The SIGNAL

Collins Collectors Association

Issue Number Forty Four | Official Journal of The Collins Collectors Association | Fourth Quarter 2006

The Collins KWM-5000 Transceiver

by Rod Blocksome, K0DAS

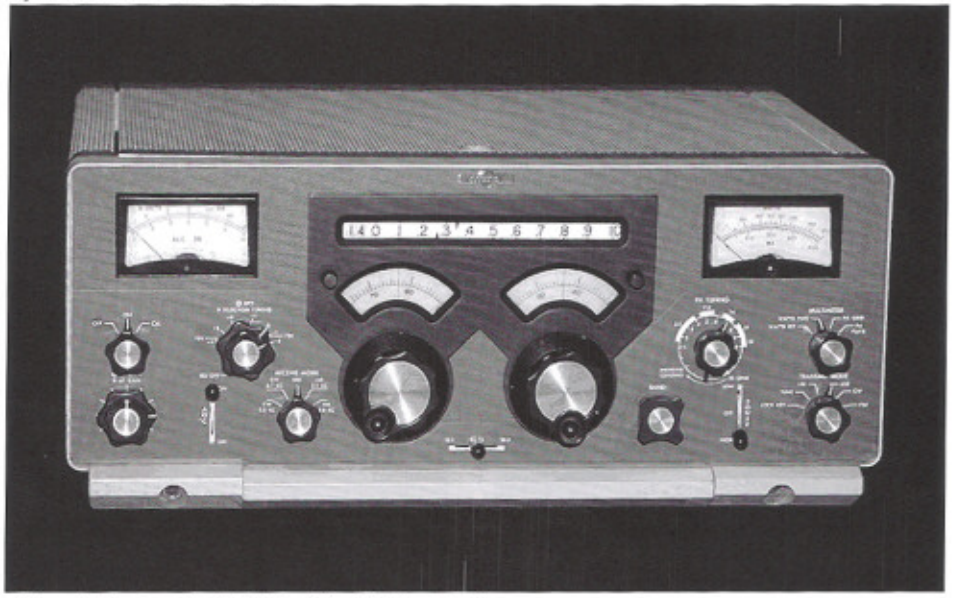

Photo 1. Engineering Model 1 of the Cadillac Radio.

Sometimes it's interesting to speculate how history might have been different if some event had occurred. Many of you have heard about some of the Collins amateur products that reached certain levels of design completion but never made it to the factory production line. This story is about one such design.

In the summer of 1960, as the KWM-2 was only one year into production, a design plan was written to create a future "Prestige Line" of Collins ham equipment. A deluxe transceiver incorporating what previously had been accessories and an automatically tuned 1 kW linear amplifier were to be designed. The transceiver was the brain child of Gene Senti, W0ROW, and Ed Andrade, W0DAN, and initially was called the KWM-5000.

In this issue...

Only one engineering prototype of the transceiver was built and is shown in Photo 1. This model now resides in the Rockwell Collins Museum in Cedar Rapids.

The prototype transceiver was frequently referred to as the "Cadillac Radio" and the "Gold Plated Special." It incorporated many of the best ideas and design features of the S/Line and KWM-2, as well as the commercial 51S-1 HF receiver. The first thing one notices is the large size–a KWM-2 on steroids! The dual PTO tuning dials catch one's attention next. Behind these weighted spinner knobs are two PTOs labeled "70K6-E1" and "70K6-E2"–each tuning over a 1 MHz range–the same as the 51S-1. There is no separate pre-selector tuning of the IF slug rack. It is ganged to the PTO tuning, similar to the 51S-1 receiver. In fact, there are two IF slug racks, one on each PTO, since they may be tuned up to a megahertz apart. Are you starting to get a feel for how this radio earned its nicknames?

The dial mechanism to keep track of where each PTO is tuned is pure Collins mechanical design ingenuity. The semi-circular scales above each knob have the familiar 1 kHz calibration increments, but one in red and the other black. The linear window above has the 1 MHz total range with 0.1 MHz calibration increments with two sliding pointers linked to PTOs–a red pointer on top and a black pointer on the bottom. At the far left appear the MHz digits selected by the band-switch knob 51S-1 style.

A lever switch, located between the two tuning knobs, allows the operator to transceive on #1 or transceive on #2, or transmit on #1 and receive on #2. No need for an external 312B-5 on this radio.

The transceiver featured a built-in power supply, thereby eliminating the 516F-2 external power supply.

A hefty complement of mechanical filters was included in keeping with its name. The receive-mode 5-position switch could select CW 0.3 kc, CW 2.1 kc, SSB, AM 2.1 kc, or AM 5.0 kc. It is curious to note the "SSB" mode position and the absence of choosing either LSB or USB. Perhaps the appropriate sideband was automatically selected with the band switch, but this seems at odds with the Transmit Mode switch. Its 6-positions are: Lock Key, Tune, LSB, USB, CW, and FSK.

A curious feature, not found on previous equipment, is the rather thick trim bar across the bottom of the cabinet. At either end are recessed jacks for the headphones and microphone. The center section folds outward to reveal four infrequently used pots: VOX gain, anti-VOX, Mic Gain, and VOX time constant as shown in Photo 2.

This was to be a hefty piece of machinery on the operating desk. The transceiver measures 20-1/4 inches wide by 8-1/4 inches high by 16 inches deep. It was to be a radio that was something to behold. Even today, it is a little awesome to sit in front of this big rig and contemplate operating it on the air, especially when you compare it to the familiar KWM-2 shown in Photo 3.

Under the hood (Photo 4), one counts a total of 27 vacuum tubes to make this baby perform. No rectifier tube can be seen, as solid state diodes were just becoming available to handle these voltages and currents. The PA cage contains the standard 6CL6 driver and pair of 6146 tubes, which are found in every S/Line transmitter.

There you have it, a KWM-2 on steroids. Would the "Cadillac" radio have been a success in the 1960s? It's hard to say. However, consider that in 1962 the combined

(continued on page 2)

The Collins KWM-5000 Transceiver *(continued from page 1)*

by Rod Blocksome, K0DAS

Photo 2. Adjustments under the lower trim bar.

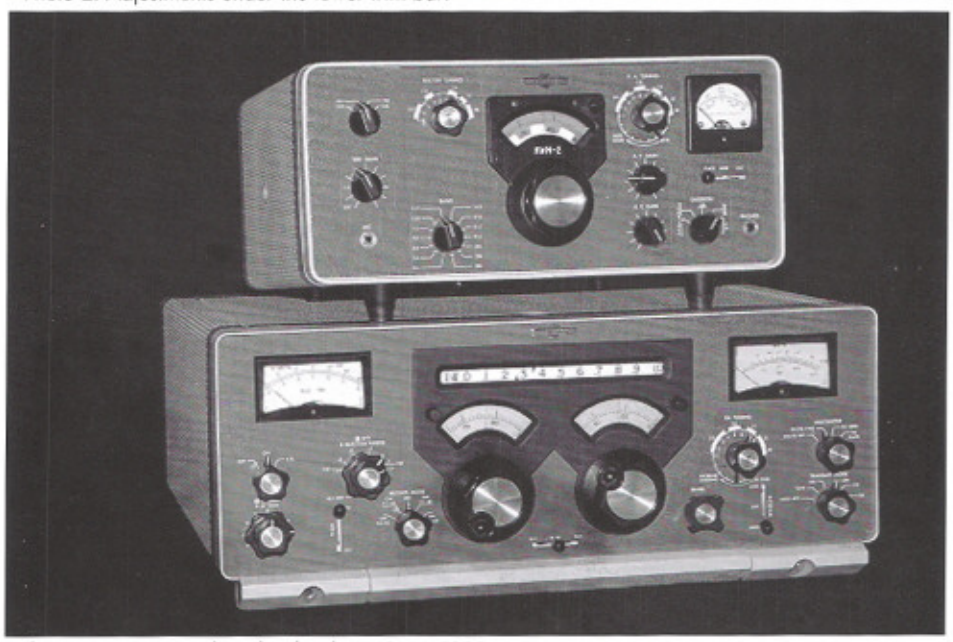

Photo 3. KWM-2 and its "big brother" KWM-5000.

price of a KWM-2A, 516F-2, and 312B-5 was $1715. Allowing another $285 for the ganged slug racks and extra filters gives an estimated selling price of $2000 for the KWM-5000 in 1962. This is equivalent to $12,350 today (using the consumer price index to adjust for inflation)–just a bit more than the high-end transceivers sell for today.

This prototype is operational, a testament to the great work by talented and skilled engineers that went into its design. However, when it came time for approval to proceed into production, Arthur Collins, after considering all the design features, costs, and schedules, declared it "neither fish nor fowl" and the project went no further. Art did not believe it was enough of an advancement. The next ham transceiver should be all transistorized. Therefore, the design was shelved and sometime later the TMT (Transistor Mobile Transceiver) design was started . . . but that's another story.

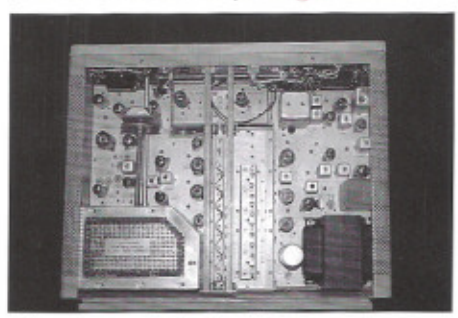

Photo 4. "Under the hood" view.

Call For Articles!

by Gail Schieber, K2RED

We need material to publish in the Signal newsletter! Technical articles, "hints 'n kinks," on-the-air experiences with Collins equipment, articles of historical nature, and items for the new column, "Collins Radios at Work"...which includes experiences of CCA members who used Collins gear in the military, commercial, aviation, and space services.

We don't necessarily need full-length articles. A few paragraphs or even just a photo with an explanatory caption are welcome. You do not have to be an experienced writer either. We are willing to help you. In exchange for any full-length articles accepted for future publication, the CCA will provide you with a FREE 1-year CCA membership!

You can contacted me via e-mail at K2REDCCA@aol.com.

We are also looking for shack photos for "In The Shack." Please send us a photo of yourself sitting at your Collins station and include a brief description of your equipment. Email them to Sandy KW6KW at kw6kw@comcast.net.

In the Shack

The radio shack of Rich Sperling, WB3JLK

Here is Rich Sperling, WB3JLK, at the main operating position in his shack. The gear shown includes a KWM-2, 30L-1, 312B-4 which he mainly uses to check into the Sunday 20 meter net on 14.263. Also pictured is a KWM-2A driving a Dentron Clipperton L. The receiver on top of the rack is a Racal RA-1217, which he uses for general monitoring. To keep modern, you'll also notice an ICOM Pro 746 driving an Ameritron AL-80A.

Rich's other operating positions include the S-1 and S-3 Lines driving individual 30L-1 amplifiers, as well as his net control position with a 75A-4/32S-1 pair driving a homebrew version of a 30L-1. He has several AM stations, including a 32V-2/75A-3 he mainly uses to join the first Wednesday AM net on 3880.

Antennas consist of a Cushcraft MA-5B minibeam for the higher bands and an Alpha-Delta 80/40m dipole.

Rich has been a CCA member and Collins collector for ten years, and served as the first Tuesday net control station for the 3805 net. Rich is also the CCA's Dayton Chairman.

At The Mic

by Floyd Soo, W8RO - President CCA
floyd@hi-rescom.com

Please join me in welcoming our new CCA Net Manager, Lloyd Rafalsky, K4HWB. His e-mail address is: rafalla@charter.net If anyone is interested in assisting Lloyd as Assistant Net Manager, send him an e-mail message. In the meantime, give him a warm welcome when you hear him on our nets!

The CCA elections are upon us! Take part in this important decision-making process. Last year we had a very good turnout for the voting, and we hope to see that level of participation again this year. This year's election will be particularly important, as a majority of the Board of Directors (BoD) will change.

The CCA is encountering the same tough times that many amateur radio related organizations are experiencing. Part of that is due to the waning interest in ham radio and vintage gear. The other factor has been a lack of interest, participation, and work ethic within the organization. Some key people in important positions within the CCA who were elected (and appointed) to keep the best interest of the CCA in mind did not pull their weight. The CCA needs motivated, responsible people with "can-do" attitudes who will take on the responsibilities needed to keep this organization alive.

We need people who will show by example that it does require dedication, teamwork, and follow-through to keep this organization healthy. However, talent such as this is few and far between, so we must be careful not to burn out these inspiring individuals.

When you choose who you vote for, don't just check off a name because you recognize it. This is not a popularity contest! You should read the bios carefully and contact each candidate with some key questions of your own. You must listen (read) their answers. This is the only way you will "get to know" who these candidates are and what they are made of! We are looking for leaders, people who are willing to do whatever is necessary to fulfill the goals of this organization, people who are willing to serve the membership, not their own agendas or egos.

Bill Wheeler, K0DEW, asked me to come up with a mission statement and here is what we agreed upon. The CCA's mission is to:

- Promote the care and use of Collins Amateur Radio equipment.
- Preserve the history and lore of Collins Amateur Radio equipment.
- Provide an informative archive of Collins Amateur Radio equipment.

The CCA BoD is responsible for overseeing the operations of the organization—from regular tasks such as paying bills, printing the newsletter, making sure the nets have NCOs, and answering correspondence, to planning Dayton CCA activities, reviewing by-laws, etc. In order for this to happen, it is imperative that we have knowledgeable, dedicated "go getters" in key management and BoD positions.

Speaking of "go getters," let me thank some of them, past and present. Fred Holmes, W1SKU, was incredible as CCA Net Manager for the years he served. His dedication and attention to detail led him to eventually be appointed one of the Assistant Web Masters. Tony Sokol, W9JXN, put together some fantastic Dayton get-togethers when he served as Dayton Chairman (and also Dayton Door Prize Chairman) for several years (he also served several years on the BoD). It looks as if Rich Sperling, WB3JLK, is on his way to filling Tony's very large size 14 shoes, as he took over the Dayton Chairman position as of this past year. Larry Saletsky, WA9VRH, has done a tremendous job as our Archive Manager for years. Gail Schieber, K2RED, and Sandy Meltzer, KW6KW have done a fabulous job for many years as Editor and Production Manager, respectively, of the "Signal" newsletter. Sandy is also a member of the CCA BoD and is co-admin of the Collins Reflector. Jack Mory , KE3WV, has done a great job as our CCA Membership Secretary and Jim Green, WB3DJU, continues to succcessfully handle our finances as CCA Treasurer. John Bess, WA5VVT will continue to serve you well as a member of the CCA BoD. Robert Turner, W5APN, and his work-mate Sally Crawford (who isn't even a ham or CCA member!) have dedicated (and donated) a tremendous amount of time as our legal counsel(s). The CCA could not afford them if we had to pay for their services.

Then there are the numerous CCA NCOs, many of whom have been coordinating CCA nets on 20 and 75 meters for many years. I will not name them individually, for if I do, I am sure to leave out some names. Let's all just agree that we know who you are and Thank You for your tireless dedication to the CCA HF nets.

In conclusion, I just want to say again that this election is very important. Please do your homework, and then vote for qualified candidates to help guide the CCA in the direction in which You want it to go. We need responsible people to take on the challenges of keeping this great organization vibrant and alive.

Thank you all for your support. It has been a pleasure and an honor to serve you!
73...dit-dit-dit-dah-dit-dah de W8RO

Join Us on the Air!

- Sunday 14.263 mHz at 2000Z
- Tuesday 3805 kHz at 8pm CST
- Thursday 3872 kHz at 8pm CST
- Friday (West Coast) 3895 kHz at 10pm CST
- Sunday 10m AM 29.050 mHz at Noon CST
- 1st Wednesday AM 3885 kHz at 8pm CST

Sunday for Technical, Buy, Sell & Swap
Tues., Thurs., Fri., & Sunday for Ragchew

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The **Signal** is published quarterly by The Collins Collectors Association

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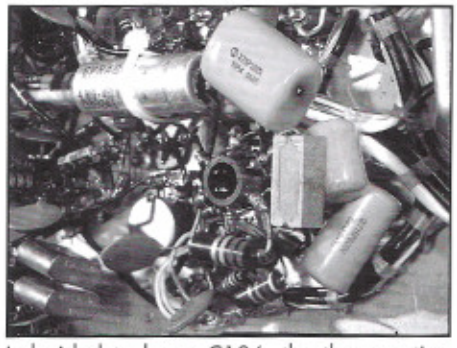
My Collins KWM-2 - Part 2

by Al Schapira, W2ADS - w2ads@arrl.net - http://home.att.net/~a.schapira/KWM-2/index.html

Referring to the Collins 1978 KWM-2 manual, in change #3, C264 was changed from 4uF/350V to 20uF/350V, so I used the new value. I also replaced C254, 4uF/350V, another dry paper electrolytic, C102, 100uF/16V, and C259, 8uF/25V.

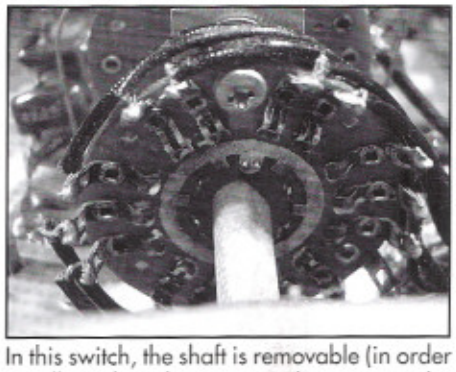


I decided to leave C106, the three-section metal can (wet) electrolytic, alone, since there was no hint of trouble (hum or excessive ripple) with it.

I noticed that C102 had not been the proper value according to the schematics, and didn't look to me like it was a Collins part. Also, it had no red glyptol on its connections.

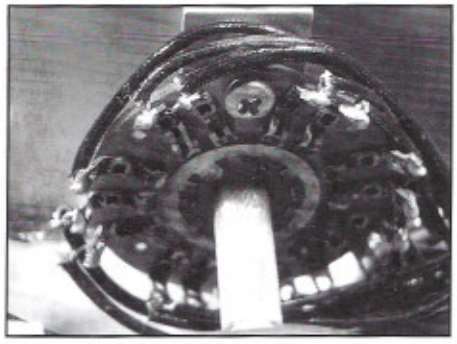
Back on the air, a few more contacts confirmed that nothing had gone wrong while changing the electrolytics.

While changing bands, I noticed that I had to "diddle" the band switch to get it to make contact reliably in the three lowest (3 MHz) band positions. An inspection showed that the "rotor" of the wafer switch came to rest with its sweeping contact not quite centered under the outer contacts.



In this switch, the shaft is removable (in order to allow the aluminum coil covers to be installed and removed), so the shaft angle is not fixed relative to the mechanical detent. I loosened the coupling of the shaft to the knob detent, rotated the shaft ever so slightly to center the rotor contact under the nearest fixed contact, and re-tightened the coupling. Now the band switch engages reliably in all positions.

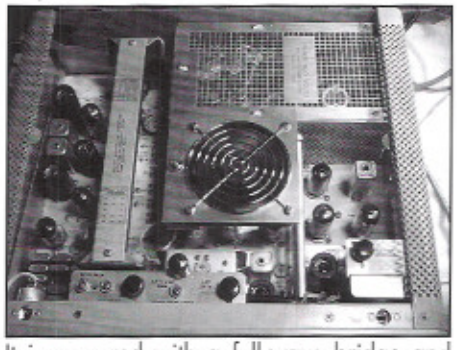
Although the band switch contacts look tarnished, I resisted the temptation to clean them just to make them look pretty; but I did



apply a little DeOxit.

The KWM-2 service instructions suggest a complete alignment if the rig hasn't been used in a long time, so I proceeded to do the "Laboratory Alignment." I followed every step of the procedure. The rig was now calibrated, aligned, neutralized, and back on the air.

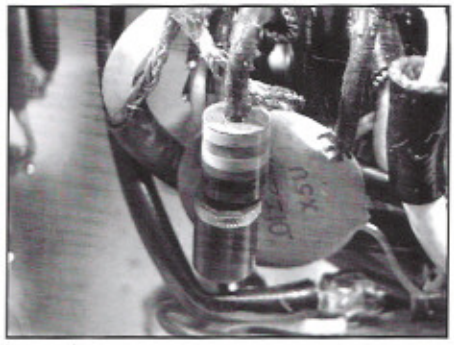
Several KWM-2 owners recommended adding a fan to keep the rig cool. This sounded like a good idea. Following some of the published articles, I fabricated a bracket and mounted a 3 inch 12 volt DC fan in a completely non-destructive and reversible way.



It is powered with a full-wave bridge and filter from the 6.3 VAC available on filament pins on the noise blanker socket. It runs fast enough to move hot air, but slowly enough not to be too noisy.

Who let the smoke out?

A few days after moving the rig off the bench and into the shack, I was listening to a QSO while working on something else nearby. Then suddenly there was a whiff of something burning and smoke was pouring out of the KWM-2. I immediately shut it off. Another "Oh No." Back down in the shop and on the bench, there were no obvious signs of anything burned. I knew that the problem must be in the receiver side, so I disabled the high voltage and screens by popping out the jumpers. Since the power supply was solid state, I gradually brought up the line voltage using a variac and soon found that the source of the smoke was inside the enclosed relay compartment. The 68 ohm 1 watt series resistor, R157, in the receiver B+ line had



burned up.

But why? It was clear that something had shorted out, causing the overload that burned out R157, but what? I turned again to the pin-by-pin resistance chart in the KWM-2 manual, and proceeded to check each tube pin's resistance to ground. (This was the second time I did this. The first time was before I powered the rig on for the first time, at which point everything checked out within reasonable tolerances.) This time everything checked out okay until I came to V12, pin 1, which was almost a dead short to ground instead of 10k. This pin is connected to R159, R160, and C237. It took me a long time just to find R159 hidden behind several wires. I carefully moved the wires to get a better look and found that R159, a 1k 1/2 watt, had burned up.

But why? R160, 120k was good, so that left only C237, half of a dual 0.01 uF ceramic disk. I clipped out the half of C237 that was connected to V12 pin 1 and found that it read a solid 7 ohms to ground, confirming the culprit! I removed the dual C236/C237 disk completely and replaced it with two 0.01 uF, 1000 volt disk ceramics, and I replaced the burned out R159. Now V12 pin 1 had the proper resistance to ground. I inspected R68, 15k, which would have blown if the other half of the dual disk, C236, had shorted, but it was right on. Only one half of the dual 0.01 had shorted. Finally, I replaced R157, the 68 ohm, 1 watt resistor, in the relay compartment.

I powered up and the receiver came to life. All the smoke was back inside the components, where it belonged. In the week or so after completing the repairs, I worked eight countries and about 20 domestic stations using a trap 80/40/20 dipole only 30 feet up. All in all, I enjoyed every minute I spent trouble shooting this rig.