THE BARLOW WADLEY XCR-30: A REVIEW
by Mike Hardester

In the brief five years I have been an active DXer, few portable receivers have been made available to the public which have proved to be of any value to the DXer planning a DXpedition, or going on vacation. One excellent receiver was the Realistic TRF; however, before its true value was realized it was taken off the market. About the same time the TRF was making news, another receiver was being born, but it wasn't until late 1972 that any real attention was placed upon the receiver from South Africa: the The Barlow Wadley XCR-30. Currently available in the United States through Gilfer Associates, Box 239, Park Ridge, N.J. 07656, the XCR-30 was retailing for US $195 in December of 1972.

The owners manual has this to say about the XCR-30: "The XCR-30 is a specialized, high sensitivity, portable short wave receiver, designed to provide precision frequency tuning over the full shortwave spectrum up to 30 MHz, with exceptional frequency stability for both amplitude modulation (AM) and single sideband (SSB) transmissions." The circuit is a "multiple heterodyne circuit...incorporated wherein the harmonics of a 1 MHz quartz crystal control the frequency shown on the dials to an accuracy sufficient to locate and identify a station whose frequency is known. The crystal stabilizes the received frequency to eliminate tuning drift over long periods of time and to provide stable single sideband pitch. Frequency selection is a composit function of two dials." One dial displays the MHz segment in fractions (e.g., 000, .010, .020 and so on in increments of .010 up to 1.000 MHz). To tune a frequency, the whole number dial is set to the MHz segment (e.g. 11), and the fractional MHz segment is set to a fraction (e.g. .950), thus the frequency is 11.000 + 0.950 = 11.950 MHz. It takes a little practice to get the hang of the dials, but once practiced, it's done without thinking.

Modes of reception are AM, CW, & SSB (USB & LSB) with a tuning dial to clarify SSB signals as well as AM signals. In addition to the mode selection switch, and on/off/volume, the tuning dial is accompanied by a fourth dial, antenna trim, for peaking incoming signals. An "S"-meter of sorts is built in, but at times it may indicate a low reading for a local station (e.g. KTRB-860 with 10 kw beaming directly at my QTH) and shortly thereafter, a high reading.

The XCR-30 is designed to operate off of six type D dry cells (1.5 v. each) for a total D.C. input of 9v. An external power socket is provided for a power supply of 6 to 12 volts. Two other jacks are present: an external antenna jack and an ear phone jack (8 ohm). The receiver comes with a built-in whip antenna; however, I have found it of use only for casual listening. On medium wave, I have utilized the Space magnet (SM-1), manufactured by Worcester Electronics Laboratory, R.D. 1, Frankfort, N.Y. 13340. On the short wave frequencies, the XCR-30 manual suggests that any longwire employed not exceed 50 feet in length to minimize cross modulation; however, I am currently using a 100 ft longwire with little cross modulation being noted.

Frequency readout is 10 kHz over each 1000 kHz tuning range and calibration accuracy is within 5 kHz on all frequencies with resetting accuracy within 1 kHz on all frequencies. Utilizing a Bendix BC-221-M frequency meter, I can attest to the above claim of 5 kHz accuracy. The resetting accuracy also checks out as correct to within 1 kHz on all frequencies. I should point out, however, that I can only make this claim from .5 to 20 MHz, as the upper limit of the BC-221 is 20 MHz. Unfortunately, I do not have the means of checking above 20 Mhz.

Sensitivity is excellent on all frequencies (using the SM-1 or longwire). Though the built in whip is not used while DXing, East Coast stations such as KDKA, WSB, WBZ, etc., are heard with fair signals, but not as well as when using the SM-1. On shortwave bands, I was unable to find any station on my HQ-129X which was not audible on the XCR-30. Though the signal on the HQ-129X was sometimes stronger than on the XCR-30, the XCR-30 pulled each signal in to an audible level at the least.

Selectivity is 6 kHz overall RF on AM, and 3 kHz overall RF on SSB and CW. In actual use, I have found AM selectivity to be from 4 kHz to 30 kHz, depending on the station being monitored. The 4 kHz was determined from WSZL-840 with WHAS-840 audio hum. The 30 kHz was from local KTRB-860 occupying 830 to 890 kHz during the day, and slacking off at night only to the extent of allowing KRVN-880 to come through. This is true regardless of the type of antenna: whip, SM-1, or longwire. On shortwave bands, selectivity is usually 5 to 10 kHz with the Voice of America occasionally pushing it to 25 to 30 kHz. (Editor's note - selectivity is normally measured by applying a reference signal to the receiver and then tuning off frequency until the strength of the signal is a certain specified fraction of what it is at the center frequency. Hence spec sheets may quote selectivity as 36 dB at + 10 KHz for example. This is independent of how strong the signal is. While Mike's figures are technically incorrect, they do give a very vivid description of how the receiver performs when in actual use - bp)

The Barlow Wadley XCR-30 is a prototype receiver, somewhat new to North America. At the present, an XCR type receiver is being planned to include the FM band. This was excluded in the current models "to eliminate the possibility of cross modulation." Unfortunately for the designers, they neglected to guard against cross modulation from locals; but then what receiver is totally free of the products of cross modulation. Possibly the only other "complaint" I can put forth is that concerning the lack of selectivity regarding locals. However, keeping in mind the fact that the XCR-30 is a portable receiver, I feel it is equal to many non-portable receivers and should be recognized as an up and coming piece of equipment in the DX field, whether for a main receiver or as a portable receiver for DXpeditions or trips.

THE XCR-30 RE-RE-REVIEWED
by Charley Keleher

A few weeks ago I received a letter from one of my column contributors, who apparently was impressed by my use of the Barlow-Wadley XCR-30 on the medium waves, and announced his intention to buy one as soon as finances permitted. I strongly advised him not to. This receiver was reviewed a little over a year ago, on two occasions, with one writer relating his practical experiences, and the other presenting a theoretical analysis. I have been using the receiver for over a year now, with various ferrite rods and preamplifiers for the antenna setup. For the benefit of the membership, I will relate my experience.

The internal circuitry of the XCR-30 is reasonably sensitive, and adequately selective for working easier splits on the BCB. But if your antenna is also sensitive, you may find it difficult to receive anything at all that is 10 kilohertz away from your local 50 kilowatter.

The fact is that the XCR-30 is quite prone to overloading. The manufacturer says that the rig is designed for listening to shortwave stations. The only antenna supplied with the rig is a whip about 3 feet long. This is adequate for listening to the shortwave powerhouses, and you may have good luck getting some of the weaker shortwave stations too. The whip setup rapidly loses sensitivity below about 4 megahertz, and by the time the lower end of the BCB is reached, it is not very sensitive at all. Therefore, in addition to the anti-fade benefits of the whip, the SWLer is provided with protection from overloads which might be created by local BCB powerhouses, particularly those in urban areas on the lower end of the band. I suspect the manufacturer anticipated the possibility of these being problematical, since many customers might live near strong BCB stations, but few live near strong shortwave stations, and their groundwaves aren't all that great.

As soon as you try to use a loop, longwire or whatever to pick up weak BCB signals, you can expect to find your local 50 kwers showing up almost anywhere on the dial; this is particularly true with lowband stations with tremendous groundwaves. As Joe Worcester pointed out, the broadband first IF in the XCR-30 does little to provide protection from off-channel interference. (I often wondered if solid-state rigs, with substantial base-to-collector capacitance in many of their amplifiers, will ever be as capable of rejecting adjacent-channel interference as the tube-type rigs with extremely low grid-to-plate capacitance.) If you're close to a pack of low-frequency 50 kwers, you may find your attempt to use a sensitive antenna with the XCR-30 will produce enough splatter, cross-modulation and imaging to make you want to pitch the whole business into the nearest lake.

I have had rather good luck at my present location (Ft. Wayne, Indiana-ed.), as there is only a single 50 kw local and all locals are above 1 megahertz. By using a tuned loopstick, enough pre-mixer rejection is obtained so that no real problems are encountered. It is necessary, of course, for the loopstick, antenna trim and the main tuning dial all to be tuned properly if a weak station is desired; if either of the first two are accidentally tuned to a strong local, the same cross-modulation, etc., will occur.

The reporter mentioned in the first paragraph had, in addition to at least one 50 kwer, several low-frequency regionals, and as far as I know, his experience in electronic tinkering was not great. Considering that the XCR-30 is now selling for over $250, I was quite apprehensive at the thought of him buying one and experiencing the results.

Incidentally, since the internal interference from the 1 megahertz crystal oscillator cannot be completely suppressed (the manufacturer warns about this), stations will sound rather distorted on 1000 khz. The manufacturer gives no warning about the second harmonic of the 455 khz IF being insufficiently suppressed, so that very exact tuning is required to hear anything on 910 khz. I have found the

XCR-30 to be a rugged and reliable receiver, in that, despite a great deal of use and transporting, it performs exactly the same as it did the day I opened the package. But the number of problems experienced in attempting to use it for BCB DXing leads me to believe there are better buys for the money.

-Charley Keleher, Box 7543, Fairfield Stn., Ft. Wayne, IN, 46807.

MORE ON THE BARLOW-WADLEY XCR-30
J.A. Worcester

In a recent issue the above receiver was reviewed by Michael S. Hardester and he included the information that the receiver, sensitivity-wise, was useful for casual listening only on MW with the built-in whip but became satisfactory when employed in conjunction with a Space Magnet loop antenna. This is only the second experience I have seen reported of this combination and since the other directly contradicts Mr. Hardester's experience, I thought perhaps I had better describe it and possibly flush out some additional experiences "to break the tie."

On May 24, 1972 I received a letter from a New York customer and I will quote directly the first two sentences. "About a year ago I purchased from you a SPACE MAGNET loop and have used it successfully with a Grundig Satellite radio. I have since acquired a Barlow-Wadley XCR-30 radio and find that the loop is completely worthless with this unit." In following up this complaint with the customer, he sent a schematic and considerable technical material which included the refreshingly candid statement that the radio would not work with an inductive antenna. I point this out to the customer with the speculation that probably the digital oscillator information derived from the quartz crystal reference produced harmonics in the MW band which were picked up by the loop and interference with proper operation. In view of Mr. Hardester's positive experience, however, I am wondering if I advised the customer correctly. If there are other members with this combination I feel their experiences in this regard would be very helpful not only to me but to the membership in general.

Having gone this far, I find it difficult to stop without giving my views, for what they are worth, on the value of this receiver as a serious tool for the MW DXer. I find it hard to envision a more unlikely prospect for this purpose than the circuit employed. In the old days it was referred to as the "single span" circuit and I recall building one in the early 30's. It is basically a cheap way to cover a lot of megahertz. The modus operandi is simple. If you wish to cover say 500 kHz to 30 mHz you make the I.F. frequency slightly higher, say 31 kHz, and then an oscillator covering 31.5 to 61 kHz will produce the necessary conversions. Since the oscillator is covering less than a 2 to 1 frequency range it is simply produced by a variable capacitance of modest size and completely avoided are multiple coils, trimmers, switching, etc. The fact that the circuit has been all but forgotten all these years is not without justification. One little problem is how do you tune the signal over the required range without getting back to multiple coils, trimmers, switching, etc. In the receiver under discussion, a single tuned circuit using simultaneous inductive and capacitance variation is employed in an attempt to provide some signal selectivity. High "Q" over such a wide frequency range is quite impossible and this is the only pre-mixer selectivity provided. In view of this, the panel graphics for this control "antenna trimmer" seem a bit inadequate. Bear in mind that for MW use the whole MW spectrum has to be tuned in a very small part of the total coverage of this control and for all these reasons the antenna tuning device cannot be counted as more than 1/2 tuned circuit and in no way can compare with the Realistic TRF having 2 good tuned circuits preceding the mixer and priced in the $30 odd price range. I am sure it is not necessary to remind the membership of the importance of pre-mixer selectivity from the standpoints of minimizing spurious response, cross modulation, desensitization, etc.

Another problem with the circuit used in this receiver is the fact that adequate selectivity cannot be realized practically in the high frequency amplifier. A second conversion to a low I.F. is necessary and therefore we reach the end of the block diagram before any meaningful selectivity is encountered. This means that not only is the premixer stage broad but the first I.F. amplifier is broad as well, with additional cross-modulation, desensitization, etc.

Mr. Hardester's selectivity information may cause some confusion and as a matter of fact, writers in popular radio magazines are increasinglyguilty of such statements as this from S9- "this receiver has a selectivity of 5 kHz at 6 db and that ain't bad." I subscribe that bandwidth measurement at 3 db and 6 db do not, in any manner, describe the selectivity of the amplifier. Their purpose is to indicate the capability of the amplifier as far as sideband response is concerned. In other words, 5 kHz at 6 db means that 2.5 kHz audio signals will get through the amplifier with only 6 db attenuation. It is perfectly possible to build a crystal diode receiver with just a tuned loop that would measure 5 kHz at 6 db but its selectivity would be negligible. For selectivity purposes the bandwidth should be measured with an input signal 60 db above normal input. Since it is unlikely that the dynamic range of the receiver exceeds 60 db, Mr. Hardester's observation that the bandwidth under strong AVC totals 60 kHz probably indicates that the 60 db bandwidth is not much less than 60 kHz which is, of course, inadequate for serious MW DXing.

To sum up, it is hard to fault Mr. Hardester's observations. He reports that the cross modulation is bad, the selectivity is poor and the S meter doesn't work either. My point of disagreement is when he puts all these things together and comes up with a positive recommendation. Remember, I am speaking of MW reception only--it may be great for SW.

The Old Radio Shop
-Grant Manning HQ

The Barlow Wadley XCR-30

Realizing that there have been articles written about the XCR-30 by others, none of which I can scratch up right now to refer to, this covers more than the average has in the past. Not being your typical DX appliance operator, and not being entirely happy with the way it was... made a few changes. This isn't the first BW I've disassembled, so I'm getting quite good at it now.

What we have is XCR-30 (now $300?!)

Coverage :	.5-30MHz continueous
Readout :	Every 10KHZ
Calibration :	within 5KHZ correctable to 1KHZ
Sensitivity :	better than 1uv for 50mW
Selectivity :	(AM) 7.5KHZ @ 6db
	14.0KHZ @ 40db
	(SSB) 3.2KHZ @ 6db
	10.0KHZ @ 40db

These are published specs friends.

Now, as I see it, the main problems as noted by various DXers are: poor selectivity, non linear readout, (should I say, not linear enough?) and it is prone to overload. (Don't we all.)
Well, read on.

It's good points are: portability, (real nice to haul along to DX meets etc) it's completely shielded, (yes, you can use a loop Mom..) good readout (if plus or minus 5KHZ, correctable to 1KHZ isn't good enough for you, go buy an SPR-4) Now, if the selectivity were a bit better, and if a couple of other operating and construction goof-ups were made known, it would be a decent receiver!

But, ah-ha, everything is possible! You too can log XEUF on 850 next to the "Great Christian Beacon" complete with 60HZ hum on 860 (some of us are sooo lucky...)

I won't go into the messy details on how I found this out, but check carefully if you have a BW. They are all a little different inside. Somewhere along the line they forgot the innitial objective of a DX machine a couple of times... Problem #1 is lousy soldering on some of the elder rx's. Check your PC board. It shows up as instability, and signal strength loss (on meter) and if you bang on it, it will straighten up. The front end coils are all handwound (!) enameled copper wire, about #18. Some of them didn't get all the enamel scraped off before soldering. Sooo, what you have to do is locate (by gently tapping with a non metalic whatever) the ones that are causing problems, gently pull them, clean, and resolder. Put them back exactly like you took 'em out. Looking at the front, with the bezel removed, about 1" over from the KHZ tune knob, there is a tin shield over the PC board - under there... proceed gently!

Some of the radio is Japaneese, (S meter, BFO switch, etc.) some is European (transistors etc.) and some is English (crystals, and main tuning caps.) The PC board isn't the best, and it's almost all hand done, so go slow!

Problem #2 is the micro switches on the "antenna trim" control. They are Japaneese. True to form they stuck some grease on them to make them reliable, and true to form the grease hardened up after awhile. I saw one where they never did work, and the deexer was amazed that after cleaning them, he could get whole bunchs of stations across the BCB with his whip, and there was daytime SW reception! It makes quite a difference if one or both of them stick. This person was using a LW on the RX at the time, and it pumped enough RF in that the tuning wasn't too critical, but on your whip, you should getquite a bit, and it should peak sharply - check.

It should be noted also that this receiver had passed the "factory check" (so much for the factory) Mine has since gone thru the same convulsions. Cure is to clean the swithces with alconol, and a stiff brush. (Not that kind of alcohol dummy...) Be sure (with a small screwdriver & watching the S meter) that they operate freely, and make.

Problem #3 seems to be selectivity. Well, thats the way they designed it. As mentioned before, they lost the innitial objective of a DX machine in a couple of places, and one of the places they lost it was the IF strip. The set comes with ceramic filters which are not the best, but used properly aren't bad either. The BW is built so that on AM, two 68pf caps are switched in across the CF's "spoiling" their nice sharp curve, making AM music sound nicer. Sure. They are not into FM Stereo in South Africa needless to say. Well, to greatly improve selectivity, you remove them, and that's all. This chnages your AM curve to the gooder SSB one, 3.2 @ -6, and 10 @ -40, or thereabouts. A nice improvement as you will see. Being dedicated I chose to unsolder, but I would suggest using a pair of dikes as an easier method. You won't ever need the caps again, or want them.

Looking at the back of the set, left hand side of RX, right hand side of "Mode" switch, and just above, C-71, and below, and to the right, C-68. Both are marked, C-71 is easiest to see, C-68 is identical, and going from the bottom of the PC board up, you have an IF can, a diode, then C-68, then the switch. The ceramic filters are those red things 3/8" square. I plan on installing a Collins 3.1KHZ mechanical filter soon, but will cover this in a future article. Dial linearity on the BW can't be changed. Only way is to bend the cap plates, and that's scary. Either learn to live with it, or if it's real bad, get a new cap from Barlow. Mine is a few kc (cycle is still a cycle huh?) off here and there, but is far ahead of the old half-inch between 9-10MHZ. Most BW's have a zero set (knob below S meter) Sometimes the nut on the back of this works loose causing problems - it was added as an afterthought. Check this if you pull the front panel.

There are adjustments for "minor calibration discrepencies" but from my experience the tracking is set for "best results across the band" and messin with the adjustments, just consumes time, however, for MHZ dial set your MHZ to to the exact cal mark, such as WWV on 10, or 15, and adjust C-32 for max reading on S meter. C-32 is the osc. trimmer, under the last gang on the MHZ tuning cap.
For KHZ adjustments, end points only, T1 adjusts the 1000 KHZ end, and C-44 adjusts the "0" end. They are next to each other underneath the KHZ tuning cap. Again, use USB, and go for zero beat. One affects the other, so have fun. Again use care.

To wrap this up, a few hints. A LW of 20' should be all you need for SWLing. Control your antenna trim with verve and elan, too much antenna isn't good.

For BCB I use a loop, both my large amplified loop, and two others designed specifically for the BW, which I will go into another time, save to say one is quite small, 7¾x4½x2¾, inexpensive, and works with several receivers here. I call it the Black Box, which is what it looks like, and easily logged Tarawa with it last night. The use of a tuned amplified loop eliminates the overload/crossmod problem. It is still mushy around couple of volt per meter locals, but does ok.

Make up a cord using the red/black plugs that BW gives you, and 3' of RG-59, or such with your favorite antenna connector on the other end- (BNC here) then you can easily change loops, antennas, or whatever. Likewise make up 20' of wire with a alligator clip on one end for a portable use, and store it inside the BW.

I shorted the small cap from the antenna jack to the whip, as I found too much loss with it in. There is another cap from the whip to the input circuit anyway.

I also added an external S meter, for loop use- I ripped all the fancy log sheets gizmo off, (so much extra weight) and bolted it under the handle, at one end. Ran the leads inside thru a small hole drilled in the top. You could mount it inside, but it would have to be a small meter, this one was easy to read, and free (couldn't find any small ones locally) so... I used a 2" meter, 100ua shunted with 470 ohms.

There are various other improvements which no doubt will be made eventually, (more stable BFO etc) and some other soloutions will come from others after they read this. I'm pretty happy with my BW now, it's become quite useful. There is still room for improvement tho, the loop for one, and the MF for another. Modifing the IF as described will just whet you want more! Good DX!

* Barlow Wadley XCR-30 available from:
GILFER & ASSOC. PO Box 239, Park Ridge NJ 05676
Write for current price.