

IRCA Technical Column

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An Informal Review of the Harris 590 Solid State Receiver

by John Bryant

Even though, as a receiver collector, I own more serious radios than ought to be legal, I continue to use JRC's NRD-525 as my main DX receiver. My MW/Tropical Band work is almost all done with Beverage antennas, so the 525's IC clock noise that has put off MW loop users has not been a real concern for me. However, the 525 was designed in the early 1980s and is now getting very long in the tooth. I have lusted after the JRC NRD-535 (an under-appreciated receiver) and the 7030, but have held out, so far, to buy a REALLY top of the line radio "someday soon." I've been quietly squirreling away odd bits of cash for the past four years and have spent many pleasurable hours studying Fred Ostermann's wonderfully complete receiver reference, *Shortwave Receivers Past and Present (1942-1997)* to try to identify the absolute best radio for my interests, no matter what the price. Like many of you, I figured that the recent downsizing of the military/intelligence communities would cause some top-drawer receivers to hit the used equipment market soon. After all, the government can't put them all into strategic stockpile, can they? And with paying a used price, maybe I REALLY COULD buy the best radio ever produced! After a lot of study, I focused on the Harris Model 590, known (I've been told) as the current favorite receiver of both the National Security Agency and the CIA. The Harris 590 specs were just what I wanted: .15 μ v. sensitivity, lots of selectable filters and it weights 45 pounds! I assumed that a modern receiver weighing in at 45 pounds would be built likka tank and shielded from here to eternity.

Well, a couple of months ago, John Reed, a retired Conoco scientist and receiver connoisseur, and Bill Bowers, owner of many of the current best/top of the line sets and my mentor in such, both bought Harris 590s from a very honest and quality-oriented military electronic surplus outfit run by Mike Murphy in El Cajon, CA. The price was \$2200 including a 2" thick manual and a no fault return policy. If you don't like the set, just send it back, with you paying freight both ways.

Soon after Bill got his Harris, I went down to visit and more or less fell even more in love with the set. It is 20" deep and when you pull the dust cover, about all you see is what appear to be cast aluminum isolation boxes... there must be 20 of them. And, at 45 pounds, definitely, my kinda radio... none of this W-J "expensive aluminum lunch box" stuff for ole John! The Harris has REAL push buttons and the controls are silky smooooth. Turning the set ON, via the audio gain control, was an almost sexual thrill. There was an honest-to-god THUNK when you gave the knob that first twist... There's a REAL switch back there. Running the "Built-In-Test-Equipment" (BITE) test turns the Harris 590 into a flashing-beeping-squealing rectangular R2D2 for about 10 seconds and then up flashes a message on the front panel which says PASSED ALL TESTS, or some-such. That BITE test itself is almost worth the cost... a real entertainment thrill for me, anyway.

The front panel is well laid out and the tuning/programming/memory scheme is fine...a small learning curve, but nothing like the old R-8 or the 7030. I just simply fell in love. My kind of receiver and built to last forever. If there was ever a solid state successor to the Collins R-390A, this is it!

Well, I came home from Bill's, slept on it for a couple of days, meditated on my cash stash and called Mike Murphy. I ordered it, got the Postal Money Orders on the way and waited breathlessly. This whole experience was better than any Christmas that I've had since I was eight! It took

almost two weeks to arrive. (Mike had to get the manual printed up and UPS is very slow on heavy packages, sometimes.) I called my wife every afternoon, wanting to know about deliveries...

FINALLY IT CAME.

Well, I rushed home, carefully disassembled Mike's good packing job and there it was. FINEST KIND! Hauled the thing up stairs, plopped it on the desk, plugged it in and ran BITE twice. Great! I then spent a wonderful two hours with a very excellent manual learning how to run the thing and putting it to the test.

The first negative thing that I noticed was bacon frying at all filter settings... made the 525's very famous hissy audio sound quite nice, actually. Well, heck, no radio is perfect. I decided to do some A-B tests with the old 525 to see what my \$2200 had bought me... this would be really fun!

Well, it wasn't. On the tropical bands, listening to a weak broadcasting station out in the open, using either AM Mode or USB, the Harris had more hiss and a poorer S/N ratio than the 525, when the Harris was using a 3.0 kHz filter and the NRD was using its 6 kHz wide filter!!! To make a long story a bit shorter, the Harris 590 that I had was a very hissy one with poor sensitivity, at least from 500 kHz to 5 MHz.

By the way, our three Harris receivers, like a lot now coming on the market, had "selectable" IF filters as follows:

CW: 300 and 1000 Hz. (Bill added a 150 Hz. at \$235)

SSB: 3.2 kHz.,

AM Mode: 16 kHz., 6.0 kHz., and 3.2 kHz.

PLEASE NOTE THAT THE HARRIS 590s FILTERS ARE "SELECTABLE" BUT ONLY WITHIN A PARTICULAR MODE. In other words, if you want to use the 1000 Hz. Filter listed above, and you are in AM mode or one of the sideband modes, you cannot select that filter! The 1000 Hz. Filter (and the 300 Hz.) are ONLY accessible/useable while the receiver is in CW mode! Neither Bill nor I know if you can unsolder the filters and move them physically to the other boards to, say, access them in the AM mode and they are soldered in, too.

After the very disappointing test results in my shack, I decided to visit Bill Bowers again and took along both the Harris 590 and my NRD-525. Bill kindly let me spend about 4 hours in A/B/C listening tests with his radios. I quickly confirmed that his Harris was less hissy than mine, by far, and had a better signal to noise ratio, so I put my Harris away and decided to compare his Harris, his Racal 6793A, his WJ-1000 and my NRD-525. My only concern was reception of weak AM signals on the tropical bands and medium wave in either U/LSB or AM mode.

I rather quickly eliminated the Racal. I tend to slowly scan across the band a lot while DXing and the Racal has a VERY fast tuning rate and a VERY slooow rate and nothing in between.... so for me, the Racal was out, period. Other users and other uses would surely disagree. I then focused on Bill's WJ-1000, his Harris and the NRD 525.

For the A/B/C comparisons, I used the 3.0 kHz filter on the Harris, used the closest filter on the NRD (a 2.8 kHz Collins mechanical) and set the WJ-1000 filters at 3.0 kHz. I tried dozens of signals in the tropical bands and weak signals on medium wave above 1600 kHz., along with the Spanish station on 855 kHz. which was present only as a very weak carrier and the 595 signal from Dominica. The latter two were decent tests of dynamic range as well, with VERY strong adjacent signals. I did not use S-meter readings and simply trusted my ears. I was concerned about intelligibility of the spoken word and not much else. I did NOT take advantage of the almost infinite number of WJ filter width settings... that seemed an unfair comparison.

In every case on tropical bands and on MW, on every signal, the WJ-1000 produced noticeably superior intelligibility of the spoken word.... period. Subjectively, the Harris and my NRD-525 were mostly in a tie for distant second... but the WJ was very noticeably superior on every signal and in every instance .. and that without manipulating the filter width. My 525 seemed a bit superior to Bill's Harris, but not by much. The 525 audio was a bit mushy, but the S/N was better and the Harris audio had more bacon on the stove but was a tiny bit more intelligible. Given the choice of

having my NRD-525 and keeping my \$2200 on the one hand or having my 525 and a Harris 590 but no money on the other, GUESS which one I chose.

Bill Bowers was a bit disgruntled by this whole affair (my NRD 525 is very ratty, having spent far too long in the field) and we decided to do brief comparisons of the WJ and both of the Harris receivers on low frequency, where Bill spends all of his serious radio time. The difference was PHENOMENAL! Even my hissy Harris put the WJ to shame in CW mode on the low frequencies. There was a literal night and day difference. Sooo, if you want to do lowfer work, the Harris 590 sure seems to be the receiver of choice.

Personally, I love the ergonomics of the WJ-1000, I love its filters and it is clearly the best of these three for what I do.... however, I am much put off by the "overpriced aluminum lunch box" approach that WJ took. I have also heard a number of people that I trust worry aloud about component reliability of the WJ and the fact that the thing does not have modular construction.... It is one big motherboard.

Some people are familiar with my review of the NRD-525 in Proceedings 1988 ("Wastegunner on a 525") You will remember that I had a love/hate relation with that radio then... I still feel the same way. However, this experience has given me new respect for that radio. It has a street value of about \$500 and stayed on the playing field with some pretty fancy radios.

I know that some of the more precision-oriented people reading this article would like to choke me for not running bench sensitivity tests on these radios. I didn't do so because I don't know how to do so, precisely, and I really do trust my ears after more than 30 years of serious listening. I admit that I am baffled by the Harris' poor performance. The manufacturer lists a sensitivity of 0.15 microvolt... but please note that sensitivity is measured in CW and is specified as above 1.8 MHz.

I know for sure that I'll never buy a serious used radio by mail, etc., without a "no questions asked" return policy like Mike Murphy's. I was VERY lucky to be dealing with Mike and I strongly recommend his place of business. He is a straight shooter and handles only the best surplus goods. Bill, John Reed and I have been awfully well treated by Mike. He doesn't advertise, but develops lists of his stock and then e-mails or faxes them, on request, to potential customers.

Well, that is it.. I so much wanted to keep the Harris 590. It appeals to all of my prejudices, heavily built, heavily shielded, the finest components that money can buy, a full size front panel, etc. The darn thing just won't hear weak AM stations between 500 kHz and 5 MHz very well, unfortunately, at least judging from these two samples.

The newest edition of Fred Osterman's book, *Shortwave Receivers, Past and Present (1942-1997)* may be ordered from his firm, Universal Radio <www.universal-radio.com> at 1-800-431-3939 (orders) or 614-866-4267.

Mike Murphy's e-mail address is <murphy@cts.com> or Murphy's Electronic and Industrial Surplus Warehouse, 401 N. Johnson Ave., El Cajon, CA, 92020, ph: 619-444-7717.

A Loop Antenna Balun

by Ralph Sanserino

It is often difficult to use amplified air-core loop antennas in urban areas due to strong signal overload which can occur in the differential matching amplifier commonly used with such loops. Though unamplified loops do not have this problem, those using a single link coupling coil to the receiver can suffer from "antenna effect" on the cable to the receiver which skews the loop pattern. In addition, the link coil can load down the loop tank winding, resulting in reduced signal strength.

My air core loop which is three feet on a side and has 12 turns of #14 AWG stranded wire on a one inch Schedule 40 PVC pipe frame can deliver plenty of signal without using an amplifier. Essentially, it uses a matching transformer between the loop antenna and the receiver, rather like that described in IRCA reprint A48 "Optimizing an Unamplified Loop Antenna", and the ones used in Ray Moore's loop antennas (see IRCA reprint A137). These reprints describe the philosophy behind the use of such transformers. However, my loop uses a matching transformer between the tank winding of the loop and the receiver, rather than between a link winding and the receiver. See Figure 1 for a schematic of the procedure used.

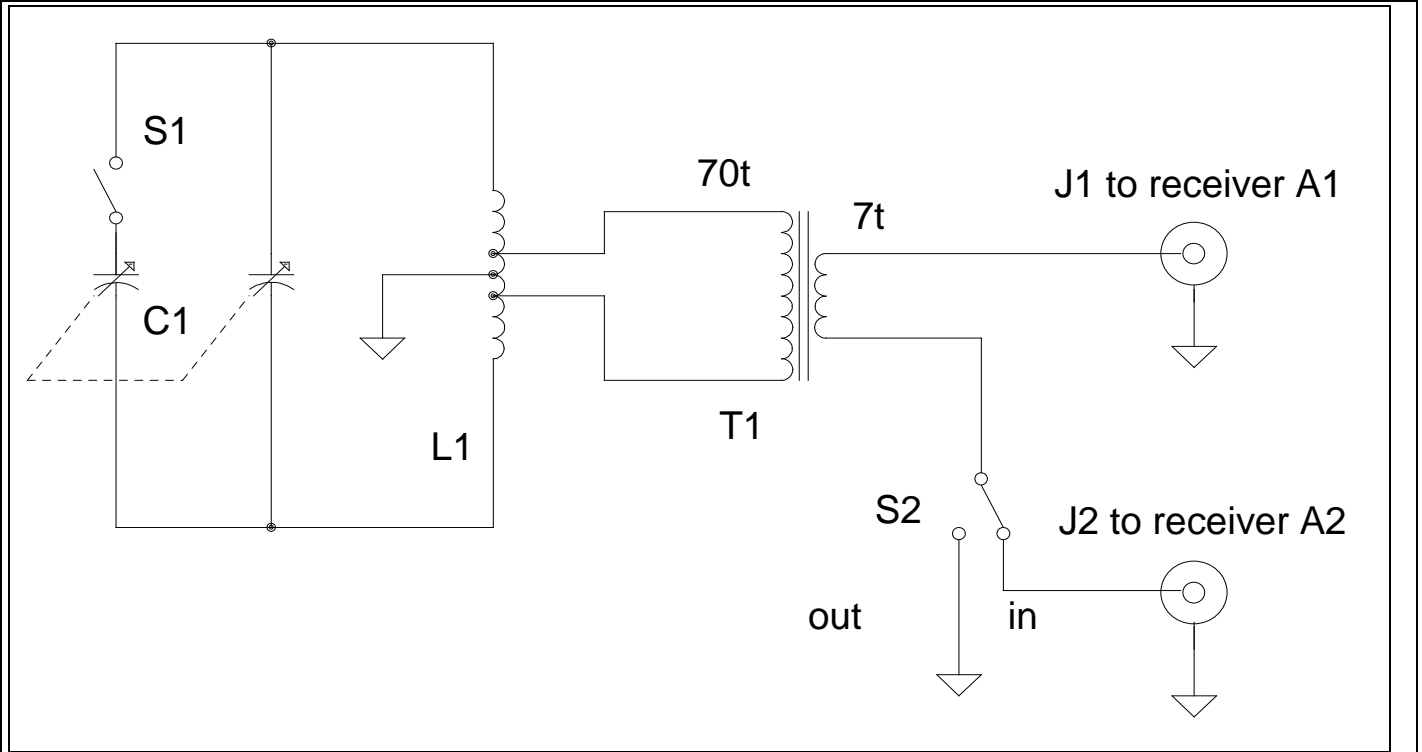


Figure 1

In addition to a center tap on the tank winding, L1 has taps on the turns either side of the center tap; these extra taps are connected to the matching transformer.

- C1 2 gang variable capacitor, ~ 250 pF per gang. Mouser 24TR222 will do with a shaft extension
- J1, J2 RCA jack
- S1 SPST range switch
- S2 SPDT J2 in-out. J2 is not used if your receiver has a single antenna input
- T1 balun uses Amidon FT 82-61 core wound with #30 magnet wire per detail in Figure 2 below

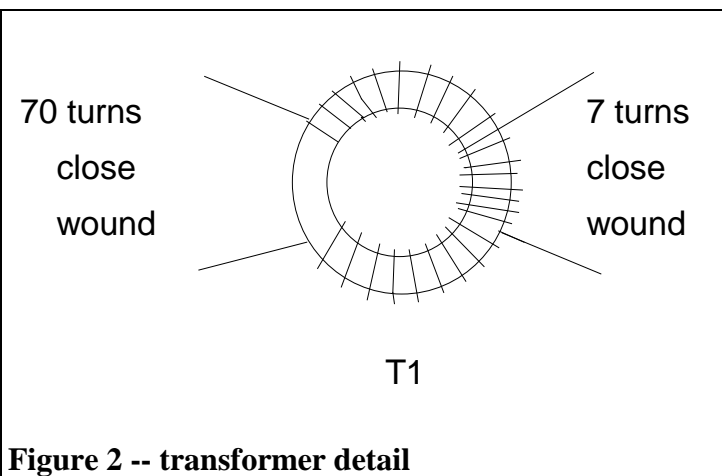


Figure 2 -- transformer detail

I assembled the capacitor, balun, switches and jacks in a metal box, which is part of the system grounding. Use shielded cable between J1 and A1 of the receiver and between J2 and A2. If you never use a receiver with two antenna terminals (such as the R-390A), then J2 and S2 can be omitted and the S2 end of the 7 turn winding can be returned directly to ground.

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---If you're interested in older communications receivers, you might look into Raymond S. Moore's book Communications Receivers. It details and illustrates 750 receivers from the vacuum tube era, 1932 to 1981, describing frequency coverage, tube complements, IF frequencies and filters, antenna inputs and audio outputs, along with details unique to specific receivers. It is available for US\$19.95 plus \$3.00 handling. Write RSM Communications, P.O. Box 27, La Belle, FL 33975-0027 or phone 941-675-2923 for further details, as well as for details of the loop antennas and accessories which Ray has available.

---Has anybody tried the ICOM IC R-8500 table top receiver? Its specs seem to place it somewhere between the R-72 and R-71, leaning towards the R-72. Its most striking feature is its ability to tune 100 kHz to 2000 MHz, but that leads one to wonder whether there are any drawbacks to its use in the lower part of its frequency range.