

**RIVER 300
CONTROLLER
OPERATION MANUAL**

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CHAPTER 1 OVERVIEW

OCEAN WINDOWS DRILLING EDM is a PC-BASED CNC controller, and OCEAN technology company invest a considerable amount of manpower and resources, after several years of effort, based on CNC fine hole(Drilling) function to the economic needs of the electrical discharge machine, research and development and economic products.

The system architecture, hardware and software are as follows.

1.1. System framework

CNC Drilling EDM Controller framework is as following figure1-1-1.

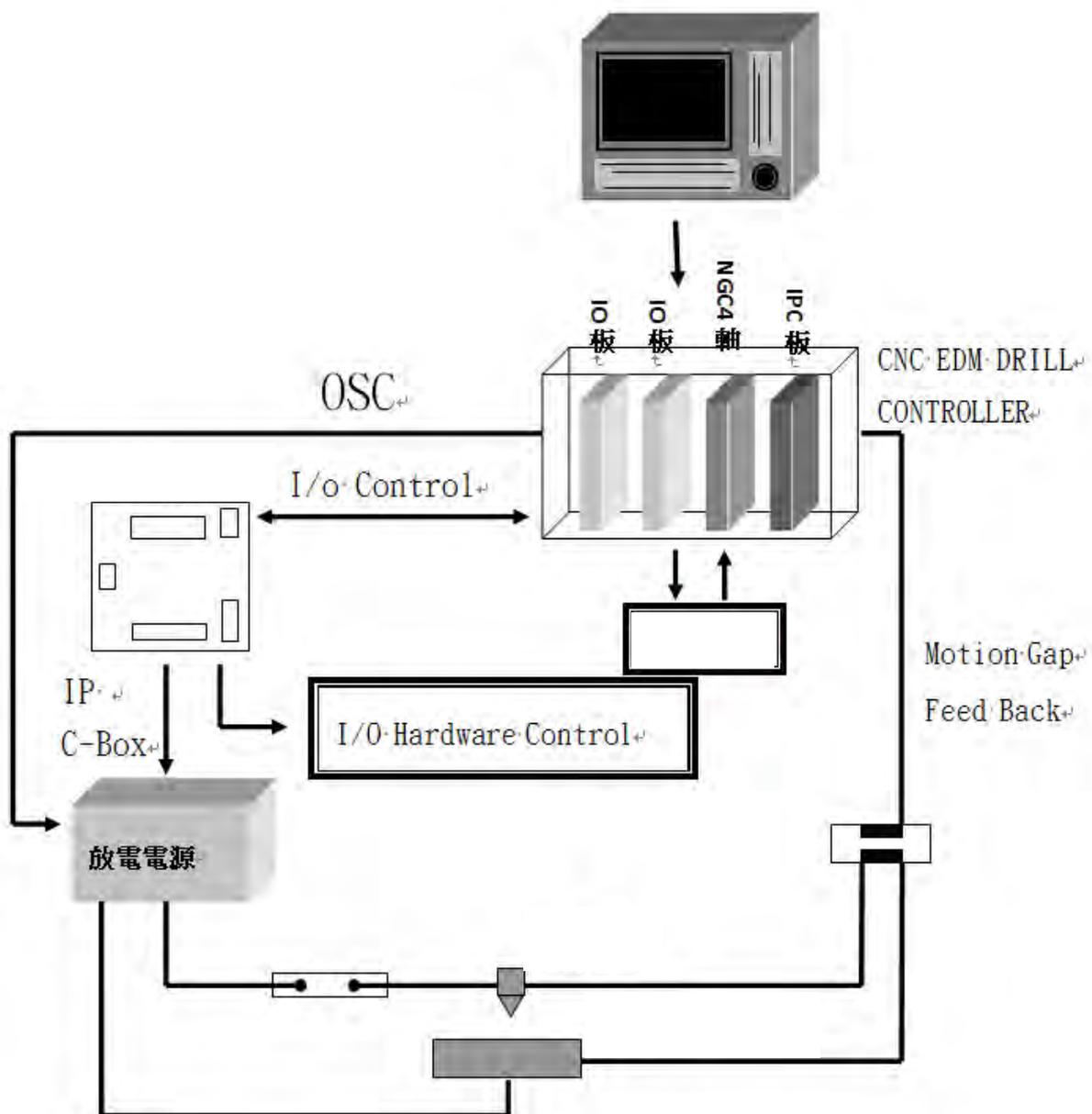


Figure 1-1-1 Controller framework

1.2. Hardware

The system hardware is divided into (1) controller, (2) LCD display (Figure 1-2-1) (3) MPG remote control (Figure 1-2-2). Please see detail specification as shown below.

(1) Controller

- Control box (include 8 slot Rack 、 100W power) * 1set
- PCA-6773 CPU CARD *1pc
- SDRAM 256MB 133Mhz *1 pc
- Servo6-Six-axis analog axis card *1 pc
- PIO5-I/O control card 48 point INPUT point 、 48 point OUTPUT point *1
- CF CARD 256 *2 pcs

(2) 15" TFT LCD touch display panel

- Size 361mm X 261mm X 45mm
- 15" TFT LCD
- Screen switch, Light brightness size control (Built-In)
- Touch operation panel

(3) Remote control

- CYCLE START
 - RESET
 - HOLD
 - JOG X/A 、 Y/B 、 Z 、 W move the plus and minus arrows keys
 - NO GUARD
 - JOG/INC
 - CW (FOR SPINDLE)
 - PUMP (Machining fluids)
 - COOLANT (Coolant liquid)
 - MTC (Manual Tool Change)
 - FTC (Finish Tool Change)
 - BASE POINT (Base PT)
 - ATC Unclamp
 - GUIDE Unclamp
 - SPEED (JOG:1% 、 10% 、 100%)
-



Figure 1-1-1 LCD Touch display panel



Figure 1-2-3 Remote Control

+

1.3. Software

- Chinese / English display.
- Metric and Inch unit setting
- Machine Coord., Work Coord. display
- Three manual modes (continuous, inch movement, No-guard)
- Home search and position
- Automatic edge, Centre of two PT., Locate Centre, Locate Corner function.
- GM Code Program and 10,000 blocks of workpiece program
- Help on Line.
- Wire cutting process document conversion, arrays of circular and square array machining processing function.
- Provides the function of calling Mach. SUB PROG .
- Has multi-set mach. criterion database, each set of criterion database can store 100 mach. criteria of operators.
- Can store 100 mach. depths of 100 operators
- Single and Multi Hole Machining
- Program Set(Start block and end block setting)
- When the Mach. attains the depth, the electrode will automatically detect and increase to the fixed height of the mach. surface.
- Backlash and Pitch Error Compensation
- USB storage interface
- Error diagnosis features.
- I/O 、 C 、 S 、 A Point 、 Register 、 Timer 、 Counter and Ladder status.

1.4. Axis Control

Item	Axis number
Basic Axis	3 axis, X,Y,W
Expended Axis	1 axis (Max. 4 axis)
Basic Co-move Axis	3 axis
Expended Basic Co-move Axis	Max. 4 axis
MPG control axis	4 axis
Spindle	1 axis

1.5. Unit

Item	Min. input unit	Min. Command	Max. Stroke
Metric	0.001 mm	0.001 mm	9999.999 mm
Inch	0.0001 inch	0.0001 inch	999.9999 inch

1.6. G Code List

Group	Function	G Code
Position	Fast Positioning	G00
	No Guard Fast Positioning	G05
	Machine Coordinate Position	G53
	Edge Searching	G80
	Locate Groove Center	G82
	Locate Inner Hole	G83
	Locate Outer Centre	G84
	Locate Circular Cylinder Centre	G85
	Corner	G86
Coordinate	Absolute/Relative Coordinate	G90/G91
	Set Coordinate	G92
Other	Hold for Seconds	G04
	Hole machining	G36

Chapter 2 Procedure of Booting up and Booting Off

2.1. Booting up Procedure

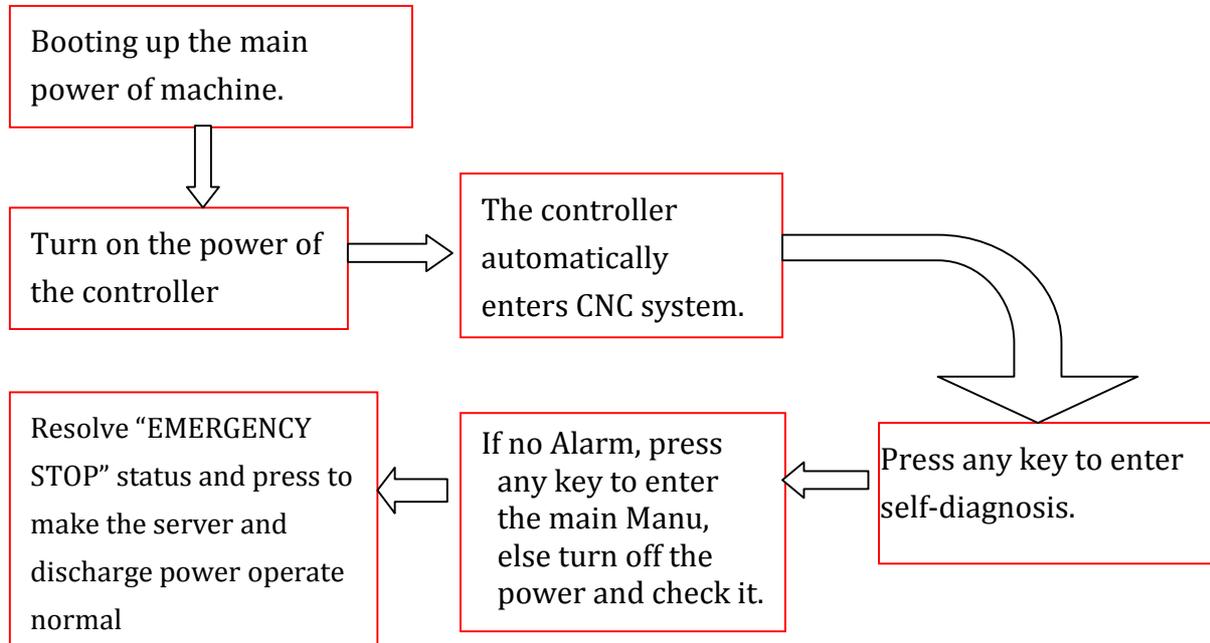


Figure 2-1-1 Turn ON Procedure Flow diagram

After booting up is completed, Manually switch to manual mode as figure 2-1-2, in order to ensure that the mechanical accuracy of coordinates of the system, please be sure to complete the action that finds the origin Home, and in order to avoid a collision situation, located in outstanding Home action, single holes or multi hole moulds will not be able to process, seek solutions for complete origin Home or limit to lift of electrode check point and located Home. But if you manually remove the protection, you will have to bear the risk of collision.

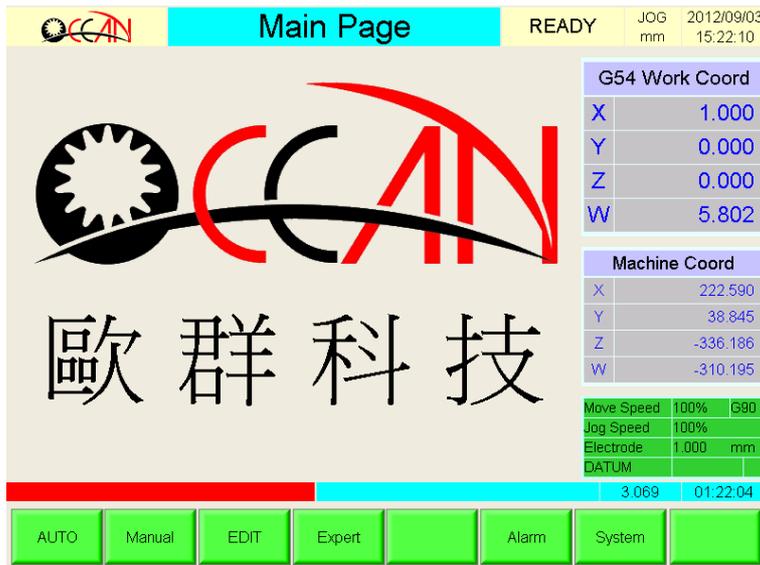


Figure 2-1-2 Manual Screen

Note : If the axis has to finish home search, it will be in the main screen under the machine coordinate axis labelled, to find the origin of the axis unfinished home search, the work coordinates will be displayed in red, as below Fig. 2-1-3.

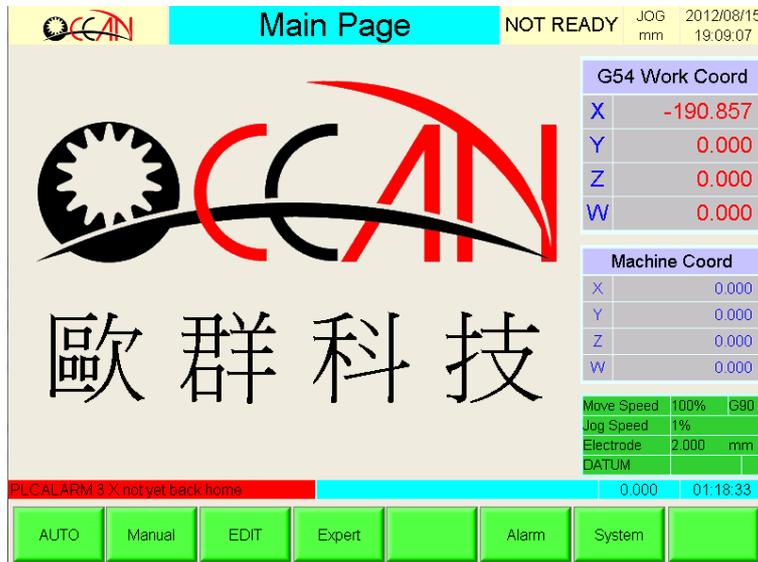


Figure 2-1-3 Manuel Screen

2.2. Booting up Procedure

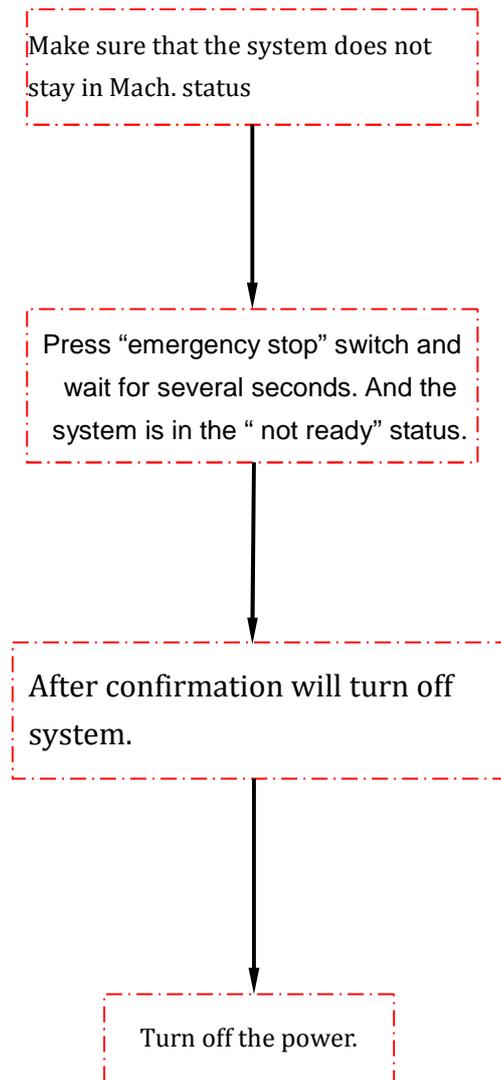


Figure 2-2-1 Booting OFF Procedure Flow Diagram

Note : Before booting off the controller, operator should press the E-Stop key at first to make controller record the status. Then turn off the power of controller and turn off power of generator finally. This procedure can avoid the file data would be lost.

Chapter 3 Operation Instructions

3.1. Screen Deployment

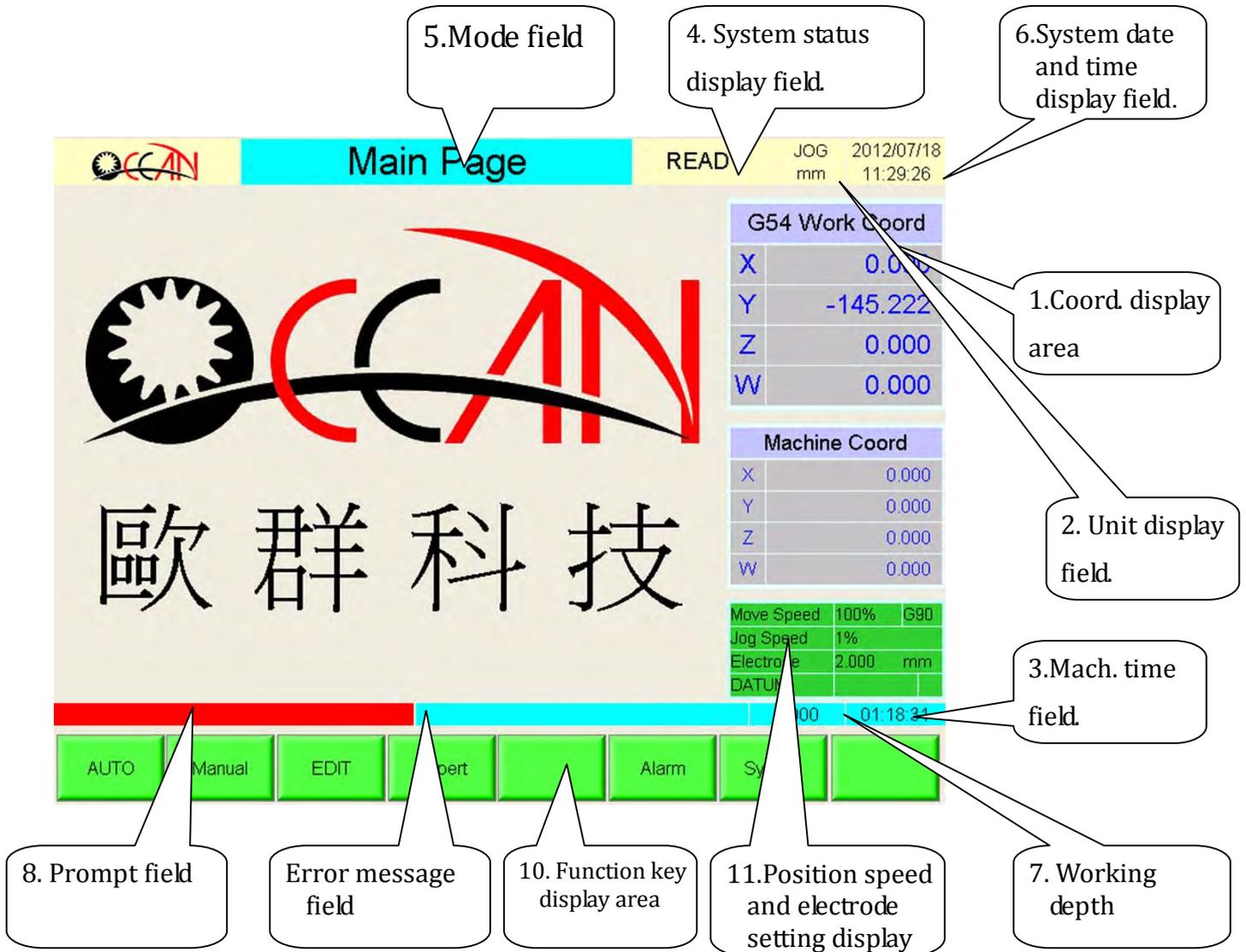


Figure 3-1-1 Screen Deployment

Reading instructions:

To facilitate readers in understanding more clearly about the description of the operating instructions, take note of the following ways of marking.

The keys of the operating panel and the I/O panel: marked in a square external frame, such as MODE.

System mode: marked in square external frame and with a grey background, such as Auto mode

System function key: marked in square external frame and with a grey

background, such as **Home search**:

The characters on the window: marked in a grey background, such as **System Ready**

As shown in Figure 3-1-1 above, the overall screen is divided into 11 areas. The description of each area is as follows:

(1) Coord. Display area

Displays the current work coord. 、 machine coord. 、 following error or apposite coord. The unit, in accordance with the different system settings, is divided into metric (mm) and GB (inch). When the unit is displayed in mm, the display min. decimal figure is 0.001mm ; when the display unit is in inch, the display min. decimal figure is 0.0001inch.

◆ Work coord.:

The work coord. is the coordinate referred to by the workpiece program. The coord. value can be double click on the coord. field to call coord. setting window in order to change the coord. value.

◆ Machine coord.:

The coordinate is a fixed reference one. The Home of the coord system is one certain fixed position of each spindle of the machinery and the operator is not allowed to set it. The operator can be in **Manual** to press **Home Search** and then select to move that particular spindle to machine coord home. Owing to the fact that the machine coord stands for the electrode on the clip relative to the position of one fixed point in the space (machine coord home), the operator cannot alter the value in manual mode. When the electrode is moving in the space, the machine coord value will change with it.

Before finish home search, each axis machine coord. marked **X**、**Y**、**Z**、**W**、**A** and **B** to prompt doesn't finish home search yet, after which axis home search completely, each axis is marked change to **blue colour** to show have finished home search now, but once press E-STOP, each axis precision maybe disappear, the marked will change to **X**、**Y**、**Z**、**W** to remind operator have to finish home search again.

(2) Unit display field:

It displays the currently used length unit is **mm** or **inch** of the system.

(3) Mach. time field:

It displays the total mach. time of the current work accumulatively, which is

displayed in the hr: mm: sec style. The hr stands for hour, mm stands for minute and sec stands for second. The max. can display " 9999 : 59 : 59 ". Regarding the clear away and cal. of mach. time, please double click this field, which display message to remind, if setting clear or not .

(4) System status display field:

It displays the current system status, such as the messages of **READY**, **Not Ready**, **Machining**, **Pause**... etc.

(5) Mode field:

It displays the currently selected function mode of the system, such as the messages of **Manual OP.**, **Edit**, **Condition**, **Deep**..., etc.

(6) System date and time display field:

It displays the current date and time. The date display method is mm/dd/yy and the time display method is hour: minute: second, such as 12/30/03 12:30:20.

(7) Working depth field:

Display depth value which you want to working.

(8) Prompt field:

Displays the data input range and the relevant prompts for the field

(9) Error message field:

Displays any system error should that occur. It wills red word display, When the error message is displayed, it is necessary to eliminate this instead of continuing operation. If warning message, even though the machine can continue to working, but suggest to eliminate warning message firstly, then to proceed working. ※When happen error message, it can double click on this field to switch error message to determine screen page directly.

(10) Function key display field:

It displays the current window of function key.

(11) Position speed and electrode setting display field:

It displays the movement speed of the current setting, Jog speed · electrode (mm).

- ◆ Position speed : For system execute G00 position feed speed rate, default value 100%.

- ◆ JOG speed : For execute JOG feed speed rate, it has 1%、10% and 100% ◦ default value is 1% ◦
- ◆ Electrode(mm) : For electrode diameter size , unit is mm ◦ default value is 1mm ◦

3.2. LCD Panel :

The deployment figure of LCD touch panel is as shown in Figure 3-2-1.



Figure 3-2-1 LCD Panel Deployment Figure

3.3. Remote controller key function

The remote controller as following figure 3-3-1.

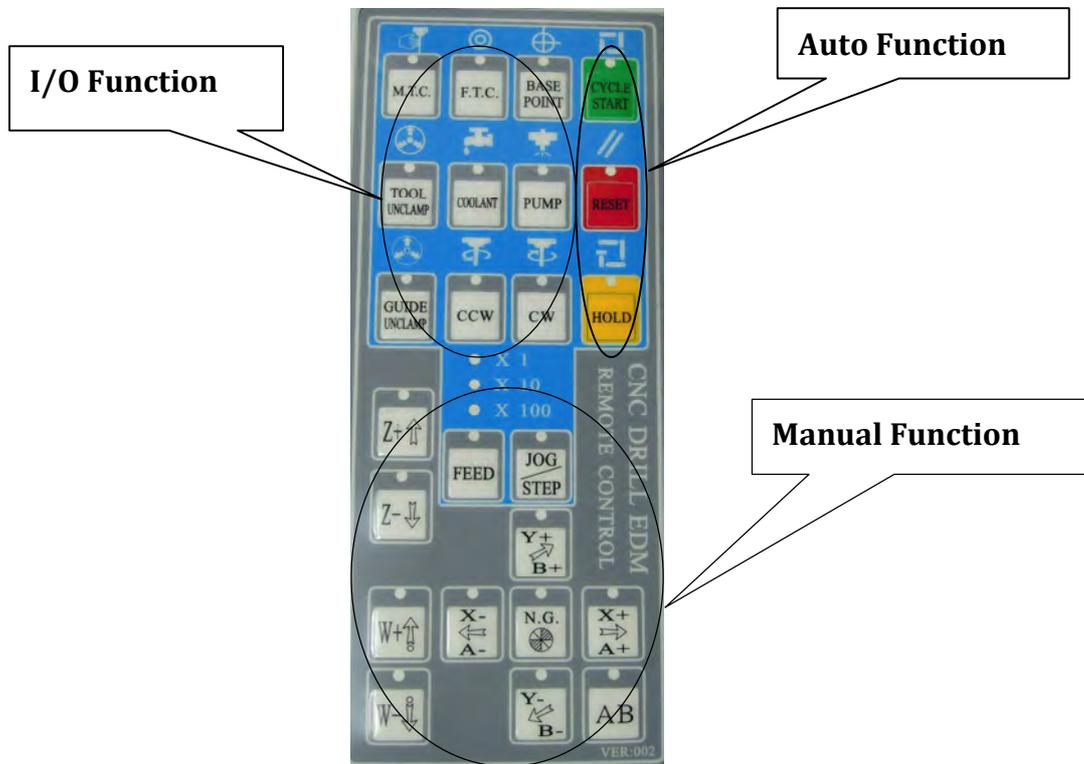


Figure 3-3-1 Remote control

3.3.1. Power Control

(1) Controller power switches : In by the front door as shown in Figure 3-3-2. Pushing down the green button on the left will turn on the controller power; pushing down the black button on the right will turn off. Please noted, the emergency stop (E-STOP) button need is push down before you turn on the controller power.

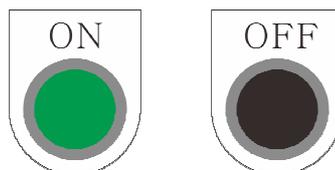


Figure 3-3-2 Controller power switches

(2) Emergency stop button : In the right side of the screen as shown in Figure 3-3-3. The heavy-duty power will be turned off after pressing down the button, and the machine will not be operable. The use of this button is when: 1.emergency event occurs and the machine operation must be stopped immediately or; 2.there is the need to turn off the overall system power. To release the emergency stop button, just turn the button CW will be ok.

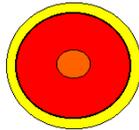


Figure 3-3-3 Emergency stop button

3.3.2. Manual Function Control

- ◆ JOG : this button will be activated when in Non-processing in progress. User can press X+, X-, Y+, Y-, Z+, Z-, W+ and W- buttons to move different axes.
- ◆ NOGUARD : this button is to protect the electrodes when contacting with machining workpiece and the short circuit occurs. It will set the feed rates of all axes to zero and disable any continuation of axes movements. Therefore, to release the system protection status, you need to push down this button and Manual button at the same time, and then move those axes to get the electrodes away from the workpiece, and solve the short circuit condition.
- ◆ Change electrode finish by Manual (F.T.C.) : The electrode runs out during machining, used when the electrode is replaced by manual (not ATC), after change electrode finish, please press this button to notify system, electrode has replaced.
- ◆ SPEED adjustment : the speed adjustment button is to adjust the percentage of JOG feed speed, can be set to 1%, 10% and 100%, If it is in INC JOG mode, the manual feed increments are 1 μ m, 10 μ m and 100 μ m. Every time you push down the button, the speed will circle from the lowest to highest and then lowest to highest again. As for the number of segments of the display, the display area is in the lower right corner of the screen positioning speed.

- ◆ **INC JOG** : this button allows user to change the manual jog mode from serial to non-serial. The difference is that the axes will continue moving as long as the manual button is pushed down under serial mode; on the contrary, when it's under non-serial mode, the axes move one incremental value every time when the manual button is pushed down, regardless how long it lasts, and the incremental value is based on the speed value. Please refer to Speed adjustment (SPEED).

3.3.3. Auto Function Control



Figure 3-3-4 auto function control button

- (1) **CYCLE START** : Pressing this button, Starts to run machining program
- (2) **RESET** : Reset machining program or the alarm. When operator presses this key, it reset the system. There are two situation operator presses this key. The first, in processing to cancel the automated processing procedure; The second, when a system error message occurs, after lifting of the problem that caused the error message occurs, you must press the reset button to restore the system to normal.
- (3) **HOLD** : Pause machining program. When pressing this key in auto-running, system will be paused. If operator wants to continue the machining, please press the CYCLE START Key to continue with outstanding processing.

3.3.4. I/O Point Function Control

- (1) **MTC** : Pressing this button, and it execute changing electrode process.

- (2) BASE Pt : In changing electrode process, if the check point is not active, it need to JOG the electrode to check point and press this button to set this position as the check point. When doing the BreakPT and InitPT. Function, it need to press this button to set the initial status.
- (3) CW : The main spindle rotates clockwise. After pressing this button, the spindle rotates clockwise. If pressing again, the spindle stops.
- (4) PUMP : The water pump is switched on. After pressing this button, the water is pumped into the electrode. If pressing again, the water pump is stopped.
- (5) COOLANT : The coolant pump is switched on. After pressing this button, the coolant is pumped. If pressing again, the coolant pump is stopped.
- (6) ATC : Spindle chuck unclamp. When pressing this button, the spindle chuck is unclamped and operator can pull the electrode clamber out. Releasing it, Electrode holder cylinder clamp, clamp the electrode chuck.

3.4. Function key illustration

This system is based on the main page to be the root catalogue (the virtual root catalogue), and then switching to each function window, therefore switching to another window, so the function window of entire system to present the tree structure, in the function window and the mode of the system has its relevant function key. The figure below shows the connection of each model and each function key.

3.4.1. Main Page

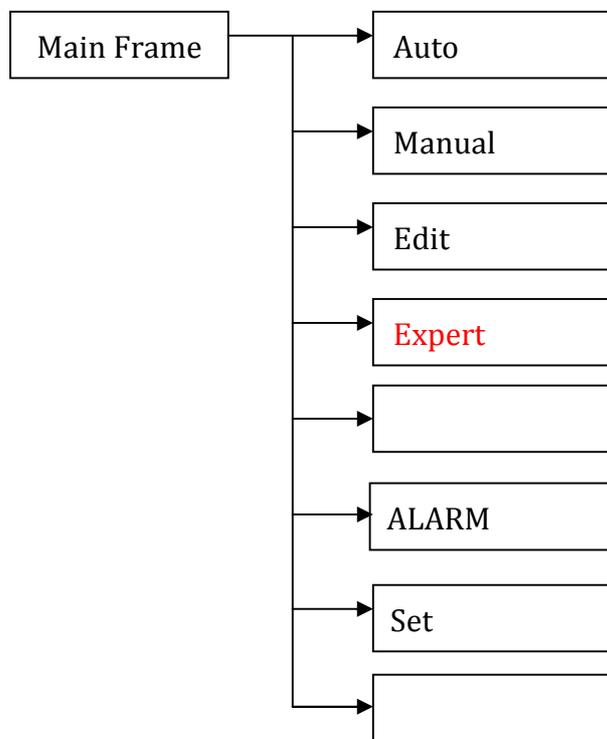


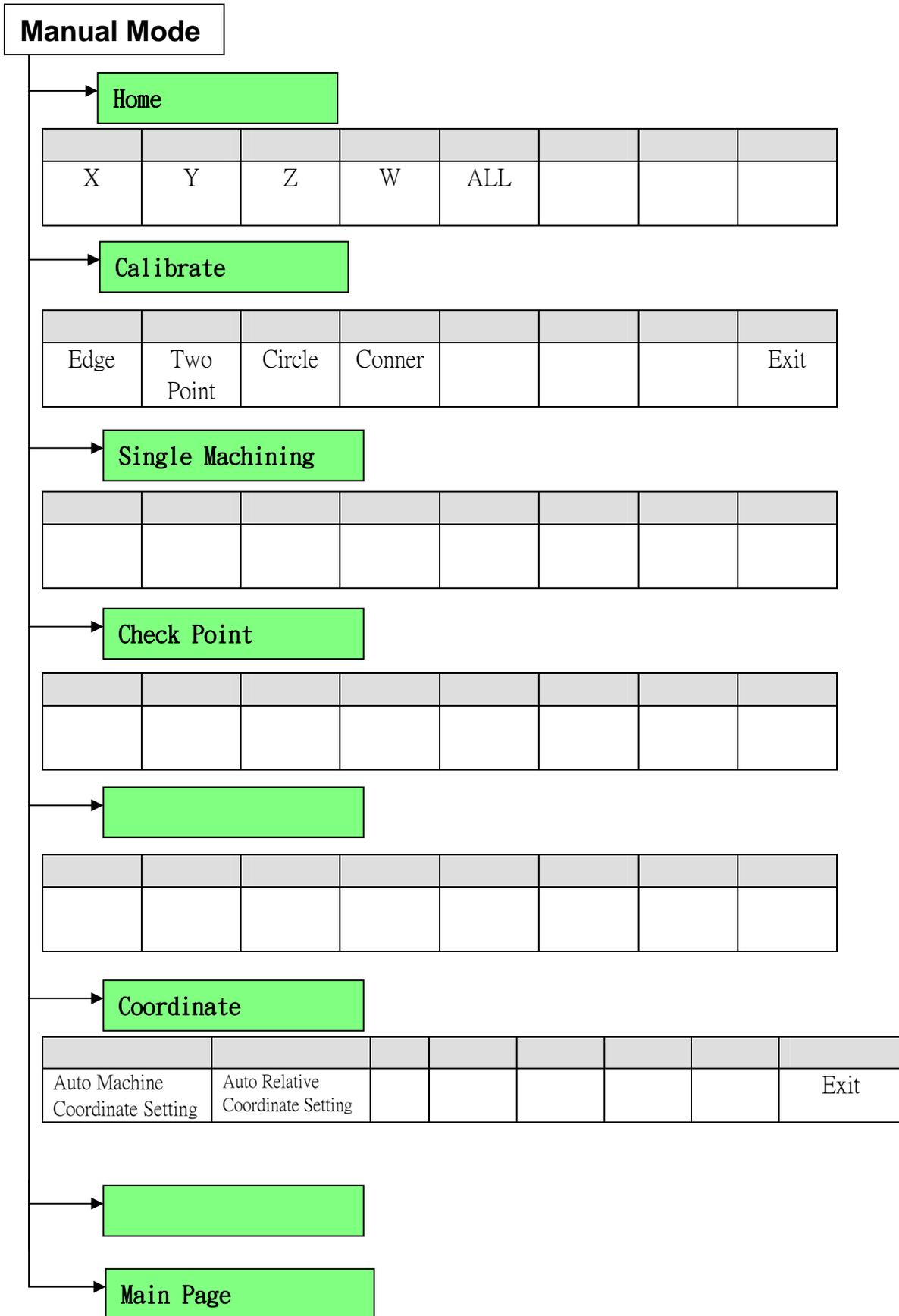
Figure 3-4-1 Main Frame illustration

3.4.2. Auto

Auto Mode

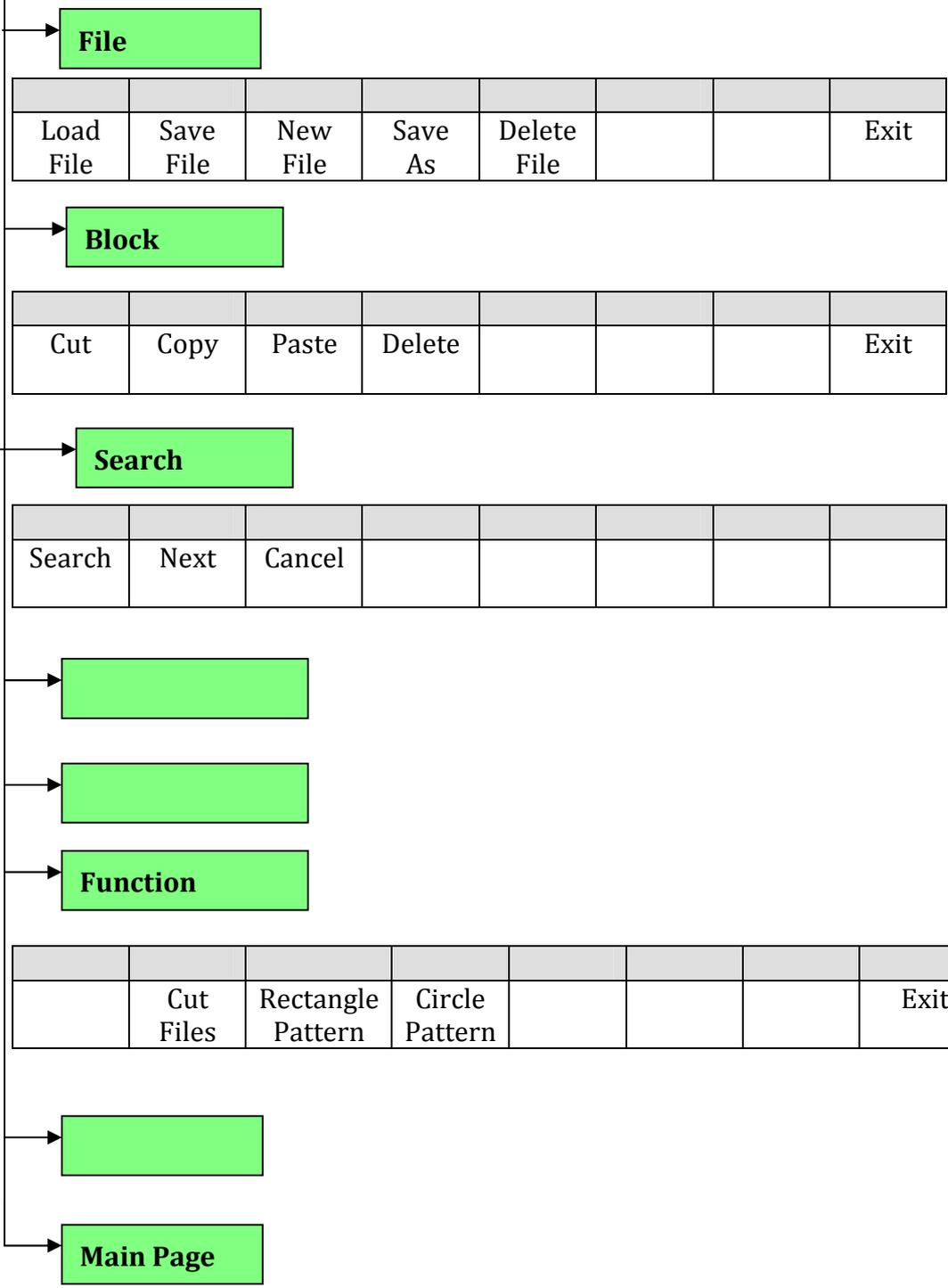
Load File	Hole Finish	Mach Set		Save Param	Dry Run		Main Page

3.4.3. Manual

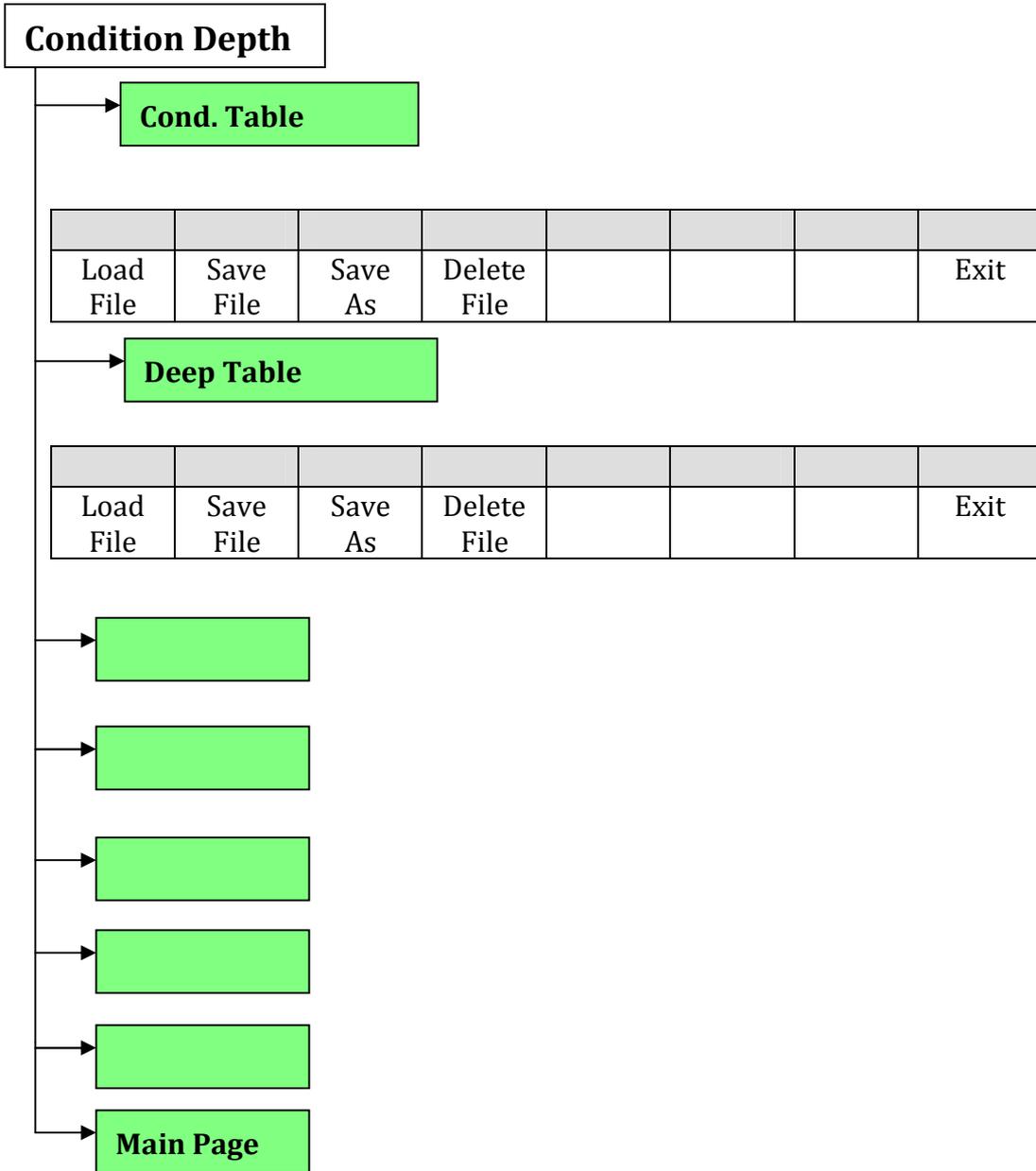


3.4.4. Edit

Edit



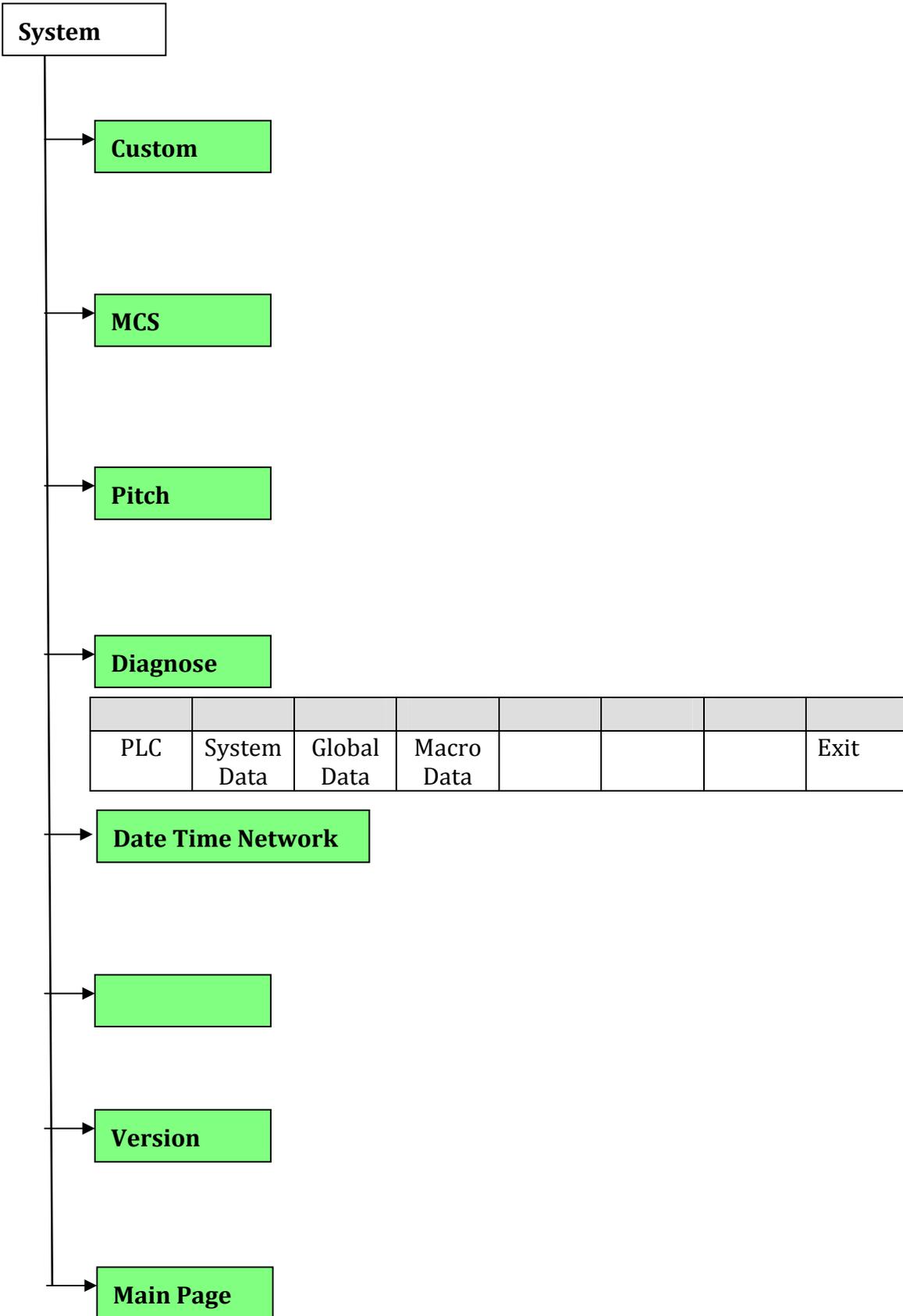
3.4.5. Condition Depth Mode



3.4.6. Alarm

Alarm

Pending Alarm	History Alarm	Clear Alarm					Main Page

3.4.7. Parameter set.

Chapter 4 Function Mode Description

4.1. Brief introduction

This chapter introduces the usage, purpose, and the operation method. The system includes the function modes of Auto mode, Manual mode, Edit, Alarm, Condition depth, Parameter set and Auxiliary. The respective introduction to each function mode is as follows.

4.2. Auto

Auto mode mainly function is offer operator edit working process at Edit mode after, enter this Auto working mode to execute working program. As following figure 4-2-1.

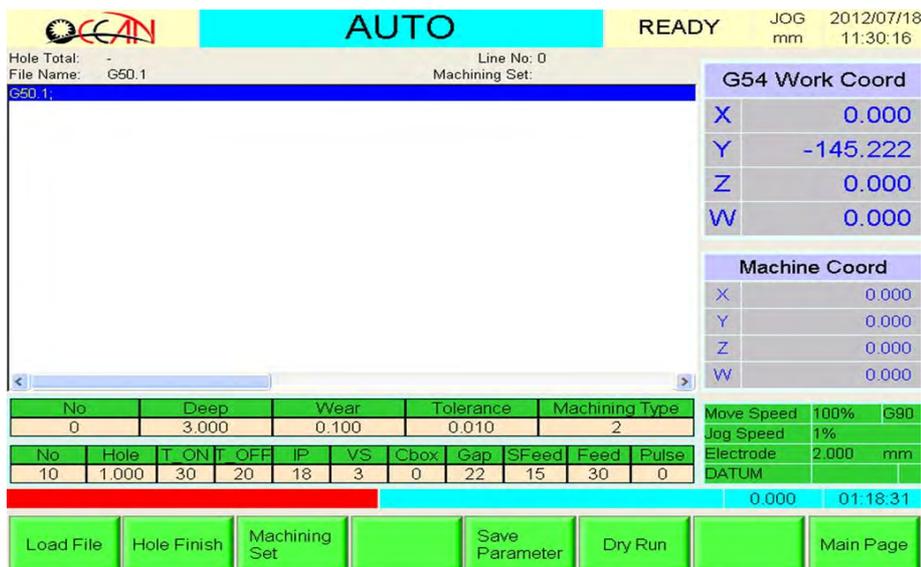


Figure 4-2-1 Auto working mode

When operation, normally edit working program file at edit mode firstly, then move to auto mode to down load this program, to process working.

In multi-hole machine screen, display have Hole To. Hole Acc., each illustration as below:

- ◆ Hole To.: Display in this working program (not include SubProg.) need working total hole. If this working program has call execute SubProg., in the SubProg working hole will not calculate in working total hole.
- ◆ Hole No: Display current the Hole No and program during the working, if this working program have call execute SubProg, the SubProg working

hole will calculate in the Hole No, Line No will change to display execute Line No of SubProg.

Under the screen display current using condition and deep parameter, above two row for current using deep parameter during working, under two row is current using working condition parameter, deep parameter NO. field is current load deep NO., and condition parameter NO. field is current load condition NO. concerning condition Table as follow figure 4-5-1. Condition Table, Deep Table as follow figure 4-5-2 Deep List.

Under the multi hole mode, the same with single hole working mode, it can direct to modify and save current using condition Table and deep Table setting, but during the working, it is unable to modify deep setting; besides if current condition file is DEFAULT.CON, it is unable to save the condition setting to DEFAULT.CON. concerning the inside file DEFAULT.CON modification, as follow figure 4-5-1 Condition Table.

Operation Steps:

Load working program: Use Load File, edit finish program file loading to current editing and save working program file, it can back file to edit mode to re-modify it, but it must be save, the auto mode can be renew, it should be noted that if this working program is in the process, can't be saved, until the process ends, or reset the system.

1. Setting working deep: Setting current using depth parameter during working, move the cursor to depth table No. field, the screen continuity click twice, and according to prompt field to prompt, separately input depth table that each parameter value setting, final press Save File, it can input depth setting value that saving to this depth value, it is convenient for operator under the single hole working screen, it can set this depth value directly.
 2. Setting working condition: Setting current using working condition parameter, move the cursor to condition table No. field, the screen continuity click twice, then according to prompt field to prompt, separately input condition value setting, final press Save File, it can input condition setting value that saving to this condition value, but if current condition file is DEFAULT.CON, it can't save file.
 3. Machine set: this function is setting which area of execute working procedure, when working procedure is all for execution, it is not need to execute this setting job, if only execute some area, it needs this function. If want to execute this function, press Mach Set, enter setting. as follow below figure 4.2.1 working setting.
 4. Save parameter: use the save parameter to start this function, the purpose for operator update with save condition parameter and deep parameter which is current using to file of condition list and deep list by separately. If condition list file is DEFAULT.CON, it can't save.
-

5. Clear time: Double click at machining time field, call machine clear dialogue windows, it will reset total machine time “0”.
6. Start machining: to use **CYCLE START** to start this function, at this time machining condition field display **Machining** .
machining can operate below action:
 - ◆ Pause: After machining, to use **HOLD** to start pause executing of workpiece program, at this time machining condition field display **PAUSE** , until press **CYCLE START** function key, it will continue to machining.
 - ◆ Reset: To offer operator to stop machining program and reset system. Use **RESET** to start this function, at this time machining condition field display **READY**.
7. Amend parameter: During machine sparking, it can amend sparking parameter of condition list at any time, but it can't amend machine depth setting at depth list, to press **Save Param** , to save condition value and depth value, if condition list file is DEFAULT.CON, it can't save condition list.

When machining hole, due to some reason, the operator doesn't want to continue machining this hole, to press **Hole Finish**, system won't process this hole machining, and process back tool to safe height, and continue next line program for single-part machining.

4.2.1 Machining Setting

This function is setting some area or some line of execute machining program. For example, if machining program has 10 lines, but it only needs to execute among third line to seven line, it can enter to this mode to do setting. When machining program is all executing, it's not need to execute this setting, due to the system default is that machining program all executing.

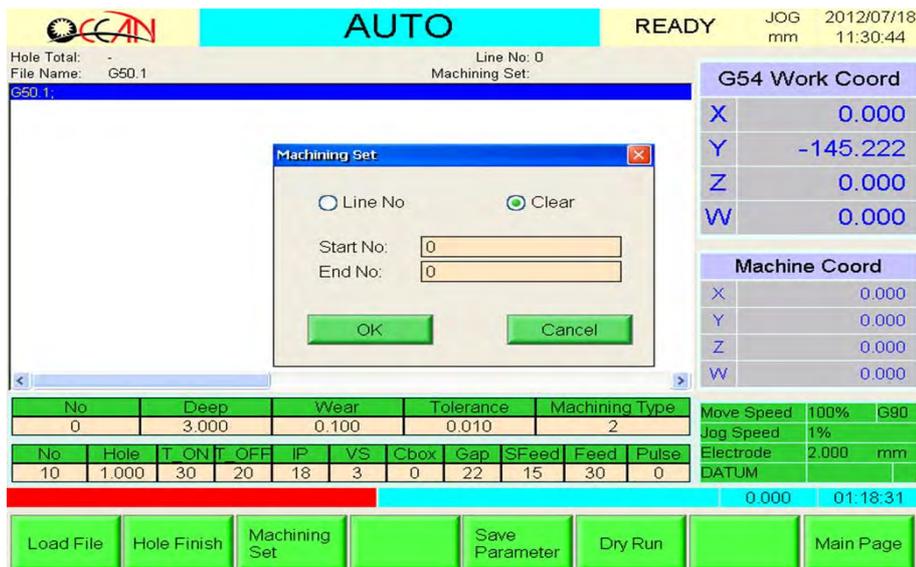


Figure 4-2-2 Machining setting execute screen

As above figure 4-2-2, this screen has two mode:

- ◆ Mode: there are two modes, it can choice area with choice way have Line No, or Clear area.
- ◆ Setting: there are two sets of fields, the first field is Program Start No., the second field is Program End No, that is , after the setting is completed, the program will beginning process the line number of a single section until ending line numbers of a single section be completed, it will stop. Be concerned is if the input data, the Start No. is greater than the End No. or Start No. and the End No. are greater than the program total line ,this setting will fail.

4.3. MANUAL

Manual OP. is mainly suitable for each setting and test of the system and workpiece, ex: Edge search, Two point, Circle, Position, Single machine...

The operating screen is as shown in Figure 4-3-1 below. The relevant functions include system Home search, Calibrate, Single hole machine, Check, Electrode, Coordinate setting. The following article introduces more of these function keys.

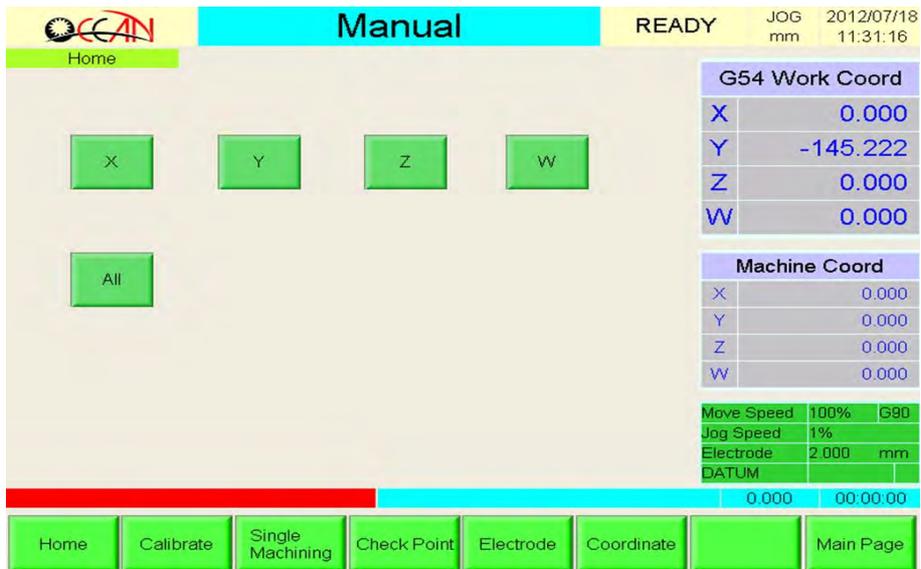


Figure 4-3-1 Manual OP. Screen

4.3.1. HOME SEARCH

This function allows an operator to search for the origin point of the machine. To make the soft-limit run normally, it is necessary to start the motion of home search. It is recommended to start home search after turning on the system. This can avoid the occurrence of error resulting from the operation.

Home search can be divided into five modes of home search **X**, **Y**, **Z**, **W**, **ALL**. The operating screen is as shown below in Figure 4-3-2. Press **X**, **Y**, **Z**, **W**, **ALL**, to select and start the desired direction of home search. When the function of home search is started, the system status field of the screen displays **Machining**. Meanwhile, the prompt field displays **Home searching, waiting...**. When the motion is completed, the status field of the system displays **READY**. Meanwhile, the prompt field displays **Home searching Finish Ok!**, and the coordinate value of the machine is cleared to zero.

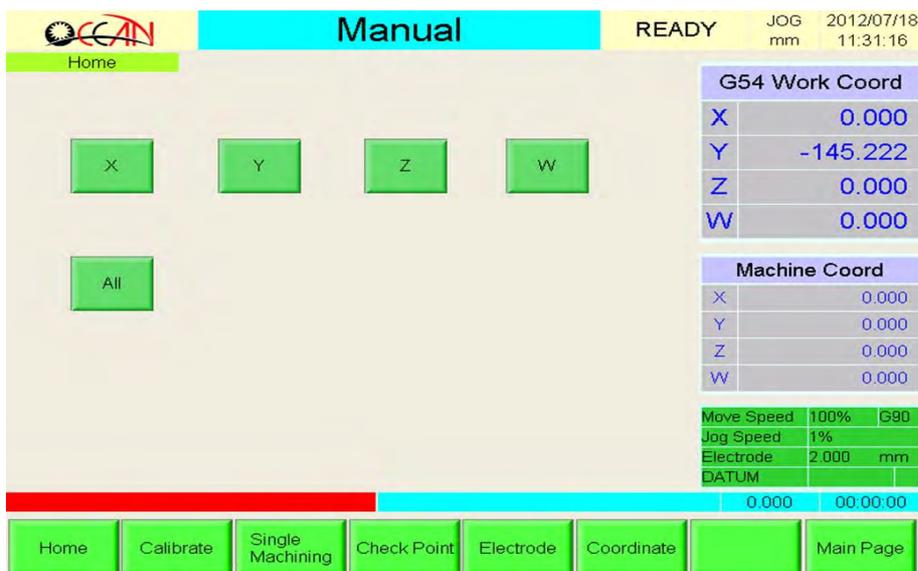


Figure 4-3-2 Home Search Screen

When the function of home search is started, press **Reset** to stop the motion. The status field of the system displays **READY**. Meanwhile, the prompt field displays **Break home searching**.

The machine coordinate area at screen right side, before finish Home search, every axis mark **X**, **Y**, **Z**, **W**, to prompt current condition for unfinished Home search, when this axis finish Home search, every axis mark change to blue script, to prompt have finished Home search, but once to

press E-STOP, every axis may lose accuracy, and mark will change to X, Y, Z, W, to prompt user to finish Home search .

4.3.2. Calibrate

Edge search is mainly suitable for workpiece edge search. The function of **Coord. Set** can be used to set the coord value of the workpiece edge into the work coord. Then it is very convenient for an operator to set the mach. reference coord. The operating screen is as shown in Figure 4-3-4.

4.3.2.1 Edge

Method of operation:

1. Set detect num.: Select detect num field, Follow the cue of the prompt field to input edge search num.
2. Set the edge search route: Using up and down key, such as **X+**, **X-**, **Y+**, **Y-**, **Z+**, **Z-**, **W+**, **W-**.
3. Start edge : Press **CYCLE START** to start edge search. At this time, the platform moves slowly in the selected edge search direction. After the edge search is completed, the detect mean field relative to edge search direction displays the average coord value of the workpiece edge and displays each detected value at the bottom of the screen.
4. Edge set: After the edge search, press **Edge Set**. At this time, the window for input coord set is displayed. Input the work coord value after edge search into the individual field. And the system will automatically calibrate the electrode radius and update the work coord value (it is necessary to set electrode size first). when the motion is start, press **Reset** any time to stop the running of the motion. At this time, the system will stops.
5. Edge PT set: After the edge search, press **Edge PT Set**. At this time, the window for input coord set is displayed. Input the work coord value after edge search into the individual field. press **OK**. and the system will automatically calibrate the electrode radius and update the work coord value (it is necessary to set electrode size first).
6. W axis distance set: After edge search, it will automatically elevating height of w axis distance set, then the system will be automatically moved to rectify that electrode radius location, the operator needs to return the coordinate to zero by themselves, this function required to

the box of move above edge search PT Check is only for the X, Y axis motion.

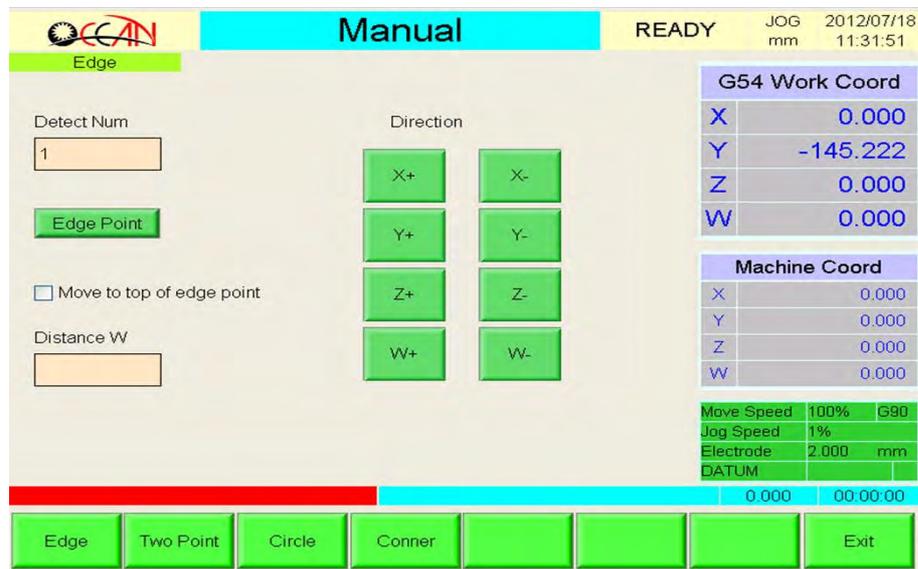


Figure 4-3-3 Edge Search Screen

4.3.2.2 TWO POINT

Two point is mainly suitable for searching the central position between any two edge points of the workpiece. This can facilitate the operator in setting the mach. reference coord. The operating screen is as shown in Figure 4-3-4 below.

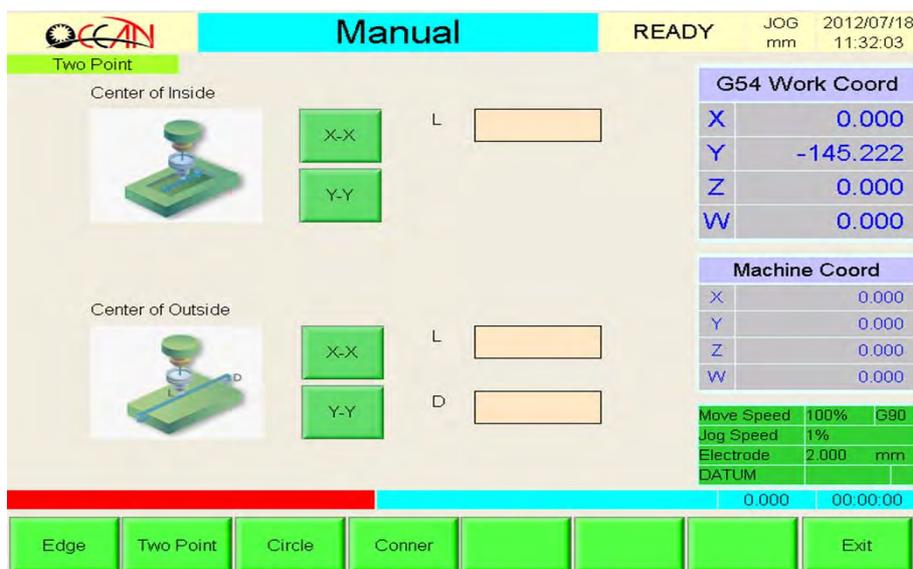


Figure 4-3-4 Two Point Screen

Operating instructions:

1. Set detect method and direction: the detect method can be divided into Inside DIR and Outside DIR. Each detect direction can further be divided into two types: X-X,Y-Y direction. Therefore, there are total of four types for selection.
 2. Set the format of outside detect: during the outside detect, it is necessary to set L(Detect Leng) and D(Detect Depth) as shown in the figure. You can understand what "L(Detect Leng) and D(Detect Depth)" mean. Use the up and down keys to select L(Detect Leng) or D(Detect Depth) and then set by numeric key input. After completing the setting, use the up and down keys to move the cursor and select the desired direction. During the inside detect, it is not necessary to set.
 3. Start two point: Press **CYCLE START** and start the motion of two point. At this time, the system status of the screen displays **Machining**. Meanwhile, the prompt field displays **Detecting!**. After completing the motion, the electrode automatically moves to the central position of the edges of the two points and the system status field displays **READY**. When the motion is run, press **RESET** to stop the motion and the system status field displays **READY**.
- ✧ **Caution:** It is necessary to pay attention to the setting value of L(Detect Leng.) and D(Detect depth) to avoid the workpiece bending the electrode by collision.

4.3.2.3 CENTER OF CIRCLE

Center of circle is mainly suitable for searching the position of the circle hole of the workpiece or the circle center of the cylinder. This can facilitate an operator in setting mach. reference coord.

The operating screen of circle center mode is as shown in Figure 4-3-5. It can be divided into two types: center inside the circle hole and center outside the cylinder.

Operating instructions:

1. Set circle center type: Once it enters the circle center mode, the cursor is placed in the executive field inside the center. Use the up and down keys to select the desired center of inside or that of outside.
2. Set the format of center of outside: When the circle center of outside is detected, it is necessary to detect the length, width and depth as shown in the figure. The meanings of the length, width and depth can be understood. Use the up and down keys to move the selection and then input the value by numeric keys respectively. When the circle center of inside is detected, it is not necessary to set.
3. Start center of circle detect: Press **CYCLE START**, and start the motion of center of circle detect. At this time, the status field of the screen display **Machining**. After the motion is completed, the electrode move to the position of center of circle and the status field of the system display **READY**. When the motion is started, press **RESET** any time to stop the motion. At this time, the system stops and the status field of the system displays **READY**.

✧ **Caution:** It is necessary to detect the setting values of the length, width and depth to avoid the workpiece bending the electrode by collision.



Figure 4-3-5 Center of Circle Screen

4.3.2.4 Calibrate

Corner is mainly suitable for searching the corner position of the workpiece. This can facilitate an operator in setting mach. reference coord.

There is a limited condition in corner mode. Before positioning the corner of the workpiece, it need to be calibrated to parrel to X or Y axis. The operating screen of circle center mode is as shown in Figure 4-3-6.



Figure 4-3-6 Corner Screen

Operating instructions:

1. Set electrode size.
2. Set search corner mode: It divide into four types P1, P2, P3, P4 . First moving the electrode to the near right angles aside, but not touching.
3. Set move distance of X axis direction, move distance of Y axis direction.
4. Set W safety height: When completing the edge search of the second point, W axis will pull heigh the safety height first and then moves to the corner of the workpiece. W safety height in order to avoid electrode colliding with the setting of the workpiece, please set W axis safe height
5. Execute: To Press **[RUN]**, and the platform moves to the edge search direction set in 2. at this time the screen system state field will display **Machining**, until it touches the edge of the workpiece. Then the search of the first point is completed. The first point coord. have save in system, and then the cursor will auto move to **Set W axis safe height** field. After the motion is completed, the status field of the system displays **READY**.

When the motion is started, press **RESET** any time to stop the motion, at this time, the system stops and the status field of the system displays **READY**.

4.3.3 Single Machining, Position

Single machining provides for the system only processes a hole, purpose for single machining or workpiece material sparking parameters test, through a single hole spark machining test, quest for the best spark parameters and electrode consumption, for formal processing parameter of the set. Operation screen as shown in Figure 4-3-7.

In the upper part of the single mach screen, there is a bar chart (white background, green foreground), which can display the current mach. progress (0%~100%). The length of the green foreground stands for mach. Progress.

In the lower part of single mach. screen is the settings of the currently used condition table and deep table. The system can store multiple sets of mach. deep table settings and mach. condition table settings. During the spark machining, it will load one set of deep table and mach. condition table settings respectively. The first two rows of the table are the setting value of the deep table currently loaded. The last two rows are the setting value of the set of condition table currently loaded. The **NO.** field of deep table is the group no. of the deep table currently loaded, and the **NO.** field of condition table is the group no. of the condition table currently loaded. Regarding to the description of condition table, please see 4.5.1 Condition Table. About the description of deep table, please see 4.5.2 Deep Table.

Under the single mach. mode, to facilitate a user in operating, the setting of condition table and deep table currently used can be modified and saved directly. However, it is not allowed to modify depth setting during machining. In addition, if the current file of condition table is DEFAULT.CON, the condition setting cannot be saved to DEFAULT.CON Regarding the modification of DEFAULT.CON, please see 4.5.1. Condition Table.

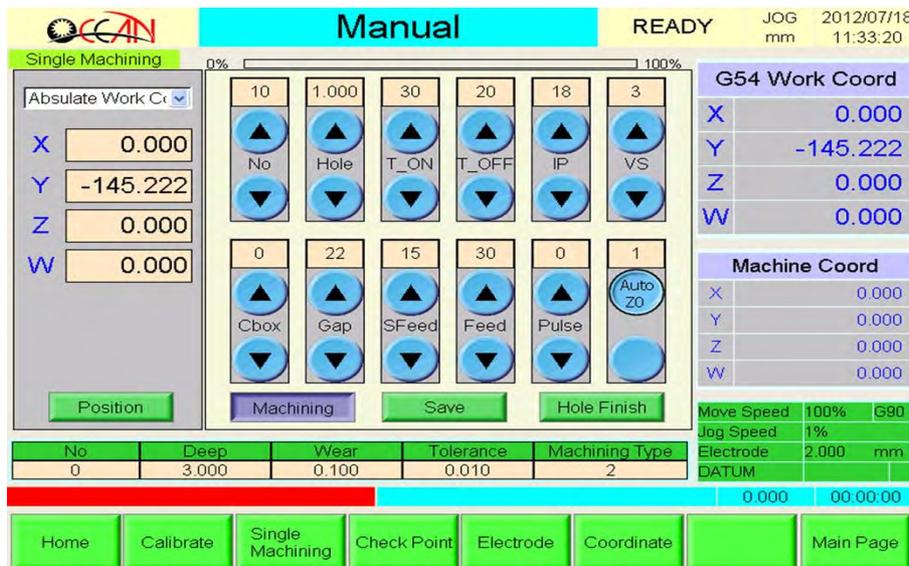


Figure 4-3-7 Single Mach Screen

Operating instructions:

1. Set mach. deep: Cursor move to deep list **NO.** field ,then according to the prompt of prompt field, input the parameter value set of the depth table, Finally press **Save**, and the input depth set is saved to the depth value of the group. This can facilitate an operator in setting the depth value of the group in the single mach. screen.
2. Set mach. condition: Cursor move to deep list **NO.** field ,then according the prompt of prompt field, input the parameter value set of the condition table, Finally, press **Save**, and the input condition setting is saved to the cond value. If the current condition table file is DEFAULT.CON, saving does not function here.
3. Clear M. Time: The work time field is placed in the under right part of the screen, recording the total mach. time. To understand the time required by a single mach, it is necessary to set the total mach. time to zero. Double click at field of total machining time, Thus it is able to return the total mach. time to 0.
4. Spark mach.: Press **CYCLE START**, and start a single spark mach immediately. During the spark mach process, the spark parameter of the condition table can be altered at any time, but the mach. Depth setting of the deep table can't be altered. Press **Save**, and save the condition value and depth value of the group. If the file of condition table is DEFAULT.CON, the condition table cannot be saved. During

machining, press **RESET**, and the system stops spark mach. Immediately, Then press **CYCLE START**, and the system continue the spark mach. You can observe the mach. Completion percentage in the upper part of the window to see the current mach. Status and progress.

During machining, due to some reason, the operator doesn't want to continue this hole machining, the operator can press **Hole Finish**, it can stop to machining, then back tool to safe height, the machining will stop.

Position function provide the operator to quickly move the electrode to set coordinates point(It can be set for work coordinates., mechanics coordinates or relative coordinates.)Respectively to set the X, Y, Z and W-axis moves the location or distance, the operation screen as shown in Figure 4-3-8.

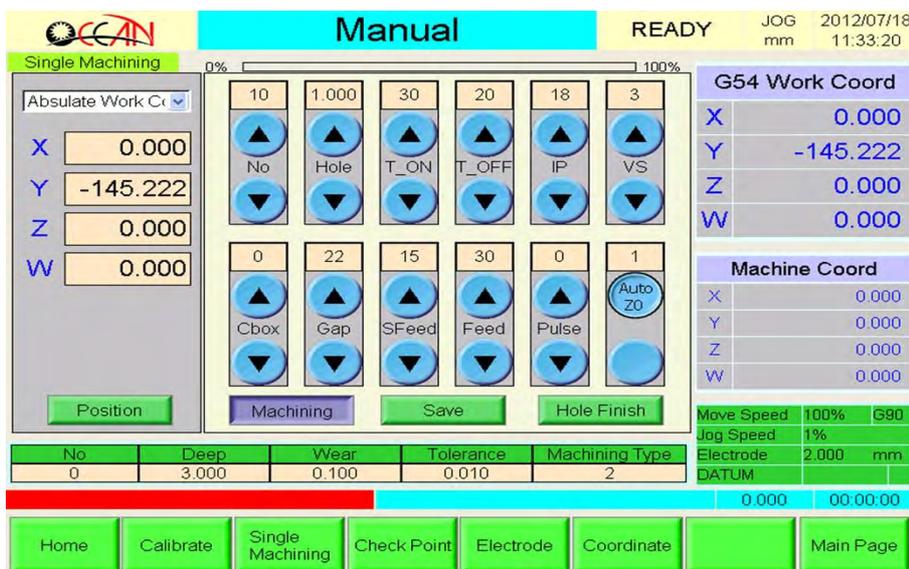


Figure 4-3-8 Position Screen

Operating instructions:

1. Coord selection: Select coordinate to move. Press **Drop down options** to select the desired movement coordinate.
2. Distance set: Set position coordinates of this coordinate, The cursor moves to the file of the moving distance. With input the value by numeric keys.
3. Start position: Press **CYCLE START**, and the system automatically move the electrode to the original set point. When the function is started, the system status field of the screen displays **Machining**. After

the motion is completed, the status field of the system displays
READY.

For instance: select the work coordinate and set the distance as X:10.0
Y:20.0 Z:30.0 W40.0. Then press **CYCLE START**, and the system starts from the
position of X, Y, Z to the work coord of X10.0 Y20.0 Z30.0 W40.0.

4.3.4 Set Check Point

Set Check Point is mainly suitable for setting the check point in easy method. Abs. CheckPT ;Mach Coord; Rel. CheckPT; Rel. Coord of drilling hole position. This function is mainly setting the check point coordinate after calibration. Before machining, it need to set check point coord. To convenient during machining electrode run out to process electrode run out measure of change electrode steps, The screen is as figure 4-3-9.

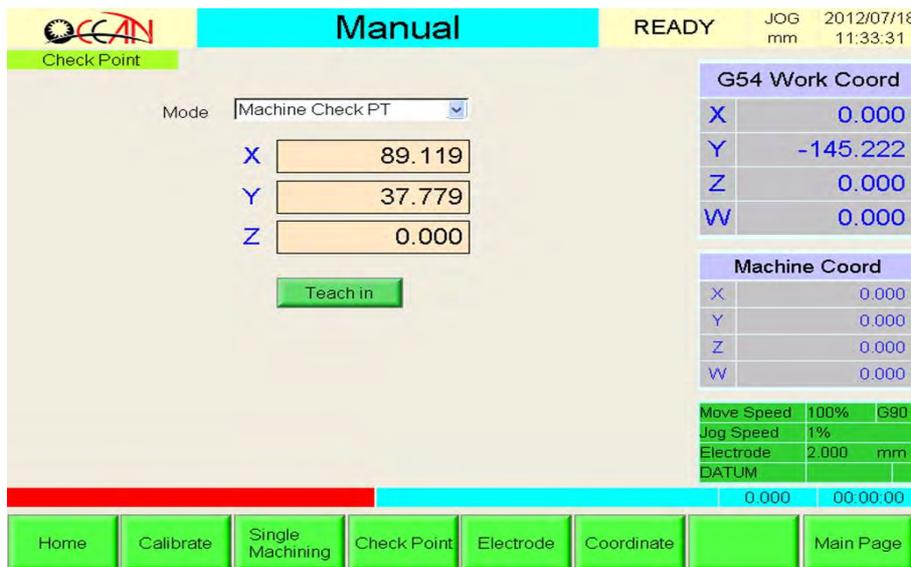


Figure 4-3-9 Set Check Point Screen

Operating instructions:

Please move the electrode to the position above the check point. Then press **Teach In**. In this moment, system copy the machine coordinates to the Set Check Pt window as figure 4-3-8. Double click to enter the value of the field can be used to enter the setting. Setting value set to check point coord, you can use the **System Param** of the screen to look up the setting value if set these coordinates to check point. If operator wants to save the check point coordinate, please press **Save**; If no save, it recover to original value after rebooting up.

4.3.5 ELECTRODE

This function provide operator to set the electrode size for the system to automatically rectify electrode radius. The screen is as figure 4-3-10.

Operating instructions:

1. Input the electrode diameter : Double click to enter the value of the field can be used to enter the electrode diameter values.

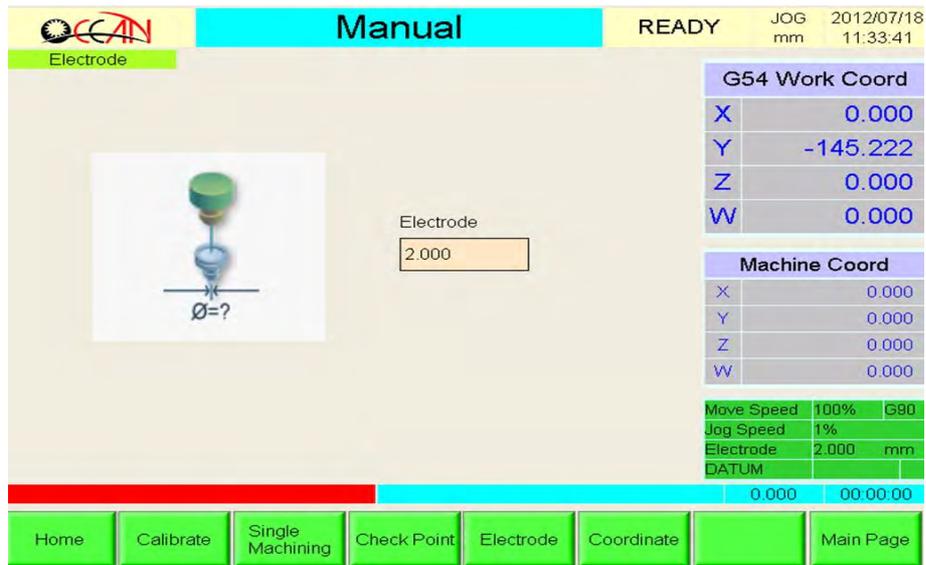


Figure 4-3-10 Set electrode size screen

4.3.6 Coordinate

General operation numerical, it may on a workpiece that different location do same of repeat processing, at this time can using coordinates system G54 to G59 that six G code representative six different coordinates system, convenient for each repeat processing, grabbing each location on machinery coordinates, to make use of execute processing,for each the same processing one by one execute processing, The screen is as figure 4-3-11.

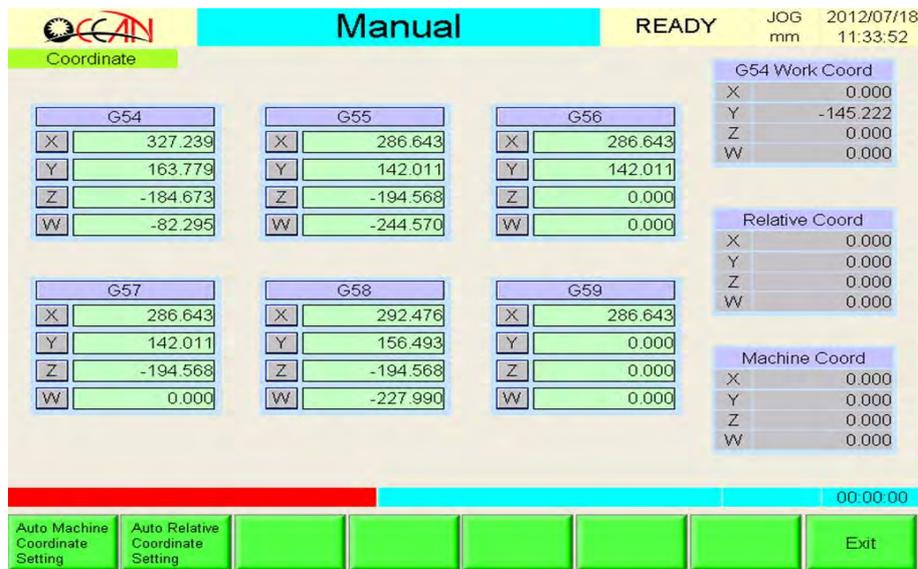


Figure 4-3-11 setting electrode size screen

Operating instructions:

1. Change work coord: click one of the group **G54~G59** to change work coord, if you want to change the coord location that can double click to input value on this coord location.
2. Auto machinery coord set: If you want to make into machinery coord., first click **Coord Instructions Format G54~G59** and then select the desired setting of the **Coord X, Y, Z, W** then click **Auto Machinery Coord Set**, the machinery coord will automatically input.
3. Auto Rel. coord set: if you want to make into Rel. coord, first click **Coord Instructions Format G54~G59** and then select the desired setting of the **Coord X, Y, Z, W** then click **Auto Rel. coord set**, the Rel. coord will automatically input.

G54...G59 : Work coord system set.

Instruction Format :

{
G54
G55
G56
G57
G58
G59
}

X 、 Y 、 Z 、 W to set the work coord system at the specified location ;

4.4. EDIT

This model provides an operator with the functions of editing mach. prog and of retrieving and editing files, This system use general G/M cord machine prog, the screen as figure 4-4-1.

Press **Edit**, and the system enters the prog edit mode. This provides an operator with the integration environment of edit mach prog and the function of file handling. Under the prog edit mode, it is able to directly virtual key in English characters or edit the mach. prog by the numeric key method to edit G/M code machine prog.

This mode also offer operator function of background edit machining prog, it is machining condition of auto, you can enter this mode to edit machining prog, include machining prog, but it need to notice that avoid to be modified machining prog, the machining prog can edit modify but can not save, until machining finish will save.



Figure 4-4-1 Edit Mode Screen

The following program is suggested. It is proposed that the starting blocks are M03(spindle CW) and M08(fluid ON),the end block is M02(program end, fluid off and spindle stop).

M03;	→Spindle CW
M08;	→Fluid ON
G92 X0.000 Y0.000 Z0.000 W0.000;	→Set Work coordinate to (0,0,0)
M36 D0 E0;	→Drilling with D Group 0 and E Group0
G00 X10.000 Y0.000 Z0.000;	→Absolute Position (10,0,0)
M36 D0 E0;	→ Drilling with D Group 0 and E Group0
G00 X0.000 Y10.000 Z10.000;	→ Absolute Position (0,10,10)
M36 D1 E1;	→ Drilling with D Group 0 and E Group0
G00 X10.000 Y10.000 Z10.000;	→ Absolute Position (10,10,10)
M36 D1 E1;	→ Drilling with D Group 0 and E Group0
M02;	→ program end, fluid off and spindle stop

This program is variable deepness machining with 4 holes in work coordinate, first mach. one hole on coord (0,0,0), (10,0,0), then mach. one hole on coord. (0,10,10) and (10,10,10). As for mach. deep and mach. condition, regarded as the content of the group of condition table is 0 and the group of deepness table is 0. About the deepness table and condition table, please refer to 4.5.1 DEEP and 4.5.2 CONDITION.

In Edit screen, include **File**, **Block**, **Search**, **Function** and **Help**...function key, below instruction for every function key:

- ◆ **FILE:** After pressing **File**, enter the relevant handling window to the file. It is used in handling the relevant handling work to the file. Regarding the detailed description, please see 4.4.2 File.
- ◆ **Block:** After pressing **Block**, enter the relevant handling window to the file. It is used in handling block method of the relevant edit work. Regarding the detailed description, please see 4.4.4 File.
- ◆ **Search:** After press **Search**, enter the window of dialogue edit machining prog, use dialogue window to convenient operator to edit machining prog, please see 4.4.5 dialogue edit.
- ◆ **Function:** After press **Function**, enter the relevant handling window of the function, it is used in handling edit work of cut file change file and Circular, the square, please see 4.4.6 File.
- ◆ **Help:** After press **Help**, enter the online help screen, when edit prog, enter this screen to look up GM Code instruct, then convenient to edit.

4.4.1 FILE

This provides copying or deleting, etc function. This includes open a file, save a file, save as another file, copy file, or delete file. This place also can transfer for wire cut start hole CAD/CAM machining prog. File information, regard to wire cut transfer file see 4.4.4.1 wire cut transfer file.

Under the edit mode, press **File** to enter the file mode. The screen is as shown in Figure 4-4-2. The description of each function key of the file mode is as follows:



Figure 4-4-2 Prog. Edit-File Screen

(1) LOAD FILE

The function can load the workpiece prog on the disc into the system memory. Press **Load File** to start the function, and show on Edit-File window. The screen is as shown in Figure 4-4-3.

Operating method:

To choice left source catalog, The disc folder name list field in the right bottom is the folder directory of each disc for switching to each disc. When operating, use the up and down keys to move the cursor to select the file or disc folder name. Open file method : use the mouse to move the cursor to upper file with double click at file name field, or on the panel to input the complete file name directly. Then press **ENTER**.



Figure 4-4-3 Open File Screen

(2) SAVE FILE

The purpose of the function is to save the mach. Prog. file in the system memory to the disc and to display the prompt that the file saving is completed on the screen. Press **Save File** to start the function.

- ✧ **Note** : When system is in background edition, in order to avoid influencing the executing program, the executing program can be edited but not be saved. After finishing execute, it can be saved.

(3) New File

The purpose of the function is to clear the editing text and open a new file to provide editing. Press **New File** to start the function.

(4) SAVE AS

The purpose of the function is to save the mach. prog file in the system memory to another new file. Use **Save As** to start the function and the operating method of the operating window for **Input or select new file name** is the same from that of open file. If you succeed in saving the file, the report of file saving completed is displayed on the screen.

Note : When system is in background edition, in order to avoid influencing the executing program, the executing program can be edited but not be saved.

After finishing execute, it can be saved. If you want to save as new file with current machining file, then it will be not allow.

(5) Delete File

The purpose of function is delete file in the cursor select that desired delete file, press Delete to clear.

4.4.2 Block

This function due to this machine model has no keyboard, so set up a virtual keyboard, but it needs a lot of copied or cut when the same block through the establishment of this functionality in order to operator convenient to operation.

4.4.2.1 Cut

This function for the user to select blocks, cut by blocks way.

4.4.2.2 Copy

This function for the user to select blocks, copy by blocks way.

4.4.2.3 Paste

This function for the user to select blocks, paste by blocks way.

4.4.2.4 Delete

This function for the user to select blocks, delete by blocks way.

4.4.3 Search

This feature allows users to search for string functions movement, the screen as shown in Figure 4-4-4.

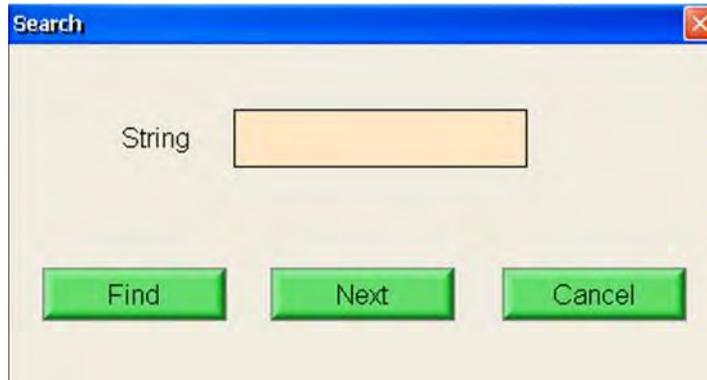


Figure 4-4-4 Search screen

4.4.4 Function

This function provides the user dialogue editing, or wire-cut file transfer the file.

4.4.4.1 Wire Cut Program

Mold processing industry, wire EDM plays a very important role, particularly in stamping die. Before machining in wire cut machine, some mold need to machining the initial hole so that they can be through the wire. Some The application of the drilling EDM is machining the initial hole in wire cut machine.

When user draws the drawing in software Auto CAD, then use the CAM transfer to the wire cut program. You can use this feature directly transfer to CAD/CAM cutting program to drilling EDM machining program, you don't need to re-editing program. When executed, the system automatically converts the start hole for drilling hole processing coordinates, the other codes in the wire cut program will be skipped.

In transferring, the system read the wire cut file. When it read the G92 command, it will automatically determine the start hole location. So as it is transferring the XY value after G92 or G00 to the drilling hole or G00 coordinate. For example, there is a block as shows.

G92 X10.000 Y20.000 or G00 X10.000 Y20.000

After transferring, the drilling code is this two block as

G00 X10.000 Y20.000

M36;

The meaning is running G00 and moving to (10.0, 20.0), and running M36 to drill at that point.

In the edit mode/file mode, press **Wire Cut** to enter this mode. The frame shows as figure 4-4-5. The function keys will be explained as follows.

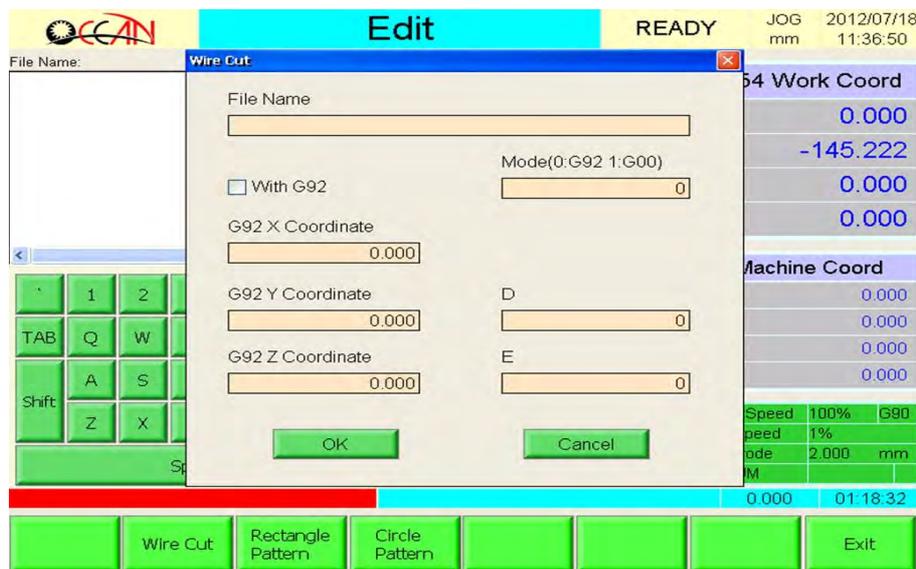


Figure 4-4-5 the transferring Wire Cut Program Frame

- ◆ **Select File** : The cursor click file name field, it can appear 『Select file』 window, Then handle this choose file.

Operating instructions:

1. Select File : The cursor click file name field, it can appear 『Select file』 window, Then key that want to load Wire cut file with mouse, direct key or input type...etc.
2. Set Mode : The cursor switch to set mode field, and set mode with numeral ,0: mean G92, 1 :mean G00.
3. Set G92 Coordinate: move the cursor to the G92X Y Z fields with direction key, or after input this field, press Enter key, it moves to next field, and set the G92 X Y Z coordinate value in number key.
4. Set Deepness Group : move the cursor to the D field, set the deepness

group in number key.

5. Set Condition Group : move the cursor to the E field, set the condition group in number key.
6. OK : Press **OK**, then the initial hole coordinate of the wire cut file will be transfer to the drilling program in GM Code, and show on program Edit window.
7. Save File : Press **Save File** to save the drilling program to disc transferred from wire cut file as a file.
8. Execute the process :Switch to the Multi-Hole mode, and load the process program transferred from wire cut file. Then executing the processing.

4.4.4.2 RECT PATTERN

A user can edit a rect pattern composed of circle holes in simple dialog edit mode. The machined figure is as shown in Figure 4-4-6. Each solid and empty circle point stands for a machined fine hole. The screen of the dialog edit window is as shown in Figure 4-4-7. The following is the description aiming at the meaning that each input field in the dialog edit window stands for.

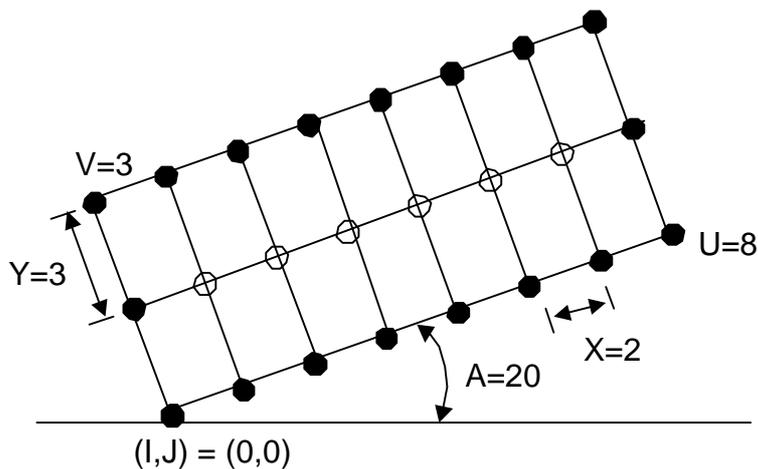


Figure 4-4-6 Rect Pattern Specification Illustration

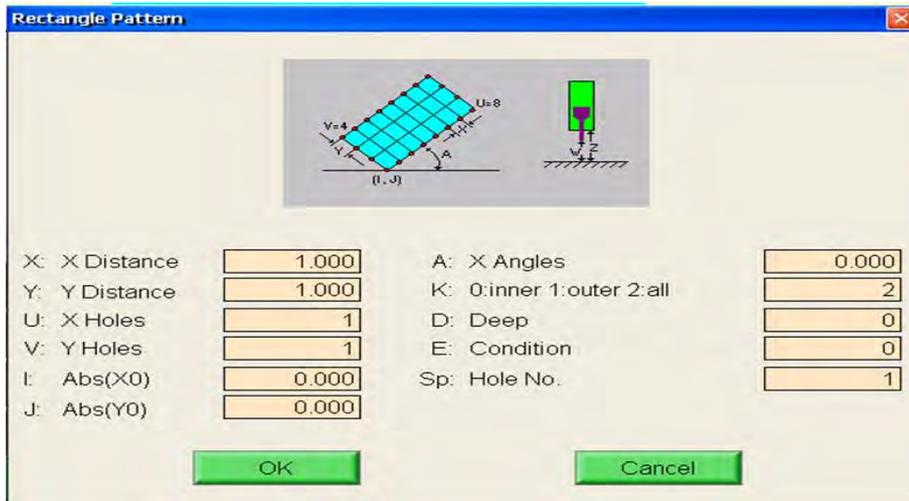


Figure 4-4-7 Rect Pattern Screen

- X:** X Dis. Set, input range bigger than 0. the distance between each hole in rect patt. X. In Figure 4-4-21, the distance of X is 2mm so X is 2.
- Y:** Y Dis. Set, input range bigger than 0. the distance between each hole in rect patt. Y. In Figure 4-4-21, the distance of Y is 3mm so Y is 3.
- U:** X Holes Set, input range bigger than 0 and integer. the holes in rect patt. X. In Figure 4-4-21, the holes of X have 8 so U is 8.
- V:** Y Holes Set, input range bigger than 0 and integer. the holes in rect patt. Y. In Figure 4-21, the holes of Y have 3 so V is 3.
- I:** Abs(X0) Set, input range bigger than 0. X coord of rect patt StPt. In Figure 4-4-21, the StPt of X coord is 0 so I is 0.
- J:** Abs(Y0), input range bigger than 0. Set Y coord of rect patt StPt. In Figure 4-4-21, the StPt of Y coord is 0 so J is 0.
- A:** X Ang, input range bigger than 0 and smaller than 360. Set X Ang between X in rect. pattern and X in work coord. In Figure 4-4-21, the angle between X in rect. pattern and X in work coord is 20°so A is 20.
- K:** rect. (ARR) , input range 0,1 or 2. Set the type of rect. (ARR). It can be set 0, 1 or 2.0 stands for the empty array of rect. pattern, and the completed figure only has solid circle points in Figure 4-4-21. 1 stands for the inner array of rect. pattern and the completed figure only has empty circle points in Figure 4-4-21. 2 stands for setting a rect. pattern as a solid rect. pattern and the completed figure includes the solid circle points and empty circle points in Figure 4-4-21.
- D:** Set the group no. of used depth table, input range 0~99 integer.
- E:** Set the used group no. of used cond table, input range 0~99 integer.

Sp: Set the machine start hole no., input range 1~99999 integer.

When each field is input, and then **OK** is pressed, the system auto-generates mach. prog of rect pattern in edit mode window.

The program as following is transferred by Rect. Pattern. The input data is showed in the second block G72. X Dis. is 5.0, Y Dis. is 5.0, X Holes U is 2, Y Holes V is 3, Abs(X0) I is 10.0, Abs(Y0) J is 10.0, X Ang. A is 45, rect (ARR) K is 2, D code is 0 and E code is 2, start hole no. Sp is 1.

<code>/* Rect Pattern Start *</code>	<code>→ Rect. Pattern</code>
<code>Start /* G72 X5.000 Y5.000 U2 V3 I10.000 J10.000 A45.000 K2 D0 E2; */</code>	<code>→ Original</code>
<code>Input Data</code>	
<code>G90;</code>	
<code>N1 G00 X10.000 Y10.000;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>N2 G00 X13.536 Y13.536;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>N3 G00 X6.464 Y13.536;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>N4 G00 X10.000 Y17.071;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>N5 G00 X2.929 Y17.071;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>N6 G00 X6.464 Y20.607;</code>	<code>→ Transferred Point</code>
<code>M36 D0 E2;</code>	
<code>/* Rect Pattern End */</code>	<code>→ Rect. Pattern End</code>

4.4.4.3 CIRCLE PATTERN

A user can edit a circle pattern composed of circle holes in simple dialog edit mode. The machined figure is as shown in Figure 4-4-8. Each solid circle point stands for a machined fine hole, and the screen of dialog edit window is as shown in Figure 4-4-9. The following is the description of what each field in the dialog edit window stands for.

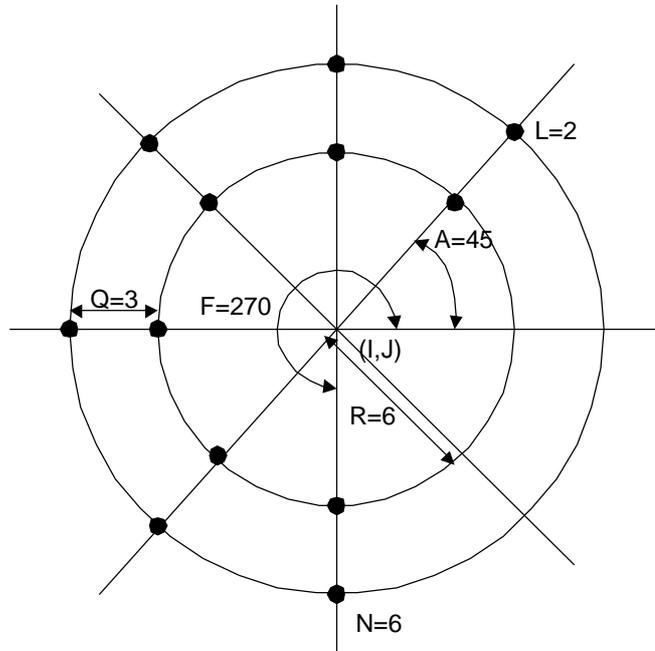


Figure 4-4-8 Circle Pattern Specification Illustration

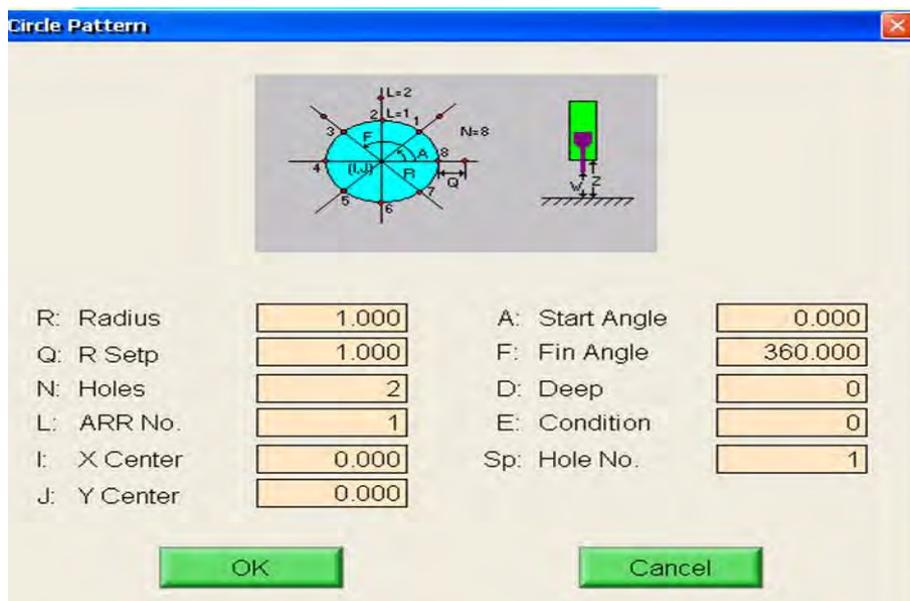


Figure 4-4-9 Circle Pattern Screen

- R:** Radius , Input range bigger than 0. Set the radius of the inmost circle in the circle pattern. In Figure 4-4-8, the radius of the inmost circle in the array is 6mm so R is 6.
- Q:** R Step, input range bigger than 0. Set the distance between each circle in the circle pattern. In Figure 4-4-8, the distance between the second circle and the inmost circle is 3mm so Q is 3.
- A:** St Ang. The input range is from 0 to 720. Set the angle (angle 0 stands for X direction of work coord) of the first hole in each circle in the circle pattern. In Figure 4-4-8, due to the angle of the first hole is 45°, A is 45.
- F:** Fin Ang. The input range is larger than A and smaller than $A+360^\circ$. Set the angle of the last hole of each circle in the circle pattern. In Figure 4-4-8, due to the angle of the last hole is 270°, F is 270.
- N:** Holes. Input range bigger than 0 integer. Set the total hole no. in each circle (including the first hole and the last hole). In Figure 4-4-8, due to the fact that each circle has 6 holes, N is 6.
- L:** ARR No. Set the total circle no. in the circle pattern. In Figure 4-4-8, due to the fact that there are total 2 circles, L is 2.
- I:** Abs(X0), input range bigger than 0. Set X coord of the center in the circle pattern. In Figure 4-4-8, due to the fact that X coord of the center in the circle pattern is 0, I is 0.
- J:** Abs(Y0), input range bigger than 0. Set Y coord of center in the circle pattern. In Figure 4-4-8, due to the fact that Y coord of the center in the circle pattern is 0, J is 0.
- D:** Set the group no. of used depth table, input range 0~99 integer.
- E:** Set the group no. of used cond table, input range 0~99 integer.
- Sp:** Set the machining start hole no., input range 1~99999 integer.

When each field is input and then is pressed, the system auto-generates the prog of rect pattern or circle pattern in edit mode window.

The program as following is transferred by Circle Pattern. The input data is showed in the second block G71. Radius R is 3.0, R Step Q. is 4, St Ang. A is 0°, Fin Ang. F is 180°, Holes N is 4, ARR No. N is 2, Abs(X0) I is 2.0, Abs(Y0) J is 2.0, D code is 3 and E code is 5, start hole no. Sp is 1.

/* Circle Pattern Start */

→ Circle Pattern Start

/* G71 R3.000 Q4.000 N4 L2 I2.000 J2.000 A0.000 F180.000 D3 E5; */ → Original Input Data

G90;

N1 G00 X5.000 Y2.000;

→ Transferred Point

M36 D3 E5;

N2 G00 X3.500 Y4.598;

→ Transferred Point

M36 D3 E5;

N3 G00 X0.500 Y4.598;

→ Transferred Point

M36 D3 E5;

N4 G00 X-1.000 Y2.000;

→ Transferred Point

M36 D3 E5;

N5 G00 X9.000 Y2.000;

→ Transferred Point

M36 D3 E5;

N6 G00 X5.500 Y8.062;

→ Transferred Point

M36 D3 E5;

N7 G00 X-1.500 Y8.062;

→ Transferred Point

M36 D3 E5;

N8 G00 X-5.000 Y2.000;

→ Transferred Point

M36 D3 E5;

/* Circle Pattern End */

→ Circle Pattern End

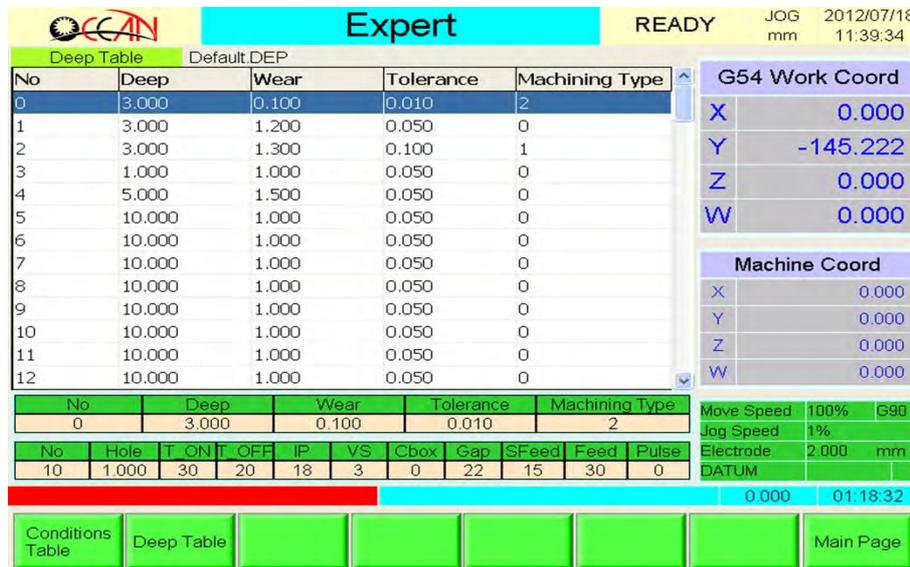
4.4.5 Explanation

G code	G00	Positioning
	G04	Hold for Seconds
	G05	Positioning with No-Guard
	G36	Hole Process
	G53	Machine Coordinate position
	G80	Edge Searching
	G82	Locate Groove Center
	G83	Locate Inner Hole
	G84	Locate Outer Center
	G85	Locate Circular Cylinder Center
	G86	Corner G86 P1 X Y W mode P1 P2 P3 P4
	G90	Absolute Coordinate
	G91	Relative Coordinate
	G92	Work Coordinate Point Setting
M code	M01	Program Hold
	M02	Machining END, Spindle Stop, Fluid Supply Stop, Return to Initial Program
	M03	Spindle CW
	M05	Spindle Stop
	M06	Guide Change
	M08	Fluid Supply Start
	M09	Fluid Supply Stop
	M11	Coolant on
	M12	Coolant off
	M20	Electrode Change
	M36	Machining a Hole
	M98	Calling sub-program
	M99	Sub-program end
D code	D0~ D99	Call the group of the deepness table
E code	E0~ E99	Call the group of the condition table

List 4-1 G M Code

4.5. CONDITION DEEP

The mode provide that operator can edit machining condition Table and deep table, the system use machining prog. in general G/M code, as below figure 4-5-1.



No	Deep	Wear	Tolerance	Machining Type
0	3.000	0.100	0.010	2
1	3.000	1.200	0.050	0
2	3.000	1.300	0.100	1
3	1.000	1.000	0.050	0
4	5.000	1.500	0.050	0
5	10.000	1.000	0.050	0
6	10.000	1.000	0.050	0
7	10.000	1.000	0.050	0
8	10.000	1.000	0.050	0
9	10.000	1.000	0.050	0
10	10.000	1.000	0.050	0
11	10.000	1.000	0.050	0
12	10.000	1.000	0.050	0

No	Deep	Wear	Tolerance	Machining Type
0	3.000	0.100	0.010	2

No	Hole	T_ON	T_OFF	IP	VS	Cbox	Gap	SFeed	Feed	Pulse
10	1.000	30	20	18	3	0	22	15	30	0

Move Speed	100%	G90
Jog Speed	1%	
Electrode	2.000	mm
DATUM		

0.000 01:18:32

Figure 4-5-1 Expert Screen

Press **Cond. Deep**, the system enter condition deep, this function provide that operator can modify machining condition and deep table.

4.5.1. CONDITION TABLE

The condition table can save multiple sets of mach. parameters. When machining different materials, the mach. cond parameters of different groups are loaded. This can save an operator's setting time. The other method is to save the cond tables with different materials as individual file (ext. file name is .CON). When machining the different materials, load individual cond table file. The purpose of the cond table mode is to allow an operator to edit the environment of cond table mach. param.

Press **Cond. Deep**-> **Cond. Table** to enter the cond table. The display screen is as shown in Figure 4-5-2. The upper part of the screen is the cond table general list which can review the setting of each set of cond values. Each cond table can totally save 100 sets of mach. param conditions. From 000 to 099, each set has 14 mach. parameters which can be set. **Current Cond. File**: in the bottom left of the screen is the file name of the current display cond table.

The bottommost of the screen displays the mach. cond value param of

Current use condition param. which is the same as the group no. displayed in the first field NO. The param group is one of 100 sets of cond tables. In addition, the cond value group in single mach and multi mach screens is that of Current use condition param. When the group or the param. is altered anywhere, save it and the other two places will be altered with it.



Figure 4-5-2 Condition Tab. Screen

In condition tab., use click to move to different groups or param. fields. And then input the set value of individual param. by numeric keys in accordance with the prompt field gives.

As shown in Figure 4-5-2, the cond table edit screen function keys:

- ◆ Use: Press **Load File**, and reflect the condition param. of the group where the cursor places to **Current use condition param.** field. This means that the group with param. set of **Current use condition param.** be updated to the group of the cond table where the cursor places.
- ◆ Save ToTxt: Save condition table by ToTxt.

The meaning of each mach. param.:

The following table is the meaning of the condition parameter. The input range and the column of parameter may be different, but the meaning is the same.

param.	meaning	Input value range
Hole	diameter size of electrode	0.01~3.0 mm
T_ON	spark time	5~99 us
T_OFF	stop time	5~99 us
I_P2	mach. peak value electric current 2	1~25 level
V_S	work voltage selection	1~3 level
C_P	mach. capacity	0~15 level
VGap	gap voltage during machining	00~100 level
S_F	SPINDLE rotating speed	0~15 level
M_F	The max. speed setting of spark machining	0~100%
AUX	Auxiliary param.(mach. at fixed speed)	0~1 level

4.5.2. DEEP TABLE

A deep table can save multiple sets of deep param. When machining different depths or with different wears, load different sets of deep params. to facilitate an operator in operating, which can save the setting time. The purpose of a deep table is to allow an operator to edit the environment set by the depth from the deep table.

Press **Deep Table** to enter the mode. The display screen is as shown in Figure 4-5-3. The upper part of the screen is the general list of deep table that can review the setting of each set of depth value. A deep table can totally save 100 sets of depth and wear values. From 00 to 99, each set can set **Desired Deep**, **Wear**, **Error** and **Mach. Type**. The bottommost part of the screen displays the group and its param. of **Current use deep param**. The used deep value group must be one of the 100 sets of deep tables. Additionally, the deep param. in the lower part of above-mentioned single mach. screen is the deep value group of **Current use deep param**. When the group or the param. is altered anywhere, save it and the other two places will be altered with it.

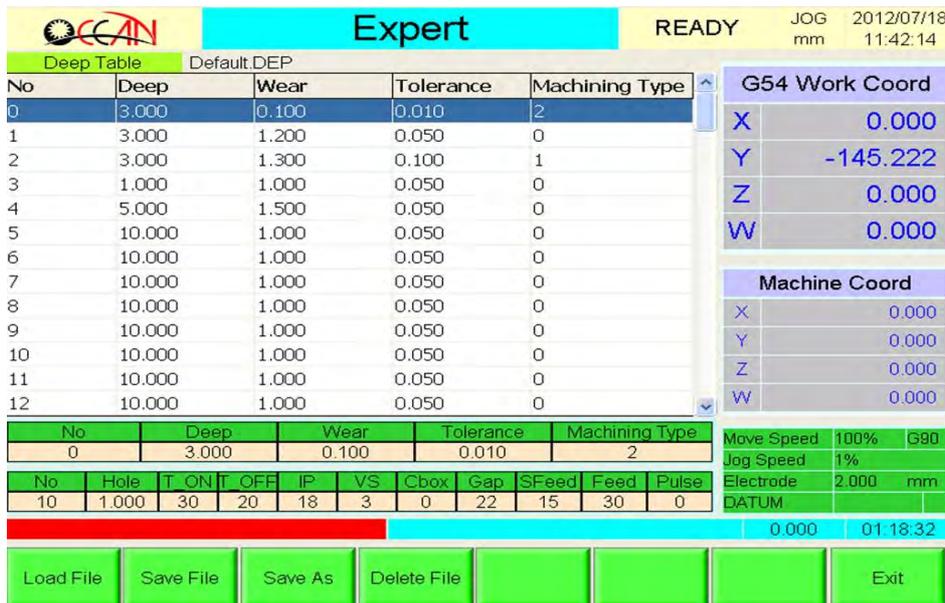


Figure 4-5-3 Deep Table Screen

In deep table can move to different group or parameter field, then according with the prompt field prompt to set individual parameter setting value with number key.

As shown the figure above, the edit screen function keys:

- ◆ Use: Press **Load File**, and the deep param. where the cursor places reflect to **Current use deep param**. field. This means the group of **Current**

use deep param. is updated as the group where the cursor places.

- ◆ Save ToTxt: Save condition by ToTxt.

The meaning of each mach. deep param.:

param.	meaning	Input value range
Desired Deep	Sets the desired real depth	0.000 ~99999.999 -1: not use the deep setting
Wear	Records wear value	0.000 ~99999.999
Error	Records error value	0.000~99999.999
Mach. Type	Sets the mach. for blind hole or through hole	0: Blind hole; 1: Through hole 2:Accuracy blind hole

✧ **Caution:**

If the mach. type is blind hole, the total deep is “Desired Deep ” + “Wear”;
 if the mach. type is through hole, the total deep is ”Desired Deep”+ “Wear”
 + ”Through Hole Compensate”. The through hole compensate is set in the
 system param. of the custom param.. Please see 4.8.1 Custom param.
 If the mach. Type is accuracy blind hole, the total Deep is “Desired Deep”, after
 finish hole, to Check PT confirm electrode wear, then supply mach. Wear,
 then confirm wear value , as so repeat, until the error below setting
 range.

4.6. ALARM

This mode is to display the system occur all error and alarm after turn on machine. Through the alarm message display and record, it will easy diagnosis and maintenance for system.

Under the system param. mode, the function key **Alarm** to enter the mode. At this time, the system mode field displays **Alarm**. Below figure 4-6-1 is Alarm display screen. Figure 4-6-2 is History Alarm screen. If record information over one page, to use up and down key to change page. If this record file will be recorded into the file, please save this screen to file by ToTxt.

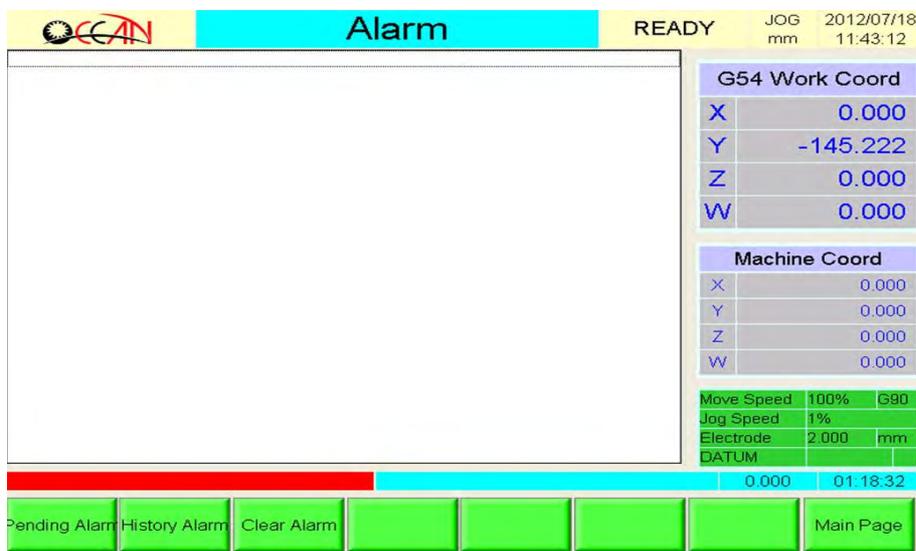


Figure 4-6-1 Pending Alarm Screen



Figure 4-6-2 History Alarm Screen

4.7. Parameter Set

This function offer operator display about repairing diagnosis information. This mode: Custom Parameter, MLC , Pitch Error, Diagnose, Timer Date Internet, Version...etc. mode, diagnosis for system status display, Including IOCSA Bit, Register, Timer, Counter and Ladder...etc. sub mode, all parameter only do display function, it can't to modify.

No	Description	Unit	Value
1	Unit:[0:inch;1:mm]	-	1
2	Language:[0:ENG;1:CHI;2:JP;3:GER;4:FRA]	-	0
3	reserve	-	0
4	Back Distance in Edging	um	1000
5	Back Distance In 5-6th Axes Edging	udeg	1000
6	reserve	-	0
7	Chect Electrode Before Machining	-	1
8	Back Distance in Machining Edging	um	200
9	reserve	-	0
10	Through Hole Compensation	um	1000
11	reserve	-	0
12	Z Axis Machinig Safety Height	um	10000
13	W Axis Machinig Safety Height	um	3000
14	reserve	-	0
15	ATC Enable(0:Disable;1:Enable)	-	0
16	Electrode length in clamp	um	100000
17	Electrode length at manual tool change	um	300000

G54 Work Coord	
X	0.000
Y	-145.222
Z	0.000
W	0.000

Machine Coord	
X	0.000
Y	0.000
Z	0.000
W	0.000

Move Speed	100%	G90
Jog Speed	1%	
Electrode	2,000	mm
DATUM		

0.000 01:18:32

Custom MCS Pitch Diagnose DateTime Network Version Main Page

Figure 4-7-1 System Screen

4.7.1. Custom Parameter

This mode is to allow an operator to set the system operate custom.

Under the system param. mode, use the key function **Custom param.** to enter the mode. At this time, the system status field displays **Custom Param.** Figure 4-7-2 below is customer param. setting screen.

No	Description	Unit	Value
1	Unit:[0:inch;1:mm]	-	1
2	Language:[0:ENG;1:CHI;2:JP;3:GER;4:FRA]	-	0
3	reserve	-	0
4	Back Distance in Edging	um	1000
5	Back Distance In 5-6th Axes Edging	udeg	1000
6	reserve	-	0
7	Chect Electrode Before Machining	-	1
8	Back Distance in Machining Edging	um	200
9	reserve	-	0
10	Through Hole Compensation	um	1000
11	reserve	-	0
12	Z Axis Machinig Safety Height	um	10000
13	W Axis Machinig Safety Height	um	3000
14	reserve	-	0
15	ATC Enable(0:Disable;1:Enable)	-	0
16	Electrode length in clamp	um	100000
17	Electrode length at manual tool change	um	300000

G54 Work Coord	
X	0.000
Y	-145.222
Z	0.000
W	0.000

Machine Coord	
X	0.000
Y	0.000
Z	0.000
W	0.000

Move Speed	100%	G90
Jog Speed	1%	
Electrode	2,000	mm
DATUM		

0.000 01:18:32

Custom MCS Pitch Diagnose DateTime Network Version Main Page

Figure 4-7-2 Custom Screen

4.7.2. SYSTEM PARAMETER

Press **System Param.** Enter this mode, the purpose is to allow an operator to plan the specification and feature of the system, to set the custom param. and display relative maintenance and diagnosis information.

This mode: Custom Parameter, MCS, Pitch Error, Timer Date Internet, Diagnose and Version...etc. mode. To modify system parameter don't need confirm password, other system parameter, pitch error which need to check the password, then set parameter value, it is to avoid the system characteristics parameters are modified.

Operating method:

Parameter modify:

Double click to input data by number key, system parameter, pitch compensation can't be modified without having to complete checking password, press the **MCS** or **Pitch Error** to open the password window with input password, after finish the password check, such as **MCS** and **Pitch Error**, it can process action of check and modify parameter.

* Only the users who are authorized for modification (needs to pass the **Maker password** confirmation) can modify the system param. of MCS. Before finish password confirmation, it can't appear this function key, it can't enter this function list , press **MCS** key to start password window to input password and auto-appear enter this function key.

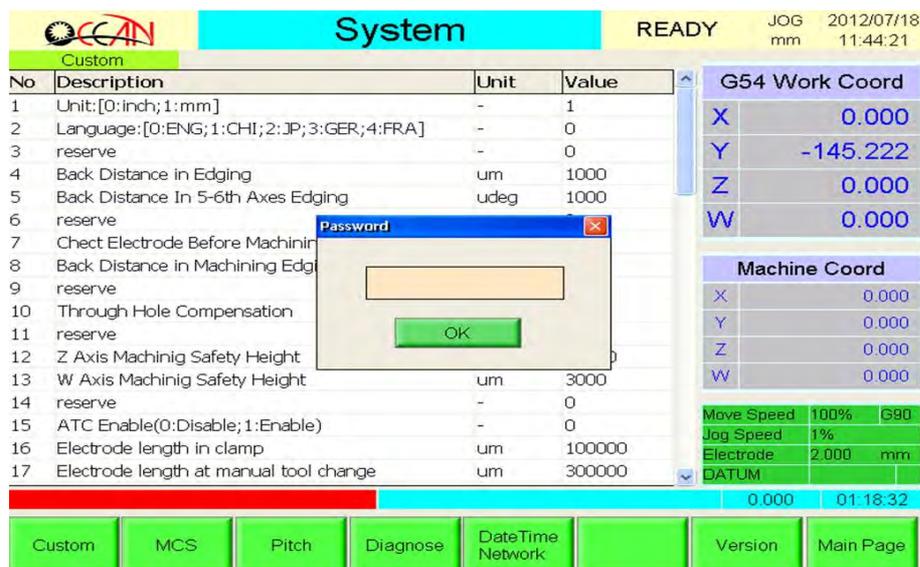


Figure 4-7-3 MCS parameter Screen

4.7.3. PITCH

This mode is to display the setting situation of the system pitch error

compensation data. When pitch error function of the system is used, you can set this environment for a system of pitch error.

Under the system param. mode, use the function key **PITCH Error** to enter the mode. At this time, the system mode field displays **PITCH Error**. Figure 4-7-4 below is Pitch Error screen.

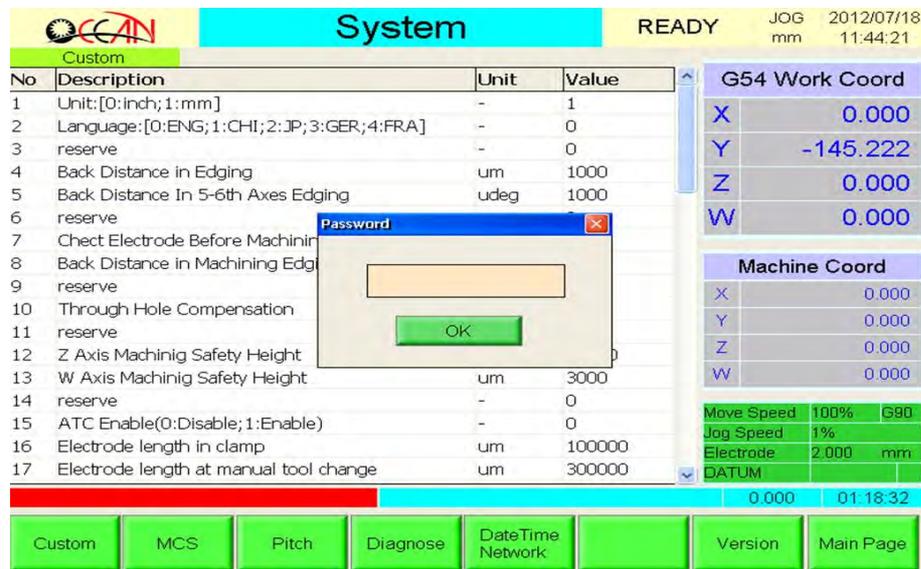


Figure 4-7-4 Pitch Error Screen

- * Only the users who are authorized for modification (needs to pass the **Maker password** confirmation) can modify the system param. of Pitch Error. Before finish password confirmation, it can't appear this function key, it can't enter this function list , press **PITCH Error** key to start password window to input password and auto-appear enter this function key.

4.7.4. Diagnose

This mode is to display the situation of the diagnose and maintance information. This mode: PLC, System Data, Global Data, Macro Data...etc. mode, include IO Bit, C Bit, S Bit, A Bit, Timer, Counter and Ladder...etc. sub mode. Below figure 4-7-5 is Diagnose display screen.



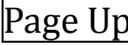
Figure 4-7-5 Diagnose Screen

4.7.4.1 PLC

This mode displays the diagnosis and maintenance information. There are I/O bit、C bit、S bit、A bit、Timer、Counter and sub modes. It display the status of I/O bit、C bit、S bit、A bit、Timer、Counter and Ladder for debugging function.

4.7.4.1.1.1. I bit

This mode is to display I bit status of the system. Through the display of system I bit status, the diagnosis and maintenance of the system can be carried out.

In the IOCSA mode, use the function key  to enter the mode. At this time, the sub mode field displays MLC -I. Figure 4-7-6 below is I bit status display screen. Use the  or  to change the display page, and

00 : stands for OFF

FF : stands for ON

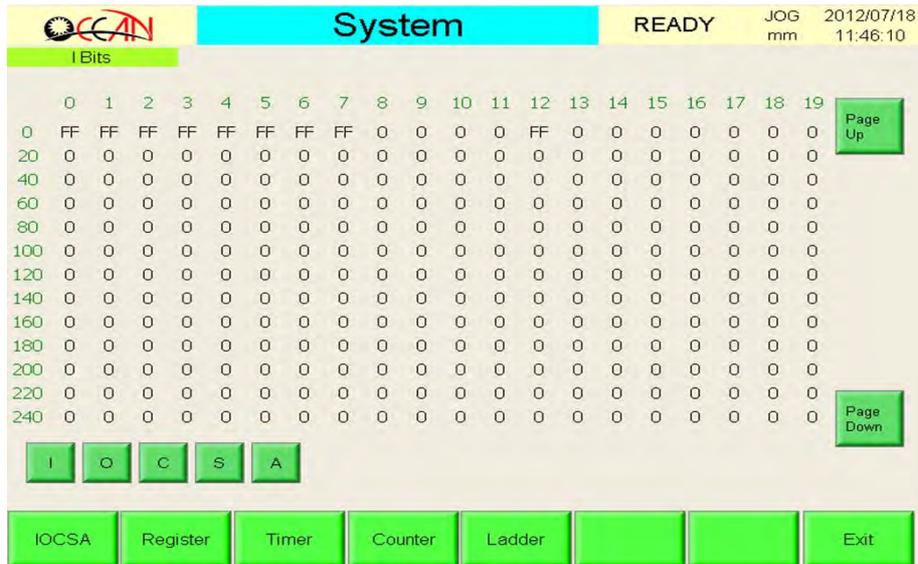


Figure 4-7-6 I bit Screen

4.7.4.1.1.2. 0 BIT

This mode is to display 0 bit status of the system. Through the display of system 0 bit status, the diagnosis and maintenance of the system can be carried out.

In the IOCSA mode, use the function key **0** to enter the mode. At this time, the sub mode field displays **MLC -0**. Figure 4-7-7 below is 0 bit status display screen. Use the **Page Up** or **Page Down** to change the display page, and

00 : stands for OFF

FF : stands for ON

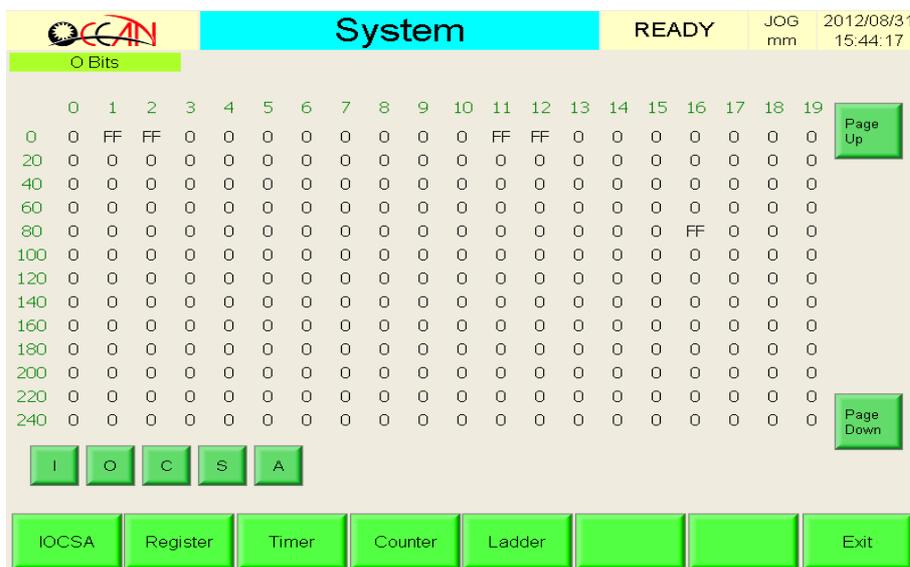


Figure 4-7-7 0 bit Screen

4.7.4.1.1.3. C BIT

This mode is to display C bit status of the system. Through the display of system C bit status, the diagnosis and maintenance of the system can be carried out.

In the IOCSA mode, use the function key **C** to enter the mode. At this time, the system mode field displays **MLC -C**. Figure 4-7-8 below is C bit status display screen. Use the **Page Up** or **Page Down** to change the display page, and

00 : stands for OFF

FF : stands for ON

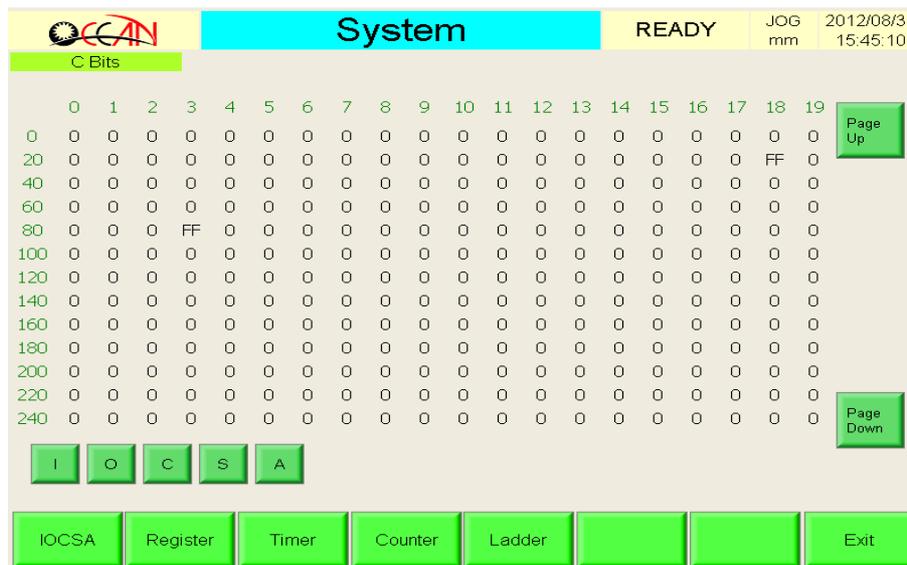


Figure 4-7-8 C bit Screen

4.7.4.1.1.4. S bit

This mode is to display S bit status of the system. Through the display of system S bit status, the diagnosis and maintenance of the system can be carried out.

Under the IOCSA mode, use the function key **S** to enter the mode. At this time, the system mode field displays **MLC -S**. Figure 4-7-9 below is S bit status display screen. Use the **Page Up** or **Page Down** to change the display page, and

00 : stands for OFF

FF : stands for ON

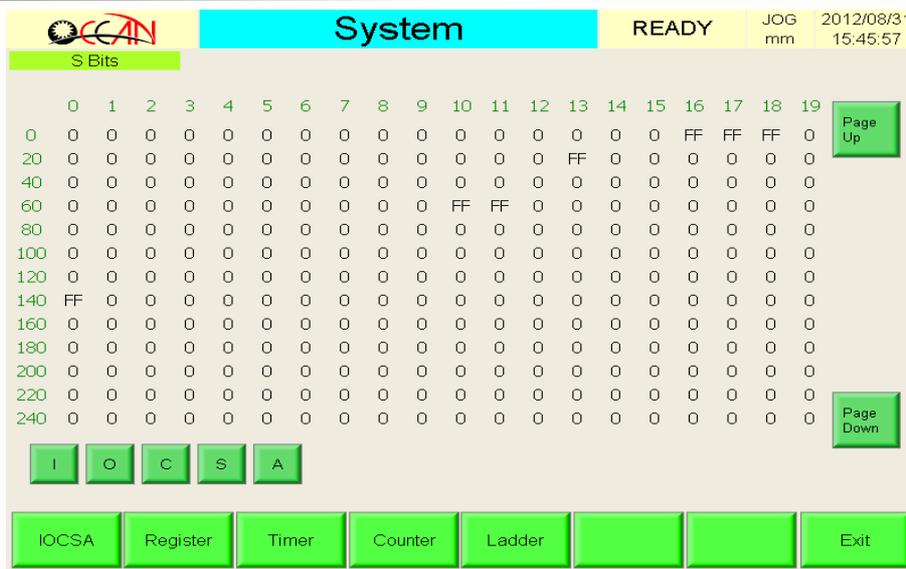


Figure 4-7-9 S bit Screen

4.7.4.1.1.5. A BIT

This mode is to display A bit status of the system. Through the display of system A bit status, the diagnosis and maintenance of the system can be carried out.

Under the IOCSA mode, use the function key **A** to enter the mode. At this time, the system mode field displays **MLC -A**. Figure 4-7-10 below is A bit status display screen. Use the **Page Up** or **Page Down** to change the display page, and

00 : stands for OFF

FF : stands for ON

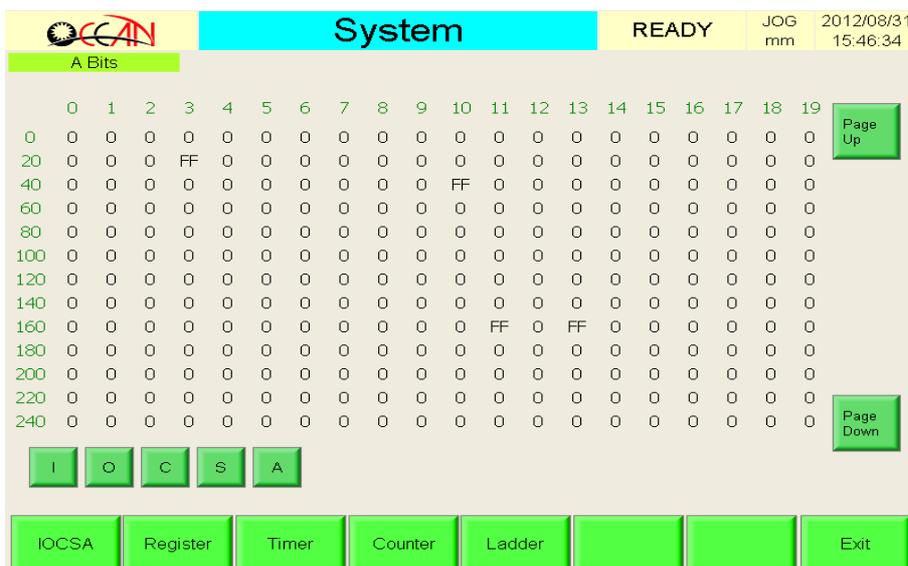


Figure 4-7-10 A bit Screen

4.7.4.1.2. Register

This mode is to display Register status of the system. Through the display of system Register status, the diagnosis and maintenance of the system can be carried out.

In the system parameter mode, use the function **Register** to enter the mode. The system have 65536 Registers, from no.0~65535, one page can display 150 Registers, every Register display setting value and current value, the setting value is Register setting value, current value is Register current value. Figure 4-7-11 is Register status display screen.

Register		System										READY	JOG mm	2012/08/31 15:47:27
0	0	1	2	3	4	5	6	7	8	9				
0	0	0	0	0	1000000	0	0	0	0	0				
10	0	0	0	4	1	0	100	1	100	0				
20	0	0	0	0	1	0	-214820	-43449	297259	0				
30	0	0	0	0	0	0	0	270000	0	2010				
40	0	0	0	0	0	0	0	0	0	0				
50	24	3	0	15	0	35	91	100	0	1				
60	0	3000	1200	50	0	0	0	0	0	0				
70	20101	0	0	0	0	0	0	0	0	0				
80	0	1	1	200	0	0	0	0	0	0				
90	0	0	0	0	0	0	0	0	0	0				
100	0	0	0	0	0	0	0	0	0	0				
110	20	1	1000	0	0	0	0	0	0	0				
120	0	0	0	0	0	0	0	0	0	0				
130	0	0	0	0	0	0	0	0	0	0				
140	0	0	0	0	0	0	0	0	0	0				
150	0	0	0	0	0	0	0	0	0	0				

Figure 4-7-11 Register Screen

4.7.4.1.3. Timer

This mode is to display Timer status of the system. Through the display of system Timer status, the diagnosis and maintenance of the system can be carried out.

Under the system param. mode, use the function key **Timer** to enter the mode. At this time, the system mode field displays **MLC-Timer**. the system have 256 Timers, from no.0~no.255, one page can display 64, every Timer display setting value and current value, the setting value is Timer setting value, current value is Timer current value. 4-7-12 below is Timer status display screen.



Figure 4-7-12 Timer Screen

4.7.4.1.4. Counter

This mode is to display Counter status of the system. Through the display of system Counter status, the diagnosis and maintenance of the system can be carried out.

Under the system param. mode, use the function key **Counter** to enter the mode. At this time, the system mode field displays **MLC-Counter**. the system have 256 Counters, from no.0~no.255, one page can display 64 Counters, every Counter display setting value and current value, the setting value is Counter setting value, current value is Counter current value. Figure 4-7-13 below is Counter status display screen.



Figure 4-7-13 Counter Screen

4.7.4.1.5. Ladder

This mode for the display system's ladder diagram. Through this screen displays, to understand the purpose of the former system ladder diagram I,O,C,S,A, Timer and Counter program. Under the system parameters mode, by function Ladder to enter this mode, at this time, the system mode field displays the Ladder, Figure 4-7-14 is the display of Ladder.

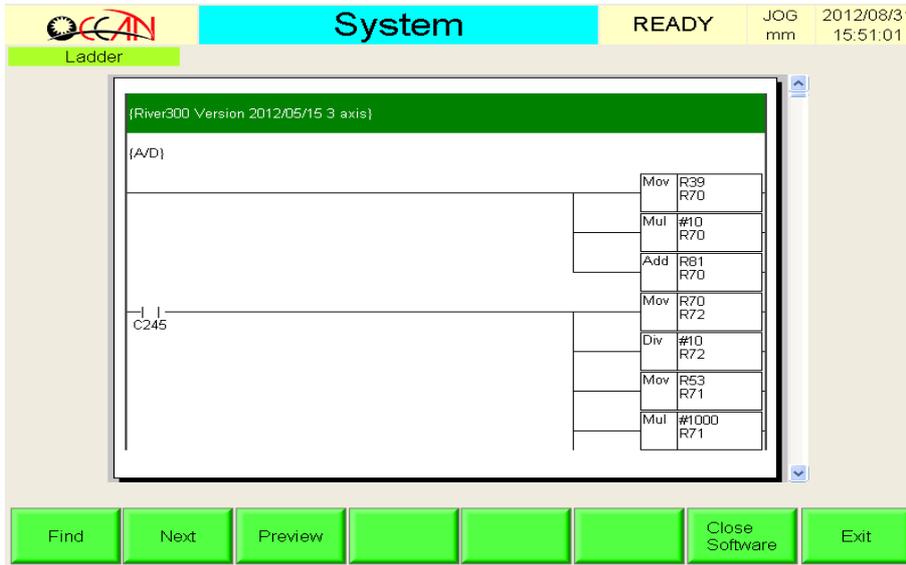


Figure 4-7-14 Ladder Screen

4.7.4.2. Global Data

This mode is to display the system param. of Global Data (System Variable). Through the display of the system variable param., the diagnosis and maintenance of the system can be carried out.

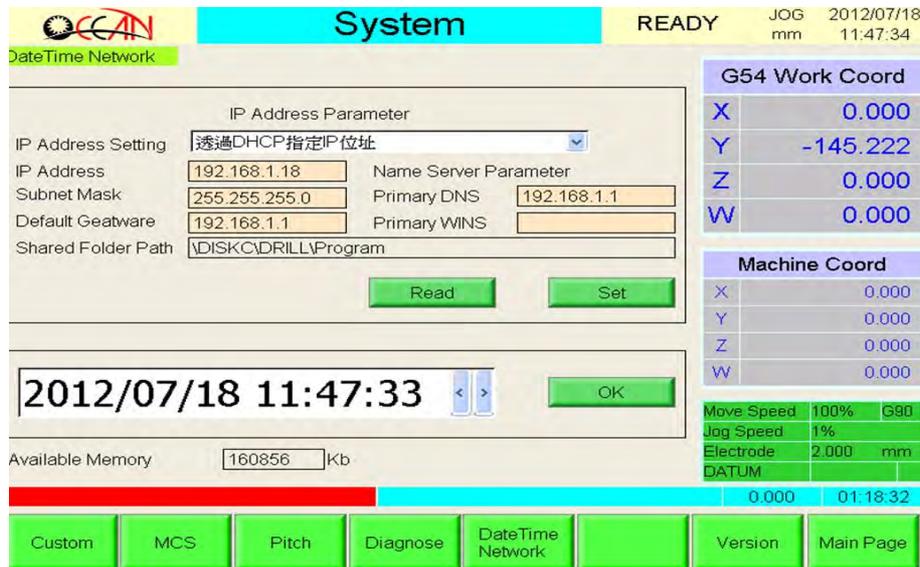
Under the system param. mode, use the function key **Global Data** to enter the mode. At this time, the system mode field displays **Global Val.** Figure 4-7-15 below is Global Data display screen. Use the up and down keys to change the page. The left side of the equal sign is the param. name, and the right side of the equal sign is the current value of the param.



Figure 4-7-15 Global Val. Screen

4.7.5. Date Time Network

Function key **Date Time Network** to enter this mode, It provided the operator setting IP address and the shared time setting of the catalog path.



4-7-16 Date Time Network screen

4.7.6. Version information

Function key **Version** to enter this mode, as below figure 4-7-17 version information screen.



Figure 4-7-17 version information screen

The meaning of each param:

No.	Description	Range
001	<p>The unit is for setting the system coord. Setting 0 mean mm unit, it load Custom.dat; Setting 1 mean inch unit, it load Custom. inh. After setting the new unit, Please press F1 Save Param then restart the computer for the newly set unit to come into effect.</p>	0:mm 1:inch
002	<p>The language mode that the system displays. Change language need load that words, after setting the new words, it will display restart message. So please be sure to restart machine. The newly set language will come into effect when the computer starts next time. (※Japanese and German language translation and update by supplier)</p>	0:Chinese 1:English 2:Japanese 3:German
003	Reserve	
004	<p>Distance back to edge: When system executes normal edge searching, the distance of auto backward. The parameter can avoid to execute finish edge , due to the distance isn't enough of backward, then cause short, the machine can't to process next step.</p>	0~100000: m/i nch
005	Back Distance In 5-6th Axes Edging	
006	Reserve	
007	<p>Check electrode before hole mach.: 0: when hole mach., directly at upper hole to check electrode after machining. 1: when hole mach., move to Check PT. to check electrode length, then back to hole position to machining.</p>	0:Directly check electrode 1:Back to check PT. to check electrode
008	Detect back distance in hole machining w axis edging.	
009	Reserve	

<p>010</p>	<p>Through Hole Compensate: Mach. type : Though hole : (The purpose is to make sure the completion of through hole motion) Total mach.depth =Desired Depth+Wear+ Through Hole Compensate. Blind : (Compensate effect of without through hole compensation value) Total mach.depth =Desired Depth+Wear. Acc. Blind : Total mach.depth =Desired Depth.</p>	<p>0~100000000: m/inch</p>
<p>011</p>	<p>Reserve</p>	
<p>012</p>	<p>Z Axis Machining Safety Height</p>	
<p>013</p>	<p>X Axis Machining Safety Height</p>	
<p>014</p>	<p>Reserve</p>	
<p>015</p>	<p>ATC to start When machine is 4-axis closed loop controller with ATC system. This parameter can set to switch on auto-change –electrode function. When this parameter Setting 0 means for manual- change electrode. Setting 1 means for Auto-change electrode. Concerning more detail information for Check PT. setting of change electrode, please reference 5.1 Manual-change electrode in mach. Note: When machine is 3-axis closed loop controller , please setting parameter is 0.</p>	<p>0:Manual change electrode 1:Auto change electrode</p>
<p>016</p>	<p>Electrode Length of inside the chuck</p>	
<p>017</p>	<p>MTC (Manual tool change), Length of electrode</p>	
<p>018</p>	<p>Reserve</p>	
<p>019</p>	<p>Dist. Of Low Sp.: It is not stable in starting of hole drilling, the electrode will judder and caused process instability,</p>	<p>0~100000: m/i nch</p>

	<p>when processed to a certain depth, it naturally stable, in order to start processing that judder can reducing. This system can set to slow down in starting machining. After reaching the setting deepness, it is speed up. This parameter is setting the desired depth, depth of algorithms for surface-down calculation of distance.[045]Percent. Of Low Sp. is the setting of slowing down. For example, setting 2mm means it is machining with low speed , until W axis coord. reach the 2mm position, it will return to original speed.</p>	
020	<p>Percent. Of Low Sp.: Reference to [044]Dist. Of Low Sp. ,this is setting the percent of slowing down. Setting 50 means the low speed is 50 percent of the original speed.</p>	0~100:%
021	Reserve	
022	<p>Finish hole ,electrode back tool compensation value When finish hole electrode back tool way setting 1, the setting is efficiency, the back tool way is Desired Depth+ Finish hole electrode back tool compensation value, then process next line. Note: Total back tool Distance if enough or not, otherwise it will cause short in moving.</p>	0~100000000: m/inch
023	Reserve	
024	Reserve	
025	<p>Finish hole with electrode go up: 0:After finish hole mach., electrode go up with off sparking condition. 1:After finish hole mach., electrode go up with keep sparking condition.</p>	0:Off 1:Spark
026	<p>Finish hole with electrode go up E code: If [011] finish hole with electrode go up must be 1 that will efficiency, use one set E code be action condition param. after sparking with electrode go</p>	0~99:E code

	up.	
027	Sparking delay time	
028	Reserve	
029	Reserve	
030	Reserve	
031	Reserve	
032	Reserve	
033	Reserve	
034	Reserve	

Chapter 5 Operating Example Description

The chapter illustrates that during the process of spark mach., when the electrode runs out, how to replace the electrode ? Divide into electrode exhausted replace the electrode in processing and electrode exhausted replace the electrode in non-processing. As described below.

5.1. During the process of electrode runs out and replace

During the process of spark mach. in single mach. or multi mach., when the electrode runs out and needs being replaced, follow the steps to replace the electrode with generally manual procedure.

Step One: The purpose of the step is to set the touch pt of the electrode length. In the system, there are two types of setting modes. The respective description is as follows:

Mode 1: The mach. Prog. have no G06 、 G07 setting, enter the mode.

During the process of spark mach., if the electrode runs out, the machine will auto pause and it move to Check PT coord of Check PT record in manual, the Check PT coord can be Abs. Coord G06 and Rel. Coord G07.

Mode 2: When the mach. prog has G06 、 G07 setting, enter the mode. At this time, Check PT setting will not role in manual, and the Check PT coord is G06 or G07 setting coord. For instance, the mach. prog single block is G06 X1.0 Y1.0 Z0.0; during the process of spark mach., if the electrode runs out, the machine automatically pauses spark mach., and moves the electrode to the coord. (1,1,0) to carry out the touch of the electrode length. if the mach. prog single block is G07 X1.0 Y1.0 Z0.0, Check PT position is current drilling hole coord. relative movement (1,1,0) to carry out the touch of the electrode length. Regarding the editing of G06 and G07, use the coord. of dialog edit to edit

※ G06 the set of XYZ coordinates for the machinery coordinates, G07 setting the XYZ coordinates for the relative coordinates.

Step Two: After executing the step one, the machine displays **Detecting**. Until the electrode search the base point , At this time the computer

records the coord. of base point, move W axis to the + direction limit and toward down move some distance, and displays **W axis is moving to W+ limit!**.

Step Three: Generally manual procedure: When machine is 3-axis or 4-axis closed loop controller and without ATC system, or it has ATC system but 4.8.1. custom parameter ATC open parameter value setting 0. At this time, you have to take off the old electrode by manual, and replace new electrode, the machine displays **Press FTC button!**. It is recommended to move the W axis into the Guider inside and move the electrode to the proper distance near the workpiece first. And then press the **FTC** button . (shorten the edging time)

Step Four: After executing Step Three, the machine displays **Edging! Please wait**, After finish the edging.

Step Five: At this time, process back to original mach. PT position and process machining, the system separate two procedures, explain as below:

Generally manual procedure: After finish the edging, it display **W&Z axis move to safety position** ,then press **Base Point** , press **Base Point** button, at this time the machine auto-move to original mach. PT. position, it will display again **W&Z axis move to Guider** , then press **Base Point** ; then press **Base Point** again , it will continue to machining.

- ✧ **Caution** : If the desired workpiece is not flat, after executing Step Five, use the **W+** button to adjust the safety distance

5.2. Electrode wear out not-during machining.(MTC : Manual tool change)

Before machining, when electrode run out or electrode poor quality or bended, it need to change electrode, you can according to follow change electrode step to change electrode.

Step one: Press **MTC** key on I/O Operation panel, or execute M20 command.

Step two: W axi move to + direction limit, then move down a little distance, and display **W axis is moving to + direction limit.**

Step three: At this time process change electrode, explain as below:

ATC procedure: when machine is 4-axis closed loop controller and **ATC Start** of 4.8.1 custom parameter setting 1, at this time X, Y, Z, W axis move to change tool PT. coord, then process auto-change electrode procedure, let old electrode move to tool bank, and let new electrode change to W axis spindle, after finish, auto move X, Y, Z, W axis to before execute change electrode coordinated.

Generally manual procedure: When machine is 3-axis or 4-axis closed loop controller and without ATC system, or with ATC system, but **ATC Start** 4.8.1. custom parameter value of setting 0, at this time you have to take off old electrode by manual type , and change new electrode , the machine will display **Please press FTC button**, suggestion W-axis move inside Guider firstly, then press **FTC** button.

Chapter 6 Program Code

6.1. G Code Explanation

G00 : Positioning

Format : G00 IP___ ;

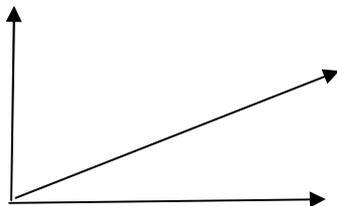
Explanation : IP is identical to X 、 Y 、 Z and W the coordinate system values target. As per its absolute values or augment values, it is determined by the status of G90 or G91 (This manual will adopt this interpretation hereafter.). Symbol ” ; ” means the ending of single block (This manual will adopt this interpretation hereafter.).

Note:

If using G00, the moving speed for each axis is determined by the MCS parameter system NO.6~9.(Reference service manual)

Example: G00 X10.0 Y20.0 Z30.0 Z40.0;

Figure:



G04 : Pause

Format : G04 X___ ;

Explanation : Pause the motion. X value of G04 is the Pause time.

When time is up, It is going to run the next block.

Note:

The unit of X value is second. Minimum units of 0.001 seconds, the setting range is 0.001~9999.999 seconds.

Example : G04 X1.0; Setting pause for 1 second

G05 : No-guard Fast Positioning

Format : G05 IP___ ;

Explanation : IP is identical to X、Y、Z or W the coordinate system values target.as X_Y_Z_W_, As per its absolute values or augment values, it is determined by the status of G90 or G91.

Note:

1. The largest difference between G00 and G05 is that G05 command will omit the short protection when tools and workpieces colliding (When short happening, the feed-in rate is 0; Short in moving, system will be reset).
2. When using G05, the moving speed for each axis is determined by the setting values of MCS parameter system NO.6~9.

(reference service manual)

Example : G05 X10.0 Y20.0 Z30.0 Z40.0;

G06 : Set Check Point

Format : G06 X___ Y___ Z___ ;

Explanation : Set the check point coordinate. The X, Y and Z value is machine coordinate of the check point. When the electrode is used up in machining, it is going to change electrode. At first, it is going to the check point and detect the wear of electrode. °

Example : G06 X10.0 Y20.0 Z30.0;

Set the check point at(10.0, 20.0 30.0)

G53 : Mechanic Coordinate Position

Format : G53 IP___ ;

Explanation : When G53 command designated, the coordinate system will change to work coordinate system and move to the designated machanic position of IP at the speed of G00.

Example: G53 X10.0 Y10.;

Move to mechanic coordinate(10., 10.)

G80 : Edge Searching

Format : G80 X+1/X-1/Y+1/Y-1/Z+1/Z-1//W+1/W-1 ;

Explanation : Locate X、Y、Z or W axis, on the workpiece's location of positive or negative axial directions.

Example: G80 X+1;

Edge searching in positive direction of X axis.

G82 : Locate Groove Center

Format : G82 P* ;

Explanation:P1 is to locate the groove center of X axis.

P2 is to locate the groove center of Y axis.

Example: G82 P1;

Locate the groove center of X axis.

G83 : Locate Inner Hole Center

Format : G83 P* ;

Explanation : P1 is to locate XY plane's inner hole center.

Example: G83 P1;

Search the XY plane's inner hole center.

G84 : Locate Outer Hole Center

Format:G84 P* IP__ ;

Explanation : P1 is to locate XY planes X or Y axis outer center.

IP is X, Y, W axes pre-move distance.

Above XY plane, X and Y axes input value, system will strong be + , W input value can be - or + , + value will upper to move, - value will down to move, generally setting - value.

Example1 : G84 P1 X5.0 W-1.0 ;

Locate XY plane's axis outer center. First move X axis + direction 5mm, then Z axis - direction move -1mm, toward X axis - edge, after finish edge, the system will record edge PT coord., then back to original PT. Second move X axis - direction 5mm, then Z axis - direction move -1mm, toward X axis + edge , after finish edge , the system will record second edge PT. coord, then back to original PT. The average of two edges PT. coord is X axis outer center coord. The system will move to this position, then finish locate X axis outer center.

Example2: G84 P1 Y5.0 W-1.0 ;

Locate XY plane's Y axial outer center. Another illustrate , please reference example 1.

G85 : Locate Circular (Square) Cylinder Center

Format :G85 P* IP__ ;

Explanation: P1 is to locate XY plane's circular (square) cylinder center.

IP is X, Y, W axes pre-move distance.

Above XY plane, X and Y axes input value, system will strong be + , W input value can be - or + , + value will upper to move, - value will down to move, generally setting - value.

Example:G85 P1 X5.0 Y5.0 W-1.0 ;

Locate XY plane's circular (square) cylinder center. The first step is searching X axis center(Reference G84 example 1 illustrate), then searching Y axis center, then finish searching of cylinder.

G90 、G91 : Absolute and Augment Coordinate Setting

Format : G90 ;

G91 ;

G90; Absolute coordinate;

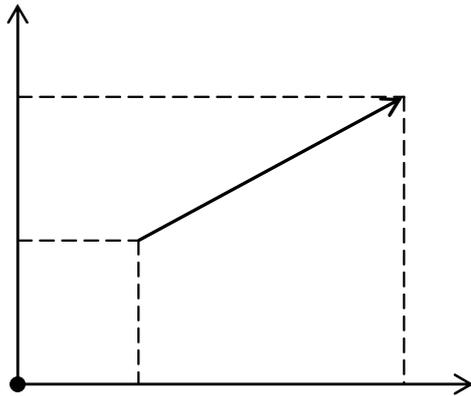
G91; Augment coordinate;

Explanation : G90 is absolute coordinate setting.

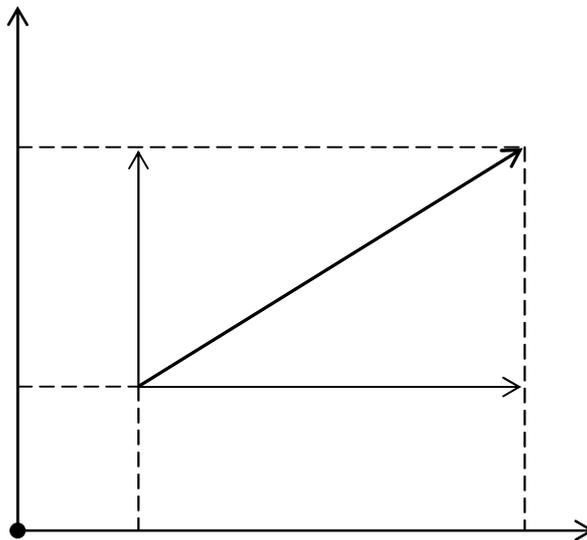
G91 is augment coordinate setting.

The system default value is G90 absolute coordinate.

Example 1 : G90 G00 X100.0 Y80.0 ;



Example 2: G91 G00 X100.0 Y80.0 ;



G92 : Absolute Coordinates Setting

Format : G92 IP__ ;

Explanation : This command is to set a certain point of absolute coordinate system as the origin of its coordinate system. This new set origin is to include new work coordinate system and treat it as new work coordinate system. After the setting for this new work coordinate system, the absolute coordinate system will be calculated based on this coordinate system.

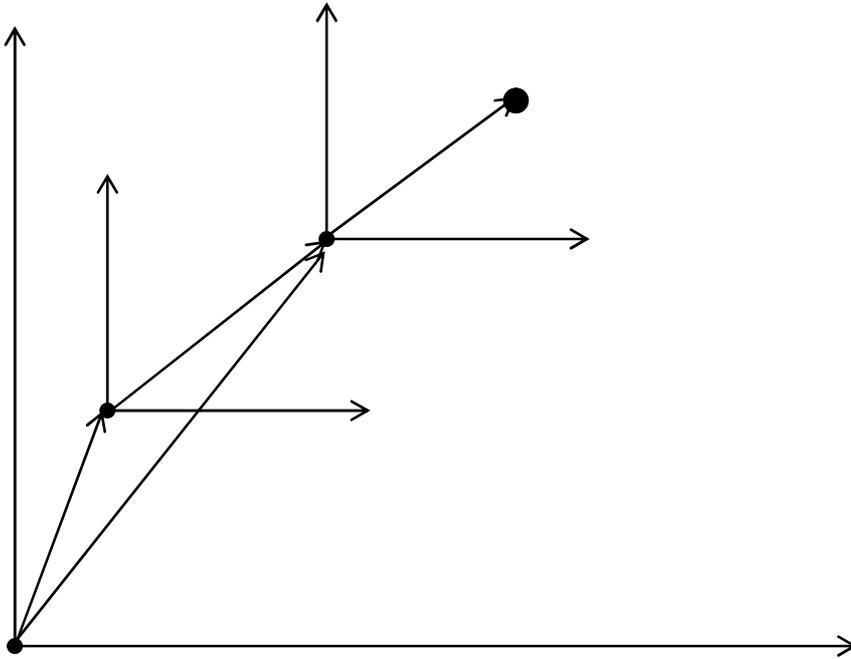
Example :

G00 X100.0 Y100.0;

G92 X0.0 Y0.0 Z0.0 ;

G00 X100.0 Y100.0;

Move to (100,100), and use G92 to set the new work coordinate origins. Reference to the following figure to find coordinate system was moved to a new location. G00 moved to (100,100), It is obvious that the machine coordinate is difference.



G Code List

G Code	Function Explanation
G00	Fast Positioning
G04	Hold for Seconds
G05	No Guard Fast Positioning
G06	Check Point Set
G53	Machine Coordinate Position
G81	Mechanic Origin Searching
G82	Locate Groove Center
G83	Locate Inner Hole
G84	Locate Outer Center
G85	Locate Circular Cylinder Center
G90	Absolute Coordinate
G91	Relative Coordinate
G92	Work Coordinate Point Setting

6.2. Auxiliary Function (M Code)

Auxiliary function is used to control the ON and Off of mechanic function and the command format is immediately following after M code with a number of 1 or 2 digits. Auxiliary can not be written into the same block as G code.

M01 : Program Pause

Explanation : When system executes automatic work till the M01 code, it will pause the program execution for the convenience to inspect the proceeding work status. If required to continue work program, just press START button.

M02 : Program End

Explanation : The general command M02 is written in the ending of main program. When system executing till this command, the system will view the program is executed to the end and make the cursor stay at the beginning block of program. If required to execute program again, just press START button, to perform a machining program from the beginning program.

M36 : Hole machining

Format : M36 D__E__ ;

Explanation :

D E code may be used or not. If not, then don't specify depth groups and discharge parameter groups.

D code is the group number of deepness table, the setting range is D00~D99 ◦

E code is the group number of condition table, the setting range is E00~E99 ◦

The total deepness in hole machining is difference according to the machining type, and list at the following

Machining type	Total machining deepness
Blind	Desired Deep + Wear
Through	Desired Deep + Wear + Through Hole Compensation

M98 : Call sub-program

Format : M98 P___ ;

Explanation :

P is sub-program file name.

The format of sub-program is O * * * *

Example: M98 P0011 L2;

Call program 00011.

M99 : Sub-program ends, and back to main program.

Explanation: When sub-program executes to the end, it must end with M99, and make the cursor back to main program to continue its execution. If main program executes till M99, it will back to the first part of main program to continue the program execution.

M Code List

M Code	Function Description
M01	Program Hold
M02	Program End
M03	Spindle CW
M05	Spindle Stop
M06	Guide Change
M08	Fluid Supply Start
M09	Fluid Supply Stop
M20	Electrode Change
M36	Machine a Hole
M98	Call Sub-Program
M99	Sub-Program End



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