NorCal 20 AGC Mod (Updated 4/21/99)

As all you NC20 builders will have discovered by now, the AGC action is not that good - someone aptly coined the phrase "the baseball bat approach" (who was that?) - the AGC would absolutely clobber a signal then take ages to recover. Also, the AGC wasn't doing a very good job of regulating the RX audio level over a wide range of input signal strengths.

The reason for all this was that I was rushed into adding AGC to the design at the last minute and simply ran out of time to do a proper job on it. However, for the past couple of months on and off, I have been working away at improving the AGC response and getting it to where it is *nice* and not something you swear at everytime you tune through a loud signal!

You'll all be glad to hear that I think I have succeeded in making the AGC *very* smooth acting and such that the audio level is now nicely controlled over a very wide input signal level range. No "baseball bat" action anywhere to be heard!

The mod is as follows:

1) Remove and discard the following components: R19, R20, C20, D9, D19, D20, D21 and C65 (put them in your junk box for future experiments).

2) Put a wire link where D9 was fitted.

3) Change R29 to 3.9K (was 2.2K).

4) Change R60 to 1M (was 4.7M).

5) Fit a new 2.2K resistor under the PCB from the junction of T4 and U4 pin2 to the AGC2 signal at R41. If you solder the resistor at the point where the wire for T4 comes through the PCB to the point where R41 comes through the PCB, you should be able to fit the resistor horizontally with almost no excess wire at either end (nice short leads). A photo of this will appear on the website soon!

6) Fit a new 680 Ohm resistor in C65's position on the PCB.

7) With your digital multimeter, measure the voltage at test point "S". With no signal input to the RX, adjust VR5 for 8V at this point. I found that the previous setting resulted in a loss of RX gain in some radios. The AGC voltage (at test point "S") can be set to anywhere you like from about 5.5V to 9V - I have found that setting it by ear is a fairly good method too - you simply find the point in VR5's travel where the RX gain begins to be reduced as the AGC voltage is reduced and set VR5 a tiny bit above that. In the end, it comes down to variations in the circuit gains across the large sample of rigs out there.

That's it! Simple eh? What this does is to remove the double loop AGC altogether. There is now only one loop. The AGC voltage for U4 is now derived from the AGC voltage generator's output through a simple voltage divider. The D9 PIN diode attenuator does not have a significant attenuating effect on the design and so I have eliminated it, improving the RX front-end performance as a consequence. The net result of this change is a much more controlled AGC loop with less "gain" than before, but with a much wider range (to be measured soon). Suffice to say, the audio output on my prototype does not vary significantly with RF inputs up to +10dBm. The AGC starts acting at an input level of about -100dBm. My ears feel a lot safer now when I put the headphones on to tune around the band!

Something else you'll notice if you do the mod as you build the kit - the mod messes up the method set out in the manual for setting the transmit offset. In order to get the TX offset method to work you will have to lift one end of the new 2.2K resistor that you added to the underside of the PCB in stage 5 above AND either lift one end of the 680hm resistor in position C65 OR cut the AGC1 link under the PCB. This will stop U4 from being totally turned off by the AGC mute during TX feature and allow you to hear your own transmit signal to set the TX offset properly. Don't forget to solder the 2.2K/680hm resistor/s back in place and put a wire link in the AGC1 link holes after you have set up the TX offset.

Please let me have your feedback on this mod.

Thanks es 72,
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