

4E4th and 4E4th IDE Forth for Education

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4E4th-IDE Instructions

This manual is slightly modified from the original to ensure that the MicroBox requirements are covered. The MicroBox project was actually triggered by Dirk's IDE and 4e4th – Juergen Pintaske 2016

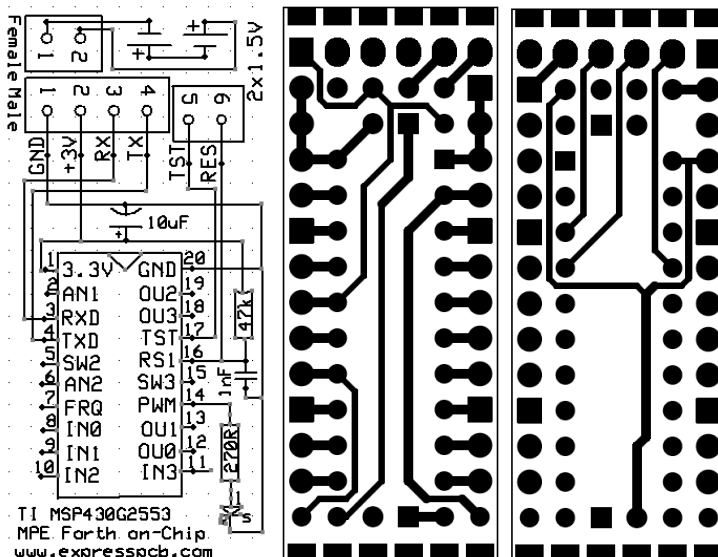
MicroBox consists of a small PCB with 2 AAA batteries in a TicTac box, just the minimum parts of the TI Launchpad, connected to the PC via an FTDI USB-to-TTL cable and can be battery operated.

For now the transfer of the Forth program image has to be done via one of two options:

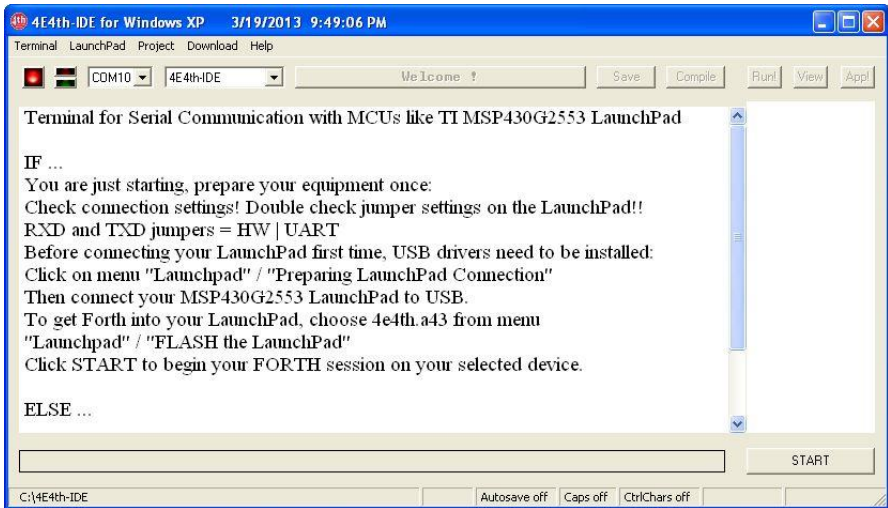
To flash the TI MSP2553 chip in the Launchpad
and then move the chip to the MicroBox, or
connect the 6 MicroBox connections

Ground - +3.3V - Rx - Tx - Test - Reset

via a cable to the Launchpad for programming the Forth Kernel into the Chip in the MicroBox. This then replaces the TI Launchpad.



Here a first look at the 4E4th-IDE:



This is what the 4E4th-IDE looks like when 4E4th-IDE.exe has been started for the first time, and a LaunchPad is connected to the computer.



The red LED shows that the 4E4th-IDE is not ready to communicate with the "target", which is the 4E4th-LaunchPad.



For a quick START to get connected with the target, click on the START button



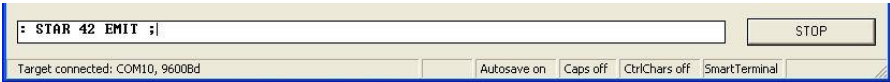
The LEDs switch to green and you can start programming.

To give you the best programming experience, I will write about all of the 4E4th-IDE controls, which will help you to have a great programming experience.

There are: menus, buttons, selections, the Terminal screen, the Input line, and the Wordlist.

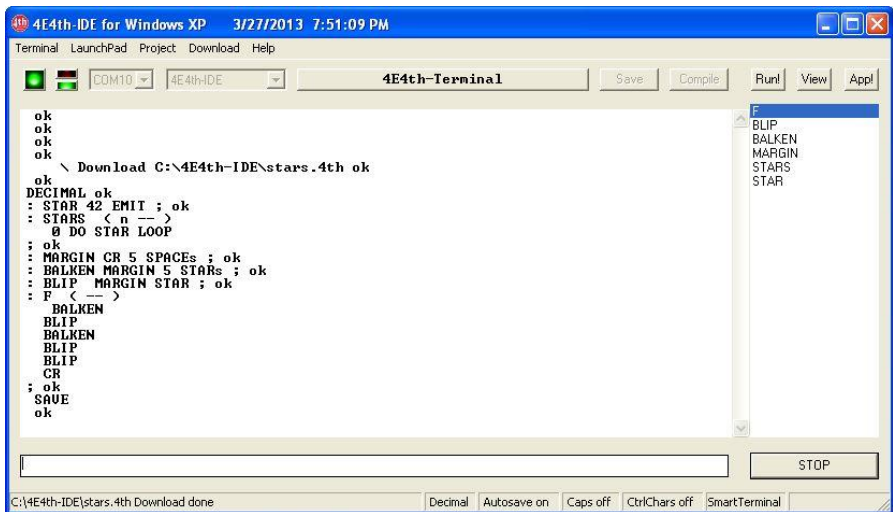
But before starting a description, a brief overview to show how you can work with the 4E4th-IDE. A brief description about using the 4E4th-IDE was already given in "First Steps with 4E4th". Here are now some new exiting possibilities:

We can use the Terminalinput Box to type in our programs:



Or we can use several Download functions which will be described later.

Let's assume that we downloaded our Stars.4th file, and our screen looks like this:



The second last line is "**SAVE**" – the saving will be done each time automatically after a file download is finished. This feature may be switched off.

The status line in the picture above shows "Autosave on", so this feature is active.

The last defined word was "F", and this word is marked blue in the Wordlist on the right side of the 4E4th-IDE.



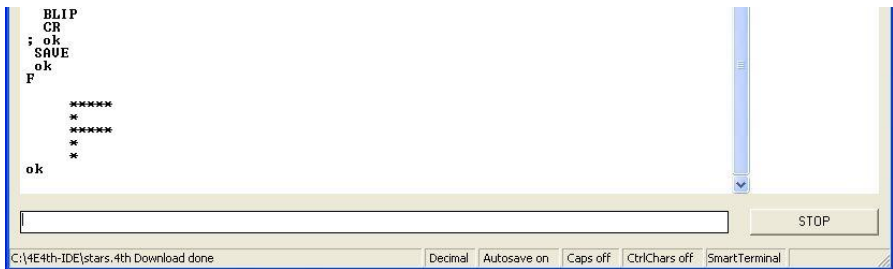
There are three little buttons on top of this Wordlist:

Run! – Run the Word selected

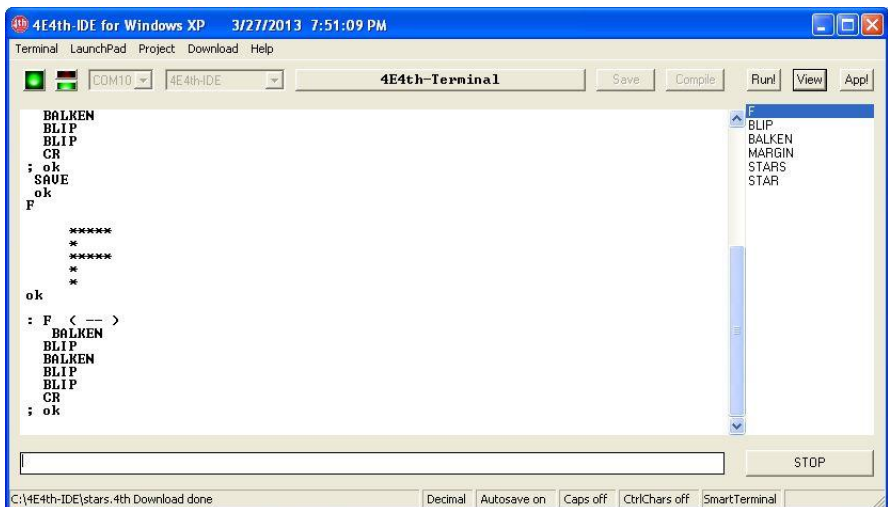
View – Show the parts of the Word selected

App! – Run this Word immediately
when the Launchpad is reset or switched on

Let's first click on the first one, "**Run!**" - a click on "Run!" starts the program belonging to the marked Word, showing the letter "F" painted by Stars:



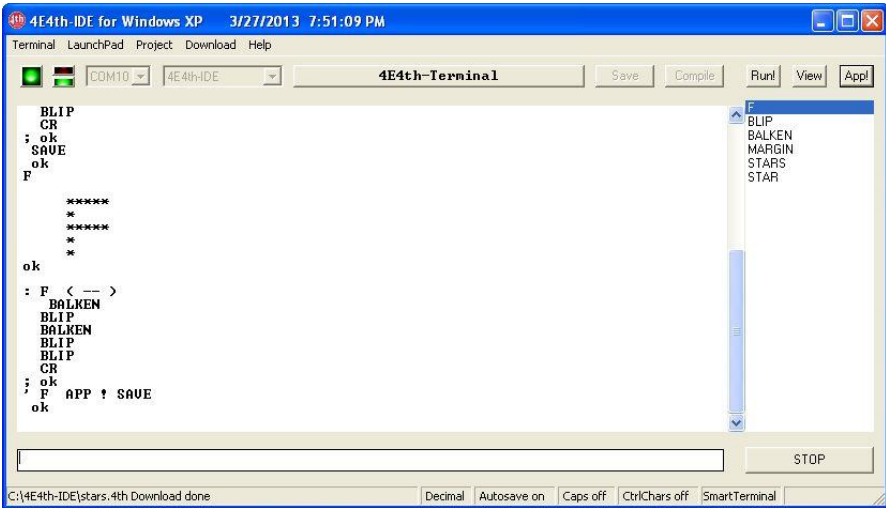
The next exercise is to click on the button "View":



The definition of "F" will be printed on the 4E4th-IDE screen again.

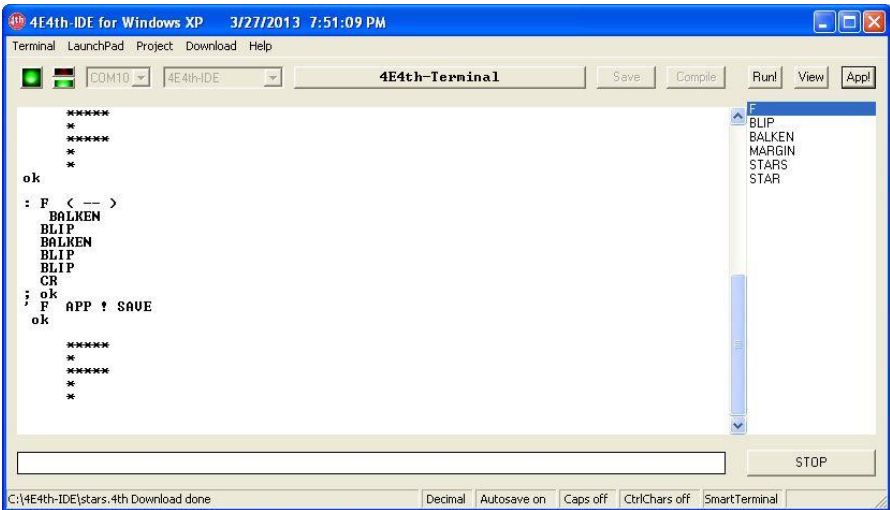


And last, but not least the third button, the most important one:
"App!"



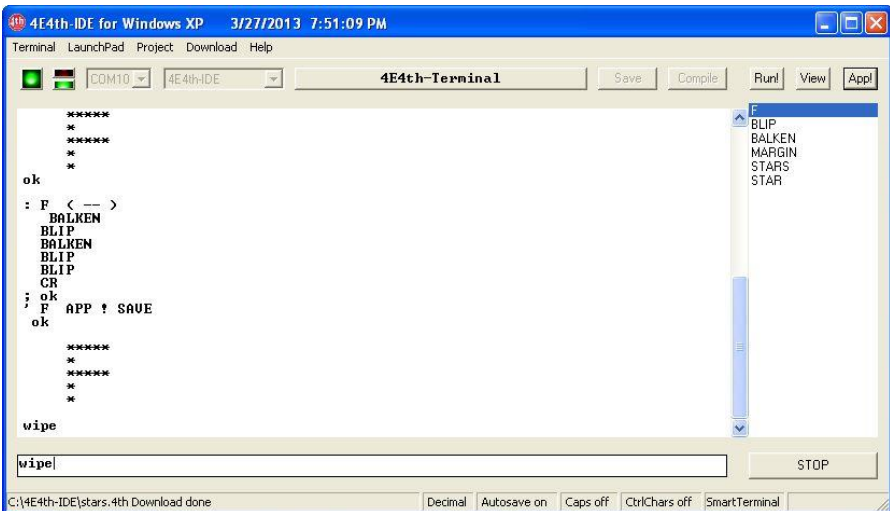
Normally we use this button **App!** only when our program is finished, to save it and to tell the 4E4th, that this Word marked in blue has to be started with each reset or power on.

To test this function now, we push the RESET button on the LaunchPad, and there it is:



Programming with Copy / Paste

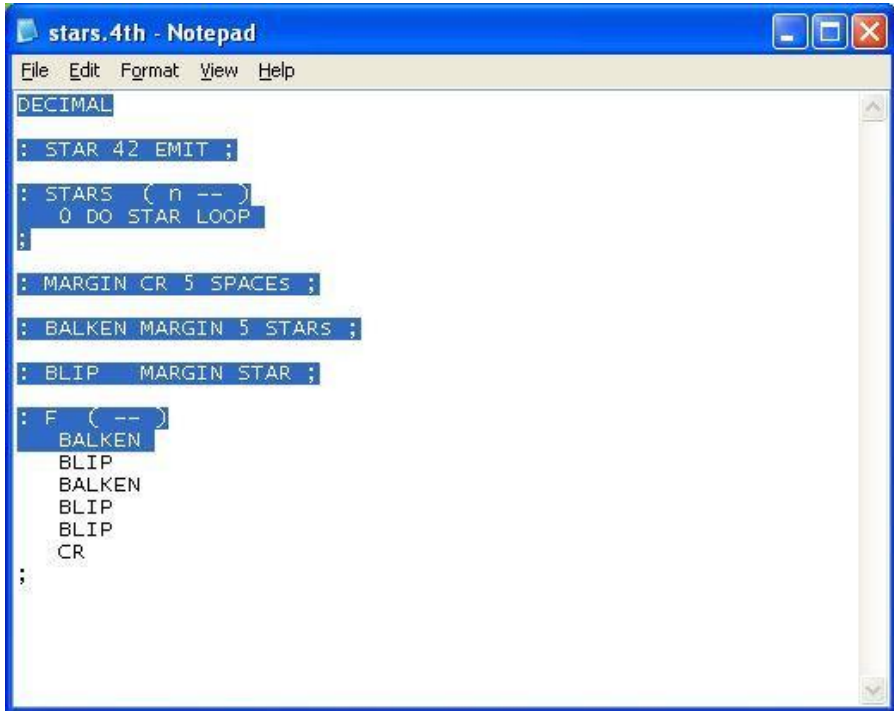
Before we start programming with Copy / Paste, we make sure that we have a “clean” Forth core, and remove all previous programs that might have been included by using the word "wipe":



After a few seconds the 4e4th-IDE looks like this:



Now we copy a part of our file stars.4th

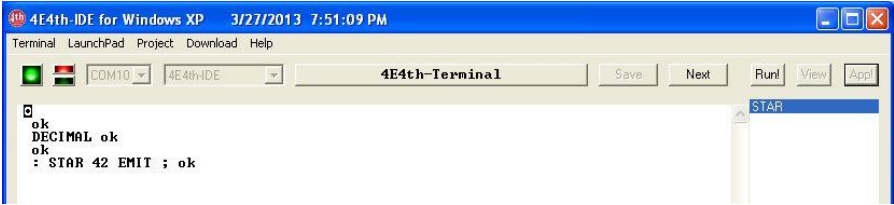


and click on Menu "Download – Clipboard – Until ;";

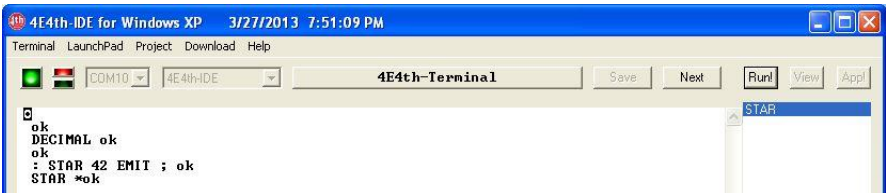
this sends all lines until the end of the first colon-definition to our target.

As we can see, that the button "Run!" is enabled, encouraging us to click on **Run!**

- and the button "Next" is enabled.

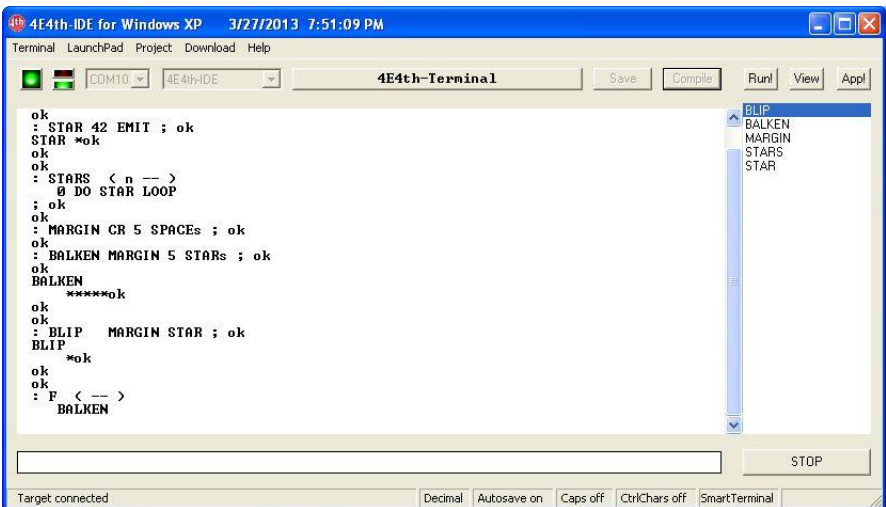


A click on "**Run!**" starts the word, which is marked in the Wordlist, as usual:



And several clicks on "Next" and "Run!" send the remaining copied code to our target and test it, until the "Next" vanished – and this button is now named "Compile" and disabled.

This shows that our Clipboard Download is exhausted.

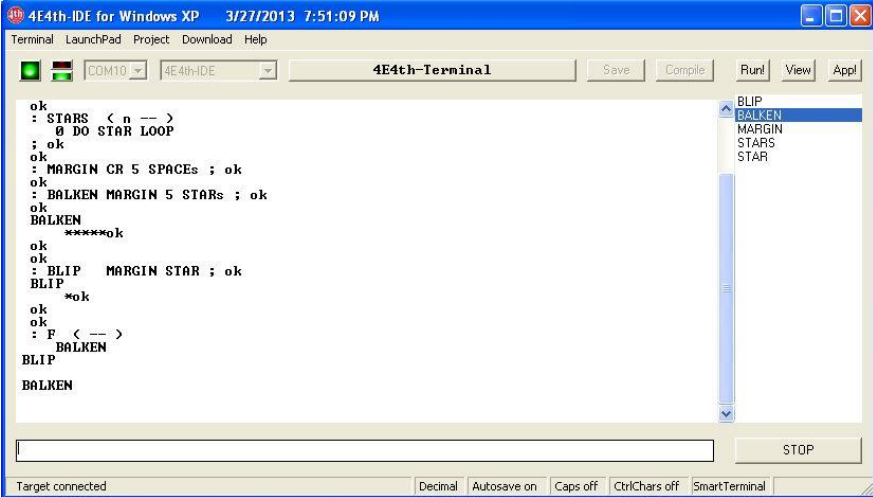


As we can see, "F" is only partly defined, because our copy didn't take the full file.

I am sure you have been wondering why I did this.

There was a reason for this: I like to show another method to finish this definition.

It is really easy: I click on "Run!" again! And as a result, the Word "BLIP" is added to F, then I mark the Word "BALKEN" and I click on "Run!" again. Here you see it:

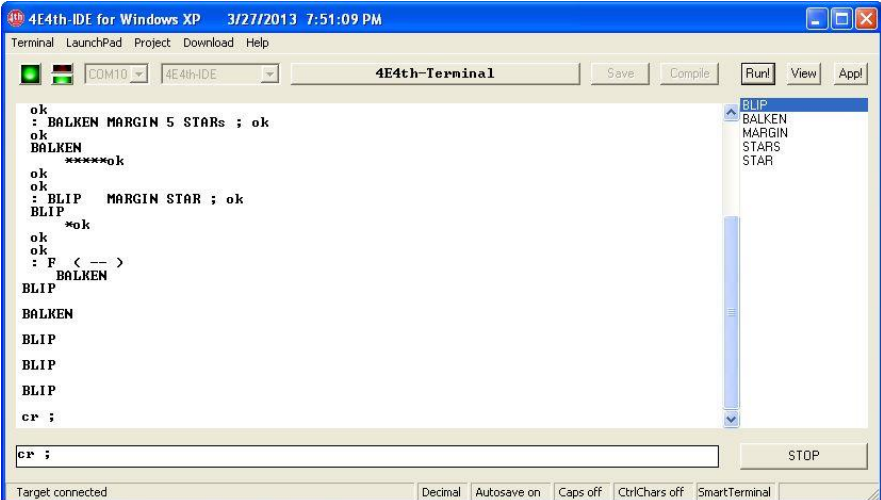


```

ok
: STARS < n -- >
  0 DO STAR LOOP
; ok
ok
: MARGIN CR 5 SPACES ; ok
ok
: BALKEN MARGIN 5 STARS ; ok
ok
BALKEN
*****ok
ok
ok
: BLIP MARGIN STAR ; ok
BLIP
*ok
ok
ok
: F < -- >
  BALKEN
BLIP
BALKEN

```

And when this definition is filled by adding "BLIP" three times, only a "cr ;" has to be typed via the Terminal input:

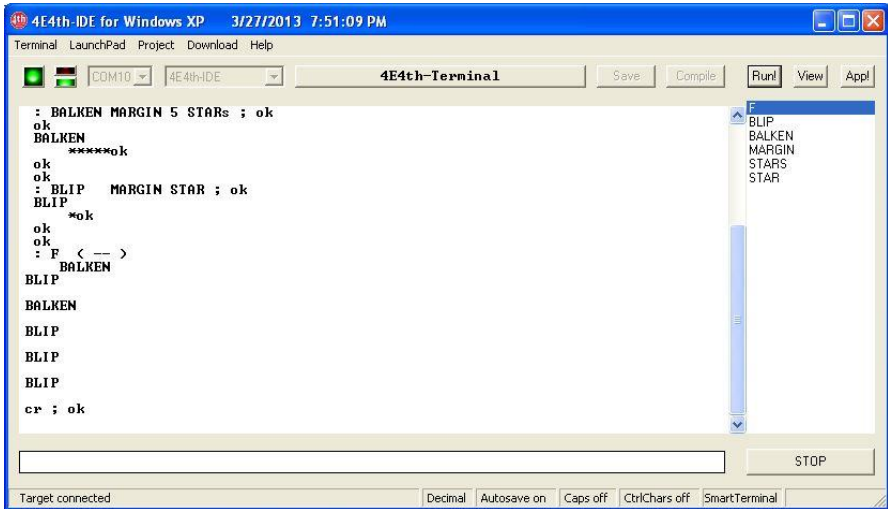


```

ok
: BALKEN MARGIN 5 STARS ; ok
ok
BALKEN
*****ok
ok
ok
: BLIP MARGIN STAR ; ok
BLIP
*ok
ok
ok
: F < -- >
  BALKEN
BLIP
BALKEN
BLIP
BLIP
BLIP
cr ;

```

Activating the Enter key finally finishes the definition –

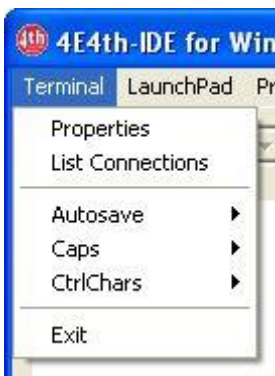


- and with another click on "Run!" the newly defined Word "F" will be started.

These pages show that programming with our 4E4th-IDE is much more convenient than by using a standard Terminal Emulator.

Terminal LaunchPad Project Download Help

Now back to our description of the 4E4th-IDE menu:



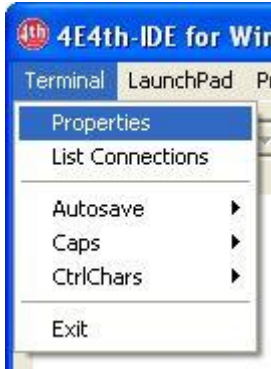
Menus:

Terminal LaunchPad Project Download Help

There are five different menus:

Terminal, LaunchPad, Project, Download, and Help.

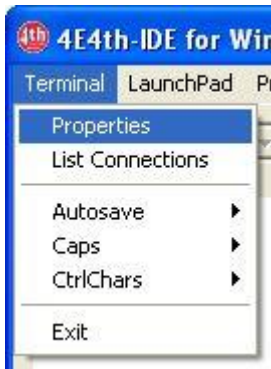
The Terminal-Menu



Terminal has six sub menus:

"Properties",
 "List Connections",
 "Autosave",
 "Caps",
 "CtrlChars" – these have settable options,
 the settings of these options will not be saved
 "Exit"

Terminal – Properties



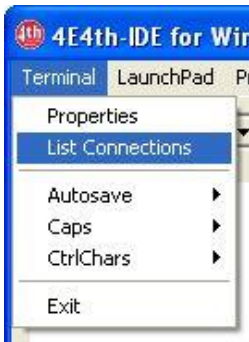
A click on "Properties" opens a pop up window which enables to set different baud rates.

This is only needed for application specific connections or for other microcontrollers. The 4E4th-IDE automatically does all LaunchPad COM port settings.

The window "Terminal Properties" is added preparing for future extensions.



Terminal - List Connections



"List Connections" checks which COM ports are available, sets these COM ports to the COM port-display and selects the highest COM port, because in most cases this is the one connected to the LaunchPad.

In case the LaunchPad has a COM port with another number, this can be selected from the COM port display:



When starting 4E4th-IDE.exe, the connection check is automatically done.

In case the target has been connected later, a click on "List Connections" adds the new COM port to be able to get connected.

Terminal - Autosave

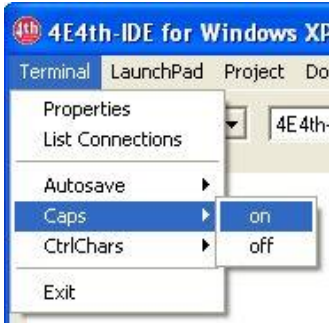


When a file download is done, all Words are automatically saved, when closing a session, a pop up will ask for saving, if not saved.

To switch this functionality off, click on "Autosave off".

And remember: This setting on / off will not be saved.

Terminal - Caps



To make the target correspondence look the "old fashioned way", or if Caps are needed, click on "Caps on".

This setting will not be saved.

Terminal - CtrlChars



The "CtrlChars" setting allows to see control characters sent to and from the target.

There are four settings:

- off
- hex,
- decimal, and
- ASCII.

This setting will not be saved.

Terminal - Exit



A click on "Exit" will end the 4E4th-IDE session. All entered data will be saved, starting 4E4th-IDE.exe anew will show the same data on screen again after a click on "START".

No data will be lost, but the "Autosave", "Caps", and "CtrlChars" settings will be in the default state again.

The LaunchPad-Menu



LaunchPad has three submenus: "Preparing LaunchPad Connection", "Dump", and "FLASH the LaunchPad".

LaunchPad - Preparing LaunchPad Connection



Preparing LaunchPad Connection is needed, when a LaunchPad is connected to a PC for the first time,

See the file "First Steps with 4E4th".

A link is found in the Help Menu.

LaunchPad - Dump



The "Dump" menu allows to dump memory areas of the 4E4th micro. There are three different areas which may be

dumped:
Info,
RAM, and
FLASH.

The latter shows how Forth Words are arranged.

To get connected to the target after a Dump again, click on "START", eventually on "STOP" first.

LaunchPad - FLASH the LaunchPad



This menu point is used to "FLASH the LaunchPad" and allows to put 4E4th Forth program onto the LaunchPad, using one of these files, which are residing in the folder \Engine\Flasher.

More information about this is provided in menu "Help" - "First Steps with 4E4th"

The Project-Menu



Project has six submenus:

"Show selected File",
 "Show Saved File",
 "Clear Screen",
 "Clear List of Words",
 "Save Screen as File", and
 "Start new Project".

Project - Show selected File



A click on “Show selected File”, opens a Windows pop up to allow editing the content of a selected 4th file on the 4E4th-IDE screen.

Project - Show Saved File



A click on “Show Saved File” allows to edit the contents of the file SavedFile. 4th on the 4E4th- IDE screen, which has been saved with Edit.

Project - Clear Screen



A click on “Clear Screen” clears the Terminal screen and temporarily the Edit screen.

Project - Clear List of Words



A click on "Clear List of Words" clears the Word List (right panel).

Project - Save Screen as File



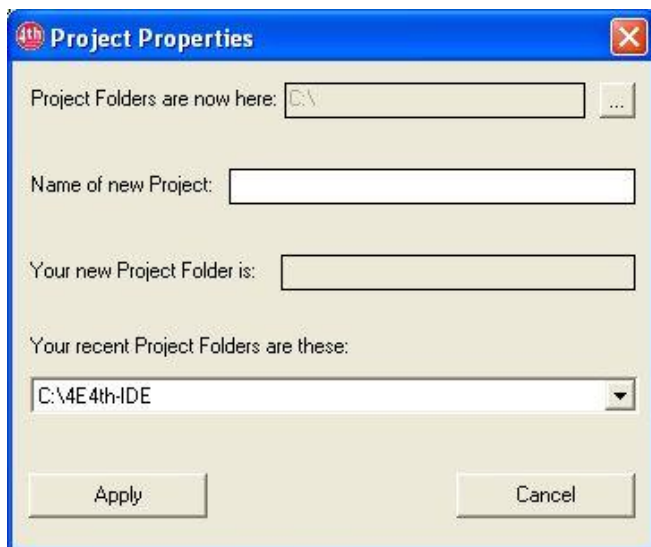
"Save Screen as File" opens a Windows pop up to allow saving the current content of the 4E4th-IDE screen.

File endings will be attached automatically.

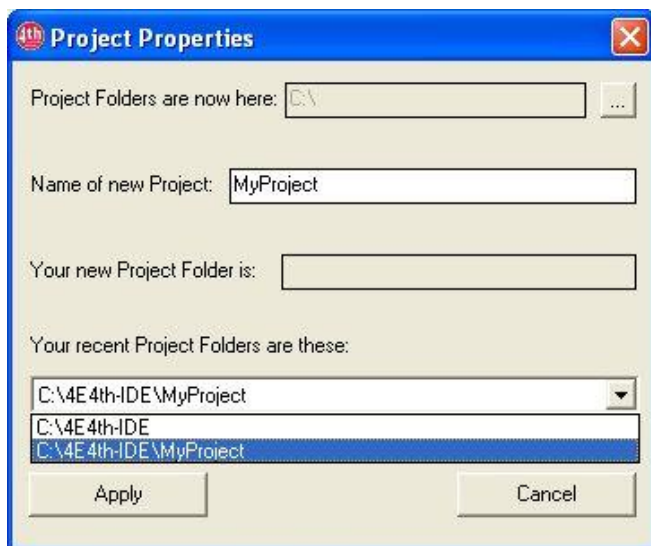
Project - Start new Project



"Start new Project" opens a Windows pop up to allow to start a new project:



To start a new project, simply type the name of your new project – in this example this name is "MyProject" - into the input field right to "Name of new Project:"



A click on "Apply" establishes this new folder and shows it at the Project Window.



The Download-Menu



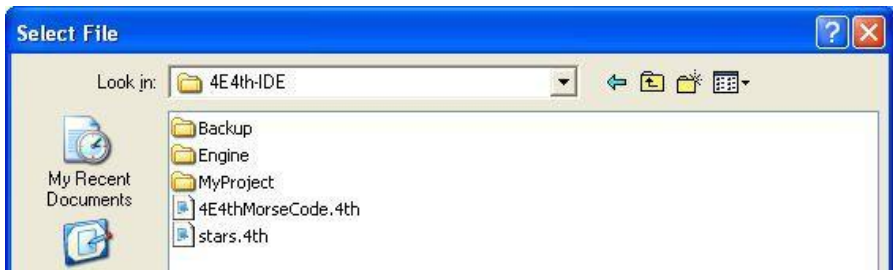
Download has three submenus:

"Selected File", "Clipboard", and "Selection".

Download - Selected File



A click on "Selected File" opens a Windows pop up to allow a file to be downloaded. Only 4E4th-Files and folders will be shown:



Download - Clipboard



Download Clipboard has three submenus:

"All",
"Until ;" and
"One Line".

Download Clipboard allows to copy & paste words, programs, or a part of programs.

Simply select and copy the words you like to transfer to the 4E4th target chip, and click on

"Download" "Clipboard" "All"

in case you like to download the whole text at once.

There are two other options for downloading data into the MSP430 chip:

A line by line download with a click on "One Line"

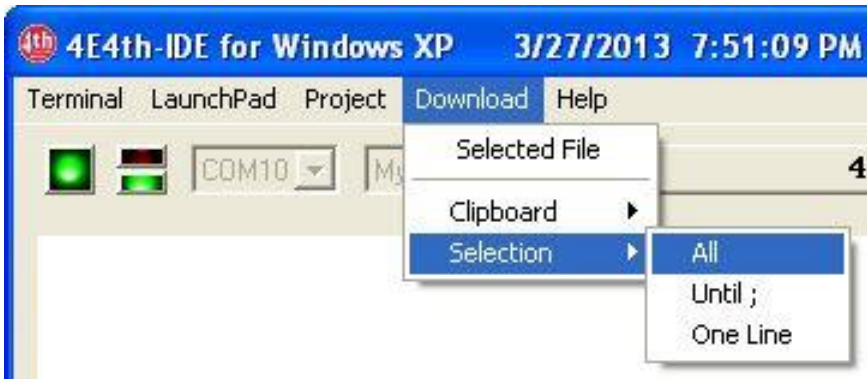
or a download for colon definition by colon definition

with a click on "Until ;", repeating this until all text has been transferred.

Click on button "Next" to proceed.

A compile error will stop this download.

Download - Selection



Download Selection has three submenus:

"All",

"Until ;" and

"One Line".

Download Selection allows to paste words, programs, or parts of programs from the 4E4th-IDE screen. Simply mark these words which you like to transfer to the target chip on the 4E4th-IDE screen, and click on "Download" "Selection" "All" in case you like to download the whole text at once.

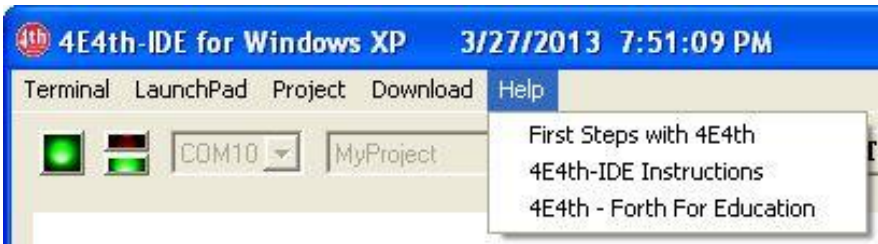
There are two other options:

A line by line download with a click on "One Line"

or a download for one colon definition for each click on "Until ;", until all text is transferred.

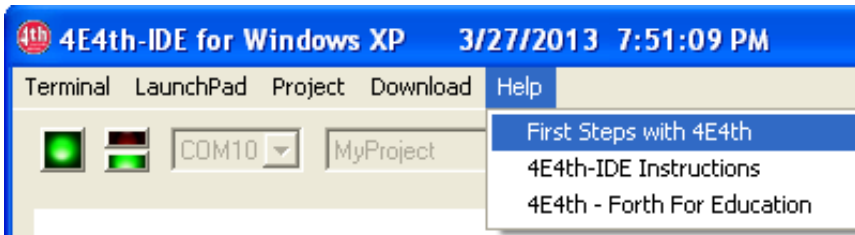
Click on button "Next" to proceed. A compile error will stop this download.

The Help-Menu



The “Help” menu has three submenus:
 “First Steps with 4E4th”,
 “4E4th-IDE instructions” and
 a web link to 4e4th.

Help Menu - First Steps with 4E4th



“First Steps with 4E4th” loads 4E4th-IDE-StartNotes from the Internet.

These 4E4th-IDE-StartNotes may be saved for later use.

“4E4th-IDE instructions” loads the 4E4th-IDE-Instructions which you are just reading now, from the Internet.

These 4E4th-IDE-Instructions may be saved for later use.

“4E4th - Forth For Education” opens our 4e4th website for further information.

Salisbury, 1/7/2013 – updated 3/29/2013 Dirk Bruehl.

Reformatted and MicroBox added by Juergen Pintaske 2016-03-29

Preliminary Version – might change without Notice