

## **Product Review: WX0B (ARRAY SOLUTIONS) SixPak Antenna Switch**

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For me, antenna switching has always represented the Holy Grail of station design. How could I get any antenna to any radio under any conditions and that would be simple and reliable? I was constantly buying relays and switches, but there were never quite enough of the right kind. Or they had the 'wrong' voltages. Then there was the user interface issue. You get the idea.

I have been doing 2-radio operating for more than 20 years at a number of different stations including my own. The most advanced stations removed antenna switching from the hands of the operator. You press the band button on the radio and you were connected to the right antenna. My own station was at the other extreme. I simply connected one set of antennas to the left radio, and a completely different set to the right radio. If you threw the right set of switches, you could get the second set of antennas (on the right) over to the left radio. But that also meant you lost all antennas on the right radio. In retrospect it is amazing that I, or any of the guest ops that visited here, didn't blow anything up in a moment of sleep deprived confusion! The automated stations relied on the computer or radio interface to switch between antennas. In my case I have different bands sharing the same coax so I needed something that was a little more flexible. I also do a lot of operating without the computer turned on, so I wanted a system that would operate in manual mode.

Walking the aisles at Dayton, I discovered a product that appeared to be just what I have been looking for – the WX0B SixPak Antenna Switch by Array Solutions. The SixPak is billed as a 6-antenna to 2-radio antenna switching system. It consists of a control head that goes in the shack and a relay unit that actually handles the coax switching. It even included interlocking to prevent the two radios from ever connecting to the same antenna, or to each other. Array Solutions owner Jay Terleski, WX0B, was happy to go through the technical details and make the sale!

### **Installation**

The SixPak is available in two versions: a 6x1 model which will switch one radio to six antennas; and a 6x2 model which handles two radios to six antennas. Both use the same control head which has two 6-position switches labeled with the six amateur bands 10 through 160m. Each switch is connected to the relay unit through a 6-conductor cable. Bright green LEDs clearly indicate which antenna has been selected by each switch.

This flexible design allows you to use a single control unit when both radios are in the same place, such as I have at my station. Or, by using two separate control heads (each with its own 6-conductor cable), you can locate one at each operating position of a multi-op. I got the 6x2 model to handle switching my two radios between the four coax lines that come into the station. Each coax lines contain multiple antennas for different bands. This switching is done by a combination of Ameritron and DX Engineering remote coax relays.

The SixPak relay unit is contained in a solidly constructed metal box with 8 coax connectors. There is one connector for each of the two radios and each of the six antennas. The coax connectors and

relays are mounted on a circuit board that can be easily disassembled for maintenance if needed. A 6x1 model can be converted to a 6x2 version in the field just by removing a jumper, adding diodes and capacitors, and of course the relays. The relays are a custom design with 18 amp contacts and special low inductance short blades made specifically for Array Solutions. The form factor is standard, so Radio Shack relays can be substituted in a pinch, but with some loss in power handling capability.

The relay unit includes hardware for mounting outside on the tower. I already had all of the coaxes coming into the shack, so just attached it to the wall of the closet where the coax enters the house.

All wiring terminations for the control head and relay unit are to terminal strips located inside the enclosures. This is not the most convenient method, especially if you are trying to wire the relay unit while up on a tower, but it does offer excellent environmental protection for the connections.

The SixPak requires 12 VDC from an external source. Terminals for connection of the power supply are inside the control head. To simplify maintenance I wanted to keep the 12V wiring separate from the 6 conductor interconnecting cables. I drilled a ¼" hole and installed an RCA connector on the back of the control head and used this to connect the external power. Since all control signals are 12V it is easy to replace or parallel the control head with some other computer or radio controlled interface.

Total installation time from opening the box to having the SixPak wired into my station took about one hour. Amazing when I think of how many hours and how much money I have spent trying to accomplish the same thing.

### **Operation**

Operation of the SixPak could not be easier. Select the antenna to use for Radio A with the left-hand rotary switch. Select a different antenna for Radio B using the right-hand switch. If both switches are selecting the same antenna, the one that was there first "owns" the antenna. This makes it impossible to get both radios connected together.

There is one scenario that the user must always be aware of. For example, if Radio A is on the 20-meter position and Radio B is also switched to 20 meters, Radio B is interlocked out and therefore is disconnected from any antenna. If you are listening on Radio B, you quickly notice the absence of receiver noise. But if you are not paying attention, or trying to operate two radios at the same time, you may forget to listen on Radio B and start sending. The resulting amplifier sparks will quickly inform you of your error. Jay told me the addition of a fall back antenna position would have complicated the logic and greatly increased the price. Since the control signals to the relay unit are so simple, enterprising users who are worried about this condition could engineer an add-on circuit to prevent the problem.

Array Solutions claims the SixPak provides at least 80 db of isolation (at 30 MHz) between the two radios and over 50 db of isolation between antennas. To put 80 db in perspective, if you put 1500 watts on one side, you will only see 0.000015 watts on the other! While I can not measure this to verify, I have been impressed at how little interference there is when transmitting on one radio and listening on the other.

When you have this level of antenna selection flexibility you must pay a bit more attention to your station and antenna design. Since either radio can get to any antenna, you need to check every combination for receiver killing interaction. With so much isolation built into the SixPak, the real worry is having harmonically related antennas that are too close together and couple dangerous amounts of power back down toward the second receiver. If you have one band per antenna position, you can easily wire a Dunestar band pass filter to the same switch as the control head. In my case, having a Dunestar on one radio provided enough rejection that I have not had a problem with blowing a receiver front end. Another option is to connect  $\frac{1}{4}$ -wave stubs to the output of the relay unit using T connectors.

The SixPak is conservatively rated for more than 5KW. That should enable it to handle the legal limit even with high SWR present. The design and construction are solid looking and the quality of the circuit board gives me reason to expect a long operating life. Array Solutions also promotes the unit for use on 6 meters.

### **Conclusion**

The SixPak has been a great addition to my station. I can now get to antenna combinations that were impossible with my previous arrangement. If I lose a radio during a contest, I can instantly use the second radio with any antenna. There are other products available on the market for doing antenna selection for multiple radios. The SixPak is the first one I have found that offers such an integrated package and simple user interface.

Other applications for the SixPak also come to mind. Many large multi-multi stations use two radios on a band. The SixPak would allow either radio to have access to the full compliment of antennas. The SixPak could also be used to switch coax stubs or band pass filters between two rigs. For FT-1000 users, you can use the SixPak to handle the antenna switching for your second receiver. Of course the 6x1 model makes a great remote coax switch for indoor or outdoor use.

The SixPak is available from Array Solutions, 350 Gloria Rd. Sunnyvale, TX 75182. Telephone (972) 203-8810 FAX (972) 203-8811 E-mail: wx0b@arraysolutions.com. Web: <http://www.arraysolutions.com>. Price ranges from \$299 to \$415 depending on relay configuration and connector type.