Optimizing AM Performance from the FT-817

This note discusses changing the stock alignment of your FT-817 so it sounds better in AM mode. For the record, I have read the manual and saw the Yaesu disclaimer that AM was only added as an afterthought (obviously to mitigate complaints over their truly lousy AM implementation). However, you can easily make AM transmissions sound much better by raising the percentage modulation from 50% to 90%.

The FT-817 operates rather strangely in AM mode. When I checked into a local AM net, I was blasted with lousy audio reports.

First off, the ALC in the 817 affects AM transmissions strangely—when it activates, the carrier drops to zero and takes about a full second for it to recover. This is why the rig takes a second to begin each transmission in AM mode as well. I have no solution for the initial transmission delay, except to simply not speak for one second after keying the rig. Preventing the carrier drop during transmission is achieved by controlling your voice level carefully... easier said than done, of course. An outboard compressor would help.

Looking at the FT-817 AM waveform on an oscilloscope, you see that you never get close to 100% modulation, regardless of audio input level. Modulation is limited to approximately 50%. The rig uses an unusual "reverse-controlled-carrier" modulation, where the carrier goes to nearly full output with no modulation, and any audio causes predominately downward modulation; modulation drops the carrier to nearly zero on negative peaks, but only causes a slight increase in output power on positive peaks. True AM would cause symmetrical increases and decreases in output power.

This problem can be fixed, but the fix reduces your carrier output. I've monkeyed with the AM carrier level in the alignment menu and can get almost 90% AM, but with only about 1W of carrier. The audio sounds better this way, though, since the modulation peaks do not cause as many ALC 'hits', which clamp the output. The benefit of this change is the modulation is fuller and has the same or better "talk power". As you remember, the carrier does not convey any information— only the audio sidebands. 90% modulation has nearly twice the sideband energy of 50% modulation, so the net increase of sideband energy compensates for dropping the carrier power 33%.

The applicable menu item is #69 "AM-CAR". My rig was set to 229 initially; I get best usable modulation at a reduced setting of 187. The drawback is the carrier power is reduced: WA6AJY, who uses a "gud buddy" amplifier after his 817, can't get the carrier-operated relay to enable the amplifier at this low level (he compromised with a setting of 200 on the AM-CAR selection).

If you want to perform this adjustment yourself, you could either just use my value (about 190), or you could hook up an audio signal generator, dummy load, and oscilloscope to the appropriate jacks on the rig and find your best setting. First, vary the audio input level from the generator a bit and get a feel for the unusual characteristics of the modulator. Enter the Alignment Menu (push and hold A/B/C while pushing on the power switch), turn to Menu 69, and start transmitting again. Adjust the audio generator and decrease the carrier level until the upward peaks are about equal with the downward on the oscilloscope. Ensure the audio level is somewhat reasonable—

about the same as your mic input. Plug in the mic and double check (I didn't have problems with this). Push and hold "F", and the settings are saved.

If you follow the procedure given in the service manual, you will be limited to 50% of mostly downward modulation.

After reducing the carrier level and replacing the (lousy sounding) stock mic element with a Heil HC-5, the fussy locals cannot tell whether I'm running the 817 or my 1000MP at low power. They CAN tell I'm not running the high-level modulated Heathkit DX-100B, though (of course!).

73 de Bob, K6XX

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