DSI-32 Series

Definicon tries not to play favorites, offering cards driven by different microprocessor families. The DSI-32 is powered by National Semiconductor's 32032 microprocessor with a 32081 floating-point processor. While their different processors give them different operating characteristics, the DSI-780 series and the DSI-32 series are similar in almost every other respect. The manual, the software, the diagnostics, and the principles of operation are all virtually identical to the DSI-780 package; the optional compilers are from different companies, but support the same language. Perhaps most importantly, like the DSI-780+, the card worked fine the first time. This review discusses only the differences between these two series.

The DSI-32 is available in models ranging from the 1-megabyte DSI-32/10 at $1,495 to the 4-megabyte DSI-32E/4 at $2,895—both driven at 10 MHz. While the DSI-32 is not quite the ferocious number crunching demon that the DSI-780+ is, it's certainly no slouch. While it is true that the 32032 processor cannot keep up with the 68020 in straight numerical operations, it does support virtual memory—something completely lacking in the DSI-020. Unfortunately, the disk accesses required by a virtual system would be very much slowed by the narrow PC bus, so this might not be such an advantage. While the DSI-780+/4 measures 1.3 million Whetstones, the DSI-32 measured only .3 million Whetstones.

Both the DSI-780 and the DSI-32 series products have their uses. If you prefer the 32032 instruction set or architecture, there is nothing about the DSI-32 package to stop you from having one for your PC. If all you want is pure numeric capability, maybe Definicon's 68020-based offerings would be more to your liking.

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DSI-32 series
Definicon Systems Inc.
31324 Via Colinas, #108/9
Westlake Village, CA 91362
(818) 889-1646
List Prices: DSI-32E2, $2,295; DSI-32E4, $2,895; FORTRAN, Pascal, and C compilers, $400 each (FORTRAN compiler requires FORTRAN run-time library license, $175); graphics package, $165.
In Short: Operationally, this series of plug-in accelerator cards is almost identical to Definicon's DSI-780 series, but it uses National Semiconductor's 32032 microprocessor with a 32081 floating-point processor. While these cards are slower than the DSI-780 series, they offer virtual memory, which the 780 series lacks.
CIRCLE **655** ON READER SERVICE CARD

Opus Systems 32.32 and 32.16 Cards

The Opus System 32.32 accelerator card is not at all like any other card tested in this review. While installing one of the DSI cards is similar to putting a VAX at the disposal of your PC, installing an Opus 32 card is more akin to actually subordinating your PC to a UNIX machine. The Opus 32 system replaces PC-DOS with a full implementation of AT&T's UNIX System V, Version 3. Hence the Opus 32 gives PC users previously unattainable access to the large body of engineering and other technical software that has been written for UNIX since the operating system's birth at Bell Labs.

The Opus 32.32 comes with either an 8- or a 10-MHz National Semiconductor 32032 CPU with a 32081 floating-point unit and a 32082 memory management unit. The base card comes with 1 megabyte of RAM, but you can add optional 1- or 3-megabyte RAM cards. A slightly less expensive 32.16 card uses the compatible 32016 CPU.

The Opus 32 system comes with a good manual. The hardware installation section is clearly understandable, with large pictures of each DIP switch to be set. Installing the UNIX software was somewhat more complicated, but it, too, was clearly documented. Standard software includes a full port of AT&T's UNIX System V (Release 2.0, Version 2)—42 floppies' worth. Of these, you'll have to install about 10 floppy disks to operate the system. The re-

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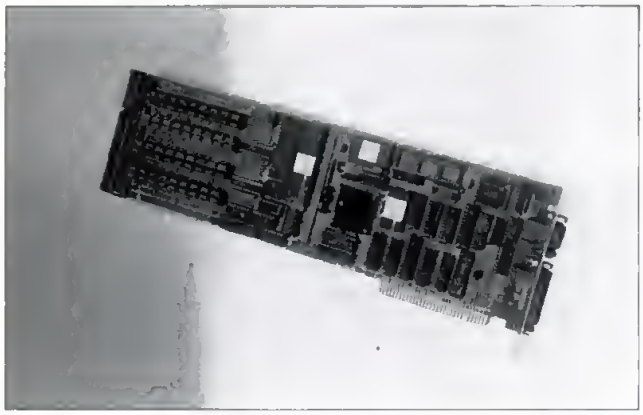
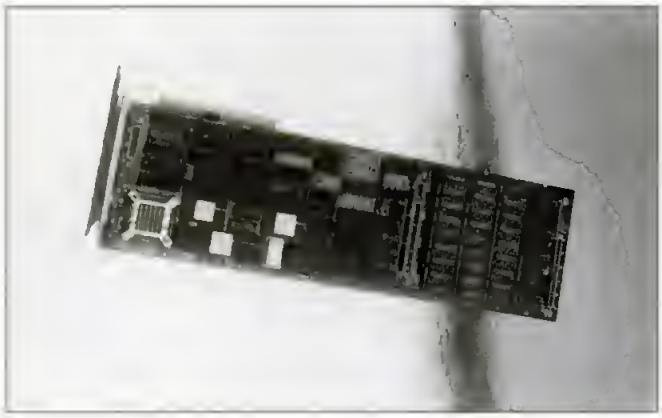
Opus Systems 32.32 and 32.16 cards
(part of Opus 532 Personal Mainframe package)
Opus Systems
20863 Stevens Creek, Bldg. 4
Cupertino, CA 95014
(408) 446-2110
List Prices: Opus 532 Personal Mainframe including the 32.16 accelerator card, UNIX System V license, diskettes, manual, 2 Mbytes of memory, and National Semiconductor's 32016 processor, $2,990; Opus 532 Personal Mainframe including the 32.32 accelerator card, UNIX System V license, diskettes, manual, 4 Mbytes of memory, and National Semiconductor's 32032 processor, $4,550.
In Short: Unlike the other cards reviewed in this series, the Opus system replaced PC-DOS with a full implementation of AT&T's UNIX System V, Version 3, operating system, which gives you access to the wide range of technical and engineering software written for UNIX. The Opus 32.32 card comes equipped with a National Semiconductor 32032 CPU, 32081 FPU, and a 32082 memory management unit.
CIRCLE **654** ON READER SERVICE CARD



The DSI-32 is powered by National Semiconductor's 32032 micro with a 32081 floating-point processor. Though it is not quite the number-crunching demon that the DSI-780+ is, it does support virtual memory.



For the most part, installing the Opus 32 system transforms your PC into a 32032-based UNIX machine. But since the PC performs I/O for the Opus 32, you can still use RAM-resident programs you installed before entering UNIX.

maining disks include a C compiler, a RATFOR compiler, a full set of games, and a host of other utilities.

Opus Sytems' UNIX requires a minimum of 5 megabytes of disk space to operate, but it really works more comfortably at the 10-megabyte level. UNIX can occupy either its own disk partition or a single, very large file as its virtual disk, which means that it isn't necessary for you to partition your hard disk.

Once installed, you can conveniently enter UNIX from DOS at any time via the command "UNIX". While in UNIX, you of course cannot access DOS commands. The host PC becomes completely occupied in performing I/O for the Opus 32 card. For the most part, the PC is totally transformed into a 32032-based UNIX machine. Except for one fluke: since the PC performs keyboard I/O for the Opus 32, you'll still be able to use any RAM-resident programs that you installed in memory before entering UNIX. It was quite a curious feeling to enter *SideKick* from UNIX! While in UNIX, you can shell to DOS for occasional DOS commands or use a few DOS commands that have been added to Opus's UNIX. UNIX can be brought down at any time by entering the command "DOS".

Nowhere is there any mention made of exactly how many users Opus Systems' UNIX can adequately support, but the *Opus Systems Newsletter* mentions attaching 24 users to a single AT.

While not strictly a number cruncher, the Opus 32 can hold its own against accelerated ATs and the like. If you need UNIX capability, the Opus 32 just might be the answer.

Inmos D700 Card and T414 CPU

The PC-bused D700 card from Inmos Corp. is really more of an evaluation product than a performance card itself. The D700 card, which contains a single T414 CPU, also known as a transputer, basically enables you to see just how the transputer works. The 15-MHz T414 on the D700 runs at an average of 7.5 million instructions per second (MIPS). Using Inmos-provided optimized software, this combination can perform a single-precision floating-point add or multiply in roughly 16.8 milliseconds.

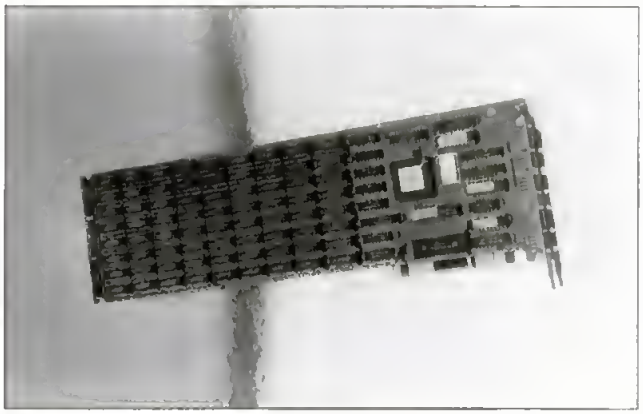
Transputers are also available in speeds up to 20 MHz or 10 MIPS. Besides the CPU, the card contains 2 megabytes of RAM. The communications lines of the T414 are brought out to connectors that allow the card to be attached to a separate chassis containing further transputers.

Although the T414 is a 32-bit microprocessor in its own right, what really sets the transputer apart is its ability to work well with other transputers in large networks of processors. The transputer chip has four serial lines that allow the chip to be connected directly to four other transputers. The chip has the ability to communicate information with the other processors at the same time that it is working on a problem. This design adapts the chip well to multiprocessor applications. For instance, when presented with multiple problems, the transputer begins to work on the first problem and passes the remainder off to its neighbors. They pass the solutions back to the T414 transputer when they are finished. This efficient "divide and conquer" approach to computing gives networks of transputers the attractive potential for very large throughput.

Inmos provides its own Occam programming language, which was specially designed to allow you to take full advantage of the transputer's parallel processing capabilities. To accomplish this, the Occam programming language includes some rather interesting additions to typical programming primitives, such as special constructs to the serial lines that can be accessed even while other operations are going on. Parallel operations are controlled via the PAR and ALT commands. PAR (parallel) and ALT (alternate) have the following format:

```
PAR                ALT
case 1:            case 1:
case 2:            case 2:
  .                  .
  .                  .
  .                  .
```

PAR does not continue with the next instruction until each of the cases has com-



The D700 card lets you see how the T414 CPU, also called a transputer, works. Although the T414 is a 32-bit microprocessor, what sets it apart is its ability to work with other transputers in large networks of processors.