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Systems Group Model 2829 Microcomputer

MODERN microcomputer systems are exhibiting great computing power and functionality unimagined only a few years ago. One such product is the Systems Group's Model 2829. Priced at $9565, the basic system comes with 128K bytes of RAM, four serial and two parallel I/O ports, one double-sided floppy, and one 10M-byte hard disk. Among the software available are MP/M 1.1 at $435, MP/M II at $585, and Oasis at $995. CP/M comes as standard equipment.

Characterized by its manufacturer as well-suited for business, industry, and educational needs, the Model 2829 is in many ways the most powerful system we have tested to date. But don't let sheer power fool you: we found some questionable items that have to be considered before an investment in a system like this is justified.

The Micro That's a Mini. The 2829 is unlike any other system we've reviewed since it couples Winchester storage with multi-user/multi-tasking capability. Moreover, the 2829 should be considered a minicomputer simply because it offers the computing functionality of much larger machines.

This computer uses a 4-MHz Z80A microprocessor and is built around an 8-slot, S-100 bus motherboard that meets IEEE 696.1/D2 conventions. Meeting these conventions implies that the system can handle 8-bit and 16-bit processors while allowing master/slave bus operations—something that this particular manufacturer hasn't taken full advantage of.

The heart of the system is the Model CPC-2810 processor board—which includes the Z80A, four serial ports, two parallel ports, a real-time clock, and a vectored interrupt structure. Working in conjunction with the processor board are two Model OM6400, 64K-byte bank-selectable dynamic memory boards for single- or multi-user applications. In addition, the System 2829 includes a Memorex 101 Winchester 10M-byte drive and a Model FD1160 double-density/double-sided floppy capable of 1.2M bytes of storage.

Interestingly, the Memorex drive is being replaced with Fujitsu or Quantum drives. This is because the Memorex drives have exhibited reliability problems, and are of limited capacity. Also, since many system designers experienced difficulties with the original Memorex drive, even Memorex has abandoned the design in favor of the Fujitsu product.

The 2829's floppy disk system is supported by the Model FDC-2800 floppy disk controller, that has onboard sector buffering and full direct memory access (DMA) functionality. This card uses the NEC-765 controller in concert with a Z80A DMA chip. The Model HDC-2800 hard disk controller from Morrow Designs can control up to four daisy-chained Winchesters.

Although the processor board has both serial and parallel ports, all interfacing to the outside world is handled via personality modules that are mounted on the back panel.

The Supply That Protects. In the case of a high-performance microcomputer, the power supply not only provides system power but also serves to protect the system against loss of power due to power-line surges. The 2829 system's supply is a linear design that provides unregulated voltages of 8 V at 16 A, ±16 V at 2.5 A, and exhibits a 20-ms holdup time after removal of ac power. The regulated portion of the supply is 5 V at 5 A, 24 V at 5 A, and − 5 V at 1 A.

The power is tied to the motherboard midway in the bus structure. This is important to ensure that sufficient power is provided to all boards on the bus—a factor frequently forgotten by many S-100 bus system designers.

In conjunction with the power supply, there are two unfused convenience outlets located on the rear panel of the enclosure. These can be used to provide power to printers, terminals, modems, etc. However, care must be taken to ensure that the maximum switched load never exceeds 9 A.

The power-supply system also allows either 115 V ac or 220 V ac to be used, and features a HI/LOW switch for operation with less-than-predictable local power sources.

System cooling is accomplished via a rear-mounted fan. This fan provides a Venturi effect, moving hot air up and away from the lower component areas while circulating air over the card rack and past the disk systems before exhausting it. Fresh cool air is brought in via a filter on the front panel.

What We Tested. The system we evaluated consisted of a 10M-byte Winchester, 1.2M-byte floppy, 128K-byte dynamic memory, and four serial ports with I/O personality cards. There was no parallel port implementation. Everything is housed in a very sturdy metal enclosure that requires only sliders to be added to fit in a standard 19-in. RETMA rack.

As shipped, three ports—0, 1, and 2—came configured at 9600 baud for terminal operation and the fourth port (3) was configured for printer operation at 300 baud. Our model employed the serial ports as dual asynchronous receiver transmitters. We could have requested synchronous I/O (SIO) ports—an option available at additional cost.

To bring the system up, we attached a MicroTerm ACT 1A CRT, configured for 9600 baud on port 0. We then booted CP/M from the distribution diskette, as suggested by the documentation. We used this for initial system checkout to determine if the system did, in fact, sign on—which it did, with a fair amount of speed.

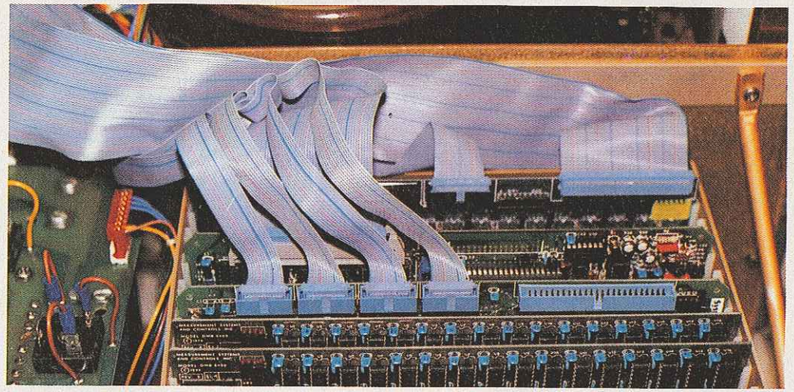
Unlike other formats that store the CP/M system on the reserved tracks of the diskette, the Systems Group stores CP/M as two files—CPSYS.SPR and CBIOS.SPR. The first contains Digital Research's Console Control Processor (CCP) and BASIC Disk Operating System (BDOS) modules in their page-relocatable format. A loader, provided by the manufacturer, is used to load these files and execute them, thus speeding up system operation. This precludes reloading the CCP on warm boots: a jump to location zero is effected instead, and a disk reset is performed.

Using this technique, one version of CP/M fits any memory size. In addition, since reserved tracks aren't used, you can add additional drivers to CP/M without worrying about running out of space to store the system. We liked this since it meant we didn't have to SYSGEN each diskette.

Once we were assured that the system did, in fact, operate, we then re-booted using MP/M 1.1. Booting takes place either at power on or by depressing the front panel RESET switch. When a diskette is placed in the floppy drive, the system boots from it; otherwise a boot takes place off the hard disk system.

Once booted under MP/M, we formatted the hard disk—the operating system takes into account any premapped defects and locates others, mapping them into the BDOS and directing the system to reserved tracks. The version we booted allows the use of both the floppy and the hard disk, and only one console. The system we transferred to the hard disk supports three consoles and a printer. (You can establish up to 14 consoles, but you have to "grow" the system in terms of memory and I/O modules.)

Hardware Evaluation. In the case of the motherboard, the designers followed current conventions by providing passive termination, ground planes between the signal paths, and full power grounds. Scope tests of the board, with the processor performing transfers between the disk controllers and memory, showed no crosstalk or ringing. Other signals were clean square waves without "rounding" or degraded rise time due to board capacitance.



Using an 8-slot motherboard, a hard-disk controller is combined with a floppy controller having DMA capability.

We like the diagnostic LEDs on the CPU and memory boards that advise when a segment is being used and for how long. We "fooled" the machine by partly disabling a segment (a 16K-byte block) to force an error. This error was then easy to locate using the LEDs.

Although the power supply does have fold-back time in case of power failure, the 2829 does not employ this feature to automatically save any data currently in memory. However, fold-back time is used to prevent a hard-disk crash since sufficient time exists to pull the head back from the media.

We rated the hardware very good, and found the design conservative and straightforward in its handling of the bus and processor. The only serious hardware fault we found involves the front-panel air filter. For this class (and price) of system we expected a form-fitted, fiber-glass design.

The Software Key. As stated earlier, the system was set up for operation under MP/M 1.1 with three consoles and one serial printer. Implementing MP/M was easy since the Systems Group had done all the work; we merely moved it to the hard disk. Unfortunately, with this implementation you either operate with floppy disk and hard disk, and one console, or have just the hard disk available to several users. This is because MP/M requires that the floppy-driver area be made to support user maps. MP/M II takes care of this problem, and with a properly written BIOS (called an XIOS in MP/M) will give the best of both worlds.

Among the first tests we performed was our obligatory speed test in BASIC. Here we use 10 GOSUB 10, which pushes all the memory contents onto the stack until an error is generated. In the case of the 2829, the time needed to produce an error was 0.1 second (average) out of ten trials.

A real challenge came with the compiling of Digital Research's chess program, written in PL/I. We used three minutes as our benchmark, as measured on an Altos 4-MHz system. In the case of the 2829, we came up with 110.4 seconds for ten trials. This included compiling, linking, and loading the code. The test was also performed using CP/M. At least 56K bytes of memory is required, and MP/M restricts you to 48K.

We performed the first trial using the hard disk system, but also achieved high throughputs on the floppy system. It was slower, but still took only 2.05 minutes. The timing for this task is significant because the compiler first had to be read in, next the code (or segments to be compiled) was read in, then internal comparisons were made to tables and library functions used, and finally the code written back out.

Because the manufacturer touts the 2829 as ideal for multiusers, we attached three terminals and a printer for a full configuration. Our first task was to go in and PIP (move) a 128-entry directory from user-0 to several user areas on the disk (you have a total of 16 user areas per logical disk). By setting up for automatic operation, and causing operations to take place between several areas at the same time, we were able to exercise the hard disk to its maximum. Part of this test included setting the time, using the time-of-day function in MP/M, and printing it out every minute.

Our next step was to perform several tasks on the system simultaneously. We asked console 1 to use user-0 and play chess. Then we instructed console 2 to set up an assembly in user-1, which we then made a background operation by employing the MP/M detach command (invoked by entering a control D from the keyboard). This freed console 2 for other operations. We also set up a spooling operation of a previously large text in user-2 and began a text-editing project in user-3. Meanwhile, console 3 was used as a general purpose utility port to monitor all system operations and slide in and out of the other areas.

We found little or no degradation of operations, except when console 3 invaded another console's user space (this is a shortcoming of MP/M 1.1 that has been taken care of in MP/M II).

Some Critical Thoughts. Undoubtedly the 2829 is powerful. But this power brings some new headaches, requiring that you go through a relearning process. For example, a "console" is different from a "user." The *console* is the physical device connected to a physical port, the *user* is the area on a disk that the console is allowed to use for handling data. These user areas can be public or restricted— making difficult your first implementations of MP/M.

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Although the system's power supply is quite good, it doesn't fully protect against power surges or dropouts. In one case, for instance, it allowed the floppy disk head to bang, causing a misalignment to which some NEC-type floppies are prone.

We really like the fact that the floppy system didn't care about diskette data density or format—it could read anything except diskettes formatted on a California Computer Systems controller. We would have preferred an MP/M implementation allowing all consoles and the floppy system to be used at the same time. We don't believe the business user will want to change disks to get the system into another configuration.

The documentation supplied is very good. Its technical content is among the best offered by any computer company. Information for reconfiguring is readily available, with sufficient details so that code can be quickly modified. However, there is very little here directed at the casual user (no manual). Most of the information is for the system integrator or computer store. According to company officials, this will be remedied, probably by the time you read this review.

The Systems Group went through a great deal of effort to implement the 2829's operating systems so they would be useful. Unfortunately, by planning to implement operating systems like Oasis, rather than sticking with well-supported systems, their efforts are diffused. And since the 2829 is aimed at business and industrial applications, it would be a plus if the System's Group would offer communications packages such as the Remote Terminal Batch Emulator that Lifeboat Associates provides for IBM communications. (A company spokesman did report that the Systems Group is planning to add networking capability, plus the ability to pool resources from remote locations, later this year.)

Conclusions. The Model 2829 is only one of several 2800-series configurations available from the Systems Group. We found it to be highly reliable, well built, and meeting all the specifications claimed by the manufacturer. We didn't feel, though, that it offered anything unusual relative to other computing systems in its class.

Where software is concerned, Oasis, though a very fine operating system, isn't as heavily supported as CP/M or MP/M. And those Oasis packages that are offered often carry a high price tag. So keep this in mind. We'd advise that you bypass MP/M 1.1 and get MP/M II, but be careful on the implementation.

—Carl Warren

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