PTT Extender Box 1R27 – Assembly Manual

Introduction

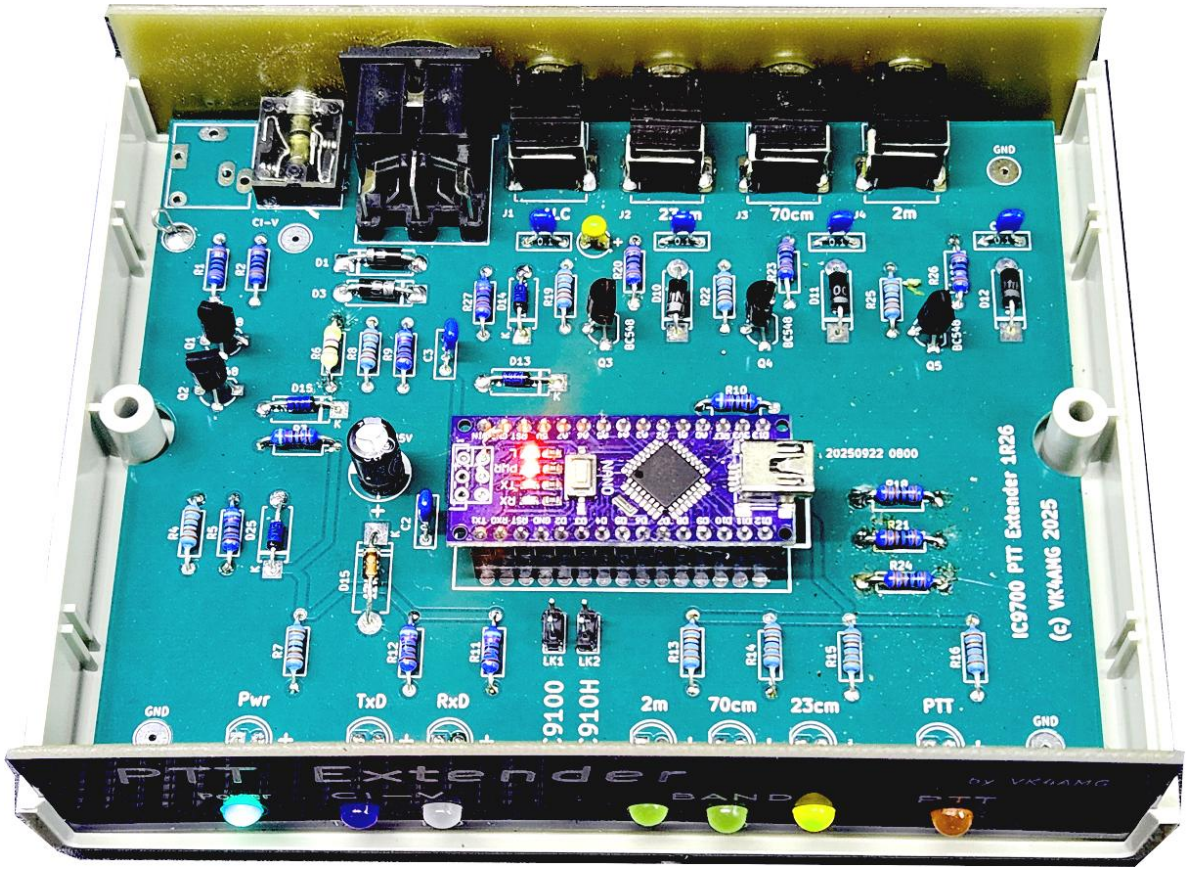
The PTT Extender provides an independent open collector output for each band of the IC9700 radio. The box connects to the ACC socket (8 pin DIN) of the radio for power and ALC and to the Remote jack by a 3.5mm phono mono male cable.

The Extender box includes diagnostics to check correct connection and operation and to display its status by the front panel LEDs.

Solder links on the PCB allow a user to configure the Extender to operate with an Icom IC910H or IC9100.

Construction

The electronics are built on a double sided plated through printed circuit board using leaded components.



The PCB is mounted in a plastic clam shell enclosure with silk-screened front and rear panels (white on blue).

Assembly

The unit is available in kit form suitable for experienced builders. An overlay with the locations and values of the components is shown on pages 6 and 7.

It is recommended that assembly in performed in the order:

1. the leaded resistors and diodes;
2. the LEDs and transistors;
3. the electrolytic capacitor;
4. the socket for the processor; and
5. the back panel jacks.

When installing the pre-programmed Arduino Nano processor, the USB connector is at the right-hand, looking at the front side of the PCB.

Testing

Before power the module, inspect all solder joints and check for shorts between tracks. Test the operation of the module before installing in its case.

The module may be powered by connecting the 8 pin DIN cable to the radio's ACC socket (IC9700 and IC910H – see for IC9100) and switching on the radio. The green 'Power' LED will light. The yellow 'band' LEDs and the red 'PTT' will flash. If a bench power supply is used, do not exceed 15V dc.

If the Nano processor is connected to terminal program on a PC serial port (check Windows/Control Panel/Ports to determine the port in use), a sign-on message (e.g. "20240623_IC9700_PTT_Box_Nano"), radio CI-V address, and "Initialised" will be displayed.

With the radio transmit power at minimum, operate the PTT and press the 'reset' button on the Nano. This will run the startup initialisation again. The red 'PTT" will flash, and the yellow 'band' LEDs will continuously flash. Remove the PTT of the radio, the red 'PTT' LED will extinguish, while the yellow LEDs will continue to flash indicating the box does not know which band is selected. As there is no data received via the disconnected CI-V, the TxD LED will flash indicating the box is requesting the band information from the radio.

For an IC9700, ensure the remote address is the default 'A2'; the remote port baud rate is '19200'; and USB CI-V and remote control are uncoupled in the IC9700 connections menu (see following sections or user manual P 8-13).

For IC910H or IC9100, see "Configuration" section for setup of their default CI-V addresses.

Connect the CI-V cable and rotate the frequency dial. The RxD LED will flash while the frequency is changing. The LED for the band-in-use will light steady. Apply the PTT on the radio the red 'PTT' LED will light and extinguish when the PTT is removed.

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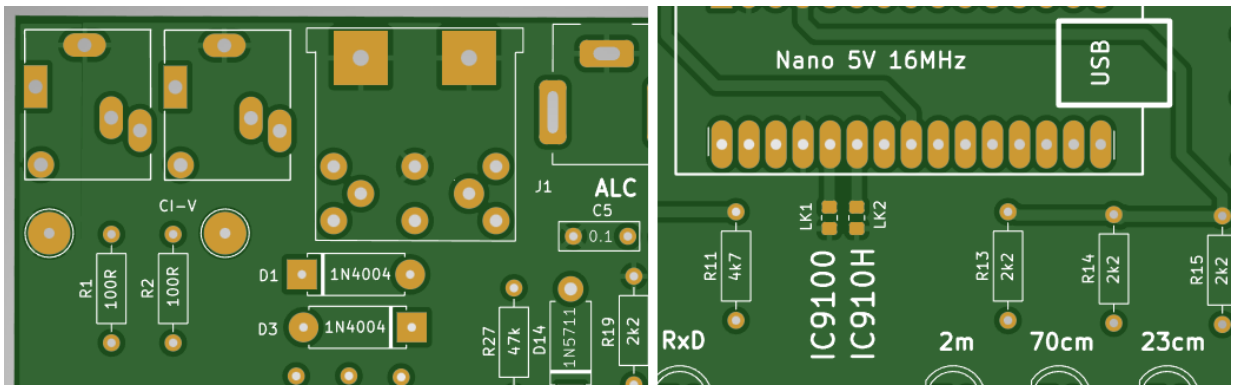
With a band PTT output connected to an amplifier PTT or test load (up to 28V dc 100mA), apply the radio PTT and confirm the amplifier is switched to transmit then to standby on removal of the PTT.

Remove the CI-V cable from the box. Note that after a short delay the ‘band’ LEDs flash indicating the band is not known. The TxD LED will flash several times as the box attempts to poll the radio for the operating band. Apply PTT and note the red ‘PTT’ LED flashes indicating a CI-V fault. PTT outputs will not be operated.

Correct operation of the ALC hold-off may be confirmed by viewing the ALC bar of the ‘meter’ display on the radio. When the radio is initially switched to PTT, the ALC bar will be at the maximum value (right-hand end of the bar) and will quickly slide back to the normal value for the power level set (should still be 0W). The ALC hold-off may be disabled by removing C3 (0.1uF capacitor).

If the ALC from the amplifier(s) is/are being used, connect the amplifier(s) ALC to the ALC RCA jack. Check the operation of the ALC is normal.

Put the module in its case and screw the sections together. The PCB is supported by the LEDs and rear panel jack. It does not need to be screwed to the case.



Configuration IC910H and IC9100

The default configuration is for IC9700. The PTT Extender may be user configured for an Icom IC910H or IC9100 radio, by shorting LK1 (IC910H) or LK2 (IC9100). The extender operates with a CI-V of “A2” for IC9700, “60” for IC910H or “7C” for IC9100.

For IC910H, where the CI_V of the radio is to be connected to other devices as well as PTT Extender. An additional 3.5 mm mono phone jack may be added to the rear panel of the PTT Extender. This provides a parallel CI-V function as in a CT-17. An additional hole is required in the back panel. Centre and outline is marked on the panel.

Put the PTT Extender in pride of place next to your radio and confidently enjoy multi-band amplifier operation.

73 George VK4AMG

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Bill of Material

20251118_PTT_Extender_1R27 18-Nov-25 VK4AMG

Id	Designator	Quantity	Designation
1	C1	1	100u 25V
2	C4	1	1uF 25V
3	C2,C3,C5,C6,C7,C8	6	0.1 50V
4	D1,D3,D10,D11,D12	5	1N4004
5	D13,D14,D16	3	1N5711
6	D15	1	Zener 12V 1W
7	D2	1	Green
8	D4	1	Blue
9	D5	1	White
10	D6,D7,D8	3	Yellow
11	D9	1	Red
12	Q1,Q2,Q3,Q4,Q5	5	BC548
13	R20,R23,R26	3	10R
14	R6	1	47R
15	R1,R2	2	100R
16	R4,R8,R13,R14,R15,R16,R18,R19,R21,R22,R24,R25	12	2k2
17	R3,R5,R7,R9,R10,R11,R12	7	4k7
18	R27	1	47k
19	Acc	1	Conn_8pin_DIN
20	CI-V	1	Jack_3.5mm
21	J1,J2,J3,J4	4	RCA_Single_Jack
22	Nano 5V 16MHz	1	Arduino_Nano
23	Case including 4x clear plastic feet	1	
25	Back and front panel -Silk screened	1	
26	Connector Strip 15 pin	2	
27	Cable 8 pin DIN M-M	1	
28	Cable 3.5 mm phono mono M-M	1	

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CI-V / Remote Settings (refer P8-13 of IC9700 Instruction Manual)

MENU » SET > Connectors > CI-V

CI-V Baud Rate (Default: Auto) Selects the CI-V data transfer rate. When "Auto" is selected, the baud rate is automatically set according to the data rate of the connected device.

CI-V Address (Default: A2h) Sets the CI-V address. "A2h" is the default address of the IC-9700.

CI-V Transceive (Default: OFF) Turns the Transceive function ON or OFF. • OFF: The status is not output. • ON: The status is output. When you change a setting on the transceiver, the same change is automatically set on other connected transceivers or receivers, and vice versa

CI-V USB/LAN→REMOTE Transceive Address (Default: 00h) Sets the address used to remotely control the transceiver or the receiver, through the [USB] port or the [LAN] port. The external equipment control signal is output from the [REMOTE] jack.

CI-V USB Port (Default: Unlink from [REMOTE]) Selects the internal connection type between the [USB] and [REMOTE] CI-V ports. • Link to [REMOTE]: The [USB] and [REMOTE] CI-V ports are internally connected. • Unlink from [REMOTE]: The [USB] and [REMOTE] CI-V ports are not internally connected. Each port functions independently. CI-V

UNLINK IS NOT AVAILABLE IN IC910H and IC9100

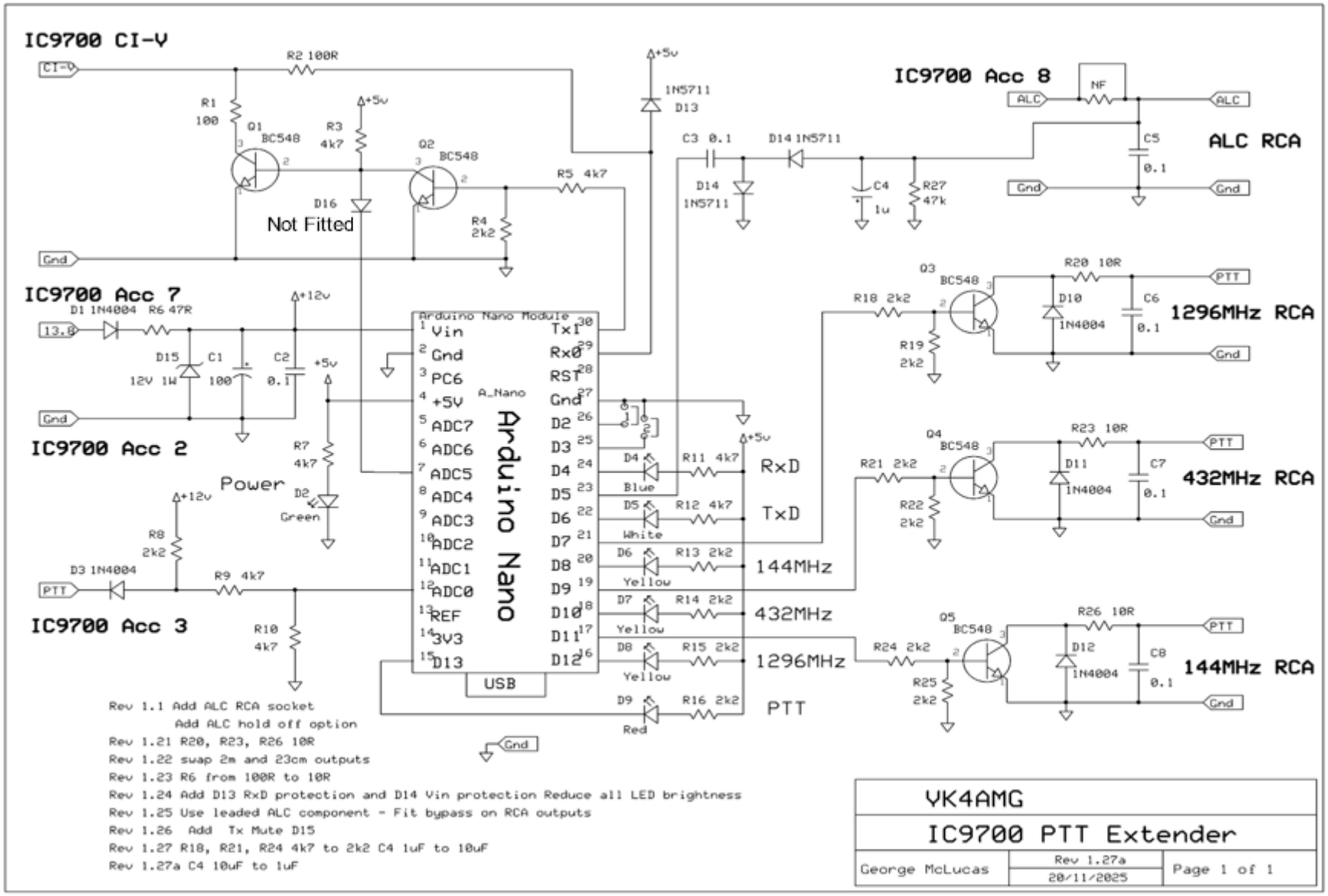
USB Baud Rate (Default: Auto) Selects the CI-V data transfer rate when remotely controlling the IC-9700 through the [USB] CI-V port. When "Auto" is selected, the baud rate is automatically set according to the data rate of the external device. This setting is valid only when the "CI-V USB Port" item is set to "Unlink from [REMOTE]."

CI-V USB Echo Back (Default: OFF) Turns the Data Echo Back function ON or OFF, when remotely controlling the IC-9700 through the [USB] CI-V port. This setting is valid only when the "CI-V USB Port" item is set to "Unlink from [REMOTE]."

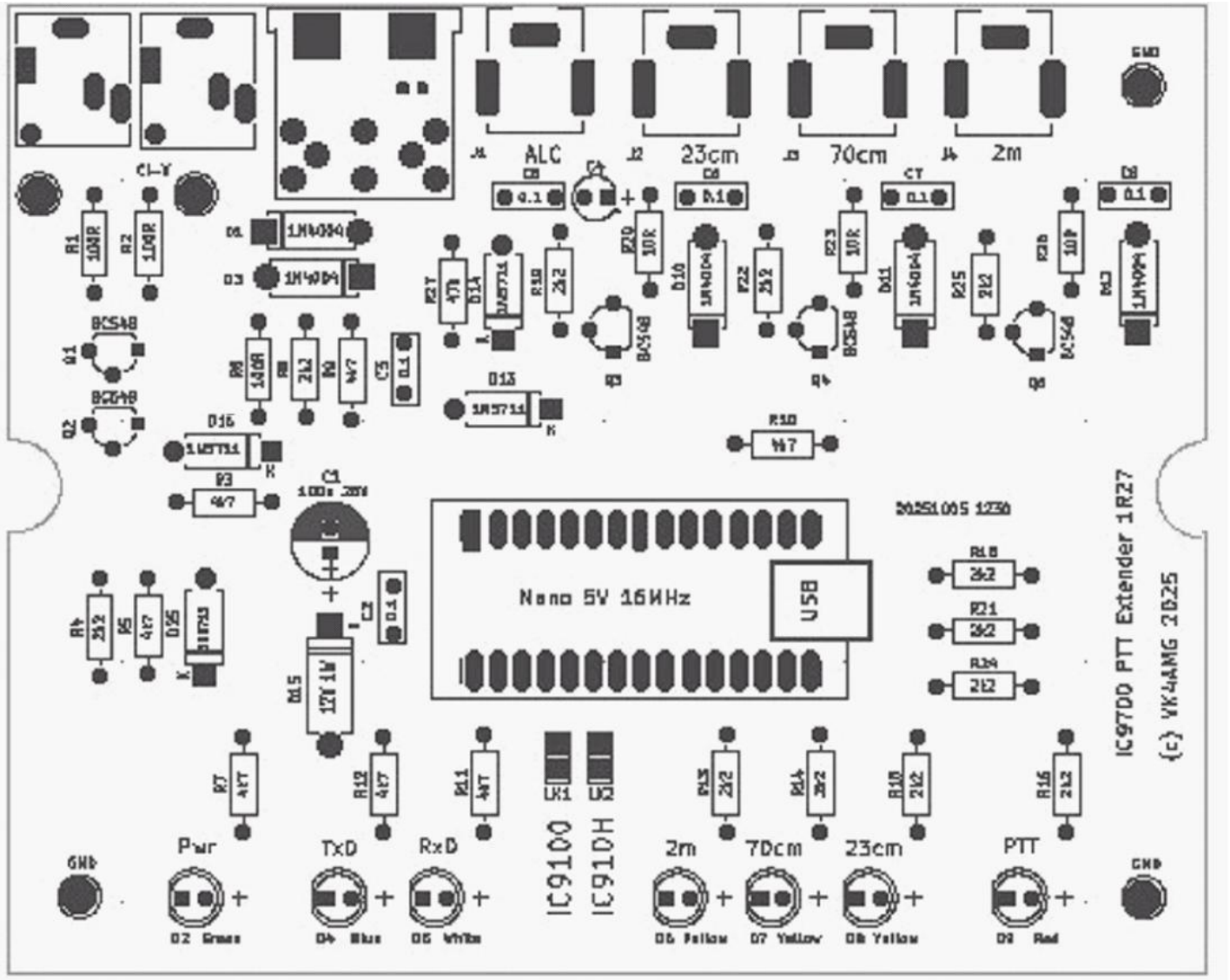
CI-V DATA Baud Rate (Default: OFF) Selects the CI-V data transfer rate when remotely controlling the IC-9700 through the [DATA] jack. ***Set to 19200 baud.***

CI-V DATA Echo Back (Default: OFF) Turns the Data Echo Back function ON or OFF, when remotely controlling the IC-9700 through the [DATA] jack

IC9700 PTT Extender Box – Assembly and Testing



IC9700 PTT Extender Box – Assembly and Testing



Top side component layout Leaded

IC9700 PTT Extender Box – Information Sheet

Introduction
The Icom IC9700 provides a single "SEND" signal on the ACC socket. Many operators prefer a separate PTT to each of their amplifiers / LNAs.
This "box" monitors the CI-V serial communications from the 3.5mm jack to determine the band in operation by the MAIN and reflects the radio PTT to the box's RCA jack the band in use.

The box connects to the radio by the ACC via an 8pin DIN cable and the 3.5mm CI-V jack. This connection provides the supply for the box and provides an optional connection of the ALC from each amplifier to the radio.
Front panel LEDs indicate CI-V data states, band-in-use, radio PTT state.

The box is designed to avoid conflict with other applications using the CI-V bus (either 3.5mm or USB).

The box is housed in a polyester instrument enclosure. The font panel carries the status LEDs. The rear panel carries a 3.5mm phone jack for CI_V, an 8 pin DIN socket, three sets for RCA jacks providing PTT connections for the three bands, and a RCA jack connected to the ALC on the Acc socket.

Enclosure
The electronics uses leaded components mounted on a single sided printed circuit. The microprocessor is an Arduino Nano connected by headers. The PCB is mounted on the base of a 140 x 110 x 35mm polyester instrument enclosure. The front panel carries the power and status LEDs.
The rear panel carries the 3.5mm phone jack for the 5V CI-V serial data, an 8pin DIN socket with pinouts matching the IC9700, and dual RCA female jacks for ALC and PTT for the three bands. An RCA female jack provides connection to the IC9700 ALC pin on the ACC connector.

Operation
When the radio is turned on, the Box is powered via the ACC cable. A Power LED indicates the Box is operating. After initialisation, the front panel LEDs are flashed in turn. No outputs are operated during initialisation. Band-in-use LEDs will be extinguished until valid CI-V band / frequency messages are decoded. If the PTT is applied by the radio when the Box initialises, the red PTT will flash rapidly as a warning, nothing further will occur until the PTT is removed.

IC9700 PTT Extender Box – Information Sheet

CI-V activity is indicated by the flashing the TxD and RxD LEDs. Once band or frequency information is decoded, the band-in-use by transceiver is indicated on one of three yellow LEDs. Application of the PTT will then be indicated on the red PTT LED and the PTT output for the operating band will be grounded.

The box includes a ALC holdoff function. When PTT is not applied or if the PTT is applied but the band has not been decoded, maximum ALC voltage is applied to the IC9700 and ALC connected amplifiers. This prevents the radio from transmitting unless the CI-V and the Extender Box are working correctly. IC9700 RF output is then not active for 100ms after PTT is applied. This function prevents the possibility of RF output spikes and holds off the RF power output until PTT and changeover functions are active.

On removal of the PTT, the red PTT LED will extinguish. Any change of band / frequency will be indicated on the yellow "band-in-use" LEDs. If no valid band /frequency CI-V messages are decoded for 30 seconds, the extender will poll the IC9700 for the "band-in-use". If a valid status is not received from the IC9700, the yellow "band-in-use" LEDs will flash, and no further output operations will occur until normal operation is established.
In the absence of PTT and band broadcasts from the IC9700, the extender will poll the IC9700 for the "band-in-use" every 30 seconds. This means the PTT Extender is ready to apply the PTT for the appropriate band. 10mS PTT debounce is applied to the PTT input signal.

NOTE: The USB CI-V and remote control must be uncoupled in the IC9700 connections menu. That is "remote control" jack communicates with PTT Extender, USB CI-V communicates with computer applications.

NOTE: Satellite Operation. The IC9700 indicates the operating band is the Main or Sub that is selected (highlighted). For correct PTT to an amplifier the transmitting band (normally Sub) must be selected. Check operation before increase the power of the transmitter to operating levels.

Specification

Power supply	13.8 Vdc 100mA max from IC9700 ACC pin 2
Baud rate	19200 8, n, 1. Remote link in IC9700 configuration must be set to match.
CIV	Icom IC-R8600 CI-V Reference Guide.
PTT output	V max up to 24 Vdc. Active low 1V @100mA
	Latency < 10mS key down key up.
ALC holdoff (Option)	Delay of IC9700 power output provided as sequencing of active PA /LNA 100 ms.

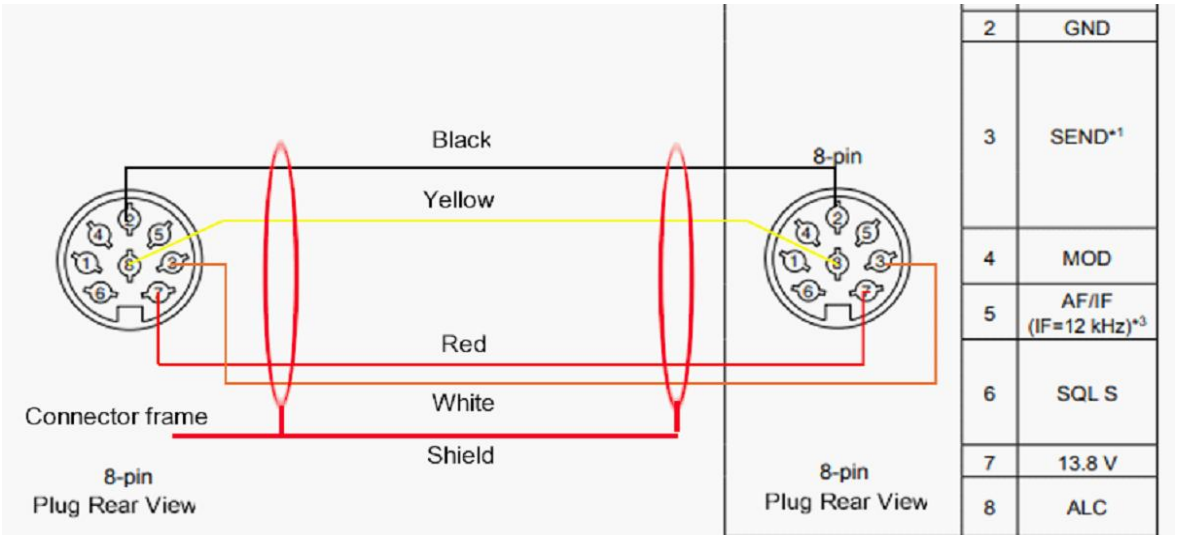
Revision history.	27 Nov 2025	Revision for 1R27- "Transceive" now OFF (Default)
	25 Jul 2025	Revision for 1R25 PCB all leaded components
	14 Feb 2023	Minor revision to ALC hold off function description.
	4 Jan 2023	Photos now show silk screen front and rear panel
		Minor revision to "band-in-use" polling.
	10 Nov 2022	Initial writing

IC9700 and IC910H PTT Extender to ACC -- 8pin DIN Cable

NOTE: From 1R27, assembled cables are provided for both kits and assembled module versions.

1. Strip 10mm of sheath from each end of the four conductor and shield cable.
2. Fold back and bundle the braid conductors both ends.
3. Cut the braid at the sheath on one end and about 5mm at the other end.
4. Strip 2-3mm of covering from each conductor each end of the cable.
5. Dissemble the connectors. Place the two covers over the cable.

6. Tin each conductor and solder to the pins on each end of the cable.
7. Solder the conductors to the pins. Recommended order is 7, 3, 2, and 8.



8. Place the pin mounding in the metal body which as the restraint.
9. Place the 5mm braid under the restraint on the connector and crimp. At the other end the braid is not connected. Crimp the restraint over the cable sheath.
10. Reassemble the connector body.

3.5mm Male Phono Cable

1. Strip 7mm of sheath from each end of the shielded cable.
2. Separate the braid and twist conductors to make a tail for the ground connection.
3. Strip 2-3mm of covering from the centre conductor.
4. Dissemble the connector. Place the two covers on the cable similar to above.
5. Solder the inner conductor to the centre pin of the plug.
6. Solder the braid to the ground connection of the plug.

Warning: do not use excessive heat on the braid. Insulation of inner is low temperature.

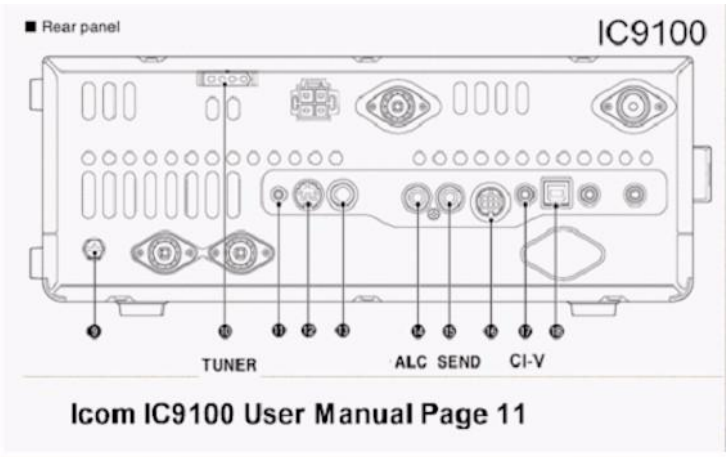
7. Crimp the ground connection over the sheath of the cable.
8. Assemble the connector.
9. Repeat the process for the other end.

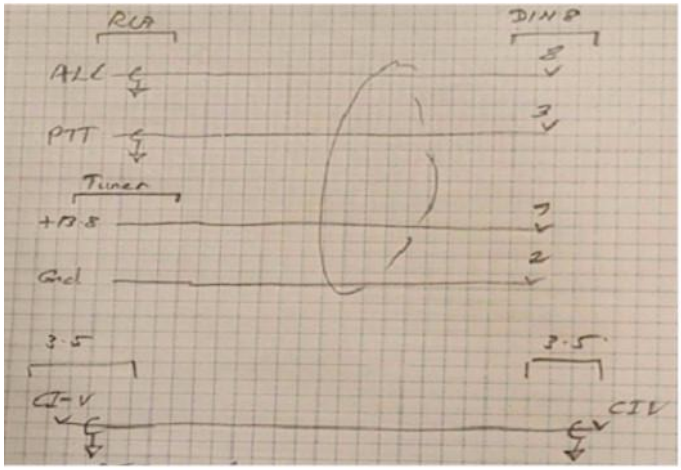
IC9100 PTT Extender – RCA PTT / ALC & Power Cable

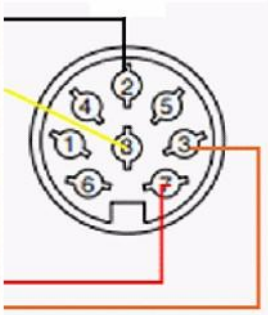
A 13pin DIN socket is used for the IC9100 ACC connector. The plug for this high-density connector is expensive, and some operators connect other auxiliary devices to this connector.

Alternative connection to the PTT Extender is provided by a 8pin DIN plug connected to two RCA plugs (“PTT” red and “ALC” yellow) and to the Tuner connector for power supply.

A 3.5mm male-to-male mono phone cable is used for CI-V as with the IC9700 and IC910H.







8-pin
Plug Rear View

2	GND
3	SEND*1
7	13.8 V
8	ALC

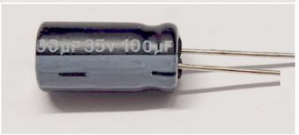
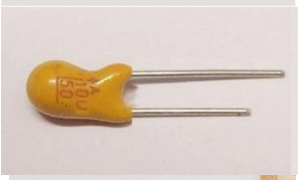
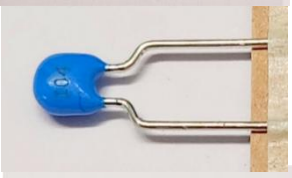
PTT Extender IC9700, IC9100, IC910H

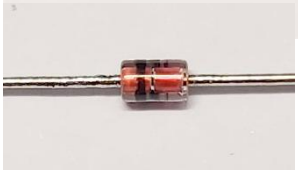
R20,R23,R26	Metal Film Resistor 10R 1/4W	3 off
R6	Metal Film Resistor 47R 1/4W	1 off
R1,R2	Metal Film Resistor 100R 1/4W	2 off
R4,R8,R13,R14, R15,R16, R18, R19 R21,R22, R24,R25	Metal Film Resistor 2k2 1/4W	12 off
R3,R5,R7,R9 R10,R11,R12,	Metal Film Resistor 4k7 1/4W	77 off
R27	Metal Film Resistor 47k 1/4W	1 off
C1	Capacitor Electro 100u 25V Long led to "+" on PCB	1 off
C4	Capacitor Electro 1u 25V Long led to "+" on PCB	1 off
C2,C3,C5,C6, C7,C8	Capacitor Ceramic 0.1 50V	6 off
D1,D3,D10, D11,D12	Diode Silicon 1N4004 Bar on diode to bar on PCB silk screen	5 off
D14,D13,D25	Diode Schottky 1N5711 Bar on diode to bar on PCB silk screen	3 off
D15	Diode Zener 12V 1W Bar on diode to bar on PCB silk screen	1 off



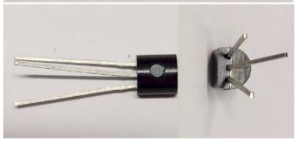
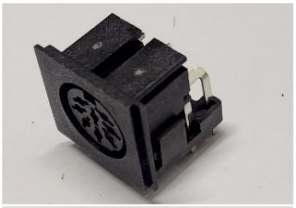
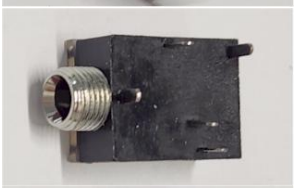
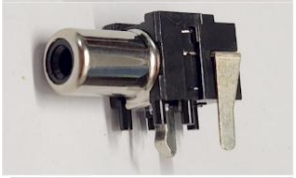
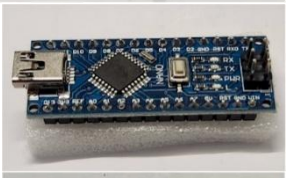
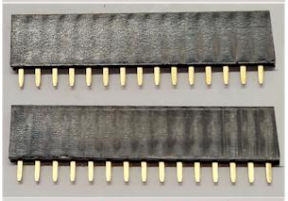




PTT Extender IC9700, IC9100, IC910H

D2	LED 5mm Green	1 off	
D4	LED 5mm Blue	1 off	
D5	LED 5mm White	1 off	
D6,D7,D8	LED 5mm Yellow	3 off	
D9	LED 5mm Red	1 off	
	Long lead to "+" on PCB silk screen		
Q1,Q2,Q3,Q4,Q5	Transistor NPN BC548	5 off	
	Bend centre leg base away from case flat to match PCB footprint to match PCB footprint		
Acc	Jack 8pin_DIN	1 off	
CI-V	Jack 3.5mm	1 off	
J1,J2,J3,J4	Jack RCA Single	4 off	
Nano 5V 16MHz	Module Arduino_Nano	1 off	
Socket	Socket strip 0.1 x 15	2 off	
PCB	PTT Extender PCB	1 off	
Panels	PTT Extender front/rear	1 off	

PTT Extender IC9700, IC9100, IC910H

Case	Enclosure Poly 130x110x35 1 off
Feet	10mm button feet

NOTE: Cables may be supplied preassembled.

Cable DIN IC9700 IC910H	DIN8 Male-male 0.5m cable

Cable DIN RCA IC9100	DIN8 Male to 2x RCA and Molex 0.5m cable

Cable CI-V	3.5mm male-male phone 0.5m cable