The SIGNAL

Collins Collectors Association

Issue Number Thirty Nine | Official Journal of The Collins Collectors Association | Third Quarter 2005

CCA Dayton Events a Resounding Success!

by Floyd Soo W8RO

The CCA Banquet at the Dayton Hamvention

The Dayton Hamvention Fleamarket

The CCA Banquet at the Dayton Hamvention was another resounding success! Thursday set up was almost a washout, but Friday brought cloudy skies and NO RAIN! Saturday was clear and sunny with moderate temps, PERFECT for the flea market! Sunday was cloudy again with just a hint of sprinkles, but still a nice day. All in all, the WX did cooperate nicely for the weekend!

The Thursday evening CCA Hospitality Suite was well attended. Snacks and finger food were abundant, as were the libations! Lots of great Collins related discussions and pictures all evening long! A few of us ended up there until well after midnight!

Friday evening brought the CCA Banquet and again, food and drink were plentiful! The company was great! The door prizes were great! The raffle prizes were great! The short presentation on the Hammond Museum was great! The feature presentation by Bruce Packham, W3UWV, on the "Historical Background of Radio Communications" was great! Wow! The whole evening was great! What more can I say?

I want to thank Tony Sokol, W9JXN, our CCA Dayton Banquet Chairman for another job well done! He and his staff of volunteers prepared an evening to remember for all in attendance! Jim Green, WB3DJU, assisted with check in (and the CCA booth); Jim Centanni, W2IMK, assisted with prizes and pictures; Paul Braun, WD9GCO, provided his usual magic with all the audio and visual equipment and expertise; Rich Davis, K8PJQ, assisted with door prize presentation, and his wife Betty provided door prizes for the ladies in attendance. Walt Barczak, KB3CGZ; and Torrey Mitchell, N9PY also assisted in the CCA Booth. I hope everyone takes the opportunity to thank these (and other) folks who took part in making this one of the best CCA Banquets we've ever had!

I want to also thank Rich Sperling, WB3JLK, for volunteering to take on the CCA 2006 Banquet Chairman responsibilities! I am sure that Rich is going to follow in Tony's giant foot steps in continuing to provide the membership with another world class event in Dayton for 2006!

Last, but not least, I want to thank everyone who participated in our CCA Dayton 2005 event! Come join the fun next year!

The CCA thanks everyone who donated door prizes and raffle prizes for our CCA Awards Banquet in Dayton this year:

ARRL - Dave Patton – NT1N
CQ Magazine - Gail Schieber, K2RED
Electric Radio - Ray Osterwald, N0DMS
Heil Sound - Bob Heil, K9EID
Hi-Rez Communications - Floyd Soo, W8RO
MaxRad - Jay Maple, WD9X
K1ROD - Rod Murray
XYL of K8PJQ - Barbara Davis
Peet Brothers - Linda Schultz
Radio Covers - Caron Carlson, W9QLT
W6KLG - Mort Jones
W0KWM - Allen Johnson
Vibroplex - Mitch Felton, W4OA

In this issue...

Call for Nominations

CCA Board of Directors Election 2005

The Collins Collectors Association will be electing two members to its Board of Directors during the month of November. A nominating committee chaired by CCA Board member Robert Turner W5APN will coordinate the nominations and elections.

Members in good standing of the CCA are invited to submit nominations and those nominated must be current CCA members. All nominees must have a second by another CCA member in good standing. All nominees should be contacted in advance to confirm their willingness to stand for the board position, and this should be done before submitting a name to the Chair of the Nominating Committee. Send nominations and seconds to Robert Turner W5APN at: rwturner@JonesDay.com.

All nominees in accepting a nomination shall prepare a brief bio of 250 words or less describing their ham activities, their vision for CCA's future and, most importantly, a clear statement of what their presence on the Board of Directors will do to enhance the CCA as an organization.

The CCA Board of Directors membership requires a commitment of time and energy, and nominees should consider the high level of activity and participation that will be required of them as a board member. There should be no conflict of interest between their board position and other undertakings. The CCA Board of Directors is responsible for overall operations of the CCA including planning of CCA events, the care and feeding of the CCA web site, publication of "The Signal" and recruitment of members to fill other key positions such as Treasurer, Membership Secretary and Net Manager. The Board sets the tone of the organization and plots the course for the future.

All nominations with appropriate seconds should be made in a timely fashion so that the completed bio of the nominee can be received by the Nominating Committee Chairperson no later than September 30th. No nominee will be considered if a bio is not submitted to the Nomination Committee Chair by the deadline. This requirement confirms that the nominee is willing to serve if elected. Election ballots and nominees' bios will be included in The Signal Fall issue mailed between October 15th and November 1st, and the deadline for ballot receipts is November 30th.

Following tabulation of results the Nomination Committee Chair shall convey results to the CCA President and Board, and shortly thereafter results will be announced via the Collins Reflector and on the CCA web site. Put your thinking caps on and contact your potential nominee for his willingness to serve, get a second to the nomination and encourage immediate bio formulation and submission prior to the September 30th deadline.

Collins At Work

W6FCS – MCAS El Toro in the Early1960s
by John "Mac" McNiel, N1AWL

My first introduction to Collins equipment was in the early 1960s. I was in the USMC. Prior to that, my equipment was homebrew. I was transferred to MCAS El Toro in 1960 to work on computers at the Navy Supply Depot. I had occasion to visit W6FCS on base, because I noticed the very large beam. The sergeant in charge of W6FCS noticed I had a ham radio license and asked me to transfer my duties to the station, which I did.

The station was located in an old aircraft tower overlooking the runways. The equipment consisted of two Collins KWS-1 transmitters, 75A-4 and 75S-1 receivers, a signal shifter exciter, and teletype punch for a couple of teletype machines driven into a BC-610 transmitter. The mics were D104s. The antenna was a Telrex Christmas Tree beam, probably the largest made, with 10, 15, and 20 meter elements stacked on top of one another. The 20 meter elements were so big that you could slide yourself along them to adjust SWR.

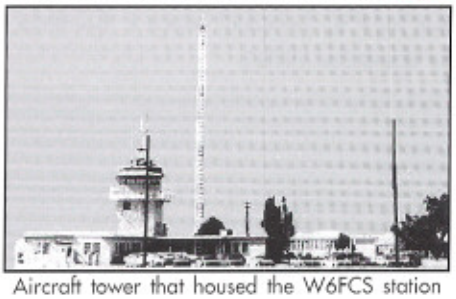
Equipment maintenance: There were several levels in the aircraft tower below the operating position in which we stored test equipment and spare tubes and parts. The spares were obtained from Navy Supply, which we visited often.

We did not dip and load the finals in the KWS-1 except on vary rare occasion. We did not wait for tubes to go bad in any equipment; they were just replaced on a regular basis. Station operation was on 20 and 15 meters running SSB, and it was devoted to running phone-patch traffic around the world to the various USMC military stations with which we had schedules. Most schedules with each station were an hour long. The stations were in Okinawa, Hawaii, Guam, and many other places after the scheduled day ended. We had set frequencies for the schedules. A typical work day consisted of getting the US phone numbers from the scheduled station, calling the US operator, and then giving her the phone numbers to schedule. Up they came, one at a time, until the station's schedule ended, and then on to the next.

My impression of Collins: At 8:00 AM, turn on equipment. Point the beam west toward Okinawa. Turn the knob to the scheduled frequency on the 75A-4. Listen. Then hear some breathing on frequency. It sounded as if someone was trying to get his coffee cup ready. "Hey, is that you?"

"Yep, it's me. Let's line 'em up for the sked." No calls were exchanged. The signals were very good, the equipment was on frequency, and there were no worries about malfunction. Then . . . "KR6MD, W6FCS running phone-patch traffic. Clear frequency would be appreciated." Thus it went for the 12-hour day. After the schedules, then it was time to run phone patches for the scientists on Kwajalein who were doing the atom-bomb testing, and then back to relatives in New Mexico.

Postscript: W6FCS received its MARS license in 1966 and with it the callsign N0RSB (http://www.marinecorpsmars.com/USN-MC_House/N0RSB-MET/n0rsb.htm).



Aircraft tower that housed the W6FCS station

MARS operator in the control tower

Tower with beam on top and tribander on left

Letters to the Editor

I just sent in my dues and membership application to the CCA. I used to belong a long time ago but dropped out. I was pleasantly surprised see how the home web site has grown. I downloaded some FREE stuff and appreciate it.

One of the main reasons I just sent in my dues is because the site was available FREE. I think that is a BIG thing for the CCA to do for the ham community.

I am glad "The Signal" now has technical stuff in it, too. Keep it up! I'm hoping to buy some of the videos soon. I have been told they are very valuable for a person wanting to restore these old rigs. I'm looking forward to getting some of them the SP-600 video. Thanks again. Lee Bahr, W0VT

At The Mic

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

Wow! Summer sure was short! Dayton has come and gone for 2005 and plans were in progress for Dayton 2006 just days after. We will be changing locations to the Holiday Inn Dayton North for 2006. This Holiday Inn is the one at Wagoner Ford Rd. and I-75. It is closer and more convenient as far as access to Hara Arena is concerned AND they have a couple of free shuttles that run there and back regularly! The staff there has been very helpful and we already have arrangements made for our group to gather there next year.

As far as Dayton is concerned, Tony Sokol, W9JXN, has been the Dayton Chairman for the past several years. Rich Sperling, WB3JLK, is taking over that position for 2006. Tony has already begun transitioning Rich into the "driver's seat" with regard to next year's event. I want to thank Tony for the fabulous job he has done with the CCA Dayton events. He and his support staff really pulled off some great banquets and presentations for our benefit! Tony has promised to help Rich any way he can, so I believe that you'll see Tony around in 2006 in more of the support capacity (I know he enjoyed it, so he won't just give it up!). Please let both Tony and Rich know how much their volunteering to take on these responsibilities is appreciated by all of you!

Another CCA event that is still in the works is the Hammond Museum Tour and Special Event. This event will be a long weekend (date to be determined) in Guelph, Ontario, Canada (45 minutes west of Toronto). CCA member Fred Hammond's (VE3HC) pet project when he was alive was his museum. It's a spectacular collection of all kinds of radio and radio-related equipment. It's truly a "hands-on" museum, so it's okay to spin the knobs and look under the hood! There are also several operating positions at the museum with classic Collins gear ready to go on the air (including a PAIR of KW-1s!). Nori Irwin, VE3AQZ, is the curator; she and her staff have always rolled out the red carpet for visitors, especially CCA members. Don't miss this very special visit there, as we plan on firing up the KW-1s along with all the other Collins gear. I want to thank Fred Holmes, W1SKU, and Scott Madison, WN1B, for volunteering to assist me in getting the Collins gear in GWO. Nori has been ecstatic to have the three of us CCA members there on a semi-regular basis assisting with the gear (Collins and non-Collins) in the operating room. This fall, we plan on lighting up a bunch of tubes there! Stay tuned for further details.

The Collins Collectors Association will be electing two members to its Board of Directors during the month of November. If you have anyone whom you would like to nominate for one of the Board of Directors slots, please contact Robert Turner, W5APN, at rwturner@jonesday.com or call Robert at (214) 969-2984. These elections are very important, as they are the chief means a member has to take part in the decision-making process. Last year we had a very good turn out for the balloting, and we hope to see that high level of participation again this year. Please vote!

Hope to catch you all on the air. Have a great autumn! TNX es 73 de W8RO.

On the Workbench

by Dutch Maurer, WB7DYW
wb7dyw@mail.ev1.net

For those of you who have an early 32S-1 transmitter and want to operate CW but notice it does not operate VOX here are a few things to check out. Let's start with the obvious, tubes. Check the tubes on a reliable tube tester or try swapping them with new or known good tubes; the likely suspects are V14 (12AT7) V10 (6AL5) and V11 (6U8). The next step is to go to the tube voltage chart in the manual and check the voltages and resistance on these tubes. To save a little time let's start with V11 pin 8.

According to the manual you should have +5 Volts DC at pin 8 but instead you may see as much as 35 or 40 Volts. STOP right there; look at the schematic and you will see two 68K 5 watt resistors in parallel going from the +275 volt supply to pin 8 thru those resistors and if you should touch them you will get a nasty burn. They are VERY hot.

So imagine they have been cooking like that for the last 40 years and ask yourself if they may have changed in value just a little and keep in mind the line voltage is a lot higher now than it was back in the early 60's. One answer is to replace the 68K resistors with higher a value to get closer to the original +5 Volts needed to turn on the relay again (keep in mind they are dropping +275 down to +5 SO USE AT LEAST 5 WATT RESISTORS). Other components may also be a little out of tolerance and it is wise to check V14 & V10 also to see if the components are still within range. Again use the voltage & resistance chart in the manual. It is also a good idea to check the +275 Volt line to be sure it is still +275 Volts and if not then check the power supply as a lot of things are affected by the +274 Volt line. These are great old transmitters but because of the age things change and part of keeping them on the air is understanding how heat and time affect old tube rigs. Kinda makes ya want to put a small muffin fan on the top to cool them down just a little.

As always, if I can help you, please send me an email. 73's Dutch.

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

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Collins Radios, Still the Best in Town - Part 3

by Edison Fong, WB6IQN - edison_fong@hotmail.com

The purpose of the CAM gear is to transfer the linear motion of the main tuning knob to a nonlinear relationship to match the tuning of a particular inductor or capacitor. This technique maintains peak performance regardless of where one is on the band. CAMs take odd shapes and sizes and were derived empirically at Collins. This was a mechanical engineer's nightmare. Art Johnson was the head of the team that developed the mechanical tracking, with Ernie Pappenfus, K6EZ, heading the electronics. Together this team changed the course of history. The receivers that were developed under their direction managed to intercept literally every Russian and Chinese message transmitted across the HF band.

There is a funny story that goes along with this. I heard that when the Russians seized an R390A in the mid 1960s, they were elated until they looked inside. Upon looking at the overwhelmingly complex CAMs and gears (see Figure 5), they decided their time and efforts could better be spent elsewhere. The Russians, and for that matter the Chinese, copied many American products for their military, but you will never find a copy of an R390A.

Does the CAM tuning system work? You bet it does, but at a high cost. As many of you old timers will attest, cost was never an object during the Cold War. There were about 65,000 of these receivers made between 1954 and 1984, when the last batch was delivered to the US government. Yes, they are not only being used today on military ships for recognizance, they are still being installed in newly christened ships (the last one was in the late 1980s). Why? Because they work, even under the most adverse conditions. These receivers have skirt selectivity that is absolutely unheard of in today's consumer-type receivers. With five mechanical filters for various bandwidths and one crystal filter for narrowband CW work, there has never been, and perhaps never will be, another receiver as superb as the R390A. The US government had ten (as far as I know) contractors work on these to meet demand, although Collins was the original designer. I have heard rumors that the last receivers made in 1984 were costing the US government $30,000 apiece. This was because the volume was very low and the cost of just setting up and maintaining a production line was high.

The first attribute that a user notices about this receiver is the way signals just pop in and out when tuning a segment. The primary reason for this is the superb mechanical filters designed by Martin Sabin. Today, Martin is still consulting for Rockwell Collins. The subject of mechanical filters will be discussed further in the section on the IF stage.

Phase Noise and the LO

The next big problem of receiver design, which in my opinion is the worst, is phase noise created by the local oscillator. Let's first review the origins of phase noise to obtain a better understanding of what it does to receiver performance.

Phase noise, as the name implies, comes from Phase Locked Loop (PLL). This term was unheard of in the old days, because PLLs were not used in HF amateur-type equipment until the Drake TR7, which was introduced in 1979. Prior to that, PLLs were only used in expensive military equipment before the introduction of inexpensive integrated circuits (ICs). A programmable PLL uses extensive logic and will contain thousands of transistors (probably closer to tens of thousands of transistors). In the old vacuum-tube days, the cost would have been prohibitive for the average ham. In an R390A or Collins S-Line, phase noise is almost nonexistent, since they all use crystals for the LO. Unfortunately, this does not make an inexpensive radio. With the S-Line, it takes 114 crystals to cover the entire HF band. At $20 per crystal, that's $2280 in crystals alone. Thus, when you see a CP-1 Collins crystal pack going for $150 on eBay, consider it a bargain.

It is interesting to note that fully synthesized HF radios were used by the military starting in about 1957, with B52 bombers using the now famous ARC58. This radio had less than 10 Hz drift and provided excellent HF SSB and CW performance. It was the predecessor of the Collins 618T series of HF radios still being used in commercial aircrafts (747's, 727's, etc.). For you bargain hunters, some of these radios have found their way into local flea markets. I saw a Collins 618T at a swap for $400, so they are within reach of the budget-minded radio amateur.

To begin with, what is the major purpose of the PLL in radio communications? Its primary attribute is that it can generate any desired frequency with just one reference crystal. This is a very powerful tool in radio communications. Because it can generate any frequency all electronically without moving parts, storing channels in memory becomes straightforward. This will become clearer in the following paragraphs.

I will not attempt to write a dissertation on PLL, but I basically will give you a qualitative explanation of how they work. Perhaps one then can appreciate how difficult it is to get one to work properly. The Voltage Controlled Oscillator (VCO) is the heart of the PLL and is basically a voltage-to-frequency converter. For low voltages, the output frequency is low, and for high voltages the output frequency is high. The programmable divider divides the output of the VCO down to the frequency of the reference oscillator. The reference frequency and the divided output are then fed to the comparator. If the output of the divider is greater than the reference frequency, the output voltage of the comparator goes down. This forces the VCO to slow down. If the frequency of the programmable divider is lower than the reference, the output voltage of the comparator goes up, which forces the VCO to go up. The VCO output eventually will lock on to a multiple of the reference oscillator. As one changes the programmable divider, the output of the VCO changes accordingly to a multiple of the reference frequency.

It is not difficult to see that this becomes a very powerful tool, since the input to the divider chain can be stored digitally in memory, allowing a return to the exact operating frequency at a flip of the switch, or better yet, with a computer, where the memory channels become infinite, limited only by the hard-drive capacity.

(continued in Part 4 - next issue)

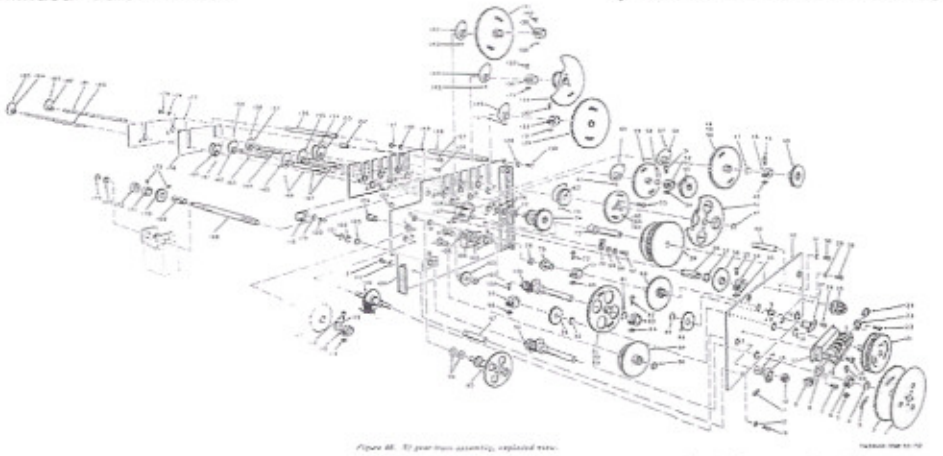

Figure 5. This is the complex gear system on the Collins R390A. It is unlikely the world will ever see a receiver more mechanically sophisticated than this.