Short reflector syndrome

Bill Wright's our inside man in the world of dish and aerial installation

Is your terrestrial TV reception better on some channels than others? If so, you could be suffering from 'undersized reflector syndrome'. This is an aerial fault that you can spot quite easily from the ground. I'll explain, but first I have to tell you about channel groups.

The UHF TV channels start at 21 and end at 68. The bandwidth necessary to include all these channels is 400MHz – too much for the conventional 'yagi' TV aerial to handle efficiently. To get round this problem the band is split into three 'groups' or sub-bands, called 'A', 'B', and C/D'.

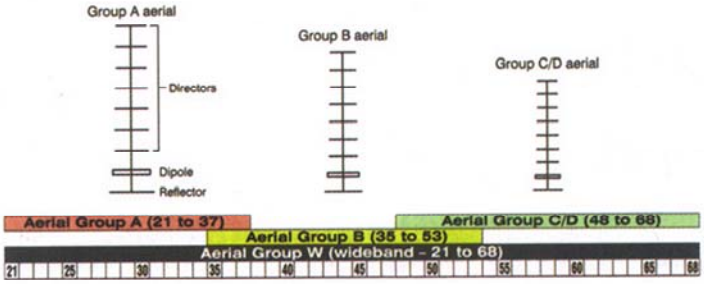
Each of these covers roughly a third of the band, so aerials made for just one group are more tightly tuned and so more efficient than their 'wideband' equivalents. Sometimes we have to use a wideband aerial because the channels and multiplexes from the nearest transmitter are spread out right across the whole UHF band, but a good installer will use a grouped aerial.

All the dimensions of an aerial relate to the frequencies it's designed for, so Group C/D aerials look like slightly miniaturised Group B aerials, and Group B aerials look like slightly miniaturised Group A aerials. Once you're aware of this you can look at a rooftop and tell the groups of all the aerials.

At the end of the aerial, farthest from the transmitter, is the reflector. It's a crucial part of the aerial because it helps the dipole (the bit connected to the cable) to collect more signal and it screens the dipole from interference from the rear. On good-quality aerials the reflector comprises four or more rods fixed one above the other. The rods are always significantly longer than the other elements. But on cheap 'contract' aerials the reflector is usually made from a rectangular piece of thin aluminium plate with slots cut in it. The length of the reflector must be half a wavelength long plus 10 per cent. Any shorter and the aerial loses all its directional properties, making it useless. The lower the channel, the longer the wavelength, so what sets the minimum length of the reflector is the lowest channel covered. For ch 21 this works out at 34cm.

Transmitter	Analogue on chs 21and 22	Digital multiplexes on chs 21 and 22)
Belmont	BBC1 (22)	
Bilsdale		ITV mux (21)
Blaenplwyf	C4 (21)	ITV mux (22)
Bristol K. Weston		BBC mux (22)
Brougher Mountain	BBC1 (22)	mux A
Caradon Hill	BBC1 (22)	
Crystal Palace		ITV mux (22)
Darvel		BBC mux (22)
Hastings	BBC1 (22)	mux A (21)
Kilvey Hill		mux C (21) ITV mux (22)
Lark Stoke		BBC mux (21)
Pendle Forest	BBC1 (22)	BBC mux (21)
Rowridge	C4 (21)	
Rumster Forest	C4 (21)	ITV mux (22)
Storeton, Liverpool	BBC1 (22)	
The Wrekin		BBC mux (21)

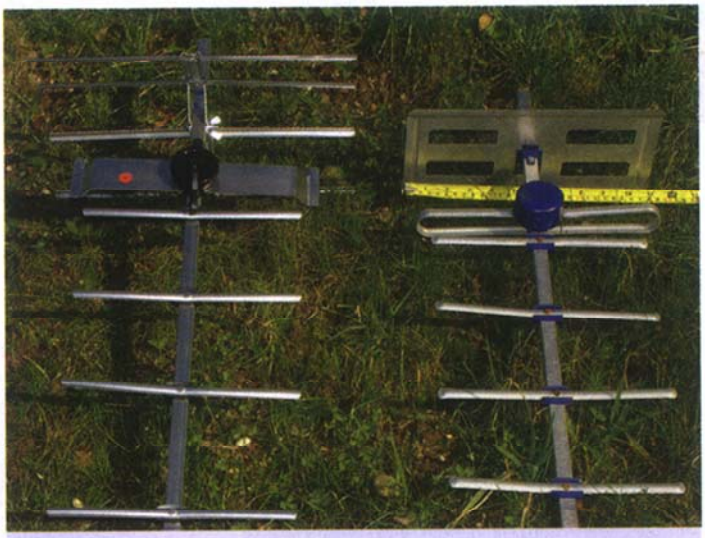
Some of the main transmitters that have all the analogue and digital channels inside Group A. If you receive TV from any of these you should have a Group A aerial (if you have a wideband aerial the performance will be severely compromised anyway).
For a full list look at www.bbc.co.uk/reception/transmitters.
If you have problems with the services listed – which all use channels 21 and 22 – there's a good chance you have 'short reflector syndrome'.



Channel groups for UHF TV aerials in the UK. The colours are the standard colour code for each group. The aerials show the relative dimensions for each group.

Now, suppose you are the proprietor of a backstreet aerial factory and your customers are cowboy installers who care a lot about profits but little about quality. A way to save money is to make a 'one size fits all' reflector, so some of these firms make Group B-sized reflectors only and fit them to the aerials of every group. Sounds like a botch? It is, but in any case these cheap aerials are often made with a scandalous disregard for how well they work. There's no balun (cable matcher) and often the design has never been tested and tweaked for the best performance, so fitting the wrong sized reflector is just another aspect of a horrible product. One manufacturer even spaces out the elements in front of the dipole to suit a standard length of boom, so they are too far apart on the Group CD aerials and too close together on those for Group A! And using Group B reflectors for aerials of all groups is a common wheeze.

If you have a Group A aerial with a Group B sized reflector, the performance of the aerial will be poor towards the lower end of the group – on channels 21, 22, and even maybe 23. On these frequencies the reflector is too short, so instead of screening the dipole from interference it can encourage it! What's more, the sensitivity of the aerial on the lower channels can be cut by half. So if you have ghosting on some analogue channels or drop-out on some digital ones, scrutinise that aerial – especially the reflector! ■



Above is the business end of a good Group A aerial. The reflector comprises the four 35cm-long rods at the top of the picture. On the right is a typical 'contract' aerial with a thin aluminium reflector, 28cm across. The absolute minimum correct width is 34cm so on ch 21 this aerial has no useful directional properties. On ch 22 and 23 it will still be poor. If the reflector on your Group A aerial is a flat plate that's only about the same length as the dipole next to it you can expect problems with these channels. Ensure your aerial has the 'CAI approved' label.