

Recording Contest Audio

After the CQ World Wide Contest 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 contestants. Contest logging software, including *TR4W*, *WriteLog*, *Win-Test*, and *N1MM Logger+*, 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 how I get 48 hours of contest audio, recorded into a reasonable amount of memory, without spending a moment of contest time fussing with the system.

The second World Radiosport Team Championship (WRTC) in 1996 was the first contest that required audio recordings. Designing a suitable low cost system that could be duplicated and distributed to all of the competing stations was one of my tasks for that event. I specified VHS VCRs with 8-hour tapes, plus a “universal” audio cable with a tap for the judge’s headphones. It was abysmal.

Later WRTCs had similar requirements but the implementation was left to the individual teams. This is the model that the CQ WW 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) create a reasonably sized file; (5) work for all modes without re-cabling or tying up soundcard hardware (think, voice keying and RTTY); and (6) keep the cost low.

Suitable recorders that meet the first criterion could be the logging PC itself, additional PC(s) dedicated to recording, or special purpose multi-track audio recorders. PCs always fail my reliability and “set and forget” requirements. Your contest logging program defines what is recorded, and it may not record the second radio or diversity receive. Also, computer implementations require a dedicated



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

sound card with stereo recording capability that does not conflict with sound hardware used for voice keying (or RTTY operation). Discrete multi-track recorders—at least the ones I found costing less than \$1000—won’t record tracks long enough to cover a 48-hour contest.

After some experimentation, I chose a low-end consumer digital voice recorder, 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 other recorders likely will do the job, this particular Sony model is recommended simply because I have verified that it meets all of our needs.

I certainly do not recommend it because of its purportedly easy-to-understand

documentation. Neither the retail packaging nor the online 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 how to configure 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! I experimentally verified that the ICD-PX333 indeed records in stereo from an external line input plugged into the 3.5 millimeter 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 it is identical in appearance. Since these recorders come with a microSD card slot, this is not a fatal limitation, but it means that a memory card is necessary for longer recordings with the older version.

Implementation

For many transceivers, directly tapping headphone audio is the best compromise, recording what the operator hears at all times. Physical hookup involves wiring a Y cable in your headphone line. Three wires are needed: left, right, and ground, with one side of the Y terminated in a 3.5 millimeter stereo phone plug. This plug connects to the red mic input jack on the recorder. I have not had any issues with ground loops or impedance mismatches. One recorder hears what you hear, in either single or SO2R operation.

There are some caveats regarding 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 recorded QSOs more difficult, and endless low-rate CQ sessions result in seemingly blank tracks—but at least the CQ WW recording requirements are met. Both

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

Figure 2 — Important Sony ICD-PX333 menu settings.

issues could be addressed if we connect our recorder(s) to a fixed line-level output on the radios.

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** jack. Turn on the ICD-PX333 recorder and press the **REC/PAUSE** button to start recording. Press **DISP** to 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!

Additional Comments

You may verify that your receiver audio is reaching the recorder by plugging earbuds into the green 3.5 millimeter headphones jack.

Turn off the recorder's special features, such as low-cut filtering and VOX.

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 0000 UTC, your first file will be calibrated. Two minutes into the file is 0002 UTC, etc. New files begin after eight hours plus a few minutes, so successive files do not have this advantage, however. It's easiest to just start recording a few minutes early.

My experience with battery life suggests that at the point the bar graph begins flashing, you'll have 8 to 12 hours of recording time remaining. Fresh cells are not discharged to this point even after a 48-hour contest.

Leave the old batteries in the recorder between contests and they will maintain the clock, which by the way is quite accurate.

Options for K3 Users

A year ago, I asked the Elecraft firmware team to provide a better way to record both sides of contest contacts, so that the K3 could easily meet the CQ WW mandate. Fixed-level receive-side recording was already available via the **LINE OUT** jack on the K3 and K3S rear panel, but transmit monitor audio was susceptible to misadjustment from the front panel controls. Elecraft's DSP programmer introduced a serial command — **!4Dhh** — that enabled fixed-level transmit monitoring. The variable *hh* represents the output level from 00 (off) to hexadecimal "FF" (maximum), so, for example, sending **!4D40** selects about 15 percent volume — a reasonable level. Since this amplitude is independent of the front panel **MON** control, a recorder connected to **LINE OUT** receives proper levels for quality recording, regardless of what the operator does to the rig during the contest.

The Elecraft K3 with firmware 5.54 or later implements this functionality at a suitable level for transmit monitoring. Simply load the firmware, and your rig is ready to go. Connect a 1/8-inch (3.5 millimeter) stereo phone plug cable between the K3's **LINE OUT** jack and the

recorder's red **MIC IN** jack, and you are configured. SO2R stations may use two recorders and will then record Main and Sub receive audio plus transmit monitoring of both rigs.

If the default transmit monitor level (equivalent to *hh* = 40) is unsuitable, the **!4Dhh** command allows customization. Since the K3 returns to its default transmit monitor level on **LINE OUT** after a power cycle, the command must be sent every time the radio is turned on, if a custom recording level is desired. Since I log with **TR4W**, this merely represents a minor annoyance. **TR4W** provides more than 60 function keys, any one of which could be used to send a serial command to the radio. Others don't have it so easy. I leaned on NCCC's in-house logging program experts, N6TV for *Win-Test*, and K6MM and N6ML for *N1MM Logger*, to determine some easy way to send the command from their favorite logging programs. Bob quickly came back with a *Win-Test* LUA script that performs the chore. But John and Iain were stuck: *N1MM Logger* has few available function keys, and these are supposed to be used for messages, not squandered for rarely used functions. I thank Bob, John, and Iain for their efforts.

The most reasonable way for *N1MM Logger* users to customize this setting is via a separate terminal program or the Elecraft *K3 Utility* program. Send the **!4Dhh** command, close the terminal program, then start *N1MM Logger*. (The terminal program or *K3 Utility* must be closed to relinquish the serial port). I think you'll find the default level is adequate for recording purposes.

This new feature has been used in several contests, and it does the job perfectly. Recordings are clean and at proper levels, meeting or exceeding the CQ WW recording requirement, and allowing unattended continuous operation for 48 hours. Since PC sound cards are not used, station hardware need not change when operating different modes.

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