Kam Sirageldin, N3KS / kamal.sirag@gmail.com

Update on TI7W (ex-TI5W)

In the November 2016 CQ WW CW, Chris Hurlbut, KL9A, visited Costa Rica to try his hand from the depths of Zone 7. The story was documented earlier, but it was a great effort through extremely trying weather conditions — a major hurricane blasting the TI5W site with a direct hit the day before the contest and knocking out power and water for several days. After operating the contest on generator power and not having the benefit of running water for 24 hours prior to and during the contest, Chris managed a 2nd place world finish, beating CR3OO in log checking to secure the silver. ZF2MJ posted a great score to end up at the top of the pack.

As station owner of TI5W (now TI7W), I learned a lot from that event. I enjoy the engineering and systems aspects of putting together a high-performance station, and the challenge of trying to improve things every year.

Costa Rica's location makes the use of a single antenna on many bands an exercise in compromise. The east and west coasts of the US are so disparate in beam headings that it is hard to use one antenna to effectively cover the entire continent. TI7W has stacked monoband antennas for 10 and 15 that are fixed at east and west coasts, but they had never been particularly effective and were significantly down in performance compared to the one rotatable antenna at the top of the 80-foot tower. The issue was finally identified as a problem with the *HFTA* terrain files used to calculate the ideal antenna heights for each of the stack antennas. Obviously, task number 1 was to remedy that. After creating my own hand-made terrain files, it turned out that the lowest of the stack antennas needed to be nearly doubled in height to perform best, and the "upper" antennas raised another 15 feet each. The antennas were adjusted in height over the summer of 2017, and live testing validated much improved performance as compared to the antenna at the top of the tower.

The recent "workhorse" high-band antenna at TI7W has been an OptiBeam OB15-7 multibander. This is a great antenna for what it is, but it's basically two elements on all seven bands, 40 through 10 meters (including 30, 17, and 12). At my N3KS station in Maryland, I had used a different OptiBeam (OB17-4) antenna which gave me great results, albeit only on contest bands 40 through 10. In the 2016 CQ WW and also in the 2016 WAE operated by Nate, N4YDU, many high-band European stations were literally just above ESP level. I decided that we needed the two or more extra elements on 20 through 10 than the OB17-4 would give us, plus a third element on 40. So, last summer, the OB15-7 was swapped out for the OB17-4, and results were immediately apparent for the better.

This still left 20 and 40 shorthanded with respect to covering both coasts simultaneously. The only way to fix that would be to install a second tower. With the very helpful modeling analyses provided by Mike Barts, N4GU, the optimal second tower location was identified and a last-minute install was made in early November 2017. The old OB15-7 was pressed into service as the main second-tower antenna, also at 80 feet, the same height as the first tower.

Unfortunately, the last-minute antenna ideas outran the in-the-shack switching and combining ideas, and it turned out that I needed another quadplexer to make the stacking of the two OptiBeams optimal. Fortunately, Chris sourced one at the last minute, we had it shipped to him, and he hand carried it to Costa Rica with him as he traveled there for the contest. It worked great.

TI7W has used a pair of full-sized phased verticals on 80 meters for the past few years with quite good results. They are fairly noisy, but the station also has an 8-circle receiving array that's typically used for receiving on 80. In 2016, Chris was not

Figure 1 — Installation of second tower.

able to take advantage of the 8-circle array — the hurricane had caused the electronics box to flood with water and rendered it irreparable in the field.

As it turns out, in July 2017, John Crovelli, W2GD, had dismantled the antennas and tower at my N3KS QTH near Baltimore, and in doing so had mentioned to me that he used a 3-element, 80-meter wire Yagi at his contest-winning P4ØW. The idea of putting a similar antenna up at TI7W intrigued me, and I scouted possible locations. It turned out that a great candidate was in the back jungle of my property that would point the antenna at about 30° — very good for EU and the eastern US. This would be a tree-top installation, but as has been written previously, I use a drone to drop wires over tree limbs and had put up a very high and effective 160-meter loop using that method. The 3-element 80-meter Yagi install would be tricky, but by the end of the day it went up in time for the CQ WW CW 2017.

That rounded out the major improvements at the station from 2016 to 2017. The rest would be up to Murphy and KL9A.

Second in Line

Operating from Zone 7 is a bit like operating from W9 in the US. In most directions you are second in line. Europe is far away, and the Zone 8 and 9 operators, as well as US east coasters, typically have earlier and better propagation to EU as well as earlier propagation from Zone 8/9 to the US. Low bands to the US are a haul, although not as difficult as for the eastern Caribbean and Zone 9 stations. But the bands open later — TI is pretty far west — 30 miles away from TI7W is the Pacific Ocean. The things to try and take advantage of are the bands staying open a bit later on 20 and 15, good opportunities on 10 to the US, and, if you are lucky, a 10-meter opening to JA (although KL9A did not work a single JA on 10 in either 2016 or 2017).

As it turned out, the biggest benefit of the 2017 station changes to TI7W was a much-enhanced ability to *hear*. On 80, the 3-element wire Yagi showed a 4 S-unit improvement in signal-to-noise over the phased verticals and a 3 S-unit improvement over the 8-circle array. There must be a lot of vertically polarized noise around TI7W. The new ability to cover both US coasts simultaneously on 40 and 20 was a significant improvement. These changes were doubly effective, because they made grabbing a complete call sign the first time much, much easier, especially on 80. What this allowed was the ability to dual CQ almost the entire contest, including any combination of low bands (on 160, the antenna is a full-sized delta loop, which is a very quiet listening antenna.) In 2016

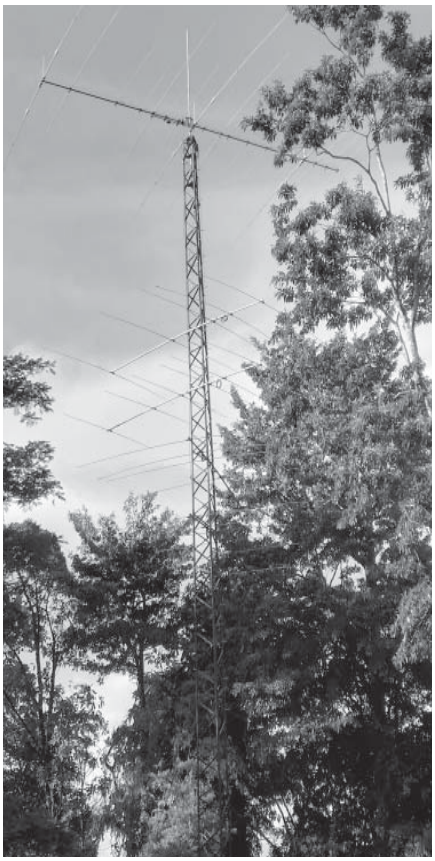

Figure 2 — Second antenna system.

it was almost impossible for Chris to dual CQ when one of the bands was 80. There was just too much noise. (Dual CQing on any of the low bands was particularly difficult that year; post Hurricane Otto, lines of thunderstorms kept rolling through all night, every night.) For 2017, as stated by KL9A, his operating plan went like this:

"The main contest goal was to dual CQ for about 44 hours. After lots of thought it seemed that 4 hours of search and pounce spread out over the contest was enough to secure adequate mults. As an almost multi-two entry, the hope is that the multipliers call you anyway. Comparing logs with ZF2MJ from 2016, it was obvious that I was missing a lot of long-haul DX that did not call CQ. Another thing to remember is that when the band is good, you are probably running. That is also the best time for mults. In theory a dual-CQ strategy will help capture a majority of those mults without requiring you to stop running. In practice, search and pounce is essential to a big score. A good search-and-pounce plan is arguably the most important strategy compared to the competition's. We will *all* be CQing on the same bands at roughly the same times. I always stress out about multipliers and push hard [to get them into the log].

"The added TI7W station hardware allowed a few things to happen that were missed in 2016. On the high bands, I could take advantage of the marginal openings and actually hold a run frequency. Twenty was absolutely brutal into Europe in 2016 and even at 14.120+ I could not hold the frequency. Fifteen was even worse, and the band closed very early. This time, I could pick any frequency I wanted and hold it while running. The signals were not loud, but they were easy copy, and it was off to the races. The RBN data shows the same signal increase into the US, which undoubtedly helped the NA QSO totals also. Instead of fully concentrating on 3-pointers only, the plan was to just work everyone all the time. Bring them all on at once! With the ability to split directions I could run EU and US at the same time with a higher overall rate. The same held true for JA. The split directions were especially effective on 40 meters.

"The low bands were really something special. Combine great conditions with a new huge 80-meter antenna, and things get interesting. No matter how many stations I worked, there was always someone new calling that couldn't make it into the log as the sun rose and the band faded on their end. The 80-meter EU comparison speaks for itself: 261 in 2016 versus 634 in 2017. Overall 3,168 EU in 2017 versus 2,251 in 2016. The bands seemed overall much better in 2016, but I just couldn't punch through well enough to take advantage of them. The highest 60 minutes in 2017 was 379, compared to 360 in 2016. That is not an accurate comparison, as the first hour in 2016 was hurt by our buddy Murphy.

"A note about rate: With 442/hour in 30 mins in 2017 (221 Qs) it is clear that a 400+ hour is very possible on CW. Having the highest rate hour does not win the contest, but it is still a worthy goal. It is not unreasonable for a single op to sustain 250/hour for 48 hours and make 12,000 contacts. The brain processing power required for 250/hour in 2BSIQ (or whatever you want to call it) is not so taxing that it is unsustainable for long periods of time. It will take some sunspots to achieve, but it is another goal worth chasing.

"Ten meters proved to be fickle once again: 963 Qs in 2016 versus 300 in 2017 with better hardware. The runs were very short, and one had to capitalize on them before the band closed. Zone 7 is a good spot for 10 meters to the US, but it's a long way to any DX population centers with their multiplier rich runs.

"The closing hours of the contest are always hard on the mind. After being awake at 100% duty cycle brain processing power for 2 days, things start getting weird. For better or worse, band strategy options are quite limited during the last 8 hours of the contest from Zone 7. The goal is to think about any missed openings for mults that

Contesting with an SDR: Up Close and Personal at TI7W

We talked with Nate Moreschi, N4YDU, about his experience at TI7W after the antenna upgrades. Nate posted a score of 7,054,080 for the ARRL DX CW in the SOAB category. He loved the flexibility he had with the second tower and said he felt really loud on 80 and 40, so Kam's efforts obviously paid off, and Nate posted the top score in his category on 3830scores. Nate discussed his experience with using a SDR for the first time in a contest.

NCJ: Describe what rigs you operated with at TI7W to post such an impressive score?

N4YDU: A pair of FLEX-6600Ms.

NCJ: What drove your choice?

N4YDU: TI7W station owner N3KS was quite happy with the previous radios (Yaesu FTDX5000s) but wanted to shift in a new direction. The FLEX platform seemed like a good choice, especially with the spectrum scope options and receiver specs.

NCJ: What prior SDR experience did you have?

N4YDU: I had very little prior to the contest, but I did play with the 6600M a little to get reasonably comfortable with it. I remain quite impressed with the receiver.

NCJ: What surprised you about using a SDR in the contest?

N4YDU: The receiver is outstanding. I found it a little easier to pull call signs out from a pile, thus making 2BSIQ mode much easier.

NCJ: Did you find any features of the SDR better than a traditional superheterodyne with tight roofing filters?

N4YDU: I believe the receiver holds up better with a lot of close by strong signals. I never detected any of the hash that you sometimes get with traditional radios.

NCJ: Do you believe SDR rigs offer contesting advantages that current operators ought to consider?

N4YDU: The spectrum display is huge. Many contesters already use spectrum displays, of course. I love it for finding a place to run or take a quick look at a dead band.

NCJ: Were there any downsides to using a SDR?

N4YDU: I have yet to find any real downsides. You do have to be a little patient when waiting for the radio to turn on. It takes about 60 seconds to get rolling.

NCJ: Did the use of SDR rigs alter your strategy, tactics, or approach to contesting?

Nate, Moreschi, N4YDU, posted a terrific score from TI7W in the ARRL DX CW (SOAB) using SDR-based transceivers.

N4YDU: The ability to monitor multiple bands at once with the spectrum scope gives you more data to pay attention to as a single op.

NCJ: Many report that SDR rigs have quieter receivers than top-end superheterodyne rigs. Did you find that to be the case?

N4YDU: Totally, in the case of the FLEX-6600M. I was cautious to give my opinion on this while initially trying the radio out, but now I totally believe the receiver is quieter.

NCJ: Did you experience weaker signals on 10 and 15 meters? Did you feel at a disadvantage on those bands?

N4YDU: Absolutely not, but to be fair, one would have to do real-time A/B comparisons.

NCJ: What other thoughts or advice do you have for contesters considering a transition to a SDR rig for contesting?

N4YDU: I think this is certainly the wave of the future for top-notch contesting. If someone is thinking about getting a SDR, I think they should proceed with confidence. — *Scott Wright, KØMD*

might be easy and make sure to capitalize on those, if possible. Other than that you only have 15 and 20 run-able to the US before JA opens for the last 2 hours. The Sunday JA runs are not fast, but they are usually steady. Once 15 dies, you can go to 40 for the last hour or so on the second radio; 80 is not really usable before the closing bell."

Closing Thoughts

In summary, although many types of post-contest analyses can be done and usually there is something to be learned from them, it is important to understand that options are typically limited (especially in a low-sunspot cycle year) by the station's location, time of day, and available propagation. Decisions can be made as to whether to focus on one band instead of two, vice versa, or S&P in the waning hours of a contest from Zone 7, but in general, all the analysis in the world will not get you many more contacts when your only Sunday late afternoon (local time) options are watching 10 for any possible activity, milking the last of 15, hitting hard on 20, and waiting for 40 to open. There just aren't any alternate strategies, something I believe anyone who has operated from Zone 7 or western Zone 8/9 would confirm.

Amazing!

The contest results were amazing. Chris took great advantage of everything the station could offer and ended up with the most raw QSOs ever (10,434) in the history of CQ WW CW SOAB HP. Included in that was the highest rate hour (379/hour) of the contest as well as the most claimed (and likely log-checked) multipliers in the contest (608).

One metric I like to evaluate in terms of station (and operator) performance during the lower-sunspot periods is the average distance for all contacts in the contest for the top three finishers. Doing this on a per-band basis really points out how well the station performs and how well the combination of station ears and operator skill can pull out weaker signals, especially on 20 through 160 (see Table 1).

Table 1
2017 CQ WW CW average QSO distance (miles)

	TI7W	*ZF2MJ*	*CR3OO*
All QSOs/Bands	4,000	3,410	2,920
160	2,840	2,050	2,820
80	4,210	3,220	2,750
40	4,710	4,080	3,050
20	3,970	3,450	2,940
15	3,390	2,990	2,960
10	2,200	2,670	2,120

Another interesting statistic is the average call sign length worked. It is sometimes stated that being close to North America is an advantage for rate, because of the shorter calls signs in the US. An analysis of the top-three claimed finishers shows that the average call sign length for the top-three stations was five characters, with quite consistent spacing about the mean.

At the end of the day (or weekend, as it were), scoring the highest number of contacts, the most multipliers, and the longest average distance per QSO was only good enough for 2nd place. Chris and I were satisfied that nothing was left on the table — Chris from an operator performance point of view, and I from a station performance point of view. More improvements are to come in 2018.

Figure 3 — Current setup.