QO100 TRANSVERTER

How to Interface to popular transceivers

Date: Jan 4th, 2024
Type: SAT ROVER MK1
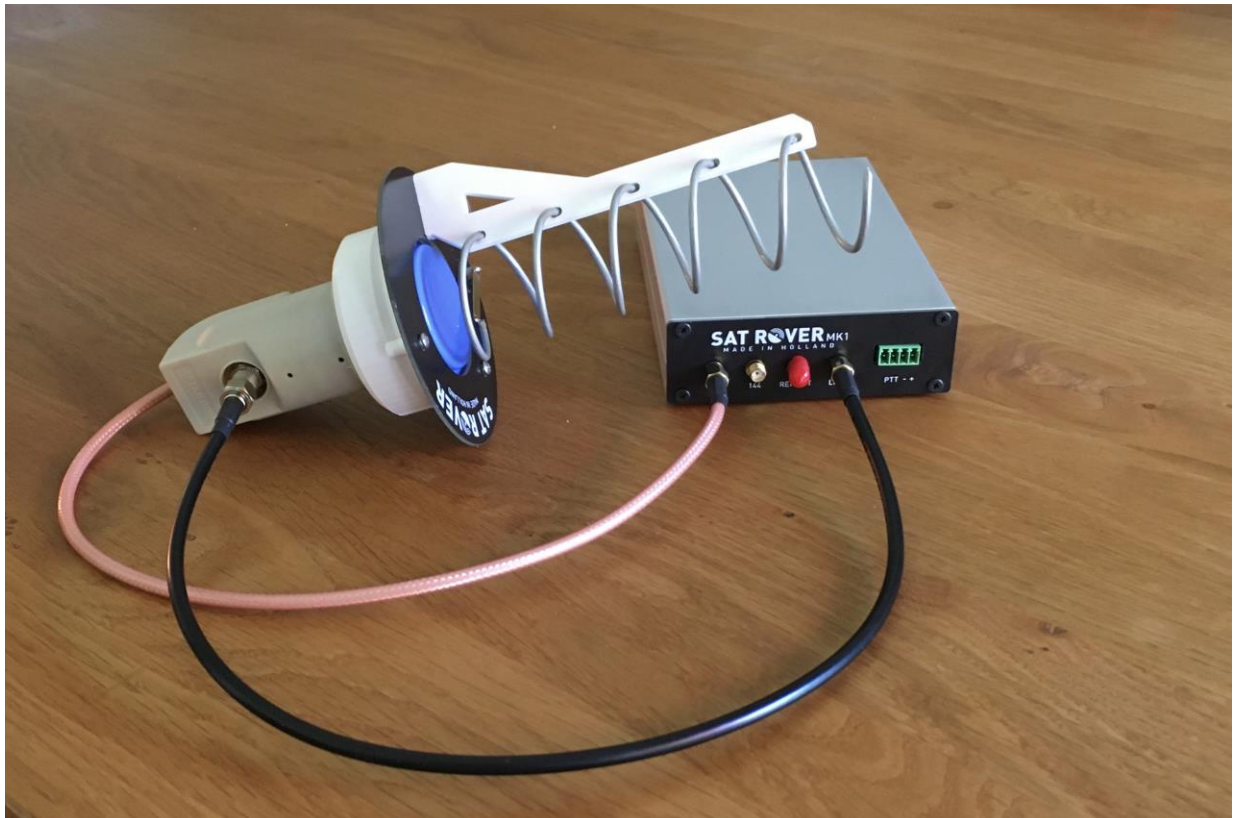
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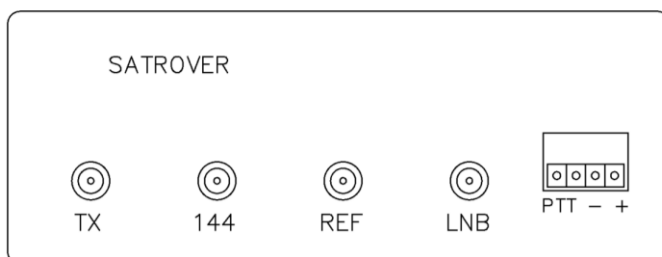# 1. Introduction

This document presents information on interfacing the SAT ROVER to the most common types of transceiver.

2. Installation and Interface

The front panel of the SAT ROVER comprises 4 SMA female connections and a 4 pin multipole connector.

2.1 Radio connection

- The SAT ROVER will work with any 144 MHz all mode transceiver where the output power level can be reduced within the range of 0.5 to 4 Watts. The RF connection between the SAT ROVER and your 144 MHz transceiver is not supplied in the kit. Use a coaxial cable of any length (RG58) connecting the output of your TRX to the SMA connector on the SAT ROVER marked **"144"**. Length is not important as long there is between 0.5–4 Watts RF supplied to the SAT ROVER.
- The PTT connection can be made in 2 different ways.
    1. If there is a DC voltage (5–12V) during transmit on the 144 MHz coaxial line the SAT ROVER changes over to transmit automatically.
    2. The leftmost pin of the 4 pin multipole connector needs a pull down to make the SAT ROVER go to transmit.
- The red transmitting led on the back of the SAT ROVER indicates transmitting status.
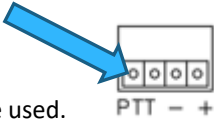
2.2 Yaesu FT-290

The FT-290 has a DC voltage on the coaxial line when transmitting.
No further connections need to be made, only coax from the FT-290 to the SAT ROVER.

2.3 Yaesu FT-818

The FT-818 needs a separate connection to enable TX on the SAT ROVER. Make the connection to the location shown below.

PTT − +

On the SAT ROVER, the leftmost pin of the 4 pin connector should be used.
On the FT-818 the connection should be made to the "TX GND" pin on the ACC Jack.

⑤ **ACC** Jack

This 8-pin, mini-DIN jack provides a closure to ground during transmission, ALC, a transmitter-inhibit pin, and "band data" for connection to an external amplifier. It is also used for Transceiver-to Transceiver Cloning and for control of this transceiver using a personal computer.

ALC
TX INH — BAND DATA
RX D — GND
TX D
TX GND — +13.8V
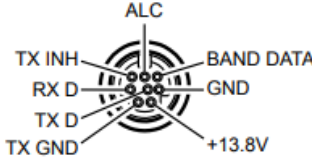
The power can be set to 1 Watt following the manual as shown below:

Adjusting the Transmitter Power Output

Four power levels are available on the **FT-818**: 6 Watts, 5 Watts, 2.5 Watt, and 1.0 Watt. When using Alkaline batteries or the supplied **SBR-32MH** Ni-MH Battery Pack, the microprocessor, detecting internal battery use, automatically sets the power level to 2.5 Watts, which appears on the display as "**Lıı**". If you set the power to 6 watts, the power level icon is the same as for 2.5 Watt operation, but at 6 Watts the icon is blinking. For 1 Watt, there is one "bar" to the right of the "**L**" in the power icon, and for 5.0 Watts there are three "bars" displayed.

The power level is easy to change:
1. Press the [F] key momentarily, then rotate the (DIAL) knob to select Operating Function Row 9 [PWR, MTR].
2. Press the [A] (PWR) key, as needed, to set the desired power level. The icon will change, based on the power level you have set.
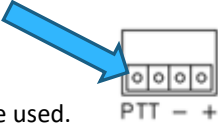
| High	Low 3	Low 2	Low 1
-	**Lııl**	**Lıı**	**Lı**
6 W (AM: 2 W)	5 W (AM: 1.7 W)	2.5 W (AM: 1 W)	1 W (AM: 0.7 W)

2.4 Yaesu FT-857

The FT-857 needs a separate connection to enable TX on the SAT ROVER. Make the connection to the location shown below.

On the SAT ROVER the leftmost pin of the 4 pin connector should be used.
On the FT-857 the connection should be made to the "TX GND" pin on the CAT/LINEAR Jack.

② **CAT/LINEAR** Jack

This 8-pin mini-DIN jack is used for connection to the **FC-30** External Automatic Antenna Tuner. It is also used for interfacing to a personal computer for control of the transceiver using the **CAT** system, and for interconnection to the **VL-1000** Linear Amplifier.
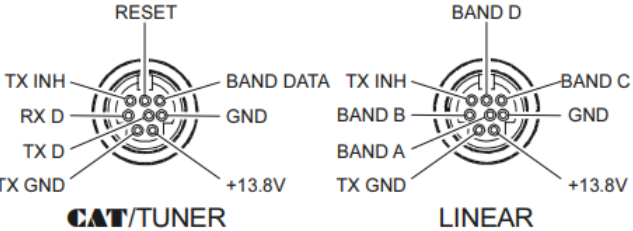
The minimum power that can be set is 5 Watts following the manual as shown below:

MENU MODE No-075 [RF POWER SET]

Function: Setting of the maximum power level for the current band.
Available Values: Depends on operating band and transceiver version.
Default: Depends on operating band and transceiver version.

As the output from the FT857 is higher than the allowable maximum input to the SAT ROVER you should use a 6dB attenuator between the SAT ROVER and the FT-857. On receive this has no effect due to the high amount of gain in the setup.
It is possible to adjust the minimum power setting to a lower level by entering the service menu.
You can find this information by searching google for "FT-857 hidden menus".

2.5 Icom IC-9700

The IC-9700 needs a separate connection to enable TX on the SAT ROVER. Make the connection to the location shown below.
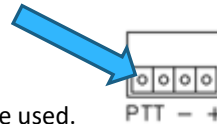
On the SAT ROVER the leftmost pin of the 4 pin connector should be used.
On the IC-9700 the connection should be made to the "SEND" pin on the [ACC] connector.

[ACC]

Connects to external equipment or a PC to control an external unit or the transceiver.

ACC 1	PIN No.	NAME	DESCRIPTION		SPECIFICATIONS	
8-pin Rear panel view	1	RTTY	Controls RTTY keying.		High level: More than 2.4 V Low level: Less than 0.6 V Output current: Less than 2 mA	
	2	GND	Connects to ground.		–	
	3	SEND*1	Input/output pin.	An external unit controls the transceiver. When this pin goes to ground, the transceiver transmits.	Input voltage (RX): 2 ~ 20 V Input voltage (TX): –0.5 ~ +0.8 V Current flow: Maximum 20 mA	
				The pin goes low when the transceiver transmits.	Output voltage (TX): Less than 0.1 V Current flow: Maximum 200 mA	
	4	MOD	Modulator input. Connects to the internal modulator circuit.		Input impedance: 10 kΩ Output level: Approx. 100 mV rms*2	
	5	AF/IF (IF=12 kHz)*3	Fixed AF detector or receive IF (12 kHz) signal output.		Output impedance: 4.7 kΩ Output level: 100 ~ 300 mV rms*4	
	6	SQL S	Squelch output. This pin goes to ground when the squelch opens (TX/RX indicator lights green).		SQL open: Less than 0.3 V/5 mA SQL closed: More than 6.0 V/100 µA	
	7	13.8 V	13.8 V output when power is ON.		Output current: Maximum 1A	
	8	ALC	ALC voltage input.		Input level: –4 ~ 0 V Input impedance: More than 10 kΩ	

Be careful! This port is very sensitive to static spikes. To be safe, first make the coax connection and then push the connector in.

The minimum power can be set to 1 Watt (1%) by following the manual.

2.6 Icom IC-705

The IC-705 needs a separate connection to enable TX on the SAT ROVER. Make the connection to the location shown below.
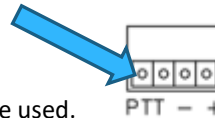
On the SAT ROVER the leftmost pin of the 4 pin connector should be used.
On the IC-705 the connection should be made to the "SEND" pin on the [SEND/ALC] Jack.

[SEND/ALC]

① ALC
When operating with a non-Icom linear amplifier, input ALC voltage (−4 ~ 0 V) from the linear amplifier.

② SEND
To control an external device such as a non-Icom linear amplifier, the terminal goes low when the transceiver transmits.

3.5 mm (1/8 inch)   ① ALC
GND   ② SEND (I/O)

Be careful! This port is very sensitive to static spikes. Many IC-705's have been damaged by static. The SAT ROVER requirements are well below the maximum ratings of the IC-705. To be safe, first make the coax connection and then plug the cable in. There is a more rugged aftermarket connector board on the market.
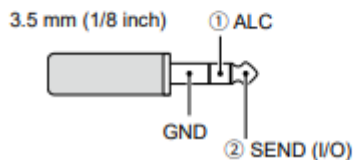
The minimum power can be set to 1 Watt (10%) following the manual:

2.7 Icom IC-706mk2

The IC-706 needs a separate connection to enable TX on the SAT ROVER. Make the connection to the location shown below.

On the SAT ROVER the leftmost pin of the 4 pin connector should be used.
On the IC-706 the connection should be made to the "VSEND" pin (7) on the [ACC] Connector

• **ACC SOCKET**

ACC	PIN #	NAME	DESCRIPTION	SPECIFICATIONS	COLOR
	1	8 V	Regulated 8 V output.	Output voltage : 8 V ±0.3 V Output current : Less than 10 mA	brown
	2	GND	Connects to ground.	———————	red
	3	HSEND	Input/output pin (HF/50 MHz). Goes to ground when transmitting. When grounded, transmits (connected to 8V line thru 2.2 kΩ resistance/144 MHz operation).	Ground level : −0.5 V to 0.8 V Input current : Less than 20 mA (HF/50 MHz bands)	orange
	4	BDT	Data line for the optional AT-180.	———————	yellow
	5	BAND	Band voltage output. (Varies with amateur band)	Output voltage : 0 to 8.0 V	green
	6	ALC	ALC voltage input.	Control voltage : −4 to 0 V Input impedance : More than 10 kΩ	blue
	7	VSEND	Input/output pin (144 MHz). Goes to ground when transmitting. When grounded, transmits (connected to 8V line thru 2.2 kΩ resistance/HF•50 MHz operation).	Ground level : −0.5 V to 0.8 V Input current : Less than 20 mA (144 MHz band)	purple
Rear panel view	8	13.8 V	13.8 V output when power is ON.	Output current : Max. 1 A	gray
	9	TKEY	Key line for the AT-180.	———————	white
	10	FSKK	RTTY keying input. Connected in parallel to the [RTTY] jack.	Ground level : −0.5 to 0.8 V Input current : Less than 10 mA	black
	11	MOD	Modulator input.	Input impedance : 10 kΩ Input level : Approx. 100 mV rms	pink
	12	AF	AF detector output. Fixed, regardless of [AF] position.	Output impedance : 4.7 kΩ Output level : 100 to 350 mV rms	light blue
	13	SQLS	Squelch output. Goes to ground when squelch opens.	SQL open : Less than 0.3 V/5 mA SQL closed : More than 6.0 V/100 µA	light green

Be careful! This port is very sensitive to static spikes. Many IC-706's have been damaged by static. The SAT ROVER requirements are well below the maximum ratings of the IC-706. To be safe, first make the coax connection and then plug the cable in.

The minimum power can be set to 1 Watt (10%) following the manual:

3. Adjustments

It is possible to make adjustments to the SAT ROVER. The power output can be adjusted to match the drive power on 144 MHz. To make these settings you must take off the top half of the enclosure. Before any adjustments are made warm up the transverter for at least 5 minutes to settle the OCXO 10 MHz frequency. Some guidance may be obtained by monitoring the "BATC NB websdr" on your computer or telephone to find the correct RF output levels.

3.1 Power adjustments

After opening the enclosure top look for the R5 trim resistor – shown opposite.
With this resistor you can set the drive level. Set it in a way there is not that much compression using a power meter or monitoring the websdr.