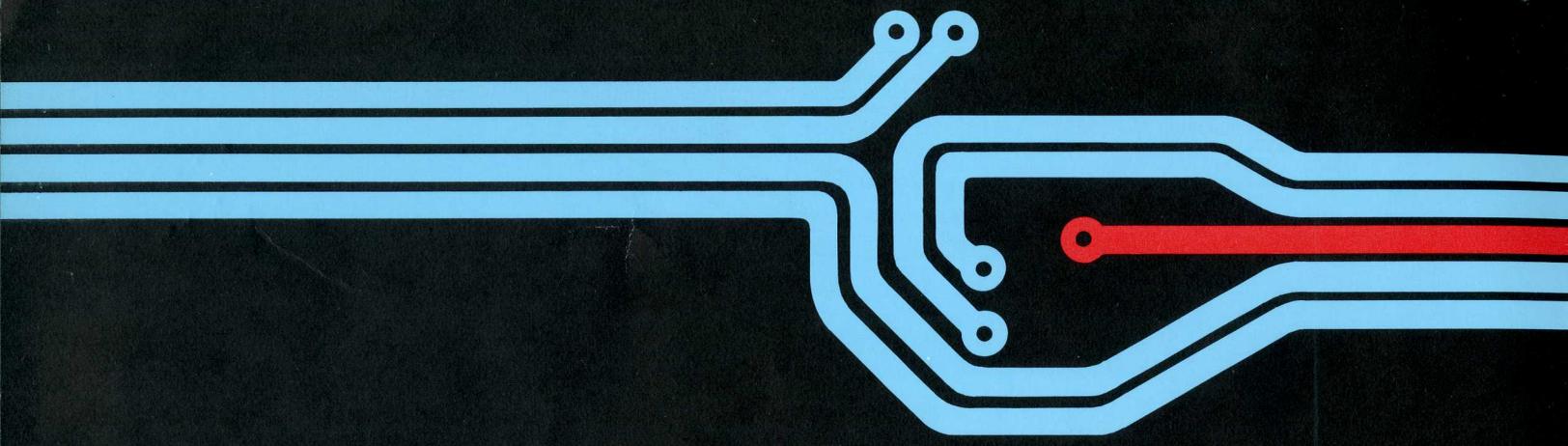


PDP-8^{*} in kit form?



**Essentially...this kit computer is
fully software-compatible with
DEC's classic PDP-8**

*PDP, DEC, FOCAL, DECtape and OS-8 are registered trademarks
of Digital Equipment Corporation, Maynard, Massachusetts.



Introducing the PCM-12, an inexpensive small computer that is fully software-compatible with the Digital Equipment Corporation PDP-8/E.

If you have been considering purchase of a small computer in kit form, you have probably noticed that almost all such machines available today have one big shortcoming—lack of software. The PCM-12 is the exception. It is designed around the Intersil IM6100 microprocessor chip, a device which is software-compatible with the most popular minicomputer in the world—DEC'S PDP-8. That means that the PCM-12 can execute nearly all PDP-8 software, without modification. And that includes assemblers, editors, debug routines, interactive languages like BASIC and FOCAL and scientific languages like FORTRAN. With the addition of a mass storage device (like a floppy disk), the PCM-12 can even run DEC'S sophisticated OS-8 operating system. All of this software has been written, debugged and fully documented by DEC, and has been in use for years. In fact, DEC makes available over 1000 programs for the PDP-8, and it nearly all runs on the PCM-12. Other hundreds of programs are available from DECUS, the DEC-sponsored, free-membership, user's group, and independent sources like universities and government-supported research facilities.

Most of the microprocessor devices available today were not intended for use as the central processor unit in a general-purpose minicomputer. Except for the Intersil IM6100, they were all designed with dedicated industrial control applications in mind. That means that any minicomputer designed around them must, of necessity, be the result of a series of compromises. The '6100, though, is basically an LSI version of the CPU in the PDP-8/E, the latest version of the classic PDP-8. This chip makes it possible for the PCM-12 to perform like a PDP-8/E in nearly every respect

—and even provide features that the '8 lacks. Features like a separate control-panel memory which makes the entire main memory available for the user's program. And a built-in binary bootstrap loader—you simply flick a front-panel switch to load a machine-language program from paper or magnetic tape. The PCM-12 control panel provides essentially all PDP-8/E functions, plus single-clock and decrement-address functions.

From the very beginning, the PCM-12 has been designed to be a full-blown minicomputer. No design shortcuts have been taken which would limit the flexibility of the completed machine, or prevent future expansion. There is full provision for a vectored, priority interrupt system and direct memory access, either of which can be added when you need them. The bus-oriented architecture provides 15 identically-operating card slots, which means you can plug in up to 32K words of memory and all the interface and other expansion logic you will probably ever want. You never need to buy an "expander" board.

The PCM-12 is not a "simplified" or limited-capability computing machine. It is a solidly-designed general-purpose computer that can serve as the heart of the simplest or the most sophisticated 12-bit computing system.

And—the software is there!



Features

Readily available software—everything you will ever need from an outside source is already available, fully debugged and documented.

12-bit word length—significantly more computing power than an 8-bit machine.

Full-function control panel—provides all functions of the PDP-8/E, plus decrement-address and single-clock controls. Control panel operates in real-time so you can watch all operations take place.

Built-in bootstrap loader—you never have to toggle a loader in from the front panel. Simply load your tape in reader and flip the front-panel switch. Compatible with low- and high-speed paper tape readers, and the optional audio cassette recorder interface.

Built-in baud rate generator—crystal controlled for stability.

Single-cycle instruction fetch—all instructions occupy just one memory location, just like the PDP-8.

Fast operation—basic fetch and execute time is just 5 microseconds with IM6100I microprocessor device.

DMA and vectored priority interrupt system provisions—you can add either of these features any time you need them.

80-line TTL-compatible bus—with 18 lines still unassigned to provide for system expansion.

Addresses 64 I/O devices—probably more than you will ever need.

Easy kit assembly—no cables or point-to-point wiring. Just load the printed-circuit boards and plug them into the backplane.

Flexible packaging system—buy only the features you need.

Heavy duty power supply—well regulated and protected.

Attractive aluminum cabinet—with built-in card cage. Mounts on table-top or in equipment rack.

Quality industrial-grade components—all P.C. boards double-sided, plated-through FR-4 epoxy glass. Industrial quality switches. Gold-plated card edges and connectors.

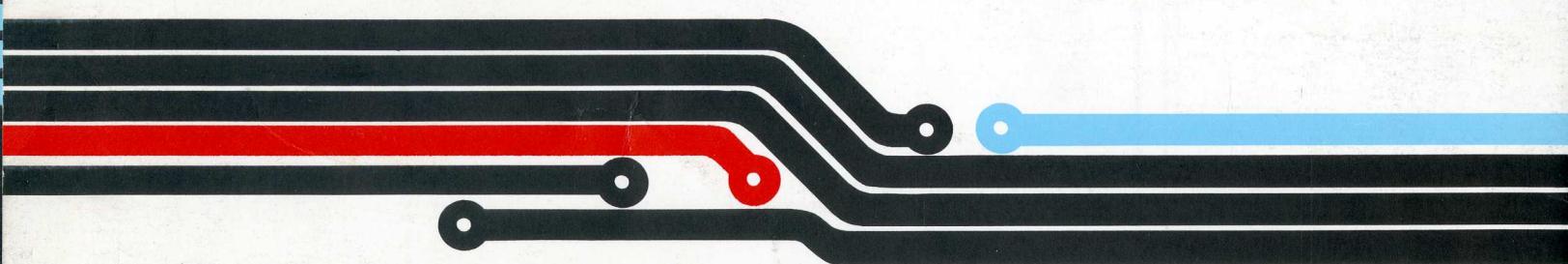
All integrated circuits socket-mounted—quality low-profile sockets.

Provision for cooling fan—for fully expanded system.

Additional memory available—NMOS and (nonvolatile) CMOS RAM boards, both static and dynamic. Also ROM and PROM boards. Both 4K and 8K fields.

Many interfacing options available—PDP-8 compatible TTY/CRT interface, DECtape, floppy disk, cassette recorder and several more.

And—the software is there!



PCM-12 Specifications

CPU—Intersil IM6100 static, silicon-gate CMOS microprocessor.

Word length—12 bits.

Cycle time—2.5 microseconds, with 4.0 MHz crystal.

Typical instruction fetch and execute time—5.0 microseconds for add-memory-to-accumulator function.

Instruction set—same as Digital Equipment Corporation PDP-8/E.

Memory—semiconductor. 4K and 8K RAM and ROM plug-in modules.
Expandable up to 32K words.

I/O capability—programmed data transfers, interrupt-initiated transfers and direct memory access.

Number of I/O devices—up to 64.

Bus structure—80 line, TTL-compatible, 15 card slots.

Control panel—all PDP-8/E functions, plus decrement-address and single-clock controls and built-in binary bootstrap loader.

TTY/CRT interface—PDP-8 compatible, 20 MA or RS-232 levels.

Software—fully PDP-8 compatible.

Power requirements—115 volts, 60 Hz, typically 500 watts maximum.

Cabinet dimensions—7" high X 17" wide X 19" deep.

Applications

General-purpose computing.

Process control.

Prototyping system for IM6100 microprocessor.

Education

Home computing

Mfg. by:

PCM

P.O. Box 215
San Ramon, CA 94583
Phone (415) 837-5400

And—the software is there!

PCM

P. O. Box 215 • SAN RAMON, CALIFORNIA 94583 • (415) 837-5400

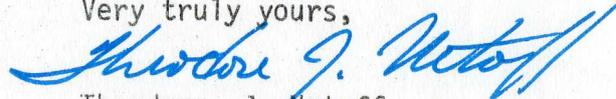
Dear Computer-user:

Everyone in the computer industry knows that the Digital Equipment Corporation PDP-8 is the most successful computer ever developed. There are tens of thousands of units in the field, and more being installed every day. And because of the PDP-8's popularity, there is more software in existence for it than for any other computer in the world. Now there is a computer available in kit form that can run nearly all of that mountain of software - the PCM-12.

Thank you for requesting information on the PCM-12. The '12 is the only computer available in kit form which is software-compatible with an existing minicomputer. That compatibility in the software department is what makes the difference between the PCM-12 and the other kit machines on the market. You can immediately put it to work, without waiting and hoping someone will eventually develop the software you need.

The enclosed brochure and other information should answer all your questions about the PCM-12. If we can be of further help, please call or write. We aim to please!

Very truly yours,



Theodore J. Netoff
Director of Marketing

P.S. - If you would like to get a fast start into PDP-8 computing, order a copy of 4K BASIC with your kit. With just the PCM-12 (with complete 12020 memory board) and a terminal and interface, this paper tape will give you a powerful programming capability at almost no cost. (In case you aren't familiar with BASIC, the document that accompanies the tape takes about thirty minutes to read - and you're up and running!) 4K BASIC is \$1.50 (that's right, one and a half dollars) when ordered with a PCM-12 kit - just an example of how easy it is to get software for your PCM-12.

NOTE: PDP is a registered trademark of Digital Equipment Corporation, Maynard, Massachusetts.

SOME OFTEN-ASKED-QUESTIONS AND ANSWERS ABOUT THE PCM-12

Just how available is DEC software for the PDP-8 (and the PCM-12)?
Electronic Engineering Times reported recently that there are more than 70,000 PDP-8 machines in the field, so there is a flood of '8 software already existing and widely distributed. If your company owns one or more PDP-8's, chances are you already have, or have access to, all the software you will ever need from an outside source. However, you can purchase '8 software if you need to, at very nominal prices. Most PDP-8 software is readily available, on an over-the-counter basis at any DEC Software Distribution Center. The PDP-8 software catalog is available free from the same source. Or write to DEC, 146 Main Street, Maynard, Massachusetts 01754, and ask for a copy. Some PDP-8 software (the OS-8, version 3, operating system is an example) is licensed, and therefore is sold only to owner of DEC PDP-8 Machines. The catalog specifies which items of software are licensed. DECUS makes available hundreds of programs for the '8. The typical cost is \$2.00 for a paper tape and write-up on the program. The categories covered are organized like this: 1) Programming Languages, Monitors, Programming Systems; 2) Text Editing and Manipulating; 3) Debugging, Disassembly, Simulation, Trace, Dump; 4) Binary Loading and Punching; 5) Duplication and Verification; 6) Numerical Function and Input/Output; 7) Utility; 8) Display; 9) Data Management and Sorting; 10) Probability and Statistics, Curvefitting; 11) Scientific and Engineering Applications; 12) Hardware Control; 13) Games; 14) Plotting; 15) Desk Calculator and Business Applications; 16) Maintenance; and (whew!) 17) Miscellaneous. The DECUS catalogs of PDP-8 program abstracts alone are over 3 inches thick!

What advanced languages are available? How much do they cost?
Many. 4K BASIC, FOCAL, FORTRAN and ALGOL to name a few. Also 8K BASIC, FOCAL and FORTRAN. 4K CINET-BASIC can be purchased from DECUS for \$2.00. 4K ALGOL is \$8.00 from the same source. 4K FORTRAN purchased from DEC is \$30.00. The 8K version is \$35.00.

Can I qualify for membership in DECUS?
Probably. Any organization which has purchased, or has on order, a computer manufactured by DEC is eligible for Installation Membership in DECUS. Any individual who has a bona-fide interest in DECUS, and is user of DEC computers, is eligible for DECUS membership. Write for membership application forms, and your free copy of the DECUS catalogs on the PDP-8. Write DECUS, Maynard, Massachusetts 01754.

I'm not really too familiar with the PDP-8. What should I read?
The PDP-8 Introduction to Programming handbook covers everything from elementary programming techniques to floating-point applications in very lucid style. It is the software "bible" for the PDP-8 (and, therefore, for the PCM-12 also). It is just \$2.50 from DEC, and is highly recommended. The PDP-8/E Small Computer Handbook covers PDP-8/E hardware and peripherals and is also good reading. It costs \$4.50. If you are only interested in higher-level languages like BASIC and FORTRAN, you will find the DEC document on the language to be adequate.

(see over)

Is the PCM-12 hardware-compatible with the PDP-8? Can I plug PDP-8 interface and memory boards into the PCM-12 bus?

No. While the PCM-12 is fully software-compatible with the PDP-8/E, DEC's latest version of the PDP-8, the hardware design is quite different. This is necessary since the PCM-12 is based on a microprocessor CPU. PCM has a continuing program underway to make available all the interfaces for the PCM-12 you will ever need for standard peripherals. So you will never need to worry about PDP-8 hardware-compatibility.

Since the PCM-12 is a 12-bit machine, how can it address as much as 32K of memory?

To address more than 4K words of memory, it is necessary to generate a 3-bit extension of the Memory Address Register, making 15 bits total. This extension is implemented in the 12040 Memory Extension Module, and of course is fully DEC software-compatible.

Is the PCM-12, and the accessories, available in assembled and tested form?

Yes. The PCM-12 can be purchased assembled and tested for \$1224.00. Accessory modules can also be purchased in assembled and tested form - please inquire at the factory.

Why does the PCM-12 come with a 3.33 MHz clock crystal?

The least expensive version of the IM6100 microprocessor device is guaranteed to operate properly at this frequency. Operation at this speed is adequate for most applications, and it saves you the cost of the more expensive CPU chip. The basic cycle time is 3.0 microseconds. If you need the additional speed of the 4.00 MHz device, the option kit is available and can be substituted for the 3.33 MHz device in your kit order.

If I have trouble getting my PCM-12 to operate properly after I have assembled it, what kind of help can I get from PCM?

PCM will get you up and running. First, if we determine that your difficulty is due to a defective component that we supplied, we will fix your machine free-of-charge, if you return it to us. If you return your computer to us, and the problem is due to any other cause, we will repair it, and return it to you C.O.D. for the applicable charges. If repairs will run more than \$25.00, we will ask for your authorization before proceeding with the work. We will usually have someone here at the factory available during normal business hours to answer any questions telephoned in to us. Frankly, we don't expect you to have any trouble with the kit; it all goes together very easily. But if you do, we will help.

I know the IM6100 microprocessor is a CMOS device. Is CMOS used throughout the PCM-12?

No. The PCM-12 is really a TTL machine; the only MOS devices in the basic design are the memory chips, the CPU itself, and the UART's. The bus structure is entirely TTL (tri-state).

PRICE LIST

| | |
|---|----------|
| <u>Complete PCM-12 kit:</u> | \$799.00 |
| 1ea - 12010 CPU module, with IM6100C microprocessor device and 3.33 MHz crystal. Built-in crystal-controlled Baud-rate generator. | |
| 1ea - 12020 4K-word (x12-bit) static memory board, with 1K words of memory semiconductors. | |
| 1ea - 12030 Front-panel board and electronics, complete with control PROM's, and bootstrap loader. | |
| 1ea - 12050 Back-plane bus structure. Accomodates up to 15 plug-in printed-circuit modules. | |
| 1ea - 12900 Heavy-duty OEM power supply. Adequate for considerable system expansion. Voltage-regulated, fold-back current-limited, over-voltage protected. 5 volts @ 12 amps, + 12 volts @ 1.7 amps. (Assembled, just connect to system backplane.) | |
| 1ea - 12800 Attractive aluminum cabinet with card-cage built-in. Accomodates up to 15 plug-in printed-circuit modules - plenty of room for system expansion. | |
| 1ea - Set of assembly, operating and trouble-shooting manuals. | |
| For assembled and tested PCM-12, add | 425.00 |

Accessories:

| | | |
|------------|---|--------|
| ✓ 12010-EX | Kit of required parts to convert CPU to 4.00 MHz operation. With IM6100I device. (\$118.00 if ordered separately.) | 32.00 |
| ✓ 12020-EX | Kit of required parts to expand original 12020 memory module to full 4K words. | 139.00 |
| ✓ 12020 | Additional 4K-word static memory module for expanding memory beyond original 4K words. (kit) | 245.00 |
| ✓ 12040 | Memory extender module. Necessary to expand memory beyond 4K words, up to 32K words. (kit) | 135.00 |
| ✓ 12060 | DEC-software-compatible TTY/CRT interface module. 20 ma or RS-232 I/O levels, selectable. 110-9600 Baud operation. Uses DEC device numbers 03 and 04. (kit) | 97.00 |
| 12070 | High-speed paper-tape reader/punch interface. Fully DEC-software-compatible. Uses DEC device numbers 01 and 02. (kit) | 97.00 |
| ✓ 12080 | Audio cassette interface. Inexpensive replacement for high-speed paper-tape reader/punch. Uses BYTE-standard modulation format at 300 Baud <u>and</u> same format at 1200 Baud, selectable. (kit) | 117.00 |
| 12090 | Prototyping card. For user-designed expansion logic and peripheral interfaces. Holds up to 55 DIP wire-wrap or solder-type IC sockets. (With edge-card connector, w/o IC sockets). | 53.00 |

Available very soon - 8K dynamic memory module; DECTape interface; LINCTape system/interface; floppy disk system/interface; PROM programmer; EPROM module; and more DEC-compatible interface modules - please inquire about your needs.

(ORDER FORM - see over)

All prices, specifications and terms of sale subject to change without notice.

ORDER FORM

(Telephone orders - call (415) 837-5400)

| Quantity | Part Number | Description | Each | Total |
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TERMS: Cash with order. COD to rated firms, 20% deposit with order.

California residents add 6 1/2% sales tax

DELIVERY: 30-90 days, depending on backlog. All orders handled on first-in/first-out basis.

Allowance for shipping

TOTAL

SOLD TO

SHIP TO

Ship via: _____
(If other than UPS desired)

P.O. # _____

Send Order Forms and Purchase Orders to: PCM, 180 Thorup Lane, P.O. Box 215, San Ramon, CA 94583

Warranty: PCM fully warrants its kits to be free of defects in material and workmanship. For a period of ninety days after shipment, PCM will replace, upon demand, any component in its kits which PCM has found to be defective. Simply return the rejected part with a brief description of the difficulty encountered. This warranty is given in lieu of all others, either expressed or implied.