I still think that the Pappas/Obolensky thing is all a leg-pull. How else can we explain an arithmetic where the closer together two signals arrive, the greater the difference in their speeds (*vide* the three 39ft figures in Table 1); ditto where 620,000 km/s is only twice 200,110 km/s; signals which are "proved" not spurious because they conform with the theory that has been constructed to account for them; plates which are added to "enhance the signals" (not to mention the blast of radiation) but then nothing is done to show that it still works with that bit shut up in a good, sound Faraday cage; and information which might have given some of the game away, on the last two photos, conveniently falling off the bottom of the page? Perhaps by being so thoroughly impolite as to suggest that it is no more than extremely poor science?

However, some people seem happy to take it seriously. I think that Messrs Winterflood and Bierman have both overlooked what little evidence we can get out of those last two photos. In the latter's case, however, the results of this need not be quite so fatal to his proposal. If the extra cable (about 6ft?) was inserted right up against the oscilloscope and perhaps coiled up neatly out of the way, he is probably still on the right track. More information is needed.

Nonetheless, until someone with a bit of time (and access to some suitably exotic 'scopery) repeats some of the results, and then shows that they repeat yet again with the "hot" end screened off, I don't think we should bother any more about it.

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Crossed-field antenna

I read the article on the crossed-field antenna with a great deal of interest (*EWW*, March, 1989, p.216). However, the field diagram in Fig. 6 troubled me deeply. Joules Watt (*EWW*, July, 1987, p.698) has caused me similar concern. French and Tessman wrote an excellent paper (*Am. J. Phys.* [1963]: 31, 201) in which they calculated the magnetic field at the edge of a capacitor that was being slowly discharged. For the convenience of *EWW* readers, I have repeated this calculation below. The radius of the capacitor plates = R and distance of separation = d.

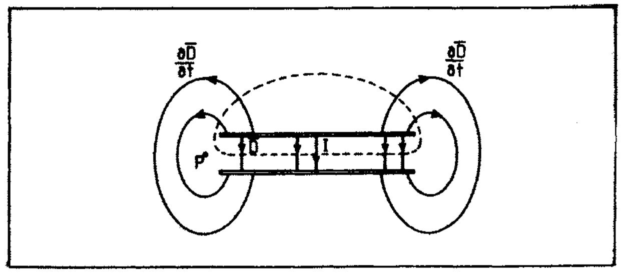
At P
$$2\pi RH=\int\int\bar{J}.d\bar{s}+\int\int\frac{\delta\bar{D}}{\delta t}.d\bar{s}$$

$$2\pi RH=I-I\left\{1-\frac{d}{2R}\right\}$$

$$H=\frac{Id}{4\pi R^2}$$

M.G. Wellard summed up the dilemma with Maxwell's equations (*EWW*, April, 1983, p.45): "The present confusion in e.m. theory lies in our failure to differentiate between electric displacement and displacement current." The above derivation would make one reach the following conclusion. A capacitor 'works' because of the presence of fringing fields, therefore a displacement current is the existence of a non-uniform field and lines of displacement must be uniform: a uniform electric field cannot change with time. The next question that needs asking is: how do you differentiate between space and time? If you asked a very intelligent child (say the young James Clerk Maxwell) what space was, he might come up with the following statement. I must define space so that there is no temporal implication, therefore space is a condition that is, always was and always will be. It is analogous to the existence of lines of $\bar{D}$ in a capacitor. Lines of $\bar{D}$ are by definition uniform. If a field is uniform, then it is physically impossible for it to become non-uniform. Conversely, if a field is non-uniform, it is physically impossible for it to become uniform. A non-uniform field is analogous to the existence of time. Time can never begin or end; it must always exist in closed loops.

A capacitor is supposed to be a condition of perfect space: i.e. it is, always was and always will be. However, when we try to create perfect space and convert $\partial\bar{D}/\partial t$ into $\bar{D}$, we succeed only by shorting out the capacitor plates. In other words, the concept that we call space – emptiness – is really solid and not hollow! Space is, by



definition, instantaneous (since it is solid). The only observation in nature that is valid is the belief that change is important. Everybody forgets that change is always happening. Now once you mistakenly believe that change can begin and end, you start to invent the meaningless concept that we call space. You also invent the meaningless concept of electric charge. $\bar{D}$ and $\partial\bar{D}/\partial t$ are mutually exclusive. A curved line cannot unlock itself and become a straight line. It is physically impossible for space or electric charge to change with time. Beginnings and ends do not exist in nature.

Finally, has anyone ever wondered why we call the circles, that surround a conductor $\bar{B}$ and not $\partial\bar{B}/\partial t$ in view of the definition of $\partial\bar{D}/\partial t$? I presume that the answer is that we assume that a uniform field exists along the axis of the induction coil and can therefore postulate the existence of imaginary magnetic charges at either end of the coil and thus invent a magnetic capacitor. The same argument applies to an inductor. If we wind a conductor in a helix, then the current should be considered $\partial i/\partial t$ at since the current is now rotating. At least Ivor Catt is consistent in that he knows that energy current exists in closed loops in the active state and they must therefore exist in closed loops in the inactive state.

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I read your article on the Crossed-field Antenna (March 1989) with interest, having been introduced to it by Mr Hateley at a conference in 1987. Antenna engineers, of whom I am one, regard this device with considerable scepticism on both theoretical and practical grounds.

The authors' attempts to ascribe causative properties to Maxwell's well-known equations describing electromagnetic phenomena are misleading and erroneous. The presence of a quantity on the left-hand side of an equation is not, as the authors try to assert, sufficient evidence for its physical existence. In fact, in equation (4), one can let the frequency tend towards zero, in which event the conduction current density J becomes equal and opposite to the rate of change of charge density D. Equation (4) then shows that the "resulting" H-field tends to zero.

In the experiment carried out with capacitor plates, can the authors explain why they have ignored any contribution to the observed magnetic field arising from Maxwell's first equation? The E-field between the two plates must be appreciable and if they wish to use Maxwell's equations in a prescriptive rather than a descriptive manner they must apply the principle consistently.

A further theoretical objection to the analysis given is that the conduction currents in the wires feeding the two sets of plates are ignored. A true analysis of the crossed-field antenna would undoubtedly show that any radiated power arises from these currents. No doubt the antenna will radiate some power but as yet there is no evidence that its radiating efficiency is any more than other antennas of a similar size (i.e. 10% or less).

The value or otherwise of the crossed-field antenna could be very quickly established by an experiment conducted by any generally-accepted method. The radiated field produced at some large distance from the antenna should be measured and related to the RF power being input to the antenna terminals. The IEEE Standard Test Procedure for Antennas (IEEE Std. 149-179)