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# Tunable Laser Source Bench-Top Unit

Primawave

- High Power Output
- Wide Wavelength Tuning Range
- Laser Welding Assembly
- Photo Detector Power Output Monitoring System



## SPECIFICATIONS

| Parameter | | | Unit | | | | | |
|---|---|---|---|---|---|---|---|---|
| TL Series | Center Wavelength (λc)[1] | | nm | 980 | 1300 | 1450 | 1550 | 1585 |
| | Wavelength Tuning Range | Min. | nm | 15 | 60 | 80 | 80 | 60 |
| | Optical Output Power[2] | Min. | dBm | 0 | | 3 | | 6 |
| | Spectral Linewidth | Max. | MHz | 1 | | | | |
| | Tuning Resolution | Max. | nm | 0.1 | | | | |
| | Wavelength Control Accuracy | | nm | ± 0.1 | | | | |
| TM Series | Center Wavelength (λc)[1] | | nm | 1300 | | 1450 | | 1550 |
| | Wavelength Tuning Range | Min. | nm | 40 | | 60 | | 60 |
| | Optical Output Power[2] | Min. | dBm | 0 | | | 3 | |
| | Spectral Linewidth | Max. | MHz | 0.3 | | | | |
| | Tuning Resolution | Max. | nm | 0.05 | | | | |
| | Wavelength Control Accuracy | | nm | ± 0.05 | | | | |
| Power Stability (in 12 hours) | | Max. | dB | 0.03 | | | | |
| Wavelength Stability (in 12 hours) | | Max. | nm | 0.08 | | | | |
| Side Mode Suppression Ratio | | Min. | dB | 45 | | | | |
| Operating Temperature | | | °C | 0 to +40 | | | | |
| Storage Temperature | | | °C | -20 to +70 | | | | |
| Humidity | | | | Non-Condensing | | | | |
| Optical Connector Interface | | | | FC/APC receptacle | | | | |
| Remote Control GPIB Interface | | | | Conforms IEEE-488 standard connector | | | | |
| Line Power | | | | 110V~120V AC 50/60Hz 50VA | | | | |
| Instrument Dimensions (WxHxD) | | | cm | 25.8 x 10.3 x 32.4 | | | | |
| Instrument Weight | | | kg | 4.3 | | | | |
| Shipping Dimensions (WxHxD) | | | cm | 55.9 x 50.8 x 47.0 | | | | |
| Shipping Weight | | | kg | 8.1 | | | | |
| Recommended Recalibration Period[3] | | | month | 12 months | | | | |

1. Center wavelength: ±3nm for 980nm model; ±10nm for 1300nm, 1450nm, 1550nm & 1585nm models. Custom wavelengths available.
2. Optical output power is defined as the minimum output power over full tuning range. Power output at λc ±15nm is typically +3dBm (TL series) and +2dBm (TM series) greater than the listed minimum power output. Optional output power availability is dependent on center wavelength of laser. Contact Primawave sales representative for details on the available options pertaining to your model
3. 12 months recommended recalibration is calculated based on normal operating conditions. Normal operating conditions is defined as 10 full range scans up or down per day

## ORDERING INFORMATION

| T | | S | | | N | 1 | N |
|---|---|---|---|---|---|---|---|

L = TL Series
M = TM Series

Center Wavelength
3 = 1300 nm
4 = 1450 nm
5 = 1550 nm
6 = 1585 nm
9 = 980 nm
X = Custom

Power Output
0 = 0dBm
3 = 3dBm
6 = 6 dBm

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# Quality Certificate

Customer Name: Picosecond Pulse Labs
Customer Order No.: 297
Customer Spec. Revision No.: N/A

Primawave Product Information:

| | | | |
|---|---|---|---|
| ***Test Date*** | June 15, 2000 | ***Current (mA)*** | 80.00 |
| ***Product Number*** | TLS56P1N | ***Temperature (°C)*** | 25.00 |
| ***Serial Number*** | 2212200634 | | |
| ***TLM S/N*** | 2012200633 | | |

**Specifications:**

| | |
|---|---|
| (1) Center Wavelength | 1550 nm |
| (2) Wavelength Tuning Range | 1510 nm - 1590 nm |
| (3) Optical Output Power | 10.4 dBm @ 1550 nm (80 mA) |
| (4) Wavelength Control Accuracy | Within ± 0.1 nm |
| (5) Temperature Control | Pass |
| (6) GPIB Interface (12 hrs continual test) | Pass |
| (7) Manual Control Function Check | Pass |

**Comments:**

(1) 12 - months recommanded recalibration is calculated based on normal operating conditions. Normal condition is defined as 10 full range scans up or down per day.
(2) Attachment: Instructions Manual

Primawave Specification Revision No.: USETLS0001-Rev.5

Robert Chiang
Senior Fiberoptics Quality Engineer

June 15, 2001
Date

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# TLS56P1N

# TUNABLE LASER SOURCE

## Instructions Manual

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# TLS56P1N
# TUNABLE LASER SOURCE

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# 1. OVERVIEW

This section gives a summary listing of the functions available in the TLS56P1N Tunable Laser Source. Functional designations for the front and rear panels are included in this section. More detail operational instructions can be found in section 4.

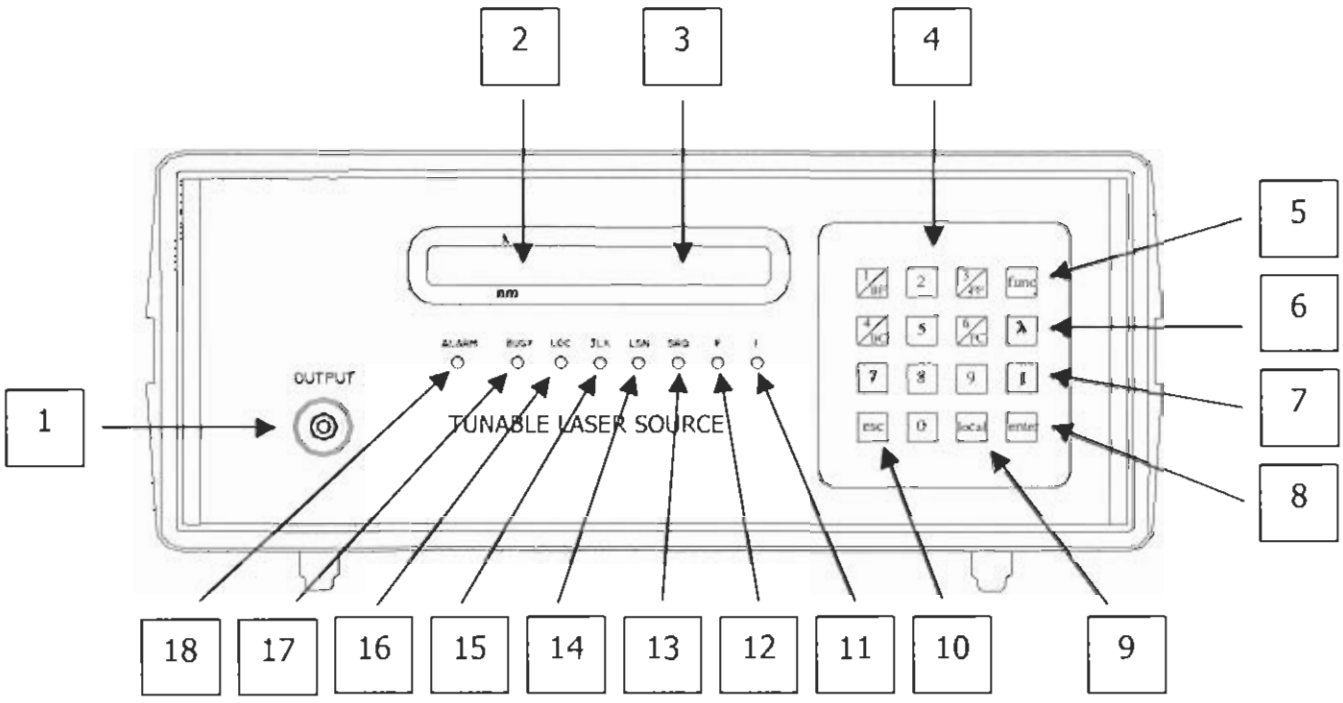



Figure 1-1 Front Panel Assignments

## 1.1 Front Panel Description

(Refer to Figure 1-1)

1. **Output** - Surface mount FC/APC receptacle for connection to compatible jumper cable.
2. **LED Wavelength Display** - Displays output wavelength in nanometers (nm).
3. **LED Settings Display** - Displays system settings for Laser Diode (LD) current (mA), Photo Detector (PD) current (μA), Wavelength (nm), GPIB address, temperature (°C); and selection of manual tuning mode and scanning function.
4. **Numeric Key Pad (*0~9*)** - Numeric inputs for optional settings.
5. **Function *(func)* Key** - Selection of system function and parameter settings.
6. **Lambda *(λ)* Key** - Selection of wavelength setting function.
7. **I *(I)* Key** - "On/Off" switch for the laser diode.
8. **Enter *(enter)* Key** - Functions as the "confirm" key for user input values.
9. **Local *(Local)* Key** - Reactivate keypad and reverts unit back to local control from GPIB remote control.
10. **Escape *(esc)* Key** - Clears user input entry.



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11. **"I" Indicator** - This light will be lit when the laser diode is turned ON.
12. **"P" Indicator** - This light will be lit when the unit is in the constant power mode.
13. **"SRQ" Indicator** - This light will be lit when the unit is actively requesting for service from remote control terminal.
14. **"LSN" Indicator** - This light will be lit when the unit is receiving commands from remote control terminal.
15. **"TLK" Indicator** - This light will be lit when the unit is sending requested information to remote control terminal.
16. **"LOC" Indicator** - This light will be lit when the unit is under local keypad control.
17. **"Busy" Indicator** - This light will be lit when the unit is in the process of performing wavelength tuning.
18. **"ALARM" Indicator** - This light will be lit when the unit is in a malfunctioning state.

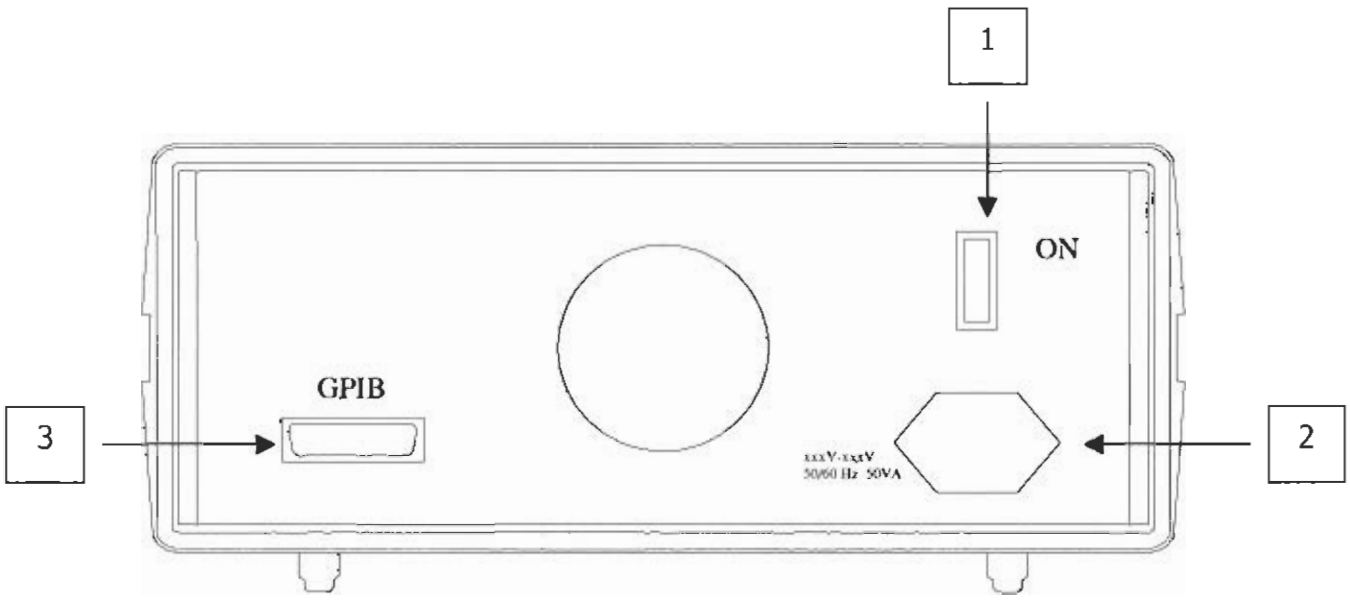



Figure 1-2 Rear Panel Assignments

## 1.2 Rear Panel Description

(Refer to Figure 1-2)

1. **Power Switch** - Main "On/Off" switch.
2. **Power Cord Receptacle** - Receives standard AC line cord: 110V~120V AC 50/60Hz 50VA.
3. **GPIB Interface** - Standard IEEE-488 interface enabling remote control.



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## 2. GENERAL INFORMATION

The TLS56P1N Tunable Laser Source is a cost-effective, programmable bench-top instrument that provides a flexible solution to general-purpose fiberoptic engineering and manufacturing. Convenient local control can be achieved using the keypad provided on the front panel of the instrument. This unit can also be remotely controlled by a computer via standard GPIB interface.

The TLS56P1N is equipped with an internal TEC temperature stabilization system to ensure optimal optical performance under typical indoor office environment. A photo detector feedback system enables the unit to be operated under constant output power mode. Standard FC/APC receptacle is provided for convenient connection to compatible fiber jumper cable.

**Main Features**

- Constant current mode
- Constant power mode
- Full range automatic scanning
- GPIB enabled remote control
- Manual tuning (coarse/fine)

### 2.1 Specifications

**Table 2-1** Specifications measured at room temperature

| | | |
|---|---|---|
| Wavelength | | C-Band |
| Wavelength Tuning Range | | 1510 nm – 1590 nm |
| Optical Output Power | Min. | 6 dBm |
| Power Stability (in 12 hours) | Max. | 0.03 dB |
| Tuning Resolution | | 0.1 nm |
| Wavelength Control Accuracy | | ± 0.1 nm |
| Wavelength Stability (in 12 hours) | Max. | 0.08 nm |
| Spectral Linewidth | Typ. | 1 MHz |
| Side Mode Suppression Ratio | Min. | 45 dB |
| Operating Temperature | | 0°C to +40°C |
| Storage Temperature | | -20°C to +70°C |
| Humidity | | Non-Condensing |
| Optical Connector Interface | | FC/APC receptacle |
| Remote Control GPIB Interface | | IEEE-488 |
| Line Power | | 110V~120V AC 50/60Hz 50VA |
| Instrument Dimensions (WxHxD) | | 25.8 cm x 10.3 cm x 32.4 cm |
| Instrument Weight | | 4.3 kg |
| Shipping Dimensions (WxHxD) | | 55.9 cm x 50.8 cm x 47.0 cm |
| Shipping Weight | | 8.1 kg |
| Recommended Recalibration Period* | | 12 months |

* 12-month recommended re-calibration period is calculated based on normal operating conditions. Normal operating conditions is defined as 10 full range scans up or down per day.



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## 2.2 Warranty Information

Primawave Photonics, Inc. warrants this product to be free of defects in material and workmanship for a period one year from date of shipment. Any defects, resulting from improper or inadequate maintenance by customer, customer-supplied software or interfacing, unauthorized modification or misuse operation outside of the functional performance and/or the environmental specification for the product, or improper site preparation or maintenance, are not covered by this warranty.

During the warranty period, Primawave Photonics, Inc. will, at its option, either repair or replace any product that proves to be defective. To exercise this warranty, contact the service department at Primawave headquarters.

Customers are required to fill out an RMA request form. An RMA number with instructions for return of unit will be issued. Send the instrument in its original shipping package, freight prepaid, to a Primawave designated service center. If for reasons that the original shipping package is no longer available, carefully package the unit in an impact resistant manner conforming to standard commercial shipping guidelines for electronic instruments. If specific packaging instructions are required, contact Primawave's customer service department. Primawave will not be responsible for any shipping damage incurred during the return shipment of an RMA item.

Repairs will be made or a replacement unit will be provided. Instrument will be sent freight prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days. Replacement units will receive full warranty.

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# 3. GETTING STARTED

This section provides procedural instructions for inspection of product and requirements for use.

## 3.1 Unpacking and Inspection

Primawave certifies that all units leaving its manufacturing facility have been carefully inspected, mechanically, electrically and optically prior to shipment. Inspection for shipment content is also performed. A list of the enclosed items can be found in section 3.3. Upon receipt of shipment, customer is requested to inspect each item. In the event of damaged instrument or missing accessory parts, write or call Primawave Customer Service Department in Fremont California. Retain a record of all shipping documents. Save original shipping carton in case re-shipment is required for any reason.

## 3.2 Damage in Shipment

If the instrument arrives damaged, customer is required to do the following:

1) Report the damage to shipping carrier immediately.
2) Inform Primawave Customer Service Department.
3) Save all shipping cartons and documents.

All instruments are sold under standard F.O.B. Fremont factory terms. Upon request by customer, Primawave can procure shipping insurance at additional cost to customer. For insured shipment, failure to follow these procedures may result in the decline of customer's claim for compensation.

## 3.3 Standard Contents

1 Model TLS56P1N Tunable Laser Source
1 AC Power Cord
1 User's Manual
1 Quality Certificate

## 3.4 Preparation for Use

The TLS56P1N Tunable Laser Source is shipped ready for use. The instrument is powered from the AC power cord.



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# 4. SYSTEM OPERATION

This section provides a detail description of the functions available with the TLS56P1N. Refer to the following table of listing of action keys with their associated setting parameters.

**Table 4-1 Summary of Setting Parameters**

| SETTING | DESCRIPTION | PARAMETER | SECTION |
|---|---|---|---|
| LD Current "I" | Constant current mode | 20mA ~ 110mA | 4.3 |
| PD Current "P" | Constant power mode | 20μA ~ 120μA | 4.4 |
| Wavelength "λ" | Wavelength setting | 1510nm ~ 1590nm | 4.5 |
| GPIB Address | GPIB address | 0 ~31 | 4.9 |

## 4.1 Power-Up

The internal power supply of the Model TLS56P1N operates from an AC line voltage in the range of 110V~120V AC 50-60Hz.

**WARNING**

**Ground the instrument through a properly earth grounded receptacle before AC operation. Failure to ground the instrument can result in severe injury or death in the event of short circuit or malfunction.**

The power ON/OFF switch operates on the rocker principle. The ON/OFF switch is located on the back panel. The instrument is turned on when the upper portion of the rocker switch is pushed. The switch will be internally lit when the unit is in the on position. The instrument is turned off when the lower portion of the switch is pushed.

After the power has been turned on, the fan in the rear of the unit should start up and remain in operation at all times when the power is on. The "LOC" indicator light on the front panel should be lit indicating that the instrument is under local control. This is the start up default mode. The LED display window will list the following messages in sequence:

**TLS56P1N**
**λ>=1510 nm** **λ<=1590 nm**
**GPIB** **Address=7**
**System** **Init.....**
**Init λ.....**
**λ=XXXX.X nm** **T=25°C**

Factory preset for GPIB Address is "7". The wavelength ("λ") reading shown is the wavelength setting if current to the laser diode is turned on. The temperature ("T") reading shown is the actual internal temperature. This reading will fluctuate as the unit works to reach a preset temperature setting of 25°C.

The instrument requires a minimum of 5 minutes for internal temperature stabilization after power has been turned on. It is recommended that user allows



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the unit to reach temperature equilibrium at between 24°C to 26°C before turning on the laser diode.

## 4.2 Optical Output Connection

The TLS56P1N is equipped with a surface mount FC/APC receptacle for easy connection to standard single mode fiber terminated in FC/APC connector. A rubber cap is provided to keep the receptacle free of dust when the instrument is not in use. Note that for optimal performance, the fiber pigtail tip of FC/APC connector should be carefully cleaned before connection to the receptacle.

## 4.3 Constant Current Mode

After initial warm up time, the laser diode (LD) is ready to be turned on. To set the current level to the laser diode, press the ***func*** key to reach the screen displaying "I=0mA". Enter desired current setting and press ***enter*** key to confirm selection. The range allowed for selection is 20mA to 110mA. For example, setting the LD current to 80mA can be achieved by entering ***8...0...enter*** or ***0...8...0...enter***.

After the ***enter*** key is pushed, the LED screen will read "I set!" for a short duration and the screen will revert to displaying the actual LD current applied. Note that the "I" set value is displayed only during the entering of the setting. In all other instances, the "I" value displayed is the actual current supplied to the laser diode. The actual current supplied to the laser diode may be ±1mA from set value.

The displayed current "I" will read 0mA when the laser diode is turned off. To turn on the LD, push the ***I*** key on the keypad. The current setting previously entered will be the setting parameter for the amount of current supplied to the LD. To see the actual current supplied to the LD, press the ***func*** key until the LED shows the "I" value. User may be required to push the ***func*** key up to 6 times to reach the desired display window.

Current "I" setting can be changed with the LD turned on or off. When main power is turned off, "I" is reset to 0mA setting upon powering up and the LD current is off.

Note that if a "I" setting outside the preset range is entered, the following message will be displayed "I > Max!". Clear the setting by pressing ***esc*** key and re-enter a new setting within the allowable range.

## 4.4 Constant Power Mode

The TLS56P1N can be set in a constant power mode. Internally, the instrument is equipped with a photo detector feedback system sampling a fixed percentage of the output light. The photo detector converts the sample output light into a current reading. This current reading has a direct correlation to the output power of the laser diode. If the photo detector remains at a constant level, the laser output power will also be stabilized. User can prescribe a current setting for the photo detector and the instrument will automatically adjust the LD current to reach and/or maintain the photo detector setting.

To activate constant power mode, current to the laser diode (LD) must be turned on. The "I" indicator light on the front panel will light up when the LD is on. Push the ***func*** key to reach the Photo Detector "P" setting window. Enter desired power



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setting and press ***enter*** key to confirm selection. The range allowed for selection is 20μA to 120μA. For example, setting the PD current to 80μA can be achieved by entering ***8...0...enter*** or ***0...8...0...enter***.

After the ***enter*** key is pushed, the LED screen will read "P set!" for a short duration and the screen will revert to displaying the actual PD current setting. The "P" indicator light on the front panel will be lit. Note that the "P" set value is displayed only during the entering of the setting. In all other instances, the "P" value displayed is the actual current read from the photo detector. The actual PD current may be ±5μA from set value.

To turn off the constant power mode and revert back to constant current mode, user is required to enter a constant current setting following procedures outlined in section 4.3. Note that PD current reading will read "P=Low" when the LD is turned off or the "I" setting is at 0mA or if the actual PD current reading is <5μA.

Note that if a "P" setting outside the preset range is entered, the following message will be displayed "P > Max!" or "P < Min!". Clear the setting by pressing ***esc*** key and re-enter a new setting within the allowable range.

Note that if a "P" setting is not attainable within the allowable "I" maximum current limit (see Table 4-1), then the following message will be flashed "P=xxx/I Limit!". The "xxx" value for "P" will be actual PD current value at maximum "I" current. To remedy this situation, enter a "P" setting smaller to the flashing actual "P" value.

## 4.5 Automatic Wavelength Tuning

To tune the laser output to a particular wavelength, push the $\lambda$ key to the Wavelength (λ) setting window. Alternatively, pushing the ***func*** several times can also reach the same setting screen. This function can be performed with the LD on or off. Enter desired wavelength setting and press ***enter*** key to confirm selection. The wavelength range allowed for selection is listed in specification section Table 2.1 under "Wavelength Tuning Range". For example, tuning the wavelength from 1550.0nm to 1565.5nm can be achieved by entering ***1...5...6...5...5...enter***. After the ***enter*** key is pushed, the LED screen should read in sequence the following:

**λ=1550.0** **New λ. . .**
**λ=1565.5** λ **set!** (short duration) **/ [previous display screen]**

The inputting of new "λ" setting is entered on the right hand LED window. The actual wavelength "λ" is displayed on the left hand LED window. Note that the wavelength "λ" set value is displayed only during the entering of the setting. In all other instances, the " λ" value displayed is the actual wavelength of the output laser on the left hand LED window. The actual wavelength displayed may be ±0.05nm from set value. Note that the last wavelength setting reached before powering off will be the initial wavelength setting when the unit is turned on the next time.

Note that if a wavelength setting outside the preset tuning range is entered, the following message will be displayed "Wrong λ!". Clear the setting by pressing ***esc*** key and re-enter a new setting within the allowable range.



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## 4.6 Manual Wavelength Tuning

The TLS56P1N can also be manually tuned using the secondary function of the following keys on the keypad:

***1/BF***- Backward Fine
***3/FF***- Forward Fine
***4/BC***- Backward Coarse
***6/FC***- Forward Coarse

To manually tune the laser output to a particular wavelength push the ***func*** key to the manual wavelength setting window. The LED display window should read "<Manual>". Under this window selection, user can push the 4 keys listed above to manually tune the laser to the desired wavelength. The LED display on the left hand will change correspondingly once a new wavelength is reached. The smallest incremental change displayed is 0.1 nm.

## 4.7 Scanning

The TLS56P1N has a built-in scanning function. With the main power on, press the ***func*** key to reach the "Scan" function selection screen. Then press ***enter*** to activate this function. This will command the unit to perform a full range of coarse tuning. For example if the unit is set at 1550.0nm, activating this function, will result in the unit tuning from 1550.0nm to lower wavelength range, back up to the upper wavelength range and return to 1550.0nm. Typically, a full range scan takes 50 seconds. During scanning, the LED window will be display the message "Scan....".

## 4.8 Local/Remote Control

Upon powering up, the TLS56P1N is in default local control. To set the unit into remote control, connect the TLS56P1N with the remote control unit via GPIB interface. Physical cable connection is done through a IEEE-488 connector located on the rear panel. A command sent from the remote control unit will automatically switch the TLS56P1N into remote control mode. The "LOC" indicator light is turn off and one of the following indicator lights will be lit instead, "SRQ", "LSN" or "TLK". The keypad on the front panel will become disabled. To return the TLS56P1N back to local control, press the ***local*** key once. The "LOC" indicator light should once again be lit and the other GPIB indicator light should all be off.

## 4.9 GPIB Address

The TLS56P1N is encrypted with 32 GPIB address designations enabling the differentiation of distinct terminal instruments by a central control unit. To set the TLS56P1N to a particular address, push the ***func*** key to the GPIB address setting window. The right hand LED window should read "GPIB=X". Enter the desired address setting and press ***enter*** key to confirm selection. The address range allowed for selection is 0~31. For example, setting GPIB address to 5 is achieved by entering ***5...enter*** or ***0...5...enter***. After the ***enter*** key is pushed, the right hand LED screen will read "GPIB set" and will revert to displaying the actual GPIB address set.



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To see the previously set GPIB address, press the ***func*** key repeatedly until the GPIB window comes up again. The window should display the address that was last entered. Note that if an address setting outside the preset tuning range is entered, the following message will be displayed "Err GPIB". Clear the setting by pressing ***esc*** key and re-enter a new setting within the allowable range.

## 4.10 Alarm

Under the following conditions the "ALARM" indicator light will flash and the instrument will become disabled:

a. LD current "I" exceeds maximum allowable limit (see Table 4-1) under normal operation. Under this condition, the unit will become inoperative and the message "Turn Off Alarm!/I Limit" will appear on LED display.
b. Temperature "T" exceeds 35°C under any mode of operation. Under this condition, the unit will become inoperative and the message "Turn Off Alarm!/T>35°C" will appear on LED display.

Under either condition, the current to the LD is shut off automatically to prevent damage to the laser diode. User is required to reset the unit. To reset the instrument, turn off the main power and turn the unit back on.

In the case of "I" exceeding maximum limit, operate the unit under constant current mode to make sure that the unit is functioning properly. Recommended "I" setting is 50mA. If the unit persists to go into alarm under proper operating procedure, it is recommended the user contact our service department for technical support.

In the case temperature exceeding 35°C, restart the unit in an environment free of direct sunlight with ambient temperature <40°C. Also check to make sure that the fan at the rear is functioning properly.

**Table 4-2 Summary of Error Messages**

| ERROR MESSAGE | DESCRIPTION | REMEDY | SECTION |
|---|---|---|---|
| "I > Max!" | Laser diode setting exceeding allowable range | clear selection by press *esc* key and re-enter allowable selection | 4.3 |
| "P > Max!" | Photo detector setting greater than upper allowable range | clear selection by press *esc* key and re-enter allowable selection | 4.4 |
| "P < Min!" | Photo detector setting less than lower allowable range | clear selection by press *esc* key and re-enter allowable selection | 4.4 |
| "I Limit!" | Photo detector setting is not attainable at this particular wavelength | enter a lower "P" setting | 4.4 |
| "Wrong λ!" | Wavelength setting beyond allowable range | clear selection by press *esc* key and re-enter allowable selection | 4.5 |
| "Err GPIB" | GPIB address setting exceeding allowable range | Clear selection by press *esc* key and re-enter allowable selection | 4.9 |
| "Turn Off Alarm!/I Limit" | Laser diode current exceeding maximum limit | Turn off main power and restart unit | 4.10 |
| "Turn Off Alarm!/T>35°C" | Instrument exceeding maximum working temperature | Turn off main power and restart unit | 4.10 |
| "Error!/Inti/MTR!" | Cannot initialize motor at start up | Turn off main power and restart unit | 4.1 |
| "Error!/Range!" | Cannot find specified wavelength | Clear entry and input another wavelength | 4.5 |



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# 5. GPIB COMMANDS

## 5.1 List of GPIB Commands

### Command *STB?

**Return value** 0 – Ready
1 – Motor busy
2 – Can not initialize motor
4 – Fail to find specified wavelength
**Description** To get motor busy status while unit is setting new wavelength, use **ibrsp** serial poll command.

### Command *TST?

**Return value** 0 – OK
1 – LD current over limit (100mA)
2 – Temperature over 35°C
3 – Motor error
4 – Fail to find specified wavelength
**Description** This command does exact the same as **SCAN** does, and returns test result.
**See Also** WAV:SCAN

### Command ERR?

**Return value** 0 – OK
1 – LD current over limit (100mA)
2 – Temperature over 35°C
3 – Motor error
4 – Fail to find specified wavelength
**Description** This command returns system error code.

### Command LAS:LDI

**Syntax** LAS:LDI [Current value in mA]
**Example** LAS:LDI 50
This command sets unit to constant current mode and sets Laser Diode current to 50mA.
**Return value** None
**See also** LAS:LDI?, LAS:MDP, LAS:MDP?, LAS:OUT



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## Command LAS:LDI?

**Return value** LD current value
**See also** LAS:LDI, LAS:MDP, LAS:MDP?, LAS:OUT

## Command LAS:MDP

**Syntax** LAS:MDP [PD current value in μA]
**Example** LAS:MDP 100
This command sets unit to constant power mode and sets Photo Detector current to 100uA.
**Return value** None
**See also** LAS:LDI, LAS:LDI?, LAS:MDP?, LAS:OUT

## Command LAS:MDP?

**Return value** PD current value
**See also** LAS:LDI, LAS:LDI?, LAS:MDP, LAS:OUT

## Command LAS:MODE?

**Return value** I – Constant current mode
P – Constant power mode
**See also** LAS:LDI, LAS:LDI?, LAS:MDP, LAS:MDP?

## Command LAS:OUT

**Syntax** LAS:OUT [Enable/Disable]
**Example** LAS:OUT 0
This command turns off LD current.
LAS:OUT 1
This command turns on LD current.
**See also** LAS:LDI, LAS:LDI?, LAS:MDP, LAS:MDP?, LAS:OUT?

## Command LAS:OUT?

**Return value** 0 - LD current off.
1 – LD current on.
**See also** LAS:LDI, LAS:LDI?, LAS:MDP, LAS:MDP?, LAS:OUT



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## Command TEC:T?

**Return value** Current temperature in centigrade.

## Command WAV:BC

**Description** Backward coarse tuning 1nm
**See also** WAV:BF, WAV:FC, WAV:FF

## Command WAV:BF

**Description** Backward fine tuning 0.2nm
**See also** WAV:BC, WAV:FC, WAV:FF

## Command WAV:FC

**Description** Forward coarse tuning 1nm
**See also** WAV:BC, WAV:BF, WAV:FF

## Command WAV:FF

**Description** Forward fine tuning 0.2nm
**See also** WAV:BC, WAV:BF, WAV:FC

## Command WAV:SCAN

**Description** This command first scan wavelength forward to the maximum wavelength supported by TLS56P1N, then scan backward to the minimum wavelength, and goes back to original wavelength point at last.
**See also** WAV:BF, WAV:FC, WAV:FF

## Command WAV:SET

**Syntax** WAV:SET [wavelength]
**Example** WAV:SET 1550.0
This command sets wavelength to 1550.0 nm.

**See also** WAV?



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## Command WAV?

**Return** Current wavelength
**See also** WAV:SET



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