

MICROPROCESSOR USER SUPPORT AT LANGLEY RESEARCH CENTER

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The microprocessor is the most significant advance in electronics since the invention of the transistor. We are building systems today with microprocessors that a few years ago would have been completely impractical or extremely expensive. Microprocessors provide numerous advantages to the system designer such as lower cost, reduced development time, increased flexibility, and increased reliability. Despite these advantages, the use of microprocessors pose significant problems. These include:

- (1) A long learning process for proficient use of microprocessors.
- (2) The requirement for extensive support in both hardware and software.
- (3) The need for coordination and sharing of the creative effort to avoid unnecessary duplication.

The following steps have been implemented at Langley Research Center to address these problems.

- (1) The establishment of a microprocessor users committee to provide an advisory interface for management and users.
- (2) The training of microprocessor users.
- (3) The publication of a newsletter to disseminate information among microprocessor users.
- (4) The use of both cross-software on the central computer complex and microprocessor development systems to support the design of microprocessor based systems.

This presentation provides a general overview of microprocessor user support at Langley Research Center, including a detailed review of each of the above items. Special emphasis is given to the microprocessor support available from the central computer complex. An assessment of the effectiveness of the approach being taken at Langley is given. In addition, specific hardware and software development efforts that are targeted toward enhancing the existing microprocessor support is discussed.

MICROPROCESSOR SUPPORT AT LANGLEY RESEARCH CENTER

- MICROPROCESSOR USER'S COMMITTEE
- CENTRAL COMPUTER COMPLEX SUPPORT
- LOCAL MICROPROCESSOR SYSTEM DEVELOPMENT LABS

MICROPROCESSOR USER'S COMMITTEE

- CONSISTS OF KEY MICROPROCESSOR USERS
- ADVISES MANAGEMENT AND USERS
- ASSISTS IN PROVIDING USER TRAINING
- ASSISTS IN DEFINING REQUIRED HARDWARE AND SOFTWARE SUPPORT
- COMMUNICATES TO USER COMMUNITY VIA A "MICRO-NEWSLETTER"
(sent to 200 people)

CENTRAL COMPUTER COMPLEX SUPPORT

- MAINTAINS MICROPROCESSOR SUPPORT SOFTWARE
 - ASSEMBLERS (14)
 - COMPILERS (4)
 - SIMULATORS (12)
 - UTILITY PROGRAMS

- IN-HOUSE DEVELOPMENT
 - ASSEMBLERS, DISASSEMBLERS
 - 8748 PASCAL COMPILER
 - 68000 HALS COMPILER
 - CENTRAL COMPUTER COMPLEX LINKS TO MICROPROCESSOR LABS
 - HARDWARE AIDS FOR USERS

MICROPROCESSOR SUPPORT MAINTAINED ON LRC's CENTRAL COMPUTER COMPLEX

MICROPROCESSOR	DESCRIPTION	ASSEMBLER	SIMULATOR	HOL
8086	Intel 16-Bit	✓	✓	
68000	Motorola 16-Bit	✓	✓	PASCAL (HALS)
9900	Old 16-Bit	✓		
8080/8085	8-Bit	✓	✓	PLM
6800/6802 . . .	8-Bit	✓	✓	MPL
Z-80	8-Bit, Super 8080	✓	✓	8080 PLM
6809	8-Bit, Super 6800	✓		
8748/8741	8-Bit, Single Chip	✓	✓	PASCAL
1802	8-Bit	✓	✓	
6502	8-Bit	✓		
4040	4-Bit	✓	✓	

LOCAL MICROPROCESSOR SYSTEM DEVELOPMENT LABS

- Typical Lab (ACD's)
 - Intel Development System linked to Central Computer Complex
 - Over a dozen users with standard procedures and documentation
 - Assemblers for 8080/8085, 8748/8741, 8086/8088
 - PLM compilers for 8080/8085, 8086/8088
 - FORTRAN for 8080/8085
 - IN-CIRCUIT EMULATORS (ICE) for 8080, 8085, 8748, 8086, 3000
 - EPROM PROGRAMMER

- Local Microprocessor Development Systems at Langley
 - Intel (7)
 - Motorola (5)
 - Tektronix (2)
 - Texas Instruments (2)

CHARACTERISTICS OF MICROPROCESSOR SOFTWARE ON CENTRAL COMPUTER COMPLEX

- STRENGTHS
 - UNIVERSAL
 - SIMULTANEOUS USERS
 - FAST
 - FLEXIBLE
 - TAKES ADVANTAGE OF EXISTING RESOURCES

- WEAKNESSES
 - RELATIVELY DIFFICULT TO LEARN (COMPLEX OPERATING SYSTEM AND EDITOR)
 - LACK STATE OF THE ART SOFTWARE
 - CANNOT SIMULATE ENTIRE SYSTEM
 - FRAGMENTS DEVELOPMENT PROCESS