Radio Shack's Current DX Portables
Performance from a BCB DX Perspective

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The recent spate of sales on Radio Shack's shortwave portables was too much for this DXer to walk away from. Yeah, I know that from a BCB DXer's viewpoint, Radio Shack's/Sangean's offerings in recent years haven't set the DX world aflame. Other than the DX-440/803A, the Radio Shack/Sangean portables have generally been decent for MW DX but nothing special (a notable exception being the Sangean-made CCRadio). So, it was with no high expectations that I bought one of each of the current multi-band portables offered by Radio Shack and put them through a MW DX shakedown. (While I was purchasing the radios, the first shipment of the new Radio Shack "Superadio" clone (12-903) arrived, so I bought one of those too...a quick look follows this review.)

The Line-Up

Radio Shack presently offers three digital read-out portables that appear to be relatively serious attempts at multi-band coverage (there are several other portables offered that cover SW and such but they are either analog read-out or appear to be less vigorous efforts) . The three radios purchased were the DX-398, the DX-402, and the DX-396. I won't go into a lot of detail on the general specs of each; those details are available in Radio Shack's catalogs and from other review sources (e.g., *Passport to World Band Radio*, etc.). Rather, I'll highlight the features that I believe are of interest to BCB DXers and run some side-by-side tests among the radios and include some comparisons with some of the current best offerings from other manufacturers.

DX-398 --- Also sold by other suppliers under the Sangean nameplate and the ATS-909 designation. This is the top of the line portable by both Radio Shack and Sangean and offers a raft of features of limited interest to BCB DXers but of potentially greater importance to listeners of other bands. List price of the radio is $249 but it is often on sale at Radio Shack for $149.

Of principal interest to this DXer was the presence of "true" SSB operation; that is, LSB and USB were provided instead of the usual BFO approach. Could these be effective in ECSS applications? The DX-398 also comes with two IF bandwidths, a highly desirable feature that, in theory, allows good fidelity as well as the option of tightening the passband to cut down on adjacent channel interference. Also, 1 kHz knob or slew tuning, a not-too-bad signal strength meter, battery strength indicator, and an RF gain control (knob)...all of these features I view as being desirable in a MW DX portable. The scan, RDS (for FM), memory pages, etc. are of little interest to this BCB DXer.

DX-402 --- This is also known as the Sangean ATS-505 and sells, at Radio Shack, for $149 (on sale sometimes for $99) but better deals are often available from other SW equipment dealers. Unlike the usual graphite-gray cabinets of traditional multi-band portables, the DX-402 has joined the new SW portable "revolution" by going with the current champagne-colored cabinet...pretty, but as far as I can tell, doesn't help with DX at all. Much less feature-laden than the DX-398, the DX-402, nonetheless, still offers a couple of useful BCB DX features, namely 1 kHz knob or slew-button tuning, a BFO for potential ECSS use (I thought), three-position tone control, etc. Of course, it also has memory and scan features, a front-end DX/Local switch, a clock, etc.

DX-396 --- This unit replaces the DX-375 as the entry-level digital radio for the budding DXer/SWLer. Spartan in features, the DX-396's tuning is limited to slew buttons (in 10 kHz steps), it has DX/Local and tone switches, and that's about it. There's no provision for connecting an external antenna...after conducting the following tests, it became apparent why this feature was omitted. It does, however, use C-cell batteries (vice AA's) and, contrary to Radio Shack catalog implications, *continuously* covers the SW spectrum up to 21.5 MHz. The DX-396 retails for $99 but can be had on sale for $69.

In order to see how the Radio Shack portables measured up against some of the currently best portable competition, I also included the following portables in the tests:

Sony ICF-2010 --- Generally acknowledged as the best of the currently available portables for BCB (and other) DX. Price: $349.

CCRadio --- Usually a close second to the 2010 in MW performance. Made by Sangean in conjunction with the C. Crane Co. Price: $159.

Sony ICF-7600G --- One of my favorite "pocket book-sized" portables for its performance on all bands and better than average performance on MW. Price: $179

The Performance Tests

Although I have the equipment to perform laboratory tests on receivers, I've found that it is usually more useful, especially with portables in this price range, to simply submit them to some tough DX listening conditions. In addition, I've limited the testing to judgments of sensitivity and selectivity, two of the more important DX criteria, with notes on the audio quality/readability of the signals and the utility of such features as ECSS effectiveness, etc.

All of the following tests were conducted around the hours of local noon on atmospherically quiet mid-October days. All tests were run on two consecutive days with the averages for the two days providing the final results.

Note also that the presented results for the Radio Shack portables are based on a sample size of one, with later, less formal verification with a second set of samples. Given the variability of low- to medium-cost portables, a sample you try may vary somewhat from the following results.

Sensitivity

First and foremost, a radio has to be sensitive enough to pull in DX. At night, when signals levels are high on the domestic channels, it is easy to hear distant stations on even your bedside clock radio. But the really good DX comes when your local pest has a silent period or when you are trying for a DX test from a "most wanted" state and you are trying to dig out that weak signal barely above the background noise. That's when sensitivity becomes important. Equally important is the "readability" of the signal. That is, not only must the radio be receiving the signal, it also has to be presenting it to your ears free of excessive distortions and gross audio imperfections. Thus, this "sensitivity" evaluation is really a combination of pure sensitivity and readability.

I've found that the best time to conduct these types of tests is during the mid-day hours of an atmospherically quiet day. This despite the fact that an overly sensitive radio can sometimes have its sensitivity sabotaged by distortion products created by the high signal levels at night.

About a dozen stations were evaluated in the sensitivity tests and were chosen primarily on the basis of their relatively weak strength and their freedom from interference from local stations. I'll present the results for a low-end, mid-band, and high-end station for each of the radios and include a late afternoon logging of Radio Vision Christiana, Turks and Caicos Islands as an ultimate measure of low-end sensitivity.

Target stations

WVMI-570 A 5 kWer located in Biloxi, MS, about 75 miles west of Pensacola and always surprisingly weak for its listed power.

WJBO-1150 A 5 kWer in Baton Rouge, LA, about 200 miles west of Pensacola.

KLEB-1600 Also 5 kW in Golden Meadows, LA, about 170 miles west of Pensacola.
Great zydeco music if that's your thing.

Radio Vision Christiana-530 Listed as 100kW in Turks and Caicos Islands, 1200 miles east of Pensacola; noted late afternoon (2.5 hours before local sunset).

Ratings

5	Local-like (all background noise "quieted")
4	Arm chair copy but not local-like

3	Readable with effort
2	Intermittently readable
1	Present but not readable
0	Nil/undetectable signal

Results

	DX-398	DX-402	DX-396	CCR	2010	7600G
WVMI-570	**3.0**	**2.5**	**3.0**	**4.0**	**4.5**	**3.2**
WJBO-1150	**1.0**	**1.0**	**1.5**	**2.0**	**2.5**	**1.5**
KLEB-1600	**3.0**	**1.0**	**0***	**3.8**	**4.2**	**3.5**
RVC-530	**0****	**0**	**0**	**1.0**	**1.5**	**0****

*****Masked by "birdie"
******Rated 1.5 with Q-Stick booster
Note: No ECSS or synchro was used to derive these ratings.

As in previous tests, the Sony 2010 led the way in the sensitivity tests with the CCRadio not far behind. The DX-398 and Sony 7600G were in the same class together with the DX-398 having perhaps a hair more raw sensitivity but it was hampered by its less readable, somewhat muffled audio. The DX-396's sensitivity was good on the low-end and on the middle of the band but got progressively worse as the frequency increased. Its principal drawback, however, was the presence of several "birdies" on the MW band. The DX-402 lagged behind the others even though its audio was more readable than the DX-398.

Note again that these target stations were chosen because of their generally low signal levels. The somewhat muddy audio on the DX-398 (all tests were in the IF Wide position) became more listenable as the strength of stations's signals increased but even on locals, the audio of the DX-398 sounded "darker" than the others. An external communications speaker was tried with the DX-398 and some minor improvement was noted but was still judged to be less crisp than the others. Apparently this is the fault of the audio stage circuitry and not the internal speaker.

In terms of using the ECSS technique to improve readability, invoking the LSB or USB modes in the DX-398 generally resulted in a 2.0 point *reduction* in readability; not only was it not a help at all, it actually lowered signal levels to, in some instances, unreadability. The BFO on the DX-402, it turns out, doesn't even work on MW, only on SW (where it was, in opinion, substandard, especially when compared to the 7600G's excellent SSB performance on SW). Both Sangeans need to increase the level of their carrier injection voltages. Conversely, utilizing either manual ECSS (SSB) or automated ECSS (synchro) on the two Sony's almost always improved readability. The ECSS and synchro capability of the 7600G would therefore give it a pretty hefty nod over the DX-398 in terms of producing a readable weak signal. The CCRadio and the DX-396, of course, do not have SSB capabilities.

Selectivity

The ability to log a station next to or near a stronger station is an important quality in a DXer's radio. Of the radios tested, only two, the 2010 and the DX-398, offered a choice of IF bandwidths. Because my modified 2010 has the original narrow filter in the wide position, I used only this "wide" filter in the following tests. With the DX-398, evaluations were made in both the wide and narrow modes. Both the CCRadio and the 7600G have "compromise" IF filters in that they are midway between the usual wide and filters and they generally do a commendable job. Little was known about the IF filtration in the DX-402 and the DX-396.

Target stations

All of the target stations were chosen so that they were adjacent to a local pest and were in-line (i.e., un-nullable) with the local.

WVOG-600 This 1 kWer is located in New Orleans, about 180 miles west of Pensacola. It is bothered mercilessly by local WVTJ-610.

CMKO-1100 This is a weak Cuban of unknown power. It is next to very sloppy WNVY-1090 located to the north of my location.

WZEP-1460 Located in DeFuniak Springs, FL to the east of me; bothered by local WBSR-1450 to the west.

Ratings

5	Clear
4	Minor sideband splash
3	Significant splash but target still readable
2	Major splash; target sometimes readable
1	Target never readable; splash intelligible
0	Target not detectable under splash

Results

	DX-398 W	DX-398 N	DX-402	DX-396	CCR	2010	7600G
WVOG-600	**3.0**	**4.2**	**3.0**	**3.5**	**4.2**	**4.5**	**4.0**
CMKO-1100	**.5**	**1.5**	**0**	**.5**	**1.0**	**2.0**	**.5**
WZEP-1460	**3.0**	**4.0**	**1.5**	**3.0**	**3.5**	**4.0**	**3.5**

Note: No ECSS or synchro was used to derive these ratings.

Again, the Sony 2010 proved best in these tests, although the 7600G, the CCR, and the DX-398 (in the narrow position) were close behind. In fact, the DX-398 was a hair better than the CCRadio when it was in its narrow mode and very close to the 2010. If the filter quality of the DX-398 had been a bit better (i.e., better deep skirt and ultimate selectivity), it probably would have won the selectivity competition. In many instances, however, the two Sony's with their sideband selectable synchro as well as their true SSB (i.e., LSB/USB) capabilities enabled about a .5-1.0 improvement in the preceding ratings. The DX-396 fared surprisingly well while the DX-402 brought up the rear. The bottom line, however, is that the two Sony's generally were more effective in the selectivity department...their ECSS capabilities making the difference.

Random Notes

DX-398

--- Connecting an external antenna to the DX-398's external antenna jack disconnects the internal antenna(s).
--- The SSB function fine tunes in 40 Hz steps; good enough if the circuit was decent.
--- Eats batteries; the AA batteries last about a dozen hours (according to the owner's manual).
--- Made in Taiwan.

DX-402

--- Connecting an external antenna does not disconnect internal antenna(s).
--- BFO inoperative on MW band; mediocre on SW.
--- Signal strength LED (single) only lights on locals.
--- Also eats batteries; the AA batteries last about 12 hours (according to the manual).
--- Made in China.

DX-396

--- No external antenna connector (which is probably good; overloading a potential problem).

--- Uses C-cells; 60+ hours per set.
--- Birdies a real problem especially on SW (five “new” stations were present between 2.5 MHz and 3.0 MHz...images from MW).
--- Made in China.

Conclusions

Of the three current Radio Shack offerings as potential BCB DX machines, the only one that is worth considering is the DX-398. It’s principal shortcoming (in my mind) is the shape of its audio passband. While its somewhat dark audio sounds pretty good on FM, this turns into a sense of “muffled murkiness” on weak AM stations. This “muddiness” really becomes apparent when compared side-by-side with a radio like the CCRadio (whose audio is shaped for voice communications). If you can live with the audio, the DX-398 fared pretty well in the sensitivity tests and quite well in the selectivity measures. Of course, there’s always the short battery life to deal with....

The DX-402 and DX-396 are okay for night time DXing of not-too-difficult domestics but fall short for DX that is a little more challenging. Either should suffice for local/clear channel listening or for listening to the easier SW broadcasters.

It’s good that Radio Shack has a 30-day return policy. You can decide for yourself whether any of the current offerings meet your needs

The Latest Radio Shack “Superadio” Clone

Every time that Radio Shack comes out with another Superadio imitation, I get suckered into buying one...I just can’t seem to resist the “extended AM range” and the “even picks up distant AM stations” in the ad copy. And every time I buy a new model, I swear I’ll never fall for the hype again (I feel like Charlie Brown, and Radio Shack is Lucy holding the football urging me to try just one more time). So, alas, when the salesman walked in from the backroom holding one of the new models (the 12-903; replacing the horrid 12-603), I whipped out my credit card, swearing under my breath at my weakness.

I was comforted not at all by the salesman’s assurances that this was a brand new, improved model, much better than the older one....Sigh, I guess I’m just a radio junkie.

So, how did it perform? **Arrrrrgh!** They did it to me again! The new model failed to show any sign at all of the stations used in the sensitivity tests above. Between my local stations, there was mostly silence, only the strongest out-of-town stations making a whispery appearance. I didn’t even bother with the selectivity tests. Within 10 minutes, the new 12-903 was in its box and on its way back to Radio Shack. Please Radio Shack, fire whichever engineer is responsible for this series of abysmal radios and give Bob Crane and his staff a call....

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