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THE SUPPRESSION OF THE NEW DISCIPLINE DIGITAL ELECTRONIC DESIGN AND ITS DISASTROUS CONSEQUENCES

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When I was an engineering undergraduate at Cambridge in 1959, the faculty was high on thermodynamics and even higher on drawing. I had to spend ten times as much time drawing as I did considering new fangled notions like electricity, which rated one lecture per week. I remember our electricity lecturer was a little man who came in without a word, wrote on the board, and left an hour later. One day, when he had said nothing for twenty minutes, a voice from the back said, "Could you speak up please?"

We also did quite a lot of surveying. I carried chain and theodolyte around in the misty fens by the Cam. They pulled a dirty trick on us. The land level rose as you went downstream. So a Cambridge man with a good engineering degree has succeeded in learning that water can quite well flow from the valleys up into the hills.

In retrospect, it seems fortunate that my degree had virtually no electricity, let alone electronics, content, because I was much less cluttered with Fourier, Laplace and other analog arpeggios than were my colleagues in industry. This made me more able to look directly at the practical problems which arose when assembling arrays of logic.

After graduating in engineering at Cambridge in 1959, I went to work in the Ferranti (now ICL) R&D labs. in Gorton, Manchester. When I enquired about training, the chief engineer Gordon Scarrott told me that he did not see how I could be trained because digital computers were so new. I would have to just get on with the job. At that time, 1959, what he said was right. I could not have imagined that the situation would still be the same twenty years later; that in 1979 the subject would remain untaught, although digital electronics had become the third largest industry in the

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U.S.A. with a turnover in the tens of billions of dollars.

Digital electronic design includes the following subjects, none of which can be learnt in anycollege course in Britain. The list is taken from my book DIGITAL HARDWARE DESIGN, pub. Macmillan 1979.

Transmission line theory applied to logic interconnection.

Component pulse response.

Distribution of D.C. power to logic.

Local decoupling of voltage supplies by printed circuit voltage planes

P.C.B. layout for high speed Schottky T.T.L.

Crosstalk.

Energy current.

Grounding in a digital system, including systems comprising more than one module.

Interference from the 50/60 Hz line.

Filtering the line.

Oscilloscopes for digital measurement.

Noise specifications on integrated circuits.

History of displacement current.

Gating of asynchronous logic signals.

Choice of type of logic symbols.

Switching loads in digital systems.

Electromagnetic theory applied to digital systems.

Whereas twenty years ago we could at a price fumble our way towards viable designs without the help of any training, the right engineers are spread more thinly today and the digital systems they are attempting to design are more complex. The result is that:

No multi-million pound project with a significant digital electronic content being developed in Britain today has any chance of meeting its original specifications.

Putting it more bluntly, we are deluding ourselves if we think that our totally untrained digital designers can possibly produce anything but rubbish.

I know my audience will find it hard to believe that all the large digital electronic projects in this country are doomed to failure. They will not believe that their apparently minor action of preventing the teaching of digital design has had such a major

Generally, the 18 items listed above will not appear in any university course in the world today, 34 years later. Note that today's Professor had not even entered college in 1979, so he has not been taught this material, which includes "Electromagnetic theory applied to digital systems". This has led to no professor or text book writer today having a grasp of the TEM Wave, the basis of a reformed electromagnetic theory and of today's digital electronic design. This is why so many electronic engineers (150) had to attend our private seminars. http://www.ivorcatt.co.uk/43.htm . The seminars were very profitable, and ran for 10 years. However, the material did not then get into any university course. http://www.ivorcatt.org/digital-hardware-design.htm Our two books "Digital Electronic Design" were given to those who attended. Now found at http://www.forrestbishop.4t.com/

repercussion. So in an attempt to prove my point, I shall put my money where my mouth is.

I challenge the management of any such project, who believe their project is viable, to invite my team to investigate it. I will commit myself to confidentiality, and in their turn they will promise to supply me with all the information I ask for and let my team interview whomsoever we ask. They agree in advance that if within three months I convince an independent arbitrator that their project will never meet its specification, they will so inform the customer. Also, my team will be reimbursed with double the consultancy rate they are currently earning.

Should I fail, I shall receive no fee and pay a £1,000 penalty to the company.

I would like to point out that I stand to lose substantially, because I am currently earning good money working on phoney projects. This money I shall have to give up if I embark on exposing another phoney project.

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but must confirm the impression

Chelmsford, Essex.

Suppressing technology in the computer industry

STRONG pressures exist in our society towards suppressing high technology. This can partly be characterised as "fear of the unknown". These pressures have somewhat relaxed due to the TV programme "Now the chips are down", and the government's strong reaction to it.

The weakening of the above barrier makes it important to take a step closer, and look at an analogous pressure within computer technology itself.

Computer technology is 98% staffed by people with no knowledge of engineering (or physics). These "technology-free" people have a fear of computer hardware which correlates with the previously discussed general public's fear of computer technology.

Management in industry, and also the politicians, being technology-free and fearing the technocracy as a potentially competing power base, are motivated to "bureaucratise" computer technology — to turn it into a paper programming, technology-free activity.

It is important to study this "Lateral Arabesque", where programming, the contemporary clerk's occupation, masquerades as high technology, microelectronics, wave of the future, Britain's last hope, etc.

Programming masquerades under various unsuitable high technology titles.

Computer science — contains no science.

Software engineering — contains no engineering.

Fault tolerant software — implies hardware content, but contains none. Also, fault tolerant programming is impossible anyway. More reliable systems can only be achieved through engineering.

This bureaucratisation of computer technology cuts us off from the major growth industries of the future, which include:

1 Airline collision avoidance.
2 Systems for sensing and improving traffic flow in the cities.
3 Most of the medical electronics industry.
4 Real time school, bus and train re-timetabling in response to emergencies and user demand.

Each of these industries will be larger than the total "Informatics". Von Neumann, conventional programmer based industry that we seem to propose to restrict Britain to.

Programmers with very little knowledge of physics and engineering control all the "Computer Science" faculties and departments in Britain. There is a very real risk that, with the help of government (diverted from its attempts to support high technology and microelectronics) they will subvert a whole generation of schoolchildren away from high technology and towards an updated clerk's role; that is, the programming of computers of ancient design (which includes the microprocessor).

It is possible that Britain will gain a lot of employment that way but it is important to realise that programming is merely a new kind of sweated labour — low in capital investment and high on labour content. It is noteworthy that the cash flow of a software house is positive almost from the moment it is set up. This kind of industry is very vulnerable to competition, as was the City.

It is possible that Britain will corner a lot of the world software business in the same way as the City won (and lost) a major share of the world's financial business.

In the 1920s and 1930s, many voices in the City argued that Britain's future lay with agriculture and the City, and that Britain did not need manufacturing industry. Today the same argument, from the same kind of voices and socio political vested interests, will argue that Britain needs a software industry but should not be in computer hardware.

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JJE/SF

12th October, 1979

Mr. I. Catt,
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17 King Harry Lane,
St. Albans.

Dear Mr. Catt

I now have much pleasure in advising you that the Organising Committee has considered your synopsis entitled 'The Suppression of The New Discipline DIGITAL ELECTRONIC DESIGN and Its Disastrous Consequences' and we would be pleased to include a contribution based on the synopsis, for inclusion in the programme.

Because of the number and quality of the papers received, the Conference will now run for four days starting 2.15 pm Monday 31st March and finishing at 1.00 pm on Thursday 3rd April.

The texts of accepted contributions will be printed in the Conference Proceedings which is reproduced direct from the typescripts submitted by the authors and I am enclosing a copy of the typescript requirements for your information. You will note that typescripts are required by the 14th December.

The Conference Programme has been arranged to allow approximately 15 minutes for the delivery of each paper with sufficient time for discussion at the end of each session. You will receive a form nearer the date of the Conference asking for details of your audio-visual requirements.

It is proposed that a small Exhibition of teaching hardware will take place during the Conference period and we hope you will be able to contribute to this Exhibition, details of which are enclosed.

Thank you for your interest in the Conference and I look forward to receiving the typescript of your contribution in due course.

Yours sincerely,

Dr. J. J. Hill,
Conference Manager.

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