The Open Channel is exactly what the name implies: a forum for the free exchange of technical ideas. Hold your contributions to one page maximum in the final magazine format (about 1000 words—less, if you want to include illustrations). We'll accept anything (short of libel or obscenity) so long as it's submitted by a member of the Computer Society. If it's really bizarre we may require you to get another member to cosponsor your item. Send everything to Jim Haynes, Applied Sciences, UC Santa Cruz, CA 95064.

A Hardware Description Language from the State of Nebraska *


In the summer of 1974 the scientific community of the University of Nebraska (Lincoln) was lured into a net of two financial disasters. First, in July a severe drought spread over all the Nebraska corn fields. By and large, objective agricultural judgment holds that every drought tends to dry out even those small financial drops that occasionally fall on a professor's head and keep him alive in these vast corn producing areas. Second, the Computer Science Department of the same university unleashed a synopsis of the course "Computer Architecture." Many believed that this alone, quite apart from the drought, precipitated a financial demise of the department that lasted for many days to come.

There is a great deal of dispute over how much and for how long these events deserved to be mentioned. If the first one (drought) prompted a flood of coverage both in the U.S. and such countries as India, Bangladesh, U.S.S.R., and China (all of whom are friendly toward the state of Nebraska), then the second was conspicuously overlooked even by a university daily newsletter.

Our need to promote interest in the new course was intricately intertwined with a common college professor problem—i.e., what must one do to be recognized not simply by a few students and nearest kin but also by the administrations of the IEEE, ACM, and, if lucky, even NSF? What technique of information dissemination could be as contagious as the Hong Kong flu among professors of computer science in the U.S. and Western Europe?

By weaving together myriad strands of scientific evidence into a cohesive theory, we found that the Hong Kong phenomenon can be fully exploited, provided (1) one uses a language which is given credence not merely by students, but also by professors whose age diminishes any likelihood of preserving the knowledge they acquired in universities; and (2) one publishes one's papers in the journals most popular in the upper clusters of scientific circles.

However, major pitfalls lay ahead, notably in finding a formal language for communication that withstands the scrutiny of all our colleagues in the computer world.

It was against this background that our favorite professional journal, Computer, prepared one of its marvelous Christmas enticements—namely, its December 1974 issue, which contained more than a hundred thousand words devoted to the subject of U.S. hardware computer languages. It is widely held that each such language attempts to put on record every shred of thought of a computer designer in a form comprehensible only by the author and his closest assistants.

The brevity of the papers published in that issue of Computer could not conceal the tremendous linguistic maturity of the authors, who exploited the ethnographical, historical, and meteorological subleties of the geographic locales of their respective universities. The significance of the research could only be matched by the work of the well-known Russian traveler Nikolai Nikolaevich Miklukho-Maklai, who for more than a quarter-century studied the native dialects of the Polynesian Islands.

To the credit of Computer's editorial staff, the second part of the issue reflected a more cosmopolitan spirit, presenting languages created in France, Italy, Japan, Germany, and Britain. One can only suppose that the rationale for selecting these particular languages was that the countries from which they emanated shared a common characteristic—undoubtedly the fact that they were the nations hardest hit by Arab petroleum policies.

This daring experiment of the journal, if it accomplished nothing else, at least ensured the preservation of these lan-


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guages during the energy crisis. Neverthe-
Hence the question: what is more important for a young author to know—the multiplication table or the laws governing the scientific triangle?

Our own experience as authors tells us that familiarity with such laws is at least as important as knowledge of any other scientific discipline. For example, we have learned that the fairness of a reviewer may range from such friendly advice as including in one's paper a diagram of a perpetual motion machine, or a categorical declaration that "This cannot be done, because this cannot be done.

One of the authors retains as a precious souvenir a review in which he is confidently advised to supplement his paper with the design for a device to ensure computer operation with the power turned off. To the end of his days he will thank the French Academy of Science, which wisely pronounced no fewer than 50 years ago that no one (not even in America) could build a perpetual motion machine. The reviewer appears to have missed this historic information, perhaps as a result of inadequate fluency in French.

Of course, we realize that any study of the scientific triangle based on correspondence addressed to the author from editors and anonymous reviewers would always be one-sided and incomplete. What would remain unknown is the mysterious connection between editor and reviewer—a relationship that is unlikely to be illuminated by any inquiry into the ties between wife and lover.

Indeed, anyone could easily imagine what difficulties are encountered by a cheated husband in his attempts to get the truth out of his unfaithful wife on what actually happened between her and her lover. But no one would envisage the predicaments endured by a young author when he attempts to get the truth out of editor and reviewer. An editor, as addressed by an unfaithful wife, always tends to obscure the magnitude of the damage inflicted by the reviewer to the author.

But let us eschew these idle though interesting conjectures on what might take place under the dark editorial blanket. Far more important is to find out why some reviewers are so eager to torment the souls of young authors with the edge of a dull knife. Having concluded a careful investigation into this problem, we are now prepared to announce that it is none other than the author, strangely enough, who is responsible for the seemingly inexplicable animosity of the reviewer. Consider:

Typically, a reviewer is a venerable professor who realizes that life is short and that, if one expects to leave one's imprint on the surface of scientific endeavor, he must succeed (i.e., publish). Why should this professor spend his valuable resources helping an unknown author to reach even the foot of scientific Mt. Olympus? Conversely, why should he attach any importance to the research of his young colleague before the latter publishes his work in a reputable journal?

Authors should realize that venerable professors use the same motto as the soldiers who mine enemy installations— "One can err only once in a lifetime."

And finally, there is the matter of the research pie. Why, after all, should not an author share his portion of the pie with a hungry reviewer? After all, even famous stars share their royalties with their enterprising agents.

Clearly, then, authors who choose to ignore these principles do so at their own peril, and they have only themselves to blame for any hostile reviews that come their way.

There are, as it turns out, several ways for an author to exchange his youth and talent for favors from aging and influential reviewers. The most popular technique uses a so-called "Principle of M. West," first applied in the Midwest. This technique will be the topic of our next installment.

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**Why not a standard 100-wire bus structure?**

The most important and often overlooked part of an Altair/IMSAI computer is the 100-wire bus structure. This bus structure as defined by MITS has become a de facto standard that has encouraged numerous companies to build and market Altair/IMSAI-compatible boards, knowing that there are thousands of machines in which to use them. The bus standard has stimulated competition and allowed product specialization; and the result has been to raise the Altair/IMSAI from just a "hobbyist" tag to a full-fledged computer that is rapidly finding its way into industrial, commercial, and educational applications. After all, what other computer on the market has such a broad base of hardware manufacturers?

To date, most of the second sources have been of RAMs, TV typewriters, etc., but there is a second generation of products just beginning to surface, which will vastly increase the power and longevity of the 100-wire bus. These products are of two basic types:

**New CPU boards** using different 8- and 16-bit microprocessor chips that will plug into the bus (you can already buy an M6800 CPU board for your Altair and work is in progress with CPU chips from Data General and Texas Instruments 9900 series).

**Mass storage** memory capacity inside the Altair chassis in excess of the 65K directly addressable bytes, made possible by the new CCD (charge-coupled device) and magnetic bubble technologies. Mass storage will typically be configured as a set of storage boards (from 1 to 20) and a controller board. The controller board must furnish to the storage boards several critical timing and control signals (all TTL levels), and because of the number of boards involved these lines should be placed on the 100-line Altair bus for storage board simplicity, lessened cost, and ease of troubleshooting.

Although opening up the future of the Altair to many new applications, these boards are putting a strain on the bus structure: they use more bus wires than so far have been defined. So, the time has come to define more of the unused bus lines. To wit:

1. + 8V: Unregulated input to + 5V regulators
2. + 16V: Unregulated input to + 12V regulators
3. XRDY: Anode with PRDY and goes to 8080 RDY
4. VI0: Vectored interrupt request 0
5. VI1: Vectored interrupt request 1
6. VI2: Vectored interrupt request 2
7. VI3: Vectored interrupt request 3
8. VI4: Vectored interrupt request 4
9. VI5: Vectored interrupt request 5
10. VI6: Vectored interrupt request 6
11. VI7: Vectored interrupt request 7
12. XRDY2