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The Four AM Stereo Systems
and the
The Sony SRF A-100 Receiver

By Karl J. Zuk

I recently auditioned the Sony SRF A-100 receiver. It is roughly the size of a business size envelope, and about an inch and a half thick. Although it contains an audio amplifier and two small speakers, it is best to try it out with headphones, or by hooking it up to a home stereo system. I found the quality to be very good, with a frequency response out to about 8 kHz in the wideband position. The selectivity in this mode was awful, as expected. In the narrow mode, the quality is cut to about 4 kHz, and the radio becomes selective enough to split domestic frequencies, but this can hardly be called a "DX machine." The sensitivity left a great deal to be desired. WNBC, a 50 kw clear channel, just barely achieved full quieting in my home about 35 miles northwest of their transmitter site. It needs another stage of RF amplification, or an outdoor antenna. Since the rig comes with no external antenna terminals, I wrapped the lead-in of my 500 foot long wire around the rig several times and got some good cheap-and-dirty results. I was able to bring in what you would expect from a ten dollar, six transistor portable. The rig had a volume and tone control, a AM mono-AM stereo-FM stereo switch, a DX-local switch for FM that doubled as a wideband-narrowband switch for AM, a tuning control and a switch to switch between the Kahn system and the other three, which seem to be close enough electronically to use the same circuit to decode them. Here's what I learned about the state of the AM stereo art:

I heard two systems of AM stereo in my tests. They were the Kahn-Hazeltine system and the Motorola C-QUAM system. I found that both systems had some flaws, but with a good signal, both systems produced a pleasing stereo sound.

I discovered that both systems have several common problems. When you listen to a AM radio station with a wide bandwidth receiver, you will hear some heterodynes, especially at night. A pair of tunable notch filters would be very useful in any future AM stereo receiver. As compared to FM, AM suffers from poor static immunity; but AM is superior in being totally immune from the familiar FM problems of multipath and "picket-fencing", especially in a moving vehicle. I would much rather listen to AM stereo than FM stereo in places of generally poor reception, such as a fast moving commuter train, or driving in a car in a "fringe area." I found both systems were very compatible with mono receivers; and I could not discern any difference in loudness when a station would play a record with extreme separation. The Sony SRF A-100 needs a good strong signal to display full quieting in the stereo mode. This particular rig needed a much more sensitive front end. At a distance of 35 miles north of New York City, I found it necessary to couple my 500 foot long wire antenna to the Sony receiver to obtain full quieting from a 50 kw clear channel station broadcasting from within the city limits.

My test was very dependent on the various station's program chains. For example, I found a great deal of difference in the sound of two local Kahn stations, WNBC, with a top 40 format, and WQXR, with a classical format. WQXR had very minimal compression and processing, and sounded better, but certainly not as loud as, WNBC.

I also think that Delco was very narrow-minded in picking one single system for their AM stereo receivers. If you are

capable of receiving a strong signal from a AM stereo station, any system will produce a nice, full stereo effect. By limiting a receiver to just one system, Delco is doing a disservice to both listener and broadcaster. Listeners will be frustrated by not being able to hear anything but Motorola stations, and will not be encouraged to buy an AM stereo radio that only gets some of the stations. Anyone who has already spent the money for a receiver and finds that it will only decode some of the stereo stations will not be a happy customer either. If AM stereo is going to be a salable concept, the receivers that the consumers buy should be simple to operate and should receive all stereo stations, regardless of system. Delco is really throwing a wrench into the works by pushing a one system radio before any standard has been set. If an AM stereo broadcaster does not gain anything from his investment in stereo equipment, he loses too. Automatic switching multi-system radios are essential for AM stereo to succeed.

There were quite a few differences between the Motorola and Kahn systems. The Motorola system suffered from a condition called "platform motion." A good approximation of what this is like can be found by listening to the Led Zeppelin classic "Whole Lotta Love." The audio will move from side to side of the stereo image creating a really annoying effect. This is due to one carrier beating against another and creating a subaudible heterodyne which makes the phase "flip-flop." The Motorola system is based on phase, and when two carriers collide, it takes its toll. There is really no way to correct this, outside of letting only one station transmit per continent. I heard a very pronounced demonstration of this listening to CKLW, Windsor, Ontario at night. Trans World Radio in Bonaire, Netherlands Antilles, was making CKLW's stereo rotate about 10 times per second. There was a frequency difference of about 10 cycles between the two stations. In mono, or using the Kahn system, which is not phase dependent, this would not be a problem. This is a most annoying effect, and would make anyone want to switch to the mono mode.

Another problem with the Motorola system is that if it the signal being received becomes weak enough, it will drop out of stereo into mono. The Kahn system will continue to show separation no matter how weak or noisy the signal becomes.

I listened to the one local station in my area that has the Motorola system in operation, WPAT in Paterson, New Jersey. Although it might have been the program chain of the station at fault, the sound sounded much more processed and "soft." The individual instruments seemed to be less distinct in the stereo image. The two Kahn stations in my area that broadcast music seemed much more sharp and clear than WPAT, and did not seem to have the high frequency roll-off that WPAT had.

The Kahn system had some unique characteristics of its own. I found that if a station broadcasted program material with a lot of compression to make the signal as loud as possible, that

occasionally the audio would seem to overmodulate and cause a momentary burst of distortion. It sounded like a elongated transient peak on a poor home stereo system. I heard this effect on WNBC, a heavily processed and loud rocker. On WQXR, I heard this effect only once or twice, but their modulation is lower due to their classical format. In general, the Kahn system sounded much more "open" and sharp in stereo imagery, and displayed no high frequency roll-off. WQXR simulcasts all of its programming on FM, and comparing the two, it was very hard to perceive a difference wearing Koss Pro 4 AAA headphones connected to the Sony SRF A-100. The Kahn system uses an independent or double sideband system, and this made tuning fairly critical. If the tuner was not fairly close to the center of the carrier, the balance of the stereo image was off proportionately. The Kahn system also allows itself to be used to reduce adjacent channel interference. For example, if a station broadcasting with Kahn stereo is interfered with by a station one frequency above it, if you eliminate the right or upper channel, you will likely hear the programming unmarred on the left or lower channel. WABC in New York, which broadcasts a mono talk format is using the Kahn system for just this purpose. Finally, the Kahn system is, by far, the superior choice for DX stereo. I listened to WBT, Charlotte, North Carolina in clear stereo and full frequency response, 35 miles north of New York City. The reception sounded like usual sky wave reception, but in stereo. I was impressed.

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I did hear one station that broadcasted with the Magnavox system, WOWO in Fort Wayne, Indiana. Although this system was also based on phase difference to obtain a stereo effect, it did not seem to suffer from platform motion very much at all, unlike the Motorola system. Their frequency, 1190 kHz, had at least two other carriers on it, (noted by counting subaudible heterodynes), but the stereo only exhibited a slight rotating effect. I would have liked to hear this system on other stations, especially with local signal strength.

The two stations that I had access to using the Harris system, WSB, Atlanta, Georgia, and WGAR, Cleveland, Ohio, were both not coming in well enough, the night of my test, to fairly conclude anything about the Harris system.

If I had to pick one system to choose as a standard, I would pick Kahn. It would be a hard choice, because they are all quite good with a good solid signal. Kahn seems to have the most potential and room for improvement. It is a simple system, and with some refinements in reception, such as a stable frequency controlled receiver to make tuning accurate and easy, and tunable dual notch filters to ward off heterodyne interference, it could be the solution to high fidelity AM radio. It has no frequency response limitations, outside of the frequency response of the station transmitting. It can be heard at great distances without any more signal degradation than mono AM. The platform motion problems of the other three systems make the Kahn system even more attractive.

If Sony could put a really good front end on an AM stereo, the separate sidebands of the Kahn system could make a radio quite a DX machine. I think the best solution, at the moment, would be a multi-system radio that could switch between systems automatically and "idiot-proof." This would also allow the public to decide which system they prefer (if any).

In conclusion, I'm not sure if I would shell out the eighty or so dollars for an SRF A-100. I think the less expensive "Walkman" model, that recently came on the market, would probably be a better buy, because with the tiny speakers and small audio amp that comes with the SRF A-100, you are better off with headphones anyway. The audio amp and speakers give an anemic sound, at best. I consider it a high tech toy, or a very interesting working prototype, at this point. It is still in great need of refinement. It is an interesting preview of the future, and if you get the chance, give it a trial like I did. Hearing stereo on skywave is really amazing!

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