Microsystems Catalog

- **Modular Systems Components**
- **Host/Development Systems**
- **Development Instrumentation**
- **Software Support**

Ⓜ **MOTOROLA**

Microsystems

Motorola's quality production of the world's broadest line of semiconductors places it in the vanguard of electronic development. This position and resultant responsibility require that Motorola provide the most advanced and capable, highest quality basic components which add the many levels of functional intelligence to virtually all forms of industrial, commercial, educational, and recreational equipment.

Following Motorola's 30-year tradition of excellence in semiconductors, the Motorola Microsystems organization is offering a similarly excellent and broad range of microcomputer systems, peripherals, and associated products, both hardware and software. The mission of this Microsystems organization is to create and design the most advanced system-level products possible, to manufacture them with quality and reliability, and to sell and service them with efficiency and integrity.

Motorola Microsystems' products cover a broad range in three categories: powerful and economical host/development systems such as the EXORset, EXORmacs and VME/10 OEM Microcomputer Systems. A complete line of software is available for these Host/Development Systems. The line of software includes: VERSAdos, SYSTEM V/68, CP/M-68K, MDOS Operating Systems; Fortran, Pascal, C and Basic Higher Level Languages; assemblers; linkers; and compilers or interpreters. All hosts are fully supported with software. Development instrumentation, the second category, encompasses microprocessor emulators, real-time bus state analyzers, educational and evaluation boards that support a variety of Microprocessors and MCU's. These products allow greater efficiency in the design process by providing the design engineer greater control and insight into the inner workings of a complex microprocessor-based system. Primary members of Motorola's development instrumentation family are the HDS-400 Hardware/Software Development Station for 16-/32-bit development projects, the HDS-300 Mid-Range MPU/MCU Development System for 8-/16-bit development, and the HDS-200 or HDS-300 Hardware/Software Development Station for 8-bit microcomputer applications. The third category comprises board-level modular system component products that reduce final system design time and allow rapid system integration from completely assembled and tested subsystem elements. These products include VMEmodules, VERSAmodules, I/O Channel Modules, Micromodules, and additional products supporting 8-/16-/32-bit systems.

The products presented in this catalog are arranged in the order of Host/Development systems and their associated peripheral products for these host systems, followed by development instrumentation stations, the bus state analyzer, evaluation boards, and educational module. The supporting or customizing board-level products are presented next. Within each product grouping, the 16-/32-bit products are presented first, followed by the 8-bit products. The hardware presentations are followed by resident and non-resident software products offered. Software products are presented in the same order: 16-bit support followed by 8-bit support. A description and listing of additional Motorola Support capabilities offered including Field Applications Engineering, Field Service, Training Seminars, and Documentation available is also provided.

A categorized list of User Documentation and an Alpha-numeric Listing of all products offered by Motorola Microsystems follow the presentations of products and services.

Microsystems

Table of Contents

Host/Development Systems

VME/10 OEM Microcomputer System
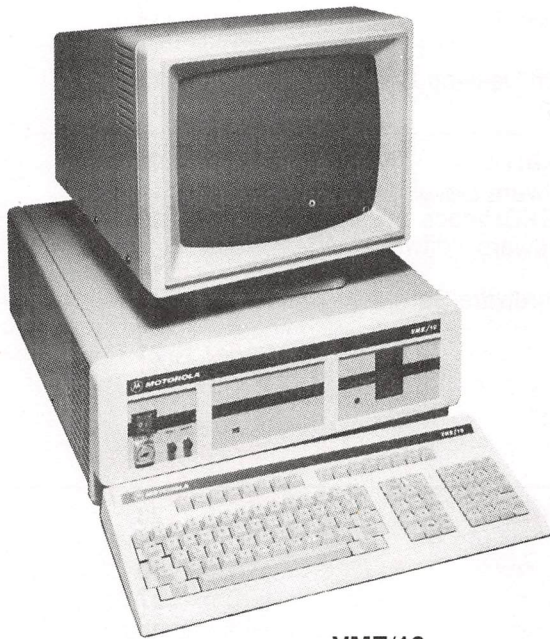
VME/10

From the pioneer of the MC68000 Microprocessor Family comes the VME/10 — a new desktop microcomputer OEM development system that is among the most advanced and capable 16-/32-bit desktop systems available. It provides a cost-efficient high-level solution to custom-system development tasks. It is for designers developing 8-, 16-, and 32-bit systems . . . OEMs requiring a complete hardware/software development station . . . for scientific, engineering, laboratory, and industrial microcomputer needs — including instrumentation control, data acquisition/analysis, and communications. It is for system integrators who require a powerful basic microcomputer that will accept the appropriate add-on modules to customize it for their specific system application. The VME/10 System employs the MC68010 Microprocessor which incorporates a full 16-bit data bus and 32-bit internal architecture; and it may serve as the host in the system to be developed. A wide variety of development software is available for use on the VME/10 System under the powerful VERSAdos Real-Time Operating System. The AT&T validated SYSTEM V/68 derived from UNIX System V, and CP/M-68K derived from CP/M, operating systems are also available. The wide variety of software and hardware makes the VME/10 system obsolescence proof for the future.

EXORmacs Development System
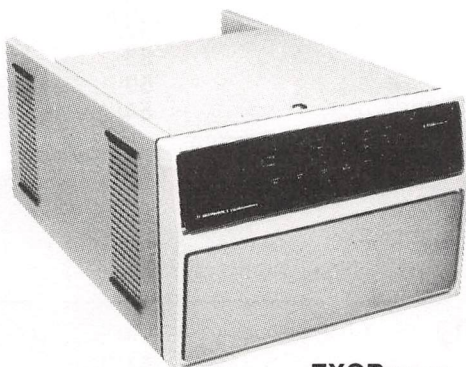
EXORmacs

For large-scale development projects, choose the EXORmacs System, a powerful, modular, multiuser microcomputer development system for the most advanced and capable 16-/32-bit microprocessor, the MC68000. This comprehensive system is the solution for high efficiency system development activities directed toward both the M68000 and M6800 Families. With the VERSAdos Operating System, it is a true realtime multitasking development system capable of fully supporting Motorola's 8-/16-/32-bit MPU and MCU product lines. The powerful SYSTEM V/68 is available to support 16-/32-bit MPU designs. The EXORmacs Development System is fully supported with hardware and software to enable immediate initiation of design and development projects.

Power Sources — The Microsystems System Products listed (and part numbers shown) are compatible with 115 volt, 60 Hz input power; these products can also be supplied for 220 volt, 50 Hz operation. Consult your local Motorola Field Representative for the correct part numbers to order for the higher input voltage compatibility.

VMC 68/2 Microcomputer System

VMC 68/2

The VMC68/2 Microcomputer System is a complete MC68000-based central processing system packaged for OEMs and Systems Integrators for a wide range of applications in industrial process control, automated testing, data acquisition, supervisory control, and many others in laboratory and factory automation. The VMC 68/2 System based on the 8-/16-/32-bit VERSAbus and VERSAmodule family of board-level microcomputer products, is available in several configurations, with and without software. The basic "hardware only" system consists of a Monoboard Microcomputer, Dynamic RAM, Dual Parallel Port I/O, a Universal Disk Controller, and optional 16 or 50Mb Hard Disk. A complete system consists of the basic hardware system including the 16Mb Hard Disk, VERSAdos Real-Time Operating System software and VERSAbug debug monitor and disk boot firmware.

EXORset 110 Development System/Desktop Controller
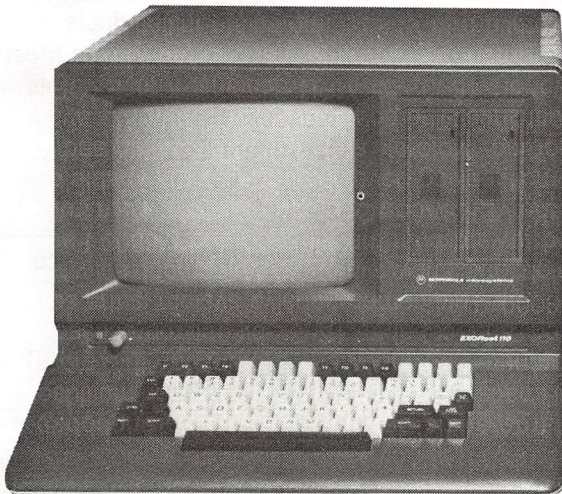
EXORset

The EXORset Microcomputer Development System is a compact, desktop, 8-bit system powerful enough to support major development projects; and it's simple and economical enough for the first-time micro-system designer. Incorporating Motorola's most powerful 8-bit microprocessor, the MC6809 MPU, the EXORset exhibits 16-bit internal architecture and instructions permitting faster handling of more data than competing 8-bit designs. The EXORset's advanced operating system, XDOS, controls all disk functions, handles sequential or random files, and is compatible with the EXORciser operating system MDOS. A greatly enhanced BASIC-M interactive compiler makes program structuring, writing, editing, and debugging simple and efficient. The integration of all hardware systems within a single, compact, desktop enclosure make the EXORset economical to purchase, easy and efficient to operate, and simple to maintain.

EXORciser II Development System

EXORciser

The EXORciser II Development System is the basic tool for designing and developing microprocessor-based systems using any of Motorola's 8-bit M6800 Family of microprocessors and peripherals. The EXORciser is a modularized and expandable instrument that permits "instant breadboarding" and evaluation of any M6800 family based microcomputer system. A wide variety of memory and peripheral interface modules are available to plug directly into the EXORciser's system bus so that expansion is quick, easy, and essentially error-proof. The EXORciser II has provisions for up to 12 add-on modules, allowing assembly of a system of almost any complexity.

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VME/10 OEM Microcomputer System
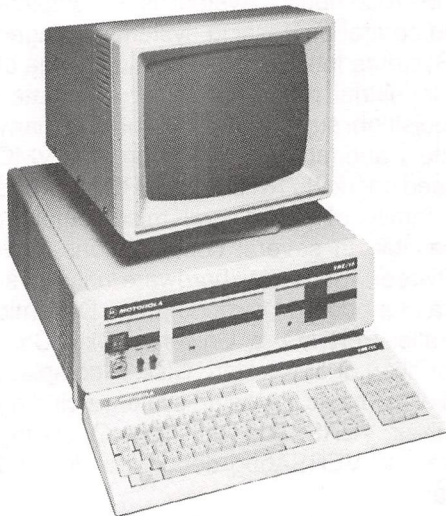
The VME/10 is an advanced microcomputer system based on the powerful 68010 microprocessor. The VME/10 is designed to offer the user maximum flexibility to configure it as a powerful OEM microcomputer system, an advanced development system, or a customized engineering workstation.

OEM Advantages   Unlike many microcomputer systems which are optimized for specific end uses, the VME/10 is designed to meet the needs of a broad spectrum of OEM's and System Integrators that are targeting to serve the needs of industrial and technical markets. Additional features/benefits to consider:

FEATURES	BENEFITS
• Designed Around Worldwide Standard Hardware and Software	• Lowers Overall Product Cost • Provides Compatibility • Increases Reliability • Lengthens Product Life
• Incorporates VMEbus System Architecture Standard Methodology	• Provides Choices from Over 500 Expansion Products • Allows Customization to Meet OEM Special Requirements • Reduces Risk and Investment Considerably • Allows "Quicker Time to Market"
• Field Proven Motorola Support, Reliability and Quality	• Provides Choice of Service Plans to Fit the Need • Reduces Learning Curve Because of Large Selection of Training Programs
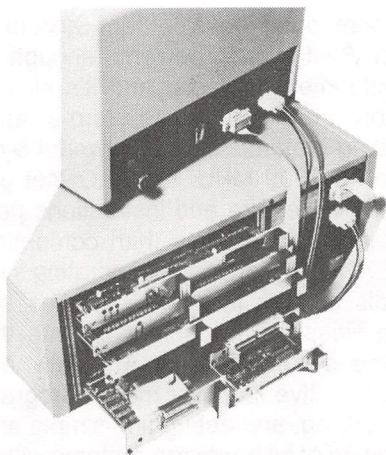
Advanced VMEsystem Architecture   The integration of the VME System Architecture (based on IEEE P1014/VMEbus Standards) allows the expansion of the VME/10 System with products offered by over 100 manufacturers. This international standard offers a broad line of modular products based on the powerful 8-/16-/32-bit M68000 family. In a complementary fashion the I/O Channel permits system expansion through a wide variety of boards without incurring additional load on the system bus. In multiprocessor applications, this relieves the VMEbus of time consuming peripheral servicing tasks that can result in a significant performance increase.

A Powerful Development Host   The VME/10 System is designed to be used with Motorola's Advanced Instrumentation products to provide a complete hardware and software development system. When configuring the VME/10 as the host, Motorola's new line of Hardware Development Stations (HDS), real-time Bus State Analyzer (BSA), and MPU/MCU specific emulators allows full emulation and debug capabilities. Additionally alternate design approaches can be quickly and economically tested in order to determine the best solution.
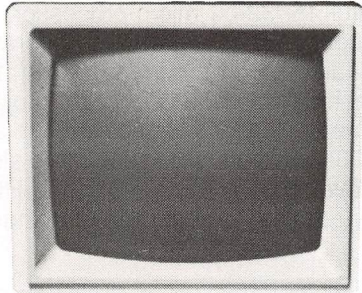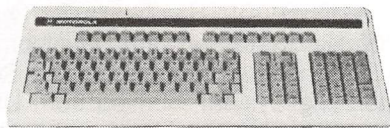
Display Unit

System Control Unit

Detachable Keyboard

Support — Hardware and Software Supporting and facilitating adaptations to dedicated applications, the VME/10 can draw on the substantial selection of VMEmodules and I/Omodules offered by Motorola and other vendors as building blocks for system implementations. The VMEbus and I/O Channel specifications are thoroughly documented and available to facilitate the design of custom expansion modules for unique applications. Witness the proliferation of VMEbus-compatible board-level products from presently over 100 other suppliers; this greatly enhances the VME/10's customizing potential.

Complete Packages

M68K102B1 VME/10 Microcomputer System — includes 15" Monochrome Video Display, Keyboard and System Control Unit with 10 MHz MC68010 MPU, 32-segment MMU, 384Kbytes of DRAM, battery-backed Time-of-Day Clock, Floppy/Hard Disk Drive Controller, 5-1/4" Winchester Disk Drive (15Mb formatted), 5-1/4" Floppy Disk Drive, and 5-Slot VMEbus backplane and 4-Slot I/O Channel card cage. Supplied software includes VERSAdos Operating System, M68000 Macro Assembler, Linkage Editor, CRT Text Editor, many Utilities, debug/monitor, and Diagnostics.

M68K102C1 VME/10 Microcomputer System, same as M68K102B1 except with 40Mb Winchester Disk Drive.

M68K102D1 VME/10 Microcomputer System, same as M68K102C1, except with 14" Color Monitor.

M68KVME10-200 VME/10 Microcomputer System with HDS-200. Includes M68K102B1, 15Mb VME/10 System; M68HDS201, HDS-200 Control Station; MVME 400 dual RS-232C serial I/O board, M68VCXBASM Cross Assembler package, and M68KIXDIOPP PROM programmer package. Emulator module is separate (see pages 18 through 20).

Separate Products

|	
M68K10CU2	15Mb System Control Unit
M68K10CU3	40Mb System Control Unit
M68K10DU1	15" Monochrome Monitor
M68K10DU2	14" Color Monitor

* * Note 1: Refer to Pages 24 through 30 and Pages 36 through 39 for expansion and customizing modules. VME/10 System compatible development instrumentation and configurations are described on page 62.
* * Note 2: Refer to System Configuration guide (see page 62).
* * Note 3: Motorola recommends Technical Training course MTT23 (refer to page 55).
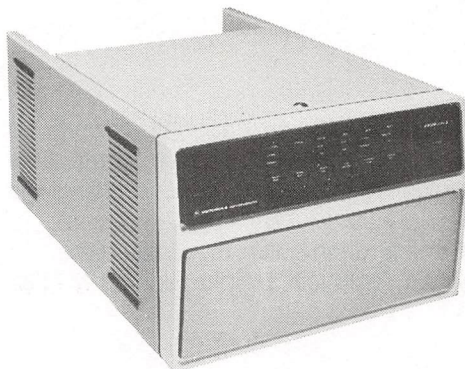
EXORmacs Development System
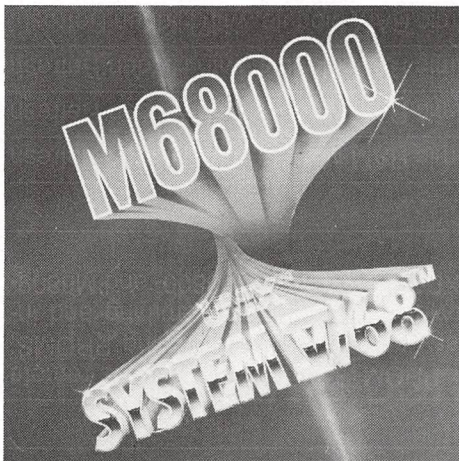
EXORmacs System is an advanced, modular, multiuser microcomputer development system for the powerful 16-/32-bit micro-processor, the MC68000 MPU. EXORmacs can support up to eight users operating simultaneously from attached terminals — with a corresponding drop in cost per user. With recognition that many large development projects incorporate both 8-bit and 16-bit elements, the EXORmacs System also hosts optionally available 8-bit M6800 Family macro assemblers along with interfaces to the EXORciser Development System and the HDS-200 Hardware/Software Development Station to support a full range of 8-bit system integration tasks.

Just as the MC68000 MPU uses 32-bit internal architecture, the EXORmacs System was planned for the future. Its 16-/32-bit VERSAbus system architecture permits 32-bit designs with very few system alterations. The innovative structure of the VERSAbus system interconnect permits direct memory addressing of four billion bytes.

The basic EXORmacs Development System incorporates all the hardware and software required to immediately begin design and development projects. With available options, you may add users, memory, and mass storage as your development needs grow. Users may be added by merely installing the associated interface board and attaching the terminal. The EXORmacs Development System configuration is shown on pages 64 and 65.

The base configuration of the EXORmacs System includes the EXORmacs chassis, an EXORterm 155 Intelligent CRT Terminal, Printer, and either or both, hard disk and floppy disk drives. The basic software package includes the VERSAdos Real-Time Operating System, an M68000 Structured Macro Assembler, a Linkage Editor, CRT Text Editor, the SYMbug Symbolic Debugger, optional Pascal Compiler, and many utilities and diagnostics. The VERSAdos software package also includes programs that allow communications between EXORmacs and EXORciser systems, and between two or more EXORmacs systems. Major hardware options for significantly enhancing the EXORmacs development capabilities include the HDS-400 Hardware/Software Development Station, the HDS-300 Hardware/Software Development Station, the HDS-200 Hardware/Software Development Station, the Remote Development Station, and the Real-Time Bus State Analyzer. The SYSTEM V/68 Operating System, derived from UNIX System V, M68000 Version, is also optionally available as an alternate system software environment.

M68KMACS MC68000 EXORmacs Development System — designed for multiuser capability using VERSAbus; includes 15-Slot Chassis, power supply, MPU/MMU Modules, 512Kbytes of RAM, Hard Disk Controller, EXORterm 155 Intelligent Terminal and VERSAdos Operating System.

　M68KMACSRK EXORmacs (M68KMACS) Rack Mount Kit.

**Note 1: Refer to EXORmacs System Configuration Guide on pages 64 and 65 of this catalog for aid in selecting peripheral equipment.
**Note 2: Motorola recommends Technical Training Course MTT13 (refer to page 55).
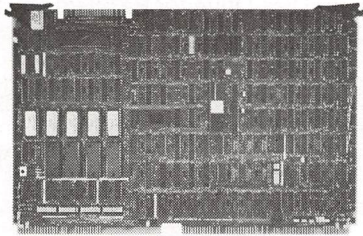
Multi-Channel Communications Module

EXORterm 155

EXORdisk III

Lark Hard Disk Drive

M68KMCCM Multi-Channel Communications Module, VERSAbus half-duplex interface controller module provides for up to four additional multiuser terminals; adequate hard disk storage is requir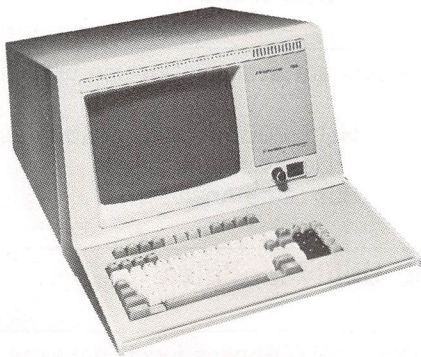ed. Includes four programmable baud rate RS-232C async ports and a parallel printer port; recommended for hard disk-based EXORmacs systems.

M68KMCCM-1 Multi-channel communications module, same as M68KMCCM except full duplex firmware.

M68KVM30-1KT Full duplex upgrade kit for the M68KMCCM to M68KMCCM-1.

Intelligent Terminal

M68SXD10155A EXORterm 155 Video Display Terminal; MC6800 based terminal and console with expanded keyboard and display features for use of Resident CRT Editor, with Cable; required for Bus State Analyzer.

    M68RS-232-10   RS-232C 10-ft. Cable.
    M68RS-232-25   RS-232C 25-ft. Cable.
    M68RS-232-50   RS-232C 50-ft. Cable.

Floppy Disk Drives

M68KFD1102 EXORdisk III 1Mbyte Double Sided, Single Density (DS, SD), Floppy Disk Drive, includes VERSAdos and Software Development Tools — Macro Assembler, Linkage and CRT Editor, SYMbug A, and cable set, for EXORmacs System.

M68SFDU1102E EXORdisk IIIE 1Mbyte DS, SD Floppy Dual Disk Drive Expansion System with Cable to primary drive unit.

    M68SFDRK3   Rack Mount Kit for Floppy Disk Drive
    M6834   Floppy Diskettes, 8″, DS, SD, Blank

Hard Disk Drives

M68KHDD16-1 Lark Hard Disk Drive, 16Mbyte, for use with VERSAdos, includes M68KFD1102 Software Development Tools.

    M68KHDE16-1 Expansion Hard Disk Unit for EXORmacs, 16Mb; includes Disk Drive and Cable Set.

    M68KHDS16-1 Up-Grade Kit for 16Mb Hard Disk Drive. Allows Hard Disk Drive addition to earlier EXORmacs Systems M68KMCASS, -MCASF1, -EXOR, -EXORA, and -MACSNP1 that do not include the SMD Controller. Includes Universal Disk Controller, Disk Drive, VERSAdos on Cartridge, and expansion unit cable set.

    M68CART Cartridge for 32-/96-Mb Disk Drive, blank.

M68KHDD50-1 Lark 50Mbyte Hard Disk Drive for EXORmacs for use with VERSAdos, includes M68KFD1102 Software Development Tools.

    M68KHDE50-1 Expansion Hard Disk Unit for EXORmacs, 50Mb; includes Disk Drive, Cable Set, and rack mount kit.

    M68KHDS50-1 Up-Grade Kit for EXORmacs, 50Mb Hard Disk Drive, same as M68KHDS16-1.

EXORmacs System Peripherals (continued)

Phoenix Hard Disk Drive

M68KHDD96-1   Phoenix 96Mbyte Hard Disk Drive for EXORmacs, for use with VERSAdos, includes M68KFD1102 Software Development Tools.
   M68KHDE96-1   Expansion 96Mb Hard Disk Unit for EXORmacs; includes Disk Drive, Cable Set, installation and rack mount kit.
   M68KHDS96-1   Up-Grade Kit for EXORmacs, 96Mb Hard Disk Drive; same as M68KHDS16-1.

EXORmacs Printer Cable

M68KVMPRTCE   Printer Cable, 10-ft.

EXORmacs Development Instrumentation
(Refer to Pages 16–21)

The following instrumentation products are available for use with the EXORmacs System:

HDS-400 Hardware/Software Development Station

M68000 Remote Development Station

HDS-200 Hardware/Software Development Station

Bus State Analyzer

EXORmacs Expansion and Utility Modules
(Refer to Pages 31–36)

The following modules are available for EXORmacs functional expansion through use of the unused VERSAbus card slots:

128Kbyte Dynamic RAM
256Kbyte Dynamic RAM
512Kbyte Dynamic RAM
1Mbyte Dynamic RAM
4Mb Dynamic RAM
Multi-Channel Communications Module

Ethernet Communications
VERSAbus to EXORbus Adapter Module
VERSAbus Extender and Wire-wrap Modules

EXORmacs Software Options (Refer to Pages 43–54)

EXORmacs Resident Software (for M68000 unless noted) listed below is available:

Pascal Compiler
FORTRAN Compiler
IEEE Floating Point
Fast Floating Point

MC6800/04/05/09 Cross Macro Assemblers
MC6809 Cross Pascal
Data I/O PROM Programmer Interface

EXORmacs Operating Systems (Refer to pages 43–51)

M68000 SYSTEM V/68 Operating System
M68000 VERSAdos Real-Time Operating System

VMC 68/2 Microcomputer System

The VMC 68/2 Microcomputer System incorporates VERSAbus system architecture and uses the VERSAmodule Family of board level microcomputer products. It is available in several configurations, with and without software. A complete system package offers the following:

- MC68000 based Monoboard Microcomputer (VM02), 128Kbytes of dual-port access RAM, direct addressing to 16Mbytes, I/O Channel interface, and dual multiprotocol RS-232C ports.
- Dynamic RAM Module (VM11) with 256Kbytes of 'global' RAM
- Dual 16-bit parallel port I/O Module (VME410) with Centronics compatible interface
- Universal Disk Controller Module (VM21) provides high-speed DMA data transfers for two SMD-Interface Hard Disk Drives AND up to four EXORdisk II/III Floppy Disk Drives
- Hard Disk Mass Storage Unit MLD-16 (16 Megabyte, 8M Fixed, 8M Removable) with SMD interface, and power supply.
- MC68000 Structured Macro Assembler and Utilities software, Text Editor, Linkage Editor, Multitasking debugger, System Diagnostics, and SYSGEN capability for system tailoring; Pascal and FORTRAN Compilers optionally available.

MVMC682-114

MVMC682-114H VMC 68/2 Microcomputer System is MC68000-based and designed for expansion using VERSAmodules; includes 4-slot VERSAbus chassis with 5-slot I/O Channel card cage, M68000 Microcomputer, 384Kbytes of dynamic RAM, Dual Parallel Port I/O module, and Universal Disk Controller (controls 2 SMD Interface 16- or 96-Mb Hard Disk Drives and 4 Floppy Disk Drives).

MVMC682-118H VMC 68/2 Microcomputer System, same as MVMC682-114H but with 8-slot VERSAbus chassis and two 5-slot I/O Channel card cage.

MVMC682-114 VMC 68/2 Microcomputer System, same as MVMC682-114H but with 16Mb Hard Disk Mass Storage Unit and the VERSAdos Real-Time Multitasking Operating System software.

MVMC682-118 VMC 68/2 Microcomputer System, same as MVMC682-114 but with 8-slot VERSAbus chassis and two 5-slot I/O Channel card cages.

Hard Disk Drives

MLD1-16 Lark 16Mb Hard Disk Drive for VMC 68/2, includes drive, SMD interface, power supply, and unformatted cartridge in 7″ high RETMA rack mount enclosure.

MLD1-50 Lark 50Mb Hard Disk Drive for VMC 68/2, Same as MLD1-16.

    M68RMSE1-1 Enclosure for 16/50Mb Lark Hard Disk Drive Expansion Unit MLD1-16 or MLD1-50; same as MLD1-16 except without drive or SMD Compatible Interface board.

Lark Hard Disk Drive

    MLD16DESKTC Lark Disk Drive Desk Top Cover.
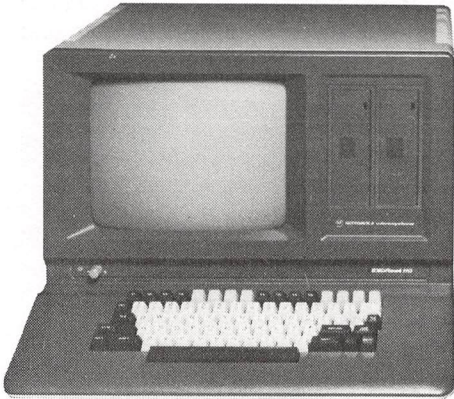   **MLD16SMK** Lark Hard Disk Drive Rack Mount Kit.
    MLD16CART Cartridge for 16Mb Lark Hard Disk Drive.
    MLD50CART Cartridge for 50Mb Disk Drive, blank.

∗ ∗ Note: Refer to listing of VERSAmodules on pages 30–36 for expansion and customization of the VMC 68/2; to page 9 for compatible terminal, disk storage; and to page 49 for VMC 68/2 Software.

The EXORset 110 Development System is an economical and compact 8-bit system development tool. It is powerful enough to support major microcomputer development projects, while simple enough for the novice microcomputer system designer. This system offers a low-cost alternate solution to more expensive, modular hardware development systems or multiuser timesharing systems.

The EXORset 110 Desktop Controller is a versatile system that can be easily configured for a variety of engineering, industrial, and laboratory automation and data acquisition and analysis applications. It was designed to meet the needs of applications that require a high performance 8-bit microprocessor, with integrated video display and keyboard, flexibility in the type and amount of disk storage, RAM, and ROM/EPROM, onboard I/O ports: serial, parallel, and counter timer, flexibility in configuring the I/O capability and adding additional memory. The EXORset system provides all this with a straightforward, simplified approach to application software development and hardware/software integration, testing and debugging. One compact, desk top unit offers not only high performance for control and data manipulation, but also offers a complete user interface plus optional mass storage on floppy disks. Optional OEM configurations are available by contacting your local Motorola sales office.

The major features include:

- MC6809 high performance microprocessor
- Three card slots for EXORbus compatible boards, (four slots are available if no disk controller board is required).
- EXORbug monitor/debug ROM included; this IC socket may be used for 8Kbytes of custom firmware if EXORbug is not required.
- Triple 16-bit programmable counter/timer.
- A broad range of optional Micromodules (Pages 39–41) that the user can install to configure a customized application system are available. Software for EXORset is listed on pages 52–54.

M6809SET110 EXORset 110 Development System, includes ASCII keyboard with 16 user-defined keys, 12″ display (80-column, 22 lines or 40-column, 16 lines with 320 x 256 dot graphics), Parallel Printer Interface, 56Kbytes of RAM and 3 EPROM sockets for up to 24Kbytes of user firmware, EXORbug debug/monitor to control keyboard and display operations, dual DS, SD 5-1/4″ floppy disk Drives provide 320Kbytes of mass storage, 160Kbytes each, with XDOS, CRT Editor, relocatable M6800 Macro Assembler, and Linking Loader.

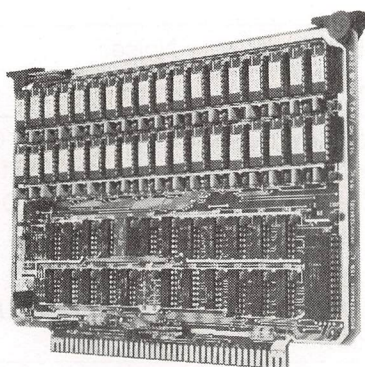**M6836** Mini-Floppy Diskettes, 5-1/4″, Package of 10.

M68SET-200 Combination of M6809SET110 Development System with HDS-200 Hardware Development Control Station and BASIC-M compiler and assembler required emulator module separate. Refer to page 20 for description of HDS-200 with associated emulator modules.

EXORdisk III
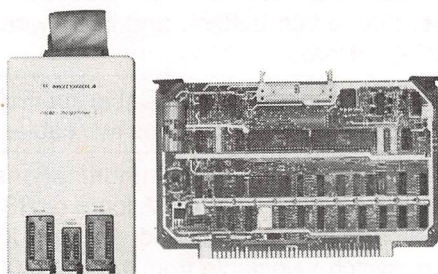
PROM Programmer

MEX6864-22
64K Dynamic RAM

EXORset Disk Drives

M68DSK3 EXORdisk III Dual 8″ DS, SD 1Mb disk Drive for use with EXORset or EXORciser, includes two disk units, chassis, enclosure, power supply, cable, controller board and MDOS software; for EXORset applications, use firmware M6809SETD3F.

> **M68SFDRK3** Rack Mount Kit for EXORdisk III (M68DSK3) or EXORdisk II.
> **M6834** Floppy Diskette, 8″, Blank, DS, SD.

M6809SETD3F EXORdisk III Firmware for EXORset.

EXORset Printer Cable

MSET110PIC EXORset 110 Printer Interconnect Cable.

PROM Programmer

M68PP5 EXORset/EXORciser PROM Programmer provides remote socket module to allow user easy access for programming PROMS, EPROMS, and EEPROMS; provides even/odd programming and includes software on MDOS and XDOS Diskette for M6800- and M6809-based development systems.

EXORbus Memory Boards

MEX6816-1HR 16Kbyte Dynamic RAM Module, with Hidden Refresh

MEX6832-1HR 32Kbyte Dynamic RAM Module, with Hidden Refresh

MEX6848-1HR 48Kbyte Dynamic RAM Module, with Hidden Refresh

MEX6864-1HR 64Kbyte Dynamic RAM Module, with Hidden Refresh, may be configured to 56Kbytes

MEX6816-22D 16Kbyte Dynamic RAM Module, with Parity

MEX6832-22 32Kbyte Dynamic RAM Module, with Parity

MEX6848-22 48Kbyte Dynamic RAM Module, with Parity

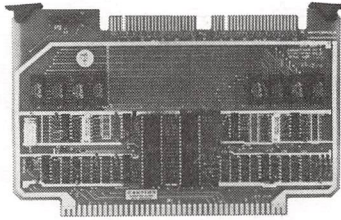**MEX6864-22** 64Kbyte Dynamic RAM Module, with Parity

MEX6812-1 2Kbyte Static RAM Module, with Parity
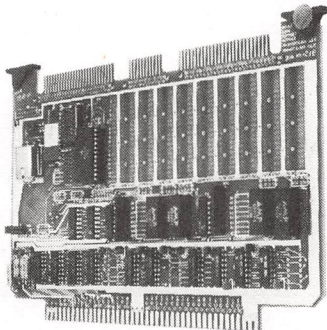
MEX6808-22 8Kbyte Static RAM Module, with Parity

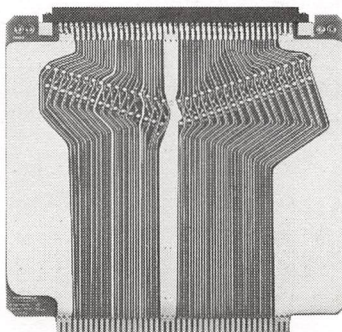**MEX6816-22S** 16Kbyte Static RAM Module, with Parity

**MEX6821-2
Peripheral Interface Module**

**MEX6850-2
ACIA/SSDA Support Module**
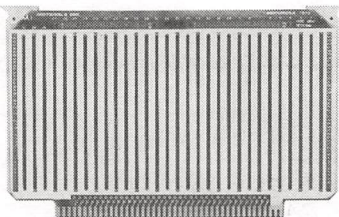
**MEX68WW
EXORbus Wirewrap Module**

**MEX68XT3
EXORbus Extender Module**

EXORset and EXORciser Expansion and Utility Modules

MEX68RR EPROM/RAM Module with Parity, provides sockets for up to 16Kbytes of ROM/PROM and up to 512 bytes of RAM.

MEX68PI2 EXORbus Printer Interface Module provides parallel interface to Centronics-compatible printers; includes interconnecting cables and wirewrap area for custom user circuits.

MEX68PIC Printer Interface Cable, 8 ft., for connecting Printer Interface Module (MEX68PI2) to Centronics-compatible printers.

MEX6821-2 EXORset/EXORciser Peripheral Interface (PIA) Module, provides flexible EXORset/EXORciser interface to users process or peripherals via address switches, three-state buffers, and large wirewrap area; requires two MEX68IC2 cables.

MEX68IC2 Input/Output 50-Pin Interconnect Ribbon Cable for PIA Module, terminated on one end; each PIA Module requires two cables.

MEX6850 EXORciser/EXORset Asynchronous Communications Adapter (ACIA) Module, provides interface to TTY (20 mA loop) or RS-232C Serial port. User custom circuits may be included on large IC wirewrap area; I/O baud rates are switch selectable from 110 to 9600 as are ACIA's base memory area; three-state buffers are compatible with EXORbus.

MEX6850-2 Same as MEX6850 ACIA Module except user has option to add custom I/O circuitry, and RS-232 port may be configured for MC68B52 Synchronous Serial Data Adapter (SSDA) via onboard jumpers.

MEX68XT3 Extender Module for EXORbus, Low Noise.

MEX68WW EXORbus Wirewrap Module.

MEX68USM Universal Support Module provides fully decoded EXORciser interface logic on lower half and wirewrap area on upper half (all signals to/from wirewrap area are buffered) two 50-pin and one 20-pin flat cable connectors are provided (Series II DSB connector allows use to 2 MHz).

MEX6845 MC6845 CRT Controller Module is adaptation of M68USM module to support CRT Controller device.

MEX68488 MC68488 General Purpose Interface Adapter (GPIA) Support Module is adaptation of MEX68USM Module to support MC68488 GPIA Controller device.

MEX6854 MC6854 Advanced Data Link (ADLC) Controller Module is adaptation of MEX68USM Module to support the MC6854 ADLC Controller device.

MEX6802-46 MC6802-46 Support Module is adaptation of MEX68USM Module to support MC6802-MC6846 combination of devices.

EXORciser II Development System
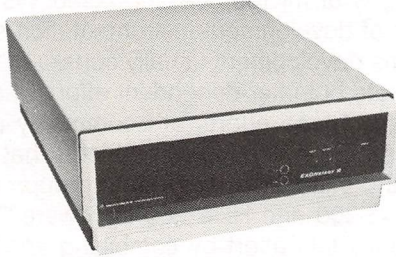
The EXORciser II System is the basic tool for designing and developing a microprocessor-based system using Motorola's 8-bit families of microprocessors and associated peripheral circuits. It is a powerful and easy-to-use development system that has been designed to be highly user-oriented in order to reduce system development time and cost. The EXORciser System represents a modular and expandable instrument that permits instant breadboarding and evaluation of the M6800 and M6809 Microprocessors.

M6800EXOR   M6800 EXORciser II Development System, capable of 1, 1.5, or 2 MHz clock operation, without RAM or software. Includes MC6800 MPU with Debug Module in 14-card motherboard with power supply; 12 EXORbus slots are open for expansion and customization. Select memory from EXORbus modules on page 13.

M6800EXORU   M6800 EXORciser II USE Development System, same as M6800EXOR but with USE board. This package allows emulation of MC6800-based target systems.

M6809EXOR   M6809 EXORciser II Development System, same as M6800EXOR but with M6809 MPU.

MEX68RK2   EXORciser Rack Mount Kit provides rails for mounting EXORciser I/II in RETMA rack.

MEX6809KT   EXORciser I or II & EXORterm (200/220) Upgrade package for M6809 Development capability, includes Debug Modules with M6809 Firmware, M6809 Macro Assembler, Editor, MDOS software, and PROM Programmer software on diskette. The M6809 MDOS firmware is supplied for EXORdisk II/III, Calcomp, and Pertec Drives. Note TTY users should also order M68MM11 RS-232 to TTY Adapter Module.

M68PANEL220   Front Panel for conversion of EXORterm 200 for M6809 MPU usage.

EXORciser Disk Drives

**M68DSK3**   EXORdisk III (refer to page 13 for description)

M68SFDU1102E   EXORdisk III E Floppy Disk Expansion system. (refer to page 9 for description.)

* * **Note:**   Refer to page 9 for description of EXORterm 155, and to pages 13 and 14 for various EXORbus modules useable with the EXORciser system.

Instrumentation

Development Instrumentation

Motorola supports the initial stages of microprocessor-based system development through its offering of development instrumentation systems. The initial stages of systems development usually consist of two parallel, though essentially separate but inter-dependent efforts, hardware design and software design. These efforts are commonly performed by two different teams, resulting in debugging problems that are often difficult, time-consuming, and expensive — for both groups and the company. The HDS-400, HDS-300 and HDS-200 Hardware/Software Development Stations simplify this effort by combining and co-ordinating both processes throughout the development cycle. These instrumentation products emulate the operation of the system MPU or MCU by providing a means to observe internal processor conditions and operations, and they enable testing of alternate designs to determine the optimum final approaches and configuration directly benefitting the developer by saving time and reducing project costs.
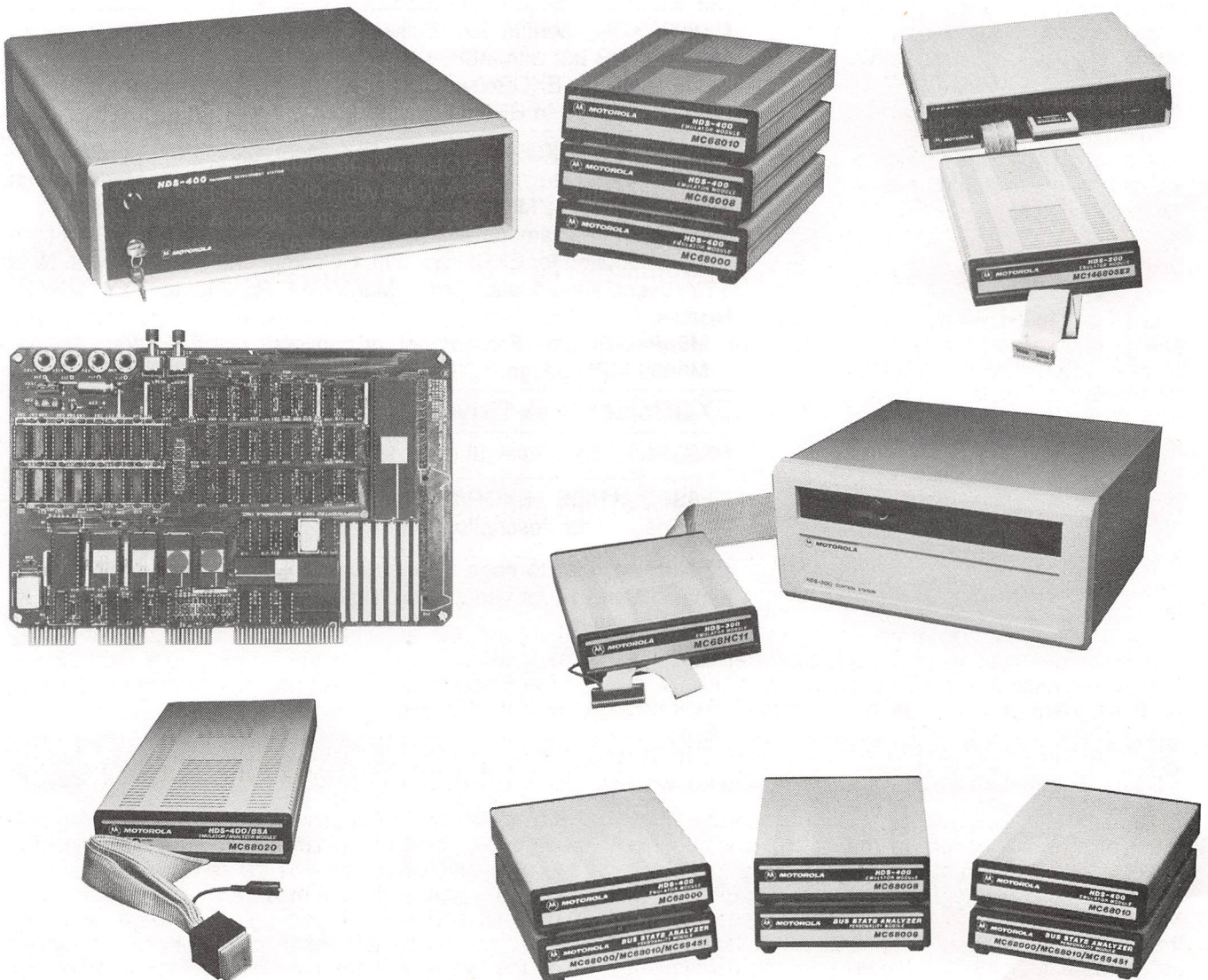
68000 Microprocessor Family Development Stations

The HDS-400 Hardware/Software Development Station is designed to provide a real-time, 10 MHz, no-wait-state emulation of the M68000 Family of 16/32-bit microprocessors. It operates under four host/operating system configurations (refer to page 51), allowing the designer to complete and debug a system in less time and get it to market faster. The HDS-400 communicates with the host EXORmacs Development System using an RS-422 synchronous serial link, or with an RS-232C link it can communicate with the VME/10 or with a DEC VAX host. Both the VME/10 and EXORmacs operate under the VERSAdos Operating System; while the DEC VAX host can operate with either VMS or UNIX System V. Three interchangeable emulators (16-bit MC68000, 8-bit MC68008, and 16-bit Virtual Memory MC68010) may be used with any of the four HDS-400/host/operating system configurations. Each of the emulators supports up to 16 target program breakpoints, within four address ranges, in either RAM or ROM. Optional incorporation of the Real-Time Bus State Analyzer significantly enhances performance; the designer can specify additional complex event breakpoints (up to 7 events from 79 qualifier lines), sequential and window trigger modes, and monitor performance histograms. Using these powerful tools the designer can edit, assemble, or compile programs using the software development capabilities available on the EXORmacs and VME/10 systems.

Mid-Range Development Station

The HDS-300 Hardware/Software Development Station emulates a variety of Complex MPUs and single chip processors. The family of products emulated include: MC6809, MC6809E, MC68HC11, and shortly will include MC6801, MC6801U4, MC68701, MC68701U4 and MC68120.

The station consists of the HDS-300 Control Station and an MCU or MPU specific emulator module. A major benefit of this system is that it is standalone and requires only a standard RS-232C terminal for basic emulation. Even a novice operator will find how quick and easy all target Hardware and some Software can be debugged. The built-in one-line assembler/disassembler allows debugging of small software drivers and utilities without connecting to another system. By adding a host system, downloading the final target code, and using the Bus State Monitor (BSM) complete development can be achieved including trace history and real-time trace analysis. The HDS-300 features a 1K x 64-bit built-in Dynamic RAM built in the BSM.

M6804/6805 MCU Development Station

The HDS-200 Hardware/Software Development Station is an 8-bit microcomputer emulator, which consists of two assemblies; the HDS-200 Control Station and an emulator module for the target MCU. When used with a host, it provides a complete development system for the MC6804/MC6805/MC146805 families of microcomputers. Emulator modules for these MCUs with varying amounts of user on-chip ROM are available. Original system algorithms and I/O parameters can be tested before finalizing firmware code for use in the MCU.

Bus State Analyzer

Additional development assistance is provided by the Bus State Analyzer (BSA); it enables monitoring of system operations at essentially any point in the system, especially during times when external processors, DMA controllers or intelligent peripheral controllers are performing operations. The BSA interfaces with the system on the system or MPU bus, monitors operations and events on the bus, while recording them for later analysis and interpretation. The BSA consists of a Control Module and one of several Personality Modules for interface with a variety of microprocessors and peripheral devices as well as the VERSAbus and EXORbus. The Personality Modules are transparent probes which sample the bus.

Evaluation and Educational Modules

Evaluation and Educational Modules offered by Motorola provide an economical means of providing monitoring and evaluation of a target system microprocessor. They are available for the M68000 Microprocessor, MC6801, and MC68701 Single Chip Microcomputers, the MC68120 Intelligent Peripheral Controller, and the MC68705 & MC1468705 Single Chip Microcomputer. Requiring only a power supply and terminal for operation, these modules assist the user in developing software and performing limited circuit evaluation. The Evaluation Modules provide the selected microprocessor on a board with the most popular peripheral components and a small debugging firmware capability. Their primary benefit lies in their ability to run subsets of the target system source code for performance checking the microprocessor to be used in the system.
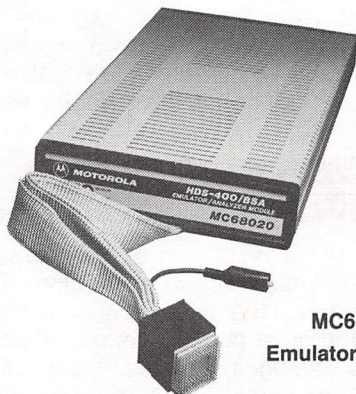
17

HDS-400 Hardware/Software Development Station

HDS-400 Control Station
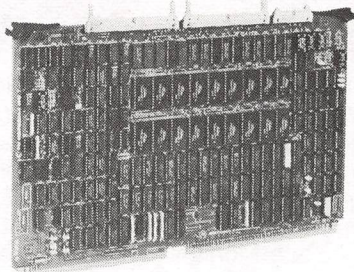
M68000 Family Interface Module

MC68010 Emulator Module

**MC68020
Emulator Module**

M68KHDS400 HDS-400 Control Station for "DLC" Host Interface to EXORmacs Development System, requires one Emulator Module and one Family Interface Module from below and the EXORterm 155 for use with EXORmacs. Includes 4-Slot chassis with built-in 30 A power supply, HDS-400 Control Module, cables and connector assemblies, plus manuals. Configured for use with 56Kbit/sec synchronous serial link to an EXORmacs host and an RS-232C link to the EXORterm 155 terminal.

* * Note: Refer to HDS-400 Configuration Guide on page 66 of this catalog for applicable optional assemblies

M68KHDSDLC 56Kbit/sec Data Link Controller must be installed in EXORmacs host, provides synchronous serial data link between HDS-400 and host (installation by Motorola Field Service).

M68KHDS400A Same as M68KHDS400 except configured for interface to VME/10 or DEC VAX hosts; requires MVME400 module in VME/10 or EXORterm 155 when used with VAX.

M68KHDS16FB 16-Bit M68000 Family Interface Module, to be installed in HDS-400 Control Station includes 32Kbytes of 10 MHz, no-wait cycle Emulation RAM, for use with MC68000, MC68008, MC68010 and MC68020 Emulator Modules; includes necessary cabling and connectors to interface with optional Real-Time Bus State Analyzer Control Module M68BSAC (can be installed in HDS-400 Control Station).

HDS-400 Emulator Modules

M68000HDS4 MC68000 Emulator Module

M68008HDS4-8 MC68008 Emulator Module, 8 MHz Operation

M68010HDS4-8 MC68010 Emulator Module, 8 MHz Operation

MC68020HDS4 MC68020 Emulator/Analyzer for HDS-400 and Bus State Analyzer

HDS-400 Emulation Memory Modules

M68KHDS4EMM1 Emulation Memory Expansion Module increases total Emulation RAM to 64Kbytes.

M68KHDS4EMM2 Emulation Memory Expansion Module increases total Emulation RAM to 128Kb.

**M68KHDS4EMM3** Emulation Memory Expansion Module increases total Emulation RAM to 256Kb.

* * Note: Refer to Page 51 for applicable HDS-400 Software.

# Remote Development Station for EXORmacs

M68KRDS1 Remote Development Station for use with EXORmacs, also MC68000-based, the RDS1 includes a VERSAbus compatible 4-slot chassis, power supply, station control module, M68KUSE Module, and MC68000 Pod Assembly. Built-in MACSbug firmware allows stand-alone debug capability plus host computer communications; requires M68KMCCM for Upload host feature.

M68KRDS2 Remote Development Station, same as M68KRDS1 but without USE Module; requires M68KMCCM for Upload host feature.

HDS-300 Hardware/Software Development Station
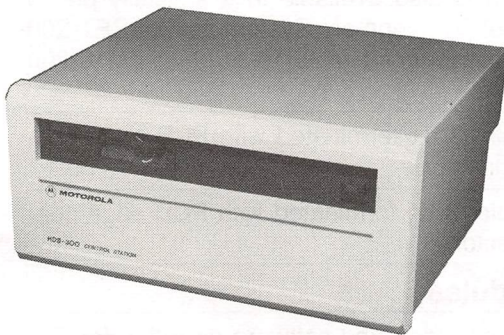
HDS-300 Control Station
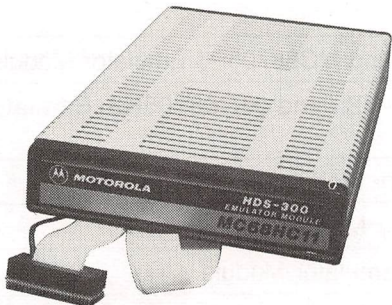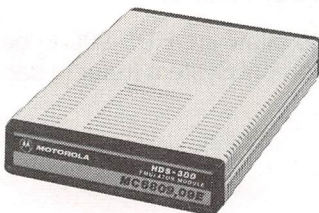
M68HDS300 HDS-300 Control Station is used with appropriate Emulator Module. The emulator is required for the HDS-300 to function properly. The HDS-300 will operate with most standard RS-232C CRTs. It has prefigured characteristics for the Motorola VME/10 Microcomputer System, EXORterm 155 Terminal, DEC VT100, and Televideo 970. Included in the HDS-300 is an install command that allows other terminals with standard RS-232C inputs. If the target file is in _S_ record format, the HDS-300 can be downloaded from a wide variety of Host Systems of terminals. The Host System is required to recognize flow control characters and respond as required.

The HDS-300 Control Station comes with user and operations manuals, power cable, and warranty package. RS-232C cables are not included (see below).

HDS-300 Emulator Modules

Emulator Modules are designed for use with the HDS-300 control station. Each module includes a specially formatted 5-1/4″ floppy diskette and appropriate user's manual.

M6809HM3 Emulator Module for real-time emulation of MC6809 and MC6809E.

MC68HC11 Emulator

M68HC11HM3 Emulator Module for real-time emulation of MC68HC11.

HDS-300 Optional Equipment

M68PRNTCBL Centronics compatible 8 ft. long printer cable for operation with HDS-300.
M68RS232-10   RS-232C 10 ft. cable
M68RS232-25   RS-232C 25 ft. cable
M68RS232-50   RS-232C 50 ft. cable
M68HDS3EMM-1 Emulation Memory Expansion Module increases total emulation RAM to 64Kb.
M68HDS3EMM-2 Emulation Memory Expansion Module increases total emulation RAM to 128Kb.
M68HDS3EMM-3 Emulation Memory Expansion Module increases total emulation RAM to 256Kb.
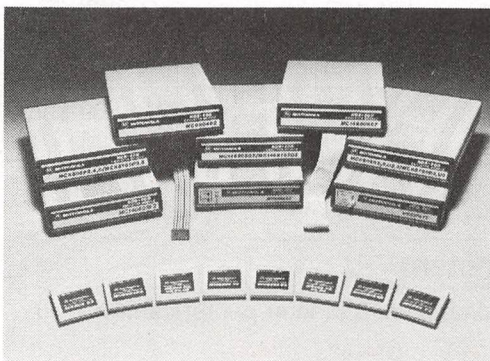

MC6809/E Emulator

HDS-200 Hardware/Software Development Station

HDS-200 Control Station

MC146805E2 Emulator Module

M68HDS201 HDS-200 Control Station is used with an appropriate Emulator Module with its included Program Cartridge and diskette for hardware/software development of M6804/M6805/M146805-based systems with development system hosts such as VME/10, EXORmacs, EXORset, EXORciser, or most standard RS-232C hosts. The HDS-200 Control Station includes power supply and MC6809 Executive MPU Module with two RS-232C serial interface ports for connection to host and a user terminal (the EXORterm 155 is recommended, see page 9, but not required). One RS-232C cable is provided. Operation with the VME/10 requires that a single RS-232C port module is installed in the VME/10 Chassis (the dual RS-232 port I/O Module MVME400 is recommended; see page 36). Operation with EXORset requires adapter cable M68RS232F or M68RS232M.

The HDS-200 Control Station is also available in a specially priced combination with the EXORset Development System as M68SET-200 (see page 12) and in combination with the VME/10 as M68KVM10-200 (see page 7).

M68RS232F RS-232C Cable, 3 ft., terminated with PCB edge connector and Female DB25 connector.

M68RS232M RS-232C Cable, 3 ft., terminated with PCB edge connector and Male DB25 connector.

HDS-200 Emulator Modules

(Modules include a Program cartridge and software diskettes for EXORset and EXORciser, applicable to the emulated MPU.)

M6804P2HM MC6804P2 Emulator Module (Also provides support to MC6804J2)

M6805P234HM MC6805P2, P4, and MC68705P3 Emulator Module

M6805RU23HM MC6805R2/3, U2, and MC68705R3 Emulator Module

M6805S2HM MC6805S2 Emulator Module

M6805T2HM MC6805T2 Emulator Module

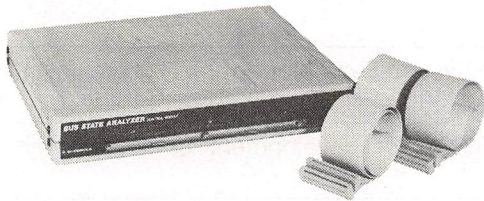**M68HC05C4HM** MC68HC05C4 Emulator Module

M146805E2HM MC146805E2 Emulator Module
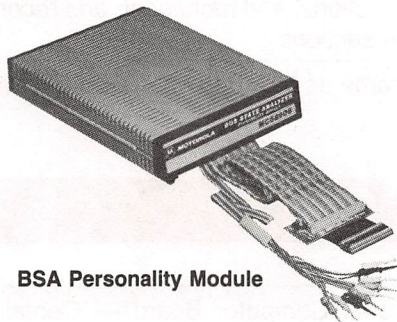
M146805F2HM MC146805F2 Emulator Module.

M146805G2HM MC146805G2 Emulator Module.

* * Note: Cross Software available to allow the HDS-200 to be used with the Intel iPDS and Intellec Development System (refer to page 53).

Bus State Analyzer

Bus State Analyzer Control Module with Enclosure

BSA Personality Module

M68BSAC   Real-Time Bus State Analyzer (BSA) Control Module provides a highly intelligent diagnostic tool designed specifically for use with microprocessors, analyzing up to 79 channels in real-time and recording events in a high-speed 128-state trace memory. A complete Bus State Analyzer consists of a Control Module plus a Personality Module specifically for use with the MPU or System Bus being analyzed. Requires the use of the EXORterm 155 terminal (see page 9) or a VME/10 as the user interface. The BSA Control Module is a VERSAbus format board which may be powered from a VERSAbus backplane, as in an EXORmacs host or in an HDS-400.

M68BSACE   Real-Time Bus State Analyzer Control Module with Enclosure for standalone usage provides a protective table-top enclosure for the BSA Control Module.

Bus State Analyzer Personality Modules

M68BSA1-1   BSA Personality Module for MC68000/MC68010/MC68451

M68BSA2   BSA Personality Module for MC6800/MC6809/MC6829

M68BSA3   BSA Personality Module for MC68008

M68BSA4   BSA Personality Module for MC6801/MC68701/MC68120

M68BSA5   BSA Personality Module for VERSAbus

M68BSA6   BSA Personality Module for EXORbus

* * Note: Refer to EXORmacs peripherals on page 9 for information on the EXORterm 155 terminal for use with the BSA.

Evaluation Modules
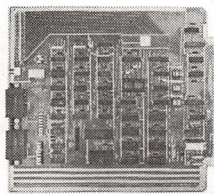
MC68120 Evaluation Module

M68705EVM   MC68705 Evaluation Module enables target system performance evaluation of the P3, R3, or U3 MCUs; provides ports for terminal, host, printer, and cassette. Monitor has one line assembler/disassembler and onboard EPROM programmer.

M1468705EVM   MC1468705G2 Evaluation Module with same features as M68705EVM.

M68120EVM   MC68120/MC68122 Evaluation Module has 4K RAM expandable to 8K, MC68120 IPC, two selectable baud rate RS-232C ports, programmable timer, debug firmware, and user wirewrap area.

M68701EVM   Evaluation Module enables target system performance evaluation of the MC6801, MC68701, MC68701U4, and MC6803. This evaluation module provides a dedicated MAP for user code and will operate at up to 2 MHz bus rates. The module has two serial RS-232C ports for terminal and host operations. Also included is a EPROM programming socket for use with MC68701 MCU's. The monitor includes a one-line assembler/disassembler. Two connectors are provided to allow port extension directly into the user's target application. Cables are not included (see page 20).

MEX6801EVM1   MC68701 Microcomputer Evaluation Module enables programming and evaluation using PRObug monitor and 2K RAM loaded with user's program from Serial I/O port or PRObug's monitor routines; includes MC68701 device and user wirewrap area.

Instrumentation (Continued)

Emulator Modules and System Analyzers
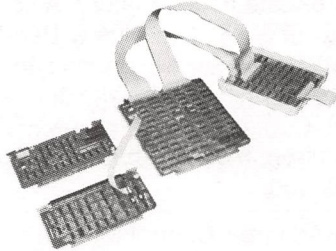
MC6801/MC68701 Development System

Emulator Modules

MEX68USEC MC6800 User System Evaluator (to 2 MHz) Emulation support for the MC6800 and MC6802.

MEX6801U4 Modified MEX6801 for development of MC6801U4/MC68701U4 based systems.

System Analyzers

MEX68SA2 Systems Analyzer (for use with 2 MHz MC6800) monitors, analyzes, and enables troubleshooting via access to all bus functions; enables stopping MPU, stepping MPU through program, memory contents modification, program trace functions, and monitoring and recording MPU operation during program sections.

M6809SA Systems Analyzer II, same as MEX68SA2, but for use with 2 MHz MC6809 MPU.

Educational Modules
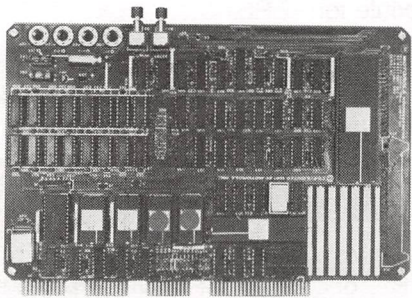
MEX68KECB MC68000 Educational Computer Board — Contains 4 MHz MC68000, 32Kbytes of Dynamic RAM, two RS-232C Serial ports with baud rate control, Centronics compatible parallel I/O port, audio cassette I/O port, 24-bit programmable timer, debug monitor, single line assembler/disassembler, with user wirewrap area.

* * Note: Requires Source Listing Rev. matching onboard PROM.
M68KTUTOR/D1 Tutor Source Code Listing Manual Rev. 1.0
M68KTUTOR/D2 Tutor Source Code Listing Manual Rev. 1.1
M68KTUTOR/D3 Tutor Source Code Listing Manual Rev. 1.2
**M68KTUTOR/D4** Tutor Source Code Listing Manual Rev. 1.3

M68KTUTORS MEX68KECB TUTOR Source Code Listing (M68000 Assembly) on 8″ VERSAdos diskette.

M68KTUTORT MEX68KECB TUTOR Source Code on 14″ VERSAdos CMD disk.

* * Note: Latest releases of M68KTUTORS and M68KTUTORT are for internal use only with no object code distribution rights unless specifically licensed. Tutor source code is the monitor and assembler/disassembler firmware on the Educational Computer Board MEX68KECB. Contact the Factory to arrange for object code redistribution rights.

Modular System Components

Motorola's Modular System Components elevate the starting point for Microcomputer design from the discrete component level to the board level. Just as there are variations in microprocessors for different end-use requirements, there are families of modular, board-level components to best serve the different demands. Therefore, Motorola has provided a wide range of choices including 8-/16-/32-bit VMEmodules and VERSAmodules for international standard compatibility and customization of end-system uses; I/O Channel modules compatible with both the VMEbus and VERSAbus to relieve system bus traffic; and the 8-bit M6800 Family Micromodules. This spectrum of microsystem functional hardware choices offers the designers of complex systems — multiuser, multiprocessor, distributed control systems — the right performance elements at each node of the system — cost effectively.
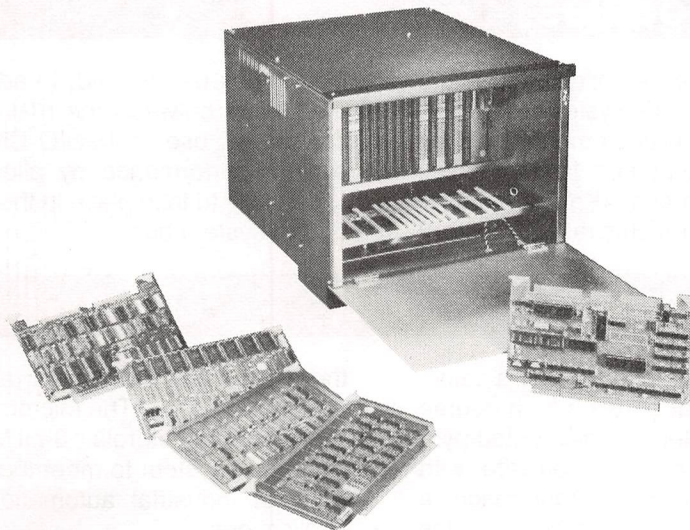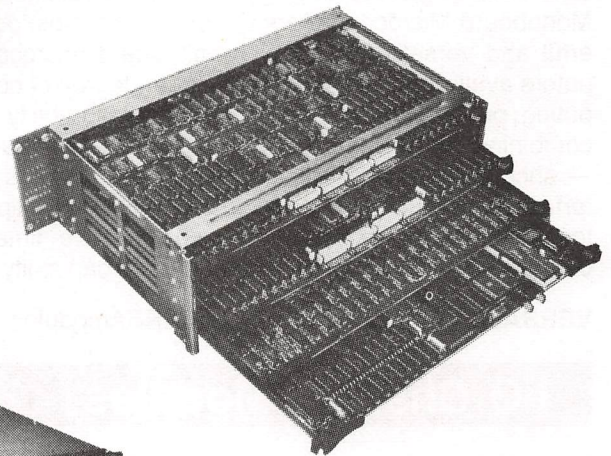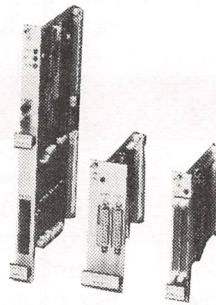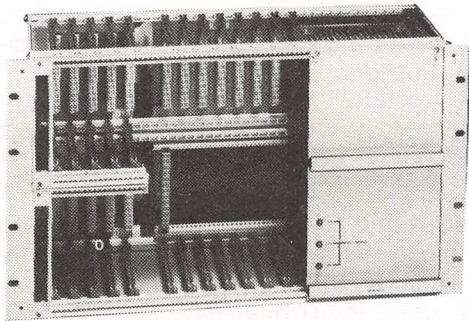
VMEmodules

Eurocard Format — Developed as the standard in Europe, this card format is gaining world-wide acceptance in modular applications in a broad range of engineering, laboratory, and industrial automation environments. Both single high (160 x 100mm) and double high are defined, offering (160 x 233.4mm) formats and card cages, a convenient size, and 96-pin/socket bus connectors provide an extra margin of reliability.

8-/16-/32-bit VMEbus — The VMEbus does not limit designers to today's technologies; its inherent flexibility and capabilities allow adaptation to any number or types of popular processors for true multi-processing applications. It allows mixing of as many bus masters as your system may desire. The VMEbus enables mixing of 8-, 16-, or 32-bit processors in the VME backplane, operating at high speeds, asynchronously, and providing seven interrupts and four levels of bus priority arbitration.

RMS68K and VERSAdos Software Support — VMEmodule products are designed for accurate response to multiple random events. The RMS68K Real-Time Multitasking Executive Software for the VMEmodule Monoboard Microcomputer provides a nucleus for real-time applications. Where large data files and mass storage resources are required, the VERSAdos Operating System provides efficient execution.

Multiple World Wide Sources — Development of the VMEbus represents the combined technical efforts of Motorola and a number of other major international electronics companies (Signetics/Philips, and Mostek for example). The original participants are being joined by an increasing number of companies supplying compatible products. These sources are united by the VMEbus International Trade Association meeting four times each year to ensure continued compatibility from a diversified list of suppliers.

VERSAmodules

Low Risk High Technology — The VERSAmodule Monoboard Microcomputers are one of the most powerful and versatile 16-/32-bit single-board microcomputers available. They provide a higher degree of computing power, memory capacity, and tailorability by combining the MC68000 and other onboard features — such as the I/O Channel Interface, VERSAbus Interface, bus arbitration logic, dual port RAM, multiprotocol serial I/O, parallel I/O, programmable timers/counters, and RAM with battery back-up capability.

VERSAbus Architecture — The VERSAmodules are interconnected within the target system using the VERSAbus interconnect standard. This high-speed interconnect structure is characterized by asynchronous operation supporting direct memory addressing and true multi-processor operation, yet it does not limit the number or type of processors that may be used.

VERSAmodule Format — The VERSAmodule format is nearly three times the area of the VMEmodules. The VERSAmodules interconnect, 260 pins versus the VMEmodule interconnect of two 96-pin connectors, provides additional access to the system bus.

I/O Channel Modules

The I/O Channel is an advanced architectural feature of VERSAmodule and VMEmodule systems. It allows greater system flexibility and low incremental cost for I/O expansion. The I/O Channel has a 12-bit address bus, an 8-bit bi-directional data bus, 4Kbytes of memory-mapped I/O, and a data transfer rate of up to 2 Megabytes per second. In addition to providing more modularity between the main processor and the I/O controllers, use of the I/O Channel increases overall system performance by allowing most lower-speed I/O activity to take place in the I/O Channel rather than on the system bus.

Micromodules

The Motorola line of 8-bit Micromodules offer a selection of modular subsystems that permit a high degree of end-product customization. It is supplemented by a library of sophisticated development software with high-level language support to simplify man-machine interaction. An array of packaging accessories provides the proper environment for an EXORbus compatible system assembly. The Micromodules, using the extensive family of Motorola's 8-bit MPU-family chips, enable tailoring a system to meet the performance objectives of most industrial automation and data acquisition applications.
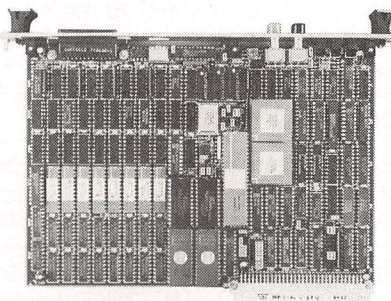
16-/32-Bit
Modular System Components

VMEmodules
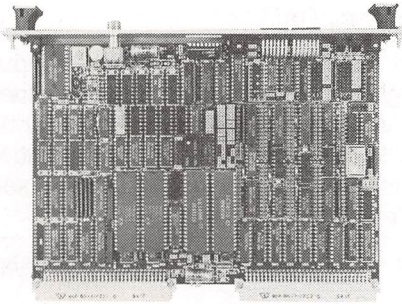
VME050 System Controller
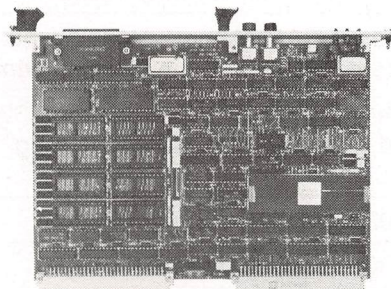
**VME110-1 (MC68000)
Monoboard Microcomputer**

**VME120 (MC68010)
Processor Module**

The cornerstones of the VMEmodule Microcomputer System components are the MC68000 microprocessors, the VMEbus, and the I/O Channel. Implementation of these cornerstones and the popular Eurocard format adds flexibility and capability unequaled in as wide-ranging a selection of system components. All VMEmodules listed below are provided in the double-high Eurocard format unless otherwise noted.

System Controllers

MVME025   VME Slot 1 System Controller Module providing round-robin and priority VMEbus arbitration, power-up reset, system clock, and bus time-out logic. The board is designed to be used with MVME115M and MVME120 series processor modules.

MVME050   VME Slot 1 System Controller and Utility Module. The board provides priority VMEbus arbitration, power-up reset, system and serial bus clocks and bus time-out logic. The utility functions include global interrupt generation, real-time clock/calendar, printer port, two sync/async serial ports, and a two-digit hexadecimal diagnostic display. Eight sockets are available for diagnostics or system memory. MVME050 is designed to work with MVME115M or MVME120. MVME701 I/O Transition Module is available to simplify serial and parallel port expansion (see page 27).

Monoboard Microcomputer and Processor Modules

MVME101   VMEbus Monoboard 8 MHz MC68000 Microcomputer with two Serial ports and two parallel I/O ports; includes 8 sockets for 2K to 32Kbyte RAM/ROM devices, 16 bi-directional parallel I/O lines, three off-board-accessible programmable 16-bit counter/timers, hexadecimal LED status display, and seven interrupt levels with bus arbitration. Designed to serve as a system controller (slot 1).

MVME110-1   VMEbus Monoboard 8 MHz MC68000 Microcomputer with one serial port, includes 8 sockets for 2K to 32Kbyte RAM/ROM/EPROM devices, I/O Channel interface, (refer to page 36 for compatible I/O Channel modules), three off-board-accessible programmable 16-bit counter/timers, run/halt/fail LED status lights, and seven interrupt levels with bus arbitration. Designed to serve as a system controller (slot 1).

MVME115M   VMEbus Processor Module with 8 MHz MC68010 CPU, 68451 Memory Management Unit, two serial ports, two parallel ports, two timers, and six sockets for 2K x 8 to 64K x 8 bytes RAM or EPROM Memory (user provided). MVME025, MVME050, or other VMEbus System Controller required.
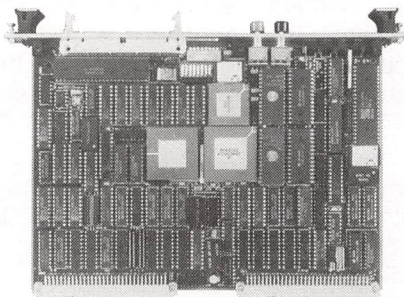
MVME120   VMEbus Processor Module with 10 MHz MC68010 CPU, MC68451 Memory Management Unit, 4Kb zero wait state CACHE Memory, 128Kb dual-ported Dynamic RAM with byte parity, one serial port, three 16-bit timers, and two sockets for 2K x 8 to 64K x 8 byte EPROM (user provided). MVME025, MVME050, or other VMEbus System Controller required.

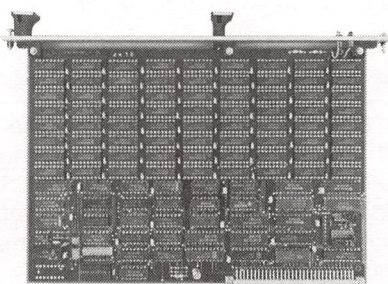**MVME121**   Same as MVME120 except 512Kb Dynamic RAM.

**Note: VMEmodule System Component Products are supported by the VERSAdos Real-Time Operating System (refer to page 48), and Debug Monitor firmware recommended (refer to page 50).
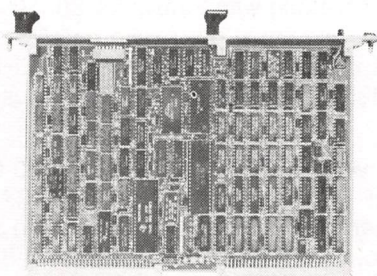
VMEmodules (continued)

MVME130 (MC68020)
32-bit Microprocessor Module

VME222-2 Mb Dynamic RAM

VME300 IEEE-488 Interface W/DMA

MVME122   VMEbus Processor Module with 12.5 MHz MC68010 CPU, 128Kb of dual-ported Dynamic RAM, three 16-bit timers, and two sockets for 2K x 8 to 64K x 8 bytes EPROM (user provided). MVME025, MVME050, or other VMEbus System Controller required.

MVME123   Same as MVME122 except 4Kb zero wait state CACHE memory and 512Kb dual-port Dynamic RAM.

MVME130   VMEbus Monoboard 12.5 MHz MC68020 Microcomputer with socket for MC68881 Floating Point Coprocessor (user provided), socket for Demand Page Virtual Memory Module (user provided), two 28-pin sockets for up to 16Kb ROM/EPROM Memory (user provided), MVMX32bus private memory bus interface, dual multiprotocol serial I/O ports, and a programmable timer module.

MVME131   Same as MVME130 except Hardware Memory Management Module included.

Dynamic Memory Modules

MVME200   VMEbus 64Kbyte Dynamic Memory Module featuring byte parity checking and user selectable memory map assignment.

MVME201   VMEbus 256Kbyte Dynamic Memory Module featuring byte parity checking and user selectable memory map assignment.

MVME202   VMEbus 512Kb Dynamic RAM Memory Module featuring byte parity checking and user selectable memory map assignment.

MVME204   VMEbus 1Mb Dynamic Memory Module with MVMX32bus interface, dual-ported, interleaved, byte parity and error checking. Designed to be used with MVME130/131.

MVME222-1   Same as MVME202 except 1Mb Dynamic RAM.

MVME222-2   Same as MVME202 except 2Mb Dynamic RAM.

RAM/ROM Memory Modules

MVME211   VMEbus Static RAM/ROM Module for added memory-mapped program (up to 1Mb); provides 16 sockets for 24/28-pin user supplied memory devices (SRAM or EPROM); device access time is selectable from 35 to 510 ns.

MVME214   VMEbus Static RAM/ROM Module for added memory (up to 1Mb); provides 16 sockets for 24-/28-pin user supplied memory devices; device access time is selectable from 100 to 400 ns, MVMX32bus Interface. Designed to be used with MVME130/131.

Peripheral and Communication Controllers

MVME300   VMEbus GPIB IEEE-488 Listener/Talker/Controller Module using DMA interface for burst or byte mode data transfer rates to 500Kbytes/sec, includes error checking and status display.

MVME310   VMEbus Intelligent Peripheral Controller Module based on MC68121 device enables custom peripheral interface implementation via serial port and header accessible interface signals; provides large wirewrap area and for up to 32Kb of dual ported static RAM buffer (4Kb supplied) and up to 32Kb of RAM/ROM/EPROM, and custom user application logic.

VME315 Intelligent Peripheral Interface

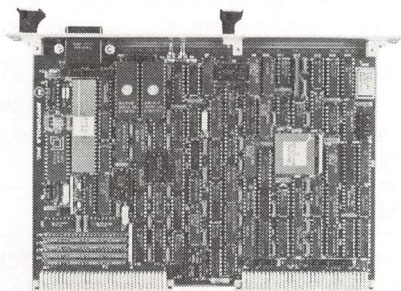**VME330 Ethernet Node Processor**
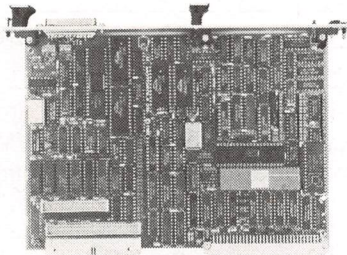
MVME315 VMEbus Intelligent Peripheral Interface, provides control for up to four SS/DS, SD/DD floppy disk drives, support for 4-channel DMA, 8Kb of dual ported RAM with controller, a SASI bus interface, a peripheral interrupt controller with full VMEbus interface and interrupt control, and a universal interface controller (MC68121) with RS-232C serial port; control firmware for support of a XEBEC Winchester Controller on the SASI interface is provided in two 8Kb PROMs.

MVME316 VMEbus to I/O Channel Interface Module that translates addresses and interrupts; and buffers data between the VMEbus and I/O channel. The module configures the I/O channel as a global resource that is accessible by only VMEbus master (refer to pages 37 and 38 for I/O Channel Modules Information).

MVME319 VMEbus Intelligent Floppy/Tape Controller and SASI/SCSI Interface Module based on the MC68121. This module enables control of cipher floppy-tape, 8 inch or 5-1/4″ floppies in any combination; supports up to eight mini-Winchester controllers via a XEBEC or Adaptech SASI/SCSI interface; DMA controller; 32Kb dual-ported RAM with controller; control firmware provided in two 8Kb ROMs.

MVME320 VMEbus Intelligent Winchester/Floppy Disk Controller Module provides high performance data channels between System memory and ST506 Winchester and/or floppy disk drives; up to two Winchester and two floppy disk drives or four floppy disk drives.

MVME330 VMEbus Ethernet Node Processor/LAN Controller Communications Module provides high performance for 10 Mbps Ethernet interface, incorporates MC68000 MPU, the MK68590 LANCE Ethernet Controller, the AM7991 Serial I/O Adapter; and onboard EPROM containing power-up self-test routines plus kernel software giving data transfer rates up to 200 1Kbyte packets/second. Available with network software including XNS host resident utilities, drivers, and XNS protocol software for UNIX SYSTEM V/68 and VERSAdos. Consult factory for details of ordering information for additional software.

MVME331 VMEbus Intelligent Communications Controller with six serial I/O ports, configurable for synchronous or asynchronous and for either RS-232C or RS-422 electrical protocols. MVME705 or MVME706 Transition Modules available (see page 28). Onboard intelligence includes MC68010 CPU at 10 MHz, with two sockets for firmware, and 128Kb of Dynamic RAM for data buffering. This module also has firmware for implementing asynchronous protocol on all six channels (up to 9600 baud bidirectional on all channels simultaneously).

MVME333 Same as MVME331 with the addition of a high-speed bidirectional DMA on two of the channels for high-speed (up to 1Mb/second) synchronous protocols, i.e. X.25 packet switching networks.

MVME340 VMEbus Parallel I/O Module provides 64 parallel I/O lines; three 24-bit timers; three interrupters; one 32-bit and one 16-bit data channel or any combination of 16-bit and 8-bit data channels; 4Gb, 16Mb or 64Kb address range.
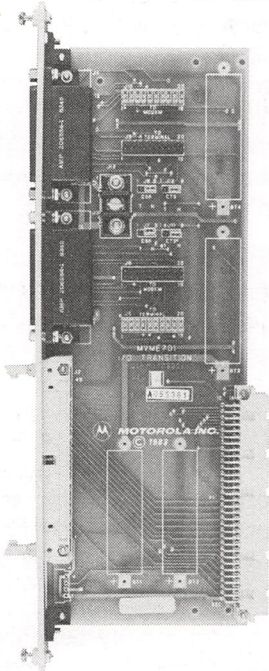
MVME701 I/O Transition Module

Transition and Mass Storage

MVME700 I/O Transition Module double-high 80 mm Eurocard Format, wirewrap board.

MVME701 I/O Transition Module double-high 80 mm Eurocard, DIN to DB25 and 50-PIN dual row header provides connector for MVME050 serial and parallel ports; and battery back-up for MVME050 time-of-day clock (user installed).

MVME705 I/O Transition Module double-high 80mm Eurocard format for six-channel serial transceiver module. Each channel can be independently configured for the RS-232C or RS-422 standard. Sockets are provided on the board to insert RS-232C or RS-422 driver and receiver devices. These devices are provided with the module. Free space is available for the user-supplied slew-rate limitation and noise filtering capacitors. Designed to be used with MVME331, MVME333 (refer to page 27).

MVME706 Same as MVME705 except all channels are already RS-232C standard available.

MVME707 MVME130 RS-232C distribution board with dual RS-232C Serial I/O Cable Assembly. Designed to be used with MVME130/131.

MVME820 Plug-in mass storage module for MVME943 chassis includes 15Mb Winchester hard disk drive and 655Kb DS/DD 5-1/4" floppy disk drive. A Winchester/Floppy Disk Controller Module is required (see MVME320 refer to page 27).

MVME821 Plug-in mass storage module for MVME943 includes two 655Kb DS/DD 5-1/4" floppy disk drives. A Floppy Disk Controller Module is required (see MVME315 or MVME320 refer to page 27).

Packaging and Utility Modules

MVME910-3 VMEmodule 200 Watt Switching Power Supply Module, provides +5 Vdc @ 30 Amps, +12 Vdc @ 3 Amps, and −12 Vdc @ 1 Amp; includes overvoltage and overload protection. Front chassis plug-in.

MVME920 VMEbus Backplane, provides 20 DIN 41612C 96-pin VMEbus sockets for use with signals up to 20 MHz; includes power and ground connections, and bus terminator.

MVME921 VMEbus Backplane, same as MVME920 except provides 9 DIN 41612C 96-pin VMEbus sockets.

MVME922 I/O Channel Backplane provides 5 DIN 41612C 96-pin I/O Channel sockets (will accept five single-high I/O Channel Eurocard modules).
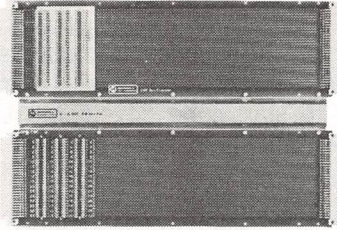
VME930
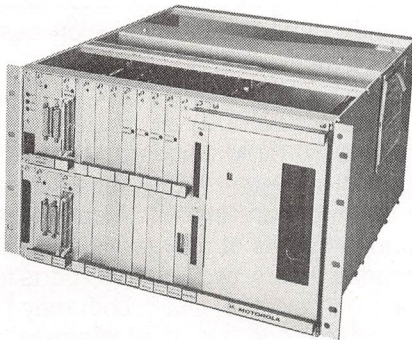**VMEbus Extender Module**
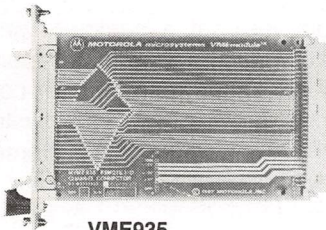
VME935
I/O Channel Adapter
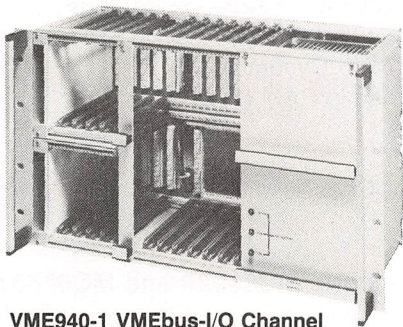
VME940-1 VMEbus-I/O Channel Chassis

MVME943 VMEbus I/O Channel Chassis

MVME930 VMEbus Extender Module, double-high, provides identification of each P1 trace with shorting jumpers.

MVME931-1 VMEbus Wirewrap Module, double-high, with ground plane; provides two 96-pin DIN bus connectors for user installation.

MVME932 VMEbus Extender Module, single-high, provides identification of each trace.

MVME933-1 VMEbus Wirewrap Module, single-high, with ground plane; provides one 96-pin DIN bus connector for user installation.

MVME935 I/O Channel to 50-pin header Adapter; brings I/O Channel to front of Eurocard Chassis.

MVME940-1 VMEbus and I/O Channel 19″ Chassis with MVME910-3 power supply; provides seven double-high VMEbus slots, two 5-slot I/O Channel backplanes with single-high hardware and cables.

MVME941 VMEbus and I/O Channel Card Cage for 19″ rack mount includes nine double-high VMEbus backplane slots and two 5-slot I/O Channel backplanes with single-high mounting hardware and cables for five I/O Channel Modules.

MVME942 VMEbus 20-Slot Double-High VMEbus Card Cage for 19″ rack mount.

MVME943 VMEbus I/O Channel Chassis with nine VMEbus slots, six I/O channel slots, sixteen 80 mm I/O Transition Modules (MVME700 series pages 27 and 28) in the back, accepts MVME820 or MVME821 Mass Storage Module (page 28), transverse mid chassis 400 watt power supply, 19″ rack mount chassis.

MVME944 VMEbus Module Chassis with 20 VMEbus slots and sixteen 80 mm I/O Transition Modules (MVME700 series refer to pages 27 and 28), transverse mid-chassis 400 watt power supply, 19″ rack mount chassis.
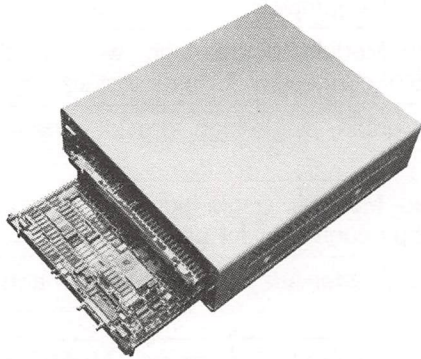
VERSAmodules

**Benchmark 20 32-bit
VERSAmodule Evaluation System**

VERSAmodule 32-Bit Evaluation System

The Benchmark 20 System Package is a 32-bit, high performance system that provides the first-time user of the MC68020 MPU a tool to quickly evaluate the MC68020 and to start code development. The Benchmark 20 system has the software tools to allow the user to do benchmarking and code debugging.

Paged memory management support is provided by the Memory Management Board (MMB) containing a gate array implementation of the table walking algorithm of the proposed MC68851 PMMU and a 512 word set associative address translation cache.

The Benchmark 20 supports Motorola resident assemblers on the EXORmacs and VME/10 systems with upload and download capability. The Benchmark 20, being VERSAmodule based, can be user configured with existing VERSAmodule boards to provide user target systems. The Benchmark 20 system comprises the following major sub-elements:

- **M68KVM04** VERSAmodule 32-bit Monoboard Microcomputer Processor — MC68020
  Coprocessor — Support for MC68881
  Memory Management Unit — MMB (Gate Array sub-set of MC68851)
  Memory Hierarchy — 4Kb Entry Cache, VERSAbus/RAMbus
  Utilities — PTM, SIO, ROM
- **M68KVM13-1** VERSAmodule 1024Kb Dynamic RAM
  Capacity — 1Mb with 64K-bit Dynamic RAM Devices
  Dual Port — VERSAbus/RAMbus
  Error Detection — Byte Parity
- **MVMCH3-1** VERSAmodule 8-slot Chassis with Card Cage, Power Supply and Front Panel
- **Software — 020bug**
  Assembler/Disassembler — Supports MC68020 and MC68881 instructions
  Benchmarking — Timer Utilities for Program Execution Timing

M68KV020BES3 Benchmark 20 high performance evaluation computer system package, includes user's manual.

Monoboard Microcomputer Modules

M68KVM01A VERSAmodule M68000 16-Bit Monoboard Microcomputer with 32Kbytes of RAM, has 8 MHz system VERSAbus system interface with bus arbitration and interrupt handling with local private bus; includes eight sockets for up to 64Kbytes of user provided ROM or EPROM, three programmable counter/timers, two RS-232C ports for data rates to 19.2K baud or 1 mbps with external clock, both may be strapped for terminal or modem interface; one port is programmable for Sync/Async and strappable to RS-422 interface. Four 8-bit/2-handshake-bit I/O ports are also provided for use as two parallel printer ports or as 8-/16-bit buffered data and control interfaces.

**VM01A (MC68000)
Monoboard Microcomputer**
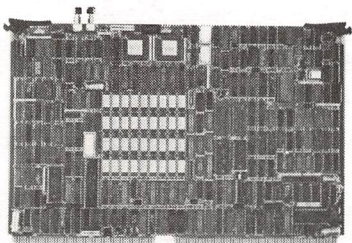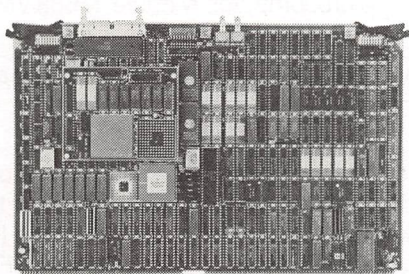
M68KVM01A2   Same as M68KVM01A but with 64Kbytes of RAM.

M68KVM02-3   Similar to M68KVM01A but with 128Kbytes of dual port RAM control, two additional sockets for up to 64Kbytes of user supplied ROM/EPROM, and two multiprotocol RS-232C Serial I/O ports for both sync/async byte oriented or SDLC/HDLC bit-oriented protocols, and local off-board I/O expansion via I/O Channel interface (refer to pages 36–38 for I/O Channel compatible modules).

M68KVM03-1   VERSAmodule MC68010 16-Bit Monoboard Micro-computer with 256Kbytes of RAM, has 10 MHz system VERSAbus system interface with bus arbitration and interrupt handling with local private bus; includes MC68451 MMU, MC6840 Programmable timer module, MC146818 Real-Time Clock, two sockets for up to 64Kbytes of user provided ROM or EPROM, three programmable counter/timers, two RS-232C ports for data rates to 19.2K baud or 1 mbps with external clock, both may be strapped for terminal or modem interface; one port is programmable for Sync/Async and strappable to RS-422 interface. Four 8-bit/2-handshake-bit I/O ports are also provided for use as two parallel printer ports or as 8-/16-bit buffered data and control interfaces. Also includes I/O Channel interface for off-board I/O expansion (refer to pages 36–38 for I/O Channel compatible modules).

M68KVM03-3   Same as M68KVM03-1 except no MMU.

M68KVM04-1   The VERSAmodule 32-bit Monoboard Microcomputer Module is designed to function in those applications requiring maximum performance while maintaining the versatility inherent with VERSA-module systems. Highest performance is attained when the VM04 is used in conjunction with one or more M68KVM13 (VM13) Dual-Ported RAM Cards operating as a main memory. The VM04 is the first VERSA-module product to offer the following:

MC68020 Microprocessor with 32-bit address and data, provision for MC68881 Floating Point Coprocessor (customer-supplied option), Demand Paged Virtual Memory Management Module implemented with gate array technology (MMB), an onboard software transparent cache configured as 4K entries, with each entry supporting full 32-bit address/data, RAMbus interface provides high-speed data path to/from memory, VERSAbus interface allows user configuration of the microcomputer system to fit the application, VERSAbus inter-rupter, interrupt handler, and arbiter onboard programmable timer module, dual multiprotocol serial I/O ports (Data Rate up to 100K-bits/sec), two ROM sockets configured for Industry Standard 28-pin ROM/EPROM devices, accepts 020bug Debug Monitor Firmware (optionally available).

M68KVM04-2   Same as M68KVM04-1 except no MMB.

* * Note: VERSAmodule System Component products are supported by the VERSAdos Real-Time Operating System (refer to pages 44–51 and Debug Monitor firmware is recommended (refer to page 51).
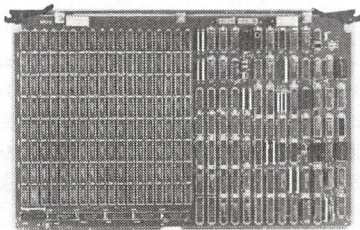
SYSTEM V/68 Operating System support available for VM03 (M68KVM03-1) Monoboard Microcomputer Module. (refer to pages 46–49).

VM03 (MC68010)
Monoboard Microcomputer

VM04 (MC68020)
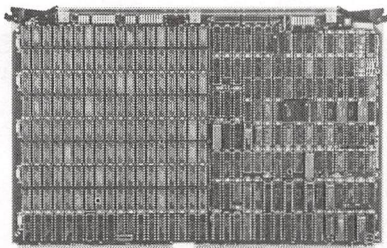**Monoboard Microcomputer**

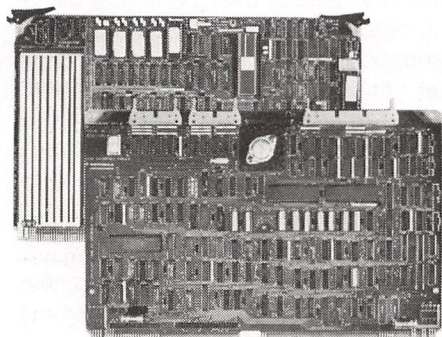## VERSAmodules (continued)
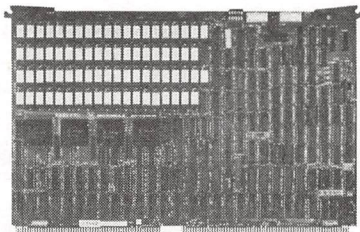
**VM11-2
512Kbyte RAM w/EDAC**

**VM12
1 or 4Mb RAM w/Byte Parity**

**VM13 32-Bit 1 or 4Mb
Dynamic RAM Module**

VM21 Universal Disk Controller

M68KVMMB851 Memory Management Module provides hardware support for 68010/68020 users needing to implement demand paged virtual memory systems and is compatible with MC68851.

Memory Modules

M68KVM10-3 VERSAmodule 128Kbyte Dynamic RAM Module including byte parity checking, 8-/16-bit addressing, separately addressable blocks of 32Kbytes, access time is less than 400 ns.

M68KVM11-1 VERSAmodule 256Kbytes Dynamic RAM Module with Error Detection and Correction (EDAC).

M68KVM11-2 Same as M68KVM11-1 with 512Kbytes of Dynamic RAM with EDAC.

M68KVM11-3 VERSAmodule 1Mb Dynamic RAM Module with EDAC.

M68KVM11-4 Same as M68KVM11-3 except 2Mb Dynamic RAM.

M68KVM12 VERSAmodule 1Mbyte Dynamic RAM Module with parity.

M68KVM12-2 Same as M68KVM12 except 4Mb Dynamic RAM.

M68KVM13-1 VERSAmodule high performance 32-bit 1Mb of Dynamic RAM with high-speed RAMbus and byte parity. The VM13 is used with the 32-bit Monoboard Microcomputer Module M68KVM04 (VM04).

M68KVM13-2 Same as M68KVM13-1 except 4Mb of Dynamic RAM.

Peripheral Interface and Communication Modules

M68KVM20 VERSAmodule Floppy Disk Controller module, enables control of one 512Kbyte EXORdisk II drive system (two drives) or two daisy-chained 1Mbyte EXORdisk III drive systems (four drives), the IPC device provides bus control. Includes daisy-chain cable M68KVMCFD1 connections from 50-pin VERSAbus backplane.

M68KVM21 VERSAmodule Universal Disk Controller provides control for up to two SMD interface compatible hard disk drives (Control Data, SMD, CMD, MMD, and LMD) and up to 4 floppy disk drives. Compatible floppy disk subsystems include one or two daisy-chained 1Mbyte EXORdisk III drive subsystems (four 8″ drives, 2Mbytes), refer to M68SFDU1102E (page 9). Optional cables, below, are required.
  M68FDIC Floppy Disk Interconnect Adapter, Industry Standard
  M68KVMCFD1 Floppy Disk (EXORdisk III) Cable Assembly for M68KVMCH1 Chassis rear panel connection to UDC Module via VERSAbus backplane.
  M68KVMCHD1 Hard Disk (two SMD compatible) Cable Assembly for M68KVMCH1 Chassis rear panel connection to UDC Module via VERSAbus backplane.
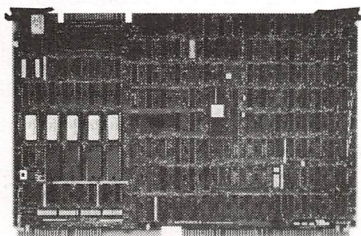 **M68KVMSMDC** Hard Disk SMD Interface Daisy-Chain Cable, 15 ft.
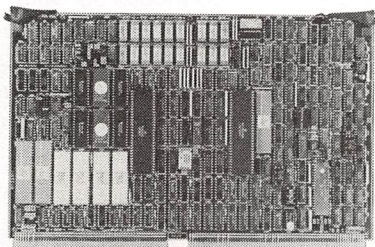 **M68KVMSMDE** Hard Disk SMD Interface Expansion Cable, 6.8 ft.
  M68KVMSMDR Hard Disk SMD Interface Radial Data Cable, 15 ft.
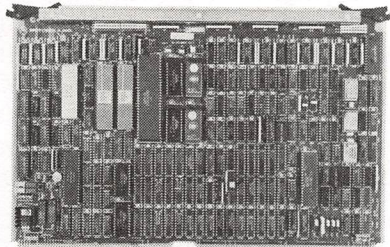
VM22 Intelligent Disk Controller Module

VM30 Multi-Channel Communications Module

VM31 Intelligent Multi-channel Communications Module

M68KVM22 VERSAmodule Intelligent Universal Disk Controller Module based on the 68000. The M68KVM22 (VM22) provides control of up to four SMD-compatible disk drives (256, 512, or 1024 bytes/sector), supports SA800-compatible 8″ floppy disk drives or SA400-compatible 5-1/4″ floppy disk drives in any combination of four. Additional features include 128, 256, 512, or 1024 bytes/sector Frequency Modulation (FM)/Modified Frequency Modulation (MFM) recording; 32-bit Error Correction Code (ECC) allows transparent correction of 11-bit burst errors on SMD disks, 16-bit cycle redundancy check (CRC) on floppy disks, multisector 4Kb First-In First-Out (FIFO) data buffer, SMD data rate is 12M-bits/sec (max), floppy data rate is 500K-bits/sec (max).

M68KVM23 VERSAmodule intelligent Peripheral Controller Module based on MC68010. M68KVM23 supports up to four ST506/ST412 compatible 5-1/4″ Winchester disks, supports four SA400 compatible 5-1/4″ floppy disks, supports one Q1C-02 compatible 1/4″ Streaming Tape Drive, supports one Centronics compatible printer, supports 24- or 32-bit DMA addressing, 32Kb dual ported SRAM for data buffering and local MPU, 32-bit Error Correction Code (ECC), 16-bit Cyclic Redundancy Check (CRC) or floppy and streaming tape, and 7-segment LED for diagnostic messages.

M68KVM30 VERSAmodule Multi-Channel Communications Module provides four async RS-232C Serial ports (programmable for modem/terminal at baud rates of 50 to 9600 bps) and one parallel printer (Centronics type) port, includes IPC device.

    M68KVM30-1KT Full Duplex Firmware upgrade kit for M68KVM30 to M68KVM30-1.

    M68KVM30-1 Same as M68KVM30 except full duplex firmware.

    M68KVM232CP VERSAmodule Chassis Cable Assembly (used with M68KVMCH1) provides external connection for four RS-232C devices and a parallel printer.

    M68KVMPRTCE Printer Cable, Centronics type, 10 ft.

    M68RS232-10 RS-232C Cable, 10 ft.

    M68RS232-25 RS-232C Cable, 25 ft.

    M68RS232-50 RS-232C Cable, 50 ft.

M68KVM31 VERSAmodule High Performance Intelligent Multi-channel Communications Module based on the 68000 16-/32-bit Microprocessors. Features include two M68000's running at 10 MHz, eight RS-232C serial ports programmable connection for synchronous or asynchronous communications, modem/terminal at baud rates from 110 to 153Kbits/sec. Additional features include 128Kbytes DRAM, 32Kbytes EPROM, and 32Kbytes private SRAM. Software available includes a real-time executive and VERSAbus drivers.

M68KVM32 VERSAmodule Intelligent Asynchronous Communications Module based on MC68010. Eight asynchronous channels, full duplex, RS-232C level conversion, programmable data rate to 19.2K baud, supports 24- or 32-bit DMA addressing, Centronics compatible port, 128Kb Dynamic RAM with byte parity for buffer and Writeable Control Store (WCS), and 7-Segment LED for diagnostic messages.
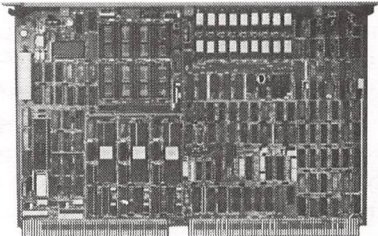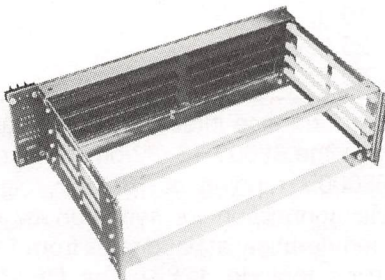
**VM80-4 Combo Memory
I/O, Time-of-Day Module**
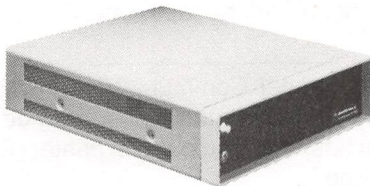
VMCH1-1 Four-Slot Chassis

VMCC1 Four-Slot Card Cage

M68KVM33 VERSAmodule Ethernet Node Processor/LAN Controller Communications Module provides high performance 10 Mbps Ethernet interface, incorporates MC68000 MPU, the MK68590 LANCE Ethernet Controller, and the AM7991 Serial I/O Adapter; and onboard EPROM containing power-up self-test routines plus kernel software giving data transfer rates up to 200 1Kbyte packets/second. Available with network software including XNS host resident utilities, drivers and XNS protocol software for UNIX SYSTEM V/68 and VERSAdos. Contact factory for details of ordering information for additional software.

M68KVM60 VERSAmodule Universal Intelligent Peripheral Controller, provides DMA data transfer capability, command channel software interface to onboard firmware monitor, and a relatively simple interface to external control logic.

M68KVM80-1 VERSAmodule Memory, I/O, and Time-of-Day Clock Module (without memory) provides eight 24-/28-pin sockets for up to 256Kbytes of user supplied ROM/EPROM, two multi-protocol (sync/async byte oriented or SDLC/HDLC bit oriented) RS-232C Serial I/O ports with baud rates selectable to 19.2Kbps, six 8-bit/2-hand-shake-bit I/O ports (60 lines), three 24-bit programmable counter/timers, and an interrupt requestor for I/O devices.

M68KVM80-4 VERSAmodule Memory, I/O, and Time-of-Day Clock Module same as M68KVM80-1 with 128Kbytes RAM.

VERSAmodule Packaging and Accessories

Four-Slot Chassis

M68KVMCH1-1 VERSAmodule System Chassis, 4-Slot, includes 15 A, 5 Vdc power supply with power fail recovery and ac line clock, includes 19″ rack mountable card cage and backplane, moveable bus terminators, dual cooling fans, backplane I/O connector kit with four standard VERSAbus 50-pin connectors, and removable front panel for front loading access. Chassis is stackable for expansion to three chassis (12 slots); access is provided for VERSAbus interconnect between chassis. Expansion kit M68KVMCHE is required for expanded configurations.

MVMCH1-2 Same as M68KVMCH1-1 except has 30 A, 5 Vdc power supply and includes 5-Slot I/O Module Card Cage.

M68KVMCC1 VERSAmodule 4-Slot Card Cage with backplane and bus terminator, includes card guides metal frame, and mating power connectors; stackable with up to three units. Expansion kit M68KVMCHE is required for expanded configuration.
   **M68KVMCHS** VERSAmodule 19″ Chassis Slide Mount Kit.
    M68KVMCHD VERSAmodule Chassis Decorative Cover Kit.
    M68KVMCHDSS VERSAmodule Chassis Decorative side Skins for stacked added 4-Slot Chassis.
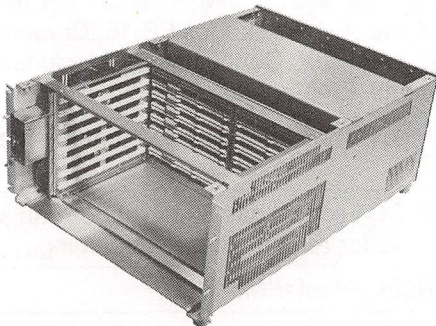   **M68KVMCCC** VERSAmodule Chassis Expansion Card Cage Mating Kit, consists of four 50-pin VERSAbus backplane mating connectors; may require up to four connectors per slot.
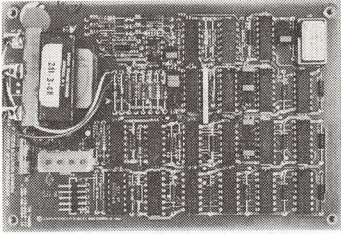
VMPM1 Power Monitor Module
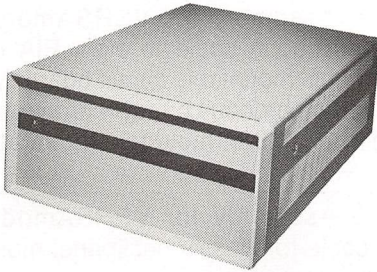
MVMCH3 8-slot Chassis

MVMCC3 8-slot Card Cage

M68KVMCHE VERSAmodule Chassis/Card Cage Expansion Kit, provides VERSAbus interconnect cable and all hardware to stack two M68KVMCH1-1/-2 chassis to create 8-Slot chassis; two kits are required to expand chassis to 12-slot configuration.

M68KVMCHU VERSAmodule Chassis Unified Power Control Kit, provides ability to control power in two or three chassis systems from one key-lock switch.

M68KVMPM1 VERSAmodule Power Monitor Module, enables use of non-Motorola power supplies to provide ACFAIL, ACCLK, and SYS-RESET signals; enables selection of 0.5, 1, or 1.5 cycles ac power drop-out and generates proper sequence of power up and power down.

M68KVMPS1A Power Supply, 228 Watt Switching Regulator provides +5 Vdc @ 30 Amps, +12 Vdc @ 2.5 Amps.

Eight-Slot Chassis

MVMCH3-1 VERSAmodule 8-Slot Chassis with 110 V, 400 watt switching power supply and power monitor module, rack mountable, four 50-pin connectors to interconnect to the VERSAbus I/O pins are also included. Includes User's Manual.

MVMCC3 VERSAmodule 8-Slot Open Frame Card Cage. Includes User's Manual.

M68KVMCHS VERSAmodule Rackmount Slides and Mounting Hardware. Includes installation instructions.

MVMCH3CVRD VERSAmodule 8-Slot Chassis decorative cover when used as a table-top unit. Includes installation instructions.

MVMCH3CHE VERSAmodule Chassis Expansion Kit that provides interconnect cable to use between two card cages. Includes installation instructions.

M68KVMPM1 VERSAmodule Power Monitor Module, enables use of non-Motorola power supplies to provide ACFAIL, ACCLK, and SYS-RESET signals; enables the selection of 0.5, 1, or 1.5 cycles ac power drop-out and generates proper sequence of power up and power down.

VERSAmodule Adapter Boards and Modules

M68KVMSIOC2 Dual Sync/Async Modem/Terminal RS-232C Cable Assembly for M68KVM01, VM02, and VM80 Monoboard Microcomputer Modules via 50-pin I/O connector on VERSAbus backplane.

MVMCH3-103 Serial I/O Cable Assembly for VERSAmodules M68KVM02, 03 and 80. Provides 50-pin connector and ribbon cable to two EIA RS-232C connectors on a chassis backpanel mountable circuit board. Synchronous or asynchronous operation for VM03. Asynchronous only to VM02. Includes installation instructions.

MVMCH3-104 Serial I/O Cable Assembly for VERSAmodule M68KVM04. Provides 50-pin connector and ribbon cable to convert TTL to EIA for two RS-232C connectors on a chassis backpanel mountable circuit board. Synchronous or asynchronous operation. Includes installation instructions.

35

I/O Adapter Modules

VERSAbus Extender Module

MVMCH3-121 Serial I/O Cable Assembly for VERSAmodule M68KVM21. Provides ribbon cable from VM21 to chassis backpanel mountable connectors. Includes installation instructions.

MVMCH3-122 Serial I/O Cable Assembly for VERSAmodule M68KVM22. Provides ribbon cable from VM22 to chassis backpanel mountable connectors. Includes installation instructions.

MVMCH3-123 Serial I/O Cable Assembly for VERSAmodule M68KVM23. Provides ribbon cable from VM23 to chassis backpanel mountable connectors. Includes installation instructions.

MVMCH3-132 Serial I/O Cable Assembly for VERSAmodule M68KVM30 or M68KVM32. Provides ribbon cable to eight EIA RS-232C connectors on a chassis backpanel mountable circuit board. May be used with two VM30's or VM32's. Synchronous or asynchronous for VM30. Asynchronous operation for VM32. Includes installation instructions.

MVMCH3-133 Serial I/O Cable Assembly for VERSAmodule M68KVM33. Provides 15-pin DLC cable to chassis backpanel mountable connectors. Includes installation instructions.

M68MMI/OC1 Micromodule and VERSAmodule I/O Adapter provides direct interface between Micromodules MM16, MM19, and VERSAmodule VM01A to remote I/O Modules such as Gordos PB-16, Crydom MS-16, Opto-22 PBP-16, and Opto PAMUX. Connectors are included to interconnect to Micromodules and VERSAmodule I/O.

M68MMI/OC2 Same as M68MMI/OC1 except has direct right-angle PCB I/O connection.

M68MMI/OC3 Same as M68MMI/OC1 except has 50-pin ribbon cable I/O connection and includes brackets for remote chassis mounting.

M68KVAM VERSAbus to EXORbus Adapter Module

M68KEXTM VERSAbus Extender Module

M68KWW VERSAbus Wirewrap Module
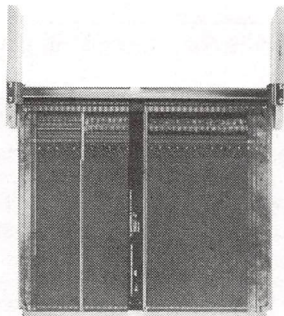
I/Omodules

VME400 RS-232C Communications Module
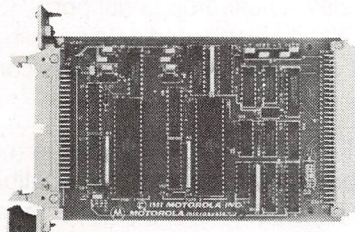
VME410 Parallel I/O Module
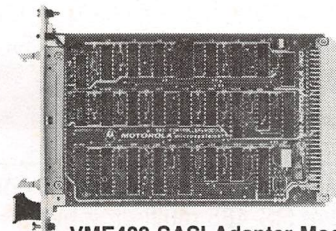
VME420 SASI Adapter Module
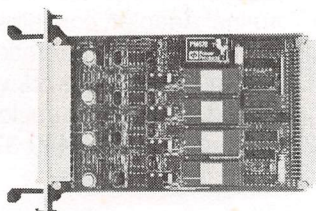
VME605 12-Bit D/A Converter
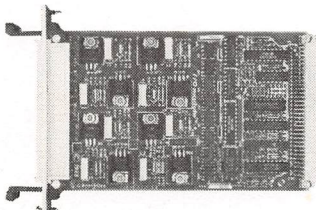
VME615 AC Output Module

These I/O Modules interface with the I/O Channel provided on certain VMEmodule and VERSAmodule boards and may be used for functional expansion of the VME/10 and VMC68/2. Unless otherwise noted, I/O Channel Modules are single-high Eurocard format (3U).

MVME400 Dual Channel RS-232C Communications Module, provides two I/O Channel compatible, full duplex, serial I/O ports; software and jumper selection enables sync/async baud rates of 50 to 19.2K-bits as a terminal or modem.

MVME410 Dual 16-Bit Parallel I/O Module provides four independent 8-bit/2-handshake-bit (40 lines) using two fully buffered MC6821 PIAs, two 50-pin outputs provide Centronics type parallel interface for two printers; jumpers enable selection of interrupt priority, channel I/O designation, I/O bit for software controlled fail LED, and PIA control.

MVME420 SASI (Shugart Associates System Interface) Bus Peripheral Interface Adapter Module, provides single host non-arbitrating SA400 disk controller interface for I/O Channel.

MVME435A Magnetic Tape Interface Adapter Module, provides buffered 1/2" 9-track, 4K-bit FIFO buffer and interface for two industry standard PERTEC compatible 9-track 800/1600 bpi magnetic tape formatters, each controlling four 25-/125-ips tape drivers in start stop mode.

MVME600 12-Bit A/D Converter Module, provides 8/16 differential/single-ended channels with four full scale input voltage ranges of 0.5, 1, 5, or 10 volts; the 16-channel multiplexer will accept additional inputs from up to five MVME601 expander input cards.

MVME601 A/D Input Expander Module provides 8/16 differential/single-ended channels for input to the MVME600 module.

MVME605 12-Bit D/A Converter Module, provides four channels of 12-bit D/A conversion with five voltage output ranges of 0–0.5, 0–10, ± 2.5, ± 5, and ± 10 volts and two current loop output ranges of 4 to 20 mA and 10 to 50 mA.

MVME610 AC Input Module, monitors status of up to eight 120/240 Vac sources; max input is 300 Vac with isolation to 2500 Vac.

MVME615 AC Output Module (Zero Crossover), provides means of switching eight independent outputs of 120/240 Vac; maximum current switching is 3 amps rms.

MVME616 AC Output Module, same as MVME615 but without zero crossover switching.

MVME620 DC Input Module, provides eight input channels for 10 to 60 Vdc signal monitoring, inputs have 2500 volt isolation and provide input overvoltage and transient protection.

MVME625 DC Output Module, provides eight 10 to 60 Vdc output pairs, each with 2500 volt isolation, inductive load transient suppression, and overcurrent protection, 2 amps max.

I/Omodules (continued)

Special-Format I/O Channel Modules

M68RAD1-1 A/D Converter Module

M68RWIN1   Winchester/Floppy Disk Controller Module, provides control for 5-1/4″ Winchester or for either 5-1/4″ or 8″ Floppy Diskette Drives, includes 4Kbyte FIFO buffer for host data transfer.

M68RAD1-1   16/32 Channel Differential/Single-Ended Intelligent A/D Conversion Module, provides intelligent control via the MC6809 MPU and firmware to control the 12-bit A/D converted and multiplexed analog inputs from 16/32 channels. A master/slave multi-drop serial port (RS-485 drivers) is provided for remote (to 3900 ft.) distributed data handling. Module includes screw terminal barrier strips for fieldwiring and is configured for NEMA backwall or 19″ rack mounting.

M68RIO1-1   16 Channel I/O Channel Interface module provides mix of up to 16 ac or dc solid-state relay input or output signals; compatible with CRYDOM Series 6 and OPTO-22 type screw-terminal barrier strips and NEMA backwall mounting is provided.

Serial Conversion Accessories
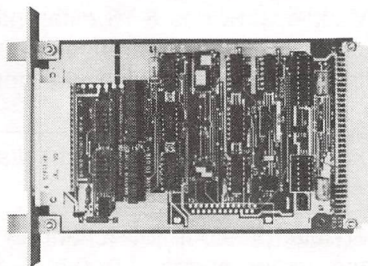
M68RSC1 Remote Serial Conversion Module

M68RSC1   Remote Serial Conversion Module, converts RS-232C port to an RS-422 point-to-point or master/slave RS-485 multi-drop network to like ports up to 3900 ft. away. *Not For I/O Channel Use.*

M68RSC2   Remote Serial Conversion Terminal Adapter, converts RS-232C terminal to RS-422 communications line; permits operation in sync/async modes with master/slave RS-485 multi-drop network when controlled by an intelligent terminal; is provided in desk top enclosure with power supply, wall cord, and RS-232C 25-pin and RS-449 37-pin connectors.

8-Bit
Modular System Components

Micromodules

MM01D Microcomputer Module

MM17 Microcomputer Module

MM14 Arithmetic Processing Unit

Monoboard Microcomputers

M68MM01A2   Monoboard MC6800 Microcomputer Micromodule (MM1A with four sockets for up to 4Kbytes of ROM/EPROM, provides 1Kbyte of static RAM, RS-232C port, four parallel 8-bit ports, an MC6850 ACIA with RS-232C interface, and two MC6821 PIAs; includes clock, timing, and EXORbus interface drivers.

M68MM01A2-1   Monoboard MC6800 Microcomputer Micromodule, same as MM1A2 but has four connectors.

M68MM01B1A   Monoboard MC6802 Microcomputer Micromodule, provides ACIA with RS-232C interface, and MC6821 PIA (two parallel 8-bit ports), two sockets for 1K/2K, single/multiple voltage devices for up to 4Kbytes of ROM/EPROM, 256-bits of static RAM, and a triple 16-bit programmable counter/timer; includes clock, timing, and EXORbus interface drivers. Uses 1 MHz clock.

M68MM01D   Monoboard MC6800 Microcomputer Micromodule, provides two RS-232C serial I/O ports, Centronics printer interface, a triple 16-bit programmable counter/timer, and five sockets for 2K ROM/EPROM/RAM devices or 4K EPROM devices; includes clock, timing, and EXORbus interface drivers.

M68MM17   Monoboard MC6809 Microcomputer Micromodule, provides an MC6850 ACIA (may be replaced with MC6852 SSDA) strappable to RS-232C, RS-422, or RS-423, Centronics printer interface, a triple 16-bit programmable counter/timer, and five sockets for 2K ROM/EPROM/RAM devices (4K to 32K devices may be used with revised address decode PROM); includes clock, timing, power-on reset, and EXORbus interface drivers. Uses 1 MHz clock.

M68MM19A1   Monoboard MC6809 Microcomputer Micromodule, provides MC6850 ACIA strappable to RS-232C, RS-422, or RS-423, a Centronics printer interface with +5 volt option, a triple 16-bit programmable counter/timer, 2Kbytes of static RAM, and four sockets for 2K to 8K ROM/EPROM/RAM devices; includes clock, timing, power-on reset, EXORbus interface drivers. Uses 2 MHz clock.

* * Note: Micromodule System Component Products software and firmware support packages include Debug Monitors and related products. Refer to pages 51 and 52 for descriptions.

Arithmetic Processing Modules

M68MM14   Arithmetic Processing Unit, 2 MHz, provides 16-/32-bit fixed point or 32-bit floating point formats.

M68MM14A   Arithmetic Processing Unit, same as M68MM14 but operates at 3 MHz, must be used in 2 MHz MPU clock systems.
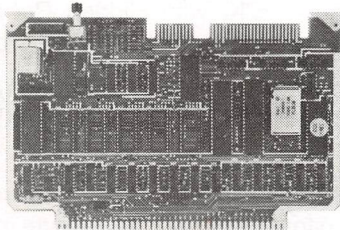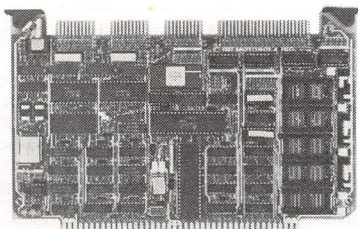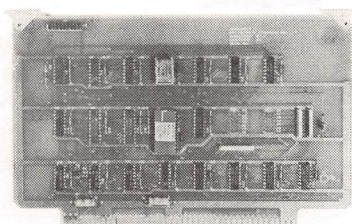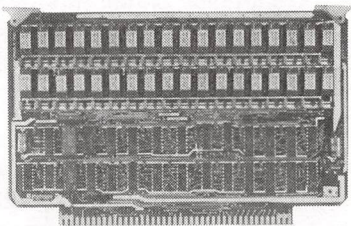
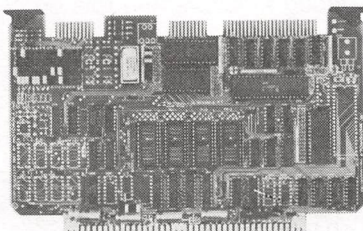## Micromodules (continued)
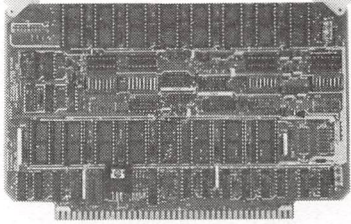
MM04A RAM/ROM/EPROM Module
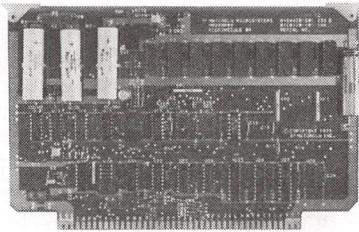
MM09 CMOS Static RAM Module

MEX68864-1HR 64K Dynamic RAM Module

MM16 Memory — I/O Module

Memory Modules

M68MM04A   RAM/ROM/EPROM Module, 16-Socket, provides sockets for sixteen 1K-/2Kbyte RAM/ROM/EPROM and 4Kbyte EPROM devices with single/multiple supply devices.

M68MM09   CMOS Static RAM Module, 4K, with battery back-up for seven days; requires power fail detect input.

MEX6816-1HR   Dynamic RAM Module, 16K, with Hidden Refresh, does not require processor interruption, provides EXORbus interface buffers.

MEX6832-1HR   Dynamic RAM Module, 32K, with Hidden Refresh, same as MEX6816-1HR but with 32K in two independent 16Kbyte rows.

MEX6848-1HR   Dynamic RAM Module, 48K, with Hidden Refresh, same as MEX6816-1HR but with 48K in three independent 16Kbyte rows.

MEX6864-1HR   Dynamic RAM Module, 64K, with Hidden Refresh, same as MEX6816-1HR but with 64K in four independent 16Kbyte rows; may be configured to 56Kbytes.

MEX6816-22D   Dynamic RAM Module, 16K, 2 MHz, with parity, provides three-state buffers for EXORbus interface.

MEX6832-22   Dynamic RAM Module, 32K, 2 MHz, with parity, same as MEX6816-22D but with 32K in two independent 16Kbyte rows.

MEX6848-22   Dynamic RAM Module, 48K, 2 MHz, with parity, same as MEX6816-22D but with 48K in three independent 16Kbyte rows.

MEX6864-22   Dynamic RAM Module, 64K, 2 MHz, with parity, same as MEX6816-22D but with 64K in four independent 16Kbyte rows.

MEX6808-22   Static 8K RAM Module with parity and EXORbus interface buffers.

MEX6816-22S   Static 16K RAM Module with parity and EXORbus interface buffers in two 8K arrays.

Combination Memory and I/O Modules

M68MM16-1   Combo Micromodule for MM01 Series, provides an ACIA strappable to RS-232C, RS-422, or RS-423, a Centronics printer interface, a triple 16-bit programmable counter/timer, and four sockets for 1K to 8K-bit ROM/EPROM/RAM devices; address map is compatible with MM01 and MM02 Micromodules, will operate in 1 MHz or 2 MHz systems, includes EXORbus interface drivers.

M68MM16-2   Combo Micromodule for MM19A1, similar to MM16-1 but with address map compatibility with MC6809 Monoboard Microcomputer.
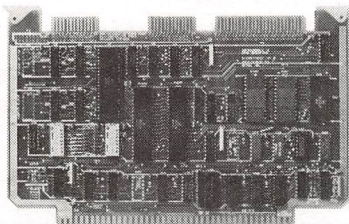
M68MM16-3   Combo Micromodule for use in EXORset, similar to MM16-2 but with same address map as MM19A1 MC6809 Monoboard Microcomputer.
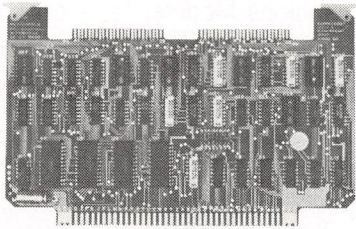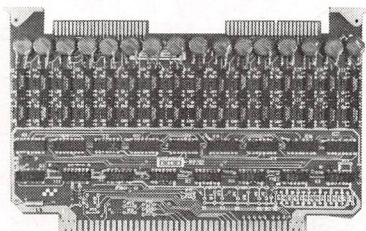
MM03 32/32 Input/Output Module
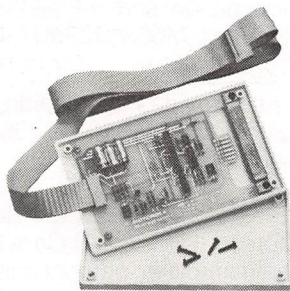
MM11 RS-232 to TTY Adapter

MM12 IEEE-488 Interface Module

MM13B Digital Output Module

Digital I/O Modules

M68MM03   32/32 Input/Output Module, 32 TTL compatible inputs and 32 TTL compatible parallel latched and buffered outputs, provide means for transferring four contiguous bytes of parallel data from microprocessor to external source/destination.

M68MM03-1   32/32 Input/Output Module, same as MM03 but with 4.7K ohm termination packages.

M68MM03-2   32/32 Input/Output Module, same as MM03 but with 330/220 ohm termination packages.

M68MM07   Quad Communications Module, provides four serial I/O channels with four MC6850 ACIAs (may be replaced with MC6852 SSDAs) may be strapped to select baud rate and provide modem/terminal RS-232C, RS-422, or RS-423, or 20 mA loop interfaces.

M68MM10B   Power Fail Detect/Clock Module, provides power failure detection and battery-backed CMOS time-of-day clock/calendar with 50 bytes of user RAM.

M68MM11   RS-232 to TTY Adapter Module, provides RS-323C conversion to 20 mA neutral loop signals required by a teletypewriter.

M68MM12   IEEE GPIB Talker/Listener/Controller Module, provides IEEE 488 GPIB functions with M6800 firmware package in EPROM and MDOS diskette to provide driver routines and a tutor program.

M68MM12A   GPIB Talker/Listener Module, provides IEEE 488 Talker/Listener functions with source code listing.

M68MM12-1   IEEE GPIB Listener/Talker/Controller Module, same as MM12 but with MC6809 firmware.

M68MM12-2   IEEE GPIB Listener/Talker/Controller Module, same as MM12 but with MC6809 firmware and XDOS diskette.

M6809MM12KT   IEEE 488 GPIB Firmware, for converting MM12 (MC6800) module to MM12-1 or 12-2 (MC6809) code; includes firmware source code on both MDOS and XDOS diskettes.

M68MM13A   Digital Output (Contact Closure) Module, provides 16 isolated reed relay contact closure outputs; each output contact set is varistor protected and has 600 Vdc isolation to module bus and 300 Vdc isolation between outputs.

M68MM13B   Digital Output (Contact Closure) Module, same as MM13A but with 32 outputs.

M68MM13C   Digital Input (Optically Isolated) Module, provides 24 byte organized inputs; inputs > 17 and <4 Vdc are logic 1 and 0, onboard address selection enables separate memory address.
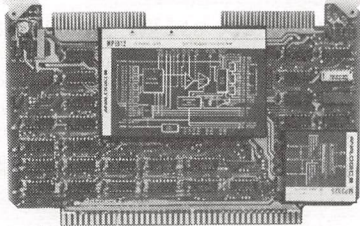
M68MM13D   Digital Input (Optically Isolated/Contact Closure) Module, same as MM13C but includes onboard power supply to enable monitoring external switch closures.
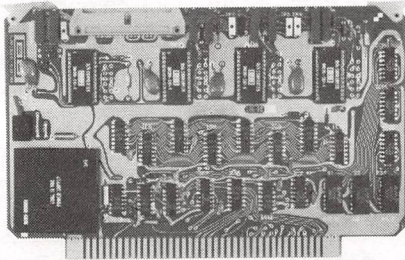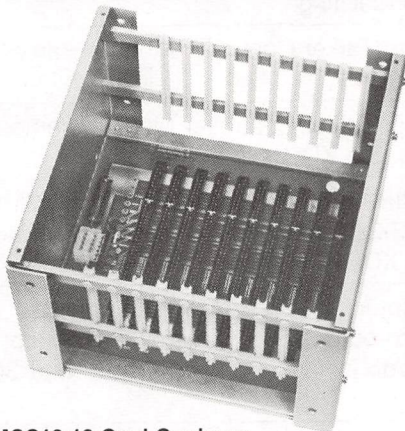
Micromodules (continued)
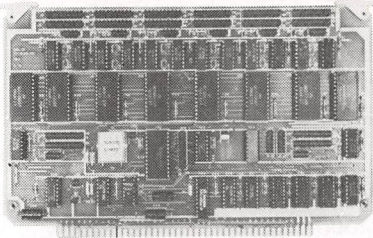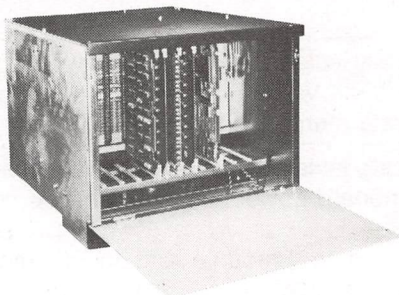

MM18 8-Channel Communications Module

MM05B 16-Channel A/D Converter Module

MM05C Quad 12-Bit D/A Converter Module

MMCC10 10-Card Cardcage

MMFLC1 14-Slot Front Load Chassis

M68MM18 Eight-Channel Communications Module, for 1 or 2 MHz systems, provides eight MC6850 ACIA serial RS-232C I/O ports, each is baud rate selectable and configurable as terminal/modem.

M68MM22 Quad Parallel Interface Adapter, provides 64 data I/O lines and 16 control lines via four buffered MC68B21 (2 MHz) PIAs; each PIA is connected to a 2 x 25 pin header with industry standard pinouts for optically isolated SSR mounting racks.

M68MM23 Optically Isolated I/O Module provides input connectors for interfacing I/O ports on MM01, MM01A, MM01A2, and MM03 and 16 sockets for optically isolated ac/dc input/output modules (IAC5, IAC5A, IDC5, OAC5, OAC5A or ODC5) in any combination; screw-type terminal strip is provided for ac or dc wiring. Requires M68MM23IKIT for installation hardware.

M68MM23IKIT M68MM23 Installation Kit, provides installation hardware and +5 Vdc power cable for mounting two M68MM23 Optically Isolated I/O Modules in rear of Front Load Chassis.

Data Conversion Modules — Analog to Digital

M68MM05A Eight-Channel, 12-Bit, Differential Input, A/D Conversion Module, includes input multiplexer, high-gain amplifier, sample and hold, 12-bit A/D converter; strap selectable input gain ranges are ±10, 0 to 10, 0 to 5, ±5, and ±2.5 Vdc.

M68MM05B 16-Channel, 12-Bit, Single-Ended Input, A/D Conversion Module, same as MM05A with single ended inputs.

Data Conversion Modules — Digital to Analog

M68MM05C Quad 12-Bit D/A Conversion Module, provides four channels of 12-bit D/A conversion; inputs double-buffered, output voltage ranges are strap selectable for 0 to 2.5, 5, or 10 volts at 5 mA; onboard dc/dc converter assures operation on +5 Vdc.

Packaging and Accessories

M68MMCC05 5-Card Cardcage, consists of 5-card motherboard, card guides, and accommodations for mounting five standard Micromodules.

M68MMCC10 10-Card Cardcage, same as MMCC05 for ten standard Micromodules.

M68MMFLC1 Front Load Chassis, 14-Card, provides 14-card cardcage and motherboard, M68MMPS1 power supply, and two fans, all mounted in 19″ chassis with provisions for two M68MM23 Optically Isolated I/O Modules, will operate in 2 MHz system.
 M68MMFLK Rack mount Kit for Front Load Chassis M68MMFLC1.

M68MMLC1 Long Chassis, 10-Card, consists of 10-card cardcage, power supply, and fan in 19″ chassis.
 M68MMLK Rack Mount slide Kit for Long Chassis M68MMLC1.

M68MMPS1-1 Micromodule/EXORciser Power Supply provides +5 Vdc @ 15 Amps, +12 Vdc @ 2.5 Amps, and −12 Vdc @ 1.5 Amps.

** Note: Refer to page 36 for EXORbus to VERSAbus Adapter Module (M68KVAM) and EXORbus Utility Modules such as Wirewrap and Extender boards.

Software Support

A major system cost and performance determining element is its software operating system and the development and maintenance of its applications software. This is particularly true in today's higher-performance systems and applications where distributed processor, multiuser, multitasking environments are common for efficient operation. Motorola has prepared for these requirements by offering a wide spectrum of operating systems and software support packages that can save months of effort otherwise spent in design, coding, and checking of complex algorithms necessary for system resource management.

System V/68 Operating System

Motorola's SYSTEM V/68 Operating System is the standard UNIX-derived Operating System for the M68000 Microprocessor Family. SYSTEM V/68 is derived from AT&T Technologies' UNIX System V; it is the generic M68000 port. This powerful operating system contains all system calls, commands, and utilities included in AT&T Technologies' UNIX System V Operating System, except those features dependent upon hardware not supported by Motorola.

In addition to the SYSTEM V/68 Operating System Software, several unique features can be added to enhance its usefulness as a host operating system for the EXORmacs and VME/10 Systems. These additional features include a Pascal Optimizing Compiler, UNIX-to-VERSAdos tool kit and support software for the HDS-400 Hardware/Software Development Station.

To enhance the value of the SYSTEM V/68 Operating System to the customer, Motorola offers a total support package to SYSTEM V/68 users. Included in this package is a problem-reporting system, software and documentation update service, a product support newsletter, and a toll-free "hotline." Additionally, specialized consultant services will be offered on a contract basis, including on-site training and applications assistance. Refer to page 55 for a listing of Motorola Training courses offered.

VERSAdos Real-Time Operating System

The M68000 VERSAdos Real-Time Operating System employs major programs with modular design to allow easy addition of user functions at minimal cost. It contains a file management package and additional device-independent I/O support, is available with software drivers for both floppy and hard disk storage, and incorporates safeguards against system failures. Through the use of true multitasking and dynamic memory allocation, it provides optimum processor and memory use. The VERSAdos Operating System can be used in systems built around Motorola Microcomputers such as the EXORmacs Development System, the VME/10 Microcomputer Systems, VMEmodule and VERSAmodule Monoboard Microcomputers, or on customer-designed systems incorporating the Motorola MC68000 microprocessor. The VERSAdos Operating System consists of a real-time multitasking kernel (RMS68K), I/O services, a powerful file management system, and a command processor. A CRT text editor, structured macro assembler, linkage editor, and system utilities are also included. A system generation capability permits tailoring VERSAdos to the specific needs of the designer. VERSAdos is configured to run on the EXORmacs, VMC68/2, and VME/10 Systems; as well as on Monoboard Microcomputers.

RMS68K Real-Time Executive

The M68000 Real-Time Multitasking Executive Software (RMS68K) is a multitasking kernel around which real-time application systems can be built. It provides interrupt processing, task dispatching, inter-task communication and synchronization, manages and allocates memory, provides a system initialization capability, and supports user exception processing. RMS68K is the standard kernel of VERSAdos, and therefore programs designed to execute under RMS68K control can also execute on systems using VERSAdos. Executable code for the entire system written using RMS68K may be placed in ROM. The system generation capability on systems using VERSAdos permits configuring RMS68K to the specific needs of the designer. RMS68K is supplied configurable for use on systems employing VMEmodule and VERSAmodule system components.

Software Support (Continued)

CP/M-68K Operating System

CP/M-68K extends the popular CP/M operating system to the Motorola MC68000 family of microprocessors. It is a high-performance single user, single-tasking operating system. CP/M-68K is ideal for the business user — it is easy to learn and use. CP/M-68K also features a flexible application program interface and powerful system utilities combined with a C compiler to provide a complete software development environment.

CP/M-68K includes a fast, reliable file system. It has a time tested, modular design which allows it to be easily customized to run in a particular hardware environment.

System dependent input/output device handlers are located in a module called the Basic Input/Output System (BIOS). The BIOS interfaces to the logical hardware independent portion of the operating system, and is the only module which differs from machine to machine.

The RAM resident portion of CP/M-68K is small, requiring about 40Kb of memory. Its size is dependent on the size of the BIOS. The actual size of the customized BIOS is dependent on the number of peripheral devices in the system. Although it is compact, CP/M-68K can manage up to 16Mb of RAM, and up to 16 disk drives, making it a good match for today's MC68000-based microcomputer systems.

Debugging Packages

The VMEbug and VERSAbug Debugging Packages provide a powerful evaluation and debugging tool for VERSAmodule/VMEmodule systems. They permit full speed execution of system and user-developed programs operating in a VERSAdos environment under complete operator control. VMEbug and VERSAbug software is available as a system debug monitor, in a

pre-configured EPROM-resident package, or as source and relocatable object modules, packaged on diskette or cartridge. This format allows creation of application specific versions within hours; reducing system development, debugging, and continuing maintenance costs. Similar debugging packages are available to support 8-bit Micromodule-based applications.

MDOS and XDOS Operating Systems for 8-Bit Systems

The Motorola Disk Operating System, MDOS, provides the basis for all other support tools for the M6800 and M6809 EXORciser Development Systems. In addition MDOS offers various utilities and capabilities such as assembly language patching of object files, disk repair, enhanced chaining functions, and memory-to-disk file creation. The XDOS Operating System, an advanced and extended subset of MDOS, provides a compatible

and simple yet extremely powerful means of structuring, writing, editing, and debugging system programs on the EXORset Development System. The XDOS operating system controls all disk operations and takes care of file directory management including random file organization, system call routines compatible with MDOS, a comprehensive set of commands, and interface with optional higher-level language compilers.

Software Categories

As a part of Motorola's effort to provide its customers with a wider range of products, Microsystems offers several categories of software. These categories define

the type of software and the corresponding service available. Unless specifically noted in the descriptions of the software, all software listed is Category 1.

Software Categories

Due to the large amount of time and effort being spent by Microsystems, on both internal software development, and on support of Independent Software Vendors, the software listed here, at the time of reading, may be incomplete. If the product you require is not shown here, you are strongly advised to consult your local sales office for an updated software list.

Category 1 Software:

1. During a one month period following shipment of this product, Motorola Inc., will provide any new revision of the software at a charge not to exceed the current price of the media including cost of reproduction to those that have returned the Software Registration Card included with the Software Package.

2. If the user encounters a problem which seems to be caused by a defect in the software, the user is required to submit a problem report to Motorola Inc., Four Phase Customer Support Center — 1919 W. Fairmont, Suite 8, Tempe, AZ 85282. Motorola will also provide telephone assistance to help the customer solve or bypass the potential problem.

3. Motorola Inc., will periodically provide, to registered software licensees, a Maintenance Newsletter which includes information concerning potential problems, code corrections, generally useful bypass procedures and/or notice of the availability of corrections or a new release which corrects problems.

4. Motorola offers Maintenance Agreements for most Category 1 software products.

5. It is Microsystem's policy to support Category 1 software as outlined above. Software is licensed on an "as is" basis, and Motorola, Inc., makes no warranty regarding the operation and use of Category 1 software.

Category 2 Software:

1. Category 2 products are licensed on an "as is" basis and there is no guarantee of future updates or extensions. Availability of a product does not imply a commitment for adaptation as a Motorola Category 1 product nor compatibility with other Motorola products.

2. Motorola will provide limited telephone assistance to help the customer understand the operation of the product.

3. Motorola believes Category 2 software products will operate and perform according to the published user's manuals.

4. If the user encounters a problem which may be caused by a defect in the software, the user is requested to submit a problem report and mail it to Four Phase Customer Support Center — 1919 W. Fairmont, Suite 8, Tempe, AZ 85282. Motorola will forward these problem reports to the software developer.

5. Motorola will, when appropriate, respond to problem reports in one of the following ways:

    5.1 Release information, if available, to correct or bypass the problem.

    5.2 Offer, when available, new revision of the product which corrects the problem.

    5.3 Notify the user that a new revision is available which corrects the problem.

6. Software Maintenance Agreements are not available.

7. It is Microsystems policy to support Category 2 software as outlined above. Software is licensed on an "as is" basis, and Motorola, Inc., makes no warranty regarding the operation and use of Category 2 software.

Category 3 Software:

1. Software is provided on an "as is" basis. Any software services, when available, will be provided at the then current charges for software consultation.

2. Software Maintenance Agreements are not available.

3. Motorola, Inc., makes no warranty regarding the operation and use of Category 3 Software.

4. In all cases, the signed license should show FO# and Distributor or Customer Code.

Category 4 Software:

Independently distributed, independently developed, software packages for Motorola equipment (Systems, Modules, and Microprocessors).

1. These packages are developed by Independent Software Vendors (ISV's), and are available only from the ISV.

Software Support (Continued)

Software Categories

Category 4 Software: (Continued)

2. Media, Licensing, Maintenance, and Documentation, are determined solely by the ISV.

3. Motorola has not examined, tested, or validated these software packages, and makes no recommendations as to their availability or quality of these products.

4. Motorola lists these products only as a service to the customer.

5. These packages are mostly listed in the "Microprocessor Software Catalog," and in ISV software update sheets. (Available from your local Motorola office.)

Software Licensing Requirements:

Motorola offers several types of software license agreements. For the license that is applicable for the software you have chosen, please contact your local Motorola Field Sales representative.

SYSTEM V/68

16-Bit Operating Systems

M68NNABSV10A SYSTEM V/68 Operating System Object Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM22 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNABSV10B Same as M68NNABSV10A except licensed for 1–8 users.

M68NNABSV10C Same as M68NNABSV10A except licensed for 1–16 users.

M68NNABSV00A SYSTEM V/68 Operating System Object Code, for the MC68000, supplied on 16Mb CMD cartridge media (VM22 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNABSV00B Same as M68NNABSV00A except licensed for 1–8 users.

M68NNABSV00C Same as M68NNABSV00A except licensed for 1–16 users.

M68NNASSV00-2 SYSTEM V/68 Operating System Source Code, for the MC68000, supplied on 16Mb CMD cartridge media (VM22 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNASSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM22 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNCBSV10A SYSTEM V/68 Operating System Object Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM21 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNCBSV10B Same as M68NNCBSV10A except licensed for 1–8 users.

M68NNCBSV10C Same as M68NNCBSV10A except licensed for 1–16 users.

M68NNCBSV00A SYSTEM V/68 Operating System Object Code, for the MC68000, supplied on 16Mb CMD cartridge media (VM21 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNCBSV00B Same as M68NNCBSV00A except licensed for 1–8 users.

M68NNCBSV00C Same as M68NNCBSV00A except licensed for 1–16 users.

M68NNCSSV00-2 SYSTEM V/68 Operating System Source Code, for the MC68000, supplied on 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNCSSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNDBSV10A SYSTEM V/68 Operating System Object Code, for the MC68010, supplied on 25Mb LARK cartridge media (VM22 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNDBSV10B Same as M68NNDBSV10A except licensed for 1–8 users.

M68NNDBSV10C Same as M68NNDBSV10A except licensed for 1–16 users.

M68NNDBSV00A SYSTEM V/68 Operating System Object Code, for the MC68000, supplied on 25Mb LARK cartridge media (VM22 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNDBSV00B Same as M68NNDBSV00A except licensed for 1–8 users.

M68NNDBSV00C Same as M68NNDBSV00A except licensed for 1–16 users.

M68NNDSSV00-2 SYSTEM V/68 Operating System Source Code, for the MC68000, supplied on 25Mb LMD cartridge media (VM22 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNDSSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM22 media format) for the EXORmacs. Requires an AT&T UNIX System V/ M68000 Release 2 Source Code License.

M68NNMBSV10A SYSTEM V/68 Operating System Object Code, for the MC68010, supplied on 25Mb LARK cartridge media (VM21 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNMBSV10B Same as M68NNMBSV10A except licensed for 1–8 users.

M68NNMBSV10C Same as M68NNMBSV10A except licensed for 1–16 users.

M68NNMBSV00A SYSTEM V/68 Operating System Object Code, for the MC68000, supplied on 25Mb LARK cartridge media (VM21 media format) for the EXORmacs, licensed for 1–2 users. (Shrink wrap license used.)

M68NNMBSV00B Same as M68NNMBSV00A except licensed for 1–8 users.

M68NNMBSV00C Same as M68NNMBSV00A except licensed for 1–16 users.

M68NNMSSV00-2 SYSTEM V/68 Operating System Source Code, for the MC68000 supplied on 25Mb LMD cartridge media (VM21 media format) for the EXORmacs. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

M68NNMSSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Requires an AT&T UNIX System V/ M68000 Release 2 Source Code License.

M68NNQSSV00-2 SYSTEM V/68 Operating System Source Code, for the MC68000, supplied on 9-track 1600 bpi cpio format Magnetic Tape media for the DEC VAX-11/780. Requires an AT&T UNIX System V/ M68000 Release 2 Source Code License. (The object code generated by this source code does not execute on the VAX.)

M68NNQSSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 9-track 1600 bpi cpio format Magnetic Tape media for the DEC VAX-11/780. Requires an AT&T UNIX System V/ M68000 Release 2 Source Code License. (The object code generated by this source code does not execute on a VAX.)

M68NNXBSV10A SYSTEM V/68 Operating System Object Code, for the MC68010, supplied on 5-1/4″ diskette media for the VME/10, contains kernel and kernel libraries for the VM03 CPU board. Licensed for 1–2 users. (Shrink wrap license used.)

M68NNXBSV10B Same as M68NNXBSV10A except licensed for 1–8 users.

M68NNXBSV10C Same as M68NNXBSV10A except licensed for 1–16 users.

M68NNXSSV10-2 SYSTEM V/68 Operating System Source Code, for the MC68010, supplied on 5-1/4″ diskette media for the VME/10. Requires an AT&T UNIX System V/M68000 Release 2 Source Code License.

32-Bit Languages and Utilities

M68BNQBCC20C MC68020 Cross C Compiler Object Code, product contains C Compiler, Assembler, Linker, down load tool, and basic Run-Time Library for the VM04 CPU board. Supplied on UNIX System V 9-track 1600 bpi cpio format magnetic tape media for the DEC VAX-11/780 and licensed for 1–16 users. (Shrink wrap license used.)

M68BNQBCC20D Same as M68BNQBCC20C except licensed for 1–32 users.

M68BNQBCC20E Same as M68BNQBCC20C except licensed for 1–64 users.

M68BNQBCC20F Same as M68BNQBCC20C except licensed for greater than 64 users.

M68BNQSCC20-2 MC68020 Cross C Compiler Source Code, product contains C Compiler, Assembler, Linker, down load tool, and basic Run-Time Library for the VM04 cpu board. Supplied on UNIX System V 9-track 1600 bpi cpio format magnetic tape media for the DEC VAX-11/780. License requirements as above.

M68N2CBASM MC68020 Macro Structured Assembler Object Code, supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Motorola software license required.

M68N2CSASM MC68020 Macro Structured Assembler Source Code, supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Motorola software license required.

M68N2FBASM Same as MC68N2CBASM except supplied on SYSTEM V/68 8" diskette media for the EXORmacs. Licensed as above.

M68N2QSASM MC68020 Macro Structured Assembler Source Code, supplied on UNIX System V 9-track 1600 bpi cpio format magnetic tape media for the DEC VAX-11/780 (the object code generated from this source code does not execute on a VAX). Licensed as above.

M68N2XBASM Same as M68N2CBASM except supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10. Licensed as above.

M68N2XSASM MC68020 Macro Structured Assembler Source Code. Supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10. Licensed as above.

M68NNCBCC20A* MC68020 Cross C Compiler Object Code, product contains C Compiler, Assembler, Linker, and basic Run-Time Library for the VM04 CPU board. Supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs and licensed for 1–2 users. (Shrink wrap license used.)

M68NNCBCC20B* Same as M68NNCBCC20A except licensed for 1–8 users.

M68NNCBCC20C* Same as M68NNCBCC20A except licensed for 1–16 users.

M68NNCSCC20-2 MC68020 Cross C Compiler Source Code, product contains C Compiler, Assembler, Linker, and basic Run-Time Library for the VM04 CPU board. Supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Requires an AT&T M68000 Software Generation System Source Code License.

M68NNXBCC20A MC68020 Cross C Compiler Object Code, product contains C Compiler, Assembler, Linker, and basic Run-Time Library for the VM04 CPU board. Supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10 and licensed for 1–2 users. (Shrink wrap license used.)

M68NNXBCC20B Same as M68NNXBCC20A except licensed for 1–8 users.

M68NNXBCC20C Same as M68NNCBCC20A except licensed for 1–16 users.

M68NNXSCC20-2 MC68020 Cross C Compiler Source Code, product contains C Compiler, Assembler, Linker, and basic Run-Time Library for the VM04 CPU board. Supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10. License requirements as above.

* Note: This product requires "UBuilds" utility from the VERSAdos Tool Kit to generate S-records for download (refer to page 49).

Pascal, Assembler, Linker Port

M68NNCBPASMLK MC68000/010 Pascal Compiler, Macro Structured Assembler, Linkage Editor, and Run-Time Libraries for SYSTEM V/68 on the EXORmacs and VME/10, VERSAdos, RSM68K, and VM01 via VERSAbug; object code. Supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Motorola software license required.

M68NNCSPASMLK MC68000/010 Pascal Compiler, Macro Structured Assembler, Linkage Editor, and Run-Time Libraries for SYSTEM V/68 on the EXORmacs and VME/10, VERSAdos, RMS68K, and VM01 via VERSAbug; source code. Supplied on SYSTEM V/68 16Mb CMD cartridge media (VM21 media format) for the EXORmacs. Motorola software license required.

M68NNFBPASMLK Same as M68NNCBPASMLK except supplied on SYSTEM V/68 8" diskette media for the EXORmacs. Licensed as above.

M68NNQSPASMLK Same as M68NNCSPASMLK except supplied on UNIX System V 9-track 1600 bpi cpio magnetic tape media for the DEC VAX-11/780 (the object code generated from this source code does not execute on the VAX). Licensed as above.

M68NNXBPASMLK Same as M68NNCBPASMLK except supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10. Licensed as above.

M68NNXSPASMLK Same as M68NNCSPASMLK except supplied on SYSTEM V/68 5-1/4" diskette media for the VME/10. Licensed as above.

VERSAdos

16-Bit Operating Systems

M68K0VDOS M68000 VERSAdos Real-Time Multi-tasking Operating System Object Code on VERSAdos Format 8″ diskette, bootable on EXORmacs, VMC 68/2, VM01, VM03, VME101, VME110. In addition, VERSAdos contains drivers for the following board-level products: VM20, VM21, VM30, VME300, VME315, VME400, VME410, VME420, VME435, VME605, VME610, VME615, VME616, VME620, VME625, M68RAD1, M68RI01, and M68RWIN1 and a full complement of utilities.

M68K0VDOSH M68000 VERSAdos Real-Time Multitasking Operating System Object Code on VERSAdos CMD Cartridge, bootable on EXORmacs. Also includes the full complement of drivers listed under M68K0VDOS and utilities.

M68K0VDOSL M68000 VERSAdos Real-Time Multi-tasking Operating System Object Code on VERSAdos LMD Cartridge, bootable on EXORmacs. Also includes the full complement of drivers under M68K0VDOS.

M68K0VDOST M68000 VERSAdos Real-Time Multi-tasking Operating System Source Code on VERSAdos CMD cartridge. Source release is not bootable. A 96Mb hard disk system is required.

M68VKMSVERDOS VERSAdos Source on 25Mb LMD cartridge. Requires a 50Mb LMD disk drive.

M68VKXBVERDOS M68000 VERSAdos Real-Time Multitasking Operating System Object Code on VERSAdos 5-1/4″ diskette, bootable on VME/10 System and VM03, VME101, VME110 Monoboard Microcomputers. Also includes the full complement of drivers and utilities listed under M68K0VDOS.

M68VKMBVRDOS Same as MVMC682-1SWL, except media is 25Mb LMD cartridge.

M68VKXSVRDOS VERSAdos Source on 5-1/4″ diskettes. Requires a 40Mb Winchester disk.

MVMC682-1SWC Same as VMC 68/2 Software, MVMC682-1SWL, but media is VERSAdos CMD cartridge.

MVMC682-1SWL M68000 VERSAdos Real-Time Multitasking Operating System Object Code on VERSAdos 8 Megabyte LMD cartridge, bootable on VMC 68/2. Also includes the full complement of drivers listed under M68K0VDOS.

16/32-Bit Languages and Utilities

M68K2CSASM Same as M68K2XSASM, except media is CMD cartridge.

M68K2FSASM Same as M68K2XSASM, except media is 8″ diskette.

M68K2LSASM Same as M68K2XSASM, except media is 8Mb LARK.

M68K2XBASM Object version of M68K2XSASM on 5-1/4″ diskette.

M68K2XFBASM Same as M68K2XBASM, except media is 8″ diskette.

M68K2XSASM The MC68020 Resident Structured Macro Assembler Source on 5-1/4″ diskette translates source statements written in either M68000, M68010, or M68020 assembly language into the corresponding machine code. Additional features include macro capability, conditional assembler capability, complex expression evaluation, inclusion of input from other disk files, high level control structures, comprehensive diagnostic measures, generates relocatable object modules. Symbol table listings, runs under VERSAdos, cross-reference, and allows for symbolic debug capability. Object modules produced by the assembler are compatible with the VERSAdos Linkage Editor.

M68KFFP MC68000 Fast Floating Point Subroutine Package Source and Object Code on 8″ VERSAdos diskette, provides a high performance 32-bit floating point, supports full range of operations and conversions provided for assembly language interfacing. Two formats are included, the high-speed fast floating point and the IEEE floating point standard as provided with M68KFPS. (Cat. 3*)

M68KFPS M68000 IEEE Floating Point Subroutine Package Source and Object Code on 8″ VERSAdos diskette, supports all functions, precisions (32, 64, and 80-bit), modes, and exceptions stated in IEEE floating Point Standard (Draft 8.0). Instructions in Reserved F-Line form are compatible with existing MC68000 architecture, especially memory addressing modes. (Cat. 3*)

M68NNCBTLKT VERSAdos Tool Kit Object for SYSTEM V/68 on CMD cartridge. This software package allows the transfer on VERSAdos files to the SYSTEM V/68 environment. The kit contains software necessary to create VERSAdos and RMS68K target systems (requires Pascal Assembler Linker Port see page 48).

M68NNCSTLKT VERSAdos Tool Kit Source on CMD cartridge.

M68NNFBTLKT VERSAdos Tool Kit Object on 8″ diskette.

*See Software Package Category Definitions.

Software Support (Continued)

VERSAdos (continued)

M68NNQSTLKT VERSAdos Tool Kit Source on 1600 bpi cpio format 9-track mag tape.

M68NNXBTLKT VERSAdos Tool Kit Object on 5-1/4″ diskette.

M68NNXSTLKT VERSAdos Tool Kit Source on 5-1/4″ diskette.

M68VVCBFORTRAN Same as M68VVXBFORTRN except media is CMD cartridge.

M68VVCBPASCAL Same as M68K0PASCAL on VERSAdos CMD Cartridge for EXORmacs.

M68VVFBABSFTN FORTRAN 77 Compiler for EXORmacs with VERSAdos; Resident MC68000 full-language compiler contains a dynamic linker, a high-level symbolic debugger, and a profiler with extensions and relaxations of restrictions; supplied on single density 8″ diskette. (Cat. 4*)

M68VVFBPASCAL M68000 Pascal Compiler on VERSAdos 8″ Floppy disk, based on language defined by Niklaus Wirth; includes Fast Floating Point Package, Code Optimizer, and Motorola extensions: Variable Address Spec, alphanumeric labels, string types, exit, non-decimal integers, runtime error checking and file assignment, and separate compilation and linking; 384Kbytes of RAM are required.

M68VVHBFORTRAN Same as M68VVXBFORTRN except media is 8″ diskette.

M68VVLBFORTRAN Same as M68VVXBFORTRAN except media is 8Mb LMD cartridge.

M68VVLBPASCAL Same as M68K0PASCAL on VERSAdos LMD Cartridge for EXORmacs.

M68VVXBABSFTN FORTRAN 77 Compiler with VERSAdos, same as M68VVFBABSFTN but with VERSAdos and supplied on double-sided, double-density 5-1/4″ diskette. (Cat. 4*)

M68VVXBFORTRAN ANSI FORTRAN 77 Compiler Object for VERSAdos on 5-1/4″ diskette produces relocatable object output which executes in either the VERSAdos or RMS68K target environment.

M68VVXBPASCAL M68000 Pascal Compiler on VERSAdos 5-1/4″ Diskette for VME/10.

M68KVKFBCALCY Alcyon 'C' Compiler for VERSAdos. This product is supplied for EXORmacs and VME/10 on 8″ diskette. For 5-1/4″ media contact your local Motorola representative.

*See Software Package Category Definitions.

RMS-68K

M68K0RMS68K M68000 Real-Time Multitasking Executive Software Object Code on VERSAdos 8″ diskette.

M68K0RMS68KH M68000 Real-Time Multitasking Executive Software Object Code on VERSAdos CMD cartridge.

M68K0RMS68KL M68000 Real-Time Multitasking Executive Software Object Code on VERSAdos LMD cartridge.

M68K0RMS68KT RMS68K Source on CMD cartridge.

M68VKMSRMS68K RMS68K Source on 8″ diskette.

M68VKXBRMS68K M68000 Real-Time Multitasking Executive Software Object Code on VERSAdos 5-1/4″ diskette.

M68VKXSRMS68K RMS68K Source on 5-1/4″ diskette.

**Note: Motorola recommends that anyone licensing RMS68K or VERSAdos enroll in the 4-day Operating Systems Training Course, MTT15, offered by Motorola Technical Training, refer to page 55. Likewise persons licensing SYSTEM V/68 should enroll in the related course, MTT18.

CP/M-68K

16-Bit Operating Systems

M68K11XBCPM68K DRI CP/M-68K for the VME/10 on 5-1/4″ diskettes. This is an OEM developers package, containing a bootable binary for the VME/10, and the utilities necessary to port CP/M-68K to other target hardware. The package includes: BIOS source (in 'C'), a 'C' compiler, assembler, linker and required relocatable binaries.

16-Bit Languages and Utilities

M68K11XBDRIBAS DRI CBASIC for the VME/10 on 5-1/4″ diskette.

M68K11XBDRIPAS DRI Pascal MT + for the VME/10 on 5-1/4″ diskette.

M68N1XBCORE VME/10 Graphics Package on 5-1/4″ diskette. Supports the CORE/SIGGRAPH standard.

M68N1XBGKS0B VME/10 Graphics Package on 5-1/4″ diskette. Supports the GKS LEVEL 0.b standard (lowest).

M68N1XBGKS2C VME/10 Graphics Package on 5-1/4″ diskette. Supports the GKS LEVEL 2.c standard (highest).

M68N1XBPLT10 VME/10 Graphics Package on 5-1/4″ diskette. Supports the PLOT/10 standard.

Communications Software

M68NNXBVMELAN Ethernet LAN Software for VERSAdos on 5-1/4″ diskette. Contains object of 'FUSION,' drivers, kernel and debugger.

M68VVFBVMELAN Ethernet LAN Software for UNIX System V on 5-1/4″ diskette. Contains object of 'FUSION,' drivers, kernel and debugger.

16-Bit Instrumentation Software Tools

M68K1XBDIOPP Data I/O Software Interface same as M68KDIOPP except on 5-1/4″ diskette.

M68KDIOPP VERSAdos PROM Programmer Interface on VERSAdos 8″ diskette, allows VERSAdos file transfer to Data I/O System 17, 19 or 29 must have (unipacs) to program almost any PROM, EPROM, or Logic Array. (Cat. 2*)

M68KDIOPPH EXORmacs PROM Programmer Interface on VERSAdos CMD cartridge. (Cat. 2*)

M68KHDS4-1F HDS-400 Software for EXORmacs/ VERSAdos interface on 8″ VERSAdos diskette.

M68KHDS4-1H HDS-400 Software for EXORmacs/ VERSAdos interface on 14″ CMD cartridge.

M68KHDS4-1L HDS-400 Software for EXORmacs/ VERSAdos interface on 8″ LARK (LMD) cartridge.

M68KHDS4-2 HDS-400 Software for VME/10-VERSAdos interface on 5-1/4″ diskette.

M68KHDS4-3T HDS-400 Software for VAX/VMS interface on 9-track magnetic tape.

M68KHDS4-4T HDS-400 Software for VAX/UNIX System V interface on 9-track magnetic tape.

M68KHDS4-5F HDS-400 Software for EXORmacs SYSTEM V/68 interface on 8″ diskette (includes HDS-400 Software and Pascal Assembler Linker Port).

M68KHDS4-5H HDS-400 Software for EXORmacs SYSTEM V/68 interface on 14″ CMD cartridge (includes HDS-400 Software and Pascal Assembler Linker Port).

16-/32-Bit Debug Monitors

M68K2CSBUG4 020bug Source and Relocatable Object Modules on VERSAdos cartridge.

M68K2FSBUG4 020bug Source and Relocatable Object Modules on VERSAdos diskette.

M68K2RBBUG4 020bug, Debugging package for M68KVM04 VERSAmodule 32-bit Monoboard Microcomputer, includes EPROM set and RS-232C Distribution Module (MVMCH3-104 allowing connection to user debug terminal and an up/downline load host.

M68K2XSBUG4 020bug Source and Relocatable Object Modules on 5-1/4″ diskette.

M68KVBUG VERSAbug Debugging Package for use with VERSAmodule M68KVM01A Microcomputer, provided as a PROM set and dual port RS-232C Serial I/O Cable Assembly, provides 39 debug, up/downline load and disk bootstrap load commands for quick debug and execution of system and user developed programs.

M68KVBUGLC VERSAbug Source Code and Relocatable Object Modules on VERSAdos CMD cartridge for use with M68KVM01A Microcomputer.

M68KVBUGLF VERSAbug Source Code and Relocatable Object Modules on VERSAdos 8″ diskette for use with M68KVM01A Microcomputer.

M68KVBUG2 VERSAbug Debugging Package for use with M68KVM02 Microcomputer, includes features of M68KVBUG.

M68KVBUG2LC VERSAbug Source Code and Relocatable Object Modules on VERSAdos CMD Cartridge for use with M68KVM02 Microcomputer.

M68KVBUG2LF VERSAbug Source Code and Relocatable Object Modules on VERSAdos 8″ diskette for use with M68KVM02 Microcomputer.

M68KVBUG2LMC VERSAbug Source Code and Relocatable Object Modules on VERSAdos LMD Cartridge for use with M68KVM02 Microcomputer. 16-Bit Languages, Utilities, etc.

*See Software Package Category Definitions.

Software Support (Continued)

16-/32-Bit Debug Monitors (cont)

M68KVBUG3 VERSAbug Debugging Package for use with VERSAmodule M68KVMO3-1 Microcomputer, provided as a PROM set and dual port RS-232C Serial I/O Cable Assembly, provides 44 debug, up/downline load and disk bootstrap load commands for quick debug and execution of system and user developed programs.

M68KVBUG3LC VERSAbug Source Code and Relocatable Object Modules on VERSAdos CMD Cartridge for use with M68KVMO3-1 Microcomputer.

M68KVBUG3LF VERSAbug Source Code and Relocatable Object Modules on VERSAdos 8" Diskette for use with M68KVMO3-1 Microcomputer.

M68VIFSBG115 MVME115bug Source and Object on 8" diskette.

M68VIFSBG120 MVME120bug Source and Object on 8" diskette.

M68VIFXSBG120 MVME120bug Source and Object on 5-1/4" diskette.

M68VIXSBG115 MVME115bug Source and Object on 5-1/4" diskette.

M68VKXSVMEBUG VMEbug Source Code and Object on VERSAdos 5-1/4" diskette. VMEbug is designed to work with the MVME110-1.

MVMEBUG VMEbug Debugging Monitor resident firmware in two 8K EPROMs, for use with MVME110-1 Monoboard Microcomputer installed in VMEbus backplane; provides over 30 commands for DEbug, Up-/Download, permits full speed execution, full access to all VMEmodule capabilities and bus activity, includes single-line assemble/disassemble for program development and complete installation and use documentation.

MVMEBUG1 VMEbug Source Code and Relocatable Object Modules on VERSAdos 8" diskette allows user modification of VMEbug to include only items needed in end system such as up/download linking or link to users bootstrap loader. VMEbug is designed to work with the MVME110-1.

MVMEBUG2 VMEbug Source Code and Relocatable Object Modules on VERSAdos CMD cartridge.

MVME101BUG VMEbug Debugging Package for use with VME101 Monoboard Microcomputer with same features as MVMEBUG.

MVME115BUG VMEbug Debugging Monitor Resident Firmware for use with the MVME115M.

MVME120BUG VMEbug Debugging Monitor Resident Firmware for use with MVME120 series modules.

MVME130bug VMEbug Debugging firmware. For use with MVME130/131.

16-Bit Non-Resident Software

M68DK0BPASCAL M68000 Cross Pascal Assembler and Linker for VAX/VMS Systems for the DEC VAX running under VMS operating system, it contains full language M68000 compiler, cross assembler, and cross linker; package produces S-Records as output; supplied on 9-track magnetic tape and one set of documentation. (Cat. 4*)

M68IK0BPASCAL M68000 Cross Pascal Assembler and Linker for IBM 370 with VM/CMS operating system, other features same as M68DK0BPASCAL. (Cat. 4*)

M68KXASM2 M68000 Cross Macro Assembler Source Code on IBM 370 9-track Magnetic Tape in VS2 Pascal, converts symbolic statements into relocatable object program listing of MC68000 machine language instructions, requires linkage editor.

M68KXLNKR2 M68000 Cross Linkage Editor Source Code on IBM 370 9-track Magnetic Tape in VS2 Pascal, allows relocatable object code from either Pascal or Macro Assembler to be combined in one object code program for MC68000 execution.

M68KXPASC2 68000 Cross Pascal Source Code on IBM 370 9-track Magnetic Tape in VS2 Pascal, a high level, user oriented, structured programming language to produce MC68000 relocatable object code; requires linkage editor.

8-Bit Operating Systems

M6800SMDOS M6800-Based CRT Editor, Macro Assembler, and Linking Loader with MDOS Operating System, provides enhanced EXORciser/EXORterm (or any TTY-type terminal) text editing capabilities, provided on 8" MDOS diskette; editor and MDOS require 32Kbytes of RAM; the assembler and linker require 24Kbytes of RAM. This package is intended for software updates only.

M6809SMDOS M6800-Based CRT Editor, Macro Assembler, and Linking Loader; same as M6800SMDOS, but for MC6809-based applications.

M6809MDOSS M6809 MDOS Source Code on M6809 MDOS Diskette; may be licensed for internal use only.

*See Software Package Category Definitions.

8-Bit Debug Monitors

M68MM08 MICRObug Module (MICRObug ROM and MEX6850 Module); used with M68MM01 and M68MM02.

M68MM08A MICRObug Module debug/monitor firmware in ROM, used with M68MM01A and M68MM01A2.

M68MM19SB MC6809 SUPERbug Firmware ROM Set for use with MC6809, M68MM17, or M68MM19 Micromodules.

M6809EXBUGS M6809 EXbug Source Code on MDOS diskette; may be licensed for internal use only.

8-Bit Languages, Utilities

M68BASR010M M6800 Resident BASIC Interpreter on MDOS Diskette; requires 24Kbytes of RAM.

M68EDITM M6800/M6809 CRT Line Editor on MDOS diskette. (Cat. 3*)

M68FTNR012M M6800 Resident FORTRAN Compiler and Linking Loader on MDOS diskette, compiler (ANSI standard FORTRAN IV subset) converts source program into object module and linking loader converts relocatable object code into absolute object file. (Cat. 2*)

M68MDOC EXORciser Text Processor, same as M68XDOC but on M6800/M6809 MDOS diskette. (Cat. 3*)

M68MPLR020M M6800 Resident MPL compiler on MDOS Diskette, a subset of PL/1 with features for microprocessor development, designed for EXORciser/EXORterm floppy disk environment and 56Kbytes of RAM; requires Macro Assembler. (Cat. 2*)

M68RTFR02M M6800 Resident Real-Time FORTRAN Compiler on MDOS diskette; contains an execution time operating system plus normal FORTRAN features; requires 48Kbytes of RAM. (Cat. 2*)

M68SETCOM EXORset/EXORciser Communication Package, extends EXORset file transfer capabilities to disk file exchanges, supplied on MDOS and XDOS Diskettes; includes one RS-232C cable; up to four EXORsets may be tied to one EXORciser.

M68SETRASM M6800/M6801/M6803/M6804/M6805/M6809 EXORset Cross Macro Assembler, permits assembly of corresponding source code on the EXORset.

M68V98BPASCAL MC6809 Cross Pascal Compiler on 8″ VERSAdos diskette.

*See Software Package Category Definitions.

M68VCXBASM M6800/01/03/04/05/09/M68HC11 Structured Cross Macro Assembler on 5-1/4″ VERSAdos Diskette, for VME/10.

M68VCFBRASM M6800/01/03/04/05/09/HC11 Structured Cross Macro Assembler on 8″ VERSAdos Diskette.

M68V9CBPASCAL MC6809 Cross Pascal Compiler on VERSAdos CMD cartridge.

M68V9LBPASCAL MC6809 Cross Pascal Compiler on VERSAdos LMD cartridge.

M68V9XBPASCAL MC6809 Cross Pascal Compiler on 5-1/4″ VERSAdos diskette.

M68XDOC EXORset Text Processor on XDOS diskette, any editor may imbed DOC commands for output processing; includes multiple and single file handling, automatic contents and page numbers, conditional text, and variable line spacing; on M6809 XDOS diskette, requires minimum of 24Kbytes of RAM. (Cat. 3*)

M6809BASMR M6809 Resident BASIC-M Interactive Compiler on MDOS Diskette; includes some facilities normally found only in higher level languages plus enhancements for micro development, generates relocatable, ROMable code; requires 48Kbytes of RAM.

M6809BASMRX M6809 Resident BASIC-M Interactive Compiler, same as M6809BASMR except on XDOS diskette.

M6809CRTEDS M6809 EXORciser/EXORterm CRT Editor Source Code on MDOS diskette; may be licensed for internal use only, contact Motorola if a license for redistribution is required.

M6809FORTRN M6809 Resident FORTRAN Compiler and Linking Loader on MDOS diskette. (Cat. 2*)

M6809MPL M6809 Resident MPL compiler on MDOS diskette. (Cat. 2*)

M6809PASCLC M6809 Resident Pascal Compiler, for EXORciser/EXORterm MDOS floppy disk, requires 56Kbytes of RAM; supports STRING variables, but not REALS or STRING functions. (Cat. 2*)

M6809SETPAS Resident M6809 Pascal Compiler on XDOS Diskette, same as M6809SETCLC except configured for XDOS/EXORset system.

M6809XMASMS M6800/01/05/09 Macro Assembler Source Code on M6809 MDOS Diskette; may be licensed for internal use only.

M6839FPRS M6839 Floating Point ROM Source Code on M6809 MDOS Diskette; may be licensed for internal use only.

Software Support (Continued)

8-Bit Languages, Utilities
(continued)

M6809XMASMS M6800/01/05/09 Macro Assembler Source Code on M6809 MDOS Diskette; may be licensed for internal use only.

M6839FPRS M6839 Floating Point ROM Source Code on M6809 MDOS Diskette; may be licensed for internal use only.

8-Bit Resident Firmware

M68BASRC1 M6800 Resident BASIC Interpreter, supplied as set of seven preprogrammed ROMs; MINIbug II-based.

M68BASRC2 M6800 Resident BASIC Interpreter, supplied as set of seven preprogrammed ROMs; MICRObug-based.

M68BASRM2 M6800 Resident BASIC Interpreter, supplied as set of seven preprogrammed ROMs on M68MM04 Micromodule; MICRObug-based.

M68EAB1 Resident Editor/Assembler and BASIC Interpreter, supplied as ROM set on M68MM04 Micromodule; MINIbug II based.

M68EAB2 Resident Editor/Assembler and BASIC Interpreter, supplied as ROM set on M68MM04 Micromodule; MICRObug based.

M68XEARC1 Resident Editor/Assembler ROM set of seven preprogrammed EPROMs providing MINIbug II/MICRObug-based M6800 Resident Editor/Assembler; not for use with M68MM01 based system.

M6800DOWNLD M6800/M6801 Down-Line Load ROM, supplied as 1K ROM, permits download of software developed in host into an EXORciser or Micromodule, features include position independence, user chosen ACIA addresses and control codes, software selection of transmission modes, error checking and reporting, and an optional entry point for developed debug/monitor programs.

M6800UPDWNLD M6800/M6801 Up/Down-Line Load ROMs, supplied as 2K PROM or two 1K ROMs, allows developed host software download into EXORciser and memory-to-file upload to EXORmacs.

M6809DOWNLD M6809 Down-Line Load ROM, same as M6800DOWNLD for M6809.

M6809UPDWNLD M6809 Up/Down-Line Load ROMs, same as M6800UPDWNLD for M6809.

8-Bit Non-Resident Software

M6804RLMS-D Same as M6804RLMS-S, except media is double-sided diskette. (Cat. 4*)

M6804RLMS-I 6804 Cross Assembler and Interface Package on 5-1/4″ diskette on an Intel iPDS System, allows the operation of the HDS-200 with the iPDS. (Cat. 4*)

M6804RLMS-S 6804 Cross Assembler and Interface single-sided 8″ diskette for Intel INTELEC System with the HDS-200. (Cat. 4*)

M6805RLMS-D Same as M6804RLMS-D, except with M6805 Cross Assembler. (Cat. 4*)

M6805RLMS-I Same as M6804RLMS-I, except with M6805 Cross Assembler. (Cat. 4*)

M6805RLMS-S Same as M6804RLMS-S, except with M6805 Cross Assembler. (Cat. 4*)

M6809XASMBL2 M6809 Cross Macro Assembler Source Code on IBM 370 9-track Magnetic Tape in FORTRAN IV, converts assembly language and symbolic statements into relocatable object program listing of MC6809 machine language instructions. (Cat. 4*)

*See Software Package Category Definitions.

Additional Support

Intangible Benefits

Some of the intangible benefits offered by Motorola are inherent and expected from an established leader since the early days of modern semiconductors. Motorola has earned an enviable reputation for leadership in technology as well as support. This excellence and leadership had produced the M68000 microprocessor family which has become an international standard for 16-/32-bit systems. The combination of the M68000 components, VMEbus, and VERSAbus with the additional capabilities of VERSAdos or SYSTEM V/68 Operating Systems provide the designer with significant flexibility in implementing future-oriented systems. Similar features in choices of MPUs, supporting chips, operating systems, and software are available for the M6800 family-based systems. In both cases, Motorola offers equipment manufacturers the appropriate hardware and software building blocks and advanced development systems and support instrumentation to streamline the implementation of their designs to end system products.

Technical Training Seminars

Motorola offers a comprehensive range of Technical Training Seminars on a wide variety of hardware, software, and systems topics in diverse locations throughout the world, in the factory, and even in your own plant site. Personalized training seminars are designed or modified standard courses are available that fill specialized and particular needs.

The standard training courses that are offered by Motorola are listed below. Costs for the courses vary by the number of days and number of students registered in a group. For specific costs,, schedules, and course coverage, consult Motorola Technical Training Headquarters at (602) 244-7126 or (602) 244-4945 or write to Motorola Technical Training, Mail Drop HW68, P.O. Box 2953, Phoenix, Arizona 85062.

MTT1   (4 Days) An introduction to microcomputers based on the original **MC6800** microprocessor and associated family devices.

MTT2   (4 Days) An introduction to microcomputers based on the **MC6801** single chip microcomputer device.

MTT3   (2 Days) An update (from MTT1 or MTT2) based on the powerful **MC6809** device.

MTT5   (2 Days) An **update** (from MTT1) based on the **MC6801** single chip microcomputer device.

MTT6   (3 Days) An introduction to microcomputers based on the **MC6805** family of single chip microcomputer devices.

MTT7   (1 Day) A **non-technical** course designed to acquaint managers, buyers, salesmen, secretaries, and other non-designers with microcomputer terminology.

MTT8   (4 Days) An advanced microcomputer course based on the **MC68000** Microprocessor device.

MTT10   (2 Days) An introduction to 8-bit microcomputer development systems based on **EXORciser** and **EXORset** hardware.

MTT11   (4 Days) An introduction to microcomputers based on the powerful **MC6809** microprocessor and associated family devices.

MTT12   (3 Days) An introduction to programming in **Pascal,** a structured high-level language.

MTT13   (3 Days) An introduction to the 16-bit microcomputer development system based on the **EXORmacs** system.

MTT15   (4 Days) An introduction to **VERSAdos,** the EXORmacs Real-Time Multitasking Operating System.

MTT16   (4 Days) Designing the **MC68010** and associated family devices into a virtual system.

MTT17   (3 Days) An introduction to the Motorola Computer Aided Design for **Macrocell Arrays.**

MTT18   (4 Days) An introduction to Motorola's UNIX-based **SYSTEM V/68** Operating System.

MTT19   (4 Days) An introduction to board level computer system design based on **VERSAmodules** and **VMEmodules,** with application examples.

MTT20   (4 Days) An introduction to the advanced 32-bit **MC68020** Microprocessor, with application examples.

MTT23   (4 Days) An introduction to the **VME/10** single-user OEM/Development System, VERSAdos real-time operating system.

Field and Factory Service

Field Service and Factory Service arrangements are available for on-site installation and maintenance, for scheduled maintenance, and for factory exchange/repair services. This service is provided by Four-Phase Systems, a unit of Motorola's Information Systems Group; over 1500 customer support staff personnel are dedicated to providing a high level of service from 162 service locations nationwide. Motorola also provides an on-going program of assistance to third-party independent software vendors to encourage development of both systems and applications packages for Motorola hardware and software systems available.

Applications Engineering — Applications engineering assistance is available through an extensive network of over 50 Motorola Semiconductor Sales Offices in North America. In addition, our toll-free Field Service Hotline provides you a quick means of answering your questions on the use of Motorola supported hardware and software products.

Repair/Spare Parts — Four-Phase Systems and the Microsystems service staff have joined forces to provide nationwide quick-response service as well as selected repair/spare parts for Microsystems' products. The Four-Phase Customer Logics Center is the communications hub for initiating exchange or repair service. The center provides technical assistance, (800) 533-3321, with the added benefit of being tied to the Four-Phase Product Support Center with its extensive computerized data bank. Inquiries for quotations on repair/spare parts and service should be directed to:

Four Phase Customer Support Center
1919 W. Fairmont
Suite 8
Tempe, AZ 85282
(800) 533-3321
(602) 438-3100

Standard Warranty

Seller warrants that its products sold hereunder will at the time of shipment be free and clear of all liens and encumbrances and will be free from defects in material and workmanship and will conform to Seller's applicable specifications or, if appropriate, to Buyer's specifications accepted by Seller in writing. If products sold hereunder are not as warranted, Seller shall, at its option, refund the purchase price, repair, or replace the product, provided proof of purchase and written notice of nonconformance is received by Seller within ninety (90) days from date of initial shipment, and provided said nonconforming products are, with Seller's written authorization,* returned FOB Seller's plant or authorized repair center within thirty (30) days from expiration of said ninety (90) day period. Upon verification by Seller that the product does not conform to this warranty, Seller will pay the cost of transporting such replacement or repaired goods to Buyer's plant within the contiguous 48 United States and Canada. This warranty shall not apply to any products Seller determines have been, by Buyer or otherwise, subjected to testing for other than specified electrical characteristics or to operating and/or environmental conditions in excess of the maximum values established in applicable specifications, or have been the subject of mishandling, misuse, neglect, improper testing, repair, alteration, damage, assembly or processing that alters physical or electrical properties. This warranty excludes all costs of shipping, customs clearance and related charges outside the contiguous 48 United States and Canada.

IN NO EVENT WILL SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS WARRANTY EXTENDS TO BUYER ONLY AND NOT TO BUYER'S CUSTOMERS OR USERS OF BUYER'S PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS, IMPLIED OR STATUTORY INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

*Customer Return Authorization Number is available from Four-Phase Customer Support Center. Call toll free (800) 533-3321.

Hardware and Software Documentation

Motorola also provides extensive use and application documentation with each of its hardware and software products. This ensures that the user will be aware of the capabilities and limitations of the product prior to selection, development and use. Documentation may be ordered from Motorola's Literature Distribution Center, P.O. Box 20924, Phoenix, Arizona 85036 or by calling (602) 994-6561. A categorical listing of documentation available for Motorola Microsystems products follows.

Hardware and Software Documentation

EXORciser

MEX68RK2/D1	Rack Mounting Kit Installation Instructions
M68CHPS/D	EXORciser II Chassis/Power Supply User's Guide
M68SDT2/D3	EXORciser II User's Guide
M68SDT2/S1	Using M6800 EXORciser II Systems
M6809EXOR/D1	M6809 EXORciser User's Guide

EXORmacs

M68KCHAS/D4	EXORmacs Chassis User's Guide
M68KDIOPP/D2	EXORmacs S/W Interface for Data I/O PROM Programmer User's Guide
M68KEMM/D3	EXORmacs Maintenance Manual
M68KMACS/D10	EXORmacs System Operations Manual
M68KMACSBG/D1	EXORmacs System MACSbug Monitor Reference Manual
M68KMACSCM/D1	EXORmacs Development System Hardware/Software Configuration Manual
M68KMACSRK/D1	EXORmacs Chassis Rack Mounting
M68KMBUG/D2	MACSbug Initialization and I/O Routines
M68KRDS/D2	EXORmacs System Remote Development Station
M68KUSE/D2	EXORmacs User's System Emulator (Single-User)

EXORset

M68SETDC35/D1	EXORset 35 Desktop Controller System User's Manual
M68SETDS35/D1	EXORset DS35 Development System User's Manual
M6809SET110/V1 & V2	EXORset User's Guide Package

VMC 68/2

MVMCBUG/D1	VMCbug Debugging Packages User's Manual
MVMCDEBUG/D1	VME 68/2 Multitasking DEbug User's Manual
MVMCSM/D1	VMC 68/2 — Series Microcomputer System Manual

VME/10

M68KTENBG/D2	TENbug Debugging Package User's Manual
M68KVSDM/D1	VME/10 Microcomputer System Diagnostics Manual
M68KVSGM/D1	VME/10 Microcomputer System Command and Graphics Primitives Reference Manual
M68KVSIG/D2	VME/10 Microcomputer System Installation Guide
M68KVSOM/D1	VME/10 Microcomputer System Overview Manual
68-M68KVSHD/V1, V2	VME/10 Hardware Documentation

HDS-200

MC146805E2/D2	MC146805E2 MPU Module User's Guide
M146805F2/D2	MC146805F2 MPU Module User's Manual
M146805G2/D2	MC146805G2 MPU Module User's Manual
M68HC05C4HM/D1	M68HC05C4 HDS-200 Emulator Module User's Manual
M68HDS20M/D2	HDS-200 Hardware Development Station Operations Manual
M68HDS2UM/D2	HDS-200 Hardware Development Station User's Manual
M6804P2HM/D1	MC6804P2 HDS-200 Emulator Module User's Manual
M6805P234/D1	MC6805P2, MC6805P4, MC68705P3, MC68705P5 HDS-200 Emulator Module User's Manual
M6805RU23/D1	MC6805R2, MC6805U2, MC68705R3, MC68705U3, HDS-200 Emulator Module User's Manual
M6805T2HM/D0	HDS-200 Emulator Module User's Manual

HDS-400

M68HDS4EM1/D1	HDS-400 MC68000 Emulator Module User's Manual
M68HDS4EM2/D1	HDS-400 MC68008 Emulator Module User's Manual
M68HDS4EM3/D1	HDS-400 MC68010 Emulator Module User's Manual
M68HDS4FB1/D1	HDS-400 M68000 Family Interface Module User's Manual
M68HDS3UM/D4	HDS-400 Hardware Development Station User's Manual
M68HDS40M/D4	HDS-400 Hardware Development Station Operation Manual
M68HDS4MM1/D1	HDS-400 Emulation Memory Module User's Manual
M68KBSA/D6	Real-Time Bus State Analyzer User's Manual

MASS STORAGE

MLD16DESKTC/D1	Mass Storage Enclosure Desk Top Cover Kit Installation Instructions
MLD16SMK/D1	Mass Storage Enclosure Rack Mount Kit Installation Instructions
M68FDIC/D1	Floppy Disk Interconnect Adapter User's Manual
M68RMSE/D2	M68RMSE1-1, MLD1-16, MLD1-50 Mass Storage Enclosures User's Manual
M68SFDRK3/D2	Rack Mounting Kit Installation Instructions
M68SFDU3A/D2	EXORdisk II/III Disk Drive Unit Maintenance Manual (CalDisk Drives)
M68SFDU3R/D1	EXORdisk II/III Disk Drive Unit Maintenance Manual (REMEX Drives)

TERMINALS

M68EEF/D1	M68SVS20155 EXORterm 155 Editor Kit
M68SXD155/D3	EXORterm 155 Display Console User's Manual
M68SXS220/D1	EXORterm 220 Development System User's Guide
M6809TERM/D2	M6809 EXORterm Development System User's Guide

BUS SPECIFICATIONS

MVMEBS/D1	VMEbus Specification Manual
MVMESYSAM/D1	VMEsystem Architecture Manual
MVMSBS/D1	VMSbus Serial Bus Specification Manual
MVMXBS/D1	VMXbus Memory Expansion Bus Specification
M68EBS/D1	EXORbus Specification Manual
M68KVBS/D4	VERSAbus Specification Manual
M68RIOCS/D2	Input/Output Channel Specification Manual

EDUCATIONAL BOARDS

MEK6802D5/D2	MEK6802D5 Microcomputer Evaluation Board User's Manual
MEK6809D4/D2	MEK6809D4 Advanced Microcomputer Evaluation Board & MEK68KPD Keypad/Display Unit User's Manual
MEX68KECB/D2	MC68000 Educational Computer Board User's Manual

EXORbus COMPATIBLE MODULES

MC6805R2UI/D2	MC6805R2 Adapter Board Upgrade Instructions
MEX68B00/D2	MPU II Module User's Guide
MEX68DB2/D2	DEbug II Module User's Guide
MEX68KDM/D4	MC68000 Design Module User's Guide
MEX68PP3/D	PROM Programmer II Supplement
MEX68PI2/D1	Printer Interface Module User's Guide
MEX68RR/D	EPROM/RAM Module Supplement

MEX68SA2/D2	Systems Analyzer Module User's Guide
MEX68SPM/D1	System Performance Monitor User's Guide
MEX68USEC/D2	2 MHz User System Evaluator User's Guide
MEX68USM/D	Universal Support Module User's Guide
MEX6801EVM/D	MC6801 Evaluation Module User's Guide
MEX6801U4/D1	MC6801U4 Support System User's Manual
MEX6801/D3	MC6801 Support System User's Guide
MEX6802-46/D2	MC6802/46 Support Module User's Guide
MEX6805/D2	MC6805 Support System User's Guide
MEX6812/D	2K Static RAM Module Supplement
MEX6820/D	Input/Output Module Supplement
MEX6845/D	CRTC Support Module User's Guide
MEX6850/D	ACIA Module Supplement
MEX6854/D	ADLC Support Module User's Guide
MEX6864HR/D	16K/64K Hidden Refresh Memory Module User's Guide
MEX6864/D2	16K/64K Dynamic RAM Module User's Guide
MEX68162/D2	8K/16K 1 MHz and 2 MHz Static RAM Module User's Guide
MEX68212/D	Input/Output Module User's Guide
MEX68488/D	GPIA Support Module User's Guide
MEX68502/D2	ACIA/SSDA Module User's Guide
MEX68701/D1	MEX6801EVM1 Evaluation Module User's Guide
MEX146805/D1	CMOS Version of M6805 Family Development System User's Guide
M1468705EVM/D1	M1468705EVM Evaluation Module User's Manual
M68PP5/D1	M68PP5 PROM Programmer User's Manual
M68SFDC3/D3	Floppy Disk Controller Module User's Guide
M6809DB/D1	M6809DB Debug Module User's Guide
M6809DCC0/D1	Floppy Disk Controller Firmware Changeover Instruction Guide
M6809MPU/D2	M6809 MPU Module User's Guide
M6809UI/D2	M6809 Upgrade Instruction Guide
M6809USE/D1	M6809 User System Evaluation User's Guide
M68120EVM/D1	MC68120 Evaluation Module User's Manual
M68705EVM/D1	M68705EVM Evaluation Module User's Manual
M68705PP/D2	Prom Programmer User's Guide
PROBUG/D1	PRObug Support Firmware for 68701/6801/6803

VERSAbus COMPATIBLE MODULES

MVMCH303/D1	M68KVM03 RS-232C Distribution Module User's Manual
M68KVAM/D1	VERSAbus Adapter Module User's Guide
M68KVBUG/D2	VERSAbug Debugging Package User's Manual
M68KVBUG2/D1	VERSAbug 2.n Debugging Package
M68KVMCCC/D1	Installation Instructions for VERSAmodule Card Cage I/O Connector Kit
M68KVMCHD/D1	Installation Instructions for VERSAmodule Chassis Decorative Cover Kits
M68KVMCHDSS/D1	Installation Instructions for VERSAmodule Chassis Decorative Side-Skins Kit
M68KVMCHE/D1	Installation Instructions for VERSAmodule System Chassis Expansion Kit
M68KVMCHS/D1	Installation Instructions for VERSAmodule Chassis Slide Mount Kit
M68KVMCHU/D1	Installation Instructions for VERSAmodule System Unified Power Control
M68KVMESH/D2	VERSAmodule Chassis, Card Cage, Power Supply and Power Monitor User's Manual
M68KVMMB/D1	M68KVMMB Memory Management Module User's Manual
M68KVMPM1/D1	VERSAmodule System Power Monitor Module User's Manual

M68KVMPS1/D1	VERSAmodule System Switching Power Supply User's Manual
M68KVMSIOC1/D1	Installation Instructions for Dual Port RS-232C Serial I/O Cable Assembly
M68KVMSIOC2/D1	M68KVMSIOC2 Dual Sync/Async RS-232C Cable Assembly User's Manual
M68KVMTPS/D1	Todd Products Corporation Switching Power Supply User's Manual
M68KV020BES/D1	Benchmark 20 High Performance Evaluation Computer System User's Manual
M68KVM01/D1	Monoboard Microcomputer User's Guide
M68KVM02/D1	VERSAmodule Monoboard Microcomputer User's Guide
M68KVM03/D1	M68KVM03 VERSAmodule Monoboard Microcomputer Module User's Manual
M68KVM04/D1	M68KVM04 High Performance 32-bit VERSAmodule Monoboard Microcomputer Module User's Manual
M68KVM10/D1	32K/64K/128Kbyte Dynamic Memory Module User's Manual
M68KVM11/D2	M68KVM11-1/-2 256K/512Kbyte Dynamic RAM Memory Module User's Manual
M68KVM12/D1	M68KVM12 1024Kb/4096Kb Dynamic RAM Module Manual
M68KVM13/D1	M68KVM13 Dual-ported 32-bit High Performance 1Mb/4Mb Dynamic RAM Module User's Manual
M68KVM20/D2	Floppy Disk Controller Module User's Manual
M68KVM21/D2	Universal Disk Controller User's Manual
M68KVM22/D1	M68KVM22 VERSAmodule Storage Module Disk Drive Controller Module User's Manual
M68KVM23/D1	M68KVM23 VERSAmodule Intelligent Peripheral Controller User's Manual
M68KVM30/D2	Multichannel Communications Module User's Manual
M68KVM31/D1	M68KVM31 VERSAmodule Eight-Channel Intelligent Communications Module User's Manual
M68KVM32/D1	M68KVM32 VERSAmodule eight-channel Communications Module
M68KVM33/D1	M68KVM33 VERSAmodule Ethernet Controller Module User's Manual
M68KVM60/D2	Universal Intelligent Peripheral Controller Module User's Manual
M68KVM80/D1	VERSAmodule Combination Memory, I/O, and Time-of-Day Clock User's Manual
M68KWWM/D1	M68K Wirewrap Module Information Guide

MICROMODULES

M68MMESH/D2	Micromodule Enclosure and System Hardware: Chassis, Rack Mounting Kits, Card Cages, and Power Supply
M68MMIOC/D1	Parallel I/O Adapter
M68MMPS1/D2	M68MMPS1-1 Power Supply
M68MMSDRM/D1	Micromodule/M68ADS2A Software Development Reference Manual
M68MM01/D4	Monoboard Microcomputer 1
M68MM01A/D3	Monoboard Microcomputer 1A
M68MM01B1A/D1	Monoboard Microcomputer 1B/1B1A
M68MM01D/D2	Monoboard Microcomputer 1D
M68MM02/D3	CPU Module
M68MM03/D3	32/32 Input/Output Module
M68MM04/D4	16K EPROM/ROM Module
M68MM04A/D2	ROM/EPROM Module
M68MM06/D	2K Static RAM Module
M68MM07/D2	Quad Communications Module

M68MM08/D2	MICRObug Monitor DEbug User's Guide
M68MM08AS/D	MICRObug Source Listing
M68MM09/D2	4K Static RAM Module
M68MM10/D1	Power Monitor and/or Real-Time Clock/RAM Module
M68MM11/D1	RS-232C to TTY Adapter
M68MM12/D1	GPIB Listener/Talker/Controller Module
M68MM12A/D1	GPIB Listener/Talker Module
M68MM12A/SL1	GPIB Listener/Talker Module Demonstration Software Listing
M68MM14/D1	Arithmetic Processing Unit Module
M68MM15A/D2	High-Level A/D Module
M68MM15B/D2	Low-Level A/D Module
M68MM15C/D	Analog Output Module
M68MM16/D2	ROM, RAM, I/O, Timer Expansion Module
M68MM17/D2	Monoboard Microcomputer Micromodule 17 User's Manual
M68MM18/D1	Octal Communications Module Micromodule 18
M68MM19/D2	Monoboard Microcomputer 19/19A
M68MM19SB/D1	SUPERbug Firmware
M68MM22/D1	Quad Parallel Interface Module
M68MM23/D1	Solid-State Relay Micromodule

VMEbus COMPATIBLE MODULES

MVMEBUG/D3	VMEbug Debugging Packages User's Manual
MVME025/D1	MVME025 VMEbus System Controller Module Manual
MVME050/D1	MVME050 VMEbus System Controller Module Manual
MVME101/D2	MVME101 MC68000 Monoboard Computer Module Manual
MVME110/D2	MVME110-1 MC68000 Monoboard Computer Module Manual
MVME115M/D1	MVME115M MC68010 Processor Module Computer Manual
MVME120/D1	MVME120 MC68010 Processor Module Computer Manual
MVME130/D1	MVME130 MC68020 Processor Module Computer Manual
MVME200/D2	MVME200/201 64K/256Kbyte Dynamic Memory Module User's Manual
MVME202/D1	MVME202/222 512K, 1Mb, 2Mb Dynamic Memory Module User's Manual
MVME211/D1	MVME211 Static RAM/ROM/EPROM Memory Module User's Manual
MVME214/D1	MVME214 Static RAM/ROM/EPROM Memory Module with MVMX32bus User's Manual
MVME300/D1	MVME300 GPIB Controller Module with DMA User's Manual
MVME315/D1	MVME315 Intelligent Disk Controller Module Manual
MVME316/D1	VMEbus to I/O Channel Interface Module Manual
MVME320/D1	VMEbus Disk Controller Module User's Manual
MVME330/D1	VMEbus Ethernet Controller Module User's Manual

I/O CHANNEL COMPATIBLE MODULES

MVME400/D2	Dual RS-232C Serial Port Module User's Manual
MVME410/D2	MVME410 Dual Parallel Port Module User's Manual
MVME420/D1	SASI Adapter Module User's Manual
MVME435A/D1	Buffered 9-Track Magnetic Tape Adapter Module User's Manual
MVME600/D1	MVME600 Analog Input Module — MVME601 A/D Expander Module User's Manual
MVME605/D1	MVME605 Analog Output Module User's Manual

MVME615/D1	MVME615/MVME616 AC Output Module User's Manual
MVME620/D1	MVME620 DC Input Module User's Manual
MVME625/D1	MVME625 DC Output Module User's Manual
MVME935/D1	Remote I/O Channel Connector Module User's Manual
M68RAD1/D2	M68RAD1 Remote Intelligent Analog-to-Digital Conversion Module User's Manual
M68RIO1/D1	Remote Input/Output Module User's Manual
M68RIOCABL/D1	Installation Instructions for I/Omodule Card Cage Cable Assembly Kit
M68RIOCC1/D1	Installation Instructions for 5-Slot I/Omodule Card Cage Adapter Kit
M68RIOCCK/D1	Installation Instructions for I/O Card Cage Connector Kit
M68RWIN1/D1	Winchester Disk Controller User's Manual

MISCELLANEOUS

MBINDER1/D	1" Microsystems Binder
MBINDER3/D	3" Microsystems Binder
MVDOSCARD/D1	VERSAdos Reference Card
M68KSDSS/D2	MC68000 Symbolic Debug Software Sampler
TB303/D	Using Microprocessors & Microcomputers: The 6800 Family — Greenfield & Wray
TB304/D	Pascal Programming Structures for Motorola Microprocessors
TB308/D	What Every Engineer Should Know about Microcomputer System Design & Debugging — Crawford and Wray
TB311/D	UNIX Primer Plus
TB318/D	C Primer Plug by Mitchell Waite, Stephen Prata and Donald Martin

SOFTWARE (Cross Software)

M68KOSIM/D2	M68000 Simulator Reference Manual
M68KPTOM/D1	PDP-11 MACRO-11 M68000 Structured Assembly Language Translator User's Manual
M68KUNUMTK/D1	VERSAdos Toolkit Manual
M68KUNUMX1/D1	Portable Cross Products Manual Pages
M68KXASM/D3	M68000 Cross Macro Assembler Reference Manual
M68KXASM2/D1	M68000 Cross Macro Assembler Reference Manual (IBM 370)
M68KXCURM/D1	M68HC11 Cross 'C' Compiler User's Manual
M68KXLNKR2/D1	M68000 Cross Linkage Editor User's Manual
M68KXPASC2/D1	M68000 Cross Pascal Compiler User's Guide
M68KXPASCL/D4	M68000 Cross Pascal Compiler User's Manual (Preliminary)
M68XLINK/D2	8-Bit Cross Linkage Editor User's Manual
M68XPASV68/D1	SYSTEM V/68 M6809 Cross Pascal Compiler User's Manual
M68XRASM/D1	M68000 Family Macro Assembler Reference Manual
M6809XASM/D1	M6809 Cross Macro Assembler Reference Manual
M6809XPASC/D1	Cross Pascal Compiler On EXORmacs User's Manual

8-BIT LANGUAGES

MSETLLD/D1	XDOS Linking Loader Reference Manual
MSETPASC/D1	EXORset Resident Pascal Compiler User's Guide
M68BAS/D3	BASIC Interpreter Reference Manual
M68CRA/D2	Resident Assembler Reference Manual
M68FTN/D3	M68000/09 MDOS Fortran Reference Manual

8-BIT LANGUAGES (Continued)

M68LLD/D4	Linking Loader Reference Manual
M68MPLR/D3	Resident MPL Compiler Reference Manual
M68PRM/D	M68000 Programmer Reference Manual
M6809BASMR/D1	M6809 BASIC-M Interactive Compilers User's Manual
M6809PASC/D2	M6809 Resident Pascal Compilers User's Guide

16-BIT LANGUAGES

M68KFFP/D1	68343 Fast Floating Point Reference Manual
M68KFORTRN/D3	M68000 Family Resident FORTRAN Compiler User's Manual
M68KLINK/D5	M68000 Family Linkage Editor User's Manual
M68KMASM/D8	M68000 Family Resident Structured Assembler Reference Manual
M68KPASC/D7	M68000 Family Resident Pascal User's Manual
M68KUNLNK/D1	SYSTEM V/68 PAL Linkage Editor User's Manual
M68KUNPAS/D1	SYSTEM V/68 Pascal Compiler User's Manual

MDOS/XDOS

MSETEDITORM/D1	EXORset CRT Editor Reference Manual
MSETPLOT1/D1	EXORset 30 PLOT 1 User's Guide
MSET30DOS/D1	EXORset 30 XDOS Operating System User's Guide
M68CRE/D	Co-Resident Editor Reference Manual
M68EDITORM/D3	Resident Editor Reference Manual
M68MDOS3/D2	EXORdisk II/III Operating System User's Guide
M68XDOS4/S2	Supplement to EXORset XDOS Operating System User's Manual
M6809RMS09/D1	M6809 Real-Time Multitasking Software User's Guide
M6809SYMBG/D2	Symbolic Debug User's Guide

VERSAdos

MVMECNFG1/D1	VME101 System VERSAdos Hardware and Software Configuration Manual
MVMEVDOS/D1	VERSAdos to VME Hardware and Software Configuration User's Manual
MVME3SW/D1	MVME300 (GPIB Controller with DMA) I/O Driver Reference Manual
MVME600DRV/D1	MVME600/601 Digital Converter/Expander Modules Driver User's Manual
MVME605DRV/D1	MVME605 Analog Output Module Driver User's Manual
MVME610DRV/D1	MVME610/620 AC/DC Input Module Driver User's Manual
MVME615DRV/D1	MVME615/MVME616 Driver Software User's Manual
MVME625DRV/D1	MVME625 Driver Software User's Manual
MVMFUSVDOS/D1	FUSION VERSAdos User's Manual
M68KEDIT/D8	M68000 CRT Text Editor User's Manual
M68KIPCS/D3	VERSAbus/IPC Command Channel Software Interface Reference Manual
M68KRADDRV/D1	RAD1 Device Driver Software User's Manual
M68KRIODRV/D1	RIO1 Device Driver Software User's Manual
M68KRMS68K/D8	M68000 Family Real-Time Multitasking Software User's Manual
M68KSYMBG/D3	SYMbug/A and DEbug Monitor Reference Manual
M68KSYSGEN/D6	System Generation Facility User's Manual
M68KVMSG/D2	VERSAdos Messages Reference Manual
M68KVOVER/D4	VERSAdos Overview
M68KVSF/D5	M68000 Family VERSAdos System Facilities Reference Manual
RMS68KIO/D6	VERSAdos Data Management Services & Program Loader User's Manual

SYSTEM V/68 (For Licensed Customers Only)

M68FUSVDOS/D1	FUSION SYSTEM V/68 User's Manual
M68KUNAG/D1	SYSTEM V/68 Administrator's Guide
M68KUNAM/D1	SYSTEM V/68 Administrator's Manual
M68KUNASG/D1	SYSTEM V/68 Assembler User's Guide
M68KUNASG/D2	SYSTEM V/68 Assembler Guide
M68KUNASX/D1	SGS M68020 Cross Compilation System Reference Manual
M68KUNDP/D2	SYSTEM V/68 Document Processing Guide
M68KUNGG/D1	SYSTEM V/68 Graphics Guide
M68KUNLDM/D1	SYSTEM V/68 Common Link Editor Reference Manual
M68KUNMSG/D1	SYSTEM V/68 Error Message Manual
M68KUNOG/D2	SYSTEM V/68 Operator's Guide
M68KUNPG/D2	SYSTEM V/68 Programmer's Guide
M68KUNRD/D2	SYSTEM V/68 Release Description
M68KUNSTG/D1	SYSTEM V/68 Support Tools Guide
M68KUNTA/D1	SYSTEM V/68 Transition Aids
M68KUNUG/D1	SYSTEM V/68 User's Guide
M68KUNUM/D1	SYSTEM V/68 User's Manual

COMMUNICATIONS

MVENPSW/D1	VM33/VME330 LAN Controller Kernel Software Reference Manual
M68DOWNLD/D1	M68000/01/09 Download Program User's Guide
M68SETCOM/D1	EXORciser/EXORset Disk Files Communication Package User's Guide
M68UPDN/D1	M6800/M6801/M6809 Up/Down Load Program User's Manual

FIRMWARE DEBUG MONITORS

MEC68MIN2L	MINIbug Source Listing
MVMCBUG/D1	VMCbug Debugging Package User's Manual
MVME101BUG/D2	MVME101 Bug Debug Package User's Manual
MVMEBUG/D4	MVME110 Debugging Package User's Manual
MVME115BUG/D1	MVME115M Debug Monitor User's Manual
MVME120BUG/D1	MVME120 Debug Monitor User's Manual
MVENPBUG/D1	ENPbug Debugging Package User's Manual
M68KMACSBG/D1	EXORmacs System MACSbug Monitor Reference Manual
M68KMBUG/D2	MACSbug Initialization and I/O Routines
M68KTENBG/D2	TENbug Debugging Package User's Manual
M68KVBUG/D2	VERSAbug Debugging Package User's Manual
M68KVBUG2/D1	VERSAbug 2 Debugging Package
M68KVBUG3/D1	VERSAbug 3 Package User's Manual
M68MM08/D2	MICRObug Monitor DEbug User's Guide
M68MM08AS/D	MICRObug Source Listing
M68MM19SB/D1	SUPERbug Firmware
M6809DB/D1	M6809 DEbug Module User's Guide
M68120UNI/D2	Unicorn Monitor in the MC68120 and MC6801U4
PROBUG/D1	PRObug Support Firmware for 68701/6801/6803

PACKAGED LITERATURE

MVMESYSAM/D1   VMEsystem Architecture Manual
Includes:
- MVMEBS/D1
- MVMSBS/D1
- MVMXBS/D1

M68KUN/V1,V2,V3   SYSTEM V/68 Binder Set (3 Volume)
(For licensed Customer Only)
Includes:
- M68KUNUMD1
- M68KUNRD/D2
- M68KUNTA/D2
- M68KUNAM/D1
- M68KUNAG/D1
- M68KUNMSG/D1
- M68KUNUG/D1
- M68KUNDP/D2
- M68KUNPG/D2
- M68KUNSTG/D1
- M68KUNGG/D1
- M68KUNOG/D2
- M68KUNASG/D1
- M68KUNLDM/D1

M6809SET110/V1,V2   EXORset User's Guide Package (2 Volume)
Includes:
- *● M68XDOS4/D3
- *● M6809PLOT/D2
- *● M68SETPRC/D1
- *● M6809EDT/D2
- ● M68MASR/D2
- ● M68LLD/D4
- *● M68SET110/D1
- *● 68P25253A82 CRT Display Monitor Service Manual
- *● BASF 6106/6108 Mini-Disk Drive Technical Manual
- *● EXORset 100 Power Supply Description

68-M68KVSHD/V1,V2   VME/10 Hardware Documentation Binder Set
(2 Volume) (Optional)
Includes:
- ● M68KVSIG/D2
- *● M68KVSEM/D2 — Equipment Manual
- *● M68KVSSCM/D2 — System Control Module Manual

- *● M68KVSWIN/D2 — Winchester Disk Controller Manual
- *● M68KVSWD/L1 — Winchester Disk Drive Manual
- *● M68KVSFD/L1 — Floppy Disk Drive Manual
- *● M68KVSPS1/D2 — Power Supply Assembly Manual
- *● M68KVSMM1/D1 — Monochrome Monitor Manual
- *● M68KVSCM1/D1 — Color Monitor Manual
- ● M68RIOCS/D2
- ● MVMEBS/D1

68-KVODS/V1,V2   VERSAdos Binder Set (2 Volume)
Includes:
- ● M68KVOVER/D4
- ● MVDOSCARD/D2
- ● M68KVSF/D5
- ● M68KVMSG/D2
- ● M68KMASM/D8
- ● M68KLINK/D5
- ● M68KEDIT/D8
- ● M68KSDSS/D3
- ● M68KSYMBG/D3
- ● M68KSYSGEN/D6
- ● M68KRMS68K/D8
- ● RMS68KIO/D6
- ● M68KDRVGD/D1
- ● MVMEVDOS/D1
- ● MVMECNFG1/D1

68-M68K10I-1/V1   VME/10 System Documentation Binder (1 Volume)
Includes:
- ● M68KVSIG/D2
- ● M68KVSOM/D1
- ● M68KVSDM/D1
- ● M68KTENBG/D2
- ● M68KVSREF/D1

*NOTE: Not available separately

Systems Configuration Guide

The following information is provided to assist in choosing complementary and compatible system components. Information is presented to plan for system expansion, number of users, and system capabilities.

VME/10 — Microcomputer System Configurations

Model

M68K102B1 — **Variables:** 15Mbyte Winchester Drive (vs 5Mbyte Drive) and 5-Slot Double Eurocard VMEmodule Card Cage plus 4-Slot Single Eurocard I/O Module Card Cage.

M68K102C1 — Same as M68K102B1 except 40Mbyte Winchester Drive.

M68K102D1 — Same as M68K102C1 except 14″ Color Monitor.

M68VME10-200 — VME/10 Microcomputer System with HDS-200

M68K10CU2 — 15Mb System Control Unit

M68K10CU3 — 40Mb System Control Unit

M68K10DU1 — 15″ Monochrome Monitor

M68K10DU2 — 14″ Color Monitor

M68K10KB1 — System Keyboard

For 16-Bit M68000 Family Development, use:
M68KHDS400A HDS-400 Hardware/Software Development Station with M68KHDS16FB M68000

Family Interface Module (additional Emulation RAM Modules, M68KHDS4EMM1/2/3, may be used), M68KHDS4-2 HDS-400 System Software, and appropriate Microprocessor Emulator Module. Use of the Real-Time Bus State Analyzer is recommended for M68000 Family development projects. For simultaneous Bus State Analyzer and HDS-400 use, the BSA Controller Module and the appropriate BSA Personality Module are required.

For 8-Bit Mid-Range Family Development, use:
M68HDS-300, HDS-300 Hardware/Software Development Station with the appropriate Emulator. The Emulators available include M6809HM3, M6809 CPU; and M68HC11HM3, M68HC11 MCU.

For 8-Bit M6805/M6804 Family Development, use:
M68KHDS201 HDS-200 Hardware/Software Development Station with appropriate 8-bit MCU Emulator Module.

Standard System Configurations

Features	Part Number		
	M68K102B1	***M68K102C1**	***M68K102D1**
Control Unit Chassis	15Mb	40Mb	40Mb
I/O Channel Card Slots	4	4	4
VMEbus Backplane Slots	5	5	5
14″ Color Display Unit	—	—	X
15″ Monochrome Display Unit	X	X	—
VME/10 System Keyboard	X	X	X
VERSAdos Operating-System and Development Tools	X	X	X
TENbug Debug/Monitor	X	X	X
Winchester Seek time (ms average)	70	33	33
Electrical Characteristics	115 V	115 V	115 V
	60 Hz	60 Hz	60 Hz

Note: Motorola Software is supplied under license agreement.

*When this Hardware configuration is intended to be used with SYSTEM V/68 Operating System Software an MVME201 VMEbus RAM module must be purchased.

OEM Configuration

The VME/10 is offered as separate components. Without paying for extra hardware or software, the necessary equipment can be configured to satisfy the needs of the application. The guide allows the OEM to choose optional VME/10 components, VMEbus and I/O Channel expansion options and personalize a system to meet his needs.

START HERE →

SYSTEM CONTROL UNIT

15Mb WINCHESTER: ORDER M68K10CU2
40Mb WINCHESTER: ORDER M68K10CU3
(No Manuals Included)

DISPLAY UNIT

15″ MONOCHROME: ORDER M68K10DU1
14″ COLOR: ORDER M68K10DU2
(No Manuals Included)

KEYBOARD

SYSTEM KEYBOARD: ORDER M68K10KB1

OPERATING SYSTEM

VERSAdos:ORDER M68VKXBVERDOS
SYSTEM V/68:ORDER M68NNXBSV10A/B/C
CP/M-68K:ORDER M68K11XBCPM68K

VMEbus COMPATIBLE EXPANSION OPT.

68000 MICROCOMPUTER:ORDER MVME101
68000 MICROCOMPUTER:ORDER MVME110-1
68010 MICROCOMPUTER:ORDER MVME115M
68010 MICROCOMPUTER:ORDER MVME120
SYSTEM CONTROLLER:ORDER MVME025
SYSTEM CONTROLLER:ORDER MVME050
64Kb RAM:ORDER MVME200
256Kb RAM:ORDER MVME201
512Kb RAM:ORDER MVME202
1Mb RAM:ORDER MVME221-1
2Mb RAM:ORDER MVME221-2
RAM/ROM:ORDER MVME211
IEEE-488:ORDER MVME300
CUSTOM CONTROLLER:ORDER MVME310
FLOPPY/SASI:ORDER MVME315
VMEbus I/O CHANNEL:ORDER MVME316
IPC WINCHEST/FLOPPY:ORDER MVME319
FLOPPY/WINCHESTER:ORDER MVME320
ETHERNET:ORDER MVME330
PARALLEL I/O:ORDER MVME340

MANUALS

VERSAdos:ORDER 68-KVDOS
USER MANUAL:ORDER 68-M68K101-1
OEM HARDWARE:ORDER 68-M68KVSHD
SYSTEM V/68:ORDER 68-M68KUN

I/O CHANNEL COMPATIBLE EXPANSION OPT.

DUAL RS-232:ORDER MVME935
DUAL PARALLEL:ORDER MVME410
SASI ADAPTER:ORDER MVME420
9-TRACK ADAPTER:ORDER MVME435A
ANALOG INPUT:ORDER MVME600
ANALOG OUTPUT:ORDER MVME605
120 V/240 V INPUT:ORDER MVME610
120 V/240 V OUTPUT:ORDER MVME615
120 V/240 V OUTPUT:ORDER MVME616
60 V INPUT:ORDER MVME620
60 V OUTPUT:ORDER MVME625
I/O CHANNEL EXTENDER:ORDER MVME935

EXORmacs — System Configurations

Step 1 — Specify EXORmacs Basic System: M68KMACS, which consists of: EXORmacs Development System Host Chassis with DEbug Module, MPU/MMU Module, 512Kbyte RAM Module, Universal Disk Controller (2 Modules), and one EXORterm 155 Display Console. Order an additional EXORterm 155 (M68SXD10155A) for each additional user.

Step 2 — Specify Mass Storage required by Number of Users:

Number of Users	1Mb Floppy Drive	2nd 1Mb Drive	16Mb Lark (8 + 8) Drive	50Mb Lark 25 + 25 Drive	50Mb Lark +96Mb	192Mb Drives 96 + 96 Drive
1	Most economical single-user system	OK for Floppy Disk-based Systems	Minimum Recommended Mass Storage	Recommended	Additional Capacity Suggested for Future Growth and/or Large User Data Bases Per User	
2						
3	Recommended only for Hard Disk-based Systems that Desire Auxiliary Floppy Disk Storage	Not Recommended				
4						
5			Not Recommended			
6				Limited Storage Space Per User	Recommended	
7						
8						
First* Unit	M68KFD1102	—	M68KHDD16-1	M68KHDD50-1	M68KHDD50-1	M68KHDD96-1
Exp Unit	—	M68KFD1102E	M68KHDE16-1	M68KHDE50-1	M68KHDE96-1	M68KHDE96-1

*Includes VERSAdos Operating System and Development Tools. For SYSTEM V/68 (only) applications, select M68KHDE96-1 as both "First Unit" and "Exp Unit."

Step 3 — Select Additional Software Tools Ordering Part Numbers for Optional SYSTEM V/68 Operating System and Optional VERSAdos Software Development Tools

Software Package	Floppy	CMD Cartridge	LMD Cartridge
8-bit Assembler	M68VCFBRASM	Not Available	Not Available
SYSTEM V/68 O/S			
(VM21 Format)	Not Available	M68NNCBSV00A/B/C	M68NNMBSV00A/B/C
(VM22 Format)	Not Available	M68NNABSV00A/B/C	M68NNDBSV00A/B/C
Pascal Compiler*	M68VVFBPASCAL	M68VVCBPASCAL	M68VVLBPASCAL
FORTRAN Compiler*	M68VVFABSFTN M68VVHBFORTRAN	M68VVCBFORTRAN	M68VVLBFORTRAN
Data I/O PROM Programmer Software*	M68KDIOPP	M68KDIOPPH	Not Available
M68000 Flt. Point*	M68KFFP	Not Available	Not Available

*Useable only with VERSAdos Operating System

Step 4A — Select Number of Communications Modules by Number of Users:

1–2 Users EXORmacs will support two EXORterm 155 CRT Consoles without additional support.

3–6 Users Select First Communication Module Addition from Step 4B.

7–8 Users Select Two Communication Modules from Step 4B.

Step 4B — Select Half Duplex Multi-Channel Communications Module M68KMCCM for use with VERSAdos Operating System or Full Duplex MULTI-CHANNEL Communications Module M68KMCCM-1 for use with SYSTEM V/68 Operating System.

Step 5 — Select Memory Size (Total On-Line RAM) required by number of Users.

Number of Users	512K	640K	768K	896K	1Mbyte
1	Minimum System		Available for System Expansion		
2		Improves System Thruput			
3	Recommended				
4					
5					
6	Not Recommended	Recommended			
7			Improves System Thruput		
8					

Memory Module Ordering Information

Part Number	Memory Module
M68KVM10-3	128Kb of Dynamic RAM with Parity
M68KVM11-1	256Kb of Dynamic RAM with EDAC
M68KVM11-2	512Kb of Dynamic RAM with EDAC
M68KVM11-3	1024Kb of Dynamic RAM with EDAC
M68KVM11-4	2048Kb of Dynamic RAM with EDAC
M68KVM12	1024Kb of Dynamic RAM with Parity
M68KVM12-2	4096Kb of Dynamic RAM with Parity
M68KVM13-1	1024Kb of Dynamic RAM with RAMbus and Parity
M68KVM13-2	4096Kb of Dynamic RAM with RAMbus and Parity

Step 6 — Printer Selection

The Debug Module and the optional Multi-Channel Communications Module have parallel printer ports to which a Centronics type compatible printer supplied by the user should be connected. Printer desirability depends on total printer output. However, a 180 cps printer is recommended as a minimum for up to two users. A high-speed line printer (400–600 lpm) is recommended for more than two users.

Step 7 — Select Optional Assemblies

Part Number	Description
M68HDS201	HDS-200 Control Station (Requires Emulator)
M68HDS300	HDS-300 Control Station (Requires Emulator)
M68KHDS400	HDS-400 Control Station (Requires several additional part numbers, see below.)
M68CART	Spare Cartridge for Cartridge Module Drive
MLD16CART	Spare Cartridge for LARK Module Drive (16Mb)
MLD50CART	Spare Cartridge for LARK Module Drive (50Mb)

Host/HDS-400 Hardware/Software Development Station

Hardware Guide

1. All HDS-400 configurations require the use of the 16-Bit Family Interface Module (M68KHDS16FB), one, appropriate MPU Emulator Module (M68000HDS4, M68008HDS4-8, or M68010HDS4-8), MC68020HDS4 and appropriate host software.

2. EXORmacs applications using VERSAdos Operating System require "DLC" Interface configuration (M68KHDS400) plus the Data Link Control Module (M68KHDSDLC), in the EXORmacs Chassis, to support up to four HDS-400 Stations.

3. EXORmacs applications with SYSTEM V/68 Operating System require "RS-232C" interface configuration (M68KHDS-400A) plus a multi-channel communications module with full-duplex configuration (M68KMCCM-1), to support up to four HDS-400 stations.

4. VME/10 and VAX applications require "RS-232C" Interface configuration (M68KHDS400A)

5. VME/10 applications require Dual RS-232C Serial Port Module (MVME400) for HDS-400 use.

6. EXORmacs and VAX applications require a dedicated EXORterm 155 (M68SXD10155A) for HDS-400 operation; VME/10 does not.

Software Guide

1. EXORmacs host applications require choice of HDS-400 Software compatible with mass storage available:
   a. EXORmacs/VERSAdos Software on 8" Floppy Disk (M68KHDS4-1F).
   b. EXORmacs/VERSAdos Software on 14" CMD Cartridge (M68KHDS4-1H).
   c. EXORmacs/VERSAdos Software on 8" LMD Cartridge (M68KHDS4-1L).
   d. EXORmacs SYSTEM V/68 interface on 8" diskettes includes HDS-400 software and Pascal Assembler Linker Port (M68KHDS4-5F).
   e. EXORmacs SYSTEM V/68 interface on 14" CMD cartridges includes HDS-400 Software and Pascal Assembler Linker Port (M68KHDS4-5HD).

2. VME/10 host applications require use of HDS-400 software on VERSAdos 5-1/4" floppy disk (M68KHDS4-2).

3. VAX host applications require choice of HDS-400 software on media compatible with VAX operating system:
   a. VAX/VMS on 9-track Magnetic Tape (M68KHDS4-3T).
   b. VAX/UNIX System V on 9-track Magnetic Tape (M68KHDS4-4T).

Options Guide

1. The Real-Time Bus State Analyzer effective components include the following:
   a. Bus State Analyzer Control Module (M68BSAC)
   b. Personality Module M68BSA1-1 (for MC68000, MC68010, and MC68451) or the M68BSA3 (for MC68008).

2. Emulation Memory Expansion Module options:
   a. M68KHDS4EMM1, expands total Emulation RAM to 64Kbytes
   b. M68KHDS4EMM2, expands total Emulation RAM to 128Kbytes
   c. M68KHDS4EMM3, expands total Emulation RAM to 256Kbytes

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Alpha-Numeric Listing

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