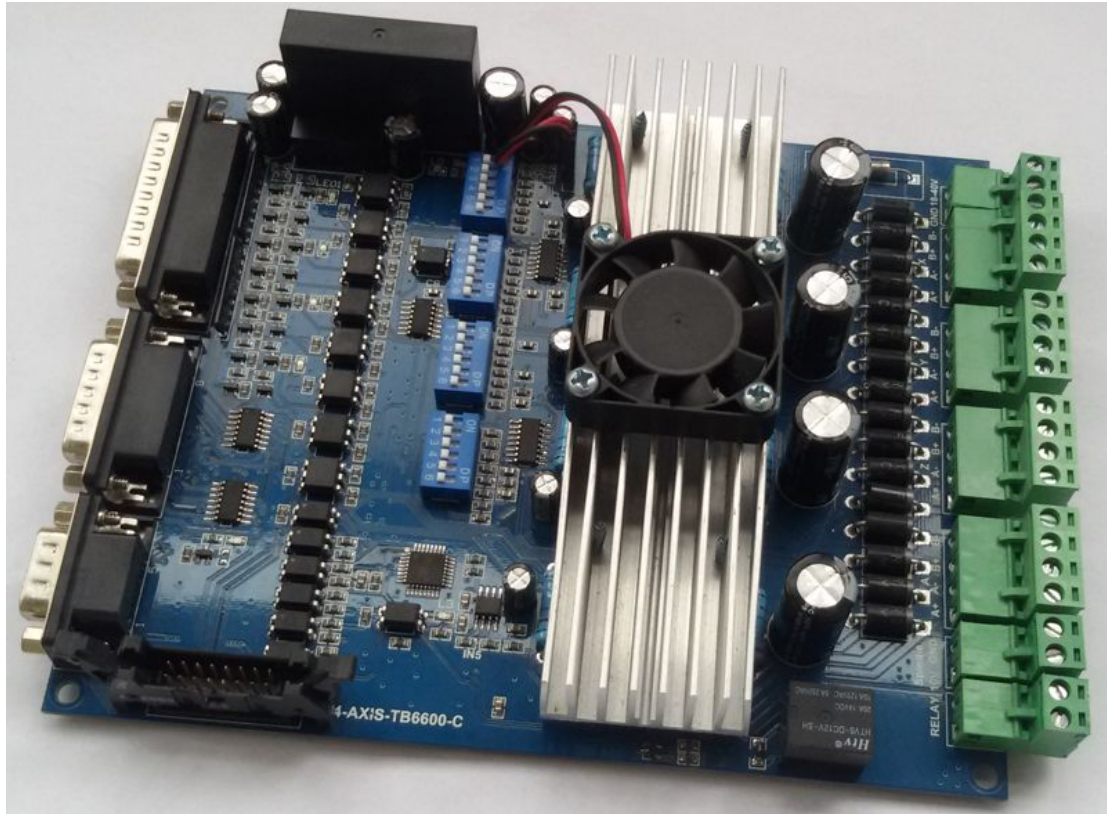


4-Axis TB6600 CNC Driver Board User's Manual



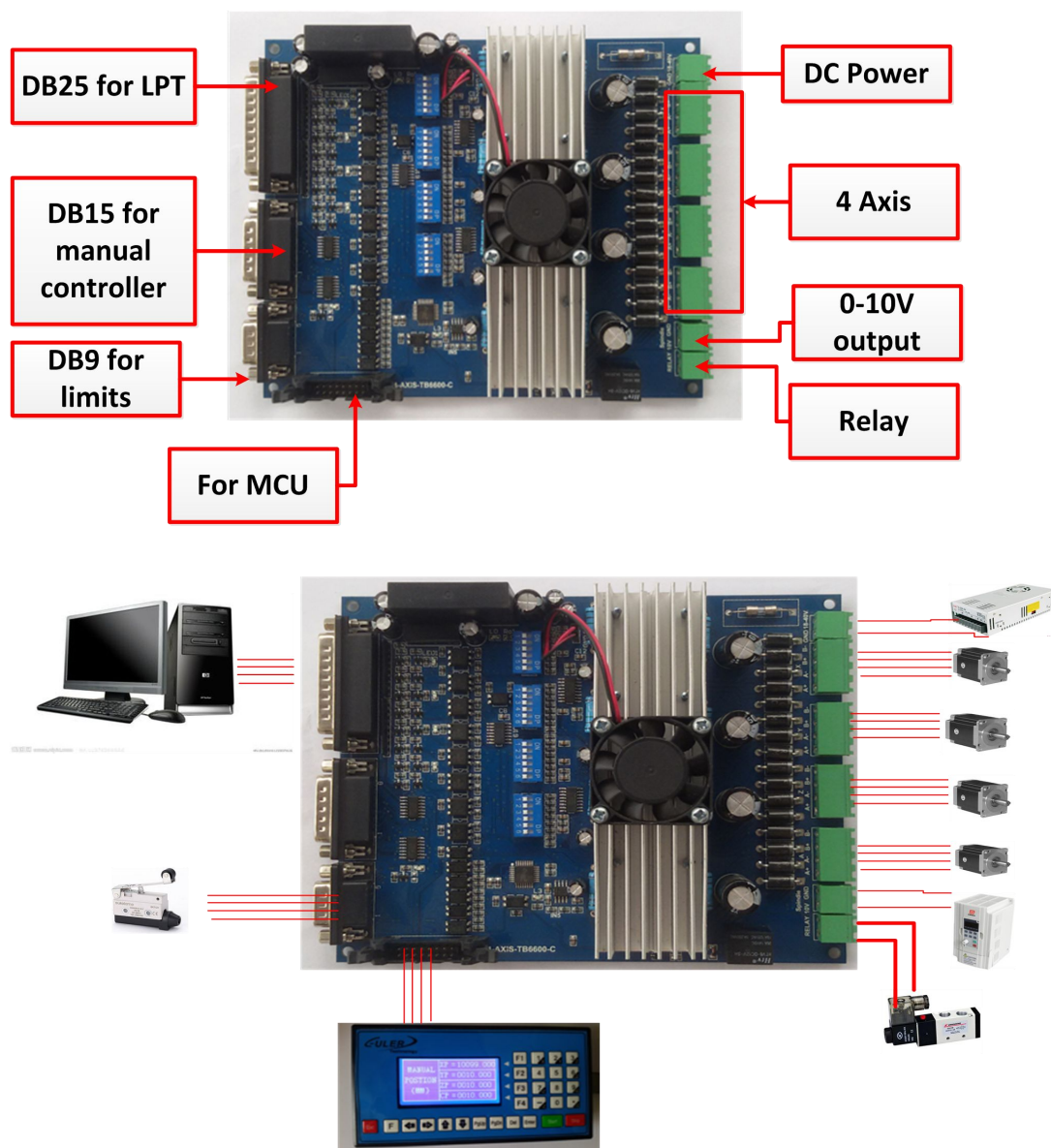
This document describes the basic functionality and the electrical specifications of the Four Axis TB6600 CNC Driver Board.

1. Hardware Features

- Supports MACH3, KCAM4, EMC2 etc...
- Can drive four channels 4.5A stepper motors, input voltage up to 18V - 40V.
- Resolution 1, 1/2, 1/4, 1/8, 1/16 micro stepping output.
- 100% Full DC-DC high-speed optical isolation to protect the user's computer and equipment.
- Four channels of 0.4 - 4.5A adjustable output current for 2/4 phase bipolar stepper driver.
- Build with 1 ways relay output and 5 ways limit interface.
- Automatic idle-current reduction.

❖ Photo of 4-AXIS CNC Board

4-Axis TB6600 CNC Driver Board User's Manual



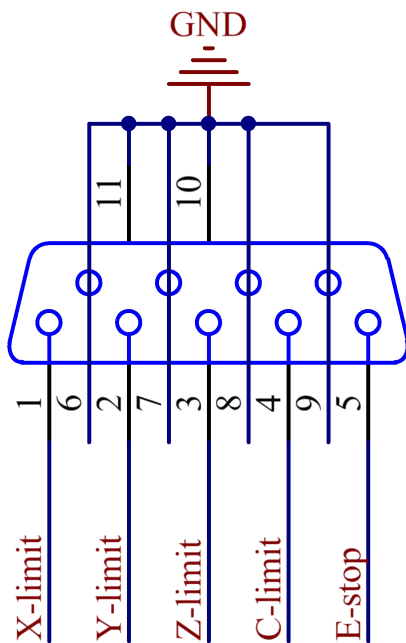
❖ Pins define

LPT pins	Pin symbols	Functions
1	PWM	0-10V output control
2	STEPX	X axis pulse
3	DIRX	X axis direction
4	STEPY	Y axis pulse
5	DIRY	Y axis direction
6	STEPZ	Z axis pulse
7	DIRZ	Z axis direction
8	STEPZ	C axis pulse
9	DIRC	C axis direction

4-Axis TB6600 CNC Driver Board User's Manual

10	LIMIT-1	LPT input signal 1
11	LIMIT-2	LPT input signal 2
12	LIMIT-3	LPT input signal 3
13	LIMIT-4	LPT input signal 4
14	ENABLE_ALL	All axis enable input
15	LIMIT-5	LPT input signal 5
16		NO USE
17	RELAY	Relay control
18-25	GND	Common GND for PC

❖ DB9 limits define



❖ Current Settings

current	0.4A	1.6A	2.6A	3.2A	3.8A	4.0A	4.3A	4.5A
1	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
3	ON	ON	ON	ON	OFF	OFF	OFF	OFF

❖ Micro steps settings

Micro steps	NC	1	1/2	1/2	1/4	1/8	1/16	NC
-------------	----	---	-----	-----	-----	-----	------	----

4-Axis TB6600 CNC Driver Board User's Manual

4	OFF	OFF	OFF	OFF	ON	ON	ON	ON
5	OFF	OFF	ON	ON	OFF	OFF	ON	ON
6	OFF	ON	OFF	ON	OFF	ON	OFF	ON

❖ **Selecting and connecting stepper motors**

WARNING: INCORRECT WIRING OF STEPPER MOTOR TO THE DRIVER BOARD CAN LEAD TO IMMEDIATE DAMAGE OF DRIVER BOARD--DO NOT CONNECT OR DISCONNECT MOTORS WHILE POWER IS ON.

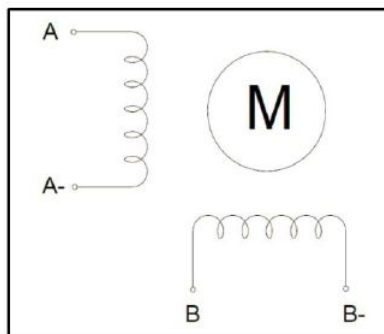
4 Wire, 6 Wire and 8 Wire stepper motor can be used with 4-axis CNC board.

4 Wire motors are recommended as they are true bipolar motors and easier to properly connect to stepper motor driver.

It's critical to obtain a proper motor coil diagram of any motor you wish to utilize (making cross connections between the two coils will destroy the control circuitry).

1.8 degree per step resolution is the industry standard for most automation grade stepper motors and is recommended for most applications.

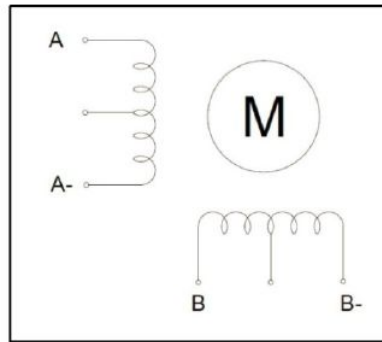
■ **4 WIRE STEPPER DIAGRAM**



Each wire is connected to its corresponding terminal block location (i.e. A-wire is connected at A-location)

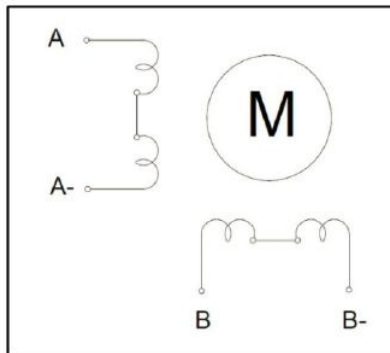
■ **6 WIRE STEPPER DIAGRAM**

4-Axis TB6600 CNC Driver Board User's Manual



Center wire of each coil not connected(insulate termination)
Remaining wires are connected to their corresponding terminal block location (i.e. A-wire is connected at A-location)

■ 8 WIRE STEPPER DIAGRAM



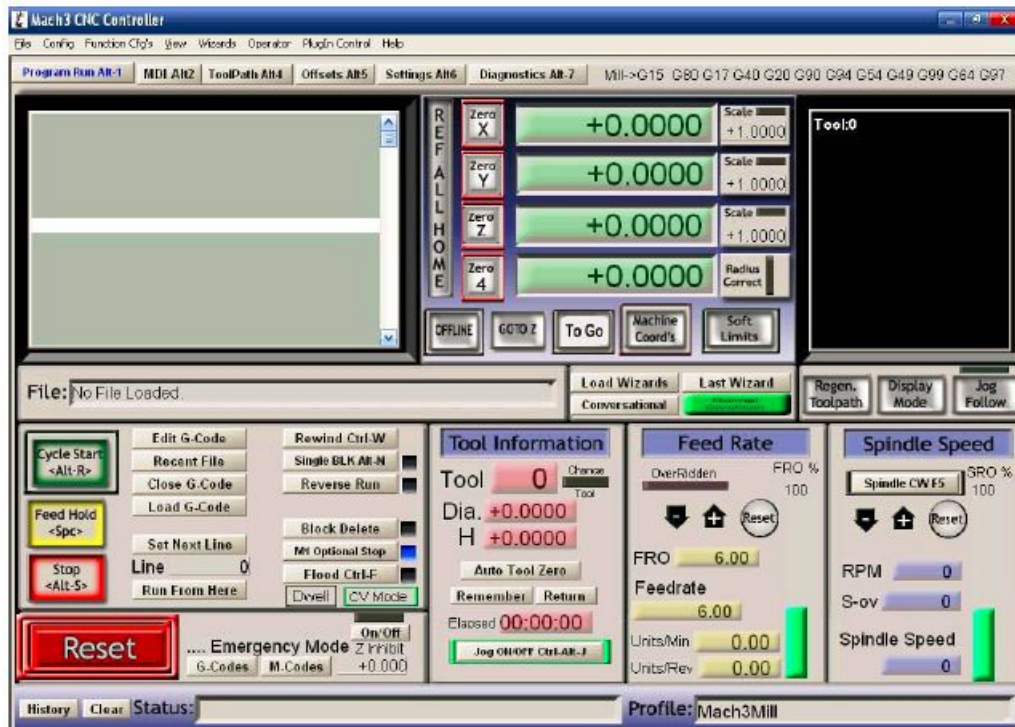
2 center wires of each coil connected(insulate connection)
Remaining wires are connected to their corresponding terminal block location(i.e. A-wire is connected at A-location).
If using 6 or 8 wire motors,connected using series wiring method,reduce labeled amperage rating by 50%(i.e. A motor rated at 4 amps should thus be connected now rated at 2 amps).

❖ How to use MACH software?

4-Axis TB6600 CNC Driver Board User's Manual

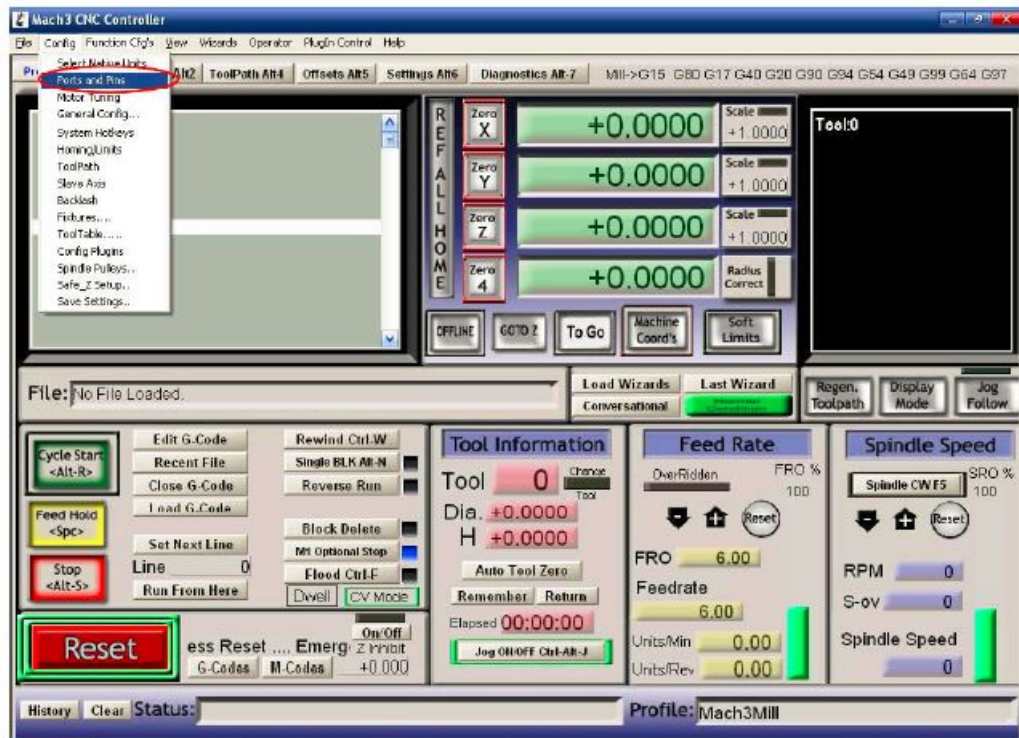


Pic. 1

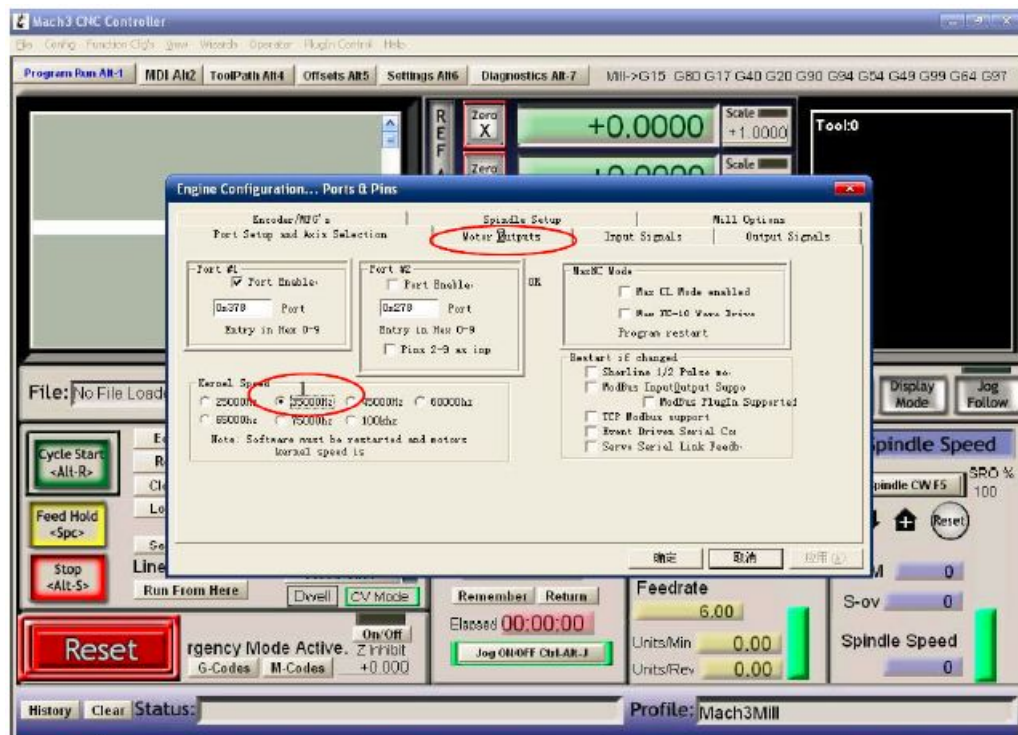


Pic. 2

4-Axis TB6600 CNC Driver Board User's Manual



Pic. 3

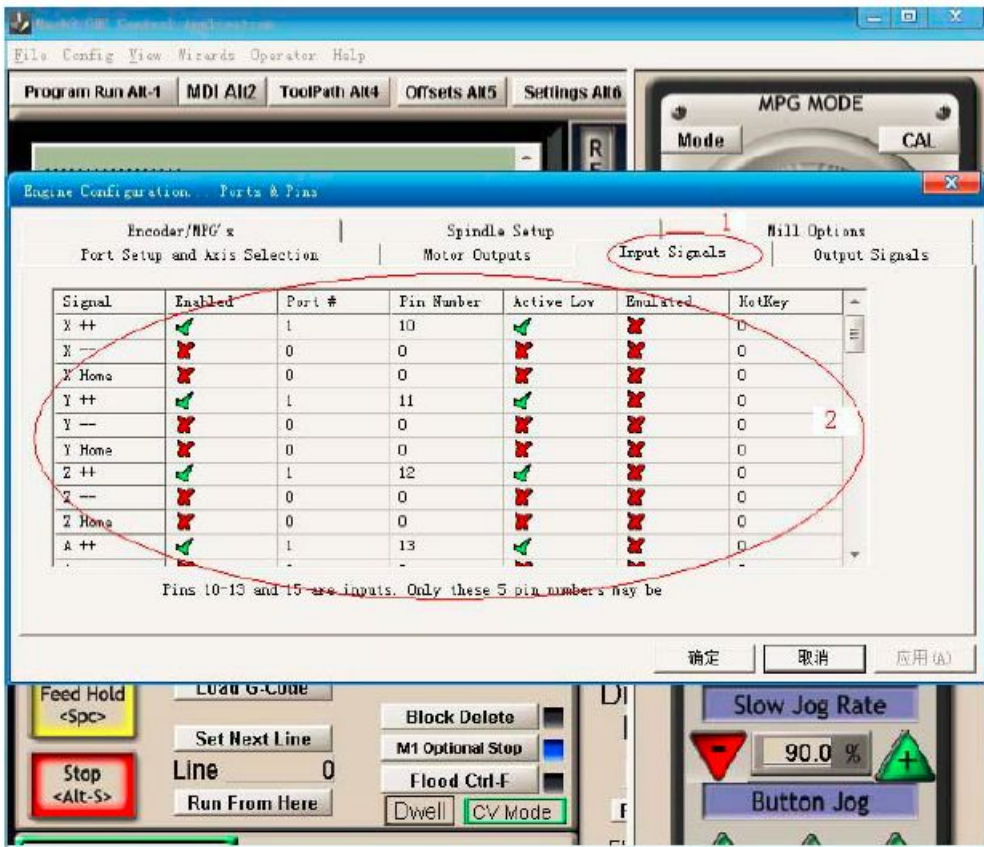


Pic. 4

4-Axis TB6600 CNC Driver Board User's Manual

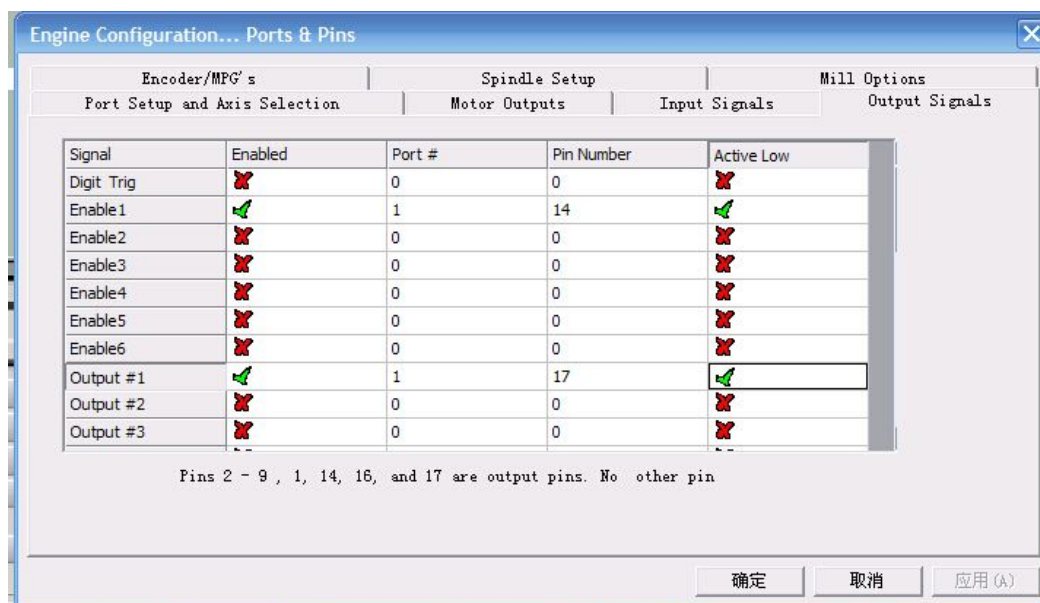


Pic. 5

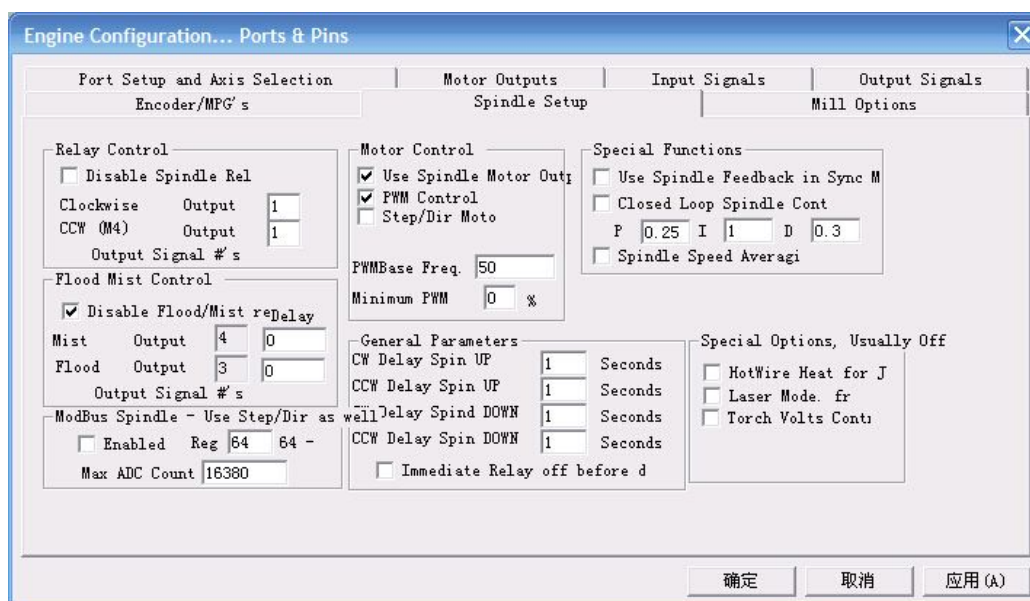


Pic. 6

4-Axis TB6600 CNC Driver Board User's Manual

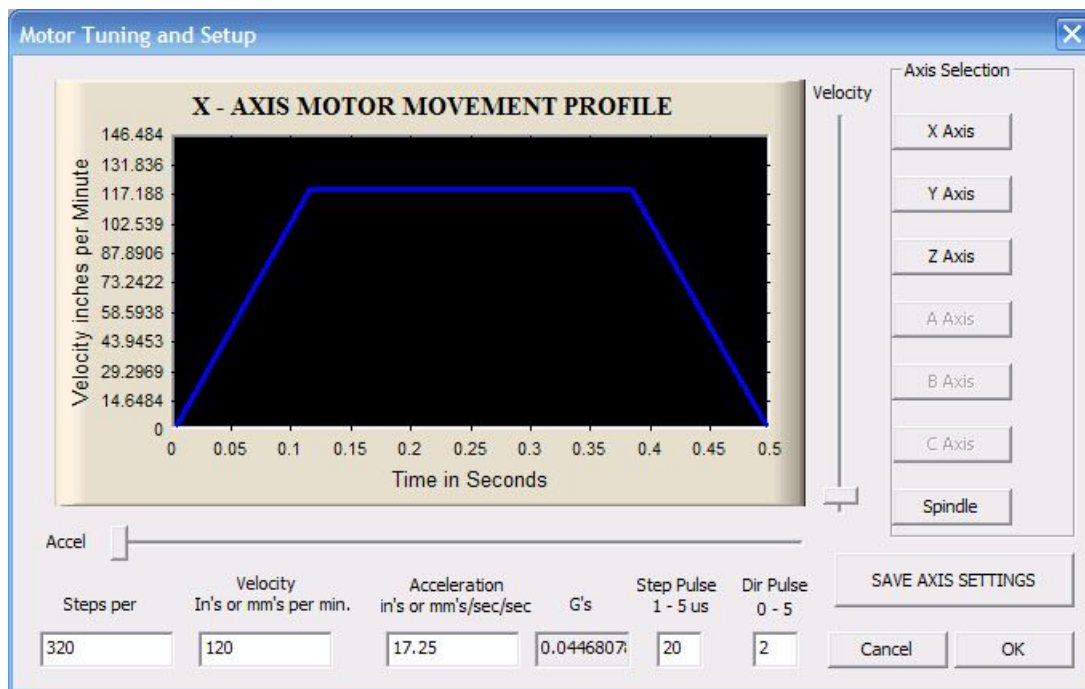


Pic. 7

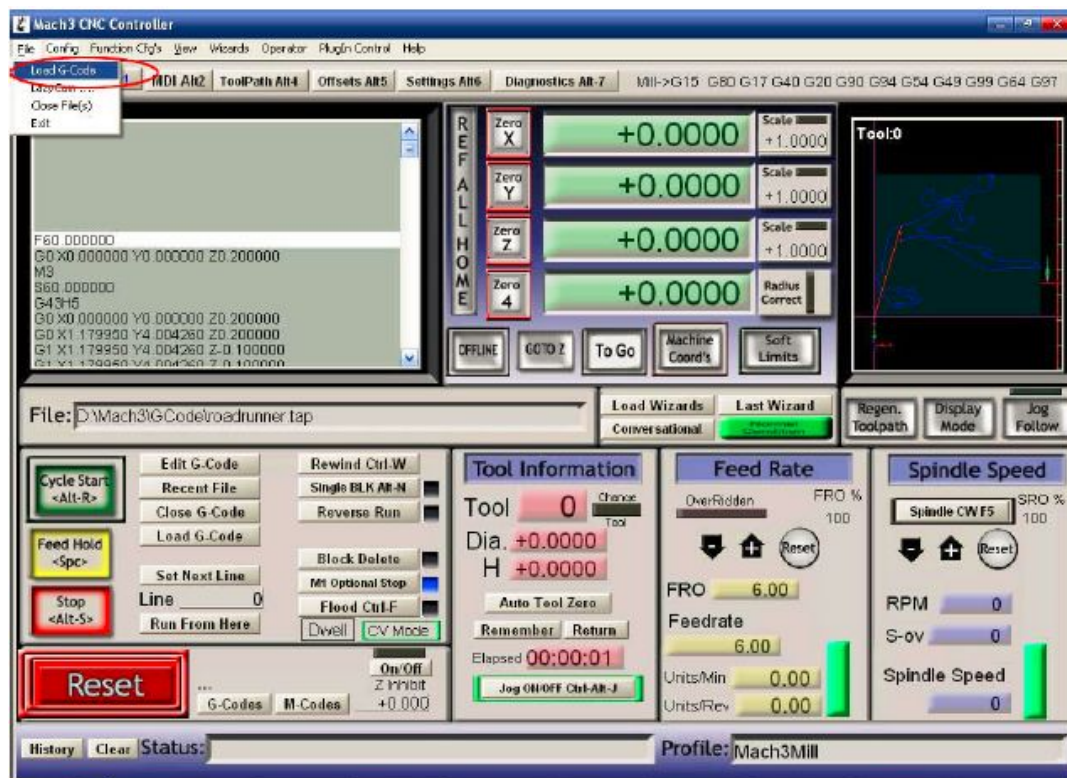


Pic. 8

4-Axis TB6600 CNC Driver Board User's Manual

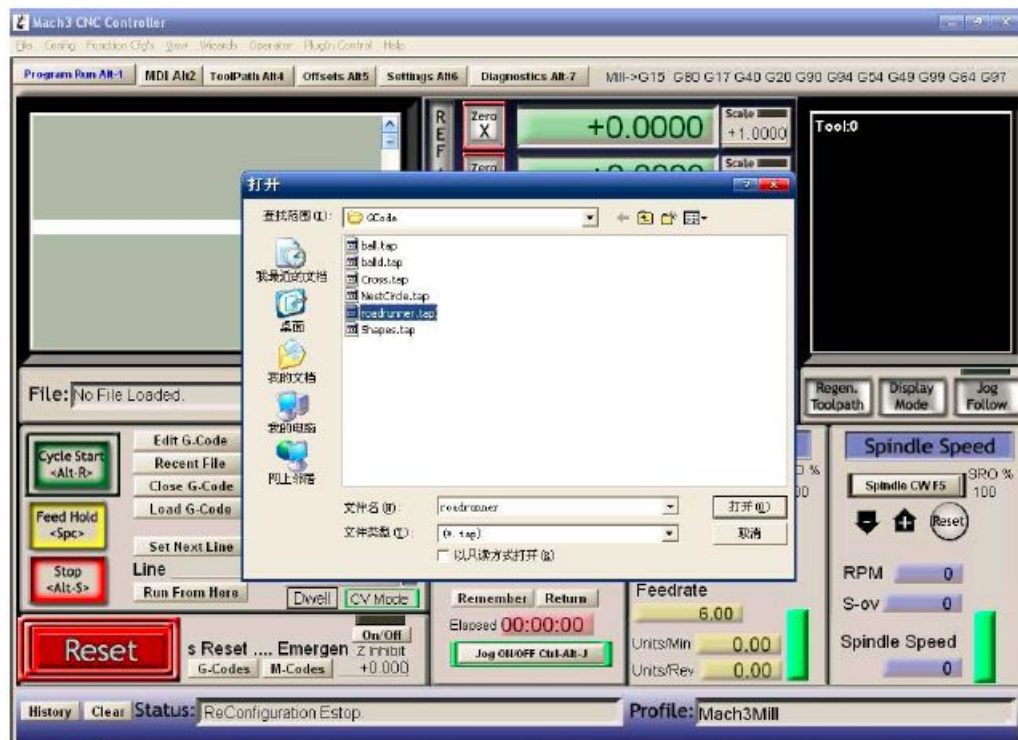


Pic. 9

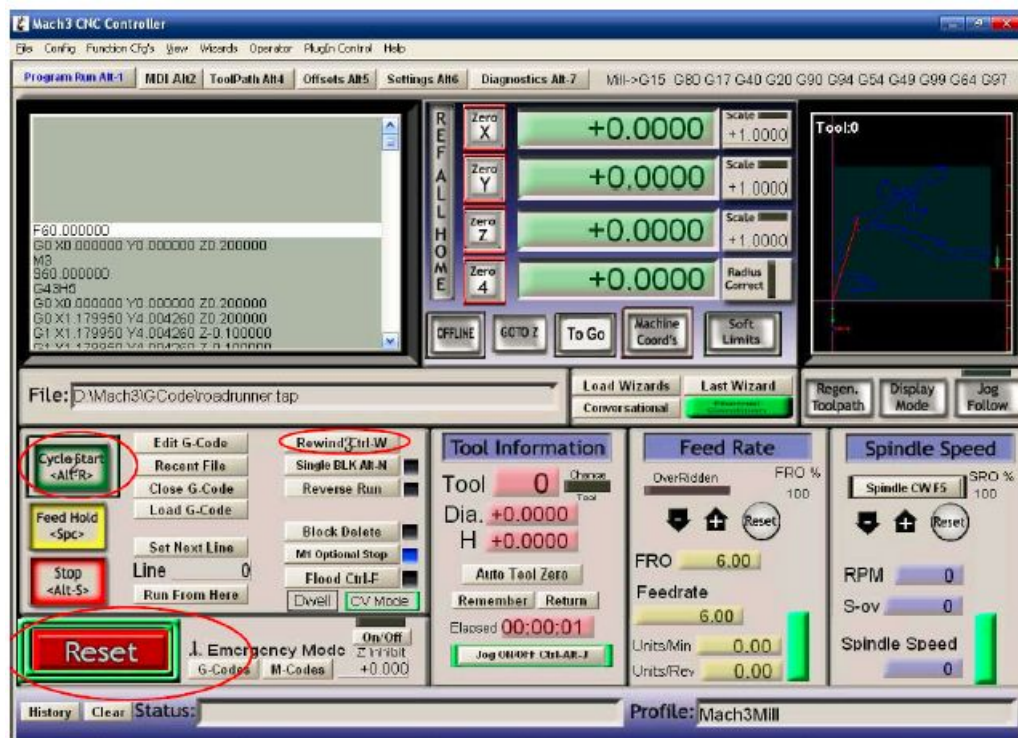


Pic. 10

4-Axis TB6600 CNC Driver Board User's Manual



Pic. 11

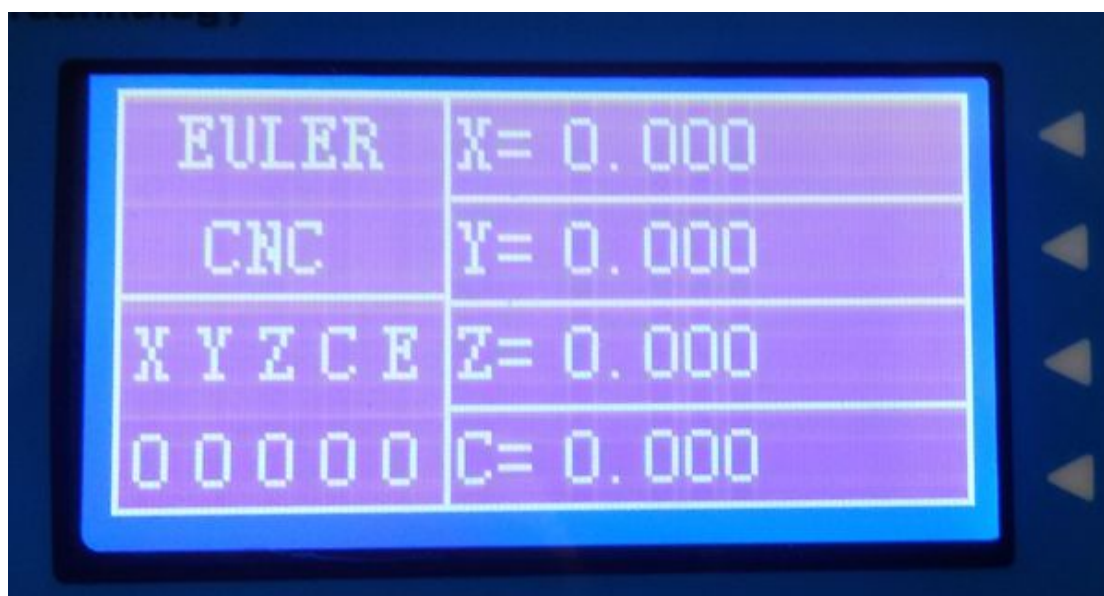


Pic. 12

2. Programming Features(Controller must be at hand)

- Integrated 32bit MCU.
- With 128*64 dot LCD.
- Record the mach3 pulses automatically.
- All of the parameters can be set by keyboard.
- With 11 programmable commands.
- Each program can be set as much as 95 lines.
- 2 programs can be saved.
- Each motor can be controlled independently or X Y&Z motors can be set as linear interpolation.
- Two running modes as relative motion and absolute motion.
- All motor can run manually or automatically.

❖ Monitor interface



Button functions in the monitor interface

Button	Function introduction
1/X	Clear X-axis position as zero
2/Y	Clear Y-axis position as zero
3/Z	Clear Z-axis position as zero
6/C	Clear C-axis position as zero
-X	Set X-axis motor to go by anti-clockwise,the distance is set by manual position.
+X	Set X-axis motor to go by clockwise,the

4-Axis TB6600 CNC Driver Board User's Manual

	distance is set by manual position.
-Y	Set Y-axis motor to go by anti-clockwise,the distance is set by manual position.
+Y	Set Y-axis motor to go by clockwise,the distance is set by manual position.
-Z	Set Z-axis motor to go by anti-clockwise,the distance is set by manual position.
+Z	Set Z-axis motor to go by clockwise,the distance is set by manual position.
-C	Set C-axis motor to go by anti-clockwise,the distance is set by manual position.
+C	Set C-axis motor to go by clockwise,the distance is set by manual position.
PgUp	Set LCD to next function interface .
PgDn	Set LCD to last function interface .
Start	Start or restart the program if command has been set as your need.
Stop	Pause the procedure.

Limits and Emergency status monitor interface:

Status	0	1
Function introduction	The sensor don't take effect, the motor can work .	The sensor take effect,the motor can't work.

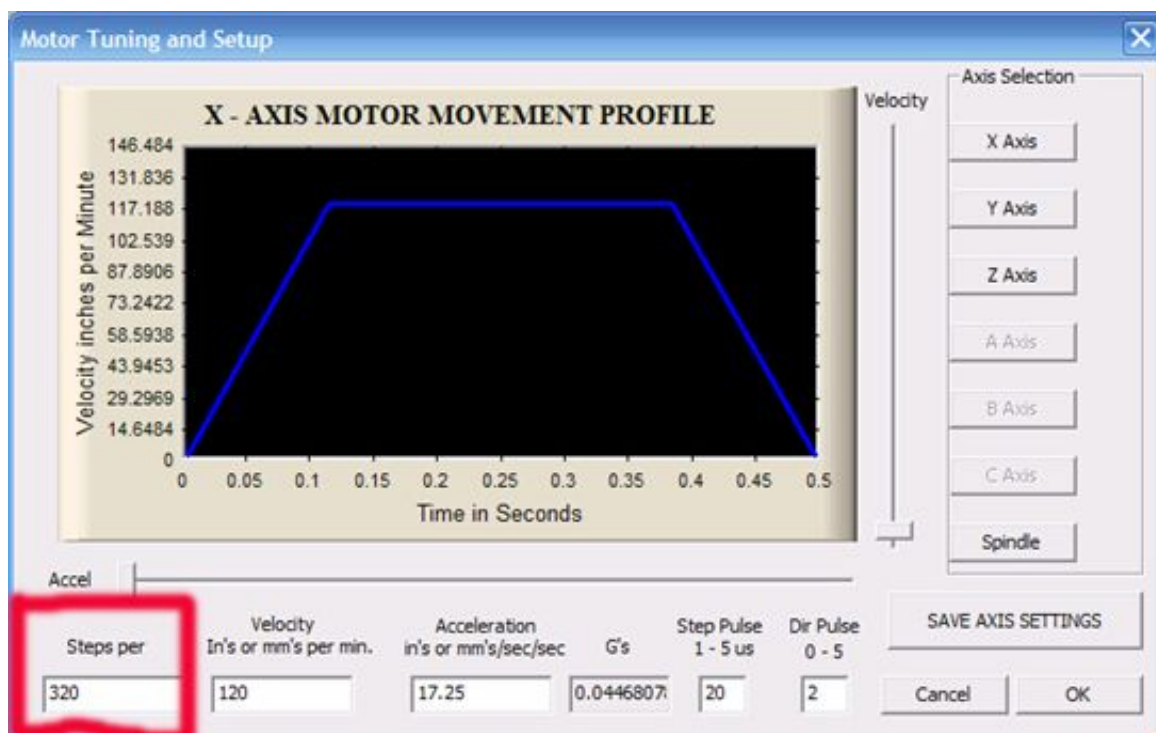
❖ The parameter relevant to step driver and step motor

The parameter k ($k = \frac{\text{numerator}}{\text{denominator}}$) is the ratio between the controller and objective distance.

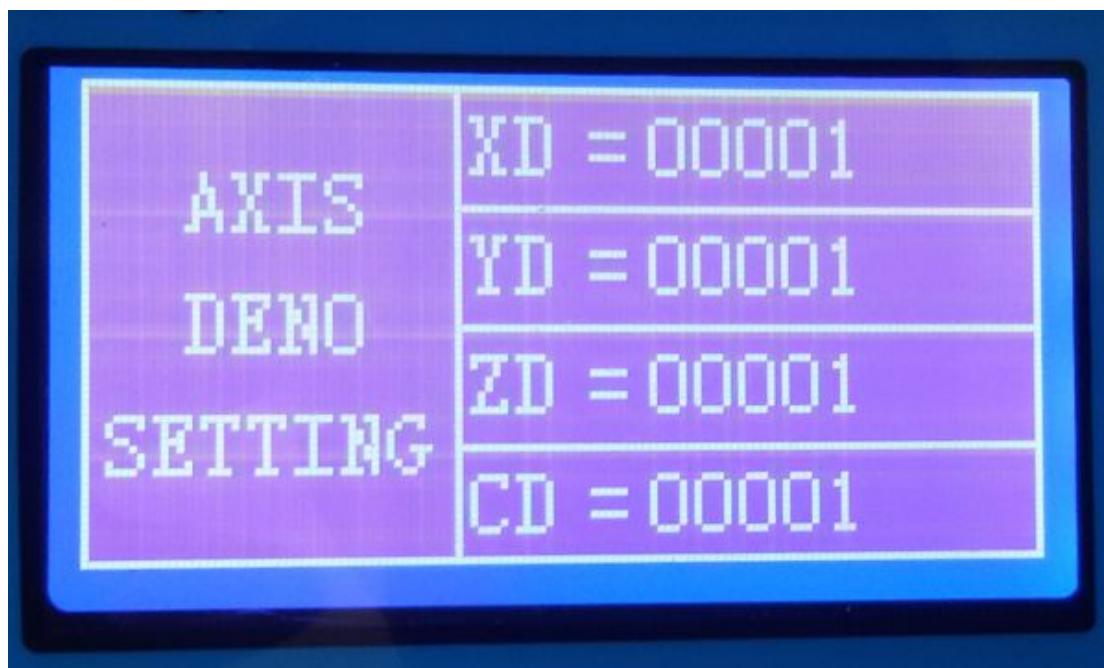
The numerator can be explicated as the number of pulses generated if the stepper motor completes a rotation. The denominator can be explicated as the moving distance when the stepper motor completes a full rotation. So, if stepper motor is 1.8° by one pulse, and the screw is 5mm, and the stepper motor driver has set as eight micro step, so the parameter can be set as

$K = \frac{\text{numerator}}{\text{denominator}} = \frac{(360/1.8) * 8}{5} = 320$, and it can be explained as 320 steps per millimeter.

BECAREFUL: If mach3 pulses recorded, the parameter of K must be set equal to Steps Per as in mach3.



- The parameter of numerator (NUME) and denominator (DENO) can be set as follows:



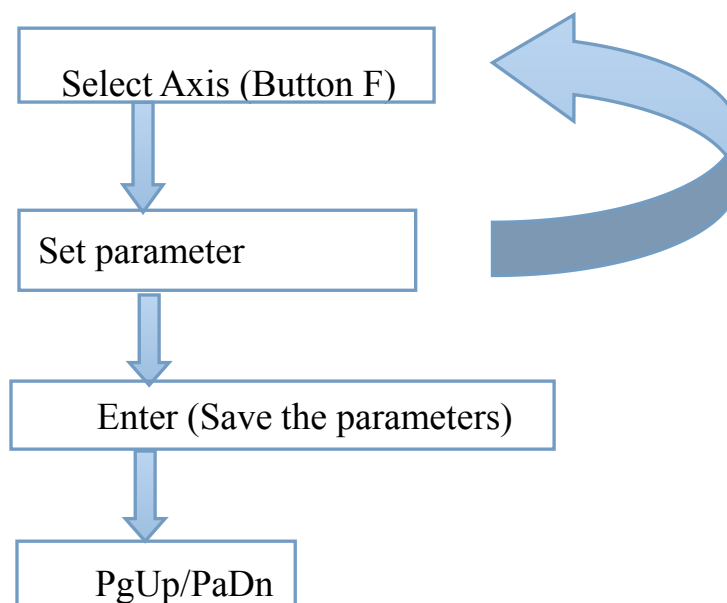
Button functions in the parameter interface:

Button	Function introduction
1	Number 1
2	Number 2

4-Axis TB6600 CNC Driver Board User's Manual

3	Number 3
4	Number 4
5	Number 5
6	Number 6
7	Number 7
8	Number 8
9	Number 9
0	Number 0
F	Select axis by looping.
Del	Clear to zero
Enter	Save the parameter
PgUp	Set LCD to next function interface .
PgDn	Set LCD to last function interface .

The parameter can be set as follows:

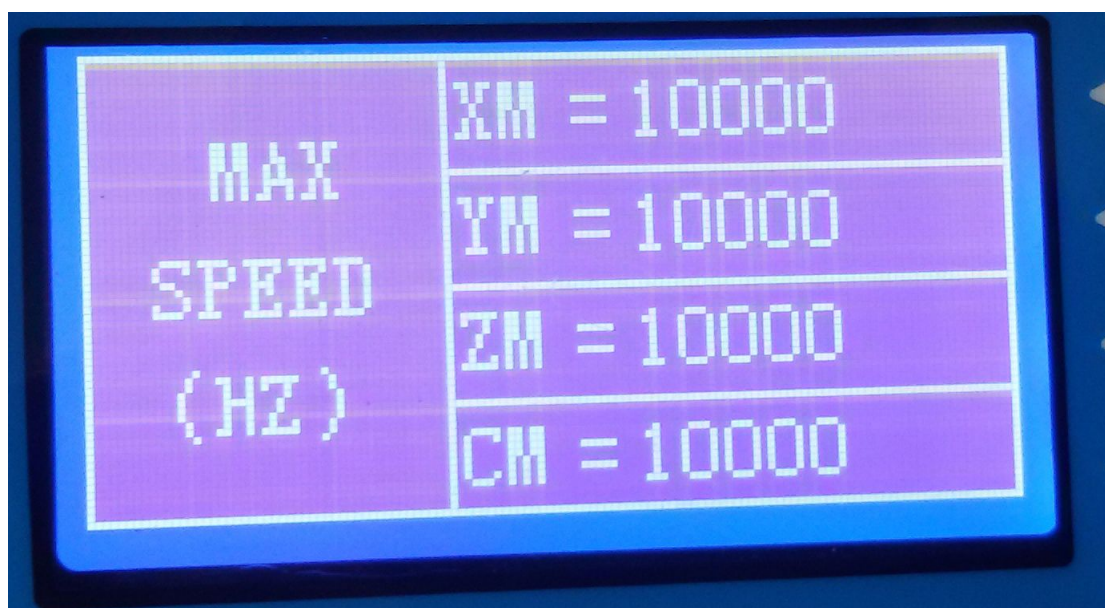


4-Axis TB6600 CNC Driver Board User's Manual

■ Start & Max speed settings :

The image shows a close-up of a blue LCD screen with a yellow border. The screen displays the 'START SPEED (HZ)' settings for four axes. The text is in a simple, pixelated font. The settings are: XS = 00500, YS = 00500, ZS = 00500, and CS = 00500.

START SPEED (HZ)	XS = 00500
	YS = 00500
	ZS = 00500
	CS = 00500

The image shows a close-up of a blue LCD screen with a yellow border. The screen displays the 'MAX SPEED (HZ)' settings for four axes. The text is in a simple, pixelated font. The settings are: XM = 10000, YM = 10000, ZM = 10000, and CM = 10000.

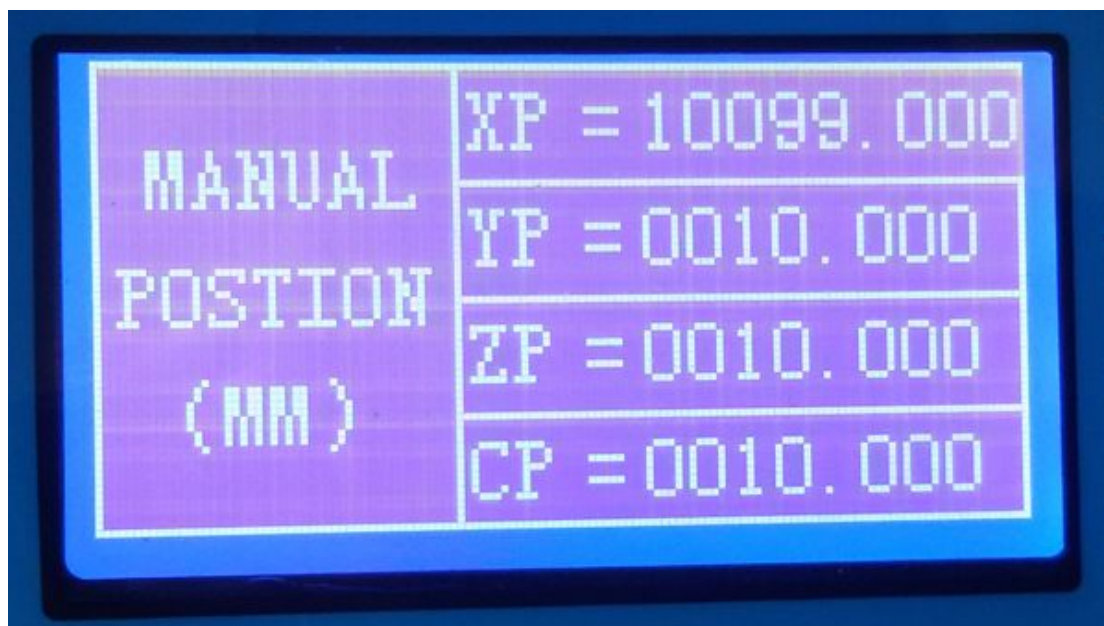
MAX SPEED (HZ)	XM = 10000
	YM = 10000
	ZM = 10000
	CM = 10000

How to set the speed?

The start speed is the minimum speed and the max speed is the objective speed of the motor(the maximum number is 30Khz).the speed's unit is frequency,the relationship of unit millimeter and frequency can be set as follows:

Unit(mm)=unit(Hz)/K.

■ Manual position:



The manual position is the feed distance by manual in the monitor interface, and the maximum number is 9999.99.

❖ Programming

The controller has a user program capacity of 95 lines. In this space, you can design one or more motion and machine control programs. More than 11 commands, or instructions, are available for this purpose. The instructions are as follows:

Instructions	Description
RelMove	This command makes the motors run as relative distance relative the position current.
AbsMove	This command makes the motors run as absolute distance relative the origin position.
MotorRun	This command makes one motor feed to the length at the speed. The parameter as: Id: which motor runs.(From 0 to 3) Cw:clockwise or anti-clockwise running. In Absolute move mode, it's no use. D: feed distance as millimeter. V: running speed as HZ
WaitOk	Waiting one motor to stop. This command will loop until the motor has stopped, then the next instruction will be executed. The parameter as: Id: which motor will stop.(from 0 to 3)

4-Axis TB6600 CNC Driver Board User's Manual

Delay	<i>Wait Time</i> , which causes your program to stop for a specified amount of time. The parameter as: T: the time will delay.the unit is 100ms.
AbsJump	This command makes the program jump to a particular line without judgement. Be careful if you use this command,it will loop without stop.
ZeroAxis	Clear the motor position to zero. Parameter as: Id:which motor's position will be cleared.(from 0 to 3)
LoopCmd	Loop the program from particular line to current line N times. Parameter as: L: particular line starting loop. N: looping times
SmothLine	The motors run by linear interpolation to the objective position. Parameter as: X: X-axis objective position. Y:Y-axis objective position Z:Z-axis objective position V:speed by unit as HZ
End	End the program.

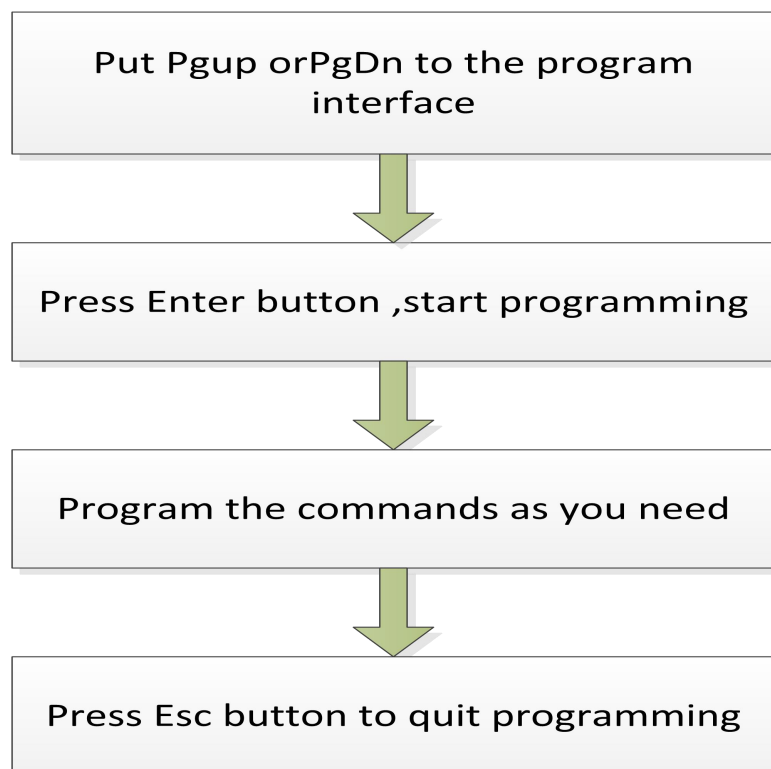
Button functions in the programming interface :

Button	Function introduction
1	Number 1
2	Number 2
3	Number 3
4	Number 4
5	Number 5
6	Number 6
7	Number 7
8	Number 8
9	Number 9
0	Number 0
.	Dot
F	Select parameter
Del	Clear to zero

4-Axis TB6600 CNC Driver Board User's Manual

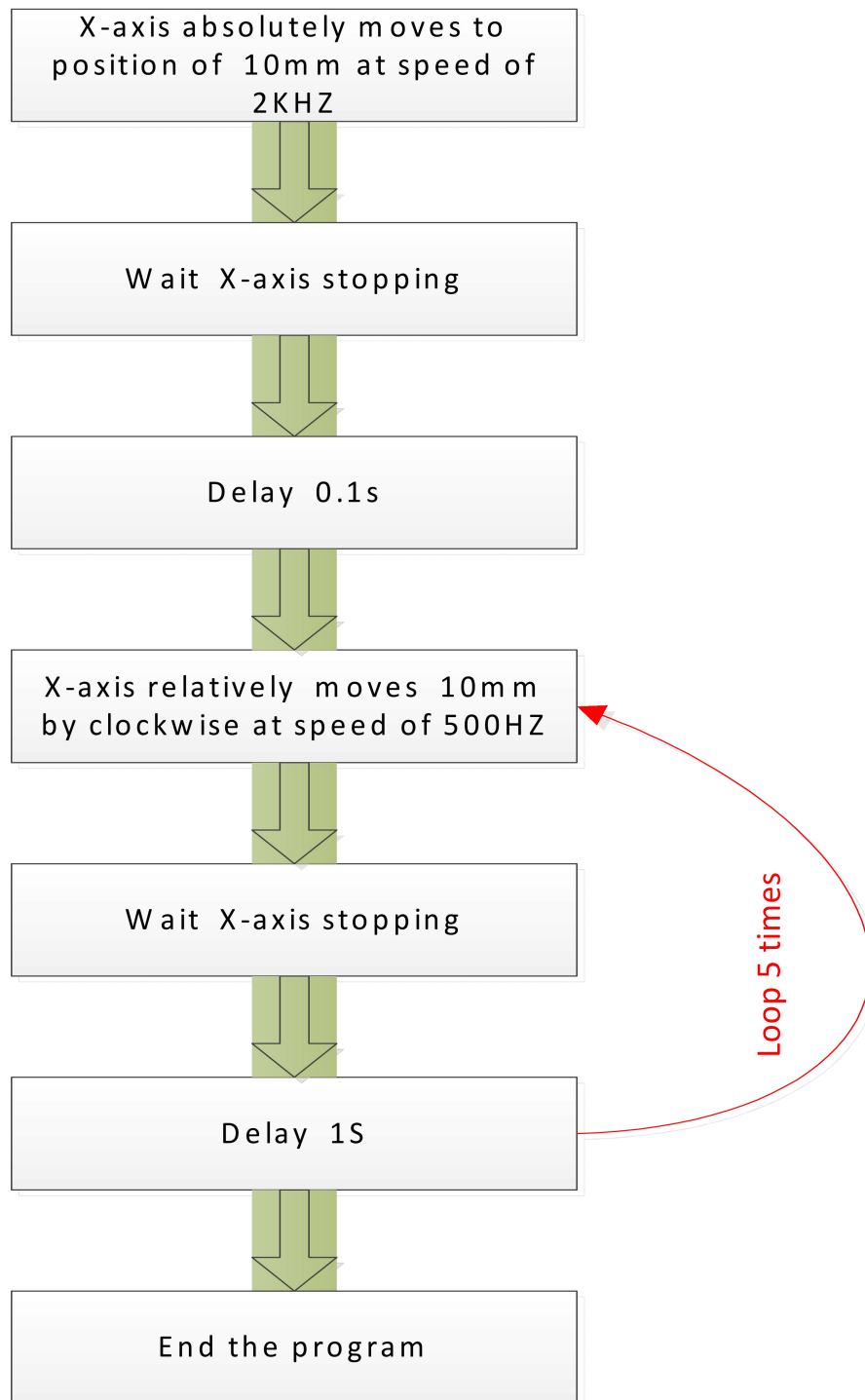
Enter	Start programming
PgUp	Next command to program
PgDn	Last command to program
Esc	End Programming interface, then other interface can be shown.
F1	Add the current command line to the program (Remarks: Press the button must be about 500ms)
F2	Modify the current command line (Remarks: Press the button must be about 500ms)
F3	Delete the current command line (Remarks: Press the button must be about 500ms)
F4	Insert the current command to the particular line (Remarks: Press the button must be about 500ms)

How to program?



Examples1:

4-Axis TB6600 CNC Driver Board User's Manual



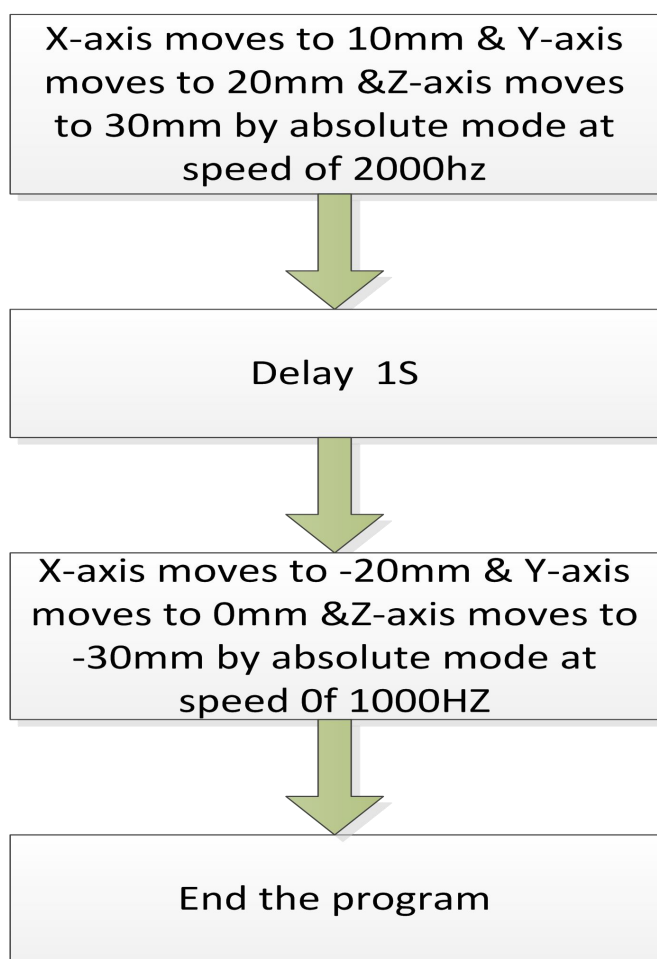
Commands as following:

Line number	Command name	parameters
00	AbsMove	Li=00
01	MotorRun	Li=01 Id=0 Cw=0 D=10 V=2000 (Remarks: Cw has no

4-Axis TB6600 CNC Driver Board User's Manual

		function in absolute mode)
02	WaitOk	Li=02 Id=0
03	Delay	Li=03 T=10
04	RelMove	Li=04
05	MotorRun	Li=05 Id=0 Cw=1 D=10 V=500 (Remarks: Cw must be set as your needs in relative move mode)
06	WaitOk	Li=06 Id=0
07	Delay	Li=07 T=1
08	LoopCmd	Li=08 L=05 N=5
09	End	Li=09

Examples2:



Line number	Command name	parameters
00	AbsMove	Li=00
01	SmothLine	Li=01 X=10 Y=20 Z=30 V=2000
02	Delay	Li=02 T=10
03	SmothLine	Li=03 X=-20 Y=0 Z=-30 V=1000
04	End	Li=04

■ How to manage the program file?

In the program management interface, the program can be saved, opened and deleted as need. The

4-Axis TB6600 CNC Driver Board User's Manual

parameter of N is the file number which file will be managed, from 0 to 1.

Button functions in the programming interface:

Button	Function introduction
1	Number 1
0	Number 0
PgUp	Set LCD to the next function interface .
PgDn	Set LCD to the last function interface .
F1	Open file of N (Remarks: Press the button must be about 500ms)
F2	Save program to address of N
F3	Delete the current program. (Remarks: Press the button must be about 500ms)
F4	Insert the current command to the particular line (Remarks: Press the button must be about 500ms)