

# FEEDBACK

## BBC ENGINEERING

The BBC Designs Dept. is truly working for cost effectiveness (WW, December 1985) if they have managed to put themselves out of business. Had they worked on tv stereo, high-definition tv and all the other goodies people really want — and it is not too late yet — they would still be in business.

As for the a.m. dynamic carrier controller, this is the acme of folly. We overseas listeners only manage to pick out the BBC from all the hash because of the present 16dB compression and could wish for more. To weaken the carrier is suicide; rather cut the highest audio frequencies and give a little boost in the 2000Hz area for that brilliant effect most a.m. broadcast music requires. We purists will use f.m. for music in any case.

**Peter Hirschmann**  
**Romema, Haifa**  
**Israel**

## AN ANSWER ABOUT 'Q'

I now have an answer to my question (Feedback, December, 1985). Estill I. Green in the *American Scientist* (1955) Vol. 43, 585-594, attributes its first use to K. S. Johnson in unpublished material in 1920 and in a book, *Transmission Circuits for Telephonic Communication*, Van Nostrand, 1925, Western Electric 1924.

He used it for the ratio of reactance to resistance because "The other letters of the alphabet had already been pre-empted for other purposes". "Quality factor" came later. What Green calls a "contagious symbol" has moved into a number of fields.

**Bertha Jeffreys**  
**Cambridge**

## PREAMPLIFIER DESIGN

I would like to comment on John Curl's interpretation of his measurements on electrolytic capacitors, reported in your November issue.

The 'residual', he says, is 'not level-dependent', which I take to mean that its amplitude is proportional to the input amplitude. In that case there is no evidence of non-linear distortion.

The fact that there is a residual at all shows that the electrolytic capacitor cannot be represented by capacitance and resistance in series. It does not follow that it cannot be represented by a more complicated, but still linear, circuit. This would alter the frequency response, but whether the change would be audible, and indeed, whether it would be an improvement or an impairment, it is impossible to decide on the evidence presented.

**Kenneth S. Hall**  
**Bromley**  
**Kent**

## LIGHT, DISTANCE AND TIME

In an earlier letter (September 1985) I introduced the idea that if full e.m. Doppler is allowed into the description of experiments that are *supposed* to support the Special Theory of Relativity, then it is found that those same experiments, now with a complete physical description, did in fact constitute an experimental disproof of the conclusions of the theory. I also put forth the idea that the paradoxes of STR had as their foundation a misconception concerning the scale of whole numbers *when applied to nature*. There have been but two replies.

I would thank E. Baird (November 1985) for his congratulations but, even by reading 'between the lines', I am still not sure whether those congratulations constitute as acknowledgement of the fact that STR is disproven by the Michelson-Morley experiment. Perhaps he would be so kind as to enlighten us?

The other, private, letter came from Alan Watson and he at least did touch upon some of the matters in hand. Since these things are of importance I am sure that he will not mind if I make my reply, at least in part, in public.

In response to the actual question Alan Watson states, with regard to the difference in arrival time of the rays of light, "I would prefer to use some sort of stop watch"; then somewhat later he says "In the case of M-M, any change would be detectable in the time taken for the light to travel along one arm when compared with the time taken along the other because such a difference would result in an alteration of the phase relationship between the two beams when they are compared in the interferometer".

This statement is a summary of the accepted teaching on the subject *and it is wrong* for the following reason.

It is central to the teaching of electromagnetism that for all observers the product of frequency and wavelength shall be the constant *c*. A further aspect of the teaching, involving relative motion of source and observer, has it that whether light be blue or red shifted there is an additional Lorentz related red shift *in each case*. These last two elements of the teaching together with the null result of the M-M experiment are natural facts which may be used to test the validity of any theory concerning light; they were facts of nature, albeit unknown, long before Maxwell or Einstein. This being so, they represent axioms which are external to STR and as such may be used to test that theory for contradiction in accordance with Gödel's theorem.

It is beyond question, because it is an experimental observation, that the frequency of the light seen in both axes by the observer moving with the M-M experiment is the same, whatever the speed of the experiment. Because *c* is a constant in both axes the wavelength of the light will also be the same in each case and within classical concepts no phase alteration is to be expected at the interferometer when the experiment is rotated.

In the case of the stationary observer, he sees the additional Lorentz red shift in both directions in the longitudinal axis. Because of the constancy of *c* (product of frequency and wavelength) the wavelength of the light is increased by the Lorentz factor along the line of the motion. It is the light path that increases by the Lorentz factor and not the length of the experiment that diminishes.

There is one further thing to be considered. A neutral particle may be accelerated by a beam of light and when the particle is at rest relative to the light source then the pressure that it experiences is in direct proportion to the energy of the photons in the beam. When the particle is in motion away from the source the particle sees a Doppler reduced frequency which includes the additional Lorentz red shift. Since the radiation pressure felt by the particle is in direct proportion to the frequency that it "sees" then it becomes clear that it not the mass of the particle that increases with velocity but in fact the propulsive effect of the source which diminishes due to Doppler.

If we ignore terms of the second

order we find that there is, in this particular case, a physical reason for the Newtonian energy equation since from rest:—

$$\frac{E \text{ (at source)}}{\gamma v} = m \cdot v$$

Within present knowledge of e.m. Doppler, *E* is of course modified in its effect by the Lorentz factor and mass *is* velocity invariant.

I invite Prof. R. C. Jennison to tell us whether my descriptions are right or wrong; if wrong would he please explain why?

**Alex Jones**  
**Swanage**  
**Dorset**

## NEW LOGIC SYMBOLS

Letters published to date do not reflect much enthusiasm for the 'new symbols'. I suspect that more problems will result from their introduction than there will be benefits gained. It does seem that all the implications of introducing this new 'standard', have not been sufficiently thought out. I wonder just what degree of involvement the British Standards Institute had.

There are three serious problem areas which should be considered by any persons involved with the documentation of electronics.

Firstly, no mention has been made of the cost of introducing the new symbols or of supporting their use thereafter. Engineers and managers should take a critical look at the financial implications for their product documentation and technical publications: I predict that the final cost to the nation will be enormous. The descriptive literature I have seen is extremely heavy going and frequently ambiguous and generally inadequate.

Secondly, there will be a dramatic increase in documentation errors, due to the over complexity of the new symbols. It has always been difficult to get engineers to sufficiently check their engineering documentation; the new standards will only make matters worse. Our electronics education system seems unable (or does not even try), to convey to engineering students, the importance of accurate documentation and the significance of initials in the CHECKED box on drawings. Many engineers seem to regard documentation as an unnecessary