RedSail CNC Machine

User Manual
For CNC
(RS-4060)

Redsail Tech Co.,Ltd

Warnings and Cautions

1. The operating staff must undergo a rigorous training, and must pay attention to their personal safety and the safety of machine in the operating process; besides they should operate the engraver machine in strict accordance with the operating rules and regulations.
2. The demand for voltage supply is 220V/50Hz.if the power supply is unstable or any other big power electric equipments are used around, we need to add stable power supply.
3. To avoid strong electric, magnetic and other equipments that affect transmission signals of engraver machine seriously, such as: welding machine, transmission towers, etc.
4. Engraving machine, control box and the computer must be safely grounded to prevent static interference.
5. Don not unplug or plug the signal lines and NC-swappable cards electrified, in order to prevent the burn of NC card and other electronic components. Please unplug the power plug when the machine is not in use for a long-term. Please turn off the power timely when the machine does not work.
6. Do not frequently start control box in a short period in order to prevent the burn of converter or other electronic components.
7. Check whether the plugs loose frequently. If there is a certain loosening, please cut off the power at first and then get it fixed.
8. During processing, please ensure the cycle of cooling water unblocked and no impurities in the bucket, the water temperature will not exceed 40 degrees and regular replacement of circulating water.
9. Do cleaning work regularly to maintain no debris on ball screw and rail. Wipe with a clean cotton cloth and add lubricants.
10. The graver is very sharp, so it is prohibited to hand-to-machine when it is running in order to prevent the injury. Do not use handkerchiefs, scarves access to the machine to prevent the involvement or damage equipment.
11. Proficiency in the use of a variety of gravers and accurate method of setting as well as the correct installation method of graver. Re-tighten the nut to bear a little better, when replace the graver.
12. To master engraving software installation method and the setting method skillfully in order to facilitate the installation in the future.
13. Do not dismantle to repair or modify the machine privately without the authorization of original company, so as to avoid damage caused by man-made or warranty failure.

Contents

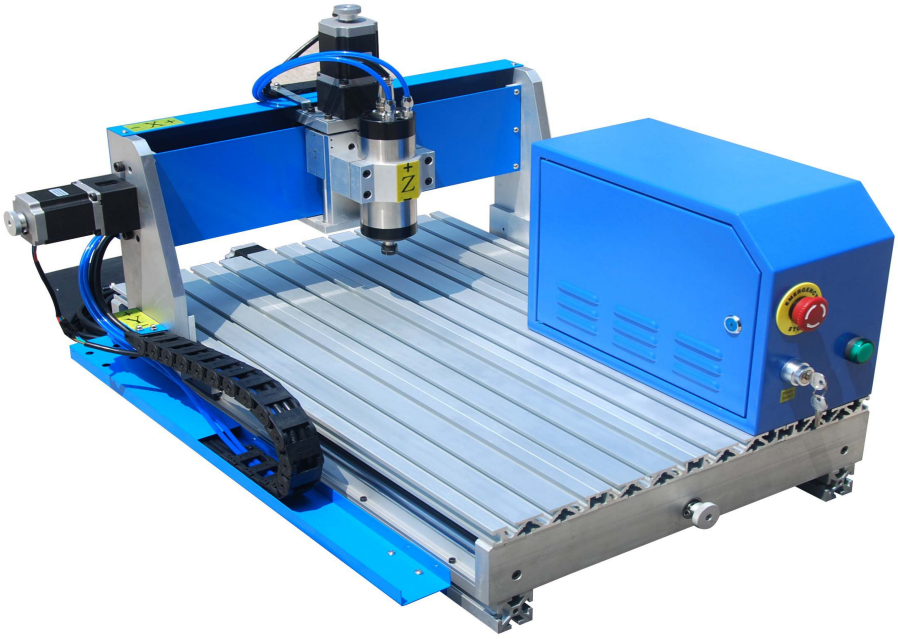
Chapter Ⅰ Mechanical Engraving Machine Summary

Mechanical Engraving Machine: RS-4060 Relevant Parameters

Worktable Size (mm):400X600
XYZ Working Area (mm):400X600X60
Max Moving Speed(mm)：4000
Max Engraving Speed (mm/min):2000
Resolutions (mm):0.05
Repeatability (mm):0.05
Max Feed Height (mm):90
Drive Type: Micro-step stepper motor
Spindle Power: 0.8 KW
Spindle Speed (rpm):0—24000
Spindle Tools: ф3.175 ф6
Command Code: HPGL, G-code

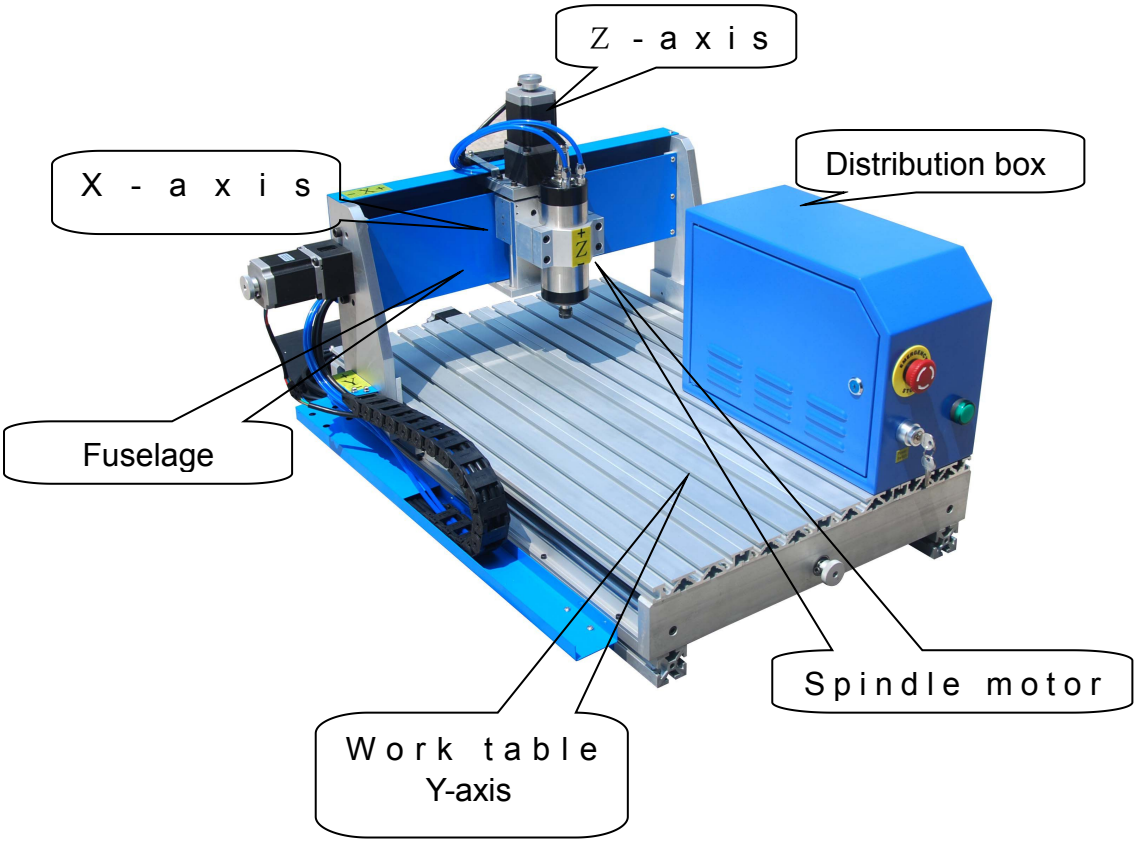
Performance Features:

- Three –axis all adopt the imported ball screw with original package, working steadily, ensures high precision
- The adoption of high subdivision drive ensures high speed and high precision.
- Water cooling variable frequency and brushless high power spindle, good speed adjustable performance, wide range, high running efficiency, smaller noise, powerful cutting capacity, can work for a long time with mass production, user-friendly design can be disassembled, and easy to installation and transportation.

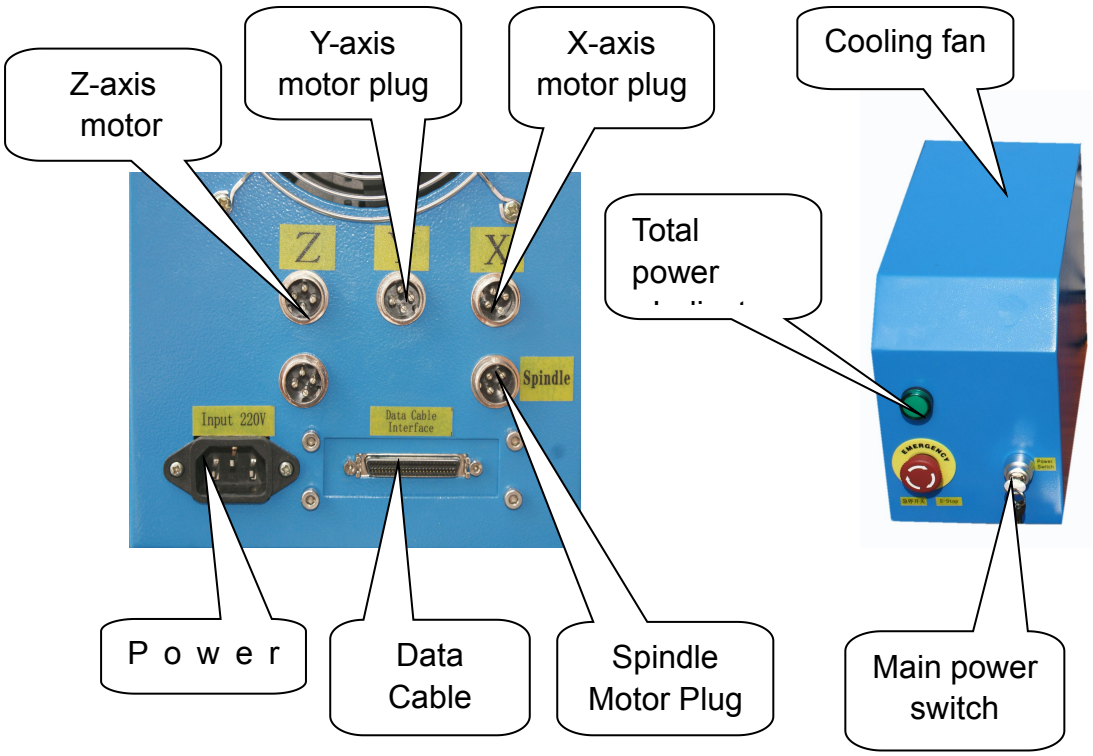


Chapter II Mechanical Engraving Machine Instructions

1: Engraver machine specification



2: Distribution box specification



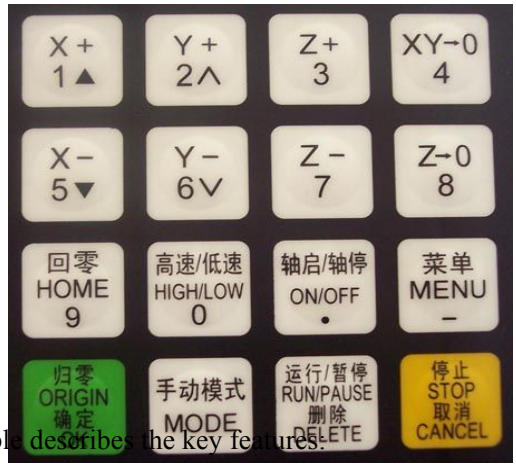
Chapter Ⅲ Mechanical Engraving Machine Operation Steps

1, Definition

Under the crew refers to the movement of data into a corresponding electrical signal output and to control machine motion system, also known as handles. Under-bit machine using mask control mode, and U disk file transfer mode, simple operation, easy to use.

2, Key features and operation methods

Arrange the following diagram Mask button：



2.1 Mask on the following table describes the key features:

Keys	Function
X+ 1 ▲	X-axis positive move, the Move menu selection, the number 1 input
Y+ 2 ∧	Y-axis positive movement, processing and adjustment of magnification, the number 2 input, menu selection of different options for property
Z+ 3	Z-axis positive move, the number 3 input, processing to increase spindle speed
XY- 0 4	Set X axis and Y-axis work zero, the digital input 4
X- 5 ▼	The negative X-axis moving down menu selection, number 5, the input
Y- 6 ∨	The negative Y-axis movement, sculpture slow speed adjustment, the number six input, menu selection of different options for property

Z- 7	The negative Z-axis movement, the number 7, the input processing to reduce spindle speed
Z- 0 8	Set the Z-axis work zero, the digital input 8
回零 HOME 9	Manual state, the shaft back to machine zero, the number 9, the input
高速/低速 HIGH/LOW 0	Manual Status High / Low Speed choice of moving the digital input 0
轴启/轴停 ON/OFF .	Manual state Spindle start or stop the input decimal point
菜单 MENU -	To enter the menu settings, negative input, processing, paging file options, select the host computer call control and secondary procedures
归零 ORIGIN 确定 OK	The axis back to zero position and work options, input, operation to determine
手动模式 MODE	Manually move, continuous, step away from the choice of three ways
运行/暂停 RUN/PAUSE 删除 DELETE	Run engraving process and the suspension of processing and input the number to delete
停止 STOP 取消 CANCEL	Into high and low speed of manual adjustment of the termination of processing and processing options, input, operation canceled

2.2 Key combination Function Description

1. “菜单 MENU -”+“数字”key， Work coordinate system switch；
2. “菜单 MENU -”+“轴启/轴停 ON/OFF .”key，Right knife；
3. “运行/暂停 RUN/PAUSE 删除 DELETE”+“数字”key， Breakpoint Processing；
4. “运行/暂停 RUN/PAUSE 删除 DELETE”+“高速/低速 HIGH/LOW 0”key，Advanced Processing；
5. “归零 ORIGIN 确定 OK”+“停止 STOP 取消 CANCEL”key，Help；

2.3 Button to use

One-click method is the use of a finger touch button to the required function calls to complete and then release the button;

Combination of keys using the first method is holding down the first key, then press the second button, when the corresponding content appears, release the two keys at the same time.

3, Back to the origin Operation（Homing）

The origin refers to the machine tool mechanical zero, so back to the origin, also known as homing. Origin, mainly from a variety of back to the zero position detect switch to determine the loading position. Back to the origin is to determine the significance of the work coordinate system with the machine coordinate system corresponding relationship. Control system depends on the realization of many functions back to the origin of the operations, such as breakpoints processing, power-down recovery and other functions, if not back to the origin of operation, these functions are not work.

3.1 Back to the origin setting

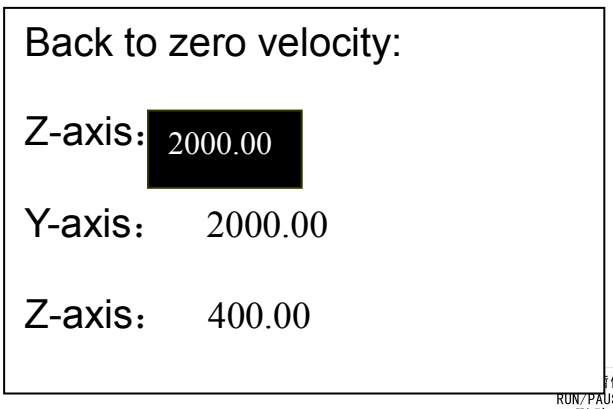
Back to the origin parameters include the return to zero velocity and direction of movement back to zero, modify the parameters to be carried out in the menu options.

Back to zero velocity parameter changes must be based on the overall structure of the machine carried out. The speed is too high may lead to the machine lost step, document processing error occurs;

Back to the direction of movement parameters to zero by the motor direction and return to zero switch installation location determined at the same time it also defined with the input level. And return custom attributes associated with zero-crossing detection switching properties.

3.1.1 Back to zero velocity is set

Standby，press key“MENU”to enter the menu, the cursor automatically in the "machine parameter configuration" item, press key 确定 OK to enter the setting items， press 5 ▼ Move the cursor to the "back to zero settings, then press key 确定 OK to enter，the cursor is in the item "back to zero velocity"，press 确定 OK to enter the speed setting，diagram is as follows：



Direct input value at the cursor. If you enter is incorrect,press key 删除 DELETE to delete previous character, after input,press key 归零 ORIGIN 确定 OK to confirm， The new value of the cursor automatically moved to the item Y-axis value If you do not need to

change this parameter， press key 菜单 MENU automatic cursor down a line, when you set up Z-axis parameters, the system automatically returns to the menu.

3.1.2 The direction of movement is set back to zero

Press key X－ 5 ▼ to move the cursor to the item"direction of movement back to zero" ， press key 归零 ORIGIN 确定 OK to enter the Settings，as shown below：

Setting the direction back to zero
X-axis： negative
Y-axis： negative
Zaxis： negative

The cursor automatically at the setting item of X-axis direction， press key Y+ 2 ∧ and key Y－ 6 ∨ to change the current property， press key X－ 5 ▼ to move the cursor to the next line.Press key 归零 ORIGIN 确定 OK to confirm the changes and return to previous menu， press key 停止 STOP 取消 CANCEL to discard your changes and return to previous menu.

3.1.3 operation of back to zero mode

1. Power-on boot, the screen prompts "Do you return to starting point?"， press key 归零 ORIGIN 确定 OK， Z-axis back to zero，
When the Z-axis back to square one after, X, Y-axis began to return to the origin. Press key 删除 DELETE, Axis does not return to zero. Press any key other, only the Z-axis implementation of the return to zero-operation;
2. In the manual stat, press key HOME 9 ， Implementation of the three-axis back to zero operation；
3. May be in the menu, move the cursor to the "System Parameters Configuration" - "setting function deployment"

Set the boot back to zero categories: boot prompt return to zero, the boot automatically return to zero, the boot does not return to the origin, once the setting has been set, the operation is set back to zero will set the basis for the implementation.

4, menu settings

4.1 Menu entry

When the system back to the origin after the operation is completed in a manual state, the following diagram:

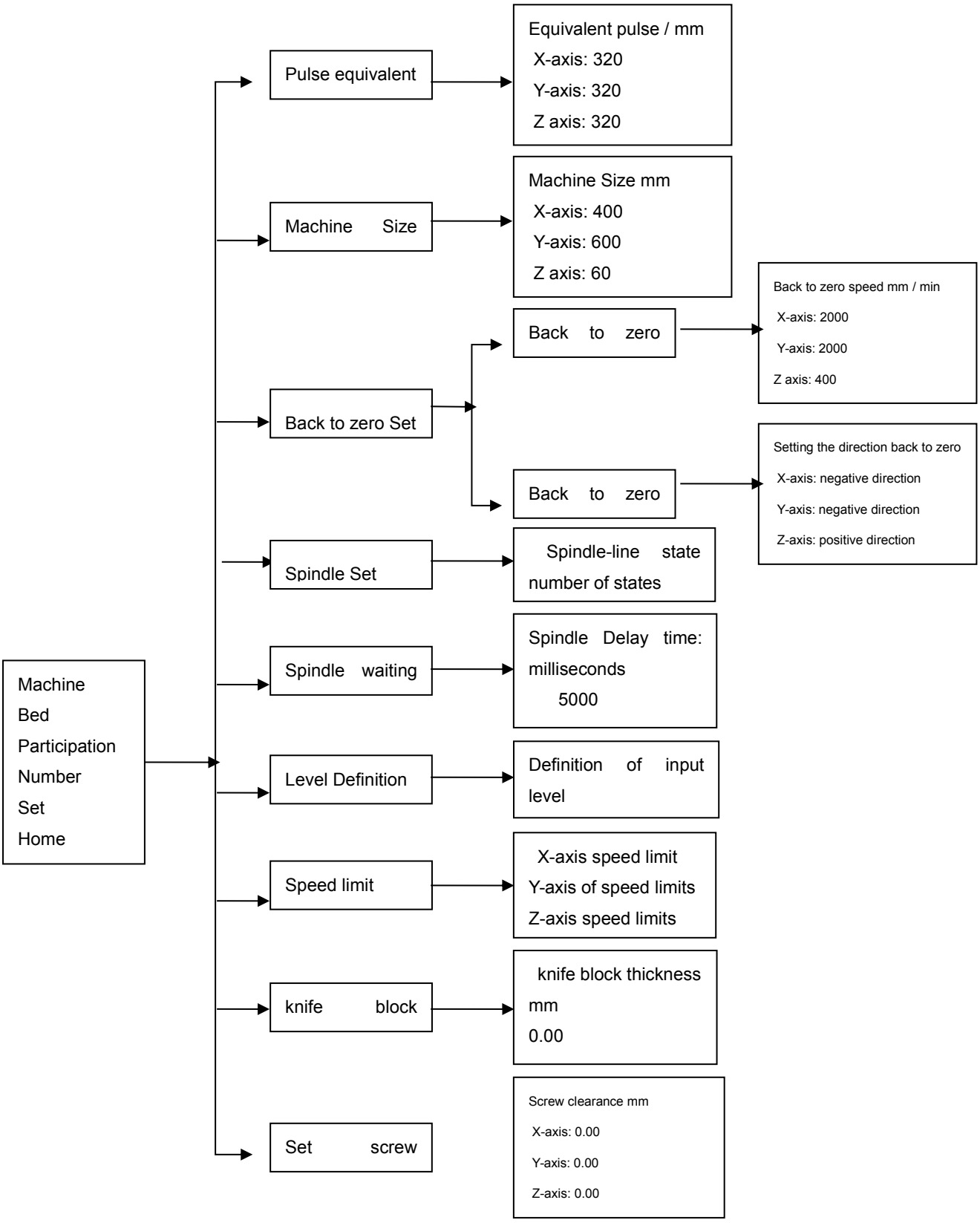
1X	0.000	manual control
1Y	0.000	F1
1Z	0.000	lower speed
continuous		

Press key 菜单 MENU to enter the menu, A total of five parameters of the menu, diagram is as follows:

Machine Parameter Configuration
Processing Parameter Configuration
System Parameter Configuration
Advanced Processing Configuration
Version of the show

4.2 Machine Parameter Configuration

Machine parameters configuration settings are mainly driven machine tool parts, transmission parts, mechanical parts, and I / O interface part of the phase matching parameters. These parameters, if set incorrectly, will result in machine tool movement and the implementation of the file operations is not normal, there may result in mechanical failure and operator injury. Recommend that users do not arbitrarily change this parameter, if you need to change, please under the guidance of engineers.



4.2.1 Machine arguments detailed

1, pulse equivalent

Pulse equivalent refers to machinery moving 1 mm fo[归零 ORIGIN 确定 OK]pulse number required, so it's units as follows: pulse / mm. Its formula is:

Pulse e[X+ 1 ▲]ulent [X- 5 ▼]) ° / step angle) * Number of [停止 STOP 取消 CANCEL]gments / screw pitch

When entering items in the Pulse-equivalent settings, the cursor automatically at the X-axis value of the，If you need to modify, input the value directly，press key“ ”to confirm the change，Automatic cursor down a line until the return to previous menu. If we did not change press key“ ”until the return to previous menu.

At the moment key and are in the state of digital input and can not move the cursor. If the pulse-equivalent value of the actual machine tool settings and there are differences in the implementation of document processing out of the size of the file would be inconsistent with the requirements. Recommends that customers do not change this parameter, so as to avoid confusion or damage to machine tool programs.

2, machine size is set

Machine size is ar[归零 ORIGIN 确定 OK]ive campaign machine stroke. In a three-axis can be set the maximum working size. Because this system to machi[停止 STOP 取消 CANCEL]e as the s[X+ 1 ▲][X- 5 ▼]nit restrictions on bit, so the actual machine size must b[illegible]sten[illegible] or may occur overrun bit or hit-axis pheno[illegible].

Entry into the machine size is set, the cursor automatically at the X-axis values, if required, the direct input values, press key to confirm the chang. Automatic cursor down a line until the return to previous menu. If we did not change，press key until the return to previous menu. At this moment, key and are in the digital input state. Can not move the cursor.

If the file is processed beyond the scope of machine size, the process of checking the code, the system will automatically prompt processing of out of range, such as processed beyond the X-axis positive limit; if it is in manual mode mobile-axis, when the position limit reached when the the upper left corner of the "manual" and "stop" rapid transformation, beyond the limit on the screen prompts.

3, back to the zero setting (see 3.1 Back to the original point set)

4, spindle set

The system is set to control the spindle motor of the multi-stage speed control functions. In the process through buttons to change the spindle speed.

Spindle setup steps are as follows:

Move the cursor to the spindle set， press key to enter into the settings， The cursor at the number of input state values, set the value of 8. The number of states refers to the number of spindle stall, the current system to support the maximum number of states to 1(r input, press key to identify. Then in accordance with the multi-stage inverter speed control interface of the state is defined to set stall speed of the line state, corresp ulti-stage speed converter OFF state, "" correspond to mul e speed converter ON state. Press key or to change Properties， press key + the cursor automaticly down next one. Setting has been completed, press key tify the changed and back to the menu. Press key to cancel the change and go back to the previous menu.

If there is no set spindle， press key ， Kai-axis on the screen, shaft stop switch, but can not control the spindle movement. If the spindle is set only two states, namely, shaft and shaft stops Kai，press key , Kai-axis on the screen, shaft stop switch, spindle also will be Kai, and stop. Set up multi-stage speed control, spindle startup screen appears on S1-first stall speed, S2-second stall speed, Sn-Cap n stall speed, spindle stops, the screen appears to stop before the Fn-axis spindle stall number. The system set up a multi-gear control, in processing, press key to increase stalls, press key to decrease stalls.

Spindle is set before leaving the factory has be it is recommended users not to tamper with this parameter, if you need to change, please under t lance of engineers.

5, spindle delay is set to wait

Move the cursor to the spindle set, press key to enter into the settings，enter the delay time at the cursor, enter the value, press key to return to the menu, set the value of 5000 milliseconds.

6, level definition

Level is defined as the interface input and output is defined as high or active-low. Therefore, the definition is divided into input level and output level setting custom settings. The down-arrow symbol for the high effective, low upward arrows marked as valid.

7, the speed limit

The speed limit is the maximum speed of three-axis moveme be provided for. This function is to determine the direction of axis in the positive and neg speed range. After setting the highest speed limit in the implementation of document processing and manual movement, if the us faster than the speed li system will be the speed limit as the highest speed. Press key to enter into s, press key + to select X, Y, Z axis is set. Press key to enter settings, full- indicates a rate of no restrictions are imposed, such as the need to modify the values directly

in the cursor, press key to confirm the change, the cursor auto-down line, positive and negative direction is set to return to previous menu exhausted. If we did not change, press key to return to previous menu. This setting has been set before leaving the factory, it is recommended users not to tamper with this parameter.

8, the thickness of the knife block instrument

Instrument on the knife greatly facilitated the use of user-defined Z-axis work zero position, when the right knife is completed, the system will be the current Z-axis location identified as Z-axis work coordinate system 0:00, so the user will need to enter the thickness of a knife block instrument to the parameters, in the implem[illegible]n of[illegible]e location of the system will automatically ze[illegible]n on the depth of the[illegible]ess of a knife block instrument, so that really set Z-axis work zero.

Interface board must have a bed with a knife right instrument block body and the physical connection to the knife function can be achieved. Operation of the knife using a combination of keys: + , methods of operation are: press does not let go, then , and then release the same time, Z-axis will slowly decrease when the tip come into contact with right knife block when the instrument, Z-axis rapid increase in the beginning to stop decline . The default value is 0.00mm.

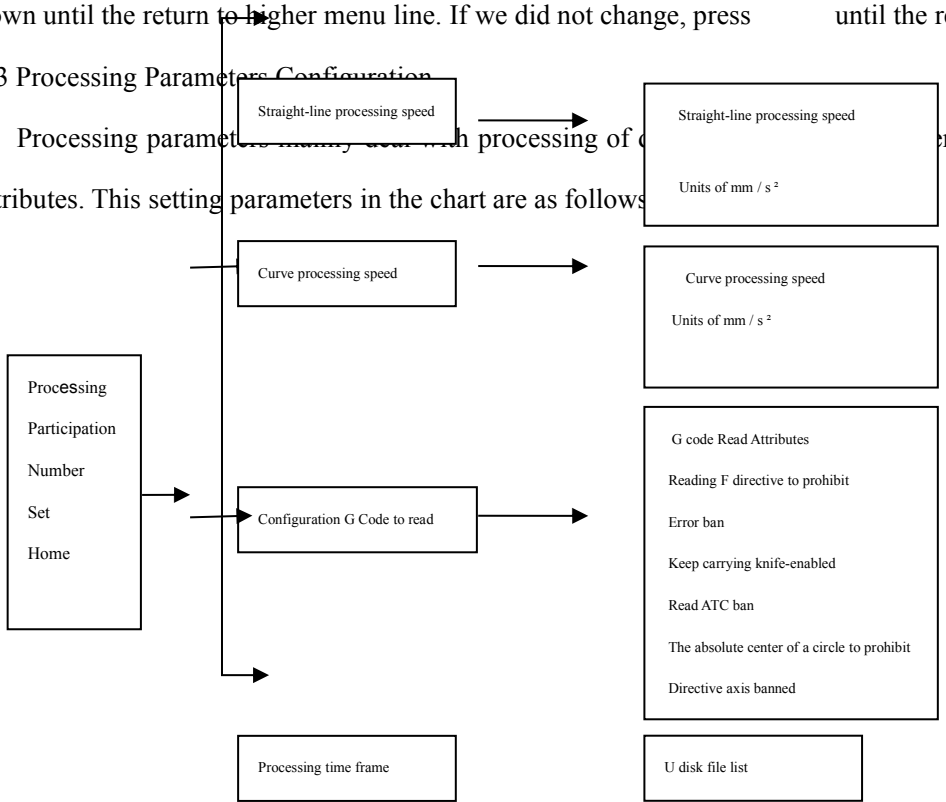
9, screw gap setting

Screw gap setting is used when the screw gap arising between the lo[illegible]n use, in order to achieve the set machining accuracy carried out compensation. The size of the amount of compensation should be based on actual test values set. But the value of not more than 1mm, if the input value exceeds this limit, the system def[illegible]o 1mm.

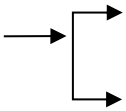
Steps are: move the cursor to the screw gap settings, press key to enter into the sett[illegible]he cursor automatically at the X-axis values, if required, the direct input values, press key to confirm the change, the cursor automatically down until the return to higher menu line. If we did not change, press until the return to previous menu.

4.3 Processing Parameters Configuration

Processing parameters mainly deal with processing of [illegible]eration parameters and the file read attributes. This setting parameters in the chart are as follows:



4.3.1 Processing arguments detailed



1, straight line acceleration

Linear acceleration linear motion increased processing capacity. The default value is: 350 mm / sec ². The cursor automatically in a straight-line acceleration values, if required, the direct input values, press key to confirm the change, the cursor automatically down until the return to higher menu line. If we did not change, then press key to return to the menu.

The acceleration associated with the processing speed can be adjusted according to actual situation in the value of acceleration in order not exceeding 800 mm / s ² is appropriate.

2, curve acceleration

Curve acceleration increased curvilinear motion handling capabilities. The default value is: 300 mm / s ². The cursor automatically at the curve of acceleration values, if required, the direct input values, press key to confirm the change, the cursor automatically down until the return to higher menu line. If we did not change, press key to return to the menu.

The acceleration associated with the processing speed can be adjusted according to actual situation in the acceleration value to no more than 600 mm / s ² is appropriate.

3, configured to read the code G

Into the configuration, the cursor automatically at the F directive attributes, if you need to change, press key or , press key + to move the cursor to prohibit the processing of the code that does not read the F-spindle speed command so that it can read and refer to the implementation of F instruction. Displays an error to prohibit neglect of G in the code is inconsistent with the code rules of the code, so that there can show the irregular code; keep carrying a knife, carrying a knife if the user sets the height, select prohibition, set height of the can not afford to carry a knife effect; options ed, the system will carry a knife at a lower height as the value of carrying a knife campaign. Press key to confirm your changes and return to previous menu, press key to cancel changes and return to previous menu.

归零
ORIGIN
确定
OK

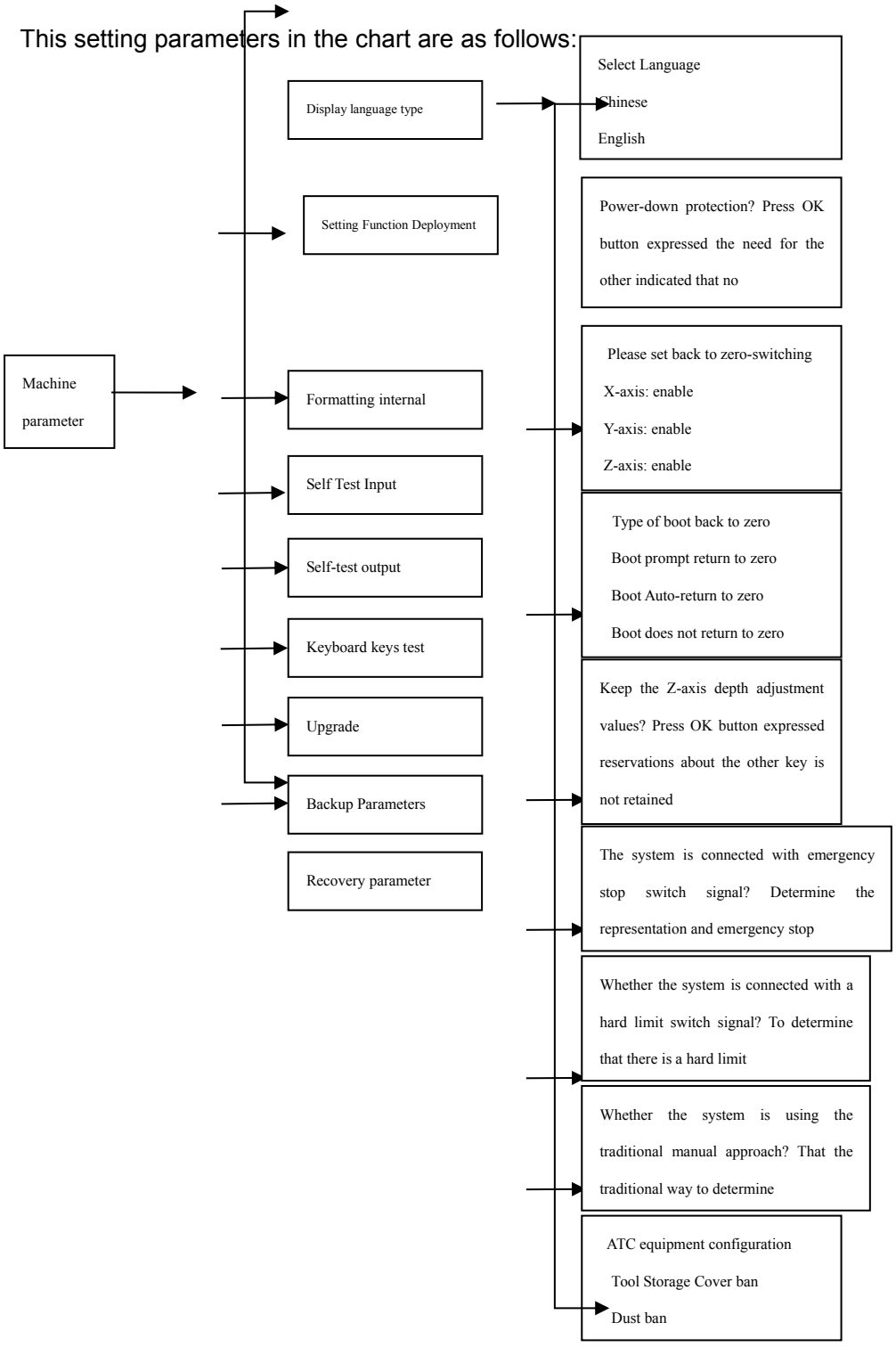
4, Processing time range

Press key to enter the scope of processing time is set to show the list of files U disk or internal file list, you can select processing documents.

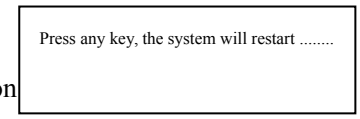
4.4 System Parameter Configuration

System parameters configuration item processing control system of language, functional configuration, file management, I / O interface testing, mask testing, as well as key inputs such as operating system upgrades.

This setting parameters in the chart are as follows:



4.4.1 System P[归零 ORIGIN 确定 OK] Configurationdetailed explanation



1, display language type

Press key [归零 ORIGIN 确定 OK] to enter into the display language type，choose system language - Chinese, English and so on. Press key [归零 ORIGIN 确定 OK], the system went into a selected language type.

2, set the Function Deployment

Main Settings function of the system, the options such as:

Brown-out protection function setting， press key [归零 ORIGIN 确定 OK] Expressed the need for power-off protection function, press key [停止 STOP 取消 CANCEL], Indicated that no power-off protection function;

Whether there is return to zero switch, can be individually configured if there return to zero switch-axis so that it can express a return to zero switch, to prohibit that there is no return to zero switch, press key [X+ 1 ▲]+[X- 5 ▼] to move the cursor，press key [Y+ 2 ∧]+[Y- 6 ∨] to change property， press key [归零 ORIGIN 确定 OK] to confirm the change， press key [停止 STOP 取消 CANCEL] to keep the original settings;

Type of boot back to zero，press key [X+ 1 ▲]+[X- 5 ▼] to move the cursor selection，press key [归零 ORIGIN 确定 OK] to confirm the change，press key [停止 STOP 取消 CANCEL] to keep the original settings;

Z-axis to change the value of the trade-offs， press key [归零 ORIGIN 确定 OK] expressed reservations about the changes, press key [停止 STOP 取消 CANCEL] Indicated he did not retain change (used to set the process in fine-tuning the Z-axis distance);

E-STOP switch signal, press key [归零 ORIGIN 确定 OK] saying that the system is equipped with emergency stop switch, press [停止 STOP 取消 CANCEL] saying that there was no emergency stop switch;

Hard-limit switch signal, press key [归零 ORIGIN 确定 OK] saying that the system is equipped with hard-limit switch, press key [停止 STOP 取消 CANCEL] saying that there is no hard limit switch.

3, formatting the internal

Formatting the internal memory chip is empty the system, all the data, when the internal documents garbled and upgrades after the need for this operation.

Recommend that users do not arbitrarily formatted within the internal parameters so as to avoid confusion, if you need to format, please under the guidance of engineers.

4, self-sense input is automatically detected input interface attributes.

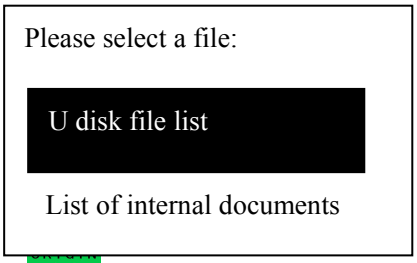
5, self-testing system to automatically detect the output is the output interface's properties.

6, the keyboard key test is the detection of the switch-off mask. Entered, press the corresponding button on the mask location and code number of the cursor will appear. If you need to exit, press combination keys: 归零 ORIGIN 确定 OK + 停止 STOP 取消 CANCEL。

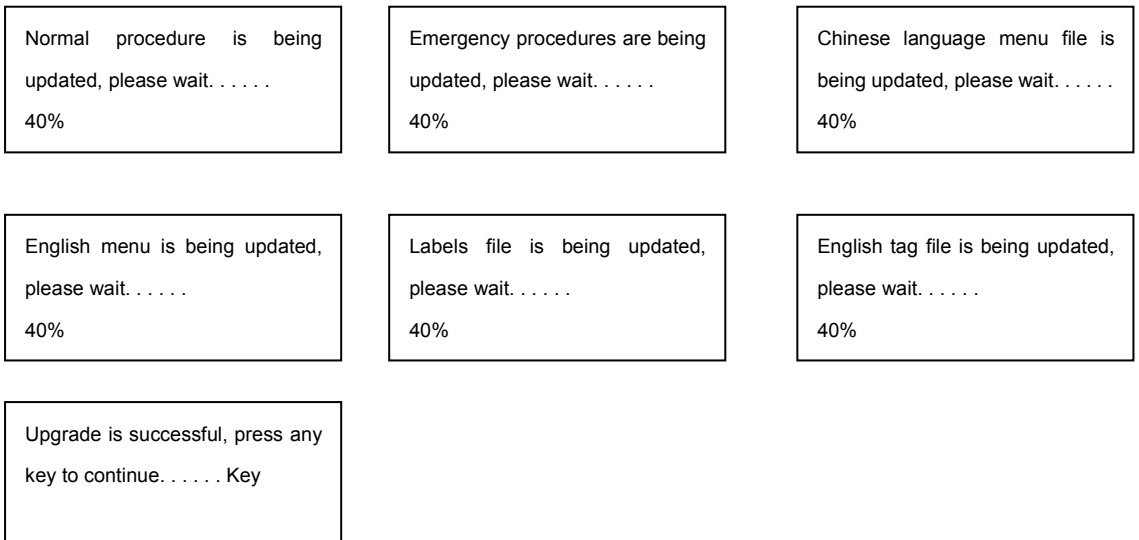
7, system upgrade

If you need to upgrade the system, users need to download the upgrade file from the network to the U disk, U disk and inserted into the control handle, the file name: *. ZUP. Move the cursor to the "system upgrade", press key 归零 ORIGIN 确定 OK to enter.

Screen tips are as follows:



Choose U disk file list, press key 确定 OK to enter， Screen to show all the files inside the U disk, move the cursor to the downloaded update files, press key 归零 ORIGIN 确定 OK to enter,Upgrading the beginning upgrade information screen appears, the user must move the cursor to read all the information, then press key 归零 ORIGIN 确定 OK to execute the next-step operation. Screen tips are as follows:



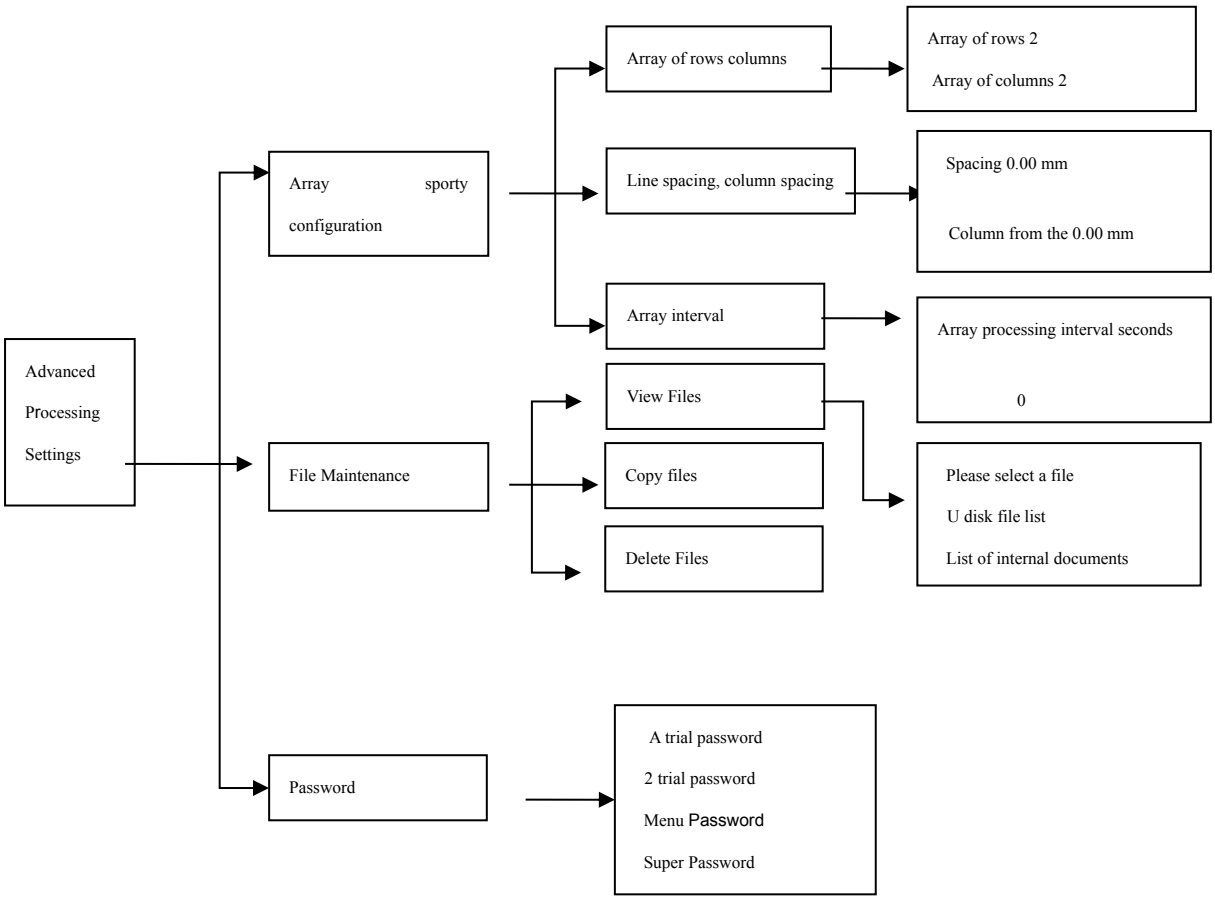
Press key 

to confirm the successful upgrade.

4.5 Advanced Processing Configuration

Advanced processing of the main application to configure a special program features. Including the array of campaign configuration, file maintenance, and set a password.

This setting parameters in the chart are as follows:



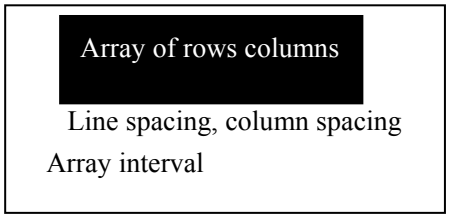
4.5.1 Advanced Processing Configuration Xiangjie

1, array configuration Sports

If the user needs to process a file into several parts, can be achieved in two ways: First, in all modeling software necessary to copy this file to G code files and generates an output, the control handle this code files as a file , and then call processing operation; two handles to control the movement within the array configuration, the array will be processed a

single file downloaded to the control handle, and then needs to set the number of rows processed, the number of columns and rows, the distance between the columns on the completion of replication capabilities of the modeling software, and then call the high-level processing of orders, with the combination of keys 运行/暂停 RUN/PAUSE 删除 DELETE + 高速/低速 HIGH/LOW 0, to move the cursor select array of repeated processing, press key 归零 ORIGIN 确定 OK to start processing. If you need to run the array of movements, first movement in the menu to set the array configuration, and then call the advanced process the command.

Array movement configuration steps are as follows: When the cursor is in this, press key 归零 ORIGIN 确定 OK, the screen displays the following diagram:



Press key 归零 ORIGIN 确定 OK to enter into the setting， the cursor automatically at the array of the value of the number of rows, if required, the direct input values, press key 归零 ORIGIN 确定 OK to confirm the change, automatic cursor down a line to the array columns values. If we did not change, press key 停止 STOP 取消 CANCEL until back to previous menu.

Press key X- 5 ▼ to move the cursor to the line spacing, column spacing settings, the cursor automatically at a line spacing mm values, if required, the direct input values, press key 归零 ORIGIN 确定 OK to confirm the change, Automatic cursor down a line to the column values from mm. If we did not change, press key 停止 STOP 取消 CANCEL So back to previous menu. Here the distance between the center of the workpiece to take two distance. Press key X- 5 ▼ to move the cursor to the array interval of time, press key 归零 ORIGIN 确定 OK to enter into the settings. End time interval refers to the array processing of a workpiece, the system to suspend processing time. Enter values in the cursor， press key 归零 ORIGIN 确定 OK to confirm the changes and return to previous menu. If we did not change, press key 停止 STOP 取消 CANCEL until the return to previous menu. If the time is set to negative, in the processing finished a workpiece, the system will stop processing until you press any key to continue processing.

2, and file maintenance

U disk files, including documents and internal documents.

U disk file is stored in the U disk file, the system interface through U disk read and write this type of file operation.

Internal document is stored in the control system for Flash chip file. File maintenance is the above-mentioned two types of file operations. Operations are: view the files, copy files and delete files.

2.1, see documents: access to view the file option, move the cursor file type, press key 归零 ORIGIN 确定 OK to choose to enter. Press key X+ 1▲ + X- 5▼ to move the cursor to the target file，press key 归零 ORIGIN 确定 OK to choose to enter. Screen to show the file line number and line contents, press key X+ 1▲ + X- 5▼ to switching line number and content. Press key Y+ 2△ to go back to the first line，press key Y- 6▽ to go to the ending line. Press key 停止 STOP 取消 CANCEL to get out of the view.

2.2, copy files: copy the file to the target in the internal documents, both U disk files can be copied to the internal documents, internal documents and can be copied to the internal documents, but not copy files to the internal U disk file. Press key X+ 1▲ + X- 5▼ to move the cursor. After copying, the system automatically return to previous menu.

2.3, delete the file: This will delete the file. This action will cause the file can not be restored, please exercise caution. First select a file type, enter the file after the move the cursor to the target, press key 归零 ORIGIN 确定 OK. After operation, the system automatically return to previous menu.

3, Password Settings

Password Settings and menus used to set a trial password, and recommends that customers do not change this.

4.6 version of the show

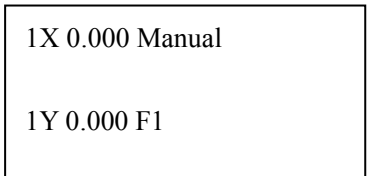
Version includes emergency recovery version of the ordinary version. Move the cursor, press key 归零 ORIGIN 确定 OK to enter, after view，press key 停止 STOP 取消 CANCEL to exit.

Chapter V Processing Instructions

Machining operations, including manual processing, automatic processing and advanced processing of three types. The three types of processing methods can be convenient to adjust the processing parameters and processing

1, processing of manual

Manual processing is directly through the mask button on the direction of achieving three-axis machine tool control. At the same time the operation can be based on operational need to change the operating speed and the grid settings to set.



Back to the origin operation is complete, the system into the manual state, the screen displays the following

5.1.1 Manual processing speed of the switch and adjust

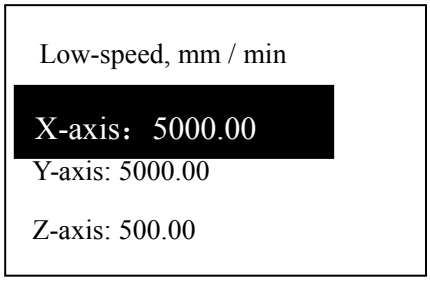
1, processing speed switching

Manual processing can be processed in high-speed processing and low-speed switch， press key 高速/低速 HIGH/LOW 0 to convert the current state.

If the current state of high-speed， press key 高速/低速 HIGH/LOW 0, high-speed converted to low-speed on the screen. If the current status is low speed，press key 高速/低速 HIGH/LOW 0，On the screen, low speed is converted to high-speed. The speed of the screen state of the decision processing speed

2, Adjustment of processing speed

In manual mode， press key 停止 STOP 取消 CANCEL to enter into the current speed mode settings. If the current state of manual processing is low-speed, screen display is as follows:



The cursor movement in the X-axis low-speed settings, press key X+ 1 ▲ + X- 5 ▼ to move the cursor options and modify the item, press key 运行/暂停 RUN/PAUSE 删除 DELETE to enter into the value set. After inputing value has been completed, press key 回零 ORIGIN 确定 OK to confirm the change, press key 停止 STOP 取消 CANCEL to exit the changing. If you enter a numerical error, press key 运行/暂停 RUN/PAUSE 删除 DELETE to delete the last one value.

In order to ensure the accuracy of processing and debugging, the system introduces the concept of the grid. Some systems also known as the minimum amount of feed. It is in the range: 0.05mm-1.0mm. When a user manual Sport mode switch to stepping, press the axis of the arrow keys, machine tools will set the grid distance of movement.

For the manual processing of the state for high-speed setting method is fully consistent with the low speed.

5.1.2 Manual Processing Mode

Manual Processing Mode

In order to meet under different circumstances manual movement, the present system provides three kinds of manual Sport mode: continuous motion mode, stepper motor mode and distance of movement patterns. In manual mode the user can switch at any time by pressing the button Sport mode. Users can view the current screen to the bottom of the display in which the movement pattern.

1, continuous motion mode

This mode is no specific data control, in this exercise mode, the user presses the movement keys (X+ 1▲、Y+ 2∧、Z+ 3、X- 5▼、Y- 6∨、Z- 7) will follow after the machine movement, until the key termination, the pace of movement is determined by the current velocity mode. Note: If the user's key time is very short (less than half a second), immediately lift button, then the machine will automatically move to the nearest grid points. And that the movement pattern is always stopped at the end of the grid point. This movement pattern is suitable for coarse mechanical coordinate position.

2, step movement pattern

This mode is always in a very low speed operation, according to a grid spacing of half a second way of stepping movements, and its grid spacing is determined by the current velocity mode. This movement pattern is suitable for adjusting the height, or to fine-tune machine tool coordinate position.

3, from the movement pattern

This model is set up according to distance running. When the user press the movement keys (X+ 1▲、Y+ 2∧、Z+ 3、X- 5▼、Y- 6∨、Z- 7), the machine will be set according to the distance exercise. Note: When the campaign will be based on the current speed mode and set distance campaign, which is not the grid, it will be precisely set the distance of the movement is not automatic movement to the grid points. If you need to change the moving distance, please continues to press keys 手动模式 MODE 归零 ORIGIN 确定 OK until the bottom of the screen appears "Distance 0" to enter from the campaign mode, press the key after inputing the moving distance.

2, automatic processing

Automatic processing is that the system according to instructions on the U disk files and internal documents for processing, also known as document processing. Before carrying out automatic processing, machine tools and systems must correctly set all the parameters.

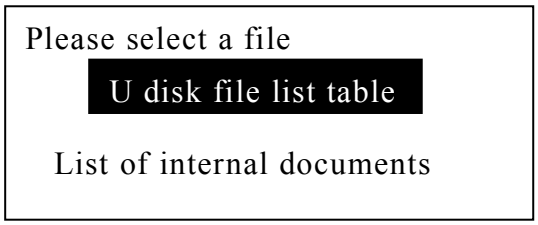
5.2.1, automatic processing steps:

1. To determine the origin of the work

When the system is in manual state of motion, the first mobile X-axis and Y-axis to the position to start processing, press key [XY- 0 4] to confirm the X-axis and Y-axis are located zero； start and move spindle to the tip surface, press key [Z- 0 8] to confirm the Y-axis are located zero. This work identified the location of origin.

2. Select File

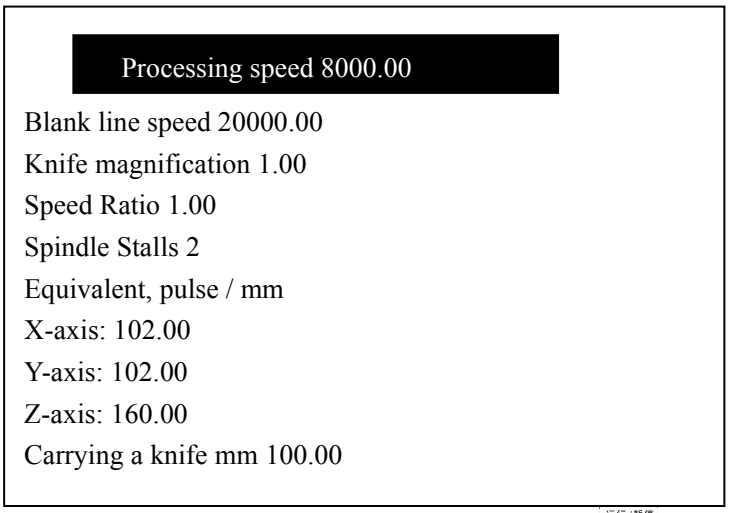
After the location of origin is identified, press key [运行/暂停 RUN/PAUSE 删除 DELETE]， the following dialog box appears:



Press key [X+ 1 ▲]+[X- 5 ▼] to move the cursor select list of files， press key [归零 ORIGIN 确定 OK] to access to the selected list of types, listed on the front screen of the three file names, press key [X+ 1 ▲]+[X- 5 ▼] to move the cursor one by one, press key [Y+ 2 ∧]+[Y- 6 ∨] to move the cursor jump two lines，choose the destination file, press key [归零 ORIGIN 确定 OK] to confirm the processing parameter settings; press key [停止 STOP 取消 CANCEL] to exit.

3. Document Processing parameter setting

Move the cursor to the target file, press key [归零 ORIGIN 确定 OK]. Users need to input file processing parameters, including processing speed, air speed, drop a knife magnification, speed magnification, spindle gear, pulse equivalent display, lifting distance.



Press key [X+ 1 ▲]+[X- 5 ▼] to move cursor to select a different setting items, press key [运行/暂停 RUN/PAUSE 删除 DELETE] to enter the numeric settings. After

the input values,press key 归零 ORIGIN 确定 OK to confirm, then press key X+ 1 ▲ + X- 5 ▼ to move the cursor select the next one. After changes， press key 归零 ORIGIN 确定 OK to identify， G code system started checking. Examination after completion of processing. Pulse equivalent in this only shows which can not be changed, if you need to change, please return to the menu changes.

Select internal document the steps Ibid

Paper processing, the screen will scroll the current file line number, processing and real-time speed, the speed magnification, processing the contents of the remaining time, etc., press key 手动模式 MODE. Switch display the contents.

4. Machining process to adjust

Magnification rate adjustment In processing document，press key Y+ 2 ∧ + Y- 6 ∨ to adjust the magnification processing, the current processing speed = Processing Speed x Processing magnification, every time press key Y- 6 ∨ ， down 0.1 magnification. Processing of magnification up to 1.0, a minimum of 0.1, the speed value displayed is also changed accordingly, but the time value can not be changed.

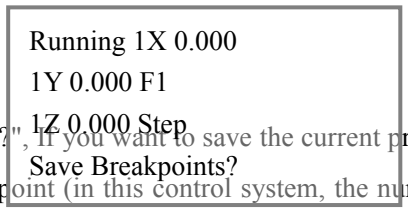
Spindle Speed Adjustment In the document processing， press key Z+ 3 + Z- 7 to adjust the spindle speed, every time press key Z+ 3 .Revised upwards in a stall, until the most high-grade S7. Every time press key Z- 7 ，lowered down to a stall, until the lowest gear S1.

To suspend processing and position adjustment In the document processing, press key 运行/暂停 RUN/PAUSE 删除 DELETE to suspend the processing， Top right corner of the screen to run into a pause, the machine stops running, but the spindle is still running. At this point you can adjust the three-axis location, the system default movement mode for stepping, for the low velocity, the user can fine-tune the three-axis distance, per click, move a low-speed grid distance; If you need a fast large-scale adjustment, you can press key 高速/低速 HIGH/LOW 0 ， to change step into the past by the high-speed mode, the sports will be a continuous model. After adjustment, then press key 运行/暂停 RUN/PAUSE 删除 DELETE ， Screen Tip: original location? The system requirements for the operator to confirm whether you want to keep just on three-axis location of change. Press key 归零 ORIGIN 确定 OK ， The system will return to the original location of the beginning before the amendment process; press key 停止 STOP 取消 CANCEL. The system will start processing in the new location. If you modify the Z-axis engraving depth, and in the functional configuration chosen to retain the value of Z-axis changes, the system will be the next processing of the recent changes to this file location for the processing of the Z-axis

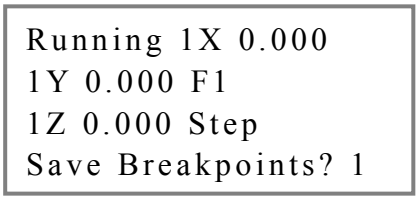
position.

Processing of exit and the preservation and processing of breakpoints

If you want to stop half-way processing, press key[停止 STOP 取消 CANCEL]， Screen:



You are prompted to "Save Breakpoints?", If you want to save the current process is location, then press key[X+ 1 ▲]， Said that the current location as on the 1st breakpoint (in this control system, the number of breakpoints can be saved as 1,2,3,4,5,6 6), when the input one after, LCD screen display:...



After input a breakpoint, press key[归零 ORIGIN 确定 OK]to identify， Three-axis automatic return to origin, LCD screen display processing of pre-state. If from the breakpoint to continue processing, you can press combination key“[运行/暂停 RUN/PAUSE 删除 DELETE]+[X+ 1 ▲]”， hold on the key[运行/暂停 RUN/PAUSE 删除 DELETE] and press key[X+ 1 ▲]， and then release both keys, the system displays the processing parameter setting, press key[归零 ORIGIN 确定 OK]， LCD screen display breakpoint a file line number, press key[归零 ORIGIN 确定 OK]again, System will resume processing from a breakpoint, and similarly, if the breakpoint 2, press combinations key“[运行/暂停 RUN/PAUSE 删除 DELETE]+[Y+ 2 ∧]”. Breakpoints preservation and processing of pre-starting point must be a return to action.

Brown-out protection

When the processing of a sudden power failure, the system will save the current processing parameters and to continue processing the next call. The new power system, the first implementation of the return to zero operation, the screen prompts: whether to resume power-down protection? Press key[归零 ORIGIN 确定 OK] to start processing of incomplete processing， press key[停止 STOP 取消 CANCEL]to cancel the power-protection and cease the processing.

3, advanced process

Advanced process is designed to meet the special requirements in the operational capabilities developed. Advanced process include: selection of regional processing, array duplication processing, area array processing, milling plane processing, and replacement of cutting tools and so on.

5.3.1, Advanced processing and detailed explanation

Press combination key[运行/暂停 RUN/PAUSE 删除 DELETE]+[高速/低速 HIGH/LOW 0]， Screen tips are as follows:

1, Select the regional processing

Access to advanced process is called, the cursor automatically at the selected area processing. The so-called regional processing, that is, the user can choose to start processing of G-code line number and ending line number, you can achieve some of the documents processing.

Specific steps are as follows：

1.Press key[归零 ORIGIN 确定 OK] to enter the settings， press key[X+ 1 ▲]+[X- 5 ▼] to move cursor to select a different file list;

2.Press key[归零 ORIGIN 确定 OK] to enter into the file list， press key[X+ 1 ▲]+[X- 5 ▼] to move the cursor select the target file;

3. Follow the prompts, choose start line number, the starting line number of code appear on the screen，press key[运行/暂停 RUN/PAUSE 删除 DELETE]， when prompted: Jump where OK? Enter to select the cursor at the end of the line number, press key[归零 ORIGIN 确定 OK] to confirm the end line number， if there si something wrong with the value, please press key[运行/暂停 RUN/PAUSE 删除 DELETE]to revise；

4.Then press key[归零 ORIGIN 确定 OK]to enter into operation of inputing the end line number， the starting line number of code appear on the screen， press key[运行/暂停 RUN/PAUSE 删除 DELETE]， when prompted: Jump where OK? Enter to select the cursor at the end of the line number, press key[归零 ORIGIN 确定 OK] to confirm the end line number， if there si something wrong with the value, please press key[运行/暂停 RUN/PAUSE 删除 DELETE]to revise；

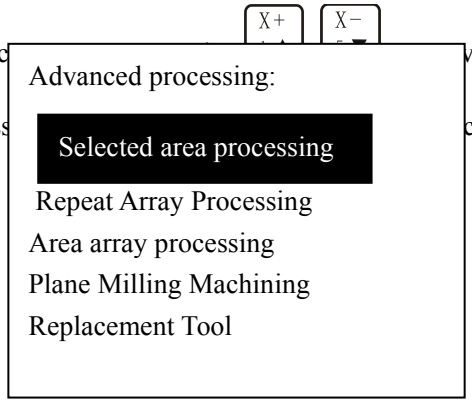
5. Set processing parameters, follow-up steps in line with the normal processing.

2, Repeat array processing

Array processing must be set in the menu array of processing parameters, and then from the advanced process to call this feature.

Steps are as follows:

1. Press the combination key[运行/暂停 RUN/PAUSE 删除 DELETE]+[高速/低速 HIGH/LOW 0], to access to advanced proc ve the cursor to repeat the processing of the array，press key[归零 ORIGIN 确定 OK]to enter，then press ct a different list of files；



2.Press key 归零 ORIGIN 确定 OK to enter into the file list， then press key X+ 1 ▲ + X- 5 ▼ to move the cursor select the target file;

3. To set processing parameters, follow-up steps in line with the normal processing. System started in accordance with the

Set the start of the array processing.

3, area array processing

Area array processing of parts of the document array processing, this feature of regional processing and array processing combine in order to meet the special needs of particular user. Before running this operation, you must set up an array of parameters, and then set the start and end line number line number, and set the machining parameters. Can be seen in front of the relevant sections of the concrete operation.

4, replacement tool

The user to set a good tool in the menu change location, select this option, set the machine will automatically return to the location of prompt and wait for users to replace the tool (this function is not supported temporarily).

Chapter VI Operation instructions

1. Connect the handle to the adapter in the control cabinet through the 50-pin data cable and give it power
2. LCD screen displays “ back to origin?”, press “ 归零 ORIGIN 确定 OK ”key to return to the machine origin, press “ 运行/暂停 RUN/PAUSE 删除 DELETE ” key not back to the origin and press “ 停止 STOP 取消 CANCEL ” key only to make the Z-axis back to the machine origin.
3. Firstly remove the X-axis and Y-axis to the position where it will start processing and press “ XY- 0 4 ” key to make zero set of X, Y axis. Then start spindle, remove the point of the blade to the surface of the materials to be processed and press “ Z- 0 8 ” key to make the zero set of the Z-axis and the origin of working.
4. Press “ 运行/暂停 RUN/PAUSE 删除 DELETE ” key and you will find a "Choose File" item, then move the cursor to choose your file type and press “ 归零 ORIGIN 确定 OK ” key to enter the list of U disk file or list of internal file. For the list of files in the U disk , press “ X+ 1 ▲ ” and “ X- 5 ▼ ” to choose the target file. Then press “ 归零 ORIGIN 确定 OK ” and it will appear “machining parameters setting ” , (refer to the relevant chapters of processing operation instructions for details) for processing. (Refer to the Appendix for details: file-download instructions).
5. After choosing the processed file, machining parameters configuration items appear. Press “ X+ 1 ▲ ” key and “ X- 5 ▼ ” key to move the cursor for selecting different parameters, and press “ 归零 ORIGIN 确定 OK ” key to enter the numeric

settings. For value changes, press " 运行/暂停 RUN/PAUSE 删除 DELETE " to delete the error input if input error value, press " 归零 ORIGIN 确定 OK " key to confirm the new value when completed input and press " 停止 STOP 取消 CANCEL " key to return to the original value. Users must be integrated with the actual situation of machine tools and processing need to modify the above configuration parameters, otherwise it will result in processing errors.

6. After completing the processing parameter setting, press " 归零 ORIGIN 确定 OK " key to exit processing parameters change. Then system starts checking processing code and when finished, press "归零 ORIGIN 确定 OK" key to start processing.

(It should be checked before processing that if the water cycle is fluent or not)

7. During processing, press "Y+ 2 ∧" "Y- 6 ∨" key to change speed magnification and "Z+ 3" "Z- 7" key to change the spindle speed.
8. During processing, press "运行/暂停 RUN/PAUSE 删除 DELETE" to adjust the location of three-axis, and press "运行/暂停 RUN/PAUSE 删除 DELETE " again it presents " original location?" Press "运行/暂停 RUN/PAUSE 删除 DELETE" key to confirm the new location and start processing while the "归零 ORIGIN 确定 OK" key to continue processing with the location that does not change.
9. During processing, press "停止 STOP 取消 CANCEL" key to stop processing, and it presents " save breakpoints". If you need re-processing from the current location, press "1", or "2" , "3" , "4" "5" or "6" key and "归零 ORIGIN 确定 OK" key, and it saves the current process. If not to continue processing, press the "停止 STOP 取消 CANCEL" again. Prompting " is zero?", press "归零 ORIGIN 确定 OK" key to return to the work origin and the "停止 STOP 取消 CANCEL" key on the contrary.
10. Breakpoint processing. If you need to continue to process the raw files you have saved, press "运行/暂停 RUN/PAUSE 删除 DELETE" key + the corresponding number keys and processing parameter setting appears. The operation is as the above-mentioned 5,6. Press "停止 STOP 取消 CANCEL" key , and the line number of the file where the breakpoint located appears. Then press "归零 ORIGIN 确定 OK" key to begin testing the code. When testing finished, it will return to the stop position to begin process.
11. Power-down processing. During processing, in case of power-down situation, the control system will automatically save the ending data of the raw files. When there is power again, firstly press " 归零 ORIGIN 确定 OK " key to the origin and the screen prompts "whether to resume power-down". Then press "归零 ORIGIN 确定 OK" to start the unfinished processing before power-down while the "停止 STOP 取消 CANCEL" key not to implement the unfinished processing.

After the start of processing, the system will be displaying the state of processing in real time, such as the speed of magnification, the remaining time of processing, the speed of real-time processing and the line number of file implementation.

Attachment: file download instructions

There are two ways to download files for handle-control system. One way is through the host computer to download the target files to the internal documents of the control system（such documents are called internal file for short）;The other way is to directly insert the U disk into the control system and the files in the U disk can be read and implemented directly (such documents are called U disk file for short).

1. Internal file download

1). Connect the GSP handle to the computer through the USB cable.

2). Click on the icon of the file ZHBUSBHandHost.exe

3). Host computer expended, click on the file, locate the file to be downloaded, and the file appears on the screen.

4). Click “ operation – download ” , choose the file to be download, and click “ OK ” to start download.

5). After the file download and checking, prompts that the file has downloaded successfully, and then click “ OK ” to confirm.

6). Unplug the USB cable, and the file is downloaded to the internal file of the control card.

2. U disk file download

1). Generates the target file with graphical modeling software and transfer and save this file to U disk .

2).Plug the U disk into the U-disk interface at the upper right corner of control card , and make sure plug solidly.

3). Press “ Run ” key, enter the "Choose File" window; press “ X+ ” and “ X- ” to move the cursor to the list of U disk file; press “ OK ” key to enter the U disk file, move the cursor to the target file and press “ OK ” key to select the desired file.

Chapter VII Function Instructions of DSP handle

1. The System Features

1). Complete off-line operation

2). Directly read files on the disk U

3). Can process very large G-code or PLT files

4). The capacity of pre-inspecting processing file can avoid writing or design errors of the processing file and prevent the materials being placed beyond processing range.

5). Good self-diagnostic capability, can diagnose a variety of input and output signals and increases the capacity of remote maintenance.

6). Fully automatic dynamic updates

7). The system supports display in both Chinese and English.

8). Can process some of the files by selecting the row number

9). The convenient and reliable function to protect power-down and restore breakpoints.

10). Acceleration and deceleration is more stable during processing and reduce mechanical shock effectively.

11). Support high-division, which can ensure the high-precision and high-speed processing.

12). Directly support linear and circular interpolation.

2. Warnings and Cautions

1). Do not use this product in strong interference or strong magnetic environment .

2). Do not plug or pull out the U disk during operation.

3). Avoid water, dust and fire.

4). Prevent metal or other conductive materials entering into the case

5). Strictly prohibit unauthorized demolition and there are no repairable parts for users internal.

6). Moderate exertion to plug or pull out the U disk and other connections.

7). Not using it for a long time, please ensure power outage and proper preservation.

3. Parameters Summary

Content	Parameter
Processor	Built-in 128G memory (removable storage technology, which can support processing any size of file)
Display	128 points * 64 points, monochrome LCD
Communication Interface	USB and U disk
Support document form	G code, PLT, (users can custom)
Linkage axes	4-axis 3 linkage
Language	Chinese, English, Russian, French, Japanese, etc. Language can be customized according to customers' requirements.
Operator interface	Button-driven and menu-driven
Drive System	Stepper motor
Interpolation method	Straight line and arc
Minimum input unit (mm)	0.001
Minimum resolution (mm)	0.001
Cutting Speed (mm / min)	64000
Maximum running speed (mm / min)	1-64000
Automatic deceleration control	No
Straight thread, taper thread cutting	No
Automatic blade	No
Spindle speed control	Yes
Detection of system data	Yes
Detection of processed data	Yes
Adjustment of processing position	Yes
Multi-processing coordinate system	Support 9 workpiece coordinate system
Breakpoint continued processing	Yes
Copy Processing	Yes
Power-down data protection	Yes
Working temperature	0°C to +70°C
Relative humidity	＜90％ Non-condensing
Working voltage	DC24V 2A
External voltage	DC5V
Power	2W
Dimension (L * W * H) (mm)	156*110*38

Chapter VIII The routine maintenance rules

In order to give full play to equipment performance, improve processing efficiency, extend the life of the equipment and

reduce the occurrence of faults, you must do the routine maintenance work well. It requires that the equipment operator not only have the machinery, processing technology, as well as hydraulics and pneumatics knowledge, but also but also have the knowledge of computer, automation, drive and measurement techniques , so as to fully understand and master the equipment performance and do the maintenance work in a timely manner. This system has certain requirements to the power network environment. There should be no welding, frequent starting of the machine tools, power tools, radios and so on in the power network where the system located. The strong power network disturbance or bad grounding could cause the computer and the engraving machine system to work abnormally.

Maintenance is an important means to ensure the using life of the engraving machine and

improve the processing efficiency. Frequent cleaning of impurities and grease lubrication are necessary in normal use, otherwise there will be much dust enter into the screws, rails sliders and bearings under the long run of the engraving machine, which can cause the crews, the sliders and the bearings rotational resistance to become large and lose step or dislocate when the engraving speed is a little faster. In actual use, it requires to use in accordance with operational specifications.

1. The routine maintenance requires the daily checking of the connection of spindle motor and water pine, as well as water-supplying conditions of the water-cooling machine.

After work, the working table should be cleaned up and transmission system should be cleaned and fueled. Above mentioned is to avoid contamination of equipment or shortening the life of equipment.

2. Continuous running time cannot exceed 10 hours per day. Guarantee clean water and normal work of water pump. Water shortage of the water-cooling spindle motor is not allowed. Regularly replace cooling water to prevent damage to spindle caused by high- temperature water. Cooling water should be replaced every week. It is recommended to add an ice to the circulating water to lower the temperature when the water temperature up fast in summer, and not to dive off all the water in spindle in night to avoid nipping the spindle when the water could freeze in winter.

3.（According to circumstances）Clean up the dust in the electrical box and check whether the wiring terminal screws loose regularly to ensure the safe and reliable use of the circuit. While cleaning and checking the electrical appliances, be sure to have cut off the main power 20 minutes.

4. Regularly (according to circumstances) clean up debris inside the suction device to ensure the clean of cleaning equipment and the reliable operation of the machine.

5. Regularly (according to circumstances) replace the water of water pump to keep the water clean and sufficient, as well as to ensure the vacuum adsorption equipment for cleaning, so as to ensure reliable operation of the machine.

6. Do not manually forcibly move the position of X, Y, Z axis in case of damage to equipment.

7. Regular maintenance should be done once a month. The purpose of maintenance is to check whether the screws of all parts of the machine are loosed and to ensure that lubricating and environmental conditions are good.

8. Regularly check the fuel lever of lubrication and supplement it timely to ensure the reliable operation of the machine and equipment.

9. If the machine has not used for a long time, regularly (weekly) refueling and running without work are needed, so as to ensure the flexibility of transmission system.

Chapter IX Common problems and solutions

Failure	Reasons	Solutions
Certain axis dose not move or move	1: Drive failure of corresponding axis	Replace motor driver of the corresponding axis
	2:Stepper motor failure of corresponding axis	Replace stepper motor of the corresponding axis
	3:The corresponding coupling fractures	Tighten or replace coupling of the corresponding

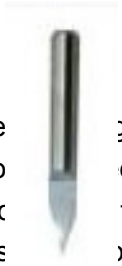
abnormally	or looses	axis
	4: Corresponding screw fractures or the nut on the screw has a fault	Replace screw of the corresponding axis
	5:The linear bearing failure of corresponding axis	Replace linear bearing of the corresponding axis
	6:The subdivision number and current of the drive are different from the software settings	Adjust the parameters of the corresponding driver to be the same as the software settings
Z-axis is out of control	2:Z-axis motor wires failure	Overhaul the Z-axis wires
	3:There is something wrong with the file path	Import the correct path to the file
	4:Transducer or electrostatic interference	Check the ground
Spindle rotation with a abnormal sound	1:Converter settings are incorrect	Reset the converter parameters
	2:Spindle dose not rotate	Check the spindle motor wires
	3:There is problem with spindle itself	Replace the spindle motor
Spindle stops rotating	2:There is something wrong with the converter settings or the spindle itself	Reset the converter parameters
	3:The man axis or data cable is short-circuit	Check the connection line or replace the data cable
	4:Spindle internal short-circuit	Overhaul or replace the spindle motor
	5:Water-cooling signals are not entered	Check the water cooling machine or its signal lines
Milling unevenness	1:Spindle and the table are not perpendicular. It requires correction.	Adjust the spindle to make it vertical to the table
	2:Blade problems	Check or replace the blade
Output error	1:Data cable loose or fault	Re-insert and re-plug or replace the data cable
	2:Drive failure	Replace the drive
	3:Stepper motor failure	Replace the stepper motor
	4:Driver failure or current subdivision setting is incorrect	Adjust the corresponding driver parameters to be the same as the software settings
	6:Data cable failure	Replace the data cable
	7:The path is wrong	Import the correct file path
Engraving depth is different	1:Material is uneven	Flatten or replace the material
	3:Stepper motor failure	Replace the stepper motor
	4: 4:Driver failure or current subdivision setting is incorrect	Adjust the corresponding driver parameters to be the same as the software settings
	5: 2:Z-axis motor wires failure	Check the Z-axis motor wires
	6:Spindle motor failure	Check the spindle motor
	7:Converter interference or data settings are incorrect	Check the converter or re-set the parameters
	8:Static interference	Check the ground

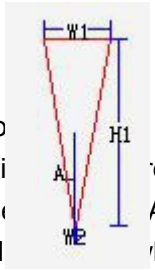
Appendix I Common Tools and Application

Common cutting tools includes 3 types: Conical flat, End Mill, V-Bit Mill (for 3D working)

Through clicking any one selection elements of artcut software,like 2D,3D,Cutting,and step into it will finish the creation of engraving tools.

1. Conical flat



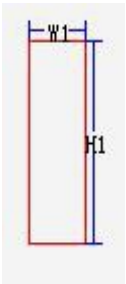


W1: diameter of handle g tools, commo 3.175， ∮4， ∮6, etc
W2: diameter of tool po cts the engravi ectly. So make it exactly when sets
A: half of the angle mac two lines; if us A should be 15, by parity of reasoning.
Rules for tool using: us e tool or smal hen engraving small letters and try to use bigger tool when engraving bigger letters in order to improve speed; choosing cutting tools depends on the thinnest line of the letter; if necessary, in the condition of not affecting letter effect, using “Node Edit” to modify the strokes is benefit to pass big tool path. 30°angle tool is normally used in engraving badges cutting tools. if the letter is too small, change to single line to count path.

Materials for engraving: double-layer plastic board, PVC board, Plexiglas, ABS board, etc.

Materials for cutting: double layer plastic board, ABS board, etc

2. End Mill



W1: the width of tool front-end. Common tool holder diameter likes ∮3.175， ∮4， ∮6; if the cutting material thickness is less than 10 mm small words, we’d better use ∮3.175 tools. If the words become deformed, sometimes the tool holder diameter ∮2 or ∮1.5 can be used for cutting.

H1: refers to the cutting part; material thickness should be less than H1; common H1 length is different according to different material thickness, for example:

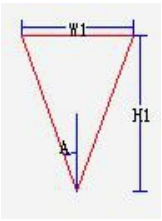
12mm: cut less than 10mm thickness material

17mm: cut less than 15mm thickness material
22mm: cut 20mm thickness material (∮3.175 for PVC and ∮4 for acrylic)

Common engraving material: PVC, Plexiglas, wood, etc
Common cutting material: PVC, Plexiglas, wood, etc

Rules for using tools: we do not suggest cutting less than 10mm materials with 22mm tools, as it may break the tools; when you want to cut 22mm material but without 22mm tools, we can use 17mm tool temporarily and finish it by different layers.

3. **3D(V-bit)**



Such tools are different from those engraving tools we normally use which are made by a alloy material; it is made through welding processing to weld various tool heads under ∮6 tool holder; it is used to engrave different kinds of special shapes files, so it is also called big-end bit or V-bit.

W1: the diameter of the big-end; random accessory is 32mm which is used to cut small 3D letters
A: half value of the angle made by the two lines of knife point; standard tool is 90°, then A should be 45°（like Conical Flat）

W2: width of the knife point; when calculate 3D path specifically, it is required to pass directly, so W2 means not too much, then normally we set it as 0.1 or 0.2.

Tools Application: three-dimension clearance angle word (calculate path with 3D function),
Engraving acrylic from backside, or the letters similar with the one made by writing brush---such letter looks like the tip of a writing brush

4. Other cutting tools: tools for relief carving, lace tools for making various lace, etc.

5. Tools Creation:

Ways for adding a cutting tool: we suggest deleting all default tools in artcut software after installing well; then set up new tools according to detailed requirements.
We take a conical flat knife of 30°×0.1 for example now

1) Choose 2D, 3D, or cut in artcut software, then click “Tools Storage”
2) Click conical flat, then filling in tool parameters; W1=3.175 A=15 W2=0.1
3) Click tool preview → add tool → confirm---then we can add a new tool.

Appendix II Common Material and Processing Parameter

Specification below is only for your reference:

Engraving Processing involves all kinds of industries，widely distribution, crafts industry，advertising industry，stamp industry，wood processing，artwork model, architecture industry, mechanical process, etc.

Applicable material is widely used including metal, stone, PVC board ,ABS board, acrylic, simulation stone, two-player plate, aluminum plastic board, etc.

Processing Method	Applicable Materials		Material Thickness (mm)	Processing speed (mm/s)	Spindale Speed (rpm/min)
Cutting	Plexiglas (Acrylic)		3	10-14	16000-18000
			5	10-12	18000-20000
			10	8-9	18000-20000
			15	6-7	19000-21000
			20	5-6	20000-22000
	PVC Plate (Anticlockwise cutting)		20	8-12	18000-20000
			15	10-14	16000-18000
			10	15-20	16000-18000
	Hibiscus plate		10	20-25	16000-18000
			15	20-25	16000-18000
			20	15-20	18000-19000
	MDF		10	10-14	17000-19000
			15	8-10	18000-20000
			18	6-8	18000-20000
	Two-layer plate		1.5	12-20	12000-18000
Engrave	Color Plate	Badges	\	18-24	12000-16000
		Door plate	\	25-35	12000-16000
	3D processing		\	10-15	18000-20000

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