

LETTERS

OUT 61H ; print
 INX H ; point to next byte
 ; to be printed
 DCR C ; decrement count
 JMP L3

L1: HLT
 Neil Roberts
 Leasco Software Limited
 Maidenhead
 Berkshire

NON-BINARY LOGIC CIRCUITS

I was saddened to see the article by C. W. Ross in the December 1982 issue, page 68. The idea of something other than straight binary surfaces every few years, and then sinks out of sight. The reality is that in around 1960 there was a historic shift from the supremacy of analogue to the supremacy of digital. The full power of binary has been missed during the last 20 years due to the worldwide fixation on the expensive, fully parallel binary. This is very limiting, and makes more plausible the partial resurgence of analogue in the form of Ross's ideas, ternary logic, majority logic, etc., etc.

In 1964 at Motorola (see "A high-speed integrated circuit scratchpad memory," Fall Joint Computer Conference, November 1966), my team delivered a system in which logic pulses 4ns wide (2ns rise time, 2ns flat, 2ns fall time) were used as a matter of course. At that time, an eight-bit byte could be delivered as a routine matter in serial form down one single wire (plus 0V return) in 32ns, a 16-bit word in 64ns. Today, 20 years later, we could probably go 10 times faster if we tried, delivering a 16-bit word in serial form down one wire (plus 0V return) in 6.4ns. (In fact, for all the ballyhoo about increasing speed, we have not tried at all to increase speed during the last 20 years!)

Serial working would reduce the cost and increase the reliability of present-day microprocessors and rams, drastically reducing the number of legs on the chip, the number of interconnecting leads, and the chip d.i.p. size. It would also drastically reduce the cost of standard buses. [In 1964, signals starting on one board, transferring to a mother board, and then transferring back to another daughter board, retained their fast (2ns) rise and fall times.]

Fixation on fully parallel working shows how this crazy industry can ignore the strongest financial imperatives. This is because of the extreme youth of the people in the industry. They learn about what should be temporary phases in the industry and assume that it was always thus and will always be thus. In fact, serial working was the norm until around 1960. Today, you are not allowed to design serial working into a digital system. (This includes a ban on serial memory.) How this fixation can hold out against the present alleged trend of computer linking up with a fully serial industry, telecom, I do not understand. It proves the strength of a fixation, how it can stand firm against all odds, including strong financial pressures.

Fully parallel working, with its concomitant complex failure (breakdown) modes, has spawned the growth of the very complex, expensive logic analyser industry, and massively forced up the complexity and rate per hour of system repair. By contrast, a serial system can be analysed using a normal oscilloscope. The bits lay themselves out along the trace, and failures are easy to find because they are catastrophic — the whole word disappears.

Ivor Catt
 St Alans
 Herts

MODERN PHYSICS

Congratulations to Wireless World for providing publication for Dr Murray's series. To find such an open-minded and intelligent discussion in a respected journal is today exceedingly rare.

Modern thinkers have become so entrapped in preconceived notions that their power of detached observation has almost entirely disappeared. To illustrate, it has never been explained *why* an electron should orbit the nucleus of an atom. Surely, if an electron and a proton experience a mutual attraction they should simply move together and unite; there is nothing to suggest that any sort of rotational motion is either necessary or possible. The fact of the matter, and one that is becoming increasingly obvious to many thoughtful persons, is that Nature does not consist of the attraction or repulsion of *two* opposing principles, but is formed by the interplay of *three* mutually interdependent principles.

Neither the electric, nor the magnetic, nor the gravitational forces exist in reality; they are merely concepts used to explain observed phenomena. An electron possesses the single property of ever-increasing motion; a proton possesses the tendency to absolute stillness; the third principle that seeks to unite the other two is as yet un-named, but determines the phenomena which our theories clumsily attempt to explain. And this view is not without historic precedent.

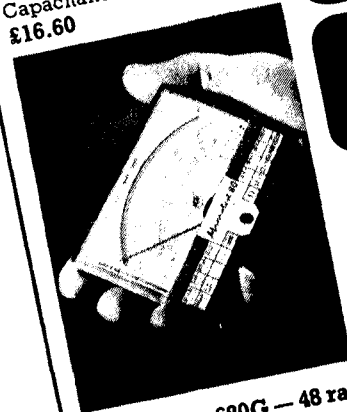
Although it is reassuring to assume that men of antiquity were less intelligent than we are today, this assumption is not supported by investigation. The Bhagavad Gita, an ancient text, states that Nature is formed from three 'Gunas' or principles, referred to as inertia, motion, and harmony; even Christianity insists that God is a trinity. When scientists learn to interpret their observations as being the interplay of three principles and not two, they will not only have re-established a teaching that is thousands of years old, but will be well on the way to a truly scientific understanding of the Universe, instead of a merely mechanistic one. Einstein's famous equation, $E=mc^2$, is a relationship between three concepts; mass, space, and time, and simply states that the tendency to infinite motion reaches an upper limit established by the balance between the principles. It does *not* state, as so many suppose, that "Nothing can travel faster than light". If it be re-written in the form $c^2=E/m$, then it is obvious that the limiting velocity relationship between three concepts; mass, space, and time, and simply states that the tendency to infinite motion reaches an upper limit established by the balance between the principles. It does *not* state, as so many suppose, that "Nothing can travel faster than light". If it be re-written in the form $c^2=E/m$, then it is obvious that the limiting velocity is determined by the ratio between 'energy' and 'matter', and that where this ratio is low, as in a piece of glass, the limiting velocity is lower than the 'speed of light', and where the ratio is high, as in interstellar space, the limiting velocity is higher.

I hope that this letter, the first I have been encouraged to write to any journal, serves to stimulate vital discussion on ideas that are very much in need of a thorough research and restatement.

P. Craig
 Wellington
 New Zealand

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