

HQ-180(A) AGC Mod

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Recently when I measured the HQ-180(A) AGC attack and release times I was surprised by the bad overshoot on attack. I also discovered that the AGC SLOW release time was about 1 second (S), not nearly as slow as it should be. This note describes solutions for both defects.

AGC overshoot is the term applied to an AGC for which the AGC line voltage goes beyond (decreases below for a negative voltage AGC system like the HQ-180(A)) the steady state voltage when a sudden increase occurs in the input signal. Overshoot is caused by the time constant capacitor overcharging, which in turn may be caused by incorrect circuit design.

In the HQ-180(A) the AGC overshoot is caused by resistor R23 (1 Meg ohm) in the AGC line which prevents the control grid AGC capacitors (C135, C130, C17, C136, and C137) from charging fast enough. In the HQ-180(A) (and other receivers) overshoot often manifests itself by an audible thump at the start of an SSB transmission, or by a harsh sound on CW. You can even see the overshoot on an HQ-180(A) S-meter when the calibrator is turned on.

The cure for HQ-180(A) overshoot is simple. Add a jumper across R23. After that was done, the HQ-180(A) attack looked fine on a scope, and sounded fine.

According to conventional wisdom, and I agree, fast SSB release or MED AM release should be about 500 milliseconds (mS), and slow SSB and AM release should be about 2 S. For graveyard MW DXing and for strongly fading SW signals a 2 S release significantly improves AM audio quality over a 500 mS or 1 S release. Perhaps one reason why Hammarlund did not use a 2 S release time in the HQ-180(A) is because quick bandscanning is not really feasible with such a slow release time. A 2 S AGC release does not release quickly enough for a quick listen to weak signals in between strong signals. However, with a 2 S SLOW release quick bandscanning in FAST or MED is fine, and you can switch to SLOW for improved audio quality whenever you wish. Another reason why Hammarlund did not use a 2 S release time may be that AGC controlled tubes with gassy or otherwise defective grids can seriously degrade a 2 S release time. I have found two 5749 (6BA6W) tubes which decrease a 2 S release time to about 500 ms. But it is usually easy to tell if a 2 S release time has been seriously degraded by a gassy tube(s) just by tuning away quickly from a strong steady signal.

To change the SLOW release to 2 S all you need to do is add a capacitor in parallel with C131. The value of this capacitor depends on the S-meter circuit in your HQ-180(A); see the simplified schematic below. You should use a 0.47 uF 250 volt mylar (or similar metal film type) capacitor for early model HQ-180(A)s (which do not contain R112 and R113), or a 1 uF for late model HQ-180As (which do contain R112 and R113). Depending on the component layout in your HQ-180(A) you may need to unbolt the 8 Henry filter choke (L8) and move it aside to install the capacitor. Measured SLOW release time for a late model circuit was about 2.7 S, which is in good agreement with theory considering the 10 - 20% tolerance of components. For the MED and FAST positions the release times were about 500 mS and 50 mS respectively. Attack times were better than 3 mS for all three AGC speeds.

