## Section 1

# OSICS-MAINFRAME


## 8-CHANNEL MODULAR PLATFORM FOR DWDM TESTING

# Instruction Manual

Document #MU/3610/DSC/001/B

February 2002

# Notice

This document is part of the “OSICS 8-Channel Modular Platform for DWDM Testing” Instruction Manual.

It supersedes all earlier versions and constitutes the “OSICS Mainframe” Instruction Manual (Doc #MU/3610/DSC/001/B).

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# 1- 1 General Safety Considerations

## 1-1.1 Terms and Symbols in this Manual

The following terms may appear in this manual:

| | | |
|---|---|---|
|  | ***WARNING*** | Warning statements identify conditions or practices that could result in injury or loss of life. |
|  | ***CAUTION*** | Caution statements identify conditions or practices that could result in damage to this product or other property. |

## 1-1.2 Terms on the Product

The following terms may appear on the product:

| | |
|---|---|
| ***DANGER*** | Indicates an injury hazard immediately accessible as you read the marking. |
| ***WARNING*** | Indicates an injury hazard not immediately accessible as you read the marking. |
| ***CAUTION*** | Indicates a hazard to property, including the product itself. |

## 1-1.3 Symbols and Labels on the Product

The following symbols may appear on the product:

| | |
|---|---|
|  | CAUTION: refer to manual. |
|  | CAUTION: risk of electric shock. |
|  | Protective Ground (Earth) Terminal. |
|  | DANGER LABEL<br>(located on the rear panel of the OSICS mainframe). |

## 1-1.4 Equipment Safety Warning

If this equipment is mishandled, abused, or used in a manner not as specified by NetTest in this instruction manual, the protection provided by the equipment may be impaired.

## 1-1.5 Laser Safety

The following tables provide information on general laser specifications, laser class, maximum wavelength ranges, and output power of the various OSICS models and options. The following table is used for laser classification.

**Table 1-1: Laser Class**

| Standard | Laser Class |
|---|---|
| IEC 60825-1 | Class 3B |
| 21 CFR Subchapter J | Class IIIb |

**Note:** OSICS is a Class IIIb product (21 CFR Subchapter J) equipped with a Remote Interlock connector (See the Auxiliary Inputs and Outputs section). Note: The OSICS platform features a Remote Interlock Connector where a remote ON/OFF switch can be connected (see the Remote Interlock section in the Operation chapter). The principle of this function is that if the interlock circuit is open, the output is set to the OFF state. The output may be turned ON again by simply pressing the OFF/ON switch, after corrective action is taken (if needed).

| | | |
|---|---|---|
|  | ***WARNING*** | **The use of controls or adjustments not specified herein as well as the performance of unauthorized procedures may result in hazardous radiation exposure.** |
|  | ***WARNING*** | **The use of optical instruments with this product will increase eye hazard.** Do **not** under any circumstances look directly into the fiber end of an optical cable attached to the optical output while the device is in use for this may cause permanent eye damage and possible loss of eyesight. Note that the laser radiation is not visible to the human eye, therefore, protective cap must always be replaced on the laser output connector after use to avoid involuntary exposure to laser radiation. |
|  | ***WARNING*** | **Disable the laser output before connecting or disconnecting a fiber optic cable on the instrument.** |

## 1-1.6 Electrical Safety

| | | |
|---|---|---|
|  | ***WARNING*** | **Power Supply Safety Requirements**<br>The OSICS system is intended to operate from a power source that does not apply more than 265 volts RMS between the supply conductors or between either of the supply conductors and the ground.<br><br>The OSICS system has a chassis connected to ground via the power supply cable. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.<br><br>To avoid the possibility of injury, insert the power cable only into a socket outlet with a protective earth contact. Before switching on the instrument, make sure the electrical installation fulfills the local safety requirements. |
|  | ***WARNING*** | **Do not attempt to perform servicing or maintenance.**<br>To avoid personal injury, do not operate this equipment without the protective cover of the chassis. Do not make any service or maintenance of any kind to the system.<br>Refer servicing only to authorized personnel from NetTest. |
|  | ***WARNING*** | **Use the proper fuse.**<br>To avoid fire hazard, use only the correct type fuse, voltage, and current ratings as specified in the *Maintenance* section in the *Service Information* chapter. |
|  | ***WARNING*** | **Operate under proper environmental conditions.** The OSICS system is not designed for outdoor use. To avoid the possibility of injury, do not expose the instrument to rain or excessive moisture. Do not operate the instrument in the presence of flammable gases or fumes. |

## 1-1.7 Ventilation of the Unit

| | | |
|---|---|---|
|  | ***CAUTION*** | **Make sure there is sufficient clearance below and at the back of the unit to ensure proper ventilation.**<br><br>The apertures (under the unit) and the fan (behind the unit) are used for the inside ventilation.<br><br>When used as a stand-alone benchtop unit, this product is designed so that the feet should leave enough room under the unit to enable proper the ventilation.<br><br>If you plan to rack-mount this unit, make sure to allow at least a 15-mm (0.6 inches) gap between two units. |

# 1- 2 Getting Started

## 1-2.1 Unpacking

Handle the instrument carefully when unpacking. To pull out the unit from its packaging, use the two lateral retractable handles which help to keep the instrument horizontal. After unpacking, set the instrument on a stable surface that is free of excessive vibration.

| | | |
|---|---|---|
|  | ***CAUTION*** | **Keep the original shipping container** to use it if the instrument has to be returned to NetTest for repair or service. |

## 1-2.2 Standard Accessories

The following accessories are standard with each OSICS mainframe unit:
- Power cord
- Rack-mount handles (2x)
- Instruction manual

The following accessories are standard with each modular optical sources:
- Certificate of traceable calibration
- ATR (Acceptance Test Report)

## 1-2.3 Options

The following options are available at time of purchase, depending on which module you purchased (see *Ordering Information*):

### All modules
- L Labview driver

### OSICS-ECL module
- P6 +6 dBm output power
- P10 +10 dBm output power
- M Polarization maintaining output
- R +1 pm resolution (tuning speed changes to 3 nm/s)

**Note:** The range of the wavelength varies according to the model and power (P6/P10) options, see the Specifications section in the General Information chapter for details.

### OSICS-ASE module
- P Polarized output
- F Flat spectrum (*ASE-SP only*)

### OSICS-LD 980 module
- P13 +13 dBm output power
- P20 +20 dBm output power

### OSICS-EDFA module
- LP Low polarization sensitivity of gain

### OSICS-ATN module
- T Optical tap
- R 60 dB return loss

# 1- 3 System Overview

## 1-3.1 Introduction

OSICS is an 8-channel modular instrument designed for fiber-optic component and system testing, particularly for D-WDM.
It features a complete line of modular sources, including tunable external cavity laser sources, distributed feed back laser diode sources, and broadband erbium-doped fiber sources based on amplified spontaneous emission. Its versatile design offers a choice of up to 8 different optical sources that can be mixed and matched. It also provides an optical attenuator, for characterizing optical signals for instance, and an optical switch for bi-directional signal routing.

## 1-3.2 System Design

OSICS platforms consist of 8 multipurpose module slots capable of hosting all types of OSICS modular sources. The OSICS platform combines flexibility with a continually increasing choice of optical sources to provide the most cost-effective solution for intensive DWDM testing applications.

- Each OSICS mainframe provides onboard front-panel controls and user interface to drive both system common controls and module parameters. All system operations are software-controlled from the OSICS user interface.

- The OSICS system may be remote operated via standard RS-232 and IEEE-488 interfaces.

- Any OSICS laser source plug-in module may be inserted in any multipurpose module slot. Also, any combination of laser sources and amplifiers is supported.

- All OSICS modules, regardless of the type of laser source, are of the same physical make and size. OSICS modules are plug-and-play units that require no additional hardware or software.

- OSICS is a universal platform designed to support all present and future laser sources and amplifier modules.

- Any OSICS platform may be used in benchtop situations or may be rack-mounted. It occupies approximately 17.6-inch wide by 5.2-inch high of rack space.

## 1-3.3 User Benefits

The OSICS multi-channel system provides a unique range of user benefits:

**Table 1-2: User benefits**

| Benefit | Description |
|---|---|
| Unique multi-channel testing capabilities | System may host up to 8 laser source, amplifier, attenuator and switch plug-in modules in any combination. |
| Easy-to-install, and easy-to-use system | OSICS mainframe is a full-integrated system with onboard hardware and software.<br>OSICS modules are plug-and-play units that are automatically detected by OSICS mainframe after plug-in.<br>Module dedicated user interface is automatically enabled on OSICS mainframe after installation in the available channel slot. |
| Intuitive user-friendly controls | Large screen for displaying the actual parameters of the various modules, which can be changed with a touch of a button using the user-friendly dedicated software.<br>A spinner knob to easily navigate the menus and adjust parameter values. |
| Multiple modulation capabilities (ECL and DFB modules) | The module and the mainframe offer a full suite of internal and external modulation capabilities. For instance, the mainframe can drive the modulation of all 8 modules simultaneously. |
| Easy system integration | Computer interfaces (RS-232 and IEEE-488.2) and analog inputs/outputs to allow all operations to be performed in remote mode and to make system integration easy. |
| Ability to save working configurations | System can automatically save working configuration on all 8 modules, simultaneously. This allows to restore operating parameters of the mainframe and of all 8 modules instantly as you left them at the last system turn-off.<br>Ideally suited for WDM testing. |

# 1- 4 System Specifications

## Key Features

| | |
|---|---|
| Modular and multi-channel platform | 8 general-purpose slots |
| Compatibility | Supports all OSICS plug-in modules in any combination |
| OSICS plug-in modules supported | ECL: Tunable External Cavity Laser<br>DFB: Distributed Feed Back Laser Diode<br>ASE: Amplified Spontaneous Emission Source<br>EDFA: Erbium-Doped Fiber Amplifier<br>LD 980: Laser Diode<br>SWT: Optical Switch<br>ATN: Optical Attenuator |

## Mainframe Interfaces

| | |
|---|---|
| Instrument front panel | Large monochrome display for system soft front panel.<br>Spinner knob to navigate the OSICS soft front panel and set parameter values. |
| Remote control | RS-232 C<br>IEEE-488.2 |
| Analog monitoring | Multi-purpose BNC output for Current, Power, or Temperature monitoring of each plug-in module |

## Modules Interfaces

| | | |
|---|---|---|
| Optical connector | ECL, ASE, EDFA, DFB-1310, SWT, ATN<br>LD 980<br>DFB-C& L-band | FC/APC on SMF-28™ fiber<br>FC/APC on 5/125 fiber<br>FC/APC on polarization maintaining fiber |
| Output isolation | | 35 dB (30 dB, EDFA) |
| Return loss | | -60 dB |
| Analog modulation | ECL, DFB | 150 Hz to 1 GHz (external modulation) |
| Digital modulation | ECL<br>DFB<br>LD | 500 Hz to 1 MHz (internal or external)<br>1 Hz to 1 MHz (internal or external)<br>1 Hz to 100 KHz (internal or external) |

## Environmental

| | |
|---|---|
| Operating temperature | +15 to 35 °C (+59 to +95 °F) ambient temperature |
| Warm up time (room temperature) | 1 hour (typ.) |
| Humidity | 80% to 50% relative humidity (with maximum operating temperature ranging from 31 °C to 40 °C) |
| Maximum operating altitude | 2000 meters |

## Power Source

| | |
|---|---|
| Power supply | 100 - 240 V AC ±10% |
| Power supply frequency | 50 - 60 Hz ±5% |
| Max. power consumption | 120 W |

## Mechanical Characteristics

| | | |
|---|---|---|
| Dimensions | Depth | 370 mm (14.6 in) |
| | Width | 448 mm (17.6 in) |
| | Height | 133 mm (5.2 in) |
| Weight (without any module) | | 8.1 kg (17.86 lb) |

# 1- 5 System Description

## 1-5.1 General Description

The OSICS system consists of the OSICS mainframe multi-channel platform and the OSICS plug-in modules.

Each OSICS mainframe contains a total of 8 general-purpose slots, numbered from left to right. All 8 slots are used for diverse combinations of OSICS single-slot or double-slot plug-in units, or as required for a particular DWDM testing application.

The OSICS mainframe may be rack-mounted for system integration and may also be used as a benchtop instrument.

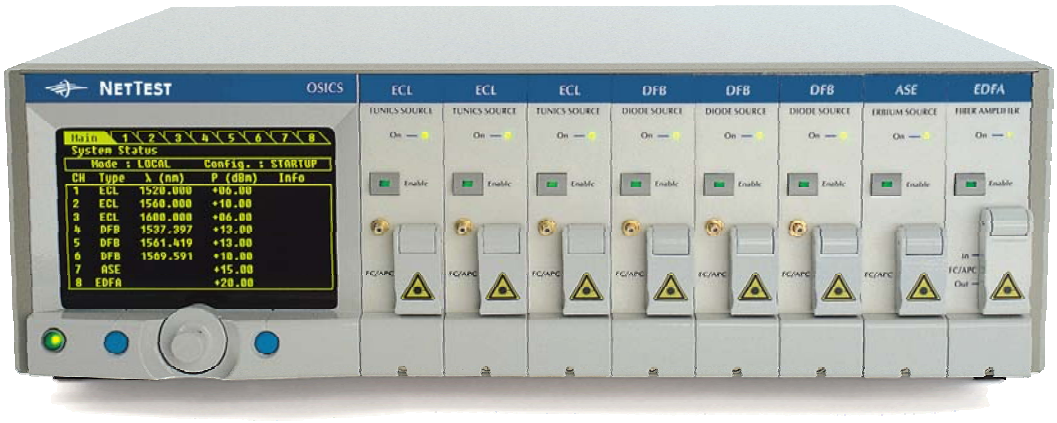



**Figure 1-1: OSICS system front panel**

The remainder of this section describes the various components of the OSICS system, including mainframe, and plug-in modules. More detailed descriptions of all OSICS plug-in modules, including technical specifications, are provided in sections 3 to 12.

## 1-5.2 OSICS Mainframe

### Operating Position

The OSICS mainframe contains all hardware and software necessary for installation except for power supply cable (included in the package), and cables for communications ports and fiber-optic input/output provided by the user.

All OSICS systems are designed for both benchtop use (with or without the front legs deployed) and rack-mount using the two rack handles provided.

**Figure 1-2: OSICS benchtop configuration with front legs deployed**

## OSICS Mainframe Front Panel

Figure 1-1 shows the front panel of the OSICS mainframe with OSICS-ECL, OSICS-DFB, OSICS-ASE, and OSICS-EDFA modules installed.

The OSICS front panel is divided into two sections, the control panel (with display and command keys) and the module area (with 8 module slots), as shown in Figure 1-1.

## Description of the Control Panel

The OSICS control panel includes a large monochrome display, a multi-purpose knob to set and control operating parameters of plug-in modules, and command keys.

During normal operation, the operating parameters of all modules are displayed simultaneously, as well as their readings constantly updated in real-time, as shown in Figure 1-3.

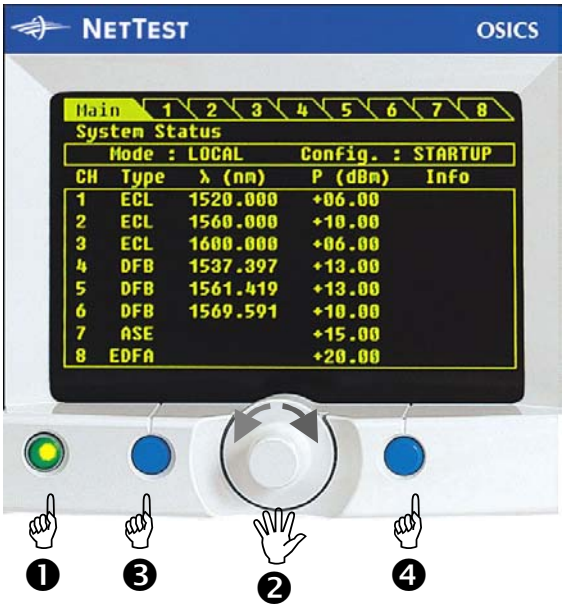



**Figure 1-3: OSICS mainframe control panel**

**Table 1-3: Description of the control panel**

| | | |
|---|---|---|
| 1 | **Power key** | Press to turn ON or OFF the OSICS system. ( green when the mainframe is powered). |
| 2 | **Spinner knob** | Multi-purpose knob:<br>**Navigator knob**<br>• Rotate left or right to cycle through user interface menus from Main menu to module-1 to -8 menus.<br>• Press to select and enter a user interface menu.<br>**Modify knob**<br>• Allows the user to change the numeric value of the selected parameter (refer to the *General Parameter Setting Principle* section in this chapter).<br>• Also allows the user to select between different choices in the menus displayed on the screen.<br>**Note:** The selection is highlighted on the screen. |
| 3 4 | **Left and right soft keys** | Provides access to the specific functions displayed right above it. |

## OSICS Mainframe Back Panel

Figure 1-4 below shows the rear panel of the OSICS mainframe.


**Figure 1-4: OSICS mainframe back panel**

## Description of the Rear Panel Connectors and Switches

The MAINS module includes the mains power switch, power cord connection, and fuse drawer (see Changing the Fuse in Section - Service Information).

In addition to the MAINS module, the following connectors are available on the rear panel:

- 1 DB9 serial connector for RS-232 C remote control mode.
- 1 GPIB connector for IEEE-488.2 remote control mode.
- 1 Sub-D9 connector for Remote Interlock ON/OFF switch (see the Remote Interlock section in the Operation chapter).
- 1 Mod. In BNC connector for external modulation signal input on the mainframe. The Mod. In connector is a digital TTL signal input. The green LED located to the right side of the Mod. In BNC connector is lit when the Mod. In connector receives a TTL external modulation signal.
- 1 Synchro output modulation BNC connector for mainframe synchronization.

***Channel Ports 1 to 8:***

- 8 OUT1 BNC analog output connectors for channel monitoring of power, current, and temperature (when supported by the plug-in module).
- 8 OUT2 BNC connectors for analog modulation signal output on each channel.

## 1-5.3 OSICS Modules

The OSICS mainframe is provisioned to provide a full range DWDM testing services. Any OSICS module can be placed in any of the 8 general-purpose slots. The general-purpose slots are designed to allow a transparent interface to any type of present and future OSICS modules being plugged-in. Currently, the OSICS mainframe supports 11 types of OSICS modules.

Following is a general overview of the DWDM testing modules supported by the OSICS mainframe.


### Tunable External Cavity Laser Modules (ECL)

The OSICS-ECL module provides a high output power tunable laser source. It operates over multiple wavelength-range options, covering the S, C, and L bands (from 1440 nm to 1640 nm). OSICS-ECL modules come in three output power options, 0 dBm, +6 dBm, and +10 dBm. They offer comprehensive internal or external, as well as analog or digital modulation capabilities.


### Distributed Feed Back Laser Diode Modules (DFB)

The OSICS-DFB modules are fixed-wavelength laser sources fit to customer applications that require a stable and constant wavelength on the ITU-T grid within the C or L bands. The user-defined center wavelength can be chosen upon order on the ITU-T grid, anywhere from 1527.2 to 1610.05 nm. The OSICS-DFB delivers over +13 dBm of optical output power in the C- or L- band. Note that there is also a 1310 nm OSICS-DFB module for extended short-wavelength applications that delivers over +3 dBm of optical power.


### Amplified Spontaneous Emission Source Modules (ASE-SP and ASE-IN)

The OSICS-ASE modules are broadband erbium-doped fiber sources that come in two versions (ASE-SP and ASE-IN) depending on their spectral shaping characteristics. OSICS-ASE SP maximizes both power with over +15dBm and spectral width with over 45 nm in the 1550 nm spectral window. The flat spectrum option (ASE-SP/F) provides less than 2 dB power flatness over 1528-1565 nm. OSICS-ASE IN offers a near-Gaussian spectrum and minimizes the coherence length of the source.


### Amplified Spontaneous Emission Source Modules (ASE-L and ASE-SPL)

The OSICS-ASE-L and OSICS-ASE-SPL are broadband erbium-doped fiber sources. The OSICS-ASE-L enables broadband spectral measurement in the L-band, while ASE-SPL is a dual-source and provides C- and L-band coverage. Both modules have unpolarized output. The OSICS-ASE-L module provides an outstanding <2 dB spectrum flatness.


## Erbium-Doped Fiber Amplifier Modules (EDFA-C17)

The OSICS-EDFA-C17 modules are high-performance Erbium-doped fiber amplifiers. OSICS-EDFA-C17 operates in the 1550 nm spectral window, delivers over +17 dBm of saturated output power and is optimized to provide small-signal gains of 35 dB and 25 dB at 1530 nm and 1550 nm wavelengths respectively.


## Erbium-Doped Fiber Amplifier Modules (EDFA-C20+, L17+)

The OSICS-EDFA-C20+ and –L17+ modules are high-performance Erbium-doped fiber amplifiers. EDFA-C20+ and –L17+ are two-pump modules delivering optical gain in the C-band and L-band respectively. These two modules provide sophisticated AGC (Automatic Gain Control) and APC (Automatic Power Control) functionalities, to maintain gain and output power constant regardless of input power variations.


## Laser Diode Source Modules (LD 980)

The OSICS-LD 980 modules are high performance laser diode sources tuned on the 980 nm center wavelength. OSICS-LD 980 comes in three output power options available upon order: +3 dBm, +13 dBm, and +20 dBm. The OSICS-LD is the ideal tool to test EDFA components or to simulate pump laser-diodes.


## Optical Switch Modules (SWT)

The OSICS-SWT module provides bi-directional signal routing capability and features a very low repeatability and crosstalk level: ±0.01 dB and –70 dB respectively.


## Optical Attenuator Modules (ATN)

The OSICS-ATN module combines a constant 0.01 dB resolution with a 60 dB attenuation range, and operates throughout the S-, C- and L-bands. The OSICS-ATN is especially suited for Optical Amplifier characterization.

## 1-5.4 User Interface Features

The User Interface is enabled at system turn on and accessible at the OSICS mainframe control panel. For laser equipment safety reasons, user password is required to access the system. Note that the default system password is **"0000".** After proper password identification, the user interface logs into the Status Screen.

### System Status Screen Features

The user interface features a menu-driven architecture. The top-level menu consists of the Status Screen, which displays the system operating parameters and the menu-bar always showing at the upper part of the screen, as shown in Figure 1-5.

The system Status Screen provides a general overview of the state of the system and is displayed once the mainframe and the modules are initialized. Operating modes and parameters of the mainframe and the plugged-in modules are displayed in this screen (see detailed field descriptions in Figure 1-5). To change the mainframe parameters, go to the Main Setup menu (using the spinner knob to select **Main** and then press the knob). To change the parameters of a specific module, you need to enter the Module Unit Setup menu by selecting the appropriate channel number from the top menu-bar.

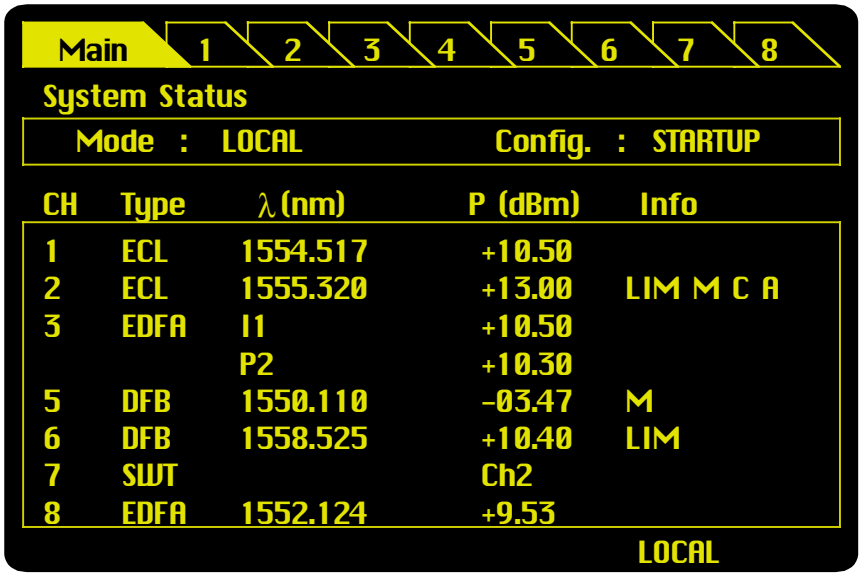



**Figure 1-5: System Status Screen**

The System status screen is divided into three areas, including from top to bottom:

- the menu-bar area
- the mode area
- the parameters area

***The menu-bar area***

The menu-bar is used to navigate the user interface menus. It includes the Main menu tab and 8 Module Unit menu tabs numbered 1 to 8. Rotate the spinner knob to cycle left or right through menu tabs and press the spinner knob to enter the selected menu.

***The mode area***

The mode area displays read-only information. It displays the current system operating mode (LOCAL or REMOTE), and informs on which system configuration is currently active (DEFAULT, STARTUP, A, B, C, or D) prior to any parameter change.

***The parameters area***

The parameters area is a read-only table that displays the key operating parameters of installed modules. It also tells which channel-slots are occupied. The parameters table includes five fields:

**Table 1-4: Status Screen parameter display fields description**

| Field | Field description | Field status | |
|---|---|---|---|
| CH | Shows the channel-slot number. | 1-8 | Channel number |
| Type | Type of OSICS module installed in the corresponding channel slot. | ECL<br>DFB<br>ASE<br>EDFA<br>LD<br>SWT<br>ATN | Module type<br>(Note: Field is left blank when the corresponding slot is not occupied or if it is the second slot occupied by a double-slot module.) |
| λ (nm)<br>or<br>f (GHz) | Shows either the operating wavelength (λ in nm) or the operating frequency (f in GHz) of the module, depending on the display unit (nm/GHz) selected from the Main Setup menu. | λ (nm) | Laser emission wavelength |
| | | f (GHz) | Laser emission frequency |
| | | (Note: ECL, DFB, and LD modules only.) | |
| P (dBm)<br>or<br>P (mW) | Displays the module output power in real-time, either in dBm or in mW, depending on the power unit (dBm/mW) selected from the Main Setup menu. | P (dBm) | Output power in dBm |
| | | P (mW) | Output power in mW |
| | | DISABLED | Laser output of the corresponding module is disabled. |
| | | INTERLOCK | All modules are disabled due to laser safety Interlock switch is opened. |
| | | (Note: All modules.) | |
| Info | This field provides additional information on module operating status, particularly whether certain module specific functions are currently active. | LIM | The set power cannot be achieved due to maximum current limit reached within the laser diode.<br>(Note: All modules.) |
| | | M | Modulation option is ON or ON INVERTED on the corresponding module.<br>(Note: ECL, DFB, and LD modules only.) |
| | | C | The "coherence control" function is active.<br>(Note: ECL modules only.) |
| | | A | The "Auto peak find" function is active.<br>(Note: ECL modules only.) |
| | | I | The "Constant Current" mode is active.<br>(Note: EDFA-C20+, EDFA-L17+, ASE-L and –SPL modules only.) |

| Field | Field description | Field status | |
|---|---|---|---|
| | | P | The "Constant Power" mode is active. (Note: EDFA-C20+ and -L17+ modules only.) |
| | | Pout | The "Constant Output Power" mode is active. (Note: EDFA-C20+, EDFA-L17+, ASE-L and -SPL modules only.) |
| | | G | The "Constant Gain" mode is active. (Note: EDFA-C20+ and -L17+ modules only.) |

## Main Setup Menu Features

The Main Setup menu is used to configure the operating parameters of the mainframe and some system parameters that may affect all installed modules simultaneously. It can be accessed by selecting **Main** at the System Status menu-bar and pressing the spinner knob.

Once the Main Setup menu is activated, a list of menus and submenus appears, as shown in Figure 1-6. A "•" indicates a menu without submenus and a "+" indicates a menu with submenu items.

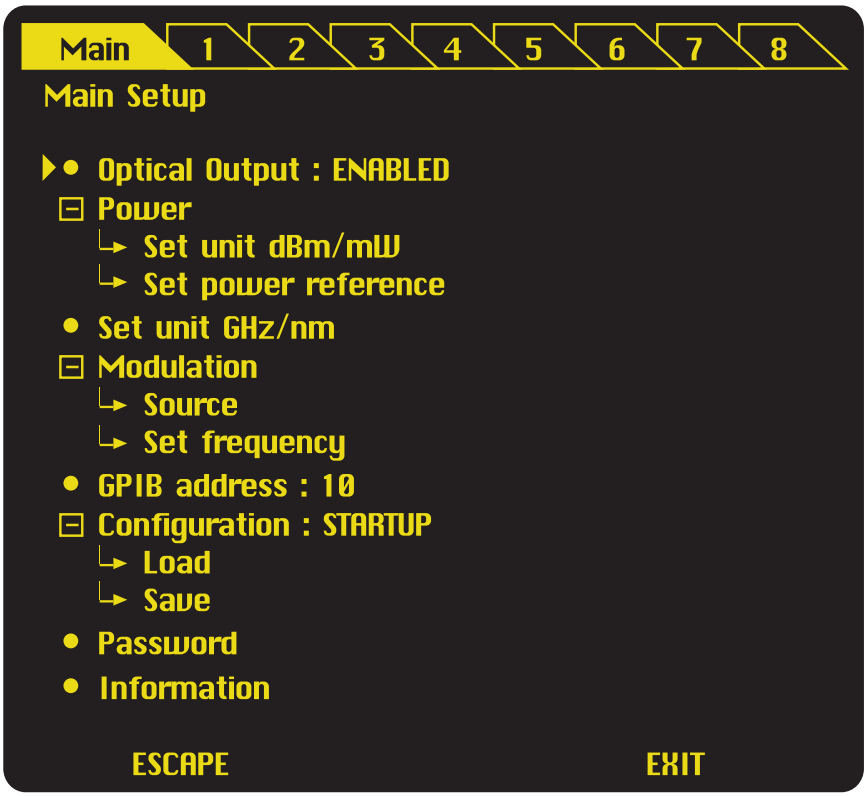



**Figure 1-6: Main Setup menu**

The following Table 1-5 describes the Main Setup menu items.

**Table 1-5: Main Setup menu items**

| Menu item | Submenu (if any) | Purpose |
|---|---|---|
| • Optical output: ENABLED/DISABLED | None | To enable/disable the optical output of all modules simultaneously. |
| [+] Power | [-] Power<br>↪ Set unit dBm/mW<br>↪ Set power reference | <br>To set power unit to dBm or mW.<br>To set the same power level for all modules. |
| • Set unit GHz/nm | None | To set the wavelength unit to GHz or nm. |
| [+] Modulation | [-] Modulation<br>↪ Source<br>↪ Set frequency | <br>To choose the type of modulation source (internal or external)<br>To set the frequency of the internally generated signal. |
| • GPIB address | None | To change the system's GPIB address. |
| [+] Configuration | [-] Configuration<br>↪ Load<br>↪ Save | <br>To load a working configuration.<br>To save a working configuration. |
| • Password | None | To change the system password. |
| • Information | None | To display the mainframe software version. |

## Module Unit Setup Menu Features

The Module Unit Setup menus (items 1 through 8 in the top menu-bar in Figure 1-6) are used to set the individual operating parameters (such as optical power, wavelength setting, and more) of each module installed in channel-slots 1 through 8.

The list of Module Unit Setup menu options may vary depending on the type of OSICS module installed in the channel-slot, as well as the FPGA software version of the said module. A detailed description of Module Setup menu options is provided for each type of OSICS plug-in module in sections 3-12.

Figure 1-7 below shows a sample ECL Unit Setup menu. This example assumes an OSICS-ECL module is installed in channel-slot 1. To bring up this menu, rotate the spinner knob till tab [1] is highlighted on the top menu-bar, then press the same spinner knob to display the ECL Unit Setup menu.

Once the Unit Setup menu is activated, a list of menus and submenus appears, as shown in Figure 1-7. A "•" indicates a menu without submenus and a "+" indicates a menu with submenu items.

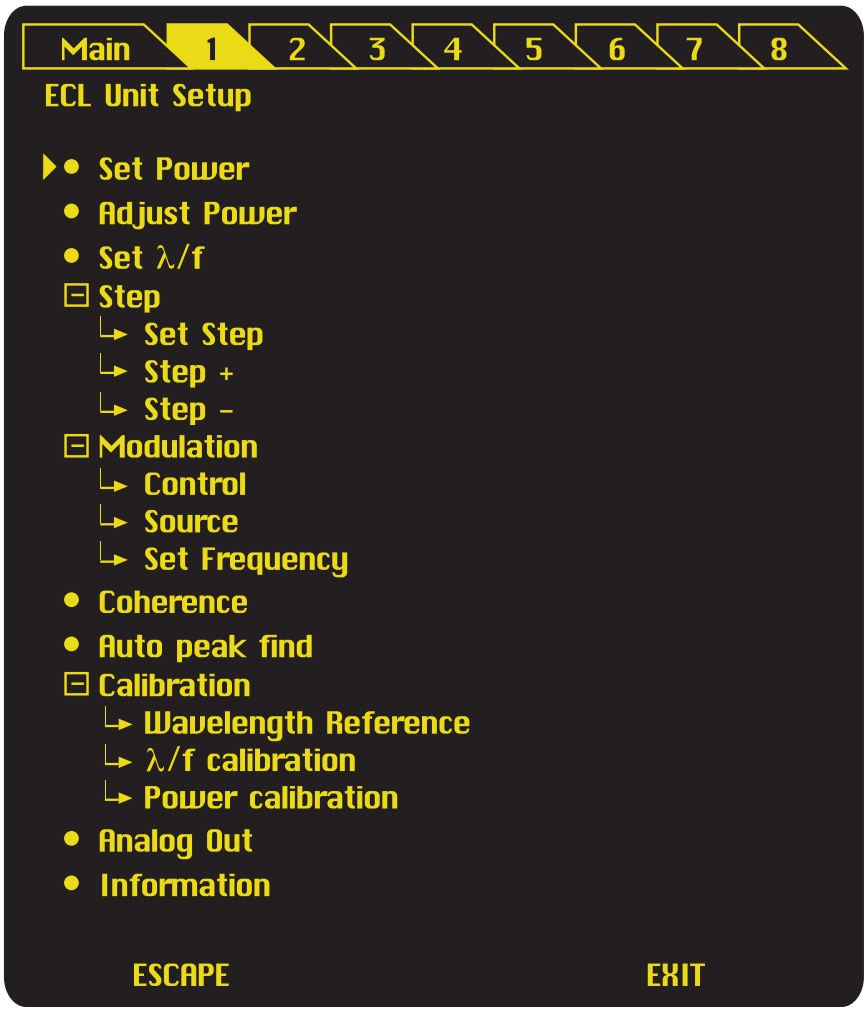



**Figure 1-7: Sample OSICS-ECL Unit Setup menu**

## How to Navigate the Various Menus

Use the control panel features presented in Figure 1-3 to navigate the various setup menus.

***The Status Screen***

The Status Screen is a read-only menu that displays current system operating parameters (see Figure 1-5). The Status Screen appears right-after system turn-on and successful initialization.

***To select and access menus***

Only the menu-bar located at the top part of the Status Screen is active to the user.
The menu-bar gives you access to configuration menus, including the Main Setup menu and Module Unit Setup menus numbered 1 to 8.

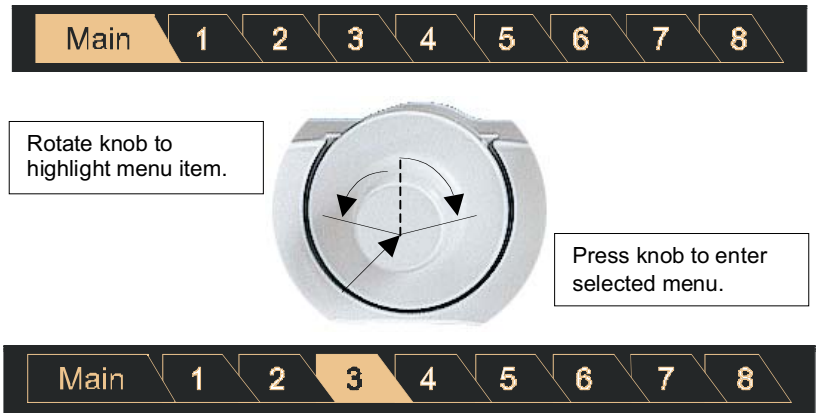



**Figure 1-8: Menu selection using the spinner knob**

To select a menu item using the spinner knob, proceed as follows:

**Table 1-6: How to use the spinner knob for menu selection**

| Step | Action |
|---|---|
| **1.** | Rotate the spinner knob left or right to highlight the desired menu item on the menu-bar. |
| Result: | The selected menu is highlighted. |
| **2.** | Press the spinner knob once to enter the selected menu. |
| Result: | The corresponding menu screen appears. |

***To navigate within menus***

Once a menu is showing (Main Setup or Module Unit Setup), use the spinner knob to cycle through menu items. Apply a clockwise rotation to the spinner knob to cycle top-down, and rotate counter-clockwise to bring back the cursor upward.

- A "•" in front a menu item, denotes there are no sub-entries to that menu. Simply press the spinner knob once to bring up the parameters contained inside the selected menu.

- A [+] sign, however, indicates a menu with one or more sub-menus. Press the spinner knob once to unfold all sub-menu entries contained below the [+] menu item. The [+] sign then becomes [-].

## How to Change Parameter Values

To change the value of a parameter, proceed as follows:

| Step | Action |
|---|---|
| **1.** | From the Status Screen, highlight the appropriate menu, either in the Main Setup menu or the Module Unit Setup menu, by rotating the spinner knob. |
| Result: | The selected menu is lit. |
| **2.** | Press the spinner knob.<br>**Note:** Repeat steps 1 and 2 to navigate menus and reach the desired parameter inside a submenu, if any. |
| Result: | The corresponding parameter setting screen appears. The current parameter value is displayed and the first digit of this number is underlined by the digit-marker, as shown in the following example:<br>λ = 1550.000 nm |
| **3.** | You may change a number one digit at a time, then move to the next digit. Move the digit-marker to the desired position using the spinner knob.<br>To edit the marked digit, press the spinner knob once. |
| Result: | The selected digit is highlighted and framed. |
| **4.** | Update the value of the marked digit by rotating the spinner knob clockwise to increment or counter-clockwise to decrement its value. |
| **5.** | Press the knob to validate the new value of the digit. |
| **6.** | Repeat operations 4 through 5 for each digit that needs to be changed. |
| **7.** | To accept the new value of the updated parameter, rotate the spinner knob all the way to the right till the marker positions itself below **ENTER** and press the knob to validate.<br>**Note:** At this moment, if you press **ESCAPE** or **EXIT** without pressing **ENTER** first, the new value of the parameter is not accepted and the previous setting is restored. |
| Result: | The new parameter setting is accepted and applied.<br><br>**Note:** If you do not wish to apply the new setting, simply press **ESCAPE** or **EXIT** to cancel the change. (Do not press **ENTER**, or otherwise the value change cannot be undone.) |

## How to Exit the Current Menu

The **ESCAPE** and **EXIT** functions are available in both the Main Setup and Module Unit Setup screens, as well as in all parameter setting menus. They can be selected by pressing the left or right blue soft-keys at the OSICS mainframe control panel.

| Function Key | Purpose |
|---|---|
| ESCAPE | To RETURN the current menu and return TO the PREVIOUS menu. |
| EXIT | To EXIT directly TO the SYSTEM STATUS screen. From there, you may select the Main Setup menu or any other Module Setup menu to change any mainframe or module (OSICS-ECL, OSICS-DFB, or OSICS-ASE) operating parameter. |

# 1- 6 System Installation, Initialization, & Basic Operation

To move the unit from place to place, use the straps on both sides which help to hold the instrument horizontal while carrying it.


**Figure 1-9: How to handle this equipment correctly**

## 1-6.1 System Installation

### How to Set up the OSICS Mainframe

To install the OSICS mainframe proceed as follows:

- Set the mainframe on a flat stable surface that is free of excessive vibration.
- Allow the flow of air from the cooling fan to circulate freely around the device and remove any equipment or paper that could block the air-flow.
- Use the proper power cord for your location.
- Make sure the Mains switch on the back panel is in the “O” position before applying power.
- Connect one end of the power supply cable to the Mains socket on the rear panel of the mainframe and plug the other end to the proper voltage supply wall socket, as shown in Figure 1-10 below. The OSICS mainframe is equipped with a self-regulating power supply that adapts to both AC 110V and 230V voltages and 50 Hz or 60 Hz frequencies.
- To turn the power of the mainframe ON, set the Mains switch located on the rear panel to the “I” position.

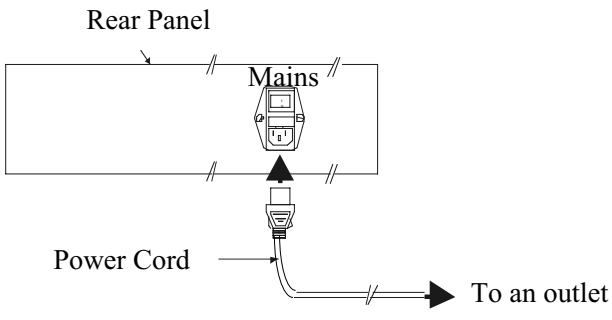
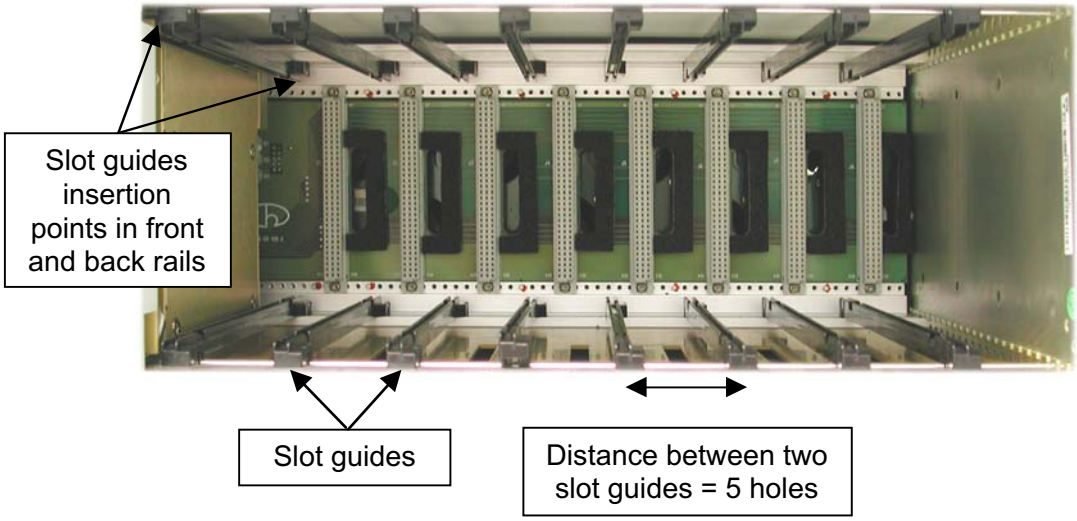



**Figure 1-10: Connection of the power cord on the rear panel of OSICS**

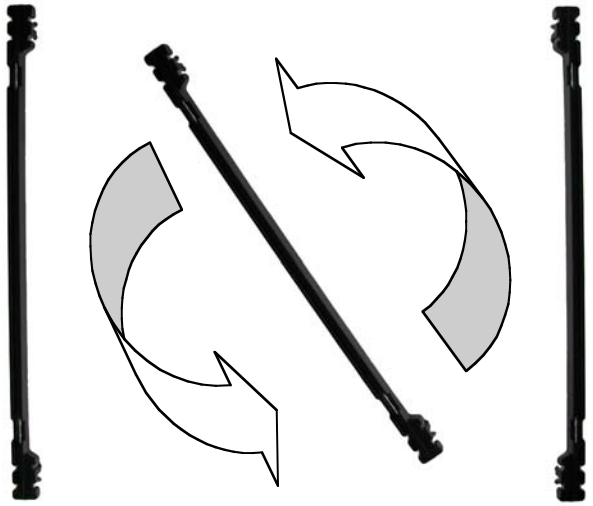
## How to Set up the Mainframe for double-slot modules

Before inserting a double-slot module, you must first re-arrange the slot guides. The slot guides delimit the various module slots and are located at the top and the bottom of the mainframe inside panels. These guides are inserted in rails at the front and at the back of the mainframe. The picture below shows the standard configuration, i.e. 8 top guides and 8 bottom guides arranged for 8 single-slot modules:



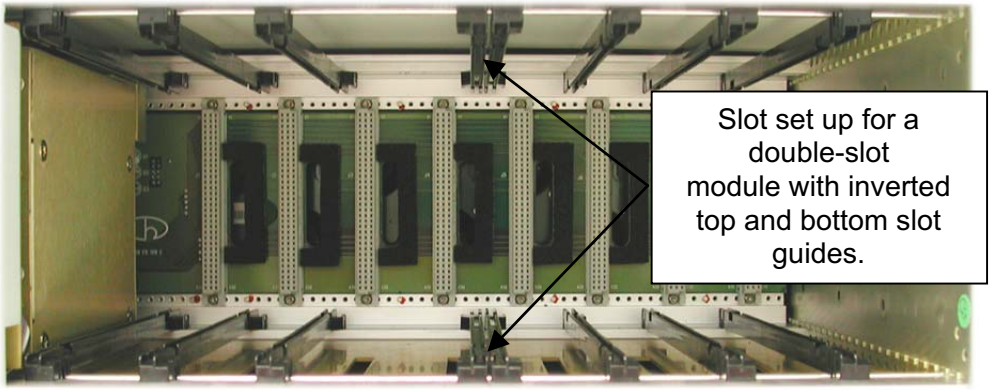

Let us assume we want to install a double-slot module in slot 3 and 4. To set up the OSICS system properly, proceed as follows:

- Remove bottom slot guide 4 from the mainframe inside-panel.
- Turn it around as shown in the figure below:



- Insert the slot guide in inverted position next to slot guide 5 into the mainframe front and back rails. **Caution**: You may have to apply pressure to insert the slot guide.
- Proceed identically with top slot guide 4.

The picture below shows the slot guides arranged to install a double-slot module in slot 3 and 4:




You can then insert your double-slot module as shown in the picture below:


For further information on how to insert a module, refer to section How to Install OSICS Modules into the Mainframe, on page 1-29.

To return to a standard configuration of the mainframe, i.e. to install one module in slot 3 and one module in slot 4, proceed as follows:

- Remove bottom slot guide 4.
- Turn it around so as to replace it in its original position.
- Position the slot guide in its original position 5 holes away from slot guide 3 and 5 holes away from slot guide 5. Again you may have to apply pressure onto the slot guide to insert it in the front and back rails.
- Proceed identically with top slot guide 4. **Caution**: The top slot guide must be positioned **exactly** on top of the bottom slot guide.

## How to Install OSICS Modules into the Mainframe

The OSICS-ECL, -DFB, -ASE, -EDFA, -SWT and -ATN modules can only by used with the OSICS-Mainframe 8-channel modular platform series from NetTest.
**Note**: you need two adjacent slots available to insert the OSICS-EDFA-C20+, EDFA-L17+, ASE-L and ASE-SPL modules.

Follow this essential precaution while installing or removing any OSICS module:

| | | |
|---|---|---|
| ⚠ | ***CAUTION*** | Do NOT fit in or remove any module from the OSICS mainframe while the system is in operation. You MUST turn off the OSICS system and temporarily unplug the Mains power supply cable from the OSICS-mainframe back-panel prior to performing any hardware installation or maintenance operation such as OSICS module fit in or removal from the OSICS platform. |

To install a module into the OSICS mainframe, follow these instructions:

**Equipment required:** Module installation or removal requires a medium-small size flat bladed screwdriver.

- Unpack the module from its wrapping.
- You must ensure that the power to the OSICS-mainframe has been turned off and the power supply cable is unplugged.
- Untighten the captive screw and remove the protection plate of the channel-slot in which you wish to install the module.

**Figure 1-11: How to install a module into the OSICS mainframe**

- Align the module upper and lower edges with the slot guides on the OSICS chassis.
- Insert the module into the open slot holding by its top and bottom edges, using both hands.
  **Note: Do NOT squeeze the module sideplates** for this may damage internal optical components.
- Push the module in with your thumb placed right above the captive screw's notch. (The module should slide in freely.)
- Apply pressure to seat the module in the OSICS backplane connector.
- Tighten the captive screw to secure the module in place.

## How to Remove a Module from the Mainframe

To remove a module from the OSICS rack, proceed as follows:

- Untighten the retaining screw at the bottom edge of the module.
- Pull the module out with both index and middle fingers positioned head up, inside the groove right behind the retaining screw's notch.
  **Note:** Do NOT extract the module by pulling on any of the front-panel protruding elements, such as the laser protection cap or connectors for this may loosen or damage those elements permanently.

**Figure 1-12: How to remove a module from the OSICS mainframe**

- Hold the module by its upper and lower edges with both hands.
- Repackage the module in its original container.
- Put back into place the original protection plate of the open channel-slot.

| | | |
|---|---|---|
| ⚠ | ***CAUTION*** | Do NOT operate this equipment while any channel-slot is left open. Always put back the protection cover plate on an empty slot. |

## Optical Connections to the Installed Modules

| | | |
|---|---|---|
| ⚠ | ***CAUTION*** | The cleanliness of the optical connectors is important for obtaining the optimum performance of the system. Refer to the cleaning instructions in the *Maintenance* section in the *Service Information* chapter. The standard output connector is an FC/APC type connector. Never connect another type of connector to the optical output. |

**Note:** In the case of frequent connect/disconnect, the use of an intermediate jumper is recommended in order to prevent premature failure of the OSICS module internal connector.

## 1-6.2 System Initialization

For safe operation, use the following procedure to initialize the system:

- Set the rear panel MAINS switch to ON (I) (see Figure 1-10).
- Press the ON/OFF button located at the lower left corner of the control panel. During the initialization phase, the message **"Initializing..."** is displayed.
- Once the mainframe is fully initialized, each channel module is initialized and set to the power-up wavelength. While the initialization routine is in progress, an initialization screen similar to this is displayed at the OSICS control panel (see Figure 1-13).

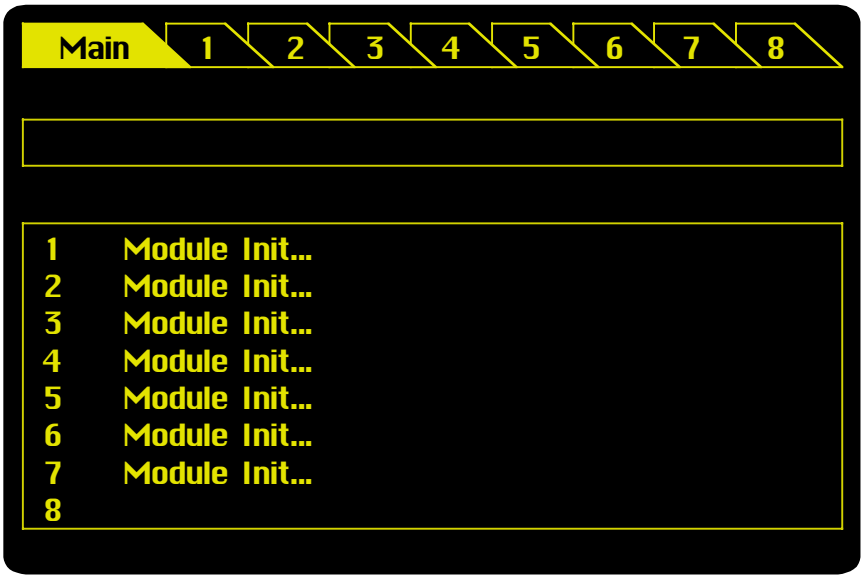



**Figure 1-13: Sample initialization screen**

The message **"Module Init…"** is only displayed facing the number of a channel-slot where a module has been installed correctly. (Empty slots or second slot of a double-slot module show no initialization messages.)

### First-Time System Turn-On

At the end of the initialization routine, each of the equipped channels is set to the default wavelength and power, and as other parameters defined and stored in the factory-set DEFAULT configuration. The default configuration cannot be changed by users (see *Saving and Loading a Working Configuration* in the *Operation* section), but the start-up configuration can.

### System Turn-On Afterward

After successful system initialization, the STARTUP configuration is loaded on each installed module. The STARTUP configuration restores the individual operating parameters of the mainframe and of each module as you left them at the last system power-off.

### System Idle State

Unless otherwise specified in the user-defined configuration, each OSICS module is in the disable (idle) state completing system turn-on. The message **"Disabled"** is displayed on the Status Screen, facing the corresponding channel number.

| | | |
|---|---|---|
|  | ***CAUTION*** | Avoid switching OFF the system before the initialization routine is complete. |

## 1-6.3 Basic Operation

### Enabling the Output

For laser safety reasons, the OSICS mainframe features a general "Enable" function to enable or disable the laser output. The OSICS mainframe "Enable" function is a master command that overrides all individual laser-enable/disable module settings.

- To allow laser emission on all installed modules simultaneously, use the **Optical Output: ENABLE/DISABLE** menu function in the "Main Setup" menu. (See *Enabling or Disabling the Optical Output* section in the *Operation* section.)
- To enable/disable specific modules only, press the **Enable** key located on the front panel of the particular module you want to enable or disable the laser output.

### Shutting Down the Laser

**Note:** Prior to shutting down the system, we recommend you to disable the laser output of all modules by using the master command **Optical Output: ENABLE/DISABLE** accessible from the "Main Setup". This ensures that at the next system turn-on, all modules are in idle state.

To shut down the system proceed as follows:

- Press the green power key located on the OSICS mainframe control panel.
- The message **"Saving Configuration…"** is displayed to indicate that the current system configuration is being saved in the STARTUP memory. (The STARTUP configuration will be loaded at the next system power-up.)
- Wait till the green power key LED is off.

| | | |
|---|---|---|
|  | ***CAUTION*** | If the OSICS unit has been turned off, you **must** wait **at least** thirty seconds before initializing the OSICS system again.<br>Before moving the instrument, or when the instrument is not in use for a long period of time, the Mains power switch must be set in the "O" position. This ensures that the instrument is no longer powered. |

# 1- 7 User Interface Operation

## 1-7.1 Introduction

This section describes how to use the various user interface functions of the OSICS mainframe. It explains:

- How to Enable/Disable the Optical Output
- How to Set the Optical Output Power
- How to Select the Power Unit (dBm/mW)
- How to Select the Display Unit (nm/GHz) of the Spectral Parameters
- How to Use the Mainframe Modulation Capabilities
- How to Change the GPIB Address of the System
- How to Save/Load a Working Configuration
- How to Change the System Password
- How to Access Firmware Version Information
- How to Use the Remote Interlock

## 1-7.2 How to Enable/Disable the Optical Output

The optical output can be enabled or disabled for each module individually or for all the modules simultaneously.

To enable the optical output for an individual module, proceed as follows:

| Step | | Action |
|---|---|---|
| 1. | Result: | Press the **Enable** key located on the front panel of the desired module.<br>The green LED on the "ON" key is lit.<br>In the System Status screen, the message **Enable** is displayed by the corresponding module, indicating the laser output of this module is now enabled. |

To enable the optical output for all installed modules simultaneously, proceed as follows:

| Step | | Action |
|---|---|---|
| 1. | Result: | Highlight **• Optical Output** menu in the Main Setup menu (see Figure 1-6).<br>If the optical output is disabled throughout the system, the **• Optical Output: DISABLED** message is displayed. |
| 2. | Result: | To switch to **• Optical Output: ENABLED**, press the spinner knob.<br>The optical output is enabled on all modules, simultaneously. The system sounds a beep and all ON keys LEDs are switched on. |
| 3. | Result: | Inversely, if the system's optical output is enabled the message **• Optical Output: ENABLED** is displayed. To disable, press the spinner knob.<br>The optical output is disabled on all modules, simultaneously. All ON keys LEDs are switched off. |

## 1-7.3 How to Select the Power Unit (dBm/mW)

The **→ Set unit dBm/mW** submenu lets you select dBm or mW as the measurement unit in which the output power is displayed in the Status Screen and all other system and module menus in which power settings are involved.

To select the power unit (either in dBm or mW), proceed as follows:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **→ Set unit dBm/mW** submenu item found in the **+ Power** menu. (see Figure 1-6.) |
| 2. | Press the spinner knob. |
| Result: | A window similar to Figure 1-14 appears. The ▸ marker points right away to the power unit currently in use: dBm or mW. |
| 3. | To change the power unit, rotate the spinner knob.<br>Place the ▸ marker in front of the selected unit: dBm or mW.<br>Press the spinner knob to validate your choice. |
| Result: | The optical output power value of each module is now displayed in the newly selected unit. |
| 4. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

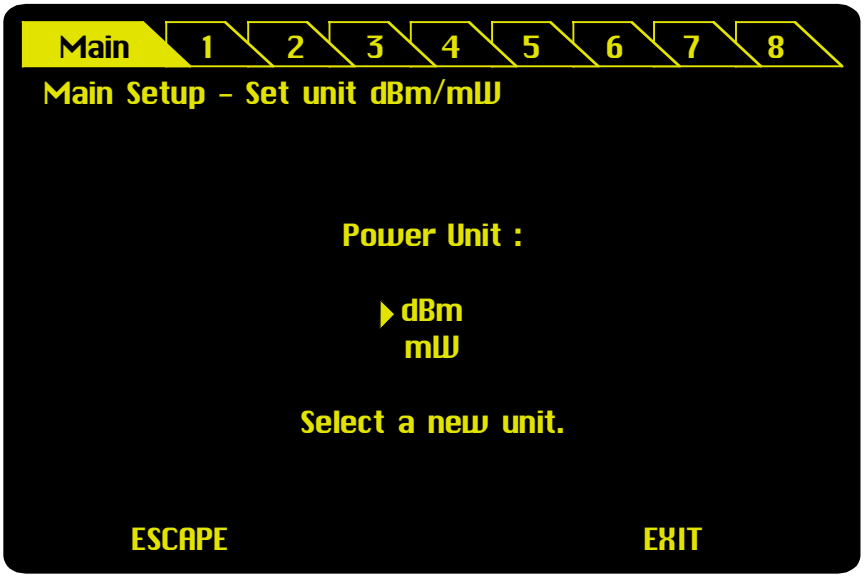



**Figure 1-14: Setting the power unit (dBm/mW)**

## 1-7.4 How to Set the Optical Output Power

The optical output can be set in either of two ways:

- on each module, individually (refer to the appropriate module section in this manual);
- on the OSICS mainframe, to set all modules output power to same value, simultaneously.

This section covers the OSICS mainframe power setting function **→ Set Power reference**. It conveniently lets you set the optical output of all modules to the same value. However, as modules of various types and with various power specifications may be installed on the system, the power setting may very well exceed one of the modules maximum power rating. To prevent any possible power overshoots, each module power is software limited within the acceptable range for that particular module.

To set the optical output power of all modules simultaneously, proceed as follows:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **→ Set Power reference** submenu item found in the **+ Power** menu. (see Figure 1-6.) |
| 2. Result: | Press the spinner knob.<br>A window similar to Figure 1-15 appears on the control panel and displays the current power reference setting. |
| 3. | To change the power reference, position the ▲ marker right below the digit you want to update, then:<br>a) Press the spinner knob once and rotate clockwise to increase the value.<br>b) Press again to validate the value change on the selected digit.<br>c) Repeat steps a) to b) to change other digits.<br>d) Place the ▲ marker below ENTER and press the spinner knob to validate the new Power Reference value. |

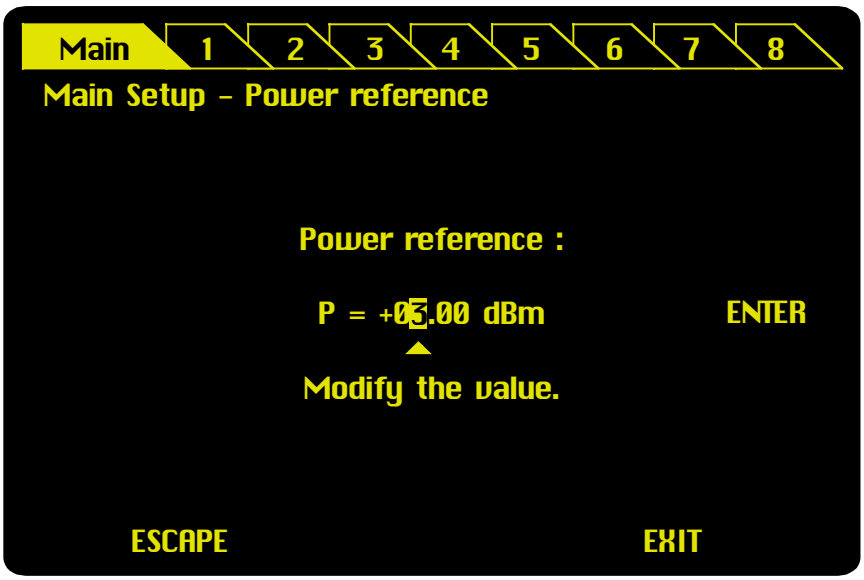



**Figure 1-15: Setting the power reference**

## 1-7.5 How to Select the Display Unit (nm/GHz) of the Spectral Parameters

To change the display unit of spectral parameters, proceed as follows:

| Step | Action |
|---|---|
| 1. | Highlight the **• Set unit GHz/nm** menu using the Main Setup menu (see Figure 1-6). |
| 2. | Press the spinner knob. |
| Result: | A window appears on the control panel, showing which of the wavelength or frequency unit is currently used, as indicated by the ▸ marker (see Figure 1-16). |
| 3. | To change the unit, rotate the knob.<br>The ▸ marker is placed in front of the unit newly chosen.<br>Press the knob to validate. |
| Result: | When a new unit has been selected, all the spectral values of all the modules (including the wavelength step) are displayed in the new unit. Parameter settings are also performed in the new unit, accordingly. |
| 4. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

As an example, if you switch from “nm” to “GHz”, the wavelength setting “λ=1550 nm” becomes the frequency setting “f=193415 GHz”.

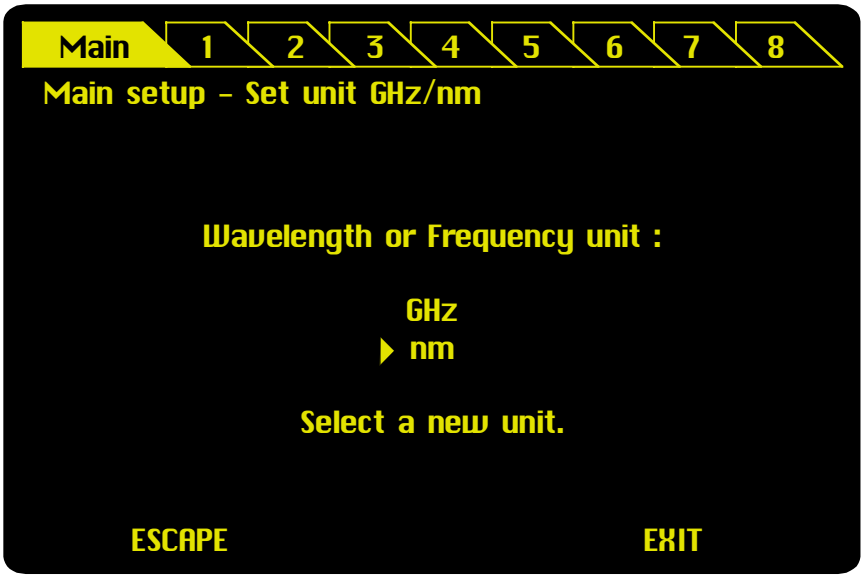



**Figure 1-16: Setting the spectral unit (nm/GHz)**

## 1-7.6 How to Use the Mainframe Modulation Capabilities

The OSICS mainframe features several enhanced digital modulation capabilities, including any internal or external TTL modulation. In addition, each (ECL and DFB) module has analog and digital modulation features of its own.

The OSICS mainframe modulation features include:

- External TTL modulation.
- Internal TTL modulation with onboard oscillator generating from 123 Hz to 1 MHz signals.

Figure 1-17 shows the OSICS mainframe modulation scheme.

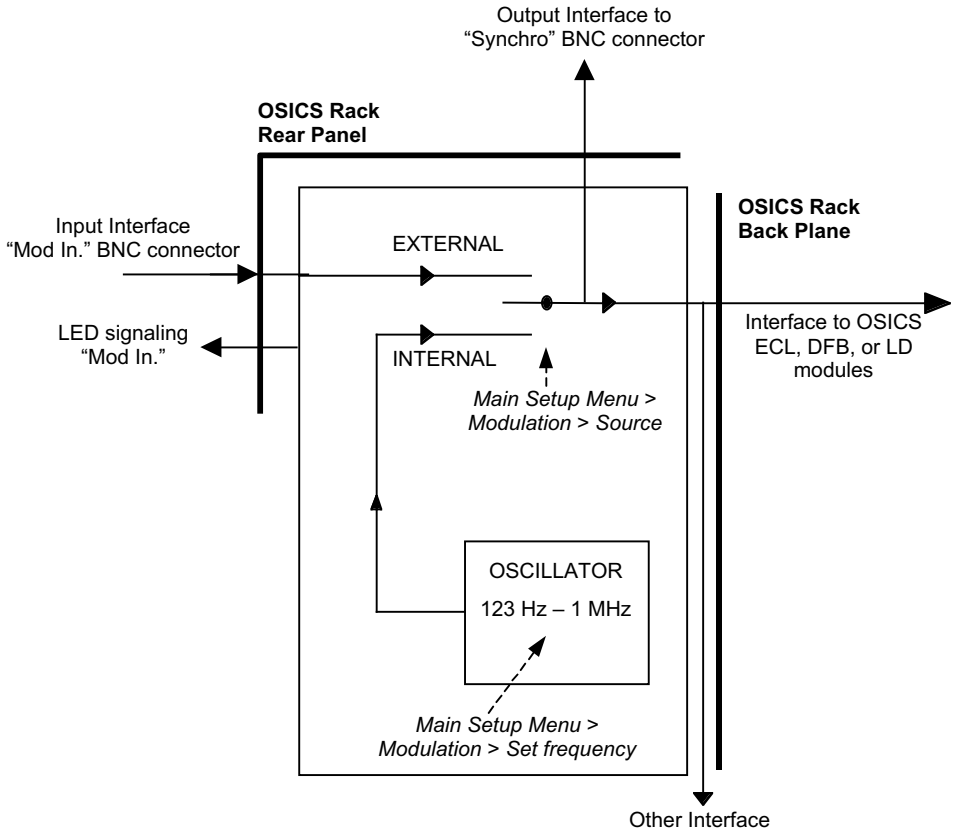



**Figure 1-17: OSICS mainframe modulation scheme**

The OSICS mainframe works as a TTL modulation signal source for OSICS ECL and DFB modules. The TTL modulation source can be either INTERNAL using the OSICS mainframe oscillator source onboard or EXTERNAL by applying an external signal to the "Mod In." BNC connector located at the rear panel.

The modulation source of the OSICS mainframe allows modulation of all the modules in a synchronous way (see Figure 1-17: OSICS mainframe modulation scheme).

As modulation of the laser diode is a key feature of OSICS ECL and DFB modules, details of full modulation capabilities are explained in the corresponding module sections in this instruction manual.

This section describes how to operate the OSICS mainframe INTERNAL and EXTERNAL digital (TTL) modulation functions to modulate ECL and DFB modules.

## How to Set the OSICS Mainframe Modulation Source

To change the modulation source, follow these steps:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **→ Source** submenu item found in the **+ Modulation** menu. (see Figure 1-6.) |
| 2. | Press the spinner knob. |
| Result: | A window similar to Figure 1-18 appears. The ▸ marker points right away to the current modulation source setting: INTERNAL or EXTERNAL. |
| 3. | To change the modulation source, rotate the spinner knob. Place the ▸ marker in front of the desired source: INTERNAL or EXTERNAL. |
| Result: | Press the spinner knob to validate your choice. The new modulation source is now set. |
| 4. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

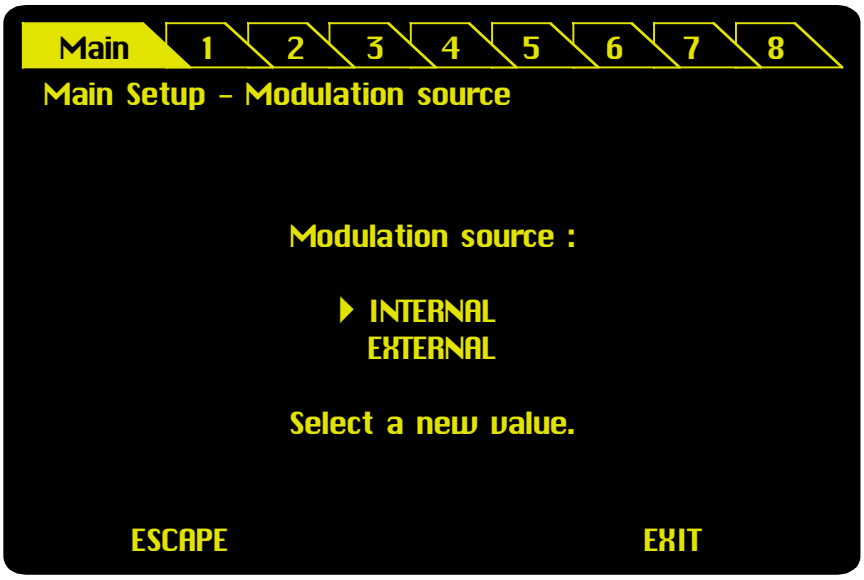



**Figure 1-18: Setting the OSICS mainframe modulation source**

## How to Set the Frequency of the OSICS Mainframe INTERNAL (TTL) Modulation source

Notwithstanding the type and upgrade version of ECL or DFB module installed, the OSICS mainframe can deliver modulated TTL signals in the following frequency range:

| OSICS Mainframe INTERNAL Modulation Source | Minimum Frequency Setting | Maximum Frequency Setting | Smallest Frequency Step |
|---|---|---|---|
| TTL Signal Specifications | 123 Hz | 1000000 Hz (1 MHz) | 1 Hz |

**Note:** The OSICS mainframe modulation frequency range is designed to encompass the frequency requirements of all types of OSICS ECL and DFB modules. Some mainframe frequency settings in the upper and lower frequency range may therefore lie outside the modulation capabilities of a particular module, in which case the module's own frequency range sets the actual modulation specification.

To set the OSICS mainframe INTERNAL modulation frequency, follow these steps:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **→ Set Frequency** submenu item found in the **+ Modulation** menu. (see Figure 1-6.) |
| 2.<br>Result: | Press the spinner knob.<br>A window similar to Figure 1-19 appears on the control panel and displays the current frequency setting. |
| 3.<br><br><br><br><br><br>Result: | To change the frequency, position the ▲ marker right below the digit you want to update, then:<br>a) Press the spinner knob once and rotate clockwise to increase the value.<br>b) Press again to validate the value change on the selected digit.<br>c) Repeat steps a) to b) to change other digits.<br>d) Place the ▲ marker below ENTER and press the spinner knob to validate the new frequency value.<br>The "Frequency value" is updated to the "real frequency" as shown in Figure 1-20. This screen displays the actual modulation frequency produced by the OSICS mainframe oscillator, which may differ slightly from the user setting. |

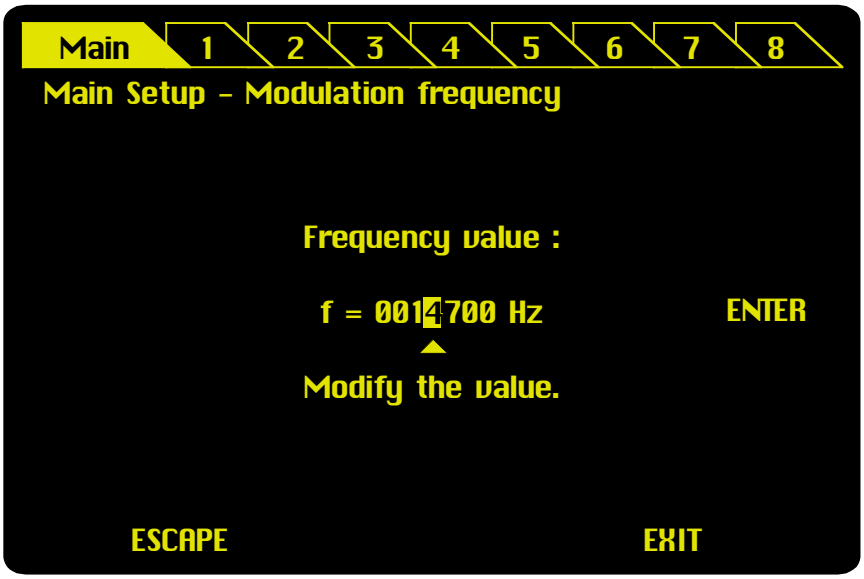



**Figure 1-19: Setting the OSICS mainframe INTERNAL modulation frequency**

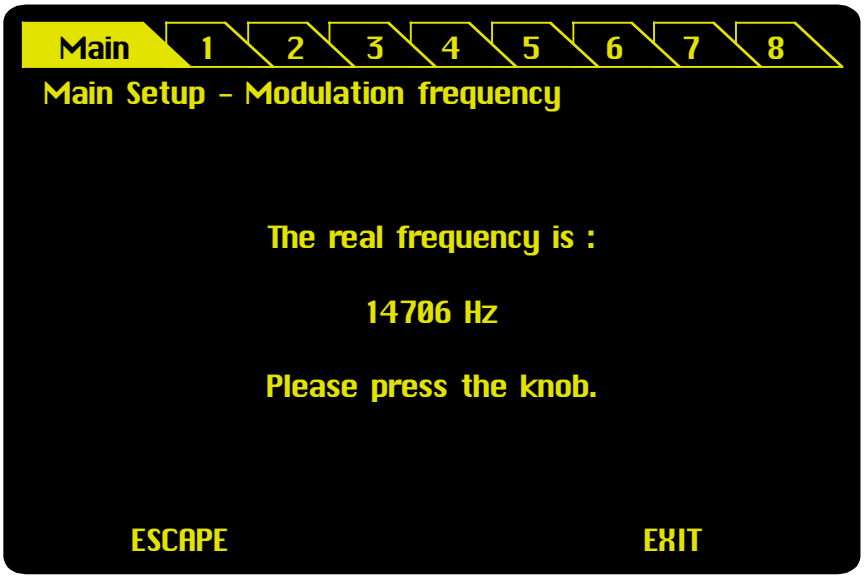



**Figure 1-20: The OSICS mainframe modulation real frequency**

## How to Use External Digital Modulation via the OSICS Mainframe

The role of the OSICS mainframe is to dispatch the external modulation signal to all modules installed, to achieve the goal of synchronizing all modules on a single modulation signal, amplitude, and frequency.

Similarly, the "Synchro" BNC output connector located at the back panel allows to tap directly into the modulation signal to synchronize other external measurement devices onto the OSICS system modulation frequency, as well.

To use the external modulation capability of your OSICS mainframe, follow these steps:

| Step | Action |
|---|---|
| 1. | Connect your external (TTL) modulation generator to the "Mod. In" BNC connector located on the OSICS mainframe rear panel. |
| 2.<br>Result: | Apply the TTL signal not to exceed the maximum voltage of +5 V.<br>The green LED located by the "Mod. In" connector is lit to indicate that an external modulation device is connected. |
| 3. | From the Main Setup menu, highlight the **→ Source** submenu item found in the **+ Modulation** menu. (see Figure 1-6.) |
| 4.<br>Result: | Press the spinner knob.<br>A window similar to Figure 1-18 appears. The ▸ marker points right away to the current modulation source setting: INTERNAL or EXTERNAL. |
| 5. | To change the modulation source, rotate the spinner knob. |
| Result: | Place the ▸ marker in front of the desired source: EXTERNAL.<br>Press the spinner knob to validate your choice.<br>The EXTERNAL modulation source is now set. |
| 6. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

## 1-7.7 How to Save/Load a Working Configuration

Saving or loading configuration settings can be done via the Main Setup menu. When saving a configuration, the system memory records the system settings of the current work session. A working configuration is composed of both the mainframe settings and of the configuration settings of each module installed. Configuration settings are stored in flash memory, and therefore, survive system turn on/off.

Three types of configuration settings are stored in system memory: DEFAULT, STARTUP, and User-Defined. Up to 4 different user configurations (A, B, C, D) can be stored. Configuration settings are described in the following table:

| Configuration | Description |
|---|---|
| DEFAULT | When called up by the user, the DEFAULT configuration restores the factory-set default operating settings on the OSICS mainframe and all the OSICS modules installed.<br>Use this function as a means to reset all modules installed and restart configuring from scratch, as needed.<br>DEFAULT parameters are listed in Table 1-7 below.<br>(**Note:** The DEFAULT configuration is load-only. It cannot be changed by users.) |
| STARTUP | The STARTUP configuration records all system operating parameters as you left them at system turn-off. It is automatically saved when the OSICS mainframe is turned off and loaded at system power up thereby allowing to continue system operations, as you left them.<br>STARTUP parameters are listed in Table 1-7 below. |
| A, B, C, or D | These are user-defined configurations that let you save up to four different sets of operating parameters. Smart use of user-defined configurations can save valuable time by eliminating otherwise tedious and repeated system parameter adjustments.<br>User-defined parameters are listed in Table 1-7 below. |

Configuration-stored parameters are listed in the following Table 1-7.

**Table 1-7: Configuration-stored parameters**

| Parameters from the… | STARTUP, A, B, C, or D stored settings | DEFAULT settings |
|---|---|---|
| **Mainframe** | ENABLED or DISABLED | DISABLED |
| | Power unit | mW |
| | Power setting | 0 |
| | Wavelength or frequency mode | Wavelength mode (nm) |
| | Modulation source (internal or external) | Internal |
| | Frequency of the modulation source | 123 Hz |
| | GPIB address | 10 |
| **Module** | ENABLED/DISABLED | DISABLED |
| | Power unit | mW |
| | Power setting | 0 |
| | Wavelength or frequency mode | Wavelength mode (nm) |
| | Wavelength setting*<br>(*center frequency of ECL module) | 1550* nm for ECL-1550<br>(*depending on ECL module) |
| | Modulation source (internal or external) | INTERNAL |
| | Modulation control (OFF, ON, or ON INVERTED) | OFF |
| | Frequency of the modulation source | 153 Hz |
| | Coherence Control function | OFF |
| | Auto peak find function | ON |
| | Step in menu | 0.1 nm |
| | Step in frequency | 10 GHz |
| | Analog out (Current, Power, or Temperature) | Power |

To save or load a working configuration, follow these steps:

| Step | Action |
|---|---|
| 1. | Highlight the **→ Save** (or **→ Load**) submenu found in the **+ Configuration** menu using the Main Setup menu (see Figure 1-6). |
| 2. Result: | Press the spinner knob.<br>The control panel displays the list of configurations to choose from to Save or Load (see Figure 1-21 and Figure 1-22). |
| 3. Result: | Place the ▸ marker in front of the desired configuration and press the spinner knob.<br>When loading, the **"Moving…"** message is displayed.<br>When saving, the **"Saving Configuration…"** message is displayed.<br>**Note:** When saving a configuration you can choose from memory A, B, C, or D (see Figure 1-22).<br>When loading a configuration you may choose from DEFAULT, STARTUP, A, B, C, or D configurations.<br>The **"Configuration Read Error"** message is displayed if you try to load a user-defined configuration (A, B, C, or D) that has no settings stored in it.<br>**Note:** The ENABLED state of the different modules, which is set through the front panel ENABLE key, is never saved in STARTUP memory. For laser safety reasons, all modules are always in DISABLED state after system turn-on and initialization.<br>**Note:** However, the ENABLED state of individual modules may be stored in user-defined memory A, B, C, or D. |
| 4. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

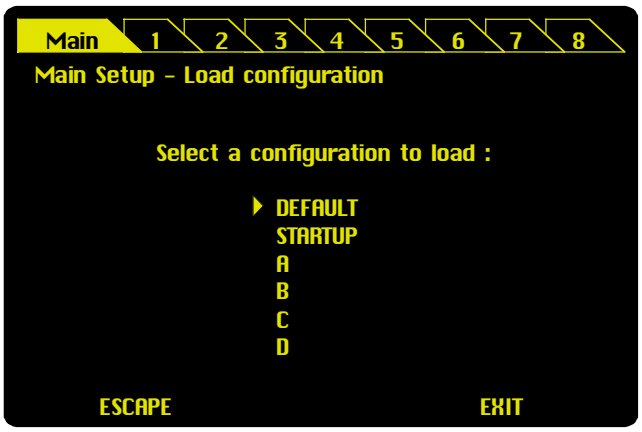



**Figure 1-21: Displayed window to load a configuration**

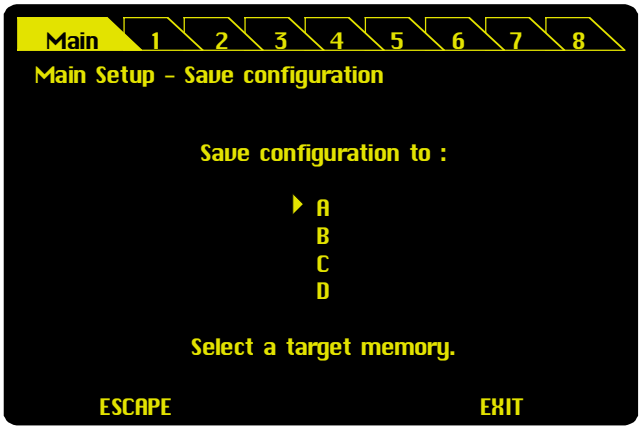



**Figure 1-22: Displayed window to save a configuration**

## 1-7.8 How to Change the GPIB Address of the System

The default GPIB address of the OSICS platform is factory-set to 10.

To change the GPIB address, follow these steps:

| Step | Action |
|---|---|
| 1. | Highlight the **• GPIB Address: 10** entry menu in the Main Setup menu (see Figure 1-6). |
| 2.<br>Result: | Press the spinner knob.<br>A window appears showing the current GPIB address (see Figure 1-23). |
| 3. | Change the value using the same instructions found in the *General Parameters Setting Principle* section in the *Front & Rear Panels* chapter.<br>A valid GPIB address ranges from 1 to 30.<br>The new GPIB address is saved in the system's non-volatile memory and survives system turn-off. |
| 4. | Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |

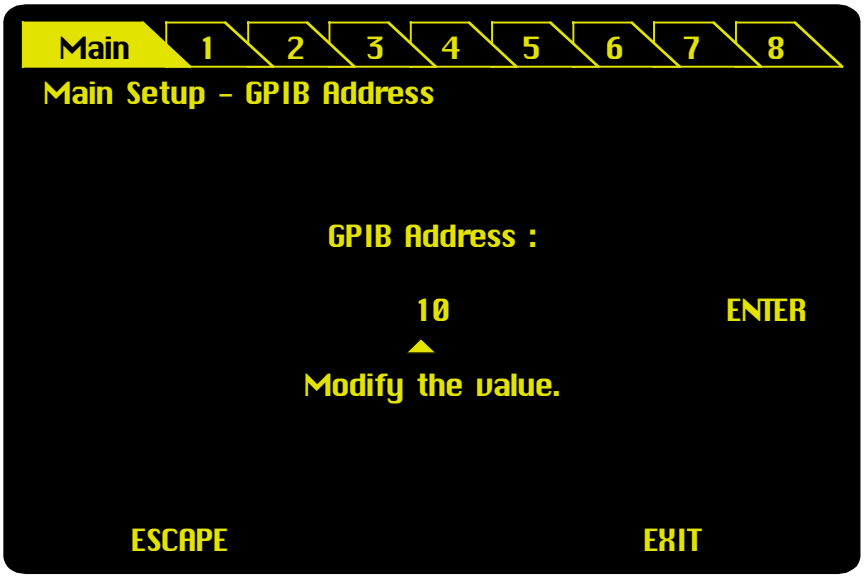



**Figure 1-23: Changing the GPIB address**

**Note:** If ESCAPE or EXIT is selected, the previous value is kept unchanged and the Main Setup menu is displayed.

## 1-7.9 How to Enter/Change the System Password

For laser safety reasons, a user password controls the access to the OSICS system.

User is required to provide a valid password at system turn-on, as shown in Figure 1-24. The password consists in a 4-digit numeral. Enter each digit of the password using the control panel spinner knob.

The default password is **"0000"**.

## How to Enter the Password

To enter the password, follow these steps:

| Step | Action |
|---|---|
| 1. | Use the spinner knob to increment or decrement the password digit marked ▲ (see Figure 1-24). |
| 2. | Press the spinner knob to validate your digit entry and release the ▲ marker. |
| 3. | Rotate the spinner knob to move the marker to the next digit and repeat steps 1 through 2 till all four digits are entered. |
| 3. Result: | Press the ENTER soft-key to submit the password.<br>If the password is correct, the control panel brings up the system Status Screen. |

**Note:** If you forget your password, please contact your NetTest authorized distributor or the NetTest Customer Support Center immediately.


**Figure 1-24: Entering the user password**

## How to Change the System Password

To change the system password, follow these steps:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **• Password** menu. (see Figure 1-6.) |
| 2. Result: | Press the spinner knob.<br>A screen similar to Figure 1-25 appears, requesting you to enter the current password. |
| 3. Result: | Use the spinner knob to enter the current password and select ENTER.<br>A screen similar to Figure 1-26 appears, requesting you to enter the new password. |
| 4. Result: | Enter the new password using the spinner knob and select ENTER.<br>A screen similar to Figure 1-27 appears, requesting you to confirm the password change. |

| Step | Action |
|---|---|
| 5. | Press the spinner knob to confirm the password change.<br>Press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |
| Result: | The system password has now changed. Please record your new password, as you will be required to provide it at the next system turn-on. |
| Note: | You may cancel the password change at any time (before final confirmation in step 5) by pressing the ESCAPE or EXIT soft-keys. |


**Figure 1-25: Entering the current password**


**Figure 1-26: Entering the new password**


**Figure 1-27: Confirming the password change**

## 1-7.10 How to Access Firmware Version Information

The **• Information** menu displays information about the software revision of your OSICS mainframe.

**Note:** For information about the firmware revision of a plugged-in module, refer to the Unit Setup menu of that particular module.

To get software revision information about your OSICS mainframe, follow these steps:

| Step | Action |
|---|---|
| 1. | From the Main Setup menu, highlight the **• Information** menu using the spinner knob. |
| 2. Result: | Press the spinner knob.<br>The OSICS mainframe information screen appears as shown in Figure 1-28. The software revision number is displayed in the "V. n.nn" format, where "n" is an integer. |
| 3. | Press the knob to quit the "Information" screen, or press the ESCAPE soft-key to return to the previous menu (Main Setup menu) or press EXIT to return directly to the Status Screen. |


**Figure 1-28: Getting software revision information about your OSICS mainframe**

## 1-7.11 How to Use the Remote Interlock

The OSICS system is a Class IIIb laser product equipped with a Remote Interlock connector in accordance with Code of Federal Rules (USA) "21 CFR Subchapter J".
The user may attach a remote interlock switch to the Remote Interlock SUBD-9 connector located on the rear panel of the OSICS mainframe.

### How to Connect a Switch to the Remote Interlock Connector

When connecting to the Remote Interlock switch, user must provide a connector that meets the following pin assignment:

- Pins 1-2 Shorted
- Pins 6-7 Connect to external switch

**Note:** User must ensure the external switch is electrically isolated from other circuits, including earth ground.

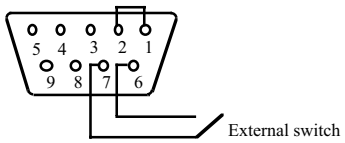



**Figure 1-29: Remote Interlock pin assignment**

### How to Use the Remote interlock Switch

If the remote interlock switch is opened, the laser output of all modules installed on the OSICS system is switched off. The message "INTERLOCK" is displayed for all module-equipped channels in the "P (mW)" or "P (dBm)" field of the Status Screen to indicate that the OSICS laser output is switched off, as shown in Figure 1-30.

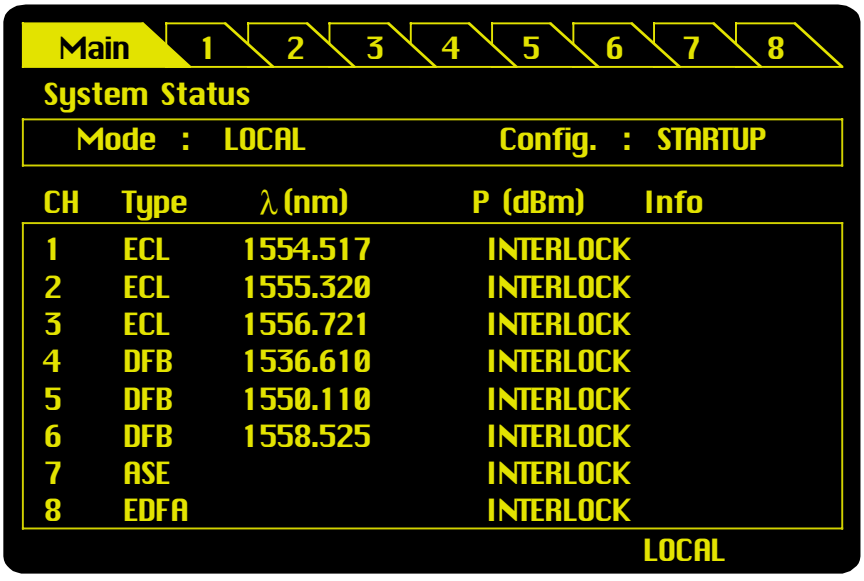



**Figure 1-30: Switching off the OSICS laser output by remote interlock**

If the remote interlock switch is closed, the OSICS system laser output is switched back on.

# 1- 8 Remote Control Operation

## 1-8.1 Introducing Remote Control Operation

The OSICS mainframe supports both the RS-232 C serial and the IEEE-488.2 (GPIB) parallel communications interfaces. When OSICS receives an interrupt on either RS-232 C or the GPIB bus, it automatically switches to the remote control mode of operation.

When OSICS is operating in remote mode, the user interface control panel is disabled. The **"Mode:REMOTE"** message is displayed on the OSICS Status Screen. The Status Screen remains active and displays current module settings, such as operating wavelength (or frequency) or output power. The Status Screen operating settings are updated in real-time, as usual.

To return to the user interface operation, simply press the "LOCAL" soft-key at the OSICS mainframe control panel (during user interface operation, the OSICS screen displays the **"Mode:LOCAL"** message).

## 1-8.2 How to Use the RS-232 C Interface

This section explains how to use the RS-232 C interface to remotely operate the OSICS system.

### Introduction to the RS-232 C Bus

***The RS-232 C Standard***

The RS-232 C interface implements a serial communications protocol between the OSICS mainframe (identified as DTE) and the computer terminal (identified as DCE).

***The OSICS Mainframe RS-232 C Port***

The RS-232 C port located at the rear panel of the OSICS mainframe uses a female 9-pin D-Sub connector. The RS-232 C port is configured as Data terminal Equipment (DTE).
The RS-232 C serial port pinout is detailed in Table 1-8.

**Table 1-8: RS-232 C serial port pinout**

| Pin # | Signal | Description |
|---|---|---|
| 2 | RXD (Receive Data) | The OSICS mainframe receives data from the computer terminal. |
| 3 | TXD (Transmit data) | The OSICS mainframe sends data to the computer terminal. |
| 5 | GND (Ground) | Ground reference. |
| **Note:** No other connector pin is used. | | |

***RS-232 Cable Connection***

If your remote terminal uses a 9-pin RS-232 connector, use a three-wire straight-through cable with the following wiring scheme to connect to the OSICS mainframe, as shown in Table 1-9.

**Table 1-9: Cable wiring scheme for RS-232 C interface**

| Remote (Computer/Terminal) Side | OSICS Mainframe Side |
|---|---|
| Pin 4 (TXD) | Pin 2 (TXD) |
| Pin 3 (TXD) | Pin 3 (RXD) |
| Pin 1 (GND) | Pin 5 (GND) |

### ***How to Configure the RS-232 C Computer Terminal***

The computer terminal is configured to be a DCE. The DCE device may be a VT-100 console or a computer equipped with a VT-100 compatible emulation program such as HyperTerminal® on a Windows® platform.

The serial port settings on the DCE must be configured with the following parameters:

**Table 1-10: Serial port settings**

| Serial port communications parameters | Serial port settings |
|---|---|
| Baud rate (Bits per second) | 9600 bauds |
| Data bits | 8 |
| Parity | None |
| Stop bits | 1 |
| Flow control (Handshaking) | None |

**Note:** If you configure port settings with values other than specified herein, the RS-232 C communications link with your OSICS system will not function properly.

## Commands Format in RS-232 C Protocol

All commands sent to OSICS by the computer consist of a string of ASCII alphanumeric characters followed by a "carriage return" character (CR or ASCII code 13). When such an instruction is received by OSICS, the character string is decoded and the relevant procedure is carried out.

The OSICS system accepts two kinds of instructions: Commands and Query Commands.

### ***Setting Commands***

A setting command consists in a character string that ends with a "carriage return" character (CR or ASCII code 13) in RS-232 C and the "line-feed" character (LF or ASCII code 10) or "EOI" message in GPIB. A setting command can be used for configuring the operating status of the instrument or for setting operating parameters of the OSICS mainframe and modules.

Commands are based on a simple two-level hierarchy. First-level commands affect the OSICS mainframe only. To enter an OSICS mainframe command, simply type in the instruction string followed by the carriage return character in RS-232 C, as shown in the following example:

P=0.22 <CR> *Sets the output power for all modules installed in the OSICS mainframe to 0.22 mW (if mW is the selected power unit).*

Second-level commands are used to control the operation and setting parameters of modules installed in the OSICS mainframe. Module commands require the "CHi:" specifier (where "i" is the channel number ranging from 1 to 8) in front of the instruction string to identify the destination module (or channel) to which the command applies, as shown in the following example:

CH2:P=0.22 <CR> *Sets the output power for the module installed in channel-slot 2 to 0.22 mW (if mW is the selected power unit).*

All OSICS remote control commands follow these syntax rules:

- Commands are not case sensitive.
- White spaces are allowed only before or after a command string, but not within a command mnemonic.
- Compound commands are allowed and consist of a series of individual instructions separated from one another by a ";".
- A single command string can be up to 255 characters long. A longer command string will generate a "command error" message, and the buffer will be cleared.
- A new command cannot be sent until all the instructions of the command string already inside the buffer are completed. This will otherwise clear the buffer, generate a "command error", and all previous commands will be lost.

## ***Query Commands***

Query commands obey the same syntax rule as the setting commands discussed earlier, but end with a "?". Query commands can be used to read back the value of a parameter setting. Therefore, to most setting commands corresponds a query command, as shown in the example below:

CH2:P=0.22 <CR> *Setting command.*
CH2:P? <CR> *Query command returns the value of the output power in the power unit specified as mW or dBm.*

**Note:** The "?" must be attached to the command mnemonic. Therefore no white space is allowed between the command mnemonic and the "?", as this will generate a "command error".

## ***Numeric Values***

Some commands require a numeric parameter as shown in the examples above. Numeric values may be integers or doubles depending on the definition of the parameter.

Numeric commands follow these rules:

**Table 1-11: Format of numeric values in RS-232 C and GPIB**

| **Handling numeric values** | **Example of correct command** P=1.2 *(sets all installed modules power to 1.2 mW)* | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Correct syntax** | | | | | | | | **Syntax error** | | | | | | |
| A numeric value can start with a leading "0". | P | = | 0 | 1 | . | 2 | | | | | | | | | |
| The "=" sign cannot be totally omitted but can be replaced by a white space character. | P | | 1 | . | 2 | | | | | | | | | | |
| White spaces are allowed before or after a command string. | | P | = | 1 | . | 2 | | | | | | | | | |
| White spaces are allowed before and after the "=" sign. | P | = | | 1 | . | 2 | | | | | | | | | |
| Unit notation cannot be used. | | | | | | | | | P | = | 1 | . | 2 | m | W |
| A comma cannot be used in place of a decimal dot. | | | | | | | | | P | = | 1 | , | 2 | | |
| White spaces are not allowed within a numerical value. | | | | | | | | | P | = | 1 | | . | 2 | |

## ***Compound Commands***

A compound command consists of a string of individual commands separated from one another by semicolons ";". A compound command can be no longer than 255 characters. Instructions are processed by the OSICS system in the order received.

The usual way of entering commands is to provide single commands as shown in the example below:

| | |
|---|---|
| MW <CR> | *Sets the output power unit as mW.* |
| ENABLE <CR> | *Switches on the laser output of all installed modules.* |
| P=1 <CR> | *Sets the power output level of all modules to 1 mW.* |
| CH3:P=1.2 <CR> | *Sets the power output level of the module installed in channel-slot 3 to 1.2 mW.* |

In compound form, the above set of commands becomes:

MW;ENABLE;P=1;CH3:P=1.2 <CR>

## ***Response Messages***

All RS-232 C commands generate a response message from the OSICS system to inform the computer whether the procedure was successfully performed or that an error occurred (error messages are explained in the following *Error Handling* section).

A RS-232 C response message always ends with the "end-of-message" group composed of the <CR> to end the message string, a blank line, and the ">" sign placed on the next line followed by one white-space character, to separate response messages from one another along the vertical layout. As an example, the following set of commands:

P=0.5 <CR>
P=? <CR>

will generate the following two response messages (when operation is successful):

OK <CR>

>
P=0.5 DBM <CR>

>

Only query commands can generate a specific answer. All other commands return an "OK" message when performed successfully.

## ***Error Handling***

The OSICS system performs error checks on each command received and during command execution. Errors fall into three categories and may generate one of the following error messages:

| | |
|---|---|
| VALUE ERROR | *The command syntax is valid but the data contained in the command parameter is out of valid range. The current parameter setting remains unchanged.* |
| COMMAND ERROR | *An unknown command is received or the command string has a syntax error in it.* |
| DEVICE DEPENDENT ERROR | *Some condition due to instrument malfunction or overload has been detected.* |

## RS-232 C Common Commands

This section describes the ECHON command, useful for viewing the characters keyed in at the terminal (see Table 1-12 below).

**Table 1-12: The ECHON Command**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| ECHON | None | Sets the OSICS mainframe to echo each typed character received back to the terminal. | OK |
| ECHOFF[d] | None | Cancels "echo" mode on the OSICS mainframe. | OK |

Setting the echo mode using the ECHON command is needed for some terminals and terminal emulation programs do not feature local echo, or otherwise typed characters cannot be seen.

Some terminal emulation programs that feature local echo, such as HyperTerminal®, may not have this feature enabled. For instance, to enable local echo manually, go to **File > Properties > Settings > ASCII Setup**, then check the **"Echo typed characters locally"** option.

- The default option is ECHOFF. In addition, if the user exits the remote mode using the "LOCAL" key and the remote operation is re-activated, the echo mode is switched to ECHOFF.

[d] Default setting. Note that if the local operating mode is restored using the front-panel "LOCAL" soft-key, the echo mode is automatically switched off and restored to default: ECHOFF.

## 1-8.3 How to Use the IEEE-488.2 GPIB Interface

This section explains how to use the IEEE-488.2 GPIB interface to remotely operate the OSICS system.

### Introduction to the IEEE-488.2 Bus

The "GPIB" (General Purpose Interface Bus) communications link of the OSICS system is compatible with the IEEE-488.2 Standard. The purpose of the normalized IEEE-488.2 bus is to allow communications between instruments and computers through a specialized parallel interface. The data transfer rate is as high as 1 Mbytes/s, and the information transfer is highly secured. The GPIB link is often used to automate measurement processes.

The standard configuration is composed of a controller device (which is usually a computer equipped with a GPIB interface board and corresponding IEEE-488 terminal emulation software) linked to various instruments. The controller manages the flow of information to, from, and between devices. One “talker” device and one or more “listener” devices may be present at any time on the GPIB link. Data sent on the bus is encoded in ASCII strings.

Each instrument on the bus is identified by its own GPIB address. The GBIP address is an integer in the range from 0 to 30. For each instrument, different control registers can be used to determine the instrument operation state. The default GPIB address of the OSICS system is 10, but it can be changed (see *How to Change the GPIB Address of the System* on page 1-43).

### GPIB Functions on the OSICS

OSICS supports the following GPIB functions, as listed in the table below:

**Table 1-13: GPIB functions on OSICS**

| Mnemonic | Meaning | Implementation |
|---|---|---|
| SH1 | Source handshake | Complete |
| AH1 | Acceptor handshake | Complete |
| T5 | Talker | Complete |
| L3 | Listener | Complete |
| SR1 | Service request | Complete |
| RL1 | Remote / Local | Complete |
| PP0 | Parallel poll | No |
| DC1 | Device clear | Complete |
| DT0 | Device trigger | No |
| C0 | Controller | No |

### How to Check System Status with the Status Word Variable

***Definition of the Status Word***

The status word is an 8-bit variable that relates to the status of the OSICS instrument and error reporting as well. It contains a number of binary indicators which can be used by the controller for an optimal synchronization between OSICS and the controller. They indicate to the controller the nature of the current operation as well as the errors encountered.

The only way to read the status word is to perform an operation called serial polling.

The following diagram in Figure 1-31 shows the status model as specified by the IEEE-488.2 standard.

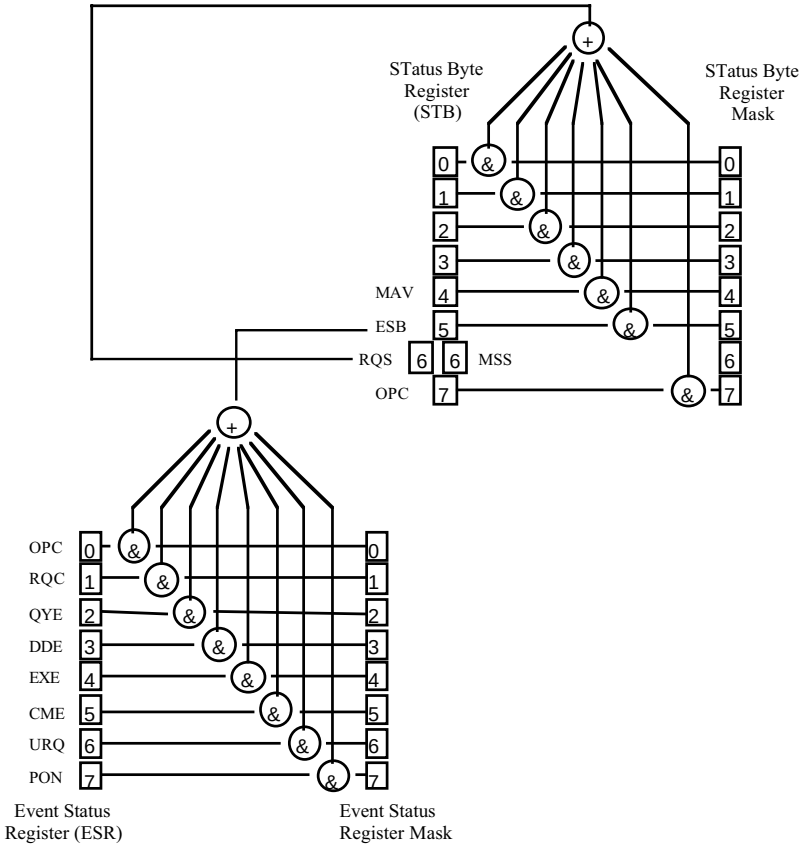



**Figure 1-31: IEEE-488.2 status word model**

## ***Control Registers and Related Commands***

The meaning of each bit in the Status Byte register (STB) and the Event Status register (ESR) is described in Table 1-14 and Table 1-15 respectively.

**Table 1-14: Status Byte Register (STB)**

| Bit number | Name | Meaning |
|---|---|---|
| 7 | OPC (OPeration Complete) | Set once the last command has been completed. |
| 6 | RQS (ReQuest Service) | Set when a service request has been generated by the OSICS instrument. This bit stays true until a serial poll has been performed. |
| 6 | MSS (Master Summary Status) | Set together with the RQS bit; this bit stays true for as long as the condition which has lead to a service request is high. It is cleared as soon as this condition ceases. This bit can be read by the *STB ? command. |
| 5 | ESB (Event Status Bit) | Set as soon as one or more bits in the Event Status Register (ESR) is true. |
| 4 | MAV (Message AVailable) | Set when a message is available and ready to be read in the output queue; this bit remains true as long as the output queue has not been emptied. |

**Table 1-15: Standard Event Status Register (ESR)**

| Bit number | Name | Meaning |
|---|---|---|
| 7 | PON (Power ON) | This bit is set once the instrument initialization routine has been completed. |
| 6 | URQ (User ReQuest) | Set to indicate that an instrument front-panel key has been pressed. |
| 5 | CME (ComMand Error) | Set to indicate a command syntax error or an unknown command. |
| 4 | EXE (EXecution Error) | Set when a parameter value is out of the valid range or when a command cannot be executed. |
| 3 | DDE (Device Dependent Error) | Set when a malfunction has occurred on the instrument or an overload condition has been reached. |
| 2 | QYE (QuerY Error) | Set in either of those two cases:<br>• the GPIB controller has attempted to read from the OSICS instrument while the output queue was empty;<br>• data in the GPIB output queue has been overwritten and lost. |
| 1 | RQC (ReQuest Control) | This bit may not be set since the OSICS instrument does not work as an IEEE-488.2 bus controller. |
| 0 | OPC (OPeration Complete) | In most cases, this bit is set as soon as a command line has been completely executed. |

The Event Status Register is cleared each time it is read by the controller. When the execution of a command line begins, the OPC bit is cleared.

Two mask registers are associated with the Status Byte register (STB) and the standard Event Status Register (ESR). These masks are used to control the service request operation of the instrument. In the status and standard event registers, individual bits are validated by setting the corresponding bit in the mask register. Once the required bits have been set in each mask register, the summary bit will become true when the corresponding status or event register bits become true.

The summary bit is obtained by performing first a logical AND between each register and the corresponding mask register, and then a logical OR between all individual bits of the result.

## How to Synchronize Tasks

Two flags of the status word are especially useful in helping synchronize tasks. Please note that this system's GPIB interface performs tasks sequentially, in the order received, and therefore, does not support overlapping tasks.

- The **OPC (OPeration Complete)** bit is cleared while the instruction is being processed and set once it has been completed. This is particularly useful when setting a channel to a new wavelength, as this operation may take a few seconds to complete. The computer should test this flag until it is set, and then only proceed to the next instruction. The status of the OPC flag is available through the serial-poll STB byte. The OPC flag is contained in bit 7 of the STB byte.

- The **MAV (Message AVailable)** bit indicates that messages are available in the output buffer and ready to be read. For instance, if a query command was sent, the computer must wait until the response message is placed in the output queue before reading it. Note that if several queries were sent via a compound command, the MAV flag stays true till all response messages have polled by the computer. The MAV flag is contained in bit 4 of the STB byte.

## IEEE-488.2 Common Commands

To accelerate and secure the exchange of information between the controller and the OSICS instrument, we recommend checking the values of the Status Register and of the standard Event Status Register using the IEEE-488.2 common commands presented in Table 1-16.

**Note:** All IEEE-488.2 common commands start with the "*" character. The channel mnemonic "CHi" may not be used for this will generate a "Command Error".

**Table 1-16: IEEE-488.2 Common Commands**

| Command | Parameter | Action | OSICS Response |
|---|---|---|---|
| *CLS | | Clears the Event Status Register and the output queue. Sets the OPC bit to 1.<br>**Note:** The CLS instruction is automatically sent to each module. | |
| *ESE | Integer value (0 to 255) | The standard event mask register is set to a value equal to the parameter of ESE command.<br>**Note:** If the parameter is out of the range of 0 to 255, this triggers the "Execution Error". | |
| *ESE? | | The value of ESE is placed in the output queue. | Returns the value of ESE (0 to 255). |
| *ESR? | | Standard Event Status Register query.<br>The value of the standard event register is placed into the output queue and the standard event register is cleared. | Returns the value of the ESR byte (0 to 255). |
| *IDN? | | IDeNtification query. | NetTest, OSICS,0,n.nn (where n.nn is the software release). |
| *OPC | | Waits till the pending command is completed, then sets the OPC bit in the Event Status Register. | |
| *OPC? | | Waits till OPC bit is true, then places "1" in the output queue, followed by the LF character. | This command always returns "1". |
| *RST | | The input buffer is cleared. The command interpreter is reset and a reset instruction is sent to every module. The status and event registers are cleared. Sets the OPC bit to 1. | |
| *SRE | Integer value (0 to 255) | Sets the value of the Service Request Enable Register. SRE determines which event triggers a serial poll. SRE is assigned the value of its parameter. For example, if bit 4 is set, this means that a service request will be generated when a message becomes available in the output queue.<br>**Note:** If the parameter is out of the range from 0 to 255, this triggers the "Execution Error". | |
| *SRE? | | Reads the value of the SRE register. | Returns the value of the SRE register (0 to 255). |
| *STB? | | STatus Byte query.<br>The value of the status byte register is sent to the output queue. STB contains the MAV flag that takes bit number 4.<br>**Note:** In the STB? query, bit 6 is assigned the MSS flag rather than the RQS flag, unlike the standard STB. | Returns the value of the STB status byte (0 to 255). |
| *WAI | | Does nothing but wait till the pending command has been completed. | |

## Commands Format in GPIB

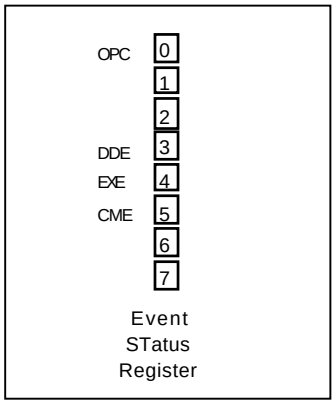
Please note that, with some exceptions that are discussed in this section, most of the commands format on the OSICS system is identical for both RS-232 C and GPIB interface protocols. For conciseness, commands format information is not repeated in this section, and we invite readers to refer to the *Commands Format in RS-232 C Protocol* section on page 1-49, for a detailed explanation on *Setting Commands, Query Commands, Numeric Values, Compound Commands, Response Messages,* and *Error Handling*.

The differences between the GPIB and RS-232 C command formats are summarized in the table below:

| Interface | How to indicate the end of a message. |
|---|---|
| RS-232 C | Use the carriage return or provide the ASCII code 13 character. |
| GPIB | Use the EOI method or provide the ASCII code 10 character. |

## Error Handling

When different types of errors occur, relevant bits in the Event Status Register (ESR) are set. The following diagram shows the ESR error model:




The ESR byte can be read via the *ESR? Query.

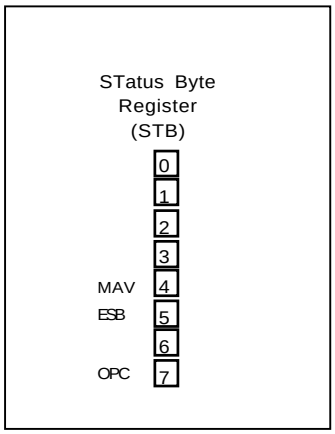
The relevant bits in this control byte are bits 0 (OPeration Complete: OPC), 3 (Device Dependent Error: DDE), 4 (EXecution Error: EXE), and 5 (CoMmand Error: CME).

We recommend reading the ESR bit each time a command is sent to help trace errors throughout programmed operation, identify possible causes for errors and make the necessary programming adjustments.

| | | |
|---|---|---|
| ⚠ | ***WARNING*** | Reading the ESR byte with the ESR? query command clears all the bits in the Event Status Register. Therefore, we recommend reading all significant bits at the time of query to ensure no relevant information is left out or lost. |

## Synchronization

To ensure a proper sequence of events, it may be useful to combine the use of the STatus Byte Register (STB) with the Event Status Register (ESR) described above. The most relevant bit in the STB byte is bit 4, (MAV). The MAV bit is set when a message is available in the output queue. The STB byte can be read either through a serial poll or as a response to the *STB? query.




## How to Change the GPIB Address

The OSICS system GPIB address is preset to 10.

Up to 15 devices may be connected on the same GPIB bus, simultaneously. Each device has its own GPIB address, in the range of 0 to 30. To void address conflicts, you must ensure that your OSICS system GPIB address is different from the address of any other device already connected on the bus.

You may change the OSICS system GPIB address at the OSICS user interface control panel only. The current GPIB address can be viewed directly in the “Main Setup” menu. To change the GPIB address, refer to instructions provided in the *User Interface Operation* section.

Changes to the GPIB address are implemented immediately (there is no need to restart the system or run the *RST command). The new GPIB address is stored in flash memory, and, therefore, survives system turn-off.

## Local Lockout

When the OSICS system receives a message on the IEEE-488.2 interface bus, it switches automatically to remote control mode of operation.

The OSICS status screen displays the message “Mode:REMOTE”. Local mode of operation may be restored by simply pressing the “LOCAL” soft-key at the OSICS control panel.

The OSICS system may also be locked into GPIB remote control operation. This condition is called “Local lockout”. While in local lockout, all OSICS front panel controls are disabled.

Local lockout may be obtained by sending the proper GPIB command (refer to the user's guide that comes with your GPIB interface board). The local lockout tells the OSICS instrument to ignore front panel (local) controls. This means that local operating mode can no longer be restored using the LOCAL soft-key. If you press the LOCAL soft-key, the message “LOCAL LOCKOUT” is displayed.

While in local lockout mode, the only way to restore the user interface control panel is for the computer (or GPIB controller) to send the “Go to local” instruction to the OSICS system (refer to the programming guide of your GPIB board to know the exact syntax for the “Go to local” instruction).

# 1- 9 OSICS Mainframe Remote Control Commands

This section describes commands that are used to operate the OSICS system remotely. These commands are specific to the OSICS mainframe (for module-related commands, please refer to the module descriptions in later sections of this instructions manual).

For programming ease, most OSICS system device-specific commands were designed to be identical in RS-232 C and IEEE-488.2 remote control modes. However, both RS-232 C and IEEE-488.2 interfaces require that programming follow specific rules as set by their respective programming standards (for general programming rules and common commands, please refer to the *How to Use the RS-232 C Interface* and *How to Use the IEEE-488.2 GPIB Interface* sections on pages 1-48 and 1-53, respectively).

## 1-9.1 System Commands

This section describes OSICS system commands. System commands can be used to control all modules, simultaneously. These commands include operating mode commands, modulation mode commands, configuration load/save commands, and OSICS mainframe management commands.

### Operating Mode Commands

Commands in this group can be used to enable/disable the laser output, set up the power units, and set up the wavelength/frequency units on all modules.

**Table 1-17: Operating Mode Commands**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| DISABLE[(d)] | None | Disables the laser output on all modules. | OK |
| ENABLE | None | Enables the laser output on all modules. | OK |
| MW[(d)] | None | Sets “mW” as the power unit on all modules. All power-related functions throughout the OSICS system now use “mW” as power unit. | OK |
| DBM | None | Sets “dBm” as the power unit on all modules. All power-related functions throughout the OSICS system now use “dBm” as power unit. | OK |
| NM[(d)] | None | Sets the wavelength in “nm” as the spectral unit on all modules throughout the system. | OK |
| GHZ | None | Sets the frequency in “GHz” as the spectral unit on all modules throughout the system. | OK |

(d) Default setting

## Modulation Mode Commands

When the OSICS mainframe is set as modulation source[1], these commands set the OSICS mainframe modulation as EXTERNAL or INTERNAL mode.

**Table 1-18: Modulation Mode Commands**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| MOD_SRC INT(d) | None | Sets the type of the modulation source of the OSICS mainframe, as INT (for INTERNAL digital modulation signal).<br>The internal source uses the OSICS mainframe modulation signal generator, onboard. (See the MOD_F function for frequency setting of the OSICS mainframe internal TTL modulation.) | OK |
| MOD_SRC EXT | None | Sets the type of the modulation source of the OSICS mainframe, as EXT (for EXTERNAL digital modulation signal).<br>External digital modulation is achieved by connecting a TTL signal generator to the "Mod. In" BNC connector at the rear panel of the OSICS mainframe. | OK |

## Configuration Load/Save Commands

These commands allow to save or load various sets of configuration settings that include OSICS mainframe and modules settings all in one configuration. (For a detailed description of configuration settings, refer to *How to Save/Load a Working Configuration* on page 1-41.)

**Table 1-19: Configuration Load/Save Commands**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| RECALL DEFAULT<br>RECALL STARTUP<br>RECALL A<br>RECALL B<br>RECALL C<br>RECALL D | None | Loads an existing configuration from DEFAULT, STARTUP, A, B, C, or D flash-memory.<br><br>**Note:** This configuration overwrites all current system and module settings with the values stored in selected flash-memory. | OK |
| SAVE STARTUP<br>SAVE A<br>SAVE B<br>SAVE C<br>SAVE D | None | Saves the current system and module configuration settings to the selected STARTUP, A, B, C, or D flash-memory.<br><br>**Note:** The DEFAULT memory is factory-set, and load-only. Therefore, no SAVE DEFAULT command is allowed (this command will generate a command error). | OK |

[1] Note that if you want to use the OSICS mainframe as modulation source for a given module, you must set the modulation source of the particular module to MAINFRAME, as well.

### Management Commands

These commands allow to perform system management tasks such as getting the information about the OSICS mainframe software release and clearing the input queue.

**Table 1-20: Management Commands**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| *IDN? | None | Returns information about the OSICS mainframe. | NETTEST,OSICS,0,n.nn (where "n.nn" is the software release). |
| *RST | None | Resets the OSICS mainframe and all modules to the same state as after system turn-on and initialization. Clears the input queue. The command interpreter is reset and a reset instruction is sent to every module. The status and event registers are cleared, as well. Sets the OPC bit to 1. | OK |

## 1-9.2 Parameter Settings Commands

### Output Power Commands

This command sets the output power of all installed modules to the same value.

**Table 1-21: Output Power Commands**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| P=nn.nn | Output power nn.nn (mW) where n=0 to 9 | Sets the optical output power of all modules to the same value, in mW. This assumes the OSICS system is set prior to mW power unit (see "MW" in *Operating Mode Commands*). | OK |
| P=(±)nn.nn | Output power nn.nn (dBm) where n=0 to 9 | Sets the optical output power of all modules to the same value, in dBm. This assumes the OSICS system is set prior to dBm power unit (see "DBM" in *Operating Mode Commands*). | OK |

### Mainframe Modulation Frequency Setting

This command sets the frequency of the OSICS internal TTL modulation source.

**Table 1-22: Mainframe Modulation Frequency Setting**

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| MOD_F=nnnnnn | Frequency nnnnnn (Hz) where n=0 to 9 | Sets the frequency of the OSICS mainframe INTERNAL digital (TTL) modulation source. The frequency setting can range from 153[(d)] Hz to 1000000 Hz (1 MHz).<br>If the OSICS mainframe is not able to generate the exact value of the frequency setting, it applies the nearest available frequency value, right under the value of the setting.<br>To check the actual frequency of the INTERNAL modulation source you can use the "MOD_F?" query command. | OK |

## 1-9.3 Query Commands

| Command | Parameter | Description | OSICS Response |
|---|---|---|---|
| ENABLE? | None | Returns the current state of the OSICS system laser output master control. | ENABLED<br>or<br>DISABLED |
| INTERLOCK? | None | Returns the current state of the remote interlock mode.<br>Remote interlock ON (laser switched OFF)<br>Remote interlock OFF (laser switched ON) | <br>1<br>0 |
| MOD_SRC? | None | Returns the type of the digital (TTL) modulation source currently selected for the OSICS mainframe. | MOD_SRC=INT<br>or<br>MOD_SRC=EXT |
| MOD_F? | None | Returns the frequency of the OSICS mainframe INTERNAL digital (TTL) modulation source in Hz. | MOD_F= nnnnnn |
| MW? | None | Returns the current power unit used throughout the OSICS system (mainframe and all modules).<br>Current power unit is “mW”<br>Current power unit is “dBm” | <br>1<br>0 |
| NM? | None | Returns the current spectral unit used by all elements of the OSICS system (mainframe and all modules).<br>Wavelength unit in “nm”<br>Frequency unit in “GHz” | <br>1<br>0 |
| P? | None | Returns the current value of the output power in notation dependent of the power unit selected:<br>when power unit is set to mW<br>when power unit is set to dBm | <br>P=nn.nn<br>P=±nn.nn |
| PRESENT? N | Channel-slot number<br>N=1 to 8 | Returns the type of OSICS module installed in channel-slot number “N”. Each type of OSICS module has its own module code, as shown below:<br>Empty slot code<br>ECL module code<br>DFB module code<br>ASE-SP and -IN module code<br>EDFA-C17 module code<br>EDFA-C20+ and –L17+ module code<br>LD 980 module code<br>SWT module code<br>ATN module code<br>ASE-L and –SPL module code | <br>-1<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9 |

# 1- 10 Appendices

This section provides you with additional information on how to:

- Provision the OSICS system prior to performing performance verification tests on other system components such as installed modules.
- Perform basic maintenance operations to keep your system up and running.
- Know the system replaceable parts.
- Use the provided troubleshooting information to identify and resolve minor problems prior to contacting your authorized dealer or NetTest Customer Support Center.

## 1-10.1 Provisioning the OSICS System for Performance Tests

This section describes provisioning procedures prior to performing performance tests of the OSICS system.

### System Warm-Up

Turn on the OSICS mainframe with the modules you are planning to check the performance already installed. Let the OSICS system as well as other test equipment run continuously for 2 hours at room temperature (within the specified operating temperature range of 20° C to 30° C) to achieve proper equipment warm-up.

### System Initialization

For safe operation, use the following procedure to initialize the system:

- Make sure the rear panel mains switch is in the "I" position.
- Connect the power supply cable to the rear panel of the controller and then to the proper mains supply.
- Press the ON/OFF button located in the lower left corner of the front panel. During the initialization phase, the message **"Initializing..."** is displayed.
- Once the mainframe is fully initialized, each channel module is initialized.
- The message **"module init..."** is displayed on the display lines corresponding to equipped channels.
- At the end of the initialization, the system is ready to enable and the message **"disabled..."** is displayed on the display lines corresponding to equipped channels.

| | | |
|---|---|---|
|  | ***CAUTION*** | Avoid switching the unit off before the system is fully initialized. |

## Connections to the Laser Output Optical Port

To connect the laser output, remove the protective cap and use a fiber with an FC/APC type connector.

| | | |
|---|---|---|
|  | ***CAUTION*** | To avoid damage to the laser output, always use an FC/APC type connector. To connect other styles, use the FC/PC to FC/APC jumper.<br>To help protect the laser output, leave a jumper cable in place when making connections to other devices. When the laser output is not connected, install the protective cap.<br>**Note:** In the case of frequent connections/disconnections, the use of an intermediate jumper is recommended in order to prevent premature failure of the OSICS module internal connector. |

To obtain the best performance, optical connections must be clean and free of contamination. Cleaning instructions for optical connections are in the Maintenance section in this chapter.

## Enabling the Laser Output

For safety reasons, OSICS has an Enable function to enable or disable the laser output.

1. To enable the laser output, highlight the **• Optical output** menu using the Main Setup menu. Press the spinner knob and all the OSICS modules plugged into the mainframe will be enabled.
2. To enable a specific module, press the Enable key located on the front panel of the selected module.
3. To disable, repeat step 1 or 2 by reversing the enable status.

## Shutting Down the Laser

Before shutting down the device, highlight the **• Optical output** menu using the Main Setup menu to disable all the outputs of the lasers. To shut down the system, press the green button located on the front panel. The message **"saving configuration..."** is displayed and the current configuration is saved as the STARTUP configuration.

| | | |
|---|---|---|
|  | ***CAUTION*** | If the OSICS unit has been turned off, it is imperative to wait at least thirty seconds before initializing the laser again. Avoid switching the unit off before the system is fully initialized. |

## 1-10.2 Basic Maintenance

User maintenance of the OSICS system is limited to basic maintenance tasks that do not require removing the instrument case-cover or accessing any internal component inside the instrument.

Performing the following basic maintenance tasks can help you keep your system up and running for optimum performance, as needed:

- Clean optical connectors for optimum power.
- Check the performance of optical connections and cables.
- Clean the instrument.
- Replace the line fuse.
- Repackage the system.

| | | |
|---|---|---|
|  | ***WARNING*** | **ACCESSING THE INSTRUMENT INTERNAL COMPONENTS IS STRICTLY PROHIBITED.**<br><br>**DO NOT MAKE ANY SERVICE OR MAINTENANCE ON THE LASER HEAD:**<br>Under no circumstance must the user make any service or maintenance repairs of any kind to the laser head. The user must not remove the protective cover of the laser head. Refer servicing to authorized NetTest personnel only. |

### How to Clean Optical Connectors and Fiber Ends

- Handle optical fiber with appropriate care and preserve the integrity of optical connectors by keeping them free of contamination.
- Use the following items to clean the optical connectors:
  - clean compressed air
  - fiber-optic cleaning swabs
  - isopropyl alcohol
- Follow these steps to clean the optical connectors:

1. Hold the can of compressed air upright and spray the can into the air to purge any propellant.
2. Spray the clean compressed air on the connectors to remove any loose particles or moisture.
3. Moisten a clean optical swab with isopropyl alcohol, then lightly swab the surface of the connectors.
4. Spray the clean compressed air on the connectors again to remove any loose particles or isopropyl alcohol.

**Note:** Cleaning kits for optical connectors are available from various fiber optic suppliers.

| | | |
|---|---|---|
|  | ***CAUTION*** | To optimize the performance of the system and to prevent loss of optical power or damage to the optical connectors, keep the connectors clean at all times.<br>When cleaning the connectors with a swab, use gentle circular motions. Use only high quality cleaning supplies that are non-abrasive and leave no residue.<br>To reduce the need for cleaning, immediately replace protective caps on the optical connectors when not in use.<br>Do not over stress or sharply bend optical fiber beyond tolerances specified by the manufacturer. |

## How to Clean the Instrument

If necessary, follow these steps to clean the OSICS instrument:

- Disconnect the instrument from the mains supply before cleaning.
- Clean with a slightly damp cloth with an isopropyl alcohol liquid.

| | | |
|---|---|---|
| ⚠ | ***CAUTION*** | Do not use chemically active or abrasive materials to clean the instrument. |

## How to Replace the Line Fuse

Before replacing the Line Fuse, be sure to unplug the power cord.

- Insert a small flat-blade screwdriver into the notch just inside the power cord socket of the line filter (see figure 6-1).
- Use the notch to pull the fuse holder straight out to remove the fuse.
- Replace the fuse (4.0A 250V SLOW/(T)) in the fuse holder and snap the fuse holder back into the lined filter.

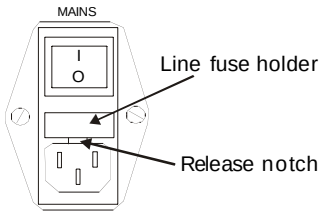



**Figure 1-32: Replacing the line fuse**

## Please Repackage the System before Shipping

Use the original container to repackage the OSICS system before shipping back to NetTest for servicing or calibration. For instructions on returning the instrument, please contact NetTest.

## 1-10.3 Replaceable Parts

For information about replaceable parts, please contact your NetTest sales representative.

### Standard Accessories

| Name | Description |
|---|---|
| Fuse | T4Amp L 250V |
| Manual, tech: instruction | OSICS Instruction Manual |
| PM optical fiber cable | single-mode polarization maintaining cable |
| Optical fiber cable | single-mode cable |
| Power cord | Power cord matching your local standards |

**Note:** OSICS system does not use a power key.

### Optional Power Cords

| Name | | Description |
|---|---|---|
| North America | 110 V, 60 Hz | CSA STD C22.2 NO21-M1984, ECN 436C approved, 5-15P attachment plug cap moulded onto No18 AWG, type SVT,SJT flexible cord, 2 meter (78.7 inch), 125V/10A AC, US. |
| Universal European | 220 V, 50 Hz | DIN 49441/2, CEE7, DIN 0625, VDE approved, IEC attachment plug cap, HO5VV-F3G 0.7 $mm^2$ flexible cord, 2.5 meter (98.4 inch), 250V/10A AC, EUROPEAN. |
| United Kingdom | 240 V, 50 Hz | BS4491. EN60.320, BASEC BS6500, ASTA BS 1363A, VDE, SEV, BSI approved, 1.0 $mm^2$ flexible cord, 2 meter (78.7 inch), 250V/10A AC, 25.4 mm fused UK plug (13A fuse). |

## 1-10.4 Troubleshooting

This section describes error and warning messages that can be generated by the OSICS mainframe system.

Note that error messages can be generated by the OSICS Mainframe unit and by any module installed in the OSICS platform (for detailed information on module-specific error and warning messages, see *Troubleshooting* in the *Appendices* section of the module instruction manuals, sections 2 to 12).

Error messages may result from the mainframe inability to communicate with any of the modules. Messages generated by the OSICS mainframe start with “Infinite Wait error”.

The following table lists the OSICS-Mainframe error and warning messages.

**Table 1-23: OSICS-Mainframe error and warning messages**

| Error and warning messages | Possible cause | Troubleshooting |
|---|---|---|
| Infinite Wait error(10) | Module is constantly busy. Mainframe can no longer communicate with module. | You will need to reset the system. First, turn off the OSICS system power by pressing the front-panel power button. Then, turn on the power and wait till the **“Initiliazing…”** sequence is complete. Enter the password and check for any error message.<br><br>If this error message does not disappear, please contact your NetTest distributor or the NetTest Service Department. |
| Infinite Wait error(20) | Mainframe cannot send data to module. | |
| Infinite Wait error(30) | Mainframe can no longer get any response from module. | |

# 1- 11 Index