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Available: Wide variety of languages and other software for use with either OS-9 or FLEX.

All GIMIX versions of OS9 can read and write RS color computer format OS9 disks, as well as the Microware/GIMIX standard format.

All OS9/FLEX systems allow you to software select either operating system.

Introducing the GMX-020™ - MC68020 Processor Board from GIMIX
MC68020 32-Bit Microprocessor

The GMX-020 CPU Board uses the state-of-the-art MC68020, the newest and most powerful member of Motorola's M68000 family of microprocessors. The MC68020 is a full 32-bit processor with separate 32-bit address and data buses, an on-chip instruction cache, and a coprocessor interface. The MC68020 is object-code compatible with earlier members of the M68000 family, with enhancements to the instruction set providing additional support for high-level languages and systems software. The processor also supports demand-paged virtual memory.

The pipelined internal architecture of the MC68020 allows overlapping execution of instructions, and can result in a net instruction execution time of zero under certain circumstances. This, along with the on-chip cache and other enhancements make the processor typically 400% more powerful than its predecessors. The 16 MHz version can process instructions at a sustained rate of 2 to 3 million instructions per second (MIPS) and at burst rates exceeding 8 MIPS.

GMX-020 Processor Board

The GMX-020 CPU Board is designed for maximum utilization of the power of the MC68020, while retaining compatibility with the already proven GIMIX line of peripherals such as DMA disk controllers and intelligent I/O processors. The board features:

- An MC68020 processor operating at a 12.5 MHz clock rate (16.5 MHz optional when available)
- A 4K byte (1K long word) instruction-only physical address cache operating at full processor speed (no wait-states). The on-board cache can be operated in any one of four modes to optimize cache utilization for a particular operating system or application. The cache RAM can also be used as high-speed (no wait-state) RAM when the cache is not enabled.
- A high-speed, discrete Memory Management Unit (MMU) that supports multi-user, multi-tasking operation and demand-paged virtual memory environments. Use of the MMU causes no increase in memory access time. In addition to dynamic address translation, the MMU associates four separate attributes with each 4K segment of memory: a write-enable bit to protect shared text, a "valid" bit to flag segments containing valid data, a "dirty" bit to flag segments that have been modified, and an "access" bit to indicate that a segment has been used. The standard MMU configuration supports 4 Megabytes of virtual memory with up to 16 separate segment maps. Other configurations can allow up to 8 Mbytes of virtual memory, or up to 64 separate maps.
- An optional floating-point coprocessor (MC68881) that directly extends the architecture and the instruction set of the processor to include floating-point data types, full support for IEEE Rev 10.0 high level math functions, and also transcendental and other standard math functions. All coprocessor calculations are performed to 80 bits of precision.
- Six levels of prioritized autovector interrupts from seven sources. Two interrupt sources are internal to the board, three are from the bus, and two (non-maskable) are from sources connected directly to the CPU board.
- Three separate hardware prioritized channels for external DMA devices. Simultaneous DMA requests on different channels are arbitrated by the board on a channel priority basis.
- A 20-bit external address bus for up to 1 Megabyte of physical memory space (RAM and I/O). The I/O devices occupy the upper 4K bytes of the 1 Mbyte address space. Two separate areas are defined within the I/O space, each with optimum timing for particular I/O devices. (Note: The I/O timing will not support any 6800/6809 peripheral devices such as the 6850 or 6821. Serial and parallel I/O is supported only through GIMIX intelligent I/O processors.)
- Two EPROM sockets that accept 8K, 16K, 32K, or 64K x 8-bit industry standard devices for up to 128K bytes of on-board firmware. The EPROMs are addressed above the 1 Mbyte RAM space, with auto-mapping of the restart vectors to low memory on power-up or reset.
- A full-featured hardware time-of-day clock/calendar with battery backup, which can also generate interrupts at one second intervals.
- A separate "tick" generator that can generate interrupts at precise, jumper selectable intervals ranging from 10 microseconds to 20 minutes. Interrupts from the "tick" generator can be enabled or disabled under program control, and have their own priority level to minimize overhead during context switching.
- A separate voltage regulator board that powers the board and provides standby battery power for the TOD clock. The regulator board receives its input from the standard power supply in the GIMIX mainframe.

St. James's University Hospital

Beckett Street, Leeds LS9 7TF
Telephone 0532-433144

NON-KEYBOARD DATA ENTRY TO A 6800 MICROCOMPUTER

A J Hall
St James's University Hospital
Beckett Street Leeds LS9 7TF

INTRODUCTION

Digitisers or graph tablets convert graphical coordinate data from a diagram, map, chart recording or menu into digital form for analysis or processing by computer. Coordinate points, which must lie within the active area of the digitiser, are specified by touching them with a pen-like stylus. The Summagraphics "Bitpad One" (Trade Mark) is an example of what is available commercially; it operates on the magnetostrictive principle with a current pulse being sent along a "send" wire lying at right angles to a magnetostrictive wire mesh laid beneath the pad surface. The current causes the mesh dimensions to change and the resultant strain wave is detected by coils within the stylus. An inbuilt microprocessor calculates the coordinate position of the pen from the time taken for the wave to reach the stylus, it also senses whether the stylus tip microswitch is closed or not and sets a flag accordingly. Depending on the type of Bitpad the data is then output, either in 8 bit parallel or in RS232 serial format.

Modes of Operation

The mode and rate of sampling data points can be predetermined by internal switch settings or be selected under software control; the latter is more flexible especially if the Bitpad is interfaced to a microcomputer. The RS232 interfaced Bitpad is controlled by sending an ASCII character to it: this selects the desired sampling rate of coordinate pairs and the operation mode. The modes are as follows:-

Point Mode - on depressing the stylus and closing the tip microswitch the bitpad outputs an X, Y coordinate pair and flag for stylus up/down.

Stream mode - the flag and coordinate pair are output continuously while the stylus is either in contact with the pad or close to its surface.

Switch Stream Mode - depression of the stylus to close the tip microswitch causes a stream of coordinate pairs and flags to be output until the stylus is lifted to open the tip microswitch even though the tip still remains in contact with the pad.

Data Format - RS232 serial and arranged as below

XXXX, YYYY, F CR LF

The line feed (LF) is optional and switch selectable: the data is in ASCII BCD format where X = X axis value Y = Y axis value, F = 0 or 1 and flags the state of the tip microswitch.

INTERFACING THE BITPAD

I have used an RS232 Bitpad connected to a SWTP 6800 microcomputer via a serial interface at Port 0. The baud rate and stop bits of the Bitpad should, of course, correspond to that of the interface. Commas are used to separate each block of coordinate and flag data and the string is terminated with a carriage return. The format is identical to the keyboard input expected in response to a Basic "Input" statement so to communicate with the bitpad only the I/O vector in SWTBUG has to be changed - from Port 1 to Port 0. This is done by a "POKE" statement to alter the contents of \$A00B (40971 decimal) from 04 to 00. This alters the port address from \$8004 to \$8000.

Directly accessing the Bitpad from your Basic program in this manner means that only the point mode can be used: it generates one set of coordinate data when the stylus is depressed, the other modes produced strings of data and these will not be acceptable. So machine code subroutines are necessary utilising SWTBUG INKEY input routine and detecting the carriage return to separate the coordinate pairs and flags. However for many purposes the point mode is all that is needed eg selecting options on a menu or specifying specific points on a curve.

At the end of any access to Port 0 the I/O vector should be reset to Port 1 so that the keyboard can be used for debugging the program during development. The routines are as follows:

SELECT POINT MODE

This is done once at the start of your program unless you intend to change modes while the program is running, in which case it should be called a subroutine.

```
POKE (40971,0) REM SELECT PORT 0 I/O
PRINT "P" REM P sets pad to point mode
POKE (40971,4) REM I/O to Port 1
```

As we are working in Basic the port addresses have to be in decimal unless your Basic allows hex characters.

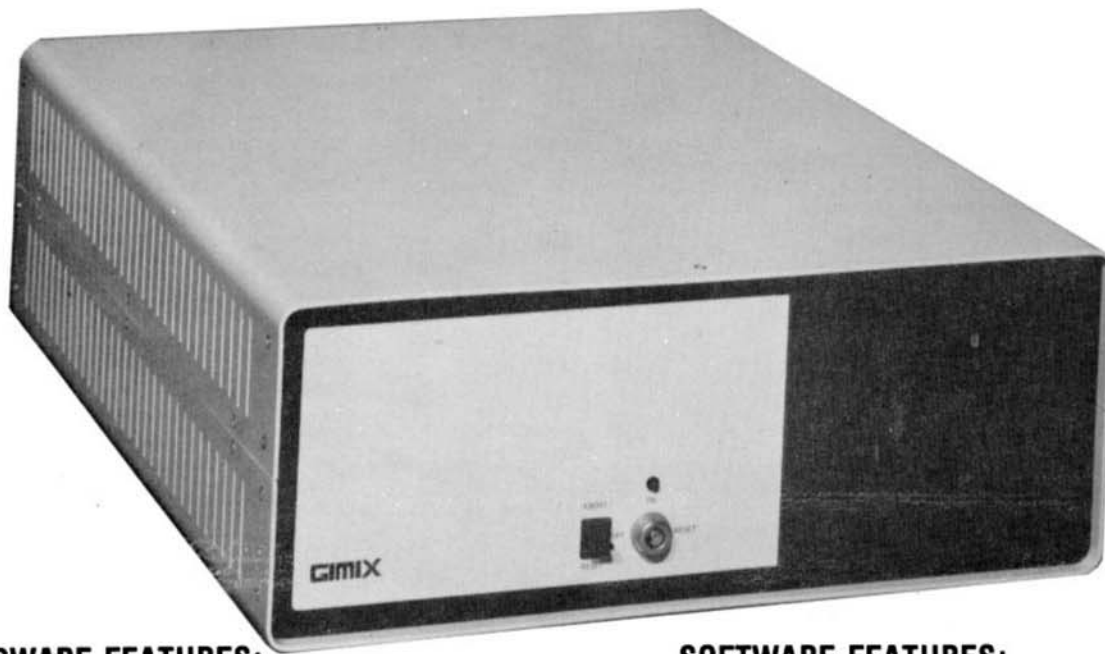
INPUT OF DATA FROM BITPAD

Having selected Point mode a general routine is needed to get data from the pad. One is given below.

```
POKE (40971,0) REM I/O to Port 0.
INPUT X,Y,F REM wait for input
POKE $40971,4) REM I/O back to Port 1.
```

GMX 68020 DEVELOPMENT SYSTEM

A Multi-user, Multi-tasking software development system for use with all 68000 family processors.



HARDWARE FEATURES:

- The GMX-020 CPU board has: the MC68020 32-bit processor, a 4K Byte no wait-state instruction cache, high-speed MMU, and a full-featured hardware time of day clock/calendar with battery back-up. It also provides for an optional 68881 floating point co-processor.
- 1 Megabyte of high speed static RAM.
- Intelligent Serial and Parallel I/O Processor boards significantly reduce system overhead by handling routine I/O functions. This frees up the host CPU for running user programs. The result is a speed up of system performance and allows all terminals to run at up to 19.2K baud.
- The system hardware will support up to 39 terminals.
- Powered by a constant voltage ferro-resonant power supply that insures proper system operation under adverse AC power input conditions.
- DMA hard disk interface and DMA double density floppy disk controller are used for data transfers at full bus speed. The DMA hard disk drive controller provides automatic 22-bit burst data error detection and 11-bit burst error correction.
- A selection of hard disk drives with capacities from 19 to 85 Megabytes, removeable pack hard disk drives, streaming tape drives, and floppy disk drives is available.

SOFTWARE FEATURES:

The UniFLEX VM Operating System is a demand-paged, virtual memory operating system written in 68020 Assembler code for compactness and efficiency. Any UniFLEX system will run faster than a comparable system written in a higher level language. This is important in such areas as context switching, disk I/O, and system call handling. Other features include:

- compact, efficient Kernel and modules allows handling more users more effectively than UNIX systems, using much less disk space.
- UNIX system V compatibility at the C source code level.
- C Compiler optimized in 68020 code (optional).
- Record locking for shared files.
- Users can share programs in memory.
- Modeled after UNIX systems, with similar commands.
- System accounting facilities.
- Sequential and random file access.
- Maximum record size limited only by the disk size.
- Multiple Level Directories.
- Up to 4 Megabytes of Virtual Memory per user.
- Optional Languages available are: C, BASIC, COBOL, FORTRAN, LISP, PROLOG, SCULPTOR, and ASSEMBLER. In development are ADA, PASCAL, and FORTH.

Included with the UniFLEX Operating System are a Utilities package, editor, relocating assembler, linking loader, and printer spooler. Options include a fast floating point package, library generator, and a sort-merge package.

The GMX version of the MOTOROLA 020 BUG is included with the system.

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GIMIX, Inc., a Chicago based microcomputer company established in 1975, has produced state of the art microcomputer systems based on Motorola 6800 and 6809 microprocessors. GIMIX systems are in use in Industry, Hospitals, Universities, Research Organizations, and by Software Developers. GIMIX was awarded the prestigious President's "E" Certificate for Exports in 1984.

GIMIX INC. 1337 WEST 37th PLACE • CHICAGO, ILLINOIS 60609 • (312) 927-5510 • TWX910-221-4055