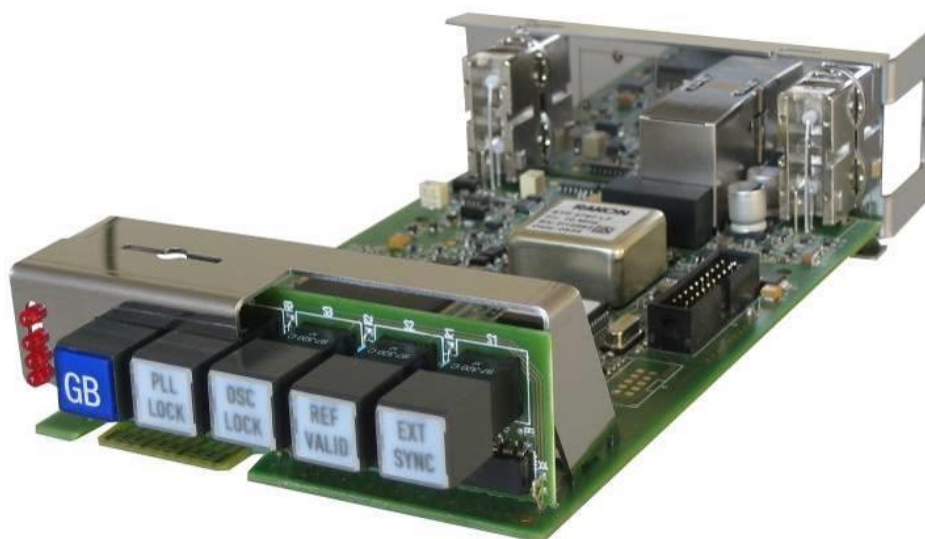




RUB GB

Master Black Burst/Tri-Level Generator



Functional Description and Specifications
Supplement to the "Installation & Systems Manual RUBIDIUM SERIES"
Version: 3.2
December 2, 2020





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A1 Revision History

| No. | Date | Subject |
|-----|-------------------|--|
| 0.2 | December 11, 2009 | Preliminary documents, changes without notice. |
| 1.0 | February 28, 2011 | First released document. |
| 1.1 | March 10, 2011 | Photos at front page added. |
| 2.0 | August 08, 2012 | Tri-level output. Completely revised. |
| 3.0 | June 12, 2014 | Updated version. |
| 3.1 | August 26, 2019 | Changed address of Plura Europe GmbH. |
| 3.2 | November 30, 2020 | Re-formatted in new design. |

Due to constant product development the features of this module are subject to change. The current functional description always refers to the current software and the current configuration tool.

You can download the latest version of the standard software from

<https://www.plurainc.com>.

Please be sure to use the latest configuration program after having done an update. You can download the latest version from the address above.

A2 Copyright

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A3 General Remarks

This manual is a supplement to the '*Installation & Systems Manual RUBIDIUM SERIES*'. Please read the below listed chapters of the '*Installation & Systems Manual RUBIDIUM SERIES*', as these chapters are necessary for the safe and proper use of RUB modules:

- *A3 Warranty,*
- *A4 Unpacking/Shipping/Repackaging Information,*
- *A5 Safety Instructions,*
- *A6 Certifications & Compliances,*
- *Plug-In a Module,*
- *Remove a Module.*



1 Module GB

1.1 Description

This module serves as a stand-alone master black burst/tri-level generator. The module is fitted with a precise reference oscillator which has been adjusted to an atomic clock reference upon delivery. It is also possible to use an external 10 MHz reference clock if higher stability is required. If real-time reference input signals (PPS + time & date) are connected, GB adjusts the phase of the output signals and the start of the PAL eight field sequence or NTSC four field sequence according to the proposed SMPTE standard. In this way, different GBs in a system will all be automatically locked to each other.

The analogue output is generated from a high-speed video DAC. Two identical outputs are provided. The output video format is selectable: black burst (PAL/NTSC) or any analogue HDTV tri-level signal.

Configuration of this module requires a computer and

- either the PC program “**Rubidium Config**”
- or a network browser and a RUB Ethernet module (**RUB IE** or **RUB PM**).

Configuration, status monitor etc. identify this module as **GB**. RUB1 version modules visibly show this id on a button at the front panel, RUB3 version modules at the rear panel. The serial number is located on the bottom side of the lower circuit board of each module.

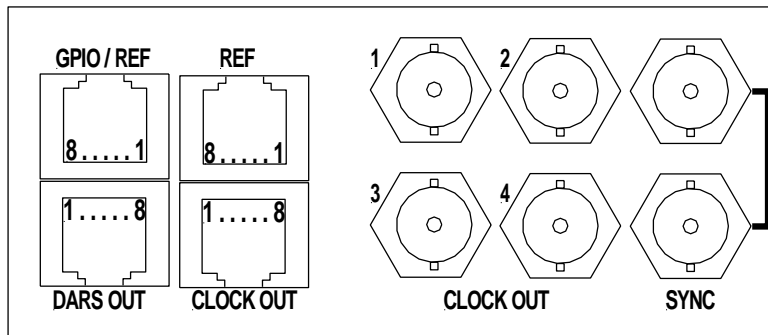
The standard hardware of this module has all of the following key features:

- Two analogue video outputs: black burst or tri-level.
- 10 MHz continuous wave input.
- Real-time reference input signals (PPS, time & date data string).
- “Hot Swapping”, i.e. it is possible to insert or remove a module without interrupting the operation of other modules in this frame.
- Failure relay, connected to the FAIL_A and FAIL_B pins of the **RLC** connector at the rear of the frame.
- RS232 and TC_link (RLC connector) interfaces to have access to the internal bus of the chassis.
- Four programmable function keys, lamps and LEDs on the front panel (RUB1 version only).
- Flash memory containing the firmware, so configuration and updates are possible via a PC connection. You can download the latest version of the program from:

<https://www.plurainc.com>.



1.2 Rear Panel and Connections



- 2 x BNC VIDEO OUT: Analogue video outputs. Video format selectable.
- 2 x BNC SYNC: Input and loop-through output for a 10 MHz signal.
- OPTION/GPI: Reserved for future use.

Pin assignments

| | |
|-------------------|---|
| REF IN: RJ45 jack | LOOP: RJ45 jack |
| 1: PPS IN | 1: PPS IN – loop-through from REF IN.PPS IN |
| 2: RXD IN | 2: RXD IN – loop-through from REF IN.RXD IN |
| 3: - | 3: - |
| 6: - | 6: - |
| 4: GND | 4: GND |
| 5: VCC24 OUT | 5: VCC24 OUT |
| 7: GND | 7: GND |
| 8: VCC5 OUT | 8: VCC5 OUT |

Signal descriptions

| | |
|-----------|---|
| GND | Signal ground. |
| SYNC | 10 MHz continuous wave input. |
| VIDEO OUT | Analogue black burst/tri-level outputs. Video format selectable. |
| PPS IN | PPS IN accepts a seconds pulse. |
| RXD IN | RXD IN accepts a serial data string with time & date information. This input accepts RS232 signals. |
| VCC24 OUT | 24 VDC voltage output, 200 mA reversible fused. |
| VCC5 OUT | 5 VDC voltage output, 300 mA reversible fused. |



1.3 Specifications

SYNC

| | |
|---------------|-----------------------------|
| Connector | BNC (IEC169-8), 75 Ω |
| Signal format | 10 MHz, sinusoidal |
| Signal level | 0.8 – 5 Vpp |

VIDEO OUT

| | |
|---------------------|--|
| Connector | BNC (IEC169-8), 75 Ω |
| Output impedance | 75 Ω |
| Format | <ul style="list-style-type: none"> • PAL 625/50, 8-Field Ident Pulse at line 7 selectable – see below • NTSC 525/60, 4-Field Ident Pulse at line 10 selectable – see below • HDTV 720p23.98 / p24 / p25 / p29.97 / p30 • HDTV 720p50 / p59.94 / p60 • HDTV 1035i59.94 or psf29.97 • HDTV 1035i60 or psf30 • HDTV 1080psf23.98 / psf24 • HDTV 1080i50 or psf25 • HDTV 1080i59.94 or psf29.97 • HDTV 1080i60 or psf30 • HDTV 1080p23.98 / p24 / p25 / p29.97 / p30 • HDTV 1080p48 / p50 / p59.94 / p60 |
| Signal level | 1 V \pm 2 % |
| 8-Field Ident Pulse | <p>This white pulse is aligned to colour field 1. It occurs at line 7 every 8 fields and identifies the 8-field sequence in the video system PAL. It can be switched off.</p> <p>Level: 100 % white (+700 mV) Width: 20 μs Start: 12 μs after horizontal reference</p> |
| 4-Field Ident Pulse | <p>This white pulse is aligned to colour field 1. It occurs at line 10 every 4 fields and identifies the 4-field sequence in the video system NTSC. It can be switched off.</p> <p>Level: 96 IRE (+685 mV) Width: 20 μs Start: 12 μs after horizontal reference</p> |



PPS IN

| | |
|----------------|---|
| Connector | Pin 1 RJ45 REF IN and LOOP |
| Characteristic | Typical input signal: 5 V impulse Input impedance: $\approx 100 \text{ k}\Omega$ Input "Low": -2.0 to +0.6 V Input "High": +2.4 to +10.0 V |

RXD IN

| | |
|----------------|---|
| Connector | Pin 2 RJ45 REF IN and LOOP |
| Characteristic | Typical input signal: RS232 Input impedance: $\geq 30 \text{ k}\Omega$ Input "Low": -15.0 to +0.1 V Input "High": +5.5 to +15.0 V Frequency: 0 –200 kHz |

Frequency stability

| | |
|----------------------------------|--|
| 10 MHz external reference clock | It is recommended to use the external sync feature. If you connect a high stability 10 MHz signal, e.g. from a RUB GPS 10 MHz module, the frequency stability of the output signals will be determined by this external clock. |
| Internal oscillator, standard | $\pm 1.0 \text{ ppm}$ |
| Internal oscillator, option OCXO | Upon request |

Others

| | |
|--|---|
| Operating voltage | 12–30 VDC |
| Power consumption | 4 W maximum (without load at VCC24 and VCC5 outputs) |
| Weight | $\approx 0.28 \text{ kg}$ |
| Mechanical | 2 circuit boards (W x D): 100 x 160 mm / 3.94 x 6.30 inch Rear panel: RUB1: 1 RU, 103 x 44 mm / 4.06 x 1.73 inch RUB3: 3 RU, 8 HP |
| Environmental characteristics, operating | Temperature: +5 °C to +40 °C Relative humidity: 30 % to 85 %, non-condensing |
| Environmental characteristics, non-operating | Temperature: -10 °C to +60 °C Relative humidity: 5 % to 95 %, non-condensing |



1.4 Software Update

Firmware updates require a (windows operating system) computer and the latest programme package **Rubidium Configuration and Status Monitor PC Programs**. You can download it from:

<https://www.plurainc.com>.

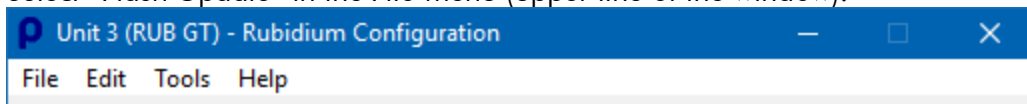
Please check the **PC** connector (looking at the rear: on the left side) at your RUBIDIUM housing: there is an USB or RS232 (with a DSUB9 connector) interface installed. You now need the same interface at your computer.

If you first plug to the USB a driver has to be installed. You can download the driver from the address above.

The new firmware should already be stored as a **.tcf** file at your computer. Standard name: "Rubidium GB v.vv.vvv.tcf" (v.vv.vvv stands for a revision number, e.g. 2.12.19).

Please now execute the following steps:

1. Connect your computer to the **PC** connector of that RUBIDIUM frame where the module has been plugged. If the **PC** connector is used for any other purpose, please disconnect it.
RS232 interface: Use a straight (1:1) connection between the **PC** connector at the RUBIDIUM frame and the RS232 of the computer.
USB interface: Use a USB A-B cable between your computer and the RUBIDIUM frame.
Switch on the power of all units.
2. Execute "**Rubidium Config**" on your computer. Open the "Port" dropdown list and select the port according to the interface (USB, RS232) you are using.
3. Select the module (unit 1, 2, 3 ...).
4. Select "Flash Update" in the *File* menu (upper line of the window).



5. Open the **.tcf** file and click OK to start the flash update. Click the OK button at the end.
6. Update is finished now. We recommend checking module's configuration utilizing the latest "**Rubidium Config**" program.

During the flash update the operation of the module stops!



2 Status Monitor

2.1 Status Monitor via Network Browser

A computer with a 10/100Base-T Ethernet interface and any RUB Ethernet module (**IE** or **PM**) are required.

- The computer and the RUB Ethernet module have to be connected to the same network.
- The module, whose status data should be displayed, and the Ethernet module have to be located in the same RUBIDIUM system.

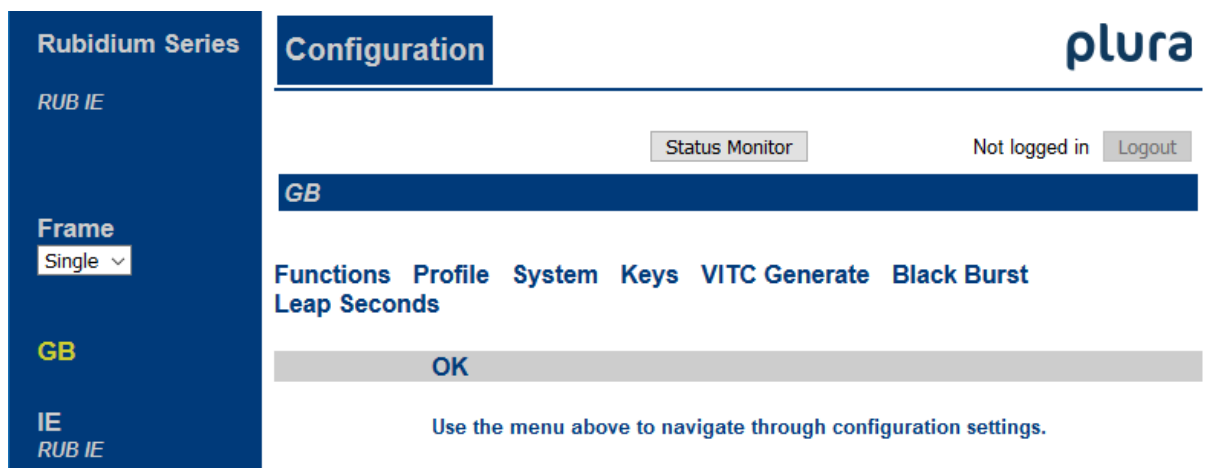
Requirements:

- The current version of *Java Runtime Environment* installed (www.java.com).
- Java should be installed as a browser plug-in (a Windows installation will do this automatically if you download Java from the source mentioned above).
- The Status Monitor works with all operating systems which support Java.

Preparation – referring to subchapters of chapter “The RUBIDIUM SERIES HTTP Server” of the “Installation & Systems Manual RUBIDIUM SERIES” manual

- Establish a 10/100Base-T Ethernet connection:
→ subchapter “Overview, Connecting the RUB Ethernet Module”.
- Set up the network:
→ subchapter “Network Set-Up”.
- Open the RUBIDIUM homepage:
→ subchapter “The RUBIDIUM Homepage”.
- Access the module, whose status data should be displayed:
→ subchapter “Accessing a Configurable Module”.

Now click button **Status Monitor** to open the status monitor.



The screenshot displays the RUBIDIUM Series Configuration web interface. On the left, a dark blue sidebar contains the 'Rubidium Series' logo and navigation options: 'RUB IE', 'Frame' (with a 'Single' dropdown), 'GB', and 'IE RUB IE'. The main content area has a 'Configuration' header and a 'plura' logo in the top right. A 'Status Monitor' button is prominently displayed, along with a 'Not logged in' status and a 'Logout' button. Below these, a 'GB' section is visible, followed by a row of links: 'Functions', 'Profile', 'System', 'Keys', 'VITC Generate', and 'Black Burst'. A 'Leap Seconds' section is also present, with an 'OK' button. At the bottom, a message reads: 'Use the menu above to navigate through configuration settings.'



2.2 Status Monitor by PC Program

The “**RubStatSE.exe**” PC program uses the **PC** interface of the RUBIDIUM housing: RS232 [obsolete] or USB. This program is part of the **Rubidium Configuration and Status Monitor PC Programs** packet you can download at:

<https://www.plurainc.com>.

Requirements:

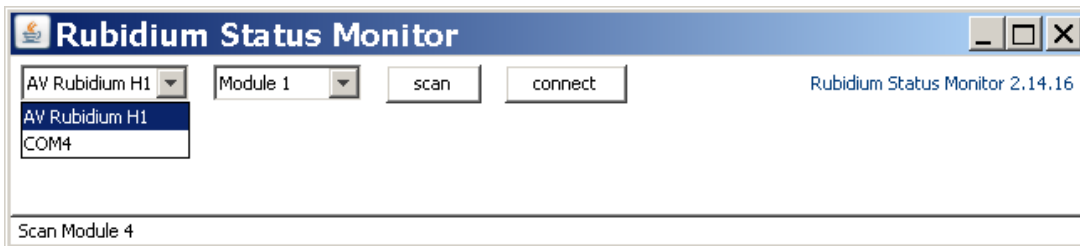
- The current version of *Java Runtime Environment* installed (www.java.com).
- For Windows operating systems: Please follow the description of **RubStatSE_Readme.txt**.
- For Linux operating systems: available on request.

Preparation – referring to subchapters of chapter “*The Rubidium Config PC Program*” of the “*Installation & Systems Manual RUBIDIUM SERIES*” manual

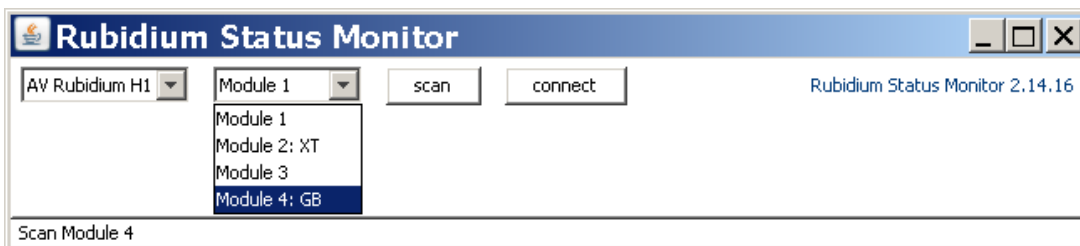
- Installation: → subchapter “*Installation*”.
- Connection to the RUBIDIUM chassis: → subchapter “*Connection to RUBIDIUM SERIES Chassis*”.

Execution

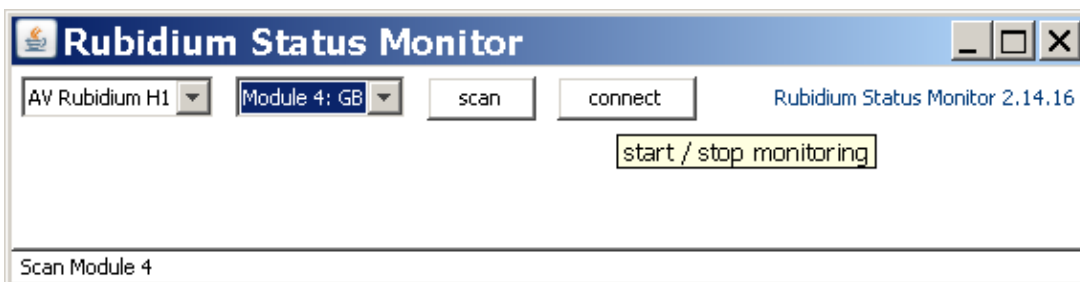
- Execute the “**RubStatSE.exe**” at your computer.
- Select the **port** according to the interface (USB, RS232) you are using.



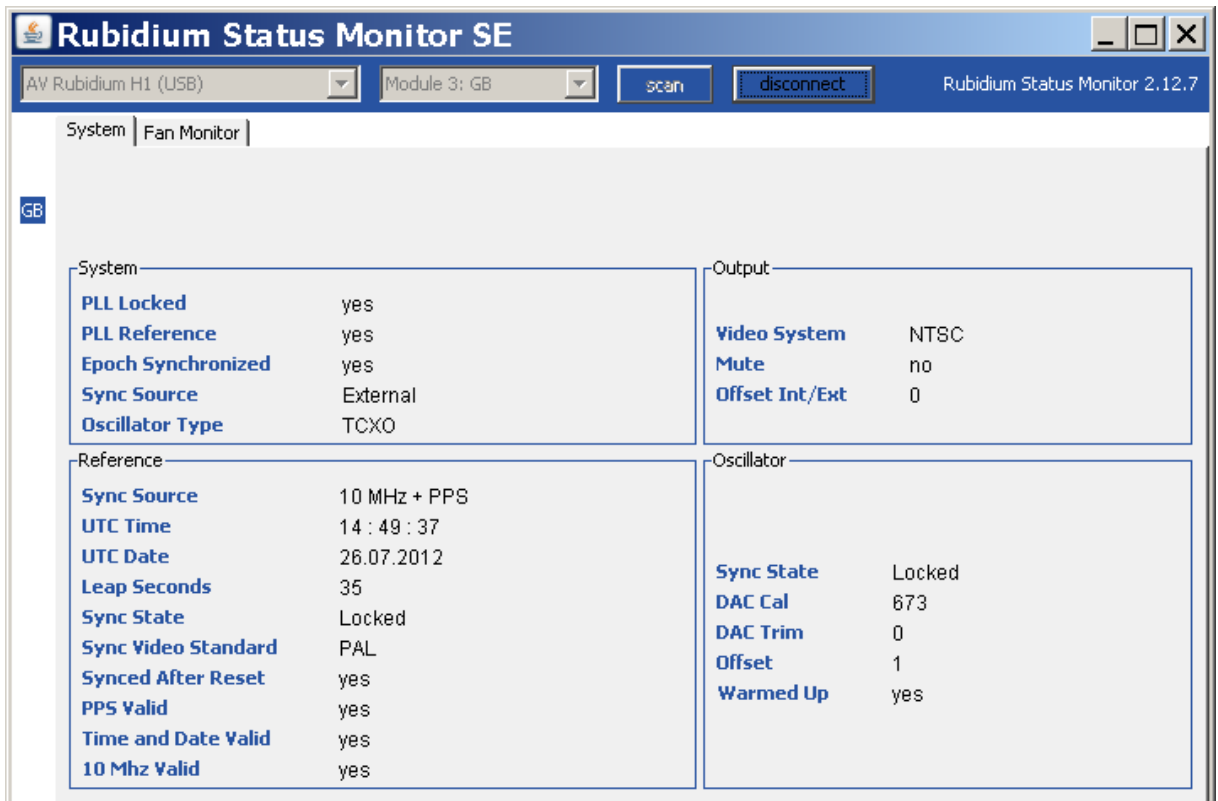
- Click the **scan** button.



- Select the module out of the dropdown list and click the **connect** button.



2.3 Status: System



System

| | | |
|---------------------------|-------------------|---|
| PLL Locked | yes/no | status of internal 27 MHz PLL |
| PLL Reference | yes/no | status of internal 27 MHz PLL |
| Epoch Synchronized | yes/no | 'yes', if the phase of the output signals is aligned according to the SMPTE Epoch method. This requires valid signal input of PPS and time & date of an external real-time reference. Please read more at chapter "Leap Seconds": Setting the Leap Seconds. |
| Sync Source | External/Internal | 'External', if any external sync source has been selected and detected. |
| Oscillator Type | TCXO/OCXO | type of internal oscillator |

Output

| | | |
|-----------------------|--|--|
| Video System | PAL/NTSC/720p.../1035i.../1080i.../1080p...: | please refer to the list at chapter "Black Burst": Configuring the Video Outputs |
| Mute | no/yes | video outputs enabled (= 'no') or disabled = 'yes'. After power has turned on as well as after any change of the video format, the video outputs keep silent until the phase synchronization has been reached. |
| Offset Int/Ext | 0 | feed back of the phase difference of PPS to 10 MHz. |



Reference

| | | |
|---------------------|-----------------------|---|
| Sync Source | 10 MHz+PPS/Oscillator | shows the selected sync source |
| UTC Time | 14:49:37 | UTC time, decoded out of signal RXD IN |
| UTC Date | 26.07.2012 | UTC date, decoded out of signal RXD IN |
| Leap Seconds | 35 | amount of leap seconds relevant for internal calculation |
| Sync State | Locked | status of synchronization to an external reference: Idle Locked Init Wait Init Reset Oscillator Backup Oscillator Resync Oscillator Resync Fine Reference Reset |
| Sync Video Standard | PAL | reserved for future use |
| Synced After Reset | yes/no | this status is part of signal RXD IN: 'yes', as soon as the reference source could have been synchronised at least once after power-on |
| PPS Valid | yes/no | 'yes', if PPS signals are present and valid |
| Time and Date Valid | yes/no | 'yes', if time & date of signal RXD IN is present and valid |
| 10MHz Valid | yes/no | 'yes', if 10MHz signal is present and valid |

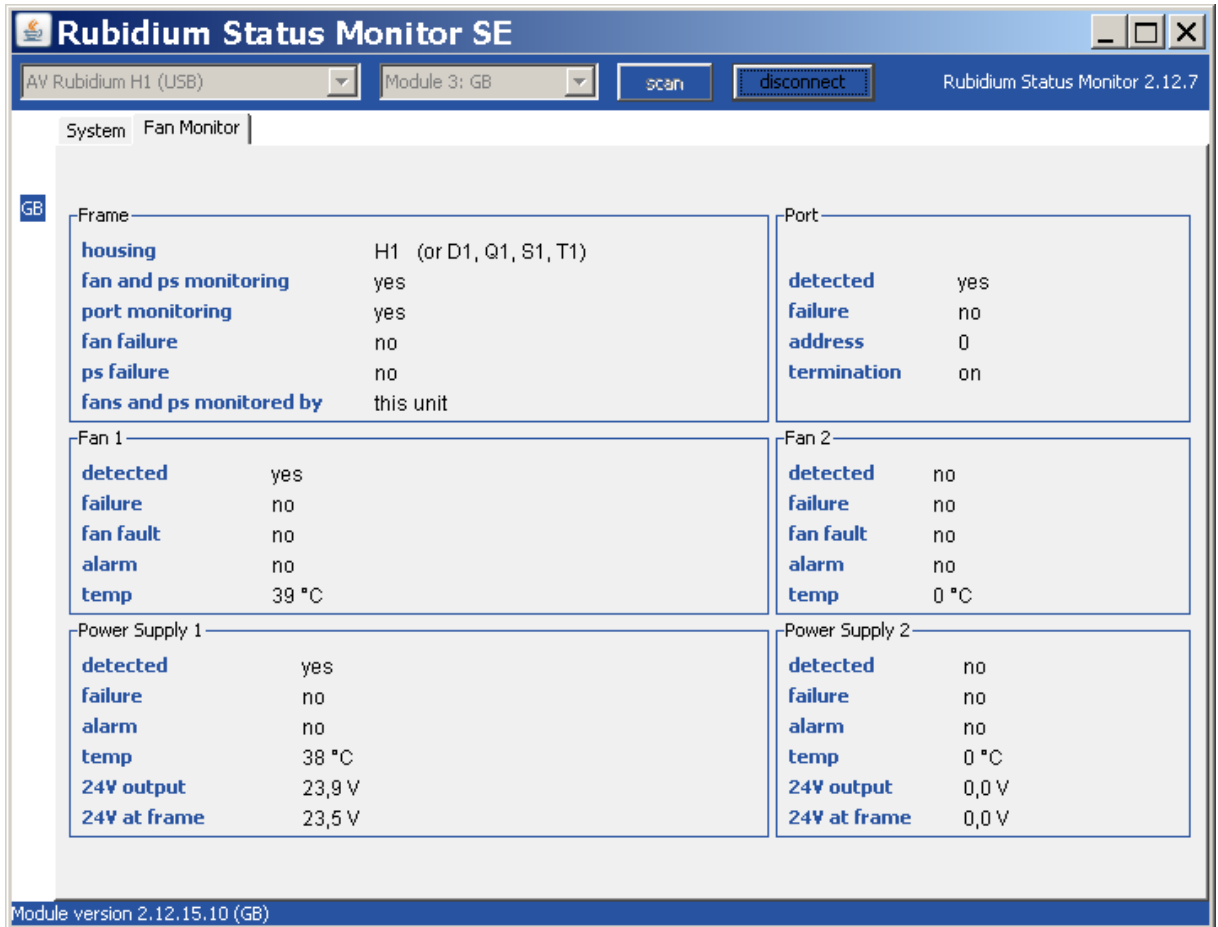
Oscillator

| | | |
|------------|--------|--|
| Sync State | Locked | status of oscillator synchronization: Idle Locked Freq Freq Coarse Freq Fine Phase Phase Reset Phase Coarse Phase Resync Phase Fine Semi-Locked |
| DAC Cal | 673 | calibration value of D/A converter |
| DAC Trim | 0 | current offset for D/A converter with respect to <i>DAC Cal</i> |
| Offset | 1 | phase offset of video output with respect to reference |
| Warmed Up | yes/no | 'yes', if oscillator has warmed up (one minute after power has turned on approximately). |



2.4 Status of Fans and Power Supplies

This module – as all configurable RUBIDIUM modules – is able to monitor the fans and power supplies which are plugged to the same housing as “GB”.



Please refer to the document “Installation & Systems Manual RUBIDIUM SERIES” for a detailed description.



3 The Rubidium Configuration Tools

3.1 The “Rubidium Config” PC Program

Please refer to

“Installation & Systems Manual RUBIDIUM SERIES”

for a general description of this program and how to install it. Please notice the following chapters and subchapters:

- *Software Tools for RUBIDIUM SERIES*
 - *The “Rubidium Config” PC Program*
 - *Overview*
 - *Installation*
 - *Connecting to RUBIDIUM SERIES Chassis*
 - *Starting the Program*
 - *Configuration of Modules:*
 - *Tabs and Functions*
 - *Store a Set-Up to a File, Load and Update the Set-Up of a Module*
 - *The “Profile” Tab: Store and Load a Complete Set-Up on the Module*

The “**Rubidium Config**” PC program uses various tab cards. With one click on the button **Configure** all available and currently activated tabs of this specific module are displayed.

Any changes at a tab will immediately be stored at the module. If you enter a number or a text press the **tabulator key** at the PC’s keyboard afterwards.



3.2 The Rubidium Series HTTP Server

The HTTP server is located in any RUB Ethernet module (**IE** or **PM**) and can be accessed via 10/100Base-T Ethernet and a web-browser.

Please refer to

"Installation & Systems Manual RUBIDIUM SERIES"

for a functional overview and for an installation guide. Please notice the following chapters and subchapters:

- *Software Tools for RUBIDIUM SERIES*
 - *The RUBIDIUM SERIES HTTP Server*
 - *Overview, Connecting the RUB Ethernet Module*
 - *Network Set-Up*
 - *The RUBIDIUM Homepage*
 - *Accessing a Configurable Module:*
 - *The First Steps*
 - *Enable and Disable Functions: The "Functions" Page*
 - *Store and Load Setups: The "Profile" Page*

As soon as you have gained access to the module, a menu appears which shows a list of all configuration pages which are currently available.

Changes on a parameter will not be stored automatically. There are two buttons at each page which should be used to transfer the parameters:



Save To Module: Click this button to store the changes on the module.

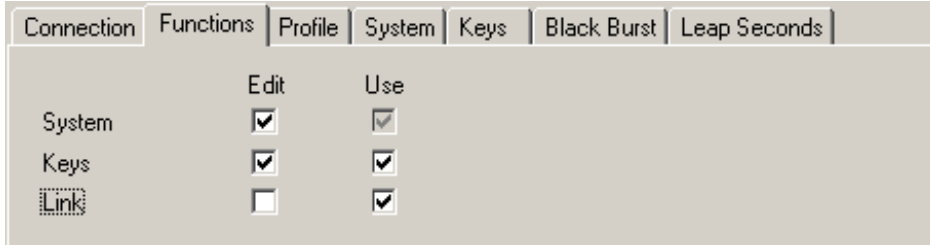
Reload From Module: Click this button to refresh the configuration page.



3.3 “Functions”: Enable and Disable Functions

The configuration page **Functions** indicates the complete range of functions. It is possible to individually switch on or off functions.

For example (screen shot of the PC program tab):



A configuration page reflects a function of the module. The **Edit** and **Use** checkboxes define the state of a function:

| Edit | Use | State of a function |
|------|-----|--|
| | | Function disabled; corresponding configuration page not available. |
| √ | √ | Function enabled; corresponding configuration page available. |
| | √ | Function enabled; corresponding configuration page not available. This avoids any unintentional operating. |

- We suggest that you uncheck **Use** of all functions you are presently not using.
- We suggest that you uncheck **Edit** of all functions you are presently not configuring. That avoids unintentional operating and malfunctions.

List of configuration pages/functions:

- Profile** Store and Load Set-Ups on the Module or on the PC (*)
- System** Name, Reset, SNMP, Fan Control
- Keys** Keys, Lamps, and LEDs
- Black Burst** Configuring the Video Outputs
- Leap Seconds** Setting the Leap Seconds
- Link** Communication between Modules

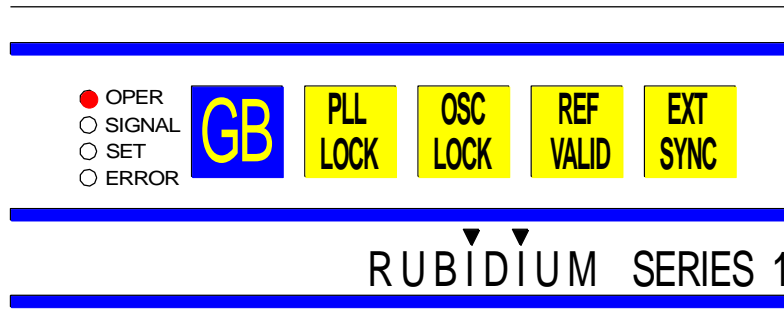
(*) refer to “Installation & Systems Manual RUBIDIUM SERIES”



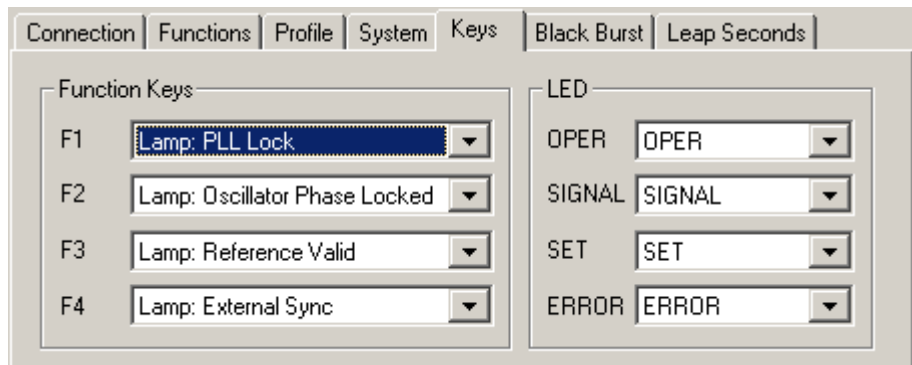
3.4 “Keys”: Keys, Lamps, and LEDs

The RUB1 version of GB has four illuminated buttons (keys and lamps) and four LEDs (Light Emitting Diodes). Basically, the functions of these in- and outputs are programmable.

Some functions presented by the configuration tool maybe assigned to special options, and therefore are not applicable with the standard firmware. For further information please contact Plura.



Configuration (example shows a screen shot of the PC program tab):



The following functions for the **LEDs** are provided for this module:

| Function | Description | Recommended LED |
|----------|---|-----------------|
| OPER | Lights up during normal operating mode. | OPER |
| SIGNAL | | SIGNAL |
| SET | Lights up as long as any PC program (configuration or status monitor program) has established a connection to the module by the PC interface. | SET |
| ERROR | Lights up, if any error has been detected. Please look at the Status Monitor to detect the source of an error. | ERROR |



The following functions for the **keys** are provided for this module:

| Function | Description | Recommended key |
|-------------------|--|-----------------|
| Lamp: PLL Lock | Pressing this key will re-start the synchronization of the video outputs to the external reference. The lamp in the key lights up if the internal 27 MHz video clock is locked. | F1: PLL LOCK |

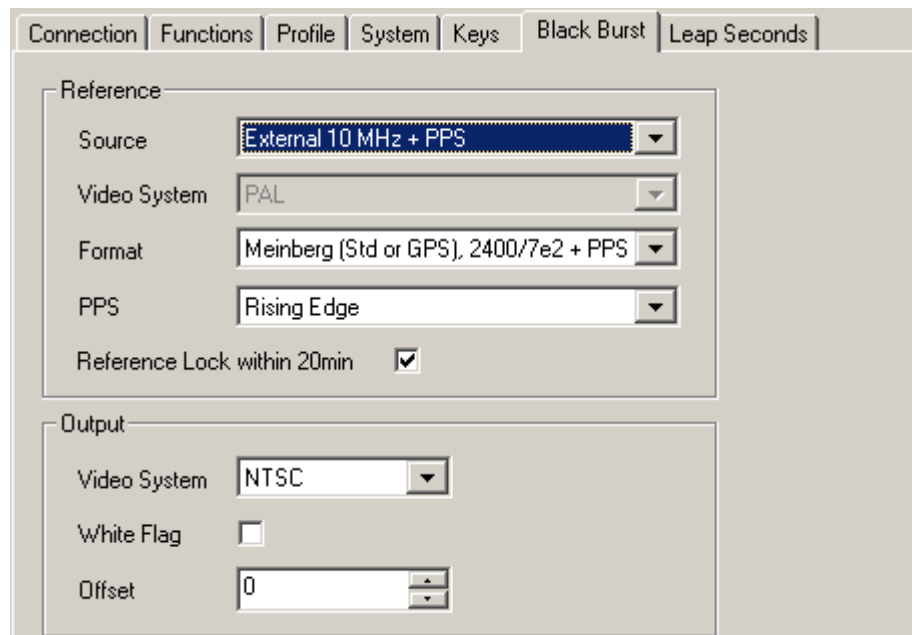
The following functions for the **lamps** are provided for this module:

| Function | Description | Recommended LED |
|--|--|------------------|
| Lamp: PLL Lock | Lamp lights up if the internal 27 MHz video clock is locked. | F1: PLL LOCK |
| Lamp: Oscillator Phase Locked | Lamp is off if internal oscillator is selected as sync source. In case of synchronization to an external reference: Lights up if the internal oscillator is locked to the external reference. Flashes slowly during phase synchronization. Flashes fast during frequency synchronization. Lamp is off if either no synchronization could be achieved or synchronization | F2: OSC LOCK |
| Lamp: Reference Valid | Lamp is off if internal oscillator is selected as sync source. Lamp gives a status feedback if "External 10 MHz + PPS" has been selected as sync source: Lights up if all signals of an external real-time reference are valid: 10 MHz, PPS, RXD IN. Flashes slowly if PPS or RXD IN signal fails. Flashes fast if 10 MHz signal fails. | F3: REF VALID |
| Lamp: External Sync | Lamp lights up if the internal oscillator is locked to external 10 MHz. | F4: EXT SYNC |
| Other functions | There are other functions provided for service purpose. | |



3.5 “Black Burst“: Configuring the Video Outputs

Two identical analogue video outputs are provided. Any set-up refers to both outputs. Configuration (example shows a screen shot of the PC program tab):



Reference

Set-up regarding the synchronization to an external reference.

| | |
|------------------------------|---|
| Source | Choose the reference: <i>Internal Oscillator</i> no external reference <i>External 10 MHz + PPS</i> These signals together with signal RXD IN enable to apply the SMPTE Epoch method |
| Video System | <i>PAL</i> (this box is currently not in use) |
| Format | Choose the correct serial protocol regarding the signal at input RXD IN: <i>Meinberg (Std or GPS) ...</i> “Meinberg Std” or “Meinberg GPS” protocol (automatic adaption) <i>Meinberg Uni ...</i> “Meinberg Uni” protocol |
| PPS | Edge of the PPS signal which should be regarded as the reference mark: <i>Rising Edge</i> this is the normal choice <i>Falling Edge</i> |
| Reference Lock within 20 min | Due to the nature of some real-time sources it may last some minutes after power has turned on until a “Lock” status will be indicated. GB can be set to monitor this status for a 20 minutes period after power-on, and as soon as “Lock” has been detected GB synchronizes again. There is a risk of generating a signal distortion caused by this synchronization. If you don’t need this feature, uncheck this checkbox. The “Lock” status has to be part of the status data received from the real-time reference. |



Output

Select the output format:

Video System PAL, NTSC

The outputs will be disabled for a few seconds if the video system switches.

Video System This sets the video format of both outputs. PAL and NTSC are the black burst signals. Each other selection outputs an HDTV tri-level signal. Changing the video system will mute the outputs for a few seconds.

PAL Black burst PAL 625/50, **8 Field Ident Pulse** at line 7 selectable – see “White Flag” below

NTSC Black burst NTSC 525/60, **4 Field Ident Pulse** at line 10 selectable – see “White Flag” below

720p23.98

720p24

720p25

720p29.97

720p30

720p50

720p59.94

720p60

1035i29.97 or psf

1035i30 or psf

1080i23.98 or psf

1080i24 or psf

1080i25 or psf

1080i29.97 or psf

1080i30 or psf

1080p23.98

1080p24

1080p25

1080p29.97

1080p30

1080p48

1080p50

1080p59.94

1080p60

White Flag If checked, a white pulse is aligned to colour field 1 of a black burst signal.

Video System = PAL: This pulse occurs at line 7 every 8 fields.

Video System = NTSC: This pulse occurs at line 10 every 4 fields.

Offset Adjust the offset of the outputs with respect to the reference.

One step corresponds to 37 ns (1 / 27 MHz).

Positive numbers: output is delayed with respect to the reference.

Negative numbers: output is advanced with respect to the reference.

Range: $\pm 30,000 = \pm 1111.11 \mu\text{s}$.



3.6 “Leap Seconds“: Setting the Leap Seconds

Leap seconds

UTC is the worldwide real-time reference. Occasionally, UTC will be corrected introducing a leap second. It is not possible to predict a leap second; the leap second is determined by the IERS (International Earth Rotation and Reference Systems Service) and will be announced at the Bulletin C (services.iers@obspm.fr). Up to now, all leap seconds have been inserted as last second before either 1st of January or 1st of July, regarding UTC time scale.

The SMPTE Epoch method

Video signals are generated with a known and fixed frequency. If the phase is known at a particular point in time, the phase can be calculated for any points in time in the past or future. You only have to know the relationship to the particular point in time. If this point in time and the phase of reference signals are defined as a standard, all sync generators applying this method only need a precise real-time reference to generate sync signals which are aligned to each other.

The proposed SMPTE 404M standard defines this point in time (= SMPTE Epoch) as 00:00:00 January 1, 1958, TAI (Temps Atomique International). For example, this point in time corresponds to the start of the first field of the colour frame sequence.

GB receiving signals of a real-time reference

GB applies the SMPTE Epoch method, if “Reference – Source = External 10 MHz + PPS” has been selected (please notice chapter “Black Burst”: *Configuring the Video Outputs*), and all signals (10 MHz, PPS, RXD IN) are present and valid. Additionally, the amount of leap seconds has to be known. If the serial protocol sent from the external real-time reference includes this information, GB will take it for internal calculations. Otherwise, the amount of leap seconds has to be set manually at this tab.

Please verify the protocol sent from the external real-time reference. The *Meinberg GPS* protocol is the only protocol known to GB which contains the amount of leap seconds.

You can verify the correct leap second information at the status monitor: *Reference – Leap Seconds* at the *System* tab indicates the amount of leap seconds taken for internal calculations.

It is recommended to keep the parameters at this tab updated. As soon as a leap second event is announced, update the *Further Leap Seconds* entry. After a leap second event, you can correct the *IERS Bulletin C* entries. Example (at UTC 23h 59m 59s @ June 30, 2012, a leap second has been inserted):

Parameter before July 2012

IERS Bulletin C
From: 2009, January 1, 0h UTC : TAI - UTC = 34 seconds.
Further Leap Seconds:
2012, July 1

Parameter after July 2012

IERS Bulletin C
From: 2012, July 1, 0h UTC : TAI - UTC = 35 seconds.
Further Leap Seconds:
---, ---



Connection | Functions | Profile | System | Keys | Black Burst | Leap Seconds

IERS Bulletin C

From , 0h UTC : TAI - UTC = seconds.

Further Leap Seconds

| | |
|------|------|
| ---- | ---- |
| ---- | ---- |
| ---- | ---- |
| ---- | ---- |
| ---- | ---- |

IERS Bulletin C

The leap second is determined by the IERS (International Earth Rotation and Reference Systems Service). The "Bulletin C", published by the IERS twice a year, contains the information about the current number of leap seconds and about an upcoming leap second event. Example:

```
from 2009 January 1, 0h UTC, until further notice : UTC-TAI = -34 s
```

This information can be entered here.

Further Leap Seconds

If upcoming leap second events are known, you can enter the date of this event. Up to now, all leap seconds have been inserted as last second before either 1st of January or 1st of July, regarding UTC time scale.

This entry allows either 1st of January, or 1st of April, or 1st of June, or 1st of October.



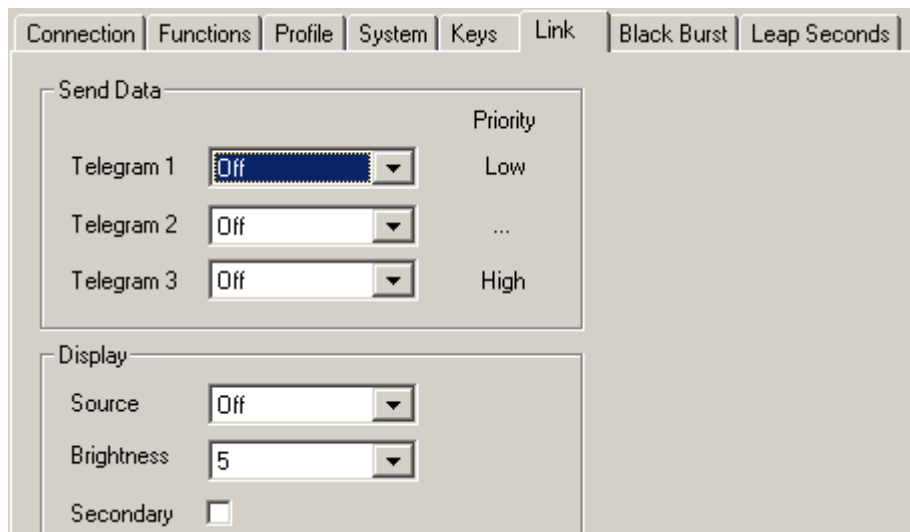
3.7 “Link”: Communication between Modules

Link uses the Rubidium internal *TC_link* interface to transmit or receive data. This interface is shared by all the modules in one frame, and via the **RLC** connector it is possible to link further modules at different frames.

In case that the selected module should transmit data, **Link** selects the channel and the kind of data. The receiving module must select this channel as a reader input.

In case that the selected module should receive data, the **Link** function has to be activated (**Use**), and the selected channel (“Telegram” 1 or 2 or 3) has to be switched off.

Configuration (example shows a screen shot of the PC program tab):



Send Data

Three channels (**Telegram 1 - 3**) have been provided to transmit data in a time code format. For each channel a function can be selected from the drop-down list:

- | | |
|-----------|---|
| Off | This channel will not be used to transmit data, data can be received. |
| Reference | This channel transfers time and date (UTC) every second as long as there are valid signals of a real-time reference at connector REF IN (PPS IN, RXD IN). |

Display

Adjust the parameters controlling the display of a RUBIDIUM **D1** or **Q1** chassis.

Source Select the kind of data to be sent and displayed:

- | | |
|----------------|---|
| Off | No data will be sent from this module. |
| Reference Time | Time (UTC) of the external real-time reference, HH:MM:SS. |
| Reference Date | Date (UTC) of the external real-time reference, day/month/year. |

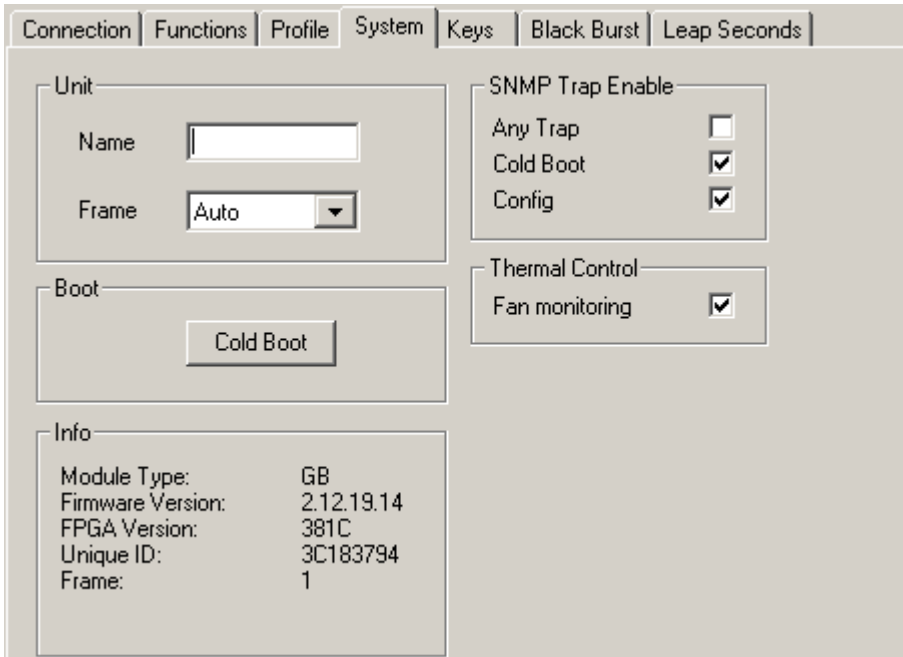
Brightness Adjust the brightness of the LEDs, steps 1 to 7.

Secondary A click on this check box addresses the “secondary” display. Without a click the “primary” display will be addressed.



3.8 “System“: Name, Reset, SNMP, Fan Control

Configuration (example shows a screen shot of the PC program tab):



Unit

| | |
|--------------|---|
| Name | You can assign a name to each configurable RUBIDIUM module. Enter a text with 10 characters at maximum. This name appears wherever this module can be found. This facilitates locating a specific module especially if several modules of the same type are present in a system You may enter, change or verify this name at this window. |
| Frame | <p>This entry is available only via the “Rubidium Config” PC program:</p> <p>Frame denotes the (RUB1 or RUB3) chassis. Accessing a RUBIDIUM module via web browser requires both the name and the frame number of the module.</p> <p>Auto will be the default setting. In this case, the module will automatically detect the frame number which is set by a rotary switch placed on the fan module of the chassis.</p> <p>Single and 1–15 can be set manually. “Single” should be selected if the system consists of only one chassis. As soon as the system consists of more than one frame, all frames must have different addresses (numbers).</p> <p>The frame number, which has been detected automatically or has been entered manually, will be shown at the “Info” box and will be stored on the module. Via web browser, any RUBIDIUM module can only be found if the frame number you are looking for (as selected at the web browser) matches the frame number stored on the module.</p> |



Boot

Cold Boot Clicking this button enables a restart of the module. At first, a message box appears to remind you that the operation of the module will stop during restart. You have to confirm this message to do the restart.

Info

Displays module's status information, e.g.:

- type of module,
- firmware version,
- options – if applicable.

SNMP Trap Enable

SNMP functionality requires a RUB Ethernet module with option "S". The SNMP function of the RUB GB module is to send commands via internal *TC_link* interface to the RUB Ethernet module.

Any Trap generally enables or disables the SNMP function of the GB module. If this check box is not checked, this module will not generate any SNMP command.

Individual traps can be enabled or disabled independent from each other:

Cold Boot Trap after a reset.

Config Trap after accessing a module via any of the configuration tools.

Thermal Control

One module of each frame should be responsible for a fan module initialisation and monitoring. At the same time this module monitors the power supplies within this frame.

Check "*Fan monitoring*" if this module should do the monitoring.



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