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ARRAY SOLUTIONS



StackMaster - 4 Antenna Phase Controller

Thank you for purchasing the StackMaster with the Universal Push Button Controller from Array Solutions. This controller comes in two versions and is configurable to support all of the Array Solutions products. The version with the 11 output relays is meant to be used with the StackMaster and is described below.

UNIVERSAL PUSH BUTTON CONTROLLER



ARRAY SOLUTIONS

Version 1

- Support for all products excluding StackMaster and has 6 output relays

Version 2

- Support for all products including **StackMaster** and has 11 output relays

Features include

1. Pushbutton with LED indicators
2. Front panel ON/OFF switch
3. Relays drive to the outside world and isolate unit from surges
4. TR or PTT input to prevent accidental hot switching of relays and to allow separate Transmit and Receive antenna selection
5. INHIBIT function which will inhibit the transmitter while relays are settling
6. Ability to program from push buttons at any time a T/R split of any antennas
7. Easy to wire DB15 jack which you can remove to protect device from lightning damage
8. Circuit board jumpers allow easy configuration of controller
9. Protection circuits for output short circuit, over current, PTT over voltage, input voltage polarity, and other good stuff too.

Description

Main function

Universal controller UNI CTRL allow to control following relay boxes:

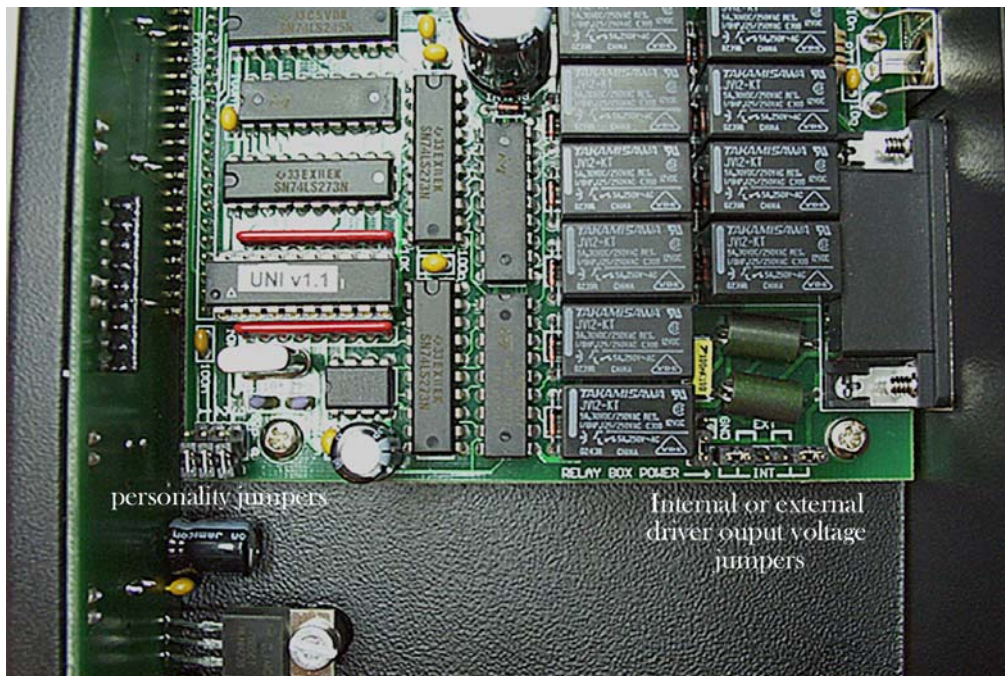
- Stack Master (this relay box require StackMaster controller version 2)
- Stack Match (also with N2NU's BOP modification is supported)
- Four square
- Triangle Vertical Array
- Double Vertical Array
- RatPack
- SixPak (one side per controller)

Relay box is selected by 3 configuration jumpers on board before controller is powered.

Special functions

1. **Maintenance mode** (push and hold buttons 1&2 together at power on). In this mode unit will run through the relays one at a time as it switches on all outputs combination for each relay box separately. Apply PTT to start sequence. Power off if you wish end this mode.
2. **Service mode version 1** (push and hold buttons 1&3&7 together at power on). This is only for service purposes. On each button pushed the LED will turn on and appropriate output pin is driven on. Push button 1-6 for outputs and LEDs 1-6,
 - **Version 2** Button 7 is for version 2 with second bank of relays 7-11 installed . When button 7 is on push buttons 1-5 for output and LEDs 7-11, button 6 for inhibit output. When PTT is activated all LEDs goes on.

Jumpers



There are several jumpers on the main board:

1. **Output level jumpers** – Output level is determined by jumper located on board near the relays upper right corner of the board. The default position (positive) is appropriate for all Array Solutions products internal power source. Many users will want to use the EXT (external voltage source) jumper position to allow them to provide an external voltage source to the DB15 connector on the back. This will provide isolation between controller and the relay box outside as well as allowing the user to run higher voltage to the outside world to compensate for very long cable runs. Remember to connect the device being driven's ground return to Pin 15 of the DB15 or directly to the negative side of the external power supply.

The Default position is INT (relay box will be powered from controller). If you move both jumpers to position EXT, controller will be galvanic separated from relay box (for maximal immunity). **Don't forget attach external power into DB15 (see chart below). If you move only top**

jumper (near the connector DB15) to EXT position, unit will share GND, but relay box will be still driven by external positive voltage. (For example if you need more than 24V driving power). You will need to place the external power supply ground to the internal ground pin 13 or 15 in this mode.

2. **Relay box personality jumpers** -Three jumpers located on bottom right position determine controlled relay box. All open is Stack Master, etc. You must reset unit (OFF-ON) if you change these jumpers. The Array Solutions products described below give the settings for these jumpers.

Power limits

Input power: 13.8 – 24V DC

You can power unit from 13.8V to 24V. Output voltage to relay box will be approximately 1V less than the input voltage when using internal power to drive them. You need not connect external power if you want power relay box higher than 13.8 V. Do not exceed 24V DC or you will blow the regulators on board.

Current consumption: 150mA

150mA is minimal consumption without any relay switched on. Maximal consumption without relay box is 330mA (7 relays on for StackMaster).

RelayBox maximal consumption : 700mA

Maximal relay box current should not exceed 700mA when using internal power for output drive

Using external power supply for output drive should not exceed 500 ma per relay being driven. This you will never do with Array Solutions products all relays are either 40, 100, or 120 ma depending on the product.

Integrated protections

- 1.Reverse voltage input protection
- 2.Over current protection (1.2A) Not a classic fuse, Polyswitch is used (re-settable fuse)
- 3.Output short-circuit protection
- 4.PTT input over voltage protections
- 5.Program hook-up protection (watchdog)



Connectors on rear panel

RELAY BOX (DB15)

- 1 – Output #1
- 2 – Output #2
- 3 – Output #3
- 4 – Output #4
- 5 – Output #5
- 6 – Output #6
- 7 – Output #7
- 8 – Output #8
- 9 – Output #9
- 10 – Output #10
- 11 – Output #11
- 12 – internal power output - positive
- 13 – internal power output - negative
- 14 – external power input - positive
- 15 – external power input - negative

T/R (RCA)

PTT input (GND activate)

INH (RCA)

Inhibit output (open collector – normally closed, open when active)

DCPower input (central is positive)

Operation

Buttons are numbered from left to right. Button #7 is always T/R. You will find the StackMaster setting listed below. This device allows you to drive these Array Solutions products by configuring the “configuration jumpers” or “personality jumpers” Just wire to a DB15 plug as described to the proper outputs and also to the external power supply as described in the DB15 chart.

Additionally there is the ability to SPLIT the antennas via the PTT signal supplied to the back of the controller so you may have a different transmit set of antennas then you receive on. This is handy for dxpeditions, and contesters so you may listen in a particular direction.

Split T/R mode programming – depress push button number 7 on the right hand side of your controller. It will be the one with the red LED and it will light. Also assert PTT from your rig and then depress the antennas you would like to use during transmit. The receive antennas will not be changed an you can change them during normal operation. The new antenna LEDs will blink it means that the new antenna selection will be used on the next assertion of PTT. So your selection is hot switch proof.

Release PTT and you get the RX antennas, assert PTT and you get the new requested TX antennas.

To cancel just depress push button 7 again.

A cable is supplied with the controller its pinouts should be color coded as follows: Be sure to check one or two pins to be certain the manufacturer has not changed the pinout.

DB15 cable supplied by Array Solutions

| PIN # | Color |
|-------|---------------|
| 1 | Brown |
| 2 | Red |
| 3 | Orange |
| 4 | Yellow |
| 5 | Dark Green |
| 6 | Blue |
| 7 | Purple |
| 8 | Gray |
| 9 | White |
| 10 | Black |
| 11 | Light Green |
| 12 | Pink |
| 13 | Brown & White |
| 14 | Red & White |
| 15 | Black & White |

Stack Master

Two BOP combinations possible, you must have the phase shifter hardware to make BOP work.

Configuration code: 0

Configuration jumper: 1-open, 2-open ,3-open

Buttons :

- 1 – ANT 1
- 2 – ANT 2
- 3 – ANT 3
- 4 – ANT 4
- 5 – BOP
- 6 – AUX
- 7 – T/R

Outputs :

| Antenna combination | OUTPUTS | | | | | | | | | | | |
|---------------------|--------------------------------|---|---|---|---|---|---|---|---|----|----|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| A | + | X | X | X | + | X | X | X | X | X | X | |
| B | + | X | X | X | X | + | X | X | X | X | X | |
| C | X | X | + | X | X | X | + | X | X | X | X | |
| D | X | X | + | X | X | X | X | + | X | X | X | |
| A+B | X | + | X | + | + | + | X | X | X | X | X | |
| A+C | X | + | X | + | + | X | + | X | X | X | X | |
| A+D | X | + | X | + | + | X | X | + | X | X | X | |
| B+C | X | + | X | + | X | + | + | X | X | X | X | |
| B+D | X | + | X | + | X | + | X | + | X | X | X | |
| C+D | X | + | X | + | X | X | + | + | X | X | X | |
| A+B+C | X | + | + | X | + | + | + | X | X | X | X | |
| A+B+D | X | + | + | X | + | + | X | + | X | X | X | |
| A+C+D | X | + | + | X | + | X | + | + | X | X | X | |
| B+C+D | X | + | + | X | X | + | + | + | X | X | X | |
| A+B+C+D | + | X | + | X | + | + | + | + | X | X | X | |
| AUX | X | X | X | X | X | X | X | X | + | X | X | |
| BOP1 | Depends on antenna combination | | | | | | | | | X | + | X |
| BOP2 | Depends on antenna combination | | | | | | | | | X | X | + |

Stack Master

Only one BOP combinations possible, you must have the phase shifter hardware to make the BOP function work.

Configuration code: 1

Configuration jumper: 1-close, 2-open ,3-open

Buttons :

- 1 – ANT 1
- 2 – ANT 2
- 3 – ANT 3
- 4 – ANT 4
- 5 – BOP
- 6 – AUX
- 7 – T/R

Outputs :

| Antenna combination | OUTPUTS | | | | | | | | | | | |
|---------------------|--------------------------------|---|---|---|---|---|---|---|---|----|----|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| A | + | X | X | X | + | X | X | X | X | X | X | |
| B | + | X | X | X | X | + | X | X | X | X | X | |
| C | X | X | + | X | X | X | + | X | X | X | X | |
| D | X | X | + | X | X | X | X | + | X | X | X | |
| A+B | X | + | X | + | + | + | X | X | X | X | X | |
| A+C | X | + | X | + | + | X | + | X | X | X | X | |
| A+D | X | + | X | + | + | X | X | + | X | X | X | |
| B+C | X | + | X | + | X | + | + | X | X | X | X | |
| B+D | X | + | X | + | X | + | X | + | X | X | X | |
| C+D | X | + | X | + | X | X | + | + | X | X | X | |
| A+B+C | X | + | + | X | + | + | + | X | X | X | X | |
| A+B+D | X | + | + | X | + | + | X | + | X | X | X | |
| A+C+D | X | + | + | X | + | X | + | + | X | X | X | |
| B+C+D | X | + | + | X | X | + | + | + | X | X | X | |
| A+B+C+D | + | X | + | X | + | + | + | + | X | X | X | |
| AUX | X | X | X | X | X | X | X | X | + | X | X | |
| BOP1 | Depends on antenna combination | | | | | | | | | X | + | X |
| BOP2 | not allowed | | | | | | | | | X | X | X |

Relay Box wiring

Remove the lid of the relay box and wire the respective output wires from the universal controller to the properly marked terminals inside the Relay box. Route your cable through the grommet hole provided. You should also strain relief the cable with the wire ties, and rout the cable inside using the one or two cable ties provided to the terminal strip.

Transmission Line Stubs are next plugged into the ports marked 50 ohms and 75 ohms. Stubs can be made by Array Solutions or by yourself. If you make your own please ask for our stub chart so you can cut them the correct length for each frequency. They are shorter than 1/4 wave length. Apply weather sealant to all of the RF connectors.

Replace the cover on the relay box and attach the stubs. Take it up the tower and locate it at the middle of your stack of antennas and use the supplied U-bolt to secure it to a tower leg.

Attach the feedline from the shack to the feedline port and seal the connector from the elements.

Your antennas should have equal length coaxial feedlines that you attach to the ports of the StackMaster antenna ports. Antenna A is the highest antenna on the switch, D the lowest. In the case of an H frame or a diamond frame system, choose your own appropriate system

Even though it's very rugged, don't use your StackMaster as a foot step on the tower. Also tape the coax cables to a tower rung or leg to relieve strain on them.

This completes set-up for the StackMaster system.

Warranty – Lifetime except for lightning damage.