

**LSF10B Automobile Label  
Fiber Laser Marking Machine**

**Operation Manual**

**Customer:Auto Alliance(Thailand)Company Limited  
Wuhan Huagong Laser Engineering Co., Ltd**

**Mar.2009**



**Operator must be familiar with this manual before operating the machine. Hglaser is irresponsible for the injury or accident do not according to operate manual. The operation manual' ownership is hglaser, only used by machine's owner.**

## Brief Introduction to the Company

**Huagong Laser Engineering CO., Ltd. (HGLaser)** is the main subsidiary company of Hugong Tech Co., Ltd. Huagong Tech. which is the first domestic listing company relying mainly on laser products. Depending on the whole predominance of HUST and backing on this university's State Key Laboratory of Laser Technology and National Engineering Research Center for Laser Processing there based, HGLaser has always been at the leading edge of the R & D of laser technology and its application in China, and has engaged in the transforming of laser high technology achievement to the laser industry.

Wuhan HGLaser locates in Wuhan east lake high-tech developing zone by the side of beautiful Tangsun Lake, which occupies area more than 23,000 square meters. As the authoritative supplier for the solution of laser processing, HGLaser specially engages in R&D、 manufacturing and sales all kinds of laser processing system with the laser output power from 10W to 10,000W. These laser processing system are suitable for all kinds of industrial processing, such as marking, engraving, cutting, welding, drilling, melting and coating, micro-processing, heat treatment and laser medical treatment etc So that the company can supply the customer with all kinds of service.

Holding the tenet of “satisfy the customer, persist in improvement, set up the world famous brand”, HGLaser completely carries out the quality control system of ISO9001 and is now creating new splendid achievement for the Chinese laser industry.

Thank you for your choosing of HGLaser products. If any problems happen during your operation, please call our after sale service center at 027-87180233 without any hesitation. We will serve you with all our heart.

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## 1. Safety

The label machine must install、operation、maintenance、mending by professional trained person. The operator must read the operate manual in practice, Especially this chapter.

### (1) Required to operate.

This marking machine use to marking automobile label specially, it is possible to bring on the machine's attaint if using another material. We are irresponsible for the losing of machine because of using another material. Also we are irresponsible for the losing of without consulting the manufacturer before altering the machine.

### (2) Marking operation

If without the error information display when the machine is marking, and the marking content without any error too. Do not change any part of the machine. If the marking content do not accord with the demand can press the stop marking in computer software. If it need adding the marking content can input the code in the interface of computer software and adding. In urgency case it can operate the "clear alarm" on the touchscreen, the machine will stop the marking operation.

### (3) Basic safety instruction

The machine using the power of AC220V, Untrained service people forbidden open the front door、back door、side door of the machine avoid occurring an electric shock accident. If it is happen press the emergency stop switch., the machine will shut off the current.

### (4) Hurt of laser radiation

This laser is manufactured according to the standard of 21 CFR 1040.10(or IEC60825), belongs to the class IV laser product. It can emit 10 Watts of laser at the wavelength of 1060nm. It is harmful to the human eyes and skin. Although the laser beam is invisible, it will cause the injury to the retinal and the corneal. It is necessary to wear a protect glass when the user operates the system. It is the user's responsibility to prepare all the safety glass.

### (5) Managing notice

The machine added the locked door and windows in some place. In order to avoid untrained people do the unlawful operation can give the different key according to authorization level. For example, Giving the power switch key on operation panel to operator carry out the marking operation. And the maintenance people have the key of front door、back door. When the machine need repairing can do the operation.

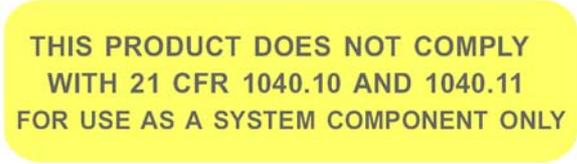
### (6) Caution marker

The followings are the FDA symbol and their place at the product.



AVOID EXPOSURE  
INVISIBLE LASER RADIATION  
IS EMITTED FROM THIS APERTURE

The Label of the aperture Location: at the way out of the collimator or the cable.



THIS PRODUCT DOES NOT COMPLY  
WITH 21 CFR 1040.10 AND 1040.11  
FOR USE AS A SYSTEM COMPONENT ONLY

The label of the certification

Location: at the bottom of the laser



Label of warning      Location:    at the cover or the front panel of the laser

## 2. Transportation

It is because of the wrong operation to the part of machine during transporting the machine lead the damage the machine. So in the process of transportation should be careful in these point as below:

- 1) **Required the machine packing with the wooden case. Fill more flexible things into wooden case can cushion some wallop. Like foam、 sponge and so on.**
- 2) **The wooden case must using big size nail and fasten it, Make sure the wooden case do not loosen.**
- 3) **Do your best to use crane、 fork vehicle and so on during loading and unloading. Do not too much wallop to avoid broken the laser.**

If find the visible strike mark. Please checking whether broken or not. And then according to the result to operation.

### 3. Introduction of machine

Automobile label Fiber-Optic Laser Marker is empoldered for the automobile industry. It is suit for flexible production line and can working on line.

#### (1) Principle and feature

**Automobile label Fiber-Optic Laser Marker** using laser process, marking on special material label clearly and good-looking. For recording the produce information of factory. Precision-controlled laser beam scanning in a special four-layer label materials. According to the information of the user. Though precision-controlled laser output power and scan speed. Removing the frist color layer(black). Revealing the second layer(white). Thus finishing the design or text information of laser marking work.. In order to easy to plast. Though precision-controlled laser marking on the edge of the design. Removing the frist and the second and the third layer. It is convenient to take off the label from the whole material. Because of the mucus on the label. So it is easy to plaster the specifically position on automobile. We call laser marking is the process of remove the frist layer of material. And laser cutting is removing he frist and the second and the third layer of material.

Compared with another marking processing. **Automobile label Fiber-Optic Laser Marker** has a lot of advantage like these.

- High production efficiency It can fulfill the on-line production speed request of all present automobile manufacturers. It adopts latest advance fiber laser, which has fast marking speed , marking line is fine, moreover stability is high. The life-time of fiber laser marking machine can reach 100,000hrs. Reduce user's service enormously, may say that it is no-maintenance laser system. .
- Good flexibility, and strong compatibility Combine with the workstation scene, vehicle type, production date and maintenance number etc. information, the machine adopts professional software to transform those information into flat laser marking output. Meets the on-line production needs completely, especially different vehicle type mixed assembly line. One set of laser marker to be possible to provide all on-line vehicles marking works.
- No maintenance The imported Germany fiber laser marker not only has very good laser beam quality, but also has very long service life. The life of laser can reach 100,000hrs, which could realize no-maintenance. Imported electric key parts ensure high standard of system quality.
- Good anti-counterfeiting laser label manufacture equipment is complex, the label material is special and cannot duplicate, causes the counterfeiter of automobile spare part is difficult to counterfeit, thus to protect the legal rights and interest.
- No storage To mark according to user's need, and no need any storage of label.
- Low comprehensive cost For the vehicle manufacturer of mass production, and type. No need other consumable materials; the running cost is very low.
- The laser label uses the special material to make; it is thermo stable, wear-resisting, corrosion preventing, waterproofing, and long service life.

Automobile label Fiber-Optic Laser Marker has more then 30 applications in automobile manufacturing. Such as Body label, hydraulic label, VIN code label, air conditioning label, barcode label, cooling system label, car keys label, starting cars label, tank label, door label, airbag warning label, button label and so on.

#### (2) Composing of the machine and detail introduction

The machine is composed of main parts as follow:

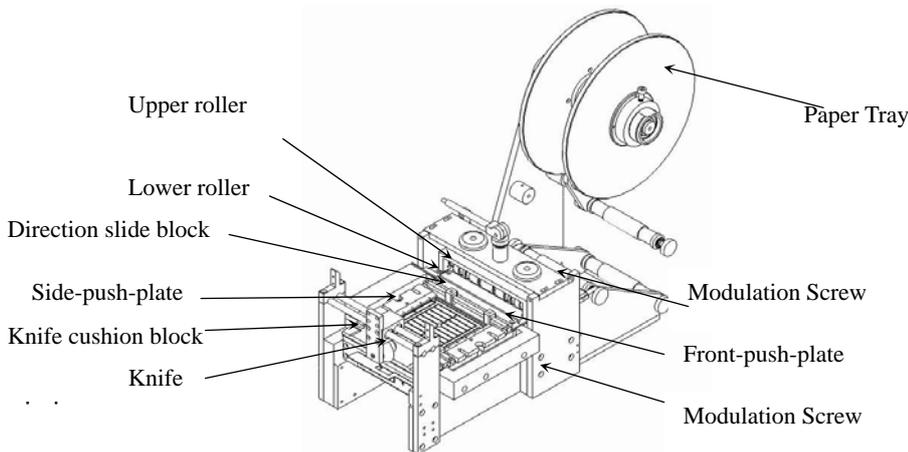
### ① Marking system

It main include laser、 outer light path、 high speed galvo、 focus and so on

Using the IPG laser made in Germany. Smallest laser beam、 easy maintenance、 air cooling, Reducing the source of noise greatly. The laser giving off the laser beam pass though X and Y axis polarized and focus on the marking area. The location X,Y control by computer. It can realize laser scan on focus surface by computer setting content of the font、 text. Thereby the content marking on the processed object. Normally optics component will install in the dustproof to avoid the lens stained.

### ② Feeding System

The motor brings along paper wheel to unwrap the paper to marking position according to prior setting speed. Its main function is tightened the label paper and unwrap it automatically while working. The system will carry a certain length of label paper for marking (the speed could be set according to user's demands.) The optics photoelectricity testing meter could check the size of paper roll, and remind operator change the paper in time.



As paper feeding system drawing shows that paper come out from paper tray, and pass through upper roller and lower roller, then pass front-push-plate for direction. There are direction slide block on front and back side of adsorb flat roof for guiding the paper moving direction. And the side-push-plate on left and right side of flat roof is for holding down and guiding the paper moving direction. When the paper belt passing through knife cushion block, it will be cut off finally.

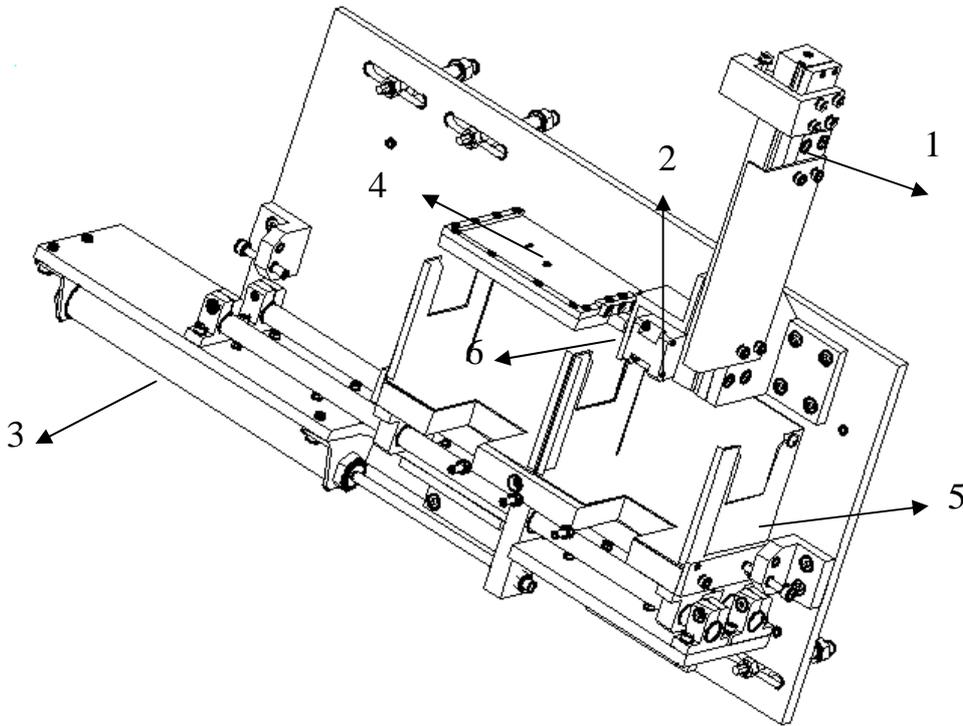
### Notice of Paper Transmission System Modulation

- At the beginning of paper transmission system modulation, after paper belt pass upper roller and lower roller, then it only pass front-push-plate for guiding direction, and pass working area directly. It won't pass after guiding direction systems. Its aim is reducing the damnification caused by machine modulation, convenient for later modulation and saving paper belt.
- The distance between direction sliding block and paper belt should keep around 1mm. Because bigger distance won't work as guiding direction function, if smaller will arouse block paper. Side-push-plate need to hold down paper belt for guiding direction. The edge of push plate should keep 2-3mm distance with the edge of paper belt. Because if the distance is too small to guide direction of paper, and will damage the paper edge and effect feeding paper. If the distance is too big to entering into marking area, the marking area will be minish. Finally the paper belt pass knife cushion block, the modulation screw on knife cushion block can not be tight entirely, should keep certain gap between knife cushion and underside, otherwise knife cushion block won't have hold paper function, its cutting paper quality will be effected.

### ③ Overturn system

After the cutting knife cut the paper, the machine will run the overturn system, and then transmitted the label in the specifically label case. Through this overturn realized the label range according to the VIN code's order. It is good for the work of pasting label.

The structure as follow:



(1) **Turnplate cylinder**

Function: to transmitted overturn plate, and then transmitted the label finished marking in the specifically label case.

(2) **Overturn motor**

Function: To make the overturn and go to origin of overturn plate.

(3) **Material case cylinder**

Function: Going to the location of material case, and choose specifically case, For different demand of marking.

(4) **Overturn plate**

Function: The overturn plate uses to fetch and sent the label, through the cooperation of the plate and motor can overturn the label 180 degree. It has the vacuum adsorption and huff function of overturn plate.

(5) **Material case**

Function: To leave in label, Different type of label will leave in the different location.

(6) **Zero fiber sensor of overturn motor**

Function: Detecting the overturn plate whether on the horizontal or not.

## Running principle

The overturn motor will be running after the machine turn on every time. When detecting the location of overturn plate on the horizontal state the motor stop. After the cutting knife cuts label on the overturn, the overturn plate begins to vacuum adsorption, After adsorbed the specifically location the overturn motor begin to overturn at the same time the overturn plate cylinder go down. After overturned 180 degree and the overturn plate cylinder in the low location begin to cancel adsorb and then huff, Dropped label down the specifically material case. After finished huff the overturn motor continue overturn until detecting the signal of zero, At the same time the overturn plate cylinder moving up, Return the origin location again.

### ④ Control case

The control case installs the important equipment of electric control board、 dust exhaust、 fiber laser and so on.

Open the back door can see the electric control board.

The electric part is adopted PLC controlling, imported motor and driver. its work is reliable and easy.

### ⑤ Exhaust System

This system is adopted original imported industrial dust collector. Its function is use professional device to adsorb and vent out exhaust gas, and doing purify in time.

### ⑥ Gas system

The machine is adopted pneumatic component made by MSC. Stabilization and good-looking.

### ⑦ Air-condition system

On the side of the control case install an air-condition. To make sure all the component of control board in best state.

### ⑧ Operation panel

On the right-top of operation panel. It main contain the computer operation、 touchscreen operation、 emergency stop switch and power switch and so on.

### ⑨ Professional Laser Marking Software

The system could be inputted any kind of nameplate and VIN scutcheon at same time or separately by one time input information, and switch is very easy.

## 4. Machine operation

### (1) Preparing before operation

Hglaser ensure the laser machine already entirely testing accord with correlative specification before shipment. When receiving the goods and checking broken of packing or part by any possibility, if broken obviously, please give notice to Hglaser as soon as possible.

Insured item before opened the machine

- ① Confirm that the power supply wires and the signal cable are all connected correctly.

- ② Confirm that the E-stop button is at the released position.
- ③ The machine already connect the AC 220V power supply.

## (2) Running machine

It can according to formerly process turn on the laser machine:

- ① Turn on the switch on the left side of machine.
- ② Turn on the computer switch on the control panel.
- ③ Turn on the switch of the main control panel, the air switch to power the laser. The display on the control panel will be light. The digital display will shows the 000 for three minutes, and then the power display will show 000.
- ④ Running the marking software, choose the suitable marking template.

## (3) Stop machine

After finished the marking can shut off the machine as follow

- ① Shut off the computer
- ② Turn off the switch of the main control panel. The laser shut off.
- ③ Turn off the switch on the left side of machine. Shut off the main power supply.

## (4) The installing and changing of paper roll

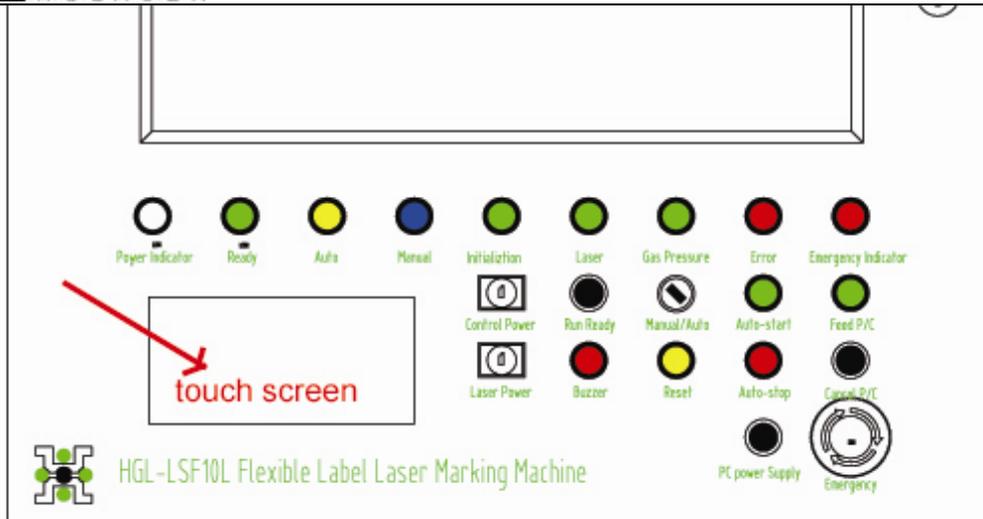
Using the machine at first or detecting the paper use out need install the paper scoll.

- ① Take off the side push-paper tray in front of paper roll tray
- ② Taking the used paper roll cell of paper tray.
- ③ Putting the new paper roll into paper tray axis in right way.
- ④ Then take off the side push-paper slice and install it.
- ⑤ Keeping the paper tape through the two rail and enter the Direction slide block of feeding system.

**Notice: Make sure the orientation ring in the middle of side push slice insert the gap of paper roll axes, if not maybe cause the wiggle of paper roll. (observe the gap of paper roll and side push slice, make sure the smaller the better)**

## (5) Parameter setting

Touch the 'parameter setting touch area' on the touch screen to modify parameters like 'feed paper speed', 'cancel paper distance', etc...



parameter setting touch area

SET FOR

Switch to parameter setting menu



1) Motor speed setting

Touch “**###**” which below ‘motor speed’ will appear a pop-up keyboard, set parameters according to your demand correctly, press “ENT” and touch ‘parameter confirm’, touch “back” to finish the setting of feed paper.

2) Cancel paper distance setting

Cancel paper distance means to save paper, paper will unthread a certain distance after cutter cuts it off. The parameter setting method is the same like feed paper speed setting.

1 PARA2

Touch **1 PARA2** switch to parameter setting screen 2.



3) "Sensor detect the connect hole and mark times" (AFTER HOLE) setting, this means in the working process when the sensor detect the hole how many paper will continue to mark. Example: when set 0, after detect hole, paper will continue to move and cut, the moving distance set through "CUT LENGTH", if set 2, it means paper will move to mark two papers and then cut.

#### 4) Motor subsection setting

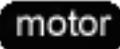
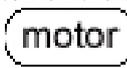
This parameter is to adjust the physical moving distance between motor driver and paper rolling system. It has done the greatest parameter optimization in factory, suggest customer do not modify it.

### (6). Manual feed paper and manual cancel paper

After paper roll has been assembled, to start manual feed, please perform as follow:

- 1) Check to see if machine is under manual operation, if not, switch manual/automatic to switch operation ways. If it is under manual operation, touch screen will show below information:



- 2) If 'motor' button on the screen shows like , it means motor is under control, you can start next step; if it shows like , touch it to switch it into black.
- 3) If you want to feed paper, press the 'Feed P/C' button. On the control panel. If you want to cancel paper, press 'Cancel P/C' button on the control panel.

### (7). Manual feed cutter, manual cancel cutter

- 1) The same as manual feed paper.

- 2) If 'cutter' button on the screen shows like , it means cutter is under control, you can start next step; if it shows like , touch it to switch it into black.
- 3) If you want to feed cutter, press the 'Feed P/C' button. on the control panel. If you want to cancel cutter, press 'Cancel P/C' button on the control panel. Cutter can stop at any time if you press button.

### (8).Manual cut paper and manual cancel paper

1) Same as manual feed paper.



2) Touch  on the screen to start cutting.

### (9).Forbidden operation



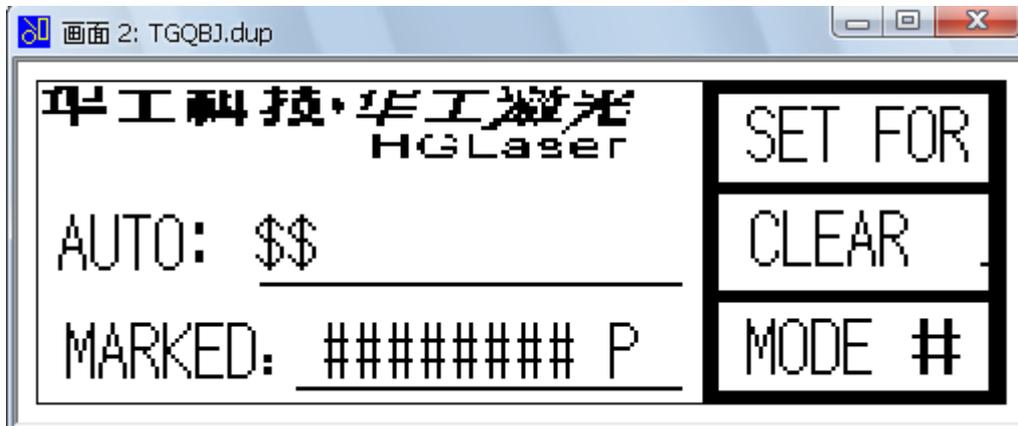
Press  can switch into no-operation condition, then buttons of 'feed paper/feed cutter' and 'cancel paper/cancel cutter' will be invalid.

### (10). Auto online marking

While machine is under 'automatic' operation condition, it can achieve auto online marking. Exact operation steps are as follow:

1) Check to see if machine is under automatic operation, if not, switch manual/automatic to switch operation ways. If it is under manual operation, touch screen will show below information:

2)



3) Switch the power supply button on control panel to 'ON'.

4) Switch laser power supply to 'ON', laser will start working if it is not under the condition of emergency stop, then system starts self-check, to protect laser source, wait for 1 minute to start operation after laser power supply turned on.

5) Check 'Manual/Auto' button switches to automatic, if not, switch to automatic.

6) Press 'Ready' button.

7) Press 'Auto' button

8) Choose marking template in marking software, add some necessary information like VIN code into data base.

9) Adjust feeding distance and marking amount.

10) Press 'start marking'

Machine will working as follow steps:

1) Start marking adsorption, output laser, mark tags on the paper.

2) Feed paper to cutter after marking.

3) Start cut and ready for cancel paper after feed paper.

4) Machine will be ready for next marking after cancel paper.

### (11).Paper counter mode



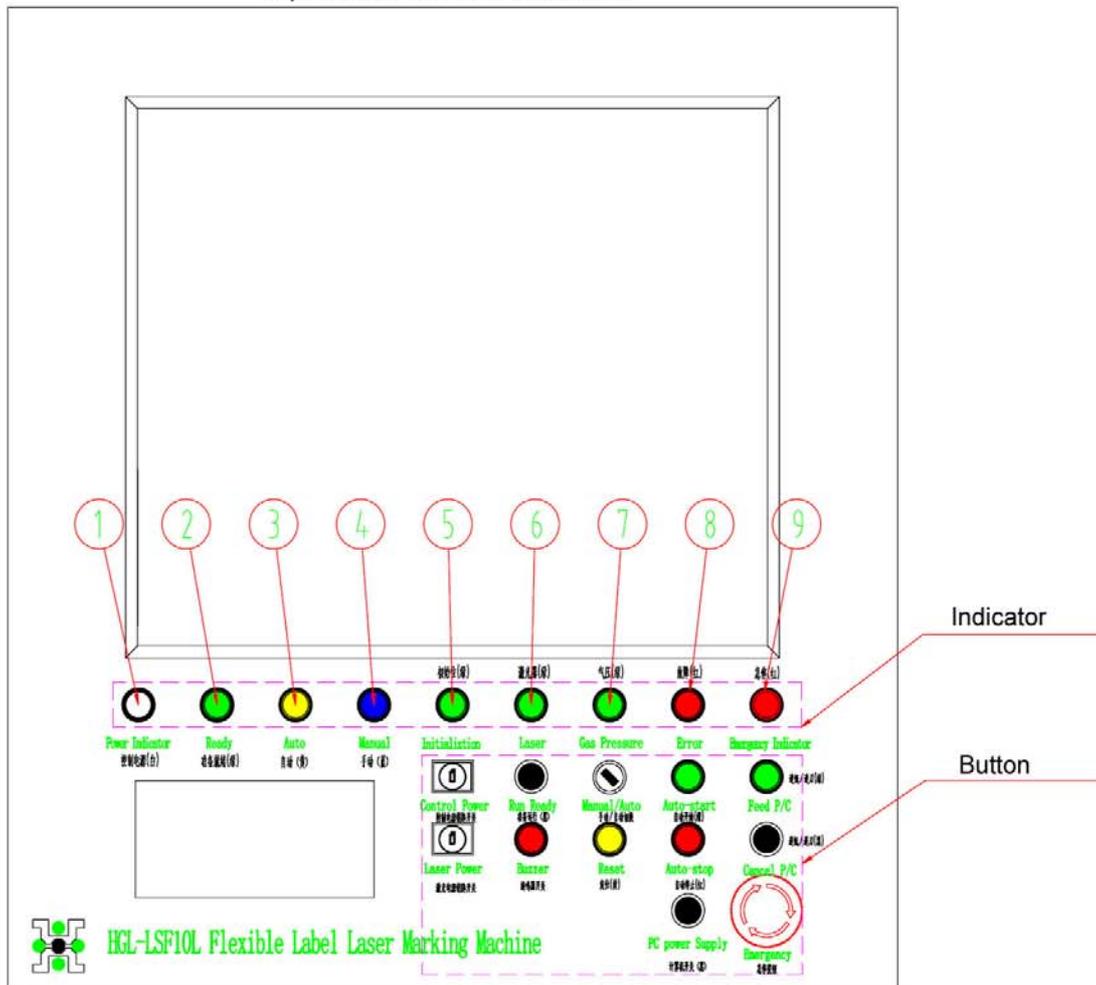
Click on  decimal digits on the back, ready to setting tag counter mode. The tolerant parameter is 2.

Parameter represent means:

- Count numbers not add up, it means when restart running, it count from zero.
- Count number add up, it means when restart running, it count from last time record.

### (12) Operation panel

## Operation Panel Instruction



1. When turn on “control power” key switch,① light.It means control power start to work.
2. When press on “Run ready” button,② light.It means mechanical parts are ready to be operated.
3. When “Manual/Auto” button switch to different position,③or④ light.It means adopt manual or auto operation.
4. When press on “Reset” button,⑤ light.It means mechanical parts return to initial state.
5. When turn on “Laser power” key switch,⑥ light.It means laser source start to work.
6. When outside air pressure in a reasonable range ,⑦ light.
7. When presss on “Auto stop” button,⑧ light.
8. When press on “Emergency” button,⑨ light.All operation will stop.
9. When press on” PC power supply” button,computer start to work.
10. When press on “Buzzer” button,the alarm will stop .
11. When press on " Feed P/C=paper/cutter " button,it means manual feed P/C state.
12. When press on "Cancel P/C=paper/cutter" button,it means manual cancel P/C state.

Notice: If you want marking automatically you must insure the state of the machine in “automation”, it can touch “the touching area of working switch” switch the working.

## 5. Alarm Explanation

It is hard to avoid some alarm phenomenon during operation. The equipment will under LOCK statement after alarm and there won't any continuous action happen until error is eliminated. The operator could press alarm statement hint on the touch screen to find alarm causes, and then solve the problem according to it. Finally, press “CLEAR ALARM” button on the touch screen to renew the normal equipment working statement. We list all kinds of alarm statement and its solutions as follows:

### 1) OP Alarm

Cause: Laser OP damages

Solution: Check laser

### 2) Temperature Alarm

Cause: Laser temperature is over-heat.

Solution: Check laser

### 3) Vacuumize Overtime

Causes: ① Air feeding pressure is not enough

② Marking area vacuum generator

③ The connection line of vacuum inspector in marking area is break off.

Solution: check the pressure display of pressure decompression valve, if the displaying parameter is normal(0.3-0.6MP), then please check the connection line related to vacuum generator and signal.

### 4) Knife Entry Overtime

Causes: Air current of cutter vat is not enough.

The resistance of hob is too big.

The position signal of hob is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

To modulate the friction between hob and paper presser

Check whether the position signal sensor of knife works well or not and whether its connection lines are loosen.

### 5) Knife Withdrawal Overtime

Causes: Air current of cutter vat is not enough.

The resistance of hob is too big.

The position signal of hob is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

To modulate the friction between hob and paper presser

Check whether the position signal sensor of knife works well or not and whether its connection lines are loosen.

### 6) Paper Lacking Alarm

Causes: Paper belt is use up.

The sensitive of inspection sensor is not match with the machine.

The inspection sensor output sort errors.

Misconnection are made between sensor and PLC

Solutions: Change new roll of paper.

Check whether the sensor is ok and whether its wiring is right.

Modulate sensor's output sort and sensitive.

### 7) Turning Tray Damage

Causes: Turning motor is damaged.

The turning tray and turning motor is loosen.

The comparative position of the turning motor zero position sensor and turning tray is changed, and can not check zero position signal.

Solutions: Change the turning motor.

Tighten the screw on turning tray axle.

Modulate the position of zero sensor and turning tray.

#### 8) The cylinder of turning tray is off-position

Causes: The cylinder of turning tray is damaged.

Air current of turning tray cylinder is not enough.

The lower position signal of turning tray is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

Check whether the lower position sensor of turning tray cylinder is ok and whether its wiring is loosen.

Change cylinder.

#### 9) The cylinder of turning tray is not reposition.

Causes: The cylinder of turning tray is damaged.

Air current of turning tray cylinder is not enough.

The higher position signal of turning tray is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

Check whether the higher position sensor of turning tray cylinder is ok and whether its wiring is loosen.

Change cylinder.

#### 10) Receiving material box cylinder is off-position.

Causes: The cylinder of receiving material box is damaged.

Air current of receiving material box is not enough.

Right position signal of receiving material box is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

To check whether right position signal sensor of receiving material box is or and whether its wiring is loosen.

Change cylinder.

#### 11) Receiving material box cylinder is not reposition.

Causes: The cylinder of receiving material box is damaged.

Air current of receiving material box is not enough.

Left position signal of receiving material box is lose.

Solutions: Increase air feeding pressure.

To modulate the air current controlling valve on two sides of cylinder.

To check whether left position signal sensor of receiving material box is or and whether its wiring is loosen.

Change cylinder.

#### 12) Turning Tray adsorption is overtime

Causes: Air feeding pressure is small.

The parameter of turning tray vacuum generator is too big.

There is paper blocking phenomenon.

Solutions: Increase air feeding pressure.

Adjust parameter of vacuum generator.

Check whether the output signal line of vacuum generator is fall off.

Adjust paper belt.

## 6. Equipment Maintenance

Good maintenance will prolong the service life of equipment, so should make good daily maintenance. Its main contents are as follows:

### 1) The periodical clearance of hob

After equipment running a period of time, there will be some wastepaper adhibit on hob, if the wastepaper is too more on the hob, it will cause hob works abnormally.

**Clearance period:** Once per week

After marking wait for a while.,

### 2) Routine drainage of decompression valve

Seeper appears in air decompression valve after a period of time, so it's necessary for maintenance personnel doing routine drainage work.

Step: open the door under the dumping gear of the equipment

press the switch for drainage in the front of the decompression valve

After the drainage process turn off the switch

Routine for drainage: every 15~30

### 3) The maintenance of fume extraction

The equipment adopt fume extraction FC 200s made in China.

Supplied with a pre-filter and a deep-bed gas filter(activated carbon).



#### Daily maintenance

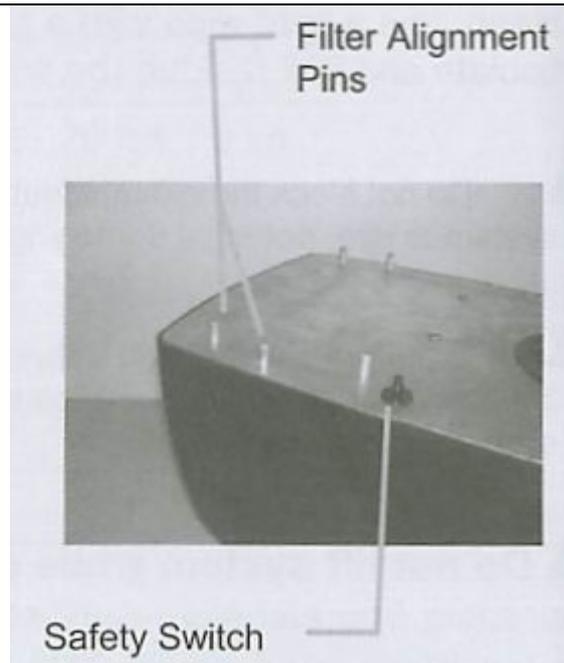
When fumes are filtered inside the unit, the particulates captured will start clogging the filter over time. The coarse particles are collected in the pre-filter while fine particles will be collected in the activated carbon. And it also can reduce some fume. Replace both filters,pre-filter and carbon filter as soon as odors become noticeable.

According to the situation of pre-filter will be change three month or one year. Change the pre-filter at first, as most gas-phase filter media achieve saturation by adsorbing moisture from ambient air. It must change the deep-bed carbon filter.

#### Notice:

**Do not block the exhaust outlets; this will cause the operating temperature of the sstem to rise, potential damaging the unit, and drop in performance.**

**Do not attempt to clean filters. Attempted cleaning can damage filters and cause potential risk to health and equipment.**

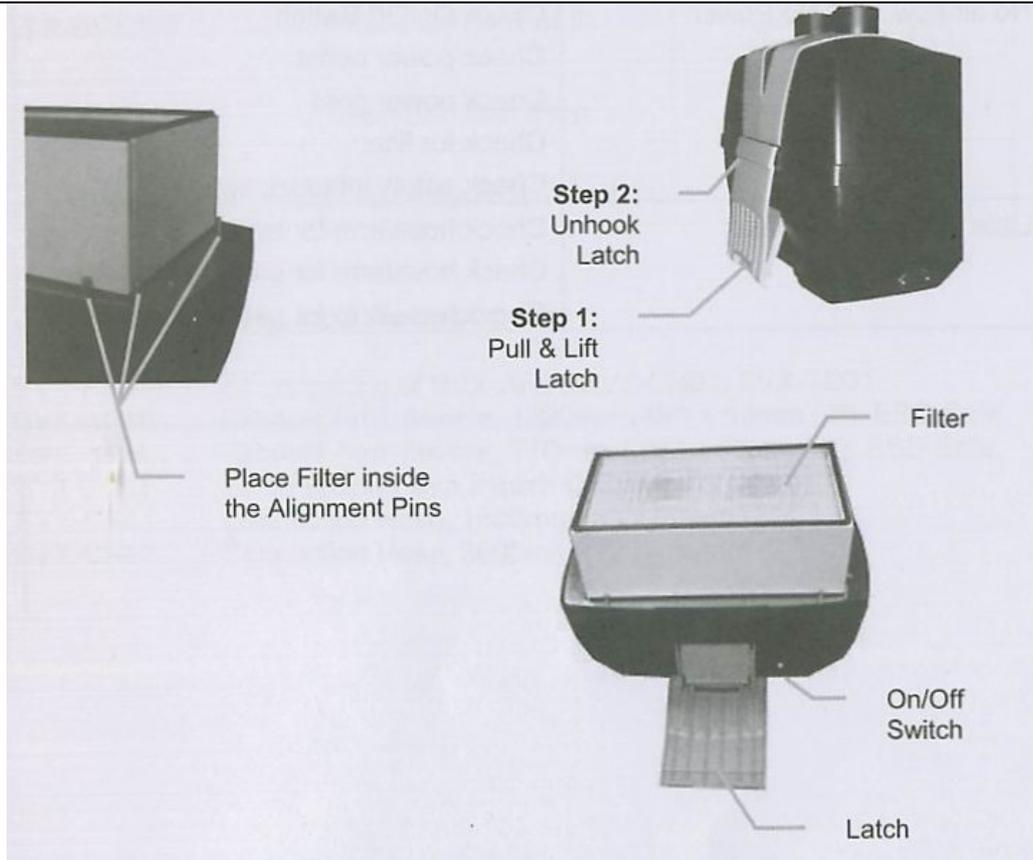


The safety switch is an interlock which turn off the fan when the fan inlet opening is exposed. The safety switch also prevents the system from operating without filters in which case the impurities would contaminate the internal unit.

**Filter replacement procedure:**

1. Turn unit off
2. Disconnect the power cord.
3. Unlatch the filter cover(see illustration on right)
4. Remove filter cover
5. Replace the filters. Ensure to place main filter inside the alignment pins so that interlock switch is depressed.
6. Replace filter cover and ensure proper fit on bottom housing. Hook both latches into filter cover and press down carefully.
7. Reconnect power cord and turn system on.

Notice: Always use new replacement filters!



Problem	Possibly cause	Check and correction
No air flow	No power	Check on/off switch Check power outlet Check power cord Check for filter Check safety interlock switch
Little air flow	Air leak	Check hose/arm for leaks Check hose/arm for proper installation Check hose/arm for partial clogging

#### 4) The normal problem and maintenance of marking machine

##### Computer system

The computer is equipped with the anti-interfere main board, windows 98 (Chinese version), special marking software and the ISA bus D/A control board which can control the Galvo head and sound-optic switch rapidly and conveniently to fulfill the marking processing according the design.

##### The trouble shooting and maintenance for the D/A control board and the Galvo head

Main possible problems concerned with the D/A board:

- ① There is no signal at the pin 8(+5V) and fail to turn on the power supply of the sound-optic switch;
- ② The analogy signal is not accordance to the design and the marking is in confusion.

The main possible problems concerned with the Galvo scanning head:

- ① The standard square is marked into trapezoid or rhombus;
- ② The outline of the standard square has pillow or barrel distortion.

The solution for the distortion of the Galvo scanning head:

- ① The pillow or barrel distortion is indigenous to the Galvo scanning marking. It is determined by the scanning method of the Galvo mirror. The solution is to revise the distortion through the output analogy signal;

- ② There are two revising methods: one is the hardware revising method which is used seldom, the other one is the software revising method which is the currently used method;
- ③ The hardware revising method is to adjust the analog output signal of the D/A transforming board through a revising board according to a certain rule. And then send the revised signal to the Galvo head;
- ④ The software revising method which is attached with the marking software is to process the digital signal firstly according to a certain rule during the marking processing, and then send the revised signal to the D/A transforming board.

The marking line becomes broken line:

- ① The signal cable may not be connected firmly or it is false welded;
- ② Some problem existed in the connect of Galvo head driving board to the motor;
- ③ The D/A board is in the wrong ISA slot