Stage 2 Mechatronics - Lab Notes







MPLAB IDE - Stage2MechLab Starting with an existing project

Open the *Stage2MechLab* project file (on the **D**: or **E**: drive). **If MPLAB complains about write permission at this point, just click cancel.** Use 'Save Project As...' to save the project to a folder on your **H**: drive.

Organize 🔻 🛛 Burn	New folder			
숨 Favorites 📃 Desktop	Documents library Stage2MechLab		Arrar	nge by: Folder 🔻
Downloads	Name	Date modified	Туре	Size
Recent Places	lcd.c	05/09/2010 08:50	C File	7 KB
🚍 Libraries	lcd.h	05/09/2010 08:53	H File	3 KB
Documents	i main.c	13/09/2010 13:14	C File	3 KB
Music	ser.c	16/09/2010 10:59	C File	5 KB
Pictures	Jenii	07/09/2010 06:48	H File	3 KB
Videos	📉 Stage2MechLab	13/09/2010 13:24	Microchip MPLAB.Project	2 KB
	Str.g. 2M. cancab.mcs	Type: Microchip MPLA	B.Project e	1 KB
🖳 Computer (DATADES)	📉 Stage2MechLab	Size: 1.73 KB	hip MPLAB.Workspace	29 KB
	user.c	Date modified: 13/09/2	010 13:24	5 KB
辑 Network	user.h	05/09/2010 13:00	H File	1 KB



MPLAB IDE - Choosing the Programmer

Once the compiler has created the binary program, this needs to be transferred to the PIC. One tool for doing this is the MPLAB ICD 2 which can connect to the computer via USB.

F	ile Edit View Project Debugger Programmer Tools Configure	re Window Help
	🗅 🚅 🖬 🐰 🐂 📾 🝏 🚜 🛛 Select Programmer 🔸	None
٢		1 PICSTART Plus
	Output	2 MPLAB ICD 2
	Build Version Control Find in Files	3 Starter Kits
		4 PICkit 3
		5 MPLAB ICD 3
		6 AN851 Quick Programmer Beta
		7 PICkit 2
		8 MPLAB PM 3
		9 REAL ICE
		10 PRO MATE II
		11 PICkit 1



MPLAB IDE - Configuring the ICD2

Before continuing, check the settings.

MPLAB may start the Wizard automatically. If so:

choose USB as the connection method

- power is supplied to the device, not the ICD2, and
- leave everything else as the default.

It is best if MPLAB *does not* connect automatically to the ICD 2 programmer.

the second se		
MPLAB IDE v8.56		
File Edit View Project Debugger	Programmer Tools Configure Window H	lelp
] 🗅 😅 🖬 🕹 🐂 🖷 🚳 🖊	Select Programmer	
💷 Output	MPLAB ICD 2 Setup Wizard	
Build Version Control Find in Files	Program	
Connecting to MPLAB ICD 2	Read	
ICD0019: Communications: Failed	Verify	= (
() ICD0021: Unable to connect with N	Erase Part	ι.
MPLAB ICD 2 ready for next opera	Blank Check	ι.
	Read EEPROM	Ŀ
	Release from Reset	
	Hold in Reset	L
	Abort Operation	L
	Connect	
	Download ICD2 Operating System	
Untitled 🗆 🔍 🔀	Settings	

MPLAB IDE - Configuring the ICD2

MPLAB IDE v8.56		
File Edit View Project Debugger Prog	ammer Tools Configure Window Help	
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Output		
Build Version Control Find in Files MPLAB	CD 2	
Connecting to MPLAB ICD 2 ICD0019: Communications: Failed to M	PLAB ICD 2 Settings	Ccessfully.
) ICD0021: Unable to connect with MPI	Limitations Versions Warnings	
MPLAB ICD 2 ready for next operatio	Status Communication Power Program Program2	
	Connect Status	
	Not Connected	
	Automatically connect at startup Automatically cownload firmware if needed	
	Messages	
	Output to debug file	=
💷 Untitled 🗖 🗖 🖾	Self Test	
	Module Vpp	
	MCLR Gnd Run Self Test	
	MCLR Vdd	
	MCLR Vpp	
	OK Cancel Apply Help	
Files Symbols		-
MDLABICD 2 DIC16E017	III W/O zdcc	► bank0
WIFLAD ICD 2 FICIOF917	W.0 2 UC C	Dallk V



MPLAB IDE - Connecting to the ICD2

Since the MPLAB does not connect automatically to the ICD 2 programmer, we need to connect via the menu. Do this *before* programming the PIC, but only *after* connecting the ICD2 to the mechatronics board.

If MPLAB starts to download an operating system, that's okay. (Check that 'PIC16F917' is shown at the bottom of the MPLAB window; if not, follow the instructions at the end of this document.)

ſ	.	MPLAB IDE v8.56		
		File Edit View Project Debugger	Programmer Tools Configure Window	Help
		🗅 🛩 🖬 🐰 🐂 🖷 🍜 🛤	Select Programmer	۲ (
		💷 Output	MPLAB ICD 2 Setup Wizard	
		Build Version Control Find in Files	Program	
		Connecting to MPLAB ICD 2	Read	
I		ICD0019: Communications: Failed	C Verify	=
		(CD0021: Unable to connect with N	Erase Part	
1		MPLAB ICD 2 ready for next opera	Blank Check	
			Read EEPROM	
1			Release from Reset	
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			Abort operation	_
I			Connect	
			Download ICD2 Operating System	
		💷 Untitled 🗖 🖻 🔀	Settings	

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MPLAB IDE - Successful Connection to ICD2

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MPLAB IDE v8.56							
File Edit View Project Debugger Programmer Tools Configure Window Help							
▏ D ≌ 문 炎	Checksum: 0xffff						
Output		<u>^</u>					
Build Version Control Find in Files MPLAB ICD 2							
Auto-connect not enabled - Not connecting (Try enabling auto-connect on the ICD2 settings pages.)							
Connecting to MPLAB ICD 2							
Setting Vdd source to target							
Reading ICD Product ID							
Running ICD Self Test							
MPLAB ICD 2 ready for next operation							
		=					
Files V Symbols							
MPLAB ICD 2 PIC16F917 W:0 z dc c	bank 0						

Stage 2 Mechatronics - Lab Notes



MPLAB IDE - Stage2MechLab - Compiling

Stage2MechLab - MP	LAB IDE v8.56 - Stage2MechLab.r	ncw		
File Edit View Proj	ect Debugger Programmer	Tools Configur	e Window	Help
] 🗅 📽 🖬 .	Project Wizard		🗖 💣 🖆 🛛	🖬 🖏 (
Output Output Build Version Auto-connect Connecting to Connected Setting Vdd so Target Device Reading ICE	New Open Close Set Active Project Quickbuild (no .asm file) Package in .zip Clean	۴ ۲	onnect on th	e ICD2 s
MPLAB ICD 2	Build	F10 Ctrl+F10		
	HI-TECH C Manual Build Configuration Build Options	F11		
Stage2Mechl	Save Project Save Project As Add Files to Project Add New File to Project Remove File From Project	Þ		
	Select Language Toolsuite		Configuration B	its set in c
	Version Control		Value 30E4 (Fiel OSC
				WDT

MPLAB IDE - Stage2MechLab - Compiling

Stage2MechLab - MPLAB IDE v8.56					_ D _ X
File Edit View Project Debugger Progra	mmer Tools Configure Wind	low Help			
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Output					<u>×</u>]
Build Version Control Find in Files MPLAB IC	CD 2				
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Running this compiler in PRO m produces code which is typical The HI-TECH C PRO compiler out	ode, with Omniscient Co ly 40% smaller than in put for this code could	de Generati Lite mode. 1 be 742 wor	on enabled, ds smaller.		
See http://microchip.htsoft.co	m/portal/pic_pro for mo	re informat	ion.		
	дегмесяцар.сон.				=
Build successidi!					-
				,	
Stage2MechLab Stage2MechLab.mcp Source Files	Configuration Bits				
main.c	Configurati	on Bits set in code.			
Serve user.c	Address Value	Field	Category		Setting
Header Files	2007 30E4	OSC	Oscillator	INTOSCIO	
		WDT	Watchdog Timer	Off	
ser.h		PUT	Power Up Timer	On	
user.h		CP	Code Protect	Off	
Object Files		CPD	Data EE Read Protect	Off	
Library Files Other Files		BODEN	Brown Out Detect	BOD And SBODEN Disabled	
Ouler Hies		IESO	Internal-External Switch Over	Disabled	
		FCMEN	rail Clock Monitor Enable	DISADIEG	
Files V Symbols	•				+
MPLAB ICD 2 PIC16F917	W:	0 z dc	c bank 0		



MPLAB IDE - Programming the PIC

Stage2MechLab - MPLAB IDE v8.56						
File Edit View Project Debugger	Programmer Tools Configure Window Hel					
🗅 🖙 🖬 🐰 🐂 🖷 🚙 🛤	Select Programmer					
Output	MPLAB ICD 2 Setup Wizard					
Build Version Control Find in Files N	N Program					
Program space Data space	Read					
EEPROM space	Verify					
ID Location space	Erase Part					
Running this compiler in	Blank Check					
produces code which is ty The HI-TECH C PRO compile	Kead EEPROM					
See http://microchip.htso	C Release from Reset E					
Loaded H:\MPLAB\Stage2MechL	Hold in Reset					
Build successful!	Abort Operation					
	Connect					
	Download ICD2 Operating System					
Stage2MechLab	3 Settings					



MPLAB IDE - Programming the PIC

	Stage2MechLab - MPLAB IDE v8.56
F	ile Edit View Project Debugger Programmer Tools Configure Window Help
	🗅 🗃 🖬 🕉 🐂 🖷 🍜 🗛 🎽 🚚 🌹 Release 🔻 💣 🖨 🥵 🖷
	Output
	Build Version Control Find in Files MPLAB ICD 2
	Erasing Part Programming Program Memory (0x0 - 0x743) Verifying Program Memory Verify Succeeded Programming Configuration Bits Config Memory
	Verifying configuration memory Verify Succeeded Programming succeeded
	T6-Sep 2010, 11:42:45 MPLAB ICD 2 ready for next operation

Carefully disconnect the ICD2 programmer from the Mechatronics board, and the program will start.

PuTTY - Connecting via the serial port putty - Starting the Application





PuTTY - Connecting via the serial port Step 1: Configuration - Connection - Serial

Category:		
	Options controlling	g local serial lines
Logging	Select a serial line	
⊡ ·· I erminal ···· Keyboard	Serial line to connect to	COM1
Bell	Configure the serial line	
⊡ • Window	Speed (baud)	19200
Appearance	Data bits	8
- Translation	Stop bits	1
Selection	Parity	None -
	Flow control	XON/XOFF -
Data Proxy Telnet Rlogin SCH Serial		
About		Open Cancel

PuTTY - Connecting via the serial port

St	tep 2	: C	onfigu	ration	-	Session	- Logg	ing
	-		U				00	U

Real PuTTY Configuration		×
Category: Session Logging G. Features Reatures Window Appearance Behaviour Translation Selection Colours Colours Connection Proxy Telnet Rlogin SSH Serial	Options controlling session log Session logging: None None None None Printable SSH packets and raw data Log file name: putty.log (Log file name can contain &Y, &M, &D for time, and &H for host name) What to do if the log file already exists: Always overwrite it Always overwrite it Always append to the end of it Always append to the end of it Always append to the end of it Ship flush log file frequently Options specific to SSH packet logging Omit known password fields Omit session data	ging output kets Browse r date, &T for
About	Open	Cancel

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PuTTY is a very useful program for communicating between computers, which may be connected over the internet or directly by a cable (as in this case).

The communication can be 'logged' (saved to a file); this is done automatically, so there is no need to press a save button.

You can choose where to save the session; the default is 'putty.log' in the same folder as the PuTTY program.



PuTTY - Connecting via the serial port Step 3: Configuration - Session

	Basic options for your PuTT	TY session
E-Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Colours Connection Data Proxy Telnet Rlogin SSH Serial	Specify the destination you want to c Serial line COM1 Connection type: Raw Telnet Rlogin	onnect to Speed 19200 SSH Seria
	Load, save or delete a stored session Saved Sessions	Load Save Delete
	Close window on exit: Always Never Only	on clean exit



Excel: Importing the session log

Step 1: File - Open...



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Excel: Importing the session log Step 2: Text Import

	zaru - Step I					
The Text Wizar	The Text Wizard has determined that your data is Delimited.					
If this is correct	, choose Next,	or choose the da	ta type that best descr	ibes your data.		
Character Character	ype	st describes your	data:			
 <u>D</u>elimit 	ed - Chara	cters such as con	nmas or tabs separate e	each field.		
Fixed	width - Fields	are aligned in col	umns with spaces betw	een each field.		
Start import at	ow: 1	≑ File <u>o</u> rigi	n: MS-DOS (PC-8)			
1 =~=~=~= 2 76668 3 77744 4 78818 5 79891 ◀		PuTTY	log 2010.09.17	15:06:00 =~=~		
		_	Cancel	Back	xt > <u>F</u> inish	



Excel: Importing the session log

Step 3: Text Import

below.		
Delimiters		
	Treat consecutive delimiters as one	
Comma		
Space	Text gualifier:	
Other:		
Data preview		
_		
76	=~=~=~=~= Pully log 2010.09.17 15:06:00 =~=~=~=~=~=~=~	
77		
79		-
•	III	P.
	Cancel CBack Next >	Finish
		Liusu

General Notes

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MPLAB IDE - Creating a new project

Re	cycle Bin		
		MPLAB IDE v8.56	x
Ē		File Edit View Project Debugger Programmer Tools Configure Window Help	
84 A	utomat	□ 🖆 🖬 🐰 🐂 🛍 🍜 🗛 🗯 🚚 🌹 □ 🔤 💣 🚔 🐘 🕤 □ Checksum: 0xffff	
M	PLAEIDE	I Output	<u> </u>
		Build Version Control Find in Files	
M	PLAB IDE		
	10.50		
	· //.		
	1/		
		Files Cymbols	-
		· · · · · · · · · · · · · · · · · · ·	•
	11:	PIC16F917 W:0 z dc c bank 0	t



MPLAB IDE - Selecting the Chip (PIC)

The C code needs to be compiled into a binary form that the PIC microchip can understand. Since the C code does not define anything about the hardware, the compiler needs to know what PIC ('device') the final binary program will execute on.

MPLAB IDE v8.56	
File Edit View Project Debugger Programmer Tools	Configure Window Help
┃ ◘ ☞ ▣ ἔ ☜ 竜 ≝ ሖ ☞ 뿌 빠 ♀ ┃ [Select Device
	Configuration Bits
Output	External Memory
Build Version Control Find in Files	ID Memory
	Settings

MPLAB IDE - Selecting the Chip (PIC)

