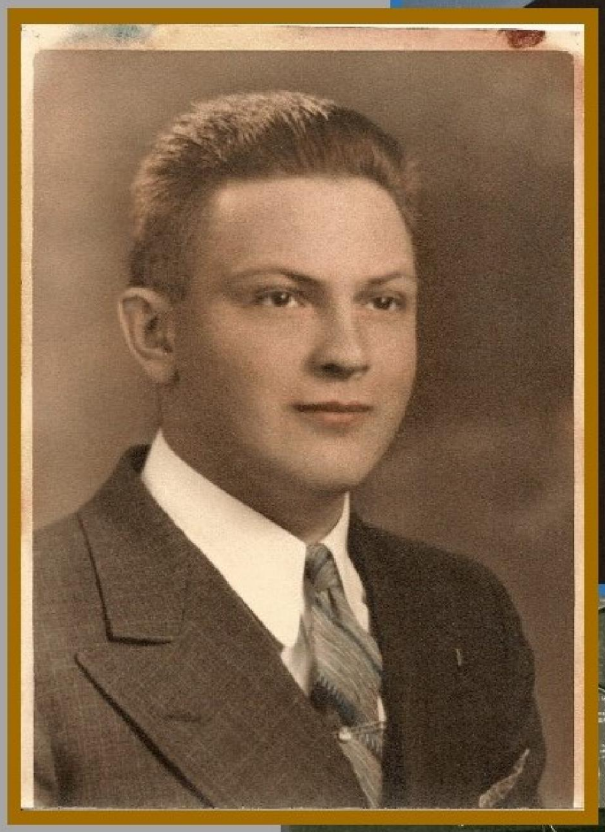
GENE SENTI (FATHER OF THE COLLINS 30L-1) WITH HIS WIFE MARY

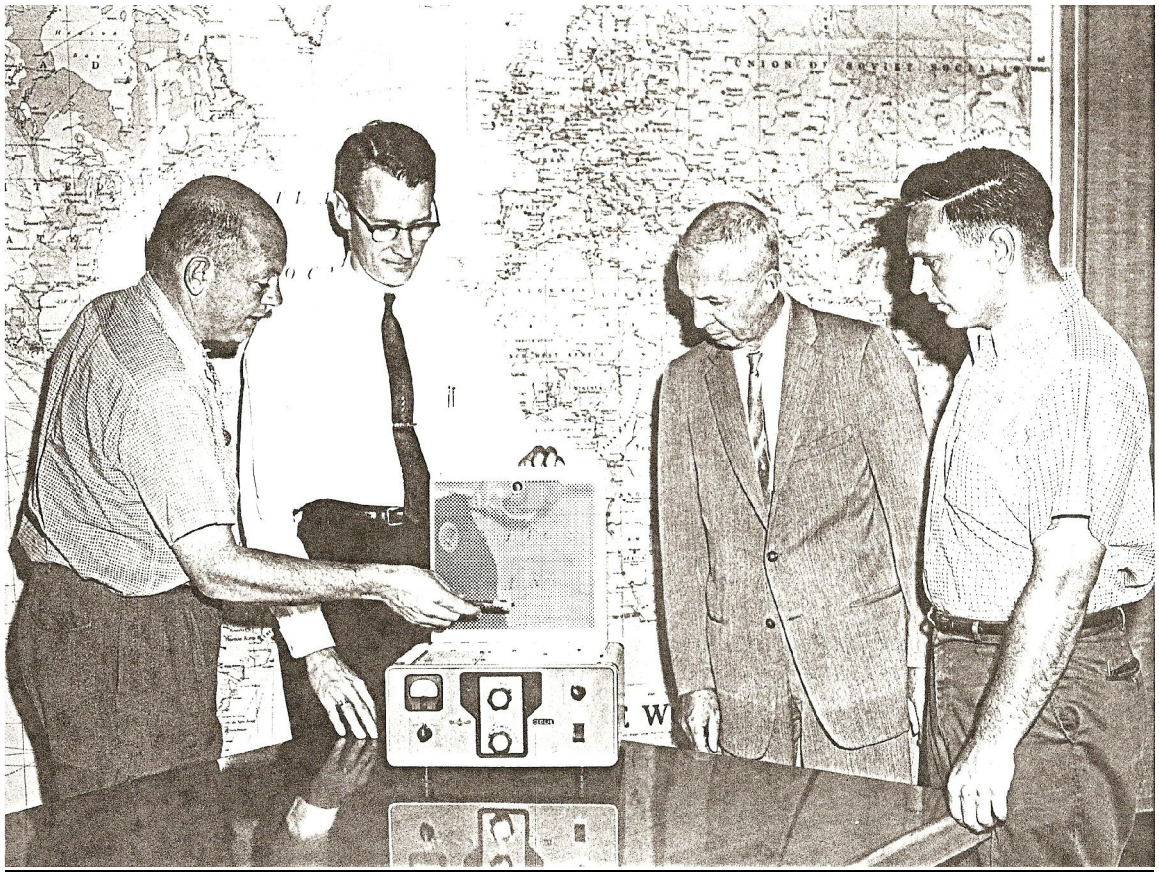
An ARTICLE on CARE OF YOUR 30L-1



The Care and Feeding of Your 30L-1 and Other Pertinent Trivia

de Bill Carns, N7OTQ/K0CXX

This article is the second one in a series of three articles on the significant contributions of Gene Senti, who retired in 1976 as the Group Head for Amateur Radio Products at Collins Radio. The first article, *The Care and Feeding of Your KWS-1 and Other Pertinent Trivia*, appeared in the ***Signal Magazine*** in the spring of 1992. To stay on schedule, the final article on the KWM-1 will run in the Q2 issue in the year of our Lord, 2028.



Needless to say, it takes this author a while to work up to one of these, but I hope you enjoy them as much as I enjoy producing them.

As you may remember, I cut my teeth on the venerable KWS-1 very early in my Collins collecting days which started in about 1986. This, of course, led to the first article in this series and my complete fascination with the folks of Collins Radio, their farm and family ethic, and the resulting quality equipment that we now still enjoy – in some cases, some 70 years later. I have several pieces of Collins gear that are now 79 year old and still have their original finals, tubes and capacitors…..They just don't make 'em like they used to. It did not take long, in the grand scheme of things, for me to acquire my first S-Line and very rapidly thereafter, my first 30L-1. I was in love – Again!

A brief history of the 30L-1

The 30L-1 is a marvel of efficiency and cost-effectiveness. As you may know, but worth repeating here, Gene was heavily involved in the development of the S-Line. The S-Line was meant to be a more cost effective, and more prolific, offering following the production of the KWS-1 and the 75A-4 Gold Dust Twins. As the S-Line became reality though, the transmitter and receiver (32S-1 and 75S-1) marginally met their cost targets, but the 30S-1 amplifier which brought the line-up output up to KWS-1 standards, was way more expensive than the original concept had proposed.

The high cost and selling price of the 30S-1 bothered Gene Senti a lot. It bothered him to the point that, following the introduction of the 30S-1 and during the winter of 1959-60, he began experimenting with a smaller and less expensive linear power amplifier in his basement at night and on the weekends. This G-job approach soon led to an amplifier being built on an old TV chassis. This low cost amplifier used 4 811As in parallel to come close to the then legal limit of a kW input power and yielded about 650 watts out. With the help of ME Arlo Meyer and some trips to the Collins employee surplus store, the infamous basement yielded two rough prototypes which were shown to Ernie Pappenfuse who was the then Director of Development for Amateur and Commercial Products. Art Collins was brought up to speed, a Green Room was immediately set up and the now famous little amp was in production 6 months later.

At a very competitive introduction price of $520, it more than satisfied the need for a cost effective amp and the rest is history. Manufactured from April of 1961 through 1981, a run of 20 years, it is estimated that over 17,000 30L-1s went out the doors of Collins Radio. This is quite a feat for the little amp.

There is more good news when you look into the performance and history of this amp. It has a wonderful record and reputation as being reliable and a real performer in spite of packing such a lot of “punch” into that small S-Line cabinet. Very few Service Bulletins were issued for the 30L-1 and they dealt with some pretty minor stuff. These will be summarized and commented on in this writing.

To keep your amp in great shape, however, there are some issues that should be dealt with and these will also be summarized as I walk through bringing up a 30L-1 that has been in storage for quite a while.

Just quickly, I have just finished a 5 year sojourn into selling my homes in Arizona, the resulting packing and moving, getting a new pad in Wimberley, Texas and then building my dream shack. You will be hearing more about this new shack in a couple of issues from now, but the result is that I am in the process of bringing up a number of pieces of Collins gear that have been in storage for from 5 to 10 years. I thought I would take this opportunity to share the process with you all and start with one of my favorite 30L-1s. It is a 30L-1 that you might say, at this point, has some “baggage”.

Now, this is another long story that will have to wait for another day, but I almost left Arizona without most of my Collins gear. I was the almost victim of a 540,000 acre forest fire - the Rodeo Chedeski Fire - which, in 2004, was put out less than a quarter of a mile from my mountain retirement home. In the process of being evacuated, I had just enough time to grab some of my favorite and more mobile Collins gear and this included the 30L-1 that will be looked at here. The result was a very unceremonious trip in the unpadded bed of my ¾ ton pick-up truck and then out over a rough dirt road – in a big hurry……..e.g. Lots of shock for those poor 811As…..So, this is where we start.

Figure 2. Oh Doctor, Serial Number 12770 is waiting in the exam room

But there seems to be something wrong with his foot - and he hasn't bathed for months.

Uncasing and Disrobing

I know that this is more general, but here are a couple of hints on how to get the case off of that heavy guy without damaging the paint or the unit. This question comes up from time to time and doing it wrong on a 30L-1 can result in much paint scratching, especially on the trim ring.

Put a soft towel down on your work space, and carefully – keeping the lid under control – turn the unit over on its top on the towel. Remove the 4 Phillips screws that hold the feet on the bottom of the case/chassis. Now, roll the unit back over right side up and with the panel to the left. Open the lid and remove the two short flathead Phillips screws that are on the front inner flange of the trim ring under the lid. DO NOT remove the painted flathead Phillips screws that show from the outside and that hold the trim ring to the case. Have a chair ready in front of your work space and call your significant other in for a moment if you have one. The only thing holding the 30L-1 chassis in the case now is the single bottom center back screw that goes through the case to the chassis so you will be using your finger tips to carry some weight for a moment.

Pick the entire cased unit up by putting your arms down the sides of the case and letting your fingertips wrap around and push the panel tightly back into the case. Now, have your helper, standing behind you, hold the cord straight up in the air. Pushing back with your finger tips, lift the unit straight up and sit back in the chair behind you and as you do, rotate the 30L-1 front panel down until the weight is resting generally on the knobs and panel on your thighs and in your lap. Hold the 30L-1 with your left hand and take out the top center screw on the bottom of the case. Now, using both hands, balance the case and chassis in your lap and lift the case straight up being careful to keep the alignment between case and chassis. Done, properly, there will be no scratches on the trim ring. Continue to lift the case up (You are going to go by and maybe bump some side screws – Go slowly) and let the cord come down through the access hole in the rear of the case. This can be done alone with a little arm hand balancing with your right hand. NOW, and this is IMPORTANT, thank your wife. Putting the case back on is just a matter of reversing the process.

While were at it, let's get those covers off. First, a couple of points. Before removing covers, turn the PA tuning and loading knobs to exactly 9 o'clock. This assures that the plates are meshed and will prevent "oh craps" while working in the RF compartment. Then, get a few Ziploc bags and start organizing screws as you take off the two top covers and the bottom cover. Leave the RF top cover screws in place - just loosen them to slide out the cover. Those screws are small and they get legs if removed.

Remove the bottom and 2 top covers of the PA tube and HV compartments. Notice that there are spring loaded shorting interlocks that short the HV to ground when the covers are off. There are two on the top and one on the bottom. I say that because 30L-1s are often damaged by inexperienced repair efforts that involve running the RF amp with these covers off. First, try to never do that and if it is absolutely necessary and you are experienced at debugging HV equipment, then these shorting interlocks need to be defeated TEMPORARILY while the trouble shooting proceeds. This can be done by slipping a piece of heavy high voltage rated heat shrink over the screw in the center.

Figure 3. **First surprise – No tubes**. I forgot that Mister Thorough removed the tubes and padded the plate clips and braid before moving…..Hmmmmmm, Time Out! … and it is tube hunting time. With the current cost of 811As, read that PANIC time!

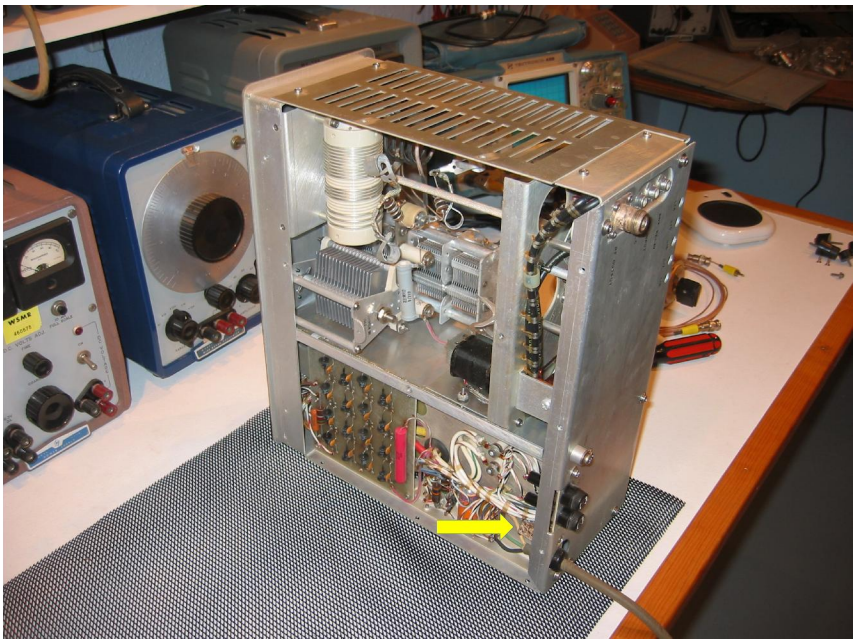


Figure 4. **Bottom Cover off** and note the bottom third high voltage interlock shown with the yellow arrow. (See the previous figure for the top two interlocks)

Now, with the case and covers off, and while I look for those 811As, let's get to work on bringing everything else up to par.

Testing Those 811As

Another surprise: This is not the 30L-1 that I though it was. I have 3 30L-1s, two of which I have run in the past. I am still not sure if this is one of the ones that I have run, but the cord has not been cut off and replaced - as I know I did with the two operating ones from the Rim home and also both the main fuses are missing along with the tubes. This may be a case of borrowing, or it may be a danger signal. Damn my 70 year old memory! However, I am going to continue with this one since it brings the same issues to the forefront, and I observe that this 30L-1 – rare indeed – is pretty much a complete virgin. I can not find one sign of repair or AC supply voltage change. And, it is pristine inside. So, my purist philosophy is going to come to the head of the line here and we are going to proceed to try and keep this amp completely original in the interest of history. If, over time, everyone tries to make their 30L-1 "*better*" than it was when it left the factory, there won't be any really pristine ones to treasure hunt for. ☹

If your 30L-1 has been used recently and is working fine, you can skip the next couple of paragraphs on testing the 811As and reforming or replacing the 6 100 mfd 450 V electrolytics. If, on the other hand, the rig has been in storage and or abused physically, then a thorough going through of the tubes and the caps is definitely in order. Bad things happen if either the caps or the tubes short.

Now, thank goodness, I have found those tubes so let's start with testing the 811As. Most good tube testers will test 811As. I use a TV-7, one of the better military tube testers, and when I have finished testing the tubes initially, I then turn the tube tester on its side so that the tube is horizontal with roughly the same side down as when in 30L-1 service and repeat the shorts and opens tests while tapping lightly on the tube envelope. This is good preventative practice since filaments can droop and get a bit brittle after they have been in service for some time. Again, you want to do everything you can do to not have a shorted tube in the amp. We will talk later about the one mod I like to do on a 30L-1, even though I am a purist. This mod protects the bias and relay supply in the event of a plate-to-grid short - - which is not uncommon.

High Voltage Section

Now that we have tested the tubes and have 4 solid 811As laid aside, it is time to look at the electrolytics in the HV power supply. I know that it is common practice to put a 30L-1 on a variac when you first bring the amp up after a long period of storage. Because of the bleeder resistor configuration where "it" is distributed across the 6 effectively stacked 100 mfd caps, you can actually get away with this – *to a point!* – with the 30L-1.

In fact, using best practices and the procedure laid out in the mil spec for reforming electrolytics, all caps that are reformed should be reformed to full rated voltage: In this case to 450 Vdc. A quick calculation will show that even in high line situations and with a variac bringing up the voltage, the most you will see on each cap is about 270 Vdc. When an electrolyte has depolarized, it can not be completely repolarized without taking it to full rated voltage. In this case you are short by almost 45 %. If the caps come into the process needing help, a variac job will not completely fix them. If they are marginal, a variac job will not hurt them and will certainly help them.

Just as an aside, I generally do not like to use a variac at all, since you can not monitor leakage currents while using this technique. In this case, with the caps all wrapped up with distributed ballasting and bleeding, it is pretty hard to bring them up to rated voltage without a complete unwiring job.

If you want to take the time, unsolder the connections from the HV transformer and rectifier board, get a DC power supply and clip into each cap individually and reform it completely to 450 Volts. This can be done with the cap in the circuit by calculating the current though the 25K ohm resistor at each voltage set point and then assuming that any current above that fixed resistive path is leakage through the capacitor under reforming. (This technique will not overstress the resistor since, as built, it is 26 watt rated and at 450 Vdc applied, you will only be dissipating 8 watts.) If it will not reform to less than specified leakage current at 450 Vdc, then definitely replace it. And…..yes, I know, we are talking a few days of work and waiting here, but worth it if you suspect the caps.

I have just gone through two cap boards that came out of 30L-1s where the boards were pulled for a preventative maintenance Harbach board replacement and all the caps measured were in spec. These caps are old, but they were very high quality caps.

The good news is that the 6 bleeder resistors that are across the 6 HV electrolytics are on the outside of the board. *Paying careful attention to the polarities*, and clipping on to the bleeder leads that are across the capacitors *with equal care* will allow you to test and reform each capacitor individually without removing the board. You just have to disconnect the connections from the diode board to the capacitor/resistor board when you do this.

The mil spec involved is MIL-HDBK-1131, but this can no longer be downloaded on the web from the Defense Supply Center website at the original address:

http://www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-HDBK-1131

If this link no longer works, look for a copy on the RX for Your Collins page of our website. I am currently looking for my original copy. The new version of this spec has much less info and is almost useless.

Normally, if there were any indication of leaky diodes on the HV diode board, I would replace all of the diodes. The original 1N1492 diodes are early GE silicon top hat diodes and have a higher reverse leakage specs and lower performance than currently available inexpensive diodes. Because of the lower leakage and the huge increases in breakdown voltage that have been achieved since the advent of the 1N1492, one can replace all 16 1N1492s with just 12 1N4007s and still have more breakdown margin, less reverse leakage, roughly the same forward drop and 33% more current handling capability. This is a win win. Just jumper the unfilled diode slots on the diode board and use just 12 1000 pf caps across the slots filled with 1N4007s.

HV Diode Specification Comparison:

Diode	Forward Current	PIV Rating	Reverse leakage	Package
1N1492 (Original)	750 mA	600 Vdc	300 microA max	Metal
1N4007	1000 mA	1000 Vdc	5 µA @ 25 deg C 50 µA @ 100 deg C	Plastic

In the case of this unit with absolutely no previous mods, I have measured the forward and reverse characteristics of the original 1N1492s and they look good - so I am going to give them a new lease on life at least until the next repair party.

Service Bulletins

OK, now let's look at the Service Bulletin situation. The 30L-1 actually has a very clean history related to design or manufacturing problems. It is, after all, a pretty simple amp, and it is really built well.

Service Bulletins for the 30L-1 can be downloaded for free from the CCA website at:
http://www.collinsradio.org/archives/Service_Bulletins_and_Information_Letters.aspx
or they can also be found in the "MANUALS" section of the website under 30L-1 SB

Service Bulletins #1 (August 1961) and #4 (November 1977) both deal with operation on 240 Vac. Carefully review the TB-1 wiring of Fig. 1 in SB #1 and make the DC measurement required on the AC cord if the unit is strapped for 240 Vac operation. There was an initial wiring problem on the 30L-1 that was pretty much gone by serial number 2500 and then, during production in the 70s, the AC switch issue crept in and was not discovered in line testing due to the fact that they tested in the 115 Vac configuration. I have observed this sort of 240 Vac wiring error problem in 2 other rigs, the 30K-5 and the KWS-1, due to the factory's propensity to test at just the one voltage.

So, the lesson on any Collins rig is, if you are converting from 115 Vac to 240 Vac for the first time, be careful and do a little tracing – or stand back.

Service Bulletin #2 deals with early production only and you should check early units to make sure that the CR19 is the later 1N458 lower reverse leakage version. If you have used your 30L-1 with a Collins 32S-(x) exciter, and not experienced the negative going ALC indication, then you are good to go.

Part A of Service Bulletin #3 was issued, again very early, in April 1962, to reduce the resting current of the 4 811As to 110 mA from the original approximately 130 mA (the bias was increased to about 3.0 Vdc) . This change results in R12 being 2000 ohms 7 watts, R28 being 39 ohms @ ½ watt, and R9 changed to 47 ohms. Follow the service bulletin here to check and see if it has been done. NOTE: There are a lot of folks that will tell you to change R28 to at least a 1 watt resistor and that the original ½ watt specified in the SB3(A) is not big enough. The Grid Bias voltage should be around -3.0 volts when the antenna relay is pulled in (R28 grounded). A quick V^2/R power calculation will tell you that this resistor is only dissipating a quarter watt.

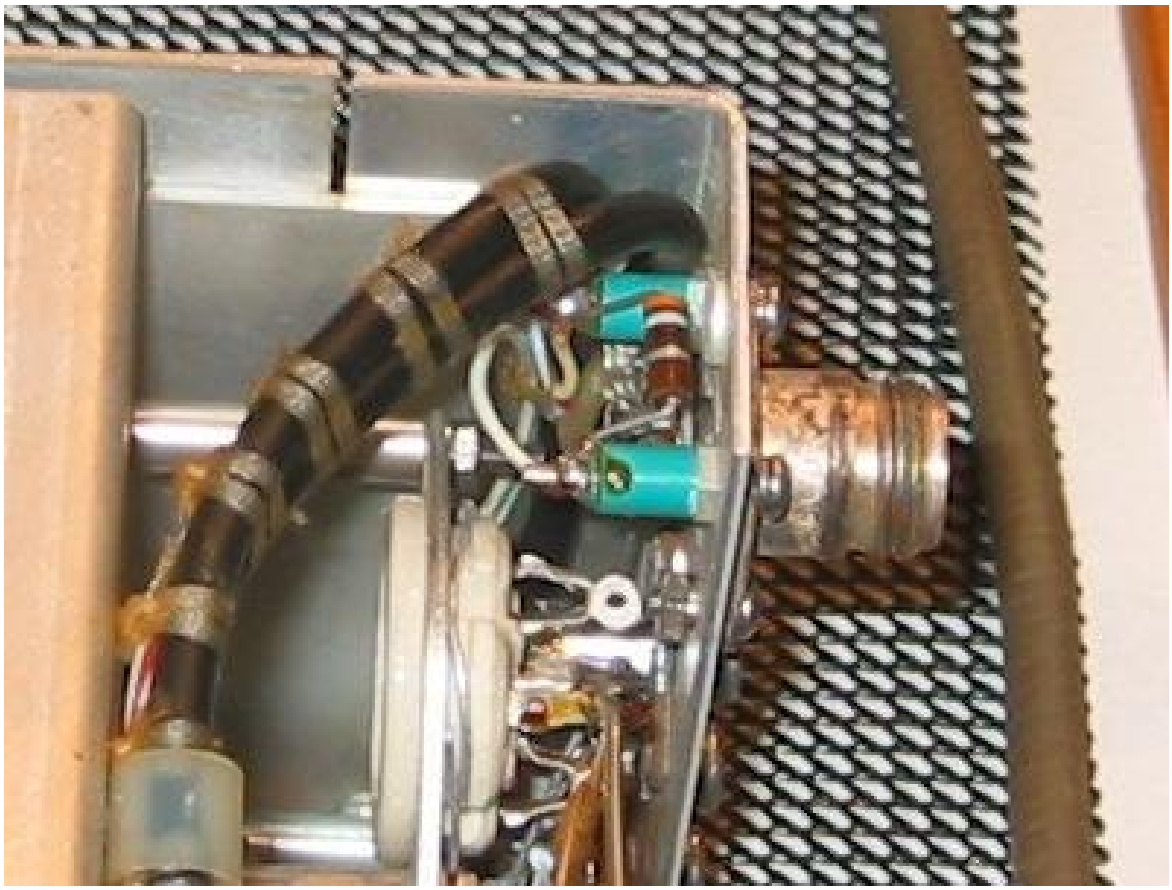


Figure 5. R28 Bias setting resistor (hiding behind the RF Antenna N Connector)

When the antenna relay is not pulled in, there is no current in R28……..So, why are folks upping the wattage when they find it blown? I think Collins engineers knew exactly what they were doing here and used a half watt because it was enough UNLESS the grid came up in voltage because of a tube short. In this case, what do you want to blow here? You can have damage to the relay and bias supply, or you can let R28 blow under this stress

and protect the relay. In fact, with the Bidirectional Clamp Diode protection mod recommended in this article, R28 will never see more than a half watt of dissipation. I leave this resistor at ½ watt. Now, finish this part by checking to see that R9 is 47 ohms and not 82 ohms. You may have to tweak this 47 ohm value (usually to a bit higher) to get the correct 110 (+/- 5) mA idle current with today's higher line voltage.

Note:

> **CHANGE REQUIRED:** SB-3A changed R9 to 47 ohms. This, along with the never-ending progression of primary AC voltage up to now - sometimes 125 volts or higher - has resulted in the resting voltage on the bias power supply filter cap C10/R15 node being typically 165 volts or sometimes higher. Running the numbers on the dissipation in R15 (10K Ω) shows that this dissipation (when the amp is not keyed) is 2.7 to 2.9 watts. R15 is specified by Collins as a 2 watt resistor. Collins did not catch this. When the amp is keyed and current through the voltage divider is added in, the voltage on that resistor falls and things get better, but R15 should absolutely be a 5 watt wire wound resistor. (Mouser 588-25J10KE works nicely)
>
> **See SB-5C (CCA generated 30L-1 Service Bulletin)** for complete instructions on this change.

Part B of SB3 deals with pilot light fluctuation under RF excitation and may or may not have been done, even where applicable as all units did not exhibit the problem. Using SB3, check to see if the listed changes have been made. I would go ahead and make them if they have not been done and you do not know if the amp has the problem. If you have operated the amp on 75 and 40 meters before and not seen the problem, I would leave well enough alone.

While you have the covers off, measure the individual grid resistors that are in a star pattern below the 811A tube sockets. They should be well within their tolerance of 10% meaning they should be from 42 to 52 ohms. If they are out of tolerance or any one is significantly different than the others, replace all four of these with current production 1 watt non-inductive resistors. See the replacement parts list for the thick film IRC replacement.. In the case of my 30L-1 #12770, all the 47 ohm resistors measure 47 to 48 ohms and look really good, so they are staying. Don't forget to measure and check R12 and R28.

While we are checking things, and to document this, there is an unmentioned fuse link in a 30L-1 (Not shown on the schematic). It is located on the terminal strip underneath the chassis and closest to the diode board. It is difficult to see and runs from the outer-most terminal lug to the next (ground) lug in and is made of ***#30 tinned buss wire***. If you do not have high voltage and can not locate the difficulty, first check to see that this link is not blown. If it is blown, replace with ***like size buss wire*** to continue to get the protection for the transformer. If this fuse link is not installed (very early unit), then definitely add it.

Now for "The exception that makes the rule!" While we are in the back end of the amp, I am going to make the one and only (non-destructive, completely reversible) mod that I recommend (No, insist on) in a 30L-1. Locate C2, a disc ceramic 0.01 mfd cap that is just to the right of the 47 ohm star connection of grid bias through the RF choke L3. Physically, C2 is on a three lug (center ground) terminal strip that is located just to the right of the tube sockets looking at the back of the amp while it is lying on its side. C2 lies flat against the chassis going from the right outside terminal to the center ground.

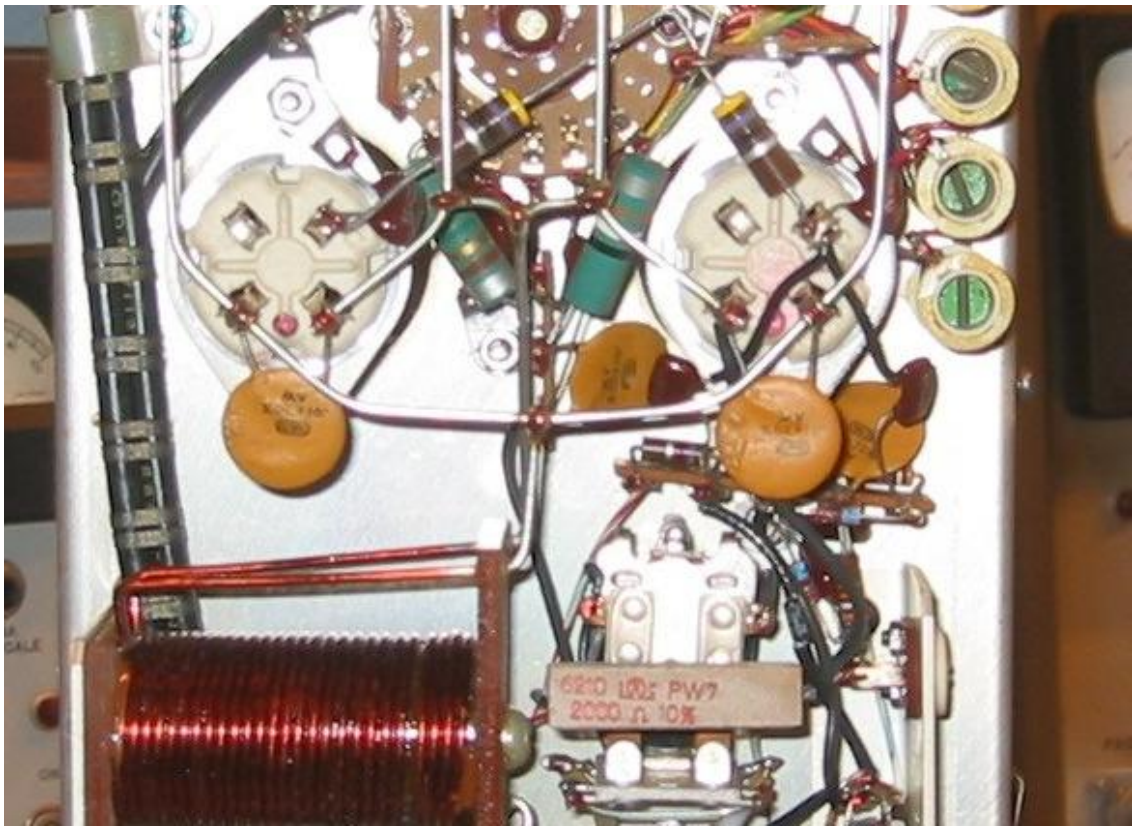


Figure 6. C2 shown to the right bottom of the terminal strip before Bidirectional Clamp Diode Install

Install a bidirectional Clamp Diode rated at 20 amps 180 volts (min). It will install in the lower position on the terminal strip flat to the chassis. It should be carefully non-destructively tacked across the terminals supporting C2. Position it in that open space to the left of the terminal strip and just below the green choke in Figure 6 shown above. Now, in case of a plate to grid short in one of the 811As (not uncommon), the Transzorb (or surge suppressor) will shunt the plate voltage to ground and save the bias supply - including the transformer winding - and also save the relay. Good Job! It will possibly die in the process and will short to ground which hurts nothing and then can be easily and non-destructively replaced. As they say at Am Ex, Don't leave home without it.

Note: This mod is also highly recommended by Dennis Brothers - who is still an authorized Collins repair station. Dennis used to run the internal repair facility at Collins Radio in Cedar Rapids. Obtain **Part # 625-1.5KE180CA-E3, Mouser pg. 596, Cat. # 643**

Note: The Bi-Directional clamp, or TransZorb, that is currently recommended for installation in the 30L-1 is much different in appearance than the original MOV shown in the earlier version of this article, but installation is the same and is not sensitive to polarity since it is "Bi-Directional". This Vishay part looks more like a diode.

OK, modification complete and now you know that I am not a completely fanatical purist….Just sorta!

Cleaning, Lubing and Check-Out

Now, before getting ready to close up, I am going to clean and lube the fan motor. Too much lube in the past may have resulted in a greasy frame and blades and these should be squeaky clean for good air flow without dirt accumulation. In order to lube the motor correctly, it must be removed from the chassis. This can be done without unwiring the fan by using a nut driver to carefully remove the castellated locknuts that hold it to the grommet mounts. Pull the motor sub-chassis up and off of the mounting studs. Have 3 each 5/16 inch (.060 thick stock clearance) neoprene grommets ready to use since the rubber ones in there are probably toast. Two of mine were bad, so I replaced them all.

Use very light sewing machine or appliance (razor) non-gumming oil and use only one drop standing on each end bushing and work the oil in by spinning the fan and then remove the excess with a Q-tip. Unless recently lubed, you will know when it is worked in when the fan gets a lot easier to spin. When correctly lubed the fan will spin about 4 turns (hard to count) after being spun up by hand, and then come to a smooth stop. The smooth stop is the difference I notice the most. Now, remount the motor being careful not to over-torque and squash the grommets. The mounts should not shift incrementally, but should flex if they are the correct tightness.

Do not clean and lube any of the RF switching contacts or (Band Change/Input Network) components unless there is obvious dirt and grime. In this case, clean carefully with just 90% pure or better IPA and then blow dry with clean air. Who needs more carbon in there for making carbon tracks? If there are signs of dust in this compartment, just try and blow it out.

Finally, let's do a good visual inspection of all of the compartments. In the case of this amp, I found a ground shield of an RF cable running dangerously close to a filament buss wire and a tie wrap solved that problem. Also found a piece of buss wire rattling around under the HV diode board. The biggie was that I discovered that this amp was the one that I had not run because it had a 120 Vac plug on it and it was wired (Incorrectly) for

240 Vac. Thank goodness for the visual. TB102 was restrapped and the black hot lead moved to the switched side for safety.

Testing

Now that we have gone through the little amp and brought it up to par, it is time for some testing. The first thing I always do with a repaired 30L-1 is put the covers on with the tubes out and turn on the power, make sure nothing blows, check that the **HV is at 2 kV** and then plug my DVM into the antenna relay jack and make sure that you have roughly the correct (**about -160 to -175 Vdc**) un-dropped bias voltage on the **RCA ANT RELAY control jack**. This is a crude way of making sure that you are going to have about **-3.0 Vdc on the tubes (Connect DVM to terminal where you installed the Clamp Diode at C2) when ANT RELAY control is grounded**. You do not want to risk the tubes if there is low bias voltage, but enough to still pull in the relay. See the note above regarding adjusting the value or R9, the now 47 ohm resistor that sets the bias supply level.

Before RF testing, here is some brief history on the 21 foot "required" exciter to 30L-1 RF input cable. I think most of you know that one of Art Collins' big hot buttons was harmonic distortion, or linearity, in the Collins SSB equipment. This philosophy was thoroughly passed down to the troops below him, and I think most of them were pretty conscientious to start with. When the 30S-1 and the 30L-1 were in the development stages, the engineers discovered that there was a small effect on the distortion of the exciter amplifier system related to the minimal reflected voltage that remained after the 30L/30S input networks were tuned properly. This effect in the exciter PA was phase dependent and therefore, by using a "on average - since there was a spectrum of frequencies involved" length of cable, the engineers found that they could get another small amount of improvement (on the amateur bands) in the exciter, and thus the system, distortion products. This somewhat klugey fix made it through into the manual as the "required" driver to amp cable length.

This, of course, raised many questions with customers – and still does today – and Art did not like that. He said it reflected poorly on the amplifier designs and that if the amps were any good they should meet specs without doing this kind of thing. After the engineers reviewed the entire problem, the "fix" was to just remove the requirement from the manuals…….Nothing else was changed and the amps still nicely meet specs without the kluge.

Back to Testing:
So, having passed the "no tube" HV and bias check, the tubes were put back in the RF compartment, a dummy load was connected for stability and the idle current and HV were checked now with tubes in place and with no drive. High voltage looks good but no idle current. Dang!

Some quick checking showed HV continuity to the tubes and the correct bias and high voltage, so some checking of the switching and metering was indicated. Meter is good because it shows HV. Continuity is good out to the minus lug on the meter through the switch….Looks like the ground switching in the *Amps* position of the multimeter is no good. I cleaned the contacts with DeOxit and exorcised them, then blew them dry and waited a half hour. Voila……110 mA idle current…..We are in business.

Let's connect up our 32S-3 driver and do some testing, and adjusting if necessary, into a dummy load before casing the amp back up.

By the way, while I was doing the no-drive testing and exorcising the relay/bias port, I hooked my MFJ 259B RX analyzer to the input drive port and looked at the input VSWR on all bands……Pretty good. Less than 1.3:1 on all bands and no tweaking required….This is a cheap and dirty way to do this testing and adjustment.

<u>Recommended (If needed) Parts Supply:</u>

Grid Balance Resistors (R1-R4) IRC Thick Film Precision	47 ohm @ 2 watts 47 ohm @ 3 watts	Replace Carbon Comp w/ Mouser 66-GS310047R0JLF
HV Capacitors (C3, C5, C7-9 & C12) Sprague/Vishay Atom	100 mfd @ 450 Vdc	Mouser PN 75-TVA1718 Price $18.85 ea. & going up!
Bleeder Resistor/Bias Load	10K Ω , 5 Watt	Mouser PN 588-25J10KE Cost $2.71

811As (V1-V4) RF Parts (Taylor) Note 1. PN 811A-MQ-TAYSEL
Surplus Sales of Nebraska PN Various Note 2.

811A	-	811A, Various brands*	Call for $$	-
811A-JAN	Pic	811A (JAN) Cetron, U.S. Made **We are almost sold out of our prized 811A...forever!**	49.00	Add
811A-JAN-MP	-	811A (JAN), Cetron, Matched Pair	105.00	Add
811A-JAN-Q	-	811A (JAN), Cetron, Matched Quad	210.00	Add
811A-JAN-T	-	811A (JAN), Cetron, Matched Trio	160.00	Ad

1) Note: These do not need to be matched, but RF Parts & SSoN offers them only this way.
2) Cetron

CR1-8, CR9-16 1N4007 1A @ 1kV Common Stock Part
Only 12 total required and reduce parallel capacitors to a total of 12 and these can be mounted on the original board with jumpers if a replacement board is not used.

Relay Clamp Diode for modification: Part # 625-1.5KE180CA-E3, Mouser pg. 596, Cat. # 643

Regarding HV & Capacitor Conversion boards and kits. While, in my opinion, these are often installed when not needed, I say to each his own…. and I include the information below. *I must comment though* that often the result is a much less valuable unit that in fact may be less reliable.

HV Diode and Capacitor Replacement Board – I have very little experience here. You are on your own, but I am very impressed with, and have heard very good things about the Harbach board.

Harbach Inc. https://harbachelectronics.com/product-category/collins/

K1ROD Rod Murry, Fountain Hills, AZ k1rod@arrl.net

K6HM Young Kim Board, Los Altos Hills, CA youngkim@yksystems.com

Service Bulletin Summary-Collins 30L-1 Linear Amplifier

30L-1	SB 1 Revision	Wiring change required before conversion from 115 To 230 volt operation is made, use of 8-ampere line fuses, and correction to instruction book drawings
	SB 2	Backward deflection of ALC meter
Multiple	SB 3A	To lower operating temperature of PA tubes
"	SB 3B	To eliminate pilot light fluctuation with RF excitation
	SB 4	Operation from 230 VAC power source

To this list now add: **SB-5C** Addresses underrated R15. This resistor needs to be replaced with 10K ohm 5 watt resistor. (You could also use 2 ea. 20K ohm carbon comp resistors in parallel, but this is much cruder, takes more room and is harder to install. The 5 watt wirewound recommended is easy to get.)