

# **RTCM/VOTER Interfaces**

[wiki.allstarlink.org](http://wiki.allstarlink.org)

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# 1 RTCM Client

**Legacy Version** - This page is about a legacy version of AllStarLink. See <sup>1</sup>

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<sup>1</sup> <https://allstarlink.github.io/voter/index>



## 2 Introduction

The Radio Thin Client Module (RTCM) is commercially available<sup>1</sup> hardware for interfacing radios to an AllStarLink computer.

<sup>2</sup> <sup>3</sup> <sup>4</sup>

The Micro-Node RTCM (and VOTER<sup>5</sup>) interfaces are typically used with AllStar in voting/simulcast applications. They **MAY** be used for **ANY** repeater interface application, through the `chan_voter` channel driver, as they are primarily a Radio over IP (ROIP) adapter.

The VOTER<sup>6</sup> is the original through-hole board<sup>7</sup> designed by Jim Dixon (SK) for this application. It is open-source, and the relevant Gerber files and BoM to build it are available<sup>8</sup>.

The Micro-Node Radio Thin Client Module (RTCM)<sup>9</sup> is the commercial version of the VOTER. It uses surface mount parts (SMT), but is functionally equivalent to the original VOTER<sup>10</sup>. In general, the two terms (RTCM/VOTER) are used interchangeably, as they operate the same, and use the same firmware (mostly, see below).

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1 <http://www.micro-node.com/thin-m1.shtml>  
2 <https://wiki.allstarlink.org/wiki/File:Rtcm2-750.jpg>  
3 <https://wiki.allstarlink.org/wiki/File:Rtcm1-750.jpg>  
4 <https://wiki.allstarlink.org/wiki/File:Rtcm3-750.jpg>  
5 <https://wiki.allstarlink.org/wiki/VOTER-Hardware>  
6 <https://wiki.allstarlink.org/wiki/VOTER>  
7 <https://wiki.allstarlink.org/wiki/VOTER-Hardware>  
8 <https://github.com/AllStarLink/Voter/blob/master/VOTER-pcb/voter-cad-rev-a.zip>  
9 <http://www.micro-node.com/thin-m1.shtml>  
10 <https://wiki.allstarlink.org/wiki/VOTER-Hardware>



## 3 Firmware

See the [firmware upgrade](#)<sup>1</sup> page for information on upgrading the firmware.

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<sup>1</sup> [https://wiki.allstarlink.org/wiki/RTCM\\_Firmware\\_upgrading](https://wiki.allstarlink.org/wiki/RTCM_Firmware_upgrading)



# 4 Board Layout

## 4.1 Connectors and Switches

J1 - ICSP Programming Header  
P1 - Radio  
P2 - Console/GPS  
SW1 - Reset (Momentary)  
SW2-1 - Init EEPROM  
SW2-2 - Calibrate Squelch  
SW2-3 - Calibrate Diode  
SW2-4 - RX Level LEDs

### 4.1.1 J1 - ICSP Programming Header (6 pin MTA-100)

1 - MCLR  
2 - +3.3Vdc  
3 - GND  
4 - PGD (Program Data)  
5 - PGC (Program Clock)  
6 - NU

### 4.1.2 P1 - Radio Connector Pinout (DB9 Male)

1 - + VIn (7-24 Volts DC).  
2 - Transmit Audio Out  
3 - Receive (discriminator) Audio In  
4 - External CTCSS Input (optional)  
5 - Gnd  
6 - Gnd  
7 - /PTT Out (open-collector, active-low)  
8 - Gnd  
9 - Gnd

### 4.1.3 P2 - Console/GPS Connector Pinout (DB15 Female)

- 1 - NC
- 2 - Console Transmit Data
- 3 - Console Receive Data
- 4 - NC
- 5 - Gnd
- 6 - GPS Receive Data
- 7 - PTT Out
- 8 - Gnd
- 9 - NC
- 10 - Console Request To Send (RTS)
- 11 - Console Clear To Send (CTS)
- 12 - NC
- 13 - GPS Power Output (5Vdc @ 800ma MAX)
- 14 - GPS Transmit Data
- 15 - External Reset

### 4.1.4 SW1 - Reset

Depress SW1 momentarily to reset the RTCM.

### 4.1.5 SW2 - DIP Switch

- SW2-1 - Init EEPROM
- SW2-2 - Calibrate Squelch
- SW2-3 - Calibrate Diode
- SW2-4 - RX Level LEDs

SW2-1 "Initialize configuration parameters in EEPROM" (factory reset). If ON when firmware starts, the operating parameters in the EEPROM will be set to default values. The system activity LED (LD1, green) will stay off for approximately 4 seconds, then stay on steady to indicate that the initialization process is complete. Afterwards, the switch may be TURNED OFF and the system will continue running normally. Note, if SW2-3 is ON during this procedure, the "Diode Calibration" process will also occur.

SW2-2 On to calibrate squelch. With the receiver connected and its antenna removed, switch on SW2-2. In the next few seconds the "Receive Signal Indicator" (LD3, Green) will flash on and off, then (hopefully) on steady. This indicates that the squelch calibration has occurred successfully. If unsuccessful, the LED will flash either fast to indicate that the discriminator

noise level is too high, or slowly to indicate that the discriminator noise level is too low. Note, if SW2-3 is ON during this procedure, the "Diode Calibration" process will also occur.

SW2-3 On to perform "Diode Calibration". This may only be done in conjunction with a configuration parameter initialization (see SW2-1, above), or a "Squelch Calibration" (see SW2-2, above).

SW2-4 On to temporarily re-purpose LD4 and LD5 to allow for visual indication of RX input level. With SW2-4 on, LD5 will indicate (by brightness) if the RX level is too low, and LD4 will indicate (by brightness) if the RX level is too high. So the idea is to tune R36 so that there is minimal brightness on both LD4 and LD5 (like a null, more or less). Alternatively, Menu 97<sup>1</sup> on the console gives a more graphical method of setting the Rx input level.

## 4.2 LED Designations

LD1 - Heartbeat  
LD2 - PTT  
LD3 - COS On solid is valid Rx signal, flashing is without CTCSS  
LD4 - GPS On solid is GPS received and locked, flashing is GPS received, lock in progress  
LD5 - HOST

The COS (RX) LED on the RTCM will flash (same rate as Heartbeat LED) if you have External CTCSS enabled, and the received signal has the wrong (or no) valid PL.

## 4.3 Jumpers

JP1 - Discriminator Level Boost  
JP2 - 20dB Pad  
JP3 - Output Amp Power Source  
JP4 - GPS TX RS-232/TTL Select  
JP5 - GPS RX RS-232/TTL Select  
JP6 - Not Used

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1 [https://wiki.allstarlink.org/wiki/VOTER-Menus#97\\_RX\\_Level\\_Display](https://wiki.allstarlink.org/wiki/VOTER-Menus#97_RX_Level_Display)

### 4.3.1 JP1 - Discriminator Level Boost

Insert if low discriminator level. If squelch cannot self-calibrate with JP1 removed (too low), try with JP1 inserted.

**Note:** this jumper affects the squelch calibration circuit only. Not to be confused with JP2, which is the pad for the receive audio.

### 4.3.2 JP2 - 20dB Pad

Insert to attenuate discriminator input level by 20db. This pad affects the **receive audio level**. See the `Receive Level Input Calibration2` section.

### 4.3.3 JP3 - Output Amp Power Source

Selects power source for output audio amplifier. 1-2 is to power it from the 5VDC power supply. 2-3 is to power it directly from Vin.

### 4.3.4 JP4 - GPS TX RS-232/TTL Select

Selects GPS Serial transmit level. 1-2 RS232 Level, 2-3 TTL (5V) Level.

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<sup>2</sup> `#Receive_Level_Input_Calibration`

#### **4.3.5 JP5 - GPS RX RS-232/TTL Select**

Selects GPS Serial receive level. 1-2 RS232 Level, 2-3 TTL (5V) Level.

#### **4.3.6 JP6 – Not used**

#### **4.3.7 JP7 - Bootloader Programming**

This jumper only needs to be removed when programming the bootloader in the dsPIC using the ICSP header.

### **4.4 Potentiometers**

R22 - Squelch adjustment

R36 - Rx Input Level

R10 - Tx Output Level



## 5 Related Pages

Documentation on the VOTER/RTCM is extensive, and as such, has been split across multiple pages. They are usually linked, where appropriate, throughout the content. However, here are all the related pages that are available:

- [Main VOTER Page](#)<sup>1</sup>
- [Original VOTER Hardware Documentation](#)<sup>2</sup>
- [Menu Structure and Definitions](#)<sup>3</sup>
- [Firmware Upgrading](#)<sup>4</sup>
- [Audio Interfacing and Configuration](#)<sup>5</sup>
- [GPS Interfacing and Configuration](#)<sup>6</sup>
- [voter.conf Documentation](#)<sup>7</sup>
- [chan/voter and Asterisk Console Documentation](#)<sup>8</sup>
- [Simulcasting Configuration](#)<sup>9</sup>
- [Buffer Tuning](#)<sup>10</sup>
- [Interfacing to the Motorola Quantar](#)<sup>11</sup>

### 5.1 Contributors

- [VE7FET](#)<sup>12</sup>
- This page was last edited on 5 June 2025, at 00:19.

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1 <https://wiki.allstarlink.org/wiki/VOTER>  
2 <https://wiki.allstarlink.org/wiki/VOTER-Hardware>  
3 <https://wiki.allstarlink.org/wiki/VOTER-Menus>  
4 [https://wiki.allstarlink.org/wiki/RTCM\\_Firmware\\_upgrading](https://wiki.allstarlink.org/wiki/RTCM_Firmware_upgrading)  
5 <https://wiki.allstarlink.org/wiki/VOTER-Audio>  
6 <https://wiki.allstarlink.org/wiki/VOTER-GPS>  
7 <https://wiki.allstarlink.org/wiki/Voter.conf>  
8 [https://wiki.allstarlink.org/wiki/RTCM\\_Channel\\_Driver](https://wiki.allstarlink.org/wiki/RTCM_Channel_Driver)  
9 <https://wiki.allstarlink.org/wiki/VOTER-Simulcasting>  
10 <https://wiki.allstarlink.org/wiki/VOTER-Buffers>  
11 [https://wiki.allstarlink.org/wiki/Quantar\\_RTCM](https://wiki.allstarlink.org/wiki/Quantar_RTCM)  
12 <https://wiki.allstarlink.org/index.php?title=User:VE7FET&action=edit&redlink=1>



# 6 Contributors

Edits User



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1 Chapter 7 on page 23





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