

**N2VZ Enterprises**

***Turbo Tuner***<sup>TM</sup>

**Fully automatic screwdriver antenna controller  
for:**

Kenwood TS-480

Operating and Installation Instructions



## **Theory of Operation:**

The Turbo Tuner is designed to allow automatic Tuning and control of screwdriver antennas based on finding the minimum SWR for the current operating frequency. This is accomplished by using the Tune function of the radio to supply 5 – 10 watts of power while the Turbo Tuner moves the screwdriver antenna in the correct direction based on the operating frequency and looks for the minimum SWR. Once the minimum SWR is found, the transceiver is placed back in receive mode automatically.

## **INSTALLATION:**

Kenwood TS-480 setup:

**'PF' Key Assignment** - The 'PF' key needs to be configured to provide the TX-Tune function. This is accomplished by setting menu item 48 (Front Panel PF Key Assignment) to 67. Once setting of the 'PF' key is accomplished, press the 'PF' key and place the radio in TX-Tune mode. Once the radio is in TX-Tune, press the 'PWR' button and adjust the power level to 5 watts. Press the 'PF' key once more to place the radio back in receive mode.

**Baud Rate Setting** – The baud rate setting on the TS-480 is accomplished by menu item 56 and needs to be set to '19200'.

Turbo Tuner Setup:

The next step is to set the dip switches to configure the Turbo Tuner to operate with your screwdriver antenna configuration.

Access to the dip switches is accomplished by removing the 4 Phillips head screws located at the bottom of the Turbo Tuner enclosure. Once the 4 screws are removed, lift off the top cover and you will see the 8 position dip switch located on the printed circuit board next to the fuse.

Dip Switch Settings:

**Antenna Direction** – This option sets the direction of travel for the antenna. This is normally set in the "Normal" position. If during the tuning cycle, the antenna does not move in the proper direction, change Dip SW-1 to the "Reversed" position.

**Antenna Stall Current** – For the Lil' Tarheel, this option should be set to 200 MA. For Tarheel Models 100 – 400, use 900 MA. If the antenna changes direction in the middle of travel for no apparent reason, try the 300 MA option for the Lil' TH and 1000 Ma for the TH Models 100 – 400. Use 900 Ma for High Sierra and Hi-Q antennas.

**SWR Threshold** – Keep this in the Normal position unless the controller has trouble finding a match on some bands. This option will allow the controller to accept a slightly higher SWR. With the option set to "Alternate" the controller will still search and find the lowest SWR.

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**Baud Rate** - The default baud rate is 19200. If you receive serial communication errors, change the baud rate to 4800. The TS-480 baud rate has to match and is set with menu function 56. Note after changing the baud rate on the TS-480, the radio needs to be powered down for the baud rate change to be in effect.

### Factory Default Settings \*

Antenna Direction	Dip SW-1 = OFF Dip SW-1 = ON	Normal * Reversed
Antenna Stall Current	Dip Sw-2 = OFF    Dip SW-3 = OFF Dip Sw-2 = OFF    Dip SW-3 = ON Dip Sw-2 = ON     Dip SW-3 = OFF Dip Sw-2 = ON     Dip SW-3 = ON	200 MA * 300 MA 900 MA 1000 MA
SWR Threshold	Dip SW-4 = OFF Dip SW-4 = ON	Normal * Alternate
Baud Rate	Dip SW-5 = OFF Dip SW-5 = ON	19200 * 4800

Once the Dip switches have been set correctly, place the top cover on the Turbo Tuner and make sure the Motor and Interface wires are positioned correctly in the enclosure cut outs before screwing the top cover into place.

### Connections:

Connect the supplied DB-9 RS-232 cable from the Turbo Tuner to the front of the Kenwood TS-480 radio body.

Connect the interface cable from the Turbo Tuner to the TS-480 'AT' connector located on the rear of the radio body.

Connect the Motor wire from the Screwdriver antenna to the 'Motor' connector on the Turbo Tuner.

This completes the installation of the Turbo Tuner.

### **OPERATION:**

#### Power On:

The Turbo Tuner is powered by the radio and is powered on and off with the radio's power button.

When the radio is first powered up, the Turbo Tuner after initializing will sound a Morse code 'R' to signify that it is ready.

#### Tuning:

To initiate tuning of the antenna, select a proper operating frequency and press the 'PF' key on the TS-480 front panel. This will place the radio in the TX-Tune mode and you will see the screwdriver antenna start moving. Once the antenna is tuned and a proper match is found, the Turbo Tuner will sound a Morse code 'K' and return the transceiver to receive mode.

If the antenna can not be tuned and an acceptable match found after the screwdriver antenna makes two reversals looking for a match, the Turbo Tuner will sound a series of Morse code 'E' and return the radio to receive mode.

Parking the Antenna:

The Turbo Tuner also has a Park function that will automatically lower the screwdriver antenna to its minimum height. To initiate the Park function, press the 'PF' key just like initiating a tune cycle but press the 'PF' key again before the tune cycle completes and the Turbo Tuner will enter Park mode. Upon entering Park mode, the Turbo Tuner will sound a Morse code 'P'; and once the screwdriver antenna is completely lowered, the Turbo Tune will sound another Morse code 'P' to signify completion of the park cycle. Once Park mode is initiated, it can not be interrupted.

### **TROUBLE SHOOTING:**

Antenna reverses before reaching end of travel while tuning:

This is caused by the antenna stall current being set too low. Set the antenna stall current one setting higher via the dip switches.

Turbo Tuner gives immediate tuning error when initiating a tune cycle:

This is caused by the antenna stall current being set too low. Set the antenna stall current to the correct setting via the dip switches.

Antenna stalls at end of travel and does not reverse while tuning:

This is caused by the antenna stall current being set too high. Decrease the stall current by one setting via the Dip switches

When powering up the radio, the Turbo Tuner sounds a series of Morse code 'S':

This error indicates a serial communication problem. Make sure the serial cable is connected between the Turbo Tuner and the TS-480. Also check that the Turbo Tuner and TS-480 are set to the same baud rate.

When changing frequency, the antenna moves in the incorrect direction:

This can be corrected without reversing the antenna motor wires by changing the position of Dip switch 1.

Can not find a proper match on one or more bands:

Manually check the antenna for an SWR of less than 2:1 on all bands of operation. If this is the problem check, the antenna installation. Changing Dip switch 4 to the alternate position will help the Turbo Tuner find a match if the antenna can not be tuned to better than 2:1 SWR.

Turbo Tuner totally dead, no audio feed back, and tuning will not initiate:

Check that the interface cable is connected to the TS-480 AT-Connector. Check the internal fuse in the Turbo Tuner which is a 20mm 2A fast blow.