Avrtx R1-2020 Radio-Network link Controller User Manual

Contents

Avrtx

Avrtx R1-2020 Radio-Network link Controller

R1-2020 User Manual ver 2.2

The R1-2020 is a Radio-Network link Controller that can be used to connect various types of radios to the internet. The product features include GPIO Detect COS and CTCSS input, GPIO outputs to control the PTT (ASL soundcard function), optocouplers and isolating the transformer to prevent Power/RF interference noise, electric conductor or circuit (inductance) to isolate Power/RF interference and high-frequency radiation, full metal case to shield all other interference, and LED status indicators.

Control Principle

The R1-2020 uses Internet voice chat software to detect audio input from the radio PTT and transmit the audio over the network. On the other end, the controller detects the SQL signal through the USB control of the network and forwards the audio to the radio. This allows for radio links or relay links to be set up and extends the range of radio transceivers or repeaters.

Controller Applications

The R1-2020 supports various chat intercom and data transfer software such as AllstarLinkECHOLINK, ZELLO, SSTV, psk31, SKYPE, QT, YY, and others. Note that some software may not support USB and control detection, in which case the VOX function or keyboard conversion software can be used.

Product Usage Instructions

When using the R1-2020, follow these instructions:

1. Connect the R1-2020 to your radio using the appropriate cable and conversion board (if necessary).
2. If using AllStarLink to connect with Raspberry Pi, set the switch position to ASL ON. Otherwise, set it to ASL OFF
3. Use the switch position to select the appropriate radio type (YAESU, Kenwood, ICOM, or Motorola).
4. Use the GPIO inputs and outputs to detect COS and CTCSS input and control the PTT (ASL soundcard function).
5. Use the LED status indicators to determine if the R1-2020 is controlling an external radio or if the external radio is receiving a signal.

For more information on specific connections and settings, refer to the Motherboard function diagram and R1 external screen function description with laser engraving in the user manual

Product features are as below

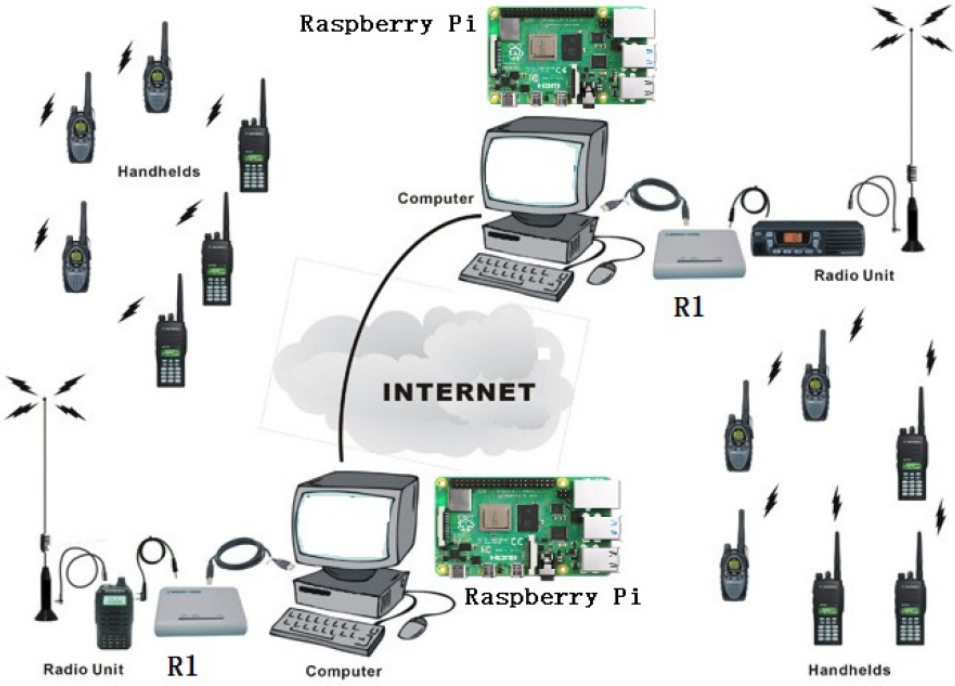
1. Built-in USB sound card chip, with high-quality audio input and output.
2. Built-in USB serial chip. E.g. launch control using RTS, receive control using DSR. ECHOLINK User
3. The built-in audio detection chip controls the radio’s PTT button and outputs the sound to the speakers by the radio-compute controller. ZELLO User
4. The control software forwards the input voice of the microphone with the detection of the SQL radio signal from the USB chip ZELLO User
5. The USB-Radio Interface is compatible with AllstarLink. GPIO Detect COS and CTCSS input. GPIO outputs and control the PTT (ASL soundcard function).
6. The user’s computer will not get Power/RF interference noise from the power supply from the radio because the R1 has the optocouplers and the isolating transformer.
7. R1 introduces the of electric conductor or circuit (inductance) to isolate Power/RF interference and high-

frequency radiation.

8. Full Metal case shields all other interference.
9. Industrial design with the standard production process.
10. LED status indicators.

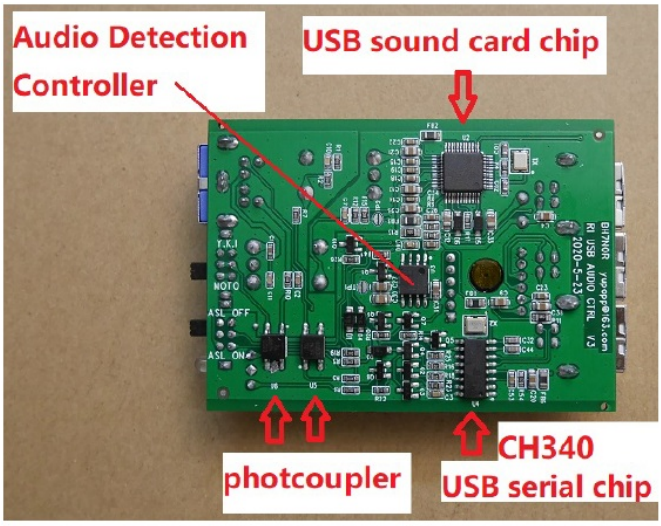
Control Principle
In general, the Internet voice chat software, with the help of an output audio controller detects audio input from the radio PTT, hence the audio will transmit over. On the other end, once the radio receives the audio, the controller detects the SQL signal through the USB control network, and the voice chat software will forward the audio to the radio. In this way, it will be on the radio-linked network.

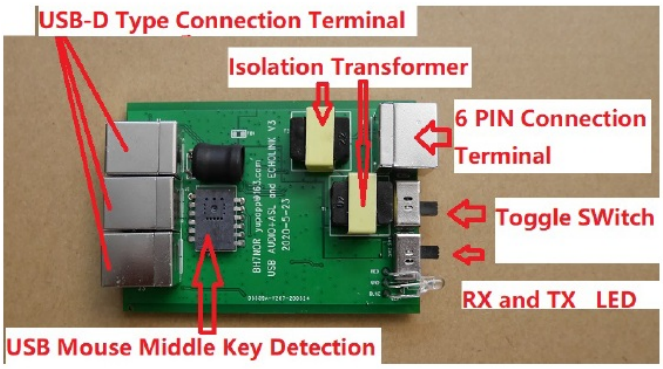
Controller applications
By getting the radio link to the network, you can set up radio links or relay links and extend the range radio transceiver or repeater, therefore global radio link is achieved.



The software that this product supports are
AllstarLink ECHOLINK, ZELLO, SSTV, psk31, SKYPE, QT, YY, and other chat intercom and data transfer software.
Notes: There is some software that does not support USB and control detection, thus at this time, while on the computer microphone input, we can use the software VOX function, or use the keyboard conversion software to trigger them. Program download website: **avrtx.com**, program name: MouseChange.zip,

Motherboard function diagram





R1 external screen function description with laser engraving

- “TX: RED” and “RX: B/G”: These are LED status indicators.
- When R1 controls an external radio, R1 lights up red.
- When the external radio receives the signal, R1 blue light or green light.

Switch position-MOTO

- Connect 6-pin to 16-pin converter board, used by Motorola radio stations 16-pin interface ,(Default accessories)
- Connect 6-pin to 26-pin converter board, used by Motorola radio stations 26-pin interface ,(Optional accessories)

Switch position -Y, K, I
Direct connection, YAESU Kenwood ICOM … Radio use 6-pin TNC interface

Switch position-ASL OFF
AllStarLink is disabled, the USB sound card chip stops detecting COS / CTCSS and controlling PTT.

Switch position –ASL ON
AllStarLink is enabled, USB sound card chip detects COS / CTCSS and controls PTT.
Note 2: “ASL ON”, Only use AllStarLink to connect with Raspberry Pi. In other states, the switch position must be in ASL OFF !!!

DIN 6 Interface

- Use 6-pin Cable.R1 to connect YAESU / Kenwood / ICOM-radio;
- Use a 6-pin cable and a “6-pin-16 pin conversion board”. R1 connects Motorola radio;
- Use a 6-pin cable and a “6-pin-26 pin conversion board”. R1 connects MotoTRBO-radio;

USB Audio
USB-Radio Interface, Connect to PC or Raspberry Pi;

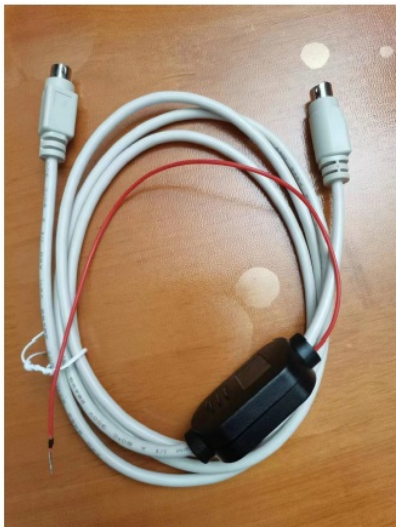
USB Detection
USB mouse middle button detection, connect to PC when running ZELLO or YY…;

USB Serial Port
USB serial port, connect to PC when running ECHOLINK / PSK31 / SSTV …;

R1 Link YAESU/ ICOM/ KENWOOD Radio Description
Note: Before purchasing R1 to connect to YKI, first confirm the level prerequisites: TNC data port squelch level: high (activated), menu setting rate: 1200BPS. Switch position: Y/ K/ I The accessory 6-pin-6-pin connecting cable attached to the machine is limited by the internal SQL signal drive capability of the radio. It includes but is not limited to the following models for connection use:

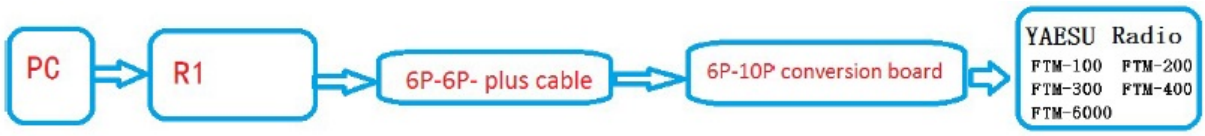
YAESU: FT-7800, FT-7900
In February 2023. Hand-made accessories 6-needle thread enhanced version, temporary number: 6P-6P-plus, including but not limited to the following models for connection use:

- ICOM: IC-207H, IC-208H IC-2720H IC-2820H
- YAESU: FT-8800 FT-8900 FT-817 FT-818 FT-847 FT-857 FT-897 FT-991
- KENWOOD: TM-V7A,TM-V71,TM-D700,TM-D710, TM-255,TM-455,TM-733

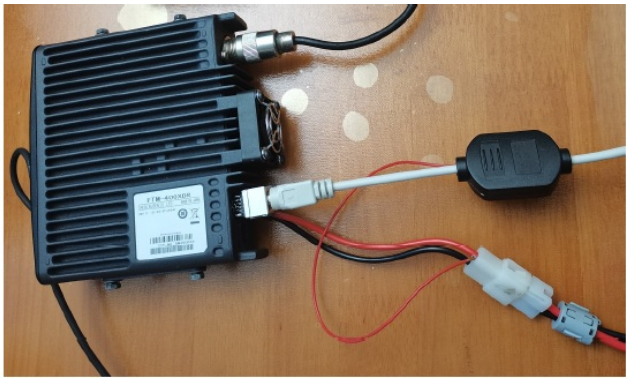


Note: The red power cord is connected to the radio +13.8V power supply. In February 2023, manual accessories 6-pin thread enhanced version, tentative number: 6P-10P conversion board, 6P-10P conversion board series accessories 6P-6P- plus cable. Including but not limited to the following models for connection use:

- YAESU: FTM-100, FTM-200, FTM-300, FTM-400,FTM-6000
- 6P-10P conversion board series accessories 6P-6P- plus cable Description



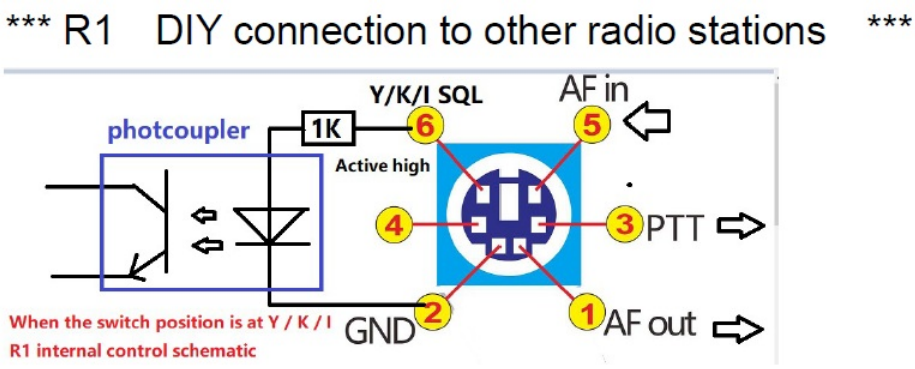
The following is the picture of R1 connected to FTM-400: (R 1 Switch position: Y/ K/ I)



YAESU FTM-400 menu "DATA" setting reference

DATA			
	1	COM PORT SETTING	SPEED: 4800 bps / **9600 bps** / 19200 bps / 38400 bps / 57600 bps OUTPUT: **OFF (camera)** / GPS OUT / PACKET / WAYPOINT WP FORMAT: NMEA 6 / NMEA 7 / NMEA 8 / **NMEA 9** WP FILTER: **ALL** / MOBILE / FREQUENCY / OBJECT/ITEM / DIGIPEATER / VoIP / WEATHER / YAESU / CALL RINGER / RNG RINGER
	2	DATA BAND SELECT	APRS: MAIN BAND / SUB BAND / A-BAND FIX / **B-BAND FIX** / A=TX/B=RX / A=RX/B=TX DATA: MAIN BAND / SUB BAND / A-BAND FIX / **B-BAND FIX** / A=TX/B=RX / A=RX/B=TX
	3	DATA SPEED	APRS: **1200 bps** / 9600 bps DATA: **1200 bps** / 9600 bps
	4	DATA SQUELCH	APRS: **RX BAND** / TX/RX BAND DATA: **RX BAND** / TX/RX BAND TX: **ON** / OFF

The data transmission of the TNC port of FTM-400 is enabled by default. It is disabled by the "SQL" signal level control triggered by panels "A" and "B" receive frequencies. Therefore, the reception frequency SQL level for panels "A" and "B" should be set to favor "High Threshold". If the SQL level is set too low, receiving SQL is opened due to radiation interference, which may cause port data transmission to be disabled.



PCB support DIY date May 23, 2020, all future versions support DIY

6-pin to 26-pin conversion board (connected to motoTRBO-26 pin accessory):-

Below is the XPR4550 physical connection:-

Accessories Terminal Settings by CPS

- RX Audio Type: Filtered Squelch
- Pin #17: Ext Mic PTT Action Level: Low
- Pin #21: PL/Talkgroup Detect Action Level: Low
- “6-pin to 26-pin conversion board” supports most Motorola mobile radios with 26-pin accessory connectors including but not limited to the below models:
- XPR Series : XPR4300, XPR4350, XPR4380, XPR4500, XPR4550, XPR4580, XPR5350,
- XPR5550, XPR8300

- XiR Series : XiRM8200, XiRM8220, XiRM8228, XiRM8620, XiRM8628, XiRM8660,
- XiRM8668, XIR-R8200 (2023 test passed, the Accessory port only supports analog mode)
- DGM Series: DGM4100, DGM6100
- DM Series: DM3400, DM3401, DM3600, DM3601, DM4400, DM4401, DM4600, DM4601

  Note 4: There is no guarantee that all versions can be used normally, please make sure that the radio version matches your region.

Below is the picture of the 6-pin to 16-pin conversion board (the accessory to be connected to Motorola-16 pin):

The above 6-pin to 16-pin conversion board, it is for Motorola radio and is to use for connection on GM300 SM50 SM120 GM338 GM339 GM398 GM3188 GM3688 GM950I CDM-1250 GM140 GM160 GM340 GM360 GM380 GM640 GM660 GM1280

Radio default setting
PIN2=MIC INPUT PIN3=PTT PIN7=GND PIN8=SQL (Action Level : Low) PIN11=AF OUT

6-pin to 16-pin conversion board, PCB pad description

- PCB connection = 2 PIN MIC input (default setting PIN2 = MIC INPUT)
- PCB connection = 5 PIN MIC input
- PCB connection = connect 15 PIN and 16 PIN, RADIO built-in speaker = enable sound output; PCB not connected = no sound output from the speaker

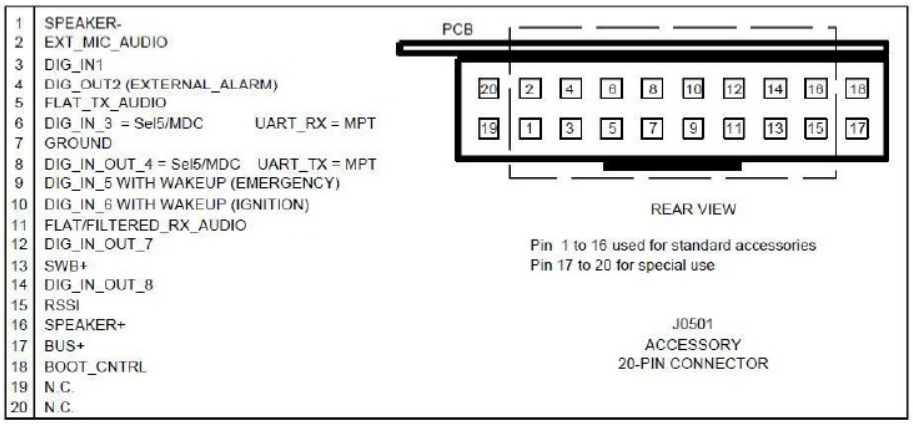
Driver Installation

- USB sound card chip: the Windows operating system has an integrated driver; hence, installation is not needed.
- USB mouse middle key detection chip: the Windows operating system also has an integrated driver; hence, driver installation is not needed.
- But you need to install the USB serial driver, the download link is as below:- **http://avrtx.cn/download/USB%20driver/CH340/CH340%20DRIVER.ZIP**

http://www.wch-ic.com/search?t=all&q=CH340 (CH341 Driver compatible)

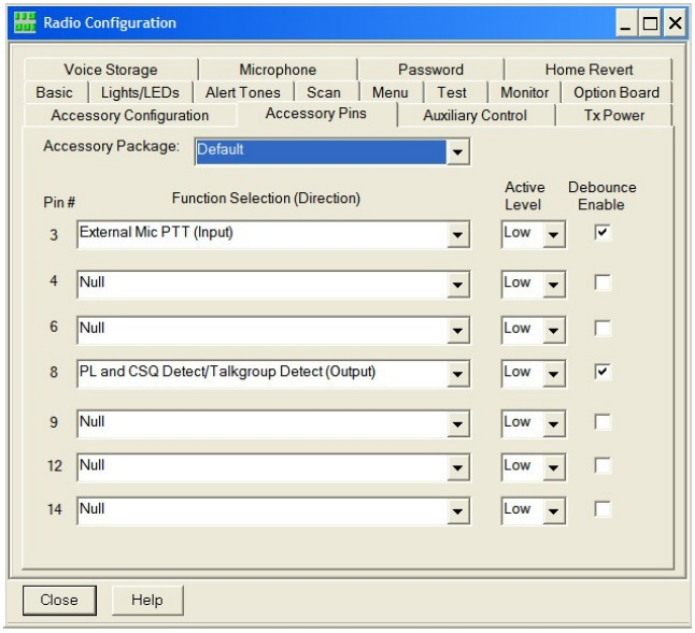
Important function microphone settings
System audio management interface, do not select the microphone to enhance or AGC if you select the option, the audio of the other party will be very loud and noisy

Motorola CDM-1250 connected to R1-2020 use and settings

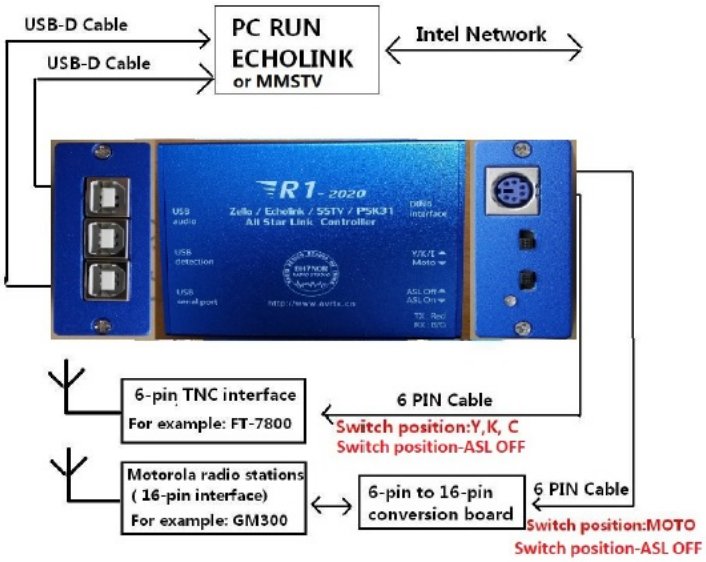


CDM-1250 accessory connector definition:

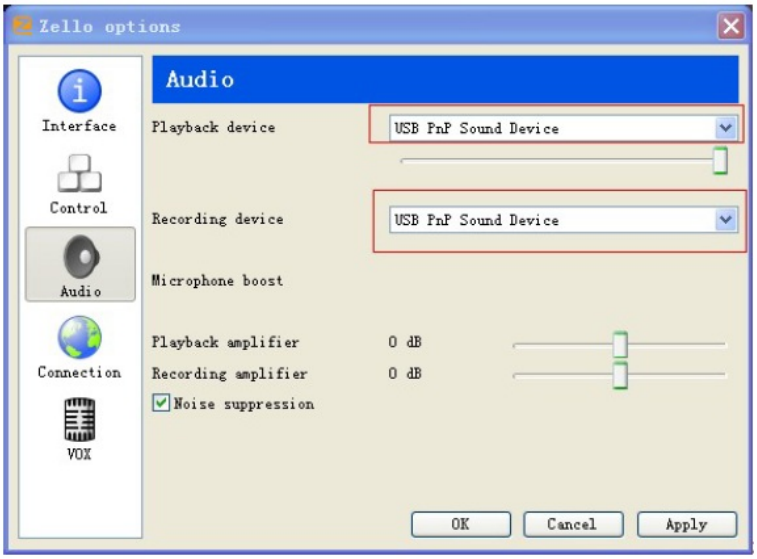
Use the" 6-pin to 16-pin conversion board" to insert CDM-1250 accessory connector 1-16
CDM-1250 "CPS" programming setting:



ECHOLINK and MMSTV Connect to use



ECHOLINK Set reference

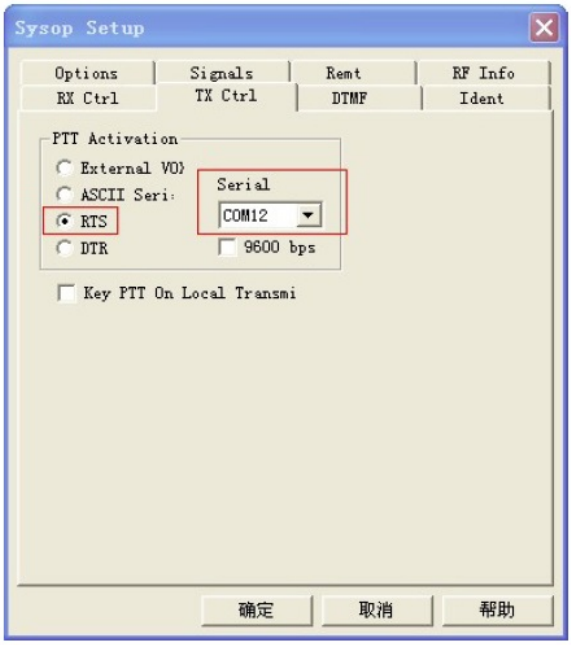


Select audio input and output as USB pnp sound device input and output volume setting, please set to the system audio management interface

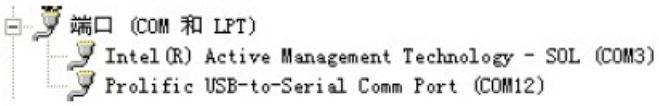
Important function microphone settings

System audio management interface, do not select the microphone to enhance or AGC if you select the option, the audio of the other party will be very loud and noisy

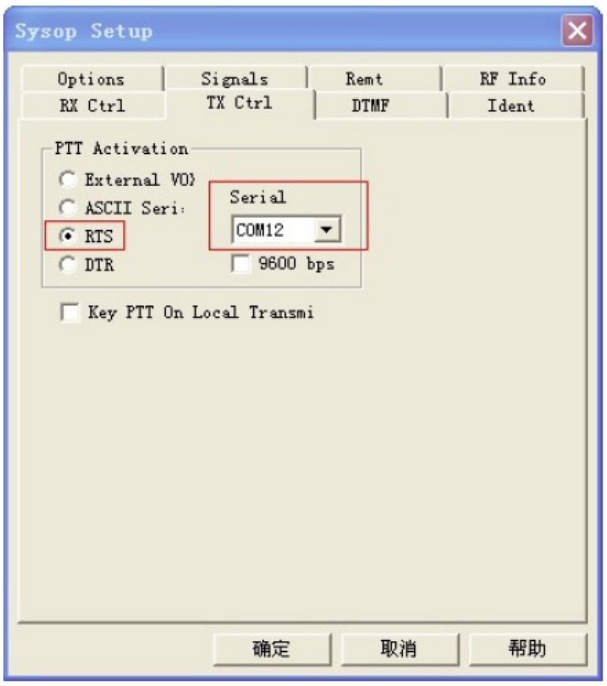
Set receive control as Serial DSR
Select: the USB serial number



USB serial number, see the hardware manager



Set the launch control as Serial port RTS

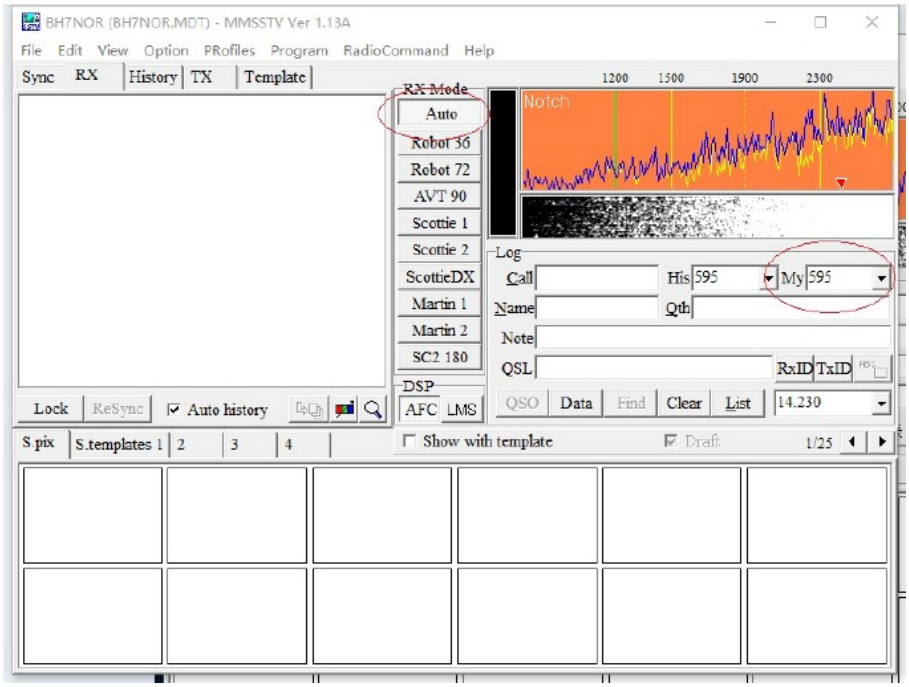


Select: the USB serial number

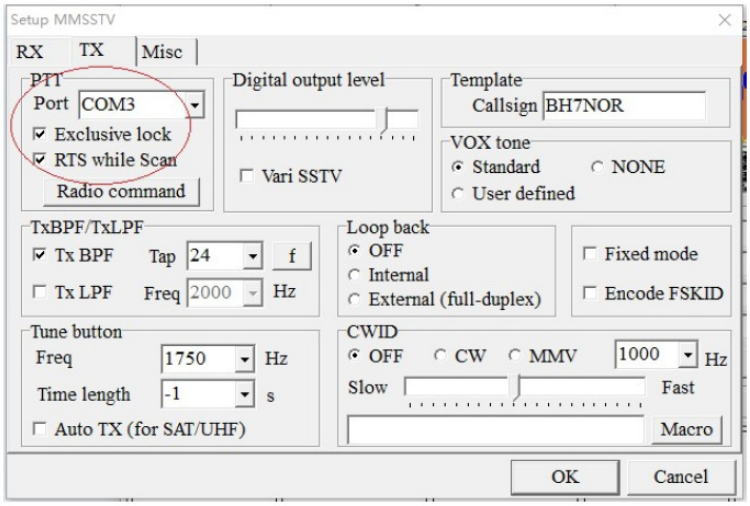
Note 5

Regarding on this R1 appliance box, please be informed that when PC is restarted, it will become abnormal. Please power off/turn off the radio power supply first, then only restart the PC. The reason for the above problem is related to the driving control principle of the R1 and PC. There is no solution to this problem yet. For the extra info, if the R1 control encounters abnormality after the PC is turned off, please set “PC shutdown = USB no power supply” in the PC BIOS.

MMSTV Set reference

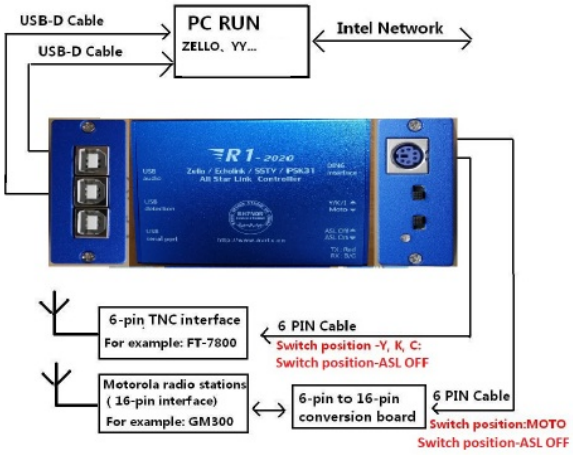


Select RX MODE: AUTO

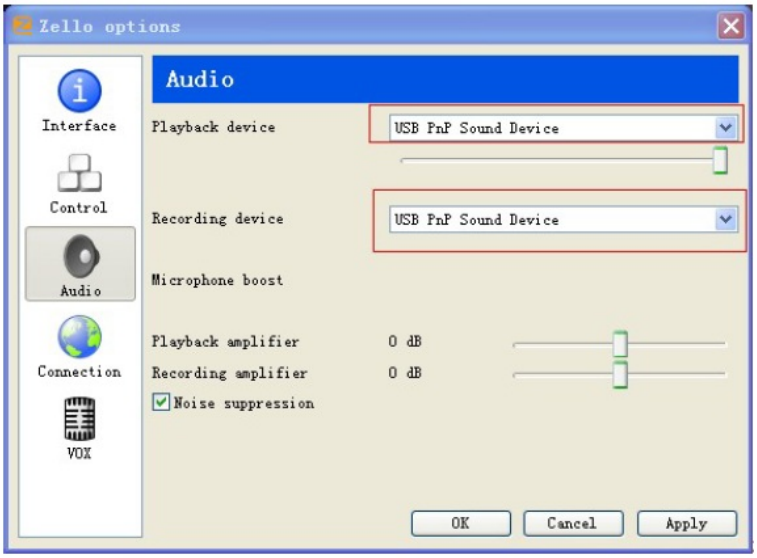


Select: USB serial COM number, Select Exclusive Lock and RTS While Scan

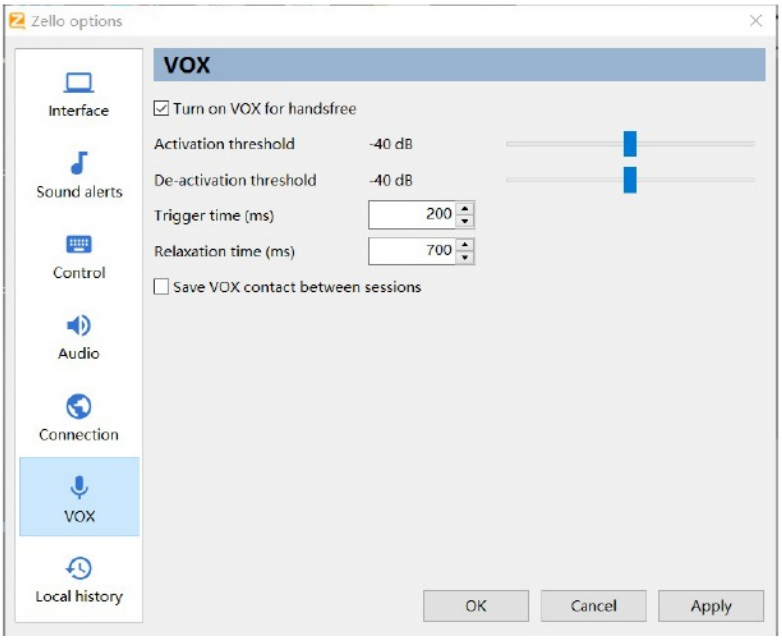
Below is the connection to use in ZeLLO:-
Important Note: Since the new version of ZELLO does not support the middle mouse button mode, you can use the “VOX” mode. Or use mouse-to-keyboard software, the software name is “MouseChange”. Convert the “middle mouse button” to the keyboard value “F7”, minimize the window, and run it. Program MouseChange download website: avrtx.cn.



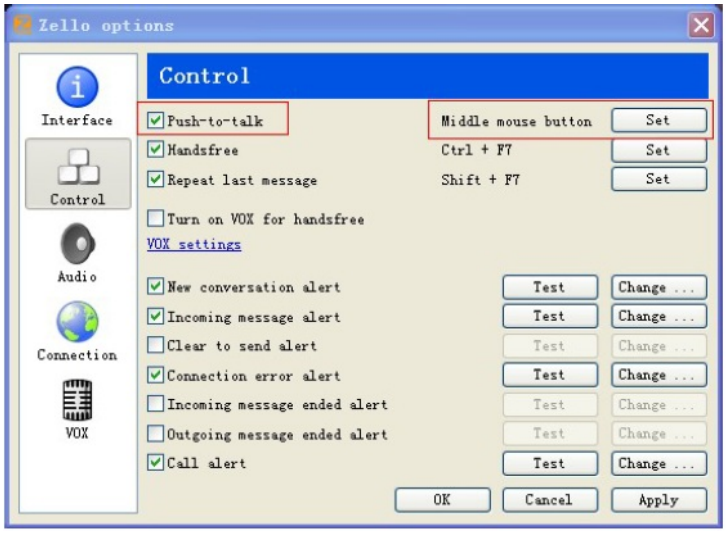
The “set reference” for ZeLLO



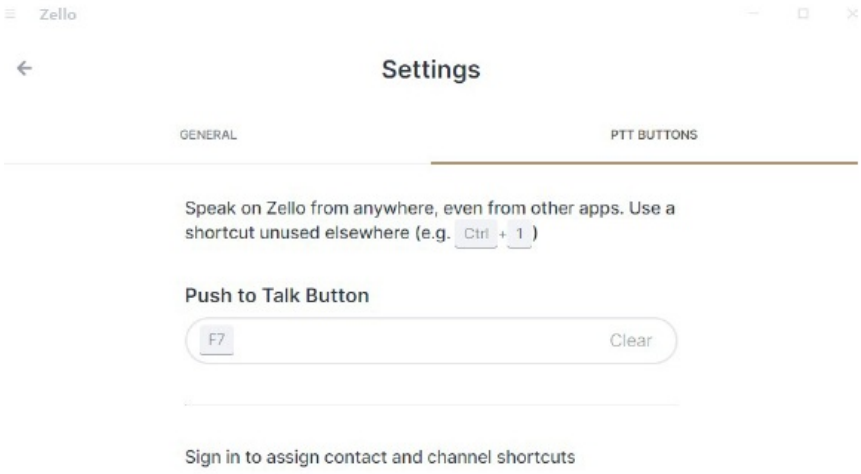
1. set the audio on both input and output to USB PnP Sound Device (windows the operating system already has the integrated driver) Important function microphone settings: System audio management interface, do not select the microphone to enhance or AGC, if you select the option, the audio of the other party will be very loud and noisy



2. Select ZeLLO detection as “VOX Enabled



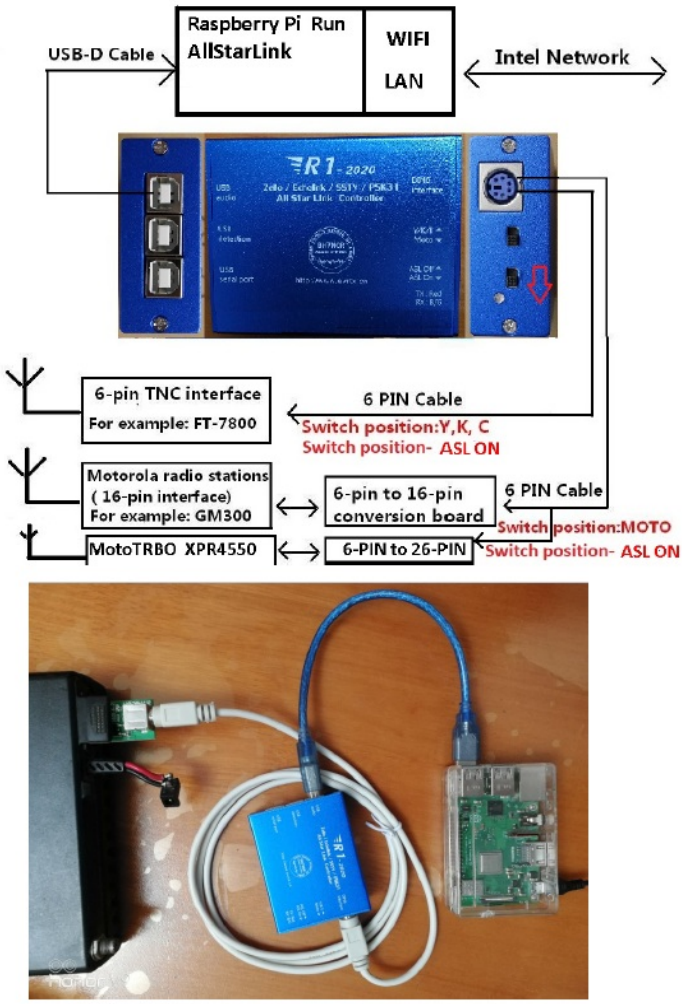
3. Set Push to talk on ZeLLO to “Middle Mouse Button”



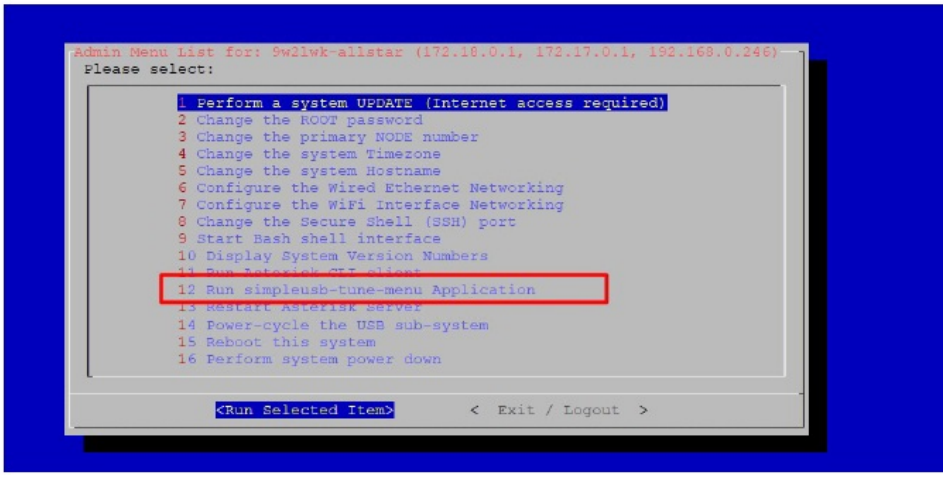
Note: The new version of ZELLO does not support the middle mouse button mode, you need to run “MouseChange”. Convert the “middle mouse button” to the keyboard value “F7”. The window is minimized to run. At this time, R1 internal detection will be converted to “F” 7 to trigger ZELLO forwarding. Program MouseChange download website: **avrtx.cn**

Using the same settings, you can also control other keyboard trigger software, for example: ESChat…

AllstarLink Connect to use



Allstarlink settings and Raspberry Pi system mirror download URL: https://allstarlink.org/ https://hamvoip.org/ image download: https://hamvoip.org/#download R1 hardware-related settings of Allstar link



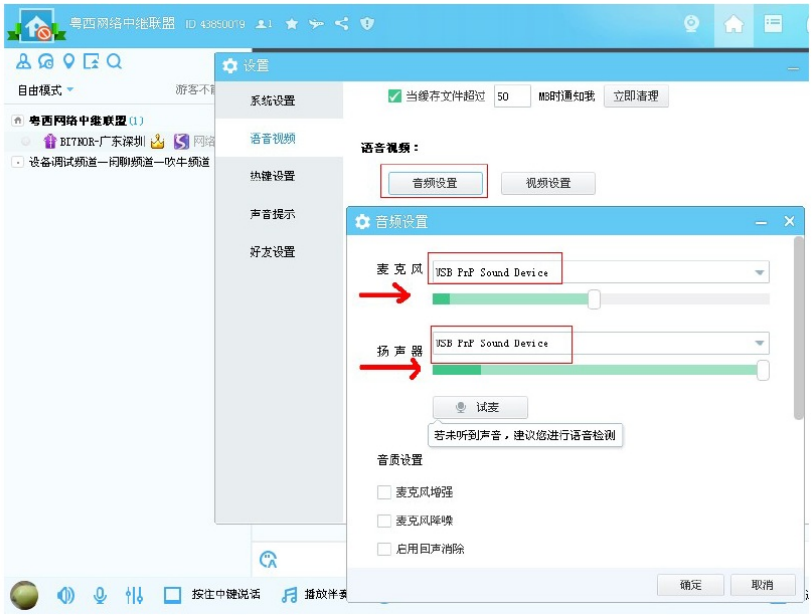
just follow the below setting like mine and make sure you have the toggle here:

```
        Starting simpleusb-tune-menu. Please type: 0<ENTER>
         when done and you will return to the admin menu.



Active simpleusb device stanza: [usb] -----------------------------------
S) Select active USB device stanza
V) View COS, CTCSS and PTT Telemetry using real-time display
P) Print Current Parameter Values ---- 2) Set Rx Voice Level (using display)
3) Set Transmit A Level           ---- 4) Set Transmit B Level
5) Set Tx Audio Level Method (currently LINEAR)
7) Set Transmit DSP Level
B) Toggle RX Boost Mode (currently Disabled)
C) Toggle Echo Mode (currently Disabled)
D) Flash (Toggle PTT and Tone output several times)
E) Toggle Transmit Test Tone/Keying (currently Disabled)
K) Manually key COS (currently Unkeyed)
F) Toggle PRE-emphasis Mode (currently Disabled)
G) Toggle DE-emphasis Mode (currently Disabled)
H) Toggle PLfilter Mode (currently Enabled)
Q) Toggle DCSfilter Mode (currently Disabled)
I) Toggle PTT Mode (currently active LOW)
J) Change COSFROM Mode (currently "usbinvert")
L) Change CTCSSFROM Mode (currently "no")
M) Change RXONDELAY value (currently "0")
N) Change RXAUDIODELAY value (currently "0")
W) Write (Save) Current Parameter Values
0) Exit Menu

Please enter your selection now:
```

Note: For help with connecting Allstarlink to R1, please contact 9W2LWK, email: **9w2lwk@gmail.com**

```
[root@9w2lwk-allstar:~]# lsusb
Bus 001 Device 078: ID 15d9:0a4d Trust International B.V. Optical Mouse
Bus 001 Device 077: ID 0d8c:013a C-Media Electronics, Inc.
Bus 001 Device 076: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 004: ID 1a86:7523 QinHeng Electronics HL-340 USB-Serial adapter
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
[root@9w2lwk-allstar:~]#
```

Connection to use in YY: (YY is only available in the Chinese Simplified version)



On the YY channel, select both the microphone input and speaker output to “USB PnP Sound Device” on the system audio management interface, please do not select microphone enhancement or AGC, if you select the option, the audio of the other party will be very loud and noisy

If you want to set the external radio to receive the audio sent through the network from each other, choose to press the mouse to speak: the middle button (selected the green point, and click the middle mouse button).

External radio transmission is the internal default control, it does not need to be set.
Tip: The middle mouse button control function should be reserved for YY software. In order to avoid mis-forwarding network communications, other software can not overlap/reuse/override the middle mouse button. The last two suggestions are to disable the voice prompt function. This is to avoid miss triggers in communication.

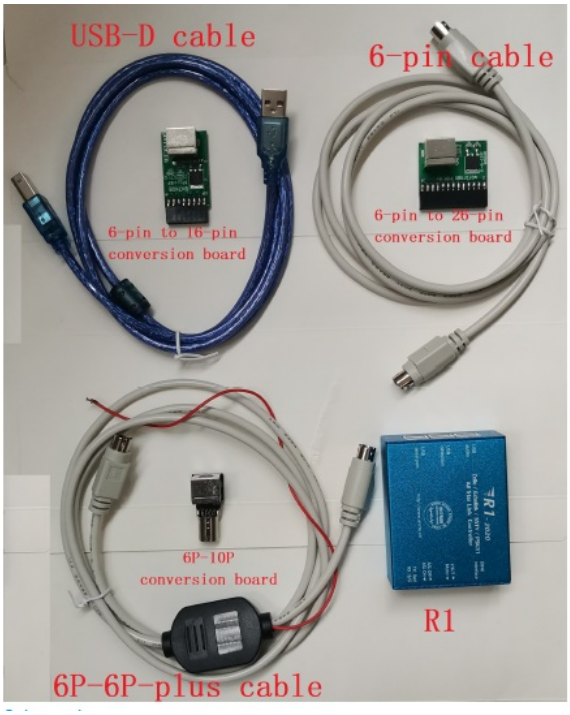
R1 Optional list of accessories

packages	main parts	Optional cable	conversion board	Radio Support List
A16	R1 * 1 PCS +USB-D cable * 2 PCS	6-pin cable	6-pin to 16-pin conversion board	Motorola: GM300 SM50 SM120 GM338 GM339 GM398 GM3188 GM3688 GM950I CDM-1250 GM140 GM160 GM340 GM360 GM380 GM640 GM660 GM1280
				Motorola:
				XPR Series : XPR4300,XPR4350,XPR4380, XPR4500, XPR4550,
				XPR4580, XPR5350, XPR5550, XPR8300
				XiR Series : XiRM8200, XiRM8220, XiRM8228, XiRM8620,
				XiRM8628, XiRM8660, XiRM8668, XIR-R8200
	R1 *			DGM Series : DGM4100, DGM6100
A26	1 PCS +USB-D cable * 2 PCS	6-pin cable	6-pin to 26-pin conversion board	DM Series: DM3400, DM3401, DM3600, DM3601, DM4400, DM4401, DM4600, DM4601
B10P	R1 * 1 PCS +USB-D cable * 2 PCS	6P-6P-plus cable		ICOM: IC-207H, IC-208H IC-2720H IC-2820H YAESU: FT-7800 FT-7900 FT-8800 FT-8900 FT-817 FT-818 FT-847 FT-857 FT-897 FT-991 KENWOOD:TM-V7A,TM-V71,TM-255,TM-455,TM-733,TM-D700,TM-D710
	R1 * 1 PCS +USB-D cable * 2 PCS	6P-6P-plus cable	6P-10P conversion board	YAESU: FTM-100, FTM-200, FTM-300,FTM-400, FTM-6000

- Sales package A16: R1 * 1PCS + USB-D cable * 2PCS + 6-pin cable * 1PCS + 6-pin to 16-pin conversion board * 1PCS
- Sales package A26: R1 * 1PCS + USB-D cable * 2PCS + 6-pin cable * 1PCS + 6-pin to 26-pin conversion board * 1PCS

- Sales package B10P: R1 * 1PCS + USB-D cable * 2PCS + 6P-6P-plus cable * 1PCS + 6P-10P conversion board * 1PCS

Accessories list



Sales Package

- package A16: R1 * 1PCS + USB-D cable * 2PCS + 6-pin cable * 1PCS + 6-pin to 16-pin conversion board * 1PCS
- package A26: R1 * 1PCS + USB-D cable * 2PCS + 6-pin cable * 1PCS + 6-pin to 26-pin conversion board * 1PCS
- package B10P: R1 * 1PCS + USB-D cable * 2PCS + 6P-6P-plus cable * 1PCS + 6P-10P conversion board * 1PCS
- Manual Download URL **http://avrtx.cn/**
- Contact E-mail **yupopp@163.com** **yupopp@gmail.com** manufacture BH7NOR (Old callsign: BI7NOR) Manual Fix: 9W2LWK

Documents / Resources

	**Avrtx R1-2020 Radio-Network link Controller** [pdf] User Manual R1-2020 Radio-Network link Controller, R1-2020, Radio-Network link Controller, link Controller, Controller

References

- AP510 AP610 AvrTx SainSonic software download
- AP510 AP610 AvrTx SainSonic software download
- avrtx.cn/download/USB%20driver/CH340/CH340%20DRIVER.ZIP
- avrtx.com
- search CH340 - NanjingQinhengMicroelectronics
- AllStarLink.org
- Asterisk Allstar on the Raspberry Pi 2/3/4
- Asterisk Allstar on the Raspberry Pi 2/3/4