radio communication

March 1975

ACHLYSUR MAWR CYMREIG

The installation of the 1975 RSGB President in Cardiff Castle

A report on this "great Welsh occasion" appears on page 184

journal of the Radio Society of Great Britain

The squashed multibander

by J. J. PHILLIPS, G3KSK*

Introduction

The configurations described below represent perhaps the shortest multiband λ/2 dipole aerial design yet achieved. Several familiar ideas are brought together in a new way, these being as follows:

(a) More than one λ/2 dipole fed at a common point.
(b) The bending back of λ/2 aerials up to λ/8 from each high-impedance/high-voltage end [1].
(c) λ/2 dipoles slung in parallel and with minimal spacing [2].
(d) The λ/4 feed line-matching transformer.
(e) The pi-net range of impedance matching.

To these, two new ideas are added:

(f) Each end of the multiband λ/2 dipole is guyed to a single point.
(g) No internal guying other than aerial lengths and terminating insulators is used.

These seven ideas are brought together in Figs 1–3 and Table 1.

Table 1. Values of λ/4 for the five bands. Note that some adjustment of length may be necessary on 80m and 40m due to the effect of bending back on the resonance

Band (m)	λ/4 (ft)	λ/4 (m)
80	66	20
40 and 15	33	10
20	16·5	5
10	8·25	2·5

Construction

The construction can be both interesting and frustrating. It is desirable to divide the strain equally between each of the six wires, and therefore careful adjustment is necessary, even to the extent of leaving wire loops protruding from the end spacers.

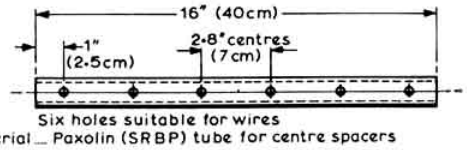

Fig 2. Centre spacers

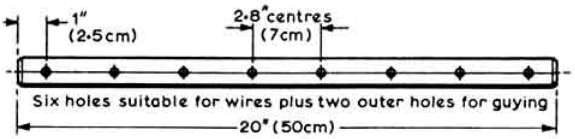

Fig 3. End spacers

Operation

Operational trials did not fully prove the feasibility of the above configuration because the positioning of the aerial was not ideal at G3KSK. In position, it sloped from 23ft (7m) to 9ft (2·75m). The higher λ/4 section ran close to the roof of a steel-framed house. The recommended 43ft (13·1m), or odd multiples thereof, was not tried; it was an afterthought to help correct the 80m mismatch found in any horizontal λ/2 dipole less than λ/4 above electrical ground. However, contacts were made on all five bands (although only 20m exhibited a near 1:1 swr), including dx on 15m. A mechanically simpler, yet wider-than-minimally-spaced, version of the aerial for three-band operation was later constructed (Fig 4). This was made to prove the feasibility of a simpler design. Many other versions based on these ideas will come to the mind of the reader, the overall length of these aerials varying from the 41ft (12·5m) of Fig 1, depending upon the band combinations. Usually a two-band combination will be more useful if it includes 40m, because 15m will thus be covered as well, and three-band coverage will be obtained in the space for two. The version shown in Fig 4 permitted contacts on the three bands with 5W input, including some dx on 20m. Fig 5 shows a single-band version.

Recommendations

In order to improve on the results obtained at G3KSK with the above configurations, the following points should be incorporated:

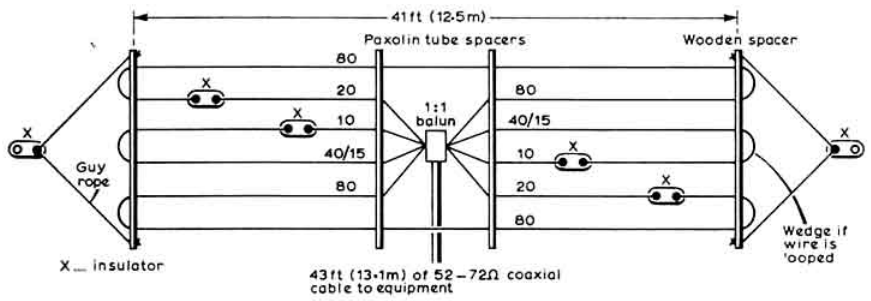

Fig 1. Five-band version of the aerial

* 13 Yeatmans Close, Shaftesbury, Dorset SP7 8LU.

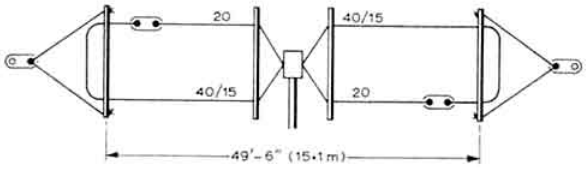

Fig 4. Three-band version of the aerial. Alternatively, the λ/2 dipoles may be sited in the same plane

1. The aerial should be raised to at least 33ft (10m) above electrical ground. The average pi-net should then accomplish all the transformation presented to it from 40m to 10m.

2. By using 43ft (λ/4 × 0·66) of 52–72Ω of coaxial cable, or odd multiples thereof, the impedance mismatch on 80m present at usual aerial heights may be transformed so that it falls within the limits of most pi-nets, while other bands remain relatively unaffected. At around 66ft high, no transformation should, however, be required, being λ/4 (80m), λ/2 (40m), λ(20m), 3λ/2 (15m) and 2λ (10m).

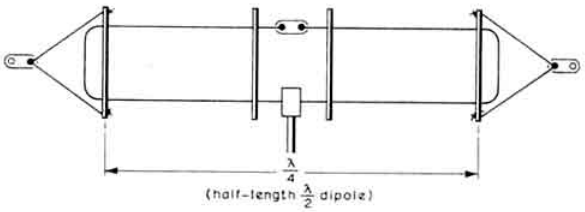

Fig 5. Single-band version of the aerial (two-band if it covers 40m)

Miscellaneous points

Ideally, a balun (1:1) is preferable but it is only worthwhile if the swr is near to 1:1 on all bands. The actual contacts made with the above configurations were almost incidental because the design as a whole is obviously feasible. The construction was therefore carried out to test the feasibility of the mechanical construction. It was considered more important to make the design freely available as soon as possible, rather than to amass predictable contacts.

Conclusion

The above aerial configurations were not well sited. However, they did work, and will work more efficiently if the recommendations given above are carried out. The advantages of the described designs are as follows:

(i) They can be used where space is insufficient to erect other types of compact multibanders.

(ii) They have no trap losses.

(iii) There is the possibility of covering small-range impedance variations via the pi-net only.

(iv) There is no wasted space within the aerial due to internal guying ropes.

The author will be pleased to receive comments and/or results regarding any of the above ideas.

References

[1] "Compact and multiband aerials", O. J. Russell, BSc, G3BHJ, *Practical Wireless*, January 1957, pages 769–70.

[2] "The F7FE all-band dipole", *Radio Communication Handbook*, 4th ed, p13.55. □

2ND FM CONVENTION

Brooklands Technical College, Heath Road, Weybridge, Surrey

Saturday 15 March 1975

Doors open noon

Convention opened at 2.30pm by Geoff Stone, G3FZL

Lectures on Oscar, vhf/uhf tv and radio broadcast aerials

Discussion by UK repeater groups on "Repeater facilities"

Limited trade show — **Bring and buy sale**

Afternoon tea — **Buffet supper from 7pm**

Tickets: convention only ... 50p, convention and buffet ... £2.50; available from G8FNF, QTHR; cheques to be made payable to "UK FM Group (London)".

Talk-in on S20 (145·5), R7 via GB3LO and 433·2MHz; callsign G8GFM/A.

Northern Radio Societies Association Annual Convention

Belle Vue, Manchester

Sunday, 27 April 1975

Commencing at 11am

Trade stands — **Club display stands**

Inter-club quiz — **Grand raffle**

Construction contest — **Club stand trophy**

The entrance to the exhibition is at the rear of Belle Vue, opposite the main car park (off Hyde Road, A57).

ATTENTION ALL RADIO AMATEURS

If you have won trophies, awards, contests, written articles, carried out special experiments, preserved old gear, constructed something special, or given help to others, during the past 10–12 years, this should be recorded in the RSGB's history book, along with any *spare* photographs you have on the subject.

Please send details, as soon as possible, to Ron Ham, Faraday, Greyfriars, Storrington, Sussex.

SPECIAL EVENT STATION

Wallington Hobbies Exhibition, 12–14 March

GB3WRC will be operational at the Wallington Rotary Club Hobbies Exhibition from 12 to 14 March at the Public Hall, Stafford Road, Wallington, Surrey. The station will be organized and operated by Sutton & Cheam RS.