Writing Your First Firmware For PDS-220Fx Series

Apr. 2018, Version 1.1



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If you have any questions, please feel free to contact us. We will respond within 2 working days.
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1 Compiler and Linker for c Programming

To develop programs for PDS-220Fx series, you can use the 16-bit compilers below:

- Turbo C++ Version 1.01
- Turbo C Version 2.01
- Borland C++ Versions 3.1 - 5.2.x
- MSC
- MSVC ++

From Borland's web site, you can download the free TC 2.01 compilers.
Web site: http://edn.embarcadero.com/article/20841
To download this, you must have registered as a free member.

Tips & Warnings



Windows 7, Windows 10, or others 64-bit Windows do not support 16-bit programs, 16-bit processes, or 16-bit components.

You can use the DOSBox emulator (http://www.dosbox.com) to emulate a 16-bit environment for running 16-bit compilers on 64-bit Windows.

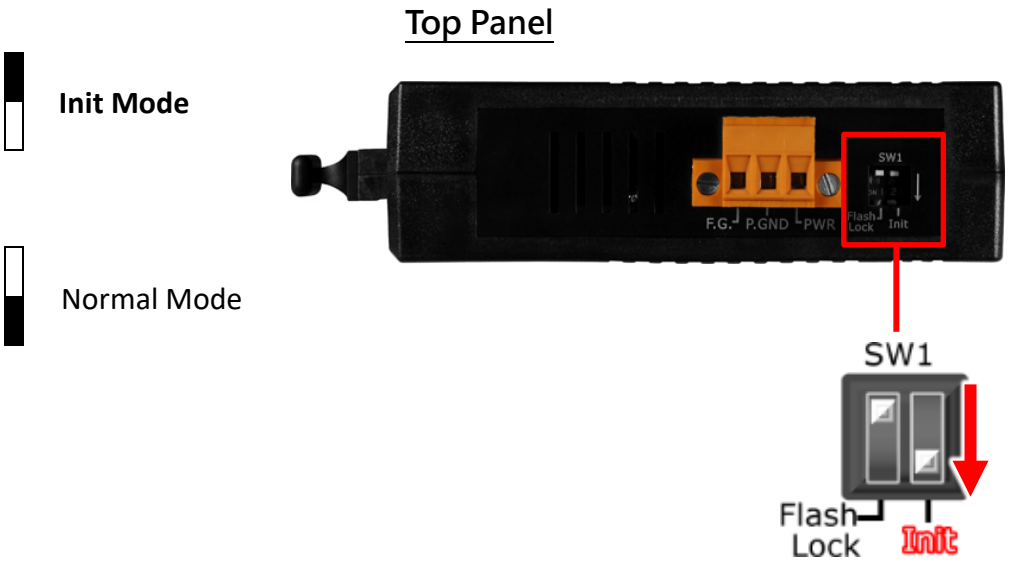
There are two commonly used 16-bit C/C++ compilers: Turbo C++3.0 and Borland C++ 3.1. The example below demonstrates how to run the Borland C++ 3.1 project on 64-bit Windows.

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2 Configuring Boot Mode

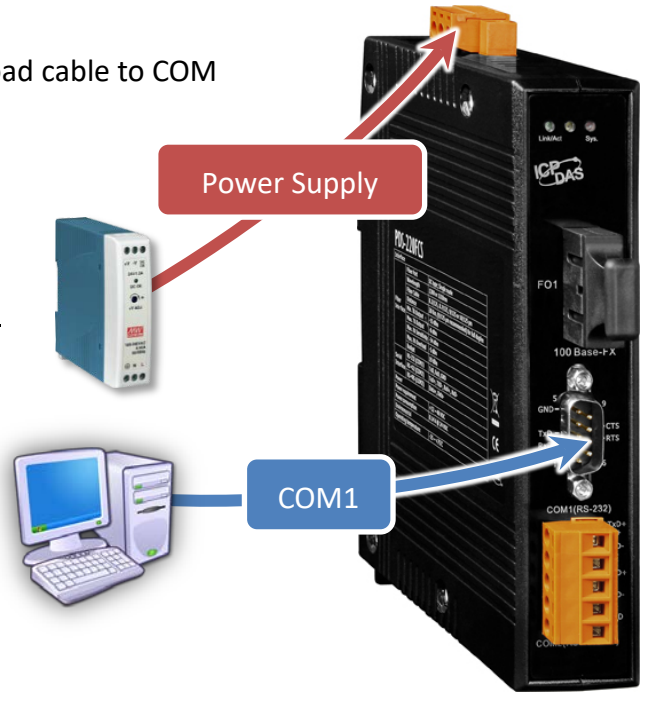
Make sure the switch placed in the **"Init"** position.



3 Connecting to PC and Power

To connect to the PC using a COM1 (RS-232) connection, please follow the instructions below.

1. Power off the PDS-220Fx.
2. Connect the DB-9 connector of CA-0910 download cable to COM Port (e.g., COM1) of your PC.
3. Wire the CA-0910 to PDS-220Fx, as follows:
Connect the CA-0910.TX with PDS-220Fx.TxD1
Connect the CA-0910.RX with PDS-220Fx.RxD1
Connect the CA-0910.GND with PDS-220Fx.GND
4. Power on the 220Fx.



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4 “Hello World” - Your Fist Program

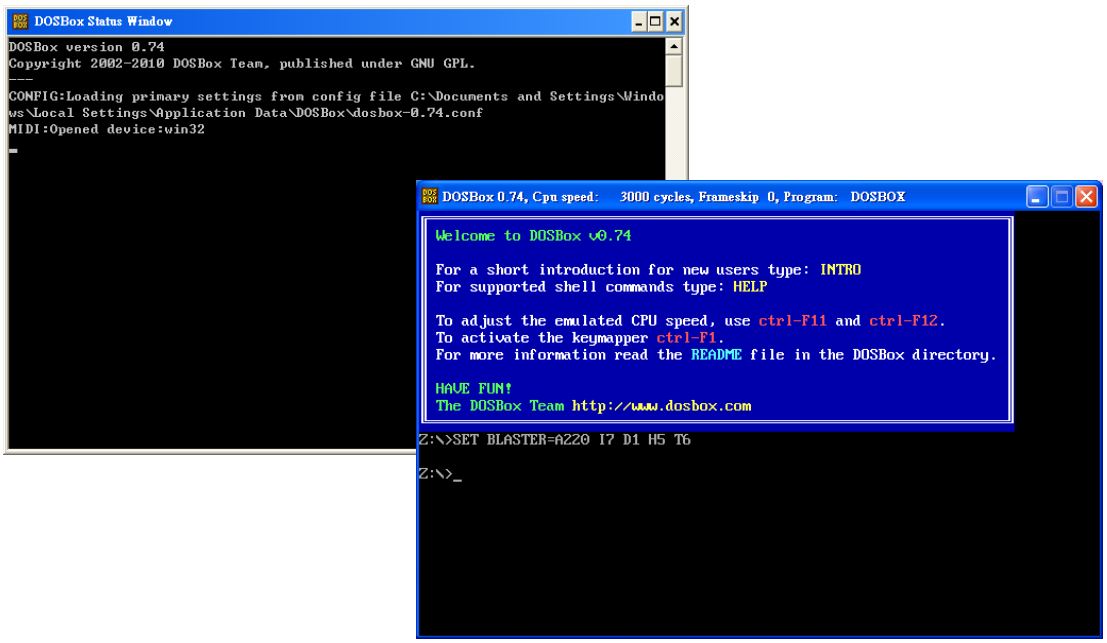
Before writing your first program, ensure that you have the necessary C/C++ compiler and the corresponding functions library on your system. Here, using the Borland C++ 3.1 on 64-bit Windows is shown as an example.

Step 1
Get the DOSBox and install it on your computer

The latest version of the DOSBox can be obtained from SourceForge web site.
http://www.dosbox.com
After the installation has been completed, there will be a new short-cut for DOSBox on the desktop.

Step 2
Run the DOSBox

Open the DOSBox application from the icon located on the desktop.
DOSBox will display two windows, one is the DOSBox Status Window (shows the processes in the "background") and another one is the main emulator window, which shows the emulated version of DOS.



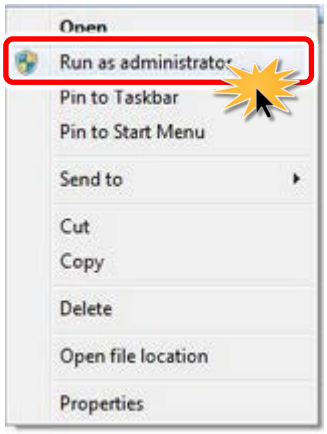
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Tips & Warnings

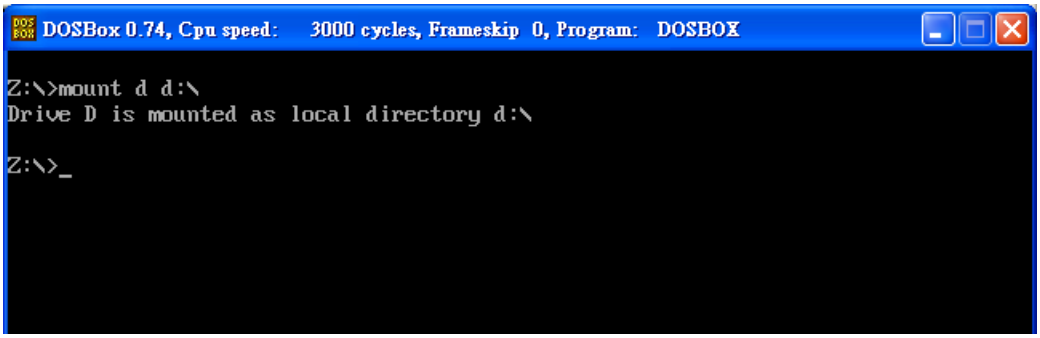


If you're running Windows 7 or later OS, we would suggest you to run the DOSBox emulator with administrator privileges. Right-click the icon or shortcut, and then click "**Run as administrator**".



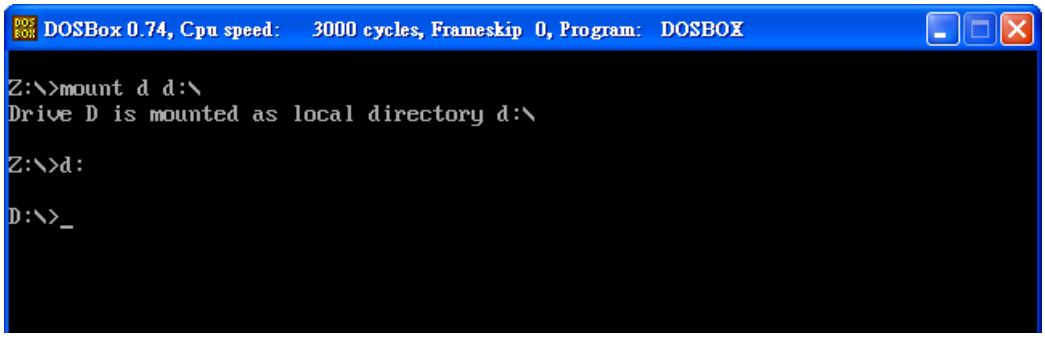
Step 3
Mount the drive as a virtual drive

For example, if you want to mount a drive D as a virtual drive D. At the command prompt (e.g., Z:\>) of the main emulator window, type **"mount d d:\"** and then press **<Enter>**. ("d:\" part represents the drive on your computer that you want to mount).



Step 4
Shift to drive D

At the command prompt (e.g., Z:\>) of the main emulator window, type **"d:"** and then press **<Enter>**.



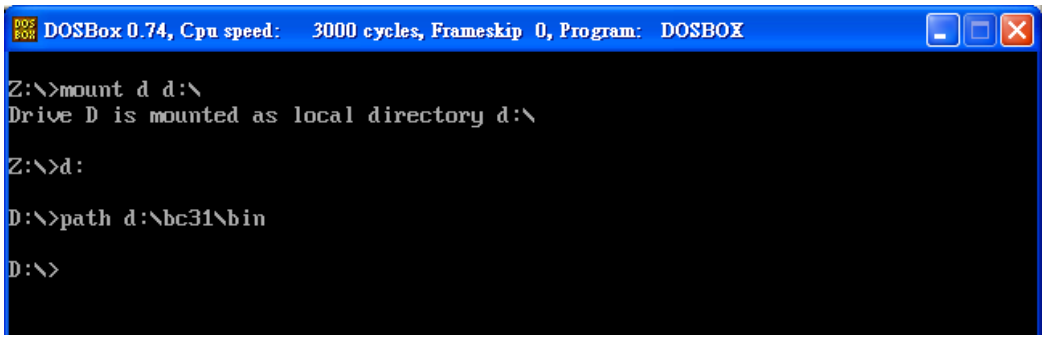
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Step 5

Add the Borland C++ compiler executable to the DOSBox path

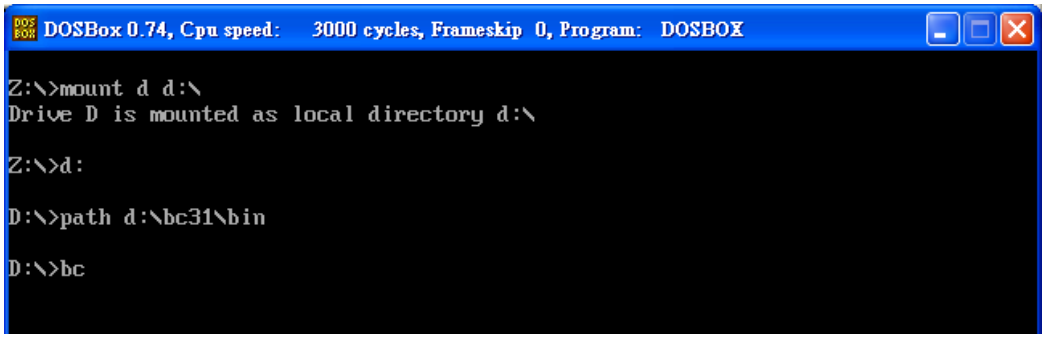
For example, we assume that you use the Borland C++ 3.1 compiler, and its bin directory is in **"D:\BC31\Bin"**. At the command prompt (e.g., D:\>) of the main emulator window, type **"path d:\bc31\bin"** and then press **<Enter>**.



Step 6

Execute bc.exe to run the Borland C++ 3.1 IDE

At the command prompt (e.g., D:\>) of the main emulator window, type **"bc"** and then press **<Enter>**.



Step 7

Edit the source code and then save it

We provide many demo programs and library file that can be obtained from ICP DAS FTP site or ICP DAS web site. The download addresses are shown below:

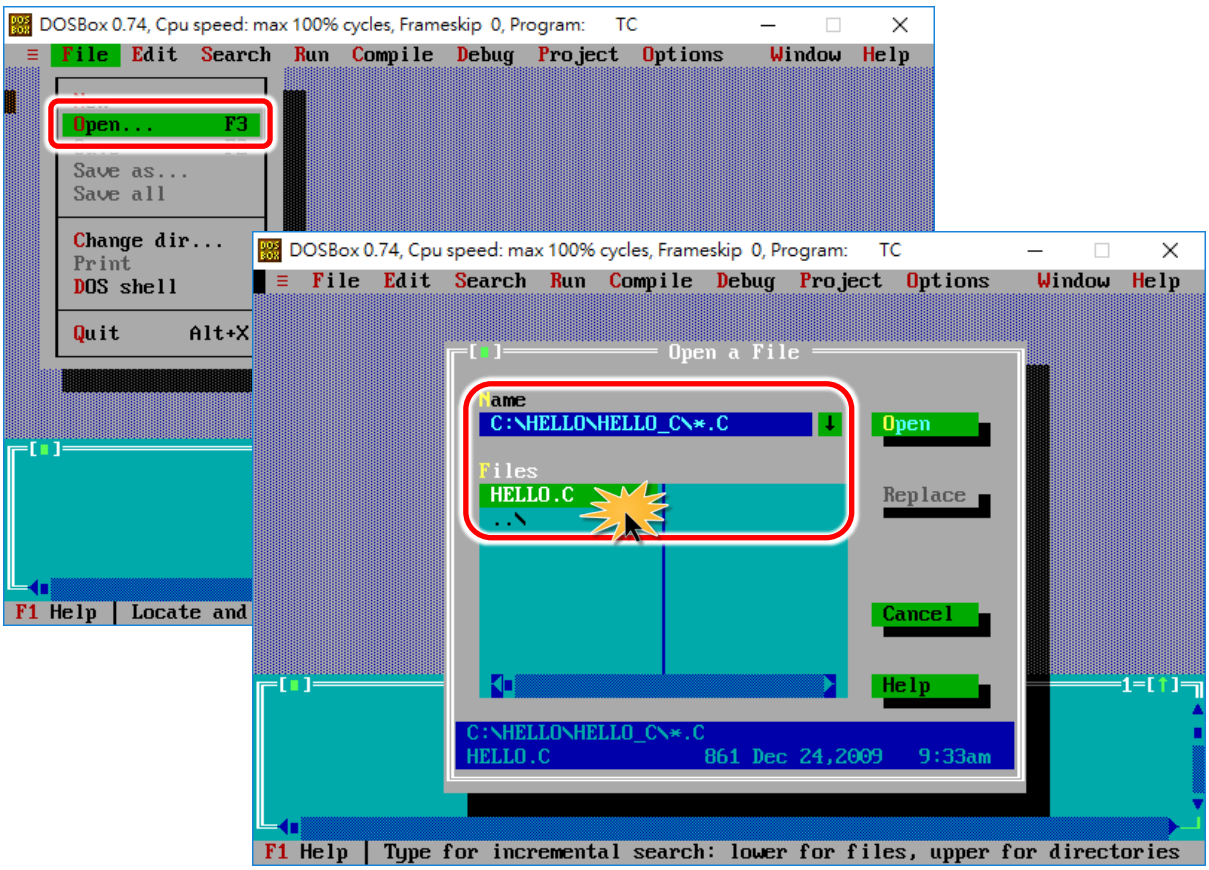
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/demo/

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1. Here, the **“hello”** demo is used as an example. First download the **“HELLO.C”** and **“7186EL.LIB”** files to the drive D, the **“HELLO.C”** and **“7186EL.LIB”** files is located at:
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/demo/firmware/basic/bc_tc/

2. Select **“Open”** from the **“File”** menu to open the **“HELLO.C”** file.

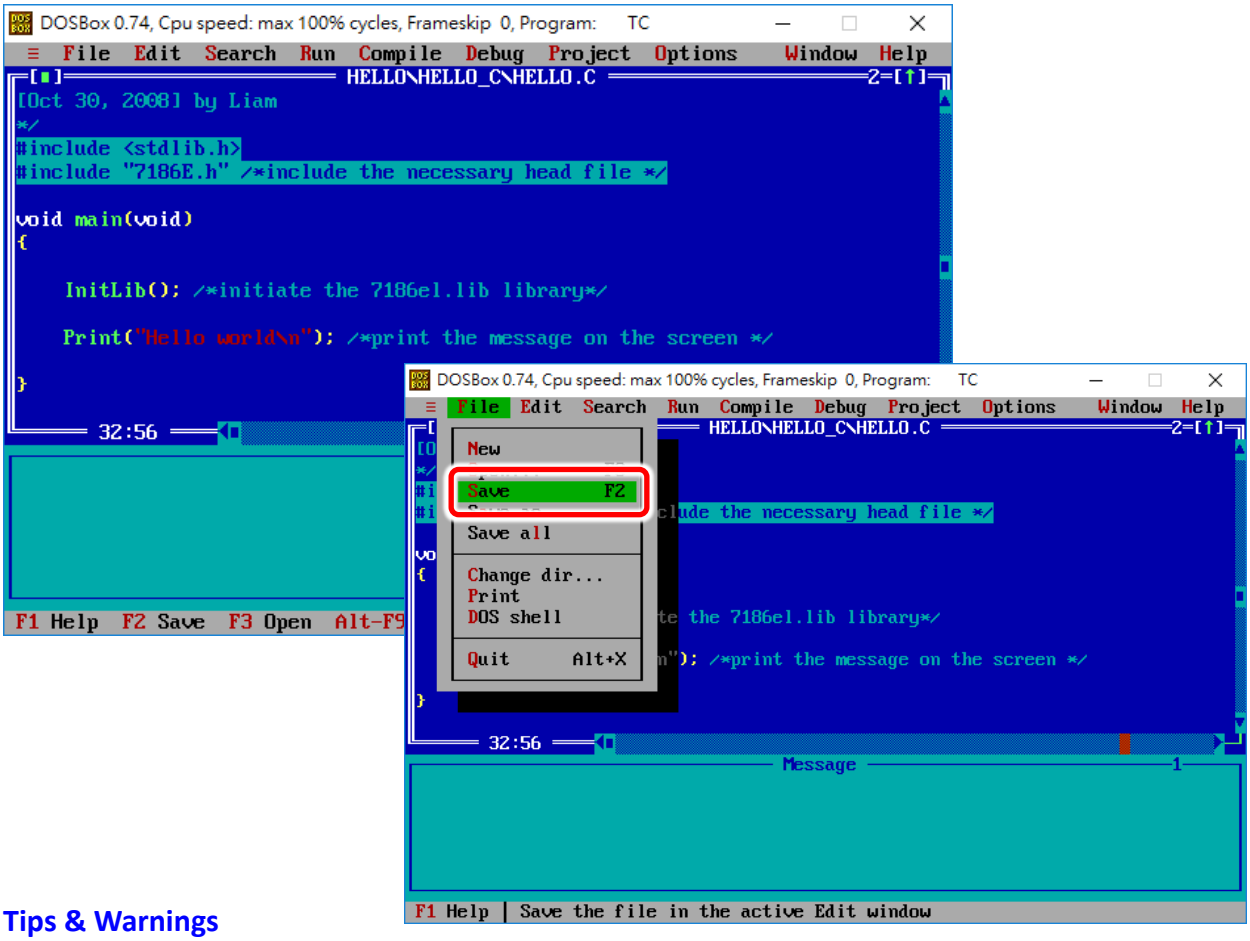


3. Modify the source code to print **“Hello World”** and save it.

```
#include <stdlib.h>
#include “7186e.h” /* include the necessary head file */
void main(void) {
    InitLib(); /* initiate the 7186el.lib library*/
    Print(“Hello world\n”); /* print the message on the screen */
}
```

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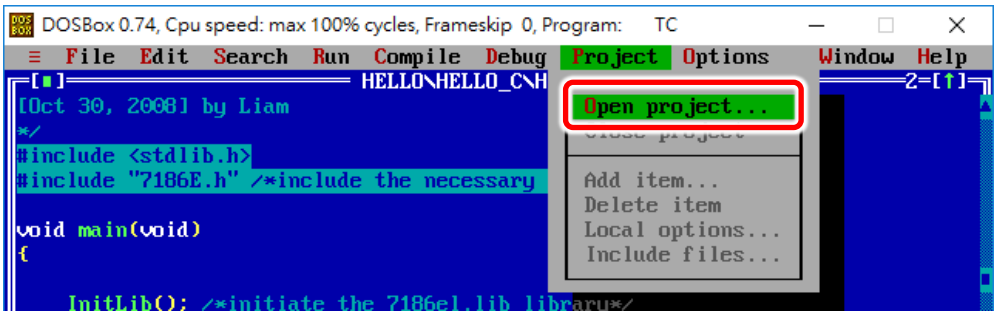
Tips & Warnings

You can write the code as shown below with your familiar text editor or other tools; please note that you must save the source code under a filename that terminates with the extension **"C"**.

Step 8

Create a project file (*.prj) and save it

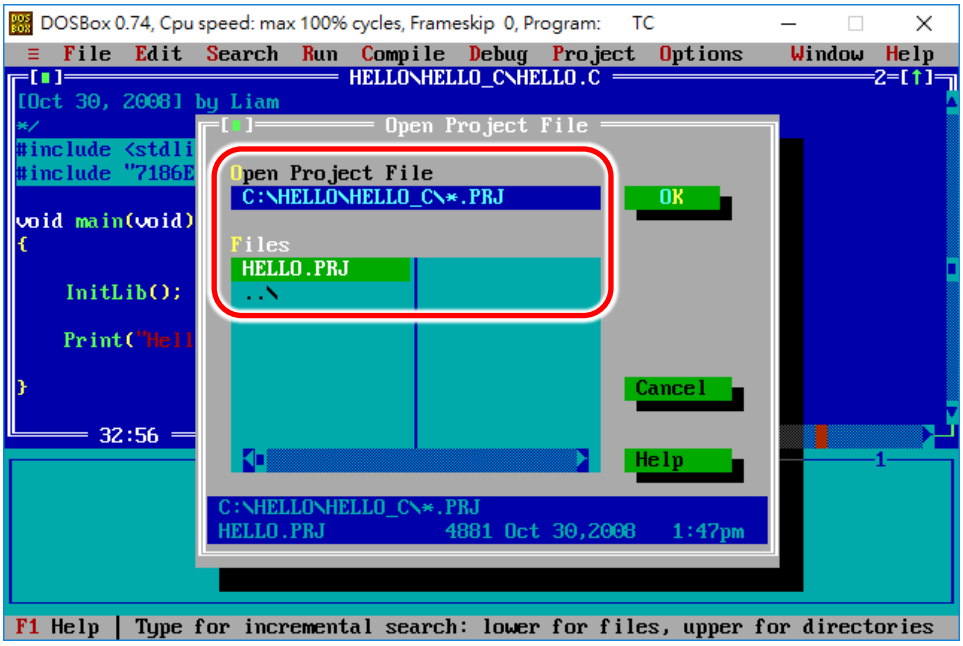
1. Select **"Open Project..."** from the **"Project"** menu to create a project file (e.g., HELLO.PRJ).



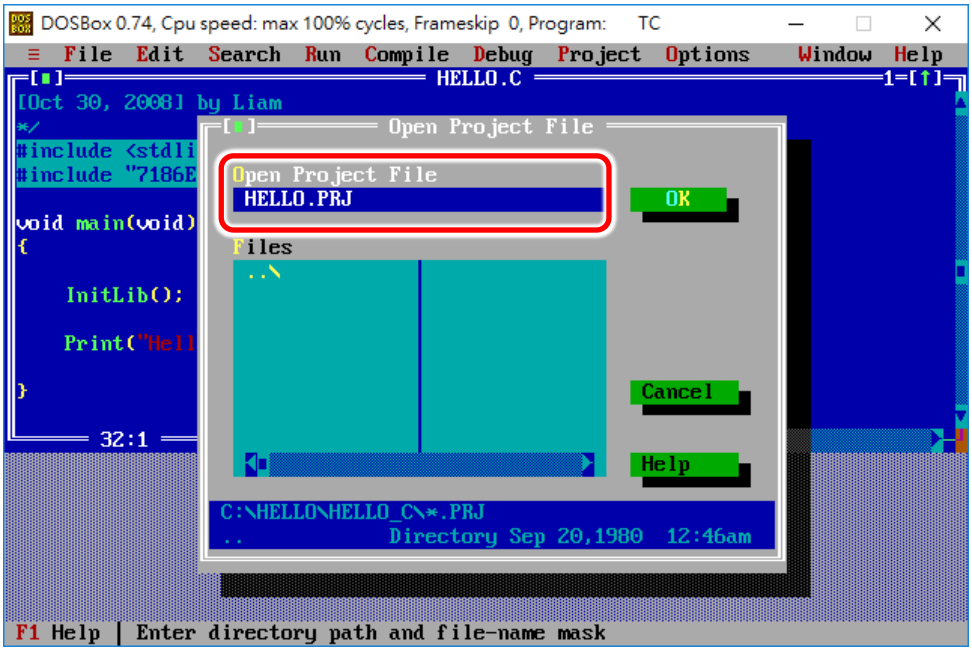
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Note that a **"HELLO.PRJ"** file has been built in this demo program. You can open this file to view it.



If you don't have a project file, please type **"HELLO.PRJ"** in the **"Open Project File"** field and press **<Enter>** to create it.

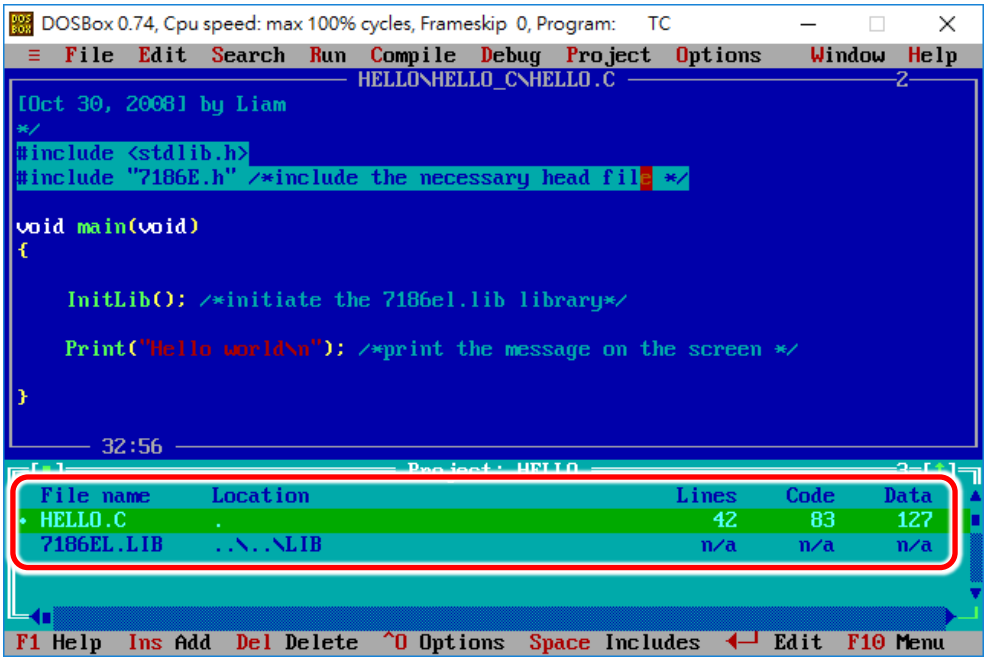


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2. Add all necessary files (**"*.C"** and **"*.lib"**) to the project.

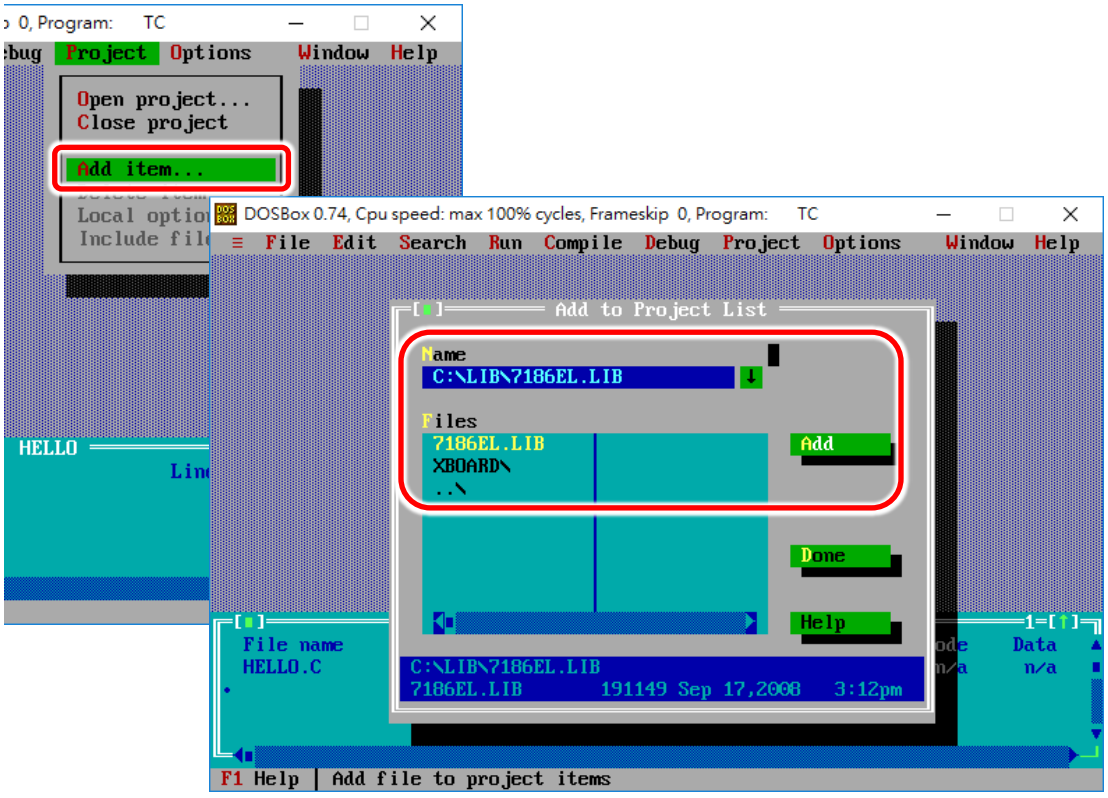
Note that in the demo program, the **"HELLO.C"** and **"7186EL.LIB"** files have been added to the project (e.g., HELLO.PRJ), as shown below.



If you don't have added these files ("*.c" and "*.lib"), please follow the steps below.

i. Select **"Add item…"** from the **"Project"** menu.

ii. Choose the **"HELLO.C"** and "**7186EL.LIB"** files and click on the **"Add"** button.



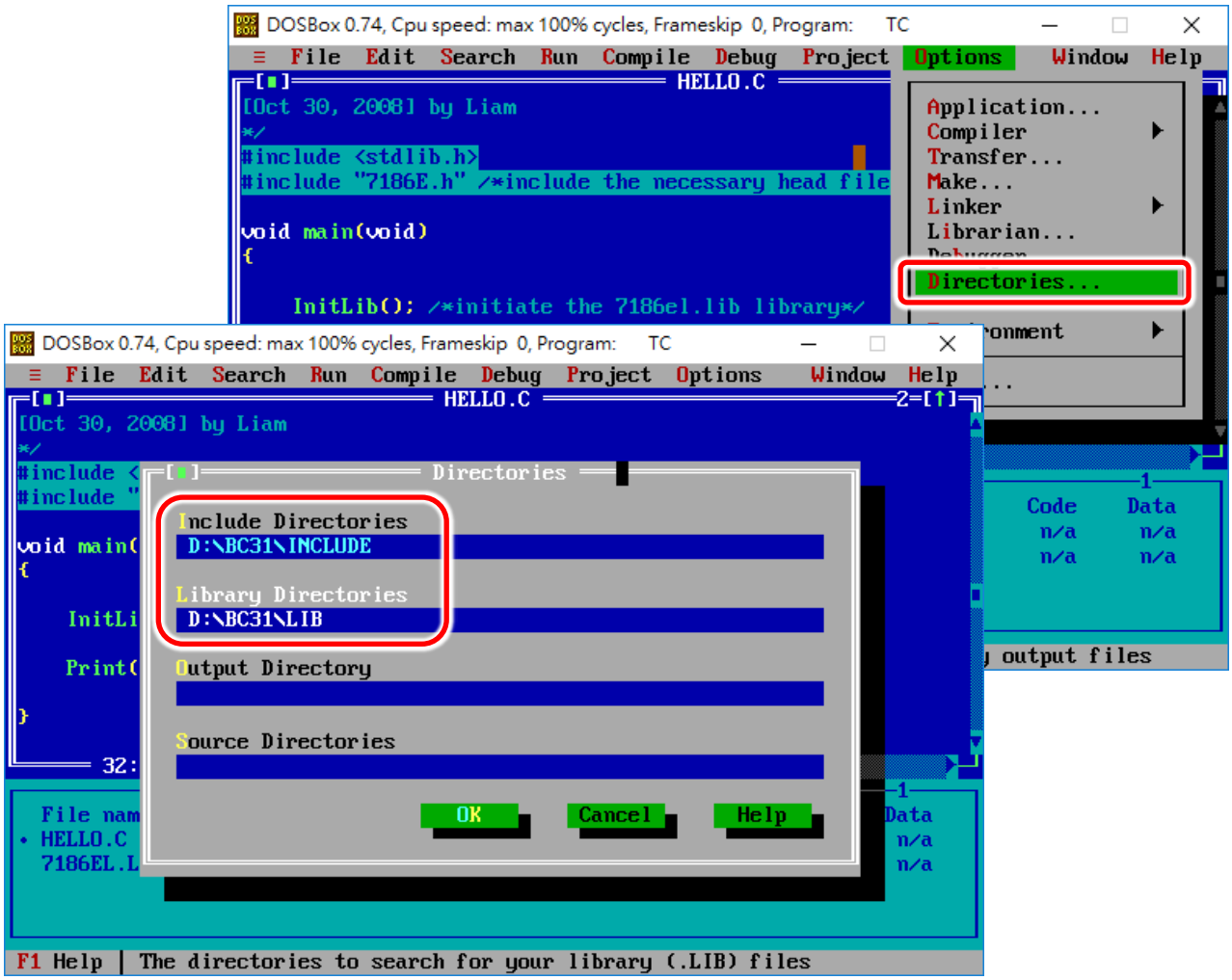
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Step 9

Specify the Include and Library directories where the compiler can search for header file and libraries

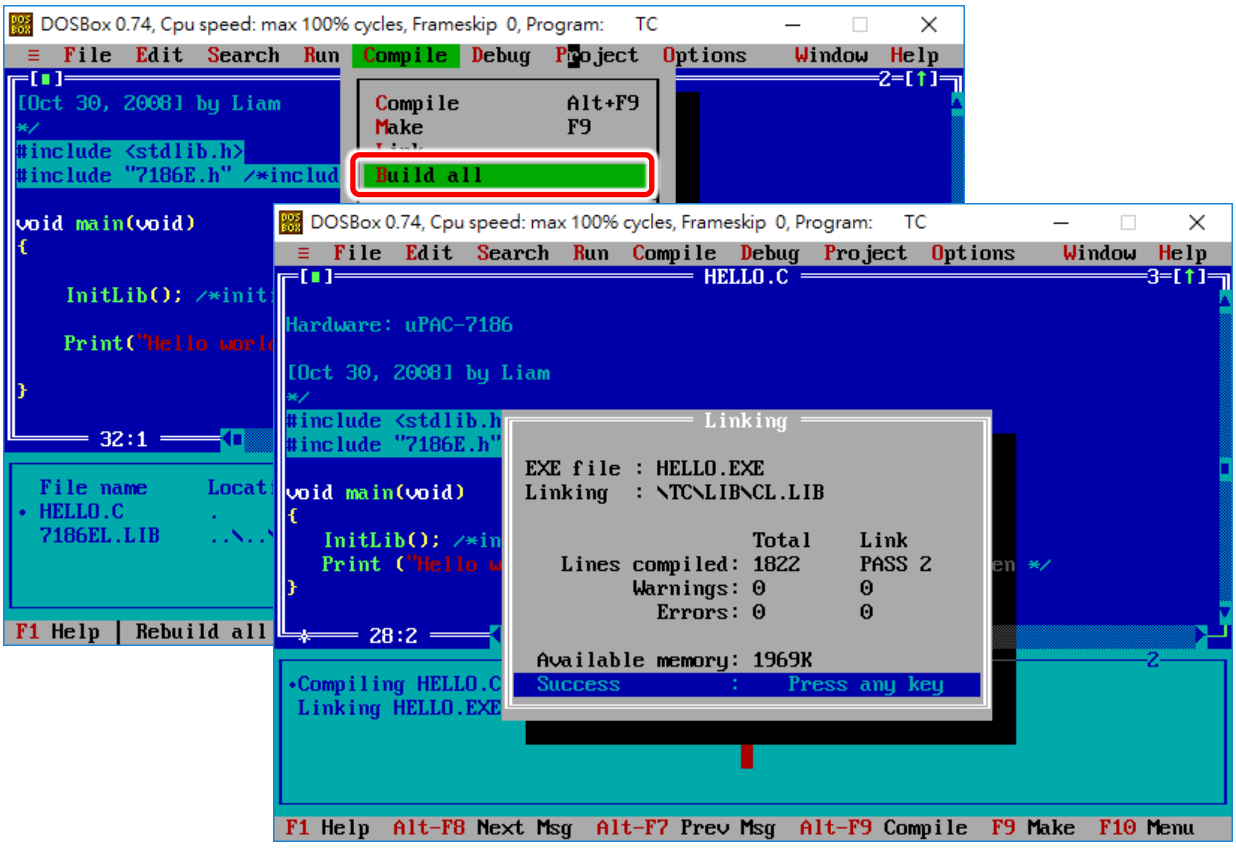
Click on **"Options"** and select **"Directories…"** to enter the BC++ 3.1 include and library directories. By default, the directories are same as the installation directory of the BC++ 3.1 compiler.



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Step 10

Select "Build all" from the "Compile" menu to build the project



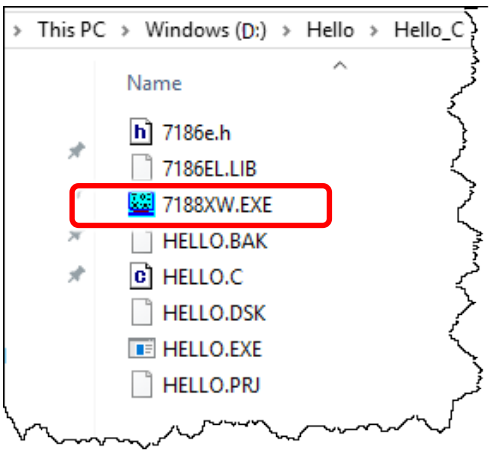
Tips & Warnings

More C/C++ compiler settings, please refer to
http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/document/compiler_v1.1.pdf

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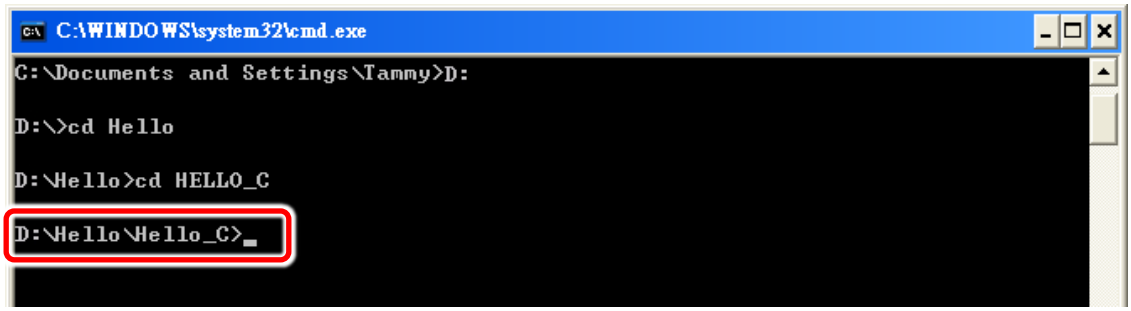
5 Uploading and Executing



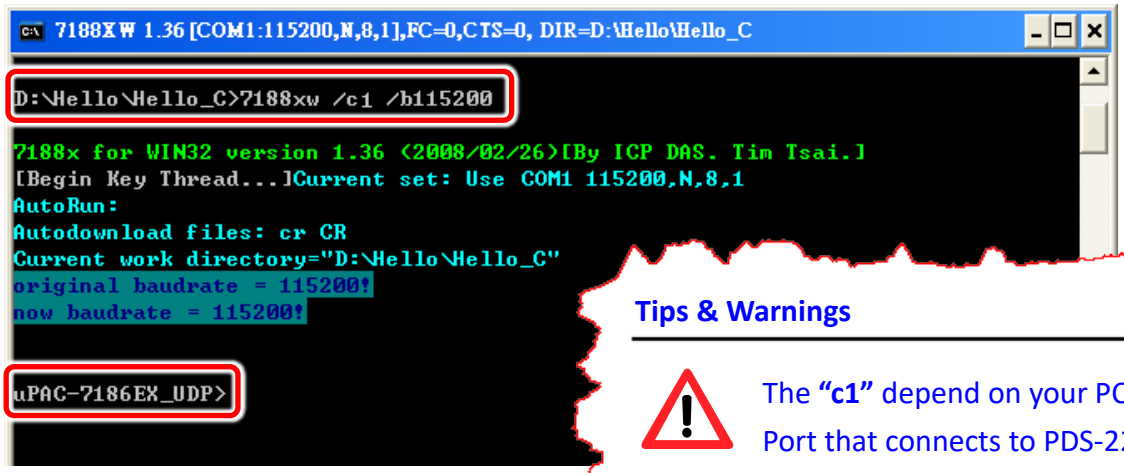
Download files to the PDS-220Fx using the **7188xw.exe**, refer to the following instruction.

1. The **7188xw.exe** is copied to the directory where the "**HELLO.exe"** file is located (e.g., D:\Hello\Hello_c\), and confirm that the PDS-220Fx is connected to the Host PC (refer to Chapter 3 "Connecting to PC and Power").

2. Open command prompt in Windows and change the current directory to the directory where the "**HELLO.exe"** file is located.



3. Type **"7188xw /c1 /b115200"** and press **<Enter>** to execute the **7188xw.exe** and then press **<Enter>** again to connect to the PDS-220Fx, which will show **"uPAC-7186EX_UDP>"**.



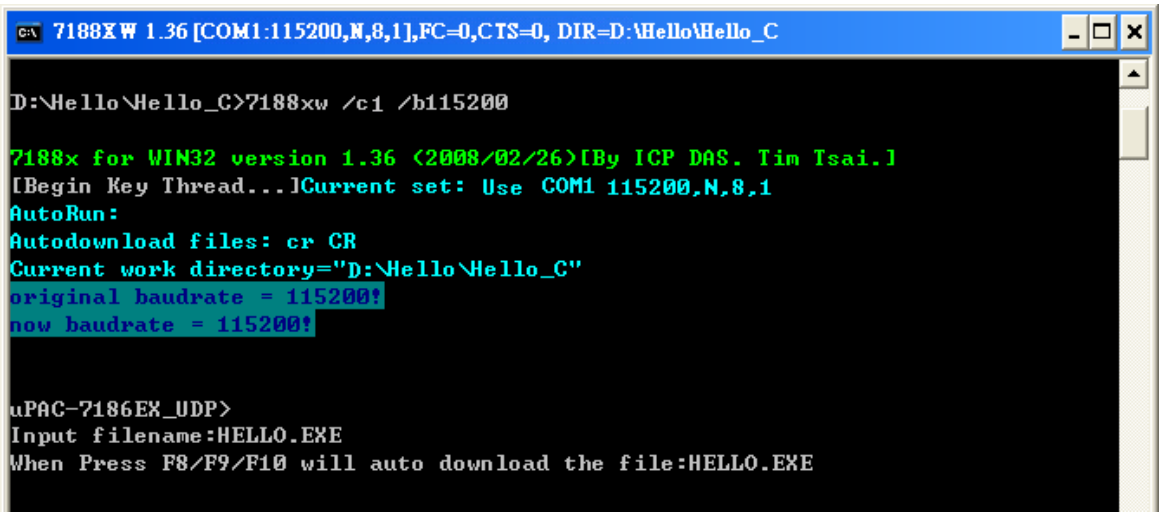
Tips & Warnings

The **"c1"** depend on your PC COM Port that connects to PDS-220Fx.

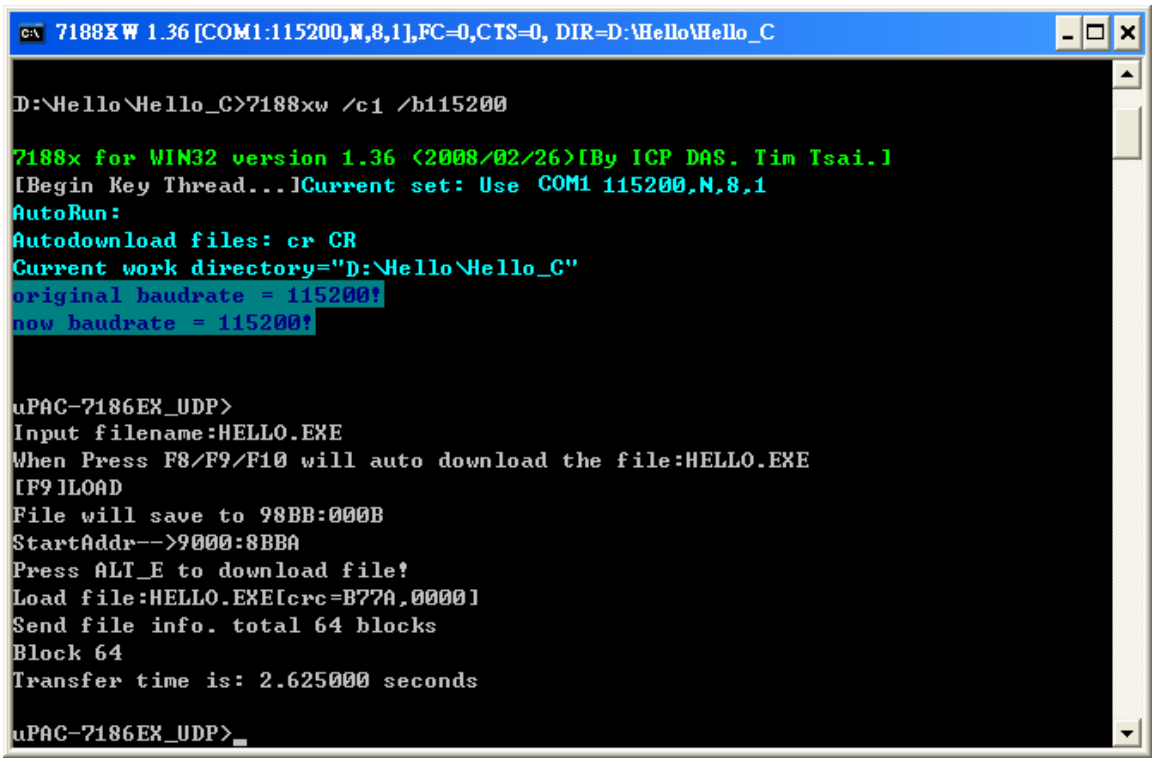
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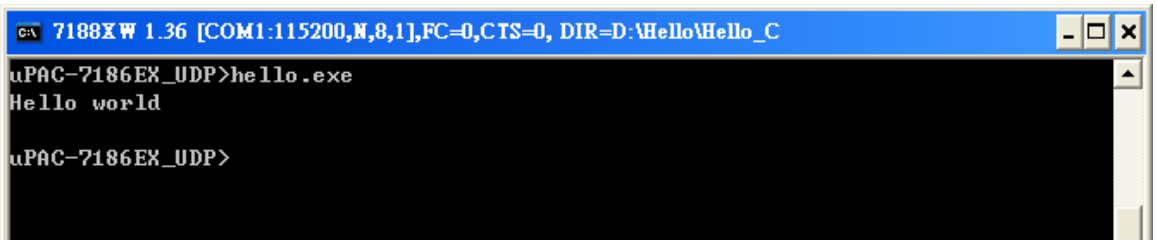
4. Press **<F2>** and type the filename **"HELLO.exe"** and then press **<Enter>**.



5. Press **<F9>** to upload the "**HELLO.exe"** file.



6. Type **"HELLO.exe"** and press **<Enter>** to execute it.



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6 Related Information

- PDS-220Fx Document:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/document/

- PDS-220Fx Firmware:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/vxcomm/server(pds)/

- Demos and Library:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/7186e/demo/
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/demo/

- More C/C++ Compiler Settings:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/document/compiler_v1.1.pdf

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