WHAT TO LOOK FOR WHEN BUYING A RECEIVER

A great many radios from cheap portables to expensive communications receivers will allow you to listen to the BCB. How can you determine which is best for you in your price range? First, don't assume that the more you pay, the better the radio will be for BCB DX'ing. The extra money might be going into its appearance, hi-fi sound quality, or coverage of bands other than BCB. The only way to find out is try the receiver in question, preferably comparing it to a known DX'ing machine, even if it's just a Realistic or GE TRF. If possible, use the radio at your DX location before buying. Stores are often in poor signal areas with lots of electrical noise from fluorescent lights, cash registers etc. Make sure you can get a refund or another radio if you're not satisfied. Particularly with the portables, there seems to be some variation in quality from set to set, so don't just use a good review as a reason for buying a radio. Try it out.

Do you want small size and portability, or will you DX from one location, and so can use a larger table model receiver? Make sure the radio's power source is compatible with what you have. Some cannot be run off batteries or from 12 volt DC, others may need an AC adapter to be used on house current. Does a bank of controls and adjustments on a radio present a pleasant challenge to you as you chase DX, or would you rather have something that you merely switch on, tune, and listen to? Don't get carried away by the sight of a lot of controls; make sure they're of some use when BCB DX'ing. Do you DX or listen to bands other than BCB? Some of the expensive multiband radios could be a waste of money if you don't, as their BCB may not be any better than a good AM or AM-FM portable. If you want to listen on headphones or to record from a radio, check that it has appropriate outlets.

Used radios are a possibility, and some of the older tube-type receivers make fine BCB DX machines. Remember that parts (and tubes) may be harder to obtain in years to come. On the other hand, an inexpensive used receiver may be an interesting challenge to your technical expertise. Test out a used receiver thoroughly before buying if possible, making sure that all controls run smoothly, that there are no "dead spots" on the dial, and that it can hear DX well.

Although a good radio is important to DX'ing success, remember that you won't hear DX unless the radio is on. Listening often and intelligently is the secret to hearing the rare ones, no matter what radio you use.

The following are some things to take into consideration once you've decided on the general type of radio that you want:

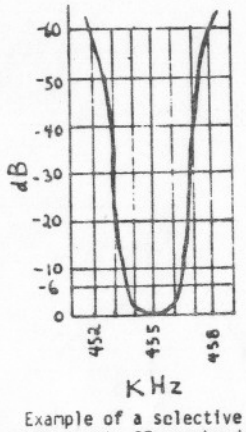
Sensitivity. This is simply the ability of a radio to receive weak signals. It is usually expressed in microvolts, such that so many microvolts of signal at the antenna terminal will give a "signal" to "signal plus receiver noise" ratio of 10 dB (all receivers have some degree of internal noise). However, the medium wave DXer should not get too excited about receivers which have excellent sensitivity specs in the order of one microvolt or less. For one thing, many of the cheaper receivers do not specify what IF bandwidth is used for this measurement. As the bandwidth has a bearing on the final sensitivity figure, it can be difficult to compare two receivers using the specifications alone. Much more important to the medium wave DXer is the fact that at BCB frequencies, external noise, not receiver noise determines whether a DX signal can be heard or not. This external electrical noise is usually man-made, radiating from power lines etc.--just something we have to live with. A DX signal which has less strength than this noise level will be unreadable, no matter how sensitive the receiver is, as it will be covered by noise.

So what one needs to determine is the useable sensitivity of the receiver. Try to use the receiver in the location you intend to DX from, using your own antenna. With a receiver which has no internal loop (if the receiver shows virtually no signals, even from locals, without an antenna, it is of this type), use this procedure:

During an electrically "quiet" time (daytime in winter--Sunday morning is often quietest), tune the receiver to a part of the band with no signals. Note the background noise, if any, with the antenna disconnected. Then connect the antenna to the receiver. If the noise level increases, then your receiver is sensitive enough for the band and antenna you are testing--no matter what the specs say.

With a receiver that has an internal loop for BCB, useable sensitivity is harder to determine. Many receivers with such a loop can use more sensitivity. At night, tune to a clear channel with no apparent signal on it. Wrap a couple of turns of wire around the radio body and connect a longwire antenna to one end and a ground to the other. If a signal appears, make sure it is a station assigned to that channel and not one of your locals making a spurious appearance. If it is a legitimate signal that can't be heard with the radio alone, you may need some help for weak signal DX'ing. Try comparing such a radio with a known DX'ing portable like one of the TRF's, so you will get an idea of its relative sensitivity.

Selectivity. This is the ability of a receiver to separate signals which are close to each other in frequency. The specifications of a radio usually give an IF bandwidth in kilohertz between the two points on either side of the center of the passband where the signal is -6 dB down from its maximum strength. A receiver with good selectivity will usually specify the IF bandwidth at -60 dB as well. Those which only specify a -40 dB or -50 dB bandwidth generally are not as sharp in their tuning.



Example of a selective receiver's IF passband

For reasonable DX listening on domestic channels, you will want a -6 dB bandwidth of at most 6 kHz (or ±3 kHz). Smaller bandwidths of down to 2 kHz can be used, although the audio that the radio delivers will be more bassy and muddy sounding the smaller the bandwidth. But with smaller bandwidths you should be able to hear split frequencies near domestic channels. You need to know more than just the -6 dB bandwidth to know whether you can hear a split close to a domestic channel however; the shape of the selectivity curve is important. For serious DX'ing of splits, the ratio of the -60 dB to the -6dB bandwidth shouldn't be more than 3:1. 2:1 or under will allow you to tune within less than a kilohertz of an interfering signal without hearing a het--this by tuning to one sideband of the desired signal.

However, sharp selectivity will not solve all your problems with interference from domestic channels. If you have a strong local which plays Top 40 and overmodulates, you may not be able to hear weak stations 10 kHz away due to the immense amounts of sideband splatter which is actually being broadcast on top of the desired channel. Sideband splash from quite distant domestics can be a problem if you're trying to ID a weak split a few kilohertz away. So don't think a receiver "isn't selective enough" if you still hear sideband splatter with it.

Again, the best thing is to try the radio out (particularly if no specs are given). If you are only interested in domestics see that semi-locals separate cleanly channel by channel as you tune past them. If you are interested in DX'ing difficult splits, you will want something which leaves substantial gaps between channels--you may hear splatter in these gaps, but no readable audio unless it is a split. As you tune past a signal on a good selective receiver, it will suddenly become readable, then suddenly unreadable again--none of the slow rising to a peak that we are used to in tuning household radios.

Signal handling ability. If you live in an urban area, this quality is probably the most important (as well as the hardest to find) in a receiver. There is no sense in having good sensitivity and selectivity in a radio if all you can hear is your local stations all over the band. The easiest way to check a radio for its signal handling ability is to tune across the band (again preferably using your own antenna and location) and listen for birdies (whistles that go from a high to low to high pitch as you tune past; make sure the BFO is not on). And listen for your local stations showing up on channels other than their own. Keep another radio nearby tuned to locals so that you don't have to wait for ID's on each channel. Check particularly the channels near to locals for any sign of the local's audio. If possible, check both day and night for these spurious responses, as daytime stations will add to the confusion. Don't think that a radio chock full of signals is supersensitive until you make sure the signals are not spurs.

It is an uncomfortable fact that many radios, particularly multi-band ones, will show any number of these spurious responses, depending upon how many BCB transmitters are nearby. Your decision regarding a certain radio will have to be personal--how many DX channels are you willing to write off due to poor signal handling ability? Or would you rather save up your money and get a receiver with more available DX channels? Incidentally, some of the "TRF" type AM portables have strong signal handling ability far in excess of the more costly multi-band radios, so expense is not everything.

On some receivers, turning down the RF gain control (if it has one) will improve the situation, but make sure the radio does not lose all sensitivity as a result. A trade-off between sensitivity and signal handling ability often appears to be the only solution with some receivers.

If there are only a few definite spurs, and no birdies, you may be dealing with "external mixing products". In this case signals from local stations are mixing and being re-transmitted at some point outside the receiver (perhaps an electrically imperfect join between two pieces of metal), and even the best receiver will not eliminate it; it's as if there is actually a transmitter on this frequency. On some receivers, birdies may be generated inside the receiver. This is not a signal handling problem, but can sound like it. Disconnect the antenna (if it doesn't have an internal loop), turn on the BFO and tune across the band. Whistles will indicate receiver-generated carriers. If these are strong, they may cover up DX.

If a radio with an internal loop shows a number of spurs with no external antenna connected, you might be wise to reject it, as only internal modification can solve the problem. If spurs appear only with an external antenna connected, you may find an antenna tuner or use of a good loop antenna will help.

Readout. It is necessary for the DXer to know what frequency he is tuned to, and to be able to tune slowly so that he does not skip over channels inadvertently. "Thumb wheel" type direct drive tuning found on some portables is virtually impossible to use for DX'ing and should be avoided. An arrangement where a pointer is moved across a dial by a cord and pulley set-up between the tuning knob and variable capacitor is better, as it spreads the band out. Usually these dials do not have particularly accurate markings, although an experienced DXer can usually find his way about using regular stations as markers and counting off channels as he tunes by. You can sometimes upgrade the dial yourself by putting a strip of masking tape along the top and marking off divisions of 10 or 20 kHz.

Some radios have gear arrangements which move a dial past a pointer. On the best radios with such a dial, readout is possible to less than one kHz, provided the radio is properly aligned.

Electronic digital displays which show the frequency the radio is tuned to in the manner of a digital watch or electronic calculator are becoming more common, and allow accuracy of ±1 kHz (or 0.1 kHz) on relatively inexpensive sets. These look impressive, but don't get carried away. Make sure the rest of the receiver performs well, and that you're not just buying a display. Also check that the digital readout is accurate, and is not giving readings of say, 1293 for a station on 1290.

The "feel" and movement of a tuning knob are often a matter of individual taste, but the more selective receivers should allow you to tune easily yet slowly through a signal. Watch out for dial backlash--you tune in a signal, take your hand off the knob and find that the radio detunes slightly. This can be frustrating in tight tuning situations, and should really only appear as a problem with cheaper radios.

Audio quality. Hi-fi frequency response is not needed in a DX'ing radio; a DXer is usually just interested in voice frequencies, approximately 250-3000 Hz, so response beyond this range usually just introduces unwanted noise. It is, however, important for a radio to have a good audio amplifier--when you're listening to a signal already distorted by the distance it's travelled, you don't need an amplifier that adds further distortion. Listen to speech on a semi-local--it should not sound distorted or "flatted-out" on voice peaks. If the receiver has narrow IF selectivity, audio will sound bassy or slightly muffled but should still be quite readable. This bassiness is not the fault of the audio amplifier. Tone controls or audio filters can help if the radio is so equipped. You can often make a voice sound more snappy and pleasant to listen to by using these controls, so try them out.

Stability. Does the receiver drift away from a frequency once it has been set? This is not usually a problem for a BCB DXer; few receivers drift very far or very quickly except just after they've been switched on (a matter of a couple of kilohertz at most). The older tube-type receivers had more problems with frequency drift than more recent receivers due to the heat generated by them. With selective receivers the problem is more acute. If you set a timer and a tape machine for a few hours later, the receiver may have drifted enough to make the desired signal unreadable by then.

If the radio has a crystal BFO (the upper/lower sideband ones are often of this type), you could let the radio warm up for 20-30 minutes, find a signal, set the BFO, and see if there's any noticeable change in the pitch in the next while. If there is much drift, there may be a problem with that individual receiver. In general, however, stability is much more important if you're interested in single sideband listening on the shortwave bands.

S-meter. An indicator of relative signal strength. It is mainly useful to the BCB DXer when he is trying to watch for a null when using a loop or phasing unit, or for peaking a loop or tuner. For best results the meter should have a wide range, i.e. it should not "pin" on every signal that is not actually down at the noise level. That way it will be easier to find peaks and nulls; it will also give you a more accurate idea of comparative strengths of signals, though on most radios such comparison must be limited to "weaker than" or "stronger than".

BFO. The beat frequency oscillator. Not absolutely necessary for BCB DX'ing, although it is often useful for spotting weak carriers which would otherwise be buried in noise. The best BFO for this purpose is one that can be set to the center of the IF passband, rather than the switchable upper/lower sideband type BFO's which are offset from the center of the IF passband. However, these can be used to spot a carrier if you remember that they are not at the center of the passband. If your receiver has good enough readout, a center-tuned BFO can help determine a signal's frequency more accurately. The BFO simply injects a signal at the IF frequency of the receiver which in turn creates a heterodyne or "beat" with the carrier of the incoming signal.

ANL. The automatic noise limiter. This is found mainly on communications receivers. Most are designed to eliminate pulse type ignition noise which is rarely a problem on BCB; if the limiter works well at all (some don't), it is most useful on the higher shortwave bands. Limiters are not often useful on the sideband splatter and random noise of the BCB, but try it out, just in case.

Notch Filter. This is sometimes found on the more expensive receivers, and is usually located in the IF stages. It can be used to null out an interfering carrier within the IF passband. Such receivers are usually high selectivity so the notch filter is only needed if there are two interfering signals, one on either side of the desired carrier. One is tuned down off the IF passband, the other is eliminated with the notch filter. These filters usually require some practice to get them working well.

Q-Multiplier. These are not found on any recent receivers, but you may find an older radio with one; there was also a Heathkit Q-multiplier once which could be fed into your receiver. Although the Q-multiplier can both peak and notch a signal, the BCB DXer will find the notch most useful. It has the same result as the notch filter described above. The peak position can very occasionally be used to bring a weak signal out of sideband splash and noise if the receiver lacks other selectivity. The Q-multiplier is a regenerative device which is fed into one of the IF transformers of a receiver to change the response of that transformer i.e. it shows a sharp peak or null instead of the wide selectivity of these transformers.

Receivers with Internal Loop Antennas

If the receiver you're looking at has an internal loop antenna for BCB, some points must be considered. Is the receiver sensitive enough with its internal antenna or will it require boosting? Can the receiver be used for nulling a signal by rotating it? Most should; there is at least one model that has a loop antenna which rotates separately from the body of the radio. How deep are the nulls? How easily can the receiver be rotated to take advantage of this nulling ability? Some are rather unwieldy; rotating them on one of the plastic "turntables" such as Rubbermaid makes may well make this chore easier. Is there an external antenna connector that is useable on BCB? And if it is, is there a problem with spurs when it is used? Radios with internal loops can make reasonable DX receivers, but it is sometimes difficult to couple in longwires or external loop antennas for more flexibility.

THE NEW RECEIVERS - HOW MUCH COMPLEXITY DO WE NEED?

by Randy Tomer

On a recent visit to San Jose, CA, I stopped by Quement Electronics to see if they had the new Kenwood R-600. They didn't, but they did have a new Drake R-7 and a Yaseu FRG-7700 sitting side-by-side on the display shelf. My immediate reaction was that I have never seen a handsomer pair of receivers. After a few moments my enthusiasm waned, however, because I was dismayed at the extreme number of controls and gadgets on the front pannels of these radios, two-thirds of which I considered to be superfluous. I wondered how much the unnecessary gadgetry adds to the already high cost of these radios, and is it all really necessary to make them sellable? A couple of years back when I first saw a Kenwood R-1000 I thought, "What a really neat little receiver," and almost bought one, but after some reconsideration I just couldn't see spending the extra bucks for the built-in clock/timer that I considered to be a mickey-mouse add-on, and the dinky little analog dial seemed to be nothing more than an ornament (the FRG-7700's analog dial is just as worthless.) I'm wondering, why all this added complexity in the new receivers, combined with gadgetry and after-thoughts, instead of the necessary basics needed for good reception during tough conditions? Before you accuse me of developing a case of "two-knob syndrome" keep in mind that my favorite receiver is an HQ-180A, but all of its controls seem to have a definite purpose in achieving the ultimate goal of hearing weak DX. The new receivers seem to be designed more and more with the Madison Avenue approach. Besides a tuning knob, volume control, and some form of accurate frequency determination, what is really necessary? At the base level, I would like to see just the following: a tone control, fast-slow-off AVC, a detent S-meter, two bandwidths, a BFO, RF gain, and preselection on the BC band. An IF notch filter is very handy for foreign DX, and shouldn't add much to the cost, but only Drake seems to know what a notch is any more. The new Kenwood R-600 may be a step in the right direction, although I've heard nothing about its performance yet. It appears to be a simplified and improved version of the R-1000, and designed with the basics in mind. Gone are the R-1000's frivolities such as the world-famous 12kHz "Winde" filter and the insane -40db and -60db attenuator positions. Also gone is the pint-sized analog dial and clock/timer. It's just a radio and it won't start your Mr. Coffee at precisely 6 AM. It has a front-facing speaker and the noise blanker has been retained. The 6 kHz wide filter and the 2.7 kHz narrow filter ought to be just fine for most BCB DX if the shapes are good, but an IF notch would have been nice. The R-600 seems to me to be the first new receiver in quite a while to combine simplicity in a quality product. More hope for the future: Drake is coming out with a new transceiver, the TR-5. Hopefully, this will be followed by an "R-5" receiver that will have the excellent performance of the R-7, but with fewer of the costly extras. A potentially beneficial trend that I notice in ham radio manufacturing is the reintroduction of general coverage receivers as opposed to ham-bands only. These should be of much better overall quality than general coverage receivers designed for the SWL market, i.e. those marketed by Panasonic and Sony.

R-390A by Phil Bytheway. This is a very popular receiver among all types of DXers (except FM and TV of course.) It has separate AF and RF controls, three position AGC, noise limiter, crystal calibrator and 16, 8, 4, 2, 1 and .1 kHz selectivity positions. The biggest selling point seems to be the fact that the first 4 selectivity positions are had by the use of mechanical filters with quite deep skirts (the last two use the 2 kHz filter with a crystal filter.) In addition, it is quite well known for its strong signal handling which is excellent. However, with the current trend in BCB, I'm spending a lot of time logging slop from locals that is so intense that it is often impossible to hear stations 10 kHz away from locals even with the locals nulled!! In addition, in the 2 kHz position, an audio filter is almost a necessity, due to the fact that all the high frequencies (above 1kHz) are gone. So, I do most of my DXing in the 4 kHz position. Overall, though, I like this set better than any I've used, (R-392/SP-600/HQ-150/TRF/etc.)... pb