ADVANCED MEMORY SYSTEMS, INC.

Dear Sir:

Thank you for your recent request for information on the 2650 μ Processor and T.E.D Module. The response by everyone has been so overwhelming that we have fallen behind in our mailings.

Enclosed you will find the information you requested plus a reply card for additional 2650 applications data. If you would fill out this card we will be happy to send you the information by return mail.

In closing, I would like to explain the mixing of Intersil and AMS information in this mailing. On November 8, 1976 Intersil was merged into Advanced Memory Systems. The combined companies were renamed Intersil on November 9, 1976.

Sincerely,

Bob Flansburg

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Product Marketing

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#419

Bitscoop

Scoop No.

Date October 15, 1976

Scoop Source Bob Koppel

TWIN - PROGRAM DEVELOPMENT SYSTEM
TEST WARE INSTRUMENT

A COMPLETE MICROPROCESSOR HARDWARE/SOFTWARE DEVELOPMENT SYSTEM

INTRODUCTION

The application of microprocessors begins with two parallel efforts - one in hardware, the other in software. In the hardware design stage, the microprocessor is interfaced with other devices - memories, clocks, etc., to form the microcomputer. Then it must be interfaced with the appropriate input/output hardware. At the same time, software instructions are developed to implement the design objective. The software instructions are then implanted in the prototype hardware, tested and the product is finalized for production.

The TWIN microprocessor prototype development system optimizes this total product effort thru the use of "Dual CPU Architecture" - two microprocessors. One called the "Master", controls the TWIN functions. The other, called the "Slave" supports your development functions.

The master executes those programs, such as the Disk Operation System, (DOS), that are independent of the particular microprocessor chip that the designer is using. These programs are permanent - they are protected from being overwritten by the slave. The slave, on the other hand, executes programs, such as assembler, editor, and prototype software, that are related to the microprocessor being used.

This separation assures the user that no matter what occurs during application development in the "Slave" it will not affect the "Master's" ability to control TWIN's functions.

With one system, the user can achieve an uninterrupted development cycle. TWIN supports software development, hardware development, software/hardware integration, and final production including testing.

THE TWIN OFFERS:

- COMPLETE FRONT PANEL CONTROL OF PROGRAM DURING DEVELOPMENT

  SINGLE STEP EXECUTION
  BREAKPOINTS
  PROGRAM MODIFICATION
  PROM PROGRAMMER

- MASTER CPU AND 16K PROTECTED MEMORY - CONTROLS SYSTEM OPERATION.
- SLAVE CPU AND 16K MEMORY - THE ACTUAL MICROPROCESSOR - EXECUTES ASSEMBLY PROGRAM
- ICE (IN CIRCUIT EMULATION) - HARDWARE REPLACEMENT OF THE BREADBOARD CPU BY THE TWIN CPU

- INTERFACES WITH:

  FLOPPY DISK
  TTY
  CRT TERMINAL
  PAPER TAPE READER
  LINE PRINTER

These features are illustrated in Figure 1, -the TWIN block diagram which also shows the 2650 Master CPU and protected memory as well as the 2650 Slave CPU and its memory.

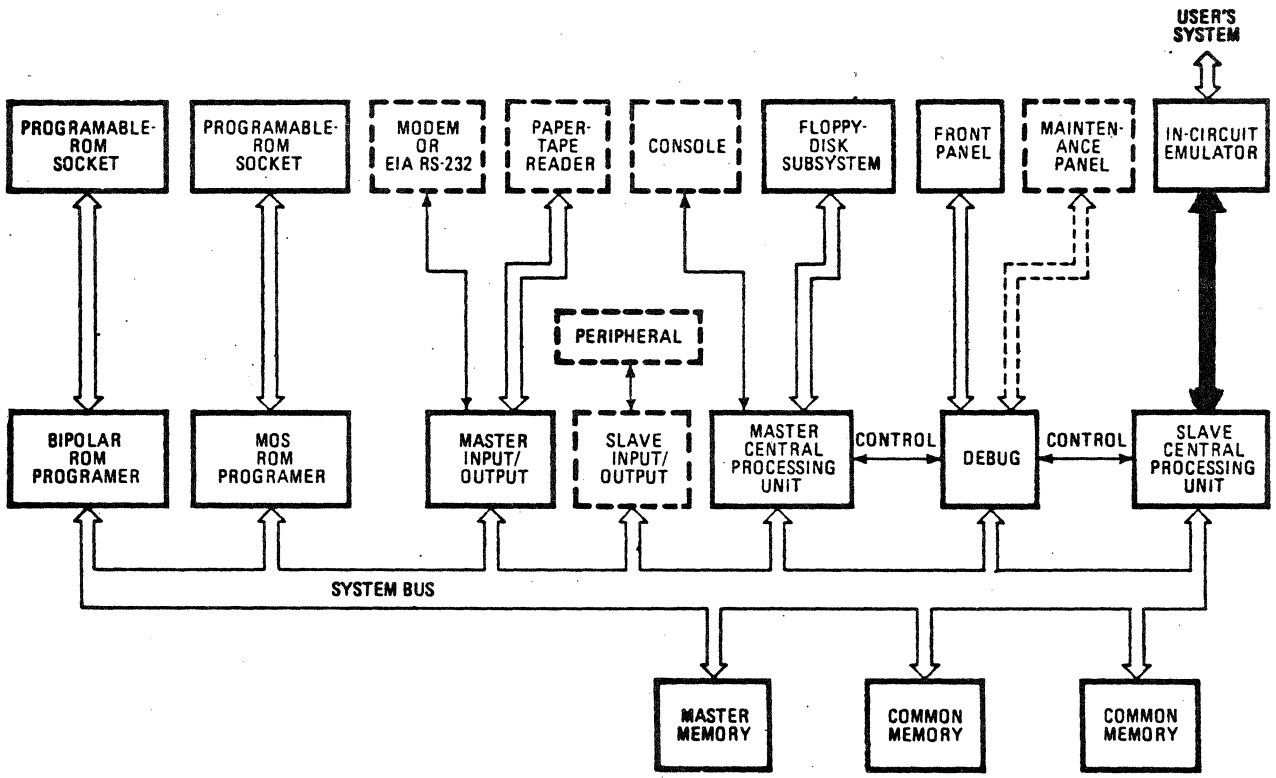

Figure 1. TWIN Block Diagram

In In-Circuit Emulator (ICE) allows the designer to check out new software while developing the hardware that's peripheral to the microprocessor chip. This is done by connecting TWIN to the 40-pin dual in-line socket where the microprocessor will eventually operate. A microprocessor inside TWIN then emulates the action of the breadboarded central processor. At the same time, TWIN gives the designer complete control of the processor through program-debugging. This allows such things as single-step execution of programs, insertion of breakpoints in the programs, and immediate modification of the program when an error occurs.

The benefits of TWIN can be appreciated by considering the sequence of events that must take place in the course of microprocessor system development.

SOFTWARE DEVELOPMENT

TWIN is a software development system that allows you to Enter, Modify, Convert and Store programs. By using the interactive Text Editor, programs can be entered via the CRT terminal in an easy to learn standard symbolic assembly language, and can be stored on a disc. The Assembler can then, upon command, automatically convert this into machine readable object code for storage and subsequent execution. The Disc Operating System (DOS), automatically performs all housekeeping functions. It assigns locations for all disc stored programs or data files, determines the necessary routines and loads them to satisfy user requests.

SYSTEM SIMULATION

Once the software programs are verified, TWIN can be interfaced to the card which simulates the final hardware product. Hardware and software now becomes interactive through the TWIN. By using the Trace capability of the TWIN, this interaction can be monitored, problems identified and corrective action taken.

PROM PROGRAMMING

The TWIN system provides for the easy transfer of the resident software out of the system and into a PROM that will be plugged directly into the system. Verified PROMs can then be placed into the hardware prototype for real-time hardware/software analysis and final development. Provision is made for programming both Bipolar fusible link and ultraviolet MOS PROMs.

TestWare In-Circuit Emulations (TWICE)

With the firmware now implented in the hardware prototype, real-time debugging can be performed. Utilizing the TWICE cable interface between TWIN and the prototype product, the user can again monitor hardware/software interaction and make the necessary corrections. The memory or registers can be easily changed in either single steps or at real-time speeds. With the exception of the "Slave" microprocessor in the TWIN, the prototype configuration is identical to the final production product.

PRODUCTION SUPPORT

The maximum utilization of TWIN does not end with the completion of the design cycle. TWIN can be used to program and verify PROMs used in the production of the product.

The basic TWIN system at $9625 contains dual processors, 16K slave memory, 16K master memory, floppy disk unit and the TWICE hardware/software package.

PRODUCTION SUPPORT (CONTINUED)

The Super TWIN at $13,900 contains, in addition to the above, 2 PROM programmers (Bipolar and MOS), GP I/O card, CRT entry/editing system terminal, and hard copy output printer.

At first glance, it may appear that the TWIN system is quite expensive for microprocessor program devleopment. However, recent studies show that almost 50% of all microprocessor software development requires an average of 250 hours. Assuming that a user is on timesharing at $100/hour, it is quite obvious that the dedicated TWIN system is a bargain. Other alternatives to the TWIN are the PC1000 prototyping system which must be programmed in Hexadecimal code or a Fortran cross-assembler program available for 16 or 32 bit CPU's.

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2650 SUPPORT DEVICES

2651 - Programmable Communications Interface (PCI)

The PCI is a programmable synchronous/asynchronous interface circuit to handle serial to parallel, serial data tranlation from or to the 2650. Among those interface applications easily handled by the PCI are:

- Teletype
- Modems
- CRT Terminals

The PCI has an on chip baud rate generator which will produce any standard baud rate from 50 to 19, 200 bands.

Key features of the 2651 are:

* Directly programmable from the 2650.
* Synchronous/Asynchronous mode in half or full duplex operations.
* All inputs and outputs TTL compatible.
* 28 PIN DIP.
* On chip clock generator
* Polled or interrupt operations.
* Parity error detection
* +5v power supply.

2652 - Universal Synchronous Receiver Transmitter

The 2652 USRT is designed to interface the 2650 to serial data communications circuits. The 2652 formats, transmits and receives three type of line protocol. Bit stuffing (BSP) such as SDLC and ADCCP ; Control Character Protocols (CCD) such as BI SYNC and Byte Count Protocol (BCP) such as DDCMP.

Key features:

* Programmable synchronous receiver and transmitter.
  - Bit stuffing protocols (SDLC, ADCCP, etc.)
  - Control character protocol (BI SYNC)
  - Byte count protocol (DDCMP)
* Separate transmitter and receiver controls
* 40 PIN Package
* NMOS technology
* 2 MHz Data Rate
* TTL Compatible I/O
* 16 bit three-state Bi-Directional Bus-Wire or capability for 8 bit μ processor.

2655 - Programmable Peripheral Interface (PPI)

The PPI is a programmable interface circuit designed to attach microprocessor peripheral devices without resorting to large arrays of TTL for multiplexing/demultiplexing of the I/O lines required, when multiple I/O devices are attached to the 2650.

The key features of the PPI are:

* 3 programmable 8 bit I/O parts.
* Individually programmable port direction, input or output.
* TTL compatibility.
* Directly programmable from the 2650.
* Four I/O port modes
    - Static
    - Strobed
    - Bi-directional
    - Serial
* +5v power supply

2656 - System Memory Interface (SMI)

The SMI is a memory circuit which allows the system designers to implement a minimum 2 device system. The SMI contains RAM, ROM, CPU clock and a 8 bit I/O bus. In a multi device system with more than 2048 bytes of ROM and 128 bytes of RAM, the SMI provides CPU clock, fully decoded timing and chip enable signals for the additional memory.

Key features of the SMI are:

* 2048 x 8 bits of mask programmable ROM.
* 128 x 8 bits of RAM
* On chip clock generator
* Eight programmable I/O lines (for chip enable or I/O parts).

2657 - Direct Memory Access Interface (DMA)

The DMA device is an interface device which allows up to 4 channels of direct access to system memory. It provides automatic priority resolution circuits in either fixed or rotating priority modes. In addition, one channel may be programmed to produce automatic refresh for dynamic RAM applications.

Key features of the DMA are:

* 4 direct access channels
* On chip priority circuitry
* Programmable channel functions
* 16k byte block transfers
* Cycle sharing with CPU
* Rotating or fixed priority
* Burst mode
* Refresh generator
* +5v power supply

2650 SUPPORT HARDWARE AND SOFTWARE

The following hardware and software support products are available for the 2650.

	Description	List Price
1.	PC1500 Adaptable board computer (ABC) 1k of Editor and Loader 1k of RAM RS232 Interface TTY Interface Two I/O ports	$ 275.00
2.	KT9500 ABC Kit 1k of Editor and Loader 1k of RAM RS232 Interface TTY interface Two I/O ports	$ 195.00
3.	PC3000 - 2650 Demonstrator Module with Serial TTY/RS232 Interface	$ 149.00
4.	PC9000 - Prototyping kit with - 2650 1 ea - 2606 1 ea - 82S115 1 ea - 8T31 2 ea - 8T26 4 ea - Manual 1 ea	$ 99.50
5.	AS1000 - 32 BIT Fortran IV Batch Cross Assembler	$ 1,250.00
6.	AS1100 - 16 BIT Fortran IV Batch	$ 1,250.00
7.	SM1000 - 32 BIT Fortran Batch Cross simulator	$ 750.00
8.	SM1100 - 16 BIT Fortran Batch Cross simulator	$ 750.00
9.	Training, Evaluation and Development Module (T.E.D.) - 256 bytes of RAM - Hex Keyboard and Displays - Self contained power supply - Self teaching guide	$ 295.00

Part #	Description	U.S. Price
26500000	FORMATTED BLANK DISKETTS (Box of 10) Formatted blank diskettes for use with the TWIN system.	$ 120
26502041	Standard 4k RAM memory card	400
26502071	1702 PROM Programmer Card	295
26502081	82S115 PROM Programmer Card	295
26502011	General Purpose I/O Card	310
26509021	Maintenance Panel	770
265011X2	Line Printer (with cables)	2,530
265011X1	CRT Terminal (with cables)	1,990
26502091	Card Extender	145
26506000	Maintenance Manual	25
26504191	Standard Terminal Cable	80
26509000	Field Maintenance Kit	6,000
26500161	Prototype User Card (Wire Wrap)	115
26503000	Operator's Guide (manual)	5
26504000	System Reference Manual	5
26505000	Assembly Language Manual	2.50

X = 5 for 50 Hz power requirement

X = 6 for 60 Hz power requirement

INTERSIL TWIN PRICE LIST

Part #		U.S. Price
265011X0	SUPER TWIN Fully configured disk-based prototyping system with: Dual processor, Memory, Dual-Drive Floppy Disk Unit, two PROM programmers, and a General-Purpose I/O card. Includes 16k slave and 16k master memory, CRT entry/Editing system terminal, LP hardcopy output printer, and the TWICE hardware/software in-circuit emulation package. Complete systems software and documentation, including a System Reference Manual, an Operator's Guide, and an Assembly Language Manual.	$ 13,900
265010X0	BASIC TWIN Functionally complete disk-based prototyping system with: Dual Processor, Memory and Dual Drive Floppy Disk Unit. Includes 16k slave and 16k master memory and the TWICE hardware/software in-circuit emulation package. Complete systems support software and documentation, including a Systems Reference Manual, an Operator's Guide, and an Assembly Language Manual.	$ 9,625
26502001	SYSTEM SOFTWARE DISKETTE* Diskett contains : SDOS (Signetics Disk Operating System), with File Management routines, DEBUG SOFTWARE (in-circuit emulation support), PROM Programming, System Monitor, and I/O functions. TEXT EDITOR to support interactive, line-oriented data entry, modification, and output of text files. RESIDENT ASSEMBLER--An easy to use symbolic assembler that generates 2650 object code on disk for immediate execution.	$ 25

*Included with purchase of BASIC or SUPER TWIN.