ProTelevision Technologies A/S
Valhoejs Alle 176
DK-2610 Roedovre
Denmark

PT3000 Product Family
Product Manual

Trade Mark of the DVB Digital Video Broadcasting Project

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1 Introduction

1.1 General

This PT3000 instruction manual describes the general technical specifications and configuration of interfaces as well as providing a manual of the system control and configuration from an operational perspective.

1.2 Document structure and scope

This product manual is divided into the following main sections:

- Electrical interface
- IP address configuration
- Front panel operation
- Webservice[1] operation principles and manual
- Alarm system
- Event logs

The present document describes the operation of the device from a generic viewpoint and it does therefore not address in detail functions or settings applicable to a specific member of the PT3000 product family except where relevant.

[1] Internet browser based control over Ethernet

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2 Electrical interface

2.1 Inputs, outputs and HW control interfaces

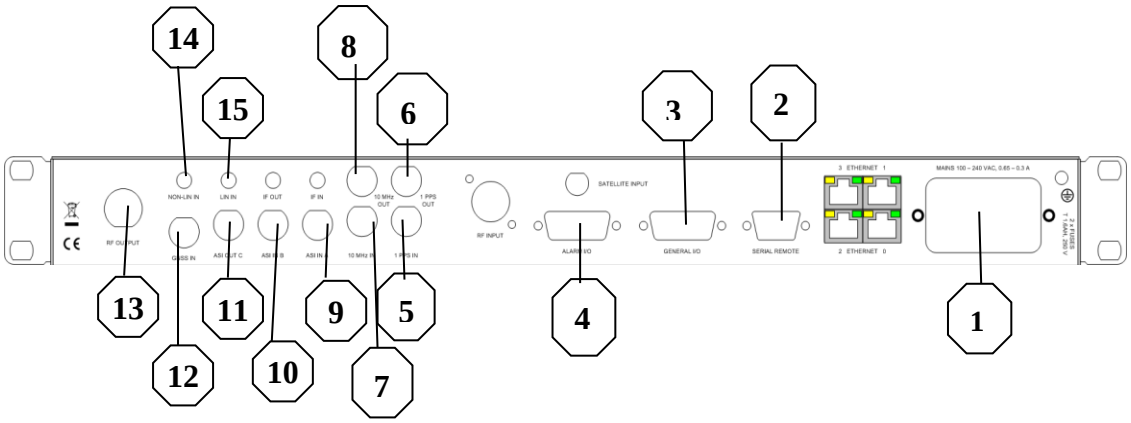

Figure 2-1 The PT3000 chassis backplane.

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2.1.1 AC Mains supply inlet module

3-pin IEC type (live, neutral, ground). Ground is electrically connected to the chassis. The inlet module features integrated V lock, 2 pole mains switch and 2 pole mains fuseholder.

Operation voltage: 100-240 VAC, 0.65 – 0.3 A.
Fuse type: 1.6A/250V 3AG SLO-BLO 5x20MM (2 pieces).

2.1.2 Serial remote

Jack for serial control using SCPI protocol.

Parameter	Value
Type	SUB-D 9-pin Male
Electrical interface format	User selectable (default state in bold): - **RS232** - RS485 - RS485HD [2]

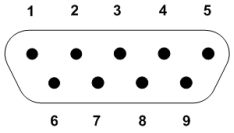


Figure 2-2 Jack pin-out viewed from chassis exterior.

	Pin								
Mode	1	2	3	4	5	6	7	8	9
RS232	n/c	Rx	Tx	n/c	GND	n/c	n/c	n/c	n/c
RS485	n/c	Rx +	Tx -	n/c	GND	n/c	Tx +	Rx -	n/c
RS485HD	n/c	Rx +	Tx -	n/c	GND	n/c	Tx +	Rx -	n/c

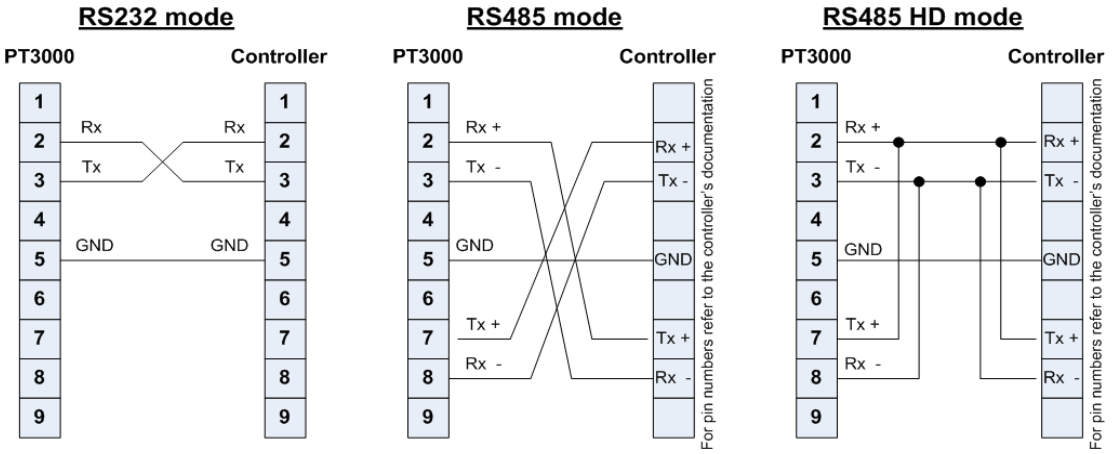


Figure 2-3 RS232 mode, RS485 mode, RS485 HD mode.

Note: The absolute pin numbers on the controller side may vary between products by RS-485 mode. The above mapping plan therefore only lists the functional names of the pins on the controller side by RS485 mode. Please refer to the specific controller's documentation for pin numbers.

[2] *The RS485HD mode is intended only for supporting operation with older existing transmitter management designs based on half duplex. It is recommended to use either the RS232 or RS485 mode for any new designs due to the notably higher communication efficiency.*

2.1.3 GENERAL I/O interface (Sub-D 15-pin female)

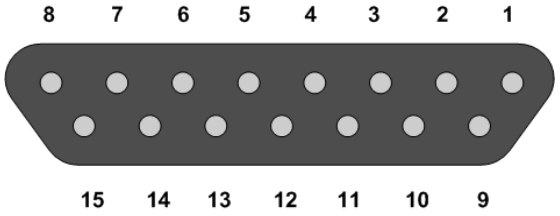


Figure 2-4 **Jack pin-out viewed from chassis exterior.**

Pin	Function	Remark
1	HARD_MUTE (interlock)	This is a logic control input (float/ground). **NOTE:The modulator output will remain muted until this line is pulled to ground.** If preferred PT3000 can be reconfigured to unmute in case the HARD_MUTE line is left floating. That is, external mute control is then active low. The muting is effective instantly when the line is drawn to the level corresponding to muted output (direct hardware control). To support 'soft' level ramp-up upon unmuting, the active mute state must be present for minimum 0,5 sec (maximum latency for the software system to detect the hardware mute and thereby support software managed ramp-up when the hardware mute is released).
2	GND	
3	nHARD_REST	This is a logic control input (float/ground). The modulator is reset (rebooted) by pulling this line temporarily to ground.
4 - 8	n / c	Leave floating (reserved for future use)
9	GND	
11	RF_FAIL	This is a logic control output (3.3V TTL logic). The output is linked to the 'RF level out of range' detector. The RF_FAIL line is activated in the event that the modulator's RF output level drops below or above the user programmed threshold. The output is by default active 'low'. If preferred, the line can be reconfigured to active 'hi' status.
12 - 15	n / c	Leave floating (reserved for future use)

2.1.4 ALARM I/O (Sub-D 15-pin female)

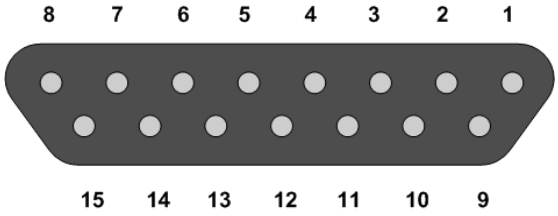


Figure 2-5 Jack pin-out viewed from chassis exterior.

Pin	Function	Remark
1	ALARM_1 (make by alarm)	Set of relay contacts[3] floating relative to ground. Alarm is active if any raised alarm is mapped by user program-ming to ALARM-1 OUT. Alarm is also active by power off.
2	ALARM_1 (common)	
3	ALARM_1 (break by alarm)	
4	ALARM_2 (make by alarm)	Set of relay contacts[3] floating relative to ground. Alarm is active if any raised alarm is mapped by user program-ming to ALARM-2 OUT. Alarm is also active by power off.
5	ALARM_2 (common)	
6	ALARM_2 (breake by alarm)	
7	GND (isolated)	Isolated ground galvanically decoupled from the chassis ground. This is the reference ground for the alarm inputs ALARM_IN_1 to ALARM_IN_8
8	ALARM_IN_1	External alarm input number 1 to 8 [4] • The alarm inputs are active low; alarm is raised when the associated input is pulled to GND (isolated GND, pin 7) • The inputs are intended for signaling external alarm events thorugh PT3000's integrated alarm system (WEB, SNMP-TRAP, etc). • The inputs are isolate galvanically from PT3000's internal circuitry through opto couplers
9	ALARM_IN_2	
10	ALARM_IN_3	
11	ALARM_IN_4	
12	ALARM_IN_5	
13	ALARM_IN_6	
14	ALARM_IN_7	
15	ALARM_IN_8	

[3] Contact max rating: Voltage 220VDC / 250VAC, Current: 2A, Switching power: 60W, 62,5VA
[4] External alarm inputs number 5 to 8 are an optional extension (input 1 to 4 are standard)

2.1.5 1PPS IN

Jack for input of external 1PPS reference

Parameter	Value
Type	BNC female
DC	AC
Level	0-5V
Impedance	User selectable (default state shown in **bold**): - **High impedance (> 1Kohm)** - 50 ohm
Trigger level	User selectable (default state shown in **bold**): - **1.6V** - 1.0 ……. 1.6 V
Trigger edge	User selectable (default state shown in **bold**): - **Rising** - Falling

2.1.6 1PPS OUT

Jack for output of 1PPS reference.

Parameter	Value
Type	BNC female
Coupling	DC
Pulse Level	0-1.5 V @ 50 ohm load 0-4.5V @ high impedance load (>1 kohm)
Pulse duration	100 micro seconds
Timing point	Rising edge

2.1.7 10MHZ IN

Jack for input of external 10MHz reference, level 100mVpp – 3Vpp, AC coupled

Parameter	Value
Type	BNC female
Coupling	AC
Level	100mVpp – 3Vpp
Impedance	User selectable (default state in **bold**): - **High impedance (> 1Kohm)** - 50 ohm

2.1.8 10MHZ OUT

Jack for output of 10MHz reference

Parameter	Value
Type	BNC female
Coupling	AC
Level	800 mV peak-peak @ 50 ohm load 2 V peak-peak @ high impedance load (>1 kohm)

2.1.9 ASI IN - A

Jack for input of TS in ASI format[5] . *Note: This connector is referred to by the alias **ASI-1** in the user interfaces provided for control and monitoring (Webservice and front display/control).*

Parameter	Value
Type	BNC female
Impedance	75 ohm

2.1.10 ASI IN - B

Jack for input of TS in ASI format[5] . *Note: This connector is referred to by the alias **ASI-2** in the user interfaces provided for control and monitoring (Webservice and front display/control).*

Parameter	Value
Type	BNC female
Impedance	75 ohm

2.1.11 ASI OUT

Jack for output in ASI format[5] of the input source selected by the user for external monitoring purpose . *Note: This connector is referred to by the alias **ASI Monitor** in the user interfaces provided for control and monitoring (Webservice and front display/control).*

Parameter	Value
Type	BNC female
Impedance	75 ohm

[5] EN50083-9

2.1.12 GNSS IN

Jack for input of RF feed from the GNSS antenna. *Note: DC bias may be injected into the RF feed for supply of active antenna.*

Parameter	Value
Type	TNC female
Impedance	50 ohm
DC bias	User selectable (default state in **bold**): - **OFF** - +3 V DC - +5V DC

2.1.13 RF OUT

Jack for output of the modulator RF.

Parameter	Value
Type	N female
Impedance	50 ohm
Level	User selectable (default state in **bold**): - **0 dBm** - -10dBm …… 10dBm - -10dBm ……. 20dBm (option PT3740)

2.1.14 NON LIN IN

Jack for input of sense feed to the non-linear adaptive precorrector

Parameter	Value
Type	SMA female
Impedance	50 ohm
Level	-10 to +10 dBm [6]

2.1.15 LIN IN

Jack for input of sense feed to the linear adaptive precorrector

Parameter	Value
Type	SMA female
Impedance	50 ohm
Level	-10 to +10 dBm [6]

[6] Maximum useful range. Webservice raise a warning when operating with sense level below -9dBm and above +9dBm.

2.2 Ethernet connections

2.2.1 General characteristics

- Four physical RJ45 10/100/1000 Base-T Ethernet interfaces are available (ETH0, ETH1, ETH2 and ETH3).
- ETH0, ETH1, ETH2 and ETH3 have seperate MAC Addresses.
- ETH2 and ETH3 are optimized for management purposes. ETH0 and ETH1 are optimized for management and/or TSoIP traffic (TSoIP support requires option PT3720).
- The Ethernet connections are managed within the PT3000 based on up to five individual LAN configurations (address spaces). The five LANs are named respectively 1st Interface (FLAN), 2nd Interface (ALAN), 3rd interface (TLAN), 4th interface (BLAN) and 5th interface (PLAN).
- The 1st Interface (FLAN) is by default enabled and cannot be disabled by the user.
- The 2nd Interface (ALAN), 3rd interface (TLAN), 4th interface (BLAN) and 5th interface (PLAN) are as default disabled but can be enabled as required by the user.
- ETH1 is as default enabled and associated with the 1st Interface (FLAN).
- The user may freely associate any of the LAN interfaces with any of the physical interfaces. *Note: a LAN interface may only be associated with one physical interface at a time but multiple LAN interfaces can be associated with the same physical interface*.
- The four physical interfaces ETH0, ETH1, ETH2 and ETH3 are separate isolated networks. Inbound/outbound traffic on one physical port is completely isolated from traffic on the other three ports.

The default configuration for the Ethernet connections is as follows:

LAN interface	Status	PHY	IP / Mask	VLAN (status and ID)
1st Interface (FLAN)	**ENABLED**	**ETH1**	**192.168.168.168** 255.255.0.0	Status: DISABLED ID: 10
2nd Interface (ALAN)	DISABLED	ETH1	10.2.1.250 255.255.0.0	Status: DISABLED ID: 11
3rd Interface (TLAN)	DISABLED	ETH2	10.3.1.250 255.255.0.0	Status: DISABLED ID: 12
4th Interface (BLAN)	DISABLED	ETH3	10.4.1.250 255.255.0.0	Status: DISABLED ID: 13
5th Interface (PLAN)	DISABLED	ETH3	10.5.1.250 255.255.0.0	Status: DISABLED ID: 14

2.2.2 Location of the ETH PHY interfaces (standard factory cabling):

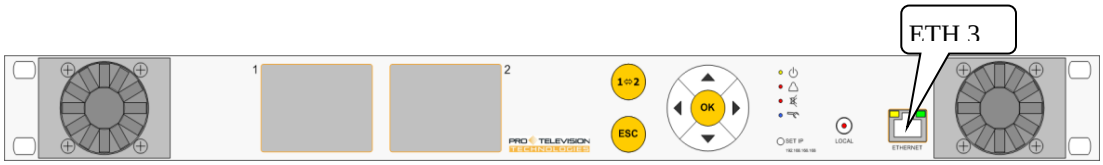


Figure 2-6 Ethernet port location on front panel.

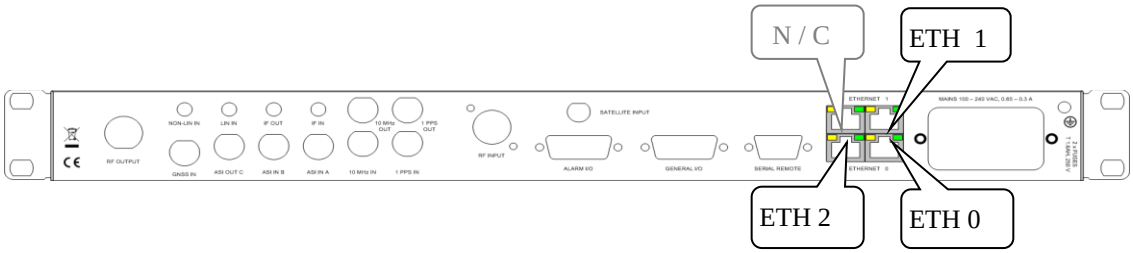


Figure 2-7 Ethernet ports location on back plane.

2.2.3 LED pattern for ETH PHY (ETH 0 to ETH3)

Each of the RJ45 physical connections includes two LED's for indicating the status of the connection. The following pattern is defined for the PT3000:

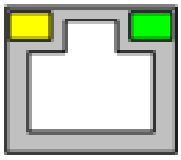


Figure 2-8 Physical ethernet port.

LED	10Mbit activity	100Mbit activity	1000Mbit activity
GREEN	OFF	OFF	ON
AMBER	Flashing	Flashing	Flashing

2.3 Configuration of interfaces

Some of the interfaces in the rear panel of PT3000 device allow for user selection between different configurations . For example, the user may select the impedance for the 10MHz reference input and the active state for the external HW mute input. These configurations are described below in section 2.3.1 to 2.3.5, exemplified by front panel and Webservice operation.

2.3.1 Serial Remote

2.3.1.1 Interface format

The format can be switched between RS232, RS485 and RS485HD (RS232 is default setting). To select interface format from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] button to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***SYSTEM*** menu by pressing [▼] until the ***SYSTEM*** menu is highlighted.
3. Press [***OK***] to open the ***SYSTEM*** submenu.
4. Navigate to the ***IP Network*** menu by pressing [▼] until the ***IP Network*** menu is highlighted.
5. Press [***OK***] to open the ***IP Network*** submenu.
6. Navigate to the ***Serial Intereface*** menu by pressing [▼] until the ***Serial Intereface*** menu is highlighted. The current interface format is displayed.
7. To select an alternative format press [***OK***] to open the pick list.
8. Navigate to the desired format [***RS232*** | ***RS485*** | ***RS485HD***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the Serial Interface menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of interface format from the PT3000 Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Follow the menu path ***WEBSERVICE → SYSTEM → NETWORK → SCPI Serial Interface [RS232 | RS485 | RS485HD]***.
- Select required format from the pick-list

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

2.3.1.2 Baud rate

The baud rate can be set between 2400 and 115200 baud (115200 is default setting). To change the baud rate from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] button to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***SYSTEM*** menu by pressing [▼] until the ***SYSTEM*** menu is highlighted.
3. Press [***OK***] to open the ***SYSTEM*** submenu.
4. Navigate to the ***IP Network*** menu by pressing [▼] until the ***IP Network*** menu is highlighted.
5. Press [***OK***] to open the ***IP Network*** submenu.
6. Navigate to the ***SCPI Baudrate*** menu by pressing [▼] until the ***SCPI Baudrate*** menu is highlighted. The current baudrate is displayed.
7. To select an alternative baudrate press [***OK***] to open the pick list.

8. Navigate to the desired baudrate [***2400*** | ***4800*** | ***9600*** | ***19200*** | ***38400*** | ***57600*** | ***115200***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the Serial Interface menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of baud rate from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Follow the menu path ***WEBSERVICE → SYSTEM → NETWORK → SCPI Baudrate [2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200]***.
- Select required rate from the pick-list.

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

2.3.2 Hard mute

The active state for the HARD_MUTE control line can be changed from the default active “HI” state (output muted if line is floating or pulled to 3V) to active “LOW” state (output muted if line is pulled to GND). To change the active state for the mute line from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] button to enable configuration from the front panel (red light in the ‘**Local**’ key confirms activation of the local control mode).
2. Navigate to the ***SYSTEM*** menu by pressing [▼] until the ***SYSTEM*** menu is highlighted.
3. Press [***OK***] to open the ***SYSTEM*** submenu.
4. Navigate to the ***BACKPLANE*** menu by pressing [▼] or [▲] until the ***BACKPLANE*** menu is highlighted.
5. Press [***OK***] to open the ***BACKPLANE*** submenu.
6. Navigate to the ***Hard Mute Pin*** configuration menu by pressing [▼]or [▲] until the ***Hard Mute Pin*** menu is highlighted. The current active is displayed.
7. To select the alternative state press [***OK***] to open the pick list.
8. Navigate to the desired baudrate [***Active Low*** | ***Active High***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the ***Hard Mute Pin*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of active state from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Follow the menu path ***WEBSERVICE → SYSTEM → BACKPLANE → Hard Mute Pin [Active High | Active High]***.
- Select required state from the pick-list .

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

2.3.3 RF fail out

The active state for the RF_FAIL_OUT signaling line can be changed from the default active “Low” state (logic low when the ‘level-out-of-range’ alarm is raised) to active “High” state (logic high when the ‘level-out-of-range’ alarm is raised). He line is 3.3V TTL logic. To change the active state for the RF_FAIL_OUT line from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] to enable configuration from the front panel (red light in the ‘**Local**’ key confirms activation of the local control mode).
2. Navigate to the ***SYSTEM*** menu by pressing [▼] until the ***SYSTEM*** menu is highlighted.
3. Press [***OK***] to open the ***SYSTEM*** submenu.
4. Navigate to the ***BACKPLANE*** menu by pressing [▼] or [▲] until the ***BACKPLANE*** menu is highlighted.
5. Press [***OK***] to open the ***BACKPLANE*** submenu.
6. Navigate to the ***RF Fail Pin*** configuration menu by pressing [▼]or [▲] until the ***RF Fail Pin*** menu is highlighted. The current active is displayed.
7. To select the alternative state press [***OK***] to open the pick list.
8. Navigate to the desired baudrate [***Active Low*** | ***Active High***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the ***RF Fail Pin*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of active state from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Follow the menu path ***WEBSERVICE → SYSTEM → BACKPLANE → RF Fail Pin [Active High | Active High]***.
- Select required state from the pick-list.

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

2.3.4 1 PPS IN

2.3.4.1 Input impedance

The 1PPS input impedance can be set to High Impedance (>1kohm) and 50 ohm; High Impedance is default. To change impedance from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***REFERENCE*** menu by pressing [▼] until the ***REFERENCE*** menu is highlighted.
3. Press [***OKBI***to open the ***REFERENCE*** submenu.
4. Navigate to the ***Reference 1PPS*** menu by pressing [▼] or [▲] until the ***Reference 1PPS*** menu is highlighted.
5. Press [***OK***] to open the ***Reference 1PPS*** submenu.
6. Navigate to the ***Impdance*** configuration menu by pressing [▼]or [▲] until the ***Impedance*** menu is highlighted. The current setting is displayed.
7. To select the alternative impedance press [***OK***] to open the pick list.
8. Navigate to the desired impedane [***High Impedance | 50 ohm***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the ***Impedance*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of 1PPS input Impedance from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Drag the 1PPS input object from the block schematic in the upper half of the Webservice to the status/control panel in the lower half of the Webservice.
- Select the required impedance by clicking the radio button provided for selection (HIGH | 50 Ohm).

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

2.3.4.2 Trigger slope

The 1 PPS trigger slope can be set to Rising and Falling edge; Rising edge is default. To change the trigger slope from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***REFERENCE*** menu by pressing [▼] until the ***REFERENCE*** menu is highlighted.
3. Press [***OK***] to open the ***REFERENCE*** submenu.
4. Navigate to the ***Reference 1PPS*** menu by pressing [▼] or [▲] until the ***Reference 1PPS*** menu is highlighted.
5. Press [***OK***] to open the ***Reference 1PPS*** submenu.
6. Navigate to the ***Trig Slope*** configuration menu by pressing [▼]or [▲] until the ***Trig Slope*** menu is highlighted. The current setting is displayed.
7. To select the alternative slope press [***OK***] to open the pick list.
8. Navigate to the desired slppw [***Rising | Falling***] by pressing [▼] or [▲] as required.
9. To save the selection:

- Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
- To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
- To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
- To return to the ***Trig Slope*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of 1PPS trigger slope from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Drag the 1PPS reference input object from the block schematic in the upper half of the Webservice to the status/control panel in the lower half of the Webservice.
- Select the required slope by clicking the radio button provided for selection (**Rising | Falling**).

1. To save the new selection:
   - Click [***Apply***].
   - To exit without saving new setting: click [***Discard***].

2.3.4.3 Trigger level

The 1 PPS trigger level can be set 1 – 1.6V; 1.6V is default. To change the trigger level from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***REFERENCE*** menu by pressing [▼] until the ***REFERENCE*** menu is highlighted.
3. Press [***OK***] to open the ***REFERENCE*** submenu.
4. Navigate to the ***Reference 1PPS*** menu by pressing [▼] or [▲] until the ***Reference 1PPS*** menu is highlighted.
5. Press [***OK***] to open the ***Reference 1PPS*** submenu.
6. Navigate to the ***Trig Level*** configuration menu by pressing [▼]or [▲] until the ***Trig Level*** menu is highlighted. The current setting is displayed.
7. To edit the current level press [***OK***] to activate in-display keyboard.
8. Type in the desired trigger level value.
9. To save the selection:
   - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
   - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
   - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
   - To return to the ***Trig Slope*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Edit the 1PPS trigger level from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Drag the 1PPS reference input object from the block schematic in the upper half of the Webservice to the status/control panel in the lower half of the Webservice.
- Place the cursor in the **Trig Level** field and edit the current value.

1. To save the new selection:
   - Click [***Apply***].
   - To exit without saving new setting: click [***Discard***].

2.3.5 10 MHz IN

2.3.5.1 Input impedance

The 10MHz input impedance can be set to High Impedance (>1kohm) and 50 ohm; High Impedance is default. To change impedance from the PT3000 front panel, proceed as follows (for more on front panel operation, see pragraph 4):

1. Press [***LOCAL***] to enable configuration from the front panel (red light in the '**Local**' key confirms activation of the local control mode).
2. Navigate to the ***REFERENCE*** menu by pressing [▼] until the ***REFERENCE*** menu is highlighted.
3. Press [***OK***] to open the ***REFERENCE*** submenu.
4. Navigate to the ***Reference 10MHz*** menu by pressing [▼] or [▲] until the ***Reference 10MHz*** menu is highlighted.
5. Press [***OK***] to open the ***Reference 10MHz*** submenu.
6. Navigate to the ***Impdance*** configuration menu by pressing [▼]or [▲] until the ***Impedance*** menu is highlighted. The current setting is displayed.
7. To select the alternative impedance press [***OK***] to open the pick list.
8. Navigate to the desired impedane [***High Impedance | 50 ohm***] by pressing [▼] or [▲] as required.
9. To save the selection:
    - Press [***OK***], then press the [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***].
    - To save setting: Press [◄] or [►] to highlight [***Save***], then press [***OK***].
    - To exit without saving: Press [◄] or [►] to highlight [***Discard***], then press [***OK***].
    - To return to the ***Impedance*** menu: Press [◄] or [►] to highlight [***Cancel***], then press [***OK***].

Selection of 10MHz input Impedance from the Webservice (for more on Webservice operation, see pragraph 5.1.3):

- Drag the 10MHz reference input object from the block schematic in the upper half of the Webservice to the status/control panel in the lower half of the Webservice.
- Select the required impedance by clicking the radio button provided for selection (HIGH | 50 Ohm).

1. To save the new selection:
    - Click [***Apply***].
    - To exit without saving new setting: click [***Discard***].

3 IP address configuration

IP address settings for the PT3000 product can be carried out in several different ways:

a) Hardware preset to default status.
b) Configuration through RS232/SCPI serial port.
c) Configuration from front panel menu system.
d) Configuration over Ethernet

3.1 IP address configuration – RS232/SCPI

By default the 1st Interface (FLAN) is enabled and linked to physical Ethernet **ETH1**. The default IPsettings are:

- *Address management: DHCP = OFF (static IP address)*
- *Physical Interface: ETH0*
- *Default IP: 192.168.168.168*
- *Default Mask: 255.255.0.0*
- *Default gateway: 192.168.1.1*

To change the IP settings or to verify/read-back the current settings a suitable terminal program should be used (for example TeraTerm or Windows HyperTerminal). The PC must be connected to the serial remote interface ‘Console’ via a null modem type RS232 cable (crossed Rx/Tx wires). The communication parameters are as follows:

- *Baud rate: 115200*
- *Handshake: No*
- *Parity: No*
- *Data bits: 8*
- *Stop bits: 1*

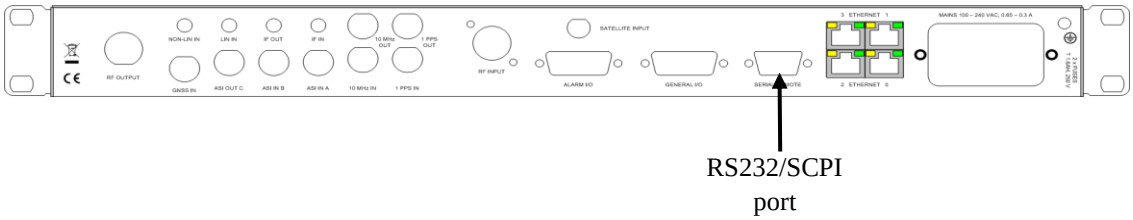


Figure 3-1 Location of RS232/SCPI port on PT3000 chassis backplane.

Each command sent to the device through the RS232 interface (set or get) must be terminated by a new-line character (‘\n’ / 0x0A). For correct function please notice that the new-line terminator must be configured explicitly in the case where TeraTerm or Windows HyperTerminal is used for the control (refer to appendix A for details).

3.1.1 Interface status

The 1st interface is hardcoded to enabled status. The 2nd , 3rd , 4th and 5th interfaces can be individually enabled or disabled as required (these interfaces are disabled by default)

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:ENAB? // request currrent status
- SYST:COMM:IPAD:ALAN:ENAB DISABLE | ENABLE // Set status

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:ENAB? // request currrent status
- SYST:COMM:IPAD:TLAN:ENAB DISABLE | ENABLE // Set status

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:ENAB? // request currrent status
- SYST:COMM:IPAD:BLAN:ENAB DISABLE | ENABLE // Set status

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:ENAB? // request currrent status
- SYST:COMM:IPAD:PLAN:ENAB DISABLE | ENABLE // Set status

3.1.2 Interface to PHY mapping

The five interfaces can be mapped individually to any one of the four physical Ethernet connections ETH0, ETH1, ETH,2 and ETH3. **The 1st interface is by default mapped to ETH1**.

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:PHYS? // request currrent mapping
- SYST:COMM:IPAD:FLAN:PHYS ETH0 | ETH1 | ETH2 | ETH3 // Set mapping

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:PHYS? // request currrent mappping
- SYST:COMM:IPAD:ALAN:PHYS ETH0 | ETH1 | ETH2 | ETH3 // Set mapping

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:PHYS? // request currrent mapping
- SYST:COMM:IPAD:TLAN:PHYS ETH0 | ETH1 | ETH2 | ETH3 // Set mapping

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:PHYS? // request currrent mapping
- SYST:COMM:IPAD:BLAN:PHYS ETH0 | ETH1 | ETH2 | ETH3 // Set mapping

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:PHYS? // request currrent mapping
- SYST:COMM:IPAD:PLAN:PHYS ETH0 | ETH1 | ETH2 | ETH3 // Set mapping

3.1.3 DHCP status

The five interfaces can be set individually to either a static IP addresss or a DHCP assigned address. The five interfaces are by defualt set to static IP address mode. The IP address for each of the five interfaces must be set to different subnets. IP addresses that reside on the same subnet are not allowed. DH.CP off corespond to static IP address. DHCP client corespond to DHCP assigned IP address

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:DHCP? // request currrent setting
- SYST:COMM:IPAD:FLAN:DHCP OFF | CLIENT // Set mode to ‘off’ or ‘client’

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:DHCP? // request currrent setting
- SYST:COMM:IPAD:ALAN:DHCP OFF | CLIENT // Set mode to ‘off’ or ‘client’

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:DHCP? // request currrent setting
- SYST:COMM:IPAD:TLAN:DHCP OFF | CLIENT // Set mode to ‘off’ or ‘client’

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:DHCP? // request currrent setting
- SYST:COMM:IPAD:BLAN:DHCP OFF | CLIENT // Set mode to ‘off’ or ‘client’

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:DHCP? // request currrent setting
- SYST:COMM:IPAD:PLAN:DHCP OFF | CLIENT // Set mode to ‘off’ or ‘client’

3.1.4 Static IP address

The five interfaces are by defualt set to static IP address mode. The IP address for each of the five interfaces must be set to different subnets. IP addresses that reside on the same subnet are not allowed. The default IP address for the 1st interface is 192.168.168.168. To below commands are used for setting the static IP address for an interface. The address must be submitted as paramter enclosed in double quotes. For example, the comand for setting the static IP address for the 1st interface to 10.1.26.10 is *SYST:COMM:IPAD:FLAN “10.1.26.10”* .

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN? // request currrent static address
- SYST:COMM:IPAD:FLAN “x.x.x.x” // Set static address

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN? // request currrent static address
- SYST:COMM:IPAD:ALAN “x.x.x.x” // Set static address

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN? // request currrent static address
- SYST:COMM:IPAD:TLAN “x.x.x.x” // Set static address

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN? // request currrent static address
- SYST:COMM:IPAD:BLAN “x.x.x.x” // Set static address

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN? // request currrent static address
- SYST:COMM:IPAD:PLAN “x.x.x.x” // Set static address

3.1.5 IP address in effect

The IP address that’s currently in effect for an interface (assigned either statically or by DHCP) can be read using the following commands:

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:ACT? // request IP address in effect

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:ACT? // request IP address in effect

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:ACT? // request IP address in effect

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:ACT? // request IP address in effect

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:ACT? // request IP address in effect

3.1.6 Static subnet mask

The five interfaces are by defualt set to static IP address mode. The below commands are used for setting the static subnet mask for an interface. The subnet mask must be submitted with the command enclosed in double quotes. For example, the comand for setting the static subnet mask for the 1st interface to 255.255.255.0 is *SYST:COMM:IPAD:FLAN:MASK "255.255.255.0"* .

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:MASK? // request currrent static mask
- SYST:COMM:IPAD:FLAN:MASK "x.x.x.x" // Set static mask

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:MASK? // request currrent static mask
- SYST:COMM:IPAD:ALAN:MASK "x.x.x.x" // Set static mask

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:MASK? // request currrent static mask
- SYST:COMM:IPAD:TLAN:MASK "x.x.x.x" // Set static mask

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:MASK? // request currrent static mask
- SYST:COMM:IPAD:BLAN:MASK "x.x.x.x" // Set static mask

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:MASK? // request currrent static mask
- SYST:COMM:IPAD:PLAN:MASK "x.x.x.x" // Set static mask

3.1.7 Subnet mask in effect

The subnet mask that's currently in effect for an interface (assigned either statically or by DHCP) can be read using the following commands:

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:MASK:ACT? // request subnet mask in effect

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:MASK:ACT? // request subnet mask in effect

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:MASK:ACT? // request subnet mask in effect

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:MASK:ACT? // request subnet mask in effect

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:MASK:ACT? // request subnet mask in effect

3.1.8 Static default gateway address

The static default gayteway address can be set using the the command SYST:COMM:IPAD:GAT "x.x.x.x" where "x.x.x.x" represnts the gateway address.

Example:

SYST:COMM:IPAD:GAT "192.100.5.0"	Set gateway IP address = 192.100.5.0
SYST:COMM:IPAD:GAT?	Request current static gateway address

The static gateway defaults to 192.168.1.1 after reset.

3.1.9 Default gateway address in effect

The default gateway address which is currently in effect (assigned either statically or by DHCP) can be read using the following command:

SYST:COMM:IPAD:FLAN:MASK:ACT? // request default gateway address in effect

3.1.10 VLAN status

VLAN mode can be enabled individually for the five interfaces if VLAN mode is required for one or more of the interfaces. Mind though that VLAN should only be enabled for an interface if the equipment connected to that interface is also configured for VLAN mode.Once the interface is switched to VLAN mode, all communication with equioment not configured for the the same VLAN will be blocked. VLAN is by default disabled on all interfaces.

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:VLAN? // request currrent status
- SYST:COMM:IPAD:FLAN:VLAN DISABLE | ENABLE // Disable/enable VLAN

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:VLAN? // request currrent status
- SYST:COMM:IPAD:ALAN:VLAN DISABLE | ENABLE // Disable/enable VLAN

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:VLAN? // request currrent status
- SYST:COMM:IPAD:TLAN:VLAN DISABLE | ENABLE // Disable/enable VLAN

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:VLAN? // request currrent status
- SYST:COMM:IPAD:BLAN:VLAN DISABLE | ENABLE // Disable/enable VLAN

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:VLAN? // request currrent status
- SYST:COMM:IPAD:PLAN:VLAN DISABLE | ENABLE // Disable/enable VLAN

3.1.11 VLAN ID

VLAN ID can be configured individually for the five interfaces (i.e. the VLAN ID to be used if VLAN is enabled for the specific interface). The VLAN ID is configurable between 1 and 4095 (Note: ID 4001 and ID 4002 are used for internal switching by PT3000 and thus cannot be used on any interface.).

1st Interface (FLAN):

- SYST:COMM:IPAD:FLAN:VLAN:ID? // request currrent ID
- SYST:COMM:IPAD:FLAN:VLAN:ID n // Set VLAN ID

2nd Interface (ALAN):

- SYST:COMM:IPAD:ALAN:VLAN:ID? // request currrent ID
- SYST:COMM:IPAD:ALAN:VLAN:ID n // Set VLAN ID

3rd Interface (TLAN):

- SYST:COMM:IPAD:TLAN:VLAN:ID? // request currrent ID
- SYST:COMM:IPAD:TLAN:VLAN:ID n // Set VLAN ID

4th Interface (BLAN):

- SYST:COMM:IPAD:BLAN:VLAN:ID? // request currrent ID
- SYST:COMM:IPAD:BLAN:VLAN:ID n // Set VLAN ID

5th Interface (PLAN):

- SYST:COMM:IPAD:PLAN:VLAN:ID? // request currrent ID
- SYST:COMM:IPAD:PLAN:VLAN:ID n // Set VLAN ID

3.2 IP configuration over Ethernet (terminal)

The PT3000 product can be configured for either static or dynamic IP address operation. The factory default setting for the unit is:

- *Enabled interface: ETH1 / 1st Interface (FLAN)*
- *Address management: DHCP = OFF (static IP address)*
- *Default IP: 192.168.168.168*
- *Default Mask: 255.255.0.0*
- *Default gateway: 192.168.1.1*

Provided that the current IP setting for the unit is known (IP address and network mask) it is possible to query and set IP parameters over Ethenret from a PC by using a terminal program like for example TeraTerm or PuTTY. The PC's network interface must be configured to a free address on the same subment as configured for the PT3000 interface.

The various IP settings can then easily be read back or changed by means of the terminal program by specifying the **IP address of the PT3000** and **port number 4000**. The terminal program shall furthermore be configured for terminating each command line with a newline character as explained above for the RS232/SCPI command operation,. The command set for control via Etherent is the exact same as listed above in paragraphs 3.1.1 to 3.1.10 for RS232/SCPI control. **Note: the PC will loose**

connection to PT3000 if either the physical interface mapping and/or the logical IP setting is changed in a way that means that the PC and PT3000 are no longer physically connected and/ormso that the PC and PT3000 are no longer on the same subnet. In that case it'll be necessary to recconnect/reconfigure the PC accordingly to re-establish the connection. The below example shows a simple query of the default gateway address followed by a change of the value:

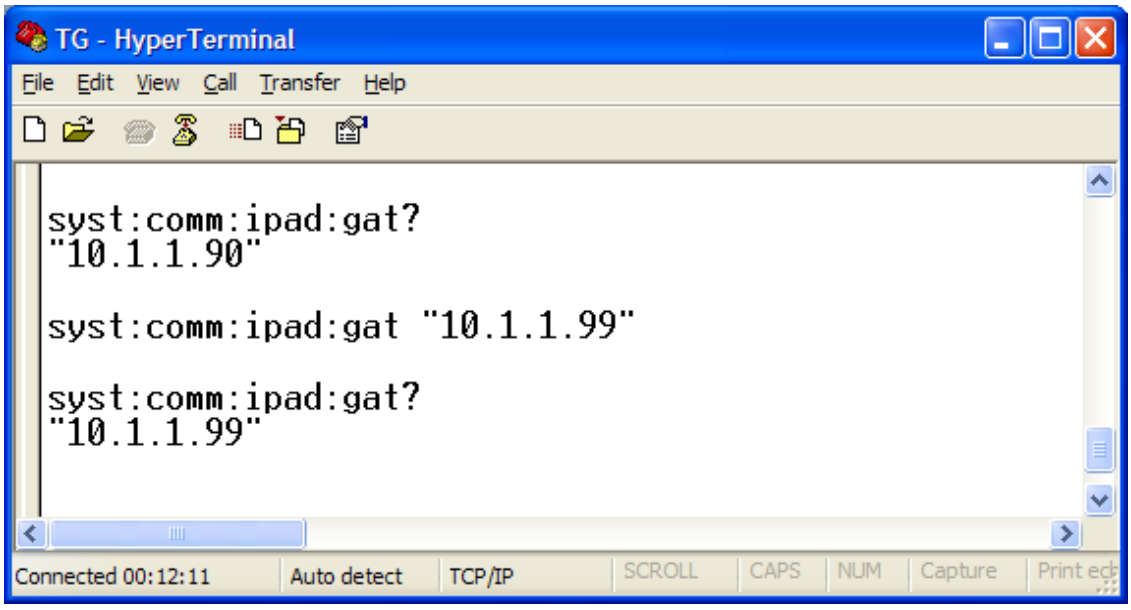


Figure 3-2 HyperTerminal showing current gateway IP address.

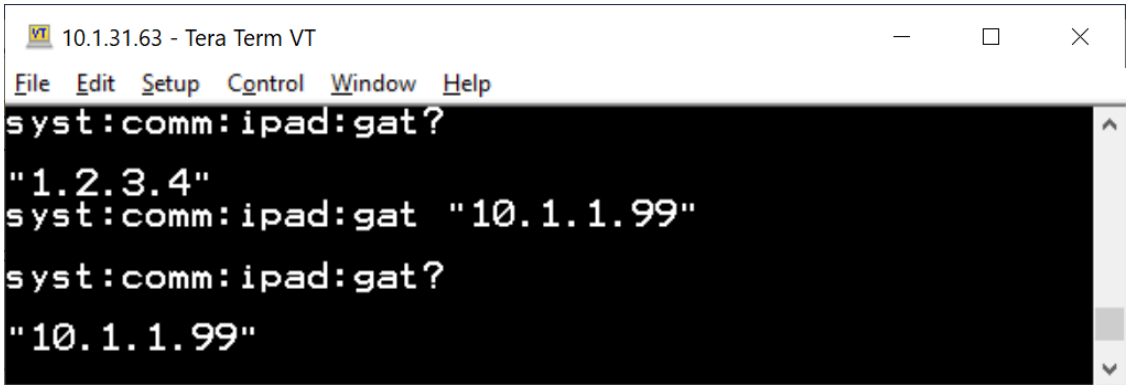


Figure 3-3 TeraTerm showing current gateway address

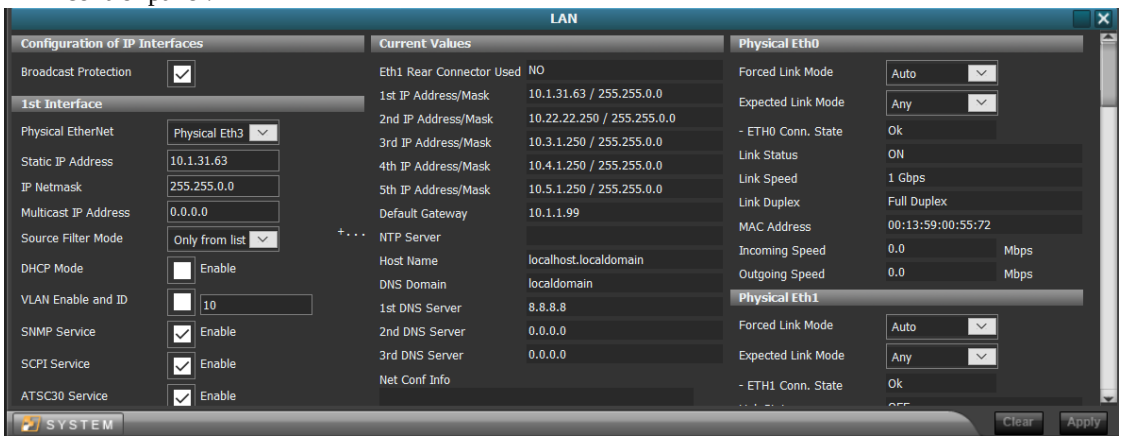
3.3 IP configuration over Ethernet (Webservice)

The PT3000 product can be configured for either static or dynamic IP address operation. The factory default setting for the unit is:

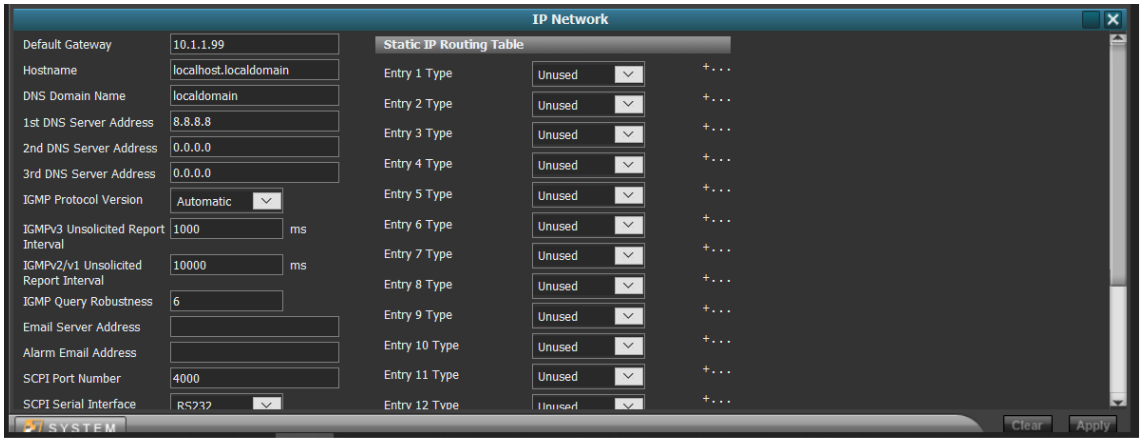
- *Enabled interface: ETH1 / 1st Interface (FLAN)*
- *Address management: DHCP = OFF (static IP address)*
- *Default IP: 192.168.168.168*
- *Default Mask: 255.255.0.0*
- *Default gateway: 192.168.1.1*

Provided that the current IP setting for the unit is known (IP address, network mask, physical port mapping) it is possible to query and set IP configurations from the PT3000 Web GUI. The PC's network interface must be configured to a free address on the same subment as configured for the PT3000 interface.
To connect to the PT3000 Web GUI enter the IP address of the PT3000 unit into the PC's web browser. When prompted login as 'admin' user, the default password is blank (i.e. no pasword). Then follow the menu path Web GUI→System→LAN (to observe and change settings ecplicit to the individual interfaces 1st Interface to 5th Interface). To observe and change common network settings like default gateway, DNS, etc follow the menu path Web GUI→System→NETWORK.
Note: the PC will loose connection to PT3000 if either the physical interface mapping and/or the logical IP setting is changed in a way that means that the PC and PT3000 are no longer physically connected and/ormso that the PC and PT3000 are no longer on the same subnet. In that case it'll be necessary to recconnect/reconfigure the PC accordingly to re-establish the connection.

LAN control panel:



NETWORK control panel:



4 Front panel operation

4.1 Front panel controls and displays

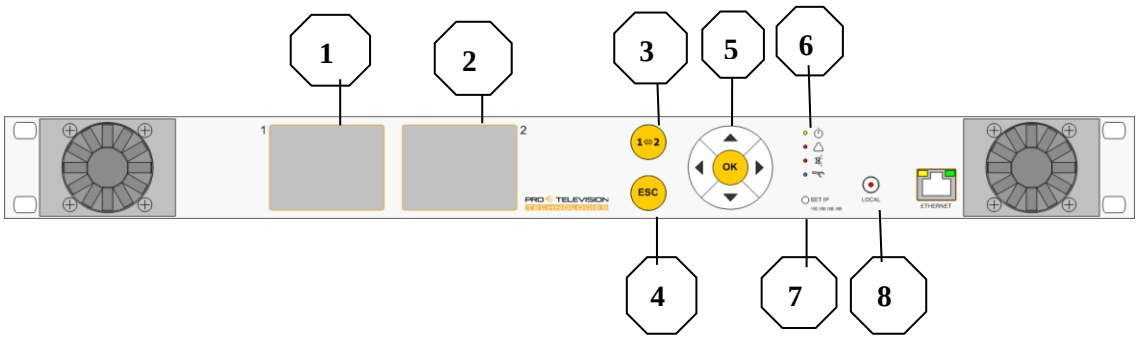


Figure 4-1 Front panel controls and displays.

Index	Function	Paragraph index for further description
1	Status and configuration display 1	4.1.1
2	Status and configuration display 2	4.1.1
3	Toggle switch for activating display 1 or display 2 for user navigation	4.1.2
4	ESC key	4.1.3
5	Main keyboard for navigation and control actions in the active display	4.1.4
6	General status LEDs	4.1.5
7	Recessed micro-switch for IP configuration reset. Use tip of ball pen, small screwdriver or similar for operation. Resets ETH1 → 192.168.168.168/16 and disables ETH0, ETH2 and ETH3	4.1.6
8	Toggle switch for enabling/disabling local control.	4.1.7

The contents of the front panel displays are generated entirely from the PT3000 Webservice which is described in paragraph 5 and 6. All user options via the front panel are identical to the options presented in the Webservice, unless it involves uploading or downloading of files (such as version- or status reports or presets), which requires the use of a PC. *Note: The range of configurational possibillities in local mode is subject to the access level in the 'Front Panel' sub-menu under the 'System' configurations menu.* ***The local mode access level can only be set through the PT3000 Webservice, allowing for central control of the device.***

4.1.1 Display 1 / Display 2

Two functionally identical displays resides on the front panel. Each providing access to the full monitoring and configuration menu. The displays may be in one of three states:

- **Active:** The display enters the active state when any key in the front panel is pressed.
- **Screen saver:** The display enters the screen saver state after a preset time of inactivity (no key pressed). The default timeout is 120 seconds. When in screen saver state one of three possible

displays will be opened: Overview of network address configuration, overview of alarm status or overview of instantaneous network data rate per interface. Default screen saver for Display 1 is Network Address display and default screen saver for Display 2 is the Network Rates display.

- **Off (blank):** The display enters the 'off' state after a preset time of inactivity (no key pressed). The default timeout is 240 seconds.

Example 1:
Display 1 and 2 active, both displays at menu root level. Display 1 in focus for control/navigation:

Figure 4-2 Display 1 (left display) in focus.

Example 2:
The support of two displays will for example facilitate simultaneous monitoring of signal performance (Optipower spectrum display) and monitoring/controlling parameters in another sub menu.

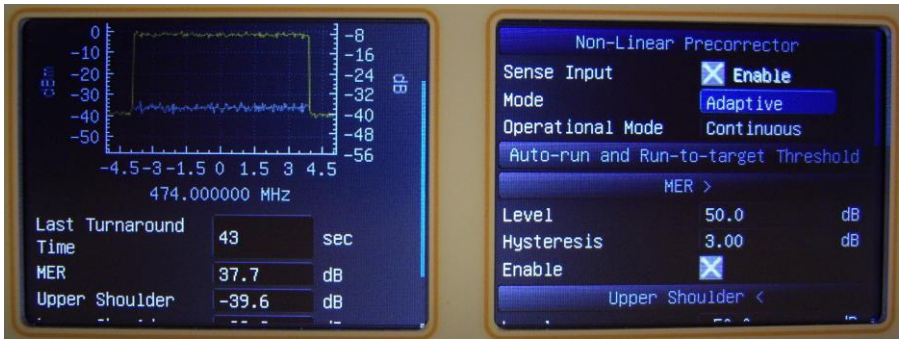


Figure 4-3 Example of utilization of the two displays.

Example 3:
Display 1 and 2 in 'screen saver' state (for more on screen saver mode, see paragraph 6.1.3.1):

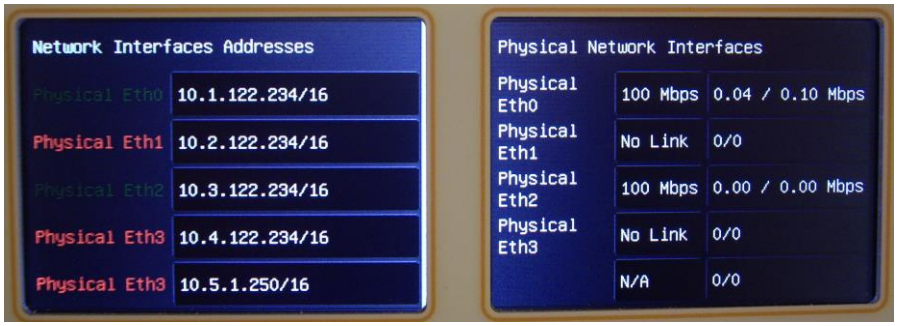


Figure 4-4 Screen saver mode for display 1 and 2.

4.1.2 Toggle display switch

The display toggle switch [***1<=>2***] allows the user to switch between the two displays.

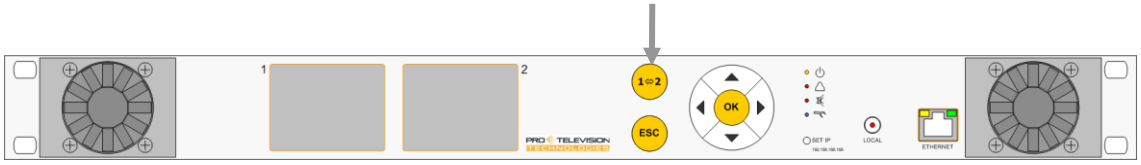


Figure 4-5 Location of the display toggle switch.

4.1.3 ESC key

The escape key [***ESC***] is used exit a sub-menu or a parameter field.

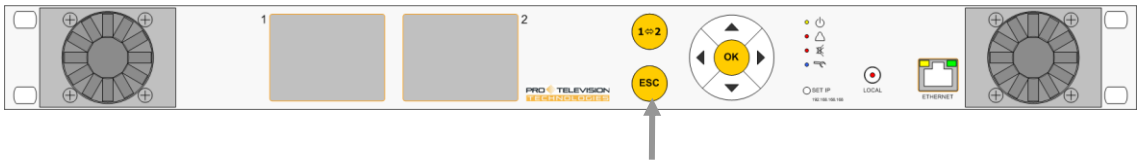


Figure 4-6 Location of the Escape key.

4.1.4 Main navigational keyboard

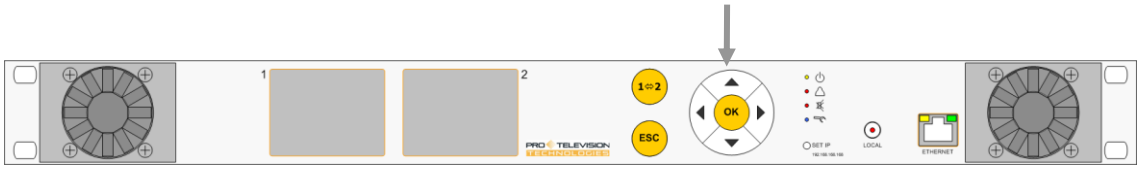


Figure 4-7 Location of the main navigational keyboard.

The main navigational keyboard is used to navigate the different menus by using the up and down arrows [▼] or [▲]. Entering a sub-menu is obtained by pressing the [***OK***] button, when the particular menu is highlighted.

Certain fields may also require horizontal navigation using the left and right arrows [◄] [►], e.g. when manually setting date or time.

When accessing individual fields in sub-menus to change parameters, the displays will provide a keyboard corresponding to the permissible input values, e.g. a numeric keyboard or an alpha-numeric keyboard. Use the arrow keys to navigate between the different keys corresponding to the desired values and select each by pressing the 'Enter' button provided in the on-screen keyboard.
When completed press the [***OK***] button, then press [***ESC***]. A confirmation dialogue will now appear and provide a choice between [***Save***] [***Discard***] [***Cancel***] .

4.1.5 General status leds

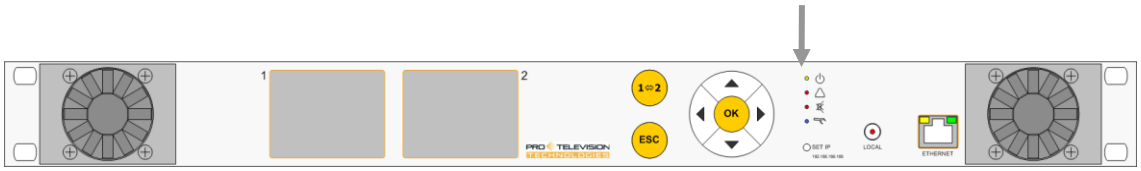


Figure 4-8 Location of the general status leds.

The front panel has four status leds to the right of the main navigational keyboard. These are - from top to bottom:

- On/Off - Amber led is lid when the device is turned on.
- Alarm - Red led is lid when one or more alarms are active.
- Mute - Red led is lid if output is muted.
- Service led - Amber led can be lid by the user.

4.1.6 Ip address reset

A micro switch that is accessible through a hole in front allows instant recovery of the default setting for the IP address parameters. To prevent accidental activation of the switch it can only be operated by inserting a small screwdriver, the tip of a pen or any other suitable pointed object through the access hole. After activation of the switch the PT3000 device will apply the following address settings:

- IP address mode: Static address (DHCP off)
- IP address : 192.168.168.168
- Network Mask: 255.255.0.0

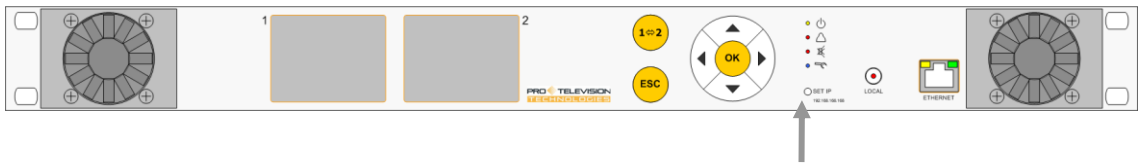


Figure 4-9 Location of IP address reset.

4.1.7 Toggle local mode switch

The local mode switch lights red when local mode is toggled on, otherwise button led is off. *Note: If local mode is enabled it will also be signaled in the PT3000 Webservice.*

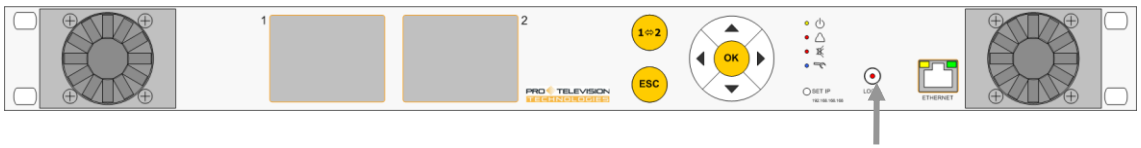


Figure 4-10 Location of local mode toggle switch.

5 Webservice operation

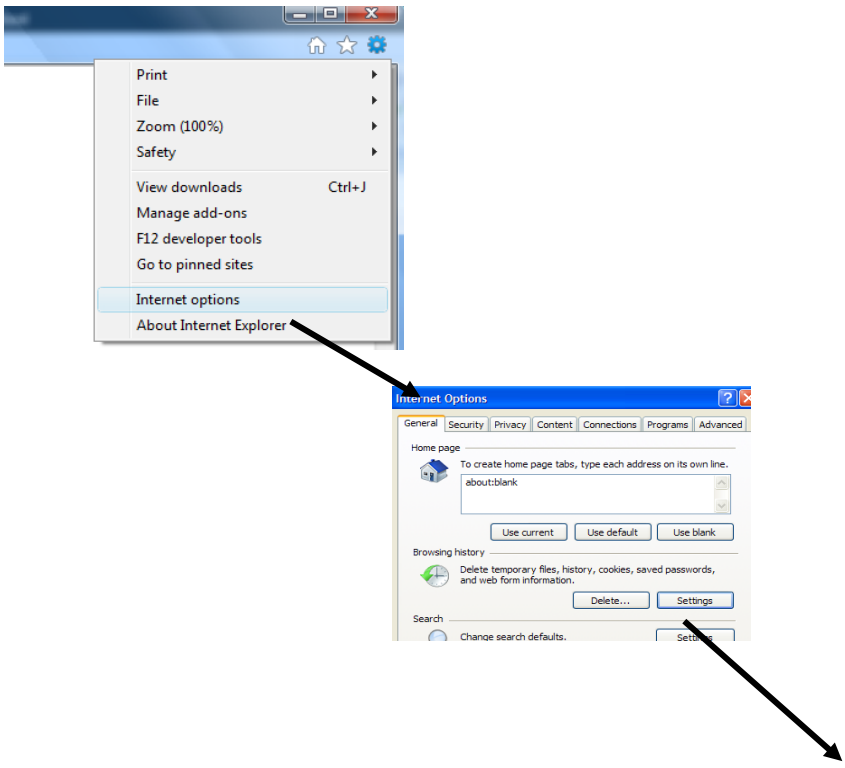
The PT3000 product is fully controllable over Ethernet by means of the Webservice function (Web browser control). The PT3000 Webservice is designed for use with **Internet Explorer** V8 and V9, and **Mozilla Firefox** V16 and **Google Chrome** V23. It is therefore strongly recommended to use one of these three browser types for the operation. The PT3000 must be configured in advance for the same address space as the PC used for the control and the PC must be connected to one of the TCP/IP mangement ports of the PT3000 over a network.

The Webservice interface is equally useful for controlling the PT3000 device in a configuration with a direct connection (Ethernet patch cable) between the PT3000 and the PC as well as in the typical operational environment where multiple products are accessible from the PC across a shared network.

5.1 Preparation of the web browser

The status pages provided by the PT3000 Webservice are updated in the web server whenever the operational status of the device changes. However, changes to operational status, occurrence of alarm messages, etc, may be masked if the web browser is configured for use of locally cached web pages. To ensure that the web browser always displays the latest status from the PT3000 Webservice and not displays outdated cached information it must be configured specifically to check for newer versions of a web page on every visit to the page. For Microsoft Internet Explorer 9 this is done as follows:

a) Select ‘Internet options’ from the ‘Tools’ menu.
b) Select ‘Browsing history’ → ‘Settings’ from the ‘General’ tab page.
c) Make sure ‘Every time I visit the page’ is ticked.



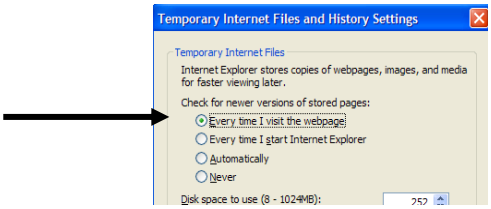


Figure 5-1 Browser preparation (Internet Explorer 9).

5.1.1 Login to the PT3000 Webservice

Connection to the Webservice function is established simply by entering in the Web browsers address field the IP address assigned to the specific PT3000 device. A login window will appear in order to authenticate the user's access to the Webservice. Login can be made at four different levels:

User classification	Default *User name*	Default Password	Remarks
Factory	*factory*	Anders4And	Access to restricted configurations like 'frequency' which are normally not intended for change after installation of device at site of operation
Administrator	*admin*	(no password)	Unrestricted access to the majority of configurable parameters for general operation including IP management and SW/FW upload
Operator	*oper*	(no password)	Access to all configurable parameters related to the PT3000 product function excluding configuration of IP parameters and excluding SW/FW upload
Observer	*observer*	(no password)	Only access to status displays and observation of current status in the configuration pages (no parameter modification is allowed – 'submit' button disabled.)

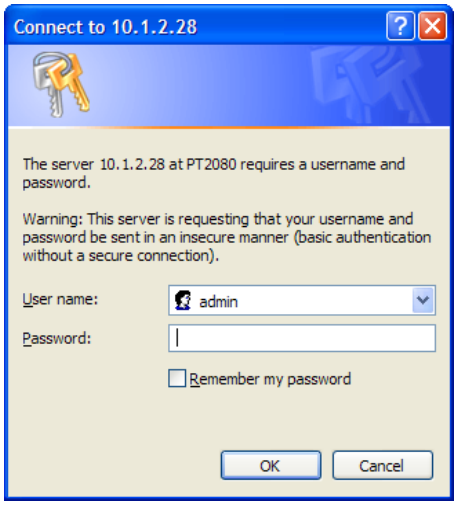


Figure 5-2 Login window (administrator status / default password).

5.1.2 PT3000 Webservice main page

The Webservice control interface allows monitoring of status as well as configuration of the operational parameters of the device subject to the log-in status for the user (observer, operator, administrator or factory). The user interface (web browser display) applies a user friendly concept where the general navigation between individual sub menus is based on a block oriented representation of the controlled device. The specific control for a certain function is therefore easily accessed by 'dragging' the functional block of interest into the configuration section of the display.

Connection to the Webservice function is established simply by entering in the Web browsers address field the IP address of the PT3000 device.
As soon as the connection has been opened the primary control and status page will appear. The page is divided into an upper section and a lower section.

The upper section provides a graphic representation of the block schematic of the device. The block schematic provides general status information about the device and serves as navigation tool for accessing specific status and configuration menus.

The lower section provides space for simultaneous display of three control and status panels for specific functional areas of the unit. The control panels are easily adapted to the current activity by dragging-and-dropping the required functional block from the upper section of the screen to the lower section of the screen (see paragraph 5.1.3.2 for details).

In case an alarm condition exists for one of the functional elements shown in the upper section of the screen the particular element will be shown in red color. Functional elements that are in the normal operational status will be shown in green color. Functional blocks that are not used in the current configuration are shown in grey color.

Figure 5-3 The PT3000 Webservice in a web browser window.

5.1.3 Webservice – Operation principle

5.1.3.1 Control panel configuration

The control panel (lower section of the screen) is easily adapted to the current activity by dragging-and-dropping the required functional block from the upper section of the screen to the lower section of the screen. Control panels for three functional blocks can be open simultaneously in the lower section.

The ‘Functional Blocks’ in the upper section of the screen can be subdivided into three types:

- **Main function block:** a main function block holds the top level control and status parameters for a specific function. These blocks are identified by the blue label ‘attached’ above the block (white text on blue background). In the below example screen print main functional blocks exist for the sub-functions Reception, Input, Mode, Pre-Correction, Output and Reference.

- **Specific function block:** a specific function block holds control and status functions for a specific function within a ‘Main functional block’. In the below example screen print it can for example be noted that the Pre-Correction main block contains specific functional blocks for the PAPR, Linear, and Non-Linear functions. Likewise, it can be seen that the Output block contains specific functional block the RF Output functions.

- **Interface points:** The various interface points in and out of the unit presented in the upper section of the block are themselves mini functional blocks and similar to the main and specific functional blocks these points can be dragged-and-dropped to the lower section of the screen whenever it’s desired to check or set parameters related to the specific point. In the below screen print it can for example be noted that individual connection points exist for the GNSS, 10MHz, 1PPS.

Figure 5-4 Block principles of the PT3000 Webservice.

5.1.3.2 Parameter control for Main Function Block

To access the control panel for a main function block (for example the ‘Reference’ block) proceed as follows:

1. Place the cursor over the blue label of the block of interest (for example the ‘Reference’ block).
2. Press the left mouse button.
3. While keeping the left mouse button pressed drag the block to the lower section of the screen.
4. When the block has been dragged to the lower section release the left mouse button. The control panel that is associated with the block will now open in place of the panel over which the block was dropped. The block may freely be dropped in any of the three panels (left, centre or right) according to individual preferences.

Figure 5-5 Example 1 of accessing a main function block.

Figure 5-6 Example 2 of accessing a main function block.

5.1.3.3 Parameter control for Specific Function Block

To access the control panel for a specific function block (for example the ‘ASI 1’ block) proceed as follows:

1. Place the cursor over the block of interest (for example the ‘ASI 1’ block).
2. Press the left mouse button.
3. While keeping the left mouse button pressed drag the block to the lower section of the screen.
4. When the block has been dragged to the lower section release the left mouse button. The control panel that is associated with the block will now open in place of the panel over which the block was dropped. The block may freely be dropped in any of the three panels (left, centre or right) according to individual preferences.

Figure 5-7 Example 1 of accessing a specific function block.

Figure 5-8 Example 2 of accessing a specific function block.

5.1.3.4 Parameter control for Interface point

To access the control panel for a specific Interface point (for example the ‘GPS’ reference interface point) proceed as follows:

1. Place the cursor over the interface point of interest (for example the ‘GPS’ reference interface point).
2. Press the left mouse button.
3. While keeping the left mouse button pressed drag the ‘Interface point’ to the lower section of the screen.

When the ‘Interface point’ has been dragged to the lower section release the left mouse button. The control panel that is associated with the connection point will now open in place of the panel over which the Interface point was dropped. The Interface point may freely be dropped in any of the three panels (left, centre or right) according to individual preferences.

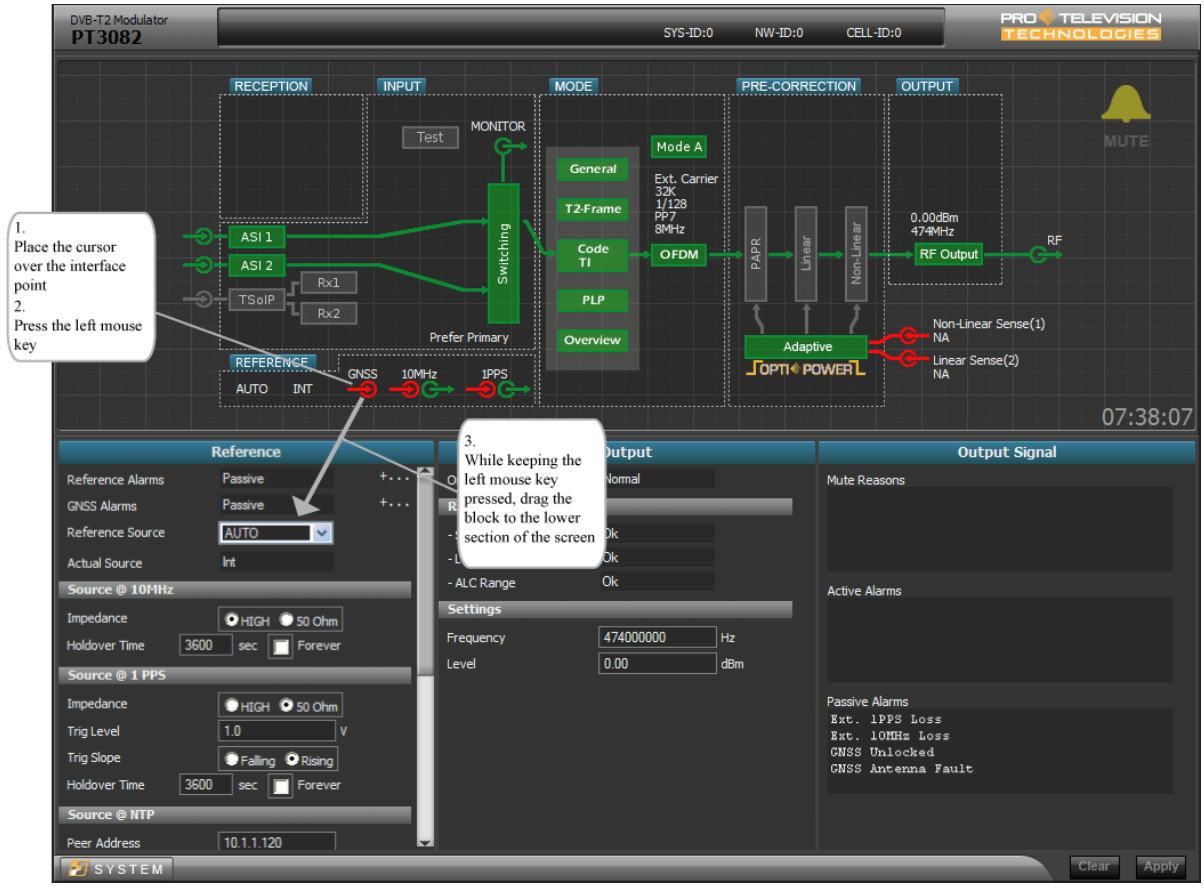


Figure 5-9 Example 1 of accessing an interface point.

Figure 5-10 Example 2 of accessing an interface point.

5.1.3.5 Access to System Parameters

A number of system oriented parameters can be accessed by left-clicking the [***System***] button located in the lower-left corner of the web page. To access a specific system (for example saving or loading a device preset) proceed as follows:

1. Left click the [***System***] button. A menu including the various choices will now open up above the [***System***] button.
2. From the menu select the required function (for example ‘Preset’ management) by left-clicking the point in the menu.
3. The corresponding control panel will now open up in the lower section of the screen in place of the three regular control panels.
4. When the setting of interest has been verified/changed as required the ‘system’ control panel is closed again by left-clicking the [***x***] in the top-right corner of the panel.

Figure 5-11 Example 1 of accessing the system parameters.

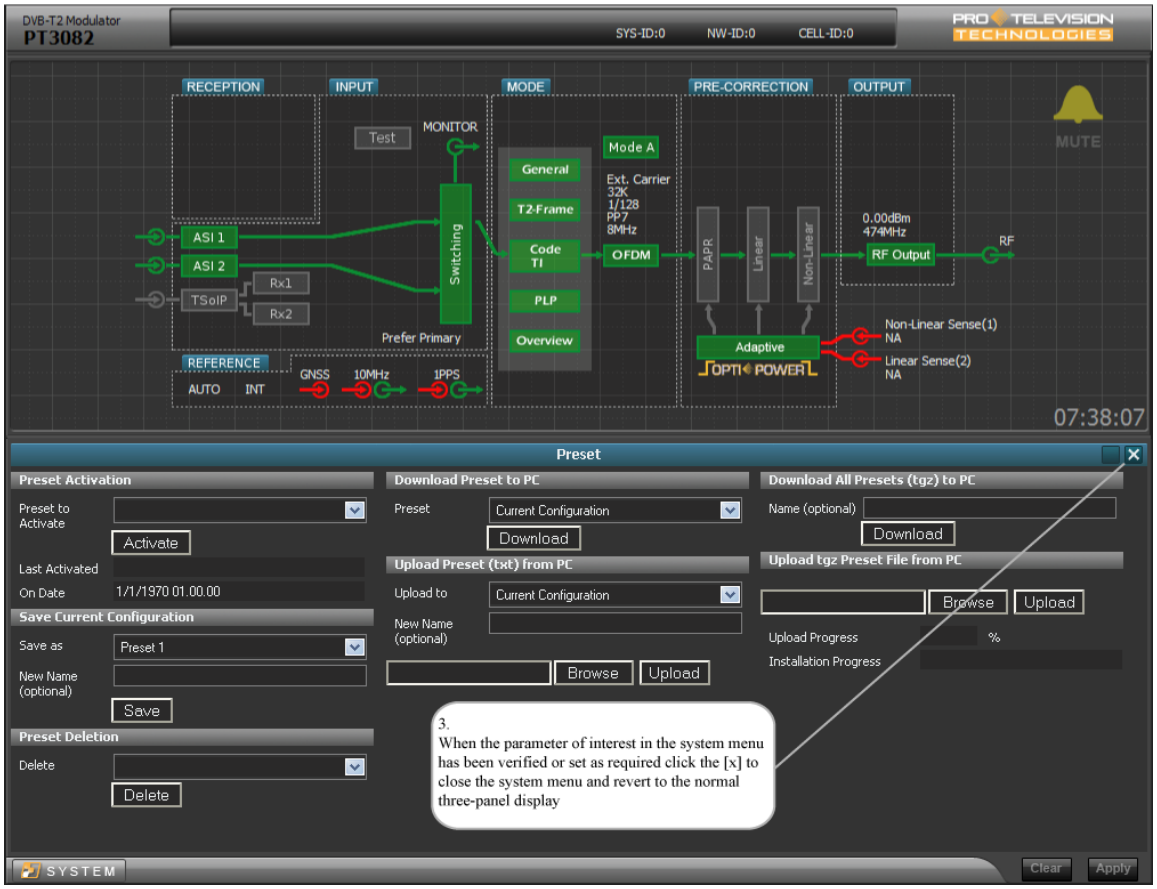


Figure 5-12 Example 2 of accessing the system parameters.

5.1.3.6 Setting of a parameter value

To change the setting of a specific user parameter, proceed as follows:

1. If not already available for modification move the functional block in which the parameter resides to the control panel in the lower section of the screen as described above.
2. Place the cursor over the location in the control panel where the parameter of interest resides and click the left mouse button to set the point in focus. Depending on the type of input set the new value as required. The input can be ‘alpha-numeric for input by keyboard’ or based on a drop-down list holding the valid choices or based on a tick-box or radio-button system. Notice that some fields are status displays only (read only) and that it consequently is not possible to access these fields for parameter change.
3. When the new value has been specified the border of the field in question will be presented in a light blue color to indicate that a new value has been specified but not yet implemented/confirmed.
4. To implement/confirm the new value move the cursor to the [***Apply***] button and click the left mouse button to confirm the entry.
5. When the new value has been implemented/confirmed the light blue border around the parameter input field will return to the normal black color.

Figure 5-13 Setting parameter values.

In case a dissallowed value is entered in a parameter field, the specific field will show a red border to indicate a wrong value has been entered. In some cases a text will appear indicating the applicable value range. This warning will appear even before the the [***Apply***] button is clicked.

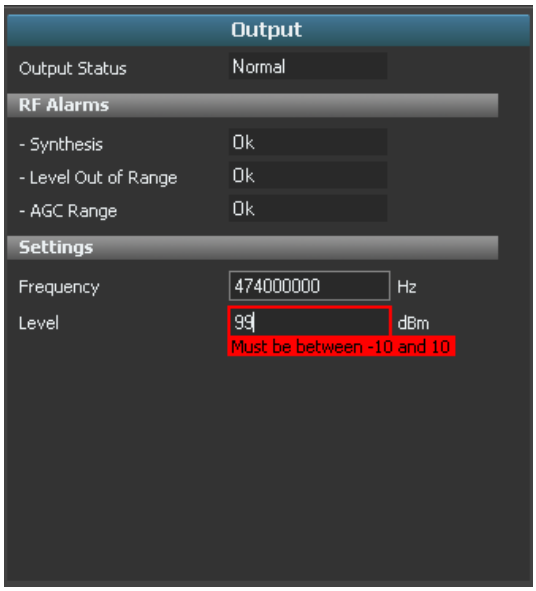


Figure 5-14 Warning when entering a wrong parameter value.

If an attempt to apply a wrong value is made an alert dialogue will appear.

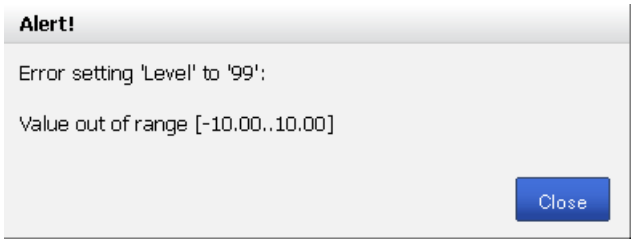


Figure 5-15 Alert dialogue when applying a wrong parameter value.

When the alert dialogue is closed the entered parameter value will be reset to its prior value, i.e. no changes has been applied.

5.1.3.7 Software/Firmware update

Software/Firmware (SW/FW) update of the PT3000 is carried out over the Ethernet interface. The update is based on a so-called 'tarball' file that contains the SW/FW images that define the specific product version (for example a DVB-T2 modulator, an ATSC modulator or an ISDB-T modulator). The typical size of the 'tarball' is about 16MByte. SW/FW updates are therefore normally downloadable from the ProTelevision FTP site (contact ProTelevision's support centre support@protelevision.com to obtain a user ID and a password).

The update procedure is as follows:

1. Download the 'tarball' file from the FTP site to a directory on your local network or to the PC that you are using explicitly for managing the PT3000.
2. Connect to the Webservice interface of the PT3000 unit as described in paragraph 3.3.
3. In the lower left corner of the Webservice graphical user interface you will find the [***System***] button. Click this button to open the system menu.
4. In the system menu select the function [***SW Upgrade***]. See paragraph 6.1 for further details about the system menu.
5. In the *Maintenance* section of the *System* menu select *Software Upgrade*.
6. Select [***Browse***] and navigate to the location of the downloaded 'tarball' file.
7. Select the file '*tarball.tgz'* and click [***Upload***].
8. The loading of the new SW/FW should now start automatically. The progress can be monitored from the Webservice interface. A number of steps including uploading, unpacking and verifying and deleting files will pass automatically (the processing time is several minutes).
9. When the loading of new SW/FW is completed the unit will automatically reboot. After the reboot the new SW/FW version is active.
10. The active SW/FW version can be verified after the reboot via the [***About***] function in the [***System***] menu.

6 Webservice manual

In the following paragraphs the system menu and main- and specific function blocks and interface points are described. The presence and types of specific function blocks in the PT3000 Webservice are to some extent determined by which options are installed on the modulator and subsequently in use (see paragraph 6.1.1.3 for details). In this section all functionalities are covered.

6.1 The System menu

The System menu gives access to system wide configurations subject to the user login level (see paragraph 5.1.1 for more on user login level). It is devided into sections containing several sub-menus pertaining to the different sections. In the top of the system menu the current username of the current user logged in is displayed. The figure below shows the system menu as displayed for the factory user, which is the highest level user.

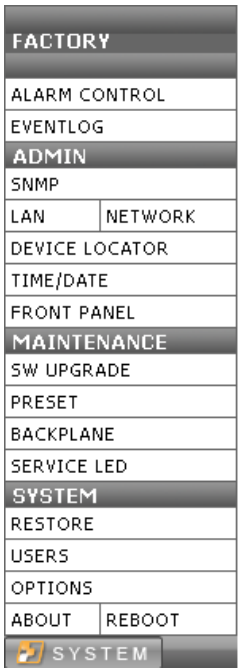


Figure 6-1 The System menu.

6.1.1 System section

The System section contains information and configuration options for to the PT3000 system.

6.1.1.1 About

The ***About*** menu displays general information about the PT3000 device, such as the device's serial number, the sowftware versions installed, IP and MAC addresses as well as information on hardware modules.
In the ***About*** menu, the user is also able to view or download version and status reports[7].

[7] The status report is intended for ProTelevision internal use e.g. in relation to support issues and is thus encrypted.

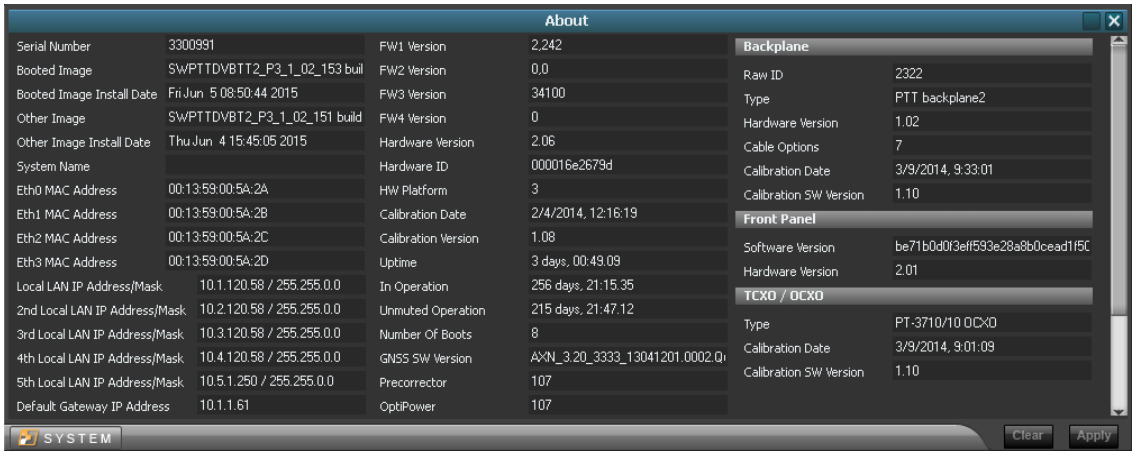


Figure 6-2 The About system settings.

6.1.1.2 Reboot

The ***Reboot*** menu allows the user to change modulation standard pertaining to the specicfic sowftware build[8]. The PT3000 may have up to two software images loaded (image 0 and image 1) of which only one image will always be the current which is displayed in 'Booted on Image' field. In case of a reboot action the user may chose to reboot on either of the software images if more than one image are installed.

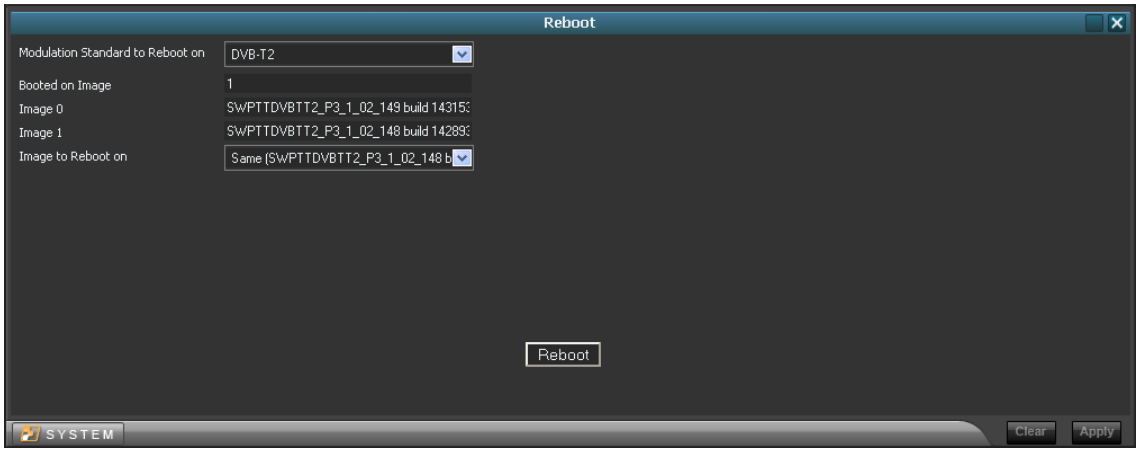


Figure 6-3 The Reboot system settings.

6.1.1.3 Options

In the ***Options*** menu optional software is displayed pertaining to the PT3000 device's software configuration. An option code can be entered to unlock software options if these have been purchased.

[8] Not all software builds have this option.

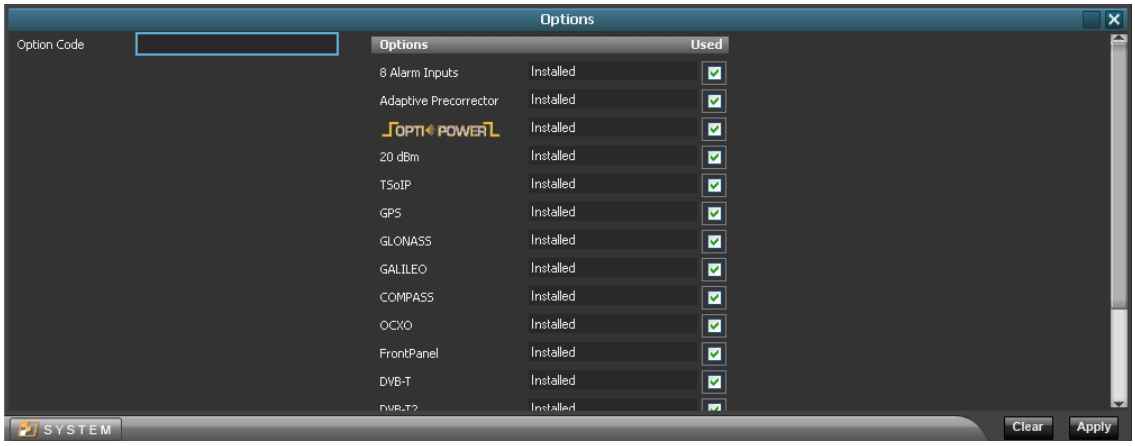


Figure 6-4 The Options system settings.

6.1.1.4 Users

The ***Users*** menu allows the user to set or change passwords for different users.

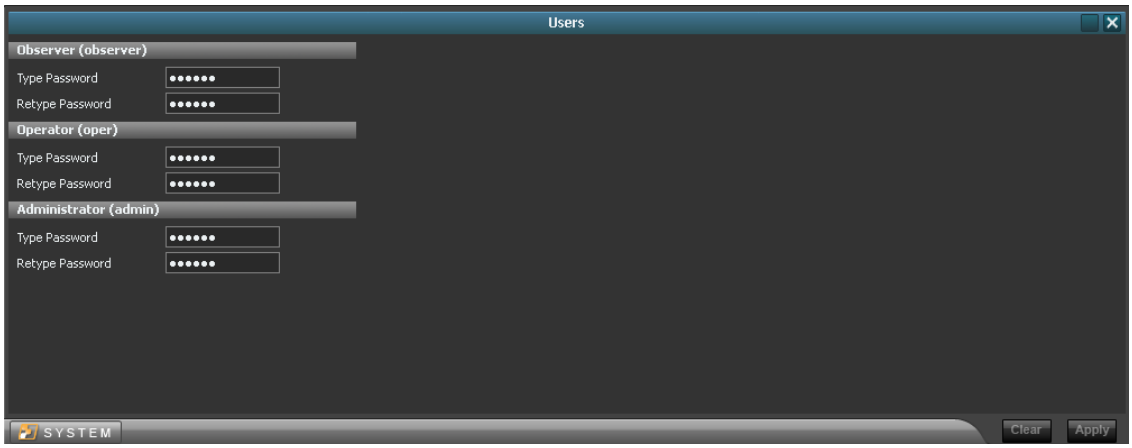


Figure 6-5 The Users system settings.

6.1.1.5 Restore

The ***Restore*** menu allows the user to restore the PT3000 device to its factory settings.

6.1.2 Maintenance section

The ***Maintenance*** section contains user configurable options pertaining to the service- and maintenance of the PT3000 device.

6.1.2.1 Service Led

The ***Service Led*** menu allows the user to lid the service led on the front panel, e.g. indicating to a service technician at the site of installation that the device needs attendance.

6.1.2.2 Backplane

The ***Backplane*** menu gives the user the possibility of switcing the general and alarm I/O connectors between ‘ Active Low’ and ‘Active High’ (see paragraph 2.1.3 and 2.1.4 for more)

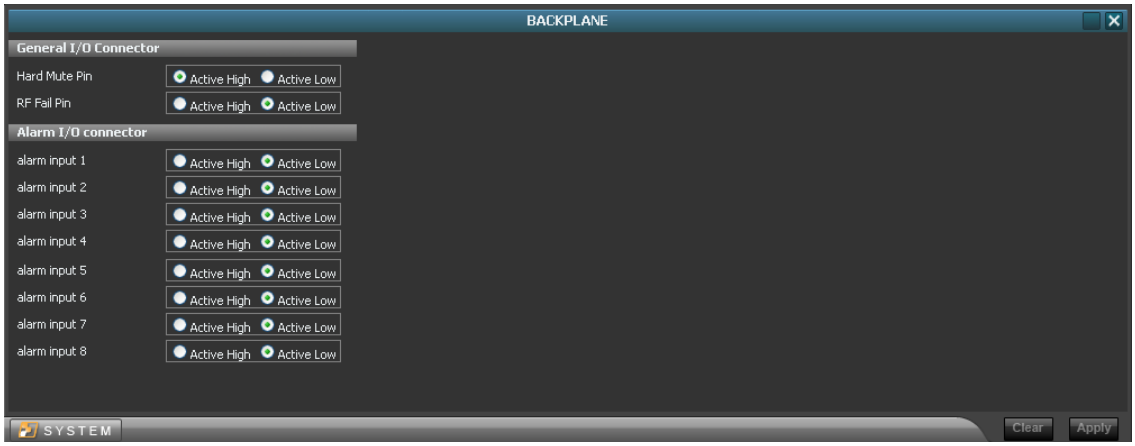


Figure 6-6 The Backplane system settings.

6.1.2.3 Preset

In the ***Preset*** menu the user can save up to 10 presets with individual preset names. Presets can also be up- or downloaded from/to a PC or deleted from the PT3000 device. An option exists to Download all existing presets in a single archive file (.tgz). This archive file can then be distributed (uploaded) to other PT3000 devices allowing for quick update of the preset configuration if needed. All presets saved to an archive file will instantly be availbale after being uploaded to a PT3000 device.

Saved presets that appear in the drop-down lists in the Preset menu, will be shown with their respective modulation standards in a parenthesis before the optional preset name.

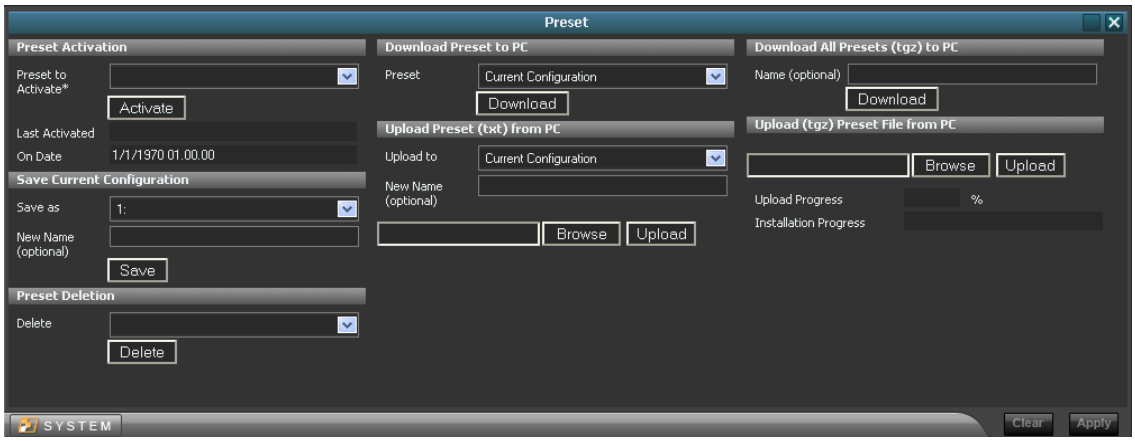


Figure 6-7 The Preset system settings.

If a saved preset differs from the current modulation standard, this is indicated by an asterix prefix (*) in front of the preset name in the ‘Preset to Activate’ drop-down list. Activating a preset with a different modulation standard requires a reboot of the PT3000 device.

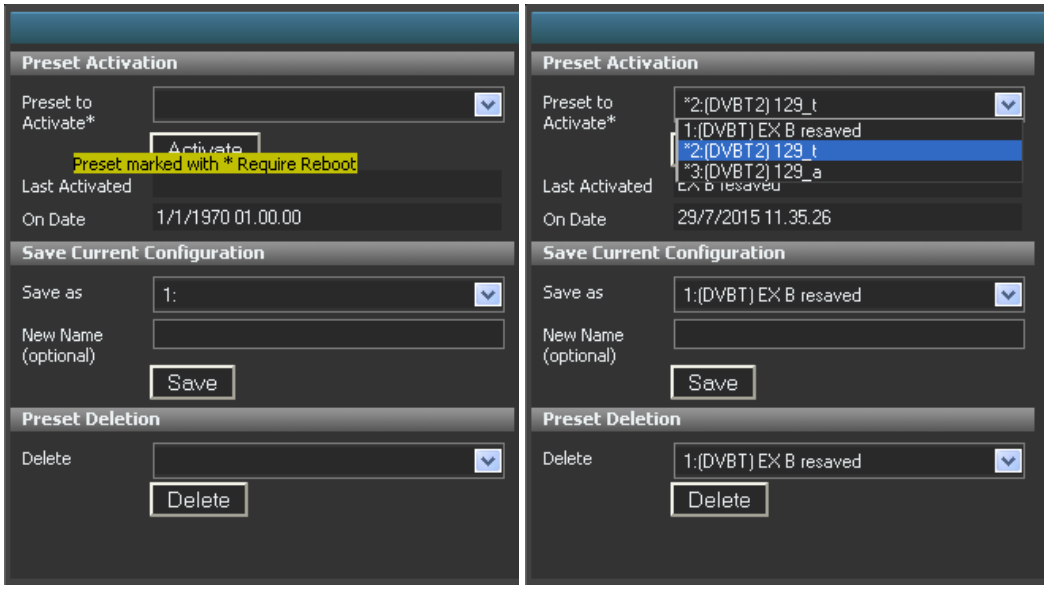


Figure 6-8 Indication of different modulation standards in presets.

6.1.2.4 Software Upgrade

The ***Software Upgrade*** menu allows the user to upload a software image to install, upgrade (or downgrade) the PT3000 device.
This will not effect the current image 'Boot Image' - but only the 'Other Image'. After completion of the software update the two images will shift place so that the just updated image wil be the one the device reboots on after installation.
For more on the software update process please refer to paragraph 5.1.3.7.

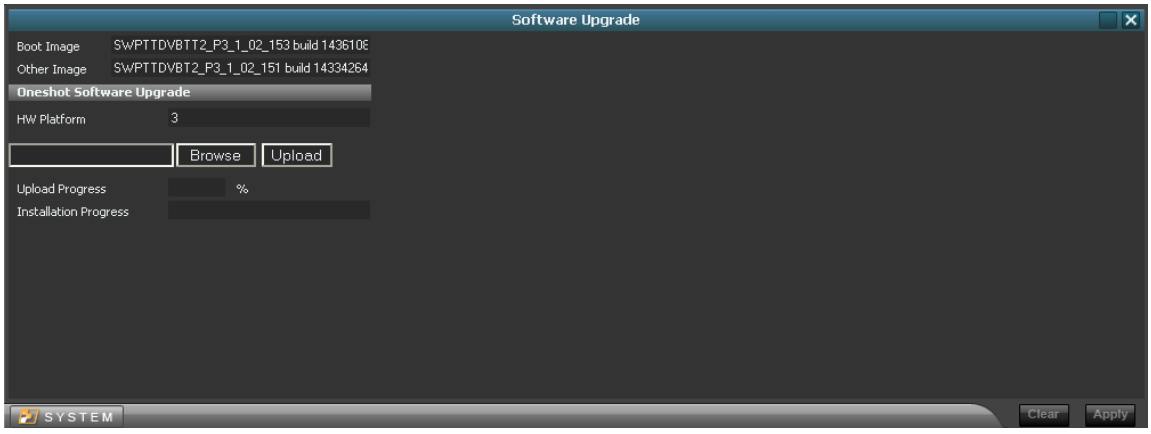


Figure 6-9 The Software Upgrade system settings.

6.1.3 Admin section

6.1.3.1 Front panel

The ***Front Panel*** menu provides the user the ability to configure the front panel settings.

The remote (Webservice, SNMP, SCPI) or local access can be switched on and the local access mode timeout can be set.

Access level for local mode can be set to Factory, Administrator, Operator or Observer respectively which will then effect what a user at the installation site is able to configure from the front panel.

There are three choices for screen saver settings for each display. These are:

- Alarm overview.
- Network addresses.
- Network rates.

Times for screen saver timeout and when the display turns off (blank) as well as individual backlight setting for each display are also user configurable.

Finaly, a tick box for testing the front panel leds is present. If active the front panel leds (except for the power led), will flash continually until the tick box is checked off.

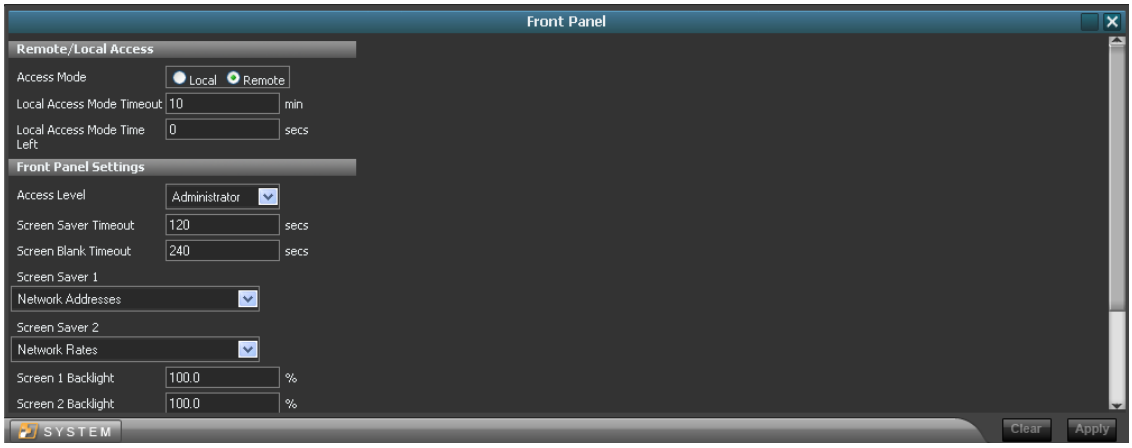


Figure 6-10 The Front Panel system settings.

6.1.3.2 Time/Date

In the ***Time/Date*** menu the PT3000 system time can be set to a wide range of timezones. It can also be manually configured or synchronized via NTP, GNSS, or automatically.

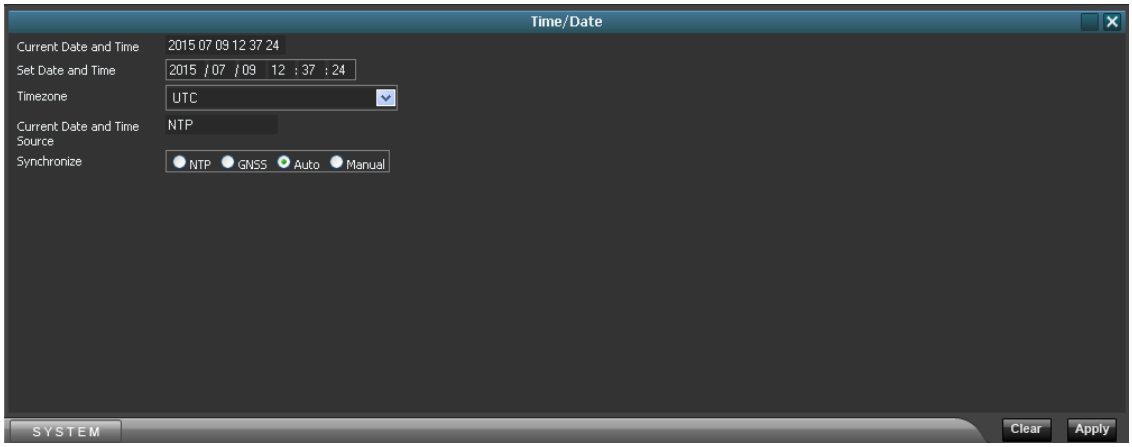


Figure 6-11 The Time/Date system settings.

6.1.3.3 Device locator

The device locator function will generate and display a listing of all ProTelevision PT2000 and PT3000 modulator units visible in the the network address space to which this modulator unit is connected.

6.1.3.4 LAN

Settings pertainning to the LAN (Local Area Network) can be configured in tha ***LAN*** menu.

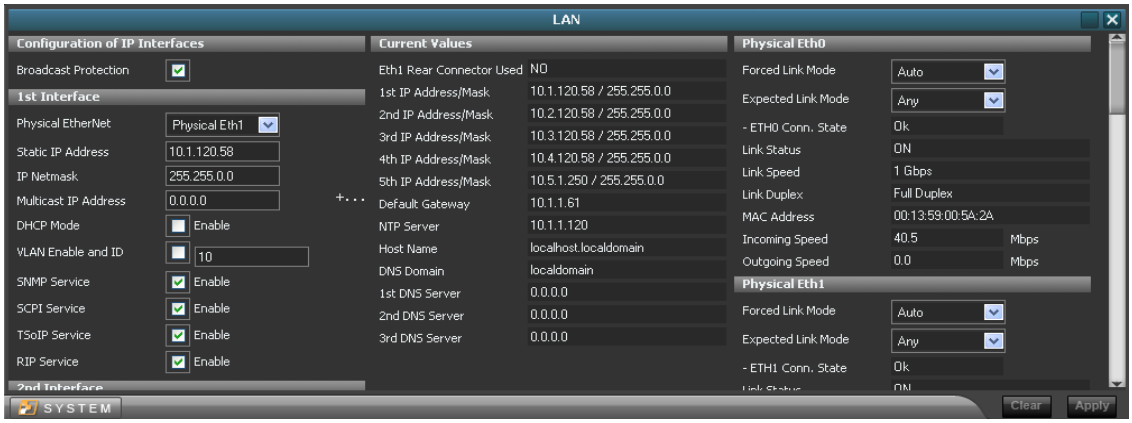


Figure 6-12 The LAN system settings.

In the LAN configuration panel under the heading *Nth Interface* the following parameters can be configured:

- **Physical Ethernet:** this field associates any of the LAN interfaces with any of the physical interfaces.
- **Static IP Address**: this field is used for specifying the IP address for the *Nth Interface* when static address mode is used (DHCP mode disabled).
- **IP Netmask**: this field is used for specifying the netmask for the *Nth Interface* when static address mode is used (DHCP mode disabled).
- **Multicast IP address**: this field is used for specifying the multicast address for the *Nth Interface*. The expansion (+..) link allows access to configuring source filter (include sources or exclude sources) in acordance with IGMP V3.
- **DHCP Mode**: This tick box is used for enabling/disabling the DHCP mode for the Nth Interface.
- **VLAN Enable**: This tick box and the numeric entry field are used for enabling VLAN mode for the Nth interface. VLAN should only be enabled if the unit is deployed and managed in a VLAN environment. The unit will not be accessible in VLAN mode unless the PC and other equipment interfacing the unit is also in VLAN mode.
- **SNMP Service**: This tick box is used for enabling/disabling SNMP control of PT3000 through Nth Interface.
- **SCPI Service**: This tick box is used for enabling/disabling SCPI control of PT3000 through Nth Interface.
- **TSoIP Service**: This tick box is used for enabling/disabling TSoIP traffic to PT3000 through Nth Interface.

- **RIP Service**: This tick box is used for enabling/disabling Routing Information Protocol (RIP) for the N[th] Interface.

Note: Webservice control of PT3000 is always enabled for the 1[st] Interface and cannot be disabled through user control.

6.1.3.5 Network

Genereal network settings can be configured in the ***Network*** menu.

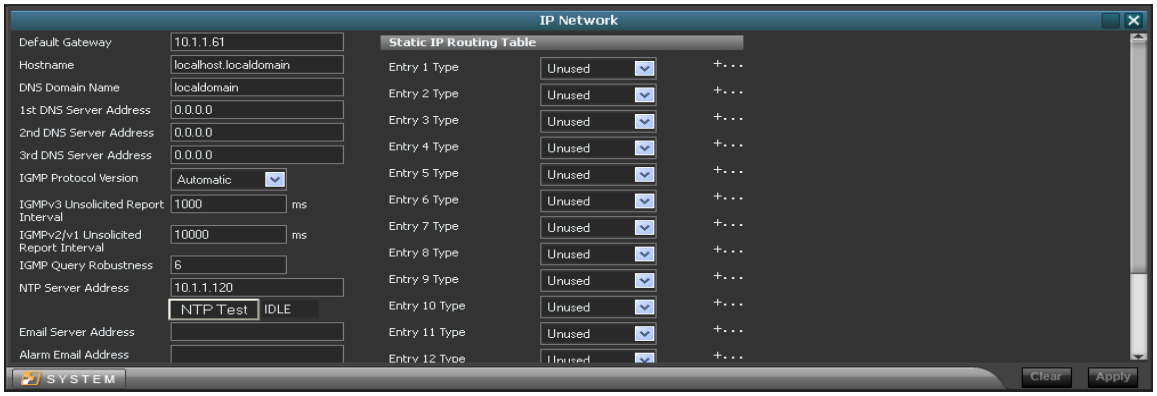


Figure 6-13 **The IP Network system settings.**

The ***IGMP protocol*** version to be used by the TSoIP function by multicast mode can be auto-detected or set explicitly through user control. To configure the 'IGMP protocol' use the the IGMP Protocol Version control field (drop-down list) to select between auto selection of protocol or static operation with either protocol version 1, 2 or 3

The ***NTP (Network Time Protocol)*** server IP address can be entered in the NTP Server Address field. The PT3000 offers the ability to test if the device can lock to the NTP peer. To do this click the NTP Test button after having entered the IP address or domain name for the NTP server. If the PT3000 is able to lock to the NTP server, it will state the message 'OK', otherwise it will state 'Failed'. If no test has been performed the NTP test message field will show 'IDLE' even if if NTP synchronization is obtained. Please consult the event log to see the status of NTP synchronization.

Setting up ***email alarm notifications*** is also done in the Network mednu. This is described independently in the Alarm System section. Specific innstructions on how to configure email alarm notifications, please refer to paragraph 7.2.1.3.

It is possible to change the PT3000 device's ***webserver port number*** (for the Webservice) if this is desired. Default Webservice port number is 80.

Port number, ***serial interface*** and ***baudrate for SCPI communication*** are also configurable through the Network menu. For more on configurartion of the serial interface, see paragraph 2.3.1 as well.

6.1.3.6 SNMP

SNMP (Simple Network Management Protocol) can be configured in the ***SNMP*** menu.

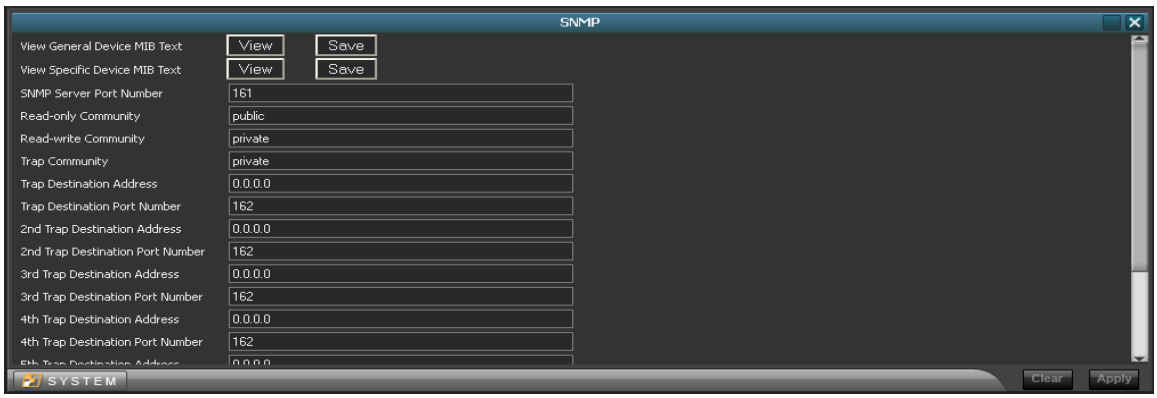


Figure 6-14 The SNMP system settings.

From the SNMP menu it is possible to view or download the general- as well as the specific device MIB text as a text file.

If desired the SNMP port number can be changed. The default port number for the protocol is 161.

Community strings for read-only, read-write and trap can be changed independantly to authenticate messages between SNMP management software and the SNMP agent (the PT3000 device). Default community strings are:

- Read-only community: **public**
- Read-write community: **private**
- Trap community: **private**

Please refer to paragraph 7.2.1.2 for information on configuring SNMP traps.

Further parameters that can be set in the SNMP menu are:

- **SysName** * should be set to the *fully-qualified domain name* (FQDN) for the managed device. In other words, it's the hostname associated with the managed device's IP address. The RFC 1213 definition is as follows:
  - ```
    sysName OBJECT-TYPE
      SYNTAX  DisplayString (SIZE (0..255))
      ACCESS  read-write
      STATUS  mandatory
      DESCRIPTION
              "An administratively-assigned name for this
              managed node. By convention, this is the node's
              fully-qualified domain name."
      ::= { system 5 }
    ```

  * Note: Setting of the SysName variable in the PT3000 device is optional.

- **SysLocation** * is the physical location for the device being monitored. Its definition in RFC 1213 is:
  - ```
    sysLocation OBJECT-TYPE
      SYNTAX  DisplayString (SIZE (0..255))
    ```

```
        ACCESS  read-write
        STATUS  mandatory
        DESCRIPTION
                "The physical location of this node (e.g.,
                'rack unit 4, 3rd floor, installation site')."
    ::= { system 6 }
```

** Note: The SysLocation will also be displayed in the top left corner of the PT3000 Webservice. Setting of the SysName variable in the PT3000 device is optional.*

- **SysContact** * is defined similarly as SysLocation:
  - sysLocation OBJECT-TYPE

```
SYNTAX  DisplayString (SIZE (0..255))
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
        "The textual identification of the contact
        person for this managed node, together with
        information on how to contact this person."
::= { system 4 }
```

** Note: Setting of the SysName variable in the PT3000 device this object is optional.*

- **SysDescription** * is an optional textual description of the entity:
  - sysLocation OBJECT-TYPE

```
SYNTAX  DisplayString (SIZE (0..255))
ACCESS  read-write
STATUS  optional
DESCRIPTION
        "This value could include the name and version
        identification this managed node's hardware
        revision, software operating-system  (e.g.,
        2.06, P3_1_02_153 build 1436107656')."
```

** Note: The SysDescription will also be displayed in the About system menu in the PT3000 Webservice. Setting of the SysName variable in the PT3000 device is optional.*

6.1.4 Eventlog

The ***Eventlog*** menu shows the most recent system events and alarms that are set to be logged in the ***Alarm Control*** menu. For more on configuring logging of events and alarms, see paragraph 7.1.2. The full eventlog can be viewed and downloaded as a text file. It is also possible to clear the current logged events or entirely disabling logging.

There are two logging modes available:

- "FIFO" - Logging mode, when the log is First In First Out, rolling window.
- "FULL" - Logging mode, when the log is full, keep eldest log entries.

For more details on the eventlog please refer to paragraph 7.3.

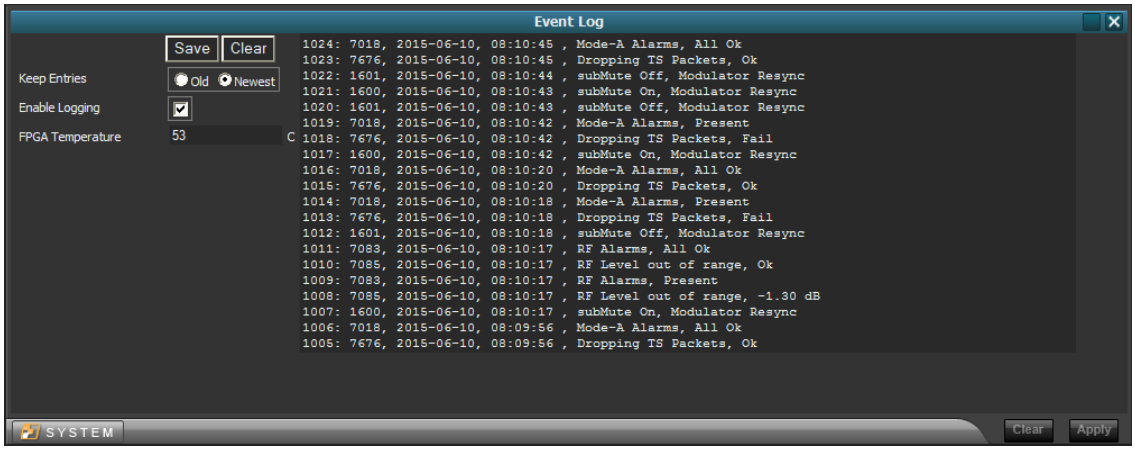


Figure 6-15 The Event Log system settings.

6.1.5 Alarm Control

The ***Alarm Control*** menu allows the user to configure an array of alarms in the PT3000 device. The alarm system is decribed independently in paragraph 7.

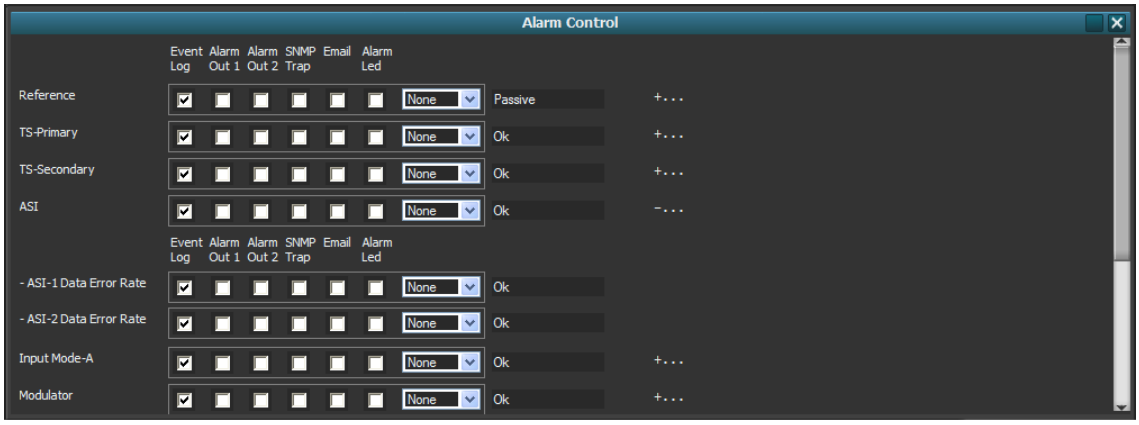


Figure 6-16 The Alarm Control system settings.

6.2 Main function block: Input

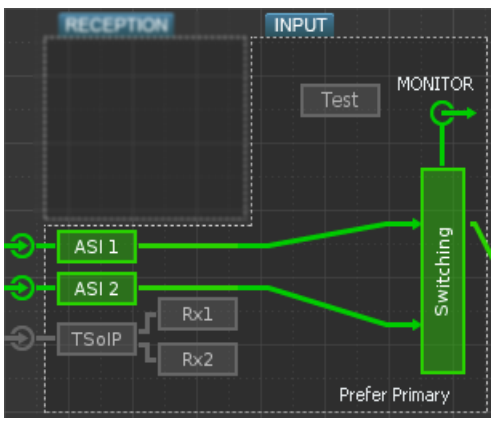


Figure 6-17 The Input main function block.

Dragging the main function Input block to the lower section of the webservice page reveals the top level status parameters for the Input function.
The Input main function block contains information on TS-Primary and TS-Secondary alarms, such as as a general alarm status. However, clicking the '+…' expands a detailed list of alarms such as Sync loss, T2MI Validation Error, L1 Current missing. The main function block also lists the PIDs of the primary and secondary input transport streams when available.

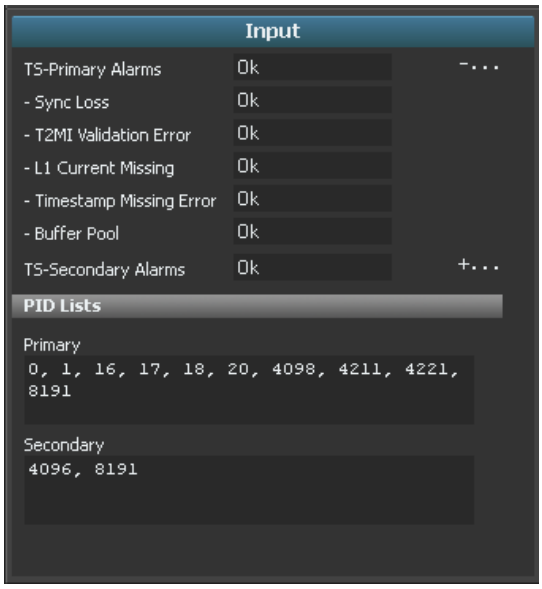


Figure 6-18 Contents of the Input block.

6.2.1 Specific function blocks in Input

6.2.1.1 ASI-1 and ASI-2

ASI –1 and ASI-2 specific function blocks display status information about the inputs of TS in ASI format. For example if Data Error Rate is present, Sync Detector Status, line Status. The two configuration parameters 'Synchronization Timeout' and 'Data Error Alarm Limit' are user controlled.

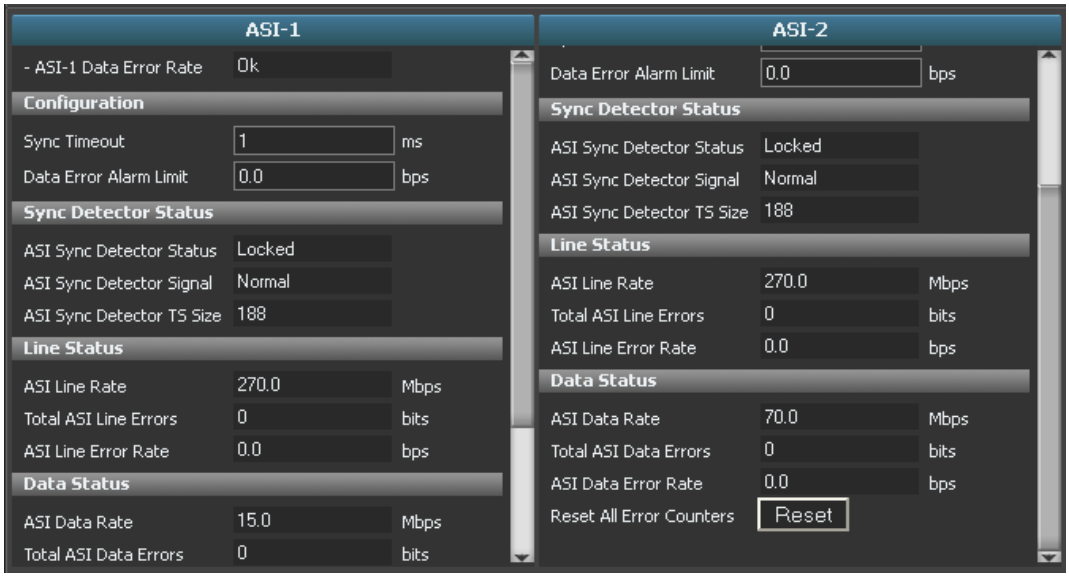


Figure 6-19 The ASI-1 and ASI-2 specific function blocks.

6.2.1.2 TSoIP Rx1 and TSoIP Rx2

The PT3000 device supports two separate TsoIP receivers (Rx1 and Rx2) for delivery of TS input in ASI format. To prepare the PT3000 for TsoIP input at least one receiver must be configured with respect to the following parameters:

- Association with one of the LAN interfaces.
- Port number for the TsoIP traffic.
- Protocol.
- Multicast or unicast operation.
- Enabling of the receiver TS output.

The TSoIP receiver configuration panel is opened by dragging the associated specific function block Rx1 and/or Rx2 from the block schematic in the upper half of the PT3000 Webservice to the configuration section in the lower half of the Webservice.

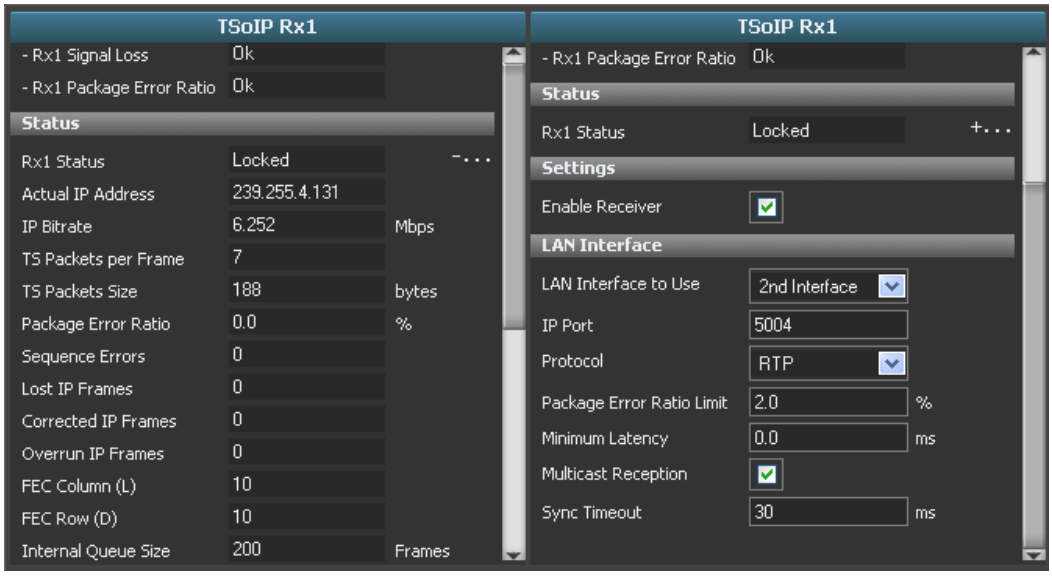


Figure 6-20 The TsoIP Rx1 specific function block.

The ***LAN interface*** to which the TSoIP receiver shall be linked must be specified through the associated menu in the TSoIP Rx1/Rx2 control panel. Proceed as follows:

1. In the TSoIP RxN control panel select the LAN interface to be linked to the TSoIP receiver by means of the drop-down list.
2. Click 'Apply' to confirm the selection.

Note: The selected LAN interface should be enabled for TSoIP traffic in the separate LAN configuration menu (please refer to paragraph 6.1.3.4).

The ***port number*** through which the TSoIP stream shall be received must be specified through the associated menu in the TSoIP Rx1/Rx2 control panel. Proceed as follows:

1. In the TSoIP RxN control panel specify the port number in the associated numeric input field.
2. Click 'Apply' to confirm the selection.

The ***transport protocol*** for the TSoIP stream must be specified through the associated menu in the TSoIP Rx1/Rx2 control panel. Proceed as follows:

1. In the TSoIP RxN control panel select between RTP and UDP or AUTO as required in the associated field.
2. Click 'Apply' to confirm the selection.

The mode (***unicast or multicast***) for the TSoIP receiver must be specified through the associated menu in the TSoIP Rx1/Rx2 control panel. Proceed as follows:

1. In the TSoIP RxN control panel the user may select Multicast Reception mode by ticking the associated tick box. The box must be un-ticked for unicast operation.
2. Click 'Apply' to confirm the selection.

The TSoIP receiver ***Rx1 / Rx2 must be explicitly enabled*** by the user before it will deliver TS output. The receiver is enabled through the associated menu in the TSoIP Rx1/Rx2 control panel. Proceed as follows:

1. In the TSoIP RxN control panel the user may specify the status for the TSoIP receiver (enabled or disabled). To enable the receiver a tick mark should be set in the associated tick box. To disable the receiver un-tick the box.
2. Click ‘Apply’ to confirm the selection.

When configured accordinglay the TsoIP can be selected as primary or secondary input source in the Switching specific function. For more on the Switching block and setting the input source, please refer to paragraph 6.2.1.4.

For information on selecting the IGMP protocol version to be used by the TsoIP function by multicast mode, please refer to paragraph 6.1.3.5.

6.2.1.3 Test

The Test function block provides the posibility to generate direct different test signals. This cannot be used when network mode is SFN. Following test signals can be generated:

- NULL P1.
- PRBS ON: Forced transmission of stuffing data (null packets) only.
- OFDM PAPR-3.
- Single Carrier.

If the Reconnect tick-box option is checked, the modulator will reapply the chosen test signal after a reboot.

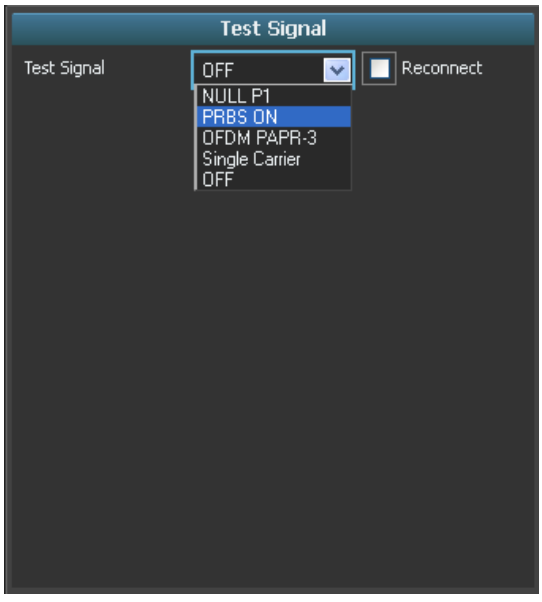


Figure 6-21 The Test Signal specific function block.

6.2.1.4 Switching

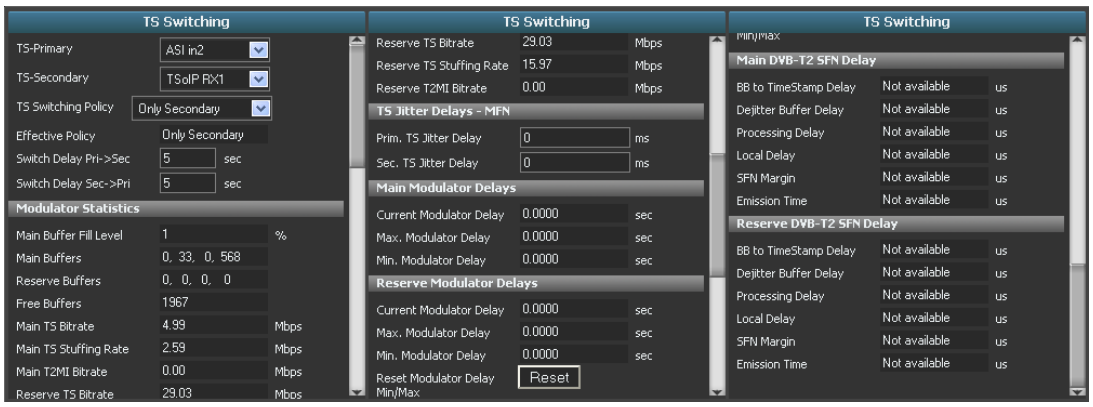


Figure 6-22 The Switching specific function block.

6.2.2 Interface points in Input

6.2.2.1 Monitor

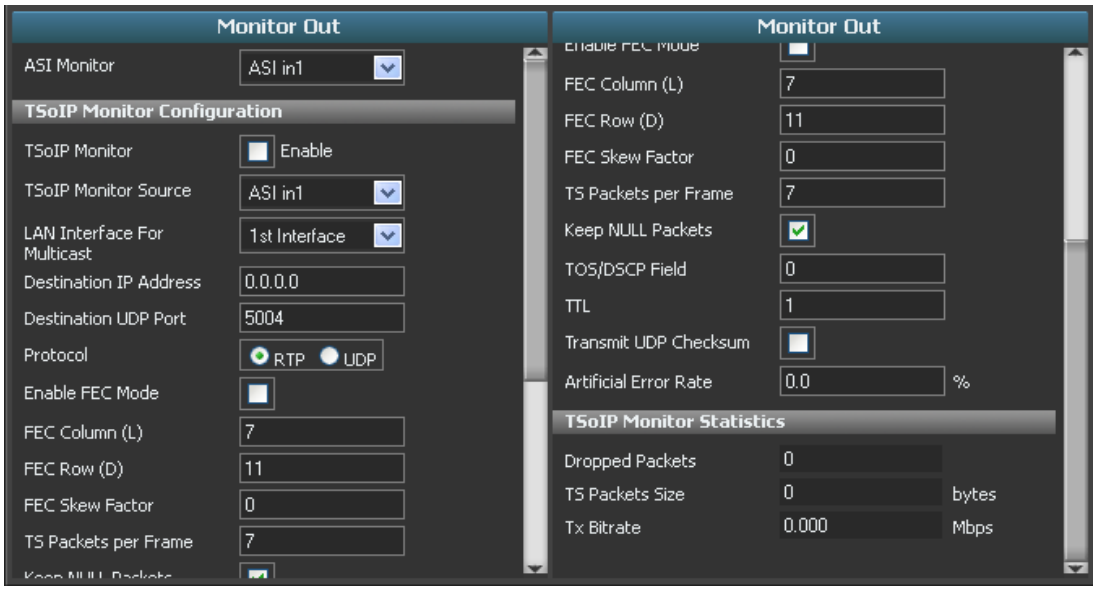


Figure 6-23 The Monitor interface point.

6.3 Main function block: Reference

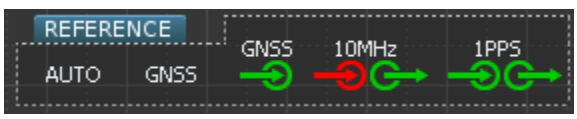


Figure 6-24 The Reference main function block.

The Reference Source field defines the input reference synchronisation source. If the value AUTO is chosen, the source is chosen automatically between available sources. The order of choice is GPS -> EXT10MHz -> INT. If the value EXT is chosen, the external clock is chosen as source. If the value INT is chosen, the internal clock is chosen as source. If the value GPS is chosen, the GNSS 1PPS clock is chosen as source.

When the PT3000 device is in operation with external reference applied, the internal reference frequency is locked to external 10MHz reference using a PLL with approximately 10Hz loop bandwidth. If no 10MHz reference is present (e.g. using GNSS), the internal reference is locked to the 1PPS information using a lower bandwidth PLL.

When loss of external reference input is detected, a hold-over mode is entered that keeps the internal reference frequency at a value based on the averaged frequency previous to the reference loss.

When 10MHz external reference reappears, a soft locking algorithm starts to avoid rapid frequency changes that would unlock demodulators.

If 1PPS signal is present, the adjustment of the internal reference would use this first to align the internal 1PPS to the external. Then the internal 10MHz is compared with external 10MHz using a digital PLL. If the frequency difference is more than 0,2ppm, the internal 10MHz changes with a rate of 75ppb/s. At smaller frequency difference, a low bandwidth digital PLL is used.
When the frequency and phase are aligned, the control is handed over to a precision analog PLL.

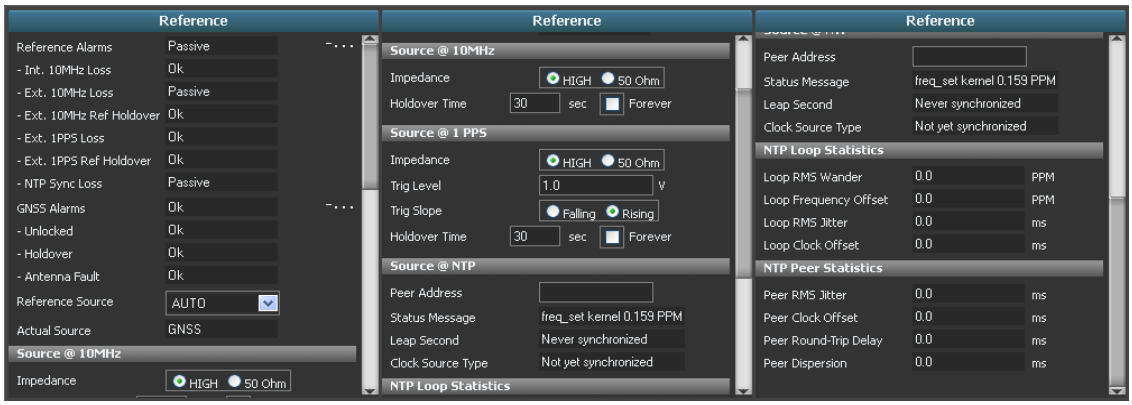


Figure 6-25 Contents of the Reference block.

6.3.1 Interface points in Reference

6.3.1.1 GNSS

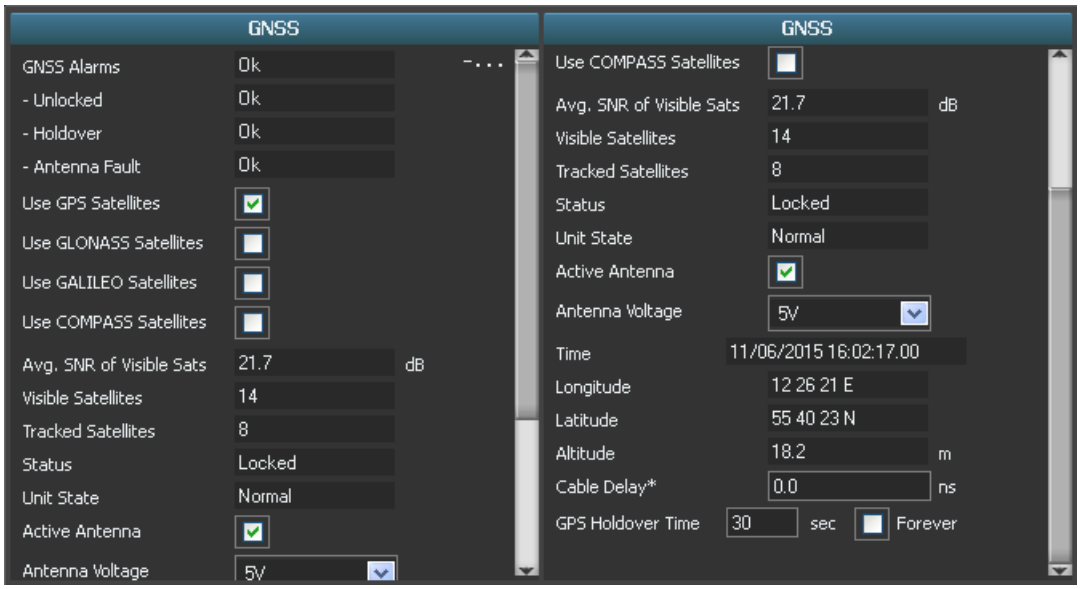


Figure 6-26 The GNSS interface point.

6.3.1.2 Reference 10MHz

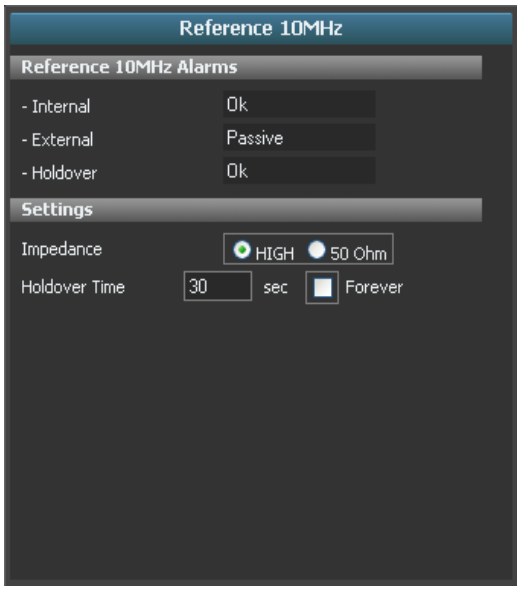


Figure 6-27 The 10MHz interface point.

6.3.1.3 Reference 1PPS

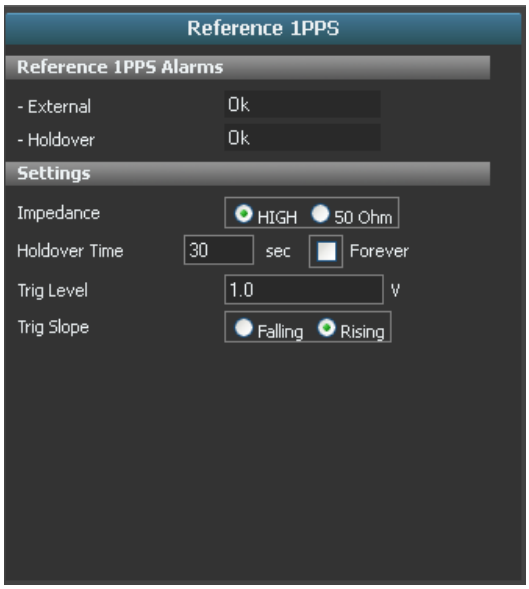


Figure 6-28 The 1PPS interface point.

6.4 Main function block: Mode

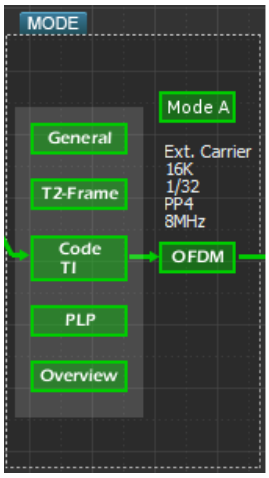


Figure 6-29 The Mode main function block.

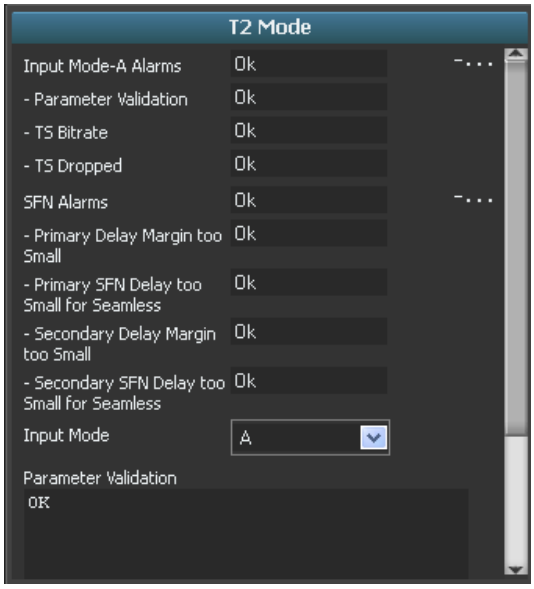


Figure 6-30 Contents of the Mode block.

6.4.1 Specific function blocks in Mode

6.4.1.1 Input Mode A

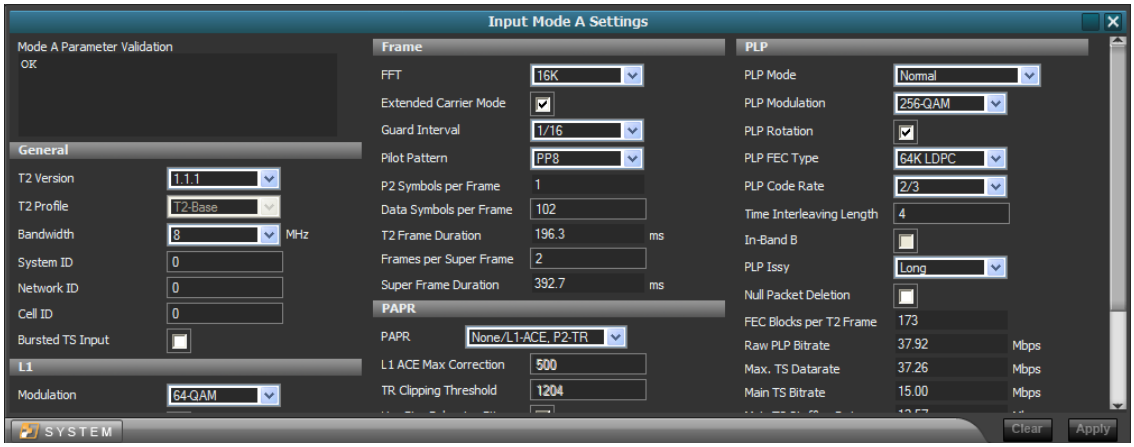


Figure 6-31 Contents of the Mode A specific function block.

6.4.1.2 Input Mode B

6.4.1.3 T2 - General Parameters

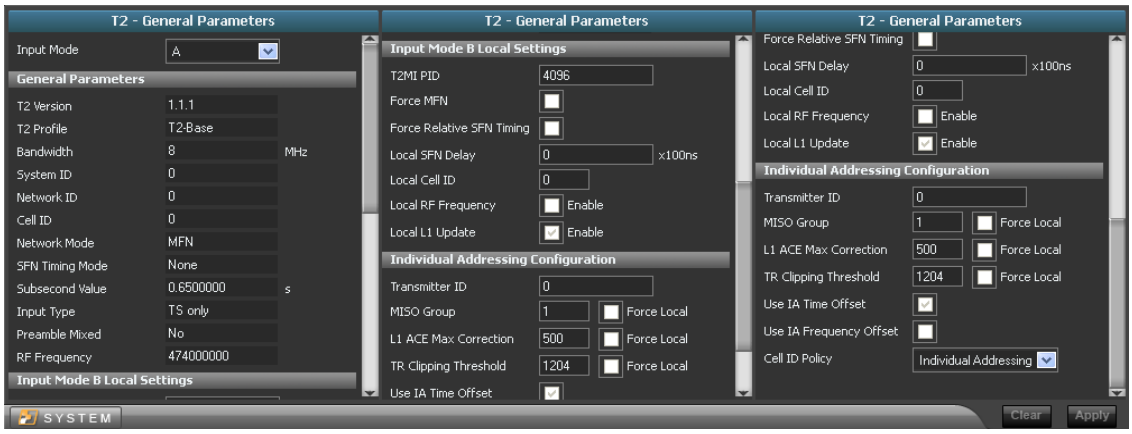


Figure 6-32 Contents of the T2 General Parameters block.

6.4.1.4 T2 – Frame Parameters

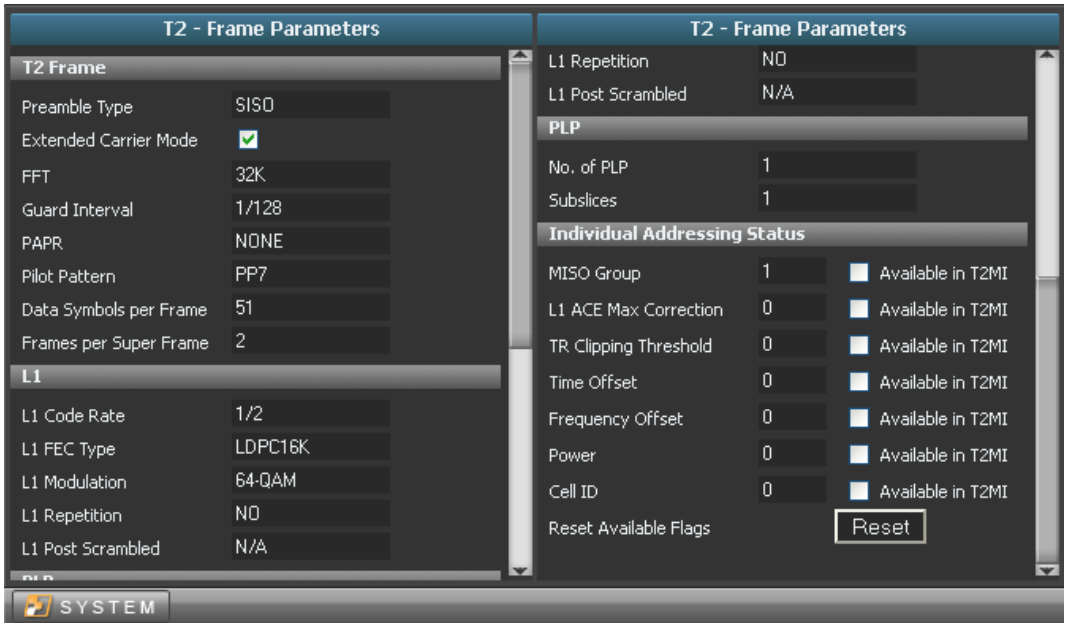


Figure 6-33 Contents of the T2-Frame block.

6.4.1.5 PLP Settings

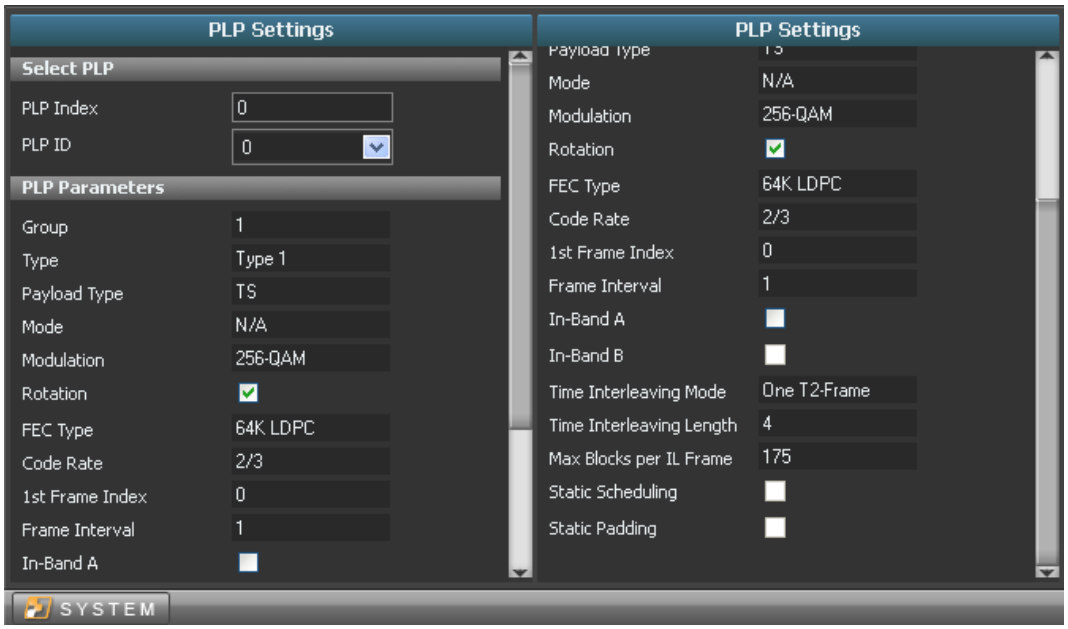


Figure 6-34 Contents of the PLP block.

6.4.1.6 Overview

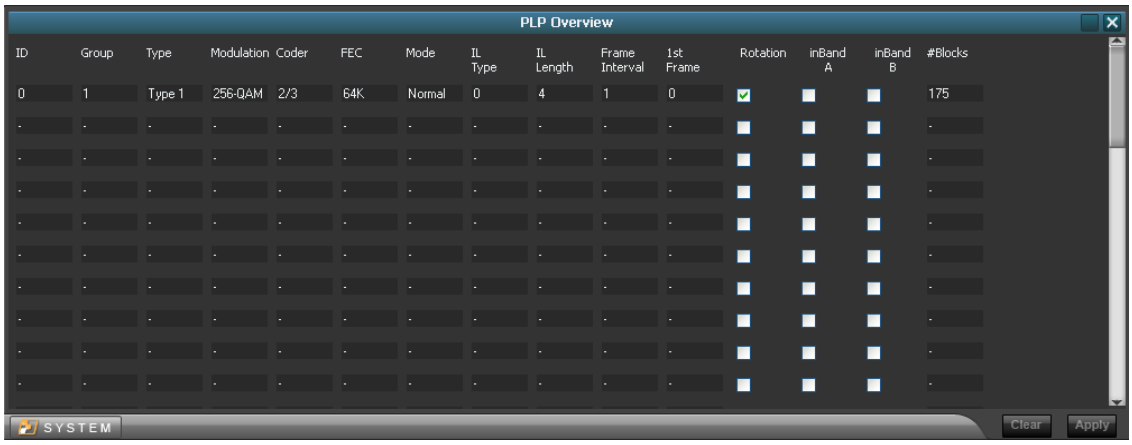


Figure 6-35 Contents of the Overview block.

6.5 Main function block: Pre-Correction

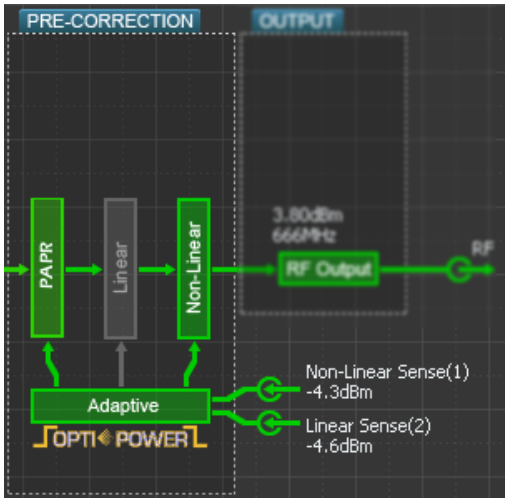


Figure 6-36 The Pre-correction main function block with valid Non-Linear and Linear sense input.

The Pre-Correction main function block gives a graphical illustration of the Non-Linear and Linear sense inputs. In the Webservice these inputs will appear in green color if the level is within the valid range for the respective input. If the level is marginal relative to the required max/min limits the input will be shown in yellow color. If the level is outside the valid range the input is shown in red color. For optimal result the corrector should only be operated with input levels in the 'green' state. Performance with 'yellow' input state is not guaranteed. The adaptive precorrector is not usable when the level is in the 'red' state.

The Non-Linear sense input must be connected to a suitable coupler/tap-off at a point right after the power amplifier before any band limiting filter. Notice further that the bandwidth between the RF output of PT3000 and the input of the power amplifier must be at least 20MHz wide to ensure effective non-linear precorrection of the amplifiers non-linearity.
The Linear sense input must be connected to a suitable coupler/tap-off point after the channel filter.

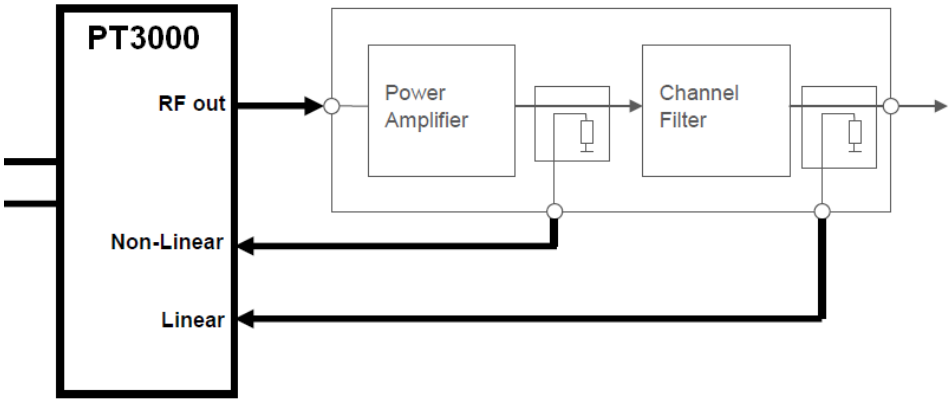


Figure 6-37 Connection of the RF output and sense inputs.

Dragging the Pre-Correction main function block to the status/control panel in the lower half of the Webservice will bring up:

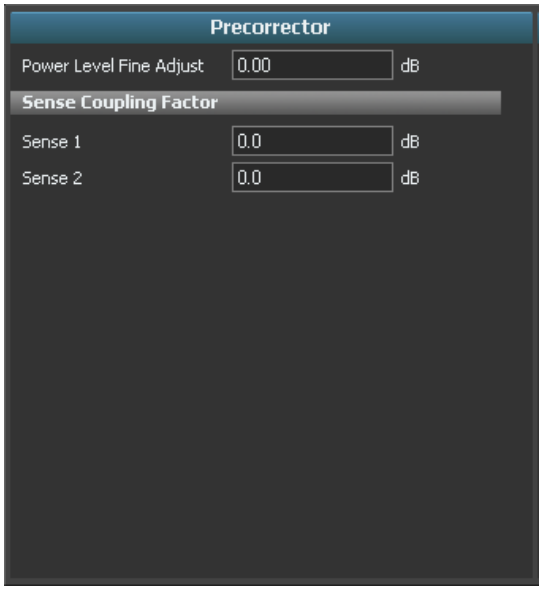


Figure 6-38 Contents of the Pre-correction block.

6.5.1 Specific function blocks in Pre-Corrector

6.5.1.1 Linear Precorrector

The linear precorrector system can operate in three different modes. The required mode is selected by opening the Mode drop-down list showed in the figure below.

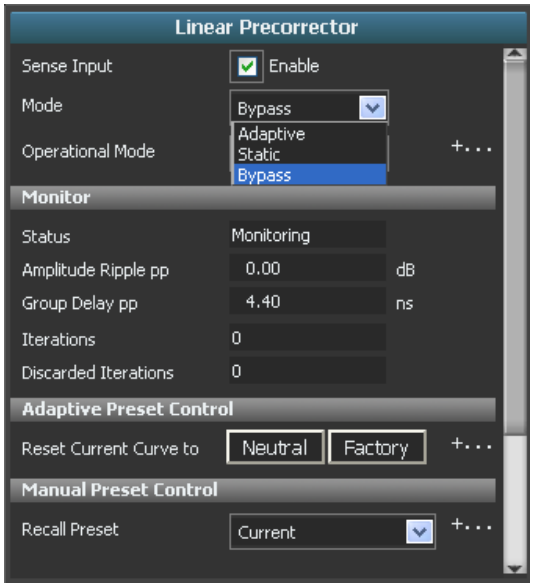


Figure 6-39 Linear Pre-corrector modes.

The available modes are:

- **Bypass:** No precorrection applied (block is bypassed)

- **Static:** The currently loaded manual linear precorrector characteristic is applied to the RF output. The manual precorrector characteristics must be generated and uploaded by means of the PC software package IMD Buster McTwo. The curve format used by the manual precorrector system is incompatible with the curves used and generated by the adaptive system.
- **Adaptive:** The current adaptive linear precorrector characteristic is applied and maintained according to the adaptive precorrectoroperational mode selected (see below for details).

The adaptive linear corrector can operate in five different modes. The required mode is selected by opening the Operational Mode drop-down list.

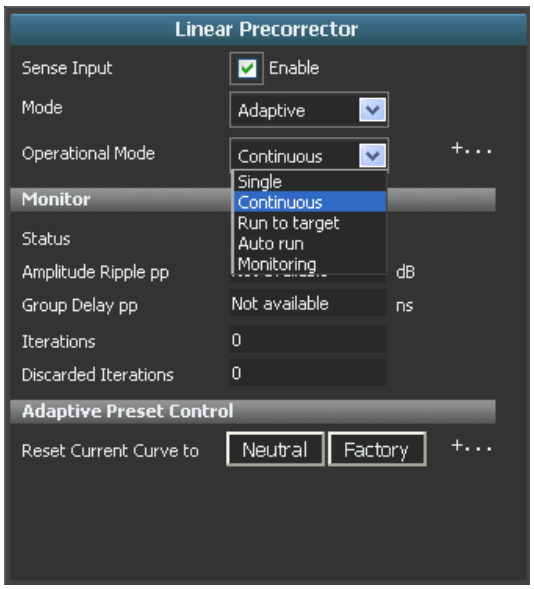


Figure 6-40 Linear Pre-corrector operational modes.

The available modes are:

- **Single**: Returns to monitoring mode after completion of one iteration
- **Continuous**: The instantaneous adaptive precorrector characteristic is applied to the RF output. The precorrector algorithm runs continuously.
- **Run to target**: The instantaneous adaptive precorrector characteristic is applied to the RF output. The precorrector algorithm will run until the set threshold value is obtained for the upper respectively the lower RE spectrum shoulder.
- **Auto run**: The instantaneous adaptive precorrector characteristic is applied to the RF output. The precorrector algorithm will run until the set threshold value is obtained for the upper respectively the lower RE spectrum shoulder. The adaptive precorrector algorithm will be automatically restarted in case the upper and/or lower shoulder performance subsequently drops below the set threshold.
- **Monitoring**: The characteristic based on the the last completed adaptive iteration is applied. No further update to the canracteristic will be made.

6.5.1.2 Non-Linear Precorrector

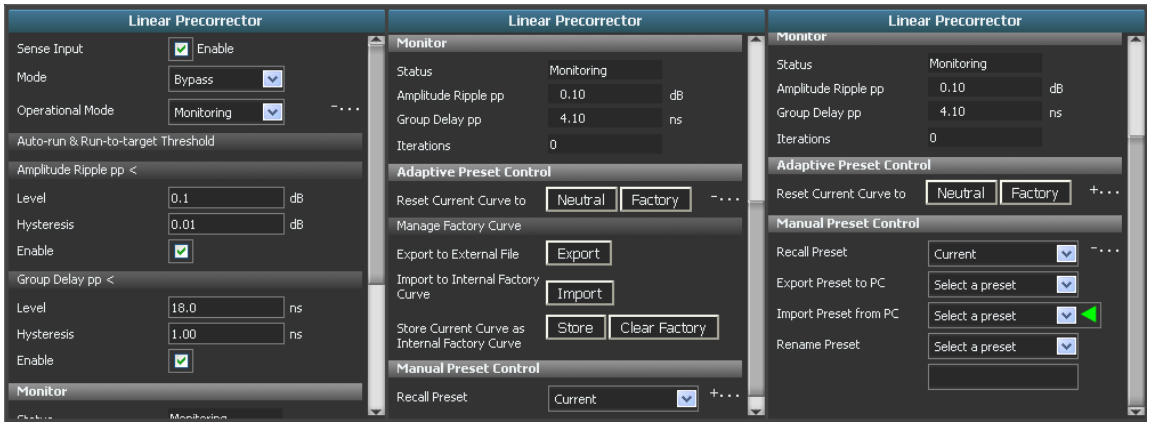


Figure 6-41 Contents of the Non-Linear Pre-corrector specific function block.

6.5.1.3 Adaptive precorrection

The Adaptive Precorrection specific function block provides various statistics concerning the adaptive process.

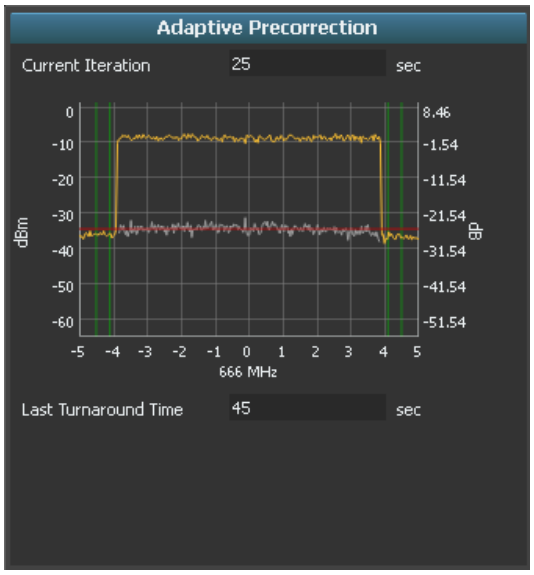


Figure 6-42 Contents of the Addaptive Precorrection specific function block.

The following information is available:

- **Current Iteration**: Displays the time elapsed for the ongoing iteration (data collection and analysis) for the adaptive process. The elapsed time may accumulate continuously in the event that the sense input is invalidated and thereby preventing successful data collection and analysis.
- **Bad Linear Sense Cnt**: Accumulated count of the number of times the data collection from the linear sense port has failed for reasons other than level out of range (typically due to application of an invalid type of spectrum on the sense port). Under normal conditions this counter is ‘0’.
- **Bad Non-Linear Sense Cnt**: Accumulated count of the number of times the data collection from the non-linear sense port has failed for reasons other than level out of range (typically due to application of an invalid type of spectrum on the sense port). Under normal conditions this counter is ‘0’.
- A graphical IMD presentation.

- **Last Turnaround Time**: Displays the recorded time consumption for the last completed iteration (data collection/analysis/curve implementation). The iteration time may typically vary from less than 10 seconds up to about one minute depending on the signal characteristic and the type of adaptive correction running. The shortest iteration time is noted when only the non-linear adaptive precorrector is running. The iteration time is increased when the adaptive linear precorrector process is running.

6.5.1.4 PAPR

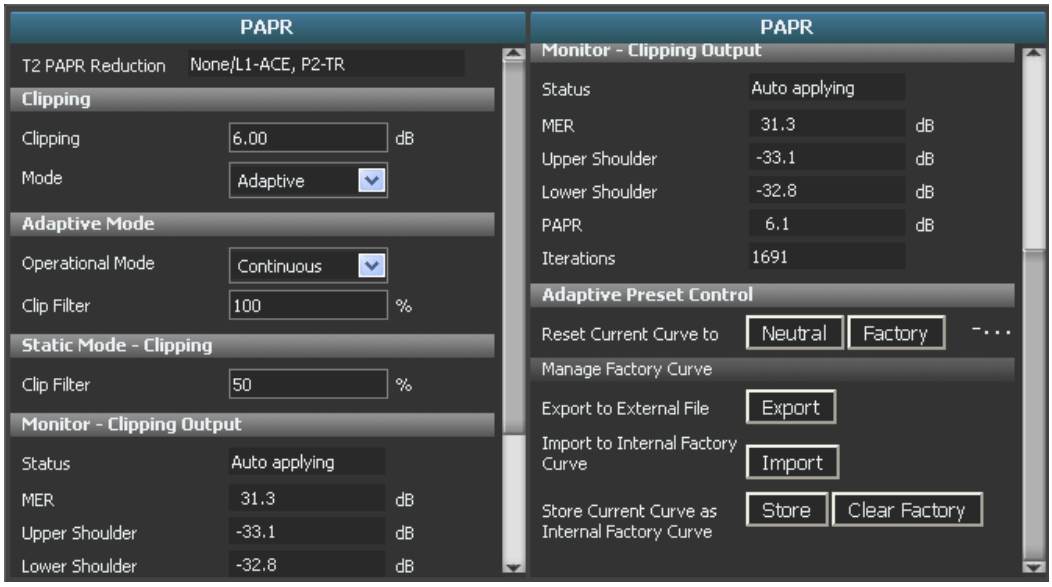


Figure 6-43 **Contents of the PAPR specific function block.**

6.6 Main function block: Output

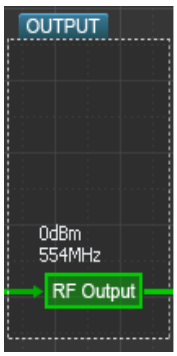


Figure 6-44 The Output main function block.

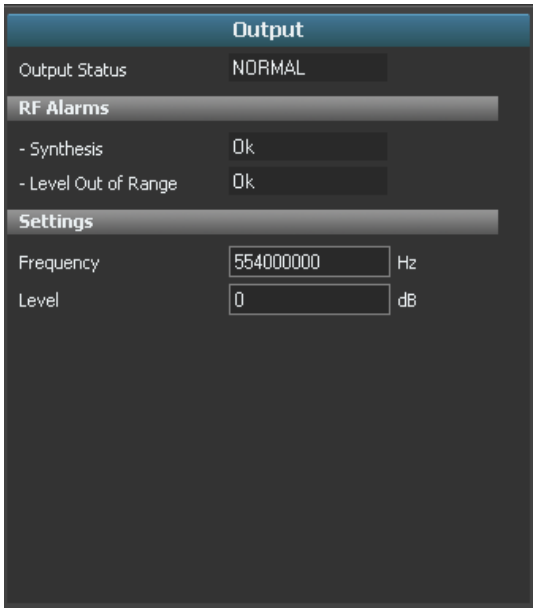


Figure 6-45 Contents of the Output block.

6.6.1 Specific function blocks in Output

6.6.1.1 RF Output

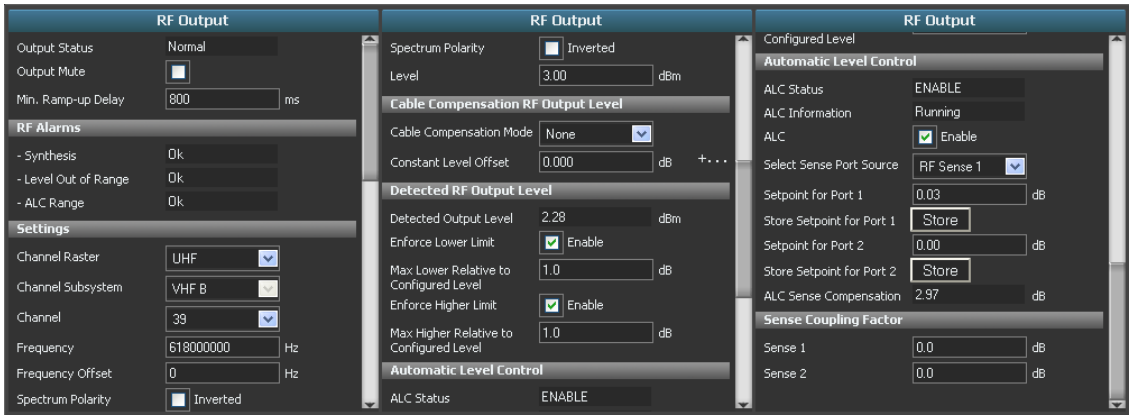


Figure 6-46 Contents of the RF Output specific function block.

6.6.2 Interface points in Output

6.6.2.1 RF Output Signal

The Output signal interface point gives a quick overview of mute reasons and alarms:

- Mute reasons.
- Active alarms.
- Passive alarms.

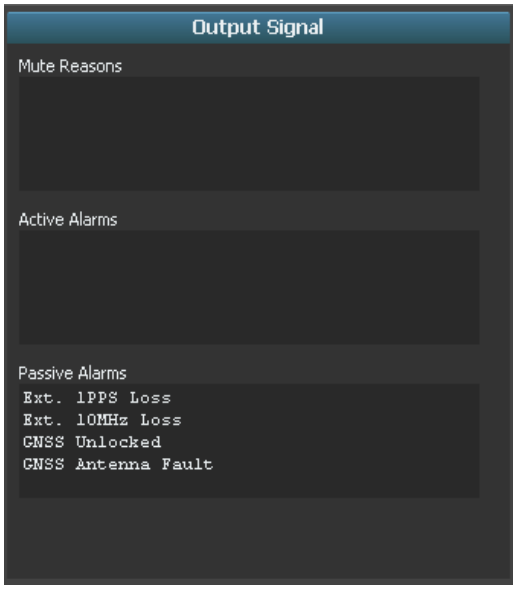


Figure 6-47 The Output Signal interface point.

7 Alarm system

The following paragraphs describe the Alarm System and the events and alarms that can be raised for the PT3000 device. The PT3000s Webservice interface is used for illustrative purposes.

The specific controls of interest regarding the Alarm System are mainly the ‘Event Log’ and the ‘Alarm Control’ found in the System menu.

The present documentation of alarm and events pertains to the DVB-T2 modulation standard.

7.1 Description of the Alarm system elements

A general feature of the PT3000 product family is the 'Alarm System'. Alarms are raised if certain conditions are present. This document describes these conditions.

Alarms and events can be signalled to the user either via the Webservice interface, an SNMP Manager[9], an email messaging system, or it can be indicated by an alarm led on the frontpanel (see paragraph 7.2 for more on alarm notifications).

A number of system oriented parameters pertaining specifically to the alarm settings can be accessed by left-clicking the [***System***] button located in the lower-left corner of the Webservice. To access the 'Alarm Control' management or the Event Log proceed as follows:

5. Left-click the [***System***] button. A menu with various choices will now open up above the [***System***] button.
6. From the menu select the required sub-menu ('Alarm Control') by left-clicking the point in the menu.
7. The corresponding control panel will now open up in the lower section of the screen.

7.1.1 Group alarms and sub-alarms

The alarm system consist of a number of group alarms, which contain a number of sub-alarms greater than or equal to one. For example the Reference group alarm contains the following sub-alarms:

- Internal 10MHz Loss.
- External 10MHz Loss.
- External 10MHz Reference Holdover.
- External 1PPS Loss.
- External 1PPS Reference Holdover.
- NTP Synchronization Loss.

A group alarm always reflects the state of its sub-alarms e.g. if a sub-alarm is active the group alarm will display an active state.

It is possible to configure an action for the group alarm itself. This enables the possibility of having a group alarm in 'Active' state even if all its sub-alarms are summarised to a state of 'Passive' (see paragraph 7.1.3 for more on alarm states). If all sub-alarms are ignored, the group alarm will always reflect the state 'Ok'.

Below is pictured group alarms in the 'Alarm Control' window. Cliking on the '+' sign left of the group alarm expands the corresponding sub-alarms.

[9] A software program using the Simple Network Management Protocol

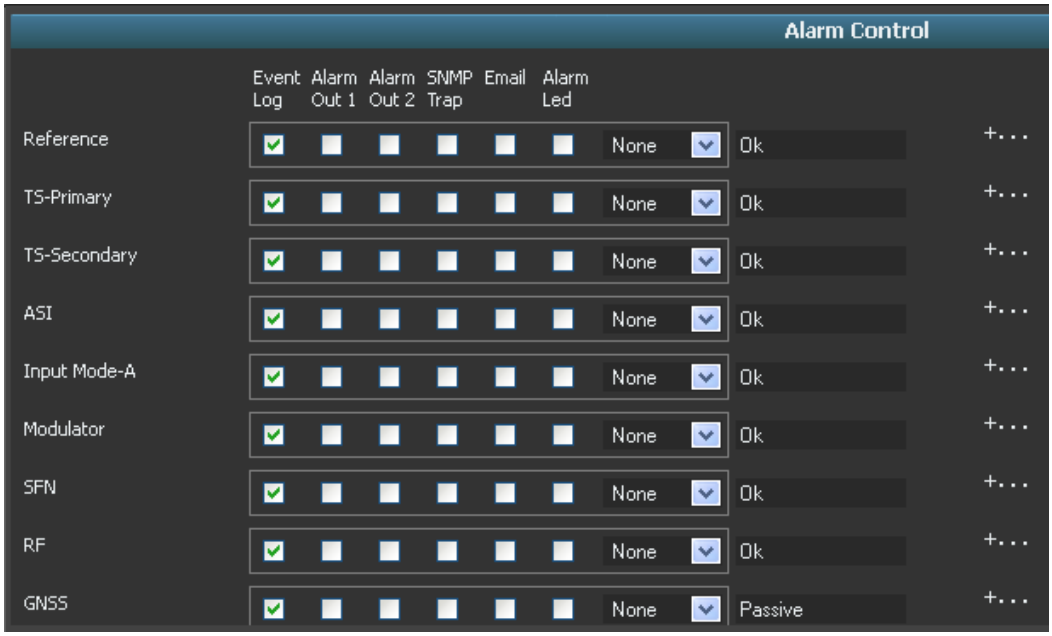


Figure 7-1 Example of group alarms in the Webservices Alarm Control.

7.1.2 Alarm actions

The Alarm System allows to setup an array of actions bound to every alarm – both group alarms and sub-alarms. These actions are:

1. Event Log – If an alarm is raised it will be written to the event log.
2. Input Status – (see Appendix B, paragraph B.1.1, event ID 7712).
3. Exciter Alarm – If an alarm is raised a logic output exciter alarm is activated.
4. SNMP Trap – If an alarm is raised a notification can be sent to up to five SNMP Manager trap destinations (see paragraph 7.2.1.2).
5. Email – If an alarm is raised an email notification can be sent to an email address (see prargraph 7.2.1.3).
6. Alarm led – If an alarm is raised the front panel alarm led will be lid (see paragraph 7.2.1.4).
7. Mute – If an alarm is raised the output signal can be muted.
8. Reboot – if an alarm is raised the exciter/modulator can be rebooted.

If no actions are activated for a sub-alarm it is in a state of ‘Ignored’. The group alarm will still report the ‘OK’ status even if all its sub-alarms are in an ‘Ignored’ state.

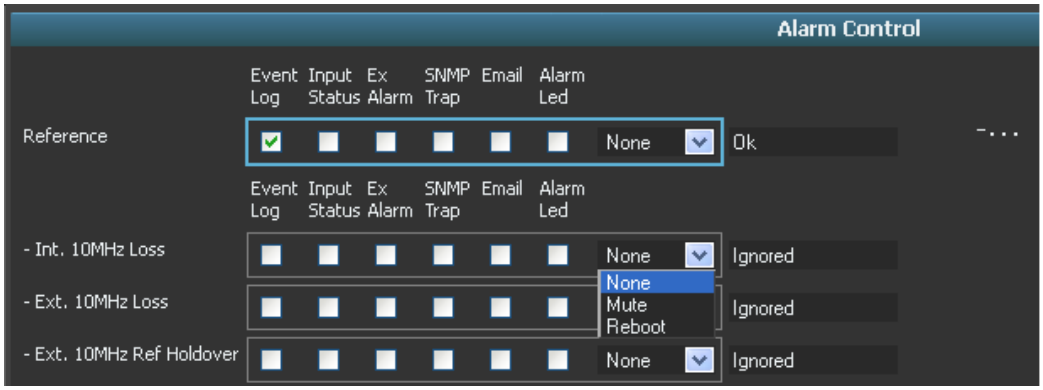


Figure 7-2 Example of alarm actions in the Webservices Alarm Control. In the pictured example 'Reference' is the group alarm, summarising its sub-alarms below.

7.1.3 Alarm states

An alarm can be:

- OK – When no alarm is present.
- Ignored – When no action is configured at all.
- Passive – When an alarm is present and is setup only for event logging and/or front panel alarm led, and nothing else.
- Active – When an alarm is present and is set to react on 'Input Status' or 'External Alarm' or 'SNMP Trap' or 'Email' or 'Mute' or 'Reboot' or any combination hereof.

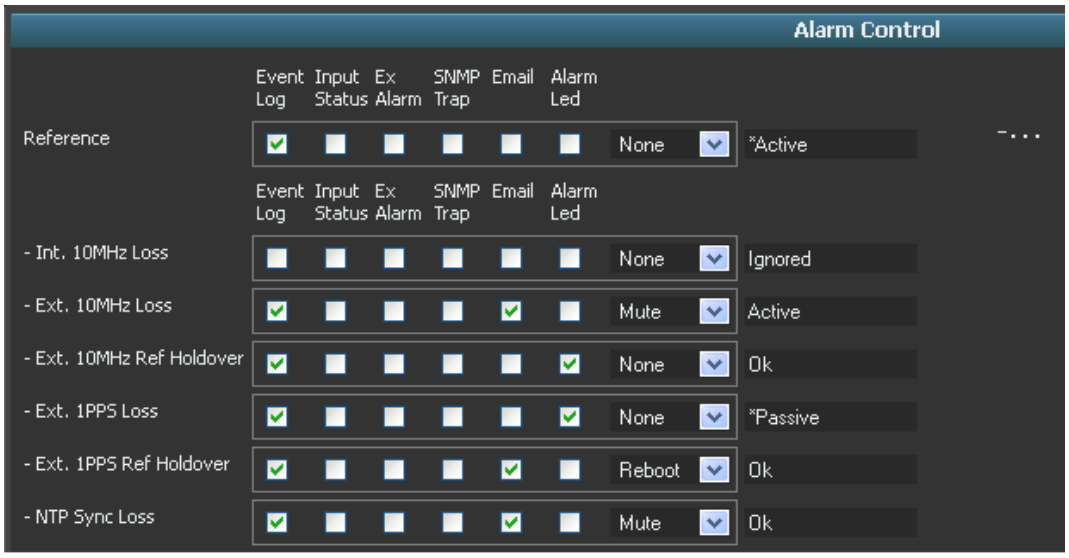


Figure 7-3 Example of alarm states in the Reference group alarm and its sub-alarms as diplayed in the Webservice's Alarm Control.

In figure 7-3 above is illustrated how the different alarm states are signalled.

Below is described how these alarm states are instigated in reference to the different alarm action configurations:

- The Int. 10MHz Loss sub-alarm is in an ‘Ignored’ state since no action is configured for this alarm.
- The Ext. 10MHz Loss sub-alarm is in an ‘Active’ state since it is configured to react on either of Input Alarm, Ex Alarm, SNMP Trap or Email (in this case email). It also causes the output signal to be muted because the mute alarm action is set.
- The Ext. 10MHz Ref Holdover sub-alarm is in an ‘OK’ state, no alarm is present.
- The Ext. 1PPS Loss sub-alarm is in an ‘Passive’ state. External 1PPS loss is occuring but since it is not configured to react on either of Input Alarm, Ex Alarm, SNMP Trap or Email, the state remain passive. Howeever an asterix (*) is prefixed in front of the Passive alarm state. This signals that the alarm led on the front panel is lid indicating an alarm is raised.
- The Ext. 1PPS Ref Holdover sub-alarm is in an ‘OK’ state. It is configured to notify the user by way of email if an alarm is raised and then instigate a reboot action.
- The NTP Sync Loss sub-alarm is in an ‘OK’ state. It is configured to notify the user by way of email if an alarm is raised and then instigate a mute action.
- As a result of the sub-alarm configurations and states, the Reference group alarm (at the very top in figure 6-2) is in an ‘*Active’ state and signalling that the front panel alarm led is lid. No actions are configured for the group alarm itself.

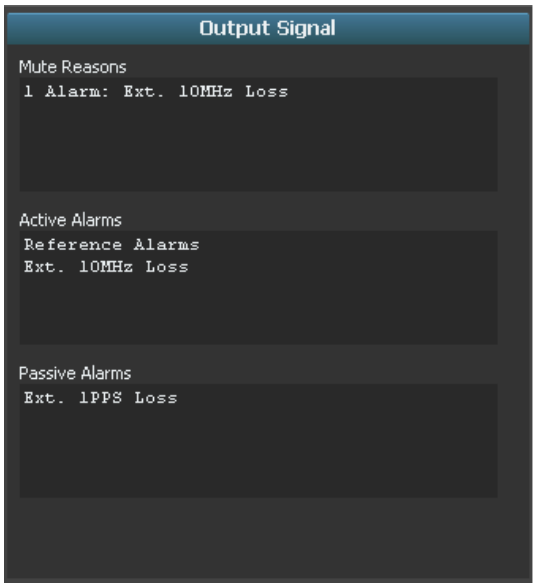


Figure 7-4 Example of alarm states in the Reference group alarm and its sub-alarms as portrayed in the Webservice’s Alarm Control.

7.2 Alarm signaling and notifications

The Alarm System supports several ways of actively notifying users if an alarm is raised. These are described in the papagraphs below.

7.2.1.1 Webservice

In the top right corner in PT3000's Webservice resides the alarm and mute signaling. Together they signal the combinations of alarm being present/absent and mute on/off. These and their conditions are described below.

If no alarm is present or in an active state and output is not muted it is signaled as in the example in figure 7-5 below.

Figure 7-5 Example 1 of alarm/mute state.

If an alarm is present and active and the output is not muted i.e. there is one or more active alarms but their alarm actions are not set to 'Mute'. This is illustrated in the example in figure 7-6 below.

Figure 7-6 Example 2 of alarm/mute state.

If no alarm is present or one or more alarms are in passive state but the output is muted it is signaled as in figure 7-7 below.

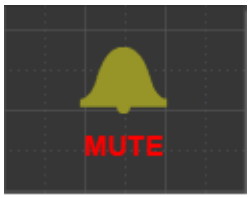


Figure 7-7 Example 3 of alarm/mute state.

Finally, if at least one alarm is present and in active state and the output is muted it is signaled as in the example in figure 7-8 below.

Figure 7-8 Example 4 of alarm/mute state.

7.2.1.2 SNMP

An SNMP (Simple Network Management Protocol) management software program, can be configured to automatically receive notifications, if alarms are raised. SNMP allows a network client (in this case the PT3000 device) to send an unsolicited or asynchronous trap (notification) to a network management system in version 2 of the prototcol, SNMPv2. Up to five different trap destination IP addresses can be set up in the device's system SNMP menu:

To setup an SNMP trap enter the system SNMP menu in the Webservice as follows:

1. Left-click the [***System***] button. A menu with various fields will now open up above the [***System***] button.
2. From the menu select the SNMP function by left-clicking the point in the menu.
3. The corresponding control panel will now open up in the lower section of the screen.

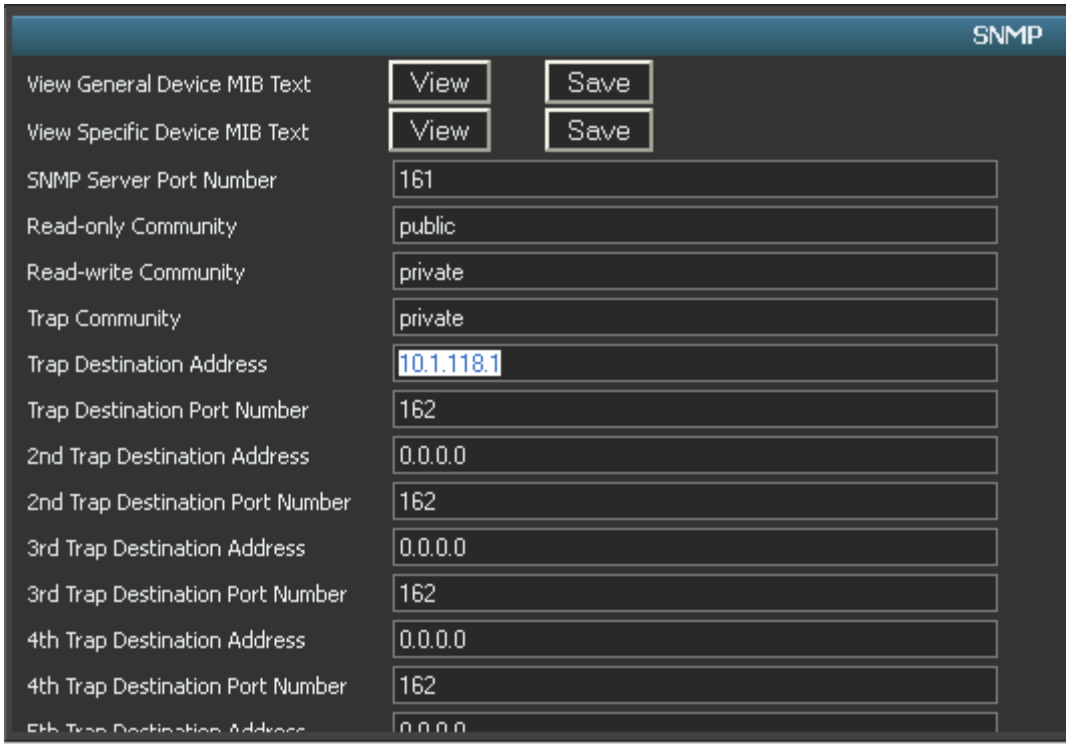


Figure 7-9 Example of setting up an SNMP trap destination address. In the case above an IP address of 10.1.118.1 (for the SNMP Management software) is provided along with the default port number, typically port 162.

In order to activate the sending of trap notification the specific SNMP trap alarms must be activated in the system Alarm Control in the PT3000 Webservice.

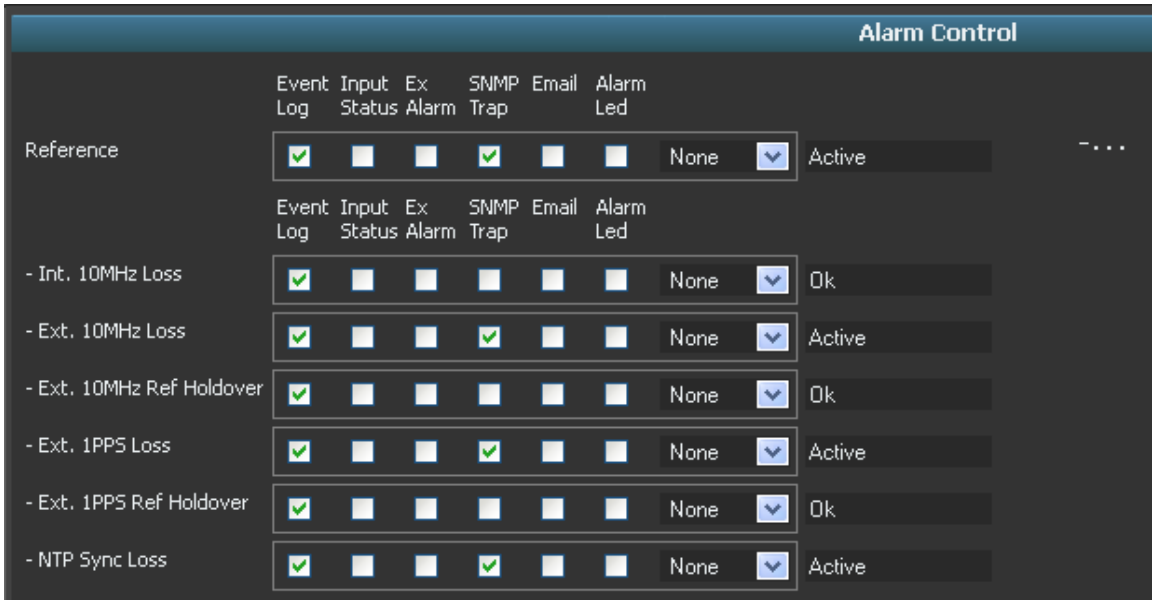


Figure 7-10 Example of activating SNMP trap alarms in the Alarm Control. In the case above SNMP trap alarms have been activated for Reference sub-alarms: Ext. 10MHz Loss, Ext. 1PPS Loss, NTP Sync Loss, which are all active in this case.

7.2.1.3 Email

It is possible to configure the PT3000 device to send email notifications when alarms are triggered.

This is accomplished through the setting of an email server IP address and an email address in the system Network.

To setup an email notifcations enter the system Network menu in the Webservice as follows:

1. Left-click the [System] button. A menu with various choices will now open up above the [system] button.
2. From the menu select the NETWORK function by left-clicking the point in the menu.
3. The corresponding control panel will now open up in the lower section of the screen.

Locate the ‘Email Server Address’ field and ‘Alarm Email Address’ an fill in the fields accordingly.

Figure 7-11 Example of setting up email notifications.

Note: it is not possible to configure the device to use encryption methods such as SSL and it does not support advanced authentification methods.

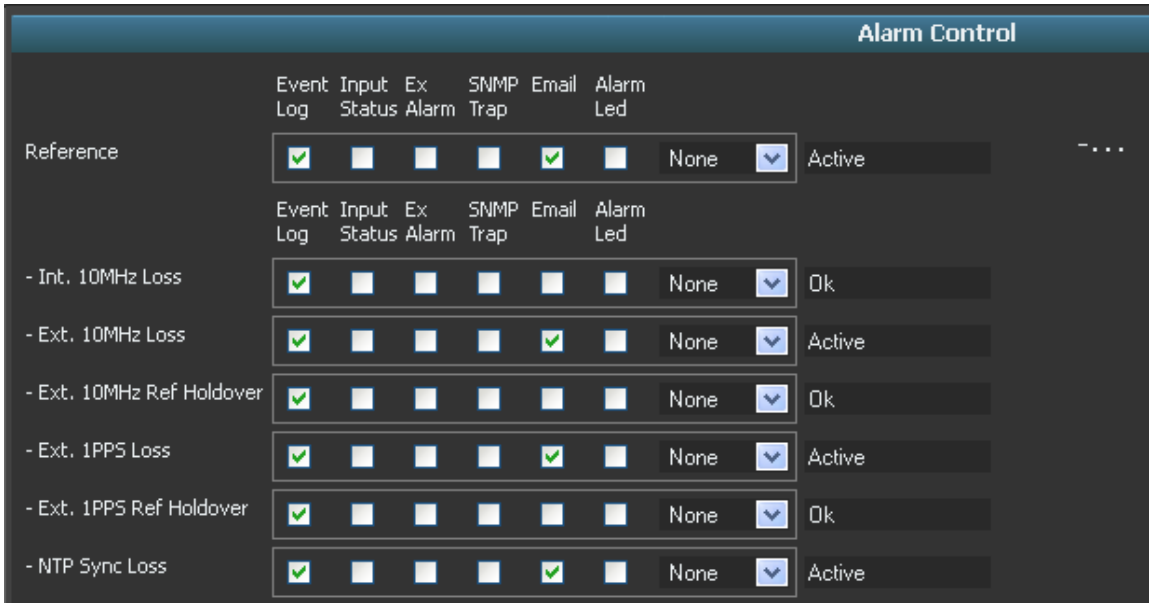


Figure 7-12 Example of activating email alarm notifications in the Alarm Control. In the case above email notifications have been activated for the following Reference sub-alarms: Ext. 10MHz Loss, Ext. 1PPS Loss, NTP Sync Loss, which are all active in this case.

7.2.1.4 Alarm led

When an Alarm Led option in the Webservice's system Alarm Control is activated and the corresponding alarm is present, the front panel alarm led is lid indicating that one or more alarms are present.

Alarm leds are indicated with an asterix (*) in the Webservice Alarm Control if present. An Alarm Led is considered a passive alarm, such as also Event Log alarms.

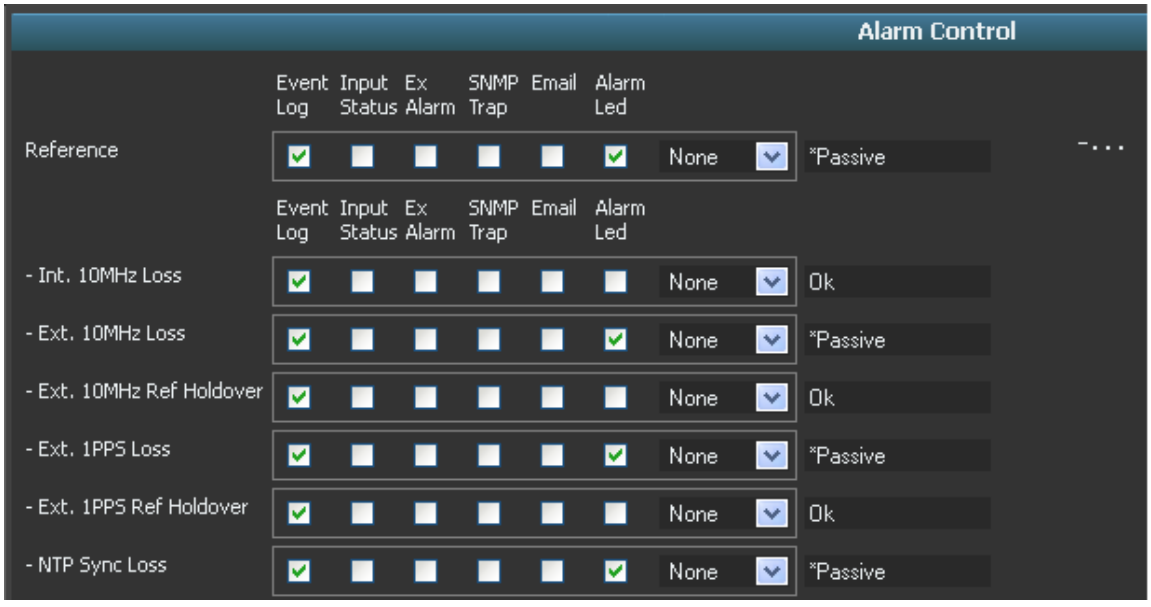


Figure 7-13 Example of activating front panel alarm led notification in the Alarm Control.

In the case in figure 7-13 the alarm led should be lid on the front panel (notice the presence of the asterix (*)) since the following Reference sub-alarms are present: Ext. 10MHz Loss, Ext. 1PPS Loss, NTP Sync Loss, which are all Passive in this case, due to no alarm actions are configured (actions for the alarms are set to 'None').

The alarm led is the second led from the top in the group of four leds to the right of the main control buttons on the front panel.

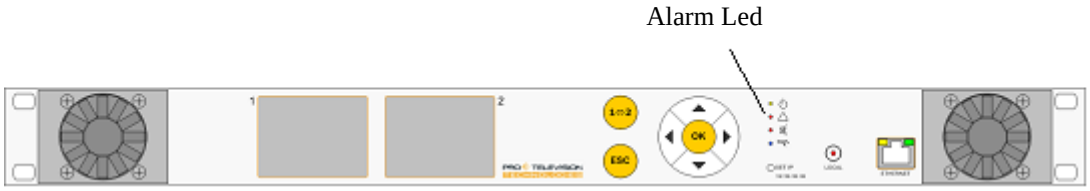


Figure 7-14 Location of the front panel alarm led.

7.3 Event log descriptions

The individual events and alarms are documented in Appendix B. Each are described in a table format where the header row cells indicate the Event ID or Alarm ID (for alarms, the Alarm ID is followed by a specific Alarm Number in parenthesis), followed by the general event or alarm text, which will be showed in the event log.
In the main cell of the table a description of the event or alarm is given.
If any additional text is available for the event or alarm it is stated under the description.

Additional text for an group alarm will always show the generalt state of the group alarm:
"Present" if one or more alarms are raised either in one or more of its sub-alarms. "All OK" if no alarms are raised in any of its sub-alarms.

Additional text for sub-alarms can be a multitude of informational text pertaining to the specific nature of the sub-alarm.

Figure 7-15 below shows how the event and alarm description is organized in a table format. See paragraph Appendix B for all event and alarm descriptions.

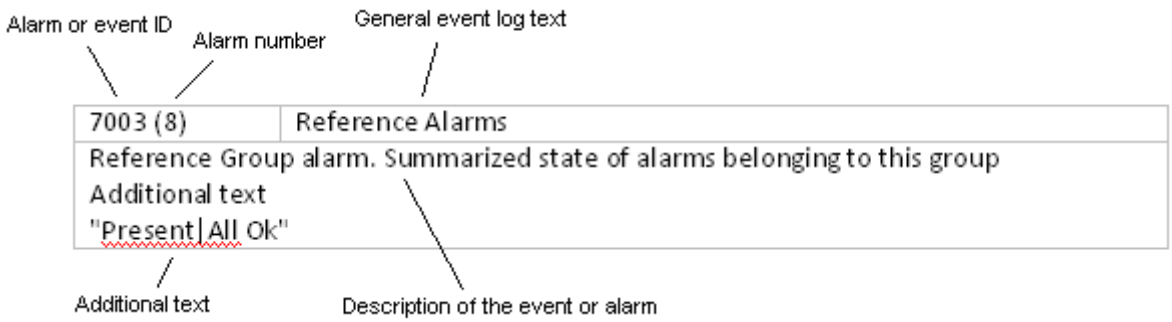


Figure 7-15 Example of the Reference group alarm event description in the current document.

Figure 7-16 below show the same information as it is displayed in the Webservice's Event Log.

```
1024: 7003, 23/06/2015, 15:04:29 , Reference Alarms, Present
```

Figure 7-16 The Reference group alarm event as displayed in the Webservice's Event Log. (*Note: the first number in the event entry is the event log number*).

Appendix A Control via HyperTerminal

A.1 General information

RS232 / SCPI remote control of the PT3000 can be implemented by means of a PC with a terminal program like Windows HyperTerminal. Commands and parameters can be sent to the unit from the terminal command line and the response of the unit will be displayed in the terminal window. This type of control is among other useful when making initial configuration of the IP communication parameters.

A.2 Configuration of terminal program

To verify that the connection is open it is suggested to send the command ***IDN?*** to the PT3000. If the connection is OK, the PT3000 product will respond by sending an identification string including product type number, serial number and SW version.

The typical issues when failing to open a connection are:

a) Use of incorrect interface cable.
b) Incorrect configuration of terminal program (Windows HyperTerminal).

The connection cable must be the null-modem type (Rx and Tx wires crossed).

The terminal program must be configured to match the communication parameters used by remote port Serial 1. The default communication parameters used by the PT3000 are:

- Baud rate: 115200
- Data bits: 8
- Parity: none
- Stop bits: 1
- Flow control: none

The communication parameters used by the terminal program must be set to match the current setting of the PT3000:

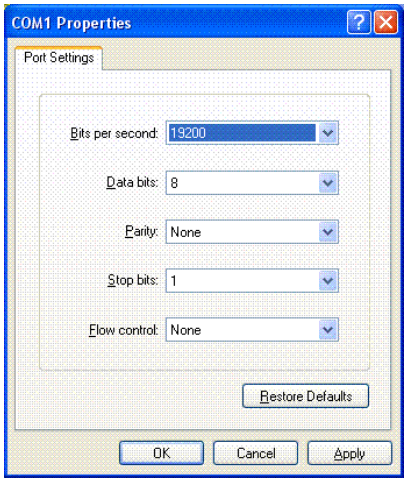


Figure A-1 Port settings.

In addition to the setting of the communication parameters it is essential to ensure that the terminal program sends a new-line character as terminator for every command line. In case of Windows hyper terminal this is accomplished by selecting the ***ASCII Setup...*** function from the ***Settings*** tab page in the ***Properties*** menu.

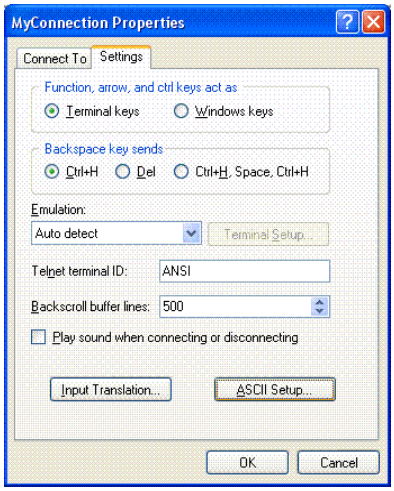


Figure A-2 Connection settings.

On the ***ASCII Setup*** page be sure to tick the option ***Send line ends with line feeds.*** To be able to monitor the characters that you type on the terminal you may also want to select ***Echo typed characters locally***.

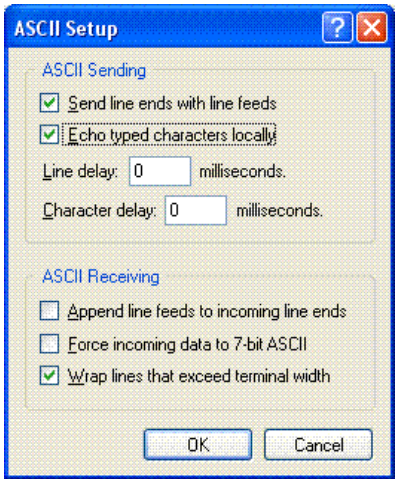


Figure A-3 ASCII settings.

When completing these settings you should be able to verify the connection by sending the command ***IDN?*** to the PT3000 from the terminal. If everything is configured correctly you will receive an identification string in the terminal window:

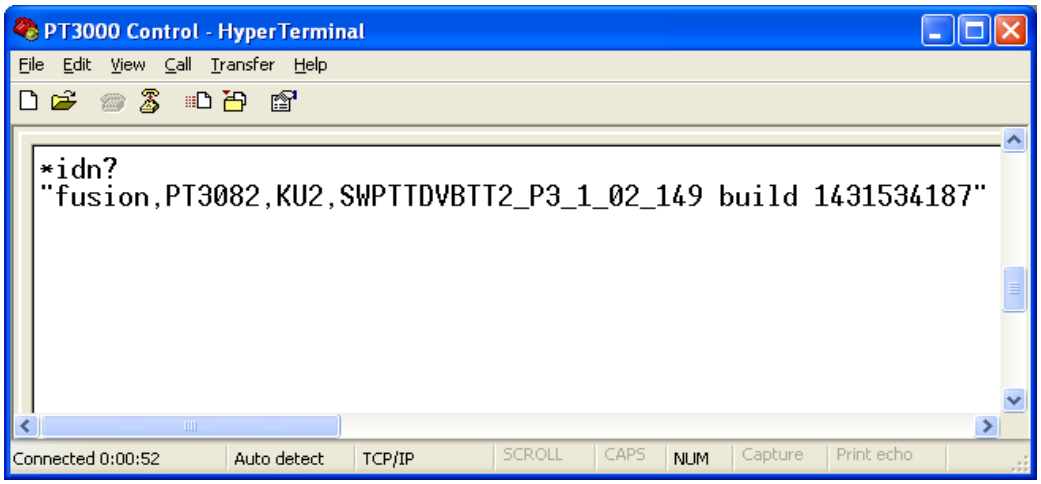


Figure A-4 Terminal window with response to identification request.

If the communication channel cannot be opened it is likely that cabling is incorrect, the power supply to the PT3000 unit is off or the PT3000 has been set to other communication parameters than the default values. In this case it might be necessary to try the possible settings one-by-one until communication is possible.

Appendix B Events and alarms

B.1 Event descriptions

B.1.1 System events

1010	Reboot
A system reboot event holds following extra description Additional text: "Operator Request" "New modStd" - Reboot because of, new modulation Standard "New Options" – Reboot because of new options installed and or taken into use "Restore" – Reboot because of a system restore "SW RebootType" – Reboot because of a software upgrade (or downgraded) "Expired Options" – Reboot if one or more options are in use and expires "Alarm(<number>) <Text-description>"	

1211	Preset Recalled
System Preset Recalled, by user Additional text: "<Preset-name>"	

1212	Preset Stored
Preset stored with a given name. Additional text: "<Preset-name>"	

1213	Preset Deleted
As a consequence of deleting a preset this entry is to be found in the eventlog Additional text: "<Name of deleted preset>"	

1411	Log Cleared
When eventlog is cleared, this will be the only log entry	

1415	Logging
Additional text: "ON" - Eventlog is turned ON "OFF" - Eventlog is turned OFF	

1416	New Logmode
Additional text: "FIFO" - Logging mode, When the log is First In First Out, rolling window. "FULL" - Logging mode, When the log is full, keep eldest log entries	

1502	Date/Time adjusted
Event entries if changes are made to the synchronization mode for date/time. Additional text: "MANUAL|GPS|NTP|AUTO"	

1503	Timezone adjusted
Additional text: "<Timezone>"	

1600	subMute On
System muted, because of ... see Appendix A for mute reasons	

1601	subMute Off
System unmuted, because of ... see Appendix A for mute reasons	

1702	Scheduled Preset Activation
Triggered when activation is initiated. Additional text: <Preset-name>"	

1703	Scheduled SW upgrade
Triggered when scheduled upgrade is initiated.	

1704	Scheduled Reboot
Triggered when scheduled reboot is initiated.	

1705	Scheduled Mute Control
Triggered when scheduled mute is initiated.	

7089	Actual RefClk Changed
The actual reference clock used has changed. Additional text: "<Actual Reference Clock>"	

7460	SW upgrade has succeeded
Software installed successfully. An automatic reboot is about to be effectuated Additional text: “rebooting”	

7461	SW upgrade failed
Software failed because of Tarball corrupted or not compatible with hardware platform.	

7462	SW upgrade ignored
Software upgrade ignored for Scheduled action, as system is up to date.	

7666	Invalid IA Data received on T2MI
This alarm is raised if the IA packet received from the T2 gateway is malformed or has illegal length fields or data fields.	

7710	GPIO AGC Off
Indicates a state change of hardware line. Additional description: "YES" "NO"	

7711	GPIO Ex. No Use
Indicates a state change of hardware line.	

Additional description: "YES" "NO"

7712	GPIO Input Status
Indicates changed state for the 'Input Status' logic output line located in the rear panel. The 'Input Status' output signals as default 'Fail' state by failure of the potential input TS sources versus the selected switching policy. The sources are the user defined 'Primary input' and 'Secondary input'; the switching policy can be Primary only, Secondary only, Any Available and Prefer Primary. Input Status will indicate 'Fail' if Primary and Secondary input sources are missing under the switching policies Any Available and Prefer Primary and if the corresponding input is failing by input policy Primary Only and Secondary Only. Additional description: "Fail" "OK"	

7800	Network Link Changed
The state of a network interface (Ethernet) has changed. This is reported, whenever an interface goes up or down, or when the speed/duplex changes. Additional text: "Eth<0|1|2|3|4>: UP: 1 Gbps" "Eth<0|1|2|3|4>: UP: 100 Mbps/<Half Duplex|Full Duplex>" "Eth<0|1|2|3|4>: UP: 10 Mbps/<Half Duplex|Full Duplex>" "Eth<0|1|2|3|4>: DOWN"	

B.2 Event description - alarms

B 2.1 Modulator alarms

7700 (3)	Modulator Alarms
Modulator Group alarm. Summarized state of alarms belonging to this group Additional text: "<Present|All Ok>"	

7076 (80)	SFN Resync Error
Additional text: "Fail" - "Ok" -	

B.2.3 ASI TS primary alarms

7001 (5)	TS Primary Alarms
Primary TS Group alarm. Summarized state of alarms belonging to this group Additional text: "Present|All Ok"	

7021 (21)	TS Primary Sync Loss
The synchronization of the Primary TS depends on the number of correct sync bytes necessary for the device to synchronize and on the number of distorted sync bytes, which the system cannot cope with. Five consecutive correct sync bytes are sufficient for sync acquisition. Two or more consecutive corrupted sync bytes will raise the sync loss alarm. Additional text: "Fail" - Sync loss "Ok" - No sync loss	

7651 (23)	TS Primary T2 MI Validation Error
T2-MI on primary input represents an invalid combination of T2 transmission parameters. For details about the specific violation please consult either: - the Webservice's parameter validation window (drag the 'Mode' block to the lower half of Webservice) or - retrieve the mode validation text string by sending SCPI query T2:MI:VALM? over serial interface or ethernet:port4000 or - retrieve the mode validation message through SNMP get object ModeT2MIParameterValidationMessage OID2.90 Additional text: "Fail" – If validation error "Ok" – If no validation errors	

7652 (24)	TS Primary T2 MI L1 Error
T2-MI L1 on primary input is rejected as invalid or missing. For details about the specific violation please consult either: - The Webservice's parameter validation window (drag the 'Mode' block to the lower half of Webservice) or - Retrieve the mode validation text string by sending SCPI query T2:MI:VALM? over serial interface or ethernet:port4000 or - Retrieve the mode validation message through SNMP get object ModeT2MIParameterValidationMessage OID2.90 Additional text: "Present" - T2-MI L1 present, ok "Missing" - T2-MI L1 missing	

7653 (25)	TS Primary T2 MI Timestamp Error

Triggered if a T2-MI timestamp packet is missing. Additional text: "Present" - T2-MI timestamp is present "Missing" - T2-MI timestamp missing

7103 (28)	TS Primary Buffer Pool
Triggered if the input to the primary buffer pool exceeds its limit when the DSP for any reason cannot pass TS packets on to the FPGA. Additional text: "Exceeded|Normal"	

B.2.3 ASI TS secondary alarms

7002 (6)	TS Secondary Alarms
Secondary TS Group alarm. Summarized state of alarms belonging to this group Additional text: "Present|All Ok"	
7029 (32)	TS Secondary Sync Loss
The synchronization of the Secondary TS depends on the number of correct sync bytes necessary for the device to synchronize and on the number of distorted sync bytes, which the system cannot cope with. Five consecutive correct sync bytes are sufficient for sync acquisition. Two or more consecutive corrupted sync bytes will raise the sync loss alarm. Additional text: "Fail" - Sync loss "Ok" - No sync loss	

7661 (34)	TS Secondary T2 MI Validation Error
T2-MI on secondary input represents an invalid combination of T2 transmission parameters. For details about the specific violation please consult either: - The Webservice's parameter validation window (drag the 'Mode' block to the lower half of Webservice) or - Retrieve the mode validation text string by sending SCPI query T2:MI:VALM? over serial interface or ethernet:port4000 or - Retrieve the mode validation message through SNMP get object ModeT2MIParameterValidationMessage OID2.90 Additional text: "Fail" – If validation error "Ok" – If no validation errors	

7662 (35)	TS Secondary T2 MI L1 Error
T2-MI L1 on secondary input is rejected as invalid or missing. For details about the specific violation please consult either: - The Webservice's parameter validation window (drag the 'Mode' block to the lower half of Webservice) or	

- Retrieve the mode validation text string by sending SCPI query T2:MI:VALM? over serial interface or ethernet:port4000 or - Retrieve the mode validation message through SNMP get object ModeT2MIParameterValidationMessage OID2.90 Additional text: "Present" - T2-MI L1 present, ok "Missing" - T2-MI L1 missing

7663 (36)	TS Secondary T2 MI Timestamp Error
Triggered if a T2 timestamp packet is missing. Additional text: "Present" - T2-MI timestamp is present "Missing" - T2-MI timestamp missing	

7104 (39)	TS Secondary Buffer Pool
Triggered if the input to the secondary buffer pool exceeds its limit when the DSP for any reason cannot pass TS packets on to the FPGA. Additional text: "Exceeded|Normal"	

B.2.4 SFN alarms

7082 (7)	SFN Alarms
SFN Group alarm. Summarized state of alarms belonging to this group Additional text: "Present|All Ok"	

7669 (92)	Primary Delay Margin too Small for Seamless and Holdover
Additional text: "Fail" - "Ok" -	

7707 (93)	Primary Delay Margin is Negative
Triggered if SFN data arrives too late to the modulator for transmission. Additional text: "Fail" - Data arriving too late "Ok" – Data arrives in time	

7671 (94)	Secondary Delay Margin too Small for Seamless and Holdover
Additional text: "Fail" - "Ok" -	

7708 (95)	Secondary Delay Margin is Negative
Triggered if SFN data arrives too late to the modulator for transmission. Additional text: "Fail" - Data arriving too late "Ok" – Data arrives in time	

B.2.5 Reference alarms

7003 (8)	Reference Alarms
Reference Group alarm. Summarized state of alarms belonging to this group Additional text: "Present|All Ok"	

7072 (76)	Ext. 1PPS Loss
If External 1PPS signal is not available this alarm is raised. Additional text: "Fail" - No external 1PPS available "Ok" - External 1PPS available	

7073 (77)	Int. 10MHz Loss
If Internal 10MHz signal is not available this alarm is raised. Additional text: "Fail" - No internal 10 MHz available "Ok" - Internal 10 MHz available	

7074 (78)	Ext. 10MHz Loss
If External 10MHz signal is not available and EXT is chosen as reference this alarm is raised. Additional text: "Fail" - No external 10 MHz available "Ok" - External 10 MHz available	

7088 (89)	NTP Sync

If NTP (Network Time Protocol) is used to obtain a clock, the NTP Sync log entry will state if the device is locked to a reference clock or if it is not. If for some reason synchronization fails, this occurrence will also be stated in the eventlog. Additional text: "LOCKED|UNLOCKED peer <IP-ADDRESS>" "NTP Sync, Fail"

7118 (109)	Ext. 10MHz holdover
If External 10MHz signal is lost, holdover event is triggered. Time range is configurable. Additional text: "Triggered|Ok"	

7119 (110)	Ext. 1PPS holdover
If External 1PPS signal is lost, holdover event is triggered. Time range is configurable. Additional text: "Triggered|Ok"	

B.2.6 RF alarms

7083 (9)	RF Alarms
RF Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

2701 (44)	Overload Protection
If the output level exeeds more than 3dB from configured this alarm is triggered.	

7079 (79)	AGC RF Level Range
If the AGC regulation exceeds either below –2dB or above 0,7dB relative set to level this alarm is triggered. Additional text: "Exceeded" - Exceeded maximum configured range "Normal" - Normal operation "AGC RF Level Range, <value in dB>"	

7084 (86)	RF Synthesis Error
Only valid for older hardware. Cannot occur in PT3000 devices.	

7085 (87)	RF Level out of range
If the RF level is either below or above set threshold this alarm is triggered indicating the current level. Additional text:	

"RF Level out of range, <value> dB" "OK"

B.2.7 GNSS alarms

7007 (10)	GNSS Alarms
GNSS Group alarm. Summarized state of alarms belonging to this group. Additional text "Present|All Ok"	

7096 (98)	GNSS Unlocked
If GNSS signal is lost, and holdover time range exceeded, event becomes "UNLOCKED". Additional text: "Unlocked|Locked"	

7106 (107)	GNSS Antenna Fault
Antenna fault involves checking current usage (<2mA) and report alarm if no antenna is present. Additional text: "Triggered|Ok"	

7105 (108)	GNSS holdover
If GNSS signal is lost, holdover event is triggered. Time range is configurable. Additional text: "Triggered|Ok"	

B.2.8 TSoIP alarms

7009 (12)	TSoIP Alarms
TS over IP Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

7480 (115)	TSoIP RX1 Package Error Ratio
Triggered if the set package error ratio is exceeded. Number of dropped packed as a percentage of received packets. Dropped packets are the sum of RTP-TS-Stream dropped packets and dropped packets on the two FEC streams. Dropped packets are calculated from sequence number gaps in the RTP headers.	

7482 (117)	TSoIP RX2 Package Error Ratio
Triggered if the set package error ratio is exceeded. Number of dropped packed as a percentage of received packets. Dropped packets are the sum of RTP-TS-Stream dropped packets and dropped packets on the two FEC streams. Dropped packets are calculated from sequence number gaps in the RTP headers.	

7484 (119)	TSoIP RX1 Signal
Additional text: "Fail" - If signal loss "Ok" - If signal is present	

7486 (121)	TSoIP RX2 Signal
Additional text: "Fail" - If signal loss "Ok" - If signal is present	

B.2.9 External alarms

7010 (13)	Ext. Alarms
External Group alarm. Summarized state of alarms belonging to this group Additional text: "Present|All Ok"	

1330 (72)	Alarm #1 Input
Triggered if extern alarm input 1 is activated. Input is user configurable active high, active low. Additional text: "Fail|Ok"	

1331 (73)	Alarm #2 Input
Triggered if extern alarm input 2 is activated. Input is user configurable active high, active low. Additional text: "Fail|Ok"	

1332 (74)	Alarm #3 Input
Triggered if extern alarm input 3 is activated. Input is user configurable active high, active low. Additional text: "Fail|Ok"	

1333 (75)	Alarm #4 Input
Triggered if extern alarm input 4 is activated. Input is user configurable active high, active low. Additional text: "Fail|Ok"	

B.2.10 HW monitor alarms

7011 (14)	HW Monitor Alarms
Hardware monitor Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

7620 (156)	Main Board FPGA Temperature
"Exceeded" - If temperature >75 degree Celsius "Normal" - If below	

7621 (157)	Main Board CPU Temperature
"Exceeded" - If temperature >100 degree Celsius "Normal" - If below	

7622 (158)	Main Board Temperature
"Exceeded" - If temperature >73 degree Celsius "Normal" - If below	

7623 (159)	Left Chassis Fan
"Fail" - Fan stopped "Ok" - Fan running	

7624 (159)	Right Chassis Fan
"Fail" - Fan stopped "Ok" - Fan running	

7626 (162)	Backplane Temperature
"Exceeded" - If temperature >80 degree Celsius "Normal" - If below	

B.2.11 Communications alarms

7019 (15)	Communications Alarms

Communications Group alarm. Summarized state of alarms belonging to this group The alarms in this group pertain to communication lines (LAN, RS-232, RS-485) state. Additional text: "Present|All Ok"

7810 (55)	ETH0 Conn. State
The state of physical network interface ETH0 is not the configured expected value. Additional text: "Failure| Ok"	

7811 (56)	ETH1 Conn. State
The state of physical network interface ETH1 is not the configured expected value. Additional text: "Failure|Ok"	

7812 (57)	ETH2 Conn. State
The state of physical network interface ETH2 is not the configured expected value. Additional text: "Failure|Ok"	

7813 (58)	ETH3 Conn. State
The state of physical network interface ETH3 is not the configured expected value. Additional text: "Failure|Ok"	

7814 (59)	ETH4 Conn. State
The state of physical network interface ETH4 is not the configured expected value. Additional text: "Failure|Ok"	

B.2.12 ASI alarms

7013 (16)	ASI Alarms
ASI Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

7490 (113)	ASI-1 Data Error Rate

Triggered if data rate exceeds data error alarm limit. Limit is user configurable. Additional text: "<value> bps|Normal"

7491 (114)	ASI-2 Data Error Rate
Triggered if data rate exceeds data error alarm limit. Limit is user configurable. Additional text: "<value> bps|Normal"	

B.2.13 Internal alarms

7014 (18)	Internal Alarms
Internal Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

7500 (132)	Reference Status
Internal event, which triggers an alarm in the device. Default alarm action is reboot. Additional text: "No OCXO Calibration found" "Bad OCXO Calibration found"	

7501 (133)	Synthesize Status
Only valid for older hardware. Cannot occur in PT3000 device.	

7502 (134)	Upconverter Status
Internal event, which triggers an alarm in the device. Default alarm action is reboot. The hex value in the additional text refers to an internal hardware status. Additional text: "V500 <hexvalue>"	

7503 (135)	Downconverter Status
Internal event, which triggers an alarm in the device. Default alarm action is reboot. The hex value in the additional text refers to an internal hardware status. Additional text: "Downconverter Status, pll1 = <hexvalue>" - If failure "OK" - If normal operation	

7504 (136)	Main board Status

Will be triggered if any of the temperature sensors V19 or V504 can't be read. This alarm is intended for HW errors that are directly related to backplane, IO controller, reference system, up converter or down converter. Most such errors will prevent linux from starting but not the temperature sensors.

7505 (137)	Main board Battery
Will be triggered if the battery has too low voltage left to keep the RTC running correctly. This alarm is only generated, when booting and have 2 side effects: 1) The date/time is reset to a well-known date. (But updated by GPS/NTP as per user settings) 2) The reboot between the two software images will not work. Only image 0 is used. It is recommended to replace the battery as soon as possible.	

7507 (139)	DSP Status
Internal event, which triggers an alarm in the device. Default alarm action is reboot. Is the DSP up and running? Additional text: "State = <0|1|2>" 0=OK, 1=HALTED, 2=DEAD	

7510 (142)	GNSS Status
If GPS module is installed and option is 'used' and it is not possible to communicate with the module this alarm is raised. Additional text: "Comm error"	

7514 (146)	Ethernet port Status
Additional text: "FAILED, Physical Eth<0|1|2|3|4>"	

7649 (182)	PLL Out of lock
Internal event, which triggers an alarm in the device. Default alarm action is reboot. The hex value in the additional text refers to an internal hardware status. Additional text: "PLL Out of lock, pll3 = <hexvalue>" - If failure "OK" - If normal operation	

B.2.15 Mode-A alarms

7018 (20)	Mode-A Alarms
DVB-T2 Mode-A Group alarm. Summarized state of alarms belonging to this group. Additional text: "Present|All Ok"	

7675 (192)	TS Bitrate is larger than the Max. PLP Datarate
If the TS bitrate exeeds the maximum PLP datarate this alarm is triggered.	
7676 (193)	Dropping TS Packets
Triggered as a consequence of Alarm 7675. Additional text: "Fail" – If TS packets are dropped "Ok" – If no TS packets are dropped	

7677 (194)	Parameter Validation Error
For details about the specific validation error please consult either: - The Webservice's parameter validation window (drag the 'Mode' block to the lower half of Webservice) or - Retrieve the mode validation text string by sending SCPI query T2:MODEA:VALMSG? over serial interface or ethernet:port 4000 or - Retrieve the mode validation message through SNMP get object ModeT2ModeAParameterValidationMessage OID2.115 Additional text: "Fail" – If validation error "Ok" – If no validation errors	

B.3 subMute reasons

The following is a list of all additional text information for all product variations pertaining to subMute On (event ID 1600) and subMute Off (event ID 1601) alarms.

outp:mute:reas:desc? 0	"Unknown"
outp:mute:reas:desc? 1	"Startup"
outp:mute:reas:desc? 2	"Network change"
outp:mute:reas:desc? 3	"IFFT change"
outp:mute:reas:desc? 4	"Constellation change"
outp:mute:reas:desc? 5	"DVB-H change"
outp:mute:reas:desc? 6	"Ofreq change"
outp:mute:reas:desc? 7	"Bandwidth change"
outp:mute:reas:desc? 8	"Recall Preset"
outp:mute:reas:desc? 9	"Test signal"
outp:mute:reas:desc? 10	""
outp:mute:reas:desc? 11	""
outp:mute:reas:desc? 12	"Ext. Mute"
outp:mute:reas:desc? 13	"PCR Offset change"
outp:mute:reas:desc? 14	"TXID change"
outp:mute:reas:desc? 15	"TS switch"
outp:mute:reas:desc? 16	"No TS Sync"
outp:mute:reas:desc? 17	"MIP Data HP"
outp:mute:reas:desc? 18	"MIP Time Offset"
outp:mute:reas:desc? 19	"MIP Freq Offset"
outp:mute:reas:desc? 20	"MIP Data LP"
outp:mute:reas:desc? 21	"SFN RefINT"
outp:mute:reas:desc? 22	"Hier mode change"
outp:mute:reas:desc? 23	"Coderate HP change"

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outp:mute:reas:desc? 24     "Coderate LP change"
outp:mute:reas:desc? 25     "Guard Interval change"
outp:mute:reas:desc? 26     "TS-Control change"
outp:mute:reas:desc? 27     "Deep Interleaver change"
outp:mute:reas:desc? 28     "MPE/FEC HP change"
outp:mute:reas:desc? 29     "MPE/FEC LP change"
outp:mute:reas:desc? 30     "Timeslicing HP change"
outp:mute:reas:desc? 31     "Timeslicing LP change"
outp:mute:reas:desc? 32     "Keep NULL Packets change"
outp:mute:reas:desc? 33     "Power Level change"
outp:mute:reas:desc? 34     "Demodulator follow change"
outp:mute:reas:desc? 35     "Load Channel Filters"
outp:mute:reas:desc? 36     "Squelch"
outp:mute:reas:desc? 37     "Overload"
outp:mute:reas:desc? 38     "Load Ecam"
outp:mute:reas:desc? 39     "Config Ecam"
outp:mute:reas:desc? 40     "Rmode"
outp:mute:reas:desc? 41     "Powerdown"
outp:mute:reas:desc? 42     "ScheduledAction"
outp:mute:reas:desc? 43     "User Request"
outp:mute:reas:desc? 44     "SFN Resync"
outp:mute:reas:desc? 45     "IF Low"
outp:mute:reas:desc? 46     "1PPS Timing"
outp:mute:reas:desc? 47     ""
outp:mute:reas:desc? 48     ""
outp:mute:reas:desc? 49     ""
outp:mute:reas:desc? 50     ""
outp:mute:reas:desc? 51     ""
outp:mute:reas:desc? 52     ""
outp:mute:reas:desc? 53     ""
outp:mute:reas:desc? 54     ""
outp:mute:reas:desc? 55     "SFN Hold"
outp:mute:reas:desc? 56     "SFN Search"
outp:mute:reas:desc? 57     "Time/Date Sync"
outp:mute:reas:desc? 58     "SFN delay too low"
outp:mute:reas:desc? 59     "DVBT-2 option not enabled"
outp:mute:reas:desc? 60     "DVBT option not enabled"
outp:mute:reas:desc? 61     "Modulator Resync"
outp:mute:reas:desc? 62     "alarm"
outp:mute:reas:desc? 63     "Mode-A Parameter Validation Error"
outp:mute:reas:desc? 64     "Mode-A Unsupported Feature"
outp:mute:reas:desc? 65     "New IF output level"
outp:mute:reas:desc? 66     "SFN Configuration Mismatch"
outp:mute:reas:desc? 67     "ISDB-T option not enabled"
outp:mute:reas:desc? 68     "ATSC option not enabled"
```

Appendix C Environmental specifications

The environmental specifications for a solution based on the PT3182 OEM card will depend on the specific chassis solution chosen in each individual case. The values shown are for ProTelevision own rack integration solution (PT3082).

C.1 Climatic temperature range operating

-5° C to +50° C
(+23 F to +122 F)

C.2 Temperature range within specs

+5° C to +45° C
(+41 F to +113 F)

C.3 Temperature range storage

-30° C to +70° C
(-22 F to +158 F)

C.4 Humidity operating

Max 90% RH

C.5 Humidity storage

Max 90% RH

C.6 EMC

Compliant to ENS5022 (emission) and EN5024 (immunity)

C.7 Safety

Compliant to ENS60950-1

C.8 RoHS

Compliant with directive 2011/65/EU

8 Document history

Rev.:	Date:	Name:	Details:
1.0.0	July 3, 2015	CEF	First release of the document
1.0.1	September 24, 2015	HSO	Minor corrections and clarifications added
1.0.2	December 15, 2015	HSO	Clarification of active low HW mute (‘floating’ deleted)
1.0.3	August 14, 2020	HSO	Incorrect references in chapter 2 to an internal Ethernet switch have been deleted. There is no internal Ethernet switch on PT3000. All the physical Ethernet connections ETH0, ETH1, ETH2 and ETH3 are truly separate interfaces. Paragraphs 3.1 and 3.2 updated to clarify that PT3000 features five logical LAN interfaces and four physical Ethernet connections. Paragraph 3.3 updated to clarify that interface specific IP configurations are located in the LAN control panel and that the general IP configurations are in the NETWORK control panel.

This is the last page of the document.