

# Functional Description and Specifications

Version: 2.0

December 5, 2011

## D1

### 19"/1RU Chassis with Power Supply and LED Display of the RUBIDIUM SERIES 1 System

Supplement to the "Installation & Systems Manual RUBIDIUM SERIES"



***Alpermann+Velte***



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## A1 Revision History

No.	Date	Subject
0.n		Preliminary documents, changes without notice.
1.0	February 13, 2008	First released document.
2.0	December 05, 2011	Fan is no longer installed. Revised.

## 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 this device.

- A3 Warranty,
- A4 Unpacking/Shipping/Repackaging Information,
- A5 Safety Instructions,
- A6 Certifications & Compliances,

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## 1 Overview

The **RUB1 D1** is a rack mount frame in 19"/1RU space. It has an integrated Power Supply/Display/LTC Distribution module.

Versions since August 2011 contain no fan and therefore work silently. This allows installation of a *Rubidium* system in working areas where background noise should be as low as possible.

### Chassis

It provides additional capacity for two *Rubidium Series 1* modules. **PC** and **RLC** connectors are located at the rear. The **PC** connector is part of a removable module which is assembled with an USB/RS232 converter, a fourfold dip switch for TC\_link termination, and a rotary switch for frame numbering.

### Power Supply/Display/LTC Distribution Module

This module is part of the delivery and fits into the appropriate double-wide slot. There is no initial set-up or configuration of this module possible; it is not addressable via any *Rubidium* configuration tool. The serial number is located on the bottom side of the circuit board of this module. This module has the following key features as these are usual for *Rubidium Series* modules:

- Failure relay, connected to the FAIL\_A and FAIL\_B pins of the **RLC** connector at the rear of the frame.
- Red LED (OPER) at the front indicates that the module is operating.

Overview of the main features:

#### Power Supply

The integrated AC/DC converter delivers approximately 15 W to additional *Rubidium* modules in this chassis.

#### Display

The 8-digit display (7-segment LEDs, LED colour red, 15 mm digit height) shows data received from the "TC\_link" interface. These data has to be transmitted from a *Rubidium* module.

#### LTC Distribution

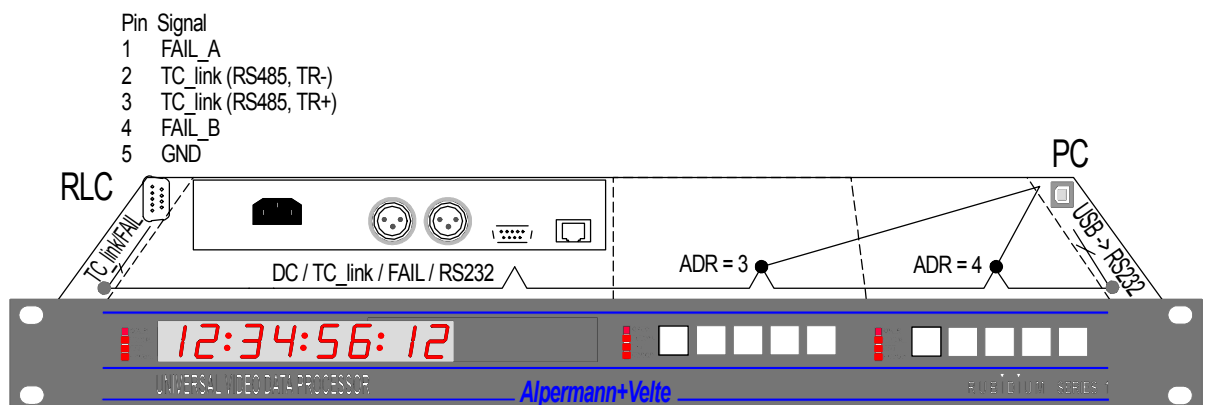
LTC signals of the *Alpermann+Velte Rubidium System* or the *MTD System* can be distributed using the connectors at the rear plate of this module. It is a hard-wired distribution from RJ45 and DSUB9 connectors to two XLR3 connectors. There is no LTC reader built-in.

## 2 The Frame

### 2.1 The 19" Chassis

The **RUB D1** mount frame was designed to house up to two additional rear loading modules in 1RU space. The connectors for inputs and outputs are a standard part of each module. There is a uniform front for these modules which offers a see-through window for four status LED's and cut-outs for 4 keys and an identification button for each module.

- The two slots are assigned to the hard wired addresses 3 and 4 of the frame. Any configurable module can send data to the display via internal "TC-link" interface. The output voltage (24 VDC) of the integrated power supply is distributed to both slots.
- The **PC** connector enables access to modules at addresses 3 and 4. PC programs for configuration and status monitor are available.
- The **RLC** connector at the rear of the frame offers a link to modules located in other frames (via "TC\_link"). The "FAIL" signals at this connector can be used for error detection: if a total failure occurs in any module in one frame the "FAIL" contacts of this frame's relay will close. In contrast to the RUB H1 chassis the RLC connector does not have the 24 V connected, neither as input nor as output.



*The "RUB D1" frame: connectors RLC and PC, internal signal distribution*

Technical data of the chassis:

Material	High-grade steel, blank
Weight	2.4 kg approx.
Mounting	Standard 19-inch rack, 1U
Dimensions (without 19" front plate)	446.5 (W) x 44.5 (H) x 176.5 (D, without DSUBs) mm 17.58 x 1.75 x 6.95 inch
Power consumption	Max.: 7.0 W (all LEDs with maximum brightness) Typ.: 5.0 W Min.: 2.0 W (all LEDs switched off except the OPER LED)
Maximum power dissipation	20 W

## 2.2 Plug-In a RUB1 Module

All modules of the *Rubidium Series* can be “hot swapped”. To plug-in a module, please proceed as follows:

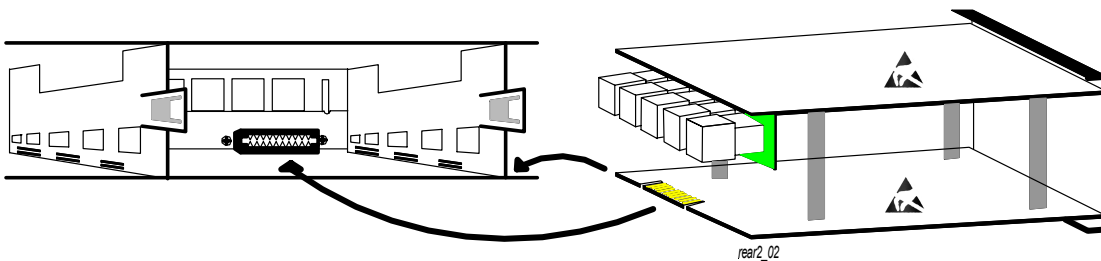
- Remove the solid rear panel cover plate for the slot where the module should be installed: on the right hand side of the slot there is a small protruding tab that needs to be slightly pressed to the right, so that the rear panel cover plate can be easily removed. Retain the cover plate for possible future use.
- Remove the front panel cover plate for the slot where the module should be installed in (it pops off with the use of a small flat screwdriver). This will open the cut-outs for 4 keys and for the module identification button. Retain the cover plate for possible future use.
- Remove the module from its anti-static packing material. Hold the module by the edges or the rear plate; please do not touch the electronic components, strip conductors or pins. Retain the packing material for possible future use.

### ATTENTION:



Observe precautions for handling electrostatic-sensitive devices. See “Electro Static Discharge (ESD) Precautions” at chapter A5 of the “Installation & Systems Manual RUBIDIUM SERIES” for details.

- The connector pads of the lower circuit board fit into the socket receptacles inside the slot. Insert the module into the appropriate slot, being careful to fit the lower circuit board into the slotted card guides located on both sides of the slot. With sufficient pressure push the module until it engages into the front socket receptacle.



### Insert a module

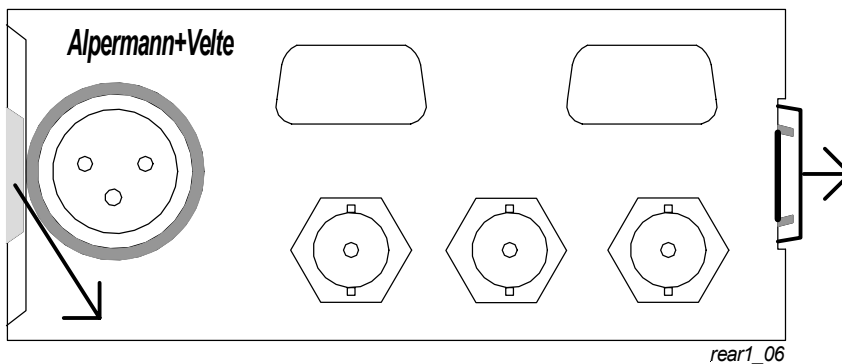
- In order to fasten the module: take care that the rear panel of the module has fully clicked into the frames protruding tab.

## 2.3 Remove a RUB1 Module

All modules of the *Rubidium Series* can be "hot swapped". There may be occasions when you must exchange a module which has a user defined configuration. If the new module should work with the same application it would be helpful to have the current configuration stored on your PC (see saving a configuration to disk in Windows help program). After exchange the new module can be reloaded with the specific configuration.

To remove a module, please proceed as follows:

- Unlock the module: on the right hand side of the slot there is a small protruding tab that needs to be slightly pressed to the right.



- Now pull the module out of the slot.
- Keep the anti-static packing material (original packaging material or adequate packaging) ready. Hold the module by the edges or the rear plate, do not touch the electronic components, strip conductors or pins. Slide the module into the anti-static packing material.

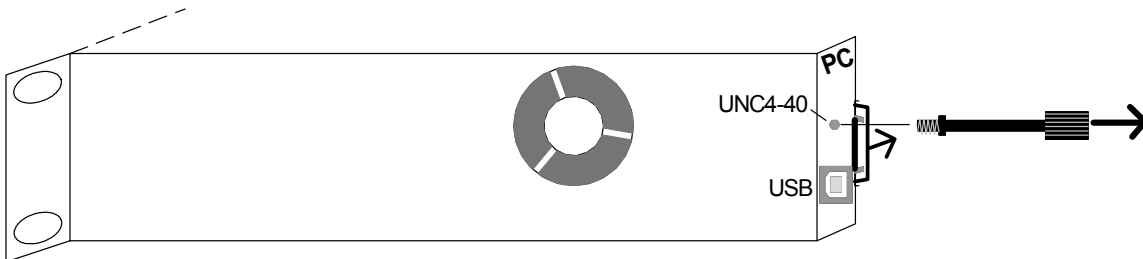
### ATTENTION:



Observe precautions for handling electrostatic-sensitive devices. See "Electro Static Discharge (ESD) Precautions" at chapter A5 of the "Installation & Systems Manual RUBIDIUM SERIES" for details.

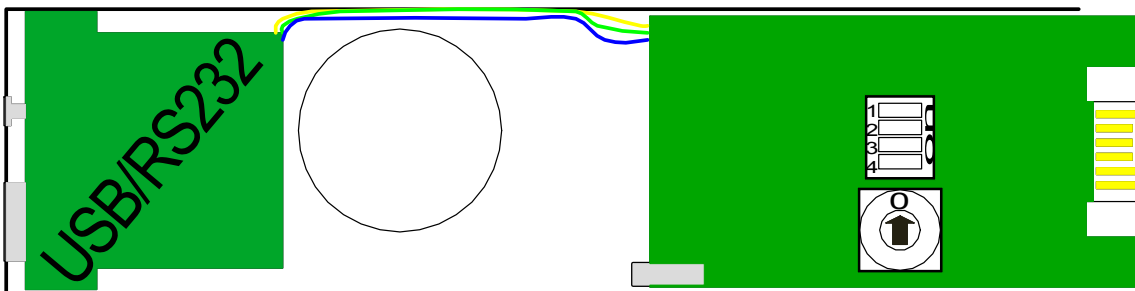
## 2.4 The PC Module: Frame Address, TC\_link Termination

The PC module is located at one side of the frame behind the **PC** connector. There may be occasions when you must exchange this module:



- It is recommended to screw a typical 4-40 UNC DSUB locking bolt into the thread as shown. Unlock the module: on the right hand side of this small slot there is a small protruding tab that needs to be slightly pressed to the right. Now pull the module out of the slot.

This module is equipped with an USB/RS232 converter, a fourfold dip switch, and a rotary switch.



The fourfold dip switch can be used to terminate the "TC\_link" interface (RS485 bus) of the RLC connector. In a system of one or two frames all the switches should be set to position ON (= terminated). In a system of more than two frames the switches of the first and the last frame should be set to position ON, all other to position OFF.

The rotary switch sets the frame number. A system of one frame only gets the number 0 (= single). In a system consisting of more than one frame the rotary switches should be set to numbers > 0 in that way that each frame gets a unique number.

## 3 Power Supply and FAIL Relay

The **RUB D1** frame has a 20W AC/DC converter integrated.

Input:

Inlet socket	According to IEC/EN 60320-1/C14, protection class 1
Line voltage range	90 - 264 VAC, auto-ranging
Power line frequency	47 - 63 Hz
Input current	600 mA maximum at 90 VAC
Inrush current	50 A max. @ 264 VAC

Output:

Output voltage	24 VDC ( $\pm 2\%$ at 60% load)
Output current	0 A minimum, 850 mA maximum
Ripple & Noise	150 mVp-p
Load regulation	$\pm 2\%$
Overload protection	Yes
Short circuit protection	Yes
Hold-up time at 100% load	10 ms

Failure relay:

FAIL signal threshold voltage	If the output voltage (nominal 24 VDC) of the power supply falls below 21 V approximately.
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During normal operation the power consumption (output of the power supply) of the **RUB1 D1** is about 5.0 W. So at maximum 15.0 W will be available for the two modules which may be plugged in.



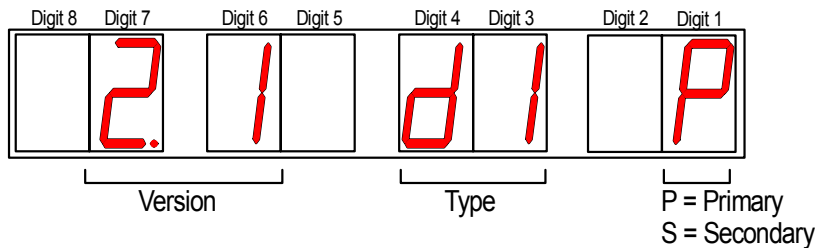
The internal 24 VDC power supply is not available at the RLC connector. It is likewise not provided to supply external power to **RUB1 D1** by the RLC connector. **RUB1 D1** therefore is not suitable for integration in a redundant power supply system.

## 4 The Display

### 4.1 Overview

The front of **RUB D1** shows an 8-digit display (7-segmented red LEDs) of 15 mm digit height.

After power-on, all of the LED's will light up shortly and then the display will show some status information:



This message disappears after a few seconds. The display waits for data. It only displays something if it receives valid data from the internal **TC\_link** interface. In case no data will be received the display switches to a shut-off mode. As soon as valid data has been received the display returns to normal operation.

### 4.2 Two Displays in One System: Primary and Secondary

Connected via RLC two displays can operate in one system. Naturally the displays should show different data. To distinguish between the displays they get a different address selected by a jumper:

A display with the jumper installed will behave as the "primary" display.

A display with the jumper uninstalled will behave as the "secondary" display.

The jumper is assembled at the components side of the display circuit board on the upper right corner.

All the *Rubidium* modules which are able to send data to the display can be configured to address the "primary" or "secondary" display.

## 4.3 The “TC-link” Interface to Control the Display

During normal operation the display only shows data if a *Rubidium* module sends data via the internal **TC\_link** interface. This interface enables a communication between modules within the same frame and – connected via the **RLC** connector - even between modules located in different frames. Basically all configurable modules are able to send data to the display.

Example of configurable modules: GT, GL, AT, AV, DT, DV, XT, XV, VL, ...

Example of non configurable modules: PS, PQ, VD, IE, ...

Utilizing one of the configuration tools the data transfer can be programmed. Select one configurable module and activate the **Link** function.

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

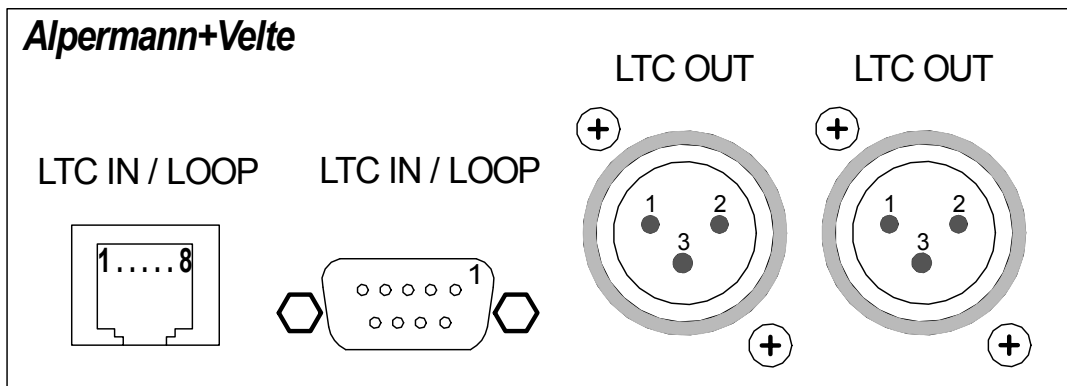


### Display

Adjust the parameters controlling the display:

<b>Source</b>	Select the kind of data to be sent and displayed:
Off	No data will be sent, the display switches to the shut-off mode.
Gen Time	Current time of the time code generator.
Gen User	Current user bits (binary groups) of the time code generator.
Read Time	Current time of the time code reader.
Read User	Current user bits (binary groups) of the time code reader.
<b>Brightness</b>	Adjust the brightness of the LEDs, steps 1 to 7.
<b>Secondary</b>	A click on this check box addresses the “secondary” display. Without a click the “primary” display will be addressed.

## 5 LTC Distribution at the Rear



### Wiring between the connectors

Signal (GT/GL)	RJ45	DSUB9F	XLR3M	XLR3M
RS485 TRA	1	1		
RS485 TRB	2	2		
LTC_A	3	3	2	2
LTC_B	6	4	3	3
GND	4	5	1	1
DRVSEL	5	- - - - 7		
SERIAL OUT	7	8		
TELEGRAM OUT	8	9		

The signal names correspond to the ones used for the MTD connector at the GT/GL module.

DRVSEL normally is not wired between RJ45 and DSUB9F, but plugging the DREN jumper establishes this connection.

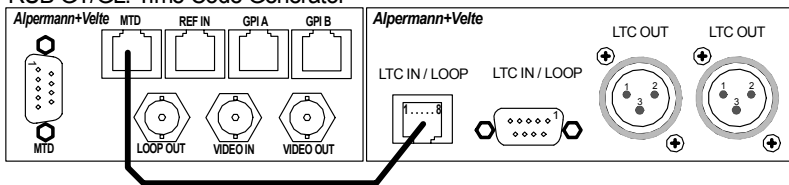
SERIAL OUT normally is wired between RJ45 and DSUB9F, but removing the GPI3 jumper cuts this connection.

TELEGRAM OUT normally is wired between RJ45 and DSUB9F, but removing the GPI4 jumper cuts this connection.

The DREN, GPI3 and GPI4 jumpers are assembled on the basic circuit board near the RJ45 and DSUB9F connectors.

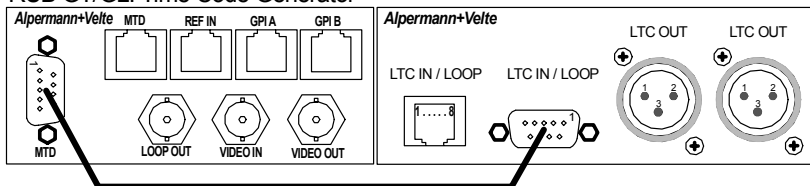
## Applications

### RUB GT/GL: Time Code Generator



1: LTC distribution from RJ45 to XLR.

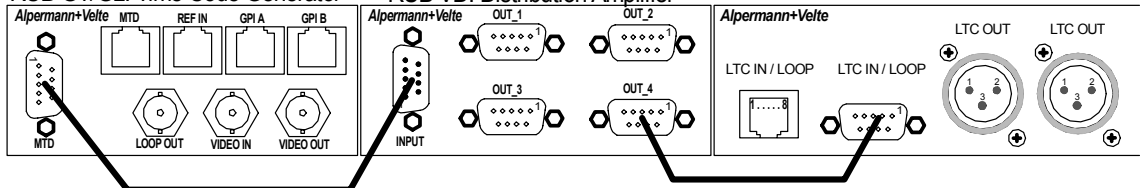
### RUB GT/GL: Time Code Generator



2: LTC distribution from DSUB to XLR.

### RUB GT/GL: Time Code Generator

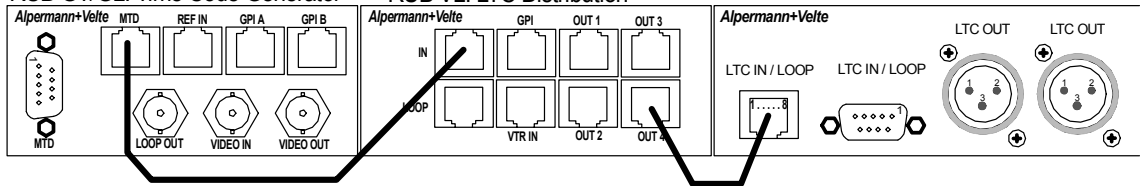
### RUB VD: Distribution Amplifier



3: One of the VD outputs is used for a DSUB to XLR distribution.

### RUB GT/GL: Time Code Generator

### RUB VL: LTC Distribution



4: One of the VL outputs is used for a RJ45 to XLR distribution.