TARGETuner

Antenna Management System for Screwdriver Antennas

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Thank you for choosing the **TARGETuner** from West Mountain Radio. This product is designed as mobile antenna management system that includes motor control for the antenna and sensing for frequency band matching. It is ideal for mobile antennas with a remote control head.

TARGETuner senses the RF Signal going to the antenna and will work with any Transmitter or Transceiver. It does not depend on radio data link for band selection and does not need to control the radio for activation. The motor control uses a bipolar transistor direct switch that incorporates pulse width modulation for control of motor speed and direction. Stall Current Sensing is programmable and available for some current limit settings.

TARGETuner provides a digital display of Basic Transmitter Frequency and SWR Readout, as well as Manual Tuning Control options which allows the user to monitor antenna performance and manually adjust the antenna if necessary. The TARGETuner continuously monitors transmitter frequency and antenna performance and can adjust the antenna accordingly with vehicle movement, antenna icing, or any other proximity or environmental related antenna detuning effects.

The TARGETuner RF Sensing Module is remote from the radio controls. This limits the RF Exposure to other radio and antenna control components. An industry standard shielded RJ-45 Cable serves as an interconnect between the TARGETuner RF Sensor Module and TARGETuner Controller. Power is supplied through industry standard Powerpole connectors for ease of power connection and fusing.

Product Contents

- **TARGETuner Controller Unit**
- **TARGETuner RF Sensing Module**
- **Shielded RJ-45 Cable**
- **Power Cable with standard Powerpole connectors**
- **PL-259 Coaxial Jumper Cable**

Installation

Antenna Installation:
Follow the antenna manufacturer's installation instructions outlining Antenna Placement, Grounding, Control Cable preparation and Ferrite Choke Placement. Follow the pre-tuning instructions for the antenna model and record the useable tuning range of the installation based on the antenna element length. An Antenna Analyzer is handy for this. (Record the useable "Frequency Range" for use later).

RF Sensing Module Installation:

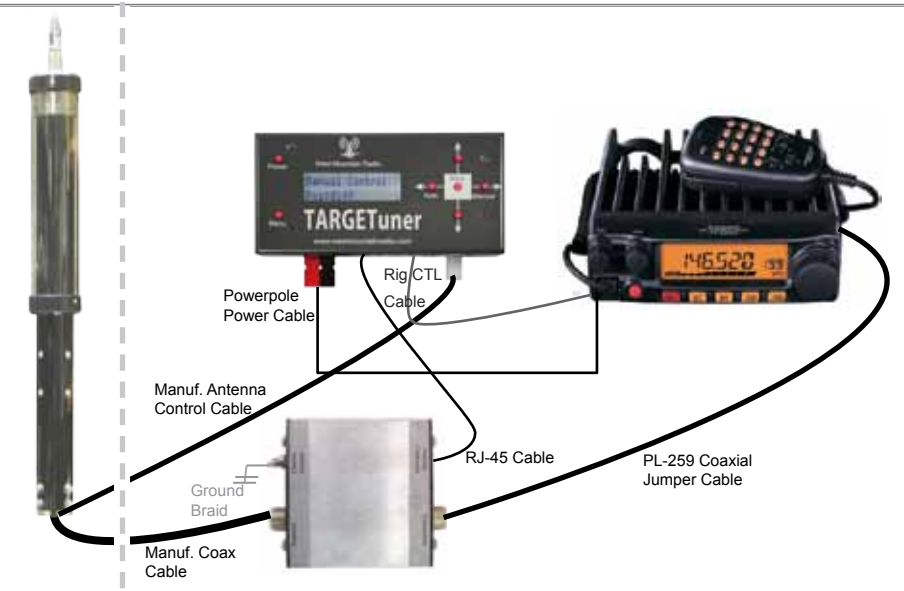
1. Install the TARGETuner RF Sensing Module close to the radio inline with the antenna feed with the provided PL-259 Coaxial jumper cable.
2. Connect a short ground braid from the grounding stud to a metal body panel or the vehicle frame. Be sure to scrape off a patch of paint to insure a good RF Ground.
3. Connect the antenna manufacturer's Antenna Control Cable between the antenna and the TARGETuner Controller. Be sure the Ferrite RF Choke is placed as close to the antenna as possible.
4. Connect the antenna manufacturer's longer coax cable between the TARGETuner RF Sensing Module and the Antenna.
5. Connect the RF-45 Sensor Cable between the TARGETuner Sensing Module and TARGETuner Controller.

TARGETuner Control Unit Installation:

1. Select a location close to the radio transmitter control panel that will be using the tunable antenna.
2. Connect the Antenna Control Cable between the antenna and the TARGETuner Controller Unit.
3. Connect the controller end of the shielded RJ-45 sensor cable from the RF Sensing Module to the TARGETuner controller unit.
4. Connect the Powerpole power cable to the 12V power source for the radio.

Initial Configuration:

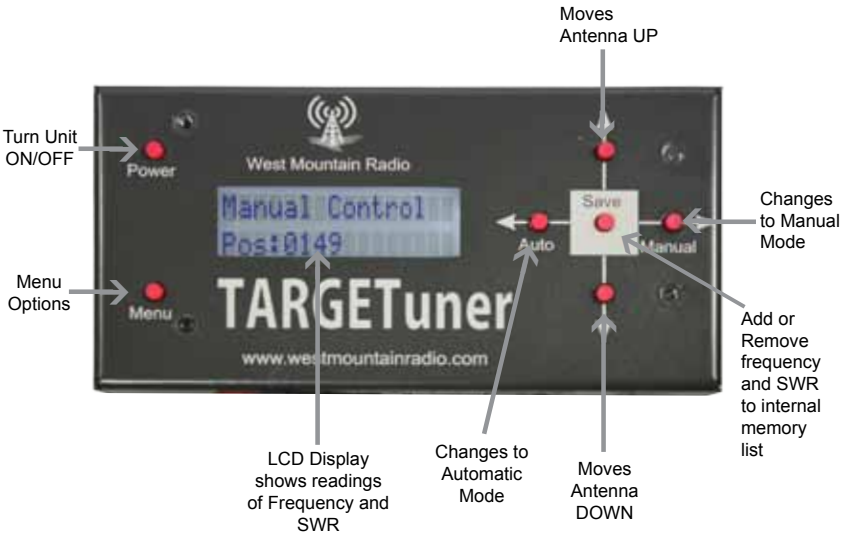
1. Push and hold the "PWR" button on the TARGETuner to apply power to the antenna controller.
2. Press "MENU" button until "Menu Select" appears in the LCD display.
3. Use Down button and scroll to "Antenna Range" and press Save button.
4. The LCD should now say "Press DOWN to limit then SAVE". Press the DOWN button until the antenna hits the down limit of the antenna and press the SAVE button to save the down limit of the antenna. The direction the antenna moves in relation to the Up and Down button can be changed with the "Motor Direction" setting.
5. The LCD should now say "Press UP to limit then SAVE". Press the UP button until the antenna hits the up limit of the antenna and press the SAVE button to save the up limit of the antenna.
6. Press the Auto or Manual button to return to normal operational modes.



Troubleshooting Tips

- The Ground for radio power should be kept as short as possible.
- Keep the vehicle Ground Reference for both RF and DC power, making sure the negative battery lead is tied to the body as well as the engine block.
- Ground straps for multi-point grounding of the vehicle body to vehicle frame will aid in eliminating RF noise from the vehicle controls to the antenna system.

Additional tips: www.westmountainradio.com/TARGETuner/FAQ



Establish Channel Positions
Repeat the following for each desired frequency:

Tune radio to a desired frequency.

Automatic positioning:

1. Press the AUTO button until the display shows “Auto SWR Tuning”
2. Key up the transmitter to desired frequency with at least 5 Watts in AM/FM mode (use 10 Watts for 6 meters)
3. Keep the radio in transmit until the antenna stops moving and the LCD says “Auto SWR Locked”
4. Press and hold the SAVE button down for five (5) seconds to store the frequency/position in memory.

Manually set the position:

1. Press the MANUAL button until the display shows “Manual Control”
2. Transmit in AM or FM mode
3. Use the UP and DOWN arrows to position the antenna to the desired position
4. Continue to Transmit and hold the SAVE button down for five (5) seconds to store the frequency/position in Memory.

Operating Modes
The TARGETuner can run in one of four operating modes: “Manual Control”, “Manual Memory”, “Auto Memory” and “Auto SWR”. To select “Manual Control” or “Manual Memory”, press the MANUAL button to toggle between those choices. To select “Auto Memory” or “Auto SWR” press the AUTO button to toggle between those choices.

Operating Mode: Manual Control
TARGETuner will not move the antenna unless the user presses the UP or DOWN button. Pressing the UP or DOWN button will cause the antenna to move in that direction, and the antenna will stop moving when the button is released. The antenna position, motor load current (Amps), detected frequency and detected SWR will be displayed on the LCD. Pressing and holding the SAVE button for five (5) seconds will save the current location, frequency and SWR in memory for use in Manual Memory and Auto modes.

Operating Mode: Manual Memory
The user can select from previously saved memory positions by pressing the UP and DOWN button. The LCD will display the selected position on the LCD screen. Pressing the SAVE button will cause the antenna to move to that position.

Operating Mode: Auto Memory

The TARGETuner will not move the antenna until a new valid frequency has been detected, at which point the antenna will be moved to the closest position in memory for that frequency. If using the serial rig control port, the frequency will be read directly from the radio and will move the antenna the moment the frequency is changed on the radio. If serial rig control port is not used, the frequency is not detected until the sensor unit has detected a transmit from the radio.

Operating Mode: Auto SWR

When the LCD shows “Auto SWR Tuning”, the TARGETuner is detecting SWR and frequency from the sensor unit and serial rig control port while attempting to find the best SWR on the antenna. The TARGETuner will not move the antenna unless the transceiver is transmitting. When the LCD displays “Auto SWR Locked”, the TARGETuner has found the best SWR. When locked, pressing SAVE button for five (5) seconds will cause this position to be saved to memory. When locked, if the frequency changes or the detected SWR gets signficantly worse the TARGETuner will exit locked mode and go back to “Auto SWR Tuning”.

Menu and settings

Pressing the MENU button loads the settings menu. The first line of the LCD will show “MENU SELECT” and the second line will display a menu setting that can be changed. When in “MENU SELECT”, pressing UP and DOWN can be used to select different settings. Press the SAVE button to select a setting to view/edit. Once an item has been opened for viewing/editing, pressing SAVE will save the new setting and MENU can be used to exit and cancel any changes.

Description of Menu Settings and Values:

Antenna Range	Used to configure the top and bottom range of the antenna. See the section of this manual labeleled Initial Configuration.
Encoder Wheel	If using a screwdriver antenna that has an encoder wheel or hall sensor to detect movement, select YES, otherwise select NO. If the antenna does not have such a sensor then the TARGETuner cannot save any positions to memory because the TARGETuner cannot detect position of the antenna.
View Memory	Used to view the memory points saved to memory. Press UP and DOWN will cycle through the memory points. Pressing and holding down the SAVE button down for five (5) seconds can be used to clear a point from memory.
Clear Memory	Allows the user to erase all points from memory.

User Motor Speed	This is used to select the fastest speed the TARGETuner will move the antenna. Generally you want to use the “Fastest” setting, which is the DC power directly applied to the motor on the antenna for full speed. This speed setting is used in “Manual Control” when the users presses the UP and DOWN button. This is also used in all other modes when the TARGETuner wants to move at the fastest speed. This is configurable in the event the user wants to limit power used by the antenna motor.
Auto Motor Speed	This speed is used by the TARGETuner in auto modes and movment modes when it wants to operate at a slower speed. One usage is in memory mode and it is close to the desired position, the TARGETuner will use this slower speed to move the final amount to reduce overshoot. Another usage is in Auto SWR mode, when the SWR is getting close it will use the slower speed. If memory mode or Auto SWR mode appears to overshoot position, try reducing this speed.
Motor Direction	The direction the antenna motor moves when the UP or DOWN button is pressed can be set with this option.
Motor Ramping	If set to “Yes”, the TARGETuner will slowly ramp the antenna motor speed to the desired speed. This is useful for performing manual tuning, tapping the UP and DOWN keys will result in slow movements of the antenna for fine adjustments. If set to “No”, the TARGETuner will not ramp the speed of the antenna motor and instead go directly to the “User Motor Speed”. This is useful if the PWM driving the DC motor in the antenna is causing a received whine noise.
Fuse Current	This setting configures the maximum current that is allowed to be used by the DC motor on the antenna. If the current goes over this setting the TARGETuner will stop the motor and display an error on the LCD. This check can be disabled with the “Ignore” setting. Refer to the manual of your screwdriver antenna, or find value via experimentation, to find a setting that allows operation of the motor but a failsafe in the event of a short.
Stall Current	If the Encoder Wheel setting is set to “No”, this current is used in “Auto SWR” mode to determine if the TARGETuner has hit the top or bottom limit. If in “Auto SWR” mode and current goes over this value then the TARGETuner will reverse direction and look for best SWR in the new direction.

Beep on Motor	Unit can be configured to beep if the motor is moving, proving useful when unable to see the antenna and want to be alerted that it is moving. Never – TARGETuner will not beep because the motor is moving. Always – TARGETuner will beep at any time the motor is moving. In Auto Mode – TARGETuner will not beep if the motor is moving due to pressing UP and DOWN button in “Manual Control” mode, will beep at any other time motor is moving.
Beep on SWR	Unit can be configured to beep if the SWR detected is over the specified threshold.
Rig CTL Protocol	If set to DISABLED, the TARGETuner will only use the sensor module for detecting frequency transmitted. In certain configurations and SWR, the frequency detected using the sensor module can be inaccurate. Alternately the user could use a serial rig control protocol to read the frequency directly from the radio. Reading frequency directly from the radio over serial is always 100% accurate. This feature requires a compatible radio and an optional accessory cable to connect to the connector on the TARGETuner labeled “Rig CTL”. The following choices are available: •DISABLED – Not using rig control, only use the sensor module •Icom CI-V – compatible with all Icom radios that have CI-V •Yaesu FT857 – compatible with Yaesu FT-817, FT-857 and FT-897.
Rig CTL Baud	If Rig CTL Protocol is not set to DISABLED, this is the serial port baud rate used to communicate with the radio. Refer to the manual of your radio to determine what baud rate is being used by your radio.
CI-V CTL Address	If Rig CTL Protocl is set to Icom CI-V, this sets the CI-V address of your radio. Refer to the manual of your radio to find this value.
LCD Auto Off	The LCD backlight can be configured to automatically turn off if there has been a period of inactivity (no buttons pressed). If “Always ON” is selected the backlight is always left on.
Sensor Module	Set to YES to use the sensor module, set to NO if you do not have the sensor module connected. It is strongly recommended that you use a Rig CTL Protocol if you want to set this to NO and not use the sensor module. When this is set to NO the SWR will not be displayed or saved to memory.

Rig Control Accessory Cable Options

- **Rig Control Cable for CI-V (Icom) Radios (#58107-971)**
- **CAT Cable for Yaesu FT-100,100D,817,857,897 (#58108-972)**

Specifications

Primary Power	13.75VDC 2.1 Amp max. 33mA Standby (internally monitored and fused)
Antenna Motor Voltage	13.75V PWM Speed Controlled
Antenna Motor Current	Monitored. Maximum current selectable - 2.0A max (intermittent)
Antenna Encoder Range	0 to 9999
Frequency Range	1.800Mhz to 54.000Mhz
Frequency Readout	+/- 0.01%
Useable RF Power Range	2.0 to 800 Watts
SWR Range	1.0:1 to 9.9:1 (auto level and ranging)
Frequency/SWR Antenna Location Memories	35

FCC INFORMATION
For a Class B digital device or peripheral, the user instructions shall include the follow-
ling or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection again harmful interference in a residential installation. This equipment generates,uses and can radiate radio frequency energy, and if not installed and used in accordance with the guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- •Reorient or relocate the receiving antenna
- •Increase the separation between the equipment and receiver
- •Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- •Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operated equipment under the FCC Rules.

Federal Communications Commission

TARGETuner Warranty

TARGETuner is warranted against failure due to defects in workmanship or materials for one year after the date of purchase from West Mountain Radio. Warranty does not cover damage caused by abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation, alteration, lightning, or other incidence of excessive voltage or current. If failure occurs within this period, return the *TARGETuner* or accessory to West Mountain Radio at your shipping expense. The device or accessory will be repaired or replaced, at our option, without charge, and returned to you at our shipping expense. Repaired or replaced items are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the *TARGETuner* or accessory made after the expiration of the warranty period.

West Mountain Radio shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss, or damage caused directly or indirectly by use or performance of the products or arising out of any breach of this warranty, including, but not limited to, any damages resulting from inconvenience, loss of time, data, property, revenue, or profit, or any indirect, special incidental, or consequential damages, even if West Mountain Radio has been advised of such damages.

Except as provided herein, West Mountain Radio makes no express warranties and any implied warranties, including fitness for a particular purpose, are limited in duration to the stated duration provided herein.

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