## *How Should We Treat Our 30L-1?*

*w/ Output power and Distortion Data*

Well folks, the results on the investigation of the 30L-1 are in and graphed.

A quick word about where this is coming from. There has been a lot of discussion, and many opinions, on the CCA reflector recently, and over the years, about how much power a 30L-1 amplifier should deliver with what required drive. Also, there has been much discussion about how to tune it.

**First - - Thanks to Don Jackson**, W5QN, who took the data and provided summary graphs.

The tuning method has been beaten to death, so no more here, but just how hard should you drive a 30L-1 and what kind of output should you expect when properly operated? That is the question at hand.

There are lots of opinions out there . . . such as, "Drive should be 90-100 Watts" ……. Or "I run my 30L-1 at 700 Watts out and it survives". We have heard many of these statements. But, what is that amp really designed for and what should we do with it.

First, I want to remind everyone, that when you raise the output power of that amp from 500 Watts to 600 Watts, that is a 0.8 db increase or about 2/10$^{th}$ of an S-Unit at the receive end. An increase of 0.8 dB isn't discernible in the real world of amateur radio communications.

We have just put a version of this email up on the CCA site under RX for Your Collins in the 30L-1 category. You can also read this there and also see the salient graphs that make it pretty evident that Gene designed this amp to be a 500 Watt amp. Will it do more? Sure!

Should it do more? Well, you decide, but the data is telling me *hell no*! **It's not worth the .8 or even 1.2 db if you push the heck out of it.** Total Distortion and Gain suffer. In addition, the power supply gets pushed close to its design limits. Bottom line, you are abusing the amp and your signal is degrading. You are "Taking it out of bounds" per Gene's recommendations and you are getting almost nothing ( < 1 db ) in return.

> Note: This data was taken on 20 meters mid-band. Gain will be somewhat higher on 40 meters and again higher on 80 meters. Then the gain will be lower on 10 meters where it is normal at times to see drive requirements approaching 100 watts.

Take a look at how 2-Tone Power Gain starts to compress above 500 watts (PEP) and how the Total IMD Distortion (the ratio of 3$^{rd}$ and 5$^{th}$ order distortion power as a percentage of desired tone power) starts to rise rapidly above 550 Watts. Note that, while gain starts to decrease a bit, there is a "Sweet Spot" in Total Distortion at about 550 Watts (PEP).

The timing is TBD, but a more compete article will appear in the ***Signal Magazine*** in the near future and we will show the data tables in this ***Signal*** article. After the magazine is published, we will put the data in the **RX for Your Collins** section of the CCA website.

When taking the power and IMD data, the Plate Current and drive required was logged for each reading.

By the way, the drive at 500 Watts (PEP) out was approximately 70 Watts (PEP) - - 70 Watts guys. And, I note that the 30L-1 specification gives 70 Watts as its drive requirement.

Guess where the plate current is when the amp is putting out 500 Watts (PEP) with a 2-tone input? 300 mA.

In working on this, we have realized that the 300 mA “Tuning point” shown in the Collins manuals is just a starting point, and that subsequent use of the TUNE function will then result in the PA being loaded to approximately 550 mA.

It is evident that Collins avoided specifying any power output numbers in the 30L-1 manual. However, the 8th Edition manual does mention a typical output at a plate current in Steps "i" and "j" of paragraph 4.7 in the MAINTENANCE section, which addresses the TUNE METER ADJUSTMENT procedure. Although we are not recommending use of the TUNE function, these steps indicate that with a 2-tone input signal, and drive adjusted for no visible "flat-topping", one should see 160 VRMS (512 Watts PEP) at the 30L-1 output, with an associated plate current of about 300 mA. This is worth noting, as it agrees well with our measured data.

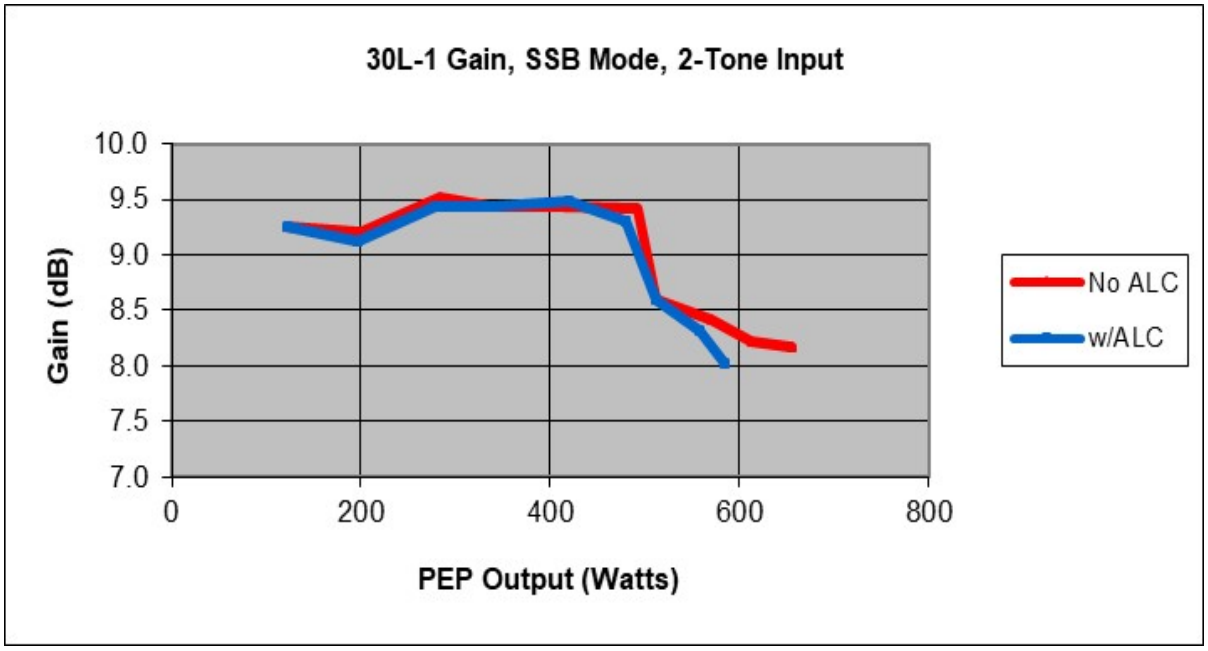
Hmmmmmmm. Guess Gene knew what he was doing.

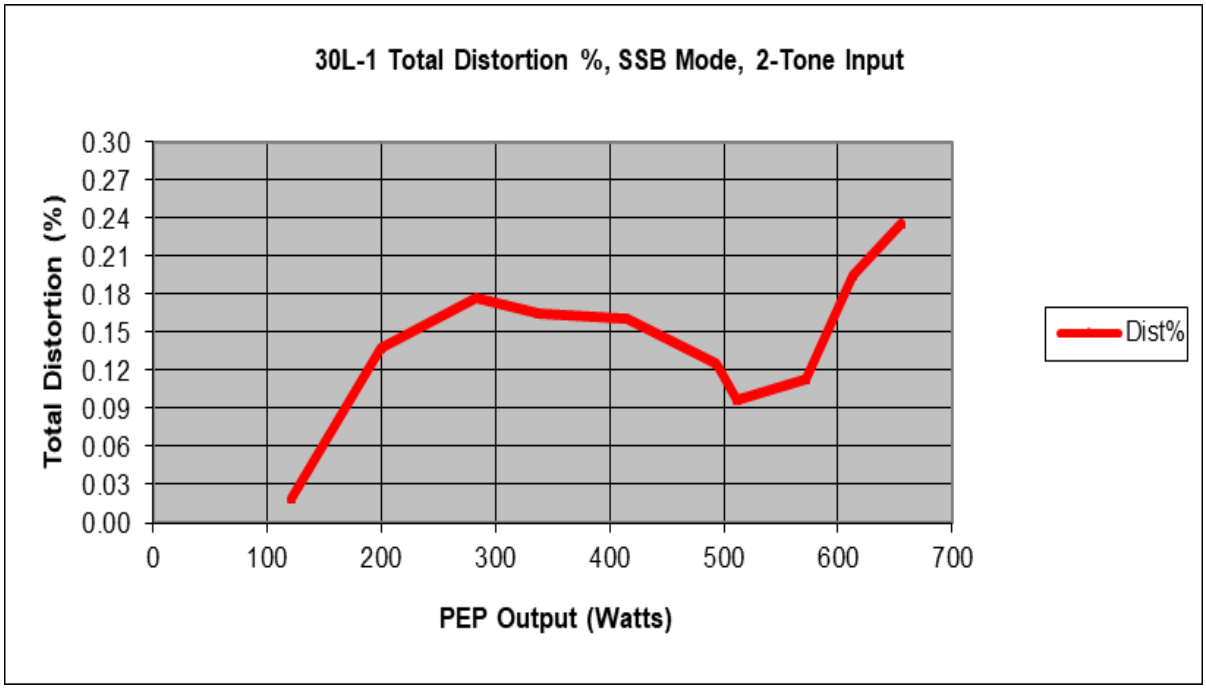
We’ll have more to say in the article about how this all came about. There is some very interesting history in how this all happened, why it happened, and how all of this shaped what we see today – both with the rig, and in the manual.

P.S. Your amp should have the GRID Clamp Diode modification and you SHOULD NOT EVER BE USING THAT POWER SWITCH. We are trying to get the word out!

de Bill & Don, K0CXX & W5QN

Below are the two figures that show the relationship between gain, Distortion and Power Output for the 30L-1.




30L-1 Total Distortion %, SSB Mode, 2-Tone Input
Total Distortion (%)
0.30
0.27
0.24
0.21
0.18
0.15
0.12
0.09
0.06
0.03
0.00
0
100
200
300
400
500
600
700
PEP Output (Watts)
Dist%