

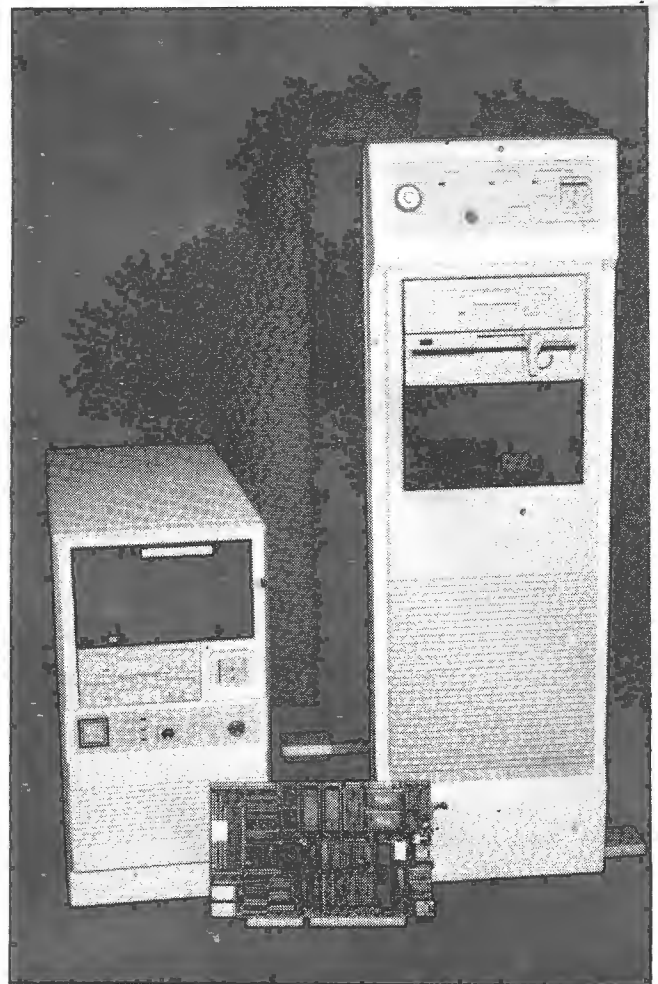
## GUILFORD MP-32 Computer System

The Guilford MP-32 Multiprocessor computer is the marriage of the 6502 & 65816 CPU architecture and the industry standard PC AT Bus structure. Under it's SSDOS\* operating system, almost all programs written for OHIO SCIENTIFIC's OS-65U can be run with little modification required. New programs can be coded in BASIC or 65816 assembler code with incredible ease over the old ways. Since the BASIC has many new commands which replace most old POKES and add lots of new features, coding is a snap.

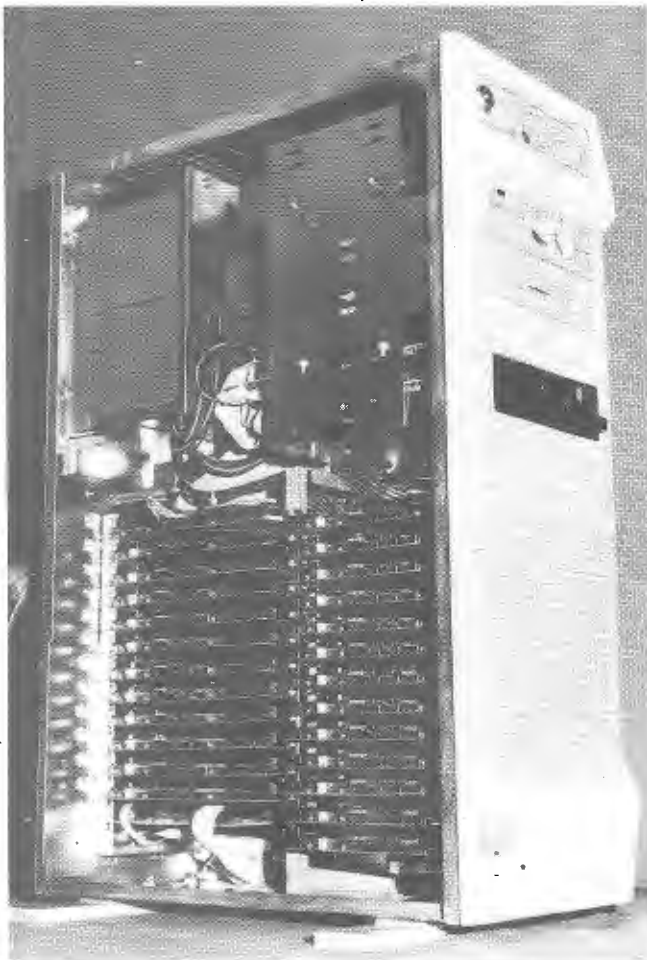
The BASIC now features 16 digit string math, and most of the overlays like CRT & EDITOR are built in. The system allows for 64 global or shared printers/modems etc. and 1 local/private printer port for each CPU. Since each CPU/User in the system is a Master, it can Reset, Boot, and Run a program without any regard for the activities of other users. There are no master executive programs to worry about as there are in both network and timeshare systems. Up to 32 CPU/User cards can share one set of printers, disks, and data files, simultaneously, giving a potential of 88 MIPS (million instrc/sec), in one enclosure. That's a tremendous amount of POWER.... Data processing power.

Use of industry standard peripherals means better availability and simple data transfer capability. Both 5" 360k & 3.5" 720k diskettes are supported using the same disk format as do PC's. Hard disk storage can go into terrabytes (Trillions). Backups are really fast at 5MB per minute to streaming tape cassettes. Adding additional users takes just minutes. Simple and quick. The mini tower configuration allows up to seven users with two global serial ports, or six users with an extra multi IO card. The full size tower can hold up to 25 users.. in the same box!

The Conqueror version packs 300 M/B of hard disk, a whopping 25 CPU/User cards, 3" & 5" floppies, tape, 275 watt PS & 32 ptr ports.



The standard Mini and Tower enclosures hold up to 7 users and varying disk/tape drives. Full size Tower can be configured for more.



The multiprocessor system works by having each independent CPU contain the logic to let the rest of the system know what it's doing, but only when the others need to know. Therefore there is no time wasted by a disinterested user. Access to the main bus is obtained by first observing that it is free, requesting it's use along with any others who may wish access, then using it in order of priority until all are cleared from the request queue. This method assures random access while taking minimum time to resolve multiple requests. Conflicts can be resolved in 1/100th the time it takes the other multi-processor system.

Like the newest of the 32 bit PC's, Prom memory is copied into high speed RAM on reset. This allows reuse of memory sections after they are used for startup. Useful programs contained in the PROM allow use of the computer without any storage devices on line. A MINI-DOS monitor allows complete diagnostics to be run without external devices, and use as a standalone computer with programs stored in PROM and started by reset or power-up.

The use of the standard PC AT bus configuration allows many of the I/O cards designed for the PC to function with a few minor modifications. Only drivers need to be added if the device is unique or non-standard, with the most common already included. While the design was optimized to allow shared use of the PCAT bus, the PC would also have to be a single plug in card design able to float or deassert all common bus signals. Otherwise a PC can be connected like a peripheral accessible to all users.

Standard physical hardware makes maintenance and support easy. SSDOS\* and the 65816 CPU's make what it does to data..AWESOME!

August 20, 1991

To: OSI enthusiasts  
Past & present  
Everywhere

re: Then & Now

Dear Enthusiast,

Well it's difficult to know where to start. Somehow or other you or the address you received this letter at, is/are involved with or have fond memories of, a computer known as Ohio Scientific, or an operating system called OS-65U. Could it really be 10 years since Mike Cheiky sold out to MA/COM and we were forced to watch the decline of what may well have been the most capable computer never to be fully realized? Yes, it has and for many it's just a memory. For others it may be a source of constant aggravation. Still others may still be eking out a living from it. The rest just think it's a dead horse and wonder why on earth anyone would be writing a letter about it in July of 1991. Well read on!

My name is Steve Guilford. In January 1979 I bought a start-up computer store whose sole inventory consisted of a C8-P, a C1-P, a Centronics 700 series printer (effective in later years as boat anchors), and a surplus SEARS Cartrivision VCR. I employed one voluptuous young girl to demo a biorhythm program on a 24 character display, and collect full payment of list price for a reservation against the next batch of computers to arrive, paid for by the advance payments no one complained about making.

Anaheim Computer & Video Equip. was off and running.....fast!.. Within months we became the West Coast distributor for OSI and it seemed we could do no wrong, selling computers like crazy. And video games like crazy. And generating obscene profits from our exclusive offering of video movies for rent. (3 / \$20)

No one had yet heard of the IBM PC, and none of us who attended NCC or that first Comdex show that year would have thought IBM would ever venture into our little world of electronic gadgets. And who could have guessed that everyone would want to get into the video rental business, or that video games would disappear?

A moment ago I intimated that 10 years was a long time, now suddenly it seems only yesterday. I guess to say things have changed would be a classic understatement. It's hard to describe the emotion I feel while typing this on the same ADDS Viewpoint CRT I've been using all those years. If only we'd had a real word processor, or a real spreadsheet, or a DMS that worked well and was thoroughly documented. Toss in source code for the operating system and the world might never have heard of MS-DOS.

Funny though, even without all those neat things we pushed OSI over the \$30 mil mark in 1980 and thought if we could fend off CP/M we might keep going.

A lot of clever, dedicated, and interesting people, (not to mention some real characters) were involved with making it happen. Many of them came from the industry they were hoping to help automate. Some of them were looking for something new and exciting. Some seemed like mystical guru-wizards. Who among us wouldn't remember the name Rick Whitesel? All those independent VAR's (never heard that term back then) who managed to do magic and create working software solutions, each and everyone completely different. All saleable, many supportable, but none really transportable to the many would-be entrepreneurs crying for software to make the magic box more saleable to business.

But thankfully we had an integrated accounting package called **AMCAP**. We sold or bought a C3-OEM, or a C3-B (somewhat equal to what everyone else sells now), a CRT, a printer, soldered some cables, wished them or heard GOOD LUCK, and the customer was up and running. Well, sort of. AMCAP wasn't perfect for everyone. I never had, or heard of, a working field installation; except when Ed Cooper came to town. He said he had dozens of satisfied customers. Oh well. Didn't seem to dampen anyone's enthusiasm.

Soon the customer became enough of a programmer to realize he needed to hire one to teach him more. I'll bet some are still plugging away. Anyway they would learn together and eventually had debugged some of the most sophisticated software running on any kind of computer then or now. I still hear stories now about industry insiders just learning of a silent independent solution to a problem that none of the pros or popular PC's could handle.

Now they're up and running. Or, they were until a few years ago when the creeping blue tide made them think they'd better move to a PC platform while their OSI was still running. Major major hassle! Some made it, many moved to standard solutions and complained of the lost features. Or, they moved to a mini to maintain the multi-user feature. Still others heard the buzzword... Networking... and proceeded to back-up to farther than where they started originally; some going bankrupt in the process.

OK> (get it?) Now I'll tell you why all of this has relevance to any one reading this letter. Specifically the last group who tried to move their sophisticated multi-user software to some kind of PC, either networked or timeshare, and discovered they didn't have the patience for the time it would take to rewrite it or just couldn't give up some of the features we all take for granted. Like the FIND command! (ring any bells?) Anyway, what sets this particular group apart, is that they went in search of an alternate solution. Something newer and faster that might still run their OS65U Basic programs; maybe even more reliably.

OSI/Isotron et al, having undergone three changes of ownership, nearing a fourth, had abandoned 300 series Turbo-Dos for UNIX. They also offered the Portland board which would speed up Level3 timeshare systems. Designed by Keith Brown, it used two 65C02 CPU's running at 4 Mhz, each with 48k RAM, on a single board.

This allowed more users and higher throughput, but still needed the host Level3 hardware and software to function. The DBI DB1 had the same 2Mhz clock speed as Level3, but had a separate CPU and 10k more RAM, per user, making it significantly faster than Level3 timeshare. Designed by Art Hughes it was truly a breakthrough product. The design allowed true multi-processing with independent computers sharing the same disks, printers; & I/O.

Later the DB2 offered 4Mhz speed and DMA disk I/O, but complex intercommunications pushed the old backplane design up to it's performance limit, somewhat shy of original OSI specifications. Like the Portland board, the DBI boards were still tied to the old Molex 48 pin bus, with it's inherent physical problems, and requiring the same bulky and expensive components to house. It took significant resources to configure/install or repair them.

For years, I had tried to convince the various owners of OSI/MA/COM OSI that our software was our strength and the rest was just a vehicle that should disappear into the background, not requiring much thought, support, installation, or maintenance. I just wanted a simple inexpensive multi-user computer which would be easy to configure and install, and simple to support. These were certainly not the hallmark of the OSI 48 pin bus.

I asked DBI to build an inexpensive tabletop 4 user, but they said they were not interested in the small end, preferring to concentrate on very large systems with many users & disks.

Finally, I realized that I was going to have to do it myself. So, in early 1986, with much determination and a background in photography, hypnosis, and aircraft design/sales/construction, I started designing my computer. I spent night & day reading all the books and literature I could get from electronics distributors, libraries, consultants, and salesmen who called. After several months I had a design, and proceeded to wirewrap my first prototype; sitting on the sand at Huntington Beach.

Everyone I knew thought I was crazy since for all intents and purposes, the market would probably be dead by the time I had working boards. But, eccentric projects somehow appeal to me.

I decided that if I adopted the IBM AT bus as a platform and could use all the off the shelf cabinets, power supplies, and related hardware, I could concentrate on my board and software without needing a large engineering staff. Oh, sure I'd have to learn to use an oscilloscope, and later a logic analyzer, just to get it all to work, but I wouldn't have to answer to anyone but me. And I could have it do anything I wanted.

I had learned 6502 assembly language the year before, (out of necessity), so writing the various I/O drivers and BUS manipulation routines seemed like an exciting challenge. I bought a MacIntosh computer and a simple circuit board design program, and proceeded to drag a mouse to create each and every trace by hand. Since I had decided to program my own logic chips I was able to optimize the design to allow it to be used as a CPU, or as an I/O card with just a couple of jumpers and a different set of chips. So, I only had to lay out 1 board. (Thank GOD!)

So here's the skinny. My computer consists of a cabinet, a power supply, a backplane, industry standard hard & floppy disk and tape drives, a common I/O card and from 1 to 32 CPU cards all plugged onto the same bus. They run 16 bit 65816 processors (as does Apple IIGS) at 8 Mhz and are fully 6502 compatible. HCMOS technology logic consumes much less power than TTL logic, creating much less heat to dissipate. Besides requiring a smaller power supply, and smaller or fewer cooling fans, it is much quieter, while greatly enhancing reliability.

Each CPU card has 2 serial ports; one for CRT and one for local printer/modem. The standard I/O card has common semaphore lock memory, real time clock, 2 global serial printer ports, and a SCSI interface. It supports many of the same disk and tape drives used by the industry standard PC.

Yes!!! It can read both 3.5 and 5.25 inch IBM PC diskettes.

By using some of the normally unused interrupt lines on the IBM PCAT BUS I was able to achieve an incredibly fast bus sharing scheme that requires no direct communication to non-requesting users allowing bus access in less than 1/100th the time needed by 2 DBI users. Throughput is increased as much as 10 times!

By storing a mini DOS monitor in the local prom, a CPU can perform diagnostics without need for any storage drives on line. Since the I/O routines stored in prom are copied to shadow RAM upon RESET, (just like newer 386 PC's) they run at full clock speed, and allow reuse of memory normally reserved for booting.

I call my operating system SSDOS\*. It is very fast. Much of it is assembled in 65816 code. Many new BASIC words have been added which replace old POKE's. That is because after hundreds of hours of backwards engineering I figured out how to separate BASIC from the old disk and printer drivers. The final result is a DOS separate from the Basic language, allowing it's use for all disk/tape/semaphore/clock/printer/modem etc... without need for Basic being present. Really neat for custom applications.

Multi-user drivers are transparent to any Level3 or DBI Level5 commands, and most Level1 syntax is legal even if inoperative. (i.e. POKE's to I/O distributor @11686 and CA-10 offset @19798) While code changes may ultimately be required for proper function, virtually every program will come up running, with more than 80% needing no modification.

SSDOS\* is very compact. It includes 16 digit string math and all overlay equivalents for CRT/EDITOR/IO etc without using up any USER RAM. Your programs can use almost 40k of the min. 64k user memory. Of course if you use some custom overlay unique to your software it can still be installed to the usual places.

All I/O drivers are table driven allowing easy change from one type/size to another. Eight drive letters are supported with any of them having any number of physical drives linked as one. Devices-'E' & 'I' can have up to 1000 segmented partitions. The new printer/semaphore drivers allow printer devices 1-64 by direct statement or mapping to a device already coded in Basic.

These features and many more allowed those aforementioned customers to bring their custom multi-user software forward to a more capable computer without all the scary uniqueness of the old hardware platform. Many of them have abandoned conversion projects altogether, and are actually writing new software for this new machine. They say they cannot believe the incredible speed and are absolutely tickled with the new features and the day to day reliability. Many import data from PC diskettes to DMS type databases. All love the 5MB/min streaming tape backup.

These upgrades have been installed all over the country in the last four years, getting rave reviews. It would seem everyone should know about it by now, since this is the information age.

However, since every few weeks, I hear from someone saying they just heard about my computer, I thought I would make one last attempt to reach everyone we've ever collected in our database to make sure that they know that there is a solid, supportable, reliable computer that will run software written for OS65U.

It is REAL!!! It does WORK!!! It is simple to install and to maintain. Using phone jacks and cable for CRT connection makes hook-up a snap. It makes moving a workstation cost only pennies and take only seconds. It's really optimized for simplicity.

Standard models are usually available from stock, and custom configurations are usually shipped within a week, all by UPS.

Bottom line: It works, it's available, and competitively priced.

With almost four years in the field, near zero failures due to manufacture or design have been encountered. With 32 user capability, (actually installed, by QFI, and running 2 years) and 64 printer ports supported, it should handle most applications.

So next time you ponder upgrading an old C3-B or DBI system, or finish tweaking software you've worked for many years on, but never sold for lack of solid reliable hardware; Take heart! And, consider using the best possible computer for the job.

The Guilford MP-32.

For detailed specs or pricing, please write, fax, or call us.

Sincerely,



Steven F. Guilford

Computer Science  
PO Box 2228  
Corona, CA 91718  
(714) 434-1124  
Fax: 434-0554