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Collins Collectors Association
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The Collins 30S-3 - What is it? Why isn't it?

by Chuck Carney, W0GDJ and Chuck Carney, K6RU

30S-3...the amp that almost was...

Introduction

Very few people are aware that a successor to the 30S-1 was designed by Collins Radio, and that two engineering models were built. They are really beauties. At first glance you might say it's a 30S-1, but on second glance it's obvious that it must be a cousin.

They were designed about the time the Collins 208U-3 and 208U-10, commercial three and ten kW HF transmitters, were being designed. Some of the design features in these transmitters found their way into the 30S-3. It incorporated:

- automatic tuning from 2-30MHz (no band switch, plate tuning or loading knobs)
- special copper alloy flat ribbon tank coils with hardened contact edges for the rolling tap
- servo-driven tuning and loading mechanisms
- odd order harmonic suppression circuits (10 db better than 30S-1)
- ability to be remotely controlled (removable control panel with 15 wire cable)
- one-second warm up time
- continuous, key down, kilowatt output
- compact (cabinet is slightly smaller than the 30S-1)

By way of explanation, W0GDJ was the Collins Amateur Product Line Manager from 1957 to 1967, the golden years of ham radio for Collins Radio. The equipment shown here was passed on to my son, K6RU, after my retirement and with no more longing for ham radio, although I do like to reminisce those exciting days.

My son, K6RU, first got his ham ticket when he was twelve years old, and has been active most of his life since as, K0HTP, KB0H, VS6II, NZ6Q, and presently K6RU. He has put a lot of effort into reviving the 30S-3, which had been sitting in my basement for many years, and survived several moves. In our discussions about it, and ham radio in general, we decided it was time to reveal it's story to the ham fraternity.

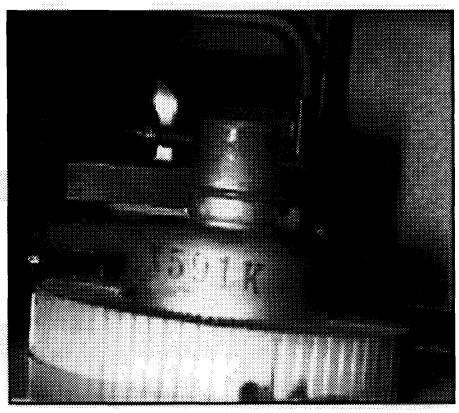
30S-3 Specifications

(From Collins Document 9/18/62 "30S-3A RF Linear Amplifier, P/N 522-3233-00")

MODE: "Any type" of emission.
TYPE OF SERVICE: Continuous SSB and CW operation. Attended or unattended and local or remote control operation is possible.

POWER REQUIREMENTS: 115v or 230v, 50-60 cps, single phase, 3000 watts maximum.

TUBE COMPLEMENT: One 3CX1000A7 triode, in a grounded grid circuit. [The tube pictured is a 1962 Eimac prototype, identified as "X591K".] Power supply uses silicon



rectifiers.
TRANSISTOR COMPLEMENT: Six type 2N618 germanium power transistors for servo output and driver stages. Four type 2N2374 germanium audio transistors for servo preamplifier stages and control circuits.

DRIVE POWER: 80 watts for full output (20 watts minimum for tuning).
POWER OUTPUT: SSB position: 1000 watts SSB or CW; low power: 550 watts CW

FREQUENCY RANGE: 2-30.0 mc, autotune.

NUMBER OF CHANNELS AND HOW SELECTED: All circuits are continuously tuned and no band information is required. Tuning and loading on all frequencies is automatically accomplished with servomotors.

TUNING TIME: Less than 45 seconds to tune from one end of tuning range to other.

HARMONIC AND OTHER SPURIOUS RADIATION: Second harmonic -50 dB; all others at least 60 dB down.

NOISE LEVEL: 40 dB below one tone Carrier.
AMBIENT TEMPERATURE: 0-50 C.
AMBIENT HUMIDITY RANGE: 0-90%
ALTITUDE: 0-6000 ft.
SIZE: 17" W, 28" H, 15 1/4" D.
WEIGHT: 175 Lbs.
OUTPUT IMPEDANCE: Variable; 50 ohms nominal, unbalanced with less than 3:1 SWR.

(continued on page 4)

In this issue...

Basic Trouble Shooting - Part 2

by John Bess, WA5VVT

I think that the last time I left you hanging with a non-working rig was in the previous issue and we were chasing voltage to the non-working circuit.

I am sure that you determined where the voltage started in the power supply and have followed it to where it stopped and have corrected the problem by now. Oh, the new resistor that you put in to replace the burned up one also went up in smoke? Well, now we both know that there is something that is shorted to ground on the side away from the power supply. If it was on the supply side the voltage would never have gotten to the resistor in the first place and it would never have gone up in smoke. Don`t you just love the smell. Look for a shorted bypass cap to ground. It could be a shorted tube but I think that we changed it out in the last issue. What, you put all the old ones back in the rig? Why? Oh well, change it out again just to be sure but also change out the capacitor first. If you feel dangerous put the old tube back in just to make sure. If the resistor doesn't self-destruct you guessed right. If it does then I guess you must love the smell. At least we now know the reason it burned up. If it works now, pat yourself on the back and go do something else. You do not have to read any farther.

To review, we have checked all of the oscillators and have verified that they are working or have gotten them to work, removed all shorts to ground, replaced tubes, resistors, capacitors, and any shorted chokes and the rig still will not work. What did we forget to check?

In Collins S-Line gear, (32S-1, KWM-2 (A), 32S-3,etc.) the TONE OSCILLATOR does more than give you a side tone in CW.
In the 32S1 and the KWM-2 (A) it does the following:
1. Keys the vox relay;
2. Provides the side tone, and
3. Sends a 1350 to 1500 hz. Tone through the balanced modulator.

It is this tone that provides the necessary signal that allows us to tune the rig up. NO TONE OSCILLATOR OUTPUT, NO OUTPUT TO THE ANTENNA. This is the tone that the receiving station hears. He does not hear a true CW signal.

This is why with the 32S-1 and KWM-2 (A) you can not send and receive on the same frequency that you are listening to. Your transmit frequency is offset by the tone frequency. That is why you have to run separate receive and transmit on these rigs.

Guess we got away from fixing the rig and into theory. Sorry about that. OK, we made sure that the tone osc. Is working. If the relays close then it works. It might not be going through the balanced modulator though. If it does not, then the rig ain`t gonna work. Check out the diodes in the bridge.

On the 32S-3 The tone osc. Is not used in this way. It only does two things. It;
1. Provides side tone and
2. Keys the vox relay.

The BFO (455.---) is routed direct to the first mixer and is not fed through the balanced modulator. OOPS, theory again, sorry. If you have stayed with me this long then it is time to make sure that the mixers are working as they should. As we all know, a mixer does just that. It mixes two different frequencies to get the desired output frequency. The resultant frequency is either the sum or difference of the two input frequencies.

How do we check the mixer? First, we must determine if both of the frequencies are reaching the mixer. Many times it is very difficult to determine this. The best way that I have found to do this is to disable one of the oscillators feeding the mixer. On a tube set this is usually accomplished by removing one of the oscillator tubes unless the tube serves more than one function. If it is the PTO tube then you are home free as this tube only serves one function in Collins S-Line gear. On other rigs you will have to look at the schematic to make this determination. If it is a dual function tube then you will have to look at the BLOCK DIAGRAM to determine the other function. You will then decide if you can just pull the tube so that the circuit you are looking at and the rig will still function for test purposes. If one section of the tube controls the vox. relay or the tone osc. you can`t remove the whole tube. I know you are thinking "how can I just remove part of a tube"?

Simple, all you have to do is to get a known good tube (used if you have one) and to cut either the grid or plate pin off of the tube for the circuit you wish to disable and then poke it in the socket. This allows only the signal you wish to check out to get to the mixer. If your receiving device you are using to "sniff" the frequency can`t hear it then it is probably not making it to the mixer. The same applies to those of you using a freq. counter. IF IT AIN`T THERE YOU HAVE PROBLEMS IN YOUR TRANSMISSION PATH TO THE MIXER.

Remember there are only three things that you have to know about trouble shooting. These three things are:
1. Origination;
2. Transmission; and
3. Reception.

In other words, does the oscillator work and is the signal being delivered to the proper point in the rig? Do this for each input to the mixer being tested. If both signals are present at the mixer then check the mixer output for the proper output frequency. Here again, Look at the block diagram and reread the theory of operation for the proper output frequency. Is it there? If so go to the next mixer and repeat the process.

OH NO, Michael just gave me the sign that I have ran out of space in this issue. We will pick up here next time. BCNU on the nets.
John, WA5VVT

CCA Hot Line
507-282-2141
Sorry, no call-backs available!

The CCA web site can be viewed at:
www.collinsradio.org

Join Us on the Air!

- Sunday 14.263 mHz at 2000Z
- Tuesday 3805 kHz at 8pm CST
- Thursday 3875 kHz at 8pm CST
- Friday (West Coast) 3895 kHz at 10pm CST

Sunday for Technical, Buy, Sell and Swap.
Tuesday, Thursday and Friday for Ragchew.

Treasurer's Two Bits

We will provide a treasurers report annually in the quarter 2 Signal Newsletter. Based on member renewals, the CCA has a little over 1000 members. As most of you know, we recently changed our membership renewal schedule to simplify the maintanance required. If you have questions about your membership renewals, please contact me at n7ur@dancris.com or contact Mac, W5HPM at w5hpm@airmail.net. 73 Ron, N7UR

Editor's Operating Desk

by Michael Crestohl, W1RC

Here's the inside scoop!!!!!!!

As we all know, for many years the US Government has been disposing of its surplus materiel through a Department of Defense bureau called the Defense Logistics Agency and their sales unit called the Defense Reutilization and Marketing Service. Anyone could receive their sales lists and submit bids on and purchase anything on which they had an interest. Anything that was considered "sensitive" was altered or destroyed prior to being sold. Many electronic surplus companies bought this stuff directly from the government, including Fair Radio Sales of Lima Ohio, who has been making these wonderful items available to radio amateurs and electronic hobbyists at prices that were very reasonable for over 50 years.

About three years ago the policies changed. Just about everything involving technology was being destroyed or, in the governmental vernacular, "demilitarized". This consisted in many cases of being smashed with a sledge hammer and sold for their scrap value. Yes friends, radios that were thirty years old and even older were being "demilitarized" because they didn't want them to fall into the hands of our enemies and terrorists. Included in this carnage were many fine radios made from the 1940s into the 1980s by the Collins Radio Company of Cedar Rapids Iowa. This company was started by a young radio amateur, Arthur Collins, W0CXX (SK) in 1932 who started making transmitters for his fellow hams. In those days there was nothing finer than a Collins transmitter. When WW-II came the Collins Radio Company's production was shifted to making radios for the military. After the war Collins continued to design and manufacture all kinds of radios, both amateur and commercial, avionics and radar for a broad spectrum of customers. But Arthur Collins never forgot his ham radio roots and continued to manufacture the finest radio equipment for the amateur market. This stuff was so good the government, military and commercial customers bought the same equipment to serve their high frequency needs. Back then anyone could buy a KWM-2, S-Line or 30L-1 amplifier from a Collins dealer. All you had to have was the cash to pay for it. Even the venerable R-390 was available for public sale in the mid sixties.

At any rate for the past few years this and a lot of other fine old equipment was routinely being destroyed. A lot of people didn't like it and I was one of them. I decided to try to do something about it. I never expected anything to come of it but it goes to show that you never can tell. I am the Editor of the Collins Collectors Association newsletter THE SIGNAL. I wrote an editorial about this demilitarization and smashing of this benign equipment. I contacted the DRMS Public Information Officer and asked "why are you destroying this equipment?" It certainly can't be of any strategic value - most of it's over 30 years old and the technology isn't any big secret.

Well, to make a long story short I got a letter in the mail the other day. Basically it means that these Collins radios will no longer be destroyed. This is really is good news because it means that the door is now open for them to change the DEMIL codes on other items that have historical value. Hopefully there will be a lot of these Demilitarization Updates going out to reflect a lot of changes.

This accomplishment was far more than I ever expected, even in the wildest stretches of my imagination! I am delighted of course but I cannot take too much credit for this incredible achievement. My contact at the DRMS is the one who is really the one to thank. Without her understanding of the situation, sympathy and well placed help this would have never been more than just a routine press inquiry and boiler-plate justification platitudes of which we all have seem way too many in our lives. Now the real work begins.

Now that we have seen that the DEMIL Codes can be changed on things it is important that we continue the work of getting these deadly codes changed for other pieces of communications equipment and test gear (like the TV-7 (*) tube tester and the URM-25D signal generator) to something we can work with - like DEMIL Code "A" (no demil required).

We were given a DRMS Point of Contact person and a phone number. Therefore it is indicative on our part to use this contact. Now that my goal has been reached I feel it is time for me to step back and let others take over. I would like to set up a special "task force" to review all the known military radio communication equipment, determine its' Federal Stock Number(FSN) and submit a request to the DRMS that these items be similarly modified. Once this is done I would like to try to find out what equipment inventories still remains in DoD and DRMS custody and finally try to work out a fair and equitable method of them selling anything unneeded to the radio community or to companies that are known to be "hobby-friendly", such as Fair Radio Sales of Lima Ohio.

In addition we now must share this information with our brethren in other hobby endeavors; namely the aircraft, military vehicle and re-enactor groups. They too had to suffer the indignity of having their toys similarly "demilitarized". However we should coordinate the effort because we don't want to overswamp them with requests so I do not plan to share the contact until we get to know them better.

This will definitely be an interesting and exciting time for the vintage equipment hobbies! With amateur radio nets, the Internet mailing lists, newsgroups and Web sites at our disposal we can really make a big bang now and garner a lot of very positive publicity for the Vintage Communications Equipment subset of Amateur Radio.

I have invited Bill Wheeler, K0DEW, President Emeritus and Founder of the Collins Collectors Association to serve on the Special Task Force. Bill was the Missouri Army Mars State Director for many years and of course is also is well qualified to represent the C.C.A. too. I am honored that he agreed to help.

It's been quite a ride!!!!

Theme Weeks '2000

(Note: Weeks begin with Monday...so we celebrate each "Theme" on the Tues, Thurs, and Friday night CCA nets and finish the Theme week on the Sunday CCA net.)

January 17th: Gold Dust Twins Week
February 21st: S-Line Week
March 27th: KWM/HF -380 Week

The full "Theme week"and "Theme day" calendar will be published in the quarter 1 '2000 issue of the Signal and on the CCA web site. All "Theme Week" and "Theme Days" are subject to change. Check the CCA web site for the most up to date information and schedule.

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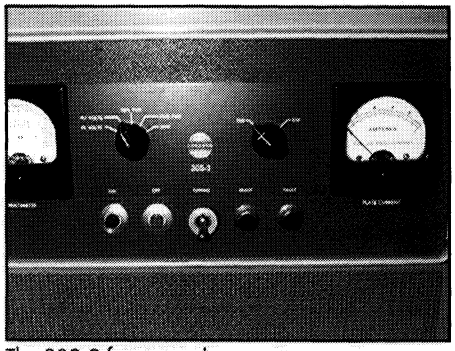
The Collins 30S-3 - What is it? Why isn't it?

(continued from page 1)



The 30S-3 front panel

Inside the 30S-3

This amplifier is presently being used mostly on 10 meters where the 32S-3 in "lock key" with a 100 watt drive will load the amplifier to an indicated 1 amp of plate current at 2500 volts, into a dummy load. This, with a 35 year old tube! The X591K is shown in the picture. Todays version, the 3CX1000A7, is still available, but with a price tag of $1200.

Back of the plate cap can be seen a small part of the copper ribbon spiral tank circuit with it's roller wheel above, riding on the ribbon's edge, about midway down the spiral. This roller wheel is servo driven. Checking linearity with a SB-610, the output signal looks good. Signal quality reports have also been good.

What happened?

This radio was designed without Art's prior knowledge. I'm sure there are some who think Art not only knew everything that went on in the design of any of the ham gear, but actually believe he touched and gave his blessing (or unblessing) to every feature as it was being designed and built. That is not necessarily so, especially in this case. This can easily be presumed when it is realized that the ham line produced less than 1% of Collins' gross income for any given year after WWII.

When the project was finished (this type project was sometimes referred to as a "Swiss Navy project"), the head of engineering decided it was time to show it to Art. He had some trepidation because Art was not aware of it. Nonetheless, he really believed they had designed an excellent kilowatt amplifier. He set up the engineering model in the middle of an empty office and brought Art in. He explained it briefly, turned it on, and tuned it up. Art looked at it, walked around it, muttered an expletive - and walked out. That was the end of the 30S-3. But why?

Much of the reasoning as to why, is deductive, for Art rarely explained any of his decisions, but after the S-line and KWM-2 were off and sailing, he paid little attention to the ham line, with one exception. He was totally engrossed in three other product areas: the SAC HF SSB communication network, Avionics equipment, and the new Collins Computer line then being developed.

Art was using the Amateur Equipment line to initiate the Strategic Air Command's worldwide communication system. In those days, HF was the only long distance communication system available to aircraft. But it was very complicated, when attempting to guarantee a system that SAC demanded, which was to contact any of SAC's aircraft anywhere in the world, at any time. But, Art did it in grand style, initially, through the use of the Collins Amateur Radio equipment. Without the ham equipment, and Art Collins, SAC would never have had the communication system it absolutely needed during the cold war. (This is another story that ought to be told.)

Also, in the mid-sixties, and to the end, Art's total attention was drawn to the Avionics Product Line and the Computer Product Line.

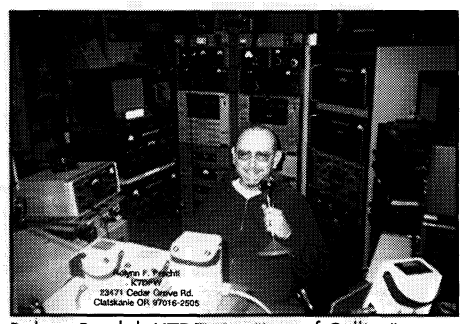
But, back to the 30S-3. (It was necessary to diverge to set the scene for its demise). About six months prior to the 30S-3 unveiling, Art had put out an edict that all new development HF equipment must be capable of being computer controlled, and all PAs must be driven by one-half to two watts. Ostensibly, the SAC communications system led him to this edict, for he had ham radios, aircraft radios, and commercial ground comm. radios, all working together in a single system. He apparently reasoned that all Collins HF radios should be interrelated and usable for any of the HF markets (avionics, commercial, military and ham), as he was doing here.

Making the 30S-3 so it could be driven by such a low power would have necessitated a complete new design. There was an attempt to make this prototype computer-controlled, but time was too short, and it never would have passed muster. These are the probable reasons for Art's expletive, and summarily shutting down it's development. Even though it was a beautiful ham radio.

Election Results

Elections were held to choose two Directors for a two-year terms on the CCA Board of Directors. Here are the total votes each candidate received: John WA5VVT - 165 (elected), Floyd W8RO - 110 (elected), Elliot K7ER - 60, Bob K1JNN/5 - 57, Al K8EUR - 53, Wally W9BEA - 52 and Art WA8VSJ - 38. The 2000 elections will be for three Directors.

In the Shack



Rolynn Prechtl, K7DFW - "Lots of Collins"

Send us a picture of your shack, your callsign, and any shack information and we may use it in a future issue of the *Signal*. Just mail it to the CCA address.

At the Mic with KW6KW

Sandy Meltzer - President, Collins Collectors Association

The new year is upon us and we expect it to be a very good year for the CCA and its members. Now that we have signed a licensing agreement with Rockwell Collins that "grants to the CCA the non-exclusive royalty free license to reproduce and disseminate, in electronic and written format, any such Collins Copyrighted documents related to Collins amateur radio products", we plan to make available "product manuals, schematics, test methods, service bulletins, advertising materials, product catalogs, maintenance information and other technical and product information related to Collins amateur radio products". Thanks to Rockwell Collins for continuing to support the CCA.

We're still working on format and trying to prioritize what gets done first, but I think all of you will be pleased to know that we are directly addressing one of the main goals of the CCA...the archiving of Collins radio technical and operational data. We are going to need more volunteers, so if want to get involved, please contact me at sandy@sandy.com. My best wishes to you and your families for a happy and prosperous new year.

_ _ . . . . . _ _ 73 Sandy, KW6KW