



Cercis, Inc.

Model 610 Optical Power Meter with Data Logging

Putting Light to the Test

Cercis 610 Series Data Logging Optical Power Meters are full-feature hand-held instruments which can store and recall up to 1000 separate data records—containing unique user-assigned label, power reading, reference value, calibration wavelength, operating mode, date and time—in the instrument's non-volatile memory. The RS232 port on the side of the instrument allows stored data to be printed or downloaded to a PC using LabView[®], Visual C++[®] or Basic[®] software, & permits remote operation—automating tedious measurements.

The 610 combines a state-of-the-art microprocessor with a graphic display. Operation is simple with five menu keys: ON/OFF, START, C, \blacktriangle and \blacktriangledown . A menu, submenu and list allows the user to label, store and recall measurements as needed. Cercis OPMs utilize a quick-connect fiber optic connector interface. All models are supplied with one adaptor (default 2.5 mm universal); others available separately.

Operating Manual



If you can use a cell phone, . . . you can operate the 610 power meter.

Menus, submenus, and lists access all features.



Features

- All Features Accessible via Menu, Submenu & List
- 3 Modes: nW, μ W, mW, dBm & dB with Relative Store
- Input Range: +5 to -70 dBm (varies by detector type)
- Digital Calibration (up to 8 calibration points per meter)
- Easily Readable Graphic Display, adjustable contrast
- >50 hours 9 V Battery Life
- Ergonomic, Tactile Rubber Keys
- Interchangeable Fiberoptic Connector Adapters
- Protective Holster with Pedestal, Tethered Dust Cap

Key	Option	Description
ON/OFF	Power on/off	Turn optical power meter on or off
Start \blacktriangle	Menu Select Submenus	Wavelength Calibration Mode dB, dBm nW, μ W, mW Data Logger Store Recall System Shutoff C Key
C	Data Store / Cancel	Display power, store, recall, mode, wavelength, scanning
\blacktriangle \blacktriangledown	Navigate	Scroll up or down through submenu or list

BOLD-type Standard Optical Power Meters

Model	Units	610g	610i	610iH	610s
Detector Type		Germanium (3 mm)	InGaAs (2 mm)	InGaAs (2 mm)	Silicon (3.5 mm)
Power Range	dBm	+5 to -60	+5 to -70	+23 to -45	+6 to -60
Calibrated Wavelengths	nm	850/1310/1550	850/1310/ 1550/1625	980/1310/ 1480/1550/1625	630/780/ 850/980
Absolute Accuracy / Resolution	dB	Accuracy +/- 0.25		Resolution +/- 0.01	
LCD Graphic Display	-	View 46 X 18.5 mm; 98 X 32 pixel; blue characters, background reflective gray, contrast adjustable, backlight not required. Display incorporates 3 distinct annunciators: nW , μW , mW (auto-ranging) dB & dBm ; + BAT (Low Bat) and LOW / OVL (power too low/too high).			
Function	W dBm dB	nW, μ W, mW (autoranging) dBm (absolute power) dB (relative power)			
Connector Interface		See list reverse side; interchangeable bayonet click-on/off mate/remate			
Power	V	Requires one 9 Volt alkaline battery (>50 hrs. battery life) or optional 120 V AC 9V adaptor (negative center) or 90—264 V AC, 47-63 Hz interchangeable 9V adaptor.			

Visual Basic and Visual C++ are registered trademarks of Microsoft; LabView is a registered trademark of National Instruments.

Specifications subject to change without notice.



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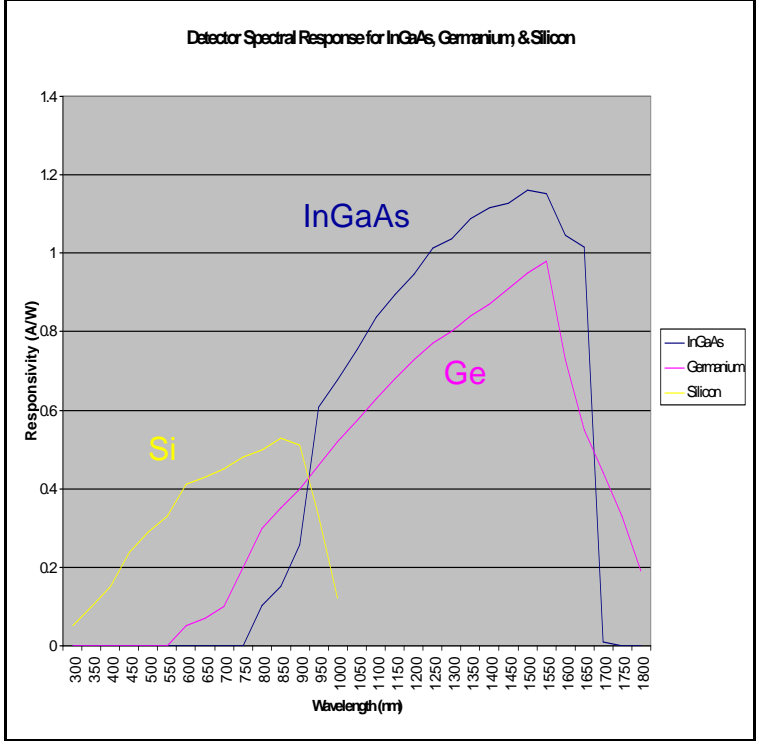
Part Number	Adapter Type Description
101	Universal 2.5 mm Adapter <small>(default supplied w/ meter)</small>
102	FC Adapter
103	ST Adapter
104	SC Adapter
105	LC Adapter
106	SMA 905/906 Adaptor
107	MU Adapter
110	Universal 1.0 mm Adapter



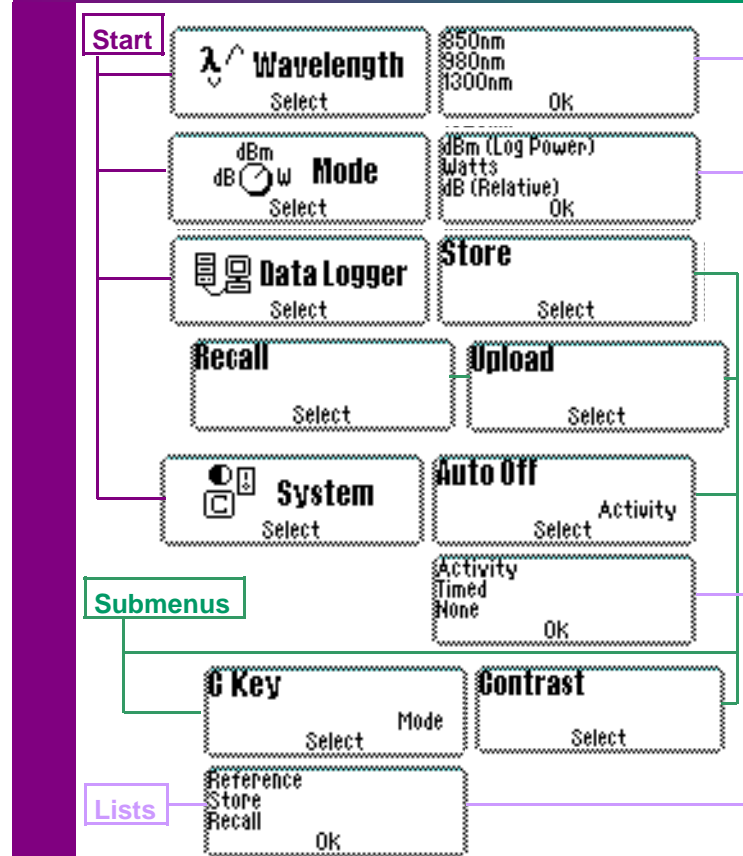
Part Number	Description
610i-40-1NA	610i 2mm InGaAs Power Meter
610iH50-1NA	610iH 2 mm High Power InGaAs OPM

Responsivity vs. Wavelength

Model 610g (Ge), Model 610i, 610iH (InGaAs), Model 610s (Si)



Menus, Submenus & Lists



Information

Calibration
 All Cercis Optical Power Meters are calibrated using procedures and equipment traceable to the US National Institute of Standards & Technology (NIST).

Holster for Additional Protection and Convenience
 Included with every instrument is a removable protective housing. This molded silicon shell protects against shock in the field, and has a pivoting bale to hold the instrument upright when required. Also, there are holes for a wrist or neck strap.

Operational & Mechanical Data

Temperature Range Operating	C	-10 C to +50 C
	(F)	(20 to 50 F)
Storage	C	-35C to +70 C
	(F)	(20 to 50 F)
Dimensions Instrument (with battery)	mm	Width X Length X Height 70 X 125 X 25 mm
	(in.)	(2.75 X 5 X 1 in.)
Instrument w/ Holster		75 X 130 X 40 mm (3.00 X 5 X 1.5 in.)
Weight Instrument (with battery)	g	241 g (7.6 oz.)
	(oz.)	Shipping Weight 545 g (12.4 oz.)



610 Optical Power Meter Front Panel Features / Description

1 Optical Input
with Interchangeable Adapter
Use Cercis PM1XX Adapters Only

2 Graphic Display
Shows measured power (loss) and calibrated wavelength + ABS (absolute measurement) or REF (reference set)

3 Power Key
Startup Menu—Cercis + Software & Firmware Versions then to std display
Hold Down to Select No/Auto/Times Shutoff during startup; release at desired shutoff

4 Start > Key
Accesses Menus and Submenus—
Push Start to Select

5 C Key
Shortcut Key— set many operations; also used to cancel operations

6 Scroll Up ^ Key

7 Scroll Down v Key
Scroll through Menus; press Start to select.
Scroll through Submenus; press Start to

8 AC & RS232 Ports
Connect center-negative AC power supply and/or serial cable to enable external control

610 Power Port: 9 VDC Regulated 1.3 mm, Center Neg

Data Send & Receive

Ground

2 Rx Data

3 Tx Data

5 Ground

DB9 (Male) To PC

Included with Each 610 Optical Power Meter

The following accessory items are included with each 610 OPM:

- One (1) interchangeable adapter (choose 1 from list on Page 2)
- One (1) RS-232 shielded cable 3 ft. length, DB9 (female) to 3.5 mm (male) center negative.
- One (1) instruction manual (available @ www.cercis.com/610OpMan.PDF)

Adaptors

Standard SC, FC, ST, LC, SMA & 2.5 mm universal precision-machined stainless steel interchangeable connector adaptors are available, which simply click-on/click-off. To re-tension the adaptor after use, pinch it between you thumbs. This will tighten the adaptor slot around the locking pin.

Holster for Additional Protection and Convenience

Included with every instrument is a removable protective housing. This molded silicon shell protects against shock in the field, and has a pivoting bale to hold the instrument upright when required. Also, there are holes for a wrist or neck strap.

Cleaning the Power Meter Optical Port

Pull off the adapter from the detector adapter mount. Clean the detector glass with optical-grade alcohol and lint-free wipes, then replace the adapter. Do not scratch the detector window.

Connector Interface Cleaning / Dustcaps

It is important that the connector interface be kept clean and free of contamination. Prior to insertion of any connector into the power meter optical port, proper cleaning of the connector should be done to industry-standard procedures. To prevent contamination, the dust cap should cover the adapter when OPM is not being used.

Battery Replacement

Note: Removal of the battery will require the clock to be reset.

Turn the OPM off; remove the power meter from its holster. Slide off battery compartment cover located at the back of the OPM. Remove the old battery and replace with a new one following the diagram embossed at the bottom of the battery compartment. Replace the battery compartment cover and holster.

Calibration & Maintenance

All Cercis Optical Power Meters are calibrated using procedures and equipment traceable to the US National Institute of Standards & Technology (NIST). The optical power meter should return to Cercis at regular intervals for recalibration;.

Kits / Carry Case

Cercis light sources & power meters can be combined in kits, including Optical Power Meter & Light Source, plus accessories such as fault finder, optical or AC adapters, batteries, cables, cleaners, etc.

Start

Menu

Wavelength
Select

Mode
Select

DataLogger
Select

System
Select

Submenus

850nm
980nm
1300nm
OK

dBm (Log Power)
Watts
dB (Relative)
OK

Store
Select

Recall
Select

Upload
Select

Print
Select

Label
Select

Clear
Select

AutoOff
Select

C Key
Select

Contrast
Select

Clock
Select

Memory
Select

Lists

Labels LBL079
NEXT

All Selected
OK

None Timed Activity
OK

Mode Reference Wavelength
Store Recall

Set Contrast
OK

May 01 2003
04:26:35 PM
NEXT • FINISH

Free Cleanup
OK

Records Available Repack
OK

Print or PC Upload from Cercis 610

To upload data from the 610 to a printer or PC, you can use either the UPLOAD or PRINT options under the Datalogger menu.

To UPLOAD, use the Windows Hyper Terminal (under the Accessories / Communications files). This will upload all the records into a comma delimited fields & carriage return delimited ASCII text which can then be imported into any spreadsheet program, such as Microsoft Excel. Connect the 610i to the PC via the RS232 cable provided by Cercis.

The PRINT option will display the same data as above formatted for an RS232 printer. Connect the 610i to the printer via the RS232 cable provided by Cercis.

Uploading or printing of the records will not clear them from the memory. To CLEAR, select CLEAR under the datalogger menu, then select All or Selected.

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On/Off Depress key & release at NO AUTO, TIMED, or ACTIVITY SHUTOFF Press to Select

Start ↑ Press to Select Menus / Submenus

C Data Store / Cancel

↑ ↓ Navigate through Submenus or Lists

LOW / OVL Low / Overload Power "BAT" Low Battery Warning

Serial No:
Part No:
NIST Cal:
Traceable Due:

The label shown at left is on the back of each **Cercis** Optical Power Meter. Included are brief operating instructions, annunciator meanings, unique serial number, **Cercis** part number, the calibration date and recalibration due date.

Thank you for purchasing a **Cercis** Model 610 Optical Power Meter.

Limited Warranty
Cercis makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that the product be free from defects in materials and workmanship: 1 year limited warranty (unless otherwise specified)
Warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, repairs or alternations made outside our facilities or to a lack of maintenance. Cercis limits all implied warranties to the period specified above from the date the product was purchased. Except as stated herein, any implied warranties of merchantability and fitness are excluded. Cercis shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damage arising from the use of its products. To take advantage of this warranty, the product must be approved for return for examination, postage prepaid, to Cercis. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection discloses a defect, Cercis will either repair or replace the product with a product of equal or higher performance. If it is determined that the defect resulted from causes not within the scope of Cercis warranty, then the purchaser must bear the cost of repair and return shipping. 9/03MAN610 Rev. 0

Depress Start Key to access Menus; use \uparrow or \downarrow keys to scroll through the menus Wavelength, Mode, Datalogger, and System.

Wavelength: All pre-programmed calibrated wavelengths available on the particular power meter will appear in the submenu. The \uparrow or \downarrow keys allow the user to scroll through the lists; the desired (highlighted) wavelength may be selected by pressing the Start key

Wavelength can also be changed from the main display by pressing the scroll \downarrow down key.

-32.28 dBm ABS 1550nm	\downarrow Key to Change Wavelength	-32.28 dBm ABS 1625nm
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Standard calibrated wavelengths are established for each detector type. The customer can specify up to 8 custom calibration wavelengths within the detector spectral response range per instrument.

Mode: Select desired measurement (dB, dBm, or autoranging n/ μ /mW) by pressing Start when desired readout is highlighted. From the main display, mode also can be changed by pressing scroll \uparrow up key.

-32.28 dBm ABS 1550nm	\uparrow Key to Change Mode	-0.02 dB -32.28dBm 1550nm
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DataLogger: Scroll through Store, Recall, Upload, Print, Label, and Clear Submenus. Highlight desired function and press Start to select or C to cancel.

- Store:** Store up to 999 records in non-volatile memory.
- Recall:** Recall a record either as list of 3 readings (Label + reading) or detail (all saved data). See sample below.
- Upload:** Upload to a PC (comma delimited listing of records with CR (carriage return) and line feed separating records).
- Print:** Print a record when connected to a PC or printer. (Outputs same data as Upload, but formatted for printer (*No Flow Control*)).
- Label:** Enables user to change alphabetical designation for all subsequent measurements (LBL001 \rightarrow ABC001). See sample below.
- Clear:** All (clears all records in non-volatile memory) or Selected (shows records by alpha-numeric label; user may highlight undesired records and delete them). Similar to Recall or a record.

Recall List	LBL001 -32.28dBm LBL002 -22.46dBm LBL003 * -16.37dBm Page 1	\uparrow or \downarrow to scroll each record	LBL004 -5.27dBm LBL005 -11.66dBm LBL006 * -21.36dBm Page 1
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If there are several records in memory, press Start to set scroll mode to 1, 3, 10 or 100 records per scroll (display will read Page 1, 3, 10 or 100). Use \uparrow or \downarrow to scroll. When closest to desired record, press Start to decrease scroll mode increment, then \uparrow or \downarrow to highlight (*) desired record.

Example— If you are at the first record with 300 stored records, and you want to find record 275: Press Start 4X to set scroll mode to 100 records/scroll (Page 100), then use \downarrow to scroll to record 300. Re-press Start to decrease scroll mode to 10 records/scroll (Page 10). Then press \uparrow to reach record 270. Re-press Start again to increment at 1 record & use \downarrow to highlight (*) 275.

Note—Records stored with first at the top of the page, last numbers at the bottom.

Recall List (Scroll)	LBL007 -32.28dBm LBL008 -22.46dBm LBL009 * -16.37dBm Page 3	Start key for scroll mode	LBL028 -5.27dBm LBL029 -11.66dBm LBL030 * -21.36dBm
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To recall the details of a highlighted record, select Details submenu. Press start to change data shown from date & time to mode and λ .

Recall Details (* Label)	LBL 275 275/300 -32.28 dBm 02:13:46 PM May 5, 2003	Start key to change last line	LBL 275 275/300 -32.28 dBm ABS 1550 nm
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The alphanumeric label can be reset to operator initials or abbreviation, by selecting Label submenu, then pressing Start. The default LBL will appear, with first L flashing. To change from LBL to ABC, \downarrow to A, and press Start. B flashes, press Start to set B, and Start and \downarrow again to reset last L to C. The numeric will reset to 000 and each stored record will be sequentially numbered: ABC000, ABC001, etc., until Label is again modified.

LBL000 Next	\uparrow or \downarrow to change 3- char alpha	ABC000 Finish
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System: Select AutoOff, C-Key, Contrast, Clock or Memory.

Auto Off: Choose NO, TIMED, or ACTIVITY SHUTOFF by pressing Start when highlighted. This can also be set by holding the ON/OFF key during startup

NO AUTO SHUTOFF will disable the power saver feature and the power meter will not shutoff until (unless) the battery discharges or ON/OFF is pushed.

TIMED SHUTOFF will automatically shutoff the power meter if it is unused for ~15 min. Depress any button within the 15 min. interval to restart timer

ACTIVITY SHUTOFF will shut down the power meter if there is no power fluctuation >1 dB within ~15 min.

C-Key: The C-Key allows the user to create short-cuts for various power meter functions. For example, set a short cut for wavelength to quickly change between calibrated wavelengths by pressing C.

Mode: Set dBm; dB (relative) or autoranging n/ μ /mWatts

Reference: Set a reference (in dB).

Wavelength: Select calibrated wavelength

Store: Store a record

Recall: Recall a record

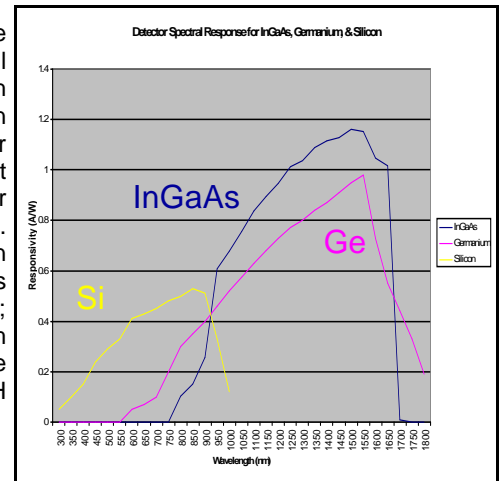
Contrast: Lighten or Darken the contrast of text to the background of the screen by using \downarrow to lighten or \uparrow to darken.

Clock: Use this function to set date and time. First, month flashes, use \uparrow or \downarrow keys to scroll until correct month is highlighted; depress Start to set. Next, day will flash until Start is depressed at correct day. Then Year 20 XX will flash until digits are set by pushing Start. Next hour, then minute, then second then AM (1) or PM (2) may be selected sequentially by pressing Start at each desired choice.

Memory: Choose Free or Cleanup which will list Records Available (number of records used subtracted from 1000) or Repack (removes any deleted records and repacks them in memory).

Spectral Range

The graph shows the typical spectral response of each detector type used in **Cercis** optical power meters. Select the unit with best response for the input source. Model 610s is Silicon (Si); 610g is Germanium (Ge); Model 610i is Indium Gallium Arsenide (InGaAs); Model 610iH is filtered InGaAs.



Calibration and Maintenance

Each **Cercis** optical power meter is calibrated to NIST traceable standards. The optical power meter should be returned to **Cercis** on an annual basis for recalibration. Call, fax, or EMAIL **Cercis** for recalibration return instructions.



Programming for Remote Operation

1.0 Overview

The Model 610 programming interface enables the user to remotely control the instrument using a PC. The interface operates using standard RS-232 serial bus ASCII text communications. It is compatible with DOS, Windows, Mac or Linux operating systems.

Software to control the 610 can be easily programmed using various programming platforms such as Microsoft Visual Basic[®], or Visual C++[®], and National Instruments Labview[®] or any programming language allowing ASCII text communications over the PC hardware RS-232 serial bus. The programming interface includes a full set of commands to allow the user to control the instrument and obtain various system configuration information and measurement results.

1.1 Communications Protocol

The 610 hardware RS-232 serial port is a 3 wire implementation using the RxD, TxD and GND pins of the standard RS-232 interface. All communications flow control handshaking is performed in software by the programming interface.

The serial communication parameters are fixed at values as follows:

BAUD RATE, 9600 DATA BITS, 8 STOP BITS, 1

PARITY, none FLOW CONTROL, none

These COM port parameters should be setup using either the operating system or programming language commands.

All communications to and from the 610 are by ASCII text string commands, parameters and returned values. Commands, parameters and return values are terminated by a RETURN character, CR (ASCII 13 decimal, 0D hexadecimal). After a command is received, the 610 will prompt for any required parameters by sending a “?” character. The program must wait for the prompt before sending each parameter. If an error is encountered at any time, the 610 will send the appropriate error code (see Table A) and terminate the command. After a command is successfully completed, the 610 will return “OK”; a new command may then be issued.

The 610 contains an internal hardware receive buffer which is 10 bytes long. All commands and parameters must be 10 bytes or less (including the terminating CR) or a buffer overflow may result.

All commands and parameters must be received by the 610 within a user programmable timeout period. This timeout period defaults to approximately 3 seconds at power on, but may be changed by issuing the TMO command. If a command or parameter is not received within the timeout period, a “TIMEOUT ERROR” code is returned and the command is terminated.

It is important to send commands and parameters quickly, because while the 610 is waiting for commands or parameters, the instrument is not acquiring power meter readings. Also, the control program should avoid continuous polling of the 610 as this will not allow the power meter to be updated.

Below is an example of a typical command and return sequence which illustrates sending the GWA (get wavelength number) command/parameter and receiving a response. In the example, (CR) is the RETURN character (ASCII 13 decimal, 0D hexadecimal), the text after and including the “;” is a comment only for explanation and should not be part of the program. The returned information is dependent on the wavelengths calibrated in the instrument in position #1 and may be different.

```
Send:    GWA (CR)           ; GWA get wavelength number command
Receive: ?                  ; request wavelength number
Send:    1(CR)              ; send wavelength #1 parameter
Receive: 850nm:(CR)        ; 1st wavelength info
Receive: OK(CR)           ; command completed
```

The following is a GWA command where the parameter send is for an invalid wavelength number (9). The 610 replies with an error code and terminates the command.

```
Send:    GWA(CR)           ;GWA get wavelength number command
Receive: ?                  ;request source # parameter
Send:    9(CR)              ; send wavelength #9 parameter
Receive: E108(CR)          ; error #108 invalid wavelength
```

The following table lists all the standard Error codes and explanations. There may be additional error codes available if the instrument has been customized for added features; see any added appendices.

1.2 Command Set Descriptions

Following is a list of all commands including command name, command mnemonic, number of parameters, parameter name, parameter type, parameter range, command description and command example. Table B describes all Command Codes by Function; Table C includes Command Codes by Alphabetical Order.

Table A Error Codes

Code	Error	Description	Code	Error	Description
E100	Null Error	Internal use	E106	Buffer Overflow	Secondary receive buffer overflow
E101	Error None	Internal use	E108	Wavelength Unavailable	Wavelength number present
E102	Unrecognized Command	Command not recognized	E109	Invalid Mode	Power meter mode is not valid
E103	Command Syntax	Command syntax error	E110	Timeout Error	Serial timeout expired
E104	Parameter Syntax	Parameter syntax error	E111	Memory Full	Memory storage full
E105	Parameter Range	Parameter value out of range			

**Table B Command Codes by Function**

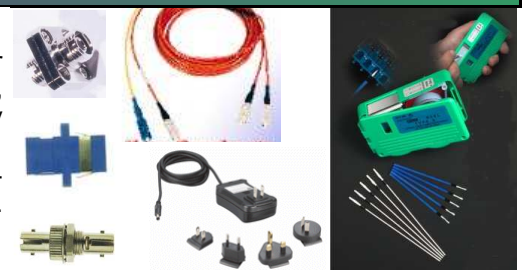
Command	Description	Page	Command	Description	Page
GMN	Get Model Number	8	TMO	Serial TiMeOut	8
GHV	Get Hardware Version	8	GNR	Get Number of Records	10
GSV	Get Software Version	8	SRC	Store New ReCord	10
GNW	Get Number of Wavelengths	8	GRC	Get ReCord	10
GWC	Get Wavelength Number Calibrations	9	CRC	Clear ReCord	10
GWA	Get WAvelength Number	9	CAR	Clear All Records	10
SWA	Set WAvelength Number	9	CLB	Change LaBel	10
SMO	Set MOde	9	AOF	Set Auto OfF Mode	10
GMO	Get MOde	9	RCK	Read CloCk	10
SRF	Set ReFeRence	9	SCK	Set CloCk	8
GRF	Get Current ReFeRence	9	CLN	CLeaNup Record Storage	8
GRS	Get Reading Status	9	SDN	Shut Down Instrument	8
GRD	Get Current ReaDing	10	MEM	Free Records from MEMory	10

Table C Command Codes by Alphabetical Order

Command	Description	Page	Command	Description	Page
AOF	Set Auto OfF Mode	10	GRS	Get Reading Status	9
CAR	Clear All Records	10	GSV	Get Software Version	8
CLB	Change LaBel	10	GWA	Get WAvelength Number	9
CLN	CLeaNup Record Storage	8	GWC	Get Wavelength Number Calibrations	9
CRC	Clear ReCord	10	MEM	Free Records from MEMory	10
GHV	Get Hardware Version	8	RCK	Read CloCk	10
GMN	Get Model Number	8	SCK	Set CloCk	8
GMO	Get MOde	9	SDN	Shut Down Instrument	8
GNR	Get Number of Records	10	SMO	Set MOde	9
GNW	Get Number of Wavelengths	8	SRC	Store New ReCord	10
GRC	Get ReCord	10	SRF	Set ReFeRence	9
GRD	Get Current ReaDing	10	SWA	Set WAvelength Number	9
GRF	Get Current ReFeRence	9	TMO	Serial TiMeOut	8

Recommended Accessories

- * Fiber Optic Jumper Cables and Mating Sleeves to connect the 610 to the fiber under test. Test jumpers should have the same core and cladding size as the fiber under test, and should match the optical adapter installed on the OPM. Test jumpers with a variety of lengths and connector styles are available from Cercis.
- * Connector Cleaning Cartridge & Swabs (similar to those shown in photo at right) or optical cleaning pads & isopropyl alcohol are recommended to clean optical connectors and adapters.
- * AC Adapter—9 V 120 or 90-264 International (shown) available—for off-battery operation.



Operation of this Optical Power Meter must conform to the specifications and instructions provided herein.
 Please read and understand the entire contents of this manual before operation.



Following is a list of all commands including command name, command mnemonic, number of parameters, parameter name, parameter type, parameter range, command description and command example

COMMAND NAME: **Get Hardware Version** COMMAND MNEMONIC: **GHV**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the instrument hardware revision number
 EXAMPLE:
Send: GHV(CR)
Receive: Hardware V2.00(CR)
Receive: OK(CR)

COMMAND NAME: **Get Software Version** COMMAND MNEMONIC: **GSV**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the instrument firmware revision number
 EXAMPLE:
Send: GSV(CR)
Receive: Firmware V2.00(CR)
Receive: OK(CR)

COMMAND NAME: **Get Model Number** COMMAND MNEMONIC: **GMN**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the model number and any custom modifiers to the base model number
 EXAMPLE:
Send: GMN(CR)
Receive: Model 610i(CR)
Receive: OK(CR)

COMMAND NAME: **Get Number of Wavelengths** COMMAND MNEMONIC: **GNW**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the number of calibration wavelengths on the instrument for the selected power meter
 EXAMPLE:
Send: GNW(CR)
Receive: 5(CR)
Receive: OK(CR)

COMMAND NAME: **set the TimeOut value** COMMAND MNEMONIC: **TMO**
 NUMBER OF PARAMETERS: 1
 PARAMETER TYPE: Integer
 PARAMETER RANGE: 0 to 255
 DESCRIPTION: Sets a new time out value for serial communications. The value is a relative number with 255 corresponding to approximately 3 second timeout
 EXAMPLE:
Send: TMO(CR)
Receive: ?
Send: 200(CR)
Receive: OK(CR)

COMMAND NAME: **Set Clock** COMMAND MNEMONIC: **SCK**
 NUMBER OF PARAMETERS: 7
 DESCRIPTION: Sets real time clock to current time and date in order: SEC, MIN, HR, DAY, MONTH, AM (0) or PM (1), YR (for 1:35:04 PM on 7/4/2003: 4, 35, 1, 4, 7, 1, 03)
 EXAMPLE:
Send: SCK(CR)
Receive:?
Send: 4(CR)
Receive:?
Send: 35(CR)
Receive ?
Send: 1(CR)
Receive ?
Send: 4(CR)
Receive:?
Send: 7(CR)
Receive:?
Send: 1(CR)
Receive:?
Send: 03(CR)
Receive: OK(CR)

COMMAND NAME: **Shut Down Instrument** COMMAND MNEMONIC: **SDN**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Turns instrument off.
 EXAMPLE:
Send: SDN(CR)
Receive: OK(CR)

COMMAND NAME: **CLeaN Up Record Storage** COMMAND MNEMONIC: **CLN**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Cleans up memory; frees unusable records.
 EXAMPLE:
Send: CLN(CR)
Receive: OK(CR)



COMMAND NAME: **Get Wavelength Calibration** **COMMAND MNEMONIC:** **GWC**
NUMBER OF PARAMETERS: One
PARAMETER TYPE Integer
PARAMETER RANGE 1 to number of calibration wavelengths
DESCRIPTION: Returns the calibration wavelength for the wavelength number requested
EXAMPLE:
Send: GWC(CR)
Receive: ?
Send: 2(CR)
Receive: 1550nm(CR)
Receive: OK(CR)

COMMAND NAME: **Get WA**avelength number **COMMAND MNEMONIC:** **GWA**
NUMBER OF PARAMETERS: One
PARAMETER TYPE Integer
PARAMETER RANGE 1 to number of calibration wavelengths
DESCRIPTION: Returns the current wavelength number
EXAMPLE:
Send: GWA(CR)
Receive: 3(CR)
Receive: OK(CR)

COMMAND NAME: **Set WA**avelength number **COMMAND MNEMONIC:** **SWA**
NUMBER OF PARAMETERS: One
PARAMETER TYPE Integer
PARAMETER RANGE 1 to number of calibration wavelengths
DESCRIPTION: Set the wavelength number
EXAMPLE:
Send: SWA(CR)
Receive: ?
Send: 2(CR)
Receive: OK(CR)

COMMAND NAME: **Set MO**de **COMMAND MNEMONIC:** **SMO**
NUMBER OF PARAMETERS: One
PARAMETER TYPE Integer
PARAMETER RANGE 0 to 4
DESCRIPTION: Set the power meter mode
 0=Absolute dBm 1=Relative dB 2=Absolute Watts
EXAMPLE:
Send: SMO(CR)
Receive: ?
Send: 2(CR)
Receive: OK(CR)

COMMAND NAME: **Get MO**de **COMMAND MNEMONIC:** **GMO**
NUMBER OF PARAMETERS: None
DESCRIPTION: Returns the current power meter mode
EXAMPLE:
Send: GMO(CR)
Receive: Abs:Watt(CR)
Receive: OK(CR)

COMMAND NAME: **Set ReF**erence **COMMAND MNEMONIC:** **SRF**
NUMBER OF PARAMETERS: None
DESCRIPTION: Sets the mode to Relative dB and sets a new reference power
EXAMPLE:
Send: SRF(CR)
Receive: OK(CR)

COMMAND NAME: **Get ReF**erence **COMMAND MNEMONIC:** **GRF**
NUMBER OF PARAMETERS: None
DESCRIPTION: Returns the current reference value or ABS if absolute mode
EXAMPLE:
Send: GRF(CR)
Receive: -26.60dBm(CR)
Receive: OK(CR)

COMMAND NAME: **Get Reading S**tatus **COMMAND MNEMONIC:** **GRS**
NUMBER OF PARAMETERS: None
DESCRIPTION: Returns T if a new power meter reading is available F if not.
EXAMPLE:
Send: GRS(CR)
Receive: T(CR)
Receive: OK(CR)



COMMAND NAME: **Change LaBel** COMMAND MNEMONIC: **CLB**
 NUMBER OF PARAMETERS: 1
 DESCRIPTION: Changes default label prefix for records and clears counter to zero.
 EXAMPLE:
 Send: CLB (CR)
 Receive: ?
 Send: LBL(CR)
 Receive: OK(CR)

COMMAND NAME: **Set AutoOff mode** COMMAND MNEMONIC: **AOF**
 NUMBER OF PARAMETERS: 1
 DESCRIPTION: Sets Auto Off Mode:
 (N = No Auto Off; A = Activity Off; T = Timed Off)
 EXAMPLE:
 Send: AOF(CR)
 Receive: ?
 Send: N(CR)
 Receive: OK(CR)

COMMAND NAME: **Get ReaDing** COMMAND MNEMONIC: **GRD**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the latest power or relative power reading
 EXAMPLE:
 Send: GRD(CR)
 Receive: -13.50dBm(CR)
 Receive: OK(CR)

COMMAND NAME: **free MEMORY** COMMAND MNEMONIC: **MEM**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Clears stored records from non-volatile memory.
 EXAMPLE:
 Send: MEM(CR)
 Receive: OK(CR)

COMMAND NAME: **Get Number Records** COMMAND MNEMONIC: **GNR**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the number of data records in memory.
 EXAMPLE:
 Send: GNR(CR)
 Receive: 813(CR)
 Receive: OK(CR)

COMMAND NAME: **Read CloCk** COMMAND MNEMONIC: **RCK**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Returns the current time and date of real time clock
 EXAMPLE:
 Send: RCK(CR)
 Receive: 02:50:36 PM, 5/09/2003(CR)
 Receive: OK(CR)

COMMAND NAME: **Clear ReCord** COMMAND MNEMONIC: **CRC**
 NUMBER OF PARAMETERS: 1
 DESCRIPTION: Clears selected record from memory
 EXAMPLE:
 Send: CRC(CR)
 Receive: ?
 Send: 5(CR)
 Receive: OK(CR)

COMMAND NAME: **Get ReCord** COMMAND MNEMONIC: **GRC**
 NUMBER OF PARAMETERS: 1
 DESCRIPTION: Returns selected record data or E105 if not a valid record number.
 EXAMPLE:
 Send: GRC(CR)
 Receive: ?
 Send: 1(CR)
 Receive: *001/001, LBL000, -13.40dBm, ABS, 1310nm, 01:20:23P, 09/16/03(CR)
 Receive: OK(CR)

COMMAND NAME: **Store New ReCord** COMMAND MNEMONIC: **SRC**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Stores record in non-volatile memory. If >999 records (no memory available), returns Out of Range error (E111).
 EXAMPLE:
 Send: SRC(CR)
 Receive: OK(CR)

COMMAND NAME: **Clear All Records** COMMAND MNEMONIC: **CAR**
 NUMBER OF PARAMETERS: None
 DESCRIPTION: Clears all records in memory
 EXAMPLE:
 Send: CAR(CR)
 Receive: OK(CR)