

K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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SAVXO

Stand Alone VXO Kit from the 4SQRP Group

Philip Cala-Lazar, K9PL



The Stand Alone VXO (SAVXO) kit, designed by Jim Kortge, K8IQY, is the 4SQRP Group's newest offering. It is one of their ensemble players with starring roles played by the SS-40 receiver, NS-40 transmitter, K8IQY Magic Box and now,

the ingénue, SAVXO VXO. Used individually or combined into a system they supply a high fun and efficiency to cost ratio.

The SAVXO kit may be ordered with crystals for the QRP calling frequency at 7.040 MHz or 7.122 MHz for check-ins to the Four State Wednesday night 40-meter net. Ordered by mail, my SAVXO kit (7.040) arrived about one week later and, as with all 4SQRP Group kit offerings, comprised a high quality silk-screened printed circuit board and all components. Thanks to the clear, correct and profusely illustrated assembly manual the kit required only two trouble-free hours of assembly time. Based on RF probe readings and no smoke escaping, my example passed all three tests detailed in the manual.

About keeping the smoke inside: the manual cautions at each test concerning power leads at header VXP: *Pay attention to this step, as there is no reversed power protection built into this circuitry. The header terminal closest to you in the above photo is the negative power lead (Ground) and the header terminal farthest away is the positive power terminal (Plus).* The two header terminals' proximity requires special care; the mini-grabber test probe leads I used worked admirably.

The manual includes simple instructions for winding the binocular core transformer (the only core in

the kit) and the option to build to complement the rock-bound NS-40 transmitter or as a "Stand Alone Frequency Control Element in a homebrew transmitter or driving an existing transmitter where one side of the crystal is grounded." Hint: If winding the core for use with the NS-40 differentiate the secondary, five turn side, with a dot of Liquid Paper® or similar to help assure proper installation.

Suggestions for putting the SAVXO on other frequencies and bands are also included in the manual.

The aluminum baking pan I build all my electronics kit assembly projects in has ½" raised sides. Those sides made a convenient prop to support the inverted, partly populated SAVXO, board while soldering. When mounting L4 examine the associated photograph closely, the inductor mounts at a diagonal, not parallel, to the PCB's side.

Another assembly note: The VXO header output floats, "...does not share a ground common to the rest of the SAVXO PCB." However, the VXO header does have "hot" and "cold" terminals. That polarity must be observed when coupling to the, for example, NS-40's crystal's solder pads.

"...keeping the smoke inside..."

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Fast-forward ahead several years, and I was newly married and living in a one-bedroom apartment in Huntsville, Alabama doing contract work for NASA. One day I picked up a copy of *QST* on the newsstand, and it was all over. There was an ad for an HQ-170 at a closeout price from Amateur Electronic Supply. This brought back fond memories of my HQ-129X, even looking somewhat familiar. I wrote the check and mailed it off, only to receive a

letter a few weeks later saying that although they were out of the HQ-170, they would offer me a new HQ-170A for only about \$30 more. By then there wasn't any question, so off went another check.

A couple of weeks later the HQ-170A arrived, and I promptly set it up on the kitchen table. I connected a 20' piece of wire to the antenna terminal, plugged it in, and turned it on. Sure enough, here came lots of signals, the bandspread separated them nicely, the crystal filter worked as well as crystal filters did, and I was happy. Add in a Q-multiplier and I was sure I would be set. Not quite. It didn't take long to realize that *all* the signals were drifting higher in frequency! I reluctantly opened up the manual, looked at the schematic, and saw that the VFO tube had its own filament transformer and was powered all the time! OK, I left it plugged in, got up and went to work the next day, thinking how stable it would be with this ingenious idea. I turned it on as soon as I got home, and gave it a few minutes to warm up. Hmm. The signals were still drifting, maybe a little longer warm-up. Nope, an hour later it was *still* drifting, always higher in frequency. It never seemed to turn around and come down, wherever that receiver is, it must be tuned to S-Band radar by now! Anyway, almost a week later, turned on the entire time, it was still drifting.

I packed it back up in its box, complete with manual, etc., and took it to my local Electronic Wholesalers. After a brief discussion, I walked out with a new Drake 2-B, even trade! The 2-B was a very unimpressive radio for those of us used to HQ-129X, HQ-150, SX-100, NC-300, etc. But I recalled my experience with the 1-A, and began to realize just how good a receiver the 2-B was. Based on serial numbers issued, there were about 10,000 Drake 2-B receivers built. Many of them are still in use today, and hold their own quite well against modern competition. Due in large part to my experiences with the BC-454 I had no problem separating one signal out of a small group, and actually came to prefer the gently sloping sides of the passband tuner. These made it much easier to hear what was going on around *my* frequency, and hear stations calling me that were not quite on my frequency.

Legacy receivers at the time were huge, heavy and hot.

Hallicrafters and Hammarlund were two of the most popular, although the 2-B was really eating into their market share. The demonstration of a 2-B that sold more 2-Bs than any other was to tune in a CW or SSB signal, lift the front of the receiver a couple of inches above the counter top, and drop it. The signal would "boing" a little bit, and come right back on frequency. By

contrast, the older receivers were so sensitive that even walking across the floor would cause them to waver. Hams went to all sorts of extremes to try and isolate their receiver from the desktop, but they just about all wavered, and some actually shifted frequency.

I used that receiver for a year or so before Drake announced the new R-4/T-4X line. By this time I was working at Electronic Wholesalers part-time. NASA was a 0730 to 1630 job, so I could be at E-W by 1700 and work until closing at 2100. Saturday we were open from 0800 to 1600. "Work" was hardly the operative word here, since my job consisted of hanging out, playing with the newest ham gear (there was a tri-bander on the roof), and demonstrating new and used equipment to the guys

*"fond memories
of my HQ-129X"*

R.L. Drake 2-B/2-BQ



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who came in after work. This job was highly prized among the very large ham population in Huntsville at that time. First off, most of the ham gear manufacturers, including Drake and Collins, offered special pricing to people who sold their equipment at retail. Not only that, you also had first shot at any used equipment that came in on trade, at cost. The end result was that a huge wave of all kinds of equipment went through my shack over the next six months. Most held of us the job for three to six months, and then let someone else take over so all could share the wealth!

When the R-4/T-4X was announced, I promptly ordered a pair, with the AC-3 (the AC-4 wasn't available yet) and MS-4. The receiver arrived pretty quickly, and was at least as good as the 2-B, PLUS it had much better frequency calibration on an easy to read dial. Several weeks passed, and no transmitter. I called Drake, and was told that it would be shipping soon! A couple of weeks later, I called again and got the same answer. Another week, and I called again! About four days after the last call, the T-4X arrived. I took it home, connected everything up, turned it on, and it didn't work! I opened it up, and after some looking found that there were about four joints in the carrier oscillator circuit that had not been soldered. A quick solder job and I was on the air! Later I called Drake, just to rib the guy I dealt with (this was before Bill Frost) about it. He asked me the serial number of the transmitter and when I told him he said it was a pre-production model that should not have been sold! I guess they got tired of hearing from me.

Not long after, I went to a hamfest in Louisville, Ky., and sat in on a forum presented by Irv Hoff, W6FFC, on RTTY and his new ST-3 terminal unit. It used one of the newfangled operational amplifier ICs, a GE PA-238, and Irv had a handful of them to pass out for those who promised to build an ST-3. I quickly put it together, and was copying RTTY on my Model 19 Teletype® machine. The machine was a leftover from my experimentation with a single tube RTTY TU that was less than satisfactory. It worked, sort of, on very strong signals, in the clear. The ST-3 was several orders of magnitude better than the previous attempt, plus it had motor control that switched the machine motor off after 30 seconds or so when the signal stopped. When the signal came back, the motor turned on!

"share the wealth!"

This simple event led to a multi-year, multi-station autostart RTTY operation on 14,075 MHz. There were several stations around the country, crystal-controlled on 14,075 MHz that were on 24 hours/day. I had stations on 20 and another on 80, Drake 4-Lines of course, that ran 24/7 for several years. Each transmitter had a small piece of perf-board with a trimmer, fixed cap and a diode switch to shift the transmitter frequency at the "new" 170 Hz shift. The transmitters were run at full power, each with a small fan on the back of the PA cage. Transmissions sometimes exceeded 30 minutes key-down for ARRL bulletins or when Irv got wound up. He was a touch typist on his Model 28 ASR Teletype®, and could type at full (60 wpm) speed for hours at a time. We spent a lot of time discussing things, and since he was on the west coast most of it was time shifted. He was a captain for United Air Lines, so was in and out at odd times. I finally had to get a paper winder for my machine to keep from coming home from work to a room full of RTTY paper!



Model 19 Teletype®

Much of the discussion regarded the ST-6 TU project. He was adamant that it should be on multiple plug-in cards so "improvements could be made without having to rebuild the whole unit." I contended the entire circuit could be put on a single PC board, leading to

much easier construction, and that most likely there wouldn't be but four or five guys who would bother to upgrade the original design anyway. Wiring that backplane was a nightmare! He stuck with the multi-card design and sold a LOT of them, many still in use today. A few years later the opportunity arose to rework the design for a Navy-Marine Corps MARS project. I managed to get the entire thing onto a single 6" x 6" board, including the bandpass and discriminator filters. This version was published in *Ham Radio* magazine as the DT-600, and sold quite a few. The project was a sort of pre-packet system that used callsigns to automatically route messages, but was overtaken by technology and never completed.

CONTINUED - GENESIS ON PAGE 7



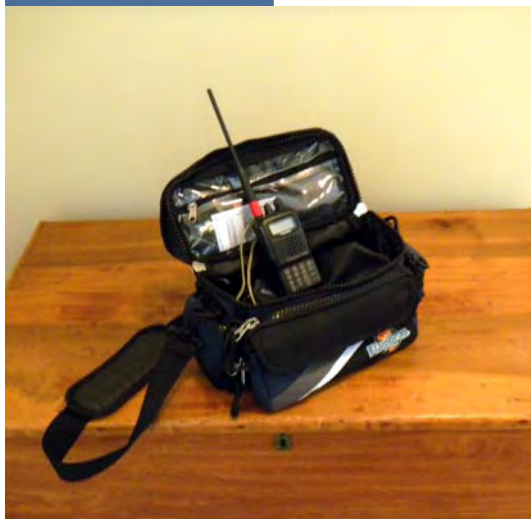
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The Venerable “Go Box”

Part 1 of 2

Paul W. Ross, W3FIS



W3FIS's "Go Box"

The discussion of the contents of “Go Boxes” is likely right up there with the discussion of Chevy versus Ford trucks. I’ll try to throw my two cents in, and share my experiences. Of course, a great deal depends on your circumstances, either ECOM, the annual ARRL Field Day, or just needing a capability to take your radio equipment on trips or out in the field, or for traveling.

For me, being a dedicated QRP enthusiast, small and light is beautiful. Anything over five watts is overkill... My ham friends suggest I am running my station on the effluvia of flatulent butterflies...

So, what do I do to address the problem? In reality, I have two “Go Boxes,” or if you wish, “Go Kits.” One is for my HTs for VHF and UHF operation, and the other is for my Yaesu FT-817ND multi-band, multi-mode transceiver for more general use on HF, VHF, and UHF. The objective, in either case, is to have all the items you might reasonably need. In this article, I’ll discuss what I do for my HTs. The second article will address the more general issues of the FT-817ND and HF work.

To a large measure, your kit’s contents is going to be governed by:

- Power source availability and duration of your expected deployment or trip.
- What you are willing or able to carry.

If you have a generator available, then the power problem goes away. An AC power supply and/or charger will work nicely, just as if you were at your home QTH.

If you are going to move your equipment via automobile or the like, then what you can bring is likewise essentially unlimited. However, in my case, I gener-

ally am going to be in a situation where, at best, I have access to the battery in my automobile, or have to function off of a rechargeable power source for eight to ten hours. Where we live in “Slower Lower” Delaware, our major problem is coastal flooding from “nor’easters,” as well as the remnants of hurricanes that move up the coast. We are about five feet above sea level where I live, and perhaps three miles inland. We can count on road blockages, minor flooding and power loss for extended periods.

For a choice of HTs, I seem to alternate between my new Wouxun KG-UV3D, and my Yaesu FT-60R. The Wouxun is lighter, but the Yaesu has some useful options in respect to the “bank” feature, which conveniently allows me to have “banks” of frequencies conveniently assigned for separate geographic areas. Also, the Yaesu has an emergency weather capability, and I can monitor the local Coast Guard and public service frequencies. I can simulate a comparable environment on the Wouxun by loading whatever memory configuration I wish from files stored on my computer.

When I visit my daughter, I select the bank of frequencies for her location, and when home in “Slower Lower” Delaware, I can select the local repeaters without having to do any extensive re-programming.

Now, what goes in the HT “Go Box”?

- The box itself—I found that a soft-sided fishing tackle box was both inexpensive, and rugged, and has all sorts of nice zipper compartments for storing small pieces. Also, the padded/insulated “lunch bags” you can purchase in the supermarket will do nicely.
- The HT itself, of course. Your choice here. I found that a dual band unit is a must here. Two-meters and 70-cm bands, for sure. If you have active 220 MHz repeaters in your area, re-think this issue. In fact, it is not a bad idea, if you have one, to bring a spare HT. You can never have enough of them! If one fails, you are still operational.

“what goes in the HT ‘Go Box?’”

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U.S. Secret Service Visits Radio Row

John F. Kennedy, SWL

Bob Ballantine, W8SU

According to Jim Riff, K7SC, the following took place sometime during John F. Kennedy's term in office (1961-1963). Onboard an Air Force One (26000) flight to NYC, the President ordered, via an aide, a Secret Service agent to shop Radio Row in downtown Manhattan. This unusual trip was to purchase a good shortwave radio so the President could tune-in to the world on his many trips aboard Air Force One.

The flight engineer indicated they had a spare in-flight receiver, a WWII surplus BC-348 that could be piped to the President's desk in the after part of the aircraft. The President needed a receiver close by where he could tune it at will as he was concerned about world opinion and foreign press coverage of his European and Cuban policies.

The Secret Service as instructed got their buy in Manhattan and purchased the best radio available which was a heavy-duty unit, the Hallicrafters SX-62. Anyone who owns one will tell you how well built it is and its extensive coverage including the FM broadcast band. So, doing as instructed, the agent returned to the aircraft for its flight to D.C. (I hope the agent had a good dolly to cart that beast.)

Who could have supplied the receiver: Harrison, Harvey Radio on 45th Street, or G&G Radio with toothy Murray Baum? Bargains galore. Urrrrah for Radio Row.

The military technicians at Andrews AFB were instructed to install the new Hallicrafters directly into the President's desk on Air Force One. A long-wire antenna was fitted from the top of the vertical rudder of the 707; angling down to just behind the cockpit and 110V AC was wired from the inverter bank to the new shortwave receiver.

The speaker was built into the desk's side panel and earphones were sometimes used due to high engine noise in the cabin.

Riff said, "The installation of the Hallicrafters set was on the port side of the aircraft and to the right console center in the president's desk. The metal case had been removed and the receiver dropped into a cutout

on the desk." Both Presidents Kennedy and Johnson used the receiver frequently during their cross-country flights.

The aircraft was retired and became property of the USAF Museum in Dayton, Ohio. My guess is that the very same receiver is still in place on the presidential aircraft.

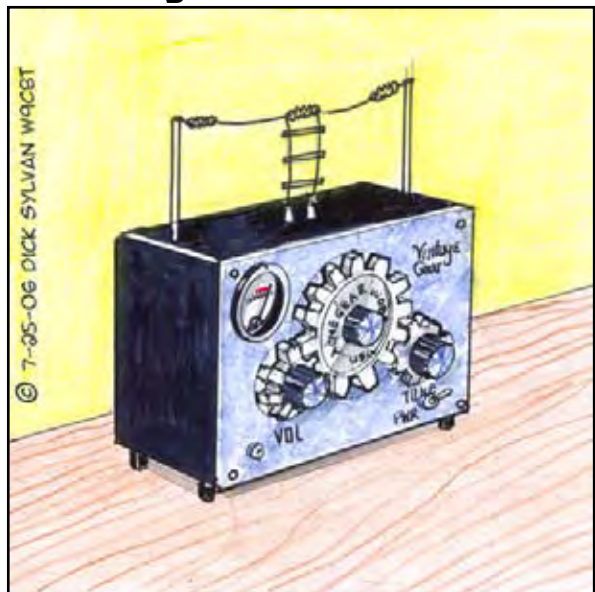
Someone in humanity is viewing that vaunted desk-mounted unit each day during visiting hours at Wright Patterson. Were Presidents Kennedy and Johnson SWLs? For sure they were.

Air Force One, the Boeing 707 we speak of, was placed into service in 1962, flew five million miles and showed well. It had few signs of wear when removed from service in 1972.

Thanks to Mr. Riff and some scripting from his article in *Electric Radio* and info from George Marko, K2DWL, my Radio Row pal. ■



Ham Lingo DICK SYLVAN, W9CBT



"VINTAGE GEAR"



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The Maritime Radio Historical Society

William M. Coverdell, WDØBC



WDØBC at K6KPH

We all have memorable things that happen while involved in ham radio. From a funny experience on field day to a testing session where we tell the applicant “this is just a practice CW test” to get them over the nerves. We all have those stories. Mine involves my trip to the Maritime Radio Historical Society and radio KPH.

Just a few months before my XYL retired in 2010, a ham friend of mine introduced me to the Maritime Radio Historical Society via the Internet. I was totally unaware of their efforts, let alone the history of the maritime service. I was also unaware of how CW was such a big moneymaker “back in the day.” I use CW almost daily and after prowling their Web site and watching the videos I was hooked big time.

The history that is preserved by the Maritime Radio Historical Society is remarkable for two reasons. First is the fact that maritime radio installations were the most profitable thing that RCA owned during their heyday. Secondly is that when they were closed, the site’s manager simply left the building with the equipment running and locked the door. To this day the station monitors two emergency maritime frequencies, although officially abandoned.

My friend soon convinced me that if I were going to drag my RV all the way from Missouri to California it would be a big mistake to not travel to the MRHS and the stations still located at Bolinas and Point Reyes just north of the San Francisco area.

Around mid-June on a Friday we arrived at Bolinas transmit site. Although officially closed we soon were on a walking tour of the transmit site con-

ducted by the live-in property manager. We even gained a look inside building #1. Our host was quite versed in the property and buildings’ history making it an enjoyable morning.

That afternoon we talked our way into the receive site at Point Reyes. The National Park Service man was pleasantly accommodating and we truly enjoyed the look at the “Boiler Room.” We had seen the Internet video of DA sending the benediction from this very spot it was a big thrill.

The next morning, after contacting MRHS via 2-meter simplex, we met Steve Hawes. Steve is the engineer and this morning we watched him rig up and send the CW bulletin of weather, news and such. Interesting how he patched it all together through a central control room. Interesting also was the audio feed into the transmitter room from different receivers copying but slightly different audio frequencies. Real funny copying with the tones constantly changing during the text. Neat, but highly unusual. Steve took us on a grand tour of the property including the history of the building and it was a great experience.

“...quite a thrill.”

After leaving the transmit site at Bolinas we traveled to the Point Reyes receive site. Bill Ruck manned this site. He gave us the grand tour of the receive site and allowed us to sit at the operating position of K6KPH, the MRHS amateur station. The photo depicts that story.

It is a grand thing that anyone can visit the Maritime Radio Historical Society and the station. It was one of the greatest thrills I have had since I got my ham license. I urge anyone within driving distance to visit MRHS, you will not be disappointed.

I truly hope you will check out the Maritime Radio Historical Society on the Internet and if you love CW watch DA and the others do their magic on the key and work K6KPH on Night-of-Nights. I have worked K6KPH on two Night-of-Night events and worked them twice otherwise, quite a thrill. ■



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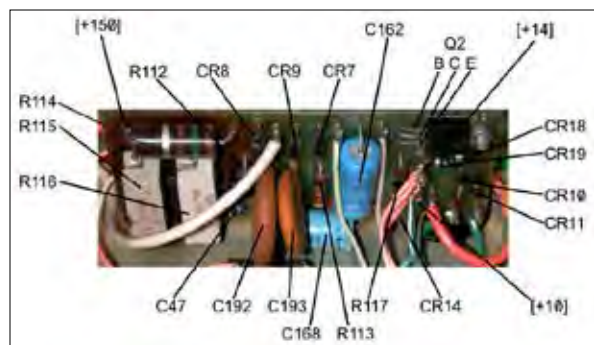
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Fast forward to retirement around 2000. Looking for something to do with my new digital camera, I decided to develop a service manual for the Drake C-Line. The original manual that came with the receiver had a brief "Theory of Operation" section, an adequate alignment procedure, and a schematic. There was a single photo of the top of the chassis with the tubes and alignment locations identified, and another photo of the bottom of the chassis, also marked for alignment. While this was sufficient for field level repairs, it was difficult to locate components on the chassis and on the multitude of small PC boards scattered around under the chassis. There was no parts list, no description of the small PC boards, or any assistance locating a part referenced from the schematic. Several factors combined to make servicing more difficult. Probably the biggest single problem is that there is no consistent color code on the wiring, which is bundled into harnesses throughout the radio. Tracing a single lead from one connection point to the other end is often impossible.

Another problem is that the small PC boards are seldom a complete circuit, but contain components from several stages on one board. They are actually more like terminal strips than circuit blocks.

These two factors can make it very difficult to trace a particular circuit for troubleshooting. You're going happily along the schematic, and you come to a point where there is a wire attached to one end of a coupling capacitor. The wire then disappears into the harness and you are lost. The other end of that wire may be on the next board, or it may be on the other side of the chassis!

So I started to make high quality, high resolution photographs of the underside of the chassis, and in-



Example Image from Drake Service CDs

dividual photos of each small PC board. I then took the schematic and generated a complete parts list in a table with each component described and listed along with a locator to identify where it is physically located in the radio. Each board is assigned a number, and flags are added to the photograph of each one with the ID of the part. The under chassis is also photographed in sections to show sufficient detail of the interboard wiring, tube sockets, etc., again with flags to identify parts in the area.

All pages are in PDF, with each photo on its own page. When viewing the photos on the computer, it's possible to blow up the area to 600% or more for a closer look. This can make it possible to see things like the physical arrangement of wiring and parts, which can help to troubleshoot problems caused by improper repairs.

There are four versions of the R-4C receiver, and two versions of the T-4XC transmitter. Correct schematics are included for all versions, and are at least as good as the original schematics supplied in the Drake manual. Also included are a couple of dozen errata, modifications and field changes.

The entire Drake manual for each unit is also on the CD, scanned in high resolution. These can be printed to equal the quality of the original; some have taken the file to an office center with a large format printer and produced three-foot wide prints to hang on the wall. High-resolution manuals for the AC-4, C-4, FS-4, L-4B, MN-4, MN-4C, MN-2000 and W-4 are also included.

The same concept was then extended to include CDs for the Drake B-Line, the "early" A-Line and "late" A-line, the 2-C/2-NT and the 2-B. CDs were also developed for the TR-4 (eight versions) and the TR-4C (four versions), including the TR-4Cw and TR-4CwRIT.

Additional information about Drake Service CDs can be obtained at: <http://www.k4oah.com/> ■



Drake R-4C

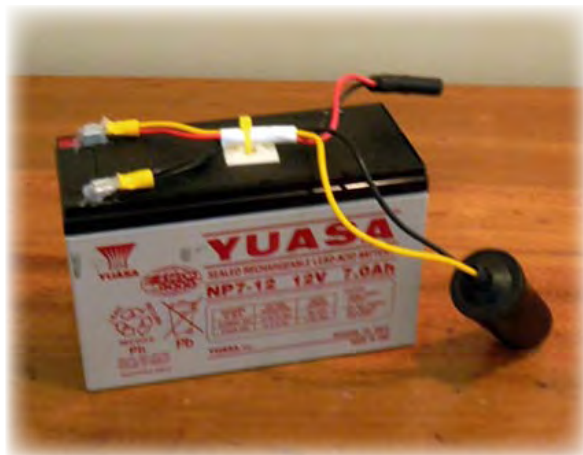
"the entire Drake manual..."



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- An antenna for the HT—likely something better than the stock “rubber ducky” that comes with it. I favor the Diamond helical whip RH77CA with a BNC fitting (I use this antenna for all sorts of things). Of course, the Yaesu and Wouxun units need an appropriate BNC to SMA adapter. The Diamond whip also works well on the Yaesu FT-817ND multi-band rig. There is also a version of the Diamond whip with an SMA connector.



- Some sort of auxiliary power supply arrangement. This can be the car adapter, a “wall wart” charger, or a small power supply that will provide enough current for the operation of the HT. Save your batteries for real emergencies! I have a nice 7 AH gel cell that I picked up at a ham fest. With a little care, this is more than sufficient for the better part of a day’s operation away from the grid. Oh yes, don’t forget spare fuses. Aluminum foil chewing gum wrappers aren’t really a good substitute!
- In addition, if circumstances permit, I bring along a magnetic mount whip and a length of coaxial cable, with appropriate fittings. If I am indoors, I can set the whip on a window, or use it on top of a vehicle if that is where I am.
- Don’t forget an up-to-date ARRL *Repeater Directory*, especially if you travel out of your home geographic area. Also, if you have computer access, there are good on-line repeater directories. I have often printed out the salient pages when I’m traveling to a new area, for convenience, as they can be more up-to-date than the ARRL *Repeater Directory*.
- Last, but not least, is the instruction manual of a “cheat” card for your HT. It is amazing how quickly you can forget the subtleties of operating your HT.

Have fun! Be inventive! Think “outside the box.” ■

Using the lazy ham’s method to determine frequency, i.e., clipping a test lead to the VXO’s hot terminal and placing said lead near the shack’s QRO rig and tuning. My SAVXO spans 7.032 MHz to 7.040 MHz. Yours may vary a bit from those numbers.



4SQR Group specs the SAVXO with 250 mW of RF power, and suggests it may be used as a standalone QRP transmitter by adding a low-pass filter. Jury-rigging the SAVXO into the NorCal Power Meter (*K9YA Telegraph*, November 2008) followed by a dummy load and adjusting onboard trimmer TR1, the measured output ranged between 0 and .3 watt.

In an upcoming issue of the *K9YA Telegraph* we’ll share box seats as the 4SQR Group’s troupe of four join forces and strut the stage ionospheric.

Join the friendly and helpful SAVXO community on Yahoo! Groups.

A page with SAVXO modifications:
<http://w5usj.com/4sqrpsavxo.html>

K9YA Telegraph Reviews:

K8IQY Magic Box, December 2010
SS-40 receiver, December 2011

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Like what you’re reading in this month’s *K9YA Telegraph*? If so, you’re in good company, as amateur radio operators in more than 100 countries agree with you. Know what else? Hams just like you write the *K9YA Telegraph*.

Evidenced by your feedback we know we’ve hit on a winning formula: **YOU + K9YA Telegraph = A Great Read**. But without your side of the equation, it just doesn’t add up.

http://www.k9ya.org/write_for_us.htm



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