JUG

Publication of the Northern California Contest Club

NCCC

Issue 525

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NCCC Meeting

Saturday 12th March

11:30 am to 2:00 pm

Program:

Remote operation with Flex Radio, Chris N6WM

Location/Venue

Watch the reflector for details

President's Report

Hello KB'ers!

Well, you have one thrilled Prez! In claimed scores, we've won RTTY Roundup and CQ WPX RTTY in landslide wins. Hopefully, the scores will hold up and we'll have another gavel and plaque in the trophy room. This club has kicked serious butt in these two contests.

Please be sure to read WX6V's summary elsewhere in this copy of the Jug.

I want to take a moment to especially thank Hank, W6SX, for suggesting, just a week and a half before CQ WPX RTTY, that NCCC might just want to go for another win. W1SRD and I had been looking at RTTY Roundup as a good way to start off the year, but we hadn't focused on the CQ WPX RTTY contest. We brought up Hank's suggestion at our January meeting and virtually everyone in attendance said to go for it. Since the meeting was full of diddlers, I kind of expected that would be the response.

Lastly, I always want to thank the floggers, and it was Shirl, AA6K, who flogged the WPX RTTY.

The meeting, by the way, was terrific, with W0YK, WK6I, and N6WM staffing a panel discussion on RTTY contesting. We had a good attendance and the venue, Back 40 BBQ, was a speaker's paradise. Food was also great along with the wait staff.

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Northern California Contest Club
Excellence In Amateur Radio Contesting

NCCC Net

Thursday 8 PM

Freq: 3.610 +/-

NCCC

Visit the meetings page of the NCCC website here for details of the next meeting

NCCC Membership Information

If you wish to join NCCC, you must fill out an application for membership, which will be read and voted upon at the next monthly meeting. (PDF application form)

To join, you must reside within club territory which is defined as the maximum of:

- Northern California, anything north of the Tehachapi's up to the Oregon border, and
- A part of north-western Nevada (anything within our ARRL 175-mile radius circle centered at 10 miles North of Auburn on Highway 49).

Speaking of Hank, he's the featured Point Generator in this issue of the Jug. Hank is, indeed, a serious point generator for NCCC, and one you rarely get to meet, since it would take him most of the day to travel to one of our meetings from his Mammoth Lakes QTH.

It never ceases to amaze me just what this club is involved with. There is simply no other contest club like ours. Very unique. I'm going to make a few comments next month about NCCC Thursday Night Contesting, but this month I want to point out the efforts of our CQP 50th committee.

The original planning group consisted of W6OAT, K6TU, K6MM, NS6T, N6DE, W1RH and was chaired by K6TD. My own contributions were minimal, but Kevin and company put out a lot of time and effort into something will go down in contesting history as a real class act from NCCC. In addition to the original planning committee, there were so many others who contributed so much to this group including N6WM, K6YL, WK6I, K6LRN, N6TV, W1SRD, WX5S and others.

The compliments have been coming too:

I just wanted to let you know that I received my coin on Tuesday. My, is it ever a nice one!

Thank you to you and the rest of the team for running the event and for offering such a nice incentive for working the contest.

--Dawn WX0Z

I received the very nice Gold Rush Coin for this running of the CQP.
Thanks!!! You guys really do a great job.
73,

--John W9ILY

And, how did those coins get out to the deserving? Well, we can thank Joanna, K6YL, for that.

All in all, a great effort from a terrific group of KB'ers.

I hope to see many of you at our March 12th meeting.

73 Bob W1RH

California QSO Party

Print you own **Certificate of Achievement**

If you participated in the 2015 California QSO Party, and submitted your log, you can now print a customized

50th Anniversary Certificate of Achievement from our website.

Follow this link: http://www.cqp.org/cqp2015-pdf.html

Both Personal and Team Certificates can be printed, depending on your class of operation. Download the PDF, then print and frame the Certificate for your collection, post it to your Facebook page, your website, your blog, or ??

We hope you enjoy your Certificate and thank you once again for participating in the 2015 California QSO Party!

Contesting with a Pea-Shooter Station

Gary Johnson, NA6O

Contesters and DXers are usually said to operate from one of two classes of station: Big guns (we all know who they are), or little pistols (think tri-bander and wires). Well, I'm here to represent a third category, the pea-shooters, and tell you how to make the most of a very limited station.

Pea-shooters are usually situated in CC&R communities (like me), apartments, rented rooms, trailer parks, on impossibly small lots with no trees, or they may simply have financial limitations or other reasons that prohibit large antennas and elaborate station installations. And yet we have a desire—sometimes a really serious desire—to work difficult DX and join in radiosport activities. Let's see how to make that a positive experience.

Operating Practices

Your operating practices are extremely important. Don't bring a knife to a gunfight and expect an easy win. Instead, you must learn to be patient, smart, and carefully choose your modes and times of operation to take best advantage of your limited station resources. I'm covering this subject first because it's universal to all contesters, and even with a limited station, a better operator may prevail.

Don't let frustration and envy rule your operating sessions. I know the feeling, listening to the big gun a few miles away, running DX stations when I barely hear a whisper.

If you're just starting out, be a happy casual contester while you learn your station's true capabilities. Try as many contests as you can to obtain experience in how the contests and your station actually work. Discover your weaknesses and come up with strategies to address those, or avoid your optimally-bad situations in real contesting. In the meantime, you can score new DXCCs, band fills, states, or whatever awards you may be chasing. Have fun while learning. It took me a good two years to really figure things out and even with the same station, I'm now much, much better at scoring points.

Set reasonable goals. Obviously we're not going to win a major competed category, but some contests have so many micro-categories that an actual award is absolutely within reach. For instance, four years in a row I "won" the ARRL DX CW contest by entering as single operator, low power, unlimited, for the East Bay section. With only a few competitors, I got some wallpaper, and by golly that feels good! Bob, KO6LU, running just a vertical, has wins in RTTY Roundup, ARRL DX, and ARRL 10m. So we can be winners.

Plan ahead. Before a contest, study previous year's results, see who did what, then figure out where you might be able to compete. Choose contests where you may be more competitive, or simply have more fun: QSO parties and CQ-WPX treat us well (especially if we have an odd prefix). Another goal I enjoy is trying to score at least 10% of the points achieved by the top California single-op.

Also remember that we all contribute to the NCCC bottom line in each major contest, no matter what our scores may be. Important: When you turn in your Cabrillo log, be sure it says "CLUB: Northern California Contest Club".

Make a list of preferred antennas for transmit and receive on a per-band basis. See if one consistently outperforms on DX or short-haul contacts. Choose the best time of day—RFI-driven as well as band conditions—that favor your station. For instance, I know my neighbor's plasma TV will be obliterating 80 m in the evening, so instead I prefer to visit that band in the wee hours of the morning. The high bands (sunspots permitting) are generally friendly to those of us with minimal antennas, so get up there on 10 and 15 as much as possible during the day.

CW and RTTY will generally work better for us than SSB. The extra bandwidth and lower average power of SSB amounts to upwards of a 10 dB penalty compared to CW. I find it extremely difficult to be competitive on SSB. In fact, just reaching DXCC is turning out to be a serious challenge... But RTTY is quite rewarding, and works at least as well as CW here. If your CW skills are not up to snuff or non-existent, check out CWops.org where we offer training and practice at all skill levels. Outside of contesting, the weak-signal digital modes like JT65 truly save the day for the pea-shooter station.

Search and pounce remains the favorite of most pea-shooter operators. It's always my best bet when conditions are poor: Nobody calls me when I try to run. S&P is also preferred in the first half of a 48-hour contest when things are manic because finding and especially holding a run frequency is usually impossible. Being a Sunday driver can be most rewarding for the pea-shooter because the big boys will be running out of stations, and you don't have to compete so often in shoot-outs (mini pile-ups), which I can attest that we almost always lose. When I have limited time to operate in such a contest, I choose the later part. You may also be able to have some good runs at that time.

Try running, if you can find a spot. I usually move up the band where the slowskis are. Then I listen for a good long time because more than likely there is someone already running there that I simply can't hear. When the coast is clear, call CQ and see how it goes. In a DX contest, I'm absolutely thrilled to get a call every minute. In a QSO party, it's often better than that since the short-haul signal for a pea-shooter is at least marginally competitive. My cutoff time is typically 5-10 minutes without an answer before I go back to search and pounce. Don't be surprised if someone stomps on you and tries to take your run frequency. Happens all the time. Call CQ a bunch of times and see if he hears you and goes away. Or slide over a bit, to where you can hear callers. Or go somewhere else and start again. Sometimes it's just hopeless. Back to search and pounce.

When you start running on CW or RTTY, fire up the Reverse Beacon Network[1], and have it search for your call. Then you can see your measured signal strength all over the world. If only a few skimmers spot you, don't expect much action (Fig. 1).

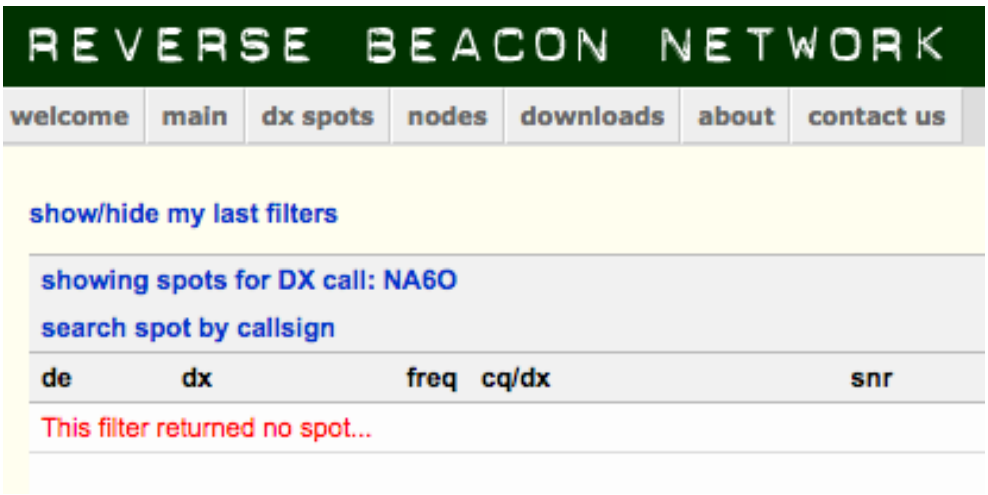


Figure 1. This is what I sometimes see from the Reverse Beacon Network: Nothing. Definitely time to change bands, or search and pounce.

Speaking of shoot-outs, always watch your score in your logging program and determine whether it's worth calling a new multiplier station for a very long time. (But if it's a New One, heck yeah, I'm going to burn on that frequency!).

I do use spotting whenever it's permitted since I'm in search and pounce mode so much. It really cuts down on the search time when I first switch to a new band and helps me find multipliers and New Ones. Also it gives you an idea of relative activity level, helping to decide when to switch bands.

If you have the space, money, and desire, there is nothing to stop you from trying advanced operating techniques like single-operator, two radios (SO2R), or using two VFOs (SO2V) and other methods that tend to generate higher scores.

Above all, become a better listener. I am thrilled when my S meter moves at all, so my weak-signal copying skills are now top-notch. DXing is great practice for contesting, with all the variations in propagation and signal distortions and of course the weakest of signals.

Antennas

Limited antennas are the very definition of the pea-shooter station. Sorry, no towers, and even a push-up mast or roof tripod is out of the question to support even the smallest Yagi. That leaves us with wires, verticals, and loops. Your main objectives are to cover as many bands as possible (often with an antenna tuner) so as to obtain maximum multipliers, access low radiation angles for DX, achieve good efficiency, and minimize RFI pickup. Doing all of these things in our limited spaces, often with low-observability, is a real challenge.

There are countless designs to consider. Check the various ARRL publications, and also our own K9YC's presentation on limited-space antennas[2]. Here are a few popular solutions that I have experience with.

1. A fan dipole with a K9YC-approved common-mode choke (a.k.a. balun). Efficient, resonant, and lowish noise in urban environments. Hang it as high as you can, even if it's bent, or with some loading. Mine works well enough at only 15 feet elevation and made of 20-gauge wire. Small wire and clear plastic insulators reduce observability. At such a low altitude, it is nearly omnidirectional on 80 through 15 m with most of the energy radiated straight up.

I ran HFTA, looking toward Europe, and compared this dipole on 20 m against a 3-element Yagi at 50 feet. The difference was typically greater than 10 dB at the lower takeoff angles. So yes, I have tower envy, in a big way.

2. Verticals, of the off-center fed dipole variety that do not require radials. Examples: Cushcraft R8, R6000; Hy-Gain AV-640; N6BT Bravo series, etc. Very handy when you have no space for radials. Go for models with fewer traps, which equals better efficiency. Mount it as high as you can. They are all fairly light and easy to handle but some taller models need guy ropes. Paint it NATO non-spectral gray, otherwise known as gray automotive primer, for lowest observability. (If it works for military fighters, it works for me!) I can pretty well guarantee that the noise level will be higher than that of any dipole you may erect, but you have at least a chance of producing some low-angle radiation depending upon your local soil properties.

Figure 2. My primary antennas, a vertical and fan dipole. This is a flagrant violation of my CC&Rs, but I have yet to get caught.

3. A low-noise magnetic receiving loop (Fig. 3). These are effective against very close-range RFI sources, which can be dramatically nulled by rotating the loop. They are basically omnidirectional for skywave communications except on 80 and 160 m. I use a Wellbrook ALA1530 to good effect all the way up to 15 m. Pixel Technologies is another maker.

Figure 3. A magnetic loop antenna for receiving, oriented to null out the evil plasma TV next door. Note the sophisticated rotation mount and support structure.

4. Conventional verticals, end-fed wires, and inverted-L designs. If you have space for radials, or use some kind of a counterpoise resonating trick, many of these unbalanced antennas will work. Again, altitude is your friend. Put that vertical on your roof, and pave it with radials resonant on each band. Tie the end of the wire to the highest available object.

5. Get creative. Mangle that dipole by running it under the eaves, around the corners, over the bushes, and along the fence. Use a mobile antenna on the bumper of your car. Build a trailer with a crank-up tower or mast, and park that on your property during contest weekends. It's great for Field Day, too. Try a transmitting magnetic loop. Get a Buddipole and it's mast kit for temporary use (another ham in my tract sets his up on the front lawn. Take that, Neighborhood Nazis.)

You can never have too many antennas. Whatever you may have, make your arrangement switchable in a convenient manner so that you may use the one with the best signal-to-noise ratio for receiving, while using the one with the best absolute signal strength for transmitting. That may or may not be the same antenna. For instance, my verticals are often the best radiators, while my low-noise receiving loop or the low dipole are almost always the best receiving antennas.

I suppose the one advantage to all of these antennas is that being omnidirectional, I never have to worry where to point them to maximize my rate!

Radios, etc.

A top-notch radio can help overcome some antenna limitations. DSP noise reduction is a godsend to the pea-shooter operator. I'm sure that a quarter my QSOs would not be possible without the noise reduction and noise blanking available on my TS-590s; it's a miracle. Better filters and the high dynamic range of the best receivers are crucial to the contester, probably more so for us little guys. Obviously, a modern rig with a CAT interface is also mandatory for automatic logging and other automation conveniences.

You definitely should use one of the top contest logging programs such as N1MM or WriteLog to maximize your efficiency; this will also come in handy if you operate another contester's station. Make sure you have a reliable computer, too.

Running higher power certainly helps to overcome limited antennas. It's bad enough that I can't hear very well, but even worse when I can hear the other guy and not make the QSO. Adding a KPA500, which I call my $2000 S-unit, has been valuable when the going gets tough. It definitely removes a degree of frustration as well, and a happy operator is a productive contester. Use caution though: If, like me, you or your neighbors are sitting close to your antennas, an RF exposure estimate is mandatory. Running full legal limit would not be advisable at my station. Also, my invisible-wire antennas may well vaporize!

One more thing about high power: Don't be an alligator (all mouth and no ears). If I know that I'm not hearing well, running can go really badly with high power. I either turn off the amp, or switch to S&P.

Figure 4. Compact and simple stations, yet capable of contesting. Bob, KO6LU (L), and Gary, NA6O (R).

Dealing with RF Interference

Being in close proximity to modern electronic devices is the bane of the ham's existence when it comes to RFI. We are inundated with ghastly switching power supplies, non-compliant LED lamps, poorly-shielded computer stuff, pot farmers with evil grow bulbs, plasma TVs, and so forth. We are also likely to interfere with neighbors' and our own home entertainment equipment, internet, and other things. Our radio gear may be located way too close to our antennas, resulting in RF in the shack and all kinds of equipment problems.

All of these issues are magnified by the pea-shooter's close quarters and fundamental limits on physical positioning of antennas and equipment (Fig. 5). For instance, two my primary antennas are 15 and 20 feet from my neighbor's den. That is a major problem, in both directions. And my rig is right under my vertical and my dipole is 10 feet over my head. If I had any hair, it would probably stand up when I transmit. There is nothing I can do to change this geometric situation, but clearly it would be of great benefit if I had more flexible space.

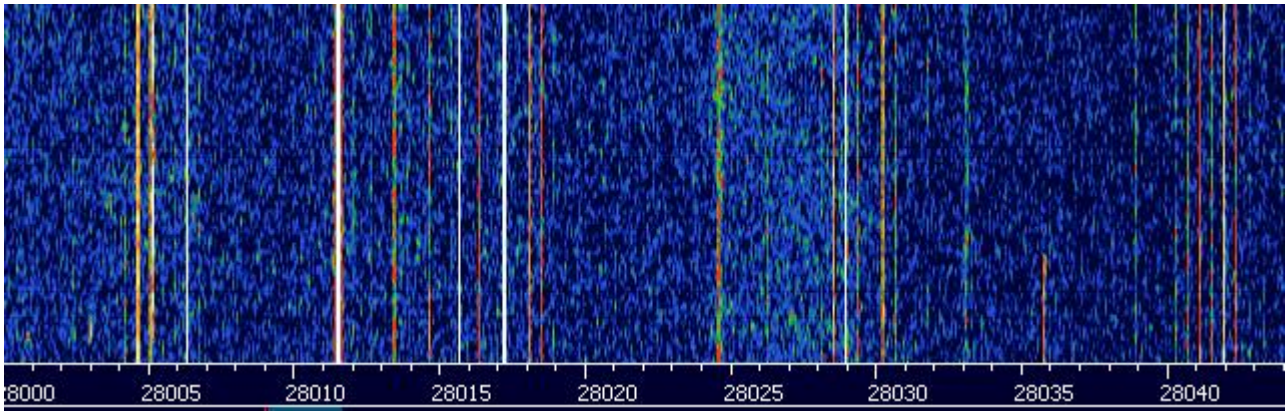


Figure 5. A typical moment of RFI on 10 m at NA6O. Computers and peripherals, networking equipment, switching power supplies... The list goes on and on.

RFI management is a complex subject and I must recommend you start by reading some key references[3] [4]. Get advice from your fellow NCCC members, many of whom are well-versed in this. Contesting.com has an RFI email list where many experts hang out and are happy to help[5]. The following measures are generally advisable, within of course the limits of your particular situations.

Try to locate antennas farther from all houses, as well as your rig. Install common-mode chokes on all coaxial lines and control wires that exit your shack. Bond all of your equipment together, and bond that to your home's grounding system (this is super important if you live in an area where lightning is likely). Run high power (>100 W) only when necessary. Be friendly with your neighbors and volunteer to help eliminate interference both to and from their equipment, typically by installing chokes. Clean up your own home first: Turn of circuit breakers while checking all bands and see if you can find unexpected RFI emitters. Use a portable AM/FM/SW radio as a sniffer. Replace crappy wall warts with linear power supplies, or known-clean switchers. Use high-quality shielded cables for station interconnects. Add common-mode chokes on cables that seem to be problematic, for instance serial or USB devices that misbehave or crash your computer.

Conclusion

You, too, can be a contester with just a pea-shooter station. The operating experience you gain will be valuable no matter where you operate. Hone your skills, keep trying different antennas, and fight the RFI battle. Most of all, make contesting fun.

Acknowledgements
Bob, KO6LU, a fellow pea-shooter, contributed to this article. Thanks to Ian, W6TCP, for prompting to me write “something.”

References

1. Reverse Beacon Network: http://www.reversebeacon.net/main.php

2. Limited-space antennas by K9YC: http://audiosystemsgroup.com/LimitedSpaceAntennasPPT.pdf

3. K9YC has several important RFI-related resources that every ham needs to read, located at: http://audiosystemsgroup.com/publish.htm

4. ARRL RFI Book

5. RFI list at Contesting.com: http://lists.contesting.com/mailman/listinfo/RFI

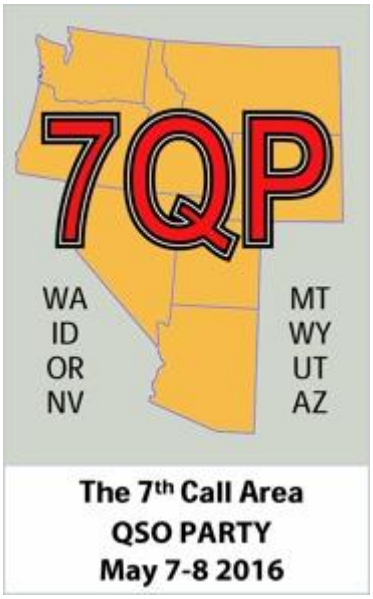
Northern California Contest Club Reflector—Guidelines

This reflector is devoted to the discussion of contesting.

This includes contests, station building, dxpeditions, technical questions, contesting questions, amateur radio equipment wants/sales, score posting, amateur radio meetings/conventions, and membership achievements.

This does not include personal attacks, politics, or off-subject posts which will be considered a violation of the Guidelines.

Violations may result in removal of the violator from the reflector and possibly from club membership in good standing.



7QP will be May 7-8, 2016

The 11th running of 7QP will be May 7-8, 2016. I am proud to have been one of the founders of 7QP as it is now the third largest state/regional QSO party in the Country.

I am also contrite in not having the time over the last few years to effectively be the Nevada State coordinator and solicit everyone to get on and activate all 17 counties.

- It is a fun one-day operating event where you are the DX
- It is an excellent opportunity for emergency communications preparedness
- It is a great way to "see Nevada" with County mobile or portable DX-Peditions

Full rules are at http://ws7n.net/7QP/new/Page.asp?content=rules

I will act as NV coordinator so please send me your plans and I will maintain a master list of who is covering which counties. It is really a fun activity for your Club or ARES group.

We will also sponsor a multiop at W7RN – NVSTO

Please freely distribute this information

Tom Taormina, K5RC
Comstock Memorial Station, W7RN
Storey County ARES, KS7AA

www.w7rn.com
775-847-7929

VP/CC Report

Greeting KB'ers. It's been a busy couple of contesting months. Coming off a strong showing in RTTY RU, NCCC rallied and did what contest clubs do. We pulled together and went for it. By all indications WPX RTTY is ours. In no small part due to Ed, W0YK/P49X, amazing and likely record breaking effort from Aruba. But it took the entire team to put us in the win column.

Strong individual and team performances in NAQP, Sprint and capped off by ARRL DX CW brings us to March. It's been fun with many KB'ers in the log.

It's been especially gratifying to see all the soapbox comments about how much fun it is running RTTY SO2R and interleaving QSO's on different bands to get some really good rates. Though we are clearly the best club at RTTY club in the world, we aren't just about RTTY.

When Bob and I took office a year ago, we said we wanted to go big with Sweepstakes in '16. By all accounts '15 is looking good for wins in the medium and local categories in NCCC territory with PVRC putting in some big numbers again in unlimited.

The question on the table is do we want to go for it? This can't come from the leadership. The membership has to both believe and want to go for a win. It will be no small feat. PVRC is on it's 8th win in a row. The last club to win SS other than PVRC was NCCC in 2007. The last serious challenge was 2010 when NCCC came very close to a win. Since then it's pretty much been a one horse race.

The SS discussion is coming to a head. We need to decide and launch the project now. Dean presented to the Board a strategy I believe has a good chance of winning, but like any complex project needs both leadership and strong support team to execute the plan to win. And not a small team. At least 25 volunteers are needed. Outside the core team we also need the desire and commitment of the club at large.

So I ask: Do you want to do it? Since announcing our plan for the '15-'16 contest year not one general member has reached out to discuss SS in '16. This leads me to conclude there is not much interest beyond the members who enjoy SS and will do it club or no club or prefer the smaller club wins.

If I've come to the wrong conclusion drop me a note at w1srd@arrl.net and please share your thoughts. I certainly hope I am wrong. The contest world will be lesser if NCCC passes the gavel for good.

73 es KB,

Steve
W1SRD

Clean, Punchy, Competitive Contest Audio Without Splatter

by Jim Brown K9YC

I'm retired from a career in pro audio, and although I designed a lot of music systems, one of my specialties was designing speech systems that allowed worshipers to understand the priest in big, very reverberant churches. To do that effectively, I had to learn a lot about the human perception of sound, and how our ear/brain translate what we hear into speech intelligibility. I also had to learn how to design sound systems that gave our ears what they need, while giving them as little as possible of what they don't need. In rooms with diffi-cult acoustics, the enemy is reverberation. In radio systems, it's noise and interference.

As an active NCCC member, I'm often asked to help other members tweak their audio for "maximum smoke." Top operator N6GQ likes to travel to interesting places for contests, and when he does, we always make a sked to make sure he's sounding good. 2015 CQWW SSB found Jeff in EA8 (operating as EF8U), and we worked through setup of the FT950s that were in the shack he was using. In his soapbox comments, Jeff said, ***"My goal was to be clean, punchy, and not splatter, as the large EF8R M/S effort was underway nearby - and there would be times when we'd be on the same band and likely S9+60 look-ing at each other - so I didn't want to be a wide signal in their path. This paid off, as I was told over and over both how loud I sounded, as well as how punchy the audio was."*** While sorting through the soapbox for that contest, CQ WW contest director K5ZD came across Jeff's comments and suggested that I write something for NCJ. So here it is. It ran in the Mar/Apr 2016 issue. Let's start with fundamental concepts.

Frequency Content of Speech: Human speech has content from about 100 Hz to 8 kHz, but only the energy between about 400 Hz and 4 kHz contributes to speech intelligibility. Vocal content below 400 Hz provides "body" to the voice (great for singers and radio an-nouncers), but that low frequency output of the mic also contains breath pops, room noise, mic handling noise, wind noise, and reverberation. This low frequency energy can easily be as much as half of the power picked up by the mic, but it contributes nothing to communications – it wastes transmitter power. Likewise, speech content above 3 kHz provides "presence" and helps communications a bit, but the added bandwidth adds noise (and QRM from other stations). Most SSB TX filters are 2.7 kHz wide, so a well adjusted rig will align those filters so that they pass audio between 400 Hz and 3.1 kHz. A few radios allow the user to tweak this setting in a menu. [These bandwidth limits for speech communications were established in the earliest days of long distance telephony – they al-low what's necessary, but nothing extra. And over more than a century, they have allowed more and more conversations to be crammed into the same bandwidth.]

Thus, our first rule is to ***minimize any part of the audio signal below about 400 Hz, and to not waste bandwidth transmitting sound above 3 kHz.*** We have several controls over this. First, we can choose a microphone without excess low frequency response. See "Choos-ing a Microphone" later in this article. Many rigs provide menu settings to tailor the audio frequency response. Study the manual for your radio to understand and choose settings for your rig.

Some rigs, like the Elecraft K3, K3S, and KX3, make it even easier to tailor the frequency response – they have a built-in octave-band equalizer (called TXEQ) covering the speech range. Each band can be set for up to 18 dB of boost or cut in 1 dB steps. A good starting point for most mics and voices is maximum cut of the three lowest bands (50, 100, 200 Hz), and 3-6 dB cut of the fourth band (400 Hz) leaving all other bands set flat (no boost or cut). Some mics/voices may benefit from a bit more cut at 400 Hz, or from 3-6 dB of cut or boost in the two highest bands. Save these tweaks for when you have a trained listener to advise you.

Getting Audio Levels Right: This is the most critical part, and more than half of the sta-tions I hear in a typical contest screw it up. The most common mistake is cranking these settings up too high – often **way** too high! The result is muffled, distorted audio that is hard to copy, often with lots of room noise. There are several adjustments that we must get right, and any one of them can make us sound bad.

In one common contesting setup, the mic feeds the mic input of the computer sound card, the sound card feeds the rig (best to a Line Level Input). For SO2R, the sound card feeds both radios via L and R outputs, and the logging software controls switching. The advan-tage of this setup is that the operator's mic can easily be used to record new messages during the contest, especially important if you're Running in split mode. In this setup, ***the most critical settings*** are 1) the *Mic Gain* in the *computer sound card*, which must be set so that the mic ***never*** overloads the sound card in-put, even when things get ***real*** exciting; 2) the *Output Gain* of the *computer sound card*, which must be set so that the sound card itself never overloads; and 3) the *Input Gain* of the radio, which must be set so that it never overloads. Any one of these overload points will turn your audio to mush!

The key to all of these adjustments is to listen with headphones as you adjust them. Adjust #1 (sound card mic input) and #2 (sound card output) by plugging headphones into the sound card out-put jack and carefully listen for any distortion. If you have trouble hearing it, recruit a friend to help. Record one or more messages (with the same mic that you'll use live), and play them back, again listening with headphones. Make sure there's no dis-tortion – if there is, turn down recording gain and do it again until it sounds clean. Once you have a good recording, adjust sound card gain set-tings so that the level (loudness) of the live mic is the same as the recording. Now you're ready to remove the headphones and feed the sound card to the radio(s).

If you are able to feed the computer sound card to a Line Level Input of your radio, you should be able to adjust the input gain of the radio for good modulation. Start with no compression (processing off or turned all the way down) and look for correct indicated power output on your rig's meter. If possible, listen on another radio (with its RX antenna disconnected and its IF bandwidth set wide (3-4 kHz), again making sure there is no dis-tortion. Make all level adjustments to your rig with equalization set as described above.

If your rig lacks a Line Input, or the line input won't allow you to do things you need to do (perhaps you can't apply EQ with it, or you can't use VOX with it), you'll need to make an adapter to feed the Mic input. That adapter will need a 20 dB pad (voltage divider) be-tween the sound card and the rig. This requires resistors in a ratio of 10:1, with the smaller resistor wired in parallel with the mic input and the large resistor in series between the computer output and the mic input. Values aren't criti-cal if they're in the right range. 1K and 100 ohms, or 470 and 47 ohms are good choices. Low watt resistors are fine, so can usually be fitted inside connectors.

Once you have good, clean sounding modulation, set your rig so that its display shows you a bar graph for compression and turn on (or turn up) Compression (processing). Talk-ing as you normally would during the contest, increase the compression until the display indicates 10 dB of compression on voice peaks. Most rigs sound good at 10 dB, and most get nasty when pushed beyond than that – intelligibility degrades, room noise increases. Again, listen to yourself on another radio if you can (no antenna, wide IF bandwidth). Once you've made these adjustments, you're ready to recruit a trained listener.

Alternative setups: Contesting from W6, 40M almost never supports running to EU, so I nev-er need to re-record messages on the fly. Instead, I record all my contest messages in advance of the contest using an audio application like Audacity. There's a WebEx talk about this on the public section of the NCCC website. During the contest, I feed the mic to my YCCC SO2R box, which switches it between the mic inputs of left and right radios, and I feed computer outs to Line Inputs of the two radios. Both are switched by N1MM Logger Plus. http://nccc.cc/misc/

RecordingVoiceMessages-K9YC.wmv

With this alternate setup, we adjust the computer output level as before, then with com-pression turned off, adjust both Mic Gain and Line Gain for indication of desired output power on voice peaks. When properly set, the live mic and your recording should sound identical and equally loud (hopefully you used the same mic for recording and for live talk-ing). Now adjust compression as before for indicated 10 dB on voice peaks.

Power Supply For Your Rig: Most modern rigs are designed to operate from DC power sup-plies that provide 13.8 – 14 VDC. When operated at a lower voltage, the distortion produced by most of these rigs increases, often by 3-6 dB. That distortion produces har-monics and intermodula-tion products (splatter).

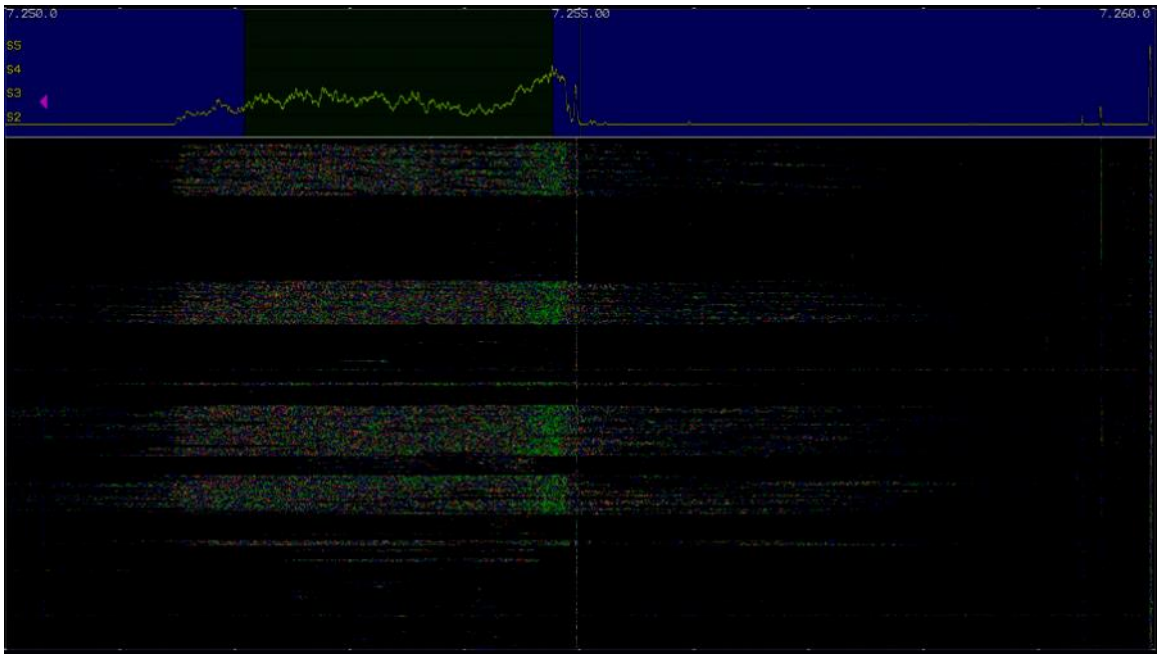


Fig 1 – Splatter On 40M

This screen grab from a P3/SVGA screen shows about 1 minute of a 40M rag-chew. Display bandwidth is 10 kHz. The shaded section of the top of the display shows the 2.7 kHz-wide RX bandwidth setting of my radio. One station is much narrower and weaker. Horizontal lines extending mostly above the signal but also below it are splatter on audio peaks. Splatter in the upper sideband of this LSB signal is only 15 dB or so below the signal, and extends more than 3 kHz above the signal, indi-cating a badly tuned or overdriven power amp, or ALC between amp and rig to set power, or both. Note the broad peak near the suppressed car-rier – this is wasted low frequency energy, and is probably contributing most of the splatter. The straight vertical lines are local noise, not part of the transmitted signals.

Setting Up Your Power Amp: Once audio is well adjusted, the most common cause of splat-ter is a badly tuned or over-driven power amplifier. Power amps are cleanest when their load (the antenna) is closely matched to the output stage. Tube amps have output stages that must be tuned, either manually, automatically, or by the automatic recall of previously settings for the frequency in use. Most solid state amplifiers have fixed output networks for both harmonic suppression and to transform a 50 ohm load to their designed load impedance. If the antenna in use does not provide a 50 ohm load, an antenna tuner must be used to 1) minimize distortion, and 2) so that the amplifier

will not “fold back” (reduce power) to protect itself.

ALC Between Amplifier and Rig should ***never*** be used to set output power. Doing so is a recipe for very nasty splatter. My 35 year-old Ten Tec Titans require only 50 - 60 W for full output; an ACOM 1010 required 50 – 75 W and KPA500 only about 28W. Always set out-put power by setting drive level (power out) of your rig needed to reach that power level. It ***is*** good practice to use ALC to protect a power amplifier in the event of some failure in the antenna system. To do this, hook up the ALC as directed by the manufacturers of am-plifier and rig, but set power out by setting drive from the rig to the amplifier.

Triode Power Amplifiers must have their output networks tuned for maximum output as indicated by a good power meter. If that’s more or less than the desired output level, sim-ply change the drive (power out) of the rig to get what you want. Whether operating CW, SSB, or digital modes, I tune in CW mode with a series of dits, carefully tuning both capaci-tors for maximum output. I start out several dB below full output, then increase drive and retune at the higher drive level. Using dits is easier on the tubes because it re-duces the dissipation (and the grid current) by one half as compared to keydown. Also, ex-cessive grid current is a primary cause of triode tube failure; minimum grid current gener-ally coincides with maximum output.

Tuning Tetrode Power Amplifiers is a bit more complicated. Veteran amplifier designer Tom Rauch, W8JI, has written an excellent tutorial and applications note on the topic. It should be considered required reading for anyone with a tetrode or pentode power ampli-fier. http://www.w8ji.com/loading_amplifier.htm

A power amplifier that automatically recalls previous settings must have been tuned properly in the first place if the recalled settings are to minimize distortion (splatter). If multiple antennas are used on a band, settings recalled for the tuning of one antenna may be wrong for another. Setups like this may require the use of an outboard tuner, ideally one that can switch between multiple outputs for the different antennas.

Tips for Listening On The Air Start by listening with your IF filters set as wide as you can. This way, you’re listening to what is being transmitted, not what is being limited by the bandwidth of your receive IF. Make sure that your radio is not being overloaded – turn preamp off and attenuator on if needed to keep the S-meter in a middle range. And make sure that your Noise Blanker, Noise Reduction, Notch Filter, and any “audio EFX” are turned off. Now that you know what that sounds like, narrow your IF to a normal contest-ing bandwidth and see if it still sounds good.

When listening to yourself on a second radio at your own station, disconnect the antenna, turn off the preamp, turn on the attenuator, and turn up the audio gain to the point of be-ing comfortably loud. What you’re looking for is any audible distortion.

Whether listening to your own signal or to a friend’s, after you’ve listened wide with a wide filter, switch to a narrow SSB filter setting and tune both sides of the signal. Listen carefully for any splatter (on CW and RTTY, listen for phase noise and clicks).

If you have a modern spectrum display (P3, LP-Pan, or SDR), set it fairly narrow (25-50 kHz wide is good for SSB, 5-10 kHz for CW). And, of course, make sure it isn’t being over-loaded – check the settings just as for the receiver itself. Again, look for splatter, which will show up as short horizontal lines in the waterfall on audio peaks. Splatter is a sign of prob-lems in the output stage – a linear amplifier, or the rig itself if you’re running barefoot. Look for overdrive, mistuning, the use of ALC between amp and rig. Study the section on setting up amplifiers again.

Choosing a Microphone: Beginning in the late 1950s, Shure introduced the model 440, the first microphone designed specifically for SSB transmission. The modern version of that mic is the 444D. Both are omni-directional mics with low frequency response falling below 400 Hz and with a

pronounced peak around 3 kHz that compensates for some of the loss in the SSB transmit filter. These are excellent sounding mics, but they're tabletop designs, not well suited to modern contesting. Most mics in the Heil line are more practi-cal applications of the same concepts.

Mics come in several basic forms. ***Dynamic*** mics operate on the same principle as a loud-speaker, (a coil moving in a magnetic field) but in reverse. A loudspeaker works pretty well as a microphone, and has been used that way for half a century in intercom systems. ***Electret condenser*** mics are very different – the diaphragm is one plate of a capacitor; a voltage is applied between the two plates (the other being fixed). The source impedance is quite high (megohms), and must be transformed to a lower impedance by a FET follower built into the mic (so that what it feeds doesn't load down the mic). The ***electret*** capsule is pre-polarized, but the FET follower needs a small positive voltage fed through a load resis-tor to operate. This voltage is called bias. 8VDC through 5.6K is typical.

Both types of mics are built with an ***Omnidirectional*** pattern (picks up equally in all direc-tions) or a ***Cardioid*** pattern (picks up better in one direction) and can be though of as "half space" mics.

Cardioid mics have an important characteristic called ***proximity effect***, which is a very strong bass boost for sound sources very close to the mic. In addition to making voices "bass heavy," proximity effect magnifies breathe pops, wind noise, and handling noise. Virtually all mics used in live sound are cardioids, and those intended for use by singers have a strong low frequency rolloff that partially compensates proximity effect. Although cardioids reduce room noise pickup, proximity effect generally makes them a poor choice in the ham shack.
Cardioids work on the principle of acoustic cancellation between sound impinging on front and rear openings of the microphone

Fig 2 –Mic Positioning

housing. Proximity effect is the result of that process, and the fact that there is a single rear opening. An important variation of cardioids is built with extra openings in the handle, which greatly reduces proximity effect. The ElectroVoice 664 and 666 were the first popular mics of this type, which are called "***variable-D***" (for the variable distant openings), as opposed to "***single-D***" cardioids with a single rear opening. If you're looking for a good pro mic for your ham station, the variable-D EV RE10, 11, 15, 16, 18, 20, and 27, and the Shure SM53 and SM54 are great choices. All but the RE16, 20, and 27 are long discontinued, but dynamic mics last forever, so buying used from a trustworthy source is a good option.

An omnidirectional mic, whether dynamic or an electret, is the best choice for ham radio. It has no problem with proximity ef-fect, so it can be worked close. I position the omni mic of my CM500 about two inches above and an inch to the left of my mouth. This gives me room to munch and drink coffee while the CQ recording is playing, and it minimizes any sign of breath pops, while still being close enough to minimize room noise.

Using a Pro Mic in the Shack: Pro electret mics cannot be used with ham gear (because of how they are powered), but pro dynamic mics work well and are easy to wire. Their 3-pin XL-connector comes wired for balanced circuits – Pin 1 is the shield, Pins 2 and 3 carry the signal. To connect them to your ham rig, wire the shield to the shell of the Foster plug, and connect the signal pair to Mic and Mic Return. Or wire both the shield and one side of audio to the rig connector shell, the other side of audio to the pin for Mic In.

About six years ago, W6XU, an EE working for an audio equipment manufacturer, discov-ered the Yamaha CM500 boom mic headset, which at the time was selling for about $45 (current cost is

about $60). Josh arranged a group purchase for NCCC members, and many of us quickly became fans of the headset and the mic. The CM500 has an electret mic and nice cushy headphones. Both sound great, and the headset is easy to wear for a long contest weekend. It comes with two 1/8-in TRS plugs, one for the headphones and the other for the mic. Both plug straight into the rear panel of a K3.

For other rigs, you'll need to make up a cable adapter for the mic. You'll need a cable-mount Foster plug to match your radio and a female 1/8-in TRS jack to mate with the TRS plug on the headset. Check the manual for your radio for pinout of the mic connector. To connect the mic to the radio, run a single conductor shielded cable (I use mini-coax) from the tip of the TRS jack to the mic input pin of the Foster plug, connecting the cable shield to the sleeve of the TRS jack and the shell of the Foster plug. Virtually all modern radios have V+ in the range of 8V on a pin of the mic connector, so all it takes to provide bias is a 5.6K resistor between 8V and the mic input pin. This can be a very low watt resistor, so it's usually possible to fit it inside the Foster plug. Buy Foster plugs from your ham suppli-ers; female TRS jacks can be bought from pro audio vendors like Full Compass and Sweet-water. You want Neutrik part number NYS240BG.

Fig 3 – Adapter For Computer Mic to Yaesu FT1000MP

K6LL recently bought a Koss SB-45, which is quite similar to the CM500 at half the cost. After using it for two 12-hour contest sessions, Dave reported that it is equal to or better than the CM500 in per-formance and comfort (and he likes the CM500). GM3SEK also likes the SB-45 (he can't buy CM500 in the UK), and reports that his XYL prefers the lighter weight headphones of the Koss CS-100, which he also recommends. As he puts it, it's a matter of which style of headphones you like.

Summarizing the steps for audio and power amp setup for SSB Contesting:

Set your rig to minimize audio content below 400 Hz and above 3.2 kHz.

Get audio gains set right, from the Mic Input of the rig (or of the computer), the Output Gain of the computer, the Line Input of the rig.

Set processing for an indicated 10 dB on voice peaks.

Resist the urge to turn Mic Gain or Compression up louder – once you have levels set as described here, turning it up louder makes you sound WORSE, not better.

Tune your power amp carefully.

Don't overdrive your power amp, and don't use ALC to set TX power.

If your rig runs on nominal 13.8VDC, run it from a supply as close to 14V as possi-ble.

Being a good neighbor on the bands isn't just politeness. In major contests, it's required. When in S&P mode, I'll tune right past signals that are too distorted to copy easily, and when running, I won't waste my time trying to work those stations calling me. In an email exchange, Jeff said, "Personally, I'm loathe to do many more SSB contests due to so many poor quality signals on the air. It just so

happens that the last good number of trips I've done have coincided over SSB contests." I think Jeff speaks for many of us – he certainly does speak for me. Take these steps and you will make SSB contesting more enjoyable for all of us, including yourself. And you'll boost your score!

Acknowledgement: Thanks to Bob Wolbert, K6XX, for his extensive contributions to the discussion of the causes and cures of distortion in rigs and power amplifiers. There's much more of this in the slides for his tutorial talk on the subject to the Northern California Con-test Club several years ago. http://k9yc.com/K6XXAmpTalk.pdf

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CQ WPX RTTY Overview

By Jim WX6V

NCCC RTTY diddlers took to the air in big numbers with unique and interesting callsigns for the CQ WPX RTTY contest over the weekend of February 12-14. Led by rtty guru and CQ Contest Hall of Fame member Ed, W0YK, operating from Aruba at P49X, it looks like the club has pulled off a big win over our traditional contesting rivals. I've often said that NCCC members have a special affinity for rtty operation and it is one of the areas where we should do extremely well as a club. So, Ed and 45 other NCCC members submitted claimed scores for this contest totaling around 37.4 million points. Initial estimates show that our nearest competitor in this event was the Society of Midwest Contesters, who appears to have posted a total score of around 29.2 million points. See what I mean?

In addition to Ed, Jeff (WK6I) did his usual outstanding job running KS7AA at the W7RN super-station, while N6IE and K6TU posted some personal all-time high scores for this event. We also noted some stations making their first-ever appearance in the WPX RTTY Contest, such as KR6N, AF6SA, and K6KNS.

Conditions seemed to be fairly good – particularly on Sunday after the K index dropped significantly and European stations started pouring through on 15 meters Sunday morning along with increased activity on 10 meters. Since this is a contest with lots of domestic and international participants, there was certainly no shortage of stations to work. Even running S&P mode, an operator could stay fairly busy all weekend without ever having to call CQ. For those stations that were CQing, the runs in this event can be quite energizing, to say the least!

Some operators reported having some problems getting their rtty setup to function properly, while some others reported problems with antennas and other equipment. Hopefully, our club members can rally around these folks to get their stations running at full speed. The most unusual comment came from NA6O, who mentioned working KB6NN, who was running his station remotely from an android phone. Wow!

I know that I certainly had fun in this contest, even though my time was limited due to the need to get my yagi tied down at 45 degrees after the rotator broke. I discovered that a lot of stations can still be worked over a wide area with an antenna pointed in this direction!

I always find it exhilarating when we can outpace Midwest and East coast clubs in a contest that features lots of DX activity and is focused on the low bands. It doesn't get much better than that – so way to go team!

KB de Jim –WX6V-

CQ WPX RTTY - FEBRUARY 2016								
			Last Update:		2/27/2016 9:17			
	Call = Log	OPERA-TOR(S)	STATION	CLASS	QSO's	PREFIXES	SCORE	NCCC
1	**P49X**	W0YK	P49X	SOAB HP	3812	983	14,250,551	14,250,551
2	**KS7AA**	WK6I	W7RN	SOAB HP	2459	738	4,221,360	4,221,360
3	**WQ6K**	N6IE	WQ6K	SOAB HP	1539	716	3,353,028	3,353,028
4	**K6MR**	K6MR	K6MR	SOAB HP	1549	684	2,419,308	2,419,308
5	**NO6F**	K6TU	K6TU	SOAB HP	1590	547	2,189,641	2,189,641
6	**W6SX**	W6SX	W6SX	SOAB HP	1516	498	1,545,792	1,545,792
7	**KY0W**	K6SRZ	K6SRZ	SOAB HP	1141	481	1,252,043	1,252,043
8	**AG6AU**	W1RH	W1RH	SOAB HP	1050	470	1,029,300	1,029,300
9	**K6EU**	K6EU	K6EU	SOAB(TS)	917	417	789,798	789,798
10	**AF6SA**	AF6SA	AF6SA	SOAB HP	726	430	686,280	686,280
11	**KR6N**	KR6N	KR6N	SOAB HP	837	366	631,350	631,350
12	**W6KPO**	N6DQ	N6DQ	SOAB HP	674	357	541,926	541,926
13	**NA6O**	NA6O	NA6O	SOAB HP	609	316	516,660	516,660
14	**AG1RL**	W1SRD	W1SRD	SOAB HP	747	347	500,721	500,721
15	**NN6NN**	W6XK	W6XK	SOAB HP	625	335	426,790	426,790
16	**N2NS**	N2NS	N2NS	SOAB HP	501	311	414,252	414,252
17	**K6GHA**	K6GHA	K6GHA	SOSB20(T	475	345	313,950	313,950
18	**K6KNS**	K6KNS	K6KNS	SOAB HP	580	298	308,430	308,430

Continued on next page...

CQ WPX RTTY - FEBRUARY 2016								
			Last Update:		2/27/2016 9:19			
	Call = Log	OPERA-TOR(S)	STATION	CLASS	QSO's	PREFIXES	SCORE	NCCC
19	**KO6LU**	KO6LU	KO6LU	SOAB HP	518	233	250,708	250,708
20	**K6LRN**	K6LRN	K6LRN	SOAB LP	379	232	208,104	208,104
21	**NZ6K**	K6RB	K6RB	SOAB HP	449	223	208,059	208,059
22	**AK6M**	K6MM	K6MM	SOAB(TS) HP	334	226	176,958	176,958
23	**WX7M**	K7XC	K7XC	SOAB LP	343	228	162,792	162,792
24	**WX6V**	WX6V	WX6V	SOAB HP	226	174	105,792	105,792
25	**K6ELE**	K6ELE	K6ELE	SOAB HP	189	158	104,104	104,104
26	**K6XN**	K6XN	K6XN	SOAB HP	262	186	89,466	89,466
27	**N6XG**	N6XG	N6XG	SOAB HP	235	152	78,624	78,624
28	**N6RK**	N6RK	N6RK	SOAB HP	241	140	76,440	76,440
29	**N6ML**	N6ML	N6ML				74,022	74,022
30	**K6GFJ**	K6GFJ	K6GFJ	SOAB HP	254	156	70,824	70,824
31	**K6LE**	K6LE	K6LE	SOAB LP	253	149	67,348	67,348
32	**W6OAT**	W6OAT	W6OAT	SOAB HP	238	162	66,582	66,582
33	**WV6I**	N6WM	N6WM	SOSB15 HP	173	127	46,990	46,990
34	**WQ6O**	N6WM	K6LRG	SOAB HP	206	141	42,018	42,018
35	**KW6S**	KW6S	KW6S				22,088	22,088
36	**AB1U**	W6RKC	W6RKC	SOAB HP	107	85	21,590	21,590
37	**K6TIG**	K6TIG	K6TIG	SOAB LP	117	92	21,252	21,252
38	**WB6JJJ**	WB6JJJ	WB6JJJ	SOAB HP	105	88	18,568	18,568
39	**WE6Z**	WE6Z	WE6Z				17,064	17,064
40	**N6EE**	N6EE	N6EE	SOSB80 LP	92	67	14,472	14,472
41	**KM6I**	KM6I	KM6I	SOAB HP	89	62	12,524	12,524
42	**N6DZR**	N6DZR	N6DZR	SOAB LP	52	49	5,390	5,390
43	**N0KQ**	N0KQ	N0KQ	SOAB LP	40	31	2,480	2,480
44	**WM6A**	WM6A	WM6A				559	559
45	**K6ST**	K6ST	K6ST	SOSB15 LP	11	11	187	187
46	**K6YL**	K6YL	K6YL	SOSB80 HP	9	9	180	180
							TOTALS	37,356,365

The NCCC meeting took place on Sunday 31st of January at Back 40 BBQ in Pleasant Hill. It was attended by the following NCCC members and their guests :-

Bob W1RH + XYL, Dick K6LRN, Carolyn K6TKD, Ian W6TCP, Jeff WK6I, Chris N6WM, Ed W0YK, Chris KG6O, Richard N6XI, Rusty W6OAT, David N6ORB, Rick N6RK + XYL, John WD6EIW, Gary NA6O, Steve W1SRD, Shirley AA6K, K6KNS, Alan K6SRZ, Ron N6IE, Steve W6SFK, Ken N6RO, Bob KR6N, Bill WX6B, Stefan AF6SA, and Mike N7MH.

The program for the meeting was RTTY Round Up / Wrap-Up / Workshop featuring W0YK / WK6I / N6WM. The meeting was also made available by WebEx for those who could not attend the actual meeting live.

Pre dinner drinks (L-to-R) Ken N6RO, Mike N7MH, Rusty W6OAT, Alan K6SRZ, Ed W0YK

Chris KG6O, prepares for the Webex broadcast (Thanks Chris) !

Food scored very highly with 599 reports all round!

Only $22 at the door—
Richard N6XI, Bill WX6B, Dick K6LRN

John WD6EIW, Dave N6ORB,
Gary NA6O

Jeff WK6I and Chris N6WM.

Dave K6KNS, Stefan AF6SA,
Bob KR6N

RTTY Panel—Chris N6WM, Jeff WK6I and Ed W0YK

See you all at the Next meeting !

Point Generator Profile

He lives in beautiful country at an elevation of 8,000 feet, in the outer reaches of our 175 mile circle. He's a regular attendee, via the internet, of our meetings. He scores a lot of points for the best contest club in the world, and he does it with wires! We're talking about Hank, W6SX, and he's this month's featured Point Generator.

Name/Call Sign: Hank Garretson, W6SX

Past calls: KN2SSX (1956), K2SSX WA8ZGC, DA1AX, K7OM, G5CAS, VK1AO

Location: Mammoth Lakes, elevation 8,083 feet in John Muir's Range of Light.

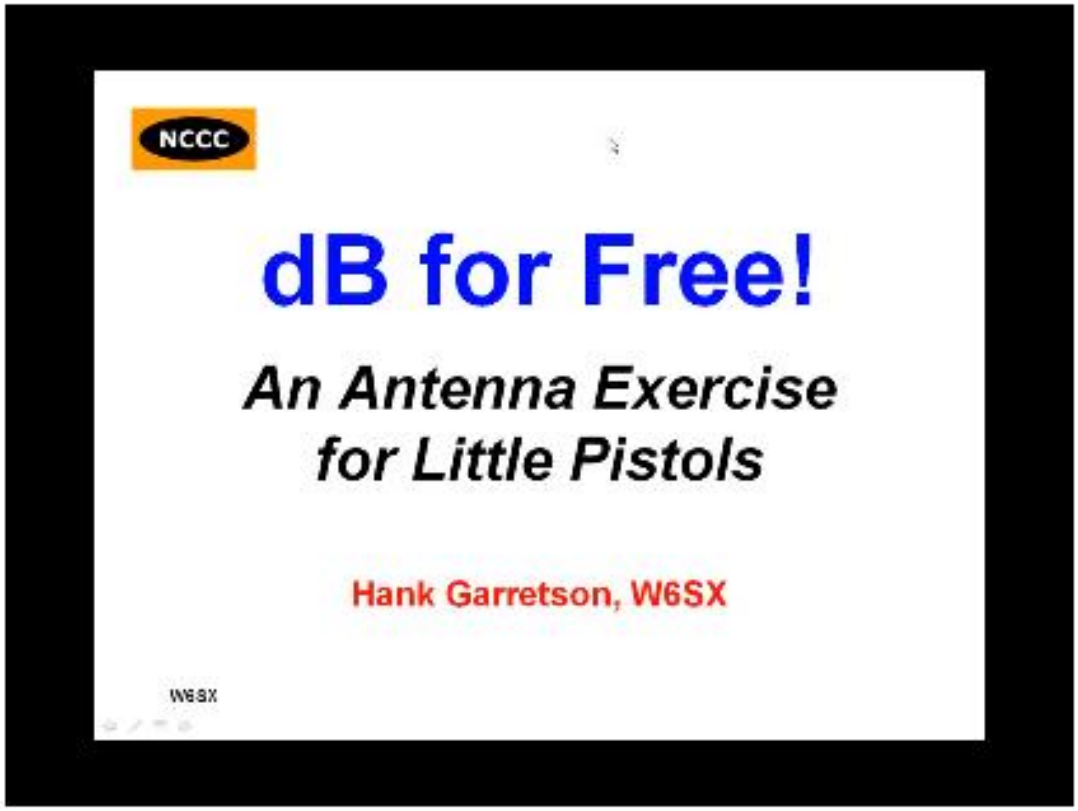
Disclaimer: 8,000 feet elevation doesn't help. 8,000 feet is a very small fraction of the height of the ionosphere. The extra elevation has negligible effect. What's important is close-in surrounding terrain.

How much property do you have? 0.17 acre

Describe your antenna system:

Current: My wire antenna is forty-six feet high.

Description here http://wwrof.org/webinar-archive/db-for-free-an-antenna-exercise for-little-pistols-by-hank-garretson-w6sx/ . If link doesn't go directly to presentation, click on "Older Posts."



Future: Unfortunately not much more I can think of. Suggestions welcome.

What's in your shack? K3, P3, ACOM 2000A, Matchboxes

What are your previous QTH's? North Syracuse NY, Troy NY, Medway OH, Patuxtent River, MD, Braunschweig Germany, Loomis CA, Edwards AFB CA, Holloman AFB NM, Fountain Valley CA, Littlerock CA

If you're working, what is your career? If not, what was your career?: Retired to Mammoth in 2004. I spent twenty years as a career officer in the United States Air Force, then seventeen years working for Northrop Grummen Corporation. I was an electrical/aeronautical/flight-test engineer and spent most of my career flight testing aircraft.

Married? Kids? Grandkids? Married to Sunshine Rhonda. One daughter, two grandkids.

How many DXCC entities have you worked? I don't keep track, but LoTW says 221.

What's your favorite contest? Contests is contests. I love them all.

Any tips for contesters?

W6SX Prime Directive: The first rule of contesting is to have fun.

W6SX First Corollary: Share the fun.

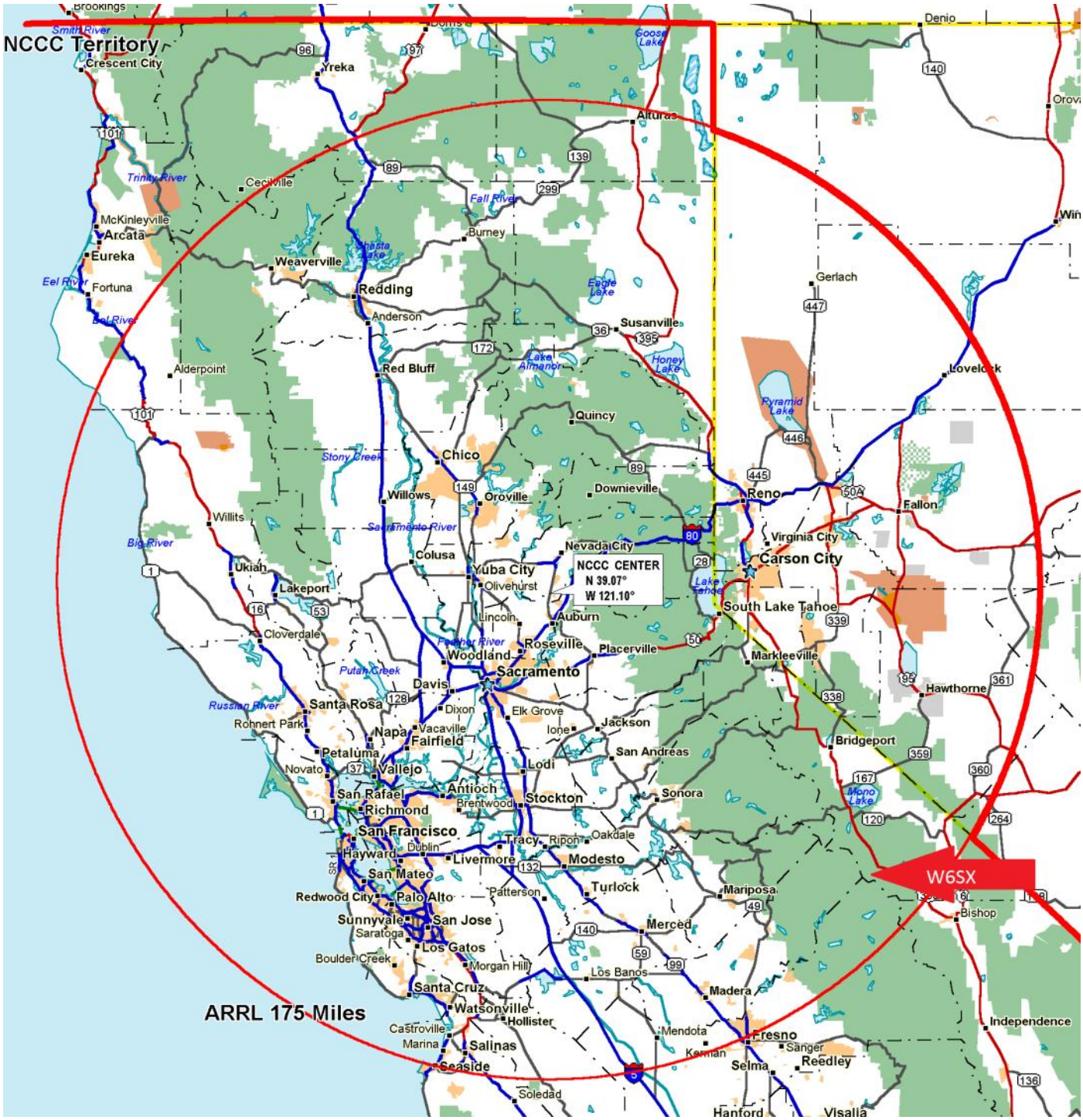
W6SX Second Corollary: We all get better together.

What would you like to see changed in NCCC?

More outreach to non-contesters. More mentoring within the club. More outreach to Little Pistols and beginners.* More volunteering by rank-and-file members to get things done—too much burden falls on too few who can burn out quickly.

Any other hobbies besides ham radio? There are other hobbies besides ham radio!?

*Some have a perception that NCCC is elitist and caters only/mostly to top-notch contesters. I don't agree, but let's work to deflate this perception. Let's be as inclusive as we can be. Let's each of us reach out and infect others with contest fever.


NCCC Territory
ARRL 175 Miles
NCCC CENTER
N 39.07°
W 121.10°
W6SX
Brookings
Smith River
Crescent City
Yreka
Denio
Goose Lake
Alturas
Trinity River
Cecilville
Fall River
McKinleyville
Arcata
Eureka
Burney
Shasta Lake
Weaverville
Eel River
Fortuna
Redding
Eagle Lake
Gerlach
Anderson
Susanville
Alderpoint
Red Bluff
Lake Almanor
Honey Lake
Lovelock
Pyramid Lake
Quincy
Stony Creek
Chico
Willows
Oroville
Downieville
Reno
Fallon
Willits
Sacramento River
Big River
Nevada City
Virginia City
Carson City
Colusa
Yuba City
Ukiah
Olivehurst
Lake Tahoe
Lakeport
South Lake Tahoe
Lincoln
Auburn
Cloverdale
Feather River
Roseville
Placerville
Markleeville
Woodland
Putah Creek
Sacramento
Davis
Hawthorne
Russian River
Santa Rosa
Dixon
Elk Grove
Rohnert Park
Napa
Vacaville
Ione
Jackson
Fairfield
Bridgeport
Petaluma
San Andreas
Novato
Vallejo
Lodi
Antioch
Sonora
San Rafael
Brentwood
Stockton
Richmond
Mono Lake
San Francisco
Tracy
Ripon
Oakdale
Hayward
Dublin
Livermore
Modesto
San Mateo
Turlock
Mariposa
Redwood City
Palo Alto
Patterson
Bishop
Sunnyvale
San Jose
Merced
Saratoga
Los Gatos
Boulder Creek
Morgan Hill
Los Banos
Santa Cruz
Madera
Watsonville
Hollister
Castroville
Mendota
Independence
Marina
Salinas
Fresno
Kerman
Sanger
Seaside
Selma
Reedley
Soledad
Hanford
Visalia

Recording Contest Audio
Bob Wolbert, K6XX
Part 1--Hardware

After the CQWW committee announced that high scoring stations may be required to provide a recording of their contest activity, several long-duration recording techniques were discussed among contesters. Contest logging software, including TR4W, Writelog, WinTest, an N1MM has featured QSO recording from the sound card onto the active hard disk for years, one way or another. Unfortunately, there are issues with recording from loggers: some only record from one radio, in mono and their cabling may be incompatible with sound card voice keyer implementations. This document describes the way I get 48 hours of contest audio, recorded into a reasonable amount of memory, and without spending a moment of contest time fussing with the system.

Our Northern California WRTC (1996) was the first contest that required audio recordings. The task of designing a suitable system that could be duplicated at low cost and distributed to all of the stations was one of my contributions to that event. I specified VHS VCRs with 8-hour tapes, plus a “universal” cable in the judge's headphone line. It was abysmal. Later WRTCs had similar requirements but the implementation was left to the individual teams. This is the model that the CQWW committee is following, and technology advancements make this task simpler and vastly superior to ancient tape-based systems.

Today's contest audio recording goals are multifold: (1) record at least two channels with full reliability; (2) include transmit monitor audio; (3) “set and forget”—no maintenance required during the contest; (4) reasonable file size; (5) works for all modes without re-cabling or tying up soundcard hardware (think voice keying and RTTY); and (6) low cost (always a critical concern here!).

Suitable recorders meeting the first criteria could be the logging PC itself, additional PC(s) dedicated to recording, or special purpose multi-track audio recorders. PCs always fail my reliability as well as the “set and forget” requirements. Your contest logging program defines what is recorded, and may not record the second radio or diversity receive. Also, computer implementations require a dedicated sound card with stereo recording capability that does not conflict with sound hardware used for voice keying (or RTTY operation). Separate-box multi-track recorders, at least the ones I found under $1,000, won't record tracks long enough to cover a 48-hour contest.

After some experimentation, a low-end consumer digital voice recorder was chosen, the Sony ICD-PX333. This model is intended for recording lectures and has been around for several years. More recent models have 4GB of internal memory, enough for 68 hours of medium quality stereo recording. Two AAA alkaline batteries power the recorder for comfortably longer than a 48-hour contest. While there are likely other recorders that will do the job, this particular Sony model is recommended simply because I have verified that it meets all of our needs (...well, at about $45 instead of free it automatically fails my “low cost” requirement). I certainly do not recommend it because of its (supposedly) easy-to-understand documentation, which isn't! Neither the retail packaging nor the on-line manual indicates that any particular model, this one or its competitors, will actually record for 48 continuous hours in stereo. Nor are the recorder's instructions clear regarding configuring this

device for long term stereo recording. Claims of “1,073 hours with 4GB” are not helpful because this statement is for mono mode and ignores battery life. The lowest fidelity stereo mode (which gives us 68 hours to the internal 4GB of memory) is not mentioned—worse, when configuring the recorder, its LCD operating screen plainly, but erroneously, indicates that the device will only record in mono mode! By experimentation, I verified that the ICD-PX333 indeed records in stereo from an external line input plugged into the 3.5mm mic jack for more than 48 hours continuously. “Trust me”—but verify this for yourself before a critical contest...

Be careful when shopping: I also bought an older Sony ICD-PX333 that only has 2GB of internal memory (capable of recording only 34 hours), yet is visually identical. Since these recorders come with a micro-SD card slot, this is not a fatal limitation, but means that a memory card is necessary for longer recordings with the older version.

Implementation

Directly tapping headphone audio is presently the best compromise, recording what the operator hears at all times. Physical hook-up involves wiring a Y-cable in your headphone line. Three wires are needed, left, right, and ground, with one side of the Y is terminated in a 3.5mm stereo phone plug. This plug connects to the red-colored mic input on the recorder. I have not had any issues with ground loops or impedance mismatch.

There are issues with this technique. First, receive audio levels vary with your AF Gain setting. Also, most of us prefer a very low or zero level of transmit monitor audio while contesting, which is often too low to record properly. Lacking transmit monitor audio makes finding QSOs more difficult, and endless low-rate CQ sessions result in seemingly blank 'tape'—but at least the CQWW recording requirements are met. Both issues could be addressed if we connect our recorder(s) to a fixed-level LINE OUT on the radios. My set of K3 radios do not send TX monitor audio to the LINE OUT jack that would otherwise be ideal for recording. Teaser: Elecraft has developed firmware that provides both RX & TX fixed level audio and makes this work very nicely. But that's for Part II: stay tuned, as they say.

Figure 1. Sony ICD-PX333 Digital Voice Recorder. 2GB version with 4GB microSD card installed (left). 4GB (right). See the difference? Neither do I.

All Menu items remain at their default settings except for the DETAIL submenu, and that data is supplied in the Table, below.

Table. ICD-PX333 Menu Settings.

The devil is in the DETAIL submenu...

DETAIL Submenu Item	Setting
REC Mode	**128k bps(MONO)** ([sic] It actually will record stereo) **HQ** (not UHQ)
Mic Sensitivity	**Medium**
Select Input	**Audio IN** (instead of the internal mono mic)
LED	**OFF** (preserve your battery life)
Time Display	**24-Hour**
Auto Power Off	**OFF**

Operation

Make sure the recorders are connected to the radios, have plenty of storage available, and have fresh batteries. Connect your Y cable between the radio, your headphones, and the recorder's MIC IN (red jack). Turn on the ICD-PX333 recorder and press the REC/PAUSE button to start recording. Hint: press DISP and confirm that you have more than 48 hours of remaining recording time available—if not, now is the time to format the memory. A battery meter at the bottom of the screen should show full scale.

Your recording system is running. Push the recorder(s) out of the way and concentrate on winning the contest!

Part II will introduce a cleaner recording implementation for a SO2R station using two Elecraft K3 radios. It discusses enabling the new firmware feature and describes how two recorders connect to LINE OUT, providing fixed-level transmit monitoring and full-time fixed-level stereo (Main + Subreceiver) receive audio. This alleviates variations as you readjust your AF Gain or monitor settings during long contests and provides vastly improved recording quality.

Final Comments

- You may verify that your K3 audio is reaching the recorder by plugging earbuds into the green 3.5mm jack.
- Keep the recorder's special features like low-cut filtering and VOX turned OFF.
- Don't forget to set the recorder's clock to UTC! Files will be date and time-stamped, which make finding an interesting QSO much more convenient.
- If you remember to start the recorder right at 0000Z, your first file will be calibrated. Two minutes into the file is 0002Z, etc. New files begin after eight hours plus a few minutes, so successive files do not have this advantage. Don't obsess over this hint, hi.
- My experience with battery life suggests that there is 8 to 12 hours of recording time remaining at the point the bar graph begins flashing. A 48-hour contest doesn't even discharge fresh cells to this point.
- The clock is quite accurate. If you leave the old batteries in the recorder between contests, they should have plenty of charge to maintain the clock.

Close up of the of the CD-PX333 Digital Voice Recorder

TUBE OF THE MONTH

Visit the museum at N6JV.com

Norm N6JV

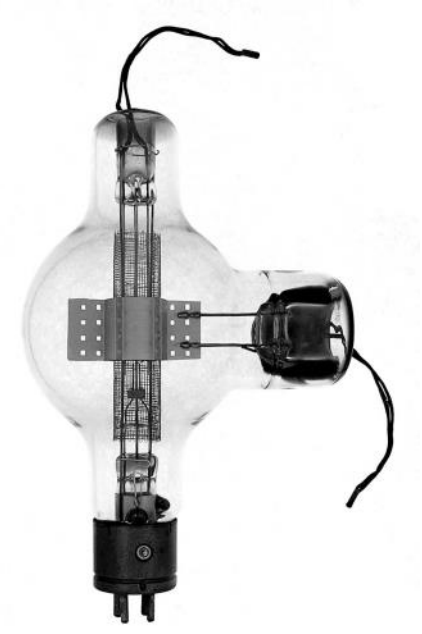
The 852 and 860

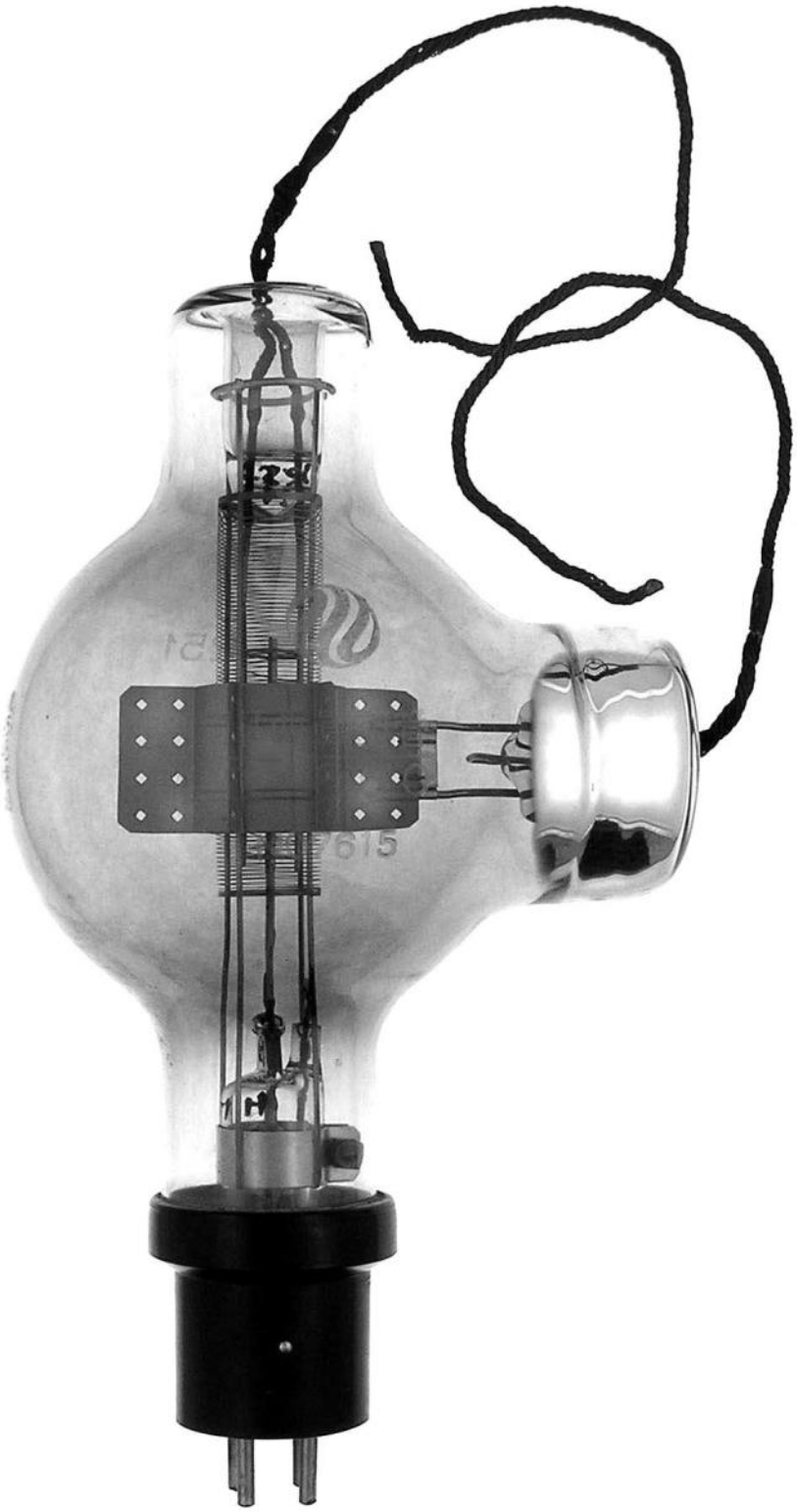
In the late 1920s, there was increasing interest in the VHF spectrum. Few tubes would operate even up to 30 MHz so 150 MHz was a real challenge. In 1927, RCA introduced a triode designated the UX-852. It was unusual in that the plate came out the side and the grid out the top. To keep the capacity low, the connections were made with wire leads. These tubes were rated at 100 watts and could be used at full power to 30 MHz and with reduced power they would operate up to 2 meters.

Getting a tube to operate above 30 MHz was hard enough but you still had to have enough power to drive it. In 1929, RCA introduced a tetrode designated the 860. The same envelope and connections were used except for the very long screen grid that connected through the base.

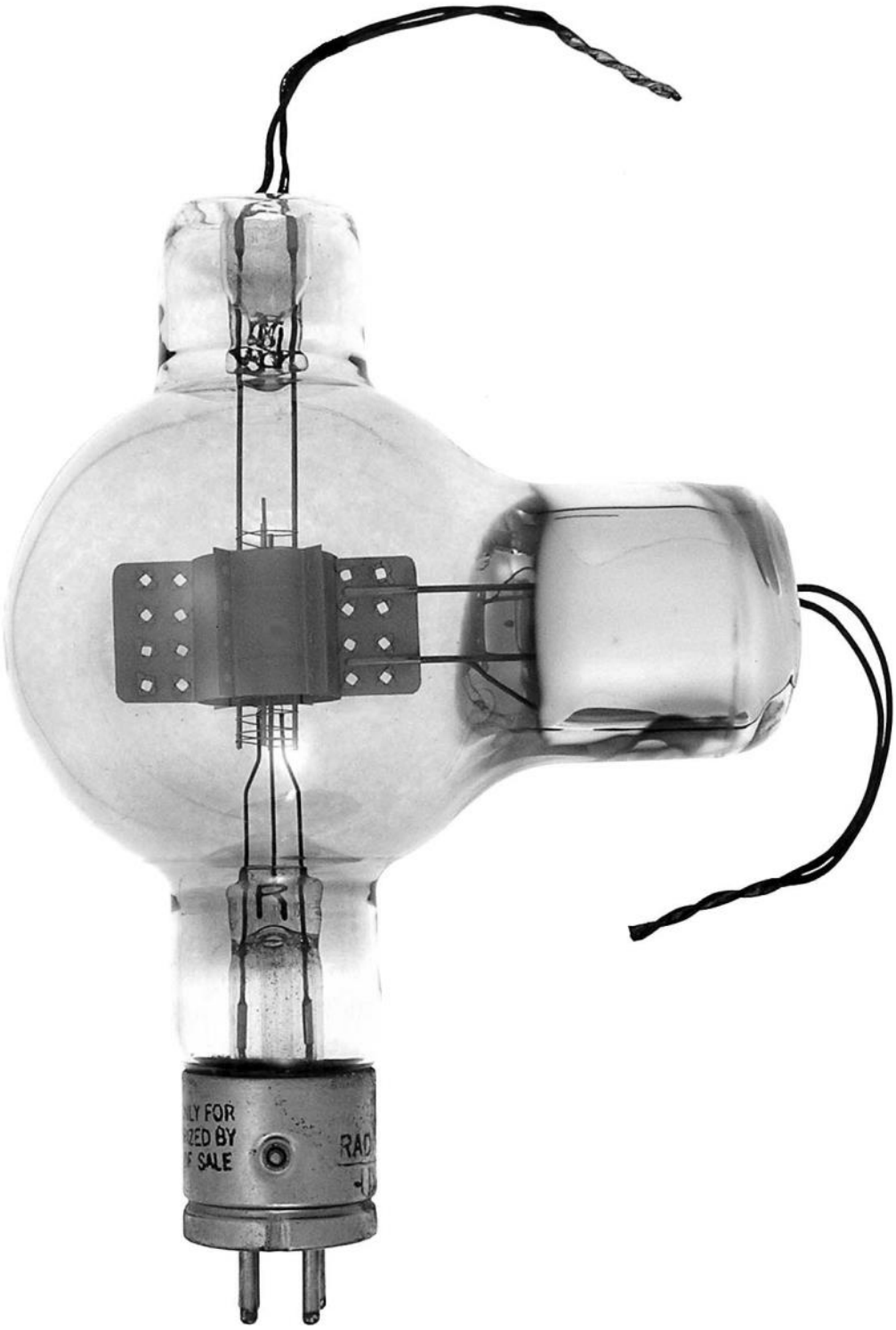
Before WWII, the Navy was developing transmitters like the TBL for their ships. The US military always was looking for a strong design and then building mass quantities and installing them in everything. Space is always a premium on ships, so they liked tall and narrow equipment. The 860 could be used at all frequencies with low driving power and would work well as an oscillator. It could also be mounted upside down, which simplified construction and circuit connections. With a stack of 860s and a larger version the 861 in the output, the Navy had their utility transmitter. They seemed to put them in everything that floated. Even submarines got them although I could never see how they ever got them installed. These were very heavy. Even the Japanese Navy thought they were a good idea and produced their version the D-860.

After the war, large numbers of these tubes were available on the surplus market and had a brief popularity until better and smaller VHF tubes were developed.





D860



UX852

GOLDRUSH—TEAM

N6R - Amador County

AE6Y

AE6Y
Andy Faber
2-13-16

I've had the distinct pleasure of operating CQP for six of the last seven years (skipping only 2010 for some forgotten reason) at the Amador County eyrie of long-time NCCCrs Ken, K6TA, and Kay, K6KO. The location seems idyllic to a visitor: on a ridge top, quiet, with scenic views and cool, clear air (well not so much last year as a residual of nearby forest fires).

Here's a picture of one end of the house. Note the 89-foot crank-up tower with an interlaced 5 el. 20/2 el. 40, 80m dipole, crowned by a 4 el 10. The smaller tubular tower holds a killer 6 el. 10 m antenna. Not shown is another tower graced with a 5 el. 15. These are very nice antennas. My Aruba co-owner John, W6LD, and I can both attest that when Ken or Kay calls us at P40L-P49Y, they come in right over the top of the pileup.

Ken has two K3s, though I usually bring my own, as well as my 87A. Because I use my own software, Ken is very tolerant of my need to tear up the station a bit to accommodate my CQPWIN software/SO2R configuration, DXDoubler, Winkeyer, etc. Here's a picture of the station in "my" configuration, as well as one of the operator relaxing after the contest. (I should note in Ken and Kay's defense that the normal configuration of the station is much neater and more elegant – the mess is all mine!).

Each year after I try to put everything back together at the end of the contest, it seems that there is a cable or two left over or missing, but somehow the station continues to work. This year we were convinced that one of Ken's K3s was not working on one band, and I even brought it back with me to drop off at Elecraft for repair. But trying it out at home showed it to be just fine; the probable culprit: a sticking SixPak relay (which generally responds to the "get a bigger hammer" theory of mechanical repairs).

But actually the nicest part of a CQP weekend with Ken and Kay is just that – getting to spend some time with two delightful and interesting people, who incidentally have an FB radio QTH and also are terrific hosts.

I never manage to win the contest from there, but have accumulated a three 6th place finishes, along with two fourths and a third. A perennial nemesis is our own Bob, K6XX, along with relative local Rich, WC6H, in nearby Calaveras County; and I don't even bother comparing my score to N6MJ's anymore

Andy AE6Y (N6R)

This year, I was pleased to be offered a “Gold Rush” callsign, N6R, and was anticipating having lots of fun imitating a special event station with it. Unfortunately, activity seemed down, and the frenzy I was expecting for the special callsigns didn’t seem to materialize. Conditions were definitely worse than in recent years. One indicator of that is the number of DX contacts made during the contest: 224 in 2014 and 43 in 2015. My score ended up at about 297k points, the first time under 300k from Amador. By comparison, my score last year was significantly higher at 342k.
To add injury to insult, I never heard even a whisper of an NT station. I was hoping to hear or be called by VY1EI, VE8EV, VE8NSD, or VY1AAA (if they had gotten their remote working). Last year, for example, VE8EV called me on both 80 CW and 80 phone, and I had worked VE8NSD in NAQP a few weeks earlier and he had assured me he would be on for CQP. But no luck! The missing mult only accounts for about 6k of the drop in score, but it’s always more fun to get a sweep.

So a summary of my N6R adventure is: another very pleasant weekend with good friends, a fine radio opportunity to enjoy contesting with radio buddies from near and far, a disappointing result, and “there’s always next year!”

N6R - Amador County

AE6Y

N6R - Amador

Contesting from the West Coast – Musings on West Coast relevant contests by N6WM

(Opinions are specifically those of the author and do not represent any official statement of the NCCC)

Greetings fellow contesters.

Well its been a fun contest season so far! It seems the NCCC has a bit of the RTTY bug and that's great! It's also great that folks were able to do a last minute rally and get so many NCCC members QRV for WPX RTTY. FB. I wanted to congratulate our CW sprinters, and our regional NCCC team 1 taking down a carefully picked group of CW "hit man" ops from all over the country. Big high five to the operators and thanks to our esteemed Pacific Division Director and resident CW sprint flogger for doing a great job motivating folks and making winning team choices.

As we move toward the end of peak contest season, now would be a great time to thank our NCCC leadership team for their hard work and service over the last year. Keep in mind that it's not just Prez and VP/CC, but treasurers board members, awards chair, Jug editor, jug contributors, floggers and many other volunteers who meet regularly and are working to bring more value to your NCCC membership. This club is run by folks who are committed to giving a little back and ask for(and usually get) very little in return. With a new election cycle approaching, maybe you should consider contributing your ideas and time and make a difference!

Here is N6WM's list of west coast contests for the Month of March 2016.. We are not done yet, here a couple big ones and a couple smaller ones..

ARRL Inter. DX Contest, SSB 0000Z, Mar 5 to 2400Z, Mar 6

Well, the CW version of this contest had some pretty good conditions, and now its time for the SSB version. Although not as well represented dx wise as the CQWW contests, this one still has oodles of juicy dx and is a great way to test your skills and propagation knowledge. So get on the air, make some mega points and fill up those DXCC slots! M/S entrants..

Public service announcement for Multi Single and Multi 2-- DON'T FORGET THE BAND CHANGE RULE!

3.4.4 Band Changes. Single Transmitter and Two Transmitter sub-category entries are limited to six (6) band changes per clock hour per transmitter.

3.4.4.1 Clock hours are counted from 00-59 minutes, not as any 60 consecutive minutes.

3.4.4.2 A band change consists of two consecutive contacts on different bands. For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the Band Change rule or improper logging will result in an entry reclassification to the Multioperator, Multitransmitter class.

Ok got it? you have been officially warned ;-).

Stew Perry Topband Challenge 1500Z, Mar 12 to 1500Z, Mar 13

And its time for the next leg of the 160m prop check.. another running of the Stew Perry TB challenge. Cross your fingers for some good propagation and low noise. Sleep during the day and pound brass at night.

North American Sprint, RTTY 0000Z-0400Z, Mar 13

Ok you are having trouble sleeping and your 160m antenna came down in a wind gust. Wait.. you can keep going! The NA sprint RTTY is a fast 4 hours of fun! You are still set up from Roundup, then you pulled it all together again for WPX, Yes! You are ready to go. If you have not sprinted before, there are plenty of folks that can get you up and running with the right Macros.. and with only 4 hours of time invested you can work all states on RTTY and complete a contest. You can even do pretty good from a little pistol. sounds like a good plan.

CQ WW WPX Contest, SSB 0000Z, Mar 26 to 2359Z, Mar 27

All right, now we are talking! If there is such thing as a truly fun SSB event, this is it. Time to rack up the superscores and work as many prefixes in as many corners of the world as possible. This is a super fun contest! You will have multi-ops, single ops., everyone out there doing their best to rack as many prefix mults as they can. If you have not operated this, do yourself a favor and make a point to be QRV. Its another opportunity to dust off that extra weird sounding club call you use for 3 contests.

Oh and a couple more state QSO parties of course….

Louisiana QSO Party 1400Z, Mar 19 to 0200Z, Mar 20

Virginia QSO Party 1400Z, Mar 19 to 0200Z, Mar 20 and 1200Z-2400Z, Mar 20

There you go. there are quite a few additional contests out there that may strike you fancy.. Do your due diligence and check the WA7BNM contest calendar at http://www.hornucopia.com/contestcal/contestcal.html and find something fun to do on the air!

Until next month, 73

….and of course, seeya next time

Chris

N6WM

Contest Calendar– March page 1

AGCW YL-CW Party	1900Z-2100Z, Mar 1
QRP Fox Hunt	0200Z-0330Z, Mar 2
Phone Fray	0230Z-0300Z, Mar 2
CWops Mini-CWT Test	1300Z-1400Z, Mar 2 and 1900Z-2000Z, Mar 2 and 0300Z-0400Z, Mar 3
UKEICC 80m Contest	2000Z-2100Z, Mar 2
NRAU 10m Activity Contest	1800Z-1900Z, Mar 3 (CW) and 1900Z-2000Z, Mar 3 (SSB) and 2000Z-2100Z, Mar 3 (FM) and 2100Z-2200Z, Mar 3 (Dig)
NCCC RTTY Sprint	0145Z-0215Z, Mar 4
QRP Fox Hunt	0200Z-0330Z, Mar 4
NCCC Sprint	0230Z-0300Z, Mar 4
ARRL Inter. DX Contest, SSB	0000Z, Mar 5 to 2400Z, Mar 6
Wake-Up!QRP Sprint	0600Z-0629Z, Mar 5 and 0630Z-0659Z, Mar 5 and 0700Z-0729Z, Mar 5 and 0730Z-0800Z, Mar 5
Open Ukraine RTTY Championship	1800Z-2059Z, Mar 5 (Low Band) and 2100Z-2359Z, Mar 5 (Low Band) and 0800Z-1059Z, Mar 6 (High Band) and 1100Z-1359Z, Mar 6 (High Band)
UBA Spring Contest, CW	0700Z-1100Z, Mar 6
DARC 10-Meter Digital Contest	1100Z-1700Z, Mar 6
SARL Hamnet 40m Simulated Emerg Contest	1200Z-1400Z, Mar 6
RSGB 80m Club Championship, Data	2000Z-2130Z, Mar 7
ARS Spartan Sprint	0200Z-0400Z, Mar 8
QRP Fox Hunt	0200Z-0330Z, Mar 9
Phone Fray	0230Z-0300Z, Mar 9
CWops Mini-CWT Test	1300Z-1400Z, Mar 9 and 1900Z-2000Z, Mar 9 and 0300Z-0400Z, Mar 10

Contest Calendar– March page 2

AWA John Rollins Memorial DX Contest	2300Z, Mar 9 to 2300Z, Mar 10 and 2300Z, Mar 12 to 2300Z, Mar 13
NCCC RTTY Sprint	0145Z-0215Z, Mar 11
QRP Fox Hunt	0200Z-0330Z, Mar 11
NCCC Sprint	0230Z-0300Z, Mar 11
Nauryz DX Contest	0800Z-1359Z, Mar 12
RSGB Commonwealth Contest	1000Z, Mar 12 to 1000Z, Mar 13
South America 10 Meter Contest	1200Z, Mar 12 to 1200Z, Mar 13
SKCC Weekend Sprintathon	1200Z, Mar 12 to 2400Z, Mar 13
Oklahoma QSO Party	1400Z, Mar 12 to 0200Z, Mar 13 and 1400Z-2000Z, Mar 13
AGCW QRP Contest	1400Z-2000Z, Mar 12
Stew Perry Topband Challenge	1500Z, Mar 12 to 1500Z, Mar 13
EA PSK63 Contest	1600Z, Mar 12 to 1600Z, Mar 13
TESLA Memorial HF CW Contest	1800Z, Mar 12 to 0759Z, Mar 13
QCWA QSO Party	1800Z, Mar 12 to 1800Z, Mar 13
Idaho QSO Party	1900Z, Mar 12 to 1900Z, Mar 13
North American Sprint, RTTY	0000Z-0400Z, Mar 13
UBA Spring Contest, 2m	0700Z-1100Z, Mar 13
NSARA Contest	1200Z-1600Z, Mar 13 and 1800Z-2200Z, Mar 13
Wisconsin QSO Party	1800Z, Mar 13 to 0100Z, Mar 14
WAB 3.5 MHz Phone	1800Z-2200Z, Mar 13
Bucharest Contest	1800Z-2059Z, Mar 14
CLARA Chatter Party	1700Z, Mar 15 to 1700Z, Mar 16 and 1700Z, Mar 19 to 1700Z, Mar 20
QRP Fox Hunt	0100Z-0230Z, Mar 16
Phone Fray	0230Z-0300Z, Mar 16
CWops Mini-CWT Test	1300Z-1400Z, Mar 16 and 1900Z-2000Z, Mar 16 and 0300Z-0400Z, Mar 17
RSGB 80m Club Championship, CW	2000Z-2130Z, Mar 16
NAQCC CW Sprint	0030Z-0230Z, Mar 17

Contest Calendar– March

QRP Fox Hunt	0100Z-0230Z, Mar 18
NCCC RTTY Sprint	0145Z-0215Z, Mar 18
NCCC Sprint	0230Z-0300Z, Mar 18
BARTG HF RTTY Contest	0200Z, Mar 19 to 0200Z, Mar 21
SARL VHF/UHF Analogue/Digital Contest	1000Z, Mar 19 to 1000Z, Mar 20
Russian DX Contest	1200Z, Mar 19 to 1200Z, Mar 20
F9AA Cup, SSB	1200Z, Mar 19 to 1200Z, Mar 20
Louisiana QSO Party	1400Z, Mar 19 to 0200Z, Mar 20
AGCW VHF/UHF Contest	1400Z-1700Z, Mar 19 (144) and 1700Z-1800Z, Mar 19 (432)
Virginia QSO Party	1400Z, Mar 19 to 0200Z, Mar 20 and 1200Z-2400Z, Mar 20
Feld Hell Sprint	1700Z-1859Z, Mar 19
UBA Spring Contest, SSB	0700Z-1100Z, Mar 20
Run for the Bacon QRP Contest	0100Z-0300Z, Mar 21
SKCC Sprint	0000Z-0200Z, Mar 23
QRP Fox Hunt	0100Z-0230Z, Mar 23
Phone Fray	0230Z-0300Z, Mar 23
CWops Mini-CWT Test	1300Z-1400Z, Mar 23 and 1900Z-2000Z, Mar 23 and 0300Z-0400Z, Mar 24
RSGB 80m Club Championship, SSB	2000Z-2130Z, Mar 24
QRP Fox Hunt	0100Z-0230Z, Mar 25
NCCC RTTY Sprint	0145Z-0215Z, Mar 25
NCCC Sprint	0230Z-0300Z, Mar 25
FOC QSO Party	0000Z-2359Z, Mar 26
CQ WW WPX Contest, SSB	0000Z, Mar 26 to 2359Z, Mar 27
Low Power Spring Sprint	1400Z-2000Z, Mar 28
Phone Fray	0230Z-0300Z, Mar 30
CWops Mini-CWT Test	1300Z-1400Z, Mar 30 and 1900Z-2000Z, Mar 30 and 0300Z-0400Z, Mar 31
UKEICC 80m Contest	2000Z-2100Z, Mar 30

HAM RADIO OUTLET

14 STORE BUYING POWER!

ICOM

IC-7600 | *All Mode Transceiver*

• 100W HF/6m Transceiver, gen cov. receiver • Dual DSP 32 bit • Three roofing filters- 3, 6, 15khz • 5.8 in WQVGA TFT display • Hi-res real time spectrum scope

IC-7200 | *HF Transceiver*

• 160-10M • 100W • Simple & tough with IF DSP • AGC Loop Management • Digital IF Filter • Digital Twin PBT • Digital Noise Reduction • Digital Noise Blanker • USB Port for PC Control

IC-7100 | *All Mode Transceiver*

• HF/50/144/430/440 MHz Multi-band, Multi-mode, IF DSP • D-STAR DV Mode (Digital Voice + Data) • Intuitive Touch Screen Interface • Built-in RTTY Functions

ID-5100A | *VHF/UHF Dual Band Digital Transceiver*

• Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch • FM Analog/DV Repeater List Function

ID-51A | *VHF/UHF Dual Band Transceiver*

• 5/2.5/1.0/0.5/0.1W Output • RX: 0.52–1.71, 88–174, 380-479 MHz** • AM/FM/FM-N/WFM/DV • 1304 Alphanumeric Memory Chls • Integrated GPS • D-STAR Repeater Directory • IPX7 Submersible

KENWOOD

TS-590SG | *HF/50MHz Transceiver*

• Equipped with 500 Hz/2.7 kHz roofing filter as standard • ALC derived from TS-990S eliminating spike issues • Antenna output function (shared with DRV connector) • CW - morse code decoder function

TM-D710G | *2M/440 Dualband*

• V+V/V+U/U+U operation • Built-in GPS • Built-in TNC for APRS & DX-Cluster operation • 50W 2M & UHF • 1,000 memories • Dual receive • Green or amber backlight colors • Latest APRS firmware w/new features • Sky Command II remote functions

TM-V71A | *2M/440 DualBand*

• High RF output (50W) • Multiple Scan • Dual receive on same band (VxV, UxU) • Echolink® memory (auto dialer) • Echolink® Sysop mode for node terminal ops • Invertible front panel • Choice of green/amber for LCD panel • 104 code digital code squelch

TM-281A | *2 Mtr Mobile*

• 65 Watt • 200 Memories • CTCSS/DCS • Mil-Std specs • Hi-quality audio

TH-F6A | *2M/220/440*

• Dual channel receive • .1 - 1300 MHz (cell blocked) RX • FM, AM, SSB • 5W 2M/220/440 TX, FM • 435 Memories • Li-Ion Battery

YAESU

The radio

FT-991 | *HF/50MHz/2M/440 Transceiver*

• 160 M-440MHz - SSB/CW/FM/C4FM Digital/AM/RTTY/PSK • 100 W (2M/4440: 50 Watts) • 3.5" TFT full-color touch panel operation • High speed spectrum scope • Roofing filers: 3kHz & 15kHz • 32-bit high speed floating point IF DSP

FTDX1200 | *100W HF + 6M Transceiver*

• Triple Conversion Receiver With 32-bit Floating Point DSP • 40 MHz 1st IF with selectable 3 kHz, 6kHz & 15 kHz Roofing Filters • Optional FFT-1 Supports AF-FFT Scope, RTTY/PSK31 Encode/Decode, CW Decode/Auto Zero-In • Full Color 4.3" TFT Display

FT-450D | *A100W HF + 6M Transceiver*

• 100W HF/6M • Auto tuner built-in • DSP built-in • 500 memories • DNR, IF Notch, IF Shift

FTM-400DR | *2M/440 Mobile*

• Color display-green, blue, orange, purple, gray • GPS/APRS • Packet 1200/9600 bd ready • Spectrum scope • Bluetooth • MicroSD slot • 500 memory per band

FT-60R | *2M/440 5W HT*

• Wide receiver coverage • AM air band receive • 1000 memory channels w/alpha labels • Huge LCD display • Rugged die-cast, water resistant case • NOAA severe weather alert with alert scan

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