MICROCOMPUTER SOFTWARE

CROMIS SERIES 3000 CROSS MICROPROGRAMMING SYSTEM

The Intel® Series 3000 Cross Microprogramming System, CROMIS, is an advanced software system that supports the generation of microprograms for custom Series 3000 processor and controller micro-architectures. It provides extensive programming facilities that greatly reduce the time and effort required to develop, debug, and document a microprogram.

CROMIS is designed for use on almost any modern computing system with high speed I/O and on-line file facilities. It is available in ANSI (standard) FORTRAN IV source form for user installation or may be immediately accessed on any of several major time-sharing services throughout the world. To insure the long term reliability and maintainability of CROMIS, all component programs are written in a highly modular, structured programming style with extensive operational documentation.

CROMIS consists of two major software subsystems, XMAS and XMAP. XMAS is a symbolic microassembler which is dynamically user extensible in the size and structure of the target microinstruction format. XMAP is a complementary subsystem which maps the microinstruction bit patterns produced by XMAS into the desired physical microprogram memory locations.

In addition to providing four built-in microinstruction fields and corresponding mnemonic sets for the basic 3001 MCU and 3002 CPE functions, XMAS accepts user definitions for extended microinstruction fields and their associated mnemonics. Graphic debugging aids, string macro capability, definable defaults, and extended address generation further simplify the microprogramming of Series 3000 computing elements.

XMAP accepts the microinstruction file produced by XMAS and generates under user specifications one or more programming files for use with standard memory components. It enables the user to specify the mapping of the individual bits in each microinstruction field into the physical bit positions of the microprogram memory components.

- **Built-In Series 3000 Fields and Mnemonics**
- **User Definable Fields and Mnemonics**
- **Hierarchical Field Defaults**
- **Free Field Statement Format**
- **String Macro Capability**
- **Extended Address Generation**
- **Graphical Microprogram Memory Display**
- **Symbolic Label Reference Directory**
- **MCU Jump Address Validation**
- **RAM/ROM/PROM Programming File Generation**

SPECIFICATIONS

XMAS CAPABILITIES

Translates all 3001 MCU and 3002 CPE mnemonics.

Dynamically allocates storage for labels, values and strings in a user expandable data area.

Accepts microinstruction format definitions of up to 64 total bits.

Provides extended address generation for up to 16K microinstructions.

Includes a four-level user definable field default mechanism.

XMAP CAPABILITIES

Provides direct or inverted mapping for any bit in any microinstruction field.

Permits explicit 1's or 0's to be specified for unused bit locations.

Generates standard BNPF or hexadecimal programming files.

Accepts memory configuration definitions from 1 X 1 bits to 16K X 16 bits.

OPERATIONAL ENVIRONMENT

Required hardware:

- 16-bit or larger word size
- 5 rewindable data files (disc or tapes)

Required software:

- ANSI standard FORTRAN IV compiler

TAPE CONTENTS

TAPE 1

- Part 1 of XMAS FORTRAN IV Source

TAPE 2

- Part 2 of XMAS FORTRAN IV Source
- XMAS Sample Program
- XMAP FORTRAN IV Source
- XMAP Sample Program
- MERGE File Editing Program

SHIPPING MEDIA

Two 2400' magnetic tapes

TAPE FORMAT

9-track	800 bpi
80 byte	unblocked
EBCDIC	unlabeled

DOCUMENTATION

CROMIS Reference Specification

XMAS/XMAP Message Summary

XMAS Installation Guide (preamble to XMAS FORTRAN source)

XMAP Installation Guide (preample to XMAP FORTRAN source)

CROMIS MICROPROGRAM EXAMPLE

```
XMAS VERS 1.0 16-BIT MULTIPLY
RECORD
NUMBER
     1              /* 10.2 USEC UNSIGNED 16-BIT INTEGER MULTIPLY
     2                 ASSUMPTIONS:  MULTIPLICAND IS IN PAIR OF 3212'S
     3                               BUFFERING M-BUS;
     4              */
     5
     6              /* CONVENIENT STRING DEFINITIONS */
     7              COUNT    STRING 'R8' ; /* LOOP COUNT IN R8 */
     8              P.P      STRING 'AC' ; /* PARTIAL PRODUCT IN AC */
     9              M.PLIER STRING 'T' ; /* MULTIPLIER IN T */
    10              ANDK     STRING 'TZR' ; /* PSEUDO OP AND */
    11
    12              /* CONVENIENT IMPLY DEFINITIONS */
    13              INR IMPLY FO = 11B ; /* INR IMPLIES INCREMENT */
    14              SDR IMPLY FO = 11B ; /* SDR IMPLIES STORE ONLY */
    15
    16              /* MASK FIELD DEFINITION */
    17              MASK FIELD LENGTH = 2
    18                        MICROPS( KFFF0 = 10B ) ;  MASK KBUS ;
    19
    20
     2.                    /* INITIALIZE LOOP COUNTER */
    22   90H:              CSR(COUNT) ; /* SET COUNT REG TO ALL 1'S */
    23   91H:              ANDK(COUNT) KFFF0 ; /* FORCE COUNT REG TO -16 */
    24
    25   94H:              CLR(P.P) ; /* CLEAR PARTIAL PRODUCT */
    26   95H:              SRA(M.PLIER) ; /* PLACE LSB OF M'PLIER ON FI LINE */
    27
    28                     /* MAIN MULTIPLY LOOP */
    29   92H: MPYLOOP:
    30                     INR(COUNT) /* INCREMENT LOOP COUNT */
    31                        JFL(ONE, ZERO) /* BRANCH ON M'PLIER BIT */
    32                           STZ ; /* SAVE CARRY FOR LOOP EXIT TEST */
    33   0A3H: ONE:           ADA(P.P) ; /* ADD MULTIPLICAND TO PARTIAL PRODUCT */
    34   0A2H:                SRA(P.P) STZ ; /* SAVE LSB OF PARTIAL PRODUCT IN Z */
    35   0A4H: ZERO:          SRA(M.PLIER) FFZ /* SHIFT & LINK IN P-P BIT FROM Z */
    36                     JZF( MPYLOOP, EXIT ) ; /*TEST OLD CARRY FOR LOOP EXIT */
    37
    38   93H: EXIT:        NOP(RO) JMP(EXIT) ;
    39
    40   EOF
```

ORDERING INFORMATION:

Part Number	Description
Z3000-XAS-FTR	CROMIS Series 3000 Microprogramming System

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