

# **TurboTuner-2**

**Automatic Screwdriver  
Antenna Controller**

**Model YTT-450**

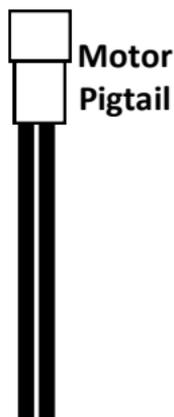
**For: Yaesu FT-450/950/  
FTDX-1200/3000**

## **User's Manual**

**TennaTronix.com**

Congratulations on purchasing the **TurboTuner-2** Automatic Screwdriver Antenna Controller. Your **TurboTuner-2** kit contains the following parts:

1. Controller
2. Radio Interface Cable
3. Motor Pigtail

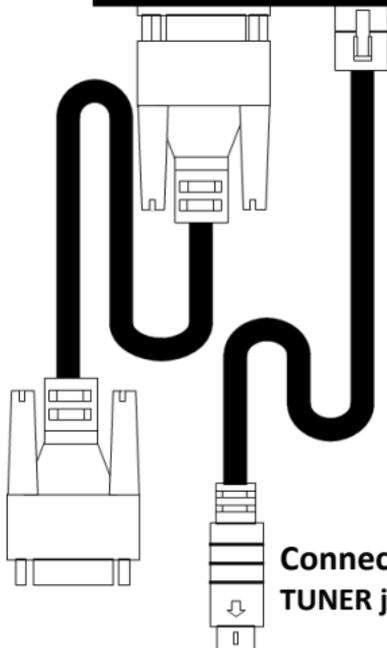


Controller



Radio Interface Cables

Connects to CAT jack



# Theory of Operation

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The **TurboTuner-2** provides automatic tuning and control of screwdriver antennas. It adjusts the antenna until the measured SWR is less than 1.5:1 at the current operating frequency. This is accomplished by using the “Tune” function of the radio to supply RF power while the **TurboTuner-2** moves the screwdriver antenna up or down and constantly measures the SWR until the minimum is found. Once found, the antenna motor is stopped and the radio is placed back in receive mode.

There are at least 3 basic pre-requisites to ensuring successful antenna tuning:

1. The motor leads must be properly RF choked.
2. The antenna needs to be properly matched.
3. The coax cable to the antenna must be properly choked.

One of many sources for information about all of the above topics is [www.k0bg.com](http://www.k0bg.com).

## Compatible Radios

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The **TurboTuner-2** is compatible with Yaesu radios that have a Tuner port and an RS-232 CAT port, including the following:

FT-450	FTDX-1200
FT-950	FTDX-3000
FT-991	

Do not connect to any other radio. Damage to the radio and/or the **TurboTuner-2** may occur.

# TurboTuner-2 Setup

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Prior to installation, set the DIP switches on the **TurboTuner-2** to match your installation according to the descriptions below. Note: You can always change the DIP switch settings after installation. Just power off the radio, change the setting, and then power the radio back on.

## DIP Switch Settings

<b>SW1</b>			<b>Antenna Direction</b>
OFF			NORMAL
ON			REVERSED
<b>SW2</b>	<b>SW3</b>	<b>SW4</b>	<b>Antenna Stall Current</b>
OFF	OFF	OFF	300 mA
OFF	ON	OFF	500 mA
ON	OFF	OFF	750 mA
ON	ON	OFF	1000 mA
ON	ON	ON	1500 mA
<b>SW5</b>			<b>SWR Threshold</b>
OFF			NORMAL
ON			ALTERNATE
<b>SW6</b>			<b>Not Used</b>

## Antenna Direction Switch (SW1)

Sets the direction of travel for the antenna. Most installations will operate with the **NORMAL** setting. If the antenna does not move in the proper direction, change the switch to the **REVERSED** setting.

## Antenna Stall Current Switches (SW2, SW3, SW4)

Used to set maximum stall current. This is used to determine when the screwdriver antenna reaches the end of travel. If set too low, the antenna may reverse before reaching the end of travel. If set too high, the antenna motor may “stall” at the end of travel and not reverse, possibly causing damage to the motor. Use the following settings for some commonly used antennas:

Antenna Model	Stall Current Setting
Little Tarheel	300 mA
Tarheel Models 75-400	1000 mA
Tarheel Models 1000-1200	1500 mA
High Sierra w/ Black Hawk motor	750 mA
Hi-Q	1000 mA

## SWR Threshold Switch (SW5)

Most installations will operate in the **NORMAL** position. However, if the **TurboTuner-2** fails to tune on a certain band (that is, SWR is never goes below 1.5:1), try the **ALTERNATE** setting. In this mode, the **TurboTuner-2** will complete the tuning process when the lowest SWR is found.

# Radio Setup

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Prior to operating the **TurboTuner-2**, there are a few settings on the radio that must be adjusted as shown below. Refer to your radio's Instruction Manual for details on how to set these values.

- Set CAT Rate to "19200".
- Set CAT RTS to "Disable".
- Set TUNER to "External".

# Connections

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- Connect the RS-232 cable from the **TurboTuner-2** to the **9-pin** connector on the back of the radio labeled “**CAT**”.
- Connect the 8-pin DIN plug from the **TurboTuner-2** interface cable to the jack on the back of the radio labeled “**TUNER**”.
- Connect the motor cable from the screwdriver antenna to the **Motor** connector on the **TurboTuner-2**. Use the supplied pigtail if necessary. Pin 1 is Motor+ and Pin 2 is Motor-.

## Operation

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### Power On

Power-on the radio. The **TurboTuner-2** receives its power from the radio and is powered on or off whenever the radio is powered on or off.

When the **TurboTuner-2** first powers on, it will beep a Morse code ‘R’ followed by a number that indicates the firmware version. This signifies the **TurboTuner-2** is ready for tuning.

### Tuning

To initiate antenna tuning, press **TUNE** button on the radio. This will place the radio in “Tune” mode. The radio’s **TX** light should turn red, indicating the radio is transmitting. In approx. 2 seconds, the antenna will start moving and the **TurboTuner-2** will start polling the radio and searching for the lowest SWR. When the lowest SWR is found, the **TurboTuner-2** will beep a Morse code ‘K’ and return the radio to receive mode.

Press the **TUNE** button to exit “Tune” mode. Make sure you do this before changing frequency bands. This will prevent the **TurboTuner-2** from initiating another tune cycle when the band is changed.

If a low SWR cannot be found after the antenna make one reversal, the **TurboTuner-2** will beep as series of Morse code ‘E’s and return the radio to receive mode.

### Parking

The **TurboTuner-2** is equipped with and “Park” function which will lower the antenna to its minimum height. To “park” your antenna, press the **TUNE** button as if initiating a tuning cycle. Wait at least 2 seconds and then press the **PTT** button on the microphone. Upon entering “park” mode, the **TurboTuner-2** will beep a Morse Code ‘P’. When the antenna reaches its minimum height, the **TurboTuner-2** will beep a Morse Code ‘P’ again signifying completion of the “park” sequence.

Note: Once a “park” sequence has begun, it cannot be interrupted. If you need to stop the “park” sequence, power the radio off.

### Summary of Beep Codes

‘R’ – Software revision followed by a number

‘K’ – Tuning complete

‘P’ – Antenna parking has begun or ended

‘E’ – An error has been detected. Will beep multiple times.

‘S’ – Serial communication error.

# Troubleshooting

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<b>Problem</b>	<b>Possible Causes &amp; Solutions</b>
<b>TUNE</b> button does not work	<ul style="list-style-type: none"><li>• Make sure all the radio configuration items are set as described above.</li><li>• Make sure the selected frequency is within band.</li></ul>
Antenna reverses direction before reaching end of travel	<ul style="list-style-type: none"><li>• Stall current set too low.</li></ul>
Error indicated immediately	<ul style="list-style-type: none"><li>• Stall current set too low.</li></ul>
Antenna does not reverse at end of travel.	<ul style="list-style-type: none"><li>• Stall current set too high.</li></ul>
When changing frequency, antenna moves in wrong direction.	<ul style="list-style-type: none"><li>• Change DIP Switch 1 setting.</li></ul>
Antenna won't tune on certain bands.	<ul style="list-style-type: none"><li>• Ensure proper installation and grounding.</li><li>• Use the radio display or a separate SWR meter to verify actual SWR.</li><li>• Change DIP Switch 5 setting to <b>ALTERNATE</b> SWR mode.</li></ul>

## Troubleshooting (cont'd)

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<p><b>TurboTuner-2</b> dead, no beep at startup, tuning will not start</p>	<ul style="list-style-type: none"> <li>• Ensure interface cable connected to <b>TUNER</b> jack on back of radio.</li> <li>• Remove tuner cover and verify internal fuse in not blown. Fuse is 5x20mm 3A Fast Blow.</li> </ul>
<p><b>TurboTuner-2</b> beeps a series of three 'S'</p>	<ul style="list-style-type: none"> <li>• Serial communication error. Ensure all radio configuration items set as described.</li> </ul>

# Radio Interface Connector

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The radio interface connector on the side of the **TurboTuner-2** contains the signals from the radio that are necessary to operate. Those signals are described below:

- 1: Key – Signal from controller to radio to start RF transmit.
- 2: Start – Signal from radio to controller to start tuning.
- 3: No connect.
- 4: +13.8V – DC Power from the radio.
- 5: Ground
- 6: No connect.

The connector pin numbering is shown in the diagram below:



The radio interface connector on the **TurboTuner-2** is Molex part # 39-29-1068.

The part numbers for the mating connector components on the radio interface cable are:

Housing: Molex part # 39-01-2060, 6-pin Mini-Fit Jr.

Contacts: Molex part # 39-00-0066, crimp receptacles.

## Specifications & Ratings

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Supply Voltage	+13.8V DC $\pm$ 15%
Frequency Range	1.8 MHz to 54.0 MHz
Max. Antenna Motor Current	1.5 Amps
Dimensions	5.7" x 3.6" x 1.2"
Weight	8 oz.
Indoor Use Only	Controller is not weatherproof

## Warranty

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Your **TurboTuner-2** is warranted against manufacturing defects for one year from date of shipment to you. Your receipt establishes eligibility for warranty service, so save your receipt.

The **TurboTuner-2** is not warranted against damage, abuse, or other failure caused by the customer or natural calamity (such as lightning). This includes damage caused by operating the **TurboTuner-2** beyond or outside of its specifications or by not following good amateur radio practice.

## Contact

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For technical support and all other inquiries, send e-mail to:

[info@tennatronix.com](mailto:info@tennatronix.com)