SIZING UP THE HAMMARLUND HQ180A IN THE 1980'S

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How can an early 1960's vacuum tube technology receiver fit into today's world of microprocessor-controlled, synthesized, miniaturized, digitized, solid state communications receivers? After a bit of research the answer I arrived at is, surprisingly, "very well indeed". The receiver is the famous HQ-180A. I discovered that, for about $500, I was able to buy a perfectly restored and highly modified Hammarlund HQ-180A with performance comparable to today's receivers priced near $1500. That's great news for somebody like me who was "raised" on tube radio and also enjoys collecting antique radios.

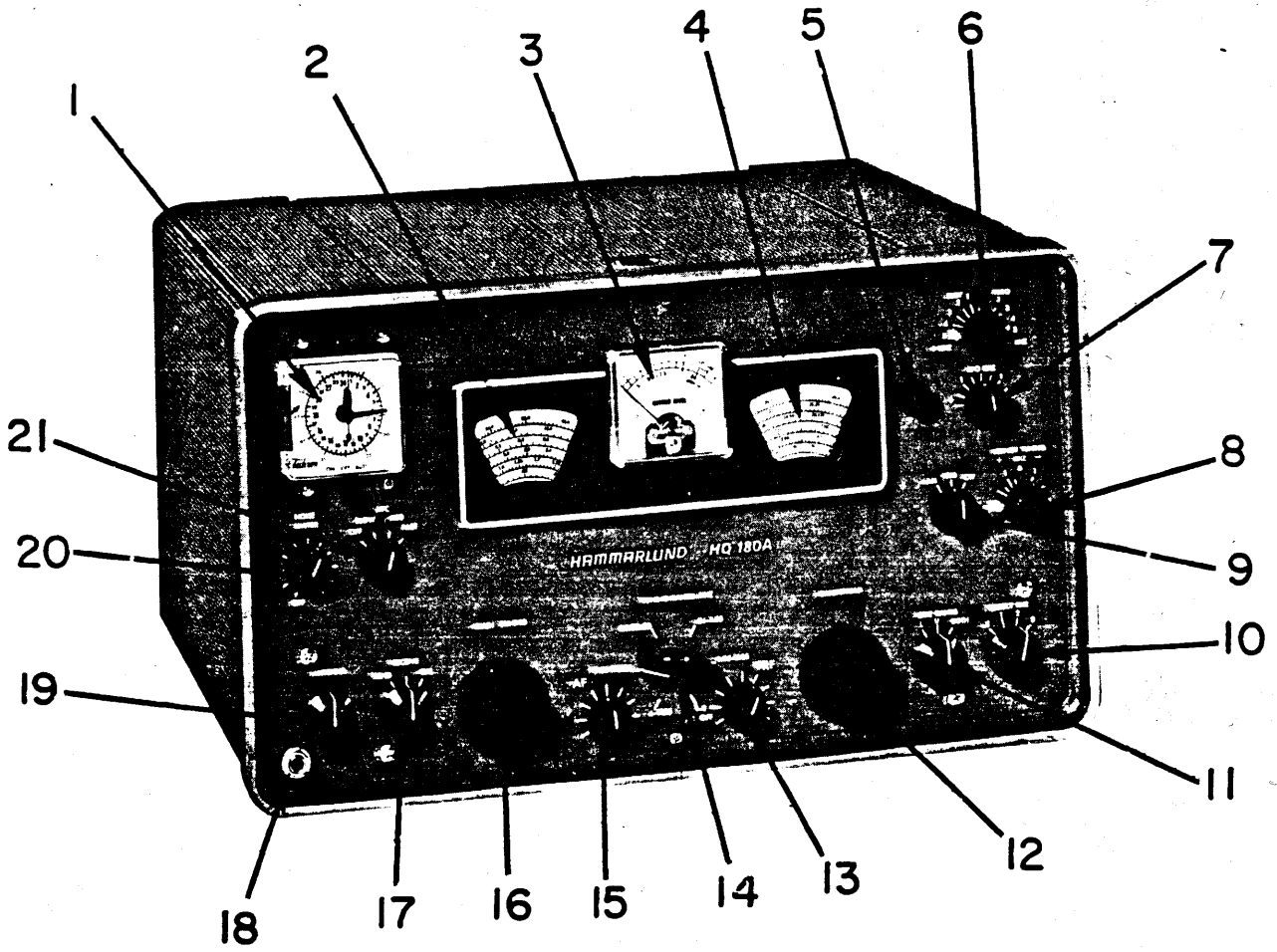
I've only had the opportunity to put the HQ-180A up next to a modified FRG-7 (with a Collins mechanical filter), R-390, R-388 NRD-515 and NRD-525. In addition, over the past 15 years I have operated, sometimes only briefly, the following receivers: Drake R-7A, a couple of new Racals, Watkins Johnson WJ-8718, Icom R-70, various Halicrafters, Hammarlund HQ-150, FRG-7700, Kenwood R-1000, plus a few other less significant receivers. Certainly not a complete comparison, but enough, I think to offer up a fairly educated opinion. And, this is an opinion. I have not attempted to approach this from a technical standpoint.

You're probably saying, "Haven't we heard this before?" Maybe you have. It's no secret that this receiver is considered to be one of the all time great tube sets, and several of you who have owned one in the past are very familiar with that fact. But, the point I want to make here is that this receiver can stand with the best of the "new" technology receivers of the '80s, for less than half the cost. That is a point well worth making, but one that hasn't been emphasized. Contrary to what you may think, the HQ-180A has had very few reviews over the years, the only real review I could find in SWL literature was one by Dan Robinson in the February 1982 *FRENDX* (my collection goes back to 1968). That review convinced me to buy my HQ-180A.

I think it is becoming increasingly more difficult and expensive to buy a truly DX-oriented communications receiver today. It is amazing that a person must spend $1000 or so for a good receiver, and then spend a few hundred more to put the filters in what should have been installed in the first place. I know it's a matter of trying to keep costs down, but if I spend that much money on a receiver, I want superb performance. Selectivity should have been one of the first areas addressed in the receiver design. The HQ-180A offers a viable solution to this dilemma by offering a very high performance-to-cost ratio, with as much or more flexibility as you'll ever get today.

Don't get me wrong, this receiver isn't for everybody. It requires some appreciation for vacuum tube technology, and, yes, a little extra care and initial attention, particularly if you are purchasing a 3rd or 4th-hand receiver. I'm not saying that its the last receiver a person ought to buy. I would like to own a JRC NRD-525 or Drake R-7 class receiver one day. However, at the moment I'm not tempted to turn loose that much money (and neither is my wife, ha!), especially when the bottom line improvement in performance (i.e. "hearability") is not easily noticeable. Other than synchronous detection (which few receivers yet have), phased lock loops, improved mixers and microprocessor based features such as memory storage/scan, mode control, synthesized tuning, etc. there haven't been many technological advances incorporated in receivers today that have enhanced the receiver performance, in terms of useable selectivity. It has mostly been a repackaging effort using solid state, digital circuits, miniaturized components and microprocessor control resulting in a vast improvement in operational ease and portability.

Looking at figure 1, beginning in the upper left hand corner and moving counterclockwise, I will describe the 180A's controls. The AC power ON/OFF switch and mixer trimmer pot are located on a panel where the clock/timer was (see fig. 2). Below that are the variable noise limiter pot and a 4-position AGC switch (OFF, SLOW, MED, FAST). These AGC settings correspond to a 1 sec., 0.1 sec. and 0.01 second decay time. Attack time is 0.001 seconds. The next two controls below that are the antenna trimmer and a 3 position switch for "Receive", "Send" and "CAL". I use the "SEND" position when not listening. The "CAL" position activates a 100 kHz crystal calibrator. To the right of that is the main tuning, AF gain, bandswitch, RF gain, bandspread, sideband selection switch (UPPER, LOWER, BOTH) and the selectivity switch. The 6 dB bandwidths are upper/lower 1-2-3 kHz, both sidebands 0.5-2-4-6 kHz. Above this is the mode select switch (AM, SSB, CW) and the vernier passband tuning (+/- 3 kHz). To finish out the front panel, there is a BFO control, slot filter (+/- 5 kHz with 40 dB of attenuation, additional 20 dB available at specified frequency by manual adjustment), a dial adjustment, and a



1. Clock Timer
2. Main Tuning Dial
3. "S" Meter
4. Band Spread Dial
5. Dial Calibration
6. "SLOT FREQ" Control
7. "BFO" Control
8. "VERNIER TUNING" Control
9. "AM-SSB-CW" Switch
10. "SELECT" Control
11. "SIDE BANDS" Control
12. "BAND SPREAD" Control
13. "RF" Gain & "AC" Switch
14. "TUNING RANGE" Control
15. "AF" Gain Control
16. "MAIN TUNING" Control
17. "SEND" "RECEIVE" "CAL" Switch
18. Earphone Jack
19. "ANTENNA" Control
20. "NOISE LIMITER" Control
21. "AVC" Switch

HAMMARLUND

HQ-180A

FIGURE 1. Receiver front view.

dial light on/off switch (which was an added modification, see fig. 3).

I purchased my HQ-180A from Serge Neumann for $200 (this receiver was previously owned by FTer Jon Williams). This deal included a Q-multiplier, preselector and KRS digital readout unit. The Q-multiplier is a must, for it helps improve selectivity and recoverable audio. I now see no real need to put mechanical filters in the 180A. The Heathkit Q-multiplier can be found used at flea markets, etc. for as little as $5. The preselector is nice and can add almost 20 dB of gain to the front end. The digital readout really makes the HQ-180A easy to operate, but isn't actually necessary if you have a second digital readout receiver.

The HQ-180A's sensitivity is excellent, meeting or exceeding all the receiver specs I checked, including a multi-kilobuck Watkins Johnson. The HQ-180A generates less receiver noise than today's receivers and this is noticeable to the listener. The receiver spec claims that a 1.5 microvolt input signal produces a 10:1 signal to noise ratio at the output. This is qualified at an unspecified IF bandwidth setting, however it is stated that the signal-to-noise ratio could be better depending on bandwidth. This suggests the spec was measured at one of the wider bandwidths.

At this point I had $200 invested in the receiver and could have stopped there. But upon Dan Sheedy's advice, I shipped it off to Steve Bohac in New Jersey for a complete restoration and some modification. Steve did a beautiful job on the radio! He completely cleaned it inside and out, touched up the paint and repaired or replaced switches, gears and other mechanical parts. He gave it a complete realignment and replaced worn tubes, the power supply and old wiring. He also added a BNC antenna connector.

The modifications included moving the AC power on/off switch off of the RF gain pot to a dedicated switch. This switch is located on a new panel which replaced the worn out clock/timer. Also added to this panel is a mixer trimmer control. Steve added a small circuit board under the chassis which is controlled by this pot. Quoting Steve's description of operation; "The mixer trimmer incorporates varactor circuitry and enables the operator to peak the receiver's mixer circuitry at any point (frequency) in the tuning range of the receiver between 540 kHz and 30 MHz. It thus compensates for the small amount of mistracking inherent in the multi-gang main tuning variable capacitor. Though this mechanical/electrical mistracking is small, it however means as much as 3 to 4 S-units and signal-to-noise ratios are dramatically improved. The absolute worst case occurs on the 15.35 to 30 MHz range. The modification operates in practice much like the antenna trimmer, however, it is in the mixer state". Total cost for this work was a little over $300. This has given the receiver many more years of productive life, with potentially less maintenance hassle, as well as some added features.

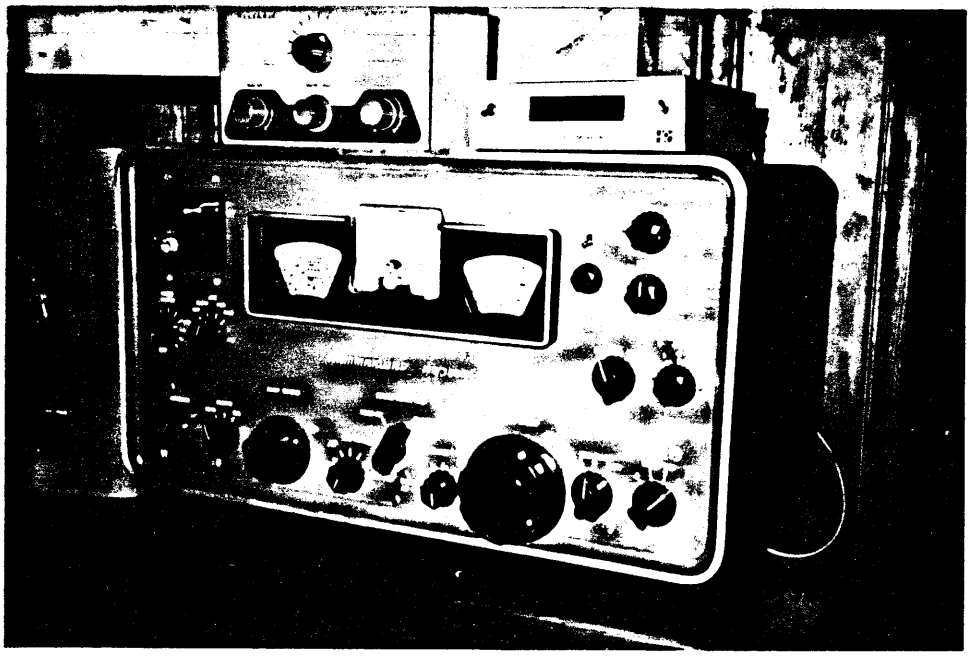


FIGURE 2. The author's HQ-180A with Q-multiplier and digital readout resting on top of the receiver. Note the non-stock oversized bandspread tuning knob.

There are some disadvantages, though, to owning the 17 tube HQ-180. It's a large receiver, weighing about 40 lbs. and measuring 10.5" H x 19" W x 13" D. So, you'll need some room for it. You may experience difficulty and some extra expense finding some spare tubes and parts (Steve Bohac has some stock Hammarlund parts). After two years of ownership I've only had to replace a few noisy tubes. I've recently noticed that the bandswitch has a little less definite contact to it and sometimes needs to be jiggled a bit to complete the contact. In comparison, my Lafayette KT-200 (a tube receiver) in the last 15 years has required a new power supply, switches cleaned, new dial chord and one tube replaced. I align it myself, or an experienced TV repairman I know can do it for me. My FRG-7, which could be considered a low maintenance receiver, needed $100 worth of work two years ago to repair the digital readout, to replace two worn out plastic switches, and to realign. I think it is easier for the average person to maintain an older tube set than the newer ones. Because of the potential for high labor costs, keeping a newer receiver over the long haul can easily be more costly.

Some other things: I notice at times that very strong images appear between 5100 kHz and about 5250 kHz, mostly in the evenings, originating from the 49 meter band. Image rejection of modern receivers can be better because of upconversion (e.g. 70 MHz IF). Additionally, crossmodulation can be a problem at times with the HQ-180. Operationally, the receiver is difficult to switch from band to band very quickly. This task may require several cranks on the tuning knob, especially if you are at the other end of the dial. Also, the antenna trim and mixer trim may have to be peaked. I usually rely on the FRG-7 to do the quick scans. Operationally this is where today's microprocessor controlled receivers have a big advantage.

I like the feel of this radio. It has well-lit dials and the largest S-meter I've ever seen on a receiver. The glow from the lights and vacuum tubes at night takes me back to my early days of DX with a tube radio. I'm referring to the 7 continuous years of DX, from grade school into the first part of college, that I spent with the KT-200. I have a lot of memories from the excitement of hearing new countries while staring that brightly lit dial in the face at all hours of the day and night. When I got a hold of a NASWA country list in 1980 I discovered that I had experienced that 172 times with this analog-readout, vacuum-tube, wide-bandwidth receiver. The solid mechanical touch to the switches and tuning knobs of these old rigs reminds one of the ruggedness of construction from days gone by. To me its like owning an old '55 Chevy. I find myself polishing and caring for the HQ-180 much like I treated the '55 Chevy I owned in high school.

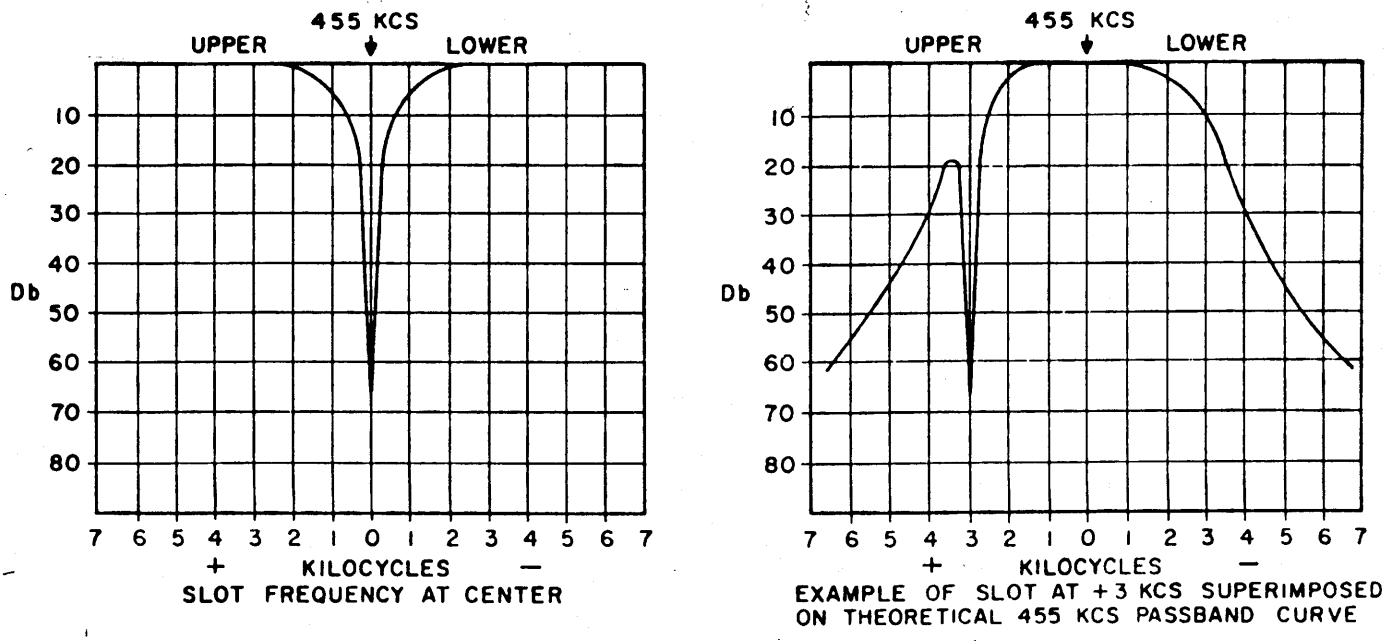


FIGURE 3. An example from the HQ-180A owner's manual showing the performance characteristics of the excellent notch, or slot, filter.

One can spend hours experimenting with the various settings of the receiver controls. Sometimes when DX is slow, I'll look for a station that is crowded by another or bothered by a utility station. I'll practice nulling the interference while still maintaining the best audio response possible. I'm still learning. By using the Q-multiplier in the "peak" or "null" position, steepening the IF response curve with the Q-multiplier, selecting upper, lower or both sidebands, an IF filter width from 0.5 to 6 kHz, passband tuning, notch filter, RF gain, noise limiter, AGC response; the operator has a multitude of combinations from which to choose. There are several approaches one can take when attacking an interference source. Choose a relatively wide bandwidth such as 4 or 6 kHz and then steepen the IF curve by 18 to 20 dB with the peak function of the Q-multiplier, shift the passband away from the interference as much as possible and bring the receiver's notch filter into play against the source of QRM. This approach tends to maintain better audio quality from the desired signal, but is less effective against a very strong interference source. By selecting upper or lower sidebands and in effect going to 2 or 3 kHz bandwidth, this will do a good job in reducing the interference. Thus making the passband and notch even more effective. It also frees up the Q-multiplier so that its notch function can be used to supplement the receiver notch. I find that once the controls have been set, the passband and two notches can be worked together against interference sources. Shifting the passband window into the signal more in order to optimize the desired signal while simultaneously bringing the notch to bear against interfering heterodynes or other sources of QRM is a pretty straightforward operation.

The designers of this receiver had the foresight to incorporate selectable sideband tuning in AM as well as SSB. That's a very useful and much-appreciated feature as far as I'm concerned. I pretty much had DXed on my own those first few years (quoting John Bryant: "I thought I invented the hobby!") and grew accustomed to tuning only in AM, not SSB.

The variable noise limiter control is about the best and most effective that I've used. Being variable it gives the operator control over the amount of clipping desired. This circuit assures that noise peaks will be no higher than the signal, providing both positive and negative clipping. Most table-top Japanese receivers in the kilobuck class now employ noise blankers. Another feature you don't see much of today is an RF gain control. I find it very useful when a weak signal is buried in noise. I just back off the RF gain a bit. In this situation it has made the difference a couple of times.

The 3 AGC settings get a lot of use in my shack. The slower (one second decay) AGC response is very effective in reducing high rate flutter or co-channel fading, pulse based interference or high frequency noise. However, it causes intolerable blanking of the receiver in the presence of any household electrical switching or static discharge.

Much has been said about the excellent audio quality of this receiver. I may have been expecting too much, since my KT-200 delivers great audio itself, but I found the HQ-180's audio to be a bit suppressed. Hammarlund employs an audio circuit which reacts to receiver gain level and automatically changes the audio passband. Should the owner so desire, the receiver can be modified to switch-out or switch-in the Hammarlund automatic audio response circuit. Suitably modified, the audio is then fuller and less "fuzzy". Putting it in perspective, though, the HQ-180A's unmodified audio is much fuller and crisper than today's rigs.

A separate filament transformer is provided to give continuous operation of the heaters in the high frequency oscillator and first converter, as long as the receiver is plugged in (even if the AC power switch is OFF). That keeps the HQ-180A amazingly stable when first switched on. There is little drift, it is not very noticeable in AM, slightly more so in SSB (especially above 10 MHz). The added dial light switch comes in handy, allowing the lights to be turned off when the receiver is left on. This cuts down on the distracting light at night and also reduces by quite a bit the heat generated by the receiver.

The HQ-180A may be more famous for its medium wave performance. It certainly seems to be very "hot" in this area and seems to produce better audio out of a weak signal than other receivers I've used. Two things I would have changed in the 180A's medium wave design are: (1) the bandspread is switched out in MW and I would prefer it to be operational (2) the receiver will not tune below 540 kHz on the main dial.

The HQ-180A owner's manual is like nothing I've ever seen: full of technical, maintenance and operational details about the receiver, including charts, graphs and tables of data. It covers just about everything.

I don't want to appear overly-enthusiastic in this review, but I hope I have made the point that this vacuum tube receiver is unsurpassed by very few other communications receivers I know of. The HQ-180A is a joy to operate and adds a touch of nostalgia to the hobby. I plan on buying a new receiver someday, but I probably will never sell the HQ-180A.