

mcHF AGC settings explained – DD4WH 2017-02-12

The mcHF has two AGCs:

Standard AGC: this AGC has been built by Clint KA7OEI a few years ago and it works very well.

WDSP AGC: this AGC has been built by Warren Pratt and is part of the WDSP library. It was implemented for the mcHF because it has some more features that might potentially be useful in very specific RX situations.

You can choose between the two AGCs with the menu entry AGC.

The **Standard AGC** is very easy to use and adjust and does a real good job. If you are satisfied with this AGC in most situations, just use this AGC and do not expect a much better result with the WDSP AGC unless you are willing to spend quite a bit of time for adjustment and use of the WDSP AGC. The standard AGC lacks double AGC detectors and a hang AGC.

The **WDSP AGC** is much more complex to use and adjust and should only be used if the user is ready to spend some time and patience to search for the best adjustment parameters and continues to learn and test this AGC with different parameter settings. This AGC has double AGC detectors (one with short and one with long time constants, thus potentially better for a suppression of short noise impulses) and a hang AGC with adjustable hang time.

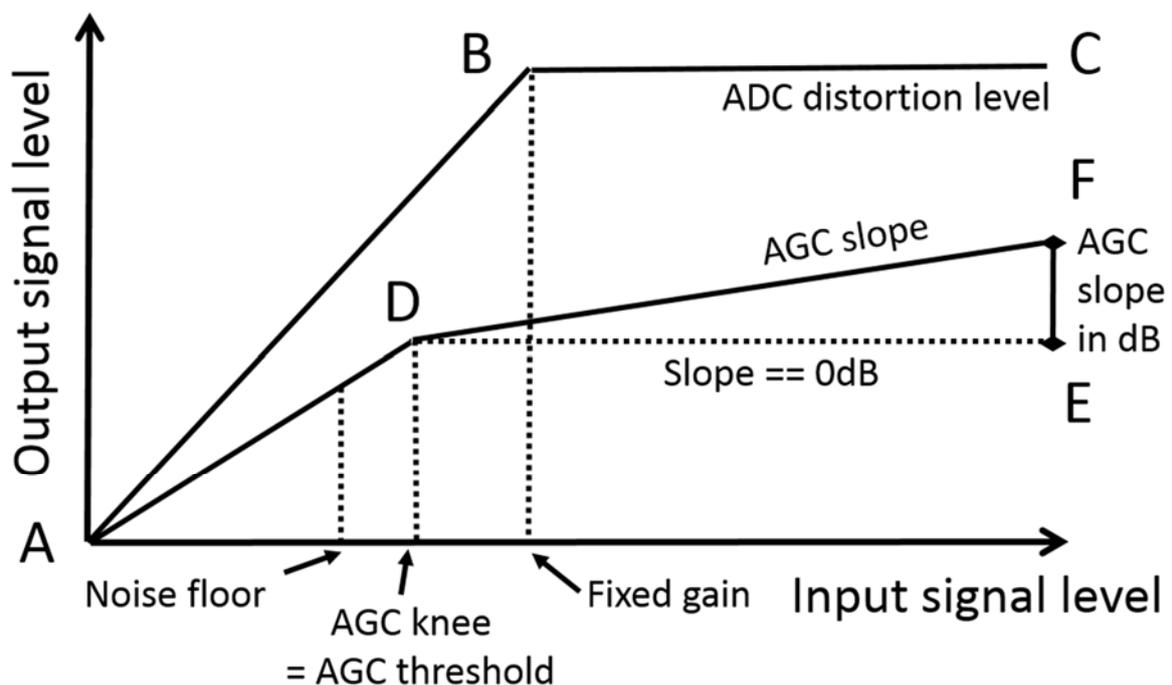


Figure 1: Relationship between input and output signal level WITH (A→D→F) and WITHOUT (A→B→C) an automatic gain control (AGC) with an indication of some of the WDSP AGC parameters that can be controlled by the user. Inspired by a paper by Phil Harman: "A discussion on the AGC requirements of the SDR1000" (I added the relevant AGC parameters for better understanding).

If you want to use the WDSP AGC, please read this paper first and additionally use figure 1 above to understand how the AGC works:

Phil Harman (VK6APH): A discussion on the Automatic Gain Control (AGC) requirements of the SDR1000. - <http://www.flexradio.com/downloads/vk6aph-agc-discussion-powersdr-pdf/>

This paper is excellent, fun to read, instructive and essential for the understanding of the functioning and the adjustment for the WDSP AGC.

Because Phil has explained the AGC so well in his paper, I will now restrict myself to the explanation of the menu adjustments of the parameters implemented in the mCHF firmware and assume that the reader is well informed about how these parameters affect the AGC functioning.

AGC WDSP switch – choose between “Standard AGC” and “WDSP AGC”: please note that the S-Meter in old school style does not work when switched to “WDSP AGC”: use the S-Meter based on dBm instead.

AGC WDSP Mode – choose between predefined parameter sets for the AGC. Decay means the time constant until the AGC recovers from a strong signal to achieve higher gain for a low signal.

AGC WDSP mode	Attack	Decay	Hang time	Hang enable
Fast	1ms	50ms	100ms	
Med	1ms	250ms	250ms	
Slow	1ms	500ms	1000ms	
Long	1ms	2000ms	2000ms	
Very Long	1ms	4000ms	3000ms	

AGC WDSP Slope – Indicates the output signal level difference between very low input signals and very high input signals. If set to 0dB, every signal has the same volume and the RX sounds flat. A good sounding effect can be adjusted with settings between 3 and 10dB, but that is very dependent on the hearing habits of the user. Experiment with this, until you achieve a pleasant and non-tiring result.

AGC Hang enable – Enable the Hang AGC which works like this: Hang is enabled when the signal level exceeds the AGC hang time threshold. When the level decreases (no more speech, for example), the hang counter is enabled and holds the AGC gain constant for the hang time, and after the hang time has expired, the gain increases quite fast. Nice for medium to strong SSB signals.

Not yet implemented: AGC Hang time – adjust the hangtime (but this is predetermined at the moment by choosing the appropriate AGC WDSP mode, see table above)

Not yet implemented: AGC Hang threshold – for signals exceeding this level, the hang AGC is activated. For lower signals, nothing happens

AGC threshold – this is the most important WDSP AGC parameter. It determines the signal level where the AGC knee is situated (see figure 1). AGC action takes place for input signal levels exceeding this level. It is given in dB above the internal noise level [not yet: has to be properly implemented !]. If this threshold is too low, AGC action takes place with band noise leading to annoying hiss for RX! If it is set too high, AGC action starts only with very large signals and can potentially lead to distortion in the ADC. For the mCHF, start with a setting of 60dB.

Fixed gain – if the AGC WDSP Mode is “OFF”, the user-adjusted figure for “AGC threshold” is taken as the “Fixed gain” in dB. For the mCHF, start with a setting of 40dB. Be very careful, with large signals without AGC, it can be very very loud!