Maintenance Manual

S400

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Chapter 1：Overview

1.1 Introduction

This manual is prepared for distributors to maintain or repair S400 laser engraver.

- Chapter 1 is the introduction of contents, safety and operating environment
- Chapter 2, we have diagrams to show the part number for every part in different sections.
- Chapter 3, introduction for electrical system
- Chapter 4, introduction to show you how to replace parts
- Chapter 5, deals with the laser system for laser tube、beam & opitcal alignment.
- Chapter 6, an instruction to show you how to upgrade firmware
- 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 General Safety

- 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 label 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 material. A well-maintained fire extinguisher and operational smoke or fire detector should be kept in the vicinity of the machine.
- Caution—Use of control or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- 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.

Always 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 to clean any small pieces that have fallen through the grid.

- Enable the SmartAIR™ nozzle when engraving or cutting materia that may easily ignite, such as acrylic, wood, or paper.
- Always wear safety goggles when the laser system is in operation. Reflective materia such as mirrors, enameled brass and anodized aluminum may partially-reflect some of the invisible laser radiation. Severe eye damage may occur if proper safety goggles are not worn.
- 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 materia that may generate toxic fumes, such as PVC and Teflon.
- Regularly clean and maintain your machine according to our cleaning and maintenance Instructions in Chapter 8. Doing so will ensure your machine will operate effectively and safely over a long period of time.

1.2.2 Safety Notice for Class 4 Machine

When the optional Pass-Through door module is installed, the laser system becomes a Class 4 machine with front and rear doors open, machine operators must wear goggles and follow the safety instructions to operate the machine. Exposure to a Class 4 laser beam via direct radiation and indirect stray radiation may cause damage to both skin and eyes. Exposure to the Class 4 laser beam may cause ignition of combustible material which can lead to a fire. A proper and well-maintained fire extinguisher should keep on hand next to the laser machine all the times.

The machine operator is responsible to take all necessary protective measures to prevent he possible ignition or explosion of material by the laser beam. A Class 4 laser system should be operated according to the following precautionary measures

among others:

- The operator is obliged to appoint **a trained Laser Protection Officer** responsible for compliance with the relevant regulations.
- **Identify the danger zone** by installing **warning lights** and **warning signs** outside the area.
- **The danger zone must be secured against unauthorized access.**
- The operator of a Class 4 laser system should always **wear laser protection goggles** suitable for the laser wavelength in use and with optical density at least OD5+ within the danger zone.
- An additional warning light should a o be installed in a visible location to warn the machine operator of any emerging laser radiation.

1.2.3 Operating Environment

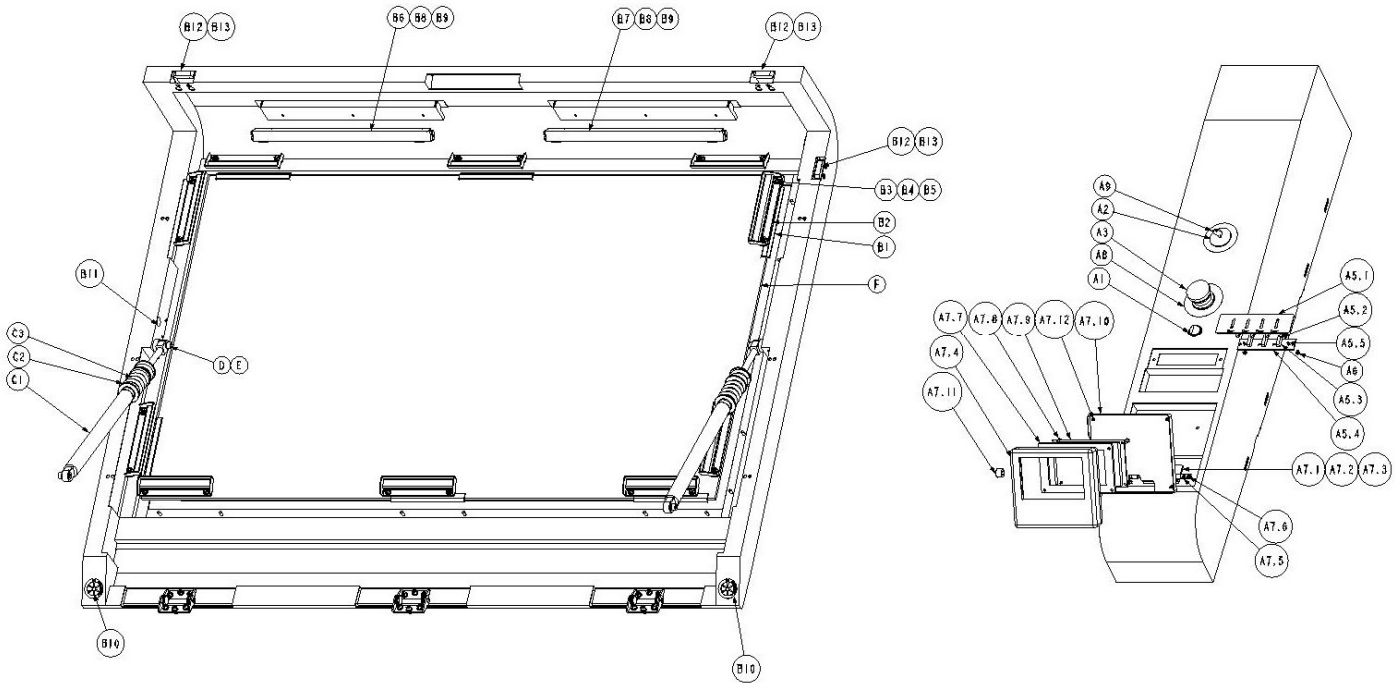
Please follow the guidelines when considering a suitable location to set the LaserPro S400. Improper work environments may lead to operational malfunction and/or unsafe working conditions. The LaserPro S400 should be placed and operated in a standard office-type environment.

- Avoid environments where the machine is exposed to high level of dust, temperature (temperature 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 level of noise and electrical noise.
- Select a location that is large enough to accommodate the LaserPro S400, 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 S400 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 apart from the wall for at least 60 cm (2 feet).

Chapter 2：Mechanical System

2.1 Top Cover

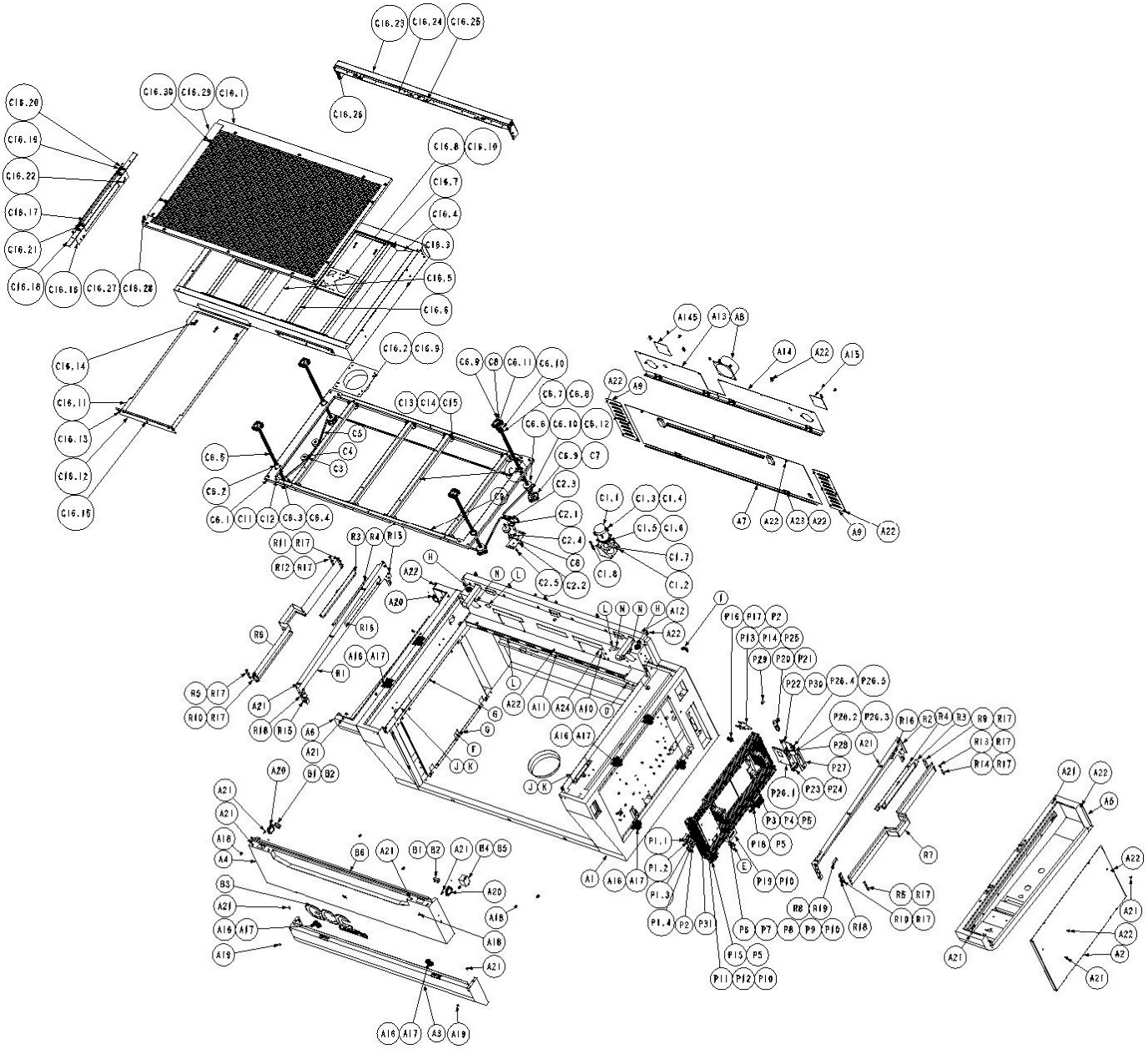


Top Cover – Parts List

Item Seq.	Part number	Item Description	Quantity
A	290092280G	Right Cover Assembly	1
A1	25700032G	LAMP SW(R13-112)	1
A2	25700094G	Key Switch (E3K2I1A.V)	1
A3	25700095G	Emergency Switch (TN3BKR-2B)	1
A5	290107260G	LED Board Assembly	1
A5.1	244058450G	LED PCB Bracket	1
A5.2	220005660G	LED Light pipe (LEM-30)	4
A5.3	233018030G	Rubber foot (SF200563)	3
A5.4	290102740G	LED Display Board Assembly	1
A5.5	25200115G	Truss head machine screw(M3*6L SUS).	2
A6	23500013G	Nut(M3xt2.4xS5.5)	2
A7	290109260G	Touch Panel	1
A7.1	244058460G	Touch panel fixer	1
A7.2	25200291G	Socket head set screw.(M6*8L)	3
A7.3	26000051G	Flat wahser (d6*D16*t1.0) sus	3
A7.4	244058470G	Touch panel bracket	1
A7.5	233015150G	Hinge(WW-001-01)	2
A7.6	25200101G	Socket head set screw.(M3*6L)SUS+CO	8
A7.7	233017200G	Spacer	1
A7.8	220004740G	Spacer Support (MAE-9T)	4
A7.9	290103060G	TFT Touch Panel Board With S400 Touch Screen Firmware	1
A7.10	244058480G	Touch panel seat	1
A7.11	23300166G	Hole Plugs M13	1
A7.12	25200442G	zinc black-Truss head machine screw (M3×6L)	4
A8	26400387G	Safety Sticker-Emergency Stop	1
A9	26400547G	Keyswitch On-Off sticker	1

Item Seq.	Part number	Item Description	Quantity
B	290092260G	Top Cover Assembly	1
B1	233017520G	I-ECO-3081 rubber gasket 400M	0.0031
B2	244058510G	Tempered Glass Windows Bracket	10
B3	26000018G	Spring washer.(d4xD7 SUS)	20
B4	26000016G	Flat washer(d4.5xD9.5xt0.8)	20
B5	23500015G	Nut(M4xt3.2xS7)	20
B6	202003460G	LED module 12V single cable (M-5630W-30-1)	1
B7	202003530G	LED module 12V dual cable (M-5630W-30)	1
B8	244058500G	LED lamp holder	2
B9	25200200G	Truss head machine screw(M4*8L sus).	6
B10	23300172G	Snap bushing (SC-2128A)	3
B11	23300166G	Hole Plugs M13	2
B12	25700015G	Magnetic Switch	3
B13	25200101G	Socket head set screw.(M3*6L)SUS+CO	6
C	290110450G	25KG cylinder assembly	2
C1	233018670G	25KG Gas Spring	1
C2	228043420G	Spring bush	2
C3	255001350G	Spring	1
D	25200299G	Socket head set screw.(M6*12L)	4
E	26000052G	Flat washer(D16mm d7mm t1.5mm)	4
F	228044330G	Windows(980x580x5mm)	1

2.2 Main Frame



Main Frame – Spare Parts List

Item Seq.	Part number	Item Description
A	202003850G	Main frame
A1	244058310G	Main frame
A2	244058300G	Side cover
A3	244053750G	Front Cover
A4	244053740G	Front Door Cover
A5	244053580G	Right Cover
A6	244053570G	Left Cover
A7	244053790G	Back door
A8	244058430G	4" pipe base
A9	244058290G	Maintenance cover
A10	244060020G	Tube maintance cover
A11	244053610G	Plate Cover
A12	244053600G	Back Top Cover
A13	244053730G	Left Cover rear
A14	244060030G	Right cover rear
A15	244058420G	Cover
A16	233012990G	Door Hinges(CL-45)
A17	233018230G	Low head countersunk screws BSARAS4-10
A18	25200204G	Socket head set screw.(M4*10L)
A19	26500362G	Hold plug (M09)
A20	23300305G	buckle door magnet(02-10-101-10)
A21	26500210G	Rubber Foot TNF-1
A22	252005230G	zinc black-Pan Washer Hexagonal Socket Screw M4*8
A23	24400991G	plank hinge
A24	252005210G	zinc black-Pan Head Torx Socket(T10) Screw M3*6
B	290092440G	Front Cover Assembly
B1	22000045G	Magnet MC-12
B2	25200115G	Truss head machine screw(M3*6L SUS).
B3	237000630G	GCC LaserPro EL-Logo
B4	220005520G	Inverter for GCC LaserPro EL-Logo
B5	252005140G	TYPE B panhead self tapping screw(black) M3*8

Item Seq.	Part number	Item Description
B6	233018250G	EXTRUSION RUBBER SPONGE PARTS U-Type 2.5
C1	290109210G	Z Motor Assembly
C1.1	23100015G	STEPPING MOTOR DSH56EL4HA4N01000 L=1000mm
C1.2	24403500G	Z Motor Bracket
C1.3	25200214G	Socket head set screw.(M4*12L)
C1.4	26000018G	Spring washer.(d4xD7 SUS)
C1.5	22800622G	z axis pulley (P20-5GT-9)
C1.6	25200170G	Socket headness set screw.(M4*4L)
C1.7	24700013G	Rubber Packing for Z Motor
C1.8	25200192G	Socket head set screw.(M4*8L sus+coating)
C1.9	25200192G	Socket head set screw.(M4*8L sus+coating)
C2	29002521G	Z-axis Idle wheel seat Assembly
C2.1	22800084G	idle Pulley
C2.2	24401000G	Z-axis Idle wheel
C2.3	24900007G	E-shape retaining ring.d6*D12*t0.8
C2.4	22800964G	Core of Z-axis pulley
C2.5	25200274G	Socket head set screw.(M5*10L)
C3	22800084G	idle Pulley
C4	24900007G	E-shape retaining ring.d6*D12*t0.8
C5	20600027G	Z-axis belt (5GT-T728-9)
C6	290103070G	Table lead screw assembly
C6.1	244058230G	Working table bracket
C6.2	228042150G	Z_AXIS_Trapezoidal lead screw
C6.3	260000770G	Flat washer.(d5.2xD8xt0.8 SUS)
C6.4	25200282G	Socket head set screw.(M5*20L)
C6.5	228042140G	Z_AXIS_TW_Lead_screw
C6.6	29002551G	Z-axis pulley Assembly.
C6.7	22800922G	Z axis top stopper
C6.8	25200173G	Socket headness set screw.(M4*6L)
C6.9	24100366G	Bearing seat
C6.10	20700034G	Bearing 628ZZ
C6.11	23500015G	Nut(M4xt3.2xS7)
C6.12	25200036G	Pan Head tap srcew type AB (M4*8 black)
C7	25200205G	Socket head set screw.(M4*10L)
C8	25200237G	Socket head set screw.(M4*16L sus+coating)

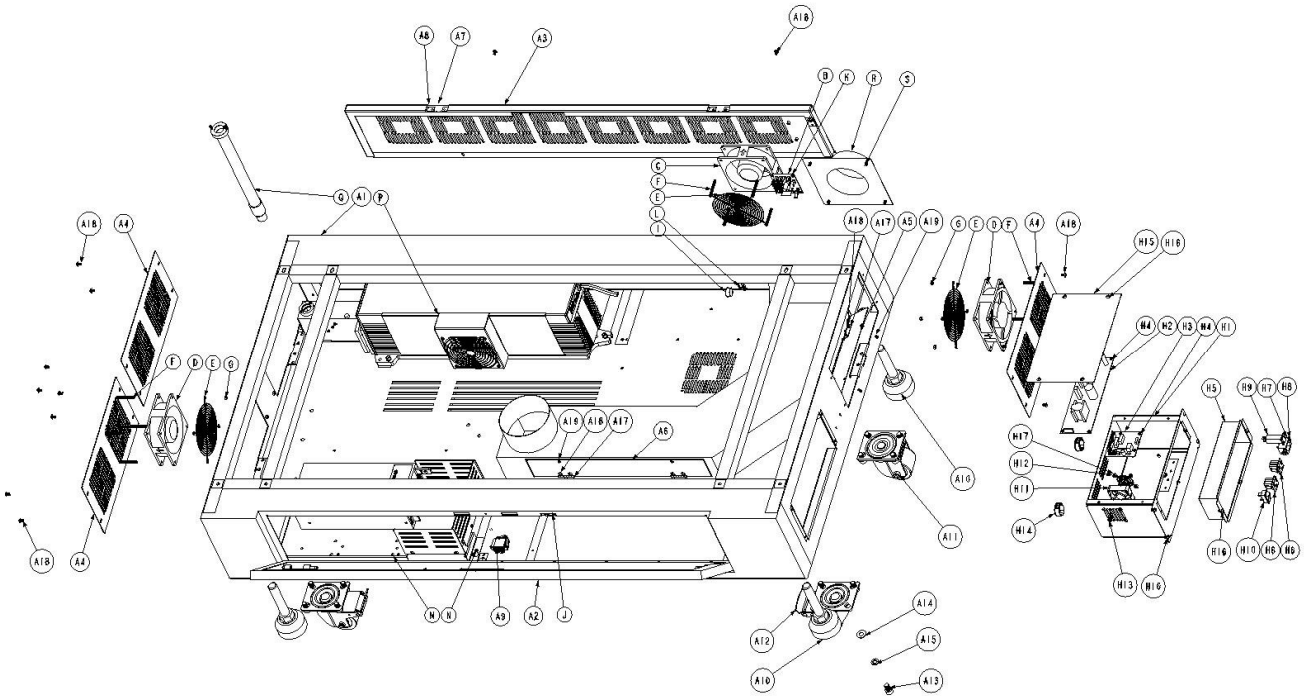
Item Seq.	Part number	Item Description
C9	244058240G	Working table support bar
C10	244058250G	Working table support bar
C11	25200380G	Socket head set screw (M5*10)
C12	260000770G	Flat washer.(d5.2xD8xt0.8 SUS)
C13	25200192G	Socket head set screw.(M4*8L sus+coating)
C14	26000016G	Flat washer(d4.5xD9.5xt0.8)
C15	26000018G	Spring washer.(d4xD7 SUS)
C16	290092510G	Working Table Assembly
C16.1	202003700G	Square Grid Honeycomb Table and Frame
C16.2	244057000G	vacuum_Adapter
C16.3	244057010G	Dust_Box
C16.4	244057090G	Side_guide
C16.5	244057100G	Main_plate
C16.6	244057110G	Guide_groove
C16.7	244060640G	Bracket
C16.8	244061981G	Rotary_Axis_Frame
C16.9	25200444G	zinc black-Truss head machine screw (M4×6L)
C16.10	25200426G	zinc black-Socket head set screw (M4x8L)
C16.11	244057120G	Drawer_panel
C16.12	244057020G	Collector
C16.13	252005230G	zinc black-Pan Washer Hexagonal Socket Screw M4*8
C16.14	22000344G	Retainer belt (YJ-205-B)(BLACK)
C16.15	25200420G	zinc black-Socket head set screw (M3x6L)
C16.16	244057030G	Ruler_Seat(Y)
C16.17	244057040G	Movable_Seat(Y)
C16.18	290102930G	Y_Ruler
C16.19	233015150G	Hinge(WW-001-01)
C16.20	25200101G	Socket head set screw.(M3*6L)SUS+CO
C16.21	25200444G	zinc black-Truss head machine screw (M4×6L)
C16.22	25200445G	zinc black-Truss head machine screw (M4×8L)
C16.23	244057050G	Ruler_Seat(X)
C16.24	290102940G	X_Ruler
C16.25	25200444G	zinc black-Truss head machine screw (M4×6L)
C16.26	25200445G	zinc black-Truss head machine screw (M4×8L)

Item Seq.	Part number	Item Description
C16.27	25200428G	zinc black-Socket head set screw (M4x20L)
C16.28	26000062G	zinc black-Flat washer (d4xD10xt0.8)
C16.29	290073850G	Space ruler for Y-axis(610*50*3)
C16.30	252005220G	zinc black-Pan Washer Hexagonal Socket Screw M4*6
D	290092560G	Limit Switch Assembly(Up)
E	290092570G	Limit Switch Assembly(Down)
F	244058260G	Dust cover for z axis lead screw
G	252005220G	zinc black-Pan Washer Hexagonal Socket Screw M4*6
H	23300172G	Snap bushing (SC-2128A)
I	290092550G	Lever SW Assembly
J	244060010G	Y-axis maintance cover
K	25200101G	Socket head set screw.(M3*6L)SUS+CO
L	233016900G	Hole Plugs (M20/Black)
M	23300166G	Hole Plugs M13
N	233017510G	Hole Plugs (M53/Black)
P	290102911G	Electric box assembly
P1	290102920G	Power fixture assembly
P1.1	244059990G	Power fixture
P1.2	25700014G	AC power ON/OFF switch (RBW2ABLKBLKFF0)
P1.3	22300003G	FUSE (15A/250V ZE-800)
P1.4	22300004G	Fuse (3A/250V ZE-800)
P2	252005210G	zinc black-Pan Head Torx Socket(T10) Screw M3*6
P3	290100680G	5272V3 Main Board in Common Assembly with 5272V3 firmware for S400
P4	290098981G	5272 Driver Board in Common Assembly with Interlock
P5	25200115G	Truss head machine screw(M3*6L SUS).
P6	244060000G	Fan Bracket
P7	22200025G	DC 12V Fan 80*80*25mm (AD0812UB-A71GP)
P8	22000053G	Fan finger guard(matchAD08024US-A70GL)(G08A5-4HA)
P9	25200465G	Pan head machine screw M4*35L
P10	25200187G	Truss head machine screw(M4*6L).
P11	245001180G	Power Supply 300W 48V/7A (HRP-300-48)
P12	23300586G	Accessory(MHS-012)
P13	209029160G	Rotary Cable 450mm
P14	26500507G	Hex screw #4*5+7..

Item Seq.	Part number	Item Description
P15	29005059G	DC12V POWER MODULE
P16	209028370G	M12 8pin male connector for CDRH Cable 100mm (TM-19G-M1208M-H-02)
P17	211005130G	M12 Connector Protection Cap (P507CAP-M12CH01)
P18	290079640G	DC & AC Fan Control Board Set
P19	21800007G	EMI Filter YE10T1L2
P20	26500488G	Air Flow Valve JSC6-02BT(Black)
P21	26500489G	airflow valve (PMF6-02) / (KUKM6-02M)
P22	244058280G	USB Cover
P23	21100184G	AC CONNECTOR(AC-008 / SS-7B-VDER-4.8)
P24	25200013G	90° dish flat head machine screw M3*8
P25	23300311G	D.Type connector cover(DTC-9F(B))
P26	290107880G	USB Storage Adapter Assembly (Red Board)
P26.1	244056530G	Adapter
P26.2	25200115G	Truss head machine screw(M3*6L SUS).
P26.3	290100500G	USB Storage Disk Board Assembly with firmware(red board)
P26.4	244059190G	usb plate
P26.5	25200010G	Truss head machine screw(M3*6L).
P27	290110330G	USB Cable bracket
P28	233018630G	Hexagonal Post of Female Screw Type L15*M4+Male Screw Type L8*M4
P29	290100300G	Indicate Light Tower PCB to Case Cable 800mm
P30	252005220G	zinc black-Pan Washer Hexagonal Socket Screw M4*6
P31	22000232G	wiring duct2545s 25*45mm
R1	244058522G	Dust prevention bracket-left
R2	244058532G	Dust prevention bracket-right
R3	244058490G	LED lamp holder
R4	202003460G	LED module 12V single cable (M-5630W-30-1)
R5	290106180G	Dust prevention bracket
R6	290107810G	Left Y-axis Dust prevention
R7	290107820G	Right Y-axis Dust prevention
R8	22000045G	Magnet MC-12
R9	244060042G	Dust prevention bracket-rear
R10	244060052G	Dust prevention bracket-front
R11	244061490G	Left Dust prevention bracket-rear
R12	290109400G	Dust prevention bracket left rear

Item Seq.	Part number	Item Description
R13	290109410G	Dust prevention bracket right rear 1
R14	290109420G	Dust prevention bracket right rear 2
R15	25200181G	Truss head machine screw(M4*6L).
R16	25200019G	Truss head machine screw(M3*8L black)
R17	25200101G	Socket head set screw.(M3*6L)SUS+CO
R18	25200138G	Socket head set screw.(M3*10L sus+coating)
R19	25200115G	Truss head machine screw(M3*6L SUS).

2.3 Base Section

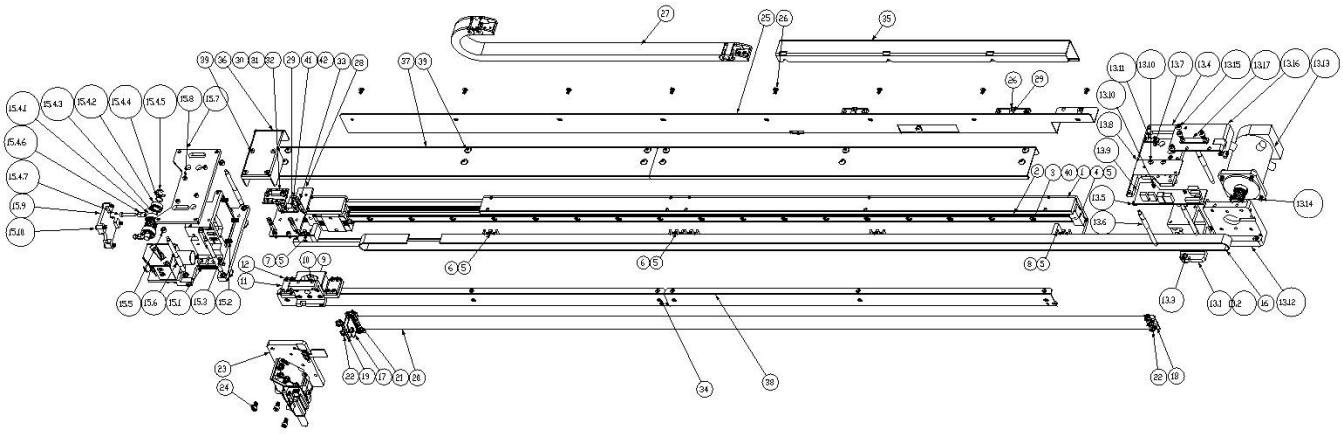


Base Section – Parts List

Item Seq.	Part number	Item Description	Quantity
A	202003860G	Base Frame	1
A1	244058400G	Base Frame	1
A2	244053860G	Base Front Door	1
A3	244053870G	Base Back Door	1
A4	244058360G	Fan Bracket	3
A5	244058350G	Pipe Cover	1
A6	244059940G	Pipe Cover	1
A7	233012990G	Door Hinges(CL-45)	2
A8	233018230G	Low head countersunk screws BSARAS4-10	8
A9	23300305G	buckle door magnet(02-10-101-10)	2
A10	233017560G	Adjuster Stand (RS7020100)	4
A11	233017610G	Caster-400KG (25JPAHD)	2
A12	233017620G	Caster with brake-400KG (25JPBHD)	2
A13	25200407G	Socket head set screw (M10*16)	16
A14	26000032G	Flat Washer(d10xD22xt1.6) Ni	16
A15	26000050G	Spring washer.(d10xD17xt2) SUS - StellarJet All	16
A16	23300387G	Plastic Embedded Pulls	1
A17	24400991G	plank hinge	4
A18	252005230G	zinc black-Pan Washer Hexagonal Socket Screw Screw	30
A19	252005210G	zinc black-Pan Washer Head Torx Socket(T10) Screw	4
B	29005059G	DC12V POWER MODULE	1
C	22200024G	FAN DC12V (AD1212HB-51(N)LF)	1
D	22200029G	DC 12V Fan 120*120*38mm (AFB1212SHE)	2
E	22000106G	Fan finger guard 12cm(008170)(G12B8-4HA)(S109-8)	3
F	25200466G	Pan head machine screw M4*45L	12
G	23500015G	Nut(M4xt3.2xS7)	8
H	290092630G	Power Fixed Bracket Assembly	1
H1	244058370G	Power box	1
H2	24500037G	power supply 150W LPP-150-12GC	1
H3	290077530G	FAN Control Board Assembly	1
H4	25200115G	Truss head machine screw(M3*6L SUS).	8
H5	244061530G	Power_adapter_plate	1
H6	21100149G	AC CONNECT(SO-11-1)	2
H7	21100184G	AC CONNECTOR(AC-008 / SS-7B-VDER-4.8)	1
H8	25200013G	90° dish flat head machine screw M3*8	2

Item Seq.	Part number	Item Description	Quantity
H9	22300003G	FUSE (15A/250V ZE-800)	1
H10	25700017G	Rocker Switch- Black Case(RF-1001N-BRWD-2 / RF-1001-NBRA3LCL)	1
H11	22200044G	DC12V Fan 50*50*15mm (MF5015V1-10000-A99)	1
H12	22000353G	FAN 50*50mm Accessories (PD-FG-05-50/TF11-50)	1
H13	25200247G	Truss head machine screw(M4*20L).	4
H14	23300172G	Snap bushing (SC-2128A)	2
H15	244058380G	Power box Cover	1
H16	252005230G	zinc black-Pan Washer Hexagonal Socket Screw M4*8	11
H17	23500015G	Nut(M4xt3.2xS7)	4
I	233016900G	Hole Plugs (M20/Black)	1
J	290092550G	Lever SW Assembly	1
K	25200115G	Truss head machine screw(M3*6L SUS).	4
L	290106120G	Lever SW Assembly	1
M	290107010G	S400 CO2(48V/1500W) Laser Power Assembly	1
N	25200200G	Truss head machine screw(M4*8L sus).	4
P	290109880G	80GT Laser System Assembly	1
Q	29003150G	600 Contraction pipe Assembly	1
R	244058340G	4" pipe base	1
S	252005230G	zinc black-Pan Washer Hexagonal Socket Screw M4*8	4

2.4 X Axis Assembly

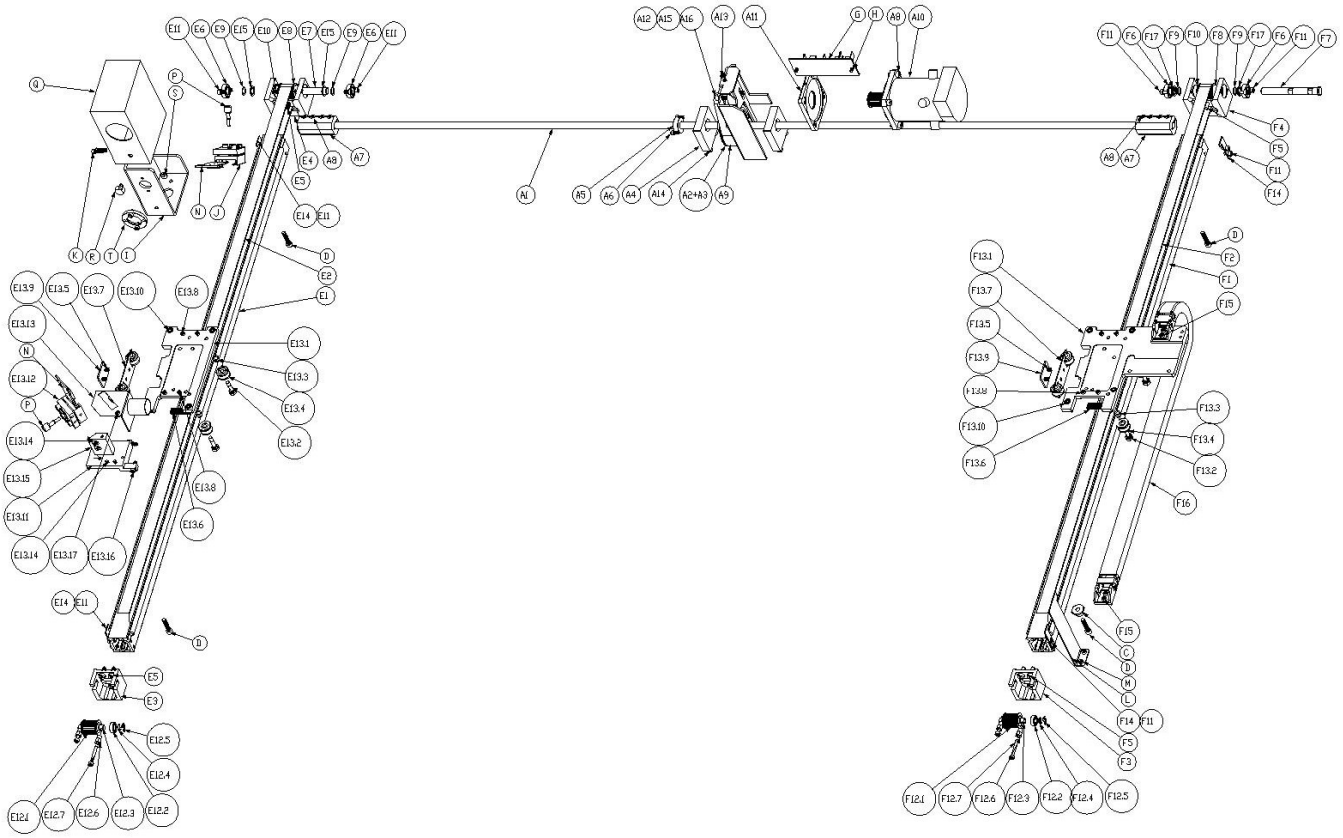


X Axis Assembly – Parts List

Item Seq.	Part number	Item Description	Quantity
1	228042352G	X Axis Slideway	1
2	233017361G	Linear_Guide(ARC15MSB1ZVCSP-1095L-20-55)	1
3	25200226G	Socket head set screw.(M4*14L) SUS	18
4	228042310G	Limit Baffle	2
5	25200149G	Socket head set screw.(M3*12L)	15
6	228043012G	X axis slideway front cover bracket	4
7	228043591G	Left Carriage stopper	1
8	228043002G	Carriage stopper	1
9	228042332G	X-axis slide bracket	1
10	25200205G	Socket head set screw.(M4*10L)	2
11	228042501G	belt retainer	2
12	25200119G	Socket head set screw.(M3*8L)SUS+CO	10
13	290102003G	X-axis driving pulley seat assembly	1
13.1	228042452G	X axis driving pulley seat	1
13.2	25200205G	Socket head set screw.(M4*10L)	5
13.3	25200192G	Socket head set screw.(M4*8L sus+coating)	3
13.4	228042472G	Motor bracket	1
13.5	20700005G	Bearing 683ZZ	4
13.6	228042362G	NITOFLON shaft	4
13.7	25200101G	Socket head set screw.(M3*6L)SUS+CO	4
13.8	244059982G	PCB Board	1
13.9	290101080G	X Motor PCB with AAS I/O Assembly-5A	1
13.1	25200115G	Truss head machine screw(M3*6L SUS).	8
13.11	29005770G	Plate	2
13.12	228042461G	bracket	1
13.13	290106140G	DC Servo Motor Assembly	1
13.14	25200214G	Socket head set screw.(M4*12L)	4
13.15	25200177G	Socket head set screw.(M4*6L)	5
13.16	244053821G	Motor Bracket	1
13.17	290110990G	Plate	1
15	290102013G	X_Axis_Tension_pulley Assembly	1
15.1	228042402G	X axis driven pulley seat	1
15.2	25200205G	Socket head set screw.(M4*10L)	3
15.3	25200192G	Socket head set screw.(M4*8L sus+coating)	3
15.4	290102022G	Tension_pulley	1
15.4.1	228042371G	X-axis driven pulley	1
15.4.2	20700019G	Bearing 688ZZ	2

Item Seq.	Part number	Item Description	Quantity
15.4.3	228042381G	X Axis driven pulley shaft	1
15.4.4	25500048G	wire ring φ8	2
15.4.5	24900010G	E-shape retaining ring.d*7mm	2
15.4.6	22800929G	strain stable screw	2
15.4.7	22802302G	Adjust screw	2
15.5	20700005G	Bearing 683ZZ	4
15.6	228043302G	Left NITOFLON shaft	4
15.7	228042412G	X axis driven pulley NITOFLON seat	1
15.8	25200101G	Socket head set screw.(M3*6L)SUS+CO	4
15.9	228044420G	Belt_tension_plate	1
15.1	25200149G	Socket head set screw.(M3*12L)	4
16	206002332G	X-axis Open Kevlar Belt(FHT-2*T1243*W14)	1
17	244061500G	X axis Left Dust prevention bracket	1
18	244061510G	X axis Right Dust prevention bracket	1
19	244061520G	X axis Dust prevention bracket	1
20	290109250G	X-axis Dust prevention	1
21	290109280G	X-axis Dust prevention bracket	2
22	25200101G	Socket head set screw.(M3*6L)SUS+CO	16
23	290102041G	Lens_Carriage_Assembly	1
24	25200192G	Socket head set screw.(M4*8L sus+coating)	3
25	244057221G	X axis chain bracket	1
26	25200115G	Truss head machine screw(M3*6L SUS).	28
27	233017490G	X tube chain.0130.15R28-53L	1
28	228042491G	X axis protected pad	1
29	29005770G	Plate	4
30	22000363G	PC SPACER SUPPORT(SS-3)	2
31	29005108G	AAS I terminal board Module	1
32	25200130G	Truss head machine screw(M3*8L).	2
33	22000029G	Hex Screw M3*25	4
34	25200438G	zinc black-90° dish flat head machine screw	14
35	244060600G	USB Protect Cover	1
36	244059930G	PCB_Cover	1
37	244060362G	X axis right slideway cover	2
38	244059972G	X axis slideway front cover	2
39	252005210G	zinc black-Pan Head Torx Socket(T10) Screw M3*6	16
40	26000018G	Spring washer.(d4xD7 SUS)	18
41	260000780G	Plastic Washer (WSG-01-N2W)	2
42	22000016G	Hex Screw	2

2.5 Y Axis Assembly



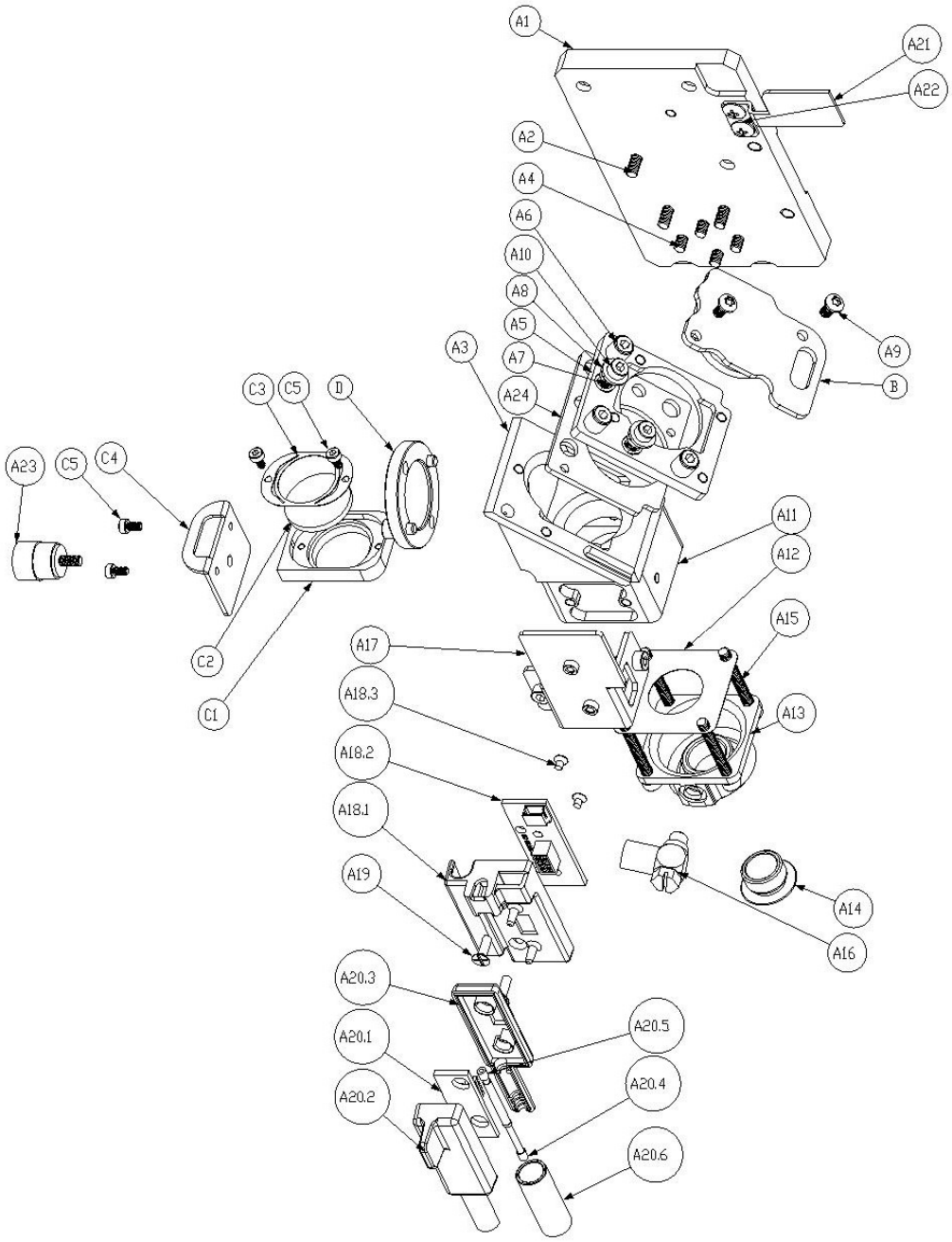
Y Axis Assembly

Item Seq.	Part number	Item Description	Quantity
A	290092350G	Y-Axis Transmit Shaft Assembly	1
A1	228042120G	Y axis transmit shaft	1
A2	228043530G	Y axis deceleration pulley	1
A3	25200170G	Socket headness set screw.(M4*4L)	4
A4	22800934G	Y transmit shaft seat	2
A5	20700052G	Bearing (698ZZ)	2
A6	25200100G	Socket head set screw.(M3*6L)	4
A7	22801797G	8mm Heavy Coupling	2
A8	25200205G	Socket head set screw.(M4*10L)	16
A9	20600180G	Y-axis Close Kevlar Belt (FHT-2*T100*W15)	1
A10	290106140G	DC Servo Motor Assembly	1
A11	228042960G	Y-axis motor bracket	1
A12	25200192G	Socket head set screw.(M4*8L sus+coating)	4
A13	25200149G	Socket head set screw.(M3*12L)	1
A14	25200191G	Socket head set screw.(M4*8L)sus	4
A15	26000016G	Flat washer(d4.5xD9.5xt0.8)	4
A16	26000018G	Spring washer.(d4xD7 SUS)	4
C	228042980G	Y slideway actions revise seat	1
D	25200241G	Socket head set screw (M4*20L)	4
E	290092361G	Y-Axis Rail Assembly(Left)	1
E1	228042130G	Y Axis Slideway	1
E2	206002310G	Y-axis Open Kevlar Belt (FHT-2*T777*W15)	1
E3	228043490G	Y axis driven pulley seat	1
E4	228043510G	Y axis driving pulley seat	1
E5	25200205G	Socket head set screw.(M4*10L)	6
E6	20700019G	Bearing 688ZZ	2
E7	228043500G	Y axis driving pulley shaft	1
E8	228042421G	driving Pulley	1
E9	25500048G	wire ring φ8	4
E10	25200170G	Socket headness set screw.(M4*4L)	4
E11	25200101G	Socket head set screw.(M3*6L)SUS+CO	8
E12	290107770G	Tension idle pulley Assembly	1
E12.1	228043520G	Y axis driven pulley	1
E12.2	20700002G	Bearing L-1260ZZ/MR126ZZ/WML6012ZZ	2
E12.3	228043480G	Y axis driven pulley shaft	1
E12.4	25500022G	wire ring φ6	2

Item Seq.	Part number	Item Description	Quantity
E12.5	24900004G	E-shape retaining ring.d4*D9*t 0.6	2
E12.6	22800929G	strain stable screw	2
E12.7	22802302G	Adjust screw	2
E13	290106161G	Y Axis Left Slide Assembly	1
E13.1	228042991G	Y-axis left slide block	1
E13.2	22800952G	4*11 small roller screw	2
E13.3	22800951G	4*4.5 interval pillar	2
E13.4	29004279G	A roller assembly(J)	2
E13.5	25200101G	Socket head set screw.(M3*6L)SUS+CO	2
E13.6	228043560G	Y axis belt retainer	2
E13.7	29004278G	Wheel spring Assembly(J)	1
E13.8	25200081G	Socket head set screw.(M2.5*6L)SUS+coating	4
E13.9	24401001G	guiding plate of spring	1
E13.10	20700005G	Bearing 683ZZ	4
E13.11	228042390G	3rd mirror mount	1
E13.12	202003240G	Prism Mounts Assembly	1
E13.13	244058730G	3rd mirror mount cover	1
E13.14	25200119G	Socket head set screw.(M3*8L)SUS+CO	4
E13.15	228043040G	Adapter	1
E13.16	25200149G	Socket head set screw.(M3*12L)	2
E13.17	252005210G	zinc black-Pan Head Torx Socket(T10) Screw M3*6	3
E14	244058880G	Stopper board	2
E15	228043030G	Spacer	2
F	290092371G	Y-Axis Rail Assembly(Right)	1
F1	228042130G	Y Axis Slideway	1
F2	206002310G	Y-axis Open Kevlar Belt (FHT-2*T777*W15)	1
F3	228043490G	Y axis driven pulley seat	1
F4	228043510G	Y axis driving pulley seat	1
F5	25200205G	Socket head set screw.(M4*10L)	6
F6	20700019G	Bearing 688ZZ	2
F7	228043500G	Y axis driving pulley shaft	1
F8	228042421G	driving Pulley	1
F9	25500048G	wire ring φ8	2
F10	25200170G	Socket headness set screw.(M4*4L)	4
F11	25200101G	Socket head set screw.(M3*6L)SUS+CO	8
F12	290107770G	Tension idle pulley Assembly	1

Item Seq.	Part number	Item Description	Quantity
F12.1	228043520G	Y axis driven pulley	1
F12.2	20700002G	Bearing L-1260ZZ/MR126ZZ/WML6012ZZ	2
F12.3	228043480G	Y axis driven pulley shaft	1
F12.4	25500022G	wire ring φ6	2
F12.5	24900004G	E-shape retaining ring.d4*D9*t 0.6	2
F12.6	22800929G	strain stable screw	2
F12.7	22802302G	Adjust screw	2
F13	290106151G	Y Axis Right Slide Assembly	1
F13.1	228042481G	Y-axis slide block	1
F13.2	22800952G	4*11 small roller screw	2
F13.3	22800951G	4*4.5 interval pillar	2
F13.4	29004279G	A roller assembly(J)	2
F13.5	25200101G	Socket head set screw.(M3*6L)SUS+CO	2
F13.6	228043560G	Y axis belt retainer	2
F13.7	29004278G	Wheel spring Assembly(J)	1
F13.8	25200081G	Socket head set screw.(M2.5*6L)SUS+coating	4
F13.9	24401001G	guiding plate of spring	1
F13.10	20700005G	Bearing 683ZZ	4
F14	244058880G	Stopper board	2
F15	25200119G	Socket head set screw.(M3*8L)SUS+CO	4
F16	26500308G	Y tube chain.0130.15R28-36L	1
F17	228043030G	Spacer	2
G	29002510G	Y Motor PCB	1
H	25200115G	Truss head machine screw(M3*6L SUS).	2
I	24400987G	Mirror Bracket	1
J	202003240G	Prism Mounts Assembly	1
K	25200138G	Socket head set screw.(M3*10L sus+coating)	2
L	244058892G	Y-axis detector	1
M	25200101G	Socket head set screw.(M3*6L)SUS+CO	2
N	29002522G	Mirror Assembly	2
P	22800914G	mirror pin	2
Q	24401108G	Dust Prevention Cap	1
R	23300299G	Hand Knobs (CRKB.M4-6L)	1
S	25200192G	Socket head set screw.(M4*8L sus+coating)	2
T	290069310G	Dust Prevention Window fix asm	2

2.6 Pen Caraige

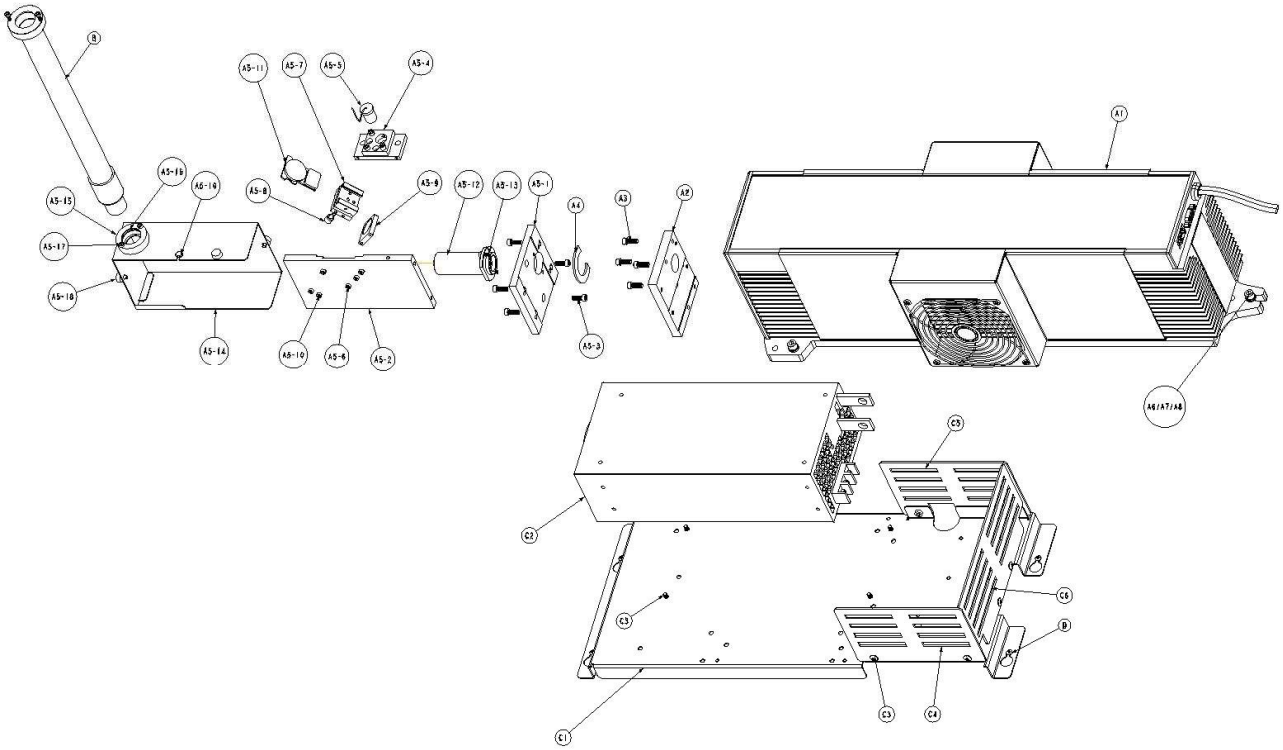


Pen Carriage – Parts List

Item Seq.	Part number	Item Description	Quantity
A	290102041G	Lens_Carriage_Assembly	1
A1	228042343G	Lens_Carriage_Base	1
A2	25200119G	Socket head set screw.(M3*8L)SUS+CO	3
A3	228042811G	Mirror_Bracket	1
A4	25200101G	Socket head set screw.(M3*6L)SUS+CO	6
A5	228035441G	Carriage_Reflector_Hold_Board	1
A6	22800281G	mirror modulate screw	3
A7	25500023G	Spring	2
A8	26000038G	Flat wahser	2
A9	252005210G	zinc black-Pan Head Torx Socket(T10) Screw M3*6	2
A10	25200138G	Socket head set screw.(M3*10L sus+coating)	2
A11	228042821G	Mirror_Stand	1
A12	244059480G	Washer	1
A13	228042830G	Blowing_Nozzle_Stand	1
A14	228042840G	Nozzle	1
A15	25200416G	Socket head set screw.(M3*25L)	4
A16	26500240G	pipe connector (M-5HLH-6)	1
A17	244059461G	Transfer_Board	1
A18	29002546G	Auto focus seat Assembly.	1
A18.1	24100365G	Auto focus pin cover	1
A18.2	29002507G	AUTOFOCUS A Module	1
A18.3	25200343G	Head-BI machine screw.(M2*3L)	2
A19	25200082G	90° dish flat head machine screw M2.5*8	2
A20	29006010G	Auto focus pin Assembly.	1

Item Seq.	Part number	Item Description	Quantity
A20.1	29006011G	AUTOFOCUS C Module	1
A20.2	24100363G	Auto focus pin cover	1
A20.3	24100364G	Auto focus pin cover	1
A20.4	22000117G	Probe (S-4A-0525)	1
A20.5	228032120G	Probe Extension	1
A20.6	228039690G	Protect Pipe	1
A21	244058721G	X-axis encoder	1
A22	25200095G	Truss head machine screw(M3*4L).	2
A23	233018430G	Hand_screw(HASW3-9)	1
A24	290099280G	Carriage Reflector Hold Board Sponge	1
B	290109740G	CO2 Carriage_Reflector_Hold_Assembly	1
C	290105770G	CO2 2.0"Focus_Lens_Assembly	1
C1	228042860G	Upper_Hold_Board(blue))	1
C2	23600011G	II-VI P/N#488614 ZnSe Lens 0.75"dia. × 2.0"FL ET=0.08"	1
C3	244059470G	0.75"Lens_Spring	1
C4	244059490G	Cover_Plate	1
C5	25200329G	Pan head machine screw(M2×4L) SUS	4
D	290069310G	Dust Prevention Window fix asm	1

2.7 Mirror 1 and Laser Tube Assembly

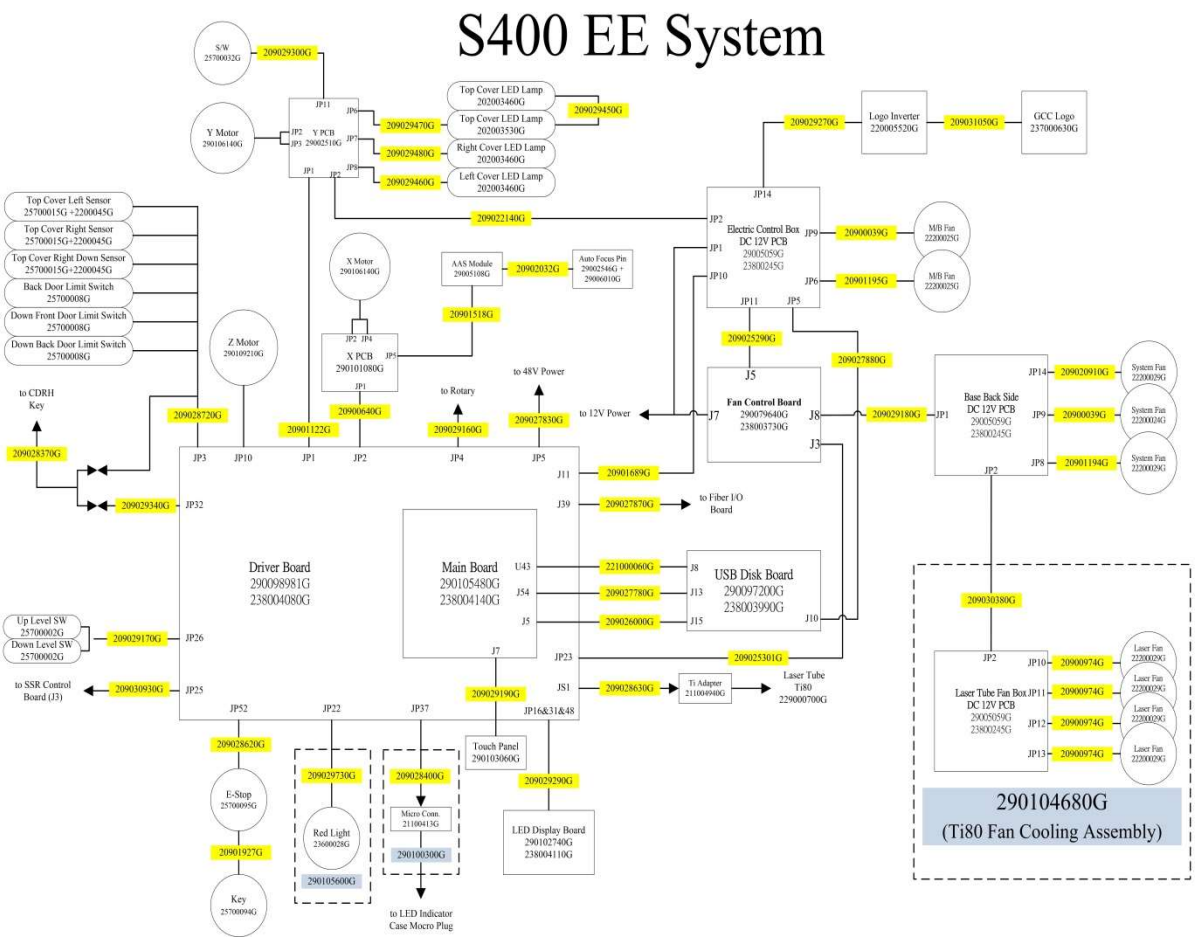


Mirror 1 and Laser Tube Assembly – Parts List

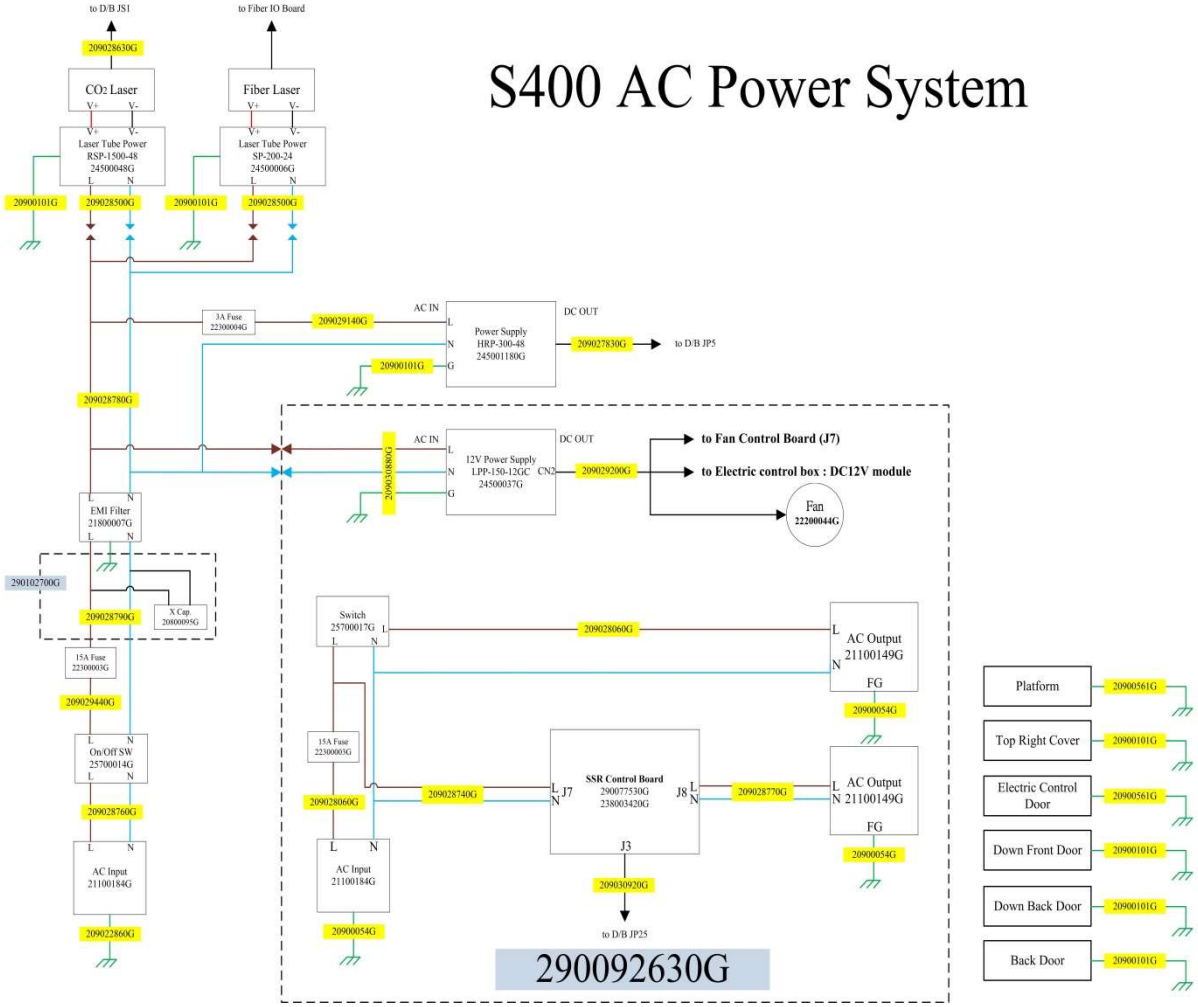
Item Seq.	Part number	Item Description	Quantity
A	290109880G	80GT Laser System Assembly	1
A1	290107100G	80GT CO2 air cooled laser	1
A2	22801470G	T60 laser reconnect board	1
A3	25200149G	Socket head set screw.(M3*12L)	4
A4	29002609G	front board dip cotton.	1
A5	290108550G	Laser Beam Combiner Assembly	1
A5-1	22801471G	Laser front bracket	1
A5-2	228039410G	Laser Front Board	1
A5-3	25200214G	Socket head set screw.(M4*12L)	6
A5-4	202003490G	Red Pointer Mounts Assembly	1
A5-5	290105600G	Red Pointer Assembly	1
A5-6	25200138G	Socket head set screw.(M3*10L sus+coating)	2
A5-7	202003240G	Prism Mounts Assembly	1
A5-8	22800914G	mirror pin	1
A5-9	290091780G	Beam Combiner Assembly	1
A5-10	25200149G	Socket head set screw.(M3*12L)	4
A5-11	290077670G	1st mirror block(1")	1
A5-12	29002528G	3x Beam Expander	1
A5-13	25200119G	Socket head set screw.(M3*8L)SUS+CO	2
A5-14	244041611G	Optical Dust Cover	1
A5-15	22801125G	Under aeroseal fixed stand	1
A5-16	24700028G	O-ring(P22)	1
A5-17	25200159G	Socket head set screw.(M3*16L)	2
A5-18	23300299G	Hand Knobs (CRKB.M4-6L)	3
A5-19	233018540G	Rubber Foot (TF-546EP)	1
A6	25200300G	Socket head set screw.(M6*12L)	3
A7	26000035G	Flat Washer	3
A8	26000036G	Spring Washer (d6xD11xt1.4)sus	3
B	29003150G	600 Contraction pipe Assembly	1
C	290107010G	S400 CO2(48V/1500W) Laser Power Assembly	1
C1	244053720G	Power supply fixture	1
C2	24500048G	POWER SUPPLY (RSP-1500-48 (48V))	1
C3	25200187G	Truss head machine screw(M4*6L).	10
C4	290106130G	Protector 1 for laser power supply	1
C5	290109820G	Protector 2 for laser power supply	1
C6	290109830G	Protector 3 for laser power supply	1
D	25200200G	Truss head machine screw(M4*8L sus).	4

Chapter 3 – Electrical System

3.1 S400 EE system

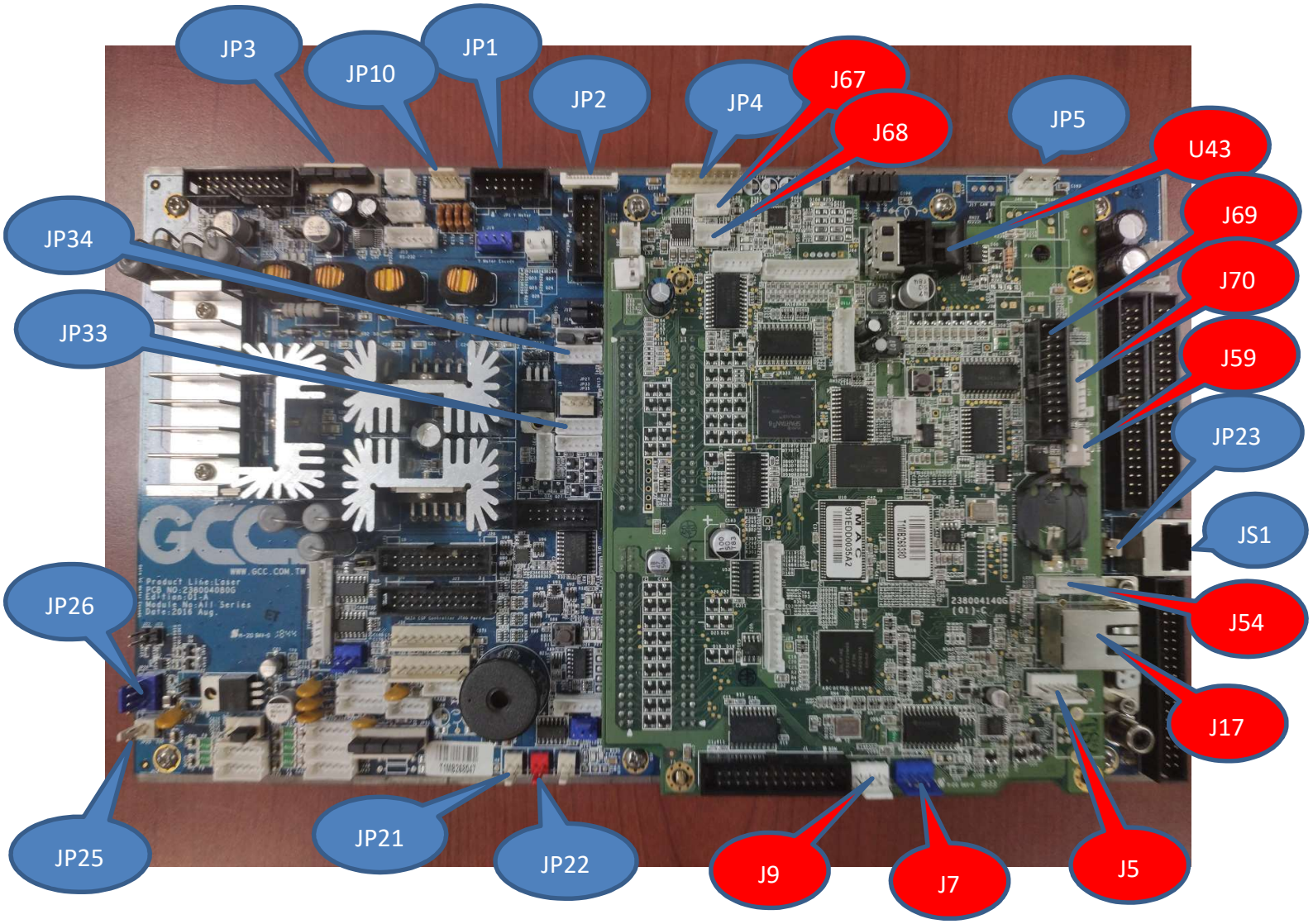


3.2 S400 AC power system



3.3 Pin definition of S400 mainboard set.

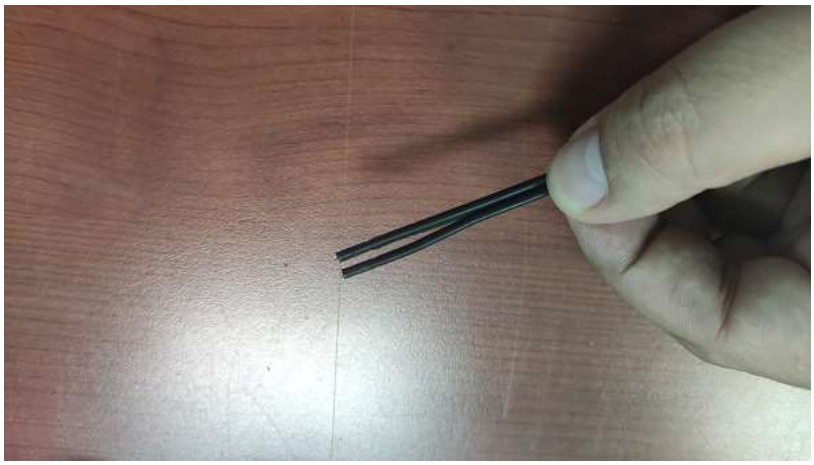
*The mainboard set of S400 contains the upper green mainboard and bottom blue driver board. (Refer to below picture)



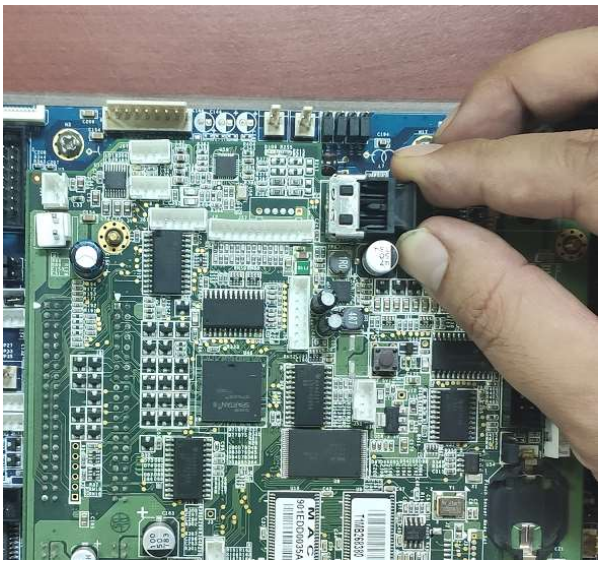
Pin mark	The definition of pin
Driver Board JP5	3 pin (White)
Driver Board JS1	RJ45
Driver Board JP4	Rotary Motor
Driver Board JP2	X-motor flat cable (White)
Driver Board JP1	Y-motor (Black)
Driver Board JP10	Stepper motor 4 pin (White)
Driver Board JP3	Doors 6 pin (White)
MainBoard J5	USB Port 5pin (White)
Driver Board JP23	3 pin (White)
Driver Board (Under U34) JP22	Laser Diode 2 pin (Red)
Driver Board (Under U34) JP21	Buzzer 2 pin (White)
Driver Board JP26	4 pin (Blue)
Driver Board JP25	SSR 2 pin (White)
Driver Board JP33	External control (Output)
Driver Board JP34	External Control (Input)
Mainboard J67	RS232-port 3
Mainboard J68	RS232-port 4
Mainboard U43	Fiber connector
Mainboard J69	External I/O port
Mainboard J70	External I/O port
Mainboard J59	UART port for debug
Mainboard J54	Ethernet
Mainboard J17	Ethernet
Mainboard J5	USB
Mainboard J7	RS-485
Mainboard J9	RS-485

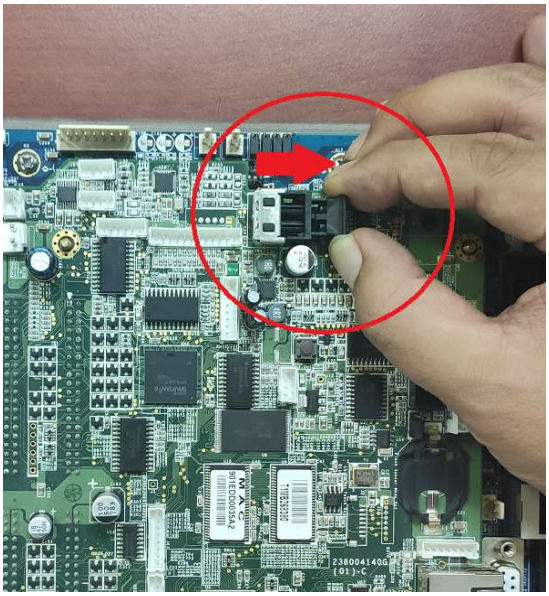
Note: How to correctly connect the fiber cable between U43 and USB I/O board?

The fiber cable is a two-wire cable

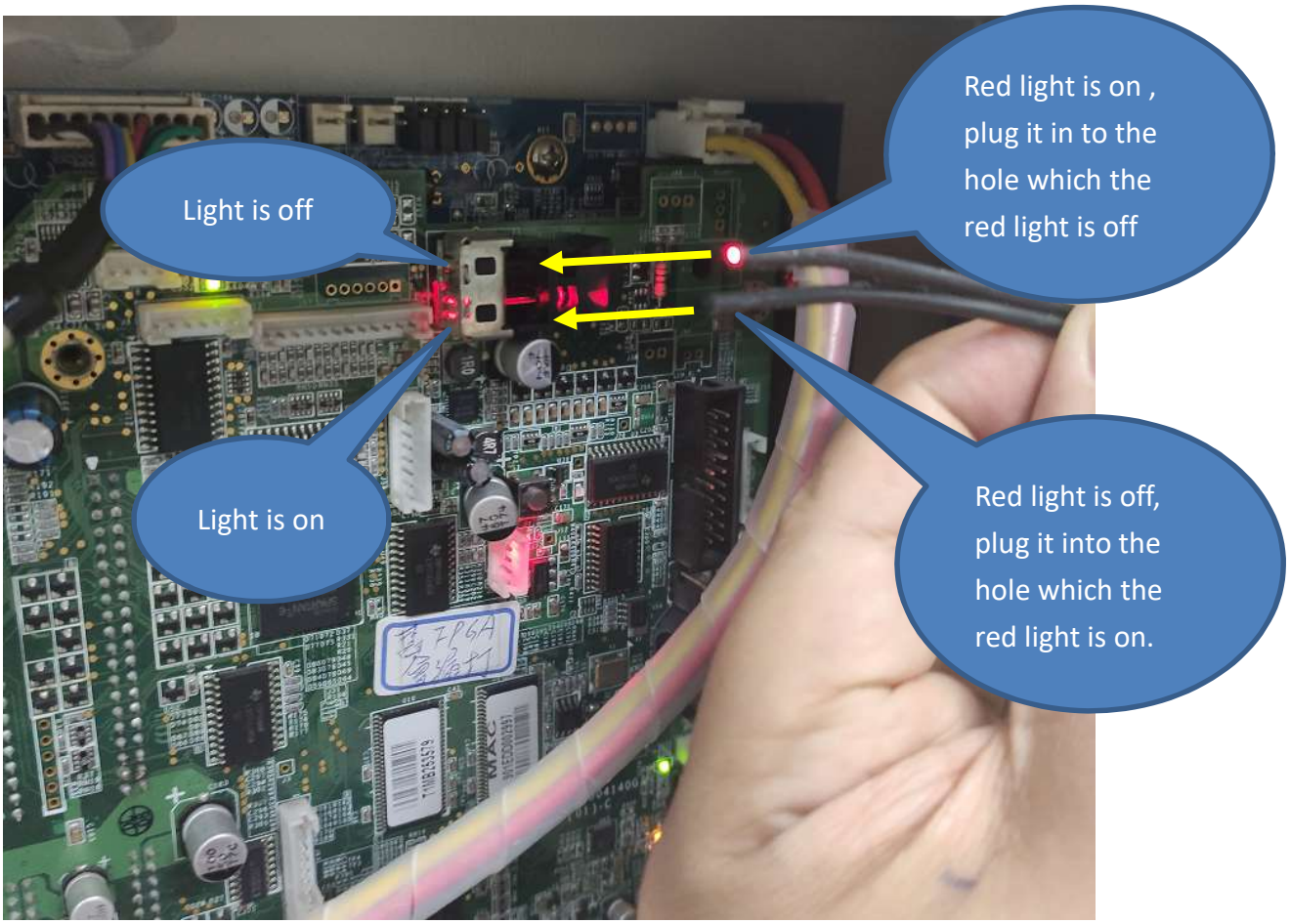


The connector is a two-hole seat, pull out the interlock of the seat





Turn on machine, plug the wire with red light into the hole without red light, and plug the wire without red light into the hole with red light..



Chapter 4 – Components Replacement

4.1 Touch Panel Changing Process

Dismount 2 screws of top cover. One is on front, one is back.

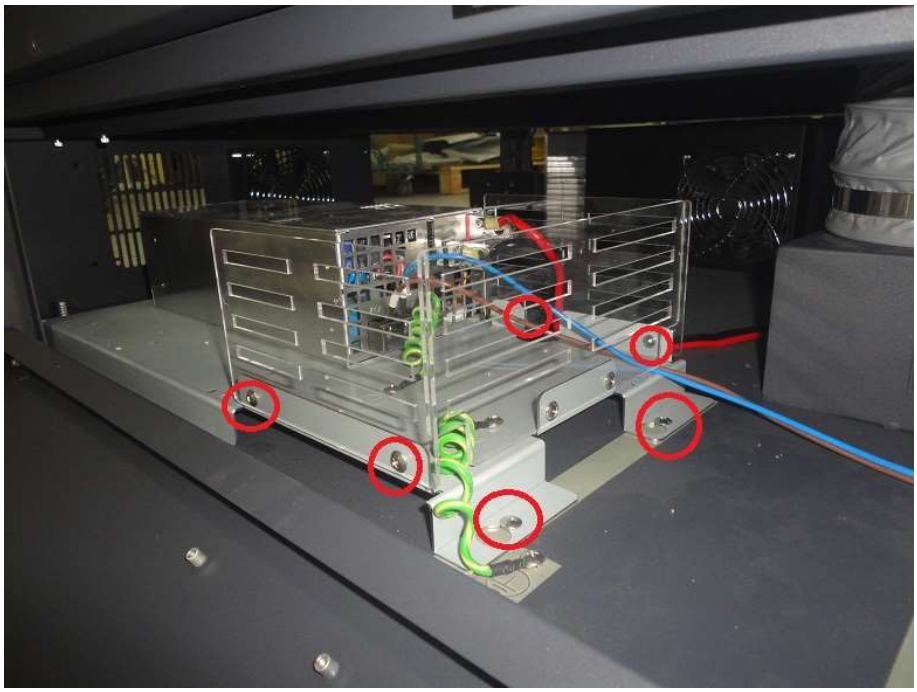
Open the right top cover and remove the 3 screws on the back. Turn over the touch panel, there are 4 screws need to be removed.

Unplug the cable and press the 4 plastic holders. The touch panel can be removed.

4.2 Power Supply Changing Process

Remove the 2 screws of the back door and flip over.

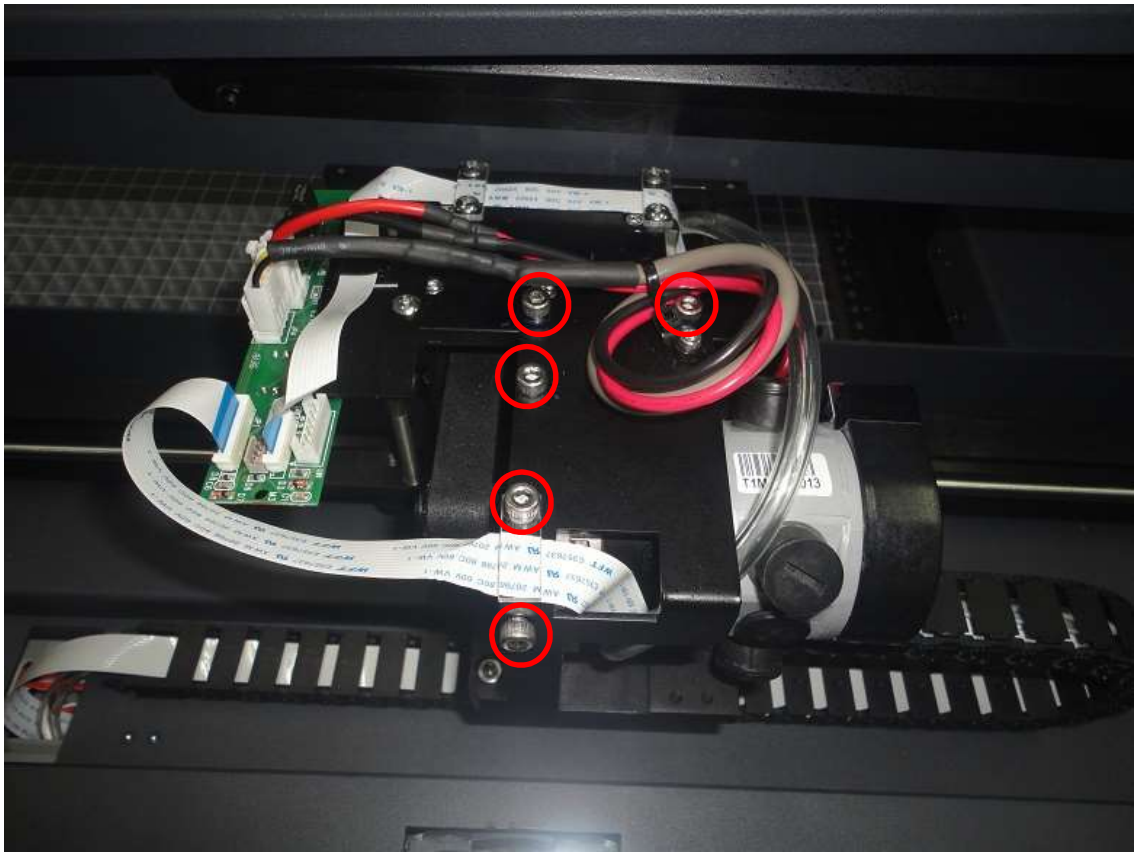
Remove the 6 screws and can change power supply.



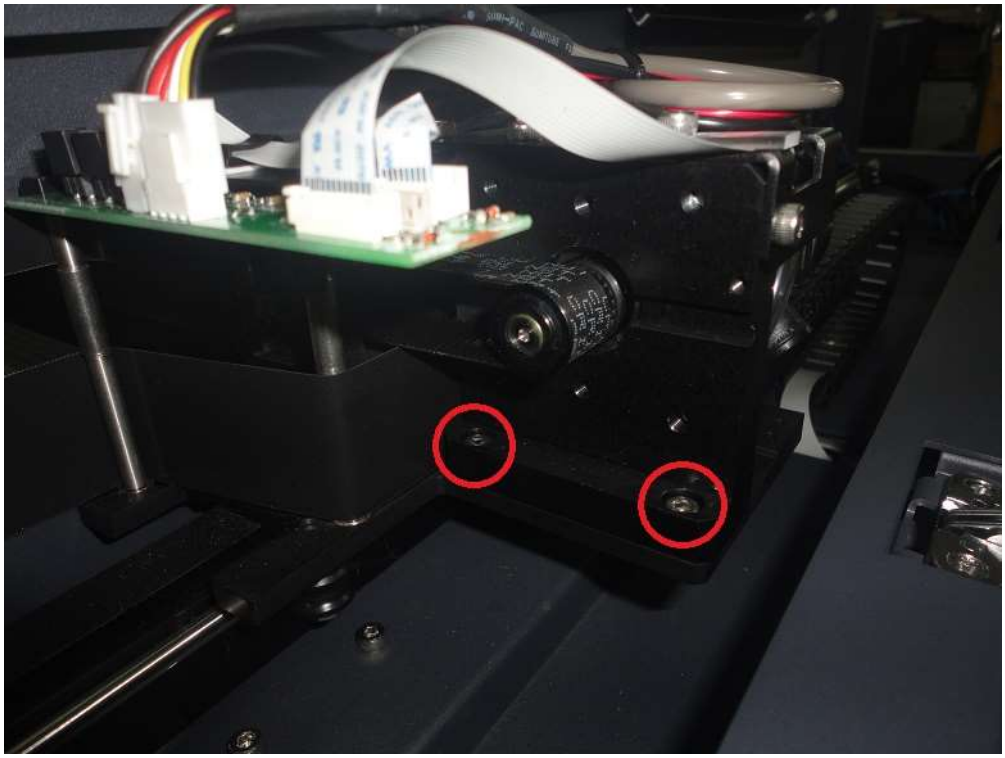
4.3 X Motor Changing Process

Dismount 2 screws of top cover. One is on front, one is back.

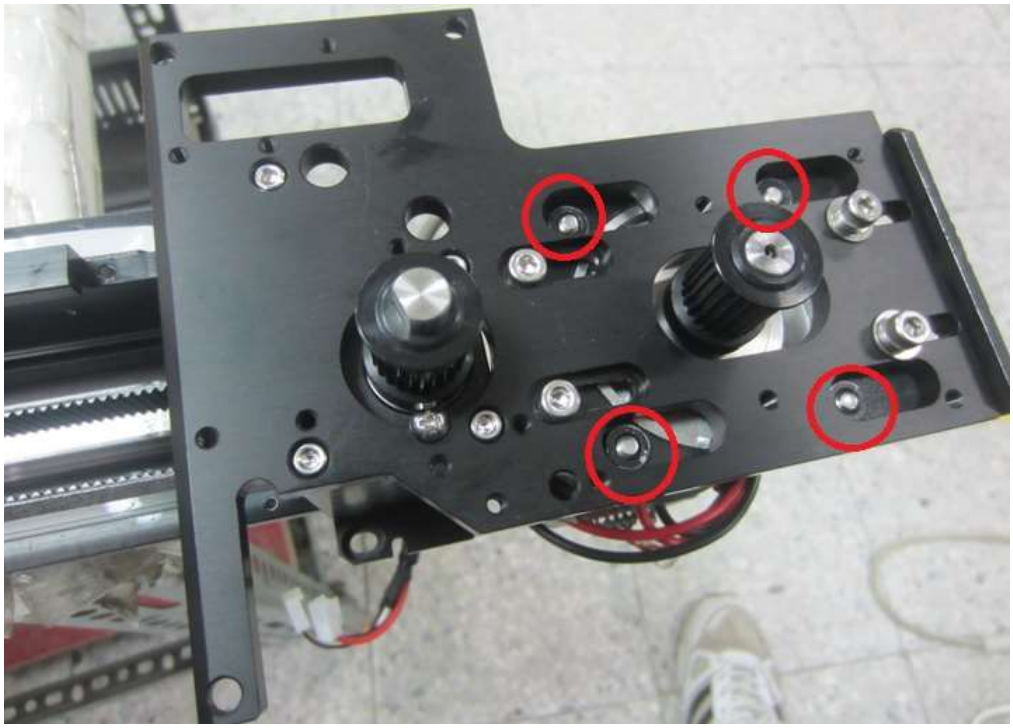
Remove the 5 screws.



Remove the 2 screws on the bottom of x motor pcb.



Then remove the 4 screws from the other side. The x motor can be removed.



4.4 Main board Changing Process

Open the 2 screws on the right side of machine.

Remove all the cables which connect to mainboard.

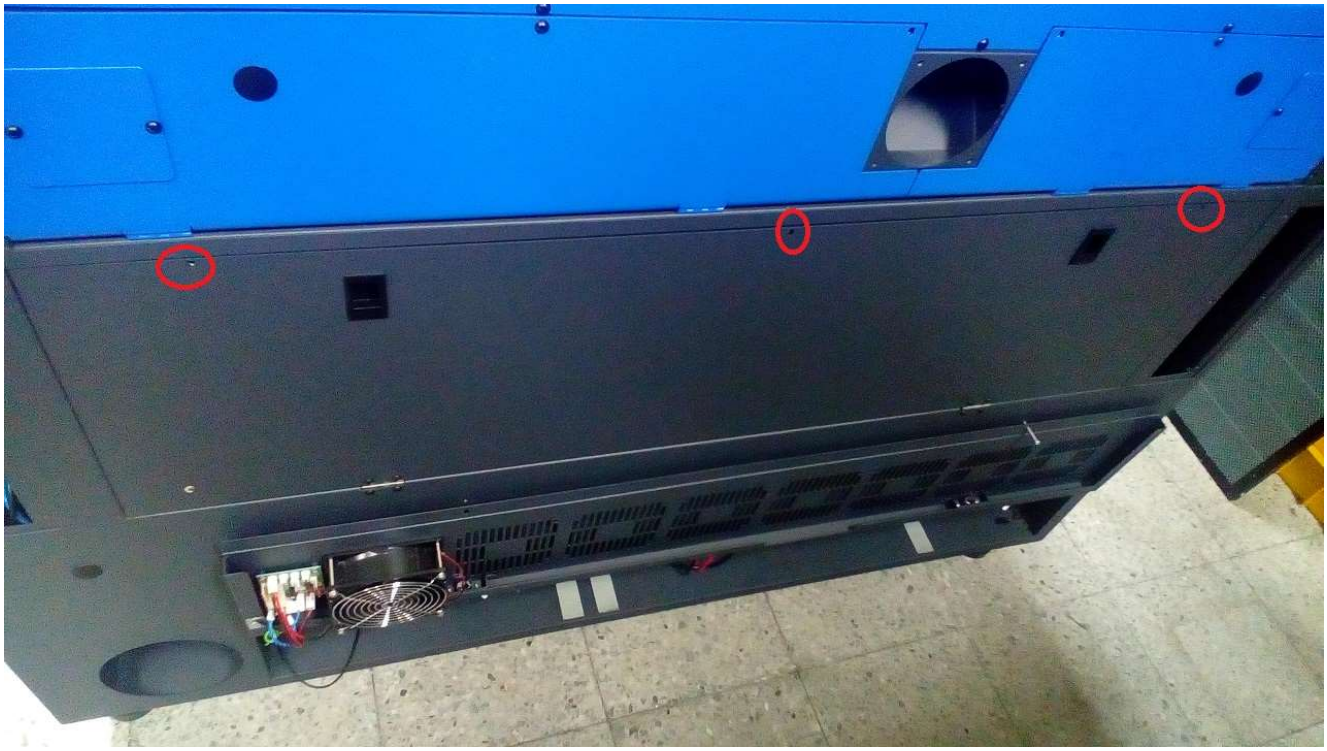
4.5-1 Y motor Changing Process

Open the back panel by removing screws.

Remove 4 screws and then can remove y motor.

4.5-2 Y motor Belt Changing Process

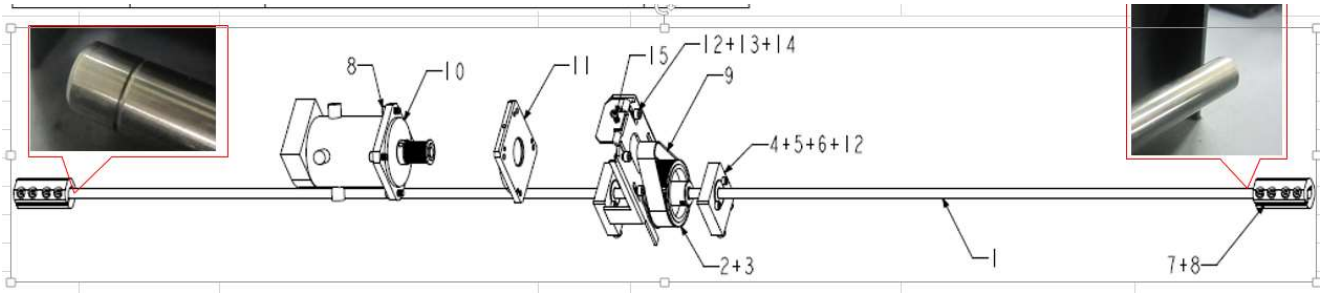
For changing y motor belt, the first two steps are same as changing y motor. Then open the back cover by remove 3 screws (see 3 red circles below)



Then remove the bottom screws of y axis synchronizer support. See the red circles.

Remove the right side 2 screws and left side 2 screws.

Then the whole y axis synchronizer can be move up and let the y motor belt remove from left side or right side.



4.6 SmartVision Pro installation process

Applicable Machine

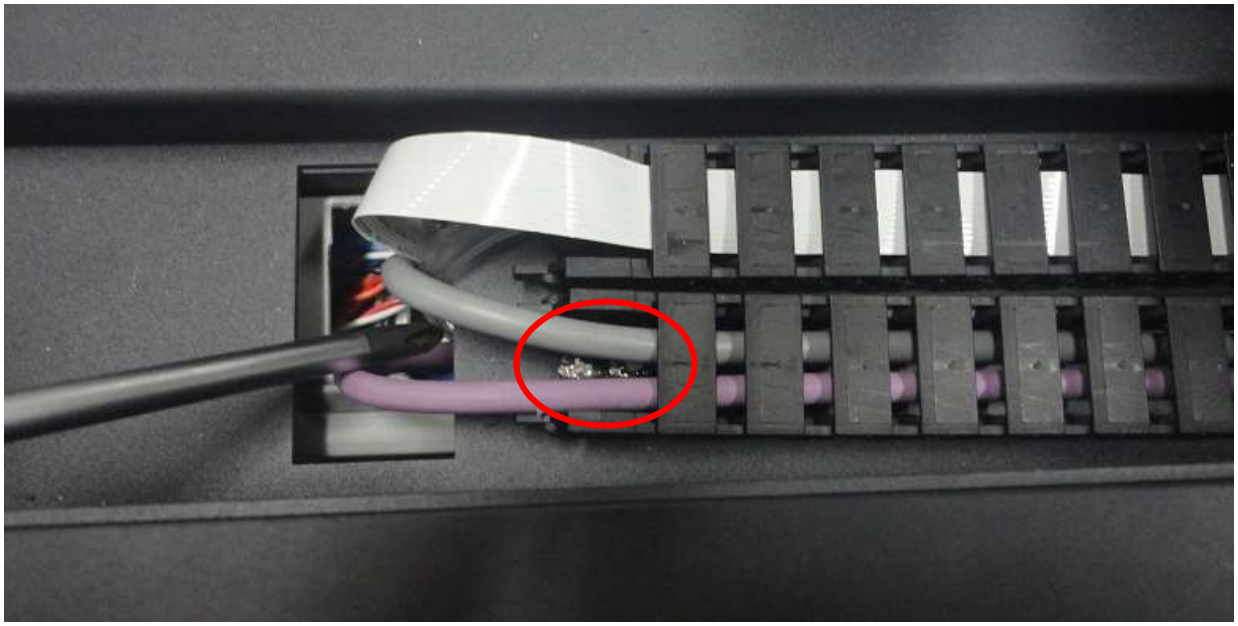
SmartVISION Pro CCD can be applied to S400 with 5272 V3 mainboard.

S400 Smart Vision Pro CCD upgrade kit part number is: 290106800G

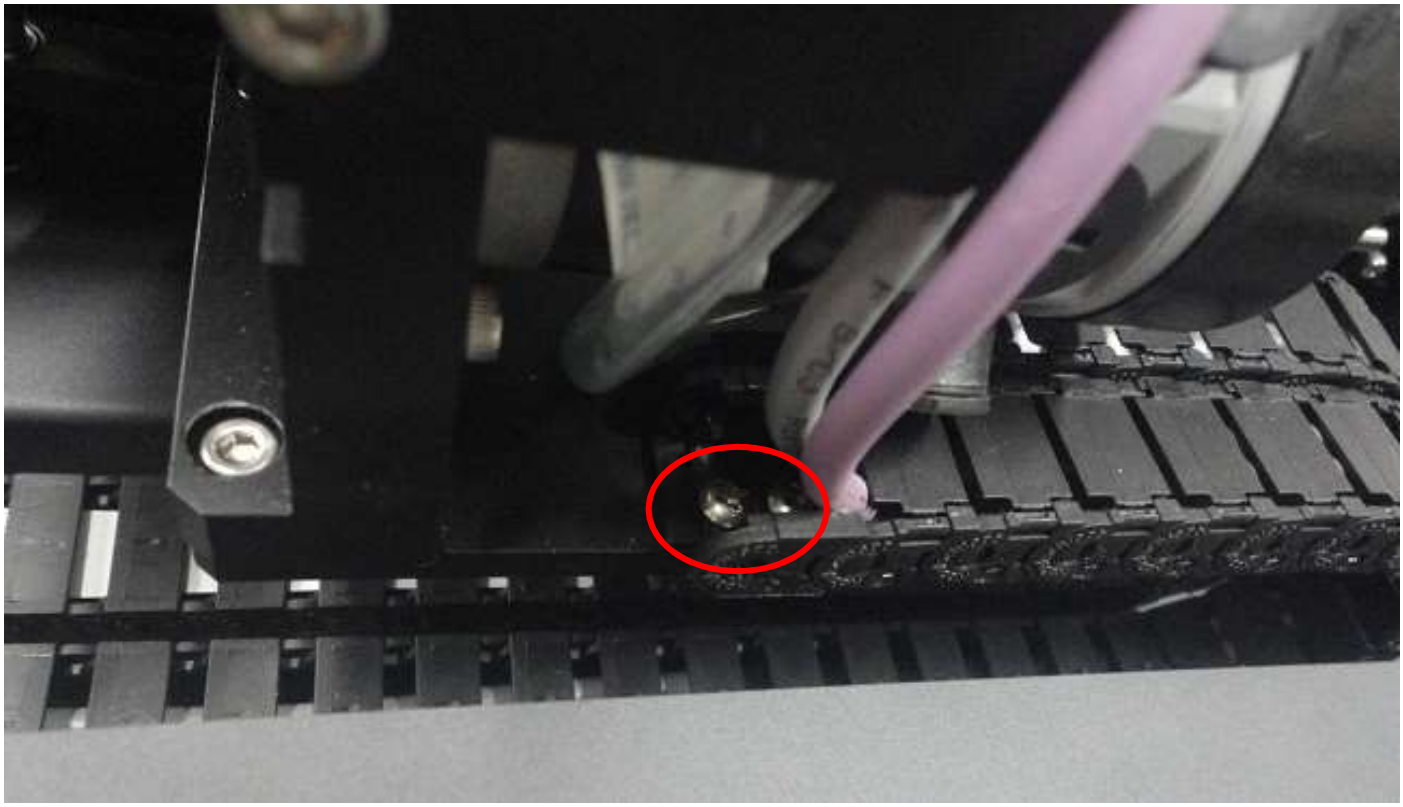
The upgrade kit parts that customer receives are below:

I. Installation

1. Mount one end of item #5(contains one grey cable, one purple cable and one tube chain) next to y axis chain. Tighten two screws on the end of item #5. See the red circle below:



2. Tighten two screws on the other end of item #5. See the red circle below:

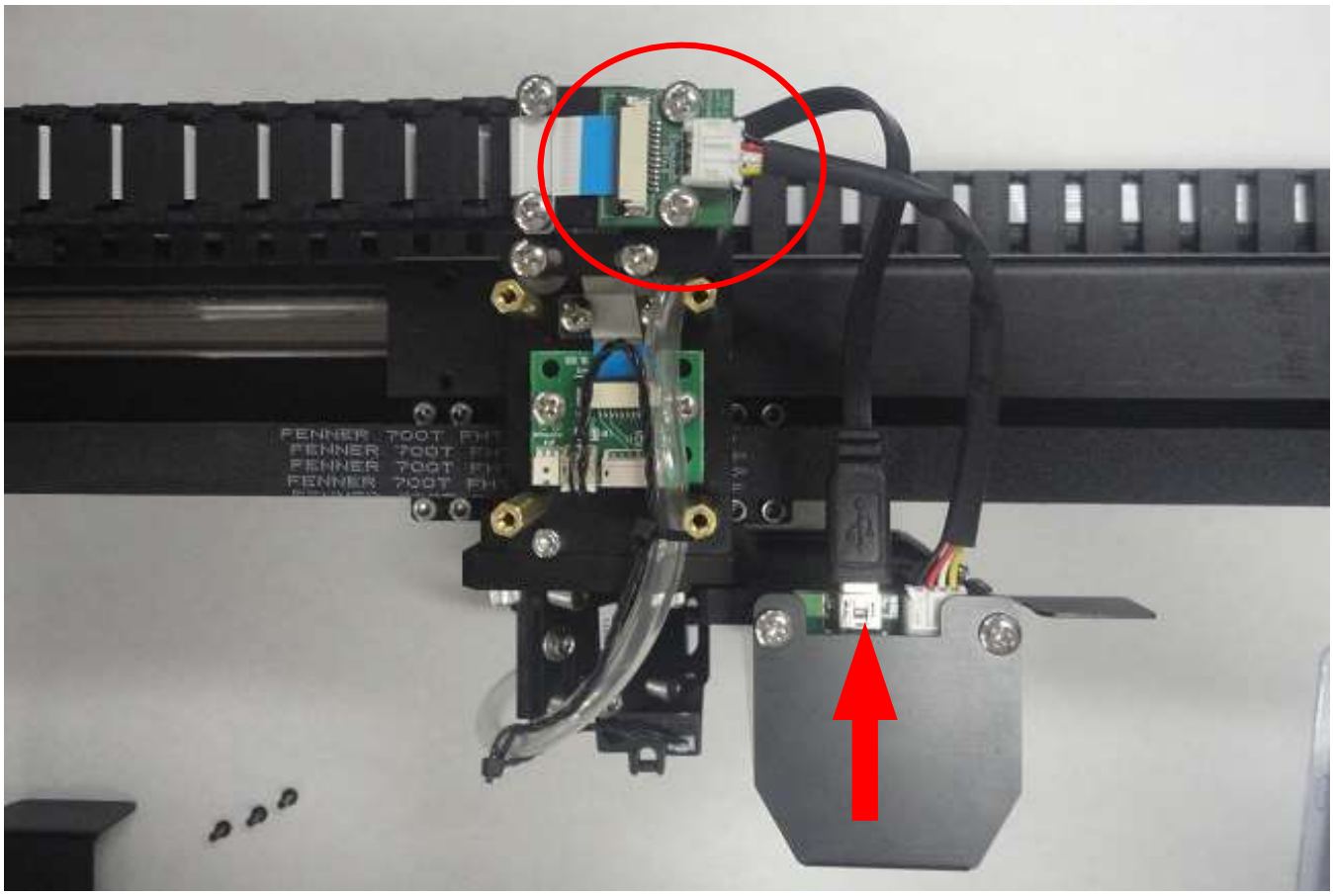


3. The two cables of item #5 need to be aligned with air pipe and use a cable tie to fix them (see the yellow circle below).

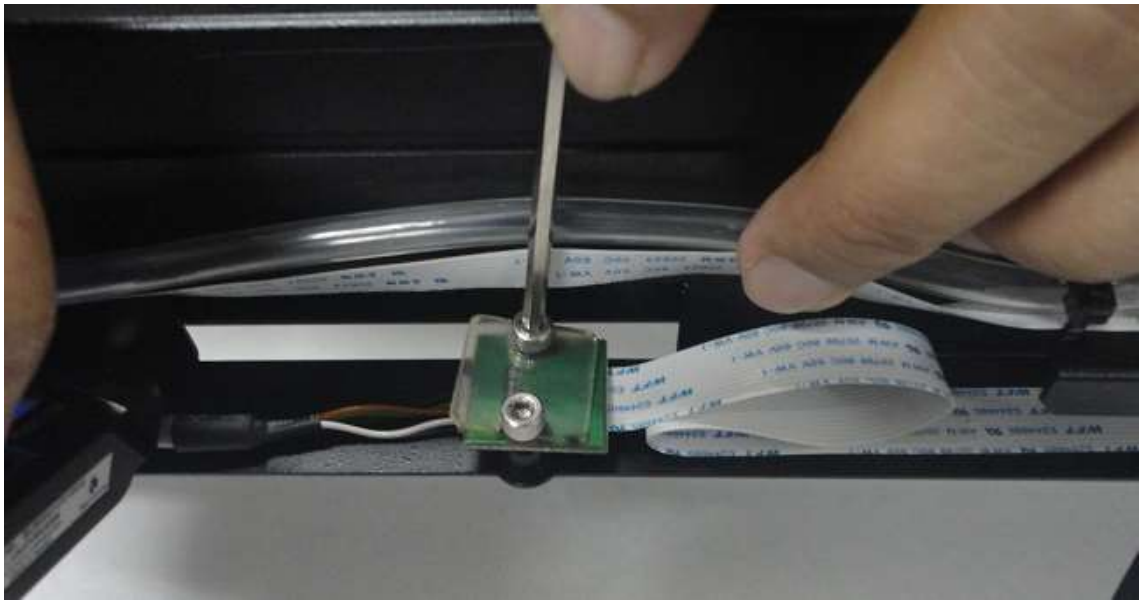
4. Open the x axis flat cable cover.

5. Connect the grey cable of item #5 to one end of item #3(first piece). The other end of item #3 connects to item #10 (flat cable).

6. There are two pieces of item #3. The other end of item #10 (flat cable) connects to second piece of item #3(the red circle below). The other end of item #3 connects to item #1 cable (209031350G). The red arrow pointed is one end of item #12 and connect to CCD head.



7. Turn over the first piece of item #3 and mount the item #6 by tighten two screws.

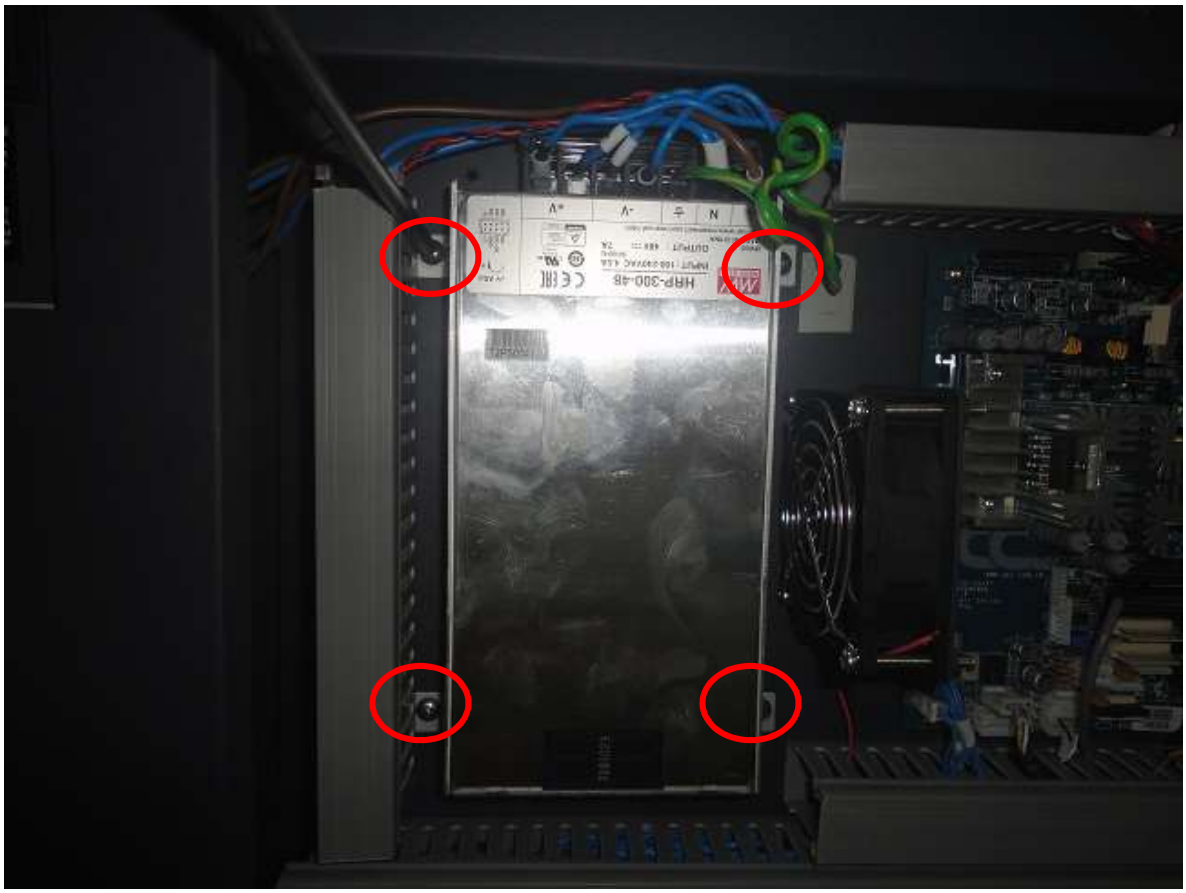


8. Connect the purple cable of item #5 to item #13. The other end of item #13 connects to the other end of item #12 (one end to CCD head, see previous page).

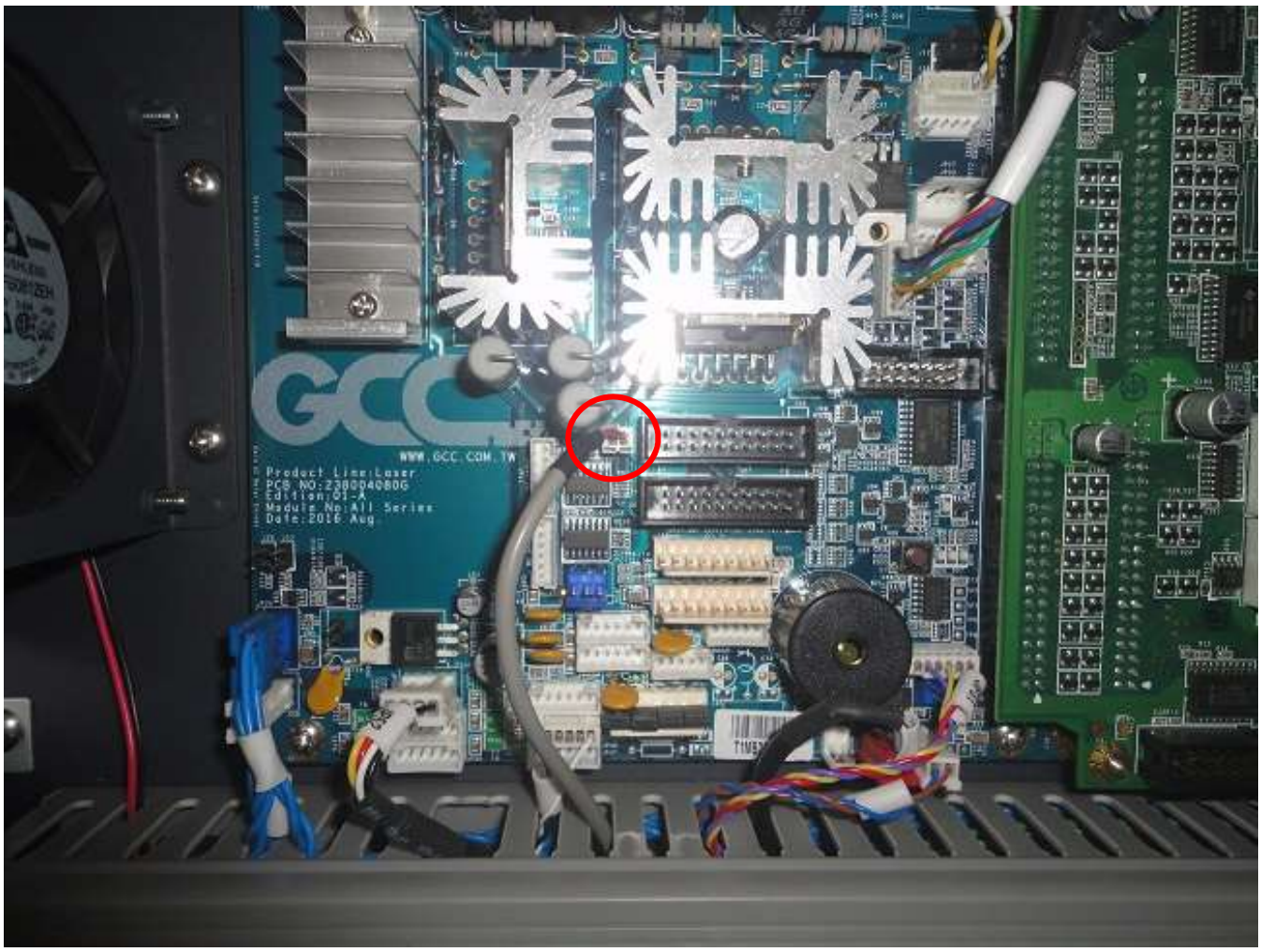
9. Mount the item #2 on the right hand side back of machine (open the backside cover first). The purple cable of item #5 connects to top connector (the purple arrow pointed). The grey cable of item #5 connects to second connector (the yellow arrow pointed). The one end of item #11 connects to third connector (the red arrow pointed). The one end of item #4 connects to fourth connector (the blue arrow pointed).

10. The other end of item #4 connect to power supply (“+ “ cable connects to V+, “-“ cable connects to V-). See the red circle below:

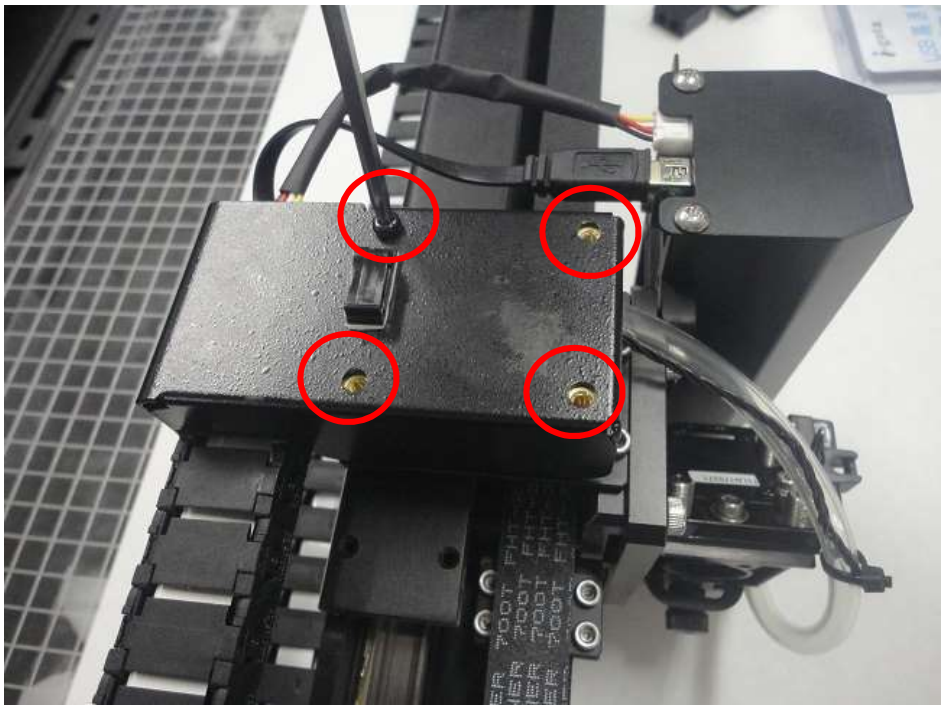
11. The cable of item #4 may not be easy to connect(small space). The power supply can be dismounted (turn off machine power first) by removing the four screws (four red circles below) and it will be easier to mount the cable of item #4.



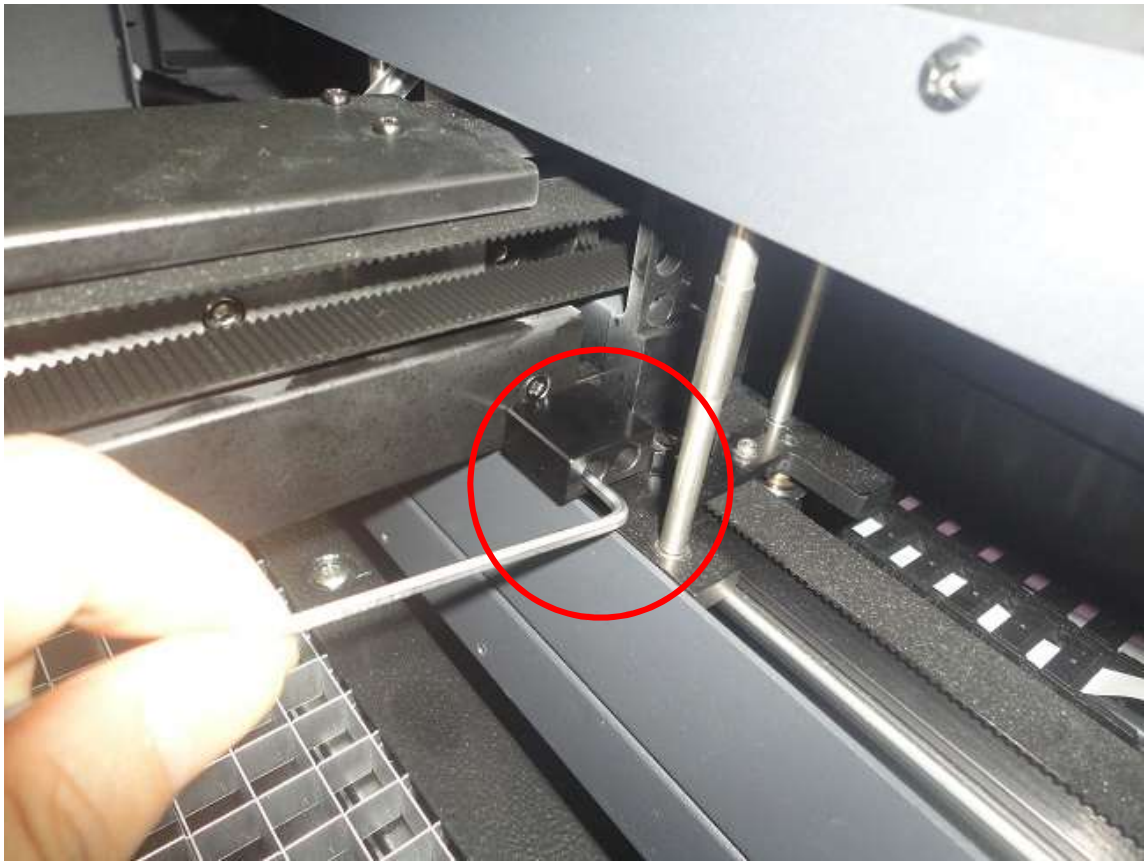
12. The other end of item #11 connects to main board (the red circle pointed).



13. Mount the carriage cover by tighten 4 screws (the 4 red circles below).



14. Mount the item #7 (hard stop) to the right hand side of x axis rail (see the red circle below).



Finish installation.

Chapter 5 - Laser System

5.1 Type of Laser Tube

S400 can be equipped with below laser tube models

GT series – 80W/100W/120W (CO2)
Synrad V/Vi series – 30W/40W (CO2)
Synrad Ti series – 60W/80W/100W (CO2)
JPT 20W/30W/60W (Fiber)

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

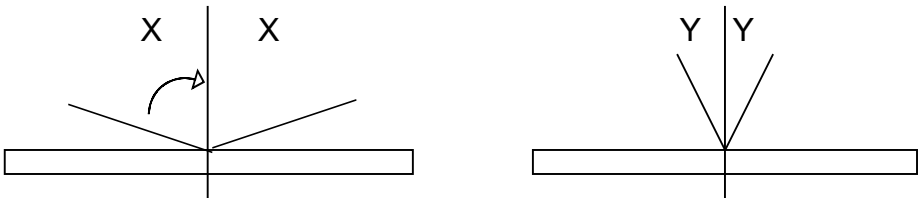
In order to measure the power output of a laser tube, we need to use a power meter (12170001G) that will measure the heat generated and convert it to a power reading. The best place to measure the laser output power is at the immediate output of the laser tube (before to mirror 1).

5.3 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.

5.3.1 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.

5.3.2 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 and boot the machine in “Hardware test mode” (refer to below instruction)

*How to enter Hardware test mode:

1. Turn on the machine and wait for the GCC logo appears.

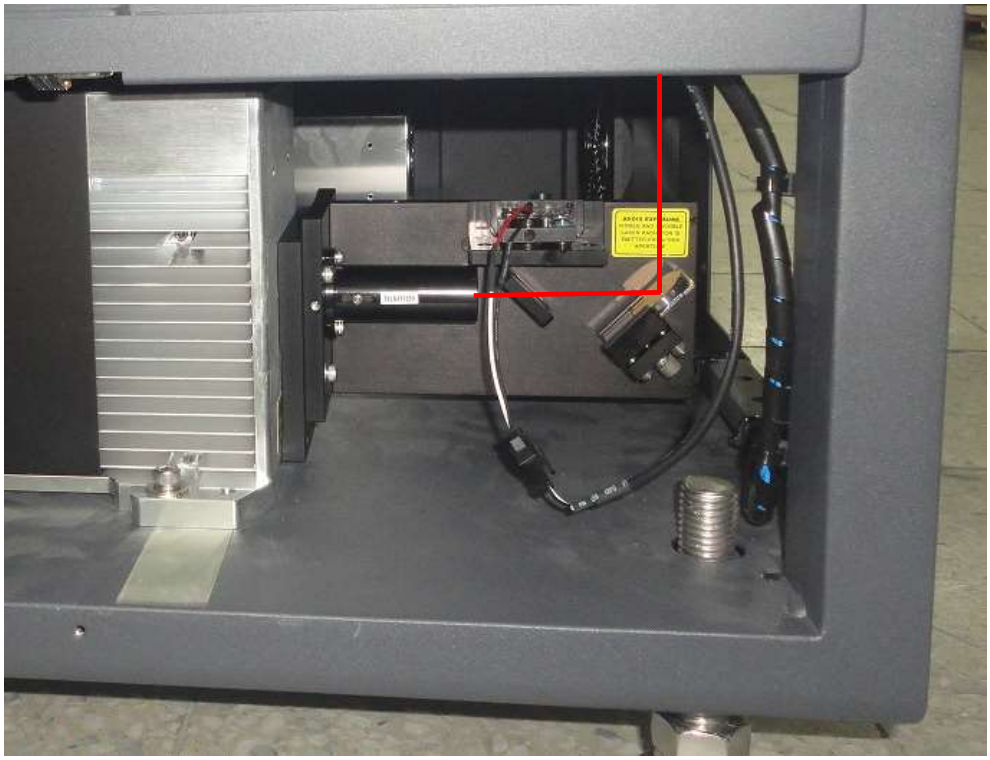
2. The GCC logo will remain on the screen for about 11 ~12 seconds, please click the GCC logo (just click, no need to hold) within the time interval the 3rd second to the 10th second after the logo appears.

3. You will see two icons “BL” and “HW” pop up at the bottom right corner of touch screen once you click the GCC logo.

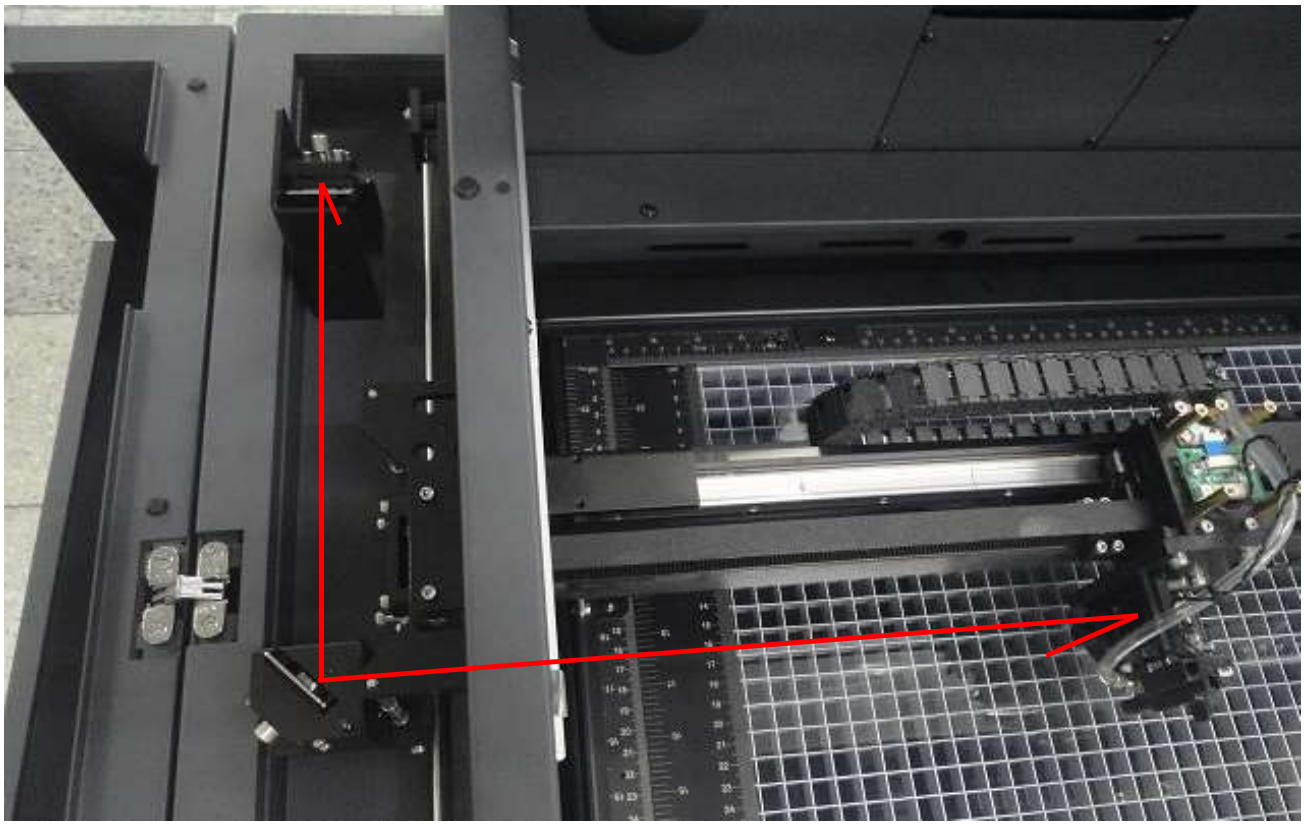
4. Click “HW” icon immediately , the machine will be boot in “Hardware test” mode.

Step 2. Enter “Laser test” page , set laser power to about 5~10%(depends on laser source).

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.



Step 3: Place a piece of masking tape over the tube opening that leads to Mirror 2. Fire the laser 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.



Step 4: 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. 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.

Step 5: 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 3 & 4.)

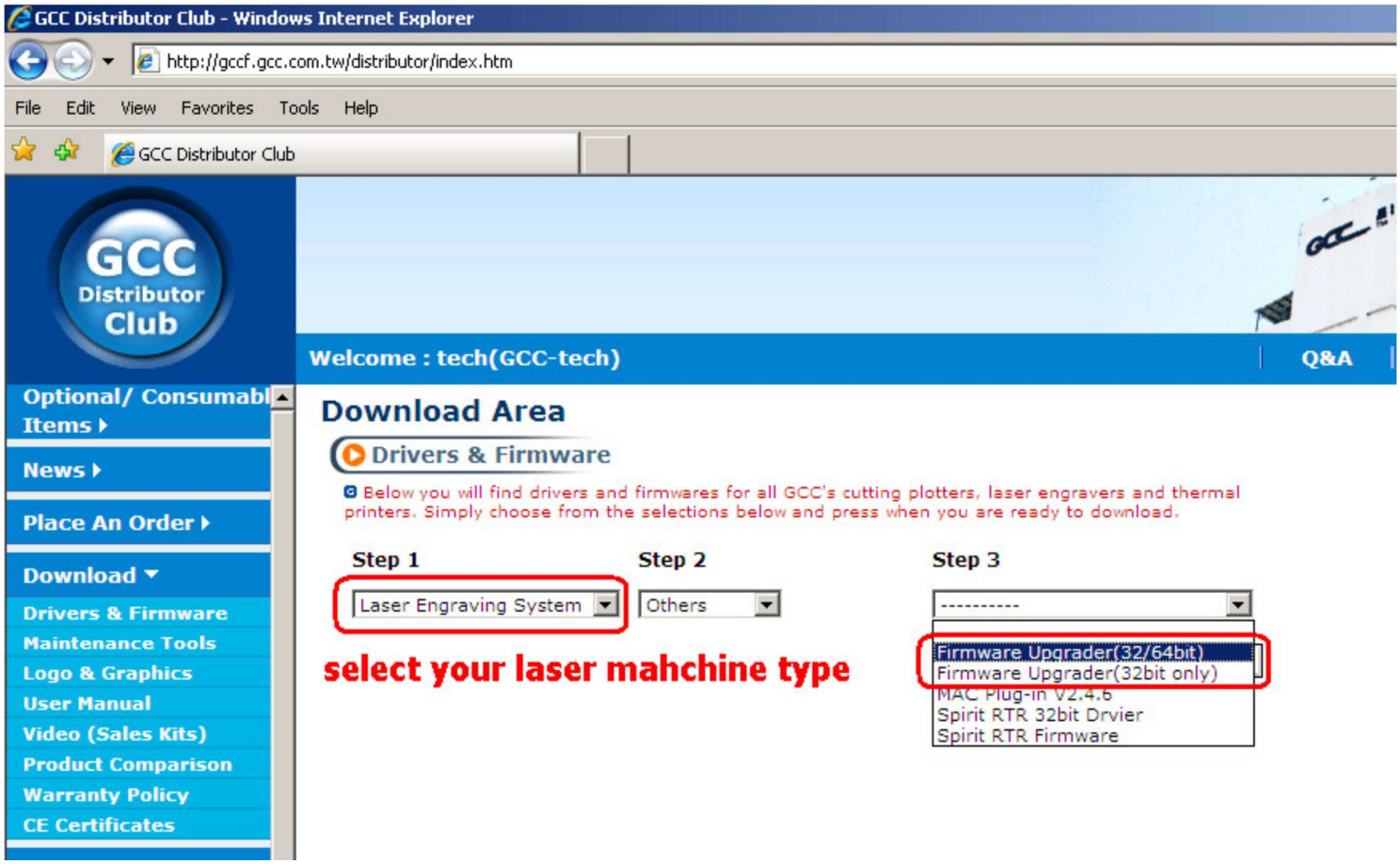
If the laser beam passes through the center of the nozzle opening at all 4 corners, then the laser beam should have been aligned properly. Cut four 20x20 mm squares at the four corners of the working area to double check that the edges of the square are not slanted

Chapter 6 – Software

6.1 How to upgrade firmware

GCC machines requires a firmware upgrader program to upload the firmware of machine through USB port.

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



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

6.1.3. By the firmware upgrader, you can upgrade the firmware to the latest version or the version you want according to below steps :

Step1. Turn on the machine and wait for the GCC logo appears.

The GCC logo will remain on the screen for about 11 ~12 seconds, please click the GCC logo (just click, no need to hold) within the time interval the 3rd second to the 10th second after the logo appears.

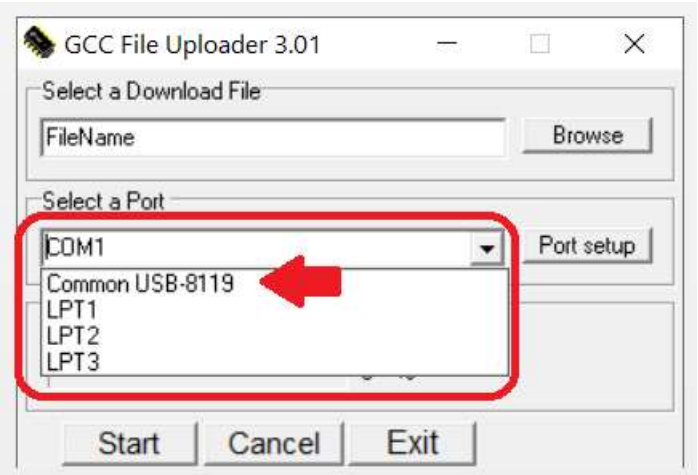
You will see two icons “BL” and “HW” pop up at the bottom right corner of touch screen after you click the GCC logo.

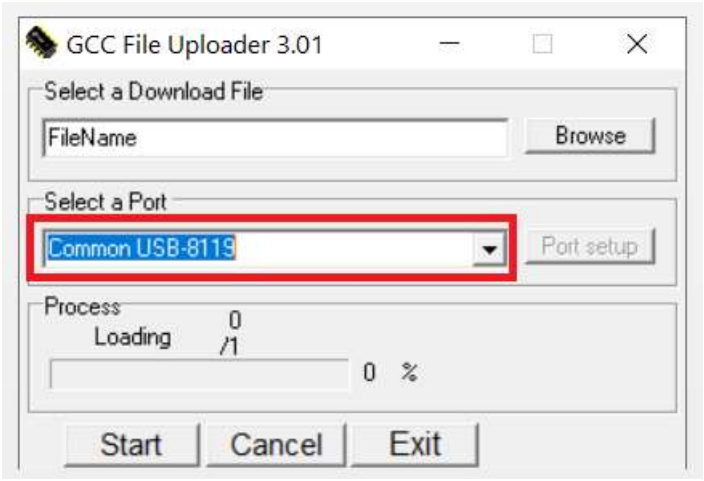
Click “BL” icon, the machine will boot in “USB PRINT SUPPORT” mode which allows users to upgrade firmware through USB cable.

Touch screen will show as below:

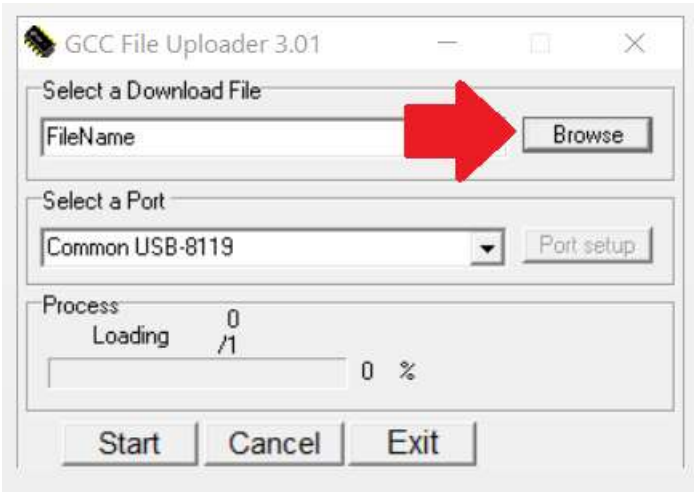
Step 2. Run “Uploader.exe” (The name of firmware upgrader program is “Uploader.exe”)

Step 3. Open the dropdown list under “Select a port” and select “Common USB-xxxx” (xxxx is variable according to the mainboard type of your PC/Laptop)





Step 4. Browse and select the firmware file.

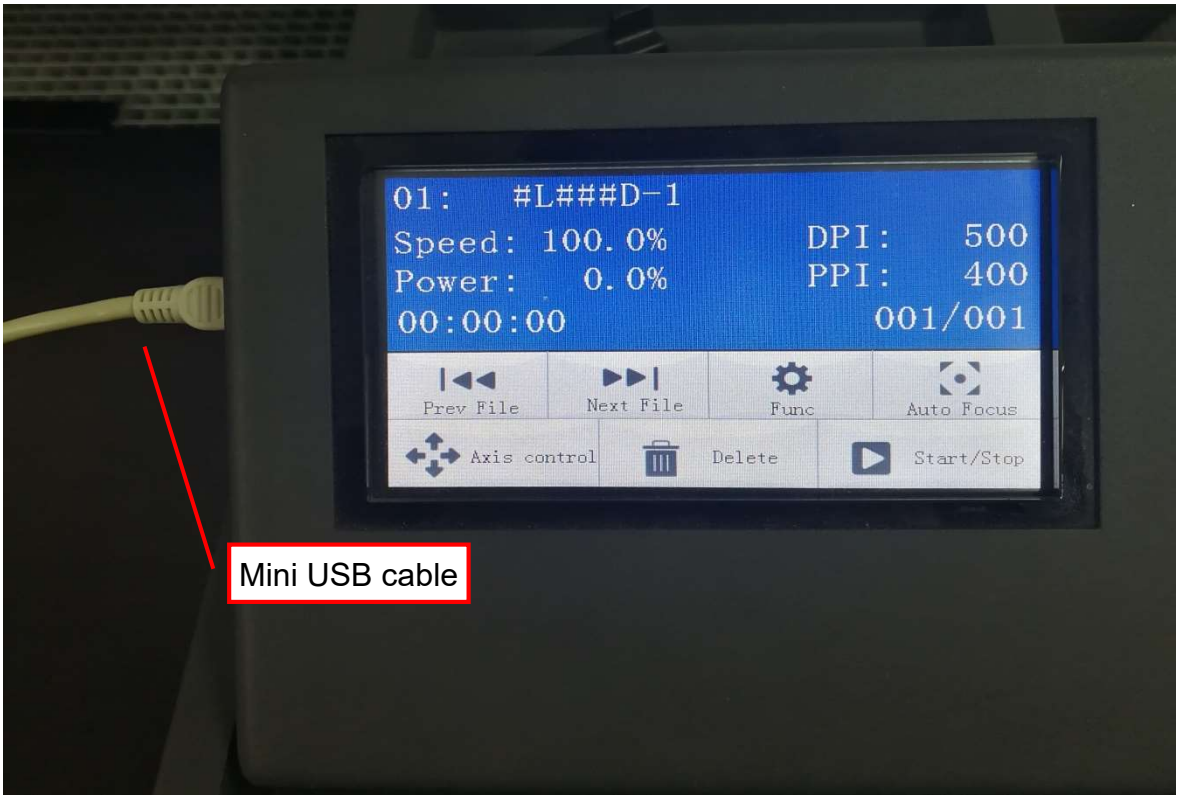


Step 5. Press the “Start” button, the upgrading process will start, wait until the process is done, the machine will reboot automatically.

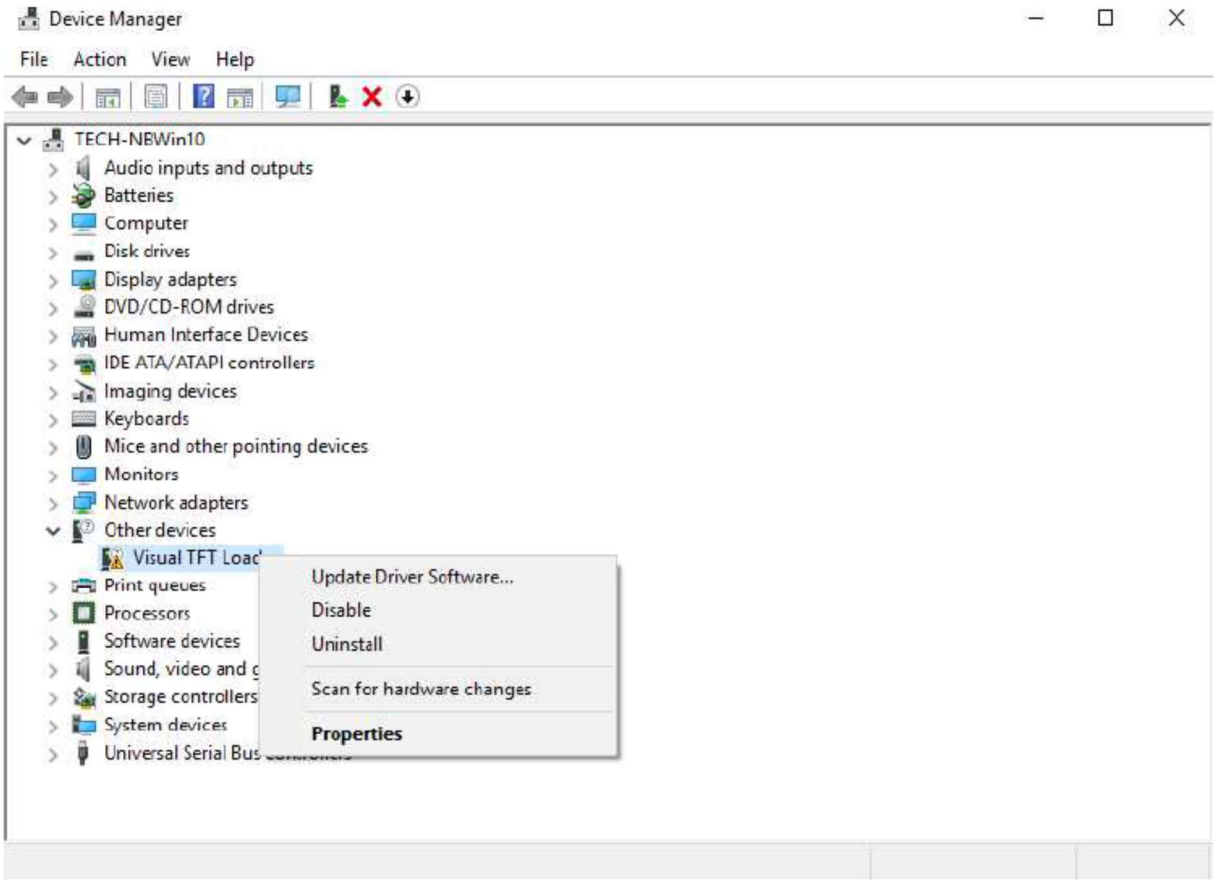
6.2 How to upgrade Touch Panel firmware

Install Driver of the touch screen panel：

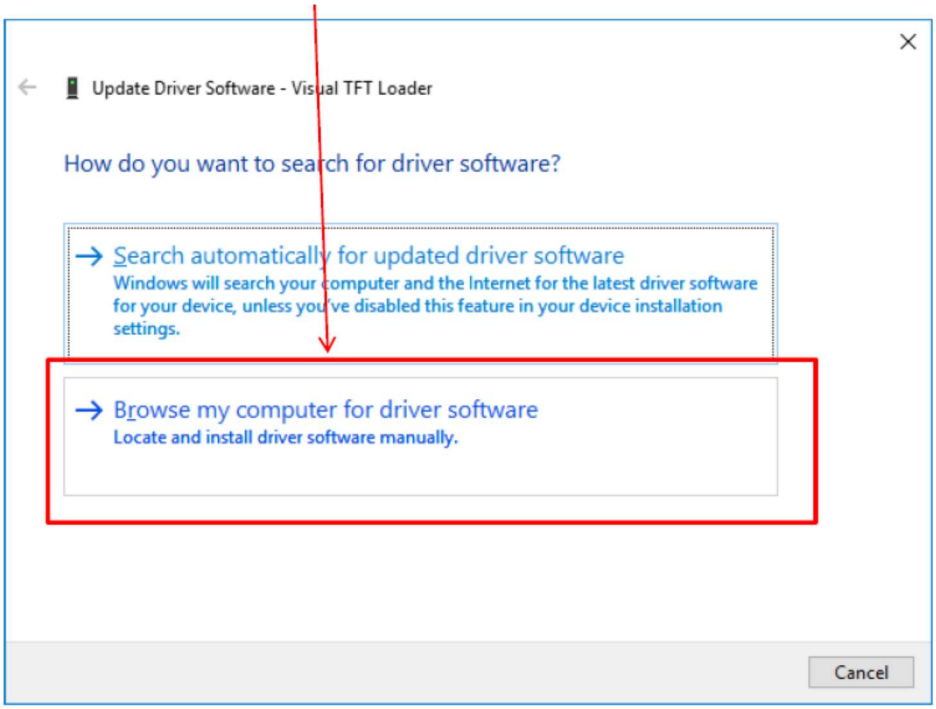
Step 1：Turn on the machine，after the machine is boot (finish the initializing process), connect the Mini USB cable to the left side of Control panel (refer to below picture) and PC/Laptop.



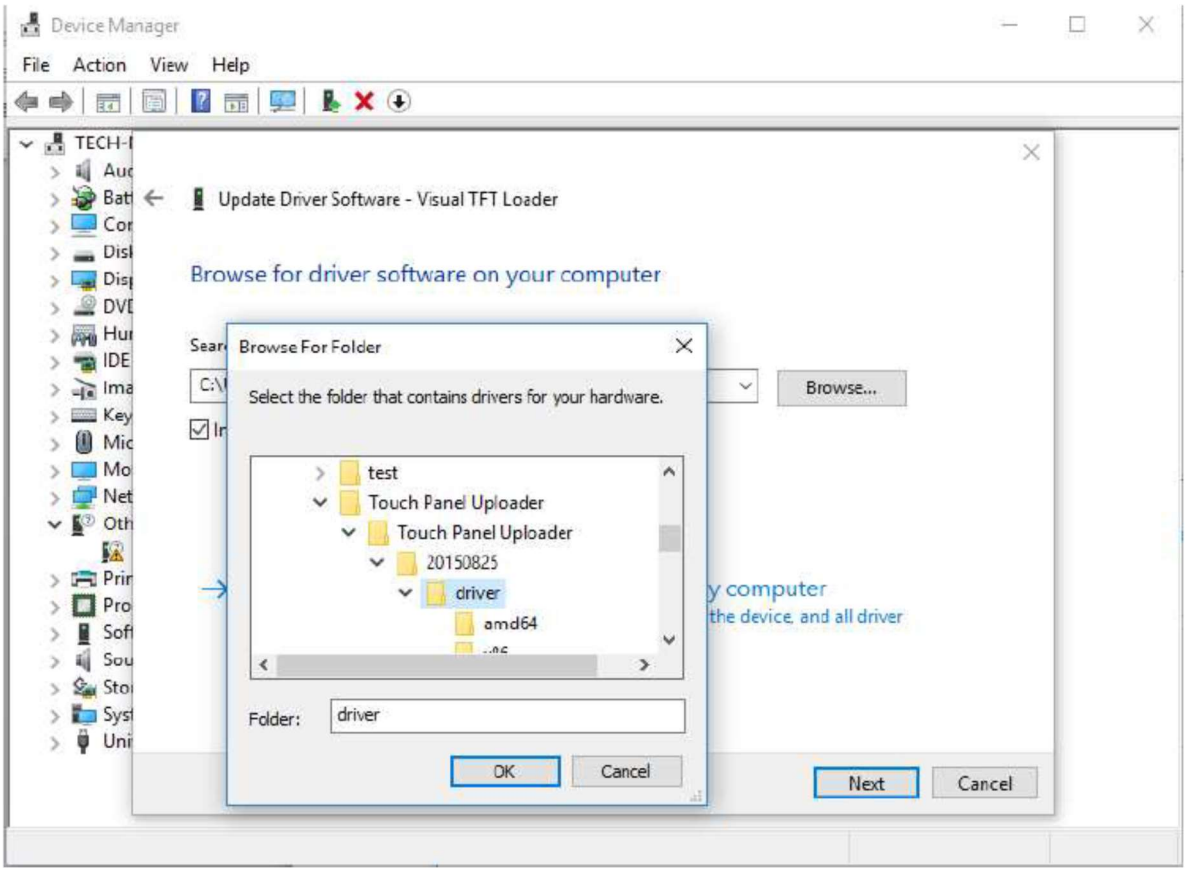
Step2. Run “Device manager” on the PC. Find the Visual TFT loader device. Right click on it and select “Update driver”.



Step3. Please select update manually.

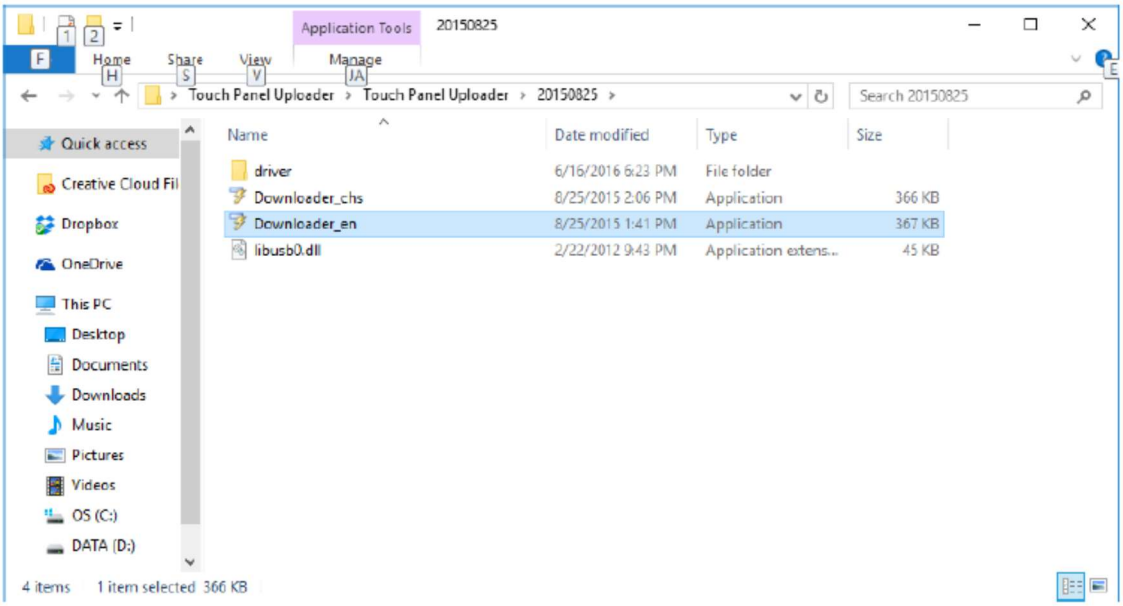


Step4. Find the file folder (Touch Panel uploader)， select「driver」 folder and start driver update installation。

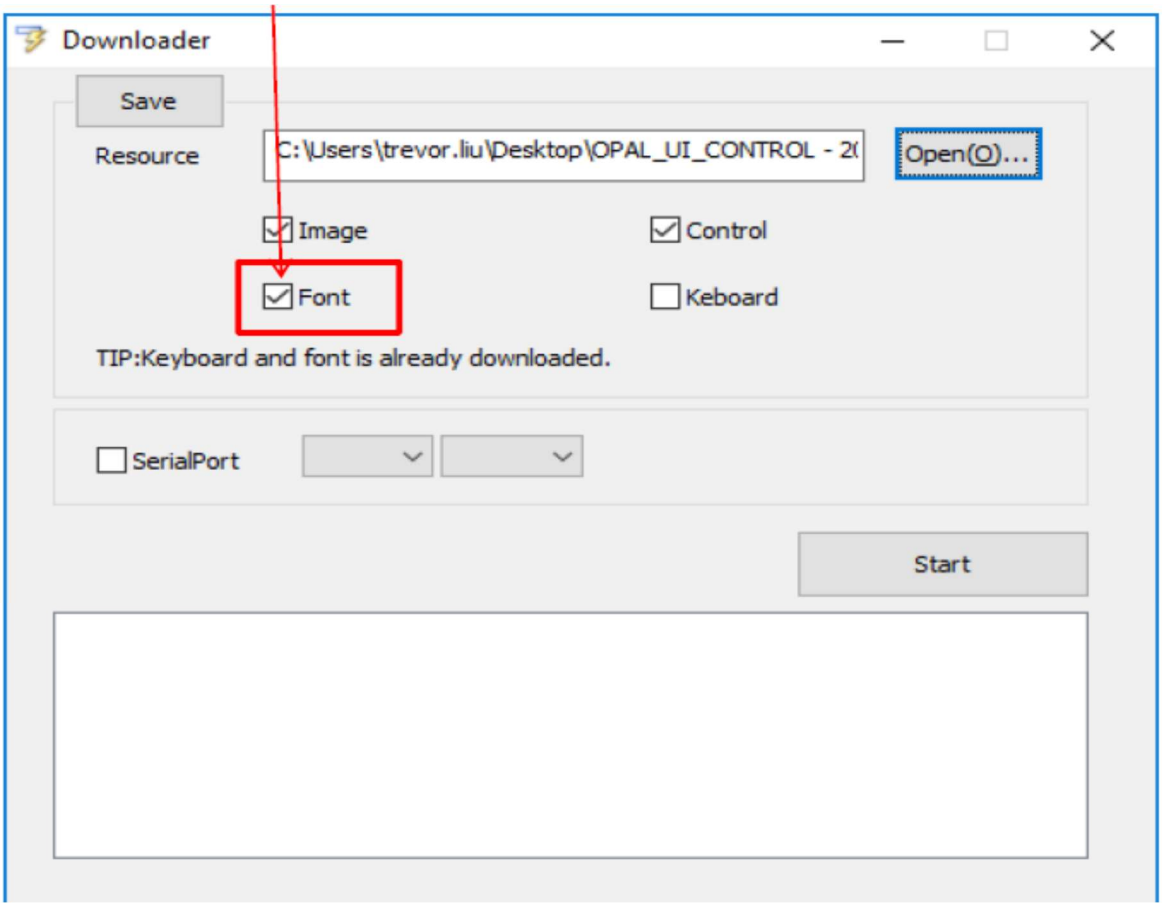


■ Update FW steps：

Step1. Open 「Control Panel uploader」 folder， double click on 「Downloader_en」。



Step2. Check “Font”



Step3. Click “Open” to select the firmware file from “OPAL_UI_CONTROL\output”

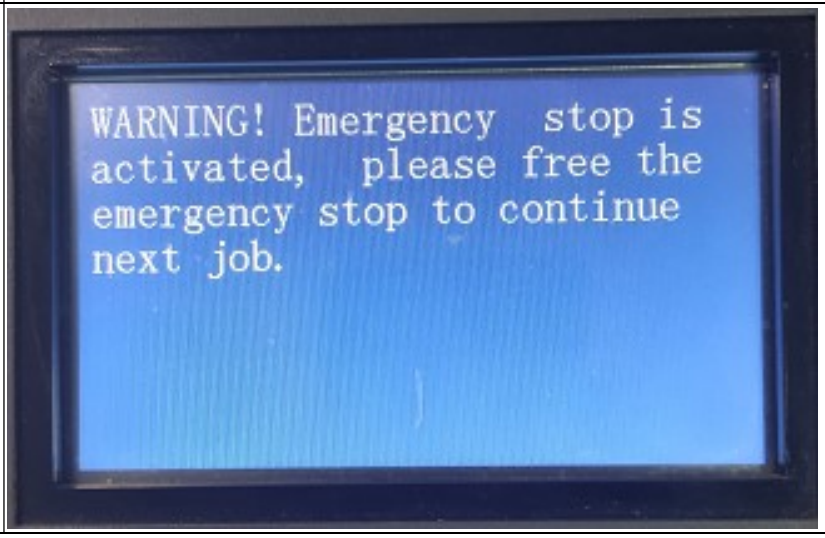
Step4. Click “Start” to begin update. When the update is finish, close the update program and reboot the printer。

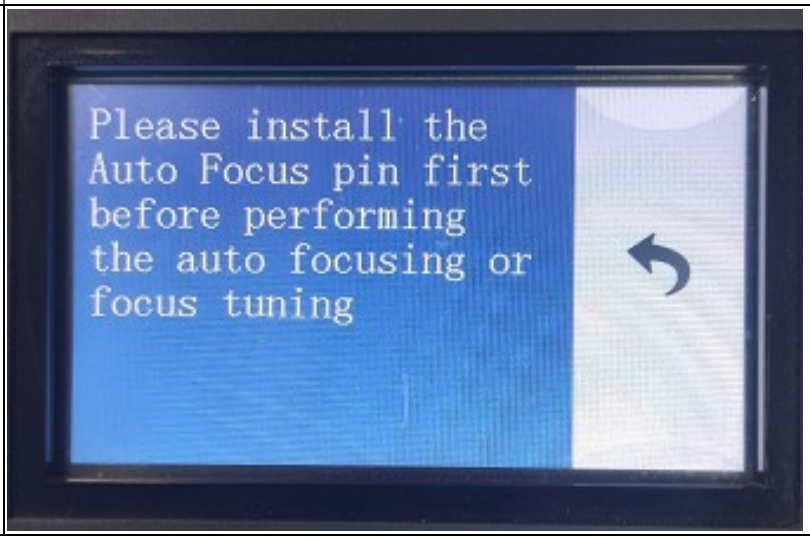
Chapter 7 - Trouble Shooting & Diagnostic

7.1 Firmware Error Message

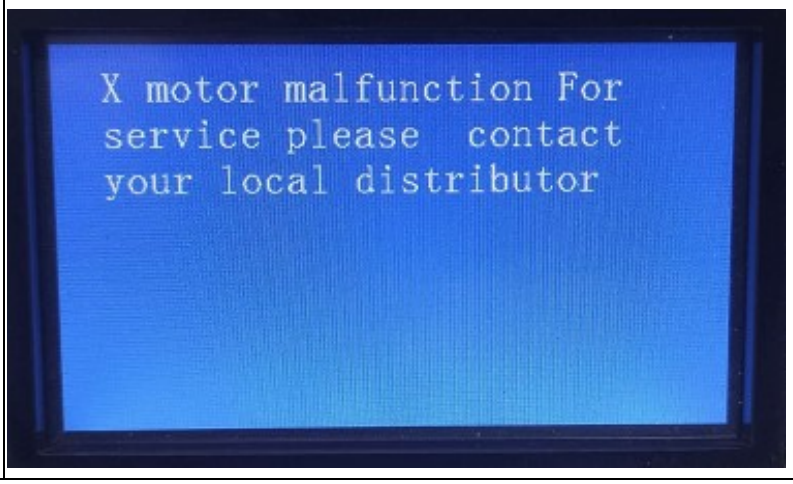
Message	Laser Tube Error Laser tube is overheat press any key to stop
Cause	V30 laser tube responses the over-temp signal for a period of time, and firmware recognizes the laser tube is over temperature.
Solution	Check if the cooling fans are functional, turn off the machine, wait for a while until the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

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 pressed
Solution	Release the emergency stop button
	

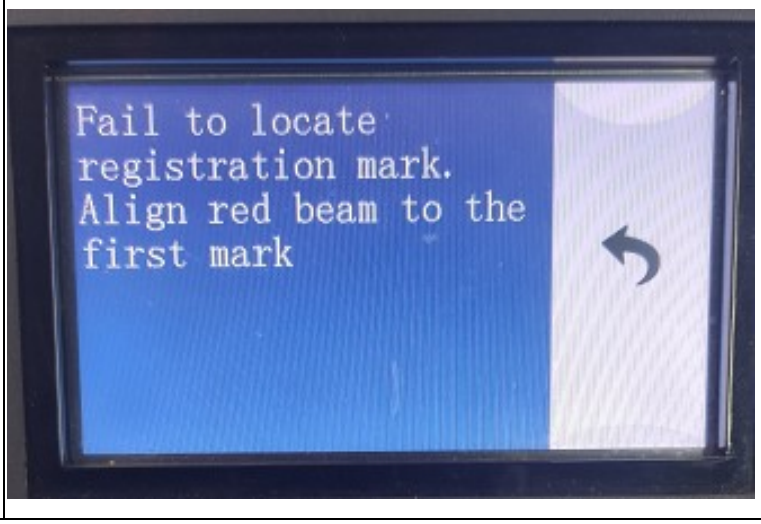
Message	Please install the Auto Focus pin first before performing the auto focusing or focus tuning
Cause	Auto Focus pin is not installed
Solution	Install the autofocus pin.
	

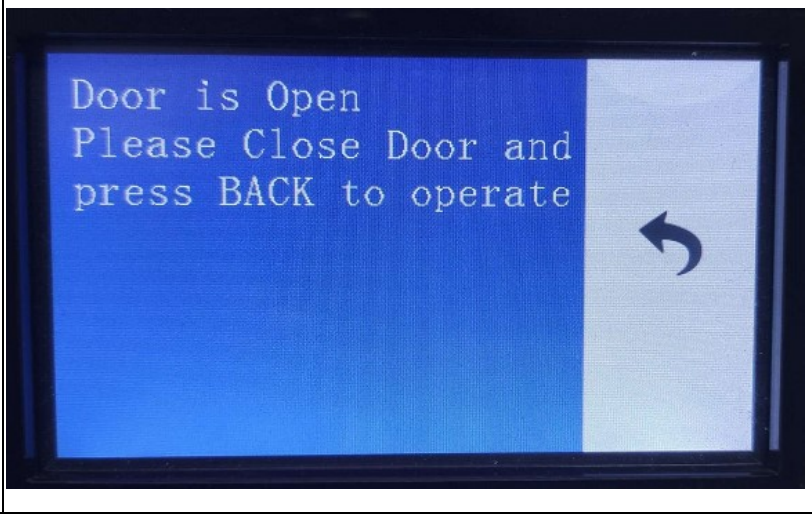
Message	Working table has reached the limit, please lower the table.
Cause	1. Platform reach the top limit 2. Platform reach the bottom limit 3. Certain object touches the limit switch 4. Limit switch malfunction
Solution	1. UP/Down platform to avoid the limit level 2. Remove the objects which touch the limit switch 3. Replace the limit switch
	

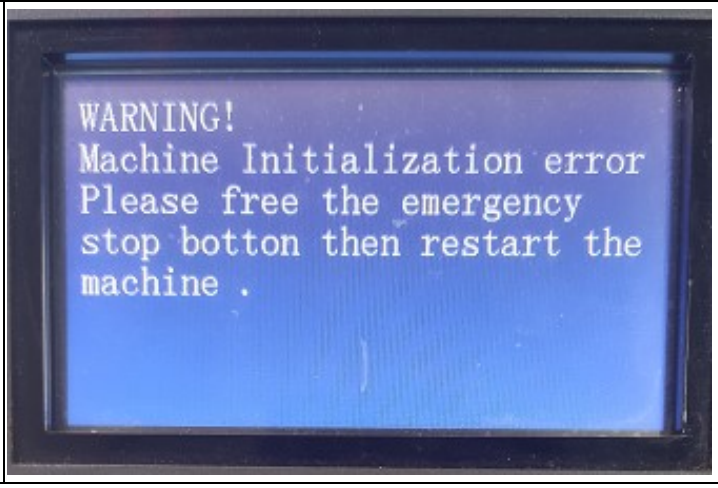
Message	X motor malfunction, For service please contact your local distributor
Cause	X motor is abnormal
Solution	Verification: 1. Check if the flat cable is properly connected. 2. Check if there is any abnormal sound made by the X motor. Solution: 1. Unplug and re-plug the flat cable. 2. Replace the motor.
	

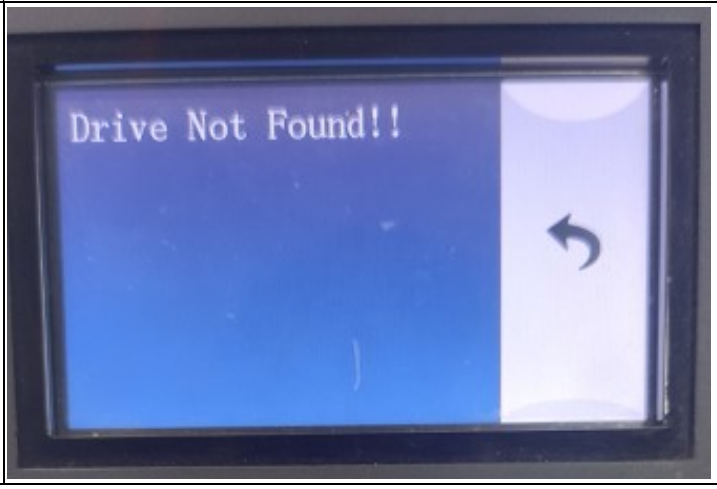
Message	Y motor malfunction, For service please contact your local distributor
Caus	Y motor is abnormal
Solution	Verification: 1. Check if the flat cable is properly connected. 2. Check if there is any abnormal sound made by the Y motor. Solution: 1. Unplug and re-plug the flat cable. 2. Replace the motor.
	

Message	Z motor malfunction For service please contact your local distributor
Cause	Z motor is abnormal
Solution	Verification: 1. Check if the cable between Z motor and mainboard is properly connected. 2. Check if there is any abnormal sound made by the Z motor. Solution: 1. Unplug and re-plug the cable. 2. Replace the motor.
	

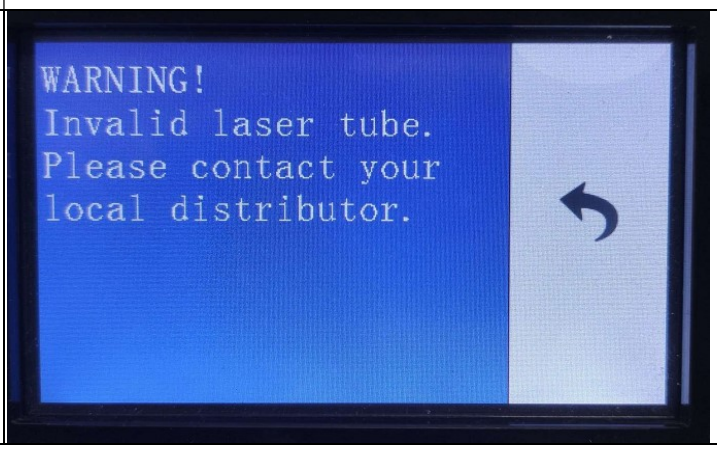
Message	Fail to locate registration mark, Align red beam to the first mark.
Cause	CCD can't recognize the registration mark.
Solution	Do the CCD recognition again.
	

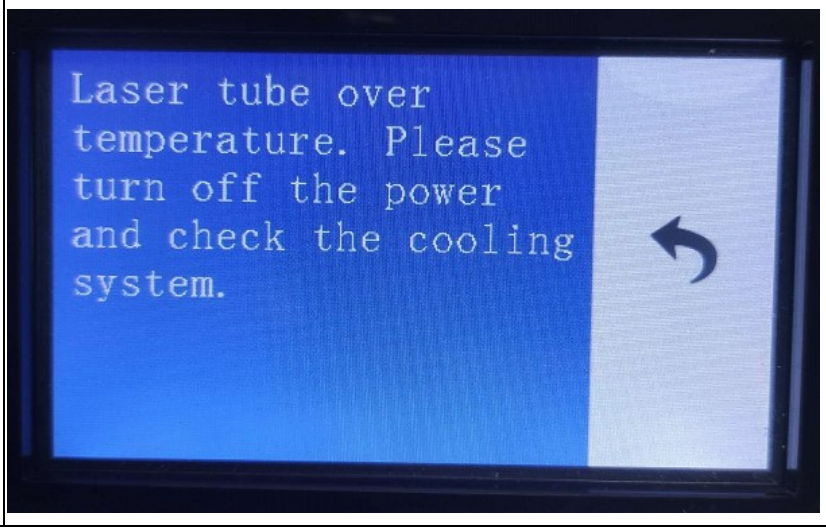
Message	Door is Open ! Please Close Door and press BACK to operate
Cause	Top cover is being opened while a job is running
Solution	Verification: 1. Check if the top cover is opened 2. Check if the Door sensor is working fine Solution: 1. Close the top cover 2. Replace door sensor
	

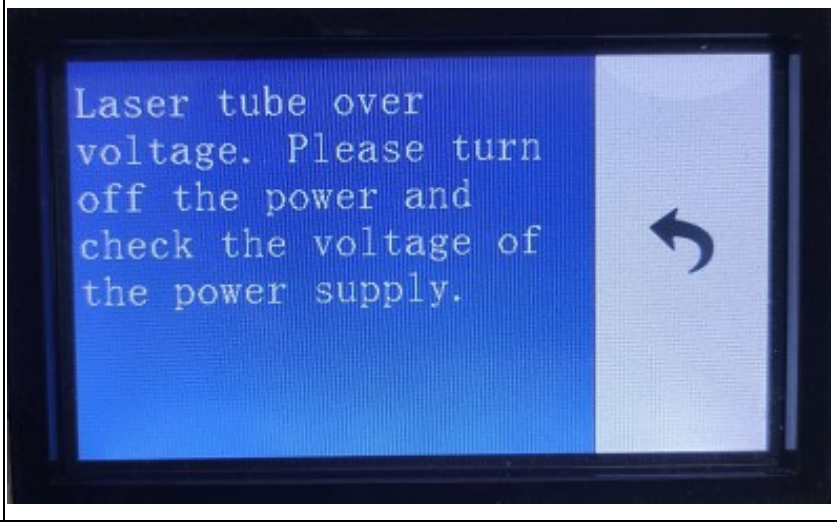
Message	WARNING! Machine Initialization error Please free the emergency stop then restart the machine
Cause	Emergency stop button is pressed while the machine is booting
Solution	Release the Emergency stop button
	

Message	Drive Not Found!!
Cause	USB storage is not plugged
Solution	Check if USB storage is plugged or plug again.
	

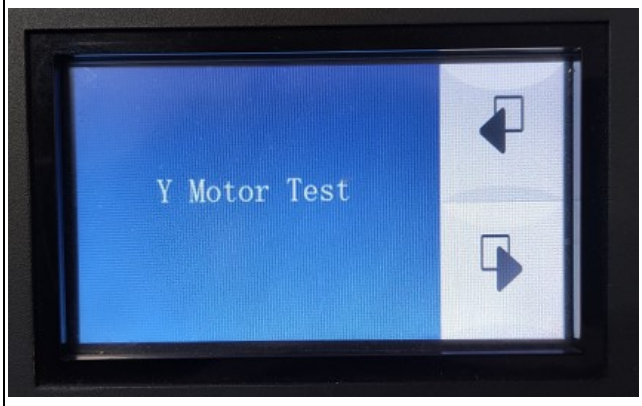
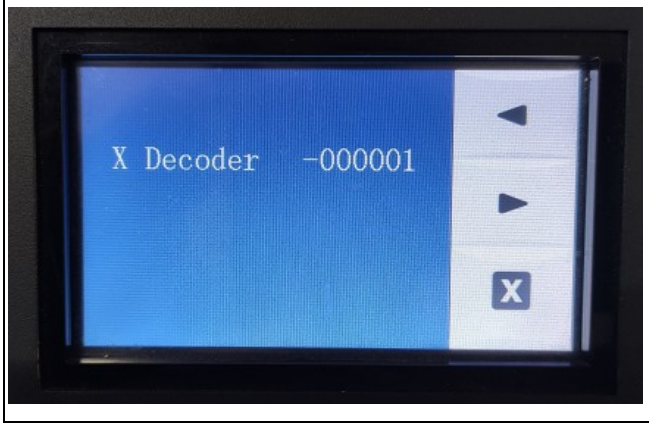
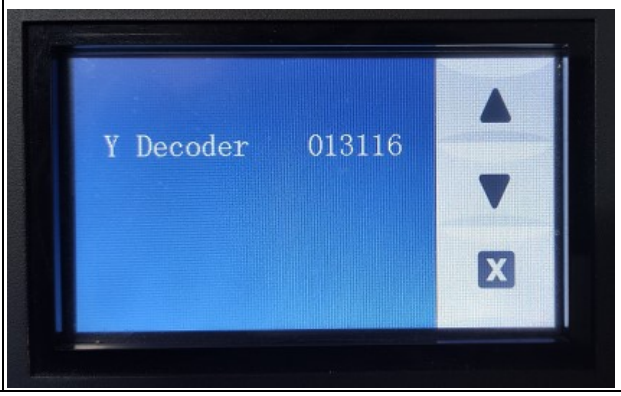
Message	Invalid File!!
Cause	1. The file format is not PRN or PLT. 2. The file name contains Chinese characters.
Solution	1. Change the file name. 2. Import PRN/PLT format files.
	

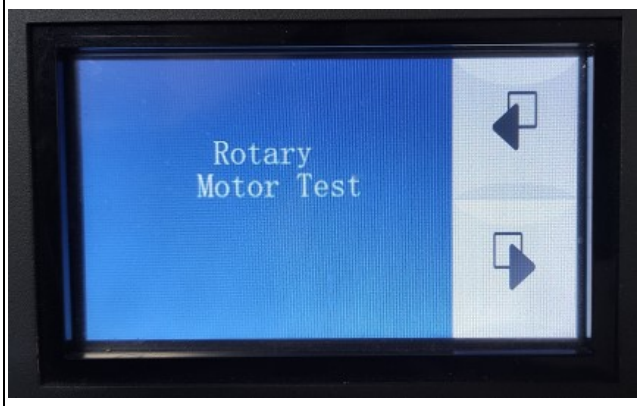
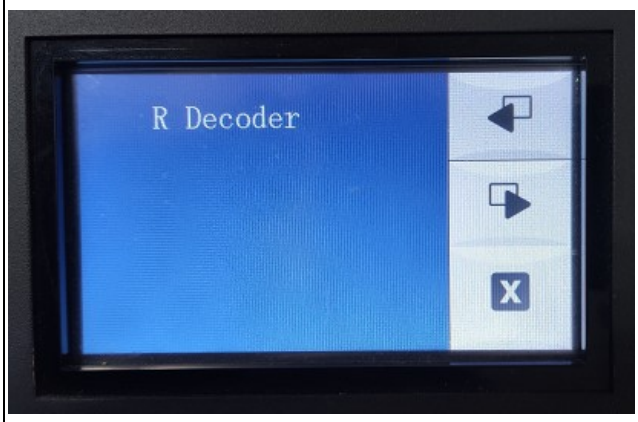
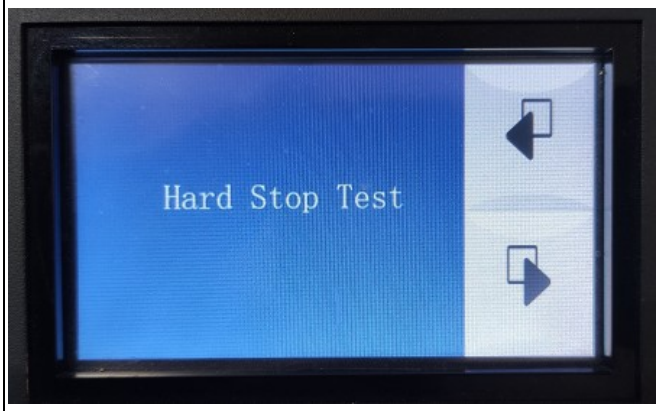
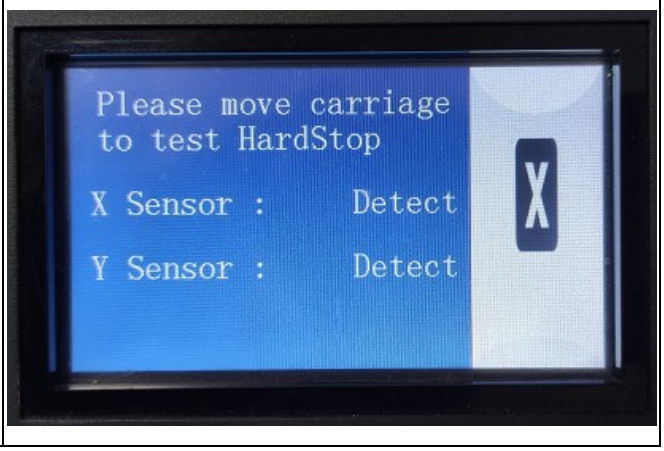
Message	WARNING! Invalid laser tube. Please contact your local distributor.
Cause	The GT laser tube is not from GCC.
Solution	Please use GCC laser tube.
	

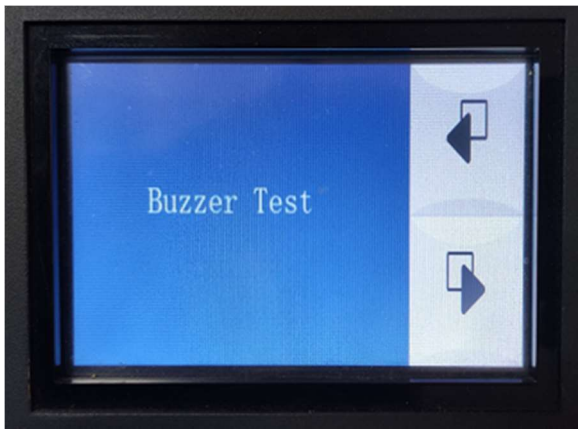
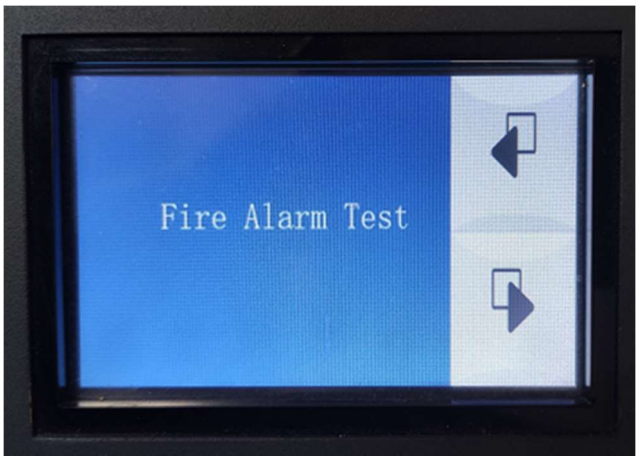
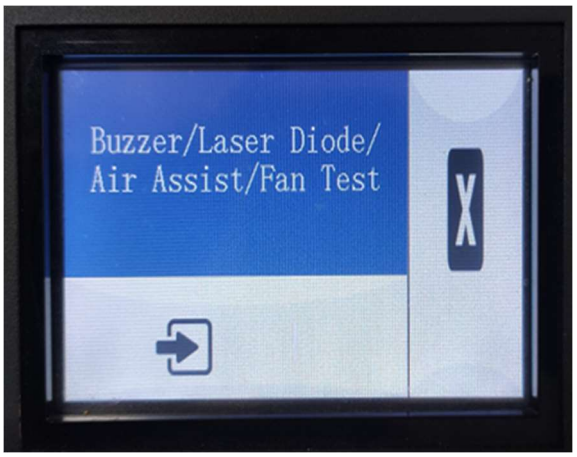
Message	Laser tube over temperature. Please turn off the power and check the cooling system.
Cause	GT laser tube is over temperature.
Solution	Please turn off machine to cool down or check the cooling system (fans are running or the machine is 20cm away from wall or the air temperature is too high)
	

Message	Laser tube over voltage. Please turn off the power and check the voltage of the power supply.
Cause	GT laser tube is over voltage.
Solution	Check the voltage of the power supply, make sure the voltage value is within the proper range (80GT and 100GT requires 48V and 120GT requires 50V)
	

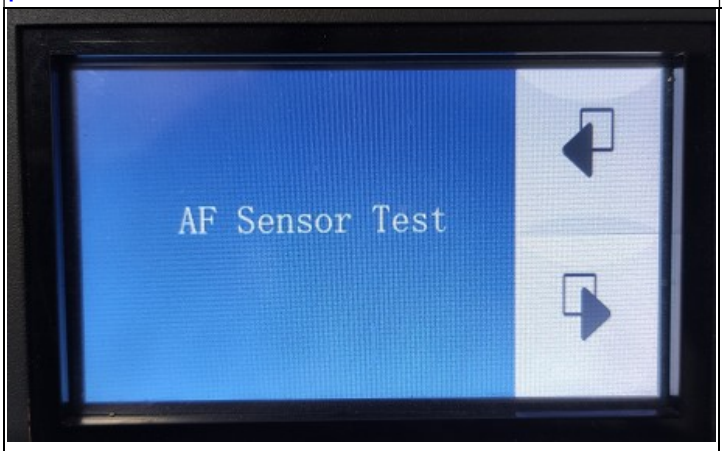
7.2 Hidden Diagnostics

X Motor Test	Y Motor Test
X motor test checks if the X motor is functional, Click on the text “X Motor Test” to enter the test, press Left and Right arrow key on the right side of touch panel to move the carriage along the X axis, you will see the value of “X Decoder” varies with the moving of carriage.	Y motor test checks if the Y motor is functional, Click on the text “Y Motor Test” to enter the test, press Up and Down arrow key on the right side of touch panel to move the carriage along the Y axis, you will see the value of “Y Decoder” varies with the moving of carriage.
	
	

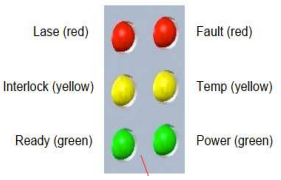
Rotary Motor Test	Hard Stop Test
Rotary Motor Test checks if the motor of the optional Rotary attachment is functional. Click on the test “Rotary Motor Test” to enter the test , press Left and Right arrow key on the right side of touch panel to roll the Rotary attachment, you will see the value of “R Decoder” varies with the rolling of Rotary attachment.	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	Fire Alarm 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.	File Alarm Test checks if the optional SmartGuard is functional. System buzzer will beep once fire is detected.
	
	

Fire Alarm Test
File Alarm Test checks if the optional SmartGuard is functional. System buzzer will beep once fire is detected.

AFocus Sensor Test	Laser Test
AFocus Sensor Test checks if the sensor of AutoFocus pin is functional, the sensor will recognize 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 with the laser power level you set. (This test is usually used to perform the Laser beam alignment.)
 	 

7.3 Indicator LEDs for GT Laser tube

Indicator	LED Color	Illumination Convention	Image
LASER READY	Green	Lights (cw) when the laser controller is ready for operation	
OVERTEMP	Yellow	Lights (cw) when the RFPA is getting too hot*	
FAULT	Red	Lights (or blinks) when the controller is in a Fault state	
LASE LED	Red	Lights with varying brightness whenever RF power is generated	
POWER	Green	Lights (cw) whenever DC power is applied	
INTERLOCK	Yellow	Lights (cw) when the interlock pin connected to ground	

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

8.2 Maintaining Motion System - Lubrication of the X & Y Rails

In order to keep the motion system running smoothly, the X and Y axis of the motion system will need lubrication on weekly base. Apply 0.1ml of lubrication syringe in accessory box to the X liner rail of S400 mode on bi-week base, while apply a small amount of light grade machine oil or PS2 grease to a paper or cotton towel and apply to the X rail of S400 model, and Y axis of S400. You can purchase PS2 grease from NSK dealers worldwide. Please visit http://www.nsk.com/eng/company/network/index.html for additional information

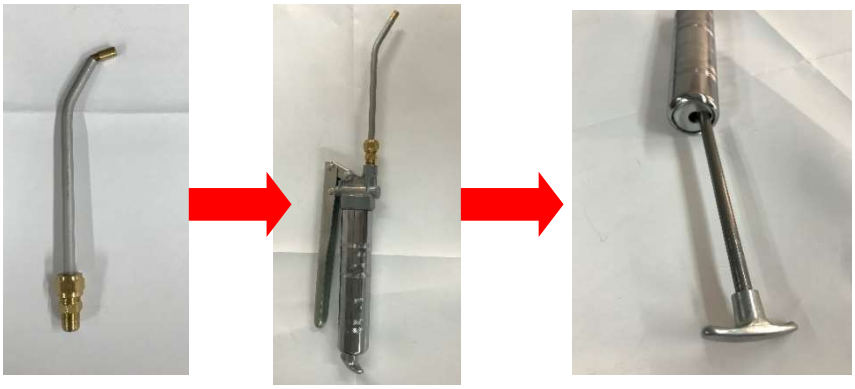
NOTE

- Clean and lubricate the X linear rail of S400 with 0.1ml grease from syringe every month to properly maintain the motion system.
- The lubrication oil for the X linear rail on S400 must to be ordered from GCC LaserPro and its authorized dealers. Other unknown grease may damage the rail's life time and performance.
- Always clean and lubricate the X and Y of S400, after working with material that produce lots of debris (such as wood).
- Too much oil or PS2 grease applied to the Y axis will accelerate the debris building up.

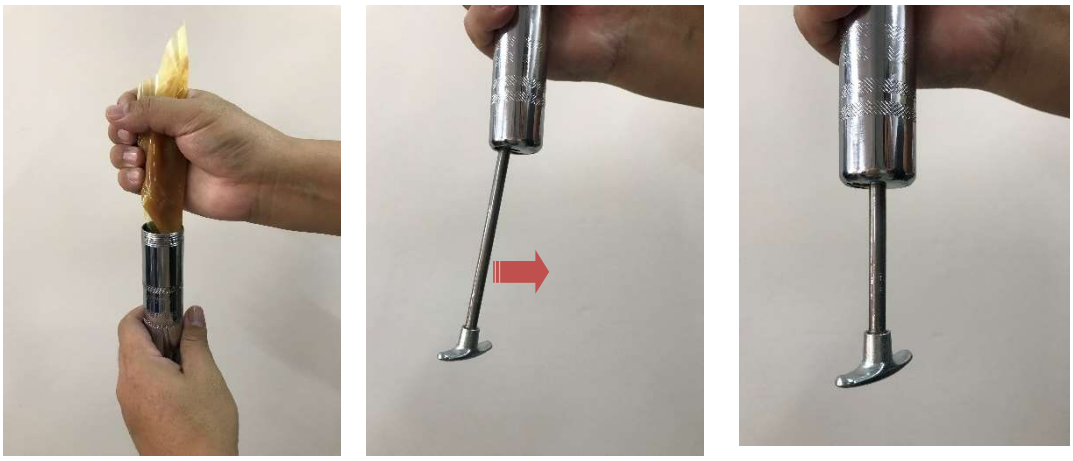
The X rail of S400 has linear bearing design which needs lubrication regularly depending on the job loading, recommend on bi-weekly base. Follow below procedures.

1. Take out the Grease Syringe from accessory box

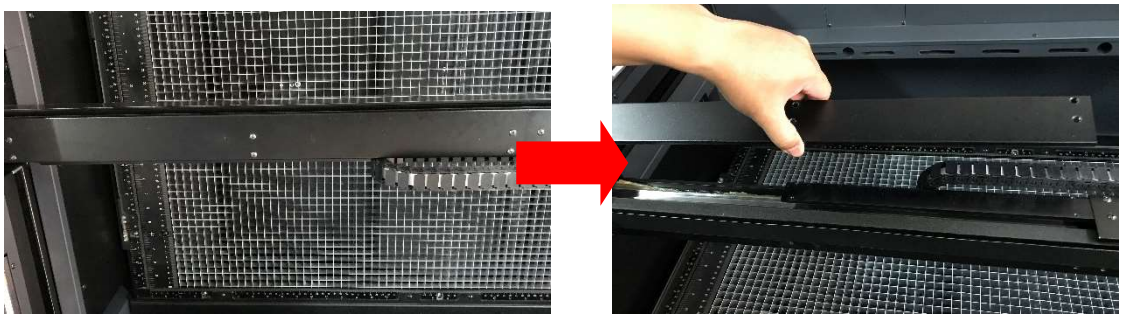
2. Select the following parts and compose the grease syringe as below pictures



3. Inject 0.1ml of grease to the injection opening inside the linear bearing



4. Remove the protected cover from the carriage



5. Inject small amount of grease to this injection opening inside the linear bearing

6. Seal the lubrication slot plate back to the X rail

8.3 Cleaning the Optics System

8.3.1 Removing the Mirrors

We recommend that 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

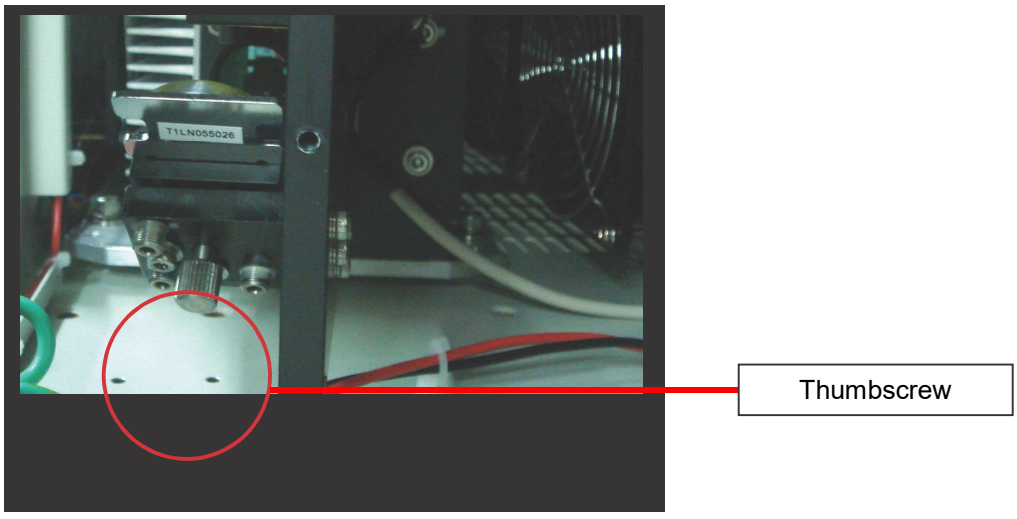
- Mirrors should be removed for cleaning one at a time to avoid beam misalignment after placing them back to the lens holders.
- Refer to section 8.3.2 on how to clean the mirrors.•

The following section will illustrate the location of the four mirrors found on the LaserPro S400 for cleaning.

Mirror 1

Mirror #1 is located inside the bottom left access door panel of the LaserPro S400.

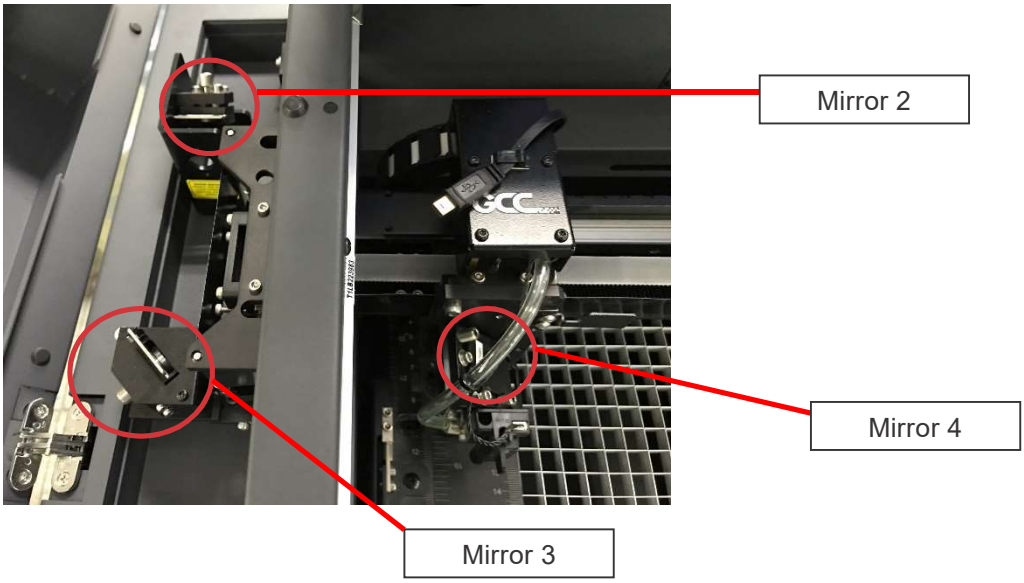
1) Use a #2 Phillips Screwdriver to open the access panel located on the bottom left side of the LaserPro S400.
2) Open the slot cover on the bottom left side of S400 machine
3) Loosen the thumbscrew and remove the black dust cover in front of laser tube.
4) Loosen the thumbscrew securing mirror #1.



4) Clean the mirror in the proper manner.
5) Place the mirror back to the optics holder after cleaning.
6) Tighten the thumbscrew.
7) Close and secure all the covers.

Mirror 2, 3, 4

These mirrors are located in the work table area of the LaserPro S400.



Mirror 2

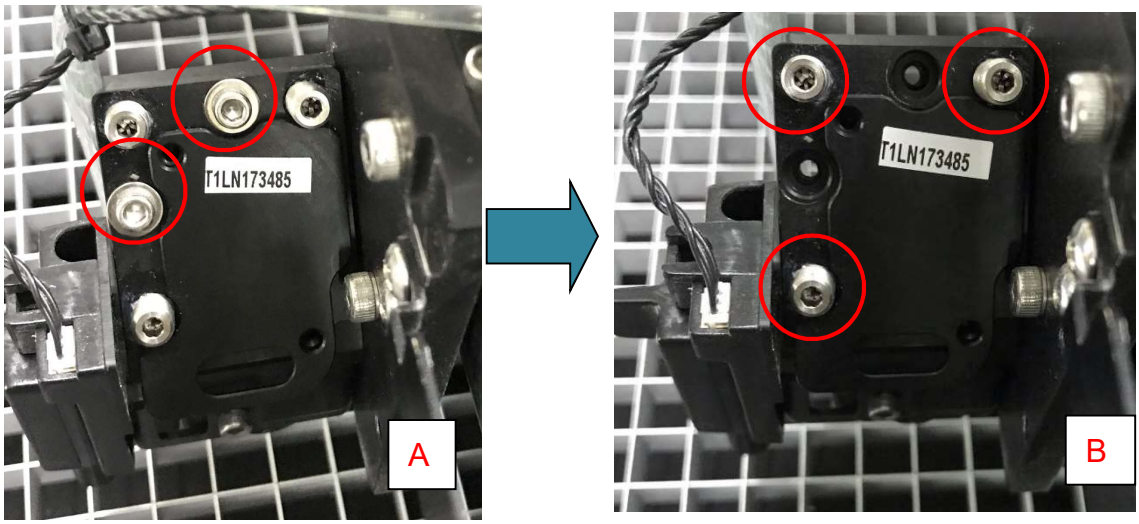
1) Unscrew and remove the black dust cover covering mirror 2.
2) Unscrew the thumbscrew holding mirror 2 in place.
3) Clean the lens in the proper manner.
4) Place the mirror back to the optics holder after cleaning.
5) Tighten the thumbscrew.
6) Close and secure the black dust cover.

Mirror 3

1) Unscrew the thumbscrew holding mirror 3 in place.
2) Clean the lens in the proper manner.
3) Place the mirror back to the optics holder after cleaning.
4) Tighten the thumbscrew.

Mirror 4

1) Unscrew the two screws securing the lens carriage panel as below picture A.
2) Loosen the three screws to remove mirror 4 as below picture B.

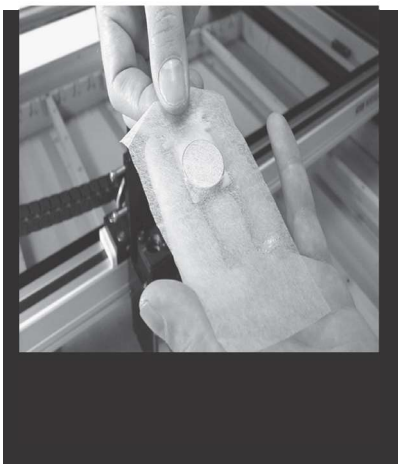


3) Clean the lens in the proper manner.
4) Place the mirror back to the optics holder after cleaning.
5) Tighten the top five screws.
6) Reinstall the lens carriage panel and tighten the three thumbscrews.

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 mirrors.

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 solution 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 GCC LaserPro representatives for replacement.
- DO NOT apply any finger pressure or any other cleaning solutions to the mirror or focal lens surface.
- The optics components are very fragile, handle carefully and follow the cleaning procedure well.

8.3.3 Removing and Cleaning the Focal Lens

1) Unscrew the three thumbscrews securing the lens carriage panel and remove the lens carriage panel to reveal the focal lens.
2) Carefully pull out the focal lens.
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 finger 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.

Remove thumbscrew

Pull out the focal lens

8.4 Cleaning the Exhaust Duct

Efficient exhaust ventilation is crucial to laser cutting quality. We suggest you to clean the Exhaust Duct from accumulated dust regularly will help to maintain the ventilation efficiency of your laser engraving system.

Step 1. Remove screws fixing the rear door panel of laser machine

Step 2. Remove screws securing exhaust duct on rear door panel

Step 3. Open the rear door and take out the exhaust duct to clean with water

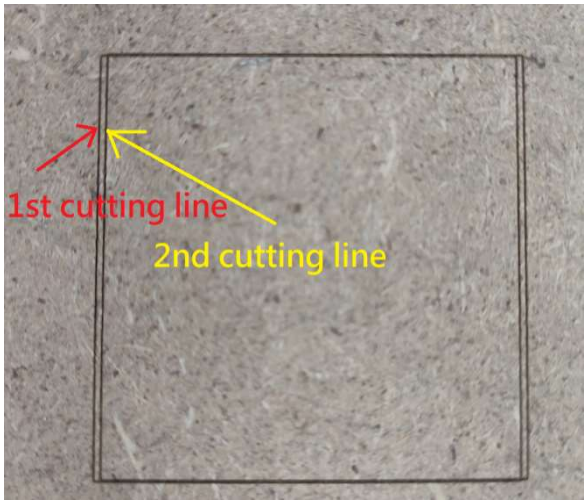
Step 4. Fix and secure the exhaust duct and rear door panel back to the laser machine

Chapter 9 FAQ

9.1 Random direction shift will happen if a job is repeated, how to solve it?

Step 1 : Output a square (vector)

Step 2 : Repeat the same job



GCC lasers use servo motor system and belt to drive the carriage, if the function “Carriage free” is set to YES, system will release the motor, (you can use hand to move the carriage) and tighten the belt again when machine is starting to do next job. When the system release the motor, the close loop is opened and firmware doesn’t know the status of carriage , we can’t guarantee while the system is re-tightening the belt, carriage is in the same position as original.

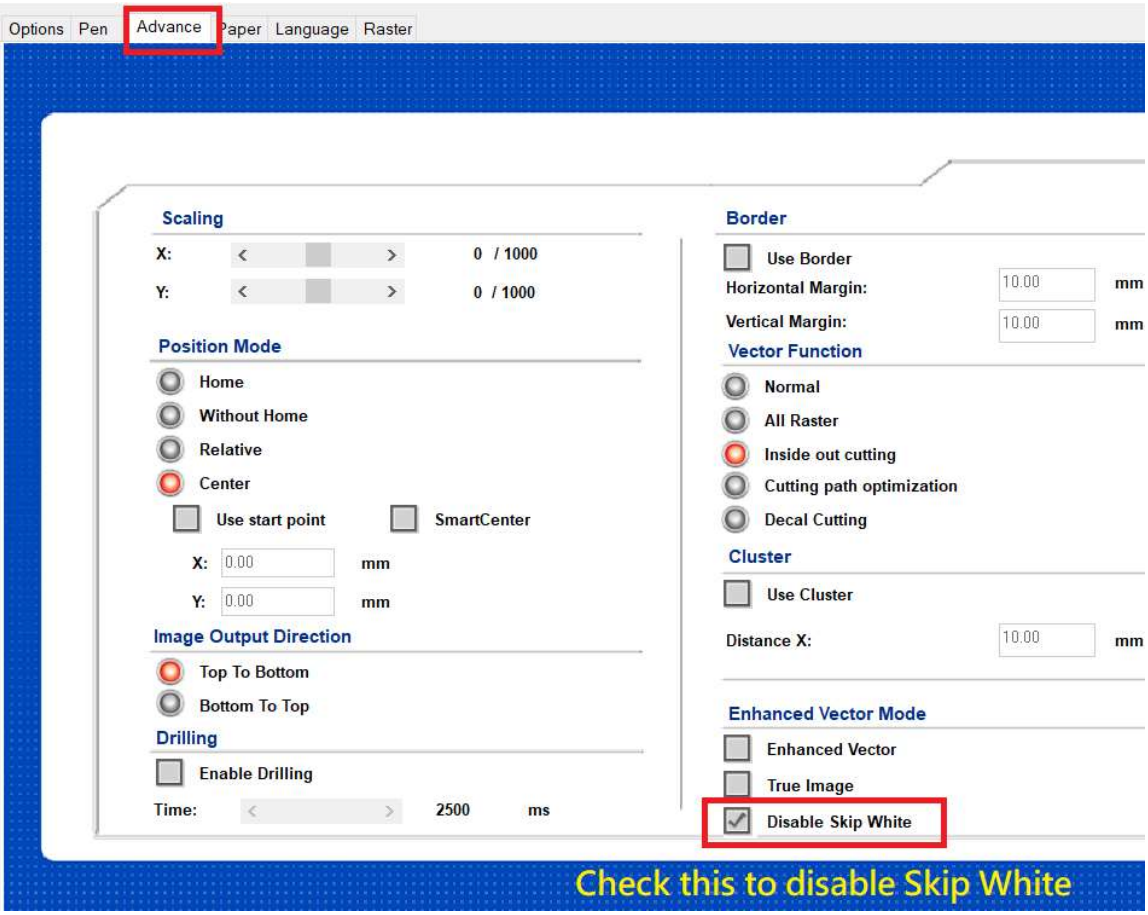
Conclusion: Set “Carriage free” to OFF can solve this kind of problem.

9.2 Shifting happens on engraving text which has different height.

This kind of shifting problem happens when the carriage moving distance changes. Take the text “Spirit” on above image for example. Carriage will move shorter distance for engraving the lower part of “p” and the shifting problem happens.

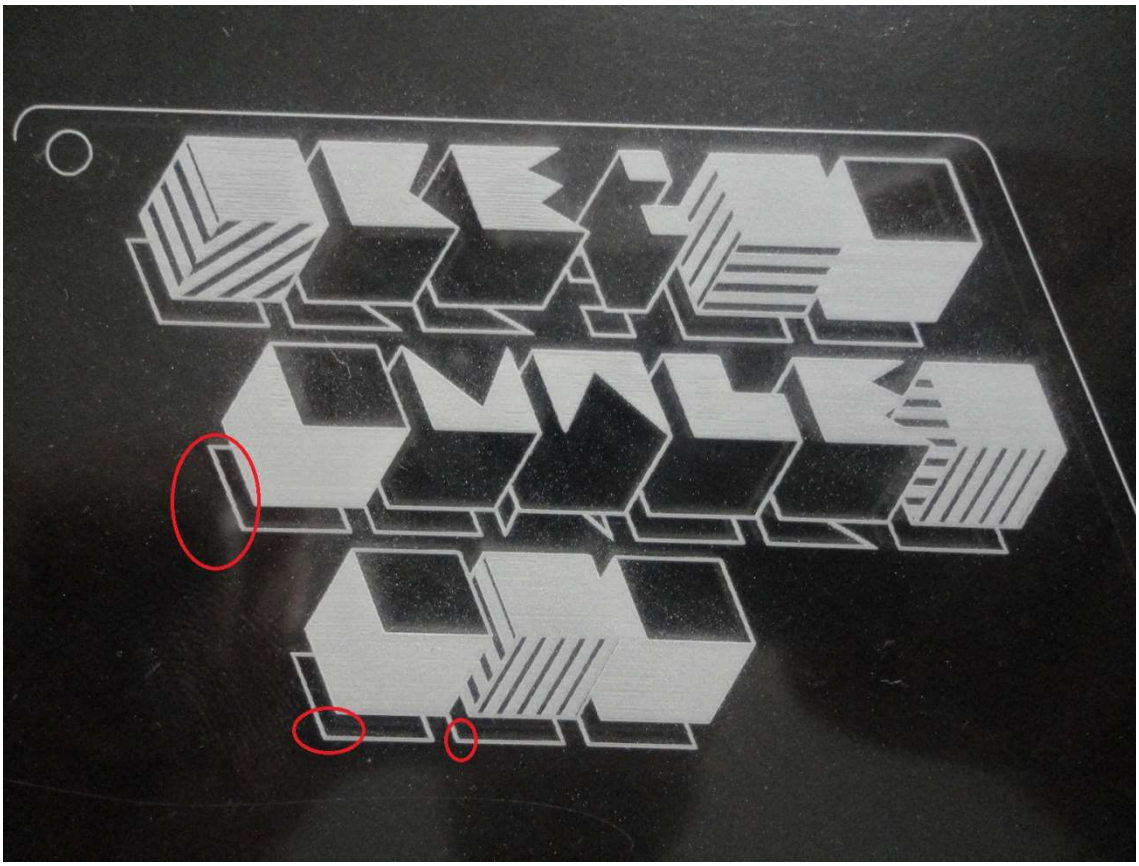
In order to increase the throughput, GCC driver default setting will optimize the carriage moving distance, therefore, for bottom part of the letter “p”, the moving distance of carriage will be much shorter than other part (Refer to below pictures).

This kind of smart working method we call it “Skip white”, this function can be disabled in driver.



9.3 Random shift during an engraving job.

Let's have a look at below picture:

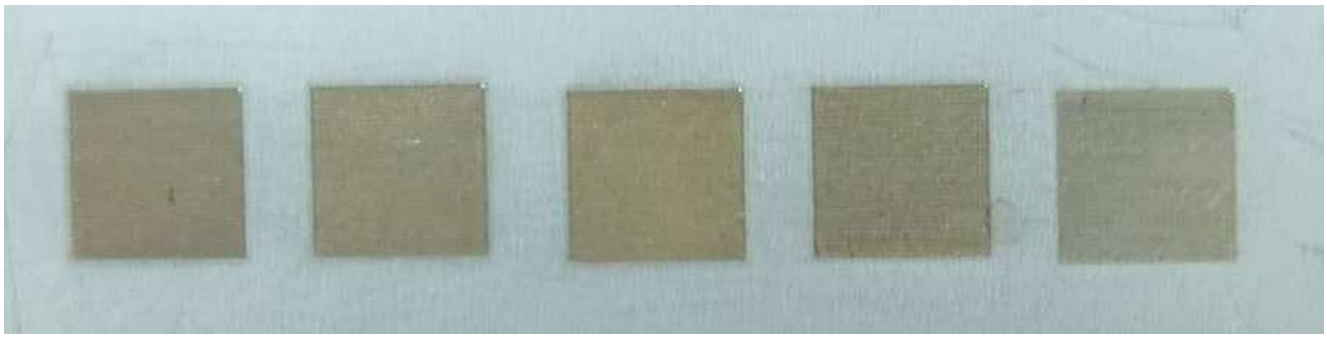


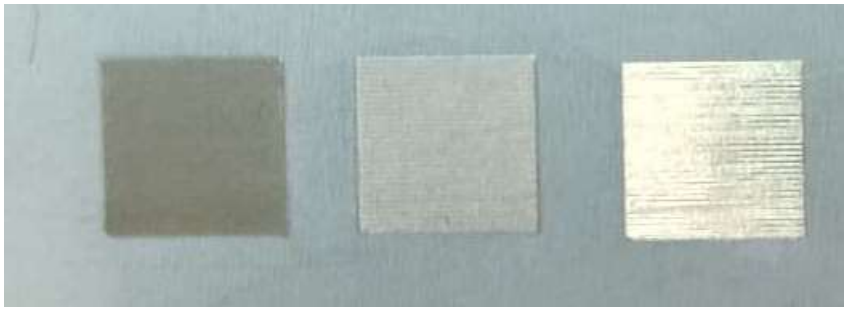
Notice it's an engraving job, the slant lines circled in red were made by engraving, therefore it's not vibrating cutting line, it's engraving shift.
The shift doesn't appear on all the lines, just focus on the left bottom part of working area.
This is usually optics related, the cause might be:

1. The beam alignment is not good.
2. Lens、mirrors are not clean.
3. Certain mirror is not well fixed (check the screws to fix the mirror)

9.4 How to get dark effect marking on a stainless steel plate with Fiber laser?

Generally, put the material on the focal point will bring us the highest power density of laser and the smallest spot size which will bring us the finest engraving quality. However, if you want to have dark marking effect on a stainless steel plate, it won't be a good way, you will find no matter what setting you use, you can just make the marking "brown", and the surface of plate will be etched.

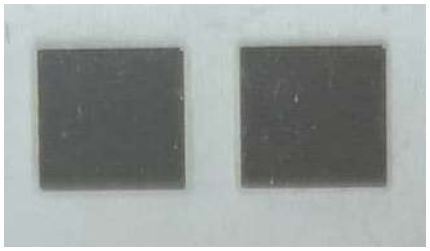




You can try this way to get the dark effect:

1. Set power to the highest (100%)
2. Set the speed to around 8~12%
3. Set the frequency to 60khz
4. The most important thing, defocus 2~2.5mm.

Defocus will decrease the power density and make the spot size larger which will bring us the dark effect, see!



9.5 Image tuning to solve the bur problem

When engraving on some sensitive material like anodized media, we might get bur on the edge like below picture shows.

The reason of it is the media is quite easy to absorb the energy of laser and react immediately.

GCC driver provides a function which can solve this kind of problem named “Image tuning”, you can find it in the “paper” tab of GCC driver page. This function adjusts the distance of each engraving line, move the bar horizontally, find out a proper setting to improve the bad edge quality.