Microsoft® Macro Assembler Version 5.1

Microsoft Macro Assembler version 5.1 puts all the speed and power of assembly-language programming within easy reach. Make your programs run faster by linking assembly-language subroutines to your Microsoft QuickBASIC, BASIC compiler, QuickC™, C, FORTRAN, and Pascal programs.

Technical Highlights

If you're accustomed to programming in a high-level language like Microsoft QuickBASIC, BASIC compiler, QuickC, C, FORTRAN, or Pascal, Microsoft Macro Assembler version 5.1 is the bridge you've been looking for to the assembly-language environment. You can, for example, use the powerful graphics functions of Microsoft QuickBASIC or the efficient math functions of Microsoft FORTRAN and then add time-critical routines in Microsoft Macro Assembler.

Easier to learn and use.

A broad range of examples in the revised and expanded documentation puts assembly-language programming within the grasp of any programmer experienced in a Microsoft language. And an on-line tutorial and comprehensive help file assist newcomers in debugging their Macro Assembler programs.

We also give you the foundation for writing assembly-language subroutines by providing sample template programs on disk that you can customize with your own code.

And in case an error creeps into your code, you can locate it rapidly with Microsoft CodeView®, the powerful window-oriented source-level debugger included with Microsoft Macro Assembler.

Clear, complete documentation.

Microsoft Macro Assembler version 5.1 comes with four manuals, including the *Programmer's Guide*, which goes well beyond the level of documentation supplied with previous versions of Microsoft Macro Assembler. This totally revised guide provides a complete and well-organized explanation of Microsoft Macro Assembler and the instruction sets it supports.

What's more, the *Mixed-Language Programming Guide* included with Microsoft Macro Assembler version 5.1 contains complete, easy-to-follow instructions on how to call assembly-language subroutines from Microsoft QuickBASIC, BASIC compiler, QuickC, C, FORTRAN, or Pascal programs. Loaded with examples, this guide will rapidly bring both newcomers and seasoned professionals up to speed.

The *Macro Assembler Reference* provides a wealth of information on the instruction set, with sections on the processors and coprocessors supported and on directives and related programs. Processor instructions are arranged alphabetically, and each entry includes syntax, timing data, and examples.

Finally, the *Microsoft CodeView and Utilities* manual is a comprehensive guide to the capabilities and operation of Microsoft CodeView and the many utilities included in the Microsoft Macro Assembler package.

Simplified assembly-language programming.

New simplified segment directives allow easy program and subroutine setup. For example, just four directives ensure that segments are set up correctly. To declare the correct model for your subroutine, just use the MODEL directive and choose the model you need. To start your data segment, just add a DATA directive; to create a stack, add a STACK directive; and to begin writing instructions, use the CODE directive.

High-level language interface macros help you declare your subroutines, set up stack parameters, and create local variables. In addition, version 5.1 offers MS-DOS interface macros that make it easy to call system routines.

High-speed assembler with 80386 and MS OS/2 support.

Version 5.1 of the Microsoft Macro Assembler assembles 25 to 40 percent faster than version 4.0 and links twice as fast, with an assembly rate of 25,000 lines per minute,* maintaining the reputation of Microsoft Macro Assembler as the fastest macro assembler available for the MS-DOS environment.

Microsoft Macro Assembler version 5.1 supports the Intel® 80386 instruction set and 80386 segmentation, including automatic generation of the correct code for both 16-bit and 32-bit segments and new real- and protected-mode instructions.

You can write MS OS/2 applications that break the 640K barrier, with full MS OS/2 support, including dynamic linking and threads.

And by creating "bound" executable programs, you can be sure they'll run under both MS-DOS and MS OS/2.

Microsoft®

Microsoft CodeView takes the guesswork out of debugging.

Microsoft CodeView, a remarkable window-oriented source-level debugger, gives you precise control over your program's execution. CodeView is ideal for debugging the assembly-language subroutines called from your Microsoft QuickBASIC,† BASIC compiler, QuickC, C, FORTRAN, and Pascal† programs.

Microsoft CodeView features a visual interface, drop-down menus, plain-language commands, and on-line help so you can debug any program quickly and easily at the source level. With your source code on the screen, you see all your comments, variable names, and data declarations just as you wrote them.

Multiple windows let you simultaneously view source code, variables, and registers, so that as you debug your program, you can see the values automatically updated on the screen. You can see and manipulate all your local and global variables. Display data structures and interactively follow linked lists and nested structures. Set watchpoints and tracepoints to stop your program's execution when a variable or expression changes value. Set conditional breakpoints on variables, expressions, or memory. You can even trace, animate, or single-step through your program, switch back and forth between your source code and the program's output, and trace your calls on the stack.

Microsoft CodeView lets you debug especially large programs—up to 128 MB under MS OS/2. There's support for the Expanded Memory Specification (EMS), and you can debug overlay programs under MS-DOS. Debug multiple-thread programs and dynamic-link modules under MS OS/2, and debug library modules under either operating system.

What's more, you can debug Macro Assembler programs written for 80386-based computers, disassemble 80386 instructions, and display the extended 80386 register set.

Powerful LINK utility is the key to combining executable files.

Microsoft Macro Assembler's LINK utility allows you to combine assembly language subroutines with main programs written in Microsoft QuickBASIC, BASIC compiler, QuickC, C, FORTRAN, and Pascal (including programs written for the 80386 CPU) into a single executable file containing up to 1 MB of code and data (MS-DOS) or up to 128 MB (MS OS/2). And it does its job twice as fast as the version 4.0 linker.

The new incremental linker for MS OS/2, ILINK, is even faster, performing partial links up to 20 times faster

With Microsoft Macro Assembler version 5.1, you can now debug assembly-language programs written for the 80386, disassemble 80386 instructions, and display the extended 80386 register set.

than a full link. You can link several files together into defined memory areas, link and overlay any number of programs with one command, and automatically resolve external references between modules.

Other advanced utilities complete the package.

- Microsoft Editor for MS-DOS and MS OS/2:
  - Supports multitasking in protected mode under MS OS/2.
  - Allows you to run programs from within itself, with compilation errors from multiple sources returned.
  - Is easy to customize.
- Library manager (LIB)
- Program maintenance utility (MAKE)
- Cross-reference utility (CREF)

Specifications

System requirements
- 320K available user memory
- MS OS/2 1.0 or MS-DOS 2.1 or higher
- Two double-sided disk drives

Shipping media
- 5¼" disks in standard MS-DOS and MS OS/2 format
- 3½" disks in standard MS-DOS and MS OS/2 format

Microsoft®