Some Reflections on WRTC 2006—Part 2

Dean Straw, N6BV, Team Leader at PT5J (with Mark Obermann, AG9A)

Conclusions: Terrain and the Top Four

One aspect comes out of these terrain analyses, and many others I did after WRTC 2006. To score well in WRTC 2006 you needed good terrain in both important directions: Europe and toward the USA. Some stations had excellent shots to Europe, but poor shots to USA. Some had the opposite situation. The top stations had good — even excellent — shots to both.

There were a number of reports on *DX Summit* (**www.oh2aq.kolumbus.com/dxs/**) indicating that the signal strengths varied quite a lot between WRTC 2006 stations. Some of this was no doubt due to beams being pointed in different directions at different times — a W6 listening to a WRTC station with its beam pointed toward Europe is going to hear a much diminished signal compared to when the WRTC station's beam is pointed toward California, obviously.

The fact is, however, that out of the Top Four stations, PW5C had nominally "good" terrain, but not "terrific" terrain. Yet N6MJ and N2NL finished in second place, with the second highest multiplier total of all stations (PT5Q, in 10th place had 248 multipliers; PW5C had 241). PW5C also had the third-highest QSO total. This is a remarkable achievement from only a "good" location, and it indicates to me that the top stations were playing on a playing field that was pretty level, even if not perfectly level.

What happens as you go down the rankings with respect to terrain differences?

A Real Terrain Problem

A rather extreme case was that PT5G, operated by K3LR and N9RV. These are both extremely talented operators, but they had the misfortune of a bad draw for their operating location. Their QTH was located at the base of a big hill, right in the crucial direction of Europe. Figure 16 shows the terrain from PT5G toward Europe, along with its terrain profile toward the US East Coast. The terrains in those directions for PT5M are also overlaid on Figure 16. Obviously, the PT5G terrain toward Europe is a problem. The hill on the way from PT5G to the USA started about 4000 feet from the tower, so it was not quite as severe a headache, even though that hill looks pretty forbidding in Figure 16 because of the different x- and y-axes.

The computed elevation response on 15 meters toward Europe and the USA are shown in Figure 17, compared to the response toward the USA for PT5M. Toward Europe, the nearby hill essentially cut off any response lower than about 6°. Even at 6°, the PT5G pattern was about 15 dB down from that of PT5M.

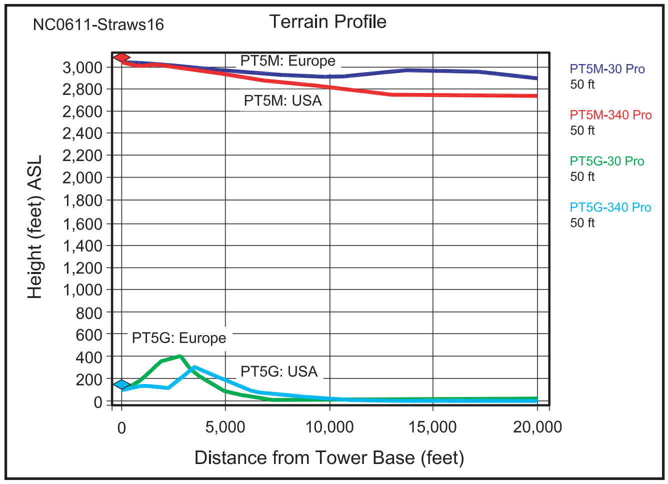

Figure 16—A comparison of the terrain profiles for PT5G and PT5M toward both Europe and the USA. PT5G faced directly into a hillside toward Europe. There was also a hill about 4000 feet away in the direction of the USA.

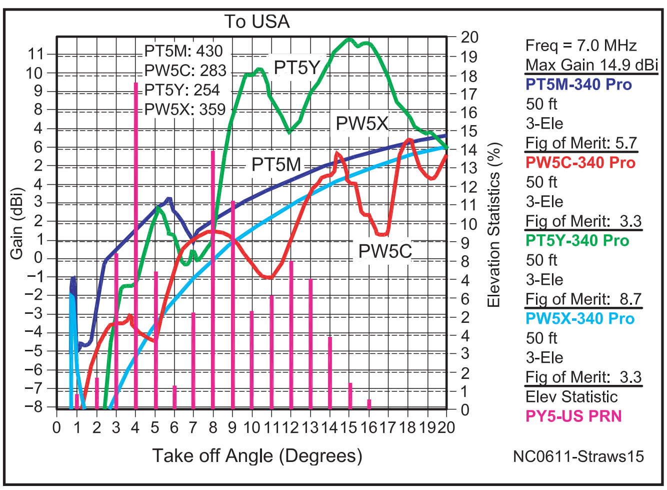

Figure 15—Responses for Top Four stations toward the USA on 40 meters. PT5M seems to have really exploited its advantageous terrain at low elevation angles toward the USA.

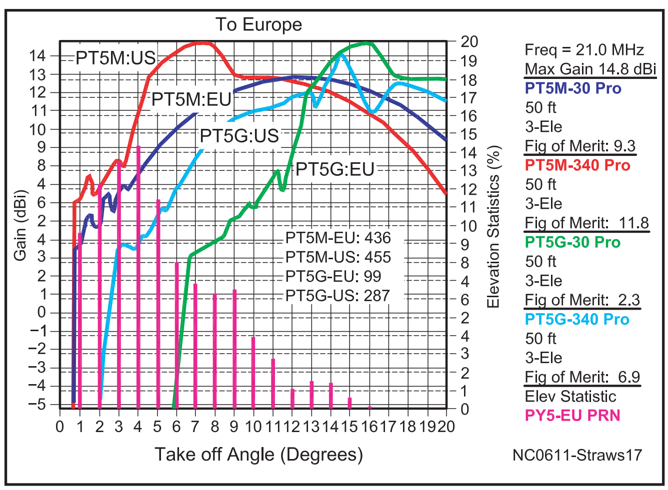

Figure 17—The computed elevation responses for PT5G and PT5M toward Europe on 15 meters. Even though the elevation angle statistics are valid only for Europe, the PT5G response toward the USA is overlaid also with that for PT5M toward the USA. The plots speak for themselves.

That doesn't mean that there was zero PT5G signal into Europe at the lower elevation angles on 15 meters, but there was precious little. The 99 total QSOs on 15 for PT5G to Europe bear grim witness to the effects of the hill, compared to 436 European QSOs for PT5M.

Even in the direction to the USA, the hill at about 4000 feet did have some effect on the PT5G signal, by an average of about 5 dB, or two "layers" of weak signals by my rule-of-thumb. PT5M had 455 QSOs to the USA, while PT5G had only 287.

Other Terrains

I often warn *HFTA* users not to put too much emphasis on FOM (Figure of Merit) values, since they represent what amounts to a broad-brush, single-dimensional snapshot of the elevation response for a particular terrain. Nonetheless, FOMs can be useful. Figure 18A graphs the FOMs for 13 WRTC 2006 stations, ranked from number 1 to number 46, toward Europe, together with the number of European QSOs for each band. Note that I have not included stations that reported extreme noise problems.

Figure 18A attempts to show how well each station played on each band, compared to the rest of the WRTC 2006 competitors. For example, on 40 meters, PT5L had the highest FOM (over 10) into Europe. The reason was that PT5L's 50 foot tower was located on a 78 foot water tower. That put the antenna at an actual height of 128 feet. PT5L had the highest 40 meter QSO count into Europe (203). PT5M on the other hand had a considerably lower FOM (almost 3), and a correspondingly lower QSO total (135).

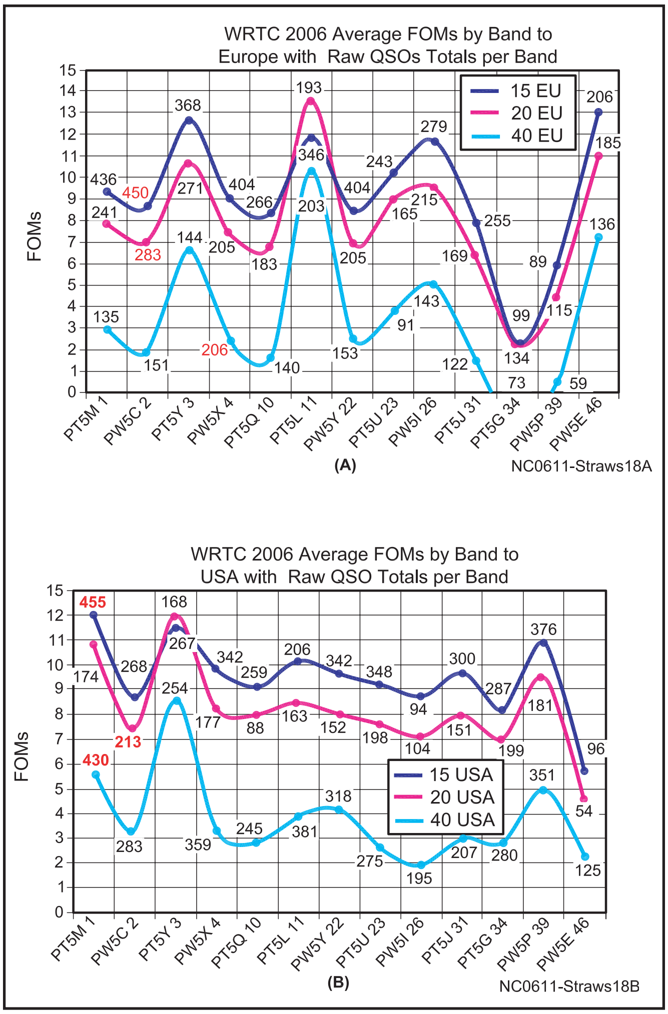

Figure 18—At A, comparing the average FOMs by WRTC 2006 stations across the bands 40, 20 and 15 meters toward Europe. The ranking of each station is shown next to its label on the x-axis. The total number of QSOs on each band is shown for each station. At B, the situation toward the USA.

Now, look at Figure 18B, which shows the same sort of presentation, but this time into the USA. Here, on 15 meters, first ranked PT5M had a higher FOM (12) than all the other stations I analyzed. PT5M had far and away the highest number of QSOs (455) into the USA on 15 meters.

So what do Figures 18A and 18B show us? First, they show us, I think, that operators do indeed make a difference, especially at the upper rankings, because they seem to be able to overcome differences (or even deficiencies) in terrains. PW5C, which ranked second in the overall competition, was not the station with the highest predicted signals due to terrain on any of the bands. But N6MJ and N2NL still managed to come close to winning the whole thing. To me, this is a remarkable performance for two fine operators from a "good" (but not "super") location.

Believe me, this is not to take anything away from the fantastic performance of VE3EJ and VE7ZO. These two guys maintained consistently high rates on whatever band or mode they were operating throughout the whole contest. But they did have a nominally superior station, at least judging from the terrain analysis.

Second, the flip side of this is that stations with only nominally "Good" locations do generally score lower than stations with "Very Good" terrains. On the basis of the overall FOM numbers in Figures 18A and 18B, I'd verbally classify the terrains as shown in Table 2.

PT5G, with a nasty hill toward Europe, is the perfect example of an unfortunate terrain. As I stated at the beginning, I don't have terrain data for many of the stations, but I think the trend is pretty clear for stations below the Top Ten ranking. A classification of "Good" amounts to an even playing field. A classification of "Very Good" gives some advantage over an even playing field.

Other Issues

Weak as Weak Acts

Terrain was not the only issue, obviously, in WRTC 2006. Strategic and even psychological issues can make big differences in contests. I always chuckle when I think of an observation made by radio personality and author Jean Shepherd, K2ORS, known to his many fans as "Shep." Back in the early 1970s, Shep gave a talk at the New England Division Convention at Swampscott, Massachusetts. After a hilarious 20 minute monologue about his Novice days with a chirpy,

Table 2

Station	WRTC 2006 Ranking	Terrain
PT5M	1	Very Good
PW5C	2	Good
PT5Y	3	Very Good
PW5X	4	Good
PT5Q	10	Good
PT5L	11	Very Good
PW5Y	22	Good
PT5U	23	Good
PW5I	26	Good
PT5J	31	Good
PT5G	34	Poor
PW5E	46	Good

one tube 6V6 transmitter that netted him exactly zero QSOs after calling CQ for two weeks, he concluded with:

"Nobody answers an apologetic CQ."

Put another way, if you don't feel strong, you won't act strong. At PT5J we never felt that strong, especially after trying to start the contest on 15 meter phone and netting zero QSOs for the first three minutes of operation (PT5M had 8 QSOs in the first three minutes on 15 phone). Figure 19 shows the differences between PT5M, PW5C and PT5J for cumulative QSO totals in the 24 hour contest period. (Having a curve above PT5M is not good in this case!)

Figure 19 shows that by the end of the first hour, PT5M was ahead of PT5J by about 50 QSOs. By the end of three hours the gap had widened to 100 QSOs, and by the end of nine hours the gap was 300. Much of the difference was on 15 meters to both Europe and the USA.

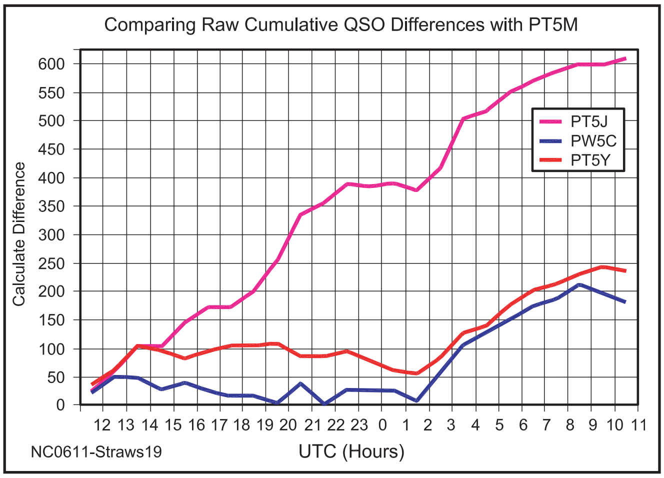

Figure 19—Comparing the differences between cumulative QSOs during the contest. PT5M's cumulative QSO total each hour is used as the reference value. By the end of the contest, PT5M was about 600 QSOs ahead of PT5J.

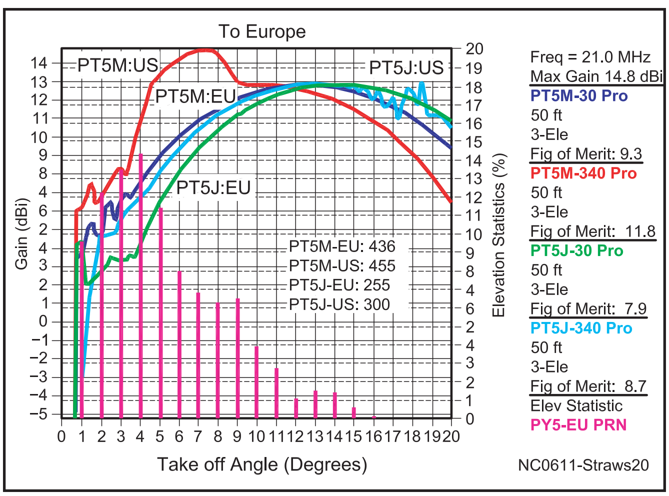

Figure 20—Comparing the computed responses for PT5M and PT5J toward both Europe and the USA on 15 meters. At a 4° takeoff angle into Europe, PT5M enjoys a 5 dB advantage. At an elevation angle of 4° into the USA, PT5M is 7 dB stronger. These are significant signal-strength differences but don't necessarily correlate directly with performance. Terrain or talent? I think both!

Table 3

Station	HQ Mults Answering Their CQs	HQ Mults They Found and Worked
PT5M	42	98
PW5C	39	114
PT5J	45	57

Figure 20 shows a comparison of the computed elevation responses for PT5M and PT5J toward the USA. At the angles that counted — the low ones less than about 8° — PT5M was 3 to 5 dB stronger into the US on 15 meters. On average that's at least one extra layer of weak signals, by the rule-of-thumb I've used for many years. Put another way, this would cut out the guys with indoor dipoles, for sure.

I consider the terrain at PT5J to have been "Good" but not "Very Good." The signal difference could have been narrowed with a taller tower at PT5J for lower elevation angles, but this certainly wouldn't have been a "level playing field" by most peoples' reckoning!

Still, a QSO difference of 455 to 300 into the USA on 15 meters due to a difference of 3 dB, or even 5 dB, in signal strength alone does sound a little hard to believe. There had to be other reasons for getting beaten so badly.

Multiplier Gathering

At PT5J we bought into the old saw: "Don't worry; the multipliers are going to call you when you're calling CQ." Well, maybe that doesn't really happen in the WRTC contest. I analyzed the patterns for HQ multipliers in the top scoring logs. (Note that I could identify HQ multipliers a lot easier than new zone multipliers in the Cabrillo logs.) I wanted to see how many HQ multipliers called the top stations, compared to how many HQ multipliers they found and worked by themselves.

The results are summarized in Table 3. Note that the sum of both multiplier categories is greater than the total HQ multiplier because some multipliers were worked on both phone and CW. The rules for WRTC 2006 say that each HQ multiplier is only counted once per band, not once per each band mode.

Oops — that strategy didn't work very well for PT5J, did it? That was a real rookie mistake on my part as team leader.

Speaking of experience, among the Top Four operators WRTC 2006 was competition number four for VE3EJ and VE7ZO; number two for N6MJ and N2NL; number five for K1DG; number four for N2NT; number three for UT4UZ (VE3DZ). My guess is that experience does count in such a specialized, high-intensity, short-duration contest such as WRTC.

Wrong Mix of CW and Phone?

Figure 21 shows a stacked bar graph of the QSOs made each hour in WRTC 2006 by PT5M. The dark red portion of each bar represents the CW QSOs in that hour; the lighter blue portion of each bar shows the SSB QSOs in that hour. It turns out that PT5M had 31 percent of their total QSOs on phone. By the end of the first 10 hours PT5M had 505 SSB QSOs.

Figure 22 shows the information for PT5J. Once we became gun shy — feeling that we weren't strong enough to run phone — we stayed gun shy, making only 21 percent of our total QSOs on phone. Note that we basically stayed on CW for the first three hours, and we still were hesitant to run SSB, even after a successful 120/hour SSB rate in the 1500 UTC hour. We had only 305 phone QSOs after the first 10 hours. We lost confidence early.

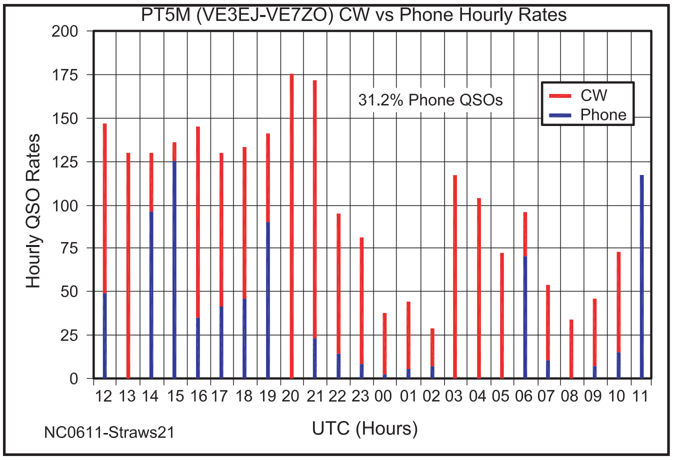

Figure 21—Stacked bar graph showing the PT5M QSO rate each hour on CW and on SSB. Overall, PT5M worked 31.2 percent of its QSOs on phone.

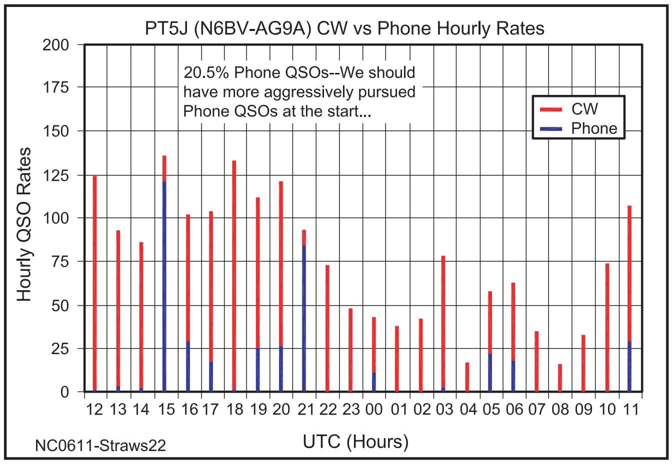

Figure 22—Stacked bar graph showing the PT5J QSO rate each hour on CW and on SSB. Overall, PT5J worked only 20.5 percent of its QSOs on phone, not a very good balance.

Still, PW5C, who scored second in the contest, also had only 20 percent of their QSOs on SSB. But PW5C appears to have made up for the deficit by running higher CW rates. It does appear that they ran out of people to work on CW at the end of the contest and were forced to go to phone.

PT5Y had 25 percent of their QSOs on SSB, a more balanced effort, but they couldn't manage to achieve the CW rates that PW5C was able to run. So, overall, it looks like PT5M's strategy balancing CW and phone was the most successful one.

My Kingdom for a Paddle (and Other Excuses)

Two equipment problems added to the lackluster performance at PT5J. My Vibroplex single-lever paddle was badly mangled when it arrived in Brazil. No amount of mouth-to-mouth resuscitation would revive it, so we turned to the backup paddle that my partner, Mark, AG9A, had borrowed from a friend in Chicago. It was a really cute little paddle, but it was also so sensitive I found I could barely send with it. Yes, I was the PT5J lid sending CW like I was a drunken sailor. My partner Mark, AG9A, could handle that paddle far better than I could, but he didn't like the action either and made many sending mistakes.

In retrospect, I find it really amazing how much I actually use (or try to use) a manual keyer paddle, even when the computer does all the logging and most of the sending. This is particularly evident when I make a typing error first entering the call — I'll send the correct call manually using the paddle and then quickly correct the typo while the exchange is being sent automatically by the computer. I particularly enjoyed the comment I later saw on the *DX Summit* cluster about "can't manage EU pileup." Yes, that was me, totally flustered by that paddle. Excuse number one.

And we did have one genuine equipment failure during the contest: The main IC-765's HFO began going out of lock — first only a little, then a whole lot. This is a known problem in the radio, and is usually solved by resoldering all the connections for the HFOs on the synthesizer board underneath a shield, a shield that is a genuine pain to remove. We substituted the second IC-765, which unfortunately had another problem — it only put out about 10 W of RF. So for about an hour and a half while I wrestled with the synthesizer in Radio A, Mark ran 200 W out through the amplifier. Actually, the power gradually increased from Radio B as it warmed up, so at the end of the repair session Mark was getting about 600 W.

Electrical Noise

At PT5J, we were blessed with low electrical noise, but other stations weren't quite so lucky, as I mentioned at the start of this article. K1KI and K1ZM at PW5D had that problem, for example.

Conclusion

With a few exceptions, the WRTC 2006 people did a remarkable job trying to ensure a level playing field. The top stations had good shots into both the USA and Europe. Lower-ranked stations usually, but not always, had less-advantaged shots into the USA.

I'd like to suggest that future WRTCs would do well to explicitly take into account terrain analysis to really ensure that elusive "level playing field." One way, of course, is to use a level playing field, literally. This would situate the next WRTC in a very large, flat area, as the Russians do in their Radiosport competitions.

Our referee at PT5J, Andy Chesnokov, UA3AB, told us that 1500 meters separate each Russian Radiosport competitor on a large, flat geographic area. Each station is located in a tent and is powered by a separate, very quiet (electrical and exhaust-noise) gasoline generator. The antennas are identical for each station, of course.