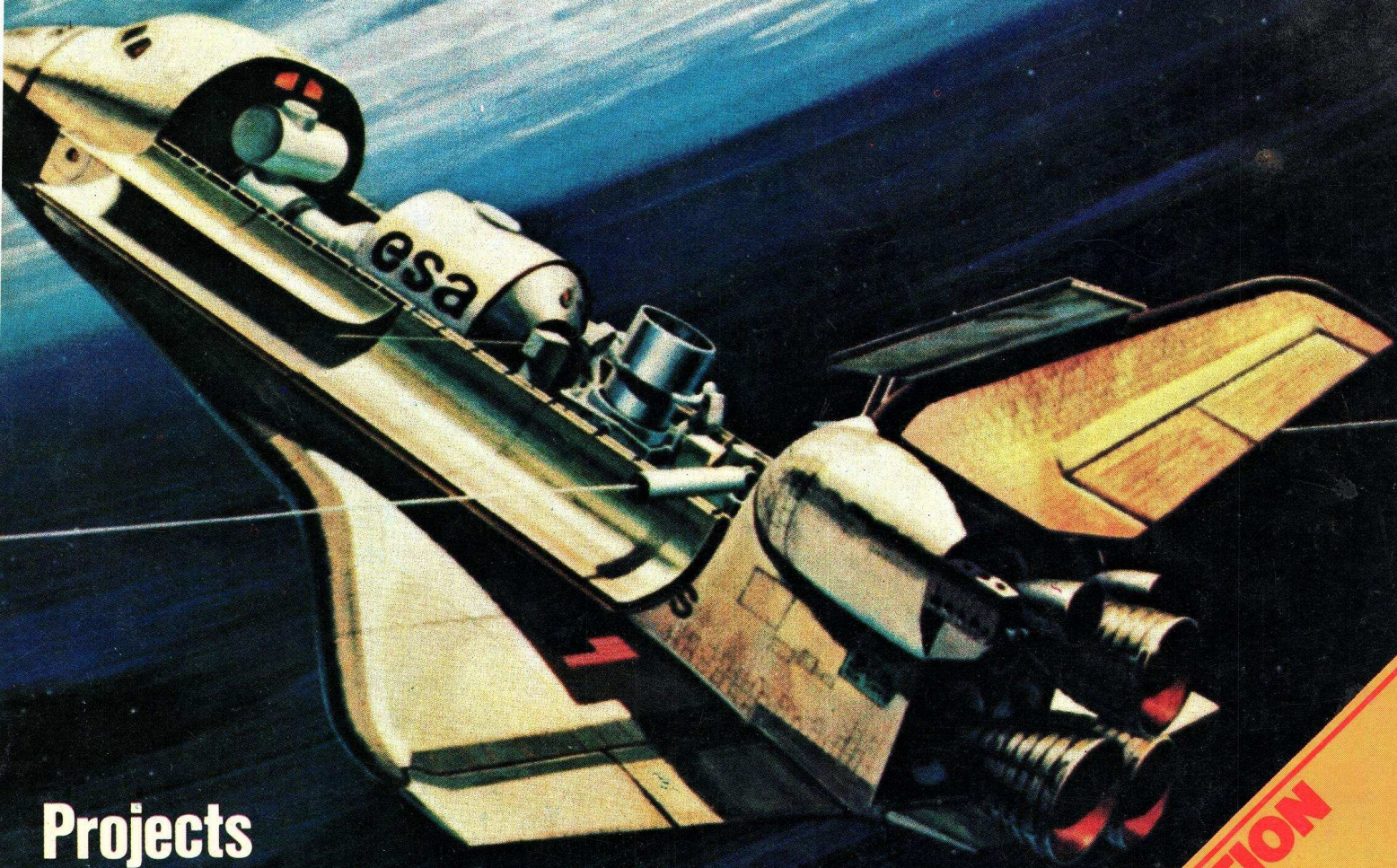


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Microprocessor University Program from Texas Instruments



Today's marketplace demands scientists, engineers and technicians who are proficient in the use of microprocessors. These "computers on a chip" have found their way into virtually every industry and profession. As a result of this impact, business and industry is looking to our universities, colleges and technical schools to furnish specially trained, microprocessor-educated individuals. In addition, learning aids are necessary to bring industry's practicing engineers into the world of microprocessors.

Texas Instruments has developed a Microprocessor University Program as an aid to institutions of higher learning as they prepare their students for careers in this demanding profession, and as an aid to hold in-house courses on microprocessors or for a self-taught course for engineers.

The Microprocessor Program consists of the following for the attractive price of \$299.00*:

- An assembled and tested University Module (TM990/189) offering hands-on experience with microprocessors, I/O, memory, and assembly language programming.
- A 570 page Tutorial Text suitable for university courses, in-house courses for industry, or as a self-taught course for engineers or serious hobbyists.
- A 300 page User's Guide to acquaint the user with the full capabilities of the TM990/189.
- Local Technical Support.
- Additional Microprocessor Modules, Development Systems, Software are available.

In addition:

- Schools may obtain free software from Texas Instruments.
- A Power Supply is available for use with the TM990/189.

Features of the Texas Instruments Microprocessor University Program

Tutorial Text

The 570-page *Introduction to Microprocessors* is a tutorial text written to satisfy textbook requirements at universities, colleges, and technical institutes for a three credit-hour course.

Emphasis has been placed on providing lab experiments at the end of most of the chapters to both test the student's progress, and to give them "hands-on" experience to reinforce their understanding of microprocessor concepts.

Tutorial Text Chapter Contents

Chapter 1. Overview of Computers, Microprocessors, and Microcomputers

- A. Basic Computer Architecture
- B. Example of Computer Operation
- C. Architectural Enhancements of Microprocessors
- D. TMS9980 Microprocessor Description

Chapter 2. Arithmetic, Logic, and the Arithmetic Logic Unit

- A. Number Systems
- B. Arithmetic Logic Unit
- C. On-Board Terminal (Terminal on University Board)
- D. On-Board Monitor Commands
- E. Exercises

Chapter 3. Introduction to Computer Addressing and Program Development

- A. Computer Addressing: Explanation of What It Means
- B. Instruction Set of Texas Instruments TMS9980 Microprocessor
- C. Programming Example, Exercises, and Lab Experiments

Chapter 4. Assembly Language

- A. Overview of Assembler Functions
- B. University Board Symbolic Assembler
- C. Directives, Labels
- D. Program Example and Lab Experiments

Chapter 5. Memory Systems

- A. Description of Memory Systems—Data Buffers, Manipulation, Memory Map
- B. Memory Characteristics, Systems
- C. Programming an EPROM for the University Board
- D. Program Example and Lab Experiments

Chapter 6. Input/Output Concepts

- A. Overview of I/O Operation
- B. Program Example and Lab Experiments

Chapter 7. Input/Output Design

- A. I/O Interfacing Considerations
- B. I/O Peripheral Components
- C. Program Example and Lab Experiments

Chapter 8. Modular Programming

- A. Definitions and Advantages of Modular Programming
- B. Subroutines
- C. Program Example and Lab Experiments

Chapter 9. Software Engineering

- A. Hardware/Software Tradeoffs
- B. Structuring the Software
- C. Linking Program Modules
- D. Interrupt Servicing
- E. Real-Time Considerations
- F. Program Example and Lab Experiments

Chapter 10. Product Development

- A. Product Overview and Definition
- B. System Design and Development
- C. Software Development
- D. Debugging, Testing, and Development Tools
- E. Program Example

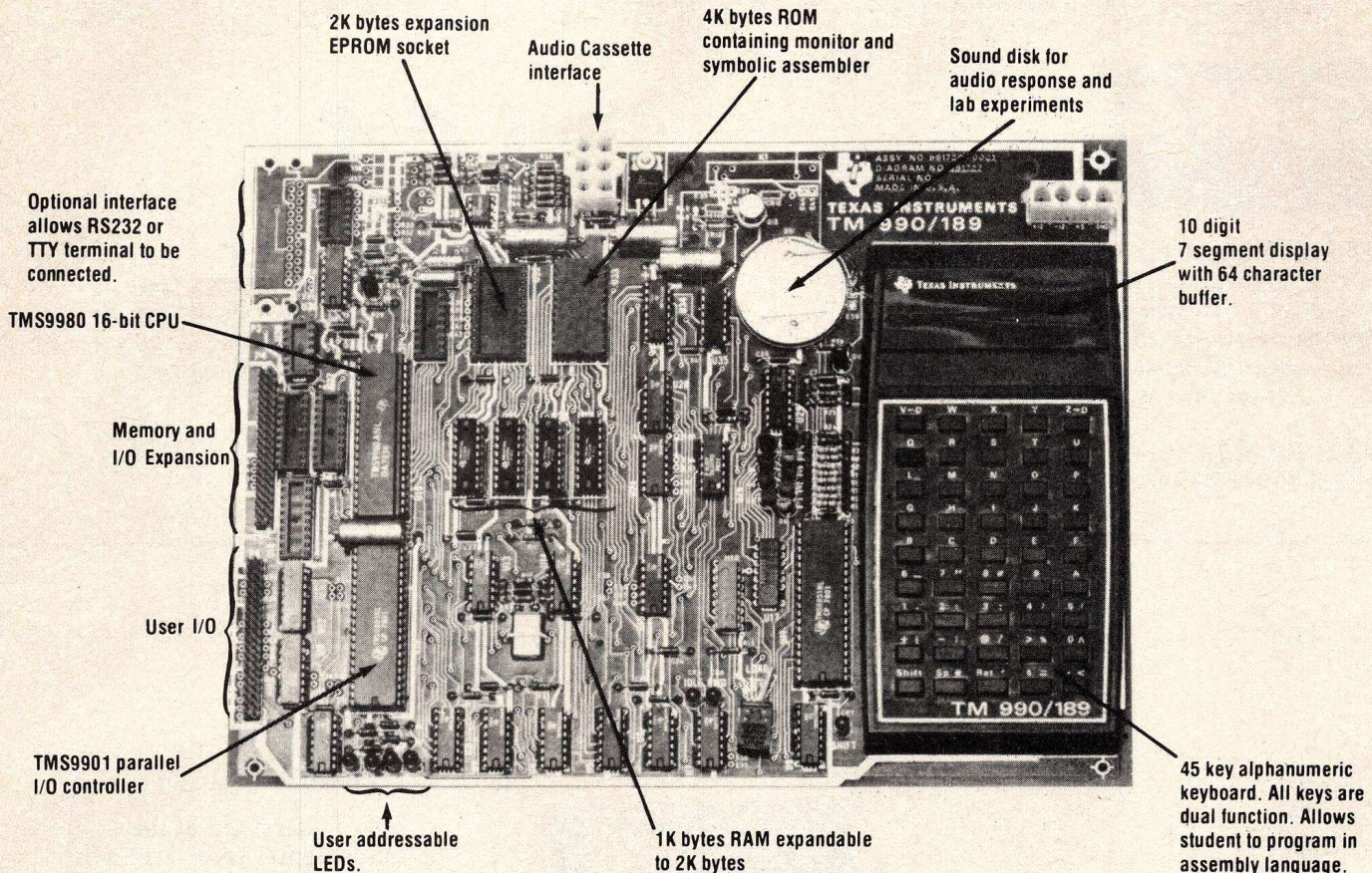


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TM990/189



The TM990 University Module is a complete learning aid that, in conjunction with the Tutorial Text, offers hands-on experience with microprocessors, I/O, memory, and *assembly language programming*.

This powerful learning tool offers advanced features such as an alphanumeric keyboard that does away with the drudgery of programming in hexadecimal. With the TM990/189 the programming is done in meaningful assembly language.

The microprocessor on the University Module offers a powerful instruction set. Multiply and divide, vectored interrupts, single bit I/O manipulation, parallel I/O, and seven addressing modes, point out just a few of the

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*Optional extra parts required

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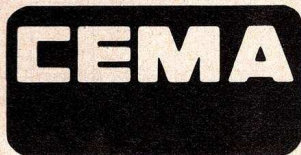
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9900 FAMILY SYSTEMS DESIGN BOOK 1016 Pages

Texas Instruments has developed and is manufacturing a family of microprocessor products and systems based on the architecture of its 990 minicomputer. The purpose of this book is to present enough factual information about the 9900 and the family of devices and systems surrounding it to serve not only as a guide for deciding to use the 9900 in an application, but also as the primary reference for design and programming activities. The book is much more than a data book or a collection of application notes. It contains basic concepts, presents methods and techniques, and most important of all, shows how the architecture of the 9900, substantially superior to other microprocessor architectures, can be translated into cost effective applications.



In reading this book, you will see the 9900 product as more than a single microprocessor. You will find a family of processors, peripherals, boards, mini-computers and systems all based on a single architectural concept called *memory-to-memory architecture*. It is this basic principle which, when

fully understood at the fundamental level, will help you understand why and how the 9900 can be used to implement outstanding products. In addition, you will see why Texas Instruments has made the commitment to the continued support of the 9900 family in both hardware and software. New microprocessors and peripheral devices will retain and complement the basic architectural features—the 16-bit word length, the instruction set, the I/O techniques, etc. Texas Instruments software support goes beyond the standard assembler, editor, linker and PROM programmer software. New design tools such as POWER BASIC and PASCAL are now available. These powerful software products bring structured programming disciplines into focus and help you to attain an advanced programming capability.

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