


TW2010TM

The AdventurerTM

Trans World Antennas

INSTRUCTION MANUAL

 **Danger:** Do not install this antenna where there exists the possibility of contact with power lines. Even with painted or coated antennas, the risk of electrical shock exists, which could cause serious injury or death.

Due to continual product improvements, the information in this manual is subject to change any time without notice. Trans World Antennas will be held free from liability, any problems arising from the use of this manual or the products described herein.

Manual Rev V1.2

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1 Limited Warranty

Trans World Antennas warrants to the original owner of this product if purchased from an authorized dealer or directly from Trans World Antennas to be free from defects in material and workmanship for a period of 12 months from date of purchase, provided dated proof of purchase.

Trans World Antennas agrees to repair or replace, at Trans World Antennas' option, any defective product still under warranty. Trans World Antennas will cover return shipping only. The warranty becomes null and void if it is determined that the product was subject to conditions beyond what the product is rated for, including, but not limited to, over power limits, extreme environmental conditions such as flood or fire, or general misuse.

Trans World Antennas will repair or replace, at Trans World Antennas' discretion, any out-of-warranty Trans World Antennas product provided all part, labor, or other repair costs are provided by the customer, the amount of which is determined by Trans World Antennas.

All repairs, in warranty and out-of-warranty should be sent to Trans World Antennas along with a brief description of the problem and the circumstances, environmental conditions, and equipment used at the time the problem occurred. For warranty product repairs, a dated proof of purchase must also be supplied.

Trans World Antennas will not be held liable, under any circumstances, for damages resulting from the use of any Trans World Antennas product.

Trans World Antennas reserves the right to make changes to this product, in part or in whole, at any time, in form, function, or manufacture, without obligation to install or incur any costs relating to the installation of modified parts onto existing product.

This warranty gives you specific rights. Other rights may apply, which vary from state to state.

An optional extended limited warranty purchased from Trans World Antennas extends the period of this warranty to 24 months or 36 months, depending on warranty product purchased.

2 Specifications

Congratulations on the purchase of your TW2010 antenna! The TW2010 represents a revolutionary jump in HF antenna performance, convenience, and reliability. The ruggedly built TW2010 was designed with ease of use in mind. Therefore, all TW2010 antennas are pre-assembled and tuned at the time of manufacture. With its compact three-part fold-up design, the TW2010 is ready to go right out of the box¹ for permanent installation, or quick and easy travel, using the optional Quadrapod folding travel stand.

The TW2010 is a center fed vertical dipole antenna with a very low radiation take-off angle (around 27 degrees above horizontal), allowing for very long skips using low power on 10, 12, 15 17, and 20 meters². The TW2010 is a ground-mounted omni directional antenna, requiring no ground radials, tower, or rotor.

2.1 Mechanical

Dimensions (folded³):

Three pieces, each less than 34" long

Antenna Dimensions (after setup):

Width: 5' 3-1/2"
 Height: 6' 10-1/2"
 8' 3" on permanent mounting tube
 Weight: Approx. 10 lbs

2.2 Electrical

Controller

Function: 5-band switching, auto or manual
 Power Requirements: 12VDC, 200mA

Antenna

Mode	Maximum Power
SSB	1,200W PEP
CW	800W
RTTY	500W
AM	375W, 100% mod (full legal)

¹ Tuning may be required

² Though some have reported some results on 2m, 6m, and 70cm, only 10-, 12-, 15-, 17-, and 20- meters are officially supported by Trans World Antennas.

³ Not including optional folding stand

2 Specifications *(cont.)*

Antenna *(cont.)*

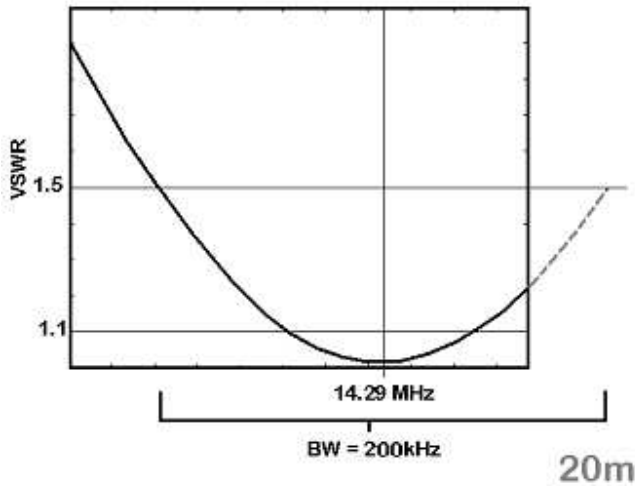
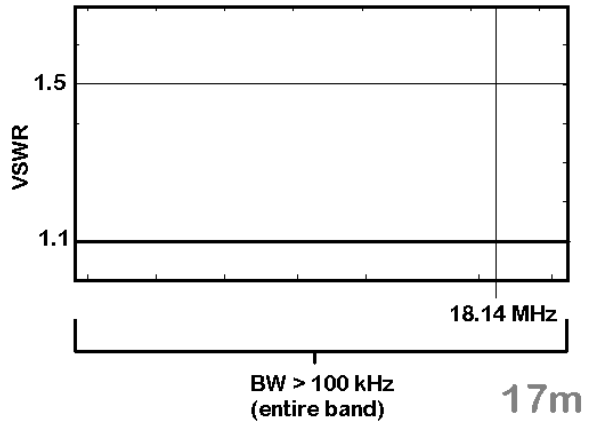
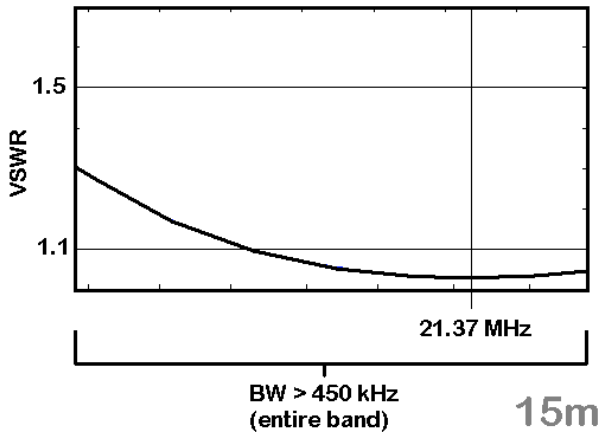
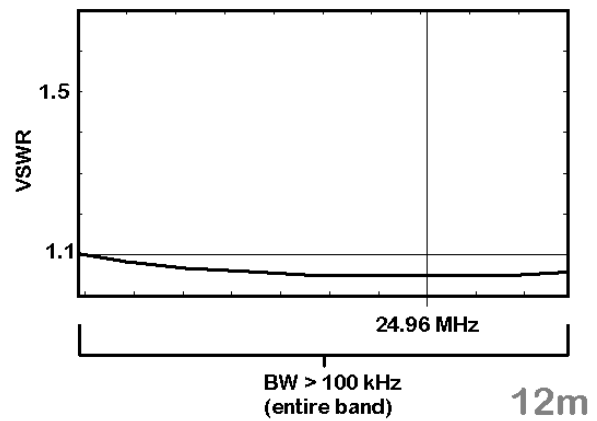
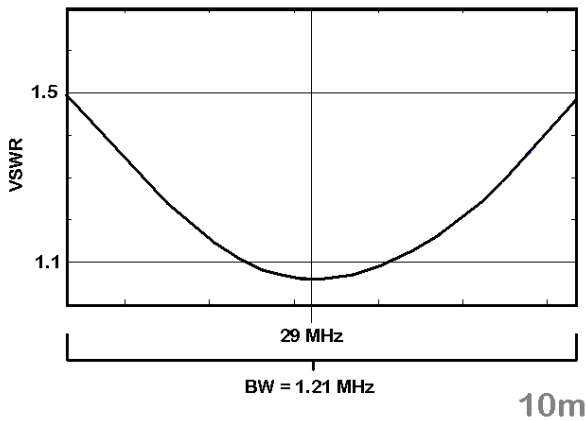
Band	1.5 : 1 Band Width ⁴	Typical minimum VSWR
10m	1,210 kHz	1.1 : 1
12m	<Entire Band>	1.1 : 1
15m	<Entire Band>	1.1 : 1
17m	<Entire Band>	1.1 : 1
20m	200 kHz	1.1 : 1

Directionality: Omni directional
 Vertical radiation angle: 27°
 Band selection: 5-band relay switched via included controller

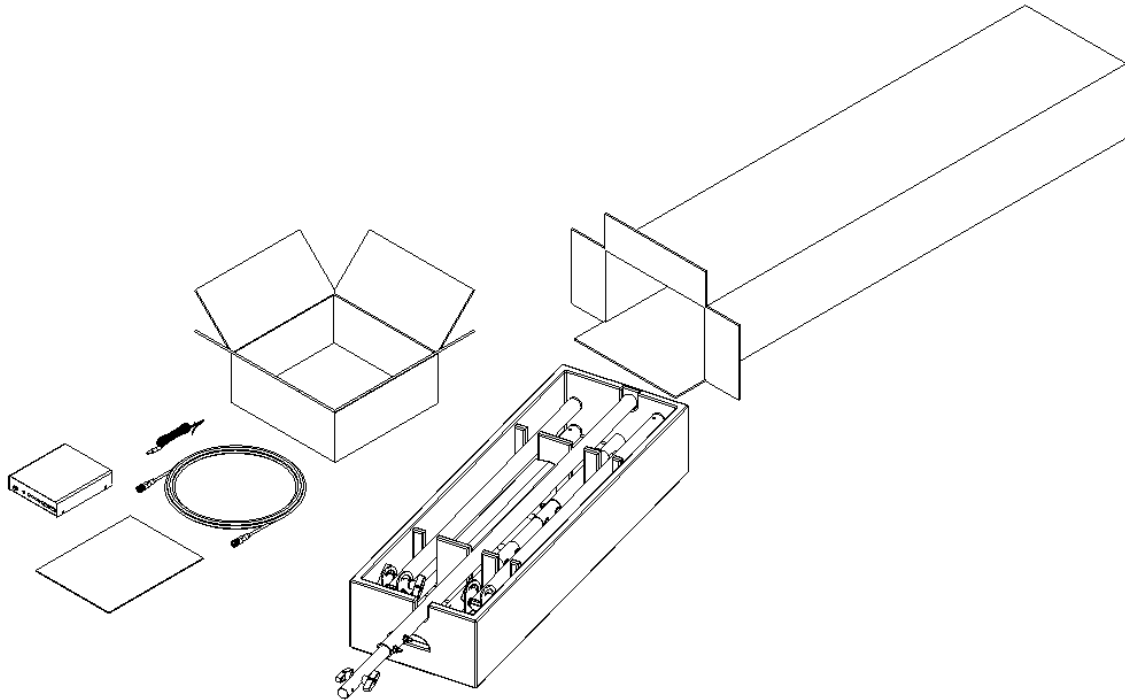
⁴ Test conditions: 100 feet of quality RG8/U coax, 100W output power, antenna mounted approx. 32" above ground with no external objects, metallic or otherwise, within 20ft radius of the antenna.

2.3 VSWR Performance

The five plots below represent the VSWR performance of the antenna under the test circumstances noted on page 5. The term “bandwidth” here refers to the range of frequencies over which the antenna exhibits a VSWR of 1.5:1 or less.



3 Unpacking



Here's what you should find in your shipping box:

- Corrugated drawer containing the four main pieces of the antenna structure:
 - Top section
 - Middle section
 - Bottom section
 - Permanent mounting assembly
- An inner shipping carton:
 - This manual
 - 65-1/2 foot quick disconnect control cable
 - Antenna auto controller
 - Power cable for controller

Save all packaging materials! The original shipping materials may serve as a very handy travel box for portable applications. Also, if the antenna is returned for warranty or money-back guarantee claims, all original packaging materials will be required for approved shipping.

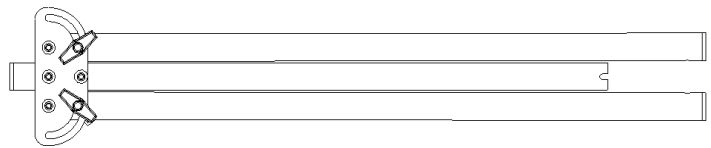
4 The Components of your Antenna

There are three basic components to your new TW2010: The structure, the controller, and cabling.

4.1 The Structure

The structure of your antenna has been built in four pieces, top, middle, bottom, and permanent mounting assembly. The top and bottom pieces fold up for quick and easy travel. Fold-up and assembly of the three main structure pieces is achieved using pre-installed clamp knobs. See below for a summary of these four components.

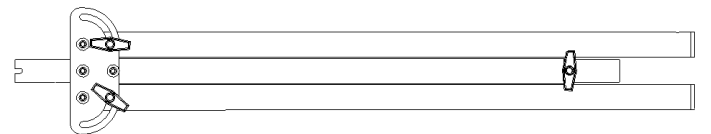
Top Section
32.2" x 6.25" x 3.8"



Middle Section
30.13" x 7.41" x 4.88"



Bottom Section
33.75" x 6.25" x 3.8"



Permanent Mounting Assembly
48.00" x 3.20" x 1.25"

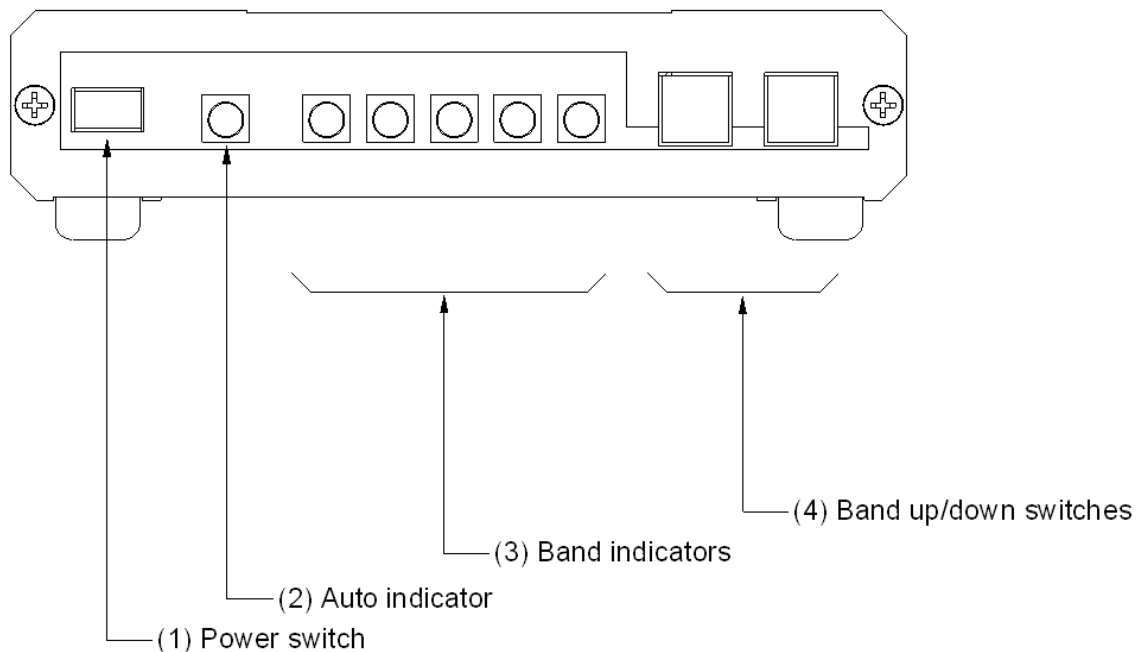


4.2 The Controller

Your TW2010 is supplied with a 5-band auto controller used for band switching. The controller can be used in automatic mode or manual mode. Automatic mode is available for use with many modern Icom® and Yaesu® radios, using an optional cable, available from Trans World Antennas.

Below are diagrams of the front and rear panels with feature descriptions.

Front Panel



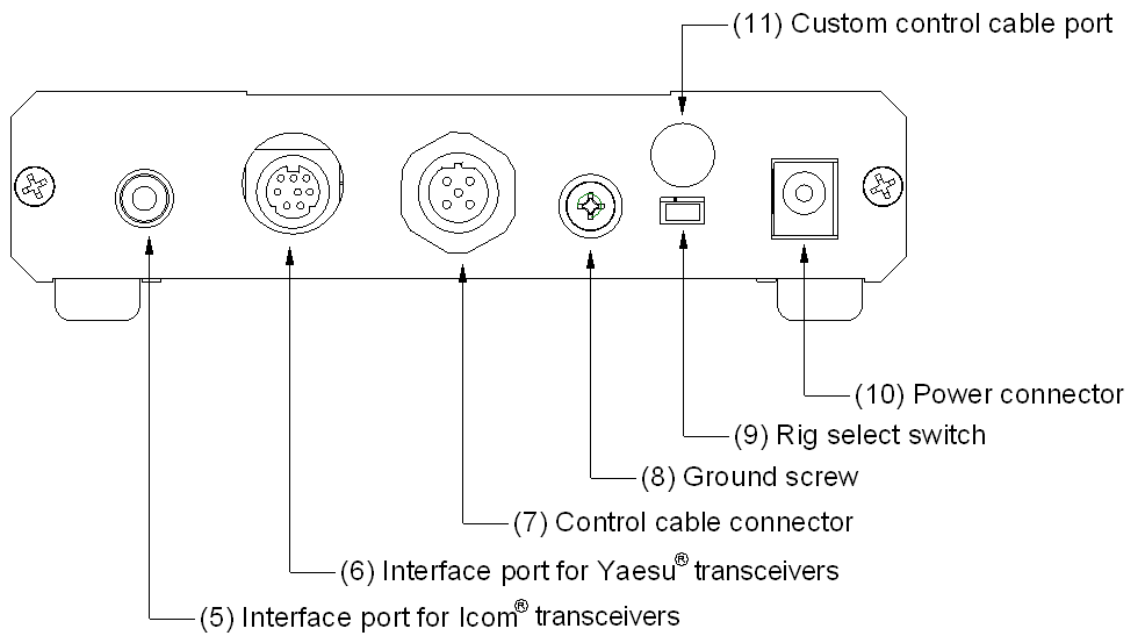
(1) Power switch. Use to turn your controller on and off.

(2) Auto indicator. This amber LED will light when the controller is in automatic mode. This LED will blink when, in automatic mode for Icom® transceivers, an attempt is made to operate the antenna outside the 10m to 20m range.

(3) Band indicators. These five green LEDs are used to display which band the antenna is currently switched to (assumes the antenna is properly connected to the controller).

(4) Band up/down switches. By pressing *Band Up* or *Band Down*, the controller will go into manual mode and the auto indicator will go dark. Press *Band Up* or *Band Down* to cycle up or down through the five bands, respectively. By pressing both *Band Up* and *Band Down* at the same time, the controller will initiate automatic mode and the *Auto indicator* will light. See *Rig Select Switch* below for more information.

Rear Panel



(5) Interface port for Icom® transceivers. This port is used to connect the controller to a compatible Icom® transceiver to allow the controller to successfully operate in automatic mode. The controller will work with most any Icom® transceiver that has a 3.5mm “Remote” jack, and can communicate information from this port at 9600 bps. This feature requires an optional TW-AC-1-ICOM cable, available from Trans World Antennas.

(6) Interface port for Yaesu® transceivers. This port is used to connect the controller to a compatible Yaesu® transceiver to allow the controller to successfully operate in automatic mode. The controller will work with any Yaesu® transceiver that has an eight-pin mini-din “CAT/Linear” connector. This feature requires an optional TW-AC-1-YC cable, available from Trans World Antennas.

(7) Control cable connector. This port is used to connect the supplied quick-disconnect control cable. See “(11) Custom control cable port” below for more information regarding homemade control cables.

(8) Ground screw. Although not required, it is recommended to ground your controller as you would other pieces of equipment in your shack. Use this supplied screw for grounding purposes.

(9) Rig Select switch. For automatic mode only, this switch selects which transceiver type to use. Switch to “I” for Icom[®] transceivers, and “Y” for Yaesu[®] transceivers.

(10) Power connector. This power connector uses a 2.5mm power cable (supplied) to connect the controller to 12VDC. The controller should pull no more than 200mA. Center pin is positive.

(11) Custom control cable port. To use a control cable other than the cable supplied with the antenna, this hole is provided to internally wire your custom cable. The unit ships with a black plastic hole plug, which can be easily removed from the inside of the unit. See page 16 for more information.

4.3 Cabling

Control cable. The TW2010 is supplied with a 65-1/2 foot long black PVC jacketed 5-conductor control cable with 12mm metal screw-on connector ends for quick connection to the controller and antenna. This cable connects to the “Control Cable” connector on the back of the controller, and the identical connector on the back of the antenna structure’s switching network box (see figure on page 15). Without this cable, the antenna will operate in 20m mode only.

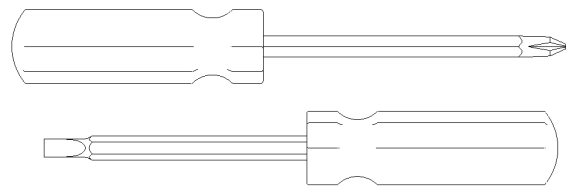
Power cord. A six-foot 2-conductor power cord is supplied with your TW2010 for powering the controller. This cord should be connected to a 12 to 18VDC power supply. The cord’s two conductors are black and black with a white stripe. The black-with-white-stripe conductor connects to the positive terminal of your power supply, and the solid black conductor connects to the negative terminal (see figure on page 15). An internal rectifier diode will protect the controller if it is accidentally connected in reverse.

5 Getting Started

Getting started with your new TW2010 is quick and easy. Follow these steps to get started using your new antenna right away.

5.1 Tools Needed

Only two tools should ever be needed for use with your TW2010. First, a small Phillips screwdriver will be required to open the switching array box for tuning (page 22), or for accessing the inside of the controller for changing the fuse (page 25) and attaching a custom control cable, if desired (page 16). Second, a small flat head screwdriver will be required to attach a custom control cable (page 16).



Under normal circumstances, after initial tuning, no tools should ever be required for break down, transport, and setup of the TW2010.

5.2 Antenna Setup

1) Choose a location for your antenna. The area you choose for your antenna should be at least 10 meters (about 33 feet) from any metal structure or other objects that could detune the antenna.

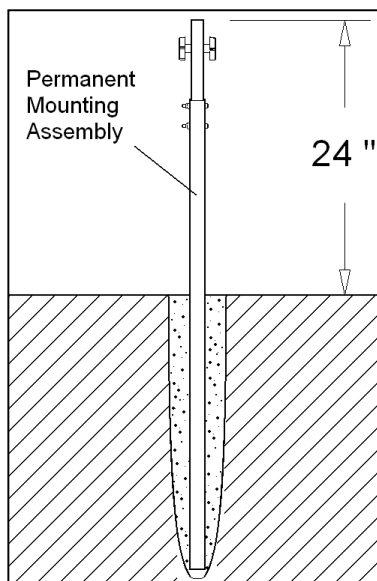
⚠ Danger: *The antenna should not be placed anywhere near power lines, as serious injury or death could occur.* And as always, **CALL BEFORE YOU DIG** to ensure you know where buried gas, water, sewer, power, and other service lines are located.

⚠ Danger: As with any antenna installation, exposure limits should be calculated to ensure safe operation. Vertical dipoles, such as the TW2010, should not be operated at more than about 200W on 20m. Visit the ARRL website (<http://www.arrl.org/news/rfsafety/>) for more information on exposure limits and calculations.

The antenna's coax feed line and control cable should be run at a 45-degree angle down from the structure to the ground to minimize parasitic coupling (see

figure on page 16). Failure to do so will result in higher than expected VSWR readings. Plan for this extra footprint when choosing a location for your antenna.

2) Install Permanent Mounting Assembly. The supplied Permanent Mounting Assembly consists of insulator rod attached to an aluminum tube using stainless steel hardware. The assembly can be installed with or without the use of concrete. Though concrete will provide a more secure, permanent base for your antenna, it will be difficult to remove or re-position later. The assembly should be inserted about 12-24" into the ground, exposing 24-36" of the assembly above ground.



It is suggested that the antenna be tried in an area using the permanent mounting assembly in a hole in the ground before concreting, in case the antenna needs to be moved later. Once you are sure of the location for the antenna, the Permanent Mounting Assembly can be concreted into place, if desired.

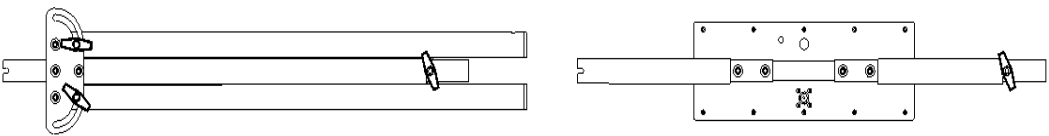
Warning: The fiberglass insulating rod is *not* hammer-proof. Do not pound the Permanent Mounting Assembly into the ground like a stake. Permanent damage to the fiberglass insulating rod could occur. If it is necessary to drive the assembly into the ground, first remove the fiberglass insulating rod using a 5/16" Allen wrench and a 7/16" socket. Drive the aluminum permanent mounting tube into the ground using a rubber mallet. Alternatively, a conventional hammer can be used if a wooden board is laid over the aluminum mounting tube before striking.

3) Assemble antenna. First, attach the bottom section to the middle section, making sure to slide the pieces completely together. The 1/4" slots on the end of the middle section should engage completely with the stud of the clamp knob on the end of the bottom section, as shown in step 1 below. Tighten the clamp knob snugly.

Second, attach the middle section to the top section as shown in step 2 below. Again, the clamp knob stud should fully engage with the slots on the end of the top section. Tighten the clamp knob snugly.

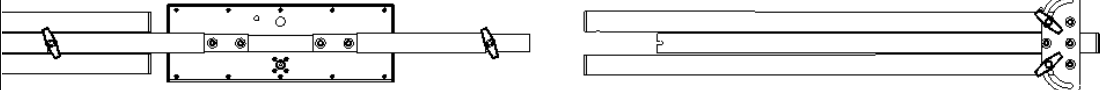
Finally, fold the arms of the top and bottom sections out as shown in step 3. The arms should be folded out completely horizontal. Firmly tighten all four clamp knobs to ensure that the top arms do not rotate downward over time.

1 Attach the bottom section to the middle section, making sure to slide the pieces completely together and tighten clamp knob.



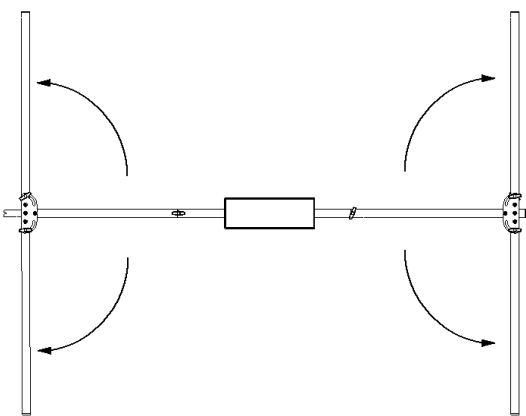
The diagram shows two views of the assembly. On the left, a bottom section with a clamp knob is being aligned with a middle section. On the right, the two sections are fully joined, with the clamp knob tightened.

2 Attach the middle section to the top section and tighten clamp knob.



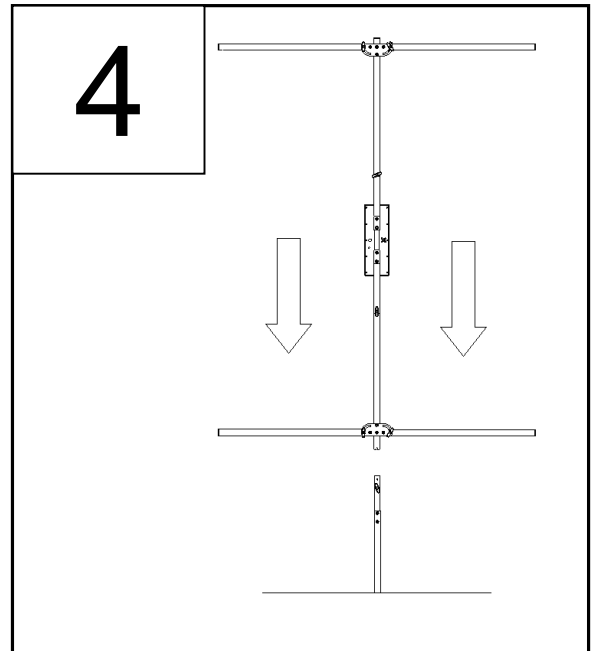
The diagram shows two views of the assembly. On the left, a middle section with a clamp knob is being aligned with a top section. On the right, the two sections are fully joined, with the clamp knob tightened.

3 Loosen arm clamp knobs. Fold out arms on top and bottom sections, then re-tighten arm clamp knobs.



The diagram shows a side view of the antenna with the top and bottom arms folded outwards. Curved arrows indicate the direction of movement for the arms.

4) Install antenna onto the Permanent Mounting Assembly. As shown at right, slide the bottom of the bottom section onto the Permanent Mounting Assembly's insulator rod. As with assembly above, the slots on the end of the bottom section should fully engage with the mounting assembly's clamp knob stud. Firmly tighten the clamp knob.



5.3 Connections

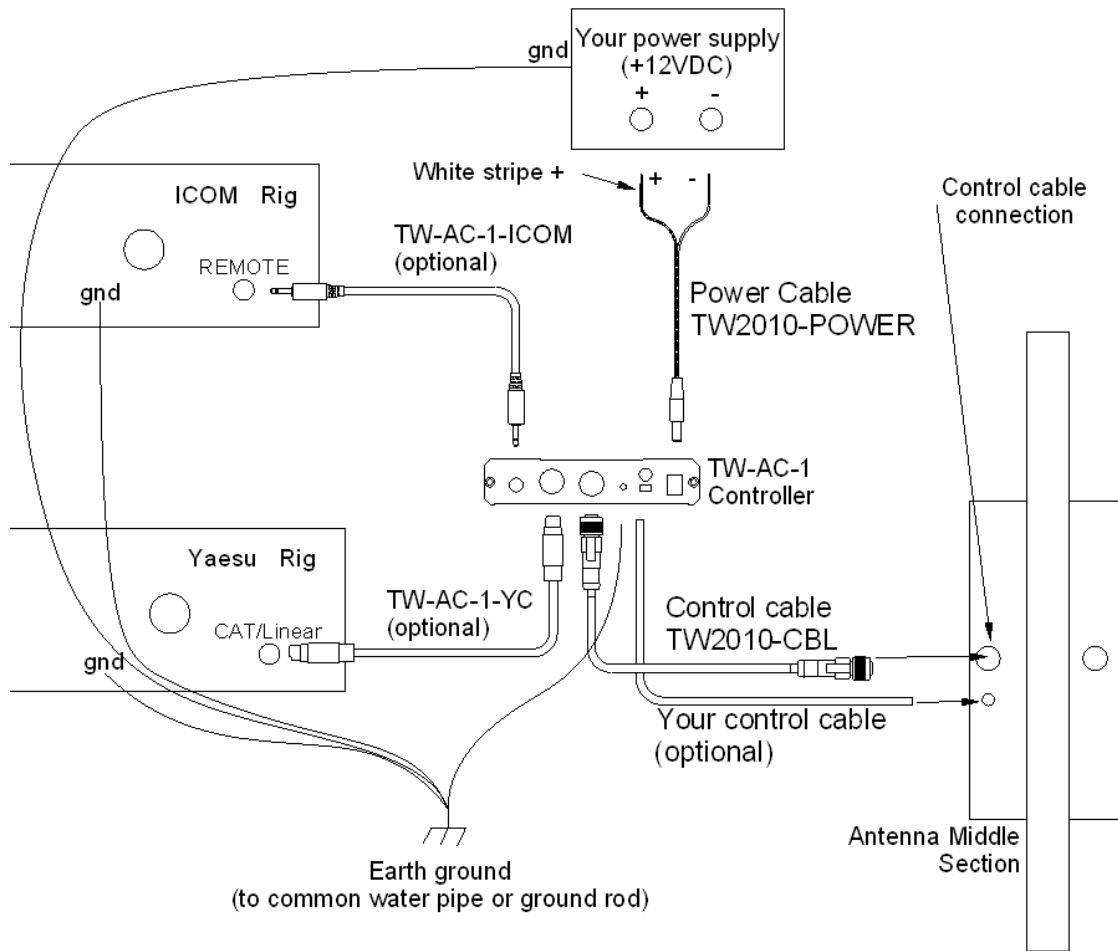
⚠ Warning: Turn off equipment before making or removing any connections. Failure to do so could result in equipment damage.

See the figure on page 15 for connection details.

Ground connection. For reduced noise and RF exposure in your shack, all equipment should be grounded to *one common point* on a water pipe or a ground rod driven into the earth. The TW2010's controller has a #6 ground screw installed on the back for this purpose, labeled "gnd."

Accessory cables. The cables labeled TW-AC-1-ICOM and TW-AC-1-YC are optional accessories available from Trans World Antennas. These cables interface the controller to a compatible Icom[®] or Yaesu[®] transceiver, respectively, and are required to operate your controller in automatic mode.

Power cable. The power cable (TW2010-POWER) is two-conductor cable with a 2.5mm DC power connector installed on one end and stripped and tinned conductors on the other end. This cable must be wired into a +12-18V DC power supply with 200mA of current to spare. One conductor has a dashed white line, designating the positive side of the connection.



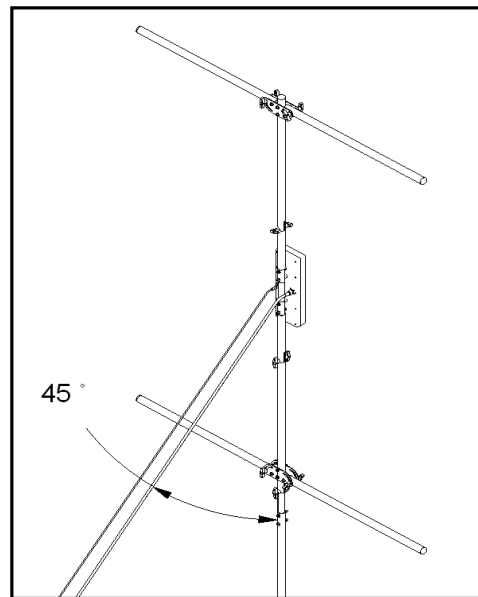
Controller connection details

Stock control cable. The 5-conductor control cable that shipped with your antenna (TW2010-CBL) has screw-lock connectors on each end. These simply plug into your controller and the antenna's switching array box. The cable connectors will attach to the mating connectors in only one orientation. Insert the cable connector into the mating connectors and screw the metal collar snugly. *Caution:* over tightening may lead to difficulty in cable removal later.

Custom control cable. The cable designated "Your control cable" in the figure above is an alternative way to connect your antenna to its controller. This should be a 5-conductor cable, not to exceed 0.312" in diameter. The leads of the individual conductors should be stripped back about ¼". The overall length of the cable should not exceed 150 feet, as the losses in the wire will prevent the antenna's switching array from operating properly. See page 16 for more information.

Coax cable. Connect your coax cable to your radio and to the SO-239 on the TW2010's switching array box. It is highly recommended to use *at least* 65 feet of coax on your TW2010. For best performance, use a high quality RG-8 or RG-8X coax cable.

Final connection notes: The control and coax cables should feed the antenna at a 45-degree angle as shown in the figure at right. Failure to do so will result in parasitic coupling and cause higher than normal VSWR readings.

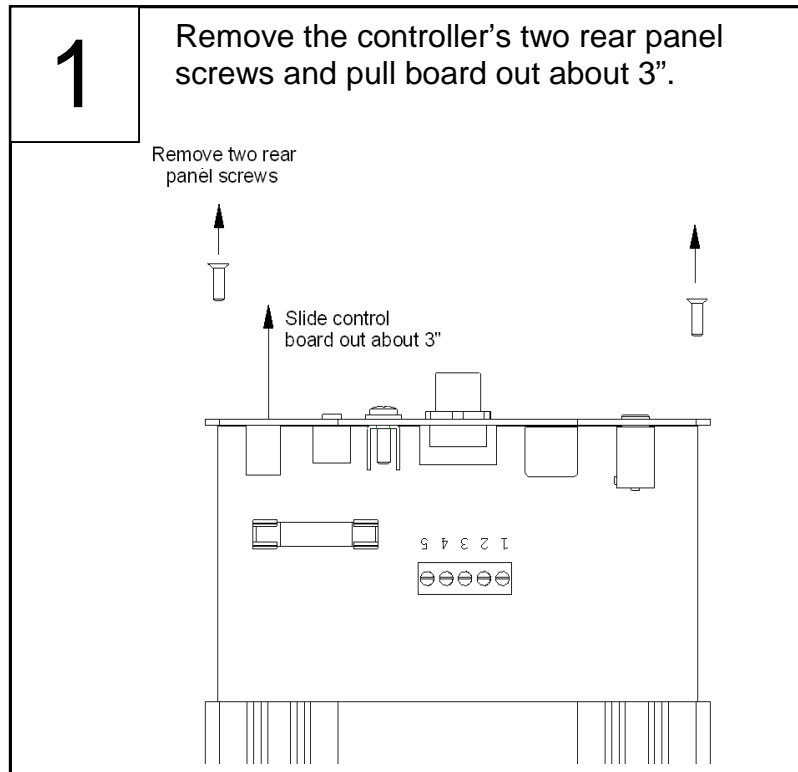


Custom control cable. A custom control cable can be used if you wish to use an existing cable, if the supplied control cable is too short, if you wish to reserve the supplied cable for travel applications, etc. If you use your own control cable, it should contain at least five conductors, each at least 24AWG. The cable should not be more than about 150 feet in length to avoid excessive voltage drop. The cable must be installed into the switching array box on the antenna and in the controller using a small flat head screwdriver. The width of the screwdriver blade must be no more than 1/8".

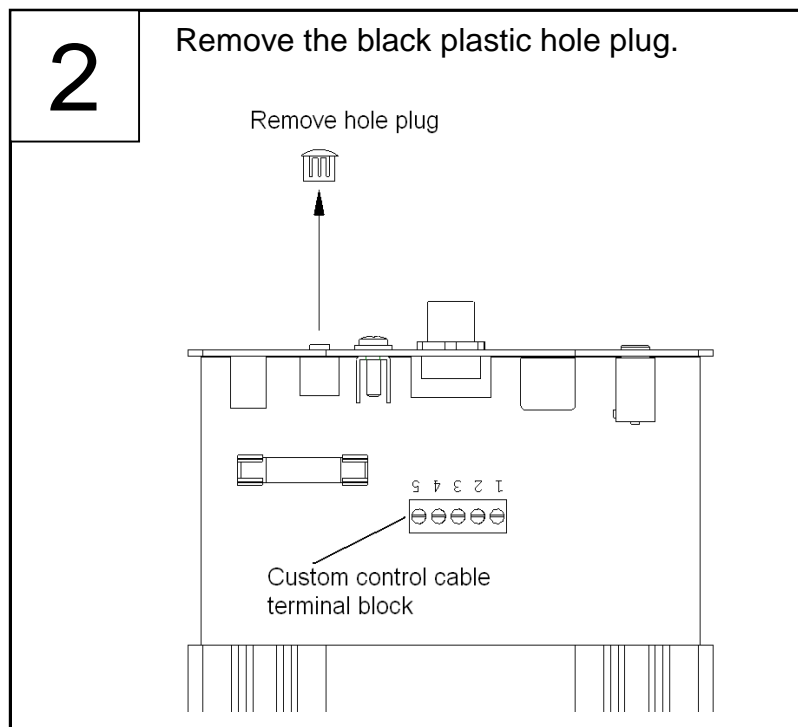
⚠ Warning: Make sure that the controller power cable is unplugged from the back of the controller before opening. Failure to do so may lead to damage to the controller.

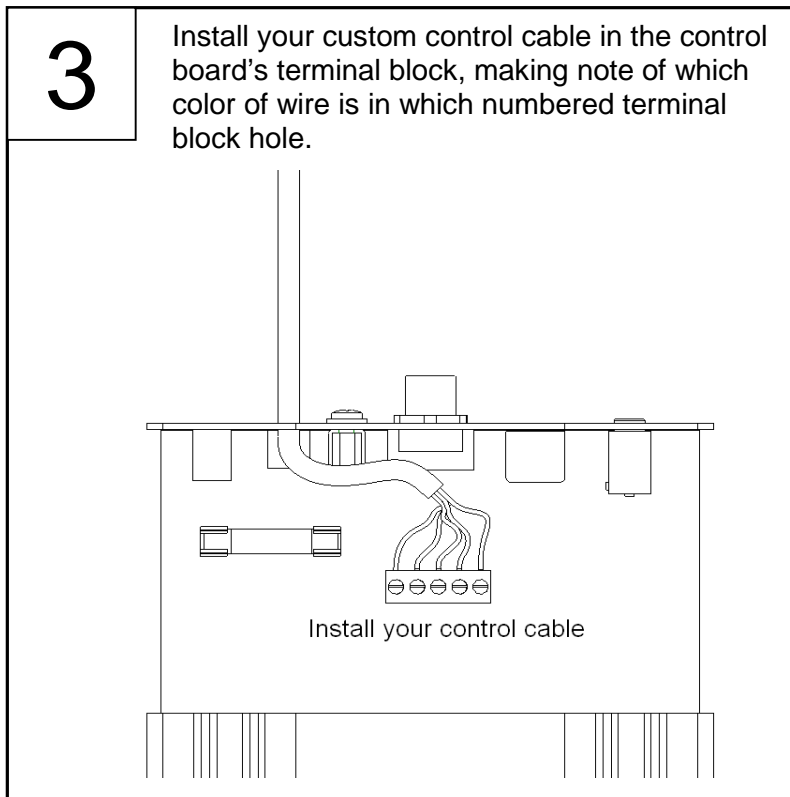
Install the cable into the control box

1) Open controller enclosure. Remove the two black rear panel screws from the controller, as shown in step 1 at right, and pull the control board about 3" out of its enclosure.



2) Remove hole plug. Remove the black plastic hole plug labeled "Aux" on the rear controller end panel, as shown in step 2. The "Aux" hole is where your custom control cable will enter the controller.





3) Connect custom control cable. Install your control cable as shown in step 3 at left. About 1.5" of outer jacket of your cable should be stripped off, and about ¼" of the individual conductor should be stripped bare. Insert each conductor into a hole in the front of the terminal block, and using your flat head screwdriver, tighten the screw in the top of the terminal block down snugly. Give each conductor a gentle tug after installation to make sure it's in securely.

If your custom control cable has more than five conductors, be sure to snip off and tape up the excess conductors to avoid a short circuit condition in the controller later.

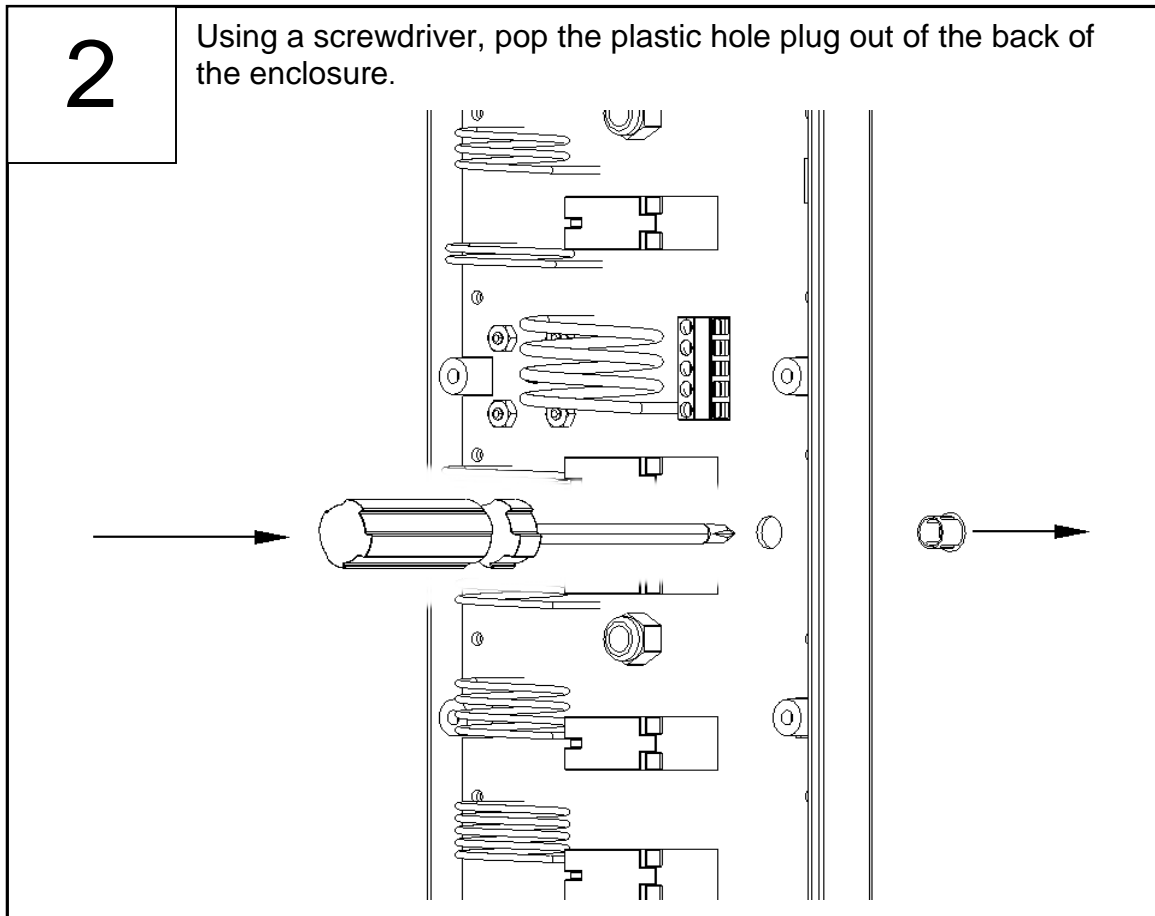
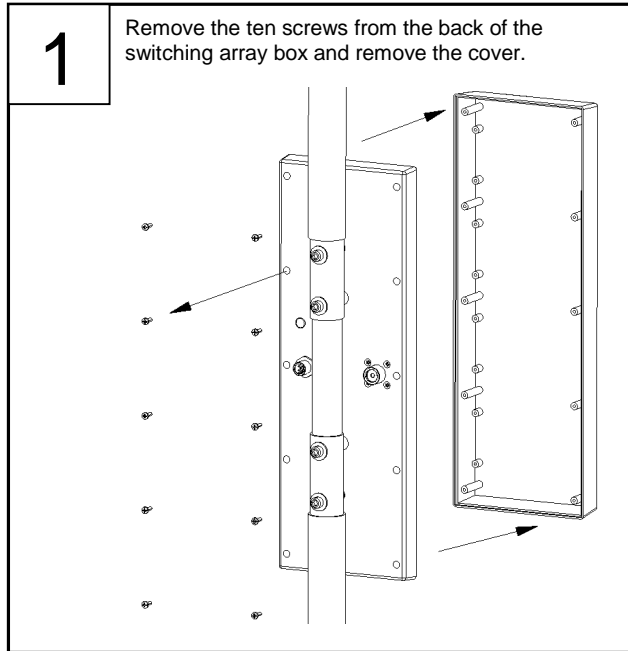
Write down which color of wire you insert into which hole (the holes are labeled 1 through 5 on the circuit board). You will need this information when you install the other end of your control cable into the switching array box on the antenna structure.

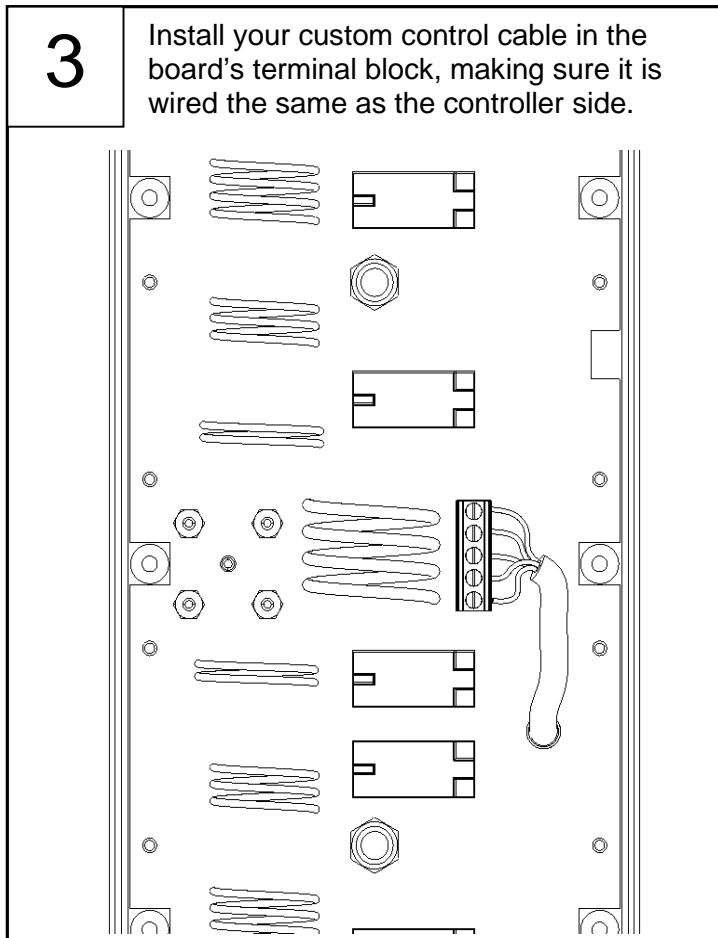
Reinsert the control board back into its enclosure and replace the two end panel screws.

Install the cable into the switching array box

1) Open switching array box. Remove the ten screws from the back of the switching array box and remove the cover. Be careful not to lose the screws as you remove them.

2) Remove hole plug. Using a small screwdriver, pop out the black plastic hole plug as shown in step 2 below. Save this hole plug if you think you will want to remove your custom control cable later. The plug will add to the box's weather resistance.





3) Connect control cable. Next, install your control cable as shown in step 3 at left. About 1.5" of outer jacket of your cable should be stripped off, and about ¼" of the individual conductor should be stripped bare.

Make sure the color / number combination you use is the same as that which you used for the controller.

Insert each conductor into a hole in the front of the terminal block, and using your flat head screwdriver, tighten the screw in the top of the terminal block down snugly. Give each conductor a gentle tug after installation to make sure it's in securely.

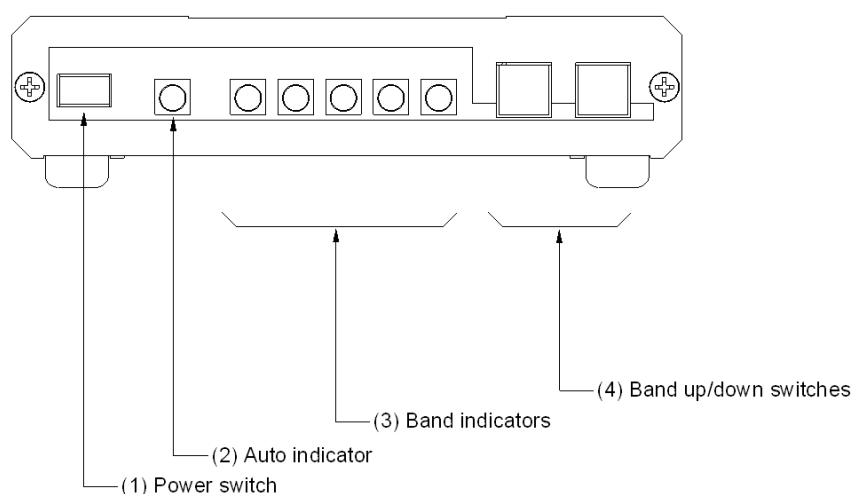
If your custom control cable has more than five conductors, be sure to snip off and tape up the excess conductors to avoid a short circuit condition.

Place the cover back on the switching array and replace the ten screws. Make sure the screws are tight enough to hold the cover securely on, but be careful not to over-tighten, as the screw holes could strip out.

5.4 Controller Operation

The controller provided with the TW2010 allows for quick and easy band changes. The TW2010 controller can be operated in manual mode or automatic mode⁵.

Power. Depress the red power switch on the front of the controller. On power-up, the green 10m LED on the face of the controller should light.



Automatic mode. The amber LED labeled “A” indicates automatic mode when lit. To activate automatic mode, press both the “Band Up” and “Band Down” buttons simultaneously. The automatic mode indicator LED should light in confirmation. Activation of automatic mode may cause the controller’s selected band to change in accordance with the information received from the connected transceiver (See pages 9-11). The “Rig Select” switch on the back of the controller must be switched to the correct transceiver type. To deactivate automatic mode, press either the “Band Up” or “Band Down” buttons.

When the controller is used with Icom[®] transceivers, the transceiver must be set as follows:

- CI-V baud rate: 9600 bps
- CI-V transceive: ON
- CI-V with IC-731: ON

When the controller is used with Yaesu[®] transceivers, the transceiver must be set as follows:

- CAT/LIN/TUN: LINEAR

⁵ Automatic mode requires a compatible transceiver. See pages 9-11 for more information.

Manual mode. On power-up, the controller will be in manual mode (automatic indicator LED off). In manual mode, press the “Band Up” or “Band Down” buttons to cycle through the bands. Pressing either of these buttons will release the controller from automatic mode.

Out of band range. If your transceiver is set to a band outside of the supported bands in automatic mode for Icom[®] transceivers (below 10m or above 20m), the amber automatic indicator LED will flash. To correct the problem, simply set your transceiver back to the 10m to 20m range. The automatic indicator LED should stop flashing.

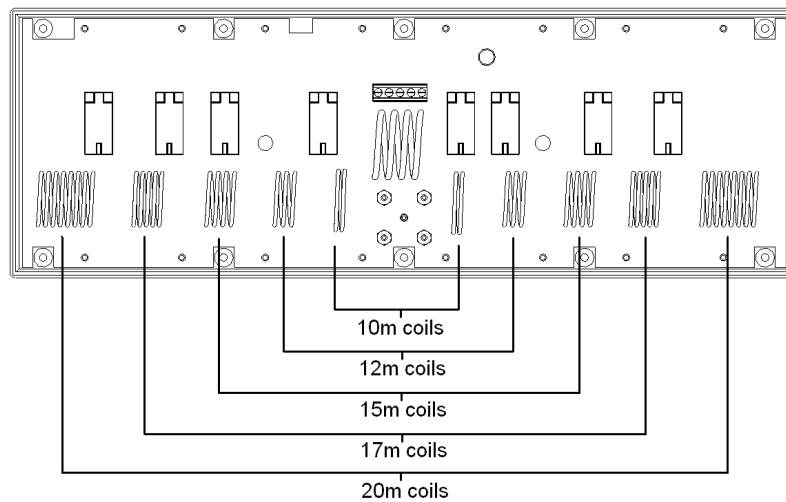
5.5 Tuning

Although your TW2010 was factory pre-tuned⁶, the environment in which your antenna is placed has an effect on tuning. Some minor adjustments may be necessary to tune the antenna to the desired center frequency for each band. Check the tuning of the antenna using an analyzer or the SWR meter on your transceiver before performing the tuning process. Post-factory tuning might not be required.

⚠ Danger: Do not apply RF power to the antenna while anyone is standing near the antenna. RF burns or electrical shock may occur, causing severe injury or death.

Switching Array Operation. All of the coils on the top half of the switching array are series connected. A relay shorts the signal to the metal structure, bypassing all of the coils above a given band (the bottom half of the switching array is effectively a mirror image of the top half). The tuning for each band depends on the tuning for the previous band. Therefore, tuning must start at the 10m coil pair and progress in order up to the 20m band.

⁶ The antenna is pre-tuned to the center of the general portion of the phone band under circumstance that may differ from the environment of your specific installation.



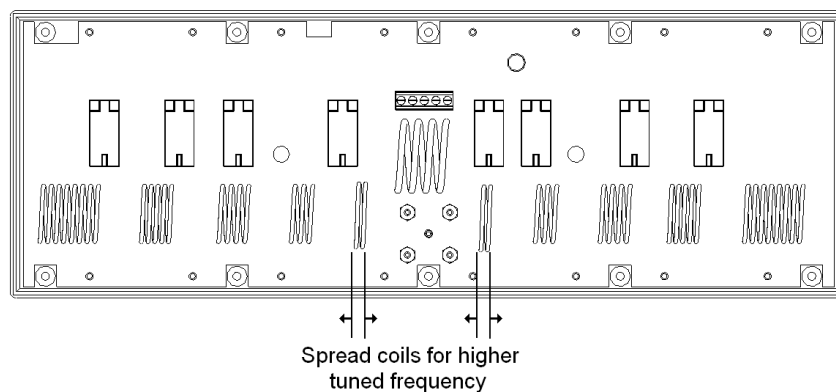
Equipment. The tuning process requires Voltage Standing Wave Ratio (VSWR) measurement. These measurements can be accomplished using most any antenna analyzer. However, these devices typically generate a very small signal (less than 0.2W), and may show higher than expected VSWR readings. A reading of 1.3:1 at the tuned frequency is typical at this low power. The VSWR readings should decrease once the antenna is used with 5W of power or more. The VSWR reading on your transceiver will likely show a lower VSWR than a low-power antenna analyzer.

Cables. Make sure that the coax used for the tuning process is at least 65 feet long, and that both the coax and control cable are installed at a 45 degree angle as described on page 16.

Tuning. To tune each band, each of two coils in the coil pair for that band must be spread or compressed (see figures below). By spreading each coil in the coil pair, the tuned frequency for that band will increase. Likewise, compressing the coils in a coil pair will decrease the band's tuned frequency. You should try to spread or compress each of the two coils in a coil pair by the same amount.

1) Preparation. To begin the tuning process, remove the switching array cover, as in step 1 on page 19 and connect the control and coax cables to the switching array box, as described on pages 15 and 16. The coax you use for the tuning process should ideally be the coax you plan to use for the antenna during normal use. Connect the coax cable to the device you wish to use to measure VSWR, and connect the control cable to your controller.

2) Start at 10m. Switch your controller to the 10m band and determine to what frequency the antenna is best tuned. If you wish to increase the tuned frequency, spread open each of the two coils labeled "10m" on the switching array circuit board, as shown in the figure below.



3) Tune next band. Once the 10m band is tuned, switch your controller to the 12m band and tune the 12m band in a similar fashion as you tuned the 10m band in step 2.

4) Repeat for remaining bands. Repeat the tuning process for the 15m, 17m, and 20m bands, in that order.

Final tuning notes

Due to parasitic coupling, installing your antenna on the optional Quadrapod stand may cause the tuned center frequencies to differ from those of a permanent installation.

If lower bands exhibit very low VSWR, but higher bands suffer VSWR problems (or vice-versa), the spacing of the center coil can be adjusted to effect which bands tune best. By spreading the center coil slightly, the low-frequency bands will tune better, and by compressing the center coil, the higher-frequency bands will tune better. But note that if the center coil is changed, the tuned center frequencies may change and the tuning process above will have to be repeated.

If tuning proves difficult, follow this checklist to eliminate common tuning problems:

- Is your antenna placed at least 30 feet away from other objects (buildings, people, trees, etc.)? The ends of the antenna's arms are very sensitive to coupling with external objects.
- Is your antenna installed such that the arms are at least 24" off the ground? The spacing between the antenna's arms and the ground should be between 24" and 36".
- Is your coax cable a high-quality RG-8 or RG-8X cable?
- Is your coax cable long enough? At least 65 feet of coax should be used for best results.
- Are your coax and control cables installed at a 45-degree angle with respect to the antenna as in the figure on page 16?
- Are you checking the VSWR using less than five watts? Once at least five watts is applied to the antenna, VSWR readings may improve significantly.

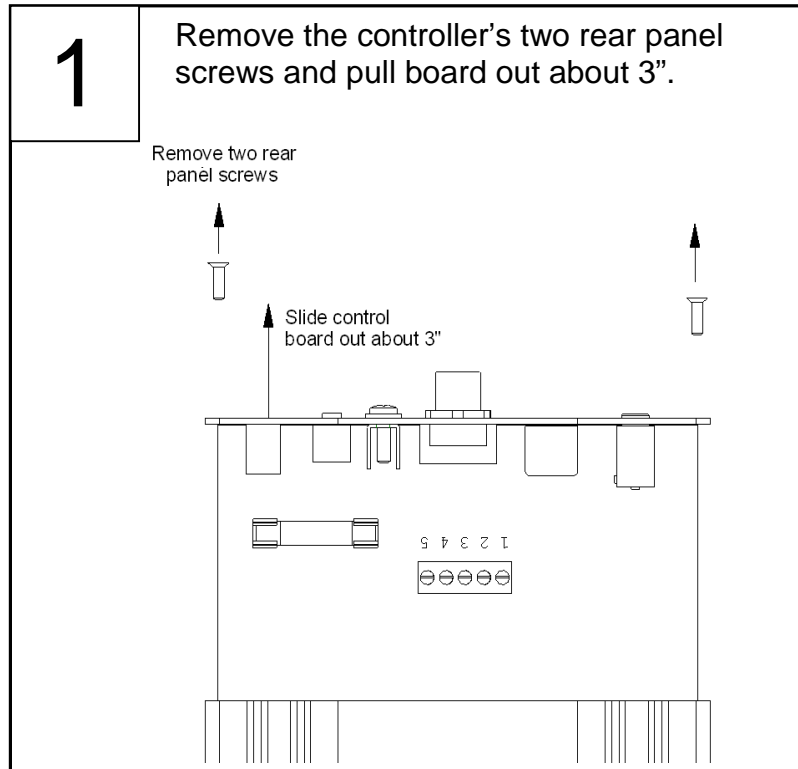
5.6 Fuse Replacement

To help protect your antenna and other equipment connected to it, the controller is provided with an internal fuse. In the event that the fuse must be changed, follow the steps in this section to change the fuse.

Fuse type. The fuse used by your controller is a 1-1/4x1/4 glass fuse rated at 200mA.

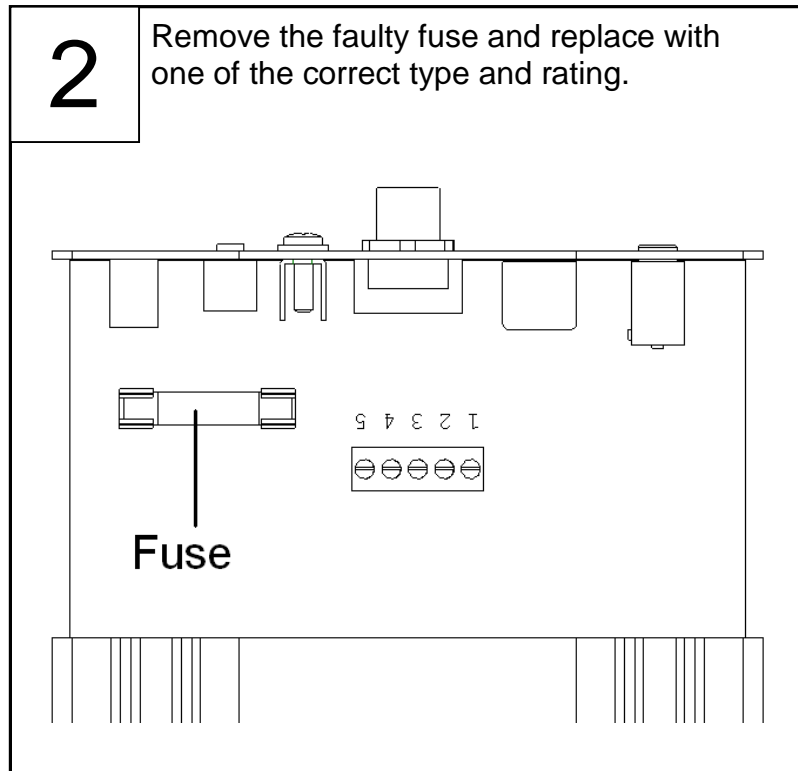
⚠ Warning: Replace only with the same type and rating of fuse. Failure to do so could cause permanent damage to your controller, antenna, or other connected equipment, and will void your warranty.

1) Open controller enclosure. Remove the two black rear panel screws from the controller, as shown in step 1 below, and pull the control board about 3" out of its enclosure.



2) Replace fuse. Carefully pull out the old fuse. Install the new fuse, making sure the new fuse is 1-1/4 x 1/4, 200mA. Discard the old fuse.

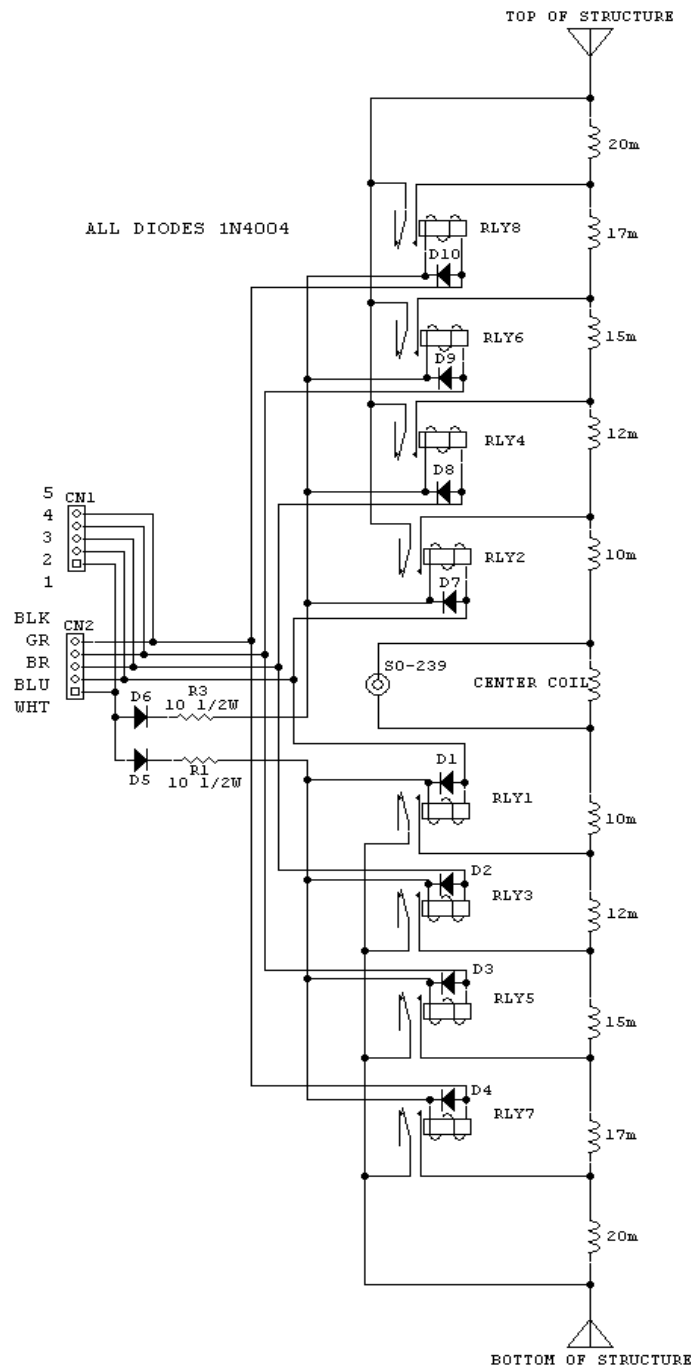
3) Replace control board. Re-insert the controller's circuit board back into its enclosure and replace the two panel screws.



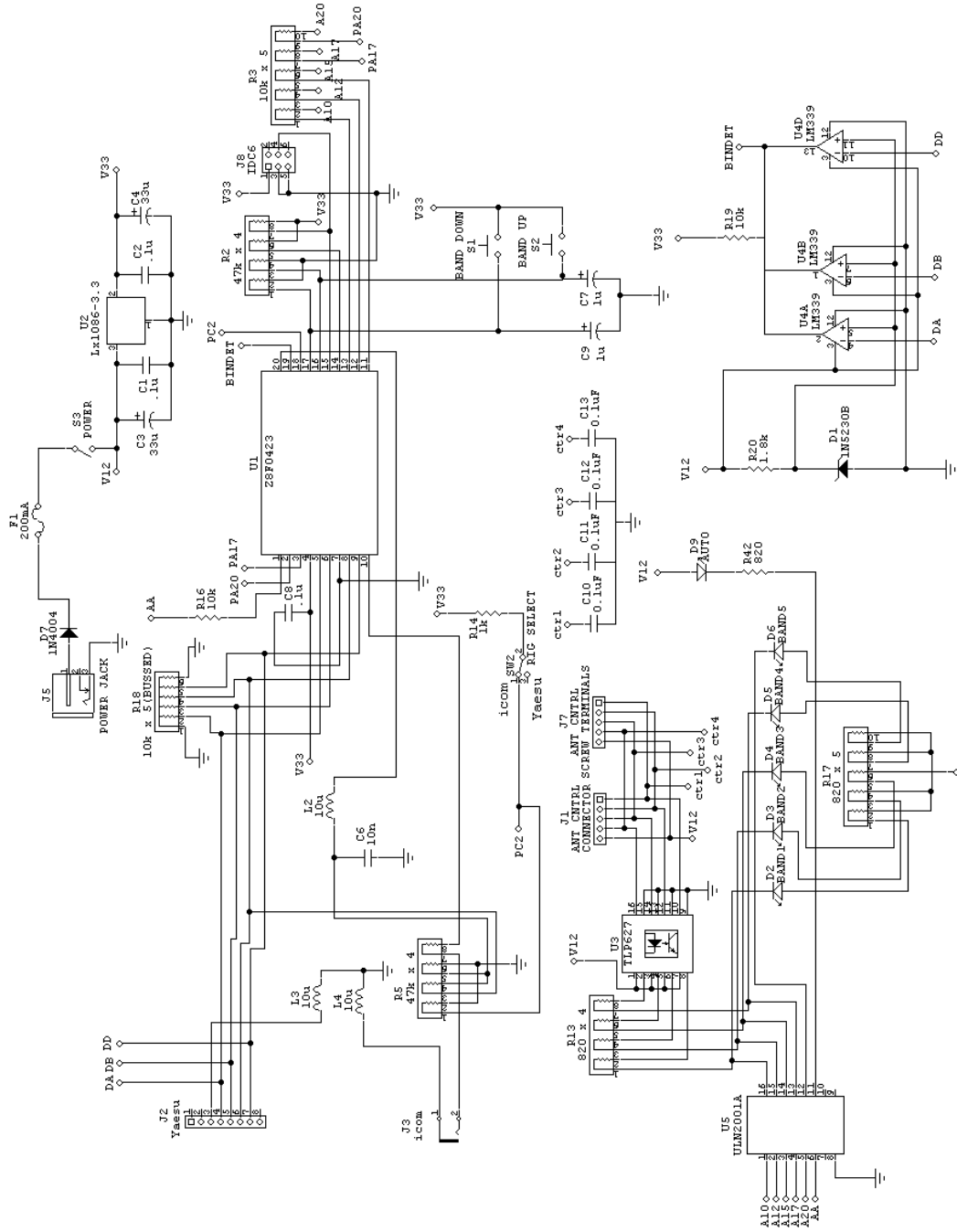
6 Schematics

This section contains the schematics for the TW2010's TW-RB-1 switching array and TW-AC-1 auto controller.

TW-RB-1
Switching Array



TW-AC-1
Auto Controller



7 Accessories

Below are the accessories available for your TW2010 antenna. Visit our website www.TransWorldAntennas.com for more information.

 <p>TW2010 AdventurerTM Quadrapod Four-leg folding stand (22" tall, 45" x 45" footprint)</p>	 <p>TW2010 AdventurerTM Transport Bag Handy travel bag to carry your TW2010 on field day outings.</p>
 <p>TW-AC-1-YC Interface cable for use with select Yaesu[®] transceivers (8-pin mini-DIN, 6 feet)</p>	 <p>TW-AC-1-ICOM Interface cable for use with select Icom[®] transceivers (1/8" mono, 6 feet)</p>

8 Contact Information

If you need to contact Trans World Antennas, just drop us an email at:

support@transworldantennas.com

Use this email address for help with installation, setup, tuning, or operation, for product or company information, or warranty/money back guarantee claims.

Check back at our website frequently for product updates at:

www.transworldantennas.com

We can also be reached through our web-based contact system on the website.