evidence that there is an advantage in volume, weight, and cost in using the Cuk topology. Dr Cuk has himself shown prototype power supplies that he has designed for the Boeing Corporation, and for the Hughes Aircraft Corporation. These are built in the form of hybrids, and have a power density of 50W/in^3. It is the integrated magnetic approach that makes this power density possible at moderate switching frequencies. To get this power density with conventional topologies requires switching frequencies in the MHz region, with all the attendant problems that this brings.

The difficulty in manufacturing the integrated magnetic element that Mr Pollard highlights is indeed perceived to be a fundamental drawback to producing a low cost power supply. Costs incurred depend on the level of mechanisation that can be employed. Although it is a more complicated structure to produce, it replaces two much larger inductors and a transformers. The total number of windings to be produced is the same, and if these are wound as self supporting bobbinless windings and assembled on one core later. I cannot see why they should cost more than three much larger windings required for the conventional topologies, assembled on to three separate cores. Without bobbins it becomes more difficult to terminate the windings, and an additional terminal carrier may have to be used. The slightly added complexity in producing the magnetic element is more than compensated for by the benefits that it brings.

The new EMC directive from the EC, originally due for implementation in 1992, (but now delayed until 1994), will have dramatic impact on all electrical equipment offered for sale. It will be an offence to sell equipment that has not passed a rigorous EMC test by an accredited test house.

The vast majority of power supplies currently on the market will not pass this test without substantial additional filtering. Wound component manufacturers, and the suppliers of filters, are excited with the prospect of increased sales to manufacturers of Buck and Flyback converters.

Mr Pollard states that the input filtering requirements of the Cuk are similar to that of the Buck. This is most definitely not the case. Even the non-integrated version of the Cuk, with its non-pulsating input current, is much easier to filter than the Buck, with its pulsating input current. With the integrated structure, and near zero ripple, the task of filtering the residual differential-mode input current noise is almost trivial. Very small components are required for the Cuk, while substantial inductors and capacitors, (and damping), are needed for both the Buck and the Flyback converter. In addition, Dr Cuk has demonstrated that by splitting the input inductor into two windings, with the appropriate ratio, a very effective common-mode noise filter is obtained at no extra cost.

Mr Pollard wonders why, with all its apparent advantages, the Cuk converter is not more widely used.

There are several reasons, the main one being that the technology is relatively new, and is still undergoing rapid improvements. Perhaps engineers were frightened off by a bad experience several years ago when the dynamics were not fully understood, or perhaps it is just because designers are unwilling to risk a design that is perceived to be too radical, preferring instead to stick to well tried and tested topologies.

The increasing pressure from the market place for higher power densities and improved efficiencies, coupled with the new EMC regulations, will force designers to consider alternative topologies, and the Cuk converter would seem to be an obvious candidate.

Alastair J Stanley
Aberlady
East Lothian

Challenging viewpoint

Anyone trying to call the invariant-velocity-of-light dogma into question, is invariably attacked by Einstein's supporters who will use any method to defend the prevailing view (cf subsequent correspondence to John W Ecklin's letter, March 1991). The fact that light is a physical phenomenon, behaving as it does independently of Einstein's theories seems to make no difference.

Light travels very fast and that is one of the problems behind performing measurements with high accuracy, especially if moving light sources or moving observers are involved. So Doppler shift measurements are used, whereas in fact distance measurement would be the most suitable.

Doppler wavelength/frequency shift measurements are indirect methods and can be rejected as invalid by Einstein's supporters who say that the product of frequency and wavelength is always equal to c.

But distance/time measurement would be possible using satellites.

Consider satellites A, B and C moving in the same orbit around the earth, A and B moving in the same direction with constant relative distance and with the same velocity, and C moving in the opposite direction. C satellite emits radio or light pulses continuously and A and B catch these signals and register their arrival time in computer data registers.

The local time registrations of each pulse in each satellite is continuously transmitted to Earth and the time differences of received data is calculated.

When C satellite approaches A and B, the time A–B will be: $t_1=S/(c+k.v)$ and when receding $t_2=S/(c-k.v)$, where k=0 if Einstein's invariant light hypothesis is valid and k = 1 if the emission theories ($c'=c+-v$) is valid. S is the relative distance between A and B.

Calculated time difference will be t_1-t_2 equal to :

dt = $2.S.k.v/(c^2 - k^2.v^2)$ or dt = $2.S.k.v/c^2$ approximately.

Inserting figures – where v = 30,000km/h or 8333m/s, c = $3x10^8$m/s and S = 100km – k = 1 gives approximately 18.5ns. If the distance is increased to 1000km, the difference will be 185ns, or nearly 0.2µs, easy to detect and establish. As everyone can see, if Einstein's hypothesis were true, the time difference would be zero.

Who will believe on that?

By this experiment, the question of the velocity of light and the velocity of radio wave propagation would be solved once and for all, relegating this tiresome question and Einstein's theories to the lumber room of failed scientific ideas where it belongs.

Ove Tedenstig
Maersta
Sweden

Telepoint – not telepointless

With regard to Mr Peter Johnsonn's letter that appeared in your September issue ("Telepointless"), I am writing as a member of the Phonepoint team to answer to Mr Johnsonn's claim that the telepoint system is ill-conceived. Phonepoint fills the gap for a mobile communications system, positioned between pay-phones and cellular, offering convenience and cost effectiveness. We do not see the fact that telepoint is at present only one-way as a detriment to its success. It is a low-cost service to meet the needs of telephone users who do not want the expense of cellular equipment and calls. Making it a two-way public service would require adding intelligence to the system, driving up the cost. For those who demand two-way telepoint, we will be offering an integrated pager and handset, and users can then decide whether they want to call back on telepoint.

Phonepoint is backed by some of the world's most powerful telecomms companies (BT, Northern Telecom, France Telecom, Deutsche Bundespost), and so is in a strong position to invest in the emerging telepoint technology and support the common air interface (CAI) launch. Telepoint cannot be dismissed on the grounds of cost. Handsets will be priced close to £100, with the complete package of handset, private base station and subscription for around £300. Call charges will be the same as making a call from a public payphone. On the subject of competition, we have always maintained that four players were too many for a start-up technology like telepoint, and produced much fragmentation of effort. This has been proved with Phonepoint and Hutchison the only two operators intending to launch a public service.

I hope my letter will answer many of Mr Johnsonn's queries.

Susan Sherring
Phonepoint
London

I still say it will never sell – Ed.