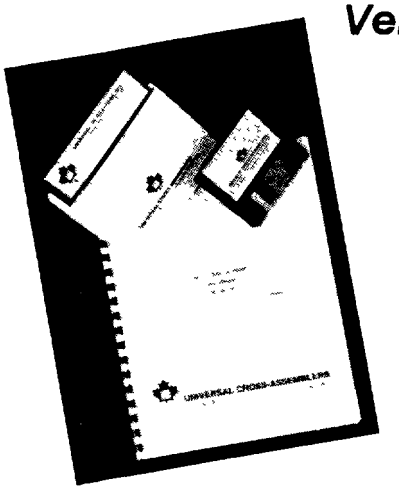
178-050

# FACTSHEET

# Cross-32 Meta-Assembler

## Version 2.0

- *Table driven macro cross-assembler*
- *Over 30 processor tables included*
- *User's may create tables for other processors*
- *Uses the manufacturer's mnemonics*
- *Arithmetic operators from the C programming language*
- *Free format source file*



The Cross-32 Meta-Assembler from Universal Cross-Assemblers is a table based macro cross-assembler that compiles programs for numerous different target processors on any MS-DOS® computer. By using a flexible instruction table structure, it assembles source code for many microprocessors, microcontrollers and digital signal processors, written in the original manufacturer's mnemonics. Cross-32 reads the assembly language source file and a corresponding assembler instruction table, and writes a list file and an absolute hexadecimal machine file in the binary, Intel or Motorola formats. This hexadecimal file can then be downloaded to most EPROM programmers, EPROM emulators and in circuit emulators.

Cross-32 saves the cost of purchasing many individual assemblers, and reduces the time needed to learn numerous different products. It can be difficult enough to grasp the intricacies of different processors, without having to master new tools. To further simplify the learning process, Cross-32 uses features of the C programming language wherever possible.

The Cross-32 User's Manual includes full directions for writing new processor tables, and modifying those supplied. Since many new processor's assembly language instruction sets are merely supersets of one of the processors included with Cross-32, this can be as simple as adding several lines to an existing table. Therefore, as new processors are introduced, the assembler does not become obsolete, and your investment is protected.

### Processor Families Included:

- 1802/5/6
- 37700
- 50740/37450
- 64180
- 6502/C02
- 65816
- 6800/1/2/3/8/6301/3
- 6805/HC05
- 6809
- 68HC11
- 68000/8/10/302*
- 8041
- 8048
- 8051
- 8085
- 8086/88/186/188*
- 8096/C196
- COP400
- COP800
- NEC7500
- SUPER8
- TMS3201X
- TMS3202X*
- TMS34010*
- TMS370
- TMS7000
- TMS9900/95
- Z8
- Z80
- Z180
- Z280*
- Call regarding others . . .

### Assembler Directives

| | |
|---|---|
| ; | Comment |
| CPU | Processor |
| DFB | Define byte or string |
| DFS | Define data storage |
| DWM | Define word |
| DWL | Define inverted word |
| DFL | Define long word |
| ELSE | Alternate conditional* |
| END | End of assembly |
| ENDI | End of IF block* |
| ENDM | End of MACRO block* |
| EQU | Equate label to value |
| HEX | Switch hex file on or off |
| HOF | Select hexadecimal format |
| IF | Conditional assembly* |
| INCL | Include file into source |
| LIST | Switch list file on or off |
| MACRO | Define macro* |
| ORG | Program counter origin |
| PAGE | Listing Page length and eject |
| SETL | Alterable equate label* |
| TITL | Title starting listing pages |
| WDLN | Size of processor word |

### Labels

- unlimited length
- all characters significant
- must start with A-Z, _, ., or ? character
- may include A-Z, 0-9, _, ., and ? characters
- must end with colon:

### Numeric Constants

- 32-bit signed integers
- ANSI C: 0xnn, 0nn, nn
- Trailing character: nnB,nnO,nnQ,nnD,nnH
- $ sign: $nn
- Decimal is default base
- Range -2,147,483,648 to 2,147,483,647

### *Operators*

Arithmetic and logical
Similar to ANSI C

| | |
|---|---|
| () | script parentheses |
| ! | logical complement |
| ~ | arithmetic complement |
| + | unary addition |
| - | unary subtraction |
| INV | invert byte order |
| * | multiplication |
| / | division |
| % | modulus |
| + | addition |
| - | subtraction |
| << | left shift |
| >> | right shift |
| < | less than |
| <= | less than or equal to |
| > | greater than |
| >= | greater than or equal to |
| == | equal to |
| != | not equal to |
| & | arithmetic AND |
| ^ | arithmetic XOR |
| \| | arithmetic OR |
| && | logical AND |
| \|\| | logical OR |
| , | multiple expressions |

### *Other Special Symbols*

| | |
|---|---|
| $ | value of program counter |
| " | character "string" |

### *Editor*

- Use your favorite ASCII editor or word-processor in non-document mode
- Error output compatible with many programming editors

### *Error Output*

- file (row,column): message
- sent to screen and listing
- compatible with BRIEF®, the Microsoft® Editor, and other text editors giving an integrated programming environment

### *Command Line*

- C32 filename —L listname —H hexname

### *Hexadecimal Output*

- User chooses format using HOF directive from: Binary Intel Hex and Extended Hex Motorola S records: S19, S28, or S37

### *Processor Instruction Tables*

- Tables for ALL processors listed above are included.
- Tables are ASCII files that may be printed and edited.
- Tables have a four part structure defining registers; operands and their ranges; addressing modes; and mnemonics.
- Creating a new table requires 3 to 30 hours of work, depending on the processor's complexity.

### *Benchmark*

- Assembles 6000 lines per minute of 6801 source code on a 12 MHz 80286 computer.

### *Documentation*

- User's manual
- Table of contents
- Index
- Numerous examples
- Instructions for creating processor tables
- Example source file for each processor on disk

### *Support*

- Call the above number anytime
- Will talk to registered users for as long as they wish

### *System Requirements*

- MS-DOS® 2.0 or later
- 256 kilobytes RAM
- 3.5" 720k or 5.25" 360k floppy drive

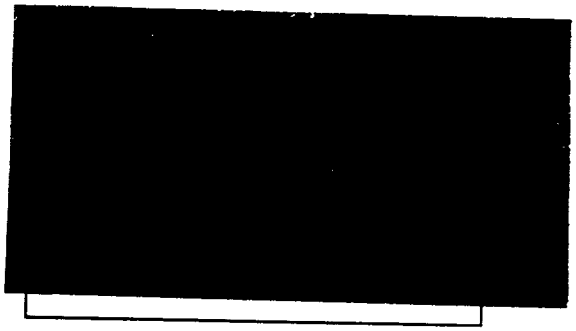
### License

- Each unit of Cross-32 may be used on only one keyboard of one computer at any given time.
- Unauthorized use, duplication or distribution is strictly prohibited.

### Other Features

- Case insensitive
- Two pass assembler with third pass if a phase error occurs.
- Program counter range: 0 to 4,294,967,295
- Binary checksum displayed on screen
- Not copy protected.

### *Your local expert:*




**Universal Cross-Assemblers**
P.O. Box 6158
Saint John, N.B., Canada
E2L 4R6
Voice/Fax: (506)847-0681


* Not supported by Cross-16 V2.0




**UNIVERSAL CROSS-ASSEMBLERS**
P.O. Box 6158, Saint John, N.B., Canada E2L 4R6 Voice/Fax: (506) 847-0681