5 Remote operation

6 Maintenance

7 Storage and transport

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Notice

Trouble-free automatic switching from mains to battery operation is only guaranteed if there are two sufficiently charged batteries in the OSA-155.
If this is not the case the error message „Coarse Error" may appear when the battery takes over from the mains. The OSA-155 must then be powered down and rebooted.

Hinweis

Die störungsfreie automatische Umschaltung von Netzbetrieb auf Akku-Betrieb ist nur dann garantiert, wenn der OSA-155 mit zwei geladenen Akkus bestückt ist.
Sollte bei Nichteinhaltung der vorstehend genannten Bedingung einmal die Fehlermeldung ‚Coarse Error' auftreten, ist das Gerät abzuschalten und neu zu booten.

Please direct all enquiries to your local Wavetek Wandel Goltermann sales company. The addresses are given at the end of this handbook.

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Printed in Germany

OSA-155
DWDM System Analyzer

BN 2260/02/03/04,Series F ...
Software Version 1.23 ...

Operating Manual

There is a compartment in the protective cover of the instrument for storing this operating manual.

WAVETEK
WANDEL
GOLTERMANN
Communications Test Solutions

1 Introduction

The aim of this chapter is to familiarize you with the instrument by explaining the uses of the instrument, how it works and its special features. It is assumed that you are familiar with the Windows operating system. If you have any questions on how to use Windows, please refer to your Windows handbook.

1.1 Applications

The OSA-155 DWDM System Analyzer is ideal for measurements on broadband multi-channel optical connections operating at wavelengths between 1450 nm and 1650 nm. The OSA-155 can be used on DWDM systems (Dense Wavelength Division Multiplexing) with channel spacings of 0.4 nm/50 GHz or above. The maximum permitted total input level of +30 dBm allows measurements to be made on systems having high channel power levels.

The main application for the OSA-155 is for analyzing optical spectra. The wavelength or frequency, power level and signal to noise ratio of each channel can be determined automatically. Functions for investigating the variation of the optical parameters with time are also provided.

Instruments fitted with a monitor output (BN 2260/04) can select out a single WDM channel and make it available for further measurements. This makes it possible to perform measurements on the digital signal itself (e.g. bit error rate, pointers, jitter / wander, etc.) using a SDH / SONET tester equipped with optical interfaces, such as the ANT-20.

1.2 Features

The OSA-155 is a PC-based measuring instrument fitted into a rugged casing. The instrument is designed for mobile use and can be operated using the touchscreen. When used in the laboratory, the OSA-155 can be operated just like any normal PC. The following peripherals can be connected to it:

- Mouse
- Keyboard
- Printer
- Monitor

1.2.1 Measurement software

The software is pre-installed. The software for the standard instrument is split into three operating modes:

- GRAPH mode: The spectrum is displayed graphically. The traces can be measured and prepared for producing a measurement record.
- WDM mode: The individual channels are identified and measured automatically. Wavelength, frequency and power level can be investigated. Statistical functions are also provided for this purpose. The data obtained is displayed in table form.
- FILTER mode (Version BN 2260/04): The filter of the OSA-155 can be set to a fixed wavelength. The signal thus filtered out from the mixture of wavelengths is available from a monitor output and can be further analyzed e.g. using an ANT-20.
- All configuration settings can be handled clearly and simply in CONFIGURATION mode.

1.2.2 Power supply

The OSA-155 can be powered from three different sources:

- AC line power supply
  having a nominal voltage between 100 V to 120 V and 200 V to 240 V
- External DC supply voltage between 12 V and 26 V (e.g. on-board vehicle power supplies or an external AC adapter, minimum 60 W)
- Built-in rechargeable batteries

The instrument selects the available power source automatically. The built-in rechargeable batteries take over if the external supply fails. The instrument reverts to AC powering as soon as the supply is restored. The instrument manages the batteries in such a way so as to ensure optimum performance, so that little maintenance is needed and maximum capacity is always available.

1.2.3 Function

The OSA-155 filters the input signal using a variable monochromator. The monochromator (refraction grating) has a resolution of 0.1 nm / 12.5 GHz. The OSA-155 measures the intensity of the filtered signal while the monochromator is scanning.

The instrument includes an internal reference source which it uses to calibrate the wavelength measurement automatically. An optical switch is used to switch from the input to the internal reference source for this purpose.

Instruments equipped with a monitor output (version BN 2260/04) use a further optical switch to pass the filtered signal from the detector to the monitor output.

1.3 About this documentation

The printed Operating Manual only contains basic information and operating instructions to save space. Detailed information about evaluation of results is found in the on-line help. Detailed information about the menus and dialogs is found in the on-line help function overview.

All texts are provided as PDF files and can be printed out as good quality hard copy.

1.4 Copyright

The software and all parts of the documentation are protected by copyright. By purchasing this product, the user agrees to the following:

- To use the software only for the purpose for which it is intended
- Not to make the program media (floppy disks, CD-ROM), program source code and descriptions available to third parties
- Not to make any copies of the software with the exception of working copies and archive copies which must be labeled accordingly.

Any change in these conditions requires the express written approval of Wavetek Wandel & Goltermann.

2 Safety instructions

This OSA-155 instrument was shipped in perfect condition. To ensure that this condition is maintained and to ensure safe operation of the instrument, take care to observe the following instructions.

2.1 Correct usage

The OSA-155 may only be used for the purpose and under the conditions for which it was constructed. Information on this subject is found in section 8.12, page 8-7 of this operating manual.

Damage / destruction of instrument

The accuracy and function of the instrument can be adversely affected by incorrect usage, damage and incorrectly performed repair work.

Caution

⇒ Only operate the instrument for the purpose and under the conditions for which it was constructed. Please follow the instructions in the "Introduction" and "Specifications" sections.
⇒ Regularly check the instrument for signs of damage.
⇒ Only allow repairs to be carried out by qualified service engineers.

2.2 AC line voltage

⇒ **Before connecting up the instrument**, make sure that the instrument operating voltage matches the voltage of the local AC line supply:

AC line voltage, nominal range	100 V to 120 V~ and 200 V to 240 V~
Frequency	50 Hz to 60 Hz
DC power supply	12 V= to 26 V=, 60 W

2.3 Safety class

The OSA-155 is a safety class 1 equipment according to EN 61010-1 (IEC Publ. 1010-1). The AC power cord supplied with the instrument includes a safety ground conductor. The AC line plug must be connected to an AC power outlet having a safety ground connection except in specially equipped and isolated rooms.

⇒ **The safety ground conductor must not be interrupted, either inside or outside the casing.**

2.4 Rechargeable batteries

If the instrument is not used for a long period of time, the rechargeable batteries may completely discharge (approx. 6 weeks) or may leak. This will damage the instrument and the batteries.

⇒ If you are not going to use the OSA-155 for some time, remove the rechargeable batteries.
(Self discharching time of the batteries: >3 months).
For details of how to do this, see section 7.1, page 7-1.

⇒ The OSA-155 ensures optimum performance from the rechargeable batteries. Always use the OSA-155's built in charger facility to recharge the batteries. See section 6.7, page 6-4.

Caution

Instrument damage

Incorrect usage and handling can damage or destroy the rechargeable batteries. make sure that you observe the following precautions when handling the batteries:

⇒ Do not short-circuit the batteries.
⇒ Do not expose the batteries to fire or water.
⇒ Do not open the batteries.
⇒ Do not store the batteries at high temperatures.

2.5 Faults and excessive stresses

If safe operation can no longer be assumed,

⇒ Take the instrument out of service and secure it against unintentional operation.

This will be the case if, for example,

- the instrument shows visible signs of damage
- the instrument does not work
- the instrument has been subjected to excessive stresses of any kind
- the instrument has been subjected to excessive stress by being stored for a long time under unfavorable conditions or by being transported under difficult conditions.

Contact your local Service Center if this situation arises. The addresses of the local Sales Organizations are listed at the end of the printed Operating Manual.

2.6 Repairs

Warning

Electric shock

When covers are opened or parts are removed with tools, components carrying dangerous voltages may be exposed. Connectors may also carry dangerous voltages.

⇒ Before opening the instrument, disconnect it from all voltage sources. Simply switching off at the AC line switch is not sufficient protection.

Capacitors in the instrument may retain a charge even after the instrument has been disconnected from all voltage sources.

⇒ Repairs should only be carried out by qualified service engineers.

Working on the opened instrument

Work on the opened instrument should only be carried out by qualified persons familiar with the risks involved. Only qualified persons can assess whether calibration, maintenance or repairs on the opened instrument (including under voltage) are unavoidable. If you are in any doubt, please contact your local Service Center. The addresses of the local Sales Organizations are listed at the end of the printed Operating Manual.

Repairs

Repairs must be carried out properly. Creepage paths and air gaps and insulation spacing must not be reduced in any way.

⇒ When repairs are made, care must be taken to ensure that the constructional features of the instrument are not altered in any way that adversely affects the safety of the instrument.

Spare parts

Only use original spare parts for replacing defective components. The use of other spare parts is permitted only if these do not adversely affect the safety features of the instrument.

Fuses

Only use the fuses specified for this instrument (see section 6.4, page 6-2).

2.7 Laser radiation

The OSA-155 is used for measurements on optical connections that normally use laser light or intensive LED radiation. The dangers from laser radiation are primarily from the device under test:

Caution

Invisible laser radiation can cause blindness

Laser light falling on the retina can cause irreparable damage.

⇒ Never look into the end of the optical fiber.
⇒ Protect other people: Always place protective caps over the free ends of optical cables and connectors.
⇒ Take note of the laser safety class designation of the device under test.

Instruments with monitor output

⇒ Always close off the monitor output with the protective cap when it is not in use.
⇒ Before inspecting or cleaning the monitor output, always switch off the instrument and disconnect it from the device under test.

2.8 Optical surfaces

Dust and fingerprints can damage optical surfaces, particularly when the surfaces are pressed together. To protect the instrument and the optical cables, every cable should be cleaned before it is connected to the instrument. The optical connectors on the instrument itself should also be cleaned regularly.

⇒ To clean the cable, dab the end surface with some cleaning tape (see section 9.3, page 9-2).

⇒ To clean the optical connector, remove the test adapter, dab the end surface of the plug pin with some cleaning tape and use compressed air to blow out the test adapter (see section 6.1, page 6-1).

⇒ Always close off any unused optical connectors with protective caps.

2.9 Securing for transport

The control computer and optics contain moving parts that must be secured before the instrument is moved. Switch the instrument off and wait until the system has run down before unplugging the AC line plug and transporting the instrument.

2.10 Ventilation requirements

Make sure that the ventilation slots on the sides of the instrument are not blocked or covered when the instrument is in use to ensure that the built-in cooling fan operates efficiently.

Notes:

3 Getting started

To ensure that the instrument is not damaged when you switch it on for the first time, carefully follow the instructions below.

3.1 Items included

⇒ Check that all items have been delivered:

Items included with OSA-155 BN 2260/04 (with monitor output)

- 2 x battery packs
- 2 x optical adapters
- 1 x AC line cord
- 1 x Windows™95 operating system
- 1 x operating manual

Items included with OSA-155 BN 2260/03 (without monitor output)

- 2 x battery packs
- 1 x optical adapter
- 1 x AC line cord
- 1 x Windows™95 operating system
- 1 x operating manual

3.2 Retaining the packaging

The packaging is designed to be re-used as long as it has not been damaged during transport or when being opened. The instrument is only reliably protected from damage during transport if the original packing is used.

⇒ Keep the packaging, padding material and moisture protection in a safe place.

If the packaging is damaged and cannot be re-used, refer to section 7.2.2, page 7-2.

3.3 Checking the instrument for transport damage

When you unpack the instrument, check to see if it was damaged during transport. Such damage is likely if the packaging has been clearly damaged. Do not attempt to operate an instrument that shows visible signs of damage as this may cause further damage.

3.4 Recovery after storage and transport

Condensation may form on instruments that have been stored or shipped at low temperatures when they are brought into a warm room. To prevent any damage to the instrument, do not switch it on until all condensation on the instrument surfaces has evaporated. The instrument is not ready to use until it has reached a temperature within the guaranteed operating range (0 °C to +40 °C).

The latter statement also applies if the instrument was stored at a high temperature.

3.5 Opening the cover

The display screen panel and connector panel of the instrument are protected by a cover. Inside this cover, there is a pocket for the operating manual, two pockets for one floppy disk each, two spare fuses and a set of tools.

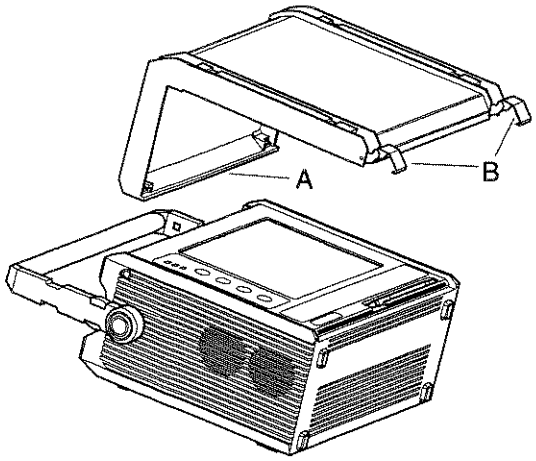


Fig. 3-1 Opening the cover

1. Lay the instrument flat on a table.
2. Open the clips (B) to the left and right on the front edge.
3. Lift up the cover from the front.

3.5.1 Closing the cover

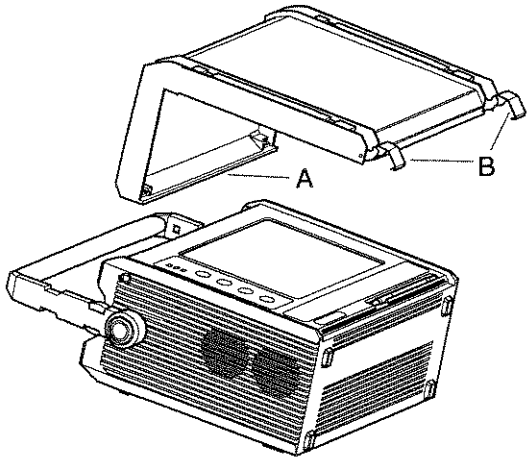


Fig. 3-2 Closing the cover

There are slots for the cover fixing clips on the long edge of the top panel and on the bottom long edge of the front panel.

To fix the cover correctly, do the following:

1. Match the guide edge (A) of the cover to the corresponding edge of the instrument.
2. Hook the clips (B) into the corresponding slots in the instrument.
3. Press the clips back towards the cover until they click into position.

3.6 Setting up the instrument

The instrument can be set up in four different positions:

- Vertically
- Horizontally
- Resting at an angle on the cover
- Resting at an angle on the handle (two different handle lengths can be set).

3.6.1 Resting the instrument on the cover

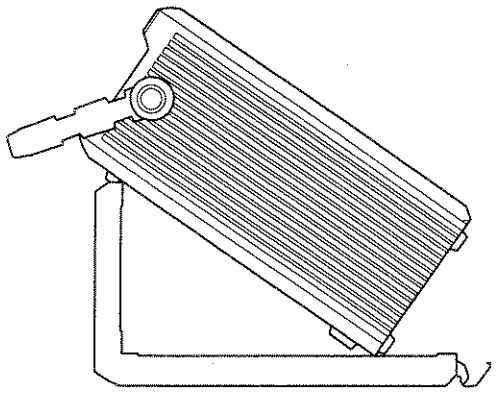


Fig. 3-3 Instrument resting on the cover

1. Lay the cover on the table with the inside facing up.
2. Place the instrument in the cover so that the upper feet rest on the edge and the groove in the rear bottom edge rests on the edge of the cover.

3.6.2 Using the handle as a support

The handle of the OSA-155 can be swung back and used as a support. The handle can be extended to allow various viewing angles. Two different handle lengths can be set. The diagrams below show how the handle length is adjusted.

Minimum length

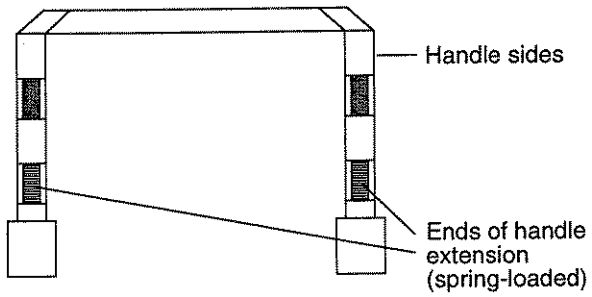


Fig. 3-4 Handle position 1: minimum length

The ends of the handle extension are locked in to the lower slots in the handle sides. This position is the minimum length of the handle.

Extending the handle

1. Press the ends of the handle extension into the slots (A) on both handle sides simultaneously and slide them upwards (B).

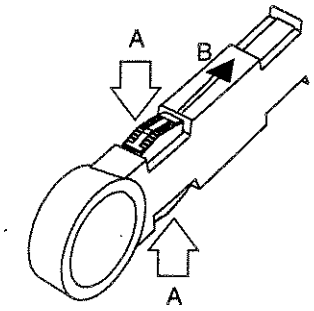


Fig. 3-5 Press here to release and extend the handle

2. Pull the handle grip upwards until the ends of the handle extension lock into the upper slots on the handle sides (C). This position is the maximum length of the handle.

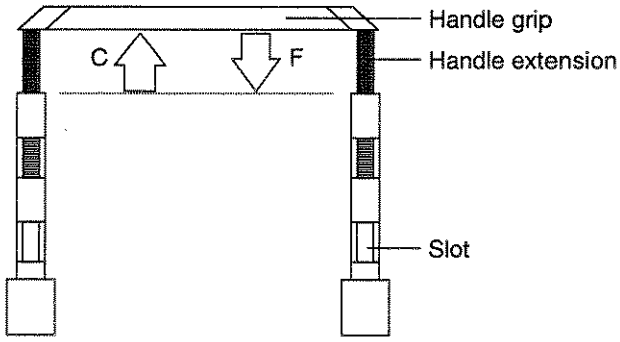


Fig. 3-6 Handle position 2: Maximum length

Shortening the handle

1. Press the ends of the handle extension into the slots (D) on both handle sides simultaneously and slide them downwards (E).

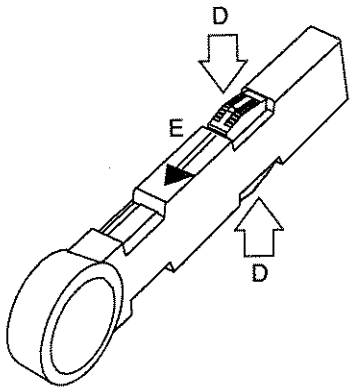


Fig. 3-7 Press here to release and shorten the handle

2. Push the handle grip downwards until the ends of the handle extension lock into the lower slots on the handle sides (F, (see figure 3-6)).

3.7 Power supply

The OSA-155 can be powered from three different energy sources:

- AC line power supply
  having a nominal voltage between 100 V to 120 V and 200 V to 240 V / 50 Hz to 60 Hz
- External DC supply between 12 V and 26 V (e.g. on-board vehicle power supply or external AC adapter, minimum 60 W)
- Built-in rechargeable batteries

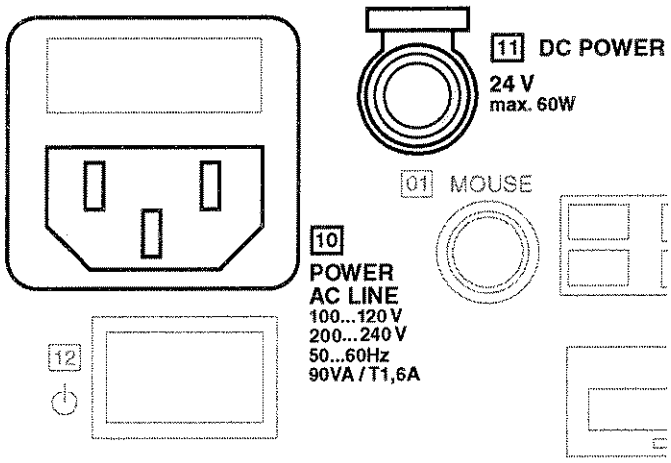


Fig. 3-8 Power supply connections on the OSA-155

[10]	Device AC line power connector with fuse holder
[11]	DC voltage connector

Table 3-1 Power supply connections on the OSA-155

If all three power sources are available simultaneously, automatic switch-over to an alternative source will occur if the AC line voltage fails. The order of priority is: external DC voltage --> internal batteries.

3.7.1 Operation from AC line power

AC line voltage and frequency

When operated from a fixed location, the OSA-155 will run on AC line power with a nominal voltage of 100 V to 120 V or 200 V to 240 V at frequencies of 50 or 60 Hz. No range switching is necessary.

Fuse

The following fuse type and rating must be used in this instrument:

Fuse
T 1.6 A

Two spare fuses are found in the accessory pocket on the inside of the instrument cover.

3.7.2 Operation from an external DC supply

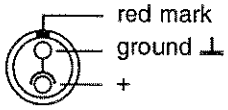
The OSA-155 is equipped with an input socket for a DC supply between 12 V and 26 V. Matching plugs can be obtained from:

Manufacturer	Type / Order No.	For instrument series
LEMOSA	FGJ.1B.302.CLL.D62	Series D onward

Making up a connecting cable

✓ All the items required are to hand:
- One of the plugs listed above
- Type LIYY unscreened cable, 2 x 0.75 mm², external diameter 5.1 mm to 6 mm.

1. Strip the cable insulation as directed by the plug manufacturer.
2. Unscrew the plug body and remove the compression rings.
3. Slide the plug body and compression rings over the cable.
4. Solder the wires to the plug contacts, making sure that the polarity is correct.
   The ground connection is right next to the red mark.



5. Screw the plug body back together.

3.7.3 Battery operation

For mobile applications the instrument can be operated from the built-in rechargeable batteries. Operating time from fully charged batteries is about 2 hours. This operating time is based on a typical operating profile with the following operating states each being used for one third of the time:

- Measurement
- Evaluation / Observation
- Suspend Mode (automatic power saving)

The ▭ LED lights up if the battery charge drops below 10% of the nominal charge capacity.

If the "ON" LED also flashes, the batteries are exhausted and the instrument will switch itself off shortly afterwards.

⇒ Save your work and turn off the instrument to ensure that the system powers down correctly.

3.7.3.1 Fitting the batteries

Two battery packs are included with the instrument. They are not fitted into the instrument when it is shipped for safety reasons. The OSA-155 cannot be operated from the batteries until they have first been fitted and charged for about 2 to 3 hours.

Component damage

Caution

The contacts, battery compartment base or the ends of the batteries may be damaged if you let the batteries drop into the battery compartment.

⇒ Always use the loop to lower the batteries into the compartment.

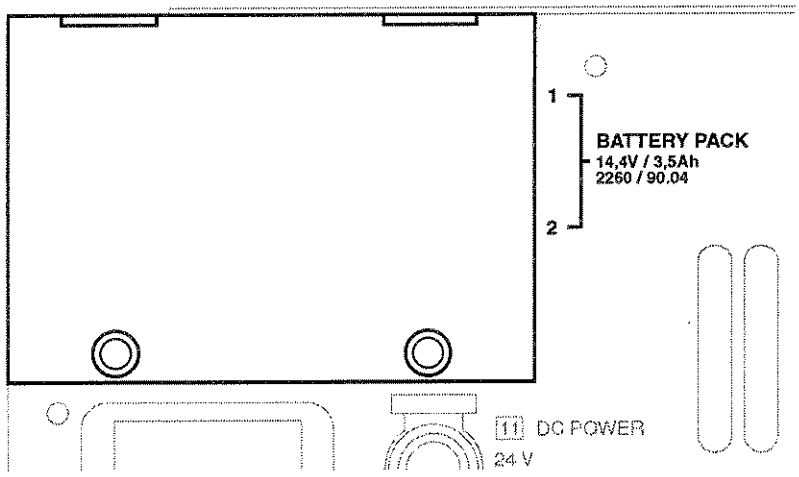


Fig. 3-9 Lid to battery compartments

1. Undo the screws and open the lid to the battery compartments.
2. Use the loops to lower the battery packs into the compartments as shown on the inside of the battery compartment lid. The batteries cannot be inserted the wrong way round.
3. Close the lid and do up the screws.

3.7.3.2 Charging the batteries

The batteries will start charging up as soon as the instrument is connected to the AC line or to an external DC power supply:

- Rapid charging with the instrument switched off
- Trickle-charging with the instrument switched on

To ensure that the batteries are sufficiently charged for mobile operation of the instrument, they must be charged up for at least 2 hours with the instrument switched off:

⇒ Connect the instrument to the AC line supply or to an external DC power supply.
The "ON" LED will briefly light up immediately after the instrument is connected to the power supply.
The ▭ LED will flash to indicate that the batteries are being charged.

3.8 Preparing the optical connector

Test adapters from the BN 2060/00.xx range of accessories are used to match the OSA-155 to the measurement interface (plug connector or bare fiber). At least one such adapter will be supplied with the instrument. All common types of plug connector can be connected to the standard socket of the optical connector which is located on the connector panel along with the other connectors. The same applies to the monitor output fitted to instrument type BN 2260/04.

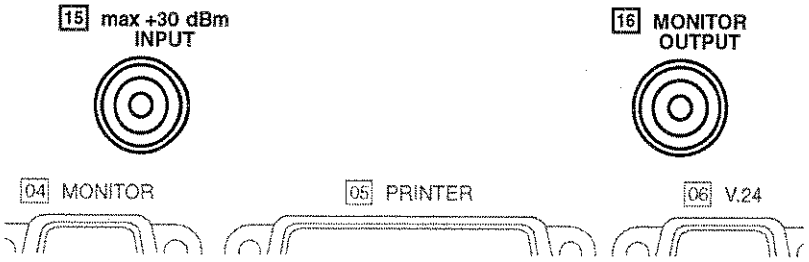


Fig. 3-10 Optical connectors for instrument type BN 2260/04.
BN 2260/03 instruments only have input [15] fitted.

Fit the test adapter supplied with the instrument as described below. Make sure that you safely keep all the protective caps that are provided.

3.8.1 Fitting the test adapter

1. Unscrew the metal protective cap and keep it in a safe place.
2. Remove the plastic sleeve from the plug pin (if present).
3. Dab the fiber end surface of the optical connector with cleaning tape.
4. Remove the test adapter from its packaging. Keep any protective caps in a safe place.
5. Blow out the test adapter with clean compressed air if necessary.
6. Plug in the test adapter and turn the inner part until the safety lock engages.
7. Screw on the outer part (movable cover).
8. Fit the test adapter protective cap.

Note: Most of the test adapters including protective covers will fit under the closed cover of the OSA-155, so it is not necessary to remove them before transporting the instrument.
Exception: Always remove type E-2000 test adapters before transporting the instrument and replace the original standard socket protective cap on the optical input.

3.8.2 Removing the test adapter

The type E-2000 test adapter must be removed before the instrument is transported to allow the instrument cover to be replaced. The instructions below also apply to all other test adapters that you may wish to remove in order to change the adapter or clean the optical connector.

1. Undo the cover nut and remove the test adapter.
2. If the adapter is no longer required, pack it away safely with its protective covers if possible.
3. If the OSA-155 is stored or transported without test adapters, replace the metal protective cap over the optical connector.

3.9 Switching on the instrument

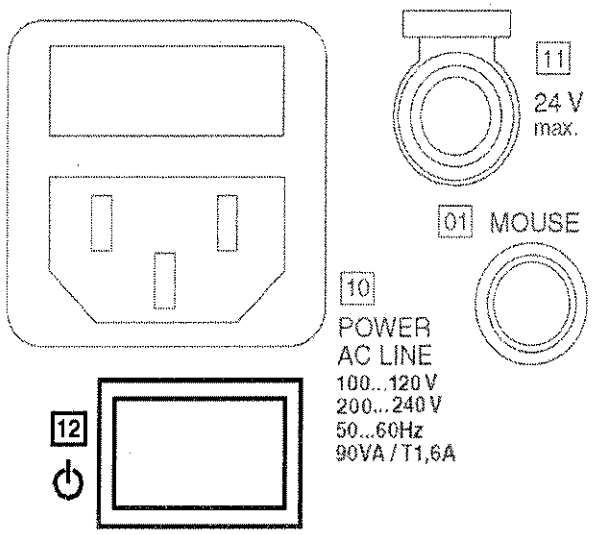


Fig. 3-11 ON / OFF key [12]

⇒ Press key [12].
The "ON" LED on the front panel will light up continuously.
Windows 95 will be started.
The OSA-155 software will then start automatically and initialize the optics.
The OSA-155 is then ready for measurements.

3.9.1 PC mode

You can exit from the measurement software at any time and use the instrument as a PC. The OSA-155 software continues running in the background.

Note: You may need an external keyboard in order to use standard software programs.

1. Press the "MAIN" foil key on the front panel.
2. Click the PC Mode action button.

3.9.2 Exiting from PC mode

You can exit from PC mode at any time and return to normal measurement operations. Any applications still open will continue running in the background. This may reduce the performance of the instrument, so it is a good idea to close any unnecessary applications before you change back to measurement operation.

⇒ To exit PC mode and return to measurement operation, press the "MAIN" foil key.

3.10 Switching off the instrument

Caution

Possible damage if initialization is terminated

Immediately after the program starts, the optical system is initialized. If the program is terminated during the initialization phase, the moving parts of the optical system will not be secured and could be damaged if the instrument is moved.

⇒ Wait until initialization is complete before terminating the program.

Possible damage and data loss due to uncontrolled termination

The system takes some time to close down Windows and secure the moving parts of the hard disk and optical system when you switch off.

⇒ If no batteries are fitted or the batteries are discharged, only unplug the AC line plug after the system has shut down completely.

The instrument is not free of all voltages when it is switched off. For example, the batteries are charged while the instrument is switched off.

Tip: You do not have to exit from the measurement software before you switch off the instrument.

⇒ Press the ON / OFF key.
The measurement software closes and Windows is shut down. After this the instrument switches off.
– or –
Click the Shutdown button in the MAIN menu.
The measurement software closes and Windows is shut down. After this the instrument switches off.

3.11 Peripherals for use at fixed locations

If you always use the OSA-155 at a fixed location such as in a laboratory, you can make use of all the features of a full PC. The OSA-155 is equipped with standard connectors for:

- Mouse (PS/2 plug)
- Keyboard (PS/2 plug)
- Monitor (submin. D plug)

Tip: Further laptop accessories such as a CD-ROM drive can be connected to the PCMCIA interface.

Note: The peripherals listed above are not included with the instrument.

All the interfaces are located on the connector panel of the OSA-155.

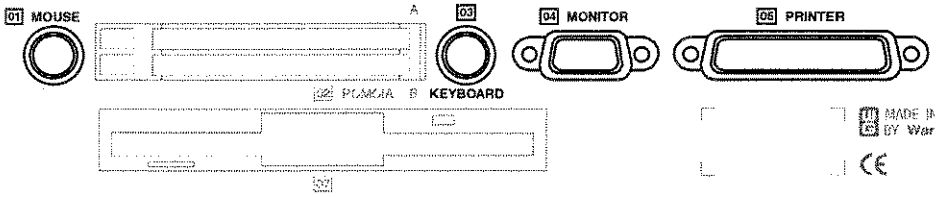


Fig. 3-12 Connections for peripherals

[01]	PS/2 mouse
[02]	PCMCIA slots (2)
[03]	PS/2 keyboard
[04]	Monitor
[05]	Printer
[07]	Floppy disk drive

Table 3-2 Connections for peripherals

3.11.1 Connecting a mouse

✓ Make sure the OSA-155 is switched off.

⇒ Plug the PS/2 plug of the mouse into the socket labeled "MOUSE".

3.11.2 Connecting a keyboard

✓ Make sure the OSA-155 is switched off.

⇒ Plug the PS/2 plug of the keyboard into the socket labeled "KEYBOARD".

3.11.3 Connecting a monitor

✓ Make sure the OSA-155 and the monitor are both switched off.

1. Plug the monitor's submin. D plug into the socket labeled "MONITOR".
2. Tighten up the securing screws.

3.12 Printer

The OSA-155 is equipped with a parallel Centronics interface to which virtually any standard printer can be connected. The interface is located on the top side of the casing.

3.12.1 Connecting up a printer

✓ Make sure the OSA-155 and the printer are both switched off.

1. Plug the printer's Centronics plug into the socket labeled "PRINTER".
2. Tighten up the securing screws.

3.12.2 Installing a driver for a new printer

Printer installation is separate from the OSA-155 software. There are two possibilities:

- Use the standard driver
- Use the printer manufacturer's driver

If you are not familiar with the use of the touchscreen, it is a good idea to connect a mouse and a keyboard to the instrument.

3.12.2.1 Using the standard driver

✓ The Windows 95 installation files are located on the hard drive. They include drivers for most common types of printer.

⇒ Install the printer driver under Windows as described in the Windows handbook.

3.12.2.2 Using the printer manufacturer's driver

✓ The printer driver for Windows 95 is located on an installation disk.

⇒ Install the printer driver under Windows as described in the printer's handbook.

Notes:

4 Operation and use

The aim of this section is to provide an introduction to the normal operating steps required for measurements. The basic operating concepts are found in the printed operating manual and in the on-line help. Detailed instructions for special measurement tasks are found only in the on-line help and in the PDF document.

Detailed information about the menus and dialogs is found in the on-line help function overview .

4.1 Controls and display elements

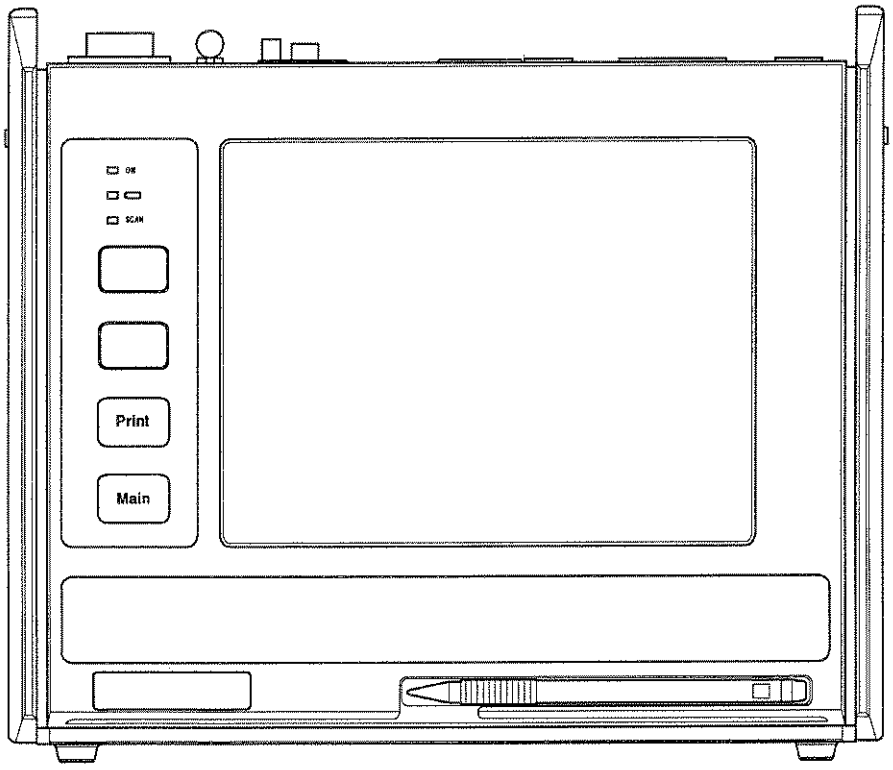


Fig. 4-1 Controls and display elements on the front panel

Most of the front panel is taken up by the display screen. This is a so-called touchscreen, i.e. the surface is pressure sensitive, allowing it to be used to operate the program.

A special pen for use with the touchscreen is found in a clip holder below the screen. This pen allows even the small screen icons to be selected.

There are three LEDs and four foil keys to the left of the screen.

LEDs

The "ON", ▭, and "SCAN" LEDs light up or flash to indicate seven different states:

ON	▭	SCAN	Meaning
Lights briefly			AC line voltage connected for the first time.
Lit			Instrument is switched on
Flashes			Windows is being closed down, after which the instrument switches off. Triggered by AC line switch, shut down or auto-off due to discharged batteries.
	Flashes		Batteries are being charged
	Lit		Batteries are discharged (capacity < 10%). To recharge, connect the instrument to the AC line but leave the instrument switched off.
Flashes	Flashes		Instrument has switched of due to overheating. It cannot be switched on again until the cooling period has elapsed, or after 60 seconds at the earliest.
Lit		Lit	Instrument is scanning

Table 4-1 LEDs

Foil keys

Only two of the four foil keys next to the screen have any functions:

Key	Meaning
Unlabeled	No function
Unlabeled	No function
Print	Outputs the screen contents to a printer.
Main	Opens a dialog for actions that are not part of measurement operations, e.g. switching to PC mode or system maintenance. The charge state of each battery pack is also displayed.

Table 4-2 Foil keys

4.2 Principle of operation

The OSA-155 is designed for on-site use and can be operated from the touchscreen. A touchscreen is a display screen that is pressure sensitive. The pen included with the instrument can be used to operate even the small screen icons.

Tip: To avoid getting the touchscreen dirty with fingerprints, always use the pen to operate the screen.

An external keyboard is not normally needed. If necessary, the OSA-155 measurement software displays a numerical keypad or a full keyboard which is very similar to a standard typewriter keyboard.

The numerical keypad is often displayed for entering parameters. As some other function keys are also needed for this in addition to the number keys, operation of the numerical keypad is explained with the help of an example (see section 4.2.1, page 4-4).

If the instrument is used in a laboratory, there is no need to do without the facilities of a PC (full keyboard, mouse and monitor). Refer to the printed operating manual in the "Getting started" section for details of how to connect up these peripheral devices. For the purposes of this section, it is assumed that you are operating the OSA-155 using the touchscreen.

4.2.1 Entering parameters

Most parameters are entered as numerical values. To allow these values to be entered without needing an external keypad, a numerical keypad is displayed on the touchscreen whenever necessary. The example given here explains how to enter the channel spacing.

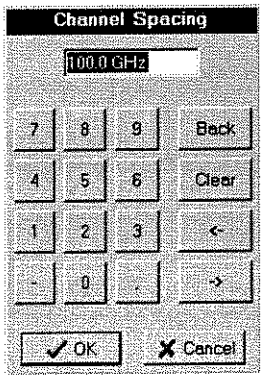


Fig. 4-2 Example of dialog for numerical entries: Channel spacing

The name of the parameter to be set is shown in the blue title bar. The entry box is below this. The units are constant, "GHz" in this example. Keys for correcting and for controlling the insertion point are located to the right of the numerical keypad.

Note: If you have connected an external keyboard, you can of course use this to enter the value into the entry box. This section only explains how to enter values using the touchscreen.

New entry

1. To delete the displayed value, touch the "Clear" button.
2. Enter the value by touching the appropriate number keys.

Corrections

1. Use the arrow keys to place the cursor after the number to be altered.
2. Delete the number to be changed by touching the "Back" button.
3. Enter the new number.

Completing entries

⇒ Confirm the entry by touching "OK".
The entered value is now valid.
– or –
⇒ Touch "Cancel" to cancel the entry.
The previous value set remains valid.

4.3 Preparing for measurements

Before you can start making measurements, the OSA-155 should be calibrated and then connected to the device under test. Various methods of calibration can be used; these are described below.

When you are making connections between the OSA-155 and the device under test or an external reference source, it is possible for invisible laser light to emanate from the device under test or from the reference source. Make sure that you follow the warning instructions given in the appropriate sections of this manual.

4.3.1 Calibrating the OSA-155

The OSA-155 is equipped with an internal reference source that is used as a wavelength standard for calibrating the wavelength measurement. Calibration to the internal reference source can be triggered automatically or manually. The OSA-155 is always calibrated to the internal source every time it is switched on. If you have a precision external reference source available, this can be used for calibrating wavelength and power level.

4.3.1.1 Automatic calibration to the internal source

If automatic calibration is activated, the OSA-155 calibrates itself to the internal reference source every 10 minutes. Only the wavelength is calibrated.

✓ The instrument is set to GRAPH mode or WDM mode.

1. Open the Calibration menu.
2. Set the "Internal Referencing On/OFF" parameter to "Internal Referencing On".

4.3.1.2 Manual calibration to the internal source

This calibrates the OSA-155 to the internal reference source. Only the wavelength is calibrated.

Triggering a calibration

✓ The instrument is set to GRAPH mode or WDM mode.

1. Open the Calibration menu.
2. Touch the "Calibrate" menu command.

4.3.1.3 Calibrating wavelength to an external source

Caution

Invisible laser light can cause blindness

Laser radiation can cause irreparable damage if it is allowed to fall onto the retina.

⇒ Switch off the reference source and do not switch it on again until all the cables have been connected up.

You can calibrate the OSA-155 more exactly if you have a reference source that is a more precise wavelength standard than the internal reference source of the OSA-155.

Note: Calibration to an external source is transferred to the internal source so that subsequent calibration to the internal source is not a disadvantage.

✓ The instrument is set to GRAPH mode.
✓ The external reference source is connected (see section 4.3.2, page 4-9).

Recording the reference source

1. Record the reference source with a single measurement as described in section 4.4.3, page 4-15.
2. Zoom in on the reference peak.
3. Select the "nm" display option in the "X-Scale" menu.

Measuring the peak

1. Open the "Peak Search" function (quick access:).
2. Note the displayed position of X cursor 1 (expressed in nanometers).

Determining the deviation

1. Deviation = known wavelength – measured wavelength.
2. Convert the deviation to picometers.

Entering the deviation

1. Open the Calibration menu.
2. Touch the "User Calibration" menu command.
   A further menu opens.
3. Touch the "Wavelength" menu command.
   An entry dialog opens.
4. Enter the deviation in picometers that you previously calculated.

Check

⇒ Check the calibration by recording the reference source again.

4.3.1.4 Calibrating level to an external source

Caution

Invisible laser light can cause blindness

Laser radiation can cause irreparable damage if it is allowed to fall onto the retina.

⇒ Switch off the reference source and do not switch it on again until all the cables have been connected up.

The internal reference source cannot be used for calibrating power level. The accuracy of the level measurement can only be increased by using an external reference source.

✓ The instrument is in GRAPH mode.
✓ A high-accuracy external power level reference source is available.

Connecting the reference source

1. Thoroughly clean the optical input as described in section 6.1, page 6-1.
2. Also clean the plug connector of the connecting cable and the optical output of the reference source if necessary.
3. Connect the reference source as described in section 4.3.2, page 4-9.

Recording the reference source

1. Switch on the reference source.
2. Record the reference source with a single measurement as described in section 4.4.3, page 4-15.
3. Zoom in on the reference peak.

Measuring the peak

1. Open the "Peak Search" function (quick access: ).
2. Note the displayed position of Y cursor 1.

Calculating the level difference

1. Level difference = known level – measured level
2. Note down the level difference.

Entering the level difference

1. Open the Calibration menu.
2. Touch the "User Calibration" menu command.
   A further menu opens.
3. Touch the "Power" menu command.
   An entry dialog opens.
4. Enter the level difference that you previously calculated.

Check

⇒ Check the calibration by recording the reference level again.

4.3.2 Connecting the device under test

Caution

Invisible laser radiation can cause blindness

Laser light falling on the retina can cause irreparable damage.

⇒ Never look into the end of the optical fiber.
⇒ Protect other people: Always place protective caps over the free ends of optical cables and connectors.
⇒ Take note of the laser safety class designation of the device under test.

Instruments with monitor output

⇒ Always close off the monitor output with the protective cap when it is not in use.
⇒ Before inspecting or cleaning the monitor output, always switch off the instrument and disconnect it from the device under test.

Note: Laser light can emanate from the disconnected cable as well as from the output of an optical component.

Note: In most cases it is not possible to guarantee that no signal is present in the device under test when it is being connected up.
For safety's sake always start with the last receiver in the chain and work back one component at a time when connecting up the optical cables and devices.

Note: The fibers in the plug connector and the test adapter are pressed together. To safeguard the optical surfaces and avoid measurement errors, check the anti-twist locks and do not pull on the measurement cable.

✓ The optical output of the device under test should be connected to other components in an optical network or it should be closed off with a protective cap.
✓ An optical connecting cable having a plug that matches the socket on the device under test and the test adapter fitted must be available.

1. Remove the protective cap from the optical input of the OSA-155.
2. Open the protective cap on the optical cable at the end which fits the OSA-155 and dab the fiber end surface with cleaning tape.
3. Connect the optical cable to the optical input of the OSA-155, checking that the anti-twist lock is properly engaged if fitted.

4. Remove the protective cap at the other end of the cable and dab the fiber end surface with cleaning tape.
5. Remove the protective cap from the optical output of the device under test and plug the cable in immediately. Do not look at the laser beam.
   – or –
   Disconnect any other optical cable from the optical output and close it off. Plug the connecting cable in immediately, checking that the anti-twist lock is properly engaged if fitted. Do not look into either of the laser beams. (Laser radiation can emanate from the optical output and from the disconnected cable.)

4.4 Measurement procedure

You can perform single measurements or continuous measurements. The DWDM signal being recorded can be displayed and evaluated in real-time as a graph (GRAPH mode) or as a table (WDM mode). GRAPH mode is mainly used for troubleshooting and WDM mode for system analysis.

Recording can be stopped and re-started in both modes as required.

Basic procedure

1. Select GRAPH or WDM mode according to the measurement task.
2. If required, trigger a single measurement as a test.
3. Set the evaluation options.
4. Perform a single measurement or a continuous measurement depending on the measurement task.
5. Save the results.

The two evaluation modes are explained briefly below. A detailed description is found in the on-line help under "Range of functions".

Measurements are very easy to perform. If you have any queries regarding them, instructions are found in section 4.4.3, page 4-15 and section 4.4.4, page 4-15.

4.4.1 GRAPH mode

The measured data is displayed as a trace (DWDM spectrum) in GRAPH mode. Various tools are provided for evaluating the trace:

- Selectable grid
- Zoom functions
- Two X and two Y cursors
- Marker function
- Auxiliary functions
  - Cursor to Peak
  - Peak to Center
  - Peak to Reference
  - Determine level difference
  - Total Power
- Min Hold and Max Hold (for continuous measurements)
- Difference trace

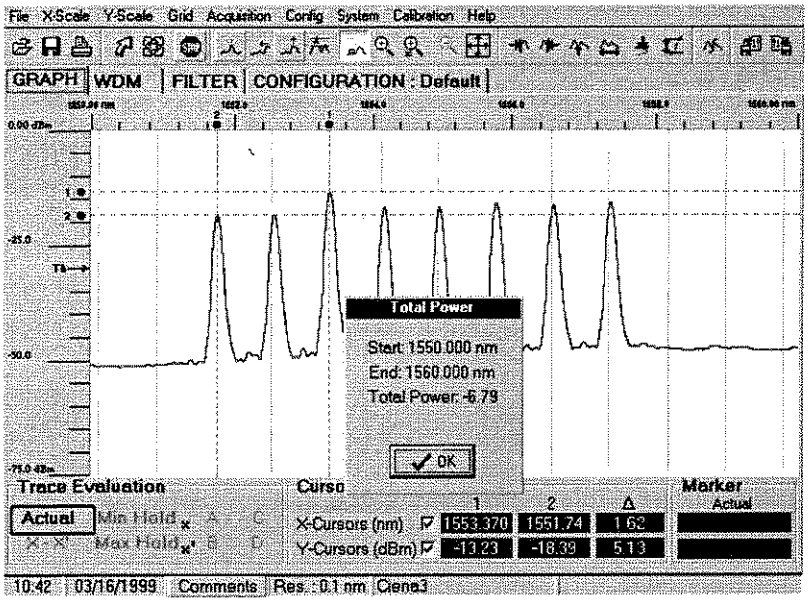


Fig. 4-3 Graph mode

Every single measurement and every minimum, maximum or difference trace can be saved as a complete trace data set in GRAPH mode. The saved data are not affected by the current configuration, i.e. they can be evaluated off-line using any configuration just like a single measurement.

4.4.2 WDM mode

Measurements are evaluated numerically in WDM mode. The results are shown in tables:

- Either with automatic identification of the DWDM channels or according to a pre-set DWDM grid
- Additional bar graph display of level for checking minimum levels (for single measurements)
- Calculation of OSNR for every DWDM channel. Threshold value violations are indicated by a different color
- Support for continuous measurements provided by statistical functions that can be applied to level and wavelength / frequency values:
  - Average
  - Maximum
  - Minimum
  - Current deviation from average

The table can be saved as a text file. The information represents the result of analysis as determined by the configuration at the time of recording. Subsequent reprocessing is not possible using the OSA-155 software.

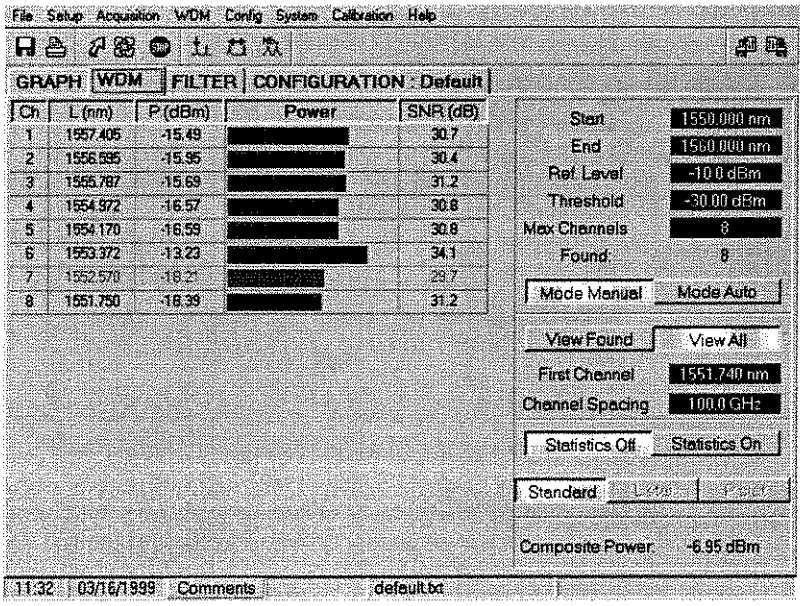


Fig. 4-4 WDM mode

4.4.2.1 Making parameter settings for displaying OSNR

Three settings must be made for correct evaluation and display of the optical signal to noise ratio (OSNR):

- the distance from the signal peak at which the noise level is to be measured (S <–> N); this is normally half the channel spacing
- the noise acquisition bandwith to be evaluated (Noise Acqu BW)
- the side of the signal where the noise level is to be evaluated (S to N Method)

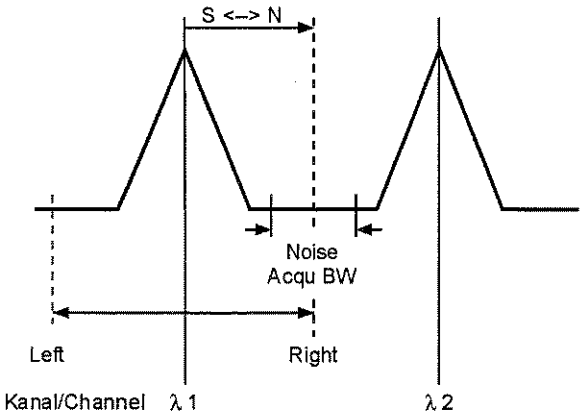


Fig. 4-5 Parameter settings for displaying OSNR

Note: The OSNR display is always referred to a noise bandwidth of 0.1 nm regardless of the noise acquisition bandwidth setting.

You can also set an OSNR threshold (SNR Limit). If the OSNR falls below this limit, the bargraph display for the affected channel will change color from blue to red.

Setting the noise level measurement points (S <--> N)

A separation of half the channel separation is normally used.

☞ Setting: CONFIGURATION - Optical SNR

1. Touch the displayed value of "S <--> N".
   The "S <--> N" entry dialog opens.
2. Enter half the channel separation or another desired value in GHz.

Selecting the noise acquisition bandwidth

The noise level is required for calculating the OSNR. The noise acquisition bandwidth specifies the wavelength or frequency bandwidth across which the noise level is to be detected and averaged. The channel spacing of the DWDM system should be borne in mind when choosing the noise acquisition bandwidth. The greater the spacing between channels, the greater the possible noise acquisition bandwidth. The channel edges must not be included in the evaluation.

Tip: Use the trace in GRAPH mode to estimate the most suitable noise acquisition bandwidth.

☞ Setting: CONFIGURATION - Optical SNR

1. Touch the displayed value of "Noise Acqu BW".
   A dialog for entering the noise acquisition bandwidth opens.
2. Enter an acquisition bandwidth in pm or GHz.

Note: The noise bandwidth for the displayed OSNR (WDM mode) is always referred to a noise bandwidth of 0.1 nm regardless of the selected noise acquisition bandwidth.

Selecting the noise measurement method

☞ Setting: CONFIGURATION - S to N Method

⇒ Select one of the methods.

4.4.2.2 Threshold setting for channel evaluation

WDM mode allows you to view the transmitted channels in the form of a table. To ensure that this is done correctly, a threshold level must be specified. All channels that exceed this threshold and then drop below it again will be evaluated as channels and shown in the table.
If the selected threshold level is unsuitable, the evaluation may be incorrect. The figure below explains this using an example in GRAPH mode.

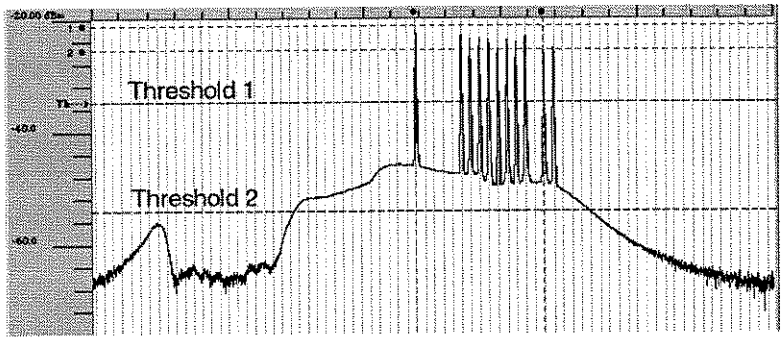


Fig. 4-6 Effect of the threshold setting on channel evaluation
Threshold 1: Correct evaluation of all 11 channels, as all channels exceed and then drop below the threshold.
Threshold 2: Incorrect setting. The result is that only the channel with the highest level value is evaluated because the level only exceeds and then drops below the threshold at one point.

4.4.3 Single measurement

This type of measurement is used to obtain results when the time-related behavior of the signal is unimportant. The following are possible:

- Obtain a quick overview of the DWDM spectra of an entire cable bundle
- Record the status (footprint) of a network, e.g. after installation
- Obtain a DWDM spectrum for printout
- Measure the peak of a reference source for calibration purposes

Tip: The OSA-155 should be re-calibrated from time to time (see section 4.3.1, page 4-5).

Triggering a single measurement

✓ The device under test is already connected up.
✓ The OSA-155 is set to GRAPH mode or WDM mode.

⇒ Touch the quick-access button.
The recording is made and displayed immediately.

4.4.4 Continuous measurement

This method is used to

- Investigate variations in wavelength
- Investigate variations in level

Such variations can be evaluated using statistical functions (WDM mode).

Tip: If continuous measurements lasting 10 minutes or more are planned, you must decide whether to activate regular internal calibration (see section 4.3.1.1, page 4-5).

Starting continuous measurement

✓ The device under test is already connected up.
✓ The OSA-155 is set to GRAPH mode or WDM mode.

⇒ Touch the quick-access button.
The spectra can already be evaluated while the current recording is in progress. The results are updated continually.

Stopping a continuous measurement

⇒ Touch the quick-access button.

4.4.4.1 Protection mode for continuous measurements (from Software Version 1.33 onwards)

To protect the moving parts in the OSA-155 from wearing out prematurely during continuous measurements, the instrument is equipped with a "take care" mode which stops a continuous measurement after a pre-set number of scans.

If a continuous measurement is to be made without limiting the number of scans, "take care" mode can be disabled.

Enabling / disabling TakeCare mode

✓ The device under test is already connected
✓ OSA-155 is set to GRAPH mode or WDM mode.

1. Touch System in the menu bar.
2. Touch ON or OFF in the opened TakeCareMode menu to enable / disable TakeCare mode.

Changing the number of scans for TakeCare mode

1. Touch System in the menu bar
2. Touch Max Count = xx in the opened TakeCareMode menu. A keypad is shown in the display.
3. Enter the number of scans required (any number between 10 and 1000; default = 100) and confirm your entry.

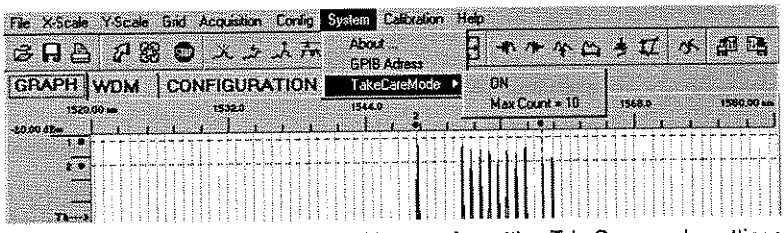


Fig. 4-7 Display in GRAPH mode with menu for setting TakeCare mode settings opened

4.5 Handling results and settings

Three types of data can be saved to the hard disk or to a floppy disk:

- Measurement traces (GRAPH mode)
- Evaluations (WDM mode)
- Configuration data

You can also print out all the data in the same form as they are displayed on the screen, either directly using a printer connected to the instrument or as a file.

Note: If you want to save the data from a recording so that they can be processed off-line using the OSA-155 software, you must save the trace data. Only data in this format can be read in again. The standard tables but not the statistical tables can be reconstructed from the traces that are read in. The statistical tables must be determined on-line and saved separately.

Tip: To preserve a clear overview of the saved data, it is a good idea to create separate folders for each type of data and project. Since the traces can be saved as *.grh files and as *.txt files, it is useful to create separate destination folders for traces and tables (which are always *.txt files).
The default folder is D:\DATA.

4.5.1 Creating a destination folder

You can create destination folders using Windows Explorer or the Save dialogs in the OSA-155 software. In both cases, an external PS/2 keyboard is required (available as an accessory).

Tip: It is a good idea to create the required folders before making measurements.

✓ An external keyboard is connected.

1. Touch the quick-access button in GRAPH mode or WDM mode.
   The "Name of file" menu opens.
2. Confirm with "OK".
   A standard Windows dialog named "Save the current curve" or "Save Data" opens.
3. Open the root directory for the new folder.
4. Touch the quick-access button.
   A new folder is created.
5. Enter a name for the new folder and confirm with "OK".
6. If no further folders are to be created, touch the "Cancel" button.
   The dialog closes. The new folder has been created.

4.5.2 Saving a measurement trace

Traces can be saved in three different data formats: as grh files, bmp files (from software version 1.22 onwards) or as text files. The grh file requires much less disk space, but can only be processed using the OSA-155 software. Traces in bmp format can be directly embedded into programs such as MS Word or PowerPoint.

✓ A suitable destination directory exists.

Entering a comment

1. To update the comment for a recording, touch the "Comments" button at the bottom edge of the screen.
   A text box opens; this may contain a previous comment.
2. Enter the comment required.
3. Confirm the entry with "OK".

Saving the trace

To save a trace in GRAPH mode:

1. Touch the quick-access button.
   A dialog for entering the file name opens and the internal keyboard is displayed.
2. Enter the file name.
3. Confirm with "OK".
   A standard Windows dialog named "Save the current curve" opens.
4. Select the destination folder.
5. Set the file name extension as required to save the trace as a text, bmp or grh file. The binary grh option (file name extension *.grh) is set by default.
6. Confirm the location by touching the "Save" button.

Note: Traces can be saved directly as bmp files from software version 1.22 onwards. Earlier software versions allow conversion of grh files into bmp files.

Converting grh files to bmp files

✓ An external keyboard is connected.

1. Switch to GRAPH mode.
2. Touch the quick-access button.
   A standard Windows dialog named "Load a file to the current curve" opens.
3. Open the source folder.
4. Select the file name extension *.grh.
   The file selection will be updated.
5. Confirm with "Open".
   The loaded trace will be displayed immediately.
6. Press the "Alt" and "Print Screen" keys simultaneously.
   The trace will be placed on the Windows clipboard as a screen dump.
7. Press the "Main" foil key on the front panel.
8. Touch the PC Mode button.
9. Open the Paint program from the Programs - Accessories menu.
10. Paste the graph from the clipboard and save it as a bmp file.

4.5.3 Loading a saved measurement trace

✓ At least one trace has already been saved.

1. Change to GRAPH mode.
2. Touch the  quick-access button.
   A standard Windows dialog named "Load a file to the current curve" opens.
3. Open the source folder.
4. Select whether to load a trace saved as a binary file or text file by selecting the file name extension.
   The selection of files having the corresponding file name extension is updated.
5. Confirm with "Open".
   The loaded trace will be displayed immediately.
6. If required, display the comment:
   Touch the "Comments" button at the bottom edge of the screen.

4.5.4 Saving a tabular evaluation

Tables can only be saved as text files, unlike the traces. Only the data for the current table are saved. if you also want to save the statistical data for power level and wavelength you must save each of the two tables separately.

Note: Data saved as tables **cannot** be read in again by the OSA-155 software, unlike the trace data.

✓ A suitable destination folder has already been created.

Entering a comment

1. To update the comment for a recording, touch the "Comments" button at the bottom edge of the screen.
   A text box opens; this may contain a previous comment.
2. Enter the comment required.
3. Confirm the entry with "OK".

Saving a table

To save a trace in WDM mode:

1. Touch the quick-access button.
   A file name entry dialog and the keyboard display open.
2. Enter the file name.
3. Confirm the entry with "OK".
   A standard Windows dialog named "Save data" opens.
4. Select the destination folder.
5. Confirm the storage location with "Save".

4.5.5 Saving instrument settings

The display and evaluation of a measurement is controlled by the settings. To ensure that different measurements can be compared with each other, all the measurements must have the same settings (footprint) with which they must be saved. For this reason, the instrument settings can also be saved (configuration files).

It is a good idea for each user to save their own configuration files if the instrument is used by more than one person.

1. Touch the quick-access button in any standard mode.
   A file name entry dialog and the keyboard display open.
2. Enter the file name.
3. Confirm the entry with "OK".
   A standard Windows dialog named "Save a configuration" opens.
4. Select the destination folder.
5. Confirm the storage location with "Save".

4.5.6 Loading instrument settings

✓ At least one configuration has already been saved.

1. Touch the quick-access button in any standard mode.
   A standard Windows dialog named "Load a configuration" opens.
2. Open the source folder.
3. Select the file.
4. Confirm with "Open".

4.6 Changing the test adapter

Different types of test adapter will be needed for measurements on different types of network. These test adapters can be ordered as accessories (see section 9.3, page 9-2).

✓ The instrument is switched off and disconnected from the device under test.

1. Undo the outer sleeve and remove the test adapter.
2. Carefully pack away the test adapter that is not required, with its protective caps if possible.
3. Dab the fiber end surface of the optical connector with cleaning tape.
4. Remove the required test adapter from its packaging. Keep any protective caps in a safe place.
5. Blow out the test adapter with clean compressed air.
6. Plug in the test adapter and turn the inner part until the safety lock engages.
7. Screw on the outer part (movable cover).

4.7 Filter mode

Filter mode is only available with instrument version BN 2260/04 (monitor output).

It is used to select a particular DWDM channel which can then be analyzed further at the digital signal level (BER, pointers, etc.) using a SDH / SONET tester equipped with optical interfaces, such as the ANT-20.

4.7.1 Connecting the analyzer and the device under test

It is assumed that you are familiar with the procedure for connecting the device under test and with the risks that this involves (see section 4.3, page 4-5).

Note: In most cases it is not possible to guarantee that no signal is present in the device under test when it is being connected up.
For safety's sake always start with the last receiver in the chain and work back one component at a time when connecting up the optical cables and devices.

✓ A connecting cable for the link between the OSA-155 and the analyzer is available.
✓ The requirements for connecting the device under test to the OSA-155 have been met.

1. Connect the connecting cable to the optical input of the analyzer.
2. Connect the other end of the connecting cable to the monitor output of the OSA-155.
3. Connect up the device under test.

4.7.2 Selecting the wavelength / frequency

You can set the monochromator to a particular wavelength or frequency in order to select a specific channel in the WDM spectrum. The monochromator has an optical bandwidth of around 0.1 nm FWHM.

⇒ Change to Filter mode.
The monitor output is activated and the signal at the selected wavelength/frequency is output with a typical attenuation of 5 dB.

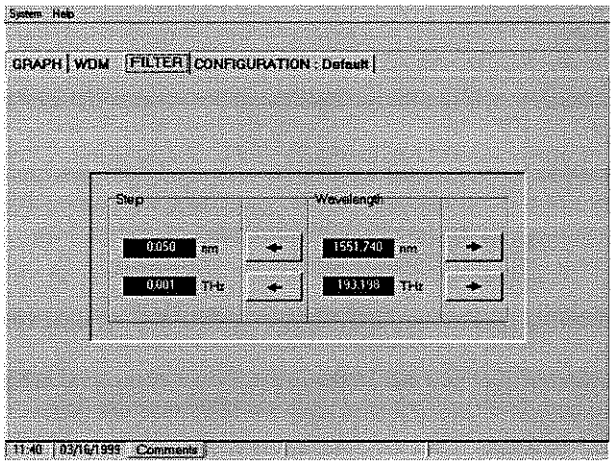


Fig. 4-8 Filter mode

Entering a step width (e.g. pre-set channel spacing)

1. Touch one of the blue boxes below "Step".
   A dialog for directly entering the step width opens.
2. Enter the value and confirm with "OK".

The step width expressed in frequency units is independent of that expressed in wavelength units. If necessary, change both step widths.

Entering an absolute value (e.g. known channel wavelength)

1. Touch the upper blue box below "Wavelength".
   A dialog for directly entering the wavelength opens.
2. Enter the value and confirm with "OK".
   The frequency display will change to reflect the new value.

Changing the filter setting by one step

⇒ Press one of the arrow buttons.

Notes:

5 Remote operation

The remote operation facility allows you to operate a remotely located OSA-155 via a dial-up link using a modem (PCMCIA card) or an Ethernet LAN (PCMCIA card) from any Windows PC.

Overview of possible functions:

Remote operation

Once the connection has been established, the remote OSA-155 can be operated using the mouse or keyboard just as if it were being operated directly.

File transfer

Files can be transferred or copied between the OSA-155 and the PC quickly and reliably.

Communications between OSA-155 and PC

Messages entered appear at the other end immediately.

Remote printout

Print jobs can be rerouted from the remote OSA-155 to your local printer, for example.

All of these functions as well as many others are provided by the ReachOut software from Stac Electronics Inc. For ReachOut, the controlling PC is the "Viewer" and the remote OSA-155 is the "Host". Detailed information is found in the ReachOut user handbook.

5.1 Remote operation via PCMCIA card modem

Option 3035/95.30 "Remote Operation" includes the software needed to operate a remote OSA-155 from a Windows PC via a dial-up modem link or via a direct link using a zero modem cable.

The software used for remote operation, ReachOut (from Stac Electronics Inc.), supports a large number of different types of modem including ISDN and cellular types. If the modem you use is not listed, you can define your own. Detailed information is found in the ReachOut user handbook.

Modems should be purchased in the country where they are to be used. This ensures compliance with any national regulations governing their use.

5.1.1 Items included

Option 3035/95.30 "Remote Operation" comprises:

- ReachOut user handbook
- ReachOut installation disks (Host & Viewer, Modem & Network, 1 Node)
- Zero modem cable, 3m (K 764): cannot be used with the OSA-155

5.1.2 Installing the hardware

PCMCIA card modem

⇒ Insert the PCMCIA card modem into a free PCMCIA slot. You do not need to turn the OSA-155 off when you do this.

5.1.3 Installing the software

If you ordered Option 3035/95.30 "Remote Operation" at the same time as your OSA-155, the ReachOut software is pre-installed on the OSA-155 (in the folder C:\REACHOUT). The ReachOut program icon is found in the Windows95 "Programs" folder.

The security options for ReachOut are pre-configured as follows: The ReachOut "Password List" contains the entry "OSA-155" as "User Name" and as corresponding password. The "Passwords Required" option is set to "No". Detailed information about the configuration options is found in the ReachOut user handbook.

Note: The OSA-155's V.24/RS-232 interface cannot be used for connecting a modem for the purposes of remote operation via a dial-up line or for a direct connection via a zero modem cable.

If you ordered Option 3035/95.30 "Remote Operation" separately, the ReachOut software should be installed as follows:

Query the COM port assigned for the PCMCIA card modem

(only required if you are using a PCMCIA card modem)

1. Start or return to Windows95.

2. Click the Windows95 "Start" button and then select "Control Panel".
3. Double-click on "Modems", select the PCMCIA modem type in the "General" tab and then click on "Properties". You need to know the COM port assigned to the modem so that you can configure ReachOut.

Installing the ReachOut software

1. Start or return to Windows95.
2. Insert the "ReachOut for Windows & DOS" disk 1 in drive A:.
3. Click the Windows95 "Start" button. Select "Run ..." and enter the following command in the dialog box:
   A:\install
4. Follow the instructions on the screen. Detailed information is found in the ReachOut user handbook.
   All ReachOut configuration parameters can also be changed after installation.
5. After installation is complete, exit from Windows95, remove the disk from drive A and re-start the OSA-155.

After installation on the OSA-155 ("Host") the ReachOut host can be started and configured as required.

Tip: To ensure that a connection to the host can be restored even if the connection is interrupted by a fault, "Inactivity Timeout" (in the "Preference .../Host Options" menu) should not be set to zero.

After installing ReachOut on the controlling PC ("Viewer") and configuration of the ReachOut viewer as required, remote operation of the OSA-155 can be started.

Detailed information is found in the ReachOut user handbook.

5.2 Remote operation via Ethernet (IEEE 802.3)

Option 3035/95.31 "Remote Operation" contains the software needed to operate a remote OSA-155 from a Windows PC via an Ethernet LAN link using the TCP/IP internetwork protocol.

The software used is ReachOut (from Stac Electronics Inc.). Detailed information is found in the ReachOut user handbook.

5.2.1 Items included

Option 3035/95.31 "Remote Operation" comprises:

- ReachOut user handbook
- ReachOut installation disks (Host & Viewer, Modem & Network, 1 Node)
- SCM Ethernet LAN card (SCM Microsystem GmbH) with:
  - Media couplers for 10Base2 and 10BaseT
  - Drivers disk
  - Installation handbook

5.2.2 Installing the hardware

1. Insert the SCM Ethernet LAN card into a free PCMCIA slot. You do not need to turn the OSA-155 off when you do this.
2. Connect the SCM Ethernet LAN card to the local network using the media coupling cable supplied.

5.2.3 Installing the software

If you ordered Option 3035/95.31 "Remote Operation" at the same time as your OSA-155, the ReachOut software is pre-installed on the OSA-155 (in the folder C:\REACHOUT). The ReachOut program icon is found in the Windows95 "Programs" folder.

The security options for ReachOut are pre-configured as follows: The ReachOut "Password List" contains the entry "OSA-155" as "User Name" and as corresponding password. The "Passwords Required" option is set to "No". Detailed information about the configuration options is found in the ReachOut user handbook.

The pre-configured network setting must now be matched to the requirements of the network:

Modifying the file C:\WINDOWS\hosts

The file C:\WINDOWS\hosts is an example only. it must be modified to match your network:
It must contain the IP addresses of all the network nodes with which communications are required, as well as the IP address of the OSA-155 itself and (if present) of the gateway between the OSA-155 and the controlling PC. The first entry in this file is the "localhost" address (see

example file C:\WINDOWS\hosts.sam). This entry must not be changed. Ask your network administrator for the network-dependent information that is to be entered in the "hosts" file.

Modifying the network configuration

1. Start or return to Windows95.
2. Click the Windows95 "Start" button, then select "Settings" and then "Control Panel".
   Double-click on the "Network" icon in the "Control Panel" window.
3. In the "Configuration" tab of the "Network" window, double-click on the "TCP/IP" option.
4. In the "IP Address" tab of the "TCP/IP Properties" window, set up the "IP Address" of the OSA-155 and the "Subnet Mask".
5. In the "Gateway" tab of the "TCP/IP Properties" window, set up the default gateway address.
   Ask your network administrator for the network-dependent information that is to be entered here.
6. Confirm with "OK".
7. When you have returned to the "Network" window, select "Identification". Then set up the "Computer Name" (may only occur once in the network), "Workgroup" etc. as required.
8. Confirm with "OK".
9. Restart the OSA-155.

If you ordered Option 3035/95.31 "Remote Operation" separately, the software packages should be installed as follows:

Installing the driver software for the SCM Ethernet LAN card

1. Start or return to Windows95.
2. Insert the SCM Ethernet LAN card into a free PCMCIA slot.
3. Follow the instructions on the screen in the "Update Device Driver Wizard" for installing the driver software:
   - Insert the SCM drivers disk in drive A.
   - Click on "Locations ..." and then enter the following folder name in the dialog box: "A:\WIN95".
   - Confirm with "OK".
   - When you return to the "Update Device Driver Wizard" window, click on "Finish".
4. After installation, remove the SCM drivers disk from drive A and click "Yes" in response to the message "Do you want to restart your computer now?".

Checking the driver installation

Open the "SCM Ethernet Combo card Properties" window:

1. Start or return to Windows95.
2. Click the Windows95 "Start" button, then select "Settings" and then "Control Panel".
3. Double-click on the "System" icon in the "Control Panel" window.
4. In the "Device Manager" tab of the "System Properties" window, select the "View devices by type" option, then double-click on "Network adapters" in the list and then "SCM Ethernet Combo card".

Modifying the file C:\WINDOWS\hosts

The file C:\WINDOWS\hosts is an example only. It must be modified to match your network:
It must contain the IP addresses of all the network nodes with which communications are required, as well as the IP address of the OSA-155 itself and (if present) of the gateway between the OSA-155 and the controlling PC. The first entry in this file is the "localhost" address (see example file C:\WINDOWS\hosts.sam). This entry must not be changed. Ask your network administrator for the network-dependent information that is to be entered in the "hosts" file.

Configuring the network setting

1. Start or return to Windows95.
2. Click the Windows95 "Start" button, then select "Settings" and then "Control Panel".
3. Double-click on the "Network" icon in the "Control Panel" window.
4. In the "Configuration" tab of the "Network" window, click on the "Add ..." option.
5. In the "Select Network Component Type" window, double-click on the "Protocol" option.
6. In the "Manufacturers" list in the "Select Network Protocol" window, click on the "Microsoft" option and click on the "TCP/IP" option in the "Network Protocols" list.
7. Confirm with "OK".
8. When you return to the "Configuration" tab of the "Network" window, delete all other protocol entries except TCP/IP from the list and then double-click on "TCP/IP".
9. In the "IP Address" tab of the "TCP/IP Properties" window, select the "Specify an IP address" option and then set up the "IP Address" of the OSA-155 and the "Subnet Mask".
   In the "Gateway" tab of the "TCP/IP Properties" window, enter the address of the default gateway in the "New gateway" dialog box and then click on "Add ...".
   Ask your network administrator for the network-dependent information that is to be entered here.
10. Confirm with "OK".
11. When you have returned to the "Network" window, select "Identification". Then set up the "Computer Name" (may only occur once in the network), "Workgroup" etc. as required.
12. Restart the OSA-155.

Selecting the start-up mode

If the OSA-155 is to be remote-operated, it is normally a good idea to suppress the log-on request during start up of Windows95. To do this, proceed as follows:

1. Start or return to Windows95.
2. Click the Windows95 "Start" button, then select "Settings" and then "Control Panel".
3. In the "Control Panel" window, double-click on the "Network" icon.
4. In the "Configuration" tab of the "Network" window, click on the "Windows Logon" option in the "Primary Network Logon" list and confirm with "OK".
5. Restart the OSA-155.

Checking the network installation

Checking the connection on the controlling PC:

1. Start or return to Windows95.
2. Click the Windows95 "Start" button, then select "Programs" and then "MS-DOS Prompt".
3. Type "C:\ping <ip_address>" where "<ip_address>" is the address of the controlling PC.

If a connection is not established, this may be due to the following causes:

- Missing or incorrect entry in the file C:\WINDOWS\hosts.
- Missing or incorrect entry in the "Gateway" tab field of the "TCP/IP Properties" window for the "Network" setup.

Installing the ReachOut software

1. Start or return to Windows95.
2. Insert the "ReachOut for Windows & DOS" disk 1 in drive A.
3. Click the Windows95 "Start" button. Select "Run ..." and enter the following command in the dialog box:
   "A:\install".
4. Follow the instructions on the screen.
5. Select the internet connection type (with Windows Sockets). Detailed information is found in the ReachOut user handbook.
   All ReachOut configuration parameters can also be changed after installation.
6. After installation is complete, exit from Windows95, remove the disk from drive A and re-start the OSA-155.

After installation on the OSA-155 ("Host") the ReachOut host can be started and configured as required.

To ensure that a connection to the host can be restored even if the connection is interrupted by a fault, "Inactivity Timeout" (in the "Preference .../Host Options" menu) should not be set to zero.

After installing ReachOut on the controlling PC ("Viewer") and configuration of the ReachOut viewer as required, remote operation of the OSA-155 can be started.

Detailed information is found in the ReachOut user handbook.

6 Maintenance

This section tells you about the maintenance work that needs to be done regularly. For information regarding repairs, see section 2.6, page 2-3.

6.1 Cleaning the optical connector

Any dirt on optical surfaces may cause damage. It will also affect the accuracy of the measurement results. The optical connector should therefore be cleaned regularly:

1. Remove the test adapter from the optical connector (see section 3.8.2, page 3-16).
   The internal plug pin is now easy to reach.
2. If the pin is very dirty, dab it lightly with adhesive tape (e.g. Scotch "Magic tape" or similar matt adhesive tape) and remove the tape.
3. Moisten a lint-free paper tissue with isopropanol (isopropyl alcohol) and use this to wipe off the end surface of the plug pin.
4. Wipe the end surface of the plug pin again using a dry paper tissue.
5. Blow through the removed test adapter using clean compressed air.
6. Screw the test adapter back on the instrument (see section 3.8.1, page 3-16).

6.2 Checking the hard disk drive

If you are experiencing problems storing or loading files or you want to be sure that the data from an important series of measurements will be saved correctly, you should check the hard disk drive using the Scandisk utility.

1. Press the “Main” key on the front of the instrument.
2. Click the “Scan disk” button.

6.3 Defragmenting the hard disk

Over the course of time, files are deleted and replaced by new ones. The new files are rarely the same size as the old ones, which means that files will be distributed all over the hard disk and will be fragmented. The performance of the hard disk can suffer as a result. It is therefore a good idea to rearrange the file system occasionally by using the "Defrag" utility.

1. Press the "Main" key on the front of the instrument.
2. Click the "Defrag" button.

6.4 Changing the fuse

There are two fuses contained in the fuse holder which is built in to the AC power cord socket of the instrument.

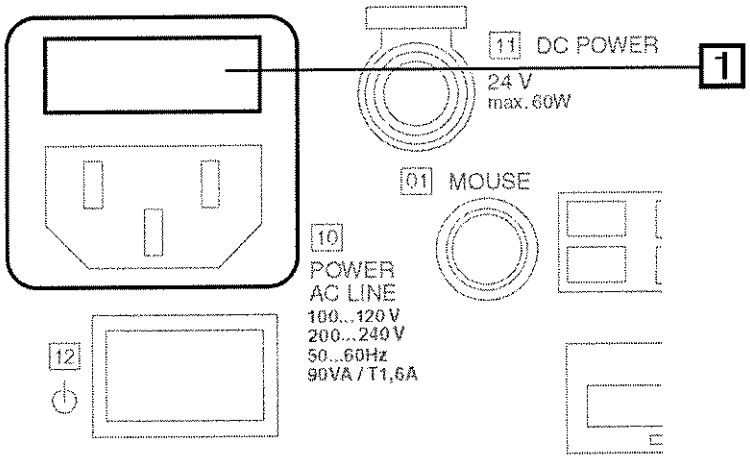


Fig. 6-1 Fuse holder [1]

Removing the fuse holder

1. Lightly press in the fuse holder.
2. Press in the lock on the flat side of the fuse holder.
3. Pull out the fuse holder.

Replacing the fuse

The following fuse value must be used:

Fuse
T 1.6 A

Table 6-1 Fuse

1. Remove the defective fuse from the fuse holder and replace it with a new one.
2. Push the fuse holder back into place, making sure that the lock engages.

6.5 Checking the Scan Counter

The micrometer screw will operate reliably up to a maximum of 1.5×10^7 rotations. The Scan Counter counts the number of rotations, thus indicating the degree of wear of this component.

Determining the number of rotations

⇒ Select "About" in the "System" menu.
The number of rotations is indicated in the "Spindle Rotations" box.

6.6 Cleaning the instrument

Danger

Danger of death by electric shock

Liquid entering the instrument can cause short circuits or provide a dangerous conductive path to the AC power supply.

⇒ Always unplug the instrument from the AC line before cleaning it.
⇒ Do not plug the instrument back in to the AC line until it is completely dry.

Caution

Danger of damage / destruction

Liquid entering the instrument can cause corrosion, particularly if the batteries are fitted.

⇒ Make sure that no liquid gets inside the instrument.
⇒ If liquid does get inside the instrument, remove the batteries and allow the instrument to dry out in a well-ventilated place.

If the instrument has become dirty through use, it can be cleaned using a cloth dampened with water to which a little mild detergent has been added. Very dirty parts can be cleaned carefully using alcohol.

6.7 Battery maintenance

Battery charging begins as soon as the instrument is connected to an external AC power supply. You should check the condition of the batteries frequently, particularly if the instrument is used on-site by several persons or if it has been stored for a long time.

The instrument provides optimum battery management. Both batteries are discharged at the same rate. To ensure that maximum capacity is maintained and that the capacity indicator is accurate, it is a good idea to condition the batteries after every 30 charge cycles by charging – discharging – recharging. The instrument provides a direct check of whether a conditioning cycle is necessary.

6.7.1 Checking the charge state

The exact charge state of the two built-in battery packs can be displayed at any time:

1. Press the "Main" key on the front panel.
   A function menu is displayed.
2. Press the "Close" button to return to the program.

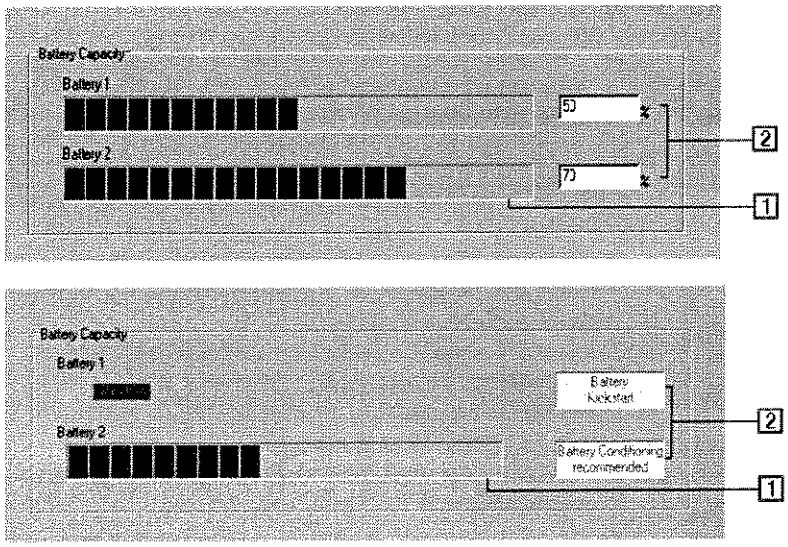


Fig. 6-2 Battery charge state

The function menu may display the following items:

[1]	2 bargraphs show the charge states of the two batteries
[2]	Numerical display of battery charge state. The following displays are possible: • Indication in percent, e.g. "96%": Battery charge state, • "Battery Kickstart": Battery is deep discharged, kick start required, see section 6.7.4, page 6-6 • "Battery Conditioning recommended": Start conditioning cycle, see section 6.7.3, page 6-6

Table 6-2 Function menu items

6.7.2 Rapid battery charging

⇒ Switch off the instrument but leave it connected to the AC power supply.
The red LED will flash.
The ventilator fan will continue running.
The batteries will be completely charged within a period of 3 hours.

6.7.3 Starting a conditioning cycle

Note: A conditioning cycle takes about 6 h for each battery. It is a good idea to start the cycle at the end of a working day or at a time when the instrument is not needed for at least this period of time.

You should perform a conditioning cycle when the instrument indicates "Battery Conditioning recommended". This will occur after about 30 charge/ discharge cycles.

1. Press the "Main" key on the front panel.
   The function menu shows the bargraphs and the "Battery Conditioning recommended" warning.
2. Press the "Battery Conditioning recommended" button.
   An information text appears.
3. Press the button again.
   The conditioning cycle starts.
   The batteries will be conditioned and fully charged after a period of 12 h has elapsed.

6.7.4 Performing a kick start

If a battery becomes so deeply discharged that it is no longer detected by the instrument, it can be reactivated by means of a kick start.

✓ The OSA-155 is switched on.
✓ Only the battery that no longer responds is fitted in the instrument.

If the OSA-155 cannot be switched on even though it is connected to the AC line when the rechargeable battery is completely discharged, the battery should first of all be removed, the OSA-155 started and the completely discharged battery then replaced in battery compartment 1. Then perform a kick-start as described below.

1. Press the "Main" key on the front panel.
2. In the "Battery Capacity" function menu, press the "Battery Kickstart" button.
   The instrument switches off and charges for about 30 sec.
   If the battery still does not react, the charge cycle will be cancelled.
   If the kick start is successful, the red LED will flash, the ventilator will run and the battery will be charged up completely.
3. If necessary, repeat the kick start several times.
   If the battery cannot be reactivated after several attempts it should be replaced.

Tip: Even after several unsuccessful attempts to kick start a battery, it is a good idea to check the battery function before deciding whether the battery is defective. If the battery function test delivers a positive result, the OSA-155 is probably defective.
See section 6.7.5, page 6-7 for details.

6.7.5 Checking the battery function

1. Remove the battery.
   There are four LEDs on the battery to indicate the charge levels 25 %, 50 %, 75 % and 100 %, as well as a switch labelled "Press".
2. Press the "Press" switch using a pen.
   If the LED do not react, the battery is defective and should be replaced or it is completely discharged and requires recharging.
   See section 6.7.5, page 6-7 for details.

6.7.6 Replacing the batteries

It should only be necessary to change the batteries if the instrument is used for a long time without access to an external power supply or if the batteries are defective.

1. Undo the screws and open the lid to the battery compartments.
   The battery packs can now be reached easily.
2. Use the loops to pull the old battery packs out of the instrument.
3. Use the loops to lower the new battery packs into the compartments as shown on the inside of the battery compartment lid. The batteries cannot be inserted the wrong way round.

Note:

1. The battery packs can also be exchanged when the instrument is operating from the AC line or from an external DC power supply. If the instrument is being operated from the batteries, it should be switched off before exchanging the batteries.
2. The instrument may be operated from a single battery pack for a brief period of time only.

Component damage

The contacts, battery compartment base or the ends of the batteries may be damaged if you let the batteries drop into the battery compartment.

Caution ⇒ Always use the loop to lower the batteries into the compartment.

6.8 Updates

The measurement software is being further developed continually. Information about any updates for the OSA-155 measurement software will be posted on the Wavetek Wandel Goltermann internet homepage.

⇒ Always request the latest software.

6.8.1 Updating the software

✓ It is assumed that you have the floppy disk containing the latest OSA-155 software.

1. Open Configuration mode.
2. Open the System menu.
3. Select "Software update".
4. Click "Yes" to confirm.
5. Insert the floppy disk with the OSA-155 software and confirm. The new software will be downloaded and installed.

7 Storage and transport

This section contains information on packaging and storage which will be useful if the instrument is to be stored for an extended period of time or is to be shipped for repairs.

7.1 Removing the batteries

If the instrument is not to be used for an extended period of time, the batteries must be removed.

1. Open the battery compartment lid.
2. Pull the batteries out of the instrument using the loop.
3. Close the lid.

7.2 Packaging for storage and transport

A cool, dry place is adequate for on-site storage of the instrument. No packaging is required in such cases.

If a dry location is not available, or if the instrument is to be shipped, e.g. to a Wavetek Wandel Goltermann Service Center for repairs, follow the instructions below to prevent damage occurring during storage and transport.

7.2.1 Storage in a damp environment

We recommend that the moisture protection provided for the original packaging is restored. This is particularly necessary if

- transport is likely to take a very long time, or
- the instrument is going to be stored for a long time in an environment where high humidity is likely to occur.

1. Place a sachet containing drying agent and the instrument in the plastic bag in which the instrument was originally packed.
2. Seal the plastic bag tightly using good-quality adhesive tape.

Caution

Damage due to storage under damp conditions

Drying agent that has become saturated may actually increase the ambient humidity.

⇒ Never place saturated drying agent in the plastic storage bag. Saturated drying agent can be recognized by its color: The color will change from blue to pink when the agent is saturated.

7.2.2 Transport packaging

If possible, re-use the original packaging supplied by Wandel&Goltermann if it has not been damaged.

If the original packaging is no longer available, use a strong box made of double-layer corrugated cardboard that is at least 4 mm thick.

The box should be large enough to allow space for at least 70 mm of padding all round the instrument.

Moisture protection

Provide moisture protection as detailed in section 7.2.1, page 7-2.

Check list

1. Make a check list of all the parts.
2. Place this list in the box with the instrument.

Padding

The padding must cover as large an area of the instrument surface as possible and hold it in such a way that it cannot shift within the box. Rigid plastic padding or cardboard padding materials are suitable. Any spaces can be additionally filled with padding chips.

Polystyrene chips alone are not suitable as padding material.

Place the instrument and padding in the box and seal the box along the butt edges using cloth-reinforced adhesive tape made from waterproof paper. The tape should be at least 70 mm wide.

8 Specifications

The following specifications are valid within the nominal range of use for ambient temperature from 5 °C to +40 °C and within the wavelength range from 1500 nm to 1620 nm or within the frequency range from 185 THz to 200 THz unless otherwise stated. The performance of the instrument is slightly restricted if the entire wavelength range is used.

8.1 Operating modes

GRAPH	Graphic display of complete spectrum with Zoom, Cursor and Marker tools.
WDM	Tabular display of wavelength, optical power level, OSNR, parameter deviations.
FILTER	Preselection filter function with variable wavelength and optical monitor output for further analysis of individual channel signals (bit errors, jitter / wander, pointers, etc.)

8.2 Measurement ranges

Wavelength / Frequency . . . . . 1450 nm to 1650 nm/ 182 THz to 206 THz
Channel power level (for ≤ 32 channels) . . . . . –60 to +15 dBm
Optical signal to noise ratio OSNR[1]
±0.2 nm / ±25 GHz from carrier signal . . . . . 34 dB (typ.)
±0.4 nm / ±50 GHz from carrier signal . . . . . >35 dB (40 dB typ.)
±0.8 nm / ±100 GHz from carrier signal . . . . . >40 dB (45 dB typ.)
Sweep time
Range 1450 to 1650 nm . . . . . ≤ 4 seconds
Range 1500 to 1620 nm . . . . . ≤ 2 secondss
Max. number of active channels 256

1 Referred to 0.1 nm noise bandwidth, single carrier measurement

8.3 Wavelength or frequency measurement

The displayed wavelength is referred to the speed of light in vacuum.

Display resolution (Marker display) . . . . . 0.005 nm/0.6 GHz
Optical bandwidth (FWHM)[1] . . . . . ≤0.1 nm/≤12.5 GHz
Measurement accuracy after internal calibration . . . . . ±0.04 nm/±5 GHz
Reproducibility (10 min) . . . . . ±5 pm (typically)

1 Calibrated and displayed for bandwidths 0.1 nm, 0.2 nm, 0.5 nm and 1 nm.

8.4 Power level measurement

Display resolution (Marker display) . . . . . 0.01 dB
Measurement accuracy[1] . . . . . ±0.5 dB
Linearity[2] . . . . . ±0.1 dB
Wavelength versus level response (flatness) . . . . . ±0.2 dB (typically)
Reproducibility (10 min) . . . . . ±0.1 dB (typically)
Polarization dependence . . . . . ±0.05 dB[3]
Noise floor . . . . . <–70 dBm

1 For channel power levels –30 dBm +5 dBm, bandwidth 0.1 nm, temperature range +10 to +35 °C.
2 For channel power levels –30 dBm and +5 dBm.
3 Valid at 1550 nm
Add ±0.05 dB in range 1550 ± 50 nm
Add further ±0.05 dB for version BN 2260/04.

8.5 Optical input

Max. permissible total power level . . . . . +30 dBm
Return loss . . . . . ≥ 35 dB
Fiber type . . . . . single mode 9/125 µm
Optical connector
Flat physical contact
interchangeable adapter for . . . . . FC, SC, DIN, etc.

8.6 Filter operation and monitor output (version /04)

For modulated carriers up to 10 Gbit/s[1]
Wavelength setting resolution . . . . . 5 pm/0.6 GHz
Setting accuracy after internal
calibration . . . . . ±0.04 nm
Wavelength versus temperature drift . . . . . ±0.02 nm
Optical bandwidth . . . . . 80 pm ±10 pm
Insertion loss . . . . . 5 dB (typically)
Return loss[2] . . . . . ≥ 35 dB
Fiber type . . . . . single mode 9/125 µm
Optical connector
Flat physical contact
interchangeable adapter for . . . . . FC, SC, DIN, etc.

1 Measurement conditions for 10 Gbit/s: Chromatic dispersion equalized to less than ±10 ps.
2 At filtered wavelength

8.7 Display

10.4" TFT color screen, 256 colors with touchscreen operation

Resolution . . . . . 640 x 480 pixels (VGA)

8.8 CPU

CPU	Pentium™ PC, 75 MHz
RAM	16 MB
Floppy disk drive	3.5", 1.44 MB
Built-in hard disk drive	at least 1.2 GB
Operating system	Windows™95

8.9 Remote operation

Option allows the OSA-155 to be operated from any location by a Windows™PC via modem or LAN card.

8.10 Interfaces

External printer	parallel (Centronics)
Remote control	serial (RS 232/V.24)
optional	GPIB (PCMCIA)
Other interfaces	keyboard, mouse, monitor, PCMCIA (2)

8.11 Power supply

Can be programmed for automatic switch-on when power returns after an AC line power failure.

The OSA-155 switches between AC line, external DC and internal rechargeable battery power sources electronically.
The power supply source can be changed during operation.

8.11.1 AC line connection

AC line voltage
- Nominal voltage range . . . . . 100 V to 120 V or 200 V to 240 V
- Operating range . . . . . 85 V to 132 V or 170 V to 265 V

AC line frequency . . . . . 50 Hz/60 Hz ±5%
Maximum power consumption . . . . . 90 VA

8.11.2 External DC connection

Nominal voltage . . . . . 24 V
Operating range . . . . . 12.6 V to 26 V
Maximum current consumption . . . . . 5 A
The rechargeable batteries can also be charged from the DC connector when the instrument is switched off.

8.11.3 Internal rechargeable battery supply

2 maintenance-free NiMH batteries . . . . . 14.4 V/3.5 Ah
Operating life[1] . . . . . 2 h (typically)
Charging time[2] for 2 batteries
with instrument switched off . . . . . 3 h

1 The operating life is based on a typical operating profile:
The following operating states are each used for one third of the time:
- Measurement
- Evaluation / viewing
- Suspend Mode (automatic power saving)

2 The batteries can be recharged from the AC line or from the DC connector. Only trickle-charging (no recharging) is possible during operation.

8.12 Ambient temperature

Nominal range of use . . . . . 5 °C to +40 °C
Storage . . . . . -20 °C to +60 °C
Transport . . . . . -20 °C to +70 °C

8.13 Humidity

Relative air humidity (0 °C to 30 °C) . . . . . 5% to 85%
Absolute air humidity
(>30°C to +40°C) . . . . . .25 g/m^3
Condensation not allowed.

8.14 Electromagnetic compatibility

Emission[1]
without any PC
accessories connected . . . . . EN 50081-1: 1992 (CISPR 22 Class B)
with PC accessories
connected . . . . . EN 50081-2: 1993 (CISPR 11 Class A)
Interference immunity . . . . . EN 50082-1: 1992

1 Without any indicated PC accessories, there are no restrictions on the installation of the OSA-155.
2 When PC accessories are connected (mouse, keyboard, PCMCIA interface cards with cable), the EMC class of accessories applies to the entire system.

8.15 Dimensions and weight

Dimensions (w x h x d) in mm
(without protective cover) . . . . . 350 x 280 x 150
Weight
(including batteries, without protective cover) . . . . . .approx 9 kg/19.6 lb

8.16 Miscellaneous

Warm-up time . . . . . .30 min
Prior to power-on, the instrument was exposed to the ambient temperature for at least 1 h.
Recommended calibration interval . . . . . 1 year
Operating positions . . . . . vertical, horizontal, inclined on support

9 Ordering information

9.1 Mainframe

OSA-155 without monitor output ..... **BN 2260/03**
(wavelength range 1450 nm to 1650 nm)
OSA-155 with monitor output ..... **BN 2260/04**
(wavelength range 1450 nm to 1650 nm)

Included with every instrument:

- Battery pack (two pieces)
- A test adapter of your choice (except 2060/00.39) for each optical connector
- Operating Manual in English or German as per your choice

9.2 Options

Calibration report (only with OSA-155) ..... BN 2260/90.01
Long-term monitoring software ..... BN 2060/90.09
Remote control GPIB (PCMCIA) ..... BN 2260/90.03
Remote operation via modem ..... BN 3035/95.30
Remote operation via LAN (TCP/IP) ..... BN 3035/95.31

9.3 Accessories

Test adapters for optical input and monitor output	BN 2060/00.xy see table below
Cleaning tape for fiber end surfaces	BN 2229/90.07
Padded carry bag	BN 3020/00.11
Transport case TPK-960/31	BN 0960/00.07
Storage case for optical accessories (ABK-30)	BN 2126/30
Spare battery pack	BN 2260/90.04
Zero modem cable	K 764
External keyboard (US/English)	BN 3035/92.04
OSA-155 Operating Manual (German)	BN 2260/98.01
OSA-155 Operating Manual (English)	BN 2260/98.21
Remote Control Manual (English)	BN 2260/98.22

Test adapters	
ST Type (AT&T)	BN 2060/00.32
HMS-10/A, HFS-13/A (DIAMOND)	BN 2060/00.34
HMS-10, HFS-13 (DIAMOND)	BN 2060/00.35
BICONIC 1006 A, 1016 A (AT&T)	BN 2060/00.37
D4 (NEC)	BN 2060/00.40
DIN 47256, HRL-10/DIN	BN 2060/00.50
FC, FC-PC, FC-APC (NTT)	BN 2060/00.51
E-2000 (DIAMOND)	BN 2060/00.53
SC, SC-PC, SC-APC (NTT)	BN 2060/00.58
Bare fiber adapter	BN 2060/00.39

10 Function overview

To save space, the function overview is only included in the on-line help. It contains descriptions of all the windows, dialogs and menus of the control software. The function overview does not contain any operating instructions.

The function overview is also provided in PDF format and can be printed out as good quality hardcopy. The printout also contains illustrations of the dialogs that are described.

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Wavetek Wandel Goltermann Environmental Management Program

Superb performance and high quality have always characterized Wavetek Wandel Goltermann (WWG) datacom and telecom measurement technology products. In this same world-class tradition, WWG has an established, proactive program of environmental management.

Environmental management is an integral part of WWG's business philosophy and strategy requiring the development of long-term, productive solutions to problems in the key areas of economics, technology, and ecology.

A systematic environmental management program at WWG is essential in regard to environmental policy and enhances cooperation between ourselves and our business partners.

The WWG Environmental Management Program considers:

Product design and manufacture

Environmental restrictions and requirements are taken into account during planning, and manufacture of WWG products. This attention ranges form the raw materials and finished components selected for use and the manufacturing processes employed, through to the use of energy in the factory, and right on up to the final stages in the life of a product, including dismantling.

Hazardous materials

WWG avoids or uses with care any hazardous or dangerous material in the manufacturing process or the end product. If the use of a dangerous material cannot be avoided, it is identified in product documentation and clearly labeled on the product itself.

Packaging materials

Preference is given to reusable or biodegradable single-substance packaging materials whenever possible.

Environmental management partnerships

WWG encourages our customers and suppliers who take this responsibility seriously to join WWG in establishing their own environmental management programs.

Recycling used products

Wavetek Wandel Goltermann has an effective program for the recycling and/or disposal of used equipment. Our customers in Germany can already take advantage of our return service for used instruments. In Europe, all new equipment purchased from WWG can be returned for scrapping at the end of its useful life, free of charge.

If you would like specific information about the Wavetek Wandel Goltermann Environmental Management Program, please contact us at

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