MAGNETIC LONG-WIRE BALUN

A LETTER FROM DEREK MORLEY (ex-YB0ADW) reported that he had recently bought (from Lowe) a 'magnetic long-wire balun' made by RF Systems Inc. The associated sales leaflet made strong claims for the device as being the ultimate way of matching any long-wire antenna to 50Ω coaxial feeder. Derek wrote: "I don't know about the theory behind it but in practice it works well - about 1.5 to 3 S-points up on a traditional long-wire antenna as comparison, with greatly reduced noise."

I must admit I was misled by that YB0ADW callsign. As a long-time user of a 40m long-wire antenna at G3VA my eyes lit up. This seemed just what I and many others wanted. I could replace that part of my long wire that passes through the roof space and down to my upstairs rig with coax!

But then my scepticism about baluns and wideband toroidal cores returned, with their tendency to saturate and overheat, and their power losses. Had RF Systems really come up with the long-awaited answer to end feeding a multiband antenna with coaxial feeder?. G6XN has indicated a partial solution with a capacitor loaded end-fed Windom intended for single-band operation. (*TT*, August 1988).

It took some minutes for the penny to drop. What RF Systems have developed is a wide-band, impedance matching transformer for *reception* - useful for enthusiastic SWLs and possibly for those amateurs who are prepared to use separate antennas for reception and transmission but not, alas, a device that could make the long-wire transmitting/receiving antenna more popular than ever.

My mistake and not the manufacturers! Indeed, wideband impedance-matching transformers were, over 40 years ago, an inherent part of the 'noise-reducing aerial systems' offered by such firms as Aerialite Ltd, matching a vertical whip antenna to a screened downlead: **Fig 9**.

But to return to Derek Morley's notes on what he felt would be of interest to *TT* readers (**Fig 10**). He wrote: "However, I examined the balun before installation. I could foresee problems of weather-proofing the PL259 connector. So I hit on the modification as shown in **Fig 11**."

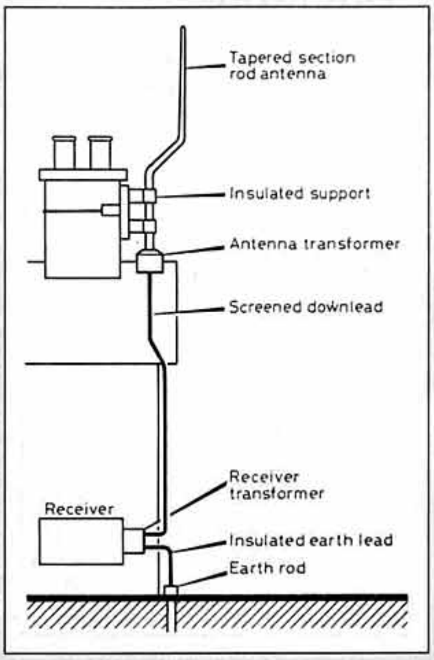

Fig 9: A wideband noise-reducing antenna installation for broadcast reception as marketed in the UK many years ago. The second receiver transformer was necessary since broadcast receivers had a relatively high input impedance of about 400Ω.

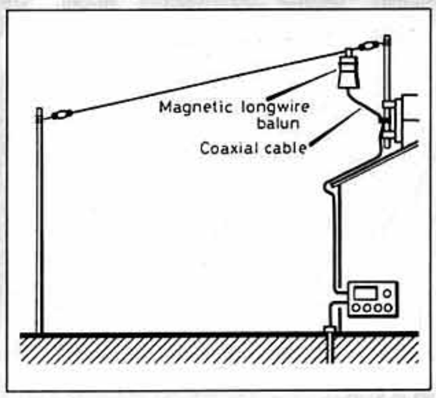

Fig 10: A receiving antenna system as suggested by RF Systems and using their magnetic long-wire balun.

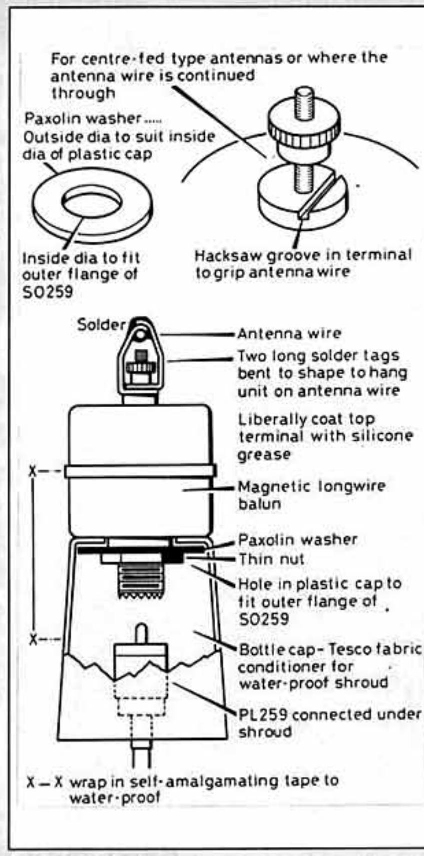

Fig 11: Modifications to improve the weather-proofing of the socket for the magnetic long-wire balun.

effect' antennas do not resonate exactly on harmonically-related frequencies. He writes: "It is probably not widely recognised that the 5th harmonic of a 3.5MHz dipole comes out roughly at 18MHz and the 7th harmonic at roughly 24MHz. After allowing for 'end effect' the dipole length for mid-band resonance on these two WARC-bands would be 134.4ft and 137.1ft respectively.

"A compromise length of 136ft would have a fundamental resonance at about 3.43MHz although if cut for 3.65MHz (the middle of the 3.5 - 3.7MHz band) would be some 8ft shorter. However, in practice, a 136ft dipole would cover much of the 3.5MHz band before there would be a cut-back of power output (due to rising SWR) when using a typical solid-state transceiver, and would thus be effective on 3.5, 18 and 24MHz bands. Furthermore, a 3.5MHz dipole is also quite effective on the 10MHz WARC-band, although on this band there is considerable reactance needing to be tuned out by means of an external ATU."

Antennas for the lower-frequency bands when used on higher-frequency bands will have multi-lobe radiation patterns. Unless some half-wavelength high, they will tend to be virtually omnidirectional on their fundamental frequency. For general use, multi-lobe patterns are seldom a disadvantage and G3IGW was pleasantly surprised to work 101 countries in 30 days on 18MHz using a 3.5MHz dipole 40ft high. He comments "18MHz is a wonderful band".

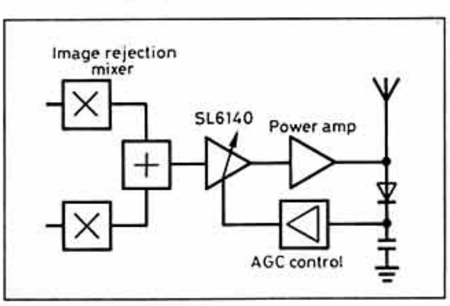

Fig 12: Use of the SL6140 AGC amplifier chip as ALC control of an SSB power amplifier.

John Greenwell, G3AEZ, sends along a clipping from one of the electronics magazines showing how the Plessey SL6140 AGC IC chip can be used as a fast-attack, slow-decay AGC system on the power stage of SSB transmitters. The SL6140 is pin-compatible with the Motorola MC1590 but has enhanced frequency performance (SL6140 up to 400MHz, MC1590 less than 100MHz) as well as mil-spec type temperature performance (-55 to +125°C).

According to the clipping: "The SL6140 has been used as shown in **Fig 12** taking an AGC input from a peak detecting diode and through an AGC control circuit to operate the ALC control pin on the SL6140. The SL6140 AGC amplifier is most suitable in this type of application as its balanced design does not 'thump' (produce a spurious output) when the AGC is activated. The input to the power amplifier in this SSB application is an image rejection mixer, but could equally well be any other input circuit requiring a power output stage with accurate control of output power." ***G3VA***