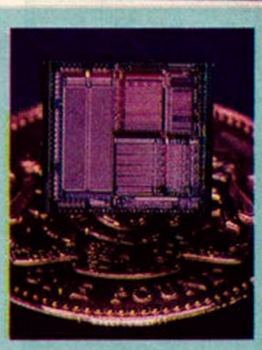
FUTURES



■ *Kuma's K-Max 1 transputer board, already commercially available. It plugs into the ST's ROM port, has a T414 transputer chip and 256k of RAM. The processing speed is 7.5 mips. If you want, a second transputer can be added in the spare socket set. Price for a one-transputer system: £695. Programs are written in transputer assembler on the ST, cross assembled and downloaded via Kuma's "Cascader". The results are then uploaded for the ST to display.*

Kuma are great fans of Perihelion's Helios operating system. The K-Max 2 is designed as a Helios engine, can plug into standard IBM card slots, and has got Loadsamemory – up to 4 Mb. At the moment, due to the fluctuating price of RAM, the K-Max 2 is priced to order, but is typically around £2000 fully populated. There's only room for one T414 or T800 on the board, but extra boards can be plugged in to create a multi-transputer farm.

TRANSPUTERS DO IT IN PARALLEL

What's all this fuss about transputers? Both Atari and Commodore have announced transputer goings-on – ST Amiga Format battled its way through all the hype to discover who's doing what.

In the beginning was the transputer. Well, more or less. It took the efforts of Iann Barron, and a fair bit of taxpayer's hard-earned, but they got there. Now that the transputer chip itself is established as a reliable computing engine, other companies are beginning to exploit it commercially.

Kuma already market a transputer add-on board for the Atari ST, called K-Max. This comes in two models: K-Max 1 has one or two transputer chips (depending on the wadge in your pocket) and 256K of RAM. It's merely an ST-controlled processing unit, not a speed-up board for the ST. The K-Max 2 has up to 4 Mbytes RAM and comes as either an ST add-on or on an IBM expansion card.

Atari themselves have recently announced the Abaq. This is a wholly new machine, which can run between one and thirteen transputers, depending on the configuration. Although not a new ST, the Abaq is promised in both stand-alone form and as an add-on unit for the Mega. The Abaq will run an operating system called Helios, currently being developed by Somerset-based Perihelion Software. Commodore's efforts are a little more foggy. At the 1988 Hanover show they announced a transputer board for the Amiga, but the development is being done entirely by Commodore in Germany. Apart from confirming its existence, Commodore UK didn't seem to know much about it.

Kuma in control

Based in an industrial park in exotic Pangbourne (near Reading), Kuma was founded by John Day and Tim Moore. Despite a good deal of success in the PC and MSX markets (MSX still being big in Brazil!), Kuma haven't expanded wildly. They now boast around 15 employees, quietly mixing conventional database and spreadsheet programs for IBM PCs with leading-edge transputer work.

Tim Moore, the technical powerhouse behind their Transputer development, is the MD of Kuma and an ardent admirer of parallel computing as The Way Forward. "It became clear after the Norway conference of 1981 that RISC chips were really on the way, and that someone was going to go and do a proper job," he says. "We considered both the transputer and the Acorn ARM for our projects – the ARM is a good chip, better in some ways, but

OCCAM'S RAZOR

The official transputer language, Occam, gets its name from a 14th century philosopher (William of Occam) who proposed that "infinite entities should not be duplicated beyond necessity" – in other words, keep it simple

PERFORMANCE TESTING

Benchmarks are supposed to be a standard measure of processor performance. Two highly criticised floating-point testers are the Whetstone and the Dhrystone. It transpires that Dhrystone is a pun on Whetstone; the originators thought a Whetstone to be a wet stone and thus came up with dry stone. On seeing their mistake they added an h and removed a space.

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in the end we plumped for Inmos because we needed technical support from the chip manufacturers and Acorn just weren't prepared to talk to us. Inmos were very helpful."

Kuma received their first transputer chip in mid '86, and developed K-Max 1 within six months. "There was a body of opinion within Inmos at the time that Occam, their parallel programming language, was the only valid way to program a transputer. As an engineer I didn't accept this", Moore says, "and wanted to get my hands on the assembly language. Inmos wouldn't tell, so I worked out from the chip what the machine code had to be. Then a week before K-Max was launched I rang Inmos and said, 'Look, we're about to publish a transputer Assembler – surely it makes sense to use your standard mnemonics?' There was a long silence on the phone, then two days later a complete instruction set arrived by post. As a result, our developers' kit was the first ever transputer assembler on the market."

K-Max has been on sale for 18 months now, so what do its users do? "It's primarily a research tool, not many home users would have a genuine use for one," Moore reveals. "Many of our customers are defence contractors who won't discuss their projects, and of course education is a big area. We've also got an Occam simulator running on the ST, and that has sold very well to universities. Students can write small Occam programs without the need to actually have a transputer."

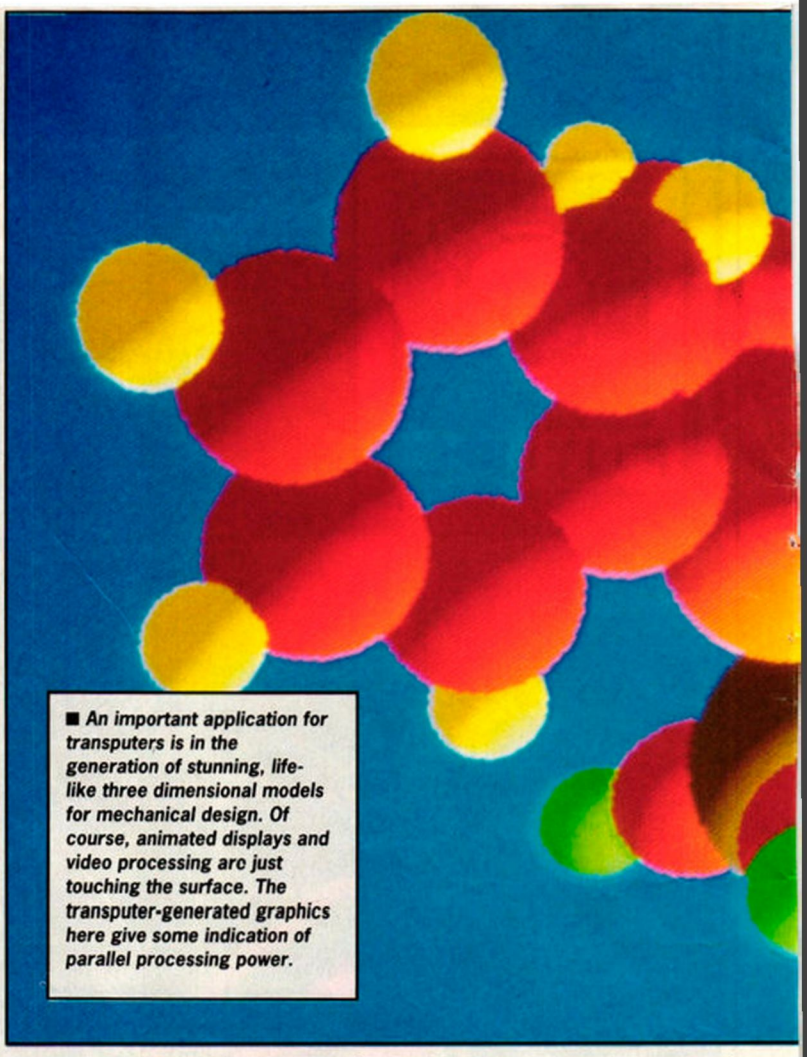
Kuma aren't planning an Amiga version of K-Max, though they comment that there's no reason why the K-Max 2 shouldn't run in one of the PC slots on an Amiga 2000 with a Bridge Board. "The transputer is a pretty good first go," Moore concludes. "Better chips will be along, but Inmos have done an excellent job for a first bash."

SUN PUNS

The name Perihelion derives from the word describing the closest transit of the earth to the sun, loosely ascribed to midsummer's day. This happens to be the name of a restaurant in Cambridge owned by Jack Lang, the founder of Perihelion hardware. Since Sun computers also make a very desirable RISC-based work station, the literal translation 'closest to the Sun' applies well to Perihelion's transputer machine.

WHAT'S IN A NAME

Although the Abaq has been well covered in the press, the name itself is only provisional, and is unlikely to be used for the finished machine as it's already used by a company in Belgium. Some wag suggested it might be called the 'Eclipse' as it would kill the Sun (see SUN PUNS to find out why this is funny).



■ *An important application for transputers is in the generation of stunning, life-like three dimensional models for mechanical design. Of course, animated displays and video processing are just touching the surface. The transputer-generated graphics here give some indication of parallel processing power.*

Letting the sunshine in

Tim King of Perihelion software bases his offices in a converted brewery in Shepton Mallet, Somerset. Hidden away on the top floor are some very fast micros with some very sober software engineers programming them for all they're worth. Out of their work will come the production version of the Abaq's multi-tasking operating system, Helios.

King left Cambridge for the academic wilds of Bath, where he lectured for three years while completing a PhD involving both database design and the workings of distributed systems (networks). After this he went to work for Metacomco,



■ *Tim King of Perihelion, architect of the Abaq's Helios operating system*

which at that time he describes as "three people working over a garage in Bristol" – very reminiscent of the carly days of Apple Computers. It was while at Metacomco that King wrote much of AmigaDOS for Commodore, before starting to look for projects that would further his interest in RISC. King knew Jack Lang, the founder of Perihelion hardware, from his days at Cambridge and became interested in his ideas for a graphics workstation based around a RISC chip.

They singled out three candidates for the core processor of their new micro: the Fairchild Clipper, Acorn's ARM and the Transputer. It was not initially the parallel processing architecture that attracted them, but the

WHAT IS A TRANSPUTER?

The transputer itself is effectively a super-fast microprocessor. It is one of the new breed of 'Reduced Instruction Set' chips, or RISCs for short; RISC chips work fast because there are very few basic machine code instructions available and they are all processed extremely efficiently. The idea is that the core instructions are the most commonly used ones. The transputer has 16 basic instructions, one of which is an 'extend' command to allow it to run a set of more complex (but less efficient) microcoded commands.

The chips that are currently causing a stir, the T414 at around £300 and the T800 at over £500, are both 32-bit processors. They have a RISC-type central processing unit, fast on-chip ram (2K on the T414 and 4K on the T800), an external memory interface capable of addressing up to 4 gigabytes and four serial links which may run at up to 20 Mbits per second. Both chips come in an 80 pin square package.

From a programmer's point of view, the transputer offers three registers, a stack, and workspace and instruction pointers. The handful of instructions available are purpose-built for loading storing and manipulating values on the stack and altering the flow of control. This could prove limiting if it wasn't for the wealth of microcoded instructions – less efficient and slower perhaps, but greatly increasing the processor's capabilities.

Like other RISCs, the Transputer has on-board communication. This means many Transputers can be connected together into a Transputer 'farm' – which can lead to staggeringly powerful multiprocessor systems. On its own the transputer isn't that special, but when it's used with a battery of others amazing things are possible. Of course, parallel programming produces problems. Programmers are used to the serial nature of traditional processors, and trying to think in parallel (let alone program) is daunting.

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