



8051 SOFTWARE DEVELOPMENT PACKAGE

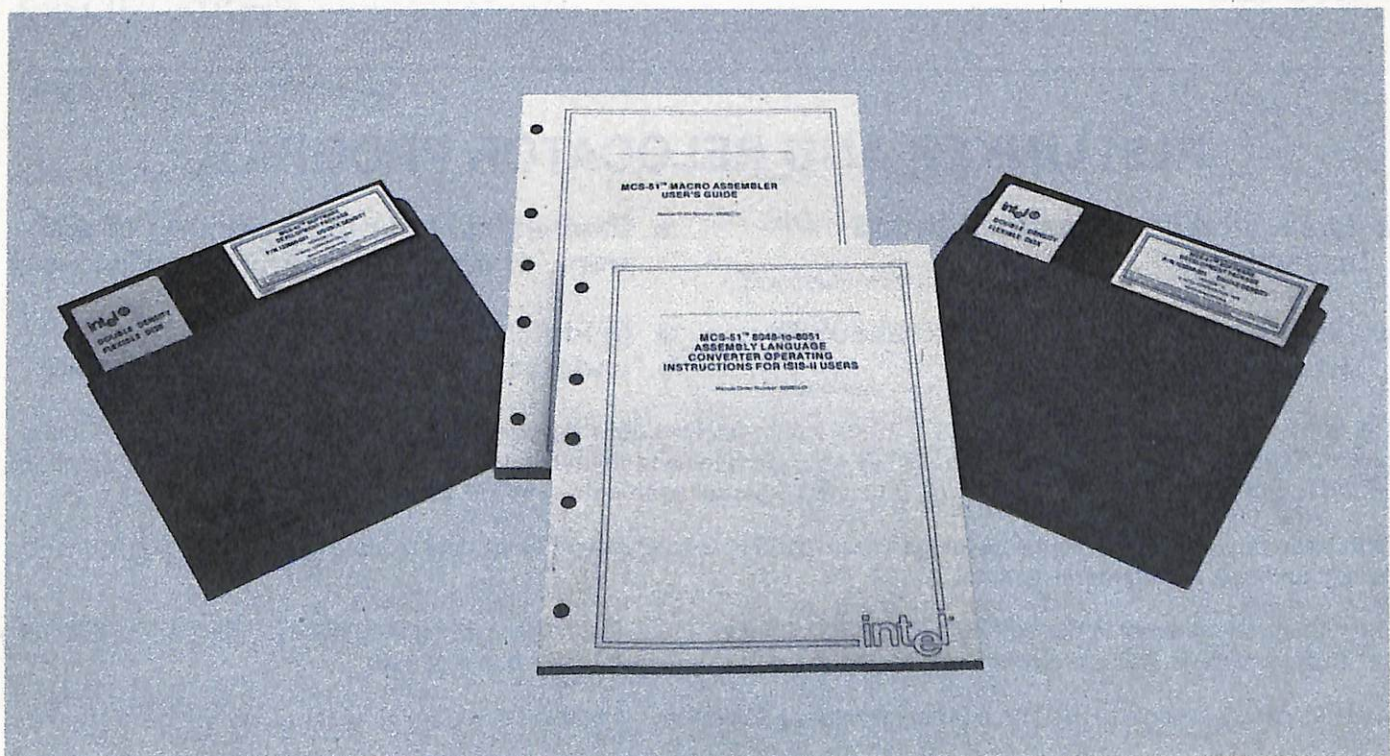
- Symbolic relocatable assembly language programming for 8051 microcontrollers
- Extends Intellect® Microcomputer Development System to support 8051 program development
- Produces Relocatable Object Code which is linkable to other 8051 Object Modules
- Encourage modular program design for maintainability and reliability
- Macro Assembler features conditional assembly and macro capabilities
- CONV51 Converter for translation of 8048 assembly language source code to 8051 assembly language source code
- Provides upward compatibility from the MCS-48™ family of single-chip microcontrollers

The 8051 software development package provides development system support for the powerful 8051 family of single chip microcomputers. The package contains a symbolic macro assembler and MCS-48 source code converter.

The assembler produces relocatable object modules from 8051 macro assembly language instructions. The object code modules can be linked and located to absolute memory locations. This absolute object code may be used to program the 8751 EPROM version of the chip. The assembler output may also be debugged using the ICE-51™ in-circuit emulator.

The converter translates 8048 assembly language instructions into 8051 source instructions to provide software compatibility between the two families of microcontrollers.

This diskette-based software package runs under ISIS-II on an Intellect Microcomputer Development System with 64K bytes of memory.



8051 MACRO ASSEMBLER

- Supports 8051 family program development on Intellec® Microcomputer Development Systems
- Gives symbolic access to powerful 8051 hardware features
- Produces object file, listing file and error diagnostics
- Object files are linkable and locatable
- Provides software support for many addressing and data allocation capabilities
- Symbolic Assembler supports symbol table, cross-reference, macro capabilities, and conditional assembly

The 8051 Macro Assembler (ASM51) translates symbolic 8051 macro assembly language modules into linkable and locatable object code modules. Assembly language mnemonics are easier to program and are more readable than binary or hexadecimal machine instructions. By allowing the programmer to give symbolic names to memory locations rather than absolute addresses, software design and debug are performed more quickly and reliably. Furthermore, since modules are linkable and relocatable, the programmer can do his software in modular fashion. This makes programs easy to understand, maintainable and reliable.

The assembler supports macro definitions and calls. This is a convenient way to program a frequently used code sequence only once. The assembler also provides conditional assembly capabilities.

Cross referencing is provided in the symbol table listing, showing the user the lines in which each symbol was defined and referenced.

ASM51 provides symbolic access to the many useful addressing features of the 8051 architecture. These features include referencing for bit and byte locations, and for providing 4-bit operations for BCD arithmetic. The assembler also provides symbolic access to hardware registers, I/O ports, control bits, and RAM addresses.

Math routines are enhanced by the MULtiple and DIVide instructions.

If an 8051 program contains errors, the assembler provides a comprehensive set of error diagnostics, which are included in the assembly listing or on another file. Program testing may be performed by using the Universal PROM Programmer and 8751 personality card to program the 8751 EPROM version of the chip, or by using the ICE-51 in-circuit emulator.

RL51 LINKER AND RELOCATOR PROGRAM

- Links modules generated by the assembler
- Locates the linked object to absolute memory locations
- Enables modular programming of software for efficient program development
- Modular programs are easy to understand, maintainable and reliable

The 8051 linker and relocater (RL51) is a utility which enables 8051 programmers to develop software in a modular fashion. The linker resolves all references between modules and the relocater assigns absolute memory locations to all the relocatable segments, combining relocatable partial segments with the same name.

With this utility, software can be developed more quickly because small functional modules are easier to understand, design and test than large programs.

The number of symbols in the software is very large because the assembler symbol limit applies only per module not the entire program. Therefore programs can be more readable and better documented.

Modules can be saved and used on different programs. Therefore the software investment of the customer is maintained.

RL51 produces two files. The absolute object module file can be directly executed by the 8051 family. The listing file shows the results of the link/locate process.

CONV51 8048 TO 8051 ASSEMBLY LANGUAGE CONVERTER UTILITY PROGRAM

- Enables software written for the MCS-48™ family to be upgraded to run on the 8051
- Maps each 8048 instruction to a corresponding 8051 instruction
- Preserves comments; translates 8048 macro definitions and calls
- Provides diagnostic information and warning messages embedded in the output listing

The 8048 to 8051 Assembly Language Converter is a utility to help users of the MCS-48 family of microcomputers upgrade their designs with the high performance 8051 architecture. By converting 8048 source code to 8051 source code, the software investment developed for the 8048 is maintained when the system is upgraded.

The goal of the converter (CONV51) is to attain functional equivalence with the 8048 code by mapping each 8048 instruction to a corresponding 8051 instruction. In some cases a different instruction is produced because of the enhanced instruction set (e.g., bit CLR instead of ANL).

Although CONV51 tries to attain functional equivalence with each instruction, certain 8048 code sequences cannot be automatically converted. For example, a delay routine which depends on 8048 execution speed would require manual adjustment. A few instructions, in fact, have no 8051 equivalent (such as those involving P4-P7). Finally, there are a few areas of possible intervention such as PSW manipulation and interrupt processing, which at least require the user to confirm proper translation. The converter always warns the user when it cannot guarantee complete conversion.

CONV51 produces two files. The output file contains the ASM51 source program produced from the 8048 instructions. The listing file produces correlated listings of the input and output files, with warning messages in the output file to point out areas that may require users' intervention in the conversion.

SPECIFICATIONS

OPERATING ENVIRONMENT

Required Hardware:

Intellec Microcomputer Development System with
64K Bytes of RAM
Flexible Disk Drive(s)
System Console
— CRT or hard copy device

Optional Hardware:

Universal PROM Programmer
Line Printer
ICE-51 In-Circuit Emulator

Required Software:

ISIS-II Diskette Operating System (V3.4 or later)

Documentation Package:

MCS-51 Macro Assembler User's Guide
MCS-51 Utilities User's Guide for 8080/8085 Based Development System
MCS-51 Macro Assembly Language Pocket Reference
MCS-51 Assembler and Utilities Pocket Reference
MCS-51 8048-to-8051 Assembly Language Converter Operating Instructions for ISIS-II Users

ORDERING INFORMATION

Part Number	Description
MCI-51-ASM	8051 Software Development Package

CONVERTER UTILITY PROGRAM

- Provides command processor for
macro definitions and editing
- Provides diagnostic information and
warning messages explained in the
output listing



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