

# OPERATING MANUAL

## 525 - 60

SINGLE-MODE OPTICAL LINE TEST SET



**fiberTOOLS™**

97-0525-60, rev D



**Tempo**<sup>®</sup>  
A Telextron Company



# **TEMPO - 525 - 60 OLTS** OPERATING MANUAL

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## **CUSTOMER TRAINING & TECHNICAL SUPPORT**

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## ***Statement of Warranty***

Tempo warrants this product to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. During the warranty period we will, at our option, either repair or replace any product that proves to be defective. To exercise this warranty, write or call your local Tempo representative, or contact Tempo directly. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument will be returned transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least ninety (90) days.

### **Year 2000 Compliance:**

Tempo warrants that the 525 and its ReportWriter Software are designed to be used after the calendar year 2000 A.D., and that the Software will operate without error relating to date data, specifically including any error relating to, or the product of, date data which represents or references different centuries or more than one century.

## ***Limitations of Warranty***

This warranty does not apply to defects resulting from unauthorized modification or misuse of any product or part. This warranty also does not apply to AC adapters, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Tempo shall not be liable for any indirect, special, or consequential damages.

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### Product Description

The 525-60 bi-directional optical test set is a compact handheld instrument incorporating an AutoTest feature, Optical Power Meter and Return Loss Meter. It can be used to measure Insertion Loss in Simplex tests.

The 525 is fitted with a PC Universal Connector Interface on the laser source, and a Snap-On Connector on the power meter, permitting the unit to be used with compatible connectors.

All models in the series incorporate features that make fiber optic tests and measurements more efficient and convenient:

- \* Built-in laser sources simplify test and measurement
- \* Non-volatile data storage for more than 1,000 measurements
- \* Pass/Fail testing mode
- \* RS232 interface for report printing, remote testing, data uploads/downloads
- \* Multiple power options, including rechargeable nickelmetal hydride (NiMH) batteries, alkaline batteries, concurrent AC/battery trickle charge mode, and AC-only operation

A large, backlit LCD display enables users to easily view measured optical power levels and the calibration wavelength in use. Intuitive controls make measurements, data storage and retrieval, and report printing easy and convenient.

### ***525-60 Series Single-mode Optical Test Sets***

The 525 Series optical test sets can perform optical power measurements within a range of +10dBm to -65dBm. They are calibrated at: 850nm, 980nm, 1300, 1310nm, 1480nm, 1550nm, and 1625nm. There are Laser sources available in the unit at 850nm and 1300nm.

### Safety Terms in This Manual

A **WARNING** identifies dangers that could result in personal injury or death.

A **CAUTION** identifies hazards that could damage the instrument.

A **NOTE** is followed by information that may be beneficial during the use of the instrument.

### *Specific Precautions*

Never use the instrument with a battery charger, rechargeable battery pack, or external power supply not expressly approved by Tempo.

Do not insert any batteries with the polarity reversed. Do not mix batteries of different manufacturers or types, e.g., alkaline and non-alkaline.

The instrument battery cover should only be opened to change the batteries, or to install or remove a rechargeable battery pack, in accordance with the procedures in this manual. No user-serviceable parts are inside.

Avoid leaving the instrument in direct sunlight, or near direct sources of heat.

Always replace the interface dust caps when the instrument is not in use. Store the instrument and interface adapters in a cool, dry, and clean place.

Protect the instrument from strong impacts or shock.

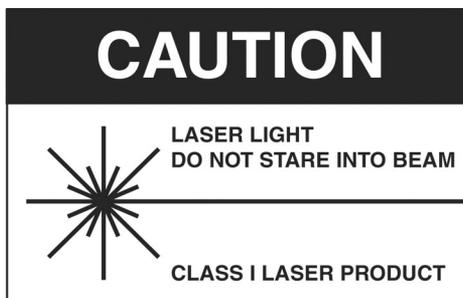
While splashproof, the instrument must not be immersed in water or stored in areas with high humidity.

When necessary, the case, front panel, and rubber cover should only be cleaned using a damp cloth. Do not use abrasives, harsh chemicals, or solvents.

*Continued on the next page...*

### Laser Safety

The 525 Series optical test sets are laser devices conforming to the requirements of CDRH, CFR 1040, Subchapter J. While there is no potential for eye damage due to unaided direct exposure, users should always avoid looking directly into the output port. The use of optical viewing instruments (such as microscopes, magnifiers, etc.) should always be avoided. The use of these devices around active fibers can focus a highly intense beam of energy onto the retina of the eye, which can result in permanent damage or blindness.



### Unpacking and Inspection

The 525 Series optical test set has been carefully inspected before shipment. When received, the shipping carton should contain the items listed below:

- 525 Unit
- AC Adapter
- RS232 Cable
- Connector Cleaning System (All-In-One)
- Adapter Cleaning Wands
- SOC Adapters (one each of ST, SC, FC)
- Ceramic UCI Adapters (one each of ST, SC, FC)
- SOC Puller Tool
- Mandrel (for SM units only)
- CD—Containing User Manual, ReportWriter Software, ReportWriter Manual, and Technical Description

Please account for and inspect each item while unpacking and preparing the instrument for use.

If the instrument received is damaged, write or call Tempo in accordance with the instructions below.

Keep the shipping carton in case reshipment is required for any reason, e.g., annual recalibration.

*Continued on the next page...*

### ***Reporting Shipping Damage***

All instruments are shipped FCA Vista, Calif., when ordered from Tempo.

If you receive a damaged instrument, you should:

1. Report the damage to your shipper immediately.
2. Save all shipping cartons.
3. Inform Tempo and follow the instructions given by customer service. You will be issued a Returned Materials Authorization (RMA) number if the instrument must be shipped back to Tempo.

To contact Tempo customer service, call (800) 642-2155 from 7 a.m. to 4:30 p.m. Pacific time.

Inquiries may also be faxed to Tempo at (760) 598-5634, or sent via e-mail to [fiberoptics@tempo.textron.com](mailto:fiberoptics@tempo.textron.com).

Failure to follow this procedure may affect your claim for compensation.

### ***Service and Product Ordering***

For warranty or non-warranty service, please Telephone, Fax or E-Mail Tempo at -

|         |  |
|---------|--|
| TEL:    | 1 800 642-2155 or 1 760 598-8900                                       |
| FAX:    | 1 760 598-5634   |
| E-MAIL: | <a href="mailto:REPAIR@TEMPO.TEXTRON.COM">REPAIR@TEMPO.TEXTRON.COM</a> |

For product and ordering information, please Telephone, Fax or E-Mail Tempo at -

|         |  |
|---------|--|
| TEL:    | 1 800 642-2155 or 1 760 598-8900                                     |
| FAX:    | 1 760 598-5634   |
| E-Mail: | <a href="mailto:SALES@TEMPO.TEXTRON.COM">SALES@TEMPO.TEXTRON.COM</a> |
| WEB:    | <a href="http://WWW.TEMPO.TEXTRON.COM">WWW.TEMPO.TEXTRON.COM</a>     |

## Preparation for Use

### ***Charging the NiMH Battery Pack***

The 525 Series optical test set is shipped with a nickel-metal hydride (NiMH) battery pack installed. This battery pack must be charged before the instrument is used for the first time.

To charge the NiMH battery pack, do the following:

1. Plug the power transformer/NiMH battery charger into a wall outlet.
2. Insert the plug from the power transformer/NiMH battery charger into the DC input receptacle on the side of the instrument.
3. The red charge state indicator will illuminate. Allow the batteries to charge until the indicator turns off (4 hours maximum).
4. Disconnect the unit from the power transformer/NiMH battery charger.

The instrument can now be used.

*NOTE: The NiMH battery pack and power transformer/NiMH battery charger will become warm during use. This is normal.*

### ***Trickle Charge Function***

The 525 Series optical test set incorporates a trickle charge function that prevents the batteries from being damaged from overcharging. The instrument can remain connected to the power transformer/NiMH battery charger indefinitely without damaging the batteries.

The trickle charge function monitors the condition of the batteries when the instrument is connected to the power transformer/NiMH battery charger. If the batteries are drained, the instrument will begin a maintenance charge cycle to ensure they are at full capacity.

### ***Setting the Internal Clock and Calendar***

The 525 Series optical test set incorporates an internal clock and calendar, permitting the time and date to be recorded when a measurement is saved.

The internal clock and calendar should be set before using the instrument for the first time using the Set 525 Clock feature in the Utilities mode of the ReportWriter software.

*Continued on the next page...*

### Boot, Housing and Power Options

#### **Removing/Installing the Rubber Boot**

The 525 Series optical test set is fitted with a rubber boot that provides impact and shock protection during use. This rubber boot incorporates a swing-out stand, permitting convenient viewing of the display when the instrument is used on the benchtop.

The rubber boot must be removed to access the battery compartment cover on the back of the instrument housing. To remove the boot, do the following:

1. Grasp the boot in both hands and gently peel back the sides starting from the top.
2. Press the back of the instrument through the rectangular hole in the boot to pivot it forward.
3. Pull the instrument away from the boot.

Installation of the boot is the reverse of removal. Make sure the instrument is seated snugly in the boot before use.

*NOTE: To prevent damage from shock or impact, do not use the instrument without the boot in place.*

#### **Removing/Installing the Battery Cover**

The battery compartment is sealed by a plastic cover secured by two Phillips screws, which must be removed for access. To open the battery compartment, do the following:

1. Remove the rubber boot as described in the preceding section.
2. Lay the instrument display-side down on a soft surface, such as a towel, to prevent scratching of the front panel.
3. The two screws securing the battery cover will now be visible. Remove both screws by turning them counter clockwise using a #1 Phillips screw driver. Put the screws in a safe place.
4. The battery cover can now be lifted away from the instrument housing. Gently pry up on the bottom of the cover. **DO NOT USE A METAL TOOL TO PRY OPEN THE COVER.**



Installation of the battery cover is the reverse of removal. Take care not to overtighten the screws securing the battery cover or damage may result.

*Continued on the next page...*

### ***Multiple Power Options***

The 525 Series optical test set features four power options:

1. Rechargeable nickel-metal hydride battery operation. Nickel-metal hydride battery pack required.
2. Concurrent nickel-metal hydride (NiMH) battery recharging (trickle charging) and AC operation.
3. Alkaline battery operation. Four AA-type alkaline batteries required.
4. AC-only operation.

*CAUTION: Never use the instrument with a battery charger, rechargeable battery pack, or external power supply not expressly approved by Tempo.*

### ***Rechargeable NiMH Battery Operation***

The 525 Series optical test set is shipped with a rechargeable nickel-metal hydride (NiMH) battery pack installed. The battery can be trickle-charged while the instrument is in use.

The nickel-metal hydride battery pack provides up to 10 hours of continuous operation.

*NOTE: The nickel-metal hydride battery pack incorporates a device that enables the charging circuit to function. The 525 Series optical test set must only be used with NiMH battery packs with this part number. Other battery packs will not charge when installed in the instrument.*

*CAUTION: Do not remove the plastic covering from the battery pack.*

*Continued on the next page...*

### **Alkaline Battery Operation**

For convenient field service, four (4) AA-type alkaline batteries may be used to power the 525 Series optical test set after the nickel-metal hydride battery pack has been removed. Alkaline batteries will provide up to 24 hours of continuous operation.

*NOTE: The instrument will not charge alkaline batteries when the power transformer/NiMH battery charger is connected. This allows the instrument to be operated using AC power when alkaline batteries are installed.*

To use alkaline batteries, do the following:

1. Remove the battery compartment cover.
2. Remove the nickel-metal hydride battery pack.
3. Install four AA-type alkaline batteries as shown inside the battery compartment. Do not reverse the polarity of the batteries.
4. Replace the battery compartment cover.

### **AC-Only Operation**

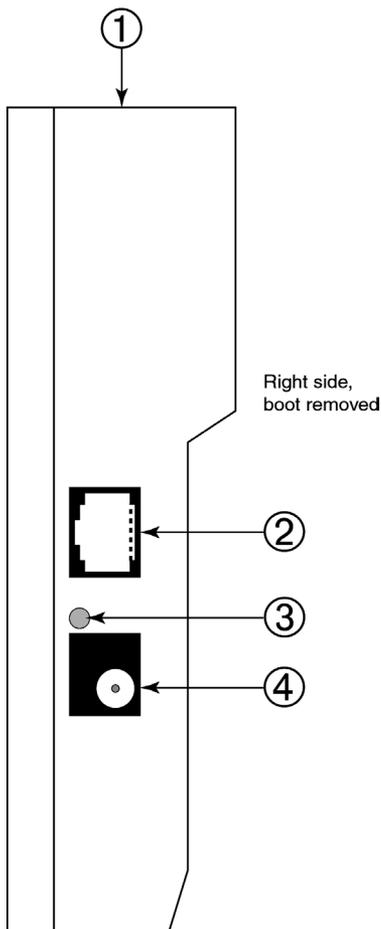
The 525 Series optical test set may be used without any batteries installed. To do so, connect the power transformer/NiMH battery charger to the instrument, and plug the other end into an AC power outlet.

### LED Indicators, DC Input, and RS232 Port

The DC input receptacle and RS232 port are located on the right side of the instrument when viewed from the front. If the protective rubber boot is installed, lift the flap for access.

1. Source active indicator: This indicator, located on top of the unit between the input and output interfaces, will illuminate when the laser source is switched on. The indicator will go out when the source is switched off.
2. Modular RS232 port: Stored data can also be displayed on-screen using ReportWriter software, Microsoft HyperTerminal, or other serial communications applications.
3. Charge state indicator: This indicator will illuminate when the nickelmetal hydride (NiMH) battery pack is fast-charging using the power transformer / NiMH battery charger. The charge state indicator will go out when the battery is fully charged and the instrument enters trickle charge mode.

*NOTE: The charge state indicator does not function for alkaline battery operation, or if the batteries are removed.*



4. DC input receptacle: The power transformer/NiMH battery charger is connected to this receptacle.

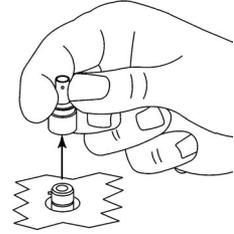
*CAUTION: Never use the instrument with a battery charger, rechargeable battery pack, or external power supply not expressly approved by Tempo.*

**Snap-On Connector (SOC) Interface**

The optical power meter input of the 525 Series optical test set incorporates a Snap-On Connector (SOC) interface and is used with standard Tempo 10-series SOC adapters. SOC interfaces and adapters offer superior repeatability and are compatible with most industry standard fiber optic connectors. SOC adapters can also be quickly removed from the interface to permit cleaning of the detector window in accordance with the following instructions.

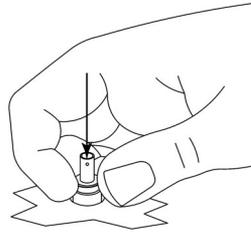
**Removing an SOC Adapter** →

1. Grasp the sides of the SOC adapter and pull it off the interface. SOC adapters require considerable force to remove. Do not attempt to pry the adapter off the interface or damage will result.
2. Put the adapter in a clean place.



**Installing an SOC Adapter** →

1. Locate the anti-rotation key on the interface.
2. With the keyway properly aligned, push the adapter over the interface until it snaps in place.



**Universal Connector Interface (UCI)**

The laser source output of the 525 Series optical test set incorporates a physical contact Universal Connector Interface (UCI-PC) and is used with standard Ceramic UCI adapters. UCI adapters are available for most industry standard fiber optic connectors.

**Removing a UCI Adapter** →

1. Turn the knurled adapter shell counter-clockwise until it is free from the interface.
2. Pull the adapter off the ferrule.
3. Put the adapter in a clean place.



**Installing a UCI Adapter** →

1. Press the adapter firmly over the interface ferrule until it reaches the stop.
2. Rotate the adapter body until the anti-rotation key engages.
3. Firmly tighten the knurled adapter shell by turning it clockwise.



### ***Cleaning the Instrument Interfaces***

To ensure absolute measurement integrity, it is essential that all instrument interfaces are cleaned before each use. Tempo recommends using a lint-free cloth, such as Texwipe TX404, and reagent-grade isopropyl alcohol to clean the SOC and UCI interfaces of the 525 optical test set.

*NOTE: It is essential that the connectors and interfaces to be mated are cleaned each and every time before connecting or re-connecting them to anything—instrument inputs/outputs, transmission equipment, patch panels, etc.*

To clean the interfaces, do the following:

1. Remove the SOC or UCI adapter in accordance with the preceding instructions.
2. Wipe once across the interface with a clean lint-free cloth, such as Texwipe TX404. When cleaning a SOC interface, take care not to press too firmly to avoid breaking the detector window.

*NOTE: If the interface is extremely dirty, reagent-grade isopropyl alcohol will be required to clean it. Moisten the lint-free cloth with alcohol and wipe once across the interface. Make sure all residual alcohol has completely evaporated before proceeding to the next step.*

3. Re-install the SOC or UCI adapter in accordance with the preceding instructions.

### ***Cleaning a UCI Adapter***

For increased durability, most UCI adapters incorporate a ceramic alignment sleeve that must be cleaned every time before a connector is mated. Failure to clean the sleeve prior to mating a connector will result in endface contamination and inaccurate measurements.

*NOTE: UCI adapters incorporating a ceramic sleeve do not require frequent cleaning. Such adapters must be handled carefully to avoid sleeve breakage.*

To clean a UCI adapter, do the following:

1. Remove the adapter from the interface.
2. Insert a new cleaning wand into the through-hole of the adapter until it stops.
3. Twist the wand, remove it and discard. Do not reuse the cleaning wand.

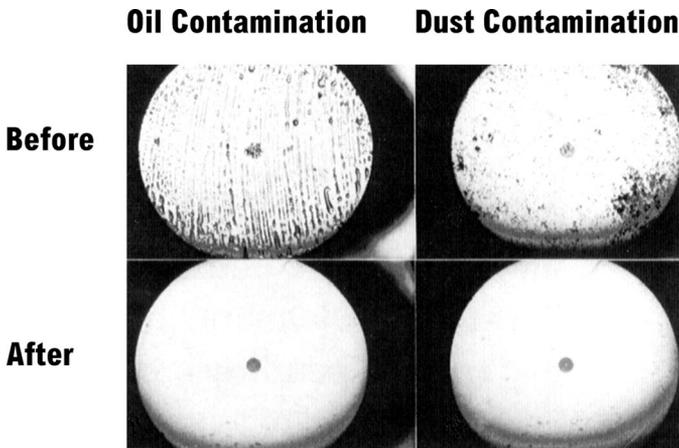


### ***Cleaning Fiber Optic Connectors***

To ensure absolute measurement accuracy and repeatability, fiber optic connectors must always be cleaned before conducting a fiber optic measurement. Dust and oil contamination on the connector end-faces, as shown at right, can result in abnormally high insertion loss readings and other anomalies.

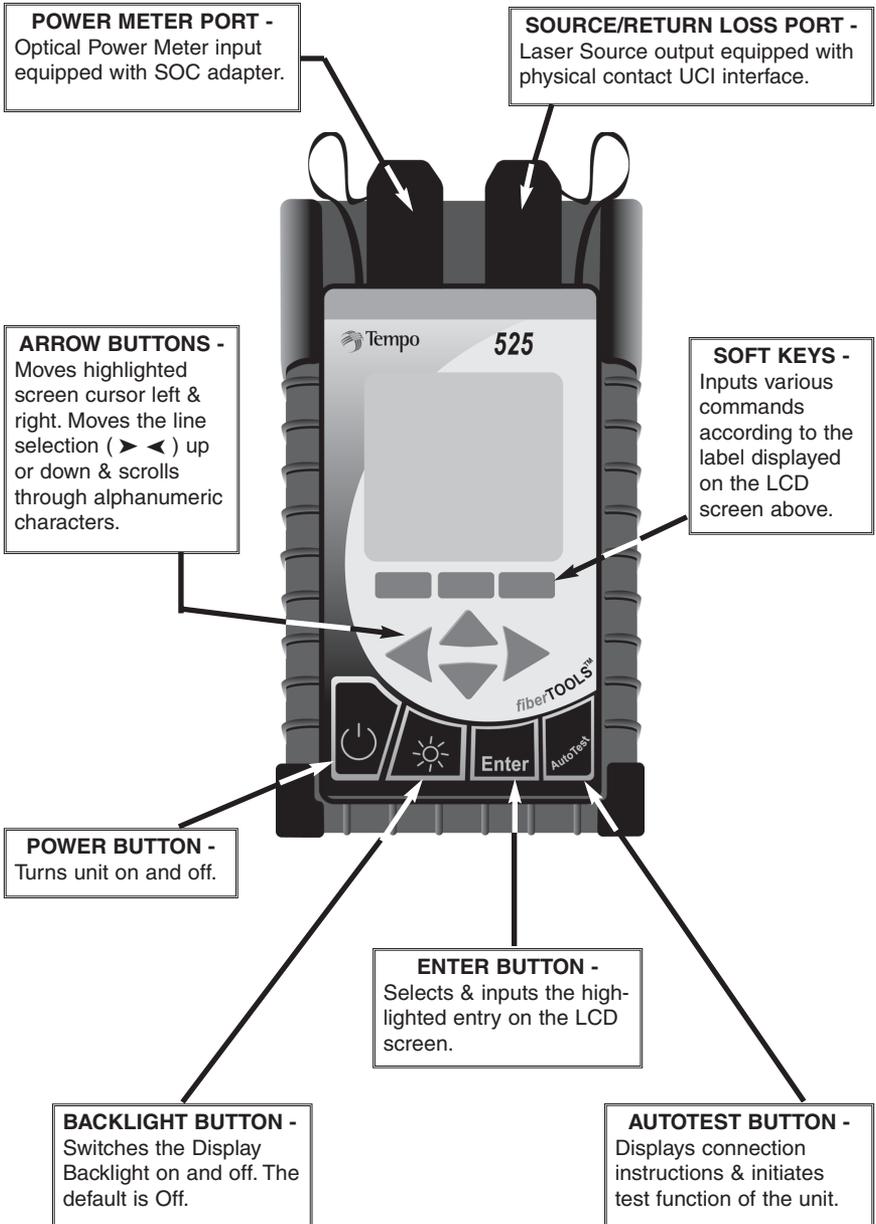
Tempo recommends the use of the All-In-One cleaning tool for fiber optic connectors in accordance with the enclosed instructions. If an All-In-One cleaning tool is not available, the connectors should be cleaned as follows:

1. Moisten a clean, lint-free cloth, such as Texwipe TX404, with reagentgrade isopropyl alcohol.
2. Wipe once across the connector endface with the damp part of the cloth using moderate pressure. Make sure the alcohol has completely evaporated before commencing.
3. If possible, visually inspect the connector endface using a magnifier or microscope, such as a Leica 200x FiberVue microscope, Tempo Part No. FVK-200/U25. If the end face still appears dirty, clean it again.



***WARNING: Never clean or visually inspect a fiber optic connector under power. Viewing the end of an optical fiber under power can cause permanent eye damage or blindness.***

**Front Panel Controls & Connectors**



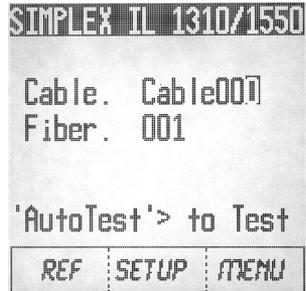
# AUTOTEST QUICK START GUIDE

**THIS IS A QUICK START REFERENCE ONLY.** Refer to additional manual sections for detailed descriptions of how to configure and perform testing with the 525-60 Single-Mode OLTS.

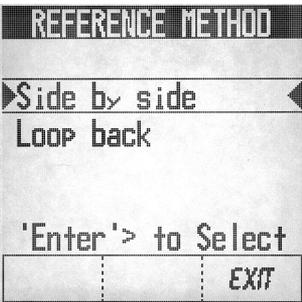
**REMEMBER:** To ensure absolute measurement accuracy, fiber optic connectors must always be cleaned before conducting a fiber optic measurement.

## Startup and Establish Reference Cables

1. Press the Power Button. Startup logo and version will display briefly.
2. At the AutoTest Main Screen establish a reference using the SIDE-BY-SIDE or LOOPBACK method by pressing the REF softkey and performing the following –

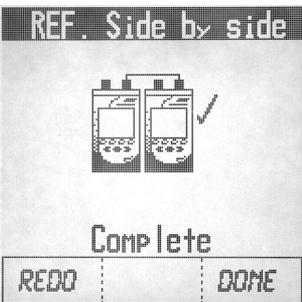


### 3A. Side-by-Side Reference -



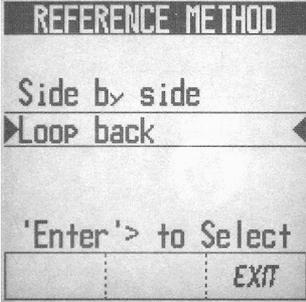
Note: The unit initiating a test or reference is the 'Local' unit, and will display the references. The other unit is the 'Remote'. For side-by-side reference, leave the Remote unit in the Startup screen.

- a. Use the UP/DOWN arrow keys to highlight ► SIDE BY SIDE ◀.
- b. Press ENTER button to select.
- c. Per the screen diagram, connect Reference Cables to both units on the Source/RL Port. Connect reference cable together.
- d. Press the NEXT softkey to continue.
- e. When complete, a checkmark will appear on screen.
- f. Go to Step 4.



**Establish Reference Cables** *Continued. . .*

**3B. Loopback Reference –**



**Perform these steps on both Local and Remote units:**



- a. From AutoTest Screen press the REF softkey.
- b. Use the UP/DOWN arrow keys to high light ► LOOP BACK ◀.
- c. Press ENTER button to select.
- d. Per the screen diagram, connect the Reference Cable from the Source Port/RL to the Power Meter Port.
- e. Press the NEXT softkey to continue.
- f. When complete, a checkmark will appear on screen.

4. Press DONE softkey to return to the AutoTest Screen.
5. Disconnect reference cables from the power meter (LBS) / each other (SBS).

Note: If referencing errors occur -

- Check Connections.
- You can redo reference or exit to use old reference.

6. Leave the fiber connected to the Source Port.

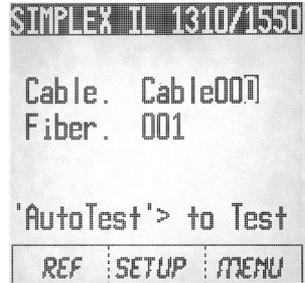
*Note: Disconnection of this cable will cause loss of references.*

**You are now ready to perform an AutoTest.**

### Simplex Insertion Loss Test – 1310/1550

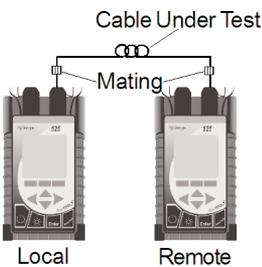
1. At the AutoTest Main Screen, for record purposes, use the Arrow buttons and Enter key to identify Cable and Fiber Names.

NOTE: The unit that initiates the test becomes the Local. The other unit will automatically become the Remote.



2. Press the SETUP softkey.
3. From Setup screen, use the softkeys to enter the WAVELENGTH you want to perform the test at – 1310, 1550 or BOTH.
4. Next, using the softkeys enter NO or YES indicating whether you want to Autosave the test. If no, you will have another opportunity to save the test later.
5. Next , using the softkeys, select from the following THRESHOLD choices –
  - NO – a Pass/Fail indication will not be provided.
  - MASK – to select from a previously defined set of standards stored in the unit, input the fiber length and set connector & splice criteria. (see Pg. 22 for more information)
  - EDIT – to set/reset thresholds previously selected (see Pg. 23 for more information)

*When complete, display returns to the AutoTest screen.*



6. To begin the AutoTest sequence, press the AutoTest button on the unit.
  7. The display will indicate the connections to be made.
  8. *Clean all interfaces* and connect the reference cables still attached to the Source/RL Port from each test unit to the Fiber to be tested.
9. Press the AutoTest button on the unit again to begin testing.
  10. When testing is complete the unit will either -
    - Display bi-directional test results
    - OR - If you did not select AutoSave earlier:
    - Ask if you want to save the results - enter NO or YES - and then the unit will display the results.

**Simplex Insertion Loss Test – 1310/1550** *Continued. . .*

EXAMPLE OF TEST RESULTS:

**SCREEN 1 -**

| C: Cable000 |  | F: 001 |          |
|-------------|--|--------|----------|
|             |  | 1310   | 1550     |
|             |  | Pass   | Pass     |
| A-B         |  | -10.9  | -11.1 dB |
| B-A         |  | -10.9  | -10.5 dB |
| Avg         |  | -10.9  | -10.8 dB |
| Max         |  | 4.01   | 4.13 dB  |
| MORE        |  | REDO   |          |

1. The screen will display test results for the Fiber. If Thresholds were either mask or manual selected, the first test screen will display Pass or Fail. Press the MORE soft key to review additional test results.

**SCREEN 2 -**

| C: Cable000 |  | F: 001 |         |
|-------------|--|--------|---------|
|             |  | 1310   | 1550    |
| Thre        |  | 15.0   | 15.0 dB |
| MaxB        |  | 4.01   | 3.85 dB |
| MaxA        |  | 4.01   | 4.42 dB |
| RfAB        |  | -1.75  | 3.08dBm |
| RfBA        |  | 0.63   | 1.53dBm |
| MORE        |  | REDO   |         |

2. The Screen will display the additional test results for the Fiber.

Press the MORE softkey to repeat the test result again

*Or-*

Press Redo to repeat the AutoTest.

**TO CONTINUE TESTING ADDITIONAL FIBERS -**

3. Press the AutoTest button to return to the AutoTest screen. If the previous test was saved, the fiber number will automatically sequence up. (i.e. Fiber 001 changes to 002)
4. To begin the AutoTest sequence, press the AutoTest button on the unit.
5. The screen will indicate the connections to be made.
6. Clean all interfaces and connect the reference cables to the Fiber under test.
7. Press the AutoTest button on the Master unit again to begin testing.

**NOTE:**

**IF AUTOTEST FAILS TO COMPLETE -**

1. Check all connections for correctness and cleanliness.
2. Ensure Link Loss is <30dB at both 1310/1550nm.
3. Keep Remote unit in Startup screen. (Simplex IL 1310/1550)
4. Ensure reference step has been completed.



### AUTOTEST MAIN SCREEN



```
SIMPLEX IL 1310/1550
Cable. Cable001
Fiber. 001
'AutoTest'> to Test
REF  SETUP  MENU
```

At powerup, the splash screen will briefly display the 525's firmware version and model number, and then display the Autotest Main Screen.

From the Autotest Main Screen, Simplex Insertion Loss testing can be performed at 1310 & 1550nm. Cable and Fiber names can be designated for record management of stored measurements and later recall.

Changing Designations - Use the LEFT/RIGHT arrow keys to move the highlighted screen cursor to the cable designation field to be set. Use the UP/DOWN arrow keys to scroll thru alphanumeric entries for cable designations.

When designated, press the ENTER button to set the Cable name and move the to the Fiber field. Use the LEFT/RIGHT arrow keys to move the highlighted screen cursor to the Fiber designation field to be set. Use the UP/DOWN arrow keys to scroll thru numeric entries for fiber designations. Press the ENTER button to set the entry.

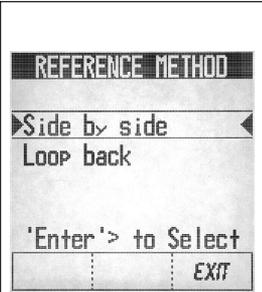
Auto Increment Feature - The numeric Fiber designations will automatically sequence up when successive testing is performed, if Autosave is turned on.

**REF** - Softkey accesses the Reference Methods screen to establish either a Side-by-Side or Loopback reference for testing. (See pg. 20)

**Setup** - Softkey accesses Setup screen to select Wavelength measurements, program the Auto Save function, select and edit Threshold settings, and input Link Parameters when performing Insertion Loss testing. (See pg. 22)

**Menu** - Softkey accesses the Menu screen to View Data from previously stored tests, open the Tools display, and open the Optical Power Meter and Power Source screen and access the Return Loss Meter. (See pg. 24)

**REFERENCE METHOD SCREENS**



From the Autotest Main screen, press the REF softkey. The Reference Method screen will be displayed. Use the UP/DOWN arrow keys to highlight ►SIDE BY SIDE◀ or ►LOOP BACK◀.

Press the Enter button to select the method.

**SIDE-BY-SIDE METHOD:**

- a. Per the screen diagram, connect the Reference Cable from the Source/Return Loss Port of the Master Unit to the Source/Return Loss Port of the Slave Unit.
- b. Press the NEXT softkey to continue.
- c. When complete, a checkmark will appear on screen.
- d. Press DONE softkey to return to the AutoTest Screen.



**LOOPBACK METHOD:**

- a. Per the screen diagram, connect the Reference Cable from the Source/Return Loss Port to the Power Meter Port.
- b. Press the NEXT softkey to continue.
- c. When complete, a checkmark will appear on screen.
- d. Press DONE softkey to return to the AutoTest Screen



### SETUP SCREENS



From the Autotest Main screen, press the SETUP softkey. The Setup screen will be displayed and automatically sequence through the following options:

#### **Wavelength? –**

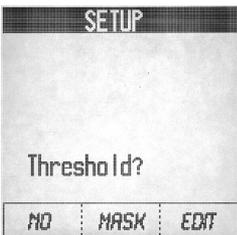
Use the softkeys to set the unit to perform Insertion Loss testing at wavelengths of 1310nm, 1550nm or Both. After selecting, the screen will sequence to Autosave.



#### **Auto save? –**

Use the softkeys to enter NO or YES indicating whether you want to Auto save the test.

If NO is selected, you will have another opportunity to save your test measurements for later recall. After selecting, the screen will sequence to Threshold.



#### **Edit Threshold? –**

Thresholds are used to set and display Pass/Fail levels in test reporting. Use the softkeys to set test thresholds as follows:

No - Test thresholds will not be used and a Pass/Fail result will not be provided with the test results.

Mask - Selects from a previously defined set of standards stored in the unit. (Go to Pg. 22)

Edit - Sets/Resets thresholds previously selected (Go to Pg. 23)

*Continued . . .*

**SETUP SCREENS** *Continued. . .*

**Edit Threshold?**

*continued. . .*



**Mask –**

Use the UP/DOWN arrow keys to highlight (➤➤) the Standard to be selected.

Press enter to select.

The LINK PARAMETERS screen will be displayed.

From the LINK PARAMETERS screen, input the following :

Use the softkeys to enter the unit of measurement -

**M** - Meters

**FT** - Feet

Then input the following fiber attributes -

**Length** – Use the LEFT/RIGHT keys to highlight the digit to be set.

Use the UP/DOWN keys to change the numbers.

Press the Enter button to select, and move to the next line.

**No. of Connectors** – Use the LEFT/RIGHT keys to highlight the digit to be set.

Use the UP/DOWN keys to change the numbers.

Press the Enter button to select, and move to the next line.

**No. of Splices** – Use the LEFT/RIGHT keys to highlight the digit to be set.

Use the UP/DOWN keys to change the numbers.

Press the Enter button to select.

When complete, press the NEXT softkey to return to the Setup screen.

*Note:* The Setup screen will display the Loss Thresholds for Pass/Fail results per the criteria set.

Press the EXIT softkey to return to the Autotest screen.

*Continued. . .*

### SETUP SCREENS *Continued. . .*

#### Edit Threshold?

*continued. . .*

| SETUP          |      |      |
|----------------|------|------|
| IL-1310        | 15.0 | dB   |
| IL-1550        | 15.0 | dB   |
| Edit Threshold |      |      |
|                |      | SAVE |

#### Edit –

Use the LEFT/RIGHT keys to highlight the digit to be set.

Use the UP/DOWN keys to change the numbers.

Press the Enter button to select, and move to the next line.

Repeat the same steps for both frequencies if required.

When complete, press the SAVE softkey to return to the Autotest screen.

**MENU SCREEN**



From the Autotest main screen, press the MENU softkey. The MENU screen will be displayed.

Use the UP/DOWN arrow keys to highlight (▶◀) the function to perform, then press the Enter button to select.

The following functions are available -

**VIEW DATA** - Access and view up to 1000 test measurements stored in memory. (Go to pg. 25)

**TOOLS** - Access and modify the following:

**SET DATE/TIME** - Manually set the 24 hour clock & calendar of the 525. (Go to pg. 27)

**ZERO** - Zero out the Optical Power Meter & obtain a noise level baseline. (Go to pg. 28)

**AUTO OFF** - Enable / Disable the 15 minute automatic shut off feature. The 525 default is - On. (Go to pg. 28)

**DEFINE STANDARDS** - Define and modify a selection of standards for use when calculating Loss Threshold. (Go to pg. 29)

**OPM / SOURCE** - Perform Optical Power Meter measurements and turn the Laser source on & off. (Go to pg. 30)

**RETURN LOSS**- Access the Return Loss meter at 1310nm and 1550nm. (Go to pg. 32)

**EXIT** - Press the Exit softkey to return to the Autotest Screen.

**NOTE: LCD CONTRAST CONTROL** - The 'Backlight' key can be used in this screen for LCD contrast control. Hold down the backlight button for 5 seconds or more to cycle between maximum and minimum LCD contrast. Release key at desired contrast level.

### VIEW DATA SCREENS

| MENU               |  |
|--------------------|--|
| ▶View Data ◀       |  |
| Tools              |  |
| DPM / Source       |  |
| Return Loss        |  |
| 'Enter'> to Select |  |
| EXIT               |  |

| C: Cable000 F:001 |       |          |
|-------------------|-------|----------|
|                   | 1310  | 1550     |
|                   | Fail  | Fail     |
| A-B               | 0.56  | -1.23 dB |
| B-A               | -3.33 | -0.69 dB |
| Avg               | -1.38 | -0.96 dB |
| Mar               | -1.38 | -0.96 dB |
| MORE              | DEL.  | EXIT     |

From the Menu screen, use the UP/DOWN arrow keys to highlight the ▶ View Data ◀ function, then press the Enter button to select. The stored test results menu will be displayed (by Date / Numeric). The latest result is always on top.

You can access and view more than 1000 test measurements stored in memory.

Use the UP/DOWN arrow keys to highlight the test to be recalled. Simplex IL test results displays will sequence through the fiber test results.

Press the Enter key to display the first test results screen as follows -

- Cable Name & Fiber Number
- Wavelength of Test 1310nm/1550nm or Both
- If Thresholds were input, the first test screen will display Pass or Fail for each wavelength.

- A-B** Insertion Loss from Unit A to B
- B-A** Insertion Loss from Unit B to A
- Avg** Average of measurement results in both directions
- Mar** Difference between the Threshold Setting and the Average Measurement
- MORE** Press softkey to review additional test results for this fiber
- DEL** Press softkey to delete the stored test result
- EXIT** Press softkey to return to the VIEW DATA Screen

*Continued . . .*

**VIEW DATA SCREENS** *Continued . . .*

|             |       |       |     |
|-------------|-------|-------|-----|
| C: Cable000 |       | F:001 |     |
|             | 1310  | 1550  |     |
| Thre        | 0.00  | 0.00  | dB  |
| MgAB        | -0.56 | -1.23 | dB  |
| MgBA        | -3.33 | -0.69 | dB  |
| RfAB        | -0.84 | -0.06 | dBm |
| RfBA        | -1.79 | 2.95  | dBm |
| MORE        | DEL.  | EXIT  |     |

Pressing the More softkey will display additional test results for the first fiber -

- **Thre** Threshold setting entered for this test
- **MgAB** Difference between Threshold Setting and the Actual A to B Measurement
- **MgBA** Difference between Threshold Setting and the actual B to A Measurement
- **Rf AB** Initial Power Reference A to B
- **Rf BA** Initial Power Reference B to A
- **MORE** Press softkey to review test results for fiber 2 of this test
- **DEL** Press softkey to delete the stored Test Result. (or all the results) selected from the screen.
- **EXIT** Press softkey to return to the VIEW DATA Screen

*Note:* When the MORE softkey is pressed, the screen will redisplay the first test screen.

### TOOLS SCREENS



From the Menu screen, use the UP/DOWN arrow keys to highlight the ► TOOLS ◀ function, then press the ENTER button to select. Use the UP/DOWN arrow keys to highlight the function, then press the ENTER button to select. To access and modify the following:

SET DATE/TIME - Manually set the 24 hour clock & calendar of the 525. (See below)

ZERO - Zero out the Optical Power Meter & obtain a noise level baseline. (Go to pg. 28)

AUTO OFF - Enable / Disable the 15 minute automatic shut off feature. The 525 default is - On. (Go to pg. 28)

DEFINE STANDARDS - Define and modify a selection of standards for use when calculating Loss Threshold. (Go to pg. 29)

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#### SET DATE/TIME

From the Tools screen, use the UP/DOWN arrow keys to highlight the ► SET DATE/TIME ◀ function, then press the ENTER button to select. The SET DATE/TIME screen will be displayed.

Use the arrow keys to highlight the Date - MM/DD/YY and Day to be changed. Then use the ENTER button to move to the next line.

Use the arrow keys to highlight the 24 Hour clock Time - HH:MM:SS to be changed. Then use the ENTER button to Set.

Press the EXIT softkey to return to the TOOLS Screen.

**TOOLS SCREENS** *Continued . . .*



**ZERO**

To Zero the Optical Power Meter and obtain a noise level baseline, do the following:

From the Tools screen, use the UP/DOWN arrow keys to highlight the ► ZERO ◀ function, then press the ENTER button to select.

The screen will instruct you to place the Black Cap on both of the ports.

Press the ZERO softkey.

When the unit has zeroed the display will automatically return to the Tools screen.

Note: An Error message will appear if the ports are not capped properly or if cap is not black.



**AUTO OFF**

Enables or Disables the 15 minute automatic shut off feature.

From the TOOLS screen, use the UP/DOWN arrow keys to highlight the ► AUTO OFF ◀ function, then press the Enter button to select.

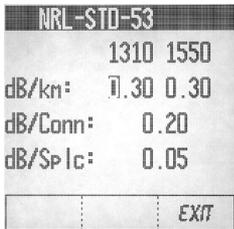
At the Auto Off screen, select:

**Yes** - to activate the automatic 15 minute shut off

**No** - to deactivate the automatic 15 minute shut off

The default setting is - Yes.

TOOLS SCREENS *Continued . . .*



**DEFINE STANDARDS**

To create a selection of standard masks for use when calculating loss thresholds, perform the following:

From the Tools screen, use the UP/DOWN arrow keys to highlight the ►DEFINE STANDARDS◀ function, then press the Enter button. The Select Standard screen will be displayed.

Use the UP/DOWN arrow keys to highlight the standard to be edited, and press the ENTER button. The Standard screen will be displayed.

**dB/km:** Use the LEFT/RIGHT & UP/DOWN arrow buttons to input the loss per kilometer of measure for each wavelength. Press ENTER to move to the next line.

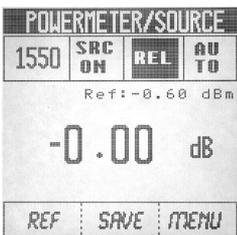
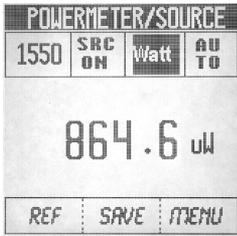
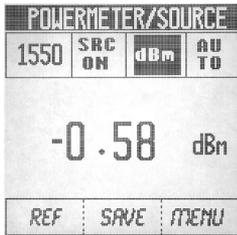
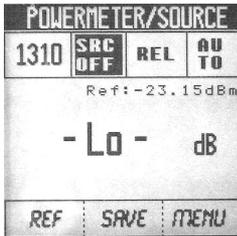
**dB/Conn:** Use the LEFT/RIGHT & UP/DOWN arrow buttons to input the loss per connector. Press ENTER to move to the next line.

**dB/Splic:** Use the LEFT/RIGHT & UP/DOWN arrow buttons to input the loss per splice. Press ENTER to move to the next line.

*Note:* To edit the name of this standard, press the ENTER button to move to the top line of the screen. Use the LEFT/RIGHT & UP/DOWN arrow buttons to edit the name to be displayed.

Press the EXIT softkey to return to the Tools screen.

**OPM / SOURCE**



To perform Optical Power Meter measurements and turn the Laser Source on & off, do the following:

From the MENU screen, use the UP/DOWN arrow keys to highlight **▶OPM / SOURCE◀**, then press the ENTER button to select.

The POWERMETER/SOURCE screen will be displayed.

1. Use the arrow buttons and the ENTER key to highlight & set the following **OPTIONS -**

Top row boxes from left to right:

**SET MEASUREMENT WAVELENGTH -**

Use the UP/DOWN buttons to toggle the test wavelength, displayed in the left hand box, to either - 1310nm or 1550nm.

**TURN SOURCE ON OR OFF -** Use the Right arrow button to highlight the SRC ON/SRC OFF box. Use the Up/Down & Enter buttons to toggle SRC ON or OFF.

**SET THE POWER MEASUREMENT**

**UNITS -** Use the Right arrow button to highlight the POWER UNIT SELECTION box. Use the Up/Down & ENTER buttons to toggle between:

**dBm -** absolute power / logarithmic scale

**Watts -** absolute power / linear scale

**Rel -** relative power / reference mode

*Continued . . .*

### OPM / SOURCE *Continued . . .*



**AUTORANGE / HOLD-** Use the Right arrow button to highlight the AUTO/HOLD box.

When Measuring in Watts, use the UP/DOWN & ENTER buttons to toggle between:

**AutoRange** - unit will seek the power range required to perform the test.

**Hold** - Unit will lock-in the power range currently set.

**Note:** HI or Lo will be displayed if input power is beyond the capability in the range currently held.

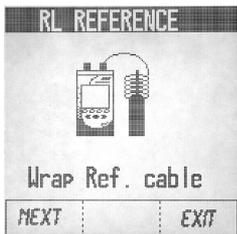
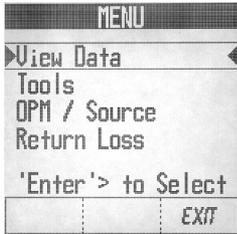
2. The power measurement will be displayed on the screen.
3. To save the reading, press the SAVE softkey. The screen will prompt you to identify the Cable & Fiber.
4. Use the Arrow buttons and Enter key to identify the Cable name and Fiber number,
5. Press SAVE softkey. The unit will return to the POWERMETER/SOURCE screen to perform additional testing if required.

**REF** To set a new 0dB reference level, connect the fiber to the unit and hold the REF softkey. The unit will automatically zero out. Release the key.

**SAVE** To save an optical power reading, press the SAVE softkey while the reading is displayed. The screen will prompt for Cable Name and Fiber Number.

**MENU** To return to the Menu Screen, press the MENU softkey.

**RETURN LOSS**



To perform Return Loss measurements and turn the Laser Source on & off, do the following:

From the MENU screen, use the UP/DOWN arrow keys to highlight **RETURN LOSS**, then press the ENTER button to select.

The RETURN LOSS METER screen will be displayed.

1. *Clean all optical interfaces* (see pg. 11) and attach the reference cable to the Source/Return Loss Port.
2. Establish a reference by pressing the REF softkey.
3. Per the on-screen diagram, wrap the Reference Cable around a mandrel 7 times and press the NEXT softkey to continue.
4. When the screen indicates UN-WRAP, remove and straighten the fiber and press the NEXT softkey.
5. The screen will return to the RETURN LOSS METER. Connect the Reference Cable to the fiber or device under test.
6. Use the Up/Down buttons to toggle the test wavelength, displayed in the highlighted left hand box, to either 1310nm or 1550nm.
7. The Return Loss measurement will be displayed.

### **RETURN LOSS** *Continued . . .*



9. To store the test, press the SAVE softkey. The screen will prompt you to identify the Cable & Fiber.
10. Use the Arrow buttons and Enter key to identify the Cable name and Fiber Number.
11. Press SAVE softkey. The unit will return to the RETURN LOSS Meter screen to perform additional testing if required.



## **Specifications**

### **Optical Power Meter Specifications**

|  |  |
|--|--|
| <b>Power Measurement Range in dBm</b><br>Wavelength $\geq$ 850 - 1700nm                | +10dBm to -65dBm   |
| <b>Wavelength Range</b>  | 800nm to 1700nm  |
| <b>Calibration Points</b>  | 850nm, 980nm, 1300nm,<br>1480nm, 1310, 1550nm,<br>1625nm               |
| <b>Absolute Accuracy</b><br>1310nm with -10dBm input power                             | $\leq \pm 0.25$ dB (6%)  |
| <b>Linearity @ 1310nm</b><br>Linearity Accuracy  |  |
| +10 to -3dBm   | $\pm 0.22$ dB  |
| -3 to -55dBm   | $\pm 0.05$ dB  |
| -55 to -65dBm  | $\pm 0.22$ dB  |
| <b>Optical stability</b><br>OPM Channel only <sup>1</sup>                              | $\leq \pm 0.05$ dB (0°C - 50°C $\pm$<br>1°C 24hr@>-30dBm) <sup>1</sup> |
| <b>Settling time, auto-range</b>   | 0.5 second (typical)   |
| <b>Optical Power Measurements</b>  | dBm, dB, Watt  |
| <b>Polarization Dependency</b>   | $\leq 0.10$ dB   |
| <b>Mating Stability of SOC Connector</b>   | $\leq 0.02$ dB   |
| <b>Repeatability</b>   | $\leq 0.05$ dB   |
| <b>Optical Interface Power Meter</b><br><b>Optical Interface MM Laser Power Source</b> | SOC Adapter<br>UCI-UPC flat polish<br>Adapter, 62.5/125 MM             |

1. While temperature is running profile from 0°C to +50°C

**Specification Summary of Lasers**

|   |   |                          |
|---|---|--------------------------|
| <b>Central Wavelength</b>   | 1310nm±30nm                             | 1550nm±30nm              |
| <b>Spectral Bandwidth</b>   | <170nm                                  | <170nm                   |
| <b>Stability</b>  |   |                          |
| Variation of $\leq \pm 10^{\circ}\text{C}$ from +17 to +40 <sup>2</sup> | $\leq \pm 0.25\text{dB}$                | $\leq \pm 0.25\text{dB}$ |
| Variation from 25 <sup>o</sup> C from +0 to +50 <sup>2</sup>            | $\leq \pm 0.75\text{dB}$                | $\leq \pm 0.75\text{dB}$ |
| <b>Power Output<sup>1</sup></b>   |   |                          |
| <b>Continuous Wave</b>  | >-10dBm                                 | >-10dBm                  |
| <b>Typical (factory adjusted)</b>                                       | >-04dBm±1.0dB                           | >-04dBm±1.0dB            |
| <b>Mating Stability of Connector</b>                                    | < 0.2dB                                 | < 0.2dB                  |
| <b>Connector Interface</b>  | Universal Connector Interface (UCI-UPC) |                          |

1. Within specified ambient environment of +20°C to +25°C
2. Instrument is ramped up from 0°C to +50°C in 5°C steps/30 min. The instrument is allowed to stabilize at each of these temperatures for 30 minutes. Initial reference power level is measured at approximately +25°C.

**AutoTest Specifications**

|                          |                        |
|--------------------------|------------------------|
| <b>Wavelength</b>        | 1310/1550nm            |
| <b>Measurement Mode</b>  | Bi-directional Simplex |
| <b>Measurement Range</b> | >30dB                  |

**Return Loss Specifications**

|   |                            |  |
|---|----------------------------|--|
| <b>RL Measurement Range with Interface Connection</b> |                            |  |
| UCI-UPC ORL >30dB                                     | $\leq 10\text{dB}$ to 30dB | (Specific to connector type)                     |
| UCI-UPC ORL >50dB                                     | $\leq 10\text{dB}$ to 40dB | (Specific to connector type)                     |
| <b>Return Loss Accuracy</b>                           |                            |  |
| UCI-UPC   | 10 to 45db                 | < $\pm 0.50\text{dB}$ (Best case for Conn. type) |
| <b>Measurement Range</b>                              | >30dB                      |  |

**Mechanical Specifications**

|                                      |   |
|--------------------------------------|---|
| <b>Dimensions</b>                    |   |
| Enclosure                            | 6.50” x 1.75” x 3.90”                                   |
| Rubber Boot                          | 7.60” x 4.30” x 2.30”                                   |
| <b>Accessories</b>                   | Soft shock-proof boot, Tilt Up Stand, NIMH Battery Pack |
| <b>Weight w/batteries &amp; boot</b> | 2.20 lbs.   |

## ***Parts and Accessories***

To order accessories, SOC adapters, and parts, contact your local Tempo distributor.

### ***Accessories***

#### Description

RS232 interface cable kit  
Printer serial cable kit  
Nickel-metal hydride battery pack  
Power transformer/NiMH charger

### ***Cleaning Supplies***

#### Description

All-In-One connector cleaner  
Adapter cleaning wands  
200X Leica FiberVue microscope

### ***SOC Adapters***

Snap-On Connector (SOC) adapters are available for a broad range of fiber optic connector types. Order additional adapters by specifying the codes listed below.

| <u>Adapter Code</u> | <u>Connector Type</u>                    |
|---------------------|--|
| 1001                | Blank                                    |
| 1010                | DIN 47256                                |
| 1020                | SOC ADAPTER, FC                          |
| 1030                | SOC ADAPTER, ST                          |
| 1038                | MIL-T-29504 optical termini              |
| 1040                | HMS-10 (2.5mm)                           |
| 1047                | Mini-BNC                                 |
| 1050                | Diamond HMS-0 (3.5mm)                    |
| 1057                | Stratos 430/Holtek 38000                 |
| 1062                | SOC ADAPTER, SC                          |
| 1081                | Radiall VFO                              |
| 1086                | Diamond HMS-10A (SMA-2.5)                |
| 1087                | SMA-905/906                              |
| 10E0                | Radiall EC                               |
| 10E2                | Diamond E-2000                           |
| 10TB                | Simplex TOSLINK/Spectran J-pin           |
| 10TD                | TR/TX set, duplex TOSLINK/Spectran J-pin |
| 10TR                | Duplex TOSLINK TX                        |
| 10TX                | Duplex TOSLINK TR                        |
| 10ZP                | H-P Versalink/Spectran V/Z-pin           |

### ***UCI Adapters***

Universal Connector Interface (UCI) adapters are available for most industry standard fiber optic connector types. Order additional adapters by specifying the codes listed below.

| <u>Adapter Code</u> | <u>Connector Type</u>     |
|---------------------|---------------------------|
| AE2-10              | Diamond E-2000            |
| APC-108/C           | Ceramic UCI, FC           |
| AMS-00              | Diamond HMS-0 (3.5mm)     |
| AMT-10              | Diamond HMS-10A (SMA-2.5) |
| ASM-90              | SMA-905/906               |
| AHP-10              | HMS-10/HP (2.5mm)         |
| AML-38              | MIL-T-29504/4 and /5      |
| ASC-108/C           | Ceramic UCI, SC           |
| ATS-108/C           | Ceramic UCI, ST           |

### ***Technical Support and Service***

Tempo offers free technical support for the 525 optical test sets. If you have questions or comments about your instrument, call Tempo Monday through Friday, from 8 a.m. to 5 p.m. Pacific time.

Please have the following information available:

1. Instrument model number
2. Instrument serial number
3. Description of the problem

To obtain service for the instrument, call the toll-free number above, or contact your local Tempo representative.

### ***Periodic Calibration***

It is recommended that the 525 optical test set be recertified and/or recalibrated every 24 months, or by the due date printed on the calibration decal affixed to the instrument, whichever comes first. Calibration of the instrument may be performed by Tempo for a nominal fee. Please call Tempo during business hours for more information.



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