The SIGNAL

Collins Collectors Association

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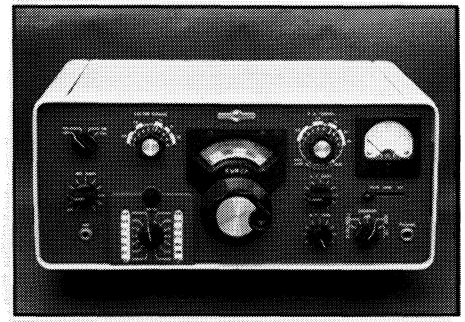
A RIT Circuit For The KWM-2A

by John Bielefeld, KA4DGF ka4dgf@sprintmail.com



I have been frustrated with my KWM-2A in one respect - the receiver did not have a RIT (receiver incremental tuning) circuit. I finally broke down and started looking into how other hams have designed RIT circuits into non-RIT transceivers. I found circuits, which ran from very simple to very complex. Most tried with success using circuits that did not mutilate the units they were designed for. I wanted to do the same but I wanted to use parts that were readily available today not 10 years ago. Also I wanted the tuning to be linear on each side of center over the RIT tuning range (i.e. +/- 1.5Khz exactly). I also noted that some RIT circuits would tune the varactor diodes all the way to zero volts. You can get large capacitance values doing this but you may cause distortion in the oscillator because the diode (veractor diode) will rectify the oscillator signal. I kept the diode reversed biased during the full tuning range of the RIT. Studying the PTO schematic I chose the 6AU6 cathode as the point at which to add the RIT circuit. It's at the low end of the tuning circuit and as such the voltage levels are low enough to allow working with modern solid state devices. This is perfect for adding a solid state device like a veractor diode. Looking in a Motorola RF Devices Manual I decided to use the MV209 veractor diode. This diode is inexpensive and also fairly linear in the voltage tuning range (4 to 10v) that I needed. The rest was just sitting down with a calculator and doing the ohm's law hoops to get the resistor values right. The circuit below is the results. It worked just as calculated. Here are some points to help you if you decide to use this RIT circuit on your unit:

(1) Veractor diode and varicap are the same thing.

(2) R1 has high impedance compared to R4 so when K4 is engaged in receive mode, R4 overrides the setting of R1. This eliminates the need for another set of relay contacts.

(3) You will need to use a frequency counter to adjust R1 in transmit mode to equal the frequency of R4 when R4 is at center of rotation. Connect the frequency counter, together with a 0.01 de-coupling cap, at the cathode follower after the PTO.

(4) You will need to adjust the PTO coil 'slightly' to calibrate the dial. The 100khz calibrator is useful too. The best method is using a receiver you can tune from 2.5 to 2.7mhz.

(5) The MV209 is most linear between 4V and 10V. The values of R3 and R5 were chosen for this range. If you substitute the MV209 for another, these resistors will need to be changed. This linear region was chosen so that equal band spread is found on each side of center on the RIT control.

(6) The larger the value of C4 and C5 the greater the band coverage of the RIT. However the RIT control will become touchy and difficult to tune in a signal because a small adjustment will tune a lot, I like a +/-1.5Khz to +/-2Khz spread. I use C4 to change the spread as I see fit.

(7) R4 was chosen so it will fit above the PTO dial. It's a miniature precision linear pot. It has a narrow shaft that fits through the hole used by the Collins emblem above the PTO dial. I removed the emblem and saved it in a 'safe

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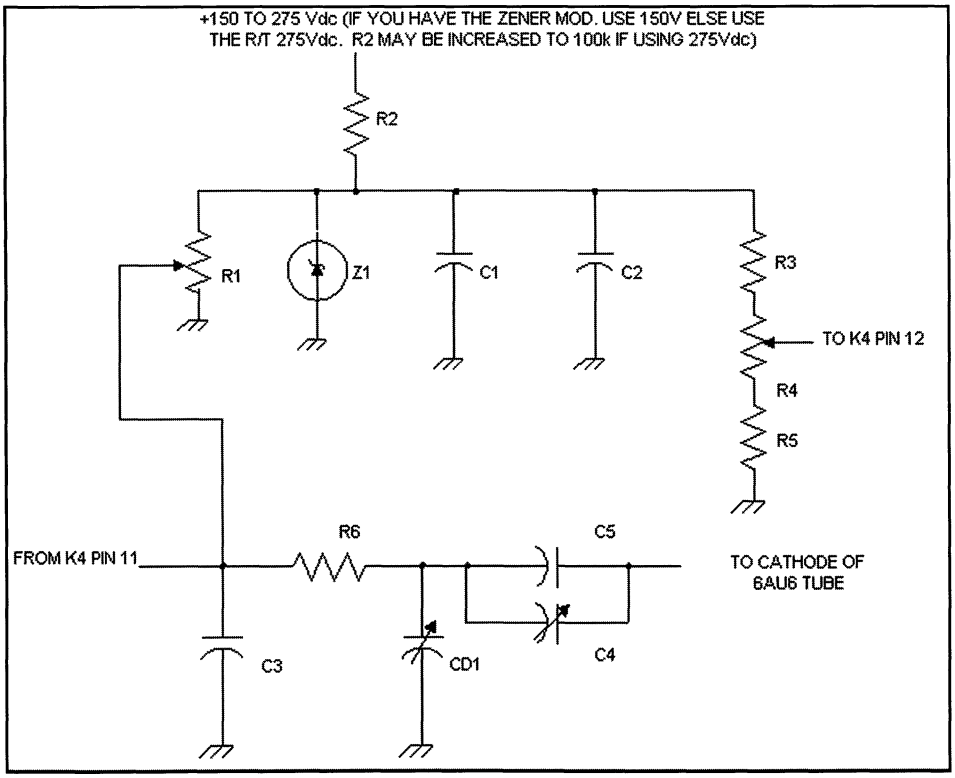
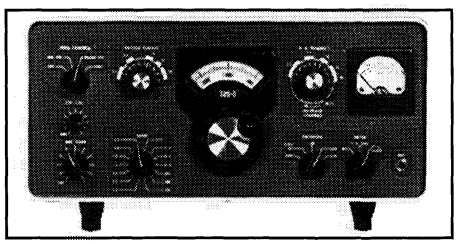


In this issue...

Basic Trouble Shooting

32S-1, 32S-3, KWM2/2A
Power Amplifier Neutralization
A guest article by Dennis Stinnett KA9AWF



If you would like to contribute a guest article to this column, please contact John, WA5VVT or Michael, W1RC.

At the end of our last article we had just replaced the 6146B's with 6146A's per John WA5VVT's suggestion and were preparing to neutralize them. Let's first review why we have to neutralize the finals and then go through the procedure according to the Collins manual.

Triode RF amplifiers with the plate and grid circuits both tuned to the same frequency have a tendency to oscillate just like any oscillator will. This is due to the inter-electrode capacitance between the grid and the plate. It's as good as placing a capacitor in the tube itself right in between the plate and the grid. If we were just building an oscillator we would be home free as the tube is oscillating just as we would expect. But if we are depending on this tube or tubes to act as an RF amplifier then we must make sure that the amplifier does not break into oscillation and that it will act only as an amplifier for the exciter signal introduced to its grid. The terminology used to prevent this oscillation from occurring is "neutralization".

There are several methods of neutralization, but for this time we will focus on my more recent experience and explain some of the alternative tools to use when performing this procedure on the 32S-1/3. The first step is to remove the plate voltage from the 6146 PA tubes. If your fortunate you can just remove the high voltage rectifier tube (5R4GYA) in the 516F-2, as this will remove the 800-Volt B+ which supplies the plates.

In my case the 516F-2 had been converted to solid state, therefore prompting me to remove the supply from its case and disconnecting (unsoldering) the two heavy blue wires which originally were connected to the rectifier tube input. Now that we have the plate circuit disabled, we must also disconnect the screen grid supply. If you look on the back of the 32S-1/3 you will notice two RCA phono jacks that say, "PA disable". These two jacks are wired directly together on the inside of the chassis and you must unsolder one end of this wire and move it out of the way. OK - We are well on our way.

The next step in the manual says to hook an "RF Probe" to the plate circuit. Now you say "RF Probe"! Hmmmm I don't own one of these beasts so, now what? Well friends there are other ways to skin this cat...First of all ANY RF indicator in the presence of AC RF will work for this procedure. If you so desire you can look in any ARRL handbook and they describe a probe put together with a one mA. Ammeter and a 1N34 diode along with a capacitor and you have yourself an RF Probe (to be used with your VTVM). Some of the other devices that can be used for this procedure are a loop of wire and an oscilloscope, a neon globe held to the plate end of the tank coil, or as I used an old Heathkit "tunnel dipper". The tunnel dippers are found sometimes at hamfests for a song and when placed in the diode position they act as a wavemeter. And a wavemeter is exactly what we need for sensing the AC RF signal.

Now that you have your sensing device setup it's time to hook up your 50 Ohm dummy load and remove the cover from the PA shielded compartment. Now we assume that you have removed the 32S-1/3 from its case by removing the two inner screws at the front of the chassis just under the door opening, and that you have removed all four of the screws that hold the feet on. This will allow you to carefully slide the chassis out of the cabinet being careful not to scratch the trim ring. (Thanks Roger!)

Set your frequency control switch to transmitter VFO (make sure that you have plugged in the transmitter VFO on the top of the chassis since you may have been operating transceive). Set the band switch to 28.5 MHz and tune the rig to 28.6 MHz. Now set the emission switch to "Lock Key" and the meter switch to P.A. Grid. Advance the Mic gain setting as necessary and adjust the exciter tuning for PEAK PA grid current. Try to keep this setting in the lower one third of the meter by adjusting the Mic gain. Now make sure that you have your indicating device coupled near the PA choke and adjust the PA tuning control for maximum RF response. (Peak the indicating device with the PA Tune control.) Now from the bottom of the chassis locate trimmer capacitor C-71. (This trimmer capacitor is labelled C-184 in the KWM-2/2A circuit - ED). It's right next to the PA tube sockets...Yes that little white circular device. Adjust this trimmer for a dip in your RF indicating device and for good measure peak the indicator once more with the PA tune control and then dip the trimmer capacitor again. That's it...Now all that is necessary is to disconnect everything and put the chassis back into the case. The RF indication is not at all hard to detect with most instruments. You will easily see the peak signal and will also easily see the nulling effect of the C-71 trimmer on this signal.

What you have just accomplished is to have fed the grid two equal and opposite voltages at the same time and they cancel. The net result is zero effective feedback to the grid from the plate circuit and the stage will NOT oscillate.. Thus neutralization. Just remember that the interelectrode capacitance is different between the 6146A and the 6146B, so when you're getting rid of those "B's" as we discussed earlier be sure to go ahead and neutralize those new tubes.

Please Note: ***Some of the techniques and technical information discussed in the Signal are controversial and we invite you to share your knowledge and experience with us. Please send your letters and comments to the Editor.***

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www.collinsradio.org

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The Editor's Operating Desk

de Michael Crestohl, W1RC/VE2XZ

Hope everyone is having a nice summer. The Dayton Hamvention is always a milestone that summer is coming and that amateur radio activity will decrease as there are other activities to attract our attention and compete for our free time. I enjoyed HAMVENTION 2000 very much - seeing old friends and meeting a few new ones. The CCA Banquet was a memorable event - I'll never forget the look on John Bess' face - for once he was rendered speechless! Great job Riley and Joe!

There was of course lots of stuff for sale in the flea market - pricey as it was! One of the members mentioned that he had picked up a 51S-1 receiver at the very reasonable price of $500.00 as a result of posting a WANTED message on the reflector. Now the seller is wise to the ways of pricing and values of this equipment and so it truly gladdened my heart to see there's someone out there who isn't in this for a quick buck but for the love of the hobby and Collins equipment. I'll not mention his name and callsign because I don't want to embarrass him but wanted to mention this here to illustrate that there are still some good people out there whose motives are not strictly profit-driven.

I am glad to see another article from Gary and J.B. on the pre-war Collins 4A which is in this issue. Thanks, fellas, for this interesting stuff! Most of us have little hope of ever having this wonderful stuff but it sure is great knowing more about it.

Your articles and input are very important to us. Please feel free to send articles, technical tidbits and whatever you feel that would be of interest to our members. 73, Michael, W1RC

RIT For The KWM-2A

(continued from page 1)

place' in case I decide to sell the KWM-2A at a later date. You may need to bore out the hole 'slightly'. Ugh! This depends on the pot you use. I chose a quality one because it will be constantly adjusted.

(8) K4 pins 11 and 12 are normally used for the AC switching of external options. I have no use for this feature so I used them for the RIT circuit. You will need to remove the extra 0.01uF ceramic cap and the 47ohm resistor, (Again keep them in a safe place!). I then disconnected the coax cable from pin 11,12, and 13. Put some heat shrink tubing on the exposed ends and leave them dangling in a safe way in the M2, (Plan on reversing everything one day.). I had to move one of the pins on the K4 relay (it's wired for normally open and you will need to wire it for normally closed). To move a pin simply remove the relay from the socket and push the pin through the socket from the pin side and out the relay side, then relocate the pin to the other Normally closed pin position (see you schematic for your M2). It seem hard but it's not it's accessible (fortunately pins 11 to 13 are at the top of the relay).

(9) I built the circuit using perforated circuit board. I mounted the perforated circuit board to the two screws behind the PTO. On one screw I used a ground lug terminal as the single ground point in the circuit.

(10) You will need to solder a thin wire (I used a 22ga-wire wrap wire) to the cathode pin on the 6AU6 tube. DO NOT OVERHEAT THE TUBE!!!! It WILL implode! (I have not lost one yet but, be careful!). Clean the tube pin before soldering. Make this wire as direct to the tube as possible.

(11) It will take you (if you are handy) approximately 6hrs to do this mod. Keep the leads of C4, C5, CD1, R6, and C3 as short as possible to avoid introducing added stray capacitance. The rest of the circuit is not critical. One could add this circuit to other transceivers as well.

Parts list:

R1 - 200k 10turn Trim pot.
R2 - 75 to 100k 2watt
R3 - 3.3k 1/4 or 1/2watt
R4 - 10k linear taper miniature pot. (this item can cost between $10 to 15.00)
R5 - 5.6k 1/4 or 1/2watt
R6 - 100k 1/4 or 1/2watt
Z1 - 12V zener 1/4watt 5% (10% will do)
C1 - 10uF Tantalum capacitor 25WVdc
C2 - 0.01uF disk ceramic cap
C3 - 0.01uF disk ceramic cap
C5 - 100pF NPO ceramic or 100pF mica cap (lowering the value will reduce the RIT spread)
C4 - 5-25pF ceramic trim cap NPO used to adjust the desired RIT spread.
CD1 - Varicap MV209 or equivalent (NTE614/ECG614 I believe but not sure, look up MV209 in NTE/ECG data book)

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Dave is interested in DX'ing, contesting, 50 mhz operation and the restoration and operation of classic "boat anchor" tube type ham gear of the 40's, 50's and 60's.

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.

Collins Legacies: The 4A Transmitter

by J.B. Jenkins, W5EU and Gary Halverson, WA9MZU

Third in a series, this article describes the lowest cost transmitter produced by Collins Radio during the prewar years. While few of these transmitters have survived today, the cute little 4A is perhaps the most common of the prewar Collins transmitters.

A Rig for the Times

The 4A was Collins' answer to a low-cost basic CW transmitter that the average depression era ham could justify, according to the Collins ads, due to the fact that the combined cost of the components were greater than the purchase price, $58.50 with one set of coils, less tubes. A perfect companion for the National SW-3 which sold for under $15.00 at that time.

The 4A was provided with a built-in power supply and used isolantite plug-in coils for each band (sold as an option: a set of two was $5.00). Rated at 25 watts, it used a 47 oscillator driving parallel 46's. An '80 was used in the oscillator power supply as the low voltage rectifier, and an 83 as the high voltage rectifier.

Collins Bulletin D-111

"The 4A transmitter marks the entry of the COLLINS line in the extremely low-priced field. The 4A uses a 47 crystal oscillator and parallel 46's in the power amplifier permitting an output of 18 to 20 watts on 1.7, 3.5, or 7 mc. The power amplifier is operated on the crystal frequency in each case. Despite its low cost, the 4A embodies the mechanical and electrical refinements found in the larger COLLINS transmitters. A separate power supply is used for the oscillator to reduce frequency 'chirp'. Standard COLLINS plug-in coils are employed. A single Weston meter is provided with a switching arrangement to read plate and grid currents. The 4A is ideal for an amateur who wants to start out with a minimum investment and yet have a transmitter wich will deliver a high quality C.W. signal. The 4A can also serve as a stand-by transmitter in a high-powered station to be used when full power is not required. Really surprising results can be obtained and amateurs who are accustomed to think in terms of kilowatts can get a great deal of service and amusement form one of these little transmitters".

The above announcement was first made regarding the 4A transmitter in the April-August issue of the COLLINS SIGNAL and only a moderate amount of importance was attached to it at the time. However, during the intervening months this model has proved to be one of our most important products. It has met a very insistent demand for a low-cost, all band CW transmitter which was not burdened by the extra cost and complication of a lot of meters and tuning controls, but, at the same time, was capable of giving consistent performance.

We have been very much gratified by the letters we have received from the many amateurs who have purchased this transmitter. Transcontinental schedules are maintained regularly with the 4A's and several users have reported working Mexico City, Hawaii and New Zealand within the first week or so of operation.

Some slight refinements have been made in the circuit of the 4A so that the measured output is now 28 watts on 3,500 and 1,700 kcs., 25 watts on 7,000 kcs., and 13.2 watts on 14,000 kcs. Of course, the outfit is crystal controlled with a D.C. note.

We have a few inquiries as to why we do not incorporate the new "universal exciter" in some of our transmitters. The universal exciter is a very clever arrangement, but no advantage is found over our existing 4A and 10B circuits. It should be remembered that the output of the universal exciter is scarcely high enough for serious transmission work, unless it is followed by another amplifier, whereas the 4A Transmitter puts out a relatively powerful signal and it also contains dual power supplies, so that no additional equipment has to be purchased.

We strongly recommend the 4A Transmitter for the consideration of every amateur who wants the most efficient telegraph transmitter obtainable at a very moderate investment".

The Economy Recovers

Like many depression era products, the 4A was the right product for the time but was quickly forgotten when the economy recovered. The profit margin had to be slim since the unit was labor intensive to build, a liability in an upscale market having more money to spend on higher powered rigs.

The various versions of the 4A's that exist today show the changes of thought that was occurring during its life cycle. Early 4A's had a bakelite engraved front panel, while later production units had an aluminum panel painted with black wrinkle enamel and name tags. The meter was a 0-200 MA Weston in early units, and a Westinghouse model MX in later units. Serial tags went from paper labels to brass badges.

The 4A was offered through 1935, however promotion efforts ceased when the 30FX was announced.

You can email J.B. Jenkins at jenkjb@flash.net, or Gary Halverson at ghal@ix.netcom.com.

At the Mic with KW6KW

Sandy Meltzer
President, CCA

I'm sad to report the passing of Harry Snyder W7HC. Harry passed away on Thursday, July 20th and was one of the true gentleman in our hobby and always ready to help Collins users.

On a brighter note, I want to announce two new appointments by the CCA Board of Directors. First, George Maier K1GXT has been appointed to be our "CCA Chief Information Officier". The primary purpose of this new position is to act as a central point of contact for CCA communications.

I'm also pleased to announce the appointment of Mike Stover KB9VU as our new CCA Membership Secretary. Mike is replacing Mac McCullough W5HPM who did an excellent job as our Membership Secretary over the past 1.5 years. Mac was responsible for redefining and significantly upgrading our CCA membership database and for revamping our yearly CCA membership renewal process. Thanks Mac!

Finally, a CCA Nominating Committee has been appointed to oversee the upcoming board of Directors election in October. Three of our five board positions are up for election and all members in good standing are invited to submit nominations for these important board positions to Gayle Lawson K0FLY, our Committee "Chair", at glawson@inav.net or mail your nominations to Gayle's "callbook" address.

The deadline for the receipt of nominations is FRIDAY, September 29th, 2000. Election ballots will be mailed to all members with the Fall issue of the Signal (late October) and results of the election will be announced on or about November 15, 2000. Please visit the Collins reflector or CCA web site for more specific information on what qualifications are required for these positions. 73' Sandy