Three Axis TB6560 CNC Driver Users Manual

Revision 2.0

Univelop Comp. Tech. LLC.
http://www.cncgeeker.com

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Content

1. GENERAL INFORMATION

1.1. Scope

This document describes the basic functionality and the electrical specifications of Univelop Tech. LLC's Three Axis TB6560 CNC Driver board.

1.2. General Description

Univelop Tech. LLC's Three Axis TB6560 CNC Driver board is designed to communicate directly with KCAM4, MACH 2/3, NINOS, etc…, which supports parallel port.

2. Descriptions of 3-AXIS CNC Board
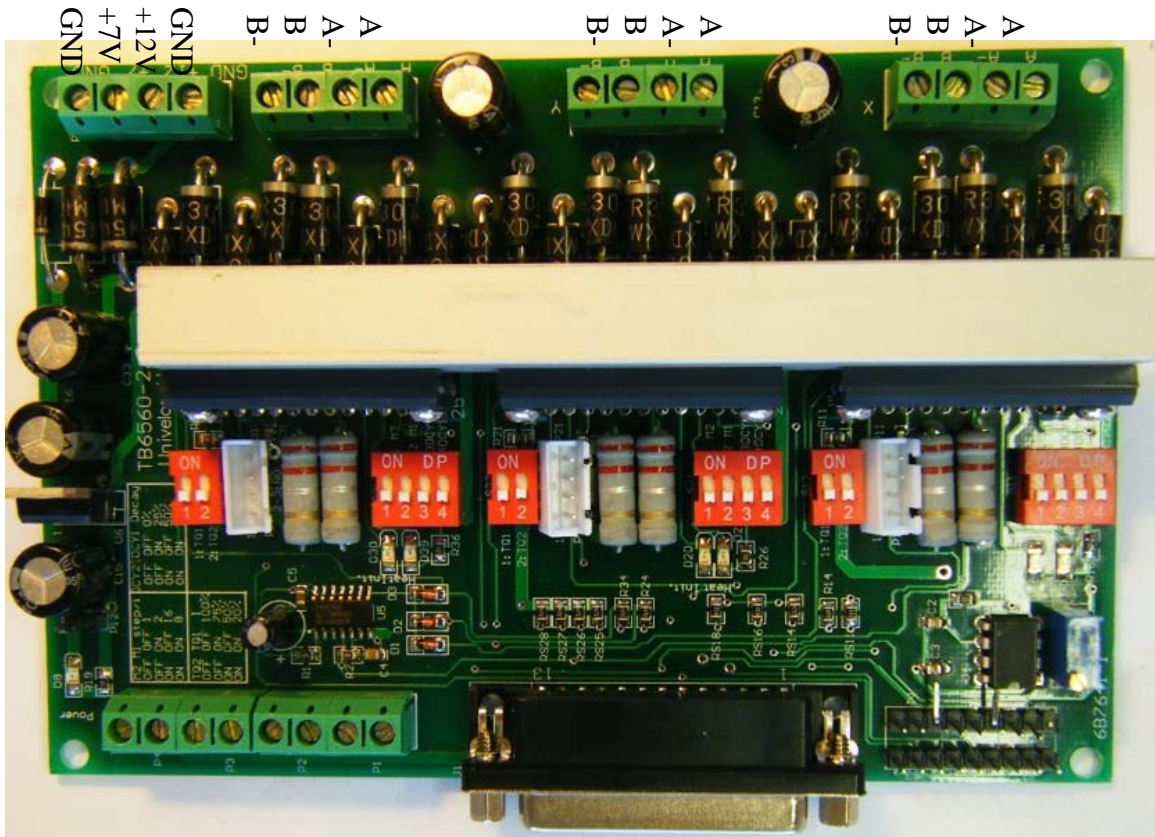
2.1. Photo of 3-AXIS CNC Board

Fig. 1 Three Axis TB6560 CNC Driver Board (Dimension: 100mm X 130mm)

Fig. 2 Step Current® Extend Board(*Optional*)

2.2. Key Features
- Supports KCAM4, MACH 2/3, NINOS, etc…
- Two phase bipolar (chopper) pulse width modulating technology
- Resolution 1, 1/2, 1/8, 1/16 micro stepping output
- Suitable for 4, 6, or 8 wire motors
- Absolute Maximum Ratings: 40VDC @ 3.5 amps(peak) /phase motor output*
- Current adjustable at 100%, 75%, 50%, 20% of full current by on-board switch**
- Voltage regulator is on board for TB6560
- Stop Button for emergency stop
- Limit/Home Signal input
- Manual Control circuit included
- Step Current® Technology (with *optional* Step Current® Extend Board): Step Current® technology is used to decrease the current up to 1/2, when motors are in idle for all axis so as to protect expensive step motor and driver board for long time running.
- Built-in overheat protection circuit

Comparison between Univelop V 2.0 (TB6560) CNC driver and V 1.0 (TA7835) CNC driver board:

	V 1.0 (TA7835)	V 2.0 (TB6560)
IC Overheat protection	N/A	Built-in
Current Adjustable	100%/50%	100%/75%/50%/20%
Current for motor	Peak 2.5A	Peak 3.5A [*,**]
Voltage	Max 35V	Max 40V [*,**]
Micro stepping	1 – 1/8	1 – 1/16
Frequency (f_{OSC})	Max 80khz	Max 600khz
Chip manufactory	Old technology	Current technology, ,makes IC chips get less heat at the same current

* See TB6560 Datasheet (2007) by TOSHIBA, (at Ta = 25°C)
** The full current is preset at 2.5A by R12/R13 (0.2ohm) for this board (you can adjust it by changing resister).

2.3. Electrical Characteristics (recommend)

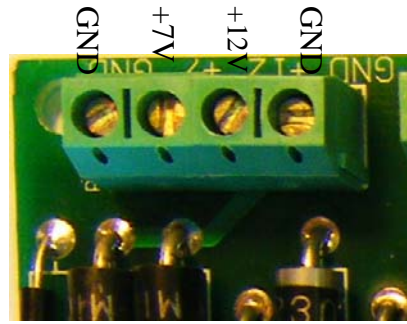| Symbol	Parameter	Min	Typical	Max	Units
T_{STR}	Storage Temperature	- 40		+150	°C
T_{OP}	Working Temperature	- 15	+ 25	+ 85	°C
I_{CC}	Current	50	100	200	MA
+12V	Motor Voltage	5	24	34 [*]	V
+7V	Board Voltage	7	9	12	V

3. Hardware Installation

3.1. Board Connection
Follow the following steps to connect the board:

UNIVELOP 3-Axis TB6560 CNC Driver Board V2.0 Users Manual

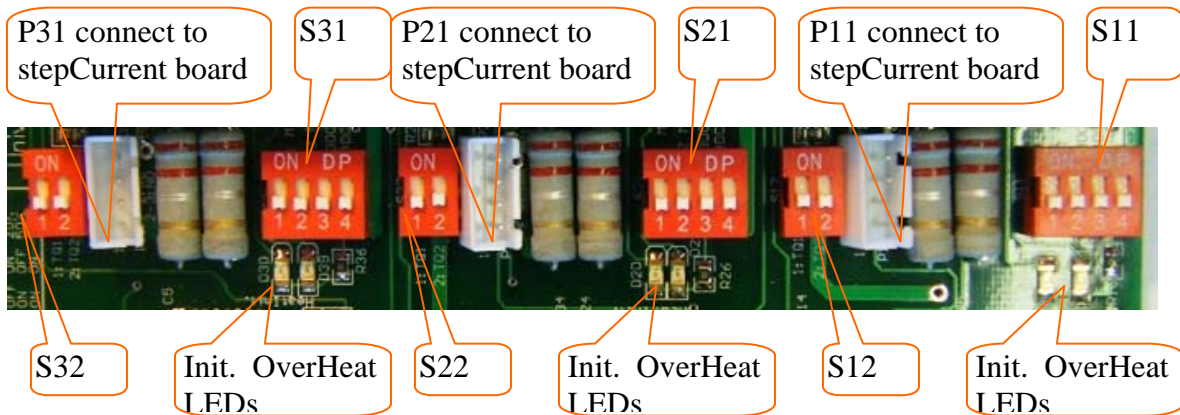1. Connect board power and motor power to the board as same as following.

GND +7V +12V GND

Here (recommend):

Symbol	Parameter	Min	Typical	Max	Units
+12V	Motor Voltage	5	24	34[*]	V
+7V	Board Voltage	7	9	12	V

2. Connect the motors to the board (more detail in Section 3.2)
3. Setup the board with S11, S12,S13,
   X-axis: S11, S12, P11; Y-axis: S21, S22, P21; Z-axis: S31, S32, P31:

P31 connect to stepCurrent board   S31   P21 connect to stepCurrent board   S21   P11 connect to stepCurrent board   S11

S32   Init. OverHeat LEDs   S22   Init. OverHeat LEDs   S12   Init. OverHeat LEDs

S11-1	-2	-3	-4	S12: -2 -1
S21-1	-2	-3	-4	S22: -2 -1
S31-1	-2	-3	-4	S32: -2 -1

M2	M1	step/i		DCY2	DCY1	Decay		TQ2	TQ1	I
OFF	OFF	1		OFF	OFF	0%		OFF	OFF	100%
OFF	ON	2		OFF	ON	25%		OFF	ON	75%
ON	OFF	16		ON	OFF	50%		ON	OFF	50%
ON	ON	8		ON	ON	100%		ON	ON	20%

* Do NOT connect any pins to P11, P21, P33 except our StepCurrent Extension board.

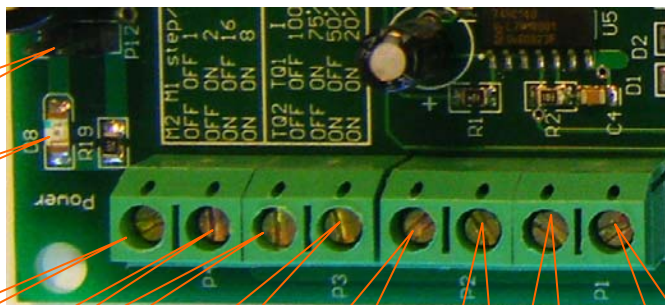4. (Optional) Setup the "Step Current" extension board with P11, P21,P31,
   Please follow the Appendix A.
5. (Optional) Connect the limit switches to the board.
   P1: Emergence Stop
   P2: Limit X
   P3: Limit Y
   P4: Limit Z

Fan connection

Power LED

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Limit Z   GND   Limit Y   GND   Limit X   GND   Stop   GND

Signals are Active Low.
4. Connect DB 25 with parallel port in a computer
 More details are in section 3.3.
5. Turn on the board power and motor power, as well as the computer.
   ● Connect suitable power supply at Input outlet on front of controller
   ● 24vdc @ 2-6amp switching power supply recommended
6. Attempt to jog each axis with software (if axis turns in opposite direction of desired direction - attempt axis rotation reversal via software- if unable to do so switch 2 wires for one coil (i.e. switch A with A#, do not switch wires between coils)
7. You are now done and able to begin using your new stepper motor drive
REMEMBER NEVER CONNECT OR DISCONNECT MOTORS WHILE POWER IS ON

3.2. SELECTING AND CONNECTING STEPPER MOTORS

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

4 Wire, 6 Wire, and 8 Wire stepper motors can be used with 3-AXIS CNC Board. 4 Wire motors are recommended as they are by their manufacture true bipolar motors and easier to properly connect to stepper motor drive controller It is 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 deg per step resolution is the industry standard for most automation grade stepper motors and is recommended for most applications

4 WIRE STEPPER DIAGRAM
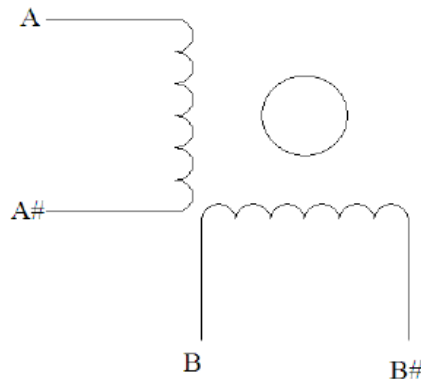
Each wire is connected to its corresponding terminal block location (i.e. A# wire is connected at **A-** location)
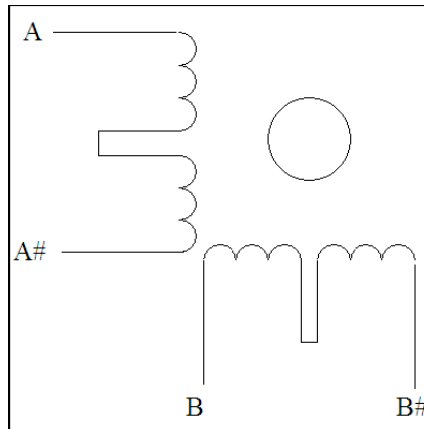
6 WIRE STEPPER DIAGRAM (SERIES WIRING)
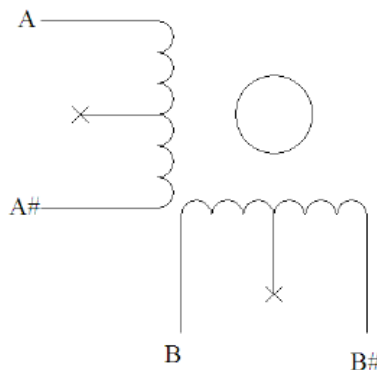
Center wire of each coil not connected (insulate termination)
Remaining wires are connected to their corresponding terminal block location (i.e. A# wire is connected

at **A-** location).
   8 WIRE STEPPER DIAGRAM

A ——

A# ——

B   B#

    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 considered now rated at 2 amps)

3.3. CONNECTING with Computer by DB25

    The following is to aid in the setup of the use of controller with various CAM software programs operating on your computer.

DB25 Female Pinout

13   1

25   14
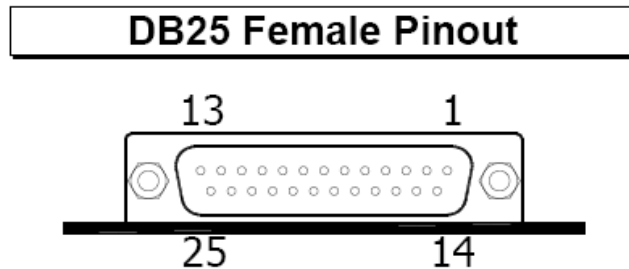
DB25 PIN USAGE:

Pin in Parallel Port	In/Out	Signal	Note
2	Out	Step X	
3	Out	Dir X	
4	Out	Step Y	
5	Out	Dir Y	
6	Out	Step Z	
7	Out	Dir Z	
8	Out	Enable Y	
9	Out	Enable Z	
14	Out	Enable X	
10	In	Emergence Stop (low***)	
11	In	Limit X (low***)	
12	In	Limit Y (low***)	
13	In	Limit Z (low***)	
1,15,16,17	N/A	Not Utilized	
18-25		GND	

***Signals are Active Low

It is critical that the connection between computer parallel port and motor drive board be direct with the use of adapters (If your computer does not feature a DB25 outlet, you must install one, (these can be achieved via PCMIA cards on laptop computers)) The use of adapters and hubs is not advisable and most likely will not work.

3.4. Manual Control

Manual control:

Using S1 to control X-axis, S2 to control Y-axis, S3 to control Z-axis.

X-axis: Connect the DB25 pin 14 to +5v to enable X, Short S1.2-3 to drive the motor, short S1.5-6 to change the direction of the motion.

S3

Start to drive motor

Change direction of motion

Y-axis: Connect the DB25 pin 8 to +5v to enable Y, Short S2.2-3 to drive the motor, connect S2.5-6 to change the direction of the motion.

Z-axis: Connect the DB25 pin 9 to +5V to enable Z, Short S3.2-3 to drive the motor, short S3.5-6 to change the direction of the motion.
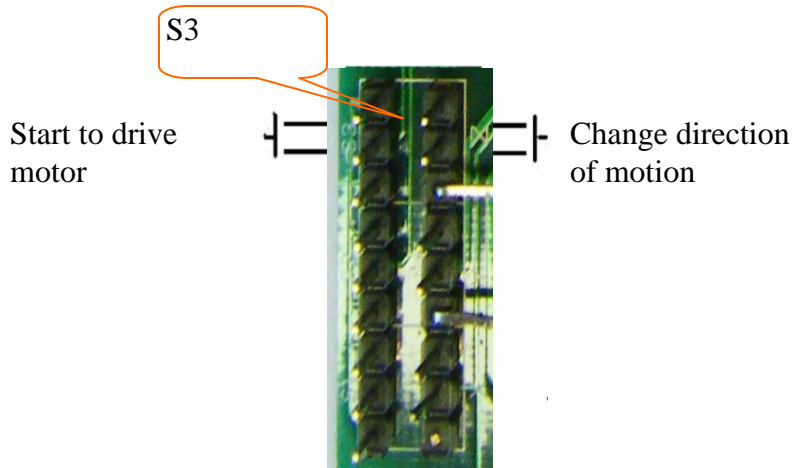
Appendix

A. Installation of Step Current® Extend Board (Optional)

Insert the step current® extend board into P11 (see Figure 3 for positions) for X-axis, insert the step current® extend board into P21 for Y-axis, Insert the step current® extend board into P31 for Z-axis. After the board is powered, the LED indictor will be turned on.
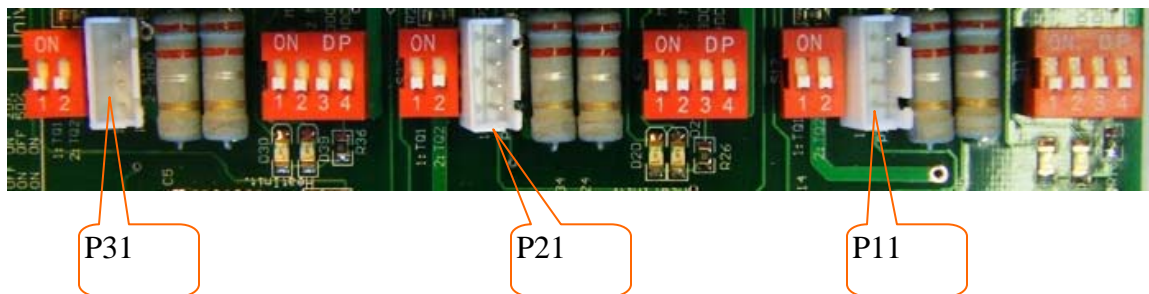
P31   P21   P11

Figure 3. Positions for P11, P21, P31

B. Change the preset current of the board by changing the value of R12/R13, R22/R23, R32/R33

The value of Iout(A)=0.5V/R12(Ohm), Iout(A)=0.5V/R13(Ohm). The peak of Iout can't be exceed 3.5A.