

# Carfax to go on trial

Carfax, the BBC's traffic information system, is to go on trial in London later this year. Five transmitters will transmit experimental broadcasts over a 40-mile radius, and the whole thing will be financed by the Department of Transport, according to an announcement by Secretary of State, William Rodgers. It is estimated that the trial will cost £285,000.

Until now, according to a BBC spokesman, the research work on Carfax has been done "on a shoestring". The transmitters used in the trials so far have been 1930s equipment (salvaged from a BBC storeroom) with a few add-on units. The aerial systems have been built from towers or existing antenna systems already possessed by the BBC.

Three of the transmitting stations at Brookmans Park, Lots Road, Chelsea, and Kingswood Warren, are already operational. The other two transmitters, one at Hoó, near Rochester, Kent, and one at the headquarters of the Transport Road Research Laboratory (TRRL) at Crowthorne, Berkshire, will be new and may well be operational by the time this issue is published.

The trial is expected to last about two years and at the end of this a decision will be made about the value of Carfax. To set the system up nationwide the BBC would need between 50 and 80 transmitters and it would cost about £4 million. The major part of the work involves an examination of the technical and broadcasting aspects of the Carfax scheme. The Corporation expects to receive about £200,000 for this. Although these sums may seem high, it has been suggested by a BBC spokesman that one should compare them with the cost of a single roundabout and look at the benefits to be had from the two cases. A TRRL working party has estimated that the Carfax scheme could save Britain between £5 million and £10 million a year. These savings are difficult to prove, but they are based on tangible and intangible benefits which apparently the TRRL are experts on. Tangible benefits come from reducing the number of cars in jams, petrol used, road accident and hospitalization



resulting from accidents. An example of an intangible benefit is the peace of mind which a driver has when he knows that he can obtain the required information for his journey.

Between 100 and 500 test receivers will be used during the trial, but these will not be available to the general public; their allocation will be decided by the Department of Transport and the BBC. If the engineering trial proves successful traffic information will be supplied by police forces in the Home Counties, probably with the help of the AA and RAC, and this could be collated by the BBC Motoring Unit. An initial £85,000 will be spent on investigating ways of improving the method of information collection.

*A top-loaded, base-fed mast radiator some 45m high used in a typical Carfax antenna system. The transmitter is adjusted to give an 'effective monopole radiated power' not exceeding 50W. This particular antenna system is a temporary installation at Kingswood Warren near Reigate. The dish antenna in the foreground is not part of the Carfax system.*



## We aff vays

In Europe motorists using the German traffic-information system, ARI, have to watch the road signs to find the receiver channel for the area they are travelling through. One wonders if this sign, seen near Oxford, is a preview of what motorists will see if Carfax is adopted. If the BBC's idea of shaping the coverage area of each transmitter to suit a geographical area (see p28, Jan. 1978 issue) works in practice, and no overlap is allowed, a motorist in area A who is about to move into area B could well miss B transmitter's vital announcement just before entering the B zone. For the system to work correctly in this case it may be necessary for drivers to take a route decided by Carfax, not themselves — hence the sign. The driver could, of course, take the "other route", and use ARI.

fact reference this paper at the end of the December 1978 article. In this latter article we do not claim to be treating the case of a circular capacitor in the mathematical appendix. We in fact refer to Fig. 2 which represents a uniform end-fed transmission line. This case is treated since it demonstrates the key features without requiring unnecessarily complex mathematics.

Incidentally, Dr Lago says that a zero risetime step is a "physical impossibility". This interesting statement merits further analysis. One would like to know whether he is attacking the concept or its practical realisation, i.e. is he against the Platonic ideal of a step or is he saying, as might Aristotle, that such a concept is not useful because it is not practically realisable? If the former then we assume he is also opposed to the sine wave concept since infinite time is required for its perfect realisation; if the latter then what physical principle determines the shortest risetime obtainable in practice? In the latter case the principle must precede the concept, i.e. there must be no circularity.

Finally, Dr Lago agrees with us (and Heaviside) when he states that "one should regard currents and charge distributions as the consequences of electromagnetic waves rather than as the sources of these waves." In that case is  $\epsilon(\partial E/\partial t)$  a current and therefore an effect or a field and therefore a cause, or is it both!

I. Catt, M. F. Davidson, D. S. Walton

#### Reference

1. "Crosstalk (noise) in digital computers", I. Catt, *IEEE Trans. EC-16*, Dec. 1967, pp. 743-763.

## CITIZENS' BAND IN THE USA

Recently, while returning from London, I picked up a copy of your magazine at the Heathrow Airport news stand. It appears from the issue I have that certain people in Great Britain are contemplating something akin to the citizens' band, which here in the States is presently the Federal Communications Commission's principal headache. Although, as a licensed amateur, I disliked losing the eleven metre band, which was one of my favourites, I originally thought the idea of a citizens' service wasn't all that bad. Now, in retrospect, permit me a few comments and observations.

1. Enforcement of existing regulations is an impossibility. The FCC could double its existing field staff and still be unable to police the eleven metre band.

2. In a total of six hours of monitoring the c.b. channels here in Grand Rapids, fewer than 10% of the contacts monitored were legal by existing rules.

3. Out-of-band operation is commonplace, with stations heard throughout the spectrum from 26.6 MHz to 27.998 MHz.

4. Although the FCC has banned commercial production of amplifiers capable of operating in the 27-29 MHz portion of the spectrum, linear amplifiers for 27 MHz are readily available and widely used in c.b. circles.

5. Amateur transceivers are converted to c.b. use, giving v.f.o. control and power levels greatly in excess of the legal maximum.

6. Illegal linear amplifiers are often adjusted improperly, resulting in interference with other services.

7. Profanity, vulgarity, and deliberate interference with other stations is common.

The above is only a partial listing of the contents of the Pandora's Box that is c.b. radio. There are, of course, many operators that do their best to operate legally, but they have little chance when competing with the impossibly large number of "dip-sticks" that inhabit the 27 MHz jungle.

The solution . . . ? If Great Britain cannot possibly survive without a citizens' service, put the miserable thing up high enough in frequency that the technology is beyond the ken of the week-end experimenter and charge a good stiff licensing fee. About fifty pounds per year sounds about right to me!

(Name and address supplied)

Michigan

USA.

## INTERFERENCE FROM 555 TIMERS

The 555 and 556 timer integrated circuits are very popular and useful devices. But they are notorious for their tendency to interfere with neighbouring circuits. Interference is through transients on the power supply line. These transients are longer and heavier than those caused by t.t.l., because the 555 has a high-current totem pole output, which is switched comparatively slowly by the timing circuit.

In designing our CCTV Target Locators we found that interference from 555s was not effectively suppressed by decoupling capacitors fitted near the 555s. But we obtained a cheap, effective solution, by fitting two ferrite suppressor beads onto the +5V supply at each 555. Suitable beads are RS Components Type 238-283.

Richard Baker

Hampton Video Systems Ltd

Wickham

Middx

## MICROPROCESSORS FOR CALCULATION

I am delighted to see your series of articles on "A scientific computer", using a microprocessor in conjunction with a 'number-cruncher'.

Having recently started working with microprocessors, I do not think the common items available are at all suited to calculations of any magnitude or complexity and consequently they may well be of far less value than the pundits would like us to think. I still feel that there is far too much rather desperate selling of what is available rather than a real attempt to find out what the market wants.

(Name and address supplied)

Procurement Executive,

Ministry of Defence

## WIDEBAND NOISE REDUCER

I should like to compliment D. L. Harrison on his compander design described in your November 1978 issue. Used in conjunction with a Revox A77, it enables me to enjoy

recordings made at 3½ in/s as much as if not more than those made previously at 7½ in/s. The virtual elimination of tape noise is by no means the only improvement. Contributing equally to the comfort of listening is the fact that I no longer need to record at a high level in order to ensure an acceptable ratio of signal to noise, and peaks in the programme can remain undistorted.

Constructors of the compander, like myself, without access to distortion-measuring equipment should nevertheless include the optional trimming components shown dotted in the circuit diagram. A setting can be made by ear which is audibly better than leaving pins 8 and 9 of the compander i.c. disconnected. The adjustment is made easier if a reasonably pure tone from an oscillator can be played through the compander when it is switched to the expand mode.

F. W. Baldock

Salisbury

Zimbabwe-Rhodesia

## CARFAX CONFUSION

Horsham is a quiet Sussex country town, normally at peace with the world. Although not well bestowed with dreamy spires it has, as your picture shows (see p.53, May 1979) a Carfax.

It would be interesting to know the name of the spy who provided you with that photograph and what was said in the accompanying message. I also wonder who at *Wireless World* has assumed that the home of lost causes had suddenly become up to date. Ve aff vays of bending beams but if Oxford is to be the real target I hope that Horsham is not the actual victim.

M. J. L. Fadil, G4CC/G4CGY

London N6.

Full marks to sharp-eyed reader Fadil! Ve aff vays of confusing the reader, for which we apologize. However, just to keep the record straight, Oxford does have a Carfax, a cross-roads in the middle of the town. And the origin of this old name, thought to be the Latin *quadrifurcus* or the French *quatre voies*, seems quite appropriate to a traffic information system by indicating the basic four directions in which a vehicle may travel. - Ed.

## "SPURIAE" (April letters)

I wonder why  
We specify  
Spurious  
As spuriae?  
For instance:  
It's curious  
(Or curiae?),  
That furious  
Aint furiae,  
Luxurious  
Luxuriae.  
And so on.  
This verse  
Has no moralae,  
I only ask that  
We all try  
Hard in future  
Not to use  
Spurious words  
Like spuriae.

J. E. Diggins  
South Ascot  
Berks

of leisure (not mentioned by CPRS). Second, there will be a continuing move in the direction of shortage of labour with special skills and lack of employment for the unskilled (this is mentioned in one paragraph of the CPRS report). The danger is that qualified engineers and managers may be working 60 hours per week while unqualified school leavers stay permanently unemployed. On the one hand education must try to make people capable of acquiring appropriate skills. On the other hand we may have to provide for those who cannot acquire the skills required in automated industry: in 1956 I suggested that a suitable organisation to employ these people might be called "Omnemployment," by analogy with Remploy. These are the real problems which are being largely ignored, drowned in the flood of "micro mania."

D. A. Bell (Professor)  
Walkington  
Beverley  
Yorks

## DISPLACEMENT CURRENT

Your contributors (I. Catt *et al.*, December and March issues) are not alone in their dissatisfaction with the usual textbook assertions about the magnetic fields "caused" by "displacement currents". A more satisfying viewpoint supporting theirs is presented in the book "Classical Electromagnetism via Relativity" by W. G. V. Rosser, Butterworths (1968), (see particularly Chapter 4, Appendix 2 (p.243) and Appendix 6). However, Maxwell's equations themselves remain unchallenged, only our interpretation of certain terms is in question. Both electric and magnetic fields are associated with the moving charges set in motion when a capacitor is discharged and the changing electric field in the airgap does not "cause" a contribution to the magnetic field by the Biot-Savart relation. There is then no paradox to be explained when a finite-sized capacitor is regarded as a short transmission line.

Incidentally the controversy about relativity and time signals (L. Essen, October and April issues) is touched upon by Professor Cullwick in another philosophical book on electromagnetism ("Electromagnetism & Relativity", E. G. Cullwick, Longmans (1959), see Chapter 5, p.72).

R. W. Watford  
St Albans  
Herts

### The authors reply:

With the best will in the world, R. W. Watford's letter is based on the premise that, in the main, the body of knowledge in e-m theory and relativity is sound and coherent. He feels that all that is needed is to brew up the right mix of existing knowledge and all will be well. His contribution is to bring relativity to the rescue; a nice touch in the centenary year.

Previously, with less good will, P. I. Day brought  $\omega$  to the rescue. We would prefer to leave both out. After all,  $\omega$  is incompatible with relativity. (A sine wave exists at more than one point in space, which makes it unacceptable as a primitive in a relativistic universe which excludes instantaneous action at a distance.) These men have brought

up two incompatible fire engines to put out the fire.

It is of the utmost practical importance that digital designers have a theoretical framework which makes them able to design and build working, reliable systems.  $\omega$  has nothing to do with their problems, theoretical and practical. Also, computers do not rush past other computers at the speed of light. We must not continue to abandon high speed digital systems very late in the development cycle, as we have continually done in the past. (cf. *Computing*, 16 March 1978, page 2 and 30 March, letter.)

Maxwell's theory is pre-relativity. If someone has cobbled up a viable post-relativity Maxwell, please tell us where the *ex cathedra* statement of this theory is. Einstein did not do this, because he was not expert in electromagnetic theory. (*Physics Bulletin*, July 1978, page 297.) Einstein never read Heaviside, and did not have a grasp of Heaviside's concept of a transverse electromagnetic wave which travelled forward unchanged at the speed of light. Also, he never mentioned the impedance of space - a major oversight of e-m is being considered. Einstein did not know Heaviside's concept of energy current. Neither do contemporary relativity theorists, including Cullwick. Cullwick does not know about Heaviside's contribution to electromagnetic theory. Einstein's famous gedanken experiment, performed when he was aged sixteen and restated by him fifty years later (see "Albert Einstein: Philosopher-Scientist," ed. P. Schilpp, 1949) as the cornerstone of relativity, is incompatible with the energy current concept.

We must not let the ignorance and oversights of the last half century prevent us from building a sound electromagnetic theory from the ground up, and building thereon a viable digital electronics industry.

I. Catt, M. F. Davidson, D. S. Walton

## HIJACKING CARFAX?

I remember reading an account in *The Daily Telegraph* a few years ago describing the hijacking of a BBC radio programme and the statement that all transmitters had been changed to prevent a repeat of this. Now your report in your June issue (p. 56) the subsequent hijacking of various broadcasting services and comment that transmitters have been modified to make another such attempt impossible! The very way your article is written seems designed to provoke this kind of joke, since those working in electronics know that there is a way round any problem, provided one has imagination and is prepared to take enough time and trouble.

The forthcoming Carfax traffic information system is surely an even more vulnerable service as someone could presumably imitate the signalling tones and make whatever announcements he wanted to a captive audience. One can imagine people with transmitters fitted in their cars using them to clear vehicles from the road ahead by announcing bogus details of accidents or whatever, and it would be naive to assume that pirates could be easily tracked and prosecuted. Just look at the level of unlicensed citizens' band activity one hears of in London and other big cities which remains largely unchecked by Post Office action. Are the designers of Carfax considering the problem now, while the system is still in the trial stage?

Another area of concern must be satellites, not only for direct broadcasting, but also their use for live international programme link-ups. One recalls the 'black propaganda' operations during the last war, Project Aspidistra and the like, and wonders whether we should ever allow ourselves to become dependent on satellites for domestic broadcasting, whatever the attractions, as a malevolent foreign power would presumably have the resources to hijack such services.

Unless these possibilities are taken more seriously than in the past could we see the Carfax opening ceremony reported by newspaper headlines "Minister Opens Hoax?"

Peter Manson  
Leeds  
West Yorkshire

## S.S.B. FOR MOBILE RADIO

Regular readers of the electronics press will by now be aware of the recent publicity given to a new v.h.f. s.s.b. mobile radio system (June issue, p.95) Although it would appear at first glance to offer an ideal solution to the rapidly ensuing overcrowding of the v.h.f. private mobile radio bands, a question arises concerning the practicability of such a system. Receiver a.g.c. and demodulation processes rely on a very narrow crystal filter which extracts a pilot carrier from the received signal. From a paper and various articles on the system it seems that this filter operates with a bandwidth of 300Hz on a signal at an i.f. in the region of 10.7MHz.

Most crystal manufacturers will agree that the production of a conventional crystal filter with a bandwidth of 300Hz at a centre frequency of 10.7MHz is a daunting proposition. Obviously such a device has been manufactured, but it is most unlikely that a crystal filter of this specification could be produced in volume at a price that would be acceptable to the cost conscious mobile radio market.

This system represents an undeniable step forward in the field of mobile communications, but its viability for use in the near future should not be overestimated.

S. Walding  
Chelmsford  
Essex

## MILITARY ELECTRONICS

Having resisted the urge to reply to your January editorial I feel that the continuation of this dangerous line of reasoning by the publication of Mr Laycock's letter (May) demands that the other side of the argument be presented.

If you have read *Jane's Weapon Systems* thoroughly you must have noticed that much of the equipment described therein has been developed, and is deployed, by nations which at best can be considered unfriendly to Britain and her allies. Admittedly two wrongs will never make a right but one wrong plus the ostrich posture which you are trying to encourage will lead us to a world where, for most of us, freedom will mean the freedom to do as we are told.

I must also agree with Mr Laycock that there is excitement in the work and, as in any other industry, the prospect of personal

displacement? Moreover, on this assumption, would it not be possible to devise a simple theory to derive an expression for the impedance of free-space, or vacuo, normally obtained in textbooks (e.g. Telecommunications, by A. T. Starr) via Ampere's Law, as 377 ohms, or  $120 \pi$  ohms? I would be very interested in your comments.

Moreover, I still cannot understand how a vacuum can offer an impedance to an electromagnetic wave, unless there is something there to do so! Perhaps someone could explain this to me.

Peter G. M. Dawe  
Botley  
Oxford

#### The author replies:

The question of intrinsic impedance of free space is fairly easily dealt with. The term 'impedance' is here merely a figure of speech, introduced because there is a close analogy with the characteristic impedance of a uniform transmission line. It merely means that in a radiated wave the ratio of electric field-strength to magnetic field-strength has a constant value which is a function only of the medium through which the wave is propagated. If the medium is free space,  $E/H = 377$  and since  $E$  and  $H$  are measured in volts/metre and amps/metre respectively, the ratio has the dimension of ohms.

I am afraid "a sea of virtual electron-positron pairs" does not seem to me any more tangible than 'free space', especially as the word *virtual* is included. There are other aspects of physics which to me seem equally 'unreal': from Newton to Einstein it was accepted that gravitation was action-at-a-distance, and although 'curved space' can be described by good mathematics, I cannot see that it fits with any everyday experience. One can only say that much of our knowledge of the universe today can be expressed coherently in a mathematical formalism which does not correspond with everyday experience of the approximate behaviour of sizeable objects, i.e. with mechanical models.  
D. A. Bell

## VHF RADIO AND THE OPEN UNIVERSITY

As with the BBC's fulsome, irrelevant, contradictory and evasive reply given to me when I made the same complaints as your correspondents Dr Crook and Mr Blanchard (July letters), their reply is just not good enough.

Long before there was any talk of Open University broadcasts the Corporation repeatedly told us that within a few years all their broadcasting would be on v.h.f. only and advised us to equip ourselves accordingly. And, indeed, all their music programmes were then available on v.h.f. Personally, with the age of retirement approaching and the possibility that the cost of changing over might then be beyond me, I did as exhorted by them, scrapped as good an a.m. receiver as money could buy or build and invested in v.h.f.

As one of your correspondents says, many of their best music programmes are now on a.m. only, and for what reason the Open University requires v.h.f. and stereo goodness only knows. Very, very few of these broadcasts require more than a low cost a.m. transistor set and, with most students

already having them, they would well attract more listeners.

As one of your correspondents suggests, one has to reach the conclusion that it is all a matter of empire building, that the BBC has too many whiz-kids being clever without knowing what they are doing and too arrogant, despite their smooth talk, to have regard to their previous commitments to listeners and makers.

T. F. Mackay  
Broadway  
Worce

In his reply to Dr Crook and Mr Blanchard (July letters) Mr Sturge of the BBC Engineering Information Department says "unfortunately the v.h.f. channel has to be used for educational programmes . . ."

It does not **have** to be used for anything of the kind. That the BBC has agreed, possibly under pressure, to this abuse does not alter the fact that it is a continuing betrayal of those who took the BBC's advice and changed to v.h.f.

D. J. Watson  
Hayfield  
Derbyshire

## 3D TELEVISION

I have felt for some time that it is impossible to provide stereoscopic viewing of a moving image on a flat screen which can be viewed for more than a short period without eye discomfort, for reasons connected with the mechanism which the brain uses to perceive distance.

The brain uses two systems to estimate the distance of a viewed object, the first and probably the most important being the stereoscopic separation simulated by the various systems in use some years ago in the cinema. However, it is also necessary for the eye to focus to the correct distance to render a sharp image of the viewed object, and this focusing mechanism must be controlled by the brain.

When attempting to view an artificial stereoscopic image there must be conflict between the two systems, since stereoscopy is telling the brain that the moving object is, say, coming towards one, whilst feedback from the focusing mechanism insists that the object is moving only at a fixed distance on a flat screen.

The result of this conflict must be discomfort, eyestrain and headaches, and this seems to be an insuperable barrier to 3D viewing until it is possible to construct a genuine three-dimensional scene in the middle of the living room.

K. P. Wood  
Wakefield  
West Yorkshire

## HIJACKING CARFAX?

Peter Manson (August letters) raised the question of possible 'hijacking' of a Carfax service, and asks whether the designers of Carfax are considering this problem. The answer is that they certainly are, although you would not expect us to say anything about the methods which could be used to prevent such intrusions.

D. P. Leggatt,  
Head of Engineering Information Dept  
BBC  
London W1

## WHAT'S WRONG WITH TELETEX?

I was interested to see the editorial in the August issue bemoaning the non-popularity of teletext; especially as I have just about finished the construction of a stand-alone teletext receiver, but have somewhat 'gone off' what it receives.

The writer suggests "A hundred or so letters-to-the-editor broadcast every day. The trouble is your have to wait up to 30 seconds for the 'next time round' for a particular page to be transmitted (on ITV the cycle time is over a minute) and, with only four lines of text transmitted per television frame, there is no room for much expansion unless a whole tv channel is devoted to teletext alone. Even if more lines could be transmitted, it takes about half a minute to read a page, so that to read these suggested hundreds of pages would take all night!

I agree that the content could be improved, but there does not seem to be any room for more pages.

I read that the set making industry would like to get the price of the teletext facility down to about £65. I heartily agree with this figure - the present service is certainly worth no more. Small criticisms I have at the moment include:

1. Frequent spelling and punctuation errors (no, *not* decoder faults!)
2. Pages mentioned in indexes, but not actually transmitted.
3. Pages that are transmitted but not indexed. (I only recently discovered the existence of several Oracle news pages that are not summarised anywhere - you have to sample a range of numbers to find what's there, and if a page is not being transmitted the only way you *know* it's not being transmitted is by waiting for more than a minute for its non-appearance!)
4. Stocks and shares. These are of no use to the ordinary viewer, and are too generalised to be of use to the stockbroker, who has much better sources of information already.
5. The information should be more localised. On Oracle especially, one has to wait for all the regional pages to be transmitted before getting to one's own.

Finally, a word of thanks to *WirelessWorld* for publishing constructional details of the tv tuner, teletext decoder, and digital PAL encoder; and to advertisers who sell 200 "untested" i.cs for £1, enabling me to construct my teletext unit with under £40-worth of materials.

David Williams  
London SE12

Why is it that British electronics invariably gets it wrong! If BREMA had asked the man in the street how he saw teletext he would have replied "a black box with coax input/output sockets at around £30-40".

O.K. it's not an ideal solution and is technically far more complicated than is really necessary, but at least it would retain the framework of teletext and prevent it from becoming extinct.

The only glimmer of hope is that our Asian brothers will produce a 'pluggable module' in time to save its "swan-song".

David Jack  
Over Hulton  
Bolton

Letters continued  
on page 76

requires some skill in analysing harmonies to derive the data, and more than a few extra keys to enter it into the instrument. I do not believe that performers would welcome additional manual input to the instrument of this complexity.

My research concerned a computer model of an instrument which would analyse the music in real time and tune from the knowledge gained. Actually, it is theoretically impossible to make a perfect job of this in real time, as M. Robins probably knows, because the context of the harmony must be known, including what follows. My work showed that only about half of the job could be done this way, and it would not be cheap, given the amount of computer power it consumes.

Just temperament is interesting, but it is not obvious that it is musically desirable all the time. Unaccompanied singing, such as the close harmony which I have done, tends to go flat, for good reasons related to the tuning changes that occur when modulating in just temperament. This would be unacceptable in an instrument. Further, the sound of chords in just temperament is very smooth and restful, lacking the high frequency beats which are normal in any other temperament. These are important, since they add "life" to the instrument, which would be dull and monotonous without them. The power of indefinite modulation, which arrived with equal temperament, is now such a central feature of music that it cannot be discarded, as would prove necessary with the progressive flattening otherwise encountered in just temperament.

I believe that just temperament is not a marketable feature, since the research and development costs would be considerable, as my work has shown. Nevertheless, it would be nice to see some organ manufacturer offer it as an optional (and no doubt very expensive) feature. Otherwise it should remain what it has been for the last few hundred years — a guide used by musicians, but not blindly followed, in aiming at acceptable compromises in tuning.

Michael C. Bailey  
Winchester  
Hants

## C-D IGNITION PROBLEMS

Recent letters in *Wireless World* on motor cycle c.d. mentioned "false triggering" and "cross talk". My problem does not involve motor cycles but misbehaviour of c.d. ignition in cars of various units built. This shows up as a slight roughness in the engine at about 2000 r.p.m.

My first unit which showed this problem was the Marston, but a cure was effected by changing the triggering circuit to a unijunction circuit. Perfect operation was enjoyed for some months until the h.t. lead worked its way out of the coil, causing the thyristor and the unijunction to expire. Upon fitting new components, the unit once more worked but with this irritating misfire. Many hours of work produced no cure, so the Marston unit was regrettably removed. The distributor was even removed from the car as well as the coil and driven by a lathe while monitoring the h.t. voltage with a good oscilloscope, but this showed only a perfect train of sparks.

Then I came across an article in *Electronic Engineering* of December 1974 written by Jorgen Hoyer of Motorola, who advanced a most interesting theory as to the cause of this erratic misfire — to quote: "Very often the

petrol/air mixture is far from being ideal. It may be too rich or too weak and usually is very unevenly mixed, in fact, an ignitable mixture may not have even reached the spark gap at the time the first arc occurs. Under these conditions an arc must be maintained for the lucky event where inflammable gas happens to move into the spark gap." Mr Hoyer goes on to describe a simple method of increasing the period. This he accomplished by connecting a suitable diode across the ignition coil primary.

However, this made no difference at all when tried on my car. Also a unit which would not function correctly on my car would perform well on a different make of car.

Another peculiar point is that tests were done on three identical units built on p.c.bs with machine wound inverter transformers. Two gave the same erratic miss but the third worked perfectly. No discernible differences could be found in the units, which were all factory built.

If any of your readers have had similar problems, I would like to hear from them as this is a problem I would dearly like to solve.

D. J. Bruyns  
Witbank  
Republic of South Africa

## INTERFERENCE WITH MSF RECEPTION

A popular student project is the reception of the Rugby transmitter (MSF) which puts out time and frequency standards and can be used to drive a self-setting clock.

The service area is large; it is claimed<sup>1</sup> to include most of Europe but in some areas interfering signals may cause trouble. There is a powerful transmitter 1800 hertz away from MSF and in the Manchester area it is 10dB larger than MSF. In Preston it is 20dB larger. A relatively wide band receiver is needed to make use of the coded time signals and this project has defeated several of our students.

May we suggest that anyone considering the problem should do a few measurements in his area before building the complete clock? It would be interesting to know if your readers have ever had trouble with commercial equipment in this area.

Another source of interference is the fourth harmonic of the tv line timebase but this can be solved by moving the receiver.

T. G. Izatt  
Preston Polytechnic  
M. D. Samain  
University of Salford

### Reference

1. *Mullard Technical Communications*, Volume 14, Number 40, October 1978.

We understand that the interfering transmitter (on 61.8kHz) is in fact H.M.S. Inskip, between Preston and Blackpool. — Ed.

## MAGAZINE PROJECTS AND KITS

It occurs to me that many of your readers may be puzzled as to why different companies quote such widely differing prices for kits of parts for projects in the magazines, and possibly a few words explaining this might be of interest.

The fact is that when engineers design/build projects, they use any materials which happen to be at hand, and then when the project is finalised, a list of parts is sent out by the magazine to the leading companies for pricing.

If completely standard parts, normally carried in stock by the firms concerned, are specified, then there is no problem, and all companies should be able to offer competitive prices. Unfortunately, this is seldom the situation, and very often special non-stock items have to be obtained. Even this in itself would be unimportant if one knew how many kits were going to sell, but it is usually pure crystal-ball gazing, and because of this the special parts have to be costed on a one-off basis.

Another problem is that for convenience a designer often uses a purely trade source to obtain his parts. This would not be particularly important if retailers were able to buy competitively from these sources, but one of the best and most reliable trade sources offers no discount for the retailer, and will not sell direct to retail customers, which means the retailer has to add his margin, and the end product becomes very expensive.

This letter is not meant as a criticism of designers or magazines, but might assist designers to provide economical kits. There is no doubt that if there was more liaison at the design stage with the retailers concerned many of these problems could be overcome.

J. N. Shipton  
A. Marshall (London) Ltd  
London NW6

## HIJACKING CARFAX?

D. P. Leggatt of the BBC (October letters) in replying to Peter Manson's letter expresses optimism that the designers of the Carfax service have adequate means to control the security and authenticity of the information broadcast. Surely such a system is fundamentally vulnerable to hijacking for the following reasons.

Firstly, inexpensive Carfax decoders are going to be manufactured in large quantities; therefore their principles of operation cannot be inordinately complex. Secondly, some 80 genuine transmitters throughout the country will be quite openly broadcasting the "secret" initiation code every few minutes. Thirdly, test generators producing the appropriate signals will, no doubt, be extensively used in service workshops.

But, perhaps, traffic wardens will have their duties extended to ensure that no obscene, humorous or alien messages are being transmitted.

Mandy Peterson  
Swindon  
Wilts

### The BBC replies:

Mandy Peterson will not let me get away with my rather generalised statement on Carfax security, and she makes some very relevant comments.

Certainly "secret" initiating codes would have their limitations, but there are other techniques available including comparisons between the originated and transmitted signals.

As ever, it will be difficult to ensure absolute security and I must confess that our obscenity detector is not yet perfected!

D. P. Leggatt  
Head of Engineering Information Dept  
BBC, London W1

## Letters continued

### CARFAX DELAY

At the recent IERE Land Mobile Radio conference at Lancaster University a BBC spokesman discussed their Carfax cellular mobile information service which is at present undergoing trials. The following points emerged:

1. Suitable receivers for Carfax should cost the public less than £10 each.
2. The cost of the system is under £3 million to install and about £600,000 p.a. to operate.
3. The quantifiable saving to the country (in fuel and man-hours) if Carfax were in use by the majority of motorists is thought to lie between £14 million and £60 million p.a.
4. Even if the trials are successful it will be five years before Carfax is introduced.

Such a delay seems disgraceful. Most developed countries already have dedicated traffic information systems — why should we always be ten years behind?

If the Government really cannot afford to invest £3 million to save the country an annual £14 million-plus perhaps the manufacturers of Carfax receivers could fund the system's installation. Five years' delay is intolerable.

*James Bryant*

*President, Citizens Band Association  
Cheltenham, Glos.*

### BROOKMANS PARK TRANSMITTERS

It was with some surprise that I recently heard of the dismantling of the Brookmans Park radio transmitters. It would seem that the BBC has no thought of the historic importance of this equipment, built in 1929 for the dual programme networks.

These transmitters formed the link between our statesmen and the populace during the last war and indeed for many crises before and since then. Who has not, at some time over the years, tuned into one or other of the BBC radio transmissions and given some passing thought to the miracle of wireless? Quite possibly they were listening to the output of one of these transmitters now quietly dismantled after fifty years of service.

A great shame, then, that the BBC should destroy its own heritage and, indeed, that of the nation. With such a history conscious country as ours, surely it is not beyond the wit of the BBC to see that a further source of income has been thrown away. With the vast range of abilities within the BBC, surely even an apparently dull engineering museum could have been made attractive at very little cost.

The BBC seems to have missed the boat, unless some of the other transmitters built for the scheme still survive elsewhere, unheralded, and await the scrap man's hammer? If they do then surely this early technology should be saved rather than be lost for ever.

*G. H. L. Childs  
Felixstowe  
Suffolk*

*The BBC replies:*

We are also sorry to see the passing of such reliable and well-known machines. A difficult decision has to be faced when the time comes for the replacement of old equipment, parti-

cularly that having significant historical associations. There are many of us who would like to see such things preserved for posterity but not many who are able to provide the required space and cost of upkeep. Much of the equipment used in high power broadcast transmissions is both large and heavy, and it has to be accepted that interest in them is limited to a comparatively small number of specialists. However, the situation is not quite so bleak as Mr Childs thinks.

Part of one transmitter (incorporating the low-power drive and modulator stages) has been presented to the manufacturers (Marconi) who, we understand, will preserve it, and other valves and components have been passed to the British Vintage Wireless Society. Furthermore, there are two similar transmitters, manufactured slightly later, at Moorside Edge and Washford which for the present continue to serve as standbys.

*Geoffrey Sturge*

*Engineering Information Department  
BBC, London W1*

### FAILURE OF DISTRESS SIGNALS AT SEA

I agree totally with Mr Wiseman's remarks in June letters about salt spray on aerial insulators at sea. There have been times in rough weather when I have been unable to operate properly on 500kHz due to salt on the aerial insulators — a nominally 1.8kW output transmitter only putting out a few watts and having difficulty in contacting a coast station only a hundred or so miles away.

This effect has been aggravated by the tendency of modern ship owners to fit high power transmitters but shorter and less efficient aeriels. A few years ago a ship would be fitted with a good T or inverted-L aerial, often extending the entire length of the ship and as high as the masts would allow. Nowadays we are lucky to have 80 feet of wire around the funnel. This is not very efficient on h.f., let alone on 500kHz. The larger aeriels did not suffer so much from insulator problems due to their higher radiation resistance and capacity. Cleaning insulators is only a temporary solution as an hour or so later in heavy weather the problem reappears. Even with new, clean insulators the effects are similar, if not quite so bad.

It is certainly high time someone had a close look into merchant marine aeriels and insulators and a means found whereby shipowners could be pressed to fit better aerial systems. As Mr Wiseman has stated, it is not normally possible to go outside in a force 9 or 10 gale and wash down the insulators with fresh water before a distress message can be sent!

*R. Philpot  
Offenburg  
West Germany*

### CAPACITANCE METER

With regard to the capacitance meter I described in the October issue, the error in the indicated value of the capacitance, due to measurement non-linearity, is basically not usually more than about 3%. However, on the 1000pF range, 20% errors have occurred with some HEF4049 i.c. samples, together with higher than normal sensitivity on this and

the 100pF range. This is caused by ringing after the square wave edges on the wires to the measuring terminals. The ringing is excited by the fast edges of the square wave produced by the i.c. and if the output impedance of the i.c. is low enough, the measured capacitor can charge and discharge during the ring, as indicated in the second paragraph on page 62 of the article. Since the ring is capacitor size dependent, this gives rise to the non-linearity. In practice, the effect is only significant on the 100pF and 1000pF ranges.

This error/excessive reading can be corrected fairly simply by increasing the output resistance of the offending i.c. with a resistor of about 100 ohms, fitted at the common i.c. pins 2, 4 and 10 to which the lead to S<sub>1</sub> connects.

A second effect has occurred in circuits with rather long wiring which can be noticed by the CAL control not always working smoothly such as perhaps only on the 10,000pF range. This was traced to parasitic oscillation which caused the square waves to be produced in bursts and to be CAL setting dependent. It ceases if a 1k resistor is fitted by the i.c. at pins 11 and 15 to which the lead which goes to S<sub>2</sub> connects.

The resistors have little effect upon calibration accuracy, once the present calibration resistors have been readjusted and so are worth fitting as standard practice.

*K. Holford  
Crawley  
Sussex*

### PROGRAMMABLE NOTES FOR MUSICAL INSTRUMENTS

Keyboard instruments have hitherto been generally confined to the equal tempered scale. This scale is an approximation to the 'true' or 'natural' scale in which each note bears a simple mathematical relationship to either the keynote (or tonic) or to the fifth note (or dominant). Music played using an instrument tuned to the true scale is more harmonious than when played on an instrument tuned to equal temperament. Unfortunately, the true scale produces problems when modulation is attempted, requiring several different pitches for the same note depending on the key in question. This produces problems in instrument design and playing problems due to the bewildering array of keys present.

An alternative electronic solution must now be possible by using programmable tone generators and recalculating the frequencies required for modulation into the new key, thus allowing a standard keyboard layout to be used. The major problem with this approach comes from the need to inform the machine of the required key as the piece of music is being played. This could possibly be solved by pre-programming the key sequence of the piece of music and using a pedal to initiate the key change.

I am sure there are many other problems that will require attention, but the end result when all are solved would be a keyboard instrument sounding smoother and more harmonious than anything we have at present.

*M. Robins  
Bilton  
Rugby*