

The Small Computer Catalog.



**And Sol Solution chart
showing applications
in business, science,
home entertainment
and management, art, law,
medicine and education.**



One source for quality hardware, software, and peripherals.



That's the Sol plan.



The new Sol-20 is unique.

It's the first small computer designed as a complete system.

Most small computers simply "grew like Topsy" - a memory here, an expansion module there. They weren't conceived or integrated to provide maximum efficiency at lowest possible cost.

Sol-20, a true breakthrough in small computer systems, includes all the essential elements as *standard* equipment — central processor, memory, keyboard and display, software, a power supply, and appropriate packaging.

There are no "surprises." You don't have to buy expensive peripheral equipment to make it run. Its own keyboard and "smart" terminal are built-in.

Use it without being a programming expert.

In fact, you can operate it efficiently without any prior computer experience.

Unlike other small computers, Sol is already programmed to receive your commands the moment it's turned on, thanks to Sol plug-in Personality Modules.

And Sol systems are supported in depth by extensive software and additional peripherals - such as flexible disk memories - so it's appropriate for more sophisticated applications.

Sol computer systems never grow old. Add new modules to update and expand your computer's power.

Sol is easy to use

Sol operates like a typewriter so many applications require no special programming. Packaged in handsome cases with solid walnut sides, Sol computers look good in the living room, office or lab. Sol computers come in kit or fully assembled form.

Sol-20 is a scaled-down big computer system

Use Sol in a variety of applications.

In the home. Home uses are limited only by your imagination. Regulate heat and light to save fuel. Run a complex model railroad. Compute taxes. Play a variety of TV games, not only computer hockey and tennis, but more interesting, more complex games such as TREK-80, where your starship takes on a whole fleet of Klingons. Several sophisticated TV games come with the Sol-20. And you can even design your own.

At the office. Use it as a fullfledged business computer. Use it to compose and edit letters electronically, store and retrieve mailing lists, process orders, maintain journals and general ledgers, and produce statements and reports.

In the lab. Use Sol to reduce and analyze data statistically, control lab equipment, prepare graphics, and fit curves. Sol-20 frees your time and expands your overall capability.

In schools and universities. Use Sol-20 to teach computer programming. Use it for computer-aided instruction. Use it for notes, records and sorting.

So much is standard

Here's the computer with a microprocessor, display and input/output circuitry, memory, full alpha-numeric keyboard, big power supply, handsome cabinet, and software.

Add extras for more power

Extras include a module to help write, edit, assemble, de-bug and run your own programs. There's no better collection of add-on memories anywhere . . . up to 16,384 words per module. Solve additional interfacing problems with our I/O module. Get big system performance with our Helios II "floppy" disk system. Display results on our video monitor. Output on line or serial printer. Other peripherals include joysticks, paper tape readers, A/D and D/A converters, and PROM programmers.

Sol Computers



Sol computers are currently offered in three forms: the Sol-20, Sol-10, and Sol PC.

The Sol-20 Stand Alone Computer

Sol computer systems are currently offered three forms: the Sol-20, Sol-10, and Sol PC.

Sol 20 is the most complete and sophisticated of the three packages, a fully contained "personal" computer able to take on an infinite variety of tasks. Sol-20 comes with:

- 8080 microprocessor, still the most sophisticated computer-on-a-chip available and the "brains" of the Sol-20.
- 1024-character video display circuitry. View your output on any standard video monitor or specially adapted TV.
- 1024 words of static low-power read/write memory (RAM) for program storage.
- 1024 words of static low-power, preprogrammed permanent memory (ROM) takes care of important system "housekeeping" chores. ROM memory automatically readies the computer for your commands as soon as the Sol is turned on.
- a custom designed, beautifully laid-out 85-key solid-state upper and lower case keyboard with cursor keys and arithmetic keypad.
- an audio cassette interface capable of controlling two recorders at 1200 bits per second. Store and retrieve programs and large amounts of data at very low cost.
- both parallel and serial standardized interfaces with connectors on card.
- a complete rugged power supply and quiet cooling fan.
- a handsome case of walnut and metal.
- software including a preprogrammed PROM personality module and a cassette with BASIC-5 language, plus two sophisticated computer video games.

- a design compatible with all S-100 bus products.
- a back plane capable of accepting five expansion modules.

The Sol-10 Terminal Computer

Sol-10 comes in the same handsome package as the Sol-20, but because of limited memory, it is designed more specifically for "smart" terminal applications. Price of the Sol-10 includes case, power supply, and 70-key solid state keyboard. A fifteen key arithmetic pad is optional.

Later you can upgrade to a Sol-20 by adding an expansion backplane, extra power supply, fan and keypad.

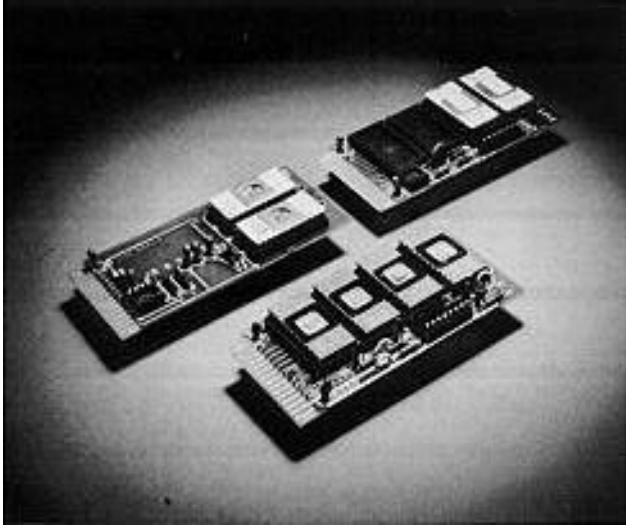
Sol-PC Single Board Terminal Computer

Here's the heart of the Sol system. The Sol-PC is a single printed circuit board with microprocessor, memory, display and interface electronics, and plug-in personality module that is fully compatible with our complete line of memory and interface modules.

The board comes in kit or fully assembled form with all of the following:

- Display: 16 lines of 64 characters per line.
- Character set: 96 printable ASCII upper and lower case characters plus 32 selectable control characters.
- Cursor: Selectable blinking. Solid video inversion. Programmable positioning standard.
- Serial interface: RS-232 and 20mA current loop, 75 to 9600 baud, asynchronous. 25 pin female "D-type" connector on card.
- Parallel interface: Eight data bits for input and output; output bus is tristate for bidirectional interfaces; levels are standard TTL. 25 pin male "D-type" connector on card.
- Keyboard interface: Seven-level ASCII encoded, TTL levels.
- Microprocessor: 8080, 8080A, or 9080A.
- On-card memory: 1024 bytes PROM (expandable to 2048 bytes); 2048 bytes low power static RAM.
- External Memory: Expandable to 65,536 bytes total ROM, PROM and RAM.
- Video signal output: 1.0 to 2.5 volts peak-to-peak. Nominal bandwidth is 7 MHz. Power required ($\pm 5\%$): +5 volts at 2.5 amperes, +12 volts at 150 mA, and -12 volts at 200 mA

A. Personality Modules



Sol Personality Modules allow you to choose three different levels of operation. Software in each module optimizes Sol for a particular application and at the same time provides a measure of general purpose capability. For custom applications and for volume OEM users personality modules are available without memory for three different types of EPROM and two types of factory-mask ROM.

SOLOS, the most popular module, optimizes the Sol for stand-alone computer applications. Choose SOLOS if you intend to use your Sol system to store and retrieve business or personal records, control electronic instruments, perform independent calculations for business, science or education, or any other application where the Sol system will be "on its own" operating independently of other computers.

SOLOS is oriented around use of the Sol's built-in CUTS audio cassette data interface. Programs such as S01-BASIC and ALS-8 can make extensive use of the cassette handling and screen-cursor manipulation routines contained in SOLOS. Commands included are: Dump, Enter, Execute Terminal (i.e. enter Terminal mode), Tape Load (reads CUTS format cassette tapes into memory), Tape Save (stores memory contents on CUTS tape) and Set I/O (permits dynamic switching of input and output devices under manual or program control). With SOLOS the Sol can also be used as a "smart" terminal in conjunction with other computer systems, but ordinarily the SOLED module is the better choice when the Sol system is often used as a terminal.

With the SOLED personality module installed the Sol becomes an advanced editing terminal system. Like SOLOS, SOLED uses the full 2048 byte capacity of its module. It contains programs and routines which allow remote direct cursor addressing and file and cassette tape editing. Data and text can be edited on or off-line and transmitted in blocks under local or remote control. Large cassette data files or text messages can also be transmitted and received automatically from remote locations.

SOLED has the ability to dynamically change input and output device assignments. Stored information can be transmitted via modem, printed on one of several printers or stored on additional cassettes or flexible disks.

CONSOL is a 1024 word low cost personality module which gives minimal capability to the system. Commands include Enter, Dump, Execute, Tape Load, and Terminal. CONSOL permits operation as a low level CRT terminal and is useful for simple stand-alone applications. Full keyboard cursor control, up, down, right, left, home, clear is provided. CONSOL is not needed with SOLOS or SOLED modules because its functions are duplicated.

B. Software



Software is the sine qua non of any computer system. It's the computer power essential. No computer can be more powerful than the software that goes with it.

That's exactly why Processor Technology has devoted more effort to the development of software than other small computer makers. Maybe that's why some of our worthy competitors have taken our source listings, added a few twists and taken title. But the truth will out.

All Sol systems software is designed to make full use of the routines and programs permanently stored in all Sol personality modules. User programs such as BASIC require less memory space, because personality module routines are called up whenever needed for functions such as keyboard input, screen formatting, and cassette tape storage operations. Interface with the user is straightforward and consistent because keyboard commands and control sequences are standardized for all Sol software.

Sol BASIC

Processor Technology offers three versions of BASIC language, each suited to a different application. BASIC-5 is a small version of this versatile language designed for applications requiring just mathematical manipulation without extensive processing of text. BASIC-5 is the perfect language for an introduction to computer programming because it's easy to learn and requires a small amount of memory storage. Many hundreds of programs already written in BASIC work with Sol BASIC-5 and our 8K BASIC as well.

Processor Technology 8K BASIC is a very high speed full function language with all the virtues of BASIC-5's multiple program capability and BCD floating point math. Speed is at least double that of the already fast BASIC-5. For even greater power, we've added strings, multidimensional arrays and multi-line, multi-variable, user functions. Here's the language for full capability systems. For instance, in our instruction manual, take a look at the *Business analysis* program. See how you get more power while using less memory for the working program.

Advantages of Sol BASIC

Processor Technology 8K BASIC offers several unique and unusual features. Versatile print statements provide fully formatted output to multiple devices, from CRT screen to teletype to line printer. Multi-dimensional arrays permit powerful fast processing of any data that can be organized graphically or in tabular form. Several statements are provided to give complete and direct high level language control over system memory and input/output channels. Full capability string functions simplify manipulation

and processing of text and alphabetic materials so they are more straightforward and easy to use than ever before. In short, with this BASIC, no effort has been spared to bring you high level problem solving power.

Extended Disk BASIC has all the powerful features of the 8K memory-resident version and includes disk commands and big system file handling capability. Disk BASIC is perfect for such complex applications as inventory control and payables-receivables accounting.

BASIC CHART

Commands:		BASIC-5	8K BASIC	Extended Disk BASIC
ASAVE	ASCII DISK SAVE			+
CONT	Continue		+	+
CLEAR		+	+	+
GET	tape or disk	+	+	+
KILL	delete file			+
LIST		+	+	+
MEM	multiple programs	+	+	+
NULL	for printers	+	+	+
RESAVE				+
RNUM	Renumber		+	+
RUN		+	+	+
SAVE	tape or disk	+		+
SCR	Scratch	+	+	+
XEQ	Get + Run	+	+	+
Statements:				
CALL	call machine subroutine	+	+	+
CLEAR			+	+
CLOSE	disk file			+
DATA		+	+	+
DEF	define function		+	+
DIM(X)		+	+	+
DIM(X,Y,Z)			+	+
ELSE	if,then,else		+	+
END		+	+	+
EXAM	memory "dump"		+	+
EXIT		+	+	+
FILL	"deposit" memory		+	+
FOR ... NEXT		+	+	+
FREE	free space		+	+
GOSUB		+	+	+
GOTO		+	+	+
IF ... THEN		+	+	+

INP(X),Y	from inport x		+	+
INPUT			+	+
INPUT," "	suppress CRLF	+	+	+
LET		+	+	+
ON	ON . . . GOSUB		+	
OPEN	disk file			+
OUT(N),	to out port N		+	+
PAUSE			+	
PRINT		+	+	+
PRINT USING			+	+
READ		+	+	
READ#N	read file	+	+	
REM		+	+	
RESTORE		+		+
RESTORE	with line #		+	+
RETURN		+	+	+
REWIND	rewind file pointer			+
SET I/O	for peripherals	+	+	+
STOP		+	+	+
WAIT	for input port bit(s)		+	+
WRITE	disk			+
BASIC Functions				
		BASIC-5	8K BASIC	DISK
ABS	absolute value	+	+	+
ARG	16 bit conversion	+	+	+
ASC	ASCII value		+	+
ATN	Arctangent		+	+
CHR	Decimal value of character		+	+
COS	Cosine	+	+	+
EOF	End of file			+
EXP	e ^x		+	+
INT	Integer	+	+	+
LEN	String length		+	+
LOG	Natural logarythm		+	+
LOG10	LOG base 10		+	+
RND	Random number	+	+	+
SEARCH	Search string for string		+	+
SGN	Sign of number	+	+	+
SIN	Sine	+	+	+
SQR	Square root	+	+	+
STR	Convert no. to string		+	+
TAB	PrintTAB(X)	+	+	+
TAN	Tangent	+	+	+
VAL	Convert string to no.		+	+

The ALS-8 Program Development System

Applications with very high speed data manipulations or critical timing elements demand "custom fit" programs and subroutines. High level languages written for microprocessors such as FOCAL, BASIC or FORTRAN cannot always handle these assignments. In these cases the best solution is programs written in assembly language, a language much more closely related to actual real-time computer operations. Assembly language is easy to learn and, with either of our two assemblers, quite easy to use.

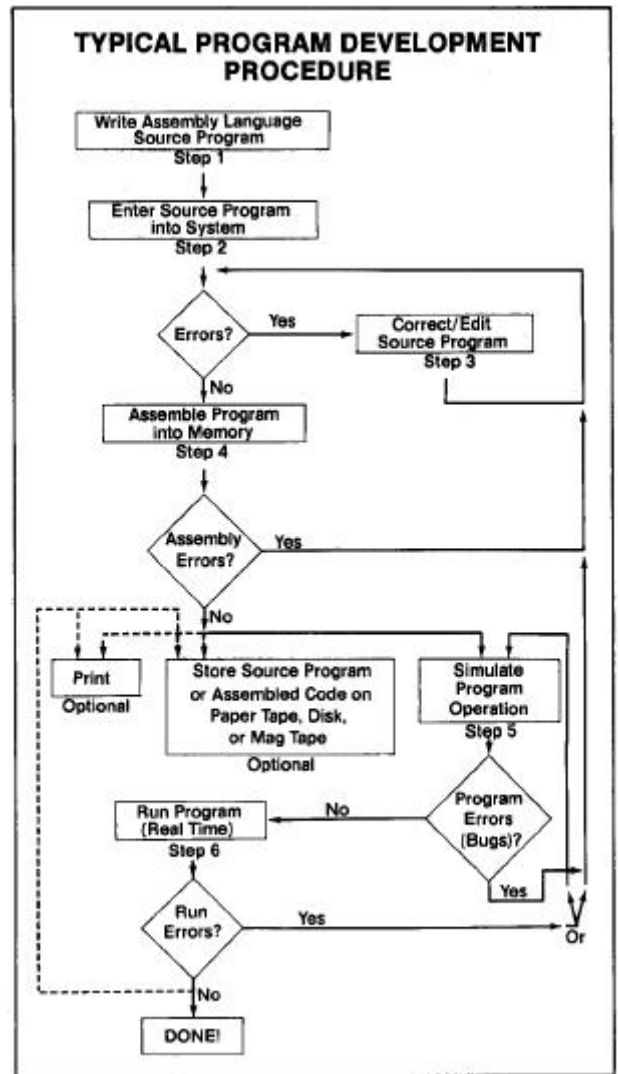
To simplify the development process as diagrammed on the right both Processor Technology assembler programs organize user programs as files.

Processor Technology's much imitated Software # 1 package is a small assembler-monitor system designed for development of small to medium length programs which must be stored in system RAM memory for assembly. The ALS-8 is a more versatile and expanded development package with many additional powerful features.

With the ALS-8 up to six source programs can be stored in memory as named files and called at will to be listed, edited, assembled or simulated. Files may also be stored on tape or disk and can be assembled from any selected input device. Files can be appended, moved, re-numbered, taken apart or linked together. Using the FCHK command, crashed files can be restored.

Assembly language source programs are entered using line numbers from paper or mag tape, keyboard or disk. All editing is done by line number but with the TXT-2 Text Editing software, it becomes possible to automatically add line numbers to un-numbered text.

The Assembler includes labels, comments, expressions and constants, along with relative symbolic addressing, which gives you the ability to chain common symbols from one program to another (even if the other program was assembled at some other time). Also, various assembly error messages are provided to help you eliminate program bugs.



ALS-8, a powerful, new development procedure

ALS-8 has the unusual ability to dynamically adjust the system's I/O handling configuration. The system includes an I/O driver table accessible through use of three resident commands or the drivers themselves. I/O device driver routines may switch themselves on and off or transfer I/O control to a different device driver under program control.

Your development system might have a CRT terminal, a high speed line printer, paper tape reader/punch and a teletype. The System can print a listing to the line printer, then input from the paper tape reader and return console control to the CRT terminal or teletype, all under program control.

Up to 20 custom commands can be entered by the user and called in exactly the same way as the standard resident commands. With the

custom commands, I/O driver table, dynamic I/O switching capability and common symbol tables, you can change your system's configuration and operating modes at any time.

Resident commands are:

ASSM	CUST	ENTR	FIND	MOVE	SYME
ASSME	CUSTD	EXEC	FMOV	NFOR	SYML
ASSMI	CUSTE	FCHK	FORM	SIMU	SYSIO
ASSMX	DUMP	FILE	IODR	STAB	SWCH
AUTO	EDIT	FILES	LIST	SYMD	TEXT

Custom commands: Up to 20 specified by by user.

The ALS-8 requires 2048 bytes of random access memory (4096 is recommended) for symbol tables and system global area, addressed at D000 (hexidecimal).

The SIM-1: The SIM-1 Interpretive Simulator is a program that actually thinks it's an 8080! With the SIM-1/ALS-8 combination, simulate 8080 programs on your Sol, IMSAI, or Altair computer without actually running them in real time. All registers, flags, program counter, and stack are simulated. Try out programs with no fear of crashing your system if something goes wrong. The system doesn't lose control if a program error is encountered (e.g., an incorrect jump or call).

With SIM-1, you can set breakpoints, enable or disable register/memory content printout. I/O instructions can be run in real time, simulated from the system console, or set to predetermined values for any I/O port address.

SIM-1 is a powerful de-debugging tool for 8080 programming.

TXT-2, Text Editor

Adds the world of text editing to your system. Using TXT-2, insert, delete and move single characters, entire lines or portions of lines. Complete text files can be scanned at several user controlled rates, up to almost 2000 lines per minute when used with our VDM-1 Video Display Module.

Both ALS-8 and Software #1 packages are available on "CUTS" 1200 bps cassette or paper tape. The ALS-8 is also available preprogrammed into permanent ROM memory to provide "Instant-on" efficiency and speed.

TREK 80

Based on the NBC television series STARTREK, this machine language program uses

8K of memory and the VDM graphics capability for real time war with the Klingons. No holds barred, they're out to get you from each of the 100 quadrants. You can warp through hyperspace, fire phasers, photon torpedos or experimental rays, or if you just can't go on, selfdestruct. TREK 80 resides and runs in 8K of memory and, if not used with a Sol, requires a Processor Technology VDM-1 Video Display Module.

New 8080 FOCAL (™ DEC)

FOCAL is a high level math language originally written for the PDP-8 minicomputer. Many thousands of FOCAL programs are in existence and now they can run in the Sol. Our original 8080 FOCAL has been updated to include operator precedence and all other standard FOCAL conventions. It also has a driver for VDM-1 or Sol displays and CUTS cassette program save and load. FOCAL is available only on CUTS 1200 bps Cassette and resides in 8K of memory.

Gamepac 1

Show off your Sol system with this line up of video games. Each is included on the CUTS cassette or paper tape.

TARGET - Keeps track of your hits and misses while you blast away at the numerous flying objects. Includes sound effects. You and your family will spend whole evenings at a time with this one.

ZING - Learn hexadecimal arithmetic fast with this video game as two players keep the five balls in the air. If both of you get too good... ZING of course, makes it harder.

LIFE - The Sol or VDM-1 make a good display for the game of LIFE and this version allows two modes of operation. The universe can be flat or wrapped around on itself. The real meaning of life we'll leave to you, but it's fun to watch.

PATTERN - We haven't figured this one out ourselves, but it's sure fun to have your computer doing it. You choose the geometric design and how rapidly it changes. The computer dazzles you with its artistic genius.

All Processor Technology software is distributed on an individual sale basis for personal use. No license to copy, duplicate or sell is granted with this sale. Each software package has been copyrighted.

Sol Solution Chart

THE HOME COMPUTER

THE LEARNING MACHINE

Recipe storage
and diet planning

Interactive learning programs

Entertainment and games

Research data storage
and retrieval

Tax form preparation
Financial records keeping

Thesis preparation

Electronic diary

Sol-20

Sol-20 with SOLOS
personality module

Solos Personality Module

16000 words memory

8000 words memory

B/W TV-Monitor

B/W TV-Monitor

Cassette recorder

Cassette recorder

BASIC-5 language

PT 8K BASIC language

various games

FOCAL language

THE LABORATORY MONITOR

THE LEGAL LIBRARY

Instrumentation control

Word processing
and letter writing

Low cost data reduction

Instant client
records access

Pattern recognition

Legal precedent libraries

SoI-PC

Time keeping
Automatic billing

SoI-20 with SOLOS module

SOLOS personality module

32,000 words memory

8000 words memory

Helios II disk system

B/W TV-Monitor

Color graphics interface

Cassette recorder

Printer

A/D-DAC converter(s)

ALS-3 ROM system

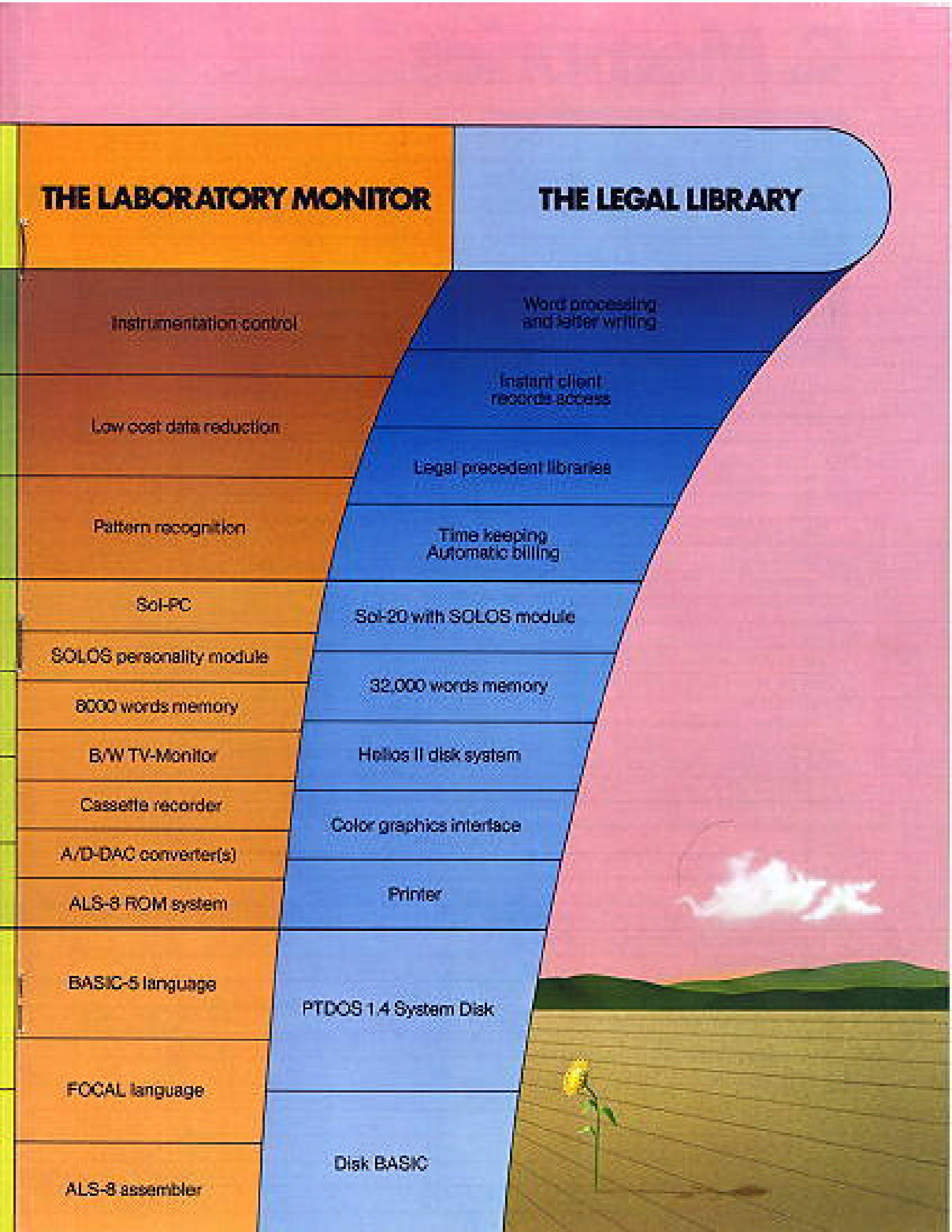
PTDOS 1.4 System Disk

BASIC-5 language

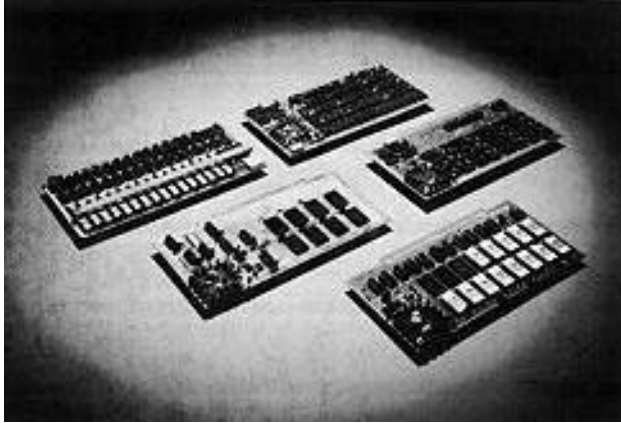
FOCAL language

Disk BASIC

ALS-8 assembler



C. Memories



As your computing needs grow you will inevitably need more memory for storage of larger programs. Processor Technology offers one of the most complete lines of memory modules for small computers available. Choose either the 4096 word or the 8192 word static read/write memories in kit or assembled form. Or add the completely assembled 16,384 word dynamic module. A 2K erasable PROM module for permanent storage is available in kit or assembled form. A powerful software development tool, the ALS-8 firmware module, with its optional firmware SIM-1 and TXT-2, gives you the power to write, edit, assemble, debug and run your own programs the moment power is turned on.

All Processor Technology memory modules include our exclusive "Phantom Disable" feature which is necessary for proper power-on operation of the Sol mainframe. The ALS-8 firmware module also generates this signal as an option when used in Altair or IMSAI computers.

Two low power, highly reliable RAMS - 4K and 8K

Now you can have fast static random access memories with 4K and 8K capacity with all the bells, whistles you need plus Processor Technology quality.

The 4KRA Static Memory Module

Here's a 4096 word read/write static memory which gives you better operation for lower cost than any other 4K memory on the market today. Run it at max MPU speed all the time.

Processor Technology uses only low power static RAM Integrated circuits. So you know you're getting outstanding reliability.

In fact our module draws so little power, you can use standard "D" cells to give you long term back up data retention. We've even built in a battery connector, and recharge circuitry.

The 8KRA Static Memory

PT's 8K memory gives you all the advantages of our 4K with twice the capacity and more flexible addressing circuitry. The 8KRA uses less power than two 4KRA memories.

All address and data lines are fully buffered. Noise immunity circuitry is built-in. The 8KRA has PT's exclusive built-in KSET switch giving you card address offset in 1K increments. Address is set by a dual inline switch easily accessible at the top of the PC board.

Each IC - all 76 of them - has its own top quality IC socket so that assembly, test and repairs are far easier.

16KRA Memory

Fully burned in, tested and assembled, PT's new 16,384 byte memory offers a better price performance ratio than anything remotely comparable. It's the quality, reliable low-cost way to add high density memory to your system. Every board is "burned in" at high temperature for twelve hours before test to insure reliability in the field.

This PT memory offers invisible refresh. There's no waiting while the CPU is running. Worst case access time is 400 nsec. Each 4096 word block is independently addressable for maximum system flexibility. Power is typically 5 watts, the same as most single 4K memory modules. It's got back-up battery capability built in.

2KRO Erasable Programmable Memory

Accepts up to 2048 bytes erasable programmable read-only memory. Stores data even when power is off. Great for your custom loader or monitor programs.

The 2KRO is jumper selectable to fit any one of thirty-two 2K segments within the 65K addressing range of the 8080. Additional jumpers select the appropriate number of "wait" states, determined by the access time of the EPROMs in use.

The 2KRO was designed for either the 1702A or MM5203 EPROMs. EPROMs are not included, but both are readily obtainable for reasonable prices on the industrial and surplus markets.

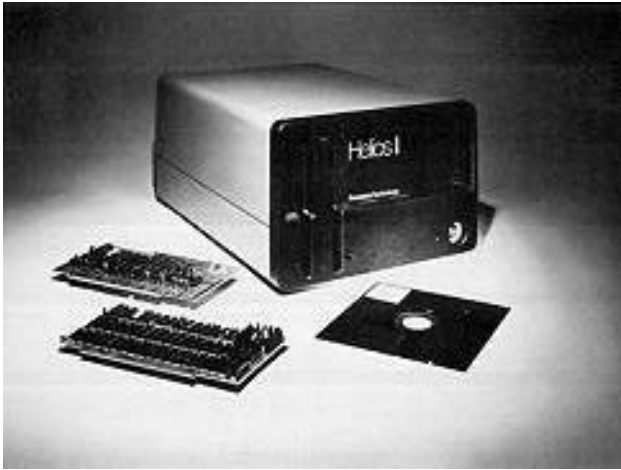
The ALS Firmware Module for fast software development

The ALS-8 is a low power "turn-on-the-switch" program developer. Quickly write, edit, assemble, de-bug and run your own programs. Here's an easy to use, easy to understand software development tool you can begin to use with only 15 minutes instruction.

Two firmware options are available, the SIM-1 Interpretive Simulator, a program that thinks its an 8080, and TXT-2 text editing firmware which adds the world of text editing to your system. For more details on this equipment please turn to the section in this brochure on software. The ALS-8 is only available factory assembled and tested.

PTC MEMORY MODULES					
	4 KRA	8 KRA	16 KRA	2 KRO	GPM/ALS-8
Maximum Capacity (8-bit words)	4096	8192	16,384	2048	5120 to 8192 bytes ROM
RAMS used	91L02A or 2102LPC	91L02A or 2102LPC	Intel 2104 or Mostek 4096 types	1702A EPROM	9216B ROM
Operating Mode	Static	Static	Dynamic	Static	Static
Access and Cycle Time	520 nanoseconds worst case maximum. Typical 400 nanoseconds.	Same	400 nsec access 500 nsec cycle	Dependent on EPROM used. Works over range of 30 to 2500 nsec	450 nsec
Bus Pinout	Plug in compatible with Sol, Altair 8800 and IMSAI 8080 bus	Same	Same	Same	Same
Power: Operating	+7.5 to 10 VDC @ 1.0A max (0°C), 0.8A typical at 25°C. 0.8A typical, 1A max.	+7.5 to +10 VDC at 1.4A typical (25°C); 1.9A max (0°C to 70°C)	+7.5 to 10 VDC C@ 0.4A typical, 0.8A max. +15 to +18 @100mA typical, 150mA max. -15 to -18 VDC @20mA max.	+8 to +10 VDC @ 0.6 max. -15 to -19 VDC @350mA max with 8 1702As installed. (Replacement transformer available for full negative supply in Altair 8800)	+7.5 to +10 VDC @ 600 max. +14 to 19 VDC@ 200mA max. (with SIM-1 and TXT-2 options installed)
Power: Standby	+1.6 to 2.5 VDC at 0.5A max worst case. 0.4A typical	+1.6v to 2.5 VDC typical; 0.9A max (power connector provided for battery connection)			
Address Selection	Dual in line switches	Dual inline switch at top of PC board allows manual selection of any 8K segment on 1K increments	Each 4096 byte page addressable with dual in line switches at top edge of PC board	Jumper selectable to any 2048 byte block of the 32 available.	Fixed at E000 to FFFF (hex)
Dimensions	5.3"x 10.0" (13.46 cm x 25.4 cm)	5.4"x 10.0"	5.4"x 10.0"	5.3"x 10.0"	5.3"x 10.0"
Phantom RAM (for Sol and ALS-8)	Yes	Yes	Yes	No	Yes

D. Disk Storage



Disk Storage

Every computer owner longs for all the advantages of fast random access memory. We're ready when you are to put big system disk memory power at your command. The new Helios II is more than just a floppy disk drive and controller. It's more than just scattered pieces of wire and patches of software. Helios II is a complete, integrated disk storage system which should meet every program and data storage requirement your system is likely to have. The Sol-Helios pair forms a cost effective, high performance system without equal.

Helios II gives you BIG SYSTEM PERFORMANCE

Big system performance is unique to the Helios II. Used in any application requiring manipulation of large data files, Helios II will outperform all other microprocessor based systems by a factor of at least 10 to 1.

Big system performance means all disk and memory buffer space allocation, all file management, all device interaction, comes from the system.

Big system performance means extended DISK BASIC, DISK FOCAL, and Processor Technology software support. DISK FOCAL is provided free on the system diskette and extended DISK BASIC is offered on a separate diskette for \$50. Using these simple languages you can immediately write programs for any application you have in mind. The file operations include random byte or block access as well as update and rewrite in place of standard sequential files. Other application packages are under continuous development at Processor Technology. And in line with our basic software philosophy, each will reach the market at the lowest possible cost.

Helios II comes complete with dual drive, controller, system diskette with DOS, power supply, case, all necessary cables and full systems documentation. A 12K assembly language program to test and report on every aspect of your unit is included too.

Helios II loads an 8000 byte program with a look up in the system directory in 0.3 sec. . . . a speed which becomes truly significant when you are working on two 100K source files to create a third, adding up to a total of 200,000 bytes.

"Firm sectored" Controller raises disk storage to 386,000 bytes per diskette

The Helios controller is a genuine performance breakthrough, increasing formatted data capacity per diskette surface to over 386,000 bytes and at the same time assuring higher reliability than the older IBM format. Standard Helios II storage capacity is over 750,000 bytes. With two dual drives, capacity can be doubled to 1.5M bytes.

Asynchronous data transfers are made directly to memory at an effective rate of one-half million bytes per second. A sixteen byte fifo memory accumulates the data to or from the drives, freeing the computer for useful work. A standard hardware CRCC error test is performed on each transfer of data and an optional read-after-write verification mode is easily selected. The controller requires at least one S-100 bus slot and is fully compatible with Sol, Altair or IMSAI systems.

No need to buy special, expensive diskettes — the controller will pre-format any standard 32 hole "floppy" diskette.

Software

PTDOS 1.4.0 is a proven disk operating system with total file and memory management. Features include:

Complete management of static, dynamic user buffers.

Device files for generality of input/output operations.

System calls for complete file operations from external programs.

Three level, triple option error handling/trapping.

Random/Indexed Files for direct positioning to any word of a file, anywhere on the disk(s).

Command Line Interpreter accepts and executes a string of commands from you or a file.

System utility call performs a random search to the utility operation of your choice.

Helios II can be configured and reconfigured for any size buffer area. Over 40 files can be open at one time. System calls provide standardized access for all file operations from external programs and routines.

The Command Interpreter accepts input from the current command input file to provide direct file operations from the keyboard or another file. Support program calls are identical to commands, but executed outside of the system area (e.g. in low memory).

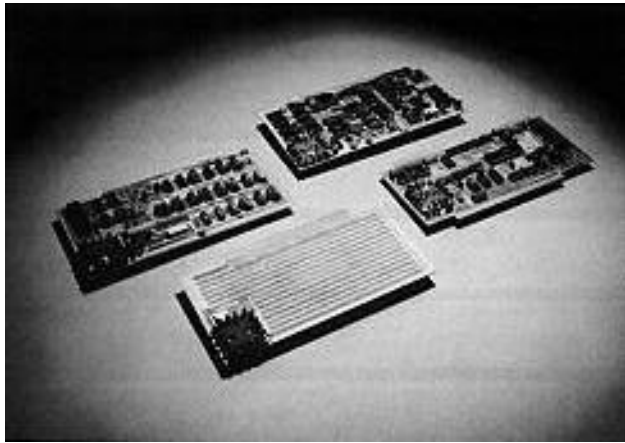
Want more information

A full product description of Helios II is available for \$1. We are also making the PTDOS 1.4.0 portion of the Helios II System Manual available for \$20. (which we credit toward your purchase of the system). But, if you are already familiar with the consistent quality, features and support given to all Processor Technology products, order your Sol-Helios system today. You'll have Big System Performance working for you that much sooner.

New extended DISK BASIC

Further increasing the value of your Helios II is our extended DISK BASIC. This powerful language offers advanced string and math functions plus direct commands (SAVE, RESAVE, ASAVE, KILL and XEQ) and program statements. DISK BASIC is the only available small computer BASIC with powerful disk file handling commands, statements and functions. These features make complex application programs for inventory control, data reduction and general accounting run ten times more efficiently on the Helios system.

E. Interfaces



When we talk about making the complete small computer, we mean interfaces, too. Nothing is left out. There's a video display module designed to work with computing equipment you may already have or auxiliary equipment you may need. There's the Computer Users Tape System so you can add additional audio cassette tapes for expanded program and data storage/ interchange. There's a wire wrap extender board for anyone who does prototyping. If you're troubleshooting, you can see what you're fixing with Processor Technology's Extender Board. You can handle any additional input/output needs of your system with our 3 P+S Input Output Module.

In sum, Processor Technology has built every basic element you need into Sol for integral operation. And we have generated the extra equipment for use with peripheral devices or other existing computer you may have. Processor Technology is dedicated to helping you get optimum computer performance.

VDM-1 Video Display Module

We call it the communicator. It provides almost Sol-like performance for Altair and IMSAI computers. It's a high speed module which has 1024 bytes of random access memory, scrolling and multiple programmable cursor circuitry. Sixteen 64-character lines are generated in a large easy to read upper and lower case font. Data handled by the read/write on-card memory is displayed instantaneously with no interference to the processor. Top display scroll speed is 2000 lines per minute!

VDM-1 lets you display white on black or black on white. VDM-1 offers EIA video output. Terminal mode software comes with the module at no extra cost so you can use it with your existing programs. Most Processor Technology software packages already include versions of these display driver routines, so no time consuming software patching is necessary. The VDM-1 can be used in Sol systems to add a second display output for expanded special applications.

CUTS: The computer users tape system

Here's the low cost high speed audio cassette interface for computer program and data storage interchange.

Operate at 300 bits per second or 1200 bits per second in the new Processor Technology CUTS format, upward compatible with the "Byte/Kansas City" standard. (see Popular Electronics, p. 86, March 1976)

Using CUTS you can load programs ten times faster than with a teletype paper tape reader. You can load Processor Technology BASIC in 58 seconds. There are no critical adjustments. Just about any ordinary cassette recorder will do. CUTS has AGC in both read and write modes. So you won't lose bits at 1200 or 300 baud.

Software on CUTS cassettes costs less than equivalent paper tape.

The following software for the CUTS module is available for \$11, all on one cassette. A. CUTER™-Computer Users Tape Entry and Retrieval monitor program. B. BASIC-5 with CUTER compatible commands implemented. C. Lunar Lander written in BASIC-5.

Many more programs are under development. You can reasonably expect a new one every few weeks.

Wire Wrap and Extender Boards

Wire wrap boards are designed for prototyping. Create custom interfaces or whatever your fancy dictates.

WWB has a "universal" seven-row pattern of pads on .3" centers, so standard 14, 16, 24 and 40 pin DIP IC sockets can be plugged right in. Power and ground are dedicated to pins 16 and 8 respectively (for 16 pin DIPs). Converts to other IC sizes easily. Use up to 62 sixteen-pin DIP ICs; six extra wirewrap socket positions have been set aside for wire wrap connections to any S-100 bus computer (Altair or IMSAI).

Use the Extender Board to help you troubleshoot any S-100 bus compatible module. Plug in a glitchy module 5" above the mother board for easy scope, VTVM or logic probe. Sol-20 systems already have a built-in extender connector on the back plane assembly.

3P+S Input Output Module

Processor Technology's 3P+S input/output module offers a low cost way to handle virtually all the I/O needs of any S-100 bus compatible computer system.

The 3P+S has two 8-bit parallel I/O ports, with full handshaking logic, plus a serial I/O port with a data rate that can be set anywhere between 35 and 9600 baud.

One parallel output port can be used to set up control conditions for both parallel and serial ports, as well as for setting the serial I/O baud rate under program control. One parallel input port is available for polling Input Data flags and External Device flags, and for checking the serial I/O error flags. You can implement full handshaking with both input and output peripherals.

Interfacing to the Sol System, Altair 8800, or IMSAI 8080 vectored interrupt bus is provided by a jumper selectable option which allows any of the UART (Universal Asynchronous Receiver Transmitter) error flags or handshaking signals to generate interrupts. (A Vectored Interrupt Module is also required for this mode of operation.)

Addressing of the module is selectable to any of 64 address segments within the range of 256 I/O addresses.

F. Peripherals



Peripherals

Processor Technology has selected a number of quality peripheral devices from other manufacturers to help you put complete systems together for many different applications. All these devices are only available factory assembled and tested.

TV-Monitor

Here's an 11" diagonal completely solid state black and white television specially modified for use with the Sol or VDM-1 units. A switch allows use as either a standard UHF/VHF television or as a video monitor. These units provide extremely crisp and stable displays and are fully grounded for safety. Manufactured by Panasonic.

High Speed Paper Tape Reader

All programs produced on paper tape for the 8080 may be loaded into Sol at up to 1000 characters/second with this handy low cost paper tape reader. The OP-80 is completely solid state and has no moving parts. The unit comes with a cable for plugging directly into the Sol Parallel Data Interface connector. Made by Oliver Audio Electronics.

PROM Programmer

The Bytesaver™ PROM programmer gives you two powerful features:

- 1) fast easy programming of 2708 Erasable Programmable Read-Only Memories (EPROMs).
- 2) Sol-bus compatible non-volatile storage of up to 8192 bytes of program.

The Bytesaver can be used to permanently store programs for use on custom application Sol personality modules or for expanded permanent storage.

Use the Bytesaver in any application where your special programs need to be permanently stored yet instantly accessed by the computer. Complete driving software included at no extra cost. Manufactured by Cromemco.

Multi-channel Analog Interface

The D+7AI/OTM module is the low cost efficient way to interface the Sol System's digital computer with the analog world. Use this module when joysticks, instruments and amplifiers, voltage and temperature sensors or any other analog device needs to be controlled or monitored by the Sol Computer.

Provided are:

- 7 multiplexed analog input channels for Analog to Digital conversion with 8 bit resolution and 5.5 microsecond conversion time.
- 7 Digital to Analog output channels with 8 bit resolution.
- 8 bit parallel interface post for digital control applications.
- +2.56 to -2.54 VDC input and output signal range (20mV monotonic increments).

The D+7AI/O is software compatible with the ALS-8 development system and PT8K BASIC language. Manufactured by Cromemco.

JS-1 Joystick

The Joystick is the fastest data entry method for interactive prompted programs and games. The JS-1 has both two axis analog outputs and four on-off switches. Requires D+7AI/O module. Manufactured by Cromemco.

See Sol now at your nearly dealer

ALABAMA

ICP, Computerland
1550 Montgomery Hwy
Birmingham, AL 35226
(205)979-0707

ARIZONA

Byte Shop Tempe
813 N. Scottsdale Rd.
Tempe, AZ 85281
(602) 894-1129

Byte Shop Phoenix
12654 N. 28th Dr.
Phoenix, AZ 85029
(602) 942-7300

Byte Shop Tucson
2612 E. Broadway
Tucson, AZ 85716
(602)327-4579

CALIFORNIA

The Byte Shop
1514 University Ave.
Berkeley, CA 94703
(415) 845-6366

Byte Shop Computer Store
6041 Greenback Lane
Citrus Heights, CA 95610
(916) 961-2983

Computer Center
1913 Harbor Blvd.
Costa Mesa, CA 92627
(714)646-0221

Data Consultants, Inc.
2350 W. Shaw, Suite 114
Fresno, CA 93711
(209) 431-6461

Bits 'N Bytes
679 S. State College Blvd.
Fullerton, CA 92631
(714)879-8386

The Byte Shop
16508 Hawthorne Blvd.
Lawndale, CA 90260
(213) 371-2421

The Byte Shop
1063 El Camino Real
Mountain View, CA 94040
(415) 969-5464

Digital Deli
80 W. El Camino Real
Mountain View, CA 94040
(415) 961-2828

The Computer Mart
624 West Katella #10
Orange, CA 92667
(714) 633-1222

The Byte Shop
2227 El Camino Real
Palo Alto, CA 94306
(415)327-8080

Byte Shop
496 South Lake Ave.
Pasadena, CA 91101
(213) 684-3311

The Computer Store
of San Francisco
1093 Mission Street
San Francisco, CA 94103
(415) 431-0640

Byte Shop
321 Pacific Ave.
San Francisco, CA 94111
(415) 421-8686

The Byte Shop
2626 Union Avenue
San Jose, CA 95124
(408)377-4685

The Computer Room
124H Blossom Hill Rd.
San Jose, CA 95123
(408)226-8383

The Byte Shop
509 Francisco Blvd.
San Rafael, CA 94901
(415)457-9311

The Byte Shop
3400 El Camino Real
Santa Clara, CA 95051
(408)249-4221

Recreational Computer
Centers
1324 South Mary Ave.
Sunnyvale, CA 94087
(408) 735-7480

Byte Shop of Tarzana
18424 Ventura Blvd.
Tarzana, CA 91356
(213)343-3919

The Byte Shop
2989 North Main St.
Walnut Creek, CA 94596
(415)933-6252

Byte Shop
14300 Beach Blvd.
Westminster, CA 92683
(714)894-9131

COLORADO

Byte Shop
2040 30th St.
Boulder, CO 80301
(303) 449-6233

FLORIDA

Sunny Computer Stores
University Shopping
Center
1238A S. Dixie Hwy.
Coral Gables, FL 33146
(305) 661-6042

Delta Electronics
2000 U.S. Hwy. 441 East
Leesburg, FL 32748
(904)357-4244

Byte Shop of Miami
7825 Bird Road
Miami, FL 33155
(303)264-2983

Microcomputer
Systems Inc.
144 So. Dale Mabry Hwy.
Tampa, FL 33609
(813)879-4301

GEORGIA

Atlanta Computer Mart
5091-B Buford Hwy.
Atlanta, GA 30340
(404)455-0647

ILLINOIS

The Numbers Racket
6231/2 South Wright St.
Champaign, IL 61820
(217)352-5435

itty bitty machine co.
1316 Chicago Ave.
Evanston, IL 60201
(312)328-6800

Reeves Communications
1550 W. Court St.
Kankakee, IL 60901
(815) 937-4516

itty bitty machine co.
42 West Roosevelt
Lombard, IL 60148
(312)620-5808

INDIANA

The Data Domain
406 So. College Ave.
Bloomington, IN 47401
(812) 334-3607

The Byte Shop
5947 East 82nd St.
Indianapolis, IN 46250
(317) 842-2983

The Data Domain
7027 N. Michigan Rd.
Indianapolis, IN 46268
(317) 251-3139

The Data Domain
219 West Columbia
West Lafayette, IN 47905
(317)743-3951

KENTUCKY

The Data Domain
3028 Hunsinger Lane
Louisville, KY 40220
(502)456-5242

MICHIGAN

The Computer Store
of Ann Arbor
310 East Washington
Ann Arbor, MI 48104
(313) 995-7616

Computer Mart
or Royal Oak
1800 W. 14 Mile Rd.
Royal Oak, MI 48073
(313)576-0900

Genral Computer Store
2011 Livernois
Troy, MI 48084
(313)362-0022

NEW JERSEY

Hoboken Computer Works
No. 20 Hudson Place
Hoboken, NJ 07030
(201) 420-1644

The Computer Mart
of New Jersey
501 Route 27
Iselin, NJ 08830
(201) 283-0600

NEW YORK

The Computer Mart
of Long Island
2072 Front Street
East Meadow, L.I.,
NY 11554
(516)794-0510

Synchro Sound
Enterprises
193-25 Jamaica Ave.
Hollis, NY 11423
(212) 359-1489

The Computer Shoppe
444 Middle Country Rd.
Middle Island, NY 11953
(516) 732-3086

Audio Design Electronics
487 Broadway, Ste. 512
New York, NY 10013
(212)226-2038

The Computer Mart
of New York
118 Madison Ave.
New York, NY 10001
(212)686-7923

The Computer Corner
200 Hamilton Ave.
White Plains, NY 10601
(914)949-3282

OHIO

Cybershop
1451 S. Hamilton Rd.
Columbus, OH 43227
(614)239-8081

OKLAHOMA

High Technology
1020 West Wilshire Blvd.
Oklahoma City, OK 73116
(405) 842-2021

OREGON

Byte Shop Computer Store
3482 S. W.
Cedar Hills Blvd.
Beaverton, OR 97005
(503) 644-2686

The Real Oregon
Computer Co.
205 West 10th Ave.
Eugene, OR 97401
(503)484-1040

Byte Shop Computer Store
2033 S.W. 4th Ave -
Portland, OR 97201
(503)223-3496

RHODE ISLAND

Computer Power, Inc.
M24 Airport Mall
1800 Post Rd.
Warwick, RI 02886
(401) 738-4477

SOUTH CAROLINA

Byte Shop
2018 Green Street
Columbia, SC 29205
(803) 771-7824

TENNESSEE

Microproducts & Systems
2307 E. Center St.
Kings port, TN 37664
(615)45-8081

TEXAS

Byte Shop
3211 Fondren
Houston, TX 77063
(713)977-0664

Computertex
2300 Richmond Ave.
Houston, TX 77098
(713) 526-3456

Interactive Computers
7646 1/2 Dashwood Rd.
Houston, TX 77036
(713)772-5257

The Micro Store
634 So. Central
Expressway
Richardson, TX 75080
(214) 231-1096

VIRGINIA

The Computer Systems
Store
1984 Chain Bridge Rd.
McLean, VA 22101
(301) 460-3634

Media Reactions Inc.
11303 South Shore Dr.
Reston, VA 22090
(703) 471-9330

WASHINGTON

Byte Shop Computer Store
14701 N. E. 20th Ave.
Bellevue, WA 98007
(206)746-0651

The Retail Computer Store
410 N.E. 72nd
Seattle, WA 98115
(206)524-4101

WISCONSIN

The Milwaukee
Computer Store
6916 W. North Ave.
Milwaukee, WI 53213
(414)259-9140

CANADA

Trintronics
160 Elgin St.
Place Bell Canada
Ottawa, Ontario K2P 2C4
(613) 236-7767

First Canadian Computer
Store, Ltd.
44 Eglinton Ave. West
Toronto, Ontario M4R 1A1
(416) 482-8080

The Computer Place
186 Queen St. West
Toronto, Ontario M5V 1Z1
(416)598-0262

Pacific Computer Store
4509-11 Rupert St.
Vancouver, B.C. V5R 2J4
(604)438-3282

All components sold by PROCESSOR TECHNOLOGY CORPORATION are purchased through normal factory distribution and any part which fails because of defects in workmanship or material will be replaced at no charge for a period of 3 months for kits, and one year for assembled modules, following the date of purchase. The defective part must be returned postpaid to PROCESSOR TECHNOLOGY CORPORATION within the warranty period.

Any malfunctioning module, purchased as a kit and returned to PROCESSOR TECHNOLOGY within the warranty 3 month period, which in the judgement of PTCO has been assembled with care and not subjected to electrical or mechanical abuse, will be restored to proper operating condition and returned, regardless of cause of malfunction, with a minimal charge to cover postage and handling.

Any modules purchased as a kit and returned to PTCO which in the judgement of PTCO are not covered by the above conditions will be repaired and returned at a cost commensurate with the work required. In no case will this charge exceed \$20.00 without prior notification and approval of the owner.

Any modules, purchased as assembled units are guaranteed to meet specifications in effect at the time of manufacture for a period of at least one year following purchase. These modules are additionally guaranteed against defects in materials or workmanship for the same one year period. All warranted factory assembled units returned to PTCO postpaid will be repaired and returned without charge.

CONDITIONS and EXCLUSIONS

This warranty is made in lieu of all other warranties expressed or implied and is limited in any case to the repair or replacement of the module involved.

The warranty herein extends only to the original purchaser-user and is not assignable or transferrable.

Processor Technology Corporation is under no obligation to extend this warranty to any product for which a Warranty Registration Card has not been completed and mailed to Processor Technology Corporation within fifteen (15) days after date of delivery.

**the
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**410 N. E. 72nd
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(206) 524.4101**



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