NTC/2280 L-Band
NTC/2277 IF

DVB-S/S2
Modulator Series with ASI or
HSSI/G703 Interfacing

User Manual

TO WHOM IT MAY CONCERN

_____

EC DECLARATION OF CONFORMITY

_____

We,
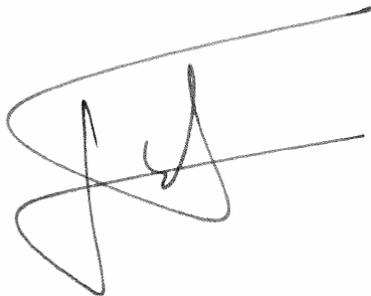
NEWTEC CY nv.

declare that our product

NTC/2280
NTC/2277

to which this declaration relates is in conformity with the essential requirements of European Union Directive 1999/5/EC Radio and Telecommunication Terminal Equipment Directive Essential Requirement 3.1(a), 3.1 (b), 3.2.

Done at St-Niklaas, on 04 th August, 2006

Serge Van Herck,
CEO

NEWTEC CY nv.   Laarstraat 5 B-9100 Sint-Niklaas Belgium.   Tel:32.(0)3.7806500 Fax:32.(0)3.7806549

NTC/22xx DVB-S/S2 Modulator Series   M&C software ntc6241 v2.02 Edit 1   Page 2 of 124

Relevant EMC information

(to FCC rules)

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Safety

Please read this chapter before installation and use of the equipment

To ensure operator safety, the equipment has been designed to comply with the following safety standard:

IEC 60950 Safety of Information Technology Equipment

Prior to installation and operation, please ensure that the following points are observed:

The equipment described in this manual is designed to be used by properly trained personnel only. Only qualified personnel who are aware of hazards involved shall carry out adjustment, maintenance and repair of the exposed equipment.

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

For the correct and safe use of the equipment, it is essential that both operating and servicing personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual. Warning and caution statements and/or symbols are marked on the equipment when necessary.

Whenever it is likely that safety protection is impaired, the equipment must be made inoperative and secured against unintended operation. The appropriate servicing authority must be informed. For example, safety is likely to be impaired if the equipment fails to perform the intended measurements or shows visible damage.

Caution 1:

FOR CONTINUED PROTECTION AGAINST FIRE, REPLACE LINE FUSES ONLY WITH SAME TYPE AND RATING (5 X 20mm T3.15 A/250v TYPE T or slow-blow)

Caution 2:

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE, DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

Environmental

Operating the equipment in an environment other than that stated in the specifications will also invalidate the safety compliance

The equipment must not be operated in an environment in which the unit is exposed to:

Un-pressurised altitudes higher than 2000 metres
Extremes of temperature outside the staded operating range
　　　Operating temperature range 0 to + 40 C (*)
Excessive dust
Moisture or humidity atmosphere above 95% RH
Excessive vibration
Flammable gases
Corrosive or explosive atmospheres
　　Never place the equipment in direct sunlight
　　　　(*): DC power supply
　　　　　　　Operating temperature range 0 to + 30 C

The outside of the equipment may be cleaned using a lightly dampened cloth. Do not use any cleaning liquids containing alcohol, methylated spirit or ammonia etc.
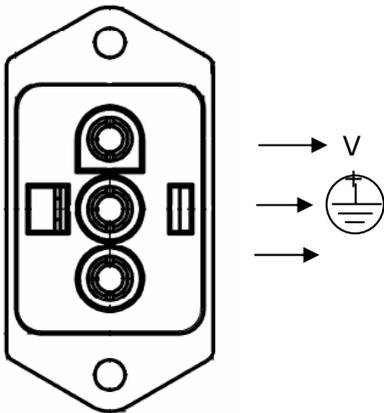
Installation:

AC power supply

This equipment is provided with a protective earthing ground incorporated in the power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact (TN type power supply). Any interruption of the protective conductor, inside or outside the equipment, is likely to make the equipment dangerous. Intentional interruption is prohibited.

The installation of the equipment and the connection of the mains power supply system must be made in compliance to local or national wiring installation standards. The positioning of the equipment must be such that the mains supply socket outlet for the equipment should be near the equipment and easily accessible or that there should be another suitable means of disconnection from the mains supply.

The power supply is set to operate from 100 to 240Vac to 47-63Hz.

DC power supply

The equipment DC power inlet is provided with a protective earthing ground that must be incorporated in the power cord (see example of cord below). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the equipment, is likely to make the equipment dangerous. Intentional interruption is prohibited. The figure below gives an overview of the position of the different lines.

The installation of the equipment and the connection of the mains power supply system must be made in compliance to local or national wiring installation standards. The positioning of the equipment must be such that the mains supply socket outlet for the equipment should be near the equipment and easily accessible or that there should be another suitable means of disconnection from the mains supply.

The power supply is set to operate with 48Vdc (range :±20%.)

DC power supply cord.
To avoid possible operational problems, the power cord must be made with the parts described hereunder. Making use of other parts than stated in the specifications will also invalidate the safety compliance.

A. Mating connector for the DC power inlet
     Molex HCS-125 Series (nylon natural)
     Housing: Molex no 03-12-1036
     Female terminal (3 needed per housing): Molex no. 18-12-1222

B. Cable Specifications
     U.L. Style 1015 600V, 105°C (C.S.A Type TEW), 18 AWG
       e.g. 8918 (Belden)

Cable distribution system

The equipment shall be installed in accordance with the applicable provisions of NEC Article 810 for US and with CEC section 54 for Canada

Before connecting the coax to the equipment make sure that equipment is properly grounded. The screen of the used coax cable should be bonded to the earth at the building entrance.

Technical Earth

On the rear panel of the equipment is a technical earth available (An unmarked terminal, on the right side of the equipment)

It is provided to:

- Ensure all equipment chassis fixed within a rack are at the same technical earth potential. This is done by connecting a wire between the technical earth terminal and a suitable point on the rack
- Eliminate the migration of stray charges when connecting between equipment.

Rack mounting
The equipment is designed to operate in a static 19-inch rack system conforming to IEC 60297

When mounted in a standard 19-inch equipment rack, the device <u>must</u> be sustained by L-profiles. Fixing the device with 4 front panel screws only will damage it and could result in injury.

Operation of the equipment in transportable installations and vehicles equipped with the means of providing a stable environment is permissible. Operation of the equipment on vehicles, ships or aircraft without the means of environmental conditioning may invalidate the safety compliance.

Mounting of the equipment in the rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Laser Safety Statement   (when ASI optical plug-in is installed)

This product is a class 1 laser product in accordance with:

IEC 60825-1, amendment 2, 2001
"Radiation safety of laser products"

This product is a Class 1 laser product in accordance with:

FDA 21CFR Ch.1 §1040: 1988
(US department of Health and Human Service, Code of Federal Regulations).

Instruction for safe use:

To avoid possible exposure to hazardous laser radiation, connect cable to laser output or put protective plastics on laser output, prior to powering up the product.

Caution:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure

Label:

CLASS 1 LASER PRODUCT
(per CDRH, 21 CFR 1040)
(per IEC 60825-1 amendment 2, 2001

Additional safety requirements for Finland, Norway and Sweden

Telecommunication connections and cable distribution system

Special conditions apply to the use of this equipment in Finland, Sweden and Norway due to unusual earthing arrangements in those countries. Therefore it is essential that the installation is done by authorized personnel and according to the national requirements.

This equipment is specified for use only in a restricted access location where equipotential bonding has been applied and which has provision for a permanently connected protective earthing conductor.

A protective earthing conductor must be installed by a Service Person.

Table of contents

History

Usermanual version

Version	Date	Details
V1.02	July 15, 2005	Initial release
V1.03	October 10, 2005	-
V1.10	December 15, 2005	- The command for ASI switching is added to the control menu - Factory default for Symbol rate changed to 5000000Mbaud, before it was 10000000Mbaud. This causes an incompatibility alarm after a factory reset when the minimum capability was active! - New configuration added: IF-Modulator + L-Band Converter + Conditioner
V1.10_Edit 2	January 2006	Safety instructions added confirm UL regulation
V1.10_Edit 3	April 2006	Safety caution added Webinterface chapter added
V1.10_Edit 4	April 2006	SNMP chapter added
V2.02	February 23, 2007	New feature improvements: - Linear predistortion - Output level plan Upgrade alarm information Alarm handling (general device/interface)
V2.02	March 02, 2007	-Alarm contact enclosure changed -Add monitoring parameters: - modulator clock phase error deviation - clock loop state - main acquisition state

Software release history (ntc6241)

Version	Date	New features	Changes
V1.00	March 17, 2005	First release	-
V1.06	November 22, 2005	- The command for ASI switching is added to the control menu.	-
V1.09	December 7, 2005	- Factory default for Symbol rate changed to 5000000 Mbaud, before it was 10000000 Mbaud. This caused an incompatibility alarm after a factory reset when the minimum capability was active !	-
V2.02	February 07, 2007	* New feature implementations: Linear Predistortion Output Level Plan * Performance improvements	-

How to read this manual

The parameters described in the operation section of this manual are organised in a similar way the menu-tree of the device is built. Depending on hardware installed and software capabilities, a number of menu items may not be present in your device. The menu structure of any Newtec device is dynamically built depending on its configuration.

Variable name – Mnemonic

The mnemonic is a unique name that is given to each parameter in any Newtec device. It is used as a reference to the variable definition in the Newtec database. It is also used as a link to the remote monitor and control parameters and as a target for the hyperlinks in this document.

The first line of the display always shows the current location in the menu-tree of the device. The second line is the label name and the default value.
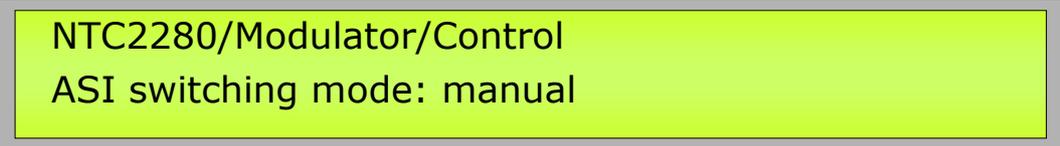
> NTC2280/Modulator/Control
> ASI switching mode: manual

description:	An explanation about the menu item.
applicability:	If a menu item is only applicable when certain hardware is installed, the related hardware will be listed here.
access level:	If a menu item is only accessible in "expert mode", a mode where additional non-frequently used parameters will become available, this will mention "expert only", activate expert mode by going to ../Unit/Setup/Device mode.
selections:	A bulleted list will all possible selections of a menu item
range:	The range of a parameter in a menu item, this range is the maximum range and can be limited dependant of installed software and hardware capabilities.

1   Front panel description

1.1   Display

The display consist of a 2 x 40 characters LCD screen. The top row indicates the path in the menu structure while the bottom row displays the item selected. If the value is not indicated push enter to bring up the submenu.

1.2   Keypad

The 16-frontpanel keys allow the operator to navigate in the menus and change parameters.

The **?** key is used for a pop-up help screen with more info on the selected item; press the **ESC** arrow to exit this help screen.

The ← and → keys are used to highlight a menu item, press the **OK** (enter) key to go one level deeper in the menu tree. Once arrive at the desired level, use **OK** again to select the desired item.

The **ESC** key is used to move back up in the menu tree

The **CLR-key**, (clear), empties the numerical input fields (backspace).

The **digit keys 0 up to 9** are used for the input of numerical values. Whenever there is a need for hexadecimal characters pressing the **A - F** key two times will bring up the desired hexadecimal character.

1.3   LEDs

Data In:	**green:**	At least 1 data input is active and valid
Data Process:	**green:**	Data processed prior to transmission (rate adaptation, BISS scrambling
Tx on:	**green:**	Transmit on
Act. Alm:	**red** :	actual alarm(s) present
Mem. Alm:	**red** :	memorised alarm(s) present
Test:	**orange:**	on if the device is in test mode

2   Back panel description

The back panel consist of several modules depending on the hardware that is installed.

2.1 PSU, M&C + external 10.0 MHz input
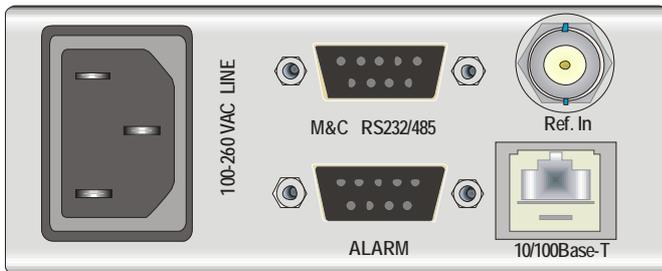
2.1.1 Power socket:

This equipment is provided with a protective earthing ground incorporated in the power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous.

2.1.2 Serial Monitor and Control via RS485/RS232

The device contains the hardware for the RS485 and RS232 interface. The operator can select the type of serial interface via frontpanel or Ethernet, not via the serial port itself.
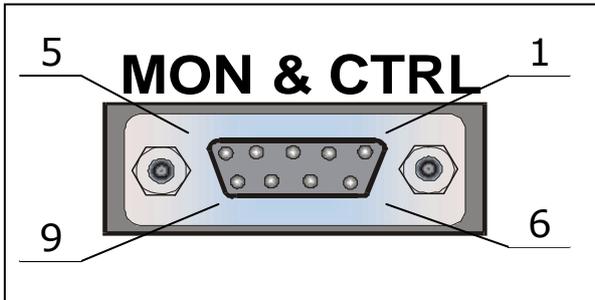
2.1.2.1 RS485 serial interface:

Pin	Name	Function
1	GND	Shield ground
2		Not connected
3	Tx-A	Send Data A (input)
4	Rx-A	Receive Data A (output)
5	GND	Signal ground.
6	Rx-B	Receive Data B (output)
7		Not connected
8		Not connected
9	Tx-B	Send Data B (input)

2.1.2.2 RS232 serial interface:

Pin	Name	Function
1	GND	Shield ground
2	Rx-D	Receive Data (input)
3	Tx-D	Transmit Data (output)
4	DTR	Data Terminal Ready (output)
5	GND	Signal ground.
6		Not connected
7	RTS	Request To Send (output)
8	CTS	Clear To Send (input)
9		Not connected

2.1.3 Contact closure alarm outputs:
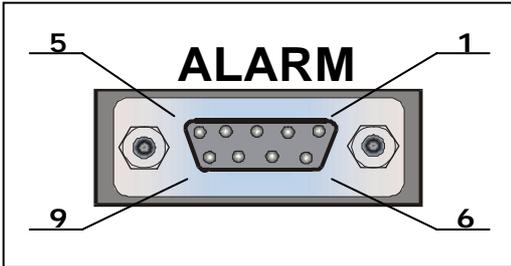
The contact closure alarm contacts can be used to drive external alarm indicators (sirens, flashlight..) or can be used to connect to redundancy switching systems.

1 ok
2 Common general alarm
3 alarm
6 ok
4 Common input alarm
5 alarm
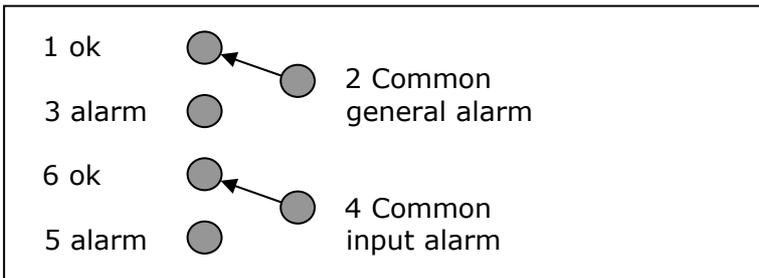
Pin 2 and 4 are either floating or tied to chassis ground

2.1.4 10.0 MHz reference input

This input is used when a reference with enhanced stability is needed or when several modulators need to be synchronised to the same clock source. The level should be 0 dBm nominally. This input is only valid if the device is equipped with a NTC/3462 10 MHz reference frequency module.

2.1.5 Ethernet connection

A standard RJ-45 connector provides connection to an Ethernet HUB in a LAN (10/100Base T). Setting of the IP address and mask is possible from the frontpanel while in expert mode.

RMCP commands can be sent to the device using the Ethernet interface. The commands are sent as data in a TCP/IP stream. The used socket number is 5933.The RMCP protocol is exactly the same as for the serial interface, with one small exception: The RMCP address of the device (that is present in an RMCP command) will be ignored by the receiving device.

To enable the device to communicate over Ethernet, the Ethernet interface needs to be configured. This is done by setting the IP address and net mask using the keyboard interface.

2.2 Base band interfaces

2.2.1   NTC/3453/Ax ASI-SPI-serial LVDS interface board
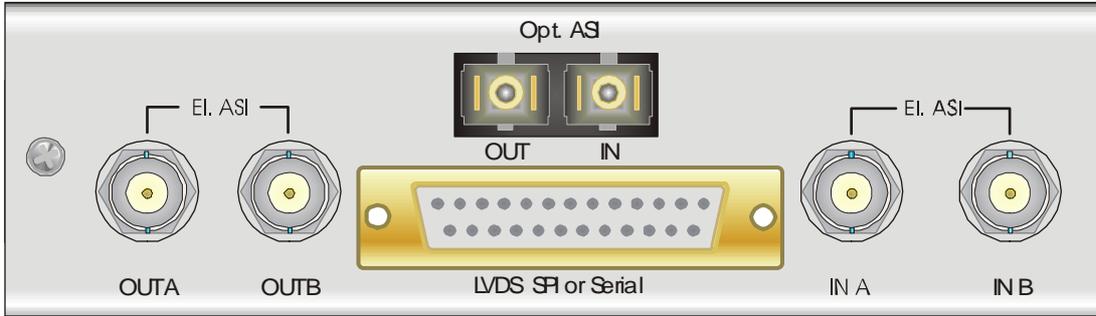
- Standard equipped with 2 selectable ASI inputs and regenerated outputs (ASI optical plug-in available (NTC/3459/AA). The DB-25 connector can handle: DBV-SPI/LVDS and RS422/LVDS. The input is selectable through via the control menu.

2.2.2   NTC/3458/Ax Dual rate G703 & Extended HSSI
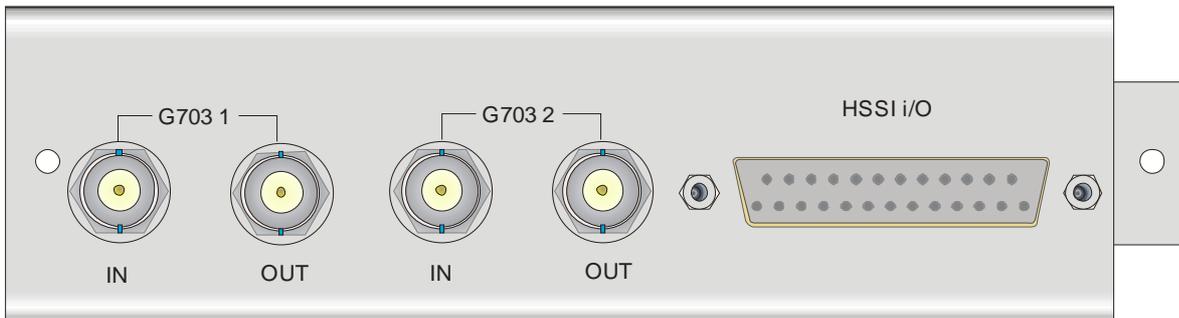
- Can be equipped with 1 or 2 independent G703 plug-in modules for all current rates (E1, T2, E2, E3, and DS3). The HSSI interface is software-upgradeable from the standard 52 Mbit/s to extended HSSI up to 110 Mbit/s.

2.2.3   NTC/3454/AC ASI concentrator interface board
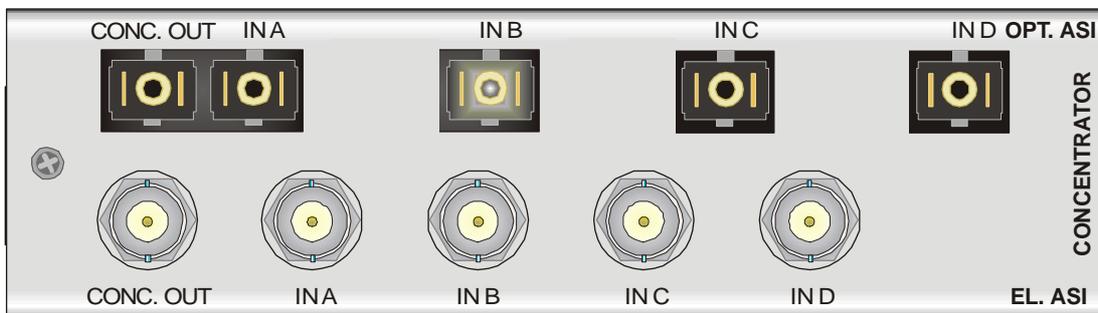
- This ASI concentrator board can be fitted so that the concentrated transport stream is directly fed to the modulator, avoiding the use of an external ASI concentrator. A concentrator basically multiplexes 4 (or 8) ASI transport streams into one ASI stream. See the datasheets of the NTC/2187/xx ASI (de)concentrator for more info.

2.3 Modulator Interface

2.3.1 NTC/2280 L-band Modulator
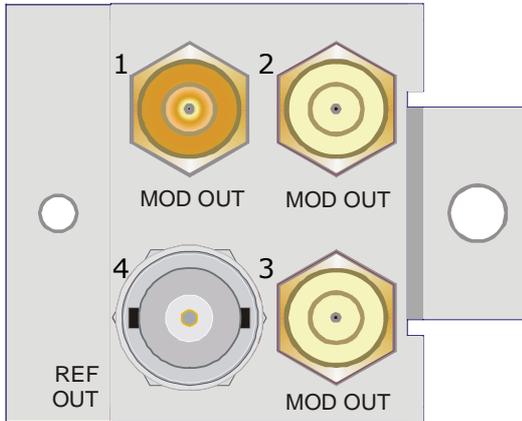
NTC/3736/TB (triple L-band output)

1) L-band out (SMA (F), 50 Ohm)
2) L-band out (SMA (F), 50 Ohm)
3) L-band out (SMA (F), 50 Ohm)
4) 10.0 MHz reference output (BNC (F))
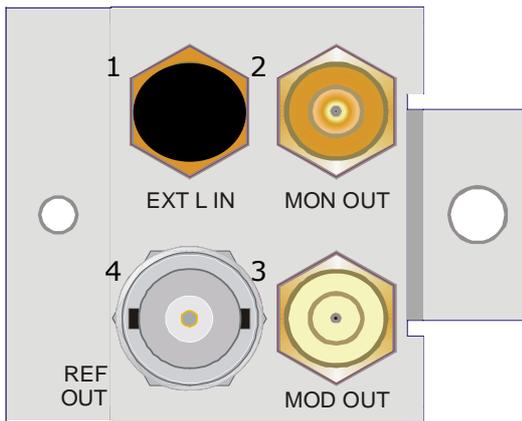
NTC/3736/TZ (single L-band output)

1) Not applicable
2) L-band monitor output
3) L-band modulator output
4) 10.0 MHz reference output
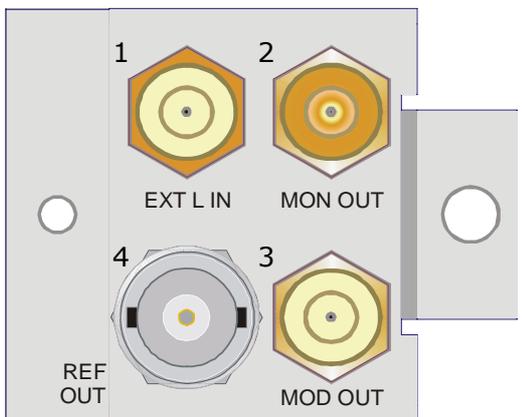
NTC/3736/xx (internal upconverter or conditioning module for ODU upconverter)

1) External L-band input
2) L-band monitor output
3) RF modulator output
4) 10 MHz reference output

All signal in/outputs are SMA (F) 50 Ohm. 10 MHz ref. output is BNC (F), 50 Ohm.

2.3.2 NTC/3750/Ax Outdoor unit – LNB conditioner + active 2 input/4 output combiner/splitter
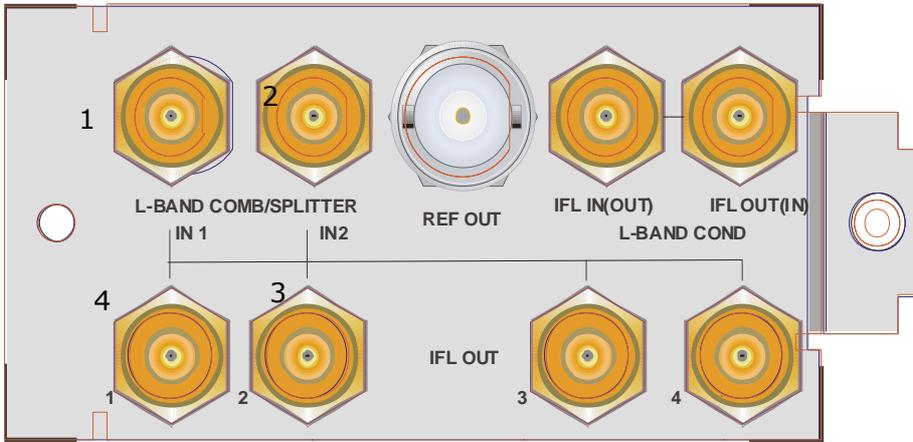
- 10/100 MHz reference injection on L-band.

- 13/18 VDC power supply, 22 kHz high/low band selection.

- Active 2 input / 4 output L-band splitter.

- Conditioning for usage of the NTC/2505 outdoor unit converter.

2.3.3   NTC/2277 IF DVB S2 modulator
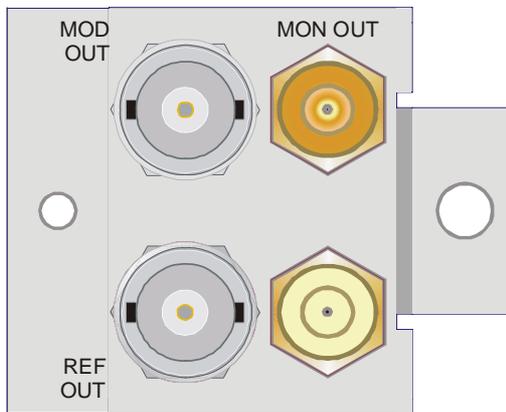
1) IF out BNC (BNC 50/75 Ohm)
2) L-band monitor out (SMA 50 Ohm)
3) Not applicable
4) 10 MHz ref. output (BNC 50 Ohm)

3 Block diagrams

3.1 IF-Modulator
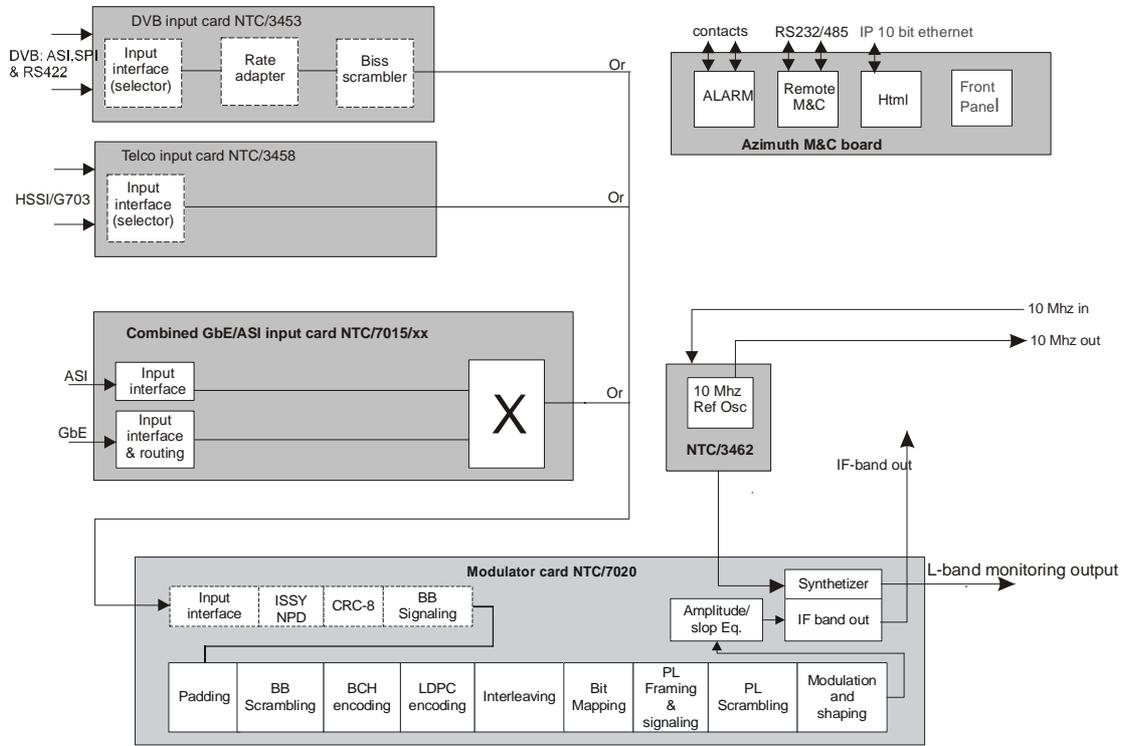
3.2 L-band Modulator
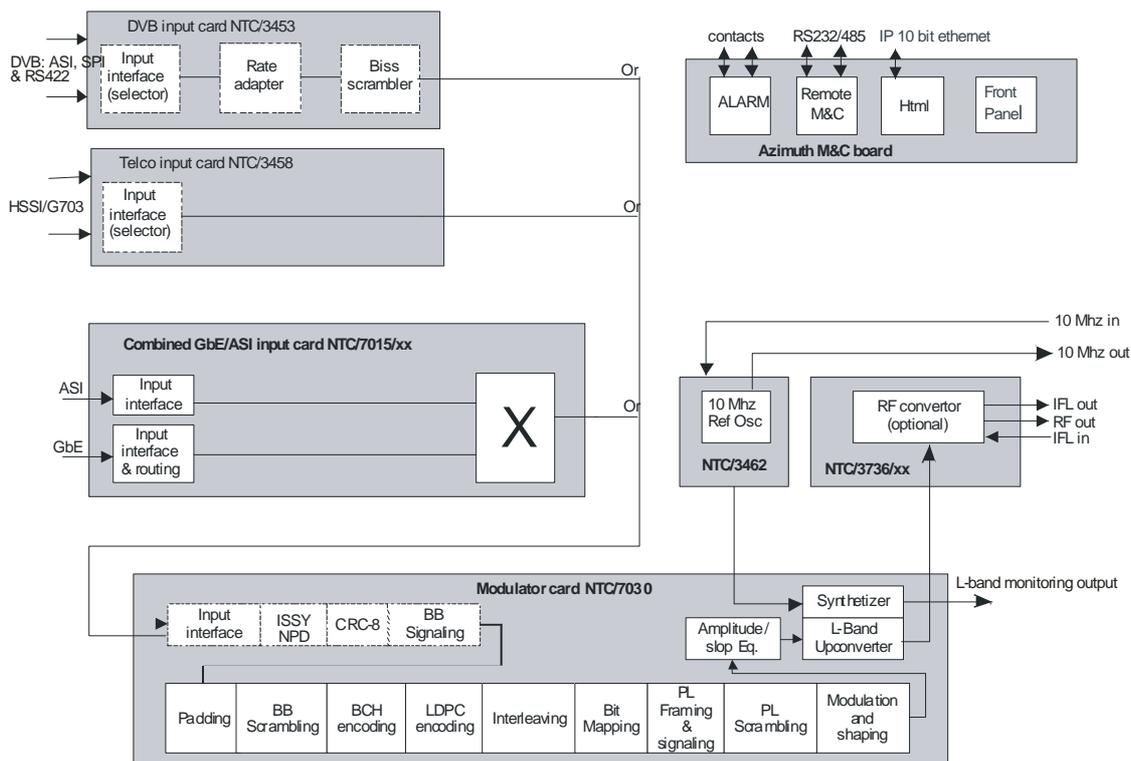
4   Operation

4.1   User

The user menu can be completely configured by the user. It allows quickly accessing the control, monitoring and testing parameters that are of interest to the user. The goal is that an operator can configure "his" device with quick access to parameters that he needs to change or monitor regularly. Also the order in which the menu items are presented can be arranged to meet the specific demands of the operator. This is a very useful feature in for example the DSNG applications, where the general parameters are pre-configured and stored in the default boot-configuration and where the relevant parameters that need a quick change (during link setup) are made available as a group in the user menu. The device can then be operated by the operator without having to go through all the different menus.

4.1.1   UsrMenu - UsrMenu

> NTC22xx/User
> : go to /unit/setup to define

description: Enter this menu to access the commands grouped by the operator.
                     Go to ../Unit/Setup/User menu to add or remove commands from the
                     user defined menu.

4.2   Unit

This section of the menu allows setup, monitor and control of general unit parameters that are common to all Azimuth platform devices. The control parameters are generally once set during installation but are not changed on an operational basis.

4.2.1   Setup

This section of the menu allows configuration of the general unit parameters, most of them being parameters that define how to communicate with the device.

4.2.1.1 Device mode - SyDevMode

```
NTC22xx/Unit/Setup
Device mode: Expert
```

description:	The following device operating modes are defined:
	Normal mode: This is the standard operating mode which enables the default set of parameters that are most frequently used.
	Expert mode: This mode gives an "expert" operator access to an additional set of more advanced parameters.
	A password is required to switch to expert mode. This password is the model number of the device (e.g. 2180 for a NTC/2180 DVB L-band modulator) or the software identification number in case of a board (e.g. 6161 for a DVB-S modulator board).
	Commands that can only be changed in expert mode are indicated in this user manual by "access level: expert only".

4.2.1.2 RMCP version – SyDevRmcpVer

```
NTC22xx/Unit/Setup
RMCP version: v2.0
```

description: This variable holds the current RMCP version, it allows controlling devices
to distinguish between RMCP versions and adapt their functionality
accordingly. RMCP v1.0 is an emulation of the older 20xx series version
of the device and is 100% downward compatible. A device of the 20xx
series, controlled by a management system, can therefore be replaced
by its successor in the 21xx series if it is set to RMCP version v1.0.

RMCP v2.0 is the new enhanced protocol that can be used when
designing new management systems. Contact Newtec to obtain a copy of
the separate RMCP user manual.

NOTE: RMCP v1.0 backward compatibility is not supported for NTC/22xx
series of equipment. NTC/22xx equipment only works with RMCP v2.0

selections:
- v1.0
- v2.0

4.2.1.3 System time - SyDevRtc

```
NTC22xx/Unit/Setup
System time: 16:24:53 14/05/2003
```

description: Read or modify the real time clock. The format is hh:mm:ss
dd/mm/yyyy.

4.2.1.4 User menu - UsrMenuConf

```
NTC22xx/Unit/Setup
User menu: <press OK, ESC when done>
```

description: This menu-entry allows configuration of the user-specific menu

4.2.1.5 Serial port settings

This section of the menu allows controlling all settings for the serial management interface of the unit.

4.2.1.5.1 Serial M&C interface type - SyDevSerIfType

```
NTC22xx/Unit/Setup/Serial port settings
Serial interf. type: RS485
```

description: M&C serial port interface type, RS485 (default) or RS232.

RS232 is used for M&C of a single device , RS485 is typically used for multiple devices on a single bus.

access level: expert only

selections:

- RS485
- RS232

4.2.1.5.2 Device address for serial interface - SyDevRs485Addr

```
NTC22xx/Unit/Setup/Serial port settings
Device RMCP address: 50
```

description: The device address, used in the messages for remote serial M&C, is a single byte with a value in the range 49 (31 hex - ASCII "1") up to 110 (6E hex - ASCII "n"). It identifies the device that has to handle the message from the remote control unit.

When the multi-user RS485 bus is used, each device on the bus must have a different address, unique in the system.

Address 111 (6F hex - ASCII "o") is the "broadcast" address. This can be used when only one device is connected to a COM-port of a PC to address the device without knowing its exact address.

range: 49/110

4.2.1.5.3 Serial interface baudrate - SyDevBaudrate

NTC22xx/Unit/Setup/Serial port settings
Serial baudrate: 115200

description: Interface baudrate for serial monitor and control via the RMCP protocol.

selections:

- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

4.2.1.6 Ethernet settings

This section of the menu allows controlling the settings for the Ethernet management interface of the unit.

4.2.1.6.1 Device IP address - SyDevIPAddr

> NTC22xx/Unit/Setup/Ethernet settings
> Device IP address: 10.0.0.1

4.2.1.6.2 Device IP mask - SyDevIPMask

> NTC22xx/Unit/Setup/Ethernet settings
> Device IP mask: 255.255.255.0

4.2.1.6.3 Default gateway IP address - SyDevIPGateWay

> NTC22xx/Unit/Setup/Ethernet settings
> Default gateway: 192.168.254.206

4.2.1.6.4 Ethernet M&C interface type - SyEthTransType

> NTC22xx/Unit/Setup/Ethernet settings
> Ethernet interface: TCP

description:	Selection of the Ethernet interface transport layer, TCP (default) uses acknowledges to confirm reception of messages while UDP does not. UDP has the advantage of being faster since it does not require the "wait for acknowledge". Furthermore RMCP over Ethernet already has protection on the RMCP layer by means of the CRC so there is no need for the extra protection provided by the TCP-type layer.
access level:	expert only
selections:	• TCP • UDP

4.2.1.6.5 Device MAC address - SyDevMacAddr

> NTC22xx/Unit/Setup/Ethernet settings
> Device MAC address: 00:06:39:00:10:5D

4.2.1.7 Display settings

This menu allows controlling settings with respect to the display of the device.

4.2.1.7.1 Display contrast - SyDevDispContrast

NTC22xx/Unit/Setup/Display settings
Display contrast: 50 units

description: Display contrast adjustment. Use the +/- keys to adjust.

4.2.1.7.2 Screensaver delay - SyScreenSaveDly

NTC22xx/Unit/Setup/Display settings
Screensaver delay: 10 min

description: The number of minutes of inactivity that is needed before the
                     screensaver is displayed. The screensaver is disabled if this time is set to
                     0.

4.2.1.7.3 Screensaver message - SyScreenSaveMsg

NTC22xx/Unit/Setup/Display settings
Screensaver message: Screensaver

description: Text to be displayed when the screensaver is active, typically a device or
                     channel identification is used (e.g. MOD_1, BBC1, HB_9, CH1,...). The
                     maximum length of this text is 20 characters. When the screensaver is
                     activated the display will show this text and the last configuration that
                     has been loaded.

4.2.1.8 SNMP settings

This menu allows controlling settings of the SNMP.

4.2.1.8.1 SNMP read only community - SyROCommunity

NTC22xx/Unit/Setup/SNMP settings
Read community: public

description: The SNMP community name with read-only access
access level: expert only

4.2.1.8.2 SNMP read-write community - SyRWCommunity

NTC22xx/Unit/Setup/SNMP settings
Read-write community: public

description: The SNMP community name with read-write access
access level: expert only

4.2.1.8.3 Trap IP address 1/2 - SyTrapIPAddr1/2

NTC22xx/Unit/Setup/SNMP settings
Trap IP address 1: 000.000.000.000

description: SNMP trap IP address 1/2.

4.2.1.8.4 Trap community 1/2 - SyTrapCommunity1/2

NTC22xx/Unit/Setup/SNMP settings
Trap community 1: public

description: SNMP trap community 1/2.

4.2.1.9 Web Interface

4.2.1.9.1 WI user 1/2/3/4 - WIUsers1/2/3/4
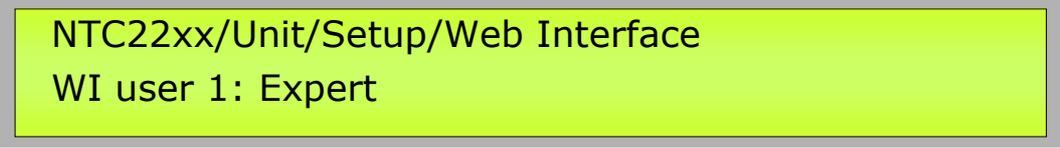
```
NTC22xx/Unit/Setup/Web Interface
WI user 1: Expert
```

description: This command is used to define the login and password for web interface (WI) users. By default the login and password is root, root. A total of 4 WI users can be defined.

access level: expert only

4.2.2   Control

This section of the menu allows changing the unit control parameters that are common to all Azimuth platform devices. The control parameters are generally once set during installation and are not changed on an operational basis.

4.2.2.1 Device sleep mode - SyDevSleepMode
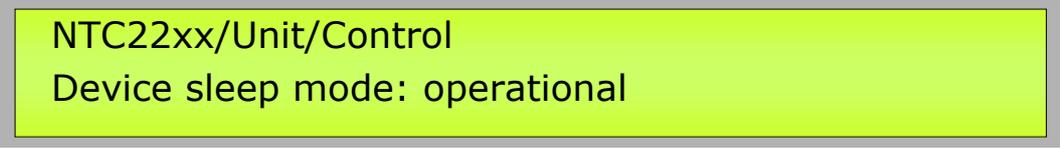
```
NTC22xx/Unit/Control
Device sleep mode: operational
```

description: The "sleep mode" control allows the user to power-down the device without actually removing the power or using a power switch.

operational: The device is fully operational and responds to keyboard and RMCP.

sleep mode: The device is put in a low power-consumption (power down) state and ignores all M&C from RMCP. It can be "awakened" by pressing a frontpanel key, after which it will perform a boot-cycle.

selections:
- operational
- sleep

4.2.2.2 Device reset - SyDevRst

NTC22xx/Unit/Control
Device reset: none

description: Performs a device reset.

A **soft reset** will send the reset command to all boards.

A **configs reset** will clear all operational control settings and place them back on default value.

A **hard reset** will power-cycle the device. After a reset, the device initially starts up the bootloader code, waits for 2 seconds and then activates the application code. Consequently, the unit performs a number of initialisation routines, loads its default configuration from permanent memory and performs a self test.

The selection **upgrade** is used whenever an upgrade through "bucket-files" is performed; refer to the Appendices for details on the upgrade procedure.

Important note:
A **factory reset** is only possible form the frontpanel. This reset clears all operational and system level settings (including Ethernet settings). After this reset the unit is set to the factory programmed values.

access level: expert only

selections:

- none
- soft
- configs
- hard
- upgrade
- factory

4.2.2.3 Functional mode - SyRejectDetModule

NTC22xx/Unit/Control

Functional mode: IF+LBand Modulator

description: The mode of operation selection is only applicable if the optional L-band output module (NTC/3474/AA) is installed in a NTC/2277 IF Modulator. In this case the NTC/2277/xF can be used in two different functional modes:

1) as IF modulator with an agile IF output: In this mode, the L-band output is disregarded, and the IF band is fully agile.

2) as L-band modulator with an agile L-band output and fixed IF band output: the L-band output frequency can be any value between 950 and 1750 MHz, while the IF output is selectable between 70MHz or 140 MHz.

In both cases a fixed L-band monitoring 1080 MHz output is available.

Please take a note that this setting will only affect the detected configuration during booting. The activation is only operational after a device reboot.

The default mode after a factory reset is full support for all boards, thus in this case IF + L-band Modulator.

Schematic overview:

NTC/2277 IF Modulator without L-band output

Input ——— [IF MOD] ········· 50 - 180MHz (IF Output)

········· 1080 MHz (fixed) L-band monitor output
Level = -45dBm

NTC/2277 IF Modulator with L-band output

Input ——— [IF MOD] ··· [NTC/3474] ··· 950 - 1750 MHz (L-band output)

········· 70 or 140 Mz (fixed)

········· 1080 MHz (fixed) L-band monitor output
Level = -45dBm
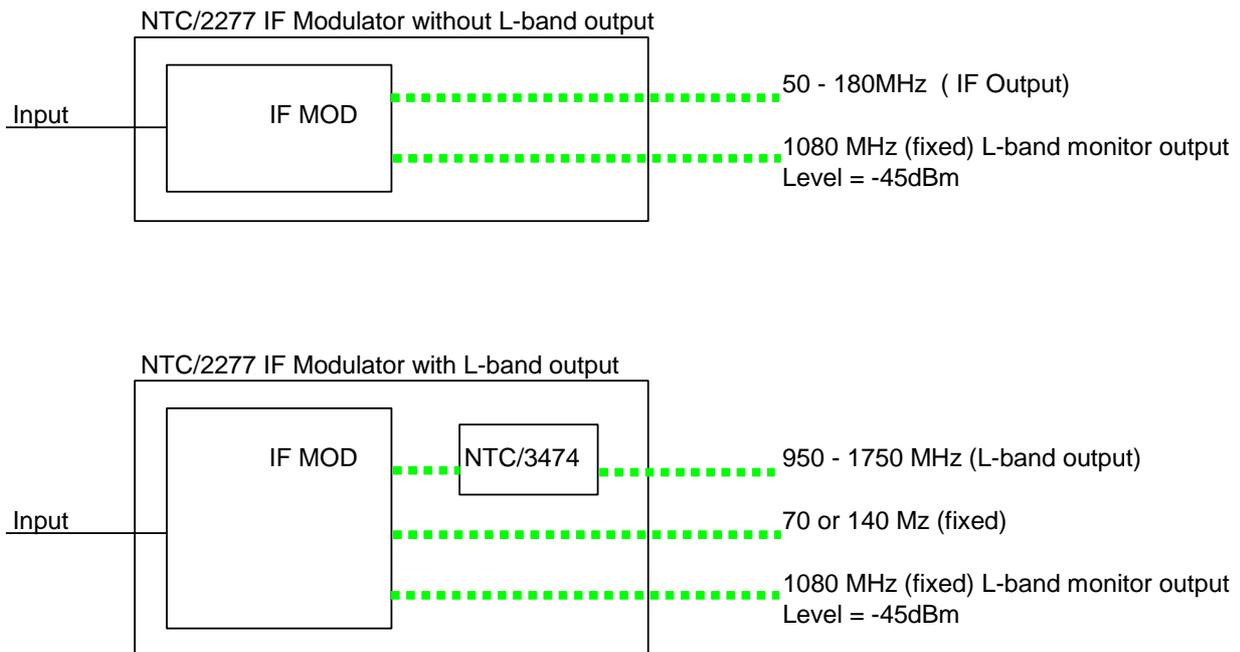
applicability:	IF modulator	**access level:**	expert only
selections:	● IF + L-Band Modulator ● IF Modulator		

4.2.2.4 Reference clock selection - SyRefClock

NTC22xx/Unit/Control

Reference clock sel.: internal

description: The 10 MHz reference clock can be either internally generated (default) or taken from an external source for enhanced stability and/or synchronisation.

selections:

● internal
● external

4.2.2.5 10 MHz operator frequency adjust - SyRef10MTuning

NTC22xx/Unit/Control

10 MHz oper. adjust: 0 units

description: Internal 10MHz operator adjustment value, this setting controls the frequency of the internal 10 MHz reference oscillator and can be used, by the operator, to re-calibrate the internal 10 MHz.

If this calibration value needs to be used, the "10 MHz reference control" must be set to "by operator". Otherwise when set to "by factory" the default tuning value of the in-factory calibration will be used.

The tuning range is normalized to a range from -50 to +50.
The actual range (ppm or Hz) depends on the type of oscillator used.

applicability: 10 MHz reference board

access level: expert only

range: -50/50 units

4.2.2.6 10 MHz reference frequency calibration factory default - SyRef10MCalib

NTC22xx/Unit/Control
10 MHz factory default: 0 units

description:	Internal 10MHz reference frequency calibration factory default. This is the factory-calibrated tuning value for the internal 10 MHz reference oscillator. This value is determined during factory calibration and is hard-coded into the reference board. It can not be changed by the operator.
	This value will be used when the "internal 10 MHz reference control" is set to "by factory". Other when set to "by operator" the value entered in the "10 MHz reference frequency adjust" will be used to adjust the 10 MHz internal reference frequency.
applicability:	10 MHz reference board
access level:	expert only
range:	-50/50 units

4.2.2.7 10 MHz reference calibration control - SyRef10MCtrl

NTC22xx/Unit/Control
10 MHz cal. control: by factory

description:	Internal 10MHz reference calibration control.
	The internal 10MHz reference frequency can be controlled by either the factory-calibrated value or the operator-controlled tuning value.
applicability:	10 MHz reference board
access level:	expert only
selections:	
	● by factory
	● by operator

4.2.2.8 Level offset - MoOLevelOffset

```
NTC22xx/Unit/Control
Level offset: 0 dB
```

description: The level offset can be used to enter a gain or attenuation in the transmit
                 path (cables, splitters, combiners, HPA). This will give the operator the
                 opportunity to set a level on the modulator that will correspond to a level
                 a certain point in the transmit chain. The factory default level is the
                 attenuation of the cable between the output of the modulator board or
                 installed converter and the connector on the chassis.

                 Typical applications would be to take into account losses of cross-site
                 cabling and/or the gain of the HPA and antenna. The level offset can also
                 be used to realign (calibrate) the modulator output level.

4.2.2.9 Ext. LO frequency - ExtLOFreq

```
NTC22xx/Unit/Control
Ext. LO frequency: 12800 MHz
```

description: When using the device with a non-Newtec external up- or down
                 converter, the LO frequency of this converter can be entered here. This
                 allows the operator to enter the RF frequency directly without having to
                 recalculate the frequency to L-band or IF. Use the external spectral
                 inversion menu to indicate if LO frequency is above or below the RF
                 frequency.

access level: expert only

4.2.2.10   Ext. spectrum inv. - ExtLOPolVal

```
NTC22xx/Unit/Control
Ext. spectrum inv.: direct spectrum
```

description: External converter spectrum polarity. When spectrum is direct the formula is:
$f(RF) = f(LO) + f(L\text{-band})$

Use inverted whenever the LO frequency is above the RF frequency, yielding in a formula where:
$f(RF) = f(LO) - f(L\text{-band})$

access level: expert only

selections:

- direct spectrum
- inverted spectrum

4.2.2.11   Outdoor cur. limit 1 - ODCurLimits1

```
NTC22xx/Unit/Control
Min. outdoor current: 0 mA
```

description: Sets the current limit of the outdoor current alarm.

applicability: RF converter, L-band conditioner up

access level: expert only

4.2.2.12   utdoor cur. limit 2 - ODCurLimits2

```
NTC22xx/Unit/Control
Max. outdoor current: 0 mA
```

description: Sets the current limit of the outdoor current alarm.

applicability: RF converter, L-band conditioner up

access level: expert only

4.2.2.13   ODU 100 MHz reference - MoODU100

```
NTC22xx/Unit/Control
ODU 100 MHz reference: disabled
```

description: Control of the 100 MHz ODU reference signal when an outdoor unit
                     conditioning module is used (e.g. NTC/3750/Ax). This 100 MHz reference
                     signal is needed whenever a Newtec outdoor unit is used (e.g.
                     NTC/2505/xL) and is used as a reference for the LO of the upconverter.

applicability: RF converter, L-band conditioner up

selections:
                     ● disabled
                     ● enabled

4.2.2.14   Up converter

4.2.2.14.1 Outdoor unit

This section of the menu allows to control relevant settings of the ODU (if connected)
otherwise this menu will not be present.

4.2.2.14.1.1 ODU communication control - MoODUCommCtrl

```
NTC22xx/Unit/Control/Up converter/Outdoor unit
ODU communication control: disabled
```

description: A Newtec outdoor upconverter unit (ODU, e.g. NTC/2505/xL) can be
                     controlled and monitored via the indoor unit (NTC/3750/ax installed in
                     modulator, L-band combiner, upconverter). This is done via an RMCP
                     interface between the indoor unit controller and the outdoor unit
                     controller (FSK over the L-band signal at 3.75 and 6.25 MHz).
                     The ODU communication control needs to be enabled when using a
                     Newtec ODU. When non-Newtec outdoor units are used, which do not
                     support the RMCP protocol, the outdoor unit communication control must
                     be disabled.

                     Upon delivery ODU communication is disabled!

applicability: L-band conditioner up

access level: expert only

selections:
                     ● disabled
                     ● enabled

4.2.2.14.1.2 ODU power supply - MoODUPow

```
NTC22xx/Unit/Control/Up converter/Outdoor unit
ODU power supply: disabled
```

description: A Newtec outdoor upconverter unit (ODU, e.g. NTC/2505/xL) can be powered with 23V (1.5 A max.) via the indoor unit (NTC/3750/ax installed in modulator, L-band combiner, upconverter). The ODU power control needs to be enabled when using a Newtec ODU.

To prevent damage to a non-Newtec ODU this powers supply voltage can be disabled.

Upon delivery the ODU power supply is disabled!

applicability: L-band conditioner up

access level: expert only

selections:
- disabled
- enabled

4.2.2.14.1.3 Outdoor power supply - ODPow

```
NTC22xx/Unit/Control/Up converter/Outdoor unit
Outdoor power supply: disabled
```

description: On/off control of the outdoor power supply as delivered by the NTC/3750/Ax outdoor unity & LNB controller unit.

applicability: RF converter, L-band conditioner up

access level: expert only

selections:
- disabled
- enabled

4.2.2.14.1.4 Outdoor power ctrl - ODCtrl1

> NTC22xx/Unit/Control/Up converter/Outdoor unit
> Outdoor power ctrl: power off

description: Voltage and/or tone selection present at the L-band in/output.

applicability: RF converter, L-band conditioner up

selections:

- power off
- 13V/0KHz
- 13V/22KHz
- 18V/0KHz
- 18V/22KHz
- 24V

4.2.2.14.1.5 HPA address for serial interface - SyDevHPAAddr

> NTC22xx/Unit/Control/Up converter/Outdoor unit
> HPA RMCP address: 48

description: Address for remote monitor and control via serial communication of an HPA, refer to the usermanual of the Newtec NTC/2505 outdoor unit converter for details of which HPAs support serial communication.

applicability: L-band conditioner up

access level: expert only

4.2.2.14.1.6 SSPA selection - ODUSSPASel

> NTC22xx/Unit/Control/Up converter/Outdoor unit
> SSPA selection: no SSPA

description: Selects one of the HPA types that are supported for M&C by the outdoor unit. Refer to the usermanual of the NTC/2505/xL outdoor unit for more details.

applicability: L-band conditioner up

access level: expert only

selections:

- no SSPA
- AWSA
- AWPA
- AWMA - serial
- AWMA - discrete
- AWSA - reduced
- Microwave
- Xicom SSPB
- Xicom TWTA
- Xicom SSPA
- Discrete

4.2.2.14.1.7 Save ODU Upconverter architecture - ConvArchSave

NTC22xx/Unit/Control/Up converter/Outdoor unit
Save ODU Upconv. arch.: <press OK>

description: Saves the ODU upconverter fingerprint/calibration-table to internal memory.

Each time the device (modulator, combiner, upconverter) boots, it will check the hardware of the connected ODU. If this hardware differs from the one previously stored in memory an ODU architecture alarm will be raised. In that case, use this menu to save the detected hardware in the device internal memory and re-boot. This will allow the device to boot faster because it will check if the detected hardware is the same as the one stored in internal memory instead of downloading the complete architecture after each re-boot.

applicability: L-band conditioner up

access level: expert only

4.2.3   Monitor

This section of the menu allows to change monitor parameters of the unit that are common to all NTC/22xx series equipment.

4.2.3.1 Device internal temperature - SyIntTemp

```
NTC22xx/Unit/Monitor
Device temperature: 40 C
```

description: The internal temperature of the device must be within +10 and +70° C. Typically, this temperature should be around 40°C (± 10°C).

4.2.3.2 Device +3V3 power supply - SyDevPowP3V3

```
NTC22xx/Unit/Monitor
+3V3 power supply: 3.3 V
```

description: +3.3V power supply monitor. A power supply alarm is triggered when this voltage is outside the range of +2.5/+4.1 volt.

4.2.3.3 Device +5V power supply - SyDevPowP5V

```
NTC22xx/Unit/Monitor
+5V power supply: 5 V
```

description: +5V power supply monitor. A power supply alarm is triggered when this voltage is outside the range of +4.0/+5.9 volt.

4.2.3.4 Device +12V power supply - SyDevPowP12V

```
NTC22xx/Unit/Monitor
+12V power supply: 12 V
```

description: +12V power supply monitor. A power supply alarm is triggered when this voltage is outside the range of +10.0/+14.0 volt.

4.2.3.5 Device -12V power supply - SyDevPowM12V

```
NTC22xx/Unit/Monitor
-12V power supply: -12 V
```

description: -12V power supply monitor. A power supply alarm is triggered when this voltage is outside the range of -10.0/-14.0 volt.

4.2.3.6 10 MHz reference input level measurement - SyRef10MLevel

```
NTC22xx/Unit/Monitor
10 MHz input level: 2950 mV
```

description: 10 MHz reference input level estimation, as derived from the monitored AGC level. For optimal operation (conform to specifications) the level should be within the range of 2.4 and 3.7 V. A level lower than 1 V (lower than - 5 dBm) will trigger the reference clock alarm. Following table shows the measured voltage and the corresponding level in dBm:

2.4 ± 0.5 V => - 3 dBm
3.0 ± 0.5 V => - 0 dBm
3.4 ± 0.5 V => + 3 dBm
3.7 ± 0.5 V => + 7 dBm
4.0 ± 0.5 V => +10 dBm

applicability: 10 MHz reference board

access level: expert only

4.2.3.7 Frequency conversion formula - SyRFCalcForm

NTC22xx/Unit/Monitor
RF freq. formula: RF Freq = LO freq [+-] L-band freq

description: RF calculation formula

access level: expert only

4.2.4   Architecture

The architecture menu gives information about all modules, boards and pug-ins that are installed in the unit. The same 9 parameters are available for all modules. Only the general architecture is described here. Depending on the installed boards and options, other architecture sub-menus will become available giving all the details about those modules in detail.

4.2.4.1 General

These parameters will be found in every NTC/22xx device. They describe the details of the complete unit. They are needed when Newtec is contacted for support or upgrade.

4.2.4.1.1 Device serial number - SyDevSn

NTC22xx/Unit/Architecture/General
Device serial number: 03051439

description: The serial number of the device as known by the firmware. This number should be the same as the serial number on the backpanel label (for rack mounted units) or as the serial number of the PCB (for boards).

Format : "yymmddnn" with:

- yy : last 2 digits of year
- mm : month of year
- dd : day of month
- nn : unit number of day

4.2.4.1.2 Device hardware identification - SyDevHwId

```
NTC22xx/Unit/Architecture/General
Hardware Id: <press OK>
```

description: Device type (NTC-number) and sub-type (alphanumeric suffix) and short
                      description identifying the hardware.

4.2.4.1.3 Product identification number - SyDevProdId

```
NTC22xx/Unit/Architecture/General
Product Id: <press OK>
```

description: Device type (NTC-number) and sub-type (alphanumeric suffix) and short
                      description identifying the product.

4.2.4.1.4 Operating system version - SyOSVer

```
NTC22xx/Unit/Architecture/General
OS version: <press OK>
```

description: OS = Operating System (version and release date)

4.2.4.1.5 RAM disk version - SyRamDiskVer

```
NTC22xx/Unit/Architecture/General
RAM disk version: <press OK>
```

description: RAM disk version and release date.

4.2.4.1.6 PPC boot version - SyPPCVer

NTC22xx/Unit/Architecture/General
PPC boot version: <press OK>

description: PPCBoot version and release date.

4.2.4.1.7 SNMP daemon version - SySnmpVer

NTC22xx/Unit/Architecture/General
SNMP daemon version: <press OK>

description: SNMP daemon version and release date.

4.2.4.1.8 Web Interface

4.2.4.1.8.1 GWIG software identification - SyDevGwId

NTC22xx/Unit/Architecture/General/Web Interface
GWIG ident. : NTC/6243/xx Gwig for NTC Devices

description: GWIG (Web Interface) software identification (NTC number + short
                         description).

4.2.4.1.8.2 GWIG software version - SyDevGwVer

NTC22xx/Unit/Architecture/General/Web Interface
GWIG version: v0.00.00 00/00/00 00:00:00

description: GWIG(Web Interface) software version and release date.

4.2.5   Diagnostics

4.2.5.1 Generate diagnostics report - SyTSRapport

NTC22xx/Unit/Diagnostics

Diagnostics report: basic

description: Generate a diagnostics report. This command is also triggered when a diagnostics report is requested through the web interface.

access level: expert only

selections:
- basic
- full

4.2.6   Board selftest results

Depending on the type and number of boards installed the results of the individual board tests during start-up can be consulted.

4.3   Modulator

This section of the menu allows to control and monitor the operational parameters of the device. In expert mode, additional (non-frequently used) parameters become available. In normal mode only relevant operational parameters are shown.

4.3.1   Control

This section of the menu allows controlling operational parameters of the (de)modulator. When device mode is set to "expert", some additional non-frequently used parameters will be added to the end of the list.

4.3.1.1 Main

4.3.1.1.1 Modulation standard - MoModStand
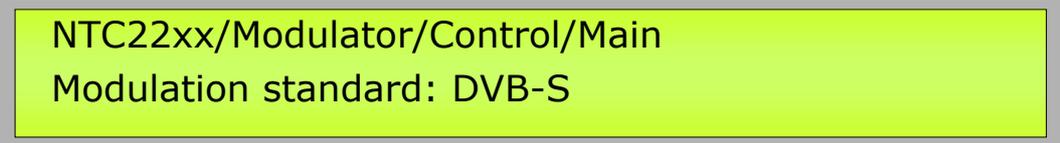
NTC22xx/Modulator/Control/Main
Modulation standard: DVB-S

description: The modulation standard defines the major operating mode of the device.

- DVB-S2 : compatible with EN302307

- DVB-S : compatible with EN300421 for QPSK and EN301210 for 8PSK and 16QAM.

- NTC : for backward compatibility reasons, when working with Newtec demodulators that do 8PSK and 16QAM in NTC mode. This NTC mode was put forward before the usage of 8PSK and 16QAM was standardised in EN301210.

- SKYPLEX-SCPC : compatible with SKYPLEX on-board demodulator in continuous mode
- SKYPLEX-TDMA : compatible with SKYPLEX on-board demodulator in TDMA mode

access level: expert only

selections:
- NTC
- SKYPLEX-SCPC
- DVB-S
- DVB-S2

4.3.1.1.2 External BB Rx interface - IfRxType

> NTC22xx/Modulator/Control/Main
> Base band interface: ASI-A

description: Base band interface type selection. The available selectable interface types depend on the interface board type that is installed and the plug-ins (G703, ASI-optical) that are installed on that board.

selections:

- DVB-SPI-LVDS
- RS422-LVDS
- HSSI
- internal BBB
- ASI-A
- ASI-B
- ASI-opt.
- G703 - 2 Mbit/s
- G703 - 6 Mbit/s
- G703 - 8 Mbit/s
- G703 - 17 Mbit/s
- G703 - 34 Mbit/s
- G703 - 45 Mbit/s
- G703(1/2) 2 Mbit/s
- G703(1/2) 6 Mbit/s
- G703(1/2) 8 Mbit/s
- G703(1/2) 17 Mbit/s
- G703(1/2) 34 Mbit/s
- G703(1/2) 45 Mbit/s
- G703 155 Mbit/s
- MMF
- SMF
- off

4.3.1.1.3 ASI switching mode - MoAsiSwitch

> NTC22xx/Modulator/Control/Main
> ASI switching mode: manual

description: Automatic ASI switching activation status.

In automatic mode the manual input selection command is overruled and the system will check for an ASI signal on both of the inputs. When a valid ASI signal is detected, this input remains selected. When no valid ASI signal is detected after 250 ms, the other input is checked.

In manual mode, input selection is controlled by the base band interface selection command, where it is fixed to ASI input A or B.

applicability:	ASI interface

access level:	expert only

selections:

- automatic
- manual

4.3.1.1.4 Base band processing mode - IfBBProc

> NTC22xx/Modulator/Control/Main
> Base band processing: Off

description: This command provides selection of different base band processing functions on the interface board, possible selections are:

Standard features:

- OFF : no additional processing performed on the base band data

- STUFFING :

In DVB-S mode, MPEG null packets are inserted to adapt to transmit rate
In DVB-S2 mode, dummy PLframes are inserted to adapt to transmit rate

Optional features (password upgradeable):

- MPEG-RA : rate adaptation activated (null packets are dropped/inserted and PCR updated)

- BISS-RA : BISS scrambler function activated.

When base band processing is OFF, the modulator transmit clock is slaved to the input data-stream. In all other modes, the transmit clock is free-running and the rate adaptation is performed by the specified stuffing/adaptation mechanism.

applicability:	ASI interface, HSSI-G703 interface, ASI interface with LVDS output

selections:

- Off
- MPEG-RA
- BISS-RA
- Stuffing

4.3.1.1.5 Master clock selection - IfMasterClock

NTC22xx/Modulator/Control/Main
Master clock sel.: Int.

description: Master clock selection for interface board, selects the main processing clock for the interface board (= output clock of the input data buffer).

The default selection always makes use of the most accurate clock source available. For standard DVB modulators (IF or L-band) the on-board clock PLL is used. If the optional 10 MHz reference frequency module (NTC/3462/Ax.A) is installed (needed when the modulator is equipped with an on-board frequency converter or an external 10 MHz reference input is necessary), the interface is slaved to that 10 MHz clock. In the last case, if the interface needs to be slaved to an external 10 MHz clock, switch the reference clock selection to external.

For the NTC/3458 (G703- HSSI) interface board the G703 input interface can be slaved to another G703 source with the same or a standard G703 different rate.

applicability: HSSI-G703 interface

selections:

● Int.
● G703(1/2) 2 Mbit/s
● G703(1/2) 6 Mbit/s
● G703(1/2) 8 Mbit/s
● G703(1/2) 17 Mbit/s
● G703(1/2) 34 Mbit/s
● G703(1/2) 45 Mbit/s

4.3.1.1.6 MPEG framing - MoMpegFram

NTC22xx/Modulator/Control/Main
MPEG framing: external (188)

description: The interface MPEG framing defines the data framing format received at the interface.

in 188 byte mode the modulator expects MPEG packets of 188 bytes with the first byte being the mpeg syncmarker (0x47) in 204 byte mode the modulator expects MPEG packets of 204 bytes, the 16 RS parity bytes are ignored (dropped)in internal framing mode (int187) the modulator will insert a syncmarker every 187 input bytes. This allows transmission of non-MPEG data.

Note that this mode requires removal of the inserted syncmarkers at the receiver side in order to reconstruct the original stream.

A change of MPEG framing will disable L-band output transmit.

applicability: ASI interface, HSSI-G703 interface, ASI interface with LVDS output

selections:

- external (188)
- internal
- external (204)

4.3.1.1.7 Interface bitrate - MoInpRate

NTC22xx/Modulator/Control/Main
Interface bitrate: 8.294118 Mbps

description: Programs the (de)modulator input bitrate at the base band interface. The actual range depends on the installed hardware and software capability of the device.

4.3.1.1.8 Symbol rate - MoSymRate

NTC22xx/Modulator/Control/Main
Symbol rate: 6.000000 Mbaud

description: Programs the symbol rate. The actual range depends on installed hardware and software capability.

4.3.1.1.9 FEC-rate and modulation - MoFecMod2

NTC22xx/Modulator/Control/Main
FEC-rate and mod.: QPSK-3/4

description: The selection of the FEC-rate and modulation are coupled and depend on the present modulation standard and capability of the device.
Because the selection of a new FEC-rate and/or modulation type changes the symbol rate and thus the bandwidth of the signal, transmit is disabled. After verification of the occupied bandwidth the operator has to re-enable transmit to go back "on air".

In DVB-S2 mode which supports dynamic changes of FEC-rate and/or modulation, transmit is only disabled when the symbol rate changes.
i.e. when the rate priority command is set to "interface rate".
The selection of an FEC-rate and or modulation type, for which the present symbol rate is outside the allowed limits will be indicated by an incompatibility alarm.

Only those selections possible with the current device capability will be listed.

selections:
Dummy PLFRAMES
QPSK no FEC (SKYPLEX)
QPSK-1/4
QPSK-1/3
QPSK-1/2
QPSK-2/5
QPSK-3/5
QPSK-2/3
QPSK-3/4
QPSK-4/5
QPSK-5/6
QPSK-6/7
QPSK-7/8
QPSK-8/9
QPSK-9/10

8PSK-3/5
8PSK-2/3
8PSK-3/4
8PSK-5/6
8PSK-8/9
8PSK-9/10

16APSK-2/3
16APSK-3/4
16APSK-4/5
16APSK-5/6
16APSK-8/9
16APSK-9/10

16QAM-3/4
16QAM-7/8

32APSK-3/4
32APSK-4/5
32APSK-5/6
32APSK-8/9
32APSK-9/10

4.3.1.1.10   Physical Layer Pilot insertion - MoPilots

NTC22xx/Modulator/Control/Main

Pilot insertion: off

description: DVB-S2 Physical Layer Pilot insertion. This is a CCM command overruling any ACM settings which might be present. (e.g. In-band ACM)

When enabled, every 16 slots (of 90 symbols) the modulator will insert 36 unmodulated symbols to aid in receiver synchronisation.

selections:
● off
● on

4.3.1.1.11   DVB-S2 FEC-Frame type - MoFrameType

NTC22xx/Modulator/Control/Main

FEC-Frame type: short

description: DVB-S2 defines 2 FEC-frame types :

- normal: FECframes of 64800 bits or 8100 bytes
- short: FECframes of 16200 bits or 2025 bytes

selections:
● short
● normal

4.3.1.1.12   Rate priority - MoRatePriority

```
NTC22xx/Modulator/Control/Main
Rate priority: interface
```

description: A modulator features 2 important rate settings, the interface rate is the bit rate at the base band interface while the symbol rate is the baud rate of the modulated output signal.

The rate priority determines which rate will be kept constant when one of the following parameters is changed:
- o   modulation type and FEC
- o   MPEG framing
- o   fraiming mode (external 188/204 bytes or internal).

The rate that has been changed last, automatically gets the rate priority assigned.

access level: expert only

selections:
- • interface
- • symbol

4.3.1.1.13   IF output frequency - MoIFFreq

```
NTC22xx/Modulator/Control/Main
IF output frequency: 140.000000 MHz
```

description: The IF frequency is adjustable in steps of 50 Hz, within the range of 50 MHz up to 180 MHz. A change of the IF frequency disables the transmitter. After verification, the operator has to re-enable transmit to go "on air".

4.3.1.1.14   Operational output frequency - MoOpOutputFreq

```
NTC22xx/Modulator/Control/Main
Output frequency: 1450.000000 MHz
```

description: Operational output frequency in case of active L-band output.

4.3.1.1.15   Output level - MoOutputLevel1

NTC22xx/Modulator/Control/Main
IF output level: -15 dBm

description: Output level in dBm. The actual range is determined by the gain of the
                     converter (which is also depending on operating frequency) and the gain
                     of the optional extra amplifier. The displayed level can also be changed
                     by introducing a level offset (see ../Unit/Level offset).

4.3.1.1.16   Output level - MoOutputLevel2

NTC22xx/Modulator/Control/Main
LBand output level: -15 dBm

description: Output level in dBm. The actual range is determined by the gain of the
                     converter (which is also depending on operating frequency) and the gain
                     of the optional extra amplifier. The displayed level can also be changed
                     by introducing a level offset (see ../Unit/Level offset).

applicability: up converter

4.3.1.1.17 Gain control mode - MoGainCtrlMode

> NTC22xx/Modulator/Control/Main
> Gain control mode: AGC

description: Output level gain control mode. The modulator output level accuracy can be controlled statically in the fixed MGC (manual gain control) mode, or using an AGC feedback loop (AGC mode).

In some communication systems with multiple overall automatic gain control it might be necessary to set the output level of the modulator to fixed (MGC mode). The AGC mode is used to keep level changes in output level small caused by gain drift (due to temperature changes or ageing) of the amplifier stages of the modulator.

access level: expert only

selections:

- MGC
- AGC

discription

4.3.1.1.18 Output Level Plan – MoOutLevelPlan

> NTC22xx/Modulator/Control/Main
> Output Level Plan: Const. Pwr

description: Typical usage : Multi streams constellation (only supported with Gigabit Ethernet Interface board)

Exceptional usage: Single stream with different BB-frames/PHY frames – dynamical changeable modcod. (standard ASI & HSSI interfacing)

The Modulator features 2 output level Plans :

1. Constant Power :

In this plan, output power is kept equal for the different modcods.
This is the default mode of operation.

2. Constant Rim :

In this plan, the outer ring of the symbol constellation is kept equal
for the different modcods. As a consequence different modcods will be
transmitted with different output power.

This mode is recommended when operating the DVB-S2 Modulator in
VCM/ACM mode
with a saturated transponder.

It avoids excessive input back-off for QPSK, 8PSK 16APSK modcods
during VCM/ACM operation.
Due to the dynamic level changes this mode is only possible with
"Manual Gain Control".

Since the highest outer ring level occurs for a modcod of 32APSK-3/4 ,
this modcod
is used as the reference for the output power level setting.
The other modcods will be transmitted with higher power :

16APSK : +1 dB
QPSK and 8PSK : +2 dB

access level: expert only

selections:
- Const. Pwr
- Const. Rim

Constant power

QPSK & 8 PSK

16 APSK

32 APSK
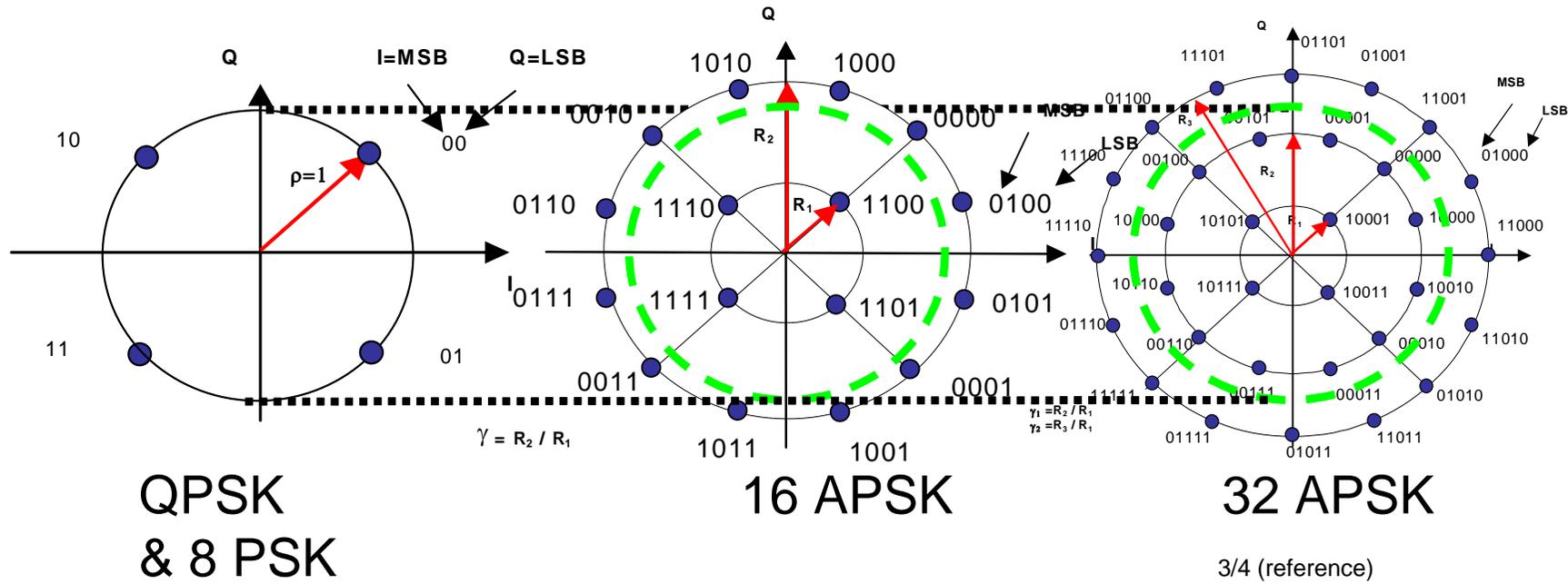
3/4 (reference)

Dashed circles = Average power

Constant RIM
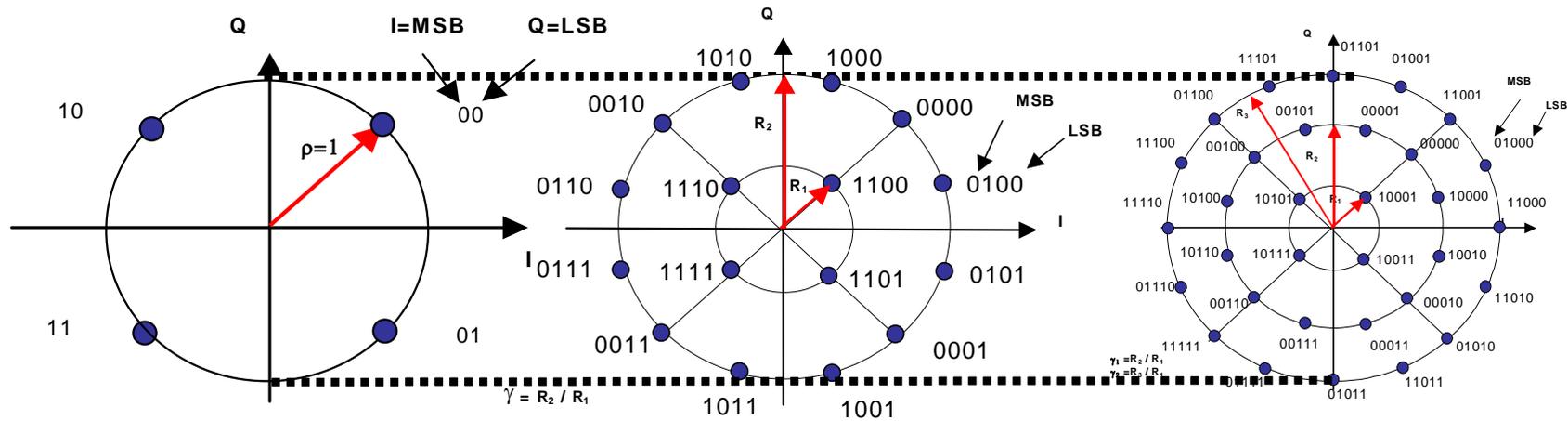
QPSK
& 8 PSK

16 APSK

32 APSK

3/4 (reference)

4.3.1.1.19   Modulator board Tx - MoOutputEnable

NTC22xx/Modulator/Control/Main
Modulator board Tx: disabled

description: Enables or disables the modulator output signal.
Transmit is switched-off upon detection of a general device alarm of the modulator board. This is the or-ing of the incompatibility, external 10 MHz reference, external 10 MHz reference PLL and synthesizer lock alarm. When this alarm is resolved transmit is switched back on.

Commands which modify the transmitted signal and its spectrum disable the transmission unconditionally:

- interface rate
- symbol rate
- FEC rate and modulation type
- interface framing
- excess bandwidth
- modulation standard
- output frequency

After such a change, the operator has to inspect the generated signal and then re-enable the transmit to go "on-air". The operator requested transmit control state can be saved in the default boot configuration stored in memory slot 0 so that after (accidental) reboot the saved transmitter state is activated.

In the modulators with IF modulator board this label will be "IF transmit". In the modulators with L-band modulator board this label will be "L-band transmit".

selections: ● disabled ● enabled

4.3.1.1.20   Internal L-band transmit - CvLbandTx

NTC22xx/Modulator/Control/Main
Internal L-band Tx: disabled

description: Controls the internal L-band transmit.

applicability: up converter

selections:

● disabled
● enabled

4.3.1.1.21 RF transmit - CvRfoutTx

```
NTC22xx/Modulator/Control/Main
RF transmit: disabled
```

description: The RF output transmit control enables or disables the RF output of the installed converter module.

applicability: RF converter, L-band conditioner up

selections:

- disabled
- enabled

4.3.1.1.22 ST frequency - IfStFreq

```
NTC22xx/Modulator/Control/Main
ST frequency: 8.448000 MHz
```

description: The HSSI-ST frequency for the HSSI - G703 interface module follows the interface rate if the ST frequency mode is set to automatic.

                      For testing purposes an ST clock can be selected, independent of the interface frequency when the ST frequency mode is set to manual.

applicability: HSSI-G703 interface

4.3.1.1.23 ST frequency mode - IfStfreqMod

```
NTC22xx/Modulator/Control/Main
ST frequency mode: auto
```

description: The ST frequency mode indicates if the ST clock follows the interface rate automatically or can be adjusted manually, independent of the interface rate.

                      When the ST frequency is to be used as transmit clock, then it must be equal to the interface rate and the transmit clock selection must be set to external, in this case use the automatic mode.

                      For testing purposes the ST frequency mode can be set to manual where

the ST clock can be set independent of the interface rate. The selection of the internal transmit clock while the HSSI interface uses the ST clock leads to MPEG null packet insertion (stuffing) if the interface rate is higher than the ST frequency and an incompatibility if the interface rate is lower than the ST frequency.

applicability: HSSI-G703 interface

access level: expert only

selections:

- auto
- manual

4.3.1.1.24   Carrier modulation - MoCaMod

NTC22xx/Modulator/Control/Main
Carrier modulation: on

description: This commands controls carrier modulation:

- pure carrier: unmodulated output signal
- modulation on: Operational modulated carrier signal
- test modulation CLK/n: Carrier modulated by a rotating vector with a period of baudrate/n, results in a single spectral line at +clk/n offset from carrier. This mode is used for calibration and verification of spectrum polarity.

selections:

- pure carrier
- on
- clock/8
- clock/4
- clock/16

4.3.1.1.25   External L-band input - MoExtInp

NTC22xx/Modulator/Control/Main
Ext. L-band input: disabled

description: The external L-band transmit control enables or disables the signal path from the external L-band input to the L-band combiner in the installed converter or conditioner module.

applicability: RF converter, L-band conditioner up

selections:

- disabled

● enabled

4.3.1.1.26   Coax 1/2 G703 interface equaliser – IfEqA/B

```
NTC22xx/Modulator/Control/Main
Coax 1 equaliser: N.A.
```

description: The G.703 interface equaliser compensates for cable effects in function of the interface rate and the expected cable loss. This parameter only applies to G703 interfaces.

The equaliser setting is selected out of up to four pre-set values, depending on the installed G703 plug-in.

Possible equaliser selections and corresponding cable loss ranges for the different G703 rates are as follows :

2 Mbps:
0.0 to -10.0 dB (fixed)

6 - 8 - 16 Mbps:
0.0 to -2.4 dB (0 - 550 ft)
-2.2 to -4.8 dB (500 - 1100 ft)
-3.1 to -6.0 dB (700 - 1350 ft)

34 Mbps:
0.0 to -5.7 dB (0 - 550 ft)
-4.1 to -12.0 dB (400 - 1150 ft)
-5.7 to -14.0 dB (550 - 1350 ft)
-6.8 to -14.0 dB (650 - 1350 ft)

45 Mbps:
0.0 to -12.0 dB (0 - 900 ft, fixed)

applicability: HSSI-G703 interface

access level: expert only

selections:

● 0.0 to -10.0 dB (fixed)
● 0.0 to -2.4 dB
● -2.2 to -4.8 dB
● -3.1 to -6.0 dB
● 0.0 to -5.7 dB
● -4.1 to -12.0 dB
● -5.7 to -14.0 dB
● -6.8 to -14.0 dB
● 0.0 to -12.0 dB
● N.A.

4.3.1.2 Base bandFraming

4.3.1.2.1 DVB-S2 DFL encapsulation mode - MoDFLMode

> NTC22xx/Modulator/Control/Base bandFraming
> DFL mode: auto

description: When operating with non-"base band frame" input formats (i.e. MPEG TS input or generic input streams) the raw input stream is encapsulated into DVB-S2 base band frames. The payload size of these frames is referred to as DFL (Data Field Length) and the maximum possible DFL is determined by the selected frame type and modulation and coding (modcod).

2 DFL encapsulation modes are defined:

- automatic : upon selection of frame type and/or modcod, DFL size is automatically set to the corresponding maximum payload size and the SYNCD (sync distance) is set to 0

- manual : upon selection of frame type and/or modcod, DFL size remains at the previous value of the Base band Data Field length (MoDFL) variable as long as this value is supported by the new frame type and modcod. In case the Base band Data Field length (MoDFL) variable > max payload size, DFL value will be clipped to the maximum. Also the SYNCD value will be kept or clipped.

access level: expert only

selections:

   ● auto
   ● man

4.3.1.2.2 Base band Data Field length - MoDFL

> NTC22xx/Modulator/Control/Base bandFraming
> Base band DFL: 376 bytes

description: Base band Data Field Length (DFL). When the modulator is operating with non-"base band frame" input formats (i.e. MPEG TS input or generic input streams) the raw input stream is encapsulated into DVB-S2 base band frames. The payload size of these frames is referred to as DFL (Data Field Length) and the maximum possible DFL is determined by the selected frame type and modcod.

This variable specifies the DFL size (in bytes) for encapsulation of User

data into DVB-S2 Base band Frames. Only applicable for non-"base band frame" input stream formats. When used in the demodulator, the DFL value is read only and is determined via BBheader info.

4.3.1.2.3 Base band Sync distance - MoSYNCD

NTC22xx/Modulator/Control/Base bandFraming

Sync distance: 0 bytes

description: The Base band Sync distance (in bytes) specifies the initial position within the base band frame of the sync marker. In case the data field length is an integer multiple of the user packet length (UPL within the base band frame) this position will be maintained over all base band frames.
Only applicable for non-"base band frame" input stream formats.

4.3.1.2.4 Input Stream Identifier - MoISI

NTC22xx/Modulator/Control/Base bandFraming

ISI: AB hex

description: The DVB-S2 Input Stream Identifier (ISI) is present in the second byte position of the MATYPE field in the Base band Header of a DVB-S2 Base band Frame. It is a single byte identifying the encapsulated stream in case of Multiple Input Streams (MIS). When the modulator input format consists of Base band Frames, this value is used for filtering the matching stream for dedicated processing like NCR insertion or monitoring.

In all other cases (MPEG TS or generic stream inputs), this ISI value is filled-in in the MATYPE field of the generated Base band Frames.

4.3.1.3 PHY

4.3.1.3.1 Physical Layer Scrambler signature - MoPLSSignature

NTC22xx/Modulator/Control/PHY

PLS signature: 0

description: The Physical Layer Scrambler Signature (PLSCRAMBLER) scrambles all of the PLFRAMES except for their header parts The sequence is reset at the start of the frame body.

Two lfsr M-sequences are combined to form a "Gold" code the delay "n" of the first (X) generator is programmable via M&C and is designated "the signature of the PLSCRAMBLER"

The PLS signature is programmed as an 18-bit value.

Range: 0/262143

4.3.1.3.2 Tx spectrum inversion - MoSpectInv1

NTC22xx/Modulator/Control/PHY
IF spectrum inv.: direct

description: The spectrum inversion off mode, or direct spectrum, corresponds with the INTELSAT specification IESS-308 (Rev.8 - pgs 18 & 69) and with the DVB standard ETS 300 421 (December 1994).

The spectrum at IFL and at RF is coupled by the installed upconverter module. This can be deduced from the frequency conversion formula. If the L-band frequency is subtracted from the LO, then the spectrum is inverted in the converter module. If a direct spectrum is required in this case, the spectrum must also be inverted at IFL.

selections:
- direct
- inverted

4.3.1.3.3 Tx spectrum inversion - MoSpectInv2

NTC22xx/Modulator/Control/PHY
LBand spectrum inv.: direct

description: The spectrum inversion off mode, or direct spectrum, corresponds with the INTELSAT specification IESS-308 (Rev.8 - pgs 18 & 69) and with the DVB standard ETS 300 421 (December 1994).

The spectrum at IFL and at RF is coupled by the installed upconverter module. This can be deduced from the frequency conversion formula. If the L-band frequency is subtracted from the LO, then the spectrum is inverted in the converter module. If a direct spectrum is required in this case, the spectrum must also be inverted at IFL.

applicability: up converter
selections:
- direct
- inverted

4.3.1.3.4 Linear predistortion - MoLinPredMode

NTC22xx/Modulator/Control/PHY
Linear predistortion: disabled

description: Enables or disables the linear predistortion filter.

The purpose of linear predistortion is to compensate for transponder amplitude and group-delay distortions.
This becomes especially important when operating at high baudrates and higher order modulation formats.

The predistortion filter coefficients must be calculated offline and require transponder amplitude and group-delay characteristics as input.
The resulting coefficient data can be uploaded via the ntcSeEqMoWafFirCoef RMCP command.

selections:
- disabled
- enabled

Step 1 : Gather Input Data

Channel Response Characteristics	Operational Spectral Parameters
• Ampl = f(Freq) • GroupDelay = f(Freq)	• Symbolrate • Center Frequency • Roll-off factor
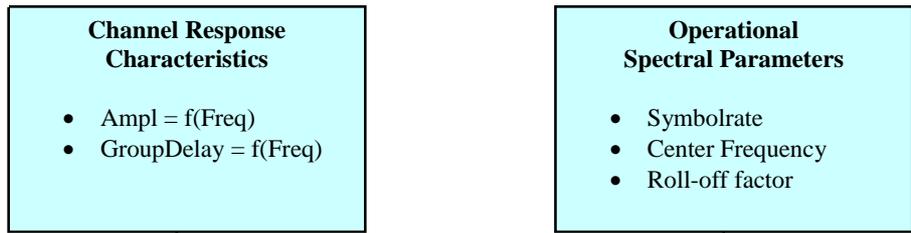
Step 2 : Calculate Coefficients

amp.txt
grp.txt

param.txt

Equalizer Coefficient Calculation @ NEWTEC :
- TechSupport@newtec.be
- Web Service (Not Yet Available)

linpred.txt
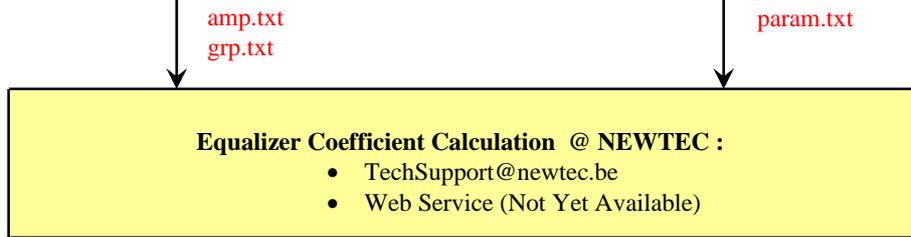
Step 3 : Load Coefficients

Equalizer Coefficient Loading
- Send RMCP command contained in linpred.txt
- E.g. via RmcpLoader program
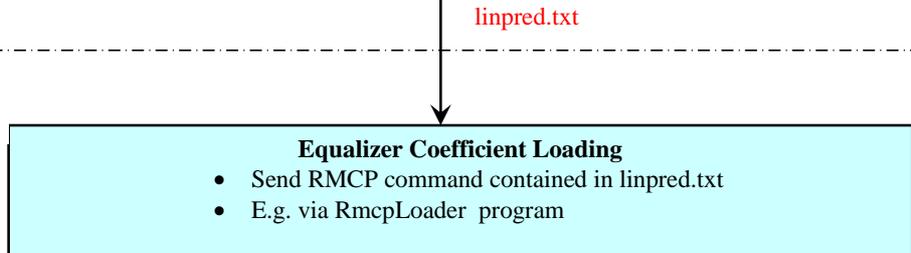
Step 4 : Activate Predistortion

Enable/Disable Pre-Distortion :
- Frontpanel control
- RMCP command
- Web Interface
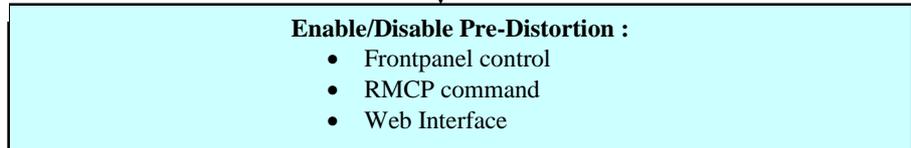
4.3.1.3.5 Amplitude slope equaliser - MoAmplEq

NTC22xx/Modulator/Control/PHY
Slope equaliser: 0 units

description: An amplitude slope in the upconverter or HPA can be compensated by using this equaliser, which has a maximum range of ± 2 dB/50 MHz. This is done by changing the corresponding control parameter in steps of 1 unit, in the range of ±7 unit.

access level: expert only

4.3.1.3.6 Excess bandwidth - MoExcBw

NTC22xx/Modulator/Control/PHY
Excess bandwidth: 25%

description: The excess bandwidth defines the RCRO (Root Cosine Roll-Off) factor for the matched filter at the modulator output.

A change of the excess bandwidth disables transmit.

access level: expert only

selections:
- 35%
- 25%
- 20%

4.3.1.3.7 Monitoring output mode - MoMonOutputMode

```
NTC22xx/Modulator/Test
Monitor output mode: always on
```

description: Controls the monitoring output functional mode:

- Always on : The monitor output signal is continuously active, irrespective of the operational output status.
- Follow Tx: The monitor output status follows the operational output status. i.e. when transmit is off, the monitor output will also be disabled.

access level: expert only
selections:

● always on
● follow Tx

4.3.1.3.8 Occupied bandwidth - MoOccBw

```
NTC22xx/Modulator/Monitor
Occupied bandwidth: 8.100000 MHz
```

description: The -26 dB bandwidth of the signal. This is calculated as the symbol rate multiplied with $(1 + a)$ with a = the selected roll-off factor.

4.3.1.4 BISS (Optional feature – password upgradeable)

4.3.1.4.1 Operation

**Note: Go to NTC22xx/Modulator/Control/Main/Base band processing/
    And activate: BISS-RA**

4.3.1.4.1.1 BISS scrambler operating mode - BissOpMode

NTC22xx/Modulator/Control/BISS/Operation
Mode: Off

description:	This command controls the operating mode of the BISS scrambler.
	BISS mode 0: no scrambling BISS mode 1: scrambling with unencrypted BISS-1 session word BISS mode E: scrambling with encrypted BISS-E session word, encryption uses the selected encryption ID
applicability: **selections:**	interface with BISS scrambling capability • Off • BISS-1 • BISS-E

4.3.1.4.1.2 BISS-1 session word - BissSessionWord

NTC22xx/Modulator/Control/BISS/Operation
BISS-1 session word: 000000000000

description:	BISS mode 1 clear session word (12 Hex digits).
applicability:	interface with BISS scrambling capability

4.3.1.4.1.3 BISS-E session word - BissESessionWord

NTC22xx/Modulator/Control/BISS/Operation
BISS-E session word: 0000000000000000

description:	BISS-E session word (16 Hex digits). The encrypted session word will be decrypted with the selected decryption ID.
applicability:	interface with BISS scrambling capability

4.3.1.4.1.4   BISS-E decryption id select - BissEDecryptionIdSel

NTC22xx/Modulator/Control/BISS/Operation
BISS-E id select: Buried

description: Selects the buried or injected (1-5) identifier used to decrypt the encrypted session word (ESW).

applicability: interface with BISS scrambling capability

selections:

- Buried
- Inj-1
- Inj-2
- Inj-3
- Inj-4
- Inj-5

4.3.1.4.2 BISS-E setup

4.3.1.4.2.1   Set BISS-E injected identifier - BissEInjectIdSet

NTC22xx/Modulator/Control/BISS/BISS-E setup
Set injected id: XXXX

description: The BISS scrambler device can store up to 5 injected identifiers. Each identifier is protected against unauthorised modification by an associated operator-definable password.

When the device leaves the factory all 5 injected identifiers and their associated passwords are cleared. The first time an identifier is programmed; the identifier value and the password are unconditionally accepted and stored in memory. Any later attempts to modify the same identifier require that the supplied password matches the stored password for that identifier.

Notes:

- In case the operator forgot the password, the identifier with corresponding password fields can be reset to the initial factory state by a separate command (in this case, please contact Newtec customer support).
- For security reasons, the injected identifiers cannot be read from the equipment.

applicability: interface with BISS scrambling capability

4.3.1.4.2.2   Clear BISS-E injected identifier - BissEInjectIdClear

NTC22xx/Modulator/Control/BISS/BISS-E setup
Clear injected id: XXXX

description: Used to reset the BISS-E injected identifier with corresponding password
field to the initial factory state.

applicability: interface with BISS scrambling capability
access level: expert only

4.3.1.4.2.3   BISS-E buried identifier - BissEBuriedId

NTC22xx/Modulator/Control/BISS/BISS-E setup
Buried identifier: 00000000000000

description: BISS-E buried identifier.

applicability: interface with BISS scrambling capability
access level: expert only

4.3.1.4.2.4   Calculate new BISS-E buried identifier - BissEBuriedIdNew

NTC22xx/Modulator/Control/BISS/BISS-E setup
Calc new buried id: XXXX

description: Calculate a new BISS-E Buried Identifier.

For BISS-E operation the session word can be encrypted using a buried
identifier. The buried identifier is unique for each device and is among
others, derived from the device serial number and a counter variable
(buried Id counter). When a new unit leaves the factory, the counter is at
0 corresponding to the factory default buried identifier.

In case the security of the buried Id gets compromised, the operator can
increment the counter hence producing a new unique buried Id. This
process can be repeated up to 10 times. After these 10 changes it is
necessary to contact Newtec support in order to get a software key to
increase the upper-bound value of the counter and to obtain new buried
identifiers.

applicability: interface with BISS scrambling capability

access level: expert only

4.3.1.4.2.5   Increment BISS-E buried identifier max count by 10 - BissEBuriedIdMaxNew

NTC22xx/Modulator/Control/BISS/BISS-E setup
Increment max cnt: XXXX

description: This command increments the upper-bound on the Buried Id counter with 10 and requires a password as argument. The password is specific for each scrambler and can be requested through Newtec support.

applicability: interface with BISS scrambling capability

access level: expert only

4.3.2   Monitor

This section of the menu allows us to monitor the behaviour of the device.

Parameters	Description
Monitor output frequency - MoMonOutputFreq	
Monitor out spec. inv. - MoMonSpectInv	
Upconverter DRO lock voltage - MoDroVolt	The DRO lock voltage is the tuning voltage for the voltage controlled DRO locals oscillator in the installed upconverter module. It defines the RF phase lock DRO alarm. **applicability:** RF converter, L-band conditioner up
Converter local oscillator - CvFreqConv	Frequency of the LO of the installed upconverter. Can be used to calculate the output frequency from the input frequency. **applicability:** RF converter, L-band conditioner up **access level:** expert only
RF gain - CvRfGain	Gain of the installed converter module and optional RF amplifier as read from the fingerprint of the converter. This gain is dependent on the used frequency and will be taken into account to set the output power that is requested. **applicability:** RF converter, L-band conditioner up **access level:** expert only
Rate adaptor packet count - IfPackCnt	The net transport rate or the number of MPEG non-null packets that are passed from the interface to the modulator board each second. This will be the useful data count if rate adapter null packet dropping is enabled otherwise it will the total data count. **applicability:** ASI interface
Rate adaptor peak delay - IfPkDelay	This is the largest delay, measured over 1 second, that an MPEG packet remains in the rate adapter buffer on the interface module. **applicability:** ASI interface
PRBS counter - BecBec	Reads the current status (PRBS synchronisation), elapsed time since start of the PRBS counter being locked and the number of PRBS errors counted since last lock. Reset the time and number counters by pushing the "CLR" key. **access level:** expert only

Bit error rate - BecBer	Reads the current status and Bit Error Rate measurement of the BER counter. **access level:** expert only
NCR packet count in 1 s - MoNcrPacketCount	Number of NCR (Network Clock Reference) packets counted in 1 second. **applicability:** ASI interface with NCR capability

HSSI loopback status - IfHssiLBState	HSSI interface loopback status as read from the LA and LB pins on the HSSI interface connector:
	
	LB LA Loopback status
	0 0 no loopback
	0 1 local line loopback
	1 0 remote line loopback
	1 1 local DTE loopback
	
	An additional status is present, indicating DTE loopback forced by the DCE equipment itself via the loopback control command. This control has priority over the loopback status asserted via the LA and LB pins.
	
	applicability: HSSI-G703 interface
	
	access level: expert only
	
	selections:
	      ● off
	      ● local line
	      ● remote line
	      ● local DTE
	      ● DCE forced on
	      ● DCE forced off

Outdoor unit internal temperature - ODUTemp	Outdoor unit (NTC/2505/xL) internal temperature. **applicability:** L-band conditioner up
HPA output power - ODUTxMeasPow	The transmit power in dBm, as measured by the outdoor unit upconverter. This menu item will only be visible when an HPA is **applicability:** L-band conditioner up
HPA Tx power voltage - ODUTxPowVolt	The transmit power voltage, in volt, as measured by the outdoor unit (NTC/2505/xL) on the discrete interface of the HPA. The translation to actual output power level depends on the type of HPA used; refer to the manual of the HPA for more detailed information. **applicability:** L-band conditioner up
Outdoor current - ODCur	Monitored outdoor unit current consumption. **applicability:** RF converter, L-band

	conditioner up
+24 volt power supply- CvPow24V	Monitored value of the +24 Volt power supply to power the outdoor unit. If the measured voltage is below +21V, the control command to enable/disable the outdoor unit power supply will be suppressed.
Estimated input bitrate- InpRateEstim	
Occupied bandwidth - MoOccBw	The -26 dB bandwidth of the signal. This is calculated as the symbol rate multiplied with $(1 + a)$ with a = the selected roll-off factor.
Buffer contents - MoBufCont	This value displays the contents of the FIFO buffer between the interface and the modulator part. The buffer content is expressed in % of the physical buffer size. 1. DVB-S operation : In case of underflow or overflow, the buffer is re-centred. When the device operates with external transmit clock, then a PLL loop maintains the buffer contents at the nominal set point. For the lower bit-rates, the nominal set point is reduced in order to minimize overall delay. Nominal buffer set-point: 1 Mbps <= interface rate: 50% 200 kbps <= interface rate < 1 Mbps: 25% 50 kbps <= interface rate < 200 kbps: 12.5% The actual buffer contents varies as function of the timing format of the base band input transport stream (for a detailed explanation see timing format). In byte mode the actual average buffer contents will be close to the nominal setpoint. In packet mode the actual average buffer contents will be about half a DVB packet $(188/2 = 94$ Bytes) above the nominal setpoint due to the bursty nature of this format.

	2. DVB-S2 operation :
	In DVB-S2 mode data buffering occurs both in the input FIFO buffer and in the base band processing circuits. The large input FIFO is mainly present for the asynchronous (internal transmit clock or stuffing mode) operation but can cause excessive processing delays in the synchronous slaved mode (external transmit clock) with short-frames. Therefore the nominal buffer set-point is no longer fixed but user-programmable via the MoBufSetp and MoBufFramSetp commands. In addition, a minimum-delay mode is included (see MoDlyMode) which initializes the base band circuits for minimum delay operation. In this case the input buffer will remain empty.
Input buffer size - MoBufSize	This is the physical size of the FIFO buffer between the interface and the modulator part. **access level:** expert only **range:** 0/2048 bytes
Modulator output level measurement	
Transmit clock offset - MoTxOffs	This is the offset (in ppm) between the set symbol rate and the actual symbol rate when the device operates with external transmit clock. This offset indication is not applicable if the internal transmit clock is selected or if the transmit clock is not synchronised to the interface clock.
Modulator clock phase error deviation - MoPhaseErrDev	Modulator clock phase error deviation, expressed in ns (average value of rectified phase error) **Access level:** expert only
Processing delay - MoDelay	Processing delay, expressed in ns. In case framing is present, delay is measured on the MPEG sync markers (e.g. for the modulator, convolution interleaver delay = 0 for sync markers). **Access level:** expert only
Delay setpoint - MoDelaySetp	Active delay setpoint expressed in ns. When the modulator is operating with TxClock = external, the transmit clock is slaved to the incoming dataframes via a PLL circuit. This variable presents the current operating point (setpoint) of the PLL. **access level:** expert only

clock loop state - MoClkLoopState	Modulator current clock loop state **Selections:** ● Dump ● Acq ● Lock **Access level:** expert only
main acquisition state - MoMainState	Modulator current main acquisition state **Selections:** ● Setup ● Unsync ● FramSync ● TbSync ● FullSync ● InputSync ● BbSync ● PlSync **Access level:** expert only
Gain control state- MoGainCtrlState	Modulator output level (gain) control state, when gain control is set to AGC and the gain loop is settling, the display will indicate "settling". In this short time the output level will approach the requested level. **access level:** expert only **selections:** ● MGC ● settling ● AGC
Tx On - MoTxStatus	Current transmit status. In case of a modulator, this status indication is used to drive the "Tx On" LED.
BISS input framing status - BissFramingState	Indicates the current state of the BISS input framing detector: - unsync : no synchronisation found - 188 byte : framing detector synchronised to 188-byte packets - 204 byte : framing detector synchronised to 204-byte packets **applicability:** interface with BISS scrambling capability
Estimated input bitrate - BissInpRateEstim	The BISS scrambler provides an estimate of the input bitrate in order to help the operator in determining a suitable output bitrate. The BISS scrambler output bitrate should be slightly higher than the maximum useful input bitrate. The scrambler might insert one additional packet for each PMT and one CAT every 10 seconds. If PMTs are spaced every 20 ms, the output bitrate must be programmed higher than the input bitrate plus 75 kbit/s. **applicability:** Interface with BISS scrambling capability

4.3.3 Actionkeys

This menu allows engaging the ActionKeys. These are user definable commands (or group of commands) that can be programmed by an expert user. The advantage is that the operator can quickly access frequently performed settings of control parameters. The ActionKeys have a user definable name to make it easier for the operator since commonly used names can be used. See appendix A "How to program ActionKeys" of the usermanual for more detail.

4.3.3.1 Action keys - SyActKeyActivate
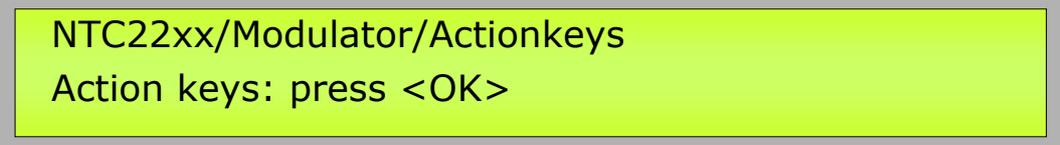
```
NTC22xx/Modulator/Actionkeys
Action keys: press <OK>
```

description: This command represents a key-press when in the ActionKey menu. An expert user can program the actions taken when such a key is pressed.

4.3.4   Test

This section of the menu allows to start some tests of the unit.

4.3.4.1 Coax output signal selection - IfCoaxTxSig

```
NTC22xx/Modulator/Test
Coax output signal: off
```

description: Selects the output signal to be placed on the coax output (ASI) of the
                    interface board.

                    When an additional processing function is present (e.g. rate adapter) the
                    output of the processing block can be selected.

                    For testing purposes (local loopback) a test generator signal can be
                    routed to the output. Selecting OFF disables the output signal.

                    The output signal selection is independent of the input interface type
                    selection for the coax output.

applicability: ASI interface, ASI interface with LVDS output

access level: expert only

selections:

                    ● off
                    ● Rx sig.
                    ● TG
                    ● proc. sig.
                    ● AIS
                    ● bbb sig.

4.3.4.2 Internal Base band Output to Modulator - IfBbbTxSig

```
NTC22xx/Modulator/Test
Internal BB Output: OFF
```

description: Selects the output signal to the Internal Modulator Base band Board Connector.

Typically 4 posibilities exist :

- By default the active external interface input signal is selected.
- When an additional processing function is present (e.g. Rate Adapter) the
output of the processing block can be selected.
- For testing purposes a Test Generator signal can be routed to the Modulator.
- Selecting OFF disables the output signal

access level: expert only

selections:

● OFF
● Rx Sig
● TG
● Proc Signal
● AIS

4.3.4.3 BER counter input signal selection - IfBecSig

```
NTC22xx/Modulator/Test
BEC input selection: off
```

description: Selects the BER counter input signal:

By default the active external interface input signal is selected. For testing purposes the test generator signal can be internally routed to the BER counter. The processed signal selection will route the input signal after processing (i.e. rate adaptation) to the BER counter.

access level: expert only

selections:

● off
● Rx sig.
● TG
● Proc Signal

- Coax 1
- Coax 2
- Sub D
- bbb sig.
- ASI 1 RX
- ASI 1 TX
- ASI 2 RX
- ASI 2 TX
- ASI 3 RX
- ASI 3 TX

4.3.4.4 Bit error rate counter control - BecControl

```
NTC22xx/Modulator/Test
BER counter control: reset
```

description: BER counter control:

Resets the bit-error and elapsed time counters while init forces a re-synchronisation to the received data stream.

access level: expert only

selections:

- reset
- init

4.3.4.5 BER alarm threshold - BecBerThreshold

```
NTC22xx/Modulator/Test
BER alarm threshold: 1 E-6
```

description: BER alarm threshold, when the received BER exceeds the programmed threshold the BER alarm is asserted.

access level: expert only

4.3.4.6 BER measurement period - BecBerPeriod

```
NTC22xx/Modulator/Test
BER meas. period: 1 s
```

description: The BER measurement period is the error accumulation period for
                         calculation of the bit error rate value.

access level: expert only

range: 1/255 s

4.3.4.7 Interface output signal selection - IfComTxSig

```
NTC22xx/Modulator/Test
Output signal: Rx sig.
```

description: Selects the output signal to be placed on all outputs of the interface
                         board.

                         By default the active external interface input signal is brought back out.
                         When an additional processing function is present (e.g. rate adapter) the
                         output of the processing block can be selected.

                         For testing purposes (local loopback) a test generator signal can be
                         routed to the output. Selecting OFF disables the output signal.

                         The output signal selection is independent of the input interface type
                         selection.

applicability: SDH interface

access level: expert only

selections:
                         ● off
                         ● Rx sig.
                         ● TG
                         ● proc. sig.
                         ● AIS

4.3.4.8 Coax 1 output signal selection - IfCoaxATxSig

```
NTC22xx/Modulator/Test
Coax 1 output signal: off
```

description: Selects the output signal on the G703(1) output of the interface board.

By default the coax output is switched off, for testing purposes a test generator signal can be routed to the output. Selecting the received signal is only possible when the interface rate matches the rate of the installed equipped G703 plug-in module. The operator can also force AIS (all ones Alarm Indication Signal) on the output.

applicability: HSSI-G703 interface

access level: expert only

selections:

- off
- Rx sig.
- TG
- proc. sig.
- AIS

4.3.4.9 Coax 2 output signal selection - IfCoaxBTxSig

```
NTC22xx/Modulator/Test
Coax 2 output signal: off
```

description: Selects the output signal on the G703(2) output of the interface board.

By default the coax output is switched off, for testing purposes a test generator signal can be routed to the output. Selecting the received signal is only possible when the interface rate matches the rate of the installed equipped G703 plug-in module. The operator can also force AIS (all ones Alarm Indication Signal) on the output.

applicability: HSSI-G703 interface
access level: expert only

selections:

- off
- Rx sig.
- TG
- proc. sig.
- AIS

4.3.4.10   Sub-D output signal selection - IfSubDTxSig

```
NTC22xx/Modulator/Test
Sub-D output signal: off
```

description: Selects the output signal to be placed on the Sub-D output of the interface board. By default the active external interface input signal is brought back out.

                     For testing purposes a test generator signal can be routed to this output. Selecting OFF disables the output signal. In case the selected receive causes an interface alarm, the output generates an AIS (all ones Alarm Indication signal). The operator can also force AIS on the output by selecting "AIS".

applicability: HSSI-G703 interface, ASI interface with LVDS output

access level: expert only

selections:
                     ● off
                     ● Rx sig.
                     ● TG
                     ● proc. sig.
                     ● AIS

4.3.4.11   Clock polarity - IfClkPol

```
NTC22xx/Modulator/Test
Clock polarity: normal
```

description: Selects the (input or output depending on the type of device) clock polarity for the DVB-SPI and RS422 interfaces.

applicability: ASI interface, ASI interface with LVDS output

access level: expert only

selections:
                     ● normal
                     ● inverted

4.3.4.12   Input clock polarity - IfInpClkPol

```
NTC22xx/Modulator/Test
Input clock polarity: normal
```

description: Selects the input clock polarity for the HSSI interface, the standard is
                     normal but for special applications this polarity can be inverted.
                     With extended HSSI (>52 Mbps), two extra selections become available:
                     - output clock shifted over 1 quarter of the clock period (= 90 degrees) :
                     1Q shifted
                     - output clock shifted over 3 quarters of the clock period (= 270 degrees)
                     : 3Q shifted.

applicability: HSSI-G703 interface

access level: expert only

selections:

                     ● normal
                     ● inverted
                     ● 1Q shifted
                     ● 3Q shifted

4.3.4.13   Output clock polarity - IfOutpClkPol

```
NTC22xx/Modulator/Test
Output clock pol.: normal
```

description: Selects the output clock polarity for the HSSI interface, the standard is
                     normal but for special applications this polarity can be inverted.

applicability: HSSI-G703 interface

access level: expert only

selections:

                     ● normal
                     ● inverted

4.3.4.14   Use LVDS clock enable - IfLvdsCe

> NTC22xx/Modulator/Test
> Use LVDS CE: off

description: Make use of CE signal on LVDS input (RS-422-LVDS and DVB-SPI-LVDS base band interface selections). The LVDS-CE is the clock-enable signal (data valid indicator) that indicates if the accompanying byte is valid or not. The DVB standard does not need this signal.

applicability: ASI interface

access level: expert only

selections:
- off
- on

4.3.4.15   HSSI loopback control - IfHssiLBCtrl

> NTC22xx/Modulator/Test
> HSSI loopback control: off

description: The loopback function on the HSSI interface can be controlled via hardware pins on the HSSI bus itself, but in addition, this commands permits loopback control via a user command.

applicability: HSSI-G703 interface

access level: expert only

selections:
- off
- on
- by DTE

4.3.4.16   Rate adapter null-packet dropping status - RaNullStat

```
NTC22xx/Modulator/Test
Null-packet dropping: on
```

description: Rate adapter null packet dropping activation status. This will be automatically become active when the base band processing is set to MPEG-RA (rate adaption).

applicability: interface with rate adapter capability

access level: expert only

selections:

● off
● on

4.3.4.17   Rate adapter PCR update activation status - RaPcrStat

```
NTC22xx/Modulator/Test
PCR update status: on
```

description: Rate adapter PCR update activation status. This will be automatically become active when the base band processing is set to MPEG-RA (rate adaptation).

applicability: interface with rate adapter capability

access level: expert only

selections:

● off
● on

4.3.4.18   Test generator type - IfTGType

```
NTC22xx/Modulator/Test
Test generator type: PRBS
```

description: Selects the test generator type:

- PRBS: sync_marker 0x47 + 187 PRBS bytes (default)
- Counter: sync_marker 0x47 + incrementing counter value
- Sky TDMA : dedicated test generator for SKYPLEX TDMA testing

access level: expert only

selections:

- ● PRBS
- ● counter

4.3.4.19   HPA RF power alarm level setpoint - ODUSSPAARfAlTrippoint

```
NTC22xx/Modulator/Test/Up converter
HPA power alarm setpoint: 0 W
```

description: HPA RF alarm level setpoint.

applicability: L-band conditioner up

access level: expert only

range: 0/9999 W

4.3.4.20   HPA attenuation - ODUSSPAAttenuation

```
NTC22xx/Modulator/Test/Up converter
HPA attenuation: 0 dB
```

description: HPA attenuation control.

applicability: L-band conditioner up

access level: expert only

range: 0/99.9 dB

4.3.4.21   Engineering string request - ODUInfoReq

```
NTC22xx/Modulator/Test/Up converter
Eng. string: <press OK>
```

description: This is a general command for requesting the engineering string data from the outdoor unit NTC/2505/xL. The engineering string is additional information about the ODU that is not needed on an operational basis but can be accessed for troubleshooting purposes.

applicability: L-band conditioner up

access level: expert only

4.3.4.22   Monitoring output mode - MoMonOutputMode

```
NTC22xx/Modulator/Test
Monitor output mode: always on
```

description: Controls the monitoring output functional mode:

- Always on : The monitor output signal is continuously active, irrespective of the operational output status.
- Follow Tx: The monitor output status follows the operational output status. i.e. when transmit is off, the monitor output will also be disabled.

access level: expert only

selections:
- always on
- follow Tx

4.3.4.23   Transmit data - MoTxData

```
NTC22xx/Modulator/Test
Transmit data: external
```

description: Select between external data input as source for the transmit data
(default) and internally generated PRBS. For testing, installation and link
evaluation, the internal data generator on the modulator can be used as
a transmit data source. This data source generates a PRBS (pseudo
random binary sequence) data stream of $2^{23}-1$ as specified in CCITT
Rec. 0.151.

In conjunction with a Newtec demodulator (that is standard equipped
with an automatic PRBS detector) one can then determine the actual BER
performance of a satellite link.

access level: expert only
selections:

● external
● int testgenerator

4.3.4.24   Modulator delay mode - MoDlyMode

```
NTC22xx/Modulator/Test
Modulator delay mode: minimum
```

description: When the modulator is operating with TxClock = external, the transmit
clock is slaved to the incoming dataframes via a PLL circuit. This
command selects the operating point (setpoint) of the PLL :

- minimum : The PLL tracks the input signal with minimum delay through
the modulator.
- programmed : The PLL tracks the input signal to a programmed delay
setpoint.
The setpoint itself is programmable via one of the following commands :
ntcSeEqMoBufSetp (expressed in % of input buffer)
ntcSeEqMoBufFramSetp (expressed in frames)
- automatic: The system will determine the optimal settings.

Please note that for low baudrate operation (lower than 100K) the
programmed delay mode can result in very long settling times for the
target delay.

access level: expert only

selections:

● minimum ● programmed

4.3.4.25   Buffer setpoint - MoBufSetp

> NTC22xx/Modulator/Test
>
> Buffer setpoint : 50 %

description: This value programs the input FIFO buffer setpoint for the clock loop
when transmit clock = external (= slaved to the input signal).
The buffer content setpoint is expressed in % of the physical buffer size.

access level: expert only

4.3.4.26   Buffer setpoint - MoBufFramSetp

> NTC22xx/Modulator/Test
>
> Buffer setpoint: 1 frames

description: Input FIFO buffer setpoint for the clock loop when transmit clock =
external (= slaved to the input signal).

The buffer delay setpoint is expressed in frame size units.
Frame size for the data in the buffer depends on the selected input
format,
frametype and DFL :

Input format = DVB-S2 Base band Frames
- short frametype -> Frame size = 16200 bits or 2025 bytes
- normal frametype -> Frame size = 64800 bits or 8100 bytes

Other input formats (TS)
- frame size = DFL bits

The setpoint equals the nominal number of frames (with size as
described above) that will be
stored in the FIFO input buffer when the TX clock is operating in slaved
mode. (PLL)

Note that the associated ntcSeEqMoBufSetp variable indicates the
corresponding percentage
of buffer contents.

access level: expert only

range: 0/1000 frames

4.3.4.27   Base band NCO programming mode - MoBbNcoMode

```
NTC22xx/Modulator/Test
BB NCO mode: auto
```

description: The test generator on the modulator board is clocked by an independent Base band NCO. The output rate of this NCO is directly programmable via this command. Although total independent programming of the rate is required for factory testing, from a standard operator viewpoint it is more desirable that the test generator base band NCO rate is automatically programmed to a value that is compatible to other modulator settings.

This mode command selects the desired behaviour:

- automatic : upon selection of frametype, modcod, symbol rate and test generator timing mode, the BbNco is automatically programmed to a compatible value for proper operation. Note that in case ntcSeEqMoTgTimMode is free running, the NCO is programmed to the calculated interface rate, while in throttled mode, the NCO is running at the maximum rate.

- manual : in this mode the base band NCO rate is only affected by the ntcSeEqMoBbNcoRate command and it is the responsibility of the operator to select a compatible value.

access level: expert only

selections:

● auto
● man

4.3.4.28   Testgenerator output bitrate - MoBbNcoRate

```
NTC22xx/Modulator/Test
Testgen output rate: 100 Mbps
```

description: Programs the test generator output bit rate when the input clock selection is set to internal. The internal test generator clock is generated by a 32-bit NCO clocked at the 120 MHz master clock.

Note that when the input clock selection is set to external, the test generator is clocked with the interface clock.

4.3.4.29   Testgenerator output timing mode - MoTgTimMode

> NTC22xx/Modulator/Test
> Testgen timing mode: free running

description: The internal test generator can operate in 2 timing modes :

- free running: output rate is solely controlled by the programmed test generator bit rate
- throttled: output rate is also throttled using data request pulses from the modulator

access level: expert only

selections:

  ● free running
  ● throttled

4.3.4.30   Packet counters reset - MoCntRst

> NTC22xx/Modulator/Test
> Packet counters rst: XXX

description: Resets the packet counters

access level: expert only

selections:

  ● all

4.3.4.31   Convolutional Interleaver - MoInterleaverCtrl

> NTC22xx/Modulator/Test
> Interleaver: On

description: DVB Convolutional Interleaver On/Off control

Note that for DVB-compliant operation the interleaver should always be enabled. This expert command is only provided for special applications.

access level: expert only

selections:

● Off
● On

4.3.4.32   Packets

4.3.4.32.1   Input Packet count - MoInpPacketCnt

```
NTC22xx/Modulator/Test/Packets
Input Packet count: 0
```

description: Input packet count.

4.3.4.32.2   Input packetrate - MoInpPacketRate

```
NTC22xx/Modulator/Test/Packets
Input packetrate: 0 pps
```

description: Estimated input packet rate in packets per second.

4.3.4.32.3   Estimated packetrate - MoPacketRate

```
NTC22xx/Modulator/Test/Packets
Estimated packetrate: 0 pps
```

description: Displays the estimated packet rate in packets/s, by default the base band
packet rate is measured. In future firmware releases a packet filtering
function will be included and this variable will present the packet rate
after filtering.

4.3.4.32.4   Packet count - MoPacketCnt

```
NTC22xx/Modulator/Test/Packets
Packet count: 0
```

description: Displays the monitored packet count, by default base band packets are
                    counted. In future firmware releases a packet filtering function will be
                    included and this variable will present the packet count after filtering.

4.3.4.33   Frames

4.3.4.33.1   Dummy Physical Layer frame-rate - MoDummyPLRate

```
NTC22xx/Modulator/Test/Frames
Dummy PL rate: 0 fps
```

description: Dummy Physical Layer frame-rate frames per second.

range: -1e+38/1e+38 fps

4.3.4.33.2   Dummy Physical Layer frame-count - MoDummyPLCnt

```
NTC22xx/Modulator/Test/Frames
Dummy PL count: 0
```

description: Dummy Physical Layer frame-count.

4.3.4.33.3   Physical layer efficiency - MoPLEfficiency

NTC22xx/Modulator/Test/Frames
PL efficiency: 0 %

description: This value displays the physical layer efficiency of the DVB-S2 modulator.
                      The PL efficiency is expressed in % and is calculated as the ratio between
                      dummy PL-frame symbol-rate and available symbol rate.

4.3.4.33.4   Base band layer efficiency - MoBBLEfficiency

NTC22xx/Modulator/Test/Frames
BBL efficiency: 0 %

description: This value displays the base band layer efficiency of the DVB-S2
                      modulator. The BBL efficiency is expressed in % and is calculated as the
                      ratio between used payload bytes and available payload bytes within the
                      Base band frames.

4.3.4.33.5   Short frames - MoBBShortFrameRatio

NTC22xx/Modulator/Test/Frames
Short frames: 0 %

description: This value displays the detected ratio of short-frames in the DVB-S2
                      modulator. It is expressed in % and is calculated as the ratio of short-
                      frames over total (optionally filtered) base band frames.

4.3.4.34   Up converter

4.3.4.34.1   HPA RF power alarm level setpoint - ODUSSPAARfAlTrippoint

NTC22xx/Modulator/Test/Up converter
HPA power alarm setpoint: 0 W

description: HPA RF alarm level setpoint.

applicability: L-band conditioner up

access level: expert only

4.3.4.34.2   HPA attenuation - ODUSSPAAttenuation

NTC22xx/Modulator/Test/Up converter
HPA attenuation: 0 dB

description: HPA attenuation control.

applicability: L-band conditioner up

access level: expert only

4.3.4.34.3   Engineering string request - ODUInfoReq

NTC22xx/Modulator/Test/Up converter
Eng. string: <press OK>

description: This is a general command for requesting the engineering string data
                       from the outdoor unit NTC/2505/xL. The engineering string is additional
                       information about the ODU that is not needed on an operational basis but
                       can be accessed for troubleshooting purposes.

applicability: L-band conditioner up

access level: expert only

5   Alarm

5.1.1   5.5.1 Build-up of alarm menu

In the normal mode, the alarm menu is built dynamically; only alarms that are present (both actual and memorised) will be indicated. Use the CLR-key to clear all memorised alarms and obtain a list of only the actual alarms.

5.1.2   5.5.2 Alarm types

Actual alarm: Alarm that is present at the time of reading the alarm.

Memorised alarm: Alarm that has happened in the past but has been resolved before reading the alarm (in case of intermittent alarms or a setting that has been corrected since). The purpose of this type of alarm is to warn the operator that there has been an alarm in the past but that the alarm condition is currently not present anymore.

Alarm counter: The number of times an alarm occurred is displayed as the memorised alarm counter saturates push CLR to clear. This counter saturates at 255 events.

5.5.2.1 No alarm

description: If the monitored parameter shows no actual or memorised alarm, the display will indicate O.K. when in expert mode. In normal mode only active (memorised or actual) alarms will be displayed.

```
NTC22xx/Alarm
Device temperature : OK
```

5.5.2.2 Memorised alarm

description: If the monitored parameters has had an alarm state and this state has been resolved at the time the alarm is read, the display will indicate a memorised alarm and the number of times the alarm has occurred since the last reset.
Clear this counter by pressing the CLR-key

```
NTC22xx/Alarm
Buffer overflow : Mem. Alarm Cnt. : 3
```

5.5.2.3 Actual alarm

description: If the monitored parameters has had an alarm state at the time the alarm is read, the display will indicate an actual alarm and indicate the number of times the alarm has occurred since the last reset.

```
NTC22xx/Alarm
ASI code violations : Alarm Cnt. : 3
```

5.5.3 Alarm mode

Press OK when an alarm-type is displayed, this will allow you to change the alarm mode from normal to masked or forced.
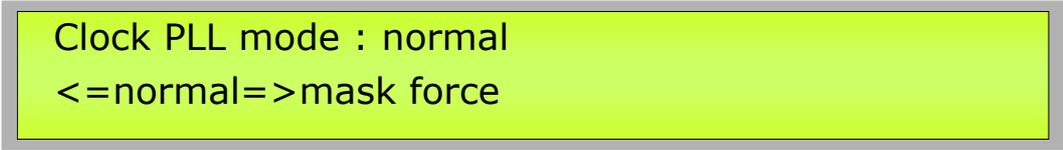
```
Clock PLL mode : normal
<=normal=>mask force
```

5.5.3.1 Masked alarm

description: Under specific circumstances it is permitted to mask alarms. However be careful because the alarm will be ignored upon occurrence and all subsequent actions
(like disabling of RF transmit) will not be taken. This could be dangerous and
masking of alarms should only be considered after consulting Newtec technical
support. Masking can only be done in expert mode. After returning to normal
device operating mode the alarms remain masked.

5.5.3.2 Forced alarm
description: For test and installation procedures it might be useful to simulate the
occurrence of an alarm (e.g. to trigger a simulated redundancy switchover).
A forced alarm can only be activated in expert mode, as soon as the operator
returns to normal device operating mode, the forced alarms are reset to normal.

5.5.3.3 Testing redundancy systems with forced alarms
The alarm relay contacts (see section 2.1.3. .Contact closure alarm outputs.) will only close upon the occurrence of a general device alarm and the interface alarm. If the operator forces for example the external 10 MHz reference alarm only this alarm will be raised and not the general device alarm. In order to test redundancy switching systems, force either the general device alarm or the interface alarm.

5.5.4 Alarm times

description: The start and stop time of an alarm is logged. Press "?" when an alarm-type is displayed.
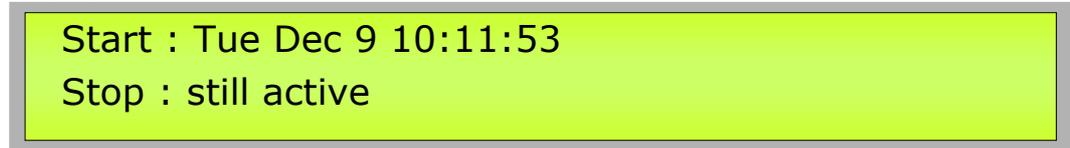
```
Start : Tue Dec 9 10:11:53
Stop : still active
```

When the alarm is not present (memorised or active) the time indication will be
empty. When an alarm is present and active the stop time will mention "still active" When an alarm is memorised, both the start and stop time will be displayed.

5.5.5. List of alarms

Following is a list of all possible alarms.

5.1.2.1 Device

5.1.2.1.1 Device has been reset - AlResFlag

description: Reports that the main-controller has had a reset. This can indicate that
                     all the parameters in the device are changed.

5.1.2.1.2 Self test - AlSelfTest

description: After power-on or reset, the device performs an internal self test. If this
                     self test fails it will trigger this alarm.

5.1.2.1.3 Incompatibility - AlIncompat

description: The device asserts the incompatibility alarm if a new control setting was
                     attempted that would result in a conflict with one or more of the other
                     present settings. The new control setting is accepted but not activated
                     (the device remains operational in the last state).

                     By changing one or more of the conflicting parameters, the
                     incompatibility condition can be removed. Only when this occurs, the
                     new "compatible" state is activated and the incompatibility alarm is de-
                     asserted.

                     Under RMCP, details on the type of incompatibility that occurred can be
                     obtained using the "Incompatibility Identification" command.

5.1.2.1.4 General device - AlGenDev

description: An alarm is indicated if at least one of the alarms is active (logical-OR of
                     the alarm indications).

5.1.2.1.5 Interface - AlInterface

description: The interface alarm is a combined alarm indicating a missing or invalid
                     input signal at the selected interface. (this alarm does not include further
                     signal processing related alarms).

5.1.2.1.6 Reference clock - AlRefClock

description: Selected 10 MHz reference clock absent or level too low.

5.1.2.1.7 Device temperature - AlDevTemp

description: A device temperature alarm indicates that the device internal
                         temperature exceeds the +10° C and +70° C limits.

5.1.2.1.8 Power supply voltage - AlPowSup

description: Summarises the four power supply alarms, an alarm is generated if at
                         least one of the monitored power supply voltages is out of range.

5.1.2.1.9 Input framing - AlMoInpFram

description: An input framing alarm indicates that the MPEG framing is missing on the
                         incoming data. This alarm is not applicable when internal framing is
                         selected.

5.1.2.1.10   ASI code violations - AlIfAsiCv

description: This alarm indicates the presence of ASI code violations in the received
                         ASI signal.

applicability: ASI interface, ASI interface with LVDS output

5.1.2.1.11   HSSI signal detect - AlIfHssiSd

description: This alarm indicates HSSI input signal loss.
                         (detection on RT clock)

applicability: HSSI-G703 interface

5.1.2.1.12   ASI optical signal detect - AlIfAsiOptSd

description: Indicates an optical signal loss at the optical ASI input port.

applicability: ASI interface, ASI interface with LVDS output

5.1.2.1.13   Coax [1 - 2] Rx signal - AlIfG703Rx1

description: Indicates G703 input signal loss.

applicability: HSSI-G703 interface

5.1.2.1.14   LVDS signal detect - AlIfLvdsSd

description: This alarm indicates LVDS input signal loss.

applicability: ASI interface

5.1.2.1.15   Coax [1 - 2] Rx signal - AIIfG703Rx2

description: Indicates G703 input signal loss.

applicability: HSSI-G703 interface

5.1.2.1.16   Coax [1 - 2] Rx code violations - AIIfG703Cv1

description: Indicates code violations on the G703 input signal.

applicability: HSSI-G703 interface

5.1.2.1.17   NCR inserter GPS 1pps - AINcrGps1pps

description: NCR (Network Clock Reference) inserter GPS 1pps signal alarm, detects missing pulses on GPS 1pps signal.

applicability: ASI interface

5.1.2.1.18   Coax [1 - 2] Rx code violations - AIIfG703Cv2

description: Indicates code violations on the G703 input signal.

applicability: HSSI-G703 interface

5.1.2.1.19   Base band frame sync - AIMoBbSync

description: A Base band framing sync alarm indicates loss of synchronisation between the base band framing and the input signal.

5.1.2.1.20   Input buffer underflow - AIMoBufUfl

description: Modulator input buffer underflow alarm.

5.1.2.1.21   Input buffer overflow - AIMoBufOfl

description: Modulator input buffer overflow alarm

5.1.2.1.22   Clock PLL - AIMoClkPll

description: The clock PLL alarm is generated when the transmit clock is not synchronised to the interface clock, if the device operates with external transmit clock. The alarm is asserted when the buffer contents exits the centre zone [40% - 60%].

For the lower bitrates, the nominal buffer set-point(=contents) is reduced in order to minimize overall delay. Therefore the lower limit for

the PLL alarm is reduced as well :

1 Mbps <= interface rate : [40% - 60%] nominal 50%
200 Kbps <= interface rate < 1 Mbps : [10% - 60%] nominal 25%
50 Kbps <= interface rate < 200 Kbps : [5% - 60%] nominal 12.5%

This alarm is not applicable if the internal transmit clock (free running) is selected.

5.1.2.1.23   Synthesiser - AlMoSynth

description: The synthesiser alarm indicates a malfunction of the hardware which generates the IFL carrier frequency. The presence of this alarm suppresses transmit of the L-band output of the modulator board (internal L-band).

5.1.2.1.24   Out of lock LO1 - AlCvLockDetLO1x

description: Out of lock detection for LO1 (610MHz to 890MHz)

applicability: up converter

5.1.2.1.25   Out of lock LO2 - AlCvLockDetLO2x

description: Out of lock detection for LO2 (1700MHz to 2500MHz)

applicability: up converter

5.1.2.1.26   RF phase lock DRO - AlMoRfPlo

description: The RF phase lock DRO alarm indicates a malfunction of the hardware which generates the RF carrier frequency. This alarm is not applicable when RF transmit is disabled. The presence of this alarm suppresses transmit at RF.

5.1.2.1.27   ODU communication - AlMoODUComm

description: This alarm is used to signal the status of the communication between the indoor unit and the outdoor unit over the RMCP-interface between these devices. An alarm is indicated if the indoor unit does not receive a response from the outdoor unit on twelve successive messages (about 5 seconds). This can indicate that the outdoor unit is not connected, does not receive DC-power or has a malfunction.

                 This alarm is not applicable if the IDU - ODU communication is disabled. The presence of this alarm suppresses transmit at RF.

applicability: L-band conditioner up

5.1.2.1.28   ODU architecture - AIODUConvArch

description: This alarm is asserted when the outdoor unit upconverter fingerprint/calibration-table does not match the internally-stored ODU upconverter image. It will become active when another ODU is connected that has not been read and stored yet by the device (modulator, converter or combiner). Refer to ../Unit/Control/Outdoor unit/Save ODU architecture to lift the alarm condition.

applicability: L-band conditioner up

5.1.2.1.29   ODU summary - AIODUSummary

description: Logical OR of the alarms in the ODU.

applicability: L-band conditioner up

5.1.2.1.30   BISS summary - AIBissSum

description: BISS summary alarm

5.1.2.1.31   Internal M&C module - AIMcModule

description: Indicates an alarm internal to the M&C board.
For detailed information the alarms of the M&C module should be consulted.

5.1.2.1.32   Internal interface module - AIIntfModule

description: Indicates an alarm internal to the interface function/module. For detailed information the alarms of the interface module should be consulted.

5.1.2.1.33   Internal modulator - AIModModule

description: Indicates an alarm internal to the modulator board.

5.1.2.1.34   RF upconverter module - AIUpconvModule

description: Indicates an alarm internal to the upconverter function/module. This can be an alarm in the upconverter, converter controller or in the optional RF/IF amplifier.

applicability: RF converter, L-band conditioner up

5.1.2.1.35   IF To LBand Upconverter module - AILCUUpModule

description: Indicates an alarm in the (IF->LBand) upconverter function/module.

applicability: up converter

5.1.2.1.36   Device architecture - AIArchitecture

description: The architecture alarm indicates that the detected device architecture (modules/interconnect) does not match the expected architecture.

5.1.3   Board alarms

Depending on the type and number of boards installed the results of the individual board the status of the individual board alarms can be consulted.

5.2   Config

In the configuration menu the operator can save and load up to 48 different operational configurations in permanent memory. A configuration can be defined as the group of all device configuration parameters that can be set in the device. Only global system parameters are not saved in a configuration since they are written in permanent memory at the moment that they are set (changed). They are parameters that are common to all configurations such as: Device mode, RMCP version, Display contrast. Serial interface type, Device RMCP address, Serial baudrate. Device IP address, Device IP mask, Default gateway, Ethernet interface Alarm mode (normal, masked, forced). All other parameters are configuration parameters that can differ in the different stored configurations.

5.2.1   Load - SyConfigLoadFlash

```
NTC22xx/Config                              (last:0)
Load: <0> 1 2 3 4 5 6 7 8 9 10
```

description: Loads a configuration from permanent memory. Up to 48 different configurations can be loaded, however only valid configurations that have been previously saved by the operator can be loaded.

The default boot configuration must always be stored in configuration "0" since this is the one that is loaded when the device (re)-boots. The last loaded configuration is also shown on the topline.

Specific for modulator(boards): Only the default boot configuration can store the status of L-band (IF) transmit, since it is required that transmission resumes if there was an (accidental) power outage, remember that in that case the default configuration "0" is loaded. The other configurations will save with transmit set to "off" and the operator will have to verify all parameters before enabling transmit to go "on-air".

On the LCD display, the top row will indicate the name the operator has given to that configuration number.

5.2.2   Save - SyConfigSaveFlash

```
NTC22xx/Config                              (last:0)
Save: <0> 1 2 3 4 5 6 7 8 9 10
```

description: Saves a configuration to permanent memory. Up to 48 different configurations can be saved. Remember that the default boot configuration has to be saved in configuration "0" since this is the one that is loaded when the device (re)-boots.

5.2.3   Name - SyCfgName

NTC22xx/Config
0= Bootconfiguration

description: Declare a name to configuration, this name will be displayed on the
                     frontpanel in order to allow easier identification of a certain saved
                     configuration.

6   Remote monitor and control

Remote monitor and control (RMCP) is possible via the serial interface (RS232/485) or through RMCP over Ethernet. The commands are described in a separate usermanual. Contact technical support at techsupport@newtec.be to obtain a copy.

6.1   Connecting to the device

The device is set to RS485 by factory default, if RS232 control is preferred go to Menu/Unit/Setup/Serial port settings.

Otherwise use a RS232 to RS485 converter to connect the M&C port to a serial comm. port of a PC. Pinout on the converter can differ depending on the brand and type of the converter, check with usermanual to make an appropriate cable.

When using RS232, construct the following null-modem cable

PC	Device	Signal
9 Pin D-Type	9 Pin D-Type	
2	3	TxD
3	2	RxD
5	5	GND

6.2   Serial Interface - Line Settings

The main line settings for this serial interface are :

> asynchronous data transfer
> 1 start bit (logic "0")
> 7 data bits (LSB first on line)
> even parity
> 1 stop bit (logic "1")
> 4800, 9600, 19200, 38400, 57600 or 115200 baud

To set the serial interface baudrate go to Menu/Unit/Setup/Serial port settings.

There is no flow control on the serial interface. Next to correct formatted messages, the only significant character is the SYNC-character (value 16 $_{hex}$), which is sent by the device to indicate that it is busy executing the command and preparing the response. This prevents other devices from taking control of the bus if the response cannot be given immediately.

6.3   RMCP over Ethernet

RMCP commands can be sent to the device using the Ethernet interface. The commands are sent as data in a TCP/IP stream. The used socket number is 5933.The RMCP protocol is exactly the same as for the serial interface, with one small exception: The RMCP address of the device (that is present in an RMCP command) will be ignored by the receiving device.

To enable the device to communicate over Ethernet, the Ethernet interface needs to be configured. See /Unit/Setup/Ethernet settings.

6.4   Protocol

The control unit sends a "request" message to a device, identified by its unique address. The addressed device interprets the message, performs the requested action and sends back a "response" message.

The receiving device rejects all messages with transmission errors without any further action. Transmission errors are: no stop bit, parity error, LRC-error and message receive buffer overflow.

All correct formatted messages, except some special system messages, are responded by the addressed device with an acknowledge message. Only in a few restricted cases, the device does not respond to a request from the control unit. This is for example the case when a general device reset is requested.

Correctly received messages, which can not be handled by the device, are refused via a no-acknowledge "error" message, containing the reason why the message is rejected.

A device never sends messages on its own initiative. It only responds to a request from the control unit. The total transmit time of a complete message may not exceed 250 ms. If the message is not completed within this time it is discarded.

6.5   Message Format

The general syntax for all messages is :

- start byte
- address byte
- message header
- message data
- end of text byte
- checksum byte

For more info or a copy of the separate RMCP usermanual describing all commands, contact Newtec technical support at techsupport@newtec.be.

6.6 GWIG - HTML interface

The Azimuth platform is equipped with a powerful and easy to use web interface (GWIG) which allows customers to remotely monitor and control their equipment through a web browser.

To use the web interface, the TCP/IP properties of the computer have to be adapted in order to set an IP address manually that is within the range of the devices IP address. For example: take as IP address 168.0.0.1 on the computer and 168.0.0.2 on the device. Make sure that that no popup blockers or firewall are active !

To adapt the TCP/IP properties:

    1) Go to Start < connect to < show all connections:
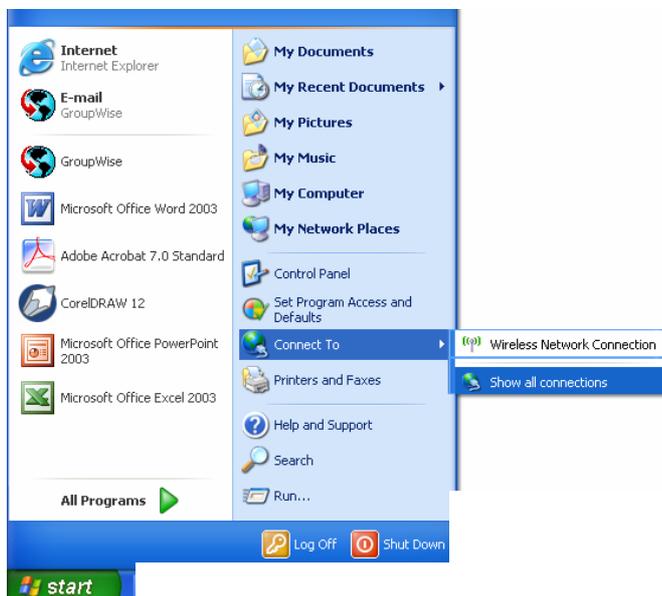
    And click on show all connections

    2) Click with the Right Mouse button on Local Area Connection and select properties
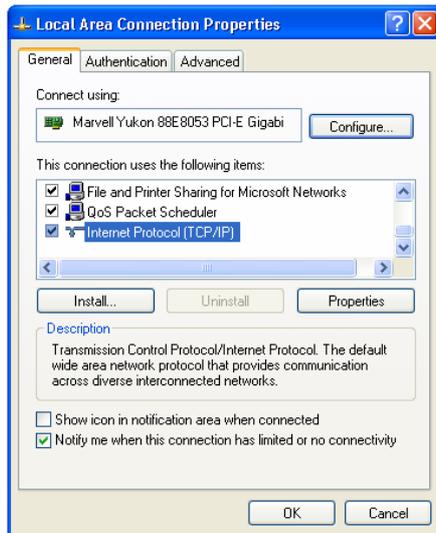
3) Scroll down and click on Internet Protocol (TCP/IP) then click on Properties
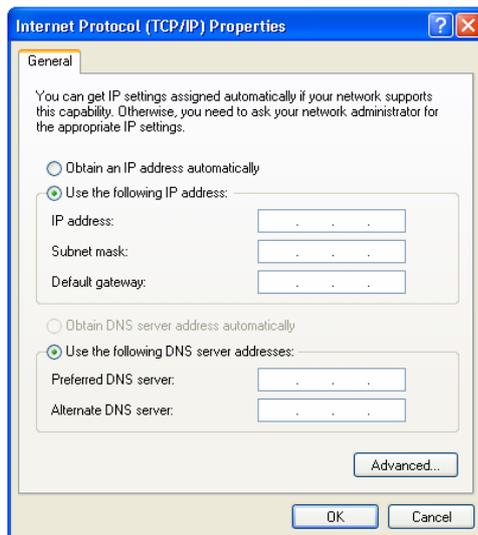
Change the IP address field to for example 168.0.0.1
And the Subnet mask to for example 255.255.0.0

The Ethernet port of the device has to be connected with the Ethernet port of a computer by a crossed network cable.

Use a web browser (Internet explorer 5.5 or later, Mozilla, …) to open the web interface of the modulator by typing the following address in the address balk: http://ip_address_device. The `ip_address_device` can be found by going to the following menu: ../unit/Setup/Ethernet settings with the keypad on the front panel of the device. By default the IP address of all Newtec devices is 192.168.254.3

```
NTC2263/Unit/Setup/Ethernet settings
Device IP address: 192.168.254.3
```

The following page will be displayed:
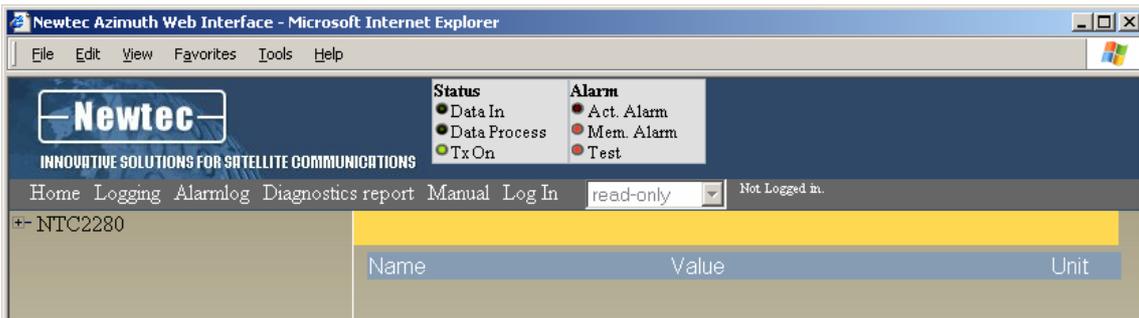
In this mode, one can have an overview of all the parameters on the device by clicking on the name of the device in the left side of the screen.

To change the parameters of the device, one has to log in into the device, by clicking `Log In`.
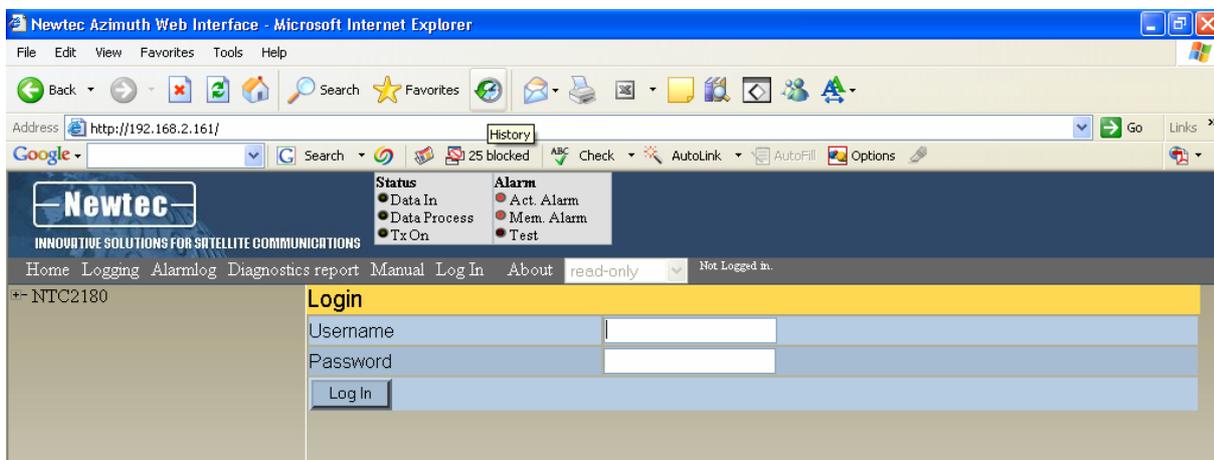
Log in with the user name and password that is defined in the ../Unit/Setup/Web interface menu. By default the login `Username` and `Password` **<root> <root>** are used.

Once logged in, there are three levels:
- `read-only`: in this mode one can only see (read) the parameters corresponding to the operator mode, they can not be changed.
- `operator`: corresponds with the device Normal mode, enables the default set of parameters that are most frequently used.
- `administrator`: corresponds with the device Expert mode, gives an expert user access to an additional set of more advanced parameters.

All the parameters of the device can now be viewed and changed remotely through the web-interface.

The web interface displays seven main menus:

- `Home`: This menu allows monitoring and control of all the parameters of the device remotely through the web-interface. All the parameter that can be changed through the keypad can also be changed in the Home menu.

- `Logging`: The menu logging gives of an overview of the most recent events

- `Alarmlog`: In the menu Alarmlog the most recent alarms can be viewed.

- `Diagnostics report`: the menu generates a diagnostic report which gives an overview of the status of the different parameters of the device. This is very useful to have by hand when one contacts support for technical questions.

- `Manual`: the complete manual with RMCP commands of the corresponding device is stored here in HTML format.

- `Log In resp Log out`: this menu is used to log in or to log out when a user is logged in into the device.

- `About`: this menu shows the version number of the GWIG used.

6.7   SNMP

The Newtec MIB is derived from the SEMS device definition database and allows full monitor and control over the complete device using any SNMP browser (HP-OpenView, NetworkView) We support the basic standard MIB (monitor and control of IP interface, versions of the software …) and above that we have a full proprietary MIB witch can be downloaded from the device using HTTP or FTP and which contains all the OIDs needed to control the device.

We do not support traps nor support multiple managers (traps are a mechanism to trigger the NMS that a change in the device has occurred, after receiving the trap the NMS still has to poll the device to find out the details of the change).

SNMP is not standard implemented on NTC/2263 devices, please contact techsupport@newtec.be for details on how to upload SNMP support to the device and further instructions.

Below you will find a screenshot from NetworkView.
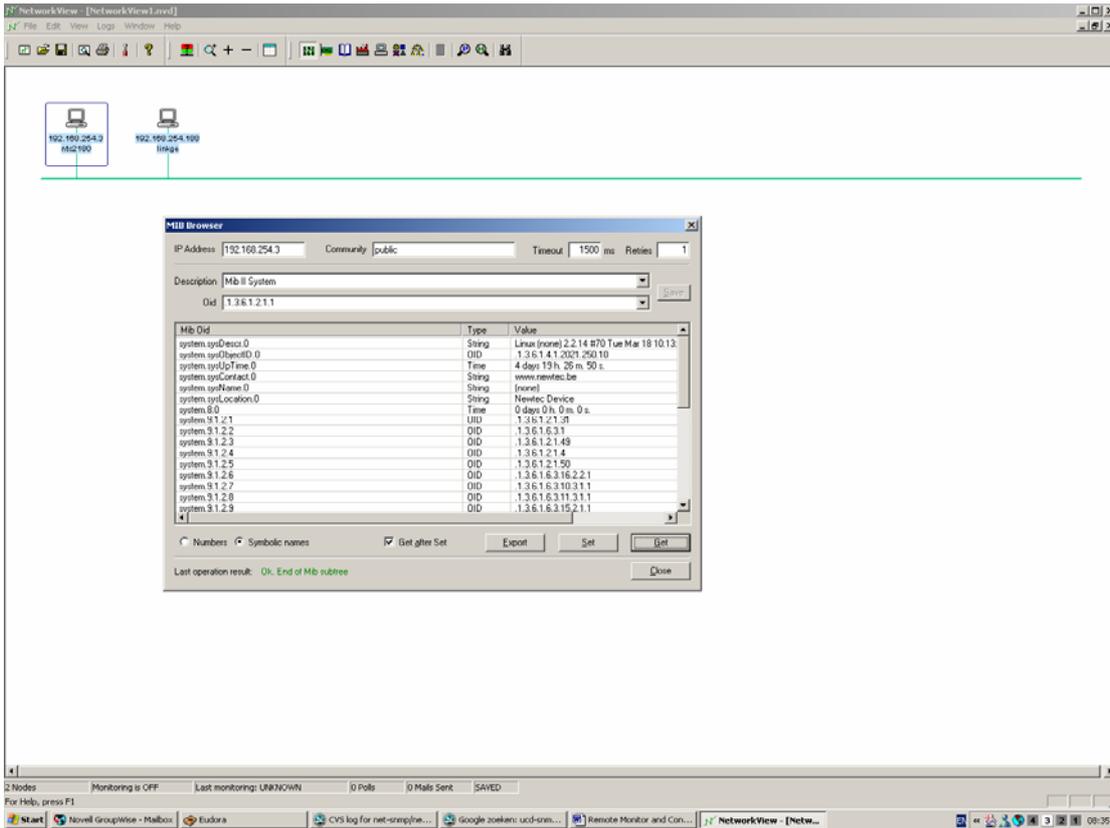
Appendix A ActionKeys

The idea behind ActionKeys is that a system integrator can define a group of frequently executed operations to configure the device. The numerical keypad will serve as a selection panel. When a certain number is pressed, a string is displayed that clearly describes the commands that will be executed. The operator can then press <OK> to execute the command(s).

On the contrary to loading complete device configurations by using the load and save configurations option, the system integrator can define group of commands (1-20) that have to be executed when the specific ActionKey is executed.

Definition of the ActionKeys

Define Action Keys - SyActKeyDef

description: This command allows the association between a certain key on the keyboard with a certain sequence of commands. When the user navigates to the action-key menu a simple keypress allows executing this sequence of commands.

Example: AKd!2,Pure carrier with reduced power;TMm!0;TLa!1;

This will associate the commands to set the modulation to pure carrier (CW) with reduced power (software 15 dB attenuator enabled) when the action key 2 is selected and executed.

rmcp header: AKd (expert: get and set, normal: no access)

structure:

get elements:	0SyActionKeyId	
get reply elements:	0SyActionKeyId	1SyActionKeyCmds
set elements:	0SyActionKeyId	1SyActionKeyCmds
set reply elements:	0SyActionKeyReply	

ActionKey Number - SyActionKeyId

description: Action-key Identifier identifies a key on the numeric keypad of the frontpanel.

range: 0/9

Action Key Definition - SyActionKeyCmds

description: This type of string is used to define the contents of the ActionKey menu, it has the following format: TITLE;CMD1;CMD2;CMD3;... (maximal 20 commands). TITLE can be any text that should appear on the display to describe the set of commands. CMD(n) is a complete RMCP command (see RMCP manual of this device).

example: Pure carrier with reduced power;TMm!0;TLa!1

Typical example

Download and install RMCPLoader from http://www.newtec.be/support/download.shtml and use the option "Grouped Commands" to send following commands in a .txt file to the device.

    AKd!0,Pure carrier;TMm!0
    AKd!5,Modulated;TMm!1
    AKd!1,Reduced;TLa!1
    AKd!6,Nominal;TLa!0
    AKd!2,Low rate QPSK3/4;TRr!8448000;TMx!13
    AKd!7,High rate 8PSK 5/6;TRr!21503000;TMx!85
    AKd!3,IF transmit off;TTm!0
    AKd!8,IF transmit on;TTm!1

When entering the ActionKeys menu, pushing the "2" key will display:
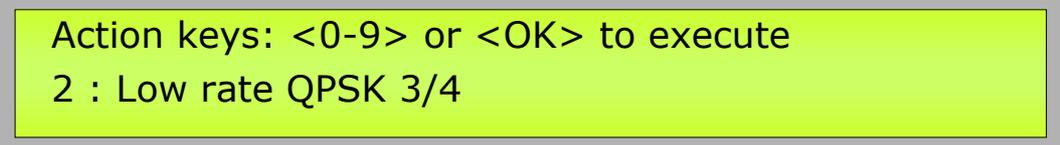
Action keys: <0-9> or <OK> to execute

2 : Low rate QPSK 3/4

When the <OK> key is pressed the interface rate will be set to 8.448 Mbit/s (TRr!8448000) and QPSK modulation with FEC 3/4 is selected (TMx!13).

Remark: After a reset to factory defaults the ActionKeys are all reset to off (default value).

ActionKey definition via the Webinterface

Navigate to the ActionKey menu; click "Define" to enter the label of the ActionKey and the associated RMPC commands that need to be executed by this macro. To find the RMCP (remote monitor and control protocol) command that is used to set or get a parameter, refer to the manual (click "Manual" in the top-navigation bar) or in a parameter entry page, click on the parameter name; this will open the manual at the position where that parameter is described including the RMPC commands. For full details on the RMPC commands, please contact techsupport in order to obtain a copy of the RMCP manual.

Once the ActionKeys are defined, the operator can executed the macro by clicking the execute button. The ActionKeys can only be defined or changed while the operator is logged in as Administrator. In other modes, the definition can only be viewed, not changed.

Appendix B User defined menu

The user menu can be completely configured by the user. It allows to quickly access only those control, monitor and test parameters that are of interest to the user.

The goal is that an operator can configure the menu structure of "his" device for quick access to parameters that he needs to change or monitor regularly. Also the order in which the menu items are presented can be arranged to meet the specific demands of the operator.

This is a very useful feature in for example the DSNG applications, where the general parameters are pre-configured and stored in the default boot-configuration and where the relevant parameters that need a quick change (during link setup) are made available as a group in the user menu. The device can then be operated by the operator without having to go through all the different menus.

A typical example would be to group following parameters: output frequency, output level, L-band transmit, while leaving all other parameters untouched.

Define the user menu

Go to ../Unit/Setup/User menu and press <OK>

```
NTC2263/Unit/Setup
User menu: <press OK, ESC when done>
```

Go to ../Unit/Setup/User menu and press <OK>, this will bring up the first item from the ../modulator/control menu:

```
Modulator/Control                        not present
Base band interface                      <OK> to add
```

Press the <OK> to add this menu in the list of menu items that will be visible in the user menu or press the → 'right arrow' key to move to the next menu item in the control, monitor and test menu. The available list are all the menu items when the device is in "expert mode".

If you select <OK> then the display changes to:

```
Modulator/Control                         present
Base band interface                  <OK> to remove
```

indicating that this menu item will be present in the user menu, to remove press <OK> again.

Remark: After a "reset to factory defaults" the user menu contents will be lost.

# Appendix C Troubleshooting

Consult the User Manual

In case you have an alarm, refer to the user manual according the alarm message on the display. In most cases a short description of the cause of the alarm is provided and what to do to resolve the problem.

Contact support

Don't hesitate to contact our support engineers if you need help. Our "*follow-the-sun*" policy assures you that you can get help anytime. To get a clean approach on your problem a diagnostic report is absolutely required.

Diagnostics report

Our web interface allows for the generation of a diagnostics report that can be sent to us for analysis.
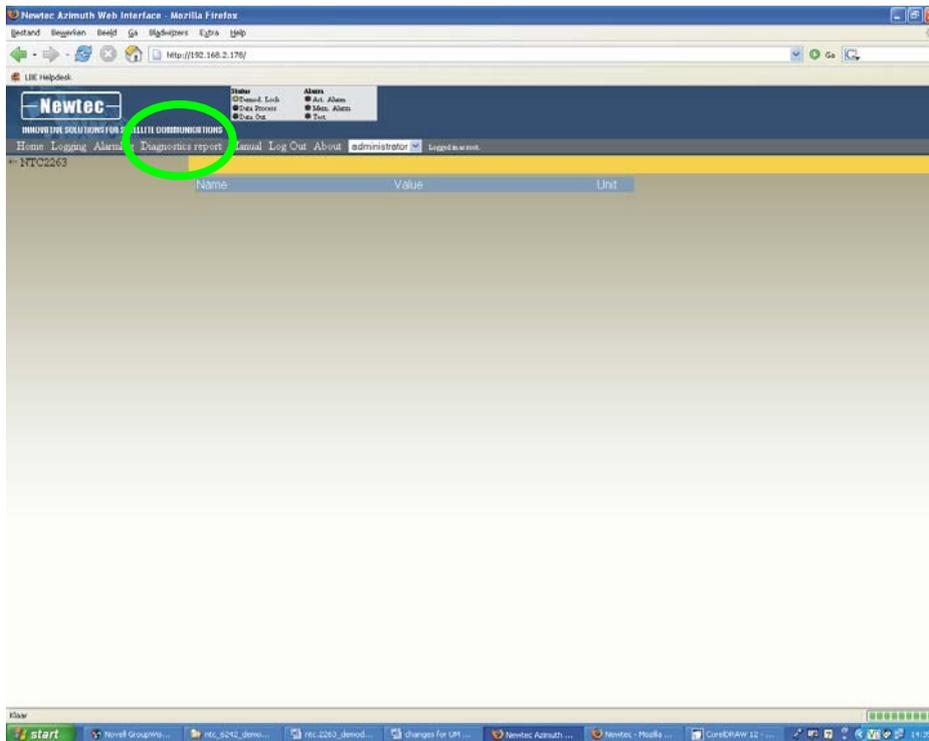
Click on Diagnostic report next screen will appears after a few seconds
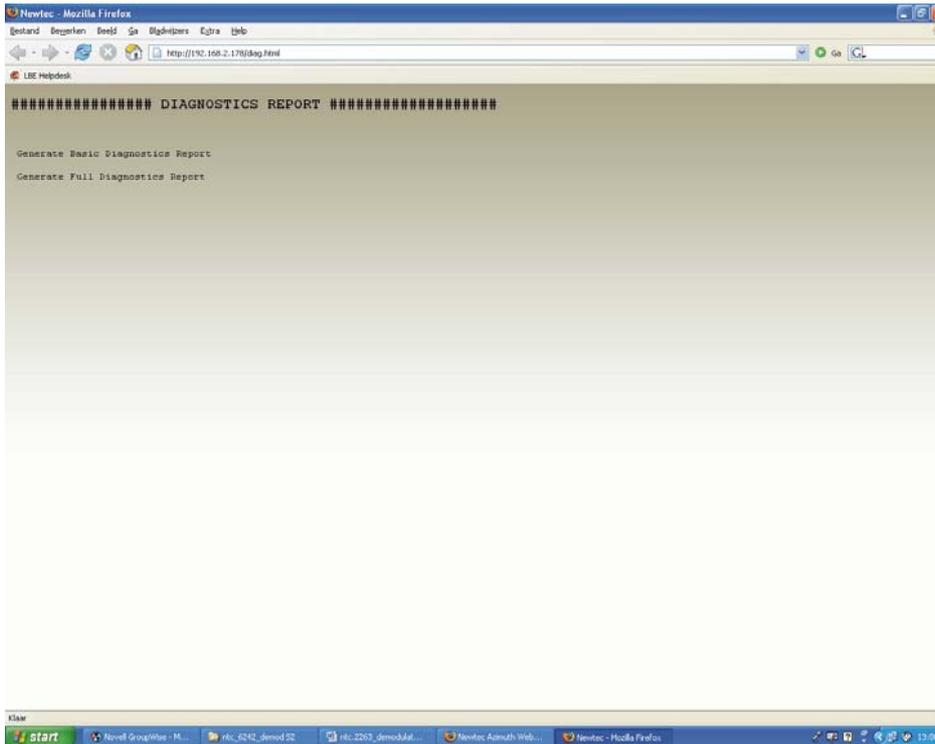
Select "Generate Basic Diagnostic Report"

After a few seconds the diagnostic file appears in html format.

Please keep this file in HTML format and sent this file to techsupport@newtec.be

together with the faulty description.

Support case logging

We use a case tracking database to log and track all our support cases, each case if given a unique identifier that can be used to quickly refer to that case. Automatic escalation will assure us that every case gets the attention it needs.