DIGITAL EQUIPMENT CORPORATION

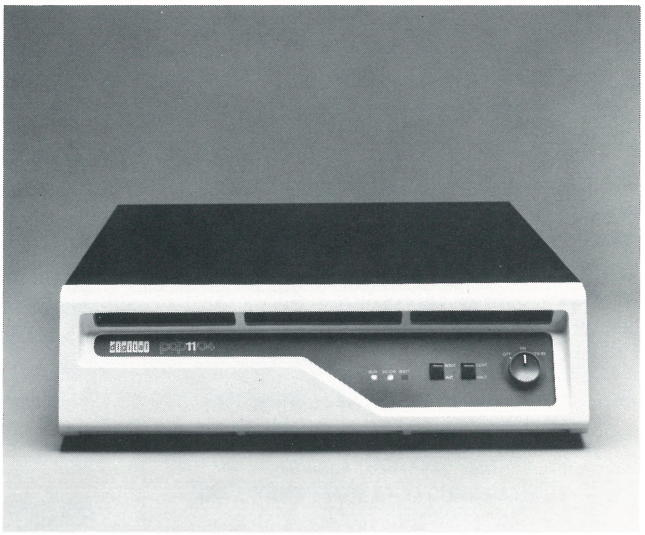
pdp11 oem products

PDP-11/04 Minicomputer

The PDP-11/04 is a full scale PDP-11 computer, hardware- and software-compatible with all other UNIBUS PDP-11's currently at work in thousands of installations around the world. The PDP-11/04 provides all of the processing capability of its predecessor, the PDP-11/05, at higher speed and lower cost. It is an excellent choice for a wide range of OEM applications.

The PDP-11/04 uses proven TTL technology for reliability and offers the flexibility of a choice of MOS or core memory. Integral bootstraps, diagnostics and automatic recovery from power failure further enhance system integrity making the PDP-11/04 especially well suited to unattended installations.

The PDP-11/04 is available in a 5¼ inch chassis providing nine backplane slots as well as a 10½ inch chassis with up to twenty-two slots. Expansion boxes can be added as required.



FEATURES

- full PDP-11 instruction set (over 400 instructions)
- multiple priority level, vectored interrupts
- multiple register architecture
- hardware stack processing
- power fail/auto restart
- CPU implemented in proven TTL technology on a single board
- integral direct memory access
- up to 16K MOS or core memory on a single board, with optional parity
- integral bootstraps for all common peripherals
- integral CPU and memory diagnostics
- virtual console routine
- large selection of peripheral, communications and I/O devices
- wide range of standard configurations
- power and space for significant expansion within chassis
- full operating system and high level language support

UNIBUS ARCHITECTURE

PDP-11/04 computer system components and peripherals connect to and communicate with each other via a single, high speed, bi-directional bus: the UNIBUS. Devices connected to the UNIBUS can communicate directly with each other, at their own speed, without CPU intervention. Direct memory access (DMA), is inherent in the UNIBUS design and affords highest priority to those devices requiring direct data transfer to or from memory.

CPU

The PDP-11/04 central processor, connected to the UNIBUS as a subsystem, controls time allocation of the UNIBUS for peripherals and performs arithmetic and logic operations and instruction decoding. The CPU is organized around eight general purpose registers which can be used as accumulators, address pointers, index registers and for other special functions. The CPU does both single and double operand addressing and handles 16-bit words and 8-bit bytes with equal efficiency.

INSTRUCTION SET

The instruction complement of the PDP-11/04 uses the flexibility of the general purpose registers to provide over 400 instructions—the most comprehensive and powerful instruction repertoire of any computer in the 16-bit class. All PDP-11/04 operations, memory reference, operate or control and input/output are accomplished with one set of instructions instead of three sets used by some other minicomputers, making programming easier and more efficient. Since peripheral device registers can be accessed as easily as memory, instructions used to manipulate data in memory can be used equally well for data in device registers. The need for a special class of I/O instructions is therefore eliminated.

The PDP-11/04 instruction set includes single and double operand instructions that operate on 16-bit words or 8-bit bytes. The PDP-11/04, therefore, performs efficiently in one step functions that would otherwise require several instructions.

The PDP-11/04 addressing modes include sequential addressing forward or backward, address indexing, indirect addressing, word addressing, byte addressing, and stack addressing. Variable length instruction formatting allows a minimum number of bits to be used for each addressing mode, resulting in efficient use of memory space.

MEMORY

The PDP-11/04 is available with MOS or core memory, or a mixture of the two. MOS memory uses industry standard 4K RAM chips with cycle time derated to 700 ns to conserve power and enhance reliability. MOS packaging provides up to 16K words on a single printed circuit board which can be located in any available backplane slot. Optional battery backup is available to maintain MOS memory contents during a power failure.

Core memory, up to 16K words on a single board, mounts in one backplane slot, overhangs the adjacent slot, and can be mounted in any available space. Provision has been made for parity on both the MOS and core memory boards. However, an optional parity control board is required to implement this feature.

MULTIFUNCTION ROM

Three features, which in most competitive minicomputers are either optional or not available, are provided by the multifunction read only memory included in every PDP-11/04 configuration.

Virtual Console

The programmer's console, little used in most OEM applications, has been replaced on the PDP-11/04 by a simpler, more reliable and less expensive operator's console, augmented by a ROM-resident virtual console routine. This routine emulates all the functions and capability of a normal programmer's console at the keyboard of any serial ASCII terminal. Load address, examine, deposit, start, and boot commands can be given at the terminal, and the commands and their results displayed. The terminal may be located remotely, even over phone lines, a feature especially useful in unattended installations.

A more traditional programmer's console, with the added benefit of a built in maintenance mode, is available as an option.

Built-In Hardware Diagnostics

Another program residing in the PDP-11/04 ROM tests the CPU and memory during power up or upon issuance of a boot command. A failure, should one occur, is reported on the ASCII terminal. This feature simplifies system maintenance, enhances system up time, and lessens the possibility of a catastrophic failure occurring while an application program is running.

Hardware Bootstraps

Bootstrap programs for all common PDP-11/04 peripherals including disks, magnetic tapes, paper tape, card readers, etc., are implemented in the ROM. The bootstrap to be run can be preselected via switches on the ROM board or chosen by a two character command at the ASCII terminal.

CONFIGURATIONS

The PDP-11/04 is available in two rack mountable chassis sizes: 5¼ inch and 10½ inch. Each configuration in its basic form includes a 9 slot backplane with one CPU board, one memory board, and the multifunction ROM. Seven backplane slots are available for expansion (six if core memory is used). The 10½ inch chassis provides mounting space for backplane expansion to a total of 22 slots. Also available are 5¼ and 10½ inch expansion boxes. PDP-11/04 systems can grow to meet the space requirements of any conceivable application.

STANDARD EQUIPMENT AND OPTIONS

The PDP-11/04 includes the 16-bit processor and memory, direct memory access, 4 priority level vectored interrupts, hardware stack, operator's console, multifunction ROM providing virtual console capability, bootstraps and diagnostics, power fail/auto restart and prewired slots for expansion. Options include battery backup, programmer's console, hardware multiply/divide, memory parity and expansion backplanes and boxes.

PERIPHERALS, COMMUNICATIONS AND I/O

The complete range of PDP-11 UNIBUS peripherals is available on the PDP-11/04. These include diskettes, fixed head disks, cartridge disks, disk pack drives, cassettes, paper tape readers and punches, video terminals, hard copy terminals, industry compatible magnetic tape, line printers, and card readers. Communications hardware includes the industry's broadest line of single and multiple line, synchronous and asynchronous interfaces. Input/output equipment includes A/D and D/A converters, digital I/O and general purpose interfaces.

SOFTWARE

The PDP-11/04 supports a full range of operating systems and programming languages.

- CAPS-11—A single user program development system using DIGITAL's cassette tape as the system device. CAPS-11 offers a complete set of utilities to support assembly level program development. Full BASIC is available as well.
- RT-11—A disk or diskette based, foreground/background system which will support a single real time task in the foreground while a lower priority job, e.g. program development, runs concurrently in the background. RT-11 is a fast, memory efficient, real time system that is easy to learn and use. Programming languages supported are MACRO, FOCAL, BASIC and FORTRAN.
- RSX-11—RSX-11M and RSX-11S are compatible, event driven multiprogramming systems designed for real time applications. RSX-11M is a powerful disk based system that supports both concurrent execution of multiple real time tasks and program development in MACRO and FORTRAN. RSX-11S, a compatible subset of RSX-11M, is a memory based system also providing multitasking capability, but not program development. Programs to be run under RSX-11S are developed under RSX-11M.

COMPATIBILITY

In an effort to reduce cost and provide as much flexibility as possible, especially to the OEM with a variety of products requiring a range of computing power and multiple computer types, DIGITAL has designed in maximum compatibility between the PDP-11/04 and PDP-11/34. Compatibility extends beyond memories and the multi-function ROM, described earlier, to the actual physical packaging of these machines. Chassis, backplane, operator's and programmer's consoles, power supply, everything but the actual CPU board, are identical. Sufficient space in the slot-position-independent backplane and power from the hefty power supply are available for extensive, easily configured expansion within the computer chassis itself.

The PDP-11/04 by itself, and especially in relation to the rest of the PDP-11 family, is a significant new product for the OEM.

PDP-11/04 HIGHLIGHTS

A basic PDP-11/04 includes:

- central processor
- 8K words of MOS or core memory
- 5¼ or 10½ inch chassis (rack mountable)
- power supply
- hardware bootstrap loaders
- ROM hardware diagnostic
- operator's panel
- jacks for external battery backup
- expansion space for additional memory or peripheral controllers
- virtual console routine

Optional items include:

- real time clock
- serial asynchronous interface
- programmer's console
- battery backup

SPECIFICATIONS

Functional

Word Length:	16 bits
Memory cycle time:	700 nanoseconds (MOS) 1000 nanoseconds (CORE)
DMA rate:	1.4 Million words/second
UNIBUS rate:	2.5 Million words/second
Addressing space:	28K words

Electrical

Power:	115 volts ± 10%, 47-63 Hz 230 volts ± 10%, 47-63 Hz 400 watts (5¼ inch chassis) 800 watts (10½ inch chassis)
UL listed	

Physical

Dimensions:	(H x W x L) 5¼" X 25" X 19" or 10½" X 25" X 19"
Weight:	45 lbs. (5¼" chassis) 110 lbs. (10½" chassis)
Expansion space:	7 slots (5¼" chassis) 7 slots plus space for 13 slot backplane (10½" chassis)

Environmental

Temperature:	+10°C to +50°C
Relative humidity:	20% to 95% (non condensing)

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OEM PRODUCTS

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