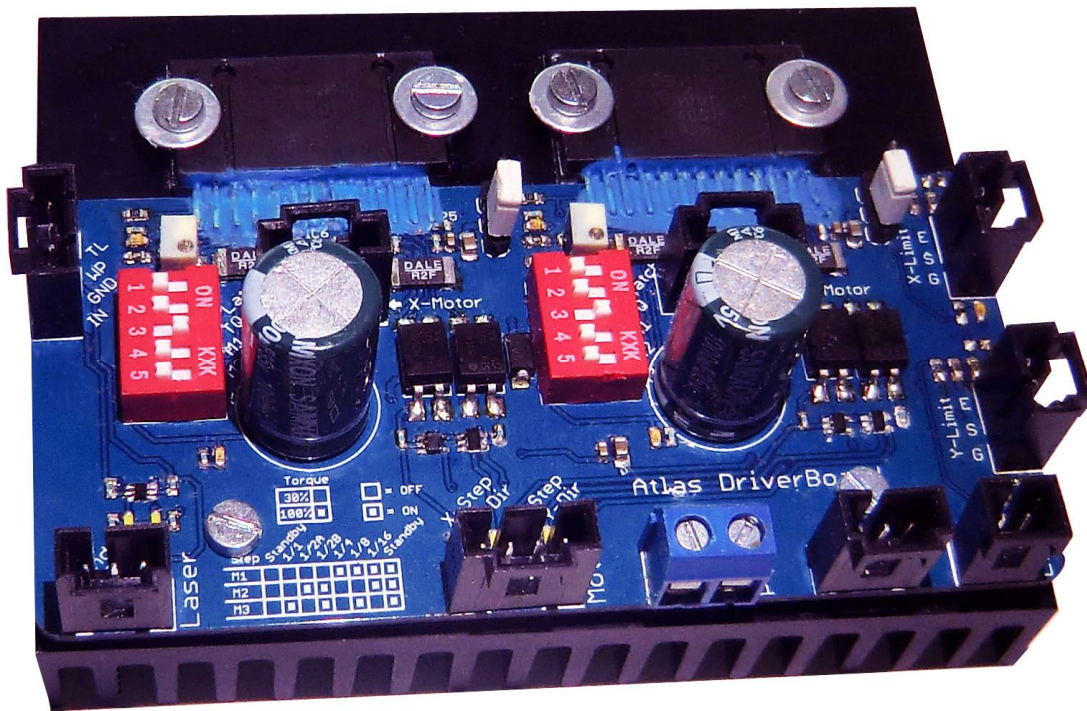


Manual

Atlas Driverboard



Flexible hardware-control for :

- 2x Bipolar and hybrid 4-wired steppermotors at X/Y-bed
- 1x LaserTube via Laser Power Supply
- Home Limit Sensors

Contains onboard LEDs for visual verification of signals

Operating at 24V DC

SMDKing

Content

Basic information				
	Schematic			1
The Basic "know-what-is-what"				
	Computer			3
	DSP			3
	ControlBox (Atlas)			4
	Laser Power Supply			4
	LaserTube / Diode			4
	X/Y-bed			4
Connectors - Description / locations				
	General			5
	Laser	(CON1)	INPUT	5
	Motor	(CON2)	INPUT	6
	Power	(CON3)	INPUT	6
	Reserved	(CON4)	IN/OUTPUT	7
	Limit	(CON5)	OUTPUT	7
	Y-Limit	(CON6 A)	INPUT	7
	X-Limit	(CON6 B)	INPUT	7
	Y-Motor	(CON7)	OUTPUT	7
	X-Motor	(CON8)	OUTPUT	8
	Laser Out	(CON 9)	OUTPUT	8
	J1 / J2		INPUT	8
	MSW1/MSW2		INPUT	9
	Latch			9
	TQ			9
	M1,M2 and M3			9
	Pot1/Pot2		INPUT	10
Upgrade - K40 laser engraving machine				11
Connect all together				13

Version : 2.0
Date : November 17th, 2017

Basic information

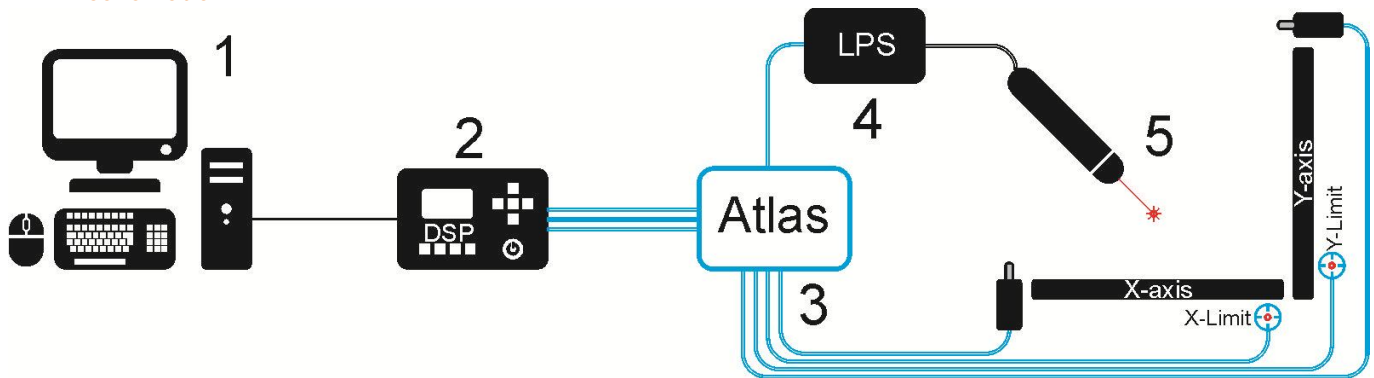
The Atlas Driverboard is developed to use as a converter, between a Control-Box and a laser engraving machines. It will convert images / cut/engraving plans in order to move a laserbeam along an X/Y-bed and eventually trigger a laserbeam. This module can be connected as an intermediate between :

- DSP (*)
- 4-wire bipolar stepper motors as output,
- controlling power laserdevices as output.
- verification for Home Limit position.

(*) There are several brands available. The Atlas-module is well tested in combination with AnyWells AWC708-series. In near future an LPT-module might be available. This means, it will operate straight from PC, by using software, like MACH3. Not tested, but certainly possible, is to use a RaspBerry Pi, or other ARM-based device. Those devices are open source and sometimes even can be modified upto your needs.

Below, a global schematic is shown, to give an impression about what components are needed to create a laser engraving machine :

Schematic



1. Computer
2. DSP
3. Atlas module + peripherals
4. Laser power supply (LPS)
5. Hardware (Laser, X/Y-bed, steppermotors, etc.)

The basic "know-what-is-what"

Computer

A computer, with additional software is needed. By using a vectorprogram (CorelDraw) a design can be created. This design can be sent to a DSP (2), over USB-, internet or wireless.

DSP

A DSP, will convert digital data received from PC into X-Y-parameters for the lasermachine (5) to cut / engrave. Some of these DSPs additionally offer the option to manually control the laser-engraving machine, concerning X/Y-position and pulsing the laser. Because the DSP is only able to convert digital data into hardware-commands an additional ControlBox (3) is required.

The data is transmitted over 3 seperate wires :

- Data for lasertube
- Data for X/Y stepper motors
- Data for X/Y home limit sensors

ControlBox (Atlas)

A ControlBox will process the received data from the DSP into hardware-controlled pulses. These signals are for positioning the laserbeam and when to cut / engrave. Consequently X/Y-stepper motors will be positioned at the required location.

Additionally, the PC, the DSP, need to know the exact home-position of the X/Y-bed. This is done by Home Limit Sensors (HLS). Whenever a lasermachine will start up, it will start to detect / re-locate the laserbeam to a home-position. The sensors (HLS) will be activated when this home-position for X and Y-axis has been reached.

The Atlas-module includes (blue color) :

- Data-Links between DSP and Atlas-module. (Laser, X/Y-stepper motor and HomeLimit)
- DataLink between Atlas-module and Laser Power Supply (LPS)
- DataLink between Atlas-module and X/Y-stepper motors
- DataLink between Atlas-module and X/Y-Home Limit Sensors
- X/Y Home Limit sensors (InfraRed)
- Atlas-module itself (device, heatsink, 4pcs mounting screws, heatconductor)

Laser Power Supply

A Laser Power Supply is a device which will send signals to the lasertube and the laser will consequently start ignite (burning / engraving). These LPS-es can be connected to several types of LaserTubes. They supply a high Voltage pulse to the LaserTube, in order to create a laserbeam.

It is wise to choose the correct LPS for the used LaserTube. LaserTubes can be ranging from several Watts, to several hundreds of Watts.

LaserTube / Diode

A lasertube / Diode is emitting a monochromatic, high energetic lightbeam to an object, which has to be cut and / or engrave an object. Various LaserTubes / Diodes are available, concerning wavelength of power. Next to the importance of wavelength (UV or InfraRed), also the amount of energy (max. Wattage) a LaserTube can emit as pulses are important. In general , the longer the tube, the more powerful and thus less time, cutting / engraving will need. Additionally, concerning wavelength : The shorter the wavelength (UV versus InfraRed), the easier it might cut / engrave objects.



A LaserTube is not able to convert the received energy 100% into a laserbeam. Additional energy-loss might / will occur. The LaserTube itself will warm up and reach harmful temperatures. Not cooling sufficiently, will cause damage to the LaserTube. A common technique to avoid this damage, is done by water-cooling.

X/Y-bed

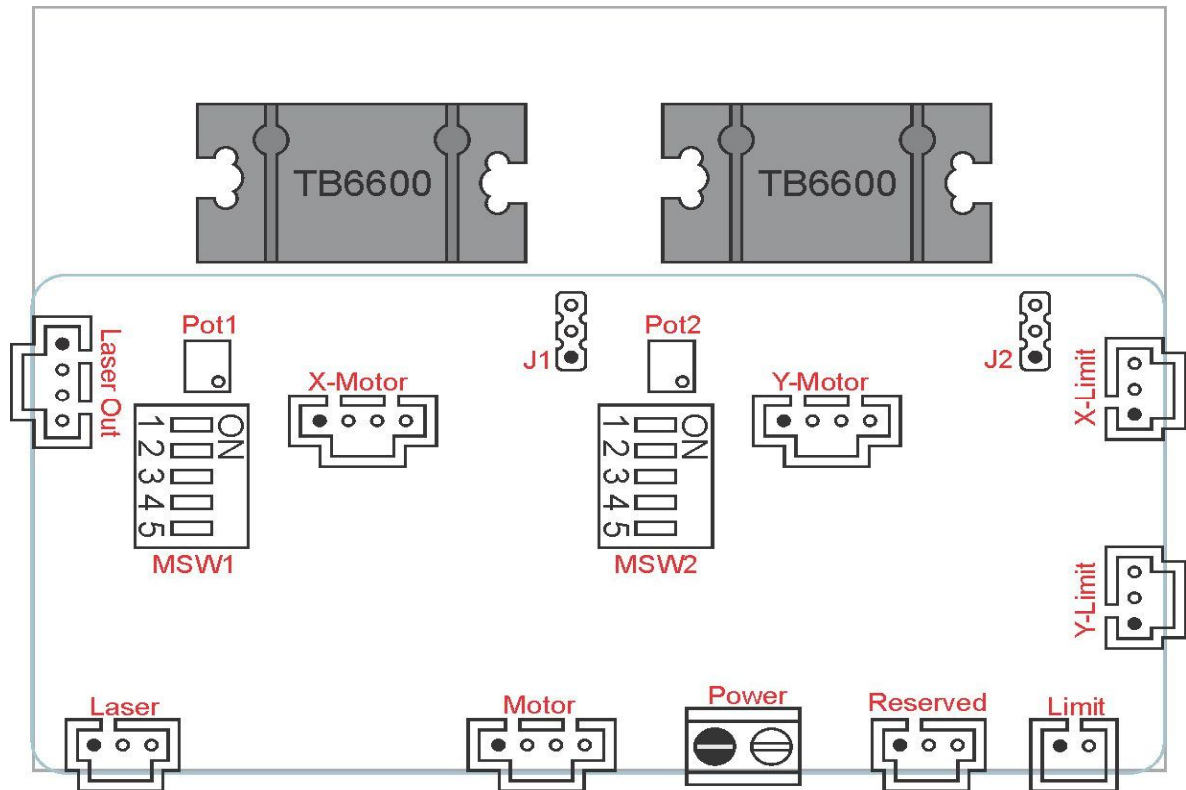
An X/Y-bed is a mechanical construction, based upon a X and Y-axis. The X/Y-bed will move a mirror, along the X/Y-axis, by using motors, in order to position a LaserBeam for cutting/engraving. Moving this mirror along the X/Y-axis, specific motors are required. A motor can be bought by variety. The Atlas-module is designed to steer bipolar (4-wire) stepper motors.

These motors can move for very small (micro)steps. The smaller the steps they can perform, the more detailed an object can be cut / engraved.

Connectors - description / locations

General

All pins for each connector or socket are numbered. The grey marked pins are always pin 1. The Atlas-module contains 2 pieces of TB6600-chips. These are for controlling the stepper motors at the X/Y-bed. The module is mounted to heatsink. Although most energy is pumped into the stepper motors, this part keep both chips luke-warm. The TB6600 can control over 4 Amps and shortly peek at 5 Amps for 100ms. Best practice is to set the power consumption between 0.5 and 3 Amps maximum per stepper motor.



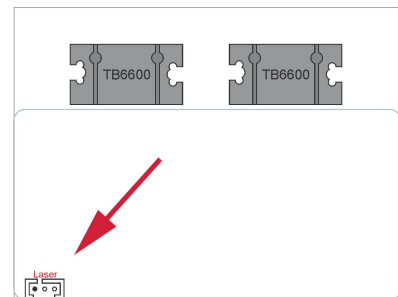
Laser (CON1) - INPUT

Located at lower left of the Atlas-module and contains 3 pins. Use a LaserLink-cable, as a connection between the DSP and the Atlas-module, for laser-steering signals. The pins are :

Pin 1 = Ground (DC-Voltage)

Pin 2 = TTL (For TTL-signals at 5V DC level)

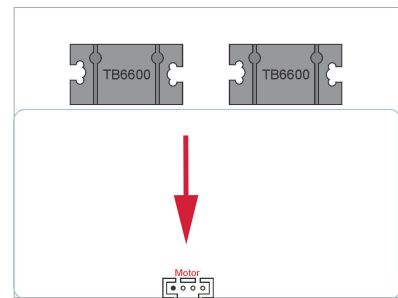
Pin 3 = PWM (For PWM-signals at 5V DC level)



The Atlas-module contains 2 LEDs as visual indicators for pin 2 and 3. When a high signal (5V DC) is present at pin 2, the left LED next to this connector will emit. If pin 3 is high, the right LED will emit. Use this feature, to verify a proper connection between Atlas-module and a DSP.

Motor (CON2) - INPUT

Its location is at the lower center of the Atlas-module and contains 4 pins. Use a MotorLink-cable for this purpose. This cable will transmit 5V DC level signals to the Atlas-module. The pins are for input :



Pin 1 = Step into X-direction.

When signal is going low (GND) to high (5V) the stepper motor will perform a single (micro)step.

Pin 2 = X-direction, positive/negative.

The motor will rotate (counter)clockwise by high or low-signal (5V DC vs GND) along X-axis.

Pin 3 = Step into Y-direction.

When signal is going low (GND) to high (5V) the stepper motor will perform a single (micro)step.

Pin 4 = Y-direction, positive/negative

The motor will rotate (counter)clockwise by high or low-signal (5V DC vs GND) along Y-axis



LEDs

For visual verification, integrated LEDs are onboard, close to this connector. They will emit light, according to the signals.

Input

Input signals should be at 5V DC at minimum of 0.1 mAmp.

Troubleshooting

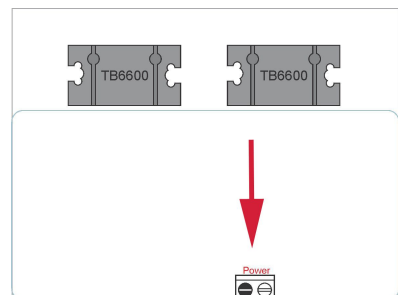
If signals are send, but LEDs are not responding, check connection of MotorLink-cable.

If stepper motors do not respond, check connection between Atlas-module and stepper motors.

Power (CON3) - INPUT

This 2-pin connector is located next to the Motor-connector. CON3 is for powering the Atlas-module and should provide also enough Amps for the stepper motors. The stepper motors can absorb 3 Amps, and peek at 5 Amps.

The Atlas-module is ment to be powered by 24V DC.



Pin 1 = Gnd (Ground)

Pin 2 = 24V DC



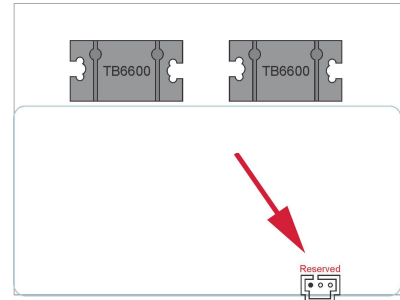
Chinese powersupplies are not always as reliable as been advertised. Sometimes it is stated a powersupply can generate 6 or 8 Amps. Unfortunately, by experience we can say, they probably will not be able sustain this amount of Amps at 24V DC for a longer time. They get hot, or the Voltage might even drop.

For this exact reason, it's better to buy / use a powersupply, which generates merely the double amount of Amps as required. They are a bit more expensive. However the costs are higher if you buy a 6 or 8 Amps powersupply and later need to buy another one, which generated 24V DC at 15 Amps. So, *overdimensioning* is the magic word for reliability.

Reserved (CON4) - OUTPUT

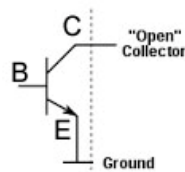
This 3-pin connector is located at the lower right, next to the Power connector of the Atlas-module. This connector is planned for future use. The targeted purpose is to hook-up to a special converter-board, which connects the Atlas straight to a PC over LPT-port. By this, you can use MACH3 (software) at your PC and leave the DSP out of the middle.

- Pin 1 = 24V DC -supply-
- Pin 2 = 5V DC -supply-
- Pin 3 = Gnd (Ground) -supply-

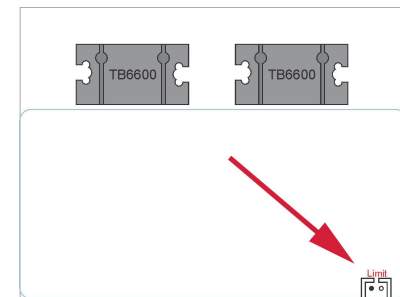


Limit (CON5) - OUTPUT

At the utter lower-right of the Atlas-module is a 2-pin connector located. This connector is used for transmitting data, concerning the Home Limit Sensors. Each pin is an "Open Collector"-type.



- Pin 1 = X-Limit (position zero for X-axis)
- Pin 2 = Y-Limit (position zero for Y-axis)

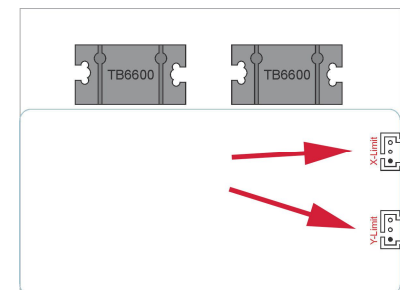


Y-Limit (CON6 A) - INPUT

A 3 pin connector is located at the lower right of the Atlas-module. This is for connecting the InfraRed HomeLimit Sensor (HLS) with GSE-marking. As an alternative, a simple switch (NO) can be used between pin 2 and 3.

Each pin has been marked by a character :

- Pin 1 = G (Ground)
- Pin 2 = S (Signal)
- Pin 3 = E (Energy)

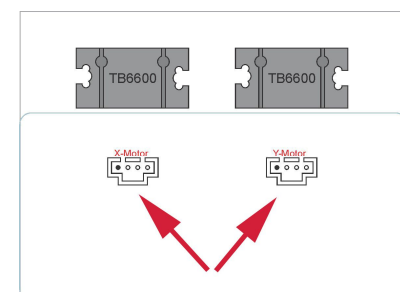


X-Limit (CON6 B) - INPUT

This 3-pin connector is located at the upper right of the Atlas-module. For reference, see Y-Limit (CON6 A).

Y-motor (CON7) - OUTPUT

This is a 4-pin connector located at the middle right of the Atlas-module. The signals from these connector are for generating movement along the Y-axis at the X/Y-bed, by means of a 4-wired bipolar or hybrid stepper motor.





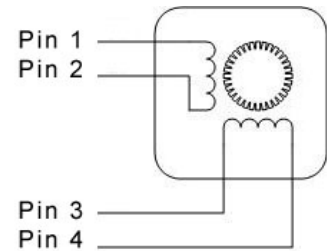
It is important to connect the 4 wires to the correct pins. The 4 wires form 2 spools inside the stepper motor.

When using internet or a datasheet as a source for information, the found data can be confusing. Different types of naming each wire (of the spool) is possible like:

- A+/A- and B+/B-
- A1/A2 and B1/B2
- 1A/1B and 2A/2B.



If your stepper motor contains a connector, most of the time they are perfectly matched in pairs/set. To be sure, you can use a multimeter and measure the Ohms. A set of 2 wires will result in low Ohms (connection). When not selecting a set the resistance will be unlimited (no connection). If you don't have a multimeter by hand, you can use a battery and a lamp. The lamp will emit light if a pair has been found.



To avoid harmful signals, the Atlas-module has protective varistors onboard.

X-motor (CON8) - OUTPUT

This is a 4-pin connector located at the middle left of the Atlas-module. This connector will control the movement along the X-axis at the X/Y-bed, by means of a 4-wired bipolar or hybrid stepper motor. For reference, see previous text (Y-motor CON7).

Laser Out (CON9) - OUTPUT

This connector contains 4 pins and is located at the upper left side of the Atlas-module. This should be connected to the Laser Power Supply (LPS). A LPS is a device which is controlling the LaserTube, by sending high-Voltage at low current (milli Amps) signals to the LaserTube.

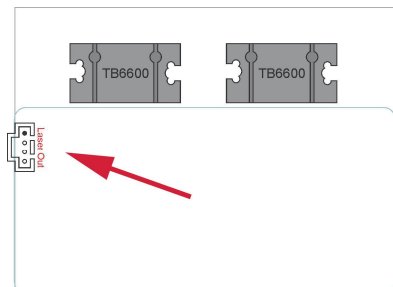
The Atlas-module contain 4 pins :

TL = High / low signal to start / stop the LaserTube via the LPS

WP = Water Protect, connected to GND. When high (5V DC), the LPS will abruptly shut down.

GND = GND

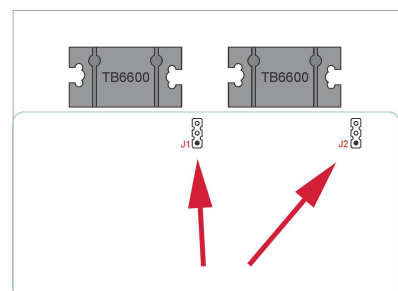
IN = PWM (chopping)-signal, to control the intensity of the laserbeam



Most of the time, a LPS contains 2 connectors. One to connect to power inlet (110/230V AC) and one for controlling the laserbeam. Check the manual of your LPS for exact connection. The LPS might have additional input-pins for 5V DC and GND. You might use Reserved (CON4) at the Atlas-module (pin 2 and 3) for this purpose.

J1 / J2 -OUT/INPUT

The TB6600 chips require a 5V DC, for internal electronics. A TB6600 contains an integrated 5V DC Voltage regulator. This 5V is generated by powering the TB6600 by a higher Voltage powersupply Power (CON3).



It is noted (in theory), to avoid internal damage, a TB6600 should first be connected to 5V DC supply. The next step is to supply the TB6600 to a higher Voltage. However, a 5V DC can't be generated if there's no higher Voltage present. So, you are running in circles without a solution. The Atlas-module has been tested many times, by just connecting a 24V DC powersupply, to let the integrated Voltage-regulator generate a 5V DC. No problems did occur. However, if you insist in safety, the Atlas-module contains an additional onboard 5V DC Voltage regulator.

Pin 3 = 5V DC generated by TB6600 (OUTPUT)

Pin 2 = 5V DC to TB6600 (INPUT)

Pin 1 = 5V DC generated by onboard Voltage regulator (OUTPUT)



Either pin 1 and 2 or pin 2 and 3 should be connected, before powering the Atlas-module. Both options might work. To be at the safe side ? Place a jumper over pin 1 and 2.

MSW1 / MSW2 - INPUT

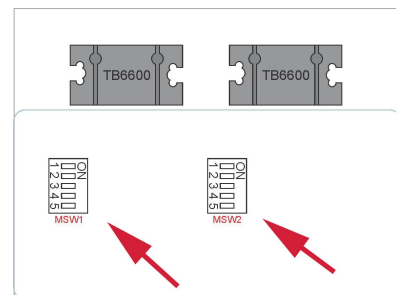
MSW1 and MSW2 are easy to locate. These are integrated 5 DIP-switches and are located vertical. These switches are used for settings to control the stepper motor. They are following :

Latch

Latch/Auto mean "Select a return type" in case thermal shutdown (TSD) and/or over-current detection (ISD) occur. If one of these 2 situations occur, a red WARNING led is visible.

ON = Automatic return

OFF = Latch



TQ (Torque)

The Torque-switch is used for fixating the stepper motor, when not moving. If there are almost no forces involved which might move the stepper motor in either direction, you can set Torgue OFF. By this setting, the stepper motor will use 30% energy. However, if the stepper motor might drift a bit, due to some external forces, it's better to set Torque ON (100%).

Hint : For a lasercutter it is OK to set TQ to OFF. For a CNC-machine it is wise to set TQ to ON.

M1, M2 and M3

Let's assume you use a 1.8 ° stepper motor. Additional you use a pulley with a circumference of 2 inches to a timing-belt. A full rotation will take 200 steps (360 / 1.8). Per step, the timing-belt will move 1/100th of an inch (2 inches / 200). The Atlas-module is able to generate microstepping. This results in even tinier rotational steps to move along the axis. This is done by setting the M1, M2 and M3 switches.

See next page

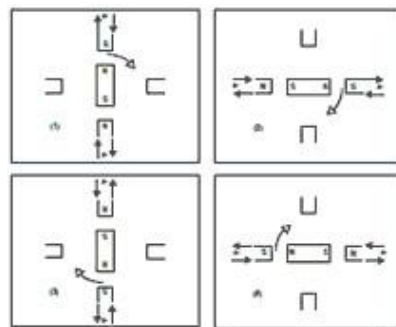
As an example, below you can see the results, based upon a 1.8° stepper motor and a pulley with 2 inch circumference.

Estimated distance, based upon 2 inch pulley				
M1	M2	M3	Setting	Result (inch / step)
			StandBy	0
		ON	1/1	0.01
	ON		1/2A (*)	0.005
	ON	ON	1/2B (**)	0.005
ON			1/4	0.0025
ON		ON	1/8	0.00125
ON	ON		1/16	0.000625
ON	ON	ON	Standby	0



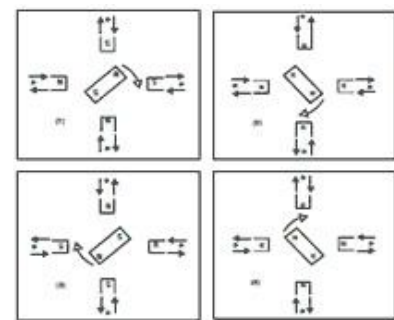
(*) 1-2-phase excitation, A type (0% - 71% - 100%)

In full step operation, the motor moves through its basic step angle. There are two types of full step excitation modes. In single phase mode, also known as "one-phase on, full step" excitation, the motor is operated with only one phase (group of windings) energized at a time. This mode requires the least amount of power from the driver of any of the excitation modes.



One-Phase On, Full Step

	PHASE			
	A	B	\bar{A}	\bar{B}
1	1	0	0	0
2	0	1	0	0
3	0	0	1	0
4	0	0	0	1



Two-Phase On, Full Step

	PHASE			
	A	B	\bar{A}	\bar{B}
1	1	1	0	0
2	0	1	1	0
3	0	0	1	1
4	1	0	0	1

(**) 1-2 phase excitation, B-type (0% - 100%)

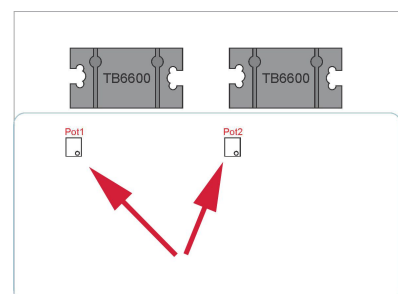
In dual phase mode, also known as "two-phase on, full step" excitation, the motor is operated with both phases energized at the same time. This mode provides improved torque and speed performance. Dual phase excitation provides about 30% to 40% more torque than single phase excitation. As a logic result, it will result also in twice as much power-consumption.

Pot1 / Pot2 - INPUT

Pot1 and Pot2 are both 1KOhm multi-turn potentiometers. They generate a reference Voltage for a TB6600. The higher the Voltage, the more current will be pumped into a stepper motor. A higher current (Amps) will benefit the time a step will take, including also more torque. Both Pots are additionally protected, to make sure the available current will be limited to 3 Amps per motor.

The Atlas-module is pre-set to values, typical for a K40 laser-engraving machine and the used stepper motors inside.

Rotating the tiny screw at the Pots, will de/increase the current to the stepper motor. When set too high, steppermotors will stall / skip steps and generate odd noise. Best practice for fine-tuning is testing it : start low and increase carefully until you find the optimum setting.



Upgrade - K40 laser engraving machine

The Atlas-module is dedicated for those who like to upgrade their machine. They contain a 40W laser, occasionally even more powerful lasers. There are 2 flaws with this machine.

- Integrated parts
When damage occur to integrated board, repair is difficult and renders it to a useless machine.
- Powercontrol for lasertube
If you need to variate the intensity of the laserbeam for engraving and / or cutting, it has to be done manually. If you cut different type of materials,.. you guess it,.. requires manual adjustments.

May we add just one more thing to this list ? The "ChinEnglish" program MoshiDraw. It's below user-friendly and lacks intuitive operation. Besides, MoshiDraw requires a special USB-stick to unlock MoshiDraw everytime is used. In other words, it needs 2 free USB-ports.

To enable an easy upgrade, the Atlas-module was created. When upgrading, be sure you got the following at hand/ pick-list :



1) A laser machine (i.e. K40)

They are sold in many colors, shapes and sizes. Under the hood,.. they're all the same.



2) DSP for CO2 lasercutter/engraver

A DSP allows you to draw in common known graphic software (i.e. CorelDraw). Next to it, you can transfer a file by USB / over internet to your laser-engraving machine.



If you use MACH3, you might even skip such a DSP. MACH3 can translate an image straight into hardware-code for a ControlBox. When control is done over LPT (parallel port) a much simpler and cheaper device can be used.



3) 40 Watts Power supply for CO2 LaserTube

The advantage of a K40-machine, is the integrated PowerSupply for the LaserTube. Downside is how it is integrated. Integrated parts comes in handy, except when a defect of malfunction will occur.

A safer choice is the use of a dedicated Laser Power Supply (LPS). This device converts 110 / 240V AC to high-Voltage and current a lasertube requires. It contains a control-mechanism (ON/OFF) for the laserbeam. Besides, it also includes the option to upgrade later to a more powerful lasertube (i.e. 60, 90, 100 Watts). It only requires to replace the lasertube and LPS.





4) Power supply (110V/230V AC to 24V DC 15 Amps)

If you plan to use 2 steppermotors rated at 1 Amps, at, say 12V DC, remember the complete system operates at 24V DC. This means, the motors will need 2 Amps / piece. Next, remember the DSP ? It also needs some (maybe about 1 Amp). In short, you may have calculated you could run your machine by 24V DC at 5 Amps powersupply.



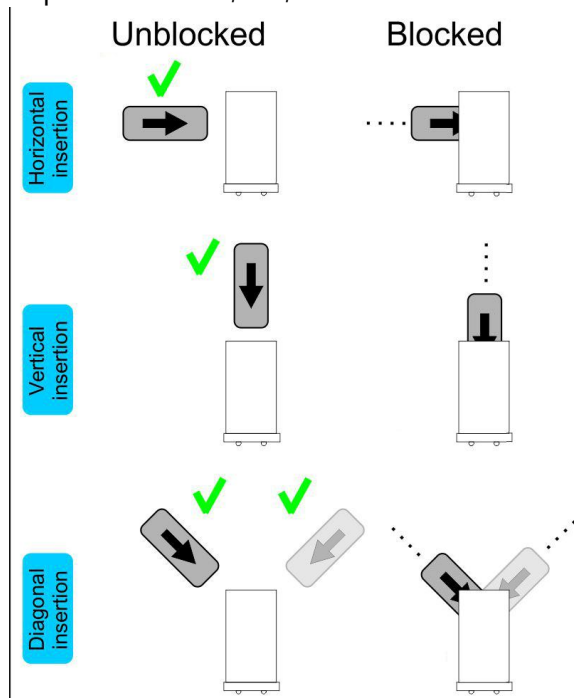
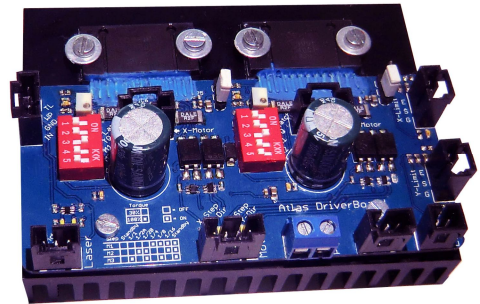
Unfortunately motors contain coil-windings and some electronic effects will occur. The real power-use will fluctuate. Next, by experience, we noted some power supplies are not that rock-solid as thought. They may be able to supply 24V DC at 5 Amps or *less*. And indeed, most of the time the word "*less*" was not emphasized enough.

When the power drain / usage fluctuates (remember : motors), this might have serious negative effects. If you want to be safe, get a power supply which covers the double amount of Amps calculated. It's better to be safe, than sorry (and paying even more money).



5) Atlas-module + peripherals

The Atlas-module will control the steppermotors at the X/Y-bed and indirectly the lasertube. The kit also includes several cables. They are for data between DSP and Atlas-module, connect your steppermotors and even the included InfraRed Home Limit Switches (HLS). To hook up everything might require some time, but, all elements are there.



One exception though.

An HLS requires a "thing" to block the IR-beam, in order to reach the homing position. You can locate the HLS at whatever location you want inside the K40-machine. By this, you even have the option to enlarge the usage of the X/Y-bed. You can drill a small hole and use a bolt and nut to fixate it. Or use the sticky tape. Because we don't know where you plan you HLS, we couldn't include a "standard" IR-blocking device. Use a piece of carton, plastic, a tiny screwdriver or whatever, which will block the InfraRed beam of the HLS.

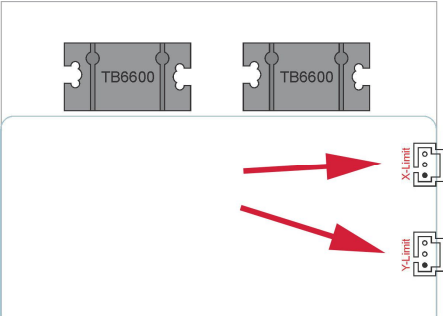
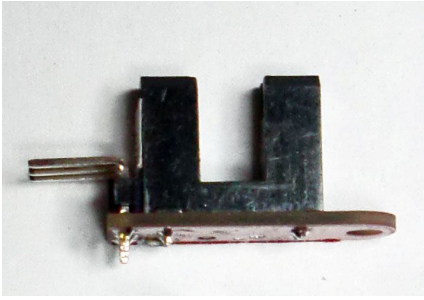
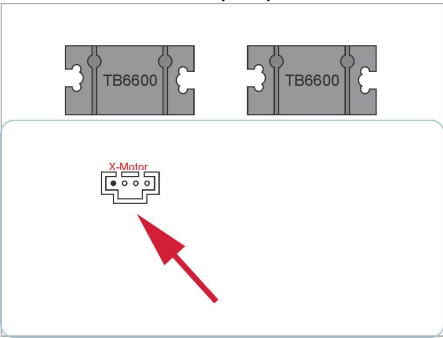
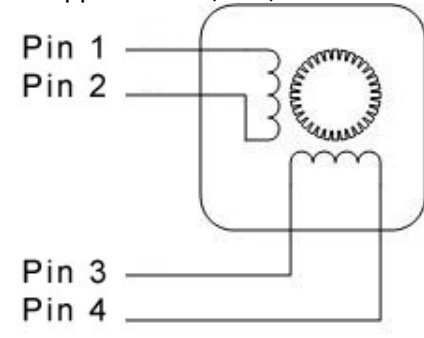

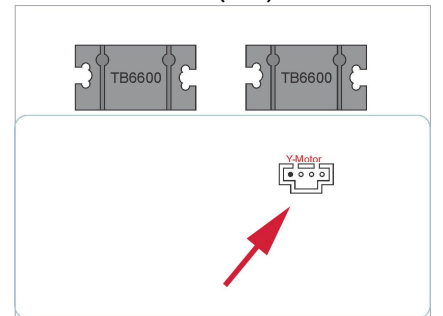
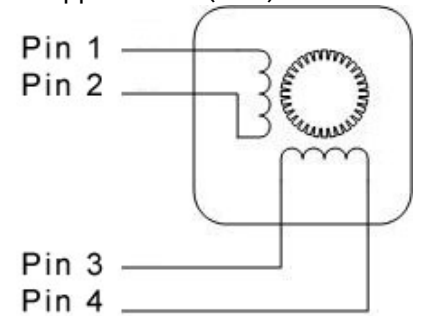

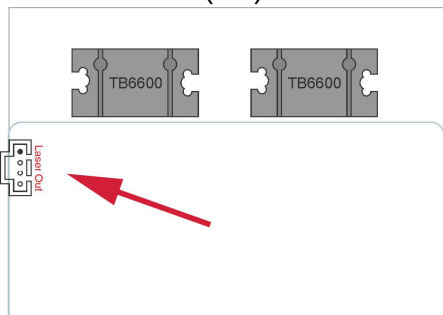

Please, be creative.

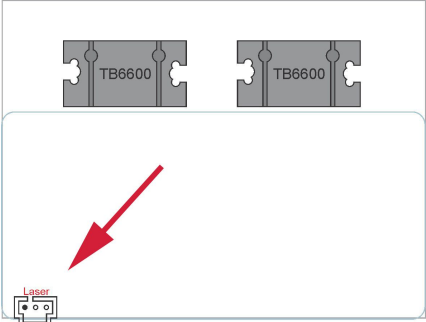
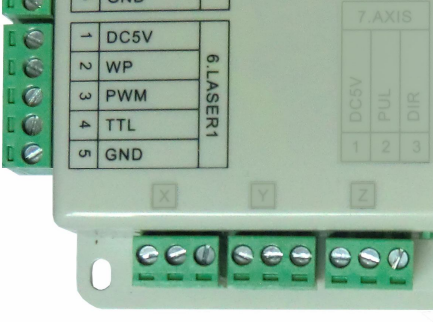
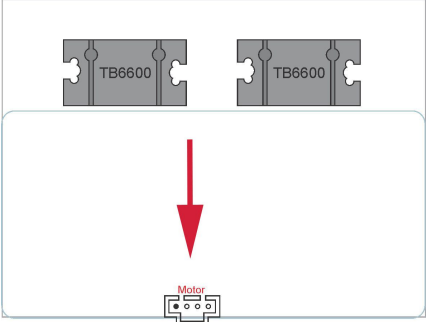
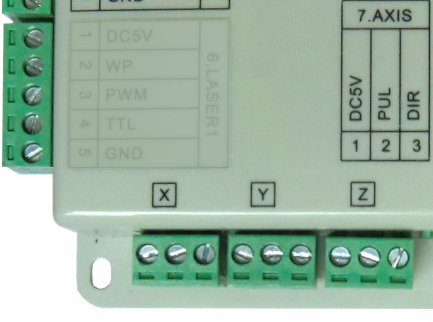
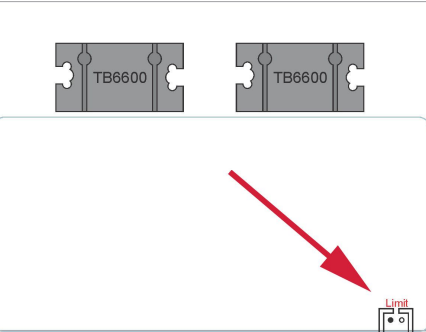
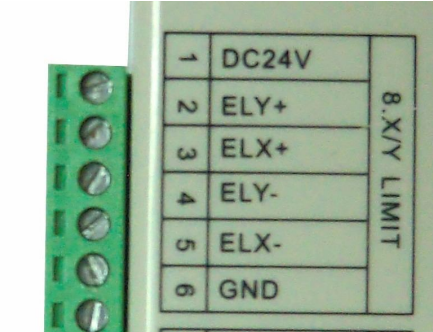
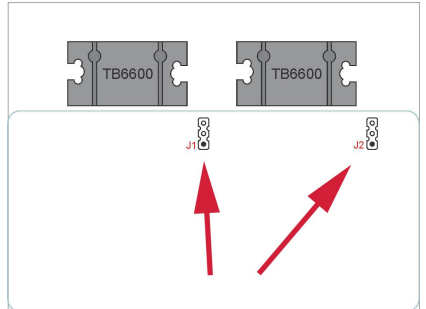


Additional note:

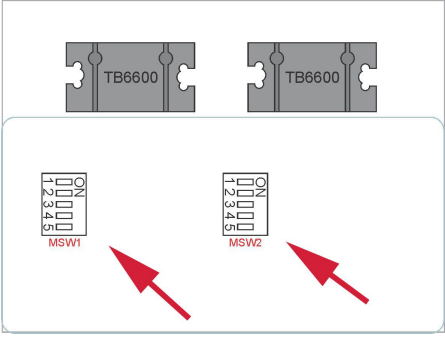
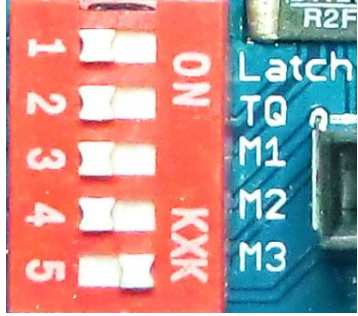
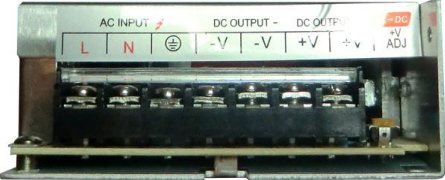

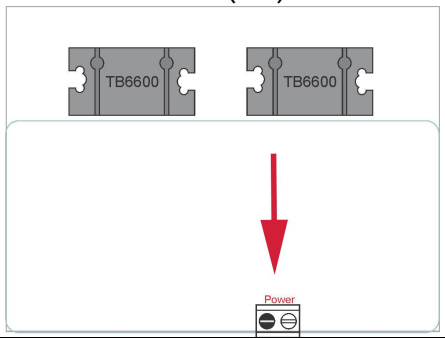
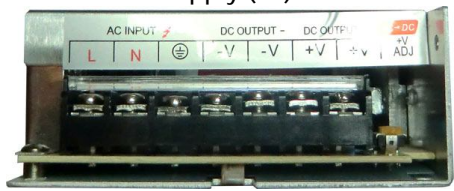
- When assembling the whole machine together, make sure you got all manuals of each part within reach and use common sense. In case you hesitate about something, start asking question at internet-fora. Loads of hobbyists went along the same path you do now.

Connect all together

Previous chapter shows what is needed. Below, perform all steps in chronologic order.

Step 1	Connect home-limit sensors	
<p>Atlas module (AM) : X/Y Limit</p> 	<p>X/Y Home Limit Sensor (HLS)</p> 	<p>For each X/Y Limit home sensor</p> <p>AM (G) → HLS (G) AM (S) → HLS (S) AM (E) → HLS (E)</p>
Step 2	Connect X-axis stepper motor	
<p>Atlas Module (AM) : X-motor</p> 	<p>X-Stepper motor (XSM)</p> 	<p>AM (Pin 1) → XSM (pin 1) AM (Pin 2) → XSM (pin 2) AM (Pin 3) → XSM (pin 3) AM (Pin 4) → XSM (pin 4)</p> 
Step 3	Connect Y-axis stepper motor	
<p>Atlas Module (AM) : Y-motor</p> 	<p>Y-Stepper motor (YSM)</p> 	<p>AM (Pin 1) → YSM (pin 1) AM (Pin 2) → YSM (pin 2) AM (Pin 3) → YSM (pin 3) AM (Pin 4) → YSM (pin 4)</p> 
Step 4	Connect LPS	
<p>Atlas Module (AM) : Laser OUT</p> 	<p>LPS : Signals</p> 	<p>AM (pin 1) → DSP (TL) AM (pin 2) → DSP (WP) AM (pin 3) → DSP (G) AM (pin 4) → DSP (IN)</p>

Step 5	Connect Laser control	
<p>Atlas Module (AM) : Laser</p> 	<p>DSP : Laser</p> 	<p>AM (pin 1) → DSP (GND) AM (pin 2) → DSP (TTL) AM (pin 3) → DSP (PWM)</p>
Step 6	Connect Stepper control	
<p>Atlas Module (AM) : Motor</p> 	<p>DSP - Steppermotor : X/Y</p> 	<p>AM (pin 1) → DSP (X PUL) AM (pin 2) → (DSP (X DIR) AM (pin 3) → (DSP (Y PUL) AM (pin 4) → (DSP (Y DIR)</p> <p>NOTE : Some DSPs use different coding for "step". Anywells uses PUL (pulse).</p>
Step 7	Connect Limit control	
<p>Atlas Module (AM) : Limit</p> 	<p>DSP : Limit</p> 	<p>AM (pin 1) → DSP (ELX-) AM (pin 2) → DSP (ELY-)</p>
Step 8	Select 5V powersource	
<p>Atlas module (AM) : 5V</p> 	<p>Details</p> 	<p>Set a jumper, for 5V-supply to TB6600.</p> <p>A) Pin 1 and pin 2 (onboard) B) Pin 2 and pin 3 (TB6600)</p>  <p>To be safe, set jumper over pin 1 and pin 2.</p>

Step 9		Select desired settings for steppermotors
<p>Atlas module (AM) : MSW1/2</p> 	<p>Details</p> 	<p>Default settings :</p> <p>Switch 1 : OFF (Latch) Switch 2 : OFF (Torque) Switch 3 : OFF (M1) Switch 4 : OFF (M2) Switch 5 : ON (M3)</p> <p>Note : When initial tests are OK, you can modify to desired settings.</p>
Step 10		Connect power to DSP
<p>Power Supply (PS) : V-/V+</p> 	<p>DSP : Power</p> 	<p>PS (V-) → DSP (GND) PS (V+) → DSP (24V)</p>
Step 11		Connect power to Atlas
<p>Atlas module (AM) : Power</p> 	<p>Power Supply (PS) : V-/V+</p> 	<p>AM (Gnd) → PS (V-) AM (Vcc) → PS (V+)</p> <p>Note : "V-" is Gnd "V+" is 24V</p>
Step 12		Almost ready
Power-up watercooler for lasertube	Check : No airbubbles in lasertube and constant waterflow.	
Power-up powersupply	Adjust settings in DSP i.e. for steps, max. speed, direction, HLS.	
Power-up LPS	Align laserbeam, check powersettings.	
Step 13		Connect computer to DSP
Use required cable for connection	For sending commands / jobs from computer to machine (DSP), a cable-connection is required i.e. USB, LPT, internet (RJ-45).	
Step 14		Install software
Install software	Several programs can control your machine. Mach3 and CorelDraw are well known for these jobs. Some require additional drivers for control.	
Step 15		-= Ready =-
Machine is ready	When everything works as planned, you can now start your laser engraving / cutting-jobs.	