

# The Watergate Rig: The Most Infamous Spy Radio

## One Radio's Role In A President's Unraveling

by Terry O'Laughlin

Thirty-six years ago, a former U.S. intelligence agent, James McCord, used personal connections and presidential money to buy a radio. The political intrigue resulting from his use of that radio eventually forced the resignation of President Richard M. Nixon. Yet, this radio has disappeared from public memory even among most radio hobbyists.

McCord purchased a Communications Electronics, Inc. (CEI), RS-111. It was a specialized radio designed for use by the Department of Defense (DoD) and various intelligence agencies. Radios like this are typically designed, deployed, and destroyed with very little fanfare, and the general public rarely becomes aware of their existence. But this RS-111 became a notable exception. Its photo was printed in the *Washington Post* and the *Washington Star*. It was also a star exhibit in the Watergate Congressional hearings and was seen by the millions of Americans glued to their television sets. How did this all happen?

### \$3,500 Cash, In Crisp \$100 Bills...

In May of 1972, James McCord walked into the Watkins-Johnson, CEI division offices, a nondescript office building at 6006 Executive Boulevard in Rockville, Maryland, with a crisp wad of new \$100 bills in his pocket. He handed his business card to the receptionist and asked to buy an RS-111, a radio he knew from previous jobs as a wireman.

But not just anybody could walk off the street and purchase these specialized radios. One had to work for an authorized agency and have the proper security clearance. Very few people even knew that in this building, innocuously nestled in an office park, radios were produced that were highly prized by a variety of secretive government agencies. Who did this guy think he was?

McCord had retired early from government intelligence work on August 31, 1970, after 19 years of service (although in the book *Secret Agenda*, a detailed account of the actual wire-tapping, author Jim Hougan questions McCord's retired status). McCord then started his own technical security consulting business, McCord Associates. On the surface, running McCord Associates did not pay nearly as well as his previous job, though he appeared to be doing fine.

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James McCord at the Senate Select Hearings on Watergate shown with the Watkins-Johnson RS-111 receiver and Bell & Howell telephone bug.

On October 1, 1971, McCord was retained as a part-time consultant by Richard Nixon's Committee to Re-elect the President (CRP) based on the recommendation of his longtime friend, Secret Service agent Albert Wong. He was promoted to security director for CRP, a full-time position, on January 1, 1972.

As McCord did not have the agency connections or proper clearance to purchase a radio from Watkins-Johnson, the receptionist returned his card and sent him across the street to the sales department. There McCord talked to Jack Bussler and Tracy Estabrook, both of whom he knew well from his days working for the government.

Bussler arranged for McCord to purchase an older demonstration RS-111 for \$3,500. McCord peeled off thirty-five \$100 bills to complete the transaction. Paying in cash was highly irregular, but the spy business is not regular business. The money came from \$65,000 he received from G. Gordon Liddy. Liddy was the head of President Nixon's Special Investigations Unit. (In *Secret Agenda*, Hougan incorrectly asserts that the receiver



Senior Test Technician Jack Howard, the expert at aligning RS-111 steel box tuners, consulting with engineer Archie Fosdick.

came from Bell & Howell, although later in the book he cites FBI transcripts stating it was a "Communication Electronics, Inc...Receiving System.")

A salesman's demo RS-111 was pulled off a shelf, sent to the test department, bench tested, and aligned to specification. Barry Wright, head of quality control, did the final inspection, signed the form and placed it inside the box with the radio. He wheeled it to the rear entrance and loaded it into McCord's van. Thus began the unraveling of a presidency.

## Inside The RS-111

The first RS-111 receivers were designed and produced above a garage in Bethesda, Maryland, by Communication Electronics, Inc., an independent company founded in 1960. By 1967, business was booming and CEI needed money to expand. Watkins-Johnson, a Palo Alto-based microwave component and systems manufacturer, purchased the company and CEI became a division of Watkins-Johnson. The name changed, but the business did not.

CEI made the best VHF and UHF radios. They outperformed everything on the market and were smaller and lighter.

The DoD and U.S. intelligence agencies were regular customers. Government agents regularly sought out CEI engineers for help on tricky surveillance problems. Agents often dropped by the Executive

Boulevard facility to pick up equipment for assignments. In the intelligence community, CEI quality and commitment to excellence were legendary.

The RS-111 was designed by CEI founder, Ralph Grimm. Grimm knew that surveillance customers would love a suitcase sized 30-1000 MHz, "all band" VHF/UHF radio with a built-in spectrum monitor. He conceived the idea in the early 1960s, but the project had to be put on hold

in 1962 when several engineers left to form Astro Communication Labs (ACL).

As new hires replenished the staff, the RS-111 was assigned to mechanical engineer William Bruff as his first project. CEI already produced receiving systems with the same capabilities using separate tuners, demodulators, and monitors. The feature set desired in the RS-111 took 15 inches of rack space with existing equipment. Squeezing all this into one suitcase sized package was a daunting task.

Tuner designs from production 900 and 700 series radios were repackaged to fit four abreast across the bottom of the RS-111. A newly designed, all solid-state intermediate frequency (IF) amplifier strip was fitted along the rear of the chassis. The spectrum monitor was nestled on top of the tuners by repackaging the electronics in a broad flat box that hinged off the scope tube.

Despite the large number of sub-assemblies crammed into the small space, the internal components were surprisingly accessible. The front panel had a clean, pleasant layout with the controls and displays arranged in a logical, accessible manner. The RS-111 was a nice piece of engineering and a joy to operate.

The four tuners used nuvistors and ceramic planar vacuum tubes. Grimm felt the transistors just coming onto the market were not good enough for serious radio frequency designs.

The three lower band tuners covering 30-60 MHz, 60-300 MHz, and 235-500



The Watkins-Johnson facility at 6006 Executive Blvd in Rockville, Maryland, where McCord came to purchase the RS-111.

MHz used Mallory "Inductuner" filters, which offered sharp tuning and exceptional stability. The top band tuner for 490-1000 MHz was a multi-section tuned transmission line unit designed by Peter Pao and referred to as the "steel box tuner." These tuners worked well but were difficult to construct and align. Only Senior Test Technician Jack Howard learned to master the mysteries of the "steel box tuners."

The circuit design was optimized for minimum noise figure. The performance specifications were pushed to the max using the best components available at that time. The vacuum tubes were hand selected during alignment to meet published specifications. Forty-five years later, these radios are still impressively quiet and stable. Their weakness is adjacent strong signal handling, but no VHF/UHF radio in the 1960s had solved that problem.

The receiver was single conversion on the tuners below 300 MHz using a 21.4 MHz IF. For the tuners above 235 MHz, the receiver offered dual conversion with a 60 MHz first IF and a 21.4 MHz second IF. The 21.4 MHz IF is standard on many surveillance receivers to this day. Grimm unintentionally created this standard in the 1950s when he chose the frequency while designing radios for Nems-Clarke,

which produced the first telemetry and space receivers. Several sources report the 21.4 MHz frequency was chosen because it was twice the 10.7 MHz IF used in most FM broadcast radios and would support wider bandwidths. It also simplified image rejection when tuning to higher frequencies.

The RS-111 had two independent IF amplifiers, each with its own detectors. One had three front panel selectable IF bandwidths, most commonly 20, 75, and 300 kHz. The narrower bandwidths used crystal filters and the 300 kHz bandwidth used L-C tuned circuits. This IF chain fed detectors for AM, FM, and CW, selectable from the front panel.

The other IF was 2 MHz wide with simultaneous AM and FM detectors for video surveillance applications. On many versions of the RS-111, the detected video outputs for this IF were available at all times through two BNC connectors on the rear panel.

Various versions of the RS-111 were shipped with different tuning meters depending on the date or the original customer specifications. The earliest radios had center tuning meters. Most of the later radios had a regular signal strength meter, albeit not calibrated like an S meter.

The 3- by 1-inch cathode ray tube in the upper left corner of the front panel

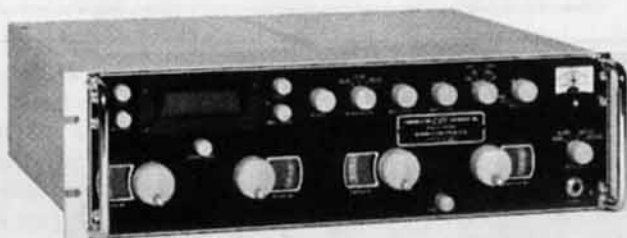
provided the signal monitor that displayed up to 3 MHz of the received spectrum. Starting with the RS-111-1B-12, a center marker was added with a switch just to the right of this display. Early versions of the radio used a 3XP1 display tube; later versions used a 3ASP1. The signal monitor circuitry completely changed as the tube changed and the parts were not interchangeable.

According to one engineer, 105 variations of this radio were shipped. The variations appear on the nameplate as number/letter combinations placed with a hyphen after the model number. Employees referred to this as the "dash" number for that model, and most CEI and Watkins-Johnson products were type numbered in this manner. Surveillance customers are project oriented and requests for special configurations were common resulting in many dash numbers for popular models.

Technicians aspiring to be engineers and newly hired engineers were often assigned to "dash" work adding these special features for customers. Being a dash engineer enabled them to learn the products and develop their skills as engineers. Many fine Watkins-Johnson engineers rose through the ranks via this route.

On most CEI and Watkins-Johnson radios, including the RS-111, the dash

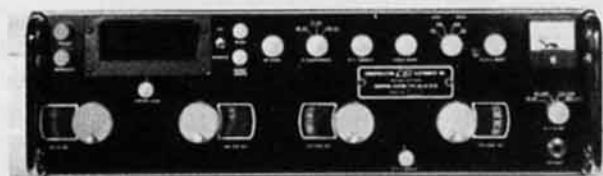
### RS-111-1B-7 VHF-UHF RECEIVING SYSTEM



For complete coverage of the frequency range from 30 to 1000 MHz. AM, FM, CW reception. Displays RF signals with built-in signal monitor. Internal relays provide single AM or FM video output. System operated from single antenna input. Four IF bandwidths: 20 kHz, 75 kHz, 300 kHz and 2 MHz. Front panel tuning meter. AGC output available for remote monitoring.

**\$6,250**

### RS-111-1B-12 VHF-UHF RECEIVING SYSTEM



For complete coverage of the frequency range from 30 to 1000 MHz in four bands. AM, FM, CW operation. Displays RF signals with built-in signal monitor which has center frequency crystal marker to aid tuning. Front panel signal strength meter. Four IF bandwidths: 20 kHz, 75 kHz, 300 kHz, and 2 MHz. 2 MHz bandwidth IF operates continuously; others are selectable.

**\$6,250**

*Two versions of the RS-111 listed in the 1968 Watkins-Johnson, Communications Electronics division, catalog.*

An RS-111 pre-detection recording system. Undemodulated signals were captured on magnetic tape for later analysis and/or decryption. →

variations represented small changes like special IF bandwidths or additional outputs and/or inputs. A few added new features like "slideback," a specially designed variable Automatic Gain Control for ferreting out pulsed signals, or Digital Automatic Frequency Control for interfacing with digital frequency readout units like the DRO-333. In almost all cases, the fundamental radio design was unchanged.

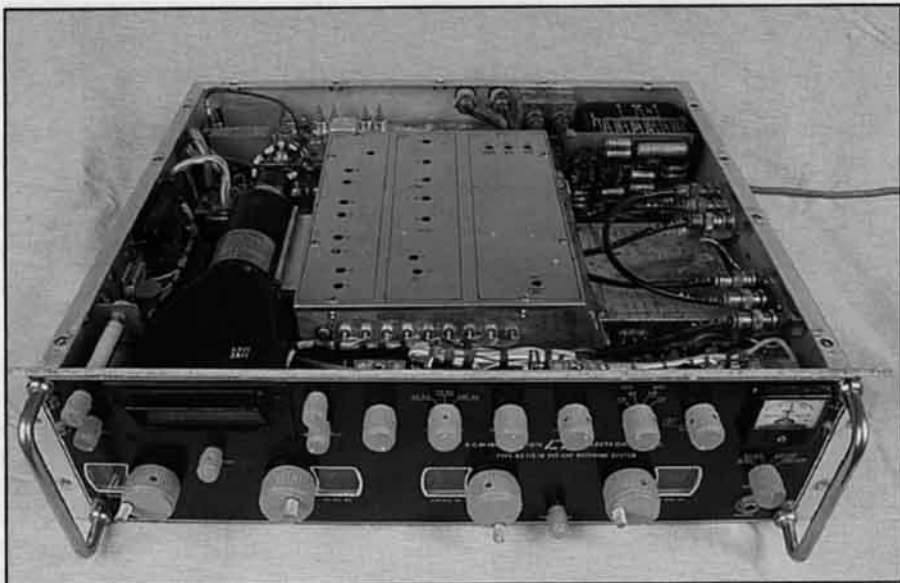
Many dash numbers were produced in small quantities of a few dozen, some in larger quantities. The RS-111-1B-12, for example, started production in 1967 and remained in the catalog for 13 of the 17 years RS-111s were sold. A military version, the AN/URR-52 was also produced. It is closely related to the RS-111-1B-7.

The high level of customization was possible because everything manufactured in the Bethesda and Rockville facilities was hand-built from start to finish. The chassis were punched, formed, and welded from raw sheet stock, the front panels milled from aluminum blanks, the overlays silk screened, the circuit boards etched, plated and stuffed, the sub-chassis formed and plated with real gold. Even the transformers were wound, potted, and packaged in house. This explains the \$6,250 list price for a 1972 model RS-111. Back then this amount would buy a new Corvette with money left over for a new Volkswagen Beetle.

The RS-111 became, according to one source, "an industry workhorse." Over 1,000 were manufactured and deployed all over the world. They were parts of systems installed in listening posts on remote military bases. They were in systems hidden in back rooms of embassies. They traveled in suitcases across borders on assignments. They were even used in the Vietnam War by Special Forces for Technical Security Counter Measures.

Examining unrestored radios often yields historic insights. A faded typewritten paper sticker on one RS-111 reads, "Property of VQ-1 Det Atsugi Special Projects." This reveals it came from the U.S. Naval Air Facility on the island of Honshu in Japan. Atsugi was the largest U.S. Navy air base in the Pacific. It also served as a base for EC-121 reconnaissance planes, which carried Watkins-





The RS-111 is compact and well designed for ease of use and service. The sub-chassis are plated in real gold.

Johnson radios disguised in black face and labeled as Ling-Temco-Vought, an aerial surveillance systems integrator.

Another RS-111-1B, this one obtained surplus from the FBI, has "used only by the good guys" written in pencil across the top. Perhaps this is an agent's sly comment on Watergate or a reaction to the counterculture view of the FBI during those turbulent times.

## The Fallout And Unwanted Scrutiny

For McCord's fateful mission, he set up the RS-111 in Room 419 of the Howard Johnson Motel across the street from the Watergate complex. His ostensive target was the Democratic National Committee (DNC) headquarters on the 6th floor of the Watergate. He left his hired man, Alfred Baldwin, III, to monitor 118.9 MHz for the bug that he had purchased from Bell & Howell.

Baldwin later told the *Los Angeles Times*, "I would keep an eye on the little TV-type screen on the monitoring unit. A constant line ran across the screen when the tapped phone was not in use. When someone started using the phone, the line would scatter and I would quickly put on the earphones."

The political upheaval that followed the arrest of the Watergate "burglars" is well known. But beyond Baldwin's words, the real role of the RS-111 in the actual wiretapping is unclear, mired in conflicting testimony, political obfusca-

tion, and still classified intelligence agency files. Inexplicably, McCord did not tape record the conversations even though he was an electronic surveillance expert. Transcripts of the intercepted conversations that Baldwin collected and typed were never obtained by any investigator.

The strangest aspect of the whole affair is that no bugs were found in the DNC headquarters. The FBI swept the rooms after the burglars were arrested and found nothing. The only bugs entered as evidence in the trial were found among the belongings of the burglars.

As for the RS-111 radio receiver, after the break-in crew was discovered, McCord returned to room 419. He told Baldwin to pack everything into his van and take it to his home in Rockville, Maryland. Oddly, the FBI never searched McCord's home or the van.

Eventually the radio was turned over to the FBI as evidence in the burglary trial. This trial was overshadowed by the Senate investigations and hearings, which centered on the Presidential cover-up. Resources that might have been used to ascertain the truth about the bugging shifted to pursuing the Oval Office.

For Watkins-Johnson, the fallout from Bussler's sale of the RS-111 to McCord created chaos. McCord had removed the nameplate from the radio, but the final inspection letter signed by Barry Wright was found in the case. McCord allegedly billed Nixon's CRP \$15,000 for the radio, far more than he paid Watkins-Johnson.

The FBI descended on the Watkins-Johnson's Executive Boulevard headquarters to investigate.

Watkins-Johnson's corporate lawyers flew in from California to coach employees on how to handle the testimony and depositions. Wright was deposed to identify the radio. John Wilburn, head of the receiver products department, was called down to the hearings to testify about the company's role. This one radio cost the company far more than they made on its bargain priced sale.

The media also pounced. Woodward and Bernstein of the *Washington Post* came calling. When they interviewed Ralph Grimm, he told them the radios were not designed to pick up bugs or wiretaps but that that was "a possible use" for them. He told the reporters the radios are normally sold to "government and those who work for the government," though he added there was no law against selling them to others.

Investigative journalist Jack Anderson hounded the receptionist for access and information. He published a scathing column on what he felt was the cozy relationship between Watkins-Johnson and officials of the intelligence community. This once quiet purveyor of specialized government radios found itself uncomfortably on a floodlit national stage.

One source told me a major government intelligence agency took particular offense to this attention and was displeased to see one of its key technical resources for solving signal intercept problems dragged into a national spotlight. The agency allegedly sent a letter to Watkins-Johnson founders, Dean Watkins and Dick Johnson, chastising them for the indiscretion and warning them to avoid further dubious activities.

## Forgotten Infamy

After all the fuss died away, the RS-111 quietly slipped back into obscurity. An industry favorite, it remained in production for years after the introduction of newer synthesized digital VHF/UHF receivers like the Watkins-Johnson WJ-8617 and WJ-8618.

McCord's RS-111 is presumably locked away with the other evidence from the Watergate legal proceedings. Only a few collectors remember its infamous role in the downfall of a president. Even fewer know of its positive role and proper place in the history of electronic intelligence gathering. ■