MU909020A
Optical Channel Analyzer Module
Operation Manual

Fifth Edition

For safety and warning information, please read this manual before attempting to use the equipment.
Keep this manual with the equipment.

ANRITSU CORPORATION

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information.   Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment.   Some or all of the following symbols may be used on all Anritsu equipment.   In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions.   Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation.   The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution.   The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution.   The contents are indicated symbolically in or near the triangle.

This indicates a note.   The contents are described in the box.

This indicates that you must consult the operation manual when working near locations at which this alert mark is present.

These indicate that the marked part should be recycled.

MU909020A Optical Channel Analyzer Module
Operation Manual

19	February	2008	(First Edition)
3	March	2008	(Second Edition)
1	June	2008	(Third Edition)
15	September	2009	(Fourth Edition)
14	October	2013	(Fifth Edition)

For Safety

WARNING ⚠

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the advice in the operation manual is not followed there is a risk of personal injury or reduced equipment performance. The alert mark shown on the left may also be used with other marks and descriptions to indicate other dangers.

2. Overvoltage Category
   This equipment complies with overvoltage category II defined in IEC 61010. DO NOT connect this equipment to the power supply of overvoltage category III or IV.

For Safety

WARNING ⚠

Repair

WARNING⚠

3. This equipment cannot be repaired by the operator. DO NOT attempt to remove the equipment covers or unit covers or to disassemble internal components. Only qualified service personnel with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Calibration

4. The performance-guarantee seal verifies the integrity of the equipment. To ensure the continued integrity of the equipment, only Anritsu service personnel, or service personnel of an Anritsu sales representative, should break this seal to repair or calibrate the equipment. If the performance-guarantee seal is broken by you or a third party, the performance of the equipment cannot be guaranteed. Be careful not to break the seal by opening the equipment or unit covers.

Replacing Battery

5. When replacing the battery, use the specified battery and insert it with the correct polarity. If the wrong battery is used, or if the battery is inserted with reversed polarity, there is a risk of explosion causing severe injury or death.

For Safety

WARNING ⚠

Battery Fluid

1. DO NOT short the battery terminals and never attempt to disassemble the battery or dispose of it in a fire.   If the battery is damaged by any of these actions, the battery fluid may leak.   This fluid is poisonous. DO NOT touch the battery fluid, ingest it, or get in your eyes.   If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help.   If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help.   If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

Battery Disposal

2. DO NOT expose batteries to heat or fire. Do not expose batteries to fire. This is dangerous and can result in explosions or fire. Heating batteries may cause them to leak or explode.

LCD

3. This instrument uses a Liquid Crystal Display (LCD).   DO NOT subject the instrument to excessive force or drop it.   If the LCD is subjected to strong mechanical shock, it may break and liquid may leak.
This liquid is very caustic and poisonous.
DO NOT touch it, ingest it, or get in your eyes.   If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help.   If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help.   If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

For Safety

CAUTION ⚠

Check Terminal

1. Never input a signal of more than the indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

For Safety

CAUTION ⚠

Replacing Memory Back-up Battery

1. This equipment uses a Poly-carbomonofluoride lithium battery to backup the memory. This battery must be replaced by service personnel when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.

   Note: The battery used in this equipment has a maximum useful life of 7 years. It should be replaced before this period has elapsed.

Use in a residential environment

2. This instrument is designed for an industrial environment.

   In a residential environment this instrument may cause radio interference in which case the user may be required to take adequate measures.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories, including the National Institute of Advanced Industrial Science and Technology, and the National Institute of Information and Communications Technology, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within one year after shipment due to a manufacturing fault.

However, software fixes will be made in accordance with the separate Software End-User License Agreement. Moreover, Anritsu Corporation will deem this warranty void when:

- The fault is outside the scope of the warranty conditions separately described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster, including fire, wind, flooding, earthquake, lightning strike, or volcanic ash, etc.
- The fault is due to damage caused by acts of destruction, including civil disturbance, riot, or war, etc.
- The fault is due to explosion, accident, or breakdown of any other machinery, facility, or plant, etc.
- The fault is due to use of non-specified peripheral or applied equipment or parts, or consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.
- The fault is due to use in unusual environments[Note].
- The fault is due to activities or ingress of living organisms, such as insects, spiders, fungus, pollen, or seeds.

In addition, this warranty is valid only for the original equipment purchaser.   It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Note:
For the purpose of this Warranty, "unusual environments" means use:
- In places of direct sunlight
- In dusty places
- In liquids, such as water, oil, or organic solvents, and medical fluids, or places where these liquids may adhere
- In salty air or in place chemically active gases (sulfur dioxide, hydrogen sulfide, chlorine, ammonia, nitrogen dioxide, or hydrogen chloride etc.) are present
- In places where high-intensity static electric charges or electromagnetic fields are present
- In places where abnormal power voltages (high or low) or instantaneous power failures occur
- In places where condensation occurs
- In the presence of lubricating oil mists
- In places at an altitude of more than 2,000 m
- In the presence of frequent vibration or mechanical shock, such as in cars, ships, or airplanes

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Crossed-out Wheeled Bin Symbol

Equipment marked with the Crossed-out Wheeled Bin Symbol complies with council directive 2002/96/EC (the "WEEE Directive") in European Union.

For Products placed on the EU market after August 13, 2005, please contact your local Anritsu representative at the end of the product's useful life to arrange disposal in accordance with your initial contract and the local law.

Notice

The following actions are strictly prohibited for all of the software installed in this product or otherwise provided by Anritsu:

1. Copying, except for archival purposes.
2. Transferring to a third party separately from this product.
3. Analyzing the incorporated software including but not limited to modifying, decompiling, disassembling, and reverse engineering.

CE Conformity Marking

Anritsu affixes the CE Conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

C E

1. Product Model

Model: MU909020A Optical Channel Analyzer

2. Applied Directive

EMC: 2004/108/EC
LVD: 2006/95/EC

3. Applied Standards

- EMC: Emission: EN 61326-1:2006 (Class A)
  Immunity: EN 61326-1:2006 (Table 2)

	Performance Criteria*
IEC 61000-4-2 (ESD)	B
IEC 61000-4-3 (EMF)	A
IEC 61000-4-4 (Burst)	B
IEC 61000-4-5 (Surge)	B
IEC 61000-4-6 (CRF)	A
IEC 61000-4-8 (RPFMF)	A
IEC 61000-4-11 (V dip/short)	B

*: Performance Criteria
A: During testing normal performance within the specification limits.
B: During testing temporary degradation, or loss of function or performance which is self-recovering.

- LVD: EN 61010-1: 2010 (Pollution Degree 2)

C-tick Conformity Marking

Anritsu affixes the C-tick marking on the following product(s) in accordance with the regulation to indicate that they conform to the EMC framework of Australia/New Zealand.

C-tick marking

C N274

1. Product Model

Model: MU909020A Optical Channel Analyzer

2. Applied Standards

EMC: Emission: EN 61326-1:2006 (Class A)

About This Manual

The purpose of this instruction manual is to explain how to set up the MU909020A Optical Channel Analyzer (OCA) and to utilize the various features and the available modes.

This manual is for anyone wishing to use a MU909020A Optical Channel Analyzer to test CWDM network.

This manual architecture and its contents are designed to appeal to professionals with the necessary technical background and prerequisites needed to use this type of instrument.

For this instruction manual it is assumed that you are familiar with fiber optic technology.

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Appendix

Index

1

This section overviews the Network Master Optical Channel Analyzer (OCA) and its features, and details the precautions and environmental conditions.

Overview

1.1   Product Overview

The MU909020A instrument is a part of the Optical Channel Analyzer (OCA) for use by field engineers deploying coarse wavelength division multiplexing (CWDM) networks. It measures the wavelength and power of the CWDM signal.

1.2   Features

- Measures power and wavelength over 18 CWDM channels
  The CWDM spectral grid is shown in the Appendix.
- Monitors drift of power and wavelength over time on all channels
  Pigtailed laser diodes for CWDM networks are not stabilized by a thermo-electric cooler (TEC). They have a thermal drift of about 0.1 nm/°C.
- Measures total power of all channels
  The MU909020A uses a separate dedicated photodiode for total power measurement, offering better accuracy and lower PDL.
- Complies with ITU-T G.694.2 and ITU-T G.695
  ITU-T-G694.2 specifies the wavelength grid for CWDM applications. This wavelength grid supports a channel spacing of 20 nm. ITU-T-G.695 specifies optical parameters for physical layer interfaces of CWDM applications for up to 16 channels.
- Indicates Pass or Fail result
  The MU909020A can check a CWDM network by comparing the channel wavelength and power against alarm settings.
- Supports easy file saving and transfer
- Supports long-term battery operation in the field with no moving parts
- Supports module changes without special tools or calibration
- Supports easy field cleaning of universal optical connector

Fig. 1.2-1   OCA Optical Channel Analyzer

The MU909020A displays all drifts errors (wavelength and power) using clear alarm indicators just by pressing the **[Start]** key.

1.3   Product Description

The OCA consists of the MT9090A main frame, the MU909020A optical module, and a battery pack. Section 2 lists the options, peripherals and accessories.

The MT9090A main frame and MU909020A are plugged together (see section *Assembling MU909020A Module, p. 2-15*). The power supply is connected on the optical module to charge the battery.

1.3.1 Precautions

The interface connector has a protective cover. Only remove the protective cover when connecting a cable.

If a unit is stored at low temperature for some time before use, harmful condensation (dewing) may form inside it when brought suddenly to normal room temperatures. Allow the unit to warm up to room temperature slowly before switching it on.

Do not use or store the MU909020A in extreme temperatures.

Safety: Only use the supplied AC adapter. Other AC adapters may damage the MU909020A.

1.3.2 Operating Environment

The OCA is designed to operate at 0° to 50°C with a non-condensing, relative humidity of 80% (max.) at 40°C. Do not leave the MU909020A in a car in summer.

1.4 Serial Numbers

The MU909020A has a serial number on the back panel and saved in firmware.

Display the serial numbers as follows:

(1) Set the OCA power to on and display the Top Menu. Press the [**Menu/Power**] key to display the General Functions pop-up menu with **Setups** highlighted.

(2) Press the [**Set**] key

(3) Press the [**Menu/Power**] key and select the **About** menu.

(4) Press the [**Set**] key

Fig. 1.4-2 Screen with Serial Numbers

The screen shows two serial numbers:

Use the full serial numbers when ordering parts or contacting Anritsu Customer Service.

Section 2   Inspection and Assembly

This section describes unpacking, the shipped items, the power requirements, and the setup.

2

Inspection and Assembly

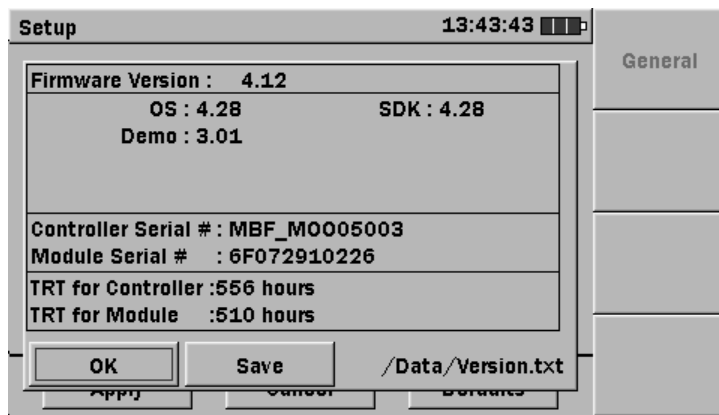# 2.1 Unpacking

2.1.1 Acceptance inspection

Save the original shipping container in case the instrument must be returned to Anritsu for repair or service.

Inspect the shipping container for damage.

Remove the OCA and accessories from the packing case.

If any item is damaged, contact your local sales representative or Anritsu Customer Service Center. If the shipping container is damaged or the cushioning material shows signs of stress, notify the carrier as well as Anritsu. Keep the shipping materials for inspection by the carrier.

2.2 Shipped Items

The OCA ships with the following items. Check that all listed items are present and contact Anritsu if any are missing.

Table 2.2-1   List of Parts and Accessories

Item		Name/Document No.	Qty.
Main Frame	Optical Channel Analyzer	MU909020A	1
Accessories	Power Pack	AC Charger Adapter	1
	Battery Pack	NiMH Battery Pack	1
	Protector		1
	Standard Soft Case		1
	Strap		1
Manual	Calibration Certificate		1
	Operation Manual on CD ROM	OCA-PRD-06	1

2.3 Power Requirements

2.3.1 Installing the NiMH Battery Pack

Install the NiMH battery pack as follows.

(1) Set the OCA to OFF.

(2) Open the battery compartment by pulling the latch down while lifting the battery compartment cover.

(3) Remove any installed AA alkaline batteries.

(4) Plug the NiMH battery pack connector into the socket next to the module release latch (white plastic latch in battery compartment shown in Fig. 2.3-3).

(5) Slide the NiMH battery pack into the battery compartment with the **THIS SIDE UP** label visible while ensuring that the battery red pull ribbon is tucked underneath but with enough exposed to help remove the battery pack when necessary.

(6) Refit the battery compartment cover.

2

Inspection and Assembly

Fig. 2.3-3   Opened Battery Compartment

(1) NiMH Battery Pack Socket

(2) NiMH Battery Pack

(3) Battery red pull ribbon

WARNING ⚠

ALWAYS set the OCA power to OFF before removing the NiMH battery pack, otherwise the NiMH battery pack and/or OCA may be damaged.

2.3.2 Replacing Battery

If the NiMH battery pack must be replaced with AA alkaline batteries, use the following procedure:

(1) Set the OCA power to off.

(2) Open the battery compartment by pulling the latch down while lifting the battery compartment cover.

(3) Using the battery pull ribbon, lift out the NiMH battery pack and unplug it (Fig. 2.3-3).

(4) Load four new AA alkaline batteries into the compartment, making sure to follow the battery polarity marks next to the battery contacts.

(5) Refit the battery compartment cover.

WARNING ⚠

ALWAYS set the OCA power to OFF before removing old AA alkaline batteries, otherwise settings and data files may be lost.

WARNING ⚠

Do not store the MU909020A for long periods with alkaline batteries in it. The batteries may leak and damage the unit.

2.3.3 AC Charger/Adapter

The MU909020A includes an AC charger/adapter as standard accessory. The battery pack typically requires 3 hours to charge fully. The OCA can be operated while recharging the battery pack, but the battery pack may not be recharged fully.

The AC charger/adapter provides a safety extra-low voltage (SELV) voltage (according to the 60950-1 standard). This ensures reinforced isolation from unsafe voltage.

The AC charger/adapter comes with four interchangeable plugs. Make sure that the AC charger/adapter's transformer is equipped with the correct plug type.

Fig. 2.3-4   AC Charger/Adapter with guard

(1)   Guard

(2)   Release

To prepare the AC Charger/Adapter for use:

(1) Pull down the release and remove the guard if it is in place

(2) Select the desired plug type from the AC charger/adapter kit

(3) Hold the release down and insert the selected plug, making sure that the tab on the plug adapter is seated in the slot on the top of the AC charger/adapter.

(4) Release the pull down release, making sure that the tab on the release is seated in the slot on the base of the plug adapter.

2.3.4 AC Power Operation

Use the following procedure to operate the OCA on AC power

To use the AC Charger/Adapter:

(1) Open the cover over the DC input port, located on the top connector panel of the OCA and plug the jack from the AC charger/adapter to the port.

(2) Plug the AC charger/adapter's into an AC outlet.

(3) Press the **[Menu/Power]** 🔘 **key** to start the OCA.

CAUTION ⚠

Only use the AC charger/adapter provided by Anritsu. Anritsu does not guarantee the safety and functionality of another AC charger/adapter.

2.3.5 Charging the Battery Pack

To charge the battery pack:

(1) Set the OCA power to off.

(2) Open the cover over the DC input port, located on the top connector panel of the OCA and plug the jack from the AC charger/adapter to the port.

(3) Plug the AC charger/adapter's transformer into an AC outlet.

(4) When the battery pack is fully charged, the Battery Status LED stay illuminated (Green).

2.3.6 Battery status LED

The Battery Status LED displays the current status of the Ni-MH Battery Pack:

Red

The battery pack is not charging for one of the following reasons:

- When starting to charge, the temperature of the battery pack is lower than 5°C or higher than 45°C. In this situation, disconnect the AC adapter from the Network Master and wait until the temperature of the battery pack is within the 5° to 45°C range.
- While charging, the temperature of the battery pack becomes lower than 5°C or higher than 60°C. In this situation, charging resumes automatically as soon as the temperature of the battery pack is within the 5° to 45°C range.
- Charging has not finished within the about 3 hours it normally takes to charge the battery pack fully. To avoid overcharging, the unit stops charging after about 3 hours.

If the Battery Status LED is always red, there is a problem with the battery pack. Please contact the Anritsu Technical Support Center or your local Anritsu representative (see Anritsu Corporation Contact).

Orange

The AC Charger/Adapter is plugged in and the battery pack is charging.

Green

The AC Charger/Adapter is plugged in and the battery pack is fully charged or the Network Master is operating. The battery pack will continue charging in maintenance charge mode.

Note: Charging or discharging can be started at any time with minimum battery memory issues. The battery pack can be left in maintenance charge indefinitely.

2.4 Assembling MU909020A Module

Use the following procedure to remove the current module from the Network Master controller and install a new module.

To change the module:

(1) Set the OCA power to off.

(2) Disconnect any connected AC charger/adapter.

(3) Unscrew the fastener on the back panel of the current test module. When fully unscrewed, the fastener slides out of remains attached to the test module.

(4) Open the battery compartment and remove the battery pack or AA alkaline batteries.

(5) Hold down the module release latch (white plastic latch in battery compartment) while pulling forward on the Network Master controller to separate it from the module.

CAUTION ⚠

The Network Master controller and MU909020A module are a precision fit. Remove the module carefully.

(6) To install the MU909020A module, align the two tabs on the back of the Network Master (end opposite 100 pin connector) with the two slots on the new module.

(7) Applying firm but gentle pressure to seat the Network Master controller on the MU909020A module. DO NOT force the two sections together.

(8) Tighten the fastener.

(9) Replace the battery pack or alkaline batteries, if removed.

(10) Refit the battery compartment cover.

This section provides a description of the physical connections to the OCA on top panel.

3

Connections

3.1   Optical Connector and Adapter

The optical connector is an interface to the measurement port which accepts adapters for FC and SC fiber connectors. Depending on the unit, the OCA port is equipped with either a PC or APC optical connector.

The following are the optical adapters currently available for the OCA.

J0617B (FC/PC)   **J0619B (SC)**
J0739A (FC/APC)

3.2   Changing the optical adapter

Caution ⚠

OCA units equipped with angle-polished (APC) optical connectors require angle-polished optical adapters.

To change an Optical Adapter

(1) Open the cover on the measurement port.

(2) Lift up on the adapter's locking lever. You will hear a 'click' when the latch mechanism disengages.

(3) Slide the adapter out of the measurement port.

(4) Slide the new adapter on to the connector ferrule in the measurement port.

(5) Push down on the adapter's locking lever. You will hear a 'click' when the latch mechanism engages.

3.3   Connecting fiber

The measurement port is used to connect a fiber for OCA applications.

Connect the fiber as follows:

(1) Slide the cover on the measurement port to the opened position

(2) Connect the test fiber directly to the measurement port.

Caution ⚠

Never force the connector ferrule or insert it with an angle into the adapter. Optical fiber are succeptible to loss from microbends or other stress. Position the patch cord to minimize mechanical strain.

3.4   Connecting peripheral devices

The OCA comes equipped with two USB ports, which allows a USB device or personal computer to be connected.

3

Connections

3.4.1 USB (Up) Port

By connecting the USB (Up) port of the OCA to a personal computer via a USB A to USB B cable, you can access the internal memory of the unit directly from the PC.

Fig. 3.4-5   USB (Up) port

Caution ⚠

Before disconnecting the USB cable between the OCA and the personal computer, be sure to prepare the computer so that the hardware can be removed. Otherwise, the internal memory may be damaged.

3.4.2 USB (Down) Port

The USB (Down) port is used to connect a USB memory stick to the OCA. Use a USB memory stick compatible with USB 1.1.

Some USB memory sticks work with this port.

Fig. 3.4-6   USB (Down) port

The following message is displayed when the OCA detects that a USB storage device has been plugged.

Fig. 3.4-7   USB storage device dialog box

Press the **Set key**, the dialog box closes and the USB device is now the default storage drive.

When you remove the US device, the following message appears.

Fig. 3.4-8   Removed USB storage device dialog box

Caution ⚠

Do not remove USB memory stick during data transfer.
The USB memory or files may be damaged.

Section 4 Panels layout and Operation

This section provides details of the controls on the panels of the OCA

4

Panels Layout and Operation

4.1   Introduction

The Network Master has a front panel with LCD and hard keys; a back panel where the MU909020A module and its battery are mounted; and a top connector panel with fiber connector, USB ports and AC input.

4.2   Front Panel

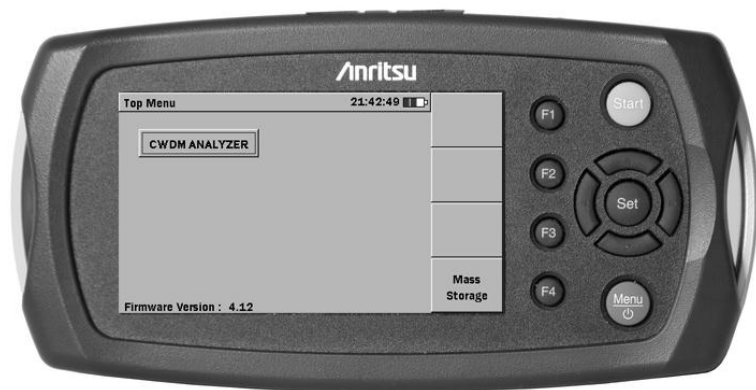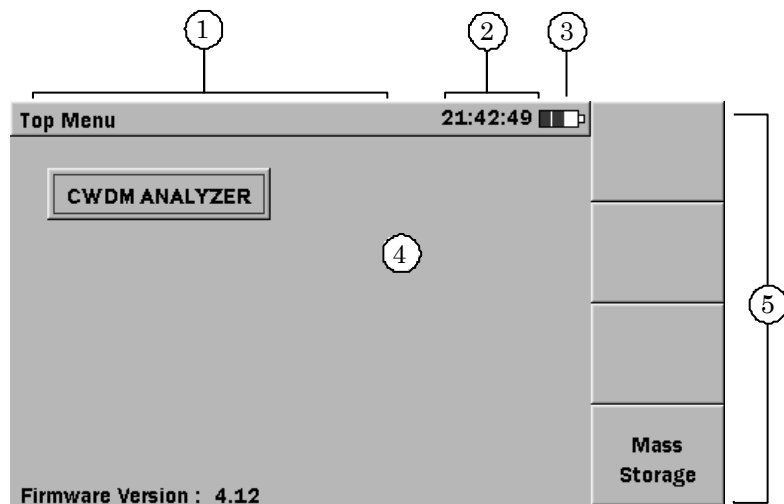The front panel contains the unit operating controls and its LCD display in Fig. 4.2-9.

Fig. 4.2-9   OCA Front panel

4.2.1 LCD

The user interface menus are detailed in later sections of this manual. The menus are displayed on five parts of the LCD as described below:

1	Screen Title area	Displays the title of the current screen
2	Time	Displays current time (hh:mm:ss)

3	Plug or Battery icon	Indicates operation on external power or on battery with icon showing remaining charge
4	Display	Contents depend on selected operation
5	Soft Keys	Soft functions activated by pressing F1 to F4 keys

4.2.2 Soft keys

Four keys (F1 to F4) are located on the right of the four user interface softkeys. Press these keys to enable the softkeys function.

4.2.3 Start key

Press the Start key to start a test in an operating mode.

4.2.4 Arrow keys and Set key

The Left/Right/Up/Down keys move the cursor and scroll up/down the pop-up menus.

Press the [**Set**] key to set the highlighted item.

4.2.5 Menu/Power key

When the unit is off, press the [**Menu/Power**] key to set the unit to on.

When the unit is on, press the **[Menu/Power]** key to display the Main menu, data save, print, and power off functions.

4.3   Back panel

The back panel contains the battery pack, screw for fastening the MU909020A, compliance and warning labels, and MU909020A serial number.

4.4   Power and batteries

The OCA can be operated from the AC charger/adapter, the NiMH battery pack, or from four AA alkaline batteries.

4.4.1 External AC charger/adapter

Use the AC adapter to power up the OCA and/or to charge the NiMH battery pack.

4.4.2 NiMH rechargeable battery pack

The NiMH battery pack can power the OCA.

4.4.3 Replaceable batteries

Four AA alkaline batteries can power the OCA.

4.5   Top connector panel

The top connector panel has a measurement port to connect the optical fiber as well as two USB ports for connecting an external PC and USB memory stick for uploading and downloading files. There is also a DC input to connect the external AC charger/adapter and a battery status LED.

Fig. 4.5-10   OCA Top Panel with Open Measurement Port

(1) Measurement Port (Open Cover)

(2) DC Input

(3) Battery status LED

(4) USB (Up) port

(5) USB (Down) port.

Section 5 General operation

This section describes the general operation and system setup.

5

General operation

5.1   Power On/Off

5.1.1 Setting Power to On

Press the [**Menu/Power**] 🔘 key. The OCA displays a brief splash screen while running a self-test and then displays the Top Menu.
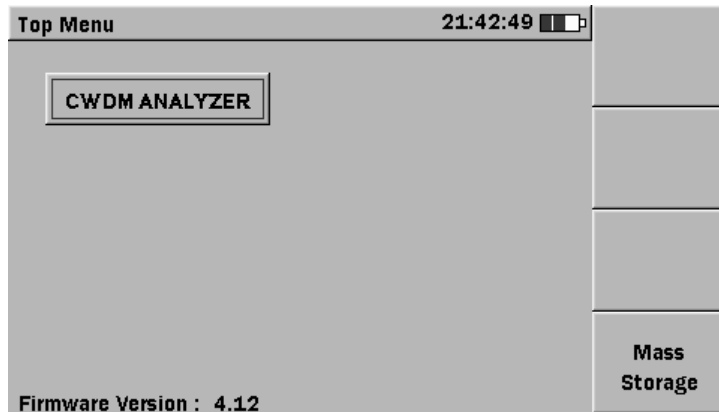
Fig. 5.1-11   OCA Top Menu

Caution ⚠

If this screen is not displayed after power-on, the OCA may have a hardware failure. Cycle the power off and on. If the problem persists, contact the Anritsu Technical Support Center or your local Anritsu representative.

5.1.2 Setting Power to Off

(1) Press the [**Menu/Power**] 🔘 key; a pop-up menu is displayed.

(2) Press the [**Down**] key to select **Power Down** in the menu.

(3) Press the [**Set**] 🔘 key to accept the selected menu item. The following message appears: "Are you sure you want to Power Down?".

(4) Select **Yes** and press the [**Set**] 🔘 key.

Forcibly set the power to OFF at any time by pressing the [**Menu/Power**] 🔘 key for 10 seconds.

5.2   General Functions

5.2.1 Top Menu

The Top Menu provides access to the:
- Test application.
- Mass storage menu (press [F4]).
- General functions pop-up menu (press [**Menu/Power**] key).

5.2.2 Accessing Mass Storage Menu from Top Menu

Press [Mass Storage] (F4) to display the Mass Storage screen.

5.2.3 Accessing OCA Application from Top Menu

(1) Use the **Left/Right/Up/Down** keys to highlight the "CWDM Analyzer" field and press the [**Set**] (Set) key.

(2) The Top Menu closes and the selected test application is launched

5.2.4 General Functions Pop-Up Menu

Press the [**Menu/Power**] (Menu) key. The General Functions pop-up menu is displayed.
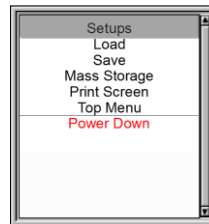
Fig. 5.2-12   General Functions Pop-up Menu

This menu provides access to the following:

Setups	Provides access to the application specific setups for the current MU909020A module and the General Setups for the Network Master.
Load	Opens the Mass Storage screen in Save mode, to save a test or setting results file (**Drift Mode** and **Settings** only)
Save	Opens the Mass Storage screen in Save mode, to save a test or setting results file (only with **Drift Mode** and **Settings**)
Mass Storage	Opens Mass Storage screen in File Operations mode, to copy, delete or rename files, as well as create new folders.
Print Screen	Saves screen capture of current screen as bitmap file to unit internal memory.
Top Menu	Opens Top Menu.
Power Down	Starts power off sequence

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5.2.5 Setups

Use the following procedure to access the Setup screen

To access Setups from a test application

(1) Press the [**Menu/Power**] ⊙ key. The General Functions pop-up menu is displayed with **Setups** selected.

(2) Press the [**Set**] key. The General Setup screen is displayed.

Fig. 5.2-13   General Setup screen

(3) Use the [**Up**] and [**Down**] keys to select Date & Time

   (a) Press the [**Set**] key. The Date & Time dialog appears. Use the [**Left**] and [**Right**] keys to highlight the required selection.
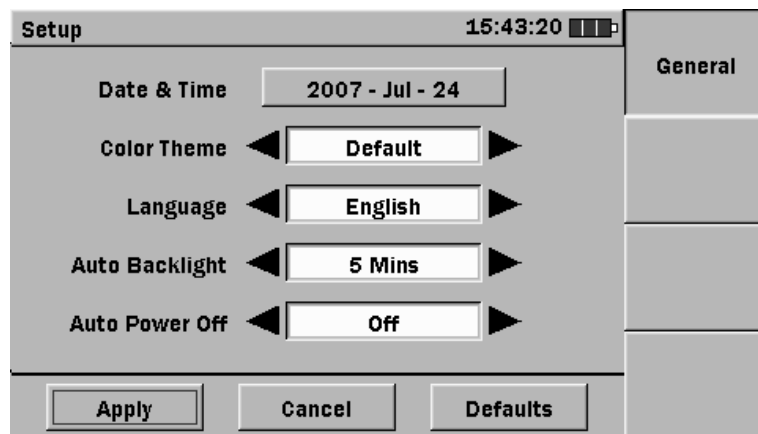
   (b) Use the [**Up**] and [**Down**] keys to scroll to the required setting.

   (c) Repeat steps 3a and 3b until the required date and time are displayed in the dialog.

   (d) Press **OK** (F1) to accept the new Date & Time setting.

(4) Select the Color Theme field and use the [**Left**] or [**Right**] key to scroll to the required color theme.

(5) Select the Language field and use the **[Left]** or **[Right]** key to scroll to the required language. Only English is available.

(6) Select the Auto Backlight field and use the [**Left**] or [**Right**] key to scroll to the required time interval to automatically turn off the backlight when no keys have been pressed.
Press any key to restore the backlight.

(7) Select the Auto Power Off field and then use the [**Left**] or [**Right**] key to scroll to the required time interval to automatically turn off the unit when no keys have been pressed.

(8) Select Apply and press the [**Set**] key to apply the settings.

Set to defaults

Use the following procedure to return to the factory default settings.

(1) Press the [**Menu/Power**] 🔘 key.

(2) Select **Setups** on the pop-up menu and press the [**Set**] key. The General Setups menu is displayed.

(3) Select **Defaults** and press the [**Set**] key.

(4) Select **Apply** and press the [**Set**] key. The General Setups defaults are now set and the Top Menu is redisplayed.

5.2.6 Loading

The Load selection is enabled only with Drift Mode and Settings.

Refer to paragraphs 6.5.2 Loading Data and 7.6.2 Loading Configuration

5.2.7 Saving

The Save selection is enabled only with Drift Mode and Settings.

Refer to paragraphs 6.5.1 Saving Data and 7.6.1 Saving Configuration.

The maximum number of characters in the name of a file is 23.

5.2.8 Help Function

Basic help information is available in the Setup and Top Menu screens.

To access Help

(1) Press the [**Menu/Power**] 🔘 key when in any of the Setup or Top Menu screens.

(2) Select **Help** in the pop-up menu.

(3) Press the [**Set**] key. The bottom half of the screen displays a dialog with the help information.

(4) Press the [**Set**] key again to close the dialog.

5.2.9 About Function

The About Function provides access to the Version/Serial Number Information screen listing the framework and test application software versions, as well as the serial numbers of the Controller and Module.

To access the versions and serial numbers:

(1) Press the [**Menu/Power**] 🔘 key at any of the Setup or the Top Menu screens.

(2) Select **About** from the pop-up menu and press the [**Set**] key.

(3) The Version/Serial Number Information screen **is displayed**.

(4) Review the information in the window and then

(a) With **OK** selected, press the [**Set**] key to close the screen

or

(b) Select **Save** and press the [**Set**] key. The version information is saved to a text file in the Data folder and the screen closes.

5.3   Mass Storage

The Mass Storage selection provides access to:

- Creating new folder
- Deleting files
- Copying files
- Renaming files

To access the Mass Storage file operations

(1) Press the [**Menu/Power**] key. The General Functions pop-up menu is displayed.

(2) Select **Mass Storage** and press the [**Set**] key. The Mass Storage File Operations screen is displayed.
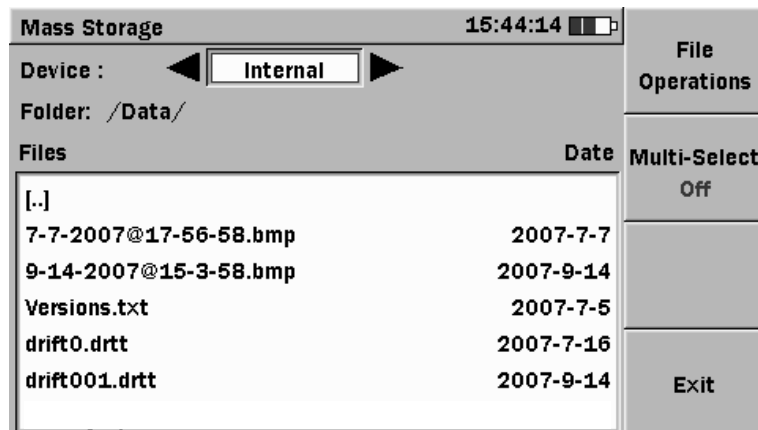
Fig. 5.3-14   Mass Storage – File Operations Screen

5.3.1 Creating a New Folder

Use the following procedure to create a new folder in the Mass Storage File Operations screen.

To create new folder

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the selection is set automatically to **Internal**.

(3) Select the location for the new folder

(4) Press [**File Operations**] (**F1**). The File Operations pop-up menu is displayed with **New Folder** selected.

(5) Press the [**Set**] key. The pop-up menu closes and a folder named [**newFolder**] is added to the current directory.

5.3.2 Deleting File

Use the following procedure to delete a file with the Mass Storage File Operations screen.

To delete file

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right] key** to select the **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(3) Find and select the file to delete.

(4) Press [**File Operations**] (**F1**). The File Operations pop-up menu is displayed.

(5) Select **Delete** and press the [**Set**] key**.**

(6) The Confirm Delete dialog is displayed. Select **Yes** and press the [**Set**] key.
The dialog closes and the file is deleted from the currently displayed directory.

5.3.3 Deleting Multiple Files

Use the following procedure to delete multiple files with the Mass Storage File Operations screen.

To delete multiple files

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right] key** to select the **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(3) Navigate to the required directory or folder.

(4) Press [**Multi-Select Off**] (**F2**). The red legend on the soft key changes to **On** and a blank checkbox is displayed in front of each file name in the current directory or folder.

(5) Select the first file to delete and press the [**Set**] key. A checkmark appears in the checkbox for the selected file.
Repeat until all files to be deleted are selected and continue from step 6.
or
Select all files in the current folder by pressing [**File Operations**] (**F1**), selecting **Select All**, and pressing the [**Set**] key. Then continue from step 6.

(6) Press [**File Operations**] (**F1**) and select **Delete** in the pop-up menu.

(7) Press the [**Set**] key. The Confirm Delete dialog is displayed.

(8) Select **Yes** and press the [**Set**] key. The selected files are deleted.

(9) Press [**Exit**] (**F4**) to close the Mass Storage screen.

5.3.4 Copying File

Use the following procedure to copy a file in the Mass Storage File Operations screen.

To copy file

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(3) Find and select the file to copy.

(4) Press [**File Operations**] (**F1**). The File Operations pop-up menu is displayed.

(5) Select **Copy** and then press the [**Set**] key. The Destination window is displayed superimposed on the Mass Storage File Operations screen.

Fig. 5.3-15   Mass Storage Screen with Superimpsed Destination Window

(6) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(7) Navigate to the required destination.

(8) Press **[Paste]** (**F1**). The Copied File(s) dialog is displayed.
Check that the file has been pasted to the required location and press the [**Set**] key to close the dialog and return to the Mass Storage screen.

(9) Press **[Exit]** (**F4**) to close the Mass Storage screen.

5.3.5 Copying Multiple Files

Use the following procedure to copy multiple files in the Mass Storage File Operations screen.

To copy multiple files

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(3) Navigate to the required directory and folder.

(4) Press [**Multi-Select Off**] (**F2**). The red legend on the soft key changes to **On** and a blank checkbox is displayed in front of each file name in the current directory and folder.

(5) Select the first file to copy and press the [**Set**] key. A checkmark is displayed in the checkbox for the selected file.
Repeat until all the required files are selected and continue from step 6.
or
Select all files in the current folder by pressing [**File Operations**] (**F1**), selecting **Select All**, and pressing the [**Set**] key. Then continue from step 6.

(6) Press [**File Operations**] (**F1**). The File Operations pop-up menu is displayed.

(7) Select **Copy** and press the [**Set**] key. The Destination window is superimposed on the Mass Storage File Operations screen.

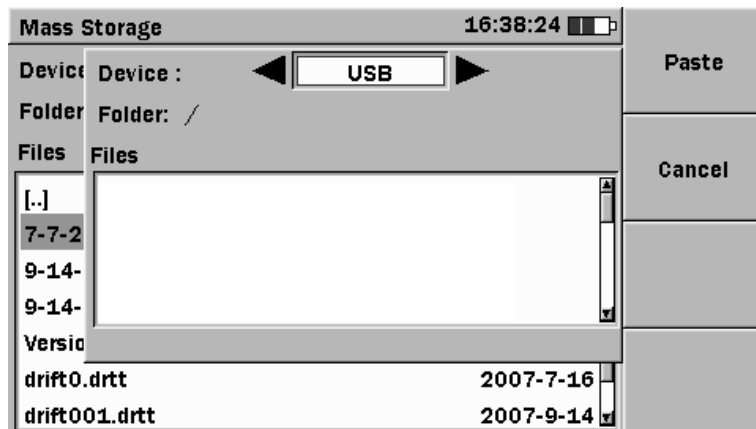(8) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(9) Navigate to the required destination.

(10) Press [**Paste**] (**F1**). The Copied File(s) dialog is displayed.
Check that the files have been pasted to the required location and then press the [**Set**] key to close the dialog and return to the Mass Storage screen.

(11) Press [**Exit**] (**F4**) to close the Mass Storage screen.

WARNING ⚠

When a file is copied from a folder to another folder there is no warning message if this file was already existing whith the same name.

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5.3.6 Renaming File or Folder

Data files and folders are renamed by accessing the Rename function in the Mass Storage File Operations screen.

To rename file or folder

(1) Access the Mass Storage File Operations screen.

(2) With the **Device** field selected, use the **[Left] or [Right]** key to select **Internal** or **USB** as the mass storage device.
If no USB device is connected, the device is set automatically to **Internal**.

(3) Find and select the required file or folder.

(4) Press [**File Operations**] (**F1**). The File Operations pop-up menu is displayed.

(5) Select **Rename** and press the [**Set**] key. The soft keyboard is displayed

  (a) Use the [**BKSP**] **key** (**F2**) to clear the entry in the name field.

  (b) Use the **Left/Right/Up/Down** keys to select the required letter in the character matrix.

  (c) Press the [**Set**] key to add the selected letter to the name field.

  (d) Repeat steps 5b and 5c to complete the file or folder name.

(6) When the file/folder name is complete, press [**OK**] (**F4**). The file/folder is saved with the new name and the Mass Storage screen is displayed.

(7) Press [**Exit**] (**F4**) to close the Mass Storage screen.

5.4   Printing Screen

Use the Print Screen function to capture the current screen as a bitmap (bmp) file. Captured bitmap files are saved to the Internal Data directory.

To save Print Screen file

(1) Display the required screen and press the [**Menu/Power**] key to display a pop-up menu.

(2) Select **Print Screen** and press the [**Set**] key.

(3) The Print Screen Complete dialog is displayed in 2 or 3 seconds. Press the [**Set**] key to save the bitmap file to the Data folder in internal memory.

Section 6   Getting Started

This section explains how to use the OCA and how to select different modes.

6

Getting Started

6.1   Running Test

To start a test, press the **[Start]** key.
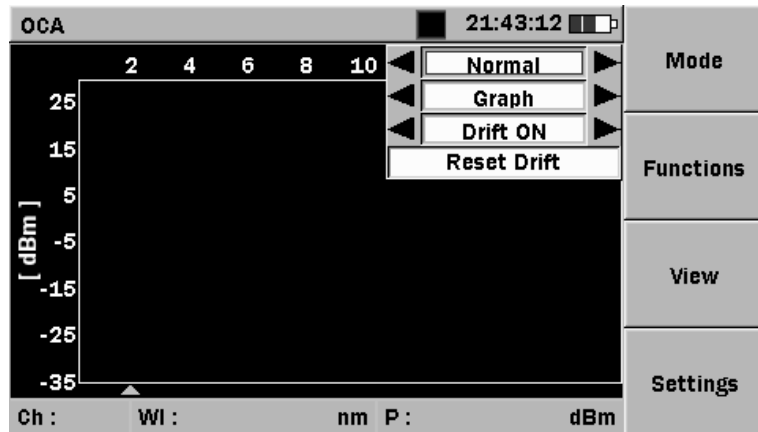
Fig. 6.1-16   OCA Mode Menu

6.1.1   About Color Conventions

Alarm thresholds are displayed in red on the graph.

(1)   The **Normal Graph** color conventions are:

- Empty bar graph: Channel below power threshold and **View All** selected
- Red bar graph: Channel outside Alarms Power Setting
- Half of bar graph red: Channel outside of Alarms Wavelength Setting
- White bar graph: Channel inside Alarms Setting

(2)   The **Drift Graph** color conventions are:

- Empty bar graph: Channel below power threshold and **View All** selected
- Red contour line: Channel outside Alarms Settings
- Green contour line: Channel within Alarms Settings

(3)   The **Normal Table** colors conventions are:

- Red characters: Value outside Alarms Settings

(4)   The **Drift Table** color convention is:

- All black characters.

6.2   Normal Mode

Run the **[CWDM Analyzer]** application; the default mode is the Normal Mode, which displays all active channels in real time. The OCA measures the wavelength and power of the CWDM channels. It displays the results as graphs and tables.

Access the Normal Mode as follows:
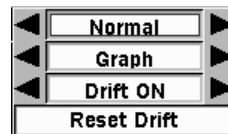
(1)   Press [**Mode**] (F1) while the OCA application is running.

```
◄ │ Normal     │ ►
◄ │ Graph      │ ►
◄ │ Drift ON   │ ►
  │ Reset Drift │
```

(2)   Select the first menu and use the [**Left**] and [**Right**] keys to select **Normal** mode.

(3)   Press the [**Set**] key to close the **Mode** menu.

6.2.1 Graph Mode

The Graph Mode of the Normal Mode displays the power vs. channel. The power unit is dBm.

Access the Graph Mode as follows:

(1)   Press [**Mode**] (F1) while the OCA application is running.

```
◄ │ Normal     │ ►
◄ │ Graph      │ ►
◄ │ Drift ON   │ ►
  │ Reset Drift │
```
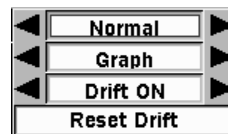
(2)   Select the second menu and use the [**Left**] and [**Right**] keys to select **Graph** Mode.
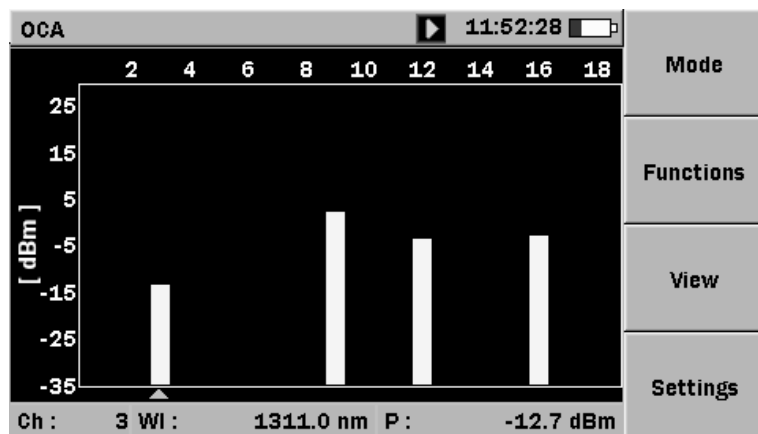
(3)   Press the [Set] key to close the **Mode** menu.

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Fig. 6.2-17   Normal Mode Graph View

6.2.2 Functions in Normal Graph Mode

The functions soft key displays three status lines.

Cursor
PTotal / Nb Ch
Duration / Nb Scan

Press the [**Set**] key to select a function

    (1) With the **Cursor** function

- Move the cursor at the bottom of the screen using the **Left**] and [**Right**] keys. The text line displays the channel number, the wavelength, and the power of the selected channel.

Ch :	3 Wl :	1311.0 nm	P :	-12.7 dBm

    (2) With the **PTotal / Nb Ch** function, the text line displays the

- Total power.
- Number of channels.

Total P :	17.4 dBm	Nb Ch :	6

    (3) With the **Duration / NB Scan** function, the text line displays the

- Drift duration
- Number of scans

Duration	5d 17h 49m	Scan count	49617

6.2.3 View in Normal Graph Mode

The **View** soft key displays four graph views.

◀	View Found	▶
	Zoom	
	Auto Zoom	
	Full Scale	

    (1) With the first menu

- Select **View Al**l to display all channels.
- Select **View Found** to display only channels above the Power threshold.

    (2) With the **Zoom** function, the text line displays.

- The minimum and maximum powers used for the power scale.

Zoom	Pmin : ◆	0.0 dBm	Pmax : ◆	15.0 dBm

- Move the cursor at the bottom of the screen with the left and Right key.

- Change the minimum or maximum power using the [**Up**] or [**Down**] key.

(3) With the **Auto Zoom** function

- The OCA automatically selects the minimum and maximum power values to display all channels correctly.

(4) With the **Full Scale** function

- The OCA selects the minimum power at −60dBm and the maximum power at +20dBm.

6.2.4 Table Mode

The Table Mode displays the wavelength and power for each detected channel as a table.

Access the **Table** Mode as follows

(1) Press [**Mode**] (F1) while the application is running.
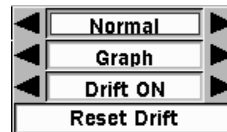
(2) Select the second menu and use the [**Left**] and [**Right**] keys to select **Table** Mode.

(3) Press the [**Set**] key to close the **Mode** menu.

OCA				■ 15:51:19		
Ch	Wl (nm)	P (dBm)	Ch	Wl (nm)	P (dBm)	Mode
1			10			
2			11			
3	1311.4	-12.8	12	1492.3	-3.0	Functions
4			13			
5			14			
6			15			View
7			16	1573.0	-2.2	
8			17			
9	1431.0	2.3	18			Settings
Total Power = 4.55 dBm						

Fig. 6.2-18   OCA Normal Mode Table View

All detected channels are displayed, and the total power is displayed at the bottom of the screen.

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6.2.5 Functions in Normal Table Mode

The Functions soft key displays two status lines.

PTotal / Nb Ch
Duration / Nb Scan

(1) With the **PTotal/Nb Ch** function, the text line displays the

- Total power
- Number of channels

Total P :	17.4 dBm	Nb Ch :	6

(2) With the **Duration / Nb Scan** function, the text line displays the

- Drift duration
- Number of scan

Duration	5d 17h 49m	Scan count	49617

6.2.6 View in Normal Table Mode

The View soft key displays one menu.

- Select **View All** to display all channels.
- Select **View Found** to display only channels above the Power threshold.
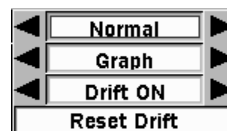
6.3   Drift Mode

The Drift Mode is the statistics mode. It collects and saves measurements over time at regular time intervals.

6.3.1 Drift On/Off

Select the Drift On Mode to save wavelength and power measurements over time.

Enable the Drift On Mode as follows:

(1) Press [**Mode**] (F1) while the application is running.

◄	Normal	►
◄	Graph	►
◄	Drift ON	►
	Reset Drift	

(2) Select the third menu and use the [**Left**] and [**Right**] keys to select the **Drift On** Mode.

(3) Press the [**Set**] key to close the **Mode** menu.

Stop automatic saving of measurements over time as follows:

(1) Press [**Mode**] (F1) while the OCA application is running.

(2) Select the third menu and use the [**Left]** and [**Right]** keys to select the **Drift Off** Mode.

(3) Press the [**Set**] key to close the **Mode** menu.

6.3.2 Reset Drift

Reset the current drift measurement to start collecting new statistics.

Use the following procedure to reset the drift measurement.

(1) Press [**Mode]** (F1) while application is running.
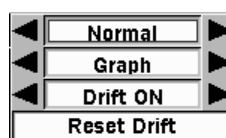
(2) Select the fourth menu and press the [**Set**] key to select **Reset Drift.**

6.3.3 Drift Graph

The Drift Graph Mode displays the channel wavelength and power statistics as bar graphs.
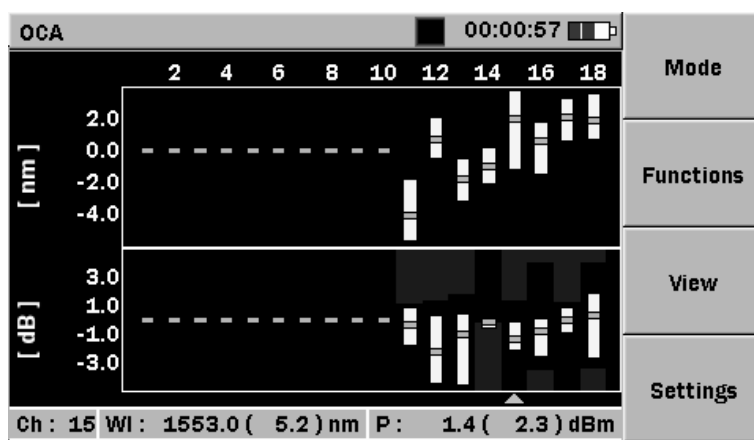

Fig. 6.3-19   Drift Mode Graph View

On the wavelength Drift bar graph, the 0 value is the center of each channel as defined by ITU-T G.694.2. The green or red indicator is the mean of the wavelength drift, and the white bar graph displays the minimum and maximum values of the channel wavelengths over time.

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6.3.4 Functions in Drift Graph Mode

The functions soft key displays four status lines.

Cursor
Date-Time / Nb Ch
Duration / Nb Scan
Total Power min / max

(1) With the **Cursor** function

- To determine the wavelength and power drift of an individual channel in this mode, press the [**Left]** and [**Right]** keys to select the channel by moving the cursor at the bottom of the graph. The displayed values for this channel are:
    - Channel number
    - Mean wavelength and difference between maximum and minimum wavelength over time
  - Mean power and difference between maximum and minimum power over time

Ch : 11	Wl : 1471.1 (0.1) nm	P : 5.9 (2.1) dBm

(2) With the **Date-Time / Nb Ch** function, the text line displays the

- Date and time at drift start.
- Number of channels.

11/09/07 17:11	Nb Ch :	6

(3) With the **Duration / Nb Scan** function, the text line displays the

- Drift duration
- Number of scan

Duration	5d 17h 49m	Scan count	49617

(4) With the **Total Power min/max** function, the text line displays the

- Minimum and the maximum of total power

Total Pmin :	17.3 dBm	Total Pmax :	17.7 dBm

6.3.5 View in Drift Graph Mode

The **View** soft key displays four graph views.

◀	View Found	▶
◀	Wl - Power	▶
◀	Absolute Power	▶
◀	Autozoom	▶

(1) With the first menu

- Select **View All** to display all channels
- Select **View Found** to display only channels above the Power threshold

(2) With the second menu

- Select **Wl – Power** to display Wavelength and Power Drift.
- Select **Wavelength** to view only the Wavelength Drift.
- Select **Power** to view only the Power Drift.
- Select **Total Power** to view Total Power Plot.

(3) With the third menu

- Select **Absolute Power**. The green or red indicator is the mean of Power Drift. The bar graph displays the difference between the minimum and maximum values of channel power over time.
- Select **Relative Power**. The green or red indicator is the mean value of Power Drift. The bar graph displays the difference between the minimum and maximum values of the channel power over time and the first measurement values

(4) With the fourth menu

- Select **Autozoom.** The OCA automatically selects the minimum and maximum wavelength values and the minimum and maximum power values.
- Select Full Scale: The OCA displays the full range of the Wavelength and Power Drift graphs.

6.3.6 Channel Drift Plot

To see the complete evolution in the drift of one channel over time and eventually identify failures, the OCA can display a graph of the changes in wavelength and power over time.

Use the following procedure to display a Channel Drift Plot:

(1) Press [**Mode**] (F1) while the OCA application is running.

(2) Select the **Drift** and **Graph** Mode.

(3) Select the channel, by moving the cursor at the bottom of the graph.

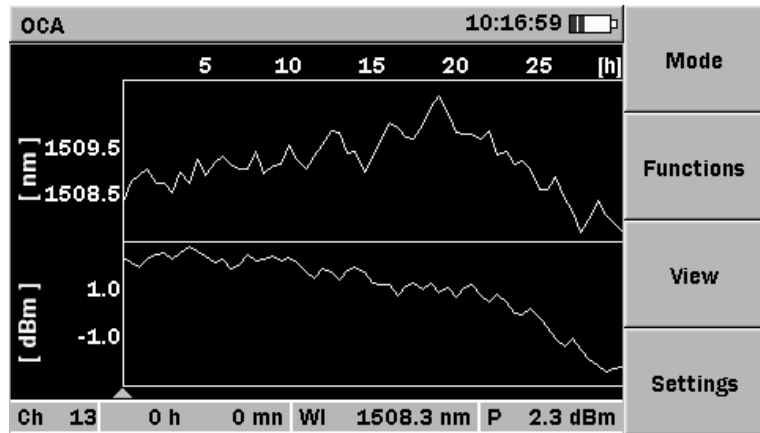(4) Press the [**Set**] key to view the **Channel Drift Plot**.

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Fig. 6.3-20   OCA Channel Drift Plot

To determine the channel wavelength and power at a specific time, press the [**Left**] and [**Right**] keys to select the time.

6.3.7 Functions in Channel Drift Plot

The **Functions** soft key displays two different status lines.

(1) With the **Duration Cursor** function, the text line displays the

- Channel number

- Drift duration
  The time origin is the time of the first measurement after setting Drift On or after selecting Reset Drift .

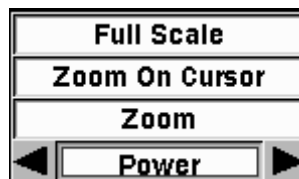- Wavelength at time

- Power at time

(2) With the **Date Time Cursor** function, the text line displays the

- Channel number

- Measurement date and time

- Wavelength at date and time

- Power at date and time

6.3.8 View in Channel Drift Plot

The **View** soft key displays four types of graph view.

> **Full Scale**
> **Zoom On Cursor**
> **Zoom**
> ◄ **Power** ►

(1) With the **Full Scale** function, the

- Graph displays all values over time

(2) With the **Zoom On Cursor** function, the

- OCA zooms on the cursor

(3) With **Zoom** function, the text line displays the

- Time at middle of screen

- Total time displays on screen
  To change these values, press the **Left/Right/Up/Down** keys**.** The [**Left**] and [**Right**] keys change the time position. Press the [**Up**] and [**Down**] keys to change the span.

(4) With the last menu, select the display view

- Select **Wl – Power** to display Wavelength and Power Drift Plot.

- Select **Wavelength** to display only Wavelength Drift Plot.

- Select **Power** to display only Power Drift Plot

- Select **Total Power** to display Total Power Drift Plot

6.3.9 Drift Table

The Drift Table Mode displays statistics for all detected channels. With different view, the OCA displays over time

- Mean
- Minimum and maximum
- Difference between maximum and minimum value

6.3.10   Functions in Drift Table Mode

The **Functions** soft key displays three status lines.

> **Date-Time / Nb Ch**
> **Duration / Nb Scan**
> **Total Power min / max**

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Getting Started

(1) With the **Date-Time / Nb Ch** function, the text line displays the

- Date and time at beginning of drift.
- Number of channels.

11/09/07 17:11	Nb Ch :	6

(2) With the **Duration / Nb** Scan function, the text line displays the

- Drift duration
- Number of scan

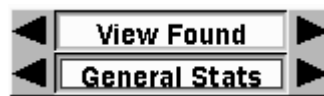| Duration	5d 17h 49m	Scan count	49617

(3) With the **Total Power min/max** function, the text line displays the

- Minimum and maximum values of total power.

Total Pmin :	17.3 dBm	Total Pmax :	17.7 dBm

6.3.11   View in Drift Table Mode

The **View** soft key displays two table views.

(1) With the first menu

- Select **View All** to display all channels
- Select **View Found** to display only channels above the Power threshold

(2) With the second menu

-       Select General Stats to display mean wavelength, difference between maximum and minimum wavelength value over time, mean power, and difference between maximum and minimum power over time for each channel.

Fig. 6.3-21   General Statistics

● Select **Wl Stats** to display the wavelength statistics (mean value, minimum value and maximum value over time, and difference between maximum and minimum values) for each channel.

Ch	Wlavg[nm]	Wl<(nm)	Wl>(nm)	dWl[nm]
1	1269.0	1268.9	1269.0	0.1
2	1291.1	1291.1	1291.3	0.2
3	1311.2	1311.2	1311.2	0.0
4	1331.1	1331.0	1331.1	0.1
5	1351.3	1351.3	1351.3	0.0
6	1371.2	1371.2	1371.3	0.0
7	1391.2	1391.2	1391.3	0.0
8	1411.2	1411.2	1411.3	0.0
9	1431.6	1431.6	1431.6	0.0

OCA (Drift)　16:00:12

Mode　Functions　View　Settings

Total Pmin : -65.0 dBm　Total Pmax : -2.2 dBm

Fig. 6.3-22　Wavelength Statistics

● Select **P Stats** to display the power statistics (mean value, minimum value and maximum value over time, and difference between maximum and minimum values) for each channel.

Ch	Pavg[dBm]	P<[dBm]	P>[dBm]	dP[dB]
1	-26.3	-26.4	-26.3	0.1
2	-22.3	-22.3	-22.3	0.1
3	-11.2	-11.2	-11.2	0.0
4	-16.5	-16.5	-16.4	0.1
5	-17.2	-17.3	-17.1	0.2
6	-17.2	-17.2	-17.1	0.1
7	-10.5	-10.5	-10.4	0.1
8	-15.2	-15.2	-15.1	0.1
9	-19.8	-19.9	-19.8	0.1

OCA (Drift)　16:00:29

Mode　Functions　View　Settings

Total Pmin : -65.0 dBm　Total Pmax : -2.2 dBm

Fig. 6.3-23　Power Statistics

6.4　Powermeter Mode

The Powermeter Mode displays the total power. The Powermeter Table Mode is the same as the Normal Table Mode. The Powermeter Graph Mode displays a horizontal bar graph showing the total power, and a short wavelength bar graph (without units) displaying detected channels.

Unlike a standard power meter, accurate measurement does not require wavelength setting, because the OCA detects the wavelengths of all CWDM channels and displays the true total power.

Use the following procedure to display the Powermeter Graph Mode:

6

Getting Started

(1) Press [**Mode**] (F1) while the application is running.
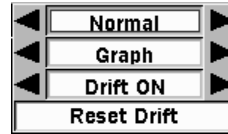
(2) Select the first menu and use the [**Left**] and [**Right**] keys to select Powermeter Mode.

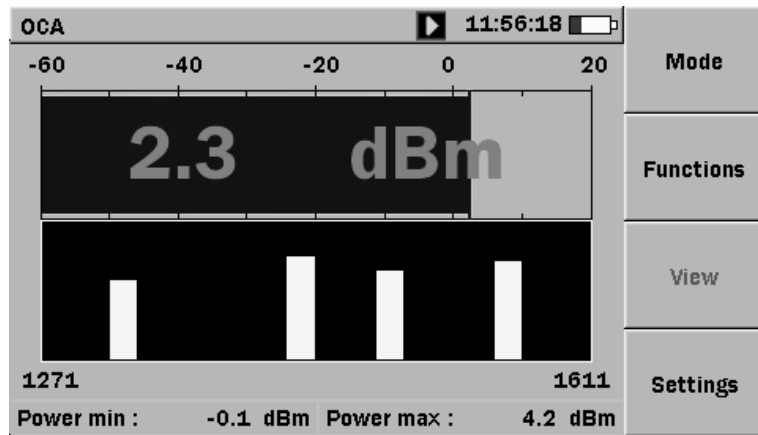(3) Press the [**Set**] key to close the **Mode** menu.

Fig. 6.4-24   Powermeter Graph

6.4.1 Functions in Powermeter Graph Mode

The **Functions** soft key displays two status lines.

(1) With the **Duration / Nb Scan** function, the text line displays the

- Drift duration
- Number of scan

(2) With the **Total Power min/max** function, the text line displays the

- Minimum and maximum values of total power

6.5   Saving and Loading data

6.5.1 Saving Data

Files can only be saved in the Drift Mode .

Drift files can be saved to mass storage (e.g.: internal memory or USB memory stick).

To save file

(1)   When the test is completed, select the **Drift Mode** (Graph or Table)

(2)   Press the [**Menu/Power**] key.

(3)   Select **Save** in the pop-up menu and press the [**Set**] key.

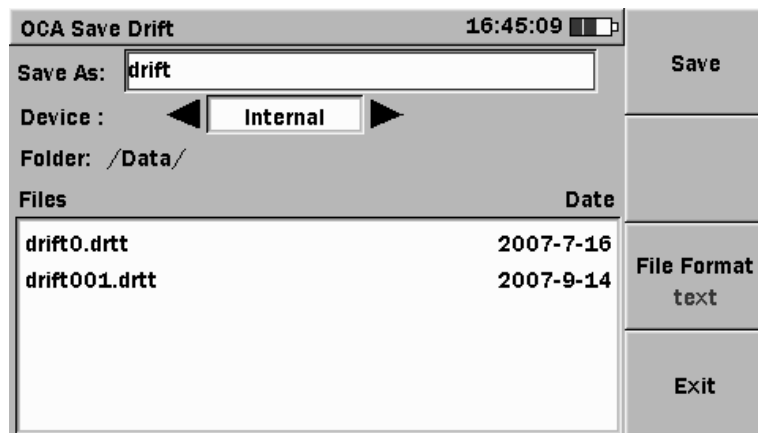(4)   The Mass Storage Save screen appears with the **Save As** field selected.

Fig. 6.5-25   Mass Storage Save Screen

(5)   To change the file name, press the [**Set**] key to display the soft keyboard.

(6)   Select the Device field and use the [**Left**] and [**Right**] keys to select **Internal** or **USB**.
USB can only be selected when a USB device (such as USB memory stick) is connected.

(7)   Press the [**Down**] key to move to the Files list. Select the root directory ([..]) and press the [**Set**] key. Select the required folder.

(8)   Press the [**Set**] key to set the selected directory.

(9)   Press [**File Format**] (F3) and select the file type (**text** or **binary**).

(10) Press [**Save**] (F1). The data is saved and the application returns to the screen displayed before starting the save.

Note: Saving data in binary format is faster than saving in text format.

However, we recommend saving data in text format for compatibility with other applications.

Getting Started

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6.5.2 Loading Data

The Load selection allows display of a previously saved file. Files can only be loaded in the Drift Mode.

To load a file:

(1)   Select the **Drift Mode** (Graph or Table).

(2)   Press the [**Menu/Power**] key. The General Functions pop-up menu is displayed.

(3)   Select **Load** and press the [**Set**] key. The Mass Storage Load screen listing files in the Data folder is displayed.
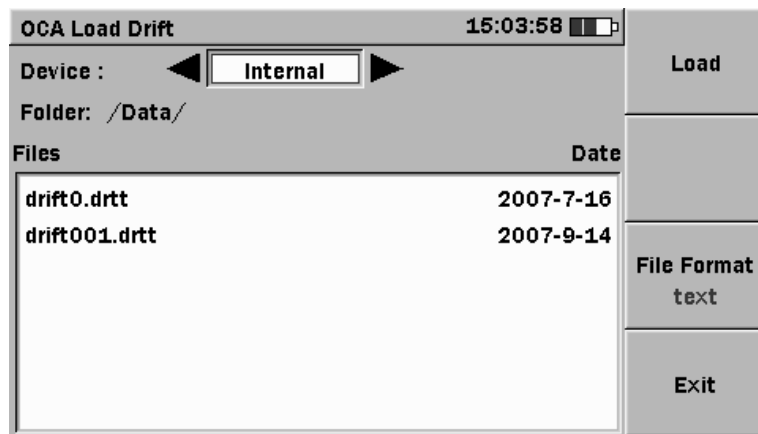

Fig. 6.5-26   Mass Storage Load Screen

(4)   With the Device field selected, use the [**Left**] and [**Right**] keys to select **Internal** or **USB**

(5)   Select the required folder

(6)   Press [**File Format**] (F3) and select the file type (**text** or **binary**).

(7)   Select the required file and press [**Load**] (F1) to close the Load screen and display the selected trace.

6.6   Saving and Loading Configuration

See section 7.6 Saving and Loading Configuration

6.7   Saving and Loading Alarms

See section 7.7 Saving and Loading Alarms

Section 7   Configuring the MU909020A

This section describes the Settings menu.

7

Configuring the MU909020A

7.1   Introduction

The Settings Mode is used to configure the OCA for testing a CWDM network.

7.2   General

Set the wavelength and power detection range as follows:

Press [**Settings]** (F4) while the OCA application is running.

Fig. 7.2-27   Settings Menu

Select the **General** Menu.

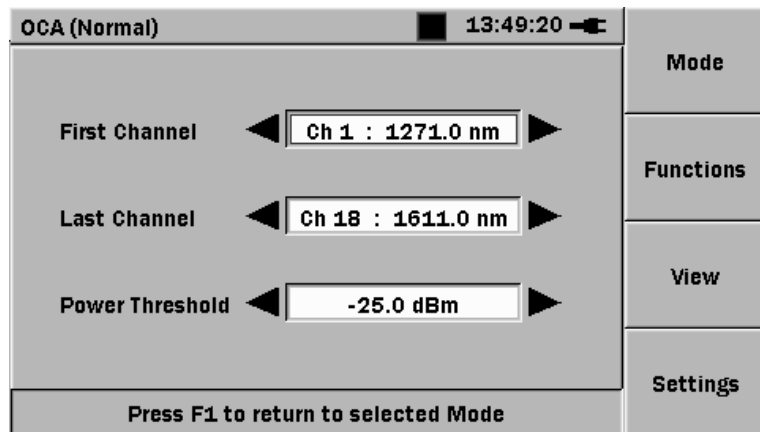Press the [**Set**] key to display the **General** screen

Fig. 7.2-28   General Settings

7.2.1 Wavelength Range

Set the first channel in the first field and the last channel in the second field.

7.2.2 Power Threshold

This value defines the lower value for power detection.

7.3   Alarms

Knowledge about the type of network under test, especially the alarm class and requested criteria is required to set alarms.

7.3.1 ITU-T G.695 Standard

The ITU-T Recommendation G.695 provides optical parameter values for physical layer interfaces of coarse wavelength division multiplexing (CWDM) applications with up to 16 channels and bit rates up to NRZ 2.5 Gbit/s. Applications are defined using two different methods, one using multichannel interface parameters and the other using single-channel interface parameters. Both unidirectional and bidirectional applications are specified.

7.3.2 Alarms screen

The Alarms setting displays the selected alarm class.

Display the Alarms screen as follows:

(1) Press [**Settings**] (F4) while the OCA application is running.

General
Alarms
Calibration
Drift

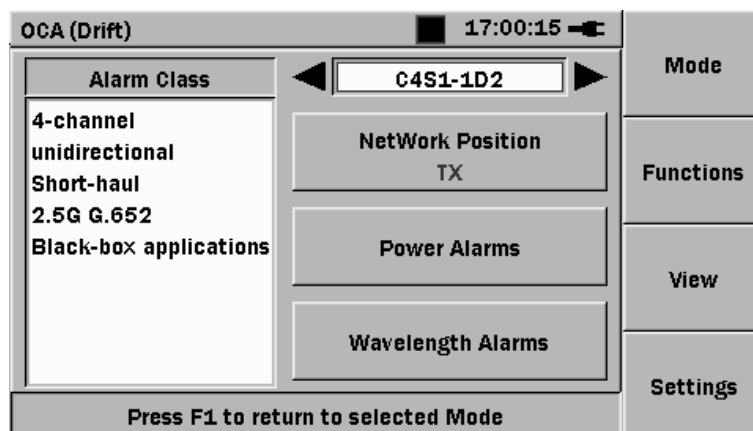(2) Select the second menu and press the [**Set**] key.

Fig. 7.3-29   Alarms Settings Screen

7.3.3 Selecting Alarm Class

With the Alarm Class field selected, use the **[Left] and [Right]** keys to select the alarm class.

The application code identifies the network, implementation, and architectural characteristics of an application. The application code notation is constructed as follows:

CnWx-ytz

Where:

C is the indicator of CWDM applications.

n is the maximum number of channels supported by the application code.

W is a letter indicating the span distance such as:

– **S** indicating short-haul;

– **L** indicating long-haul.

x is the maximum number of spans allowed within the application code.

y indicates the highest class of optical tributary signal supported:

– **0** indicating NRZ 1.25G;

– **1** indicating NRZ 2.5G.

t is a placeholder letter indicating the configuration supported by the application code. In the current version of this Recommendation, the only value used is:

– **D** indicating that the application does not contain any optical amplifiers.

z indicates the fibre types, as follows:

– **2** indicating G.652 fibre;

– **3** indicating G.653 fibre;

– **5** indicating G.655 fibre.

A bidirectional system is indicated by the addition of the letter **B** at the beginning of the application code. CWDM application codes becomes:

$$B\text{-}CnWx\text{-}ytz$$

A system using the "black-link" approach is indicated by the addition of the letter **S** at the beginning of the application code. For CWDM application codes this will be:

$$S\text{-}CnWx\text{-}ytz$$

To select Network Position

With the Network Position button selected, press the [**Set**] key to select the position in the network (central-office side **Tx** or end-user side **Rx**).

7.3.4 Viewing Alarms

To select **Power Alarms**, select the [**Power Alarms**] key and press the [**Set**] key. The Power Alarms screen is displayed.

Fig. 7.3-30   Power Alarms Screen

To select **Wavelength Alarms**, select the [**Wavelength Alarms**] key and press the [**Set**] key. The Wavelength Alarms screen is displayed.

Fig. 7.3-31   Wavelength Alarms Screen

7.3.5 Modifying Alarms

Display the alarms screen as follows.

(1) Select the closest alarm class to change.

(2) Select [**Network Position**] (Tx or Rx)

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Configuring the MU909020A
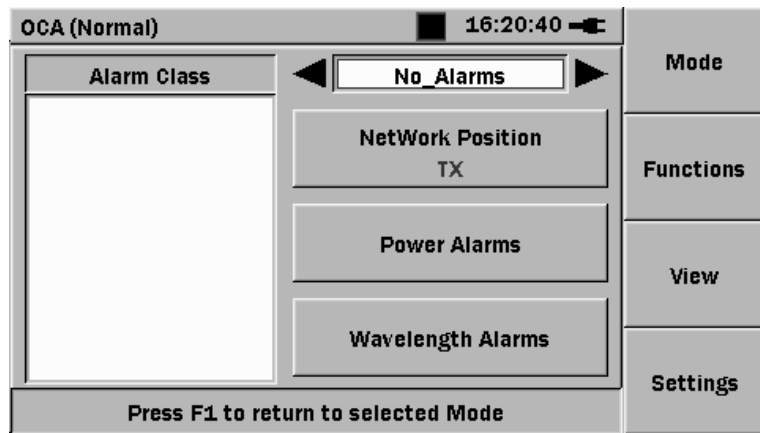
(3) To change Power values, select **[Power Alarms].**
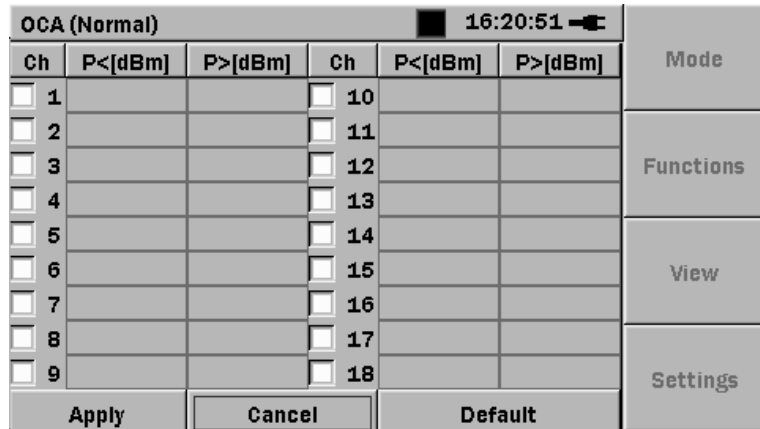
(4) Select a channel (Channel 16 for example)

(5) The OCA automatically sets values inside the minimum and maximum cells.

(6) To change a value, select the first cell (**P<[dBm]**) and press the [**Set**] key**.**

(7) Adjust the value using the [**Left**] and [**Right**] keys**.**

OCA (Normal)				■ 16:38:52 ◾◾		
Ch	P<[dBm]	P>[dBm]	Ch	P<[dBm]	P>[dBm]	Mode
☐ 1			☐ 10			
☐ 2			☐ 11			
☐ 3			☐ 12			Functions
☐ 4			☐ 13			
☐ 5			☐ 14			
☐ 6			☐ 15			View
☐ 7			☑ 16	◀ -30.0 ▶		
☐ 8			☐ 17			
☐ 9			☐ 18			Settings
Apply		Cancel		Default		

(8) Press the [**Set**] key to set the value.

(9) Select the second cell (**P>[dBm]**) and press the [**Set**] key.

(10) Adjust the value using the **[Left]** and **[Right]** keys**.**

(11) Press the [**Set**] key to set the value.

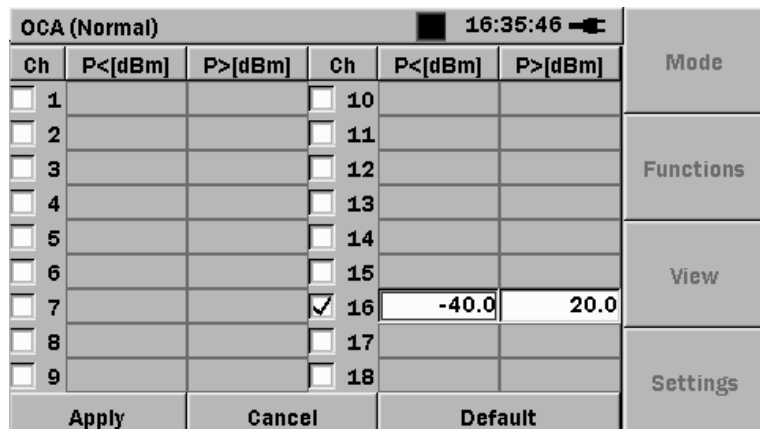| OCA (Normal)				■ 16:58:06 ◾◾		
Ch	P<[dBm]	P>[dBm]	Ch	P<[dBm]	P>[dBm]	Mode
☐ 1			☐ 10			
☐ 2			☐ 11			
☐ 3			☐ 12			Functions
☐ 4			☐ 13			
☐ 5			☐ 14			
☐ 6			☐ 15			View
☐ 7			☑ 16	-30.0	0.0	
☐ 8			☐ 17			
☐ 9			☐ 18			Settings
Apply		Cancel		Default		

(12) Use the **Left/Right/Up/Down** keys to select [**Apply**].

(13) Press the [**Set**] key.

Caution ⚠

It is possible to adjust a minimum value greater than the maximum value. In this case, the channel is always in alarm.

(14) To change Wavelength values, select [**Wavelength Alarms**]

(15) The previous channel is selected (Channel 16 in this example)

(16) Modify the wavelength value and the bandwidth (nm). Use the **Left/Right/Up/Down** keys to select and modify values.

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OCA (Normal)				10:26:52		Mode
Ch	WI[nm]	dWI[nm]	Ch	WI[nm]	dWI[nm]	
☐ 1			☐ 10			Functions
☐ 2			☐ 11			
☐ 3			☐ 12			
☐ 4			☐ 13			View
☐ 5			☐ 14			
☐ 6			☐ 15			
☐ 7			☑ 16	1571.0	4.0	Settings
☐ 8			☐ 17			
☐ 9			☐ 18			
Apply		Cancel		Default		

(17) Use the **Left/Right/Up/Down** keys to select [**Apply**].

(18) Press the [**Set**] key

OCA (Normal)	10:29:20	Mode
Alarm Class ◀	**User Alarm** ▶	
User defined	**NetWork Position** RX	Functions
	Power Alarms	View
	Wavelength Alarms	Settings
Press F1 to return to selected Mode		

The OCA automatically adds the new Alarm Setting with the name <User Alarm>.

7.3.6 Saving and Loading Alarms

See section 7.7 Saving and Loading Alarms

7.4 Calibration Settings

Set wavelength and power calibration as follows:

(1) Press [**Settings**] (F4) while the OCA application is running.

General
Alarms
Calibration
Drift

(2) Select the **Calibration** Menu.

(3) Press the [**Set**] key to display the **Calibration** screen.
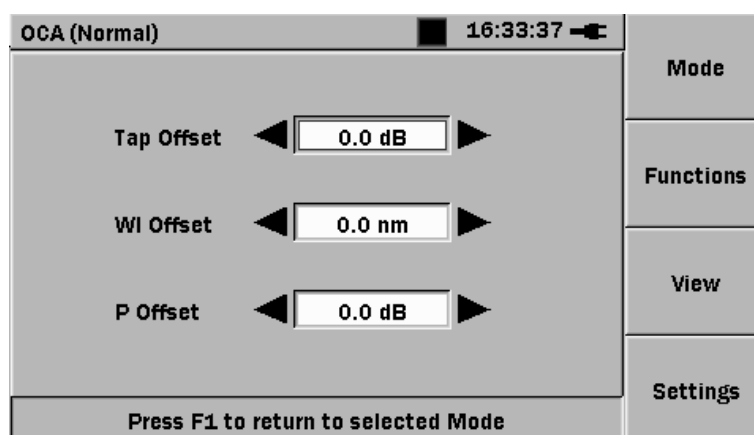
Fig. 7.4-32   Calibration Menu Screen

Caution ⚠

When a calibration value is modified, the OCA inserts the uncalibrated icon 📊 at the screen top.

7.4.1 Tap Offset

In some applications, the OCA measures power at the output of the monitoring port, which is a small percentage of the multiplexer output power. The Tap Offset value set at this menu is added to the power level readings to compensate for the monitoring port attenuation.

The range for this parameter is 0.0dB to 30.0dB in 0.1dB increments.

7.4.2 Wavelength Offset

A wavelength offset can be applied for all CWDM channels.

The range for this parameter is -1.0nm to 1.0nm in 0.1nm increments.

7.4.3 Power Offset

You can apply a power offset (to compensate loss in a patchcord) for all CWDM channels.

The range for this parameter is -1.0dB to 1.0dB in 0.1dB increments.

7.5   Drift Settings

Before launching a Drift measure, select the duration of the Drift (Drift Duration value) and the interval between two measures (Drift Pause value).

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Configuring the MU909020A

Set the Drift Duration and Pause as follows:

(1)   Press [**Settings**] (F4) while the OCA application is running.

(2)   Select the **Drift** Menu.

(3)   Press the [**Set**] key to display the **Drift** screen
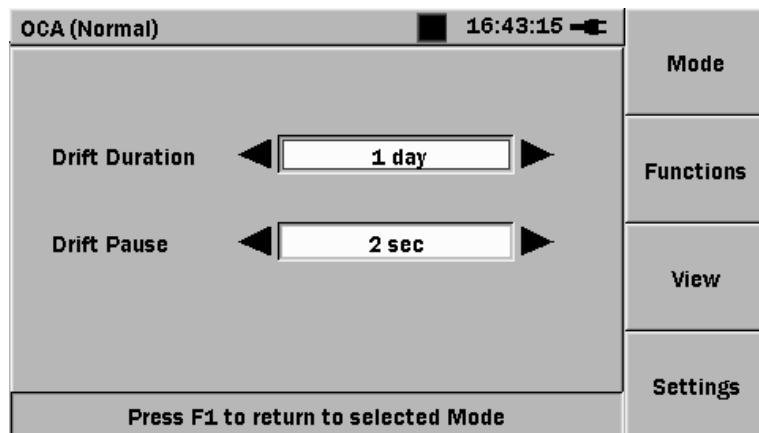
Fig. 7.5-33   Drift Menu Screen

(4)   Set Drift Duration and Drift Pause for the application.

Values possible for Drift Duration are: 10 seconds, 30 seconds, 1 minute, 5 minutes, 10 minutes, 30 minutes, 1 hour, 5 hours, 10 hours, 1 day and 7 days.

Values possible for Drift Pause are: 2 seconds, 10 seconds, 30 seconds, 1 minute, 10 minutes, 30 minutes, 1 hour, 2 hours, 5 hours, 10 hours and 1 day.

It is not possible to select a Drift Duration value inferior to a Drift Pause value.

7.6   Saving and Loading Configuration

Configuration can be saved and loaded to internal memory or USB memory stick.

The configuration file contains the:

- First channel
- Last channel
- Power threshold
- Network position (Rx or Tx)
- Alarm name
- Calibration tap offset
- Calibration wavelength offset
- Calibration power offset
- Drift duration
- Drift pause

7.6.1 Saving Configuration

To save a configuration, select the [**Settings**] soft key (F4). The Settings function pop-up menu is displayed.

General
Alarms
Calibration
Drift

(1) Select a function (General, Alarms, Calibration or Drift).

(2) Press the [**Menu/Power**] key

(3) Select **Save** at the pop-up menu and press the [**Set**] key

(4) The Mass Storage Save is displayed with the **Save As** field selected.

Fig. 7.6-34   Settings Save Screen

(5) To change the file name, press the [**Set**] key**.** The soft keyboard is displayed.

(6) Select the **Device** field and use the [**Left**] or [**Right**] key to select **Internal** or **USB**.
The USB selection is available only when a USB device (such as a USB memory stick) is connected.

(7) Press the [**Down**] key to move to the Files directory list. Select the root directory ([..]) and press the [**Set**] key. Select the required folder.

(8) Press the [**Set**] key to set the selected directory.

(9) Press [**File Type**] (F2) to toggle **Settings/Alarms.**

(10) Press [**Save**] (F1). The data is saved and the application returns to the screen displayed before starting the save process.

7.6.2 Loading Configuration

The Load selection allows a previously saved settings file to be reused. Files can only be loaded in the Settings Mode Mode.

To load a Settings file:

Configuring the MU909020A

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(1) Select [**Settings Mode**] (F4)

(2) Select a function (General, Alarms, Calibration or Drift).

(3) Press the [**Menu/Power] key**. The General Functions pop-up menu is displayed.

(4) Select **Load** and press the [**Set**] key. The Mass Storage Load is displayed, listing files in the Data folder.
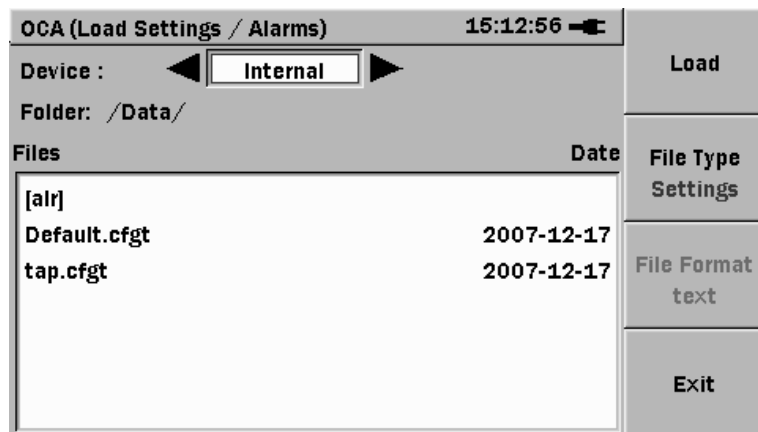
Fig. 7.6-35   Mass Storage Load Screen

(5) With the Device field highlighted, use the **Left** or **Right Arrow key** to select the mass storage device; **Internal** or **USB**

(6) Select the desired folder.

(7) Select the **File Type** (F2) to toggle **Settings / Alarms**

(8) Highlight the desired file and then press **Load** (F1). The Load screen closes and settings are applied.

7.7   Saving and Loading Alarms

Alarms can be saved and loaded to internal memory or USB memory stick.

The alarm file contains the:

- First channel
- Last channel
- Power threshold
- Network position (Tx or Rx)
- Alarm name
- Tap offset
- Wavelength offset
- Power offset
- Drift duration
- Drift pause

7.7.1 Saving Alarms

To save an alarm setting, select the [**Settings**] soft key (F4). The Settings functions pop-up menu is displayed.

General
Alarms
Calibration
Drift

(1) Select a function (General, Alarms, Calibration or Drift).

(2) Press the [**Menu/Power**] key

(3) Select **Save** in the pop-up menu and the press the [**Set**] key.

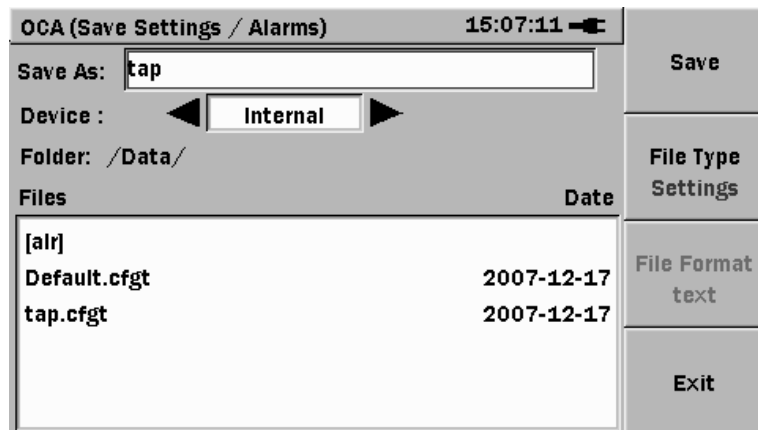(4) The Mass Storage Save is displayed with the **Save As** field selected.
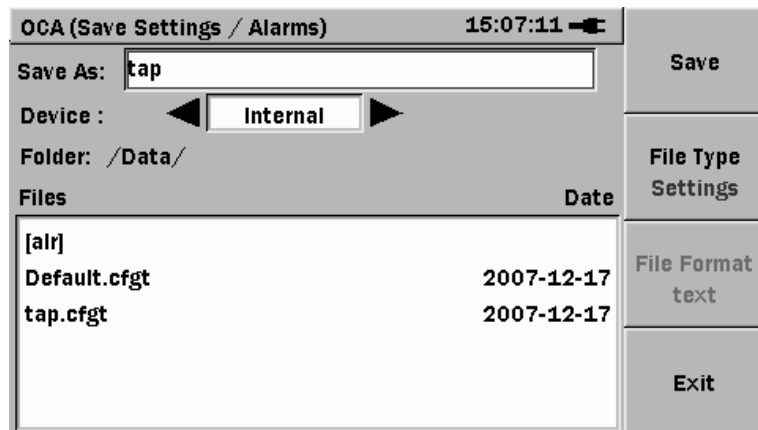
Fig. 7.7-36   Settings Save Screen

(5) To change the file name, press the [**Set**] key. The soft keyboard is displayed.

Warning ⚠

Check that the file name does not exist already. Otherwise the backup fails.

(6) Select the **Device** field and use the [**Left**] or [**Right**] key to select **Internal** or **USB**.
The USB selection in available only when a USB device (such as a USB memory stick) is connected.

(7) Press the [**Down**] key to move to the Files directory list. Select the root directory ([..]) and press the [**Set**] key. Select the required folder.

(8) Press the [**Set**] key to set the selected directory.

Caution ⚠

To load the newly defined alarms automatically, save the alarm in the [alr] directory.

(9) Press **[File Type]** (F2) to select **Alarms**.

(10) Press [**Save**] (F1). The alarm is saved and the application returns to the screen displayed before starting the save process.

7.7.2 Loading Alarms

The Load selection allows a previously saved alarm file to be reused. Files can only be loaded in the Settings Mode.

To load an Alarm file:

(1) Select [**Settings Mode**] (F4).

(2) Select a function (General, Alarms, Calibration or Drift).

(3) Press the [**Menu/Power**] key. The General Functions pop-up menu is displayed.

(4) Select [**Load**] and press the [**Set**] key. The Mass Storage Load is displayed listing the files in the Data folder.
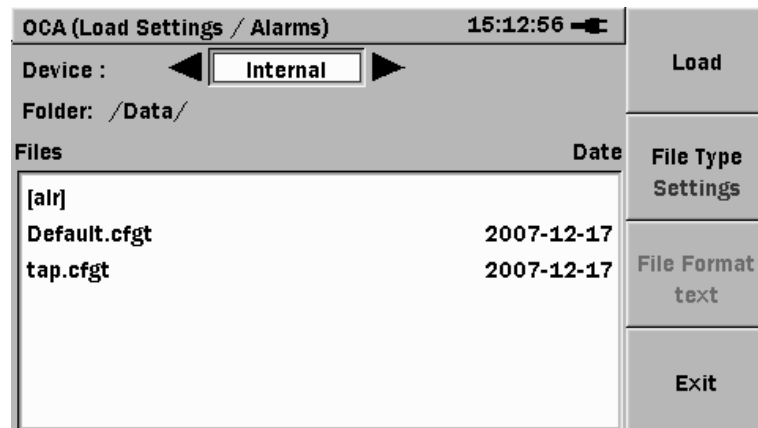
Fig. 7.7-37   Mass Storage Load Screen

(5) With the Device field selected, use the [**Left**] or [**Right**] **key** to select **Internal** or **USB**.

(6) Select the required folder.

(7) Select [**File Type**] (F2) to select **Alarms**.

(8) Select the required file and press [**Load**] (F1). The Load screen closes and the settings are applied.

Section 8   Service Information

This section explains how to test the performance of the OCA and the user maintenance.

8

Service Information

8.1   Performance Verification

Use the procedures described in this section to verify the OCA absolute wavelength and power accuracies.

The recommended calibration interval is 1 year.

Warning ⚠️

To avoid risk of damage to eyes, never look into the end of any optical cable. Although the laser radiation is invisible, the intense infrared may damage the eyes.

8.1.1 Required Test Equipment

The following table lists the equipment required to verify the performance. The type and number of connectors may vary with the equipment used.

Test equipment

Description	Minimum Requirements
Optical power meter	Wavelength range: 1250 nm to 1650 nm Maximum power: 10 dBm Power accuracy : ±-0.1dB
Wavelength meter	Wavelength range 1250 nm to 1650 nm Wavelength absolute accuracy: ±0.1 nm
Laser light source	Wavelength range 1250 nm to 1650 nm Maximum power: 10dBm
Attenuator	
Jumper	Adapt fiber connector to your optical connector
2x2 Coupler	On the wavelength range 1250nm-1650nm

8.1.2 Preparation

Warm-up the OCA and required test equipment for 30 minutes at the ambient temperature (between 20°C and 30°C).

8.1.3 Initializing the System

For safe operation, use the procedures described in this guide to turn on the OCA. Launch the application when the root menu is displayed.

8.1.4 Optical Connection to Unit

External optical equipment is connected to the OCA via the JAE universal connector on the top panel.

Caution ⚠

Always keep fiber connectors spotlessly clean to achieve optimum performance. Refer to the cleaning instructions in the Appendix. Be careful to plug correct type of connector to the optical input.

8.1.5 Wavelength Accuracy

This procedure explains how to check the wavelength accuracy over the full wavelength range. If these values do not match the absolute wavelength specification, calibrate the channel using an external wavelength meter.

- Connect the laser light source to the coupler input.
- Connect the coupler outputs to the wavelength meter and the OCA.
- Set the laser output power to –10 dBm.
- Set the laser wavelength to the lower channel (1271 nm) and enable the laser output.
- Compare the wavelength displayed on the OCA with the wavelength read on the wavelength meter. The difference must be less than 1 nm.

Check all the CWDM channels from the lower (1271 nm) to upper channel (1611 nm) in the same way.

8.1.6 Power Accuracy

This procedure explains how to check the power accuracy over the full specified range. If these values do not match the absolute power specification, calibrate the channel using the external power meter.

- Connect the laser light source to the attenuator input.
- Connect the attenuator output to the OCA.
- Set the laser output power to –10 dBm.
- Set the laser wavelength to the lower channel (1271 nm).
- Enable the laser output and note the power displayed on the OCA.
- Repeat the check for all CWDM channel at the center wavelength.

Replace the OCA with the power meter and make the same measurements. Compare the power values from the OCA and power meter. The difference must be less than 0.5 dB.

8

Service Information

8.2   Maintenance

User maintenance of the OCA is limited to:

- Cleaning optical connectors for optimum power measurement
- Cleaning instrument
- Calibration

Warning ⚠️

Only Anritsu personnel are authorized to service the OCA. There are no user serviceable parts in the OCA. DO NOT attempt to service it.

8.2.1 Cleaning Optical Connectors and Fibers

Refer to the cleaning instruction in the Appendix.

8.2.2 Cleaning Instrument

Clean the OCA as follows when necessary.

- Unplug the power cable from the top panel.
- Clean with a cloth slightly moistened with isopropyl alcohol.
- Do not allow alcohol to enter the connector between the module and main frame. Use high-pressure air to blow out any dust.

Caution ⚠️

Do not use active chemicals or abrasive materials to clean the OCA.

8.2.3 User Calibration

To modify the OCA performance, follow the procedures in section 7.4 Calibration Settings. If the performance does not meet the guaranteed specifications, full calibration may be required. Some calibration steps require adjustment of internal parts, including the optical module, so full calibration must only be performed by authorized Anritsu personnel.

8.2.4 Packing for Shipment

Keep the original packing in case the OCA must be returned to Anritsu for service or calibration. For instructions on returning the instrument, contact Anritsu.

8.3   Disposal

When the Network Master has reached the end of its useful life, dispose of it in accordance with local environment regulations. Before disposal, dismantle or physically destroy any non-volatile memory media in the Network Master to ensure that data in memory cannot be recovered by third parties.

Appendix

Appendix

MT9090A Mainframe

Dimensions and Mass	Size (w x h x d): 190mm x 96mmx 48mm (7.5"x3.8"x1.9")
	Weight (including mainframe, module and battery): <800g (<2 lbs.)
Display	4.3 inch TFT-LCD (480x272, with backlight, transparent type)
Interface	USB 1.1, Type A x1 (memory), Type Bx1 (USB mass storage)

MU909020A Optical Channel Analyzer

Model	MU909020A
Number of channels	All 18 CWDM channels, compliant to ITU-T G.694.2
Channel pass band	+/- 6.5 nm, compliant to ITU-T G.695
Channel wavelength accuracy	+/- 1 nm*[2]
Power range per channel	+10 dBm to −40 dBm
Channel power accuracy	+/- 0.5 dB *[1]
Channel power linearity	+/- 0.3 dB *[2]
Total power accuracy	+/- 0.5 dB *[1]
Total power linearity	+/- 0.3 dB *[2]
Maximum total safe power	+17 dBm
Maximum channel safe power	+13 dBm
Instrument repeatability	+/- 0.2 dB *[1]
Channel imbalance (adjacent	> 12 dB *[2, 3]
Polarization Dependant Loss	+/- 0.3 dB
Power supply*[8]	9 VDC, 100 to 240 VAC, 50/60 Hz
Battery	NiMH: Operating Time: 4 hours(typical) *[4], Recharge Time: 3 hours (typical)*[5]
Environmental conditions	Operation: 0° to +50ºC *[6] ,<80%(non-condensing) *[7] Storage: -20° to +60ºC
	Vibration: MIL-T-28800E Class 3, Dust and Drip proof: IP51
	Altitude max <2000 m
EMC	EN61326

*1: measured at -10 dBm

*2: Signal from +10 dBm to -35 dBm

*3: for wavelengths spacing > 15 nm. Channel imbalance > 15 dB for wavelengths spacing > 20 nm

*4: Backlight low

*5: 10° to +30°C, Power OFF

*6: Specifications are guaranteed from 10° to 40°C. Operating is [0:50]°C, limited to [0:40]°C when AC adapter is plugged.

*7: 10° to +30°C (During Recharging battery, Power OFF)

*8: Operating voltage: within the range of +10% to -10% from the rated voltage

Cleaning and Caring for Optical Connectors and Fibers

(1) Hold the can of compressed air upright and spray the can into the air to purge any propellant.

(2) Spray the clean compressed air on the connectors to remove any loose particles or moisture.

(3) Moisten a clean optical swab with isopropyl alcohol, then lightly swab the surfaces of the connectors.

(4) Spray the clean compressed air on the connectors again to remove any loose particles or isopropyl alcohol.

Note:

Cleaning kits for optical connectors are available from many fiber optic suppliers.

Caution ⚠

To optimize the performance of the system and to prevent damage to the optical connectors, keep the connectors clean at all times.

When cleaning the connectors with a swab, use gentle circular motions. Use only high quality cleaning supplies that are non-abrasive and leave no residue.

To reduce the need for cleaning, immediately replace protective caps on the optical connectors when not in use.

Do not over stress or sharply bend optical fiber beyond tolerances specified by the manufacturer.
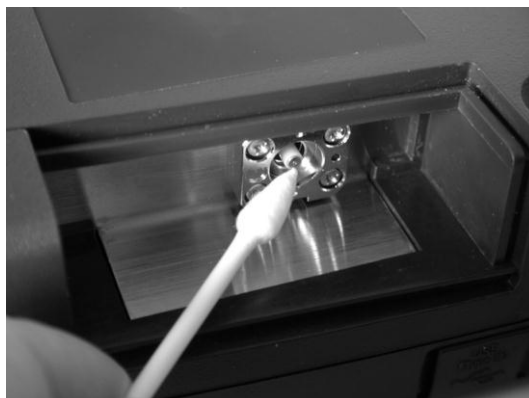
Appendix

Appendix C   Alarms Classes

Physical layer parameters and values for CWDM applications

Class	Target distance (km)	Maximum number of channels	Bit rate	Maximum mean channel output power dBm	Minimum mean channel output power dBm	Central wavelength nm
C4S1–1D2	37	4	2.5	4.5	–3	1531–1591
C4S1–1D3	37	4	2.5	4.5	–3	1531–1591
C4S1–1D5	37	4	2.5	4.5	–3	1531–1591
C4L1–1D2	69	4	2.5	4.5	–3	1531–1591
C4L1–1D3	72	4	2.5	4.5	–3	1531–1591
C4L1–1D5	72	4	2.5	4.5	–3	1531–1591
B–C4L1–0D2	90	4	1.25	5	0	1531–1591
B–C4L1–0D3	90	4	1.25	5	0	1531–1591
B–C4L1–1D2	80	4	2.5	5	0	1531–1591
B–C4L1–1D3	83	4	2.5	5	0	1531–1591
B–C8L1–0D2	64	8	1.25	4	–3.5	1471–1611
B–C8L1–0D3	64	8	1.25	4	–3.5	1471–1611
B–C8L1–1D2	55	8	2.5	4	–3.5	1471–1611
B–C8L1–1D3	58	8	2.5	4	–3.5	1471–1611
C8L1–1D2	55	8	2.5	4	–3.5	1471–1611
C8S1–1D2	27	8	2.5	4	–3.5	1471–1611
B–C8S1–1D2	27	8	2.5	4	–3.5	1471–1611
B–C12L1–0D2	42	12	1.25	3.5	–4	1291–1351
				1.5	–6	1471–1611
B–C12L1–1D2	38	12	2.5	3.5	–4	1291–1351
				1.5	–6	1471–1611
C16S1–1D2	20	16	2.5	3.5	–4	1311–1371
				2.5	–5	1391–1451
				1	–6.5	1471–1611
B–C16S1–1D2	20	16	2.5	3.5	–4	1311–1371
				2	–5	1391–1451
				1	–6.5	1471–1611
C16L1–1D2	42	16	2.5	3.5	–4	1311–1371
				1.5	–6	1391–1451
				–0.5	–8	1471–1611
B–C16L1–1D2	42	16	2.5	3.5	–4	1311–1371
				1.5	–6	1391–1451
				–0.5	–8	1471–1611
S–C8S1–1D2		8	2.5	5	0	1471–1611
S–C8S1–1D3		8	2.5	5	0	1471–1611
S–C8S1–1D5		8	2.5	5	0	1471–1611
S–C8L1–1D2		8	2.5	5	0	1471–1611
S–C8L1–1D3		8	2.5	5	0	1471–1611
S–C8L1–1D5		8	2.5	5	0	1471–1611

Class	Central wavelength nm	Maximum attenuation dB	Minimum attenuation dB	Maximum mean channel input power dBm	Minimum mean channel input power dBm	Maximum optical path penalty dB
C4S1–1D2	1531–1591	10.5	4	0.5	−13.5	1.5
C4S1–1D3	1531–1591	10.5	4	0.5	−13.5	1.5
C4S1–1D5	1531–1591	10.5	4	0.5	−13.5	1.5
C4L1–1D2	1531–1591	19.5	13	−8.5	−22.5	2.5
C4L1–1D3	1531–1591	20.5	13	−8.5	−23.5	1.5
C4L1–1D5	1531–1591	20.5	13	−8.5	−23.5	1.5
B–C4L1–0D2	1531–1591	25.5	12	−7	−25.5	1.5
B–C4L1–0D3	1531–1591	25.5	12	−7	−25.5	1.5
B–C4L1–1D2	1531–1591	22.5	12	−7	−22.5	2.5
B–C4L1–1D3	1531–1591	23.5	12	−7	−23.5	1.5
B–C8L1–0D2	1471–1611	21	12	−8	−24.5	1.5
B–C8L1–0D3	1471–1611	21	12	−8	−24.5	1.5
B–C8L1–1D2	1471–1611	18	19	−8	−21.5	2.5
B–C8L1–1D3	1471–1611	12	12	−8	−22.5	1.5
C8L1–1D2	1471–1611	18	12	−8	−21.5	2.5
C8S1–1D2	1471–1611	9	3	1	−12.5	1.5
B–C8S1–1D2	1471–1611	9	3	1	−12.5	1.5
B–C12L1–0D2	1291–1351	20	11	−7.5	−24	1
	1471–1611	14.7	7	−5.5	−20.7	1
B–C12L1–1D2	1291–1351	18	13.3	−7.5	−22	1
	1471–1611	11	7	−5.5	−19.3	1.5
C16S1–1D2	1311–1371	8.5	3.5	0	−12.5	1
	1391–1451	7.5	2.5	0	−12.5	1
	1471–1611	6.5	0.5	0.5	−13	1
B–C16S1–1D2	1311–1371	8.5	3.5	0	−12.5	1
	1391–1451	7.5	2.5	−0.5	−12.5	1
	1471–1611	6.3	0.5	0.5	−122.8	1
C16L1–1D2	1311–1371	18	11	−7.5	−22	1
	1391–1451	15.8	9	−7.5	−21.8	1.5
	1471–1611	13.3	7	−7.5	−21.3	2
B–C16L1–1D2	1311–1371	18	11	−7.5	−22	1
	1391–1451	15.8	9	−7.5	−21.8	1.5
	1471–1611	13.3	7	−7.5	−21.3	2
S–C8S1–1D2	1471–1611	16.5	5	0	−18	1.5
S–C8S1–1D3	1471–1611	16.5	5	0	−18	1.5
S–C8S1–1D5	1471–1611	16.5	5	0	−18	1.5
S–C8L1–1D2	1471–1611	25.5	14	−9	−28	2.5
S–C8L1–1D3	1471–1611	25.5	14	−9	−28	2.5
S–C8L1–1D5	1471–1611	25.5	14	−9	−28	2.5

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