# Array Solutions

# StackMatch II Plus


# User's Guide

Thank you for purchasing the StackMatch II. Since the StackMatch introduction it has become a standard for phasing mono-band and multi-band beams, logs, quads, etc. The unit comes with our Life Time Warranty. If it should fail for any reason, save for an act of God, we will repair or replace it for free. You only pay for shipping back to us.

# Controls

The StackMatch II Plus control switch box has a rotary switch and three LEDs which display the antennas selected. The LEDs will light to indicate in the same pattern as chosen with the switch. Antenna 3 is your upper or U antenna, and antenna 1 is your lower or L antenna on the switch. When you rotate the pointer knob you can chose U, L, B (both), or AUX. The other positions will be Off. The StackMatch II Plus will default to full stack (both in phase) when no relays are energized. Pretty handy if you should have a 12V DC supply failure in a contest.

NOTE: The StackMatch II PLUS uses the AUX control line to insert the 180 degree phase shift transformer. Wire the AUX terminal in the controller to the AUX (BOP or Both out of Phase) terminal in the StackMatch II PLUS


# Control Selection

Selecting the positions is very simple for Upper, Lower, BIP, and BOP:

U – Upper antenna only – top (3) LED will light

L – Lower antenna only – bottom (1) LED will light

B – BIP - both antennas are fed in phase (BIP) – LEDs 3 and 1 will light

AUX – BOP - both antennas are fed out of phase (BOP) – Middle LED (2) will Light.

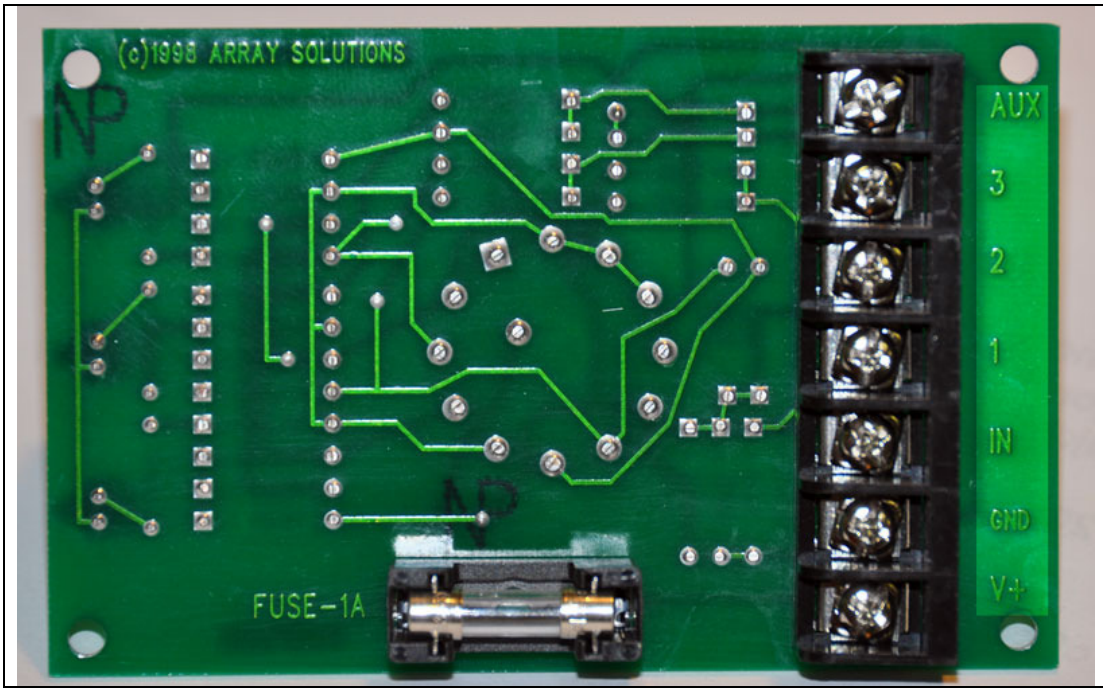
# Wiring the StackMatch II Plus

The StackMatch II Plus control cable should contain at least 5 conductors. 4 wires and a shield would be OK. 18-20 gauge wires will work for even very long runs since the relay currents are only ~40 ma.

You will also need a 2 wire 12 VDC cable that you will wire to the terminal strip inside the controller box in your shack. +12v does not go directly to the relay box. You may use a power supply up to 15V DC safely.

Remove the control box cover. The circuit board is wrapped inside the box with a control knob and a couple of wire ties.

A grommet is provided in the back to push the control cable through. Strip the insulation of the 5 wires and use crimp spade lugs or just tin them and insert into the terminal strip and tighten the screws. See the photo below for the terminal strip and its labeling.




Make a chart of your wire colors so you can connect the correct wires in the StackMatch II Plus relay box. Use the Ty-Wrap™ supplied to secure the cable from pulling out of the box.

In the controller, wire the V+ and GND terminals to the power supply, and wire your control cable to the 1, 3, IN, AUX (BOP) and one wire or the shield to the GND terminals of the circuit board. Terminal 2 is not used.

Install the circuit board in the controller chassis and assemble the PCB to the control box with the hardware provided. Also attach the knob to the shaft of the rotary switch using a small screwdriver to tighten the setscrew in the knob to the shaft. There is a flat spot on the shaft where the setscrew will tighten.

You may want to terminate the control cable with a plug such as a *Cinch Jones* Plug a foot or so after it leaves the control box to make it easy to disconnect the box from the cable. We also recommend you use a lightning surge protector device like the Array Solutions AS-8SP (http://www.arraysolutions.com/Products/surge_arrestor.htm) out on your tower.

In the relay box, wire the other end of your run of control cable to the 1, 3, IN, BOP and the GND terminals of the relay box.

IN

3

1

BOP

GND

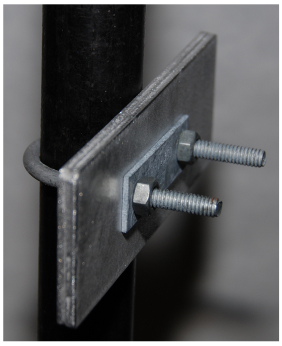

# Weatherproofing

**A word about weatherproofing the cable, connectors and box:** There are many viable techniques to weatherproof your connectors, so please use your favorite one to keep your outside connectors protected. Do not seal the bottom tray in the Lid since allowing the box to "breathe" will help keep condensation from building up. The PC board is coated and suspended above the box, and all hardware is stainless steel. All relays are sealed. This unit should give you very long service without any extra waterproofing.

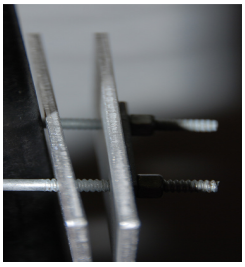
# Installation

Mount the StackMatch II Plus using the supplied galvanized U-bolt and aluminum plates to the tower at the position you want. Most often this is near the base of a tower to avoid climbing should a need to make adjustments or for future maintenance.

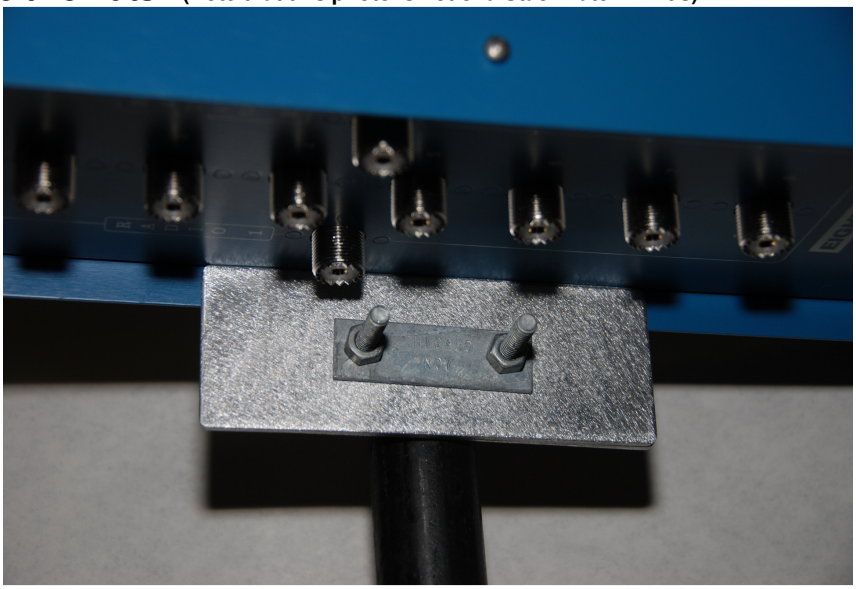
**We have designed a very simple bracket that allows mounting to a tower leg or other pipe. It is constructed of two plates, and one U-bolt as shown here.**



**To mount it on your tower, remove the two nuts from the U-bolt, and position it on your tower leg at the point where you want the StackMatch II Plus to be placed. Leave the nuts loose enough to fit the side of the chassis between them.**



**Position the edge of StackMatch II Plus cabinet between the two plates, and tighten the two nuts . (Note that this photo is not of a StackMatch II Plus).**



The location for the StackMatch II Plus can be physically between the antennas although most prefer to mount the StackMatch at the base of the tower. If you choose to do this, remember that you still must cut equal lengths of feedline for each antenna. Note: the lower antenna cable will be extra long, so plan to coil it up loosely and use ty-wraps to keep it neat at the base of your tower.

There is no need to use ¼ wavelength cables or odd multiples of ¼ wavelength cables, but you may do so if you wish. Just make the cables equal in electrical length.

Attach the cables to each antenna, and dress them along the tower to the StackMatch II Plus relay box. Attach the Upper antenna to the number 3 port, and the Lower antenna to the number 1 port. Connect a feed line from the shack to the Feedline IN port. Make sure you weatherproof your connections especially at the antennas. We also recommend a surge arrestor in the coaxial line like the model AS-303U which is also available from Array Solutions.

This completes the installation.

# Operation

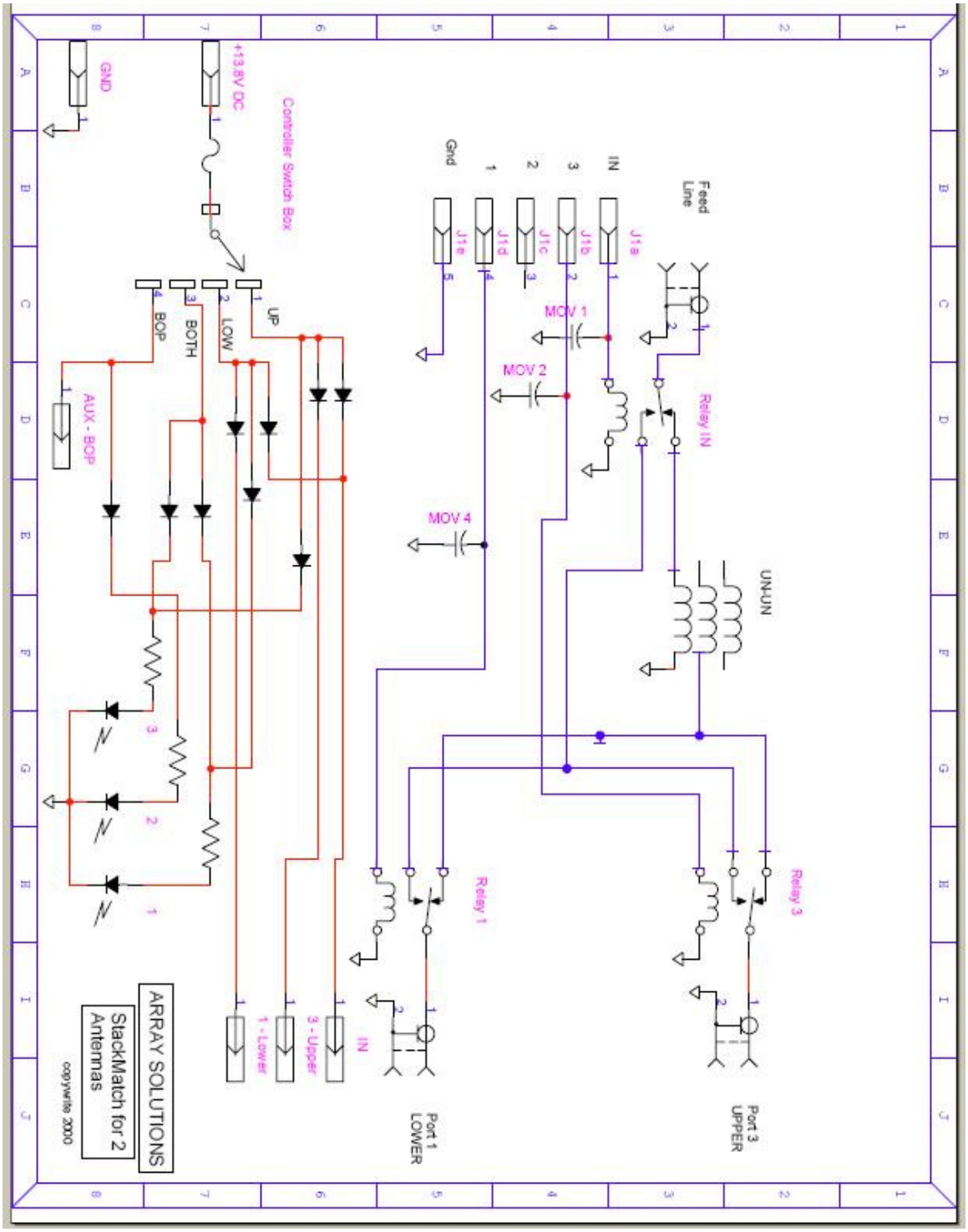
The SWR of the antennas should be the same as they were as individual antennas. You can check them to make sure they are by selecting the individual antennas and running an SWR curve. Select the B (or BIP) combination of antennas and verify the curves are about the same. Typically they will move up or down only 10 KHz. If you had a 1:1 SWR with the individual antennas you should also see a 1:1 SWR with the combinations of beams. The antennas should ideally be optimized to have identical SWR curves. Most customers observe that the SWR curve flattens out when used in a stack.

Determining how much power gain you achieve can be modeled with the antenna programs available. You should be able to verify the stack is working by listening to DX signals and selecting various stack combinations. Remember different propagation modes will favor different arrival angles, and you may find the lower beam or the BOP position works best in some conditions vs. the upper or BIP position. This is the beauty of being able to choose the takeoff angles of your signals to match the conditions during the day. Work with it several days to get a feel for what stacks can do for you.

# BIP-BOP Operation

Both-In-Phase and Both-Out of-Phase operation is possible for two multi-band or mono band antennas. The reason to use BOP operation is that two beams fed 180° out of phase will result in a very high angle take-off lobe. This is useful for making a high stack of antennas (that would have a very low take off angle main lobe) work for local contacts or for E-Skip conditions where a high angle is desired. This capability is included in the StackMatch II Plus.

# Schematic Diagram



# POWER HANDLING, MAINTENANCE, HOT-SWITCHING, ETC.

Under normal conditions the StackMatch would not be hot switched. But as contesters know, it is inevitable that at some time either a wrong antenna will be selected or a hot switch will be made in the heat of the battle. The StackMatch has been designed with this in mind. **You will not harm the unit with an occasional mistake.**

Actually, to keep the contacts from silver oxide build-up, the manufacturer of the relays recommends that these units be hot-switched occasionally. So once a month or so apply 100 watts of power to the unit and run through the positions to keep them clean.

Your StackMatch II Plus is rated for 3kW CW with SWR under 2:1

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We hope you enjoy your WX0B StackMatch II Plus. If you have any questions, please phone or email us. We are glad to assist you in whatever way we can.


Array Solutions
2611 N Belt Line Road
Suite # 109
Sunnyvale, TX. 75182
Phone 214.954.7140 Fax 214.954.7142

E-mail: sales@arraysolutions.com