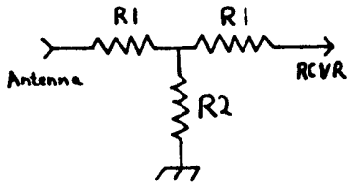
RANDOM WIRE ACCESSORIES

So you've strung up a good high longwire and it's been hooked up to your receiver, and sure enough, you're getting better signal strengths on your DX than you were when using the bedsprings or the loop in your radio. Only one problem--your local stations are now cropping up all over the dial. This is a sign of receiver overload and means that the front end of your receiver can't handle the mass of strong signals that the longwire is delivering to it. It's a common failing in receivers, and difficult to fix without redesigning the radio.

However, it's often possible to find solutions to overload without getting inside the radio. You could try shortening the longwire, or attenuating the signal from it. This isn't as drastic as it seems--with the reasonably high noise level on BCB you may not need all the signal that the longwire is offering in order to hear DX. And a small reduction in DX signal strength means a much greater reduction in the strength of spurious signals.

Here is a simple attenuator which can be placed between the antenna and the receiver.

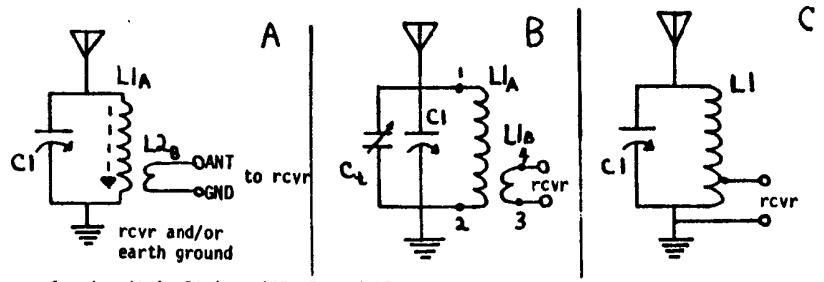


For a -3 dB attenuator (approximately) at 50 ohm impedance, try 8.2 ohms for R1 and a 130 ohm resistor for R2. For a 500 ohm input impedance (more likely with a BCB receiver), R1 could be an 82 ohm resistor, while R2 would be 1300 for a -3 dB attenuation. For other values of attenuation, and other input impedances for the receiver, as well as switching arrangements etc., see the ARRL Data Book, pp. 32-33.

Another solution is to use some sort of tuning network between the longwire and receiver. A commercial device which does this is the McKay-Dymek DP-40 RF preselector which is tunable in various bands from 150 kHz to 30 mHz, and a low-pass filter for use below 150 kHz. It uses two coupled tuned circuits on bands above 150 kHz and is more selective than the usual single tuned couplers as are described below. In many cases however, a single tuned circuit will do fine, although the DP40 has other advantages in ease of operation over a wide range of frequencies and a pleasing appearance.

Various homebrew antenna tuners are described here by Brian Sherwood:

These longwire tuners have the same effect as an air-core loop in that they add another stage of selectivity before the receiver. By "peaking" the tuner at the desired frequency, one can attenuate interference and feedthrough from nearby stations; an obvious advantage over the untuned longwire.



In circuit A, C1 is a 365 pF variable capacitor, $L1_A$ is the main winding on a "loopstick" BCB coil (J.W. Miller #6300 available from Circuit Specialists Co. and others). $L1_B$ is a 5-turn outer winding on the coil. If C1 has a trimmer capacitor (indicated by a small screwhead at the base of the stator, or at the bottom or back of subminiature jobs), then a flat ferrite bar antenna from an old radio can be used, as in circuit B. $L1_A$ is the long winding and $L1_B$ is the short winding. On some flat loopsticks (figure D) "2" and "3" are connected together; if so, make sure "2" and "3" are on the grounded side of the tuner and "1" and "4" are on the "hot" side of the circuit. Figure C above is the tuner circuit for a 3-wire loopstick.

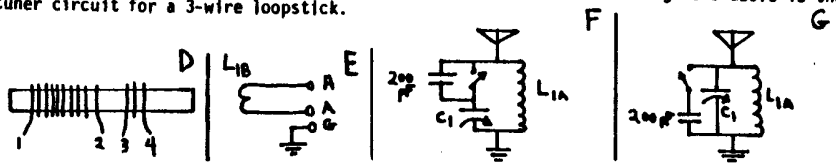


Figure E shows the connection of $L1_B$ (from either circuit A or B) to a receiver with two antenna and one ground terminals. To use the coupler, tune the receiver to 540 and with capacitor plates fully meshed, tune either the loopstick core or the trimmer, or both, for a peak on 540. The tuner should then tune the entire BCB, peaking on each frequency like a tuned loop does. If the tuner doesn't reach 1600, a small (200 pF or less) capacitor may be switched in series with C1 and shorted out when tuning the low end of the band (figure F). If you can't peak the low end of the band, switch the 200 pF capacitor in parallel with C1 (figure G). With most receivers and longwires, these should not be necessary.

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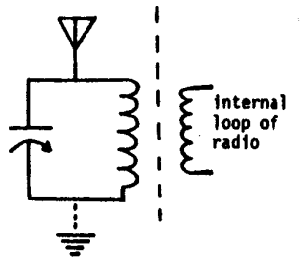
COUPLING A LONGWIRE TO A RECEIVER WITH AN INTERNAL LOOP

Most portable BCB radios do not have an effective external antenna input, if any at all. In fact, some of the cheaper multiband receivers use an internal ferrite loop for BCB reception, and neglect to couple in the external antenna input on BCB. So, what do you do if you want to use the signal from a longwire to boost the sensitivity of such radios? An antenna coupler can be constructed quite simply by paralleling a 365 pF variable capacitor with any BCB ferrite core antenna coil--rather like the longwire tuners just described, only without $L1_B$, the coupling coil to the receiver. If the capacitor does not have a trimmer on it, the coil should be adjustable, like the Miller #6300. The circuit is at the right. It is not necessary to connect the circuit to a good ground, though it may boost signal strength in some cases. You will have to construct some sort of stand to support the coil so that it is close to and in the same plane as the radio's internal loop. You may have to take the back off the radio to determine where this loop is located. Use wood or plastic for the stand to affect the coil as little as possible.



Now tune the radio to the high end of the BCB, and tune the variable capacitor until the signal peaks. If no peak is noted with the capacitor plates fully unmeshed, adjust the trimmer capacitor or the slug in the coil until a peak is noticed. The coupler should now tune the whole BCB. When you tune the radio to a new frequency, re-tune the coupler as well for best signal strength. Be careful you don't tune the coupler to a local station's frequency, as that may well overload the radio, and your local will appear with the desired signal (cross-modulation).

When listening on channels close to locals, you may find that there is a problem with such cross-modulation no matter how carefully you tune the coupler. The solution is to move the coupler's coil away from the radio until cross-modulation ceases. The coupler will probably tune more sharply at this point and there may be some loss of signal strength, but at least you will be able to hear your DX without interference.

Gerry Thomas and Charlie Barfield described a "T-bar" coupler in the technical column in the September 23, 1978 DX Monitor, which uses a "swing-away" ferrite coil which is fitted on the back of some stereo receivers. This allowed the user to permenantly attach his longwire coupler to his radio, and to easily de-couple the device from the radio by swinging it away when cross-modulation is a problem. However, the T-bar is a tough item to find unless it's attached to a stereo receiver; if you have one, it might be worthwhile to look up this article. It's also included in NRC reprint R4.

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THE PI-NETWORK ANTENNA COUPLER

This circuit is actually an impedance matcher between a random length antenna and a receiver; it allows a greater transfer of signal (up to 2 or 3 S-units) between the antenna and receiver.

There are two things to keep in mind before playing about with an antenna coupler on BCB:

1) Weak signals received on BCB are generally limited by external noise (atmospheric and man-made). Increasing the strength of a DX signal at the receiver's antenna terminals by any means (preamplifier, coupler etc.) will mean a louder signal volume heard in the receiver's speaker, but also a louder volume from external noise. Therefore, there will be no increase in signal readability. Most receivers with antenna terminals are sensitive enough to be used with badly mismatched antennas on BCB, and still get reasonable results.

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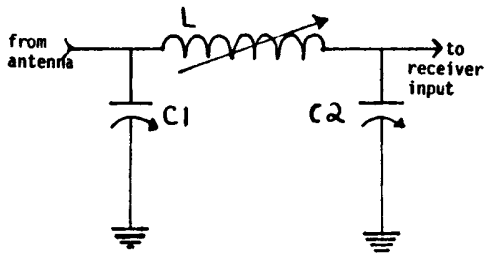
2) Increased signal at the antenna terminals often results in degraded spurious signal rejection in the receiver. You are often better off using the simple antenna tuners described above which can help reject strong locals. Sometimes these tuners do offer some impedance matching between antenna and receiver, thereby increasing apparent signal strengths. The pi-net coupler does not always give as sharp rejection of unwanted signals as the simple antenna coupler can, and your receiver may suffer from overloading.

However, if your receiver seems quite insensitive with your longwire, the pi-net coupler might be worth a try. The basic circuit appears at the right. C1 and C2 are 365 pF variable capacitors while L can either be an adjustable ferrite BCB loopstick or a home-wound coil of 100 to 200 turns on a 1¼" form (use an old toilet paper or paper towel cardboard tube) with taps every five turns. A multipole switch can be run from one end of the coil with various poles connected to the taps to vary the coil inductance. Two circuits using home made coils appear in the NRC Antenna Reference Manual. One of those circuits also appears in the March 1968 issue of Popular Electronics.



To use the pi-net coupler, connect your antenna and receiver up to it, set C1 and C2 about half open, tune the receiver to a desired frequency, and adjust L for maximum signal strength (either by adjusting a ferrite slug or switching through the positions on a multi-pole switch with homebrew coil). Now adjust C1 and C2 for maximum signal strength.

Because various longwires (and receiver inputs) have different impedances, this circuit must be regarded as experimental. On some frequencies, you may find that you can't peak the signal on C1 or C2 and must add capacitance in parallel to one or both. Try about 250-300 pF with a SPST switch to switch it in and out of the circuit. Or you might need more inductance in series with L in order to peak signals on the low end of the BCB. Or even less inductance at the high end of the BCB when using a loopstick in the circuit; some inductance switched in parallel with L may be needed. See the SPR-4 antenna coupler (p.53) for details on such a circuit arrangement.

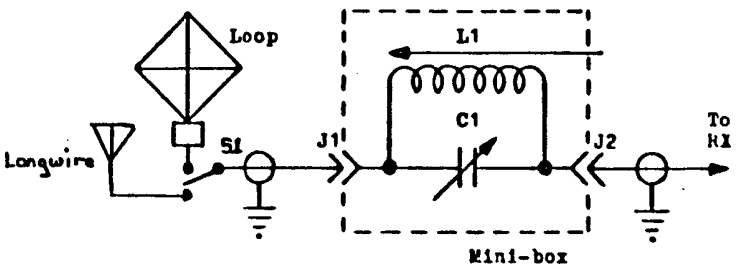
Eventually however, you will find a set-up that works right across the band for your longwire(s) and receiver(s). Good luck!

A LONGWIRE TUNER/PRE-AMP USING THE MW-1 by Mark Connelly

I have been running experiments with my MW-1 (Radio West) loop to see if I could use it as a longwire tuner/preamplifier. The first step was to construct a coupling coil to be slipped over one end of the ferrite rod. I made a 4-inch long cardboard tube that fit snugly around the ferrite rod; black electrical tape was used to hold the cardboard together. I wound a one-layer coil with #24 enamelled copper magnet wire, covering the cardboard coil form. Then I covered the coil with electrical tape, leaving two exposed leads, one from each end. Two longwires, each 120 feet long, were used for these tests. WVLC on 1170 was tuned in and the R-390A RF gain was set to 8, or 80% of full. The MW-1 without the coupling coil gave a 30 dB (over zero) peaked meter reading. My SM-2 yielded a 42 dB reading. With the MW-1 and coupling coil set up so one end of the coil went to one longwire and the other end to the other longwire, a 36 dB peaked reading resulted, not much difference. But when I tied both longwires to one end of the coil and grounded the other end to the MW-1 preamp case, I got a whopping 80 dB reading. The reading with the two longwires tied directly to the receiver's unbalanced input was 57 dB, so coupling through the MW-1 realised a 23 dB gain.

Similar testing was done on WLBZ-620. With the RF gain at 9, meter readings were as follows: 25 dB (normally-peaked MW-1); 20 dB (normal SM-2); 70 dB (MW-1 with coupling coil grounded at one end and fed by the two longwires at the other); 20-40 dB with noticeable WVNJ SAH (one end of coil to longwire #1, other end to longwire #2--apparently with different directional characteristics resulting). Then I tried something different: I connected the SM-2 output across the coupling coil on the MW-1 and peak-tuned both loop amplifiers; a 62 dB reading resulted, better than either loop alone. Nulling with this arrangement was somewhat more difficult. I tried the SM2-feeding-MW1 configuration on Marc DeLorenzo's HQ-100 and it only produced 6 dB of gain over the SM-2 alone. I suspect that different receiver input impedances will affect the usefulness of coupling other antennae to the MW-1. Still, there is room for experimentation.

ANTENNA TUNER and/or TRAP



C1 = 365pf Variable capacitor

J1 & J2 = Phono jack or equiv

L1 = Ferrite antenna coil...Miller # 6300 or Radio Shack # 270-1430

Use shielded cable to and from tuner as indicated. Insulate variable capacitor from mini-box. Enlarge hole in 'L1' mounting clip so coil slug slides in and out freely for ease in tuning. This tuner may not work with all set-ups, but it's worth a try; also you will note a signal trap position when adjusting the slug or tuning the variable capacitor, this device is also a parallel tuned trap. I haven't tried this on a SW yet, it sure works on my loop and rx.....Ralph Sanserino