

A comparison of tube and transistorized receivers

by Bruce Portzer

One fundamental question faced by today's broadcast band DXer is whether to buy a modern solid state receiver or an older tube-type receiver. There are advantages and disadvantages to both categories of receivers. This article will discuss these differences. In order to maintain some sort of framework to the article, I've limited discussion to general coverage receivers, such as the HQ-180A, DX-160, S-120, R-390, FRG-7, RF-2200 etc. In itself that covers a fairly broad range. At the same time, the discussion, unless otherwise noted, will deal with medium wave reception rather than shortwave.

As a general rule, for a given price range, sensitivity, selectivity, and front-end overload immunity are better on the older (used) tube receivers than on the newer SWL oriented solid-state receivers. So far, the state of the art in consumer-oriented solid-state receivers has not advanced to the level that tubes reached. As a result, most cheaper solid-state rigs are very prone to overloading on strong locals. A longwire, an amplified loop, or a mistuned unamplified loop can produce all sorts of "gross" overload on many of today's receivers. There are some exceptions among today's rigs. The Drake SPR-4 and R-7 have overload immunity comparable to the best tube sets. Many commercial and military receivers have front ends far superior to tubes in signal handling ability. But at prices beginning around \$4000 they're beyond the pocket books of most DXers. Many consumer-oriented receiver makers today have handled the front end problem by desensitizing their receivers, usually by switching in a small ferrite loopstick on medium wave, or by reducing the gain of the RF stage. The end result is that you won't hear your locals all over the AM dial, but you won't hear much AM DX either, even though sensitivity on the shortwave bands may be excellent. As a general rule, a solid-state receiver which is designed for use only with an external antenna will perform better than one with a built-in BCB antenna.

The world of tube receivers is filled with good and bad performers. As a rule, general coverage receivers designed for amateur or military use, such as most Hammarlund and Collins rigs, have very good sensitivity and overload immunity. Those designed as inexpensive SWL receivers usually leave a lot to be desired.

Selectivity on most of today's solid state rigs also leaves much to be desired. The great majority of receivers made today have very wide bandwidths for a number of reasons. The biggest one is cost. The manufacturer can use less expensive components this way and the receivers are easier to align when they come off the assembly line. As a secondary consideration, the typical general coverage receiver is designed for shortwave listening which some manufacturers equate with high fidelity. Consequentially IF bandwidths are wider. Some distributors of these wide bandwidth receivers are now modifying them with narrower IF filters, for use by the more demanding DXer. A couple of decades ago, manufacturers typically designed receivers for use on crowded amateur bands, where audio fidelity was not nearly as important as eliminating adjacent interference, so some of these sets have sharp selectivity.

Selectivity, sensitivity and overload immunity may be better on older rigs, but today's solid-state receivers invariably offer vastly superior audio quality. I suspect that the receivers of yesteryear were designed by RF engineers who considered it beneath their dignity to fool with audio circuitry ("What? Me design the audio stage? That's for sissies!"). As a result, the audio from most tube receivers sounds muffled, distorted and noisy. Today's receiver designers have apparently borrowed or stolen audio circuits from the world of stereo, for their audio is generally very crisp, clear, and noise-free. Keep in mind that part of this difference is due to the broader selectivity in today's receivers. However, for a given IF bandwidth, a solid state audio stage will offer better quality audio than a vacuum tube amplifier.

In a similar vein, the audio output from solid-state rigs generally have a narrower dynamic range than that of tube receivers. This makes them superior to tube sets for unattended taping---a strong sign-on will be less likely to pin the needle on your recorder's level meter.

Solid state receivers have a decided advantage in portability. While tube receivers are heavy, bulky and are, with few exceptions, limited to 110 volt operation, solid-state sets invariably weigh a few pounds and can operate from low voltages (i.e. a car battery or several "D" cells). These features make them ideal for DXpedition work.

Most of today's receivers have better eye appeal than the communications receivers of 10+ years ago. Ask any DXer's wife if you don't believe me. While this feature won't help you in your quest for exotic DX, it can be an important consideration if your DX shack is in the living room or some other spot frequented by non-DXers.

One very important consideration in selecting a receiver is reliability. Here, the deck is stacked heavily in favor of solid state receivers. The older, tube sets, when they emerged from the factory, did not have the life expectancy of today's receivers. The heat generated inside a tube set is tougher on components than the relatively small amount of heat generated inside solid state equipment. This consideration is not too important

(yet) for equipment designed since the mid 1950's. The space age created a need for miniature tubes, ceramic capacitors, and other lightweight, reliable components, which carried over into more down-to-earth electronics such as receivers. However, components such as paper tubular capacitors contained in earlier equipment are less reliable and more difficult to replace. Vacuum tubes, of course, need replacement. My own experience shows that 8-10 years is a not unreasonable lifetime for miniature tubes. Bear in mind that fewer and fewer dealers are stocking tubes and those that still do are maintaining smaller inventories. Today there are only two firms left in the U.S. making vacuum tubes for a dwindling replacement market and we can expect that they, too, will someday throw in the towel. It would be an excellent idea to lay in a full set of spare tubes for your set. This can become expensive; a set of tubes for a typical communications receiver can cost upwards of \$100. And the cost problem is worse with the large metal tubes than with miniature tubes, even allowing for the customary 40-50% discount from list price. For example, the once popular 6SK7 now lists for a heart-stopping \$19.00.

In that same vein, it will become more difficult in the future to find service shops willing to handle tube sets. There's no need to be alarmed just yet. You'll probably be able to find replacement parts and repair shops for tube sets for another decade, maybe two. But eventually, parts and service for a tube-type receiver will be about as common as for a Stanley Steamer. Hopefully, those high performance \$10,000 solid-state receivers will be available at low prices on the surplus market by then.

In conclusion, vacuum tube receivers generally offer the best performance for your dollar, especially for reception of exotic long-haul foreign stations on MW. Many excellent used tube-type receivers are available in the price range of \$100-300---the HQ-150, HQ-180, SP-600, R-388, R-390, R-390A, R-392 and others. These receivers have selectivity, sensitivity, and overload immunity far superior to any new solid-state receiver in that price range. Solid state receivers offer more superficial advantages, though not necessarily unimportant ones: portability, DC operation, improved readout (especially on shortwave), and greater reliability. If you can afford the expense, it's nice to have one of each---a good tube receiver for serious BCB DX, and a good solid-state one for DXpeditions, shortwave reception, and casual listening on the broadcast band. However, not everyone can afford two receivers, making the decision one of one's own personal needs and interests.

