GXP-Antennas 13-Element, 6-Band Yagi

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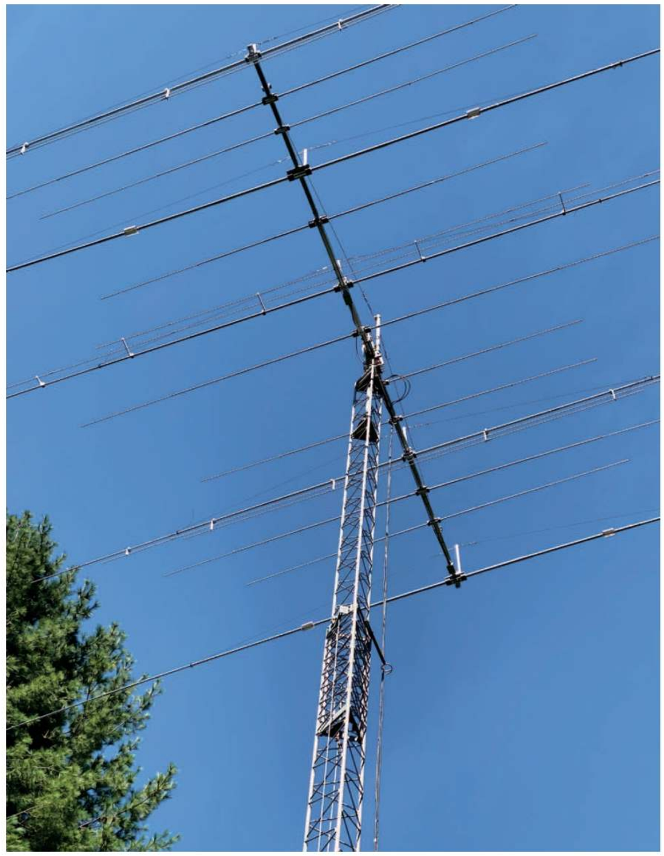

After many years of service, it was time to rebuild my old multiband Yagi, but as this process is increasingly difficult, I started my search for a replacement that hopefully would take me into my sunset years.

I live on a 1-acre suburban lot, but my tower is built approximately 28 feet from the property line and in the middle of a group of pine trees. Moving the tower now was not an option. However, with my crank up/down and tilt-over tower, I would have to find a new antenna I could put together on my antenna TiltPlate at ground level (see Figure 5). This would make assembly much easier than having to bring in a crane to hoist the finished product. Local zoning limits me to a final height of 60 feet.

So, my goal was to find a Yagi antenna that would cover as many of the HF bands between 80 and 10 meters as possible. It needed to have a turning radius of less than 27 feet and a wind load that would be compatible with the US Towers model that I already had in place. I didn't want another antenna with moving parts that would need service in the future.

Use of the TiltPlate makes assembly much easier, but is limiting in that the new boom would have to fit through the U-bolts already attached. One of the six-band Yagis on the market would have fit the bill, but the boom is rectangular and would have required modification of the mounting plate. After a lot of thought, searching, and reviewing of specs and advice

Figure 5 — The assembled antenna on the tower TiltPlate lowered at ground level.

Bottom Line

The GXP-Antennas 13-element, six-band Yagi performs well and as expected. After one winter, it's been through several heavy rain and snowstorms, as well as one true ice storm with strong winds without any issue.

Table 2
Antenna BEAM, 13 Elements, Six Bands (Model 2016)

Manufacturer specifications

Bands (meters)	*40*	*20*	*17*	*15*	*12*	*10*
Active elements	2	3	3	3	3	5
Gain (dBd)	3.6	5.3	5.8	6.0	6.2	7.3
Gain (dBi)	10.8	12.5	13.0	13.2	13.4	14.5
F/B (dB)	15	23	22	23	21	22
Bandwidth at VSWR 1.5:1	200 kHz	350 kHz	100 kHz	350 kHz	100 kHz	550 kHz

Maximum SSB power input	4,000 W	Turning radius	27 ft (8.5 m)
Maximum digital power input	500 W	Maximum wind speed	84 mph (135 km/h)
Feed lines	Two coax (50 Ω)	Wind surface area	25.83 ft² (2.4 m²)
Boom length	23 ft (7.03 m)	Minimum antenna height (in open space)	45.11 ft (14 m)
Maximum element length	47.6 ft (14.5 m)	Weight	108 lbs (49 kg)

from other club members who had installed antennas from SP7GXP with success, I settled on their 13-element, six-band model. In doing so, I gave up 80 and 30 meters, but I replaced these bands with a vertical for 80, 40, and 30 meters from DX Engineering and have been glad I did. Also, SP7GXP has an extensive website with several videos documenting the build process.

Ordering and Shipping from Poland

Since February 1, 2021, there has been no distributor for this product in the US, and I ordered mine in March of that same year. So, a new issue immediately presented: Ordering equipment from abroad. Other hams I talked to had not had a problem, as the company until then had a local representative who handled US orders. However, the manufacturer, had taken ordering "in house" and established a PayPal account. The order went smoothly, but with the COVID pandemic, the shipment got delayed at the port for a week. In 3 weeks, two large orange cylinders and a box were delivered to my driveway. While I had been waiting on the shipment, Waldek, SP7GXP, from GXP-Antennas, had sent ahead the directions (more on this later) and told me to report any damage. He also noted that the "pipes" would be packed inside of each other and he recommended doing an inventory on arrival to check inside the larger tubes. In fact, they were largely grouped by element, making assembly that much easier later (see Figure 6). One of the packing tubes arrived damaged and had been taped back together (see Figure 7). Amazingly, the tubing was fine — a testament to the packaging technique and the quality of the aluminum.

Figure 6 — The antenna pipes packed inside of each other.

Organizing for the Build

Two new issues arose as I approached putting the antenna together. First, all measurements and hardware were in metric units. I needed a metric socket set, open/closed end wrenches, metric T-wrenches, and a metric measurement tape. This was not a major issue

Figure 7 — The antenna packaging tube that arrived damaged and that was taped together.

Figure 8 — The elements mounting point with the plastic standoffs.

for me, as I had most of these tools. Once I got used to it, many things become more intuitive. The tubing was of several lengths, and so I made up a "story stick" — a length of wood with marks at the several lengths, allowing quick identification rather than wrestling with a tape that didn't go the full length.

The second issue, one that initially made me laugh out loud, was that the four pages of drawings and instructions were in Polish. While most of the terms, such "boom" and "mast," were intuitive, others were not. I found that I could use my phone's camera and Google Translate to hover over terms and translate them quickly. I simply annotated the drawings Waldek sent, and I was off and running. I put the boom together first, then slid it into the **U**-bolts on the TiltPlate. Fortunately, even though the boom was dimensioned in metric, it fit just fine in the imperial dimensioned **U**-bolt. Once snugged up, it wasn't going anywhere, and has remained stable since, in winds over 50 mph.

You could do the build several ways. One could put all the elements together first, then attach them to the boom in sequence. I chose to build and attach each element in turn, starting from one end after placing the boom in the TiltPlate where the diagram showed the mast should go. It's easier to adjust the boom without elements on it, as opposed to after all the elements are bolted on. All the hardware and **U**-bolts are quality stainless steel. A tube of ointment used to prevent galling of the bolts is included. The plastic standoffs for those elements that have multiple tubes hanging from the longest in a group are very high-quality, carefully machined plastic. All the elements are carefully drilled and deburred for the bolts (see Figure 8).

They do use an interesting technique to bolt the telescoping elements together. The hole on the inner tube is drilled to fit the size bolt required at that location. However, the outer tube has two different-sized holes, allowing the head of the bolt to fit inside the outer tubing, but snugly fitting the opposite side. The diagram specified that the head of the bolt should face downward. They don't explain why, but I imagine it has proven to be a strong fit and allows for better drainage. All the telescoping tubing is bolted in this way, except for the last tube on the longest elements, which is held in place with pipe clamps. This allows for final adjustment of length prior to lifting the antenna to the final height and for tweaking the tuning for best SWR if you're so inclined.

Building the Antenna

Starting at one end and working toward the other, I marked the boom with a black marker where the first element should go, and measured, marked, and bolted each element in turn. The coils used in the 40-meter elements installed without any difficulty, as did the two baluns. This antenna requires two separate feed lines — one for 40 meters and one for the other bands. Because the tower is only 100 feet from my shack, I have located a switch in my eave that is controlled by a band decoder and switches between the two runs of coax from the tower and my 80/40/30-meter vertical using a band decoder. It would be slightly cheaper to run one coax from the tower and put the switch on the tower. However, I feel the switch is better protected from the weather placed indoors.

Following the adage, "measure twice, cut once," even though there was no cutting involved, I was meticulous in measuring all lengths, as well as the element spacing. Even so, when it was all together, I had a mismatch on 40 meters. I texted the factory for advice. Waldek very patiently said he was sure the 40-meter elements were probably not the right length. I measured a third time, only to find that not only was he right, but that one side of the driven element was off by 40 centimeters. That was easily corrected, and I now have an SWR of less than 1.5:1 over almost the entire band. (I have changed the adage, however, to "measure three times!")

I did run into one issue that I could have thought out more thoroughly. When raising the antenna for the first time, I neglected to consider that my tower has standoffs that hold the coax out from the tower. The topmost standoff crossed with one of the 10-meter elements as the antenna rotated into position, and bent half the

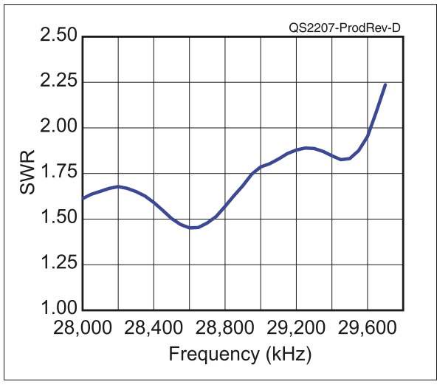

Figure D — SWR chart for the 10-meter band.

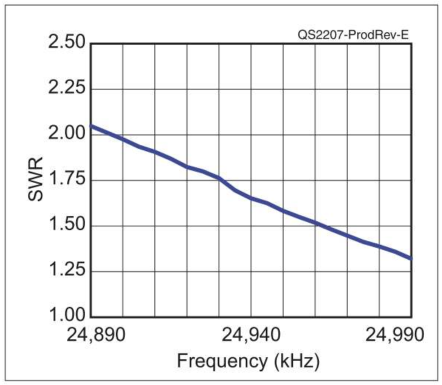

Figure E — SWR chart for the 12-meter band.

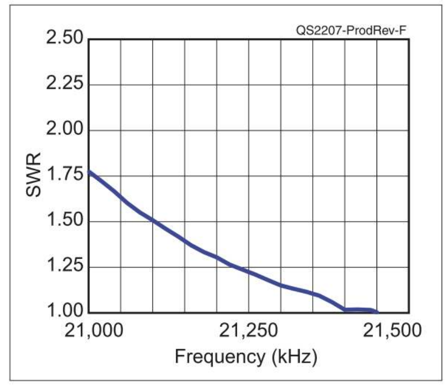

Figure F — SWR chart for the 15-meter band.

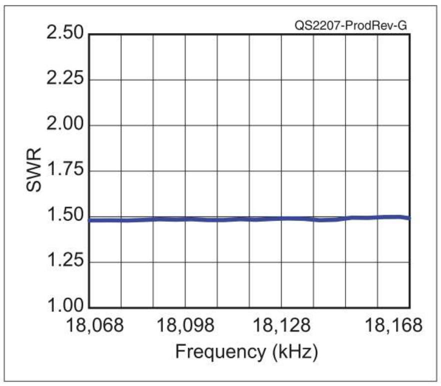

Figure G — SWR chart for the 17-meter band.

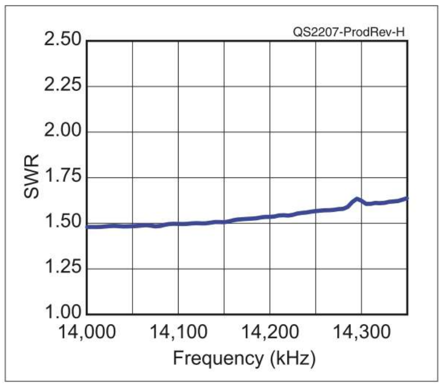

Figure H — SWR chart for the 20-meter band.

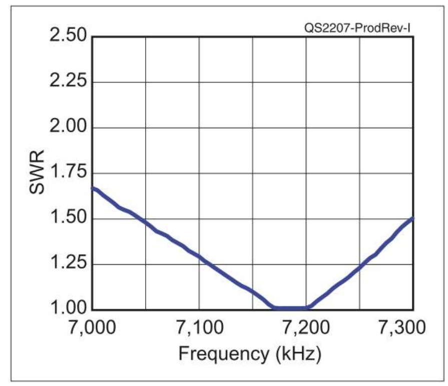

Figure I — SWR chart for the 40-meter band.

element 90 degrees from the other half — not ideal. I moved the standoffs to the back of the tower where they wouldn't meet any of the elements, and all has gone well since then. Waldek had a new tube at my front door in 5 days and hasn't charged me for the replacement, even though the need for it was clearly my own fault.

I found that the factory-supplied dimensions were right on for me. On several frequencies the SWR needle didn't move at all, and I had to check the forward power to be sure I was actually transmitting.

We have now been through our first winter with this antenna at this height. The Philadelphia region has been through several heavy rain and snowstorms, as well as one true ice storm with strong winds sustained over 50 mph. The antenna has taken those forces without any damage so far.

I don't have any sophisticated measuring devices that allow me to measure the front-to-back ratio and the antenna gain, but I do have a Telepost LP-500 Digital Power/SWR Meter that I had verified with a Bird 45 initially. So, I have measured the SWR and produced graphic plots for all the bands (see figures D to I). While the shape of the plots was a bit of a surprise, these dimensions have worked for me. Note that I used the factory-supplied dimensions without any tweaking so far.

Conclusion

More to the point, in my opinion, the antenna has helped make contacts. During the two CQ DX contests and two ARRL DX contests in fall 2021, I got a good feel for its performance compared to other hams in the area. I live in the middle of many stations that belong to one of the most serious contest clubs in the world. While I'm not truly competitive, I can say that my signal was competitive in the pileups with stations that had more aluminum, higher up, and more stacked than I do, and that I was nearly always the first or second station the DX replied to. Data from the Reverse Beacon Network confirmed my subjective impression.

All in all, this adventure was great fun. You just need an understanding wife who can read metrics.

Manufacturer: GXP-Antenna; Poland; **www.sp7gxp.pl**. Price: $1,890 USD plus shipping.