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## 51B USB MACH3 (Green) -5AXIS





The motion control card for machine control, with strong professional. Requires the operator to have the relevant expertise! If used improperly, may appear an accident, please strictly follow the instructions and warnings using this product if you are not sure, consulting engineers for help. First time users, if you are not familiar with the product and software features Mach3 In your test product, make sure the machine's power switch on hand, you can quickly turn off the power. Recommends that users install the emergency stop button and make sure the button is functioning properly. Please strictly follow the instructions and warnings using this product. Any direct / indirect personal injury, our company does not assume any responsibility.

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## Contents

Mach3 USB Motion Card ( 51B) Installation Manual.....	1
Contents .....	3
Features:.....	4
Basic connection diagram (an Overview):.....	5
Mechanical dimensions diagram: .....	6
1.Prepare: .....	6
1.1.Installation the Mach3:.....	6
1.2.Software license application: .....	7
1.3. Installation the software of the USB motion card: .....	7
1.3.1 Connecting the USB cable to the PC and the motion card:.....	7
1.3.2 Installing the motion card plug-in. ....	8
2.config for mach3: .....	9
2.1 Mach3 X、 Y、 Z、 A、 B Axis config as shown below: Config => Ports and Pins):.....	9
2.2 Motor tuning setup as shown below: (Config => Motor Tuning).....	10
2.3 The Mach3 Menu => Config => Homing/Limits dialog: .....	10
2. 4 Setup the input signal: .....	10
2.5 Setup the Output signals: .....	11
2.6 Spindle speed control (0-10V) Setup: .....	12
2.6 Mach3 MPG Setup:.....	14

## Features:

1. Support for 5-axis linkage, you can connect four stepper motor drives or servo drives;
2. Maximum step-pulse frequency is 100KHz, which is suitable for the servo or stepping motor;
3. 4 general-purpose opto-couplers isolation input : can connect the limit switch, emergency stop switch, auto tool zero, home switch etc.
4. Support for connecting electronic handwheel;
5. Have 0-10V signal output , you can use mach3 software to control the spindle motor speed.
6. 4 general-purpose isolated relay drive output interface, can drive four relays for controlling the spindle starts, forward rotating and reverse rotating, pumps or other device;
7. 1 status LED, indicate connection status on the board.

# 1.Prepare:

## 1.1.Installation the Mach3:

Open the CD, find mach3 software, run the installation file:



The screenshot shows a Windows file explorer window with the title bar '新建文件夹' (New Folder). The window displays a table of files with the following columns: '名称' (Name), '修改日期' (Modified Date), '类型' (Type), and '大小' (Size). A single file is listed: 'Mach3VersionR3.041', which is highlighted with a red rectangular box. The file's details are as follows:

名称	修改日期	类型	大小
Mach3VersionR3.041	2014/1/10 13:23	应用程序	25,733 KB

Follow the prompts to install, until the last step.

The last step requires Note: For 64-bit computer, it is best not to select "**LoadMach3 Driver**" "this one, because it will cause the system to prompt installation errors.



## 1.2. Software license application:

Copy license files “**Mach1Lic.dat**” from “**mach3 software folder**”, to **C:\Mach3** Cover the original file, Reset Computer (must reset the computer, please don't open the software directly!) Way above the license for DIY or study purposes only, not for commercial use.

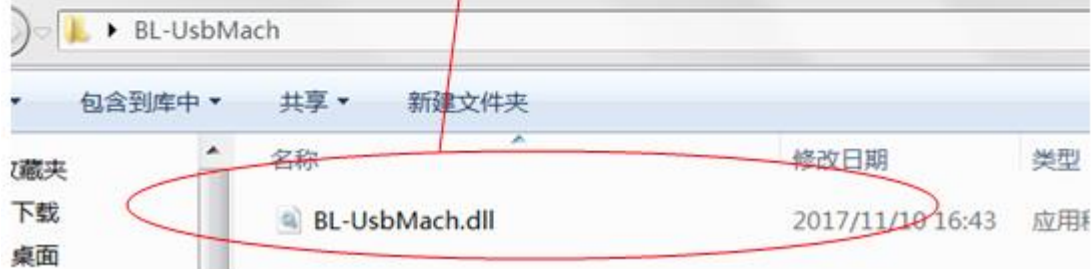
## 1.3. Installation the software of the USB motion card:

This USB motion card does not need install any USB driver, Windows 2000/XP/Windows 7, can directly identify.

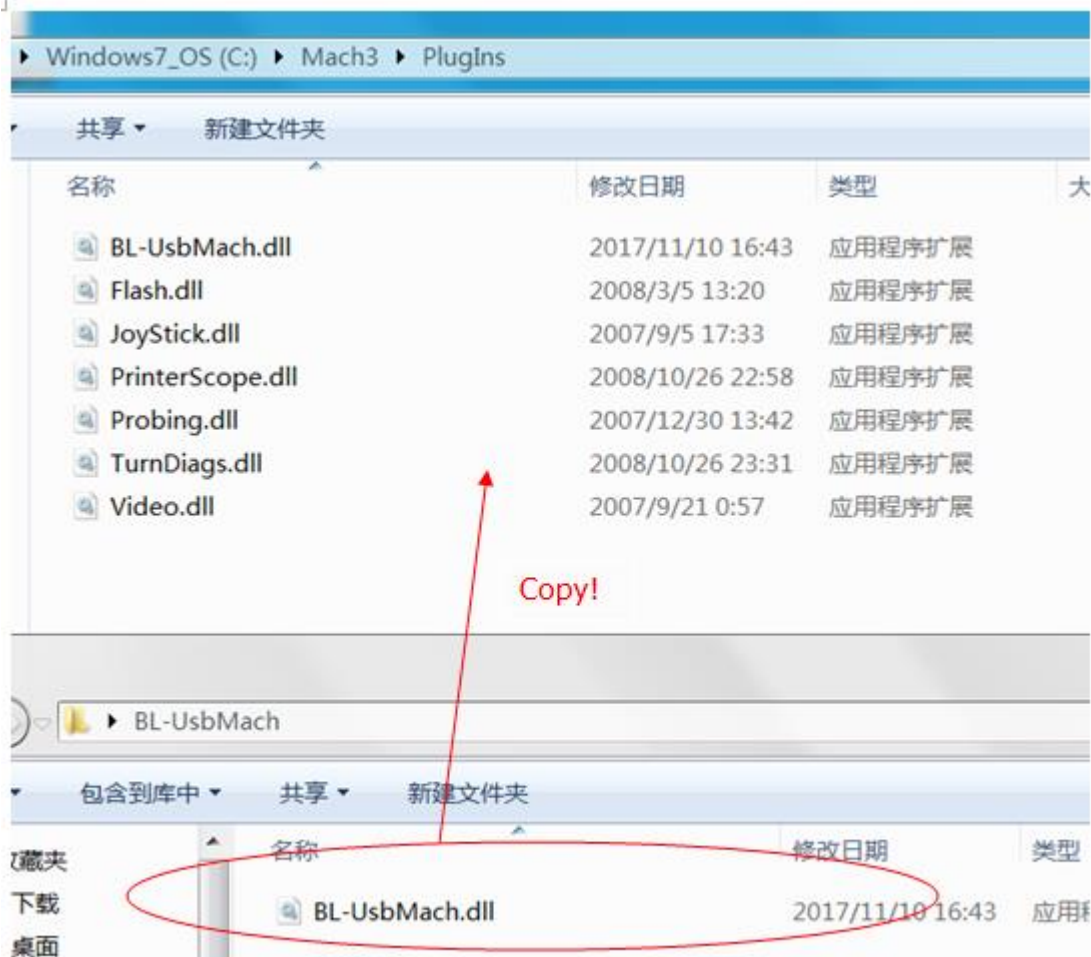
### 1.3.1 Connecting the USB cable to the PC and the motion card:

The first installation of motion control card, take about 10s, when the green led lights on motion control card, indicating that the connection is successful, return the following tips when you install on your computer:

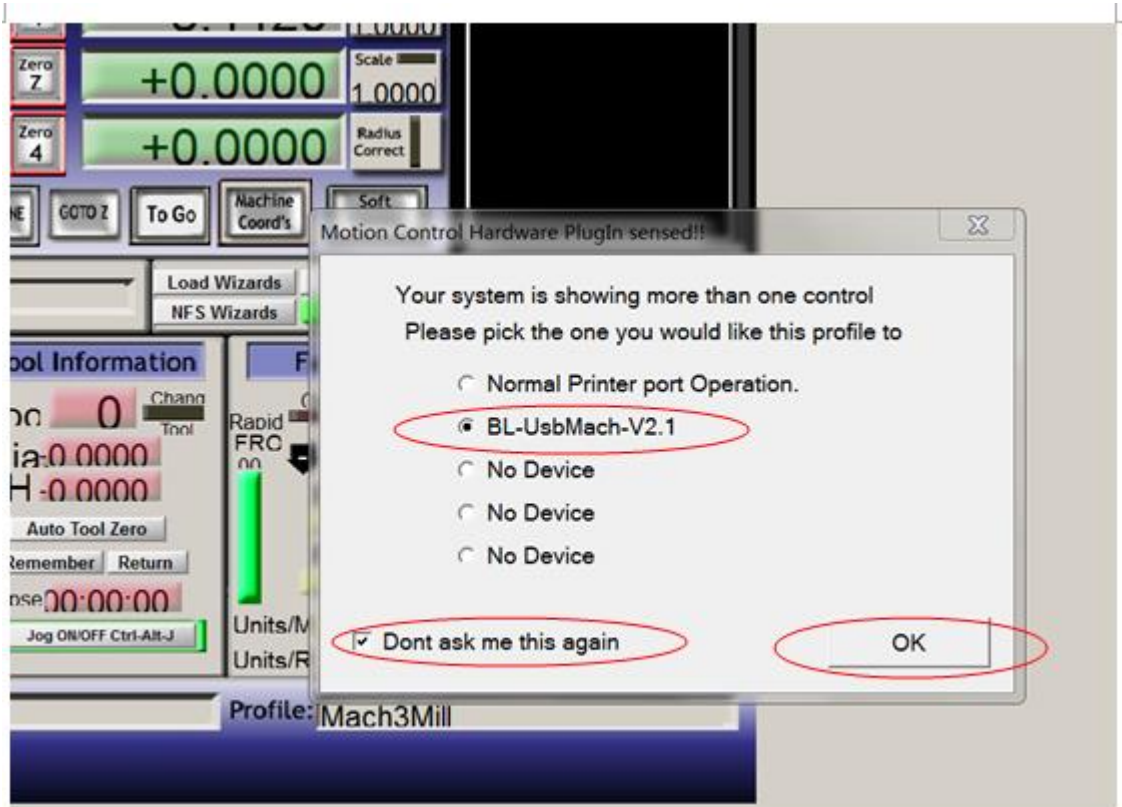




er.

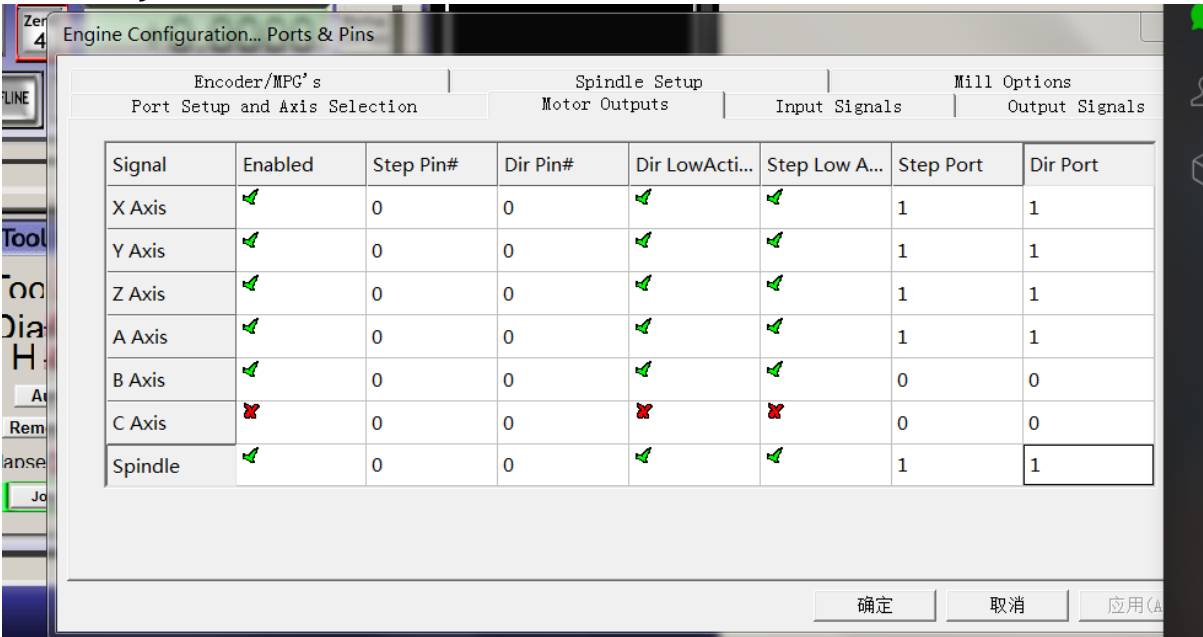


1.3.3 Start the Mach3 software, a dialogue of “Motion Control Hardware PlugIn sensed!” is shown. Please select the“BL-Usbmach3-V2.1”, you can also check”Don't ask me this again”.



2.config for mach3:

2.1 Mach3 X、 Y、 Z、 A Axis config as shown below: Config => Ports and Pins):





## 2.2 Motor tuning setup as shown below: (Config => Motor Tuning)

Setup each axis

Save now

3 Velocity

4 Acceleration

2 Mach3 steps per unit:  
**Mach3 steps per unit** = Mach3 steps per rev x Motor revs per unit

Steps per: 640

Velocity: 880

Acceleration: 60

SAVE AXIS SETTINGS

Mach3 steps per unit:

**Mach3 steps per unit** = Mach3 steps per rev x Motor revs per unit

## 2.3 The Mach3 Menu => Config => Homing/Limits dialog:

Axis direction, depends on the “Reversed”

Axis	Reversed	Soft Max	Soft Min	Slow Z...	Home ...	Home ...	Auto Z...	Speed %
X	X	100.00	-100.00	1.00	0.0000	✓	✓	20
Y	✓	100.00	-100.00	1.00	0.0000	✓	✓	20
Z	✓	100.00	-100.00	1.00	0.0000	✓	✓	20
A	X	100.00	-100.00	1.00	0.0000	✓	✓	20
B	X	100.00	-100.00	1.00	0.0000	X	✓	20
C	X	100.00	-100.00	1.00	0.0000	X	✓	20

Axis direction:  
Depends on "✓"  
or "X"

## 2.4 Setup the input signal:

There are 4 general-purpose input channels. The channels number is from I1 to I4.

Example of input signal settings: I1 is connected to emergency stop switch, I2 is connected to 4 axis limit switches, I3 is connected to 4 axis home switches, I4 is connected to auto tool zero, set as shown

below:

Engine Configuration... Ports & Pins

Encoder/MPG's			Spindle Setup		Mill Options	
Port Setup and Axis Selection			Motor Outputs		Input Signals	
Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
X ++		1	10			0
X --		1	10			0
X Home		1	10			0
Y ++		1	11			0
Y --		1	11			0
Y Home		1	11			0
Z ++		1	12			0
Z --		1	12			0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be

Automated Setup of Inputs

确定 取消 应用

Engine Configuration... Ports & Pins

Encoder/MPG's			Spindle Setup		Mill Options	
Port Setup and Axis Selection			Motor Outputs		Input Signals	
Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
Input #4		1	0			0
Probe		1	15			0
Index		1	0			0
Limit Ovrd		1	0			0
EStop		1	13			0
THC On		1	0			0
THC Up		1	0			0
THC Down		1	0			0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be

Automated Setup of Inputs

确定 取消 应用

The relationship of pin numbers between CNC controller and mach3 software:

Cnc controller	IN1	IN2	IN3	IN4	IN5
markers					
Mach3 software	Pin number- 10	Pin number- 11	Pin number- 12	Pin number- 13	Pin number- 15
lables					

## 2.5 Setup the Output signals:

There are 4 general-purpose (open-drain) output channels, The channels number is from O1 to O4, mach3 setup as shown below:

Signal	Enabled	Port #	Pin Number	Active Low
Digit Trig		0	0	
Enable1		0	0	
Enable2		0	0	
Enable3		0	0	
Enable4		0	0	
Enable5		0	0	
Enable6		0	0	
Output #1		0	0	
Output #2		0	0	
Output #3		0	0	
Output #4		0	0	

引脚2-9,1,14,16,17都是输出. 没有其他引脚在此可使用.

Engine Configuration... Ports & Pins

Port Setup and Axis Selection	Motor Outputs	Input Signals	Output Signals
Encoder/MPG's	Spindle Setup		Mill Options

Relay Control

☐ Disable Spindle Rel

Clockwise Output

CCW (M4) Output

Output Signal #'s

Flood Mist Control

☐ Disable Flood/Mist reDelay

Mist Output

Flood Output

Output Signal #'s

ModBus Spindle - Use Step/Dir as well

☐ Enabled Reg  64 -

Max ADC Count

Motor Control

☒ Use Spindle Motor Out

☒ PWM Control

☐ Step/Dir Moto

PWMBase Freq.

Minimum PWM  %

General Parameters

CW Delay Spin UP  Seconds

CCW Delay Spin UP  Seconds

Delay Spin DOWN  Seconds

CCW Delay Spin DOWN  Seconds

☐ Immediate Relay off before d

Special Functions

☐ Use Spindle Feedback in Sync M

☐ Closed Loop Spindle Cont

P  I  D

☐ Spindle Speed Averagi

Special Options, Usually Off

☐ HotWire Heat for J.

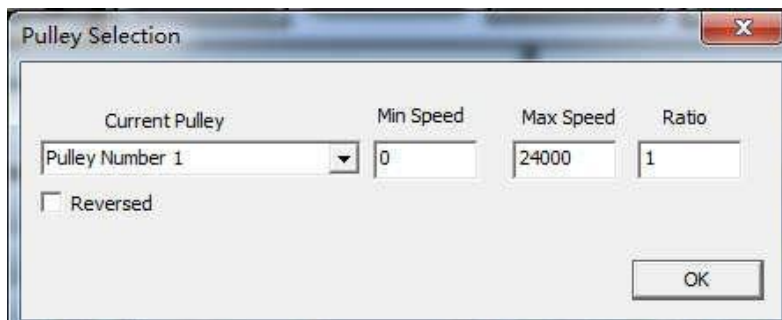
☐ Laser Mode. fr

☐ Torch Volts Contr

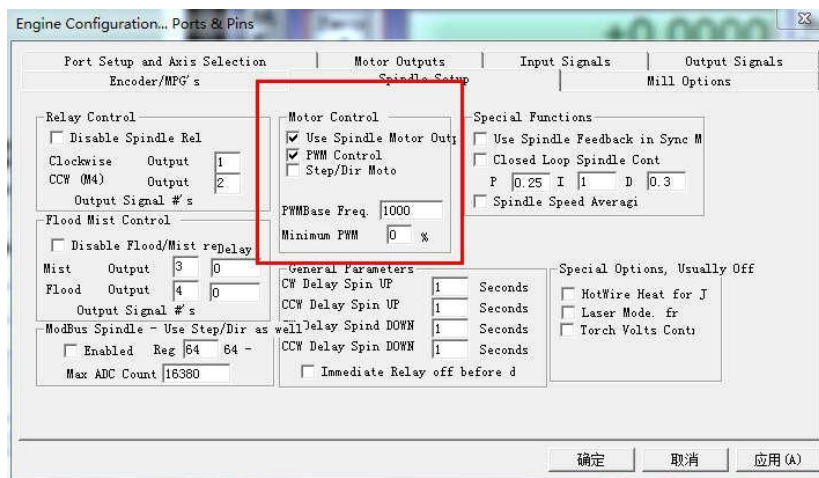
## 2.6 Spindle speed control (0-10V) Setup:

There is 0-10v signal output on the control card, Can be used to connect the Inverter to control the spindle speed.

According to the actual parameters of the inverter and the spindle, set the maximum spindle Speed (for example,24000RPM). As shown below:The Mach3 Menu => Config => Spindle pulleys:



Setup Spindle parameters: as shown in the red box



Enable spindle output. as shown below:

Signal	Enabled	Step Pin#	Dir Pin#	Dir LowActive	Step Low Act...	Step Port	Dir Port
X Axis	✓	0	0	✓	✓	1	1
Y Axis	✓	0	0	✓	✓	1	1
Z Axis	✓	0	0	✓	✓	1	1
A Axis	✓	0	0	✓	✓	1	1
B Axis	✓	0	0	✓	✓	0	0
C Axis	✗	0	0	✗	✗	0	0
Spindle	✓	0	0	✓	✓	1	1

Completion of the setting, there are two ways to control the output value of 0 ~ 10V.

1. Using the S command. Such as S20000 (the speed to 20000RPM)
  2. Using the Mach3 interface control (input Spindle Speed, and adjust Percentage SRO's).
- Figure:
- 

