The Signal

OFFICIAL MAGAZINE OF THE COLLINS COLLECTORS ASSOCIATION * Q2 2017 Issue #86

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Collins Collectors Association

From the President's Desk…

This spring has been a real encouragement for the CCA. There is a lot of enthusiasm for Collins equipment and our membership is still growing! We want to do all we can to encourage each of you to enjoy the hobby and expand your collecting as time and resources permit. If any of you can Elmer to a new Collins collector this would be really great as it is always important to bring new Collins collectors into our Club!!

Dayton was a great success for the CCA. Many of us went not knowing if we would be able to go again. As it turned out, the new venue was good in many ways. Our CCA booth was well received and we had a nice location! We hope the flea market can be improved for next year so that there will be less mud. Thanks to Floyd and all who helped with our booth!

I have decided to bring the 1964 Collins Communications Van to the 2018 Dayton Convention and display it inside near the Collins Booth. I am asking any CCA member who can attend Dayton in 2018 to sign the lower rear panel of the van. Please plan to come for this special event that will likely never happen again!

Our banquet was very well received a nd Francesco Ledda gave a wonderful presentation (See my Dayton Banquet Report). The Miami Valley Golf Venue is well liked and attendance was up.

Wayne and Sharon Spring were kind to donate this year's raffle prize of a 516F2 round emblem power supply which was won by Carmen Peca, WO3T. There were plenty of other prizes donated by:

Ray Osterwald, N0DMS, Electric Radio Magazine, Ray@ERmag.com
One Year Subscription Certification

Tree Top Circuits, Bob VE3TOU, radio@treetopcircuits.com
SB-390 Sideband adapter

Charles Talbott, K3ICH, pincon@eols.com
Four Gift Certificates

Mike March, K4QU, mike4qu@gmail.com
Large Collins Winged Emblem

Heil Sound, Bob Heil, K9EID, bob@heilsound.com
Two HC5.1 elements for SM-2 or SM-3 Mic

Arthur A. Collins Legacy Association
DVD

Peet Brothers Company, Linda Schultz, peetbros@peetbros.com
Ultimeter 2000 Weather Station

Nationwide Radio, Mark Olsen, KR9PQ, ke9pq@new.rr.com
S-line feet, 30S-1 feet, 30S-1 key, CC-2/3 suitcase key

HI-RES DVD's, Floyd Soo, W8RO, www.hi-rescom.com
S-Line DVD's

Thanks to Scott Kerr and everyone who helped make the banquet so special!

- Jim Stitzinger
President, CCA
Dayton Events Coordinator

Electric Radio Magazine
Serving the Dedicated Collector

ELECTRIC RADIO

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- **Ray Osterwald, NØDMS**
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The Collins Collectors Association
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You can renew your membership or join the CCA on our website using the "JOIN US" link.

From the Editor

On the front and back covers are images from an old HF80 brochure.

In this issue of the Signal, we have a story by Francesco Ledda KF5RXV that covers the history of the URG I, II and HF 80 commercial lines of Collins radios. There is a growing and active group of collectors (including me) that are acquiring and restoring these units. Francesco was our speaker at Dayton (see the Dayton report) and is passionate about this equipment. I had the honor of visiting his shack recently and was amazed with the amount of military and commercial gear that he has restored and operates.

Also, we are including the Dayton report on both Dayton (Xenia) 2017 and the CCA Banquet. It was fun to see the new venue and encouraging to see the excitement amongst the attendees. I have a small article in this Signal about my first-hand experiences into restoring some HF 80 equipment and the In The Shack is a few pictures of Francesco's amazing collection of equipment.

Finally, this will be my last issue as Signal Editor. While I have enjoyed the few issues that I have been involved this task to keep up the standards of quality that Bill set some years ago. I will continue with the web site and reflector but the Signal is not really in my wheelhouse of talents so the board is forming a new team to take this over. I am sure that it will continue to be an exciting publication.

– Scott KE1RR

Collins Radios in Uniform

By Francesco Ledda, K5URG

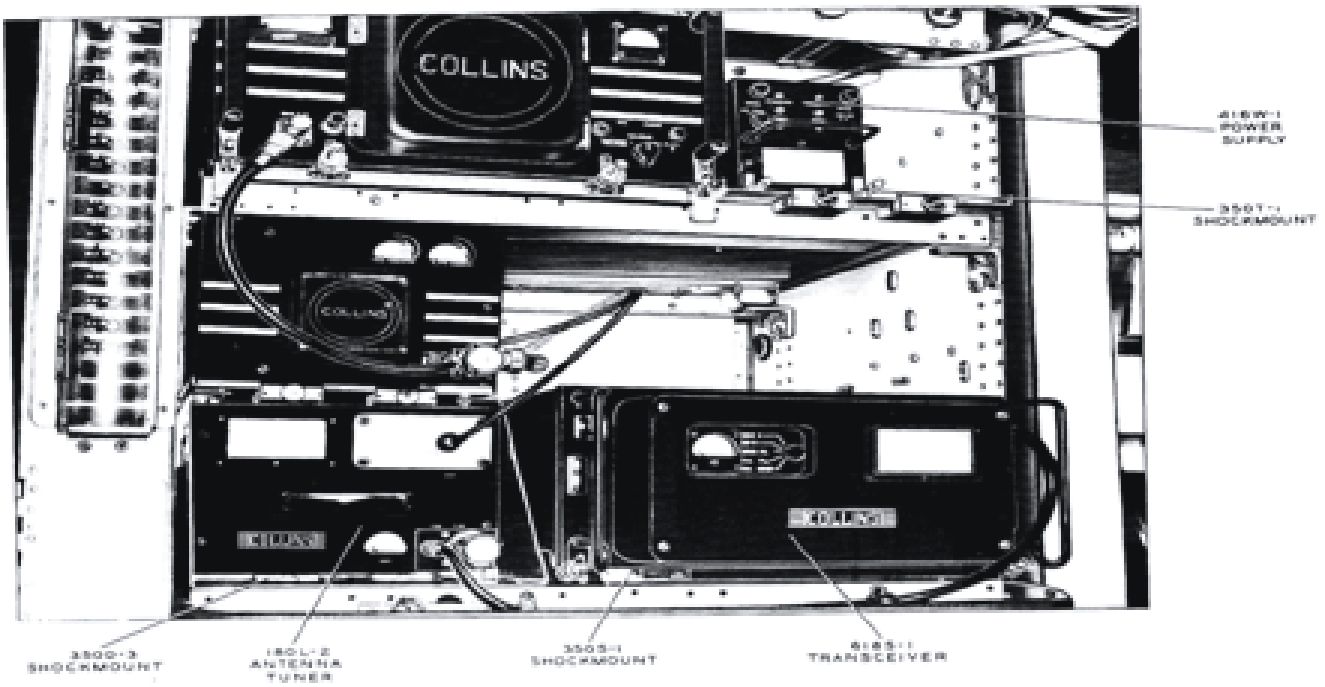
Without any doubt, Arthur Collins was an innovator. His innovation spanned from radio communication to computer networking. The superior performance of his radios made Collins Radio the supplier of choice for government and aviation radio communication.

In this article, we are going to focus on some lesser known HF Radio systems that Collins developed from the early 50s to the late 80s.

We go back to the early 50s. Those were the days when US aviation transport, commercial and military, was stretching its wings for the first time; RADAR coverage was almost not existent and radio communication was key to maintaining traffic separation and staying in contact with airline operational bases. DC-4s, DC-6s and Lockheed Constellations flew back and forth between East and West locations; pilots were joined by flight engineers and radio operators. There was a very real financial and operational need to make HF radios simpler to operate and more reliable.

Collins 618S-x

In the early 50s, Collins Radio introduced the 618S-x HF transceiver. This revolutionary radio supported AM/CW with 144 crystal controlled channels and a self-tuning power Amp, an automatic antenna coupler and a remote control head. Besides, the implicit technical innovation, the critical change was the simplicity of the radio operations. Tuning was as simple as moving a switch; setting up the transmitter was as easy as pushing the push to talk switch!



Collins AN/ARC-38

Not much later, Collins Radio introduced the AN/ARC-38, a synthesized version of the 618S-x for the US Military. This radio supported AM and CW, and utilized a cumbersome control head; the operator had to use a code book that generated for each frequency a tuning code; the code was set on the control head, and this tuned the radio. The revolutionary aspect of this radio was to provide up to 500 Hz channel separation and fully automatic tuning. Later on, the SSB version AN/ARC-38A was introduced. This remained in service until the seventies.

The ARC-38 introduced a new kind of frequency generation system referenced to a high accuracy crystal oscillator. The frequency generation system used an electromechanical auto-positioner to provide a "rough" frequency tuning, and a complex electronic control loop to perform the fine frequency tuning for high accuracy. The frequency generation scheme developed for the ARC-38 was later reused for future Collins equipment. The ARC-38 made heavy use of mechanical filters; very often, we only focus on the sharp skirts offered by these filters, a wonderful feature that is very useful in crowed frequency bands.

The other innovative features were: small size, very light weight, pre-tuned from the factory, easy to replace and the simplicity of radio design. Mechanical filters made Collins radios lighter and easier to repair and allowed for the miniaturization of SSB modulators. This is no small advantage when selling to the aviation market and the US military.

AN/ARC - 38
Photo by John Mackesy, VK3XAO

Collins AN/ARC-58

The ARC-58 followed; this was a clear evolution of the ARC-38 with extended frequency range (from 2MHz to 29.999MHz) , direct frequency reading (No code book), an output power approaching 1kW and an automatic antenna coupler. The larger output power of the RF power amp forced the designers to split the Receiver-Exciter and the RF Power Amp into separate enclosures. Cannon type connectors made the replacement of failed units a very quick operation. Collins took its ARC-38 learning and experience to improve the reliability of the ARC-58. As in the case of the ARC-38, the radios were modular in nature and easily repairable by swapping modules and sending the failed parts to the depot.

The ARC-58 had many close relatives; these are the Navy/Air Force AN/URC-32 (KWT-6), the Army AN/TRC-75 and the USMC AN/TSC-15. The ARC-58 had a civilian brother called 18Z-3 and 18Z-4.

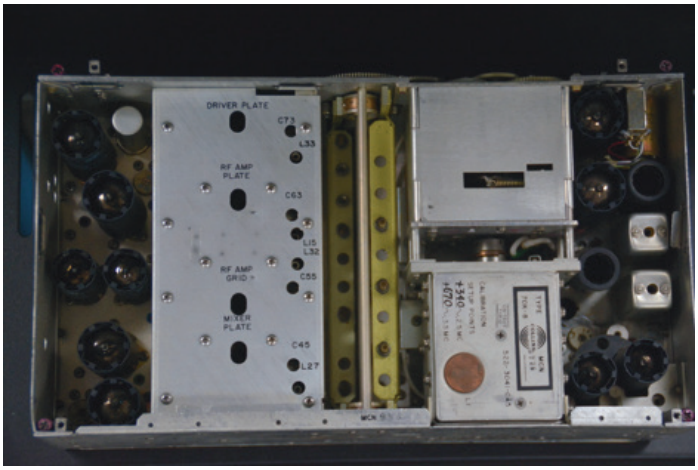
Collins 618T-x

As in the past, Collins took the lessons from ARC-58, the new growing semiconductor technology and designed a new HF transceiver. This new transceiver packed a 400W power amp in a single 50lb package.

The 618T was a real commercial success; virtually all commercial Boeing and Douglas jets from DC-8 to the B-747 had a couple of 618T in their bellies and tails. The US military used the 618T-x series everywhere, from Jeeps, to helicopter and to F-4 Phantoms, to name few. The 618T family included military other denominations such as AN/ARC-94, AN/ARC-102, AN/ARC-105 and AN/MRC-108 to name few.

The RF Translator module was a marvel of engineering; its miniature moving tuning slugs looked like a mini Collins R-390/URR; the frequency stabilization circuits were now solid state. The RF Power Amp packed two 4CX250 in a box 4 ½ x 7 x 6 inches in size. Most of the RF circuit was still using vacuum tubes; in other circuits, semiconductors were wisely used to provide miniaturization, low power consumption and high reliability.

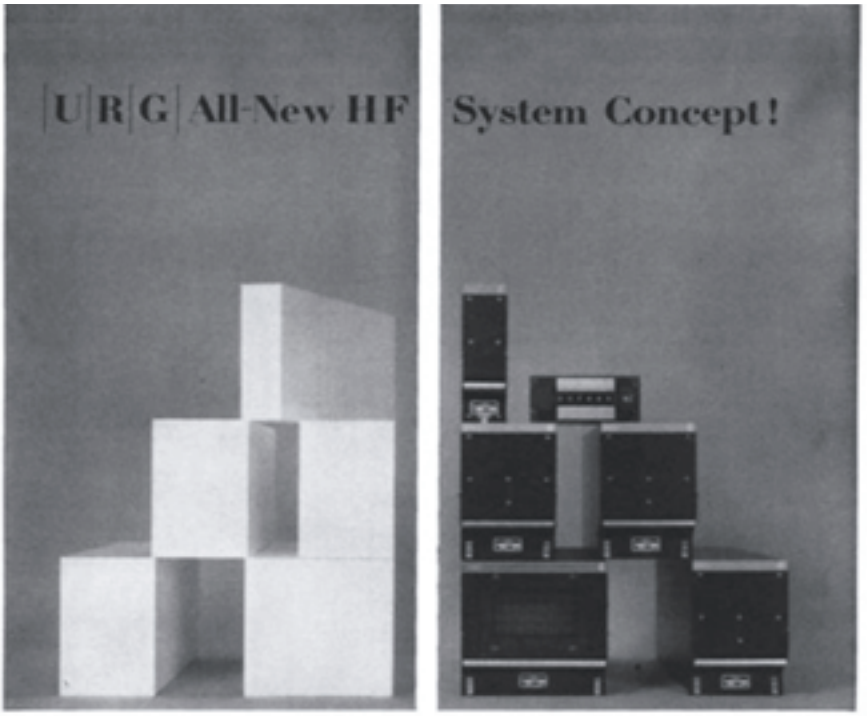
Below (LEFT) is the RF translator from a Navy AN/SRC-23. Notice the tiny PTO (Precision Tuning Oscillator). The Translator is the RF core of the 618T. On the right is a 618T-3 being repaired and tested.



1962 URG-1

In the early 60s, Collins introduced the Universal Radio Group.

Behind the Universal Radio Group was a new concept of modularity. The purpose of this modularity was to quickly put together complex radios system for different applications; Collins was trying to simplify its offering to fit the need of different branches of the US military. Use the same bricks to build "houses of different size, look and function". In modern terms, Collins wanted to do more with their R&D dollars. Also, the use of the same building blocks made sparing easier and simplified the supply chain.



Get maximum flexibility for your expanding communication requirements.

The most advanced answer to your requirements for a growing or changing HF system is Collins' SSB Universal Radio Group. Employing system-oriented modular design, U/R/G will meet *all* requirements . . . from simple local control voice circuits to complex remote control data circuits. It is equally applicable to fixed station, transportable or airborne installations. □ Covering the 2.0-29.999 mc frequency range in either 0.1 or 1.0 kc channel increments, U/R/G offers a choice of power levels, functions and operational modes. Utilizing the latest solid state circuits, this rugged new system is compact, lightweight, and it features low power consumption. □ Advanced modular packaging allows individual circuit cards to be housed in compact, easily installed units conforming with standard racking. □ This flexibility makes U/R/G the most easily expanded system available to meet your changing communication requirements. □ For a brochure with complete information about Collins' Universal Radio Group, write to COLLINS RADIO COMPANY, Cedar Rapids, Dallas, Los Angeles, New York, Washington, D.C.

COLLINS

The technology of the URG-1 was very similar to that used on 618T-s radios. Collins also added some powerful PAs from 1kW to 50kW.

The US Government relied heavily on URG equipment for their most demanding communication needs; URG-1 systems found their way on Air Force 1, Strategic Air Command communication centers, Navy ships, Army and NASA Apollo airplanes.

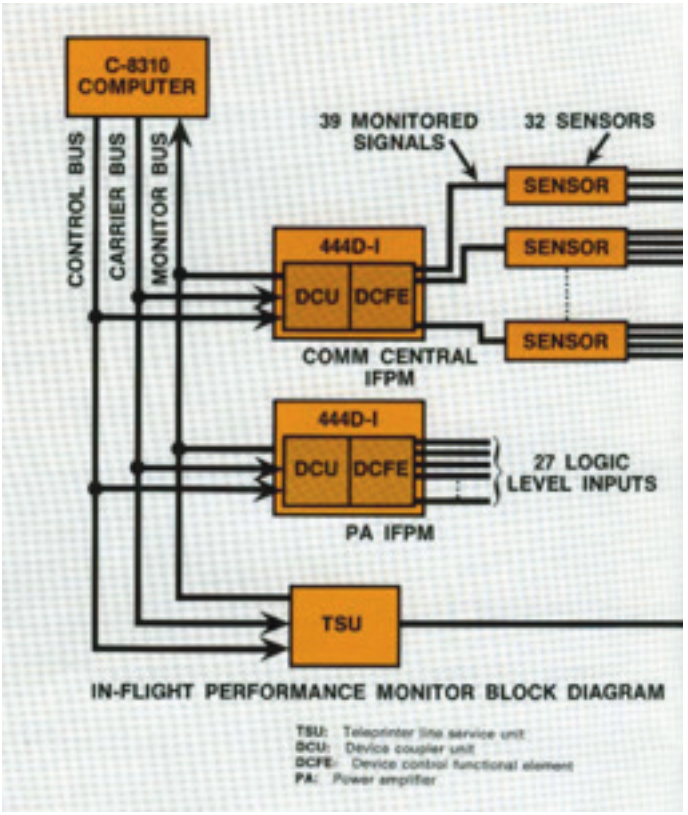
Late 60s - URG-2

Before we get deep in the URG-2, we need to go back in time; in 1968, consumers were still buying vacuum tube based TVs, mostly black and white, and telephones had rotary dials. We had heard of computers, but they were bulky, very costly and mostly used by NASA and big banks.

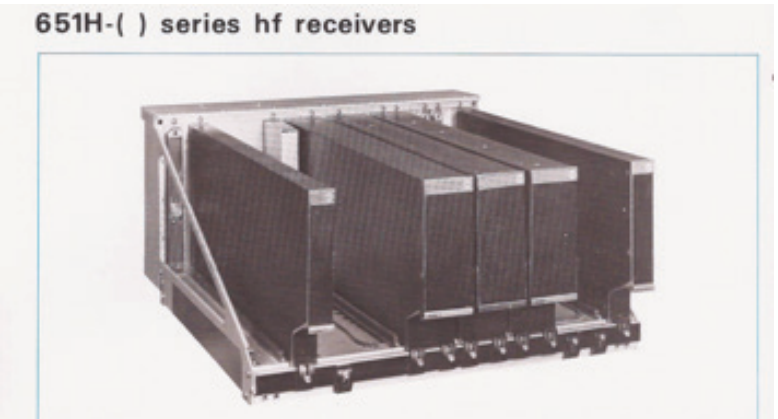
In the late sixties, Collins started working on the Universal Radio Group 2. This was much more than a more modernized URG-1 with state of the art components. In fact, Collins was thinking about computer controlled radios with self diagnostics capabilities. It is important to note that the URG-2 architecture applied not only to HF radios, but to VLF and UHF radios (TACAMO and AN/ARC-138), (Take Charge and Move Out)

Collins' goal was a radio that could be controlled remotely by a computer or a control terminal, and interconnected by simple serial interfaces. Additionally Collins wanted an intelligent radio that could diagnostic itself and direct the operator to the proper repair action: "Hey, I am broken, do me a favor, change my 888B-1 slice, and I will be happy again".

To reach these goals, Collins had to invent/design a new architecture and a set of technologies and capabilities, very innovative for those days. The design implementation made extensive use of integrated circuits and some of the first ASICs (Application Specific Integrated Circuits). Note that in 1968 the US Government purchased 37% of the total integrated circuit production (Source Wikipedia).

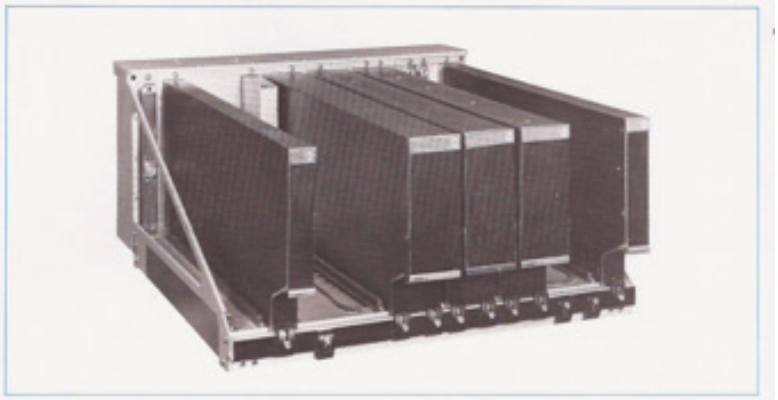


Like the URG-1, the URG-2 was modular; the modules, now called slices, plugged into a complex backplane; for this purpose, Collins developed its own connectors. The 651H-( ) receiver was made up of 5 slices: one power supply, a receiver frond end and converter, a frequency synthesizer, IF and a test modules.



The 310Y-( ) exciter utilized the same backplane as the receiver, with different wiring options, and included five slices.

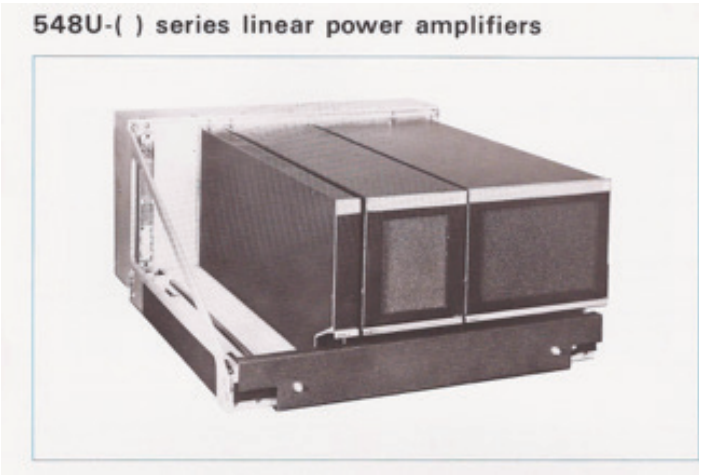
651H-( ) series hf receivers



URG-2 RF Amplifiers

Collins also developed a new 1kW amplifier called 548U-( ). The RF amplifier was a marvel of engineering, being extremely small and compact.

548U-( ) series linear power amplifiers



The existing 2.8kW, 10kW and 50kW amplifiers were rejuvenated with an upgraded control system and serial interfaces. These were the 208U-3A, 208U-10A and 208U-50A.

One of the first US Government URG-2 contracts was dated in 1968 (F19628-68-C-0164), and this was for the AN/ARC-132 airborne system. This was installed on a C-130E for strategic communication. This contract was followed by additional URG-2 applications: TSC-60(V), AN/ARC-165 (AWACS), AN/URC-75 (Navy Shipboard), AN/USC-12(V) and AN/USC13(V) (EC-130), TACAMO, AN/ARQ-34 (E-2C) and AN/ARC-138 (Navy, AF) to name few.

Collins AN/TSC-60 (V)

Collins developed an URG-2 based mobile communication system for the US Air Force to replace older systems. There were two main versions:TSC-60(V)1 with two 1kW amplifiers, TSC-60(V)2 with two 2.8 kW amplifiers. A 10kW amplifier shelter was also available (TSC-60(V)3).

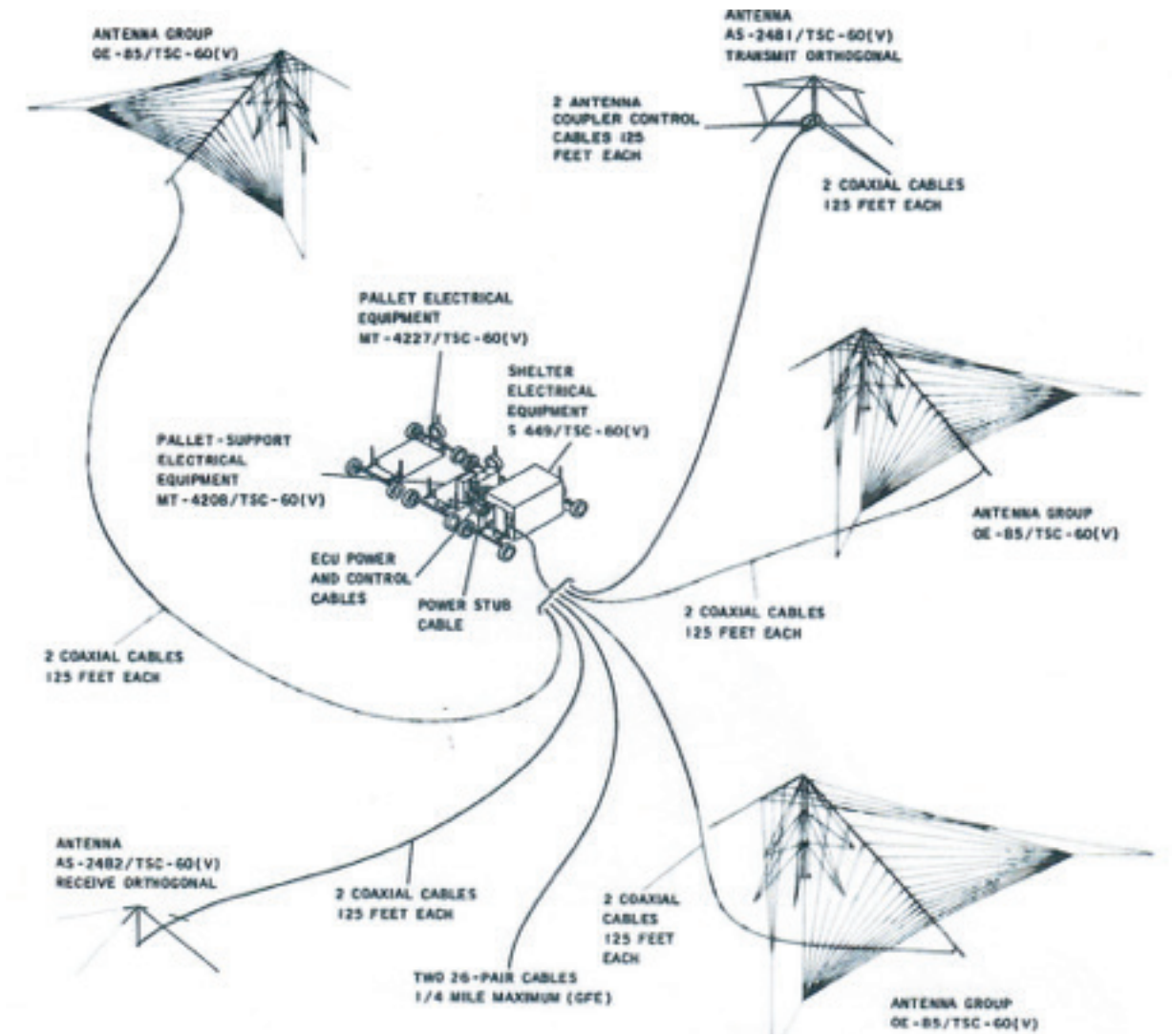
The TSC-60 was transportable and could be set up in the field in less than 24 hours, by an experienced crew. The system included "portable" and fixed log periodic antennas, electrical generators and air conditioners.

The AN/TSC-60(V) was capable of up to (16) 75 Baud rate Teletype channels and (7) voice plus data channels, using (2) transmitters and (2) Radio receivers. Later, Time Diversity Modems (increased Radio Teletype reliability) and (2) AN/FTA-28 Telephone Terminals were added to provide over the air DTMF telephone dialing capability.

AN/TSC-60 (V) 2 Specifications

- Freq Range 2-32 MHz
- 2 Receivers
- 2 Exciters
- 2 Amps 2.8kW
- 10 kW Amp
- Multiple antennas
- Continuous Duty
- Can operate in full duplex
- Can be remotely controlled

The picture below from TO 32S1-2TSC16-12 shows the deployment diagram or a TSC-60(V)2. Notice the 3 fixed log periodic antennas. The goal was to have reliable communications on a 2,400 miles range.



Like most complex systems, the TSC-60 wasn't simple and required know-how and a focused crew; well taken care systems were reliable and liked by their crews. The only negative comments were about the noise generated by the equipment cooling fans.

Below are a few TSC-60 pictures; the first one shows the control console (center), the TTY multiplexer and telephone converter, and the 308U-3A amplifier on the left.

The second picture shows the receiver exciter rack and the second 208U3-A amplifier.

The URG-2 was a cool piece of engineering, ahead of its times, very revolutionary, but also quite pricey. The control system added a large amount of electronics and the modularity price tag was high. In 1971 the average cost for a TSC-60 was $225k (about $1.4M in 2017 dollars.

$13.1 Million Order For AN/TSC-60(V) Systems Received

Collins has received a $13.1 million production order from the U.S. Air Force for AN/TSC-60(V) HF communications systems. This order is a follow-on to the preproduction phase of an Air Force program recently completed by Collins.

The production order calls for Collins to provide 58 AN/TSC-60(V) transportable HF communication centrals for use in the Air Force Tactical Air Control System.

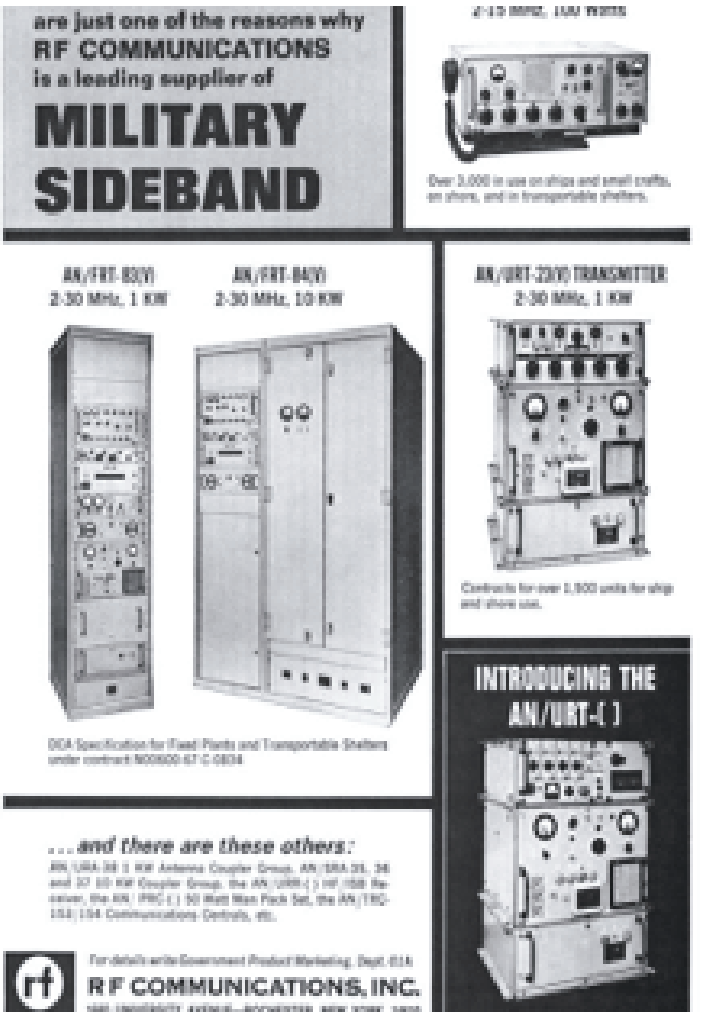
Included in the order are AN/TSC-60(V)1 (1 kW) systems, AN/TSC-60(V)2 (2.5 kW) systems and AN/TSC-60(V)3 (10 kW) systems.

All systems will utilize Collins state-of-the-art equipment that provides digital control, maximum interchangeability, and ease of operation and maintenance. Each central is a dual system that includes two independent radios, each with four 3-kHz audio channels.

The systems can be operated in upper sideband, lower sideband, 4-channel multiplex, independent sideband or compatible AM. Modes of operation include voice, speech-plus-TTY (85-Hz shift), CW and up to 16 channels of 85-Hz-shift TTY.

The systems will be manufactured at Collins facilities in Dallas.

The high cost of the URG-2 Collins communication gear and the shrinking DoD budget (after the Vietnam war), opened the door to new suppliers, such as RF Communication Inc. RF Communication designed and offered more traditional HF comm gear. With no self diags and no remote control, they were simpler and priced about half of the cool Collins stuff.



Automatic Antenna Couplers

- For Transportable Systems
- For Fixed Plant Installations
- For Shipboard Operations

RF-690 10 KW COUPLER

The RF-690 10 KW p.e.p. and average power antenna coupler automatically matches any known 10 KW transmitter to a 35 foot whip over the 2-30 Mc band. Manual and automatic tuning are available. No band information is required and all solid state circuitry is employed. There is a built in dummy load. The RF-690 is designed to MIL-E-16400.

AN/URA-38 (RF-601) 1 KW COUPLER

The AN/URA-38 (RF-601) 1 KW p.e.p. and average power antenna coupler matches any known 1 KW transmitter to a 15, 25 or 35 foot whip antenna over the 2-30 Mc band. Full MIL-E-16400. In high quantity production for the U.S. Navy under NOBSR 93367.

BOTH THE RF-690 AND THE AN/URA-38 (RF-601) CAN OPERATE AT HIGHER POWER LEVELS DEPENDING UPON THE ANTENNA USED.

R F Communications is the producer of the AN/URT-23 (V) 1 KW Shipboard SSB Transmitter and the 1 KW and 10 KW AN/FRT ( ) Shore Station DCA SPEC SSB Transmitters for the U. S. Navy.

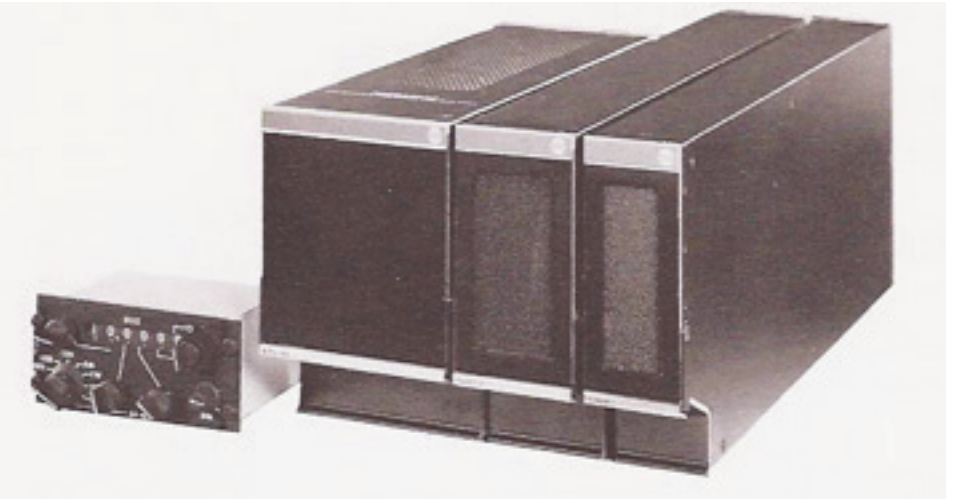
RF Communication won Navy Air Force and Cost Guard contracts, and became a huge competitor for Collins. RF Comm was purchased by Harris, and today they are the 900 pound gorilla, when it comes to military comm.

In a few words, the Collins strategy seems to have lacked lower cost solutions for applications that did not need the URG-2 sophistication.

URG-2 Evolution

The 718U family was an evolution of the URG-2. Collins designed the 671U-(x) Receiver-Exciter (11.2 lbs). This maintained a serial interface, and utilized newer technology integrated circuits. The 718U family included new RF Amps and antenna couplers.

Performance wise, the 718U family was outstanding with very high reliability. Its application ranged from airborne to ground to shipboard. Below is a picture of 718U-4 (400W) airborne system.



The 651S-1 belongs to the 718U family; the 651S-1 is a 671U-4 with a control panel, minus the exciter. Arthur's Collins son, Alan, told me that the 651S-1 was his dad's favorite receiver; he told me that in 1994, when he was trying to sell me two 651S-1s that belonged to his dad!

The 718U technology found its way into older radios such as the SRC-23 in the form of upgrades. Collins was a master in providing upgrades and generating more business. For example, the AWACS URG-2 AN/ARC-165 was upgraded with Collins AN/ARC-190s.

HF-80

We are not going to discuss in details HF-80 in this article; I am only going mention that the HF-80 radios heavily leverage URG-2 and 718U technology. The HF-80 was high performance and lower in cost than the URG-2 series, but did not support airborne applications. The HF-80 was widely used in military and commercial applications and by armed forces of many other countries.

Amateur use of Collins military gear

There is a large community of Hams and SWLs involved with Collins military gear. Patience and perseverance are the most important skills to work on these radios; most of the times, it take years to collect all the pieces, and documentation is very hard to find. Trades, eBay, ham-fests and surplus dealers are our best friends.

Often, when we think we have reached critical mass to get things ready to fire, we usually find out that some connectors and/or other little things are missing in action. Unusual power sources are part of the game like 3-phase 60Hz or 400Hz, but none of these will stop us.

We spend 95% of our time working on the radios and 5% (or less) on the air. It is very rewarding to see an old radio that survived the Service, DRMO, and the junk yard, come back to life and prosper again.

Collins HF-80 and Military Radio Net

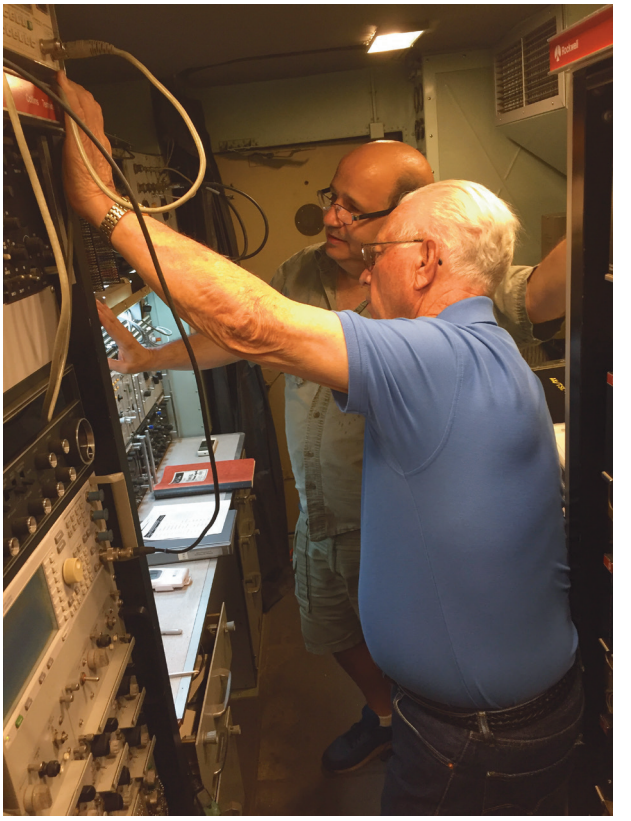
The CCA has been working on creating a net focused on the use of Collins military gear; this is a great opportunity to further enlarge our beloved Collins Radio and CCA community! I thank them for their wisdom! Thank You, All!

I appreciate the opportunity that Jim Stitzinger and Scott Kerr have given me to share my passion in this forum; hopefully, you will find this writing interesting and stimulating. If you have questions or comments, please, feel free to reach me by email (frledda@att.net).

- 73, K5URG

In The Shack with Francesco, K5URG

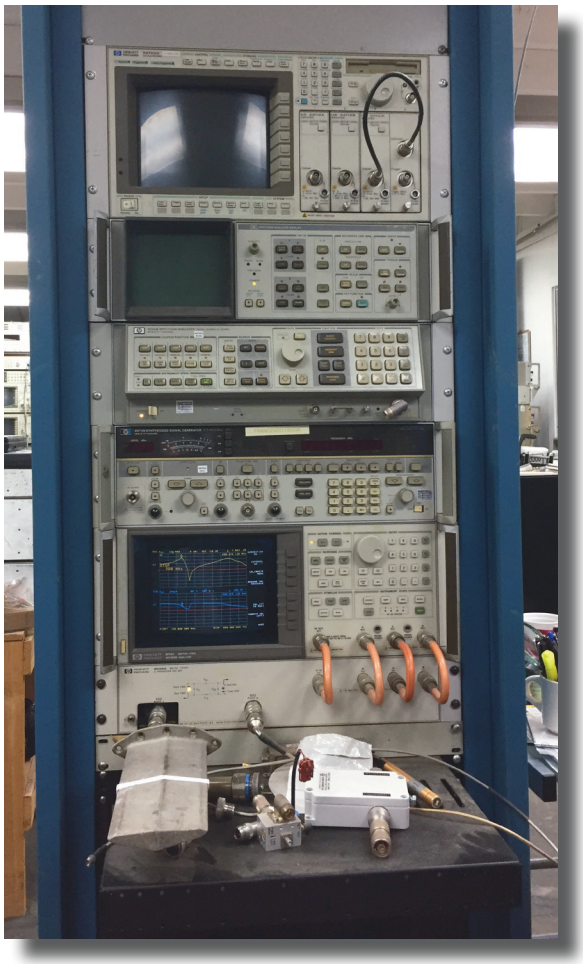
Right after the Dallas HamCom event, Wayne Spring, W6IRD, and I had a chance to visit Francesco's shack. I had recently found out that he lives about a mile from me – nice to have a fellow Collins collector so close!

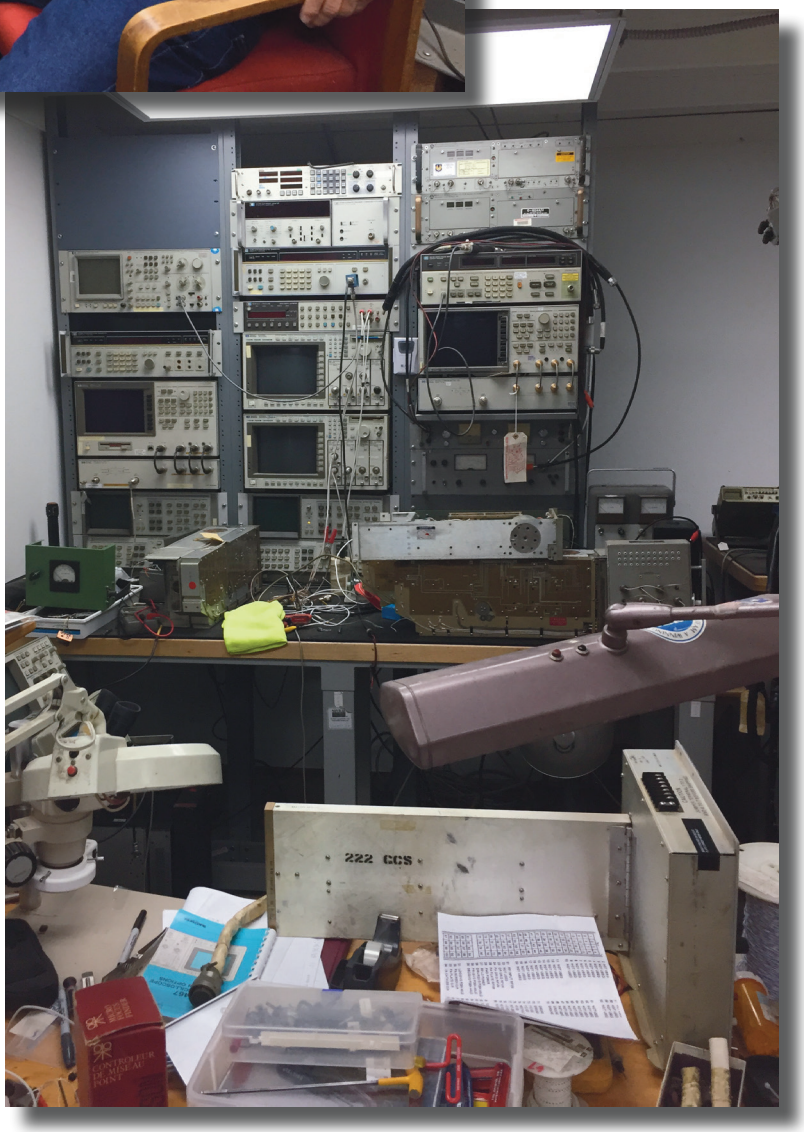


This is not the average ham shack. Francesco's passion for commercial and military radios are on full display with two Collins shelters and a plethora of Collins and other commercial gear. Enjoy the pics but I can honestly say that they do not do justice to the collection!

- Scott Kerr, KE1RR


USE DURING MAINTENANCE ONLY

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Memorex
COOL DISKS
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DAYTON 2017

Dayton 2017 Banquet Report

Scott and I had been very concerned that attendance would be way down at this year's banquet due to the new Hamvention venue. When we had asked for a show of hands, we realized our concernes might be warrented. Much to our surprise, we had a lot of reservations in the last few weeks before the banquet and ended up with about 80 attendees.

Last year we made last minute reservations at the Miami Valley Golf Club because our event venue closed. This year we decided to return to the Golf Club and had time to schedule a seated dinner in the dining room. The food and service were excellent, the atmosphere relaxed, and there was plenty of room for everyone. I am sure we are going to return there next year.

Francesco Ledda – K5URG, gave an enthusiastic and informative presentation on the URG I, II and HF 80 Collins lines of equipment. Francesco was with Collins for years and then went on to other communications companies so he has a vast knowledge on both the sales and engineering side of the business. I continue to be impressed with his passion and knowledge – I am sure that we will be seeing much more of Francesco in the future.

Thanks to all of our friends that support the CCA by donating each year!! In short, we had a great time over a nice dinner with a fun presentation. We could not ask for anything more!

- Jim, W3CEX
Dayton Banquet Chair

Dayton 2017 Booth Report

What can I say about this year's Dayton or should I call it Xenia? It was very different and…much the same. Each year many of us have flown or driven to Dayton and our expectations of Hara Arena and the outdoor flea market are so etched in our memories that it is like going back to our childhood home – the sites, sounds, and smells all bring back fond memories. It is something we are comfortable with. For the Dayton Hamvention to be in a different venue is like Mom and Dad moving to a new house after 50 years – will it ever feel like home again?

The answer for me was yes. The buildings and grounds were very different! I arrived on Wednesday and scoped out the place and picked up our booth badges and found our booth. The big surprise was that everything was ready! The carpet, extra chairs, and draped tables were all set up and ready – and I did not have to go track down anyone to get it done. Each booth space now has electricity and wired internet – they spent a ton making that happen! The staff was prepared to show everyone that the Dayton Hamvention Committee had done their job to make the transition as comfortable as it could be. What a nice surprise!! But the real reason to attend Dayton was not only to search for that one treasure but to see all of those people you only see once a year at Dayton. Jim and I were very apprehensive about the turnout but most of our regular crowd showed up – sitting in the booth and visiting with all the Collins crowd is really what Dayton is about - and that was what made it feel like home.

There just is not as much indoor vendor space at Xenia as we had at Hara but the Hamvention management had used that as an opportunity to keep the cream of the crop of vendors and weed out the used laptop and sunglass vendors (I am glad they felt that the CCA is part of that cream!). Almost all of the vendors were really Ham Radio focused. The booths were also split into about 6 buildings but they were all close together so navigation was pretty easy.

One of the highlights of the event was the food. Xenia is a fairground and many of the regular fair food vendors showed up ready to impress. Everything I tasted was really good and I would have tried more but the lines were long – even though there were many vendors with varied foods – from Cajun, Homemade Ice Cream, Ribeye Steak, and Pork Chop Sandwiches – you name it – it was there.

The bad (what needs improvement) – traffic! Xenia is on two lane roads to the east of Dayton and there are a ton of people that all seem to want to get there at the same time. That said, there was adequate parking, lots of folks to direct you, and some remote sites with buses into the event. I heard a lot of complaints on Friday about the traffic and parking but almost none on Saturday. I know that they are working with the local governments to improve traffic flow. Also, the flea market area is spread into several different areas and is a little bit of a hike from the main vendor buildings. Then the flea market area is mostly grass lots and with the inevitable Dayton rain (has it ever NOT rained at a Hamvention?) got a little messy. I know there were fewer flea market vendors that at most Hamventions but I think that the committee is going to work on the problem this year and we should see some of those issues resolved by next year.

Floyd Soo, W8RO, and his team of Bryan, Bob, Charlie, Rick, and Tony turned out, as usual, for the Booth setup and teardown. All of them also helped man the booth for the hundreds of members and other Collins fans who seem to have a never ending stream of questions for all things Collins related. We also had a large number of new memberships and renewals this year. Our membership chairman, Jerry Kessler – N4JL – had us well organized with a printout of all the relevant membership data so we could quickly determine the membership status of anyone that had a question about their renewal status. Our Treasurer, Ron Mosher, K0PGE, was there from start to finish - making sure we kept all the finances straight along with Tony Sokol's envelope system. Thanks to all for their hard work!

I did not spend much time out in the flea market but I did see some quality Collins gear – and picked up a wonderful KWM-1 and related KWM-1 accessories. There seemed to be the usual number of guys that came back to the booth bragging about this or that find so the hunting may not have been as good as it has been some years but – the hunt was still on!

Jim Stitzinger is already talking about bringing the Collins van next year, and we are also talking about some radical but fun changes for the booth for next years' Dayton, Xenia - still need to know what to call it – Stay tuned!

- Scott Kerr, KE1RR
Dayton Booth Chair

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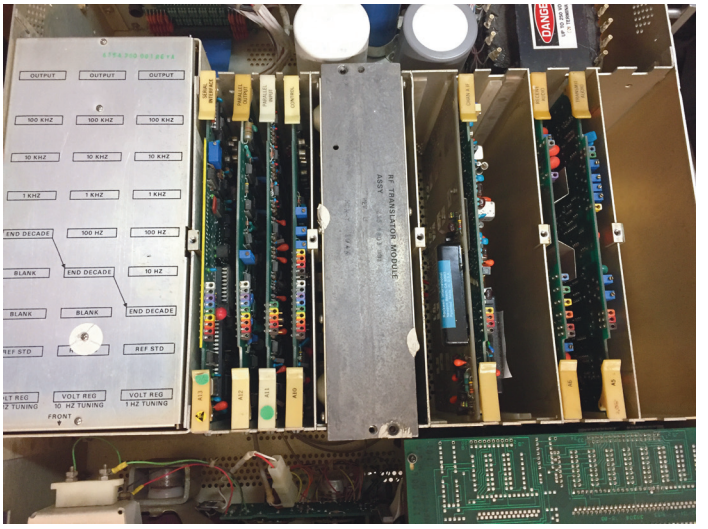
Restoring HF-80 Equipment

By Scott Kerr, KE1RR

The Collins HF-80 equipment was not really on my Radar – I had spent time collecting A-Line, S-Line, WWII and Broadcast equipment but was not familiar with the HF 80 gear. That all changed after visiting Jim Stitzinger's – WA3CEX shack a few years ago. His collection has been featured in Electric Radio and here in the Signal but you have to see it in person to really get the full impact of all that gear in one place. The aisle of HF 80 is a little overwhelming.

Late last year I had the opportunity to pick up some non-working pieces and started down the road of restoration. I will say that my PC board skills had gone by the wayside after so many years of working on boat anchor tube equipment. Soon I was consumed with new projects and knee deep in the manuals trying to understand the architecture of the rigs and where the problem areas were. My first project was an HF 8054 receiver – the 'Holy Grail' of the HF 80 receivers. This is a unit capable of receiving 4 channels of voice\data (Independent Sideband or ISB) at one time and delivering that to various outputs. There is a matching exciter – the 8014 that will transmit 4 Channels – UUSB, USB, LSB and LLSB. The architecture of the HF 80 systems is such that all of the receiver/exciters and exciters are 100 MW units and are paired with 1KW, 3KW, 10 KW or 45 KW amps. There are matching preselectors, remote controls, line flateners (auto-tuners), mics, cables and a host of other accessories – most of which 'talks' to each other. Most everything is interchangeable to form a custom system to meet the desired communication goals – cool stuff!



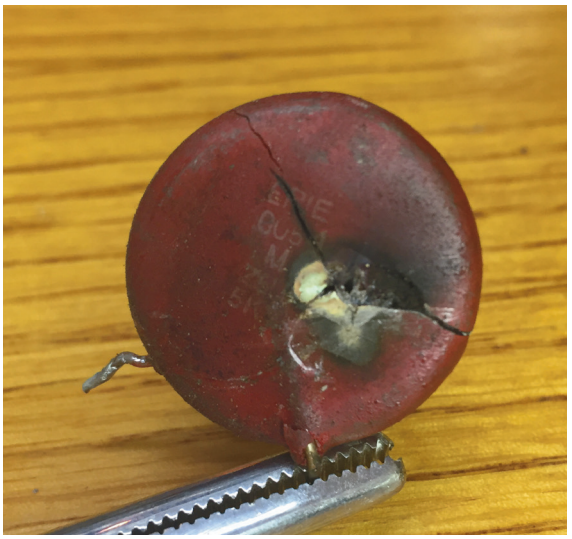
Each of the units are modular in that various functions are accomplished with a plug-in card and the cards plug into backplanes or motherboards and the whole unit is then put together with ribbon cables. This makes each receiver or exciter customizable with different filters, options for remote control, frequency standard, etc. Many of these cards are interchangeable with other receivers of exciters. This makes for complex systems and the manuals (which are excellent) 400-700 pages each. And then there are maintenance manuals on top of that!

I found two real problem areas common to all the units that I have worked on. The first is the interconnections between the units and internal connections within the units tend to have deteriorated with corrosion and need dexoit and some time spent 'working' the connection (whether it be a board or interconnect cable) by inserting and pulling apart the connection several times. The second is the dreaded Tantalum issue. The unit will power on and then you get a fault light and you know that there are tantalums that are bad – but there are hundreds of them! Although it is time consuming, the bad ones can be found. The good news is that all of the bad tantalums that I found went bad with a dead short.

On my 8054, there were so many shorted tantalums that the unit was not able to even power the backlight of the S Meter. On the advice of some of the gurus out there I pulled boards until I found the one that was dragging down the bus – viola – power. The bad news was that then one of the IF boards released magic smoke – never a good sign. Pulled that board and found a choke had burned where the bus entered the board and two dead shorted tantalums right after the choke – easy. On the advice of some sage ex Collins guys I used cheap aluminum electrolytics from Mouser rated at 50V (the tantalums were rated at 35V). The newer electrolytics are only slights larger than the tantalums and work just fine. One board down – the next board was harder. One of the buses showed a dead short with about 12 tantalums sitting on the bus. Even with extender cards and a heat sensor I could not find the bad one. Making use of my solder sucker – I pulled one leg off each cap, ohmed it out and then came across the shorted cap – replaced it and the board worked great – for about a minute! Seems that the next cap down the line failed – replaced it and the unit works great! In all, I found about 8 bad tantalums in the receiver on three boards and all the pots and rotary switches needed deoxit (and deoxit fader lube).

On to the next project - the 1KW tube amp. This is the 8020 amp with one 4CX1500 and 8030 power supply. This is one very well built amp! One of the alignment procedures calls for the amp to be run key down at 1100 watts for 5 minutes before adjustment! The same issue of interconnections, plug in cards and tantalums exist for this unit. Also, the power supply is the 'Hub' for all of the interconnect cables to each unit in the system. I found that special attention needs to be paid to all of these connections.

The first real problem was that the 3KV high voltage would fault after the warmup period. The problem was a simple fix but finding it required a lot of work. A simple visual inspection revealed a high voltage bypass cap that had a hole in it the size of a .30 caliber bullet, with white powder falling out of the hole. That happened to be buried below many layers of boards and then it was not easily visible after taking apart the unit.



Replacement fixed the issue. Actually, I found the common causes for HV fault is this cap, the HV choke and the diode string. The next issue drove me nuts (not a very long drive these days). The exciter was putting out RF (verified with a scope) and the Amp was getting RF but the metering and faults showed not RF in to the Amp. The RF from the exciter goes straight to an 20 watt solid state amp that then drives the 4CX1500 through a matching network. Replacement of the tantalums on that board did not fix the issue. Turned out the problem was that the cooling blower hit the side of this board first and over many years of service it had corroded the first two traces on the board to the point that over 3 inches of trace my meter measured about 400K Ohms! Remember that many of these units ran 24/7 and sometimes in harsh environments. I ran jumpers across the traces and that fixed the issue. I was ready to fire it up and check into the 20-meter net!! Not quite….

Seems that the autotune required attention. The tuning was just not stable. It would tune one time out of ten. The architecture of the autotune is complex but in simple terms, a fixed capacitance is selected by a servo running a rotary switch, and the tuning and loading coils are coarse positioned via servos and then fine-tuned with the application of power. This just takes a few seconds – and will tune into a VSWR of 3 to 1 or less across 2-30 Mhz. Collins at its best! Careful cleaning and adjustment of all the components yielded some improvement but still was not reliable. A close inspection of the assembly (I was getting REALLY good at taking these things apart!) revealed that one of the rotary contacts on the tune coil had broken off and was causing the unit to fail to tune. Turns out that I had a friend with a spare coil assembly! An afternoon of disassembly of the coil assembly, replacement of the connector and assembly, alignment was performed. Put it all back together and – wow – it tuned right up and gave me a bright blue light saying READY. Two months of work and my HF 80 rig is one the air.

I can say that this was a fun project and found that even an amateur repair guy can troubleshoot one of these units if you are willing to read, study and ask questions – thanks to all of those that patiently answered questions and talked me out of taking a 5 pound sledge the units as I worked on them! The reward is something that gives me the best signal reports that I have ever gotten! Bill Carns – K0CXX, is starting a HF Comm group so that we can swap information, parts and have the occasional net. If you have an interest in this area of Collins I advise you to jump in!

– Scott KE1RR