

## Transceiver interface Operation for Steppir

For Direct computer control see the Data Out connector description.

For Radio control see the Data In connector description.

The following radios are supported:

1. ICOM – all ICOM with a CI-V interface.
2. Kenwood – All Kenwood's with a RS232 interface.
3. Kenwood – All with ACC1 serial support.
4. K2, K3 – using the Kenwood setting.
5. Yaesu FT847
6. Yaesu FT857 (requires the Yaesu CT-62)
7. Yaesu FT897 – using the FT847 setting (requires the Yaesu CT-62)
8. Yaesu FT920
9. Yaesu FT990
10. Yaesu FT1000D (requires IFF232) (can be 25 pin or 9pin)
11. Yaesu FT1000MP
12. Yaesu FT2000, FT9000
13. Ten-Tec ORION/ II
14. Ten-Tec Omni+
15. SteppIR transceiver interface
16. Flex-Radio
17. MicroHam Station controllers

For a more detailed list and cabling information refer to the **table at the end of this document**.

## Connections

The Transceiver interface is mounted inside the SteppIR controller. It is attached to the driver board at the back of the controller and has two 9 pin sub-D connectors, **Data in** and **Data out**. The Transceiver Interface will only control the Steppir when it is in the General Frequency Mode or AutoTrack with SDA.

**Data In** is the Radio connection port. This port has a unique pin-out requiring non-standard cables to connect to the Radio. This was done so it only required a cable change to connect to a different radio type. This Port has a Baud Rate range of 1200 to 57600.

### PINOUT of 9 pin SUBD **DATA IN** CONNECTOR

1. **Data out** RXD
2. RXD to RS232 Radio TXD
3. TXD to Radio RXD
4. TTL Kenwood and active high for Radio CTS
5. Signal Ground
- 6.
7. TTL version of pin 2
8. NC

## 9. TTL RXD for Steppir.

**Data Out** is the Computer or Daisy chain Port. This port is wired like a Computer serial port and requires a standard Null Modem cable (pins 2 and 3 crossed) to connect to a computer or the **Data In** of a Steppir controller. This ports Baud Rate range is 4800 to 19.2K. When the controller baud rate is set higher than 19.2K this port will remain at 19.2K.

### PINOUT of 9 pin SUB-D **DATA OUT** CONNECTOR

1. + 5 VDC out
2. RXD
3. TXD
4. No connect
5. Signal Ground
6. No connect
7. No connect
8. No connect
9. Radio TTL RXD

## OPERATION

For the Steppir controller to follow the Radio frequency the baud and radio type must be set and the controller needs to be in the “General Freq” mode or AutoTrack. The Controller behaves differently with ICOM radios than the rest. With a ICOM radio the Controller will only track when the radio frequency is changed, so when you first turn on the controller it will not do anything until the Radio front panel knob is moved, also The ICOM radio must have the CI-V transceive Mode enabled so it can broadcast its display frequency. With the rest of the Radios the controller or if using a “Y” cable the logging program needs to requests status from the Radio to get the frequency. When you first turn things on there will be a delay before the frequency changes, depending on how fast the status request is made, the Steppir requests frequency once a second.

When the frequency changes the controller has a tuning window before it will change frequency, so when moving small frequencies the Steppir will not tune unless the frequency moves more than the current band resolution.

There several operating configurations depending on what you are using to control the Steppir.

- Stand alone Radio to the Steppir controller using the **Data In** connector – This is the most basic and only requires the proper cable, on some radios a serial adapter, to go between the Radios Computer port and the Steppir .
- Computer Logging program and Steppir using the **Data In** connector – In this configuration the Steppir must share the Radio computer port with the Logging program which creates a conflict on the transmit data going to the Radio. To address this problem the Steppir “Y” cable passively listen to the Data being sent to the Computer from the Radio.

The draw back to this method is that the logging program must request the radio to echo back the frequency so the Steppir can see it. Most logging programs, such as TRX Manager and Logic 6, do

echo the frequency to ensure the radio did indeed get the frequency okay. However, a few do not and they will not work with the Steppir “Y” cable. ICOM radios will work with any logging program and do not require a “Y” cable.

- Computer Control using the **Data Out** connector – This is accomplished several different ways, one use a program like N8LPs virtual (**VCP**) control panel that uses the Steppir commands to control the antenna direction and frequency. Use a Logging program that supports the Steppir command format like N1MM or TRX-Manager. Then of course there many grow your own options but in all cases it will require a dedicated PC serial port to do the job.
- Computer Control using the **Data In** connector – Only the frequency can be controlled through the data in connector. You can use a program that emulates a radio like LP-Steplink or TRX-Manager to send the Frequency to the Steppir.
- Using one Steppir controller to control several Steppir controllers– In this configuration you can use one controller to make several Steppirs follow each other or just pass the Radio Data through to the next controller down the line. This feature makes controlling a stack simple.

### **Daisy chaining Controllers**

- There are several ways to get multiple controllers to track the radio frequency it will depend on your preferences and the Radio type. With ICOM radios you have the ability of connecting 5 devices directly to the Radio using a CT-17 or similar device. If you have a RS-232 radio you would need a “Y” cable to do the same thing with the first controller being the only controller connected to the Radio RXD pin.
- Alternately you can Daisy chain controllers having one controller be the master and the rest slaves. This has the advantage of allowing you to select the direction or the frequency of all the controllers connected together from the Master.

### **Remote Control Considerations.**

If you are planning on doing a remote station some things you should consider:

- The SteppIR will remember the State of the power switch but it takes about 3 minutes before the controller will remember the power is On. After this delay you can remove power from the controller and it will come up on when power is restored.
- You should use the Retract (HOME) elements command before removing power.
- If the Controller loses power while it is tuning it will get out of sync with the Steppir Antenna and will need to be re-calibrated.
- Use the Data Out connector so you can have full control of the antenna. The data out connector give the ability to Calibrate, Home and set 180 and Bid direction control.

### **Radio Considerations**

#### **ALL Radios**

- The baud rate must be set the same on both the radio and the Steppir. The Steppir is not compatible with the auto baud rate feature that some radios have.
- When using a logging program on a RS232 radio and the Steppir requires a “Y” cable that connects the radio Transmit pin to the Steppir Receive pin. This allows the Steppir to monitor the

data coming from the Radio for the frequency information. The limitation of the “Y” cable is that the Steppir will only track when the Logging program is loaded and active.

- With Yeasu radios the “Y” cable may not be 100% reliable, depending on the radio model and logging program being used the frequency tracking can be unstable.
- The Steppir Transceiver interface cables have unique wiring, standard cables will not work unless modified to match the Steppir diagram for the radio being used.
- ICOM radios must have the CI-V transceive mode enabled.
- ICOM radios do not require the “Y”, in fact they work better using a CI-V splitter like the CT-17
- There are a few logging programs that want the transceive mode disabled, in this configuration the Steppir will only follow the frequency when the logging program requests status.
- K2 and K3 radios use Kenwood format commands so set the Steppir to Kenwood.
- Kenwood Radios use several different port configurations depending on age and size, please check your manual to determine what type of computer port your radio has.
- The ORION and ORION II are the same as far as the Steppir is concerned.
- The FT9000 (DX) and FT2000 are the same as far as the Steppir is concerned.
- Flex-Radio uses Kenwood format.

### Steppir Slave Mode

This mode allows you to gang multiple controllers together under the control of one master controller. The master controller will control the slaves either manually or from a radio. The master is controlled via **Data In** port (the upper 9 pin DB connector) by the radio and the first slave is then connected to the master **Data Out** port (the lower 9 pin DB connector). Use a special 9 pin to 9 pin crossed cable to connect each controllers **Data Out** to the next in lines **Data In** port together.

- This mode is provided to make the Radio port (**Data IN**) so it can read data from the **Data OUT** port of the Steppir.
- In this master slave mode the controllers with the widest frequency range (ie 40M to 6M) should be first in the chain so the frequency gets passed along.

### DATA OUT PORT (Data Out Connector)

- The Steppir can be controlled by a computer using this port (lower 9 pin DB).
- This port is always active thus allowing control of the antenna by both the computer and radio simultaneously.
- The **Data out** port is a standard RS-232 port with a baud rate range of 1200 to 19.2K baud. Setting the Baud rate higher than 19.2K on the Steppir controller will set this port to 19.2K.
- There are two commands: **Status request** and **Set**.

The **Data Out** command string “?Acr” must use to get the current frequency and direction status. It is a poled response so a external device like another Steppir controller, computer, or other device must send the status request to get a response.

The frequency and direction should always be correct when sending a **Set** command “@Acr”, they will always be updated whether you want them to be or not.

The Data out port is passive (it will not send data without a request) but beyond that you can send all the commands you want with out ever requesting a response with the only restrictions being the commands must be separated by a 100ms delay and the controller display must be on.

**The Status command** has three ASCII characters. The controller will return an 11 byte string indicating frequency, motor active/tuning status, and direction Normal, 180 or BID (3/4 wave in vertical case)

To **request the current Status** of the controller the Computer will send the status request command.

ASCII string: 1 2 3  
 ? A "CR" (0x0D)

The controller will respond with a eleven Byte string that contains both 8 bit hex values and ASCII.

**It is important to note that there is up to a 3/4 second delay in updating the frequency and direction and tuning (ac flags) information after the set command.** This can be a particular problem when waiting for the antenna to stop tuning.

The response to request for status:

ASCII **8 bit** byte number: 1 2 3 4 5 6 7 8 9 10 11  
 ASCII values @ A z Fh Fm Fl ac dir vh vl "CR" (0x0D)

Translation:

@= ASCII @ = (40 hex, start code)

A = ASCII A (41 hex, command code)

z = the Zero (00H, this byte is always zero)

**Fh, Fm, Fl** = 24 bit Hex value representing the frequency divided by 10 (ie 14.2MHz = 1,420,000 = 15AAE0 hex)

**ac** = active motor flags, a 8 bit value with any of the following bits 2,3,4,5,6,7 being set if a motor is active. 2= DVR, 3= DIR1, 4=Refl, 5=DIR2

**dir** = direction, an 8 bit value defined as follows, other bits will be set so the value must be filtered;

bit number 01234567

Normal direction = 00000000 B

bit number 01234567

180 direction = 00000010 B

bit number 01234567

Bi-directional = 00000001 B

bit number 01234567

3/4 wave= 00000100 B

**vh,vl** = Two ASCII Transceiver interface version number.

**The Set Command** is basically the same as the Status response. When sending the Set command the frequency is always checked so make sure it is correct when sending a command.

There will be as much as a one second delay between the set command and the antenna tuning.

The command format is:

ASCII **8 bit** byte number: 1 2 3 4 5 6 7 8 9 10 11

ASCII values                    @ A z Fh Fm Fl ac dir cmd 0 "CR" (0x0D)

@ = the ASCII @ (40 hex)

A = the ASCII A (41 hex)

z = the Zero (00 hex, this byte contains no info, it's always zero)

**Fh, Fm, Fl** = 24 bit Hex value representing the frequency divided by 10 (ie 14.2MHz = 1,420,000 = 15AAE0 hex)

**ac** = 0 hex, will be ignored needed for place filler

**dir** = direction, an 8 bit value defined as follows;

Normal direction = 00 hex

180 direction = 40 hex

Bi-directional = 80 hex

$\frac{3}{4}$  **wave** = 20 hex (for vertical antennas)

**cmd** = ASCII command that is passed to the controller

**Valid commands** =

1 = Default set frequency and Direction, Must be present if only valid direction update is requested

R = Turn on Serial frequency update, Required after a home command to re-enable

S = Home antenna

U = Turn off Serial frequency update

V = Calibrate antenna.

0 = 0 hex value is ignored

"CR" = 0D hex, end of message.

## MicroHam:

MicroHam Station Master and S2RO controllers will both interface directly to the Steppir. The MicroHam controllers are a great way to do your station control when you have multiple Radios and transmitters. The MicroHam controllers connect to the DataOut port using a 3 wire Null modem cable.

The SDA100 must have the latest firmware or the MicroHam controller must support the SDA100 for it to operate correctly with this controller.

END

**Radio type table:**

**Tested and working Logging programs: TRX manager, DX4win, Logger, Logic6**

Radio	Cable Required	Interface	Notes
ICOM all	“S01”, 3.5mm Phono,	CI-V	CI-V Transceive mode must be enabled. Does not need our “Y” cable for logging. May require CT-17 from ICOM or a Mono “Y” adapter, Radio shack – model # 42-2437 or 274-310, if CI-V port is in use.
<b>Kenwood</b> -----			
TS850S	“S15”, 6 pin din,	ACC1	Tested .....
TS940S	“S15”, 6 pin din,	ACC1	Requires Optional IF-10B
TS950S	“S15”, 6 pin din,	ACC1	
TS680S	“S15”, 6 pin din,	ACC1-	Requires Optional IF-10C
TS690S	“S15”, 6 pin din,	ACC1	
TS440S	“S15”, 6 pin din,	ACC1-	Requires Optional IC-10
TS450S	“S15”, 6 pin din,	ACC1	
TS140S	“S15”, 6 pin din,	ACC1-	Requires Optional IF-10C
TS711A	“S15”, 6 pin din,	ACC1-	Requires Optional IF-10A
TS790A	“S15”, 6 pin din,	ACC1	
TS811A	“S15”, 6 pin din,	ACC1-	Requires Optional IF-10A
R5000	“S15”, 6 pin din,	ACC1-	Requires Optional IC-10
TS570	“S18”, 9 pin male RTS.		
TS870	“S18”, 9 pin male RTS.	-	Requires kenwood cable
TS2000	“S18”, 9 pin male RTS.		
TS50S	“S12”, 9 pin male Cross	- -	Requires Optional IF-10D
TS480D	“S18”, 9 pin male RTS.		Requires Optional IF-10?
<b>Yaesu</b> -----			
FT847	“S12”, 9 pin male Cross	CAT -	Tested.
FT897	“S13”, 9 pin M to F	CAT -	Must select FT847 - Requires CT-62 interface– Tested
FT920	“S00” or “S18”, 9 pin	CAT -	
FT990	9 Pin (S13) or 25 pin (S19) <u>M to F.</u>	<u>M to F.</u>	Requires IFF232 RS-232 interface. Rom of ver –04 or later only.
FT1000D	9 Pin (S13) or 25 pin (S19) <u>M to F.</u>	<u>M to F.</u>	Requires FIF-232 interface.
1000MP	“S00” or “S18” 9 pin.	CAT --	
1000MP-field	“S00” or “S18” 9 pin.	CAT -	- -
FT2000	S18 9 pin male RTS	CAT	Tested Select 9000D
FT9000DX	S18 9 pin male RTS	CAT	Tested Select 9000D

**TenTec**-----

<b>Omin 5</b>	<b>Does not work</b> -      -      -	<b>Tentek IF</b>
<b>Omni 6,7</b>	<b>“S01” 3.5 mm or “S13” 9 pin</b>	<b>Has ICOM interface</b>
<b>Orion</b>	<b>“S13”, 9 pin M to F</b>	<b>-Requires 57.6K baud, new Xtal.</b>
<b>OrionII</b>	<b>“S13” 9 pin M to F</b>	<b>Need latest Orion flash</b>
<b>Paguis</b>	<b>????</b>	<b>Similar to Orion</b>
<b>Jupiter</b>	<b>“S01” 3.5 mm or “S13” 9 pin</b>	<b>ICOM port.</b>
	<b>“S13” 9 pin</b>	

**Other**-----

<b>K2</b>	<b>“S13”, 9 pin M to F</b>	<b>Needs K2 Serial kit</b>
<b>K2 + serial kit-9 pin</b>	<b>Male to female straight through</b>	<b>Select Kenwood 4800 baud</b>
<b>K3</b>	<b>“S13”</b>	
<b>Flex-Radio</b>	<b>“S12”</b>	<b>All models</b>
<b>JS245</b>	<b>“S19”</b>	<b>Not supported</b>
<b>SteppIR</b>	<b>“S16”, 9 pin fm Cross, one back shell.</b>	<b>Used for Slaving controllers or computer.</b>
<b>MicroHam</b>	<b>“S12” or “S16”</b>	<b>StationMaster and MK2R</b>
<b>PC program to Data Out</b>	<b>“S12” or “S16”</b>	<b>PC must have 9 pin serial port</b>