Version : 2.0

Maintenance Manual

C 180 I &II

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Chapter 1：Overview

1.1 Introduction

This manual is prepared for distributors to maintain or repair C180/C180II. Briefly,

- Chapter 1 is the introduction of contents, safety and operating enviroment
- Chapter 2, we have diagrams to show the part number for every part in different sections.
- Chapter 3, introduction for electrical system
- Chapter 4, deals with the laser system for laser tube、beam & opitcal alignment.
- Chapter 5, an instruction to show you how to upgrade firmware
- Chapter 6, introduction to show you how to replace parts
- Chapter 7, trouble shooting & system diagnostics
- Chapter 8, basic maintenance
- Chapter 9, FAQ

Manual contents may be subject to change without notice. Please contact GCC Customer Service by calling at 886-2-2694-6687 or e-mailing to tech.support@gccworld.com for services.

1.2 Safety

1.2.1 The Safety Interlock System

The laser system is equipped with a safety interlock system utilizing magnetic sensors on the top and side access doors, laser-activation and door LED lights on the control panel. The magnetic sensors will deactivate the laser when either door is opened. At this time, the "door" LED light found on the control panel will illuminate, indicating an open or improperly closed door. When the laser is in operation, the "laser" LED will illuminate to inform the operator that the laser is activated. If at any time, any of the access doors are open and the "laser" LED is illuminated, IMMEDIATELY unplugs the laser system and contact GCC technical support for service instructions.

⚠ WARNING

- DO NOT operate the laser system if any component of the safety system is malfunctioning.
- DO NOT attempt to remove or modify any component of the safety interlock system.

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1.2.2 Product Label

This label is located at the right-back side of machine. All the product information such as Serial Number, Model Numbers, Laser Power and Electric power can be found here. Before requiring any tech support, always provide service person the information on this label.

1.2.3 Safety Measures

- **LASER RADIATION WARNING**: Exposure to laser radiation may result in physical burns and severe eye damage. Proper use and regular maintenance of this machine is important to the safety of all people in the immediate area.
- Prior to operation, carefully read and familiarize yourself with the warning labels located on both your laser system and in this manual.
- Never leave the machine unattended during the laser cutting and engraving process. The laser may ignite combustible materials. A well-maintained fire extinguisher and operational smoke or fire detector should be kept in the vicinity of the machine.
- **Caution—Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**
- GCC cannot be held responsible for any direct or indirect damages, which result from using or working with the products electric circuits or software described herein. The apparatus must be used only by trained and skilled personnel. Before using the machine, user should read and follow the manuals carefully. Furthermore GCC reserves the right to change or alter any product described herein without prior notice.
- Resulting debris from laser cutting are very dangerous and may cause fire hazard.
- **DO NOT** leave debris and scraps inside laser machine after job finished. Must keep machine clean after job finished.

WARNING

- Resulting debris from laser processing are very dangerous and may cause fire hazard
- DO NOT leave debris and scraps inside laser machine after job finished. Must keep machine clean after job finished.
- Always remove the vector grid or honeycomb table to clean any small pieces that have fallen through the grid.

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NOTE

SmartGUARD™ is an optional fire detection alarm system developed by GCC. Contact your local GCC authorized distributor for more details for having this safety option installed onto your system.

- Enable the SmartAIR™ nozzle when engraving or cutting materials that may easily ignite, such as acrylic, wood, or paper.
- Always wear safety goggles when the laser system is in operation. Reflective materials such as mirrors, enameled brass and anodized aluminum may partially-reflect some of the invisible laser radiation. Severe eye damage may occur if appropriate safety goggles are not worn.

NOTE

Each LaserPro laser machine is shipped with a single pair of safety goggles. If additional safety goggles are required, please contact GCC directly or an authorized GCC distributor. If you wish to purchase one on your own, please make sure the safety goggles meet these requirements:

- Connect the machine to a properly grounded power outlet. Ensure the voltage of the power source is identical to the voltage of the machine.
- Do not open the laser access panel when the machine is plugged in.
- Do not attempt to modify or disassemble the laser module.
- Do not attempt to remove or modify any component of the machine's laser interlock safety system.
- Ensure the immediate work area of the machine is well-ventilated. Odors, vapors, and dust are by products generated during the laser engraving and cutting process. An exhaust system, vacuum cutting box, and honeycomb table are recommended. Please contact GCC or your local GCC distributor for more information.
- Do not laser heat-sensitive surfaces or materials that may generate toxic fumes, such as PVC and Teflon
- Regularly clean and maintain your machine according to our cleaning and maintenance instructions. Doing so will ensure a machine that will operate effectively and safely over a long period of time.

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1.2.4 Operating Environment

Please follow the guidelines when considering a suitable location to set the LaserPro C180II. Improper work environments may lead to operational malfunction and/or unsafe working conditions. The LaserPro C180II should be placed and operated in a standard office-type environment.

- Avoid environments where the machine is exposed to high levels of dust, temperature (temperatures exceeding 30°C or 85°F) or humidity (humidity exceeding 70% or where the

  ambient temperature is near the dew point).
- Avoid small, enclosed areas with poor ventilation.
- Avoid areas with high levels of noise and electrical noise.
- Select a location that is large enough to accommodate the LaserPro C180II, an exhaust system, a computer and a work or storage table.
- Select a location in which the ambient temperature remains between 15°C and 30°C (60°F to 85°F).
- Select a location in which the relative humidity remains between 30% - 40%.
- Select a location in which there is a short, direct path to the fume exhaust system.
- Set the LaserPro C180II on a floor surface that is completely even.
- Make sure your smoke or fire detection system in the immediate area is functioning.
- Setup the machine to be at least 60 cm (2 feet) away from the wall.

NOTE
SmartGUARD™ is an optional fire detection alarm system developed by GCC. Contact your local GCC authorized distributor for more details for having this safety option installed onto your system.

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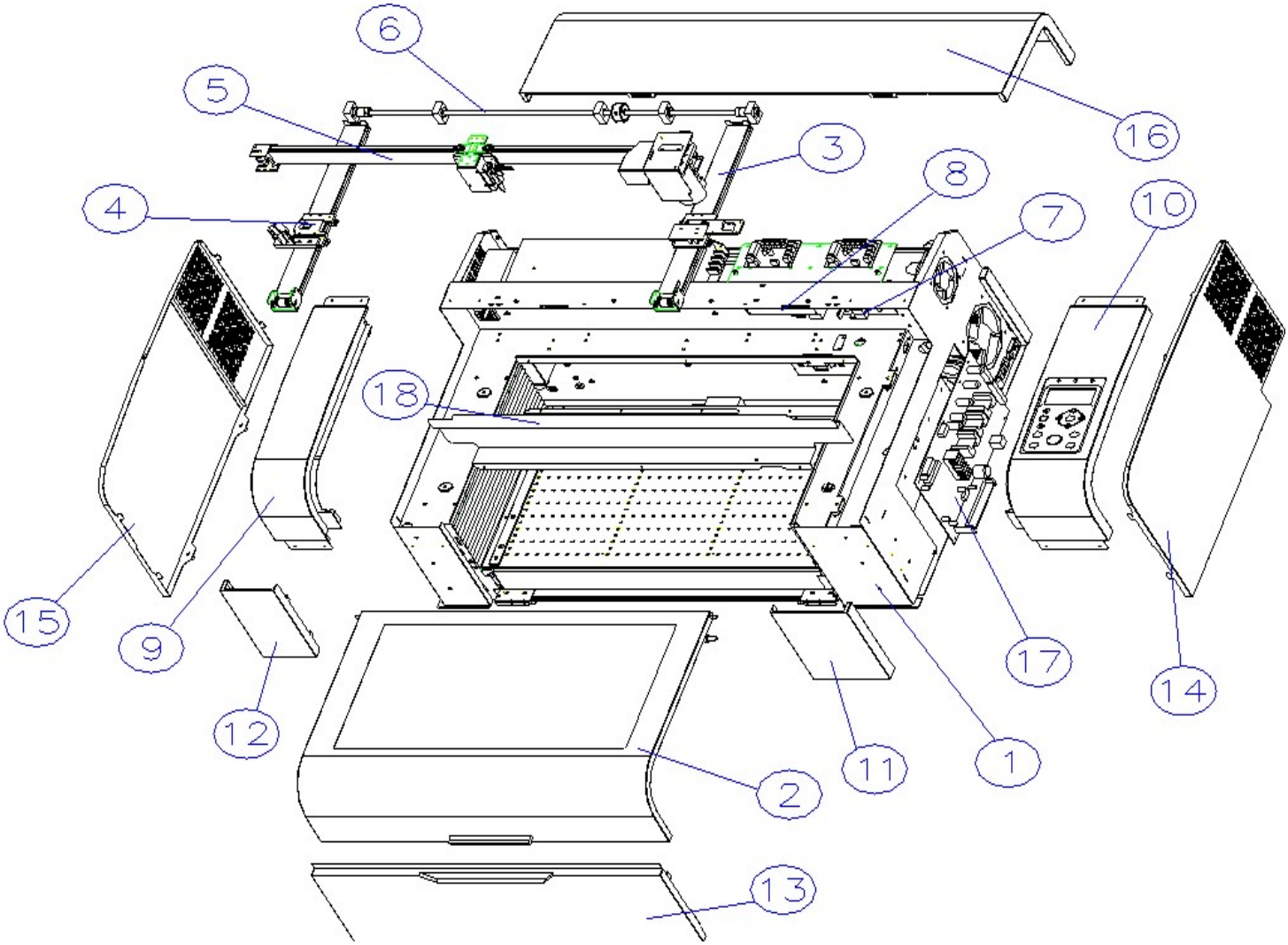
Chapter 2：Mechanical System

1-1. Overall for C180 I



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Overall - Parts List

No.	Part No.	Description
1	20200167G	Main unit Assembly - C180
2	29005132G	Top Cover asm. - C180
3	29004635G	Right Y-axis Assembly - C180
4	29004643G	Left Y-axis Assembly - C180
5	29004640G	X-axis Assembly - C180
6	29004642G	Y Transmit Shaft Assembly - C180
7	29004628G	C180Y-AXIS SET
8	23100013G	MOTOR 500COUNT(116-33224-8)
9	24402565G	COVER TOP-LEFT - C180
10	29005131G	Right Top Cover asm. - C180
11	24402562G	COVER FRONT-RIGHT - C180
12	24402561G	COVER FRONT-LEFT - C180
13	24402568G	DOOR FRONT - C180
14	24402564G	COVER RIGHT - C180
15	24402563G	COVER LEFT - C180
16	24402567G	COVER TOP-REAR - C180
17	29005390G	Mainboard for C180 with C180 firmware
18	24402546G	Motor Cover - C180

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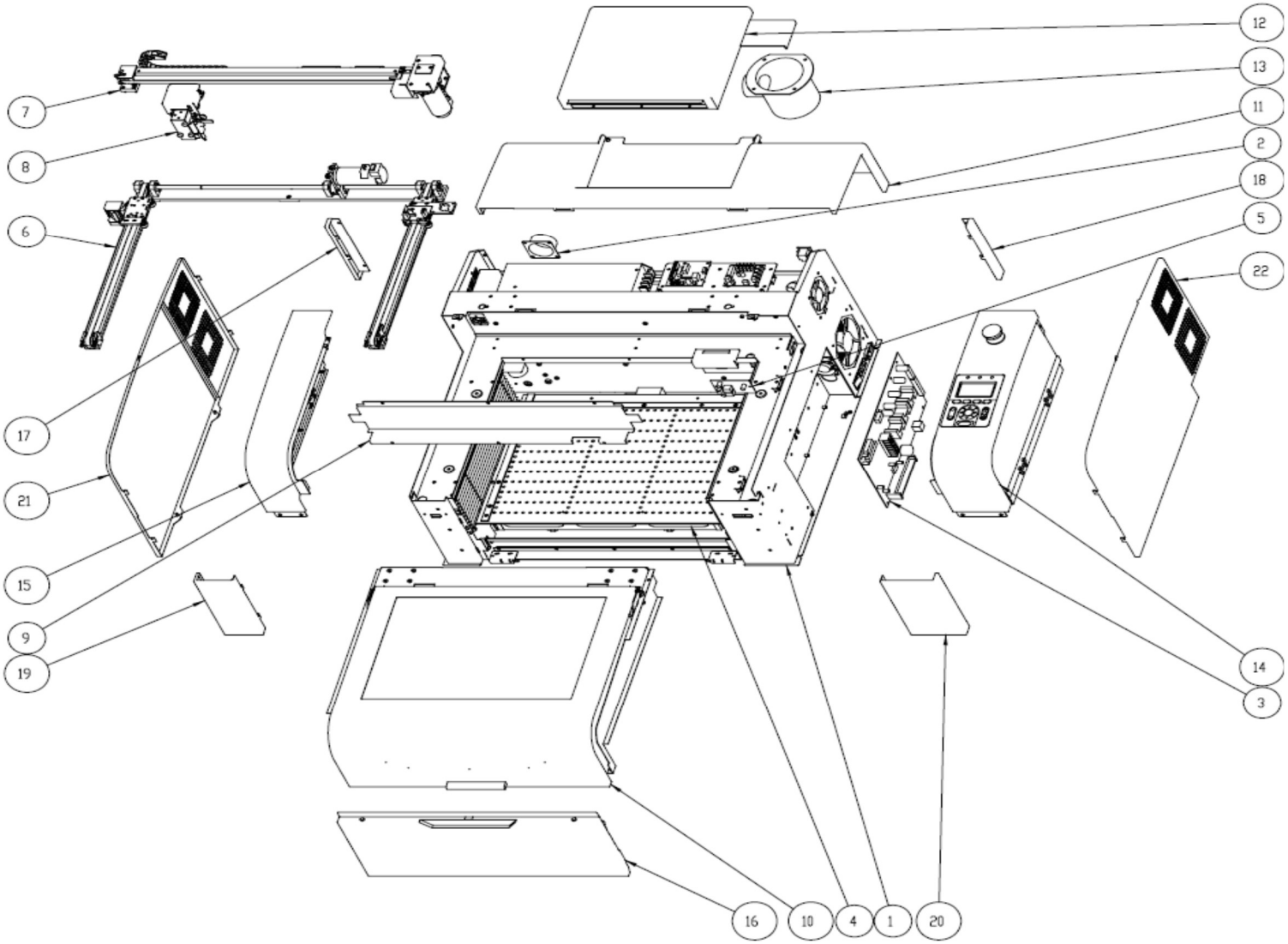
1-2. Overall for C180 II



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No.	Part No.	Description	QTY
1	202003180G	main unit Assembly	1
2	24402246G	2" Wind pipe base	1
3	290081230G	C180II mainboard with C180II firmware (5206E)	1
	290093780G	C180II 5272 Mainboard with driver board	
	290106250G	C180II 5272V2 Mainboard + driver board assembly From S/N R98001	1
4	290076270G	Z-axis Assembly	1
5	29004628G	C180 Y-AXIS PCB SET	1
6	290076290G	Y-axis Assembly	1
7	290076240G	X-axis Assembly	1
8	290076230G	Lens carriage Assembly	1
9	244045690G	Motor Cover	1
10	290076160G	Top Cover asm.	1
11	244045630G	COVER TOP-REAR	1
12	244046020G	Rear guide duct	1
13	244045980G	Duct tap seat	1
14	290076110G	Right Top Cover asm.	1
15	244045650G	COVER TOP-LEFT	1
16	244045780G	DOOR FRONT	1
17	24402684G	Cover rear - left	1
18	24402685G	Cover rear - right	1
19	24402561G	COVER FRONT-LEFT	1
20	24402562G	COVER FRONT-RIGHT	1
21	244045590G	COVER LEFT	1
22	244045600G	COVER RIGHT	1

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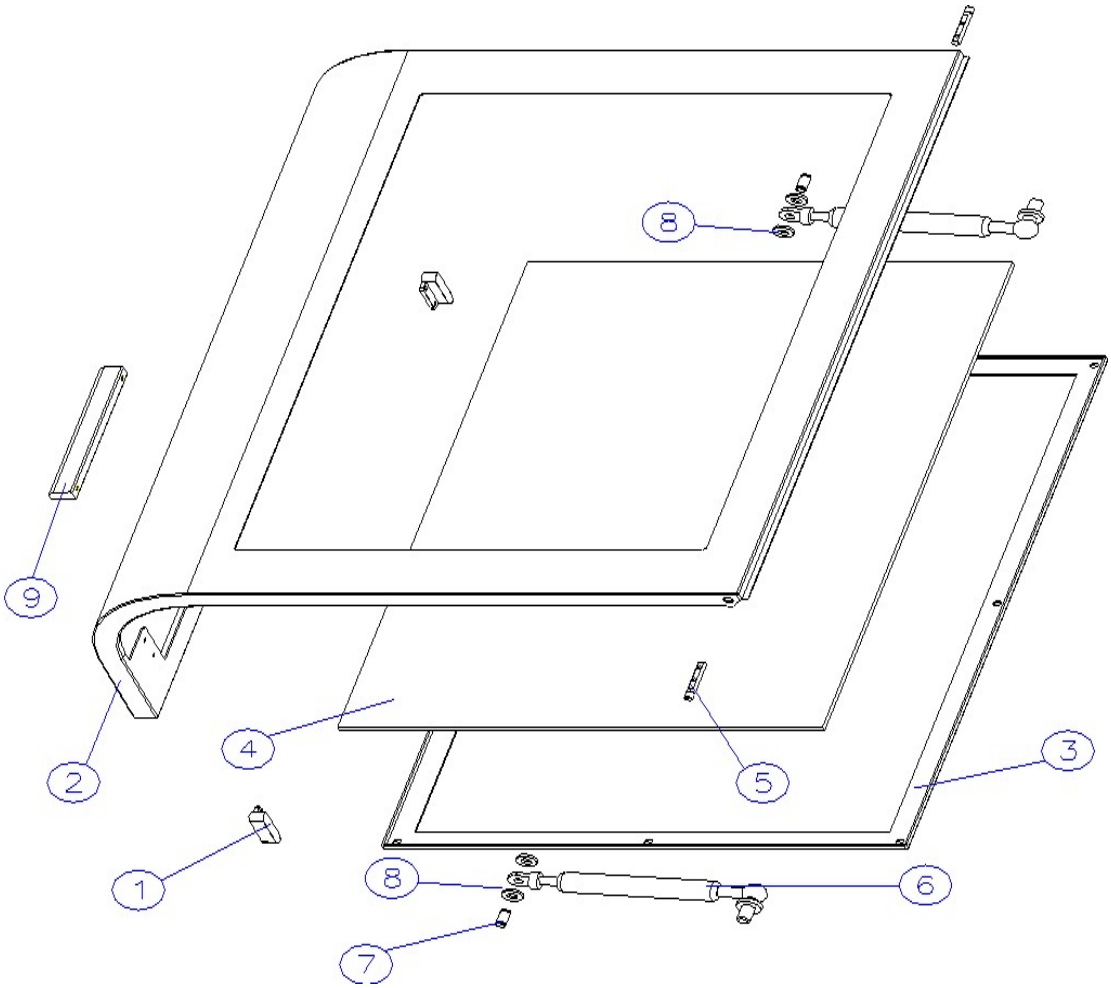
2-1. Top Cover for C180 I



Top Cover – Parts List

No.	Part No.	Description
1	22000045G	Magnet MC-12
2	24402686G	Door upper - C180
3	24402687G	Frame window - C180
4	22802382G	Window - C180
5	22802304G	SHAFT 1 - C180
6	23300887G	cylinder - C180
7	22802381G	Shaft 3 - C180
8	23300928G	Spacer (WS1276420B) - C180
9	23300956G	Handle (LG-02.105.01) - C180

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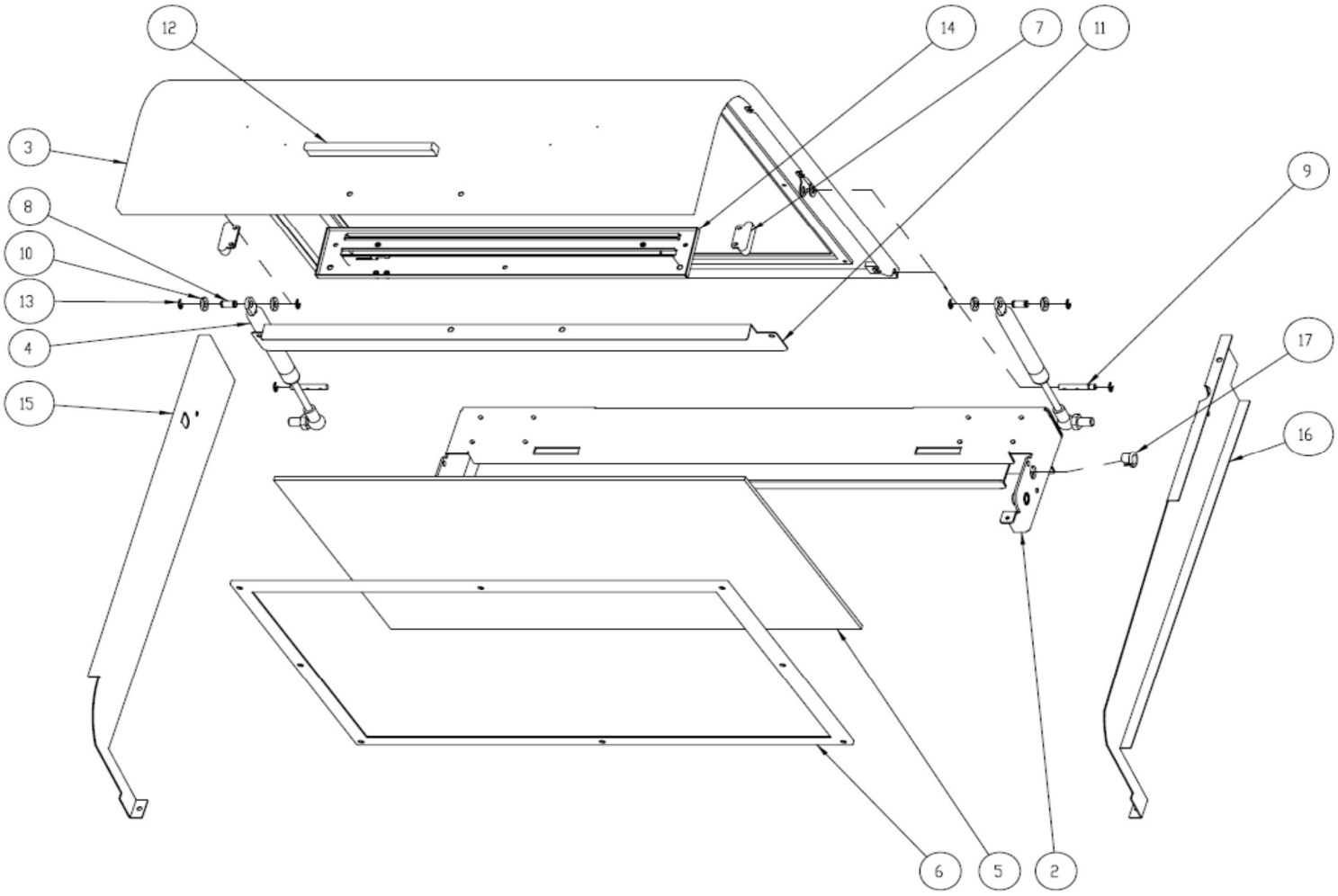
2-2. Top Cover for C180 II



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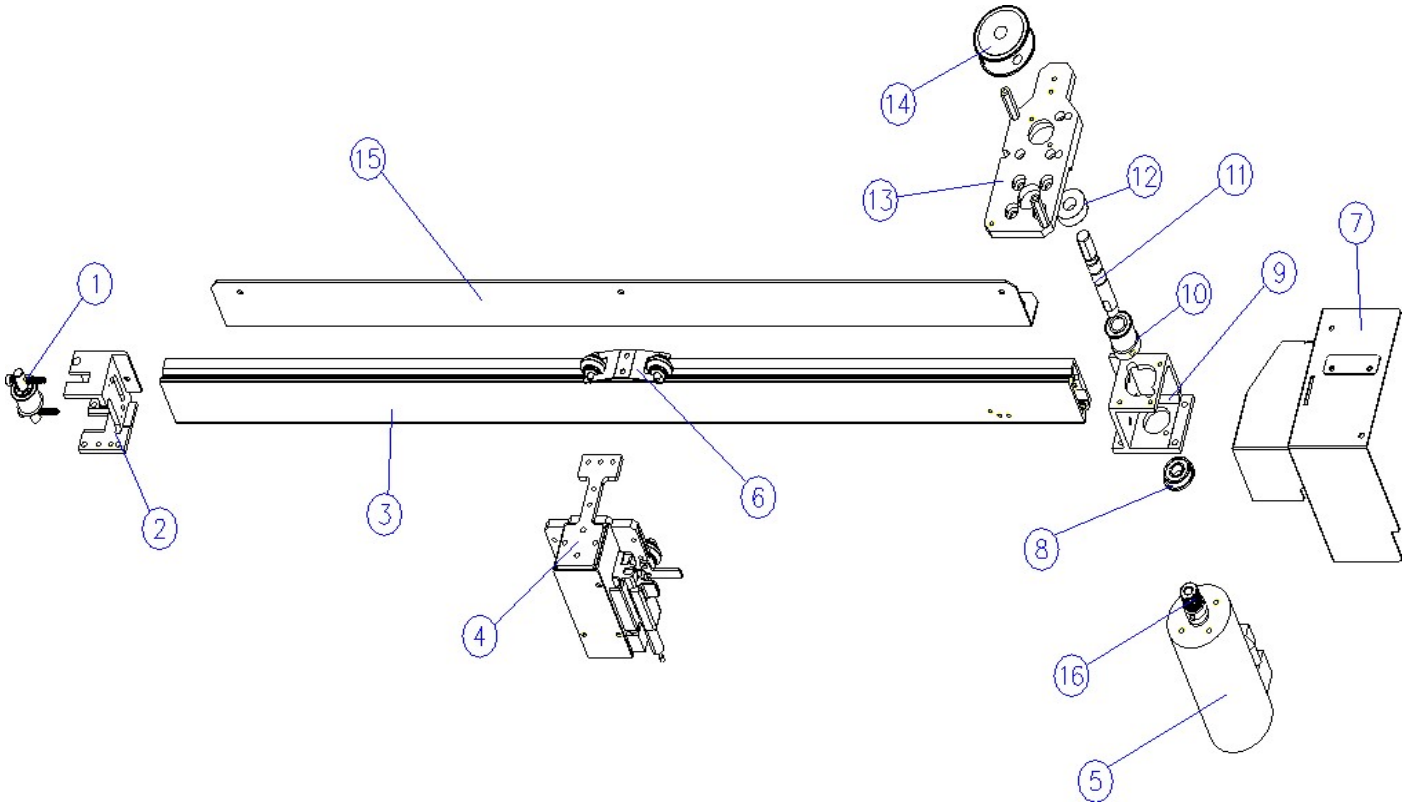
Top Cover – Parts List

No.	Part No.	Description	QTY
1	290076160G	Top Cover asm.	1
2	244045640G	Door upper bracket	1
3	244045610G	Door upper	1
4	23301090G	cylinder (14.5kg)	2
5	228032130G	Window	1
6	24402687G	Frame window	1
7	25700015G	Magnetic Switch	2
8	22802381G	Shaft 3	2
9	22802304G	SHAFT 1	2
10	23300928G	Spacer (WS1276420B)	4
11	244045990G	air intake guides	1
12	23300956G	handle (LG-02.105.01)	1
13	24900004G	E-shape retaining ring.d4*D9*t 0.6	6
14	290076340G	LED Light Set	1
15	244045670G	Left partition	1
16	244045680G	Right partition	1
17	23301151G	SNAP BUSHING (0813C)	1

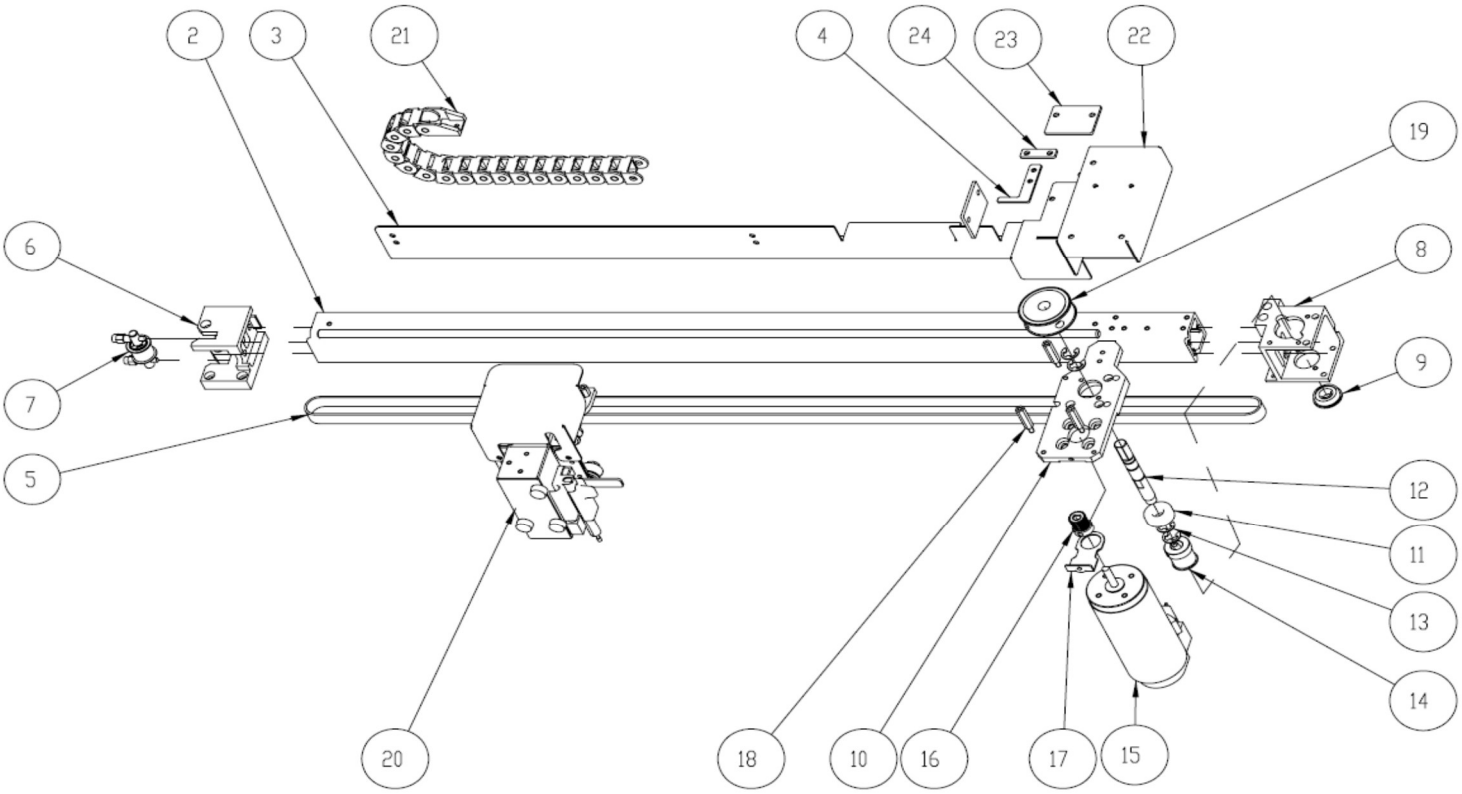
3-1. X-axis assembly for C180 I



X-axis assembly – Parts List

No.	Part No.	Description
1	29005135G	Tension idle pulley asm. - C180
2	22802044G	belt tuning bracket - C180
3	22801994G	X Bearing track - C180
4	29004654G	Lens Carriage Assembly - C180
5	23100048G	Hansen (X16-32624-8)500CPR Motor - C180
6	29004655G	A Wheel Assembly - C180
7	24402790G	Prevention Cover - C180
8	20700037G	bearing (F697FZZ)
9	22802646G	X axis transmission wheel set - C180
10	22802060G	X Axis pulley - C180
11	22802068G	transmit shaft x axis - C180
12	20700052G	Bearing (698ZZ)
13	22802040G	X-motor bracket - C180
14	22802062G	Y axis transmit pulley - C180
15	24402266G	X axis Tube Chain Holder - C180
16	21700009G	Motor pulley 2GT-P18

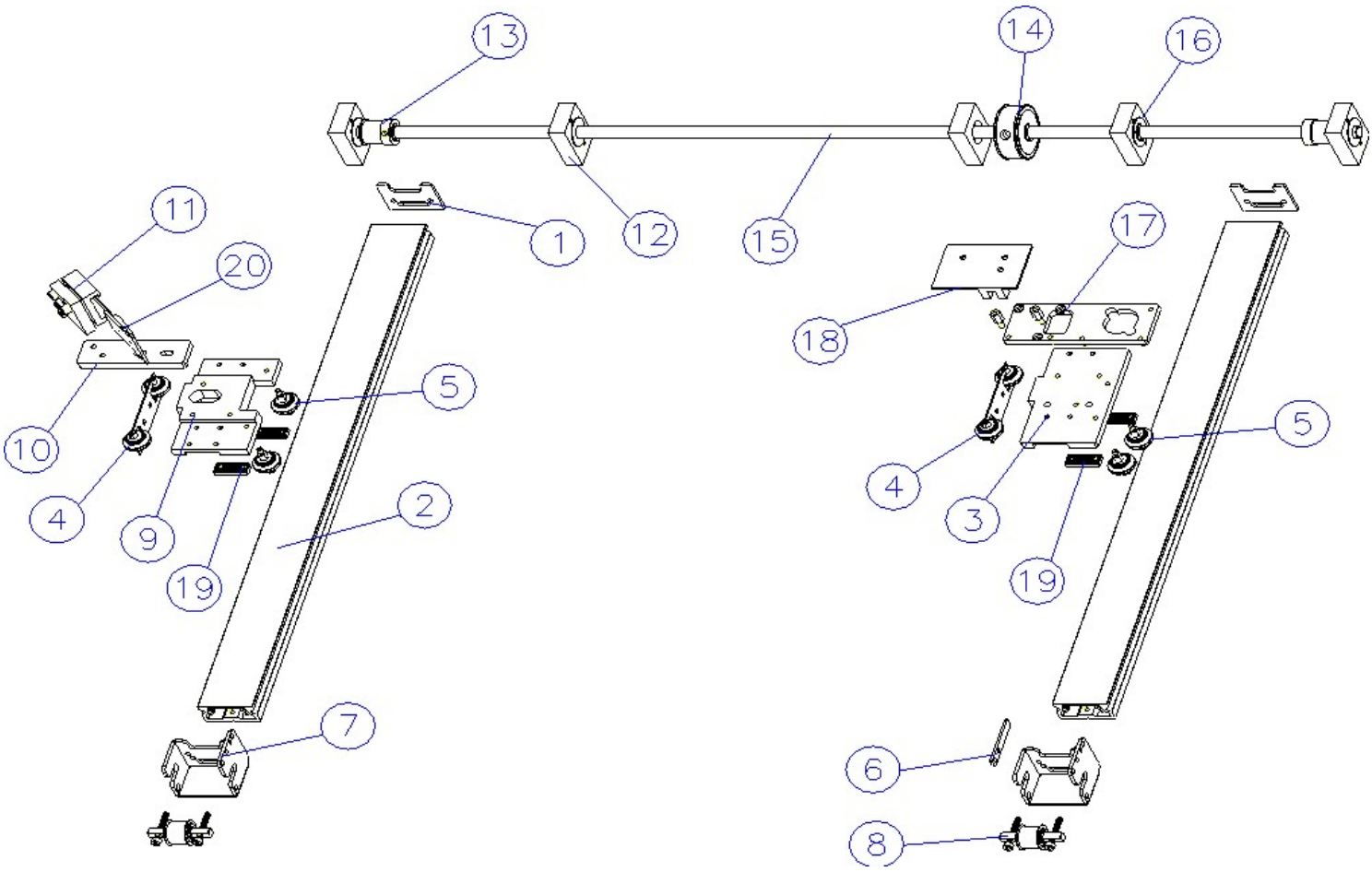
3-2. X-axis assembly for C180 II



X-Axis Assembly - Parts List

No.	Part No.	Description	QTY
1	290076240G	X-axis Assembly	1
2	228034800G	x axis slideway	1
3	244046010G	X axis Tube Chain Holder	1
4	24400997G	Stopper board	1
5	206001920G	X axis belt(2GT-1296-10)	1
6	228034810G	Tension pulley shaft	1
7	290076280G	Tension idle pulley asm.	1
8	228034780G	X axis transmission wheel set	1
9	20700037G	Bearing (F697ZZ)	1
10	228034770G	X-motor bracket	1
11	20700052G	Bearing (698ZZ)	1
12	228034790G	transmit shaft x axis	1
13	24900005G	E-shape retaining ring(D12*d6*t0.8)	4
14	22802060G	X Axis pulley	1
15	23100013G	MOTOR 500COUNT(116-33224-8)	1
16	21700009G	Motor pulley 2GT-P18	1
17	244045570G	Adjusting Bracket	1
18	23300620G	Hex Screw M3.0*20mm	3
19	22802062G	Y axis transmit pulley	1
20	290076230G	Lens carriage Assembly	1
21	233014490G	X Cable Chain (045.10.028-26L-045.10.12 total 28 links)	1
22	244046000G	Dust cover	1
23	29005215G	Magnetic Switch Washer	2
24	29005770G	Plate	1

4-1. Y-axis assembly for C180 I



Y-axis Assembly – Parts List

No.	Part No.	Description
1	24402267G	Y axis position block - C180
2	22801995G	Y Bearing track - C180
3	22802057G	Right base board - C180
4	29005358G	Y axis Wheel Assembly - C180
5	29004638G	Fixed Wheel Assembly - C180
6	29005214G	Y axis detector - C180
7	24402265G	belt tuning bracket - C180
8	29005135G	Tension idle pulley asm. - C180
9	22802056G	Left base board - C180
10	22802100G	M2 bracket - C180
11	20200185G	prism mounts Assembly
12	22802009G	Y axis Bearing supprt - C180
13	22802060G	X Axis pulley - C180
14	22802062G	Y axis transmit pulley - C180
15	22802061G	Y axis transmit shaft - C180
16	20700052G	Bearing (698ZZ)
17	22802059G	Right connect board - C180
18	29004513G	X-Motor PCB - C180
19	22802004G	belt retainer - C180
20	29002522G	Mirror Assembly

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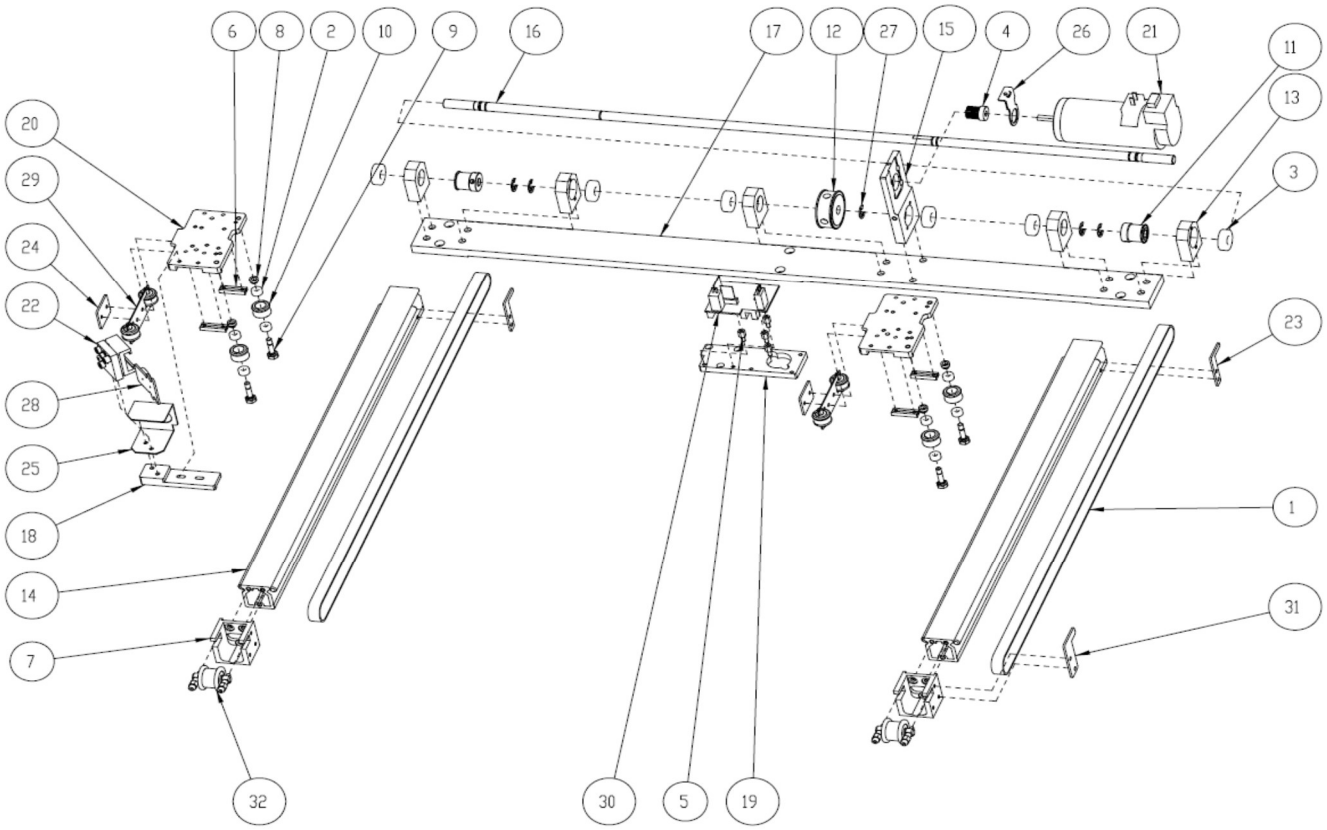
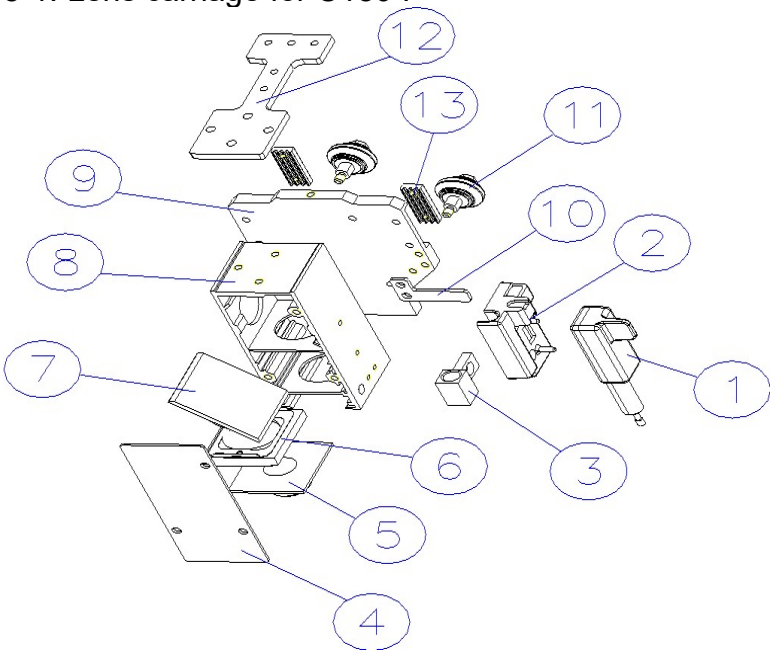
4-2. Y-axis assembly for C180 II



Y-axis Assembly – Parts List

No.	Part No.	Description	QTY
1	206001930G	Y axis belt(2GT-902-10)	2
2	20700038G	Description	8
3	20700052G	Bearing (698ZZ)	6
4	21700009G	Description	1
5	22000094G	Hex Screw M3*6	4
6	22800917G	Description	4
7	22800928G	Tension pulley shaft	2
8	22800951G	Description	4
9	22800952G	4*11 small roller screw	4
10	22801859G	Description	4
11	22802060G	X Axis pulley	2
12	22802062G	Description	1
13	22802835G	Y axis Bearing support	5
14	228034700G	Description	2
15	228034710G	X-motor bracket	1
16	228034730G	Description	1
17	228034740G	Y driveshaft base	1
18	228034750G	Description	1
19	228034760G	Right connect board	1
20	228034830G	Description	2
21	23100013G	MOTOR 500COUNT(116-33224-8)	1
22	23300098G	Description	1
23	24400997G	Stopper board	2
24	24401001G	Description	2
25	24403255G	M3 Dust Cover	1
26	244045570G	Description	1
27	24900007G	E-shape retaining ring.d6*D12*t0.8	6
28	29002522G	Description	1
29	29004278G	Wheel spring Assembly(J)	2
30	29004513G	Description	1
31	290076260G	Y axis detector	1
32	290078110G	Description	2

5-1. Lens carriage for C180 I



Lens Carriage – Parts List

No.	Part No.	Description
1	29002547G	Auto focus pin Assembly.
2	29002546G	Auto focus seat Assembly.
3	22800955G	carriage airflow valve-Spirit
4	22802084G	Lens carriage front shingle - C180
5	22802117G	air nozzle - C180
6	29004737G	2.0" Focal lens Assembly - C180 & Spirit GX
7	29004736G	Carriage Reflector Hold - C180 & Spirit GX
8	22801996G	Lens carriage Assembly-V2 - C180
9	22801999G	Lens carriage base - C180
10	29005213G	X axis detector - C180
11	29004638G	Fixed Wheel Assembly - C180
12	24402273G	X axis transmit shaft bracket - C180
13	22802004G	belt retainer - C180

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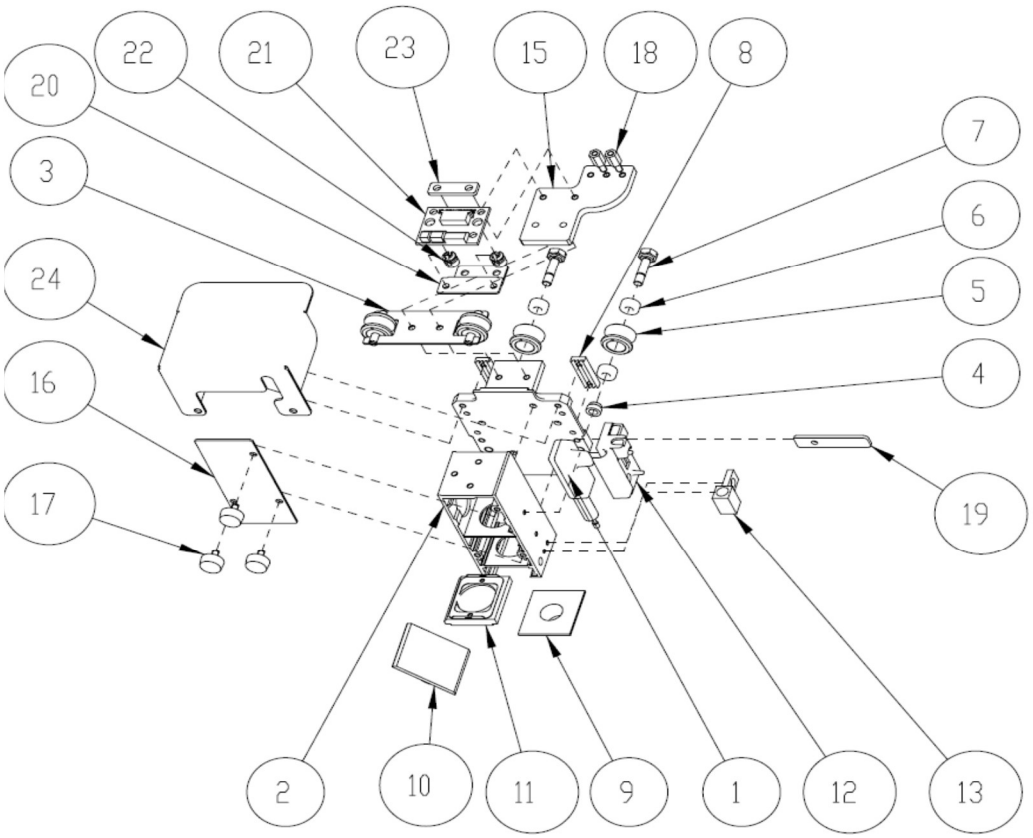
5-2. Lens carriage for C180 II



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Lens Carrage – Parts List

No.	Part No.	Description	QTY
1	22802972G	Lens carriage base	1
2	22801996G	Lens carriage Assembly-V2	1
3	29004278G	Wheel spring Assembly(J)	1
4	22800951G	4*4.5 interval pillar	2
5	22801859G	4*9 unilateral Wheel(J)	1
6	20700038G	Bearing 684ZZ.	2
7	22800952G	4*11 small roller screw	2
8	22800917G	belt retainer	2
9	22802117G	air nozzle	1
10	29004736G	Carriage Reflector Hold	1
11	29004737G	2.0" Focal lens Assembly	1
12	29002546G	Auto focus seat Assembly.	1
13	22800955G	carriage airflow valve	1
14	29006010G	Auto focus pin Assembly.	1
15	228034820G	Lens carriage assist base	1
16	22802084G	Lens carriage front shingle	1
17	23300298G	Hand Knobs(CRKB.M3-6L)	3
18	22000039G	Hex Screw M3X8L	2
19	290076250G	X axis detector	1
20	244045750G	translation board spacer	1
21	29005108G	AAS I terminal board Module - Spirit	1
22	22000363G	PC SPACER SUPPORT(SS-3)	2
23	29005770G	Plate	1
24	244045970G	Lens carriage top shingle	1

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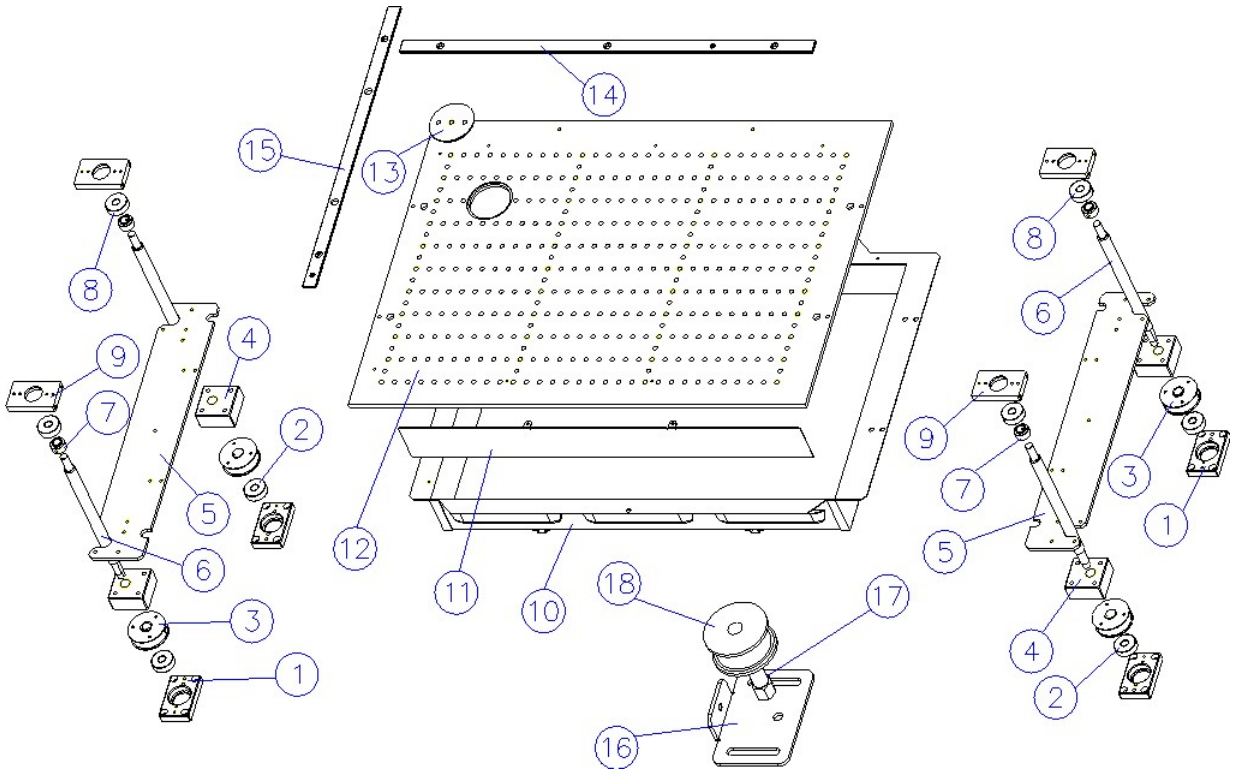
6-1. Z-platform for C180 I



Z-platform – Parts List

No.	Part No.	Description
1	22801998G	Bearing seat - C180
2	20700034G	Bearing 628ZZ
3	29002551G	Z-axis pulley Assembly.
4	22802008G	Z axis screw thread - C180
5	24402201G	Working table Bracket - C180
6	22801997G	Z-Axis Table Screw - C180
7	22800922G	Z axis top stopper
8	20700034G	Bearing 628ZZ
9	22802299G	top Bearing seat - C180
10	24402200G	Dust box. - C180
11	24402688G	Block Plate - C180
12	22802007G	Z axis Platform - C180
13	22802085G	Engraving Table s Hold Plug. - C180
14	22802022G	X Ruler - C180
15	22802023G	Y Ruler - C180
16	24402269G	Z axis belt tuning bracket - C180
17	22802003G	Core of Z-axis pulley - C180
18	22800084G	idle Pulley

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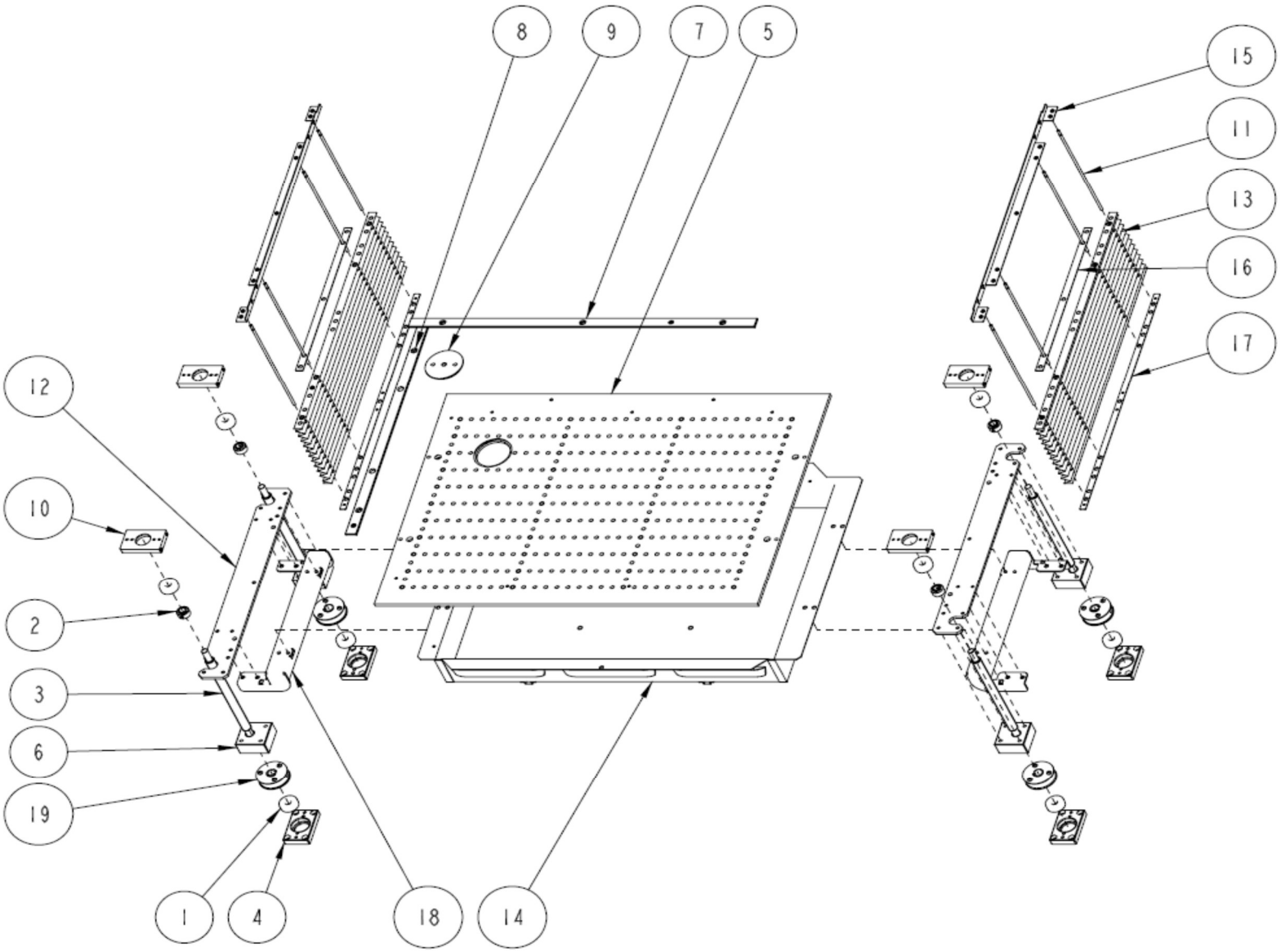
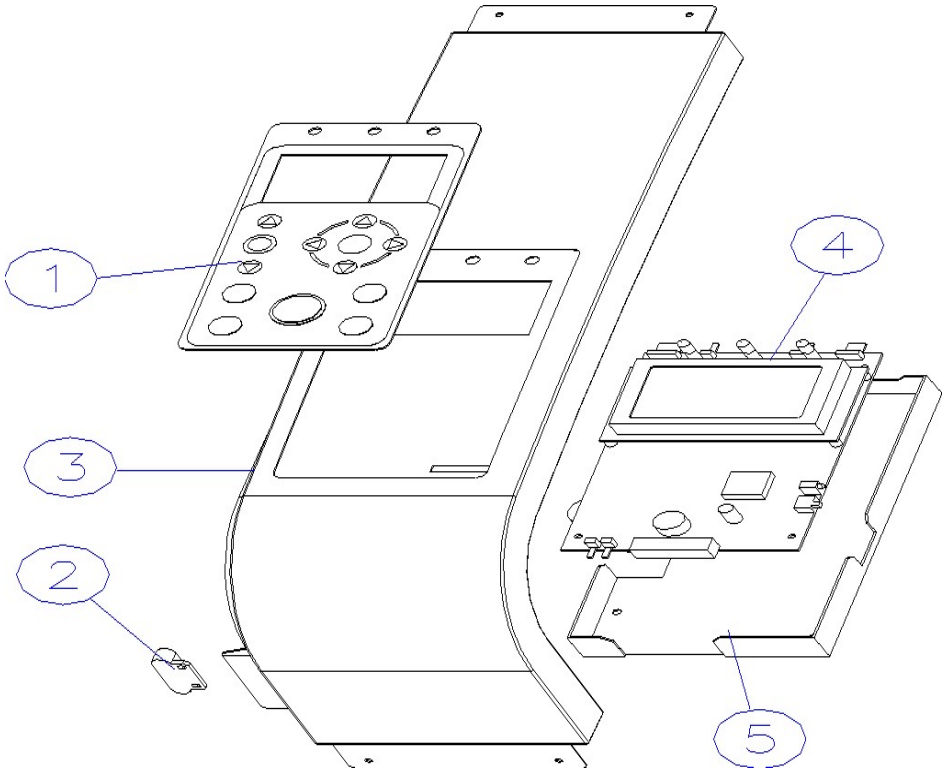
6-2. Z-platform for C180 II



Z-platform – Parts List

No.	Part No.	Description	QTY
1	20700034G	Bearing 628ZZ	8
2	22800922G	Z axis top stopper	4
3	22801997G	Z-Axis Table Screw	4
4	22801998G	Bearing seat	4
5	22802007G	Z axis Platform	1
6	22802008G	Z axis screw thread	4
7	22802022G	X Ruler	1
8	22802023G	Y Ruler	1
9	22802085G	Engraving Table s Hold Plug	1
10	22802299G	top Bearing seat	4
11	22802884G	sides block the bits press board	8
12	228034720G	Working table Bracket	2
13	24100569G	sides block the bits board	2
14	24402200G	Dust box.	1
15	24403497G	Keeps off filings Daoban	2
16	24403498G	Daoban clamp	2
17	24403512G	sides block the bits press board	2
18	244045580G	Working table Bracket	2
19	29002551G	Z-axis pulley Assembly.	4

7-1. Control Panel for C180 I



Control Panel – Parts List

No.	Part No.	Description
1	23400025G	C180 Control Panel - C180
2	25700015G	Magnic Switch
3	24402566G	COVER TOP-RIGHT - C180
4	290068470G	Control panel assembly (C180)
5	24402625G	CP COVER - C180

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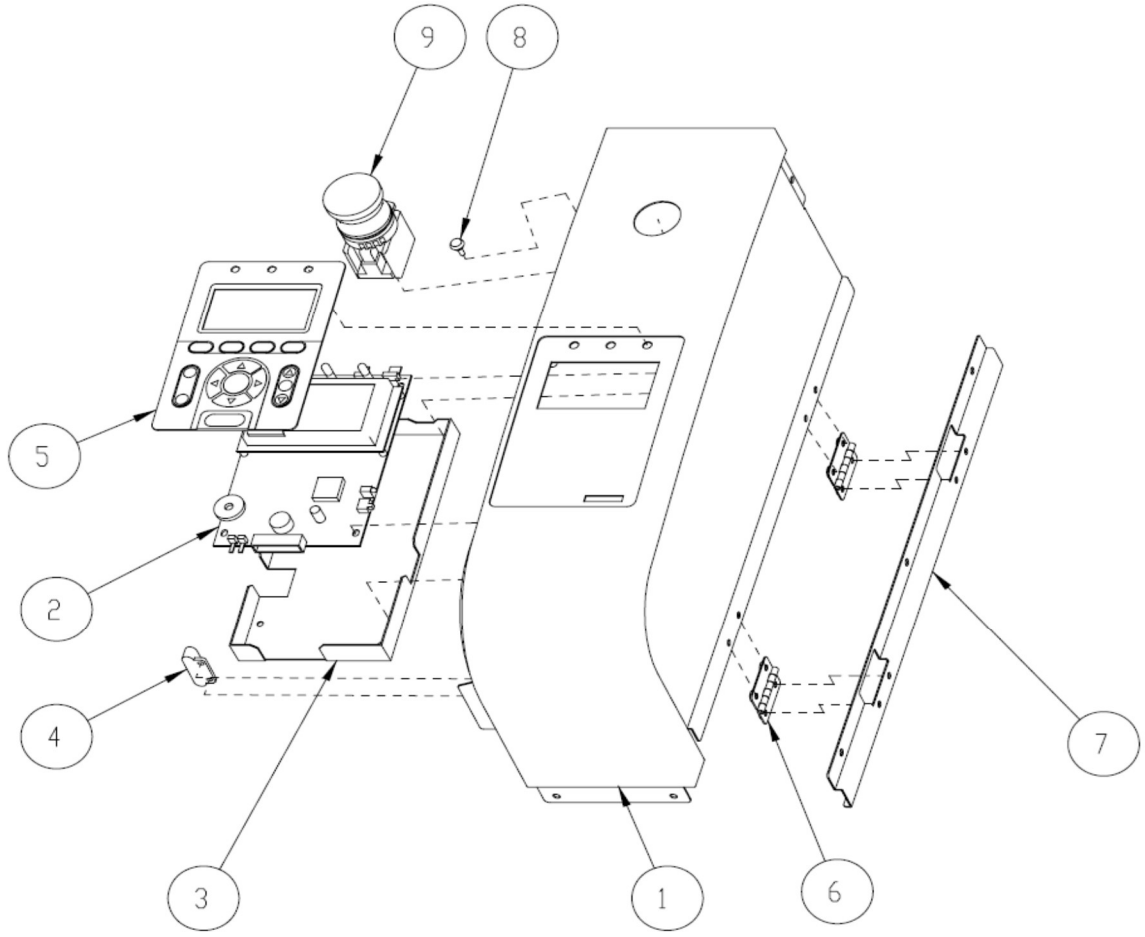
7-2. Control Panel for C180 II



Control Panel – Parts List

No.	Part No.	Description	QTY
1	244045660G	COVER TOP-RIGHT	1
2	290068430G	Control Panel Without Remote Function Set	1
3	24402625G	CP COVER	1
4	25700015G	Magnetic Switch	1
5	23400020G	Control panel sticker.	1
6	24400991G	plank hinge	2
7	244045620G	translation board	1
8	26500210G	Rubber Foot TNF-1	1
9	25700095G	Emergency Switch (TN3BKR-2B)	1

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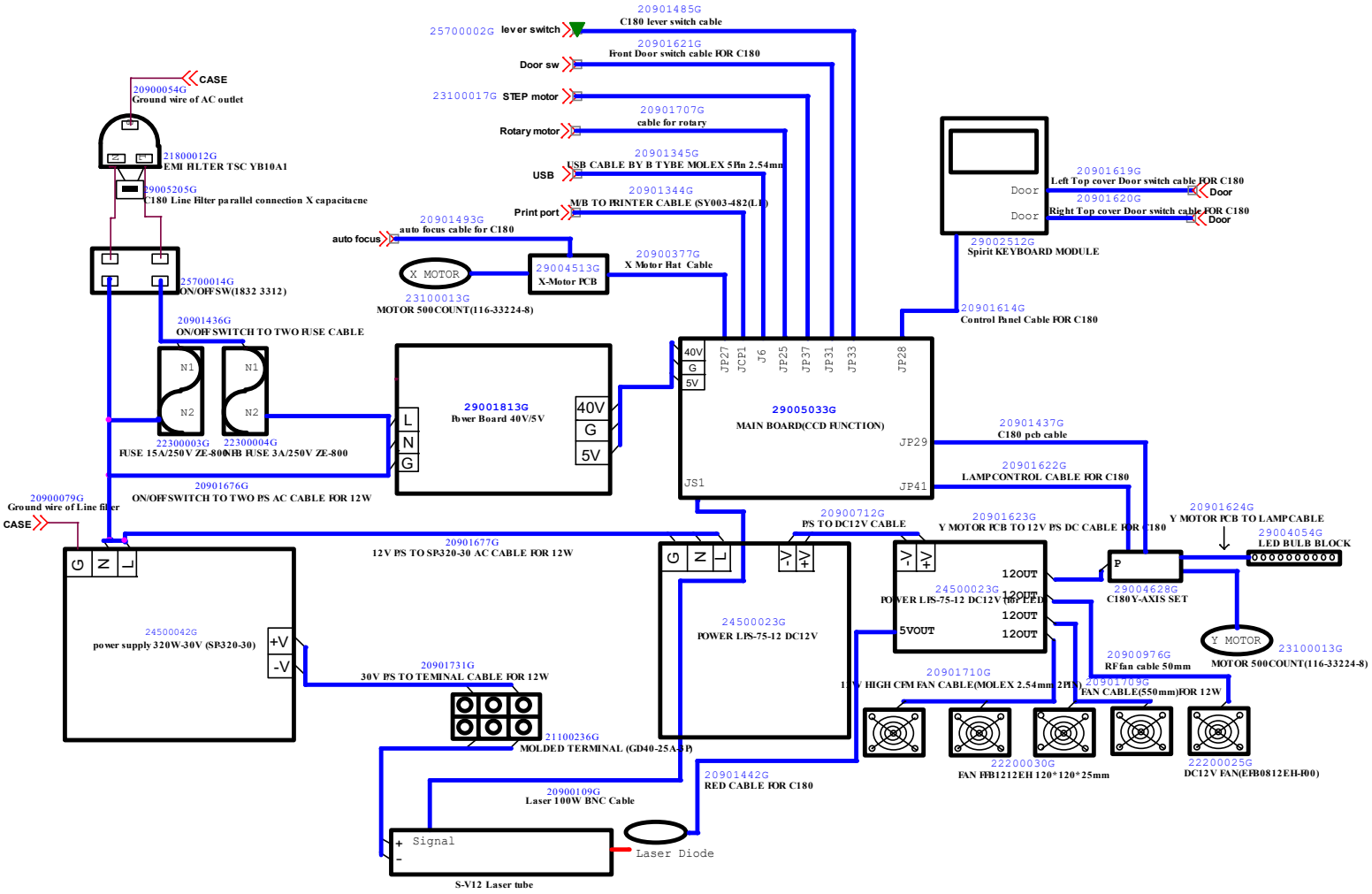
Chapter 3 Electrical System

3.1 Diagram for C180 (5206e M/B)

- **12W**



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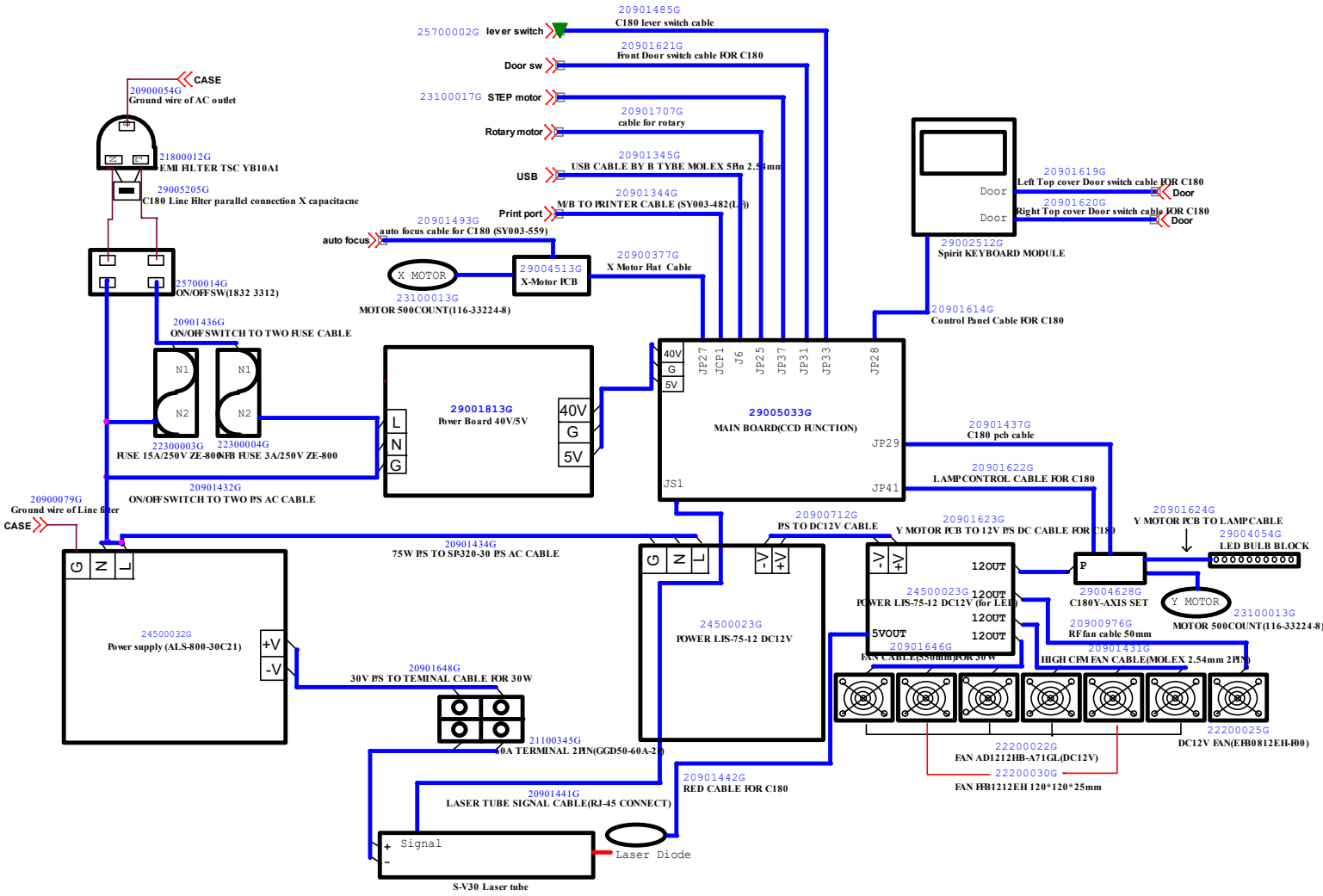
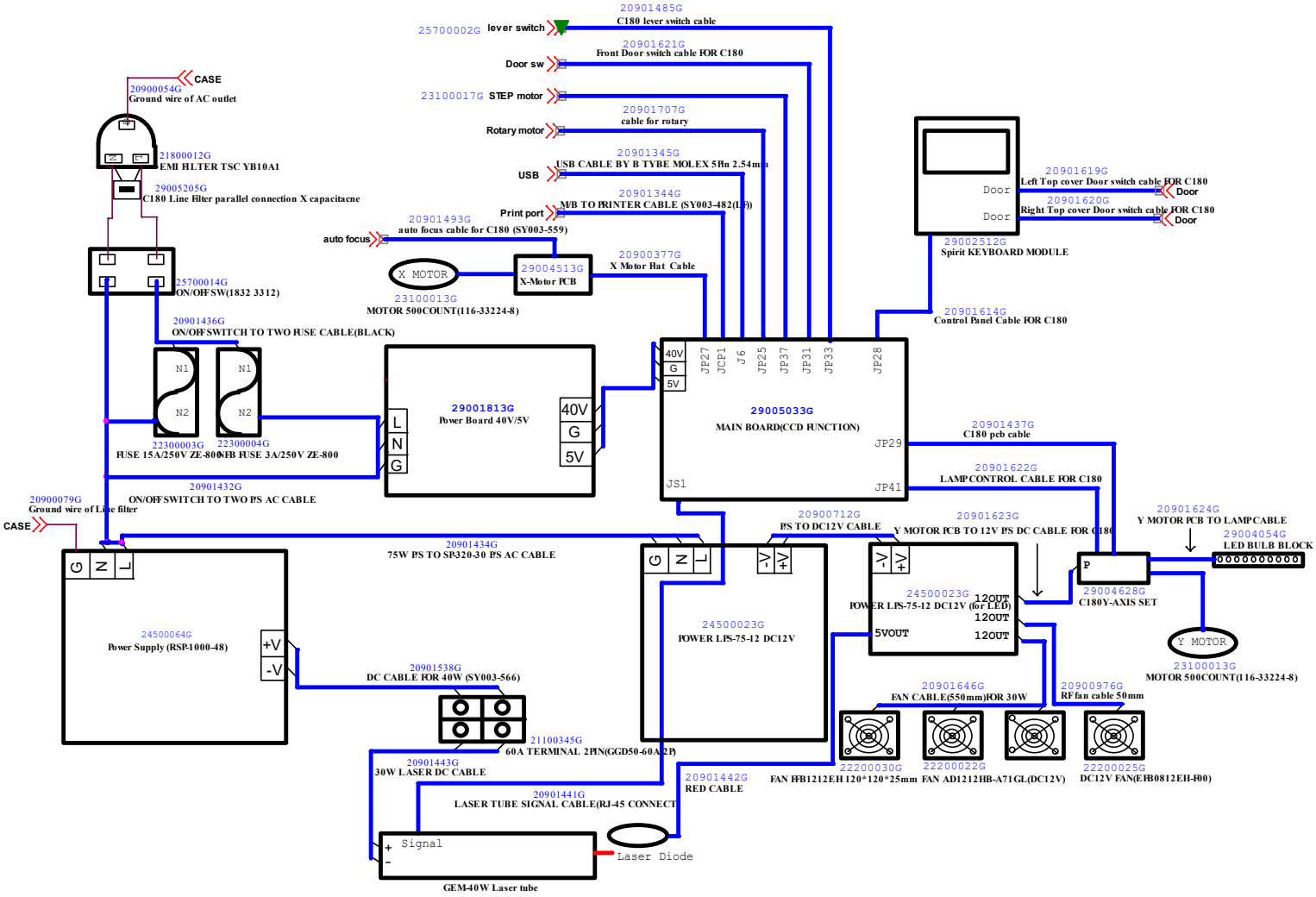
Version : 2.0

- **30W**



- **40W**



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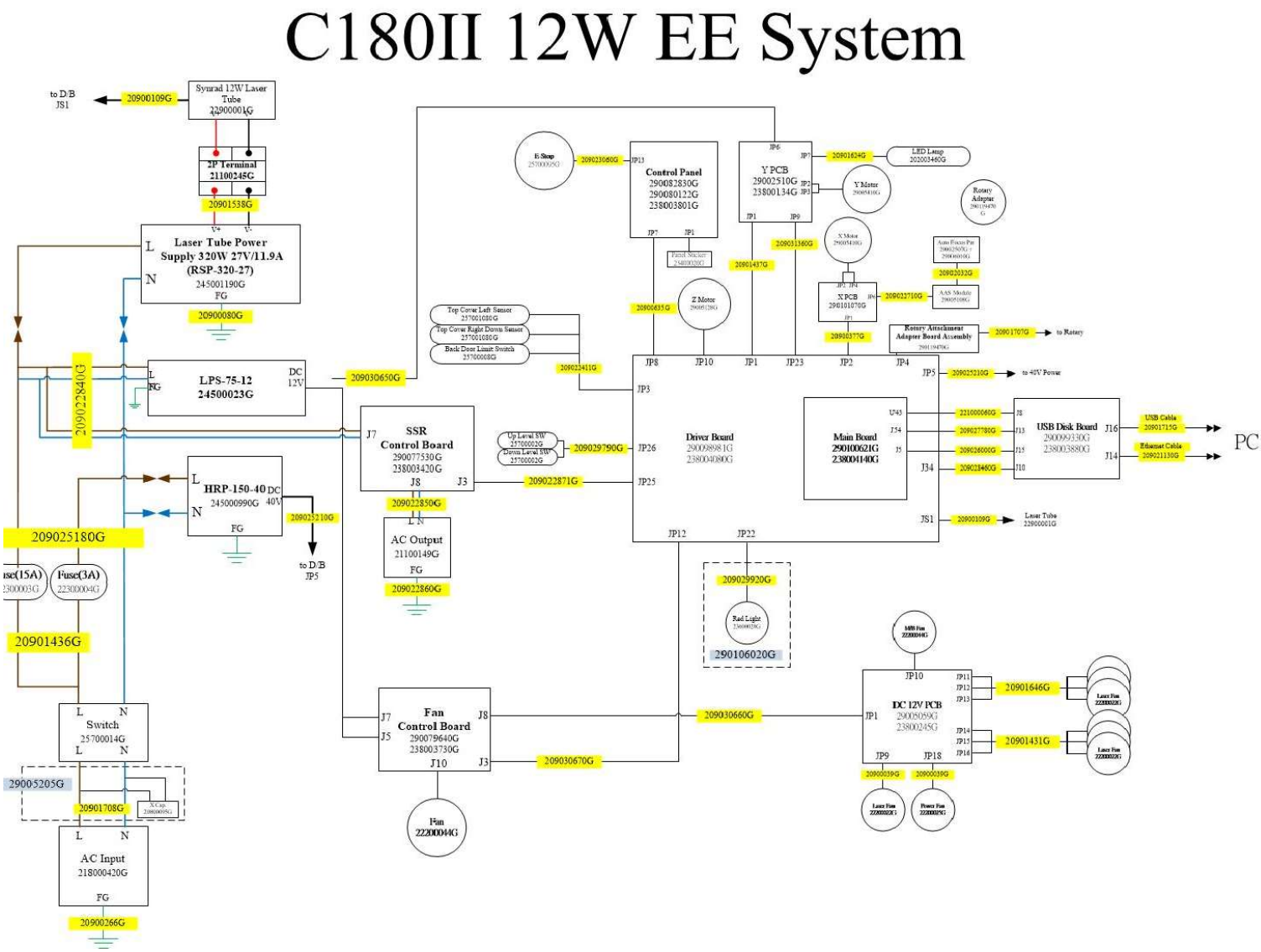
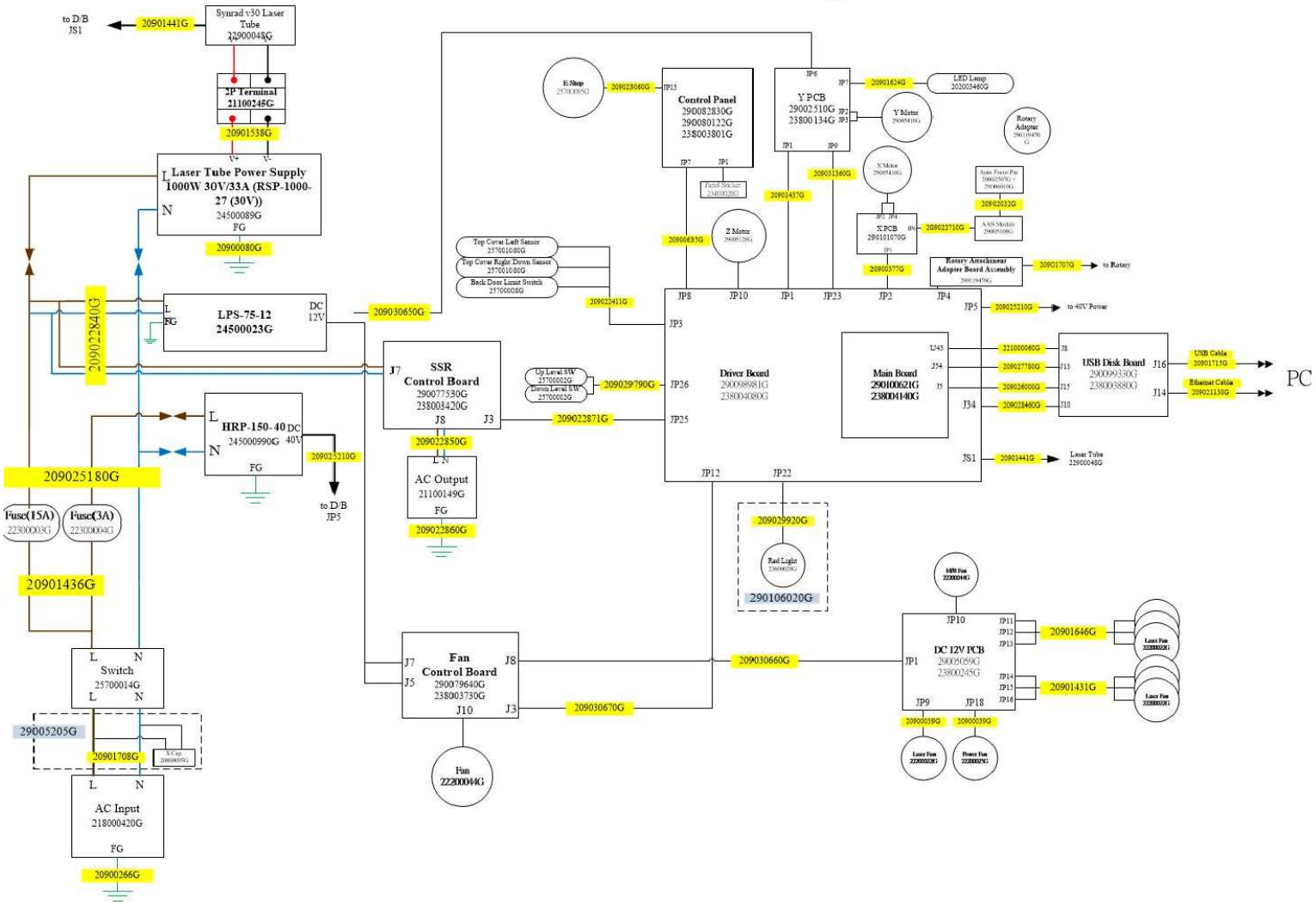
3.2 Diagram for C180 II (5272 V3 M/B)

- **12W**



- **30W**

C180II 30V EE System



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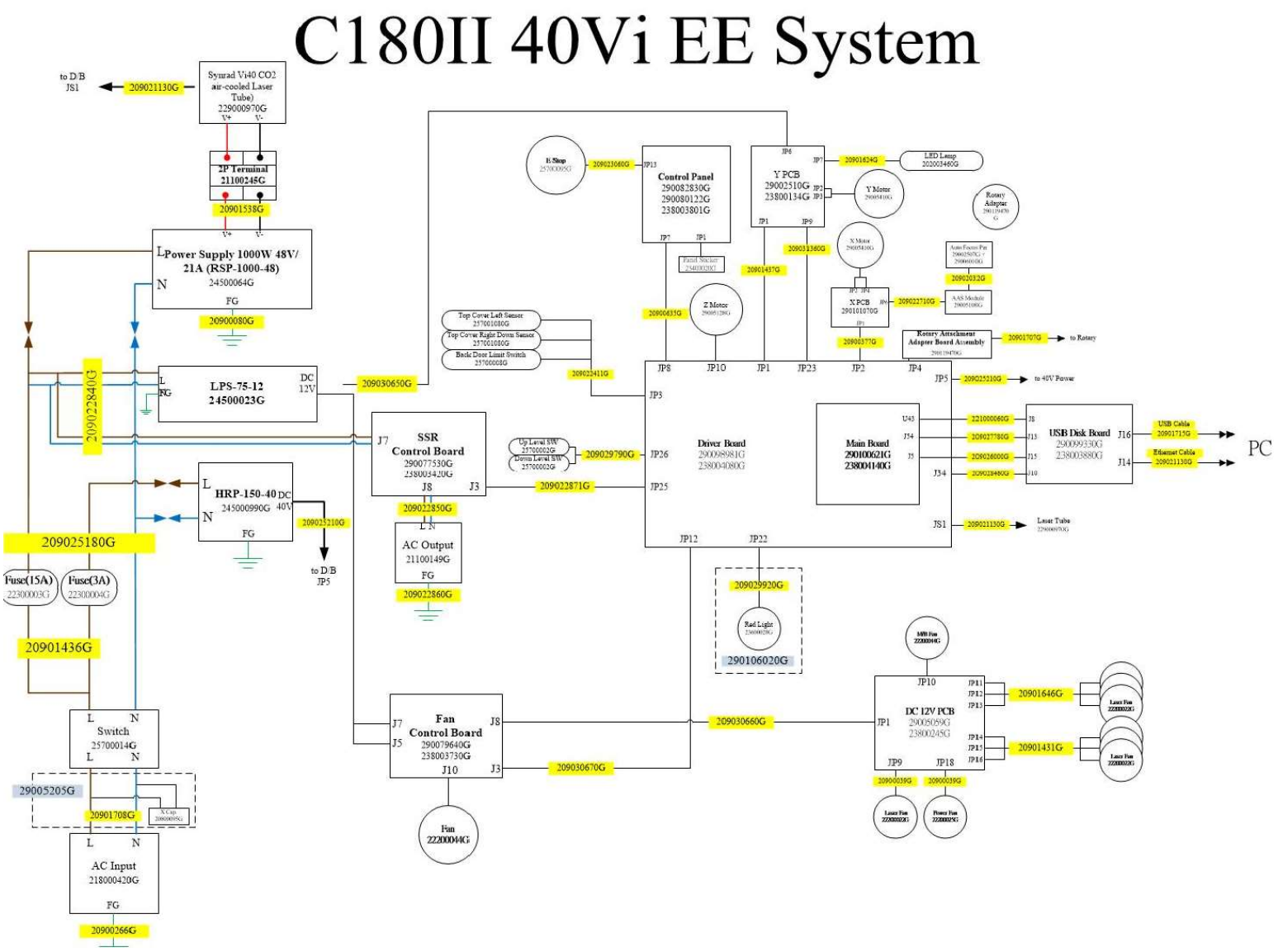
- **40W**



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Chapter 4 - Laser System

4.1 Type of Laser Tube

There are two types of laser sources used with C180/C180II, namely Coherent and Synrad.

4.2 How to measure the power output of a laser tube?

In order to measure the power output of a laser tube, we need to use a power meter (237000780G) that will measure the heat generated and convert it to a power reading. The best place to measure the laser output power is at the immediate output of the laser tube (before to mirror 1).

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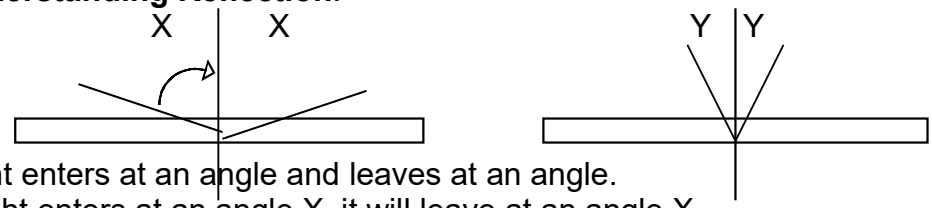
4.3 How does the laser beam travel to the working area ?

The laser beam generated by the laser source is reflected and guided by 4 optical lenses on to the working area. Therefore the proper adjustment and maintenance of them are crucial.

4.3.1 Optical Alignment

Understanding Reflection.

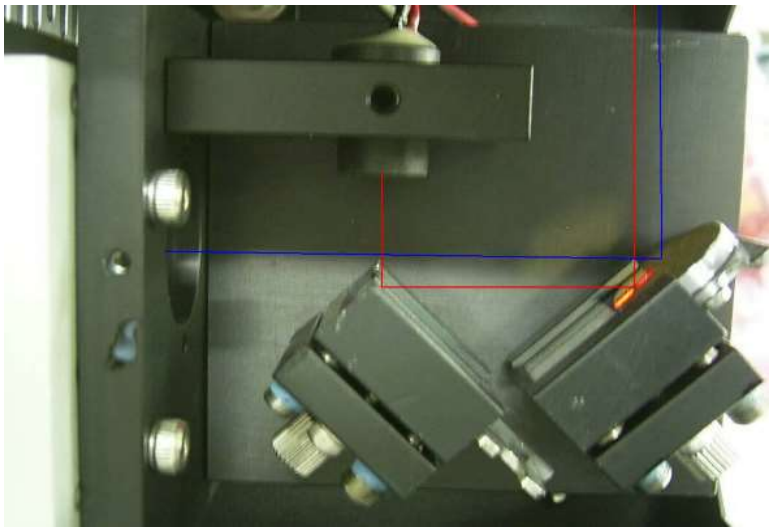


Light enters at an angle and leaves at an angle.
If light enters at an angle X, it will leave at an angle X.
If light enters at an angle Y, it will leave at an angle Y.

4.3.2 Basic Beam Alignment

The laser beam is guided to the top of the working area by using 4 reflective mirrors. Therefore, these mirror adjustments are crucial to the proper functioning of the machine. If the laser beam is not aligned correctly, the beam path will be shifted or tilted and both rastering and vectoring quality will be affected.

Step 1: Unscrew the back panel of the machine revealing the laser tube and Mirror 1. Turn on the machine and enter the hidden diagnostic menu by holding down the Enter keys while turning on the machine. Select test laser source. Set laser power to about 5~10%. Remove the protective cover of Mirror 1 and remove Mirror 1. Place a cardboard or paper about 1.5 meters away from the laser source. Fire the laser until you get a small burnt mark on the cardboard. (Determine the laser beam and the red beam are aligned by seeing if the burnt hole is at the exact location of the red beam. If they are not, adjust the red beam diode so that the red beam and the burnt mark are at the same location.) Place Mirror 1 back to the mirror holder.



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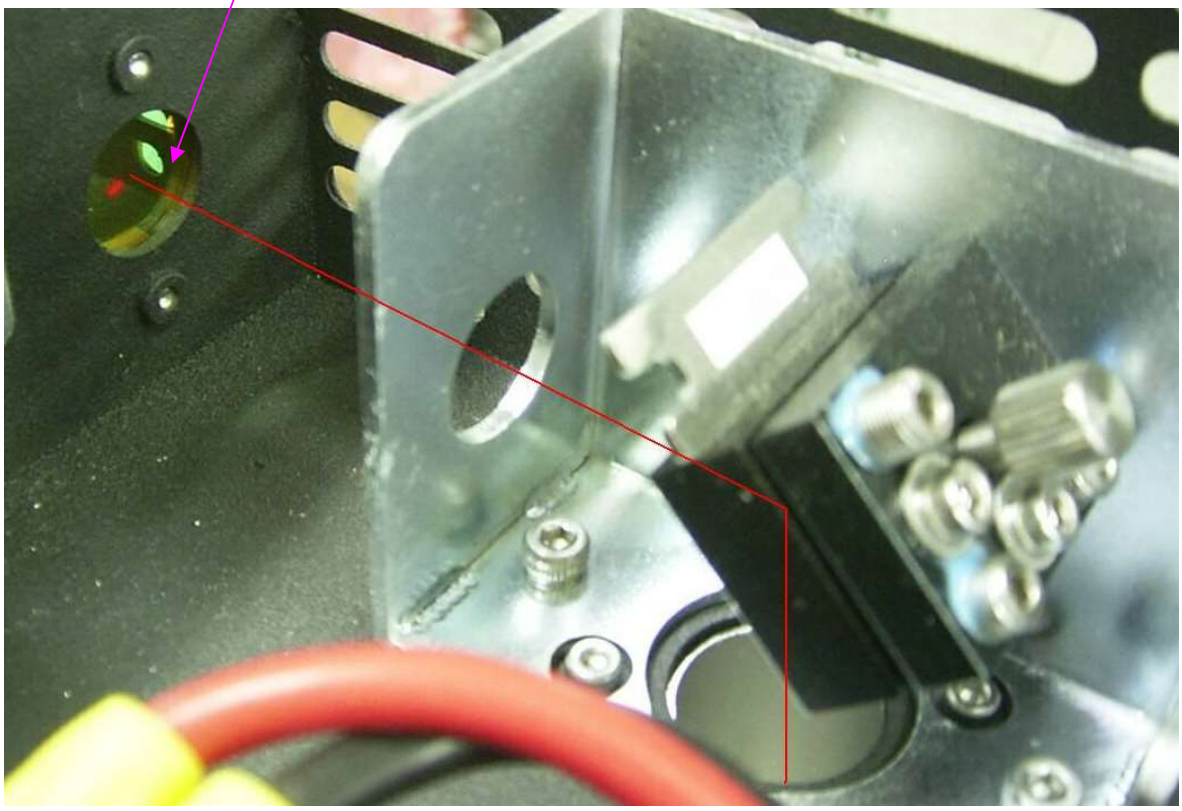
Step 2: Place a piece of masking tape over the tube opening that leads to Mirror 2. Fire the laser and let laser beam pass though dust prevention lens and see if it leaves a burnt mark in the center of the hole. Also check that the burnt mark left by the laser beam is circular in shape. If it is not circular, i.e. oval or other shape, then the laser beam might have hit the inner tubing and get reflected on the way from Mirror 1 to Mirror 2. If this is the case, place a piece of masking tape before the tube entrance, fire laser and adjust Mirror 1 so that laser passes through the center of the opening.

Dust prevention lens
290069150G



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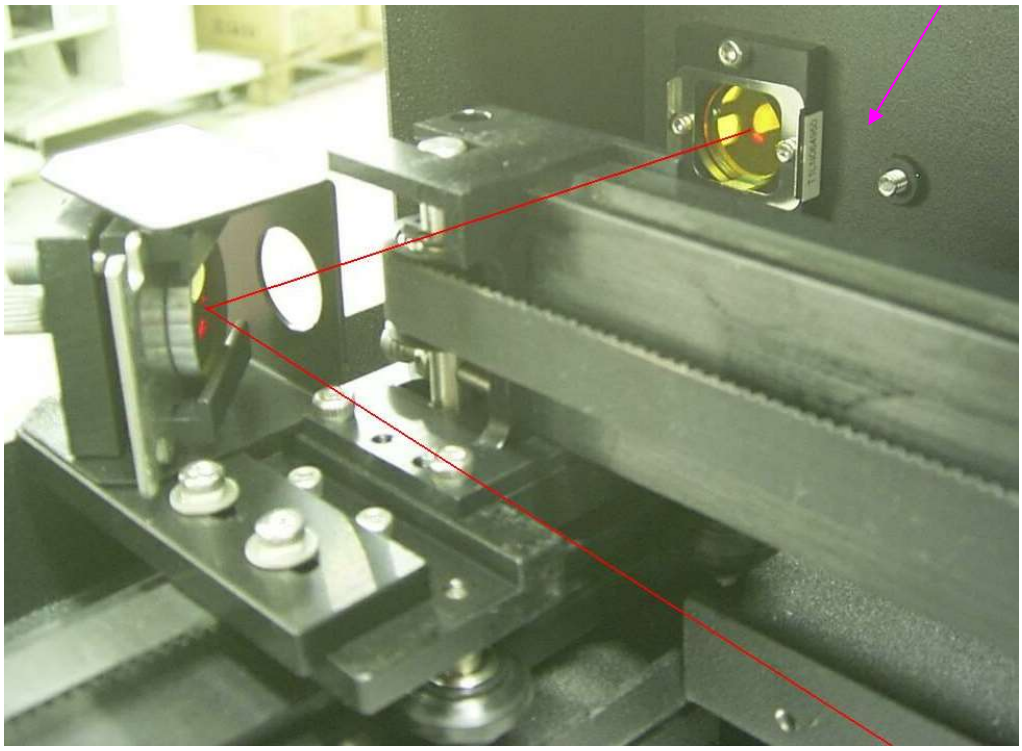
Step 3: Place a masking tape on the opening before Mirror 3. Move the rail along the Y-axis so that Mirror 3 is close to Mirror 2 (or dust prevention lens). Fire the laser and see if the laser beam goes through the center of the circle. Then move the rail so that Mirror 3 is to the far end of Mirror 2. Fire the laser and see if it leaves a mark at the same location when it was close to Mirror 2. Adjust Mirror 2 repeatedly so that the burnt mark is at the center and on top of one another when Mirror 3 is both close and far from Mirror 2.

Dust prevention lens
290069150G



Step 4: Place a masking tape on the opening before Mirror 4. Move the pen carriage to the upper left corner of the working area. Fire the laser and adjust Mirror 3 so the laser beam passes through the center of the opening. Move the pen carriage to the upper right end of the working table. Fire the laser and adjust Mirror 3 so the laser beam passes through the center of the opening. The laser should pass through the same spot when the pen carriage is positioned at upper left and upper right. Do the same for the bottom left corner and bottom right corner.
Place a masking tape over the nozzle opening. Position the pen carriage at one of the 4 corners of the working area. Fire the laser and adjust Mirror 1 so the laser passes through the center of the nozzle opening. Repeat for all 4 corners of the working area. After adjusting Mirror 1, you may have to re-adjust Mirror 2 and Mirror 3 as well. (Repeating Steps 2 & 3.)

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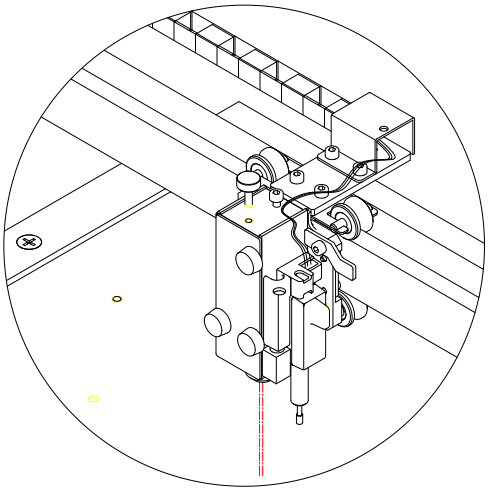
If the laser beam passes through the center of the nozzle opening at all 4 corners, then the laser beam should have been aligned properly. Cut four 20x20 mm squares at the four corners of the working area to double check that the edges of the square are not slanted

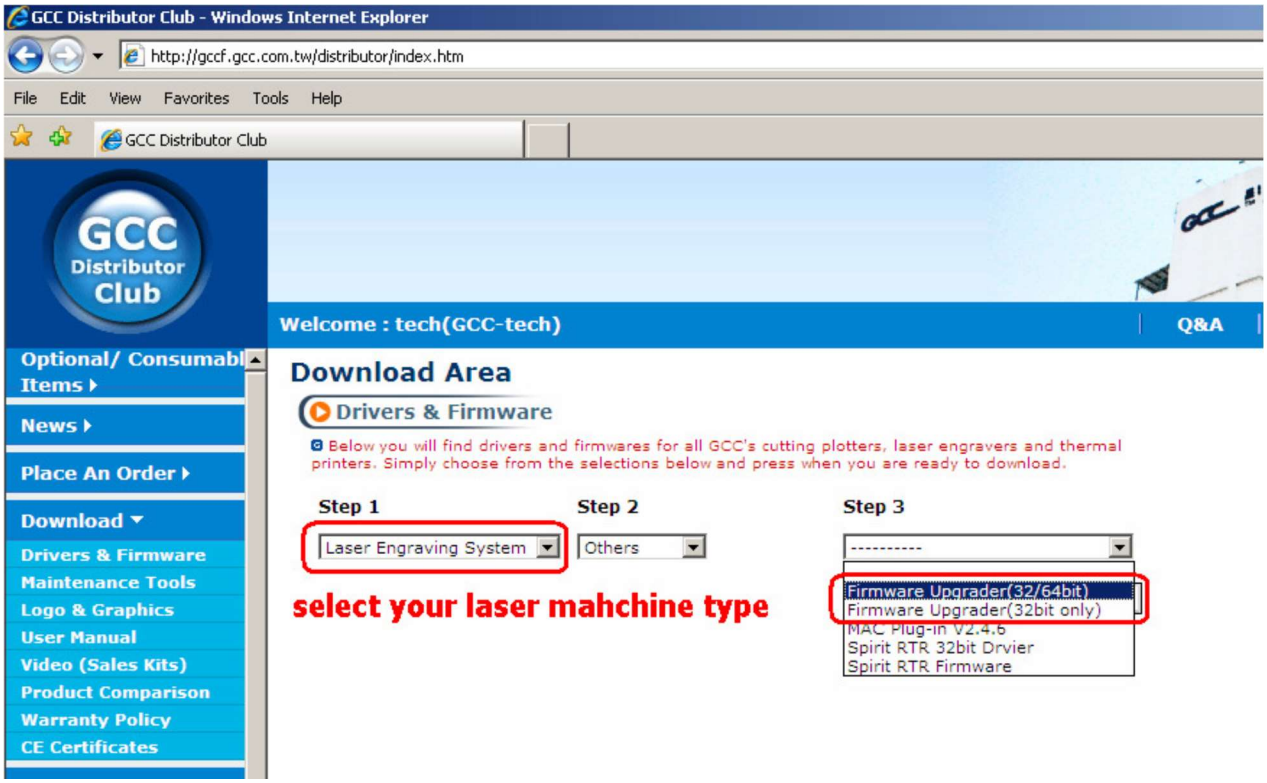


Chapter 5 - Software

5.1 How to upgrade firmware

GCC machines require a firmware uploader program to upload the firmware of machine through USB/Parallel port.

5.1.1 The Firmware Uploader can be downloaded from GCC Distributor Club website : http://gccf.gcc.com.tw/distributor/login.aspx



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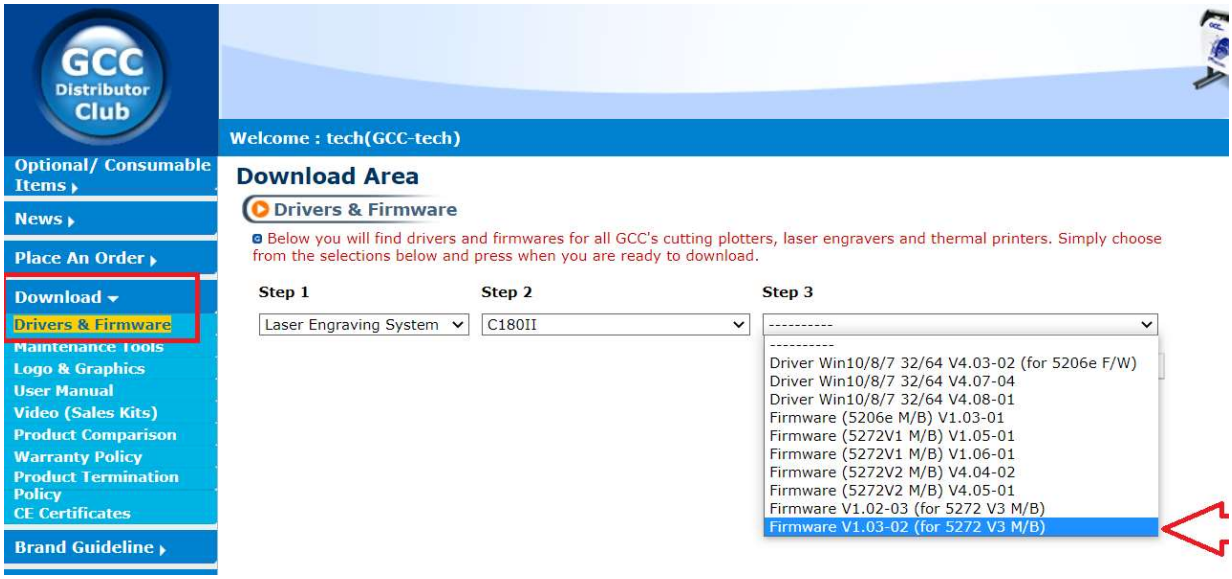
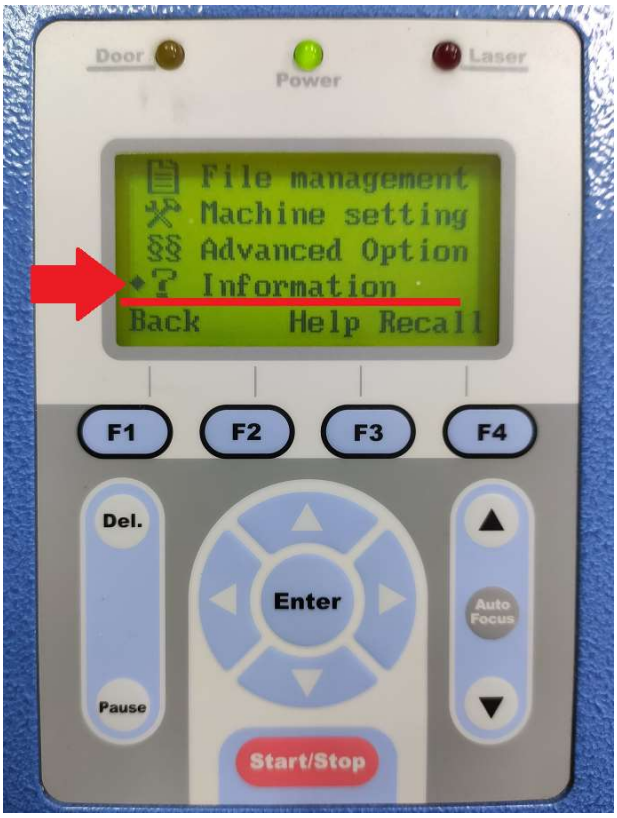
5.1.2. Firmware can be downloaded from GCC Distributor Club
http://gccf.gcc.com.tw/distributor/login.aspx



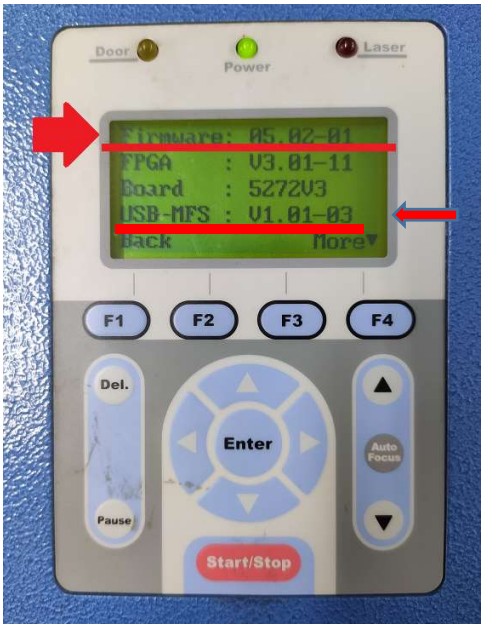
5.1.3. Check the version of firmware installed on the machine and the mainboard type first.

a. Press F4 to enter “Func” page

b. Select “Information”



c. Press “Down” arrow key to enter the information page, the firmware version and mainboard type will show.



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5.1.4 **For older machines:**

For machines with 5272V1 mainboard equipped which have older firmware installed(*1) , and all machines with 5206E mainboard equipped, please follow below step 1 ~ step 5 to finish the firmware upgrade.

*1 Refer to this firmware version dividing line chart to judge if the firmware in your machine is an older version.

Model	Firmware version dividing line
Spirit	3.03-09
Spirit LS	3.03-04
Spirit GLS	3.03-04
X252RX	1.02-08
X380RX	1.03-01
S290LS	3.02-05
Venus II	1.03-06
C180II	1.03-07
Mercury III	3.03-02
MG380Hybrid	1.03-06

Step1. Refer to below chart, turn on the machine with pressing and holding the corresponding button, the machine will be boot in transfer mode using the communication port according to the button you press when turning on the machine.

Model	Parallel port	Common USB	GCC USB
LaserPro,Mercury I, Mercury II, Venus series	Resume key + Power ON	N/A	N/A
Explorer, ExplorerII, Spirit, Spirit GE, Spirit_GX, Spirit LS, Spirit GLS, GAIA, GAIAII, MercuryIII, S290, S290LS, X252RX, X380RX/LS, X500RX/LS, X500III, C180II, FMC280, T500	F2 key + power on	F1 key + power on	F3 key + power on
C180	A/F key + power on	UP key + power on	Down key + power on

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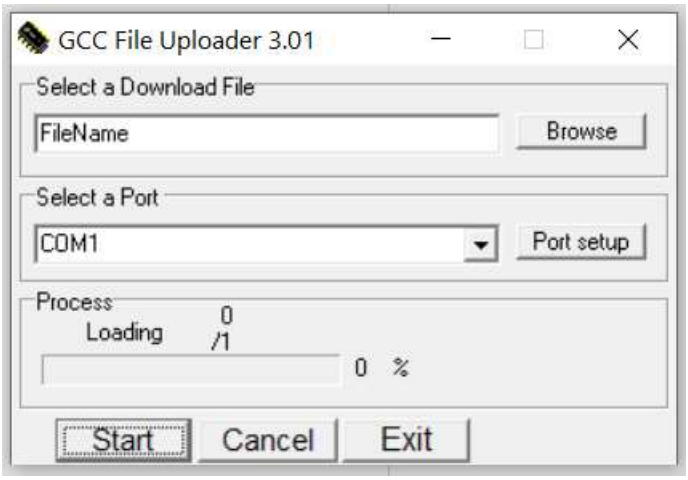
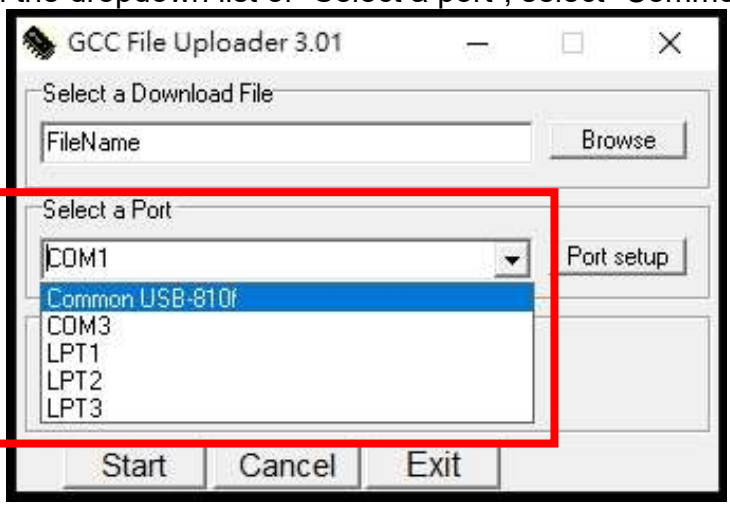
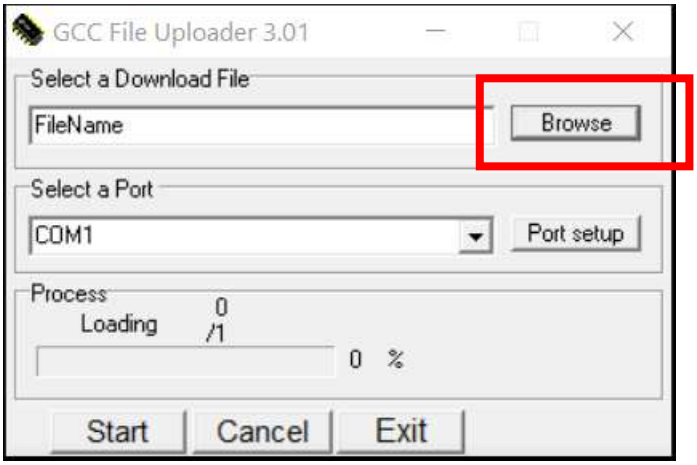
Step 2. Connect the USB / LPT cable between PC and Laser machine then run firmware uploader



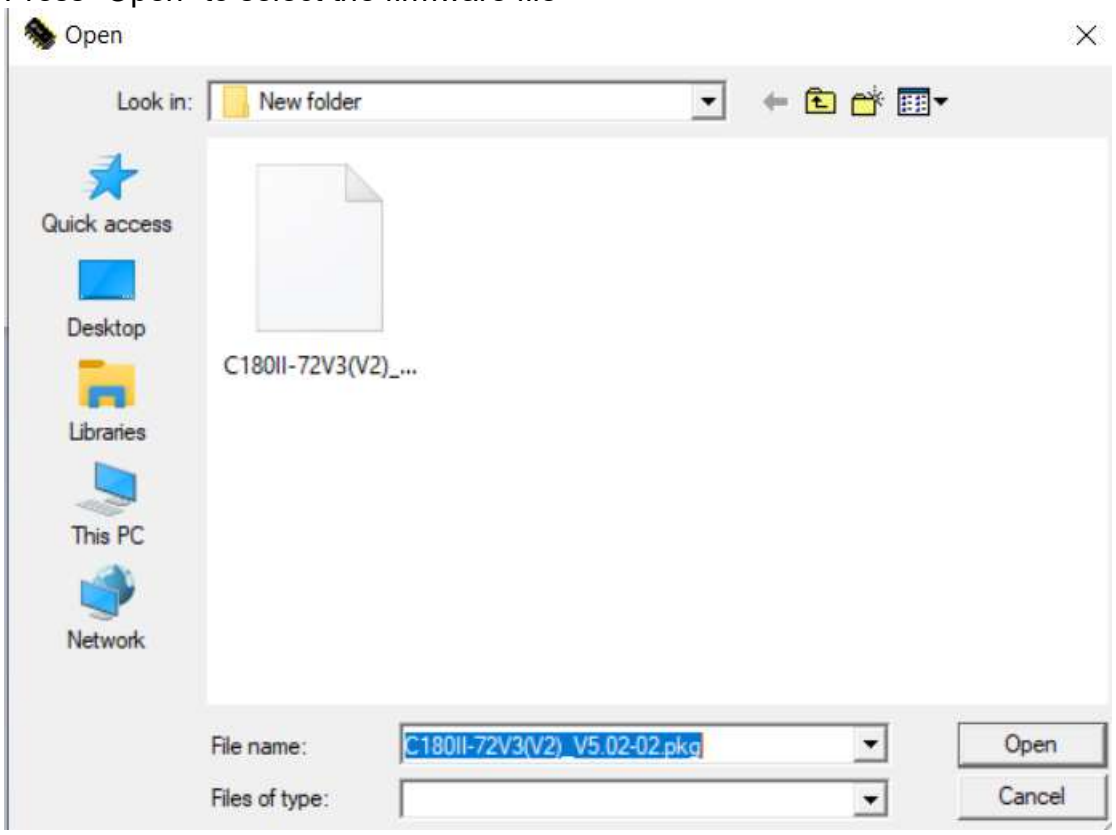
Step 3. Pull down the dropdown list of “Select a port”, select “Common USB-XXXX”

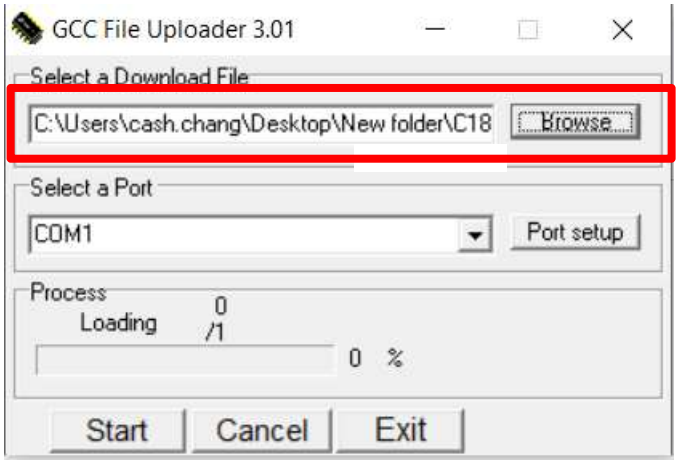


Step 4. Press the button “Browse” and select the firmware file you want to upload.



Press “Open” to select the firmware file





Firmware file is selected.

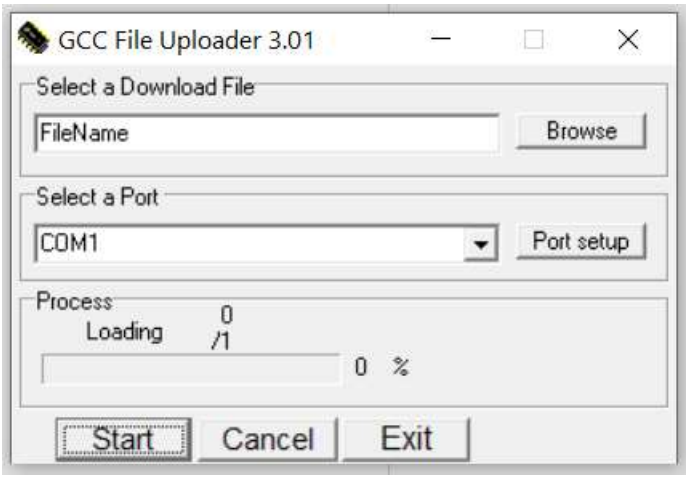
Step 5. Press the “Start” button, the upgrading process will start, wait until the process is done, the machine will reboot automatically.

5.1.5 **For new version machines** (only USB is supported)

For machines with 5272V1 mainboard equipped which have new firmware installed (refer to the dividing line chart at 6.1.4) , and machines with 5272V2、5272V3 mainboard equipped, please follow below step 1 ~ step 5 to finish the firmware upgrade.

Step .1 Press and hold “F1” and turn on the machine, machine will be boot in “USB Print support” mode.

Step .2 Connect the USB cable between PC and Laser machine then run firmware uploader



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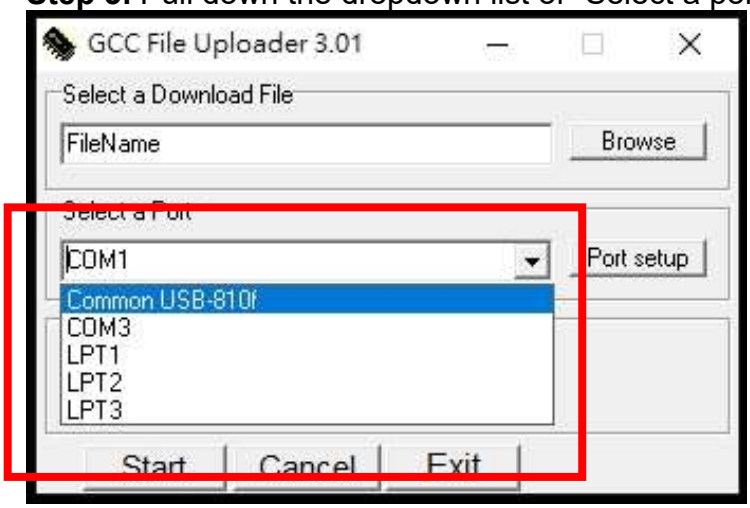
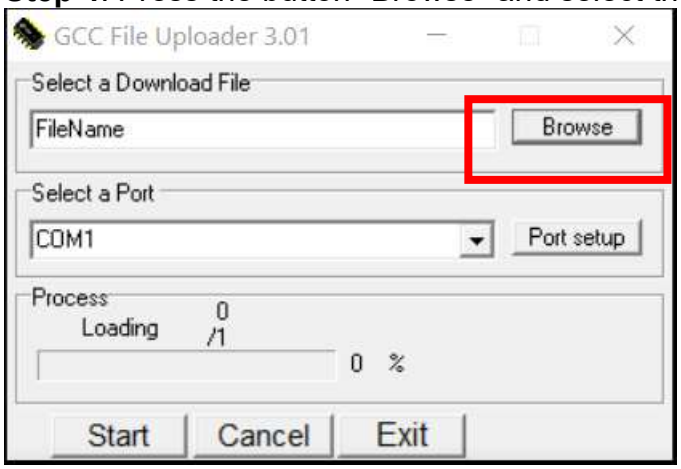
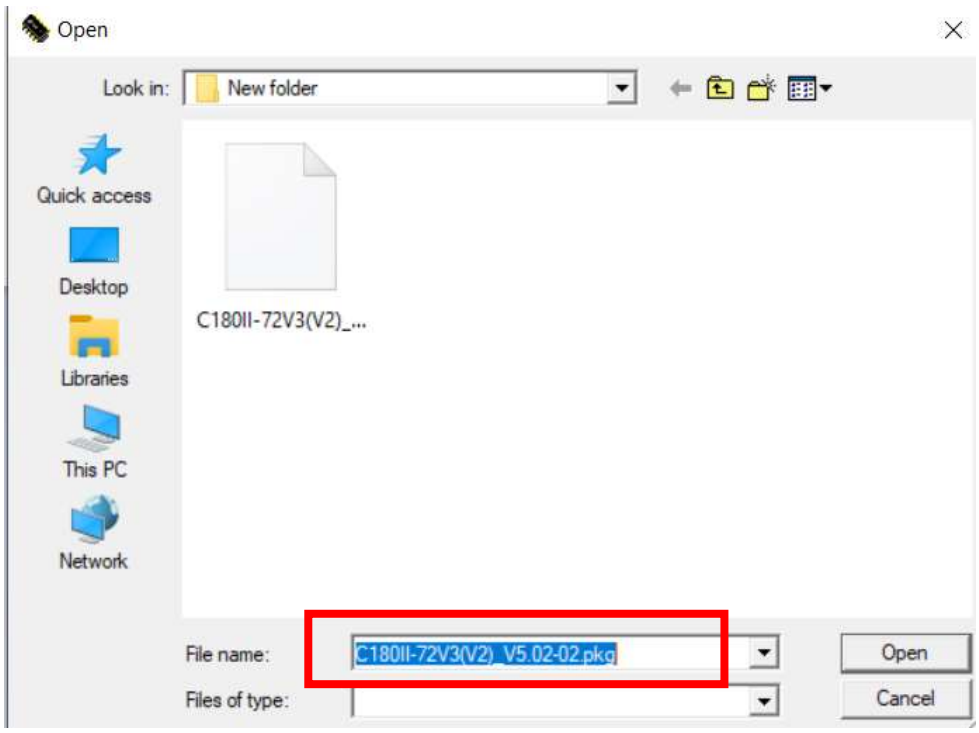
Step 3. Pull down the dropdown list of “Select a port”, select “Common USB-XXXX”

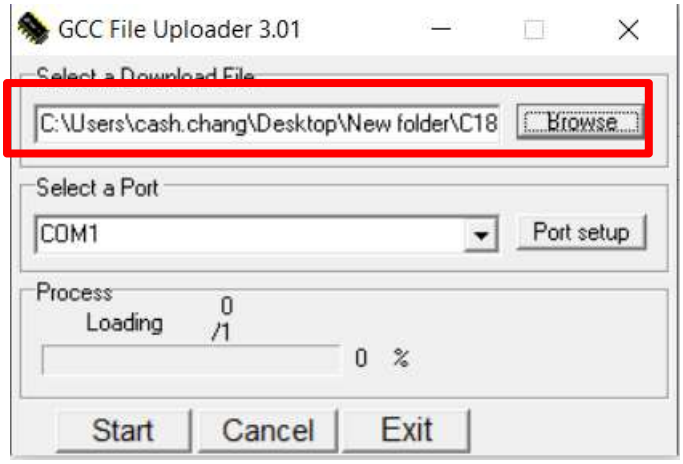


Step 4. Press the button “Browse” and select the firmware file you want to upload.



Press “Open” to select the firmware file





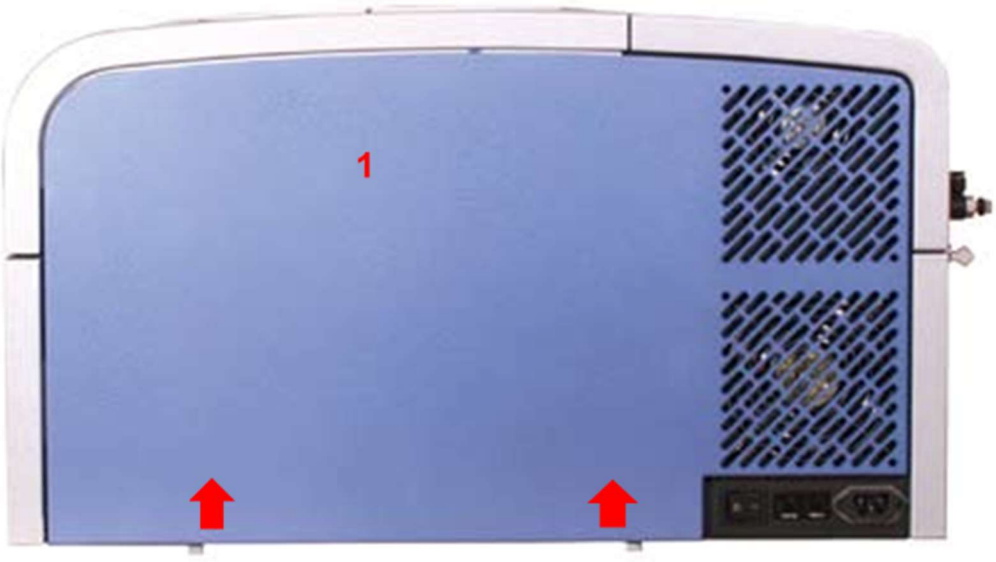
Firmware file is selected.

Step 5. Press the “Start” button, the upgrading process will start, wait until the process is done, the machine will reboot automatically.

Chapter 6 Components Replacement

6.1 Changing the X motor

1. Dismount two screw on the bottom of side panel (see red arrows below)



2. Dismount two screws of right-front cover(M3 *2)

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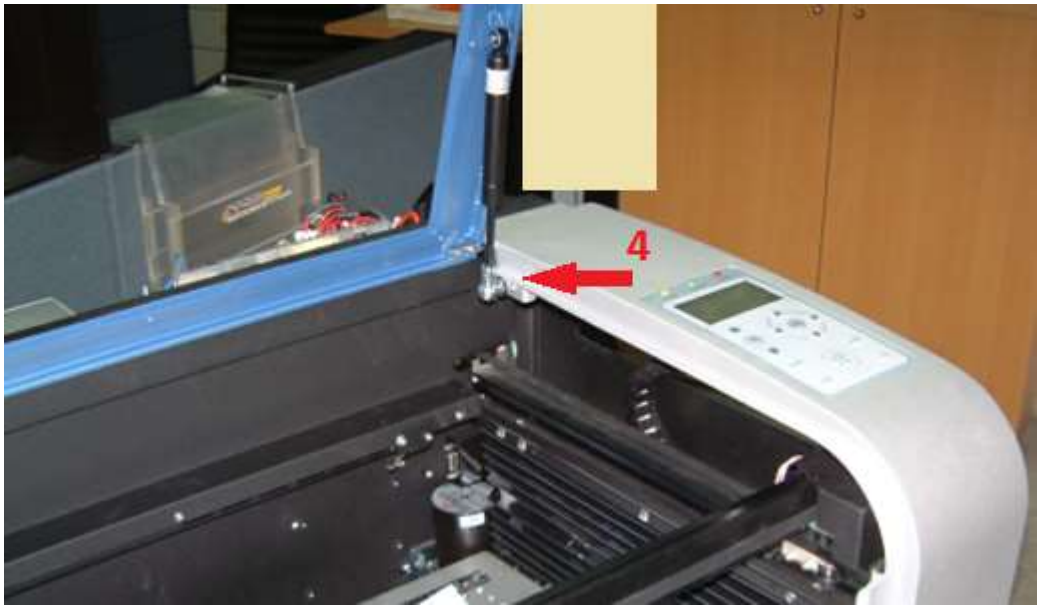
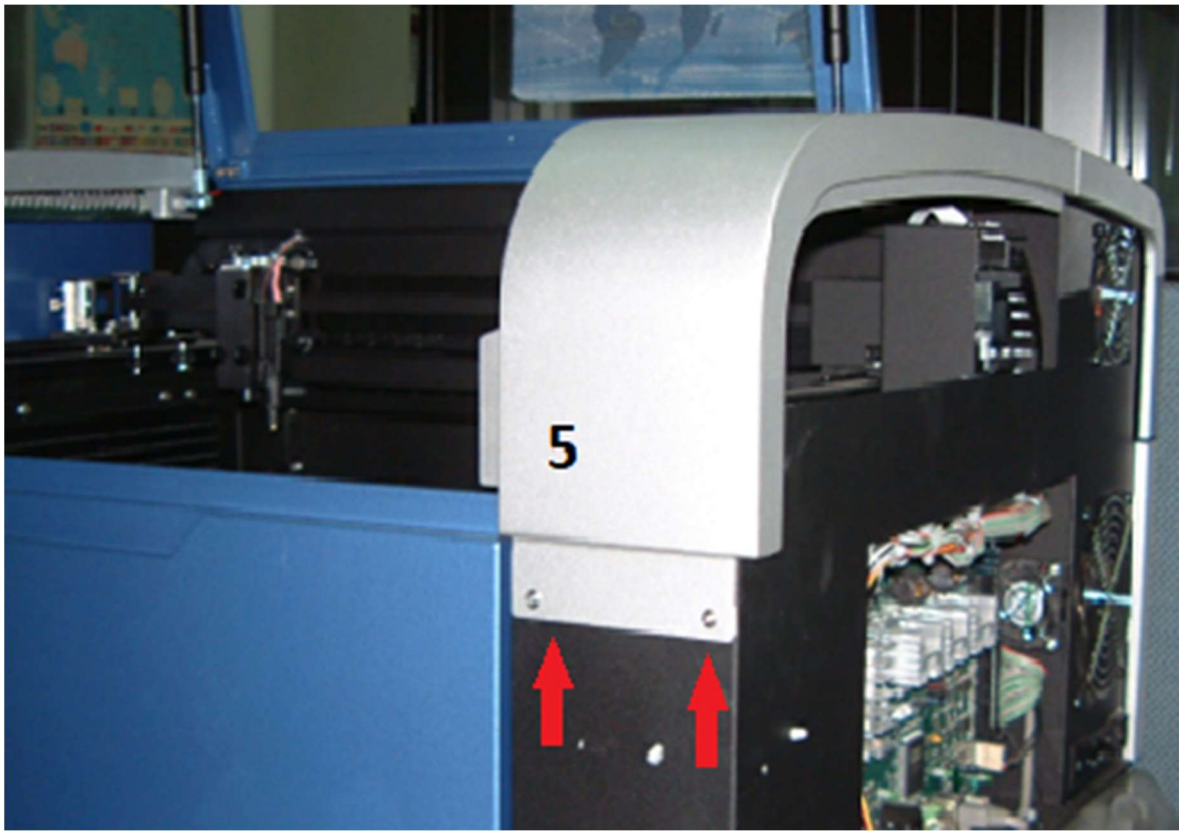
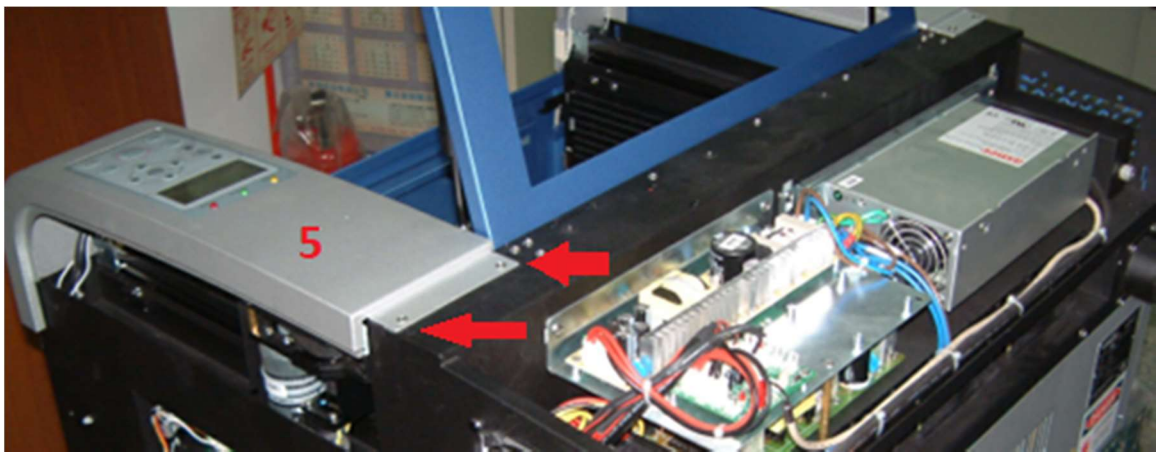
3. Dismount 4 screws of back cover(M3 *4

4. Dismount right window cylinder



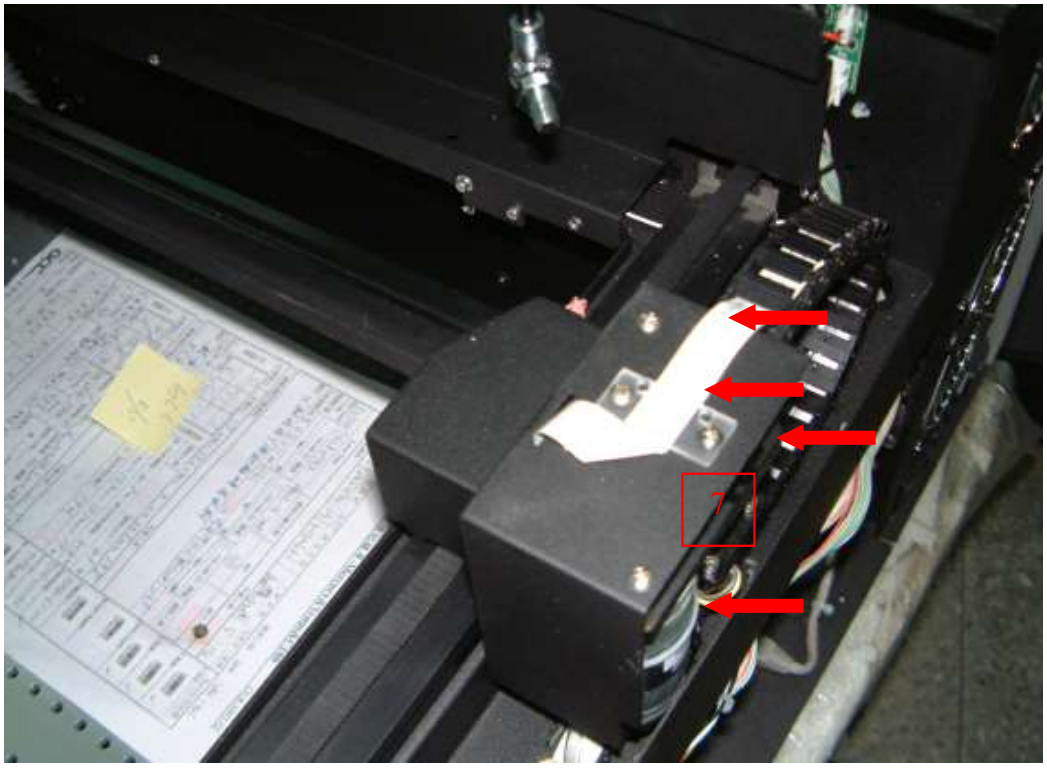
5. Dismount 4 screws of right top cover (where the control panel locates)





6. Hanging the right top cover to the right side.

7. Dismount 4 screws of x motor cover(M3 *4)



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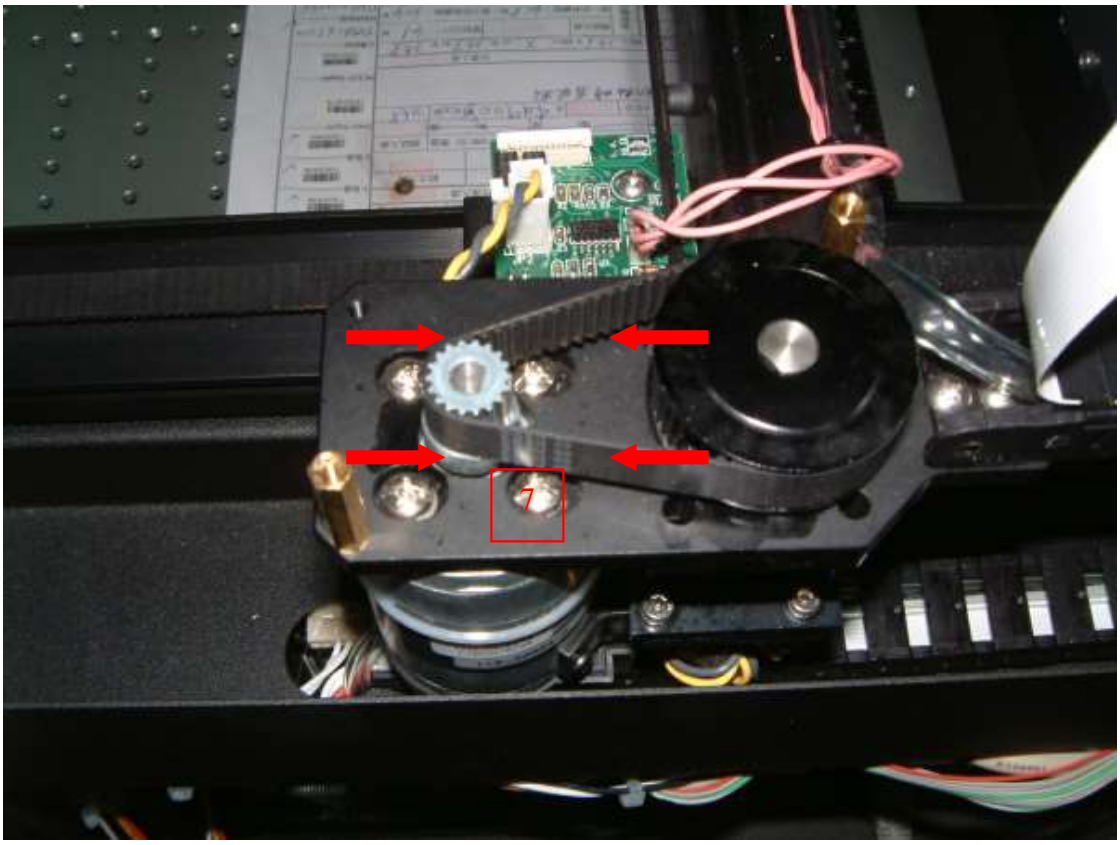
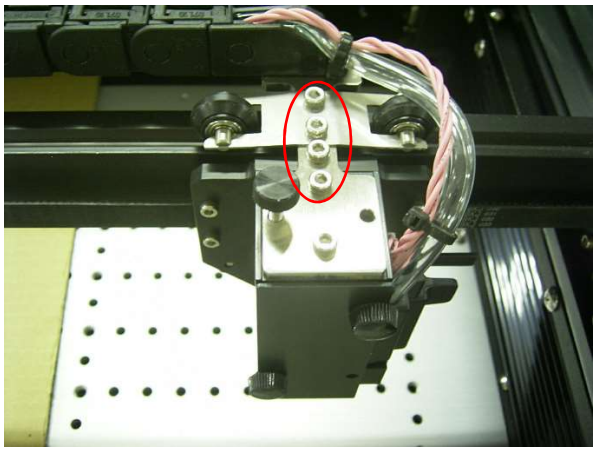
Dismount 4 screws of x motor(M4 *4)



6.2 Changing the X rollers

The estimated life of a set of rollers is about 500 working hours. To change rollers, simply remove the hex bolts using a size 3 Allen key as shown below.



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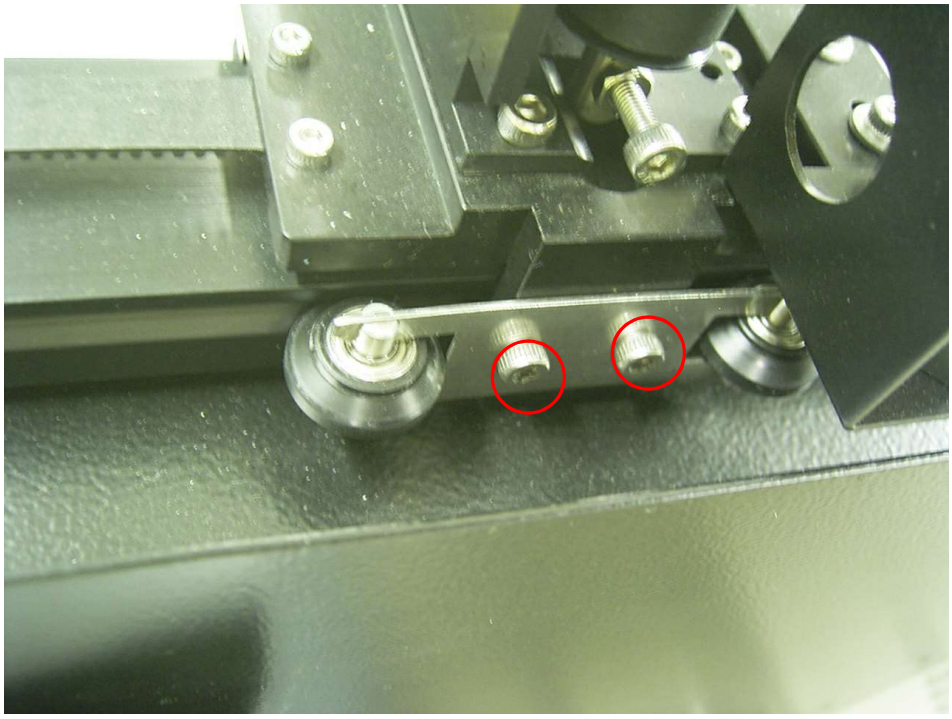
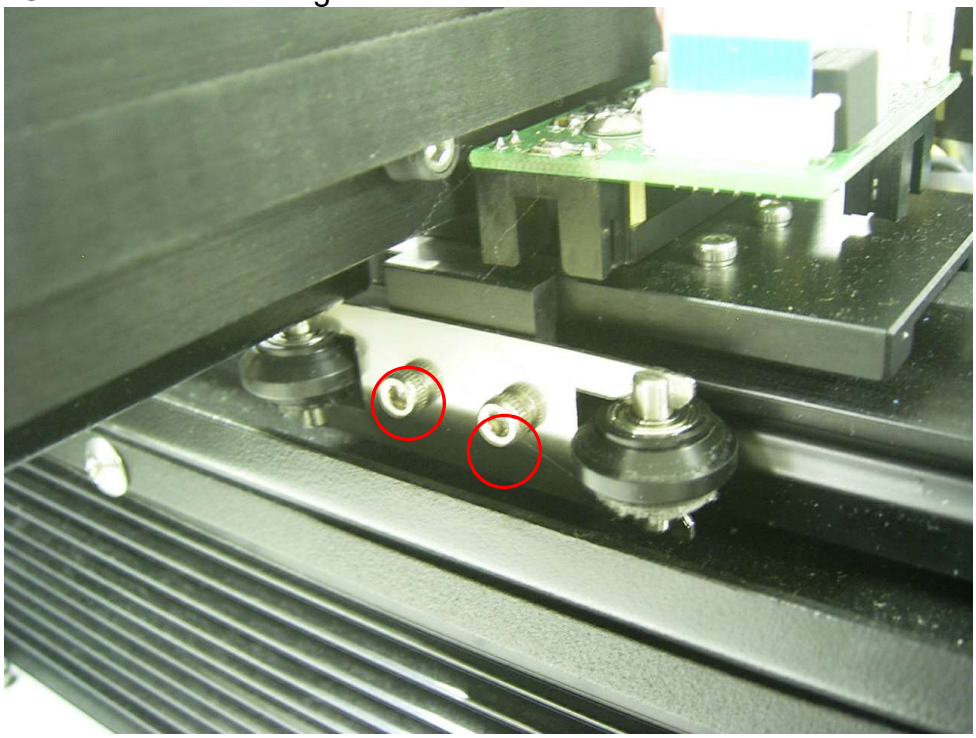
6.3 Changing the Y rollers.

Remove the following screws to completely remove the Y rollers.



Unscrew the following screws to remove the side rollers.



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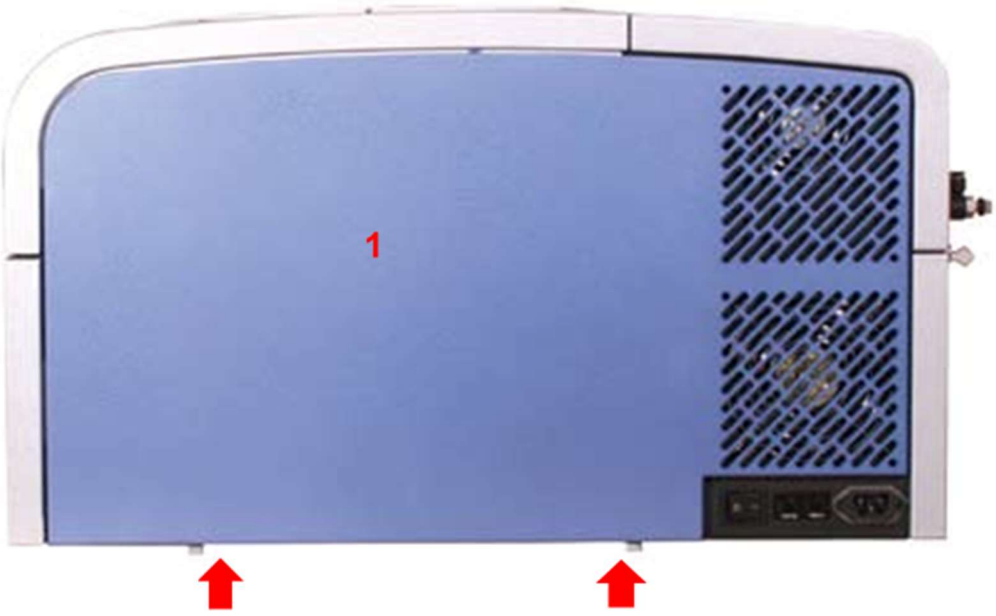
6.4 Changing the Y motor & Y motor belt

1. Dismount two screw on the bottom of side panel (see red arrows below)



2. Dismount two screws of right-front cover(M3 *2)

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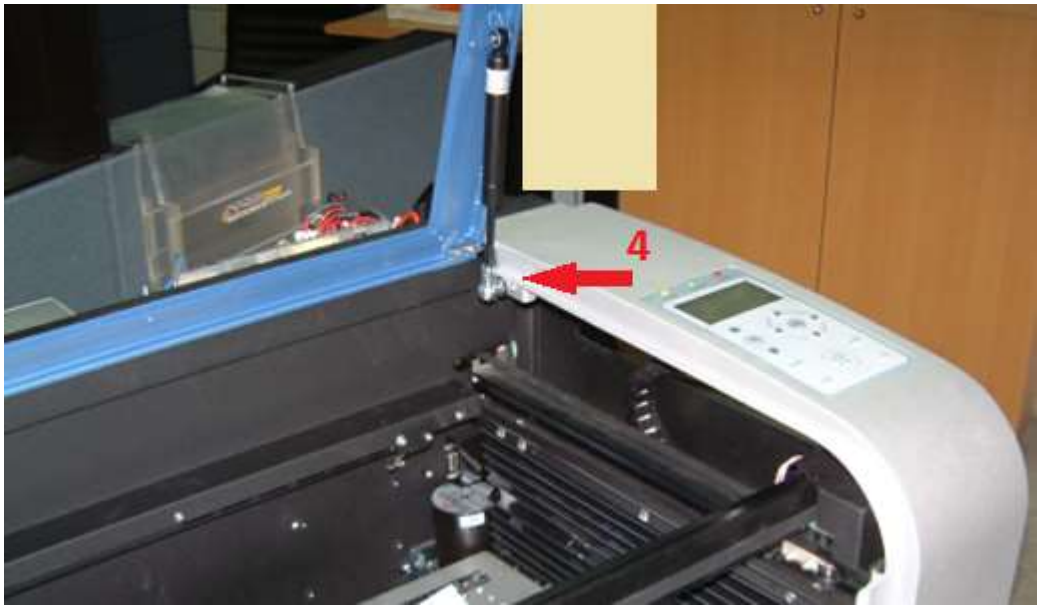
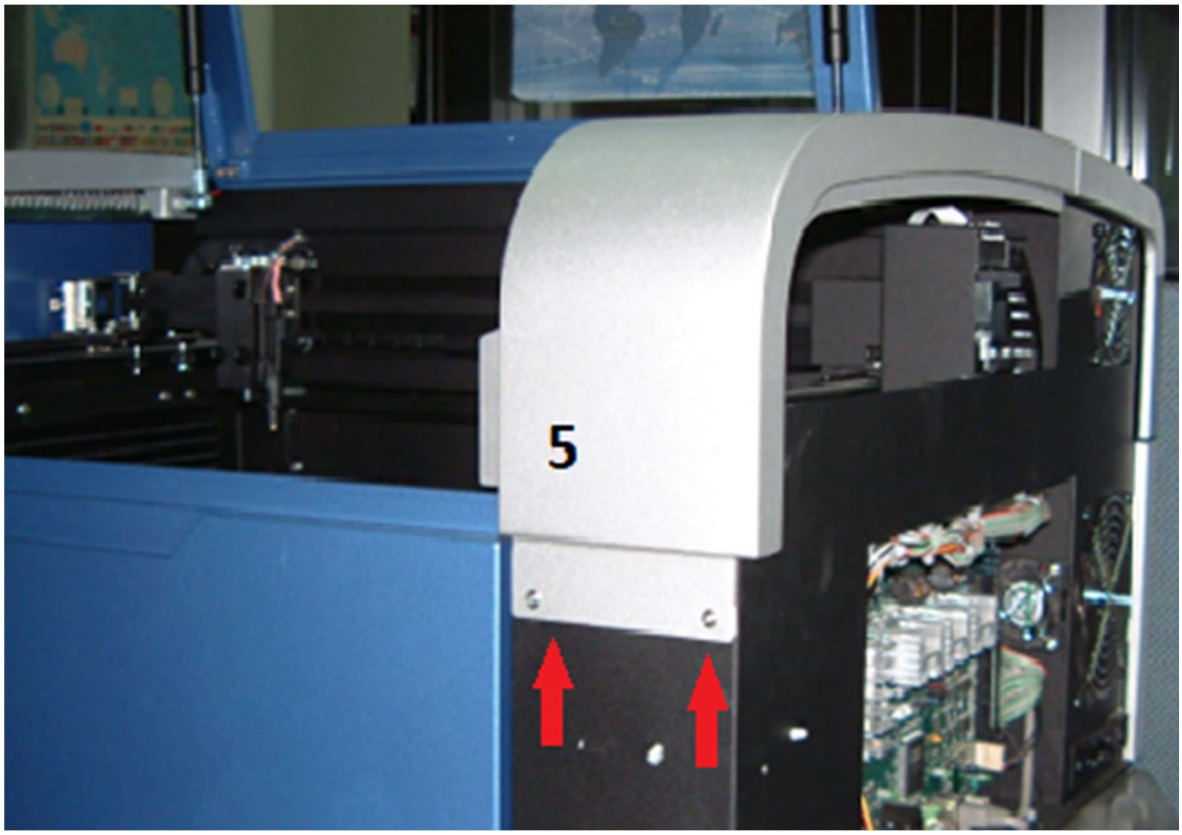
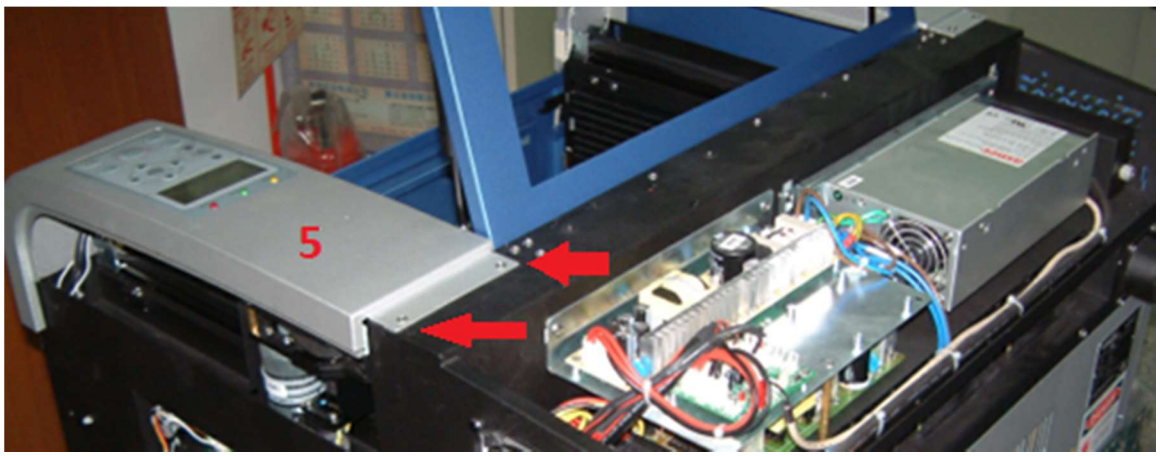
3. Dismount 4 screws of back cover(M3 *4

4. Dismount right window cylinder



5. Dismount 4 screws of right top cover (where the control panel locates)





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6. Hanging the right top cover to the right side.

7. Remove left side cover: first remove the two screws on the bottom (red circles)

8. Then remove the left two screws

9. Remove left-front two screws

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10. Then remove the back panel. There are three screws on front

11. for back panel. There are three screws on top (from back side)

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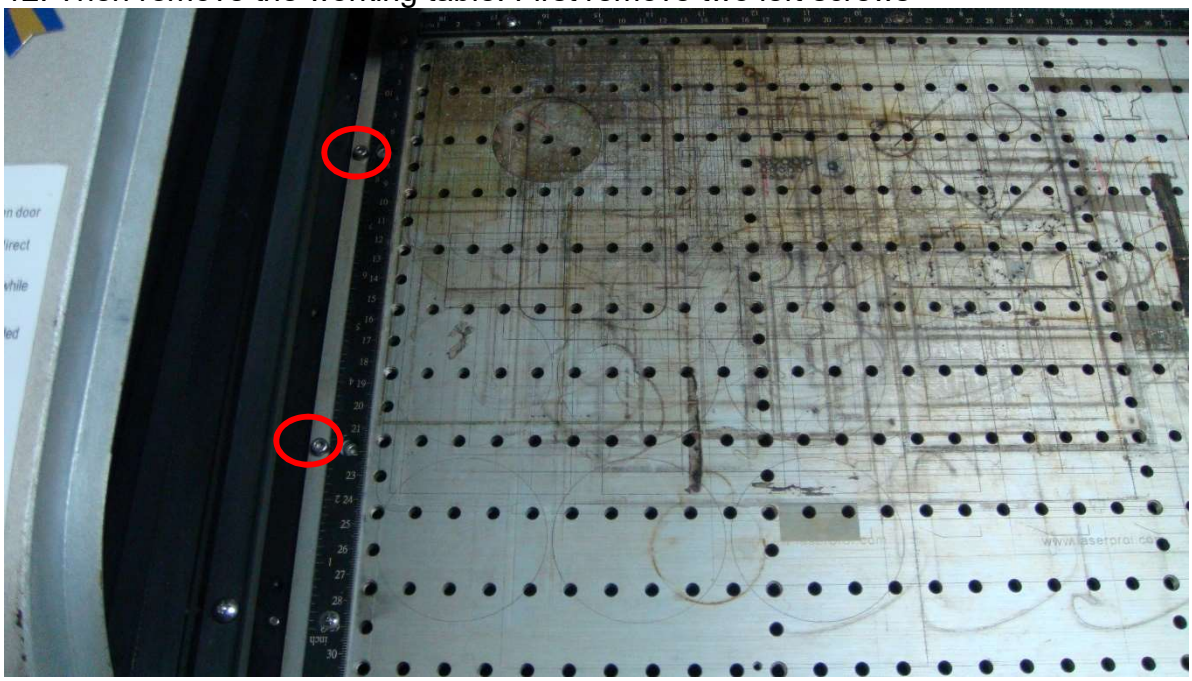
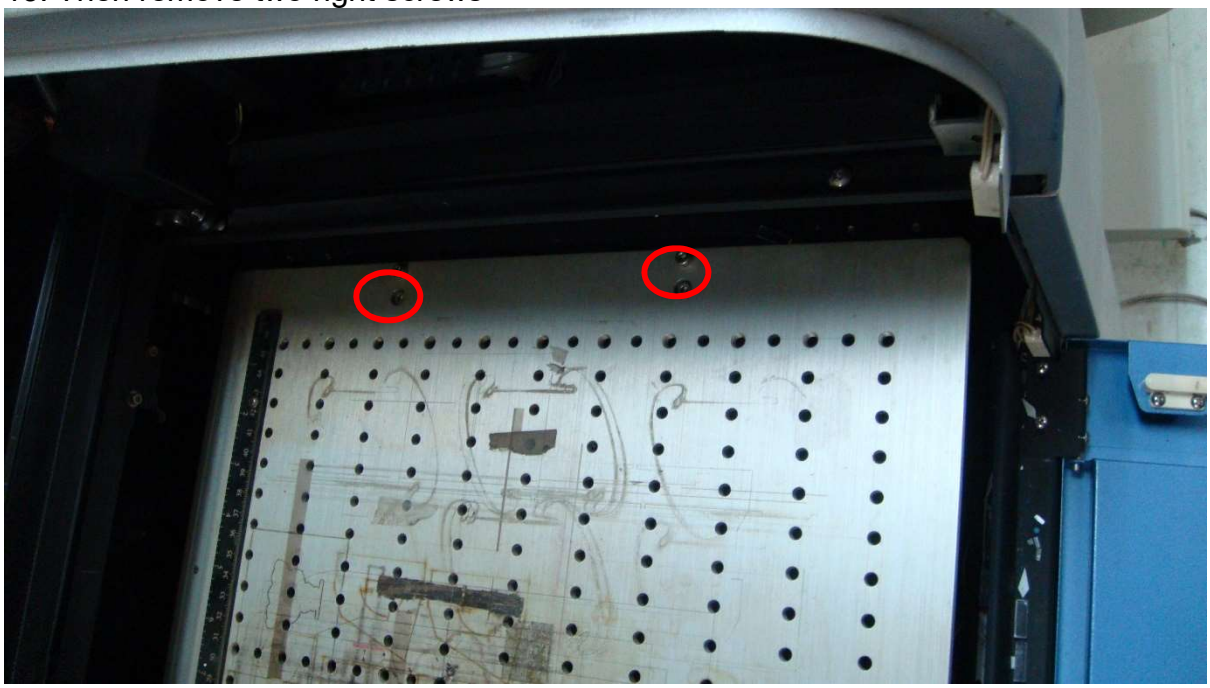
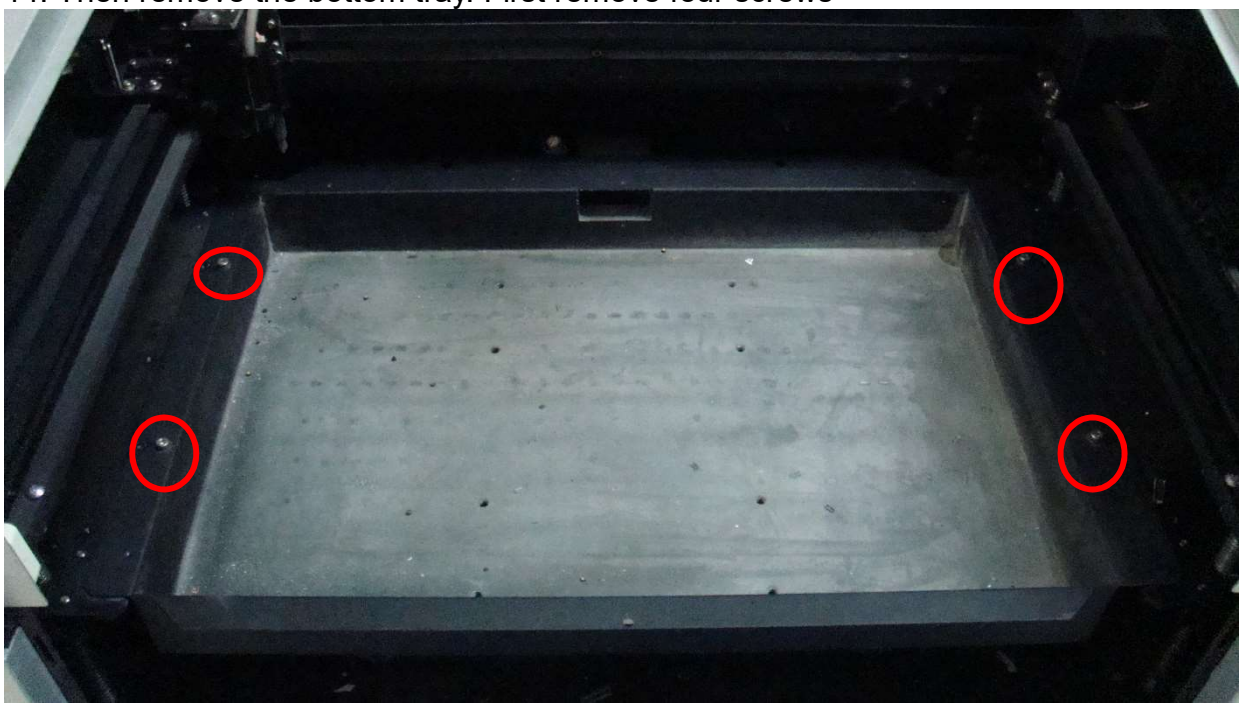
12. Then remove the working table. First remove two left screws



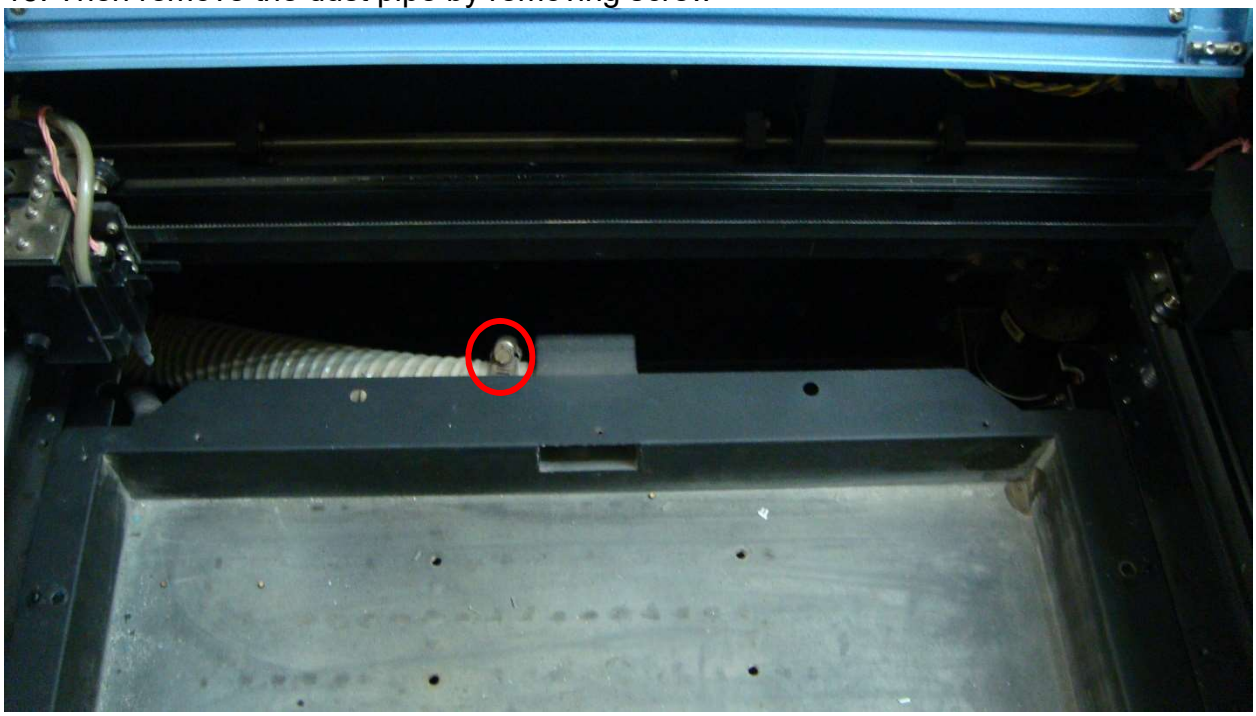
13. Then remove two right screws



14. Then remove the bottom tray. First remove four screws

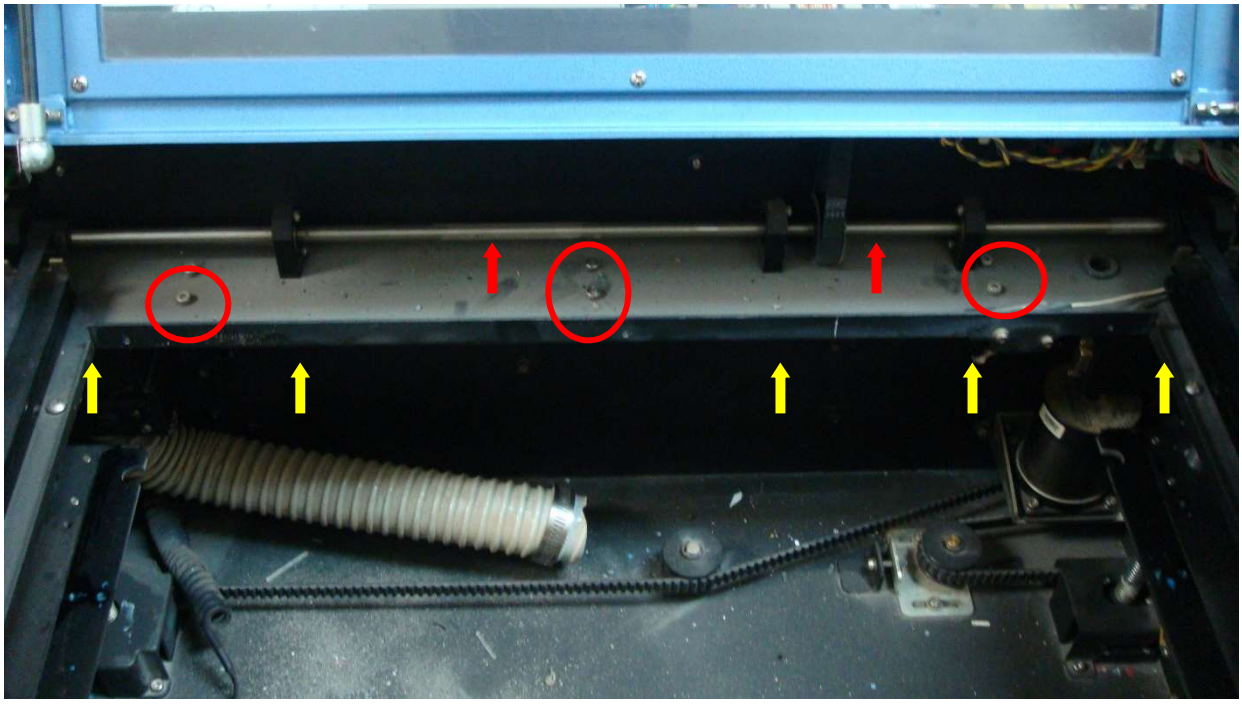


15. Then remove the dust pipe by removing screw

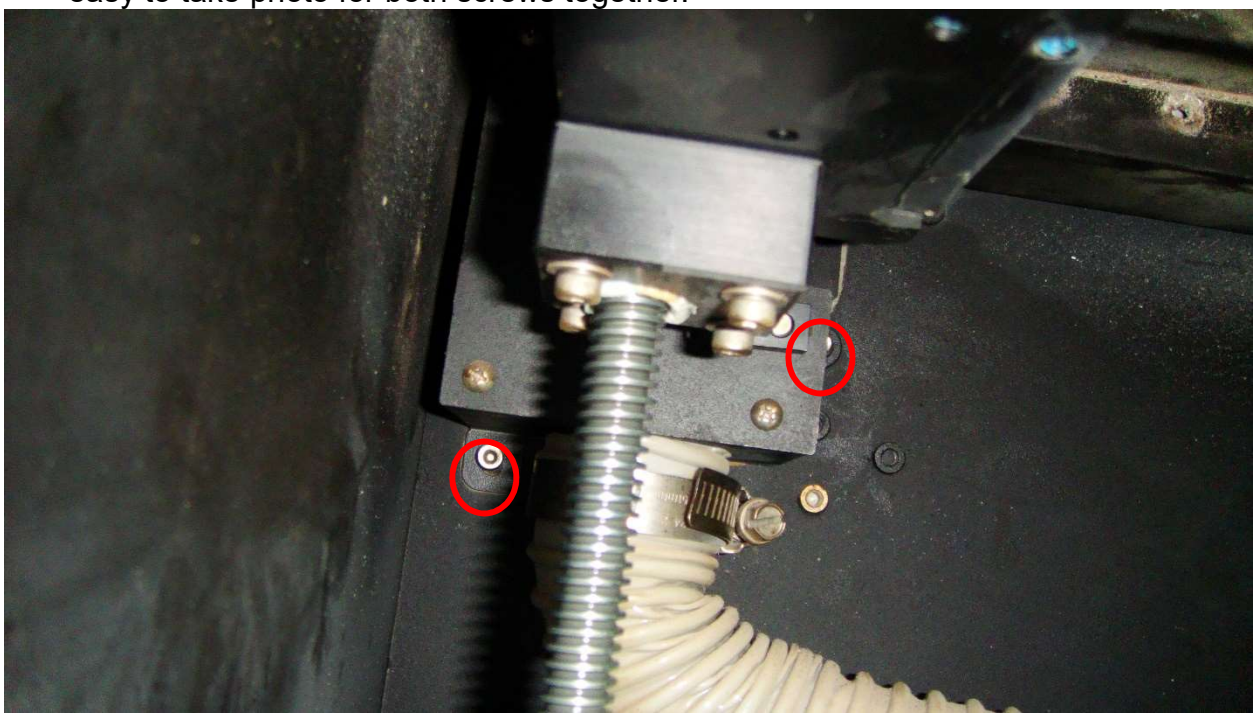


16. Then remove the ground cable screws. The bottom tray can be removed now.

17. To remove the y axis synchronizer bar (the red arrows pointed) need to remove the screws of synchronizer bar holders and they are at the bottom (the yellow arrow pointed). The screws of synchronizer bar holders cannot be reached until the dust guide pipe is removed. The screws of dust guide pipe have 6 screws on top (the red circles)



18. The dust guide pipe screws are two more screws on bottom (red circles). It is not easy to take photo for both screws together.



19. The screws of synchronizer bar holders (below picture only show four screws. They are 10 screws in total)

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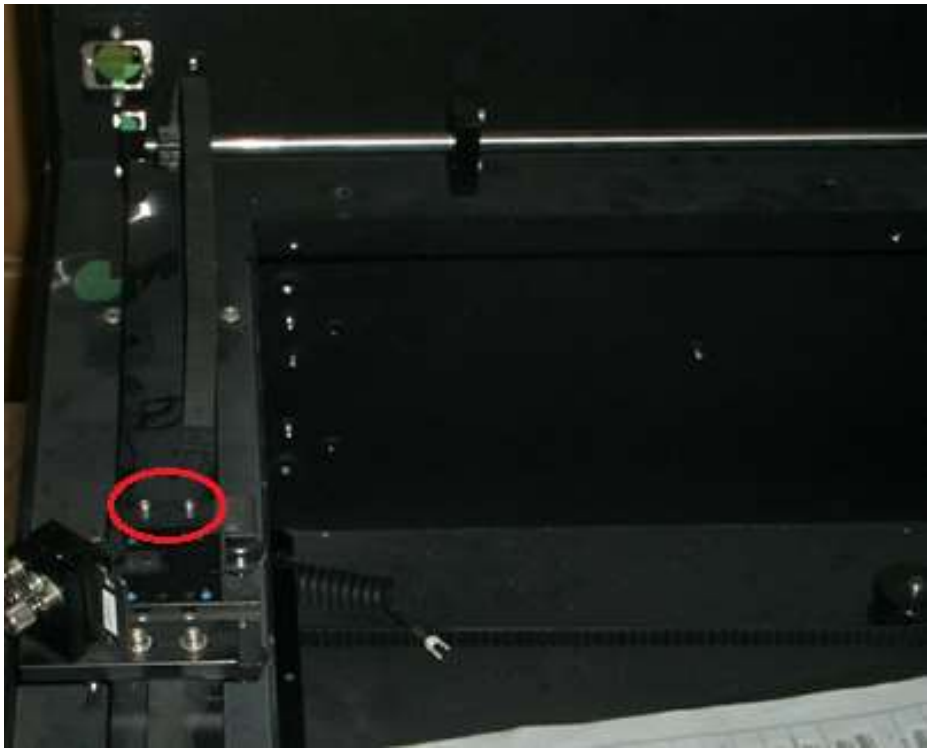
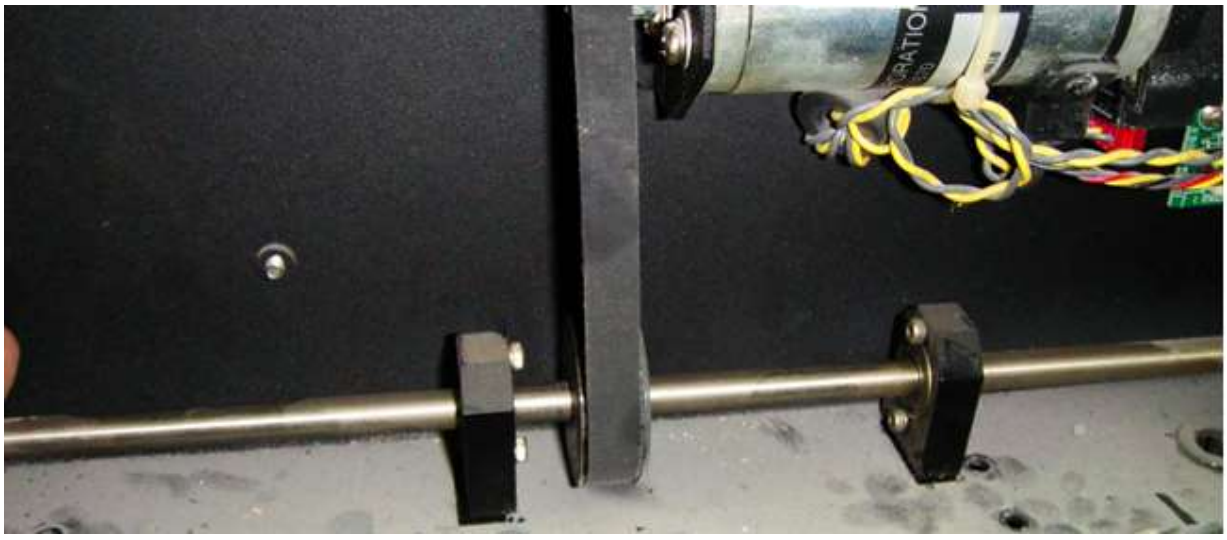
20, To move up the y axis synchronizer bar, the y axis belt need to be remove or loosen. To remove the left y axis belt will be easier by loosen the two screws of belt retainer (the red circle).



21. Now the whole y axis synchronizer bar can be move up a little. So the y motor belt is loosen also and can be removed.



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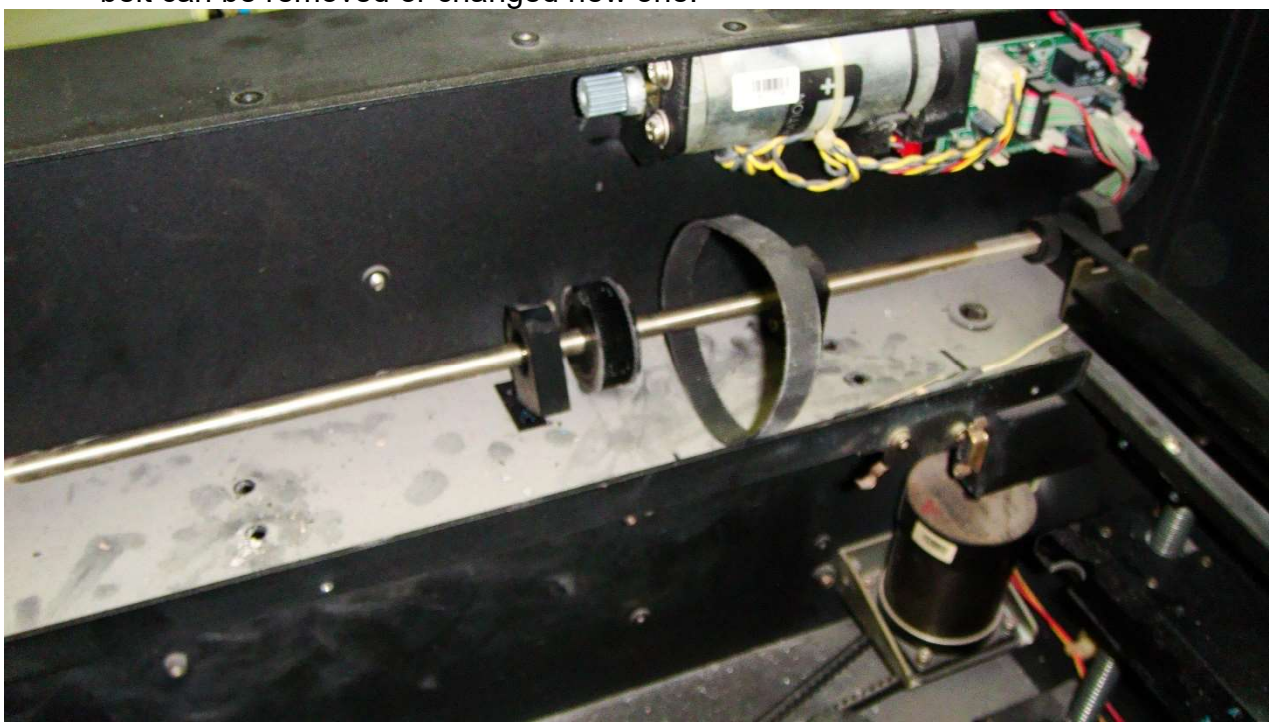
22. The y motor belt can move cross the synchronizer bar and holders. The y motor belt can be removed or changed new one.



6.5 Changing power supply.

1. Dismount four screws on the top back panel (see red arrows below)

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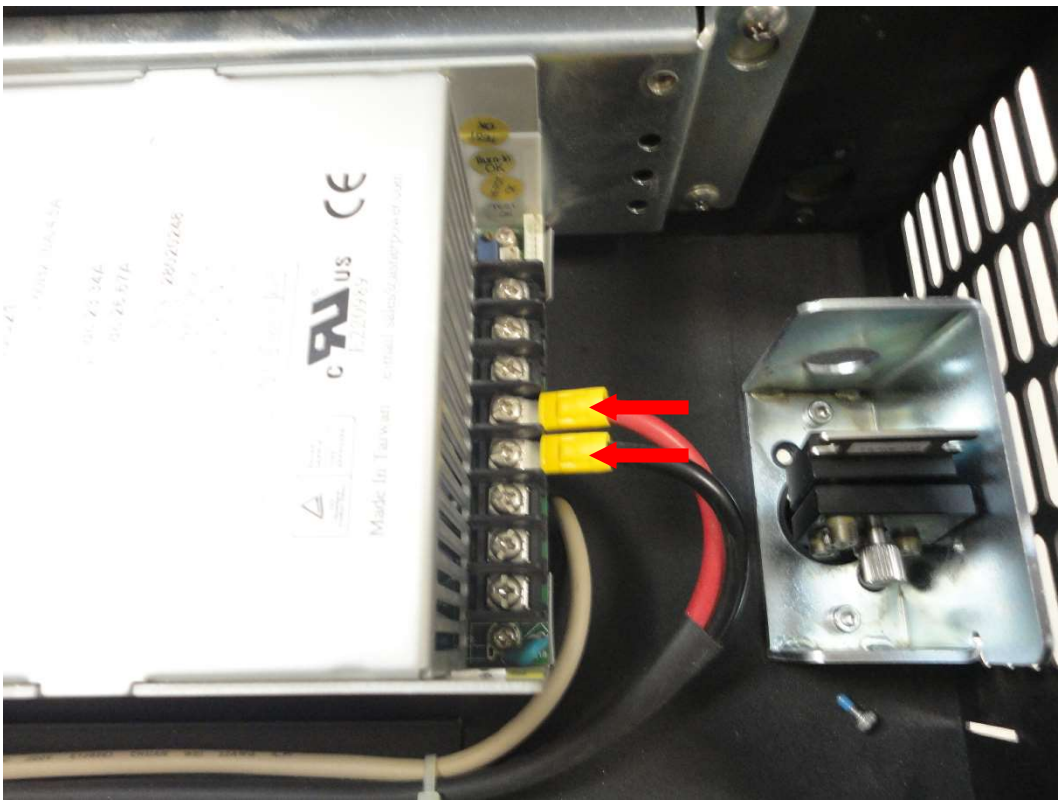
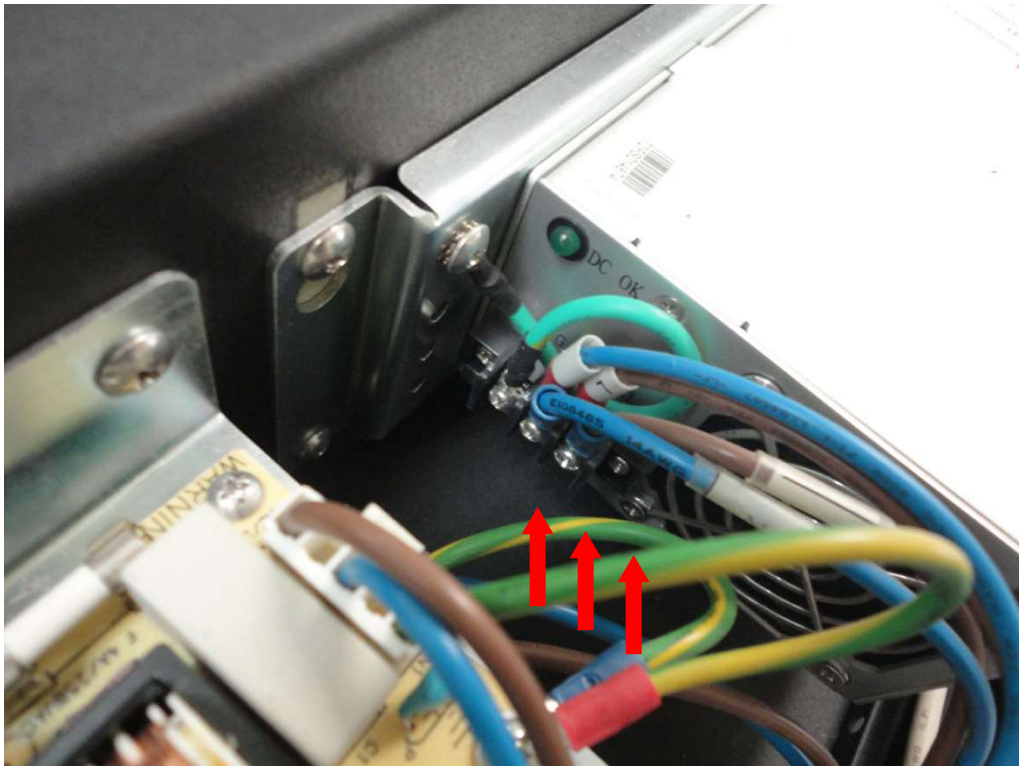
2. Loosen the screws and remove the two power supply AC side cable (red arrow)



3. Remove the DC side 3 cables (see red screws)



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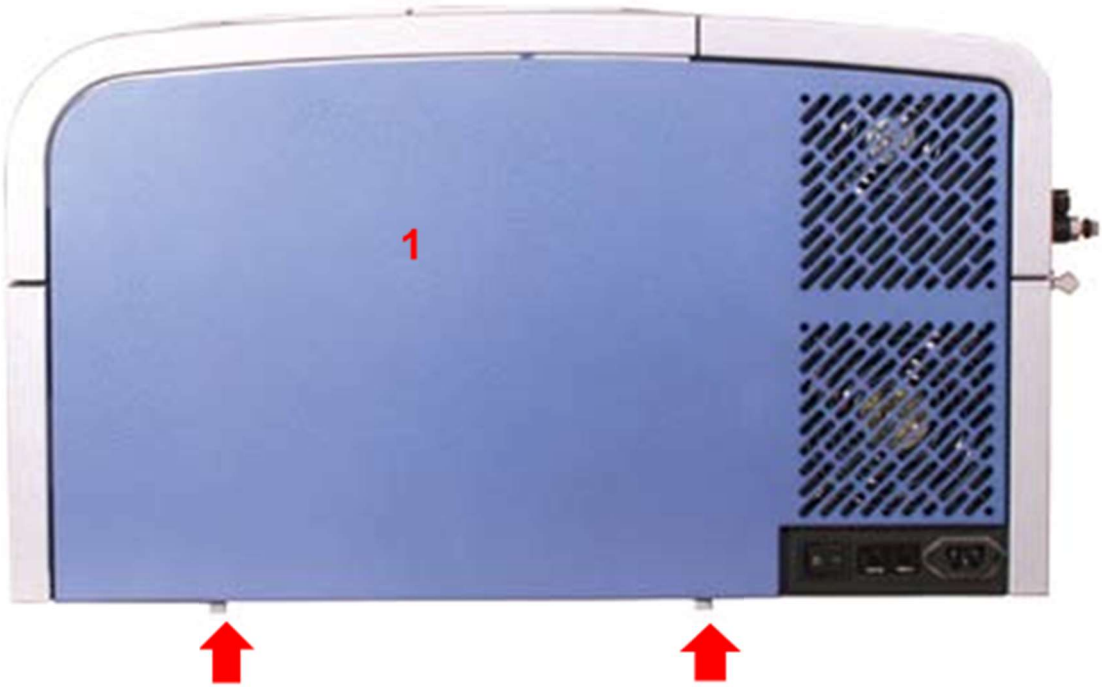
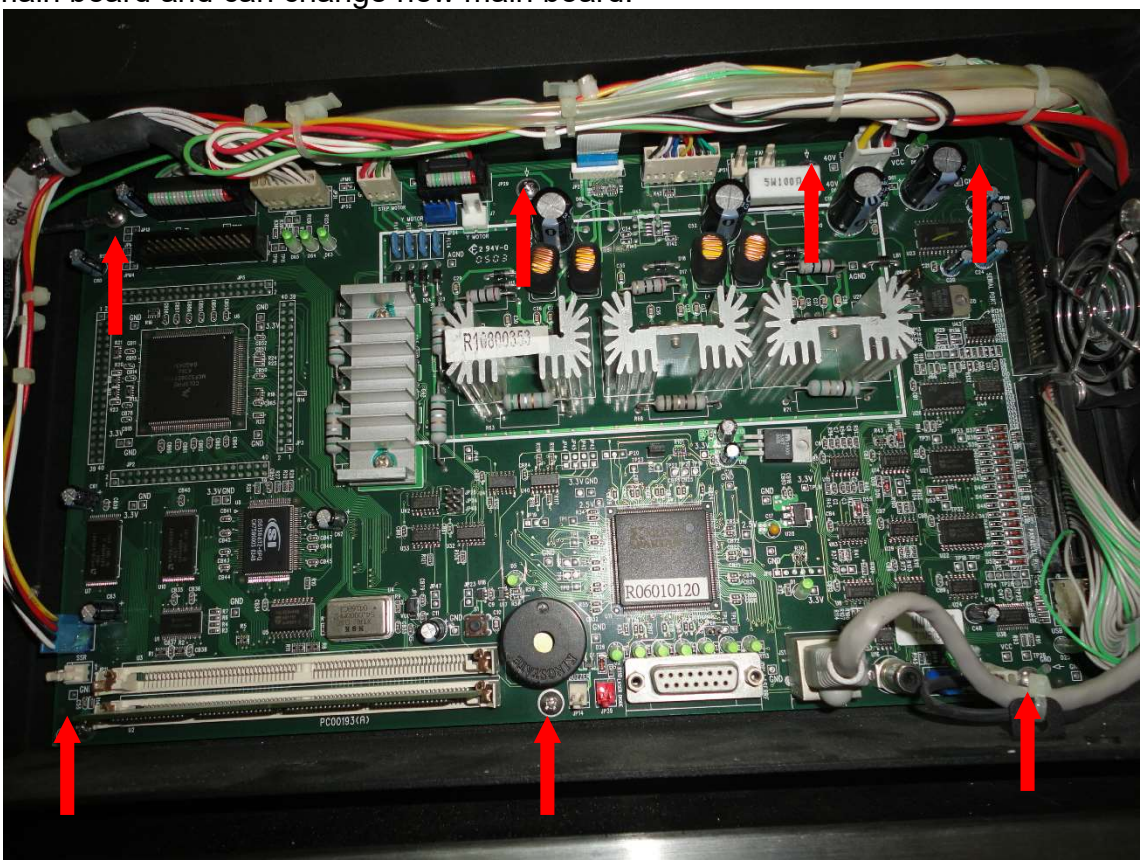
6.6 Changing main board (5206e)

1. Dismount two screws on the bottom of side panel (see red arrows below)

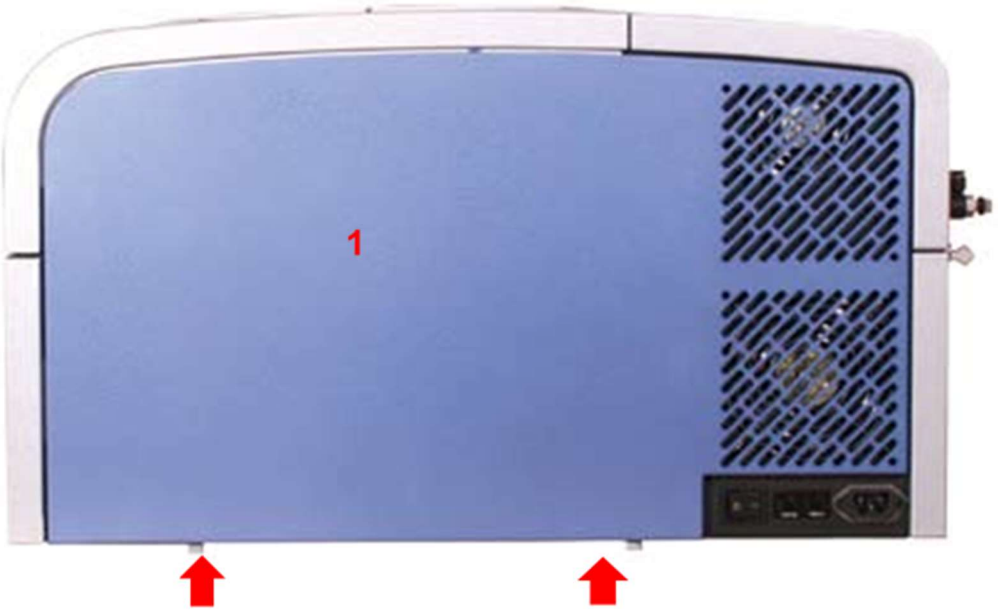


2. Dismount 7 screws (see red arrows below) and remove all cables connecting to main board and can change new main board.



6.7 Changing control panel

1. Dismount two screw on the bottom of side panel (see red arrows below)



2. Dismount two screws of right-front cover(M3 *2)

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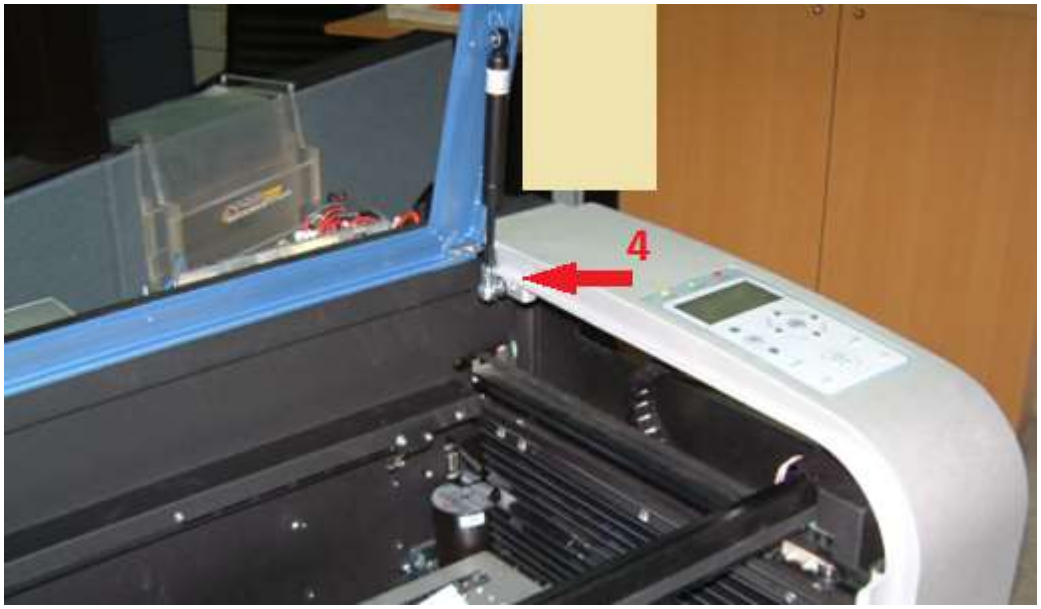
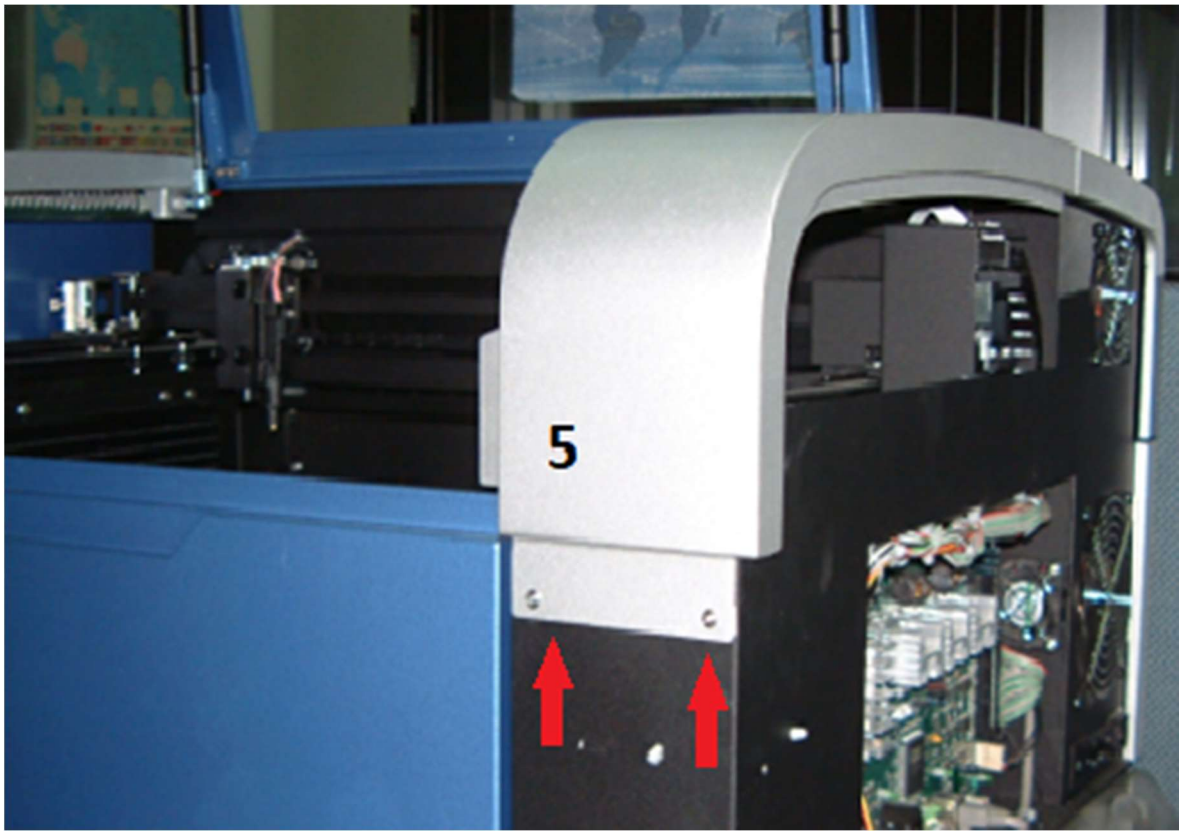
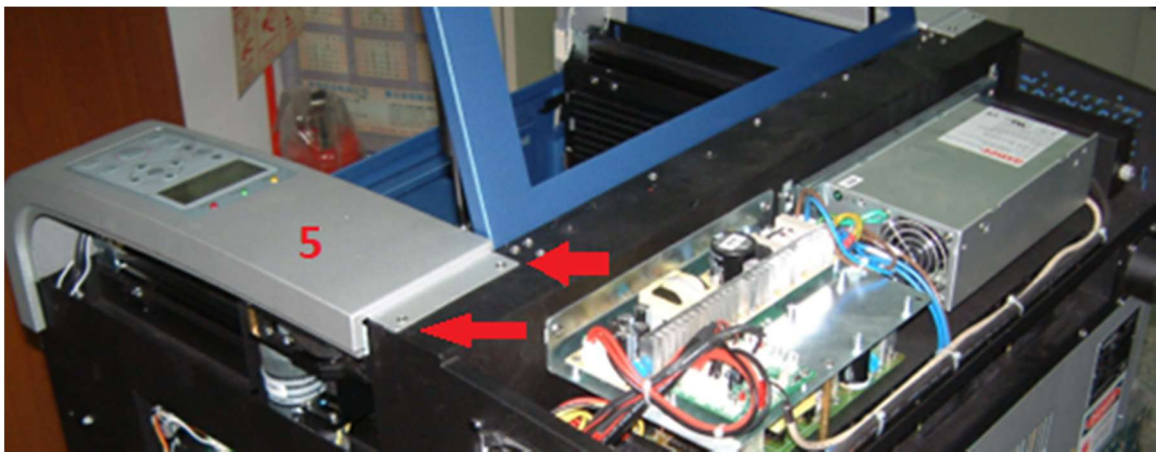
3. Dismount 4 screws of back cover(M3 *4

4. Dismount right window cylinder



5. Dismount 4 screws of right top cover (where the control panel locates)





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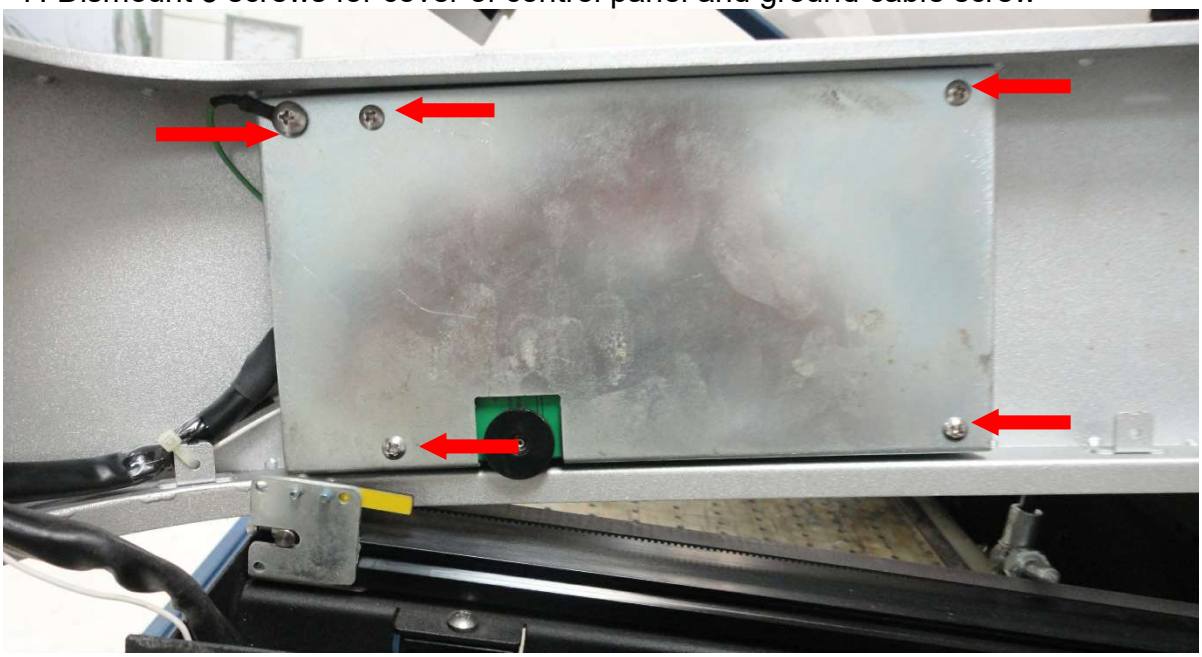
6. Hanging the right top cover to the right side.

7. Dismount 5 screws for cover of control panel and ground cable screw



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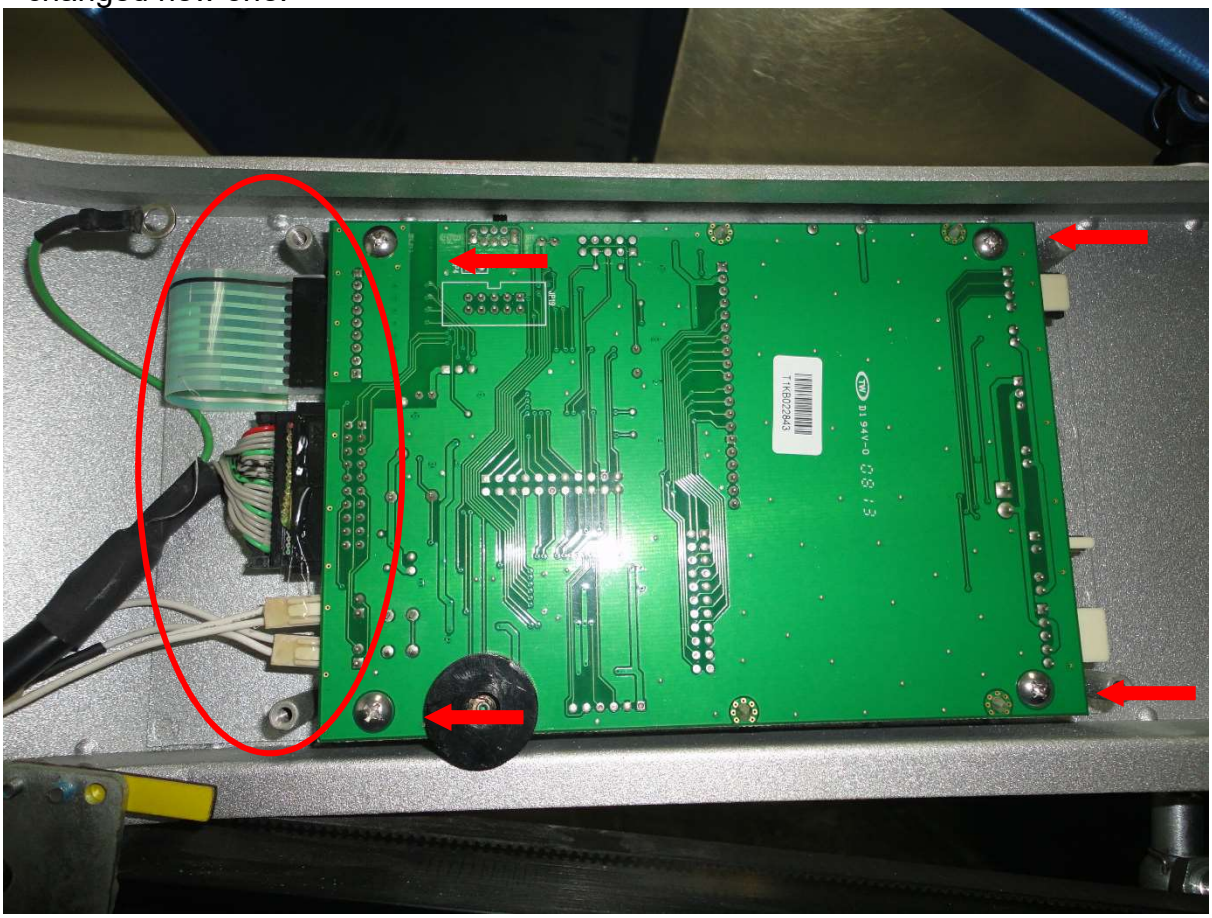
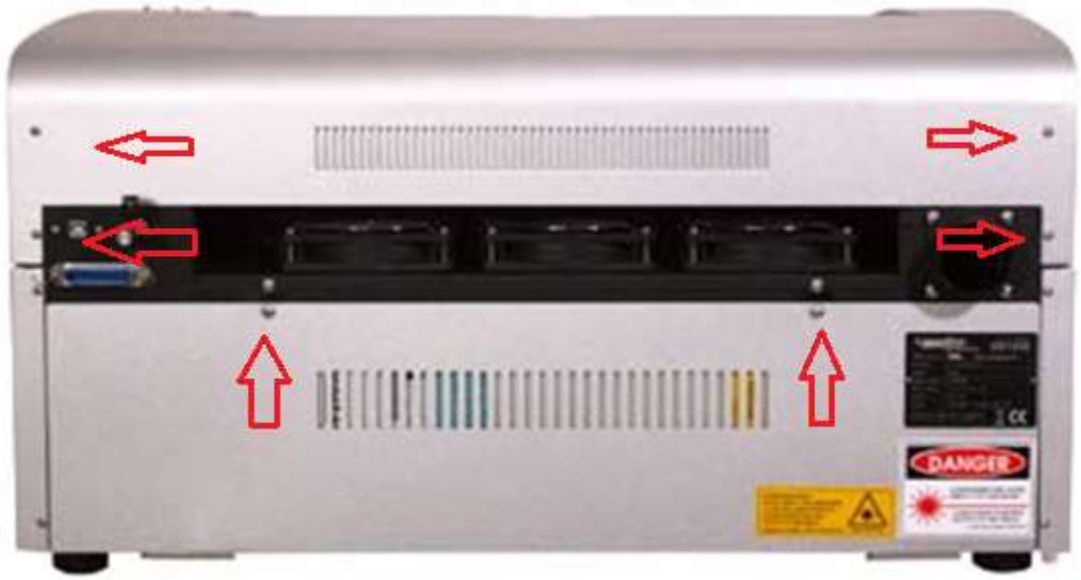
8. After control panel cover is removed, there are 4 screws needs to be removed and the four cables (in the red circle). Then the control panel can be removed and changed new one.



6.8 Changing laser tube & cooling fans

1. Dismount the screws of back covers (back top and back bottom cover)



2. Remove left side cover: first remove the two screws on the bottom (red circles)

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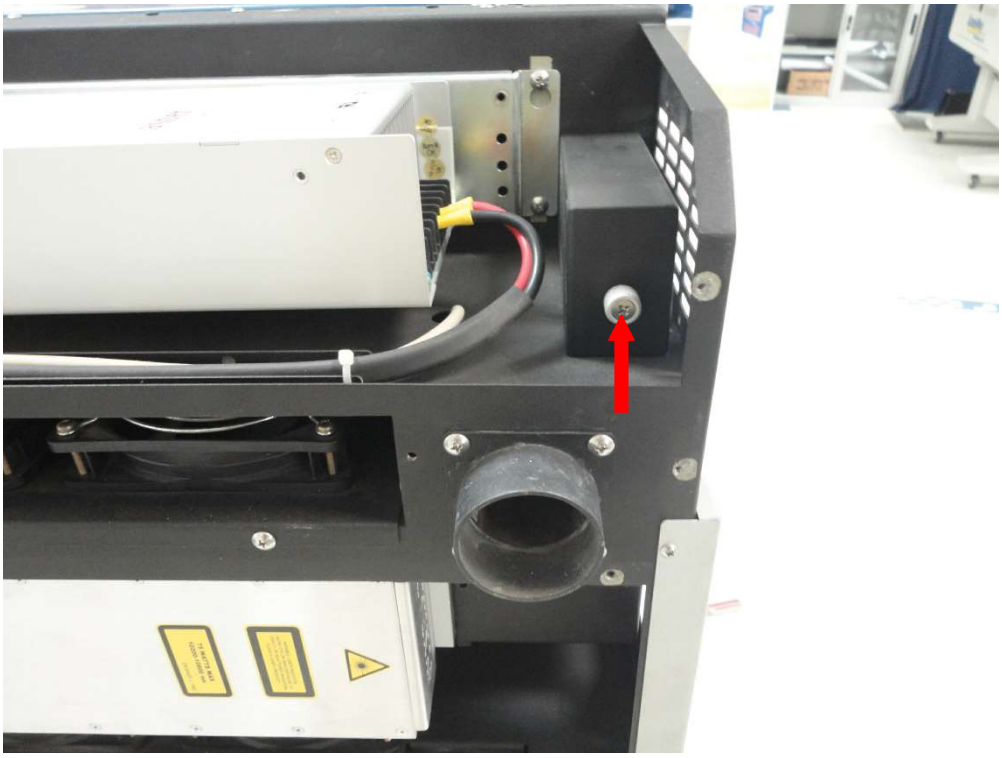
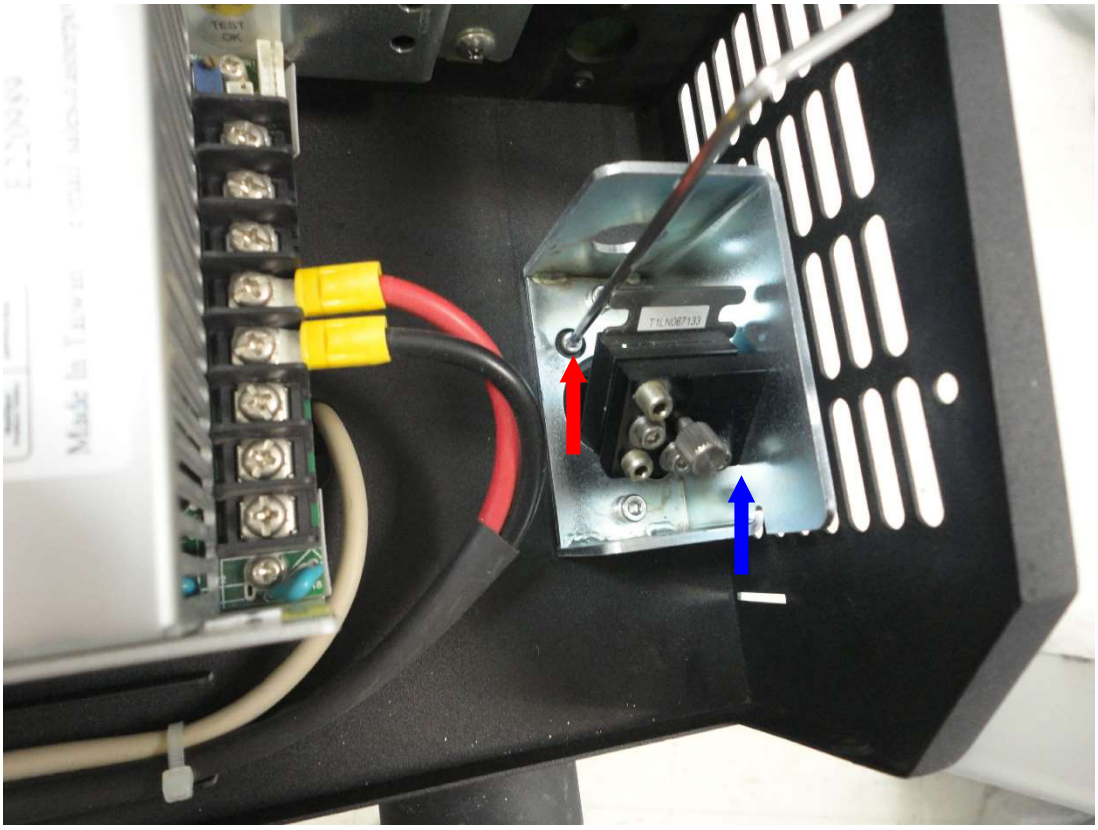
2. Then loosen screw and remove for the second mirror dust cover



3. There are two screws for dust prevention pipe. The top screw(red arrow) can be reached easily, but the bottom screw (blue arrow) will be blocked by mirror 2 bracket



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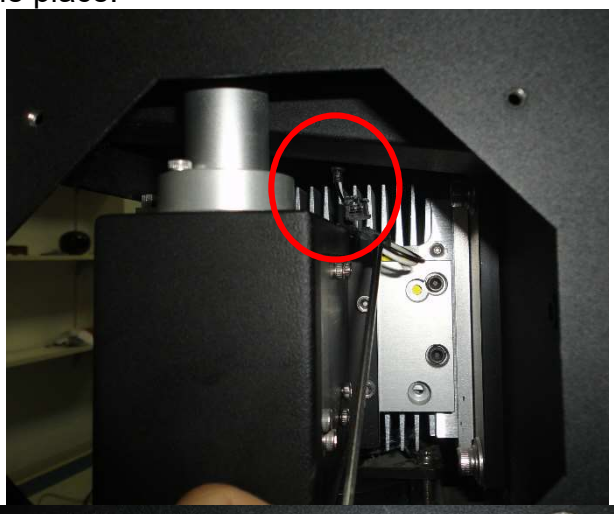
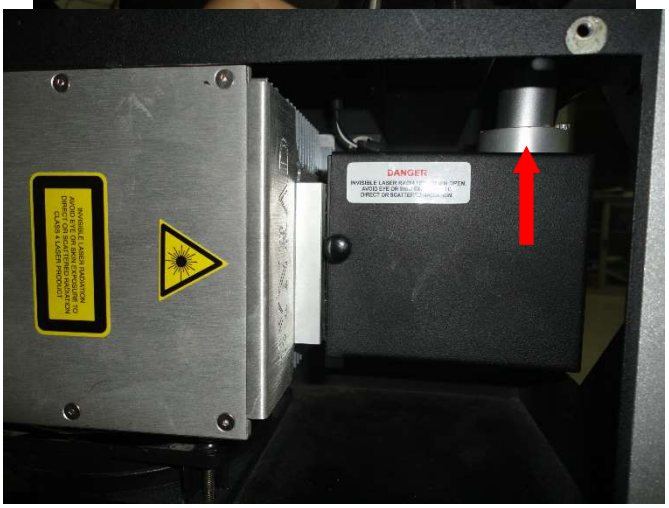
4. The mirror 2 bracket has two screws. Loosen one screw and remove one screw can let mirror 2 bracket rotate some angle and let the Allen key reach the bottom screw of mirror 2 bracket (the blue arrow)

6. Remove the red beam mirror cable (see red circle) and remove the screw of mirror 1 dust cover(see red arrow). When laser tube is removed, the mirror 1 dust cover can still stay at same place.





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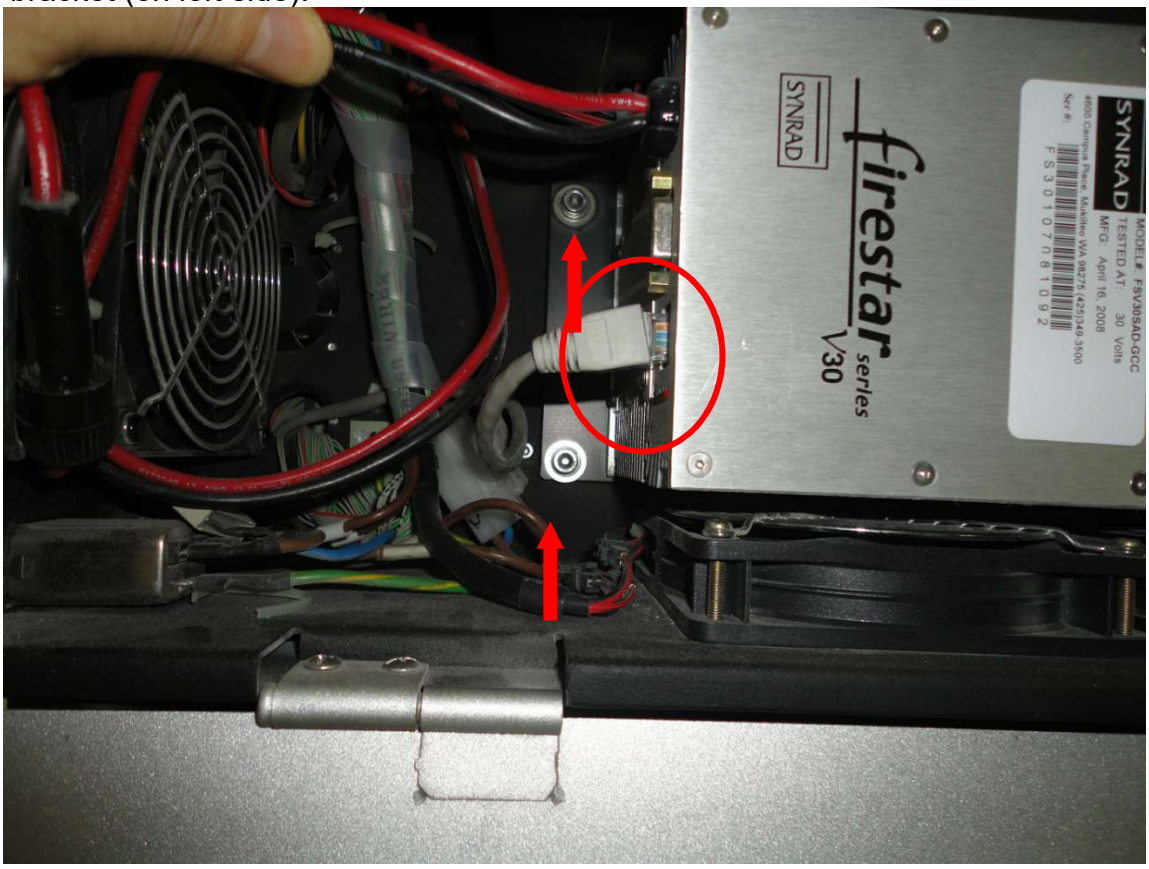
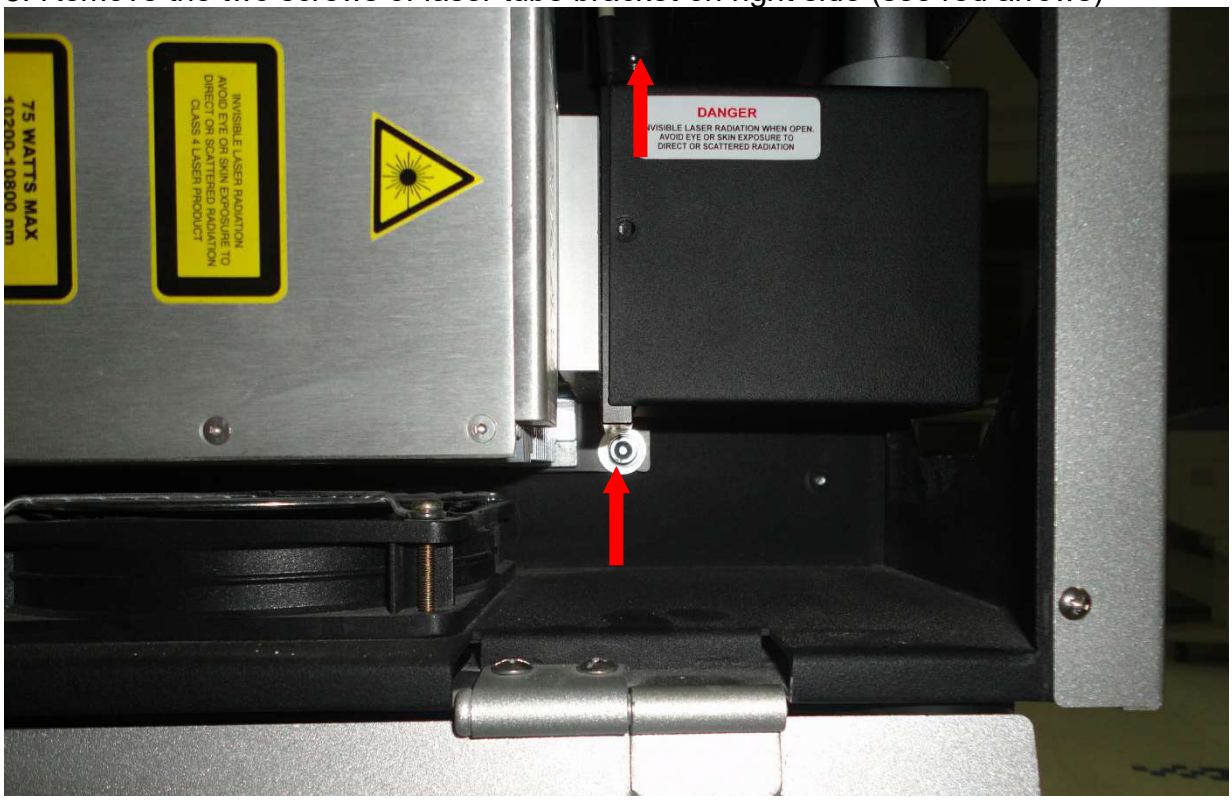
7. Remove the laser tube signal cable (red circle) and two screws of laser tube bracket (on left side).



8. Remove the two screws of laser tube bracket on right side (see red arrows)



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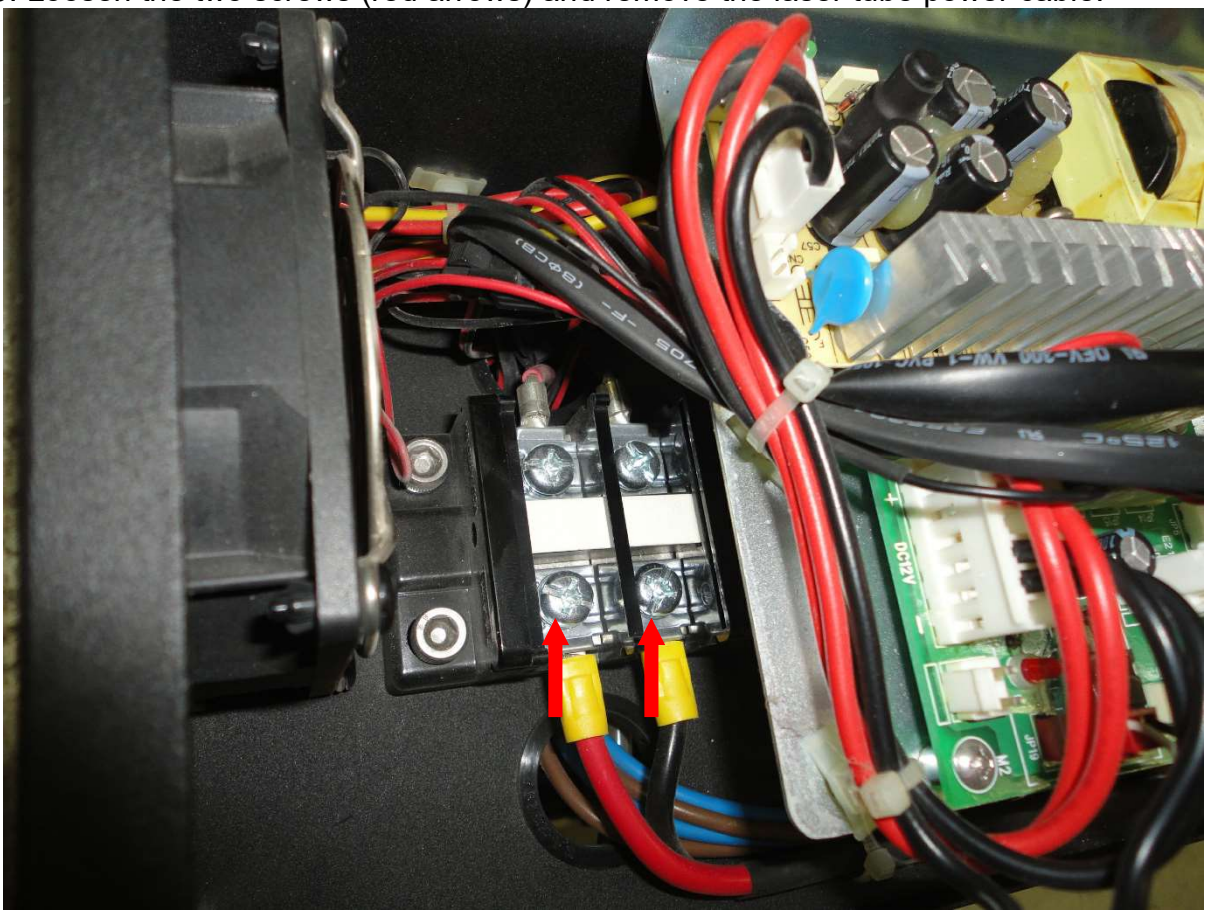
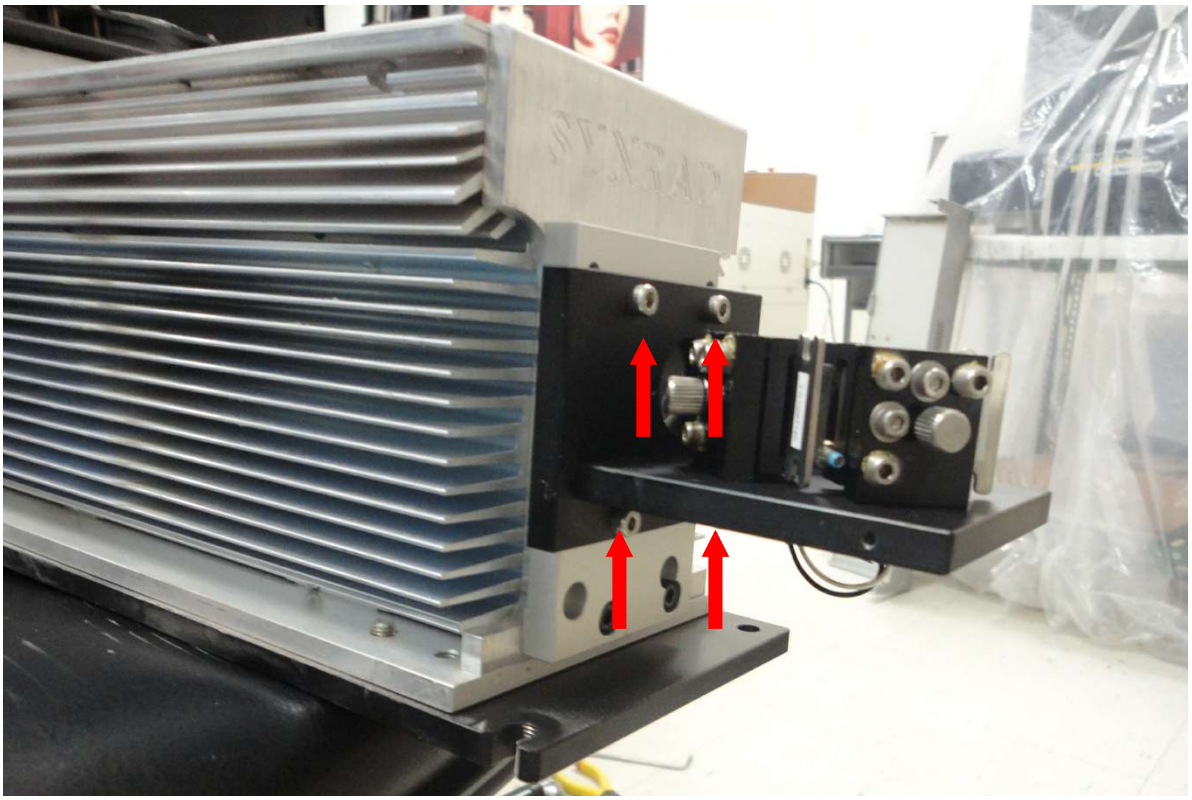
9. Loosen the two screws (red arrows) and remove the laser tube power cable.



10. When replace new laser tube and send back laser tube for repair, the front bracket need to be removed (remove four screws that red arrows pointed) and do not send back this bracket.



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11. Remove the three screws (red arrows) from laser tube bottom bracket. Then the laser tube changing process is finished

12. For changing bottom cooling fans, the laser tube need to be removed first and then the screws driver can reach the fan screws

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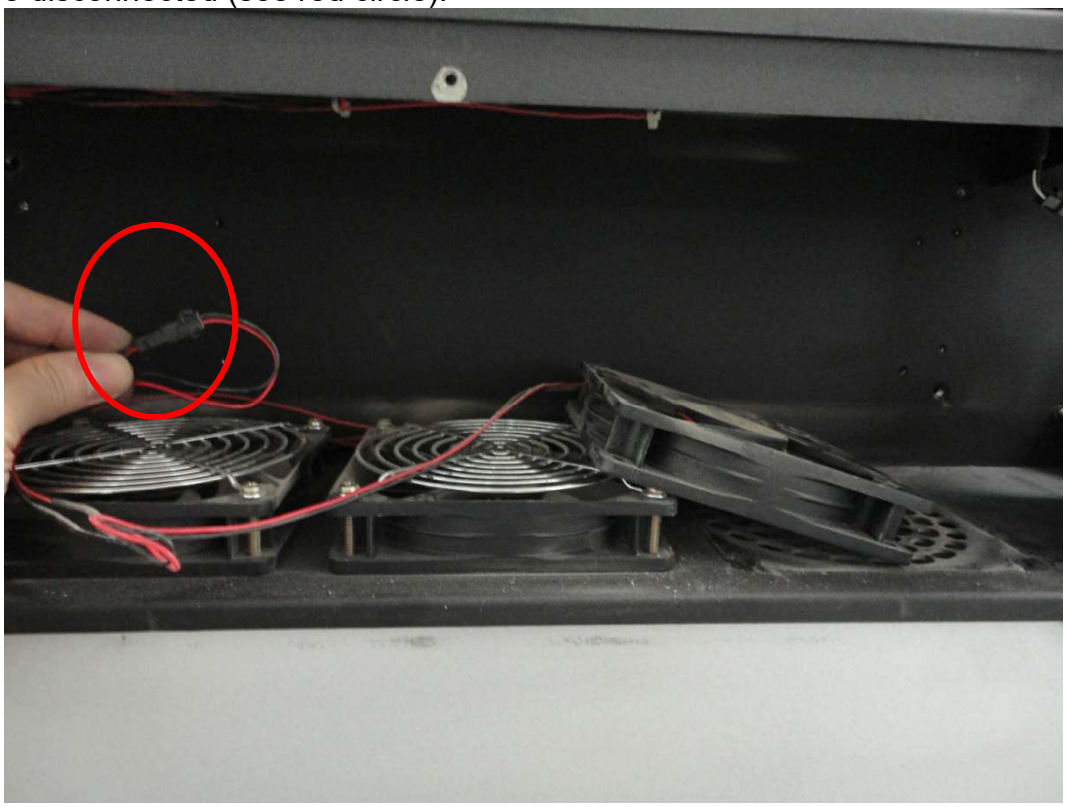
13. When four screws of cooling fans are removed, the cooling fan cable also needs to be disconnected (see red circle).



14. For changing top cooling fans, there are 6 screws need to be removed. See red arrows on below two pictures.

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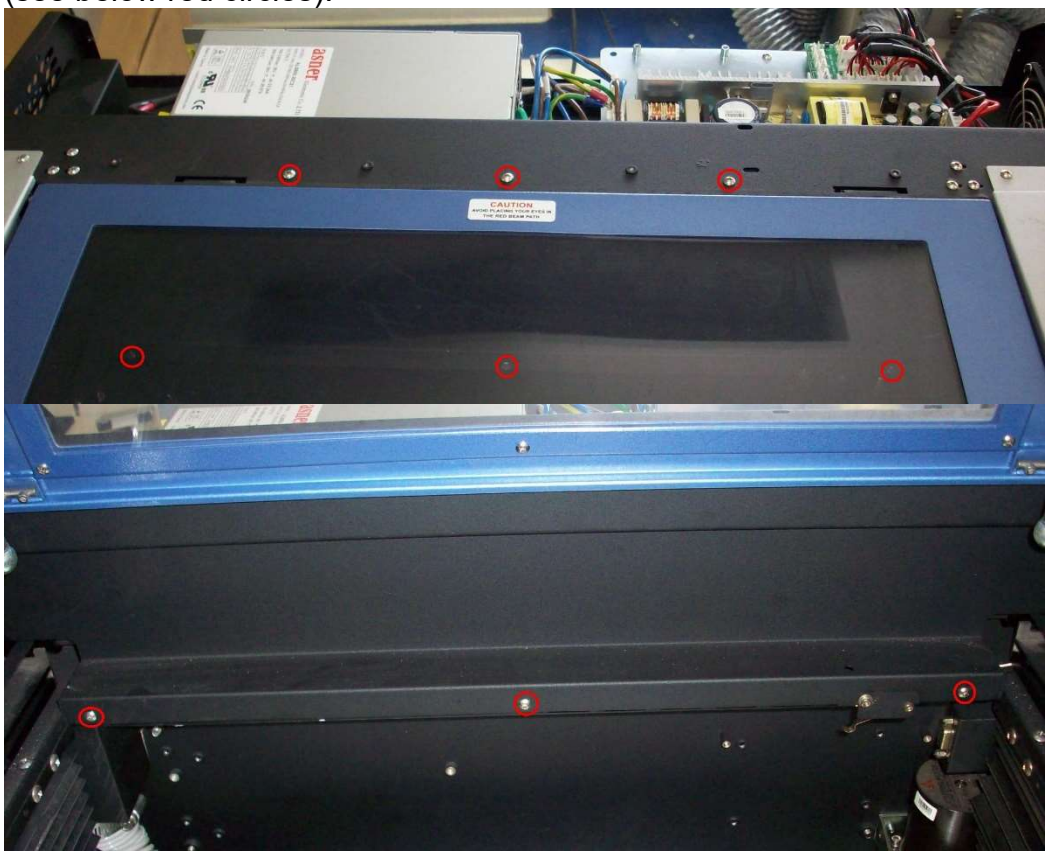
15. Then remove the 4 screws of that defective fan and then also remove the cable of those defective fans.

6.9 Fire alarm installation process

1. Remove back-top cover by removing four screws (see red circles below).

2. Remove shield cover by removing 6 screws. 3 screws on top and 3 screws inside (see below red circles).



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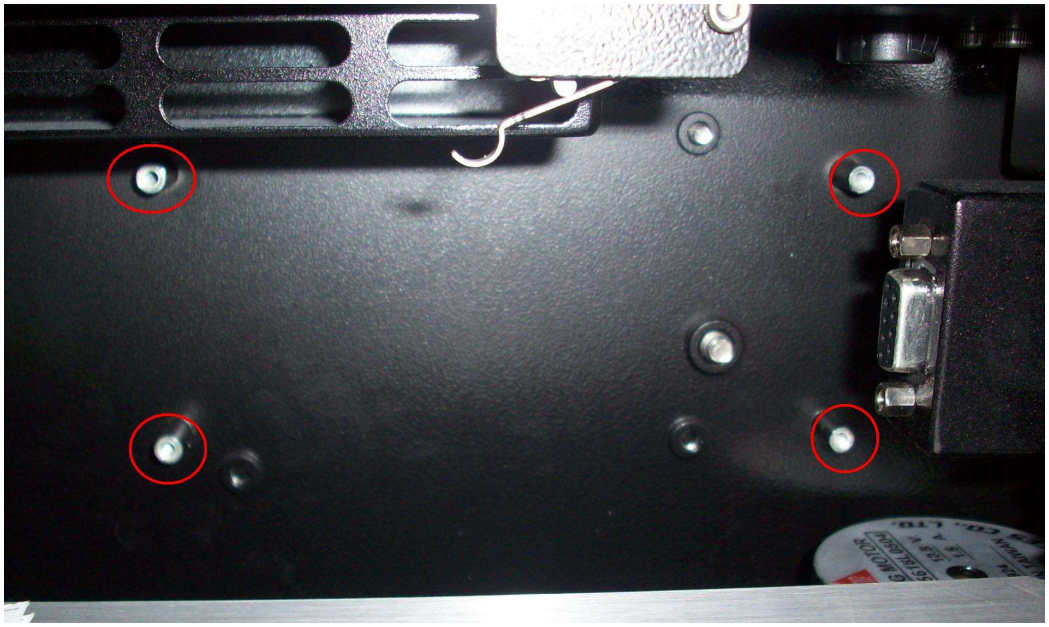
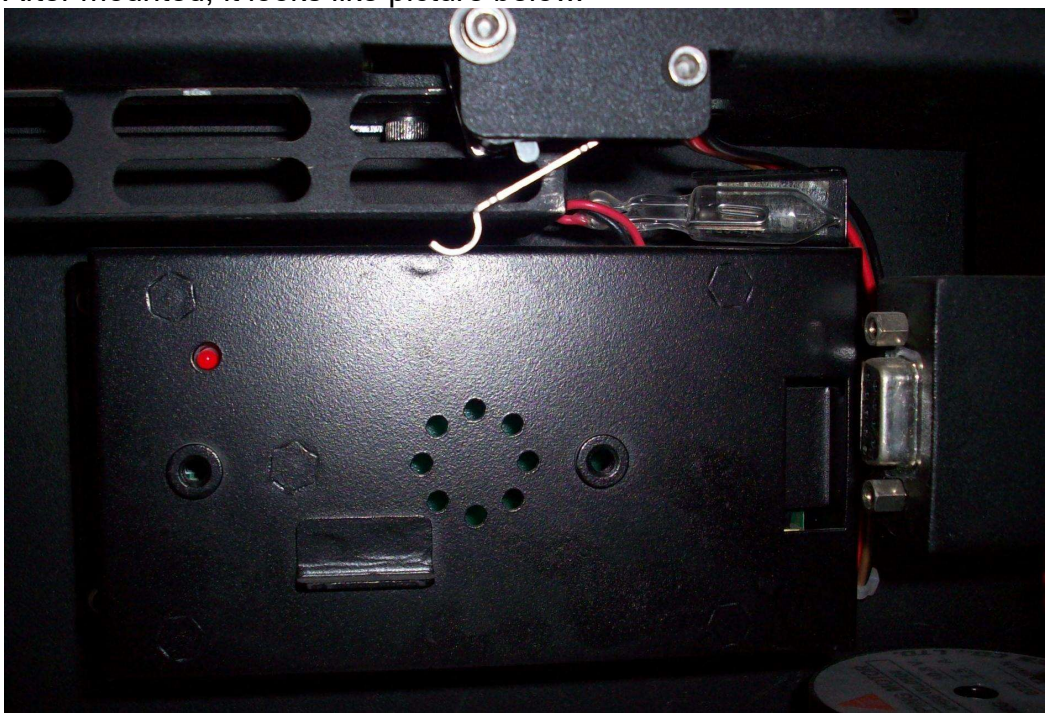
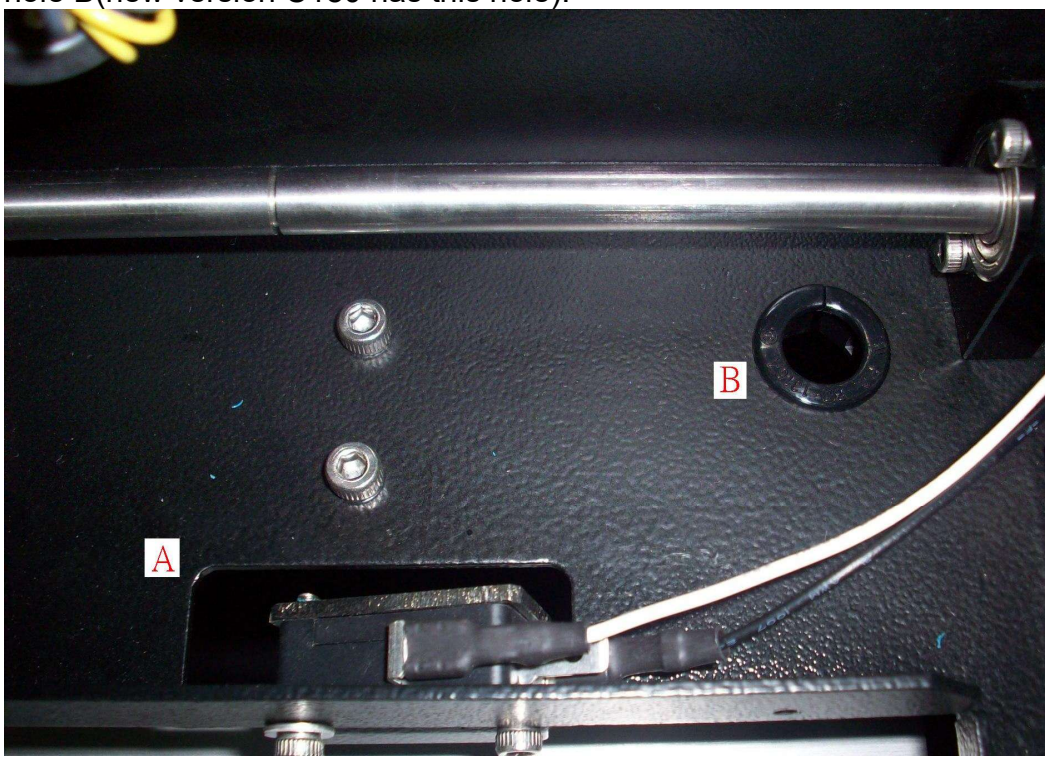
3. Fire Alarm (or called Smart Guard) is mounted on the four screws(see red circles below).



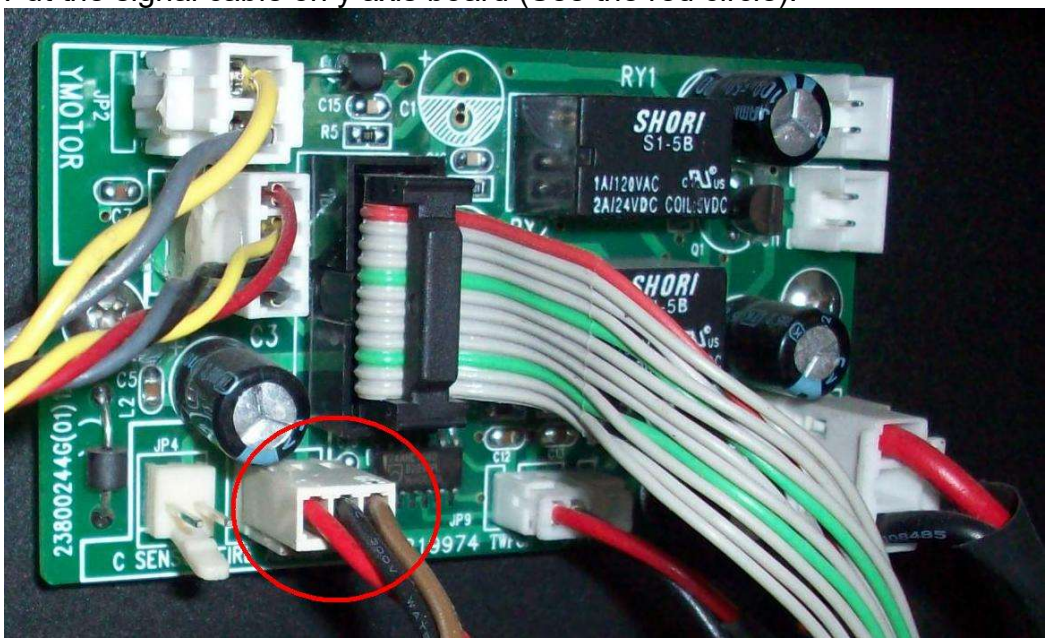
4. After mounted, it looks like picture below.



5. For signal cable, it can pass through hole A (old version C180 only has A hole) or hole B(new version C180 has this hole).



6. Put the signal cable on y axis board (See the red circle).



7. Mount all the screws of shield cover and back-top cover.

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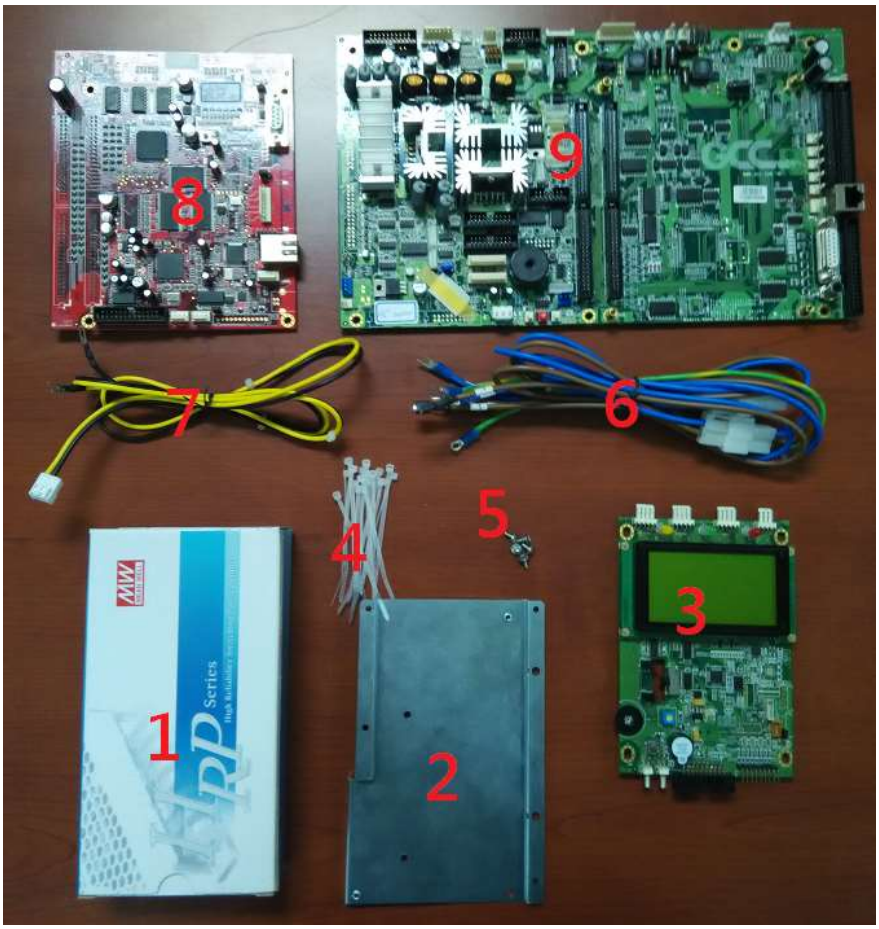
6.10 5206E M/B upgrade to 5272 M/B upgrade kit instruction (Model : C180II)

Please check if all the parts of the upgrade kit are included

NO.	P/N	Description	Quantity
1	245000990G	Power supply	1
2	244049450G	Power adapter plate	1
3	290082830G	Control Panel set	1
4	22000013G	Cable tie	15
5	25200010G	Truss head screw M3x6L	4
6	209025180G	ON/OFF SWITCH TO TWO P/S AC CABLE	1
7	209025210G	Power Supply to M/B DC Cable	1
8	290083920G	5272 M/B with C180II firmware	1
9	290079570G	Driver board set	1



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For the upgrading, we need a cross head screwdriver and a diagonal cutting plier.

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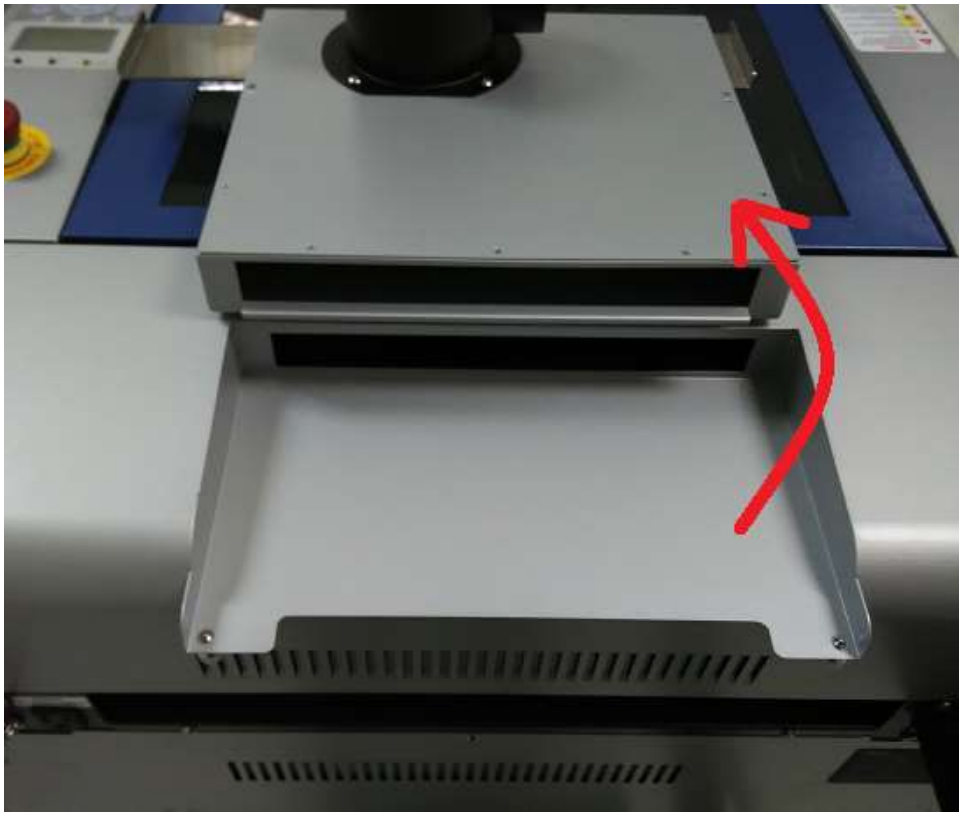
A. Replace the power supply

1. Loosen two screws next to the 4” air pipe hole on the back of machine. (refer to below pictures), so that the wind box can be lifted up.

2. Lift the wind box.



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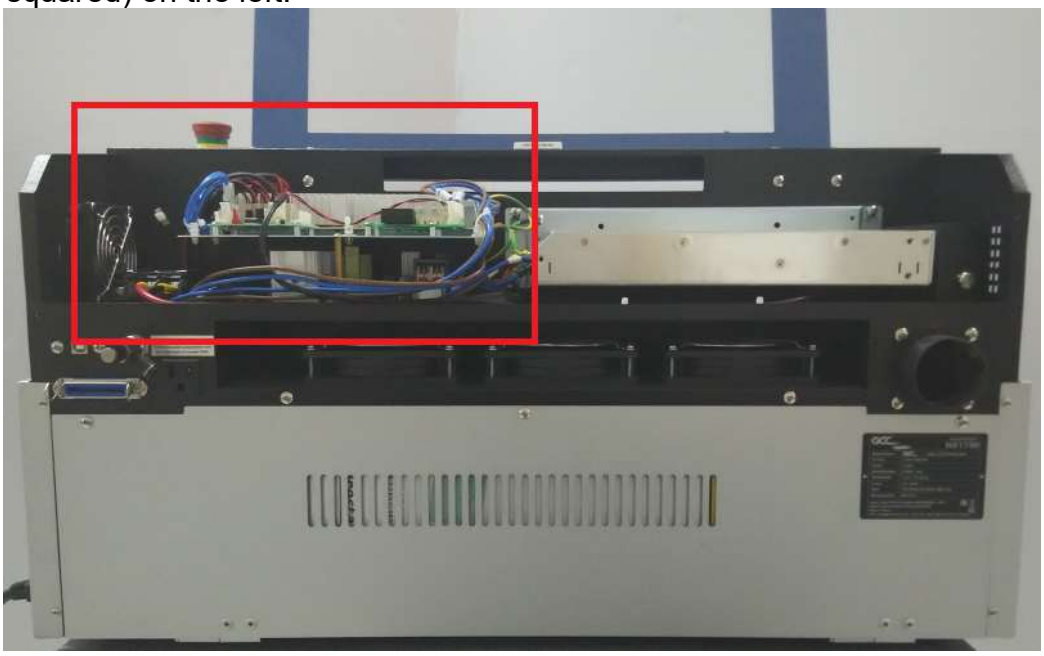
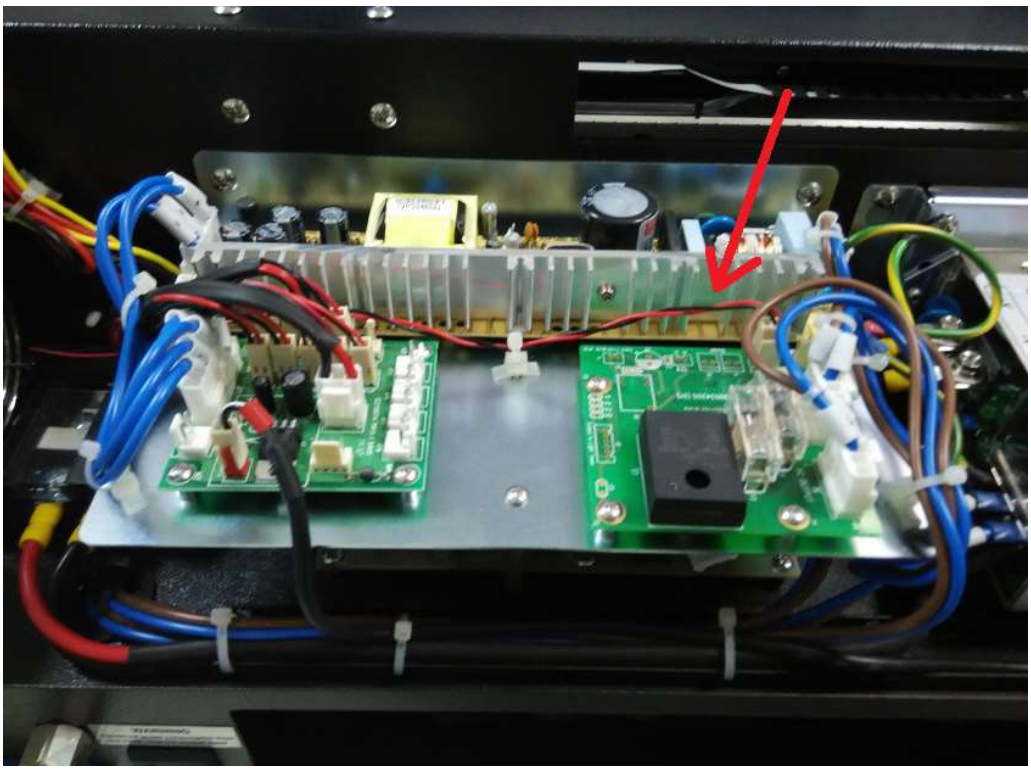
3. Refer to below picture to loosen the four screws on the back of machine, then the back cover can be removed.

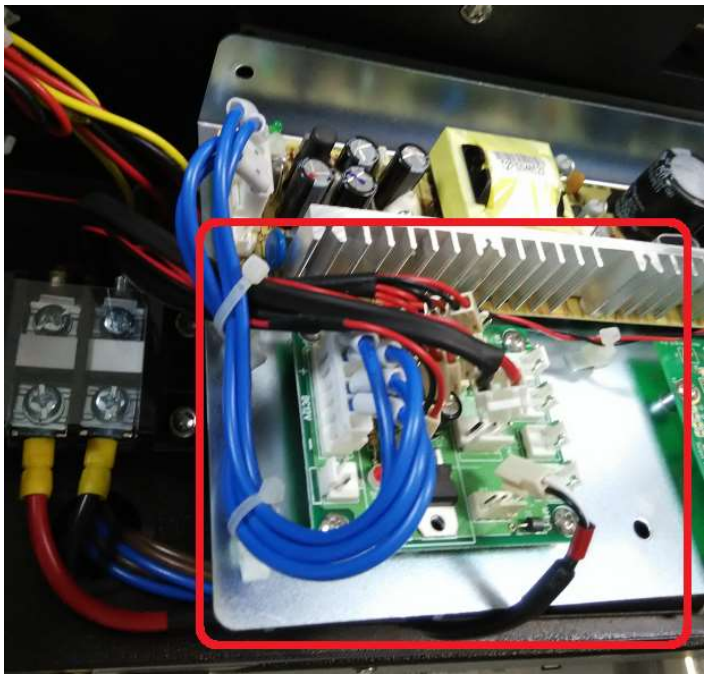
4. After the back cover is removed, you can reach the power board assembly (red squared) on the left.



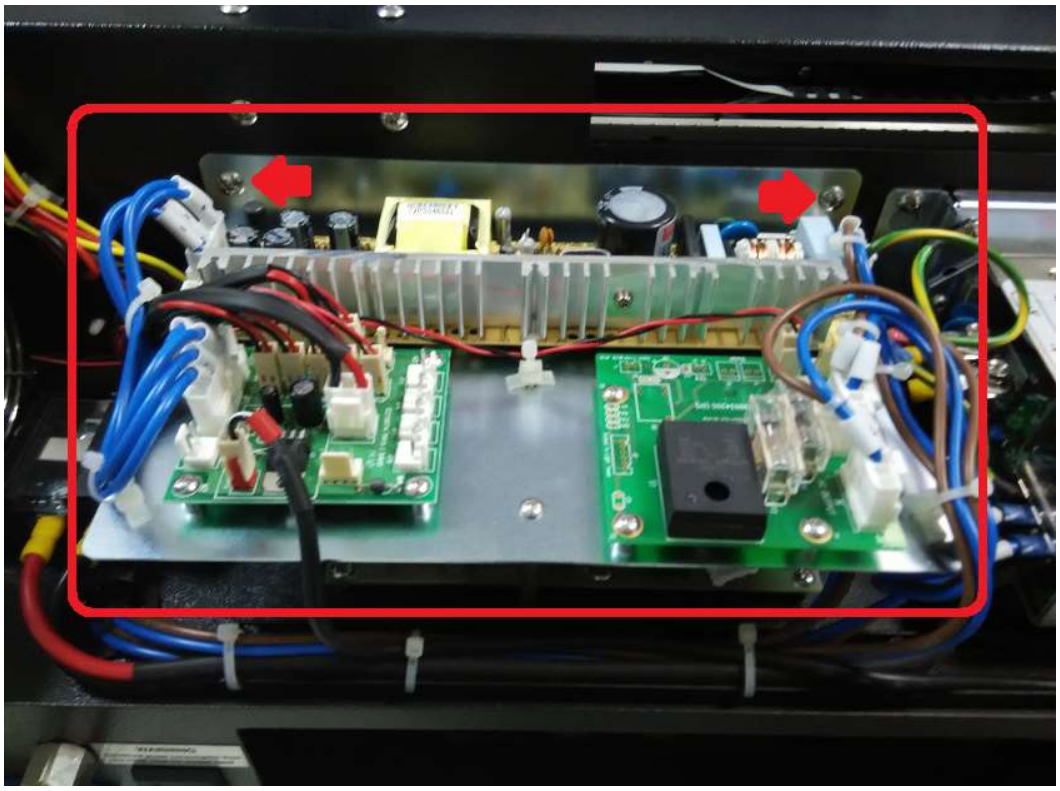
5. Unplug the 2-pin black-red twisted cable from the PCB



6. Refer to below picture and unplug all cables on the 12V transfer board.



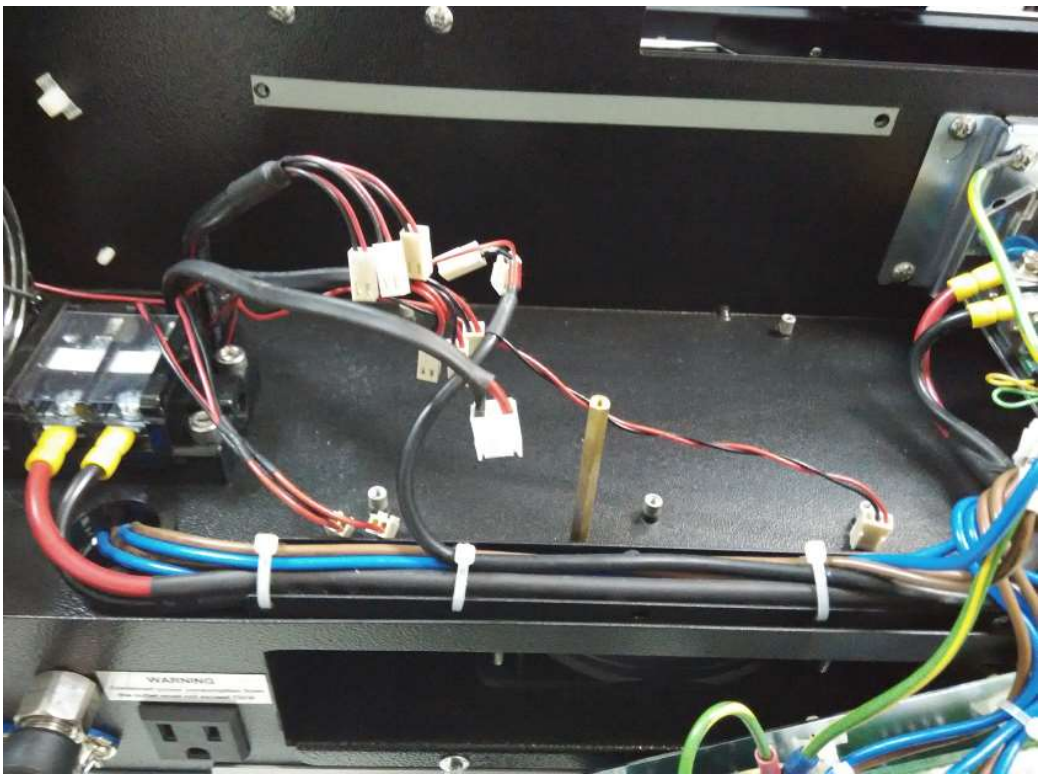
7. Refer to below picture to loosen the two screws which fix the power board plate, then you can remove the entire power board and it's plate so that you can reach bottom board, see next picture.



8. Refer to below picture to unplug the 4-pin cable connected to the down-right corner of the board.

9. Then, loosen the four screws which fix this power board, then we can remove the board, we will replace this board with new power supply.

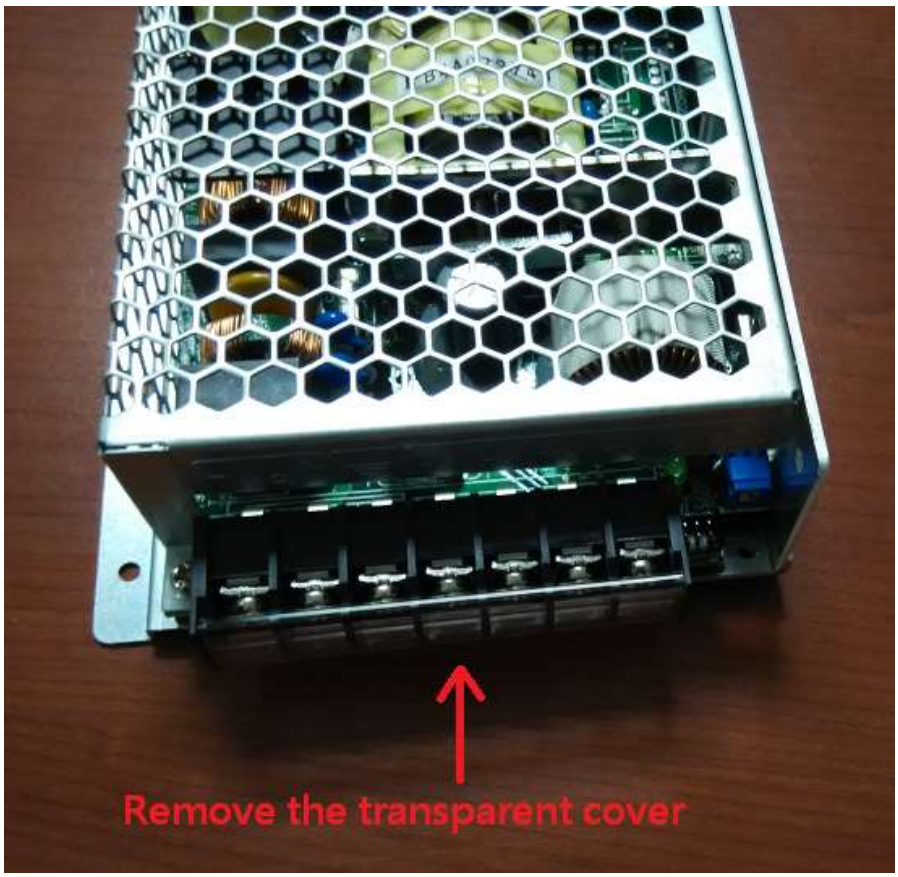
10. The board is removed.

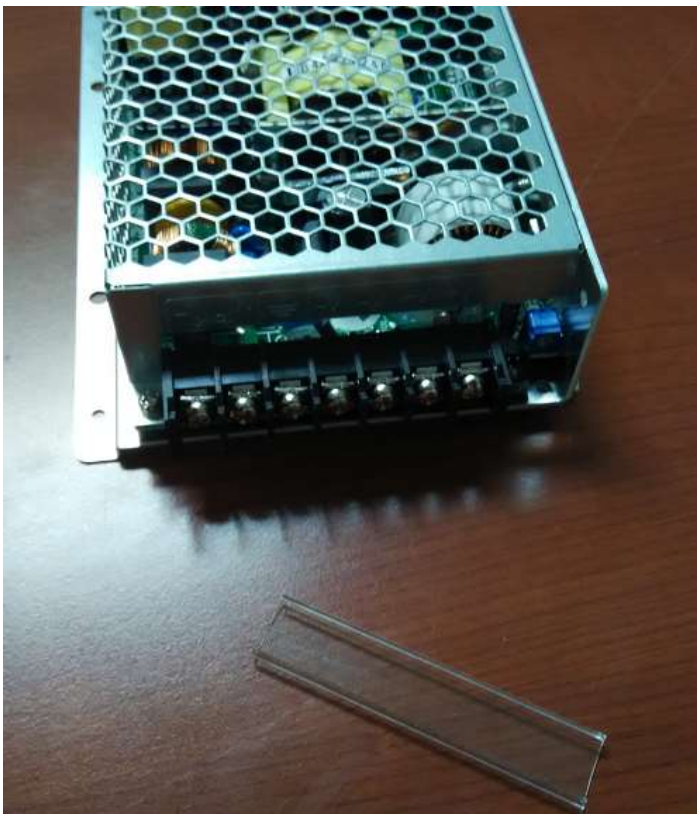


11. Unpack the power supply, we first have to assemble the power supply and it's mounting plate.

12. The power supply and the mounting plate are fixed by two truss head screws, refer to below picture to realize the corresponding screw holes. (Just put the plate on the power supply according to the direction below picture shows then fasten the screws)

13. Remove the transparent plastic cover which protects the distribution panel.





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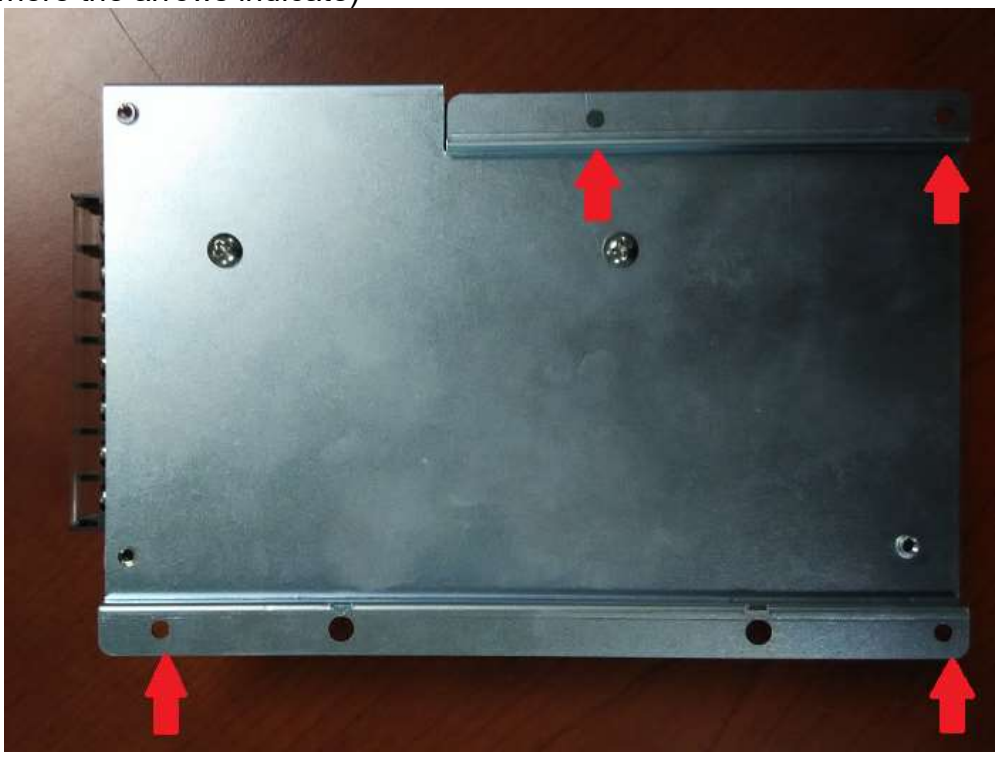
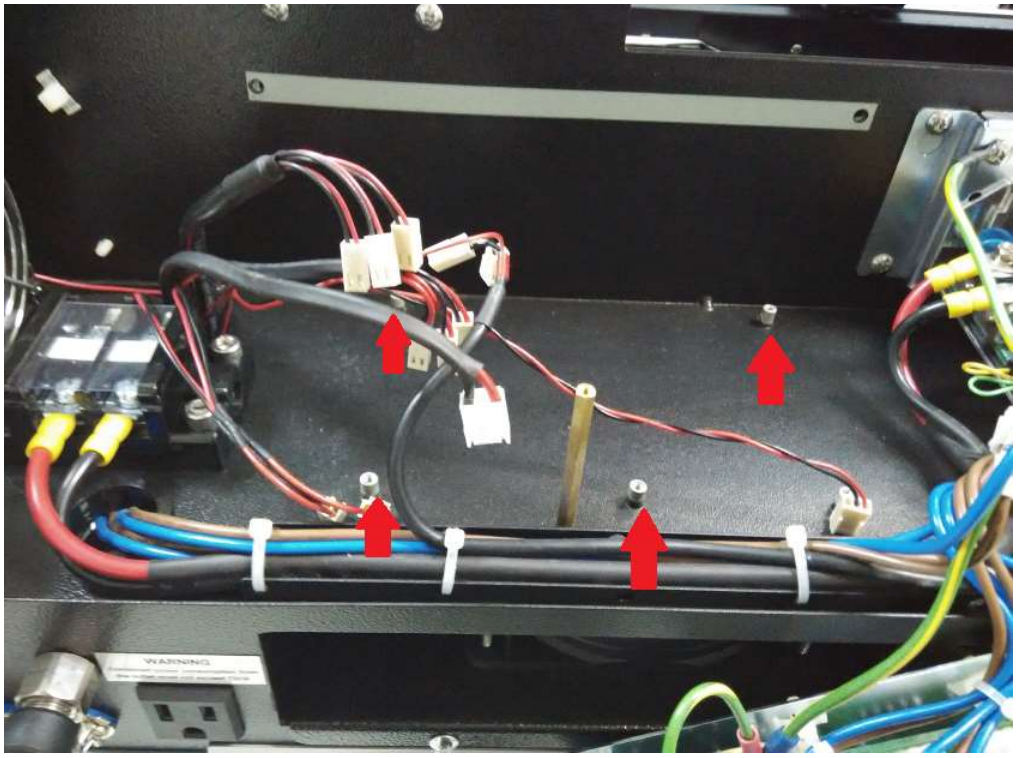
14. Install the new power supply to the position where original power board is installed by four truss head screws. (refer to below pictures, fix the screws to where the arrows indicate)





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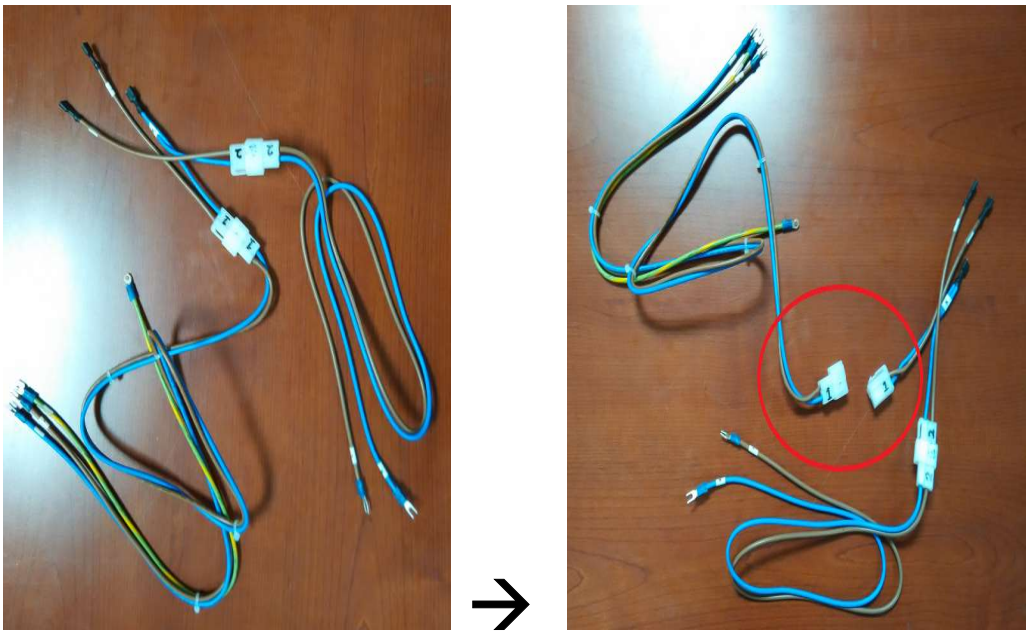
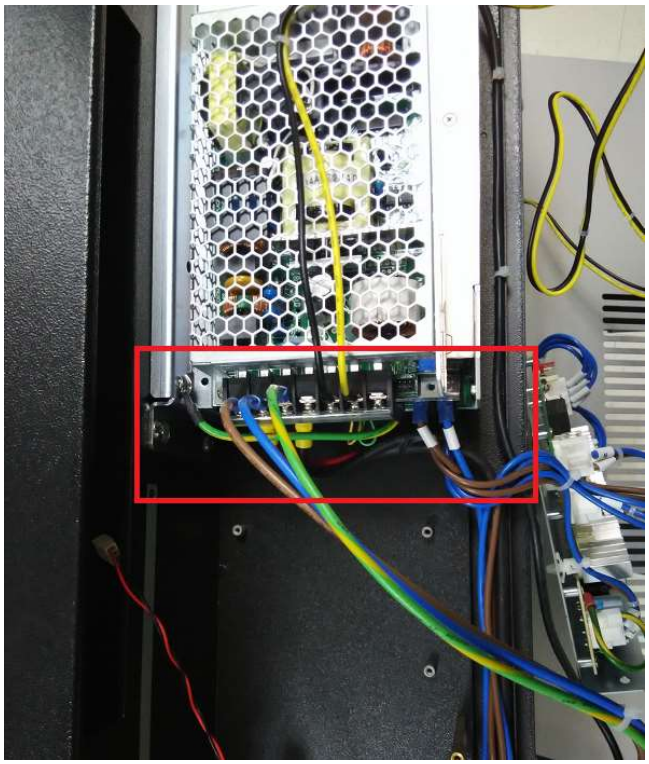
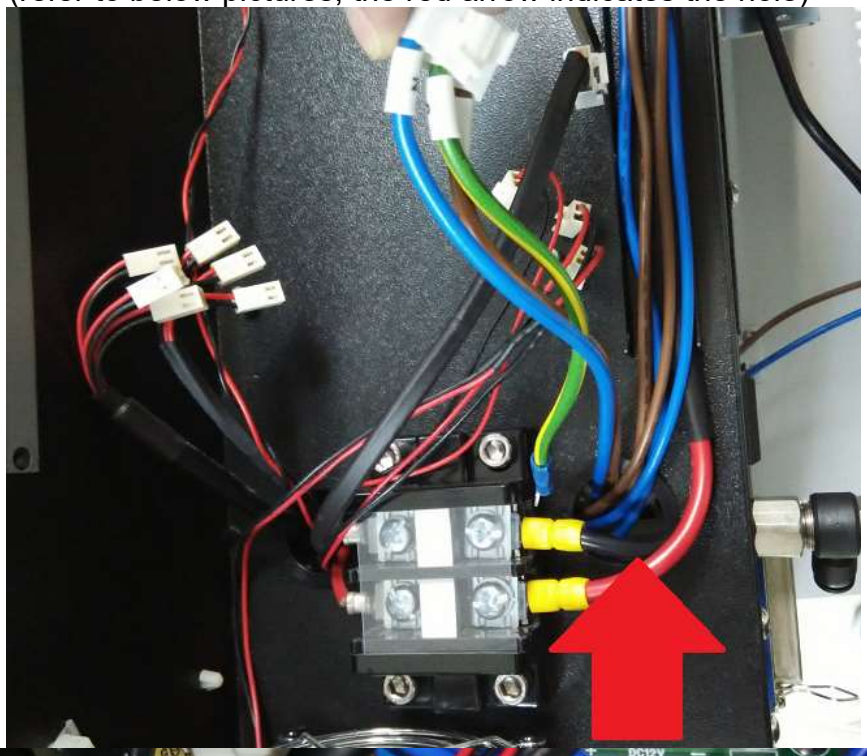
15. Separate the 3-way cable which have number marked from node number 1, we just need the left part cable in the picture.

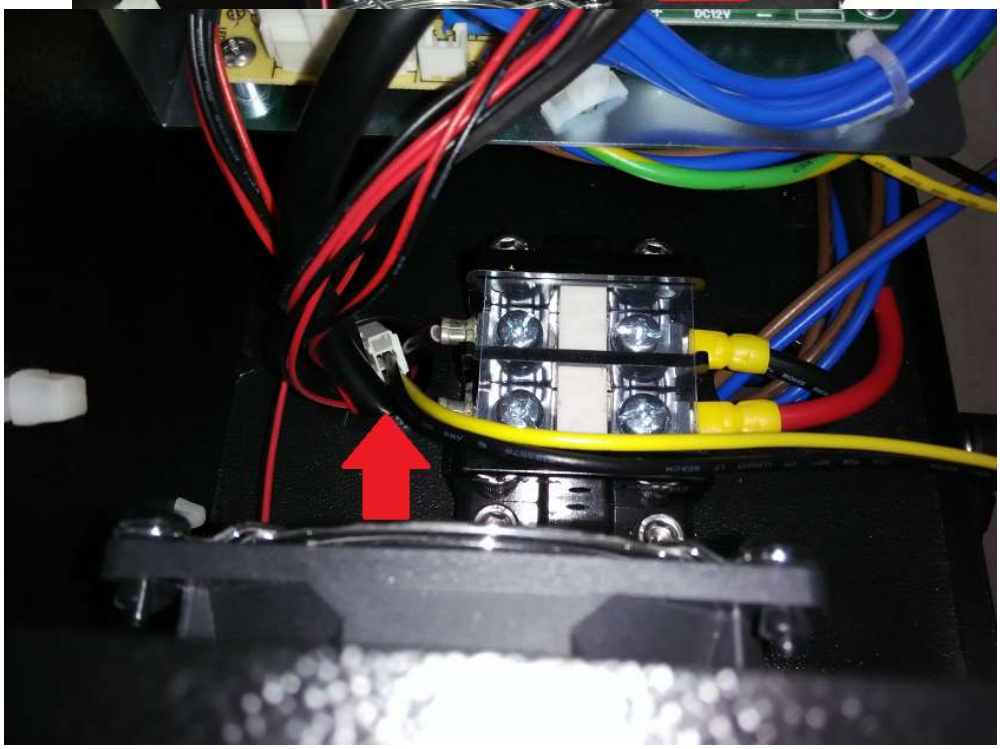


16. Connect the 3 way cable in step 15 and the 2-pin yellow/black cable included in the upgrade kit to the distribution panel of the new power supply according to below picture.



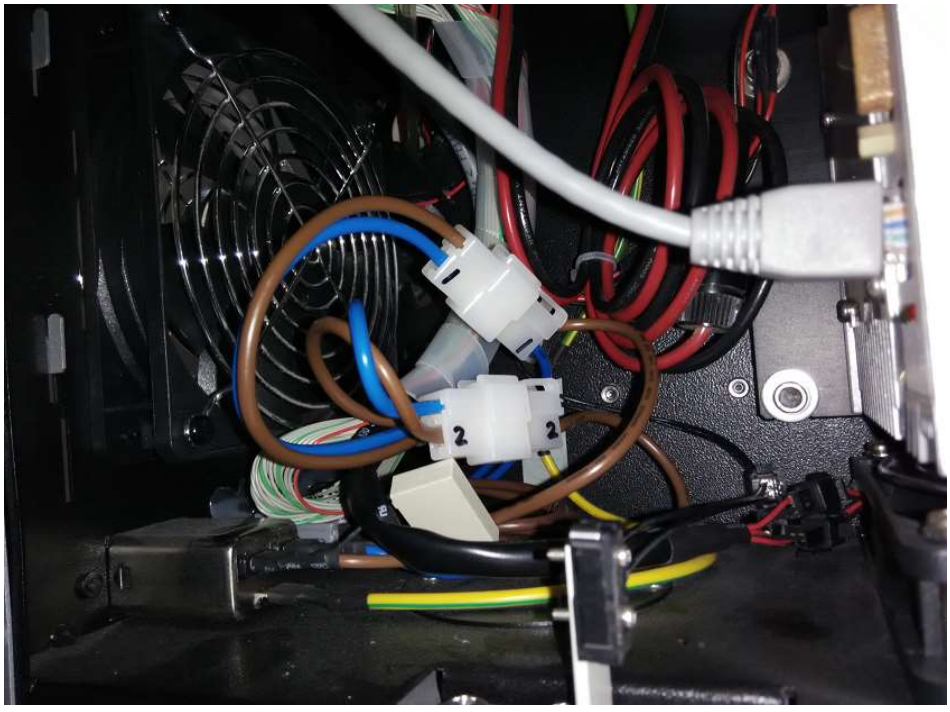
17. The other end of the cables we installed on step 16 please go through the cable hole located next to the to the machine distribution panel to the laser tube room. (refer to below pictures, the red arrow indicates the hole)

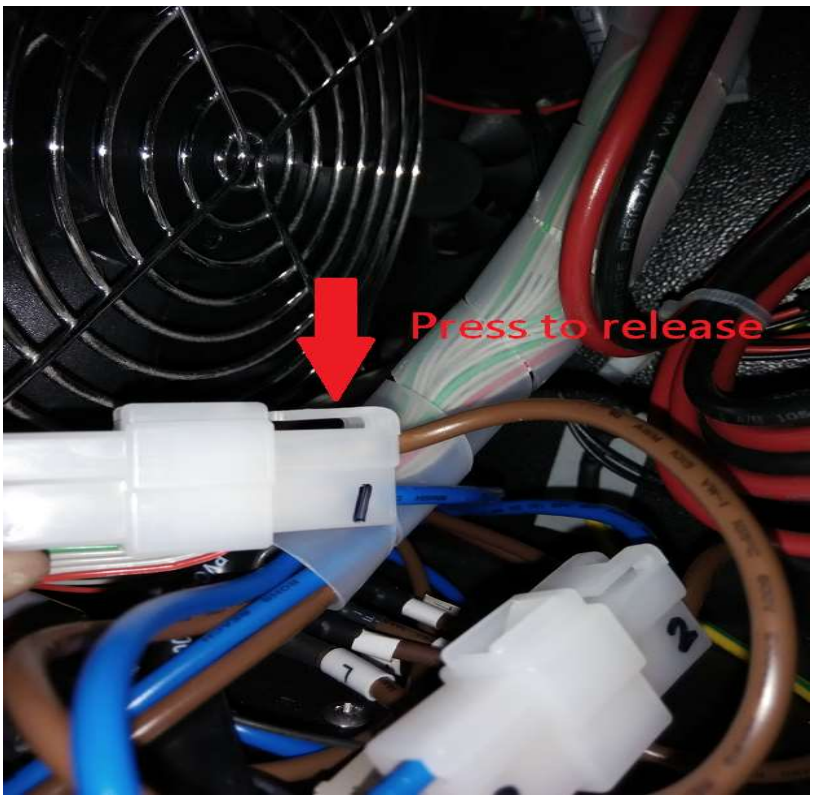




18. Loosen two truss head screws on the back bottom cover show in below picture then we can remove the cover to reach to the laser tube room.

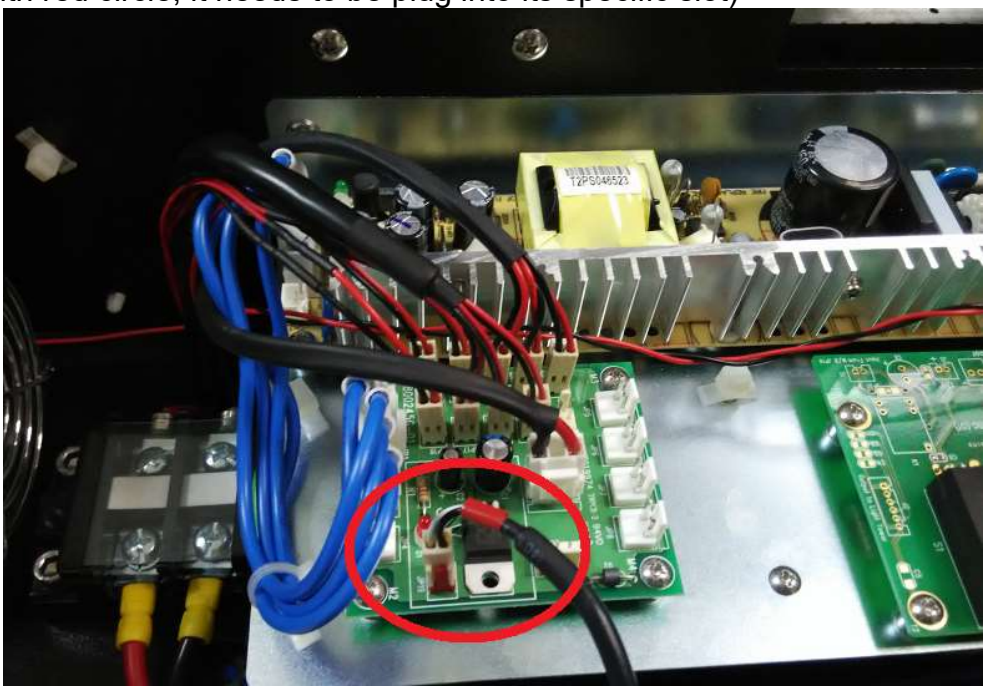
19. In laser tube room, next to the laser tube, you can find a cable set which have number marked, disconnect the node number 1 and replace by the other end of the cable in step 16. (as to the yellow/black cable, the other end will link to M/B room, will introduce later)





20. Restore the power board plate in step 7, plug back the two cable set according to below picture.(the red arrow indicates)

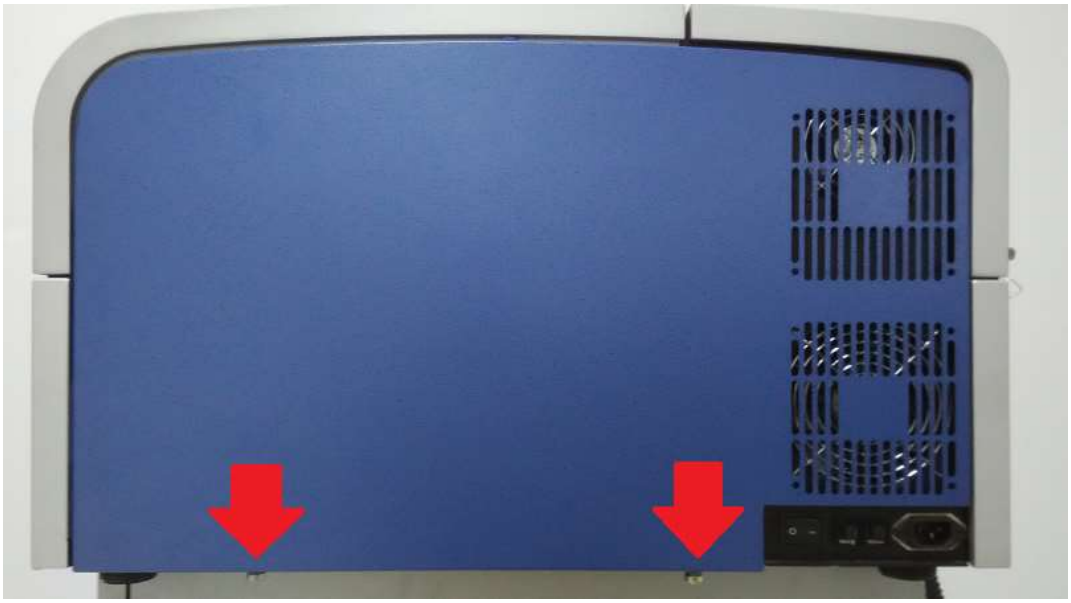
21. Restore all the 2-pin cables to 12V converter board (each cable can plug into any slot on the converter board, they are all the same except the bottom one with red circle, it needs to be plug into its specific slot)



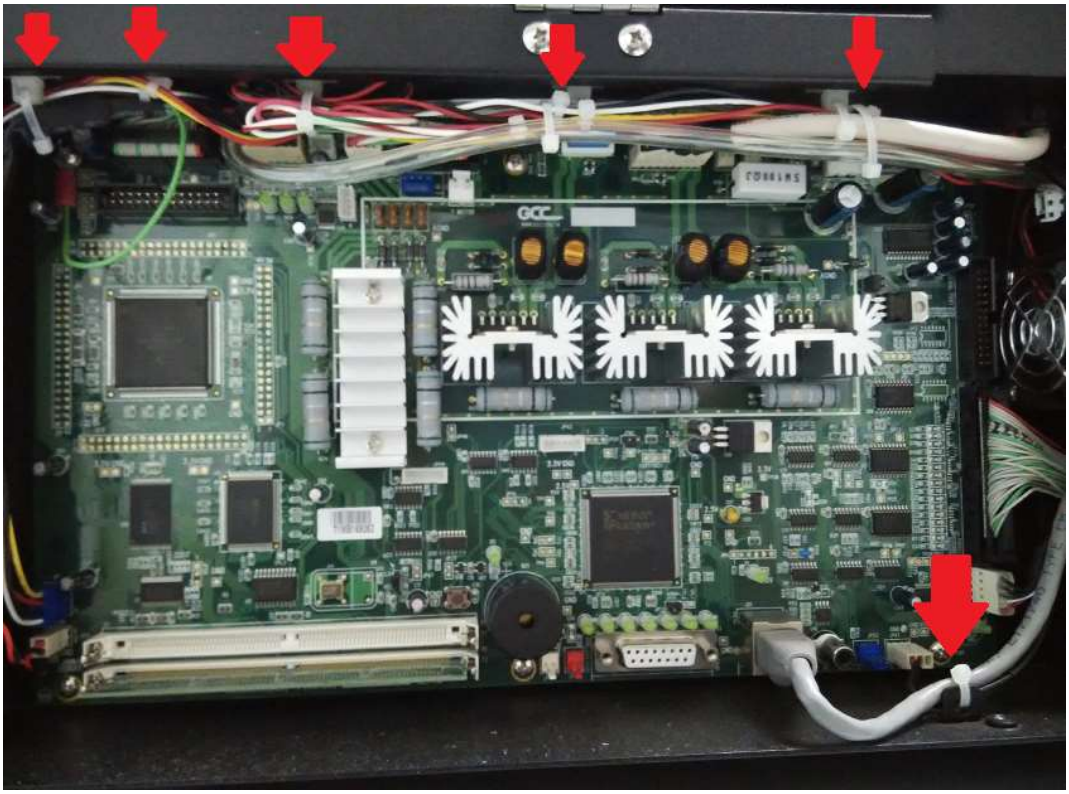
22. In laser tube room, you can find a cable hole which you can go through it to mainboard room (refer to below picture), let the yellow/black cable go through this hole to the mainboard room.

B. Replace the Mainboard.

1. Loosen the two screws on the bottom of right side cover to remove the side cover, then you can reach mainboard room.



2. Use the diagonal cutting spiller to cut off the cable ties indicated in below picture.



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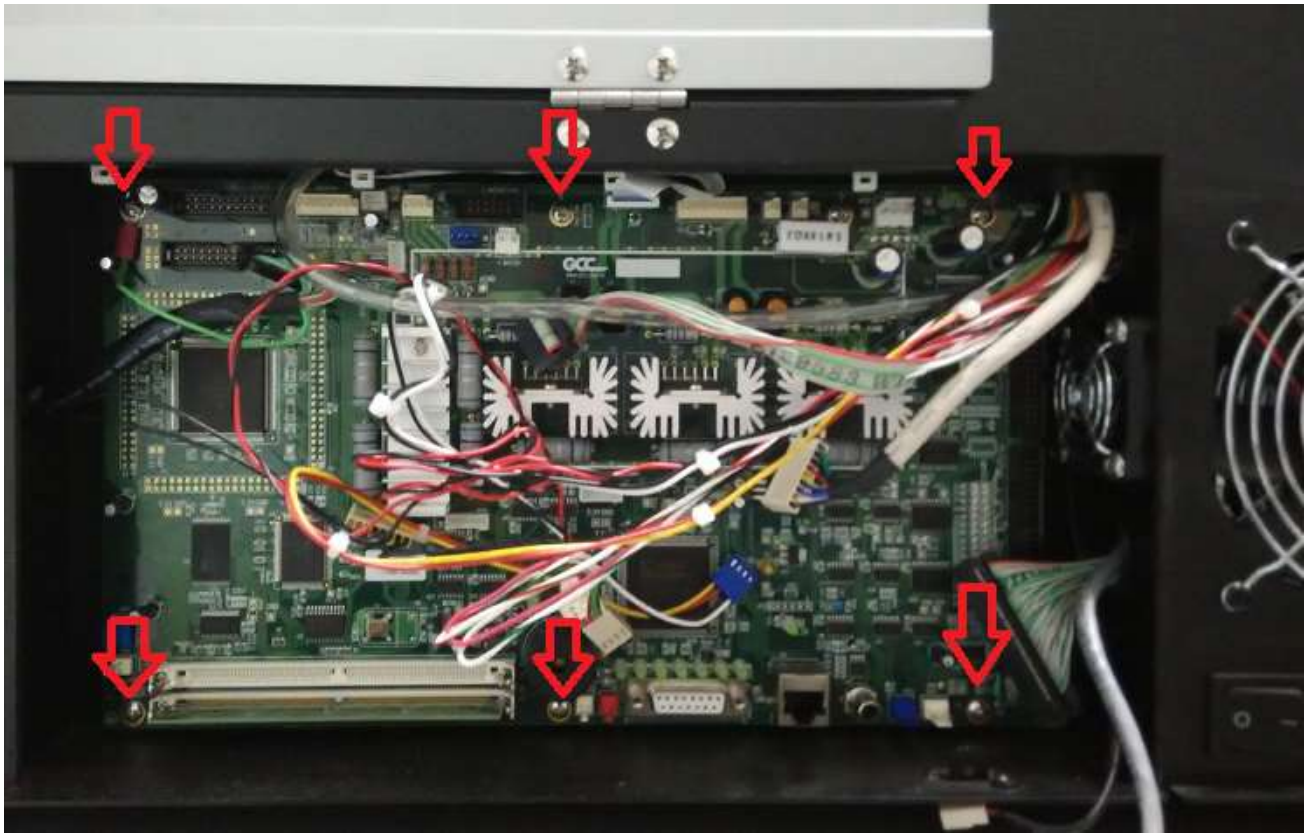
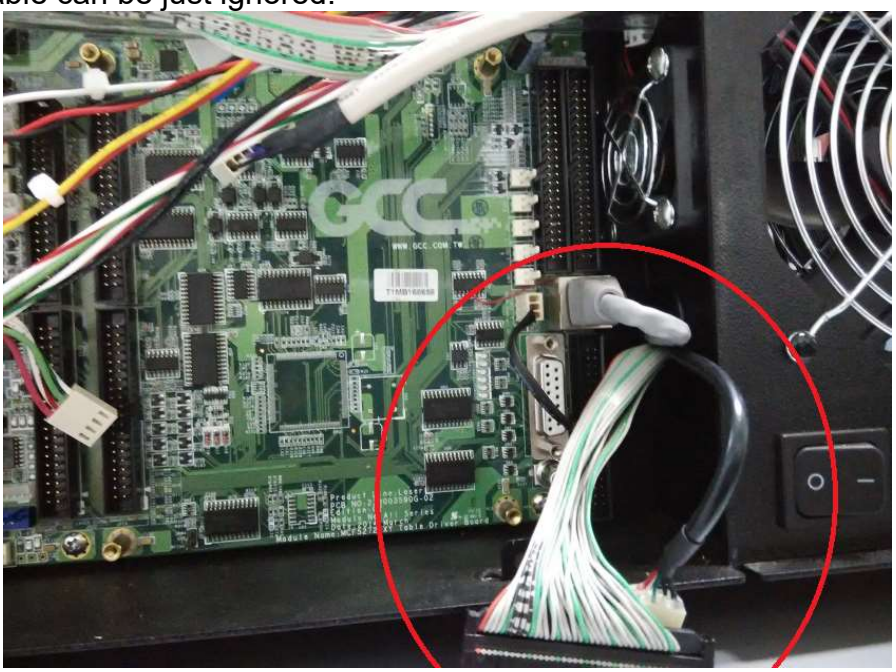
3. Unplug all the cables connect to mainboard and loosen the six screws indicated by the red arrow in below picture.

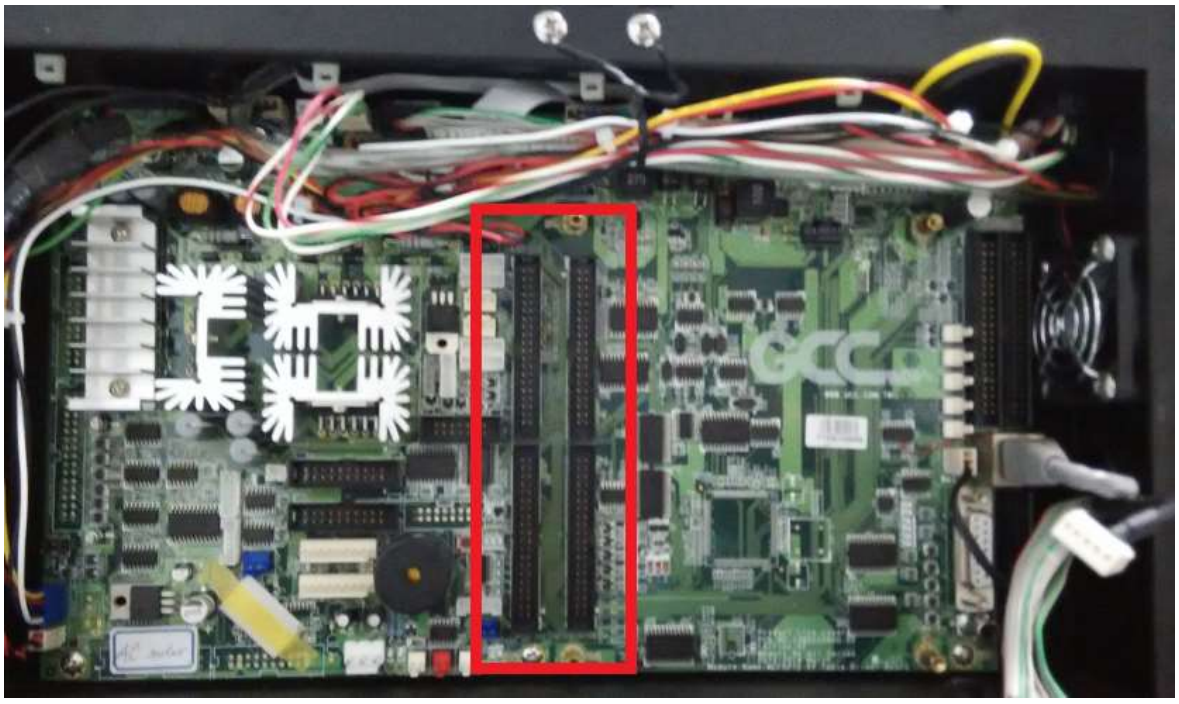


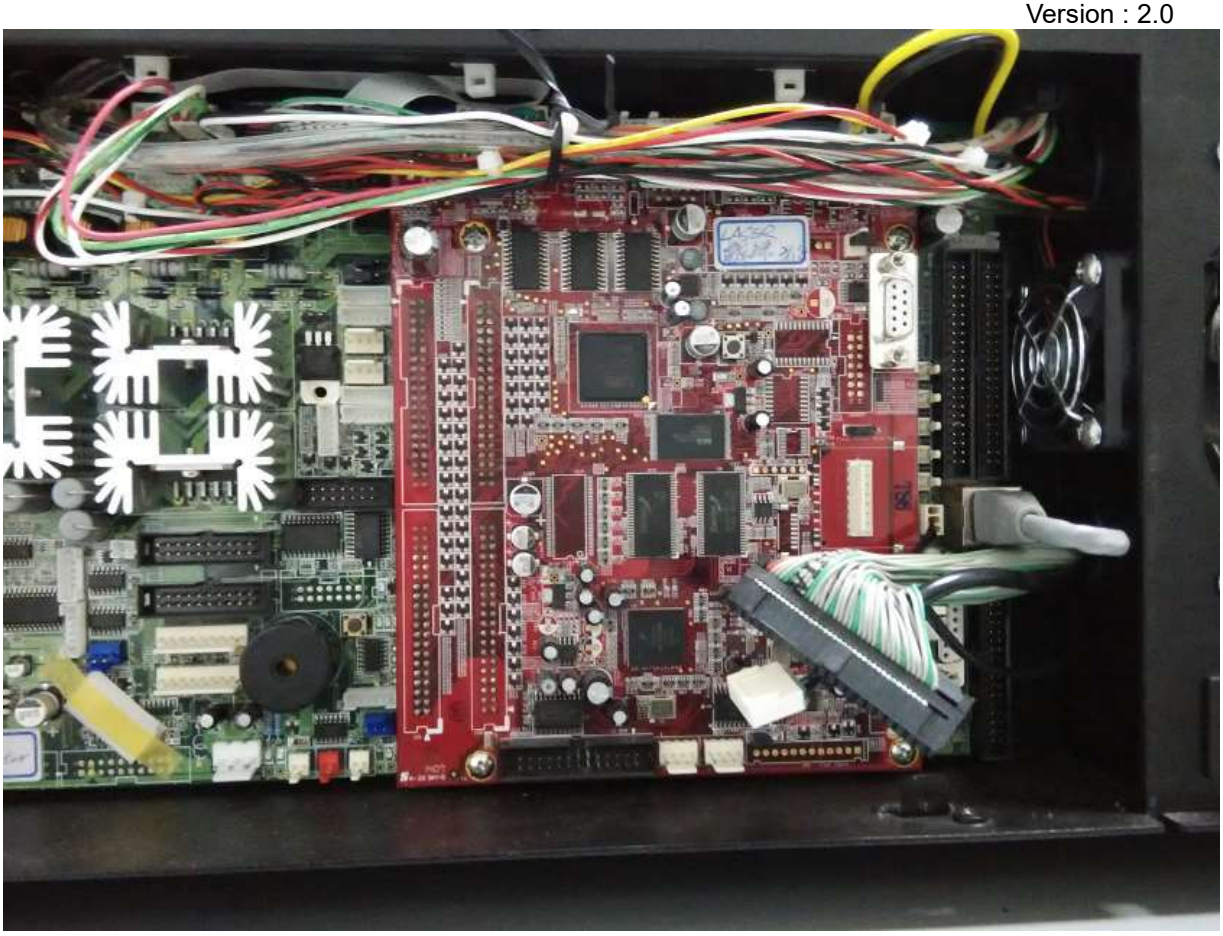
4. Notice that the printer port will no longer be supported on 5272 M/B, the printer port cable can be just ignored.



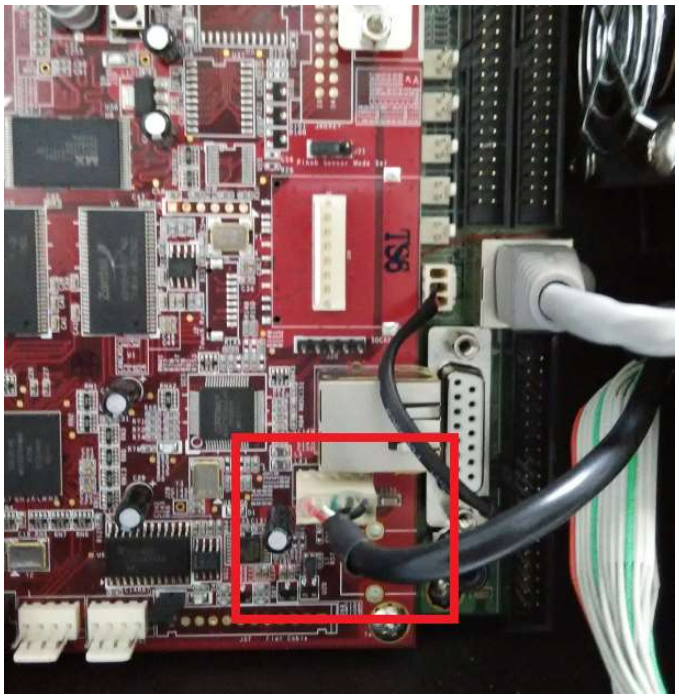
5. Install the green driver board and connect all the cables except the 6-pin USB cable (there are six screws, the hole location is the same as old mainboard.

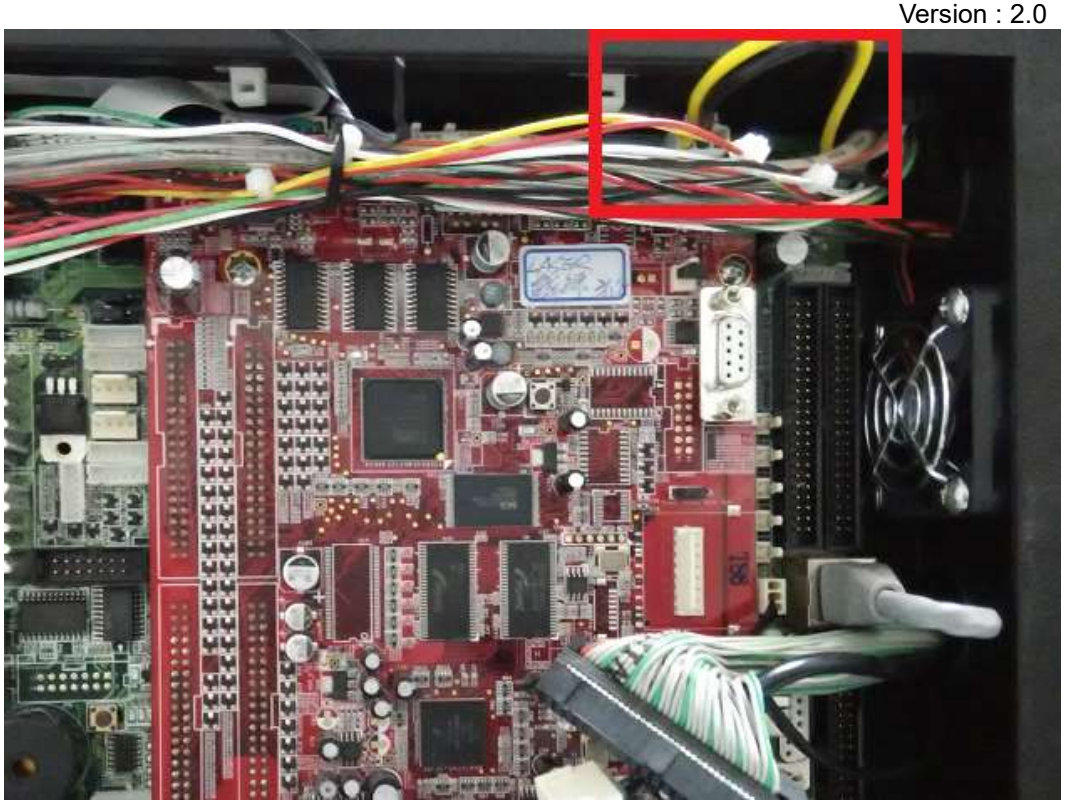
6. Plug the red 5272 mainboard into the four 40pin slots on the driver board





7. Connect the USB cable and the yellow/black cable.





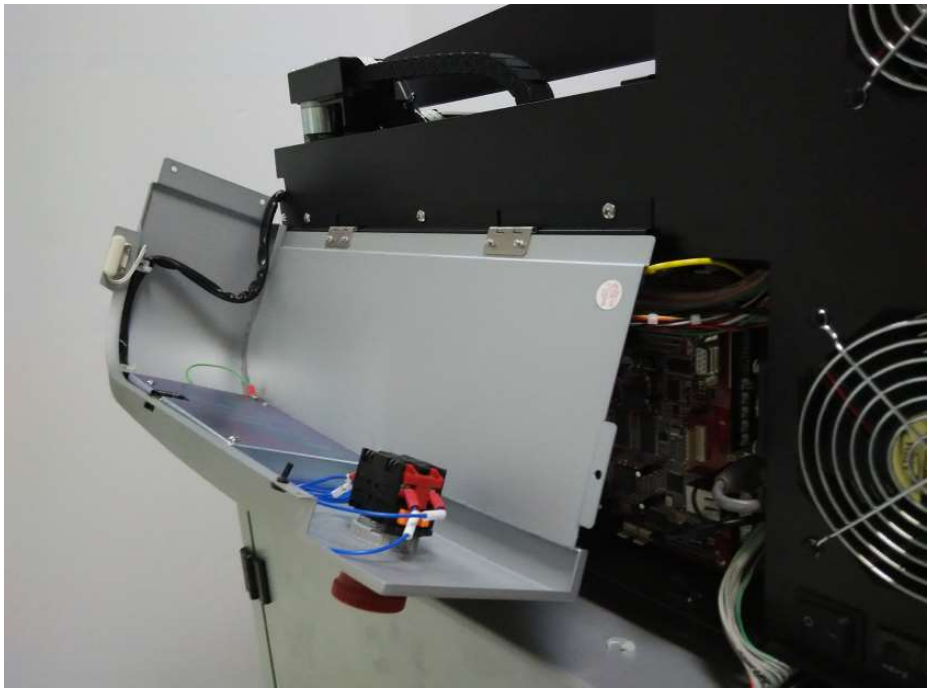
C. Replace the Control panel.

1. Open Top cover of C180II, you can find a truss head screw, loosen it.

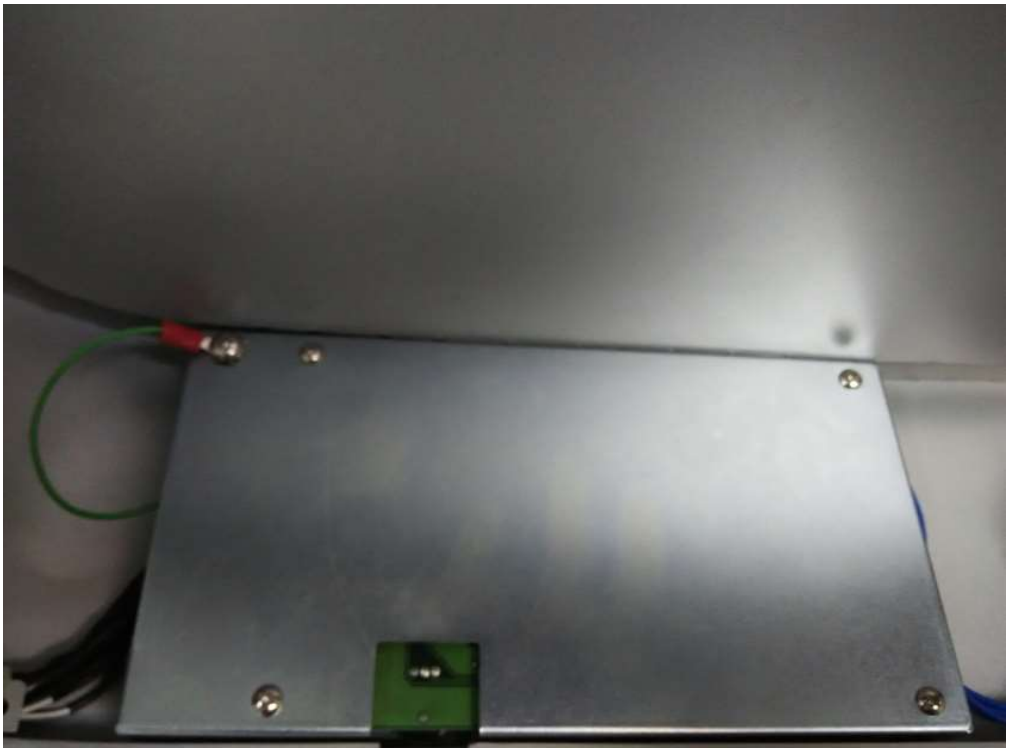
2. Pull down the right front cover.

3. Loosen the two screws inside.

4. Pull down the top right side cover, you can see the Control panel assembly.



5. Loosen the four screws on the protection cover. (no need to remove the one with ground cable connected)



6. Remove all the cables connected to control panel, and loosen the four screws which fix the control panel body then replace the new control panel, remember to restore all the cables, the layout is entirely the same as old one.

Chapter 7 - Trouble Shooting & Diagnostic

7.1 Firmware Error Message

Message	Laser Tube Error Laser tube is overheat press any key to stop
Cause	V30 laser tube responses the over-temp signal for a period of time, and firmware recognizes the laser tube is over temperature.
Solution	Check the temperature is down to normal level , turn off the machine,wait for the laser tube be cooled.

Message	Invalid file, check output file or reset command mode. press any key to stop
Cause	PCL command error
Solution	Check the output file command

Message	WARNING! SmartGUARD fire alarm system is activated,please reboot machine
Cause	Flame detected by SmartGUARD
Solution	Reboot the machine

Message	WARNING! Emergency stop is activated, please free the emergency stop to continue next job
Cause	Emergency stop is activated
Solution	Release the emergency stop button

Message	Please install the Auto Focus pin first before performing the auto focusing or focus tuning
Cause	Auto Focus pin is not installed
Solution	Check if the autofocus pin is installed

Message	HPGL Command Error Command: Address: Please press any key to stop
Cause	HPGL command of printing file is not defined.
Solution	Check the HPGL command

Message	Working table has reached the limit, please lower the table.
Cause	1. Platform reach the top limit 2. Platform reach the bottom limit 3. Certain object touches the limit switch

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	4. Limit switch malfunction
Solution	1. UP/Down platform to avoid the limit level 2. Remove the objects which touch the limit switch 3. Replace the limit switch

Message	PCL Command Error Command: Address: Please press any key to stop
cause	PCL command of printing file is not defined.
Solution	Check the PCL command

Message	Error! Please make sure the work piece or carriage within work area
Cause	The design object is out of working area
Solution	Verification: 1. Check if the size of design exceed the working area defined. 2. Check if the design is in the default working page. 3. Check the position mode Solution:: 1. Place the object in the default page of driver 2. Select proper position mode.

Message	Language Error Please upload properlanguage pack.
Cause	While using multi-language, precise language file is not imported.
Solution	Import correct language pack file.

Message	No Language Data Please upload proper language data first
Cause	While using multi-language, precise language file is not imported.
Solution	Import correct language pack file.

Message	SmartMEMORY is full.Please remove some file
Cause	SmartMEMORY buffer is full
Solution	Delete files in SmartMEMORY

Message	SmartMEMORY is not dectected. Please check the device
Cause	SmartMEMORY is not installed
Solution	Install the SmartMemory

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Message	X motor malfunction For service please contact your local distributor
Cause	X motor is abnormal
Solution	Verification: 1. Check if the cable connections of X motor are correct 2. Check if there were any abnormal sounds from X motor Solution: Re-install the motor cable.

Message	Y motor malfunction For service please contact your local distributor
Cause	Y motor is abnormal
Solution	Verification: 1. Check if the cable connections of Y motor are correct 2. Check if there were any abnormal sounds from Y motor Solution: Re-install the motor cable.

Message	Z motor malfunction For service please contact your local distributor
Cause	Z motor is abnormal
Solution	Verification: 1. Check if the cable connections of Z motor are correct 2. Check if there were any abnormal sounds from Z motor Solution: 1. Re-install the motor cable 2. Adjust the speed of table moving

Message	Laser Warming Up Please Wait
Cause	Laser tube is warming up
Solution	Wait for the laser tube warm up

Message	Please install the Auto Focus pin first before performing Please press any key to stop
Cause	Auto Focus pin is abnormal
Solution	Check Auto Focus pin

Message	CCD Error! Move carriage to first mark or reset CCD Thank you
Cause	CCD didn't recognize the object successfully
Solution	Do the recognition again.

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Message	CCD Offset Error Please change your media or confirm CCD focus distance
Cause	The pattern is too close to the boundary and the carriage goes out of the boundary after the recognition is finished.
Solution	Move the pattern to the center of the table

Message	WARNING!The CCD unitis not detected. Press Back to leave CCD offset mode.
Cause	CCD is not installed
Solution	Install the CCD

Message	WARNING! No CCD Please remove include CCD command file
Cause	CCD is not installed
Solution	Install the CCD

Message	Door is Open; Please Close Door and press BACK to operate
Cause	Top cover is opened while a job is running
Solution	Verification: 1. Check if the top cover is opened 2. Check if the Door sensor worked fine Solution: 1. Close the top cover 2. Replace Door sensor

Message	WARNING! Laser Head Temp. over ; please close machine and check Laser Head
Cause	Fibre laser tube over temperature
Solution	Check if the temperature of tube is really too high

Message	Error Code : please wait
Cause	Error code responsed by Fiber laser
Solution	Check the definition of the Code.

Message	Fail to locate registration mark. Align red beam to the first mark
Cause	The first registration mark can’t be recognized
Solution	Move the red beam to the first mark and do the recognition again.

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Message	Object is out of bound. Please place object within the valid working area.
Cause	The pattern is too close to the boundary
Solution	Place the pattern to the proper position

Message	Auto Focus disabled Please use the and keys to move the working table
Cause	Auto focus function is disable，please up/down the table manually
Solution	Check Auto focus function

Message	WARNING! Machine ; Initialization error Please free the emergency stop then restart the machine
Cause	Emergency stop button is pressed while the machine is booting
Solution	Release the Emergency stop button

Message	Permit Expired!!
Cause	Time locker date is expired
Solution	Check the expiration of time locker.

Message	Invalid Timer
Cause	Time locker’s effective time is different from firmware internal time.
Solution	Confirm the effective time in Time Locker.

Message	Drive Not Found!!
Cause	USB storage dose not plug.
Solution	Confirm if USB storage is plugged or try to replug again.

Message	No Valid File!!
Cause	File name is Chinese version or there is no prn and/or plt file mode under the folder.
Solution	Change file name to be English or check if there is prn and/or plt file mode under the folder.

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Message	USB drive error. GCCcertified USB drive models w/FAT 16/32 format is required
Cause	Format is not FAT16 or FAT32
Solution	Confirm the format of USB storage.

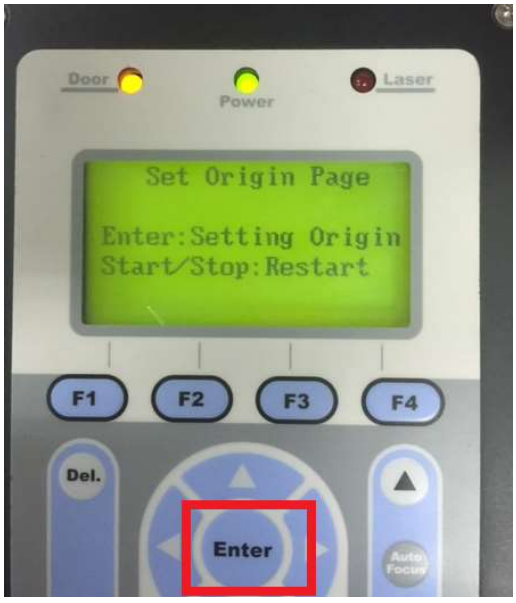
7.2 Hidden Diagnostics

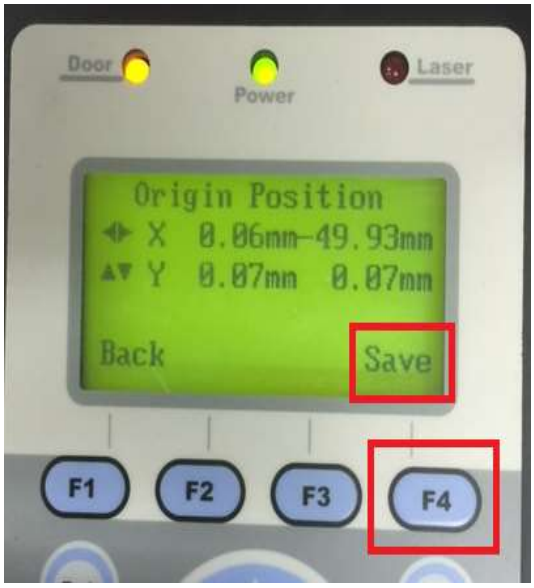
7.2.1. Hidden Function

To enter the Hidden Function , **hold down the ▽ button and turn on the machine.**

7.2.2 Setting Origin

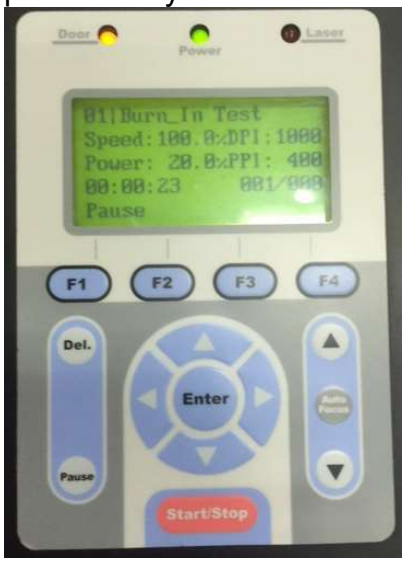
Pressing and holding “Enter” key and turn on the machine → Adjust X、Y position by pressing arrow key → Pressing 「F4」 to Save





7.2.3 Burn In Test

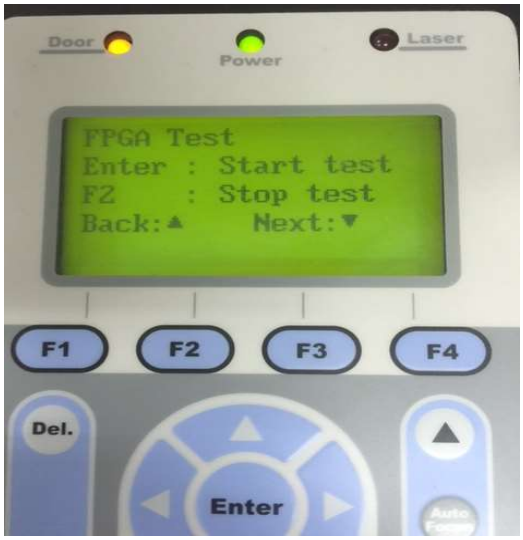
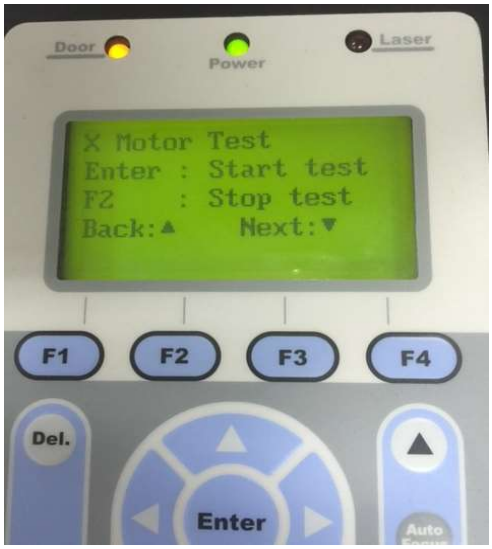
Pressing and holding “Start/Stop” key and turn on machine; after the machine is boot, a file with name “Burn_In_Test” will be generated and output automatically, this file will permanently run unless user stop it .

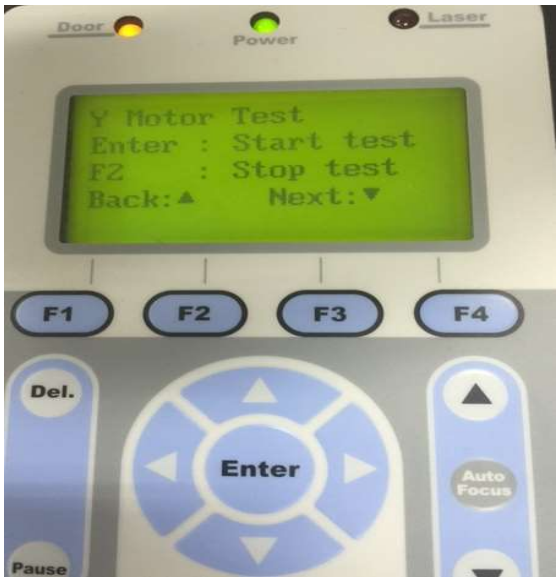
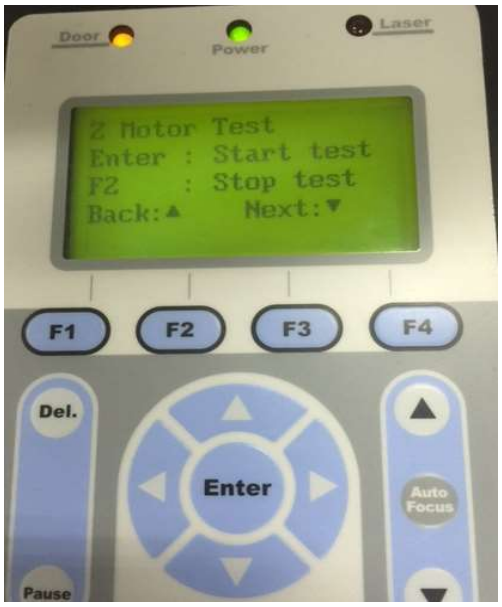


7.2.4 Hardware Test

To enter the Hardware Test , **hold down the 「Auto Focus」 button and turn on the machine.** Following the instruction, pressing ▼、▲ to go to previous or next page.

Contents of Hardware Test (Pressing 「Enter」 to start test):

FPGA Test	X Motor Test
FPGA test checks if FPGA chipset is working correctly, test will be started by pressing the “Enter” key, test result will be shown on the screen (Test ok or Test fail)	X motor test checks that the X motor is functional by asking user to use the keys on the control panel to move the pen carriage along the X axle.
	

Y Motor Test	Z Motor Test
Y motor test checks that the Y motor is functional by asking user to use the keys on the control panel to move the pen carriage along the Y axle.	Z motor test checks that the Z motor is functional by asking user to use the keys on the control panel to move the platform up and down the Z axle.
	

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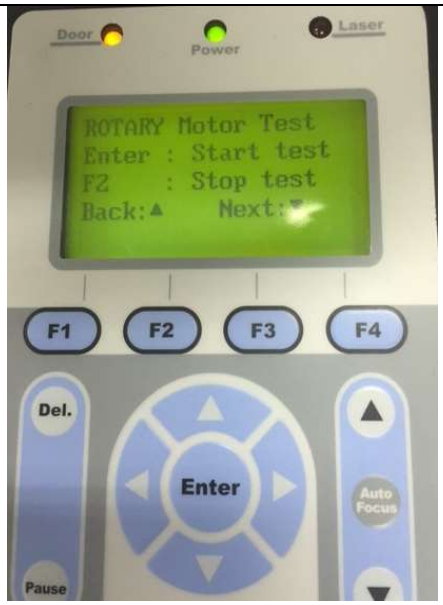
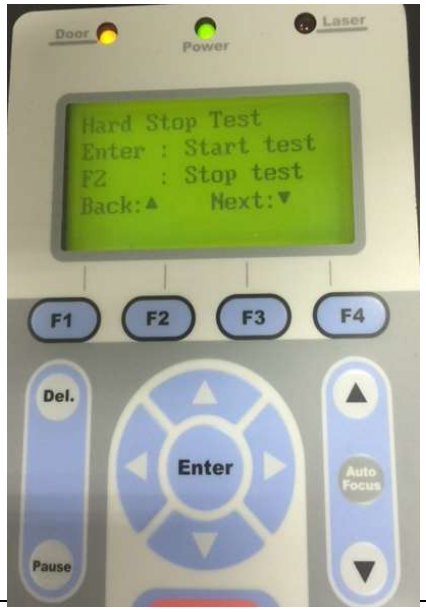
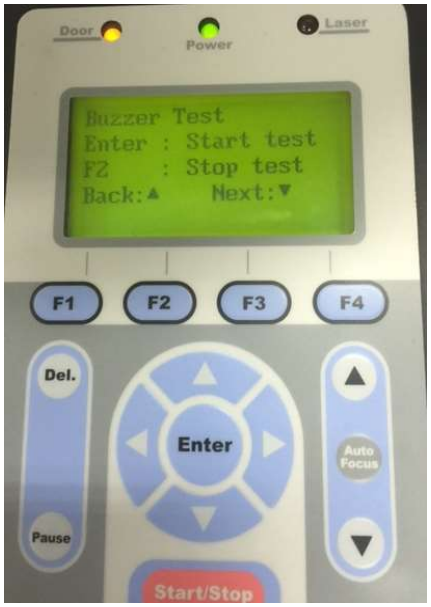
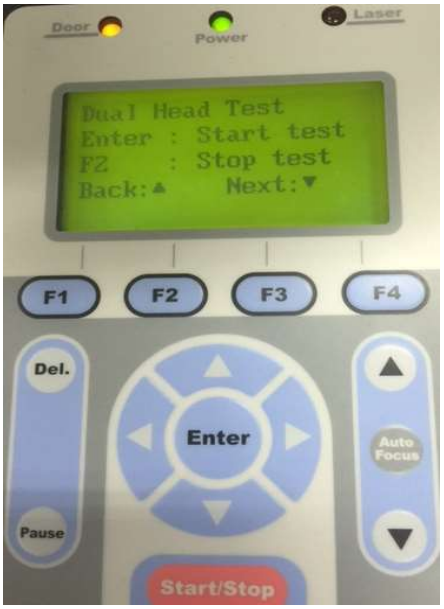
Rotary Motor Test	Hard Stop Test
Rotary Motor Test checks if the motor of the optional Rotary attachment is functional. Press Up or Down arrow key and see if the Rotary attachment will roll or not.	Hard Stop test checks that the X and Y sensors are functional by asking the user to manually move the pen carriage towards the X and Y sensor flags
	

Buzzer Test	Dual Head Test
Buzzer test checks if the following items are functional :Buzzer / Laser Diode / Air / Fans Those functions will run at the same time while users press the “Start/Stop” button.	Dual head test checks if the optional Dual Head module is functional. System buzzer will beep while user is pressing the switch of Dual head module is it’s functional.
	

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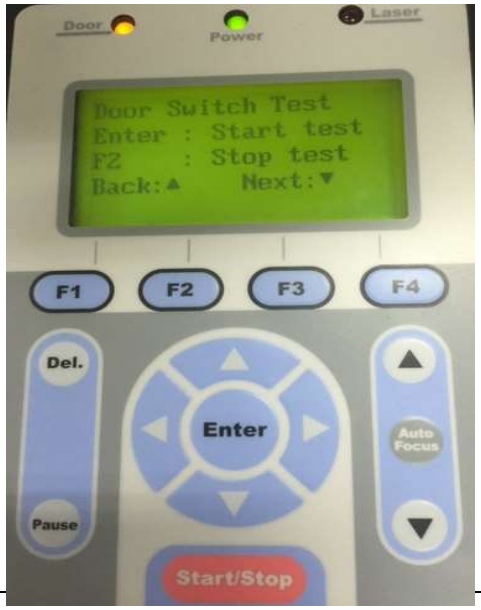
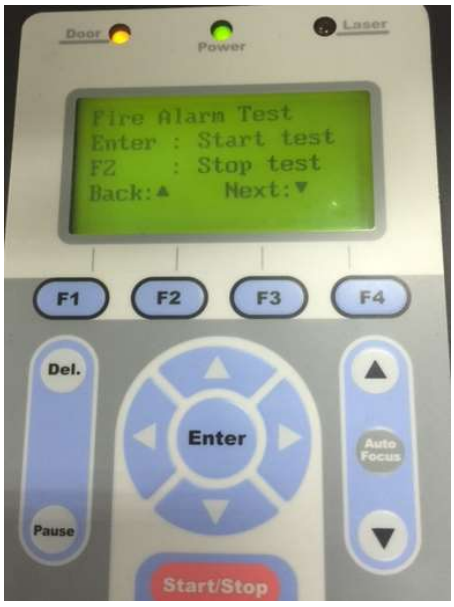
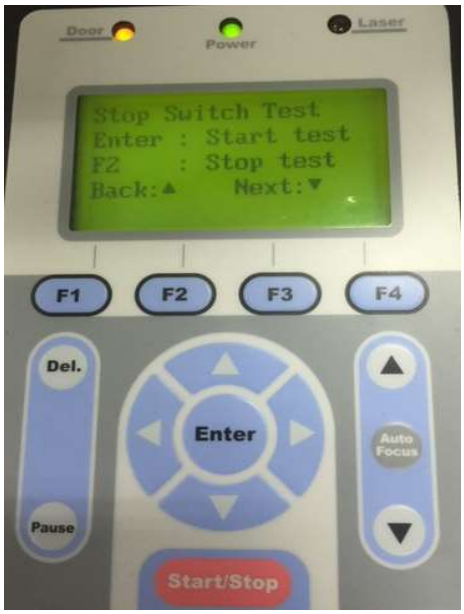
AutoFocus Test	Door Switch Test
AutoFocus Test checks if the AutoFocus Pin probe is functional. The system buzzer will beep once user press the AutoFocus pin if it's functional.	Door Switch Test checks if the door switches are all functional.The system buzzer will beep and the yellow door led on control panel will turn to on once any door of the machine (includes top cover、front door、back door) is opened if it's functional.
	

Fire Alarm Test	Stop Switch Test
File Alarm Test checks if the optional SmartGuard is functional. System buzzer will beep once fire is detected.	Stop Switch Test checks if the Emergency Stop switch is functional. System buzzer will beep once user press the Emergency Stop switch.
	

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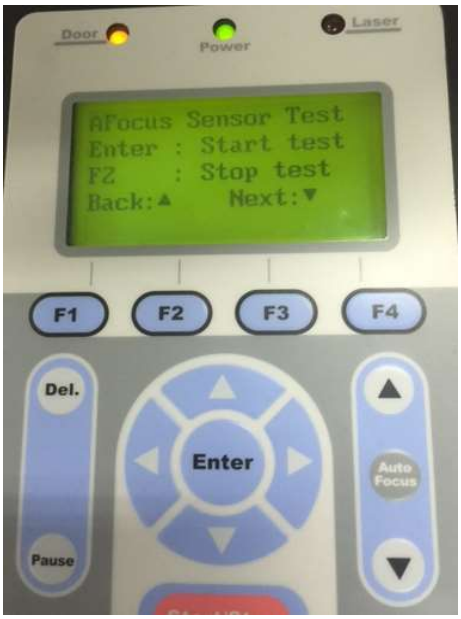
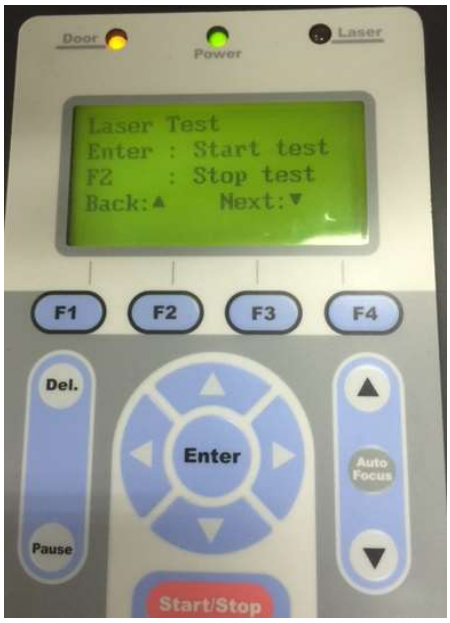
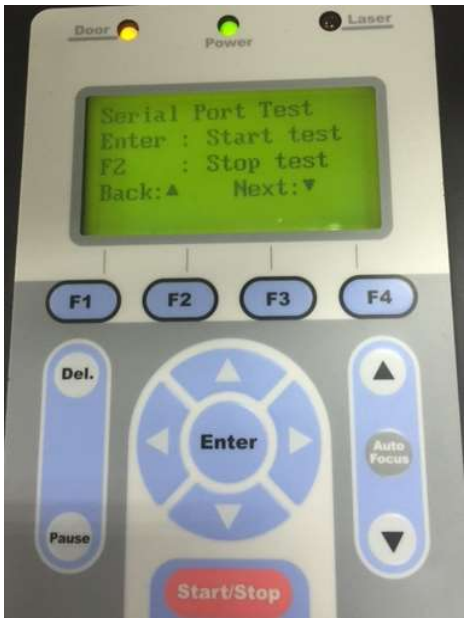
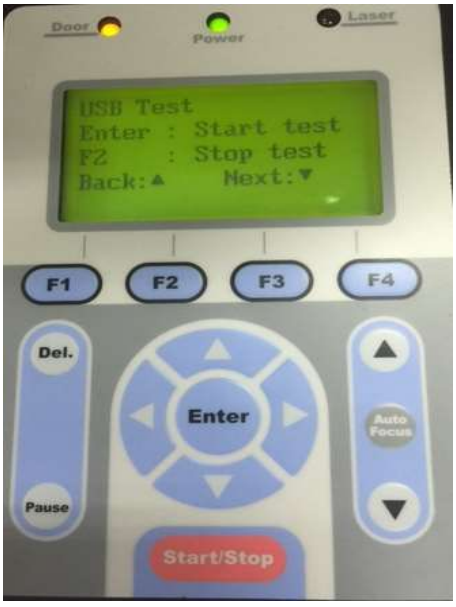
AFocus Sensor Test	Laser Test
AFocus Sensor Test checks if the sensor of AutoFocus pin is functional, the sensor will detect if the AutoFocus pin is well installed on the AF seat. System buzzer will beep once you remove the AF pin from AF seat if the sensor is functional.	Laser test allow you to fire the laser tube at a selected laser power. (This is also the utility that you use to perform beam alignment.)
	

Serial Port Test	USB Test
Serial port test checks that the serial port is functional by asking the user to send a file through the serial port. (The serial port is for diagnostic purposes only. Please do not use.)	USB port test checks that the USB port is functional by asking the user to send a file through the USB port.
	

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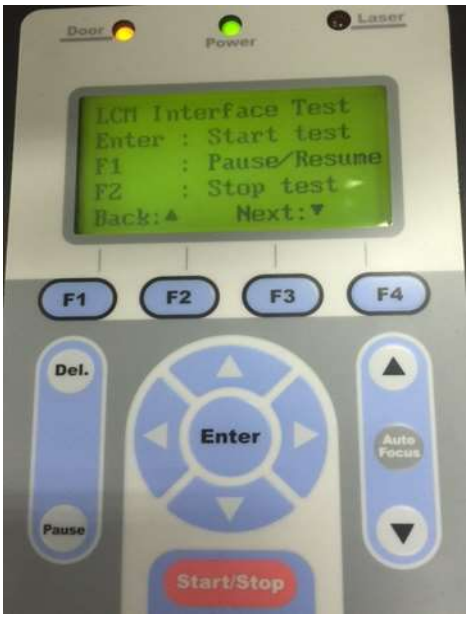
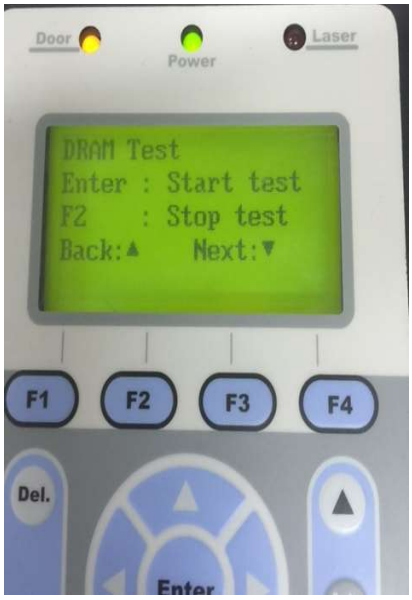
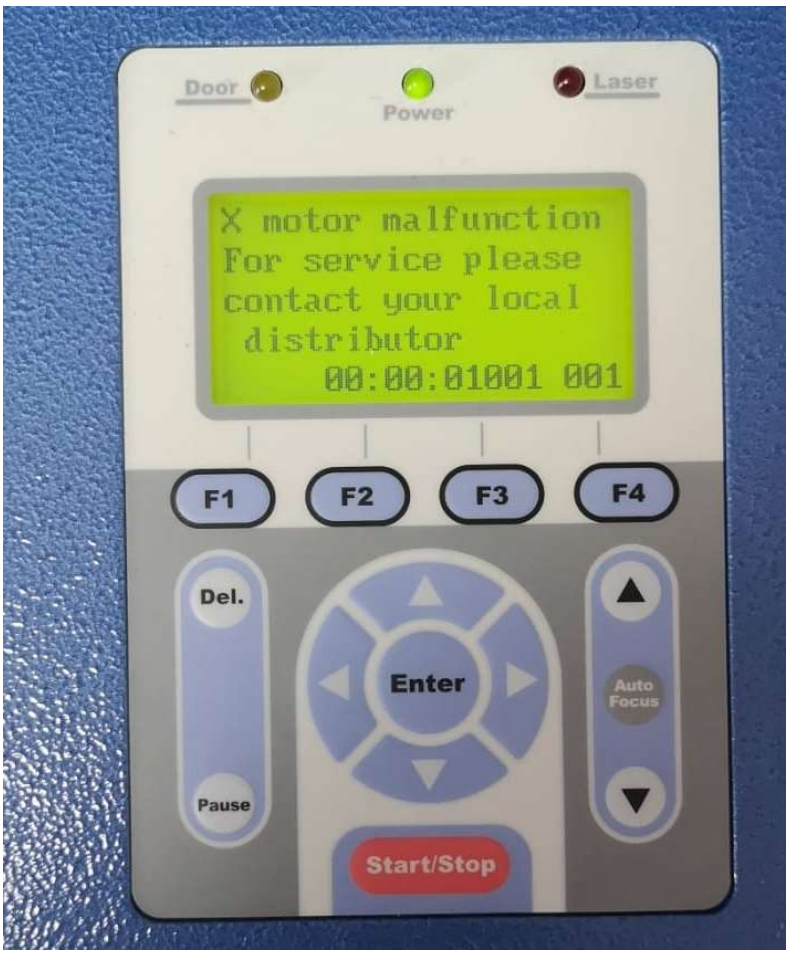
LCM Key Test	LCM Interface Test
LCM Key test will test the functionality of the keys on the keypad	LCM Interface test will display a series of different shapes on the LCM to allow user to detect any malfunction on the display unit.
	

DRAM Test
DRAM test checks the functionality of the DRAM.


7.3 When turns on machine, control panel shows “X motor malfunction” (see picture below) and machine cannot finish initialization.



Diagnostic process:

Every GCC laser x/y table machine will have initialization process when machine turns on. Machine will first rotate x motor and let the lens carriage move to right side and touch the x axis sensor on x motor pcb. Then the whole x axis rail move to front side (y axis) and touch the y axis sensor on x motor pcb. And then the lens carriage will move to top-left corner (origin position) and finish initialization process. When machine cannot finish initialization process and shows “X motor malfunction”, there are four parts could be the reason: X motor, main board, x motor pcb and x motor flat cable. The logic is that main board needs to control x motor and get the feedback signal from x motor and x motor pcb. When main board cannot do these, these four parts are the related parts.

Situation 1: When lens carriage does not move at all and already shows “X motor malfunction”, that means the x motor is defective or main board (x motor chip) is defective or x motor flat cable is broken somewhere or does not connect well.

Situation 2: When lens carriage can move to right side but it stops there and shows “X motor malfunction”. The most possible part is x motor pcb (the x axis sensor is defective). The next possible part is x motor flat cable (broken somewhere and cause the signal cannot send back to main board).

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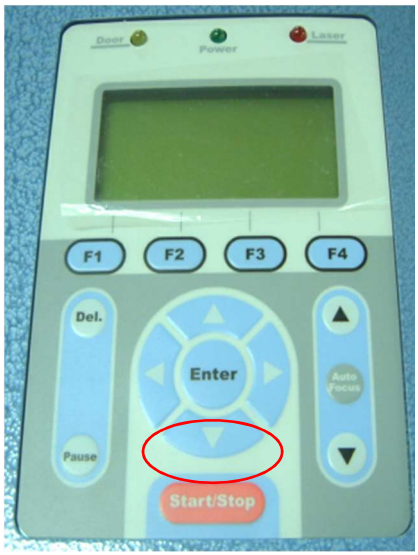
7.4 When machine is doing an engraving job, but there are some extra vertical lines on the both sides of engraving job. See the picture below (the 4 red circles are the extra lines).

Diagnostic process:

Every GCC laser x/y table machine will have 4 factors to control machine. These factors are: Mechanical, Electronic, Software and Optical. From above picture, the engraving job is Ok, so this symptom has nothing to do with mechanical. Software is much less possible because the engraving texts are all OK and does not have shifting problem. If you take a good look when the machine is engraving, you can find that the extra lines are the lens carriage stop on both sides of x axis movement. The laser somehow fire extra laser on both sides. So the logic process is to check the laser signal from main board and see if the frequency is too high. The frequency setting is hidden function by pressing Down arrow key (see the red circle below) and Turn On machine together.



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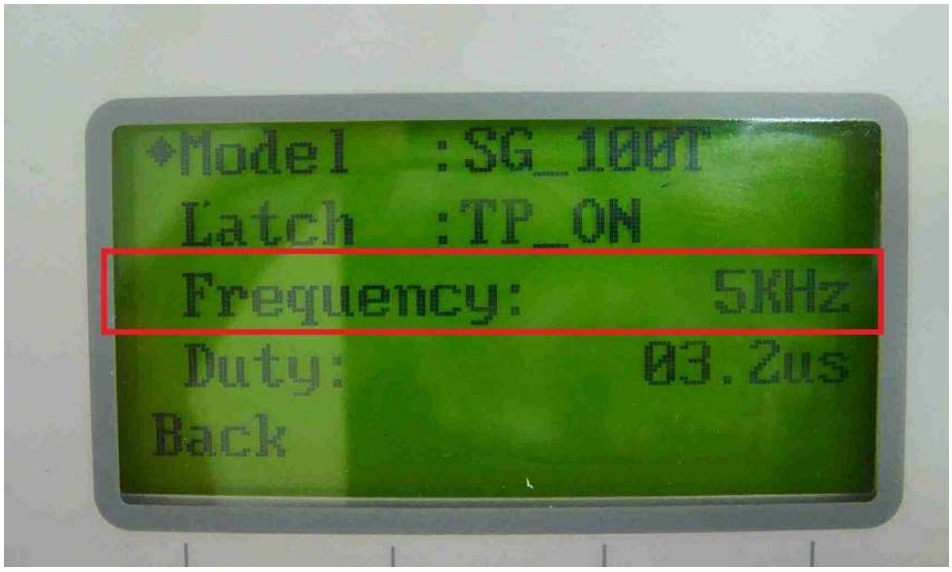
When machine is entered to hidden function, the control panel will show below and then choose the second function “Laser Tube Model” and then press Enter key.

The default Frequency is 5Khz, if the 5Khz still has extra lines, it can change to be 4Khz or 3Khz. If 3Khz still have extra lines, that means the laser tube has problem and need to be repair or replaced.



Explain: From GCC experience, the extra lines on both side of engraving job are what we called bleeding. That means the laser tube has too high frequency and fire weaker extra laser when it should not be fired. The extra lines on both side is because the weak power can still form a dot on material when lens carriage stop very short on both side and moves backward. When lens carriage keep engraving from top to bottom, the dots on both side can become lines.

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Charper 8 Basic Maintenance

8.1 Suggested Cleaning and Maintenance Supplies

Cleaning / Maintenance Tool	Special notes
Soap Solution or All-Purpose Cleaner	
Paper Towels	
Cotton Cloth	
Denatured Alcohol	DO NOT use alcohol on any painted surface, plastic, or the laser system.
Acetone	ONLY to be used on the work table
Vacuum Cleaner with a Flexible Nozzle	Only to be used in and around the work table and motion system
Lubrication syringe	Supplied
Cotton Swabs	Supplied
Lens Cleaner	Supplied 1pc. Local supply is suggested.*
Lint Free Lens Tissue	Supplied
#2 Phillips Screwdriver	
Allen Wrench .050”	

*The recommended lens cleaner is Eclipse Cleaning System Solution from Photographic Solutions or HPLC grade Methanol. Search “Eclipse Cleaning System Solution” on Amazon or eBay to get the solution locally.
http://www.amazon.com/Photographic-Solutions-ECDCS-Cleaning-Solution/dp/B0000AUR1I

Eclipse Cleaning System Solution

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8.2 Maintaining the Worktable and Motion System

8.2.1 Cleaning the Worktable and Motion System

Clean the working table and the motion system on weekly basis through the following steps:

- Turn the power off and unplug the C180II before cleaning.
- Use a vacuum cleaner with a flexible nozzle to remove dust and debris from the worktable and motion system.
- Apply small amounts of all-purpose cleaner, alcohol, or acetone to a paper or cotton towel to clean the working table.
- Apply a soap solution, all-purpose cleaner, or alcohol to a paper or cotton towel to wipe down the rails of the motion system.
- Wait for all cleaning residue to dry completely before plugging in and operating the C180II.

CAUTION

- Never pour or spray alcohol or acetone directly to the working table.
- Oil, alcohol and acetone can cause fires or smoke build-up if improperly used.

TIP

Please clean the AutoFocus pin each time after completing the engraved job to make sure the AutoFocus pin is free to move.

8.2.2 Lubrication of the X / Y Rails

In order to keep the motion system running smoothly, the X / Y rails of the motion system will need lubrication on a weekly basis. Use a small amount of light grade machine oil or PS2 grease to a paper or cotton towel and apply to the rails.

You can purchase PS2 grease from NSK dealers worldwide. Please visit http://www.nsk.com for additional information.

NOTE

- Always clean and lubricate the rails after working with materials that produce lots of debris (such as wood).
- Too much oil or PS2 grease applied to the X / Y rails will accelerate the build up of debris.

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8.3 Cleaning the Optics System

8.3.1 Removing the Mirrors

We recommend you check the mirrors once or twice a week to see if they require cleaning. If any debris or smoke residue is present, use the following steps to clean them.

NOTE

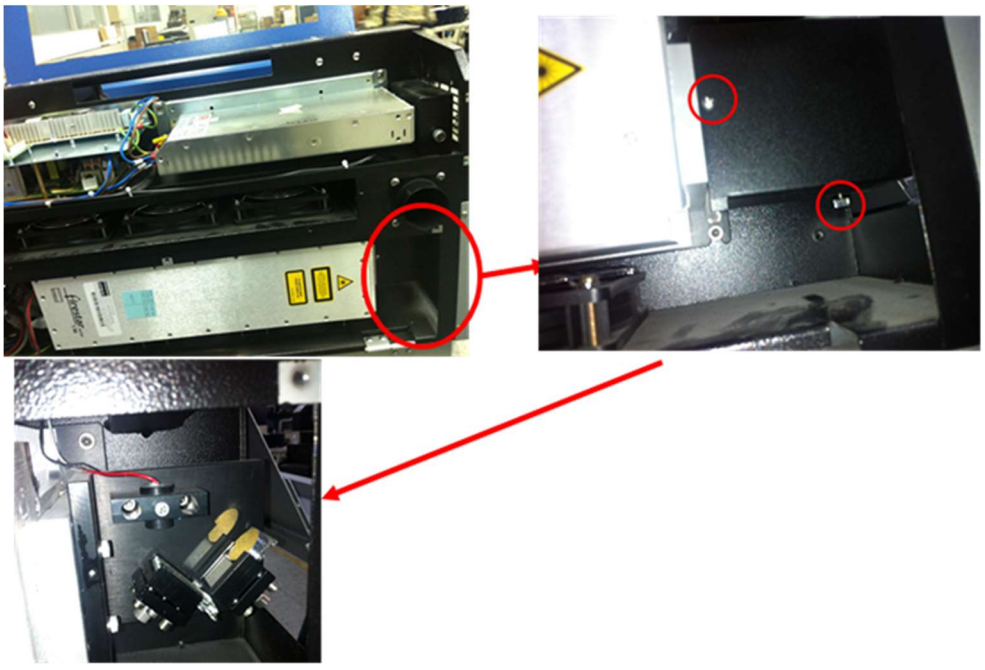
- It is highly recommended you remove, clean and replace each mirror one at a time!
- Refer to section 8.3.2 on how to clean the mirrors.

The following section will detail how to access and remove each of the four mirrors found on the LaserPro C180II for cleaning.

Mirror 1

This mirror is located inside the bottom cover of the LaserPro C180II.

1. Use a Screwdriver to remove the back cover located on the bottom side of the LaserPro C180II.
2. Loosen the thumbscrew and screw to the dust cover securing the mirror. (As shown in the picture below)
3. Clean the lens in the proper manner.
4. Re-install the mirror after cleaning.
5. Tighten the thumbscrew and screw
6. Replace and secure the outer access panel.



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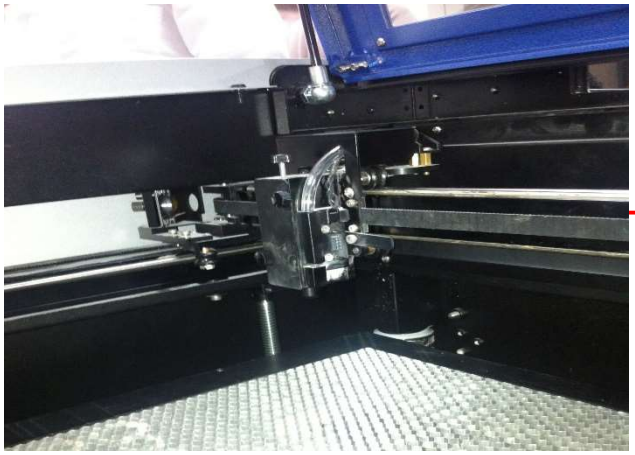
1) Unscrew and remove the black dust cover covering mirror 2.
2) Unscrew the thumbscrew holding mirror 2 in place.
3) Clean the lens in the proper manner.
4) Re-install mirror 2 after cleaning.
5) Tighten the thumbscrew.
6) Replace and secure the dust cover.

Mirror 3, 4

These mirrors are accessible on the worktable area of the LaserPro C180II.

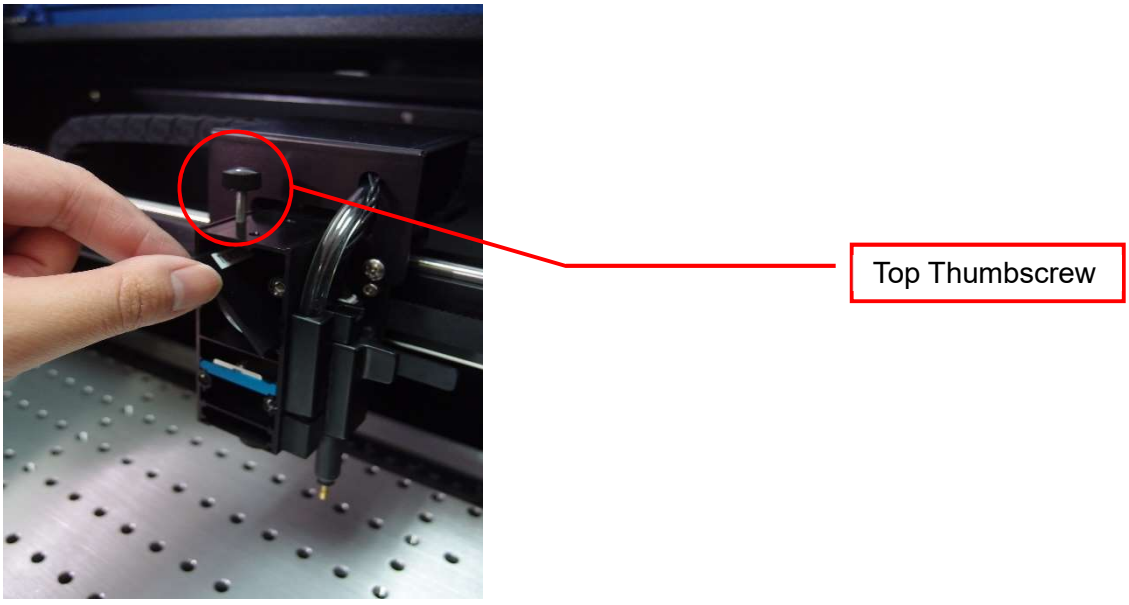


Mirror 3

1) Unscrew the thumbscrew holding mirror 3 in place.
2) Clean the lens in the proper manner.
3) Re-install mirror 3 after cleaning.
4) Tighten the thumbscrew.

Mirror 4

1) Unscrew the three thumbscrews (front face of the laser head) securing the laser carriage panel and remove the laser carriage panel to reveal mirror 4 and the focal lens.
2) Loosen the top thumbscrew to remove mirror 4 (as shown in the picture below).



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3) Clean the lens in the proper manner.
4) Re-install mirror 4 after cleaning.
5) Tighten the top thumbscrew.
6) Reinstall the laser carriage panel and tighten the three thumbscrews.

8.3.2 Cleaning the Mirrors

After you have removed each mirror, you will want to inspect each mirror for scratches, smoke residue, or debris. If any residue or debris is present, use the following steps to clean the mirror.

1. Hold the mirror with the reflective side up, without touching the reflective side of the mirror(DO NOT apply any finger pressure or any other cleaning solutions to the mirror surface).
2. Drape a new sheet of lens tissue over the mirror.
3. Apply a few drops of lens cleaner on the tissue covered mirror (apply enough so that the tissue absorbs just enough to cover the mirror surface).
4. Pull the tissue across the mirror in only one direction.
5. Repeat the cleaning processes if the mirror is not completely clean after the first attempt.
6. Make sure that the mirror is completely dry before reinstalling it.

⚠ CAUTION

If the center of the mirror is scratched, contact your LaserPro C180II dealer for a replacement.

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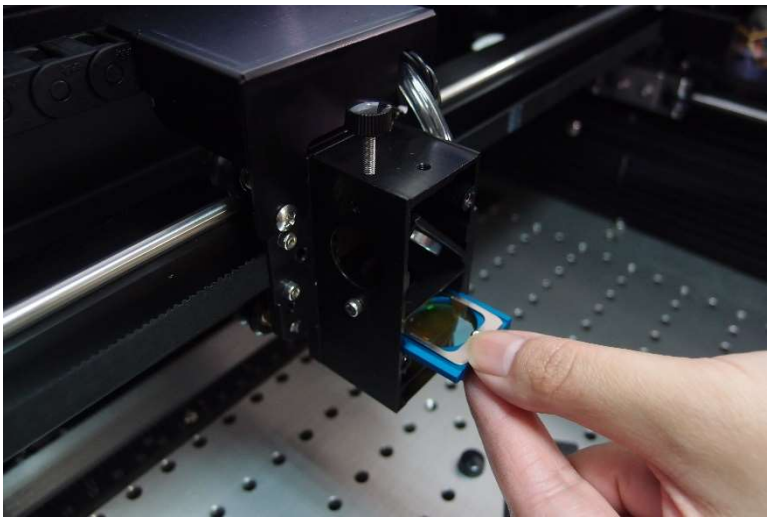
8.3.3 Removing and Cleaning the Focal Lens

1. Unscrew the three thumbscrews (front face of the laser head) securing the laser carriage panel and remove the laser carriage panel to reveal the focal lens.
2. Carefully pull out the focal lens (as indicated in the picture below).



3. Clean the focal lens with a cotton swab and lens cleaner solution. Be sure to clean both sides of the focal lens (DO NOT apply any pressure or other cleaning solutions to the lens surface).
4. After cleaning, use a cotton swab to gently dry the focal lens and lens cover.

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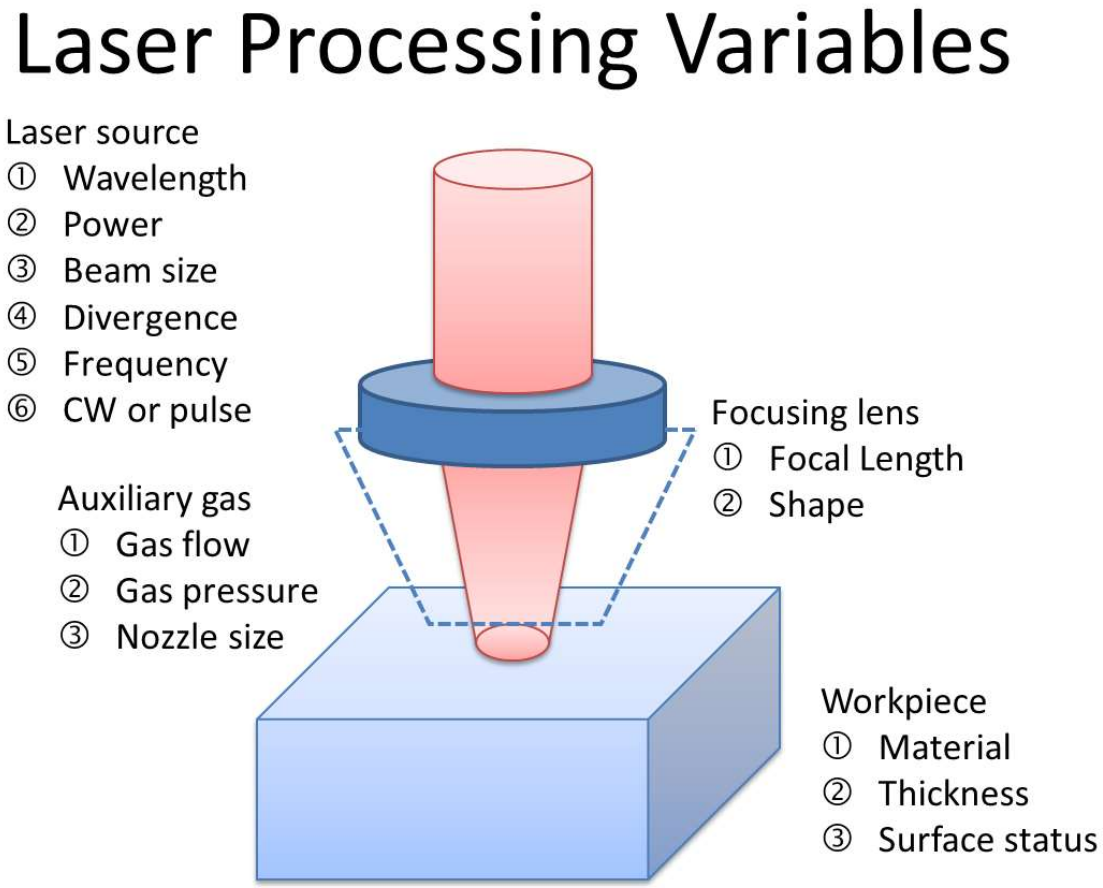
Chapter 9 FAQ

9.1 For laser machines, what factors affect cutting throughput?

Explain: many factors will affect cutting throughput. See “Laser Processing Variables” image below.



For laser machine users, the major factor that user can control is focusing distance. The correct focusing point will have highest power density. If the focusing point is not on the correct focus point, the power density will be lower and the laser beam will be bigger. See “Laser Optics (Focusing lens)” image below: The correct focus point is the position of “d” (the black text and black line below). When the focus distance move to the position of “e” (the green text and green line below), the power density will be lower and the beam size will be bigger. If the focus distance move more to the position of “s” (the purple text and purple line below), the power density will be even lower and the beam size will be much bigger.

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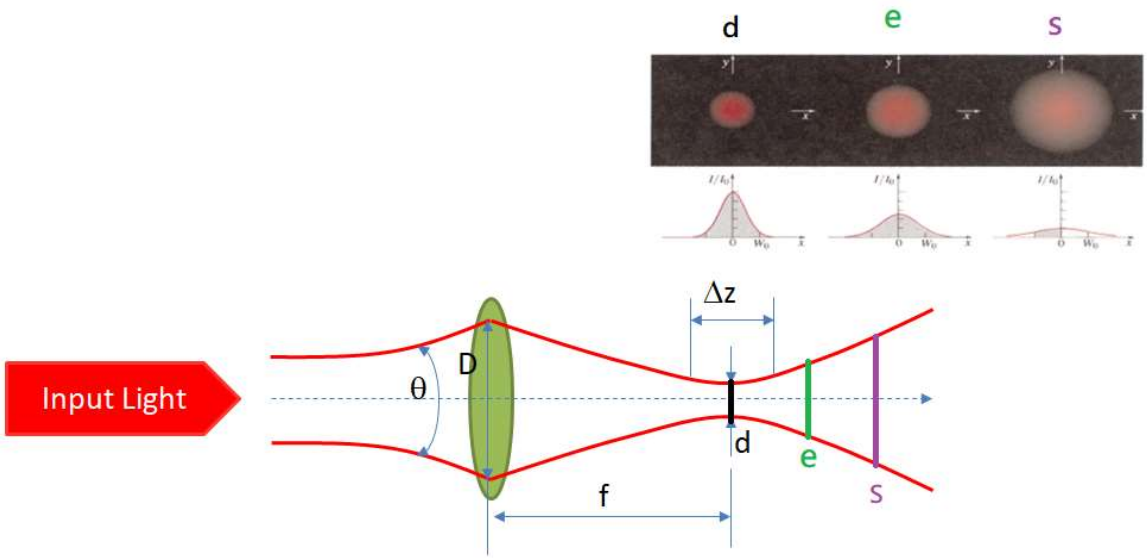
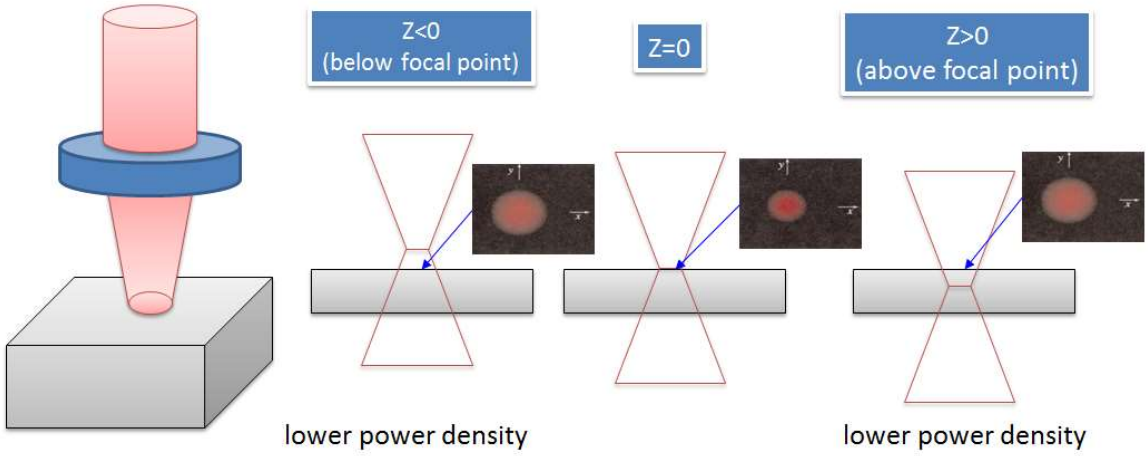
Laser Optics (Focusing lens)



From the following picture, right focusing position will provide the maximum power density for laser cutting.

Different Focusing Positions



About different thicknesses of materials, it needs to take different focusing positions for cutting. In general, focusing position is right on the surface for the thin materials. However, in order to get the better cutting quality for thick materials, adjusting the focusing position to 1/3~1/2 of thickness of the material below the surface makes the material cover with high power density range during cutting processing and it makes the better cutting quality.

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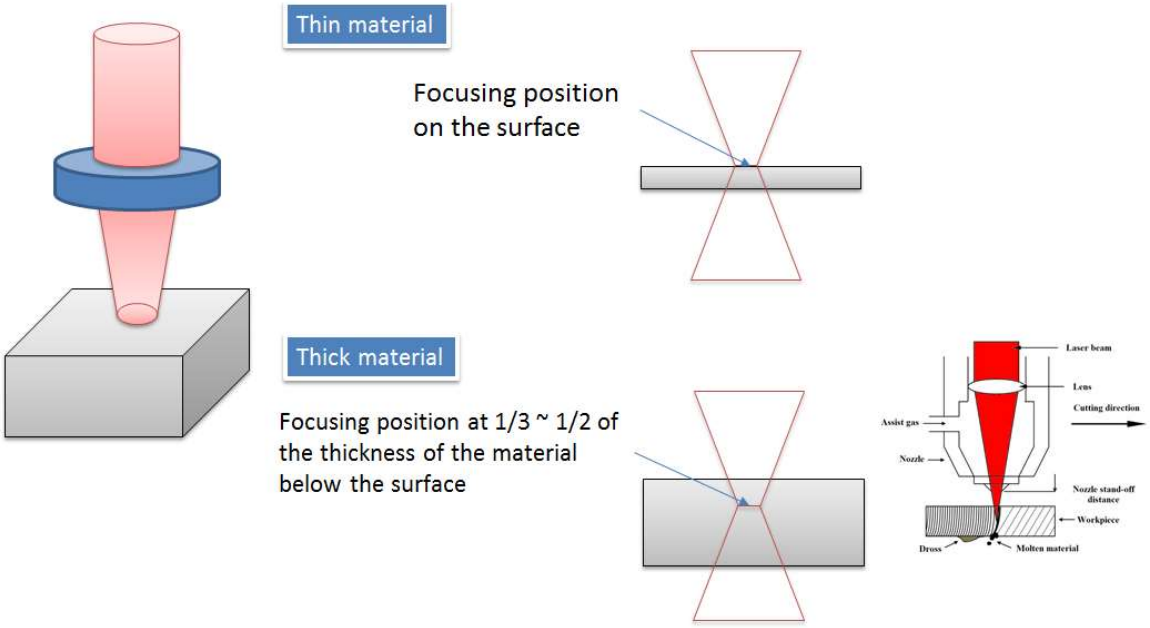
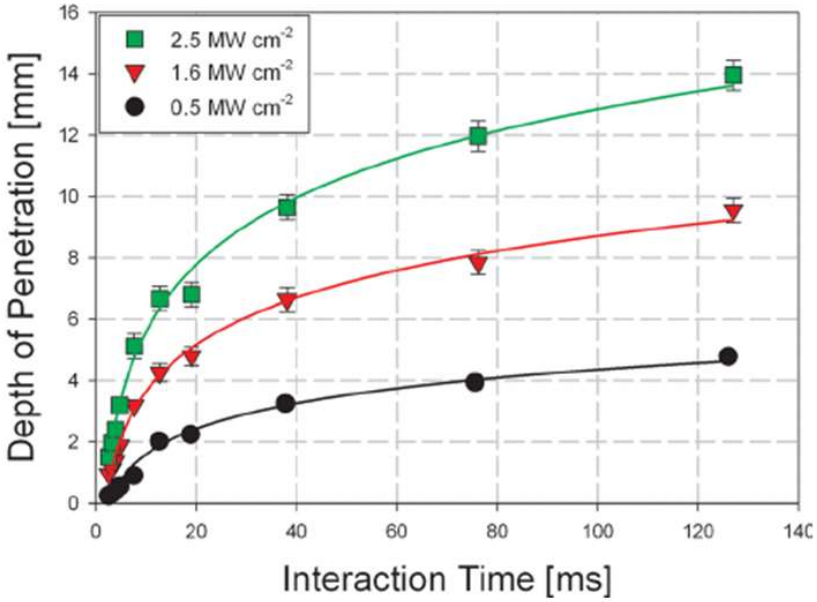
Different Focusing Positions for Different Thicknesses of Materials



For the relationship of cutting throughput and the power density, there is a lot of information we can find from Internet. One of the good examples is the “Laser-Material Interaction” image below:

Laser-Material Interaction



Ref:
https://www.researchgate.net/figure/Depth-of-penetration-as-a-function-of-power-density-and-interaction-time-for-a-beam_fig3_252017073

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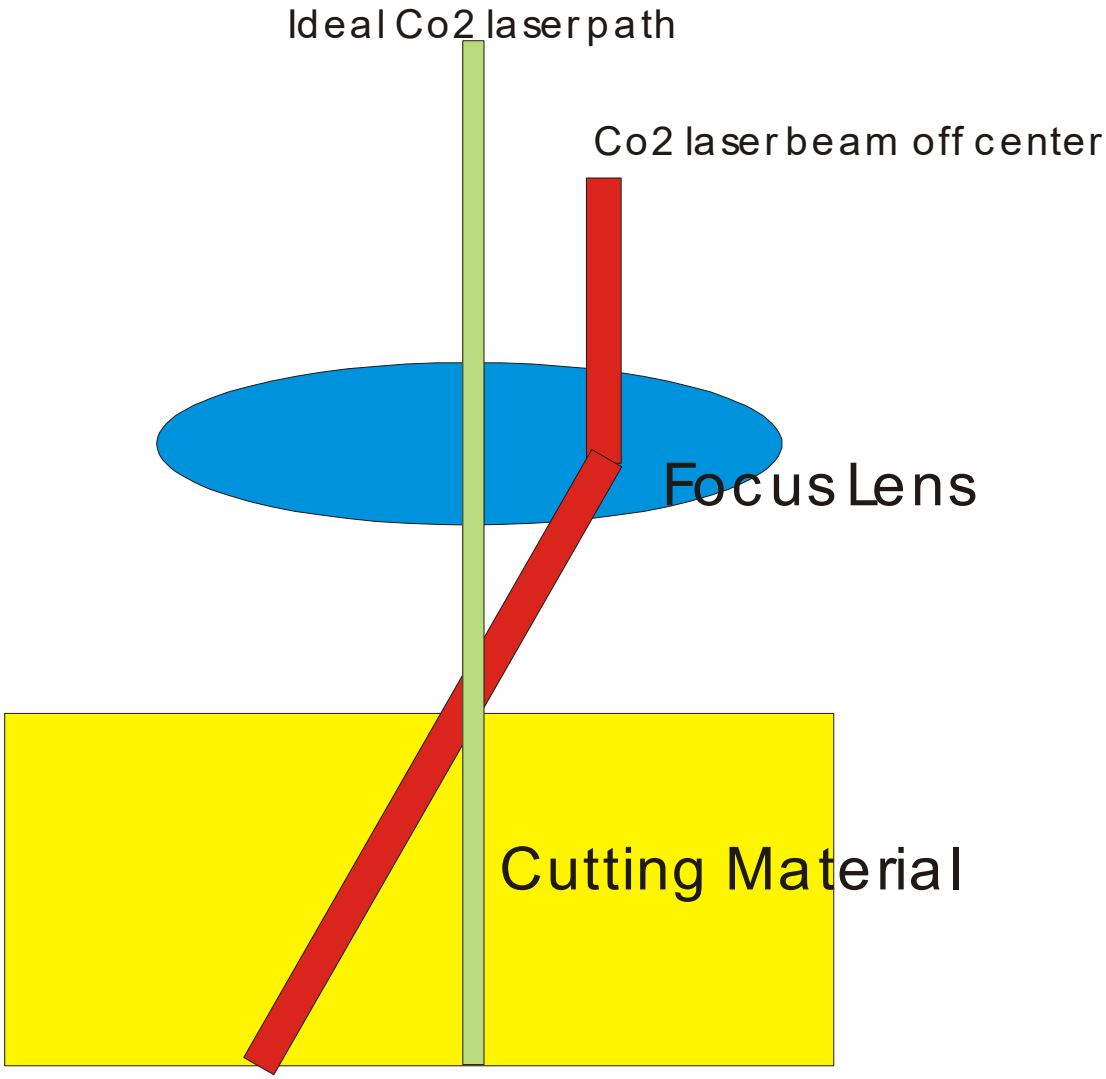
9.2 When cutting thick material (10mm acrylic for example), why the cutting edge is slant?

Explain: The problem is that the laser beam path does not pass through the center of focus lens. It's conventional to see some slant in the thick material cutting because of the mechanical accuracy and the lens focuses in then out. Please refer to the diagram below. If the Slant is very serious, please refer to "Optical Alignment" in the maintenance manual to improve the situation.



Slant Cutting Phenomena(see red)

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