The SSR-201 "Watch-Dog" Aperiodic Receiver

Designed and Built by the FCC's Radio Intelligence Division During WWII

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Introduction

I was cruising the bone yard at the 2013 Shelby, North Carolina, hamfest when my old friend Ron Lawrence (W4RON) asked if I would be interested in an OSS receiver. 30 seconds later we were standing in front of what looked to me like a piece of 1930's test gear in a wooden box with a metal handle on top.

Figure 2: At the Shelby, NC, hamfest the SSR-201 patiently waits on a table for its new owner.

When I got home I looked the receiver over. I also looked around the web for more information. After a bit of "Googling" I came across a fascinating PDF file titled *George Sterling History of the RID*. See **figure 1**. This file is Sterling's unpublished manuscript and it tells the story and accomplishments of the FCC's Radio Intelligence Division (RID) before and during WWII, such as:

- 9000 Signals Investigated
- 400 Unlicensed Stations Silenced
- 200 Spies Rounded Up World-Wide
- 600+ military aircraft flying between the West Coast and Hawaii were saved, thanks to the RID HF/DF network.

Figure 1: George Sterling and the RID, an unpublished history.

George Sterling was the only amateur radio operator to rise to the rank of FCC Commissioner.

Over 80 percent of RID employees were experienced hams and/or commercial operators. The RID was well supported by a number of manufacturers including Hallicrafters (receivers and transmitters) and the Hudson Motor Car Company (radio sedans). Anything the RID couldn't buy they designed and manufactured themselves, such as the SSR-201 Aperiodic Receiver.

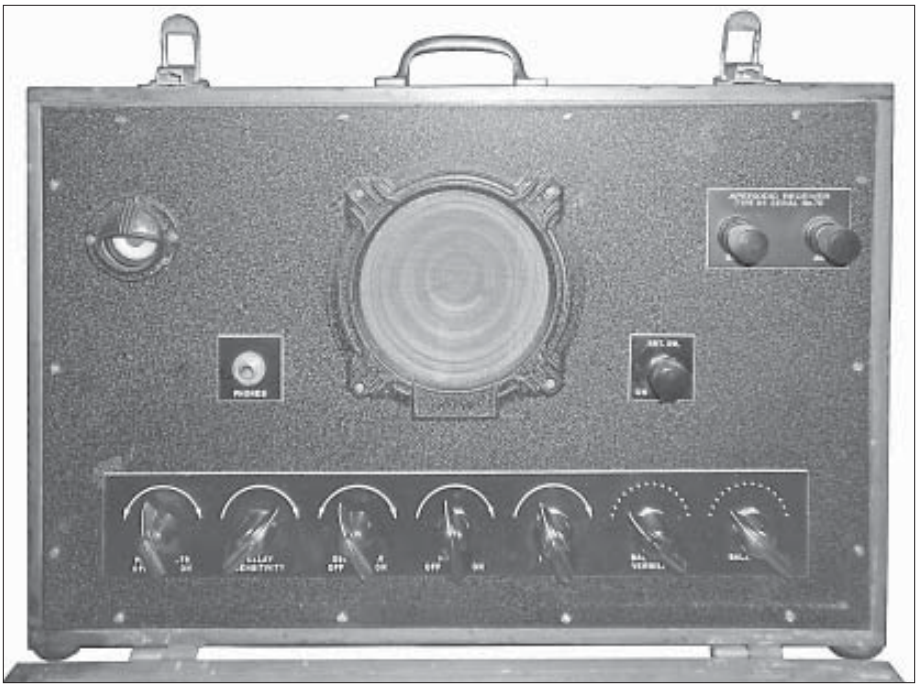

Figure 3: The SSR-201 receiver used black wrinkle paint and white lettering.

Figure 4: The SSR-201 was built into a simple blonde-colored wooden case with a hinged front cover.

The Aperiodic Receiver

The purpose of the aperiodic receiver was to provide "early warning" of anyone in close proximity transmitting on any frequency usable for DX. Afterwards, other receivers and antennas would be used to identify the transmission's frequency and take bearings to find its source.

For the aperiodic receiver to work reasonably well, the number of local strong signals needed to be as few as possible. World events were happening that would help quiet the ether: as of June 4, 1940, U.S. hams were no longer allowed to communicate outside of the U.S., and after December 8th, 1941, all amateur transmissions below 54 MHz were prohibited.

RID prowl car. The operator (Ed Atems) tunes in a signal on the Hallicrafters SX-28 while the signal is being recorded on a Telecord wax cylinder recorder. The loop did not show while the car was cruising but only when taking a bearing.

Figure 5: This photo of the RID "prowl car" does not show a SSR-201 in use, but the government agents are using the Hallicrafters SX-28 in direction-finding applications with a retractable loop, mounted on the roof of the vehicle. The Hudson Motor Car Company had contracts for some of the FCC radio sedans.

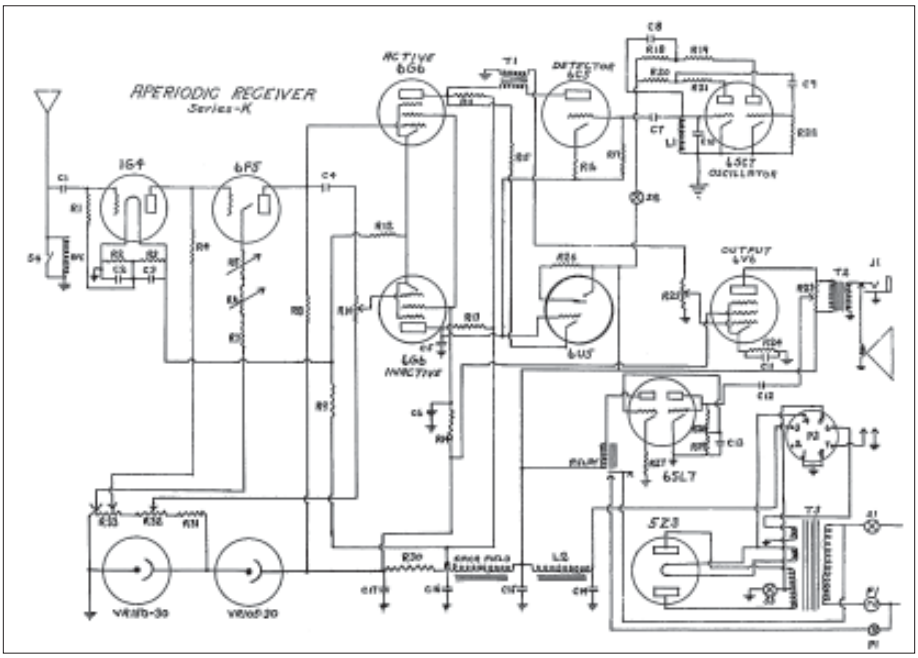

Figure 6: This is a schematic for the series-K SSR-201 receiver.

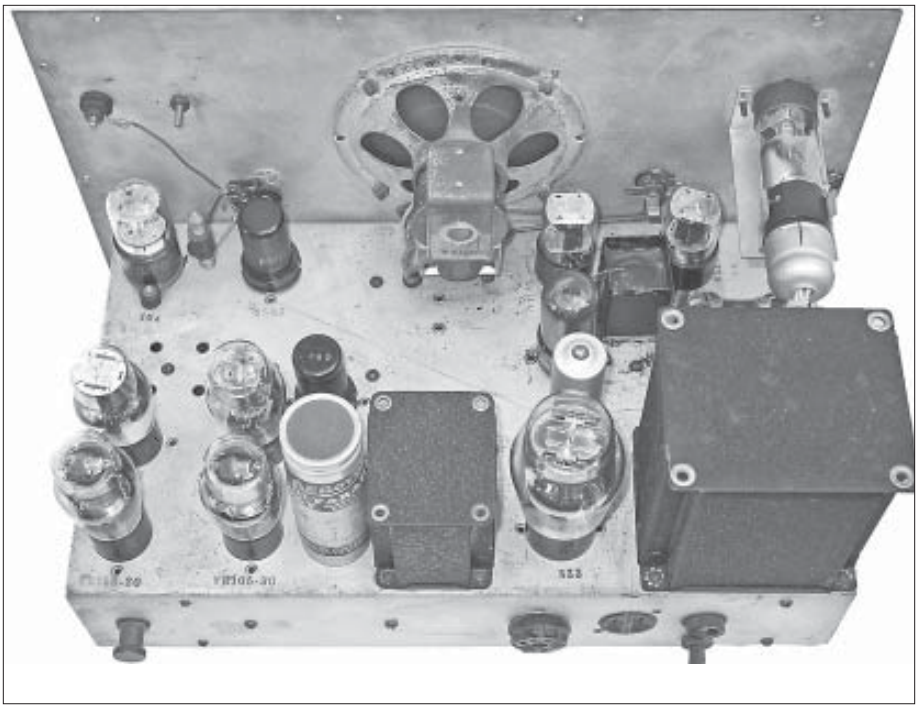

Figure 7: This is a top-chassis view of SSR-201, S/N 45, from the OSS.

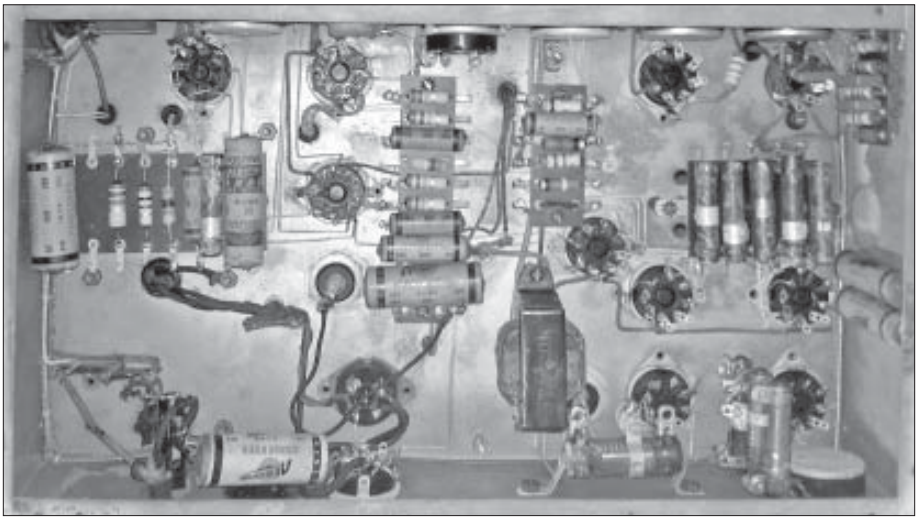

Figure 8: In this below-chassis view of SSR-201, S/N K70, notice the use of "tag" boards (mounting boards) for all of the discrete components, resistors and capacitors, associated with nearby electron tubes.

In Sterling's history manuscript there are a number of references to the aperiodic receiver, summarized below:

Page 17:

"Since we had neither enough men or money to provide a continuous surveillance over enemy suspects who might be engaged in clandestine operations, it became necessary to develop a radio receiver which would respond to any signal within the communication range of the spectrum at that time, yet insensitive except to the strongest signal. Out of this requirement an aperiodic receiver was developed by two RID engineers, James Veatch and William Fellows. This receiver was used to advantage in our mobile units and providing surveillance at fixed locations such as the Japanese internment camp. It paid off too. It was subsequently adopted by the Navy and OSS."

Page 20:

"When the war was underway, most manufacturers were loaded with defense contracts and not interested in small orders. Consequently RID persuaded Mr. Manuel Kann, W3ZK, of Baltimore to manufacture our aperiodic receivers and Adcock direction finder parts in the basement of his home at nights aided by technicians employed at local broadcasting stations when they were off duty. Before Kann knew it, he was up to his neck in the manufacturing business for the Navy Department and OSS as well as RID. I imagine his neighbors often wondered what went on in his house with lights burning in the basement and particularly with men going in and out all hours of the night." See the sidebar that has more information on this house in Baltimore, MD.

Page 60:

"Prior to the attack on Pearl Harbor I had assigned three mobile units in the District of Columbia to provide a special surveillance over certain embassies. In the wee hours of Tuesday, December 9, 1941, Monitoring Officer Morris Blum in charge of one of the units radioed my office (I had slept in my office from December 8th going to a hotel when I could for a bath and change of clothes) stating that his aperiodic receiver, which I previously described, had sounded off on a strong signal with the call letters "UA." With another receiver he identified the frequency and I immediately alerted the other mobile units to guard the frequency and take bearings on any transmissions."

Page 265:

"In the general alert which followed that shocking Sunday morning we had put several mobile monitoring units out cruising the Washington streets. These were equipped not only with loop direction finders but with a device we called the watch-dog, an aperiodic receiver we had developed which would sound an alarm when it received a strong signal on any of a wide range of frequencies. (It was patented by two RID engineers and later used by OSS and the Navy.) In the wee hours of Tuesday,

Author's Notes: Manuel Kann's QTH (W3ZK) during 1940-1951 is listed as 3309 Leighton Avenue, Baltimore, MD. Thanks to Pete (NL7XM) and Steve (W3HF) and their collections of early ham call books for this information. The house still exists, I would love to see that basement! After the war Kann teamed up with RID Technical Head Charles Ellert (W3LO) to incorporate Kann-Ellert Electronics Inc., which sold amateur radio equipment in Baltimore.

Plot of bearings taken by RID primary monitoring stations to determine the location of a clandestine transmitter in Washington, DC area on December 9, 1941. The first alert was sounded by an aperiodic receiver in a mobile unit cruising DC that was immediately followed by an alert from the primary monitoring station in Portland, Oregon.

Figure 5: Direction finding plots were used to pinpoint spy transmissions.

December 9, one of these watch-dogs was triggered by signals on a transatlantic frequency."

On page 97 I even found a reference to RID activities in New Bern, North Carolina. (My SSR-201 was found in New Bern by the previous owner 15+ years ago.) The following is a verbatim report of RID Monitoring Officer, Gene Brizendine, recounting his experiences while on a coastal patrol assignment that took him and his associate Wilson to Cape Hatteras:

"Early in 1942, Carl Wilson and I were dispatched to the East Coast, driving the direction-finder Hudson sedan. We were headed on what was to be a most interesting assignment. We later learned that we would literally live by night, in the custom-built sedan vehicle...for several months. We were assigned the entire cut-up coastline of North Carolina, to monitor Nazi submarine communications with shore-based agents.

Quarters for sleeping in the daytime were established in the home of one Mr. Ives, a retired cotton broker, in New Bern."

So possibly, was my receiver misplaced, pinched, abandoned, or made surplus after the war?

By the way, the only known example of an "OSS" SSR-201 unit has a serial number of 45 and sports a black leatherette-covered metal case and leather carrying handle. It resides in the "Jan Corver" amateur radio museum in Budel, Netherlands. (Thanks to Louis Meulstee, PAØPCR, author of the *Wireless for the Warrior* series for this information).

In preparation for a presentation at an event for "Antique Radio Charlotte " (AWA) in March 2014 on *The RID in WWII,* including a demo of the SSR-201, Ron Lawrence (W4RON, Matthews, NC) lightly cleaned the radio's wooden cabinet while Steve Ellington

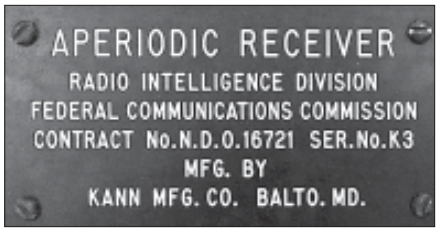

Figure 7: Data tag for SSR-201, S/N K3

(N4LQ, Charlotte, NC) repaired the chassis by replacing most of the caps throughout with modern equivalents. Steve made "Youtube" videos as he brought the SSR-201 back to life. (Google "youtube aperiodic radio" to see these videos.)

With no manual or documentation to refer to, Steve came up with ideas on how the receiver's front panel controls should be set.

Fifteen minutes before my Charlotte AWA session was to begin, Jim Kreuzer

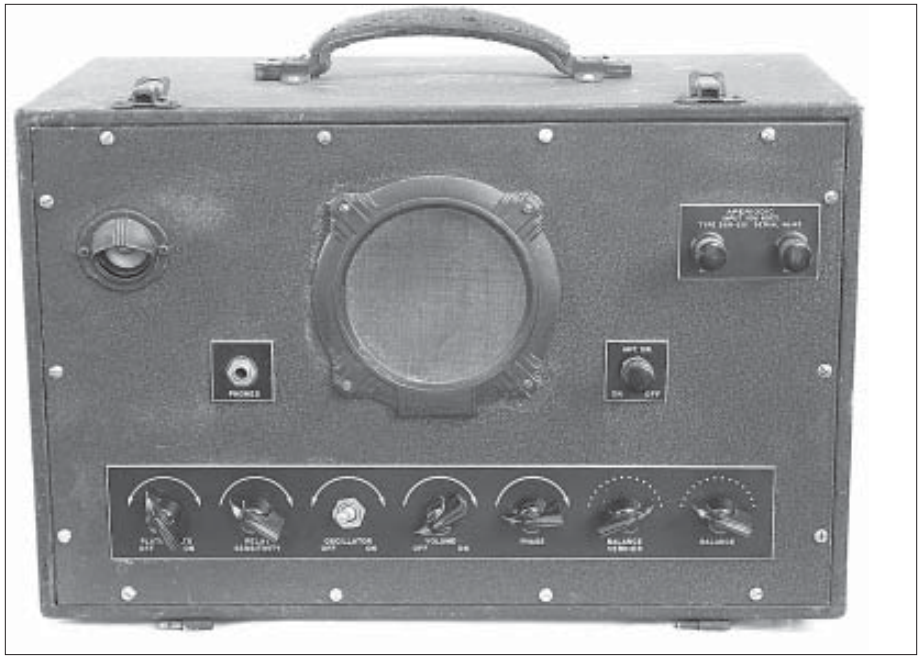

Figure 6: SSR-201 number 45 in the OSS display in Belgium is nearly the same.

SSR-201_sn45_OSS_front

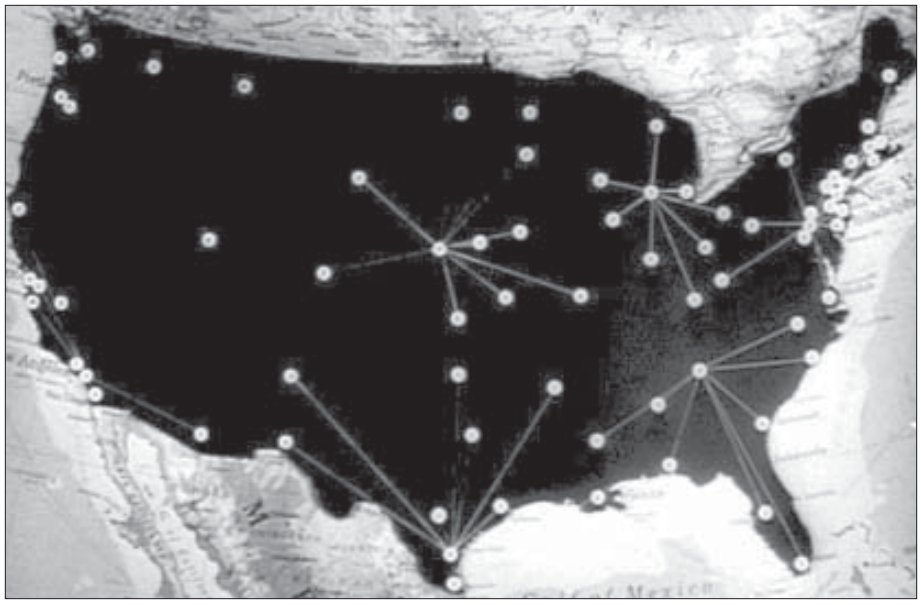

Figure 8: Clues to locations of other surviving SSR-201 receivers may be found with this map of RID monitoring sites.

(N2GHD, Grand Island, NY) walked in with another SSR-201 he had acquired 3 weeks before from a collector in Miami – it had been found a few years prior at the Miami, FL, hamfest. His is the twin of mine, only better, it has a lower serial number of "K3" (mine is K70) with a data plate on the inside front cover and an original manual!

So we are aware of three SSR-201s. How many more exist? That's unknown, but by the end of WWII there were approximately 100 RID monitoring sites across the U.S. and a handful overseas (mostly South America) and each site would have had at least one and most likely multiple aperiodic receivers available for use – plus the units that went to the Navy and OSS, etc. So I would guesstimate a couple of hundred, at least, were manufactured.

Where might you find one? **Figure 8** is a U.S. map showing some of the RID monitoring sites. (There were also a dozen sites in Hawaii and a handful in Alaska.)

The Reason for this Article

Jim Kreuzer (N2GHD) bet me a case of beer that no more than 3 additional SSR-201 examples will come to light this calendar year (2014). I took that bet and I'll gladly share those beers, one six pack at-a-time, with any ER reader who sends me a "sightings report" – so good hunting!

I would also appreciate hearing from anyone with RID stories, information, or artifacts. By the way, there is a very entertaining 20-minute video produced in 1944 about the RID in WWII entitled *Patrolling the Ether*. It's not available on Youtube or elsewhere on the web for free but a copy can be purchased as part of the *Crime Does Not Pay: The Complete Shorts* collection. Google "Crime does not pay patrolling the ether DVD."

ER