The Signal

OFFICIAL MAGAZINE OF THE
COLLINS COLLECTORS ASSOCIATION
Q4 2017 Issue #88

THE COLLINS 75A
AMATEUR RECEIVER

None Other Like It At Any Price

FEATURES
- 80, 40, 20, 15, 11, 10 meter bands
- straight line tuning
- dial calibrated directly in frequency
- 50 db image rejection on all bands
- crystal filter—variable selectivity
- high sensitivity
- automatic noise limiter
- double conversion (triple detection)
- self-contained power supply
- signal strength meter
- permeability tuned
- receiver disabling circuit
- 10 db signal to noise ratio
- three IF amplifiers
- extremely high stability
- separate oscillators for mixers
- amplified avc

The Collins 75A Receiver Revisited

$7.50 USA $8.00 Canada 700 円日本

Collins Collectors Association

From the President's Desk…

This year has passed by so quickly! It has been a fun year for collecting Collins. We are already thinking about Dayton and all the opportunities it will afford us!

As you probably gathered from the last Signal, I had a lot of fun working with Gary, our acting Signal editor, in the restoration of my early Collins 150B. This coming year I look forward to working with Gary again on the restoration of an early Collins 30FXB transmitter. One-by-one these transmitters are coming back together — right now it's in about 30 pieces! I trust each of you will have a great project to enrich your collection for the new year.

In this issue you will read about our first CCA Board and Leadership Meeting, held here in California. It was a great event and it was amazing to bring our whole team together! We truly have a wonderfully talented group to lead the CCA and I was inspired leading the group at this amazing event, which was held around the kitchen table of Wayne and Sharon Spring's (W6IRD and K6IRD) home with a guest appearance of the 150B that Mr. Collins made in his basement factory! What fun!

On a more serious note, on the same day I write this the brush fires rage here in Southern California. The Rye fire (named after the road where my warehouse and collection are located) came within 1/2 air mile from my building. I spent the morning really scared and thinking which one radio I would take with me if told to evacuate! I finally settled on a new round KWM-2A in a CC2 case that I have long cherished.

But I'm not the only one who came this close to losing a radio collection. I was sitting on I-10 some years back when Bill Carns' home and radio collection were surrounded by flames at Forest Lakes, AZ. And two years ago Gary Halverson came within a heartbeat of losing his home and collection near Mokelumne Hill, CA, with another close call again this year. Having good health, safety from disasters, and a collection of Collins is a great privilege!

In closing, Clarence Marshall, K5CGM, who contributes to the Signal, lost his wife in recent days. If you think of it remember him in your prayers.

Jim Stitzinger, WA3CEX
President, CCA.

The Signal Magazine
OFFICIAL JOURNAL OF THE COLLINS COLLECTORS ASSOCIATION ©

Issue Number Eighty Eight - 4th Quarter 2017

The Signal Magazine
Published quarterly by the Collins Collectors Association

Membership Chairman
The Collins Collectors Association
2910 Kerry Forest Pkwy D4-201
Tallahassee, FL 32309-6892

Come Visit Out CCA Website: www.collinsradio.org
You can renew your membership or join the CCA on our website using the "JOIN US" link.

Join Us on the Air!

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

From the Editor

Our feature story by the late J.B. Jenkins, W5EU, investigates the beginning of the A-Line and specifically, the 75A. J.B. originally published this comprehensive piece of investigative reporting in two parts in Electric Radio Magazine in early 2007. Ray Osterwald, N0DMS, Publisher of Electric Radio, has very generously granted us the right to reprint the story — Thank You, Ray!

For those of us concerned about what happens to our radio collections after we're gone, Steve Airola, W6RXK, a seasoned California estate planning and divorce attorney, offers some general guidelines to ensure our wishes are fulfilled legally in his brief article, "Passing On Your Ham Radio Collection."

Mike Sedgwick, K7PI, presents a practical and simple solution to the problem of removing S-Line units from their cabinets without scratching the trim rings with an easy-to-construct fixture. Thanks for sharing this Mike!

"In The Shack" for this quarter spotlights Joe Eide, KB9R, in Eau Claire Wisconsin. Joe's World-Class collection features many Collins items all in pristine condition. And check out his fully equipped test bench to keep all his gear running. Nice going "Nine Radio!"

We are always looking for interesting stories for future editions of The Signal. Some topics we hope to present include human-interest stories centering, of course, on Collins Radio, and hopefully some "Cold War" stories featuring one-time secret Collins projects that have been declassified that don't necessarily relate to ham products. If you have any juicy "spook" stories you are able to share, we are all ears!

Writing for The Signal is easy as pie. No experience necessary. Simply type up your story in your favorite word processor (save as a .doc file), and submit your document and attached JPEG, PNG, or TIFF photos (hi-resolution preferred), to SignalEditor@collinsradio.org

I look forward to hearing from many of you!

Gary Halverson, K6GLH
Acting Signal Editor

The Collins 75A Revisited

By J.B. Jenkins, W5EU (SK)

It has been fourteen years since Electric Radio published the series of articles titled "The Collins 75A-Series Receivers: A Legacy of High Quality." They continue to be an excellent historical and technical commentary on the Collins "A-line" receivers. Since that time, additional information has surfaced which the writer believes will provide a measure of answers to the questions that surround the Collins 75A receiver, and some new conclusions will be presented.

Included in this article is a chronology of events that cover some of the engineering and production stages. A prototype 75A receiver has been found, as well as finding the owners of a few early receivers. Let's begin with the Collins Column magazine.

The Collins Column was a monthly magazine published "specifically for Collins employees as a means of providing information about their company." It solicited written contributions relating to any Collins activity. Under the heading of "Plant Static," there were reports from every area of operations. A special section called "Ham Chatter" reported the activities of amateurs for the past month, and at least one station was featured in some of the issues, complete with a picture of the shack and operator. This magazine gives us a rough time line and provides some additional insight about the production of the 75A receiver.

In the September 1946 issue of the Collins Column, L. W. Couillard announces a new receiver. He writes, "The 75A Receiver is one of several units at Collins that have resulted from ideas which were shaped up for military applications just before the war. Recently there has been developed at Collins a new variable frequency oscillator with such greatly improved accuracy and stability that when used in the 2 to 3 Mc range, a definite frequency may be set and held within a few hundred cycles. To use this accuracy for higher frequencies, precision crystals may be used to mix or beat with the high frequencies, resulting in lower frequencies within the range of our accurate receiver. These two steps, (1) the use of crystals to convert the high frequencies to low and (2) the use of an accurate, stable low frequency oscillator, are combined in the 75A receiver to make what we believe is the most stable and accurate receiver being built." Mr. Couillard continues to write, "To get some idea of just what could be done with this receiver in actual operation, models have been tried at several of the local ham stations."

The Prototype Collins 75A As Seen Today

The 75A Receiver was also announced in The Collins Signal, "...a semi-technical magazine which is published chiefly for outside audiences." The first of two "Product Descriptions" in the form of a four-page brochure was released in August of 1946. It was titled "The 75A Amateur Receiver," followed by the words, "None Other Like It At Any Price."

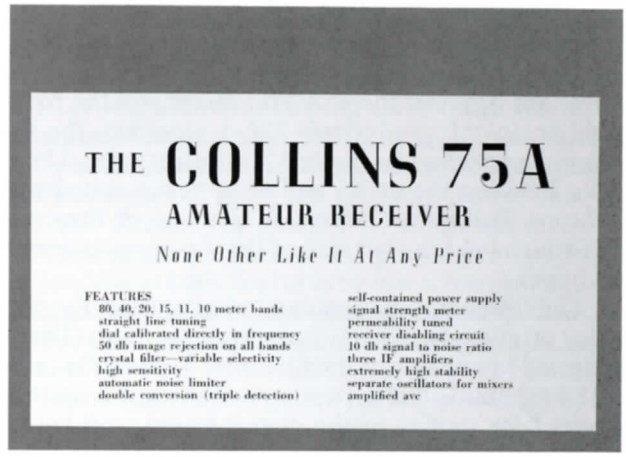
Most notable were two tuning dials controlled by a single knob. The kilocycle dial peered through a square hole with an arch at its top. The slide ruled dial displayed the frequencies in Megacycles, while the bands strips were titled in meters, matching the markings on the band switch. A brief description of the circuit, controls, specifications, and features followed.

The second "Product Description" was released in May 1947. The cover of this brochure featured a receiver with a new lighted dial assembly. The QST ad for March 1947 proclaimed "The Collins band-lighted dial gives you Added Pleasure," followed by the statement, "The band lighted dial is further proof of Collins' interest in amateurs."

There were other changes: The kilocycle dial now peered through a doublearched window, just as we see today. The band switch is numbered 80 through 10, in a clockwise direction, instead of 10 thorough 80 as seen on the first product description. A new "S" meter is shown with factory markings, supporting a white face that is red lined above S9. Again, two inside views were included. The top view now has a cover for the coil assembly while the bottom photo remained the same. Two statements in the circuit description were changed or deleted. The signal-to-noise ratio was changed from 1 microvolt for 10 dB signal-to-noise ratio, to 6 dB signal-to-noise ratio. The statement, "There is no loss in gain by use of the crystal filter" was deleted. Other changes not so evident will be discussed next.

Rare and unusual items are often "for sale" on the on-line auction sites such as eBay. One such item was a 75A receiver that was purchased by the writer a few years back. Upon arrival, it was obvious that this old receiver had not been operational for many years. Several points of identification proved (at least to my satisfaction) that it is the prototype pictured in the second product description.

There are many differences between this receiver and the production 75A-1. A list of differences is discussed



THE COLLINS 75A

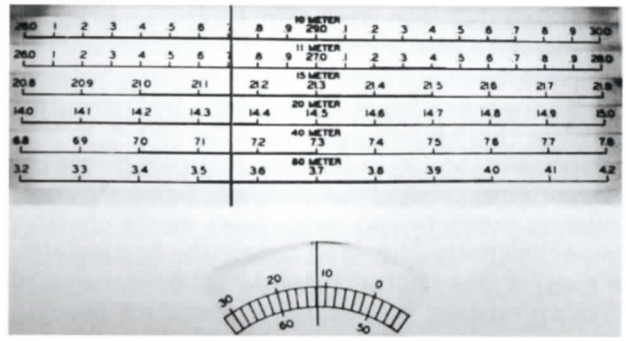
AMATEUR RECEIVER

None Other Like It At Any Price

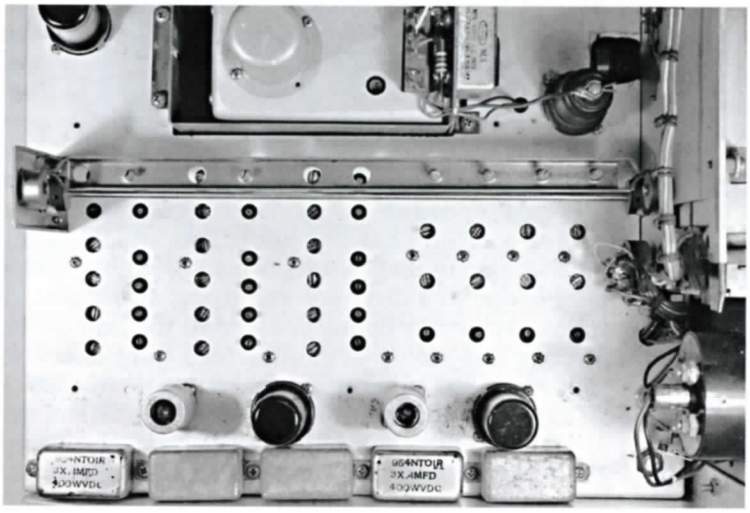
FEATURES

80, 40, 20, 15, 11, 10 meter bands
straight line tuning
dial calibrated directly in frequency
50 db image rejection on all bands
crystal filter—variable selectivity
high sensitivity
automatic noise limiter
double conversion (triple detection)
self-contained power supply
signal strength meter
permeability tuned
receiver disabling circuit
10 db signal to noise ratio
three IF amplifiers
extremely high stability
separate oscillators for mixers
amplified avc

The First of Two Product Descriptions Dated August 1946



The unlighted dial assembly as first used on the prototype 75A. Note how the band titles are in meters.



Left: The 75A top view

below, and important changes have been underlined:

1. There are no ventilation holes in the side panels. As we will see later, all 75A-1 receivers beginning with serial number "1" have ventilation holes in the side panels.

2. The front panel is engraved rather than silk screened. Included in my collection is a 250-watt, AM desktop transmitter, the only prototype which was made. It was intended to be sold as part of the KW-1 product line, and it too has an engraved panel. The lab tech who built the model told me it was common for the prototype panels to be engraved at that time. A close look will reveal the engraver forgot the spacer between the number "11" on the band switch.

3. The receiver is wired with colored wire which has plastic insulation.

4. The 6AK5 crystal oscillator tube location is almost equidistant between the 6SA7 1st mixer and the 6SK7 IF amplifier. In the production 75A-1 receivers, the 6AK5 is moved very close to the 6SA7 1stmixer tube. The hole shown between the 6AK5 and 6SA7 tubes was absorbed by the oscillator tube socket. It was one of three screw holes which held the left side of the top cover assembly to the chassis.

5. The fifth bathtub capacitor, missing from the chassis of the production 75A-1, has three sections. They are connected to one side of the filament, B+, and the cathode of V1 to ground. The bypass capacitor for the cathode of V1 was later moved to the circuit board, and later still was shunted with a small capacitor directly from the tube socket to ground.

6. A square hole was cut by a hacksaw to clear the turn-stop washers, which were added to the shaft of the PTO.

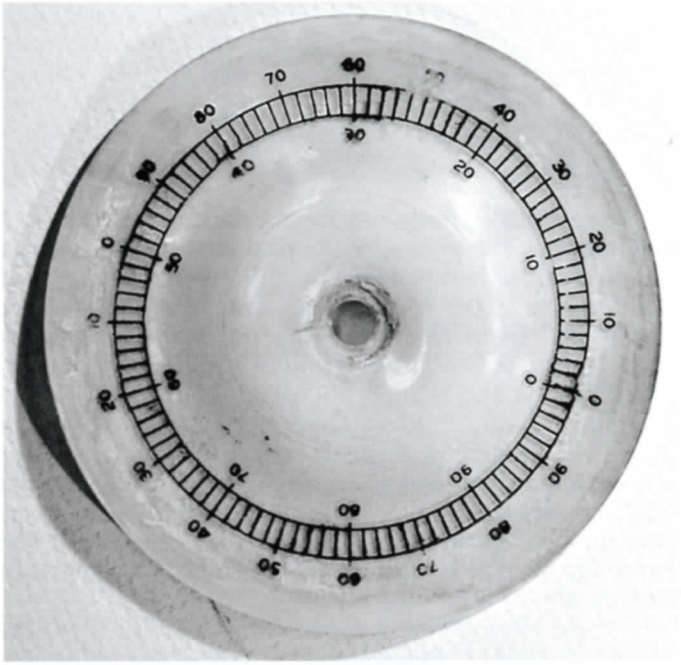
7. The kilocycle dial was drawn by hand and then sandwiched between two thin layers of plastic. The backside of the plastic dial was painted white, and the dial was cemented directly to the shaft with Duco® cement.

8. The power supply components had already been moved to the location as seen in the 75A-1 today. The holes are still located in the chassis shown by the layouts in the original product descriptions. Part designators are written in pencil by the empty holes on the chassis. The components were moved to reduce the heating effect of the rectifier tube on the BFO and PTO frequencies. While frequency change caused by temperature change can compensated for with component selection, the greatest effect of temperature is on the mechanical structure of the oscillator. For a better explaniation of oscillator drift and compensation, see the excellent article written by Ted Hunter.

We can see from the bottom view that C84 was once a plug-in electrolytic capacitor and is now a twist-lock capacitor. It has been moved next to the BFO can. The rectifier, V1, has been moved to the edge of the chassis where it can be ventilated. The former socket hole for VI is covered by choke L29, and choke L28 covers the hole left by C84. The output transformer, T5, is rotated 90 degrees and a fuse holder is added between C84 and V12. These changes can be seen in all 75A-1 receivers today.

9. A power disconnect is handy for a prototype, as power must be applied and removed many times during optimization of a new design. For the production 75A-1, the power cord is permanently attached.

10. There is no name plate or badge on the chassis, or any drilled mounting holes in the chassis.



Original Dial from the 75A

11. The noise limiter is functional at all times. The noise limiter switch and its associated hole are not present in the front panel. The 47k resistor, R37, used only when the 75A-1 noise limiter is in the "off" position, is present on the circuit board of the prototype receiver but is not wired.

12. There is no zero-set knob or pointer adjustment for the kilocycle dial. The pointer consists of a red line that has been glued to the backside of the dial glass.

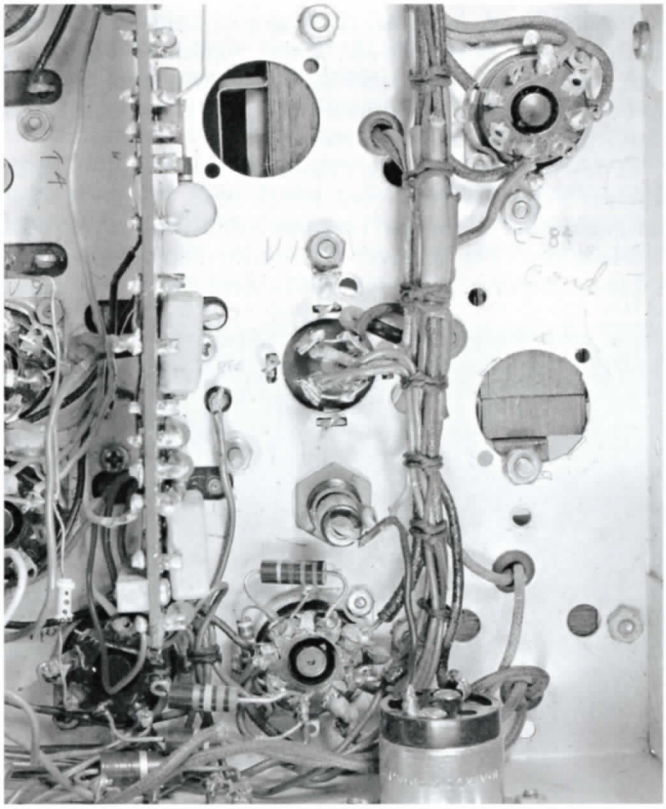
13. The IF transformers and BFO cover are painted gray with their part numbers stamped on top.

14. The aluminum shield between the power supply and IF stages has not been added.

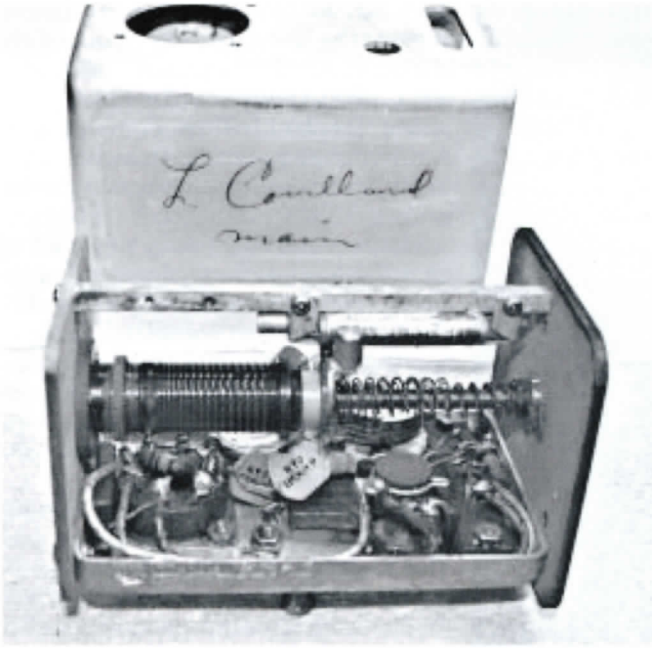
15. The aluminum "stiffener" between the dial assembly and chassis is not present.

New Life for the Prototype 75A

The receiver was received without a cabinet, and the cover for the slug rack assembly was missing as well as the bottom cover for the band switch. The kilocycle disk as shown above had buckled and the tuning knob could not be turned. The front panel was removed and the dial was replaced with one drawn with Autocad and then, printed out on a clear Mylar sheet. The silk screening was removed from a spare 75A-2 dial and the Mylar replacement was glued to its face. While the front panel was removed from the receiver, the audio and the radio frequency gain pots were replaced with new Allen Bradley potentiometers After the filter capacitor was replaced, the receiver was slowly powered up with a Variac. As the receiver warmed up, a light hiss could be heard in the speaker indicating that some of the IF stages were working. The S-meter was unstable due to a dirty pot and it was also replaced. A signal generator was lightly coupled to the grid of the second mixer and plenty of gain seemed to be available through the crystal filter and intermediate frequency stages. This was not the case with the variable IF and the front-end stages. Only the strongest signal could be forced through the receiver by the signal generator. The receiver would also break into oscillation as the band switch was



Bottom View of the 75A



Here is the PTO shown removed from the prototype 75A receiver. The inside cover has been removed. Note the name "L Couillard," followed by the word "main." Whether this means "main receiver" or "main plant" is not clear.

turned.

The metal partitions which hold the individual band switches and coil assemblies have silver-plated contact strips attached to their sides. Close inspection revealed metal migration on the silver contacts had occurred, and the partitions were not able to maintain good electrical contact with the sides of the aluminum box. All of the partitions were removed from the receiver and cleaned. The wafer switches were also removed from the partitions and their contacts were cleaned. The partitions were then placed back in the receiver. At this point, all stages of the receiver were functional.

As alignment began, the PTO calibration was found to be poor. Using a frequency counter, it was discovered that ten turns of the dial fell about 50 kilocycles short. Oscillations ceased as the frequency trimmer capacitor in the PTO was adjusted. Hoping for a quick fix, the tube was replaced with a new 6SJ7. The PTO now refused to oscillate with the trimmer capacitor in any position. The PTO was removed from the receiver. On the side of the PTO was written (in pencil), "L Couillard Main." The PTO covers were removed and power was applied. The problem was quickly found to be low screen voltage on the 6SJ7 oscillator tube. All of the resistors were checked for proper values and were out of tolerance by several hundred percent. The PTO was heavily loaded by 30k of resistance. The 100-k load resistor (R003) had been bridged by a 40-k resistor inside the oscillator assembly. All of the resistors were replaced, and the 40-k resistor was removed. Now, the oscillator was completely functional and ten turns of the dial now fell about 5 kilocycles short. The 25-pF trimmer capacitor was at its minimum value. C002, a capacitor selected during production, was removed. The PTO could then be tracked perfectly.

The PTO was placed back into the receiver and the alignment continued. It was soon apparent that none of the other trimmer capacitors would peak or tune. It was determined that the silver plating on top of the trimmer capacitors had broken away from the solder connections. All of the metal partitions were again removed and each ceramic trimmer capacitor was replaced. Not wishing to remove the partitions a third time, all of the mica capacitors were also replaced with brown dipped-mica capacitors.

After the partitions were placed back into the receiver, the alignment was successfully completed. During alignment the following problems were noted.

1. The slugs of L13, Ll4, Ll5, and Ll6 peaked with the slugs almost all the way in. This problem was corrected in the production 75A-1 with the addition of C31 and C35.

2. The 6AK5 tube in the high frequency oscillator circuit is very hot to the touch. The plate current was measured to be 17 mA, indicating the tube is running at its maximum plate dissipation. A RF choke is in series with the cathode to ground, without a bias resistor. This choke can be seen on the bottom views found in the first "Product Description." The problem was solved in the production 75A-1 receivers by replacing the choke with R17A and R17B.

3. The PTO is not sealed against moisture. In his QST article7, Mr. Hunter writes, "There is only one good way to eliminate humidity effects completely, and that is to design the oscillator so that moisture can not enter. However, the cost of producing a unit sealed against moisture is not justified in amateur applications."

By 1948, all 75A-1 receivers had hermetically-sealed PTOs.

4. Receiver standby is accomplished by lifting the power transformer center tap above ground. This will be discussed in detail later in the article.

With the restoration and alignment completed, an antenna was connected and an evening of enjoyment was spent tuning through the bands. The noise limiter functioned very well and there was little distortion evident on the strongest signals. A production 75A-1 was placed by the 75A prototype and provisions made such that the antenna and speaker could be instantly switched between the two receivers. The audio from the 75A appeared to be higher in pitch because of the noise limiter. It is likely that the .002-µF capacitor connected across the audio gain control accounts for this.

Collins 75A-1, Serial Number "0"

A few years ago, a call was received from a man who had a 75A-1 receiver with serial number 0. His name was Max Hendrickson and he has held the call sign KØDPT since the age of 12. After college, Mr. Hendrickson joined E.F. Johnson, where he was involved with the development of single sideband equipment and the scanning receivers. His father, Aldis Hendrickson, held the call WØYUA and was the owner of a 75A-1 with serial number 3.

Ralph E. Evans (WØBTX), who lived in nearby Webster City, Iowa, was Aldis Hendrickson's friend. Mr. Evans owned a 75A-1 receiver with serial number 0. The receiver had been previously modified to receive the 160-meter band. A crystal calibrator had also been added. There came a time that Mr. Evans wanted to buy a new Hammarlund receiver. His 75A-1 was not a suitable trade-in because of the modifications. Mr. Evans and Aldis Hendrickson swapped receivers.

A few days after Max Hendrickson's call, the 75A-1 receiver arrived with a card which read, "Collins 75A-1 Serial Number 0 Donated by Aldis Hendrickson WØYUA, A Silent key." The receiver is proudly displayed with my A-Line equipment, along with Max and Aldis' QSL cards.

ID Plate on 75A-1 S/N "0"

The receiver had an outboard tuned circuit and band switch, just as Max Hendrickson had described. A toggle switch was added between the RF stage and first mixer.

Here is the Collins 75A-1, S/N "0" and documentation from its owner, WØYUA.

The switch connects the first mixer to either the external tuned circuit or the RF stage. The external tuned circuit can be tuned to 160 meters or 80 meters. The crystal filter was wired out of the circuit, and a frequency calibrator, using a 200-kilocycle crystal, was wired inside the bandswitch compartment. A micro switch, with a string attached to its lever, was used to activate the calibrator.

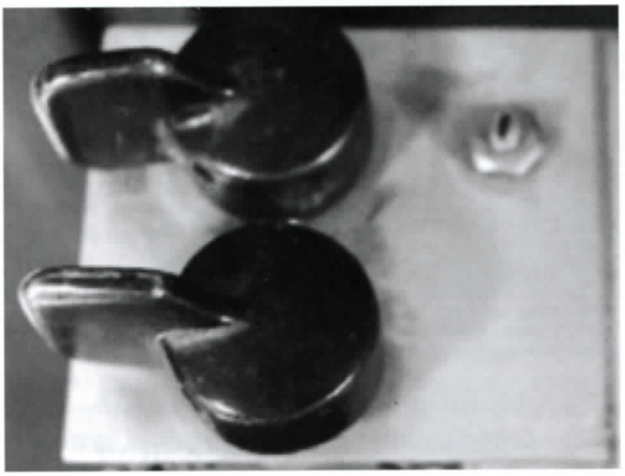
The receiver was slowly powered up on a Variac and it was obvious that the electrolytic filter capacitor needed to be changed. With that completed, a signal applied to the grid of the second mixer indicated that the IF amplifiers were functioning fairly well. At that point, the crystal filter was wired back into the receiver.

Next, the generator was loosely coupled to the plate of the first mixer. The variable IF gain seemed to be within reason, but the front end was totally dead. Close inspection revealed that the 6SA7 mixer socket had been removed and placed back into the receiver, only turned 180 degrees. The high frequency oscillator had been wired into the signal grid and the signal from the RF stage into the oscillator injection grid. The toggle switch and the external tuned circuits were moved and receiver rewired to its original

configuration.

The receiver now played on all bands with the signal loosely connected to the plate of the 6AK5 in the RF stage. The RF stage was completely dead. The sides of the aluminum switch box were heavily worn where the partition holding the antenna coils and switch was located, indicating that it had been in and out of the receiver many times. The partition was removed and all of the capacitors on this assembly were replaced. This time, the trimmer capacitors were checked and found to be usable.

The assembly was placed back into the receiver and the RF stage was now operational. A complete alignment was made and the receiver functioned just as new.



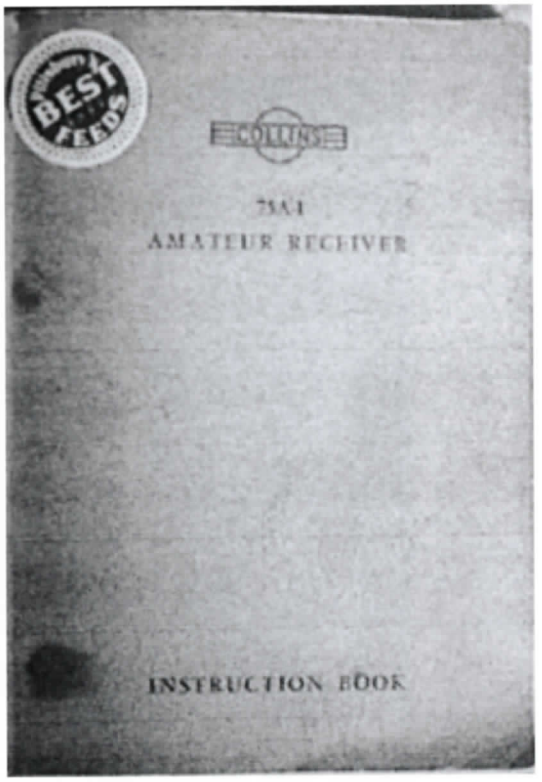
Outboard Coil Assembly on the 75A- 1, S/N "0"

Collins 75A-1, Serial Number 1

The February 1947 edition of the Collins Column announced the delivery of the first 30K Transmitter and 75A Receiver. "Clyde Hendrix, division president of Pillsbury Mills, Inc. has held an amateur operator's license for more than twenty years, and a commercial radio license for the last seven years. He purchased one of the first transmitters built by Arthur Collins. In 1942, he turned his first Collins 30FBX transmitter over to the U.S. Army, after which he called and reserved the first Collins postwar transmitter to be delivered. Hendrix received a 30k and a 75A receiver."

Included below is a picture of Mr. Hendrix receiving his equipment at Collins. A similar picture may be found in QST. Close inspection of the pictures will reveal that the limiter switch and fiducial adjustments are missing. We also note that the ventilation holes on the side panels of the receiver can be seen through the slits in the side of the cabinet, indicating that the rectifier and power supply components had already been moved to their new locations. A better view of the receiver can be found in QST, where it appears Mr. Hendrix's friends have been edited out of the photograph.

In July of 2001, Collins 75A-1, serial number 1, was placed on auction at eBay. The description read as follows: "Yes, that is right! This is a 75A-1 receiver and it is serial number 1. The seller continued, "The original owner was L.E. Seevers, his call was WØAXD, and he was an operator technician for the Illinois State Police. This comes with the original manual, which is in great shape, even has the warranty card still."



Original 75A-1 Instruction Book

The seller was contacted by phone, and a discussion about the previous owner followed. We spoke about the articles in QST and the Collins Column, and that the owner of another 75A-1 with serial number 1 was Clyde Hendrix, who was president of Pillsbury Mills Feed and Soy Division. "That would explain the Pillsbury Best Feeds label found on the cover of the instruction book," the seller said. Looking inside he could see the faint signature of Clyde Hendricks.

The photos which accompanied the eBay auction were very interesting. At this point, only low resolution photos are available, and the instruction book photo is the only one suitable for reproduction. Note the Pillsbury sticker and how the instruction book is identified "75A-1 Amateur Receiver." The receiver name tag reads "75A-1 serial 1." Today, this receiver has both the limiter switch and the fiducial adjustment.

Collins 75A-1, Serial Number "4"

Glen Zook, K9STH, is a well known radio amateur and author who has published many articles in the amateur periodicals. Glen was, at one time, the owner of a 75A-1, with serial number 4. While a student in Georgia Tech, he frequented a local amateur radio store. At some point, the owner was out of the store and an employee had taken the receiver as a trade in. It was a "basket case" and not resalable. Glen, who received the receiver as a gift, described it as follows: "The bathtub capacitors had been re- moved and tubular capacitors hung in their place. It had a limiter switch added which was unlabeled and the fiducial adjustment was missing. The name tag read '75A-1, serial 4.' Unfortunately," Glen said, "I traded it off in the mid- 1970s when you almost couldn't give some of the old boat anchors away."

PRESENTATION OF SERIAL NO. 1

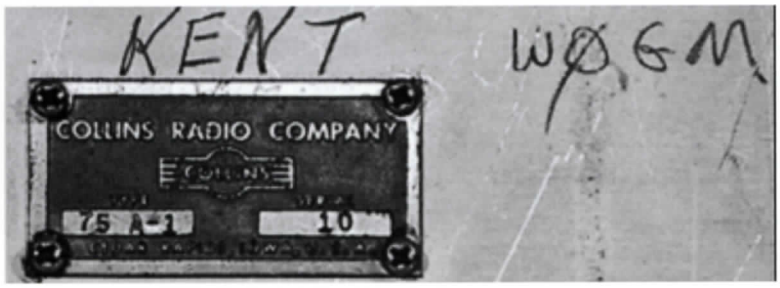
Clyde Hendrix operates his new amateur radio unit. Standing are M. E. Cook, Earl Harris, C. F. Baker and J. W. Zipoy. Harris is a radio service man at Clinton, Iowa and operator of ham station WØQBM. Cook, Baker and Zipoy are members of the Advertising Department at Pillsbury Mills, Inc.

Collins 75A-1 Serial Number "10"

A thread exists on the Internet Collins QTH.net email reflector seeking information about a 75A/75A-1 receiver. The owner at the time was Charlie Summers (WØYG). Mr. Summers was contacted recently and he shared this information about the receiver. The name tag is stamped "75A-1 Ser. 10." An original Collins invoice accompanied the receiver. It is dated December 30, 1947, and is labeled "Demonstrator." The purchaser of this receiver was Don Kent (WØGM). Mr. Kent, an employee of Collins Radio, paid $168.30 for the receiver. Mr. Summers subsequently sold the receiver to Bill Standefer who is the present holder of call sign WØGM. Bill has graciously shared photos and a copy of the Collins invoice for this article.

A noise limiter switch has been added to the receiver. It is not a toggle switch, rather a wafer switch with a knob. The hole for the switch is not in alignment with the other knobs and it is unmarked. Only one of three holes needed to mount the fiducial assembly has been drilled in the front panel. The receiver retains the original fixed kilocycle dial pointer but the red line is missing. Most notable is the wire used in the receiver. It is the same multicolored wire used in the 75A prototype.

Below: ID Plate From 75A-1 Serial Number



Notable Changes in the 75A: Relay and Break-in Control

A board with two terminals exists on the prototype and all of the early production 75A-1 receivers. A set of external relay contacts can be used to place the receiver in standby during times of transmission. Problems associated with this circuit were identified early in the design stage. The circuit was changed four times during production of the 75A-1.

I am indebted to Warren Bruene for sharing his personal notes that are dated May 13, 1946; "Notes and comments on 30K-I and 75A-1 performance on the air." Roy Olsen and Arthur Collins listened at Olsen's home on the 75A receiver while tests were made with the transmitter at John Foster's place." Warren continues, "The receiver seemed slow in coming back to life when the switch was thrown from send to receive. This could be caused by two conditions. One is that breaking the power transformer CT in the receiver causes a delay by the amount that it takes the filter condensers to charge up. The other is that the transmitter dies down slowly as it keeps running until the filter condensers die down so far that the oscillator stops. If this is the cause, the transmitter would paralyze the AVC for a short time and would have to be eliminated by opening the key when turning the transmitter off."

An additional note on May 16, 1946, reads "Last night I worked some CW using the 30K-I and 75A-1 and have following comments. The transmitter worked break-in nicely and when working on same frequency, the receiver made a nice keying monitor by turning gain down a bit."

For the phone man, break-in operation typically means single control, or simply push-to-talk. The receiver must recover fast enough to keep from missing a syllable or word.

For the CW operator, break-in is more difficult to achieve. The operator receiver must be able to hear signals during the key-up intervals of a transmission. True break-in operation requires a very fast antenna switch, which is properly sequenced, and a quick recovery of the receiver. Separate antennas for the receiver and transmitter gives some relief for the low-power stations but the amount of power delivered to the antennas terminals on the receiver must be limited in some way. As we have read, the prototype could not recover fast enough when switching the power transformer center tap to ground.

The first 75A-1 production receivers were wired so that the standby switch (wired in parallel with the external relay terminals) interrupted the B+ to all of the receiver stages. This unloaded the receiver power supply during transmit and was not very desirable.

The circuit was revised such that the B+ was interrupted to all stages of the receiver with the exception of the screen voltages to the audio stages. Since the plate voltage on the audio output stage comes from the first section of the power supply filter, the output stage provided some loading of the power supply.

Finally, B+ was continuously supplied to all stages of the receiver. This time, the cathode resistor (R51) of the output stage and the RF gain control were both switched to ground. Also, two additional terminals were added to the board marked "Relay." The added terminals are labeled "Break In Voltage." A positive voltage (20-50 VDC) may be inputted to these terminals to fully mute the receiver. The instruction book warns that external protection must be used to limit excessive power that might be available at the antenna input terminals.

Problems continued with the break-in circuits in the field. Strong signals at the antenna terminals tended to charge up the AVC line, silencing the receiver until the operator cycled the standby switch. The problem was most notable in the 6SA7 mixer stage. For more information about this problem, see the 75A-1 Collins Service Bulletins, numbers 3 and 4.

Noise Limiter Switch

The noise limiter switch was added, following the evaluation of the demonstration receivers, and before the release of the schematic diagram for production in March 1947. It is an enhancement that allows the performance of the limiter to be determined by the operator. Revisions in the parts list indicate that a SPDT switch was once used, but soon changed to a DPDT switch as seen today. The limiter switch is shown on the schematic and is found in the initial release of the instruction book.

Addition of a Fiducial, or Zero Set Adjustment

As we have seen, the 75A receiver was introduced in 1946 as the most stable and accurate receiver being built. The Collins ad in the June 1947 QST claimed the "dial is accurate to within one kilocycle at all frequencies below 22 megacycles, and within 2 kilocycles on ten and eleven meters. By the March 1948 QST ad, there is no mention of this accuracy. It states, "Accuracy and stability is very high."

A third "Product Description" was released in April 1948, titled "The Collins 75A-1 Amateur Receiver." All references to the 75A were changed to 75A-1.

The most notable change was found in the section under "Accuracy and Stability." It reads, "Three factors contribute to very high accuracy and stability (1) the use of precision quartz crystals in the first conversion circuit, (2) the inherent accuracy and stability of the V.F.O. in the second conversion circuit, and (3) linearity and absence of backlash in the tuning mechanism. In order to take advantage of this precision, a secondary frequency standard, continually checked against WWV, is utilized in the factory calibration. You can rely upon the 75A-1 being accurate under all normal variations in operating conditions." The zero set or fiducial adjustment was added without fanfare. Byron Goodman's review of the Collins 75A in QST18 reports, "Although not present in the models examined at headquarters, we have been advised that a movable index, or 'fiducial,' has been added to the calibration dial. This allows the operator to set up the receiver exactly on frequency, in the event that drift or aging of components shifts the calibration slightly."

The following 75A chronology is presented:

• Year 1946

–January: Roy Olsen was asked to design the receiver.

–February: QST reports the new receiver design shaping up.

–May: Warren Bruene records 75A-1/ 30K tests in notes.

–August: 75A Product Brochure #1 is released.

–September: Lou Couillard announces the new 75A in the Collins Column.

–October: (1) A Collins ad announced "The Collins 75A...A new standard for amateur receivers" in QST. (2) Pictures of Collins 75A were shown in the general section of the Collins Signal. (3) 75A-1 literature was available upon request.

• Year 1947

–January: Design Engineer, Lou Couillard, described the 75A receiver in the Collins Signal.

–February: The Collins Column announced shipment of 75A-1, serial "1" on January 8th, to Clyde Hendrix, in a special presentation.

–March: (1) The schematic of 75A-1 was originally released. (2) The Collins Column announced a production line for the 75A was in process of setup.

–April: The Collins Column announces that "the 75A production line is really underway now."

–May: (1) 75A Product description #2 was released. (2) QST ad showed Clyde Hendrix and his new 75A-1 and 30K along with a telegram dated January 17th, 1947, describing its operation.

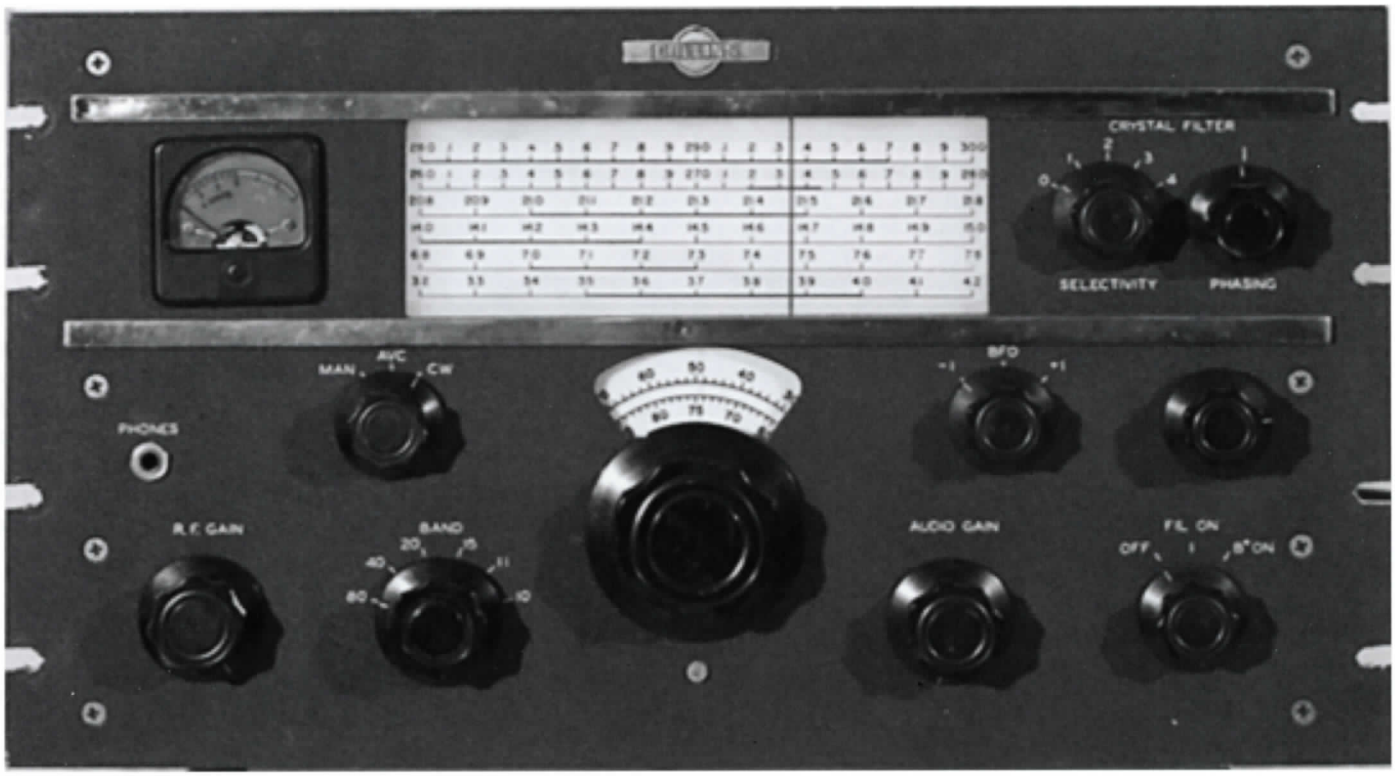
–June: QST ad showing a 75A and 32V on a desk with mike and key was titled "This can be your complete ham shack."

–September: A QST article was titled "Looking Over the Postwar Receivers." The 75A has a limiter switch, but announces a new fiducial adjustment to be added to later models.

–December: Bill of sale delivered for Collins demonstrator, S/N 10.

• Year 1948

–March: A QST ad showing the same picture and title was used in a June 1947 ad. The receiver model numbers have been changed from 75A to 75A-1 in the text.



Front Panel of the Collins 75A-1, Serial Number 10

Conclusions

In the March 1947 edition of the Collins Column, Edith Mason announced, "We proudly present to you the new Lloyd Banks line, 'Ham Radio 75-A.' Operations are now being set up for final production, and we hope to get going soon, luck prevailing." The April 1947 Collins Column continues, "The new line is really underway now." As we have seen from the chronology, the 75A-1 receiver serial number 1 was delivered to Clyde Hendrix three months before the production line was set up.

Collins Radio has historically used "pilot lines" to build the first models of a new product. The pilot line operators are highly skilled operators who can work from hand-drawn schematics and procedures. Engineering technicians also possess the same skills. It is likely that these first ten (or more) 75A-1 receivers were assembled by pilot line or engineering technicians. The use of colored wire with plastic insulation indicates that they were not assembled by the production line. The wire used on the production 75A-1 receivers has cotton covered insulation and is laced on a cable board.

All receivers (including the preproduction receivers serial 1 through serial 10) were labeled "75A-1." All editions of the instruction books carry the 75A-1 identification on the cover. The lack of a limiter switch on the front panel and the placement of power supply components shown in the initial "Product Descriptions" have traditionally been used to set the 75A receiver apart from the 75A-1 receiver. There are photographs showing the 75A-1 receiver, serial number 1, without a limiter switch or fiducial adjustment. We conclude that there are no production receivers legitimately labeled 75A. At this time, only two prototype 75A receivers can be identified from the photographs that are currently available. Both have the original holes in the chassis for the power supply components as shown in the two product descriptions. One of these receivers has the socket holes covered or painted in. That receiver can be seen in the first edition of the instruction book. The other receiver is in my collection.

While Clyde Hendricks' 75A-1 receiver appears to have been upgraded at the factory, many of the first ten serial numbered receivers were not upgraded, as we have seen. These receivers are probably the demonstration models mentioned by Lou Couillard.

A study of several 75A-1 instruction book editions has revealed an interesting fact. Each page of the instruction book, with the exception of schematics, pictures, and drawings, has a 5-digit part number. It may be found at the bottom of the page on the left hand side. The pages containing only text are written on a typewriter, several sheets at a time. When a page is revised, a dash number follows the 5-digit number. Changes can be easily followed by comparing the various editions of the instruction book. The schematics in the instruction books do not carry a revision history. A recently found schematic drawing gives an original release date of March 1947. The drawing revision history records three changes. Unfortunately, it is not possible to identify the various changes that were made. Only the "0" numbers are shown, not the actual changes. The schematic is identical with that found in the latest edition of the 75A-1 Instruction Book.

The assignment of product type numbers or model designators was very important to Mr. Collins. These numbers were usually set up in families, such as the 30-series and 32-series of transmitters. The Collins Radio Company has been a manufacturer of commercial and military receiver products since the 1930s. However, the 75A was the first receiver designed specifically for the amateur. The receiver needed a new family number. The number "75" was likely chosen because it was unused,

available, and easily remembered by the amateur radio operator. Mr. Collins often chose type numbers that were familiar to the amateur. The "A," while first in the alphabet, likely stood for amateur, just as the letter "S" stood for "sideband" in the 75S-series receivers.

Recently, while looking through some papers that Warren Bruene gave me, I discovered additional information. In 1965, a proposal marked "company private" described equipment to be designed that would follow the "A" and "S" lines. The equipment was transistorized and therefore carried the "T" designation. The receiver carried the designation, 75T- 1. A preliminary set of specifications were listed but no picture was given. Similarly, a 51T-1 commercial receiver was proposed, as well as a transceiver designated TWT-1. I have seen pictures of the TWT-1, or at least a balsa wood model. The 30S-3 was part of the package. None of these ever made it into production.

Some believe that the "75A" type number was assigned to the hardware and the "75A-1" designator to its documentation. There is some indication that this is true. However, this would require the second generation receiver to be assigned type 75B and its documentation to be 75B-1. We now know this is not the case.

By 1950, suggestions for improving the 75A-1 began to show up in the amateur publications. The 75A-2 addressed many of these suggestions, such as improving the antenna input match, especially on 10 meters, and the upgrade to the newer 7 and 9-pin tubes throughout the receiver. Only the octal-based 5Y3 rectifier was retained. A secondary frequency standard was no longer needed because a frequency calibrator was included in the receiver. The high frequency oscillator was changed to the Butler circuit and the 160-meter band was added. An additional stage of IF gain and a noise limiter for CW was added. An additional stage of IF gain and a noise limiter for CW was added. Manufacturing costs were improved by eliminating a number of coil partitions and the many screws needed for the covers. Rumors are, Mr. Collins did not favor the slideruled dial on the 75A-1 receiver, thinking it was too similar to a Hallicrafters all-band receiver, which was popular at the time. That problem was also corrected with the 75A-2.

The origin of 75A-1 receiver, serial "0," is unknown at this time. The receiver has a production wiring harness, and the BFO and IF transformer covers are painted gray. It was likely removed from early production for engineering evaluation. To my knowledge, no Collins product ever started with serial number 0. The serial tag was probably added at a much later date by the original owner. The outboard tuning network, mentioned earlier, may have been used to evaluate the addition of the 160-meter band to the receiver. The crystal filter was likely removed during the evaluation of the mechanical filter plug-in assemblies. The reversal of the inner and outer grids on the 6SA7 mixer stage could have been an attempt to solve the break-in problem previously mentioned. For a complete explanation of converter tubes with oscillator voltage on an outer grid, and signal voltage on the inner grid, see The Radiotron Designer's Handbook.

Acknowledgments:

A number of people have shared documents, JPEG photos, and information for this article. A special thanks to Warren Bruene (W5OLY), Rod Blocksome (KØDAS), Jay Miller (KK5IM), Jim Stitzenger (WA3CEX), Max Hendericks (KØDPT), Ray Osterwald (NØDMS), Glen Zook (K9STH), Bill Standefer (WØGM), Charles Summers (WØYG), and Robert Ramirez.

For further reading, see the original article in the January 1947 Signal by Lou Couillard introducing the 75A Amateur Receiver: http://www.collinsradio.org/signal/Q42017/

CCA Board Meeting Recap

Notes from our CCA Board meeting held on 11/18/17 in Los Angeles CA:

Since the CCA Board of Directors is geographically diverse, it is rare that the whole board can get together and brainstorm ideas on how the CCA can better serve its members.

When I was President of the CCA, I had wanted to have a face to face board meeting, but everyone's schedule kept getting in the way. We resorted to phone calls and brief meetings at Dayton to take care of the CCA business.

The idea stayed alive, and our President Jim Stitzinger – WA3CEX was finally able to set a date in November, at the start of the Thanksgiving Holiday, to gather in sunny California. Wayne and Sharon Spring were kind (and brave) enough to host the gathering. While I am not on the board now, Jim asked me to attend and lend my ideas as past President.

We all arrived at Wayne's house on Friday night and had a great dinner and time to get to know each other. After that, Jim had brought several of his rare receivers and we had a good time sitting in Wayne's shop comparing the performance of each of them.

The next morning started at a local coffee shop for a big breakfast and then back to Wayne's house for serious discussion. Each of the board members has a CCA job and each gave a report on the state of that area of responsibility.

Below is a recap:

Jim Stitzinger – WA3CEX, our President, gave us a run down of what had happened over the last year and his plans for the next year. He nominated our newest board member, Francesco Ledda-K5URG as Secretary to replace the termed out retiring Dennis Kidder, which was seconded and unanimously voted to. Since we have been one board member short, Jim also nominated Wayne Spring, W6IRD to be the Board Member at Large which was seconded and unanimously voted to.

Ron Mosher K0PGE, our Treasurer, gave the financial report. Please, look for a recap of CCA financials in the first quarter Signal 2018. Rest assured, though that we are in good shape and should have a few

dollars of surplus funds from operations in 2017. We also debated some changes in the By Laws to make the CCA run more efficiently. Look for a recap of those proposals soon. One of the issues was the Associate Membership – this is not in the bylaws and, therefore, will be deleted. We are going to ask the Associate Members to upgrade to full membership.

Dennis Kidder W6DQ, our Retiring Secretary, gave us a recap of Board votes and decisions over the last two years we debated the most efficient method to stare CCA docs.

Jim Hollabaugh W6TMU, our 20 meter net manager, brought us up to date on the status of the nets and net controls. We could use some help with more net controls, but the current group is doing a great job, especially with the poor propagation that we currently have.

Scott Kerr – KE1RR, Web Site Manager, Dayton Booth Chair and Reflector Manager and retired Signal Editor, brought the board up to date on the Web site. There is a lot of work that needs to be done to get new content loaded, and some out of date material removed. The reflector seems to be working well except for the spam blocking by ISP's which is a problem.

Jerry Kessler - N4JL – Membership Chair, joined in by phone and brought us up to date on Membership numbers and some of the technical details of managing our membership database. We worked on a plan to move away from the Associate Membership.

Gary Halverson - K6GLH, Acting Signal Editor, joined us by phone, and everyone expressed their excitement about the great Signal that he produced. Gary made some suggestions about layout changes and we discussed ideas for future content. All of the changes that Gary discussed are agreeable to the board and we are all excited to see the next issue.

Bill Carns N7OTQ, Past President, Retired Signal Editor and HF Comm Chair, submitted a written report on the status of our new HF Comm Group. Look for a new Net and some exciting things in this specialty sub group of the CCA.

We then went to dinner and visited after dinner. Sunday morning, we had a round table discussing two topics – How to bring in and mentor new CCA members and how to preserve the Collins Parts that seem to be thrown away as people downsize or leave them to their estates. Wayne is especially sensitive to this subject and we are still talking about how to have a cache of parts to keep these radios running for the next 70 years.

In short, this was a productive time and everyone left with some great ideas on how to better serve the members in whatever responsibility they have with the CCA. Look for some exciting changes over the next year!

- Scott KE1RR

Passing On Your Ham Radio Collection

By Steve Airola, W6RXK

Like many of us, you have been a "Ham" for many years. Along with the hobby often comes collecting a wide variety of radios, some rare, some expensive but most don't have much value except extrinsic value to us, as Ham radio operators. Still, your collection can add up monetarily to a substantial sum when taken as a whole.

Now that we're older, we may contemplate either selling our collection now or bequeathing our valuable "stash" to our children or giving it to a friend to enjoy. This can be accomplished by either making a Will or a Living Trust. A Will is a court-supervised document that allows the court in your state to supervise your wishes as to whom will receive your property after your death. This is frequently a lengthy process (often 7 to 12 months) or longer and is a court-mandated procedure, wherein the attorney and Executor of your Estate each receive a "statutory fee," based upon the gross value of your estate. A Revocable Living Trust avoids probate and saves unnecessary costs in having the whole process supervised by a superior court. There are benefits and detriments to both the Will or Living Trust method and you should consult your tax and legal professional to determine which process is right for you.

The act of making a Will or Trust may seem minor indeed in the face of the overwhelming emotional force and mystery of death. Though most people are aware that they need a Will or Trust, the majority of Americans don't have one. Why? No one knows for sure but it's likely due to A) the legal establishment has managed to mystify the process. B) Lawyers charge too much, or C) either thinking about or preparing a Will or Trust may somehow hasten the process of death.

One thing for sure, if you die without a Will or Trust or fail to use some other valid legal method to transfer your assets and Ham radio collection after you die, the law of your state will cause your valuable Ham radio collection to be distributed to your spouse and children. If you have neither, your collection will go to other close relatives according to a statutory formula set out in your particular state. If no relatives exist, then your collection will go the State in which you live.

Since most of our spouses, family members or friends are unfamiliar with our vast radio collection and any process or procedure for disbursing of our valuable collectibles, it makes sense to instruct your Executor or Trustee to contact a reputable auction house that specializes in amateur radio equipment to take possession of and to auction the collectibles. With the assistance of the Internet, auction houses now have worldwide reach and tools to serve the ham radio community fairly well. Even eBay can be a satisfactory alternative if someone can navigate the technicalities of selling on eBay.

When preparing your Estate plan you may want to identify in writing a trusted friend or relative who has knowledge of amateur radio equipment and who has agreed to take on the responsibility of disposing of your valuable collection in a responsible manner that will generate the most funds for your designated beneficiaries. You should talk with your chosen individual that you have designated so that he or she understands your wishes with respect to the disposition of your collection.

You may also specifically authorize your Executor or Trustee to appoint a specific individual such as a trusted friend to specifically handle the disposition of your collection.

Many people worry that the gifts they want to make in their Will or Trust will not turn out to be legally binding or be ignored by the Trustee or Executor. The best way to ensure compliance with your wishes is to retain an attorney who specializes in the area of Wills or Trusts. You would also want to have specific wording in your Will or Trust as to the disposition of your collection, for instance, if you want to give your collection to a specific individual or your local non-profit amateur radio club you may use the following wording:

I make the following specific gifts of my Amateur Radio Collection to [Insert: Name of Beneficiary]: or if [Insert: Name of Beneficiary] does not survive me by forty-five (45) days to [Insert: Name of Alternate Beneficiary].

If you wish to have the collection sold by a trusted friend, you may want to consider the following: *I direct that my Amateur Radio Collection and all Attendant Accessories be sold as soon as feasibly possible. I direct that my good friend [Insert Name] take possession of all such Amateur Radio equipment and attendant items who shall then be responsible for the sale of such items in any manner in his absolute discretion as he deems appropriate. He shall then account to my Estate or Beneficiaries for all income received. He shall be entitled to a reasonable fee for his services rendered as well as reimbursement for all costs associated with the disposition of my collection.*

US tax laws provide an incentive for individuals to donate either during their lifetime or upon their death, collectibles to tax-exempt organizations, such as museums, universities and other organizations that display and make use of the collectible in furtherance of their tax exempt purposes. The transfer of a collectible to a charitable organization saves the individual donor income taxes because of the allowable income tax deduction while at the same time the lifetime transfer relieves the donor of the despair and worry connected with the maintenance of the specific piece of equipment. A transfer on death, otherwise called a testamentary transfer, to a tax exempt organization saves Estate taxes for the decedent's estate because the full fair market value at the date of death is an allowable estate tax deduction.

In my opinion, in order to ensure that your collection brings the highest and best monetary value to your Estate and Beneficiaries, deal directly with an auction company that specializes in Amateur Radio Equipment. Several of these companies can be found in nation-wide publications that serve the Amateur Radio Community. You can contact these companies and make arrangements for the disposition of your collection prior to your death or you may instruct your Executor or Trustee as to whom to contact when that fateful day arrives. Prepare your Estate plan NOW and to communicate in writing your wishes and desires as to the disposition of your valuable collection. DO NOT PUT IT OFF!

Support Stand For S-Line Cabinet Removal

By Mike Sedgwick, K7PI

Removal of an S-Line cabinet is not hard but it can be cumbersome, especially for the heavier equipment like the 30L-1 and 51S-1. Even for the lighter equipment, it is relatively easy to scratch a trim ring or even the cabinet because it is difficult to hold both the cabinet and the weight of the radio at the same time. The process of cabinet removal can be made much easier by fabricating a simple stand that holds the equipment in a vertical position supported from the front end of the radio.

Figure 1 shows a top view of the S-Line stand. All materials are available from a standard hardware store for less than $10. Mine is fabricated from a piece of 17-inch by 17-inch, ¾-inch thick piece of plywood. The large size and thickness give the stand stability and allow additional holes to be drilled at a later date should it be used with larger equipment. The supports are 4 each ¼-20 screws, 4 ½ inches in length with matching nuts and washers (washers placed on both sides of the plywood). Matching sized plastic tips (purchased from Home Depot but usually available at most hardware outlets that sell bulk nuts/bolts) are put on the ends of each support screw to protect the front panel finish. Note that the length of the support screws is not critical except they must raise the front end of the unit high enough from the stand to clear the front panel controls (about 2 ½-inches with my after-market machined tuning knobs with spinner handles). The support screw width separation dimension is 13 ½-inches and the height separation dimension is 5 ⅜-inches. I also installed rubber feet on the bottom of the stand so it could be placed on a table top.

Figure 1 – Top View of S-Line Stand

The S-Line unit is first positioned on the stand as shown in Figure 2. This allows freedom of using both hands to remove the 5 cabinet retaining screws on the bottom of the cabinet (4 in the rubber feet plus 1 located at the center rear) and the 2 screws under the top lid which attach the cabinet through holes in the trim ring to brackets on the top front of the chassis (not to be confused with the screws holding the trim ring on the cabinet itself). The cabinet can then be lifted and guided off the chassis with both hands with no radio weight to contend with.

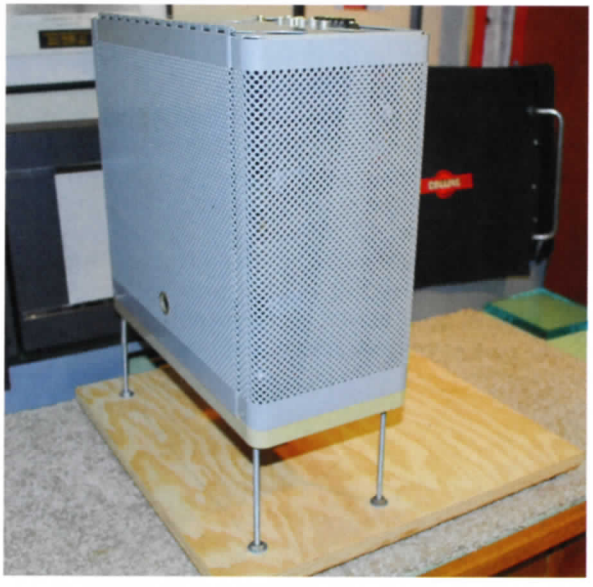


Figure 2 – S-Line Unit w/Cover On Stand

The stand makes cabinet removal a trivial job even with a heavy 30L-1 or 51S-1. Figure 3 shows support details of my 51S-1 after cabinet removal. When work on the radio is complete, the radio chassis is again placed faced down on the stand (as shown in Figure 3) and the cabinet is slipped over the chassis with 2 hands. Trim ring and bottom cabinet screws can then be inserted and tightened and the job is done.

For a few dollars and less than 15 minutes of time you can save damaging your beautiful S-Line receivers and transmitters during cabinet removal by building this simple support stand.

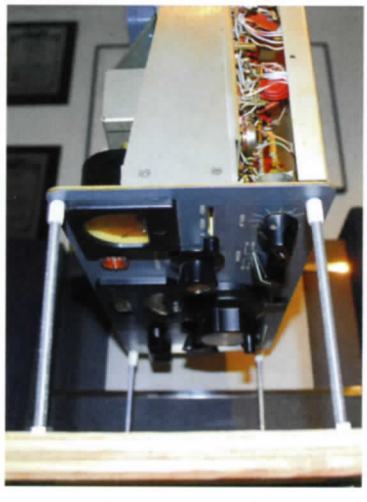


Figure 3 – Unit w/o Cover On Stand

In The Shack with Joe Eide - KB9R

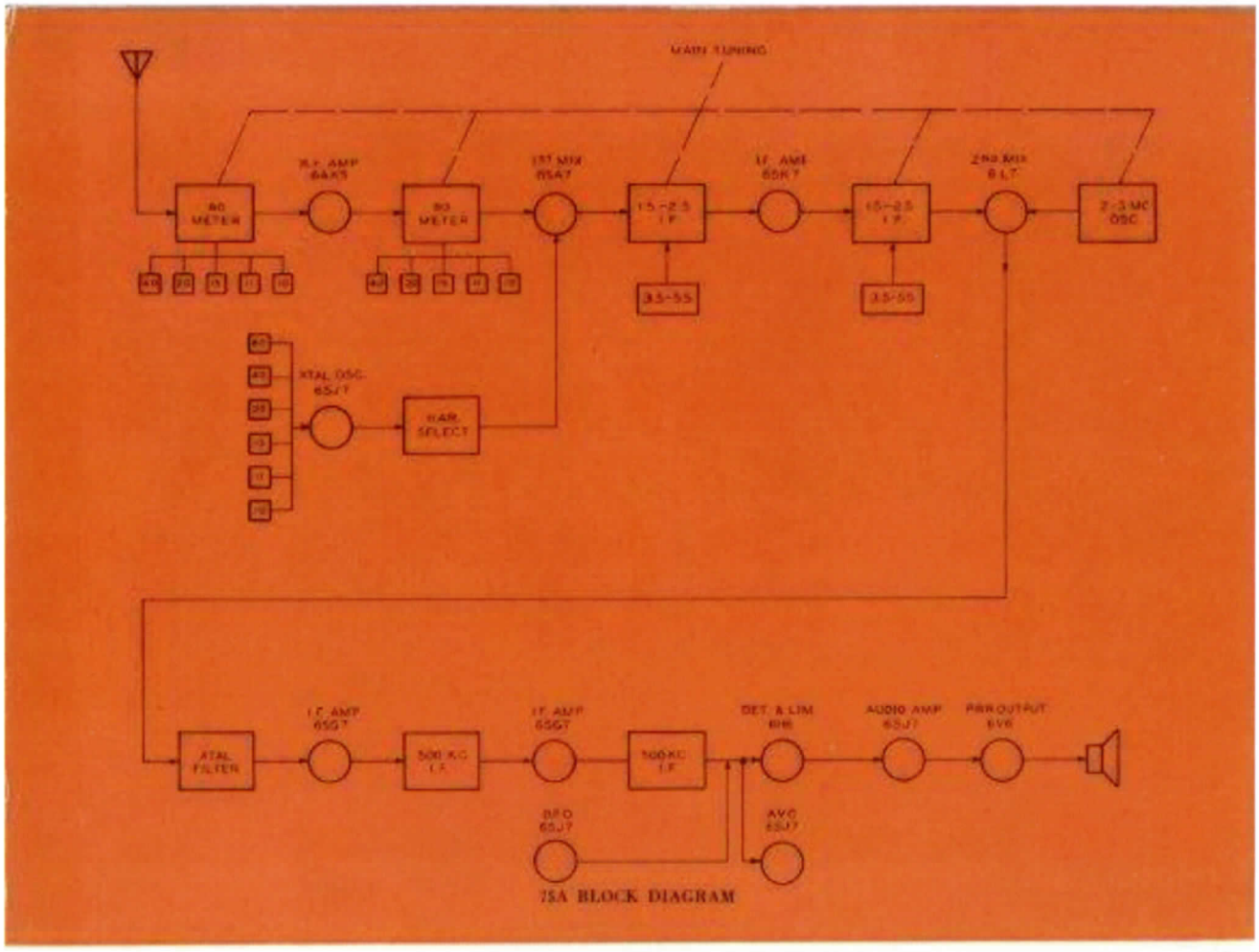
I fell in love with Collins radios from the inside out.

In 1989 I had my first real hands-on encounter with a Collins amateur receiver. A friend of mine (actually my Elmer) brought me a 75A-4 receiver needing help. The complaint was lack of sensitivity and erratic operation. At first glance, I was not impressed with the outward appearance of this Saint James grey box. Upon inspection, I found that the previous owner had attempted to re-engineer the mixer stages. Reinstalling the original circuitry restored the receiver to normal operation. As I worked on the 75A-4, I was struck with the quality of components, craftsmanship and performance. To this day, the 75A-4 is my favorite Collins piece.

After graduating Mondovi High School in 1965, I worked in a radio/TV shop and helped build a cable TV system in Durand, WI. This was while going to school in Eau Claire, WI. In 1971, after a stint in the Army as a helicopter electrician, I returned to work in the cable television industry. I worked out of Eau Claire for 34 years. During my career in cable I accumulated a modest collection of St. James Grey radios and EF Johnson transmitters. There have been and are other brands of course, but St. James Grey and maroon are my colors of choice. I retired in 2005 as Chief Engineer of the cable television system serving several communities in northwestern Wisconsin. Of course, it was a lot more than television by 2005, to include internet, phone, etc. The early years of retirement here in Eau Claire, allowed me to continue filling voids in my collection along with more time for radio restorations.

I am slowing down these days as age and multiple hobbies dictate. Besides radio I have a passion for woodworking, photography, vintage cars and old farm tractors. However, I still rag-chew on AM, CW and SSB, 4 or 5 times a week. I also own a 440 MHz repeater here in Eau Claire that has been on the air since 1990. I am lucky to have a wife of 50 years (Sue - K9SUE) who has always been supportive of my hobbies.


ELECTRON TUBES



75A BLOCK DIAGRAM

OTHER COLLINS EQUIPMENT FOR AMATEURS

30K transmitter—500 watts input on CW, 375 watts on phone, 6 bands, bandswitching, v.f.o. control, floor model.
32V transmitter—150 watts input on CW, 120 watts on phone, 6 bands, bandswitching, v.f.o. control, table model.
70E-3 v.f.o.—precision unit, 10 volts output, 1600 kc to 2000 kc range, linear tuning.

FOR RESULTS IN AMATEUR RADIO, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street
New York 18, N. Y.

458 South Spring Street
Los Angeles 13, California

53M-12-46—N8740—29117—Printed in U.S.A.

December 1946