THE WEST RAND AMATEUR RADIO CLUB

November 2003
Volume 4, Issue 4

ANODE

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Editor's Comments

Congratulations

To all the successful RAE students. Well done Garth! A 100% pass this year!

Goodbye Coax

It's the end of an era in the workshop today. The coax network is being removed after being replaced by a u.t.p. 100 Megabits/Second one. The coax and hub will go to the garage to form a new 'old' network there.

Its also time to clean house and put the u.t.p cable into the plastic conduit, so carefully laid some years ago. The new 100Mb/Sec 'switch' cost a quarter of the 16 port 'hub' which is also going into the garage. Switches are now the 'norm', as hubs were dropped from manufacture a year or two ago.

These network 'switches' are semi-intelligent and clever enough to switch the cable connections around when you plug a straight cable in or a cross-over cable. The bandwidth is switched between used ports and directs network traffic (packets) to the correct port. This keeps the performance at 100 million bits per second for all the ports.

"Whoopsie" of the month

Sorry for the incorrect

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The Oscillator

by James Franklin from Electronic Building Blocks - Wireless World

One of the functional blocks in the television set diagram in Part 1 is labelled "oscillator". According to the dictionary, to oscillate is. to swing like a pendulum, move to and fro between two points. This, of course, is a definition 'of oscillation in visible, mechanical terms. In an electronic oscillator the oscillation cannot be seen because the to-and-fro movement is not of some mechanical part but of electrons in a circuit (Part 5). Although we cannot see this movement directly we can detect, measure 1 and display it by various instruments, and so can discover a good deal about what goes on.

In one type of oscillator the character of this to-and-fro electron

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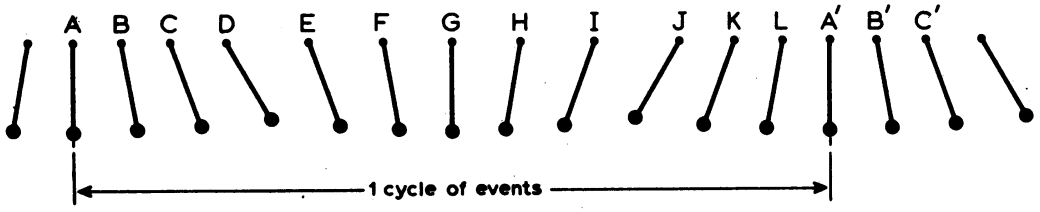

Fig. 1. Sequence of positions of a swinging pendulum—a mechanical oscillator.

Special points of interest:

- Contact details on back page

How To Automate Windows

I was asked the other day how I automated certain applications in Windows. In the DOS days, you would write and run a batch file program. These files would have an extension of '.BAT' e.g. Menu.bat. You can still run batch programs in Windows but their functionality has limitations that can interfere with other Windows programs.

Today's replacement for batch programs is a script program. The script file can be in several language types having access to the Win operating system. The two main languages are Visual Basic and Java Script. Others are available such as PERL. These scripting engines are 'free', in the sense that you don't have to pay for them. In Windows 2000 and XP they are supplied with the operating system. However for all previous versions back to Windows 95, the Windows Scripting Host can be downloaded from www.microsoft.com/scripting. Go there to download both the documentation and the engine. If you have installed IE 5.0 or later you will have it already, though it may not have all the functions and features of the latest version. At this time its version 5.6.

Once you have the 'scripting engine' installed you can write simple/short programs to automate your computer. The most obvious one to do first is backup but to give you more confidence in your programming abilities, try this one :-

```
MsgBox "Hello Scripting World", 64
```

Type it in Notepad on one line and save it as "Hello.VBS" and include the quotation marks. This is because notepad will automatically add the '.txt' extension if you don't tell it to save as another type of file. Save it to a suitable folder and use explorer (My Computer) to find it. Select it and press enter.

You should see this message box with your message.

What do I backup to?

These days everybody will tell you to buy a cd Writer. This does work for moderate sized backups but does not have any long lasting appeal. Very soon the CD media becomes either full or worn out. Damage to the cd is easily accomplished; just leave it on the parcel shelf of your car.

Tape drives are quite reasonably priced and tapes when not re-used again and again, last for several years. But they take a long time to backup that 80GB disk drive you bought cheap last year. What on earth did you put on it?

The quickest and lowest cost is another disk drive. It can either be in the same machine or across the local area network cable. At 100 megabits per Second it doesn't take too long to do a large backup. In the same machine it goes very quickly but you stand the risk of the machine being stolen or damaged.

Using MsBackup

Well its not easy but you can use it. MS like to improve things, but they really overdid it with MSBackup in Windows 98. The NTBackup that appears in NT, Win2k and XP is a version that is easy to automate. If you have Windows 98 and you want to do it really well, I suggest that you get hold of a copy of Windows 95's Backup. It worked better for me.

To make it work reasonably well, I had to use the 'SendKeys' statement in VBScript to simulate my key presses. This meant I had to manually do the backup first. And then write down which keys to press. I very carefully selected unattended operation in Tools | options but that didn't work out the way I thought. Try this yourself and let me know how you got on.

Using Zips for Archiving

When some files change on a daily basis, it's a good idea to

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How To Automate Windows

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backup the previous version of the file as well as the latest. Sometimes you make changes to the document that you regret and wish for a really good undo command. With this method of backup you can go back to yesterdays or last weeks version of the file and re-use it.

With the scripting engine in place, you can zip up files and folders into a zip file with today's date as part of the file. These will be unique and won't be overwritten when you do another backup. Sure, it does take up more space on disk, but you did buy that 80GB disk cheap last year didn't you?

Think yourself lucky you have last years model of PC, the new ones don't have physical room to fit a second hard drive.

Using Scripting for Programs

You can use scripting for automatically running programs. So you could have a packet program connect to the BBS and do a send or receive operation. If you need programs to run at specific times, you can use the built-in Windows Task Scheduler. By setting a 'job' to run at a time during the day or night you could have your computer conduct a QSO with another station on a daily basis.

The task scheduler is that icon on the left in the system tray. When you double-click it, it opens the task scheduler. You

can then add a task and run through the wizard adding programs or scripts as you wish.

JB

The Oscillator

(Continued from page 1)

movement is similar to that of pendulum movement in a clock- so let us look more' closely at a swinging pendulum. Fig. 1 is like a series of frames from' a cinematograph film showing the positions of a pendulum at successive instants during its swing. If we take the dead centre position A as a reference point we see that the pendulum swings first to the right to an extreme position D, back to the dead centre position G, beyond this to an extreme left-hand position J, then back to the dead-centre position A'. It then repeats the process through D' G' J' and back to A". . . . and so on. This is a cyclic movement which, in the clock, goes on repeat- itself as long as mechanical power is applied to the pendulum at the right instants to keep it swinging (e.g. through an escapement mechanism from a spring).

One complete cycle of pendulum swing is marked on Fig. 1 as being between reference position A and position A' but a cycle could equally well be defined as between any two corresponding positions, for example between C and C'.

If we plotted a time graph of the displacement of the pendulum bob along its arc of swing it would come out as shown in Fig. 2*-a graph which some readers may recognize as simple harmonic motion. In the comparable electronic oscillator, if we plotted a time graph of some variable that indicated electron movement it would be similar to Fig. 2. We cannot easily measure the. displacement of electrons from a given point but we can readily measure the *rate* of displacement of electrons, which is electric current (Part 3). Thus a time graph of current measured at a suitable point in the oscillator circuit would be similar to Fig. 2. This version of simple harmonic motion in electrical. form is called a *sinusoidal* oscillation, or, because 'of the wave-like character of the graph, a *sine-wave* oscillation. A similar shape would be obtained if we plotted a time graph of potential difference existing across a part of the oscillator

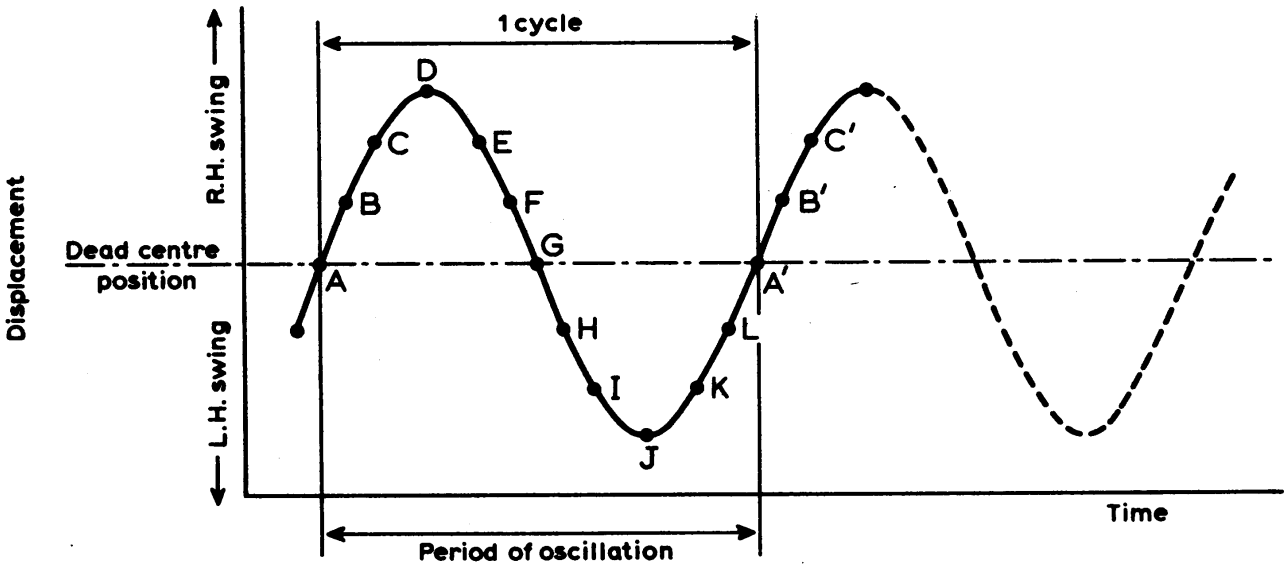

Fig. 2. In this graph the pendulum positions in Fig. 1 are plotted, as displacements from time.

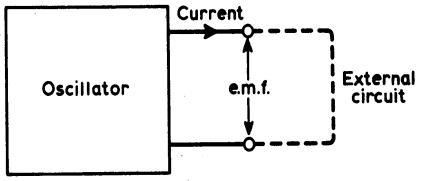

Fig. 3. Output of an oscillator is measurable as an e.m.f.

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The Oscillator

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circuit; and in fact the output of an oscillator is often measured as an e.m.f. between two terminals (Fig. 3).

The swinging pendulum is analogous to the electronic oscillator for another reason: in both the energy is continually changing between potential form and kinetic form. As we have hinted ` the sinusoidal oscillator is only one of several types available. There are, for example, oscillators generating square waves, pulses of various shapes, and saw-tooth waves (Fig. 4). An oscillator producing pulses is normally called a pulse generator, and one of these appears in!' the computer block diagram in Part 1. Whatever the wave shape, however, all oscillators have this in common, that they generate a cycle of variation in an electrical quantity which is repeated indefinitely, as long as electrical power is supplied to the oscillator. The length of time taken by one cycle is called the *period* of the oscillation., and the number of periods (or cycles) that occur *in* a given time is called the *frequency* of oscillation. In- practice frequency is measured in cycles occurring per second, and the unit cycle per second is called the hertz (Hz). *

The name comes from the trigonometrical function, the *sine of* an angle. A graph *of* the sine of an angle plotted against the angle in degrees has the same shape as Fig. 2.

Named after Heinrich Rudolf Hertz 1857 German physicist.

from Wireless World, March 1971

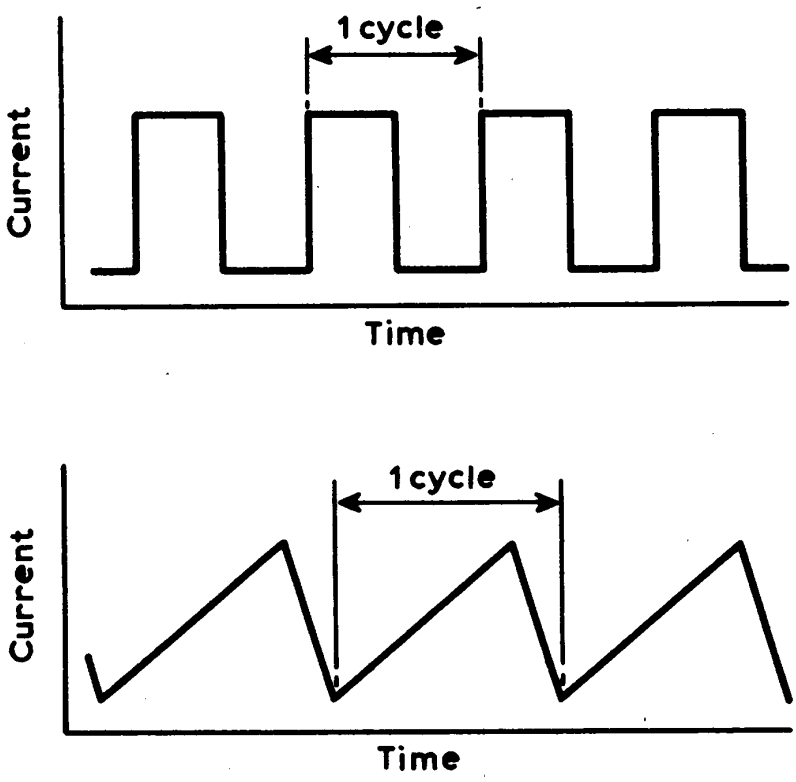


Fig. 4. Two other current /time graphs which are cyclic and are therefore oscillations.

U.H.F. log-periodic Aerial

Constructional details of wideband aerial for television reception

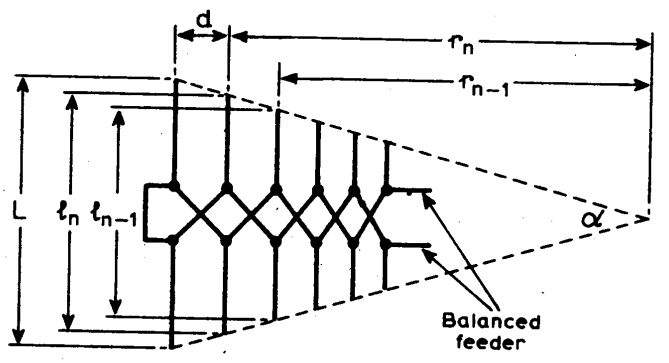
*by J. L. Eaton *, B.Sc., M.I.E.E. and R. D.. C. Thoday*, M.I.E.R. E.*

It is obviously desirable that viewers should use the type of television receiving aerial which gives the best results for their location. This usually implies' the installation of an outdoor or loft aerial connected to the set with good quality coaxial feeder. Available field strength of the transmissions is only one of, the factors which influence's the type of aerial required. It must also be capable of discriminating against unwanted co-channel signals and delayed reflections. over as wide an arc as possible. In some areas, discrimination against delayed reflections is the most critical requirement. Receiving aerials as supplied by manufacturers can be obtained with adequate gain and their directivity is normally adequate to give protection against 'co-channel interference'.

Delayed reflections, however, need greater suppression 1 m general if ghostages are not to be visible on the received television picture. Directional receiving aerials of the yagi type, which are the most common, tend to have side and back lobes in their horizontal radiation patterns which vary with frequency and therefore differ from channel to channel. At locations where delayed reflections are potentially troublesome it may be impossible to position a *yagi* aerial to give sufficient protection against ghosts on all the available channels. The log-periodic aerial on the other hand, although its gain is somewhat lower than a yagi of comparable size, can be designed to have a horizontal radiation pattern with extremely small back and -side lobes, which remains constant over, a wide frequency band. It is therefore especially suitable for areas of reasonable signal strength where delayed reflections are a particular problem. This article describes the design of a log-periodic, aerial for u.h.f. television reception.

log-periodic principle

Du Hamel and Isbell predicted that a frequency-independent aerial could be designed by making its configuration vary . periodically with the logarithm of the frequency; that is by giving it a log-periodic structure. The dipole type described in this article is only' one of a number of possible, configurations embodying this principle. A Schematic representation of the log-periodic dipole array is shown in Fig. 1. The longest and shortest elements are made approximately half-a-wavelength long at the lowest and highest frequencies of the band to be



$$T = \frac{l_{n-1}}{l_n} = \frac{r_{n-1}}{r_n} : \sigma = \frac{d}{2L} = \frac{r_n - r_{n-1}}{2l_n} : \tan\frac{\alpha}{2} = \frac{1-T}{4\sigma}$$

$L = \lambda/2$ at lowest frequency

Fig. 1. Schematic representation of log-periodic aerial with dipole elements connected to balanced feeder. Longest and shortest elements are made approximately λ/2 at lowest and highest frequencies.

U.H.F. log-periodic Aerial

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covered. In operation the aerial has an active region involving a group of elements whose lengths are near to half-a-wavelength at the frequency of the incoming signal. At a given frequency in the band covered by the aerial three adjacent elements are fully active, the contributions from other elements falling off rapidly away from this region.

In this type of log-periodic aerial, all the dipole elements are connected to a balanced line; adjacent elements being connected in an alternate manner as shown in, Pig. 1.

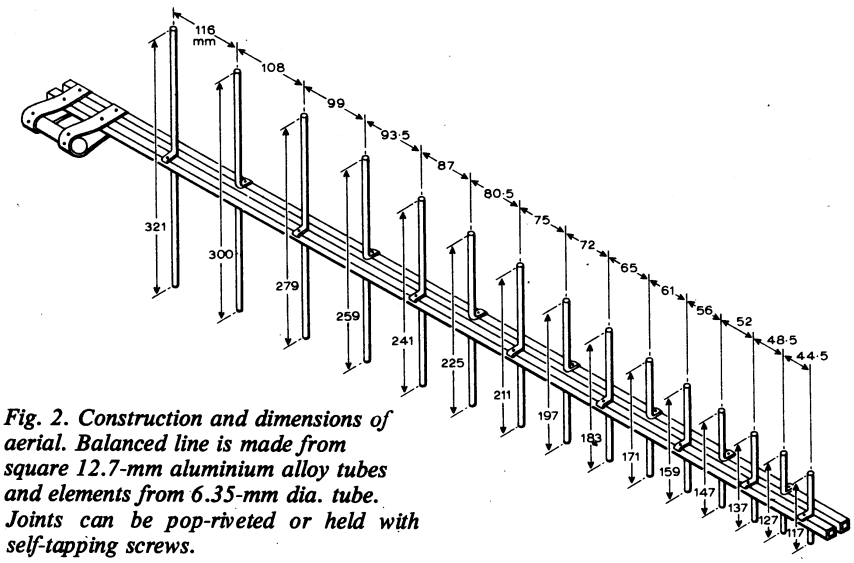

Fig. 2. Construction and dimensions of aerial. Balanced line is made from square 12.7-mm aluminium alloy tubes and elements from 6.35-mm dia. tube. Joints can be pop-riveted or held with self-tapping screws.

The drive point of the balanced fine is at the high frequency end of the aerial, the other end being terminated in a short circuit behind the longest element. With this method of feeding the main lobe of the aerial pattern is in the direction of the high-frequency end. This means that an incident wave arriving in the main lobe passes over short non resonant elements before reaching the active region appropriate to its frequency. Further. the signal from the active region travels along the feeder in the opposite direction, again only encountering non resonant elements. Thus the pattern of the aerial is substantially that of the elements in the active region.

Two parameters (somewhat arbitrary) are required to define the aerial configuration, which specify the logarithmic spacing of the elements and the taper. The parameters T and o defined in Fig. 1 are most often used for this type of aerial.

The design is based on data given by Carrell. Optimum values for Tanda giving the best radiation patterns were arrived at by experiment; these were T 0.93 and a = 0. 17. Calculation showed that these values of T and a would give a gain of approximately 9.0dB relative to a dipole. The design bandwidth was made 2: 1; slightly in excess of 'that occupied by channels 21 to 68 inclusive. This gave some latitude for possible deterioration of the aerial performance at both ends of the working range. Fifteen elements were required to obtain this bandwidth. All elements in the aerial were made from rod of constant crosssection and consequently it was necessary to make some allowance for the effective lengths of elements due to the variation of the ratio *Hla* (*H* is the element half-length and a its radius). The impedance characteristic is optimized by adding some shunt susceptance to the terminals of the transmission fine.

Mechanical construction

Construction and dimensions of the aerial are shown in Fig. 2. The balanced fine on the axis of the aerial is made from a pair of 12.7-mm (0.54 in) square cross-section, fight aluminium alloy tubes separated by 9mm (0.354in) between adjacent faces. (This is a standard size of square tube which is

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U.H.F. log-periodic Aerial

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obtainable from metal merchants.) The elements are made from 6.35-mm (71 -in) diameter aluminium alloy rod flattened at one end and formed into a foot with a small turn-down as can be seen from Fig. 2. Elements are riveted with pop riveting pliers to the square-section rods (rustproof steel rivets are preferable). Self-tapping screws could be used in place of the rivets but the result would be less robust. The method for obtaining the alternating connection to the feeder can be seen in Fig. 2.

Aerial output is by way of an unbalanced feeder of 7 1 -ohm characteristic impedance, carried through the centre of one of the balanced-line conductors to terminals at the drive point of the balanced fine. Terminals are protected by a plastic moulding. Mechanical support for the aerial is provided by a bracket mounted on the balanced fine behind the longest dipole element, which . also acts as the terminating short, horizontal or vertical polarization.

Circuit.

This arrangement of coaxial feeder, balanced lines and short-circuit termination acts a s a balanced-to- unbalanced transformer which minimizes the effect of pick-up on -the outer conductor of the down lead. Fig. 3 shows the aerial with its normal mount which is adjustable for either horizontal or vertical polarization. The weight of the aerial, without clamps, is 1.02kg.

Discussion

Measured radiation patterns are shown in Fig. 4 for horizontal polarization and in Fig. 5 for vertical polarization. Although these patterns were measured at, 650MHz they are typical of patterns at any frequency in Bands 4 or 5. Table 1 summarizes the pattern performance of the aerial over its entire frequency range. Fig. 6 shows a typical v.s.w.r. characteristic referred to a 71-ohm connector cable.

The C.C.I.R. template' for the recommended minimum directivity of u.h.f. receiving aerials is superimposed on the radiation patterns of the aerial in Figs. 4 and 5. The C. C.I.R. template is used as a criterion for planning purposes but greater rejection of signals from the back and side of the aerial than that implied by the template is necessary in

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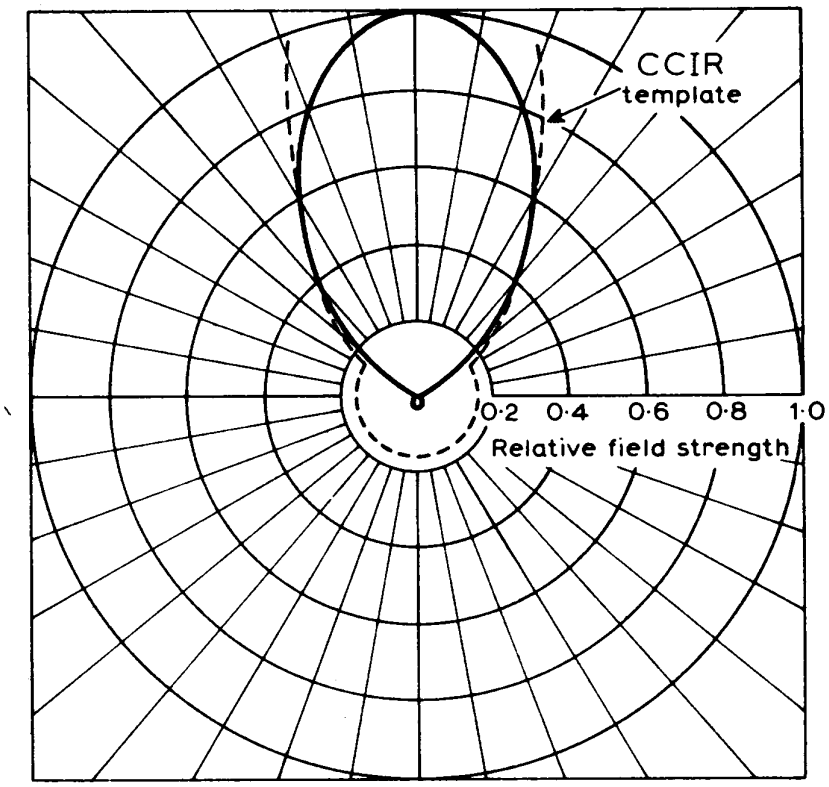

Fig. 4. Radiation pattern at 650MHz for horizontal polarization

U.H.F. log-periodic Aerial

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certain areas to combat ghosting.

The E-plane pattern (horizontal polarization) meets this template although there is some transgression in the case of the H-plane pattern (vertical polarization). The aerial would therefore always be suitable for the reception of horizontally polarized transmissions, provided the gain is adequate. In general terms it will be satisfactory at locations having received field strengths in excess of 70dB (rel. 1uV/m). In situations where the received transmission is horizontally polarized but where the gain is 'marginal, the use of an aerial pre-amplifier could be considered, as the benefits of the very low back and side lobes would be preserved.

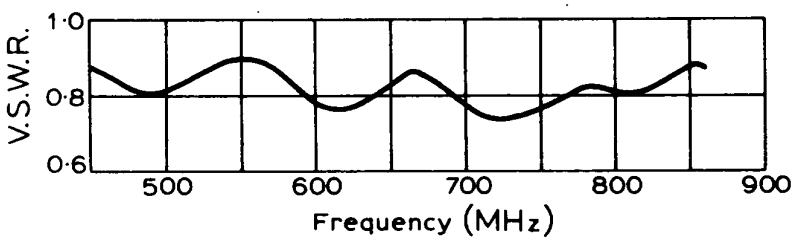

Fig. 6. Voltage standing-wave ratio referred to a 71-ohm connector cable.

For reception of vertically polarized transmissions the radiation pattern could be improved by using two aerials stacked side' by side. In many situations where the transmission is vertically polarized, but where the advantages of low back and side lobes are needed, it is likely that the small transgression of the C.C.I.R. template will not be serious. The performance of the aerial indicates that the principal advantages claimed for the log-periodic form have been achieved, i.e. low back and side lobes and. constancy of performance over all the u.h.f. television channels in use in the U.K.

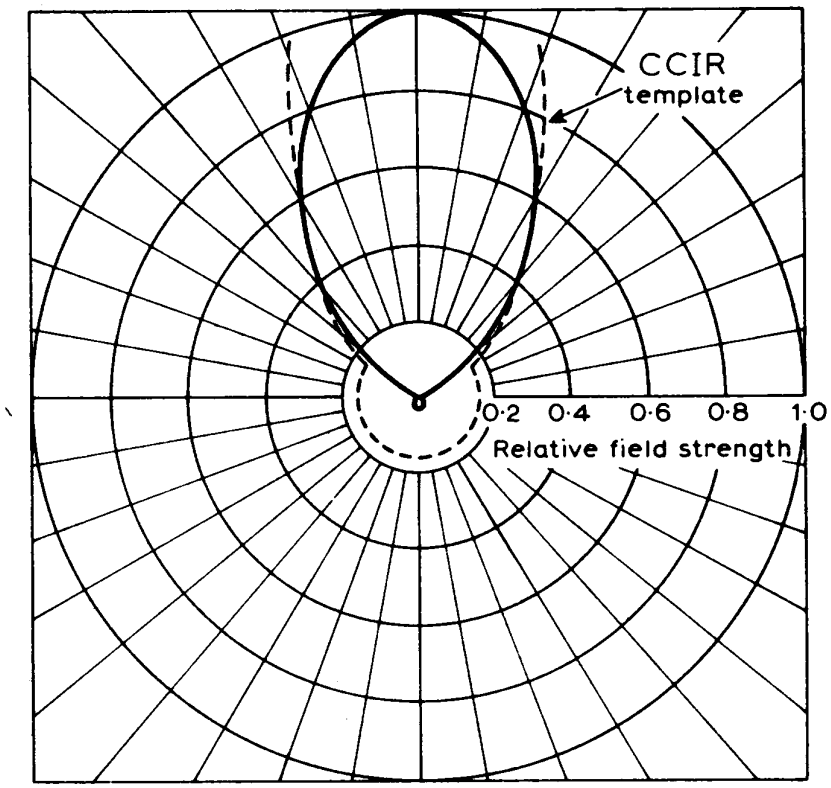

Fig. 4. Radiation pattern at 650MHz for horizontal polarization

We think there is a good case for introducing an aerial of this type to the public.

REFERENCES 1. Du Hamel, R. H. & Isbell, D. E.Troadband logarithmically periodic antenna structures. *LR.E. Nat. Conv. Rec.* March 1957, Part 1, P. 119.

2.' Carrel, R. 'The design of log-periodic dipole antenoas'. *LR.E. Int. Conv. Rec.* Vol. 9,1961.

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Editor's Comments

(Continued from page 1)
numbering of the Anode last month. It should have been Volume 4 Issue 3. This one is Issue 4.

Mind you a close second place must go to Leanne Manas on SABC3's Business Report this week. Apparently the Taiwanese want their 'kick-back' money back. Its around 500 Million dollars for the "FRYGATES" that they bought from the French company Thomson CSF. After saying "FRYGATE" about five times, I realised she meant "Frigate". WHOOPSIE!

[Whilst on the subject; more spelling mistakes from the Amateur Radio Newsline]

RADIO LAW: EMDERGENCY OFFICIALS CONCERNED ABOUT PUBLIC ACCESS TO "MIRT"

Emergency responders are concerned that MIRT, or mobile infra red transmitters are falling into the wrong hands. Mainly, into the hands of people not willing to obey traffic laws.

A mobile infra red transmitter allows personnel aboard emergency vehicles responding to emergency calls to quickly change specially-equipped traffic signals in their favour. That was fine until Internet websites began offering the same devices for use by the public for around $300 a pop.

Unlike radar jammers and certain laser detectors that emit radio signals, the mobile infra red transmitter and other signal changers send out a beam of invisible light. Since light is not controlled by the FCC the devices do not run afoul of the agency's rules.

Needless to say that this is causing concern for those who rely on the technology for legitimate needs. Don't be to surprised if states begin enacting their own laws to control the sale and purchase of the units.

More on the situation and the device is in cyberspace at www.detnews.com/2003/commuting/0310/26/a01-307303.htm and http://www.themirt.com (CGC, others)

[They wouldn't work here of course.]

JB

U.H.F. log-periodic Aerial

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3. C.C.I.R. Recommendation 419, Documents of the X1th Plenary Assembly, Oslo 1966, Vol. 5, p. 62.

Wireless World, January 1971

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Bulletins (Sundays at ...)
11h15 Start call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
(West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

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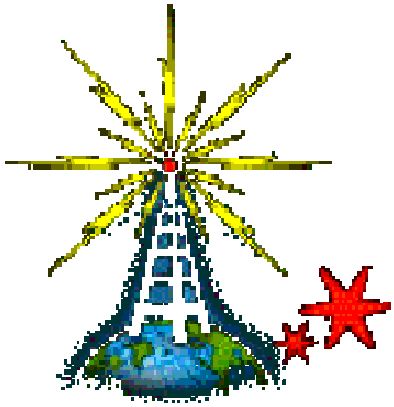
West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June this year. This included the new Adobe reader. It has been updated, check with the chairman for details.



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