set the loss using the **Test Point Loss** control.



Vertical Scale and dB/Div: To set the full-scale reference point and dB/Div of the vertical axis, select the **Scale** tab, then use the **Full Scale** and **dB/Div** controls to set the values.



Status panel – scan

You can view the test configuration at any time by touching the **Status** button:

- Currently-enabled channel plan
- RF input attenuator setting
- State of Peak-hold and Averaging controls

8

Sweep and Return Spectrum Tests

Test requirements

To carry out the sweep and return-spectrum tests, you must have the following in place:

- Dual-path Sweep module enabled on your Network Profiler (see *Dual-path Sweep module (Option 052):*, page 1–3).
- A CaLan 3010H Sweep/Ingress Analyzer, with Option 050 (Forward Sweep) or 052 (Dual Path) installed, at the headend to transmit the forward sweep and to monitor the return path. The 3010H also transmits the sweep table to the Network Profiler. A CaLan 1777 Sweep Transmitter may also be used, though this unit does not have Fast Sweep capability. In this chapter, it's assumed that the headend unit is a 3010H.

The 3010H and N1776A combination enables you to align the forward and return paths at the same time, with minimal use of forward spectrum. The 3010H can communicate with up to 10 field units (N1776A or 3010R) simultaneously. The N1776A provides the same return sweep capability as the 3010R.

For instructions on setting up the 3010H and preparing a sweep table, see *CaLan 3010H Sweep/Ingress Analyzer User's Guide* (Sunrise Telecom publication 85963A-M01).

Forward Sweep

Overview

The Forward Sweep mode allows the N1776A to integrate carrier level measurements with sweep information received from either the 1777 or 3010H sweep transmitter. Any sweep response can be stored in a results file and used to make comparison measurements in the Referenced mode. Together with the relative sweep response measurement, the N1776A allows you to simultaneously measure the absolute level of system ALC pilots preprogrammed as active carriers in the sweep table. You can define test points to adjust the offset and slope of the referenced sweep response at different points in the system. By programming the expected levels for various test points, offsets are automatically calculated and applied to the referenced sweep trace.

In the results area at the top of the screen, the N1776A displays the selected ALC carrier levels (design frequencies labeled C1 and C2) and the peak-to-valley result. The N1776A also allows you to change the start and the stop frequencies without changing those of the transmitter. This allows you to take a closer look at the peak-to-valley measurement over a specific span.

The sweep rate for the forward sweep is determined by the nature of the sweep table and the transmitter that is used. If the 3010H is used, the sweep rate can be optimized by setting the transmitter to "Fast". This mode will be automatically downloaded to the receiver and is identified by the flashing sweep indicator at the left of the results area: ">" for Normal sweep and ">>" for Fast sweep.

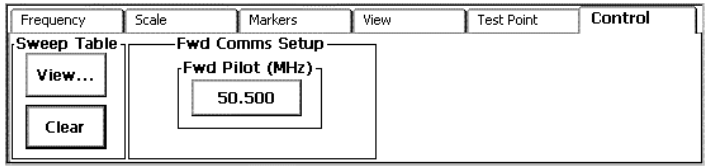
The horizontal screen resolution (501 points) on the N1776A is greater than the sweep resolution of the 3010H (401 points); the sweep data are therefore interpolated to 501 points. The N1776A allows you to zoom in on the sweep response, but no changes are made in the 3010H sweep table and the resolution does not improve. The minimum start and maximum stop frequencies are programmed in the sweep transmitter.

Referenced sweep (formerly “normalized”) is one in which real time measurementsare compared to reference measurements stored in memory. The difference between the two is displayed on the screen. The reference file is selected on the **View** tab. If the current measurement is the same as the reference, the trace will be centered at 0 dB on the display.

Running the test

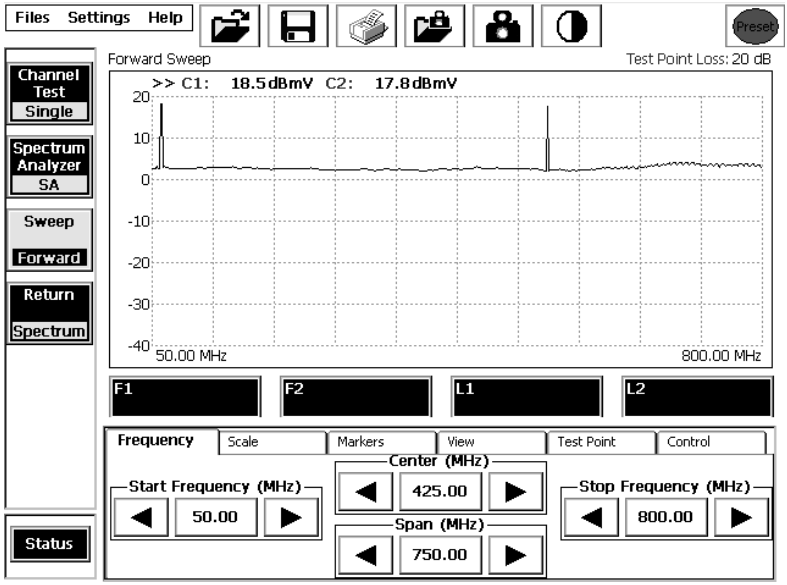
The 3010H at the headend may operate in forward sweep or dual-path mode. Prepare the Network Profiler as follows:

1. From the test selector buttons at the left of the screen, select **Sweep > forward.**
2. If you have not already done so, set the Forward Pilot frequency as follows. On the **Control** tab, touch the **Fwd Pilot (MHz)** button under **Fwd Comms setup:**



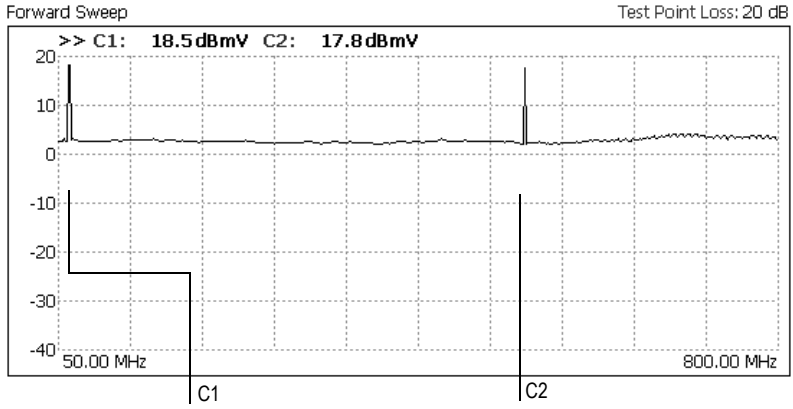
   Enter the pilot frequency using the numeric keypad, and touch **OK**.

3. You should see a flashing ">" or ">>" at the left of the results area, indicating that communication has been established with the headend, and a forward sweep is being transmitted:



   If the sweep indicator does not appear right away, first check your connections, then make sure that the 3010H is on and transmitting.

If the forward sweep does not appear immediately, your Network Profiler probably has not received a current sweep table from the 3010H. The headend device will transmit a new table within 120 sweeps, after which you should see the trace similar to this example:

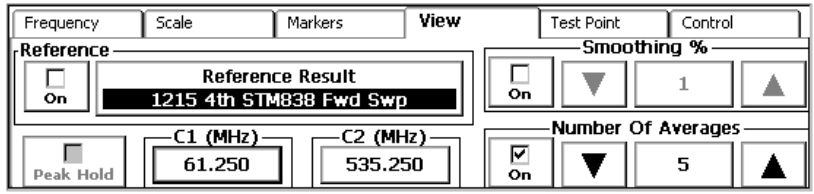


The lower and upper design frequencies are automatically assigned to the level variables **C1** and **C2**, respectively. These levels are detected at each sweep and continuously updated in the results area.

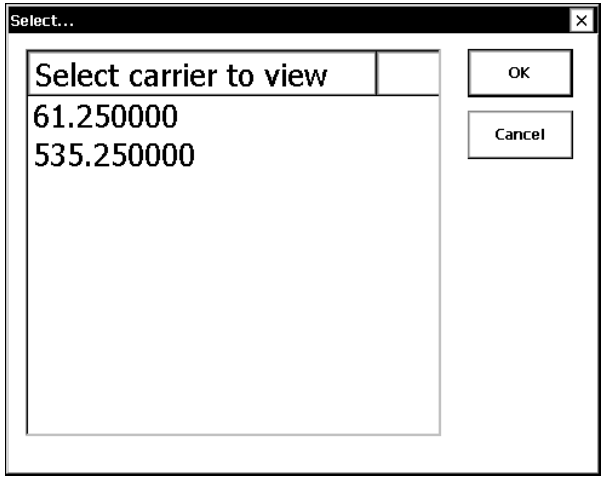
Observing other sweep frequencies

If the current sweep table contains more than two carriers with dwells greater than 0, their peaks will show in the trace. You can monitor the levels of any two of these carriers by assigning them to either of the variables **C1** or **C2**, as follows:

1. On the **View** tab, touch either **C1** or **C2** to select the carrier to be associated with that variable:



2. From the displayed list, select and highlight the carrier you want to examine:



3. Touch **OK** to assign that carrier to the variable.

The carrier frequencies assigned to **C1** and **C2** are shown in the status panel.

Smoothing and averaging

These controls are on the **View** tab (see previous figure).

The Smoothing and Averaging functions enhance the overall display of the trace by eliminating minor trace-to-trace variations. The Averaging function averages level variations on a point-by-point basis, by displaying the cumulative average level for each point. The Smoothing function compares a selected number of points, computing a "moving average" across the displayed data. Since the two functions interact to some degree, we recommend that you experiment with varying levels of each on a known reference trace, to determine the best overall use for the specific system being tested.

Because it does not affect the update rate of the display, you can use the Smoothing function to align the system. But use Averaging before printing or storing a trace.

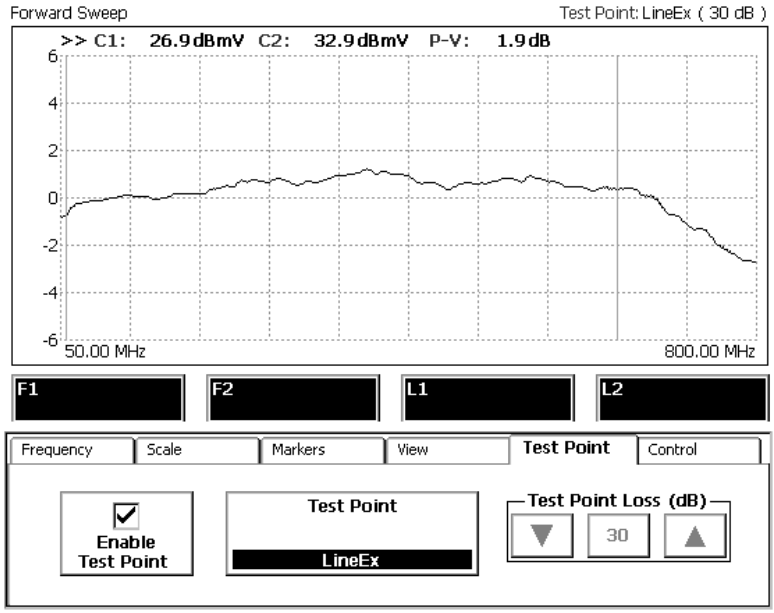
When you are adjusting amplifier gain and slope, disable averaging by unchecking the **On** check box for **Number of Averages**, then enable **Smoothing %** by checking its **On** box. Set the smoothing percentage to 1 or 2 to obtain an optimum trace.

To obtain the most accurate sweep response after alignment, enable averaging, set **Number of Averages** to 4 or more, and disable Smoothing.

Peak-to-Valley measurement

To display the peak-to-valley results, you must enable a test point file. (Please refer to Chapter 10, *Test points, Locations, and Channel Plans*, for instructions on setting up a test point.)

Enable the test point as described in *Enabling a test point file*, page 3–17. Two markers appear on the screen (blue in normal view, orange in bright-screen view):



These markers indicate the frequency limits of that portion of the sweep response over which the peak-to-valley measurement is calculated (typically, the usable frequency range of the system).

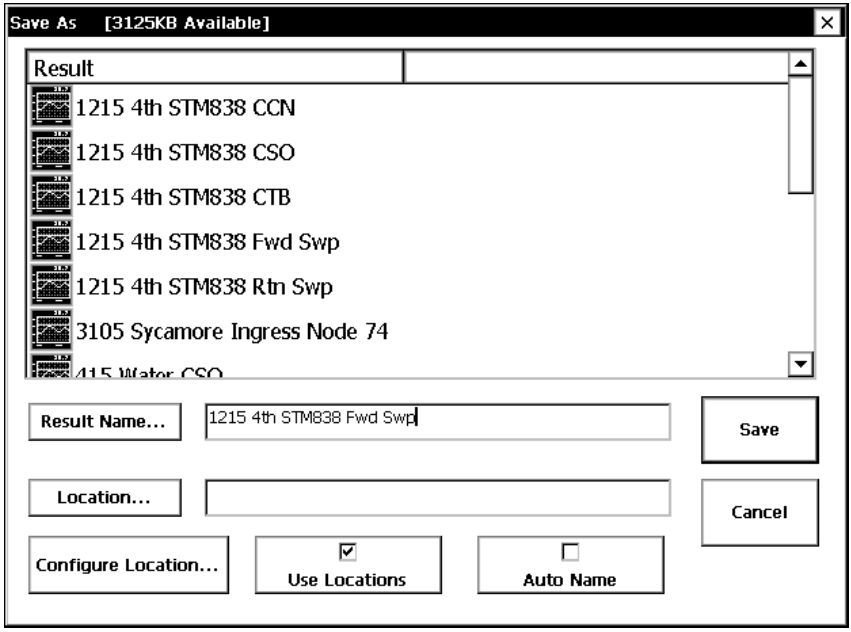
Frequency Span

You may adjust the displayed frequency span within the range set in the sweep transmitter, using the controls on the **Frequency** tab. The resolution will not change, but you may find it easier to identify specific problems in the sweep.

Referenced (Normalized) Sweep

You may save the results of a sweep response for later use as a reference. For the best accuracy, it is recommended that reference traces be taken with averaging set to at least 10 and with smoothing disabled.

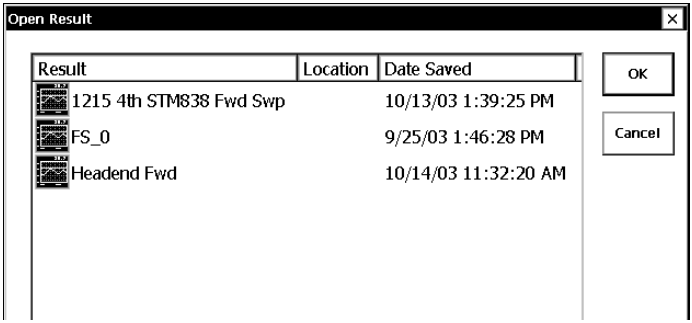
To save a test result, touch the **Save** icon on the toolbar, or select **Files > Save as...**:



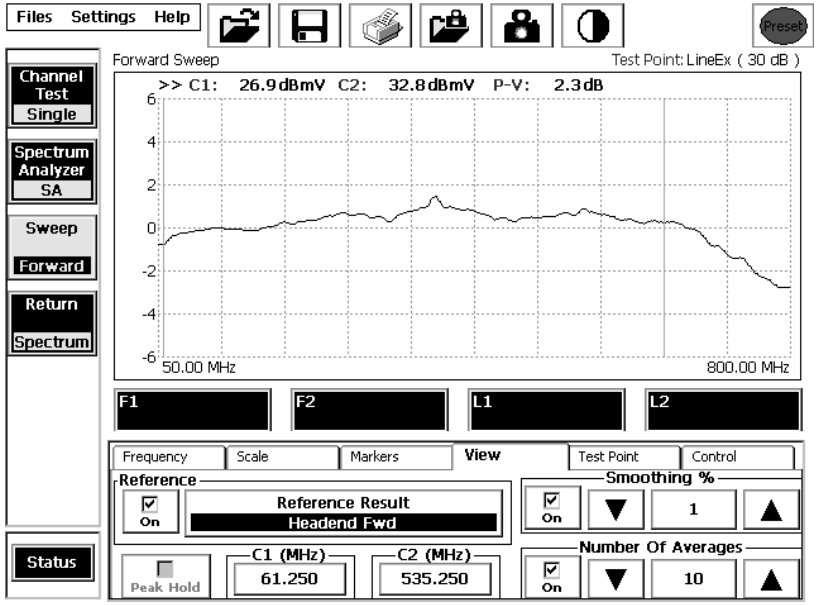
Touch **Result Name...** to type a name for the file, or use the automatically generated name provided. Touch **Save** to save the results. (For detailed information on saving data,see *Saving test results*, page 9–3.)

To enable a sweep reference:

1. Touch the **Reference Result** button on the **View** tab to display the list of reference files:



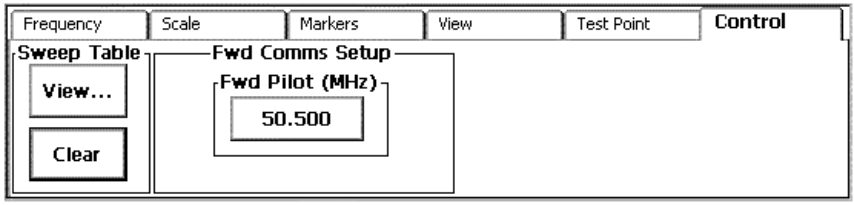
2. Touch the name of the desired file to highlight it, then touch **OK**. The list box closes; when you return to the test, the reference file will be enabled, and you will see the referenced trace:



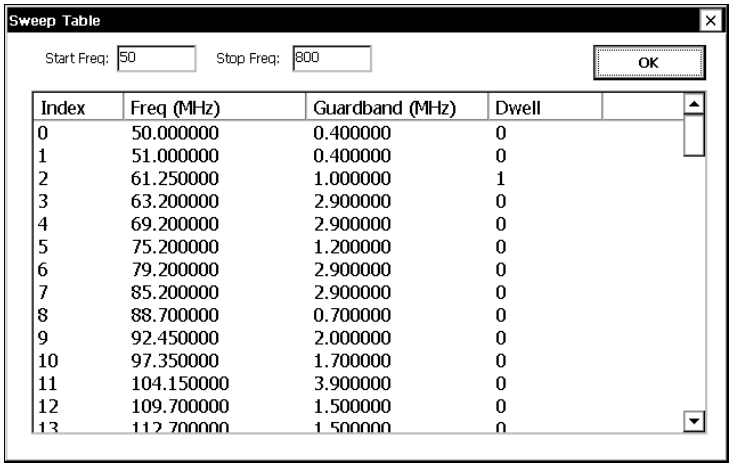
The vertical axis has changed from absolute level (in dBmV or dBµV) to relative level (in dB). The Center Scale Reference is calculated from the Full Scale reference of the reference trace and the current Full Scale Reference.

A note on the Sweep Table

You can view the contents of the Sweep Table at any time. Touch the **Control** tab, then the **Swep Table View...** button:



The sweep table is displayed in a list box, through which you can scroll in the usual way:



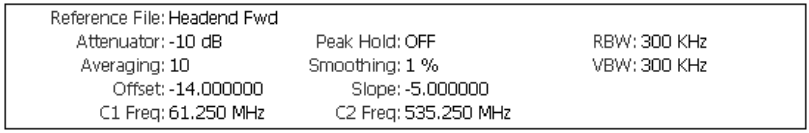
If the sweep transmitter is using a Standard sweep table, all of the system visual carriers with dwells of 1 or greater will be included in the table. If the sweep transmitter is using a Phantom sweep table, the design frequencies will normally be the only carriers in the table with dwells greater than zero. For detailed information on the sweep table and instructions for settting up the sweep transmitter, please refer to *CaLan 3010H Sweep/Ingress Analyzer User's Guide* (Sunrise Telecom publication 85963A-M01).

The sweep transmitter sends its sweep table to the Network Profiler after every 120 sweeps. The Network Profiler compares the checksum of its current sweep table with that of the newly-transmitted table. If the checksums match, no action is taken. If the checksums do not match, the Network Profiler will update its table with the new information. The update will usually cause a flat trace to appear briefly, before a new sweep is displayed.

If for any reason you want a fresh sweep table, touch the **Clear** button on the **Control** tab, then wait for the 3010H to download a new table.

Forward Sweep status panel

To view the measurement configuration, touch the **Status** button:



The following parameters are shown:

- Reference file status. If enabled, shows the name of the reference file
- RF input Attenuator
- States of the Averaging, Peak hold, and Smoothing controls
- AGC offset and slope
- RBW and VBW frequencies
- Assigned carrier frequencies (C1 and C2). these are usually the design frequencies of the sweep.

Return Sweep

Overview

The gain of the amplifiers in the forward path of a cable network compensates for the losses of the cable and preceding passive devices. Each forward amplifier is set to the same output level.

The return amplifier compensates for the loss of the same length of cable. Typically, return amplifiers are set for a constant input level because the signals in the return path combine. The output pad and equalizer are adjusted for a specific input level at the next amplifier and subsequently a constant level at the headend.

The Return Sweep test requires RF communications in both directions on the network. The Network Profiler inserts a sweep signal into the return path and views the sweep as detected by the 3010H at the headend. The horizontal screen resolution (501 points) on the N1776A is greater than the sweep resolution of the 3010H (401 points); the sweep data are therefore interpolated to 501 points.

The minimum start and maximum stop frequencies are programmed in the sweep transmitter. The N1776A allows you to narrow the frequency range of the sweep response, but the 3010H sweep table does not change and the resolution does not increase.

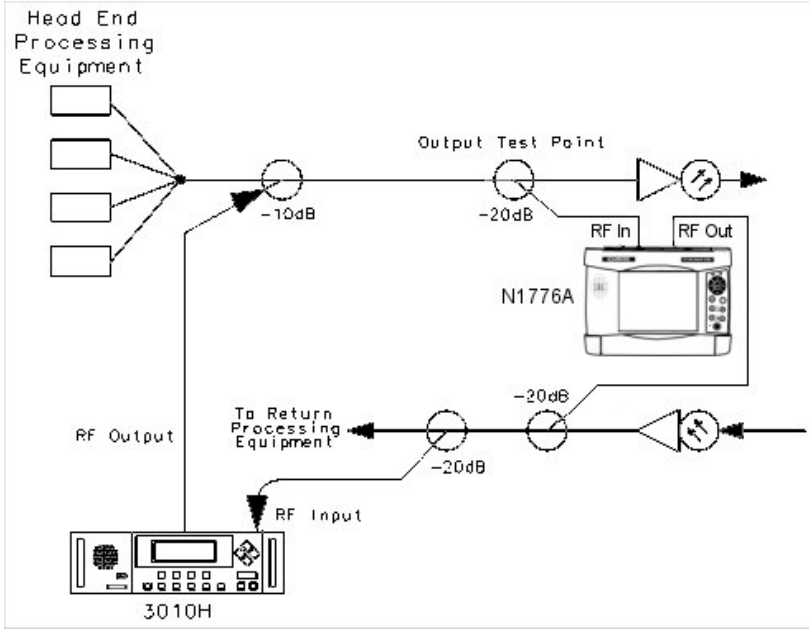
The sweep source is generated in the N1776A. The information displayed on the N1776A consists of data from measurements made on the sweep received by the 3010H. The measurement data are therefore dependent on the following factors:

- RF Input Attenuator setting of the 3010H at the headend
- Output level setting of the source in the N1776A
- Gain and response of return link
- Display scale set in the N1776A

Installing the Network Profiler

The N1776A can be connected anywhere in the network. Normally, the initial setup is performed at the headend. The basic setup procedures are the same,

regardless of the location. Actual connections may vary, but the following configuration is typical:



You must know the losses and levels of your particular system in order to install the equipment correctly.

Running the test

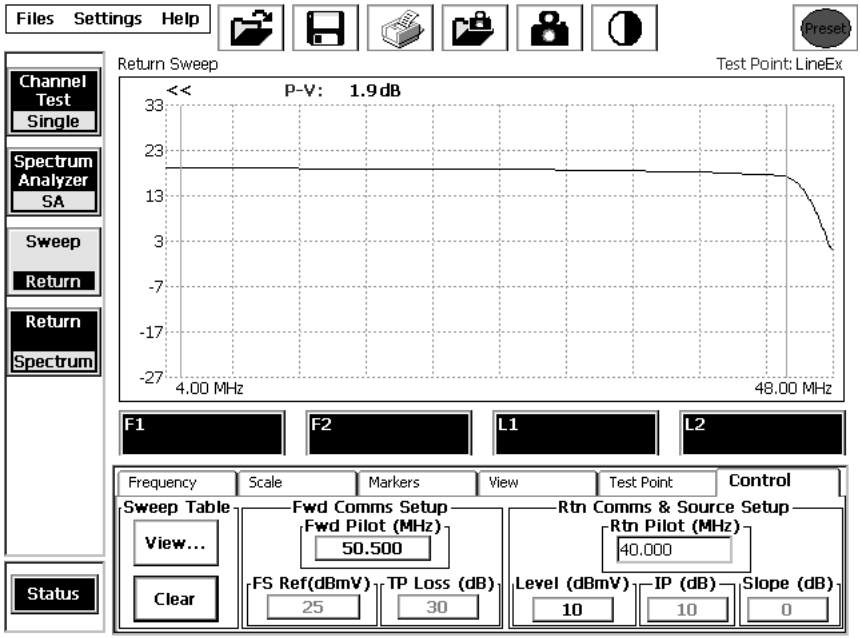
Forward communications

1. Select **Sweep > Return**.
2. On the **Control** tab, touch the **Fwd Pilot (MHz)** button under **Fwd Comms setup** to set the Forward Pilot frequency.
3. On the **Scale** tab, use the **Full Scale (dBmV)** step control to set the full-scale reference level. This should be 5 to 10 dB higher than the analog carriers in the vicinity of the forward pilot.

Return communications

The return pilot frequency is set automatically from the 3010H as soon as the Network Profiler receives the first forward pilot message. When the Network Profiler detects the return sweep, a flashing single (normal sweep) or double

(fast sweep) arrow pointing left appears at the left of the results area, with the return-sweep trace in the graphical display:



If no flashing arrow appears, there is a problem with the RF communications between the 3010H and N1776A. One of three conditions will be indicated at the left of the results area:

No indicator or steady square: The Network Profiler is not receiving the forward pilot.

Flashing square: The Network Profiler is receiving the forward pilot, but the headend is not receiving return communication.

The square indicator, whether steady or flashing, is solid yellow in normal display, and black in bright-screen display.

If the flashing arrow appears, but the trace is not obviously being updated, there could be a mismatch in some of the settings on the control tabs.

If any of these conditions exists, follow the procedures described in the following section.

Troubleshooting

No indicator or steady square

If you are not receiving the forward pilot, try these remedies:

1. Check the **Fwd Pilot** setting under **Fwd Comms Setup** on the **Control** tab. This must be the same as the forward pilot frequency programmed in the 3010H. If you are in the field, you can check the level of the forward pilot by using the spectrum analyzer and peak hold function.

2. Check the **FS Ref** setting under **Fwd Comms Setup** on the **Control** tab. This should be 5 to 10 dB above the analog carrier levels in the vicinity of the forward pilot.

3. If the pilot is not present, the 3010H may be turned off or you may have a problem with the combiner at the headend. Make sure the 3010H is connected and running in the Dual-path or Return Path Monitor mode.

Flashing square

1. Check the **Level** and **IP** settings under **Rtn Comms & Source Setup** on the **Control** tab. If these are incorrect, the return pilot may not be getting back to the 3010H at the correct level.

2. Check the insertion point itself. If you are testing the system at a node or an amplifier in the field, try a different insertion point. Not all test points are bi-directional or have a path to the return amplifier.

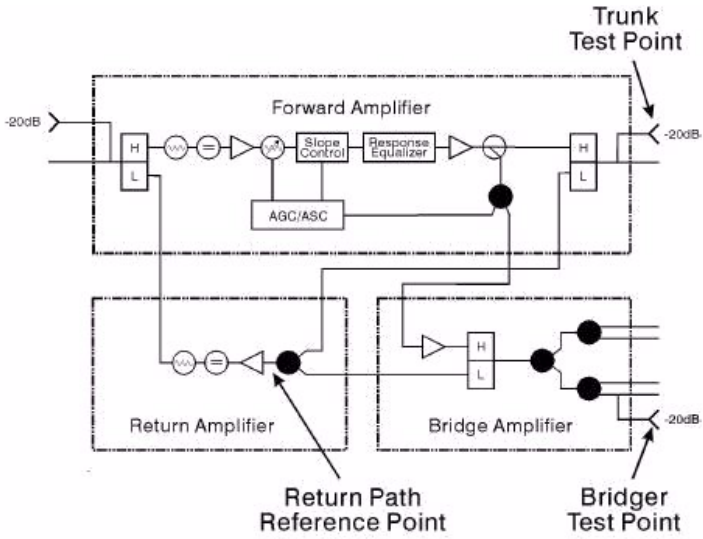
Trace not updating

1. Check the **Full Scale** setting on the **Scale** tab. This should be close to the Full Scale Reference set in the 3010H spectrum scan mode. The return measurements are made by the 3010H and the data is transmitted to the 3010R. The setting of the full scale and test point value in the spectrum scan mode of the 3010H determines its input sensitivity, therefore it is important to note the absolute full scale reference value programmed in the 3010H. If the headend is receiving +15 dBmV of level (regardless of test point correction), your full screen should be +15 dBmV or slightly higher. For reliable scaling, view the return sweep trace at 10 dB/div.

2. Check the **Level**, **IP**, and **Slope** settings under **Rtn Comms & Source Setup** on the **Control** tab. These parameters define the source output level of the Network Profiler; they relate the loss of the insertion point to the actual gain block in the amplifier. The output of the Network Profiler source is the sum of the **Level** and **IP** values. If **Level** is set too high or too low, the trace may not be visible. The next section is a detailed discussion of these settings.

Setting the Source Level, IP, and Slope

The Network Profiler source output level is determined by the settings of three parameters on the **Control** tab (see previous figure): **Level (dBmV)**, **IP (dB)**, and **Slope (dB)**. The following block diagram will help in understanding their functions:



Level (dBmV)

This control sets the sweep level at the return path reference point, which is typically an input to the active gain block in the fiber node, the amplifier housing, or as shown, the return amplifier. To be consistent with the forward sweep setup, minimize the sweep energy injected into the system by setting this control 10 dB below the return path carriers on the system. For example, if the return carrier level is +20 dBmV, set **Level** to +10 dBmV. The level of the sweep signal at the Return Path Reference Point would therefore be +10 dBmV.

IP (dB)

Normally, there will be loss to overcome at the return sweep insertion point of an amplifier. If you were inserting the signal at the Trunk test point shown in the diagram, the IP loss would be the sum of the losses of the test point, the diplex filter, and the splitters for the distribution. Setting **IP (dB)** to this value changes the output level of the source to overcome these losses. The sum of the values of **IP (dB)** and **Level (dBmV)** is the actual output of the source. This output must be in the range +10 dBmV to +50 dBmV.

To keep track of the insertion loss of your equipment and help prevent errors in setup, make a Source Level Table for your equipment as in this example:

Internal Coupling Loss	5 dB
Test Point Loss	20 dB
Total Insertion Point Loss: (Internal Coupling Loss + Test Point Loss)	25 dB
Sweep Input Level	+10 dBmV
Source Output Level	+35 dBmV

Test Point Loss	20 dB
Diplex filter Loss	1 dB
Splitter combiner before gain block loss	4 dB
Total Loss	25 dB

Other technicians can use this table to ensure that they are using the correct source level for this test point.

Slope (dB)

You may adjust the slope of the source by as much as ±10 dB, except that you cannot set it to a level where any part of the sweep will be less than +10 dBmV or more than +50 dBmV. When these limits are reached, no further adjustment can be made.

Frequency Span

You may adjust the displayed frequency span within the range set in the sweep transmitter, using the controls on the **Frequency** tab. The resolution will not change, but you may find it easier to identify specific problems in the sweep.

Referenced Sweep

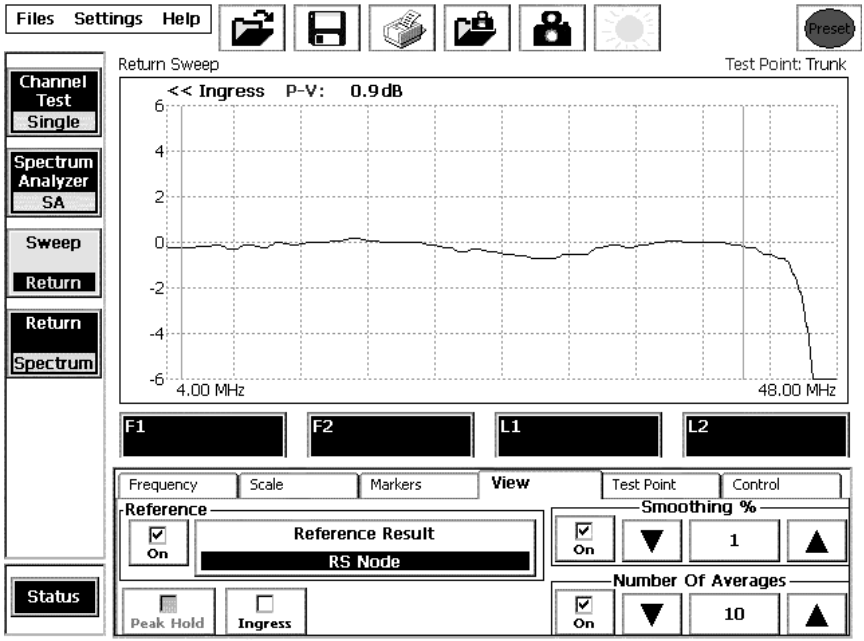
You may save the results of a sweep response for later use as a reference. For the best accuracy, it is recommended that reference traces be taken with averaging set to at least 10 and with smoothing disabled. For instructions on saving a reference file, see *Referenced (Normalized) Sweep*, page 8–7.

Measuring ingress

A major problem in the return path of the network is the ingress of unwanted signals into the system. If the ingress signals are large enough, they will disrupt the operation of the return path and the communications between the

N1776A and the 3010H. The 3010H monitors the return telemetry frequency, measuring the noise floor. If ingress or return impairments rise above a threshold, the 3010H will broadcast an alert and a return spectrum measurement to all receivers in the field on the forward sweep pilot.

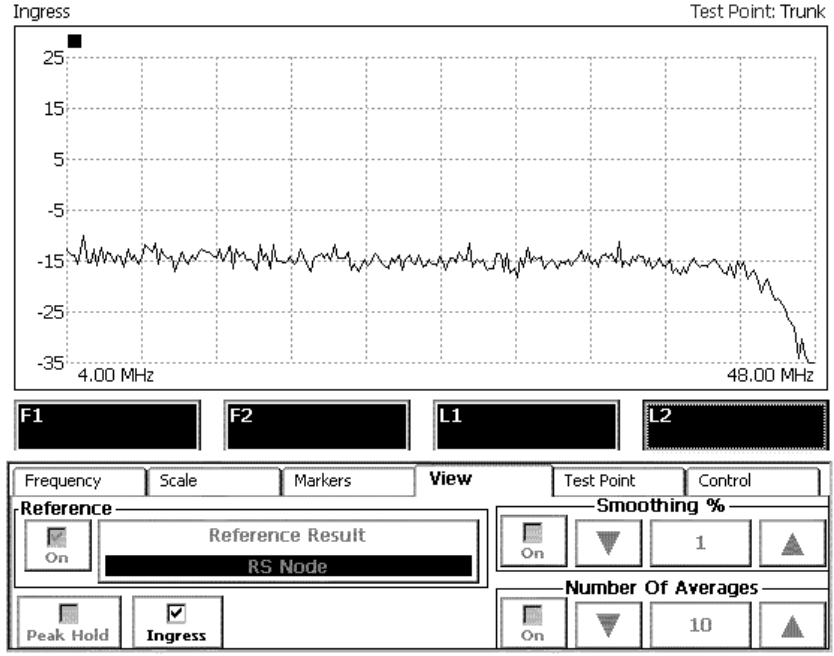
When the N1776A receives an ingress message, the word **Ingress** is displayed in the results area of the screen to the right of the sweep indicator:



This indicates that ingress has exceeded the -30 dB threshold at the 3010H. You may access the ingress measurement by touching the Ingress button on the View Tab. By using the return spectrum and spectrum analyzer measurement mode, you can troubleshoot the source of the ingress problem. The ingress measurement can be set to send a return spectrum measurement each time the 3010H polls the system. The dynamic range of the measurement is dependent on the attenuator setting of the 3010H.

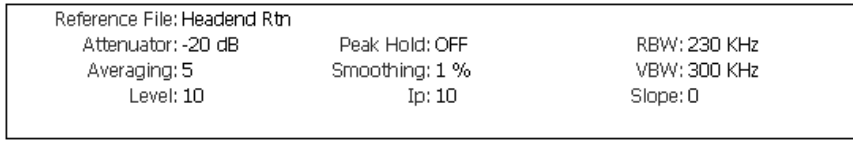
When the N1776A receives an ingress measurement message from the 3010H, the **Ingess** check box on the **View** tab is enabled. To view the broadcast

return spectrum response transmitted from the headend, touch the **Ingress** check box:



Return Sweep Status panel

Touch the **Status** button to display the measurement configuration:



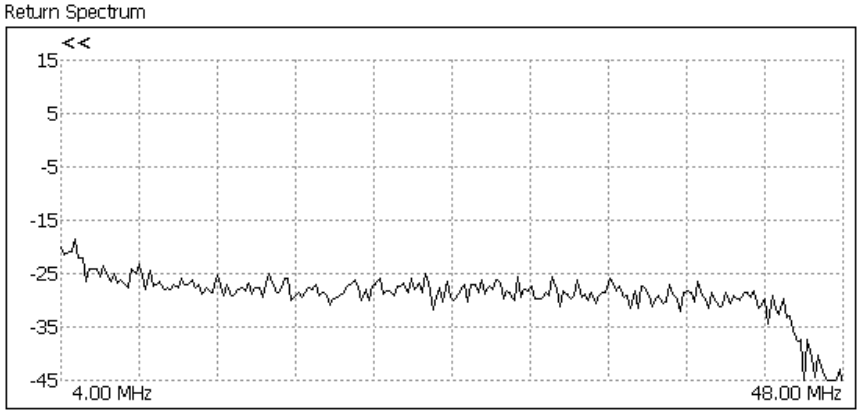
This panel shows the states of the following parameters:

- RF input Attenuator
- Averaging and Peak Hold controls
- RBW and VBW frequencies. The RBW in this case is the measurement RBW of the headend sweep receiver.

Return Spectrum

This test and its controls are similar to the Return Sweep. The trace shows measurements of the return spectrum made by the 3010H at the headend. In the Return Spectrum and Ingress modes, the dynamic range of the measurement is dependent on the Full Scale setting of the 3010H in Spectrum Scan mode.

To start this test, select **Return Spectrum**. The display shows the return spectrum measured at the headend:



Most Return Spectrum controls have the same functions as in the Return Sweep, except that changes in the source level and IP loss will not affect the headend instrument's measurements.

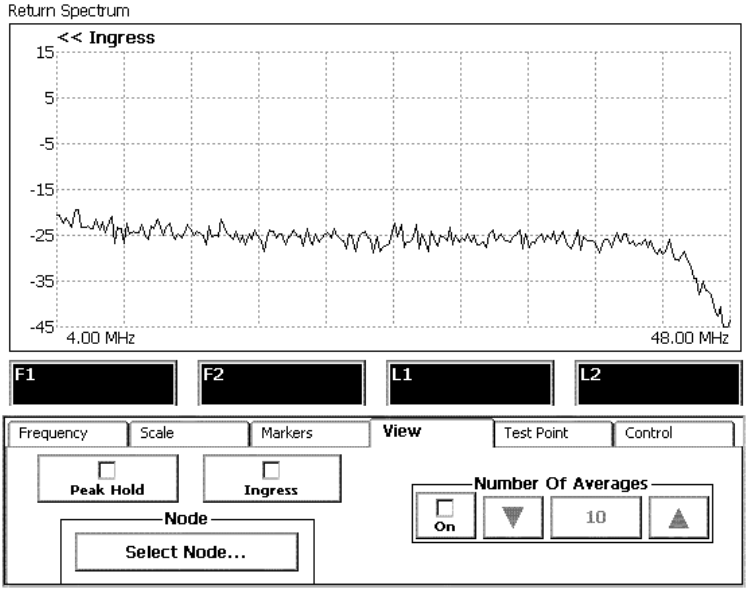
Frequency Span

You may adjust the measured frequency span using the controls on the **Frequency** tab. The resolution will not change, but you may find it easier to identify specific problems in the sweep.

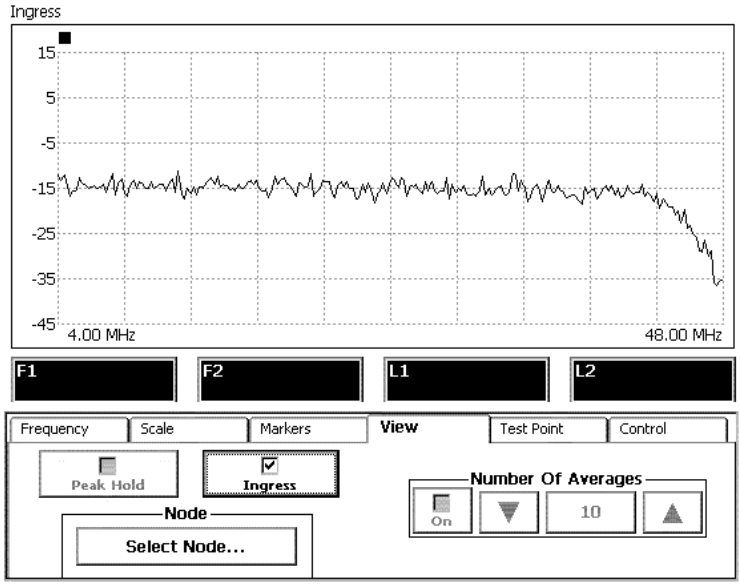
Measuring Ingress

High levels of ingress on the return path can interfere with the return pilot. If the 3010H has detected ingress, the message "Ingress" appears in the upper

right corner of the data display, and the **Ingress** check box on the **View** tab is enabled:



To see theproducts of ingress, touch the **Ingress** check box:



Return Spectrum status panel

Touch the **Status** button to display the measurement configuration:

This panel shows the states of the following parameters:

- RF input Attenuator setting
- Averaging and Peak Hold controls
- RBW and VBW frequencies

9

Maintaining and Managing Your Data

Overview

The first part of this chapter, *Saving your data*, page 9–3, describes how to make a record of your measurements in the field, in test-results files and in screen captures.

The second part, *Backing up your data*, page 9–10, describes how to prevent accidental loss of your data by backing up your files, either to the Network Profiler's internal FlashFx disk or to a PC Card.

The third part, *Synchronizing files*, page 9–15, describes how to keep copies of your data files on a computer, and how to establish a "partnership" so that you can automatically update those files with new measurement results, using either the serial link or an Ethernet connection.

The fourth part, *Managing files*, page 9–19, describes how to move files both from and to the Network Profiler, giving you direct control over the transfer of data, and allowing the Network Profiler to receive, for example, software updates and new channel plans.

The last part, *Setting up a partnership*, page 9–25, describes how to create a partnership with a computer.

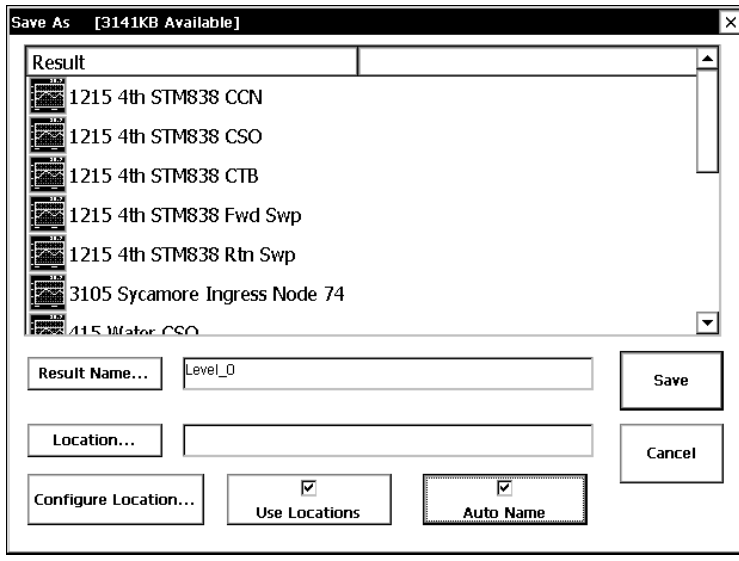
Saving your data

You can save test data in two ways: in a text-based results file or as a graphical screen capture. The results file stores numeric data and identifying information so that the signal trace and status panel can be re-created on the Network Profiler itself. The data are in a tabular form that can be used for data analysis in preparing custom reports when the results files have been transferred to a computer (see *Backing up your data*, page 9–10). Another common use for such a file is as a reference for a referenced (normalized) sweep when making forward- and return-sweep tests.

A screen capture is a snapshot of the data display, markers, and status panel (if visible) saved as a graphics file that you can view on the Network Profiler or a PC.

Saving test results

To save the current data in a results file, select **Files > Save as...**, or just touch the **Save as...** toolbar button. The Network Profiler displays a dialog box with a list of existing results files, if any (the amount of memory available for new files is shown in the title line of the box):



You may save new results under an existing name, or you may create a new results file in one of two ways: by using the **Auto name** function, or by entering a unique name manually.

Creating a new file using *Auto Name*

The Network Profiler constructs a file name from the following elements:

Measurement type: Identifies the test being performed; for example, **Level** for analog level test, **Multi** for multi-channel test, **FS** for Forward Sweep.

Location name: Included if you check the **Use Locations** check box, and a location name appears in the Location text box.

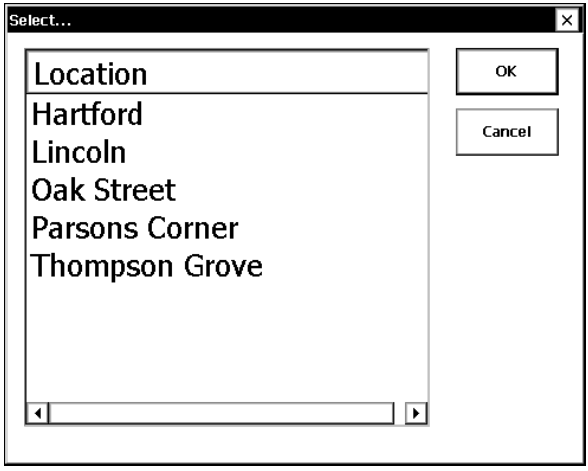
Test Point name: Included only if a test point file is enabled for the current test.

Sequence number: For each series of auto-names, this begins at 0 and increases by 1 for each succeeding file.

The elements are separated by underlines. A name with all four elements might look like this:

When you first open the **Save as...** dialog, both **Use Locations** and **Auto Name** are enabled, and a default name appears in the **Result Name...** text box, as shown in the figure on page 9–3. If you want to use this name, touch **Save**; the Network Profiler saves the file and closes the **Save as…** box.

To associate this file with a different location, touch the **Location...** button to display the list of location files:



Highlight the location name that you want to use, then touch **OK.** The selected name will appear in the space next to the **Location** button.

The *Configure Location...* button

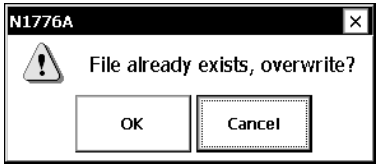
You can edit the data in the selected location file by touching this button to bring up the Location File Editor. Using the editor, you can modify the data for the current location or create an entirely new location file. The Location File Editor is described in Chapter 10, *Test points, Locations, and Channel Plans*.

Creating a new file without using *Auto Name*

1. Select **Files > Save as...**, or touch the **Save as...** toolbar button, to bring up the **Save As...** dialog box.
2. Make sure that the **Auto Name** box is unchecked.
3. Touch **Result name...** to display the soft keyboard.
4. Type in a name, then touch **Save**.

Saving results in an existing file

Select a file from the list by highlighting it (use the scroll bar on the right if necessary to see the entire list). When you touch **Save**, a confirmation request appears, to forestall accidentally overwriting the wrong file:



Touch **OK** to save the data under this file name.

Warning! The previous contents of the file are lost.

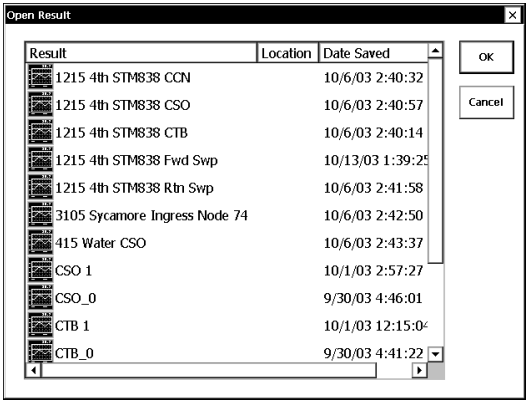
The Network Profiler can store up to 300 results files internally, depending on whether and how much location data are included. This is usually more than enough space to accommodate one field trip. From time to time, however, you should make a backup copy of your data; see *Backing up your data*, page 9–10, for instructions. When you return to your office, you can transfer all your data to a PC; see *Synchronizing files*, page 9–15, and *Managing files*, page 9–19.

Viewing test results

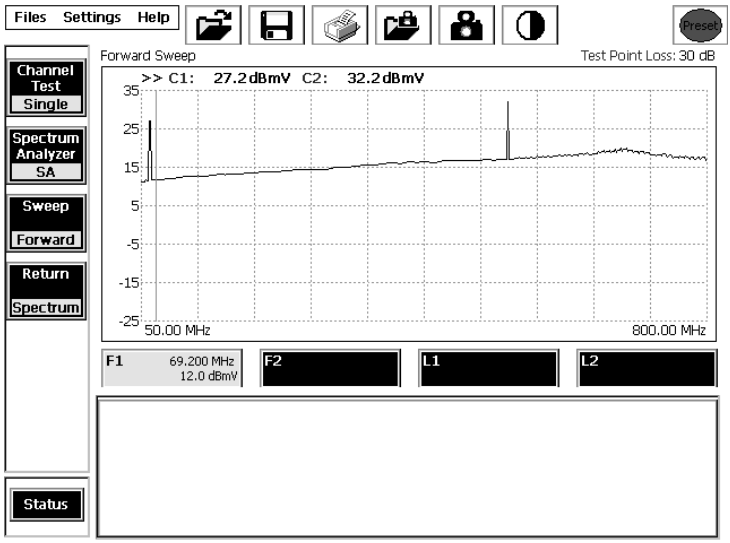
You can look at test results in two ways: as a graphic representation on the Network Profiler itself, or as data in a spreadsheet on a PC to which you have transferred the files from the Network Profiler.

To view a results file on the Network Profiler:

1. Select **File > Open**, or touch the **Open File** icon on the action bar, to display the file list:



2. Double-tap a file name to open it. The corresponding data are reconstructed and displayed:



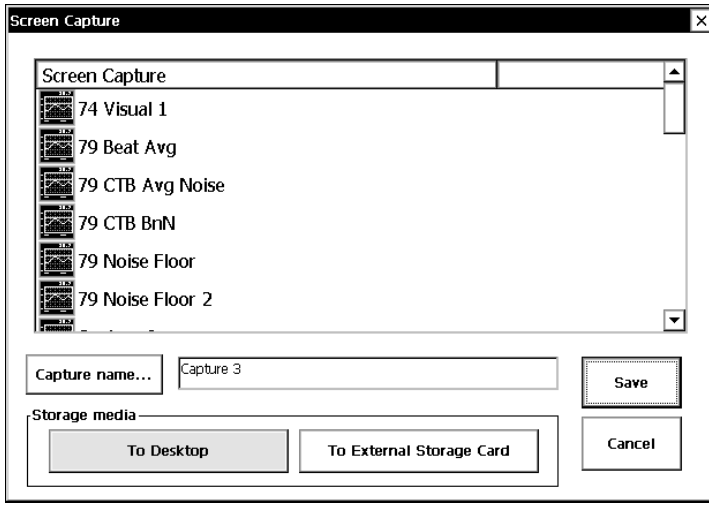
The control tabs are blanked out; they would have no effect on the display. The marker selectors, on the other hand, are active, so that you can place markers to see actual values at any point on the saved trace. Likewise, you can touch the Status button to see the saved Status panel.

You can save the results display, together with any marker placements, as a graphics file by taking a screen capture, as described in the next section.

Return to normal operation by touching any test selector button..

Capturing a screen image

A screen capture is a snapshot of the data display: title line, results area, graphic display, markers, and status panel (if it is visible). To capture a screen image, touch the **Screen Capture ( )**button on the toolbar. The following dialog box will appear:



The box contains a list of all the capture files currently saved in the location highlighted in yellow—the N1776A desktop or an external PC Card. (Touch either button to see the list of files stored there.) To save the screen capture, you may use the automatic default name provided in the **Capture name...** text box, or create your own name. The automatic names run sequentially starting with “Capture_0”. To save a file under the default name, simply touch **Save**.

To create a file name:

1. Touch **Capture name...** to display a keyboard. Type the name, then touch **Enter**.
2. Touch the button indicating the destination of your file: **To Desktop** or **To External Storage Card**. That button will be highlighted.
3. Touch **Save**.

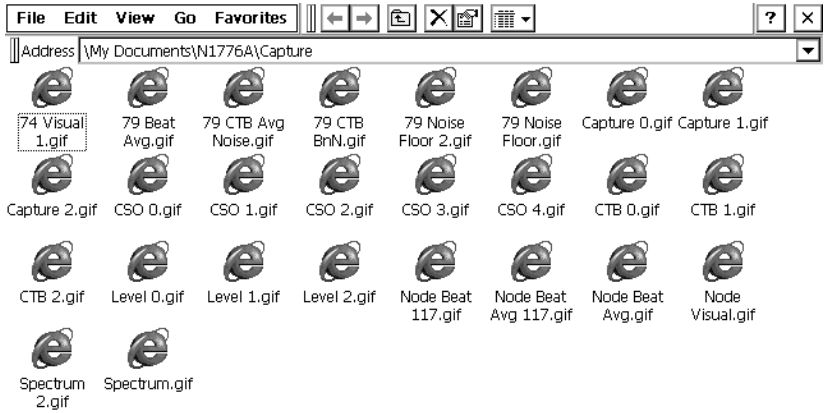
You can reuse an existing file name, but remember that the current contents of that file will be lost.

1. Touch the file name in the list to highlight it; the name will then appear in the text box.
2. Touch the button indicating the destination of your file: **To Desktop** or **To External Storage Card**. That button will be highlighted.
3. Touch **Save**. A message will appear warning you that the contents of the existing file will be overwritten and lost; if that is what you want, touch **OK** to save the screen capture.

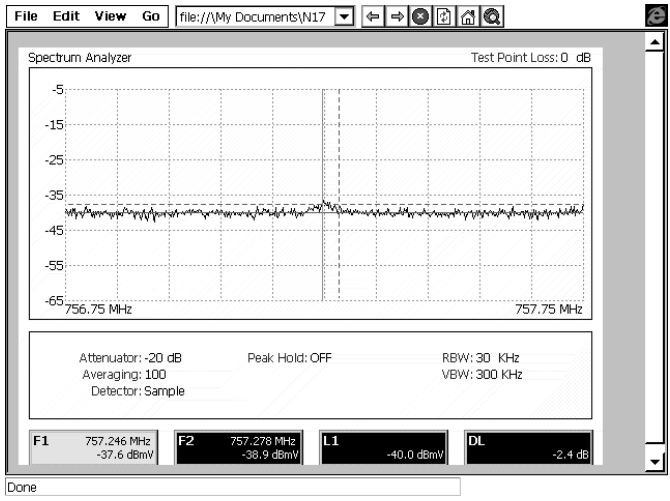
Note: The capture file is in the .GIF format; it can be viewed on any computer, with either a graphics application or a Web browser. For best viewing results, the Network Profiler's display should be set to high-contrast when you make a screen capture.

Viewing a capture file

To look at a capture file in the Desktop folder on the Network Profiler screen, touch the view-screen-capture icon ( ) on the toolbar, or select **Files > View Screen Shots...** to display the contents of the Capture folder in a Windows Explorer screen:



Double-tap a file icon to see the snapshot displayed in an Internet Explorer window:



Backing up your data

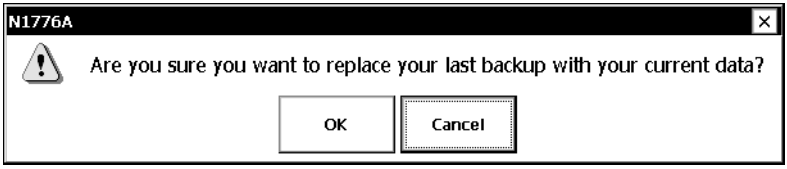
To guard against accidentally losing test data, it's a good idea to back up your files from time to time. There are several ways to do this:

- copying files to FlashFx memory;
- copying or moving files to a PC Card;
- using a serial connection or an Ethernet link to synchronize files on the Network Profiler with those on a computer.
- using a serial connection to copy or move files between the Network Profiler and a computer.

Using flash memory

Backing up files

To make a backup copy of all your current data on the Network Profiler's internal FlashFx memory, select **Files > Backup all**. You will be asked to confirm your intention:



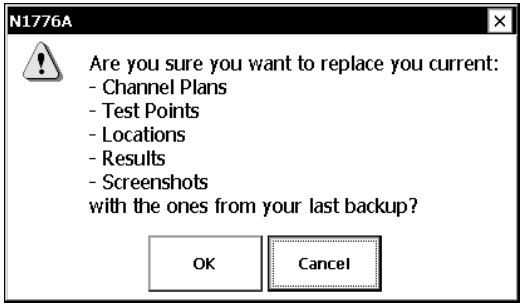
Touch **Yes** to begin the backup. The Network Profiler will copy the following data to FlashFx memory:

Test results files
Screen capture files
Test point and location files
Channel plans

The previously backed-up files, if any, are lost. You can retain previous backups by copying them to a PC Card (see *Using a PC Card*, page 9–11), or synchronizing them with a computer (see *Synchronizing files*, page 9–15).

Restoring backed-up files

If you do lose some data, you can restore the last previous backup by selecting **Files > Restore all**. As before, you will be asked to confirm your intention:



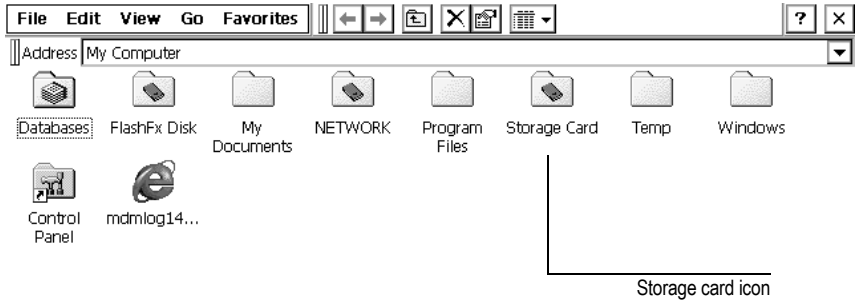
Touch **Yes** to begin the restore. All your current data files (that is, those in the \My documents\N1776A directory) will be replaced by the most recent-backup.

Using a PC Card

A PC storage card is useful for keeping files in permanent storage, transferring files to any other computer, or for storing data files if you need more room in the Network Profiler's internal memory.

First, insert a PC storage card into the slot on the top of the Network Profiler. Be sure that the card is fully seated—the top of the card should be flush with the top of the slot, and the eject button should be fully extended.

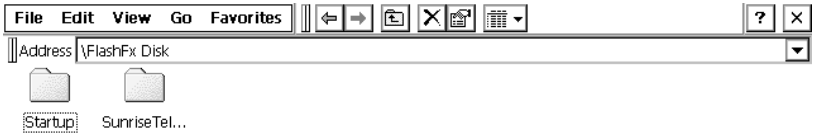
From the Start menu, select **Programs > Windows Explorer**. It will open in the **My Computer** directory:



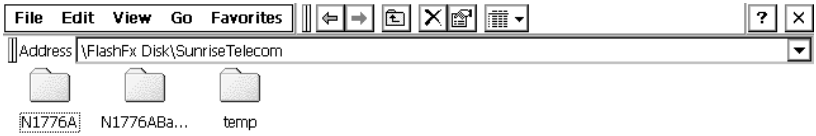
If the storage card is properly seated, its icon will appear in the window, as shown.

Saving backups

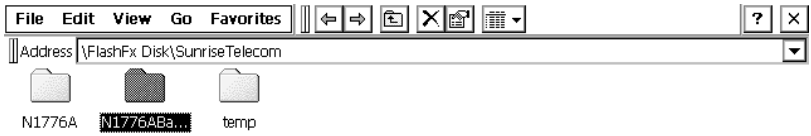
1. From the **My Computer** directory, double-tap the "FlashFx Disk" icon to display its contents:



2. Double-tap the "SunriseTel..." icon to open the folder:



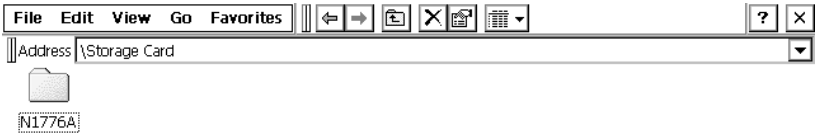
3. Touch the "N1776ABa..." icon to highlight it:



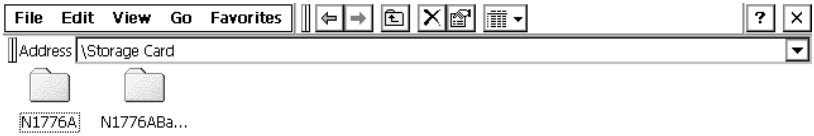
4. Select **Edit > Copy** to copy the folder to the Windows CE clipboard.

5. Touch the "up-one-level" button ( ) twice to return to the "My Computer" directory.

6. Double-tap the "Storage Card" icon to display its contents, if any:



7. Select **Edit > Paste** to copy the backup folder to the PC Card:



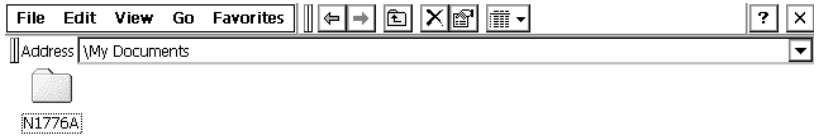
8. Touch the ✖ box in the upper right corner of the Explorer window to close it.

Moving files

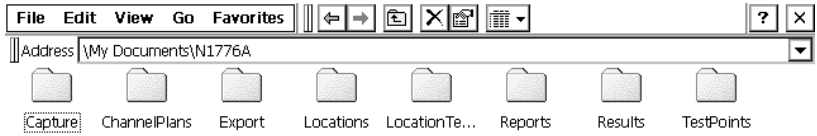
You can recover memory space by moving data files to the PC Card in much the same way as for copying backups. The following example illustrates the method.

1. Open Windows CE Explorer as described above, making sure that the PC Card is properly seated in its slot. You will see the contents of the "My Computer" folder as before.

2. From the **My Computer** directory, double-tap the "My Documents" icon to display the "N1776A" folder:



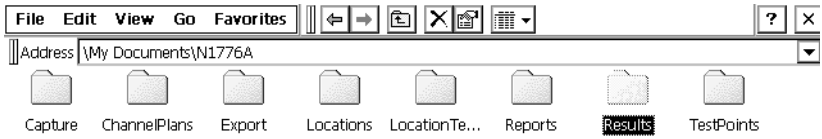
3. Double-tap this icon to display its contents:



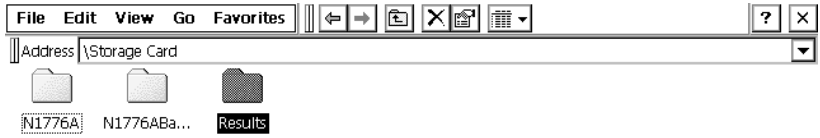
4. Touch the "Results" icon to highlight it, then Select **Edit > Cut** to move the folder to the Windows CE clipboard. The icon is "faded out" to show that it will be removed from the N1776A folder.

5. Touch the "up-one-level" button ( ) twice to return to the "My Computer" directory.

6. Double-tap the "Storage Card" icon to display its contents, if any:



7. Select **Edit > Paste** to copy the Results folder to the PC Card:



8. Touch the ✖ box in the upper right corner of the Explorer window to close it.

You can use this method to copy or move any files or folders from one place to another. For example, in Step 3 above, you could copy or move all the folders in "My Documents\N1776A" by selecting **Edit > Select All**, then **Edit > Copy** or **Edit > Cut**, depending on whether you want to leave the files in the original folder or remove them. Then open the PC Card and paste the folders there.

Note: If you remove files from their normally-assigned folders, they will not be available for use in the Profiler (for example, to view test results or edit location files).

(Another way to move files about on the Network Profiler is by using the serial link with ActiveSync from your PC, as described in *Managing files*, page 9–19.)

For more information on Windows Explorer, see *Windows CE Explorer*, page 11–4.

Transferring PC Card data

Once your data files are on a PC Card, you can easily transfer them to any PC (such as a notebook) that has a Type 2 PC Card slot. To remove the card from the Network Profiler, push the Eject button down all the way; the card will rise out of the slot. Grasp the card firmly by the edges to remove it.

Synchronizing files

To maintain copies of all your field data on a separate computer, and to ensure that the data are always up to date, you can establish a partnership with the computer. The partnered computer keeps a folder of all your working data, including test results, screen captures, test points, and reports (see *Setting up a partnership*, page 9–25, for a complete list of these files). Whenever you connect to your partnered computer, the files on the Network Profiler are "synchronized" with those on the computer, that is, older files are replaced by more recent ones. Most of the time, this means that data from the Network Profiler replaces that on the computer, thereby automatically backing up your current work.

To communicate with a partnered computer, you need the following:

- a PC with Microsoft ActiveSync® installed (see *Installing ActiveSync*, page 9–25, for instructions if it is not already present);
- the supplied RS-232 serial cable connected between the Network Profiler and the PC,

  or

  a CAT5E Ethernet cable connected between the Network Profiler and an Ethernet hub.

The instructions given here assume that you have established a partnership with a PC, and that this partnership has the following properties:

- the synchronizing option is for Files only;
- the synchronizing mode is "Continuously while the device is connected";
- the conflict-resolution rule is "Leave the item unresolved".

Synchronizing over the RS-232 serial connection

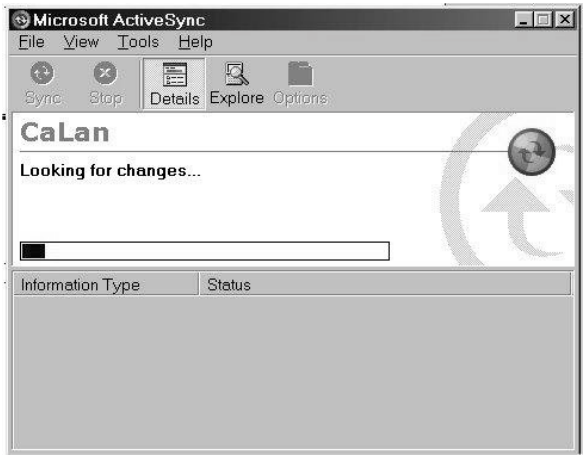
1. Connect the supplied RS-232 serial cable between the Network Profiler and the PC on which the partnership has been established.
2. On the Network Profiler, select **Run...** from the Start menu. The **Run** dialog box will appear, with the **repllog.exe** program highlighted:

You will use this program to establish the connection from the Network Profiler's end.

3. On your PC, start ActiveSync. You will see the following window:

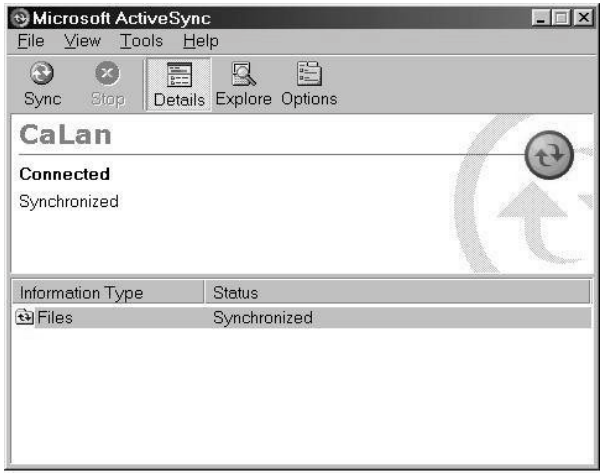
4. Select **File > Get Connected...** to display the next screen:

5. Make sure that the **Next>** button is highlighted, as shown in the figure. Now click on this button (or press **Enter** on the keyboard), and *immediately* touch **OK** in the **Run** window on the Network Profiler. Establishing the connection may take a few seconds (your PC may emit some musical tones), but eventually you will see the following screen on your PC:



ActiveSync is comparing the files on your Profiler with those in the PC, if any. New files are automatically transferred from the Network Profiler to a folder on the PC desktop titled "N1776A My Documents". (If you have given your Network Profiler a different name, that name will replace "N1776A". See *Choosing a name for your Network Profiler*, page 9–26.) If the contents of an existing file on the Profiler have changed since the last synchronization, the newer file will replace the one on the PC. (This updating works in both directions, but in most cases, the newer data will always be on the Network Profiler). If, for some reason, both files have changed, ActiveSync will mark it for your attention.

When synchronization is finished, ActiveSync remains connected:



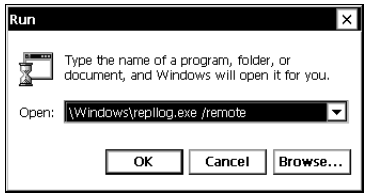
You can verify the connection by looking for the connection icon in the Windows CE system tray on your Network Profiler:

While the connection is maintained, all new or modified data files you create on the Network Profiler will automatically be synchronized with those on the host computer.

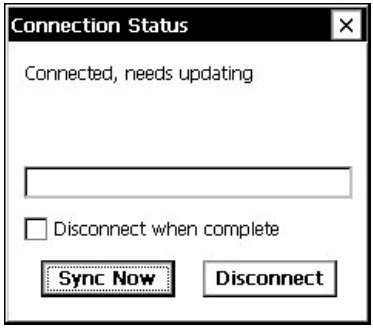
Synchronizing over an Ethernet connection

The instructions given here assume that your Network Profiler's has been configured for network connection. To use an Ethernet link, you must have a partnership with a host computer.

1. Connect an Ethernet cable between your Network Profiler and a node on the computer network.
2. Press the blue keypad button to bring up the **Start** menu, and select **Run...**. From the drop-down list of programs, select **\Windows\repllog.exe /remote**:



3. Touch **OK** or press the **Enter** key on the keypad. The Network Profiler will display the following window,



then automatically connect with the partnership computer and begin synchronizing the files. When the files have been synchronized, the message **$UPTODATE$** appears.

Managing files

Using the RS-232 serial link

With the RS-232 serial connection, you can use ActiveSync not only to back up files manually, but also to copy or move any files from your computer to the Network Profiler. In this way, you can back up selected files to your computer, update the Network Profiler's software, load new channel plans, or restore earlier data. You do not need a partnership for these tasks.

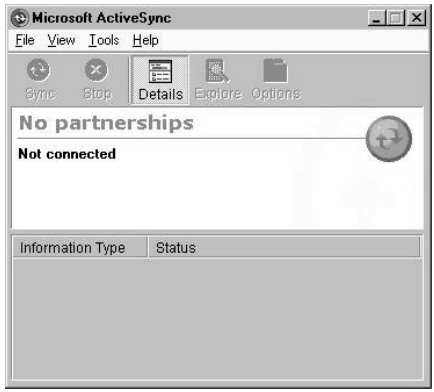
Establishing the connection

1. Install the included serial cable between the Network Profiler's serial port and a COM port on your PC.

2. Turn on the Network Profiler, and select **Run...** from the Start menu. The **Run** dialog box will appear, with the **repllog.exe** program highlighted:

   You will use this program to establish the connection from the Network Profiler's end.

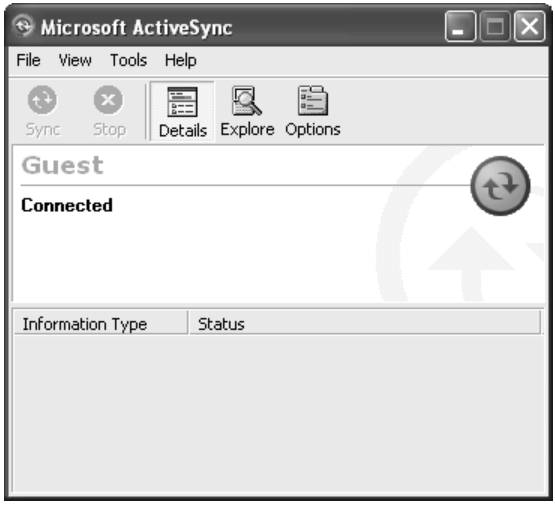
3. On your PC, start ActiveSync. You will see the following window:



4. Select **File > Get Connected...** to display the next screen:

5. Make sure that the **Next>** button is highlighted, as shown in the figure. Now click on this button (or press **Enter** on the keyboard), and *immediately* touch **OK** in the **Run** window on the Network Profiler. The two programs will make the connection and the **Run** window will close. If you have a partnership, ActiveSync will automatically synchronize your data, as described in *Synchronizing files*, page 9–15. If not, you will see the following window:

6. Click on **No**, then **Next>**. ActiveSync displays its last and working screen:

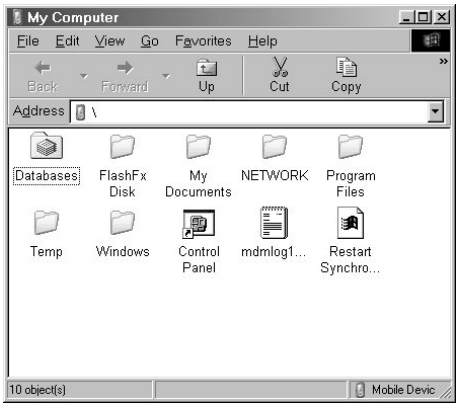


You are now connected to the Network Profiler.

Using ActiveSync to manage files

1. From ActiveSync, select **File > Explore**. This will display a Windows Explorer window titled **Mobile Device**, showing the contents of the Network Profiler's Windows CE Desktop:

2. Click on **My Computer** in this window to see the principal folders in the Network Profiler:



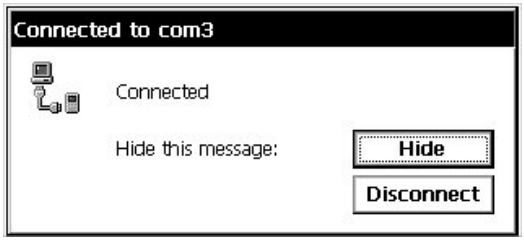
From here you can open and close any folder (if a PC Card were inserted, you would see an icon labeled “Storage Card”), move or copy files from one folder to another, and move or copy files to or from your PC, using standard Windows methods: Copy/Paste, Cut/Paste, or drag-and-drop.

Using an Ethernet connection

You can carry out all the tasks described in the previous section using an Ethernet connection. In this case, however, you must have established a partnership with the computer.

Establishing the connection

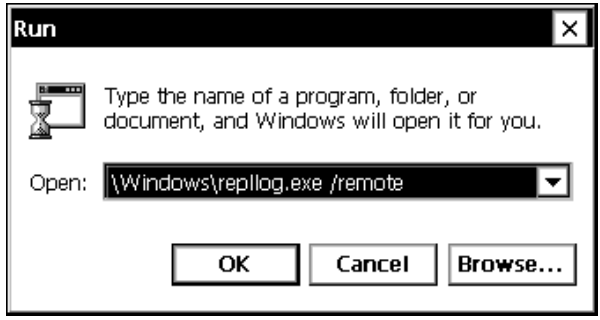
1. If you are connected to a PC over a serial link, disconnect by double-tapping the network icon on the taskbar to display this message:



2. Touch **Disconnect**. You may also disconnect the RS-232 serial cable at this time.

3. Connect a CAT5E Ethernet cable between your Network Profiler and a node on the computer network.

4. From the **Start** menu, select **Run...**. From the drop-down list of programs, select **\Windows\repllog.exe /remote:**

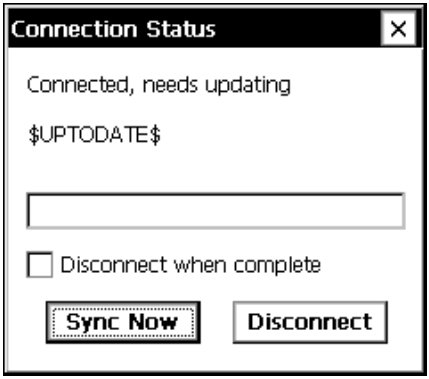


5. Touch **OK** or press **Enter** on the keypad. If this is the first time you are connecting via Ethernet, you will see a dialog box titled **ActiveSync,** requesting "Choose a method to connect to the selected desktop computer". This box contains two list boxes: one of connection methods, and one showing the name of your Network Profiler. In the first box, scroll down to **Network Connection** and highlight it**.** In the second box, make sure the correct name is shown; if not, scroll the list to find it. Now press **Connect...** to establish the connection.

   If an ActiveSync partnership has not been established the following error message will be displayed on the Profiler:

6. When the connection is established, the Network Profiler will display the following window, then automatically begin synchronizing the files:

If there are many files, a progress bar will appear in the box. When synchronization is complete, the message $UPTODATE$ appears:



(If only a few files need synchronizing, you will see this message almost immediately after you start **repllog.exe /remote**.)

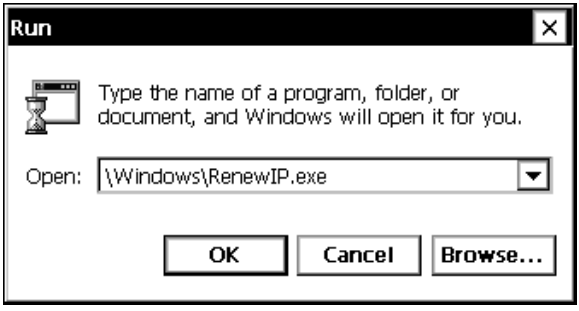
On the PC, ActiveSync synchronization screen will indicate the current status of the synchronization and when it is complete, as it does when using an RS-232 serial connection.

7. Touch the ✖ box to remove the dialog box.

When you can't make the connection

If the Network Profiler is unable to connect to the PC via Ethernet, the problem may be in the assigned IP addresses. Follow these steps to renew the IP address.

1. Select **Start > Run...**. From the drop-down list of programs, select **\Windows\RenewIP.exe**:



2. Touch **OK** or press **Enter** on the keypad. This program clears the current IP address and allows you to reconnect with a new DHCP assignment.

Setting up a partnership

To synchronize files with a computer, you must set up a **partnership**, which can be done only over the serial link. The computer must be running Windows NT, Windows 98, or any later version of Windows.

Installing ActiveSync

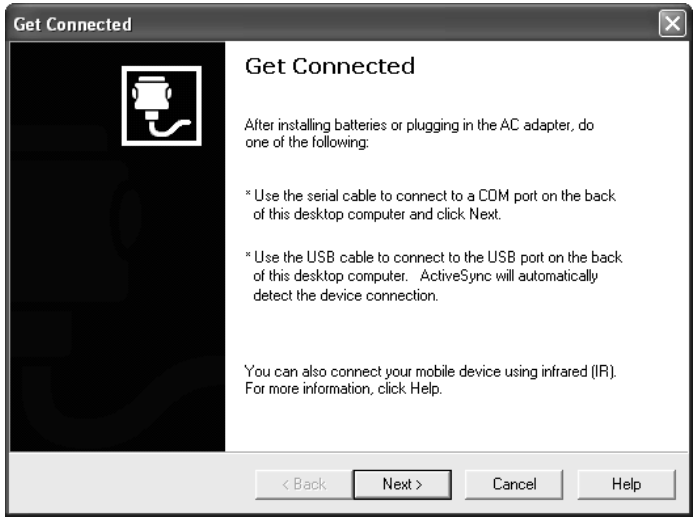
ActiveSync® is a Microsoft utility that is used to connect a Windows PC to another device, such as the Network Profiler. If ActiveSync is already installed on your computer, you may skip this section. Otherwise, follow these steps:

1. Obtain the latest version of the ActiveSync program from the Microsoft Website:

   http://www.microsoft.com/windowsmobile/resources/downloads/pocketpc/

   Follow the directions on the Website to download the program MSASYNC.EXE to your hard drive. Note which folder the program is stored in.

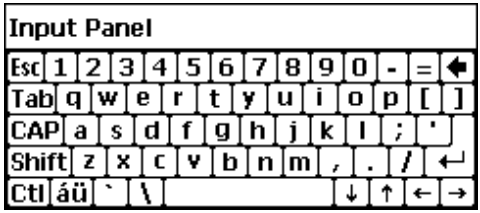
2. Find MSASYNC.EXE on your hard drive, and double-click on it to start the installation. Follow the instructions for installing the program. When ActiveSync is installed, it will automatically start up, to display the following screen:



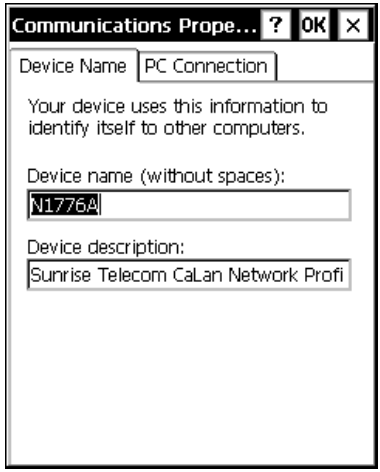
Choosing a name for your Network Profiler

So that more than one Network Profiler can be synchronized to the same computer, each Profiler needs a unique device name. All Network Profilers are shipped from the factory with the default name "N1776A". To change your device name, follow these steps:

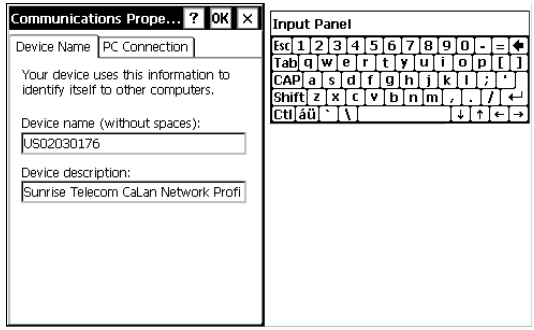
1. From your Network Profiler's **Start** menu, select **Programs > softkbd** to display the Windows CE keyboard (Input Panel):



2. Select **Start > Settings > Control Panel,** then double-tap **Communic…** to open the Communications Properties dialog box:



3. Use the soft keyboard to enter a unique Device Name for your Profiler:



   As shown in this example, the instrument's serial number is a good choice. You will find it on the back of the Profiler, or in the **About** box when you select **Help > About...** in the Network Profiler.

4. Touch **OK** to save the new Device Name

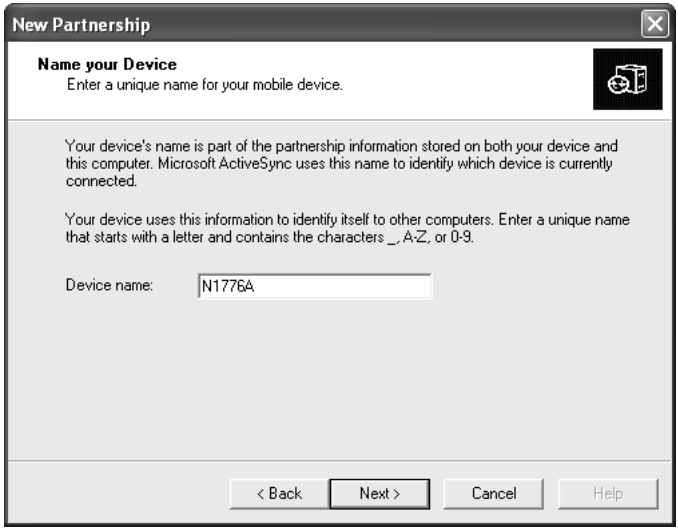
5. Close the soft keyboard by selecting **Programs > softkbd** from the **Start** menu.

Creating the partnership

1. Install the included serial cable between the Network Profiler's serial port and a COM port on your PC.

2. Start ActiveSync and establish a connection as described on page 9–19, until the following window appears::

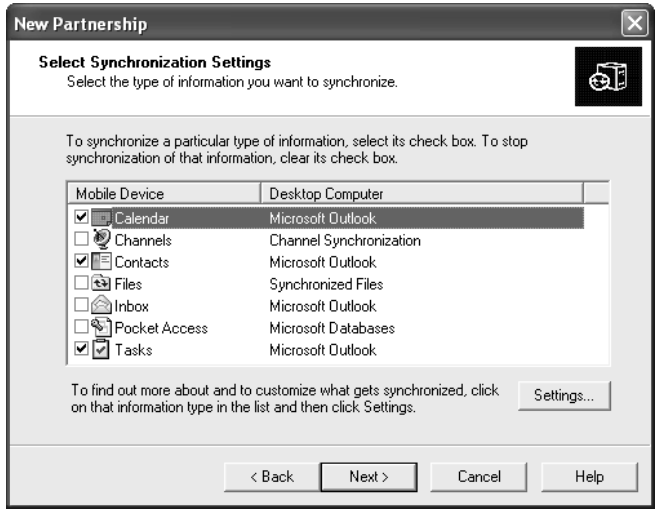
3. Check **Yes, then** click on **Next>** to display the following dialog box:



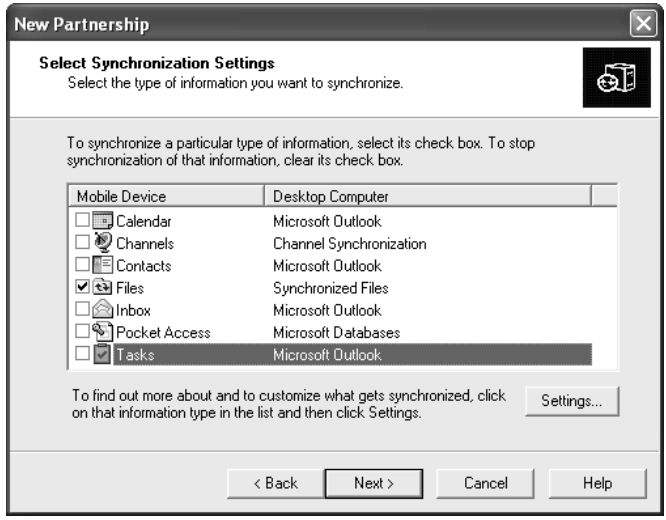
The default name for all Network Profilers is shown. If you have chosen a different name (see *Choosing a name for your Network Profiler*, page 9–26), that name will appear instead.

4. Click on **Next**. If the name you have chosen is the same as another Network Profiler partnered with this computer, the following error message will appear:

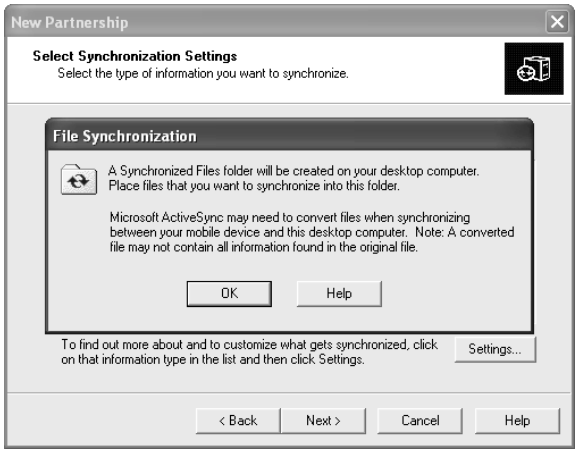
If this happens, click on **OK**, then on **Cancel** in the main dialog. Now follow the steps in *Choosing a name for your Network Profiler*, page 9–26, to give your instrument a new and unique name. Then restart the partnership procedure and continue until the following dialog box appears:



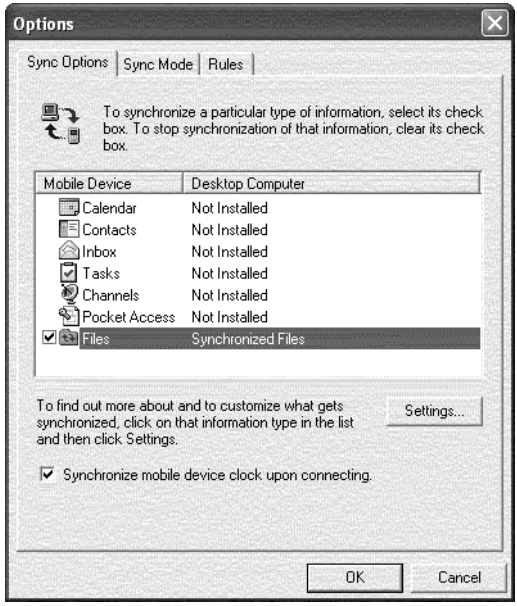
5. Click on **Files** to check its box, then uncheck all the other boxes:



6. ActiveSync will confirm your selection:

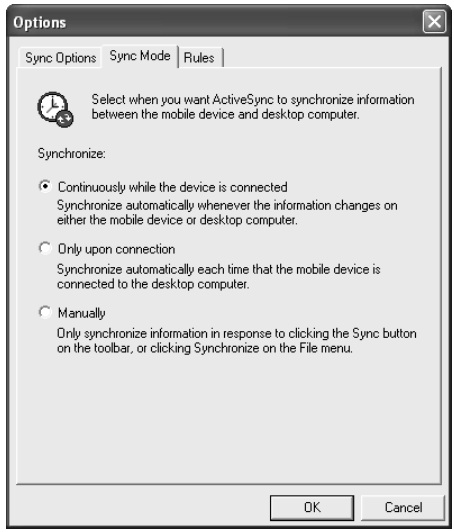


7. Click on **OK**. Now select **Files > Settings...** to display the **Options** dialog:



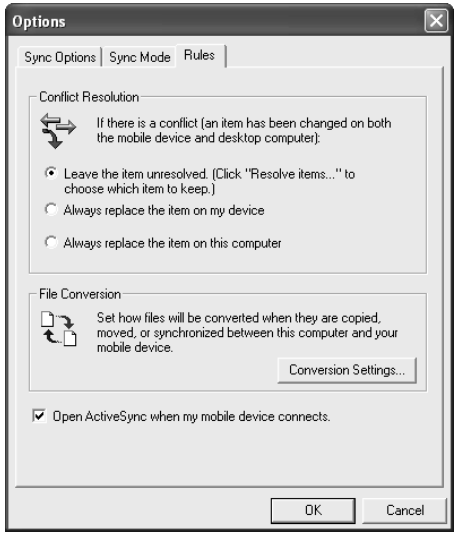
8. If it is not already checked, click on the check box labeled “Synchronize mobile device clock upon connecting”.

9. Click on the **Sync Mode** tab to display its contents:



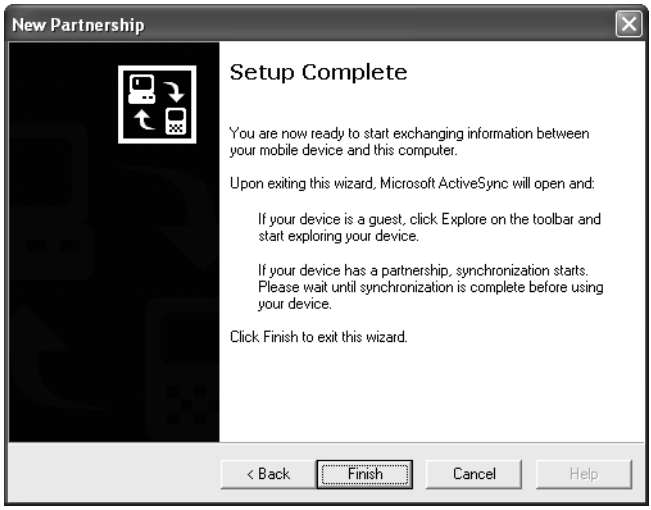
Unless you have special requirements, leave the mode as shown, to synchronize continuously while connected.

10. Click on the **Rules** tab to display its contents:



Again, unless you have special requirements, leave the mode as shown, to leave conflicts unresolved.

11. Click on **OK**, then click on **Next>** in the dialog box to display the last setup window:



12. Click on **Finish**. ActiveSync will now set up a folder named "*xxx* My Documents" on your PC desktop, and copy into it from the Network Profiler the following folders and their contents:
    - Capture
    - Channel Plans
    - Export
    - Locations
    - Location Templates
    - Reports
    - Results
    - Test Points

Note: "xxx" is the name you have chosen for your Network Profiler as described in *Choosing a name for your Network Profiler*, page 9–26. The default name is "N1776A".

When it is finished, ActiveSync remains connected, and begins to synchronize your files. If you have never set up a partnership with this computer, you may see the following message:

Make sure the first option is selected, then click on **OK**. ActiveSync will synchronize your files. When it is finished, you can close the ActiveSync application.

10

Test points, Locations, and Channel Plans

Test Point files

A Test Point file is a convenient way to set up a measurement at frequently-used test point types, such as a node, bridger, trunk amplifier, or a line extender. It contains the following information:

- the name of the test point, or some other unique identification;
- the loss compensation (in dB) at that point;
- the full-scale reference and dB/Div of the vertical axis of the data display graph, set separately for each measurement;
- channel assignments and limit lines for each bar in the multi-channel test;
- Forward and Return Sweep and Return Spectrum setup parameters.

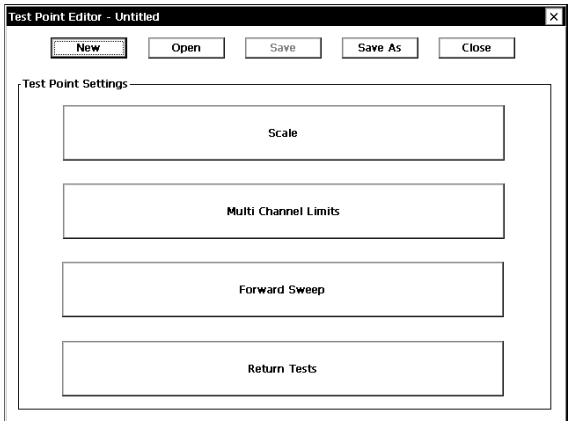
When you enable a test point, these values automatically replace the current settings of the parameters, and the corresponding controls on the control tabs are “grayed out”, and so can’t be modified. To use these controls, you must first disable the test point file.

Test point files are enabled and disabled separately for each test. For example, you could enable one for the multi-channel test but not for the others.
See *Enabling a test point file*, page 3–17, for instructions.

Note: Limit lines in the multi-channel test, and peak-to-valley limits and results in the sweep tests, are displayed only when a Test Point file is enabled.

Viewing and editing test-point data

To view and modify test point data, select **Settings > Test Point.** The test point editor's opening dialog box appears, showing the name of the most recently enabled test point file in the title line:

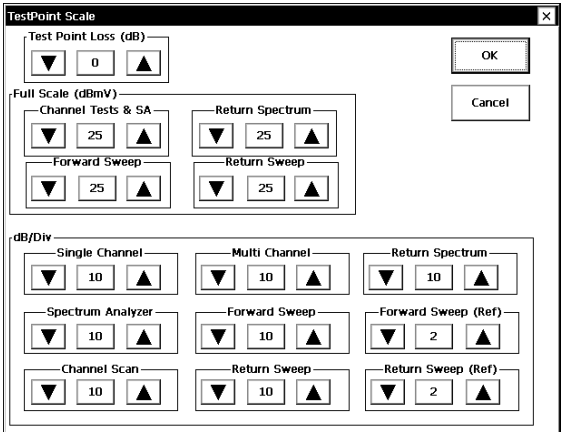


If you want to see a different file, touch **Open**, and choose a file from the displayed list.

The test point file comprises four groups of settings: **Scale, Multi-channel limits**, **Forward Sweep**, and **Return Tests**.

Scale settings

Touch **Scale** to show the scale-setting controls:



Test Point Loss: compensates for any loss between the measurement point and the Network Profiler's RF input. For example, if you are creating a test point file for a trunk amplifier output with a 20-dB test point, set the test point loss value to 20dB.

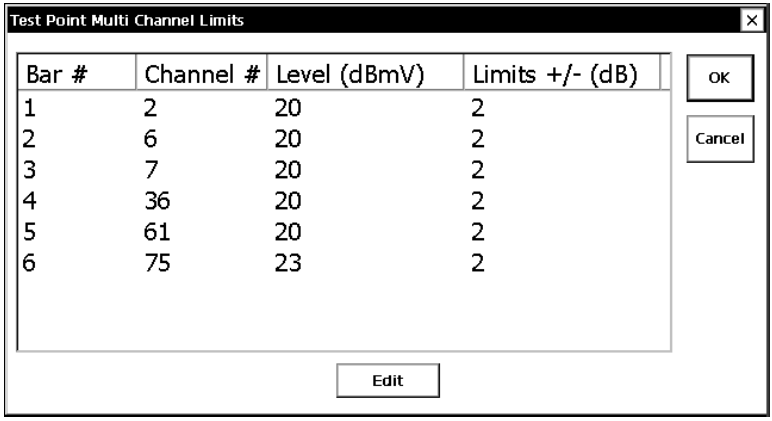
Full scale: sets the upper limit of the vertical axis of the graphic display and of the RF input attenuator.

dB/Div: sets the vertical axis dB/Div for each test. These are all step controls, as described in *Check boxes and step controls*, page 2–7.

To save your changes, touch **Save**; you will then return to the main screen of the editor.

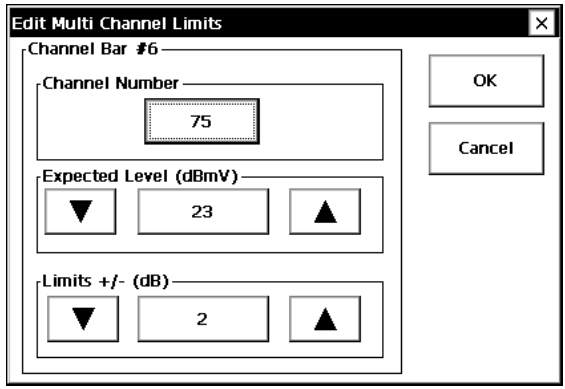
Multi-channel limits

This group of settings lets you do two things: assign a channel to each bar, and set limit lines according to that channel's expected performance. Touch **Multi-channel limits** to display the channel-assignment list:



The first column shows the number of the bar in the multi-channel graph; the second shows the number of the channel assigned to that bar; the third shows the expected visual carrier level for that channel; the fourth shows the limits of deviation from the expected level that are allowable for the channel. In this example, the limit lines for each channel will appear 2 dB above and below the expected carrier level.

To change the settings for a bar, touch its bar number (or anywhere else on that line) to highlight it, then touch **Edit**. The following controls will appear:



Channel Number: assigns a channel to the bar. Touch the number to bring up a keyboard, enter the number of the channel to be assigned, then touch **ENTER**.

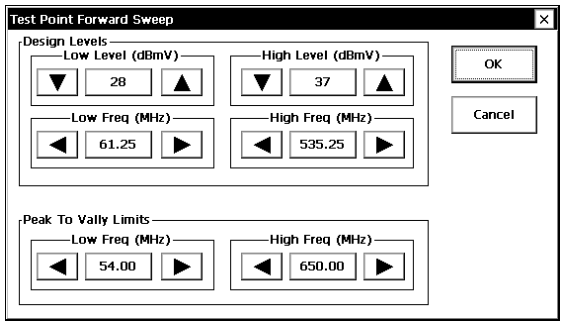
Expected Level: sets the expected carrier level for the channel.

Limits: sets the upper and lower limit lines to be displayed when the test point file is enabled.

When you have finished making changes, touch **OK** to return to the channel list. You can edit other bars, or touch **OK** to return to the main edit screen. Press **Save** to record your changes, or **Save as...** to save the data as a different test point. Press **Close** to exit the editor. (If you have not already saved your changes, you will be asked if you want to save them before exiting the editor. Press **OK** to save them, **Cancel** to abandon your edits.)

Forward Sweep

Touch **Forward Sweep** to display the Sweep parameters:

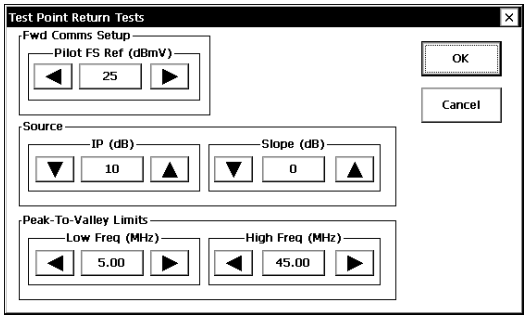


Design Levels: Low Level and **High Level** are the ALC pilot levels used in the system design. These levels automatically compensate the slope and offset of a referenced sweep response when using a sweep reference from a different test point. This automatic compensation is available only if a test point is enabled for both the reference and current sweep. **Low Freq** and **High Freq** are the corresponding ALC pilot frequencies used in the system design.

Peak-to-Valley limits: These controls determine the range over which the peak-to-valley measurement is calculated.

Return tests

Touch **Return Tests** to display these controls:



Fwd Comms Setup: Pilot FS Ref (dB/Div) is the RF input attenuator setting used to monitor the forward path sweep pilot. If this is set incorrectly, you might not be able to receive the forward pilot in the return sweep or return spectrum tests.

Source: IP (dB) controls the insertion-point loss used to determine the return pilot and return sweep source level output from the Profiler. **Slope (dB)** allows you to set the slope of the return sweep source. A positive value will lower the low-frequency level with the slope pivoting around the high frequency end.

Peak-to-Valley limits: These controls determine the range over which the peak-to-valley measurement is calculated.

Creating a new test point file

To create a new test point file, select **Settings > Test Point**. At the opening screen (see page 10–3), touch **New**. The test point name in the title bar changes to **Untitled**. Set up your test point by editing the scale controls and multi-channel limits as described in the previous section. When you have finished, return to the main editing screen and touch **Save**. A keyboard will appear; type the name of the new test point and touch **Enter** to save the new data.

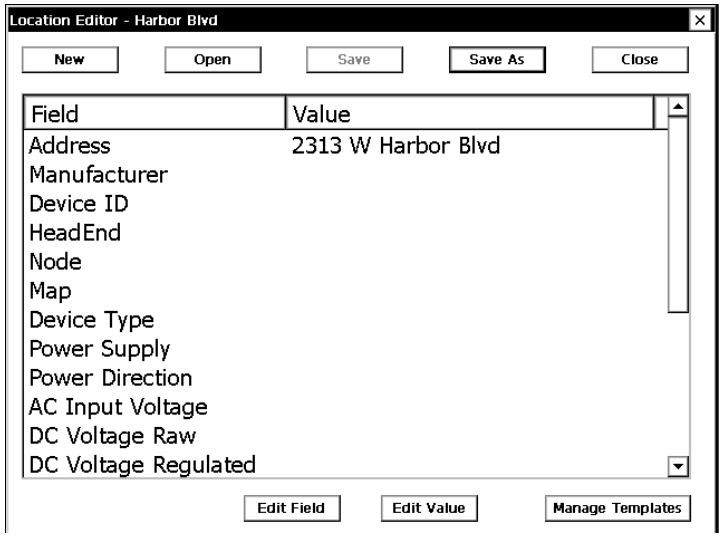
Location files

A location file contains information about a particular test site. Location files are useful when saving test results, as described in Chapter 9, *Maintaining and Managing Your Data*. By linking the results to a location, you will make it easier to interpret the data when you are away from the site.

The Network Profiler provides a default template containing 19 fields. The default field names indicate common types of information you might want to store in the file, such as its name, address, or device type. You can change any name to fit your system's needs. A value associated with each field provides the information for that field. You may enter any text you wish; nothing is calculated from the location file data except the date on which it was created or updated. For example, **Name** can be anything that helps identify the location: a neighborhood (Green Acres), a map reference (10E-89), or a pole number (STM 838).

Template items are independent of one another; you can use as few or as many as you wish. A complete list of items in the default template is shown in the table on page 10–9.

To see the contents of a location file, select **Settings > Location files**. Data from the most recently opened location file will be displayed:

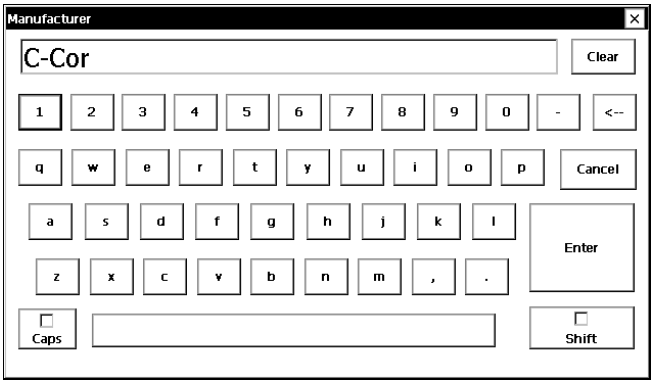


Use the scrollbar to see all the data. To view a different file, touch **Open**, and choose a name from the resulting list.

Note: You can also reach the Location File Editor from the **Configure Location...** button in the **Save As**... dialog box for saving test results, as described in ***Saving test results***, page 9–3.

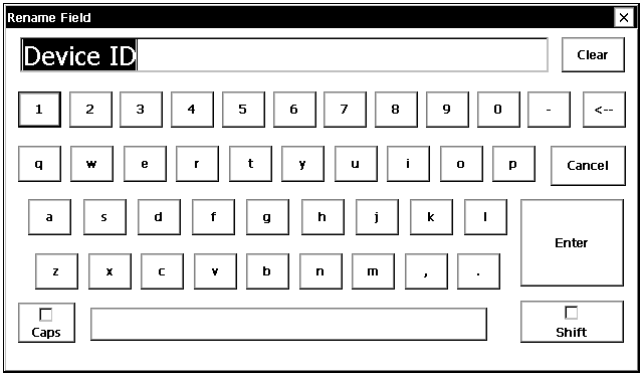
Editing a location file

To add or change information in a field item, highlight the field name by touching it, then touch **Edit Value**; an alphanumeric keyboard appears in which the title bar shows the name of the field and the number of characters allowed, and the text box contains the current entry in that field, if any. Example:



Type your entry, then touch **Enter**.

To change the name of a field, touch **Edit Field.** An alphanumeric keyboard appears entitled **Rename Field**, with the current field name in the text box:



Type your entry, then touch **Enter**.

When you have made all your changes, touch **Save** to save the data and return to the opening screen. Touch **Close** to exit the Location File editor.

Creating a new location file

To create a new file, select **Settings > Location File**, then touch **New** to bring up a new default template. Add whatever data you wish, as described in the previous section. When you have finished, touch **Save**. A keyboard appears; type a name for the new location (maximum 31 characters), then touch **Enter**. The location data will be stored under that name.

To save a location file under a different name, touch **Save as...**, type a new name, then touch **Enter**. The original file will remain as it was.

Here are the fields of the default template. All fields are alphanumeric; **Length** is the maximum number of characters allowed in the field.

Field	Length	Use	Examples
Address	40	Location of equipment under test	32 Bitwide Path
Manufacturer	30	Maker of that equipment	CCcor, MTec
Device ID	6	Unique identifier within the design drawing	HE1-Node3-Amp2
Headend	6	Identifies the headend feeding the device under test	HE1
Node	6	Identifies the node feeding the device under test	Node3
Map	6	Number of the design map on which this location is found	SR-345-p5
Device type	10	Kind of device under test	CCor trunk amp T526, S/A Minibridger
Power supply	10	Identifies the power supply feeding the device under test	PS4
Updated date	*n/a*	*(automatically supplied by the Editor)*	
Power direction	4	Direction of the AC voltage	In, Out, Through
AC input voltage	100		Range: 35 – 90 VAC
DC voltage raw	100	Raw DC measured at the test point	26 VDC
DC volt regulated	99	Regulated DC measured at the test point	+24 VDC

Field	Length	Use	Examples
Forward input pad	8	These all refer to the specified modules within the device under test. They could be device IDs, loss or equalization levels, or other unique identifiers.	
Forward input Equalizer	8		
Forward interstage pad	8		
Forward interstage equalizer	8		
Return input pad	8		
Return input equalizer	8		
Comments	254	Space for notes, reminders, etc.	

Channel plans

Note: The Network Profiler's channel plans are designed to make repeatable measurement configurations possible. The plans are very flexible; only the basics will be discussed here. Application notes available from Sunrise Telecom describe particular channel-plan configurations that can be used to optimize measurements.

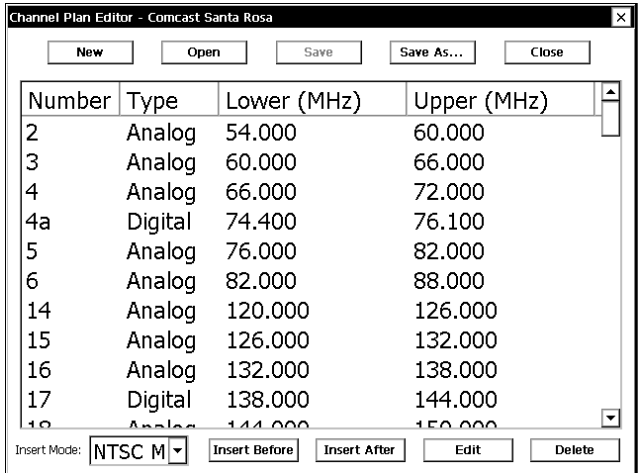
A channel plan (used in the channel-test modes) is a list of all the channels on the network with configuration data for each channel, including the channel number, name, and type (analog or digital), its lower and upper frequency limits, dwell times, and other characteristics that the Network Profiler needs to perform the tests.

Editing a Channel plan

Note: A simple way to edit channel plan data is by touching the **Quick Edit Channel...** button on the **Measure** tab of the single-channel test, as described in *Using the Channel Plan Quick-Edit*, page 5–3. This provides access only to the data for the channel currently being tested.

The Channel Plan Editor allows you not only to change values in the data for any channel, but also to add or remove channels from the plan.

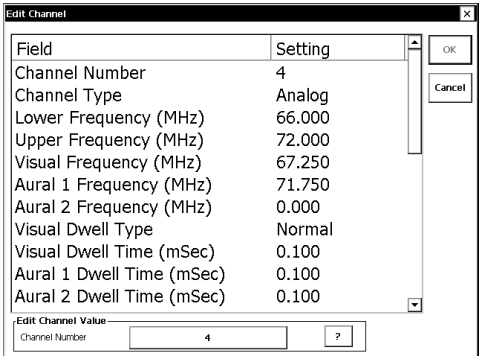
Select **Settings > Channel Plans** to open the Channel Plan Editor and display the contents of the currently enabled plan:



Use the scroll bar or the keypad arrows to see more channels (see Chapter 2, *Getting Started: Touchscreen Basics*).

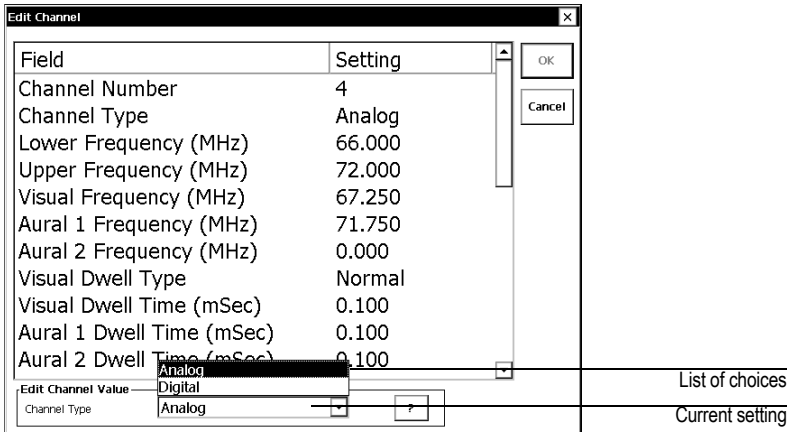
To look at a different plan, touch **Open** to display the list of available plans in a box similar to the one on page 3–19. Highlight the plan you want to work on, then touch **OK** to see its channel list.

To edit channel data, highlight the channel number by touching it, then touch **Edit** to see the data for the selected channel in the **Edit Channel** window:



The names of the fields appear on the left, their values on the right. To change a field's value, highlight the field name by touching it; the appropriate control will appear at the bottom of the screen. Examples:

1. For the channel number, you will see a bar with the channel number on it, as shown in the figure above. Touch the bar to display a keyboard, as described in *Using the "soft" keyboards*, page 2–8. Type the name in the text box, and touch **Enter**.
2. For the channel type, the burst mode of a digital channel, and other fields, you will see a list box with the current setting; touch the arrow to see the drop-down list of choices:



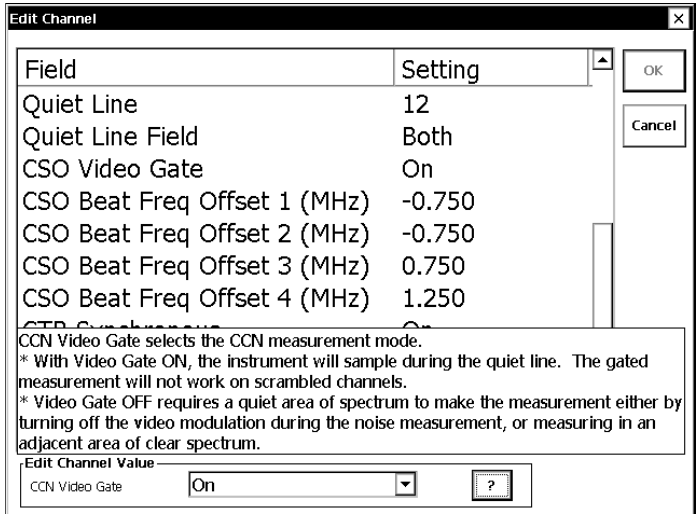
Touch the desired mode to set it.

3. For other data, you will see a numeric step control:

To save your changes, touch **OK**. To exit without making changes, touch **Cancel**.

Context help

To see a brief description of any field, highlight it and touch the **?** button at the bottom of the window:



To close the help text, touch it, or touch anywhere in the field list.

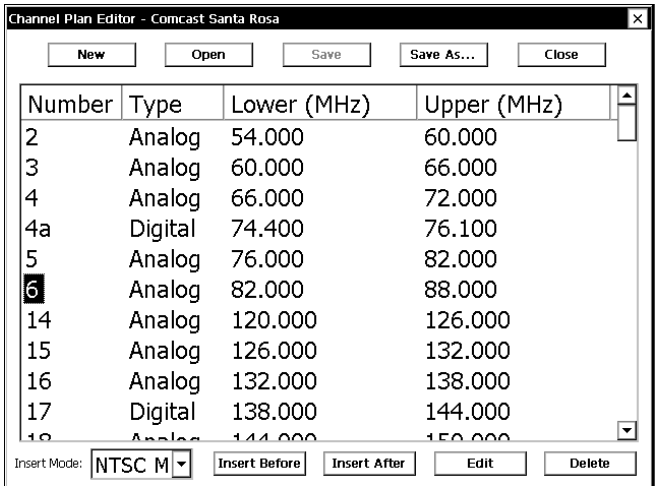
When you are finished editing data, touch **OK** in the **Edit channel** window, then **Close** in the main window.

Deleting a channel

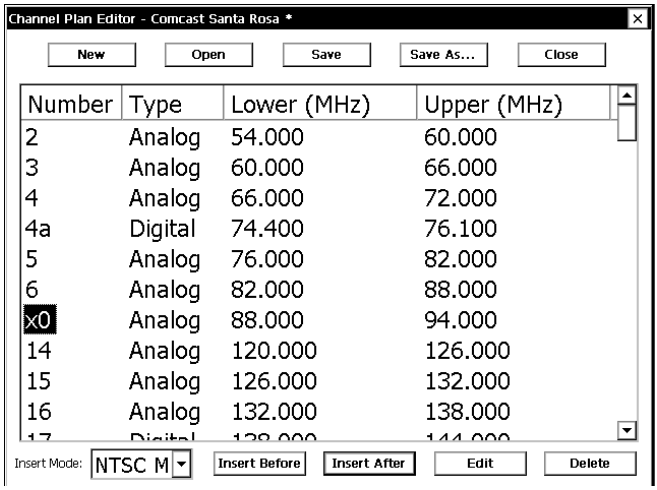
To delete a channel from a plan, open the plan in the Channel Plan editor. Highlight the channel you want to remove, then touch **Delete** at the bottom of the screen.

Inserting a new channel

1. Open the Channel Plan Editor and highlight the channel before or after the point at which you want to insert a new one:



2. Touch either **Insert Before** or **Insert After**. A new channel will appear at the desired point, with default values based on those of the adjacent channels. The channel number is set to **x0** and the channel type to **Analog**:



You may now edit the fields of this channel, including number and type, as described in the previous section.

A note about the insertion mode

When you first open the Channel Plan editor, you will se a small list box at the bottom left of the screen, entitled “Insert mode:”. The setting in this box determines the values that are automatically assigned when you insert a new channel. Normally, you will not change this setting, as it is associated with the type of channel plan you are working with. In the US, this is NTSC M; the other choice, used in Europe, is PAL I.

Channel Plan data fields

Here is the full set of channel plan data:

Field	**Setting**	
	Type	**Range, length or choice**
Channel Number	Alphanumeric	4 characters
Channel Type	List box	Analog Digital
Lower Frequency (MHz)	Numeric	0 – 1122
Upper Frequency (MHz)	Numeric	0 – 1122
Analog channels		
Visual Frequency (MHz)	Numeric	0 – 1122
Aural 1 Frequency (MHz)	Numeric	0 – 1122
Aural 2 Frequency (MHz)	Numeric	0 – 1122
Visual Dwell Type *[msec]*	List box	Custom *[1.0-999]* Inactive *[none]* Normal *[fixed at 0.1]* Scrambled *[fixed at 24]*
Visual Dwell Time (msec)	*Numeric*	*see Dwell Type*
Aural 1 Dwell Time (msec)	Numeric	1.0-999
Aural 2 Dwell Time (msec)	Numeric	1.0-999
Quiet Line	Numeric	10-30
Quiet Line Field	List box	Both Odd Even
CSO Video Gate	List box	On, Off
CSO Beat Freq Offset 1 (MHz)	Numeric	-1.250 – 4.750
CSO Beat Freq Offset 2 (MHz)	Numeric	-1.250 – 4.750

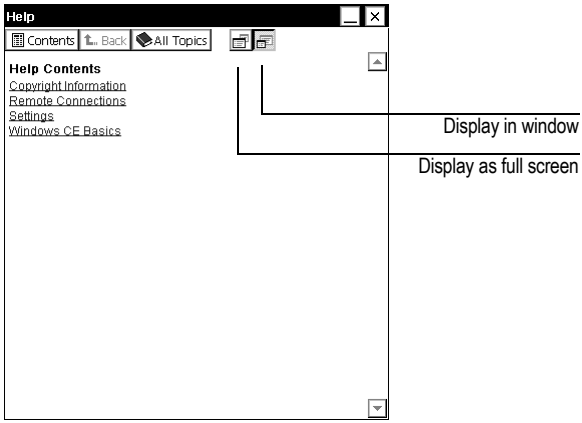
Field	Setting	
	Type	**Range, length or choice**
CSO Beat Freq Offset 3 (MHz)	Numeric	-1.250 – 4.750
CSO Beat Freq Offset 4 (MHz)	Numeric	-1.250 – 4.750
CTB Synchronous	List box	On, Off
CTB Offset (MHz)	Numeric	-1.250 – 4.750
CTB Video Gate	List box	On, Off
CCN Noise BW (MHz)	Numeric	0.200 – 4.000
CCN Meas Start Offset (MHz)	Numeric	-1.250 – 3.000
CCN Meas Stop Offset (MHz)	Numeric	0.500 – 4.750
Hum Mode	List box	Modulated CW
Hum Line Frequency (Hz)	List box	60 Hz 50 Hz
Digital channels		
Center Frequency (MHz)	Numeric	0-1122
Bandwidth (MHz)	Numeric	0-100
TDMA	List box	Off, On
Burst mode	List box	Threshold Sample
TDMA Rate (mSec)	Numeric	100 – 1500
TDMA Threshold (dBmV)	Numeric	-40 – 70
Modulation Type	List box	16 QAM 64 QAM 128 QAM 256 QAM
Polarity	List box	Normal Auto Inverted
Symbol Rate (ks/s)	Numeric	160 – 7000

11

Using Windows CE

Windows CE basics

Windows CE is much like other Windows interfaces; if you have any experience with those, Windows CE should be familiar. Should you need assistance, the Network Profiler includes an on-screen help service which you can access from the Start menu by selecting **Help**. This will bring up the "Help Contents" box:



Touch any underlined item to see its list of topics. Continue until you reach the instructions you're looking for.

The toolbar buttons have the following properties:

Contents: Returns to the last topic list displayed

Back: Returns to the previous topic

All Topics: Returns to the opening screen

Zoom buttons: The two buttons with icons let you display the Help window at full-screen size or at its normal size, as shown in the figure.

Note: The Windows CE help files were written for "palmtop" computers and PDAs. Some references may therefore not apply to the Network Profiler.

Windows CE services

For the field technician, Windows CE provides these important services: file management, power management, communications, and control of peripheral devices. The Windows CE environment makes possible the use of other applications, in addition to those of the Network Profiler.

File management

This consists primarily of saving, retrieving, and copying files. These things are done using Windows CE Explorer, a directory of files and folders containing files, either on the internal disk or on a flash memory card inserted in the PC Card slot. Using Explorer, you can copy or move files from one location to another.

Power management

Windows CE monitors the state of the battery and charging circuitry to provide a continuous display of the battery's state on the taskbar (see *Taskbar*, page 11–8). Power management is described in detail in Chapter 12, *Power Management*.

Communications

Windows CE provides the services that let you transfer data between the Network Profiler and another device or a network, using the serial port, the Ethernet connection, or a wireless link such as a PC card modem.

Peripherals

Windows CE provides the drivers, controls, and interface for using devices connected to the USB port, such as a keyboard, a mouse, or a USB printer.

Support for other applications

Other Windows CE applications may be installed and run on the Network Profiler, including a remote-display utility, IP configuration tools, wireless communications support, and peripheral drivers. For application notes describing third-party products that have been successfully tested on the Network Profiler, please visit the Sunrise Telecom website.

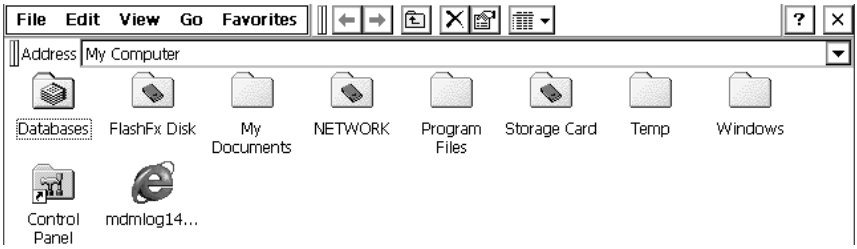
The Stylus and the Keypad

Using the stylus or other pointer with Windows CE is exactly like using it within the Network Profiler: touch items on the screen to select them (as in highlighting a file in a list) or to execute a task (as in saving a file or closing a window).

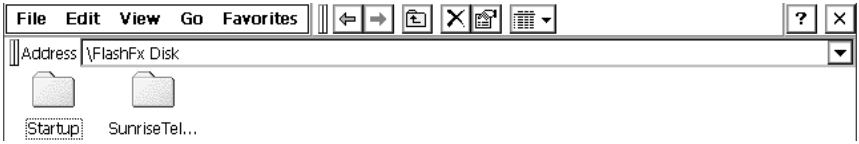
You can also use the keypad to move about the Windows screen. The arrow and **ENTER** keys function as they do on a typical computer keyboard. Use the arrows to move up and down in a list, open menus and submenus, and move among file icons in a directory. Use **ENTER** to execute the task or function of a highlighted item. Use the blue **Start** button to display the taskbar and Start menu, and the **Close-window** (✕) button to close a window or dialog box, or to make the Start menu and taskbar disappear.

Windows CE Explorer

The quickest way to open Windows Explorer is from the Start menu: press the **Start** button on the keypad, then select **Programs > Windows Explorer**. When Explorer opens, it will show the contents of the **My Computer** folder:



Double-tap any folder to show its contents:



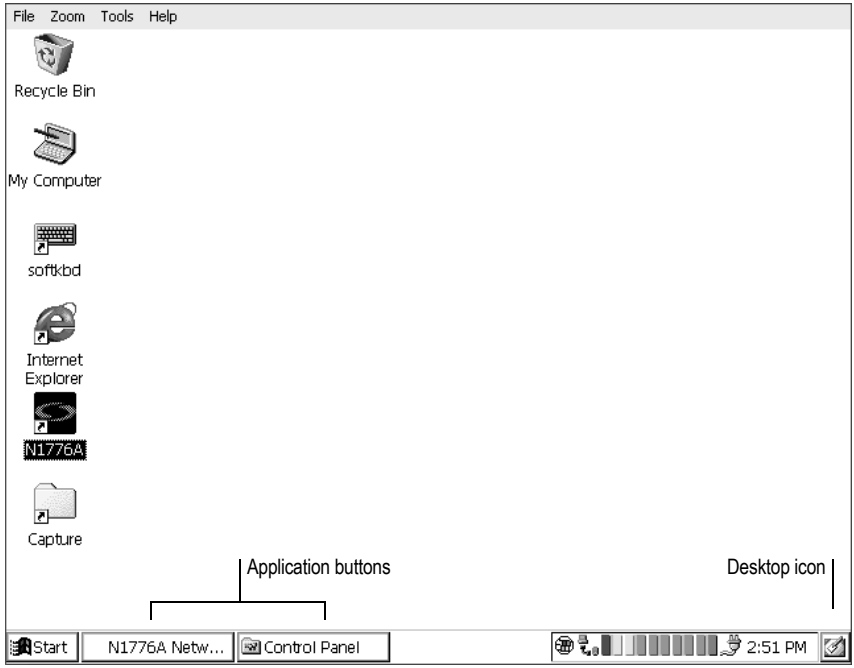
Use toolbar buttons to move between folders or directories:

Up one level ( ): Touch this button to move up one level in the directory tree. For example, if you move up one level from **My Computer**, you will reach the Desktop directory.

Switch directories ( ): Use the blue arrows to switch between the two most recently-displayed directories.

The Desktop

The Windows CE Desktop is the base on which all Windows operations rest. To display the Desktop, touch the pencil-and-pad icon at the extreme right of the Taskbar (if the Taskbar isn't visible, press the blue keypad button).



Most of the icons you see on the Desktop are not of immediate interest; either you won't be using them in normal work (Recycle Bin, My Computer) or there are easier ways to get at them (Internet Explorer, softkbd).

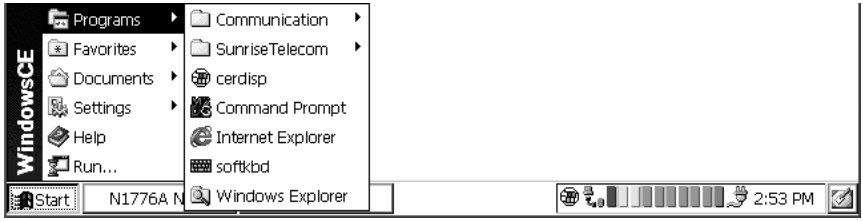
You can restart the Profiler (for example, after a hard reset) by double-tapping the **N1776A** icon.

To return to the last application you were using, touch its button on the task-bar, or touch the Desktop icon again (you may have to double-tap the icon).

The Start menu

Most of the time, you will use the Start menu to access Windows CE programs. This menu appears when you touch the **Start** button on the taskbar, or press the blue button on the keypad:

Each of the first four menu items includes an arrow (▸). This indicates that there is a submenu (or menus). As soon as you highlight one of these menu items (by touching it or by pressing ▾ until you reach the item, then ▸), the submenu appears to the right:



If you now touch one of the submenu items, that application will open.

Programs

You will probably need only a few of the items in this menu.

Communication

This consists of two utilities: **Remote networking**, which is used to set up the ports for communication through the serial connection, and **Terminal**, which is used to establish a command-line (terminal emulation) dialup connection.

Sunrise Telecom

This contains only one program: **N1776A**, which is the Network Profiler application.

Command Prompt

This utility provides a window for running MS-DOS commands.

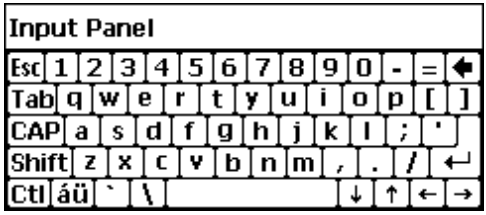
Internet Explorer®

Use this much the way you would on a PC, as a Web browser or to send and receive files over the Network Profiler's Ethernet connection.

The Network Profiler uses Internet Explorer to display screen capture files.

Softkbd

Select **Start > Programs > Softkbd** to display the Windows CE alphanumeric keyboard:



This keyboard (similar to that of a notebook PC) will always appear "on top", that is, over any other windows or applications on the screen. You can use the soft keyboard whenever you would use a regular computer keyboard, for example, to change the name of a file, type settings for the taskbar clock, or enter Web addresses when using Internet Explorer.

To close the soft keyboard, repeat the steps used to open it: select **Start > Programs > Softkbd**.

Note: The soft keyboard application is labeled "Input Panel" in the Windows CE Control Panel folder.

Windows Explorer

See *Windows CE Explorer*, page 11–4.

Favorites and Documents

In a typical Windows CE environment such as a handheld computer, these submenus contain, respectively, links to Web sites and the file names of recently-used documents. Use **Favorites** to store the addresses of frequently-used Internet connections. In normal use, **Documents** will likely remain empty.

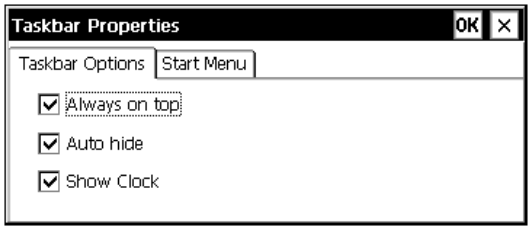
Settings

Control Panel

Select **Settings > Control Panel** to display this folder, which contains numerous utilities for modifying the properties and actions of Windows CE. **Power** and **Stylus** are described in Chapter 12, *Power Management*. **Date/Time** is described in *Restarting Windows CE*, page 11–10. For use of the other utilities, please refer to the Windows CE on-screen help.

Taskbar

Select **Settings > Taskbar** to display the Taskbar Properties dialog box:



The **Taskbar Options** tab is the only one of interest here. It allows you to set any of the three properties as follows:

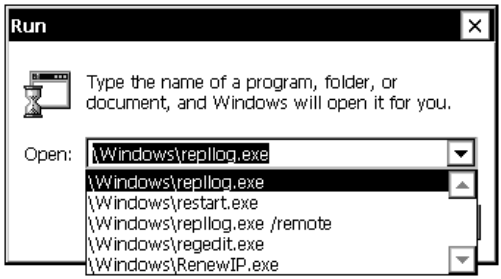
Always on top: When this item is checked, the taskbar will be visible over any other windows on the screen.

Auto hide: When this is checked, the Taskbar will disappear whenever you touch the screen anywhere other than the Taskbar itself.

Show Clock: When this is checked, the digital clock will be displayed to the right of the system tray on the Taskbar.

Run

Select this menu item to display a list box containing a selection of independent utilities. Touch the arrow in the box to display the list:



\Windows\repllog.exe: Establishes an ActiveSync connection with another computer through the serial port. See *Using a PC Card*, page 9–11, for instructions.

\Windows\repllog.exe /remote: Establishes an Ethernet connection with another computer for automatically synchronizing files. See *Using an Ethernet connection*, page 9–22.

\Windows\restart.exe: Restarts Windows CE. See *Restarting Windows CE*, page 11–10.

\Windows\regedit.exe: Used to edit the Windows CE Registry. To be used only by system administrators.

\Windows\RenewIP: Used to restore the Network Profiler's IP address (for network communications) if it gets lost or corrupted.

Restarting Windows CE

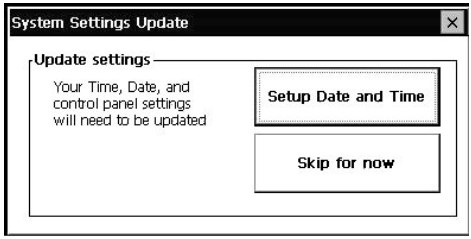
The easiest way to restart Windows CE is through the **Run...** function just described.

1. Select **Start > Run...** to display the **Run** list box, and touch the arrow to display the list of programs, as shown in the previous figure.
2. Touch **\Windows\restart.exe** to highlight it.
3. Press the **Enter** key on the keypad. The screen will fade to black; a few moments later, the Windows desktop will appear. You must now restart the Network Profiler by double-tapping the **N1776A** icon.

Restarting after a full reset

If you find it necessary to do a "hard" reset (see *Doing a Hard Reset*, page 3–23), Windows CE will reboot automatically, but you will have to manually restore the current date and time.

When Windows CE reboots, you will see a startup screen asking if you want to set the date and time.



These settings are used to "time-stamp" test-results and other files; they should always be up to date. Follow these steps:

1. Touch **Setup Date and Time** to display the calendar/clock utility:

2. To set the month, touch the month to display a months list:

Touch the desired month to set it. (You can also scroll forward or backward from month to month using the arrows to the left and right of the month/year.)

3. If you need to set the year, touch the year to display two spin buttons:

You can scroll through the years by touching the arrows, but it's easier to use the up and down arrows on the keypad.

4. Set the date by touching it on the month calendar. The date will be outlined in red.

5. Set the time zone by touching the list arrow in that box:

6. Scroll through the list using the right scrollbar or the keypad up and down arrows. When you reach the correct zone, highlight it, then close the list by pressing the keypad **Enter** key, or by touching anywhere else on the screen.

7. If Daylight Saving time is in effect, touch that check box.

8. Before setting the clock, touch **Apply** to lock in the settings so far.

9. To set the clock, you may use either the spin-button arrows in the dialog box, or the arrow buttons on the keypad.

   Touch the hours segment to highlight it, then use the spin buttons (or the up and down arrow keys) to scroll through the possible settings. When the setting is correct, set the minutes and seconds segments in the same manner. Set “AM” or “PM” using either the up or down arrow; the setting will switch from one to the other each time you press the key.

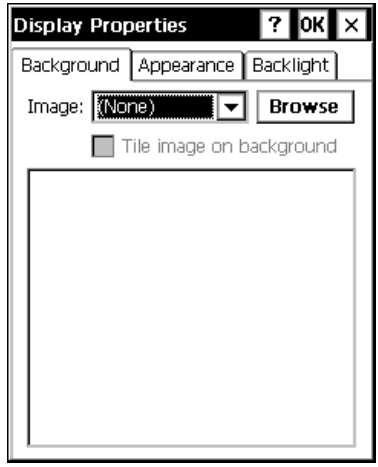
10. Touch **Apply** to set the clock, then **OK** to close the window and retain the settings. The Windows CE desktop will be displayed.

To restart the Network Profiler application, double-tap the **N1776A** icon.

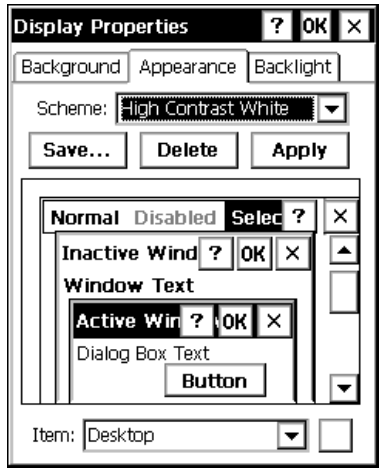
A note on screen contrast

If you use the Network Profiler in bright daylight most of the time, you can set the screen contrast for better visibility as follows:

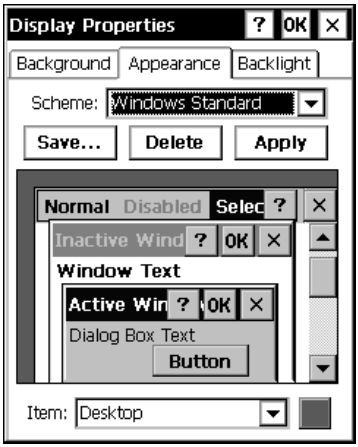
1. From the **Start** menu, select **Settings > Control Panel**.
2. Double-tap the **Display** icon to open the utility:



3. Touch the **Appearance** tab:



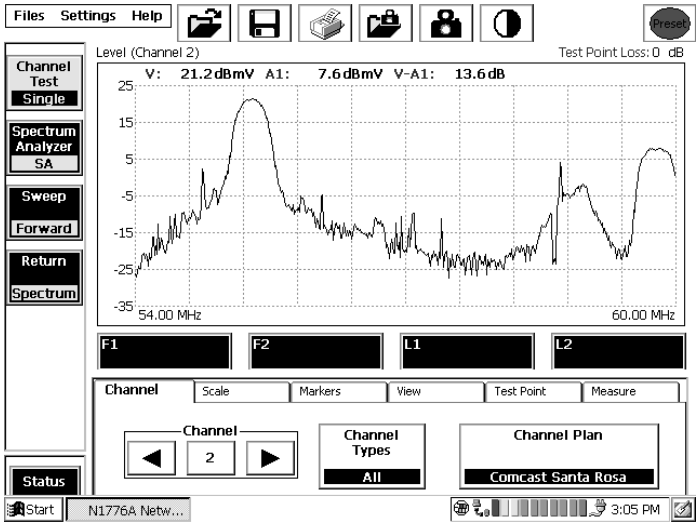
4. Touch the arrow in the **Scheme** list box to display the choices of colors:



5. Scroll the list until you see the scheme called “High Contrast White”. Touch this to highlight and select it, then touch **Apply**. The screen colors will change to an all-white background.

6. Close the Display window.

When you return to the Network Profiler, enable the high-contrast display mode. The screen will look like this:



All parts of the display now have a white background. The colors of items such as markers and icons are not affected.

12

Power Management

The Sources of Power

The main battery

The rechargeable lithium-ion battery supplied with the Network Profiler, Inspired Energy Model NI2040 (Sunrise Telecom Part No. 1420-0868), is rated at 10.8V and 6 A-Hr:

It fits into a compartment on the lower left side of the unit, under a hinged protective cover. To gain access, turn the lock ring one quarter-turn counter-clockwise and let the cover swing down. The visible end of the battery contains a 5-segment LCD display that indicates the state of the battery's charge. When fully charged, all 5 segments are visible:

A fully charged battery will power the Network Profiler for 4 hours of continuous service. In Suspend mode, a fully-charged battery will maintain the state of the unit's internal RAM for up to 60 days.

Notes: If the unit is stored for more than 60 days without recharging, the contents of internal RAM, including the measurement configuration and all saved data in the My Documents folder (channel plans, test points, etc), will be lost. When the unit is next turned on, it will behave as though a hard reset had been performed (see *Doing a Hard Reset*, page 3–23).

"Supercap" internal capacitor

When the Network Profiler is in Suspend mode, an internal supercapacitor can maintain power for up to 20 minutes if the main battery must be removed and external power is not available. This capacitor is kept charged only while the instrument is in use; it gradually loses its charge when the unit is in suspend mode. The instrument should therefore not be without battery or external power for a long period, otherwise the contents of RAM may be lost and a hard reset will occur when the unit is turned on.

To avoid losing data, change the battery only when an external power adapter is connected, or immediately after putting the unit into suspend mode.

Using the external power adapters

When an external power source is available, you can conserve the battery by using an adapter. An AC adapter for 100 – 240VAC (Part No. 0950-4230) is included with the Network Profiler; a 12 VDC car adapter (Part No. 0950-4245) is available as an option.

AC adapter

Plug the DC cable into the **DC Input** on the top of the Network Profiler, then plug the adapter into an AC outlet of the correct voltage.

Car (12 VDC) adapter

Plug the DC cable into the **DC Input** on the top of the Network Profiler, then plug the adapter into a 12 VDC outlet such as the accessory outlet in a car or truck.

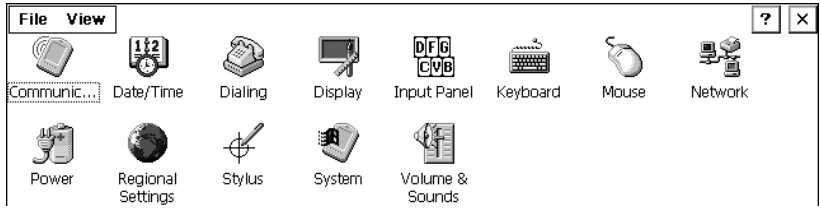
You must use one of these adapters to power the built-in battery charger; see *Using the built-in charger*, page 12–10.

Conserving energy

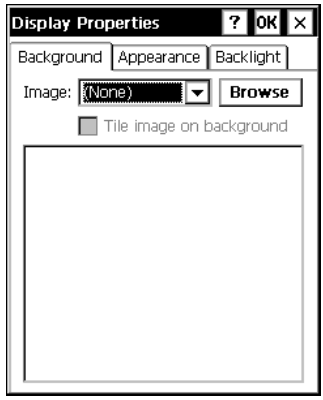
Windows CE's power-managing utilities allow you to conserve both battery and external power in two ways. First, you can set the unit to turn off the touchscreen's backlight after a specified "idle" period – one in which no screen touch or keypress is detected. Second, you can set the unit to enter Suspend mode after a specified period of no activity when it is not connected to external power.

Setting the backlight idle times

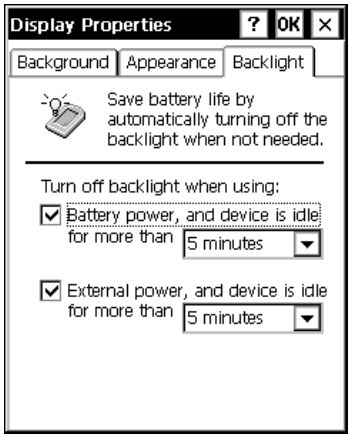
1. Press the blue Start/taskbar key to bring up the Start menu.
2. Select **Start > Settings > Control Panel** to display the Control Panel utilities:



3. Double-tap **Display**:

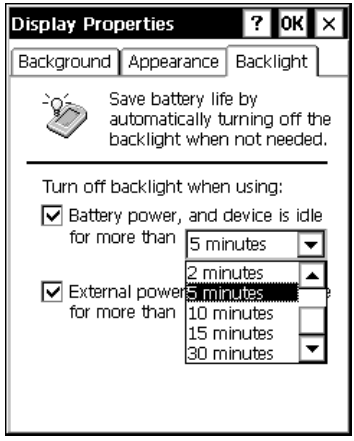


4. Touch **Backlight** to display that tab:



5. If necessary, touch the **Battery power** or **External power** check box to activate the associated control.

6. Touch the list arrow, then select a time from the drop-down list (15 sec - 5 min for battery power, 15 sec - 30 min for external power):



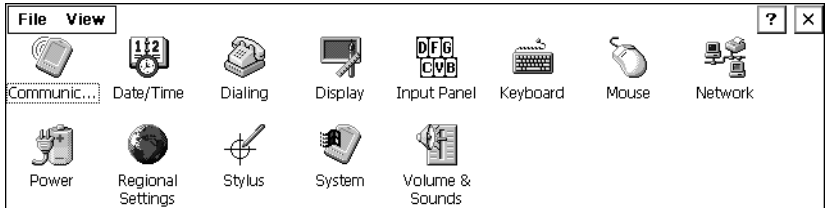
7. Touch **OK** to save your new settings and return to the Control Panel window.

8. Touch the ✕ box, or select **File > Close**, to close the Control Panel and return to the Network Profiler screen.

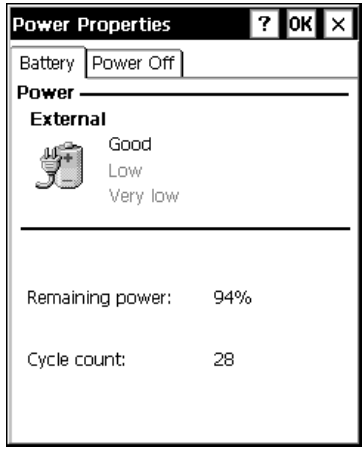
Setting the Suspend-mode idle time

This function applies only when the Network Profiler is running on main battery power.

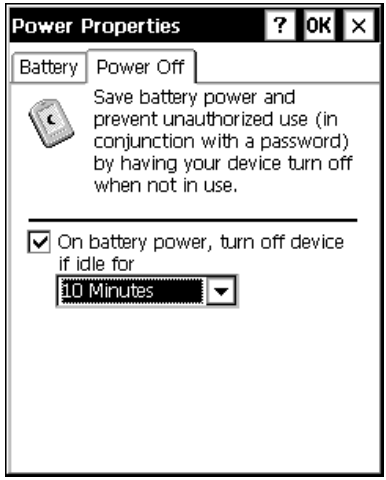
1. Press the blue Start/taskbar key to bring up the Start menu.
2. Select **Start > Settings > Control Panel** to display the Control Panel utilities:



3. Double-tap **Power** to start the utility. The first view is the **Battery** tab, which reports the current power conditions:

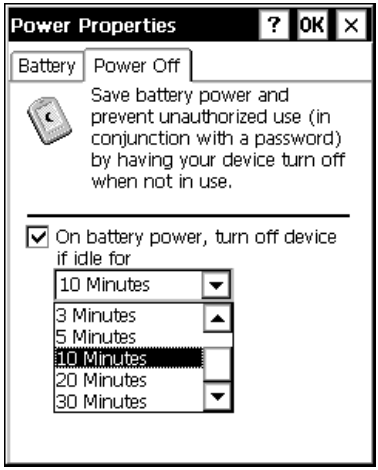


To display the power-management functions, touch the **Power Off** tab:



4. The enabling check box should already be checked; if not, touch it to display a check mark and enable the control.

5. To set the idle time, touch the arrow in the list box, and select one of the seven choices in the list (1-30 minutes).



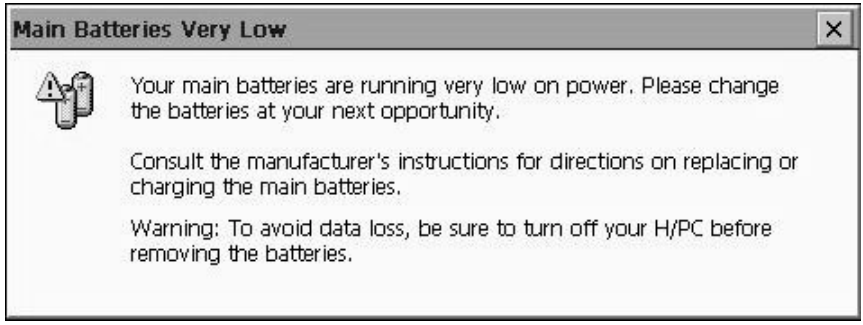
6. Touch **OK** to apply the new settings.

7. Touch the ✕ box, or select **File > Close**, to close the Control Panel and return to the Network Profiler.

Maintaining the battery

Battery-low warnings

If the remaining run time on the battery falls below 30 minutes, a warning will appear on the screen:



Touch ✕ to close this dialog box. You will have time to finish your current test, back up your data, and exit the Network Profiler. Put the unit into Suspend mode, then follow the directions in *Using the built-in charger*, page 12–10.

If you continue to use the unit without external power, the Network Profiler will automatically go into Suspend when the remaining run time falls below 10 minutes. Under these conditions, the battery will maintain the state of RAM in Suspend mode for only two days. As soon as possible, connect an external power adapter, back up your data (using **Files > Backup All)** and leave the unit in Suspend mode to recharge the battery.

Charging the battery

Using the built-in charger

The Network Profiler has a built-in battery charger that runs off power from either of the external adapters. The battery is charged only when the unit is in Suspend mode, to minimize internal heat buildup. To recharge the battery:

1. Connect an external power adapter to the unit as described on page 12–4.
2. If the Network Profiler is running, press ⏻ to put it into Suspend mode. The red charging light should begin to flash.
3. Leave the unit in Suspend mode until the battery is fully charged (up to 3 hours); when it is fully charged, the charging light will be a steady red, and the charge indicator on the end of the battery will show all 5 segments.

Using the (optional) external charger

The optional desktop dual battery charger and reconditioner (Part No. 0950-4276) can charge two Network Profiler batteries, or recondition one battery, at a time.

Fast charging

To charge a battery:

1. Plug the charger's AC adapter into the connector on the rear of the charger, then into an appropriate (110–240 VAC) outlet.

2. Insert the battery into one of the bays, as shown:

3. Observe the LED indicator on the front of the charger to monitor the charging process:

Indicator	Indication
Off	No battery inserted
Flashing green	Fast-charging
Steady green	Fully charged
Flashing yellow	Recalibrating
Yellow/green	Recalibration complete
Steady yellow	Charger is on standby (temperature range exceeded)[1]
Flashing red	Error[2]

Notes: 1. The permitted temperature range of the battery while it is being charged is 0°C – 45°C. If the battery gets too hot or too cold, it will signal the charger to stop and go into Standby.

2. An error will occur if the charging terminals are shorted or if the "smart" battery sends one or more error bytes to the charger. Charging stops when an error occurs.

Reconditioning the battery

As the battery goes through many charge/discharge cycles, the reliability of the information it sends to the power management system will degrade, making the charge indicator on the Network Profiler's taskbar inaccurate. To restore accuracy, you must recondition the battery using the desktop dual-battery charger, as follows:

1. Remove the battery from the Network Profiler (see *Replacing the battery*, below).
2. Insert the battery into the *left* bay of the charger.
3. Press the blue **Recondition** button in the center of the charger's front panel. The charger will first charge the battery, then fully discharge it, then fully charge it once more. The entire recalibration process may take up to 16 hours, during which time the indicator will flash yellow.
4. When the reconditioning cycle is complete, the indicator will alternate yellow and green. Remove the battery.

Replacing the battery

To remove and replace the battery:

1. Put the Network Profiler into Suspend mode by pressing the Suspend button or selecting **Suspend** from the Start menu.

Warning! If you remove the battery without first putting the unit into Suspend mode, the system will not shut down cleanly. The next time you start the Network Profiler, it will not return to normal operation. If this should happen, select **File > Exit** to close the Advisor application, then select **Programs > Sunrise Telecom N1776a > N1776a** from the Windows CE Start menu.

2. Open the battery compartment by turning the lock ring on the cover one quarter-turn counterclockwise, and let the cover swing down. Gently pull the tab on the end of the battery, lifting up slightly as you pull the battery out.
3. When the battery disengages, pull it all the way out.
4. Make sure that the label and the contact slots of the new battery are on top. Slide the battery in until it touches the contacts, then gently push it all the way until it is fully seated.
5. Close the cover and lock it by turning the lock ring clockwise until it clicks.

If you have to replace the battery without access to an external power source, please keep in mind that the internal supercapacitor will maintain the state of internal RAM in Suspend mode for only about 20 minutes. It will be recharged when you begin using the unit with a new battery.

13

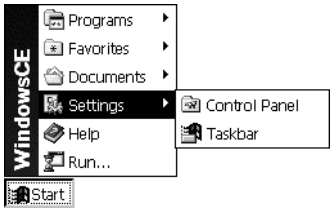
Maintenance and Care

Recalibrating the touchscreen

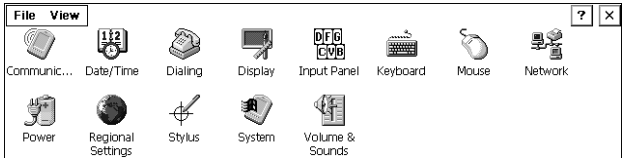
Note: Wherever a touch or a double-tap is called for in the following discussion, you can use the keypad arrow and **ENTER** keys to highlight and select the item.

If the touchscreen begins to respond unpredictably to the stylus, for example, by failing to recognize a touch unless you move the stylus away from the intended point, you can recalibrate the screen as follows (use the keypad if the stylus response is unreliable):

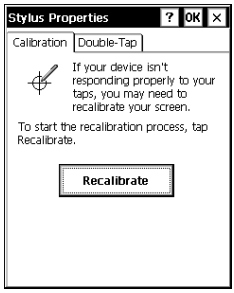
1. Press the blue Start/taskbar key to bring up the Start menu.
2. Using the keypad arrow keys, highlight **Settings.** Press right arrow to display the submenu:



3. Highlight **Control Panel**, then press ↵ to display the utilities available:



4. Using the arrow keys, highlight the **Stylus** icon, then press ↵ to display the **Stylus Properties** dialog box:



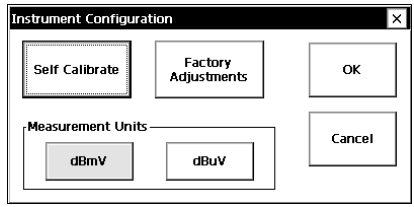
5. Touch **Recalibrate**, then follow the instructions on the screen.

Instrument configuration

Self-calibration

The Network Profiler automatically runs a self-calibration every time it returns from Suspend mode, and whenever the internal temperature varies by more than 5° C. You can also recalibrate the unit manually as follows:

1. From the Network Profiler menu bar, select **Settings > Instrument configuration** to display the configuration dialog box:



2. Touch **Self calibrate**; the screen will display a message until the provess is completed

Setting the measurement units

The two buttons grouped under **Measurement units** set the units of measurement, either dBmV or dBµV (set by touching the **dBuV** button). This setting determines the units for test results and for displayed information such as the marker readings and the vertical scale of the graphical display.

Note: The default setting is determined by the country the unit is intended for; the US default is dBmV.

(**Factory Adjustments** is a password-protected maintenance tool which is not part of the normal operation of the Network Profiler.)

Instrument care

Cleaning the touchscreen

To clean the touchscreen, wipe it with a lint-free cloth, using water or isopropyl alcohol.

Technical support

Sunrise is located in the Eastern Time zone with regular office hours from 8:00AM to 8:00PM. A toll free number service covering all of North America is provided at no charge. Key Sunrise personnel can always be reached any time of the day through a toll free number or electronic mail service over the Internet.
International Customers should contact the nearest Sunrise Representative or the factory at 1-514-725-6652 or by fax at 1-514- 725-5637
North America Toll Free: 1-800-297-9726
Outside of North America: 1-514-725-6652
E-mail address for Technical Support: catv@sunrisetelecom.com
website: www.sunrisetelecom.com/broadband

Returning equipment to Sunrise

Sunrise manufactures equipment to very high standards. Products are warranted against defects in materials and workmanship, as specified in our published product warranty. When properly used and operated, your equipment will provide many years of service. Should it become necessary to return the, equipment to Sunrise for in or out of warranty repairs or calibration, the following steps should be followed.

Note: If products are repaired or altered by persons not authorized by Sunrise, or not in accordance with instructions furnished by Sunrise or if the products have become defective due to a result of misuse, improper repair, abnormal operating conditions; the labor and materials required to effect the changes will be billed at our standard repair rates.

Customer's Responsibility

1. Contact Sunrise and request a Returned Material Authorization (RMA) number. Be sure to have your model and serial number ready.
2. After receiving the RMA number, return the equipment with an accurate description of the symptoms and be sure to state the authorization number on your paperwork. The client is responsible for all transportation charges to Sunrise.
3. Original packaging is preferred. If unavailable, carefully package the equipment in alternate packing material to ensure adequate protection during shipping.

Sunrise's Responsibility

1. Sunrise will acknowledge the receipt or the returned equipment and at that time bring any discrepancies to your attention.
2. Sunrise will replace or repair, at its discretion, any component or sub-assembly it deems necessary to return the unit to a proper condition.
3. After the necessary repairs, Sunrise will perform complete test and re-calibration of the unit.

All precautions are taken by Sunrise to ensure that every unit meets all electrical and mechanical specifications prior to returning the equipment to the client.

Note: Sunrise is not responsible for failures caused by transportation to/from the customer's location, nor by rough handling by the customer after receipt causing further damage to the product. Sunrise is solely responsible for the defects stated above and in our standard product warranty policy.

Returning equipment to Sunrise

If you require information or assistance, contact SunriseTelecom Broadband at 1-800-297-9726 toll free from anywhere in North America or by fax 1-514-725-5637 or by e-mail to: info@sunrisetelecom.com.

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