



## MICROCOMPUTER SOFTWARE

## MCS-40<sup>TM</sup> CROSS ASSEMBLER MAC4

The MCS-40 Cross Assembler, MAC4, is a powerful program development tool for Intel's® 4-bit microcomputers, the 4004 and the new 4040. MAC4 provides extensive capabilities which reduce the time and effort involved in program development, debug and documentation. The cross assembler allows usage of the high speed I/O and text editing capability of a large computer system to further shorten the programming task.

MAC4 is written in ANSI standard FORTRAN IV and is designed to run on most large scale computing systems with a 32-bit or larger integer format (word size). It is also available for immediate use on several major time-sharing services throughout the world.

MAC4 translates 4004/4040 machine assembly language instructions into the appropriate machine operation codes. In addition to eliminating the errors of hand translation, the ability to refer to program addresses with symbolic names makes it easy to modify programs by adding or deleting instructions, or to move the program to another memory location. Full macro capability eliminates the need to rewrite similar sections of code repeatedly and simplifies program documentation. Conditional assembly permits MAC4 to include or delete sections of code which may vary from system to system, such as the code required to handle optional external devices.

Output from MAC4 may be punched to paper tape in hex format for loading into an Intellec® 4 Development System or may be punched in BNPF format to program ROMs.

**Accepts All 4004 and 4040  
Instructions**

**Conditional Assembly Capability**

**Full Macro Facility**

**Hexadecimal or BNPF Object Code  
Formats**

**Written in ANSI Standard FORTRAN  
IV**

**Comprehensive User Documentation**

**Instantly Available On Worldwide  
Timesharing Services**





# SPECIFICATIONS

## CAPABILITIES:

Accepts all 66 instruction mnemonics plus 10 pseudo-operators.

Allows up to 499 labels in standard configuration; easily expandable.

Allows a total of up to 9 levels of nested conditional assembly and nested macro-calls.

User definable I/O formats.

Batch or interactive mode.

## OPERATIONAL ENVIRONMENT:

Hardware required

32-bit or larger word size

12–16K words depending on machine

Software required

ANSI standard FORTRAN IV compiler

## SHIPPING MEDIA:

Magnetic tape

## TAPE FORMAT:

9 Track

EBCDIC

800 BPI

80 Byte unblocked

records

Unlabeled

## TAPE CONTENTS:

MCS-40™. Cross Assembler (FORTRAN IV Source)

MERGE Source File Editing Program (FORTRAN IV Source)

XCNV4 Conversion Program (FORTRAN IV Source)

## DOCUMENTATION PACKAGE

### INCLUDES:

4004/4040 Assembly Language Programming Manual

MAC4 Operator's Manual and Installation Guide

Pocket Reference Card

## MCS-40™ ASSEMBLY LANGUAGE PROGRAMMING EXAMPLE:

```

;          DECIMAL ADDITION
;          ADDEND 1 IN RAM 0, REG 0
;          ADDEND 2 IN RAM 0, REG 1
;          SUM TO RAM 0, REG 2
;          ALL NUMBERS ARE STORED LEAST
;          SIGNIFICANT DIGIT FIRST
0000      ADD1 EQU 00H ; ADDRESS ADDEND 1
0010      ADD2 EQU 10H ; ADDRESS ADDEND 2
0020      SUM  EQU 20H ; ADDRESS SUM
0000      PLUS:
0000      2000      FIM 0,ADD1 ; POINT TO START OF ADDEND 1
0002      2210      FIM 2,ADD2 ; POINT TO START OF ADDEND 2
0004      2420      FIM 4,SUM ; POINT TO START OF SUM
0006      F1        CLC ; CLEAR CARRY
0007      LOOP:
0007      21        SRC 0
0008      E9        RDM ; READ NEXT DIGIT OF ADDEND 1
0009      23        SRC 2
000A      EB        ADM ; ADD NEXT DIGIT OF ADDEND 2
000B      FB        DAA ; ADJUST FOR DECIMAL
000C      25        SRC 4
000D      E0        WRM ; WRITE DIGIT TO SUM
000E      61        INC 1 ; ADVANCE
000F      63        INC 3 ; ADDRESS
0010      75G7      ISZ 5,LOOP ; POINTERS AND LOOP
0012      F7        TCC ; MOVE HIGH-DIGIT CARRY TO ACC
0013      E4        WR0 ; AND WRITE TO STATUS CHAR 1
0014      C0        BBL 0 ; RETURN FROM SUBROUTINE
END
```

## ORDERING INFORMATION:

**Part Number**      **Description**  
Z4000-XAS-FTR      MCS-40  
Cross Assembler

Also available on these time-sharing services:

<b>U.S., U.K., France</b>	<b>Japan</b>
Tymshare	Dentsu
<b>U.S., Canada</b>	<b>U.S.</b>
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