

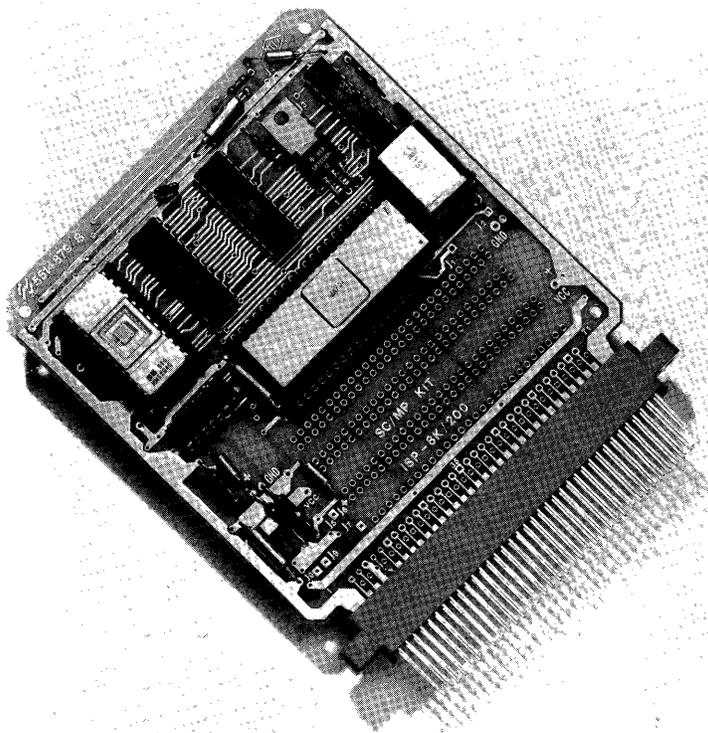
MICROCOMPUTER DIGEST

Volume 2, Number 10

April, 1976

NATIONAL ANNOUNCES \$99 SC/MP KIT

National Semiconductor has unveiled their latest entrant in their family of microcomputer boards, the SC/MP Demonstration Kit. This small, single board microcomputer includes all



the integrated circuits and discrete components required to build a small and completely functional microcomputer system.

The \$99 kit includes the SC/MP 8-bit microprocessor chip, 256 bytes of RAM memory for storage or user programs; 512 bytes of preprogrammed ROM containing a debug program and TTY I/O routines; an 8-bit buffer between the outputs of the memory devices and the

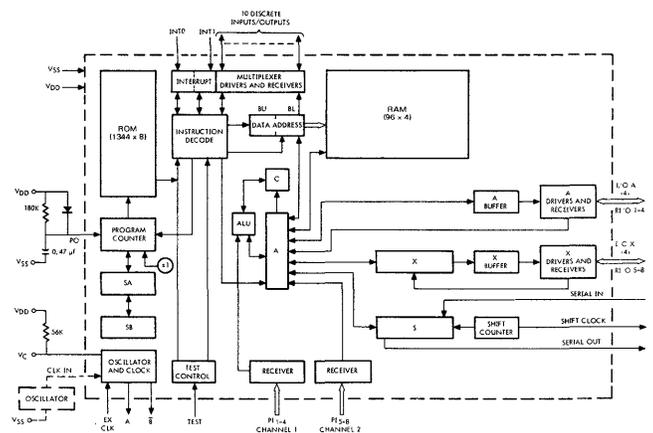
SINGLE CHIP ROM-CPU-I/O

A complete one-chip microcomputer containing 1344 x 8 program memory, 96 x 4 data memory and 31 I/O channels with interrupt capability, is now offered by the Microelectronic Device Division of Rockwell International Corporation.

Priced under \$10 for medium quantities, the one-chip microcomputer is designated the Rockwell PPS-4/1.

Key features of the chip include its large ROM (10,752 bits) and the multi-function capabilities of its 50-instruction set.

(Cont'd on page 2)



ONE CHIP COSMAC

A new, faster CDP1800-family CMOS microprocessor, complete with peripherals and software, is available immediately from RCA Solid State Division, according to Bernard V. Vonderschmitt, vice president and general manager.

"The CDP1802 central processing unit, an 8-bit, single-chip, COSMAC-architecture device using self-aligned silicon-gate CMOS technology, is the logical extension of the COSMAC-architecture CDP1801, which RCA

(Cont'd on page 4)



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NATIONAL ANNOUNCES \$99 SC/MP KIT

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SC/MP chip inputs; interface circuitry to provide the level conversions and drive requirements for a serial I/O interface to a TTY; voltage regulator and crystal to meet SC/MP power and timing requirements; PC board mounting sockets for the CPU and ROM chips; 72-pin edge connector; and all required discrete components.

According to Hash Patel, manager of the SC/MP microprocessor department, a micro-computer veteran or novice can completely assemble the kit and have it communicating with a TTY terminal inside of 35 minutes. Although Patel would not quote current sales of the kit, he did note that they had sold far more than they expected and that National expects the kit to be one of their leading sales item.

Programs that have been developed can be entered into the memory via the TTY keyboard and then executed, operations monitored and debug via the KITBUG program which resides in the preprogrammed ROM.

According to another National spokesman, the SC/MP Kit is ideally suited for "real life applications". For example, the I/O control signals and control-oriented instruction set allows the kit to function as a program-controlled timer and to operate external lights switches, and controls. Photographic lights, lawn sprinkler systems, and alarm and security systems are a few examples of the kits possible applications.

All of the timing requirements of the SC/MP Kit are met by a 1.000 crystal, which is connected to the X1 and X2 inputs to the MPU chip.

The kit requires three regulated voltages: +5V, -7V, and -12V. The user provides the +5V and -12V while the -7V is derived from the voltage regulator included with the kit.

All of the SC/MP signals are available at "stake holes" located along each side of the SC/MP chip on the card. The desired signals can be easily wired to the edge-connector pins allowing complete flexibility in designating the connections to the edge card.

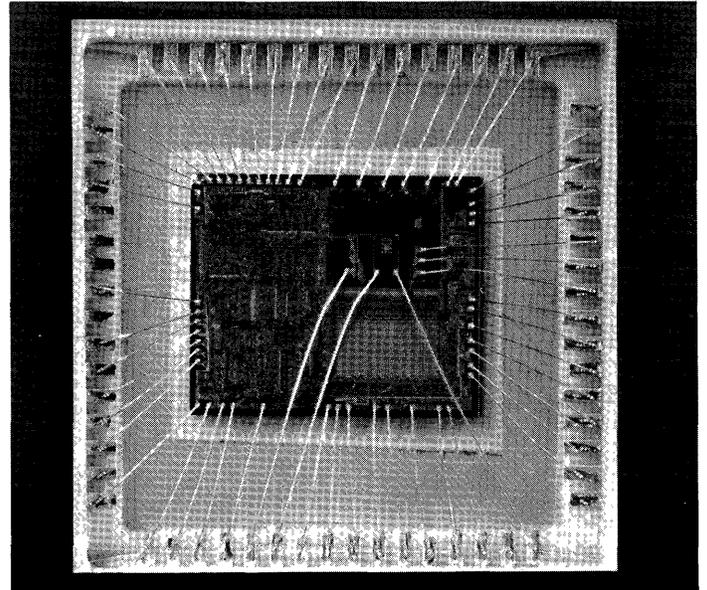
SINGLE CHIP ROM-CPU-I/O

(from page 1)

Processing power is enhanced by 8-bit instructions and by flexible, bi-directional, I/O options.

These include two 4-bit input channels which can be simultaneously used for testing or comparing data; two 4-bit I/O channels and 10 discrete I/O lines. Two interrupt request input lines, one of which can be used to automatically trigger an echo signal, provide priority input and status capabilities.

A unique I/O feature is the provision of clocked, simultaneous serial I/O capabilities. Pulsed or complex digital waveforms may be easily generated as a variety of serial or parallel outputs.



The I/O options also permit the cascading of PPS-4/1 microcomputers to provide systems utilizing multi-processors in complex applications.

Other features of the device are a large data memory (384-bit RAM), TTL and CMOS compatibility, ALU with five working registers, on-chip resistor controlled clock generator which can be externally synchronized, and single power supply (15V) requirement. Power dissipation is 70 mW.

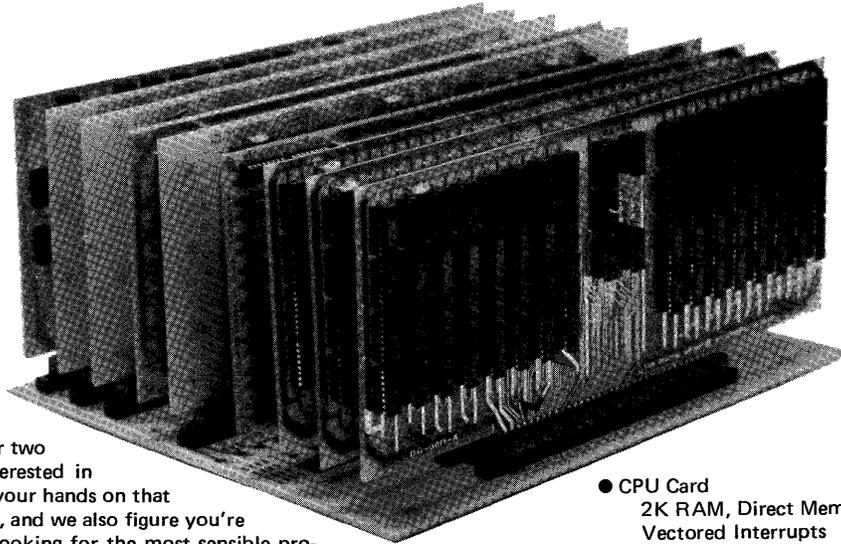
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MEET THE DIGITAL GROUP



If you're taking time to read this ad, we already know a thing or two about you. We know you're interested in devouring everything you can get your hands on that deals with microcomputer systems, and we also figure you're out there shopping around . . . looking for the most sensible products to fit your needs and your budget.

That's why we think you should get to know us.

We're the Digital Group, a relatively small, 18-month-old organization obstinately dedicated to providing quality in every product we offer. You may have already heard a little something about us from a friend — our reputation does seem to be getting around quickly, even though we've never advertised before.

We think it's due to a number of important factors: state-of-the-art designs, a really complete systems philosophy, unexcelled quality, reasonable software, three-week delivery, and no pre-announcements until we're ready to deliver. Our products are not just a gleam in our designers' eyes; they are currently being delivered . . . fast!

The Advantages

Here are a few specific advantages of our product line:

- We offer CPU's from different manufacturers which are interchangeable at the CPU card level. That way, your system won't become instantly obsolete with each new design breakthrough. The major portion of your investment in memory and I/O is protected.

- Digital Group systems are complete and fully featured, so there's no need to purchase bits and pieces from different manufacturers. We have everything you need, but almost any other equipment can be easily supported, too, thanks to the universal nature of our systems.

- Our systems are specifically designed to be easy to use. With our combination of TV, keyboard, and cassette recorder, you have a system that is quick, quiet, and inexpensive. To get going merely power on, load cassette and go!

- Design shortcuts have been avoided — all CPU's run at full maximum rated speed.

The Features

Digital Group Systems — CPU's currently being delivered:
8080A/9080A 6800 6500 by MOS Technology

All are completely interchangeable at the CPU card level. Standard features with all systems:

- Video-based operating system
- Video/Cassette Interface Card
 - 512 character upper & lower case video interface
 - 100 character/second audio cassette interface

- CPU Card
 - 2K RAM, Direct Memory Access (DMA)
 - Vectored Interrupts
 - 256 byte 1702A bootstrap loader
 - All buffering, CPU dependencies, and housekeeping circuitry

- Input/Output Card
 - Four 8-bit parallel Input ports
 - Four 8-bit parallel Output ports

- Motherboard

Prices for standard systems as featured above, start at \$425 for 8080 or 6800 and \$375 for 6500.

More

Many options, peripherals, expansion capabilities, and accessories are already available. They include rapid computer-controlled cassette drives for mass storage, color graphics, memory, I/O, monitors, multiple power supplies, prototyping cards, and others. Software packages include Tiny BASIC Extended, games, ham radio applications, software training cassettes, system packages, and more (even biorhythm).

Sounds neat — now what?

Now that you know a little about who we are and what we're doing, we need to know more about you. In order for us to get more information to you, please take a few seconds and fill in our mailing list coupon. We think you'll be pleased with what you get back.



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P.O. Box 6528
Denver, Colorado 80206
(303) 861-1686

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To facilitate production testing of the programmed microcomputer, an on-chip design scheme enables complete testing of every function, including the customer's unique ROM patterns.

The instruction set of the PPS-4/1 microcomputer is very similar to that used for Rockwell's PPS-4/2 and PPS-4 microprocessor systems.

Full software support permitting development of the user's proprietary programs is provided, including assembly and simulation programs on the G.E. timeshare network.

Also available is an "Assemulator" -- a system development tool which converts a program written in easy-to-use assembler language code which is interpreted by a special evaluation version of the PPS-4/1.

The Rockwell Assemulator has editing capabilities enabling easy modification, debugging and checking of the assembly language program. The instrument can also be used to integrate the programmed microcomputer in an equipment system for prototype testing.

The specific PPS-4/1 evaluation version (P/N A6799) has address and memory lines bonded to external pins, permitting storage of a proposed program in an external PROM or RAM for real time development and testing, or even as a low-cost, low-quantity system.

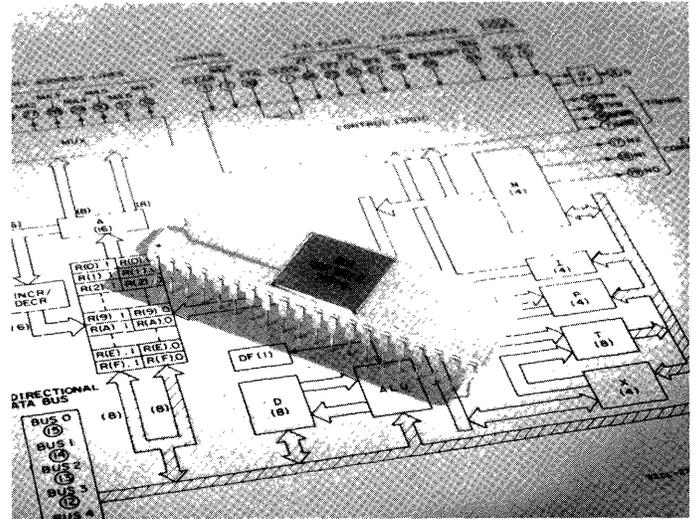
ONE CHIP COSMAC

(from page 1)

introduced as the industry's first CMOS microprocessor.

RCA's announcement, according to Mr. Vonderschmitt, encompasses not only the CPU but also several memory and I/O circuits which provide additional flexibility to the CDP1800 family. Devices include the CDP1802 microprocessor the CDP1831 and CDP1832 static mask-programmable 512x8 ROM, the CDP1824 32x8 static RAM, the CDP 1821S SOS 1K static RAM, the CDP1822S SOS 256x4 RAM, and the CDP1852 latching byte I/O circuit. He indicated that devices planned to be announced in the second quarter of 1976 will include a UART a multiply-divide unit, 3-bit latch decode circuits, a bus buffer, and a 256x4 CMOS RAM. A 128x8 RAM, a programmable bit I/O circuit, and an analog/digital converter will be available later in 1976.

An evaluation board containing the CDP1802



is also available as a separate item. Offered in kit form with PC board, with a teletypewriter terminal it gives an engineer direct access to the CPU and its peripherals.

The COSMAC Software Development Package encompasses an assembler, or a higher-level implementation language for the more sophisticated programmer, an an interactive debugger/simulator. This package is available either for use on the GE timesharing system or as a Fortran IV program, which can be installed readily on an in-house computer.

The CDP1802CD is priced at \$23.50 in quantities of 100.

CDP 1802 SECOND SOURCING

Two semiconductor companies have each reached an agreement in principle with RCA whereby RCA will supply certain technical information and services to assist the companies in becoming alternate source suppliers for RCA's CDP1802 8-bit CMOS microprocessor and associated peripheral circuits announced by RCA Solid State Division.

The companies involved are Hughes Micro-electronic Products Division, Newport Beach, California and Synertek, Inc., Santa Clara, California. Synertek also second-sources the MOS Technology 65XX Series.

In accordance with the understandings, RCA will proceed to negotiate definitive agreements with each company within 90 days.

TOSHIBA 16-BIT CPU

Tokyo Shibaura Electric (Toshiba) has reportedly developed a microprocessor incorporating 16-bit parallel architecture and 3,800 gates integrated on a single chip. The company is currently marketing a minicomputer using the new device.

The two chip TOSBAC-40L is comprised of an ACU (Arithmetic Control Unit) and a BCU (Bus Control Unit). Only one ACU and four BCU's are needed in the minicomputer.

The ACU chip, in particular, contains all the circuitry for 16-bit parallel arithmetic operation control. The high-performance 3,800-gate processor capable of a machine cycle time of 300 ns was achieved by utilizing the most advanced LSI techniques, including an N-channel, silicon-gate E/D-MOS process. The microprocessor also includes 16 general purpose registers for floating-point operation instructions.

MMI REDESIGNING 6701

Monolithic Memories Inc., is in the final throes of redesigning their bipolar microprocessor and peripheral devices. The new family is designed for heavy competition with Advanced Micro Devices 2900 bipolar series.

The 6701-1 4-bit slice chip will have 90 ns minimum microinstruction cycle times with 5V Vcc and a temperature range of 0-70°C. The previous 6701 version had a minimum of 175 ns time.

The 6701-1 will have an extra flag for the sign bit brought out to what is now an open pin on the 6700. The MMI's 6710 microprogram control device replaces about 25 TTL parts in the 6700 system. Only one 6710 is required per system up to a 32-bit configuration. Other new 6700 devices to be introduced include the 6716 DMA control unit, 6718 I/O control unit, 6741 FIFO, 6720 "Nova Chip," 6750 16 x 16 multiplier and 6755 8 x 8 multiplier.

It was also learned that MMI will shortly be offering a Kit containing a PC board, CPU, card, and all major components. The buyer will have to provide his own crystal, TTL, MSI and SSI chips for the system.

MMI would not quote prices at this time for the Kit or the new 6700 family.

MICROCOMPUTER BASED PRODUCTS:

ENGLISH APPLIANCE MICROPROCESSOR

The F150 microprocessor developed by the English ITT Semiconductor is designed for washing machine and domestic appliance applications.

The chip is being used by one British firm to replace the electromechanical timer/controller. The chip produces signals to cycle through any of nine standard washing programs approved by the International Standards Organization.

The microprocessor can be adapted for use with sewing machines, dishwashers and other appliances.

10 MHZ 64-INSTRUCTION

Ferranti is developing a microprocessor chip, the F100L 16-bit CPU fabricated using Ferranti's collector diffusion isolation technology. The CPU is capable of addressing up to 2K words of memory directly, and 33K words indirectly.

The single chip device is to have a repertoire of 64 instructions and the clock rate will be 10MHz, giving instruction times between 300 ns and 2.1 us.

A spokesman for Ferranti said that when the F100L becomes available, customers will be offered full software support.

MICROCOMPUTER DEVELOPMENT TERMINAL

MOS Technology has announced the MDT650 Microcomputer Development Terminal for modeling new 650X designs. The MDT650 terminal is used to evaluate and debug the user's programs and system hardware. The unit can be configured to a wide range of design applications through user-system emulation. The MDT650 incorporates a completely separate processor and bus structure for application emulations, thus eliminating emulator executive overhead time during real time execution.

Interaction with the MDT650 is normally with the integral keyboard/display. However,

(cont'd next page)

a TTY or other terminal device can be used. The expandable port configurations are TTL compatible.

The standard MDT650 system allows the user to assign up to 65K of memory as desired (with independent address and data bases). The ROM resident system monitor includes all necessary functions for program loading, debugging, and execution. A resident assembler may be used to assemble machine instructions. Interpretation of machine codes is linked to original op-codes, labels and mnemonics. A resident editor provides source language editing capability.

The MDT650's bare system price of \$3950 includes dual microprocessor module, RAM memory module, program trace and address trap board, I/O board, resident monitor ROM module; chassis with 14 board slots, power supplies, cabinet, keyboard and display, system monitor, assembler text editor, user's manual, MCS650 assembly language programming manual, and MCS650 assembly language reference card. Options planned include a PROM programmer available for 82S115, 2708 or 1702A, wire-wrap board for custom designs, extender board module, address and data bus display board, 4K RAM board, 8K PROM board, 2K RAM/4K PROM board, I/O board, user RAM write protect option, high speed ports for printer, card readers, floppy disc interface, In-Circuit Emulator, and system software source listings.

MOS Technology reports availability of the base system in the second quarter, 1976 with the various hardware options becoming available in the second and third quarters, 1976.

HARDWARE/SOFTWARE DEVELOPMENT

COMPAS is offering a hardware/software system called MINmic 1165 which represents a new way to develop microcomputer software and hardware.

Specifically, the MINmic 1165 consists of a board which mounts an MOS Technology 6502 microprocessor on the PDP 11 bus, and software for the PDP 11 which supports the Mm 1165 board. All MOS 6502 memory references are normally directed to the PDP 11. The Mm 1165 software maps these memory references into the PDP 11 address space and performs the appropriate read or write as directed by the microcomputer. All the microcomputer software can reside in the existing PDP 11

memory and software development can proceed as soon as the board is plugged in and the software has been loaded.

The Mm 1165 software supports address tracing and can be easily modified to support breakpoints or emulation of special purpose hardware.

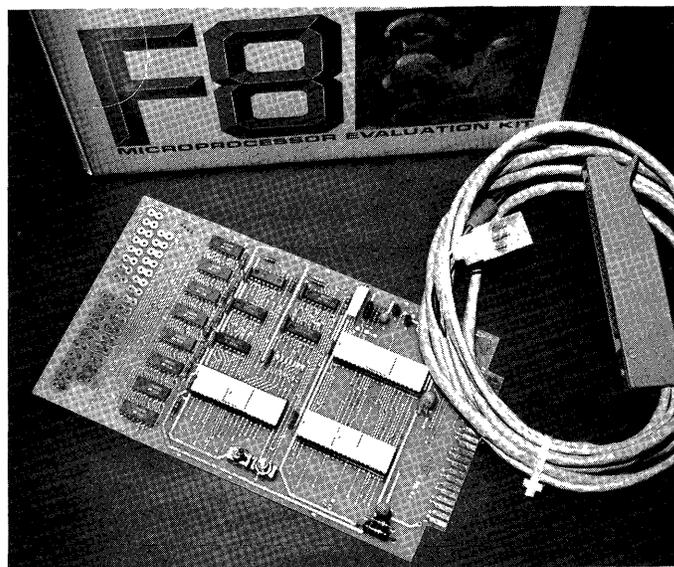
The Mm 1165 board also contains a ribbon connector which carries all the necessary signals off the board to special purpose hardware via a ribbon cable. This special hardware can be user designed for future MINmic products which will include chassis and power supply, RAM, PROM, I/O and CPU boards.

MINmic 1165 sells for \$495 which includes an assembled MM1165 board with MOS 6502, Mm 1165 software and manual with full schematics. The manual is available for \$5.

FULLY ASSEMBLED DESIGN KIT

The Microsystems Division of Fairchild Camera & Instrument Corporation has introduced a microcomputer design kit on a fully assembled circuit board that comes with a connecting cable for power supply and TTY hookup.

The F8 kit contains an assembled and tested PCB which includes Fairchild's 3850 F8 CPU, the 3851 program storage unit, the 3850 static memory interface, and eight 2102 1K RAMs as well as a wired edge-connector cable to connect the microcomputer to a standard TTY and power supply.



The kit also comes with an F8 programming manual, F8 data book and Fairchild's Fairbug program.

The Fairbug program resides in the 1K ROM of the 3851 program storage unit and provides user-oriented subroutines to assist with microcomputer design. The program contains a "bootstrap" loader for easily entering a program into RAM memory from a terminal. Fairbug contains 1K bytes of programming that allow communication with a variety of terminals at speeds from 110 to 2400 baud. It can also dump memory from RAM for future loading or create a PROM program tape, and can read from a high-speed paper tape reader. The Fairbug program can examine and alter any register or memory location within the F8 system from a terminal.

The F8 kit is available from either distributors or directly from the Microsystems Division. Single unit pricing is \$185.

FLOPPY DISC CONTROLLER SYSTEMS

Scientific Micro Systems has introduced a series of complete microcontroller-based IBM-compatible floppy disc controller systems. The controllers provide a common interface to currently available floppy disc drives (Orbis 76/77, Shugart 800, Pertec 400/500, Calcomp 140, Innovex 210). A single floppy disc controller can interface up to four floppy disc drives connected in series.

Available for immediate delivery is the SMS FD0300 Floppy Disc MicroController with a general-purpose interface. Priced at \$320 each in quantities of 100, the FD0300 provides the OEM with a completely tested printed circuit board for easily interfacing floppy disc drives with CRT terminals, instruments, microprocessors or other byte-oriented systems.

The FD0300 is a pre-programmed IBM-compatible PC board controller with a TTL-compatible I/O interface for transferring data, commands and status to or from a host system. The user may command the FD0300 to seek to a track, read a sector of data, write a sector of data, format a track, read sector identification, write deleted data, read status, or reset. The FD0300 also includes a sector data buffer and allows for overlapped seeking with multiple drives.

All SMS floppy disc controllers use a single-chip bipolar microprocessor developed by the firm. All IBM format and control functions are implemented by programs stored in ROM/PROM and executed by the microprocessor. Functions implemented by a fixed program include track seek, address verification, CRC generation, address mark detection, read sector, write sector, data buffering, track formatting, and status reporting.

IM6100 MICROCOMPUTER KIT

PCM's new kit is built around the Intel IM6100 microprocessor and can execute most PDP-8 software, including assemblers, editors, debugging routines and languages such as Basic and Fortran.

The basic PCM-12 includes the 6100, 4K words of memory, a TTY interface, an audio cassette recorder interface, power supply and cabinet. Kit prices range from \$400 to \$600, depending on options.

The memory is expandable to 32K words and provisions have been made for a vectored priority interrupt system and for DMA. The control panel provides most PDP-8/E functions plus a built-in binary bootstrap loader.

M6800 SBC FAMILY

Sphere Corp. has introduced a family of single board computers using the Motorola 6800 microprocessor as its CPU.

Memory is 2107A-type 4-K RAM and all refresh circuitry is included on the CPU board. The stand-alone system includes 16-programmable I/O lines and four additional control lines. The PROM contains a program development system consisting of a debugger, assembler, editor, 16-bit arithmetic, and ASCII conversion routines. Also featured are a real-time clock and power-on reset. Price of the one card computer in kit form is \$350; and \$520 assembled.

8008 BASED MEMORY MODULE

The DESIGN 349 Memory Module offered by MI² Data Systems, is an Intel 8008 microcomputer based message processing system.

The standard 349 has an assembler program stored in its 2K ROM and has a 2K electronic RAM for data or additional program storage. The RAM can be expanded to 6K in 1K increments. The 2K ROM with a fundamental assembler program can be replaced with the users application ROM set of 256 to 2048 characters in length. Further expansion of the RAM from 6K to 14K, in 1K increments, is available as a factory option.

Primary applications of the DESIGN 349 Memory Module are message storage, code conversion, data rate conversion, and/or message formatting for transmission to a central processor in a communication system. For example four CRT terminals can be controlled by the DESIGN 349 on a page mode basis. The DESIGN 349 provides a local "front end processor" function to minimize central CPU time.

μ C CONTROLS PRINTER/PLOTTER

Hewlett-Packard is incorporating a 16-bit custom microprocessor into the firms new 9871A printer/plotter. The company is manufacturing this chip at its Loveland, CO facilities.

Sources have said that H-P went to an in-house MPU design because existing microprocessors from semiconductor suppliers lacked the speed required to operate such electro-mechanical printer elements as stepping, ribbon and hammer motors.

GTE INTRODUCES μ C TELEPHONE SYSTEM

A new telephone system which utilizes an LSI microprocessor will be introduced this month by General Telephone & Electronics Corporation.

Called the GTD-120 Digital PABX, the new communications system was developed by GTE Automatic Electric, Inc., a GTE manufacturing subsidiary.

GTD-120 is the first microcomputer-controlled PABX developed by GTE Automatic Electric and is the first and smallest of three such digital systems to be introduced during the next two years. In addition, the company will introduce late this year a version of the GTD-120 design expressly for small hotels

and motels.

The GTD-120 operates via stored program control, under direction of the CPU. The CPU performs all decision-making in the system, controls the network call set up, and performs all scanning operations of lines, trunks, attendant console and so forth. The CPU is designed around an 8-bit LSI microprocessor chip. In addition to the microprocessor, the CPU complex includes a 500 ns clock circuit, 512-work ROM for bootstrap loading, TTL interface logic, and up to 32K words (8-bits wide) of RAM for storage of the generic program, as well as all office-dependent data base information.

μ C CONTROLLED D/A SYSTRON SYSTEM

A new microcomputer controlled data acquisition, control and readout system for use with optical emission and X-ray spectrometers has been announced by Systron-Donner's Labtest Equipment subsidiary.

Model CRT-1000, incorporates the Intel 8080 to control spectrometer functions, calculate per cent concentration and interelement corrections, and an average of several analyses.

Purchased PL/M software subroutines are supplied on magnetic tape cassettes. The basic model is priced at approximately \$15K with delivery in 3 to 4 months.

SYCOR MATRIX PRINTERS USE μ P

Sycor has announced that it is offering its new series of microcomputer-controlled matrix printers for use on its Model 350 intelligent terminal and Sycor 250 intelligent display system.

The new printers, which operate at 60 (66 cps on the Sycor 250 series), 120 and 180 cps, use a microcomputer to control all system dynamics including print head needle timing, character registration, paper acceleration profiles, and adaptive print head acceleration and deceleration; and to perform multiple task processing for simultaneous data transfer, line feed, keyboard scanning and indicator drive.

The new printer series features bi-directional printing, a "look ahead" function to optimize throughput, and vertical and horizontal slewing.

Delivery of the Model 350 printer is in June while the Model 250 printer series will be in July, 1976. Prices vary between \$4,800 and \$11,830. Leasing is available.

MICROCOMPUTER DEVELOPMENT SYSTEM



Mupro Associates has announced the uPro-80 development system. The system is a general purpose microcomputer designed to aid in the hardware and software development of several types of microprocessors. Initially the system is configured for use on 8080-based products.

In addition to all common control functions the uPro-80 offers both breakpoint and program-trace capabilities, with register and memory contents displayed in hexadecimal form on the front panel. To convert the system to another microprocessor the user merely inserts a new CPU card and a new front control panel logic card. Options include an In-Circuit Emulator and a terminal of the user's choice.

According to the firm, Mupro is offering a unique set of resident software support. Called BSAL (Block Structured Assembly Language), the relocatable assembler/compiler generates machine code from assembly instructions written in a format similar to that of FORTRAN. Additional software available include an editor, linking loader, and a cross-assembler written in FORTRAN IV.

The \$3950 price includes the hardware, documentation and software. Delivery is stock to 45 days for the hardware and cross-assembler. And 60 to 90 days for the resident assembler/compiler.

μ P LEARNING MODULE

Texas Instruments is marketing a unique method for gaining hands-on experience with microcomputers.

Offered through their distributors, the TIuP Learning Module Microprogrammer, consists of a 4-bit static parallel processor is manually programmed, has VLED bus monitors, push button manual clock, and offers a 40-pin socket for expansion. The hand-held module is operated from a rechargeable battery.

A microprogrammer instruction manual covers the basic and advanced concepts of microprocessing and suggests follow-on applications to demonstrate further microprocessor advantages.

The \$149.95 price includes the full system plus instruction manuals.

Future modules planned include a controller that allows conversion to PROM, a controller allowing operation from a programmable clock; Memory that adds 1K of program and data storage; and an I/O Module for expansion to four 4-bit ports.

μ SCOPE PROGRAMMING SYSTEM

Tranti Systems, Inc. announces the immediate availability of its uScope, Model 8000 Programming System. The company claims uScope is the first, fully self contained, easily portable, programming system which can be universally applied to all existing microprocessors. The system's hardware contains a full alpha keyboard, a CRT display, a small full alpha printer, magnetic tape cartridge device, and an expandable memory with up to 57K of user space.

The software package is resident in ROM and consists of three parts: monitor, editor and assembler.

The monitor reads, writes and verifies magnetic tapes; copies and compares blocks of memory; allows direct entry or modification of any memory location; and has the capability for multiple traps or breakpoints in the program.

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Entries are via numeric key pad and control keys are provided to set address, examine, backspace, clear, deposit and run.

The editor features control keys which facilitate program entry enabling the user to set program address, increment address, decrement address, label, list, move, assemble and disassemble programs.

The assembler is designed to convert user entries into object codes, the only additional memory required is for labels.

The complete uScope, Model 8000 Programming System is priced at \$6995. Delivery is 30 days ARO after June 1, 1976.

MEMORY & LSI TEST SYSTEM

Micro Control Co.'s M-10A is a general purpose system for testing microprocessors, memories, and other LSI circuits. The M-10A is a fully automated test system and includes a standard set of programmed patterns that can be utilized on any read/write memory with no changes in the pattern program except "end of field" values.

Patterns are generated using a microprogrammed digital processor capable of operating at a 10 MHz real time rate. All pattern generation is performed under software control. This provides the user with the necessary flexibility for testing future

designs and guards against equipment obsolescence. Also, a large program memory (256 words of 64 or 96 bits) with address and data generator operands, expandable address and data generators (24 bits and 72 bits respectively) and topological address scramblers (optional) are included—even address "bit forcing" capability is included.

The Peripheral Controller (microcomputer) is used for operating all peripheral devices such as the magnetic tape drive and TTY. It also provides computer controlled test supervision.

Priced at \$39,000 the system can be operated from an optional terminal using English Language mnemonics.

6800 FLOPPY SYSTEM

A Motorola 6800-based microcomputer system has been introduced by Hollinbeck Enterprises.

The system includes a Shugart dual diskette, up to 64K of memory, a microcomputer CPU with two TTY/RS 232 I/O ports, a microprogrammed diskette controller and a desktop enclosure.

Software support includes a DOS assembler, linking loader and BASIC compiler.

An 8K paper tape system is priced at \$4,000 in single quantities and \$7,500 for the diskette system.

NEC INTRODUCES PDA-80

A self-contained, general purpose microcomputer system, designed for precise 8080A program development, has been introduced by NEC Microcomputers Inc.

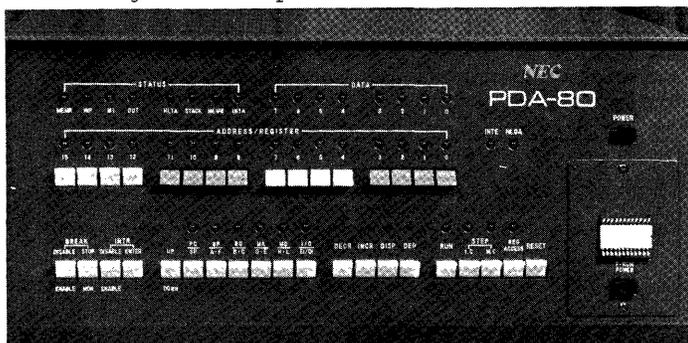
The system, called PDA-80, requires only an interactive terminal and supports a high-speed paper tape reader/punch.

Two features of the system, the company said, are its ability to erase and program NEC's electrically erasable PROM (uPD45D), and its unique front panel.

The panel allows an engineer to single-step his way through any program, either by instruction or machine cycle, and to display and examine the contents of the seven internal registers in the processor, as well

(Cont'd next page)

as the program counter, the stack pointer, or memory. Breakpoints can also be inserted.



Besides the TTY, the PDA-80 can accept an interactive device that operates at speeds from 110 to 1200 baud. The console interface is speed selectable without software modification, and accepts either an EIA RS232C, or 30 ma current loop device.

The PDA-80 has a DMA controller module that permits a user to design an interface for high-speed data devices, such as magnetic tape units, disc drives, and real-time data acquisition devices.

A series of punched paper tapes containing software programs are supplied with the PDA-80. These programs include a text editor, macro assembler, on-line debugger, and memory and systems diagnostics. The tape loader/monitor program resident in the system's ROM allows users to load and debug programs, program the uPD454D PROM, execute programs, test programs, and take advantage of I/O subroutines.

Delivery is 30 days ARO.

MICROCOMPUTER SOFTWARE: SOLIE-STACK ORIENTED LANGUAGE

Display & Decision Systems Ltd. has introduced Solie, The Stack Oriented Language for Intel 8080 microcomputers. The language is said to have the capabilities of FORTRAN minus floating point.

Solie optimizes the execution speed and PROM storage required. Calculations use 16- and 32-bit integer add, subtract, multiply and divide instructions.

The \$480 package can contain a 300-statement FORTRAN program in 2K bytes for interpretive code and 1K for strings and constants.

INTEL CROSS-ASSEMBLERS

Information Processing Techniques Corp., Palo Alto, Calif., is offering an enhanced cross assembler for Intel 8008 and 8080 microprocessors. The cross assembler includes a simulator for program debugging.

F8 ASSEMBLER/SIMULATOR

The Fairchild F8 microcomputer assembler/simulator is available on the Remote Computing Corp. (RCC) time-sharing service.

MEMORIES AND PERIPHERALS: MECHANICAL PROM

The Plug-PROM, offered by Brent C. Olson is essentially a diode pin matrix which simulates the PROM mechanically in a microcomputer.

The heart of the Plug-PROM is a labeled 1/2 x 1 in. plug, which ties four diode bits together to form a hexadecimal number. A word is formed when two plugs are inserted together into an 8-bit edge connector socket. A sequence of 32 words is available in the \$300 standard version. For longer programs, the machine's capabilities can be expanded to 256 x 8 for \$1995.

An optional LED indicator monitors each instruction executed and the Plug-PROM can be attached to a PROM duplicator once the debugging has been completed.

The system draws its power from the PROM socket in the system and requires only one system ground. Several PROM type models are available from Olson.

μ PROGRAMMED FLOPPY DISC CONTROLLER

A microprogrammed floppy disc controller from Millenium Information Systems has been designed to support the Shugart 901 and Calcomp 140 disc drives. The controller can also be used with a Centronics printer. The system is capable of diagnostics and error checking routines.

Software drivers are available for the Intellec 8 models 8 and 80 as are driver flow diagrams for other microcomputers. The single pc card unit is priced at \$750 in OEM quantities.

HARRIS ENTERS MEMORY MARKET

Harris Semiconductor has entered the CMOS static RAM market with a 1K circuit. HM-6508 is a 16-pin device pin-compatible with other 1K RAM's currently manufactured.

Power requirements are 50 nW/bit standby and 15 uW/bit during operation. Harris also noted that an 18-pin version will be offered in the near future. Prices for the two parts in 100-999 quantities were given as \$8.95 for industrial range and \$22.50 for Mil Spec.

BIPOLAR μ P SUPPORT CHIPS

A pair of bipolar microprocessor support circuits is now available from Advanced Micro Devices. The circuits, AM8212 and AM8224, are specifically designed to implement the I/O, clock generator, and timing functions for the AM9080A and other compatible microprocessors. These devices allow the designer to minimize the number of circuits in his microprocessor system to optimize speed/power performance.

The AM8212 is an I/O port consisting of an 8-bit latch with tri-state output buffers, together with control and device selection logic.

The Am8224 contains a crystal controlled oscillator, a divide by nine counter, high level drivers and auxiliary logic functions.

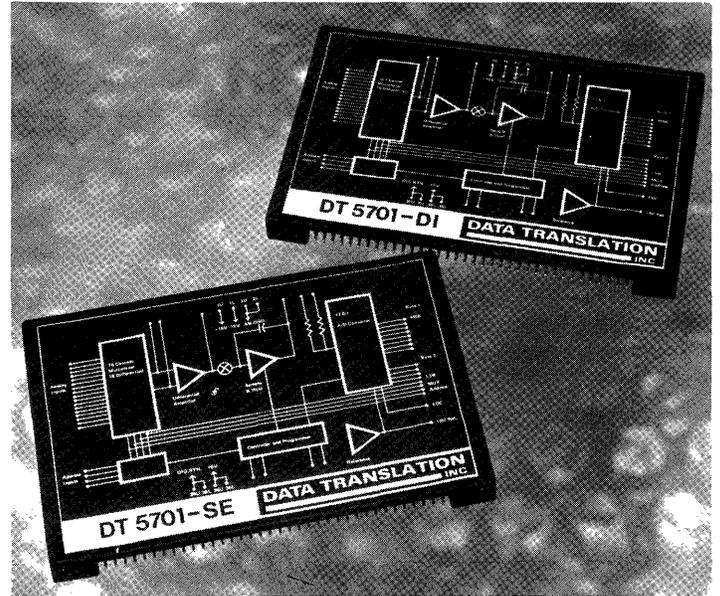
Prices for these devices start at \$2.90 for the 8212 and \$5.00 for the 8224 device.

INTERDYNE CASSETTE FORMATTER

A Cassette Formatter offered by Interdyne Co. provides parallel interfacing to microcomputers and minicomputers for the IC 2400 digital cassette tape drive. Adding only 2 inches to drive depth, this unit performs parallel/serial conversions of 8-bit data, pre- and postamble generation and stripping, bi-phase encoding/decoding and request/acknowledge handshaking (tri-state). No price was given by the firm.

DATA ACQUISITION MODULE

A new, low cost 12-bit, 16 channel data acquisition module has been announced by Data Translation. Containing a 16-channel multiplexer, buffer amplifier, high speed sample/hold amplifier, 12-bit A/D converter and all control and programming logic. the DT5701 is



\$175 in 100 quantity. Delivery is from stock.

The DT5701 is the lowest cost member of Data Translation's growing DATAX II series, all designed for full compatibility with new microcomputers. All outputs are tri-state TTL buffered for direct connection to microcomputer busses.

The new DT5701 has a full 12-bit resolution, 1/2 LSB linearity from 0°-70°C, and system accuracy of 0.03% of full scale range. Additional features include: 35KHz throughput rate or 28.5 us total throughput time, random or sequential multiplexer addressing, and multiple shielding against EMI/RFI noise through steel encasement of the data acquisition module.

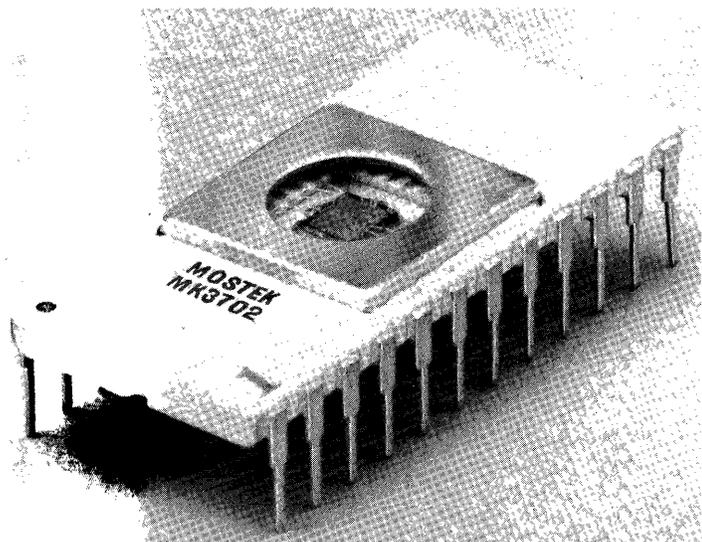
CRAMER OFFERING \$1,000 μ C KIT

Cramer Electronics, Inc. has announced an all encompassing microcomputer that they will unveil at Electro '76.

Cramer has packaged together a complete microcomputer kit system for under \$1,000. Included in the package are Cramer's Intel 8080A model Cramerkit, 2704/2708 EPROM Programmer Kit, a new custom color-coded socket packaging board from Augat, an Elexon or Lambda power supply, Prometrics UV EPROM Eraser, the new text, Microcomputer Dictionary and Guide, extra memory, complete software, and more.

Cramer's presence at the Electro'76 show will include a full range of their other microcomputer products.

1702A REPLACEMENT



MOSTEK's new MK 3702, PROM is a pin-for-pin replacement for the popular 1702A. The MK 3702 incorporates MOSTEK's P-channel silicon-gate, ion-implanted depletion load process with standard access times of 550 ns to 1 μ s. Programming is typically 30 seconds for all 2048 bits using standard PROM programmers.

The 24-pin PROM requires no VGG supply and is available through MOSTEK distributors now. Price in 100 quantities start at \$11.00.

DICE/68-6800 EMULATOR

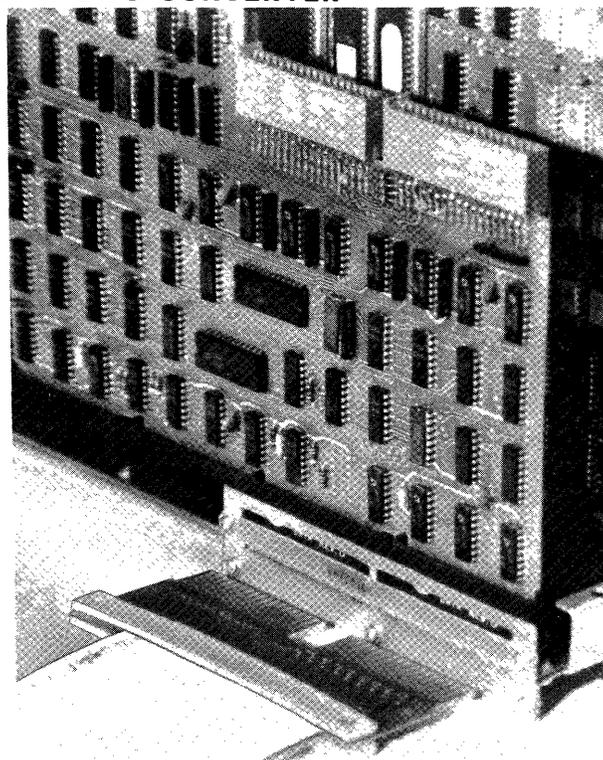
To speed the design and development of Motorola 6800 microcomputer products, Digital Electronics Corp. has introduced a CPU emulator called DICE/68. It provides users of the 6800 and the Motorola EXORciser development system with in-circuit emulation of the CPU.

One feature of the design/debug tool, includes status indicators for data and address buses and system control capabilities.

The 40-pin DICE/68 adapter can be inserted into the socket for debugging. The company noted a major advantage in that the EXORciser system bus is effectively extended onto the prototype 6800 system bus, allowing access to all user memory and I/O interfaces on the prototype through EXORciser software.

The \$795 DICE/68 system, in addition to being a debugging aid, can also be used for production testing.

LSI-11-BUS CONVERTER



Able Computer Technology (ACT) has introduced an adaptor which allows DEC users to convert to the LSI-11 microcomputer and PDP-11/03 minicomputer without redesigning controllers already in use on the PDP-11 line.

Model 1001 Univerter is offered as an LSI-11 option which converts the LSI bus to a unibus structure and permits full bidirectional communication between the two. A pseudo-status register returns control to the user over all four unibus interrupt levels, and an extended memory MOD provides a virtual memory scheme which extends addressing to 512K words.

Both the memory and DMA devices are placed on the unibus side of the adaptor and handshake allows NPR devices to release the bus quickly and free the processor or other devices to make effective use of an increased bandwidth over the basic LSI bus.

The Univerter is a standard quad-width board which can be installed into an LSI-11 card cage or into the PDP-11/03. It is available off-the-shelf at \$480 in quantity.

DISC CONTROLLER

Microcomputer Systems Corp., MSM-10X Disc Controller supports up to 4 drives in its standard configuration. It is expandable

(Cont'd next page)

to 15 drives for a total storage capacity 15M to 4500M bytes.

The 12 x 15-in. PC-board microprogrammed controller offers a 1.2M byte/sec transfer rate, automatic self-test of both controller and disc and built-in maintenance panel. Options include soft sectoring, defective track sensing and flagging, error detection/correction and overlap seek. No price was given by the firm.

DUAL/TRIPLE μ C SUPPLIES

Sola Electric is offering dual and tripple output power supplies for microcomputers and accessories. The suppliers offer fully isolated independent output for either positive or negative operation. Series or parallel operation is offered plus, remote sensing/programming, and complete serviceability.

Interested individuals may write for catalog 647.

OPEN FRAMED μ C POWER SUPPLIES

Specifically oriented toward microprocessor systems, floppy discs and chargers for semi-conductor memory backup batteries, three new, open framed power supplies from Standard Power, Inc. are now available.

The SMP-40 will have outputs of 5V+10%, 3A; 12V+10%, 1A; 9 to 12V, .6A and a fixed 5V, .3A. Ratings of the SMP-80 are 5V+10%, 6A; 12V+10%, 1A; 9 to 12V, 1.8A; and fixed 12V, .9A. The SMP-160 will be the same as the SMP-80, except the 5V+10% will have a 12 A rating. Other members of the series are to be added in the future.

General characteristics are an input of 115/230V+10%, 47-440Hz, line and load regulation of 0.1% and less than 1-mV ripple. Short-circuit and over-voltage protection are included.

DUAL MAGTAPE μ P PERIPHERAL

The Model 31-001 MicroVox Dual Magtape Microprocessor Peripheral has two magnetic tape transports; one for writing and the other for reading. The Peripheral provides a parallel, 8-bit data bus and requires four handshaking signals for communication control with the microcomputer. The Peripheral interface is fully compatible with an Intel 8255 PPI or Motorola 6820 PIA.



MicroVox continuous-loop Wafer cartridges are the storage medium in the Peripheral. A 50-foot Wafer stores a maximum of 48,000 bytes. The Wafers and the Peripheral both are manufactured by Micro Communications Corporation.

BENCHTOP MICROPROCESSOR TESTER

A new benchtop microprocessor tester and software development system is currently being offered by Micro Control Company. The unit, designated the MPU-1, is priced at \$8,500 and includes test programs and TTY software loader.

The MPU-1 compares the chip under test with a standard microprocessor chip. The test uses worst case voltages and timing, including both fast and slow re-rates; the test program, stored in 4K RAM, is loaded from a TTY (optional mag tape drive for high-speed loading).

The unit, also useable for software development, adapts to most microprocessor chips. It features complete panel controls for entering and displaying data plus STEP mode for manually stepping through programs, and facilities for debugging new programs, including program breakpoint.

PEOPLE, LITERATURE AND EVENTS: RCA MOVING 4K RAM OPERATION

RCA Solid State division is moving most of its 4K RAM production to a new IC facility in a 100,000 sq. ft. building at the company's Palm Beach Gardens, FL plant.

The space thus freed at its Somerville,
(Cont'd next page)

N.J., plant is expected to be used for micro-processor production, including a previously unannounced silicon-on-sapphire 8-bit unit.

PERSONAL COMPUTING '76

One of the latest developments in the electronic field, personal computers, will be the theme of a trade show/convention in Atlantic City, N.J. August 28-29, 1976.

Personal Computing 76 will be a national gathering of manufacturers and users of these devices. To discuss and exhibit microcomputers, space has been provided for over 200 exhibitors and a series of related seminars is currently being arranged.

The weekend show is being staged in the Shelburne Hotel on the Boardwalk and is sponsored by the Southern Counties Amateur Radio Association of New Jersey.

John H. Dilks, chairman of Personal Computing 76, said, "We are expecting that most of our exhibitors will be aiming directly at the consumer". "In the first days after our plans were announced", Dilks added, "we received a number of exhibit commitments from some of the biggest names in the microcomputer field".

For further information contact: Personal Computing '76, Shelburne Hotel, Boardwalk & Michigan Ave., Atlantic City, N.J. 08404, (609) 927-6950.

MEMORY SYSTEM DESIGN SEMINAR

Intel, in cooperation with Elmar Electronics, is presenting an intensive two day seminar on the design of semiconductor memory systems. The seminar is designed especially for the engineers, managers, and technicians who design, test or use memory devices or systems. The program is structured for both experienced and first time designers of memory systems.

The seminar topics include the use of 4K and 16K RAMs, Charge Coupled Devices, and PROMs/ROMs. In addition, system debugging will be discussed in detail.

Contact Bill Scharenberg at Elmar Electronics, 2288 Charleston Rd., Mt. View, Ca 94043, (408) 961-3611.

MICRO-MINI INTERFACING

Microprocessors and Minicomputers-Interfacing and Applications is a new American

Chemical Society sponsored hands-on short course built around the DEC LSI-11. The course will be offered June 6-11, 1976, at Virginia Polytechnic Institute and State University, Blacksburg, Va.

Each participant receives hands-on interfacing experience at hardware level using the major portion of the LSI-11 I/O bus, brought out by cable to a breadboard patch-wire unit. Using a unique new teaching tool called VISA, designed and built by the group, data from any chemical instrument can be emulated providing on-line experience in data acquisition, storage, manipulation, digitization, ADC/DAO conversion, timing and signal conditioning.

For further information and registration write Am. Chem. Co., Educational Activities Div., 1155 16th St., N.W., Washington, D.C. 20036 or call (202) 872-4508.

PEOPLE ON THE MOVE

NEC Microcomputers, Inc. has appointed K-MAR ENGINEERING AND SALES, as their sales representative for Kansas, Nebraska, Missouri, and Southern Illinois. Distributors appointed by NEC were INTERMARK ELECTRONICS which has offices in Sunnyvale, Santa Ana, and San Diego, CA and in Seattle, WA; and CENTURY ELECTRONICS, which has offices in Albuquerque, NM, Denver, CO, and Salt Lake City, UT.

Under an agreement recently formulated between CTL and Motorola Semiconductor group, CTL will be supporting existing and future Motorola microcomputer users in England. This agreement has been developed in collaboration with Motorola distributors and services to be provided range from initial exploratory consultancy through to total system responsibility.

The Memory Systems Division of Intel Corp. has completed its national network of OEM field support representatives with the appointment of JERRY KORSBON as Midwest regional memory specialist.

BILL MANSFIELD, a Datatron founder, has announces his resignation as a full time Datatron employee. Mansfield will remain a Datatron director and consultant, but will also be joining Electro Units, Inc., a San Jose-based company that produces micro-

(Cont'd next page)

computer-based inventory control systems.

INTRODUCTION TO MICROPROCESSORS

Microlog has announced their latest text "Introduction to Microprocessors" the book explains the general fundamentals of micro-processing hardware and instruction sets, outlines criteria for selection and discusses hardware/programming support requirements.

Detail descriptions of 4- and 8-bit uP's from Fairchild, Intel, Motorola, National, RCA, Rockwell and Signetics are included. Microlog is offering the book for \$60.

SELF TEACHING μ C SOFTWARE COURSE

A microcomputer software course designed to meet the needs of hardware designers who are learning software has been introduced by Creative Computer.

According to the company, the course is divided into 10 self-teaching lessons, with additional sections of information on computer architecture, operation, and software systems. Each lesson is divided into sections on software concepts and software implementation. The concept sections discuss the theory behind software techniques or problems that are commonly encountered in microcomputer applications. The implementation sections then show how to put theory into practice on real microcomputers. Throughout the course, the firm's spokesman said, emphasis is placed on understanding the hardware/software relationships that must be considered when designing a microprocessor-based digital system.

The Microcomputer Programming with Modu-Learn is distributed in a sequence of five shipments, with the first shipment available for 30-day delivery. The unit cost is \$49.95, F.O.B. Mountain View, with quantity prices available. (MD will review this series at a later date.)

RECENT LITERATURE

"Microprocessors In Testingland--The Jury Receives Its Instructions.

Martin Marshall,
EDN, March 20, 1976

A very light, informative and entertaining article. Marshall has very cleverly outlined

the various facets of testing that a micro-processor must undergo to assure its quality.

Staged in the fantasy of Testingland, Marshall has placed his Microprocessor Under Test (MUT) in a courtroom scene in which MUT must prove he has had all his circuits thoroughly tested. The article is spell binding and has a most unique ending.

"Focus on Microprocessors"

Edward A. Torrero

Electronic Design 7, March 29, 1976

This article is a quick recap of the phenomenal growth of the microcomputer kits, OEM and single board microcomputers. The various boards currently on the market are discussed as well as microprocessor technology, software and documentation available, and prototyping support. The article is an excellent review for those first entering this field or those who have not been following the microcomputer growth.

"Displays Don't Trouble 8-Bit uPs"

Roger Thompson

Electronic Design 7, March 29, 1976

This article is an excellent description of how microprocessors can provide information for displays as diverse as simple digital types to data-demanding video terminals.

Beginning with the premise that the display will be treated by the microcomputer as a standard peripheral like memory, the author describes how to accomplish all peripheral transactions using standard memory-reference instructions. After describing the various methods employable on the macroprogram level Thompson then discusses how microprogramming can be used to alter an instruction set to achieve the desired data transfer.

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EDUCATION

MICROCOMPUTER COURSES, SEMINARS, CONFERENCES.
Date, title, cost, location, sponsoring organization (addresses on page 14).

APRIL

- 26-28 MCS-4/40 \$350 Santa Clara CA
Intel Corp.
- 26-29 Microprocessor Fundamentals \$395
Santa Clara, CA National Semiconductor Corp.
- 26-29 SC/MP Applications \$395 Miami FL
National Semiconductor Corp.
- 27 National SC/MP No Charge Encino
CA Liberty Electronics
- 27-28 Military and Aerospace Microprocessor Systems \$395 Chicago IL
Integrated Computer Systems Inc.
- 27-29 How to Design With Programmed Logic \$300 Freeport CT Pro-Log Corp.
- 28 National SC/MP No Charge Encino
CA Liberty Electronics
- 28-30 Second Annual Asilomar Workshop on Microprocessors Asilomar CA Contact: T. Laliotis, ASI, Inc.
- 29 National SC/MP No Charge Anaheim
CA Liberty Electronics
- 29-30 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 Chicago IL Integrated Computer Systems Inc.

MAY

- 3 Microprocessors/Microcomputers \$220 Los Angeles CA Integrated Computer Systems Inc.
- 3- 5 IMP-16/PACE Applications \$395 Santa Clara CA National Semiconductor Corp.
- 3- 6 MCS-80/ICE-80 \$350 Boston MA & Santa Clara CA Intel Corp.
- 3- 7 Advanced Programming \$395 Miami FL National Semiconductor Corp.
- 3- 7 Microprocessor Fundamentals \$395 Dallas TX National Semiconductor Corp.
- 4 National SC/MP No Charge San Fernando CA Liberty Electronics

- 4- 5 Software Development and Applications Techniques for Microcomputers \$395
- 4- 6 Comdesign/76 \$50-\$120 Los Angeles CA Computer Design Magazine
- 5 National SC/MP No Charge Hawthorne CA Liberty Electronics
- 5 1976 Western Microcomputer Show Palo Alto CA IEEE Computer Society Contact: Western Microcomputer Show
- 6 National SC/MP No Charge Anaheim CA Liberty Electronics
- 6- 7 Workshop on Microprocessor Architecture and Systems Evanston IL Contact: M. Gonzalez, Northwestern University
- 7 A Manager-Level Overview of Microprocessors/Microcomputers \$220 Los Angeles CA Integrated Computer Systems
- 10 Microprocessors/Microcomputers \$220 San Francisco CA Integrated Computer Systems Inc.
- 10-12 PL/M \$350 Boston MA Intel Corp.
- 10-13 IMP-16/PACE Applications \$395 Dallas TX National Semiconductor Corp.
- 10-13 Microprocessor Fundamentals \$395 Miami FL National Semiconductor Corp.
- 10-13 SC/MP Applications \$395 Santa Clara CA National Semiconductor Corp.
- 11-12 Software Development and Applications Techniques for Microcomputers \$395 San Francisco CA Integrated Computer Systems Inc.
- 11-13 How To Design With Programmed Logic \$300 Milwaukee WI Pro-Log Corp.
- 11-14 Comdesign/76 \$50-\$120 San Francisco CA Computer Design Magazine
- 13-14 Intel Memory Seminar \$15/day Denver CO Elmar Electronics.
- 14 A Manager-Level Overview of Microprocessors/Microcomputers \$220 San Francisco CA Integrated Computer Systems Inc.
- 17-18 Military and Aerospace Microprocessor Systems \$395 Dayton OH Integrated Computer Systems Inc.

MAY

- 17-19 Microprocessors and Microcomputers: Using Tomorrow's Technology in Today's Systems \$485 Houston TX Institute for Science and Public Affairs.
- 17-20 Advanced Programming \$395 Santa Clara CA Intel Corp.
- 17-20 IMP-16/PACE Applications \$395 Miami FL National Semiconductor Corp.
- 17-20 MCS-80/ICE 80 \$350 Boston MA & Santa Clara CA Intel Corp.
- 17-20 SC/MP Applications \$395 Dayton OH Integrated Computer Systems
- 18-20 How To Design With Programmed Logic \$300 Raleigh NC Pro-Log Corp.
- 19 RCA COSMAC Microprocessors Palo Alto CA No Charge Elmar Electronics
- 20-21 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 Dayton OH Integrated Computer Systems
- 24-25 Military and Aerospace Microprocessor Systems \$395 Philadelphia PA Integrated Computer Systems
- 24-26 Series 3000 \$350 Santa Clara CA Intel Corp.
- 24-27 Advanced Programming \$395 Dallas TX National Semiconductor Corp.
- 24-27 Microprocessor Fundamentals \$395 Santa Clara CA National Semiconductor Corp.
- 24-27 SC/MP Applications \$395 Miami FL National Semiconductor Corp.
- 25-27 How To Design With Programmed Logic \$300 Denver CO Pro-Log Corp.
- 25-27 SEMICON/West San Mateo CA Contact: Golden Gate Enterprises
- 26-27 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 Philadelphia PA Integrated Computer Systems Inc.
- 27 Symposium on Trends and Applications Micro and Mini Systems Gaithersburg MD IEEE Contact: M. Abrams, National Bureau of Standards

JUNE

- 1- 2 Military and Aerospace Microprocessor Systems \$395 San Diego CA Integrated Computer Systems, Inc.
- 2- 4 MCS-4/40 \$350 Santa Clara CA Intel Corp.
- 3- 4 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 San Diego CA Integrated Computer Systems Inc.
- 7-10 IMP-16/PACE Applications \$395 Santa Clara, CA National Semiconductor Corp.
- 7-10 MCS-80/ICE-80 \$350 Boston MA Intel Corp.
- 7-10 MCS-80/ICE-80 \$350 Santa Clara CA Intel Corp.
- 7-10 Microprocessor Fundamentals \$395 Dallas TX National Semiconductor Corp.
- 8- 9 Military and Aerospace Microprocessor Systems \$395 New York NY Integrated Computer Systems Inc.
- 8- 9 Military and Aerospace Microprocessor Systems \$395 San Francisco CA Integrated Computer Systems Inc.
- 10-11 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 New York NY Integrated Computer Systems Inc.
- 10-11 Bit-Slice Microprocessors PLA's and Microprogramming \$395 San Francisco CA Integrated Computer Systems Inc.
- 14-16 Microprocessors and Microcomputers \$485 Bethesda MD The Institute for Advanced Technology
- 14-16 PL/M \$350 Santa Clara CA Intel Corp.
- 14-17 Advanced Programming \$395 Miami FL National Semiconductor Corp.
- 14-17 IMP-16/PACE Applications \$395 Dallas TX National Semiconductor Corp.
- 14-17 SC/MP Applications \$395 Santa Clara CA National Semiconductor Corp.

JUNE

- 15-16 Military and Aerospace Microprocessor Systems \$395 Asbury NJ Integrated Computer Systems Inc.
- 15-17 How To Design With Programmed Logic \$300 Pittsburg PA Pro-Log Corp.
- 17-18 Military and Aerospace, PLA's and Microprogramming \$395 Asbury NJ Integrated Computer Systems Inc.
- 21-24 Advanced Programming \$395 Santa Clara CA National Semiconductor Corp.
- 21-24 IMP-16/PACE Applications \$395 Miami FL National Semiconductor Corp.
- 21-24 MCS-80/ICE-80 \$350 Santa Clara CA Intel Corp.
- 21-24 MCD-80/ICE-80 Boston MA Intel Corp.
- 21-24 SC/MP Applications \$395 Dallas TX National Semiconductor Corp.
- 22-23 Military and Aerospace Microprocessor Systems \$395 Washinton CA Integrated Computer Systems Inc.
- 24-25 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 Washington DC Integrated Computer Systems Inc.
- 28-29 Military and Aerospace Microprocessor Systems \$395 Seattle WA Integrated Computer Systems Inc.
- 28-30 Series 3000 \$350 Santa Clara CA Intel Corp.
- 28 - 2 How To Design With Programmed Logic \$350 Monterey CA Pro-Log Corp.
- 30-31 Bit-Slice Microprocessors, PLA's and Microprogramming \$395 Seattle WA Integrated Computer Systems Inc.

SPONSORING ORGANIZATIONS AND CONTACTS:

ASI, Inc., Ted Laliotis, 840 Del Rey Ave, Sunnyvale CA 94086

Computer Design Magazine, Compdesign/76 Registration, 797 Washington St, Newton MA 02160

Elmar Electronics, 2288G Charleston Rd, Mountain View CA 94040 (415) 961-2611

Golden Gate Enterprises, 1333 Lawrence Expy, Santa Clara CA 95051 (202) 241-8100

Institute for Science & Public Affairs, 6003 Executive Blvd, Rockville MD 20852 (301) 770-8576

Integrated Computer Systems Inc., PO Box 2368 Culver City CA 90230 (213) 559-9265

Intel Corp., Microcomputer Systems Training 3065 Bowers Ave, Santa Clara CA 95051 (408) 246-7501

Liberty Electronics, 124 Maryland St, El Segundo CA 90245 (213) 322-8100

National Bureau of Standards, Marshall Abrams, Technology B-212, Washington DC 20234

National Semiconductor Corp., 2900 Semiconductor Dr, Santa Clara CA 95051 (408) 732-5000

Northwestern University, Prof. Mario Gonzalez, Computer Science Dept, Evanston IL 60201

Pro-Log Corp., 2411A Garden Rd, Monterey CA 93940 (408) 372-4593

Western Microcomputer Show, 3855 Corina Way, Palo Alto CA 94303 (408) 244-8695

FINANCIAL:**EPTAK SALES PASS 525 UNITS**

With formal introduction the EPTAK Microcomputer System less than six months past, Eagle Signal Industrial Controls Division, a Gulf + Western Manufacturing Company, reports orders for over 525 systems, ranging in price from \$3,000 to \$40,000.

INTEL LANDS \$1 MILLION 8080 ORDER

Intel has landed a long fought contract valued in excess of \$1 million with Digital Equipment Corp. The contract calls for Intel to give DEC technological data for its N-channel MOS process and the 8080A mask set. The pact effectively makes DEC its own 8080A second source.

Motorola, Fairchild, MOS Technology and Mostek had competed in the 50,000-piece bid. No reasons were given by any of the compa-

(Cont'd next page)

nies or DEC why Intel had been selected. However, speculators cited second sourcing, 8080 popularity and the willingness to enter a technology transfer pact as principle reasons.

DEC will be manufacturing the 8080 compatible devices at its new Colorado Springs microelectronics plant. The microprocessors will reportedly be used in a DECwriter TTY terminal.

TARIFF REGULATION REPEAL URGED

Repeal of tariff regulations covering duties on components partially assembled overseas could cost the United States its worldwide leadership position in high-technology electronics, the head of a California manufacturing firm recently told a congressional committee.

In remarks to House of Representatives Ways and Means Subcommittee, on March 24, 1976, W. J. Sanders III, president of Advance Micro Devices, said that repeal of current tariff regulations would cause a profit margin reduction for semiconductor manufacturers, thus sharply reducing available funds for research and development which would affect this country's technological edge in the world marketplace.

Tariff regulations 806.30 and 807, Sanders said, "permit U.S. firms to have competitive costs to enable us to achieve reasonable profits to pay for the research and development, thus permitting us to lead the world in the international marketplace."

Loss of this world leadership position would not only be harmful to the semiconductor industry, Sanders explained, but would also affect those industries that are heavily dependent on semiconductor technology for their competitive edge, particularly the computer industry. And, he added, the semiconductor industry materially contributes to a favorable balance of trade.

Sanders, with David Packard, Chairman of Hewlett-Packard and former Deputy Secretary of Defense, represented the Western Electronic Manufacturers Association (WEMA) of Palo Alto in urging the committee to reject repeal of these regulations.

"These regulations, which are of vital importance to the semiconductor industry," Sanders said, "allow American manufacturers to produce parts domestically, ship them

aboard for assembly or processing, and then re-import these semi-finished products to the U.S. for subsequent processing and testing, paying duty only on the value added to the assembly abroad.

In tracing the historical development of the semiconductor industry, Sanders explained that the technical dominance enjoyed by U.S. firms was the result of substantial research and development investment made possible by reasonable profits, which were achieved while simultaneously reducing prices year after year in an inflation-plagued world. "Thus, by maintaining its technological leadership, the United States industry keeps moving the market wavy from the ever-advancing foreign competition." Foreign competition, Sanders added, that is often heavily subsidized by their governments.

Instead of a general repeal of these highly beneficial regulations, Sanders urged that any modification of the provisions should be limited to problem industries and problem areas, and that such changes could be made through existing administrative procedures presently provided to the International Trade Committee and the President under provisions of the Trade Reform Act of 1974.

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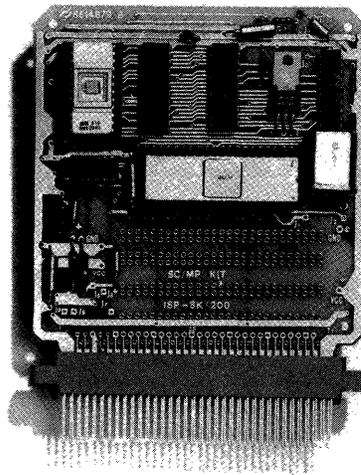
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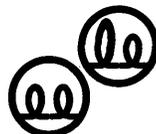


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1. Distributed Processing with Minis.
(Dan Zatyko - General Automation)
2. Military Applications for Microcomputers.
(Joe Genna - Delco Electronics)
3. The Effect of LSI Technology on Memory Systems.
(Dan Bowers - Bowers Engineering)
4. Interfacing the Analog World to Minis/Micros.
(Larry Brown² - Calnex)
5. Integrating OEM Peripherals into Computer Systems for End-use.
(Martin Himmelfarb - Digital Design)
6. Microcomputer Software and Hardware Development Aids.
(Dave Millet - NEC Microcomputers)
7. History to Current Development of Memory Peripherals for Mini and Micro Computers.
(Bill Frank - Cal Comp)
8. The Make or Buy Decision.
(Robert Van Naarden - DEC)
9. Microcomputer Applications; Logic Replacement; Minicomputer Replacement, New Products.
(Jerry Ogdin - Microcomputer Techniques)
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