



## Price List

### SYSTEMS

**83/500** ~~\$51,610~~  
~~\$65,940-B\*~~

The Dual 83/500 is a high performance micro computer system capable of delivering the throughput and larger storage required by the UNIX™ operating system, by sophisticated data base management systems, and by expanded application packages. Features:

- CPU-68000M-L10, MC68000-based central processor with memory management; 10 MHz clock rate.
- 2 EMEM, 1M byte boards totalling 2M bytes of dynamic RAM with parity. Additional memory can be added (up to 6.25M bytes total)
- Two SIO4-DMA, four-port Serial I/O boards with DMA. (8 Ports).
- 20-slot IEEE 696/S-100 backplane. (9 expansion slots available).
- CLK-24C, system clock board.
- EPROM-32/64K, board containing system boot.
- WDC-SMD high-speed hard disk controller\*\* (two board set).
- 500M byte SMD disk expandable with a second 500M byte disk.
- FDC, floppy disk controller.
- 1.25M byte floppy disk drive, 8", DSDD.
- TCON, 9-track magnetic tape controller.
- 9-track, 1600 BPI tape drive.
- One 23.75" x 30" x 66" rack.
- Multi-User UNIX™ operating system license.
- C Programming language, standard with UNIX™ operating system.
- All hardware and software documentation.

#### OPTIONS:

- Communications capabilities including X.25 and Ethernet.
- All software currently available on the 83/20 and 83/80.

**83/80** ~~\$15,990~~  
~~\$21,990-B\*~~

Multi-user, multi-tasking configuration with UNIX™ operating system. Features:

- CPU-68000M-L10, MC68000-based central processor with memory management; 10MHz clock rate.
- Two DMEM-256KP boards totalling 512KB of dynamic RAM with parity; additional memory can be added (up to 6.25M bytes total).
- SIO4-DMA, four-port serial I/O board with DMA.
- CLK-24C, system clock board.
- EPROM-32/64K, board containing system boot.
- 20-slot IEEE 696/S-100 backplane.
- WDC-SMD high-speed hard disk controller\*\* (two-board set).
- FDC, floppy disk controller.
- SMD-80M byte, 8" hard disk drive.
- 1.25M byte floppy disk drive, 8", DSDD.
- Multi-user UNIX™ operating system license.
- C programming language Standard with UNIX™ operating system.
- All hardware and software documentation.
- Four-user system expandable to 16 users.

**83/20** ~~D.C.~~  
~~\$17,275-B\*~~

Multi-user, multi-tasking configuration with UNIX™ operating system. Features:

- CPU-68000M-L10, MC68000-based central processor with memory management; 10MHz clock rate.
- Two DMEM-256KP boards totalling 512KB of dynamic RAM with parity; additional memory can be added (up to 6.25M bytes total).
- SIO4-DMA, four-port serial I/O board with DMA.
- CLK-24C, system clock board.
- EPROM-32/64K, board containing system boot.
- 20-slot IEEE 696/S-100 backplane.
- WDC, Winchester disk controller (two board set).
- FDC, floppy disk controller.
- 20M byte, 8" hard disk drive.
- 1.25M byte floppy disk drive, 8", DSDD.
- Multi-user UNIX™ operating system license.
- C programming language, standard with UNIX™ operating system.
- All hardware and software documentation.
- Four-user system expandable to 12 users.

**83/00** ~~\$4,590-B\*~~

Basic development configuration consisting of CPU-68000 (single-user) with MACSBUG monitor, 20-slot IEEE 696/S-100 backplane, (2) CMEM-32K, EPROM-32/64K, SIO-2, plus power supply in cabinet.

**83/20 to 83/80 upgrade** ~~\$11,500-E\*~~  
System must be in factory for three weeks.

Third party maintenance available.

Lease-financing available.

\* See Discount Schedule

## IEEE-696/S-100 INDUSTRIAL GRADE BOARDS: HIGH PERFORMANCE SYSTEMS BOARDS:

### WDC-SMD\*\*

#### Board A Board B

The WDC-SMD hard disk controller\*\* is designed especially for high throughput in large, heavily-loaded multi-user UNIX™ systems. All sectors on a track are transferred essentially within a single disk rotation regardless of where the head settles first or the order in which sectors are encountered. Interfaces to either one or two industry-standard SMD hard disk drives at an average transfer rate of 800KB/sec in read and 560KB/sec in write mode. The controller offers 16-bit throttled DMA data transfers up to 2.5 MB/sec with data transfer rates of up to 10 MB/sec. Also features Dual-ported, full-track, look-ahead cache, and on-board microprocessor.

### SIO4-DMA

#### Cables (four)

The most advanced, intelligent, 4-port serial I/O board available for the IEEE-696/S-100 bus, this module features 256 bytes of FIFO buffer for input characters and provides DMA transfers for output. A built-in 8085A processor greatly reduces system overhead.

### DMEM-256KP

Features 256K bytes of memory and either 8 or 16-bit data paths. 24-bit addressing, and parity checking on each byte. DMEM has no S-100 wait states. Provides two independently addressable 128K byte banks.

### EPR0M-32/64K

Capable of either 8- or 16-bit data transfers, this 32/64K EPROM offers the versatility of running with 68000, Z-8000, 8086, 16000, and other 16-bit processors. It accepts industry-standard 2732 and 2716 EPROMs. 64KB RAMS may be mixed with 2716 EPROMs for use as a RAM/EPROM board.

**\$2,195-A\***

**\$1,383-A\***

**\$812-A\***

**\$695-A\***

**\$100-A\***

**\$1,295**

**~~\$1,395-A\*~~**

**\$345-A\***

### CPU-68000M-L10

High-performance CPU board with 16-bit data path, 10 MHz CPU operation and MC68451 MMU for multi-tasking applications.

### CPU-68000M

MC68000/MC68451 central processor board featuring memory management, running at 8 MHz.

### CPU-68000

Similar to 68000M, but features 8K bytes of on-board ROM with Motorola's MACSBUG monitor instead of the Memory Management Unit.

### M/BD-15 & 20

#### 15-slot

#### 20-slot

These premium quality motherboards feature four-layer construction with two internal ground planes, and Schottky-diode termination. They provide high-speed operation with true transmission line characteristics and minimum noise.

### CMEM-8K

### CMEM-16K

### CMEM-32K

This non-volatile CMOS memory board provides easy-to-use 8 or 16-bit data paths and 32K bytes of memory with dynamically movable write-protect window. On-board lithium battery holds data for 3-10 years with power off.

### WDC

Two-board DMA Winchester disk controller set. SA-4000 type interface.

**\$1,195-A\***

**\$995-A\***

**\$895-A\***

**\$495-A\***

**\$545-A\***

**\$525-A\***

**\$625-A\***

**\$725-A\***

**\$1,050-A\***

### FDC

Floppy disk controller, SA-800/850 interface.

### MACSBUG™

Set of two EPROM chips containing MACSBUG monitor.

### TCON

9-Track magnetic tape drive controller. IEEE-696/S-100 standard including IBM ANSI 9-Track formatter interface. 512 byte FIFO buffering of data on read and write, full 24-bit addressing on DMA transfers, and DMA on read and write to tape. Runs in S-100 systems up to 6 MHz (bus speed) and supports tape densities up to 6250 bpi. Available third quarter 1984.

### EMEM

1M byte dynamic RAM board featuring 256K chips. Draws only 1.45 amps maximum. Access time is 220 ns, cycle time is 300 ns. Board contains byte error detection.

### FLOATING POINT PROCESSOR

Sky board (Sky FFP) includes: Software for C, Fortran, and Pascal; 2901 bit-slice ALU and 16 x 16 multiplier; separate program & data memories; writeable control store; PROM or RAM program memory; PIO interface; user programmable; transcendental, trigonometric, and other compound functions; 32-bit and 64-bit IEEE floating point format; 16-and-32-bit integer operations.

**\$750-A\***

**\$50-A\***

**\$1,250**

**~~\$TBA-A\*~~**

**\$2,495**

**~~\$4,995-A\*~~**

**\$3,300-C\***

## DATA ACQUISITION AND CONTROL BOARDS:

### CLK-24C

Clock-calendar features an LSI CMOS chip and on-board long-life lithium battery.

### AIM-12

A highly reliable Analog-to-Digital converter with 35 micro seconds maximum conversion time, instrumentation amplifier, 12-bit resolution and accuracy, and 32 channels single-ended or 16 channels differential.

### AIM-12B

As above, without instrumentation amplifier.

### AOM-12

This Digital-to-Analog converter offers I/O mapped port address, 12-bit  $\pm 1/2$  L.S.B. accuracy (0-70°C), and voltage outputs of 0 to 10 volts,  $\pm 5$  volts, and  $\pm 10$  volts. Four separate channels.

### VIC4-20

Converts voltage outputs from AOM-12 into 4-20MA current output. Module also provides overvoltage protection on all current output, and transient protection per ISO standards.

**\$325-A\***

**\$725-A\***

**\$675-A\***

**\$675-A\***

**\$600-A\***

\* See Discount Schedule

**WD-500 \$20,730-B\***

Add-on SMD 513M byte (unformatted) Winchester hard disk featuring 25 ms average access time. Configuration includes: 513M byte, 14" hard disk, power supply, cabinet, and cabling.

NOTE: Each SMD\*\* controller present in System 83/500 supports one or two SMD drives.

**WD-80 \$8,950-B\***

Add-on SMD 84M byte (unformatted) Winchester hard disk featuring 20ms average access time. Configuration includes: 84M byte, 8" hard disk, power supply, cabinet, and cabling.

NOTE: Each SMD\*\* controller present in System 83/80 supports one or two SMD drives. (For System 83/80 Only)

**PERIPHERAL OPTIONS:****WD-20 \$4,950-B\***

Add-on 23M byte (unformatted), 8" Winchester hard disk featuring 70ms average access time. Configuration includes: 23M byte, 8" hard disk, power supply, cabinet, and cabling.

NOTE: Each hard disk controller present in system 83/20 supports up to four 20M byte Winchester disk drives.

**9-TK \$6,745-C\***

Nine-track tape configuration; includes TCON tape controller board, tape driver, and 1/2" tape drive, and cables.

**83-TERM \$680-C\***

Kimtron KT-7 intelligent terminal including Ergonomic design and 20 programmable function keys.

**220V/50Hz \$500-C\***

Factory option of power supplies to accommodate operation at 220V, A.C., 50Hz. (For 83/80, 83/20, or 83/00).

NOTE: Boards purchased as enhancements to a system will be given the same discount as the system.

**COMMUNICATION OPTIONS:****ETHERNET****First Node \$3,995-C\***  
**Each additional Node \$2,495-C\***

Ethernet board set (2 boards) provides connection of a system to a full 10 megabit Ethernet. Eight 2k byte buffers for packet reception/transmission. Set includes transceiver, coax cable, and terminator. Supplied without software. Use B-Net networking software to provide TCP-IP protocol. Available on System V only.

**B-NET (Networking Software) \$400-D\***

B-Net conforms to the ISO seven-layer model for network protocol. B-Net features process-to-process communication, remote file transfer, virtual terminal facilities, datagram service, electronic mail transfer, automatic route-through, access to all protocol levels, support for a variety of devices for each node.

**X.25 \$3,750-C\***

This X.25 board offers automated file transfer on UNIX™-system-to-UNIX™-system and implements the full CCITT international standard protocol for connecting with packet-switching networks. (Software Included.)

**SCOM \$995-A\***

IEEE-696/S-100 communications board that will implement various protocol such as HDLC, SDLC and Bisync. Available fourth quarter 1984. Software not available.

**PC WORKS Basic Product \$495-D\*****Additional stations:**

**1 Dual + multiple PC's \$195 each-D\***

**1 PC + multiple Dual's \$295 each-D\***

A "desktop" networking application which links IBM personal computers (or PC-compatible computers) to Dual systems. PC Works consists of four modules: Menu System Terminal Emulator, Configuration Manager, and Mail/File Network Interface. Systems can connect directly or through modems via RS232 Asynchronous lines.

**SOFTWARE OPTIONS:****OPERATING SOFTWARE / LANGUAGES:****FORTRAN-77 \$600-D\***

SVS Fortran-77 implements for full ANSI 77 specification for the FORTRAN language, with the ANSI 66 implementation of FORTRAN. Uses IEEE-format floating point. Includes debugger.

**SVS PASCAL \$600-D\***

A subset of ISO standard PASCAL (does not support conformant arrays, PACK, UNPACK), with extensions for string handling and separate compilation of modules, following the UCSD model. Uses IEEE—format floating point. Includes debugger.

**PASCAL-2 \$600 to 1,650-D\***

ISO standard Pascal, including conformant arrays: highly optimized code generation, sophisticated error checking/recovery, support library in Pascal source, easy linkage to C/UNIX™ routines and utilities. Available: debugger, profiler, code formatter, cross reference tools, and formatter. Source code available for support library.

**BASIC+ \$400-D\***

SVS BASIC +, an implementation of the BASIC-PLUS language. Provides an interactive/interpreter environment ideal for quick programming tasks and calculations. Uses IEEE-format floating point.

**RM-COBOL \$1250-D\*****Run time Only \$450-D\***

The popular Ryan-McFarland COBOL. Provides COBOL with extensions for screen-oriented display and data entry, as well as compatibility with a wide range of systems and applications code that has been developed with RM/COBOL. Includes compiler and interpreter.

**ASM-68 \$300-D\***

68000 macro assembler with Motorola-format mnemonics. Includes conversion program for compatibility with UNIX™ assembler.

\*See Discount Schedule

(continued)

## OPERATING SOFTWARE / LANGUAGES (continued):

<p><b>RTK™</b>                                 <b>\$1500-D*</b> Real-time executive kernel for stand-alone use in process control and data acquisition applications; resultant code is PROMable. Package provides memory allocation, task scheduling, and event processing. Development portion runs under UNIX™ for debugging. Object code runs on Dual System 83/00.</p>	<p><b>RECONFIGURATION RIGHTS</b> <b>\$Factory Quote</b> Materials required to recompile the UNIX™ Kernel in order to reconfigure a system. Includes Source Code for sample device drivers.</p>	<p><b>UNIX™ Source Code Available</b>                         <b>\$Factory Quote</b></p>
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## APPLICATION SOFTWARE OPTIONS:

<p><b>microINGRES™</b>                     <b>1,100-D*</b> A relational database, ported for the UNIX™ operating system. Features: Report Writer, Forms Management, Virtual Screen Formatter, a precompiler for relational query statements embedded in C-Language, Equal.</p>	<p><b>VIEWCOMP™</b>                         <b>\$400-D*</b> Electronic spreadsheet calculator designed specifically for the UNIX™ System. It has 16,129 worksheet locations; select 127 columns by 127 rows to 2 columns by 5450 rows; write protect; column formatting; multiple windows. Files can be read or created with standard UNIX™ system utilities and can accept data from other files.</p>	<p><b>MBSI™</b> <b>Modules (1-5)</b>                         <b>\$850-D* each</b> <b>Module (6)</b>                         <b>\$450-D*</b> Accounting Packages. Available Modules: 1. General Ledger/Financial Statements 2. Accounts Payable 3. Order entry/Inventory Control 4. Accounts Receivable 5. Payroll 6. Sales Analysis Support and source code are available. Requires RM COBOL.</p>
<p><b>UNIFY™</b>                                 <b>\$1,999-D*</b> <b>Run Time Only</b>                     <b>\$999-D*</b> Relational database. Includes: SEQUEL 2, query-by-forms, fourth-generation application development facilities, fullscreen interactive data entry, report writer, menu driven, non-procedural, transaction logging, concurrency control, security, multiple access, multiple process, and raw I/O.</p>	<p><b>LEX™</b>                                     <b>\$750-D*</b> Menu-driven word processing. Includes all word processing functions plus list processing with database, spelling, on-line help, forms, programmable calculator, multiple column, hyphenation, indexing, programmable functions, document merge, and terminal independence.</p>	

## DOCUMENTATION:

**UNIX™ DOCUMENTATION-E\*:**

UNIX™, System V, 3 volume set	\$ 70
UNIX™, System V, tutorials	\$ 75
UNIX™, Version 7, 3 volume set	\$150

**PUBLICATIONS:**

UNIX™ Catalog, USR/GROUP	\$35
UNIX™ Guide, Bill Freiboth	\$25
User's Guide to UNIX™, Jean Yates	\$19

**SCHEMATICS**                         **\$50-E\***

Blue-line logic diagram(s) of purchased Dual circuit board(s). (To be used for repair and trouble-shooting purposes only).

**DUAL HARDWARE MANUALS-E\*:**

CPU68000	\$25
CPU68000M-L10	\$25
DMEM-256KP	\$25
E MEM	\$25
SIO4-DMA	\$25
EPROM32-64K	\$25
M/BD 15 & 20	\$25
AIM-12/AIM-12B	\$25
AOM-12	\$25
VIC4-20	\$25
CLK-24C	\$25
C MEM 8,16,32K	\$25
WDC-SMD	\$25
83/500 User's Manual	\$75
83/80 User's Manual	\$25
83/20 User's Manual	\$25

**SOFTWARE MANUALS-E\*:**

SVS Fortran-77	\$25
SVS Pascal	\$25
RM COBOL	\$35
Basic+	\$25
ASM68	\$25
RTK	\$25
VIEWCOMP	\$35
microINGRES	\$100
LEX68	\$35
UNIFY	\$95
Pascal 2	\$25

### NOTES:

Full twelve-month warranty on all systems, boards, and board sets. Prices are F.O.B. Berkeley, California. Terms Net 30 days on approval of credit. Deposit is required prior to initial shipment of system(s) or board(s). Prices, Terms and Conditions of Sale are subject to change without notice.

Discounts are offered to OEMs, distributors, and educational institutions.

\*see discount schedule

\*\*patent pending

### TRADEMARKS

UNIX—Bell Laboratories, Inc.  
microINGRES—Relational Technology, Inc.  
UNIFY—Unify Corporation

RTK—ADAX, Inc.  
UniPlus—Unisoft Corporation  
LEX—Softest, Inc.

MBSI—RealWorld, Inc.  
MACSBURG—Motorola  
VIEWCOMP—Viewcomp, Inc.

# DUAL

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