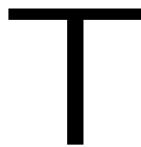


WASM05

USER'S MANUAL

A 68HC05 EDITOR/MACRO CROSS ASSEMBLER
for
Windows



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1.0 INTRODUCTION

WASM05 is a Windows hosted text editor / 68HC05 macro cross assembler. This program is one of a set of tools provided by TECI to facilitate the development of 68HC05 single chip microcomputer applications.

TECI provides several other development tools for 68HC05 family microcontrollers such as our MCPM-3 programmer and TECICE-HC05 real time in-circuit emulator.

2.0 DEVICES SUPPORTED

WASM05 supports all 68HC05 family members.

3.0 SYSTEM REQUIREMENTS

This product requires an IBM PC or compatible running a Windows 3.1/95/98/ME/NT/2000/XP operating system. Minimum recommended system is at least a 486 class PC with 64MB ram, 4 MB of free hard disk space, one 3 1/2 inch diskette drive. A color monitor is recommended.

4.0 GETTING STARTED

4.1 INSTALLING WASM05

The software is contained in a single self-extracting .EXE file called wasm05setup.exe. This is a standard windows install file and you need to be running windows for it to guide you through the install process. You may have downloaded the wasm05setup.exe file from our web site at www.tec-i.com or received the file on a single 3.5" floppy diskette. To start the setup process you can either double click on the file name from windows explorer or use "RUN" from the windows start menu.

The files extracted from wasm05setup.exe are:

- WASM05.EXE - Editor/Macro Assembler executable file.
- WASM05.HLP - Editor/Macro Assembler online help file.
- WASM05.INI - Editor/Macro Assembler initialization file.
- WASM05MANUAL.PDF - This manual in .PDF format.
- WTTDEMO.05P - Demo 68HC05 project file.
- WTTDEMO.ASM - Demo 68HC05 project source code file.
- ITEST.ASM - Demo 68HC05 project include file.
- D68HC05.05P - Project file for showing WASM05 source code examples.
- D68HC05.ASM - File showing WASM05 source code examples.

***** Important Note *****

Refer to this file for examples of proper WASM05 Source Code Syntax.

- UNINSTALL.EXE - Uninstall executable.
- INSTALL.LOG - Installation log file - required by the uninstall program.

***** Important Notice *****

FONT SIZE: If the text is not displayed as desired, the font size may be changed from within WASM05 by clicking Options|Font and changing the font size.

4.2 UNINSTALLING WASM05

To uninstall the software, double click on the UNINSTALL.EXE program in the installation directory. This program will read the INSTALL.LOG file and remove all files that were installed with the wasm05setup.exe program.

5.0 OVERVIEW

5.1 WASM05 PROGRAM OVERVIEW


WASM05 is a windows hosted text editor and 68HC05 macro cross assembler. The program is a general purpose text editor that has special enhancements for managing assembly language programming projects. WASM05 can edit 255 files simultaneously in a tabbed editor environment. To switch between files just click on the tab with the name of the file that you want to edit. Each of the 255 files can be up to 16MB in size and several files can be grouped together and associated with one another. Thus all of the files required for a programming project can be loaded and/or saved with a single command.

WASM05 is a project oriented program. Each project is specified by a unique project file name. Project files have an extension of .05P which stands for HC05Project. When a project file is opened, all of the files that comprise that project are loaded into the editor at once. Each file is assigned its own unique editor tab and the name of the file appears on that tab. A file is selected for editing by clicking on its tab. When a project is saved, all of the files that are open in the editor are saved as part of the project. Among others, the program has speed buttons for opening and saving projects, and adding or removing files from the current project so that managing projects is very easy and natural. However...

*** Important Notice ***

There are two project management details that the **user is responsible** for getting correct: (1) Projects **must** be saved with the .05P file extension; and (2) the main source code file of the project **must** have the same file name as the project file with an extension of .ASM. This is how the assembler knows which file to assemble first.

Example: If the project file name is **DEMO.05P**, then the main source code file must be named **DEMO.ASM**. All other project files may have any name/extension.

The figure below shows some of the more commonly used controls and features of the WASM05 program. Most of the speed buttons perform normal text editing functions. Refer to the online help file for complete descriptions of these speed buttons. Three of the speed buttons are specifically for program development work. The  speed button assembles the project files and creates an object code file, a listing file and a map file. The “D” speed button calls your favorite debugging program. We recommend the WTT05.EXE emulator control program, another TECI 68HC05 development tool. The “P” speed button calls your programmer software. Which programs the “D” and “P” buttons invoke depends on what you specify under the Options/Project Options dialog box. You can set up these buttons to call any program you like by entering the command line parameters for your program in the edit box provided.

WASM05 MAIN SCREEN

The screenshot shows the WASM05 main screen with the following callouts:

- Open Project
- Save Project
- Add File to Project
- Remove File from Project
- Create Blank Editor Page
- Save Current File
- Print Current File
- Cut
- Copy
- Paste
- Undo
- Redo
- Find
- Find Next
- Find and Replace
- Exit
- Assemble Project Files
- Run Debugger
- Run Programmer

The main window displays the following code:

```

temp_accum    rmb    1    ;
;
;Note: The last ram location, not counting the stack is at $BF.
;
;
power_on_reset org    rom    ;start of program memory
               lda    #%01001010 ;reset
               sta    port_a    ;init port a
               clr    port_b    ;
               lda    #%11001111 ;init port c
               sta    port_c    ;
               lda    #%11111111 ;
               sta    port_a_ddr ;
               sta    port_b_ddr ;
               sta    port_c_ddr ;
               ldx    #ram    ;
               lda    #176    ;
clear_ram     clr    ,x    ;zero ram
               incx    ;
    
```

The status bar at the bottom shows:

- Line:176
- Col:16
- Insert
- File Lines: 2506
- File Bytes: 134197
- 1:49:10 PM

File tabs at the bottom are labeled:

- MCPM3B.ASM
- MCPM3B.LST
- MCPM3B.S19
- MCPM3B.MAP

Additional callouts for the status bar and file tabs:

- File Modified
- Column Number
- Line Number
- Insert/Overwrite
- File Lines
- File Size
- Current Time
- File Tabs - Click to change file.

6.0 TUTORIAL


The quickest way to get started using the WASM05 program is to use it to perform some common program development tasks. So please take a few minutes to work through this tutorial.

6.1 USING WASM05

First, invoke the WASM05 editor/assembler program by clicking on its chip icon. The first time you use the program, it should come up with the WTTDEMO.05P project already loaded into the editor. This is an example project for use with this tutorial. The project name and active editor file name are shown in the title bar of the main program window. If the program doesn't come up with the WTTDEMO.05P project loaded, you can load it with the File|Open Project menu item. At this time the project consists of two files, the WTTDEMO.ASM main source file and one include file named ITEST.INC . You can switch the editor back and forth between these files by clicking on the file tabs. Try It!



To see what each of the speed buttons on the button bar do, move your mouse pointer over each button and hold it there for about a second. A yellow help hint box should appear near the mouse pointer describing the button function. A little more detailed description appears on the status bar at the bottom of the screen. Once you get used to what the speed button functions are, you can turn the help hints and status line help hints off by unchecking the appropriate Option menu items. The operation of the text editor portion of WASM05 is similar to most Windows text editors; so we won't go into how to edit text here. You can use the online help for this purpose or, better yet, just experiment on your own. If you always click on the "Save Project" speed button before exiting the program, WASM05 will come up configured exactly as it was when you last used it.

WASM05 source code files use standard Motorola 6805 op-code mnemonics and source file syntax with a few industry standard enhancements. See the online help for complete documentation. Also, a project named D68HC05.05P was included in the distribution files. This is a project that shows the proper usage of all 68HC05 mnemonics, pseudo ops and source file syntax.

Now let's assemble the WTTDEMO project. To do this click the large  speed button on the button bar. Two errors were intentionally left in the project files to show what happens when errors are encountered by the assembler. Note that an error window opened that has a list of the errors. The first error is an "unrecognized opcode mnemonic" error in line 40 of file WTTDEMO.ASM . Also note that the cursor in the WTTDEMO.ASM file was placed at the beginning of line 40, the line that contains the first error. If you click on the "GoTo Next Error" button, the editor cursor goes to the next error, which is in line 7 of the include file ITEST.INC . When errors are encountered, you can find and fix them easily by using the "GoTo Next Error" button and the information in the error window.

Now lets fix the errors and reassemble the project. Click on the "GoTo Next Error" button until the editor cursor is at the line containing the first error: line 40 of file WTTDEMO.ASM . Note

that the op code mnemonic in that line is “staa”, an improper 6805 mnemonic. Obviously, the proper 6805 mnemonic is “sta”; so change “staa” to “sta”. Click on the “GoTo Next Error” button. This is another “unrecognized opcode mnemonic” error in line 7 of ITEST.INC . Here, the opcode mnemonic reads “.rts” instead of “rts”. Change “.rts” to “rts” and click on the “GoTo Next Error” button. This error just informs the user that the assembler could not complete its second pass because of errors encountered during pass one. We do not have any corrections to make associated with this error.

Click the  speed button to reassemble the project. Note that this time no error window appears, so no errors were encountered and the project assembled correctly. To view the files created by the assembler, click on the Options menu, then on the Project Options submenu. The Project Options dialog box opens. Check the “Auto Load Output Files” checkbox; then click OK. Click the  button again and note that after assembly there are now four files loaded into the editor. The two new files were the files created by the assembler and are WTTDEMO.LST, the listing file, and WTTDEMO.S19, the object code file in Motorola S-record format. Click on their tabs to view these files. The WTTDEMO.LST file is used by the WTT05 program to control the emulator and the WTTDEMO.S19 file is used to program 68HC05 chips when the program is debugged.

You have now completed the WASM05 Tutorial. From this point on, you should be able to utilize the program successfully with the assistance of the online Help program.

7.0 CONVERTING TASM05 PROJECTS TO WASM05 PROJECTS

Before going any further in this section, it is very important that you complete the Tutorial and become familiar with the basics about WASM05. Having accomplished this, if you have developed project(s) in TECI's TASM05 Cross Assembler Program, you may follow these steps to convert each project to WASM05.

- 1) Invoke WASM05 and open a New Project (File|New Project).
- 2) Click on the "Add File to Project" speed button. Find the directory your TASM05 files are in and add each file, one at a time.
- 3) Once you have added all of your files, use File|Save Project As to save the project.

Remember, (a) projects must be saved with the .05P file extension; and (b) the main source code file of the project must have the same file name as the project file with an extension of .ASM. This is how the assembler knows which file to assemble first.

Example: If the project file name is **DEMO.05P**, then the main source code file must be named **DEMO.ASM**. All other project files may have any name/extension.

WASM05 USER'S MANUAL

APPENDIX A—TUTORIAL LISTING FILE

```
*****
**
**          WTTDEMO.ASM  4/30/97  RBJ
**
**
** A WASM05 cross assembler and WTT05 emulator demonstration program.
** Written for the MC68HC705C8 but also runs on
**
**          MC68HC705C8A and
**          MC68HC705C4A and
**          MC68HC705B5  and
**          MC68HC805B6
**
**
**          *** IMPORTANT NOTICE ***
**
** If your emulator is configured for the C9 or B16 chips then you must set
** the variable "target_has_16k" to 1 before you assemble the program.
**
**          TECI - The Engineers Collaborative, Inc.
**          RR#3 Box 8c
**          Barton, VT 05822
**          Ph (802)525-3458  Fax (802)525-3451
**          email bobj@tec-i.com
**
*****
;
0000  target_has_16k  equ    0                ;1 if 16K memory map device, 0
otherwise
;
2000  vectors        equ    $2000 * target_has_16k + $2000 ;
;
0050  ram            equ    $50              ;start of ram area
0800  program        equ    $800            ;start of program area
;
0000  port_a         equ    0                ;port a data register
0004  port_a_ddd     equ    4                ;port a data direction reg.
;
0050          org    ram                    ;ram variables
0050  count_up       rmb    1                ;
0051  count_down     rmb    1                ;
;
0800          org    program                ;start of program memory
0800 A6FF  power_on_reset  lda    #11111111  ;program starts here after reset
0802 B700          sta    port_a            ;initialize port A with 1's
0804 B704          sta    port_a_ddd       ;set port A to an output port
0806 3F50          clr    count_up         ;clear
0808 3F51          clr    count_down       ; the ram variables
080A 3300  main_loop  com    port_a        ;compliment port A
080C 3C50          inc    count_up         ;increment count up
080E AD02          bsr    decrement_byte   ;increment a word
0810 20F8          bra    main_loop        ;loop forever
;
*****
**          ITEST.INC  4/30/97  RBJ
**
** An include file to the WTTDEMO program.
**
*****
;
0812 3A51  decrement_byte  dec    count_down  ;decrement the variable count_down
0814 81          rts          ;and return
;
0815 81  dummy_isr        rts          ;should never be called
;
1FF0          org    vectors - 16         ;interrupt service routine vectors
1FF0 0000          dw    0                ;serial peripheral interface
1FF2 0000          dw    0                ;serial peripheral interface
1FF4 0815          dw    dummy_isr        ;serial peripheral interface
1FF6 0815          dw    dummy_isr        ;serial communication interface
1FF8 0815          dw    dummy_isr        ;timer
1FFA 0815          dw    dummy_isr        ;external irq
1FFC 0815          dw    dummy_isr        ;swi
1FFE 0800          dw    power_on_reset   ;reset
```