LETTERS

AERIALS AT SEA

It is hard to understand the logic of Mr Benyons' statement (Letters, *WW*, May, 1983) that it is "unfair" to look at Soviet ships' aerials because these ships are "under military control". I would like to point out that:

- By no means *all* Soviet bloc ships have "good" aerials. As General Booth said to the Salvation Army band, "why should the devil have all the best tunes?", *so* why should the "red peril" have all the best aerials?
- The experience of the Falklands war shows that British ships are also under "strict military control". Even Mr Benyon would wish them the best possible radio communications capability.

Could it be that the USSR has better trained engineers than we have, not subject to the dollar veto of penny-pinching shipowners, nor rubber-stamp government supervision?

Mr Benyon correctly perceives that short aerials lack much radiation resistance, but I don't see his 20 foot vaulting pole aerial as being any "great leap forward", for the following reasons.

All existing marine transmitters, at 500 kHz, rely on the aerial to provide the tank circuit capacitance. The helical whip has none.

Only low driving-point impedance will confer any benefit. As well as altering all transmitters, it would be necessary to provide feeders and matching coils, introducing more losses than gains. Marine transmitters, unlike their broadcast counterparts, are free from this extra paraphenalia at present.

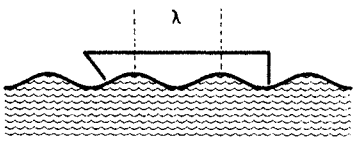
ARRL "antenna book" points out that a vertical helical wound aerial of quarter wave electrical equivalence, should be a minimum of 0.05 wavelength long. At 600 metres, that comes to 30 metres, so nothing is gained in the area of the height problem. The same book also relates that "some helical antennas have acted as Tesla coils with high power transmitters and have actually caught fire at the high impedance end"!

Back to the drawing board, Mr Benyon.

John Wiseman
Hawthorn
Victoria, Australia

ELECTROMAGNETIC DOPPLER

In the answer to Mr D. Hall (June letters) I suggest that he studies the following picture.



It represents a boat on a lake. Waves are being generated and are propagating across the lake at constant velocity. The point of interest is that there is no way of telling whether the boat is stationary or is moving, the reason being that the wavelength is the only observable parameter and that is unaffected by the velocity of the boat.

The frequency is the number of waves passing the boat in unit time. Clearly the faster the boat moves in the same direction as the waves the less waves will overtake it in unit time. If there are two boats travelling across the lake at different velocities they will experience different frequencies and if we call the velocity of propagation C then the formula is:

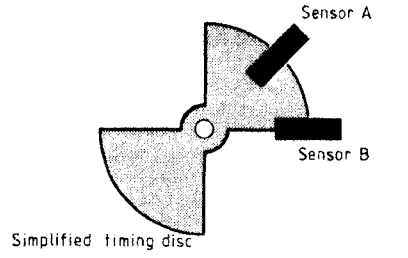
$$\frac{f_1}{f_2} = \frac{c-v_1}{c-v_2} \qquad (1)$$

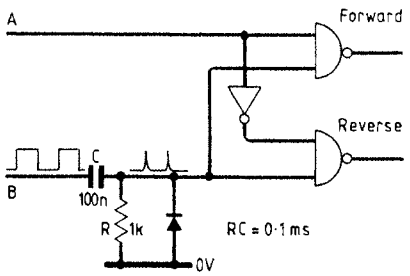
This is a general formula for any two observers, observing the same wave. If one of the observers is also coincident with the source he may be conventionally described as the source. The wavelength which the source would have produced if it had not been moving is a non-existent parameter, because the source is moving and at no time does that wavelength appear even to the observer at the source. Not only is the propagation velocity constant, but so is the wavelength. The difference in frequency is due purely to the fact that the velocities of the two observers relative to the waves are different. I claim that this model for water also holds for sound waves and therefore cannot be the same for e.m. waves without violating the constant-velocity postulate of relativity.

Mr Hall suggests that the e.m. Doppler equation is only an approximation and should more accurately be as equation 1. This cannot be so because the second order terms such as $v_2(v_2-v_1)/c^2$ cannot be expressed purely in terms of the relative velocity (v_2-v_1). If accurate measurement did in fact detect such a term it would also have detected other drift. The relativistic Doppler equation is supposed to be accurate even when v is very close to c and the term it contains is $(c-v)/c$.

Mr Hall's point about photons, waves and interference I accept. I'll go away and think about it.

J. Kennaugh
Callington
Cornwall





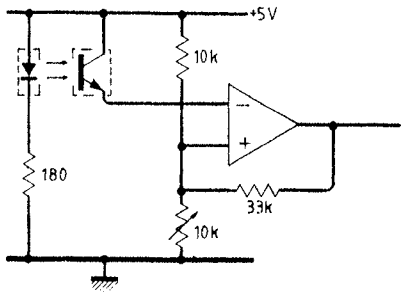
DIGITAL TAPE CLOCK

The following alternative method for producing the 'forward' and 'reverse' inputs to the counter/display section may be of interest.

The two optical sensors are both mounted on the 'length-of-tape' timing disc, with a quarter-cycle 'phase' difference between them, as simply shown in Fig.1. If these sensors' outputs are fed, suitably buffered, into the circuit of Fig.2, a 90Hz version of the forward and reverse signals results. This can easily be counted down with 2 more 74192s.

Also I am unable to understand the buffering circuitry for the 'length-of-tape' opto-coupler. I would use a circuit like that of Fig.3., with positive feedback for jitter-free operation.

M. S. Farmiloe
Camberwell
London



A HERETIC'S GUIDE TO MODERN PHYSICS

Tut, tut, Mr Coleman of July! A photon of visible light has a wavelength?

If it did not bounce back and forth between and amongst its neighbours it would simply keep going in a straight line without a wavelength. But then, a photon, being a packet of energy carried by a bouncing building block doesn't bounce at all, does it? The building blocks merely play "pass the parcel", and the parcel moves linearly if spewed out of a laser, otherwise it is split up providing the so-called square-law effect which is part of an expansion of a spherical surface.

As I said in my letter of July, it takes one particle an impossible amount of work to make a wave. A wave is an integrated effect of a lot of moving particles. It is hoped that there is not some mental mix-up here with spin velocity, which determines the amount of energy within the particle and thus its relativistic mass, and thus in turn the gravitational gradient in the immediate environment of the particle?

I doubt very much indeed whether an individual photon can remove even a conduction electron from a metal, at least not in these parts: its spin velocity would have to be so high that catastrophe was being approached, somewhere near the boundary of the universe perhaps? Of course it takes a wave, an integration of a lot of bouncing building blocks, and therein lies the strength of wave mechanics which sadly explain nothing more than the cause of an effect at the subjective level of apparency, delightfully demonstrative of a shallow and superficial analysis.

LETTERS

Until the specialists of this world come to realise and thus accept that the absolutes are really asymptotes, modern science will remain stuck in its glorious mud. I have in mind absolute zero, absolute resistance, the speed of light, and the basic building block. The asymptotes can not be reached because a multiple lamination of short Planck's constants gets there first.

Space, of course, is purely reactive, there being no friction within chaos: only genuine fully-fledged masses can demonstrate friction at work, in their interactions so demonstrating the decay therefrom. Space, like any other reactive device, is an energy-store out of which mass condenses.

How I wish that the specialists of this world would stop their silly arguments and learn!

James A. MacHarg
Wooler
Northumbria

I continue to read with interest Dr Scott Murray's series on modern physics. However, I must take issue with what I regard as a fallacious argument in the 7th part.

He points out that it is possible, after the event, to determine the position and momentum of an electron "to any accuracy we please". He then goes on to assert that our ability to do this indicates that the electron's behaviour was determinate, and that it must have obeyed the law of causality. Hence, the Copenhagen doctrine is false.

Later, though, he admits that he is unable to prove that the law of causality is obeyed throughout inanimate nature, although there is no evidence against that assertion. Herein lies the flaw, for we can only determine the past properties of the electron if the law of causality has been obeyed. That is, we deduce where the electron was and what it was doing by knowing where it has been subsequently and what interactions it has undergone. If causality did not apply, then we would still be faced with the indeterminacy of instantaneous observation, so an argument that assumes causality cannot be used to refute any doctrine to the contrary.

Almost 30 years ago I was taught by my professor of physics that causality was the underlying assumption in the study of physics. This meant that, given a knowledge of the causal relationships governing inanimate matter, it would be possible to predict the future from a knowledge of the present, which was the goal of the Victorian physicist. The indeterminacy principle, we were told, strikes not at causality but at our knowledge of the present. If that is uncertain, our predictions must change from certainties to probabilities. Perhaps I move in the wrong circles, but I have not met anyone who seriously contested that interpretation. I have to admit that much of my working life has been spent among engineers.

R. T. Lamb
British Telecom
Milton Keynes

Dr Scott-Murray's articles on a heretic's guide to modern physics have clearly shown that the Copenhagen philosophies and mathematical theories of statistical wave mechanics have left scientists without a fundamental theory of matter.

Probably the most glaring error made by the Copenhagen School is their deduction that superfluid helium is a special type of quantum liquid, to which they have devoted many papers and given many names: Liquid Helium II, Landau's two-fluid liquid, Bose-Einstein Condensate.

The common sense approach of Faraday, Newton, and Galileo, recommended by Dr Scott-Murray, easily deduces that superfluid is a powder. It is a fluid like table salt and pepper but it is not a fluid like vinegar, which is a liquid. Scientific studies of all the properties of superfluid helium show that every experiment demonstrates that superfluid helium is the solid phase of helium in the physical form of a very fine transparent amorphous powder which is only 3°C below its boiling point; hence it is a rapidly subliming powder.

Because university students have to accept without question the beliefs of the Copenhagen statisticians, they have to believe that this powder is a form of magic liquid with antigravity properties. They are all baffled because it doesn't behave like other liquids.

Throughout my career in science I have used the wave concept of light and the particle concept for an electron. I can explain the photoelectric effect without resorting to a photon particle concept and I can explain the behaviour of an electron in an electron microscope without resorting to a wave concept for an electron. Hence I agree with Dr Scott-Murray's statement "All the indications explored in this series support the view that the Copenhagen myths, although undoubtedly propounded by their originators in complete sincerity, constitute one of the biggest hoaxes of self-delusion of the twentieth century".

When I left Cambridge (with a first-class science degree) in 1949 I was a firm believer in the photon, wave mechanics and quantum liquid, but thirty years of scientific experiment and study has shown to me that photons, phonons and rotons are myths and superfluid helium is, as one would expect by common sense, solid helium in the form of a very fine powder. When this powder melts at 2.2K it absorbs latent heat (the λ effect) and becomes normal liquid helium which boils at 4.2K.

P. Holland
Egremont, Cumbria.

Now that Dr Scott Murray's series of articles on physics has ended, I hope that you will continue to have a physics section in Wirless World. If so, why not name it, "Frontier Physics". There are no doubt others like myself who buy your journal not for its electronics but solely to enjoy reading those controversial physics articles – and, of course, the Letters section in which wayward physicists express their ideas can certainly stimulate one's own thoughts.

It is a pity that physics has become dogmatic. Some years ago I proved that Special Relativity was mathematically and physically wrong, but I couldn't convince others. However, I did discover that there was a 'closed loop' acting in physics.

The closed loop is an argument. It consists of a main theme, which cannot be disputed, and which begins and ends any discussion. For example, the closed loop of Special Relativity can be used to prove that time dilates as follows:

1. Special Relativity is true (main theme)
2. Its equations show that time dilates.
3. Its equations cannot be wrong.
4. Therefore time must dilate.
5. Special Relativity is true. (main theme).

In a scientific journal recently, the closed loop is used to show that the cost of accepting common time (Newtonian time) would be too high a price to pay in physics. The closed loop is as follows:

1. Special Relativity is true. (main theme).
2. Inserting common time into Special Relativity's equations gives a daft answer for the speed of light.
3. This daft answer means that either Special Relativity's equations are wrong or that common time is wrong.
4. Special Relativity's equations cannot be wrong.
5. Hence, common time must be wrong.
6. Special Relativity is true. (main theme).

In the past, the closed loop has been used to give a satisfactory answer to the late H. Dingle's challenging question, "Of two uniformly-moving clocks, A and B, which ticks the faster?" The closed loop gives the well-known answer.

1. Special Relativity is true. (main theme).
2. Moving A ticks slower than stationary B.
3. But stationary B can be regarded as moving and moving A can be regarded as stationary (by the principle of relativity).
4. So A ticks slower than B and B slower than A!
5. Either commonsense is wrong or Special Relativity is.
6. Special Relativity cannot be wrong.
7. Therefore commonsense is wrong.
8. Special Relativity is true. (main theme).

It can be seen that the closed loop is an invincible argument. Of course, the above examples seem obviously silly because they are presented in skeletal form. When the closed loop is clothed with advanced maths, though, its use is by no means obvious; you must look carefully for it!

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DESIGN COMPETITION

Although I applaud your initiative in setting a competition for electronic devices to assist the disabled, I fear that many potentially suitable devices will not be entered. This is because they may originally have been designed for other purposes, where their commercial value is such that publication of their design is precluded. It would be useful if your journal could also act as a clearing house for information on the existence of these devices.

In many cases, I imagine that the designers of these devices would be prepared to spend some of their own time in adapting them to the needs of disabled people, but cannot reveal how they work.

As an example, Hydraulics Research Ltd has collaborated with the Weed Research Organisation on the development of a low-cost "plant sensor". At present the devices exist in two forms:

(i) is a linear readout instrument which can be used to indicate the relative health of plants, their degrees of maturity, or the proportion of a field of view which contains plants. It can, for example, indicate on an analogue meter the degree of wear on a grass playing field.

(ii) is a switch which energises a load when it sees a plant. This is intended for incorporation into a "robot" crop sprayer, when the load would be the coil of a solenoid valve in the line to a spraying nozzle.

The designs originate from the need to make