

IRYS Icom-to-Yaesu Tuner Adapter

Overview

The IRYS device adapts an Icom AH-4 (or compatible) tuner to interface with a Yaesu radio. It does this by emulating an FC-40 antenna tuner to the radio while implementing Icom tuner signaling when requested. It has been tested with the following radios:

- Yaesu FT-450
- Yaesu FT-710
- Yaesu FT-891
- Yaesu FT-991A
- Yaesu FTDX10
- Yaesu FTDX101MP
- Vertex Standard VX-1700

And with the following tuners:

- Icom AH-4, AH-730, AT-120
- LDG Z-100A, IT-100, AT-100/200/600/1000
- MFJ-929

Connection and Setup

The IRYS device connects to the Tuner/Linear jack on the back of the radio with an 8-pin Mini-DIN connector. On some radios (such as the FT-710) a menu setting is required to enable this jack. In the radio's menus, you must also enable "External Tuner" mode. Follow your radio's instruction manual for setting up the FC-40 tuner.

An Icom AH-4 (or compatible) tuner is attached to the Molex connector on the other side of the IRYS. LDG tuner users should use the IC-100 cable for Icom radios.

Power-up

Each time the radio powers up, the IRYS device must synchronize state with the tuner. This is required because some tuners (i.e. LDG) maintain state even when powered off. When the controller first receives power, you will see it activate the tuner without RF, which may cause an error indication on the tuner (if it has such an indication). This is normal and part of the power-on reset procedure.

NOTE: The tuner needs to be plugged into the IRYS device when it is powered up so it can do that synchronization step. If it is not connected, it may get stuck waiting for the tuner and not respond to the radio.

Operation

The IRYS device behaves just like a Yaesu FC-40 tuner and thus operation is basically the same, with a few exceptions.

A single press of the Tune button on the radio toggles the tuner in and out of bypass, and the "TUNE" indication on the radio display provides status. If your tuner has a manual button (i.e. the LDG Z-100A, or similar) you can not use the button on the tuner since the Yaesu protocol does not allow for the tuner to initiate a cycle.

If you do press it, the IRYS and tuner will be out of sync with each other. Long-press to initiate a tune cycle to get them synced back up.

A long-press of the Tune button on the radio triggers an actual tuning cycle. The radio disables the tuner (if enabled), transmits an RF carrier, and the tuner begins to measure and correct high SWR. If the tuner is successful, the “TUNE” indication will remain lit on the radio after the process is complete. If it goes out, then the tuner was unable to find a suitable match.

If at any time the “TUNE” indication on the radio and the state of the tuner get out of sync, just do a long-press tune cycle to get everything aligned.

NOTE: Because of the (different) timing requirements of both the Yaesu and Icom tuner protocols, you must wait a minimum of one second between presses of the Tune button on the radio. If the button is pressed in rapid succession, the IRYS device will signal an error to the radio and reset the tuner and radio communication to avoid losing sync with each.

Indicator LEDs

Under the cover are the following LEDs for troubleshooting, if necessary:

LED		Meaning
Power		12v power is being delivered from the radio
Status		On when the tuner is enabled, off when it is in bypass
Act		Blinks when communication is being received from the radio
Key		On when the tuner is expecting RF from the radio
Start		On when the IRYS device is commanding the tuner to do something

Troubleshooting

The tuner does not respond and/or appears to be getting no power

Check the power light on the IRYS board. If it is not lit, then power is not being received from the radio, which may indicate a cabling problem, a blown fuse in the radio, or an internal radio problem.

Pressing the Tune button on the radio does not work or signals error

Check that the “Act” light is blinking either continuously or when you press the Tune button. If not, the radio is not sending commands to the tuner. Check that the radio is configured for “External Tuner” mode and, if applicable, check that the radio is configured for a tuner connected to the Tuner/Linear jack. Also try power-cycling the radio (which also resets the tuner and IRYS device).

For anything else, please contact me at irys@f.danplanet.com. If you test this with a radio or tuner not listed above, please let me know!

The radio immediately stops transmitting before the tuner has a chance to work

Yaesu radios will refuse to drive the external tuner if they detect that the SWR is over about 5:1 at the start of the tuning process. This very unfortunate design decision means that even when using a superior tuner like the Icom AH-4 or anything from LDG, the radio will not even allow the tuner to *attempt* to tune into a bad match. If you experience this behavior on one or more bands, you may use the “Manual Tuning” procedure listed below.

Manual Tuning

Starting with IRYS Rev4B, manual triggering of the tuner is available via the button integrated into the top of the case. This can be useful if you are tuning an antenna with very high SWR and the radio refuses to drive the tuner to do it normally. It is recommended that you **only use the button** when you need to perform a manual tuning cycle.

The procedure is follows:

1. Place the radio in a constant-power mode such as CW, AM, FM, etc (SSB will NOT work)
2. Set the output power to 10 watts
3. Key the radio
4. Press the manual button on the IRYS for one second
5. Keep the key down until the tuner finishes (or gives up). If the tuner is successful, the STATUS LED should remain lit, and go out if not.
6. Unkey the radio
7. If the tuner was successful, press the “TUNE” button on the radio once to synchronize the radio’s tuner state with the IRYS and the tuner. This will indicate the tuner is engaged on the radio’s display and mean that the next press of the button would disable the tuner properly.

Optional AH4 optimization

A real Icom AH4 does not support re-enabling after bypass mode is selected. LDG (and other tuners that mimic an AH4) do, and pressing the TUNE button on the radio will alternate between bypass and the “last tune settings”. If you are using a real AH4 (or other tuner that only supports full tune and bypass signaling, you may wish to bridge the OPT1 jumper on the top left of the board. This will make the IRYS refuse to try to enable the tuner on a short press.