

## Semiconductors

## Missing link from Inmos?

INMOS International PLC, the government-backed British semiconductor manufacturer, last week gave a description of a new type of microprocessor which, it claims, will become a building block for "fifth generation" computers.

The device, to be known as the transputer, was originated by Mr Iann Barron, a director of Inmos. The transputer includes on a single chip a processor, 4 kbytes of memory and communications links. The first member of the family will be a 32-bit device running at 10 million instructions per second, claimed to be eight times faster than any existing or announced device. A 16-bit version is also planned.

The transputer will operate with a reduced instruction set optimized for execution of high-level languages. The impressive specification has been achieved partly by increased communication speeds possible when memory and processor are combined on the same chip. But the feature that is likely to secure a long-term future for the transputer is that it is designed for integration into arrays of many transputers operating concurrently. The transputer will be able to interface with existing industry standard devices and, most importantly, with other transputers, via special "Inmos links". These links will allow an array of transputers to operate as an "intelligent community". Inmos has developed a special language for use with the transputer which reflects this feature. The language, called Occam, allows problems to be broken down into separately-running subunits so that the processing speeds likely to be needed in so-called intelligent machines can be achieved.

Inmos is still looking for further sources of capital. In line with recommendations from the government, the British Technology Group has indicated that it will not be able to shore up the company much longer. Inmos made a loss of more than £20 million last year, but hopes to reach profitability next year if market conditions improve. Indeed, if the transputer is as successful as a hopeful spokesman for Inmos expects, there may be a problem in meeting demand. **Tim Beardsley**

## Correction

In the leading article entitled "Reagan flirts with pie in the sky" (*Nature* 3 November, p.1), the proposal is to develop satellites mounting enough weapons to destroy 10,000 re-entry vehicles (not 1,000 as stated), and the cost of the first stage of the work would be \$95,000 million (not £95,000 million).

The first News story (p.3) concerns NASA's 1985 budget submission, not that for 1984. □

## UK space research

## Earth scientists make their bid

BRITISH oceanographers, climatologists and solid-Earth scientists set their sights last week on a ten-year programme of satellite-based radar altimetry. At a meeting organized by the Royal Astronomical Society, more than a hundred geophysicists made common cause by advocating that the Science and Engineering Research Council (SERC) and the Natural Environment Research Council (NERC) should spend £18 million for the development of instruments that would be carried by various of the remote sensing satellites now being planned, the Canadian Radarsat for example.

The proposal is, however, politically sensitive because such an extra claim on research council budgets may be resisted by other dependants of the research councils, particularly the astronomical community.

The benefits of radar altimetry were loudly sung last week. Thus Professor J. Woods of the University of Kiel explained that, while flow patterns within major oceans and seas are well known, uncertainty persists about even the largest scale flows between such basins. Yet climatic modellers concerned with the effects of atmospheric carbon dioxide need to know the oceanic fluid and heat circulation which cannot now be supplied by oceanographers. The only alternative to satellite altimetry, according to Professor Woods, would be a massive sea monitoring exercise.

Altimetry may also be used to monitor the elevation and extent of ice sheets on land and sea, of obvious significance in the

relatively inaccessible Arctic and Antarctic ice fields. Again, the extent of large ice sheets is climatologically significant, given their ability to affect ocean temperature, shallow and deep circulation patterns and also the amount of sunlight reflected back into space. For the solid Earth, satellite altimetry provides the detailed shape of the Earth's gravitational field which, for example, can be related to the processes of convection in the Earth's mantle which are thought to drive plate tectonics.

For such a project, accurate positioning of satellites by laser and radio Doppler tracking would be essential. The accuracy of altimetry is expected to be 10 cm or so over a range of 1,000 km, and laser tracking can measure heights to comparable or greater accuracy. In comparison, the elevation amplitudes of oceanographic phenomena range between 10 cm for currents on continental shelves, 30 cm for changes in heat storage (over periods of months) and 1 m for tides and the Gulf Stream. Accuracy to 10 cm is required for useful analysis of the gravitational field.

On the political aspects of the project, the idea is that the Advisory Board for the Research Councils (ABRC) should make a bid for an extra £18 million from the Department of Education and Science over ten years to cover hardware and software development. Suppliers of the project argue that it should give the United Kingdom a lead in the technology and interpretation of precision altimetry. But the budgets of SERC and NERC would need to be maintained to provide back-up

## Harvard to pay up record amount

### Washington

**HARVARD** University has agreed to repay \$4.6 million improperly charged to federal research grants. The agreement settles a six-year investigation of Harvard's management of research grants by auditors from the Department of Health and Human Services (HHS, the parent agency of the National Institutes of Health), which found that funds were routinely transferred from one project to another in order to cover cost overruns and to ensure that all available grant money was spent. Audits of the school of public health and the medical school found evidence of \$3.8 million in improper charges as well as tens of millions of dollars in charges that could not be verified because of inadequate documentation.

When the audit of the medical school was released last year, Harvard officials said they had no intention of repaying anything more than a token amount (see *Nature* 300, 3; 1982). Explaining the change of heart, Harvard's vice-president

for finance, Thomas O'Brien, said that although an audit commissioned for Harvard for fiscal year 1978 showed an "error rate" of less than 2 per cent, which the university felt was acceptable, the government "could accept no error rate at all". O'Brien said that given the cost of litigation, Harvard agreed to pay up.

Under the agreement, the university will repay \$1 million in cash immediately. The remaining \$3.6 million will come from adjustments in overhead payments on research grants to the university over the next three years. According to HHS, the final figure was arrived at by extrapolating the government's audit findings, which cover 1975 to 1977, up to 1983. Harvard has also agreed to improve its accounting procedures. HSS auditors say the \$4.6 million is the largest single repayment from a university, although in relative terms it amounts to less than 1 per cent of the federal research funds received by Harvard during the eight years from 1975 to 1983.

Stephen Budiansky