

## Array Solutions 160/80/75M Vertical Tuner

### High Performance 160/80/75m Tuner



**Array Solutions Tuner System for AS80V-FS or any 68-70 ft tall vertical**

#### **Congratulations.**

You have selected one of the finest high performance low loss vertical tuner systems made. We have under-rated the power capability of this system to assure the user high reliability under heavy use such as in a 48 hour radio contest. Please contact us if you have any questions about the product and please send a picture and description of your station showing the control system installed and in use.

The Tuner system has three components: a relay box that mounts to your vertical base, and the external loading coil and the LED controller. The system will tune up fast with a basic VSWR meter.

#### **Wiring the system:**

Take the cover off the switch box and unwrap the circuit board. Wire the control cable before mounting the board to the box.

You will need a cable with 3 wires. Small gauge wires are fine and will fit inside the boxes better than large rotor cable. For runs of less than 500 feet #18 or larger gauge stranded wires will be adequate. The relays draw only 120 ma at 12V DC. Try to use a supply that has a 13.8V+ DC output.

You will also need a small two-wire 13.8-15V DC line for power. A 13.8VDC 1 amp power supply should be ample. But please use a reliable power source, since wall wart transformers have a habit of falling out of plugs and going bad in the middle of a contest.

The silk-screen on the PCB indicates where to wire the +12 V DC (+13.8V DC) supply and its RETURN or GND wire to the Power Supply.

Wire the control switch PCB to the relay box per the following Table 1.

Control Switch PCB Terminal Strip	Relay Box Terminal strip
1 - 160M	1 160
2 - 75M (SSB) position	2 SSB
3 - 80M no wire	3 no wire
4 - no wire	4
5 - no wire	5
6 - no wire	6
+12V - wire to your 13.8 V DC supply	
GND - Ground return to your DC supply	GND - return wire back to control switch

Table 1

**Please use a connector on a short piece of cable so you may disconnect the control unit from the control cable when not in use, or when a thunderstorm arrives. We also recommend the use of a surge protector at the station end for the control cable and RF cables, such as the model 348 and 303U products we sell. A little money spent now can save valuable radios later. We have MOV protection inside the relay box.**

Place the control switch PCB inside the control switch and secure the PCB in place with the rotary switch hardware. The LEDs should just protrude through the holes provided for them.

Use the tie wraps supplied as a strain relief when the control cable is fed through the grommet hole. Snug the tie wrap next to the hole in the back of the box to prevent the wire from being pulled and stressing the PCB.

Do the same with the 13.8 VDC-power wires you will supply through the other grommet hole.

### Relay Box

Route the control cable through the rubber grommet hole in the relay box tray. Use a Ty-wrap™ as a strain relief. The relay box terminal strip is marked to indicate the connection to terminals. See the above **table 1** for the proper connections. There is no terminal 1 since it is the no power default position. The relays are bypassed with MOVs, capacitors, and diodes for RF and lightning suppression. See **Fig. 2** which is a picture of the inside of the phasing box.

## Figure 2 Description

**Feedline** RF connector is where your 50 ohm feedline connects.

**Terminal Strip** – attach your control cable to this

**Brass Bolt External Coil Taps** – use the supplied copper foil strap and solder to coil after you find the correct points. Top to top of coil, CW for 80m CW lowest VSWR, 160m for lowest VSWR.

**160m Matching Jumper** – tap coil for perfect 1.0:1 match on 160m usually 2<sup>nd</sup> turn down

**Ground Bolt** – attach this to ground rod and radial screen.

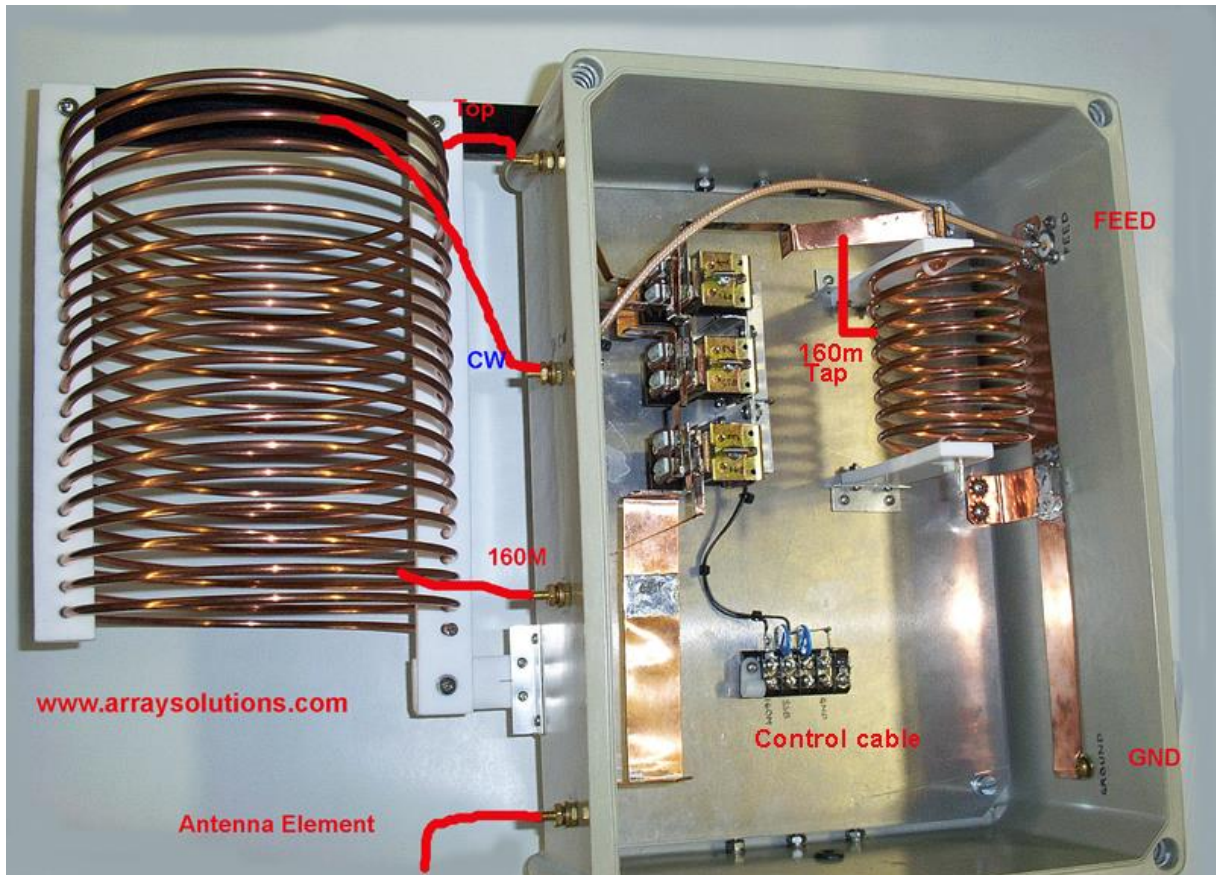


Figure 2

## Setting up the system

### Mount the box and large coil

The coil mounts to the top of the box with stainless hardware and bolts in the holes provided. Also you will find a mounting bracket on the top and bottom of the box that you can mount to your antenna base by drilling holes for two bolts through the base channel leg. Mount it so the coil is facing out on the side that the antenna winches down. Mount the box fairly close to the radial screen plate.

### Attach Copper Foil Leads and Antenna Lead

You will find 3 foil leads that you should attach to the brass bolts for 75m, 80m and 160m operation. Place them in the positions shown on fig 2. Just wrap the lead around the coil for now to make an electrical connection. You may find some large alligator clips useful for holding the foil securely on the coil. You can solder the "top of coil" tap to the very end and top of the coil. Dress is along the side of the box away from the other bolt above it and well away from the coil.

Next attach the Antenna Lead wire to the Antenna. You can use one of the AI Clamps to attach a lug or just drill the bottom tube of the antenna for a stainless steel ¼-20 hex head bolt and hardware.

Attach a ground copper wire or foil to the ground bolt and to your antennas systems radial screen. You should also have used a ground rod in the base of your antenna that you should attach the radial system to as well.

Attach the feedline to the input RF connector, and wire the control cable to the terminal strip based on table 1. 160, 75m SSB, and GND Return.

Place a static bleed choke between the antenna lead bolt and the radial ground screen to bleed off static charge. We sell these, or you may make your own.

### 75M SSB Tune Up Procedure – Do this first

**Do NOT use high power! 10 watts will be fine. Be careful you can still get a burn on this coil even at 10 watts**

Position 2 on the LED controller is the SSB position and there will be voltage applied to relay K2. This is your 75M or SSB position. Using a VSWR meter (one that is not swamped by nearby BCB strong carriers) you should find a "dip" in VSWR in the 80m band. You may need to take the tip off the top of your vertical or adjust its length for where you wish the dip to be. Most users either tune this to 3790 KHz or 3650 KHz. If you have a very good radial system you will see that you can achieve a VSWR of less than 2:1 for the whole 80m band with the Array Solutions AS80V-FS vertical. So place your VSWR dip at your favorite 75m frequency.

The VSWR dip will vary from 1.4 to 1.0:1 depending on your radials and ground conditions.

## 80M CW Position

Now select position 3, no relays are energized, and you should see a dip lower in frequency. Move the CW tap (fig 2) to your favorite CW frequency area perhaps 3535. You will find you have a low VSWR over the whole CW band. So don't worry about placing the dip exactly at 3510 for instance. You should only need 1 or 2 turns of the large coil to achieve this.

## 160M Position

Lastly place the controller in position 1. Relays K1, and K3 should pull in. Put the 160M match tap on the second turn down on the match coil inside the box (fig 2). Wrap it around the coil once. Then adjust the 160m large coil tap to the portion of the band you wish to operate. You will see a very narrow dip in frequency. Add more coil to lower the frequency. Once you are happy with the frequency of the dip you can tweak it to exactly 1.0:1 VSWR by moving the match coil tap.

You will achieve 30-50 KHz of operating range in the 160 meter band. This is normal and is to be expected with a 1/8 Wavelength vertical. Loss in these large coils is very small.

Check the 75, 80, and 160m positions and adjust if needed. Then cut the foil and solder in place.

## Specifications

<b>HxWXD</b>	14" X 11" X 8" NEMA 4 Fiberglass Heavy Duty Box
<b>Weight</b>	15 lbs
<b>Power</b>	5 kW CW / 10 kW PEP
<b>Relays</b>	Double pole high power RF relays
<b>Hardware</b>	Stainless and #10 Brass bolts for RF and ground connections
<b>Coils</b>	External 6.5 inch diameter and 2.75 inch diameter, Qs in excess of 800

<b>Standoffs</b>	Teflon and Delrin
<b>Box</b>	NEMA 4X corrosion, harsh chemical resistant, and waterproof

**Thank you for purchasing this high quality phasing system.**

**Please visit our website at [www.arrayolutions.com](http://www.arrayolutions.com)**