

The
Homestead High School
Homebrewed Computer
System

by Chris Espinosa

The Homestead High School Computer System

We purchased the parts to this system in June of 1976 to add to the facilities available to our high school computer club. We were then composed of approximately 30 members, a Hewlett-Packard 2007 minicomputer system (2114 CPU, 8K bytes of core x 16 bits, teletype, high-speed punch and reader) which was working in Educational BASIC, an on-line ASR33 teletype, an on-line 300 baud Tektronix graphic CRT, and Compucorp Beta 326 super programmable calculator with TTY interface and cassette drive. The majority of our members could only program in BASIC, and their activities centered around homework and games. Most of our equipment was donated as a tax write-off for the donating companies, and was at least 10 years old. We wanted to get into what was happening now, learn about microprocessors and assembly language, talk to other schools and hobbyists, and discover what the real world was doing with computers.

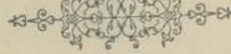


The reasons we chose this particular system are many. There were three main objectives: cost, compatibility, and expansion. The Altair and IMSAI systems offered great compatibility and expansion, but the cost for even a basic system (CPU, power, front, panel, memory) was above \$900, and we wanted a lot of peripherals and memory. The Apple computer was the best complete system we saw (and we may get one eventually) but the cost was still too high and expansion seemed difficult. After observing most of the available systems on the market, we set down some solid priorities: S-100 (Altair) buss for memory and peripheral expansion (so we were not locked into a specific manufacturer's options and prices), a hardware front panel (we would be working much in machine language, and the single-step and debugging options are better than in a monitor-based system), a popular processor, a reasonable library of compatible programs, and a CPU/Front panel/power supply price of under \$300.

After much thought, we purchased the system you see outlined in the next column. The only delivery problems we had were with the CPU, power supply and the Tarbell interface. These were all factory supply problems and the retailers (Byte Shops 1 and 2) were very helpful with supplying the other components, as well as offering assistance and advice.



We intend to use this system mostly for assembly language programming, and store subroutines for I/O, bootstrapping, floating point math, etc., in PROM. After we have mastered that (HA!) we might write our own language, programs, etc. We also will modify Apple Basic for use with VDM and Tarbell. We are thinking of getting more CPU's and having students do individual work, transferring programs to the main system by tape when they are finished.



CPU: The Western Data Systems "Data Handler", a 6502-based microcomputer on a single 13.75" x 10.5" PC board. It is fully compatible with the S-100 (Altair/IMSAI) buss structure and will support all other compatible boards. The CPU board also has some other features that are described below. In kit form, \$169.95.

Front Panel: A full-function hardware front panel is included on the CPU board itself. Entry is in hex, display from data and address busses is binary. Push-button operation of run, halt, single cycle, single instruction, reset (initialize), examine (incremental), deposit (incremental).

System Buss: Processor Technology 16-slot mother board, fully compatible with S-100 buss. With edge connectors, \$125.00

Memory: 1K on CPU board, and 3 Processor Technology 4KRA memory modules, \$417.00.

I/O: 8-bit parallel port on CPU board is currently being used for decimal display, sense switches.

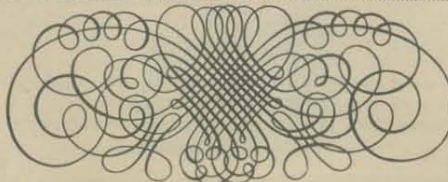
Other peripherals: Processor Tech. VDM 16x64 video board, \$160.00; Tarbell Cassette Interface, \$120.00; Oliver Audio OP-80A Paper tape reader, \$74.50; Processor Technology 3P+S, \$141.00; and a keyboard we scrounged from somewhere.

ROM: Processor Technology 2KRO using 1702's. We do not have the 1702's yet: \$65.00.

Power supply: an IMSAI PS-28 power supply with all needed voltages (+10, ±18). The CPU board gets its single +5v supply via an LM322K 5 amp regulator, complete, \$110.00.

Miscellaneous: Blastmasters Extender board/logic probe, \$35.00; Solid State Music extender board used to connect mother board and CPU, \$8.00; IC sockets for everything, \$50.00.

TOTAL SYSTEM COST: \$1475.45



AND NOW
FOR SOMETHING
ALMOST
COMPLETELY
DIFFERENT

JEAN & HER
FRIEND:
THE COMPUTER

We have received all sorts of interesting material on computing in schools from Jean Rice. Jean teaches a community college course called "Do Not Bend, Spindle or Mutilate" and has had extensive experience working with grade school kids in Edina, Minnesota. If you are thinking of doing something at the grammar school level, I would suggest dropping Jean a line and asking for a copy of the report on her project in the Edina Elementary Schools. She worked with fifth graders:

"The class met for 12 sessions of 45 minutes each with each student having additional time at the terminal scheduled at other times during the school day."

Instruction and learning took place in a variety of modes including short discussion sessions on various aspects of a computer system (equipment, programs, computer usages, personnel, etc.); reinforcement of these discussions using interactive programs; playing simulation games at the terminal; interviewing people working with computers; taking a field trip to a computer company; and viewing a film on the history of computers.



Other activities the students took part in were making computer scrapbooks; making paper tapes; coding messages in an 80-column card; collecting newspaper and magazine articles on computers; making flow charts; writing short computer programs in BASIC and writing computer book reports."

The class was organized around Jean's textbook *My Friend the Computer* which is written in a non-threatening style and covers what computers are, applications, history and programming. The table of contents is not unusual, but the low key presentation and the instructors' guide which is chock full of preprinted ditto master and overhead transparencies ready to use in the classroom are unique.

Jean's address is 5132 Tifton Dr., Edina, MN 55435, and her publisher is T.S. Denison & Co., 5100 West 82nd St., Minneapolis, MN 55437. If you write Jean for her report, it would be nice to send an 8 1/2 x 11 self-addressed stamped envelope with about \$.23 postage.

My Friend the Computer is available from the PCC Bookstore.