

# **340 OTDR Plus™ Multitester II**

## **Operators Manual**

TEQ-76 Rev. A  
May 2001

# Release and Revision Notes

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Revision	Date	Software Release	BIOS
A	May-01	4.10d5	Rev: 4.01.02

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## NOTE

This manual covers the software and BIOS version in the preceding table and versions with higher numbers.

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## Compliance Information and Warnings

**GENERAL** Units bearing the CE mark have been tested to show compliance with the Electromagnetic Compatibility (EMC) requirements and safety requirements of the European Union's EMC and Low Voltage Directives respectively. The Compliance Folder and Declaration of Conformity will be held in Europe at GN Nettest AS, Kirkebjerg Alle' 90 DK 2605 Brøndby, Denmark.



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**CORNING CABLE  
SYSTEMS 340  
OTDR PLUS™  
MULTITESTER II EMC**

The Corning Cable Systems 340 is a Class A product with respect to radiated and conducted emissions. In a domestic environment, it is possible that this product may cause radio interference, in which case the user may be required to take adequate measures. Such measures may include relocation or reorientation of the product, the use of shielded cables, or possibly the direct connection of a ground wire to the instrument chassis.

In order to reproduce EMC compliant operation as tested, the user must:

- Use parallel and/or serial cables that are shielded and less than six feet in length
- Use peripherals that are properly marked as compliant by the respective manufacturers
- Use a VGA cable that is less than 6 feet in length, double shielded and loaded with a ferrite at each end
- Use only the AC adapter/charger provided for the product by Corning Cable Systems

## Corning Cable Systems 340 OTDR Plus™ Multitester II Laser Safety

### CAUTION

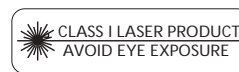
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

**CLASS I** The Corning Cable Systems 340 OTDR Plus™ Multitester II test ports are fully compliant with both the CDRH(FDA) Federal Register 21CFR parts 1000 and 1040 and EN60825-1 Class I Laser Emissions levels. The Class I level is considered to be eye and radiation exposure safe. This compliance is met when the product is used as intended.

To avoid any possibility of eye injury, adhere to the following warnings:

- DO NOT stare into these ports or into the ends of fibers connected to these ports when the instrument power is on. They emit invisible infrared laser radiation.
- DO NOT inspect the optical ports or fiber ends with a lens or ‘fiber scope’ while power is on. A lens, viewer or scope could concentrate the laser power to injurious levels.
- DO NOT clean optical ports while the power is on.
- DO keep these ports and the ends of connected fibers covered when the instrument is in use.
- An icon on the instrument screen (See Section 2.1.1) will indicate when any laser device in the instrument is on.

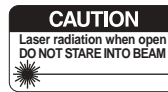
The following is a facsimile of the label located on the top panel that identifies the Class I laser ports.



**VISUAL FAULT LOCATOR (VFL)** The Corning Cable Systems 340 OTDR Plus™ Multitester II optional Visual Fault Locator (VFL) port produces laser radiation in the visible spectrum, ranging from 625 nm to 655 nm, which appears RED to the human eye.

The VFL option can potentially produce Class II laser radiation levels. However, the CDRH has issued a ruling stating that the Corning Cable Systems 340 product, with or without the VFL option, shall be classified as a Class I product (eye safe). This ruling is based on the fact that normal operation conditions for any active fiber optic test port requires a fiber connection, and that the instrument and fiber fully contain the radiation to safe levels.

In the same ruling, the CDRH stated that the following Caution label needs to be provided near the VFL port to alert the user of potential hazards if the product is used incorrectly.



### **Corning Cable Systems 340 Electrical Safety**

To reduce risk of equipment damage, injury or death, adhere to the following warnings:

- Do not use the Corning Cable Systems 340 or its external power supply if either case is cracked or damaged.
- Use the Corning Cable Systems 340 only with an external power supply provided for the 340 by Corning Cable Systems. The safety and functionality of other supplies will not be guaranteed by Corning Cable Systems.
- The Corning Cable Systems 340's external power supply requires a three-wire grounded line cord. Do not use two wire line cords, ungrounded line cords, or damaged line cords.
- The Corning Cable Systems 340's external power supply is not intended for use in outdoor or wet environments.
- Ensure that the AC input to the external power supply is within the voltages marked on the power supply's case.
- Do not attempt to service the product in any way other than routine maintenance as described in this manual.

## Corning Cable Systems 340 Warning Symbols

*The following labels are used to warn the user of possible dangers*



Always refer to the manual for important safety information regarding the use of the unit when you see this warning symbol near any port or receptacle on the unit.



This symbol denotes hazardous voltages. Do Not attempt to touch or otherwise service parts behind covers marked with this symbol.



This symbol denotes earth safety ground. Do Not disconnect safety ground terminals.

## Batteries

The Corning Cable Systems 340 is provided with a rechargeable lead-acid type battery (Panasonic LCS2312 or equivalent). Usage of other battery types may cause equipment malfunction, damage, toxic electrolyte leakage, personal injury and other problems.

The 340's battery contains lead. Spent batteries must be disposed of or recycled according to the appropriate regulations in the user's locality. If there are problems with disposing of spent batteries, contact Corning Cable Systems Customer Service.

**Environmental Specifications**

Corning Cable Systems 340 Environmental Specifications	
Input Power:	12 V, 36 watts (input to Corning Cable Systems 340; input to external AC adapter is marked on adapter itself)
Operating Temperature:	0 to 45°C (external AC adapter) 0 to 40°C (battery powered)
Storage Temperature:	-25 to 60°C
Humidity:	95% maximum RH (non-condensing)
Altitude:	50,000 ft maximum

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## 1.0 Quick Start

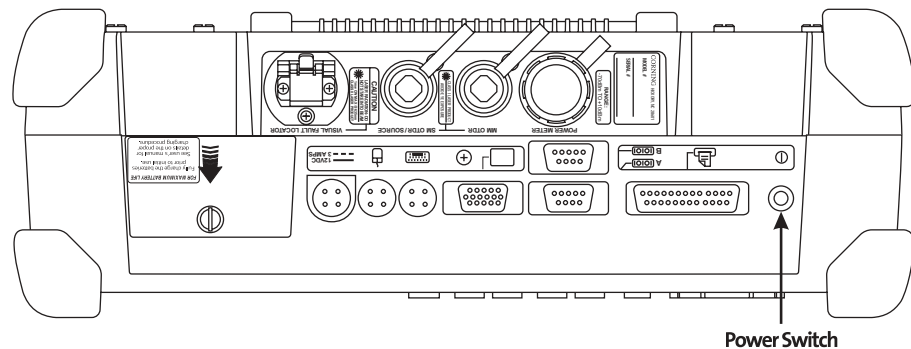
The Corning Cable Systems 340 OTDR Plus™ Multitester II is an enhanced Optical Time Domain Reflectometer (OTDR) designed for use in the building, commissioning, maintenance, restoration, and record keeping of optical fiber and cables.

This chapter provides quick operating information for each of the operating modes for experienced users. More detailed information on each mode can be found in later chapters of this manual.

### 1.1 Instrument Power Up

The Corning Cable Systems 340 can be powered externally by using the AC charger/adapter or internally by using the 12V rechargeable battery pack. The battery compartment and the power cord outlet are shown and explained in more detail in Chapter 2.0 of this manual.

The power switch is located in the lower right corner of the top connection panel of the 340. Start the unit by pressing the power switch firmly.



*Figure 1-1: Top Connection Panel*

## 1.2 Start Up Sequence

As the unit powers up, a logo screen, which includes the software version and date, is displayed. The unit performs a self-test on power up, during which *Equipment* and *Testing* information boxes are displayed (See Figure 1-2).

Press the **PAUSE** softkey during the self-test to pause the unit so you can read the information on the screen. Press **CONTINUE** to resume operation.

Once the self-test is completed, the Corning Cable Systems 340 displays the MODES selection screen.

---

### NOTE

The instructions for the operating modes presented in this chapter assume a unit operating with all setup values at their default settings.

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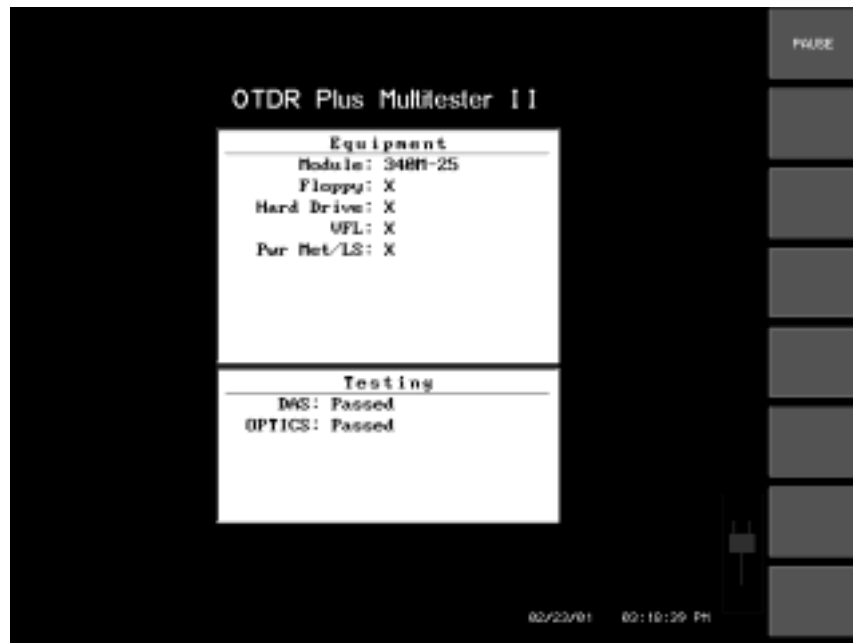


Figure 1-2: Sample Equipment and Self-Test Information Boxes

### 1.3 Modes Selection Screen

Figure 1-3 shows the MODES selection screen. Press a softkey to begin operation in a specific mode. A brief description of each mode appears to the left of each softkey.

---

**NOTE**

Softkeys are referred to by the numbers one through eight with one being at the top and eight at the bottom.

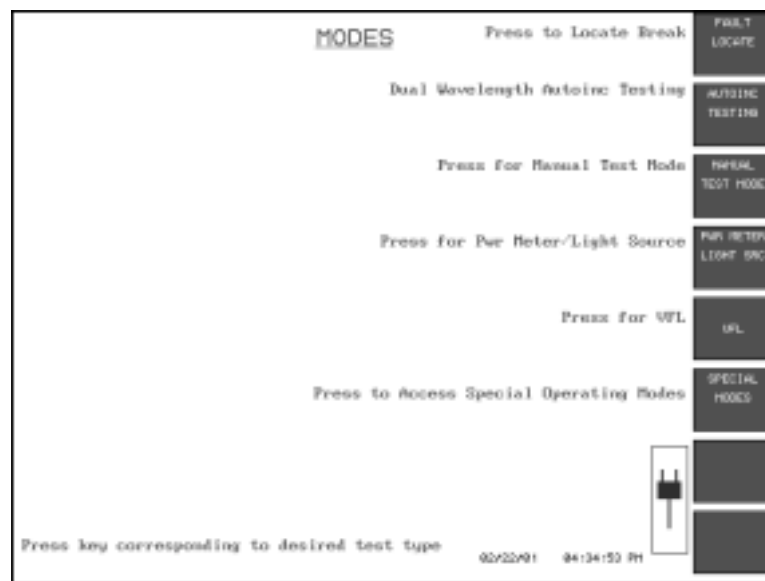
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**NOTE**

If an operating mode is unavailable in the unit, the softkey label appears dimmed.

---



*Figure 1-3: MODES Selection Screen*

**FAULT LOCATE MODE** Fault Locate Mode provides a quick method for determining an end/fault location. When you press the **FAULT LOCATE** softkey, a Connection Check is performed (if the connection check option is enabled in additional setups). This check rates the connection Bad, Fair, or Good, based on the backscatter level of the trace.

- If the connection is Bad, the following instructions are displayed:

TRY TO IMPROVE CONNECTION:

- 1.) Clean all optical connectors
- 2.) Switch ends of patch cord
- 3.) Use another patch cord
- 4.) Fiber may be shorter than approx. 75 meters
- 5.) Call factory for assistance

The message "Check/clean connector or change patchcord." is displayed beneath the Status Box. To continue with the test, press the **CONTINUE** softkey or the **Start/Stop** hardkey.

- If the connection is approximately half way into the "GOOD" section of the gauge, the instrument proceeds to AutoMode after a few seconds. AutoMode selects the appropriate range, resolution, and pulse width for the test. This is indicated in the text area beneath the Status Box with the message "Determining Range/Reso/Pulsewidth."

After the check is performed and testing is completed, the end/fault and prior event locations are displayed as shown in (See Figure 1-4).

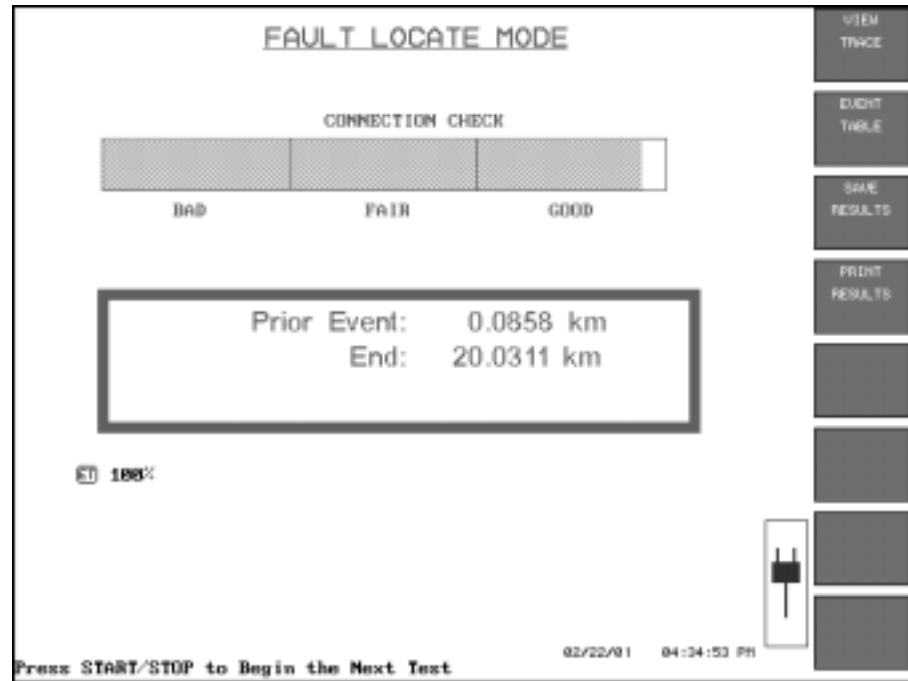
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**NOTE**

A Connection Check works best with fiber lengths > 75 meters.

---

Cancel a test by pressing the **Start/Stop** hardkey or the **Mode** hardkey (See Figure 2-1). Either method returns to the MODES selection screen. More detailed information on Fault Locate Mode can be found in Chapter 4.0 of this manual.



*Figure 1-4: FAULT LOCATE MODE Screen after Check is Performed and Testing is Completed*

**AUTOINCREMENT™ TEST MODE** Autoincrement Test Mode tests fibers at multiple wavelengths. Press the **AUTOINC TESTING** softkey on the MODES screen to display the AUTOINCREMENT TEST MODE screen and INFORMATION window. A character matrix, located at the bottom left of the screen, allows text entry for recording descriptive test information and checkboxes for test parameter enabling/disabling.

**AUTOINCREMENT TEST MODE**

Base Filename:

Use "\*" characters (1 to 4 max) to identify the auto-incrementing field position and width.

Use "\_" character (1-2) to identify wavelength ID field position and width.

Use "B" character to indicate SM (S) or MM (M).

☐ Del ☐ Dup ☐ Cap  
 ABCDEFGHIJKLMNOP  
 + . , 1234567890  
 \* \_ ( ) = ! @ # \$ % ^ & ' { } [ ] < > : ; " ' \ / ? ~ -

**AUTOINCREMENT INFORMATION**

**Autoincrement Mode Test Setup**

Save Path:

☐ Autorange Once  
☐ Rapid Save Mode  
☐ Enable Overlay

Port A:

☒ 1550 SM  
☒ 1310 SM

Start No.:

Base Filename:

Press **CONTINUE** to Begin Test Sequence

02/23/01 02:26:52 PM

CONTINUE  
SELECT  
QUICK SETUP  
BACK

*Figure 1-5: AUTOINCREMENT TEST MODE Screen and INFORMATION Window*

Press the **CONTINUE** softkey once to display the Connect Fiber screen. Press **CONTINUE** again to begin testing.

Autoincrement mode allows many traces to be saved. The software will automatically increment a user-specified portion of the trace filename which allows more efficient testing and archiving. The Base Filename field allows user-specified placement of autoincrementing number, wavelength ID, and single/multimode characters in the filename. Using check boxes, the form screen also allows selection of certain test parameters and display options.

More detailed information on AutoInc Testing can be found in Chapter 5.0 of this manual.

**MANUAL TEST MODE** Manual Test mode allows the user to utilize the advanced capabilities of the Corning Cable Systems 340. Full OTDR functionality is available in this mode.

Press the **MANUAL TEST** softkey to display the Trace Grid Screen. Press the **AVG** softkey to display **REAL TIME** then press the **Start/Stop** hardkey to run a real time scan. Press the **Start/Stop** hardkey again to terminate the real time scan without starting an average.

---

**NOTE**

The Quick Setup Screen will be displayed if the User Preferences option, Initial Setups, is set to Yes.

---

The Real Time test mode is available by pressing the **Start/Stop** hardkey while softkey #7 is displaying **AVG REAL TIME**. Averaging is available while pressing the **Start/Stop** hardkey while softkey #7 is displaying any timed (seconds) value. (Default timed setting is set in Set-Up Options.)

More detailed information on Manual Test mode can be found in Chapter 6.0 of this manual.

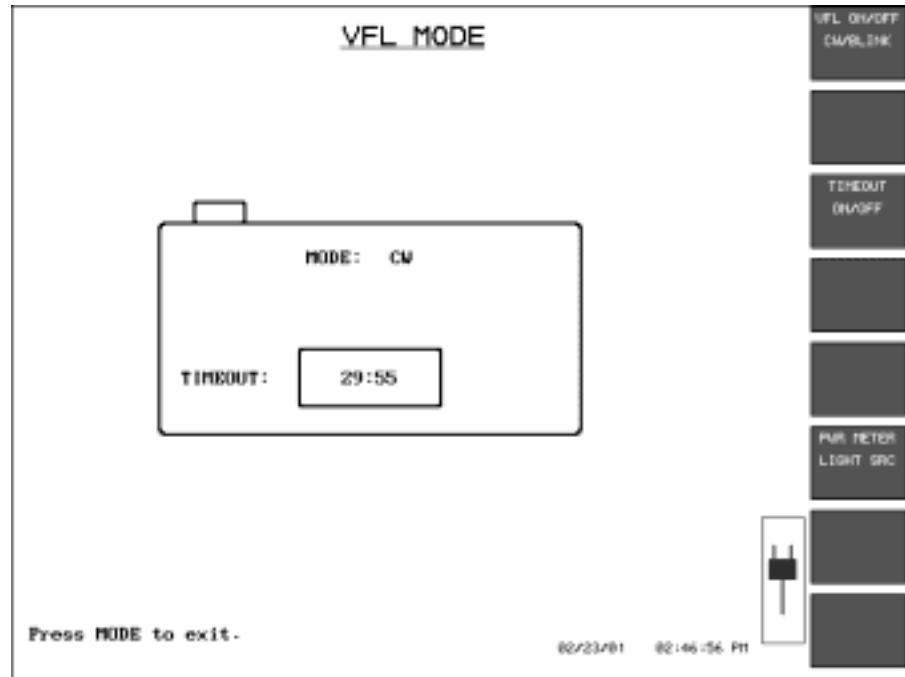
**POWER METER/LIGHT SOURCE MODE** This softkey is active only if the test module installed in the Corning Cable Systems 340 has the Power Meter/Light Source option. If these options are not available, the text on this key is dimmed and the key is not active.

If the options are available, press this key to display the Power Meter/Laser Source/Loss Table display screen. The **Mode** hardkey is provided to return to the MODES selection screen to select another operating mode.

More detailed information on Power Meter/Light Source mode can be found in Chapter 7.0 of this manual.

**VISUAL FAULT LOCATE (VFL) MODE** The **VFL** softkey is active if a Visual Fault Locator is installed in the Corning Cable Systems 340. Press this softkey to access the Visual Fault Locate Mode.

If a Visual Fault Locator is not available on the test module, the **VFL** softkey is dimmed.

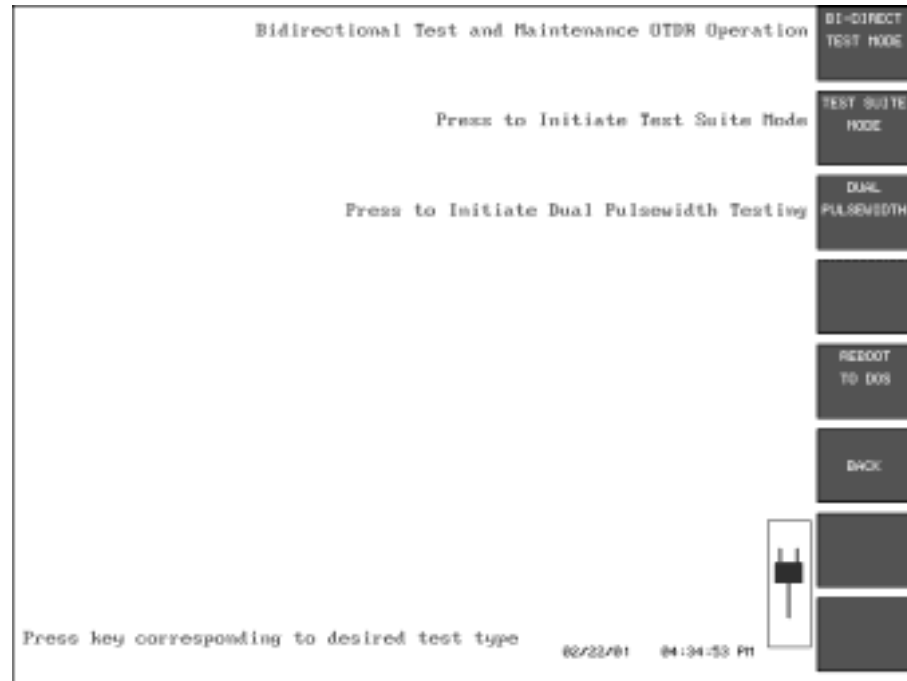


*Figure 1-6: VFL (Visual Fault Locate) MODE Screen*

More detailed information on VFL mode can be found in Chapter 8.0 of this manual.

**SPECIAL MODES** The **SPECIAL MODES** softkey on the MODES selection screen allows access to other automated testing modes by displaying another operating mode selection screen. Three additional operating modes are available for selection in that screen. (See Figure 1-7).





*Figure 1-7: Special Modes Selection Screen*

#### NOTE

The softkey legend for the fifth softkey is determined by the presence of the MS-DOS or Windows 95 operating system on the instrument's hard drive. If neither is present, the softkey legend will be blank. When MS-DOS is present the legend reads "REBOOT TO DOS." If the Windows 95 operating system is installed, the legend for softkey F5 will be "LAUNCH WINDOWS."

**BIDIRECTIONAL TEST MODE** Bidirectional Test mode simplifies and automates the tests required as fiber is installed. This mode is designed for testing multiple fibers from both directions.

Press the **BIDIRECT TEST MODE** softkey to display the FIBER STORAGE INFORMATION window (Figure 1-8) where information can be entered to describe the new test.

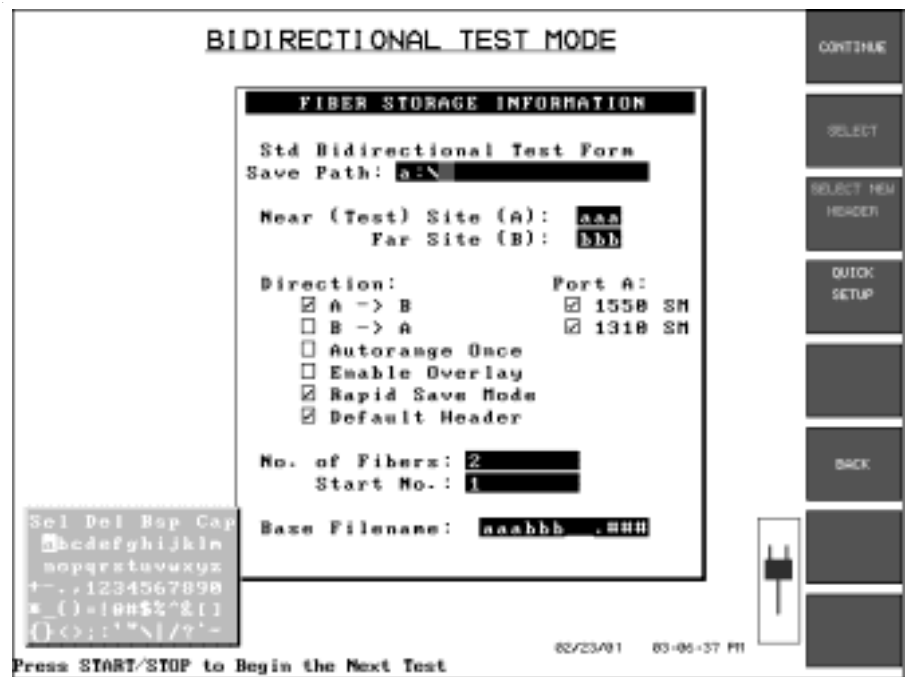


Figure 1-8: BIDIRECTIONAL TEST MODE Screen and FIBER STORAGE INFORMATION Window

Press **CONTINUE** to reach the Connect Fiber Screen and then press **CONTINUE** again to begin testing. A **Mode** hardkey is also available to return to the MODES selection screen.

More detailed information on Bidirectional Test mode can be found in Chapter 9 of this manual.

**TEST SUITE MODE** Test Suite mode provides an automated, script-driven mode of operation which can be used to perform many tests on a single fiber.

For detailed information on Test Suite Mode see Chapter 10.0 of this manual.

**DUAL PULSEWIDTH MODE** Dual Pulsewidth test mode collects trace data for a fiber for pre-requested wavelengths and performs a dual pulsewidth test. This test mode provides optimum event detection by collecting both a high resolution and high dynamic range trace and merging the results for optimum event detection.

Pressing the **DUAL PULSEWIDTH** softkey displays the DUAL PULSEWIDTH TESTMODE screen which contains the Dual Pulsewidth Information window. Select the desired options on this screen and press **CONTINUE** to display the Connect Fiber screen. Press **CONTINUE** again to begin testing.

More detailed information on Dual Pulsewidth mode can be found in Chapter 11.0 of this manual.

**BOOT TO DOS OR  
LAUNCH  
WINDOWS** The F5 softkey, if not blank, will display either **Boot to DOS** or **LAUNCH WINDOWS**, as determined by the presence of either the MS-DOS operating system or the Windows 95 operating system on the instrument's hard drive.

The Corning Cable Systems 340 operating system software is not accessible or coresident when running under either MS-DOS or Windows 95.

More detailed information on these functions can be found in Chapter 15.0 of this manual.

Modes Selection Screen

Quick Start

## 2.0 Corning Cable Systems 340 OTDR Plus™ Multitester II Overview

It is important to become familiar with the layout of the Corning Cable Systems 340. Three areas important to the use and function of the 340 are the front panel, top connection panel, and floppy disk drive.

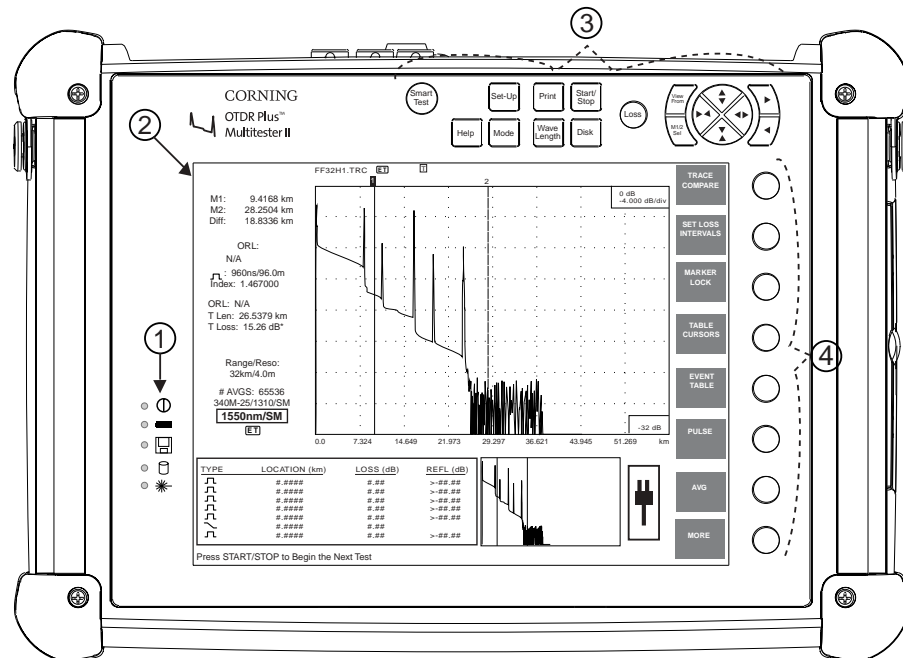


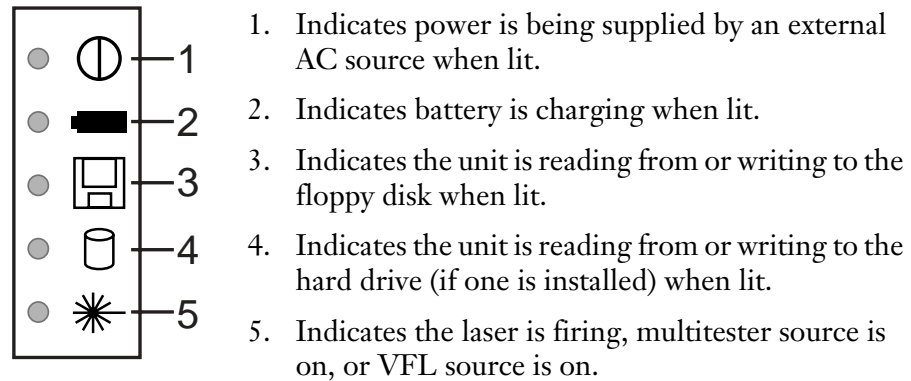
Figure 2-1: Corning Cable Systems 340 Front View

### 2.1 Front Panel

The front panel of the unit contains four main areas of controls and displays important to the use of the unit (See Figure 2-1):

1. Function Indicator Lights
2. Display Screen
3. Hardkeys
4. Softkeys

### 2.1.1 Function Indicator Lights



*Figure 2-2:  
Function Indicator  
Lights*

### 2.1.2 Trace Display Screen

The display screen contains all the data and information necessary to operate the Corning Cable Systems 340. The display configuration is determined by the current operating mode. Figure 2-3 shows a typical trace display screen of a unit running in an OTDR mode.

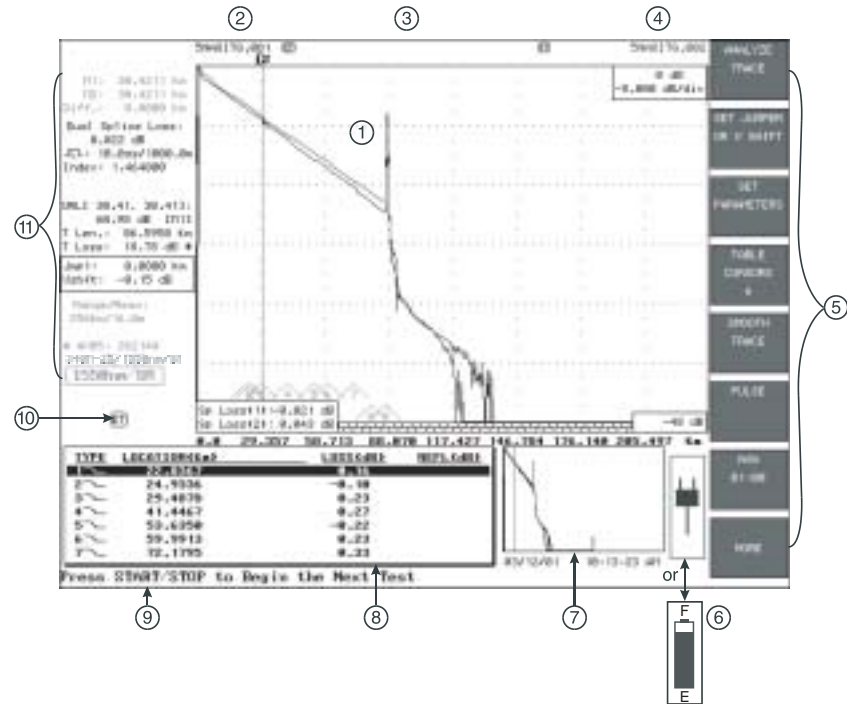


Figure 2-3: Trace Display Screen

ITEM#	NAME	DESCRIPTION
1	Trace Grid	<p>Corning Cable Systems 340 trace data is displayed on a grid with as many as eight vertical and eight horizontal divisions.</p> <p>The vertical axis of the grid is in units of decibels (dB) with the top right corner representing 0 dB. The grid markers are labeled with negative decibel values representing the number of dB down from the zero reference point with the lowest dB value displayed in the lower right corner. The dB per division depends on the vertical expansion state and the maximum dynamic range of the module.</p>

The horizontal axis of the grid is in units of distance that depend on the Units setting in the System setup. The number of distance units/division depends on the current horizontal expansion state and the distance range setting that is a function of the module chosen.

The trace grid also includes two markers, labeled 1 and 2, used for distance and loss measurement. These are also referred to as M1 and M2.







## 2 Primary Trace Filename

The Primary Trace Filename, located above the trace grid on the left side, displays the file name of the primary trace that is displayed on the trace grid screen if the trace has been saved to memory or if the trace was recalled from memory.

If the trace that is displayed as the primary trace has not been saved or was not recalled from memory then “Not Saved” is displayed in this location.

## 3 Icon Row

The Icon Row, located above the trace grid, displays information about both the primary and the overlay traces. This includes information regarding filtering, attenuation, analysis and scan cycle. The filename and related icons for the primary trace are displayed on the left side of the screen and the overlay filename and related icons (if applicable) are displayed on the right side of the screen above the grid. The following table shows icons and their explanation.

Icon	Explanation
	Event Table Available
	Smoothing has been run
	Trace Align On
	Delta Compare
	Marker Lock (Displayed next to M2 distance)
	Attenuated Trace



- |          |                               |  |
|----------|-------------------------------|--|
| <b>4</b> | <b>Overlay Trace Filename</b> | <p>The Overlay Trace Filename, located above the trace grid on the right side, displays the file name of the overlay trace that is displayed on the trace grid screen if the trace has been saved to memory or if the trace was recalled from memory.</p> <p>If the trace that is displayed as the overlay trace has not been saved or was not recalled from memory, then “Not Saved” is displayed in this location.</p> |
| <b>5</b> | <b>Softkey Labels</b>         | <p>The softkeys labels indicate the function of each of the eight softkeys in the current mode of the unit. The labels may change with each keypress and mode change. When the text label for a softkey is dimmed, the softkey is not active</p>   |
| <b>6</b> | <b>Power Source Icon</b>      | <p>The Battery Gauge or Plug Icon is located in the lower right hand corner of the display.</p> <ul style="list-style-type: none"><li>• The Battery Gauge icon shows the proportion of battery life remaining. A battery low warning message will be displayed when battery failure is imminent.</li><li>• The Plug Icon indicates that the unit is connected to an external power source.</li></ul>                     |
| <b>7</b> | <b>Full Trace View Window</b> | <p>The Full Trace View window, located in the lower right-center of the screen, shows the full view of the current trace when the main view has been expanded horizontally, vertically or in both directions. This is helpful in determining the location of an expanded section on the main view and the current marker location if off screen.</p>   |

- 8 Event Table** The Event Table is a summary of all events detected by analysis of the primary trace displayed in tabular format. The table is part of the file that is saved when saving the trace. The Event Table will be automatically generated if enabled in Quick Auto Setup.
- 9 User Instruction Row** Below the Event Table is the User Instruction Row containing text that guides instrument operation.
- 10 Status Area** The 340 uses a true multi-tasking operating system, so it is possible to run certain tasks as background tasks yet continue instrument operation. The Status Area indicates the tasks that are currently running and those that have been completed by using icons to indicate task status. A digital clock or percentage value next to the icon signifies the time remaining until the task is completed.

Icon	Explanation
03:00	Data Collect in Progress
00:00	Data Collect Completed
50%	Analysis in Progress
100%	Analysis Completed
SMT	Smoothing in Progress
	Print in Progress
	Print Complete
	Trace Save in Progress
	Disk Format in Progress
ORL	ORL Calculation in Progress
	Trace Align On
A	Attenuated Trace

## 11 Trace Parameters Area

The Trace Parameters are displayed to the left of the trace grid. The information displayed in this area will depend on the type of test that has been executed and whether Fiber Analysis has been executed on the trace. Following is a description of all the trace parameters that may appear in this area.

- The upper left section contains marker distance information. This includes the M1 distance, M2 distance, and the distance (DIFF.) from M1 to M2.
- Manual ORL reading. To perform a manual ORL measurements, the LOSS MODE must be set to ORL and the **CALCULATE ORL** softkey must be pressed.
- Pulsewidth. The pulsewidth is represented as time in nanoseconds (ns) or microseconds (μs) and length of the pulse of light in meters or feet.
- Index of Refraction (IOR).
- Reflectance is the Fresnel Reflection of a reflective event and is a negative number. Reflectance will be displayed if it is enabled in the User Preferences in Additional Setup.
- Auto ORL value is displayed if ORL is selected in Additional Setup. The ORL value may be for the full trace or the area between the M1 and M2 markers. The value will only be displayed after Fiber Analysis Software (FAS) has been executed on the trace.

- Total Length (T Len) is the total length of the fiber as determined by the Fiber Analysis Software.
- Total Loss (T Loss) is the total loss of the fiber as determined by the Fiber Analysis Software.
- Jmp1/Vshift (Jumper1 Vertical Shift) is the Horizontal and Vertical shift of the trace via the Softkeys.
- Range and Resolution (Range/Reso) value is as selected in Quick Measurement Setup Screen.
- AVGS (Averages) is the number of averages taken for the displayed scan as selected in the Quick Measurement Setup Screen.
- 340MXXX/YYYYnm/SM. This sequence indicates the current optical module, wavelength of the optical module, and whether the wavelength of the module is Single-mode (SM) or Multimode (MM).

### 2.1.3 Character Matrix and Checkbox Selection

Specific fields in the various mode setup screens and the Save File screen require entering/editing of text. Use the Character Matrix to enter/edit the text in these fields (unless the optional external keyboard is attached).

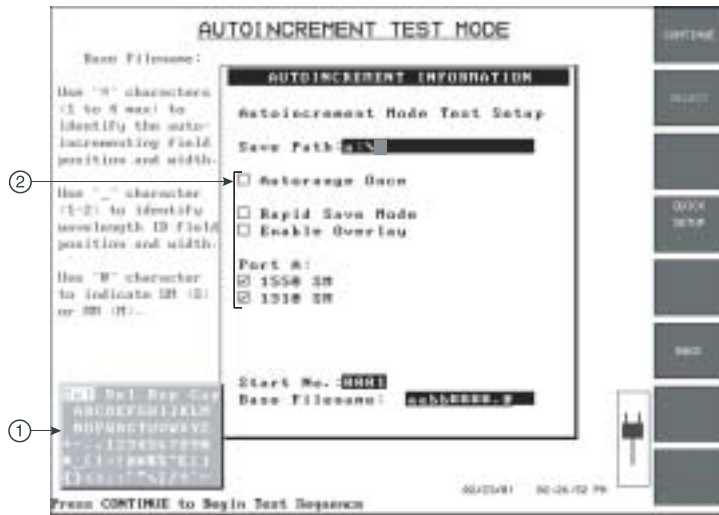


Figure 2-4: Character Matrix and Checkboxes

- 1 **Character Matrix** The Character Matrix, or character selection window, will be displayed in any screen where the user may need to enter text. The Marker movement keys will move a text cursor over each character. If pressed and held down, this text cursor will traverse the character set continuously. Once the desired character is highlighted, press the **M1/2 Sel** key to insert the highlighted character into the text box.

Use the **Vertical Expand/Contract** key to move to the next field requiring text entry.

---

#### NOTE

The Character Matrix is only on screen when the cursor is in an editable text box.

---

- 2 Checkbox Selection** Use the **Vertical Expand/Contract** key to move to the desired checkbox. The currently selected checkbox is indicated by a “>” to the left of the box. Press the **SELECT** softkey to check/uncheck the box.

#### 2.1.4 Hardkeys

##### SmartTest™



SmartTest function provides a one button test method. When a test is not in progress, pressing the **SmartTest** function will initiate Automode, perform a timed average, and execute trace analysis.

##### Set-Up



Press the **Set-Up** hardkey to access the Quick Setup and Additional Setup menus. The options available are dependent upon the current mode of the 340 and the type of test module that is plugged into the instrument.

To jump from section to section within the menus, use the Tab key on the optional external keyboard. Otherwise, traverse the menu using the **Horizontal/Vertical Expand/Contract** hardkeys.

---

##### NOTE

Set-Up is available from the MODES selection screen or the Trace Grid Screen.

---

##### Print



Press the **Print** hardkey to print any of the following to the active printer specified in Printer Setup:

- Current Screen Display
- Primary Event Table
- Overlay Event Table
- Primary Trace Header
- Overlay Trace Header

**Start/Stop**

This button will initiate a Real Time test or an Averaged test, depending on the legend visible in the 7<sup>th</sup> softkey.

**Help**

Press the **Help** hardkey to obtain an index to information and instructions about Corning Cable Systems 340 modes, controls, and functions.

**Mode**

The **Mode** hardkey returns the unit to the MODES selection screen. In some modes, it may be necessary to Cancel from the area before using the **Mode** key to access the MODES selection screen.

**Wavelength**

The **Wavelength** hardkey is only active if the test module installed has more than one wavelength. Use this key to switch from one wavelength to another. If a single wavelength module is installed and this key is pressed, an error tone sounds and a message is displayed on the instruction line.

**Disk**

Press the **Disk** hardkey to access the MASS STORAGE pop-up menu which includes these options:

<i>Save File</i>	<i>Rename File(S)</i>
<i>Load File</i>	<i>Make Directory</i>
<i>Delete File(S)</i>	<i>Delete Directory</i>
<i>Copy File(S)</i>	<i>Format Disk</i>
<i>Upload File(S)</i>	<i>Display Header</i>
<i>Disk Summary</i>	<i>Save Setups</i>
	<i>Load Setups</i>

**Loss**

Press the **Loss** key to select the type of loss that is calculated and displayed on the 340. The menu contains these options:

*Splice Loss*  
*2-Pt Loss*  
*2-Pt LSA*  
*dB/km Loss*  
*dB/kmLSA*  
*ORL*  
*OFF*  
*Dual Splice Loss*

**View From**

Press the **View From** key to toggle the View From reference point. Choose from these options:

*Origin*  
*M1*  
*M2*

---

**NOTE**

If **View From M1 or M2** is selected, that line will be highlighted in the trace parameters box on the display screen. If **Origin** is selected, neither line will be highlighted as is the case in Figure 2-3.

---



### M1/2 Sel



The **M1/2 Sel** hardkey performs two different functions, depending on the mode of the instrument:

**OTDR mode** Press the **M1/2 Sel** key to toggle between markers. The active marker will be indicated with a highlighted number above the marker line segment.

If M1 is active, pressing the marker movement keys moves only Marker 1. Press the **M1/2 Sel** key to activate Marker 2 (and vice versa).

**Pop-up menu mode** Press the **M1/2 Sel** key to select the highlighted menu option.

### Horizontal Expand/Contract



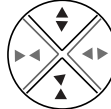
Press the **Horizontal Expand** hardkey for closer examination of a portion of a trace. Each press will decrease the distance/division value on the horizontal grid scale by a factor of two.

In the pop-up menu mode, this key is used to move the highlighted bar to the right.

Press the **Horizontal Contract** hardkey for examination of a larger vertical portion of a trace. Each press will increase the distance/division value on the horizontal grid scale by a factor of two.

This key also moves the highlighted bar to the left, in a pop-up menu.

### Vertical Expand/Contract



Press the **Vertical Expand** hardkey for closer examination of a portion of a trace. Each press will decrease the dB/division value on the vertical grid scale by a factor of two.

This key moves the highlighted bar up in pop-up menu mode.

Press the **Vertical Contract** hardkey for examination of a wider portion of a trace. Each press will increase the dB/division value on the vertical grid scale by a factor of two.

This key moves the highlighted bar down in pop-up menu mode.

### Marker Movement Keys



The **Marker Movement** keys are used for marker control, trace movement, menu selection, and character matrix text cursor controls.

#### 2.1.5 Softkeys

The Corning Cable Systems 340 has eight softkeys on the front control panel, located to the right of the display screen (See Figure 2-1). Each softkey's function is designated by the current operating mode of the unit and is labeled on the screen to the left of the key. This manual will refer to softkeys as 1 through 8, with 1 being at the top and 8 at the bottom, when required.

## 2.2 Top Connection Panel

The top connection panel of the 340 contains the connection ports for connecting fiber and all external devices to the unit.

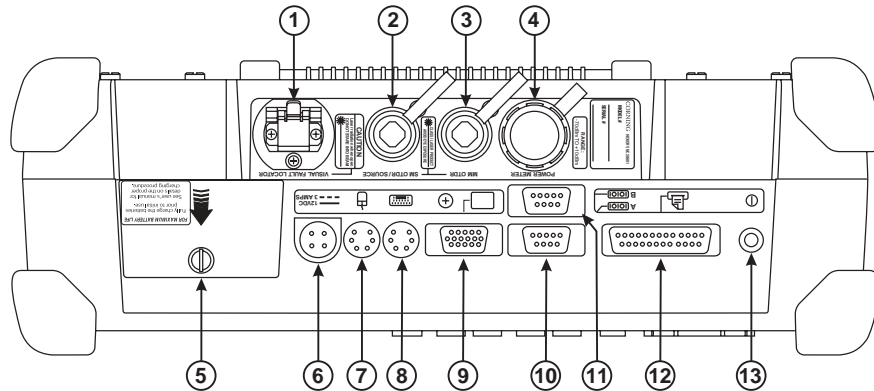


Figure 2-5: Top Connection Panel

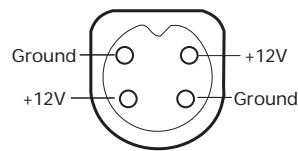
ITEM#	NAME	DESCRIPTION
1	<b>Visual Fault Locator</b>	The optional visual fault locator connection.
2	<b>Single-mode OTDR and Light Source</b>	Single-mode OTDR and light source connection. Light Source Class I Laser source.
3	<b>Multimode OTDR</b>	Multimode OTDR connection. Class I Laser Source. <i>(Possible future single-mode access.)</i>
4	<b>Power Meter</b>	Optional power meter connection.
5	<b>Battery Compartment Cover</b>	Secured with a thumb screw; houses the lead acid battery provided with the unit.

<b>6</b>	<b>External Power</b>	DC power connection. Use only the Corning Cable Systems 340 charger/adaptor provided. Rated for 3 amps @12V.
<b>7</b>	<b>Mouse Port</b>	PS2 style (6-pin mini-DIN) connector for a mouse. The mouse port is only supported if the instrument is operating under Windows 95 or MS-DOS (if the DOS application supports the Mouse Port).
<b>8</b>	<b>External Keyboard</b>	An optional external keyboard attached to this PS2-style (6-pin mini-DIN) connector can be used to enter data and simulate front panel keys. Refer to Section 2.6 for information on the external keyboard.
<b>9</b>	<b>External VGA</b>	An external VGA monitor can be connected to the Corning Cable Systems 340 to view the display screen.
<b>10</b>	<b>Modem Interface Port</b>	9-pin female modem interface port designated as COM A.
<b>11</b>	<b>Serial Interface Port</b>	9-pin female serial interface port provided for data transfer, mouse support and printer support. This port is designated as COM B.
<b>12</b>	<b>Parallel Interface Port</b>	The parallel interface port is provided for printer support.
<b>13</b>	<b>Power Switch</b>	Push to switch the Corning Cable Systems 340 power on or off.

### 2.3 AC Charger/Adapter

The Corning Cable Systems 340 comes with an AC Charger/Adapter as standard equipment. The Charger/Adapter provides the means to both operate the unit under AC power, as well as charge its 12V battery pack.

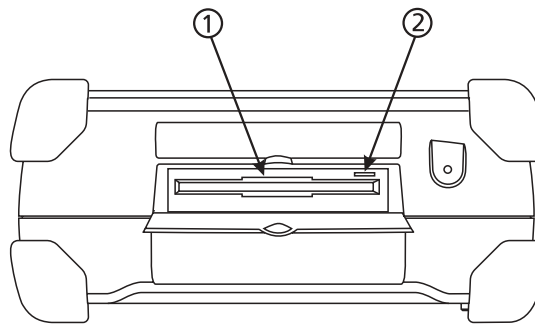
To use the Charger/Adapter, attach its connector to the DC power connection (See Figure 2-5) on the Corning Cable Systems 340.



*Figure 2-6: Corning Cable Systems 340 AC Charger/Adapter Pin Out*

### 2.4 Floppy Disk Drive

The floppy disk drive (See Figure 2-7) is located on the right end panel of the 340. The 3.5-inch floppy drive supports 1.44 MB and 720 KB diskettes. The drive is designated as Drive A and will be used for trace storage and software upgrade capabilities.



*Figure 2-7: Floppy Disk Drive*

- 1 Disk drive
- 2 Disk eject button

## 2.5 Hard Drive Option

An internal hard drive is an option for the 340. If installed, this drive is designated on Mass Storage menus as Drive C.

## 2.6 External Keyboard

An optional external keyboard is available for the 340. A port is provided on the top of the instrument to connect the keyboard (See Figure 2-5).

### CAUTION

Do NOT connect the external keyboard with the power on as the keyboard will not initialize properly.

When connected, the keyboard may be used to enter alphanumeric data or to emulate the Corning Cable Systems 340 front panel keys. The following is a list of the external keyboard equivalents to Corning Cable Systems 340 hardkey and softkey functions:

External Keyboard Key	340 Function
F1 through F8	Softkeys 1 through 8
ALT F2	Mono Contrast DOWN
ALT F3	Mono Contrast UP
ALT F4	Mono Contrast MID
ALT F5	LCD Backlight Intensity MAX
ALT F6	LCD Backlight Intensity MIN
CTRL LEFT	LCD Backlight Intensity DOWN
CTRL RIGHT	LCD Backlight Intensity UP
CTRL END	LCD Backlight Intensity MID
F9, RETURN	Select
ALT F9	Save current screen image to hard drive as PCX file

<b>External Keyboard Key</b>	<b>340 Function</b>
A	Display From
C	Real Time/Stop
D	Mass Storage
L	Loss Mode
P	Print
Q	Wavelength
R	Range Select
S	Setup
T	Start/Stop
W	Mode Screen
↑	Scroll Up Menu, Vertical Expand
↓	Scroll Down Menu, Vertical Contract
←	Horizontal Contract
→	Horizontal Expand
TAB	Go to Next Menu Window
SHIFT TAB	Go to Previous Menu Window
END	Move Marker Right
HOME	Move Marker Left

External Keyboard

Corning Cable Systems 340 OTDR Plus™ Multitester II Overview



## 3.0 Corning Cable Systems 340 OTDR Plus™ Multitester II Setup

The Setup menus for the Bidirectional and Manual Test modes allow customizing the preferences and parameters for a given data collection or series of collections. This chapter contains important information regarding the menus and settings available.

### Navigating the Setup Menu Screen

- Use the **Marker Movement** keys or the **Horizontal/Vertical Expand/Contract** hardkeys to move the highlight through the menus.
- Use the **SELECT** softkey or the **M1/2 SEL** hardkey to activate a field for editing.
- Use the **ACCEPT** softkey to set the changes.

### 3.1 Quick Setup Menu Screen

When **BI-DIRECT** or **MANUAL TEST** mode softkeys are selected from the MODES selection screen, the Quick Setup screen will be displayed, if enabled in the User Preferences setup option, Initial Setups. If already in an OTDR mode, enter Quick Setup by pressing the **Set-Up** hardkey.

---

#### NOTE

When Quick Setup is entered by pressing the **Set-Up** hardkey, there is no softkey available to return to the MODES screen.

---

Bidirectional Test Mode and Manual Test Mode setup screens display the same setup menus (See Figure 3-1) and allow editing of Quick Auto, Quick System, and Quick Measurement Setup. Softkey 1 provides access to Additional Setup.

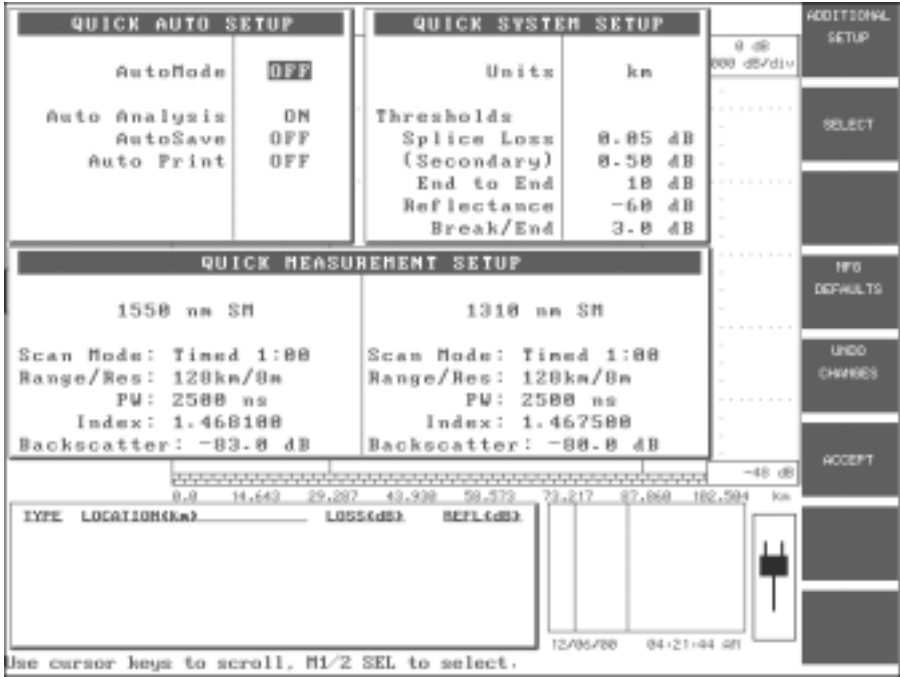


Figure 3-1: Quick Setup Menu Screen

3.1.1 Quick Auto Setup

The parameters set on this screen affect the automatic operation of all the major functions of the 340. This window controls whether a function runs automatically, is started by a softkey press, or does not run at all.

AutoMode

Options: ON, OFF

Default: OFF

When AutoMode is ON, the 340 will select the optimum Range, Resolution, and Pulsethwidth values for a data collection. The Scan Mode in effect for the data collect remains at whatever the current Timed value is set to.

When the AutoMode value is set to OFF, the operator must select the range, resolution, and pulsewidth values. See pages 38 & 40 for information on setting these values.

---

**NOTE**

Pressing the **Smart Test** key will always set the 340 OTDR to AutoMode, regardless of its current setting.

---

**Auto Analysis**

Options: ON, OFF

Default: ON

When Auto Analysis is set for ON, analysis is performed on trace data immediately after a scan is completed, and an event table is displayed when analysis is completed.

When Auto Analysis is set for OFF, fiber analysis only runs when the **ANALYZE TRACE** softkey is pressed.

**AutoSave**

Options: OFF, Stand.

Default: OFF

With AutoSave set to Stand., the SAVE FILE window will be displayed as soon as the data collection is completed or halted.

If this parameter is set to OFF, enter the SAVE FILE window by using the **Disk** hardkey.

**Auto Print**

Options: ON, OFF

Default: OFF

When the Auto Print option is ON a hard copy of the trace will be printed automatically from the attached, selected printer after data collection and analysis.

**3.1.2 Quick System Setup**

The 340 parameters set on the Quick System Setup screen (See Figure 3-1) determine the performance of, and reports from, Auto Analysis.

**Units**

Options: km, m, kft, ft, mi

Default: km

Specifies the unit of measure used to display distance on the horizontal axis of the trace grid. This affects Range and Resolution readings and analysis events incorporating distance.

**THRESHOLDS** The four threshold settings define the parameters for Trace Analysis.

**Splice Loss Threshold**

Options: 0.00 to 6.00 dB in 0.01 dB increments

Default: 0.05 dB

Splice Loss values equal to or greater than this setting will be reported in the Events analysis.

**Secondary Loss Threshold**

Options: 0.00 to 6.00 dB in 0.01 dB increments

Default: 0.50 dB

Events which have loss equal to or greater than the Secondary Loss Threshold will be flagged in the Events analysis.

The flag is identified as an arrow (→) in the Event Table.

**End-to-End Loss Threshold**

Options: 1 to 99 dB in 1 dB increments

Default: 10 dB

End-to-End loss values that equal or exceed this threshold are “flagged” with an (\*) in the Event Table.

**Event Reflectance Threshold**

Options: -10 to -70 dB in 1 dB increments.

Default: -60.0 dB

Event Reflectance determines the lowest reflectance value that will be reported by Analysis.

Any event that has a reflectance equal to or greater than the value in this parameter will be reported in Events analysis.

**Break/End Threshold**

Options: 0.2 to 15.0 dB in 0.2 dB increments

Default: 3.0 dB

Any event with a loss equal to or greater than this value will be identified as the end of the fiber.

### 3.1.3 Quick Measurement Setup

Each wavelength in the optical module installed in the 340 has setup parameters for Number of Averages, Range/Resolution, Pulsewidth, Index of Refraction, and Backscatter Coefficient.

A Quick Measurement screen for a dual-wavelength test module is shown in Figure 3-1. The wavelengths displayed on this screen are dependent upon the test module installed in the 340.

#### Scan Mode

Options: Timed (00:05 to 99:55 minutes:seconds)

Default: Timed 1:00

Scan Mode specifies the number of minutes and seconds that the test will take. The longer the duration, the more noise will be averaged out.

#### *To change the time:*

1. Select Scan Mode using the **Marker Movement** keys, then press the **SELECT** softkey. A dialog box with four selections will be displayed; only **Timed** is available.
2. Press **SELECT** again and the softkey labels will change to display keys for incrementing and decrementing the minutes and seconds.
3. Use the softkeys to reset the time and then press **ACCEPT**.

#### Range and Resolution

Options: 2 km/0.25 m to 256 km/16 m (Selections dependent on test module)

Default: Depends on current test module plug-in

The 340 has the ability to take up to 16,000 samples (data points) to represent an OTDR trace waveform. The number of data points to be acquired over a given distance is determined by the Range and Resolution setting.

The Range value determines the distance range of the fiber to be tested and the Resolution value specifies the distance between data sampling points. These settings work in conjunction with each other to allow up to 16,000 samples, regardless of the units of measure selected.

- The preferred Range setting is at least two times the length of the fiber being tested to provide the Analysis software sufficient clean noise floor following the end of the trace. For accurate analysis, double the fiber length, then select the next available distance range.

**EXAMPLE:** Given a 6 km fiber length:  $6 \text{ km} \times 2 = 12 \text{ km}$ . The next available Range setting is 16 km, so that would be the preferred setting.

- The minimum Range selected should never be less than 25% longer than the fiber length to be tested.
- The Resolution should always be the minimum selectable setting for the Range selected. (Refer to Table 3-1 in Section 3.1.4 for suggested Range and Resolution settings.)

Available ranges will be determined by the current wavelength, and some wavelengths may be restricted when trying to achieve maximum range. Depending upon the current range, certain pulsewidths may not be selectable. (These will appear dimmed.)

---

**NOTE**

The AutoMode Setting in the Quick Auto Setup menu automatically provides the optimum range, resolution and pulsewidth settings and eliminates the need for manually setting these two parameters.

---

***To select a new range and resolution:***

1. Select Range/Res using the **Marker Movement** keys, then press the **SELECT** softkey. A dialog box of the selections will be displayed.
2. Scroll through the selections using the **Marker Movement** keys to highlight the desired range/resolution.
3. Press the **SELECT** softkey to lock in the desired range/resolution once selected. The dialog box will disappear.

***To change the range and resolution during a real time or averaging scan cycle:***

1. Press the **Set-Up** hardkey during data collection.
2. Scroll through the selections using the **Marker Movement** keys to highlight the desired range/resolution.
3. Press the **ACCEPT** softkey to lock in the desired range/reso once selected. Press the **ACCEPT** softkey again to start a new scan with the new range/reso setting.

***or***

Press the **CANCEL** softkey to exit without changing the range/reso. The unit will return to the scan that was in progress when the **Set-Up** key was pressed.

**Pulsewidth**

Options: 4 ns to 30  $\mu$ s (selections dependent on test module)

Default: Depends on test module

Pulsewidth specifies the width of the light pulse that is sent down the fiber under test.

Available ranges will be determined by current wavelength and some wavelengths may be restricted when trying to achieve maximum range. Depending upon the current range, certain pulsewidths may not be selectable. (These will appear dimmed.)



### Index of Refraction (IOR)

Options: 1.400000 to 1.699999  
Default: 1.468100 (1550 nm SM)  
1.467500 (1310 nm SM)  
1.487000 (1300 nm MM)  
1.496000 (850 nm MM)

IOR represents the Index of Refraction value of the fiber being tested to six decimal places. This value is used to calculate distance measurements.

IOR values can be obtained from the fiber manufacturer and are entered in Setups or Set Parameters.

---

#### NOTE

The IOR value affects distance measurements. It is important that the correct IOR is entered. Incorrect IOR values will adversely affect reported distances.

---

### Backscatter

Options: -60.0 to -90.0 dB  
Default: -83.0 dB (1550 nm SM)  
-80.0 dB (1310 nm SM)  
-74.0 dB (1300 nm MM)  
-67.0 dB (850 nm SM)

Backscatter determines the backscatter coefficient that is used to calculate a reflectance value. Individual backscatter coefficient values may be saved for each wavelength on the current test module.

Backscatter coefficient values can be obtained from the fiber manufacturer and are entered either from **SETUP** or from the **SET PARAMETER** softkey.

Corning Cable Systems uses the industry standard backscatter coefficient based on a 1 ns pulsewidth, defined as “the dB magnitude of backscatter for a 1 ns pulse.”

A fiber manufacturer may use a coefficient relative to a 1 μs pulse. For example, a manufacturer’s fiber coefficient might be published as -49 dB, but the value to be entered as the 340 backscatter coefficient would be -79 dB.

Use the following formula to adjust for this discrepancy:

$$1 \text{ ns backscatter coefficient} = 1 \text{ ms backscatter coefficient} - 30 \text{ dB.}$$

### 3.1.4 Typical Corning Cable Systems 340 Settings

Max. Fiber Length			Range Setting		Pulse Width	Resolution		Duration	Approx. # of Avgs.
miles	feet	kilometer	feet	kilometer	(ns)	feet	meters	minutes/seconds	#
.738636	3,900	1.3	6,000	2	250	0.8	0.25	3:00	16K
1.6	8,450	2.6	13,000	4	500	0.8	0.25	3:00	12K
3.030	16,900	5.2	26,000	8	1000	1.6	0.5	3:00	28K
4.924	26,000	12.0	52,000	16	1001	3.3	1.0	3:00	42K
27.557	145,500	24.9	104,000	32	1001	6.6	2.0	3:00	70K
29.688	156,750	48.0	209,000	64	2500	13.1	4.0	3:00	72K
59.517	314,250	96.0	419,000	128	10000	26.2	8.0	3:00	90K
119.176	629,250	192.0	839,000	256	20000	52.5	16.0	3:00	48K

*Table 3-1: Suggested Corning Cable Systems 340 Settings*

#### NOTE

1 ft = 0.3048 meters

1 m = 3.281ft

1 km = 3,281 ft

1 mile = 1.609 km

1km = 0.621 miles

### 3.2 Additional Setup Menu Screen

Setup options that need to be accessed infrequently will be contained on the Additional Setup menu screen. To access this screen press the **ADDITIONAL SETUP** softkey in the Quick Setup Menu screen.

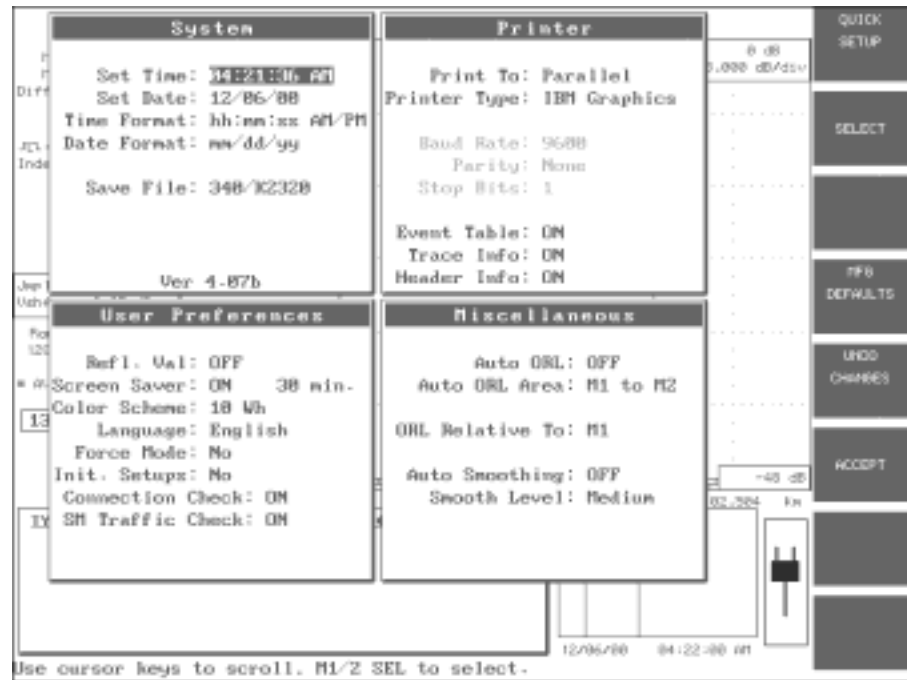


Figure 3-2: Additional Setup Menu Screen

#### 3.2.1 System Setup

##### Set Time

Options: 0-23 hours, 0 - 59 minutes, 0 - 59 seconds

Default: Read from real time clock

Set the time stored in the real time clock in this field.

**Set Date**

Options: 1 - 31 days, Jan- Dec months, 1995 - 2099 years

Default: Read from real time clock

Set the date stored in the real time clock in this field.

**Time Format**

Options: hh:mm AM/PM, hh:mm:ss AM/PM, hh:mm, hh:mm:ss

Default: hh:mm:ss AM/PM

The time format displayed on the Corning Cable Systems 340 screen is selectable in this field.

**Date Format**

Options: mm/dd/yy, dd-mmm-yy, dd-mmm, mmm-yy

Default: mm/dd/yy

The date format displayed on the Corning Cable Systems 340 screen is selectable in this field.

**Save File**

Options: TD-1000/TD-2000, 340/K2320, Original,  
GR-196, 383/K2310, 383/K2310 min, 383/K2310 max

Default: 340/K2320

Save File determines the format used to save the current trace data.

Selection	Trace File Format
TD-1000/ TD-2000	T4C
340/K2320	T5
Original	Preserves the “original” trace file format. For example, whatever format the trace comes in to the 340 as, will be the format saved as.
GR-196	Industry standard format defined by Telcordia
383/K2310	Original Siecor 383/Siemens K2310OTDR format, min & max compression

### 3.2.2 Printer Setup

#### Print To

Options: None, Parallel, Serial, Internal (*Internal is not currently available, as noted by the dimmed selection on the screen.*)

Default: Parallel

This determines the printer port to which the output is sent when the **Print** hardkey is pressed.

Parallel	Printer output is directed to the Corning Cable Systems 340 external parallel port.
Serial	Printer output is directed to the Corning Cable Systems 340 external serial port.
None	Printer is not attached.

## Printer Type

Options: Epson, HP Deskjet, HP Desk550C, HP Laserjet, IBM Graphics, IBM Proprinter, IBM ProX24, Laserjet Legal, Laserjet Turbo, Panasonic, Postscript BW, Postscript CMYK, Postscript RGB, Seiko (See *page 48* for special setup instructions for the Seiko printer.)

---

### NOTE

The printer types (drivers) listed may actually be applied to other models of printers. If the printer being used is not listed, check the printer manual to see if the printer is IBM or HP compatible then make the appropriate selection.

---

Default: IBM Graphics

Determines what type of printer is attached to the port selected in the “Print To” selection. The printer output driver is selected based on this setting.

## Baud Rate (serial printers only)

Options: 2400, 4800, 9600

Default: 9600

Sets the baud rate for printer data sent to the Serial Port. This option will only be available if the “Print To” option is set to SERIAL.

## Parity (serial printers only)

Default: None

Sets the parity for printer data sent to the Serial Port. *This selection can not be changed, as noted by the dimmed selection on the screen.*

**Stop Bits (serial printers only)**

Default: 1

Sets the number of stop bits used for printer data sent to the Serial Port.  
*This selection can not be changed, as noted by the dimmed selection on the screen.*

**Event Table**

Options: ON, OFF

Default: ON

If set to ON, the Event Table will automatically be printed after the current screen display.

If set to OFF, the Event Table will not be printed.

**Trace Information**

Options: ON, OFF

Default: ON

If set to ON, the trace name, trace source, and trace date and time will automatically be printed when a screen print is executed.

If set to OFF, this information will not be printed.

**Header Information**

Options: ON, OFF

Default: ON

If set to ON, header information (if available) is printed after the current screen display. If no header information is available, a statement to this effect is displayed.

If this option is set to OFF, the header is not printed.

### Seiko Printer Setup

Either the DPU-414 or TD-105 (DPU-411) may be used.

1. Use the AC adapter provided with the printer to connect the Seiko printer to an acceptable AC source.
2. Power-on the printer.
3. Insert the thermal paper into the printer and press the FEED button to feed the paper into the printer.

---

#### NOTE

For the TD-105 (DPU-411), settings are made using DIP switches SW-1 and SW-2 on the bottom of the printer.

For the DPU-414, follow steps 4 & 5.

---

4. Slide the Power Switch to ON while pressing the ONLINE Button. Release the ONLINE Button after a list of current settings starts printing out (takes about 5 seconds). This information can be ignored if the Printer is being set up for the first time.
5. Following the printed list of current settings, there is an option to change settings. Settings may be selected/changed by pressing either the ONLINE button (for ON) or the FEED button (for OFF). Following each press of the ONLINE or FEED buttons, the paper will advance to prompt the user with the DIP setting. Either the ONLINE or FEED button must be pressed for each setting. The proper settings for each of the printers follow:



**DPU-414 Printer Settings****Parallel Cable Connection  
[DIP SW setting mode]****Dip SW-1**

- 1 (ON) : Input = Parallel
- 2 (ON) : Printing Speed = High
- 3 (ON) : Auto Loading = ON
- 4 (OFF) : Auto LF = OFF
- 5 (ON) : Setting Command = Enable
- 6 (OFF) : Printing
- 7 (ON) : Density
- 8 (ON) : = 100%

**Dip SW-2**

- 1 (ON) : Printing Columns = 40
- 2 (ON) : User Font Back-up = ON
- 3 (ON) : Character Select = Normal
- 4 (OFF) : Zero = Slash
- 5 (ON) : International
- 6 (ON) : Character
- 7 (ON) : Set
- 8 (OFF) : = U.S.A.

**Serial Cable Connection  
[DIP SW setting mode]****Dip SW-1**

- 1 (OFF) : Input = Serial
- 2 (ON) : Printing Speed = High
- 3 (ON) : Auto Loading = ON
- 4 (ON) : Auto LF = ON
- 5 (ON) : Setting Command = Enable
- 6 (OFF) : Printing
- 7 (ON) : Density
- 8 (ON) : = 100%

**Dip SW-2**

- 1 (ON) : Printing Columns = 40
- 2 (ON) : User Font Back-up = ON
- 3 (ON) : Character Select = Normal
- 4 (OFF) : Zero = Slash
- 5 (ON) : International
- 6 (ON) : Character
- 7 (ON) : Set
- 8 (OFF) : = U.S.A.

**DPU-414 Printer Settings****Parallel Cable Connection  
[DIP SW setting mode]  
Dip SW-3**

- 1 (ON) : Data Length = 8 bits
- 2 (ON) : Parity Setting = NO
- 3 (OFF) : Parity Condition = Even
- 4 (ON) : Busy Control = H/W Busy
- 5 (OFF) : Baud
- 6 (ON) : Rate
- 7 (ON) : Select
- 8 (ON) : = 9600 bps

**Serial Cable Connection  
[DIP SW setting mode]  
Dip SW-1**

- 1 (ON) : Data Length = 8 bits
- 2 (ON) : Parity Setting = NO
- 3 (OFF) : Parity Condition = Even
- 4 (ON) : Busy Control = H/W Busy
- 5 (OFF) : Baud
- 6 (ON) : Rate
- 7 (ON) : Select
- 8 (ON) : = 9600 bps

**TD-105 (DPU-411) Serial Printer Switch Settings**

- |      |         |      |         |
|------|---------|------|---------|
| SW-1 | 1 - OFF | SW-2 | 1 - ON  |
|      | 2 - ON  |      | 2 - ON  |
|      | 3 - ON  |      | 3 - OFF |
|      | 4 - ON  |      | 4 - OFF |
|      | 5 - OFF |      | 5 - OFF |
|      | 6 - OFF |      | 6 - OFF |
|      | 7 - ON  |      |         |
|      | 8 - ON  |      |         |

6. When all the switches are set, connect the printer to the Corning Cable Systems 340.

### 3.2.3 User Preferences Setup

These preferences allow customizing of the 340 screen appearance. Some of the settings are aesthetic and some add useful information to the display.

#### Reflectance Value

Options: AUTO, MANUAL, OFF

Default: OFF

Auto Setting is most useful for reflective events that are not close together or close-in to the OTDR. Manual Setting is most useful for FITL (Fiber-in-the-Loop) applications, or for reflective events that are close together or close-in to the OTDR.

If set to Auto or Manual, the box reporting the reflectance measurement is displayed in the upper right hand corner of the trace grid screen.

If set to Auto, the reflectance of any event is reported based on the position of M1.

If set for Manual, the reported reflectance is based on the positions of both the M1 and M2 markers.

#### REFLECTANCE READING AND INDICATORS

The Reflectance Value displays a numeric value representing the reflectance (in decibels) of the reflective event being measured with the markers as described in Section 14.3.

In addition to this numeric reflectance value, two other indicators may be present: “S” or “>”.

1. An “S” following the numeric value indicates that the reflective event being measured is very close to the top limit of the OTDR’s data set, and is considered “saturated” (hitting the high limit of the measurement ability). An S (saturated) indicator will be present any time that the peak of the event being measured is within 0.5dB of the top of the OTDR trace screen.

---

**NOTE**

Longer pulsewidths (1001 or higher) will report an “S” only if the top of the reflective event is at 0 dB.

---

2. A “>” preceding the numeric value indicates that the reflectance measurement being made may actually be more reflective than the current measurement is reporting.

There are two reasons that a “>” can be present:

- a. When the peak of the reflective event is within 3 dB of the top of the OTDR trace.

This is because electronic limiting (clamping or clipping) in the OTDR may be present. Electronic limiting of the OTDR signature improves recovery after reflections, but it can make a reflective event appear to be shorter than it actually is. Therefore, the “>” indicates that the reflective event being measured is at least as reflective as the value being reported, but may be more reflective. The electronic limiting is not present below the 3 dB from the top of the screen level.

- b. When there are not enough data points (fewer than 8 points per pulsewidth) representing the reflective event to accurately define the real shape of the reflected pulse.

The “>” is present because the reflective event being measured may actually be taller than the trace representation. The OTDR requires a minimum of eight data points per pulsewidth (length of transmitted pulse) to accurately represent the shape of the reflection. If the OTDR parameters are set for fewer than 8 data points per pulsewidth, the “>” will be displayed. Data point spacing is actually the OTDR’s Resolution setting, which can range from 0.25 to 16 meters. The length of the OTDR pulse is selectable via the pulsewidth setting, which can range from 10 ns to 30000 ns (1 meter to 3000 meters). The number of data points per pulsewidth for the current OTDR setup can be calculated by dividing the present pulsewidth setting (in meters) by the resolution setting (in meters).

**AUTO SETTING** Auto Setting makes reflectance measurements fast, easy and accurate. This setting also requires placement of **ONLY** Marker 1 (M1) (procedure follows) and automatically bases the measurement upon that placement.

---

**NOTE**

There are important restrictions on the placement of the M1 marker and in the Points Per Pulsewidth, which are defined by the 340 Setup parameters. These restrictions and the calculations necessary to meet the restrictions are detailed in this section.

---

To proceed with Auto setting, place the M1 marker just prior to (the left side of) the reflective event, in order to achieve an accurate reflectance measurement. Use the **Horizontal Expansion & Contraction** and **View From** hardkeys to place M1 as close as possible to the rising edge of the reflection (See Figure 3-3).

***Auto setting restrictions:***

M1 should not be placed within a distance equivalent to two pulsewidths from the origin or start of the OTDR Trace (OTDR Bulkhead). A minimum distance out from the bulkhead connector is required to allow the 340 Analysis software to have sufficient fiber length on which to establish a 'reference level' of the backscatter, prior to the reflectance.

---

**NOTE**

The width of the injected pulse (pulsewidth) can be expressed in terms of either time or distance and is displayed on the screen in both seconds ( $\mu$ s or ns) and meters (m).

---

**EXAMPLE:** PW: 1000 ns/100.0 m The length of the pulsewidth, displayed in nanoseconds, can quickly be converted from time in nanoseconds to distance in meters by dividing by 10.

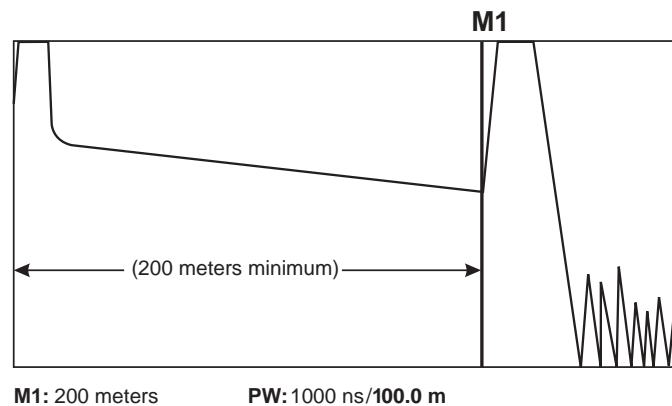
***To calculate the minimum distance the M1 can be placed from the OTDR Bulkhead Connector using the 1000 ns pulsewidth:***

1. Convert the pulsewidth to meters.

2. Multiply the pulsewidth by two in order to calculate the minimum distance that M1 must be placed from the trace Origin (OTDR Bulkhead).

**EXAMPLE:**  $100.0 \text{ m} \times 2 = 200 \text{ meters}$ . Therefore, for a 1000 ns pulsewidth, the minimum distance that M1 must be placed from the Trace Origin is 200 meters (See Figure 3-3).

3. A minimum of eight Points Per Pulsewidth is required for the Reflectance Value to report a value without a ">" when set for Auto. With fewer than eight data Points Per Pulsewidth, a ">" will always be displayed.
  - Points Per Pulsewidth is the number of samplings (loss readings) that are taken along the fiber span within a given fiber length (as defined by the length of the pulsewidth used.)
  - A minimum of eight Points Per Pulsewidth is required to ensure that the Corning Cable Systems 340's Analysis software has enough data from the fiber region surrounding reflection in order to make accurate Reflectance Measurement calculations.



*Figure 3-3: Proper Placement of M1 for Auto Reflectance Measurements*

***To calculate the number of Points Per Pulsewidth:***

- a. Note the pulsewidth (in meters) and the Distance Resolution Setting (in meters) shown on the display screen (PW: 500 ns/50.0 m and Range/Reso: 32 km/2.0 m). Note that the

other units of measurement (kft, ft, mi) will still yield the same points per pulsewidth.

---

**NOTE**

If the Corning Cable Systems 340 is not set up to measure in kilometers, see “Units” on page 36 to change Units to Kilometers (km).

---

- b. Divide the pulsewidth (in meters) by the Distance Resolution Setting (in meters) in order to calculate the number of Points Per Pulsewidth.

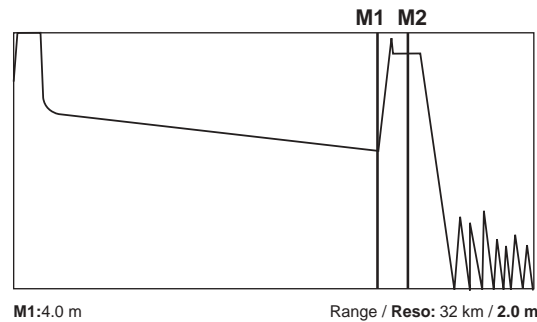
**EXAMPLE:**  $50.0 \text{ m} / 4.0 \text{ m} = 12.5$  Points Per Pulsewidth. As 12.5 is greater than the minimum required number of 8, the pulsewidth and distance resolution setting used in the example yield a sufficient number of Points Per Pulsewidth.

Refer to Section 14.3.1 for a detailed procedure on making Auto Reflectance measurements.

**MANUAL SETTING** Both M1 and M2 markers must be used for measurement when Manual is selected. Additionally, the Attenuate Trace feature, which uses Real Time Mode, provides a means to take the reflectance out of saturation if necessary.

To proceed with Manual Setting, place M1 just prior to (left side of) the reflective event on the waveform backscatter and NOT the rising edge of the reflection. Place M2 at the center of the top of the reflection in order to achieve an accurate reflectance measurement (See Figure 3-4).

Use the **Horizontal Expansion & Contraction** and **View From** hardkeys to zoom in and place the markers in the required positions.



*Figure 3-4: Proper Placement of M1 and M2 for Manual Reflectance Measurements*

Refer to Section 14.3.2 for a detailed procedure on making Manual Reflectance measurements.

**OFF SETTING** If the option is set to “OFF,” reflectance values will not be reported on the trace grid screen.

#### Screen Saver

Options: ON, OFF

Default: ON

The Screen Saver automatically shuts down the LCD display to conserve power. The Screen Saver starts one minute after the last key press when operating on battery power and 30 minutes after when operating on AC power.

#### Color Scheme

Options: 1 - 16

Default: 10

The 340 has sixteen predefined color schemes. Select this option to display a pop-up window with the numbers 1 through 16 and the corresponding list of colors for the major portions of the screen.



### Language Description

- Options: English, Russian, French, German, Italian, Portuguese, Spanish (Castillian), Spanish (Latin American), Chinese
- Default: Currently installed language. Contact Corning Cable Systems for the availability of other languages.

### Force Mode

- Options: No, Fault Locate, Autoinc Mode, Manual Mode, Pow.Meter/LS, Power Meter, Light Source, VFL
- Default: No

The Force Mode field dictates the mode to which the instrument will go upon power up. This feature allows the user to configure the instrument to boot directly into the desired mode of operation. If set to NO, the instrument will boot to the MODES selection screen.

### Initial Setups

- Options: Yes, No
- Default: No

This option determines whether the Quick Setup Screen is presented to the user when the **MANUAL TEST MODE** is pressed in the MODES selection screen, or when the **BIDIRECT TEST** softkey is pressed in the Special Modes screen. The default setting is No, as the setups may also be accessed directly by pressing the **Set-Up** hardkey, or, when the **QUICK SETUPS** softkey is available.

**Connection Check**

Options: ON, OFF

Default: ON

This field controls enabling/disabling of the Connection Check screen for the Fault Locate and Manual Test mode of operation.

**SM Traffic Check**

Options: ON, OFF

Default: ON

The Single-mode Traffic Check performs a “live fiber” check on the currently attached fiber under test to detect whether the fiber is carrying traffic before firing any OTDR laser sources. If no traffic is detected the requested test cycle(s) proceed normally. If traffic is detected, a Warning message appears on the screen and all pending tests are aborted.

---

**NOTE**

This feature is not applicable when testing at multimode wavelengths (the Setup option is ignored, if set to ON, when a multimode wavelength is selected).

---

**3.2.4 Miscellaneous Setup**

ORL and Smoothing setups are established in the Miscellaneous Setups.

ORL, Optical Return Loss, is the total amount of light returned to the OTDR including backscatter and all reflections. The ORL settings customize the way Optical Return Loss is reported on the 340.

**Auto ORL**

Options: ON, OFF

Default: OFF

When set to ON, the Analysis function of the 340 will automatically calculate ORL and report the results in the Trace Parameters Area (See Figure 2-3).

If set to OFF, then ORL calculations will not be performed.

**Auto ORL Area**

Options: M1 to M2, Full Trace

Default: M1 to M2

This parameter determines the start and stop distances for ORL calculation.

If set as M1 to M2, only the area between the M1 and M2 markers will be used for ORL calculation.

If set as Full Trace, ORL will be calculated on the area from the origin of the trace to the end of the trace.

**ORL Relative To**

Options: M1, Origin

Default: M1

The ORL Relative to M1 setting yields the ORL that would be observed by an ORL meter attached to the fiber at marker 1.

The ORL Relative to Origin setting yields the contribution to the ORL seen at the origin from the fiber segment between M1 and M2.

### Auto Smoothing

Options: ON, OFF

Default: OFF

If Auto Smoothing is set to ON, smoothing, a process applied to the OTDR trace to reduce noise, will run automatically on the trace data when a scan cycle is completed or halted. The smoothing function will **NOT** run if the current Range/Reso combination provides too few data points per pulsewidth. (A minimum of eight points per pulsewidth is required.)

If this option is set to OFF, smoothing can be accomplished by pressing the **SMOOTH TRACE** softkey.

---

#### NOTE

Save a copy of the trace before smoothing, as the smoothed trace cannot be converted back to its original state.

---

### Smooth Level

Options:	Light	Least noise reduction and least distortion
	Medium	Displays the best compromise between noise reduction and distortion
	Heavy	Most noise reduction with the most distortion

Default: Medium

Select a *Light*, *Medium* or *Heavy* filter level.

## 3.3 Alternate Setup Options

Some commonly used parameter settings can be changed without re-entering Setups. Using available hardkeys and softkeys (See Figure 2-1), a single parameter can be changed for the next data collection or series of data collections. This change will remain in affect until a new selection or a change through Setups is made.

### 3.3.1 Pulsewidth Softkey (PULSE)

The **PULSE** softkey can change the pulsewidth used to collect trace data at any time.

#### Selecting a New Pulsewidth

1. Press the **PULSE** softkey to display a list of all available pulsewidths.
2. Use the **Marker Movement** keys or the expand/contract keys, to scroll through the list of pulsewidths.
3. Press the **M1/2 Sel** hardkey to lock in the desired pulsewidth once it is highlighted. The pop-up window will disappear.

Press the **CANCEL** softkey if you want to exit without changing the pulsewidth.

#### Changing the Pulsewidth during a real time or averaging scan cycle

1. Press the **PULSE** softkey during data collection to display the pulsewidth pop-up menu.
2. Select a new pulsewidth. The trace display will return and a new scan set will be initiated using the new pulsewidth.

Press **CANCEL** to exit without changing the pulsewidth. The instrument will return to the scan that was in progress before the **PULSE** softkey was pressed.

Pulsewidths are optical module dependent.

### 3.3.2 Wavelength Hardkey

Change the wavelength on test modules containing more than one wavelength laser using the **Wavelength** hardkey.

#### Changing the wavelength

Press the **Wavelength** hardkey. The value displayed in the wavelength field in the trace parameters section of the display screen will cycle to the next available wavelength.

If only one wavelength is available on the attached test module, an error tone will sound when the **Wavelength** hardkey is pressed.

3.3.3 Set Parameters Softkey

The Index of Refraction and Backscatter Coefficient can be set without returning to the Setups screen. Press the **MORE** softkey, then the **SET PARAMETERS** softkey in the Trace Display window. An Index of Refraction and Backscatter Coefficient settings box (See Figure 3-5) appears in the Trace Parameters area of the screen and a new set of softkeys is displayed (See Figure 3-6).

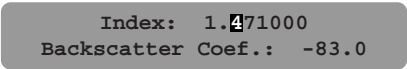


Figure 3-5: Index of Refraction and Backscatter Coefficient Settings Box

NOTE

Toggle between **SET BACKSCATTER** and **SET INDEX** by pressing softkey 4.

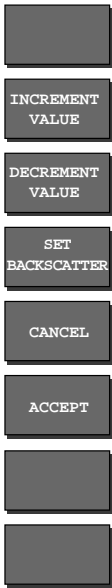


Figure 3-6: Set Parameters softkeys

### Setting Index Of Refraction

The Index of Refraction for the currently installed optical test module plug-in is selected when you enter Set Parameters mode.

1. Use the **Marker Movement** keys or press the **INCREMENT VALUE** and **DECREMENT VALUE** softkeys to change the present IOR (Index of Refraction) value.

---

#### NOTE

Each digit in the IOR is changed independent of the others. Notice in Figure 3–5 that the first digit to the right of the decimal is highlighted. You can move to any of the other five digits to the right of the decimal using the left or right arrow keys. The number 1 to the left of the decimal cannot be changed. The trace display is updated as you change the value.

---

Index of refraction values may be in the range of 1.400000 to 1.699999.

2. Press the **ACCEPT** softkey to lock in the new value and return to the trace display screen.

Press the **CANCEL** softkey to return to the trace display mode and restore the value in use before the pop-up window was invoked.

### Setting the Backscatter Coefficient

1. Press the **SET BACKSCATTER** softkey to move the active marker to the Backscatter Coefficient.
2. Use the **Marker Movement** keys or press the **INCREMENT VALUE** and **DECREMENT VALUE** softkeys to change the present Backscatter Coefficient value.
3. Press the **ACCEPT** softkey to lock in the new value and return to the trace display screen.

Press the **CANCEL** softkey to return to the trace display mode and restore the value in use before the pop-up window was invoked.

See “Backscatter” on page 41 for information on Backscatter Coefficient.

### 3.4 Software Upgrades

The Corning Cable Systems 340 can be upgraded in the field via the floppy disk drive. Upgrade application software is loaded and decompressed from the diskette and programmed into the instrument's FLASH ROM devices.

#### 3.4.1 Upgrade Procedure

1. Insert the floppy diskette into the floppy drive and turn the power switch on.

The unit automatically reads from the diskette to download the necessary upgrade files. Processing information is displayed on the screen while the upgrade is in process (approximately 2-3 minutes).

2. Remove the floppy from the drive and turn the unit off when the following message is displayed:

```
Application code is now loaded. Reboot instrument.  
B>
```

Turn the power switch on and the unit will boot up with the upgraded application software.

---

#### NOTE

For Version 3.18a and higher, the upgrade utilities automatically determine whether the instrument is currently under Battery or AC power. The upgrade process will not take place until the software has determined that the AC adapter is plugged into the instrument and a commercial power source. The upgrade utilities prompt the user to connect the AC adapter before continuing with the upgrade.

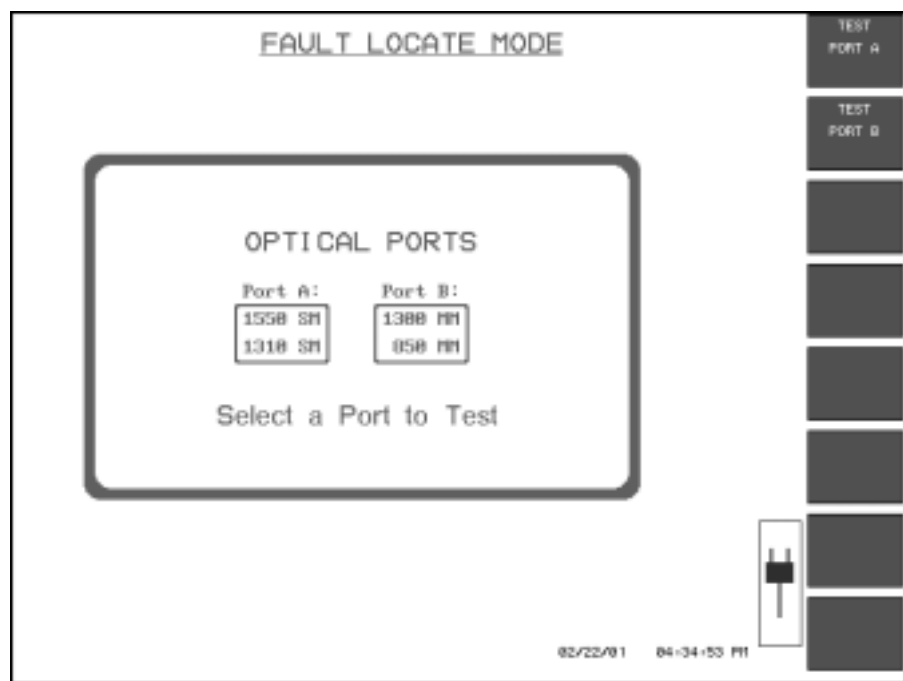
---



## 4.0 Fault Locate Mode

### 4.1 Fault Locate Test Sequence

Select the Fault Locate option on the MODES selection screen to activate the Fault Locate mode. The initial screen displayed is dependent upon the type of optical module installed and may be a Port Selection screen (See Figure 4-1).



*Figure 4-1: Port Selection Screen (Fault Locate Mode)*

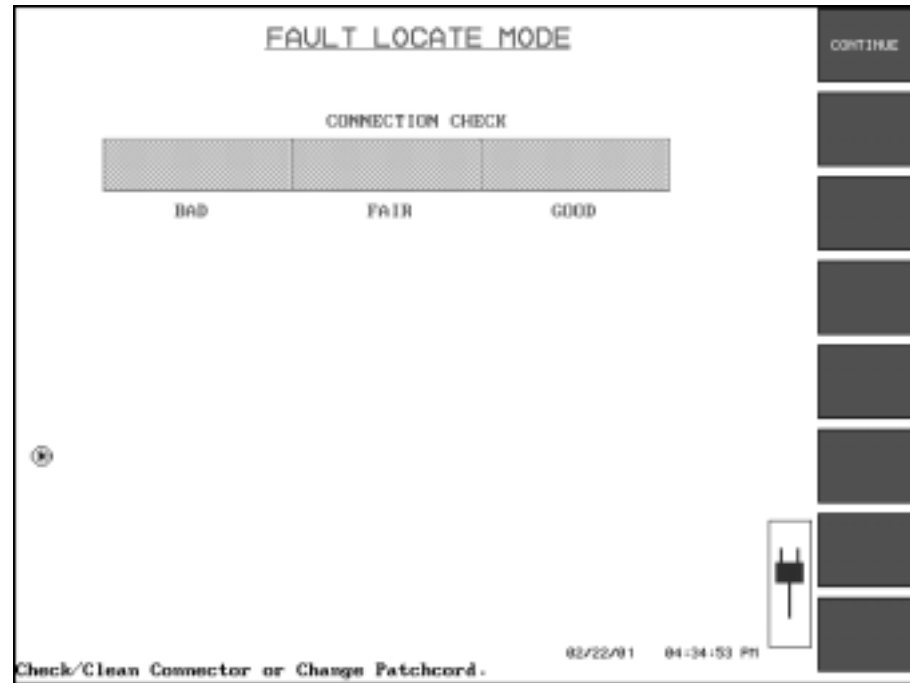
Select the wavelength (Port) for the test by pressing the applicable softkey.

---

**NOTE**

This screen is displayed only when an optical module with two ports is installed. If the optical module has a single port, the Port Selection screen is bypassed and the Connection Check screen shown in Figure 4-2 is displayed.

---



*Figure 4-2: Connection Check Screen (Fault Locate Mode)*

A Connection Check screen is only displayed when the Connection Check option is set to ON in the User Preferences section of the Additional Setup menu. If a GOOD connection is detected, the connection check indicator will be the same as in Figure 4-2.

- If the connection is Bad, a message is displayed "Check/clean connector or change patchcord." To continue with the test, press the **CONTINUE** softkey or the **Start/Stop** hardkey.
- If the connection is Fair or Good, the instrument proceeds to AutoMode after a few seconds. AutoMode selects the appropriate range, resolution and pulsewidth for the test. This is indicated in the text area beneath the Status Box with the message "Determining Range/Reso/Pulsewidth."

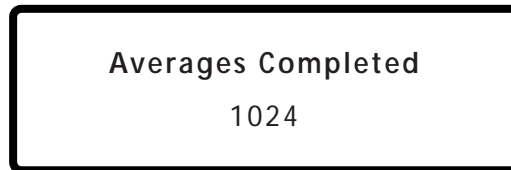
---

**NOTE**

Fault Locate AutoMode uses the longest wavelength, typically 1550/1625 nm for single-mode and 1300 nm for multimode, to determine the best parameters for data collection to locate the End/Fault of the fiber under test. The Connection Check feature works best for fiber lengths >75 meters.

---

- While data is being collected the number of averages completed is counted up on the display screen and is displayed as shown in Figure 4-3.



*Figure 4-3: Averages Message Box*

The 340 will run Analysis in the background while data averaging is running. This is a multi-tasking function of the instrument that helps find the End/Fault much faster.

Press the **Start/Stop** hardkey or the **Mode** hardkey to cancel the test while it is running.

After the test is completed, the Prior Event and End Fault location are displayed as shown in Figure 4-4.

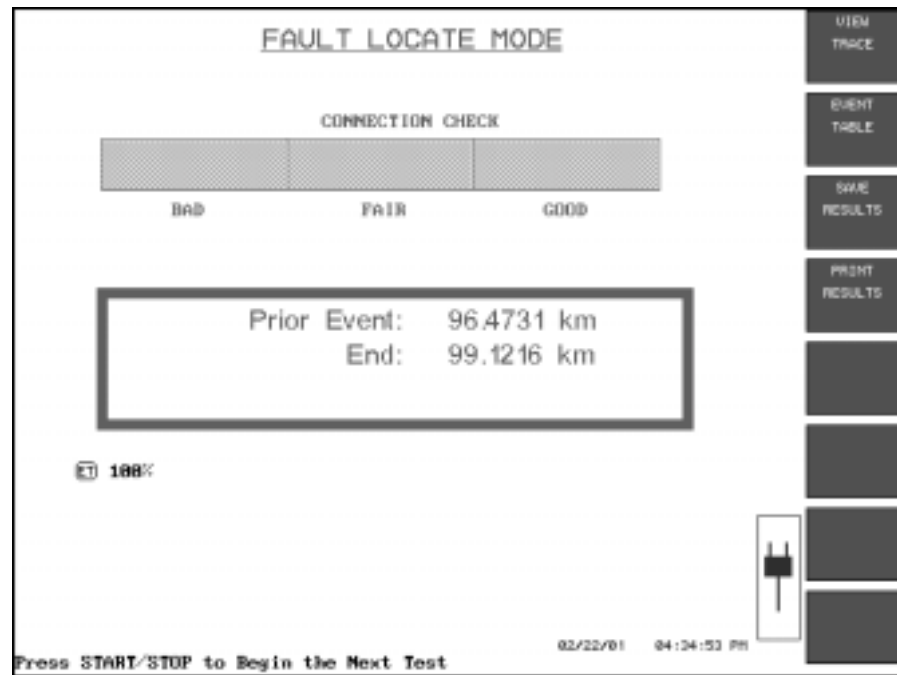


Figure 4-4: End Fault Display (Fault Locate Mode)

Press the **Start/Stop** hardkey to begin another test.

Press the **Mode** hardkey to return to the Modes selection screen.

## 4.2 Softkeys

There are four softkeys provided in the End/Fault and Prior Event window as a means to verify and analyze test information and to save and print test data.

### 4.2.1 View Trace

Press this softkey to display the corresponding trace data grid. View Trace automatically expands the display around the end or break in the fiber in the View From M1 mode. Refer to Chapter 6.0, “Manual Test Mode” for more display options and View Trace information.

**4.2.2 Event Table**

Press this softkey to display the entire event table. For more information on the Event Table refer to Chapter 6.0 of this manual.

**4.2.3 Save Results**

Press this softkey to save test data to a disk. See Section 12.1.1 for more detailed information on saving files.

**4.2.4 Print Results**

Press this softkey or the **Print** hardkey for a hard copy of the test results. For more information on printing options refer to Section 12.3 of this manual.

Softkeys

Fault Locate Mode

The AutoIncrement Testing Mode provides automatic file naming for trace files and tests fibers at one or more wavelengths. Press the **AUTOINC TESTING** softkey to display the AUTOINCREMENT TEST MODE Setup Screen (See Figure 5-1) which contains the AUTOINCREMENT INFORMATION window.

## AUTOINCREMENT TEST MODE

Base Filename:

Use "\*" characters (1 to 4 max) to identify the auto-incrementing field position and width.

Use "\_" character (1-2) to identify wavelength ID field position and width.

Use "0" character to indicate SM (S) or NM (N).

### AUTOINCREMENT INFORMATION

Autoincrement Mode Test Setup

Save Path: a:\N

☐ Autorange Once

☐ Rapid Save Mode

☐ Enable Overlay

Port A:

☒ 1550 SM

☒ 1310 SM

Start No.: 8881

Base Filename: aabbcccc.g

CONTINUE

SELECT

QUIT/SETUP

BACK

Esc Del Bsp Cap  
 ABCDEFGHIJKLM  
 NOPQRSTUVWXYZ  
 +-.1234567890  
 \* \_ ( ) = ! @ \$ % ^ & \*  
 { } < > ; : ' " \ / ? ~

Press **CONTINUE** to Begin Test Sequence

02/20/01 04:40:06 PM

The information entered in this window determines the filename for saving files during the test cycle. It is suggested that the directory to which files will be saved, should be created before beginning this procedure. For information on making a directory, refer to Section 12.1.8.

See the **CAUTION** box regarding saving files in Section 12.1.

### 5.1.1 Editing AutoIncrement Information

Use the following methods to edit or enter information in the AutoIncrement Information box.

*For text editing:*

1. Use the **Vertical Expand/Contract** key to move between fields. The active field will be highlighted and the Character Matrix will appear in the lower left corner of the screen.
2. Use the **Marker Movement** keys to navigate through the Character Matrix. Highlight the desired character and Press the **M1/2 Sel** hardkey to insert the character into the active field.

*For Checkbox selections:*

1. Use the **Vertical Expand/Contract** key to select the desired field. The selected checkbox will have a ">" to its left.
2. Press the **SELECT** softkey to check or uncheck the box.

### 5.1.2 Information Fields.

<b>Save Path</b>	Specifies the drive and directory where trace files are to be saved.
<b>Autorange Once</b>	When checked, AutoMode will run before the data collect cycle of the first test only.
<b>Rapid Save Mode</b>	When checked, the instrument will perform analysis (if set to ON in Setups) and save the trace without any user intervention.  When unchecked, Event Table and File Save screens will be displayed.
<b>Enable Overlay</b>	When this box is checked, traces will be "swapped" into the overlay (background) before testing at the new wavelength commences. This allows for visual comparison of the prior test trace and the currently averaging trace.
<b>Port A</b>	Lists the available wavelengths for the current module. More than one wavelength can be selected.



**NOTE**

Port A is assigned as the single-mode fiber test port and Port B is assigned as the multimode fiber test port. On some quad wavelength modules, multimode wavelengths will be listed under Port B to indicate the different physical location from the single-mode connector. Test cannot contain a mix of single-mode and multimode wavelengths.

**Start No.** Specifies the number (up to four digits) of the first fiber to be tested. The start number replaces the # characters in the base filename.

**Base Filename** Enter the base filename for fiber tests using the following format:

Test taken in A→B direction: aabb####.@\_ \_

Test taken in B→A direction: bbaa####.@\_ \_

where:

aa = First two characters of the Test Site entry

bb = First two characters of the Far Site entry

#### = Fiber number

@ = Indicates Single-mode (S)  
or Multimode (M)

\_ \_ = Indicates wavelength ID.  
(Use characters in Table 5-1: Wavelength ID Equivalents.)

The base filename will be displayed in the Fiber Storage Information window and can be edited.

---

**NOTE**

Lower case letters in the base filename (as shown in the preceding example) will automatically be substituted with letters from the Test Site and Far Site on a character-by-character basis. Upper case letters will remain in the filename as entered.

---

Wavelength	one_	two_
1550	5	15
1310	3	13
1300	0	30
850	8	85
1244	2	12
1410	4	41
1625	6	62
1650	6	65

*Table 5-1: Wavelength ID Equivalents*

Press **CONTINUE** to proceed to the Connect Fiber screen once all the necessary information has been entered.

Press **BACK** to return to the Operating Mode Selection Screen.

## 5.2 Connect Fiber Screen

The Connect Fiber screen (See Figure 5-3) prompts the user to connect the fiber to be tested. This screen also lists file names for verification.

Press **CONTINUE** again or the **Start/Stop** hardkey to begin testing once the fiber is connected.

Press **CANCEL TESTS** to return to the Information window to make any changes.

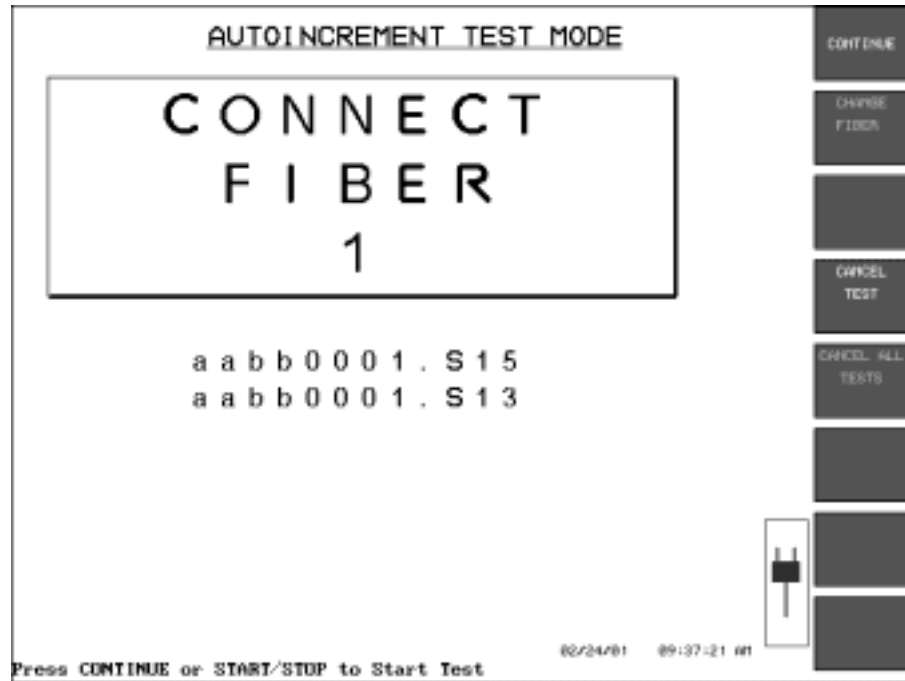


Figure 5-2: CONNECT FIBER Screen

### 5.3 Testing

During testing, enter setups via the **Set-Up** hardkey to change test parameters.

Once the test is completed, the Event Table will be displayed below the trace grid display. View the Event Window for an event by highlighting the event in the table and then pressing the **EVENT WINDOW** softkey.

This will display the Trace Grid along with the Event Window (See Figure 5-3) for the highlighted event.

Type:	RT (1 of 5)
Dist:	8.4390 km
Loss:	2.00 dB
Refl:	-38.00 dB

*Figure 5-3: Event Window*

Press **EXIT** to return to the Event Table.

Pressing **EXIT** again will display the AutoSave Screen. Filename information can be verified or edited. More information on saving files can be found in Chapter 12.0 of this manual.

Press **SAVE FILE AND EXIT** to return to the Connect Fiber Screen and begin another test.

## 6.0 Manual Test Mode

Full OTDR functionality is available in Manual Test mode. This includes features such as Mass Storage, Trace Compare, Loss Mode Menu Setup, Trace Shifting, Printing, etc.

Press the **MANUAL TEST** softkey in the MODES selection screen to enter the Manual Test mode.

### 6.1 Testing

Press the **Start/Stop** hardkey to begin testing; then press softkey 7 to select Real Time or one of several different Averaging scan selections.

- Functions set for automatic operation will run in the appropriate sequence.
- Functions not set for automatic operation can be executed manually using softkeys after the test cycle is completed.
- If AutoMode is set in the Quick Auto Setup window, it will run immediately. Otherwise, the currently selected range, resolution, and pulsewidth values will be used.
- On completion of a scan, smoothing will be performed if Auto Smoothing is turned on.
- Fiber analysis will run next if Auto Analysis is set to automatic.

REAL TIME is a non-accumulated mode which provides rapid updates for setup purposes.

#### 6.1.1 Initiate a Real Time or Averaging Scan

- To initiate a Real Time Scan, press softkey 7 until the **AVG REAL TIME** legend is displayed; then press the **Start/Stop** hardkey to initiate a Real Time scan.

**OR**

- To initiate an Averaging scan, press softkey 7 until the legend displays a number of seconds/minutes (i.e., 10, 20, 30, 1:00 or SETUPS TMR); then press **Start/Stop** to initiate an averaged scan.

---

**NOTE**

SETUPS TMR is the last selection available in the sequence before returning to AVG REAL TIME.

---

These keys may be pressed in the reverse order. That is, press Start/Stop, then cycle through the 7th softkey available test modes: AVG REAL TIME, AVG 10 SEC (provides 10 seconds of averaging), AVG 30 SEC, AVG 1:00, and AVG SETUPS TMR.

The AVG SETUPS TMR sets the amount of scan (averaging) time to the current *Scan Mode* setting in SETUPS. The default scan time is 1minute but can be set to any value between 5 seconds and 99 minutes:55 seconds, in 5 second increments.

## 6.2 Pause/Resume/Restart Feature

The Manual Test mode, and several other test modes, has a Pause/Resume/Restart capability as indicated by the **PAUSE** softkey (softkey 1) which is active whenever a data collect (Real Time or Averaged) is in progress. When **PAUSE** is selected, softkey 1 toggles to read **RESUME** and softkey 2 reads **RESTART**.

**PAUSE** allows temporary suspension of a test in progress, in order to inspect launch level, current range, and pulsewidth and to verify that current test parameters are acceptable.

Press **PAUSE** to suspend the current scan. Once the scan is paused, Setups, including wavelength or pulsewidth, cannot be entered or changed; View From, Marker control and Expand/Contract keys are active to view/manipulate the currently displayed trace for verification purposes.

Press **RESUME** to resume the test in progress at the point it was suspended or press **RESTART** to restart the scan.

## 6.3 Internal Attenuation

The Corning Cable Systems 340 offers the ability to internally attenuate the signal level of the trace backscatter. When used in combination with the Manual option (in the Reflectance setups), highly saturated reflective events can be brought out of saturation, in order to use the Markers M1

and M2 to accurately measure the event reflectance. This is especially useful in FITL (Fiber-in-the-Loop) applications where the bit error rate may be adversely affected by highly reflective connections in the fiber path.

### 6.3.1 Operation

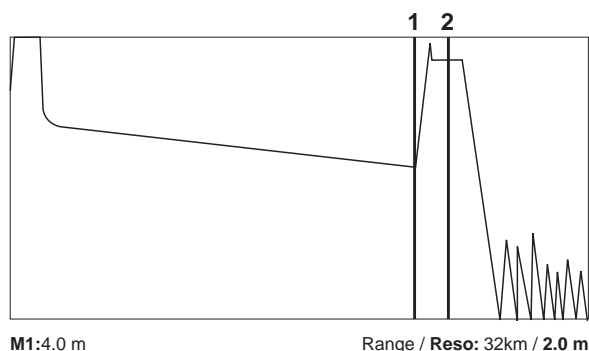
To optimize the use of Internal Attenuation, the Manual option should be selected in the Reflectance setups. (See “Reflectance Value” on page 51)

#### TO SET UP INTERNAL ATTENUATION

1. Initiate a Real Time scan. (See Section 6.1.1.)
2. When the Real Time scan is started, press the **MORE** softkey to display a new softkey layer.
3. Softkey 5 displays the legend **ATTENUATE TRACE**. Press this softkey (only available in REAL TIME mode) to display a pop-up window which shows the current Attenuation of the signal as a percentage of full power.

At this point, the trace may be expanded or contracted and the Display From mode is available for selection for placing markers M1 & M2. M1 should be placed just before the rising edge of the reflection of the event being qualified and M2 in the middle of the reflection's peak level.

Depending on the pulsewidth setting, as the signal is attenuated, a sharp, very narrow peak may be seen at the beginning of the reflection. M2 should NOT be placed at this peak point, but further to the right, ensuring that M2 is roughly in the middle of the event's top line segment. (See Figure 6-1)



*Figure 6-1: Internal Attenuation Marker Placement*

- TRACE ATTENUATION**
1. Attenuate the trace signal by pressing the **Marker Movement** keys. The “A” (Attenuated Trace Data) icon will appear in the bottom left of the window and the percentage of attenuation will increase.
  2. Continue to press the **Marker Movement** keys until the “>” symbol at the Reflectance value disappears. This indicates that the event is no longer saturating the receiver, and that an Averaged scan may now be initiated to ultimately provide an accurate measurement of the event’s reflectance value.
  3. Press the **EXIT/SAVE ATTENUATION** softkey when the event is forced out of saturation in order to maintain the current level of signal attenuation.
  4. Press the **AVG** softkey to allow the data to be averaged.

---

**NOTE**

Press the **EXIT/UNDO ATTENUATION** softkey to undo an attenuation. Press either the **SAVE** or **UNDO** softkey to close the Attenuation Percentage window.

---

Depending on the amount (percentage) of attenuation that was required to bring the event out of a saturated state, the backscatter signal level before the event (at the point where M1 is positioned) may exhibit a noisy signal level. Averaging of the data will help reduce this noise. The Manual Reflectance measurement performs data point averaging around each marker to provide input to the Reflectance Calculation software. The use of an averaged TEST and the averaging of the M1 and M2 data values help provide very accurate Reflectance measurements.

Once the test is halted (either by natural completion or by pressing **Start/Stop**), the signal attenuation is removed in preparation for the next data scan. The current trace, if saved to Mass storage media, will contain a flag indicating that the trace data was internally attenuated. If such a trace is recalled on the instrument, the A icon will be displayed alongside the trace filename at the top of the trace grid.



## 6.4 Set Jumper or V Shift

The **SET JUMPER OR V SHIFT** softkey allows the trace to be shifted horizontally or vertically. The distance shifted is displayed in the Trace Parameter Area on the left side of the display. The horizontal and vertical shift are only available in Display from Origin mode.

**SET JUMPER** is used to shift the trace horizontally so the jumper is not displayed with the fiber under test.

**V SHIFT** is used to raise or lower the displayed screen position of one trace waveform relative to a second (overlaid) trace waveform, when visually comparing two displayed trace waveforms.

*Procedure for Set Jumper or Vertical Shift:*

1. Select the **MANUAL TEST MODE** softkey from the MODES selection screen.
2. Make any necessary setup changes.
3. Test a fiber to obtain a trace on the screen.
4. Press the **MORE** softkey once.
5. Press the **SET JUMPER OR V SHIFT** softkey.
6. Press **SHIFT VERTICAL** or **SET JUMPER 1**.
7. Use the **Marker Movement** keys to shift the trace.
8. The distance shifted is displayed in the Trace Parameter Area.

The **RESET VERTICAL** and **RESET JUMPER 1** keys will clear the shift.

## 6.5 Trace Overlay

Two OTDR traces can be displayed simultaneously on the 340. The trace lines will be different colors. All parameters displayed on screen during Overlay Trace mode refer to the primary trace.

There are actually three types of traces on the Corning Cable Systems 340: primary, overlay and resultant.

- A trace produced by the data collect system will be designated as in the primary trace. The primary trace can also be loaded through the Load File function of the Mass Storage Menu (See Section 12.1.2.) or the **SWAP** function (accessed from **TRACE COMPARE** softkey).
- The overlay trace can only be loaded using a Mass Storage function or the **SWAP** function.
- The resultant trace is created from data from a mathematical operation (**DELTA COMPARE**) in Trace Compare Mode.

### 6.5.1 Overlay Modes

**STANDARD OVERLAY** In Standard Overlay mode both traces are recalled from disk.

*Procedure for Standard Overlay:*

1. Press the **Disk** hardkey.
2. Select the *Load File* option from the menu. The LOAD FILE directory is displayed.

---

#### NOTE

The first trace filename on the list will be highlighted and placed in the *Primary Trace File:* field. As you move through the filenames using the **Marker Movement** keys or the **vertical and horizontal arrow** keys, the information in the field changes to read the selected filename.

---

3. Press the **SELECT PRIMARY** softkey and highlight the desired trace filename. The filename is placed in the *Primary Filename* field, and the trace file data is loaded into the primary buffer.
4. Highlight a second trace filename and press the **SELECT OVERLAY** softkey. The selected filename is displayed in the *Overlay Filename* field and the overlay buffer is loaded with the selected trace file data.
5. Press the **VIEW FILE(S)** softkey. Both traces will be displayed on the grid screen.

**OVERLAY WITH SETUPS** The Overlay with Setups feature allows restoral of the setting at which the archived (saved) trace was collected. This gives a good visual indication of any change to the fiber since the trace was originally saved.

*Procedure for Overlay with Setups:*

1. Press the **Disk** hardkey.
2. Select the *Load File* option from the menu. The Load Trace directory is displayed.

---

**NOTE**

The first trace filename on the list will be highlighted and placed in the *Primary File:* field. As you move through the filenames using the **Marker Movement** keys or **vertical and horizontal arrow** keys, the information in the field changes to read the selected filename.

---

3. Highlight the desired trace filename
4. Press the **OVERLAY WITH SETUPS** softkey. Several things happen:
  - The selected trace is loaded as an overlay trace.
  - The 340 trace parameters will change to match those saved with the selected trace file.
  - The instrument will immediately exit from Mass Storage mode and return to the trace grid screen.
5. Press the **Start/Stop** key to collect the new primary trace using the overlay trace parameters.

**REAL TIME OVERLAY** In Real Time Overlay a trace is recalled from disk into the overlay buffer and a Data collect (with real time display updates) is performed to load a trace into the primary buffer.

*Procedure for Real Time Overlay:*

1. Press the **Disk** hardkey.
2. Select the *Load File* option from the menu.

3. Highlight a trace filename and press **SELECT OVERLAY**. The selected filename is displayed in the *Overlay Filename* field and the overlay buffer is loaded with the selected trace file data.
4. Press the **VIEW FILE(S)** softkey to return to the main grid screen.
  - Notice the trace is dimmed to indicate that it is the overlay (secondary) trace
5. Press the **REAL TIME** softkey and then the **Start/Stop** hardkey to initiate a Data Collect. The Data Collect update is loaded into the primary buffer on top of the background trace.

### 6.5.2 Overlay Functions

Both an Overlay and a Primary Trace must be displayed to perform Overlay Functions. Press Trace Compare and then one of the following function softkeys: **SWAP**, **ISOLATE**, **ALIGN**, **DELTA COMPARE**, and **ABANDON OVERLAY**.

**SWAP** Press the **SWAP** softkey to exchange the primary and overlay traces. The data and display of the primary and overlay traces, filenames, and icons displayed in the icon row (located just above the trace grid) will all be effected.

---

#### NOTE

The Trace Grid Parameters are determined by the Primary Trace. Swapping the Primary and Overlay traces may result in changes to the Trace Grid Parameters.

---

**ISOLATE** The **ISOLATE** softkey hides the overlay trace leaving only the primary trace displayed. The softkeys will change to **SWAP**, **SHOW OVERLAY**, **ABANDON OVERLAY**, and **EXIT**, and the overlay trace filename will be replaced with “Isolated” in the upper right of the screen above the trace grid.

- Press the **SHOW OVERLAY** softkey to restore the overlay trace to the display along with the primary trace.
- Press the **ABANDON OVERLAY** softkey to remove the overlay trace from the background and leave only the primary trace on the screen.

---

**NOTE**

After this softkey has been pressed, the only way to bring the overlay trace back is to go into Mass Storage and reload the overlay trace from disk.

---

**ALIGN** Press the **ALIGN ON** softkey to automatically line up the primary trace data with the overlay trace data. The overlay trace is shifted vertically by the difference between the data point value of the primary trace at M1 and the data point value of the overlay trace at M1.

Press **ALIGN WITH 1 DB OFFSET** to force a 1 dB offset between the 2 traces while maintaining alignment.

Press the **ALIGN OFF** softkey a third time and the traces will no longer be aligned.

**DELTA COMPARE** The Delta Compare function is used to detect any changes in a fiber over a period of time. Begin with the two traces to be compared displayed in Trace Compare Mode; one as the primary trace and the other as the overlay trace. A new resultant trace is created when the **DELTA COMPARE** softkey is pressed. A Delta Compare icon is displayed in the icon row above the grid to signify that the trace is a resultant trace.

---

**NOTE**

An unchanged fiber will display a straight line across the middle of the screen.

---

The softkeys will change to **SWAP**, **CLEAR RESULTANT**, **OVERLAY TRACE #1**, and **EXIT**.

- Press the **SWAP** softkey to switch between the primary and resultant trace.
- Press the **CLEAR RESULTANT** softkey to delete the Delta Compare resultant trace file.

- Press the **OVERLAY TRACE #1** softkey to overlay the primary trace. The softkey name changes to **OVERLAY TRACE #2**. Press this softkey to overlay the secondary trace, that is, the trace originally loaded as the overlay. The softkey name changes to **ISOLATE**. Press this softkey to display only the resultant trace.

### 6.5.3 Overlay Template

This function is similar to the Trace Overlay function, except that a Template Trace is placed in the overlay position (see Chapter 13.0 for details on Template Trace files) and all subsequent commands to perform analysis (either through the **ANALYZE TRACE** softkey, or if Auto Analysis is enabled) will impose the Overlay traces' Event Table onto the existing Primary Trace. Event Analysis does not actually run, but the template trace event table will be applied to the current primary trace.

A Template Trace can be placed in the Overlay position by using the following methods:

- Test a fiber and save it as a template, then use **SWAP** to move the template trace into the overlay position.
- Enter Mass Storage and select *LOAD FILE*. Select the desired template trace and press either **SELECT OVERLAY** or **OVERLAY WITH SETUPS**.

## 6.6 Smoothing

The 340 provides a smoothing filter that is used to reduce noise from an OTDR trace, thereby expanding the dynamic range of the instrument.


The smooth function filters the trace data between reflections.

Select a Light, Medium or Heavy filter level in the Quick System Setup window.

<i>Light</i>	Least noise reduction and least distortion
<i>Medium</i>	Displays the best compromise between noise reduction and distortion
<i>Heavy</i>	Most noise reduction with the most distortion

Smoothing can be set for automatic execution in the Quick Auto Setup window by setting the Auto Smoothing option to ON. Smoothing is run on trace data as soon as data collection is complete.

If the Auto Smoothing option is set to OFF in the Quick Auto Setups window, the **SMOOTH TRACE** softkey must be pressed to run smoothing on the current primary trace data.

The Smoothing In Progress  icon is displayed in the Status Area when Smoothing is running.

## 6.7 Event Table

The Event Table (See Figure 6-2) is a summary of all events detected by analysis in a trace, displayed in a tabular format. The table is part of the file when you save a trace and can be printed as part of the file.

The Event Table is always displayed below the main trace grid window.





TYPE	LOCATION (km)	LOSS (dB)	REFL (dB)
1 	2.3563	0.27	-41.36
2 	11.1842	→ 0.35	-51.62
3 	17.2346	0.05	N/A
4 	22.4945	73.00	-43.24

Figure 6-2: Corning Cable Systems 340 Sample Event Table

### NOTE

If the Secondary Threshold in System Setup is set to 0.34 dB, then an arrow will appear next to 0.35.

### 6.7.1 Types of Events Reported

#### REFLECTIVE EVENT

- A reflective event typically indicates the detection of a mechanical splice or connector
- Any reflective event with a loss greater than the set Splice Loss Threshold will be reported
- Any event with a reflectance equal to or greater than the set Reflectance Threshold will be reported

If the event has a reflectance greater than the Reflectance Threshold but meets the event loss criteria, it is still reported.

The distance location, splice loss, and reflectance will be reported for a reflective event.

The letter “R” is displayed on the print out of the Event Table after the event number for a reflective event.

### Non-Reflective Event —

- All non-reflective events, such as fusion splices, with a loss equal to or greater than the set Splice Loss Threshold are reported.

The distance location and splice loss is reported for non-reflective events.

The letter “N” is displayed on the print out of the Event Table after the event number for non-reflective events.

### Grouped Event —

- Events spaced too close to each other for Analysis to distinguish them as separate events are reported as Grouped Events.

The start and end distance locations, loss, and reflectance will be reported for grouped events.

---

#### NOTE

Losses are usually detected using the Splice Loss method, however losses may be calculated as 2 pt. These losses are indicated by the text (2 pt) in the event table.

---

A “G” is displayed on the print out of the Event Table after the event number for grouped events.

### End/Fault Event —

- Any event with a loss equal or greater than the Break/End Threshold is reported as the End/Fault Event.

The distance location and reflectance is reported for an End/Fault event.



The letter “E” is displayed on the print out of the Event Table after the event number for the end event.

### **Out of Range Event —**

Out of range may indicate out of dynamic range or out of distance range.

**Out of Dynamic Range** The point where the OTDR ran out of dynamic range is reported if the end of the fiber is not found and the noise floor is encountered.

**Out of Distance Range** The point where the OTDR ran out of distance range is reported if the end of the fiber is not found and the end of trace data is encountered.

## **6.7.2 Event Location**

The Location field on the Event Table represents the distance from the start of the trace to the start of the feature. This value is reported in the distance units set in the Quick System Setup window, for example “km.” Grouped events take up two lines of text on the event table, the first line displaying the start distance of the grouped event and the second line displaying the end of the grouped event.

## **6.7.3 Loss**

The Loss calculated for the event is displayed in decibels (dB).

- In the case of a reflective or non-reflective event, the loss is the result of a splice loss calculation.
- For grouped events, a splice loss or two-point loss calculation is made; 2-Pt loss calculations are denoted in the event table.
- The loss displayed for the end/fault event is the Fiber Break threshold value.
- Losses which exceed the Secondary Threshold will have an “→” character to the left of the loss value.

**6.7.4 T Loss**

The T Loss parameter, located in the Trace Parameters area, specifies the Total End-to-End Loss as produced by the trace analysis algorithms. This value is flagged with an asterisk \* if its value is greater than the End-to-End Loss in SETUPS.

**6.7.5 Reflectance**

A reflectance value is displayed for all reflective events. No value will be displayed in the Reflectance Field for non-reflective events. (See “Reflectance Value” on page 51 for a description of the available reflectance reporting options and the pros and cons of each method.)

## 7.0 Power Meter/Light Source Mode

Power Meter/Light Source Mode is an optional power meter and light source capability that allows taking loss measurements by combining laser source and power meter control. When in Power Meter/Light Source Mode, the Corning Cable Systems 340 is capable of optical measurements in the range of -70 to +10 dBm (-60 to +20 dBm when the optional 10 dB attenuator filter is installed).

### 7.1 Power Meter/Light Source Mode Information Screen

Press the **PWR METER LIGHT SRC** softkey on the MODES selection screen to enter this mode. (If the key is dimmed, the option is not available.) A message box reading “Calibrating Power Meter ...Please Wait...” will momentarily overlay the screen shown in Figure 7-1.

#### Power Meter

**LOW** dBm

1.247 nW

Reference: N/A  
Wavelength: 1318 nm  
Offset: 11.35 dB  
P/F Status: N/A  
P/F Threshold: -68.88 dB  
Single Mode

#### Laser Source

Laser: OFF

Wavelength: 1558 nm  
Output Mode: OFF

#### Loss Table

WL	REF				

LOCK REF

TABLE ON

SOURCE WAVELENGTH

SOURCE SELECT

BACK

CLEAR REF

Figure 7-1: Power Meter/Light Source Mode Information Screen

### 7.1.1 Power Meter

The Power Meter section displays the following information: current power measured (in dB and watts), reference power measured, current wavelength, offset, P/F status, P/F threshold and fiber type. If no reference is stored, the reference field displays N/A.

### 7.1.2 Laser Source

The Laser Source indicates laser state and output mode, if this option is installed. The current wavelength, which is the same as power meter wavelength, is also displayed.

### 7.1.3 Loss Table

Press the **TABLE ON** softkey to activate the loss table. (When turned on, the softkey changes to read **TABLE OFF** to allow the user to deactivate the table.) A Table Wavelengths selection screen will be displayed as shown in Figure 7-2.

TABLE WAVELENGTHS			
First:	Second:		
850 nm	850 nm		
1300 nm	1300 nm		
> 1310 nm	> 1310 nm		
1550 nm	> 1550 nm		
	None		
Third:	Fourth:		
> 850 nm	> 850 nm		
1300 nm	> 1300 nm		
1310 nm	1310 nm		
1550 nm	1550 nm		
None	None		

FIRST WAVELENGTH  
 SECOND WAVELENGTH  
 THIRD WAVELENGTH  
 FOURTH WAVELENGTH  
 CANCEL  
 CONTINUE

Figure 7-2: Table Wavelengths Selection Screen

Measurements may be taken and saved to the table using one to four different wavelengths. To select the wavelengths, scroll through each of the columns by pressing the correlating softkey. A ">" will be placed next to the selected wavelength. Press **CONTINUE** to set the selected wavelengths and begin saving measurements. Press **CANCEL** to return to the Power Meter/Light Source mode information screen and turn the table off.

When the wavelengths are selected and the active table is displayed:

- Press the **Start/Stop** hardkey to save the current reading for the current wavelength to the table
- Use the **Expand/Contract** hardkeys to scroll through the table
- Press the **Disk** hardkey to store all readings in the table to the hard drive or floppy disk
- Press the **Print** hardkey to print the table

## 7.2 Power Meter/Light Source Softkeys

The softkeys displayed when in Power Meter/Light Source Mode are **LOCK REF**, **TABLE ON(OFF)**, **SOURCE ON/OFF**, **MULTI MODE/SINGLE MODE**, **2KHZ**, **CLEAR REF**, and **CLEAR TABLE**. The **LOCK REF** softkey toggles to read **MODIFY REF** when pressed.

### 7.2.1 Lock Ref

Press the **LOCK REF** softkey to store the current power meter reading value in the Corning Cable Systems 340 and update the Reference area on the screen. If the Loss Table is ON, the REF field of the appropriate wavelength is also updated. This value is retained when the unit is powered down. Whenever Power Meter/Light Source Mode is entered, the reference value that was last stored is displayed.

When **LOCK REF** is pressed, the legend changes to **MODIFY REF**. This feature allows the current reference to either be changed or modified.

**MODIFY REF** Press the **MODIFY REF** softkey to display a window containing the current reference value.

Press the **LOCK REF** softkey to lock a new reference value.

Press the **EDIT REF** softkey to modify the current reference value. This is convenient when performing two way power measurements where the instrument needs to have a reference value equal to the value of the power meter at the far end.

Press **CANCEL** to cancel any changes.

Press **ACCEPT** to permanently store the new or modified reference value.

### 7.2.2 Table On

The **TABLE ON(OFF)** softkey toggles between **ON**, **OFF** and Wavelength selection softkeys to activate or deactivate the Loss Table and set the wavelength, depending upon the current state.

Press **TABLE ON** to display the Wavelength selection softkeys.

The softkey changes to read **TABLE OFF**.

---

#### NOTE

If readings are stored in the memory and **TABLE OFF** is pressed, an attention message regarding the loss of data is displayed.

---

### 7.2.3 Source Wavelength

Pressing the **Wavelength** hardkey changes the current power meter wavelength, and forces the current light source wavelength to match the current power meter wavelength.

### 7.2.4 Source Select

Pressing the **SOURCE SELECT** softkey changes the type; of light source modulation. The current mode is listed in the Laser Source Information Box as output mode. Available modes are: OFF, CW, 2kHz. CW is always used to take Power Meter/Light Source readings. 2kHz is used for fiber identification. If a light source is not available on the current test module plug-in, the text on this softkey will be dimmed.

### 7.2.5 Back

Press the **BACK** softkey to return to the MODES selection screen.

### 7.2.6 Clear Ref

Press the **CLEAR REF** softkey to clear the current power meter reference value.

## 7.3 Power Meter/Light Source Hardkeys

The hardkeys available in the Power Meter/Light Source Mode are **Wave Length**, **Set-Up**, **Print**, **Start/Stop**, **Disk**, and the **Horizontal/Vertical Expand/Contract** hardkeys.

### 7.3.1 Wavelength

The **Wavelength** hardkey changes the Power Meter wavelength. Pressing **Wavelength** forces the Source wavelength to match the Power Meter wavelength if the Source is on.

### 7.3.2 Set-Up

The **Set-Up** hardkey displays the Power Meter Setup Screen (See Figure 7-3) which includes four windows: *Power Meter*, *Printer*, *User Preferences*, and *System*.

#### SETTING PASS/FAIL THRESHOLDS

Enabling PASS/FAIL in the Power Meter Setup (See Figure 7-3) window allows the OTDR to automatically check the in-progress power readings against the threshold settings for specific wavelengths. If the in-progress power is less than the set threshold, the unit will display a FAIL message. The threshold setting can range from 20.00 to -65.00 dB. Each wavelength has its own setting.

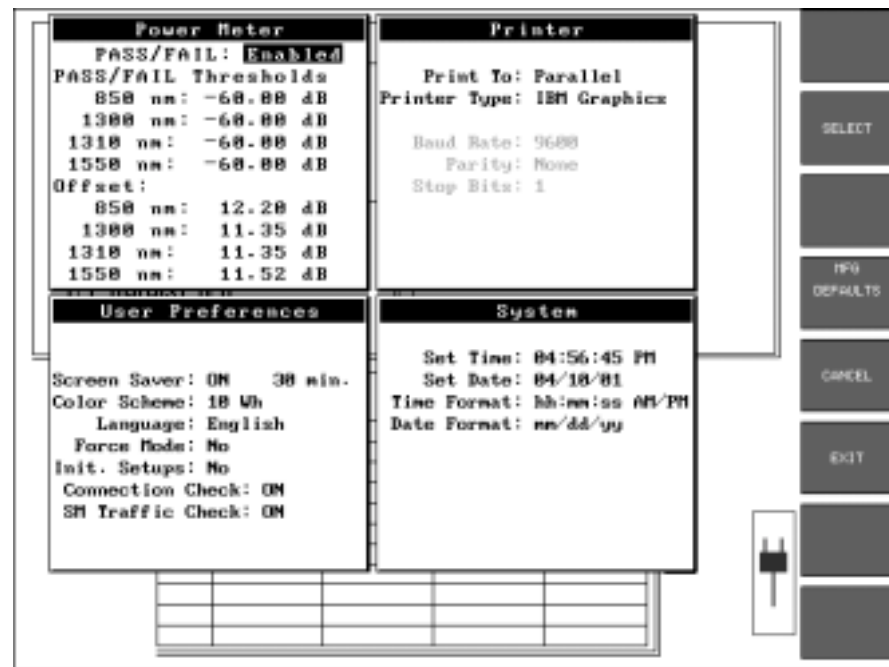


Figure 7-3: Power Meter Set-Up Screen

### 7.3.3 Print

The **Print** hardkey prints the Loss Table.

### 7.3.4 Start/Stop

The **Start/Stop** hardkey stores the current power meter reading into the table and selects a new data cell in the Loss Table when the table is on.

---

#### NOTE

Edit the Loss Table data in a saved table by selecting the data cell to be edited and storing a new power meter value into the cell.

---

### 7.3.5 Disk

The **Disk** hardkey allows the user to store data the same as in an OTDR mode of operation.

### 7.3.6 Horizontal/Vertical

The **Horizontal/Vertical** hardkeys allow the user to select a location in the Loss Table.



## 8.0 Visual Fault Locate Mode

The Visual Fault Locate mode provides the Corning Cable Systems 340 the ability to function as a visual fault locator. Connecting a fiber to the Visual Fault Locator (VFL) allows the unit to find breaks or severe bends in the fiber. The VFL produces a visible red glow at the break or bend. (See Figure 2-5 for the location of the optional Visual Fault Locator connection.)

---

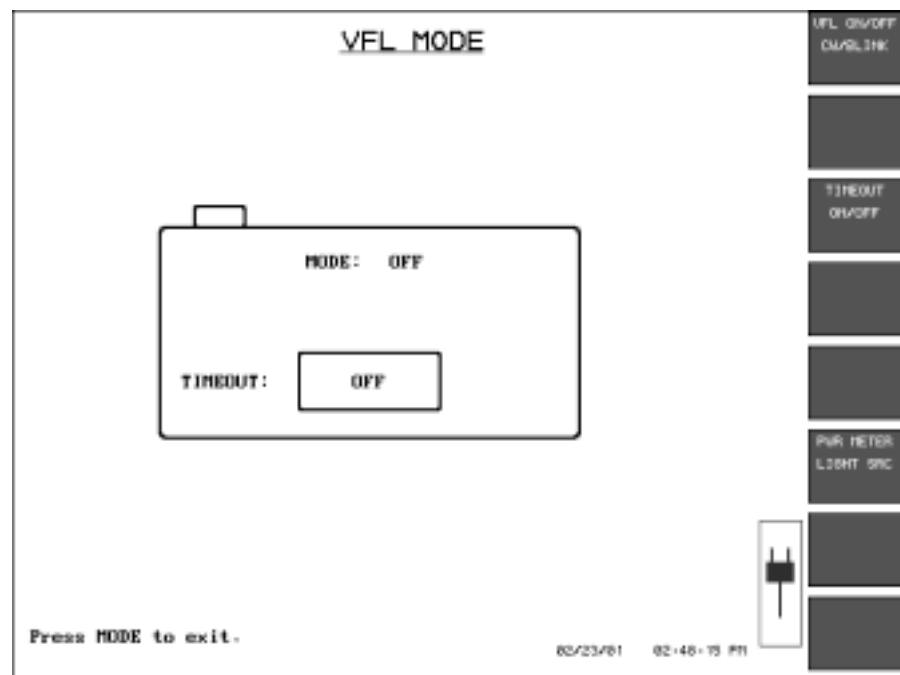
**NOTE**

The Visual Fault Locator is a field-installable option.

---

### 8.1 Visual Fault Locator Operation

Press the **VFL** softkey in the MODES Selection screen to display the screen in Figure 8-1.



*Figure 8-1: VFL MODE Screen*

### 8.1.1 VFL On/Off CW/Blink

Press this softkey to change the state of the light source. The light source will always be off when the mode is entered. There are three states available:

- CW**      Continuous Wavelength - Sends a steady stream of light through the fiber
- BLINK**   Modulation Mode (2HZ) - Turns the light source on and off 2 times per second
- OFF**      The light source is inactive

### 8.1.2 Timeout On/Off

The Timeout feature, when set to ON, automatically turns the laser off after 30 minutes if no keys are pressed. If the 340 is operating on battery power, the timeout occurs after 10 minutes.

---

#### NOTE

When the visible light source is on, a laser icon will flash in the upper left corner of the screen. Refer to the safety precautions in the front of the manual.

---

### 8.1.3 Mode

Press this hardkey to return to the MODES selection screen. The visible light source is automatically turned off. It remains off until the Visual Fault Locate mode is re-entered and the **VFL ON/OFF CW/BLINK** softkey is pressed.

## 9.0 Bidirectional Test Mode

Bidirectional Test Mode is designed to simplify and automate tests that are required when fiber is being installed. It is also designed for testing multiple fibers.

### 9.1 Entering Bidirectional Test Mode

Press the **BI-DIRECT TEST MODE** softkey from the Special Modes Selection screen to enter the BIDIRECTIONAL TEST MODE Input Form screen.

#### 9.1.1 Fiber Storage Information Window

Use the Fiber Storage Information window to enter information that describes the new test. This information will be used as header information for the trace files that are saved during the test cycle. It will also be used to create the base filename for saved traces.

---

#### NOTE

Read Caution regarding file saving in Section 12.1 before continuing with this procedure. It is also suggested that a directory for saving files should be created before beginning any file save procedure. Refer to Section 12.1.8 for making a directory.

---

**BIDIRECTIONAL TEST MODE**

**FIBER STORAGE INFORMATION**

Std Bidirectional Test Form

Save Path: **a:\N**

Near (Test) Site (A): **aaa**

Far Site (B): **bbb**

Direction:

<input checked="" type="checkbox"/> A -> B	Port A: <input checked="" type="checkbox"/> 1550 SM
<input type="checkbox"/> B -> A	<input checked="" type="checkbox"/> 1310 SM
<input type="checkbox"/> Autorange Once	
<input type="checkbox"/> Enable Overlay	
<input checked="" type="checkbox"/> Rapid Save Mode	
<input checked="" type="checkbox"/> Default Header	

No. of Fibers: **2**

Start No.: **1**

Base Filename: **aaaabb .HHH**

CONTINUE

SELECT

SELECT NEW HEADER

QUICK SETUP

BACK

Press CONTINUE to Begin Test Sequence

02/24/01 10:10:50 AM

*Figure 9-1: BIDIRECTIONAL TEST MODE Screen/FIBER STORAGE INFORMATION Window*

After entering all information as described in the following section, press the **CONTINUE** softkey or the **Start/Stop** hardkey to begin testing.

### 9.1.2 Editing Fiber Storage Information

Use the following methods to edit or enter information in the Fiber Storage Information box.

*For Text Editing:*

1. Use the **Vertical Expand/Contract** key to move between fields. The active field is highlighted and the Character Matrix is displayed in the lower left corner of the screen.
2. Use the **Marker Movement** keys to navigate through the Character Matrix. Highlight the desired character and Press the **M1/2 Sel** hardkey to insert the character into the active field.

*For Checkbox Selection:*

- 1. Use the **Vertical Expand/Contact** key to select the desired field. The selected checkbox has a ">" to its left.
- 2. Press the **SELECT** softkey to check or uncheck the box.

**INFORMATION FIELDS**

- Save Path** Specifies the directory path for trace data files created during a test. See Chapter 12.0 for directory path information that will make using this feature easier.
- Near (Test) Site (A)** Enter text that describes the location of the Corning Cable Systems 340 connected to the fiber under test (FUT).
- Far Site (B)** Enter text that describes the opposite end of the fiber under test (FUT).

**Direction**

- A to B (Test to Far)/  
B to A (Far to Test)* Select one of these to specify the direction in which a test is performed.
- Autorange  
Once* If checked, AutoMode will run before the data collect cycle of the first fiber test only; it will not be run for the rest of the test sequence.

---

**NOTE**

Checking this box activates AutoMode and overrides manual setting in Setups.

---

If unchecked, AutoMode will NOT be performed for any fiber test regardless of the AutoMode setting in Setups.

<i>Enable Overlay</i>	If checked, traces will be “swapped” into the overlay (background) before testing at the new wavelength commences to allow for visual comparison of the prior test trace and the trace currently averaging.
<i>Rapid Save Mode</i>	If checked, the unit saves the file without displaying the Event Table and Save File box after each test.
<i>Default Header</i>	<p>If checked, the unit uses its default header when saving a trace file.</p> <p>If unchecked, a custom header, if available, may be used.</p> <p>If unchecked, background traces are not displayed.</p>

**Port A** Lists available wavelengths for current module; more than one can be selected.

---

**NOTE**

Single-mode and multimode wavelengths cannot be mixed on a single test setup. When a wavelength is selected, the Corning Cable Systems 340 will deselect any wavelengths that do not match.

Typically, Port A is assigned as the single-mode fiber test port, and Port B as the multimode fiber test port.

On some quad-wavelength modules, multimode wavelengths will be tested under Port B to indicated the different physical location from the single-mode connector.

---

**No. of Fibers** Enter the number of fibers to test. The number of digits that can be entered is limited by the number of # signs entered as placeholders in the base filename. Example: Three ###'s in the base filename will allow for up to 999 fibers.

---

**NOTE**

If zero is entered in this field, the test cycle will continue until cancelled with a softkey or until the Corning Cable Systems 340 is turned off.

If a number is entered in this field, the Corning Cable Systems 340 will display a warning message when the maximum number of fibers has been tested.

---

**Start No.** Enter the number of the first fiber of a test sequence.

**Base Filename** Enter the base filename for fiber tests using the following format:

Test taken in A→B direction: aaabbb\_#.###

Test taken in B→A direction: bbaaa\_#.###

*where:*

- aaa = First three characters of the Test Site entry
- bbb = First three characters of the Far Site entry
- = Digits indicating wavelength (Use characters in Table 9-1)
- ### = Fiber number

The base filename will be displayed in the Fiber Storage Information window and can be edited.

**NOTE**  
Lower case letters in the base filename (as shown in the previous example) will automatically be substituted with letters from the Test Site and Far Site on a character-by-character basis. Upper case letters will remain in the filename as entered.

Wavelength	one_	two__
1550	5	15
1310	3	13
1300	0	30
850	8	85
1244	2	12
1410	4	41
1625	6	62
1650	6	65

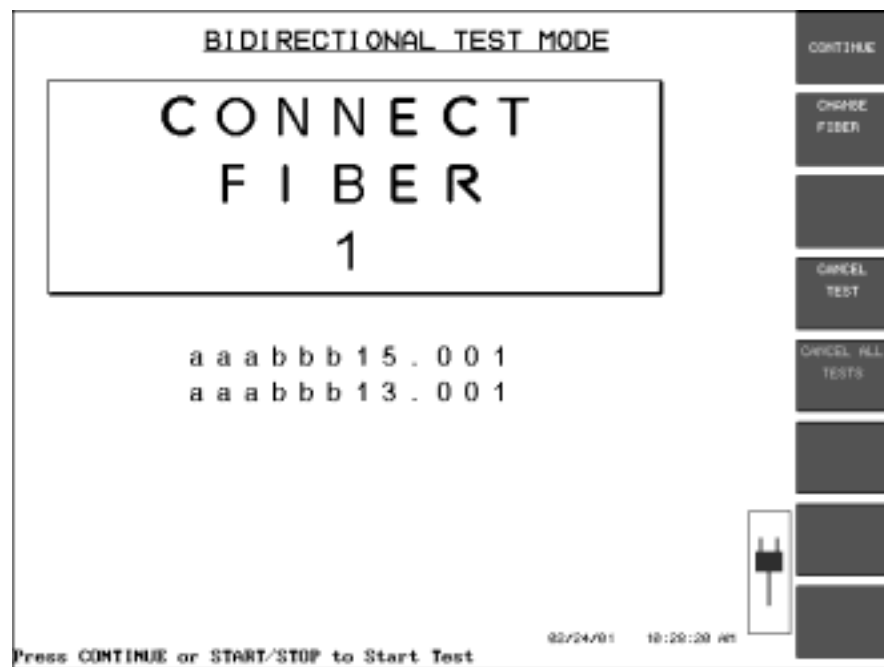
Table 9-1: Wavelength Conversion for Base Filename

SOFTKEYS	
<b>CONTINUE</b>	Begins the test sequence
<b>SELECT</b>	Toggles checkboxes On or Off
<b>SELECT NEW HEADER</b>	Select the standard header or a custom header, if available
<b>QUICK SETUP</b>	Accesses the Quick Setup screen: see Section 3.1 and Section 3.2 for information on Quick Setup and Additional Setup
<b>BACK</b>	Returns the unit to the MODES selection screen



## 9.2 Connect Fiber Screen

Pressing the **CONTINUE** softkey in the Fiber Storage Information window, displays the **CONNECT FIBER** screen (See Figure 9.2). The screen displays the filename of the fiber to be connected for verification purposes.



*Figure 9-2: CONNECT FIBER Screen*

Once the fiber is connected, press the **CONTINUE** softkey or the **Start/Stop** hardkey to begin testing. The 340 runs a fiber connection check (if it is selected in Additional Setup) and the results are displayed briefly if the connection is good.

If the connection is bad to fair, a message will be displayed to check or clean the connector and then press **CONTINUE** to proceed.

Press **CANCEL TEST** twice to cancel pending tests and return the unit to the Fiber Storage Information window.

Press the **CHANGE FIBER #** softkey to change the current fiber number.

### 9.3 Trace Display Window

After a good connection has been established, testing will begin and a Trace Grid window will be displayed (See Figure 2.3).

Also:

- All functions enabled in Quick and Additional Setups will run
- Automatic testing will be performed at the wavelength(s) selected on the Fiber Storage Information screen
- The display will indicate the function being performed and its progress
- The trace data on the grid will be updated while a data collect is in progress

At the completion of the test, either the Event Table (See Figure 9-3) is displayed or the unit returns to the Connect Fiber box, depending upon the mode selected in the trace display window. This cycle is repeated for the number of fibers entered on the Fiber Storage Information screen and continues until the **CANCEL TESTS** softkey is selected or until the **Mode** hardkey is pressed, returning the unit to the MODES selection screen.

#### 9.3.1 Check Result Mode/Rapid Save Mode

Softkey 1 toggles between **CHK RESULT MODE** and **RAPID SAVE MODE**. When the test begins running, the unit is in Rapid Save mode and the first softkey legend reads **CHK RESULT MODE**. When pressed, the unit enters the Check Results mode and the key toggles to read **RAPID SAVE MODE**.

**CHECK RESULT MODE** Press the **CHK RESULT MODE** softkey to enter this mode from the Rapid Save mode.

Once the trace is completed in the Check Result mode, the unit will display the Event Table as shown in Figure 9-3. Analysis (event table) softkeys—**PREVIOUS EVENT**, **NEXT EVENT**, **EVENT WINDOW**, and **EXIT**—displayed to allow viewing or editing of events.

TYPE	LOCATION(km)	LOSS(dB)	REFL(dB)
1	6.9468	0.35	
2	26.7520	0.30	
3	45.2801	0.14	
4	57.2063	0.13	
5	61.5967	-0.08	
6	63.8574	0.36	
7	70.2792	-0.23	

Figure 9-3: Bidirectional Mode Event Table

Press **EXIT** to display the Save File information box. The header information and filename information can be changed before saving the file to disk.

Press **SAVE FILE AND EXIT** to save the trace and return to the Connect Fiber screen to begin the next test. More detailed information on Event Tables is provided in Section 6.7 of this manual.

**RAPID SAVE MODE** The Rapid Save mode is the default save mode in Bi-Directional Testing, therefore testing automatically begins in the Rapid Save mode.

Press the **RAPID SAVE MODE** softkey to enter this mode from Check Result mode.

Rapid Save mode performs Event Analysis and file save operations without user intervention. Neither analysis results nor the file save entry screen are displayed as the unit automatically tests and saves traces at selected wavelengths, returning only to the Connect Fiber screen when a trace is finished.

Trace Display Window

Bidirectional Test Mode

## 10.0 Test Suite and Scheduled Test Modes

The Test Suite and the Scheduled Test modes provide a method of automatically performing several tests on a single fiber.

Test Suite mode is an automated, script-driven mode of operation. This allows true unattended testing of a fiber using the auto-filename and auto-save functions.

Four distinct tests for each wavelength may be performed.

### Test Suite

When all setups are complete, the **START TEST** softkey must be manually selected to begin testing. Once selected, the 340 automatically runs through all selected tests, unattended.

### Schedule Test

Where Test Suite mode requires a manual start to begin, Schedule Test provides the capability to set up the instrument to automatically begin and run a Test Suite sequence of tests at future dates and times.

All setups are selected the same as for Test Suite, except for selecting Schedule Test in the Mode field of the Switch Setup screen. Once completed, an **ARM SCHED TEST** softkey is available in place of the **START TEST** softkey. Pressing the **ARM SCHED TEST** softkey arms the unit to monitor the time and automatically begin testing at the selected dates and times. The Frequency field allows the you to run these tests on a daily or weekly basis.

### Accessing Test Suite mode

1. Press **SPECIAL MODES** on the MODES selection screen
2. Press **TEST SUITE MODE** to display the Switch Setup screen

### 10.1 Switch Setup Screen

The Switch Setup screen(See Figure 10-1) is the first screen displayed when entering Test Suite mode. Mode selection, file name format setup, wavelength selection, and test scheduling (if in Schedule Test mode) are all done in this setup screen.

## Mode

Select either Test Suite or Schedule Test mode. Selecting Test Suite activates the **START TEST** softkey. Press the **START TEST** softkey to begin testing.

Selecting Schedule Test activates the **ARM SCHED TEST** softkey. The unit is “armed” to automatically begin testing at the selected dates and times when this softkey is pressed.

## Selecting the mode

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to move the cursor to the Mode field.
2. Press **SELECT** to display the mode selection box.
3. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to highlight the desired mode.
4. Press **SELECT** or **ACCEPT** to enter the highlighted mode. The active mode is displayed in the Mode field.

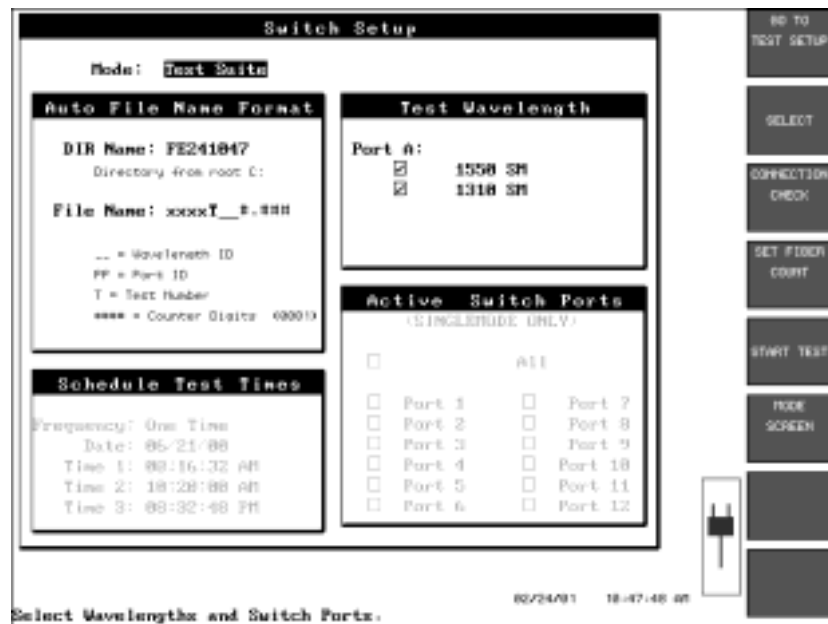


Figure 10-1: Switch Setup Screen

### Auto File Name Format

**DIRECTORY NAME** The trace files are saved into the directory name displayed in this field. The traces are saved to the Hard Drive only.

An 8-character directory name is automatically created based on the month/day, hour, and minute reflected in the current date/time of the instrument's real time clock. For example, if the current instrument date/time is 12-Jan-00, 3:30:00 PM, then the default directory name is: JA121530.

### Editing the directory name

1. Use the **Vertical Expand/Contract** key to move the cursor to the DIR Name field. When the cursor enters the Directory Name field the Character Matrix is displayed in the lower left corner of the display.
2. Use the **Horizontal Expand/Contract** key to highlight a character in the Directory Name field and the Character Matrix (See Section 2.1.3) or optional ASCII keyboard to change the character.

If the directory does not exist, it will be created.

Directory naming conventions must be DOS compatible (e.g. no spaces or “illegal” characters are allowed) and are limited to a maximum of 8 characters.

**FILE NAME** Set up the filenames convention by editing the base file name displayed in this field, using the following placeholders:

--	= Wavelength
PP	= Port ID ( <i>this feature is not applicable for the current version</i> )
T	= Test Number ( <i>must use upper case</i> )
####	= Counter Digits

### Editing the file name

1. Use the **Vertical Expand/Contract** key to move the cursor to the File Name field.
2. Use the **Horizontal Expand/Contract** key to highlight a character in the Directory Name field and the Character Matrix (See Section 2.1.3) or optional ASCII keyboard to change the character.

**FIBER COUNT** The Fiber Count (Start Number) is displayed in red next to the Counter Digits field in the Auto File Name Format box. This value is incremented whenever a new Optical Port position is enabled. It may be set manually when required.

The Start Number (or Fiber Count number) may be set from 1 to 9999.

#### Setting the fiber count number for the pending test cycle

1. Press **SET FIBER COUNT** (F4); the Fiber Count dialog box will overlay the setup screen and the softkeys will change (See Figure 10-2).

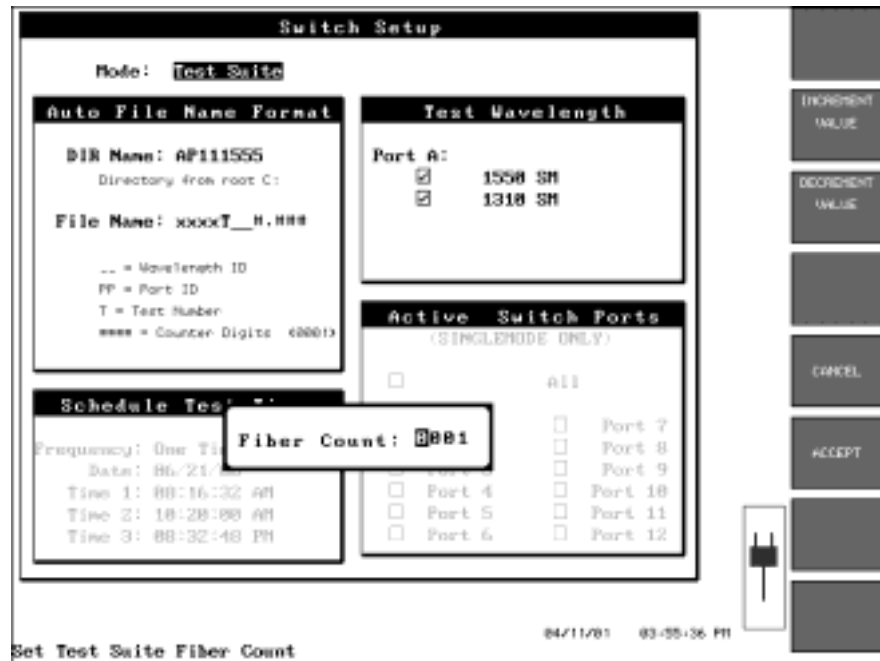


Figure 10-2: Fiber Count Selection Dialog Box

2. Use the **Horizontal Expand/Contract** key to highlight a number.
3. Press **INCREMENT VALUE** (F2) or **DECREMENT VALUE** (F3) to change the number.
4. Press **ACCEPT** (F6) to accept the new start number and return to the Switch Setup screen.



## Schedule Test Times

### NOTE

The Schedule Test Times box is only active when Schedule Test is first selected in the Mode field.

Specify the frequency (One Time, Daily, or Weekly), as well as start dates/times (up to three), for running scheduled tests. The tests will be based upon the wavelengths specified in the Switch Setup screen, as well as the parameters set in the Test Suite Setup screen.

**FREQUENCY** The displayed frequency determines how frequently the selected Test Suite sequence will run.

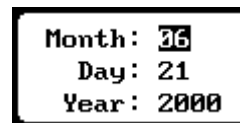
### Setting the frequency

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to move the cursor to the Frequency field; the frequency is highlighted.
2. Press **SELECT** (F2) to toggle through the selections; Weekly, Daily, One Time, until the desired setting is displayed.

**DATE** Determines the start date for the scheduled test suite sequence.

### Setting the date:

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to move the cursor to the Date field; the date is highlighted.
2. Press **SELECT** (F2). A date dialog box will overlay the setup screen and the softkeys change.



*Figure 10-3: Date Dialog Box*

3. Use the **Vertical Expand/Contract** key to scroll through the month, day and year settings and highlight the desired field.
4. Press **INCREMENT VALUE** (F2) or **DECREMENT VALUE** (F3) to change the current setting of the highlighted field.

5. Press **ACCEPT** (F6) to accept the date and close the dialog box.

**TIME** Schedule up to three start times for the test suite sequence.

#### Setting Time 1, 2 or 3

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to move the cursor to the desired Time field; the time will be highlighted.
2. Press **SELECT** (F2). A time dialog box overlays the setup screen and the softkeys change.
3. Use the **Vertical Expand/Contract** key to select the hour, minute, second, or AM/PM field.
4. Press **INCREMENT VALUE** (F2) or **DECREMENT VALUE** (F3) to change the current setting of the highlighted field.
5. Press **ACCEPT** (F6) to set the time and close the dialog box.

#### Test Wavelength

The Test Wavelength window displays the currently available wavelengths, which are dependent upon the instrument's optics module.

Single-mode (SM) and multimode (MM) wavelengths are provided on separate optical port connectors (Port A and Port B), but cannot be mixed. Therefore, if a single-mode wavelength is selected for Port A and a multimode wavelength for Port B, the wavelength selected for Port A will automatically be deselected.

#### Selecting the desired wavelength

1. Use the **Vertical Expand/Contract** key to move the cursor to the desired wavelength checkbox. The currently selected checkbox is indicated by a ">" to the left of the box.
2. Press **SELECT** (F2) to select/deselect a wavelength. A checkmark will appear in the box when selected.

### Active Switch Ports

*This feature is not currently available as noted by the dimmed selections on the screen.*

When all Switch Setup selections have been made, the following softkeys are available for beginning testing, accessing further setups, or returning to the Mode selection screen:

Softkey number	Label	Function
F1	GO TO TEST SETUP	Displays the Test Setup screen
F2	SELECT	
F3	CONNECTION CHECK	Starts a Connection Check process (to verify fiber connection)
F4	SET FIBER COUNT	Displays Fiber Count dialog
F5	START TEST (Test Suite selected in Mode field)	Begins a full test cycle
	ARM SCHED TEST (Schedule Test selected in Mode field)	Arms unit to monitor time and begin scheduled tests
F6	MODE SCREEN	Returns unit to the Mode selection screen

## 10.2 Test Suite Setup Screen

Press **GO TO TEST SETUP** (F1) to display the Test Suite Setup screen.

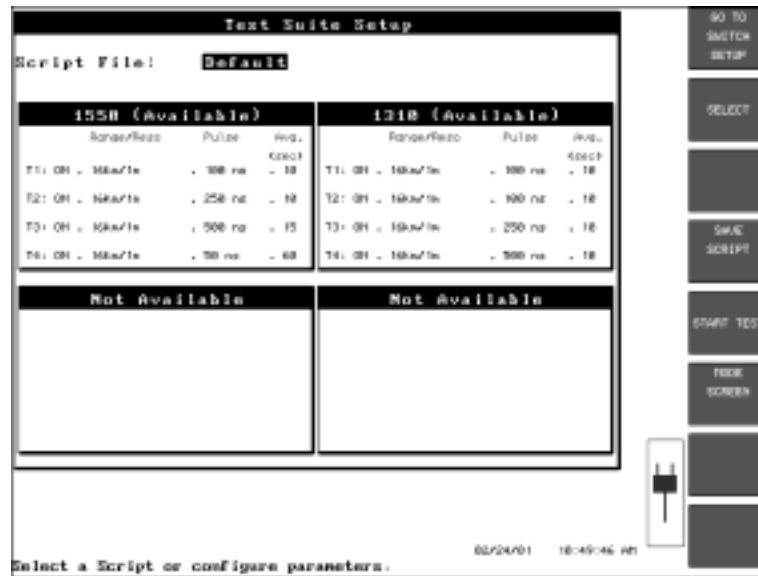


Figure 10-4: Test Suite Setup Screen for Two Wavelengths

The Test Suite Setup screen contains four wavelength test parameters setup windows.

Up to four tests are possible in a wavelength window and each test may be set up with unique parameters for Range/Reso, Pulsewidth and Averaging Time. Post processing of the trace files allows keeping those tests which produce the most desirable results, and discarding the rest.

Active windows are labeled “*Wavelength*” (*Available*) and contain selectable test options for up to four tests per wavelength. The other windows are labeled either *Not Available* or *Not Selected*, depending upon the wavelength checkbox setting in the Switch Setup screen.

Test parameters in these windows can be entered manually or loaded from a Script File (See Section 10.2.2).

### 10.2.1 Manually Setting Test Parameters

1. Press **GO TO TEST SETUP** to display the Test Suite Setup screen (See Figure 10-4).
2. Select/enter test parameters for each field as described in this section.

**ON/OFF** Enables/disables a particular test (T1-T4).

- Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to scroll to the ON/OFF field for a particular test and press **SELECT** (F2) to toggle between ON and OFF.

**RANGE/RESO** The Range/Reso pull-down menu allows the user to select the desired range and data point spacing (resolution) for each of the enabled tests (T1-T4). The choices reflect the distance units currently specified in Setups.

---

#### NOTE

Changing a Range/Reso value may result in the current pulsewidth value being forced to a different value. The OTDR limits, or restricts, certain pulsewidths based on the current Range/Reso setting.

---

#### Setting the Range/Reso

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to scroll to the Range/Reso field for a particular test.
2. Press **SELECT** (F2) to display a pop-up menu of available choices.
3. Scroll through the choices using the **Vertical Expand/Contract** key or the **Marker Movement** keys to highlight the desired selection.
4. Press **SELECT** (F2) to activate the selection.

**PULSE** This field determines the pulsewidth setting for each test.

---

#### NOTE

Some pulsewidths may be unavailable (dimmed) in the pull down menu. Availability is dependent upon the range setting; therefore, if the desired pulsewidth is unavailable, the range value should be changed. *(For a shorter pulsewidth, select a shorter range value. For a longer pulsewidth, select a longer range value.)*

---

**Setting the pulsewidth:**

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to scroll to the Pulsewidth field for a particular test.
2. Press **SELECT** (F2) to display a pop-up menu of available choices.
3. Scroll through the choices using the **Vertical Expand/Contract** key or the **Marker Movement** keys to highlight the desired selection.
4. Press **SELECT** (F2) again to activate the selection.

**Avg** This field determines the averaging time (5 seconds to 180 seconds) for each test.

**Setting the averaging time:**

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to scroll to the Avg. field for a particular test.
2. Press **SELECT** (F2) to display a pop-up menu of available choices.
3. Scroll through the choices using the **Vertical Expand/Contract** key or the **Marker Movement** keys to highlight the desired selection.
4. Press **SELECT** (F2) again to activate the selection.

Once all Switch Setup selections have been made, the following softkeys are available for beginning testing, accessing further setups, or returning to the Mode selection screen:

Softkey number	Label	Function
F1	GO TO SWITCH SETUP	Displays the Switch Setup screen
F2	SELECT	Selects active parameter for editing
F4	SAVE SCRIPT	Saves current test setups to the selected Script file
F5	START TEST (Test Suite selected in Mode field)	Begins a full test cycle
	ARM SCHED TEST (Schedule Test selected in Mode field)	Arms unit to monitor time and begin scheduled tests

F6	MODE SCREEN	Returns unit to the Mode selection screen
----	-------------	---

### 10.2.2 Setting Test Parameters Using Script Files

Once a set of test parameters is entered, the current selections may be saved in a “Test Script” file for future recall. The instrument supports up to 4 script files: Default, Script1, Script2 and Script3. These filenames are “hard-coded” and must not be renamed.

#### NOTE

At initial Power-Up, a newly upgraded instrument does not have any test script files on the hard drive. The instrument pre-fills the Test Setup screen with standard factory default values (128 km/ 8m, 2500 ns, 60 sec. avg time). These values may be modified and saved to one of the script files in the Script file field. See “Saving a script file” on page 119.

#### Saving a script file

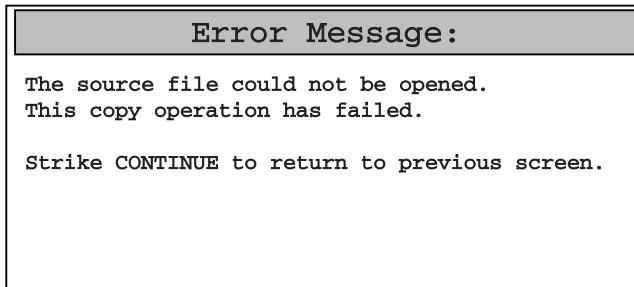
1. Select a *Script* from the pull down list.
2. Modify the desired test parameters.
3. Press **SAVE SCRIPT** (F5) to save these parameters to this script file. “FILE SAVED” will be displayed on the screen next to the Script File field.

The Test Script may now be recalled at a later time to facilitate testing.

#### Selecting a script file

1. Use the **Vertical Expand/Contract** key or the **Marker Movement** keys to scroll to the Script file field.
2. Press **SELECT** (F2) to display a pop-up menu of script files.
3. Scroll through the choices using the **Vertical Expand/Contract** key or the **Marker Movement** keys to highlight the desired selection.
4. Press **SELECT** (F2) again. The name of the selected script file will be displayed in this field.

If the Test Script file does NOT exist, a warning message will be displayed (See Figure 10-5) and the message “Invalid File” will be displayed next to the Script File field.



*Figure 10-5: Invalid Script File Error*

If the desired Test Script DOES exist, the Test Setup parameters will be reflected in the Test Setup windows for each wavelength in the Test Script, and the message "FILE LOADED" will be displayed in red next to the Script File field.

Once the script parameters have been loaded, the same softkeys and options are available as with manually setting parameters (see page 118).

### **Script Files and Optics Modules**

The information in the Test Scripts is dependent on the Wavelengths available in the currently attached Optics Module. If Test Scripts are generated on a particular instrument, and then the Optics Module is changed to a module containing different laser wavelengths, an error message will be posted when an attempt to load a Test Script is made. No attempt is made to delete the Test Script file(s). You may overwrite the Test Script(s) to accommodate the new Optics Module.



### 10.3 Connection Check

Initiate the Connection Check process from the Switch Setup screen to verify the fiber connection to the OTDR.

#### Running a Connection Check

1. Go to the Switch Setup screen and press **CONNECTION CHECK** (F3); the Connection Check screen is displayed.

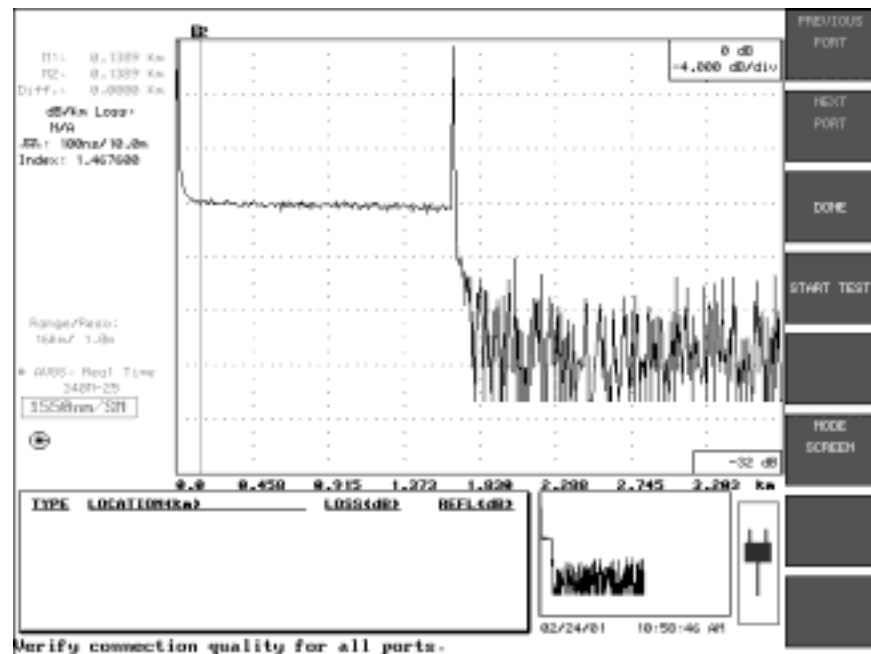


Figure 10-6: Test Suite Connection Check Screen

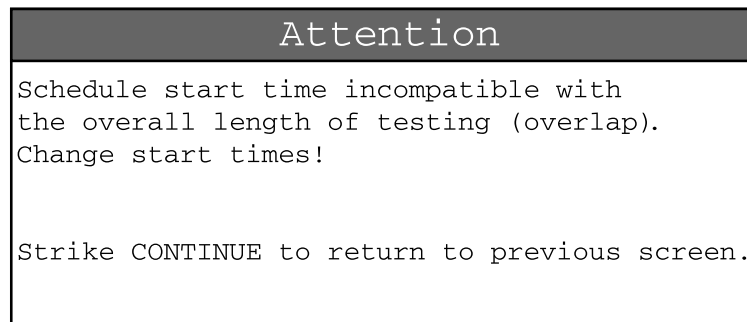
2. Press **START TEST** to initiate a test sequence, or press **DONE** go return to the Switch Setup screen.

#### NOTE

The Test Suite Mode may be cancelled at any time by pressing the **MODE SCREEN** softkey.

#### 10.4 Executing a Scheduled Test Sequence

1. Select Schedule Test in the Mode field of the Switch Setup screen and complete all other desired setups.
2. Press **ARM SCHED TEST** (F5) to place the instrument in the “armed” or standby mode. The unit will proceed to the Trace Grid screen.
  - The unit is now “armed” to monitor the current date/time and trigger the start of the Test Suite sequence when the current date/time matches any of the programmed date/times.
  - In the “armed” mode, the only available softkey on the screen is **CANCEL SCHED TEST** (F2) and may be pressed to end the test cycle.
  - If the software detects a conflict (e.g.: two hour tests scheduled one hour apart) when **ARM SCHED TEST** is pressed, the “overlap” warning message in Figure 10-7 is displayed.



*Figure 10-7: Scheduled Test Overlap Warning*

If this message is encountered, press **CONTINUE** to return to the setup screen and adjust the start times.

### 10.5 Executing a Test Suite Sequence

Start the test sequence from the Connection Check screen or from the Test Setup screen (See Figure 10-4).

- Press **START TEST** (F5) to begin the Test Suite sequence; the trace grid is displayed and the test sequence starts.

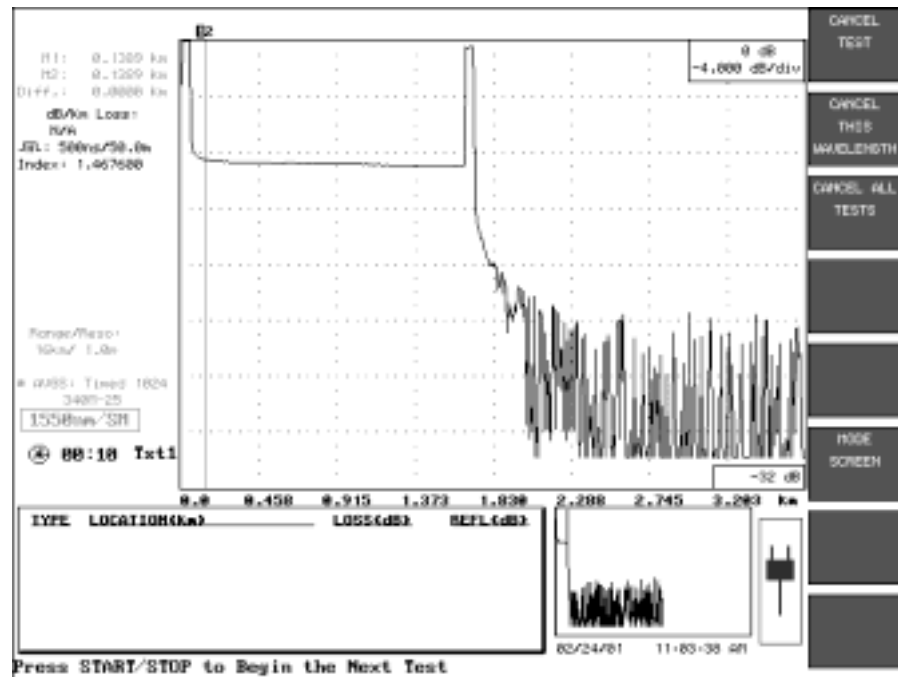


Figure 10-8: Test Data (Trace) Screen

The current Test Number is displayed in the status area directly above the Event Table.

Softkey number	Label	Function
F1	CANCEL TEST	Cancels current test
F2	CANCEL THIS WAVELENGTH	Cancels all pending tests for current wavelength
F3	CANCEL ALL TESTS	Cancels all tests for all wavelengths
F6	MODE SCREEN	Return to the Mode selection screen

Press the appropriate softkey to cancel according to the preceding table. In the event that ALL TESTS are cancelled, the instrument will revert to the Switch Setup screen.

## 10.6 Test Completion

As each fiber test is completed, the trace file is automatically saved to the directory specified in the Switch Setup screen. The filename is based on the current File Name format and the current Fiber Count number.

When all of the requested tests are completed, the instrument returns to the Switch Setup screen. The Fiber number displayed in the Counter Digits field (See Figure 10-1) reflects the next Fiber Count value to be used. It is not necessary to adjust or reset the Fiber Count number other than to reset it to 0001.

If the Fiber Count number is reset to “0001,” a new Directory should be entered for subsequent file saving on subsequent fiber tests to avoid overwriting previously saved files.

## 10.7 Hard Keys

The **Start/Stop**, **SmartTest**, **Disk**, **Set-Up**, **Wavelength**, and most other hardkeys functions **are not** available during a Test Suite cycle. All parameters are therefore locked into the settings displayed in the Test Setup screen shown in Figure 10-4.

## 11.0 Dual Pulsewidth Mode

Dual Pulsewidth testing is an advanced feature that allows fiber testing with both short (High-Resolution) and long (High-Dynamic Range) pulsewidths in a single test. Both the short and long pulsewidth traces are displayed and a single “merged” event table is created.

Dual Pulsewidth testing generates and saves three files: a Short Pulse trace, a Long Pulse trace, and a combined long pulse trace/merged event table file.

A common application of the Dual Pulsewidth Mode is for measuring loss on substantially long lengths of fiber (requiring a long pulsewidth) while maintaining the ability to differentiate and measure splices, connections and faults which are in close proximity to the OTDR bulkhead (requiring shorter pulsewidth waveform).

Press the **SPECIAL MODES** softkey on the MODES selection screen to display the **DUAL PULSEWIDTH** softkey.

Press the **DUAL PULSEWIDTH** softkey to display the Dual Pulsewidth TEST MODE screen. (See Figure 11-1)

## 11.1 Dual Pulsewidth Information Window

**DUAL PULSEWIDTH TEST MODE**

Base Filename:

Use "H" characters (1 to 4 max) to identify the auto-incrementing field position and width.

Use "\_" character (1-2) to identify wavelength ID field position and width.

Use "S" character to identify PW type Field (S=SHORT, L=LONG, H=MERGED).

**DUAL PULSEWIDTH INFORMATION**

Dual Pulsewidth Mode Test Setup

Save Path: A:\N

☐ Autorange Once

☐ Rapid Save Mode

Port A:

☒ 1550 SM

☒ 1310 SM

Start No.: 0001

Save Filename: aabb0000.g

Character Matrix:

Ctrl	Del	Boy	Cap
A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P
Q	R	S	T
U	V	W	X
Y	Z	0	1
2	3	4	5
6	7	8	9
*	(	)	+
=	!	@	#
\$	%	^	&
*	(	)	+
<	:	"	'
>	;	`	~
/	/	/	/

Press CONTINUE to Begin Test Sequence

9/17/01 11:38:02 PM

Figure 11-1: DUAL PULSEWIDTH TEST MODE/  
INFORMATION Screen

The information entered in the Information window determines trace header information and the base filename for saving files during the test cycle.

### 11.1.1 Editing Dual Pulsewidth Information

Use the following methods to edit or enter information in the Dual Pulsewidth box

*For Text Editing:*

1. Use the **Vertical Expand/Contract** key to move between fields. The active field is highlighted and the Character Matrix is displayed in the lower left corner of the screen.
2. Use the **Marker Movement** keys to navigate through the Character Matrix. Highlight the desired character and Press the **M1/2 Sel** hardkey to insert the character into the active field.

*For Checkbox Selections:*

- 1. Use the **Vertical Expand/Contact** key to select the desired field. The selected checkbox will have a “>” to its left.
- 2. Press the **SELECT** softkey to check or uncheck the box.

**11.1.2 Information Fields**

<b>Save Path</b>	Specifies the drive and directory where trace files are to be saved.
<b>Autorange Once</b>	<p>When this box is checked, AutoMode will run before the data collect cycle of the first test only. The 340 will automatically select the pulsewidth, range and resolution for the long pulsewidth portion of the test.</p> <p>If unchecked, the 340 will use the settings from the Manual Test Mode setup screen for the long pulsewidth.</p>

---

**NOTE**  
The short pulsewidth will ALWAYS be 100 ns.

---

<b>Rapid Save Mode</b>	Makes Dual Pulsewidth a one-button test. When checked, the instrument will perform analysis (if set to ON in Setups) and save the trace without any user intervention.
------------------------	--

<b>Port A</b>	Lists the available wavelengths for the current module. More than one wavelength can be selected.
---------------	---

---

**NOTE**  
Port A is assigned as the single-mode fiber test port and displays the available wavelengths. Port B is assigned as the multimode fiber test port which this mode does not support.

---

**Start No.** Specifies the number of the first fiber to be tested. Up to four digits may be entered. This is an auto-incrementing mode and will increment this number by one each time a test is begun.

**Base Filename** Specifies the base filename for fiber tests.

Use # characters (1 to 4 max) to identify the autoincrementing field position and width.

Use “\_” characters (1 or 2) to identify wavelength ID field position and width. (See “Table 9-1: Wavelength Conversion for Base Filename” on page 104.)

Use “&” character to identify PW type field. The 340 will insert “S” for short pulse trace, “L” for long pulse trace, and “M” for the merged trace file.

**Example:** tst####.\_\_&

Use “@” character to indicate Single-mode (S) or Multimode (M).

Press **CONTINUE** to display the Connect Fiber screen when all information has been entered.

Press **MODE SCREEN** to return to the Operating Mode Selection Screen.



## 11.2 Connect Fiber Screen

The Connect Fiber screen (See displays a prompt to connect the fiber to be tested. Verify that all file names displayed are correct for the fiber being connected.

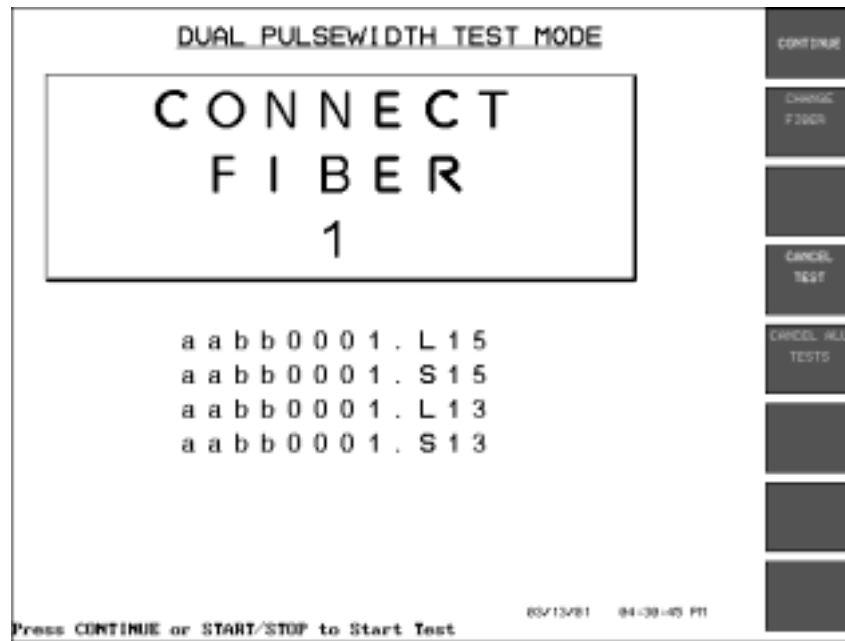


Figure 11-2: DUAL PULSEWIDTH TEST MODE, CONNECT FIBER Screen

## 11.3 Testing

Press **CONTINUE** again or the **Start/Stop** hardkey to begin testing once the fiber is connected. The long pulsewidth is tested first.

### NOTE

The Corning Cable Systems 340 always selects a 100 ns (10 meter) pulse and a Range/Resolution combination of 16 km/1 m for the Short Pulse portion of the test. This setting assures good deadzone performance and a combination that works well with the 340's analysis software.

Press **CANCEL TEST** to return to the Information screen to make any changes.

Press the **Mode** hardkey to return to the Operating Mode selection screen to select another mode.

Press the **Set-Up** hardkey to change test parameters during testing.

If the Rapid Save Mode box was checked in the Dual Pulsewidth information screen, the trace will be saved to the designated Drive:Directory automatically, and the second test (short pulsewidth) will start once the first test is completed.

If the Rapid Save Mode box was not checked, the Event Table will be displayed over the trace grid display, and the table can be traversed to inspect the events. To view the Event Window for a selected event, highlight the event in the table, and then press the **EVENT WINDOW** softkey. This will display the Trace Grid, along with the Event Window (See Figure 5-3), for the highlighted event.

Press **EXIT** to return to the Event Table.

Press **EXIT** again to display the AutoSave Screen. Filename information can be verified or edited. The AutoSave default directory is "A:" for Dual Pulsewidth mode. Be sure to have a diskette inserted into the floppy drive, or press **CHANGE DIRECTORY** and then press **CHANGE DRIVE**, and select "C:" before saving the file. More information on saving traces can be found in Chapter 12.0 of this manual.

Press **SAVE FILE AND EXIT** to return to the CONNECT FIBER screen and begin another test.

The second test will be performed at the same wavelength, but the data collect parameters are forced to 16 km/1 m, 100 ns pulsewidth. The filename for this scan will contain an "S" character based on where the "&" placeholder is located in the Base filename string. The first trace is sent to the background and the second trace begins.

When the second trace is completed, information from the two traces is merged into one event table.

If more than one wavelength was selected, the instrument proceeds automatically to perform testing at the second wavelength.

If only one wavelength was selected, the instrument will stay in the trace view mode and allow inspection of both traces and their event tables, and will not proceed to the next test until the **Start/Stop** hardkey is pressed.

Testing

Dual Pulsewidth Mode

## 12.0 Save and Print Functions

### 12.1 Mass Storage Main Menu

The MASS STORAGE menu can be accessed while the Trace Grid is displayed. Additionally, Mass Storage can be entered when in the MODES selection screen and the Power Meter/Light Source mode information screen.

**CAUTION:** The OTDR can only display a maximum of 1000 files in any of its hard drive or floppy directories, although more files may actually reside in the directory. It is recommended that caution be exercised when saving trace files to the hard drive by trying to limit the number of files in any given subdirectory to less than 1000.

When using Select All to copy, upload or delete files, a maximum of 1000 files are selected, even though there may be more than 1000 files in the directory. Therefore, if the intent is to delete ALL files in a subdirectory, be aware that after deleting all files selected using Select All, the DELETE FILE(S) process needs to be repeated to ensure that no more files exist.

**EXCEPTION:** The root directory of the hard drive is limited to 512 entries, where files and subdirectories are considered “entries.” This is a standard DOS limitation.

- Press the **Disk** hardkey to display the Mass Storage menu shown in Figure 12-1.



Figure 12-1: MASS STORAGE Menu

- Press the **Vertical Expand/Contract** keys to move through the menu selections.
- Select the highlight option by pressing the **M1/2 Sel** hardkey or the **SELECT** softkey. Selection is confirmed by a highlighted arrow to the left of the menu item.
- Press the **EXIT MASS STORAGE** softkey to return the Corning Cable Systems 340 to the previous state.

#### 12.1.1 Save File

Trace data recorded by the 340 OTDR can be stored to floppy disk, hard disk, or nonvolatile internal storage using the Save File function. Trace files will be stored in the format specified in the Save File field in Additional System Setups.

---

#### NOTE

If AutoSave is enabled, please refer to Section 12.2.

---

- TO SAVE A TRACE FILE**
1. Select the *SAVE FILE* option from the Mass Storage main menu. The *SAVE FILE* screen will be displayed. (See Figure 12-2.)

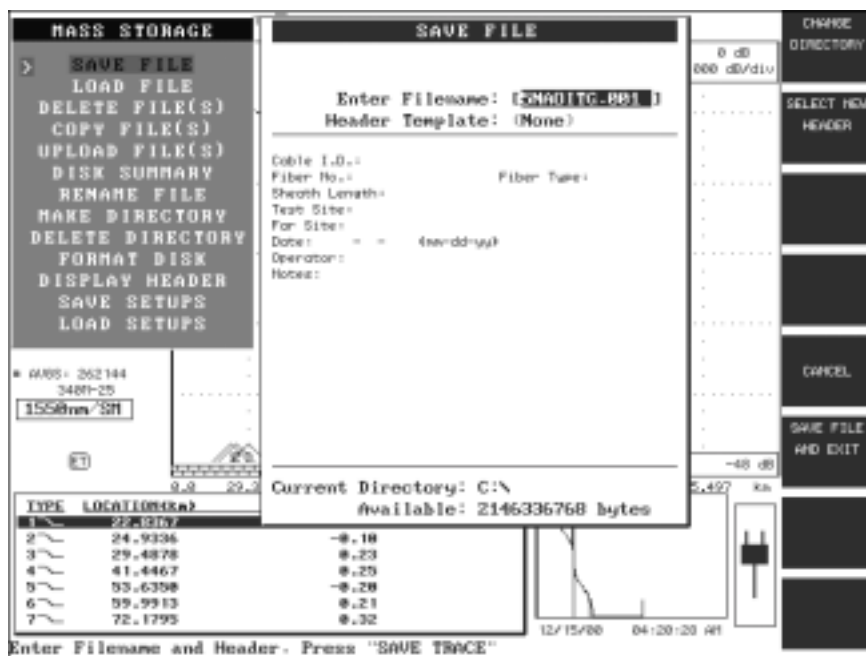


Figure 12-2: SAVE FILE Window

#### NOTE

In Bidirectional Test mode, the SAVE FILE Window displays all information for the currently displayed trace and is non-editable. The following procedure is mainly used in Manual Test mode, but can also be used in Autoincrementing and Dual Pulsetwidth modes.

2. Enter a filename for the primary trace in the Filename field using the Character Matrix (See Section 2.1.3) or the optional external keyboard. File names must be in MS-DOS compatible format – a maximum of an eight character name, a period and an optional three character extension, for example, ABCDEFGH.TRC. The first character must be a letter or a number.

3. Press **CHANGE DIRECTORY** to save to a different directory than the one listed. Once this softkey is pressed, a different drive may also be selected.

---

**NOTE**

If it is necessary to save the trace to a different drive, press **CHANGE DRIVE** to select a new default drive and then press the **ACCEPT** softkey to gain access to the files in the selected drive.

---

4. Press **SELECT NEW HEADER** to change the Header format.

---

**NOTE**

The information in the Header Template field is determined by the Save File format selected in System Setup or by a custom header file. (See Section 12.4 for information on how to create a custom header.)

---

5. Enter the Header information into the fields in the center of the screen.
6. Press **SAVE FILE AND EXIT**. An icon will be displayed in the Status Box to indicate a trace save in progress.
7. Press **CANCEL** to return to the Mass Storage menu without saving the trace file.

**12.1.2 Load File**

Besides files saved in the native Corning Cable Systems 340 format, the Corning Cable Systems 340 is able to recall:

- 383/K2310 formats
- GR-196 – Telcordia defined universal trace formats
- TD-3000, TD-3486 format
- TD-2000 format
- TD-9950 format
- TD-9960 format
- TD-1000 format



**TO RECALL A TRACE  
FILE**

1. Select the *LOAD FILE* option from the Mass Storage main menu.  
A directory list of all the files stored on the current selected storage device is displayed.

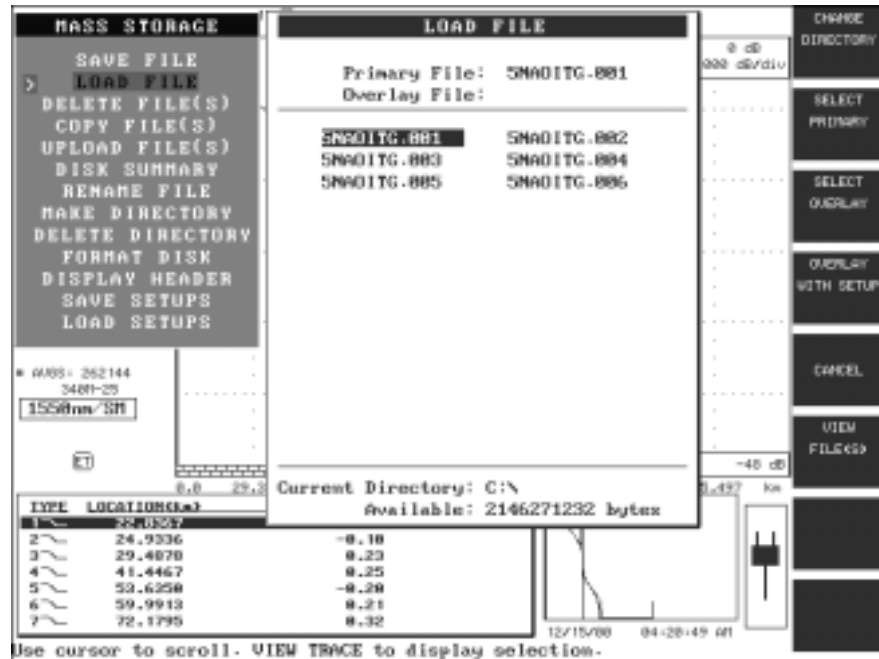


Figure 12-3: *LOAD FILE Window*

2. Press **CHANGE DIRECTORY** to obtain a list of available directories on the selected drive if the directory shown is not the one desired.
3. Press **CHANGE DRIVE** to select a new default drive from a list of the available drives.
4. If the Directory or Drive is changed, press the **ACCEPT** softkey to gain access to the files in the selected Drive/Directory.
5. Scroll through the list of names using the **Marker Movement** keys, **Expand/Contract** hardkeys or arrow keys on the optional keyboard (if attached).

6. Press **PRIMARY TRACE** to select the primary trace. The selected file name will appear in the Primary Trace File field
7. Press **VIEW FILE(S)** to load the selected file as the primary trace. The 340 will return to the main grid screen.

An overlay trace can be recalled from the Load File option, also. See Chapter 6.0 for a detailed explanation of the procedure.

Pressing the **OVERLAY WITH SETUPS** softkey causes the 340 trace parameters to change, matching those saved with the selected trace file. The instrument will immediately exit from Mass Storage mode and return to the trace grid screen. When you press the **Start/Stop** key, the new primary trace will be collected using the overlay trace parameters.

### 12.1.3 Delete File(s)

Select files for deletion from a directory list of all the files stored on the currently selected storage device.

#### **WARNING**

See the **CAUTION** box on page 133

#### **TO DELETE A TRACE FILE**

1. Select the *DELETE FILE(S)* option from the Mass Storage Main Menu to display a directory list of all the files stored on the selected storage device. The first file in the list is highlighted.
2. Press **CHANGE DIRECTORY** to obtain a list of available directories on the selected drive if the directory shown is not the one desired.
3. Press **CHANGE DRIVE** to select a new default drive from a list of the available drives.
4. If the Directory or Drive is changed, press the **ACCEPT** softkey to gain access to the files in the selected Drive/Directory.

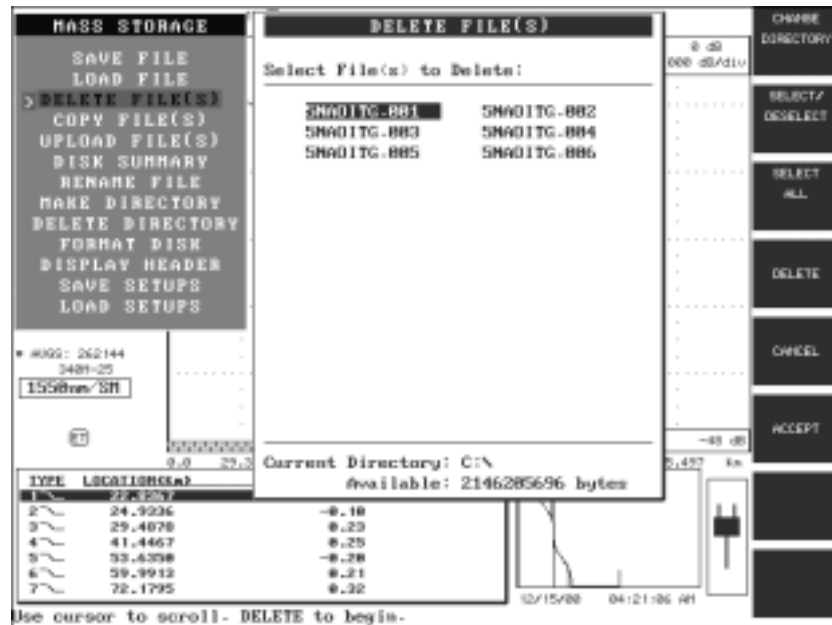


Figure 12-4: DELETE FILE(S) Window

5. Scroll through the list of names using the **Marker Movement** keys, **Expand/Contract** hardkeys or arrow keys on the optional keyboard (if attached).
6. Press the **SELECT/DESELECT** softkey to tag the highlighted file with an arrow on the right to signify that this file has been selected for deletion.
  - Multiple files may be tagged.
  - Press the **SELECT/DESELECT** softkey when a file that has already been selected is highlighted to deselect it.
  - Press the **SELECT ALL** softkey to tag all of the displayed files for deletion. After you press this key the softkey label changes to read **DESELECT ALL** so that all files may be un-tagged.
7. Press the **DELETE** softkey to initiate the deletion process.
8. Press **ACCEPT** to complete the deletion process.

- 9. Press **CANCEL** to exit.

12.1.4 Copy File(s)

Use the Copy File(s) option to copy one or more files from a designated source directory to a specific destination directory.

**WARNING**

See the CAUTION box on page 133.

TO COPY FILES ON THE  
340

- 1. Select the *COPY FILE(S)* option from the Mass Storage Main Menu. The COPY FILE window (Figure 12-5) is displayed containing a list of files on the current directory, which is listed in the Source Directory field in the upper section of the screen.

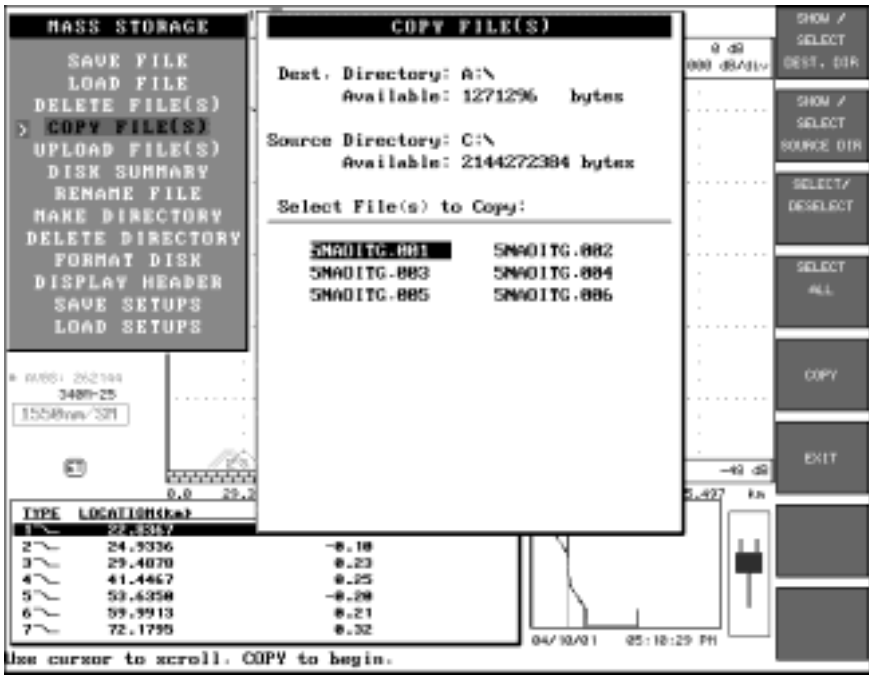


Figure 12-5: COPY FILE(S) Window

- 2. Press the **SHOW/SELECT SOURCE DIR** softkey. The softkey labels will change to the following:

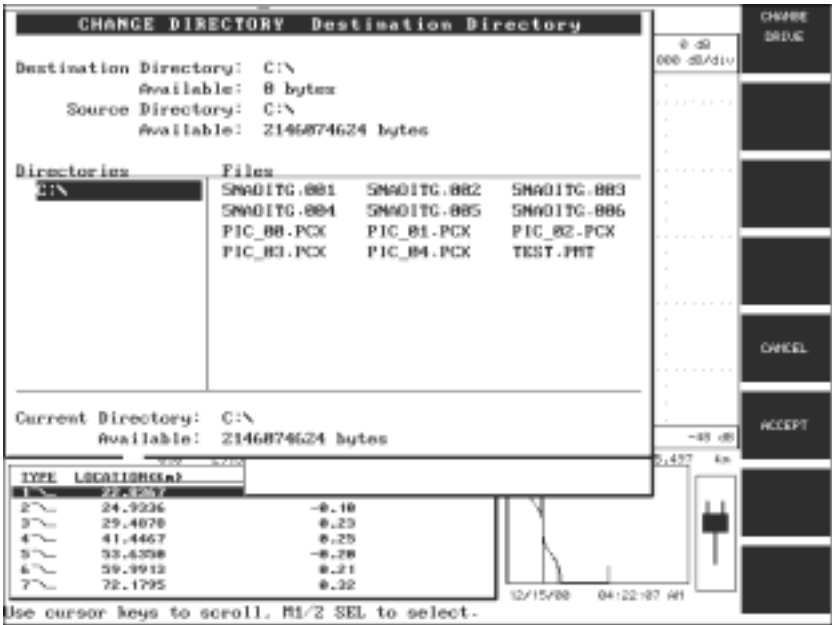


Figure 12-6: CHANGE DIRECTORY/CHANGE DRIVE Softkeys

NOTE

A Destination Directory must be selected for the Copy File(s) procedure to work. The Source Directory may be changed from the currently selected storage device.

To change the Source Directory:

- a. Use the **Marker Movement** keys or the **Vertical Expand/Contract** keys to scroll through the available directories on the current storage device. Press the **ACCEPT** softkey or the **M1/2 Sel** hardkey when the desired directory is highlighted.
- b. To change the storage device option, press the **CHANGE DRIVE** softkey. A pop-up menu will appear with the currently selected drive highlighted.
- c. Press the **SELECT** softkey or the **M1/2 Sel** hardkey when the desired drive is highlighted.

- d. Select the directory from which to copy the file(s).

*To select the Destination Directory:*

- a. Press the **SHOW/SELECT DEST DIR** softkey. Follow the same procedure as followed to change the Source Directory.
  - b. Press **ACCEPT** to return to the Copy File(s) window with the source directory list displayed or press **CANCEL** if you do not want to save any of the selections made.
3. Scroll through the list of files by pressing the **Marker Movement** keys, the **Expand/Contract** hardkeys or the arrow keys on the optional external keyboard. Press **SELECT/DESELECT** to tag the highlighted file with an arrow indicating that this file is to be copied to the destination directory. Press **SELECT/DESELECT** again to remove the arrow and un-tag the file. You can select any number of files to copy, up to a maximum of 1000.
  4. Press the **COPY** softkey to start the process.
  5. Press the **EXIT** softkey to return to the Mass Storage main menu.

<b>TIP:</b> When copying files from the Hard Drive to a floppy drive, the instrument will notify the user if and when the floppy diskette is full. At this point, a fresh formatted floppy can be inserted into the floppy drive, and the balance of the files (the ones not yet copied) will retain their “tagged” status, and the copy process will resume where it left off.
---

### 12.1.5 Upload File(s)

The *Upload File(s)* option on the Mass Storage menu allows the user to select a large number of files and initiate a remote copy process without having to copy to a floppy and then to a PC or database. The file transfer is accomplished serially using the optional upload kit (Corning Cable Systems part # 33147) or a null modem cable (see the following description) and the software utility OTDRcopy.exe. The OTDRcopy.exe

utility is a small DOS program that can run from DOS or from a DOS shell in the Windows environment. It can be found on the 340 upgrade diskette

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**NOTE**

Files over 200 kb in length WILL NOT be transmitted.

---

The null modem serial cable required is a DB-9 female to DB-9 female serial cable (such as the Radio Shack® cable #26-152B) with a 9 pin male to female null modem (such as Radio Shack null modem #26-264A) that has the following pin out:

Standard pin	Null modem conversion
1	4
2	3
3	2
4	1 & 6
5	5
6	4
7	8
8	7
9	unused

*Table 12-1: Null Modem Pin Out*

**TO TRANSFER FILES  
SERIALLY USING THE  
OTDRCOPY.EXE  
UTILITY**

Use this procedure to transfer files serially from the 340 (version 3.19a or higher) to a PC.

1. Using Windows Explorer, create a directory or subdirectory on the PC named OTDRcopy (or something easily recognized) in which the OTDRcopy.exe utility will reside. This is also the directory or subdirectory to where the files will be transferred.

- Copy the OTDRcopy.exe file from the 340 upgrade disk (version 3.18a or later) to the directory or subdirectory (OTDRcopy) created in step 1.
- Connect the Null Modem serial cable from the COM B port on the OTDR to the COM 1 port on the PC.

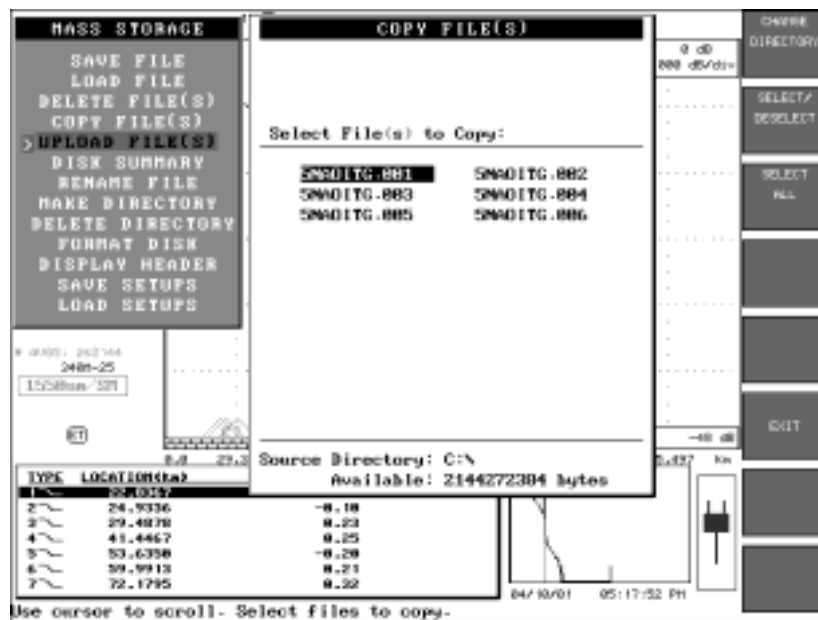


Figure 12-7: *UPLOAD FILE(S) Window*

- Upon selecting the *UPLOAD FILES(S)* option on the 340, the window shown in Figure 12-7 will be displayed with a list of files on the current directory. Use **CHANGE DIRECTORY** and/or **CHANGE DRIVE** to bring up the desired trace file list (See “Copy File(s)” on page 140).
- Select the desired trace files as described in “Copy File(s)” Section 12.1.4.
- When all files are selected or tagged, open the OTDRcopy.exe utility by double clicking on it in Windows Explorer.
- Once opened, type “FT” to begin the transfer process. The OTDRcopy utility will then begin requesting each trace file in



sequence and initiate a transmission over the serial cable at 9600 baud rate. The PC will display the file name, the number of bytes, and the file checksum (CRC) which is used to verify correct transmission. If a transmission is corrupt (bad checksum or CRC), the OTDR will attempt a second transmission. As each file is transmitted, the OTDR begins to transmit the next select file(s). This continues until all the desired trace files have been transmitted.

8. Once completed, the option exits to select and transfer another group of files or end the process by pressing ESC on the PC keyboard.

#### 12.1.6 Disk Summary

The *DISK SUMMARY* option on the Mass Storage Main Menu will run an error check on all of the trace files in the selected directory. The wavelength, pulse width and range for each trace file will also be displayed. (Non-trace files will present an error.)

---

**WARNING**

See the CAUTION box on page 133.

---

**TO DISPLAY A DISK  
SUMMARY**

1. Press the **DISK SUMMARY** softkey. The screen in Figure 12-8 will be displayed
2. Press the **CHANGE DIRECTORY** softkey to select and display a different directory or drive in the Current Directory field.
3. Press the **GENERATE SUMMARY** softkey when the directory on which you want to run a summary is displayed.
4. If the summary information does not fit in one window, the **NEXT PAGE** and **PREVIOUS PAGE** softkeys will be available to scroll through the list.
5. Press **EXIT** to return to the Mass Storage main menu.

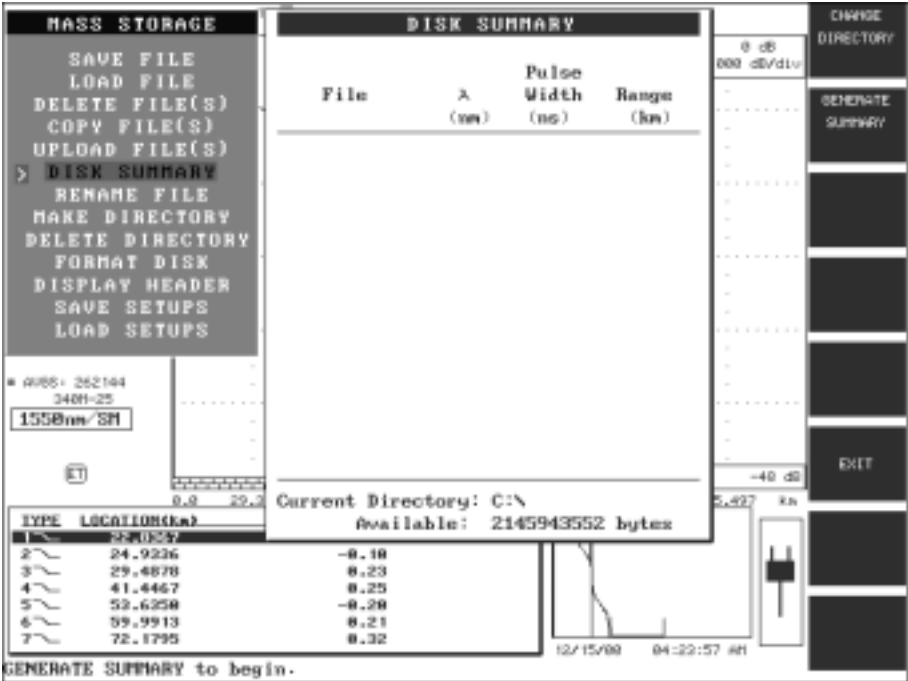


Figure 12-8: DISK SUMMARY Window

### 12.1.7 Rename File

Files on any available directory on the 340 can be renamed.

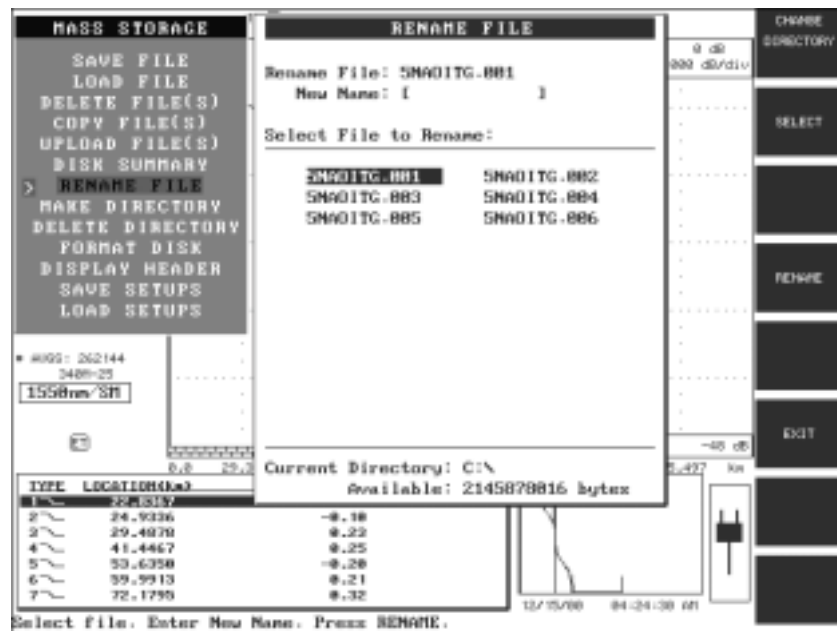


Figure 12-9: RENAME FILE Window

- TO RENAME A FILE**
1. Select the *RENAME FILE* option from the Mass Storage main menu to display the Rename File window.
  2. Scroll through the directory using the **Marker Movement** keys, **Expand/Contract** hardkeys or arrow keys on the optional keyboard until the file to be renamed is highlighted.

#### NOTE

Use the **CHANGE DIRECTORY** softkey to change to another source directory or drive.

3. Press the **SELECT** softkey. The New Name: field will be highlighted. The first character space will have a different shade (or color) prompting you to input the new name.

4. Enter the new filename using the Character matrix (See Section 2.1.3) or the optional external keyboard; press the **RENAME** softkey.
5. Press **EXIT** to return to the Mass Storage main menu.

### 12.1.8 Make Directory

The MAKE DIRECTORY option allows the user to create a subdirectory under the currently selected directory.

#### TO MAKE A NEW DIRECTORY

1. Select the *MAKE DIRECTORY* option from the Mass Storage main menu. The screen in Figure 12-10 will be displayed.

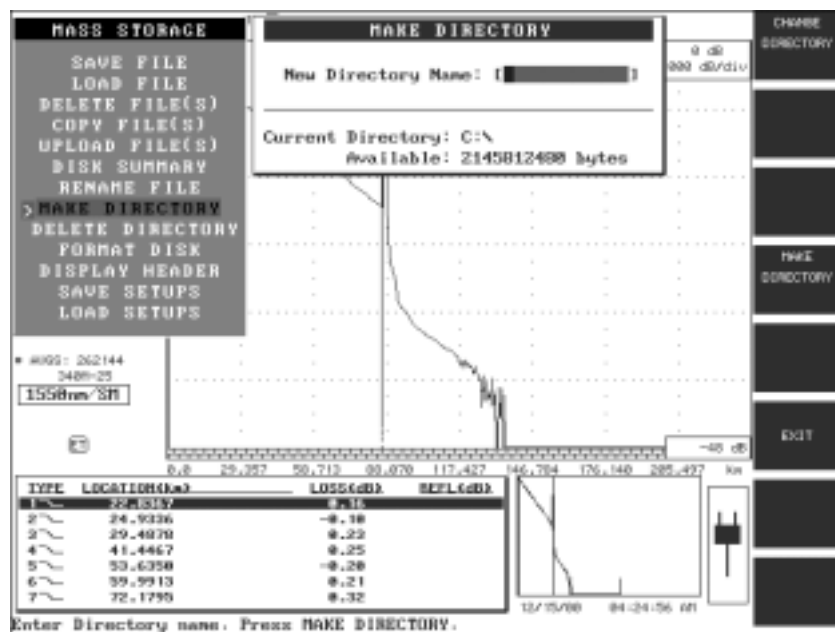


Figure 12-10: MAKE DIRECTORY Window

2. Enter the new directory name using the Character Matrix (See Section 2.1.3) or the optional external keyboard. Directory names must follow the same conventions as MS-DOS filenames, a maximum of 8 characters, plus an optional 3 character extension.
3. Use the **CHANGE DIRECTORY** and **CHANGE DRIVE** softkeys if you want to change the Current Directory.

4. Press **MAKE DIRECTORY** to create the new subdirectory under the Current Directory.
5. Press **EXIT** to return to the Mass Storage Main Menu without creating a directory.

#### 12.1.9 Delete Directory

The **DELETE DIRECTORY** option allows the user to delete any empty subdirectory under the current directory.

---

##### NOTE

There can be no files in the subdirectories of the Directory being DELETED.

---

##### TO DELETE A DIRECTORY

1. Select the *DELETE DIRECTORY* option from the Mass Storage Main Menu. A list of the subdirectories under the current directory is displayed with the first directory highlighted.
2. Select subdirectories to be deleted by scrolling through the list using the **Marker Movement** keys, **Expand/Contract** keys or arrow keys on an optional keyboard.
3. Press the **SELECT/DESELECT** softkey to mark the highlighted directory with an arrow. This signifies that this subdirectory has been selected for deletion. More than one directory can be selected for deletion.

---

##### NOTE

Press the **SELECT/DESELECT** softkey to deselect a highlighted subdirectory that has already been selected. The arrow will be removed.

---

4. Press the **DELETE** softkey to initiate the deletion process.
5. Press the **ACCEPT** softkey to complete the process.
6. Press **CANCEL** to exit without deleting any directories.

#### 12.1.10 Format Disk

Format all floppy diskettes (pre-formatted or blank) before use with the 340 using the following procedure.

**CAUTION**

Any information stored on a floppy disk will be erased by this process.

**TO FORMAT A FLOPPY  
DISK IN THE 340**

1. Insert the disk into the floppy disk drive on the 340.
2. Select the *FORMAT DISK* option from the Mass Storage main menu. The window in Figure 12-11 appears:
3. Use the **Marker Movement** keys, **Expand/Contract** keys or arrow keys on the optional external keyboard to make your selection and press the **M1/2 Sel** hardkey.
4. Press the **FORMAT** softkey to initiate the process. A floppy disk icon is displayed in the Status Window to indicate formatting in progress and a Disk format in progress message will displayed on the bottom of the trace screen.

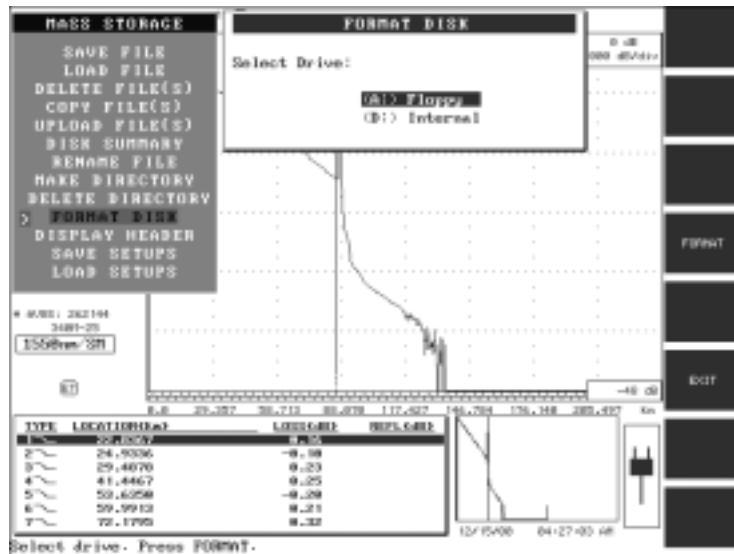


Figure 12-11: *FORMAT DISK Select Drive Window*

A message is displayed to inform you when the formatting process is completed.

5. Press **EXIT** to return to the Mass Storage main menu.

12.1.11 Display Header

The DISPLAY HEADER option provides viewing of the header for the current trace allowing verification of the information for the trace.

TO DISPLAY THE  
HEADER

1. Select the *DISPLAY HEADER* option from the Mass Storage Main Menu. The header for the current trace is displayed.
2. Press **EXIT** to return to the Mass Storage mode.

12.1.12 Save Setups

This feature allows the user to save the current instrument setups into a file. The default filename extension is “.SET.”

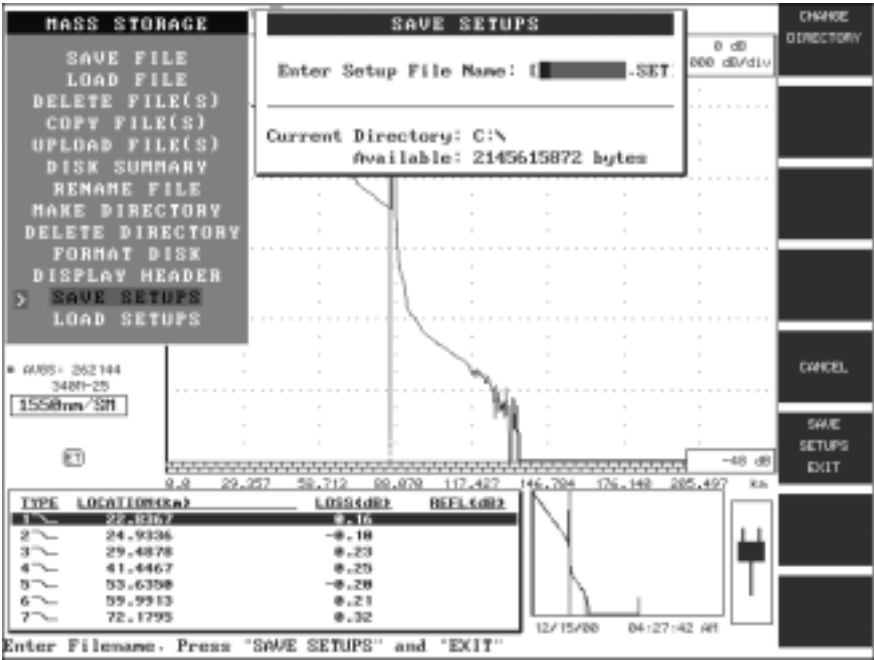


Figure 12-12: SAVE SETUPS Window and Softkeys

TO SAVE A SETUP

- Set the instrument to the desired setting.
1. Select the SAVE SETUPS option from the Mass Storage main menu.

2. Press **CHANGE DIRECTORY** to choose a different directory to save the file in, if desired.
3. Enter a filename (up to 8 characters) for the Setup File using either the Character matrix (See Section 2.1.3) or the optional external keyboard.
4. Press **SAVE SETUPS EXIT** to save the file and return to the Mass Storage main menu.
5. Press **CANCEL** to return to the Mass Storage main menu without saving the file.

There is no limit to the number of saved setup files that may be created, other than the disk capacity available for storage.

#### 12.1.13 Load Setups

Load Setups allows the user to recall a saved setup for the instrument.

##### LOADING A SETUP FILE

1. Select the LOAD SETUPS option from the Mass Storage main menu.
2. If the desired setup file is not in the current directory, press **CHANGE DIRECTORY**.
3. Highlight the desired setup file and press **LOAD SETUPS**, a trace grid screen will appear. Press the **Start/Stop** hardkey to begin the test.  
**OR**
4. Press **CANCEL** to return to the Mass Storage main menu without saving the file.



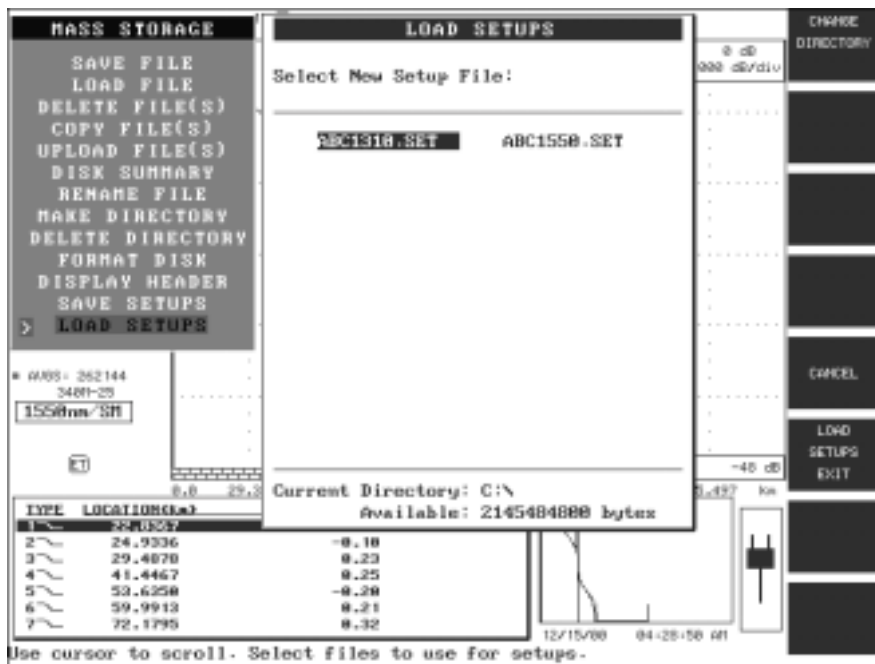


Figure 12-13: LOAD SETUPS Window and Softkeys

#### 12.1.14 Save the Current Screen Image (PCX) to the Hard Drive

Any image displayed on the screen of the Corning Cable Systems 340 can be saved as a PCX file format. The file that is saved reflects the VGA density of the instrument (640 x 480). The PCX file is saved to the hard drive by pressing the ALT F9 key combination (Press and hold the ALT key while striking the F9 key) on the optional external keyboard.

The resultant file is named PICXX.PCX, where the XX value ran from 00 to 99. The file(s) are saved to the hard drive root directory (C:\) and will start at the 00 value at each new power-up.

The file(s) may be copied to diskette or transmitted serially to a Host PC using the UPLOAD FILE(S) feature (see Section 12.1.5) and viewed and/or printed (in full color) by any utility that supports the PCX format.

Once the file PIC99.PCX has been created, the next file saved will be named PIC00.PCX and will overwrite any existing file named

PIC00.PCX. This limitation has been instituted in order to prevent too many files being saved to the root directory of the optional Hard Drive.

## 12.2 AutoSave/Auto Filename Feature

The Auto filename feature requires entering a base filename which is used to generate sequentially numbered filenames. This screen will only be displayed if the AutoSave option is set to Stand. (Standard) in Quick Auto Setup.

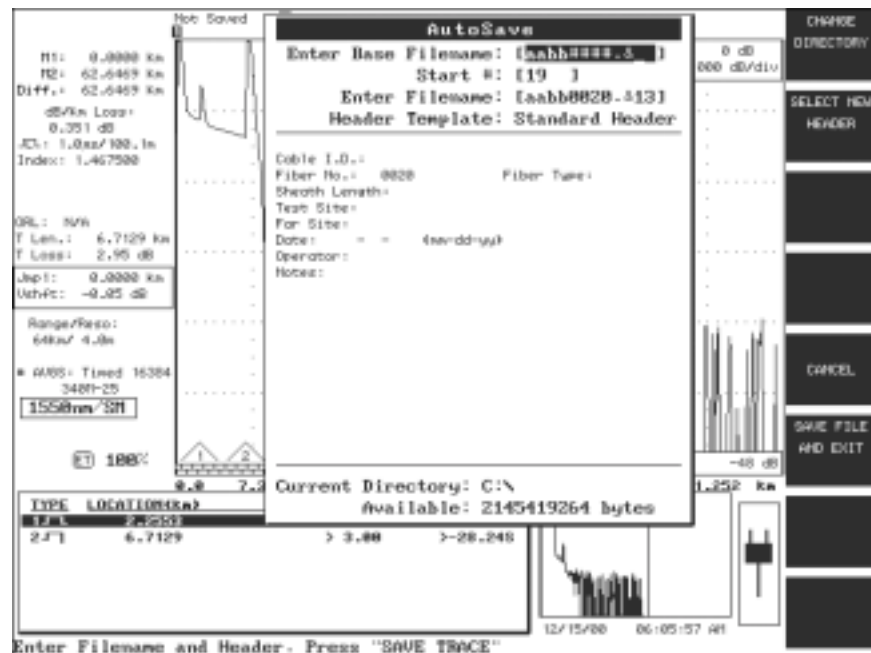


Figure 12-14: The AutoSave Window

The base filename will consist of up to 8 characters and an optional three character extension, MS-DOS format. Enter the base characters for the filename and the character “#” to signify placement of the digits that will automatically increment.

### Example

1. Power up a 340 with a 1310/1550 nm single-mode optical module.

2. Set the AutoSave option in Quick Auto Setups to “Stand.”
3. Perform the first data collect at 1550 nm.
4. When the Auto Save screen is presented, the Enter Base Filename template should be similar to the following:

XXXYY@\_###

where:   XXX   represents Near Site  
           YY     represents Far Site  
           @     specifies Single-mode or Multimode  
           --     specifies wavelength ID (see Table 12-1  
                   Wavelength ID Equivalents)  
           .     standard DOS extension prefix  
           ###   specifies autoincrement field

Wavelength	one_	two__
1550	5	15
1310	3	13
1300	0	30
850	8	85
1244	2	12
1410	4	41
1625	6	62
1650	6	65

*Table 12-1: Wavelength ID Equivalents*

5. Enter the number “1” in the Start #: field, if starting with Fiber #1.

---

**NOTE**

Any Start number may be entered, for example if fiber #133 was the last entry, the new start number would be 134.

---

6. Press **SAVE FILE AND EXIT**.

The first filename will be

XXXYY15.001

7. Collect the next trace at the 1310 nm wavelength.

The next filename will be

XXXYY13.001

8. Collect the next trace at the 1550 nm wavelength.

That filename will be

XXXYY15.002

This allows you to document fiber tests in a more meaningful manner.

---

**CAUTION**

If no wavelength ID characters are specified, filenames will be automatically incremented by one each time a new save is initiated regardless of the wavelength.

---

### 12.3 Print Functions

The Corning Cable Systems 340 provides a **Print** hardkey. To access print options press the **Print** hardkey to display the Print Selections menu:

Use the **Marker Movement** keys or the **Vertical Expand/Contract** keys to scroll the highlight through the menu selections. Press the **PRINT THEN EXIT** softkey or **M1/2 Sel** hardkey to print the highlighted menu item and return the instrument to its previous state.

Press the **RETURN** softkey to the instrument to its previous state without executing a print function.

After a print function has started an icon indicating printing in progress is displayed in the Status Window.

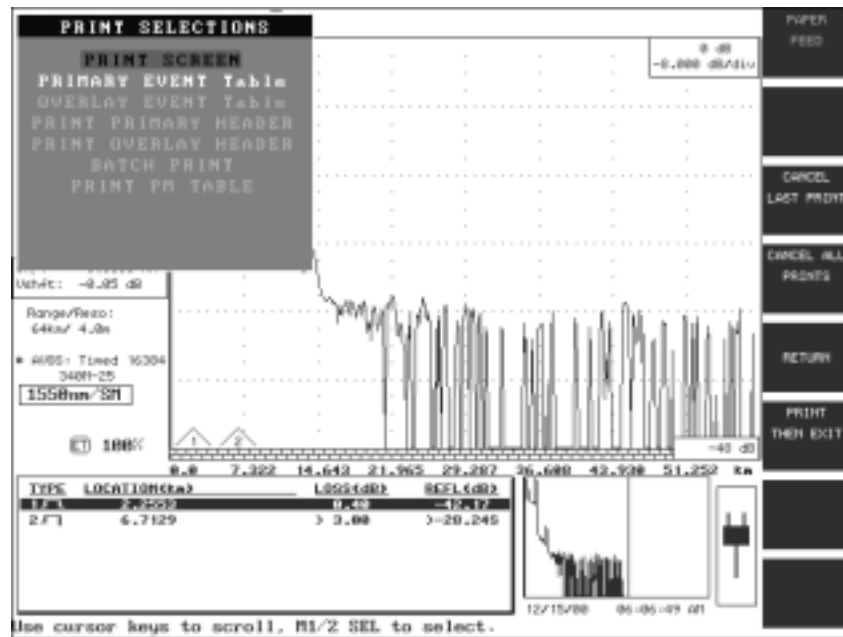


Figure 12-15: PRINT SELECTIONS Menu and Softkeys

### 12.3.1 Print Screen

The current screen display image is sent to the active printer port specified in Printer Setups (see Section 3.2.2). If any other fields (trace parameters, event table, header) are enabled in setups, this information is printed immediately following the screen print.

### 12.3.2 Primary Event Table

The analysis information for the current primary trace is printed without a copy of the trace grid. The entire Event Table is printed, not just the information displayed on the screen.

### 12.3.3 Overlay Event Table

If the Event Table for the Overlay trace is present, it can be printed using this softkey.

### 12.3.4 Print Primary Header

Prints just the current primary trace header information.

### 12.3.5 Print Overlay Header

Prints just the overlay trace header if available.

### 12.3.6 Batch Print

Possible future enhancement. This feature is available in SoftView emulation software package.

### 12.3.7 Print PM Table

Prints the power meter table if available.

## 12.4 Creating a Custom Header

Headers hold valuable information about the trace file which may save a considerable amount of time when recalling traces for comparison.

If the standard header does not meet your needs, you can easily create a custom header template using the following procedure.

Only files with an extension of **.HDR** are available when the **Select New Header** softkey is active.

A Custom Header can be created using any text editor (such as MS-DOS Edit) on a PC as long as the file is saved in a text format with the extension **.HDR**.

#### TO CREATE A CUSTOM HEADER

1. Open a text editing application.
2. Type the custom header template text using the following guidelines:
  - Line length limited to 50 characters
  - Maximum of 12 lines of text per page
  - Maximum of 10 pages

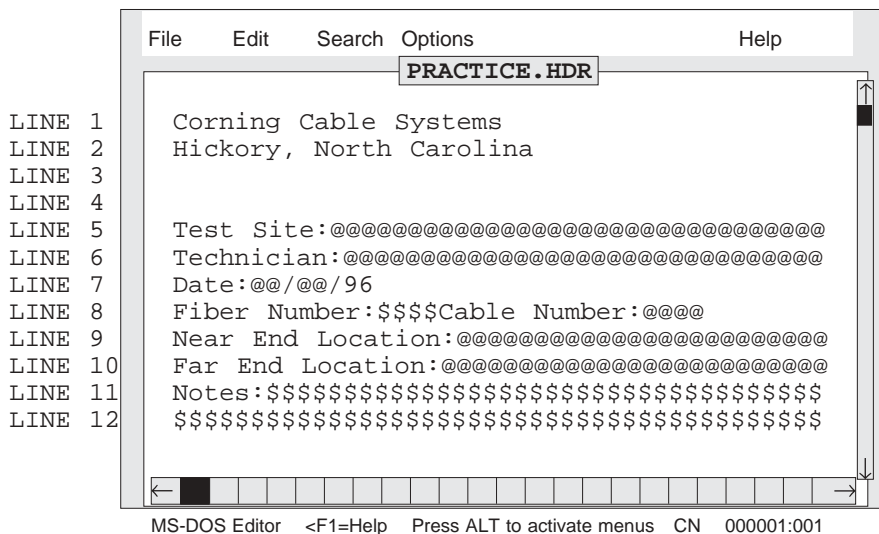
Any typed text will appear on screen each time the header is used

- The symbol “@” creates an editable field in the header template.

This information will appear every time the header template is used. It can be changed only by typing over it.

- The symbol “\$” creates a text field. This will be blank on the header template.

New information can be typed in.



*Figure 12-16: Header Template As Entered in DOS Edit*

3. Save the new header template to a DOS formatted disk. The file name can be eight characters of your choice. The extension .HDR must be added so the Corning Cable Systems 340 software will recognize the file when you enter the Select New Header mode.
4. Insert the disk into the Corning Cable Systems 340 and follow the Copy File(s) procedure in Section 12.1.4 to copy the custom header template to the 340 memory or hard drive.

The custom header will be available the next time you perform a Save File function.

#### **NOTE**

To make the custom header the default header, it must be named exactly custom.hdr and saved to the D (SRAM) drive.

Creating a Custom Header

Save and Print Functions



## 13.0 Template Feature

The template feature allows you to create a template by executing the BUILD TEMPLATE function and then apply the template to trace files by executing the APPLY TEMPLATE function. This feature allows batch analysis of a set of trace files, based on measurements defined in the “master” or “template” trace file. The output of the Apply Template function is a Template Report file which is an ASCII file containing the measurement details for ALL selected fibers, based on each event as defined in the template trace file.

Typically, traces on all fibers in a cable will be collected before executing the template feature.

Data collect parameters should be identical for all trace files (e.g.: Index of Refraction, Horizontal Shift, Pulsewidth, Range/Reso) in order to obtain the best results. Care should be exercised when collecting the traces to ensure that a sufficient number of averages are collected.

### 13.1 Building a Template Trace File

To begin building a template trace file:

1. Press the **Disk** hardkey. The Mass Storage main menu will be displayed.
2. Select *LOAD FILE* from the mass storage menu. The Load Trace directory list of all files on the currently selected storage device is displayed.
3. Scroll through the list using the **Marker Movement** keys or **Vertical Expand/Contract** hardkeys and highlight the desired trace.
4. Press the **VIEW FILE(S)** softkey to load the desired file as the primary trace.
5. Press the **EVENT TABLE** softkey. The Event Menu will be displayed.
6. Press the **TEMPLATE** softkey.
7. Press the **BUILD TEMPLATE** softkey. The Event Menu will be displayed.

8. Press the **TABLE CURSOR** softkey. Use the **Marker Movement** keys or **Vertical Expand/Contract** hardkeys to select the desired events.

To ADD, DELETE, or EDIT events, press the **ADD EVENT**, **DELETE EVENT** or **EDIT EVENT** softkey. (See Section 13.1.4 through Section 13.1.8.)

To adjust “fuzzy” LSA cursors, press the **SET LOSS INTERVALS** softkey. See “Modifying Loss Intervals” in section 13.1.5.

This procedure allows the user to create a “master” or “template” trace file which defines the locations of all optical events (splices, macrobends, connectors, etc.,) for the fibers in the cable, as seen from one direction.

The BUILD TEMPLATE facility executes the Analysis software on the current trace file and “flags” the file as a “template” file (T). If the trace has ALREADY been analyzed, the first step is skipped. The results of the analysis must be closely studied to ensure that all events have been detected and qualified. This is especially important for very low loss fusion splices, which may not be detected by the analysis software. Pay close attention to the Analysis thresholds when executing the Analysis function.

#### 13.1.1 Verifying Events/Adding Events

Inspect the event locations and use the ADD EVENT facility to define events on the trace that may not have been detected via Analysis. Some event locations may need to be adjusted, depending on known optical verses physical distance information.

---

#### NOTE

When adding a new event, the start distance is an Optical distance NOT the cable sheath distance.

---

Save the results in the Template Trace file to Mass Storage media. Rename the file in order to maintain a separate trace file (the one you started with) and template file.

### 13.1.2 End Event Distance versus End-to-End Loss Measurements

To use the Template Trace end event distance to compute end-to-end loss for each trace, the Template trace end event distance must be less than or equal to the end event distance of each trace to be batch-analyzed.

Otherwise, the end event may correlate to the end fresnel deadzone, or in the noise floor of the fiber being analyzed, and the end-to-end loss value will be inaccurate.

- HINTS**
- You can use the ASCII REPORT facility to batch analyze the fiber traces (without applying a template) in order to create a report that lets you easily determine the correct end distance to use for the Template trace file. Simply execute the ASCII REPORT facility on the selected files, review the report, and use the shortest end distance for the template end event distance.
  - Use the MERGE option, when applying the Template trace, to force the facility to “blend” event measurements from either the template event or the selected trace file event, based on a correlation distance factor and a Template Priority option (See Section 13.2 for additional details).

### 13.1.3 Loss Measurements

Each event has an associated Loss Mode indicator and predetermined LSA intervals (“fuzzy” cursors). As a rule, the Loss Mode for each event should be of the LSA type (LSA Splice Loss), but a straight two-point loss may also be used. On some events, you may need to adjust the “fuzzy” cursor limits to obtain a better estimate of an event splice Loss, especially if either of the intervals falls within the actual loss interval or “knee.” Do this by exiting the EVENT TABLE mode and then press the **SET LOSS INTERVALS** softkey in order to adjust the fuzzy cursors.

### 13.1.4 Adding Events

1. Move Marker M1 to the desired location.
2. Press the **ADD EVENT** softkey.
3. Press the **INSERT NEW EVENT** softkey.

### 13.1.5 Modifying Loss Intervals

1. Press **SET LOSS INTERVALS** softkey. If the key is “dimmed,” press the **Loss** hardkey and select **SPLICE LOSS** mode.
2. Press the **SET LEFT INTERVAL** and/or **SET RIGHT INTERVAL** softkeys and use **Marker Movement** keys to adjust beginning and end of each interval.
3. Press **EXIT LOSS SETUP** when done.
4. Press **EVENT TABLE**
5. Press **EDIT EVENT** and then press **SELECT FIELD** until “Loss” field is highlighted.
6. Press **PASTE MEAS.** to accept the loss mode and LSA intervals.

### 13.1.6 Modifying Event Distance

1. Press **EVENT TABLE** and then press **EDIT EVENT**.
2. Press **SELECT FIELD** repeatedly until the Distance field is highlighted.
3. Press **MANUAL EDIT** and use the Character Matrix (see Section 2.1.3) or the optional external keyboard to enter new distance  
OR
  1. Press **EVENT TABLE** and then press **EDIT EVENT**.
  2. Press **SELECT FIELD** repeatedly until the Distance field is highlighted.
  3. Place M1 at desired distance and press the **PASTE MEAS.** softkey.

### 13.1.7 Modifying Event Type

1. Press **EVENT TABLE** and then press **EDIT EVENT**.
2. Press **SELECT FIELD** repeatedly until the Type field is highlighted.
3. Press **MANUAL EDIT** and then press **CHANGE ICON** until the desired icon is selected
4. Press **EXIT** to set the change.

### 13.1.8 Deleting an Event

1. Press **EVENT TABLE** and select **DELETE EVENT**.
2. Press **TABLE CURSOR** then use the **Marker Movement** keys to select the event to be deleted.
3. Press **DELETE EVENT**. The focus will now advance to next event.

### 13.1.9 Saving the Template Trace File

1. When you have finished building the Template Trace file, press the **EXIT** softkey.
2. Press the **Disk** hardkey and select *SAVE TRACE* from the MASS STORAGE menu.
3. Enter a new filename for the Template Trace to be saved and then press the **SAVE FILE AND EXIT** softkey.

## 13.2 Applying the Template Trace File (Generate Template Report)

This section explains the basic steps for preparing to apply the template trace file. Details and descriptions of Template options are described in later sections.

Basic procedure:

1. Press **EVENT TABLE** softkey.
2. Press the **TEMPLATE** softkey.
3. Press the **APPLY TEMPLATE** softkey.
4. Press the **SET VALUES** softkey
5. Enter the Filename for Template Report (default filename is FASTEMPL.RPT)
6. Press the **Expand/Contract** hardkeys and complete the choices for MERGE, PRIORITY and SAVE ANALYSIS.
7. Press **FILE SELECTION** and select Trace files for processing (Use **SELECT/DESELECT** or **SELECT ALL** softkeys).

8. Press **GENERATE OUTPUT** to apply the Template Trace file to ALL selected trace files and generate the Template Report file.

After building the Template Trace, it can be used for batch analysis of a set of traces based on the event locations in the Template trace.

---

**NOTE**

Make sure that the Template Trace is applied to sets of traces that were all collected in the same direction.

---

*Apply the template in one of the following ways:*

- **Merge = “NO”**

Use the Template Trace event locations, loss modes, and “fuzzy” cursor intervals to compute the loss at the same location on all selected trace files.

- **Merge = “YES”**

Attempt to correlate the Template Trace events and selected trace file events by location (distance). The correlation window is 2% of the distance, limited to a maximum of 1 km.

If a Template Trace event location does not correlate to any of the currently selected trace event locations, the Template Trace location, Loss Mode, and “fuzzy” cursor intervals will be used to compute the loss of the currently selected trace at the specified location.

If the currently selected trace event does not correlate with any Template Trace event locations, the currently selected trace event location, Loss Mode, and “fuzzy” cursor intervals are used.

If a Template Trace event correlates with a selected trace event location then:

**If Template Priority = “YES,”** the Template Trace event is used to compute the loss on the trace.

**If Template Priority = “NO,”** the trace event is used to compute the loss on the trace.

**For Example:**

Template Event Loc	Trace Event Loc	Merge = "NO"	Merge = "YES" Template Priority = "YES"	Merge = YES Template Priority = "NO"
10.0 km	---	10.0 km	10.0 km	10.0 km
20.0 km	20.1 km	20.0 km	20.0 km	20.1 km
---	30.1 km (non splice)	---	30.1 km	30.1 km
40.0 km (end)	40.1 km (end)	40.0 km	40.0 km	40.1 km

**NOTE**

The term "selected trace" is used in this section to indicate a trace OTHER than the Template Trace.

The preceding process determines the event location, loss mode, and "fuzzy" cursors for each trace. These are used to compute the event loss for the Template Report. The event used to compute the loss may be the Template Trace event which is probably not the same as the trace event, so the loss value will not be exactly the same but it should be close to the original trace event loss value. If the results are to be saved back into the trace file and the Template Trace event is used in the analysis, then the Template Trace event comment field will be copied into the trace file event comment fields.

- HINTS**
- Generate the Template Report with Merge = "NO," to have identical event (splice) locations across all fibers.
  - The Analysis function can be run with high thresholds (for example, Event Threshold  $\geq 2$  dB, and Reflectance Threshold  $\geq -10$  dB) on the Template trace, or all traces, to report and display ONLY the end event.

If the Template Trace end event is used to compute the end-to-end loss, then the location must not be farther than the trace end event location. Otherwise, the end-to-end loss will be computed based on a location in the

end fresnel or noise and the loss will be inaccurate. In this situation, set the Template Trace end event location LESS THAN OR EQUAL TO all trace end event locations.

---

**NOTE**

When processing a bidirectional set of traces, it is necessary to build two Template Trace files, one for each direction. Make sure to apply the correct Template Trace to the correct set of traces.

---

The following warning may appear when applying the Template Trace file to a set of traces:

Template End greater than trace end which will  
result in incorrect Loss.

This warning will NOT be repeated.

If this warning appears, press **CANCEL** and go back to the Build Template procedure. Move the location of the end event on the Template Trace in closer.



### 13.3 Template Report File Format

<b>Trace Filename</b>	The trace filename that was analyzed
<b>Date</b>	Trace file date
<b>Time</b>	Trace file time
<b>Event Index</b>	Event number
<b>Event Type</b>	Event type: “N” = Non-reflective “R” = Reflective “G” = Group “E” = End
<b>Start Distance (km)</b>	Event start distance in kilometers
<b>End Distance (km)</b>	Event end distance in kilometers
<b>Attenuation Loss</b>	Loss of the fiber, up to the event, in dB
<b>Attenuation Loss per km</b>	The loss of the fiber, up to the event, expressed in dB per km.
<b>Splice Loss</b>	This is generally the loss of the event in dB.
<b>Reflectance</b>	The reflectance of the event in dB.
<b>Cumulative Loss</b>	The total loss up to the event, expressed in dB.v
<b>Flags</b>	“>S” Saturated reflectance “>” Potentially inaccurate Reflectance “?” End of fiber is Out of Distance / Dynamic Range “2” Two point Loss used
<b>Comments</b>	Comment text

The following displays a typical Template Report file for 6 traces:

“Trace Name”, “Date”, “Time”, “No.”, “Type”, “Start”, “End”, “Atten Loss”, “A.L. dB/Km”, “Splice Loss”, “Ref”, “CumLoss”, “Flags”, “Comments”

```

“5ITGNAO.001”, “05/08/95”, “11:06:10 AM”, 1, “N”, 6.8641, 0.0000, 1.41, 0.21, -0.12, 0.00, 1.41, “”, “”
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“5ITGNAO.003”, “04/25/95”, “07:33:30 AM”, 7, “N”, 61.5000, 0.0000, 0.81, 0.19, 0.05, 0.00, 12.46, “”, “”
“5ITGNAO.003”, “04/25/95”, “07:33:30 AM”, 8, “N”, 63.8411, 0.0000, 0.46, 0.20, 0.27, 0.00, 12.97, “”, “”
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“SITGNAO.006 ”,“04/25/95 ”,“07:59:51 AM”, 8,“N”, 63.7000, 0.0000, 0.43, 0.20, -0.07, 0.00, 13.19,““,””
“SITGNAO.006 ”,“04/25/95 ”,“07:59:51 AM”, 9,“N”, 70.3120, 0.0000, 1.34, 0.20, 0.11, 0.00, 14.47,““,””
“SITGNAO.006 ”,“04/25/95 ”,“07:59:51 AM”,10,“N”, 80.4361, 0.0000, 2.04, 0.20, 0.11, 0.00, 16.61,““,””
“SITGNAO.006 ”,“04/25/95 ”,“07:59:51 AM”,11,“E”, 86.6122, 0.0000, 1.27, 0.21, 3.00,-18.73, 18.00,““,””

```

### 13.4 “Live Trace” Template Feature

The Overlay Template feature allows placement of a template file into the overlay position (either via the **SWAP** softkey or from MASS STORAGE LOAD FILE screen using either the **SELECT OVERLAY** or **OVERLAY WITH SETUP**

softkeys). All subsequent commands to perform Analysis, either through the **ANALYZE TRACE** softkey or if Auto Analysis is enabled will impose the Overlay traces' Event Table onto the existing Primary Trace (e.g. Event Analysis does not actually run, but the template trace event table will be applied to the current primary trace).

## 14.0 OTDR Mode Measurements

### 14.1 Distance Measurement

When a primary trace is displayed, the fiber distance is automatically measured from the origin of the trace to each of the two markers and between the markers. The values are displayed in the first three lines of the Trace Parameters Area (in the upper left corner of the display). Proper marker placement is crucial for accurate measurements.

---

**NOTE**

Improper distance readings may be reported if the Index of Refraction is set inaccurately.

---

The following procedures illustrate two common distance measurements; the total length of a fiber and the distance from a known point to a break in the fiber.

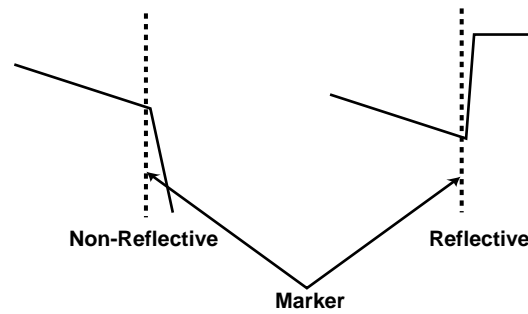
#### 14.1.1 Fiber Length

**PROCEDURE**

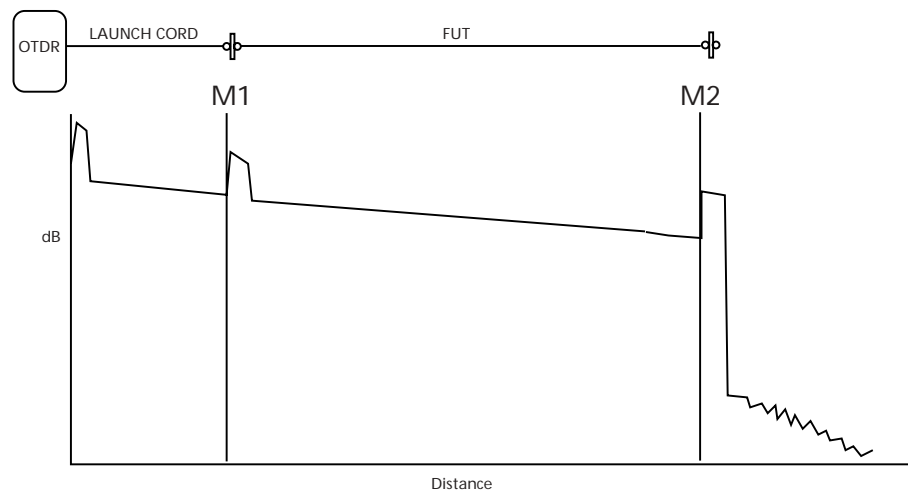
1. Set the View From Origin.
2. Place Marker M1 at the end of the launch cable (pulse suppressor), if one is used, or at 0.00 km (See Figure 14-1).
3. Set the View From M1.
4. Expand the screen vertically and horizontally around M1 for more accurate marker placement (See Figure 14-1).
5. Place Marker M2 at the end of the fiber (See Figure 14-2).
6. Set the View From M2.
7. Expand the screen vertically and horizontally around M2 for more accurate marker placement.
8. Place Marker M2 at the start of the reflective or non-reflective end of the fiber (See Figure 14-1).
9. Read the fiber length as the M1 → M2 distance (Diff.); the third line in the Trace Parameters Area.

**NOTE**

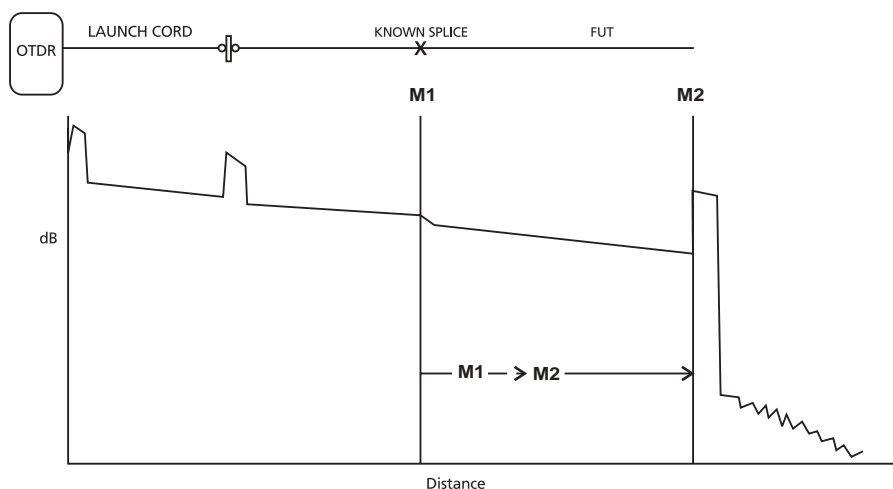
If Marker 1 was set at 0.00 km, then the M1 → M2 distance (Diff.) will be the same as Marker 2 (M2) distance.



*Figure 14-1: Marker Placement at a Reflective or Non-Reflective Event*



*Figure 14-2: Marker Placement for Fiber Length Measurement*



*Figure 14-3: Marker Placement for Break/End of Fiber*

#### 14.1.2 Distance To A Break

The following procedure demonstrates a method of locating a break relative to a known point on the fiber.

---

##### NOTE

Individual fibers in cable may follow different internal cable paths and could therefore have significantly different actual lengths and also differ in length from the cable sheath. Contact the cable manufacturer for information regarding sheath distance relative to fiber distance.

---

- PROCEDURE**
1. Set the View From Origin.
  2. Place Marker M2 at the break in the fiber (See Figure 14-3).
  3. Set the View From M2.
  4. Expand the screen vertically and horizontally for more accurate marker placement.
  5. Place M2 at the beginning of the break in the fiber (See Figure 14-1).
  6. Set the View From Origin.

7. Place M1 at a known point on the fiber (See Figure 14-3).
8. Set the View From M1.
9. Expand the screen vertically and horizontally for more accurate marker placement.
10. Move M1 to the beginning of the known point (See Figure 14-1).
11. Read the distance from the known point to the break as the M1 → M2 distance (Diff.); line three in the Trace Parameters Area.

## 14.2 Loss Modes

After you acquire a trace, you can make several different types of measurements with the Corning Cable Systems 340 using the loss modes available through the **Loss** hardkey:

- Splice Loss
- 2-Pt Loss
- 2-Pt LSA
- dB/km Loss
- dB/km LSA
- ORL (Optical Return Loss)
- OFF
- Dual Splice Loss

The current loss mode and corresponding loss value are displayed in the upper left of the Trace Parameters Area directly below the M1 & M2 distance (See Figure 2-3).



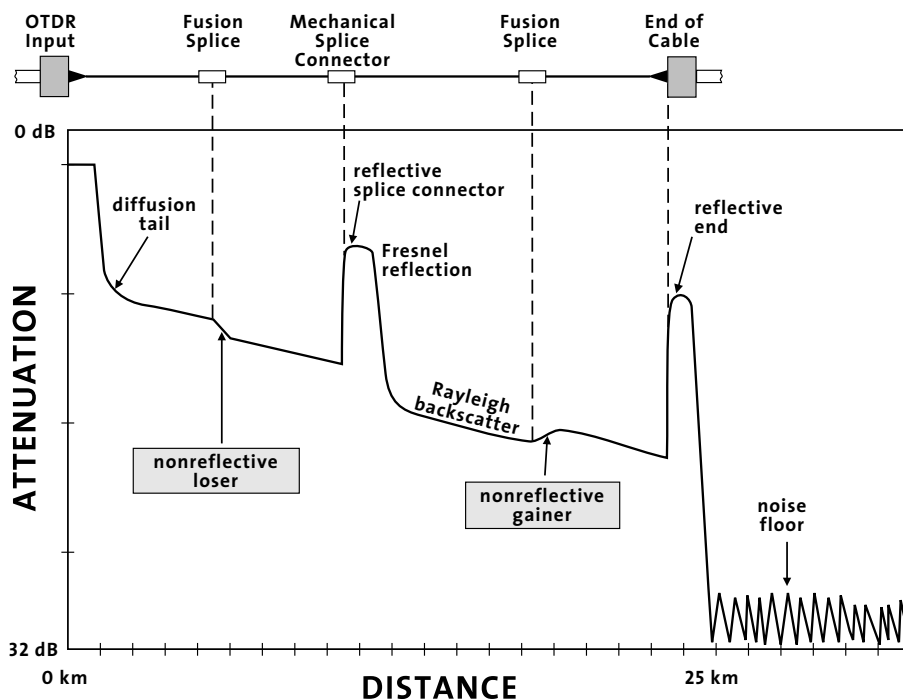


Figure 14-4: Measurement Reference Illustration

Figure 14-4 shows examples of events on a fiber that are referred to in this chapter. Use this illustration as an aid to understanding some of the terminology used to describe measurement procedures.

#### 14.2.1 Splice Loss

Splice Loss is used to measure the optical power loss caused by connectors, splices and couplers on a fiber optic cable. The following figure depicts the technique used to measure splice loss:

Marker M1 should be placed at the start of the splice. The Y-axis position (Ⓐ) at the start of the splice will be determined by an LSA calculation using the interval set up to the left of M1. The Y-intercept point (Ⓑ) is determined by an LSA calculation using the current data interval setup to the right of M1, and calculating the intercept back to M1.

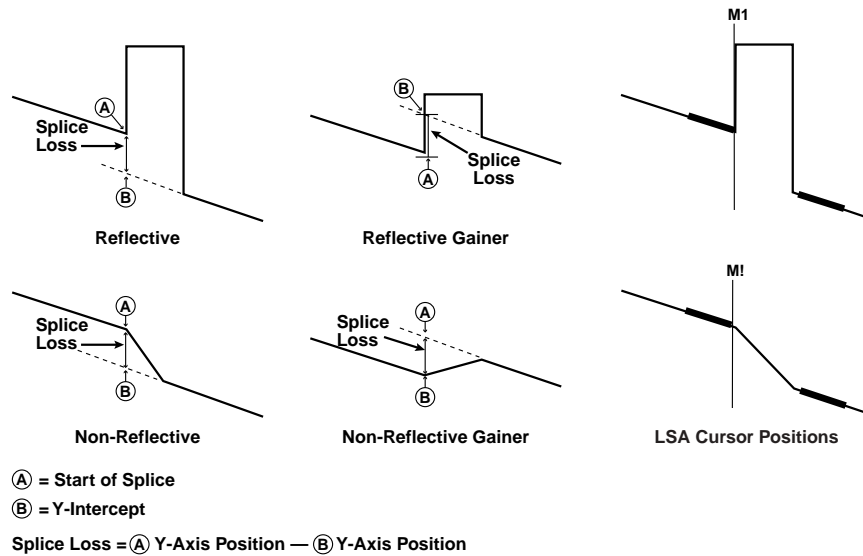


Figure 14-5: Splice Loss Measurement

1. Set the View From Origin.
2. Place Marker M1 near the beginning of the splice where loss is to be measured.
3. Set the View From M1.
4. Expand the screen vertically and horizontally for more accurate marker placement and place M1 at the beginning of the splice to be measured.
5. Select *Splice Loss* from the Loss Mode menu.
6. If the LSA intervals are set properly, go to Step 9.
7. Press the **SET LOSS INTERVALS** softkey.
8. Adjust the LSA intervals so that they are on straight backscatter.
9. Read the Splice Loss, located directly below the Marker information section, in the Trace Parameters Area.

The data intervals used for Splice Loss may be modified by the user via the **SET LOSS INTERVALS** softkey. Refer to Section 13.1.5 for information on how to change intervals.

#### 14.2.2 2-Pt Loss

The 2-Point Loss Measurement uses a data point at Marker M1 and a data point at Marker M2 to calculate the change in dB between the two points. Normally M1 (Y-Axis) data is greater than M2 (Y-Axis) data and a positive loss measurement is displayed. Otherwise, the loss value is reported as a negative quantity called a “gainer.”

##### PROCEDURE FOR 2-POINT LOSS MEASUREMENT

1. Set the View From Origin.
2. Place Marker M2 at the end of the fiber.
3. Set the View From M2.
4. Expand the screen vertically and horizontally for more accurate marker placement.
5. Place M2 at the beginning of the reflective end of the fiber and read the total fiber length from the highlighted M2 location in the Marker Location window.
6. Set the View From Origin.
7. Place M1 just to the right of the diffusion tail, if one exists, after the beginning of the fiber.
8. Set the View From M1.
9. Expand the screen vertically and horizontally for more accurate marker placement.
10. Move M1 to the end of the diffusion tail.
11. If the Loss Mode is not properly set, press the **Loss** hardkey and select *2-Point Loss*.
12. Read the total loss for the fiber located directly below the Marker information section in the Trace Parameters Area.

#### 14.2.3 2-Pt LSA

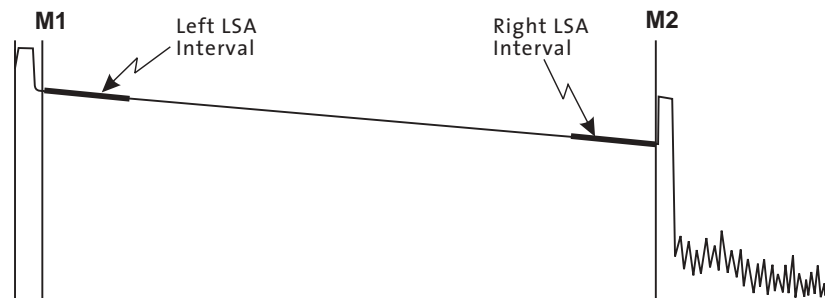
The Least Squares Approximation (LSA) 2-Point Loss Measurement uses an LSA technique to calculate the best Y-intercept values based on the current marker positions. Intervals directly to the right of Marker M1 and left of Marker M2 will be used to calculate the intercept values. The length of the LSA intervals is user selectable. The default value is 408.7 meters.

The intervals will be highlighted on the trace data with the ends marked by **Xs**.

The LSA 2-Point Loss is the change in dB (Y-Axis) calculated between the two points. When the M1, Y-Axis position is greater than the M2, Y-Axis position, a positive loss measurement is displayed.

**LSA (Least Squares Approximation) technique is useful when the trace is excessively noisy.**

The “left interval” is associated with Marker M1 and the “right interval” with Marker M2. The default location for the left interval is immediately to the right of M1 in Figure 14-6. The scale has been exaggerated for illustration purposes. The default location for the right interval is immediately to the left of M2.



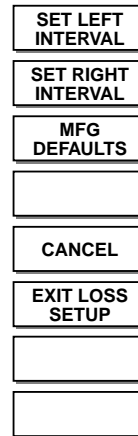
*Figure 14-6: 2-Point LSA Loss Difference*

**PROCEDURE FOR  
2-POINT LSA  
END-TO-END LOSS  
MEASUREMENT**

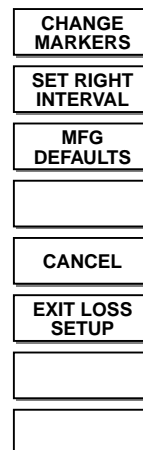
1. Place the markers as for an end-to-end loss measurement.
2. Set the View From Origin.
3. Select *2-Point Loss LSA* from the Loss Mode menu.
4. View from each marker and expand as necessary.
5. Check that the LSA intervals are located on areas of straight backscatter and do not touch a splice or other feature.
6. Read the 2-Point LSA Loss located directly below the Marker information section in the Trace Parameters Area.

**Adjusting LSA intervals to ensure a more accurate 2-Point LSA Loss reading:**

1. Press the **SET LOSS INTERVALS** softkey. The following softkeys are displayed.



2. Press the **SET LEFT INTERVAL** softkey to enter the change mode for the interval at Marker M1. The softkeys will change to read:



The marker distance information in the Trace Parameters area (See Figure 2-3) will be temporarily replaced by the LSA interval distance measurements.

L → 1:	0.0000 km
R → 1:	0.4087 km
L → R:	0.4087 km

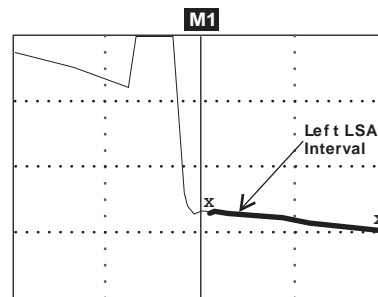
*Figure 14-7: Left LSA Interval Distance Measurements*

L → 1 Distance from the left boundary to marker M1

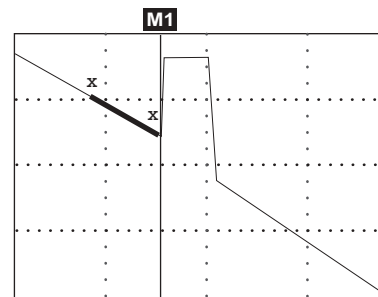
R → 1 Distance from the right boundary to marker M1

L → R Distance from the left boundary to the right boundary

The next illustration shows an example of how a section of the trace screen expanded around Marker 1 (M1) would look.



*Figure 14-8: Left LSA Interval for 2pt Loss & dB/km Loss Modes*

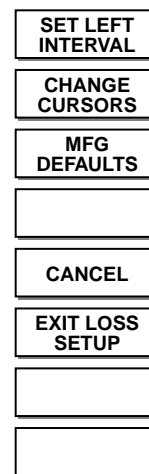


*Figure 14-9: Left LSA Interval for Splice Loss Mode*

3. Press the **Marker Movement** keys to adjust the left side of the Left Interval. The left X will move with the fuzzy cursor and the L → 1 reading will change in the LSA Interval Distance Measurements.
4. Press the **M1/2 Sel** hardkey.

5. Press the **Marker Movement** keys to adjust the right side of the Left Interval. The right X will move with the fuzzy cursor and the R → 1 reading will change in the LSA Interval Distance Measurements.
6. Press the **SET RIGHT INTERVAL** softkey to enter the change mode for the interval at Marker 2 (M2) for 2pt Loss and dB/km Loss modes. Marker 2 (M2) is not used in Splice Loss mode.

The softkeys will change to read:



The marker distance information in the Trace Parameters area will be temporarily replaced by the LSA interval distance measurements.

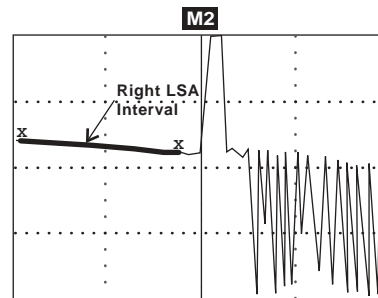
L → 2:	-0.4087 km
R → 2:	0.0000 km
L → R:	0.4087 km

*Figure 14-10: Right LSA Interval Distance Measurements*

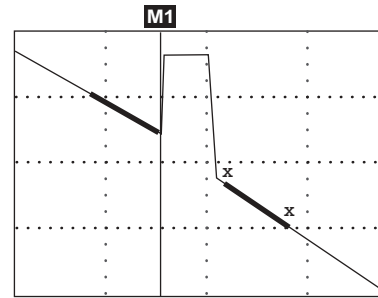
- L → 2      Distance from the left boundary to marker M2
- R → 2      Distance from the right boundary to marker M2
- L → R      Distance from the left boundary to the right boundary

Figure 14-11 shows an example of a section of the trace screen expanded around Marker 2 (M2) for 2pt Loss and dB/km Loss.

Figure 14-12 shows Marker 1 (M1) placement for Splice Loss.



*Figure 14-11:  
Right LSA Interval for 2pt Loss &  
dB/km Loss Modes*



*Figure 14-12:  
Right LSA Interval  
for Splice Loss Mode*

7. Follow the procedures in steps 3 through 5 to adjust the interval end positions.

---

#### NOTE

The right X will be adjusted first. Press the **M1/2 Sel** hardkey to switch to the left X.

---

8. Read the 2-Point LSA or Splice Loss from the Loss window.
9. Press the **EXIT LOSS SETUP** softkey to leave Set Interval Mode.

---

#### NOTE

The **MFG DEFAULTS** softkey may be pressed at any time during the Set Interval procedure for interval default settings.

---

The other two softkeys in the Set Loss Intervals mode are **CHANGE MARKERS** and **CANCEL**.



**CHANGE MARKERS** Acts like the **M1/2 Sel** hardkey during Set Loss Intervals Mode because the M1/2 select key function is changed to switch between interval ends.

**CANCEL** Press this key to exit Set Loss Intervals mode without saving any changes that have been made to the intervals.

#### 14.2.4 dB/km Loss

The Loss/Distance Measurement uses a data point at M1 and a data point at M2 to calculate the change in dB (Y-Axis) between the two points. This is divided by the distance between the two Markers to calculate the Loss/Distance measurement. When M1 (Y-Axis) data is greater than M2 (Y-Axis) data, a positive loss measurement is displayed.

$$\text{Loss/Distance} = \frac{\text{2-Point Loss}}{\text{Distance Between Marker 1 and Marker 2}}$$

Loss/Distance will be expressed in the following three forms depending on the units chosen in setup:

Loss/Distance	Current Unit of Measurement
dB/Km	M, Km
dB/Kft	Ft, Kft
dB/Mi	Mi

*Figure 14-13: Loss/Distance Measurement Units*

#### 14.2.5 dB/km LSA


LSA Loss/Distance finds the LSA 2-Point Loss and divides it by the distance between the two Markers.

$$\text{dB/Distance} = \frac{\text{LSA 2-Point Loss}}{\text{Distance Between Marker 1 and Marker 2}}$$

LSA Loss/Distance will be expressed in the three forms shown in the Loss/Distance measurement chart depending on the units chosen in the setups.

#### 14.2.6 ORL (Optical Return Loss)

The Corning Cable Systems 340 provides the ability to calculate Optical Return Loss (ORL), the ratio of reflected energy to input energy for a fiber optic link.

When the Loss Mode tag reads ORL, a **CALCULATE ORL** softkey will be displayed. Place the Marker 1 (M1) to mark the start of the ORL interval, and the Marker 2 (M2) to mark the end of the interval. Press **CALCULATE ORL** to initiate an ORL calculation. While in progress, an icon  will be displayed in the Status window indicating that ORL calculation is in progress. When the ORL calculation is complete, the value will be displayed in the Loss Information area of the Trace Parameters section.

If ORL can not be completed, a tone will sound.

A “<” displayed in front of the ORL value, along with an “S” following the value, indicates that saturation was encountered in the marked area of the trace. This implies that the actual ORL is, at most, the displayed value but probably less.

A “<” displayed without an “S” indicates that there were insufficient points per pulsewidth to perform an accurate ORL value.

#### ORL Auto Mode

1. In the Manual Test Mode, go to the SETUP screen.
2. Set *Auto Analysis* to ON and the rest of the Quick Setups to OFF.

3. Set the *No. AVGs* to Timed 1:00 min.
4. Set the *Pulsewidth* to 1000 ns.
5. Set the *Range/Reso* to the shortest range possible, still following the fiber length plus 25% rule, and the *Reso* to the highest resolution possible for the range selected.
6. Press the **ADDITIONAL SETUP** softkey (F1).
7. In the ORL window, set *Auto ORL* to ON.
8. Set the *Auto ORL Area* to either *Full Trace* or *M1 to M2* depending on the testing requirements.
9. Set **ORL relative to** either *Origin* or *M1* depending on the testing requirements.
10. Press **GO** (F6).
11. Press the **Start/Stop** hardkey to test the fiber.
12. Press the **ANALYZE TRACE** softkey.
13. The ORL value is displayed in the center of the Trace Parameters Area.

---

**NOTE**

If M1 to M2 and Origin were selected in steps 8 and 9, Markers 1 and 2 (M1 and M2) must be positioned as follows:

Place M1 225 meters prior to the left side of the reflective event in order to achieve an accurate reflectance measurement.

Use the **Horizontal Expansion & Contraction** and the **View From** hardkeys to place M1 225 meters before the rising edge of the reflection. M1 must be placed on the linear section of the waveform backscatter and NOT on the rising edge of the reflection (See Figure 14-14).

M1 may be placed within two data points from the origin or start of the OTDR Trace.

---

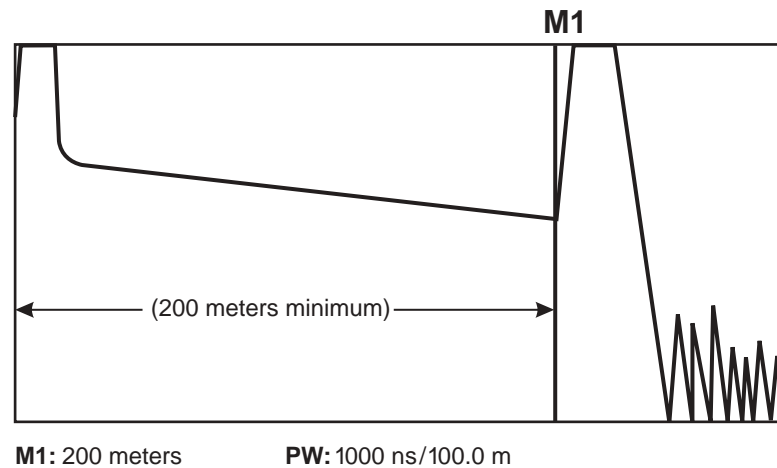


Figure 14-14: Placement of Marker 1 (M1) in ORL Auto Mode.

#### ORL MANUAL Mode

1. In the Manual Test Mode go to the SETUP screen.
2. Set *Auto Analysis* to ON and the rest of the Quick Setups to OFF.
3. Set the *No. AVGs* to Timed 1:00 min.
4. Set the *Pulsewidth* to 1000 ns.
5. Set the *Range/Reso* to the shortest range possible, still following the fiber length plus 25% rule, and the *Reso* to the highest resolution possible for the range selected.
6. Press the **ADDITIONAL SETUP** softkey (F1).
7. In the ORL window, set *Auto ORL* to ON.
8. Set the *Auto ORL Area* to either *Full Trace* or *M1 to M2* depending on the testing requirements.
9. Set ORL relative to either *Origin* or *M1* depending on the testing requirements.

10. Press **GO** (F6).
11. Press the **Start/Stop** hardkey to test the fiber.
12. Press the **Loss** (Loss Mode) hardkey to display the LOSS MODE window.
13. Select the *ORL mode*.
14. Position Markers M1 and M2 to determine the desired ORL area.
15. Press the **CALCULATE ORL** softkey.
16. The ORL value is displayed in the center of the Trace Parameters Area.

---

**NOTE**

Moving M1 or M2 after the ORL calculation will change the ORL value to a N/A. Press the **CALCULATE ORL** softkey to display the new ORL value.

---

#### 14.2.7 Dual Splice Loss

Dual Splice Loss mode provides a method for determining the individual splice loss of two closely spaced fusion splices. This mode displays a box at the lower left of the trace grid, displaying the two Splice Loss values, as based on the current positions of the M1 and M2 Markers (See Figure 14-15).

**PROCEDURE FOR  
DUAL SPLICE LOSS  
MODE**

1. Press the **Loss** hardkey and select *Dual Splice Loss* from the LOSS MODE window.
2. Place M1 at the start of the first splice.
3. Place M2 at the start of the second splice.
4. Enter **SET LOSS INTERVAL** and press **SET LEFT INTERVAL**. Use the **Marker Movement** keys to set the left loss interval on linear backscatter to the left of M1.
5. Press **SET RIGHT INTERVAL** to set the right loss interval on linear backscatter to the right of M2.

- If the two events are fully resolved, the dual splice loss readout box will display the individual measurement at M1 and at M2. The loss readout (located in the upper left side of the display) will display the cumulative splice loss of both splices.

If the two events cannot be resolved, the loss readout will display the splice loss of the combined event. The dual readout values will be approximate.

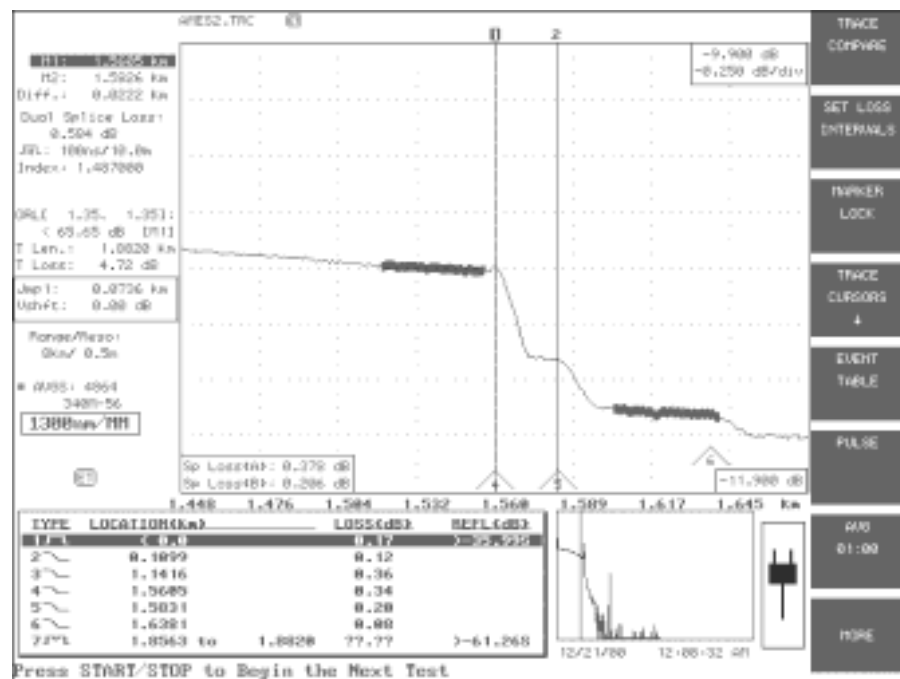


Figure 14-15: Dual Splice Loss Mode

### 14.3 Reflectance Measurement

A reflectance value for reflective events will be displayed in the Trace Parameters area of the screen, if Reflectance in the User Preferences setup window is set to AUTO or MANUAL. An “S” or a “>” indicator may also be present in the box (See “Reflectance Reading and Indicators” on page 51). The reflectance measurement is made relative to Marker M1 when set for AUTO, and relative to M1 and M2 when set for MANUAL.

Reflectance is the ratio of reflected power to incident power displayed in dB. A Reflectance measurement is affected by the Pulsewidth and the Backscatter Coefficient, both selectable in Setups. The default coefficients are shown in the table in Figure 14-16.

Wavelength	Mode	Coefficient
850 nm	MM	67.0
1300 nm	MM	74.0
1310 nm	SM	80.0
1550 nm	SM	83.0

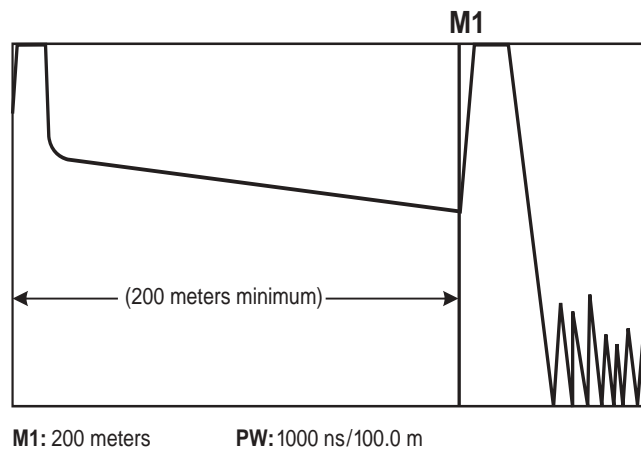
*Figure 14-16: Default Backscatter Coefficient Table*

#### 14.3.1 Reflectance Auto Mode

Reflectance AUTO Mode requires placement of ONLY Marker M1 and automatically makes the measurement based upon the marker placement. There are restrictions on the placement of M1 detailed in the following procedure.

- PROCEDURE**
1. In the Manual Test mode go to the SETUP screen, QUICK MEASUREMENT SETUP window, and set the No. “AVGS” to Timed 1:00 min.
  2. Set the Pulsewidth to an appropriate pulsewidth; 1000 ns is a good typical setting.
  3. Set the Range/Reso to the shortest range possible, following the fiber length plus 25% rule, and the Reso to the highest resolution possible for the range selected.
  4. Place M1 on Backscatter just prior (to the left side) of the reflective event in order to achieve an accurate reflectance measurement.
  5. Use the **Horizontal expansion/contraction** and the **View From** hardkey, to place M1 as close as possible to the rising edge of the reflection. M1 must be placed on the waveform backscatter (linear section) and NOT the rising edge of the reflection (See Figure 14-17).

The example shown in this figure uses a 1000 ns pulsewidth which yields a 200 meter minimum distance between origin and M1 placement.



*Figure 14-17: Marker M1 placement for Reflectance Auto Mode Measurement.*

6. M1 may be placed to within two pulsewidths from the origin or start of the OTDR Trace.
7. Press the **Start/Stop** hardkey to test the fiber.
8. After the test is completed, the reflectance is displayed in the Trace Parameters Area. Moving M1 will change the reflectance value.

The trace can be saved to Disk.

### 14.3.2 Reflectance Manual Mode

Both Markers M1 and M2 are used for this measurement. Additionally, the Attenuate Trace feature, which uses Real Time Mode, provides a means to take the reflectance out of saturation.

1. In the Manual Test Mode go to the SETUP screen, QUICK MEASUREMENT SETUP window, and set *No. AVG* to Timed 1:00 min.
2. Set *PW* (Pulsewidth) to an appropriate setting; 1000 ns is a good typical setting.



3. Set *Range/Res* to the shortest range possible, following the fiber length plus 25% rule, and the *Reso* to the highest resolution possible for the range selected.

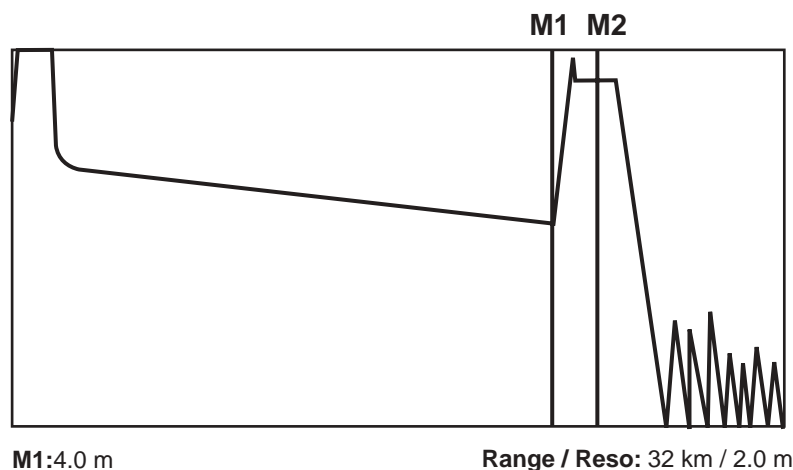
---

**NOTE**

To ensure that a “>” will not be present due to pulsewidth and resolutions settings, be certain that the parameters are set for at least eight data points per pulsewidth (See “Reflectance Reading and Indicators” on page 51).

---

4. Place M1 on backscatter just prior (to the left side) of the reflective event in order to achieve an accurate reflectance measurement.
5. Use the **Horizontal Expand/Contract** and the **View From** keys to place M1 on the waveform backscatter, and as close as possible to the rising edge of the reflection. (See Figure 14-18).
6. Place M2 on the center of the reflectance pulse (See Figure 14-18). Do not put M2 on the top of the first narrow peak, if a narrow peak is present.



*Figure 14-18: Markers M1 and M2 placement for Manual Reflectance Measurement*

7. Execute a Real Time Scan and observe the value in the Reflectance section of the Trace Parameters Area.
8. If the Reflectance is in Saturation, indicated by the “S” after the Reflectance reading, or is being electronically limited, indicated by the “>” preceding the Reflectance reading, then press the **ATTENUATE TRACE** softkey. If the **ATTENUATE TRACE** softkey is not available, press the **MORE** softkey to display the **ATTENUATE TRACE** softkey.
9. Press the **Marker Movement** keys slowly until the reflectance goes out of saturation and the “S” and the “>” disappear.
10. Press the **EXIT/SAVE ATTENUATION** softkey, then press the **Start/Stop** hardkey to complete the test.
11. After the test is completed, the reflectance is displayed in the Trace Parameters Area and the trace can be saved to disk.

## 15.0 MS-DOS 6.22 or Windows 95 Option

The Corning Cable Systems 340 can be ordered with MS-DOS 6.22 or Windows 95 pre-installed on units with an internal hard drive. When running either MS-DOS or Windows 95, the user will have access to the instrument's Hard Drive and Floppy Drive. The 340's internal RAM DRIVE (D:) is NOT CURRENTLY accessible from the MS-DOS or Windows 95 environment. This will be addressed on a future release.

### 15.1 Accessing MS-DOS

To access MS-DOS:

1. Press the **SPECIAL MODES** softkey layer.
2. Press the **BOOT TO DOS** softkey. Pressing this softkey will force the 340 to soft-reboot and load MS-DOS. A DOS prompt C> will be displayed.

---

#### NOTE

A Power cycle will ALWAYS load the Corning Cable Systems 340 application.

---

### 15.2 Accessing Windows 95

To access Windows 95:

1. Press the **SPECIAL MODES** softkey to enter the Special Modes screen.
2. Press the **LAUNCH WINDOWS** softkey. Pressing this softkey will force the 340 to soft-reboot and load Windows 95.

---

#### NOTE

MS-DOS and Windows 95 should be used with AC power only. The Battery Low indicator is not automatic and could result in loss of data while using MS-DOS or Windows 95.

---

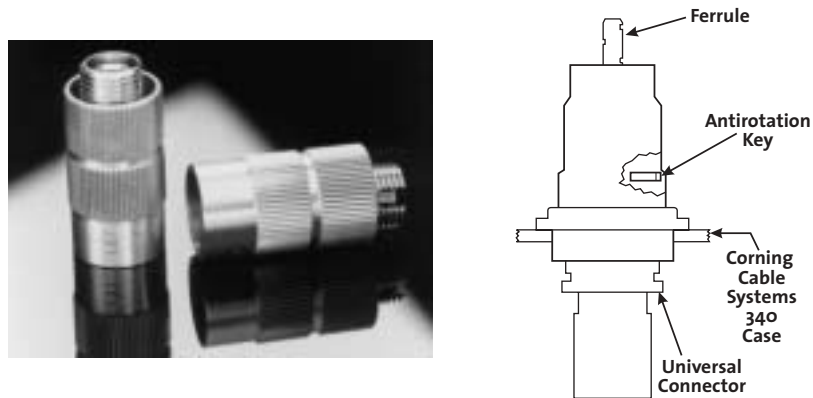
Accessing Windows 95

MS-DOS 6.22 or Windows 95 Option

## Appendix A: Connecting to the Corning Cable Systems 340

This appendix has critical information for proper use of the Corning Cable Systems 340. For new users, we recommend an in-depth examination of the following procedures and, whenever possible, an actual physical test.

### Universal Connector and Adapter: Instructions for Use



*Figure A-1: Universal Connector and Adapter*

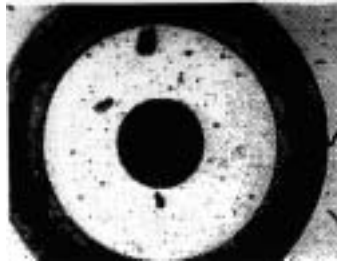
#### **UNIVERSAL CONNECTOR**

The universal connector (Universal Fiber Optic Interface) is an interface to the Corning Cable Systems 340 that accepts adapters for all fiber connector types. The universal connector's dust cap protects the ferrule's tip from dust, dirt or damage which could affect measurement results.

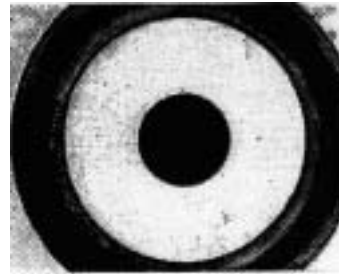
#### **Cleaning the ferrule tip prior to switching on the Corning Cable Systems 340:**

1. Remove the dust cap.
2. Blow the ferrule tip with compressed air.
3. Wipe the ferrule tip clean with a precision cleaning tissue moistened with isopropyl alcohol.
4. Blow the ferrule tip dry with compressed air.

5. Make sure that the instrument is switched off and inspect the ferrule using a hand microscope or magnifier. It should appear as in the picture in Figure A-2: Clean Ferrule Tip.



*Contaminated Ferrule Tip  
(200X)*



*Clean Ferrule Tip (200X)*

*Figure A-2: Magnified Ferrule Tip*

**UNIVERSAL ADAPTER** It is advisable to clean the universal adapter using a round nylon brush or a cleaning tissue and compressed air before mounting it on the universal connector.

**CAUTION**

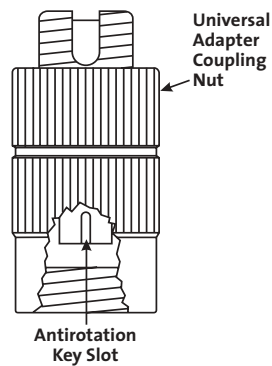
Do not attempt to engage the universal coupler and adapter at an angle. Keep alignment as straight as possible.



*Figure A-3: Attaching the Universal Connector Adapter*

### Attaching the Universal Adapter to the 340:

1. Remove the protective cap from the ferrule.
2. Be sure the antirotation key on the universal connector (See Figure A-1) is engaged in the slot on the universal adapter (See Figure A-4) before starting to screw the coupling nut. You can test this by attempting to turn the adapter gently to ensure that it doesn't move.
3. Turn the coupling nut clockwise to tighten the adapter to the coupler.



*Figure A-4: Universal Adapter*

Each connector type, ST<sup>®</sup> compatible, FC, SC-PC, and so on, has a specific adapter sleeve. Most industry-standard connectors can be affixed to an instrument equipped with this interface.

Different adapters are required for angled-polish universal connectors. The adapter supplied with the Corning Cable Systems 340 has a 2.14 mm key.

There are currently five angled-polish universal connector adapters for the Corning Cable Systems 340:

FC	UA-60
SC	UA-65
DIN	UA-70
ST	UA-73
Diamond	UA-80

**OTDR/SOURCE  
UNIVERSAL  
CONNECTOR  
ADAPTERS**



**UA-25**  
FC/PC Adapter  
Tungsten Carbide



**UA-30**  
ST<sup>®</sup> compatible  
Adapter



**UA-55**  
SC Adapter



**UA-60**  
FC/PC Adapter



**UA-65**  
SC/APC Adapter



**UA-75**  
ST/APC Adapter



**UA-80**  
E2000 Adapter

***Other adapters available include:***

UA-10Biconic  
UA-15D4  
UA-20SMA 905/906  
UA-40Diamond HP HMS-10  
UA-45Diamond HMS-0  
UA-50Diamond HMS-10/A  
UA-70DIN/HRL-10  
UA-85DIN 47256



### **Mating the Patchcord to the Universal Adapter**

The connector from the system to be measured should be cleaned using the procedure described in the previous section before mating it to the universal connector and adapter.

Once again, straight alignment is the key to avoiding damage to the sleeve in the universal adapter. No force should be necessary to mate the system connector to the universal adapter (you may feel slight resistance). The connection should be snug.

Keep the optical fiber as straight as possible, also. Radial force on the connector due to fiber optic cable weight will then be minimized.



*Figure A-5: Patchcord Connected to OTDR Port*

---

#### **NOTE**

Never force the connector ferrule or insert it at an angle into the adapter.

---

## POWER METER CONNECTOR



*Figure A-6: Power Meter Connector and Adapter Cap*

### Handling the Power Meter Connector

Optical fibers, especially single-mode fibers, are susceptible to loss from microbends or other stress. To ensure accurate, repeatable measurements, the fiber lead attached to the meter must be positioned to minimize mechanical strain (See FigureA-7).

1. Remove the dust cap from the detector housing at the top of the Corning Cable Systems 340 and screw on the appropriate connector adapter (MA-Series).
2. Secure the fiber being tested to the connector adapter. Be sure to clean the test fiber before connecting it to the connector adapter.

---

#### NOTE

The Power Meter connectors should be cleaned when normal backscatter signal levels cannot be obtained.

---

**POWER METER  
CONNECTOR FIBER  
ADAPTER CAPS**



**BFA-FC**  
Bare Fiber Adapter  
(BFA-ST, BFA-SC and  
BFA-DIN also available)



**MA-35**  
SC Adapter



**MA-25**  
FC Adapter



**MA-80**  
E2000 Adapter



**MA-30**  
ST<sup>®</sup> compatible Adapter

***Other adapters  
available include:***

MA-10Biconic  
MA-15D4  
MA-20SMA  
UA-85DIN 47256  
MA-00FDDI



*Figure A-7: Patchcord Connected to Power Meter Port*

### **Cleaning the Power Meter Connector**

The power meter connector located on the top of the unit should be cleaned if you can see contaminant. It is not necessary to perform this procedure with each use.

1. Remove the adapter (MA-Series).
2. Moisten a lens-cleaning wipe with isopropyl alcohol and gently wipe the detector.
3. Hold a can of compressed air approximately 2 inches from the power meter connector and blow air into the connector once or twice.
4. Clean all threads on the adapter cap
5. Reconnect the adapter cap to the Corning Cable Systems 340.

---

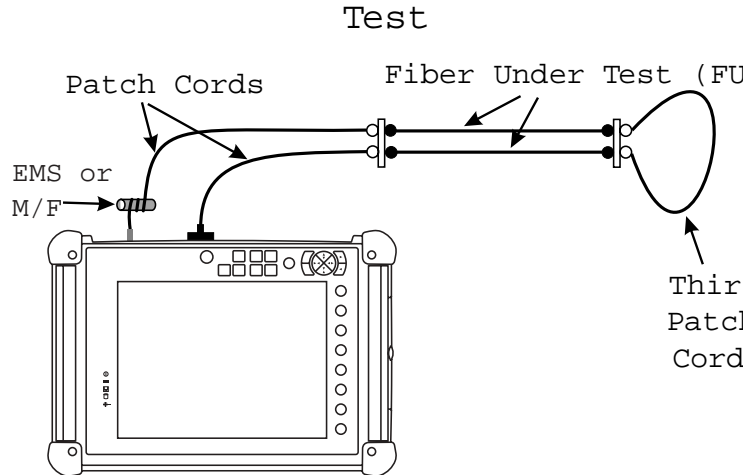
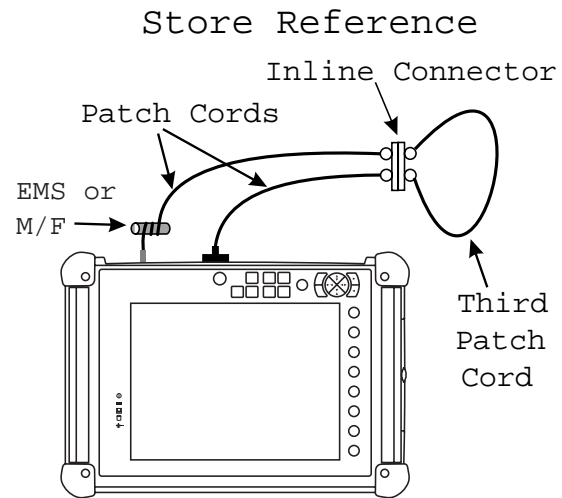
### **NOTE**

Avoid hand contact with the power meter connector.

---

## Fiber Connection Methods

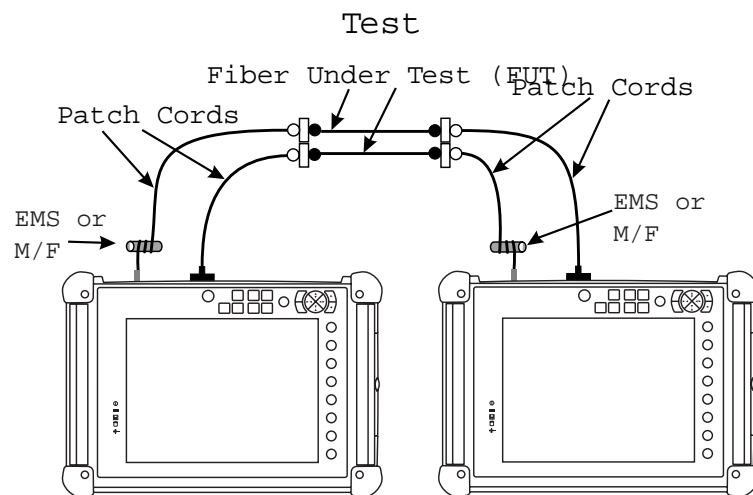
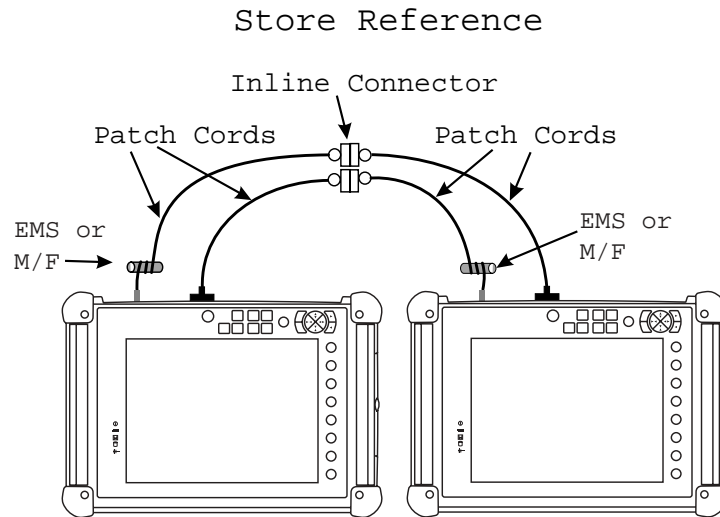
### SINGLE OTDR METHOD



**EMS:** Equilibrium Mode Simulator (Multimode Fiber)

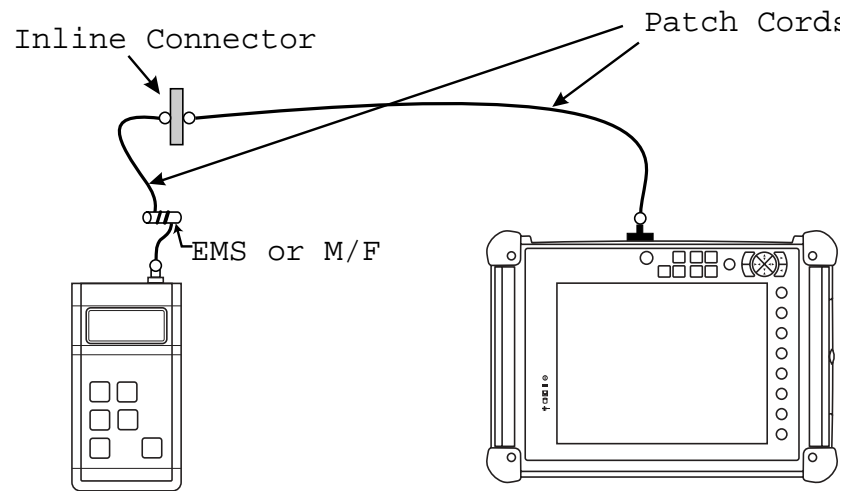
**M/F:** Mode Filter (Single-mode Fiber)

**DUAL OTDR  
METHOD**

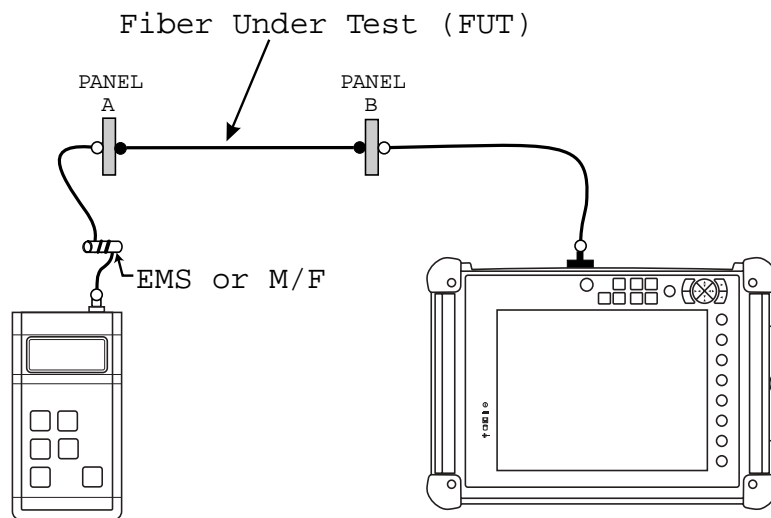


**SINGLE OTDR  
METHOD**

**Store Reference**



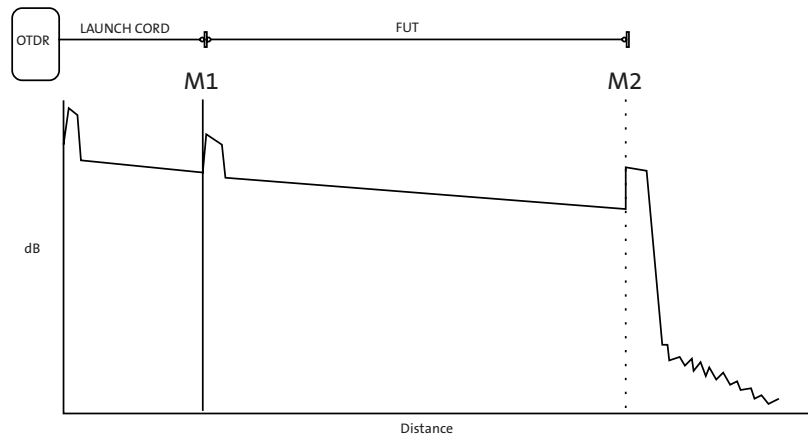
**Test**



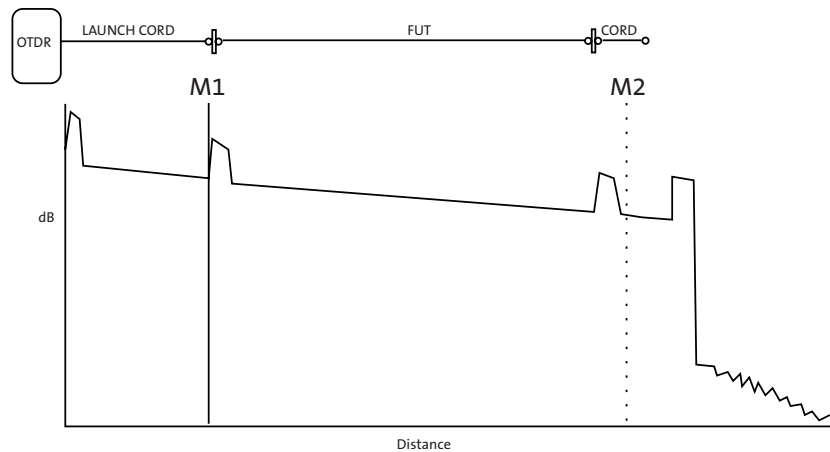




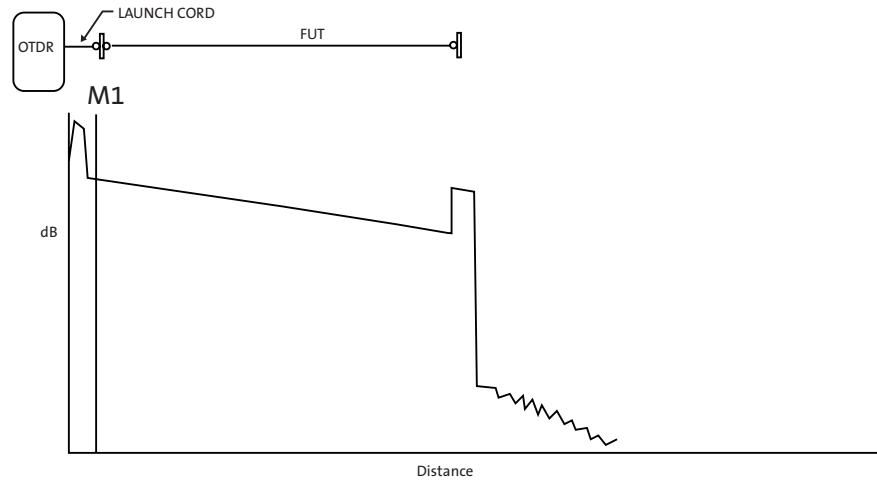
## Appendix B: Sample Traces



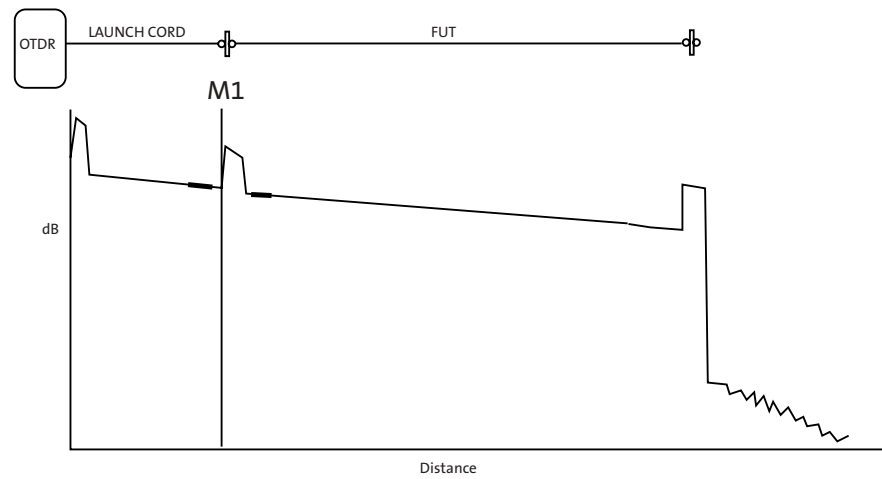
OTDR sample trace with a section of launch cord (dead-zone fiber) of a known length preceding it. The Two-Point loss includes the input connector loss of the fiber under test (FUT).



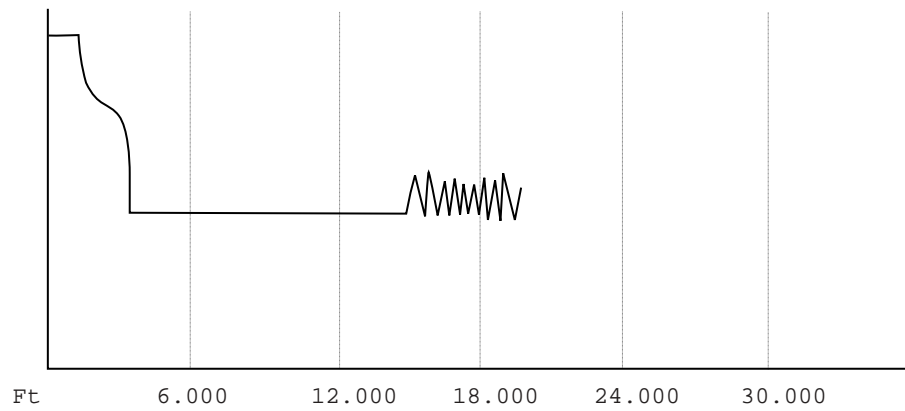
OTDR sample trace with a section of launch cord (dead-zone fiber) of a known length preceding the FUT and a cord following the FUT. The Two-Point loss includes the loss of both connectors of the fiber under test (FUT).



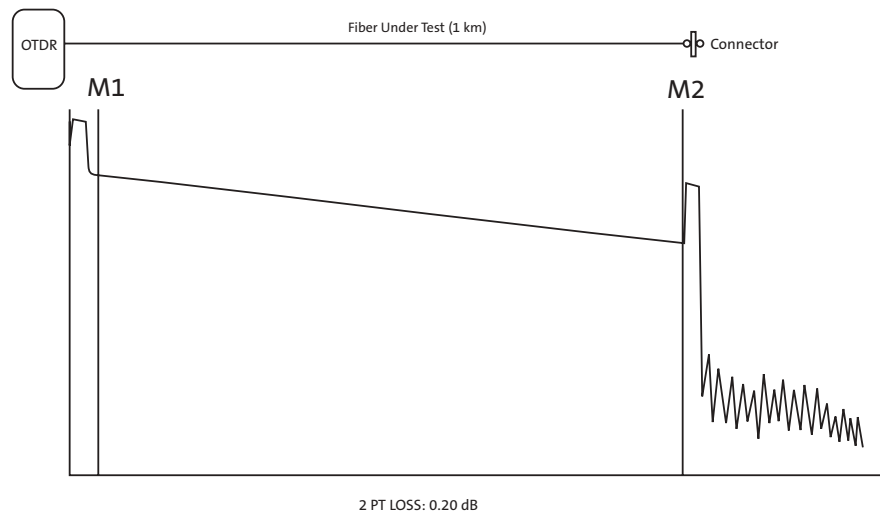
Panel-Splice Measurement using Launch Level



Panel-Connection and Panel-Splice Measurement using Splice Loss Mode and Long Launch Cable

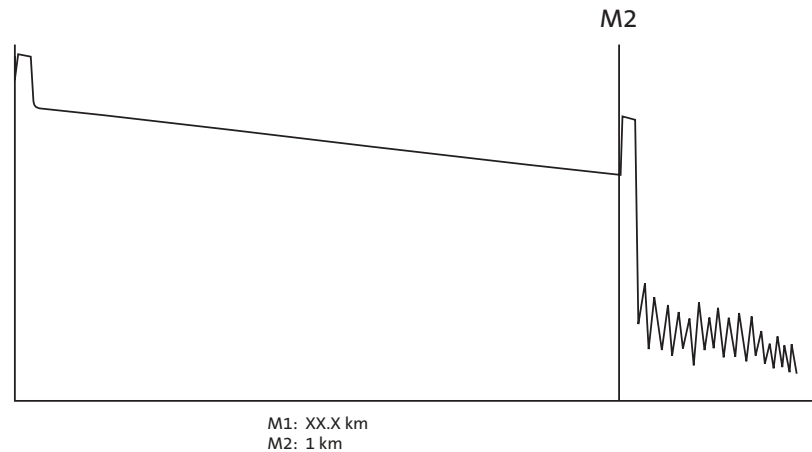


Bad Launch - possible causes: connection at OTDR, defective patch cord, bad connector on FUT, or broken FUT in the first few feet. (Pulsewidths from 1001 nS to 30000 nS)



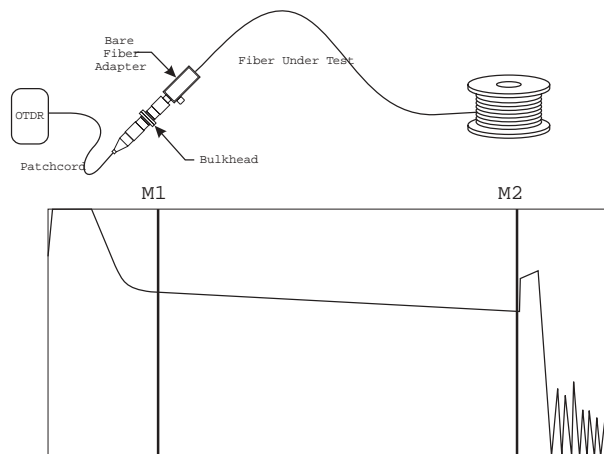
Marker Placement For End-To-End Loss Measurements - Place Marker 1 (M1) and Marker 2 (M2) at the locations shown.

Refer to 2PT LOSS: for End-To-End Loss.



Proper Marker Placement For Fiber Length Distance Measurements — Place Marker 2 (M2) at the location shown. Marker 1 (M1) may be substituted in place of Marker 2 (M2).

Refer to M2: (or M1:) for Distance to End of Fiber.



Set-Up and Marker Placement when using any of the BFA-Series Bare Fiber Adapters page 203. For accurate measurements, be sure to place Marker 1 (M1) in the linear portion of the trace.

---

**NOTE**

Marker 2 (M2) is positioned at the end of the fiber reel.

---



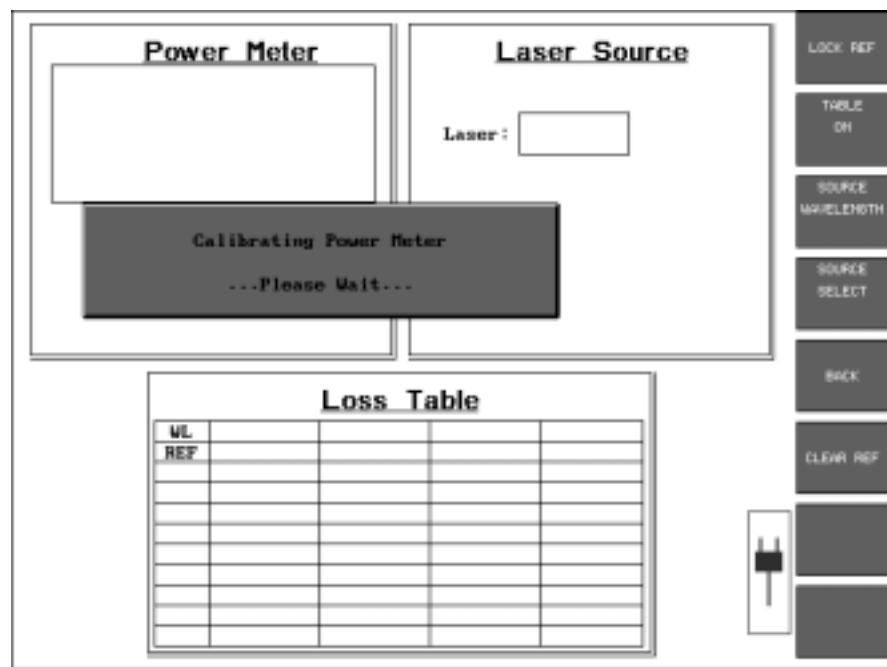
## Appendix C: Power Meter/Light Source Measurement Procedures

This appendix details two methods of performing Power Meter/Light Source measurements with the Corning Cable Systems 340:

- Single OTDR method, using a hand held light source
- Dual OTDR method

### Single OTDR Method using a Hand-Held Light Source

- REFERENCE PROCEDURE**
1. Power up the 340 and press **PWR METER LIGHT SRC** (F4) on the MODES selection screen. The Power Meter/Light Source screen is displayed with the message “Calibrating Power Meter Please Wait” (See Figure C-1).



*Figure C-1: Power Meter/Light Source Screen with Calibrating Power Meter Message*

2. When the calibration sequence is completed connect the light source to the 340 Power Meter port using either a single patchcord or two patchcords and inline connector (see Figure C-2). The light source should be powered on and allowed to warm up for about 5 minutes.

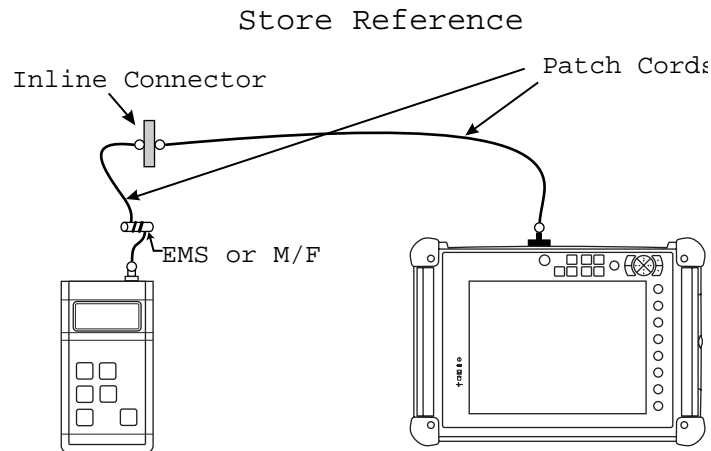


Figure C-2: Reference Setup

#### CAUTION

When operating in Power Meter/Light Source Mode, the key response may seem to be slow; therefore, allow time between key presses for the software to respond. The reason for the seemingly slow response is that the software must change between modes of operation.

3. Press the **CLEAR REF** softkey (F6) to clear any previous reference.
4. Set the Source wavelength and the Power Meter wavelength both to 1310 nm and press the **LOCK REF** (F1) softkey. The reference should be about -07.00 dBm (this can vary with different light sources).

The Power Meter indicates +00.00 dB and the Reference field displays the locked reference value for the 1310 nm wavelength.



5. Press the **Wavelength** hardkey to change the Power Meter wavelength to 1550 nm, and then press the **CLEAR REF** softkey to clear any previously set reference.
6. Change the Source wavelength to 1550 and allow the 1550 nm source five minutes to warm up.
7. Press the **LOCK REF** softkey.  
The Power Meter indicates +00.00 dB and the Reference field displays the locked reference value for the 1550 nm wavelength.
8. Use the **Wavelength** hardkey to toggle between the locked references for 1310 nm and 1550 nm
9. Press **TABLE ON** (F2); this activates the TABLE WAVELENGTHS screen (See Figure C-3).

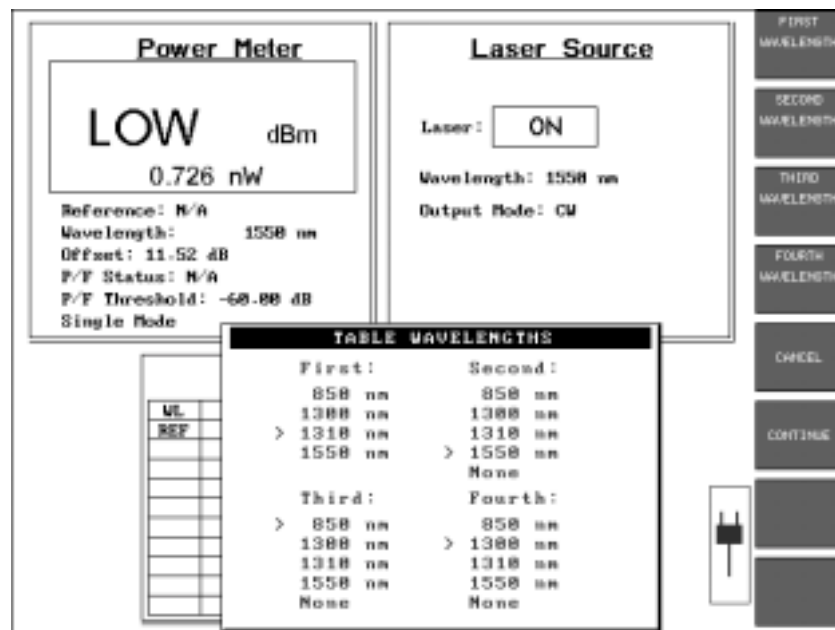


Figure C-3: Table Wavelengths screen

10. Use the **F1** through **F4** softkeys to select the wavelengths to be tested. Select the wavelength by pressing the corresponding softkey until the chevron (>) is aligned with the desired wavelength.

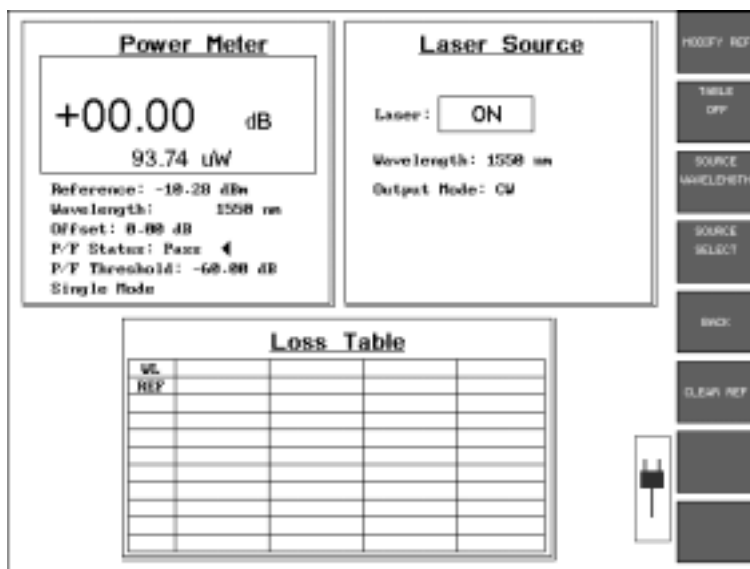
---

**NOTE**

The **WaveLength** hardkey is inactive when the Loss Table is active. Use the **Horizontal/Vertical Expand/Contract** keys to navigate the Loss Table. The Power Meter will always reflect the wavelength currently selected in the Loss Table.

---

11. Press **CONTINUE** (F6); the screen will be similar to Figure C-4.



*Figure C-4: Power Meter/Light Source Screen with Setup Completed*

**TESTING** Now that the setup is completed, use the following procedure for testing.

1. If a two patchcord method is being used, disconnect the patchcords at the inline connector.

If the one patchcord method is being used disconnect the patchcord from the power meter port.

---

**NOTE**

Regardless of the method used (one or two patchcord) **DO NOT DISCONNECT THE PATCHCORD FROM THE LIGHT SOURCE.**

---

2. Place the Light Source at one end of the Fiber Under Test (FUT) and connect it to the first fiber.

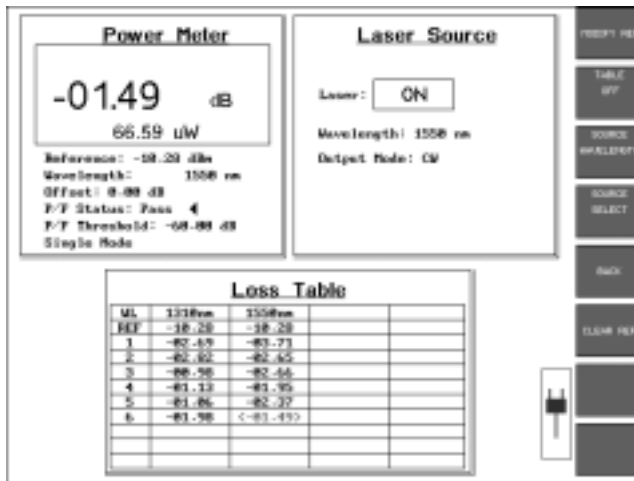
Connect the other end of the FUT to the Power Meter port of the 340.

Contact the person at the Light Source end and make sure that both the Light Source and Power Meter are set to the same wavelength. (Allow five minutes for the light source to warm up.)

3. Press the **Start/Stop** hardkey to store the current loss reading to the table; the Power Meter will change to the next wavelength.

Press the wavelength key on the source to change the wavelength (verify that the light source and power meter are set to the same wavelength).

Press the **Start/Stop** hardkey to store the current loss reading to the table. The unit prompts to connect to the next FUT. Repeat this sequence for each fiber to be tested.



*Figure C-5: Wavelength Selection Softkeys*

4. After the desired number of fibers have been tested, press the **Disk** hardkey to save the results (see Chapter 12.0 for details). Use up to 8 characters to name the file, do not add an extension. The Power Meter/Light Source software will automatically add the “.PMT” extension upon saving the file.

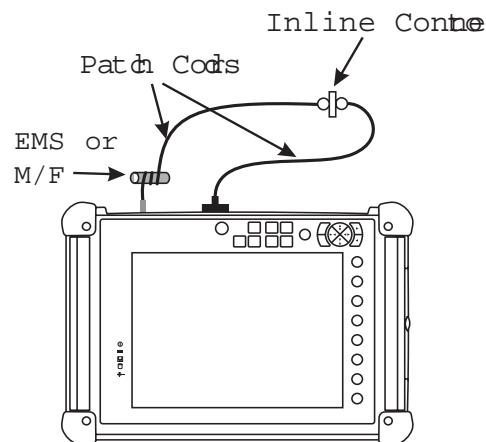
### Dual OTDR Method

This procedure details how to operate the Loss Test Set mode for two 340 units (designated OTDR-A and OTDR-B) that have not been physically connected together to establish their Reference settings.

#### REFERENCE PROCEDURE

Perform the following procedure on both OTDR-A and OTDR-B.

1. Power up the 340 and press **PWR METER LIGHT SCR** (F4) on the MODES selection screen. The Power Meter/Light Source screen is displayed with the message “Calibrating Power Meter Please Wait” (See Figure C-1).
2. When the calibration sequence is completed, connect the Single-mode OTDR port to the Power Meter port using two patchcords that are connected with an inline connector (See Figure C-6).



*Figure C-6: Reference Setup*

3. Use the **SOURCE WAVELENGTH** (F3) softkey to select the first wavelength to test.

---

**NOTE**

Insure that the Power Meter wavelength and the Source wavelength are the same.

---

4. Press the **SOURCE SELECT** (F4) softkey once to fire the laser. (The Output Mode changes to CW.)
5. Make note of the value displayed in the Power Meter's numeric display. The number should read in the range of -9.00 dBm to -12.00 dBm. If there was a previously stored reference, the reading will be in dB, not dBm. Clear the old reference by pressing **CLEAR REF** (F6), then press **CONTINUE** (F3) at the Reference Over-write screen.
6. After noting the new Reference Power in dBm, press **LOCK REF** (F1) to store the new Reference Power.
7. Press **SOURCE WAVELENGTH** (F3) to select the next wavelength for testing, if applicable.
8. Repeat Steps 5 through 7.

---

**NOTE**

The Reference Values just stored will be retained on power down of the instrument.

---

**MODIFYING THE  
STORED REFERENCE**

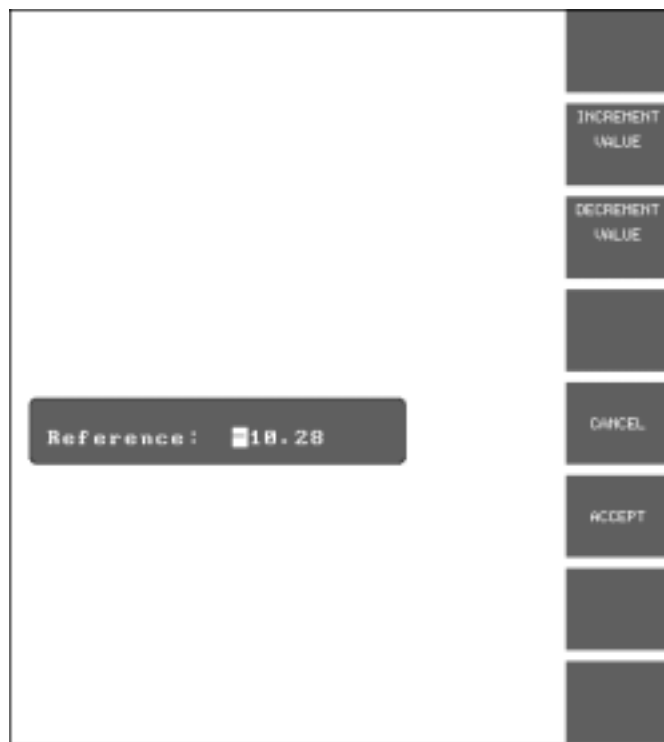
The stored reference values in OTDR-A need to be input into OTDR-B and the stored reference values in OTDR-B need to be input into OTDR-A.

1. To input the Reference Value(s) noted on the opposite OTDR, press **SOURCE WAVELENGTH** (F3) to select the wavelength to modify.
2. Press **MODIFY REF** (F1).
3. Press **EDIT REF** (F2)
4. Use the **Vertical Expand/Contract** hardkeys to select the number to be adjusted.

5. Press **INCREMENT VALUE** (F2) or **DECREMENT VALUE** (F3) to select the new Reference value (See Figure C-7).

Insure that the number sign in front of the new Reference Value is a negative (-) sign. With the number sign highlighted, use the **Marker Movement** keys to adjust.

6. Press **ACCEPT** (F6), when completed.

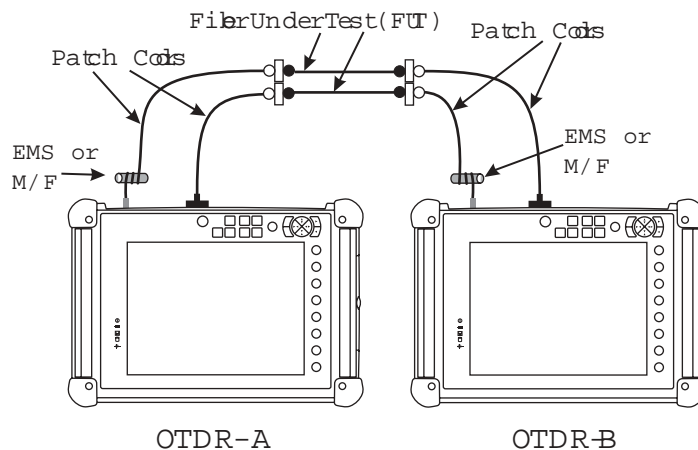


*Figure C-7: Edit Reference Window and Softkeys*

7. To input the Reference Value(s) noted on the opposite OTDR for the second wavelength of test, if applicable, press **SOURCE WAVELENGTH** (F3).
8. Repeat Steps 2 through 6.

**TESTING** Now that both units (OTDR-A and OTDR-B) are setup (See Figure C-8), use the following procedure for testing:

1. Connect to the first fiber under test.



*Figure C-8: Dual OTDR Setup*

2. Press **SOURCE WAVELENGTH** (F3) to select the first wavelength for test as shown in the first column of the Loss Table (See Figure C-4).

---

**NOTE**

Insure that the Power Meter wavelength and the Source wavelength are the same.

---

3. Press the **Start/Stop** hardkey to store the Loss Reading at the current wavelength.
4. Press **SORUCE WAVELENGTH** to select the second wavelength for test.

---

**NOTE**

Insure that the Power Meter wavelength and the Source wavelength are the same.

---

5. Press the **Start/Stop** hardkey to store the Loss Reading at the second wavelength.
6. Connect to the next fiber under test.
7. Repeat steps 1 through 6 for the first set of readings (for example, for the first 10 fibers).
8. Press the **Disk** hardkey to enter the MASS STORAGE menu and save the file (see Chapter 12.0 for details on saving files).

---

#### NOTE

It is a good practice to save the Loss Table periodically (for example, every ten fibers) as loss readings are being stored. By doing so, all reading will not be lost should a power failure occur. Only those readings not saved to the file will be lost. Loss readings may be replaced in a file, should a fiber or fibers need to be re-tested at a later date.

---

#### ADDING TO A PREVIOUSLY SAVED LOSS TABLE

Use the following procedure to add to an existing set of loss readings or to modify readings from a previously saved Loss Table.

1. Select **LOSS TEST SET** from the Operating Mode Selection screen.  
The message "Calibrating Power Meter Please Wait" will be displayed momentarily.
2. Press the **Disk** hardkey.
3. Scroll to and select *LOAD FILE*.
4. At the LOAD FILE window select the desired file.
5. Press **VIEW TRACE(S)**. The selected Loss Table will be displayed.
6. Use the **Vertical/Horizontal Expand/Contract** hardkeys to navigate through the Loss Table. Choose the fiber number at which testing shall resume or to be modified.

#### Printing Power Meter Test Results

Test results from the Power Meter/Light Source mode (Power Meter Loss Table) can be output directly to a printer, if a printer is attached to the 340. Additionally, files can be transferred from the 340's mass storage and



loaded into SoftView™ emulation software on a PC for printing. SoftView is a Windows-based PC program designed to analyze Corning Cable Systems 340 OTDR trace and Power Meter data. Contact Corning Cable Systems for additional information.

The following procedure outlines how to use SoftView software to print the power meter files.

1. Copy the desired file(s) from the 340's mass storage to a floppy disk. (See Chapter 12.0 for details.)
2. Place the 3½-inch floppy disk in the Drive A of the PC.
3. Open the SoftView software on the PC.
4. At the SoftView software Main Menu, left click on File
5. Scroll to and left click on Open...
  - a. In the Open window, left click on the down arrow in the Look in: field and select 3½ Floppy (A:) from the rolldown menu.



*Figure C-9: Open Dialog Box*

- b. Left click the down arrow in the Files of type: field and select Power Meter (\*.pmt).
  - c. Open the desired power meter file. The Power Meter file window appears.

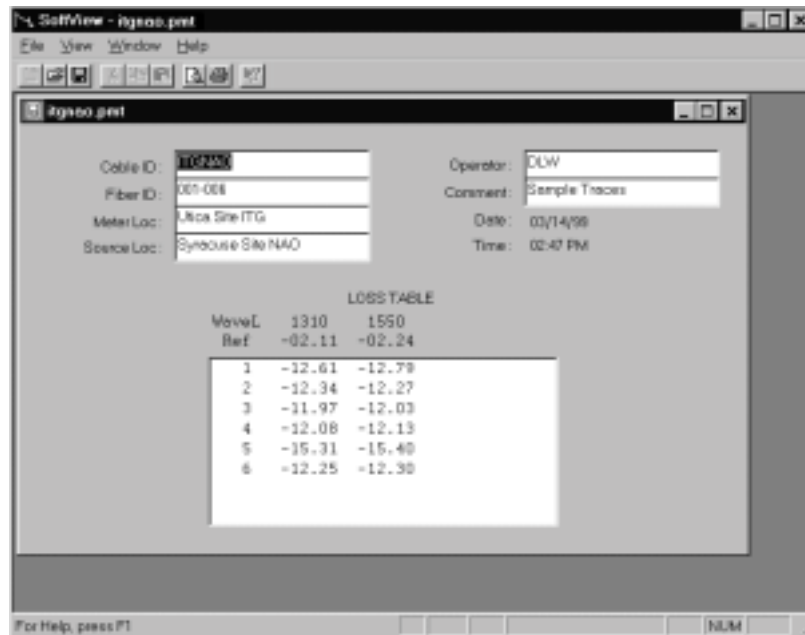


Figure C-10: Power Meter File Window

6. Left click File from the Main Menu.
7. Scroll to and select Print... from the rolldown menu. The Failure Thresholds dialog box appears.

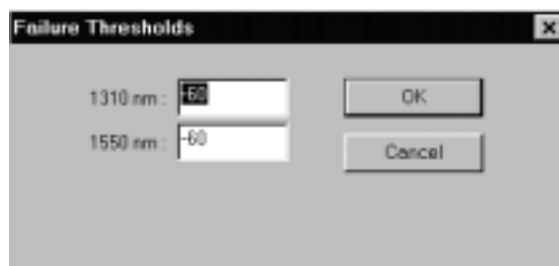


Figure C-11: Failure Thresholds Dialog Box

8. Left click OK on the Failure Thresholds dialog box.
9. The Print window is displayed. Make sure the proper printer is selected (make any printer setup changes necessary) and left click OK to print the file.

The following figure shows the test results for a 6 fiber test. Shown at the end of the report is the Min (minimum), Max (maximum), and Avg (average) loss values.

Power Meter Report											
Alignment						Operator : DLW					
10/11/00						Comment : Sample Traces					
Cable ID : ITONAO						Date : 03/14/99					
Fiber ID : 001-006						Time : 02:47 PM					
Meter Loc : Utica Site ITG											
Source Loc : Syracuse Site NAO											
<hr/>											
WaveL	1310	1550	WaveL	1310	1550	WaveL	1310	1550	WaveL	1310	1550
Ref	-02.11	-02.24	Ref	-02.11	-02.24	Ref	-02.11	-02.24	Ref	-02.11	-02.24
Thres	-80.00	-80.00	Thres	-80.00	-80.00	Thres	-80.00	-80.00	Thres	-80.00	-80.00
1	-12.61	-12.79									
2	-12.34	-12.27									
3	-11.67	-12.03									
4	-12.08	-12.13									
5	-15.31	-15.48									
6	-12.25	-12.28									
Min	-15.31	-15.48									
Max	-11.67	-12.03									
Avg	-12.78	-12.82									

*Figure C-12: Example of a Power Meter Report*



## GLOSSARY

### A

**Absolute Power** A power measurement per a universally accepted, fixed unit of measure. In optical measurement instruments, absolute power readings are displayed in either the linear domain (watts, milliwatts, microwatts, nanowatts, or picowatts) or in the log domain (dBm, which equals  $10\log P/P_o$ , where P is the incident power, and  $P_o = 1$  milliwatt).

**Adapter** A device to interface or connect two similar or dissimilar connectors to each other. Some connector adapters can only accommodate a single connector type, while others can be affixed to a 'universal' connector, to allow connection to several fiber connector types or a bare fiber. Other types of adapters allow for temporary connection of two bare fibers (non-connectorized). Adapters may also be referred to as a coupling, bulkhead, or interconnect sleeve.

**Attenuation** Decrease (loss) in magnitude of signal power in transmission between points, usually measured in decibels (dB) at specific wavelengths.

$$\text{Attenuation(dB)} = 10\log\left(\frac{p_1}{p_2}\right)$$

where:

$p_1$  = Near-end power (incident power) (mW)

$p_2$  = Far-end power (transmitted power) (mW)

If optical power is expressed in dBm, attenuation can be found as follows:

$$\text{Attenuation(dB)} = P_1 - P_2$$

where:

$P_1$  = Near-end power (incident power) (dBm)

$P_2$  = Far-end power (transmitted power) (dBm).

**Attenuation Coefficient** The loss rate of average optical power with respect to distance along the waveguide, usually measured in decibels per kilometer (dB/km) at a specific wavelength. It is defined by the equation,

$$P(z) = P(0)10^{-((\alpha z)/10)}$$

The lower the coefficient, the better the fiber's attenuation.

**Attenuator** An optical device that attenuates an optical signal, such as in an optical fiber. An attenuator typically has a minimum attenuation of several dBs and unlimited maximum attenuation.

**Averages/Averaging** A measurement technique of accumulating multiple samples of data and dividing the data by the number of samples taken. Averaging reduces the random noise content of the measurement signal. This technique is used in OTDRs and other instruments to improve dynamic range capabilities and provide for stable measurements.

## **B**

**Backscatter** The deflection of radiation caused by scattering processes through angles in excess of 90 degrees of the original motion direction. A portion of the signal travels back toward the signal source.

**Backscatter Coefficient** The calibration factor for reflectance measurements; a normalized value that represents the amount of total light that is reflected/scattered when traveling through a unit thickness of the fiber. The value is wavelength-dependent; typical values for telecommunications single-mode fiber are –79.2 @ 1310 nm and –81.7 @ 1550 nm.

The backscatter coefficient,  $\eta$ , is the ratio of the backscattered power to the energy launched into a fiber. The logarithmic value of the backscatter coefficient normalized to a 1 ns pulse duration is given by:

$$B_{ns}(dB) = 10\log\eta - 90$$

<b>Bidirectional Averaging</b>	This technique overcomes measurement anomalies that can occur from a single-ended OTDR trace data. Measurements are taken from both ends of the fiber and the two traces are averaged at the respective, physical points on the fiber. This yields a single trace with better measurement accuracy.
<b>Break/End Threshold</b>	A value which defines the minimum loss (in dB) of an event needed for that event to be reported as a break or end of the fiber.
<b>Bulkhead</b>	Type of connector.
<b>Bundle</b>	Many individual fibers contained within a single jacket or buffer tube. Also, a group of buffered fibers distinguished in some way from another group in the same cable core.

## C

<b>Cable</b>	An assembly of optical fibers and other surrounding material providing mechanical and environmental protection of the fibers.
<b>Cable Assembly</b>	Optical fiber cable that has connectors installed on one or both ends. General use of these cable assemblies includes the interconnection of optical fiber cable systems and opto-electronic equipment. If connectors are attached to only one end of a cable, it is known as a pigtail. If connectors are attached to both ends, it is known as a jumper or patch cord.
<b>Calibration</b>	The setup and adjustment of a measuring device or instrument to assure that it is performing with a known relationship to industry standards (e.g. NIST).

**Centroidal Wavelength** The mean wavelength of the spectral power distribution of an optical light source.

$$\lambda_c = \frac{\sum p_i \lambda_i}{p_0}$$

where:

$\lambda_c$  Centroidal wavelength of laser  
 $p_0 = \sum_i p_i$  Total power summed or all peaks within 25 dB of the maximum power peak  
 $p_i$  Power of the  $i^{\text{th}}$  peak  
 $\lambda_i$  Wavelength of the  $i^{\text{th}}$  peak

**Cladding** The material surrounding the core of an optical waveguide. The cladding must have a lower index of refraction to keep the light in the core.

**Clipping** “Flattening off” of a reflected pulse on an OTDR display due to saturation of the OTDR’s detector and the upper limit of displayed data power.

**Connection Check** An instrument feature that measures the test signal quality to determine the integrity of the fiber connection to the instrument. This allows for optimal connection before testing begins.

**Connector** A mechanical device used to align and join two fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel). Commonly used connectors include the 568SC (Duplex SC), ST<sup>®</sup> compatible, FDDI, ESCON<sup>®</sup>, SMA 905/906, Biconic, FC, or D4.

**Connector Panel** A panel designed for use with patchcords; it contains multiple adapters pre-installed for use with field-connectorized fibers.

**Core** The light-conducting, central region of an optical fiber, defined by its high refractive index. The core is bounded by concentric cladding of lower refractive index.

**CW** Abbreviation for continuous wave. Usually refers to the constant optical output from an optical source when it is on but not modulated.



## D

**Dead Zone** The distance immediately following a fiber event (splice or connector) which could partially or completely inhibit the ability to perform accurate measurements on a closely spaced subsequent event. This distance is largely a function of the OTDR test pulsewidth, but is also affected by the OTDR receiver recovery time.

**dB (Decibel)** A unit of measure for expressing the relative intensity of electrical, acoustic, or optical signals. Power measurements in the log domain are equal to  $10 \log P_2/P_1$  where  $P_1$  and  $P_2$  are both linear values, and  $P_1$  is a reference level.

$$\text{Power}_{(\text{dB})} = 10 \log P_2/P_1$$

When the reference power is fixed at 1 milliwatt, absolute power measurements in the log domain can be calculated, and the unit of measure becomes dBm

$$\text{Power}_{(\text{dBm})} = 10 \log P_2/(1 \text{ milliwatt})$$

**Delta** Used to indicate the difference or change between two values. In an OTDR, the delta function is used to express the difference in power (in dB) or distance between two points on the fiber signature being displayed.

**Detector** An optical equipment device which collects optical energy emerging from the fiber optic system and then converts this energy to electrical energy. The detector may contain integrated circuitry to filter and amplify the received optical signal. The detector can either be a separate unit or part of an integrated optical test set. See also Receiver.

**Dispersion** The cause of bandwidth limitations in a fiber. Dispersion causes a broadening of input pulses along the length of the fiber. Three major types are (1) modal dispersion caused by differential optical path lengths in a multimode fiber; (2) chromatic dispersion caused by a differential delay of various wavelengths of light in a waveguide material; and (3) waveguide dispersion caused by light traveling in both the core and cladding materials in single-mode fibers.

**Dispersion-shifted fiber** A fiber with a nominal zero-dispersion point at 1550 nm rather than 1310 nm.

<b>Distance Resolution</b>	The distance between adjacent data sampling points.
<b>Download</b>	Transfer of files from an outside source to an instrument or PC.
<b>Dual Pulsewidth</b>	A test mode within an OTDR instrument which automatically uses two different pulses to provide a unified set of test results. A short pulse is used to provide good signal resolution, and the longer pulse is used to provide increased dynamic range.
<b>Dynamic Range</b>	<p>The maximum signal level measurement range capability of an instrument which covers the range from the highest signal level possible without distortion or clipping, to the lowest signal level that can be discerned from noise. For an OTDR and power meters, this is usually expressed in dB.</p> <p>For an OTDR, there are several methodologies for defining the lowest signal level, where each method result in a different dynamic range value.</p> <p>The SNR = 1 (SNR = signal to noise ratio) method is most commonly accepted in the industry. SNR = 1 this is the point at which the average noise level and the measurement signal level are of equivalent value.</p> <p>The 98% noise floor was a Telcordia method. (The level where 98% of all noise data are less than or equal to this level).</p> <p>In general, the SNR = 1 method provides a dynamic range figure which is greater than the 98% figure by approximately 1.7 to 2.0 dB.</p>

## E

<b>End/Fault Event</b>	Any event that surpasses the Break/End threshold.
<b>Event</b>	Any artifact on a fiber, such as splices, breaks, bends, etc.
<b>Event Reflectance Threshold</b>	An instrument setting which determines the lowest reflectance value that will cause an event to be reported by analysis software.

## F

<b>Ferrule</b>	A component of a connector that holds the fiber in place and aids in its alignment. Usually cylindrical in shape with a hole in the center.
----------------	---

<b>Fiber</b>	An optical waveguide consisting of a thin filament glass core and a cladding that is capable of carrying information in the form of light.
<b>Fiber Analysis Software (FAS)</b>	Software that locates, classifies, and measures optical events on an OTDR trace.
<b>Fiber Optics</b>	Light transmission through optical fibers for communication or signaling.
<b>Fiber Range</b>	The optical distance over which an instrument looks for fiber or features.
<b>FITL</b>	Abbreviation for Fiber-in-the-Loop.
<b>Fresnel Reflection</b>	Reflection of a light pulse due to a change in refractive index; generally seen as the end of the fiber or a connector (patch panel). Appears on an OTDR display of a fiber signature as an upward spike (pulse).
<b>Frequency</b>	The number of pulses or cycles per second; measured in units of Hertz (Hz) where 1 hertz equals 1 pulse/cycle per second.
<b>Front-End Resolution</b>	The minimum distance two events can be spaced apart in the fiber network immediately adjacent to the test set so the test set can correctly identify and measure the second event. The first event has the reflectance of the test set's optical output port and the second event is either reflective or non-reflective, depending on the type of resolution being measured.
<b>Fusion Splicing</b>	A permanent joint produced by the application of localized heat sufficient to fuse or melt the ends of the optical fiber, forming a continuous single fiber.

## G

<b>Gainer</b>	A splice that shows an apparent increase in signal after the splice on an OTDR display. This is due to differences in scattering properties between the two fiber segments being joined caused from different mode field diameters or fiber properties. Bidirectional averaging is needed to accurately measure the loss at such splices.
<b>Ghost</b>	The appearance on an OTDR display of a pulse reflection where there is no reflective feature. Ghosts are generally caused by secondary reflections of OTDR pulses between highly reflective components/connections. Signals from a previous test pulse can appear in the data set for a subsequent data collect cycle, causing the ghosted data errors.

**Grouped Event** Events on a fiber, spaced too closely together for analysis software to distinguish as separate events.

## **H**

**Header** Header contains user specified text information about the trace file such as Cable I.D., Fiber number, Test Site, Test Date, etc, for archiving purposes.

**Helix Factor** A value stated as a percentage to compensate for the differences in length of the individual fibers in a cable.

**Horizontal/Vertical Offset** A method for repositioning the X and Y axis of a displayed trace, useful when displaying overlayed traces.

## **I**

**Index of Refraction (IOR)** The ratio of light velocity in a vacuum to its velocity in a given transmission medium.

**Insertion Loss** Loss of optical power due to insertion of a passive optical element (switch, connector, WDM, coupler, or patchcord) in a transmission path.

## **J**

**Jumper** Optical fiber cable that has connectors installed on both ends.

## **K**

**Kilometer (km)** Standard unit of length measurement. One thousand meters or approximately 3,281 feet or 0.62 miles. (1 ft. = 0.3048 m.)

## **L**

**Laser** Light Amplification by Stimulated Emission of Radiation.

**Launch** The transmission of a light pulse into an optical fiber.

<b>Least Squares Average (LSA)</b>	A mathematical method of fitting a line to acquired data.
<b>Loss (Optical)</b>	The decrease in optical signal power after transmission from one point to another. Loss is usually expressed in terms of decibels (dB), 10 times the log to the base ten of the ratio of the far-end (transmitted) power to the Near-end (incident) power. Also called Attenuation.
<b>Loss Table</b>	A tabular formatted list of all features along the length of the fiber that can be detected by an OTDR. The list includes splices, connectors, microbends, the end of the fiber, or anything that causes a change in the backscatter slope. The Loss Table typically includes the optical distance to the feature, the signal loss calculated across the point and the reflectance of the feature.

## M

<b>Marker</b>	A vertical line, extending from the top to the bottom of the trace screen, which can be moved horizontally with instrument controls. Used for manual measurements of distance and loss. (Also known as a Cursor.)
<b>Measurement Time</b>	Total time required for a test set to sample an optical fiber network.
<b>Mechanical Splicing</b>	Joining two fibers together by permanent or temporary mechanical means (fusion splicing or connectors).
<b>Micrometer (μm)</b>	One millionth of a meter; $10^{-6}$ meter. Typically used to express the geometric dimension of fibers, e.g., 62.5 μm.
<b>Microbend</b>	A small bend which may cause significant radiative losses and mode coupling. Such bends may result from fiber coating, cabling, packaging, installation or environmental stresses.
<b>Mode</b>	A term used to describe an independent light path through a fiber, as in multimode or single-mode.
<b>Modulation</b>	Coding of information onto the carrier frequency. This includes amplitude, frequency, or phase modulation techniques.
<b>Multifiber Cable</b>	An optical fiber cable that contains two or more fibers.

<b>Multimode Fiber (MM)</b>	An optical waveguide in which light travels in multiple modes. Typical core/cladding size (measured in micrometers) is 62.5/125.
<b>Multiple Wavelength</b>	A unit, such as an OTDR, which can test fibers at more than one wavelength.

## N

<b>Nanometer (nm)</b>	A unit of measurement equal to one billionth of a meter; $10^{-9}$ meters. Typically used to express the wavelength of light, e.g., 1300 nm.
<b>Noise</b>	Any disturbance that may interfere with the ability to detect or quantify a signal. Noise is usually the result of electrical, thermal, and quantization noise in the receiver circuit itself, random noise on the returning signal, or fiber dependent noise effects, such as coherence and/ or polarization noise. Electrical noise includes lightning, crosstalk, reflections, and external electromagnetic disturbances.
<b>Noise floor</b>	The sensitivity limit of the OTDR. It is the noise power level measured in absence of any applied signal.
<b>Non-reflective Event</b>	A low loss event, such as a fusion splice, which shows little change in backscatter on the trace.

## O

<b>Optical Module</b>	A component of a modular OTDR. Different optical modules allow an OTDR to test at different wavelengths, single-mode and/or multimode fiber compatibility, long-haul vs. high resolution, or various levels of dynamic range performance.
<b>Optical Power Meter</b>	Refers to a stand-alone instrument used to measure optical power

**Optical Return Loss (ORL)** The ratio of the total reflective signal returning to the optical signal source, with respect to the strength of the originating signal, expressed as: The ratio (expressed in dB) of the reflected power,  $P_r$ , to the incident power,  $P_i$ , from a fiber optic system or link.

$$\text{ORL} = \log\left(\frac{P_r}{P_i}\right)$$

ORL will be in positive dBs. ORL is a property of the fiber link, in contrast to reflectance (R) which is a property of a fiber event. ORL can be determined either by direct measurement or by calculation from the fiber trace.

**Optical Switch** An electro-mechanical device used to switch an optical input to any of several optical outputs. This is accomplished by the use of lensed fibers precisely attached and aligned on a positional stepping motor. The collimating lenses of the fibers provide for the coupling of the light between the desired connection points.

**Optical Time Domain Reflectometer (OTDR)** An instrument that measures optical fiber characteristics by sending a series of optical pulses through a fiber, and measuring the resulting backscatter and reflection data as a function of time. Used to estimate attenuation coefficient as a function of distance and identifying defects and other localized losses.

**Out of Range Event** An OTDR may report out of dynamic range if the end of the fiber is not found and the noise floor is encountered or out of distance range if the end of the fiber is not found and the end of trace data is encountered.

**Overlay Trace** A recalled trace displayed with the primary trace for comparison purposes.

## P

**Patch Panel** A panel of connectors that attach test equipment to fiber systems requiring testing.

**Patchcord** A jumper generally used to connect test equipment, such as an OTDR, to a fiber being tested via an inline adapter or patchpanel.

**Pigtail** Optical fiber cable that has a connector installed on one end. See Cable Assembly.

<b>Port</b>	A connection point on an instrument for connecting fiber and/or any external devices (power, printers, displays, keyboards) to an instrument.
<b>Power Meter</b>	A device for measuring optical power levels.
<b>Primary Trace</b>	The current trace produced by the data-collect system.
<b>Pulse</b>	A short burst of light launched into a fiber.
<b>Pulse Duration</b>	The time between a specified reference point on the first transition of a pulse waveform and a similarly specified point on the last transition. The time between the two transitions is the Duration.
<b>Pulsewidth</b>	The duration (length) of a pulse of light, generally expressed in ns (nanoseconds), and related to the pulse duration by:

$$PW = 0.5D\left(\frac{c}{N}\right)$$

where:

PW	= pulsewidth
D	= pulse duration
c	= speed of light
N	= group index.

Pulsewidth by this definition is half the physical length of the OTDR pulse in the fiber.

## ***R***

<b>Range</b>	The distance range (length) of the fiber to be tested.
<b>Rayleigh Scattering</b>	The scattering of light due to reflection from very small variations in the refractive index along the fiber's length and is typical in its construction. Scattered light is inversely proportional to the 4th power of the wavelength.
<b>Real Time</b>	The operating mode under which the received data is displayed and analyzed without extensive averaging.



- Receiver** The piece of terminal equipment that collects optical signals emerging from the fiber network and converts it to electrical signals. The receiver is part of the operating communications network, as compared to a detector that is part of a test set.
- Reference** A baseline measurement.
- Reflectance** The ratio of reflected power,  $P_r$ , to the incident power,  $P_i$ , at a reflection point, connector junction or other component or device. Reflectance can be expressed as a ratio, in percent, or in dB(a negative number):

$$R(\Delta) = \left( \frac{P_r}{P_i} \right) \times 100$$

$$R(\text{dB}) = 10 \log \left( \frac{P_r}{P_i} \right)$$

$$R(\text{Ratio}) = \left( \frac{P_r}{P_i} \right)$$

The terms “return loss,” “back reflection,” and “reflectivity” are also used synonymously in the industry to describe device reflections, but stated as positive values.

- Reflective Event** A feature on a fiber span, normally a mechanical connector or fiber break, that produces a substantial reflection of an optical signal.
- Reflective Splice** A mechanical splice that causes a pulse to reflect back to the OTDR.
- Refraction** The bending of a beam of light at an interface between two different media or in a graded-index medium.

## S

- Single-Mode Fiber (SM)** An optical waveguide (or fiber) in which the signal travels in one mode. The fiber has a small core diameter, typically 8.3  $\mu\text{m}$ .
- Smoothing** Analysis software feature which runs filtering algorithms on the data points to produce a cleaner trace signal to reduce noise and expand dynamic range.
- Softkey** Keys on an instrument that can have variable functions. The current softkey function is indicated on the instrument screen.

<b>Special Modes</b>	Found on the Mode screen, this softkey allows access to other automated testing modes by displaying another operating mode selection screen.
<b>Splice</b>	A permanent junction between optical fibers that has been thermally fused or mechanically applied.
<b>Splice Loss Threshold</b>	An instrument setting that determines the lowest Splice Loss value that will cause an event to be reported in the Events Analysis Table.
<b>Start/Stop Hardkey</b>	Begins a new test or stops a test by terminating data.

## T

<b>Thresholds</b>	Various settings in an OTDR instrument that allow determination of which measurements the instrument should report. Some types of threshold settings are Splice Loss, Fiber Break, and Reflectance.
<b>Transmitter</b>	Terminal equipment that injects an optical signal into the communications fiber network in response to an electrical signal input. The transmitter is part of the operating communications network, as compared to a test source that is part of a test set. The transmitter is usually a Light Emitting Diode (LED) or Laser Diode.

## V

<b>Visual Fault Locator (VFL)</b>	A visual fault locator incorporates a Class II Laser source at a wavelength between 635 nm and 670 nm (RED). Due to very high attenuation of visible light in normal optical fiber, the maximum useful distance of the VFL is normally 5 to 6 km.
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## W

<b>Wavelength</b>	The distance between two successive points of an electromagnetic waveform, usually measured in nanometers (nm).
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**Wavelength Division Multiplexer (WDM)** A multi-port, passive optical element used to combine or extract selected wavelengths onto or out of a fiber. Each wavelength dependent port of the WDM is designed to accommodate a unique wavelength range. The WDM port provides for minimal insertion loss for the port's selected wavelength, yet provides high rejection (attenuation) of 'out-of-band' wavelengths. In the OTDR, WDMs are used to couple lasers of different wavelengths onto the fiber being tested.



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