# IRCA Technical Column

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## The SONY ICF-SW7600G, ICF-SW1000T, and ICF2010 as Medium Wave Receivers

When the SONY ICF 2010 first made its appearance in the mid ‘80s, one of its selling points was its synchronous AM detector, which, though not always as effective as some on more recent communications receivers, was a big step forward for any radio, let alone a portable. Recently, SONY has been making the synchronous AM detector a feature on other radios, even on one of its less expensive portable radios. How effective are such radios for medium wave DX?

**Overall descriptions:**
In this review, I will not describe memory and clock functions, as they tend to work as advertised. I will instead concentrate on the receiver part of each unit. The ICF-SW1000T is quite small (7 by 4 by 1.5 inches) which is extraordinary as it also includes a cassette tape recorder; the ICF-SW100, upon which it is based, and for which this radio review is likely relevant, is even tinier. The ‘1000T and SW100 both feature synchronous AM detection, as does the ICF-7600G, but unlike other radios with synch AM, the ‘7600G lists at under US$200. The SONY 2010 is well known, but a few of its good points for a DXer in comparison with the ‘1000T and the ‘7600G can be re-emphasized. It has a 10-LED S-meter, while the others have a single tuning indicator; it also tunes in, and displays, 100 Hz increments. The 1000T tunes in 100 Hz increments only in SSB, and does not display those increments; the display is good to 1 kHz only, which is the tuning step size in the AM and AM synch modes. The ‘7600G always tunes in 1 kHz increments, but has an SSB fine tuning control for use between the steps.

**Sensitivity (using the DX position of the front end attenuator):**
In almost all cases the ‘2010 was most sensitive, often by only a small amount, when each set was using its internal loop antenna. For example, afternoon reception of fair audio from 50 kw KXL-750 200 miles away, was possible on the’2010, with only audio traces on the other two, and on 1100 kHz it was possible to hear audio traces from San Francisco in Victoria on the’2010, while only a carrier was audible on the others. And a weak signal on 1400 was able to lock the ‘2010’s synch detector before it was audible in the splatter from 1410 on the others.

I prefer to use an external loop antenna for DXing on most portables, due to their relative insensitivity. Initially, I used an unamplified 3-foot box loop with its pickup link connected to the antenna input of each radio. In each of the radios, use of the antenna input switches out the internal antenna, so the signals heard are exclusively from the external antenna. (Note that the external antenna jack on the SW1000T is a miniature stereo type. The antenna

signal goes to the “ring” of the plug, and the tip supplies 3 volts from the radio to power an optional active antenna.) Again, the 2010 was the most sensitive. At dawn in early May, I was able to hear audio traces from Japan on both 774 kHz and 828 kHz, but only on the ‘2010, in both its AM and SSB modes. On the others, a carrier could be detected, but never audio in any mode. During the daytime, the 2010 was the first to show audio as KSWB-840 (200 miles away at 1 kw) faded up using the external loop; however, as the others (first the SW1000T then the 7600) showed audio, the sound was crisper and more readable than the 2010, even using its wide filter.

I disconnected each radio from the loop and directly coupled it by lining up the test radio parallel with the loop antenna with its loop null matched with the null of an unamplified 3-foot box loop. With all radios, sensitivity was better throughout the band using this method rather than connecting the loop through the external antenna connector.

A 15” ferrite loop using Ralph Sanserino’s amplifier (IRCA reprint A31) was also used with all radios via the external antenna input, and all radios showed improved sensitivity over the radios’ internal antennas; the greatest improvement was with the ‘7600G. In all cases, direct coupling to the air-core loop provided vastly more signal, however.

**Selectivity:**

Making selectivity judgements on portable radios is often tied up with making judgements on their demodulation capabilities and signal handling capabilities as well. All these radios were able to easily separate out 10 kHz channels, except for channels adjacent to my locals (50 and 10 kw x 2 within 3 miles), but that was due to splatter rather than bleedthrough from the local station itself. The 2010 in the narrow position was most selective using the simple test of tuning past a local and noting where the signal became readable, as the carrier was shifted into the IF passband, then became unreadable again as the carrier was shifted out. It showed a readable signal between 1197.3 and 1202.7 for my local on 1200, while the other two delivered a readable signal between 1196 and 1204 kHz; both have only one IF filter. It was noted that the 7600G still showed readable audio from 770 on 774 when I was looking for Japan, but that the SW1000T showed only splatter from 770 on 774, so the ‘7600G seems to have the poorest IF filtering of the three. We don’t usually have split channels coming in at equal strength to our semi-locals here, so I was not able to judge close-in selectivity, but I suspect the synch detector would be needed within one or two kilohertz of any 10 kHz channel on any of the radios.

**Strong signal handling:**

Before testing for strong signal handling, I made up a list of expected second and third order products likely to be generated by mixing between my local stations. (See “Spurious Responses and How To Recognize Them”, IRCA reprint T10 for details on calculating second and third order products.) When using its internal antenna, each radio had weak but perfectly readable third order spurious responses on at least 3 of the 6 possible 10 kHz MW channels during the daytime; the other three were channels with semi-locals on them. Using the external loop usually provided sufficient front end selectivity to eliminate these products, but overload easily occurred if an external loop antenna was tuned to one of the locals while the radio was set to another channel. Second and third order products were also noted on the predicted longwave and tropical band frequencies of all radios. It was discovered

that the ‘2010’s spurious signals were stronger if the whip antenna was extended, but that problem wasn’t noted with the other radios.

The SW1000T delivered clear audio from my locals on adjacent 10 kHz channels in the AM setting, but not in the AM sync or SSB settings. These spurs showed up as far as 30 kHz away, and were also noted at 5 kHz increments from 15 to 45 kHz away as well. They are likely due to the synthesized local oscillator generating a number of spurious sideband signals every 5 kHz. There is a similar problem on the ‘2010 which delivers my locals 25 KHz either side of their assigned frequency. Such spurious signals can not be easily eliminated though a fix for the 2010’s problem is described in a Medium Wave Circle booklet (reprint T10), “The Sony ICF2010 Collection” by Steve Whitt, for 2.95 British pounds , available from MWC, 86 Dereham Road, New Costessey, Norfolk NR5 0SY, UK. Fortunately, the responses were not observed on the ‘7600G.

Images were a problem on all sets on longwave, 910 kHz below two of my locals, but appeared to be worst on MW on the ‘7600G. Clear audio from a semi-local on 1450 kHz was heard on 540 kHz using that radio in the daytime, while the SW1000T delivered only a weak carrier which seemed to be caused by 1450; the 2010 showed no image there at all. At night, both the ‘7600G and the ‘1000T suffered image related hets on 10 kHz channels below 660 kHz. One advantage of using the loop antenna connected directly to these radios is that the images disappear with the tuned front end afforded by the loop.

**Synchronous detection:**
The 2010’s synch detection is more likely to improve medium strength rather than weak signals, but it does at least substitute for sharper filters, by allowing one to listen to the sideband which suffers from less adjacent channel splatter, and so can improve the quality of a DX signal. The SW1000T synch detector has this USB/LSB capability, but it adds more wideband noise to the desired signal initially after it has locked up on a weak signal. However, once the received signal becomes stronger, the SW1000T delivers crisper audio than the 2010 does. The SW1000T’s synchronous detector seems more useful than the 2010’s because it is often the only way to make a splatter covered signal readable, but the 2010 would sometimes deliver a somewhat readable signal through the splatter even before switching in the synch detector. The synch detector on the 7600 also has USB/LSB capability, using the USB/LSB switch while the sync detector switch is also on, but isn’t quite as useful for DXing on MW. The other two radios were able to escape splatter from 1410 on 1400 by going to the lower sideband (on the SW1000T, synch detection was the only way a readable signal could be delivered), but even after the 7600 had locked onto the weak signal on 1400, it was covered by splatter. On stronger signals adjacent to locals, the 7600’s detector was quite able to pull something readable out of the murk however.

Non-synchronous heterodyne detection (using USB/LSB positions to demodulate AM) is easiest using the 7600 because of its continuously variable SSB fine tuning control. The 100 Hz steps on the others are often not close enough to the received station’s carrier. In addition, the SW1000T I was using had a zero beat about 600Hz low, and like the ‘7600, but unlike the 2010, the tone generated between the BFO and the incoming signal was unstable sounding.

**Conclusion:**
If you’re looking for a portable with memory and reasonable SW capabilities but have a strong interest in MW DX , the ‘2010 is probably the way to go if you can justify the price

difference between it and the 7600G. You're paying primarily for miniaturization and the tape machine with the SW1000T, so the '2010 is probably the better investment for the MW DXer. However, the SW1000T does seem at first hearing to have a better synchronous detector.

(Thanks to Victoria DXers Walt Salmaniw for the use of his ICFSW1000T and Colin Newell for his ICF 7600G)