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## Microsoft® CodeView® Debugger

The Microsoft® CodeView® debugger runs the assembled or compiled program while simultaneously displaying the program source code, program variables, memory locations, processor registers, and other pertinent information.

**Syntax** CV *[[options]] executablefile* *[[arguments]]*

CVW *[[options]] executablefile* *[[arguments]]*

| Options | Option             | Action   |
|---------|--------------------|--|
|         | /2                 | Permits the use of two monitors.   |
|         | /8                 | Uses 8514/a as Windows display, and VGA as debugger display (CVW only).                                    |
|         | /25                | Starts in 25-line mode.  |
|         | /43                | Starts in 43-line mode.  |
|         | /50                | Starts in 50-line mode.  |
|         | /B                 | Starts in black-and-white mode.  |
|         | /C <i>commands</i> | Executes <i>commands</i> on startup.   |
|         | /F                 | Exchanges screens by flipping between video pages (CV only).   |
|         | /G                 | Eliminates refresh snow on CGA monitors.   |
|         | /I[0   1]          | Turns nonmaskable-interrupt and 8259-interrupt trapping on (/I) or off (/I0).                              |
|         | /L <i>dllfile</i>  | Loads DLL <i>dllfile</i> for debugging (CVW only).   |
|         | /K                 | Disables installation of keyboard monitors for the program being debugged (CV only).                       |
|         | /M                 | Disables CodeView use of the mouse. Use this option when debugging an application that supports the mouse. |
|         | /N[0   1]          | /N0 tells CodeView to trap nonmaskable interrupts; /N1 tells it not to trap.                               |
|         | /R                 | Enables 80386/486 debug registers (CV only).   |
|         | /S                 | Exchanges screens by changing buffers (primarily for use with graphics programs) (CV only).                |
|         | /TSF               | Toggles TOOLS.INI entry to read/not read the CURRENT.STS file.   |

| Environment Variables | Variable   | Description   |
|-----------------------|------------|---|
|                       | HELPPFILES | Specifies path of help files or list of help filenames. |
|                       | INIT       | Specifies path for TOOLS.INI and CURRENT.STS files.     |

## CVPACK

The CVPACK utility reduces the size of an executable file that contains CodeView debugging information.

**Syntax** CVPACK *[[options]] exefile*

| Options | Option | Action  |
|---------|--------|---|
|         | /HELP  | Calls QuickHelp for help on CVPACK.               |
|         | /P     | Packs the file to the smallest possible size.     |
|         | /?     | Displays a summary of CVPACK command-line syntax. |

## EXEHDR

The EXEHDR utility displays and modifies the contents of an executable-file header.

**Syntax** EXEHDR *[[options]] filenames*

| Options | Option              | Action   |
|---------|---------------------|--|
|         | /HEA: <i>number</i> | Option name: /HEA[[P]]. Sets the heap allocation field to <i>number</i> bytes for segmented-executable files.  |
|         | /HEL                | Option name: /HEL[[P]]. Calls QuickHelp for help on EXEHDR.  |
|         | /MA: <i>number</i>  | Option name: /MA[[X]]. Sets the maximum memory allocation to <i>number</i> paragraphs for DOS executable files.  |
|         | /MI: <i>number</i>  | Option name: /MI[[N]]. Sets the minimum memory allocation to <i>number</i> paragraphs for DOS executable files.  |
|         | /NE                 | Option name: /NE[[WFILES]]. Enables support for HPFS.  |
|         | /NO                 | Option name: /NO[[LOGO]]. Suppresses the EXEHDR copyright message.   |
|         | /PM: <i>type</i>    | Option name: /PM[[TYPE]]. Sets the application type for Microsoft Windows®, where <i>type</i> is one of the following: <b>PM</b> (or <b>WINDOWAPI</b> ), <b>VIO</b> (or <b>WINDOWCOMPAT</b> ), or <b>NOVIO</b> (or <b>NOTWINDOWCOMPAT</b> ). |
|         | /R                  | Option name: /R[[ESETERROR]]. Clears the error bit in the header of a Windows executable file.   |
|         | /S: <i>number</i>   | Option name: /S[[TACK]]. Sets the stack allocation to <i>number</i> bytes.   |

| Option | Action  |
|--------|---|
| /V     | Option name: /V[[ERBOSE]]. Provides more information about segmented-executable files, including the default flags in the segment table, all run-time relocations, and additional fields from the header. |
| /?     | Option name: /?. Displays a summary of EXEHDR command-line syntax.  |

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## EXP

The EXP utility deletes all files in the hidden DELETED subdirectory of the current or specified directory. EXP is used with RM and UNDEL to manage backup files.

### Syntax

EXP [[*options*]] [[*directories*]]

### Options

| Option | Action   |
|--------|--|
| /HELP  | Calls QuickHelp for help on EXP.                                   |
| /Q     | Suppresses display of deleted files.                               |
| /R     | Recurse into subdirectories of the current or specified directory. |
| /?     | Displays a summary of EXP command-line syntax.                     |

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## HELPMAKE

The HELPMAKE utility creates help files and customizes the help files supplied with Microsoft language products.

### Syntax

HELPMAKE {/E[[*n*]] | /D[[*c*]] | /H | /?} [[*options*]] *sourcefiles*

### Options

| Option | Action   |
|--------|--|
| /Ac    | Specifies <i>c</i> as an application-specific control character for the help database, marking a line that contains special information for internal use by the application. |
| /C     | Indicates that the context strings are case sensitive so that at run time all searches for help topics are case sensitive.   |
| /D     | Fully decodes the help database.   |

| Option             | Action  |
|--------------------|---|
| /DS                | Splits the concatenated, compressed help database into its components, using their original names. No decompression occurs.   |
| /DU                | Decompresses the database and removes all screen formatting and cross-references.   |
| /E[ <i>n</i> ]     | Creates (“encodes”) a help database from a specified text file (or files). The optional <i>n</i> indicates the amount of compression to take place. The value of <i>n</i> can range from 0 to 15.   |
| /H[ELP]            | Calls the QuickHelp utility. If HELPMAKE cannot find QuickHelp or the help file, it displays a summary of HELPMAKE command-line syntax.   |
| /K <i>filename</i> | Specifies a file containing word-separator characters. This file must contain a single line of characters that separate words. ASCII characters from 0 to 32 (including the space) and character 127 are always separators. If the /K option is not specified, the following characters are also considered separators: !"#&'()*+,-./:;<=>?@[\\]^_`{ }~ |
| /L                 | Locks the generated file so that it cannot be decoded by HELPMAKE at a later time.  |
| /NOLOGO            | Suppresses the HELPMAKE copyright message.  |
| /O <i>outfile</i>  | Specifies <i>outfile</i> as the name of the help database. The name <i>outfile</i> is optional with the /D option.  |
| /S <i>n</i>        | Specifies the type of input file, according to the following values for <i>n</i> : <ul style="list-style-type: none"> <li>/S1 Rich Text Format</li> <li>/S2 QuickHelp Format</li> <li>/S3 Minimally Formatted ASCII</li> </ul>  |
| /T                 | During encoding, translates dot commands to application-specific commands. During decoding, translates application commands to dot commands. The /T option forces /A:.  |
| /V[ <i>n</i> ]     | Sets the verbosity of the diagnostic and informational output, depending on the value of <i>n</i> . The value of <i>n</i> can range from 0 to 6.  |
| /W <i>width</i>    | Sets the fixed width of the resulting help text in number of characters. The value of <i>width</i> can range from 11 to 255.  |
| /?                 | Displays a summary of HELPMAKE command-line syntax.   |

# H2INC

The H2INC utility converts C header (.H) files into MASM-compatible include (.INC) files. It translates declarations and prototypes, but does not translate code.

**Syntax** H2INC [[*options*]] *filename*.H

| <b>Options</b> | <b>Option*</b>           | <b>Action</b>  |
|----------------|--------------------------|--|
|                | /C                       | Passes comments in the .H file to the .INC file.   |
|                | /Fa[[ <i>filename</i> ]] | Specifies that the output file contain only equivalent MASM statements. This is the default.                                   |
|                | /Fc[[ <i>filename</i> ]] | Specifies that the output file contain equivalent MASM statements plus original C statements converted to comment lines.       |
|                | /HELP                    | Calls QuickHelp for help on H2INC.   |
|                | /Ht                      | Enables generation of text equates. By default, text items are not translated.   |
|                | /Mn                      | Instructs H2INC to explicitly declare the distances for all pointers and functions.  |
|                | /Ni                      | Suppresses the expansion of nested include files.  |
|                | /Zn <i>string</i>        | Adds <i>string</i> to all names generated by H2INC. Used to eliminate name conflicts with other H2INC-generated include files. |
|                | /Zu                      | Makes all structure and union tag names unique.  |
|                | /?                       | Displays a summary of H2INC command-line syntax.   |

\*H2INC also supports the following options from Microsoft C, version 6.0 and higher: /AC, /AH, /AL, /AM, /AS, /AT, /D, /F, /Fi, /G0, /G1, /G2, /G3, /G4, /Gc, /Gd, /Gr, /I, /J, /Tc, /U, /u, /W0, /W1, /W2, /W3, /W4, /X, /Za, /Zc, /Ze, /Zp1, /Zp2, /Zp4.

| <b>Environment Variables</b> | <b>Variable</b> | <b>Description</b>  |
|------------------------------|-----------------|---|
|                              | CL              | Specifies default command-line options.   |
|                              | H2INC           | Specifies default command-line options. Appended after the CL environment variable. |
|                              | INCLUDE         | Specifies search path for include files.  |

## IMPLIB

The IMPLIB utility creates import libraries used by LINK to link dynamic-link libraries with applications.

**Syntax** IMPLIB *[[options]] implibname {dllfile... | deffile...}*

| Options | Option | Action  |
|---------|--------|---|
|         | /H     | Option name: /H[[ELP]]. Calls QuickHelp for help on IMPLIB.             |
|         | /NOI   | Option name: /NOI[[GNORECASE]]. Preserves case for entry names in DLLs. |
|         | /NOL   | Option name: /NOL[[OGO]]. Suppresses the IMPLIB copyright message.      |
|         | /?     | Option name: /?. Displays a summary of IMPLIB command-line syntax.      |

## LIB

The LIB utility helps create, organize, and maintain run-time libraries.

**Syntax** LIB *inlibrary [[options]] [[commands]] [, [[listfile]] [, [[outlibrary]] ] ] [;]*

| Options | Option           | Action  |
|---------|------------------|---|
|         | /H               | Option name: /H[[ELP]]. Calls QuickHelp for help on LIB.  |
|         | /I               | Option name: /I[[GNORECASE]]. Tells LIB to ignore case when comparing symbols (the default). Use to combine a library marked /NOI with an unmarked library to create a new case-insensitive library.        |
|         | /NOE             | Option name: NOE[[XTDICTIONARY]]. Prevents LIB from creating an extended dictionary.  |
|         | /NOI             | Option name: /NOI[[GNORECASE]]. Tells LIB to preserve case when comparing symbols. When combining libraries, if any library is marked /NOI, the output library is case sensitive, unless /IGN is specified. |
|         | /NOL             | Option name: /NOL[[OGO]]. Suppresses the LIB copyright message.   |
|         | <b>Option</b>    | <b>Action</b>   |
|         | /P <i>number</i> | Option name: /P[[AGESIZE]]. Specifies the page size (in bytes) of a new library or changes the page size of an existing library. The default for a new library is 16.                                       |

*/?* Option name: */?*. Displays a summary of LIB command-line syntax.

| Commands | Operator      | Action   |
|----------|---------------|--|
|          | <i>+name</i>  | Appends an object file or library file.  |
|          | <i>-name</i>  | Deletes a module.  |
|          | <i>-+name</i> | Replaces a module by deleting it and appending an object file with the same name.          |
|          | <i>*name</i>  | Copies a module to a new object file.  |
|          | <i>-*name</i> | Moves a module out of the library by copying it to a new object file and then deleting it. |

## LINK

The LINK utility combines object files into a single executable file or dynamic-link library.

**Syntax** LINK *objfiles* [, [*exefile*] [, [*mapfile*] [, [*libraries*] [, [*deffile*] ] ] ] ] [;]

| Options | Option           | Action  |
|---------|------------------|---|
|         | <i>/Asize</i>    | Option name: <i>/A[LIGNMENT]</i> . Directs LINK to align segment data in a segmented-executable file along the boundaries specified by <i>size</i> bytes, where <i>size</i> must be a power of two. |
|         | <i>/B</i>        | Option name: <i>/B[ATCH]</i> . Suppresses prompts for library or object files not found.  |
|         | <i>/CO</i>       | Option name: <i>/CO[DEVIEW]</i> . Adds symbolic data and line numbers needed by the Microsoft CodeView debugger. This option is incompatible with the <i>/EXEPACK</i> option.                       |
|         | <i>/CPnumber</i> | Option name: <i>/CP[ARMAXALLOC]</i> . Sets the program's maximum memory allocation to <i>number</i> of 16-byte paragraphs.  |
|         | <i>/DO</i>       | Option name: <i>/DO[SSEG]</i> . Orders segments in the default order used by Microsoft high-level languages.  |

| Option                      | Action  |
|-----------------------------|---|
| /DS                         | Option name: /DS[[ALLOCATE]]. Directs LINK to load all data starting at the high end of the data segment. The /DSALLOC option is for assembly-language programs that create MS-DOS .EXE files.                                    |
| /E                          | Option name: /E[[XEPACK]]. Packs the executable file. The /EXEPACK option is incompatible with /INCR and /CO. Do not use /EXEPACK on a Windows-based application.   |
| /F                          | Option name: /F[[ARCALLTRANSLATION]]. Optimizes far calls. The /FARCALL option is automatically on when using /TINY. The /PACKC option is not recommended with /FARCALL when linking a Windows-based program.                     |
| /HE                         | Option name: /HE[[LP]]. Calls QuickHelp for help on LINK.   |
| /HI                         | Option name: /HI[[GH]]. Places the executable file as high in memory as possible. Use /HIGH with the /DSALLOC option. This option is for assembly-language programs that create MS-DOS .EXE files.                                |
| /INC                        | Option name: /INC[[REMENTAL]]. Prepares for incremental linking with ILINK. This option is incompatible with /EXEPACK and /TINY.  |
| /INF                        | Option name: /INF[[ORMATION]]. Displays to the standard output the phase of linking and names of object files being linked.   |
| /LI                         | Option name: /LI[[NENUMBERS]]. Adds source file line numbers and associated addresses to the map file. The object file must be created with line numbers. This option creates a map file even if <i>mapfile</i> is not specified. |
| /M                          | Option name: /M[[AP]]. Adds public symbols to the map file.   |
| /NOD[: <i>libraryname</i> ] | Option name: /NOD[[EFAULTLIBRARYSEARCH]]. Ignores the specified default library. Specify without <i>libraryname</i> to ignore all default libraries.  |
| /NOE                        | Option name: /NOE[[XTDICTIONARY]]. Prevents LINK from searching extended dictionaries in libraries. Use /NOE when redefinition of a symbol causes error L2044.  |
| /NOF                        | Option name: /NOF[[ARCALLTRANSLATION]]. Turns off far-call optimization.  |
| /NOI                        | Option name: /NOI[[GNORECASE]]. Preserves case in identifiers.  |
| /NOL                        | Option name: /NOL[[OGO]]. Suppresses the LINK copyright message.  |

| Option                    | Action   |
|---------------------------|--|
| /NON                      | Option name: /NON[[ULLSDOSSEG]]. Orders segments as with the /DOSSEG option, but with no additional bytes at the beginning of the _TEXT segment (if defined). This option overrides /DOSSEG.   |
| /NOP                      | Option name: /NOP[[ACKCODE]]. Turns off code segment packing.  |
| /PACKC[[ <i>number</i> ]] | Option name: /PACKC[[ODE]]. Packs neighboring code segments together. Specify <i>number</i> bytes to set the maximum size for physical segments formed by /PACKC.  |
| /PACKD[[ <i>number</i> ]] | Option name: /PACKD[[ATA]]. Packs neighboring data segments together. Specify <i>number</i> bytes to set the maximum size for physical segments formed by /PACKD. This option is for Windows only.   |
| /PAU                      | Option name: /PAU[[SE]]. Pauses during the link session for disk changes.  |
| /PM: <i>type</i>          | Option name: /PM[[TYPE]]. Specifies the type of Windows-based application where <i>type</i> is one of the following: <b>PM</b> (or <b>WINDOWAPI</b> ), <b>VIO</b> (or <b>WINDOWCOMPAT</b> ), or <b>NOVIO</b> (or <b>NOTWINDOWCOMPAT</b> ). |
| /ST: <i>number</i>        | Option name: /ST[[ACK]]. Sets the stack size to <i>number</i> bytes, from 1 byte to 64K.   |
| /T                        | Option name: /T[[INY]]. Creates a tiny-model MS-DOS program with a .COM extension instead of .EXE. Incompatible with /INCR.  |
| /?                        | Option name: /?. Displays a summary of LINK command-line syntax.   |

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**Note** Several rarely used options not listed here are described in Help.

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### Environment Variables

| Variable | Description                              |
|----------|--|
| INIT     | Specifies path for the TOOLS.INI file.   |
| LIB      | Specifies search path for library files. |
| LINK     | Specifies default command-line options.  |
| TMP      | Specifies path for the VM.TMP file.      |

# MASM

The MASM program converts command-line options from MASM style to ML style, adds options to maximize compatibility, and calls ML.EXE.

---

**Note** MASM.EXE is provided to maintain compatibility with old makefiles. For new makefiles, use the more powerful ML driver.

---

## Syntax

MASM *[[options]] sourcefile* [, *[[objectfile]]* [, *[[listingfile]]* [, *[[crossreferencefile]]* ] ] ] *[[;]]*

## Options

| Option                    | Action   |
|---------------------------|--|
| /A                        | Orders segments alphabetically. Results in a warning. Ignored. |
| /B                        | Sets internal buffer size. Ignored.                            |
| /C                        | Creates a cross-reference file. Translated to /FR.             |
| /D                        | Creates a Pass 1 listing. Translated to F1/ST.                 |
| /Dsymbol[= <i>value</i> ] | Defines a symbol. Unchanged.                                   |
| /E                        | Emulates floating-point instructions. Translated to /FPi.      |
| /H                        | Lists command-line arguments. Translated to /help.             |
| /HELP                     | Calls QuickHelp for help on the MASM driver.                   |
| /I <i>pathname</i>        | Specifies an include path. Unchanged.                          |
| /L                        | Creates a normal listing. Translated to /Fl.                   |
| /LA                       | Lists all. Translated to /Fl and /Sa.                          |
| /ML                       | Treats names as case sensitive. Translated to /Cp.             |
| /MU                       | Converts names to uppercase. Translated to /Cu.                |
| /MX                       | Preserves case on nonlocal names. Translated to /Cx.           |
| /N                        | Suppresses table in listing file. Translated to /Sn.           |
| /P                        | Checks for impure code. Use <b>OPTION READONLY</b> . Ignored.  |
| /S                        | Orders segments sequentially. Results in a warning. Ignored.   |
| /T                        | Enables terse assembly. Translated to /NOLOGO.                 |
| /V                        | Enables verbose assembly. Ignored.                             |

|                              | <b>Option</b>   | <b>Action</b>   |
|------------------------------|-----------------|---|
|                              | <i>/Wlevel</i>  | Sets warning level, where <i>level</i> = 0, 1, or 2.            |
|                              | <i>/X</i>       | Lists false conditionals. Translated to <i>/Sx</i> .            |
|                              | <i>/Z</i>       | Displays error lines on screen. Ignored.                        |
|                              | <i>/ZD</i>      | Generates line numbers for CodeView. Translated to <i>/Zd</i> . |
|                              | <i>/ZI</i>      | Generates symbols for CodeView. Translated to <i>/Zi</i> .      |
| <b>Environment Variables</b> | <b>Variable</b> | <b>Description</b>  |
|                              | INCLUDE         | Specifies default path for .INC files.                          |
|                              | MASM            | Specifies default command-line options.                         |
|                              | TMP             | Specifies path for temporary files.                             |

## ML

The ML program assembles and links one or more assembly-language source files. The command-line options are case sensitive.

**Syntax** ML *[[options]] filename [[ [options]] filename ]... [[/link linkoptions]]*

| <b>Options</b> | <b>Option</b>           | <b>Action</b>   |
|----------------|-------------------------|---|
|                | <i>/AT</i>              | Enables tiny-memory-model support. Enables error messages for code constructs that violate the requirements for .COM format files. Note that this is not equivalent to the <b>.MODEL TINY</b> directive.  |
|                | <i>/Blfilename</i>      | Selects an alternate linker.  |
|                | <i>/c</i>               | Assembles only. Does not link.  |
|                | <i>/Cp</i>              | Preserves case of all user identifiers.   |
|                | <i>/Cu</i>              | Maps all identifiers to uppercase (default).  |
|                | <i>/Cx</i>              | Preserves case in public and extern symbols.  |
|                | <i>/Dsymbol[=value]</i> | Defines a text macro with the given name. If <i>value</i> is missing, it is blank. Multiple tokens separated by spaces must be enclosed in quotation marks.   |
|                | <i>/EP</i>              | Generates a preprocessed source listing (sent to STDOUT). See <i>/Sf</i> .  |
|                | <i>/Fhexnum</i>         | Sets stack size to <i>hexnum</i> bytes (this is the same as <i>/link /STACKnumber</i> ). The value must be expressed in hexadecimal notation. There must be a space between <i>/F</i> and <i>hexnum</i> . |

| <b>Option</b>          | <b>Action</b>  |
|------------------------|--|
| <i>/Ffilename</i>      | Names the executable file.   |
| <i>/F[[filename]]</i>  | Generates an assembled code listing. See <i>/Sf</i> .  |
| <i>/Fm[[filename]]</i> | Creates a linker map file.   |
| <i>/Fofilename</i>     | Names an object file.  |
| <i>/FPi</i>            | Generates emulator fixups for floating-point arithmetic (mixed-language only).   |
| <i>/Fr[[filename]]</i> | Generates a Source Browser .SBR file.  |
| <i>/FR[[filename]]</i> | Generates an extended form of a Source Browser .SBR file.  |
| <i>/Gc</i>             | Specifies use of FORTRAN- or Pascal-style function calling and naming conventions. Same as <b>OPTION LANGUAGE:PASCAL</b> .       |
| <i>/Gd</i>             | Specifies use of C-style function calling and naming conventions. Same as <b>OPTION LANGUAGE:C</b> .                             |
| <i>/H number</i>       | Restricts external names to <i>number</i> significant characters. The default is 31 characters.                                  |
| <i>/help</i>           | Calls QuickHelp for help on ML.  |
| <i>/I pathname</i>     | Sets path for include file. A maximum of 10 <i>/I</i> options is allowed.  |
| <i>/nologo</i>         | Suppresses messages for successful assembly.   |
| <i>/Sa</i>             | Turns on listing of all available information.   |
| <i>/Sc</i>             | Adds instruction timings to listing file.  |
| <i>/Sf</i>             | Adds first-pass listing to listing file.   |
| <i>/Sg</i>             | Turns on listing of assembly-generated code.   |
| <i>/Sl width</i>       | Sets the line width of source listing in characters per line. Range is 60 to 255 or 0. Default is 0. Same as <b>PAGE width</b> . |
| <i>/Sn</i>             | Turns off symbol table when producing a listing.   |
| <i>/Sp length</i>      | Sets the page length of source listing in lines per page. Range is 10 to 255 or 0. Default is 0. Same as <b>PAGE length</b> .    |
| <i>/Ss text</i>        | Specifies <i>text</i> for source listing. Same as <b>SUBTITLE text</b> .   |
| <i>/St text</i>        | Specifies title for source listing. Same as <b>TITLE text</b> .  |
| <i>/Sx</i>             | Turns on false conditionals in listing.  |
| <i>/Ta filename</i>    | Assembles source file whose name does not end with the .ASM extension.   |
| <i>/w</i>              | Same as <i>/W0</i> .   |
| <i>/Wlevel</i>         | Sets the warning level, where <i>level</i> = 0, 1, 2, or 3.  |

| Option                    | Action   |
|---------------------------|--|
| /WX                       | Returns an error code if warnings are generated.   |
| /Zd                       | Generates line-number information in object file.  |
| /Zf                       | Makes all symbols public.  |
| /Zi                       | Generates CodeView information in object file.   |
| /Zm                       | Enables <b>M510</b> option for maximum compatibility with MASM 5.1.                      |
| /Zp[[ <i>alignment</i> ]] | Packs structures on the specified byte boundary. The <i>alignment</i> may be 1, 2, or 4. |
| /Zs                       | Performs a syntax check only.  |
| /?                        | Displays a summary of ML command-line syntax.  |

### QuickAssembler Support

For compatibility with QuickAssembler makefiles, ML recognizes these options:

| Option | Action  |
|--------|---|
| /a     | Orders segments alphabetically in QuickAssembler. MASM 6.1 uses the <b>.ALPHA</b> directive for alphabetical ordering and ignores /a. |
| /Cl    | Equivalent to /Cp.  |
| /Ez    | Prints the source for error lines to the screen. MASM 6.1 ignores this option.  |
| /P1    | Performs one-pass assembly. MASM 6.1 ignores this option.   |
| /P2    | Performs two-pass assembly. MASM 6.1 ignores this option.   |
| /s     | Orders segments sequentially. MASM 6.1 uses the <b>.SEQ</b> directive for sequential ordering and ignores /s.                         |
| /Sq    | Equivalent to /SI0 /Sp0.  |

### Environment Variables

| Variable | Description                              |
|----------|--|
| INCLUDE  | Specifies search path for include files. |
| ML       | Specifies default command-line options.  |
| TMP      | Specifies path for temporary files.      |

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## NMAKE

The NMAKE utility automates the process of compiling and linking project files.

### Syntax

NMAKE [[*options*]] [[*macros*]] [[*targets*]]

**Options**

| <b>Option</b>      | <b>Action</b>  |
|--------------------|--|
| /A                 | Executes all commands even if targets are not out-of-date.   |
| /C                 | Suppresses the NMAKE copyright message and prevents nonfatal error or warning messages from being displayed.   |
| /D                 | Displays the modification time of each file when the times of targets and dependents are checked.  |
| /E                 | Causes environment variables to override macro definitions within description files.   |
| /F <i>filename</i> | Specifies <i>filename</i> as the name of the description file to use. If a dash (-) is entered instead of a filename, NMAKE reads the description file from the standard input device. If /F is not specified, NMAKE uses MAKEFILE as the description file. If MAKEFILE does not exist, NMAKE builds command-line targets using inference rules. |
| /HELP              | Calls QuickHelp for help on NMAKE.   |
| /I                 | Ignores exit codes from commands in the description file. NMAKE continues executing the rest of the description file despite the errors.   |
| /N                 | Displays but does not execute commands from the description file.  |
| /NOLOGO            | Suppresses the NMAKE copyright message.  |
| /P                 | Displays all macro definitions, inference rules, target descriptions, and the <b>.SUFFIXES</b> list.   |
| /Q                 | Checks modification times of command-line targets (or first target in the description file if no command-line targets are specified). NMAKE returns a zero exit code if all such targets are up-to-date and a nonzero exit code if any target is out-of-date. Only preprocessing commands in the description file are executed.                  |
| /R                 | Ignores inference rules and macros that are predefined or defined in the TOOLS.INI file.   |
| /S                 | Suppresses display of commands as they are executed.   |
| /T                 | Changes modification times of command-line targets (or first target in the description file if no command-line targets are specified) to the current time. Only preprocessing commands in the description file are executed. The contents of target files are not modified.  |
| /X <i>filename</i> | Sends all error output to <i>filename</i> , which can be either a file or a device. If a dash (-) is entered instead of a filename, the error output is sent to the standard output device.  |
| /Z                 | Internal option for use by the Microsoft Programmer's WorkBench (PWB).   |
| /?                 | Displays a summary of NMAKE command-line syntax.   |

**Environment Variable**

| <b>Variable</b> | <b>Description</b>  |
|-----------------|---|
| INIT            | Specifies path for TOOLS.INI file, which may contain macros, inference rules, and description blocks. |

## PWB (Programmer's WorkBench)

The Microsoft Programmer's WorkBench (PWB) provides an integrated environment for developing programs in assembly language. The command-line options are case sensitive.

### Syntax

PWB *[[options]]* *[[files]]*

### Options

| Option             | Action  |
|--------------------|---|
| /D <i>[[init]]</i> | Prevents PWB from examining initialization files, where <i>init</i> is one or more of the following characters: <ul style="list-style-type: none"> <li>A     Disable autoload extensions (including language-specific extensions and Help).</li> <li>S     Ignore CURRENT.STS.</li> <li>T     Ignore TOOLS.INI.</li> </ul> If the /D option does not include an <i>init</i> character, it is equivalent to specifying /DAST (all files and extensions ignored). |
| /e <i>cmdstr</i>   | Executes the command or sequence of commands at start-up. The entire <i>cmdstr</i> argument must be placed in double quotation marks if it contains a space. If <i>cmdstr</i> contains literal double quotation marks, place a backslash (\) in front of each double quotation mark. To include a literal backslash in the command string, use double backslashes (\\).   |
| /m <i>mark</i>     | Moves the cursor to the specified <i>mark</i> instead of moving it to the last known position. The mark can be a line number.   |
| /P <i>[[init]]</i> | Specifies a program list for PWB to read, where <i>init</i> can be: <ul style="list-style-type: none"> <li>Ffile    Read a foreign program list (one not created using PWB).</li> <li>L        Read the last program list. Use this option to start PWB in the same state you left it.</li> <li>Pfile    Read a PWB program list.</li> </ul>  |
| /r                 | Starts PWB in no-edit mode. Functions that modify files are disallowed.   |

|                       | <b>Option</b>             | <b>Action</b>   |
|-----------------------|---------------------------|---|
|                       | <code>[/t] file...</code> | Loads the specified file at startup. The <i>file</i> specification can contain wildcards. If multiple <i>files</i> are specified, PWB loads only the first file. When the <i>Exit</i> function is invoked, PWB saves the current file and loads the next file in the list. Files specified with /t are temporary; PWB does not add them to the file history on the File menu.<br><br>No other options can follow /t on the command line. Each temporary file must be specified in a separate /t option. |
|                       | <code>/?</code>           | Displays a summary of PWB command-line syntax.  |
| Environment Variables | <b>Variable</b>           | <b>Description</b>  |
|                       | HELPPFILES                | Specifies path of help files or list of help filenames.   |
|                       | INIT                      | Specifies path for TOOLS.INI and CURRENT.STS files.   |
|                       | TMP                       | Specifies path for temporary files.   |

## PWBRMAKE

PWBRMAKE converts the .SBR files created by the assembler into database .BSC files that can be read by the Microsoft Programmer's WorkBench (PWB) Source Browser. The command-line options are case sensitive.

### Syntax

PWBRMAKE `[[options]] sbrfiles`

### Options

| <b>Option</b>                  | <b>Action</b>   |
|--------------------------------|---|
| <code>/Ei filename</code>      | Excludes the contents of the specified include files from the database.   |
| <code>/Ei (filename...)</code> | To specify multiple filenames, separate them with spaces and enclose the list in parentheses.   |
| <code>/Em</code>               | Excludes symbols in the body of macros. Use /Em to include only macro names.  |
| <code>/Es</code>               | Excludes from the database every include file specified with an absolute path or found in an absolute path specified in the INCLUDE environment variable. |
| <code>/HELP</code>             | Calls QuickHelp for help on PWBRMAKE.   |
| <code>/Iu</code>               | Includes unreferenced symbols.  |
| <code>/n</code>                | Forces a nonincremental build and prevents truncation of .SBR files.  |
| <code>/o filename</code>       | Specifies a name for the database file.   |
| <code>/v</code>                | Displays verbose output.  |
| <code>/?</code>                | Displays a summary of PWBRMAKE command-line syntax.   |

# QuickHelp

The QuickHelp utility displays Help files. All MASM reserved words and error messages can be used for *topic*.

**Syntax**QH [[*options*]] [[*topic*]]**Options**

| <b>Option</b>        | <b>Action</b>   |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
|----------------------|---|---|--------------------|---|--------------------------------|---|-------------|---|------------------------|---|-----------------|---|------------------|
| <i>/d filename</i>   | Specifies either a specific database name or a path where the databases are found.  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/n number</i>     | Specifies the number of lines the QuickHelp window should occupy.   |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/m number</i>     | Changes the screen mode to display the specified number of lines, where <i>number</i> is in the range 25 to 60.   |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/p filename</i>   | Sets the name of the paste file.  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/pa[filename]</i> | Specifies that pasting operations are appended to the current paste file (rather than overwriting the file).  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/q</i>            | Prevents the version box from being displayed when QuickHelp is installed as a keyboard monitor.  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/r command</i>    | Specifies the command that QuickHelp should execute when the right mouse button is pressed. The <i>command</i> can be one of the following letters:<br><table><tbody><tr><td>l</td><td>Display last topic</td></tr><tr><td>i</td><td>Display history of help topics</td></tr><tr><td>w</td><td>Hide window</td></tr><tr><td>b</td><td>Display previous topic</td></tr><tr><td>e</td><td>Find next topic</td></tr><tr><td>t</td><td>Display contents</td></tr></tbody></table> | l | Display last topic | i | Display history of help topics | w | Hide window | b | Display previous topic | e | Find next topic | t | Display contents |
| l                    | Display last topic  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| i                    | Display history of help topics  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| w                    | Hide window   |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| b                    | Display previous topic  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| e                    | Find next topic   |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| t                    | Display contents  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |
| <i>/s</i>            | Specifies that clicking the mouse above or below the scroll box causes QuickHelp to scroll by lines rather than pages.  |   |                    |   |                                |   |             |   |                        |   |                 |   |                  |

| Option         | Action   |     |                        |        |                       |         |                        |
|----------------|--|-----|------------------------|--------|-----------------------|---------|------------------------|
| <i>/t name</i> | <p>Directs QuickHelp to copy the specified section of the given topic to the current paste file and exit. The <i>name</i> may be:</p> <table border="0"> <tr> <td>All</td> <td>Paste the entire topic</td> </tr> <tr> <td>Syntax</td> <td>Paste the syntax only</td> </tr> <tr> <td>Example</td> <td>Paste the example only</td> </tr> </table> <p>If the topic is not found, QuickHelp returns an exit code of 1.</p> | All | Paste the entire topic | Syntax | Paste the syntax only | Example | Paste the example only |
| All            | Paste the entire topic   |     |                        |        |                       |         |                        |
| Syntax         | Paste the syntax only  |     |                        |        |                       |         |                        |
| Example        | Paste the example only   |     |                        |        |                       |         |                        |
| <i>/u</i>      | <p>Specifies that QuickHelp is being run by a utility. If the topic specified on the command line is not found, QuickHelp immediately exits with an exit code of 3.</p>  |     |                        |        |                       |         |                        |

Environment Variables

| Variable   | Description   |
|------------|---|
| HELPPFILES | Specifies path of help files or list of help filenames. |
| QH         | Specifies default command-line options.                 |
| TMP        | Specifies directory of default paste file.              |

## RM

The RM utility moves a file to a hidden DELETED subdirectory of the directory containing the file. Use the UNDEL utility to recover the file and the EXP utility to mark the hidden file for deletion.

Syntax

RM *[[options]]* *[[files]]*

Options

| Option              | Action   |
|---------------------|--|
| <i>/F</i>           | Deletes read-only files without prompting.               |
| <i>/HELP</i>        | Calls QuickHelp for help on RM.                          |
| <i>/I</i>           | Inquires for permission before removing each file.       |
| <i>/K</i>           | Keeps read-only files without prompting.                 |
| <i>/R directory</i> | Recurses into subdirectories of the specified directory. |
| <i>/?</i>           | Displays a summary of RM command-line syntax.            |

# UNDEL

The UNDEL utility moves a file from a hidden DELETED subdirectory to the parent directory. UNDEL is used along with EXP and RM to manage backup files.

**Syntax** UNDEL [[*option* | *files*]]

| <b>Options</b> | <b>Option</b> | <b>Action</b>                                    |
|----------------|---------------|--|
|                | /HELP         | Calls QuickHelp for help on UNDEL.               |
|                | /?            | Displays a summary of UNDEL command-line syntax. |