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- Thursday 3805 kHz at 8pm CST
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- 1st Wednesday AM 3880 kHz at 8pm CST

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Tues., Thurs., Fri., & Sunday for Ragchew

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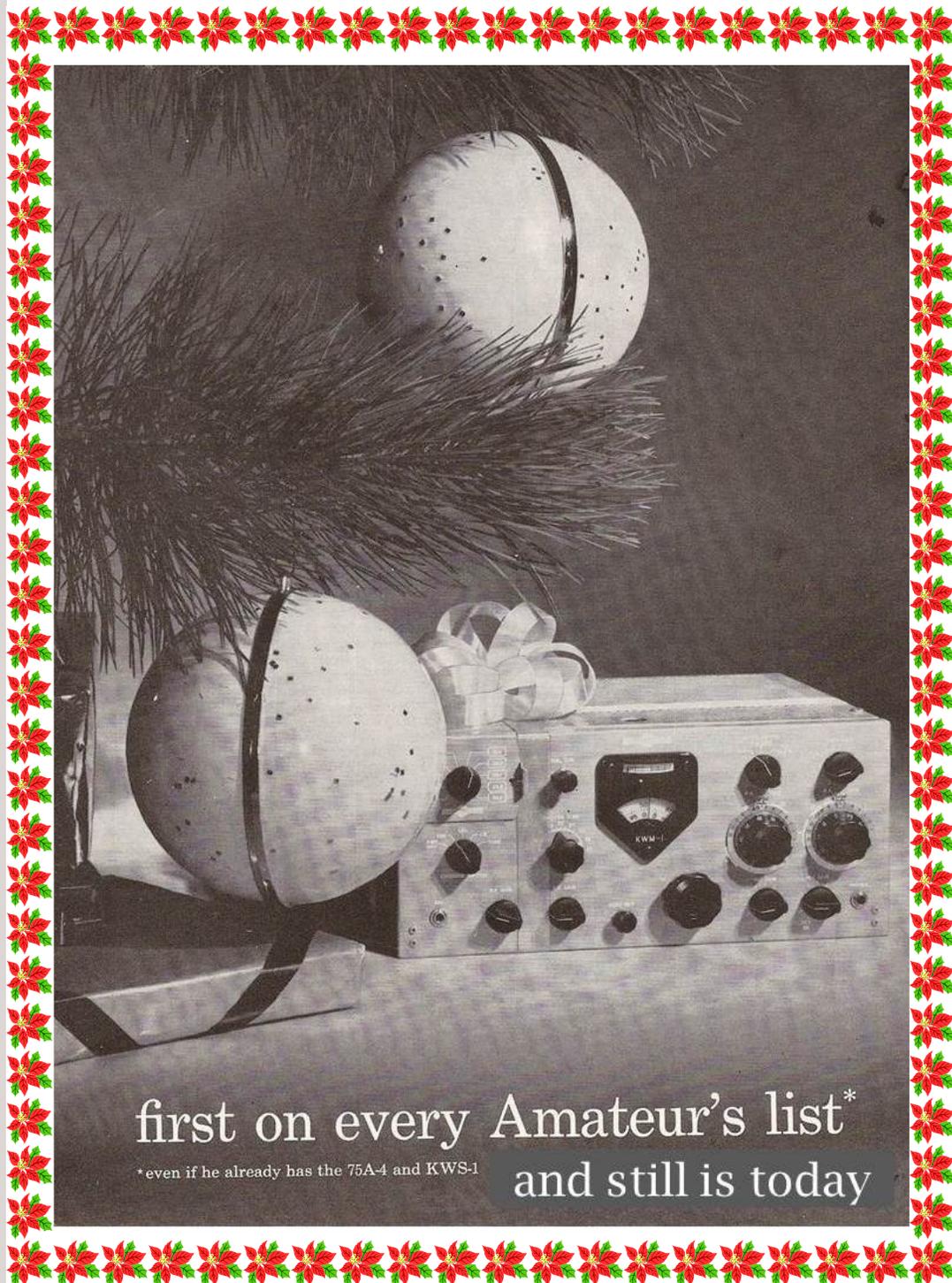
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In the News

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- Jim Monk WOJLL Passes

Every 15 Year-old's Dream



first on every Amateur's list*
*even if he already has the 75A-4 and KWS-1
and still is today

From the Editor's Desk

by Bill Carns, N7OTQ and Co-Editor Joe Nyberg, WILJN

Hello again from Wimberley. It is hard to believe that another year has gone by. I mark the years now with the holiday Q4 issue - and it is always a wakeup call that the year is coming to an end, but another is beginning.

I always enjoy this issue because it is such a wonderful time of year and it gives me a chance to dig back through the time capsule that we have managed to amass and look for goodies for the cover art and for the "gift" that the CCA likes to bring to you every Holiday Season.

This year is no different and I hope that you enjoy the issue and the technical insert.

The cover art this year is taken from the December 1957 Christmas advertisement that appeared in that issue of QST.

Collins had not moved to its honored inside cover position yet and the ad is a grey scale B & W that appeared on the second page of the book. It is notable to me because, as a person who was very involved with marketing and advertising in my career, I always had noticed that, from its inception in the 30s up until 1957, Collins passed through the holiday season with advertisements that reflected their technical and equipment pride, and they consistently made no mention of the season and the fact that it was a time of giving (and buying) presents. They apparently felt that their image was so strong that they did not need to work on enhancing the desire

of their potential customers for ownership. I think they assumed that the quality and technical capability would sell itself.

This advertisement in 1957 was the first time that they picked up on this holiday theme and they would go on to follow this trend for the remainder of their Amateur Radio advertising.

It is also interesting to note that in my discussions with past Collins employees, it has become apparent that initially marketing was a very weak service group at Collins, and that it was not until the S-Line period that marketing started to assume more of a guidance role in the philosophies surrounding advertising and image and introduction strategy. This is not to say that they ever took on a leadership role in these areas. Back in the Amateur Radio days, Collins was an engineering centric company. But, in the late 50s and through to the 80s, there appears to have been a shift to more influence from marketing.

Now, let me switch gears a little. First I want to thank the many readers that have called with their comments about the *Signal*. I appreciate the feedback and I am pleased and proud to say that it is predominantly positive. I know that I sure want to keep it that way.

You have perhaps noticed that the articles are, for the most part, coming from a relatively few contributors. I am significantly in their debt because we could not have the magazine that we do have without them. I would, however, like to broaden

the base of those who put in the effort to write for us and ask, if you undertake a significant project, that you think in terms of contributing some writings about the process and the result.

Articles about your treasure hunting and finding, as well as articles about significant Collins history are also very welcome. Do not be intimidated by a lack of writing experience. The *Signal* staff can help you with either constructive editing or even ghost writing should the need arise. What is important is to share your information and experiences with our other readers.

Please consider contributing and give me a call or an email to kick around any ideas that you may have.

Finally, In this issue, Don Jackson has given us his last "chapter" in the story about AGC in our receivers and how that relates to S Meter readings and performance in general. I know that I have learned a lot, and I hope that you have too.

Thank you Don - for the work that you have put in on this series and for the resulting knowledge that you have imparted to our entire group. It is much appreciated and we will look forward to hearing more from you, should you be so inclined.

And, to all - Have a great holiday and see you next year.

de N7OTQ, Bill Carns
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Automatic Gain Control Theory and Operating Conclusions Part 3 – What Does it All Mean?

By Don Jackson, W5QN

At the excellent suggestion of Bill Carns, the following is a summary of the major points relating to receiver AGC. Most of this information is somewhere in Part 1 or Part 2 of the previous article on AGC, but may be something of a pain to find. In addition, there is a discussion of the 75S-3B S-Meter function, its warts and a suggested solution.

Automatic Gain Control (AGC) is a feedback system in which the receiver gain is automatically adjusted to maintain a relatively constant output. The AGC system is not active until the receiver input exceeds the input “AGC Threshold” level (dBm or uV), which is set by potentiometer R57 in the 75S-3B. The AGC voltage can be thought of as a measure of the attenuation required to keep the receiver output at a constant level as the RF input level is varied. It is desired that the attenuator have a “dB/Volt” characteristic (AGC Slope) that remains constant over the range of the AGC system. If that is the case, the AGC voltage can be combined with the AGC Threshold to calculate the absolute receiver RF input power in dBm.

What would we like in an AGC system? For starters, we would like our AGC system to have a large operational dynamic range, over which it introduces little distortion. Analog receivers of this era typically have around 80dB of AGC range. Modern receivers sometimes incorporate a digital attenuator at the antenna input, allowing a very high AGC range. However, this approach limits the ultimate output S/N once this attenuator begins to activate. One way to check the AGC range is to measure the total harmonic distortion of an AM signal. Figure 1 shows the results of this measurement taken on my 75S-3B. I used 90% modulation at a 400 Hz rate. AGC mode was set to FAST, and the AGC threshold was 1.5uV. Audio output was set to 200mV p-p at each data point.

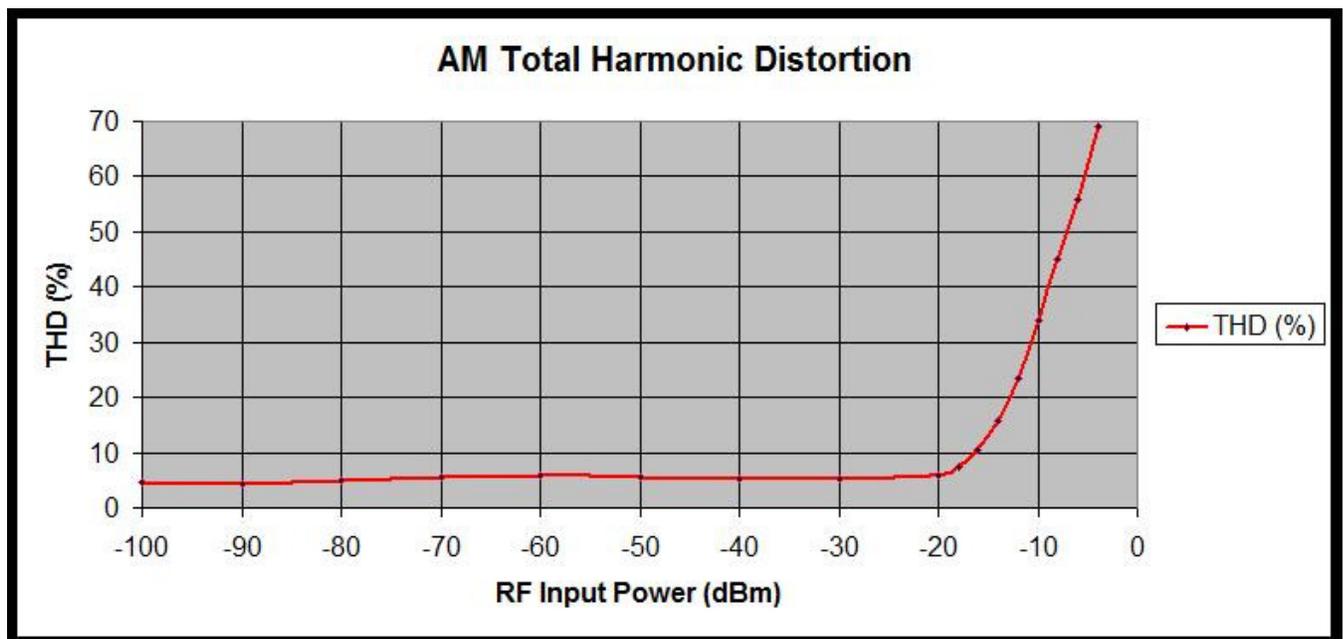


Figure 1

From Figure 1, we can see the AGC range is approximately 87dB, as measured from the AGC Thresh-

AGC Theory and Operating Conclusions - Cont'd

Part 3 - What Does it All Mean?

(Cont'd)

old, -103dBm, to the point of 10% audio distortion, -16dBm.

Normally, we would like a very fast AGC attack time, allowing the AGC action to act very quickly on a sudden RF input pulse. However, the attack time cannot be too fast due to loop stability considerations. The choice of AGC decay time is dependent on modulation mode. For casual SSB and CW operation, most operators prefer a long decay time to prevent noise from rising to a high level during the time between CW characters or SSB voice words. This is very much determined by operator preference. Note that in some situations, such as contests, a long decay time is not desirable since a long decay means a long time before you can hear a weak signal after the removal of a strong signal. With AM, FM or digital modes, there is always a carrier present, so there is no need for a long decay time. One consideration with amplitude modulated signals is that the decay time should not be significantly shorter than the period of the lowest modulating frequency. If that occurs, the AGC loop will begin to "track" the modulation, essentially removing the modulation from the signal.

Of the two attack/decay modifications discussed in Part 2 of the article, my opinion is that the one to lengthen the decay time is very useful and produces dramatic results. Simply installing a 100k resistor across R88 will produce a reasonable decay time. However, I prefer an even longer decay time, similar to the Drake line of receivers. I find a good choice of component values to be 30k installed across R88 and 2.2uF installed across C137. This produces a decay time that requires about 5 seconds for the receiver gain to increase to S0 level upon removal of an S9 signal. The attack time modification (increasing C11) is not particularly important, as the improvement is only audible to the operator under lab test conditions with a high level pulse input signal.

The S-Meter on a receiver is usually thought of as an approximate measure of signal strength. On high performance modern receivers, the meter may be accurate enough that it is calibrated in dBm, rather than the somewhat vague "S-Unit". In an analog receiver, the meter is nearly always driven by the AGC voltage, which can be thought of as the control voltage for an attenuator function in the RF/IF chain. The ability of the signal strength meter to read absolute input power is dependent on several parameters:

1. Stability of the input AGC threshold (dependent on maximum receiver gain)
2. Linearity and accuracy of the attenuator function over the range of the AGC accuracy and stability of the AGC voltage to S-Meter transfer function

If all of the above are excellent, the receiver signal strength meter may function almost like a laboratory power meter. In the case of the Collins S-Line receivers (or other receivers of that era), these three criteria are not precise enough to warrant calibration in dBm. The 75S-3B measures the AGC voltage using variations in the V7 cathode current, and screen currents of V6 and V7 to drive the S-Meter. Since the S-meter is a current sensitive device (1ma full scale on the 75S-3B), the AGC voltage must be converted to current. In the 75S-3B, this "S-Meter Transfer Slope" is approximately .19 ma/Volt from S1 to S9. Although this circuit is clever in that it adds few components, it has disadvantages.

We would like our S-Meter to increase one S-Unit for approximately every 6dB increase in signal level, as this is the current IARU standard for an S-Unit. Two things affect the relationship of input power (P_{in}) to S-Meter reading. One is the attenuation (dB) of gain stages V2, V6 and V7 as a function of AGC voltage. This is the "AGC Slope" (dB/Volt). The other is the "S-Meter Transfer Slope" (ma/Volt) function that relates the S-Meter current to the AGC voltage, a function of V6 and V7, in ma/Volt. Combining the AGC Slope, the S-Meter Transfer Slope, and the "S-Unit to current factor" (S-Unit/ma), one can calculate the

AGC Theory and Operating Conclusions - Cont'd

Part 3 - What Does it All Mean? (Cont'd)

overall "S-Meter Slope" (dB/S-Unit). My 75S-3B has an average S-Meter Slope between S0 and S9 of about 4dB/S-Unit. Unfortunately the slope varies from 2.9dB/S-Unit to 5.7dB/S-Unit depending on where your signal is in the S0 to S9 range. Can we improve non-linear behavior of the S-Meter? I separately measured the AGC Slope (dB/Volt) and the S-Meter Transfer Slope (ma/Volt) to determine the major cause of the rather poor linearity of the S-Meter. The data was taken with the AGC Threshold set to 1.5uV (-103.5dBm). The results are shown below.

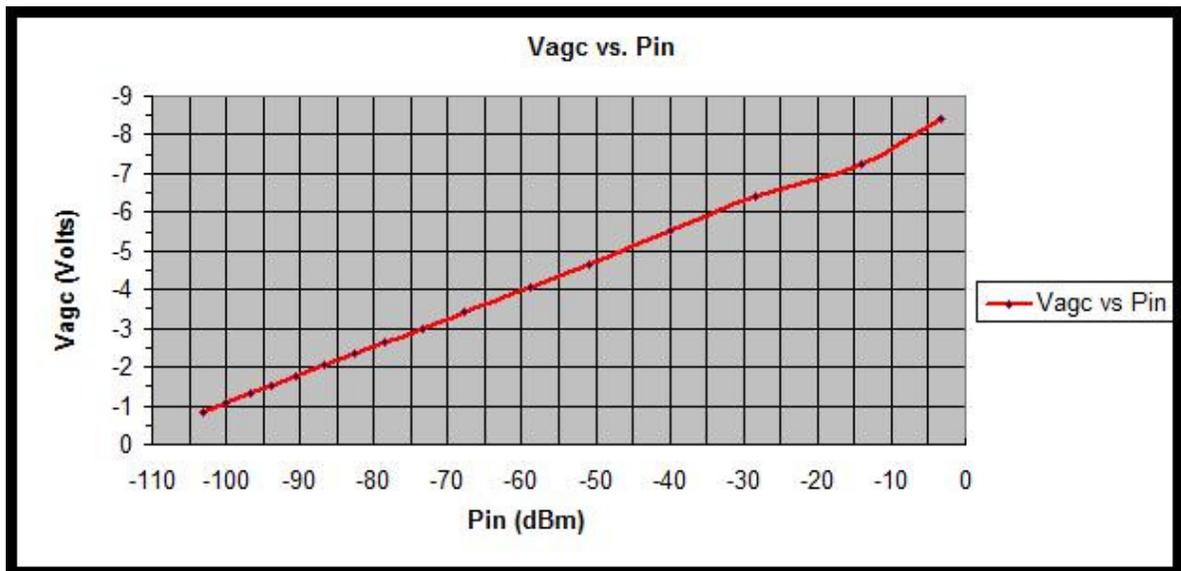


Figure 2

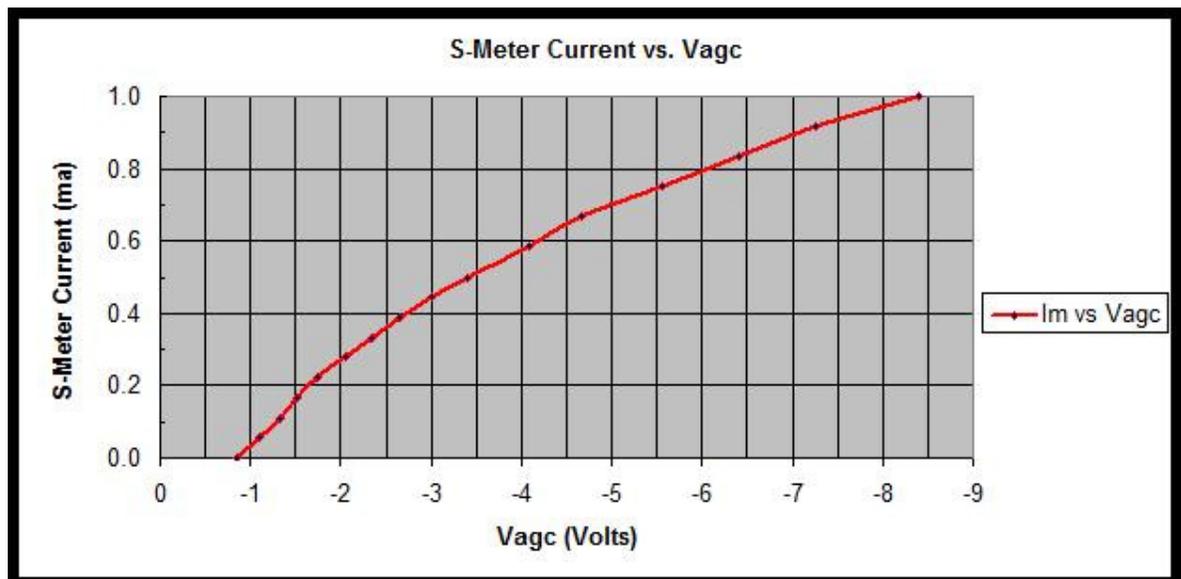


Figure 3

AGC Theory - Part 2 Dynamic Analysis (Cont'd)

by Don Jackson, W5QN

Clearly, the AGC voltage curve of Figure 2 has an excellent dB/Volt slope that is quite constant over the AGC range. Unfortunately, this performance is significantly degraded by the S-Meter Transfer function in Figure 3. Comparing the accuracy of the S-Meter with the existing 75S-3B circuitry with the accuracy that could be obtained by replacing the transfer function with a linear measurement of the AGC voltage produced the results shown in Figure 4.

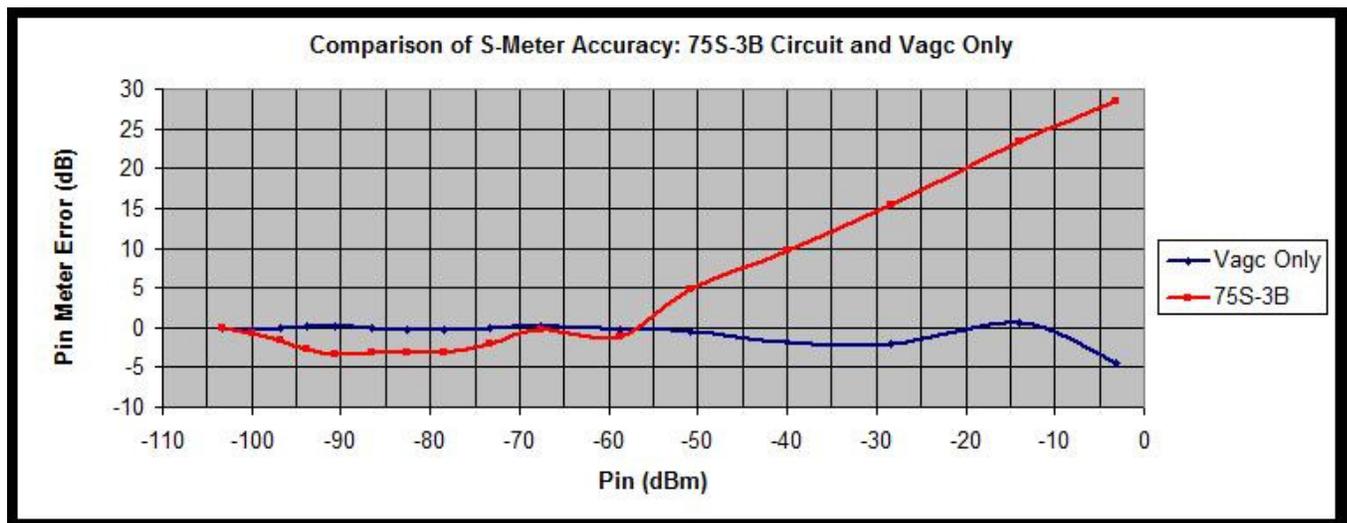


Figure 4

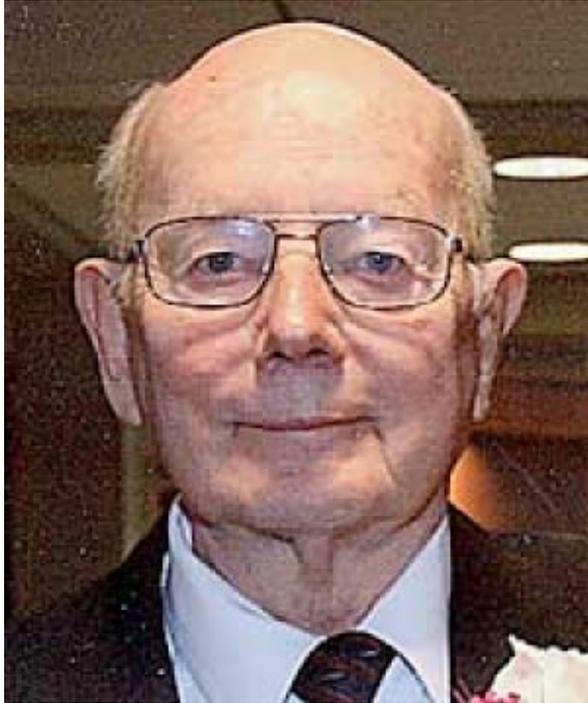
Installing a new S-Meter driver circuit would substantially improve the linearity of the S-Meter, meaning its sensitivity in dB/S-Unit is much more constant over the entire AGC range. This makes it more useful for relative measurements such as antenna gain comparisons, but it doesn't improve the absolute power (in dBm) measurement accuracy. This is because the gain of the receiver varies as the band is changed, or as you tune the receiver over the 1st IF pass band. These gain variations change the AGC Threshold value, which must be known to calculate absolute power from the S-Meter reading.

Implementing the new meter driver would be fairly simple, involving an op-amp or two. The circuit would eliminate most meter drift sources, and provide the ability to set the S-Meter Slope to 6dB/S-Unit or another value, as desired. I'm going to build up and install a circuit and try it out myself. This may appear as a follow up article in the Signal in coming months.

Since we are on the subject of the S-Meter, I have to say the explanation of meter scales in the 75S-3B manual is troublesome for me. The manual says the AGC threshold is set for 2 uV (-101dBm), and the alignment procedure defines this as the level at which the S-Meter begins to move from S0. The manual also says the dB scale is referenced to 1 uV (-107dBm), so S9 (40dB on dB scale) is 100 uV. This would mean that S0 (10dB on the dB scale) should correspond to 3.16 uV (-97 dBm), not the 2 uV the receiver is set to. The only way I see for the S-Unit and dB scales to behave as the manual describes is to set the AGC threshold to 3.16 uV, and modify the S-Meter sensitivity to be 3.33dB/S-Unit rather than its normal 4dB/S-Unit. If these changes were made, both scales would be correct and S9 would correspond to 100 uV. But, I wouldn't recommend doing either of these modifications.

de Don Jackson, W5QN

Jim Monk, WOJL—SK



Just as the Q3 issue of this magazine was going to the printer, we received word of Jim's passing on the 30th of September. There was not enough time to get this article prepared for that issue, so it had to wait. I apologize for the delay in getting this information to you.

Jim was a long time (since the concept in 1991) member of the Collins Collectors Association and he was one of those people that just contributed solidly all those years. He was always ready to give aid and advice when service questions came up. Many of you who are relatively new to the group may not be very familiar with Jim, since he had become more quiet when his health started to fail him several years ago, but going back into the early 2000s and the 1990s, he was a familiar voice of knowledge on the nets and the reflector.

Jim was born in Lincoln Nebraska and graduated from high school there in 1947 when he joined the Nebraska Public Power Company where he had a lifelong career in Power Delivery. He also got his first ham license at age 17, so he had been in electronics and power delivery for some 65 years.

Between 1950 and 1953, Jim took a break from his career and joined the Army where he was a radio intercept operator. During service, Jim served 18 months in Korea. He remained a true CW man for the rest of his life with a code speed up in the 25 wpm range. During that period of service, he also met and married his wife Carol. Following his discharge, they returned to Lincoln where Jim's family expanded to include two children.

He retired from NPPD in 1994 after 47 years of service. He also was very active in his church, the Rotary, and was on the Board of Directors of the Lutheran Community Hospital. He also served in many other capacities related to community service throughout his lifetime.

Jim was a beloved member of our community here, his local community and his family. He is missed by all.

Thank you Jim - For your service to our country, your community and family, and to our organization.

Best 73s Jim.



Increasing the Illumination of S Line Meters

by Dick Weber, K5IU



For a while I've wanted to improve the illumination of the meters in my S Line gear. After trying a couple of things, I now have a simple method to improve the brightness to a level I like. A typical "before and after" is shown in **Figure 1**.

of the meter to edge-light the meter face. In the past, I've used white gloss to paint over the original gloss paint. Recently I noticed the meters in newer gear have wider bands that extend right up to the inside front of the meter while in older meters the painted bands stop about even with or slightly behind the faces of the meter movements. I also noticed the older meters used gloss paint while the newer ones used flat. This led to a couple of simple experiments with an old, defunct meter from a

small can of the whitest, flat latex paint they had. After the gentleman in the paint department understood what I was up to, he sold me an eight ounce can of Glidden Tintable Tester, GL6000. This stuff is really, really white - trust me. Using this paint, I painted over the existing white band inside the 30L-1 meter extending it as far forward as possible as shown in **Figure 2**.

With the whiter, broader band the illumination of the meter

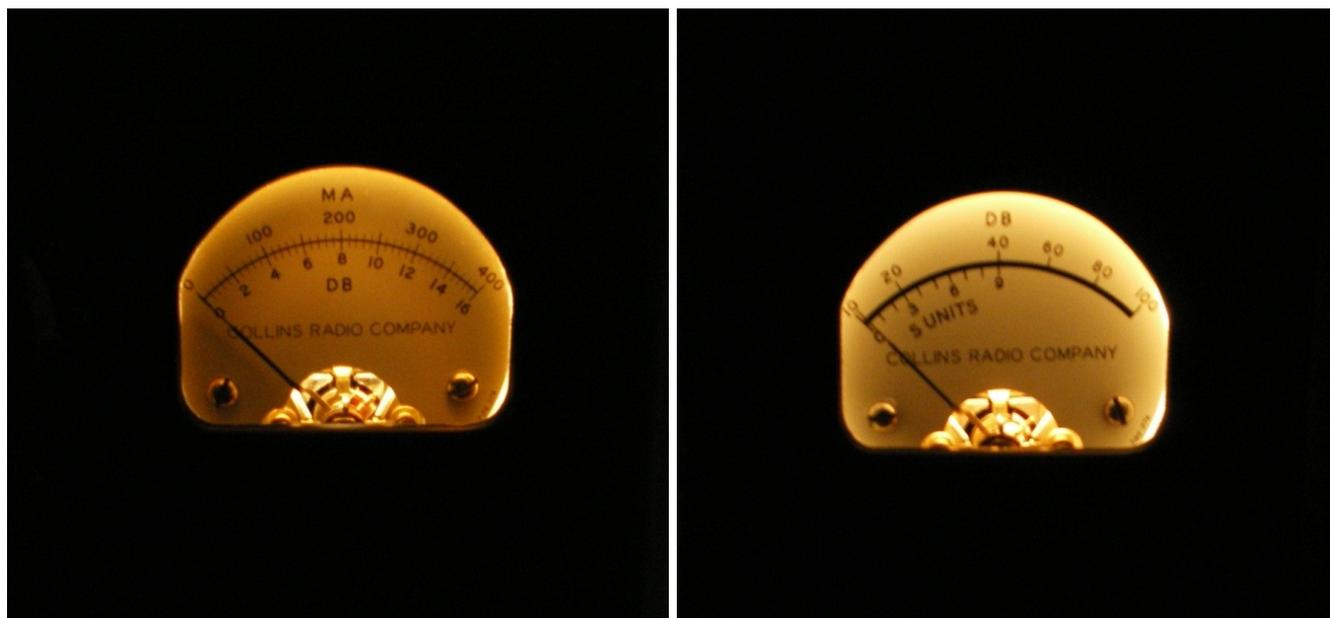


Figure #1 - Side by Side Comparison of Original Factory Meter Configuration (Left) and Enhanced Reflection Treatment (Right)

One of the things I've done over the years while refurbishing S Line gear is to repaint the white band inside the meter used to reflect light from the #47 bulb around the internal periphery

30L-1 that had the narrower band.

The first thing I did was to go to Home Depot where I asked for a

face was definitely improved, but not as bright as I wanted.

If you look inside an S Line meter, you'll see the bulb shines

Increasing the Illumination of S Line Meters - Cont'd

by Dick Weber, K5IU



Figure #2 - Extending the White Paint Band Forward Allows More Light to Reflect on the Meter's Face

to inject more light into the duct. The result was a much improved illumination of the meter's face by the combined effect of extending the band forward, by painting dull surfaces, and by using very white paint.

As a final note, I didn't consider changing the #47 lamp to a #44 because I didn't want to put more heat into the meter's closed volume even though a #44 lamp would produce more light.

Enjoy, de Dick Weber. K5IU

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Figure #3 - Painting of Meter Internal Surfaces Aides in Light Reflection

on the rear of the meter case, on the dull aluminum rear surface of the meter movement's face, and on the dull metallic surface of the meter's magnet. In view of this, I painted the rear of the movement's face and the circumferential sur-

faces of the meter's magnet as shown n **Figure 3**. Doing this essentially creates two white opposing surfaces to duct the light around the internal periphery of the meter and provides more reflective surfaces near the bulb

Author Information

Dick Weber (K5IU)

Dick writes periodically for the *Signal Magazine*. He is employed as a Principal Engineering Fellow (Specializing in M.E.) by Raytheon and has been a ham since 1974. He is published often in CQ and QEX with a strong bent towards Antenna design. He also has had his own company specializing in Rotating towers.

Dick's primary interests in Collins center around the S-Line and he is most often heard on CW. Thanks again for the contribution Dick.

.....cca.....

In the Shack of Pete Zilliox, K5PZ

It is a pleasure this issue to bring back the “In the Shack of” series - - and to feature the shack of Pete Zilliox, our CCA Membership Chairman. Pete lives with his new wife Catherine in Huntington Beach California

Pete has been a ham since age 13 (1965) and has electrical engineering degrees from Penn State and USC. He has worked at Hughes Aircraft, Rockwell Collins and now has his own consulting company which, for the most part, focuses on on-line course presentations for technical training.

This article gives me a chance to thank him publicly for his dedicated - behind the scene - service to the CCA, and it also gives us a look at one of the most well-presented collections of Collins that I have seen. The warm atmosphere is apparent, and it takes me back to the days when we all coveted this equipment, but could not afford it.

I have included a picture of Pete’s original collection and shack in Dallas. It was a formidable collection of beautiful Collins and deserves to be remembered.

Following his move to Huntington Beach, Pete set up his current shack and it is a thing to behold. It speaks volumes about Pete and his attitude towards Collins gear, as well as his prowess as a decorator and technologist.



One of Three Collins Factory Consoles. This was the Visitor’s Op Position at W1AW for Many Years

In the Shack of Pete Zilliox, K5PZ

I will let the pictures tell the rest of the story, but to Pete, I say: Well done and thanks again for your service. We all appreciate it.

Beautiful KWM-380 and 30S-1 operating position shown here to the right - Note Original 9CXX QSL Card



Left - Gold Dust Twins With Complete SC101

Lower Left—Previous Dallas AM Studio & Collection

Below is Pete's Beautiful 32V-3/75A-1



From the President



Season's Greetings to all of you and I hope that your holidays are joyful and find you in good health and enjoying your friends and family. You all are also, I hope, getting a little time in this busy season to join in a net or two, and to enjoy your Collins equipment.

This has been a good year and a sad year. It has been good in the sense that the CCA has continued to grow and get stronger, and it has added a new venue to its agenda with the addition of the Dallas Ham Com to the list of annual events. Propagation has finally improved and we are considering firing up the good old 10 meter AM net. I must say that it continues to be a bizarre sun spot cycle and nothing seems to be very predictable.

This has also been a sad year, in that we have lost an inordinate number of members from our ranks who have gone SK. I certainly hope that this trend does not continue. Knock-on-wood, it seems to have slowed down.

We have not given up on providing some additional CCA benefits in the area of monogrammed and screen printed clothing. I hope to make some progress on this in 2012. We will have some other surprises for you, and I will keep them just that - a surprise.

We will be adding a west coast meeting venue for 2012 and that will bring us to three significant regional events. This coming year, we will have meetings, dinners and social happenings at Dayton, Dallas, and a west coast location to be announced in the first quarter. For those of you that have missed the Dayton and Dallas meeting in the past, we are trying to make these more accessible by spreading them around the country, so we hope to see you at at least one of them.

----- Renewal Notice -----

Please note that our annual renewal period is open for all members! Please renew if your dues are only paid through December 31, 2011 (check the mailing label on this issue) as soon as possible. You must do this prior to next year's 1Q Signal mailing! Dues and renewal information are found at the Membership page on the CCA website at www.collinsradio.org. You are highly encouraged to pay via the website! At the website, you may pay with a PayPal account, debit or credit card. Dues paid on the website are only \$32/year. Alternately, your dues paid via a mailed in check are \$35/year. If you must pay by check, mail the check to CCA, 9121 Atlanta Ave, Box 316, Huntington Beach, CA 92646

I sincerely hope that all of you are enjoying your Collins and the camaraderie of the Collins Collectors Association as much as I am. It is a great group and a day does not go by that I do not get some enjoyment from a contact or activity related to the group.

Please continue to give us feedback when you see that there is an issue that needs to be addressed and also give us your thoughts and ideas on improvements that could be made that would benefit the group.

Again, Season's Greetings from your CCA Board of Directors and from me personally.

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