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User's Operation Manual

For Laser Cutting & Engraving Machine

Model No.: Including: MT-9060 series

MT-1610 series MT-1080 series

MT-1813 series MT-6040 series

MT-1810 series MT-2516 series

MT-FC5040 series MT-3016 series

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Manual Profile:

- ☆ Thank you very much for buying MT series laser cutting/engraving machines.
- ☆ In order to make sure that your laser cutting/engraving machines can work steadily for a long period of time, please read this manual carefully, be familiar with and master the operation method and technological requirements of the machine in advance.
- ☆ If abnormal situation takes place, please turn off the power immediately and consult this manual. If the problem can not be solved, please contact with our company or the local customer service agent to work out a solution.
- ☆ In order to guarantee the personal safety and machine security, please bear in mind the Equipment Maintenance and Safety Cautions.

Statement:

1. The manufacturer owns the right to modify the products without notification to customers in advance.
2. The manufacturer only undertakes legal responsibilities for his products sold to customers. The manufacturer won't be responsible for other losses caused by troubles of the machine.

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I. Function of Laser Engraving/Cutting Machine

The application scope of our Laser Engraving/Cutting Machine is very wide. Different designs have been used in machines to meet different needs of all users. We believe that the type of machine you've chosen will surely be of great help to your work. The following introductions might provide you information for enlarging the scope of usage and to use laser machine better.

- 1. Printing and packaging: rubber plate laser engraving, laser carving, laser cutting of paper product, etc.**
- 2. Artwork and gift: bamboo slip laser engraving, wooden book laser engraving, redwood laser engraving, double-colored plate laser engraving, box-shaped artwork laser engraving, chessboard laser engraving, etc.**
- 3. Advertising: organic glass(acrylic), laser engraving/cutting, laser engraving of all kinds of boards, double-colored plate laser carving, etc.**
- 4. Leather and clothing: genuine and synthetic leather cutting and surface pattern engraving of different kinds of shoes and leather clothing, pattern engraving of all kinds of clothing and textile, etc.**
- 5. Model-cutting: building model laser engraving/cutting, laser engraving/cutting of aviation and navigation models, laser engraving/cutting of cartoon figures, industrial model laser engraving /cutting etc.**
- 6. Rotary Device is a brand new product designed as per the clients' requirements. It features in small size and practical, professional used in processing the cylinder or irregular objects such as cups , brush pens , brush pots , musical instruments etc .**

II. System components

The Laser Engraving/Cutting Machine of MT series is consisting of five parts: machinery platform, optical system, transmission system, control system, and accessory system.

- ※ **Machinery platform:** composed of fittings such as machine cover, guide rail, base frame, reflector mount, etc..
- ※ **Optical system:** composed of laser tube, laser power supply, three reflecting mirrors and one focus head.
- ※ **Drive system:** composed of six imported balanced straight line guide rails of high accuracy, belt, two step motors and several gears.
- ※ **Control system:** composed of high speed DSP control card, two sets of switching power supply and two step motor drivers.
- ※ **Accessory system:** composed of circulating cooling system, air blowing compressor and smoke suction machine.

III. Installation of MT series Laser Engraving/Cutting Machine

1. Dismount of the packing box

After opening the packing box, please check out whether there is any damage on laser tube or not. Then check up the complete machine to see whether there is any scratch on the surface and the completeness of fittings.

2. Positioning

The machine should be put in cool and dry places. It should be placed close to earth wire. When the machine has been debugged, please don't move it again, otherwise the ray path has to be readjusted.

3. Installation

- 1). Insert the softdog(USB) in computer and install the operation software.
- 2). Connect the data wire with the computer.
- 3). Fill the water chiller with purified water, place the water pump(+) inside the water, feel the water outlet and connect one of the tubes(at the back of the engraver, it connect with laser tube to supply water cooling) with water pump. 10-20 seconds later, water comes out from other tube. After several minutes of water circulation, please check out whether there is any bubble in the laser tube. If there is, please turn over the tube to push the bubble out.
- 4). Embed a copper conductor with the minimum diameter of 2MM into the earth (the

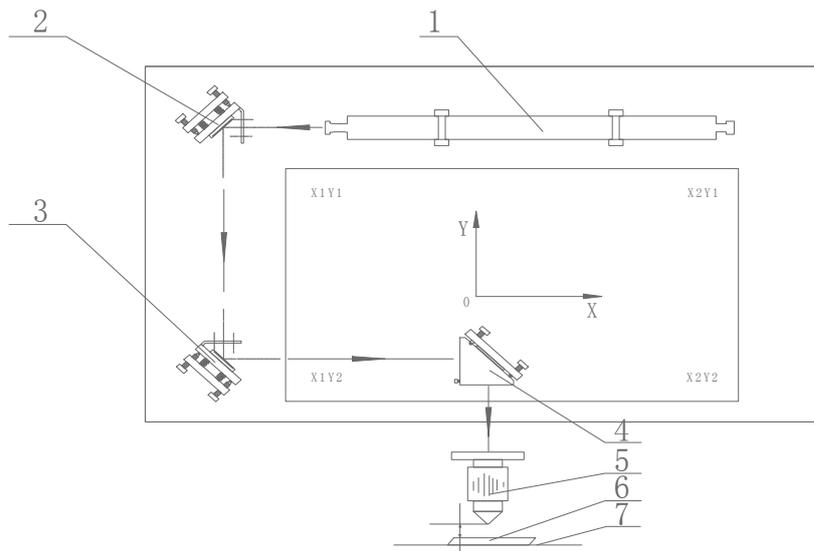
minimum depth is 1M). Then connect the other end of the conductor with laser power supply.

Notice: it must be grounded strictly!!!

5). Connect the main machine and blower fan with power supply, and then start the machine.

IV. Structure and adjusting method of ray path

1. Structure of the ray path



1. Laser tube 2. The first reflecting mirror 3. The second reflecting mirror 4. The third reflecting mirror 5. Focus head
6. Object being processed 7. Working platform

2. Structure of Optical Components

Ray path is ray guide system. Laser Engraving/Cutting machine of MT series has adopted flying-optical system. The complete system is made up of **laser tube, three reflecting mirrors, condensing lens and relevant adjusting devices**. These are the main parts of the machine.

Ray path has close relationship with the effect of engraving and cutting. Therefore please be patient and careful when adjusting the ray path.

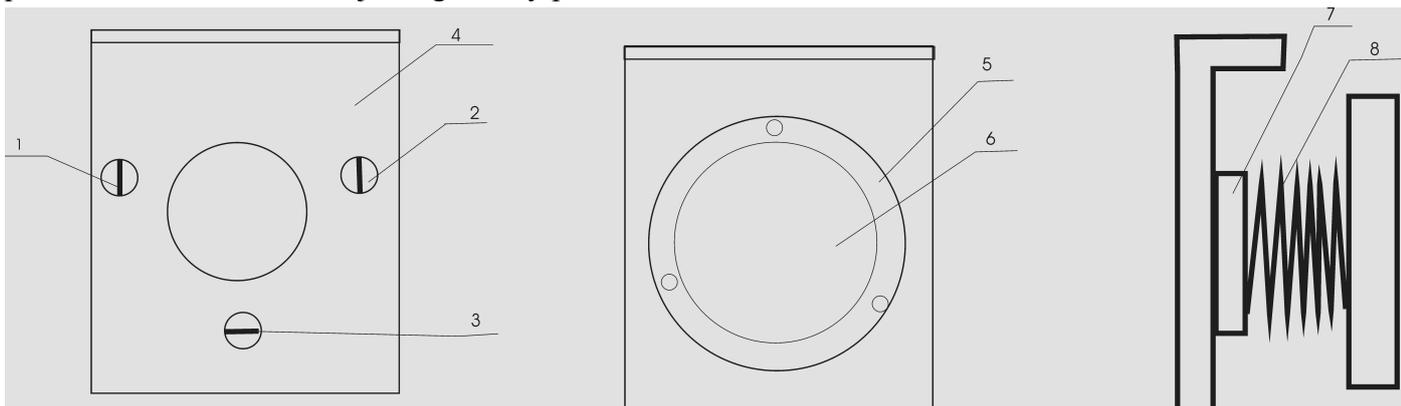


Figure 3: Sketch map of reflector mount

1. Left adjusting screw of the reflecting mirror
2. Right adjusting screw of the reflecting mirror
3. Lower adjusting screw of the reflecting mirror
4. Fixed mount of the reflecting mirror
5. Fixed ring of the reflecting mirror
6. Reflecting mirror
7. Spring seat
8. pressure spring

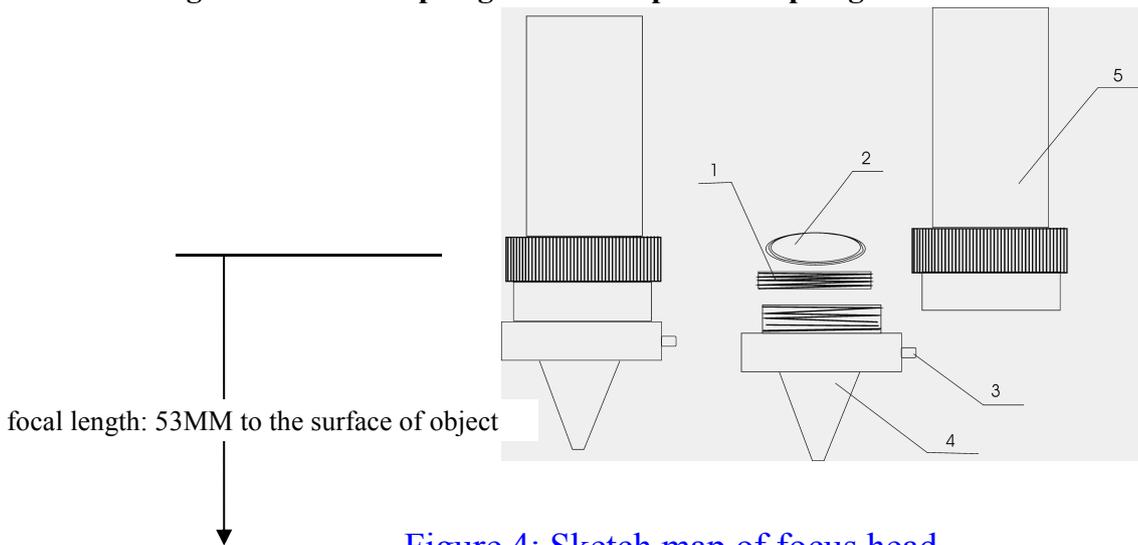


Figure 4: Sketch map of focus head

1. Condensing lens cap
2. Condensing lens (convex side down)
3. Suction nozzle
4. Air nozzle
5. Lens cone

3. Ray Path Adjusting

(1) Ray, reflecting mirror adjusting

Stick a piece of paper on ray inlet hole of laser head; then move the laser head to upper left corner of the machine. Press “ray testing” button and make a dot. Then move the head to the lower left corner of the machine to make another dot. Using adjusting screw of the first reflecting mirror to make these two dots totally matched together, thus fix the ray path Y. Then turn to ray path X. Move the laser head to the left of crossbeam. Press “ray testing” button to make a dot. Then move it to the right to make another dot. Using adjusting screw of the second reflecting mirror to make these two dots totally matched together.

(2) Laser tube adjusting

Though in the above step, flying-optical path has been fixed, the laser ray may not be in the center of ray inlet hole. The next step is to adjust the position of laser tube to make the laser ray in the center of the hole. Then check up the ray position in the hole. If the ray locates in upper part, the

laser tube should be moved downward. If the ray locates in lower part, the laser tube should be moved upward. The ray locates in the front; the tube should be moved backward. The ray locates in the back; the tube should be moved forward. During this process, the tube must be moved slowly and carefully. Don't operate it in haste.

(3) Ray verticality adjusting

Put a piece of acryl on the working platform. Press "ray testing" button to see whether the pierced acryl is vertical or not. If it is not vertical, adjust the mirror cover of the third reflecting mirror to make the ray vertical. Ray verticality adjusting is to adjust the ray position on condensing lens. Only the ray is in the center of condensing lens, can the it be straight and strong.

V. Operation Panel and Instruction

Function of keys and buttons

 **Move left**  **Move right**  **Move forward**  **Move backward**

Datum: Laser head will move to the original point of the machine slowly.

Laser: Laser on/off.

Stop: Cease the processing operation.

Test: The laser head will run along the outline border of the processing data.

Start/Pause: Start/pause the processing operation.

Esc: Escape the current status window.

Menu: Enter accessory interface.

Notice: Function of the operation panel is the same as computer.

VI. Basic Operation Procedure

1. Starting up

- 1) Start the water pump and air pump; let the water in laser tube circulate for 3 minutes.
- 2) Turn on the power of principal machine
- 3) Turn on the power of blower fan
- 4) Turn on the laser power, and press "test" button to see if there is ray
- 5) Start the controlling software, make sure that left and right optical head can move.
- 6) Put work pieces in position, and fix up the focal length (the length see Figure 4).
- 7) Operate the transmission file in the computer to start carving.

2. Shut down

Turn off the laser power, principal machine, blower fan, water pump and air pump in turn.

VII. Safety Cautions and Maintenance

1. Safety cautions

- 1) It is forbidden to start the machine without grounding. The ground wire of laser power must be connected with the earth. It can not be connected on facilities such as doors, windows, water pipes, and so on. The wire should be pulled to the outdoor ground.
- 2) Check the water chiller to see if it can let the water out each time after starting the machine. It is forbidden to start the machine up when water can not come out from the pump.
- 3) Operators can not leave the machine when it is working so as to avoid unnecessary loss.
- 4) The water temperature should be about 20°C. If the temperature is too high, the water should be changed. It is better to use purified water so that there isn't any contaminant. Circulating water should be changed regularly (every three days).
- 5) Because there is laser and high-pressure in the machine, non-professional workers should not disassemble the machine without authorization.
- 6) Reflecting mirror and condensing lens should be wiped with special camera lens paper or medical-use cotton wetted by mixture of alcohol and ether. (Proportion of ether and alcohol should be 1:1) Cleansing of mirrors and lens should be done once a week. It is required that the grounding of all parts of the machine and user's computer should be safe to avoid damage of machine and injuries caused by static electricity.
- 7) Blower fan must be turned on while carving, so as to avoid pollutions on mirrors and lens. It is forbidden to put any flammable and explosive articles close to the equipment so as to avoid fire.
- 8) Any irrelevant total reflection or diffuse reflection objects can not be placed in the equipment to prevent the laser from reflecting on human body or flammable articles directly.
- 9) The water in laser tube should be drawn off in winter, in order to avoid frost cracking of the tube.
- 10) When the machine is working, operators should examine the working conditions (especially the water supply and temperature of circulating water, etc.) at any moment.
- 11) The crossbeam can not be pulled by hand. The machine should be put in places where there is no interfere and harmful effect of pollution, strong electricity, strong magnetism, and so on.
- 12) When the voltage is not stable, please don't start the machine. It is suggested to use voltage regulator.
- 13) People who have not been trained should not use the machine.
- 14) Don't strike the keys and buttons strongly. Please press it lightly to avoid damages of those keys and buttons.
- 15) In case there is damage or fire, please turn off the power at once.
- 16) Don't start the machine when there is thunder or lightning.

NOTICE:

Users should follow all the above mentioned regulations carefully. Otherwise the manufacturer will not take responsibility for any troubles of the machine or physical injuries.

2. Maintenance

- 1) It is forbidden to use circulating water of poor quality, because it may affect the laser power seriously and shorten the service life of laser tube. The manufacturer is not responsible for repairs and maintenance of damages of the tube caused by the using of poor-qualified water. It is suggested to use purified water.
The minimum amount of cooling water should be 30L.

- 2) Water temperature should be examined at all times during the working process. Once the water turns to be warm, please change it right away (the right way of changing the water is to get out of some hot water and fill in cold water).
- 3) If there is any particular requirements, the ray intensity shouldn't be no more than 20MA, thus to avoid the tube becoming aged quickly.
- 4) Water chiller, water inlet rubber tube should be cleaned once every four days.
- 5) Lens and mirrors should be cleaned once every day before starting the machine (Notice: not at the time of being off duty).
- 6) Please clean the reflecting mirror carefully when it is on the machine, otherwise, the ray path must be readjusted!
- 7) When cleaning the third reflecting mirror and condensing lens, they must be removed from the machine. After that, the mirror and lens should be fixed firmly but not too tightly for fear of breaking up.
- 8) Please pay attention to the focal length before starting the machine every time. If the length is not accurate, it will greatly affect the carving effects.
- 9) Please clean the working platform every time after working. Don't make the dust fly upwards.
- 10) Please clean the machine after working every day. When doing this, the crossbeam and larry can be pulled lightly and carefully in the condition that the power is turned off. Don't pull them strongly.
- 11) Guide rails should be cleaned, and lubricant should be added onto the rail every two weeks.
- 12) The outer equipments (blower fan, air pump, etc.) should be cleaned once every two weeks.

VIII. Problems and Solutions

Problem	Cause	Solution
No rays	Laser power supply is broken	Replace it with a new power supply
	Data wire of the laser power supply is broken	Replace it with a new wire
	No TTL control signal	Check control signal
The object can not be fully cut	Laser tube is old	Replace it with a new one
	Condensing lens is polluted	Clean the lens
	Reflecting mirror is polluted	Clean the mirror
	Ray path is not right	Adjust the path
There are two slitting	The ray is not in the center of condensing lens. It is reflected when shining on metals	Adjust the third reflecting mirror

Square becomes parallelogram when cutting	Guide rail X and rail Y are not straight	Adjust rail X and rail Y
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IX. Technical Parameters

Technical Parameter

Item	MT-9060/MT-9060D (for reference)
Size of the principal machine (Length× Width ×Height)	1300MM×1130MM×1100MM
Maximum Engraving/Cutting Area/Time	900MM×600MM
Weight	250kg/300kg
Engraving/Cutting Speed	0-80m/min 0-36m/min
Speed Control	0-100% no segment control
Laser Tube Cooling	Water Cooling
Machinery Resolution	0.0064mm
Minimum size of Shaped Character	Chinese character 2*2mm, English 1*1mm
Repetitional Precision	<0.01mm
Power Supply	AC220V±10% 50Hz
Total Power	<1250W
Format of Images	BMP, JPGE PLT, CDR, DWG, DXF, DST
Driving	Step motor, subdivision driving
Laser Power	80W
Temperature of Operating Environment	0℃～45℃
Humidity of Operating Environment	5%～95%

X. Accessories

Accessories List

Complete Machine	1
Blower Fan	1 set
Water Chiller	1 set
Air Compressor	1/2 set
USB Data Cable	1
Power Cord	1
User's Manual	1
Software	1
Laser Power Supply	1/2
Laser Tube	1/2

XI. Regulations of Repair Guarantee

We are responsible for the repair of complete machine for **12 Months**. Guarantee period for repair of laser tube (we are not responsible for blowing out of laser tube caused by high water temperature and frost cracking caused by low water temperature) and optical glass is **6 Months**, and that of outer equipment (blower fan, air pump, water pump) is **1 Year**.

Regulations of repair guarantee

1. Within the guarantee period, our company will provide service for problems that appear in normal using conditions for free.
2. Certain amount of maintenance fees will be charged by our company when the guarantee period is over.
3. Our company will not provide maintenance and repair for free in circumstances that the sealing paper is damaged caused by disassembly of the machine without authorization, the machine is not used in correct way, problems caused by calamities of nature and calamities imposed by other people, or the customer can not show us the repair guarantee certificate of the product.
4. It is very important to keep the serial number of the product given by the manufacturer when the product leaves factory. Only when information contained in it has been confirmed, can customers enjoy after-sale service provided by our company.
5. The manufacturer has the right to modify specifications of the product without notification to customers in advance.
6. The manufacturer only undertakes legal responsibilities for his products sold to customers, but is not responsible for other losses caused by problems of the machine or indirect compensation responsibility. The manufacturer will not take any compensation responsibility for loss of commercial profits, service interruption or any other monetary loss caused by the use or abnormal use of the product.
7. This certificate will be valid only after being stamped by distributor. It will be invalid if altered.