FEEDBACK

erations seem to have caught the imagination of the Subjectivist Tendency.

My design makes no reference to component specifications (of the sort that Mr Nalty means) because they have no basis in reality. Any well-brought-up electronic circuit should be insensitive to tolerances in conventional parameters; in my professional capacity the circuitry I design is reproduced by the thousand, and so any other approach would be disastrous.

The cartridge loading resistor is just a resistor – 5% carbon film is quite adequate – and to put it bluntly, anyone in audio who spends £10 on a resistor is a fool.

The root of the problem is that Mr Nalty, as a hard-line Subjectivist, feels free to put forward as facts assertions that are lamentably devoid of a shred of supporting evidence. He dare not even hint at what sort of mechanisms are involved, or describe their effects on a signal, for fear that a quick experiment will show that they are illusory. Has Mr Nalty made any measurements on capacitors in real-life circuit situations? I think we should be told.

One of the few definite statements that Subjectivists have been tempted into making is that electrolytics (and indeed, copper wires) suffer from a sort of low-level crossover distortion that can be heard but not measured. It did not take me long to prove that if any such effects exist they are well below the −150 dBu level, and if that is not audible I should like to know what is[2].

I therefore bluntly challenge Mr Nalty to be more specific in his speculations so that they can be subjected to the ruthless duo of logic and experiment. The scientific method got us to the moon; it is unlikely that it cannot cope with audio.

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References

1 Letters, *E&WW* Feb. 86, pp43,44.
2 Self. "Ultra-Low-Noise Amplifiers and Granularity Distortion." *JAES* Nov. 1987.

Relativity and engineering

J.C.G. Field quotes an accuracy for Navstar (GPS) of 18 metres. Perhaps engineer Field could put relativity aside for a moment and consider the 18-metre error.

The earth turns on its axis one revolution each 24 hours. Hence the signal from the satellite to the ground observer suffers a phase shift resulting from the Sagnac effect (principle of the laser gyro). Since the satellite is in a 12-hour orbit, the distance between the satellite and the ground observer is continually changing, that is, there is a time rate of change of the Sagnac phase shift, which is a frequency. That frequency should be added to the Doppler in the algorithm but is not.

For a numerical example, consider an observer on the equator in the plane of a polar satellite. His ground position error, as a function of the satellite elevation angle is, then,

elevation angle (degrees)	error (meters)
0	14.15
10	14.4
20	15.25
30	16.7
40	19.0
50	22.7
60	29.9
70	56.7
78.182 (horizon)	infinite
80	−49.7
90	0

The beauty of this observation is that the noted phase shift is compatible, according to the establishment, with both the Special[1] and General[2] Theories of Relativity. Is there an Establishment "cover-up" of this error? You bet!

References

J.C.G. Field, *Electronics and Wireless World*, March 1988.
1. F.C. Michel, *Phys. Rev. D.* vol.19, No.4, 1271, 15 February, 1977
2 J.M. Cohen and H.E. Moses, *Phys. Rev. Lett.*, vol.39, No.26, 1641, 26 December, 1977
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In *EWW* for March, 1988 J.C.G. Field comments on Einstein's theory of relativity on the basis of physical effects of moving bodies and clocks. Referring to such effects is a common method when defending this theory instead of answering the criticism.

The mass-increase phenomenon was initially discovered by Kaufmann in 1901 in cathode-ray experiments, and not predicted by Einstein's theory. It is known that H.A. Lorentz and Abraham Pais had suggested a theoretical formula for it, the formula which the particle physicist uses today.

The relation $E=m.c^2$ was also known and suggested by Poincaré, Hasenöhrl and Langevin independently of Einstein and before him. It is even known that the time-dilation effect was suggested by Larmor in 1900 and the hypothetical length-contraction effect by Lorentz and Fitzgerald some years before. Poincaré was the inventor of "the principle of relativity" as reported from an international congress of Physics at St. Louis, USA, in 1904. The mathematics of space and time was developed by Lorentz.

Obviously, the adduced effects as referred to in the theory of relativity can be deduced from other starting points having nothing with to do relativity and not necessarily erroneous. Hence, we may ask: "What have these physical effects to do with relativity?"

The theory of relativity has been criticized mainly on the basis of its invariant light hypothesis, the hypothesis constituting the base of the theory. Einstein himself said: "If the speed of light is in the least bit affected by the speed of the light source, then my whole theory of relativity and theory of gravity is false". Dedicated relativists try to muddy the water by talking about other things when this criticism appears, neglecting what the critics are trying to say: if the base hypotheses of a theory are not correct, the predicted imaginary physical effects of the theory cannot be correct. Dedicated relativists seems to have real difficulties in accepting this simple and obvious fact.

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Atomic fission

There is a certain sacerdotal smugness to the assertions proffered by Hankey and Coleman (Letters, March): we are told that "experiments have failed to determine a size for the electron", but that "the two particles do, in fact, have drastically different sizes"; and I did not deny an internal structure for them, as a more careful rereading will show. I warned that the article was "simplistic" in order to dissuade any reader from assuming that the diagrams were scaled, thereby to infer that gamma frequencies need be involved, but some are so fond of the taste of shoe leather that they must perforce open their mouths.

Should any biologist offer an analysis of a cell nucleus which completely ignored its environment, he would be roundly condemned; yet physicists model the atomic nucleus with no reference whatever to the intense, complex, and dynamic electromagnetic field surrounding it, and demand absolute authority for their deductions. Since no-one to my knowledge has ever seen a sub-atomic particle (the above gentlemen possibly excepted) our understanding of them must rely on many steps of inference and reasoning, any of which may at some future date be proved faulty or incomplete. As a more cautious commentator observes, "How a particle sits in equilibrium with the aether in a quiet background can be very different from how it appears in our mammoth machines in reacting to high-energy collisions". By investigating the relationship that exists between the e.m. field and the nucleus, there is every chance that we may be able to influence the nucleus indirectly by manipulating the field, and this involves readily obtainable energies, such as from ordinary lasers. My reason for not quoting any numerical values was not that they might be "too complex for EWW readers", but simply because the research needed to establish them has not been done.

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