

**ST-2010 Optical Fiber Coupler/WDM
Workstation Systems**

Operation Manual

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1. Overview

ST-2010 Coupler/WDM Workstation System is designed with conventional Fused Bi-Conic Tapering technology for fabrication of the most of popular low cost fiber optic couplers and wavelength division multiplexer(WDM), those all-fiber components, simple looks like, but play the key role, are widely used in today's fiber optic communication and sensing networks.

As a new generation optical coupler/WDM manufacturing system, ST-2010 is developed by Sunma engineering team in 2002, on the basis of OC-1010 and OC-2000 high reputation coupler/WDM workstation systems in China. ST-2010 is equipped with latest technologies, new features, and enhanced functionalities; the new generation optical coupler/WDM manufacturing system provides a turn-key solution for coupler manufacturers with unsurpassed performance quality.

ST-2010 Coupler/WDM Workstation System is so versatile that can fabricate all common used optical fiber couplers,WDMs, and can be used for manufacturing some specialty components through some additional accessories or fixtures, one by N channel or NxN monolithic 3x3 or 4x4 couplers may be fabricated by ST-2010, provided suitable fixture can be equipped with. Furthermore, ST-2010 can be treated as an ideal platform for developing polarization maintaining coupler workstation system.

ST-2010 Coupler/WDM Workstation System features incomparable accuracy in stage movement, enhanced functionalities, easy to use Graphic User Interface(GUI), powerful process management software, volume production hardened design, and the flexibility for manufacturing process changes, the system incorporates a high stability light source and a high accuracy power meter with integrated features, the new generation optical coupler manufacturing system provides the most reliable solution for fabrication standard and special feature couplers with high yields. This system enables the end products to have ideal output with low polarization-dependent loss(PDL),low excess loss, and highly repeatable coupling ratios.

2.Key Features and Specifications

.Key Features

High yield rate and high reliability

High-precision stages

Short cycle time

Low excess loss and high repeatability

Real time monitoring system

Anti-Vibration design to absorb external shocks

Easy access hot-key control panel for instant control and micro-adjustment

Special designed enclosure and machine platform to prevent working area from being contaminated

Modular design for convenience of maintenance and future upgrade

Ability to produce short length couplers

Windows 2000 based PC-2000 series software package



Specifications

Model	ST-1010	ST-2010
Application	Standard Coupler Wide-band Coupler WDM Coupler Special Coupler	Standard Coupler Wide-band Coupler WDM Coupler Special Coupler
Product Specifications		
Movement Resolution Of Fiber Chucks	0.01um/Step	0.001um/um/Step
Maximum one side pulling length		25mm
Pulling speed(one side)	0-99um/sec	0-400um/sec
Stroke Length Of Fiber Chucks	25-75mm	25-100mm
Pre-Pulling	0.001-9mm	0.001-10mm
Movement Resolution Of Torch Unit	a axes 0.01mm/step	3axes 1.5um/step
Hydrogen Flow Control	0-300 sccm	0-300sccm
Pre-Package Unit	Auto	Auto
Curing Temperature Of Pre-Package Unit	Continuous Adjustment	Continuous Adjustment
Photo Detectors	φ2mm InGaAs	φ2mm InGaAs
Wavelength Range	850nm-1650nm	850nm-1650nm
Power Meter Range	+3dBm --70dBm	+3dBm --70dBm
Power Meter Accuracy	±5%(-10dBm,23℃)	±5%(-10dBm,23℃)
Power Meter linearity	±0.02dB(+3dBm -60dBm)	±0.02dB(+3dBm -60dBm)
Electrical and Mechanical Specifications		
Dimension(w×d×h)	500×468×232	558×398×250
Voltage Supply	110VAC or 220 VAC 50/60Hz	110VAC or 220 VAC 50/60Hz
Power Consumption	250W	320W
Operating Temperature	23℃±5℃	23℃±5℃
Humidity	<90%	<90%
Other Features		
Manual/Auto stop tapering		Yes
Data base management		Yes

1.Power Supply

- 1.1 Power Supply: 220VAC ±10%, 50HZ
- 1.2 Power: <320W

2.Hydrogen supply

- 2.1 Maximum Pressure:0.2MP
- 2.2 Recommended Pressure:0.12MP
- 2.3 Purity:>99.999%

3.Operation Environments

- 3.1Temperature:
- 3.2Humidity: <90%RH



4.Key Specifications

- 4.1 Maximum pulling length (one side): 25.000mm
- 4.2 Movement Resolution Of Fiber Chucks(one side): 2 nm
- 4.3 Pulling speed (one side): 0.001mm/s – 0.4mm/s
- 4.4 Pulling speed resolution (one side): 0.001mm/s
- 4.5 Maximum movement range of torch unit: 20.00mm
- 4.6 Movement resolution of torch unit: 0.01mm
- 4.7 Torch unit moving speed range: 0.1mm/s -- 9.9mm/s
- 4.8 Torch unit moving speed resolution: 0.1mm/s
- 4.9 Tapering length resolution: < 5um
- 4.10 Tapering length resolution repetition: < 10um/50times
- 4.11 Torch unit position control resolution: < 15um
- 4.12 Torch unit position control resolution repetition: < 15um/50times
- 4.13 Power meter measurement range: +3 -- -70dBm
- 4.14 Power meter linearity: $\pm 0.02\%$
- 4.15 Wavelength range: 850nm -- 1650nm
- 4.16 Dimensions: 500mm(W)×398mm(D)×232mm(H)

5.Other functions for easy control the equipment

- 5.1 Manual/Auto stop tapering functions
- 5.2 All parameters can be logged, stored and recalled.
- 5.3 Auto protect functions such as: short cut circuits, maximum movement range limits.
- 5.4 Torch linear swing movement, circular movement.



3. Installation and operation instructions

3.1 Overview the whole system

Please see figure 1:



Figure 1 ST-2010 System

3.2 Installation

3.2.1 Please make sure that the system operation environment meets demands that are as per specifications said.

3.2.2 ST-2010 system is designed with high tapering movement resolution as 0.002 μ m, therefore, please make sure that the ST-2010 being installed onto a secure, stable, horizontal bench.

3.2.3 System connection please see figure 2, you may find the power supply cable in ST-2010 system packing.

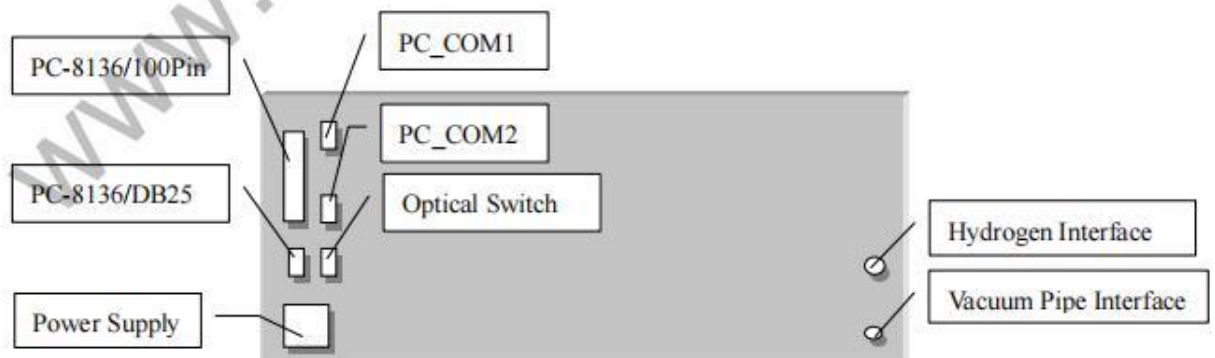


Figure 2: Connection the system

Important Note: The ST-2010 system needs AC Power 220VAC/50HZ; Firm and reliable ground connection is a must. ST-2010 just has "Short-cut protection" function, we strongly recommend that customer's power supply circuits include leakage of



electricity circuits. A sample is as follow (Figure 3):

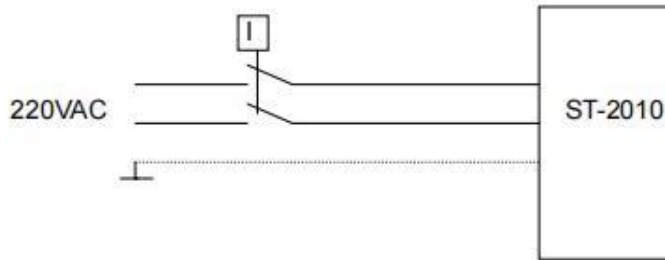


Figure 3: Leakage of Electricity Protection

3.2.4 Connect external Vacuum Pump with ST-2010 Vacuum Pipe Interface through a qualified pipe, and make sure the connection is airtight enough.

3.2.5 Connect external hydrogen gas container with ST-2010 Hydrogen Gas Interface through a qualified pipe, and make sure the connection is airtight enough, reliable. It is very important to guarantee hydrogen gas pressure within the range of **0.15MPa--0.2Mpa**. **External hydrogen gas supply should have "on/off" switch, flow control devices that can be controlled manually by the operator.**

3.2.6 Connect ST-2010 system interfaces: PC_COM1; PC_COM2 and SUNMA Control Card with PC accordingly through the other three cables that included with ST-2010 system packing.

3.3 Operation

3.3.1 Power on

- Inspect all connections carefully before power on the ST-2010 system.
- Switch on PC and wait for PC standard by (ready to work properly)
- Power on ST-2010 system.

Run ST-2010 system software.

3.3.2 Stop

- Exit ST-2010 software
- Switch off ST-2010
- Switch PC

3.3.3 Keyboard functions and display

See Figure 4

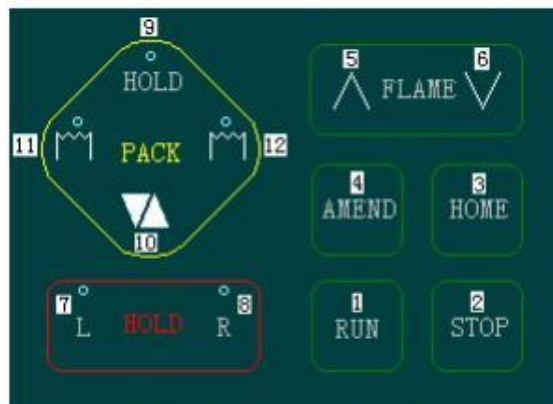


Figure 4: Keyboard and display



3.3.4 Keyboard Operation

- (1) RUN: Start tapering
- (2) STOP: Stop tapering
- (3) HOME: Electrical machinery return to pre-setting position that was fixed at factory.
- (4) AMEND: Amending
- (5) FLAMEUP: Flame moving upside (this function is live when tapering)
- (6) FLAMEDOWN: Flame moving upside (this function is live when tapering)
- (7) HOLDL: Right vacuum absorption fixture open/close
- (8) HOLDR: Right vacuum absorption fixture open/close
- (9)PACKHOLD: Pack Platform open/close
- (10)PACKUPDOWN: Pack Platform moving forward/ backward
- (11)HEATL: Left Heating, can be shut down manually or by computer
- (12)HEATR: Right Heating, can be shut down manually or by computer



4. Software Installation and Operation

4.1 Software Installation

4.1.1 Insert ST-2010 software disk into CD/DVD driver, and enters into then run Setup.exe by double click Setup.exe , restart your computer. Please note that ST-2010 software can be used at Win95, Win98, WinNT, Win2000).

4.2 Software Operation

4.2.1. Start OC_2010 software. See Figure 5:

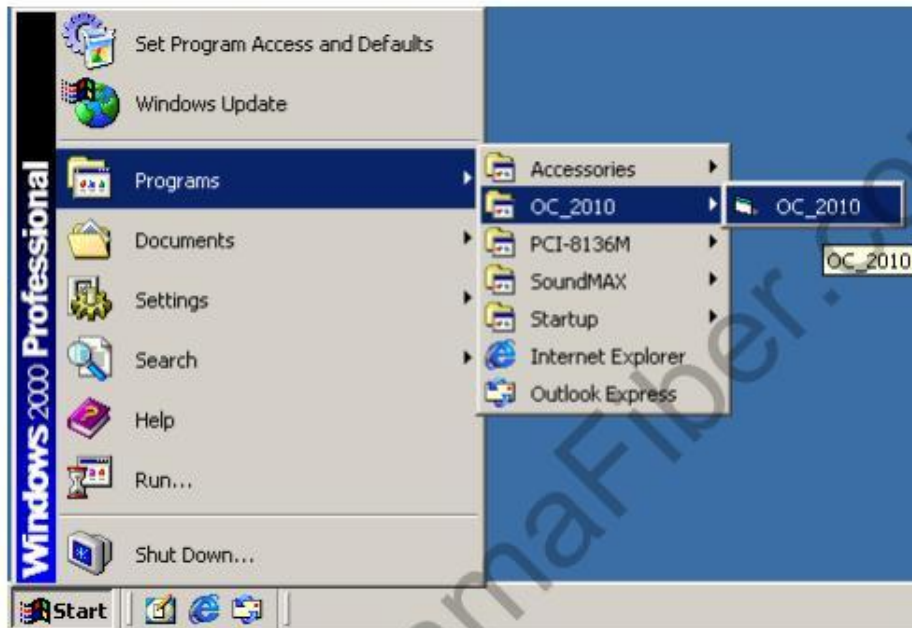


Figure 5 Start OC_2010 Software

If you see the follow window (Figure 6), there are problems on keyboard communication, please inspect ST-2010 system power supply, ST-2010 maybe not operating, or there maybe poor connection between mainframe with computer.

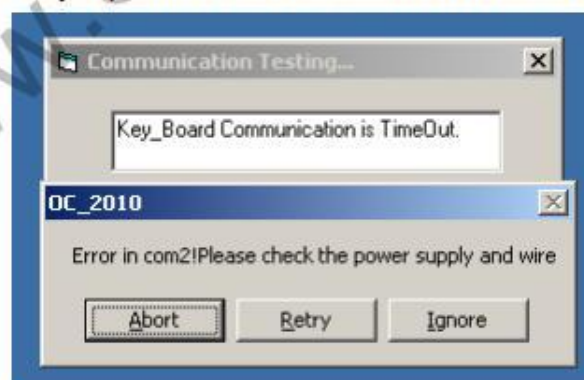


Figure 6 Communication failure warning window

The window below appears every time when you run ST-2010 software:

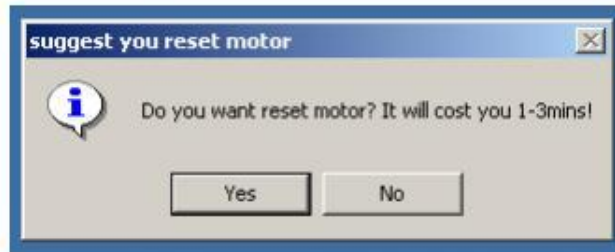


Figure 7 Electrical Machinery resetting window

If any electrical machinery of ST-2010 system is not at proper position, please click “Yes(Y) to reset electrical machineries, otherwise, ST-2010 system can not work properly, worse, the electrical machinery may be damaged.

ST-2010 software main page is as below (Figure 8):

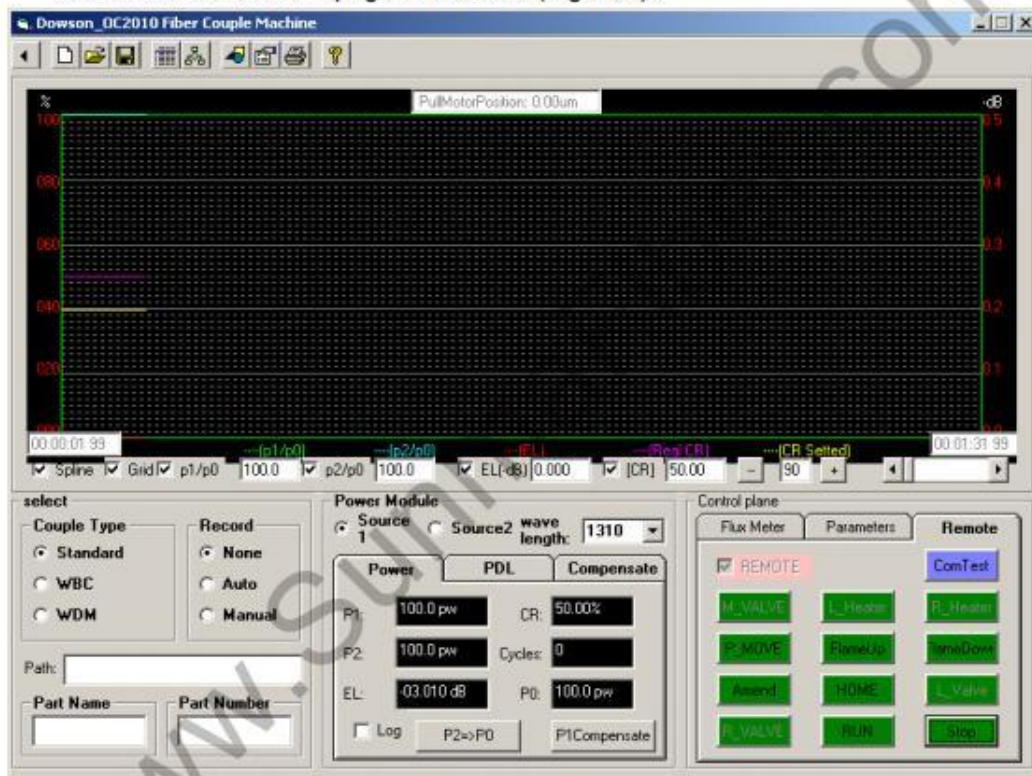


Figure 8 Main page of ST-2010 software

Notes: When ST-2010 software is started, all parameters last time used (or set) will be recalled automatically.

4.2.2. Select to fabricate different components

ST-2010 software provides three different couplers standard fabricating processes that are common used optical fiber fused couplers today. Standard Optical Coupler, Wideband Optical Coupler and Wavelength Division Multiplexer, you may select each of them for easy operation. See Figure 9



Figure 9 Select different components

4.2.3. Tapering parameters setting

4.2.3.1 Parameters setting window .See Figure 10



Figure 10 Main Tool Bar

Click “New” enter into parameter setting window. See Figure 11. In this window, the operator can change, input and storage all related parameters.

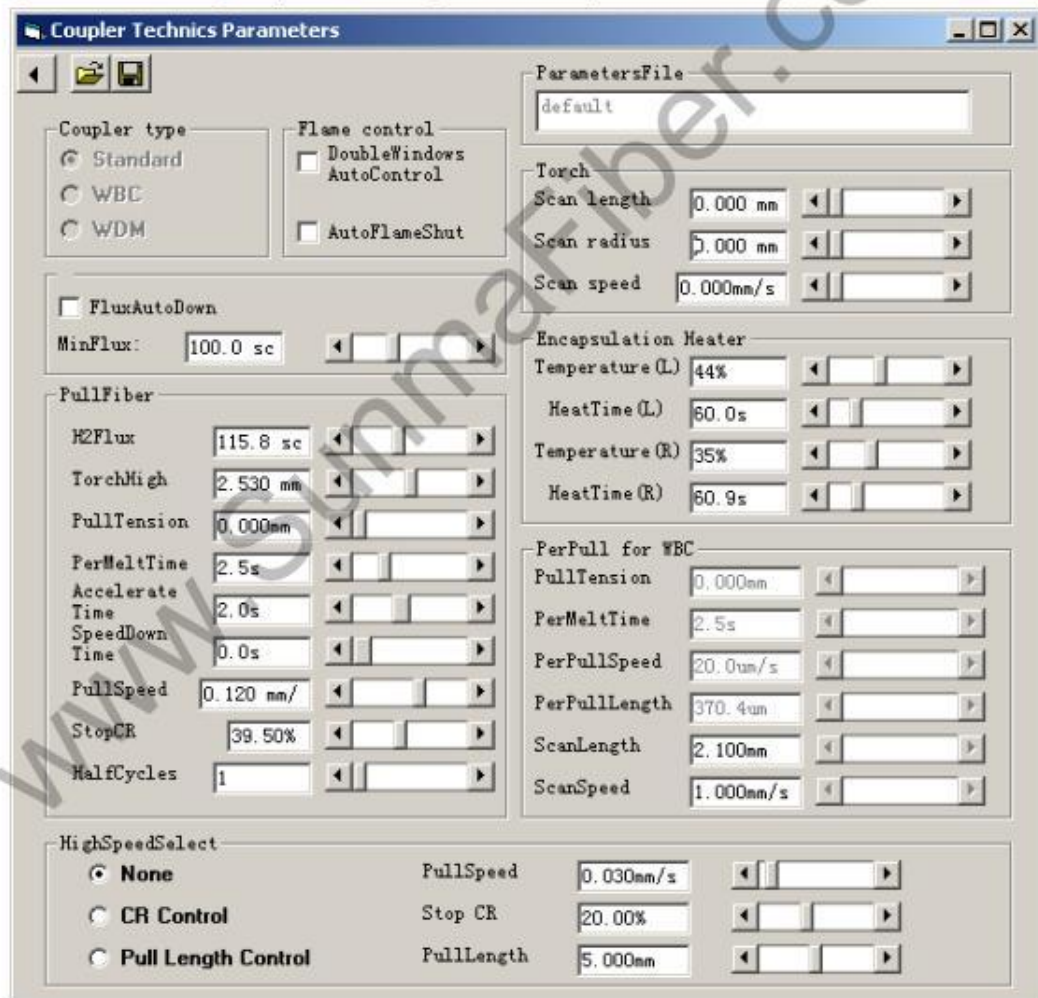


Figure 11 Parameters Setting Window



4.2.3.2 Storage Parameter Files

When you need to save parameters files into hard drive, you may click save button, see Figure 12, select file name and route, then click “S (save)” .

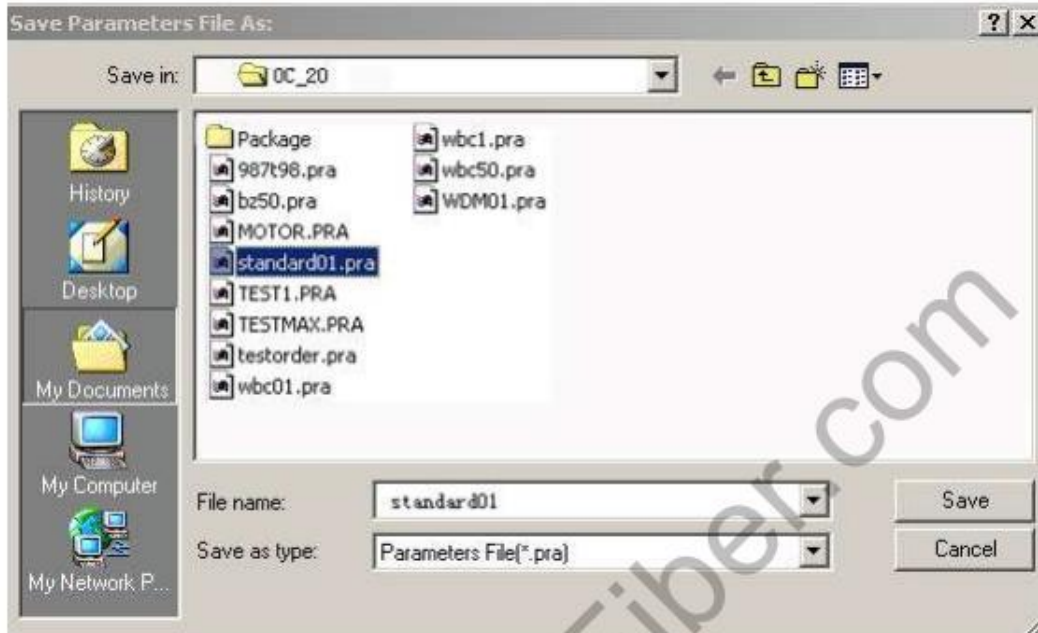


Figure 12 Save parameter file

4.2.3.4. Recall Parameter Files from Hard Drive

When you need to recall a certain parameter file, please click “Open” , select route and file name that you want to recall, and then click “O (open)” .

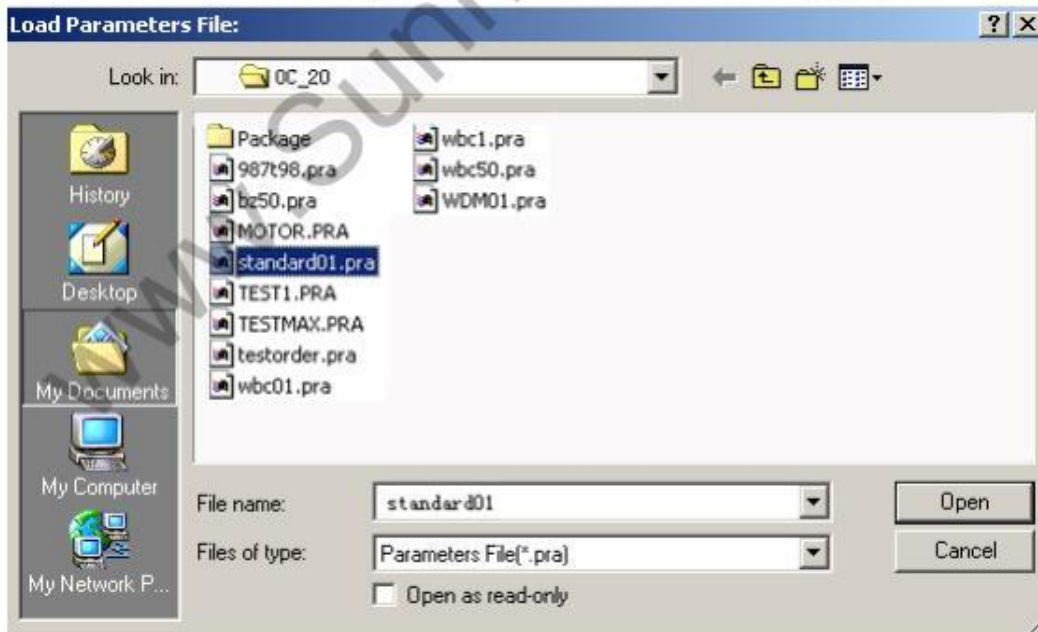


Figure 13 Recall parameter file



4.2.4 Change Frequently-used Parameters

During tapering process, especially at the first begging, some parameters need to be adjusted or changed frequently, ST-2010 software provides a special window in which the operator can change those frequently-used parameters easily. When you change parameters at main page frequently-used parameter window, all changed parameters will be showed at tapering parameter setting window, respectively. See Figure 14.

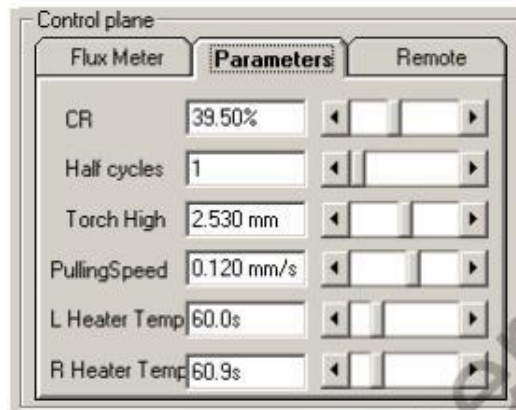


Figure 14 Change Frequently-used Parameters

4.2.5 Control Flow Meter

Click "Flow Meter" at ST-2010 software main page, Control Panel. See Figure15

Click "Open" to turn on hydrogen gas flow switch.

Click "Close" to turn off hydrogen gas flow switch.

Click "Washing" to wash flow meter pipe.

Click "Ignite Test" to test ignition about 0.5 second.

When Hydrogen flow meter turned off or flow zero-setting, click "Zero Flow" can calibrate Flow Meter zero status. This function is useful when there is a relatively big difference between setting flow from measured gas flow.

Important Notes: When you use zero Flow key, please make sure that the Flow Meter is turned off, or set flow to zero and wait for stable flow is obtained by Flow Meter. We recommend waiting for at least ten seconds.

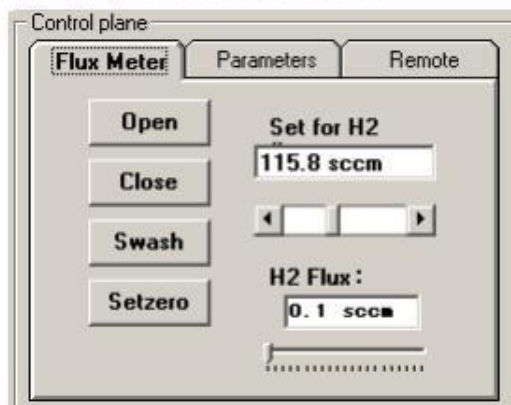


Figure 15 Control Flow Meter



4.2.6 Remote Control

Click "Remote Control" at ST-2010 software main page, Control Panel. See Figure 16:



Figure 16 Remote Control

Remote control functions are mainly for maintenances purpose. Please use this functions carefully .

4.2.7 Power Meter

Click "Power Meter" at ST-2010 software main page, See Figure 17

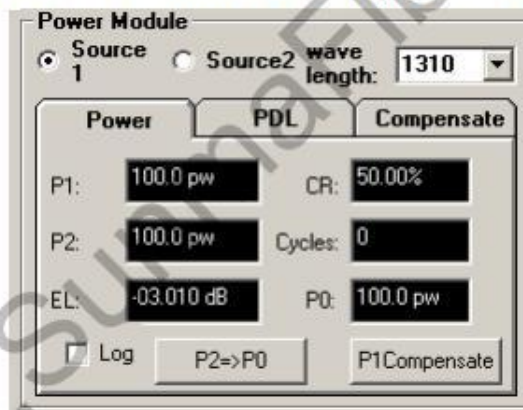


Figure 17 Optical Power Meter window

All value display is against used light source

P1: Channel one power

P2: Channel two power

EL: Insertion loss

CR: Actual Splitting ratio

Cycle: Half-Cycle number

P0: Power value before tapering

Log: mW/ dBm Switch

4.2.8 Power Compensation

See Figure 17:

Before tapering, the operator input the first fiber into Channel 1, and then input the second fiber into Channel 2, then click "P2=>>P0" button, P0 records an optical power value. Click "P1 Compensation" button, the ST-2010 software will equal two channel light power automatically.



4.2.9 PDL Measurement

Click "PDL" at ST-2010 software main page, See Figure 18:

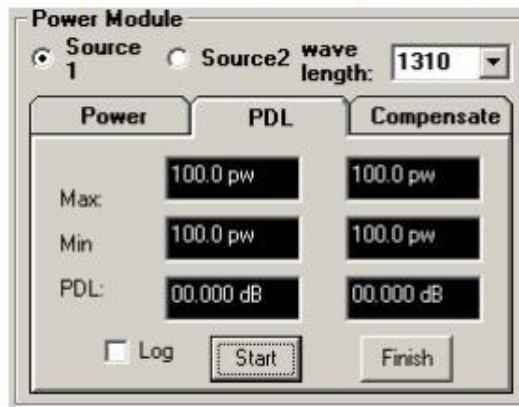


Figure 18 PDL Measurement

Notes: PDL measurement needs to connect with an external polarization controller. Push "Start" key to start PDL measurement. push "Finish" key to stop measuring.

4.2.10 Save Tapering Curve File

When you need to save a certain tapering curve parameters as a file into hard drive, you may click "Save Tapering Curve File" button, see Figure 12, select file name and route, then click "S (save)" See Figure 19:



Figure 19 Save Tapering Curved File



4.2.10 Tapering Curve File Recall

When you need to recall a certain tapering curve file p , please click “Open” , select route and file name that you want to recall, and then click “O (open)See Figure 20

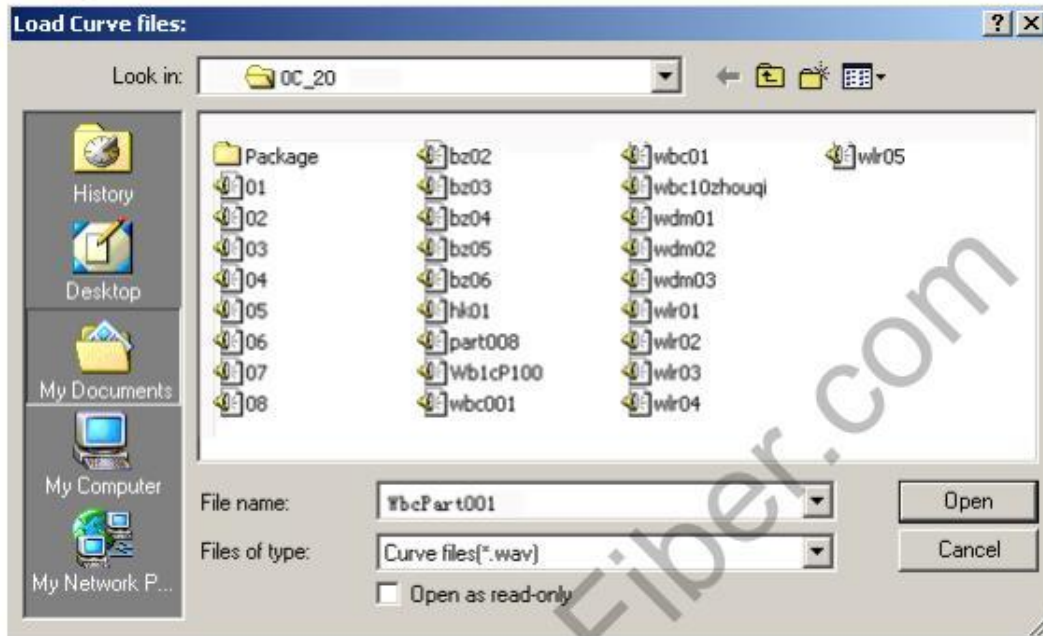


Figure 20 Tapering Curve File Recall

4.2.11 Component Parameters Record

ST-2010 software can record tapered components parameters both manually and automatically. See Figure 21



Figure 21 Parameters Record

Auto: When you want to use auto record function, please set a file as: c:\Sunma\record , ST-2010 software itself will set three files as: Standard; Wbc(Wide band coupler); and Wdm (Wavelength division multiplexer), and name saved files by the way as increasing numbers of each file accordingly. Please note that auto record function may cover the recorded file when new file name is as same as previous one.

Manual: Save files manually.

All components parameters files are in TXT format. The files can be opened by



Notebook or Microsoft word.

4.2.12 How to observe tapering curves

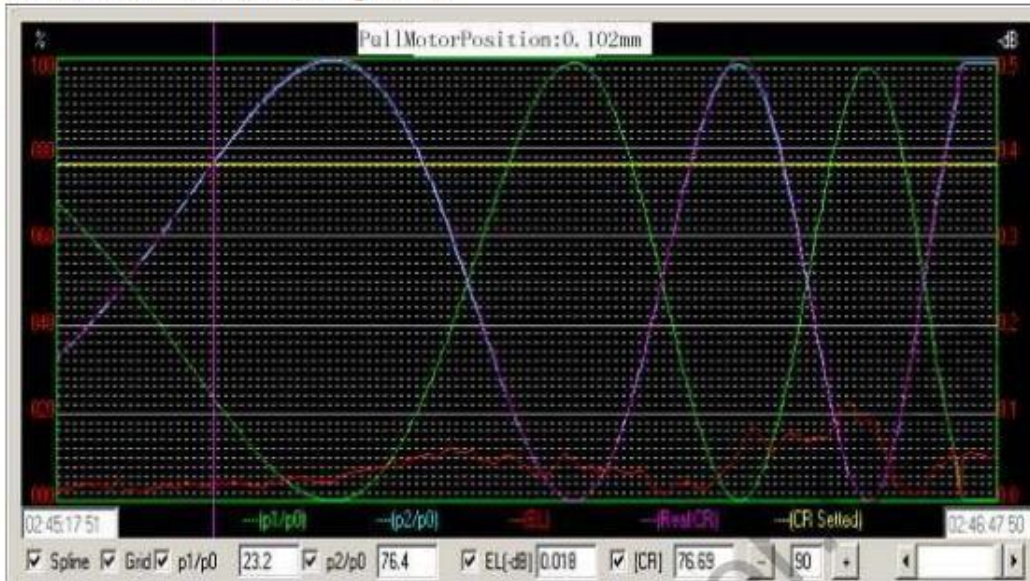


Figure 22 Tapering Curve

When ST-2010 is not tapering, click any point of the tapering curve, some key parameters will be showed at the bottom line of the window.

Spine: Tapering Curve Flatness

Grid: Grid display

P1/P0: P1 Power Ratio P2/P0: P2 Power Ratio

EL: Excess Loss CR: Coupling Ratio

+/-: Tapering time adjustment Rolling Bar: Rolling



4.2.13 Three types typical optical fiber couplers curves

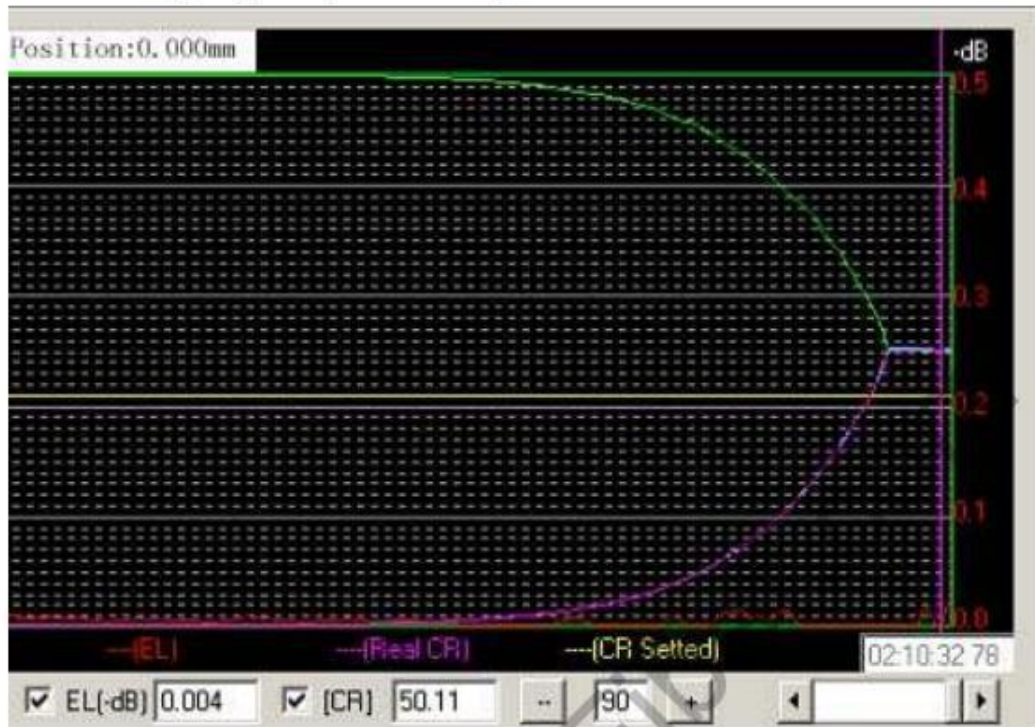


Figure 23 50/50 Standard Coupler

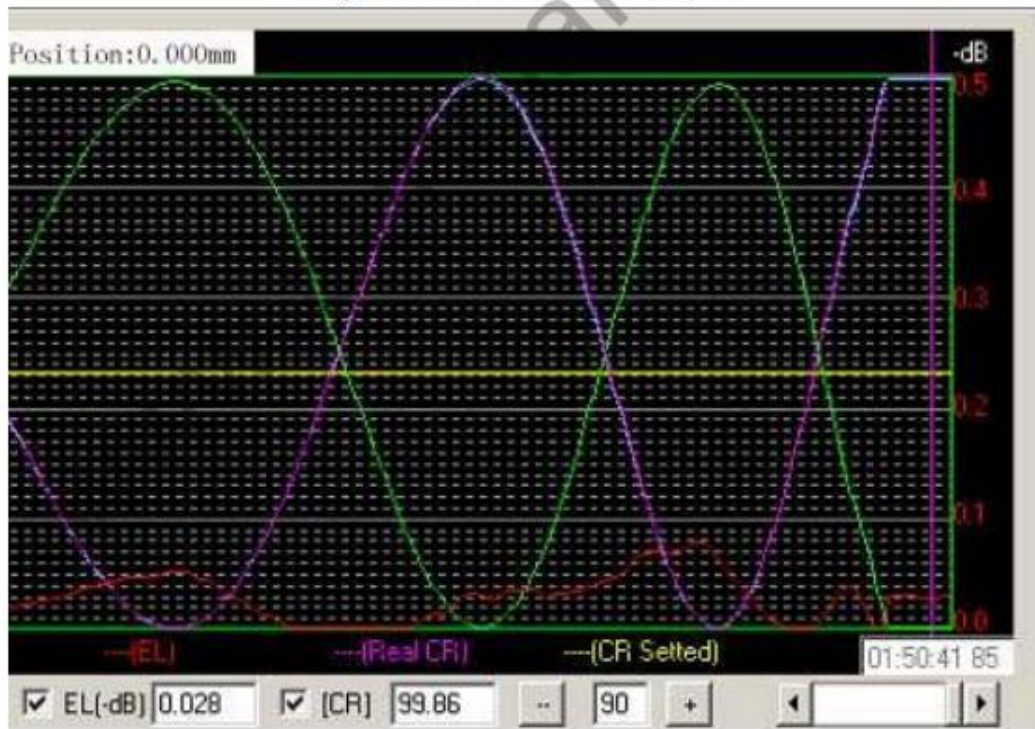


Figure 24 Wavelength Divisions Multiplexer

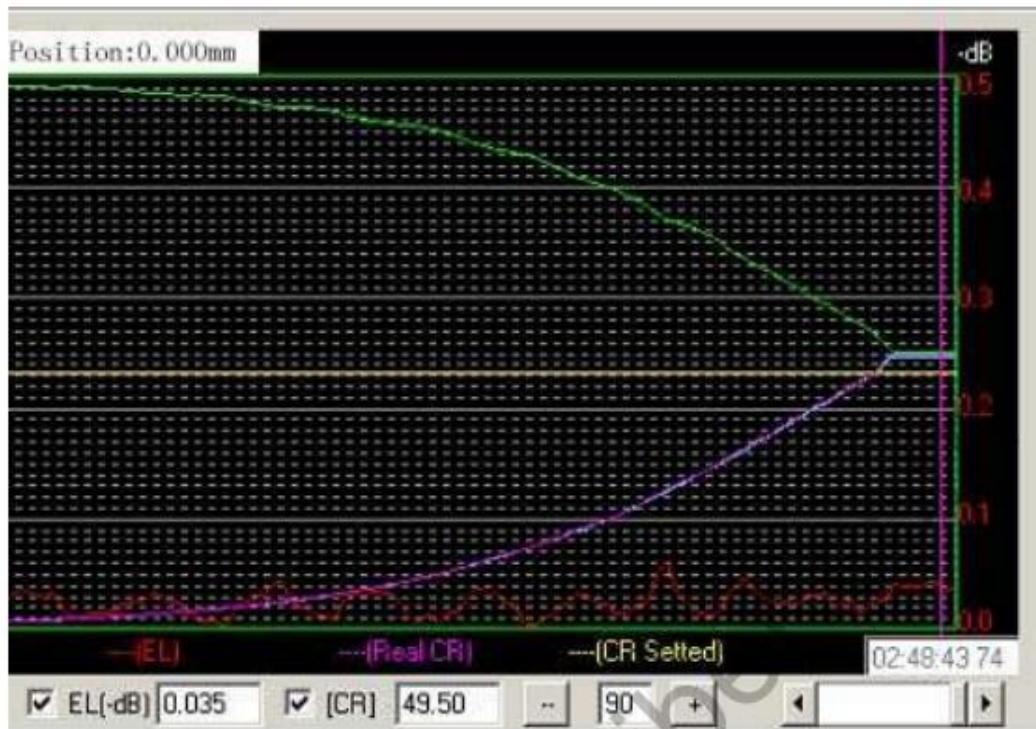


Figure 25 Dual-window Wideband Coupler