

# HUST CNC

## BENDING MACHINE OPERATION MANUAL

### **H6D-B** 3-AXIS

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**When the controller is power on it will download some data. So do not operate the controller till the download operation finished.**



Fig 1

### 1. Non Mode Page (Freedom editor)



Fig 2

To main page : Press “AUTO” on the key board

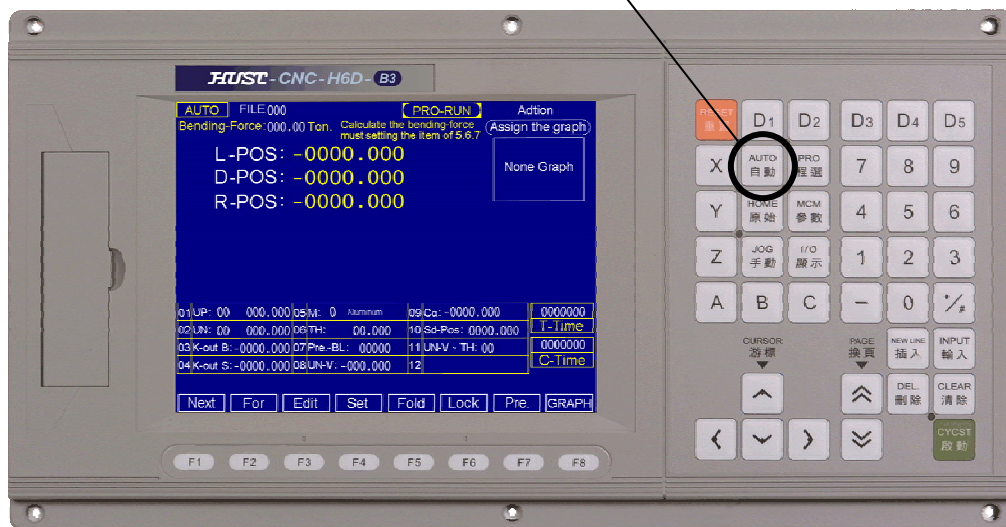


Fig 3

**Caution !!! When the power is reopened, plz execute 3 Axes to home**

## 2. AUTO mode : (main page)

AUTO		FILE000		PRO-RUN		Adtion	
Bending-Force:000.00 Ton.				Calculate the bending-force must setting the item of 5.6.7			
<b>L-POS : -0000.000</b>						Assign the graph	
<b>D-POS : -0000.000</b>						None Graph	
<b>R-POS : -0000.000</b>							
N	X	R	$\alpha$	Vice	BL	C $\alpha$	
00	0000.00	-000.00	000.00	00	0000	-00.00	
01	UP:00 000.000	05	M: 0 Aluminum	09	C $\alpha$ : -0000.000	0000000	
02	UN:00 000.000	06	TH: 00.000	10	Sd-Pos: 0000.000	T-Time	
03	K-out B:-0000.000	07	Pre.-BL: 00000	11	UN-V · TH:00	0000000	
04	K-out S:-0000.000	08	UN-V: -000.000	12		C-Time	
Next	For	Edit	Set		Lock	Pre.	GRAPH

Fig 4

### (1) Function key :

a. CYCST : Cycle start

(a) Press this key to run the program.

(b) When the program is running, the LED-light located left-up of the CYCST will be on. Then the number of piece bended will begin to be counted.

b. RESET :

CNC gives an order to controller that let it stay on the non-mode, and the frame jumps to the non-mode page.

c. Edit :

When pressing this key on any mode, the controller will execute RESET first. Let the controller stay on non-mode status and then jump to the file-set page.

d. Set :

When pressing this key on any mode, this key will highlight. It means that the controller is not running any program. And use CURSOR key to set the value of Total-Cor.(G  $\alpha$ ), SD-Pos., Total-number(T-Time) 【Material】 · 【Depth】 · 【Pre.-BL】 and Count number(C-Time).

e. FORWARD : Execute last program

Do not press the NEXT key again when the white light is not canceled. Because the program is not running over.

f. NEXT : Execute next program

Do not press the FORWARD key again when the white light is not canceled. Because the program is not running over

g. Lock :

When pressing this key, the running program will stop at this step.

※ Press again to cancel.

h. Pre.-BL

Calculate the Bending-Force must be setting the item of 5,6,8.

i. Graph for reference ( Graph )

Push this key and enter Graph for reference and establish pages.

(2) Additional description : When the setting key is highlight:

a. Total correction (  $G\alpha$  ) :

Programs in the file are all corrected When trying to bending 90 degree, the angle is not enough : Set value positive too deep : Set negative value

EX 1 :

(a) The Y-axis ( D-axis ) movement of one unit is set as 0.01 (  $P-\alpha D = 0.01$  ).  
Set in the mode of Edit—FOLD—UN-SET.

(b)  $G\alpha = 5.000$  ( total correction )

(c) The unit of the total correction is

$$P-\alpha D \times G\alpha \div 1000 = 0.010 \times 5000 \div 1000 = \mathbf{0.05 \text{ mm}}$$

EX 2 :

(a) The Y-axis ( D-axis ) movement of one unit is set as 0.04 (  $P-\alpha D = 0.04$  ).  
Set in the mode of Edit—FOLD—UN-SET.

(b)  $G\alpha = 5.000$  ( total correction )

(c) The unit of the total correction is

$$(d) d. P-\alpha D \times G\alpha \div 1000 = 0.040 \times 5000 \div 1000 = 0.2 \text{ mm}$$

b. SD-position :

Input the location of angle-axis directly. Then press 【CYCST】key to execute it. When the position is arrived, the number of D-axis will be canceled automatically. At this time we can press 【CYCST】 key to run the program directly.

c. T-Time :

Set total number of pieces

d. C-Time :

When it has run all the programs, the number will be added by 1 (Number of piece)

e. Material : (Establish the range 0-2)

Establishment : 0 , Stainless steel 、 1 , Iron 、 2 , Aluminium

f. Pre.-BL

g. Calculate the Bending-Force condition needed

h. Thickness :

Input the Bending Machine of project



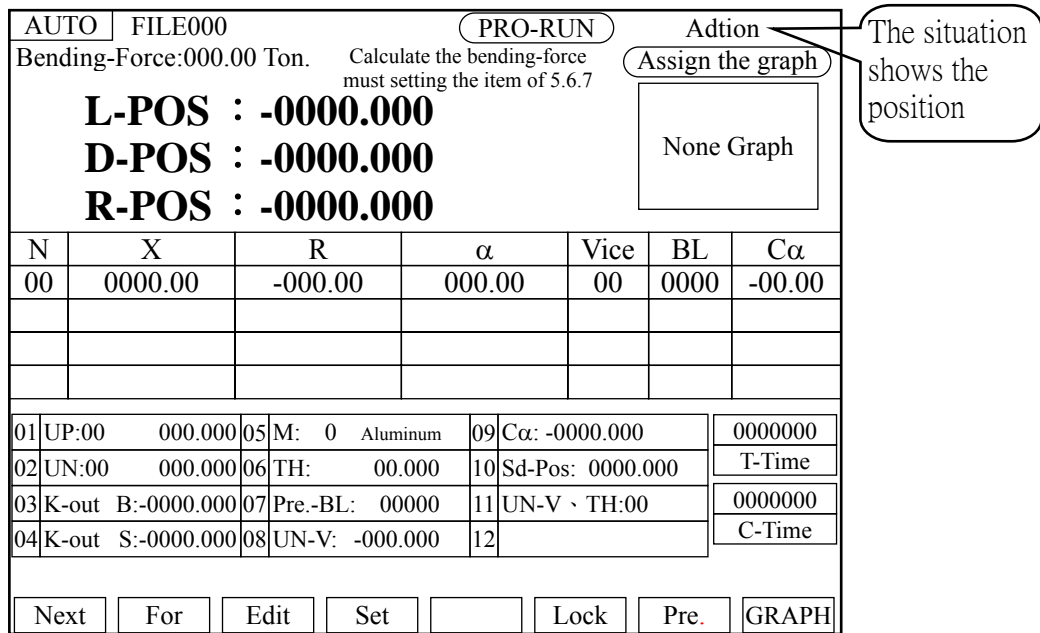


Fig 5

Display :

- (1) Press RESET to the frame of non-mode.
- (2) Status display

When the number of work pieces is up to the setting :

The MARK 【Reaching-End】 will highlight if the setting value is not equal to 0 OR current number is > or = the setting number.

- a. K-OUT  $\leq$
- b. UP-H  $\leq$  0
- c. UN-H  $\leq$  0
- d. UN-V  $\leq$  0
- e. TH  $\leq$  0

※When status is shown, it can not be operated by controller.

- (3) L-axis : ( X-coordinate )  
Show the position of L-axis right now.
- (4) D-axis : ( Y-coordinate )  
Show the position of D-axis right now
- (5) R-axis : ( Z-coordinate )  
Show the position of R-axis right now
  - a. Show the bend song pressure number value of this project.
  - b. In the project lasts : When projects are carried out , will show the white.
- (6) Graph for reference ( Graph )  
Show this procedure chooses at present Graph for reference.



(11) Graph delete ( Del.-Graph )

After pushing this function key, can delete the figure of all Graph for reference of procedure.

(12) RET : BACK TO AUTO MODE

PS :

When the MCM setting value is 0, the program has no recycle and no DX. It ranges from 0 to 10.

Ex : Function setting ( Vice )

Value 1: The program will execute first motion by the MCM-setting page.

Value 2: The program will execute second motion by the MCM-setting page.

ETC...

### 4. MCM ( Vice ) setting page:

VMCM		Parameter Setting 1~10			
Vice	Cyc	Time	Ran	Count	
01	0	00.0	-000.000	0000	
02	0	00.0	-000.000	0000	
03	0	00.0	-000.000	0000	
04	0	00.0	-000.000	0000	
05	0	00.0	-000.000	0000	
06	0	00.0	-000.000	0000	
07	0	00.0	-000.000	0000	
08	0	00.0	-000.000	0000	
09	0	00.0	-000.000	0000	
10	0	00.0	-000.000	0000	
					Ret

Fig 7

- (1) Cycle : ( Cyc )  
 Square input-area number chosen  
 value 1 → Successful recycle. 【bending arc】  
 value 0 → Failed recycle. Only run the distance of DX  
 ※ By using this function you must set counter value as not zero. Or this function will be useless.
- (2) Delay Time : ( Time ) Range from 0 to 9.9s  
 Cycle setting value 【1】: The pausing time is set as when executing cycle motion for bending arc, there is a pausing time between each time bending.
- (3) DX :  
 Set the distance of X-axis move out or cycle when bending.
- (4) Count :  
 If the cycle setting value is 1, the program motion will proceed orderly by 【Ran】 setting value.  
 Ex : If the 【Ran】 value is 3mm, 【count】 value is 10 , X-axis will proceed 3mm and repeat 10 times. And each time will proceed after I007 signal changes on to off.

**Attention :**

When the cycle setting value is 1 , we must notice that if the total distance of cycle will be over X initial coordinate. 【between X difference and keep-out setting】 If it dose, system will adjust cycle value automatically.

**EX:**

Set value of cycle to 1, **【Ran】** to 3, **【count】** to 10, X initial coordinate to 20.000, keep-out area to 7.9, System will adjust it to 4 times automatically.

$$3 \times 10 = 30$$

$$20 - 7.9 = 12.1$$

$30 > 12.1$  , **【count】** value will turn to 4 automatically.

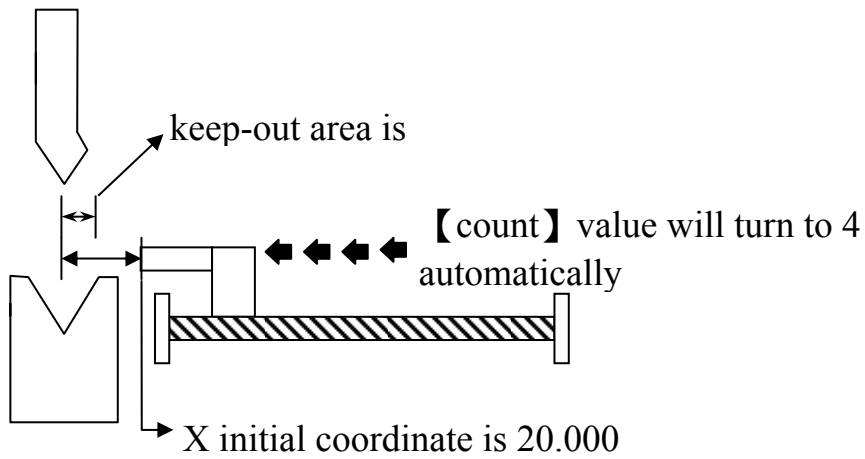


Fig 8

### 5. Editing mode

EDIT		None Graph	01	M :	Aluminum	Set-File:0→400									
			02	TH :	00.000	File:000									
			03	UP :	00 0000.000										
			04	UN :	00 0000.000	06	K-Out B:-0000.000								
			05	V :	-000.000	07	K-Out S:-0000.000								
N	X	R	$\alpha$	Vice	BL	C $\alpha$									
00	0000.00	-000.00	000.00	00	0000	-00.00									
<table border="1"> <tr> <td></td> <td>Fold</td> <td>V.MCM</td> <td>BTO</td> <td>F.Pro-S</td> <td>GRAPH</td> <td>Del Graph</td> <td>Ret</td> </tr> </table>									Fold	V.MCM	BTO	F.Pro-S	GRAPH	Del Graph	Ret
	Fold	V.MCM	BTO	F.Pro-S	GRAPH	Del Graph	Ret								

Fig 9

- (1) Press the CURSOR key to move to the column to be input. Then input the value.
- (2) When the cursor is located on the last line of program, by pressing the cursor-down key the controller will insert one blank program line automatically. If you are not going to use this blank program line, please press the DELETE key to delete this blank program.
- (3) If you want to set the value as “BLANK”, you can press the CLEAR key first and then press the INPUT key. The setting column will be on the blank status.

## 6. The main page of program number selection

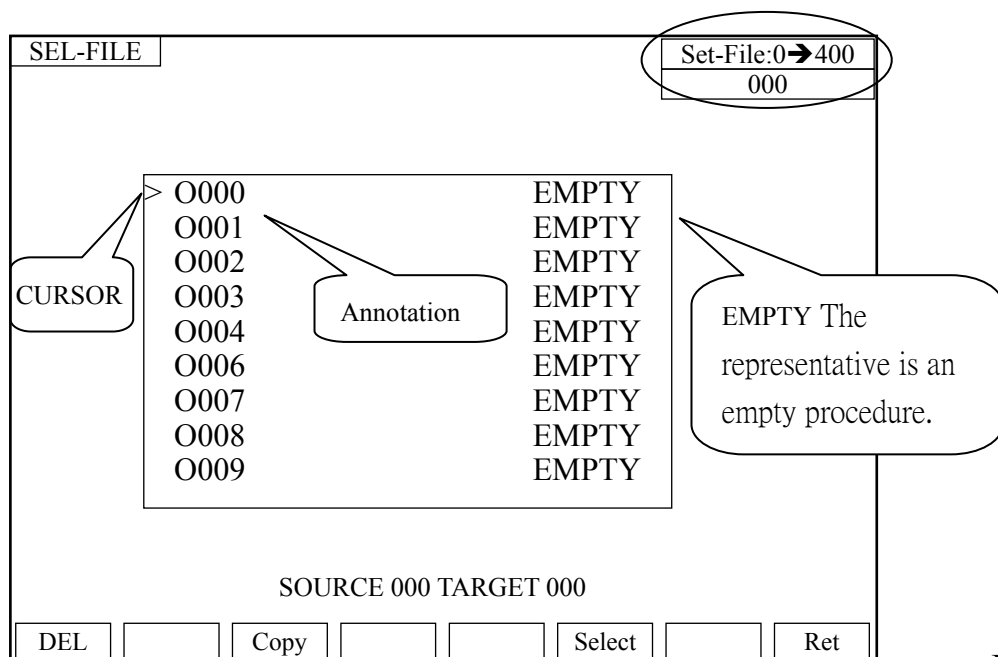


Fig 10

- (1) Press **【PAGE】** or **【CURSOR】** key to move the cursor.
- (2) **【Ret】** key : back to the File setting page.
- (3) **【COPY】** key : go to the PRO-COPY page.
- (4) Move to the set number then press the SELECT **【SEL】** key.
- (5) Editor key : After choosing the procedure, to editor's page editor's procedure.
- (6) Group number after altering , Show above right of the screen.  
The cursor stays on the position of O000 ,The group shows it is 0, If the cursor is moved to O004, The group shows it is 4 after pushing the options button.
- (7) **【DELETE 【Del】** key: When you are trying to delete the program number the cursor pointing at, the confirming line will be shown as the picture below  
Press **【Y】** : Delete the content of the program.  
Press **【N】** : Back to the former page.

※ After finishing carrying out movements , get back to the procedure and choose the page °

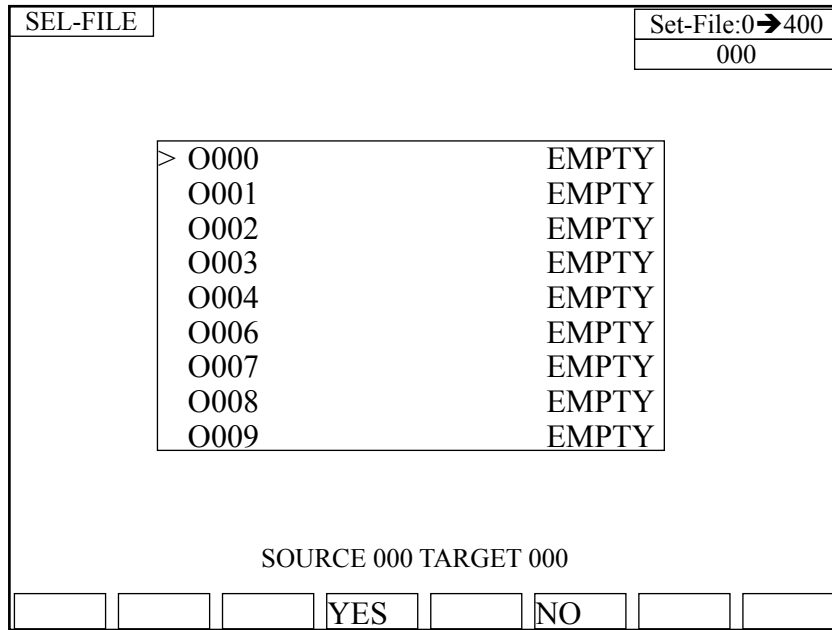


Fig 11

※ The program-copy page

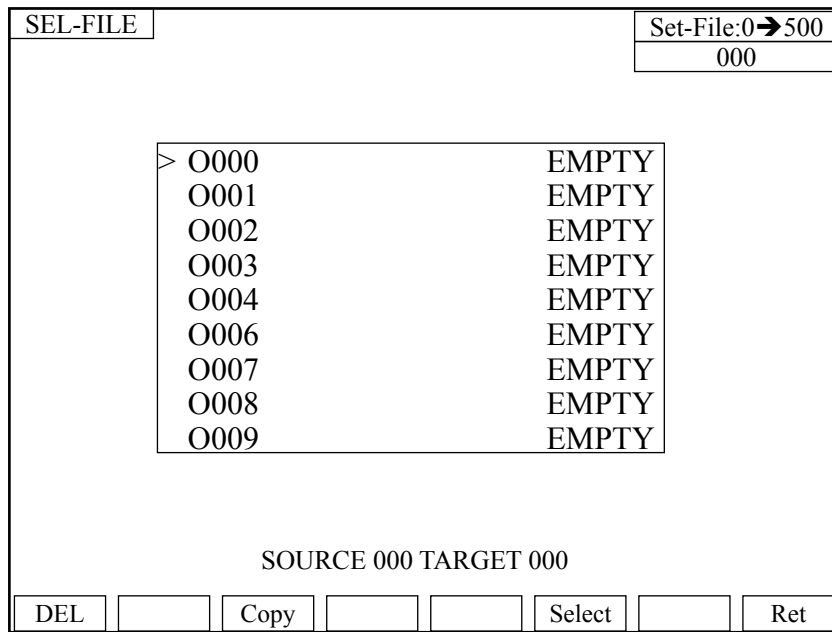


Fig 12

- (1) Move the cursor to the program number to be copied and press the **【SOURCE】** key.
- (2) Then move the cursor to the program number to be placed and press the **【TARGET】** key.
- (3) Press the **【COPY】** key. The operation of copying program will be executed.  
 EX : A group and 0 (O000) copy 5 to the group (O005)
  - a. The cursor is moved to “Source” Group (O000) Press down the Source key ◦
  - b. The cursor is moved to “Purpose” Group (O005) Press down the Purpose key ◦



- c. Will show at this moment 【0 groups copy to 5】。
- d. Push and copy the key, Can finish copying movements.

(4) Press the enter key and get back to the automatic way page.

### 7. Bending-selection for fold setting page : ( FOLD )

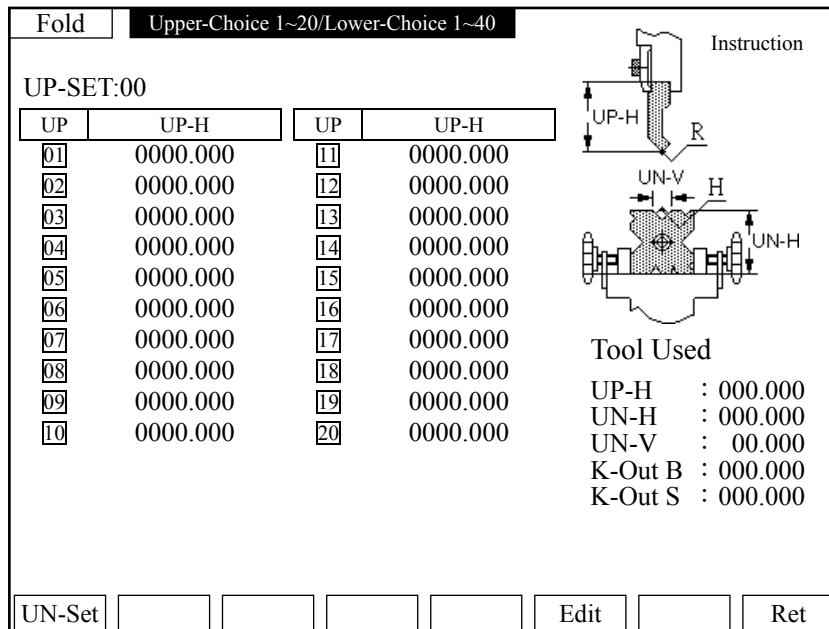


Fig 13

- (1) Upper-CHICE number : ( UP )  
Input the serial number of upper- CHICE
- (2) UNIT- CHICE number : ( UN )  
Input the serial number of unit- CHICE
- (3) UP-SET :  
Total file setting of UP-SET is 20.  
Function key :
  - ( UN ) Lower : Establish pages to make the ( UN ) Lower.
  - Editor : To editor's page.
  - Turn back : Get back to the automatic way.
 Display :
  - Ones that show and choose at present specification of the cutter 。
  - (UP) Upper and ( UN ) Lower Choice the structure chart , Can establish the specifications of a knife of tools according to the sign of the figure .
  - (UP) Upper-Choice page : (Can establish the height , width of cannelure , SMALL K-OUT setting 、 BIG K-OUT setting.)
- (4) UN-SET :  
Total file setting of UN-SET is 40

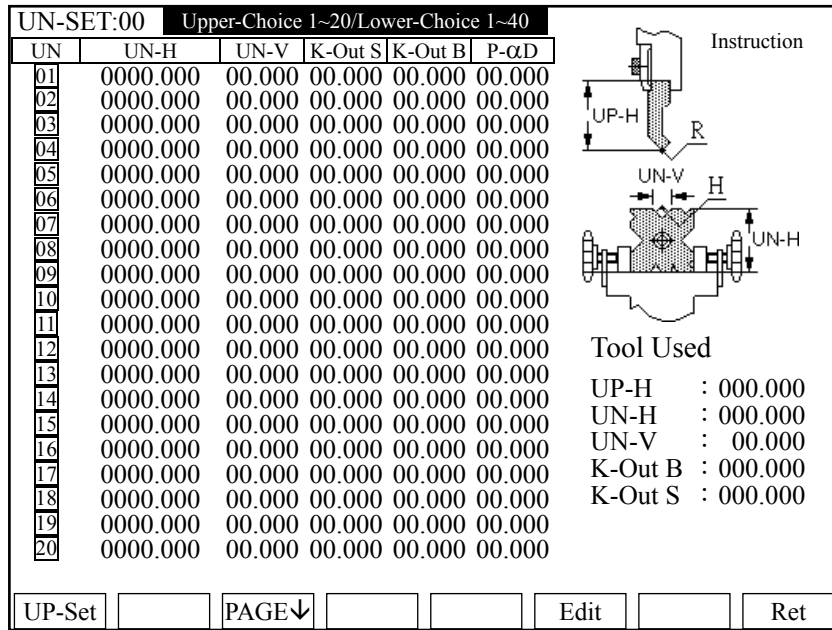


Fig 14

The upper-highness( UP-H )、unit- highness( UN-H )and unit-vice( UN-V )will show up after the value of upper and unit setting.

PS1 : The upper file and UNIT file can match each other freely

PS2 : 1 : SMALL K-OUT setting.

2 : BIG K-OUT setting

※ It must be careful to setting the K-OUT value.

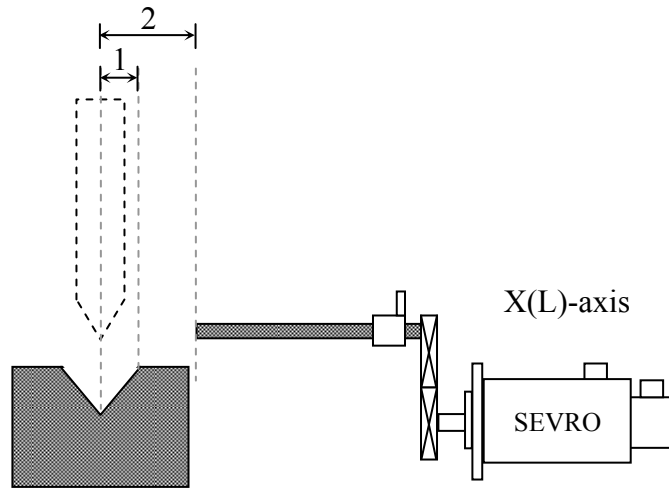


Fig 15


Function key :

- (UN) Lower : Establish pages to make the (UN) Lower.
- Editor : To editor's page.
- Turn back : Get back to the automatic way.
- UP (DOWN) page : Switch over the UP(DOWN) page of establishing.

Display :

- Ones that show and choose at present specification of the cutter ◦
- (UP) Upper and (UN) Lower Choice the structure chart , Can establish the specifications of a knife of tools according to the sign of the figure .

## 8. JOG mode :

- (1) The page will move to JOG mode by pressing  key. ( this key will fail when the program is running )

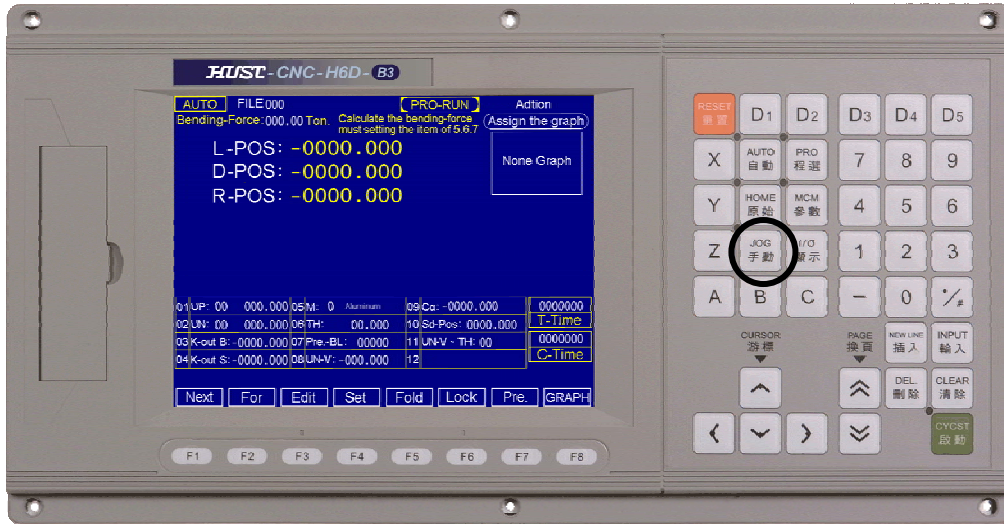


Fig 16

- (2) Choose axis value of JOG by MPG or choose it on the keyboard. When the MPG is off, then the function on the keyboard is on.

L-axis(X) 、 D-axis(Y)

Parameter 22 = 0 : The function is on by MPG hand wheel.

Parameter 22 = 1 : JOG operation on the keyboard.

### Setting by engineer

- (3) Turn the “MPG” or press “PAGE” key → Manual control

Machinery coordinate

Servo Error

JOG

<b>L-POS</b>	<b>-0000.000</b>	<b>X1</b>	<b>X10</b>	<b>X100</b>
<b>D-POS</b>	<b>-0000.000</b>	-0000	000.000	000.000
<b>R-POS</b>	<b>-0000.000</b>	-0000	-0000.000	-0000
		-0000	-0000.000	-0000.000

+ limit signal  
HOME limit signal  
- limit signal

Setting coordinate

L : -0000.000

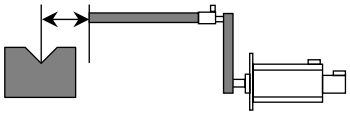
D : -0000.000

R : -0000.000

Correct Step :

1. MPG or JOG mode, move the L(X)-axis to suitable position.
2. Measure the actually value.
3. Input the Value.
4. Quickly press the ENTER key twice. Then renew the coordinate.
5. After renew the coordinate then turn to the JOG mode automatically.

Measuring value: -0000.000



**Error Message:**  
Err56 The Z-axis(R-axis) negative way assign value is smaller than the setting value.

Correct
Enter
Ret

Fig 17

- (4) After inputting assign point of each axis, by pressing the “M.T.C” key, the axis will move to the assign coordinate.

When executing this operation, some error maybe occur :

Err 51 : The X -axis ( L-axis ) positive way assign value is bigger than the setting value.

Err 52 : The X -axis ( L-axis ) negative way assign value is smaller than the “Keep-Out” area value.

Err 53 : The Y -axis ( D-axis ) positive way assign value is bigger than the setting value.

Err 54 : The Y -axis( D-axis )negative way assign value is smaller than the setting value.

Err 55 : The Z -axis ( R-axis ) positive way assign value is bigger than the setting value.

Err 56 : The Z -axis( R-axis )negative way assign value is smaller than the setting value.

- (5) DX : ( add pressure limit )

When this function is on, it will highlight. When the DX signal ( I007 = 1 ) is coming in, the X-axis will do the operation of DX. The distance is based on the VICE of the 10th group of EDIT MODE.

- (6) Correct : 【Just only L-axis ( X)】

a. move the L-axis and measuring.

b. Enter the L-axis of measuring value °

c. Quickly press the ENTER key twice , then renew the coordinate.

d. After renew the coordinate then turn to the JOG mode automatically.

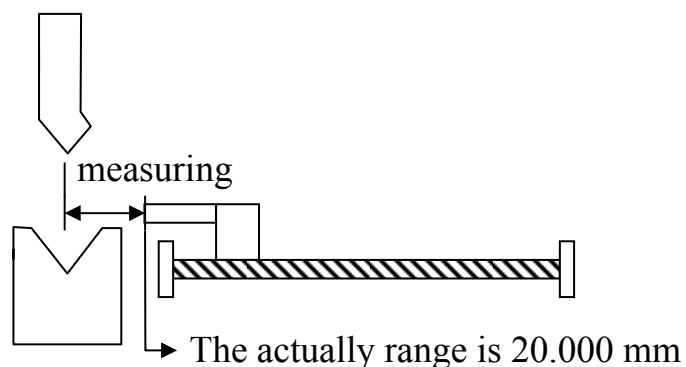



Fig 18

## 9. HOME mode

- (1) It will move to the HOME-mode page by pressing  key ( This key will fail when the program is running.)

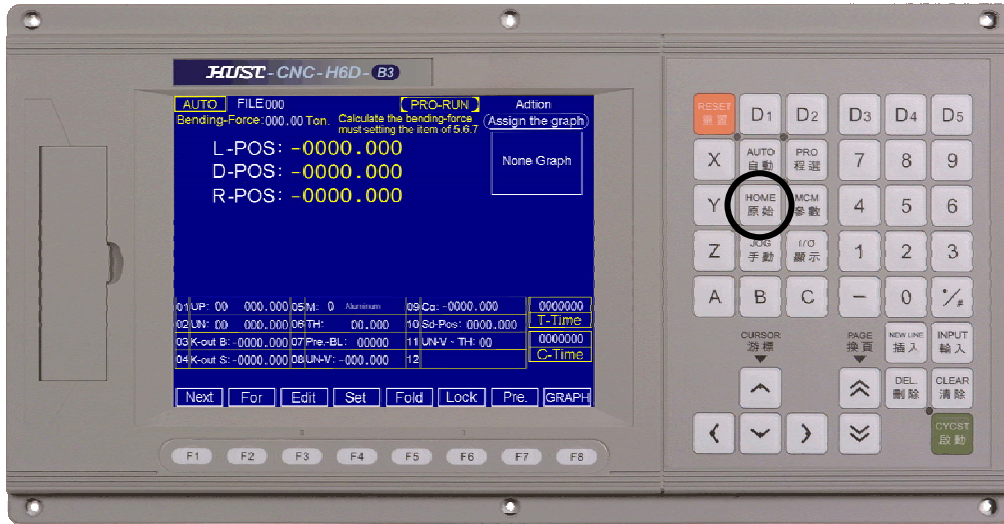


Fig 19

- (2) Choose axis to home operation on the keyboard.  
L-axis(X) 、D-axis(Y) 、R-axis(Z)
- (3) Press CYCST key. Motor begins to execute the motion to HOME.
- (4) After the motion done, press AUTO key to the main page.

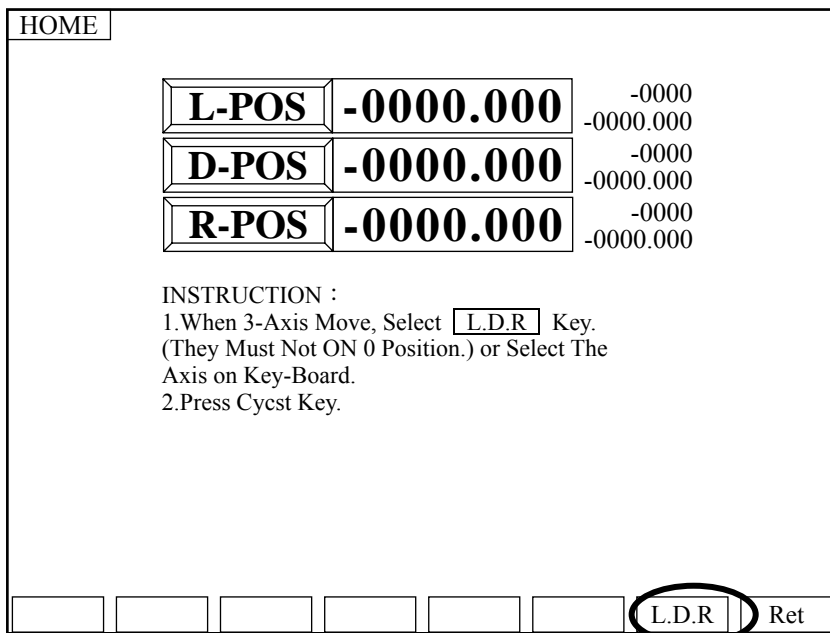


Fig 20

**10.Error and Absolve (total Error page)**

Fig 22

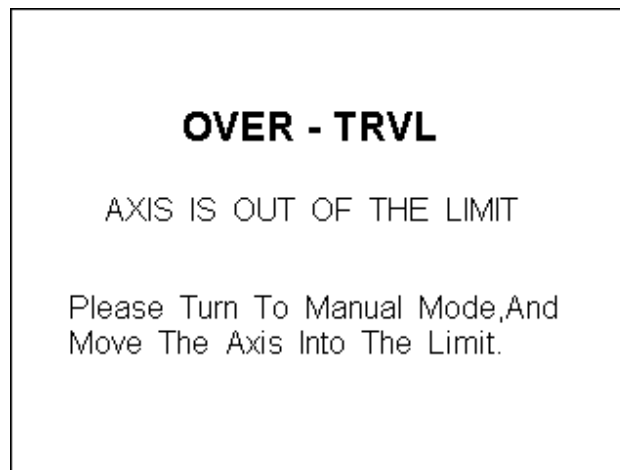


Fig 23

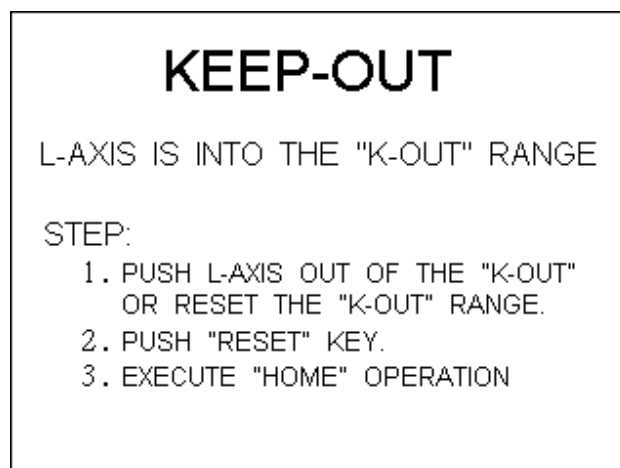


Fig 24



Fig 25

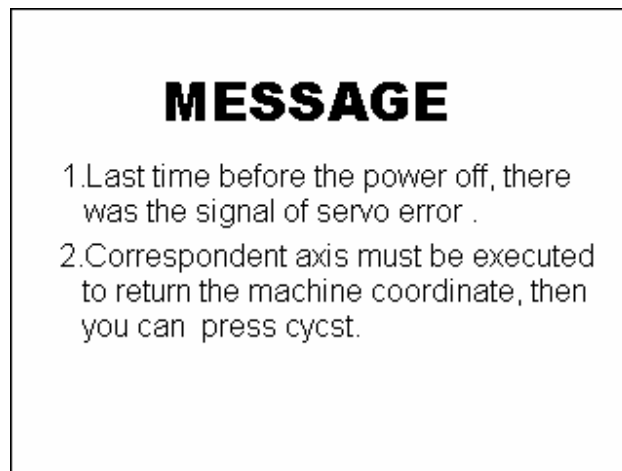


Fig 26



# 11. Graph for reference ( Graph )

Show that chooses the serial number of the figure

Input the position

Graph for reference		Choose the graph:00	
01	04	07	10
02	05	08	11
03	06	09	12
PAGE 2	PAGE 3	ENTER	RET

Fig 27

Graph for reference		Choose the graph:00	
13	16	19	22
14	17	20	23
15	18	21	24
PAGE 1	PAGE 3	ENTER	RET

Fig 28

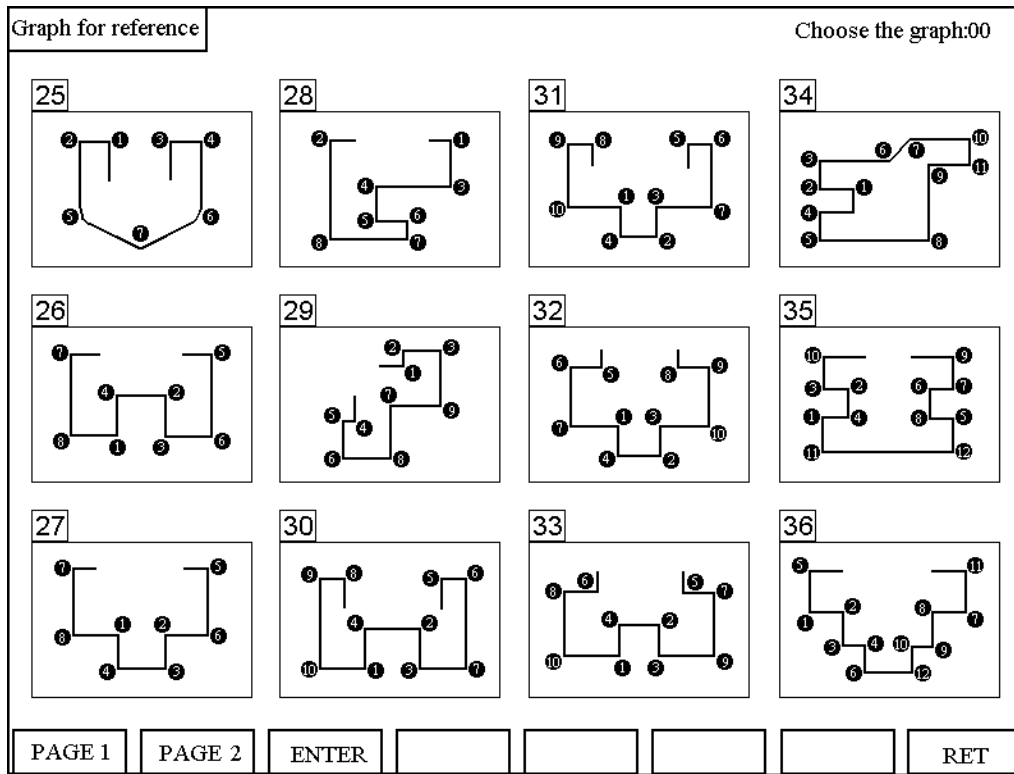


Fig 29

Display :

- 36 kinds of crooked pictures, and label crooked orders, as reference.

Function :

- Page 1 : Consult page 1 to the figure ◦
- Page2 : Consult page 2 to the figure ◦
- Page 3 : Consult page 3 to the figure ◦
- Affirmation key : While choosing to consult the figure, push and confirm the key, can enter the editor and establish pages and memory procedure the graph for reference.
- Press the enter key and get back to the automatic way page.

Operating sequence

1. Controlled the page or the editor mainly and established pages, choose to consult and pursue buttons, enter and consult page 1 of figure .
2. Use and change the function key of pages, switch over and look for necessary reference to pursue .
3. While seeing Graph for reference needed, input the serial numbers of the figure upper left corner, then push INPUT button.
4. After finishing choosing , press editor's button, reach editor set for pages , or push the carriage return button, the carriage return mainly controls pages.

## 12. Bending Machine I/O List

INPUT		INFORMATION	OUT	INFORMATION
0	NC	L-axis Limit (hardware +)	0	Oil - Stop
1	NC	L-axis Limit (hardware -)	1	L-AXIS SERVO-ON
2	NC	D-axis Limit (hardware +)	2	D-AXIS SERVO-ON
3	NC	D-axis Limit (hardware -)	3	R-AXIS SERVO-ON
4	NC	Emergent Stop (EM-STOP)	4	NC ALARM
5			5	EM-STOP
6	NO	Re-CYCST ( Oil Upper Limit )	6	
7	NO	DX signal ( add pressure limit )	7	
8	NC	L-axis Home Limit	8	
9	NC	D-axis Home Limit	9	
10	NC	R-axis Home Limit	10	
11	NO	MPG -X-axis	11	
12	NO	MPG -Y-axis	12	
13	NO	MPG -Z-axis	13	
14	NO	MPG × 1	14	
15	NO	MPG × 10	15	
16	NO	MPG × 100		
17	NC	R-axis Limit (hardware +)		
18	NC	R-axis Limit (hardware -)		
19				
20	NO	“CYCST” key unused		
21				
22				
23				

NO : Normally-Open

NC : Normally-Close

**OT limit and HOME limit can be found in the parameter page 2. They are set as Normally-Open or Normally-Close. And the default is Normally-Close.**

Press this  key, the I/O signal will be shown :

I/O					
INPUT	Explain	INPUT	Explain	OUTPUT	Explain
I00	L axis OT+	I16	MPG X 10	O00	Oil system stop
I01	L axis OT-	I17	R axis OT+	O01	L axis Servo ON
I02	D axis OT+	I18	R axis OT-	O02	D axis Servo ON
I03	D axis OT-	I19		O03	R axis Servo ON
I04	EM-STOP	I20	Cycst signal fail	O04	NC ALARM
I05		I21		O05	EM-STOP
I06	RE-START	I22		O06	
I07	DX-SIGNAL	I23		O07	
I08	L axis Home Limit			O08	
I09	D axis Home Limit			O09	
I10	R axis Home Limit			O10	
I11	MPG - X			O11	
I12	MPG - Y			O12	
I13	MPG - Z			O13	
I14	MPG X 1			O14	
I15	MPG X 10			O15	

Fig 31

### 13. Machine Connection Diagram

#### Input Signal

(Input Board) Connect signal line to input board of HUST, and then connect to input connector on the H3BN through DB25LF of the input board. Using HUST input board has an advantage that it will protect the controller lines of H3BN series. This connecting way is only suit for the input connector of NPN type

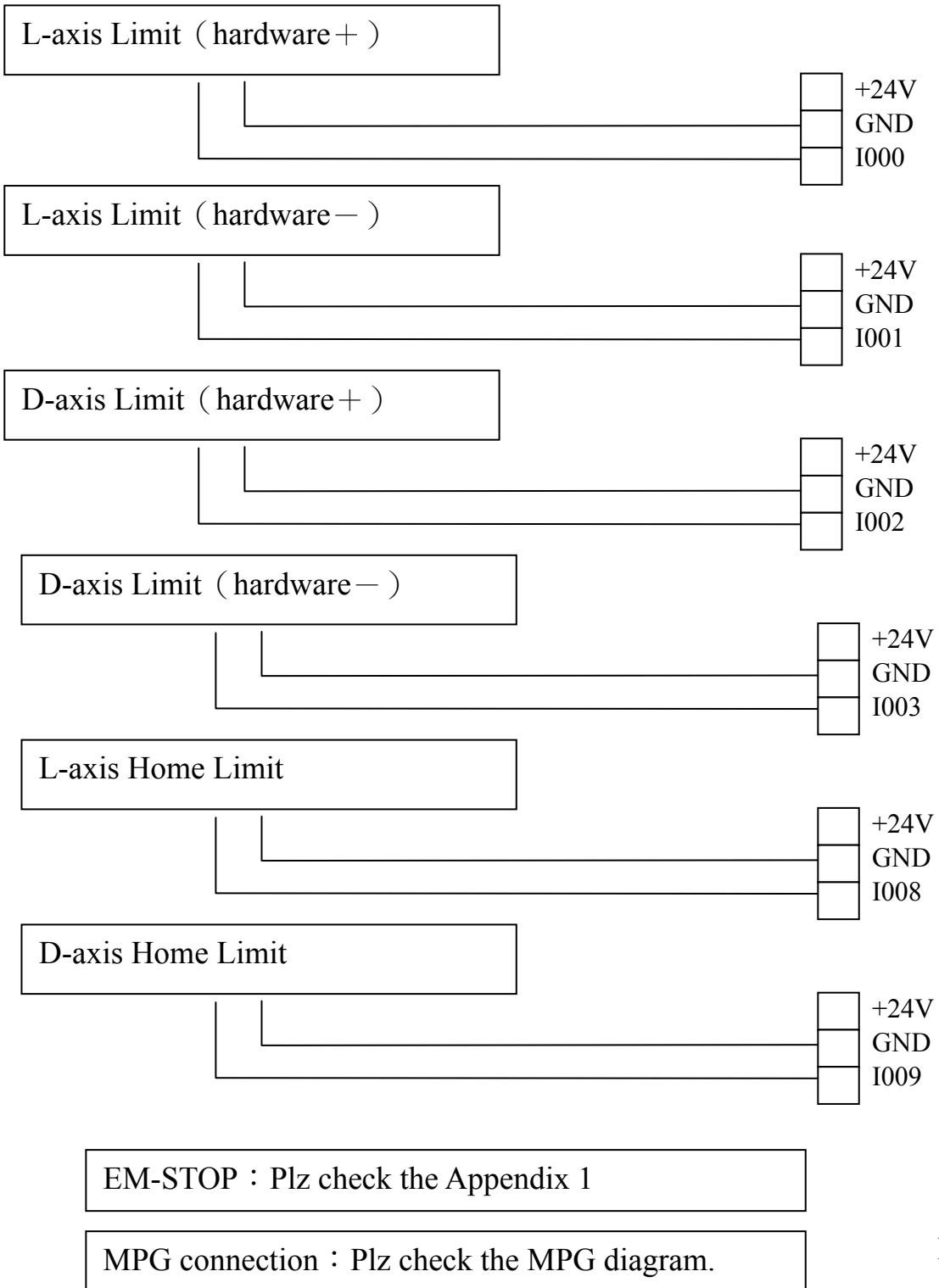
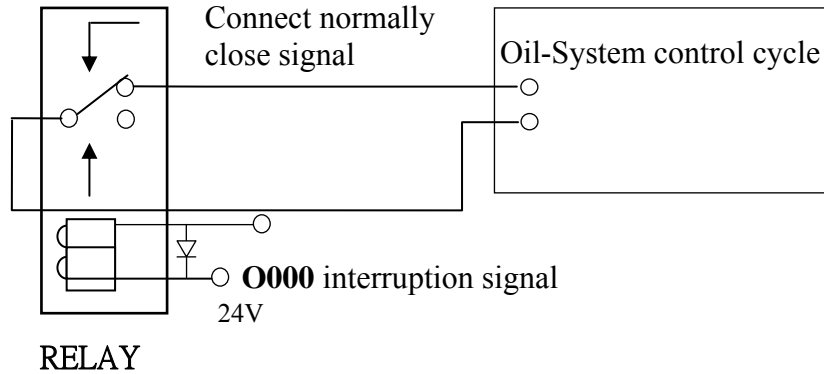


Fig 32

**Output Signal Type**

- (1) If we use output relay-board, each joint can sustain up to 250V(alternate) and 1A.
- (2) If we don't use output relay-board, each joint can only sustain up to 24V and 100mA.

Oil System Interruption



L-axis 、 D-axis 、 R-axis SERVO-ON

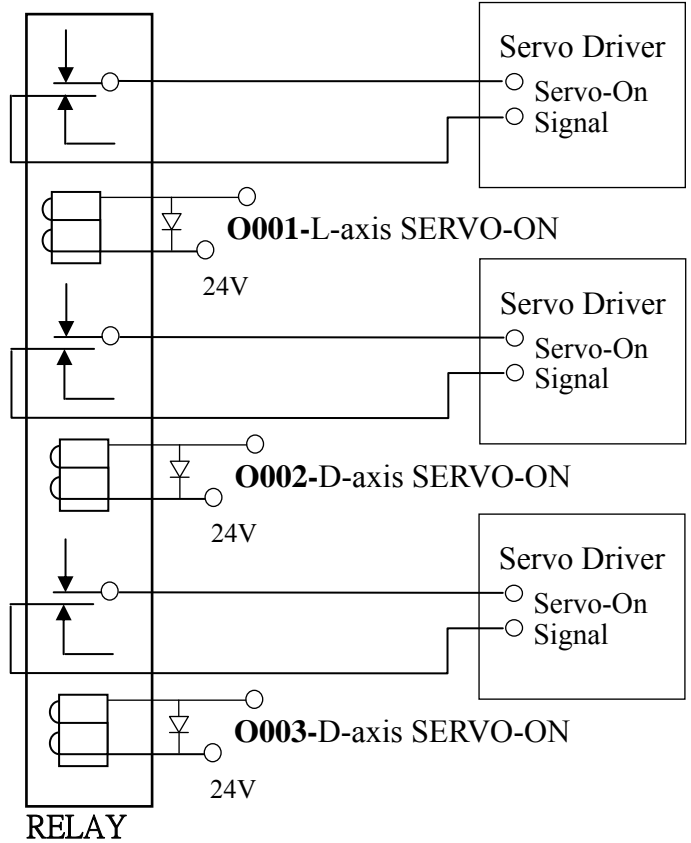


Fig 33

**Machine Illustration**

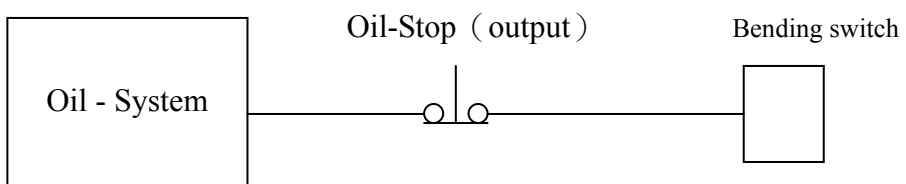
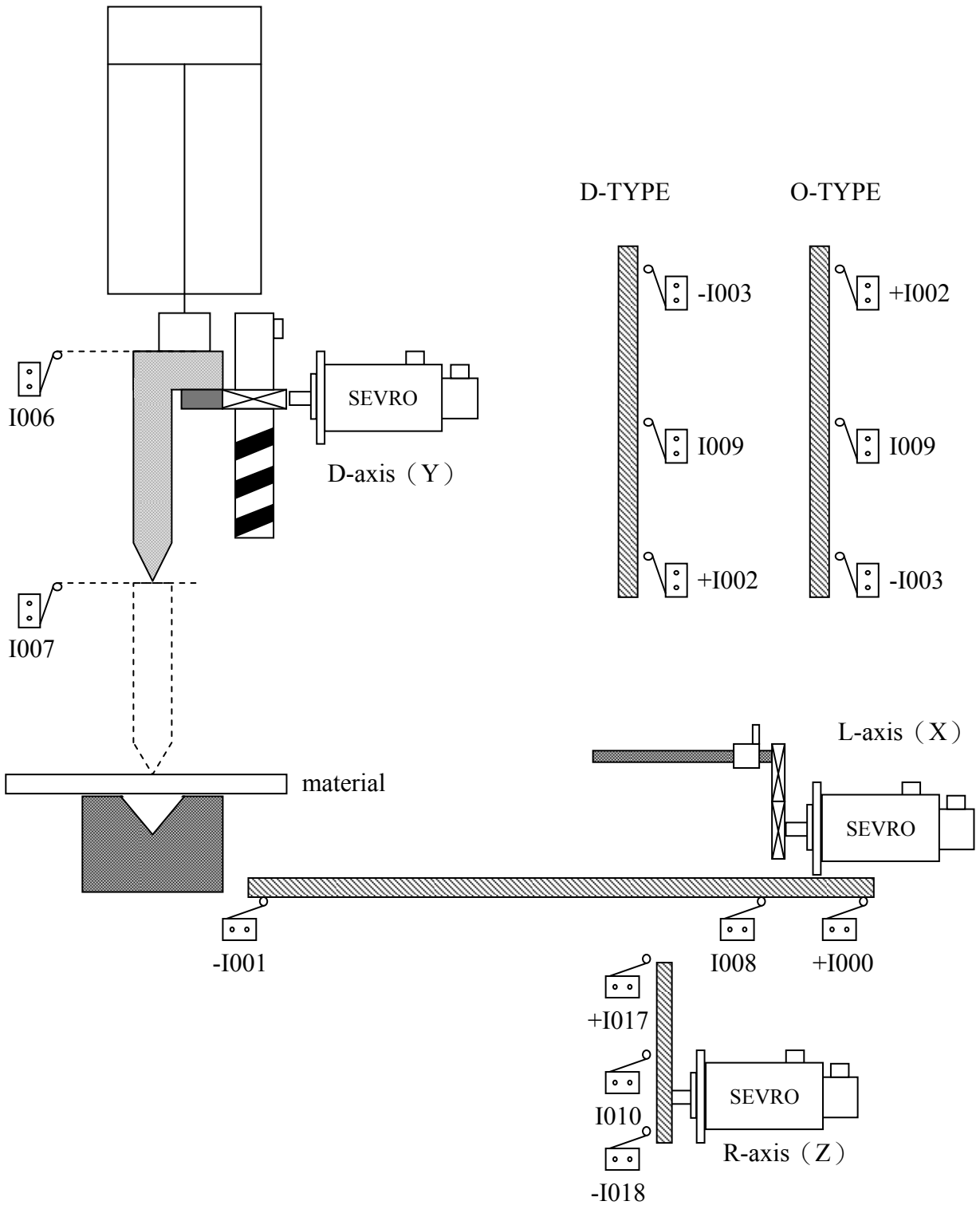


Fig 34

## Appendix 1 : Emergent Stop Connection Diagram

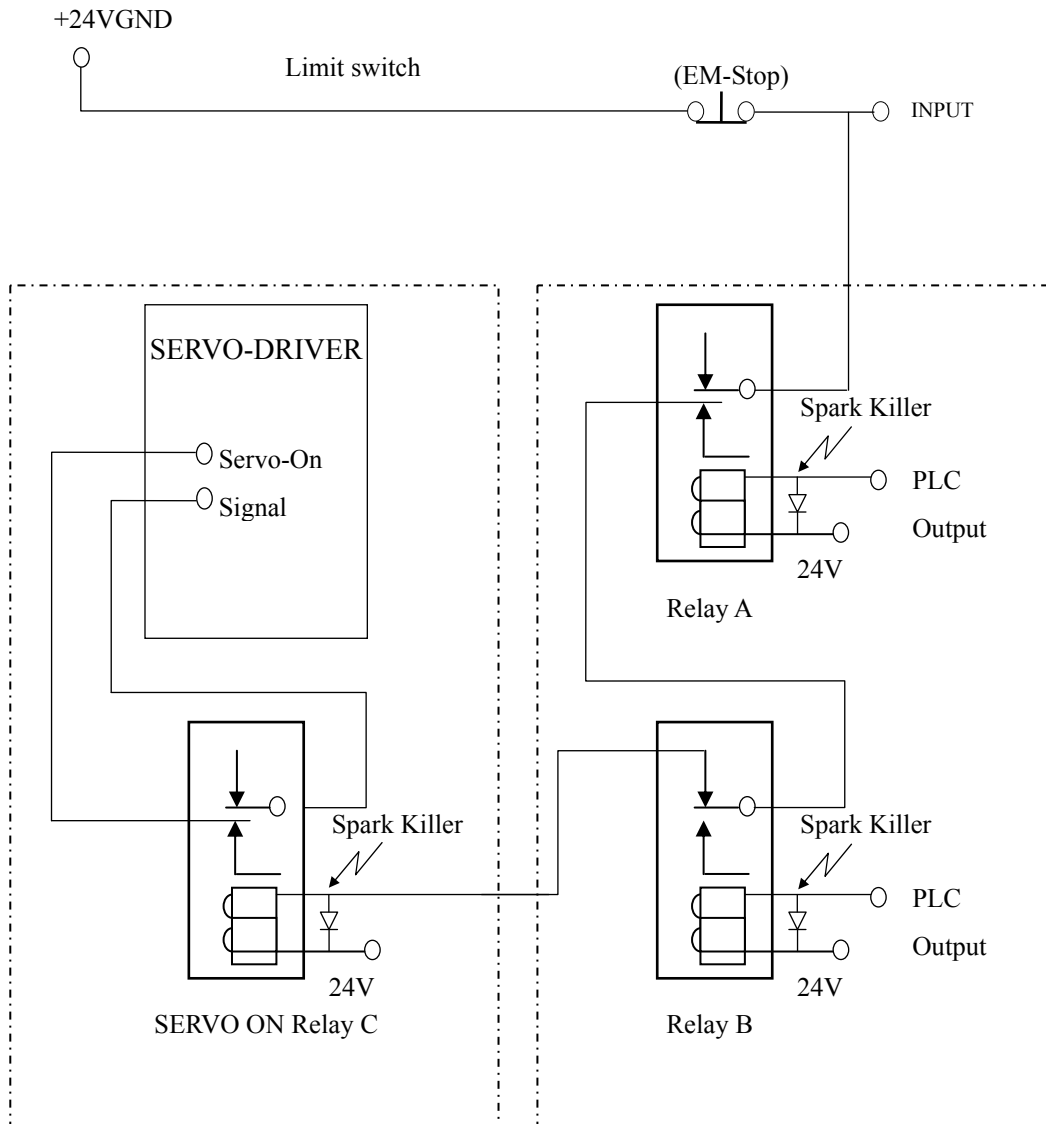


Fig 35 Emergent Stop Connection

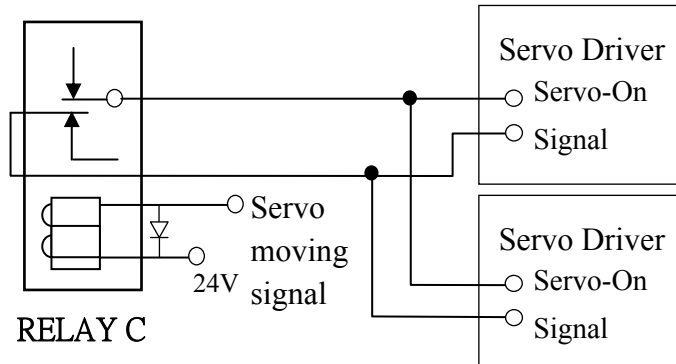
PS :

1. Relay A 、 B are protective lines for starting. They prevent the controller starting failure. Output will destroy machinery construction.
2. Relay C is servo-on relay.
3. Relay A 、 B are two outputs in PLC.
4. Relay C commonly is multi-joint. Each driver needs an unique joint. And some drivers can't.
5. The PLC edition of servo-on is mentioned in appendix-3.



## Appendix 2 : Servo Driver Servo-On Connection Diagram

**Wrong way :**



**Right way:**

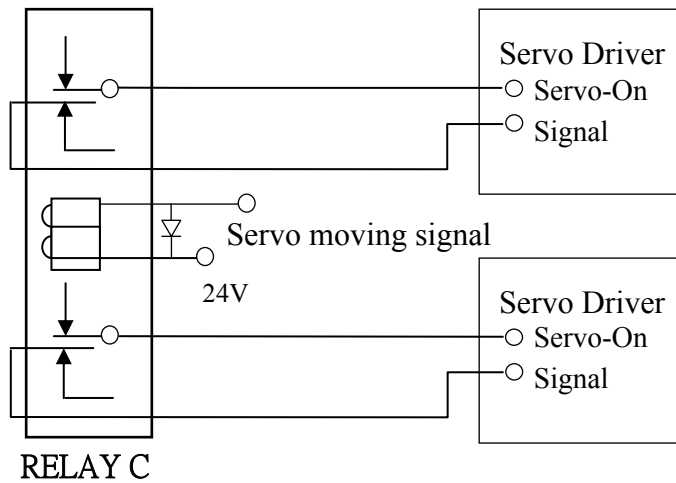


Fig 36 Right and Wrong way of driver connection

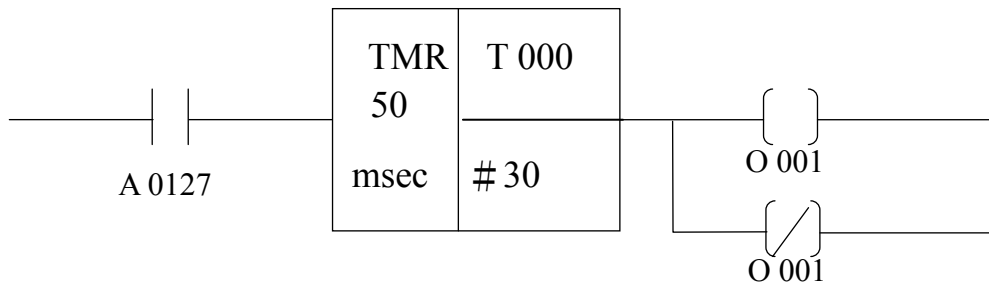


Fig 37

### Appendix 3 : H6D-B Controller size



Fig 38 H6D-B CPU Main Board Connectors

### H6D-B The Size of Box (Back)



Fig 39

### H6D-B The Size of Box (Upper)

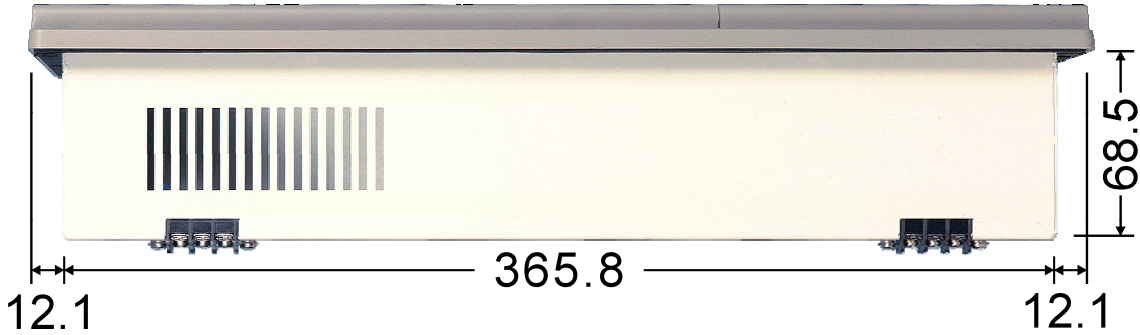


Fig 40

### H6D-B CUT OUT Size

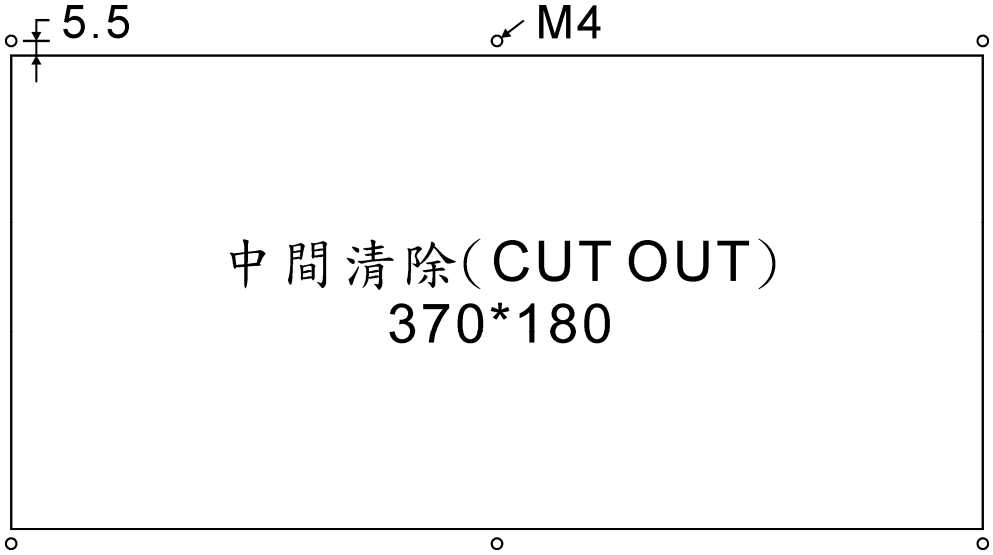


Fig 41

## Appendix 4 : Bending Angle Conception

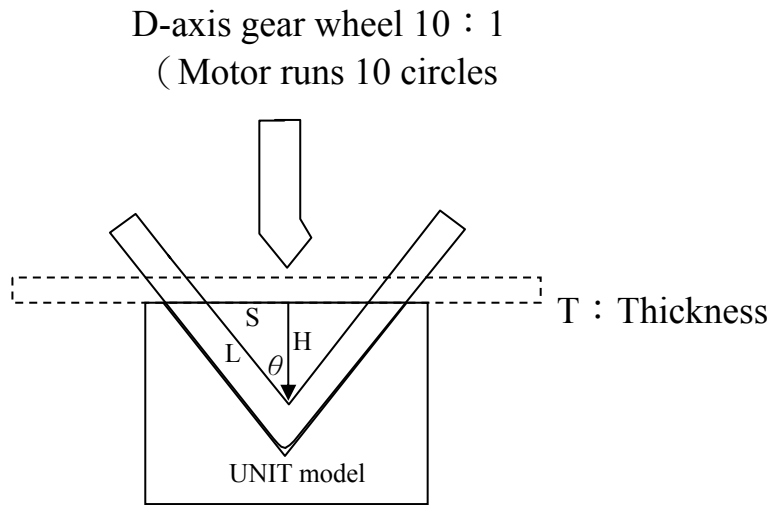


Fig 42

$$\sin \theta = S/L \ ; \ \cos \theta = H/L \ ; \ \tan \theta = \sin \theta / \cos \theta = S/H \ ; \ H = S / \tan \theta$$

Ex1 :

UNIT-CHICE model is 30mm width ( S = 15mm) ; angle 90 degree ; the piece 2mm thickness (actual calculation uses  $\mu$  as unit)

Calculation :

- (1)  $90 \div 2 = 45$
- (2)  $\sin 45 = 0.707$  ;  $\cos 45 = 0.707$  ;  $\tan 45 = 1$
- (3)  $H = 15000 (\mu) \div 1 = 15000 (\mu)$
- (4)  $15000 (\mu) - 2000 (\mu) = 13000 (\mu)$
- (5)  $\therefore 13 \text{ mm Pressing Down Depth}$

EX2 :

UNIT-CHICE model is 30mm width ( S = 15mm Actual calculation uses  $\mu$  as unit) ; angle 150 degree ; what is the pressing down depth H?

Calculation :

- (1)  $150 \div 2 = 75$
- (2)  $\sin 75 = 0.9659$  ;  $\cos 75 = 0.2588$  ;  $\tan 75 = 0.9659 \div 0.2588 = 3.7322$
- (3)  $H = 15000 (\mu) \div 3.7322 = 4019.077$
- (4)  $4019.077 (\mu) - 2000 (\mu) = 2019.077 (\mu)$
- (5)  $\therefore 2.019 \text{ mm Pressing Down Depth}$

### Appendix 5 : H4CL-B Control Structure of Bending Machine

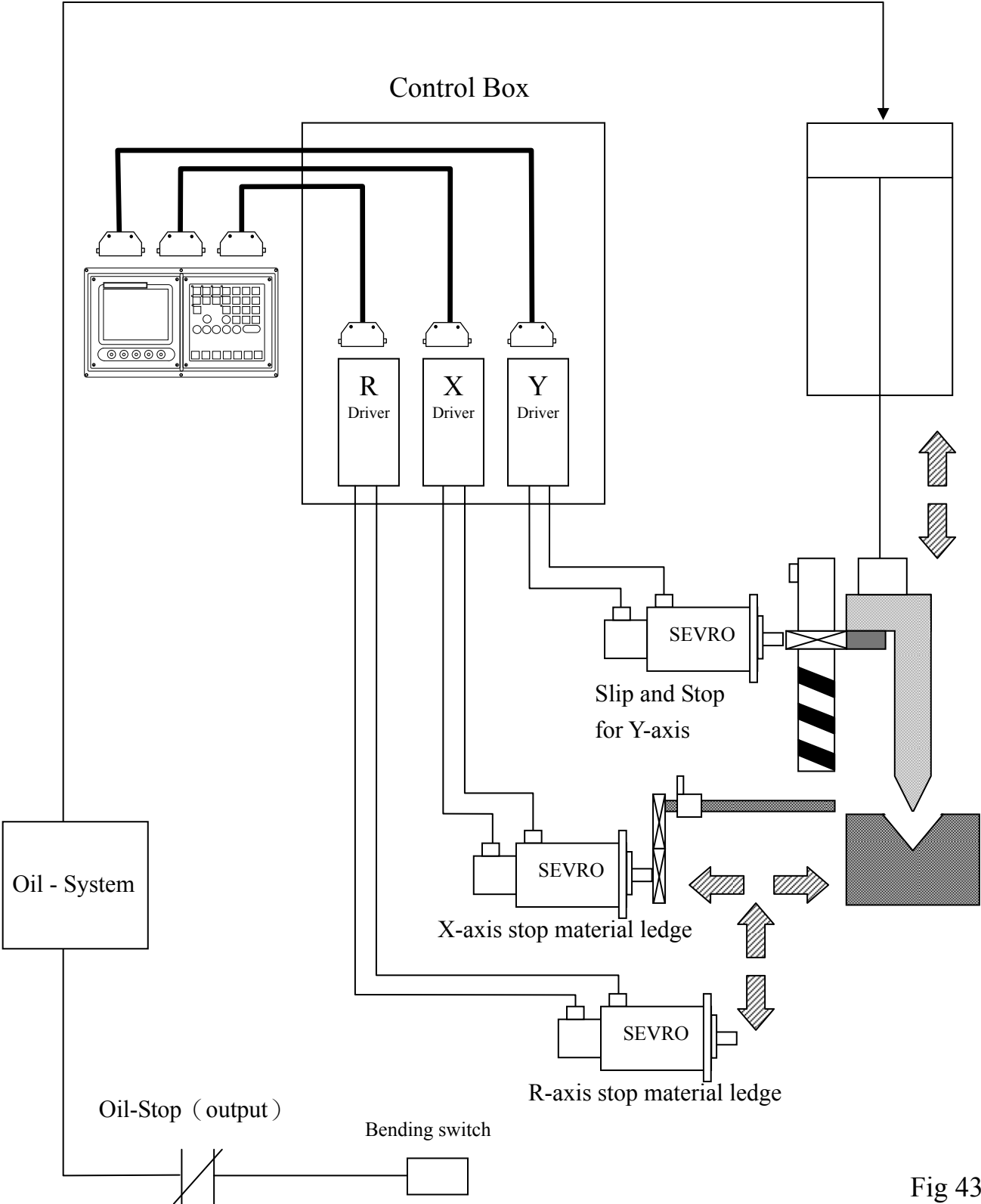


Fig 43

## Appendix 6 : MCM (Parameter) ◦

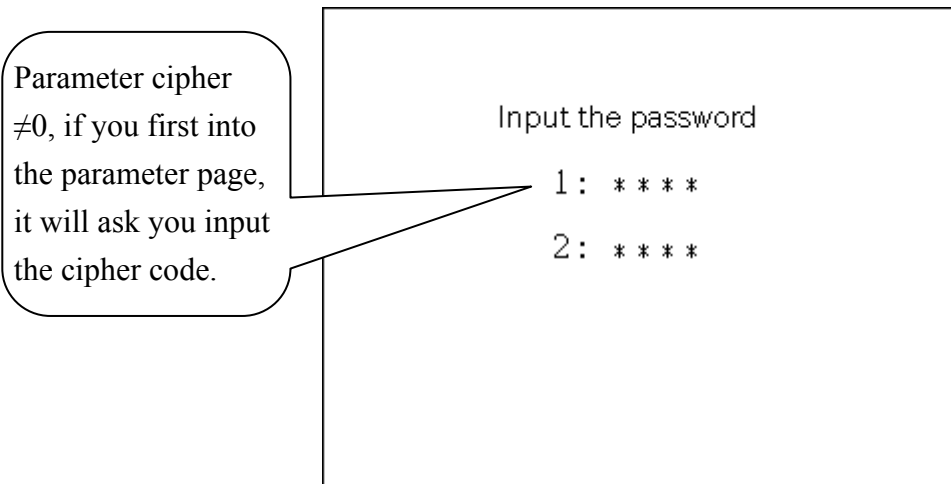


Fig 44

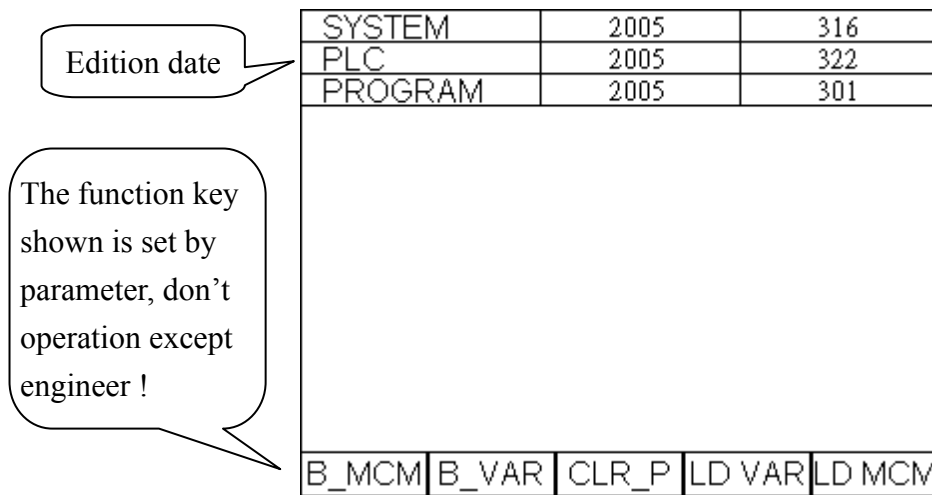


Fig 45

Then press “MCM” key twice quickly to go to the page below

Parameter	X	Y	Z
Resolution-DEN	0000000	0000000	0000000
Resolution-NUM	0000000	0000000	0000000
Encoder Factor	0	0	0
Traverse Speed	0000000	0000000	0000000
Rotate Direction	0	0	0
Home Direction	0	0	0
Home Speed1	0000000	0000000	0000000
Home Speed2	0000000	0000000	0000000
Software OT+	-0000.000	-0000.000	-0000.000
Software OT-	-0000.000	-0000.000	-0000.000
Backlash comp	0000.000	0000.000	0000.000
MPG-NUM	0000000	0000000	0000000
MPG-DEM	0000000	0000000	0000000
JOG Feed-Rate	0000000	0000000	0000000
Setting the range of Grid	0000.000	0000.000	0000.000
Home Limit	0000000	0000000	0000000
OT Limit	0000000	0000000	0000000
Software Program-Pos. OT+		-0000.000	
Software Program-Pos. OT-		-0000.000	

Signal Type :0=NC 1=NO

Fig 47

D-axis adjust value	000.000
Y-Opening default setting	000.000
D-axis Home limit setting	000.000
R-axis Home limit setting	-000.000
G00 Linear accel/decel	0000
MPG direction	0000
MPG Accel/Decel time	0000
0=Metric mode 1=Inch mode	0
USB FUNCTION 0=OFF 1=ON	0
Basic parameter cipher code1	0000
Basic parameter cipher code2	0000
Parameter list 0=NO 1=YES	0000
Lock the function key on the mcm page	0000
The basic point of Y-axis Home direction	-000.000
The calculation of Y-opening default	0000
The mode after Power-ON	0000

Y : -0000.000                      Signal Type :0=NC 1=NO

Y Set-0                      CLR-ALL

The function key shown is set by parameter, don't operation except engineer !

Fig 48

- 1. Resolution – DEN                                      Format : □□□□□□ (Default = 100)
- 2. Resolution – NUM                                     Format : □□□□□□ (Default = 100)
- 3. Encoder Factor                                         Format : □ (Default = 4)

Denominator (D) = pulses/rev for the encoder on motor.

Numerator (N) = pitch length (mm/rev) of the ball-screw.

Gear Ratio (GR) = Tooth No. on ball-screw / Tooth No. on motor.

Pulse Multiplication Factor (MF) = Encoder Factor

$$\text{Machine Resolution} = \frac{(\text{Pitch of Ball - screw})}{(\text{Encoder Pulse}) * (\text{MF})} * \frac{1}{\text{GR}}$$

Ex1: X-axis as linear axis, pitch = 5 mm = 5000 μm

Encoder = 2500 pulses

Encoder Factor = 4

GR = 5 (motor rotates 5 times while ball-screw rotates once)

Machine resolution = 5000/(2500 x 4)/5 = 5000/50000 = 1/10 = 0.1 μm/pulse

Therefore, the setting value for Resolution – DEN and Resolution – NUM can be one of the three combinations. They are all correct.

(1) D=10000, N=1000    (2) D=10, N=1    (3) D=100, N=10

**※ Setting by engineer.**

- 4. Traverse Speed                                         Format : □□□□□

Unit: mm/min    (Default=10000)

Note : The format is only for integer.

The traverse speed limit can be calculated from the following equation:

$$F_{\max} = 0.95 * \text{RPM} * \text{Pitch} * \text{GR}$$

RPM    :    The max. rpm of servo motor

Pitch    :    The pitch of the ball-screw

GR    :    Gear ratio of ball-screw/motor

Ex: Max. rpm = 3000 rpm for X-axis, Pitch = 5 mm/rev,    Gear Ratio = 5/1

$F_{\max} = 0.95 * 3000 * 5 / 5 = 2850 \text{ mm/min}$

Therefore, it is recommended to set Traverse Speed =2850.



### ※ Setting by engineer.

5. Rotate Direction                      Format : □ (Default = 0)  
 Setting = 0, Motor rotates in the positive direction. (CW)  
 Setting = 1, Motor rotates in the negative direction. (CCW)

This MCM can be used to reverse the direction of motor rotation if desired. So you don't have to worry about the direction of rotation when installing motor. These parameters will affect the direction of HOME position

6. HOME Direction                      Format : □ (Default = 0)  
 Setting = 0, Tool returning to HOME in the positive direction.  
 Setting = 1, Tool returning to HOME in the negative direction
7. HOME Speed 1                      Format : □□□□ (Default = 2500)

### ※ Setting by engineer.

8. HOME Speed 2                      Format : □□□□ (Default = 40)  
 Unit: mm/min  
 Set the moving speed when the tool, after having touched the HOME limit switch, is searching for the encoder grid signal during HOME execution. H4B CNC has three (3) different speeds when you execute HOME function as shown by Fig A ~D.

Speed 1: The motor accelerates to Speed 1 and its maximum speed is determined by the settings of MCM #136, #137, #138, #139 (X, Y, Z, A-axis) and the direction by MCM #130, #131, #132, #133. When tool touches the home limit switch, it starts deceleration to a stop.

Speed 2: The motor accelerates again to speed 2 and its maximum speed is equal to 1/4 of Speed 1 and the direction is by MCM #231~#234. When tool starts leaving the home limit switch, it starts deceleration to a stop.

Speed 3: The motor accelerates to speed 3 and its maximum speed is determined by the settings of MCM #142~#145 and the direction by MCM #231~#234. Once the encoder grid index is found, motor decelerates to a stop. This is the HOME position.

Note that the length of the Home limit switch should be longer than the distance for the deceleration of Speed 1. Otherwise, serious error may result. The equation to calculate the length of the Home limit switch is

$$\text{Length of Home Limit Switch (mm)} \geq \frac{\text{FDCOM} * \text{ACC}}{60000}$$

FDCOM = Speed 1, in mm/min. (MCM #136~ #139)

ACC = Time for acceleration/deceleration, in ms. (MCM #167)

60000 = 60 seconds = 60 \* 1000 milliseconds

When the C-bit C063=1 in PLC program, it commands the controller to do homing operation. Do homing operation for X-axis if R232=1, do Y-axis if R232=2, do Z-axis if R232=4, do A-axis if R232=8 and do four axes simultaneously if R232=15.

Ex: FDCOM = 3000.00 mm/min, and ACC = 100 ms

Length of Home Limit Switch = 3000 \* 100 / 60000 = 5 mm

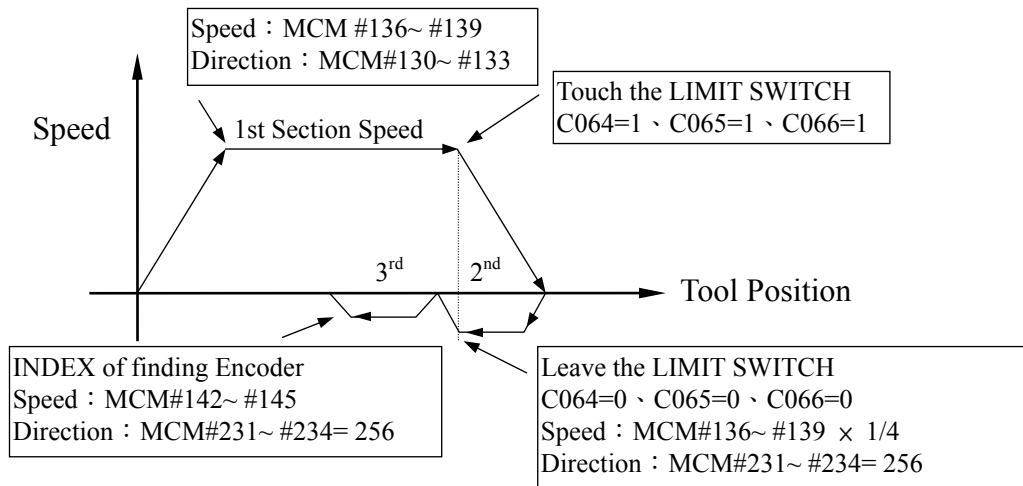


Fig 49 A Homing Speed and Direction of finding ( GRID )

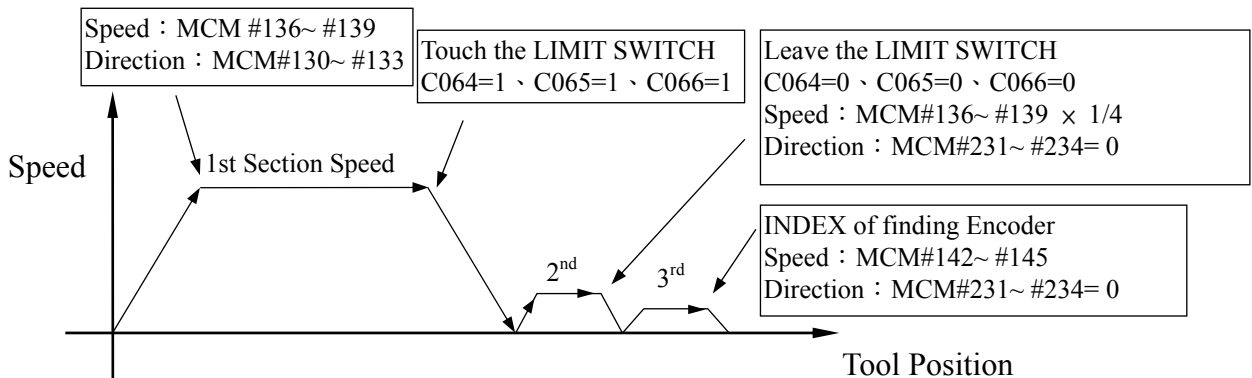


Fig 50 B Homing Speed and Direction of finding ( GRID )

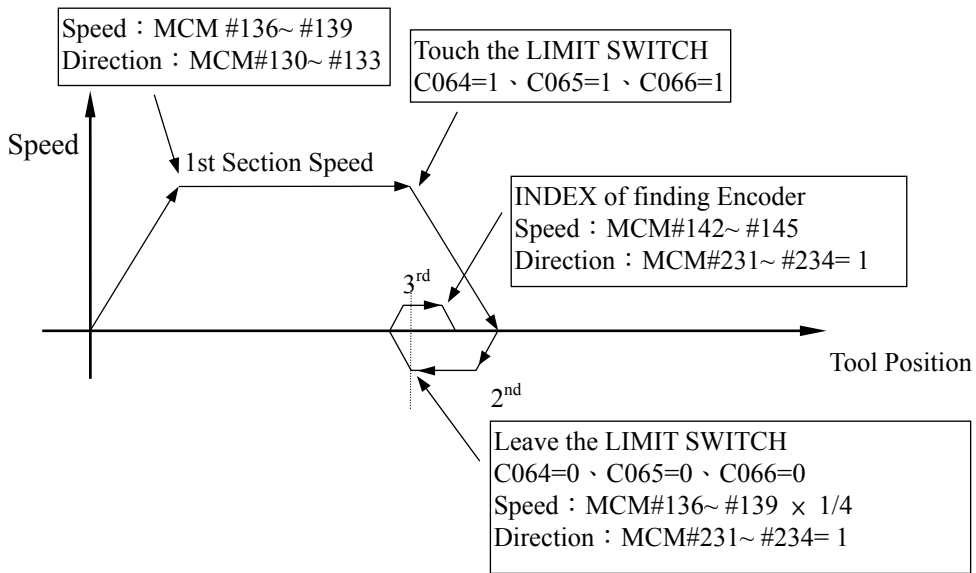


Fig 51 C Homing Speed and Direction of finding ( GRID)

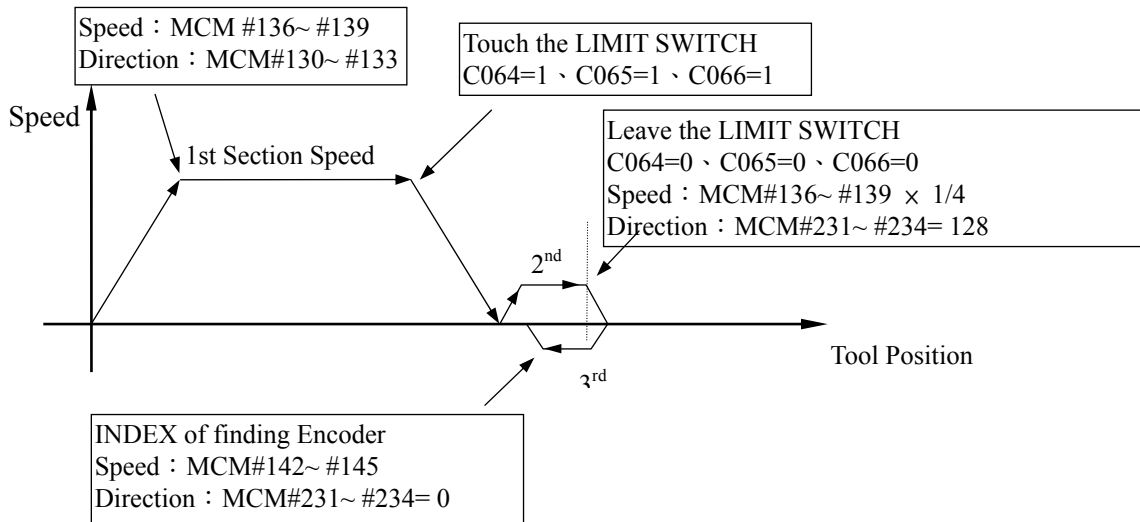


Fig 52 D Homing Speed and Direction of finding ( GRID)

※ **Setting by engineer.**

9. Software OT +1                      Format : □□□□□□ (Default = 9999.999)  
Unit: mm/min  
Set the software over-travel (OT) limit in the positive (+) direction, the setting value is equal to the distance from positive OT location to the machine origin (HOME).
  
10. Software OT -1                    Format : -□□□□□□□□ (Default = -9999.999)  
Unit: mm/min  
Set the software over-travel (OT) limit in the negative (-) direction, the setting



The distance's maximum when servo motor searching the Grid signal:

EX :

The servo motor of X-axis turns 3/4 round = 5.000 mm MCM216 = 5.200

The servo motor of Y-axis turns 3/4 round = 5.000 mm MCM217 = 5.200

※ If it exceeds the range and the motor can not find the Grid still. ERR15 will be shown up.

※ **Setting by engineer.**

18. HOME Limit Format : □ (Default = 0)

Value = 0 ; The signal type is 『Normally Close』 .

Value = 1 ; The signal type is 『Normally Open』 .

19. OT Limit Format : □ (Default = 0)

Value = 0 ; The signal type is 『Normally Close』 .

Value = 1 ; The signal type is 『Normally Open』 .

20. D-axis adjust value Format : □□□□.□□□ (Default = 0.000)

EX 1.

MOPM = 326.00

Measure the distance of machine opening = 327.319

『D-axis adjust value』 = 1.319

EX 2.

MOPM = 326.00

Measure the distance of machine opening = 325.117

『D-axis adjust value』 = -0.883

21. Y-Opening default setting Format : □□□□.□□□ (Default = 0.000)

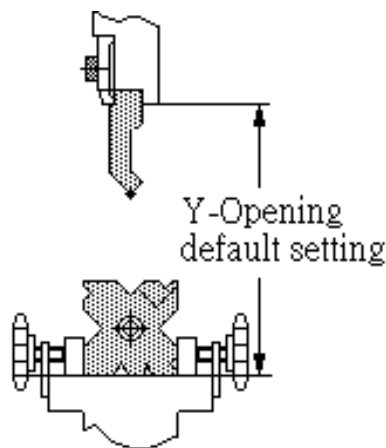


Fig 54

22. D-axis HOME Limit setting      Format : □□□□.□□□ (Default = 0.000)  
 Show the coordinate when finish the HOME operation

23. R-axis HOME Limit setting      Format : □□□□.□□□ (Default = 0.000)  
 Measure the distance when finish the HOME operation

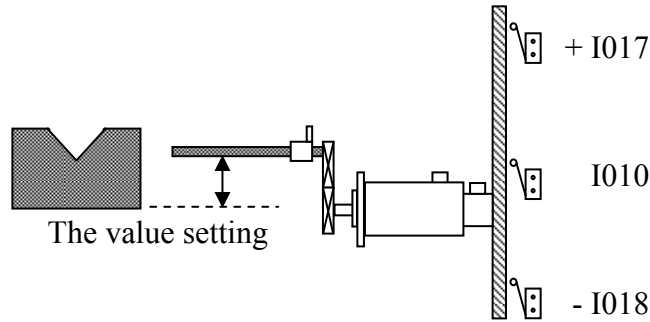


Fig 55

24. G00 Linear accel / decel      Format : □□□ (Default = 100)  
 Unit: millisecond  
 Setting Range: 4 ~ 512 millisecond.

25. MPG direction      Format : □ (Default = 0)  
 Adjust the MPG direction (Positive or Negative to the Axis)  
 According to the bit, bit 0 represents X-axis, bit 1= Y-axis, and bit 2=Z-axis.  
 EX1: When tending to change the MPG direction of Y-axis, its setting is 2  
 EX2: When tending to change the MPG direction of X-axis and Y-axis, it's setting is 3.

26. MPG Accel / Decel time      Format : □□□ (Default = 64)  
 Unit: milliseconds  
 Setting Range: 4~512 ms.  
 The motor acceleration / deceleration time is equal to MCM #236 when MPG hand-wheel is used in JOG mode.

27. 0 = Metric mode, 1 = Inch mode Format : □ (Default = 0)  
 Setting = 0,      Measurement in METRIC unit.  
 Setting = 1,      Measurement in INCH unit.

**※ Setting by engineer.**

28. Language 0 = Chinese, 1 = English      Format : □ (Default = 0)

29. Basic parameter cipher code 1      Format : □□□□ (Default = 0)

30. Basic parameter cipher code 2 Format : □□□□ (Default = 0)

If the password setting of MCM is zero, user can get in the displaying page directly.

If it is not zero, user must enter the correct password to get in the MCM page.

Until the password has been solved, the 『Correct』 function under JOG mode will not be set-up.

31. Parameter list 0 = NO, 1 = YES Format : □

※ **Setting by engineer.**

32. Lock the function key on the MCM page Format : □

The value = 0, Lock

The value = 1, Unlock

value = 1, illustration is below :

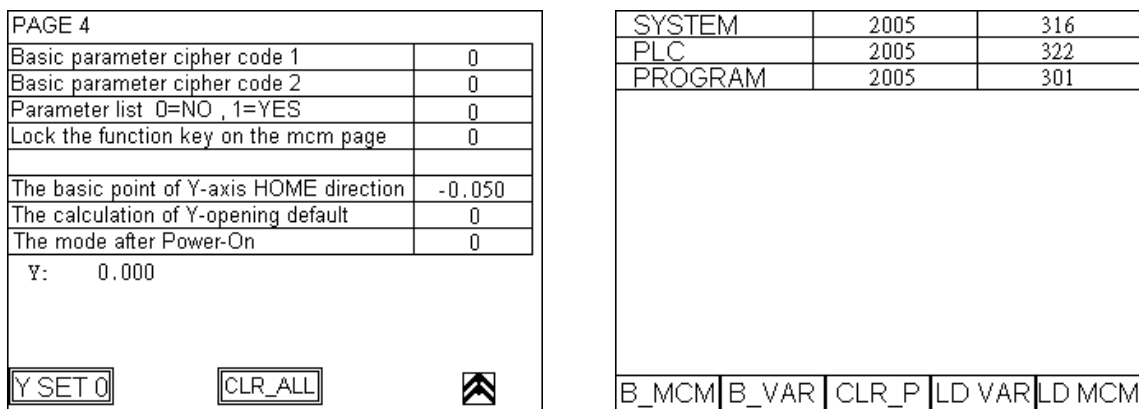


Fig 56

Y SET 0 : Clean the machine coordinate when press this key 6 sec.

CLR\_ALL : Press this key 6 sec  
Clean the memory of the FLASH ROM and set the default to original value.

B\_MCM : Burn MCM parameters into FLASH-ROM when press this key 2 sec.

B\_VAR : Burn variables into FLASH-ROM when press this key 2 sec. (#9000- # 9999)

CLR\_P : Delete all programs.

LD VAR : Read variables burned into FLASH-ROM when press this key 2 sec. (#9000- # 9999)

LD MCM : MCM parameters reset when press this key 2 sec.

※ **Setting by engineer.**

33. The basic point of Y-axis HOME direction Format : □□□.□□□ (Default = 0.000)  
The setting means that after executing HOME, the distance of moving along the direction to HOME. Then the HOME signal input in the controller.

※ **Setting by engineer.**

34. The calculation of Y-opening default Format : □  
Setting=0 The bigger Y-axis' coordinate is set, the more bending angle is executed.  
Setting=1 The smaller Y-axis' coordinate is set, the more bending angle is executed.

**This setting factor is set by engineer before selling. So, any change of this setting will effect the location of Y-axis very critically.**

※ **Setting by engineer.**

35. The mode after Power-On Format : □  
Show the page when Power-On  
The value = 0 AUTO MODE  
The value = 1 JOG MODE  
The value = 2 HOME MODE



**HUST H6D MCM Parameter**

H6D / H6DL : X, Y, Z, A, B, C-AXES

H9D / H9DL : X, Y, Z, A, B, C, U, V, W-AXES

MCM No.	Factory Default Setting	Unit	Description	Setting
1	0	mm	G54 X-axis 1 <sup>st</sup> Work coordinate (origin)	
2	0	mm	G54 Y-axis 1 <sup>st</sup> Work coordinate (origin)	
3	0	mm	G54 Z-axis 1 <sup>st</sup> Work coordinate (origin)	
4	0	mm	G54 A-axis 1 <sup>st</sup> Work coordinate (origin)	
5	0	mm	G54 B-axis 1 <sup>st</sup> Work coordinate (origin)	
6	0	mm	G54 C-axis 1 <sup>st</sup> Work coordinate (origin)	
7	0	mm	G54 U-axis 1 <sup>st</sup> Work coordinate (origin)	
8	0	mm	G54 V-axis 1 <sup>st</sup> Work coordinate (origin)	
9	0	mm	G54 W-axis 1 <sup>st</sup> Work coordinate (origin)	
10-20			System Reserved !	
21	0	mm	G55 X-axis 2 <sup>nd</sup> Work coordinate (origin)	
22	0	mm	G55 Y-axis 2 <sup>nd</sup> Work coordinate (origin)	
23	0	mm	G55 Z-axis 2 <sup>nd</sup> Work coordinate (origin)	
24	0	mm	G55 A-axis 2 <sup>nd</sup> Work coordinate (origin)	
25	0	mm	G55 B-axis 2 <sup>nd</sup> Work coordinate (origin)	
26	0	mm	G55 C-axis 2 <sup>nd</sup> Work coordinate (origin)	
27	0	mm	G55 U-axis 2 <sup>nd</sup> Work coordinate (origin)	
28	0	mm	G55 V-axis 2 <sup>nd</sup> Work coordinate (origin)	
29	0	mm	G55 W-axis 2 <sup>nd</sup> Work coordinate (origin)	
30-40			System Reserved !	
41	0	mm	G56 X-axis 3 <sup>rd</sup> Work coordinate (origin)	
42	0	mm	G56 Y-axis 3 <sup>rd</sup> Work coordinate (origin)	
43	0	mm	G56 Z-axis 3 <sup>rd</sup> Work coordinate (origin)	
44	0	mm	G56 A-axis 3 <sup>rd</sup> Work coordinate (origin)	
45	0	mm	G56 B-axis 3 <sup>rd</sup> Work coordinate (origin)	
46	0	mm	G56 C-axis 3 <sup>rd</sup> Work coordinate (origin)	
47	0	mm	G56 U-axis 3 <sup>rd</sup> Work coordinate (origin)	
48	0	mm	G56 V-axis 3 <sup>rd</sup> Work coordinate (origin)	
49	0	mm	G56 W-axis 3 <sup>rd</sup> Work coordinate (origin)	
50-60			System Reserved !	
61	0	mm	G57 X-axis 4 <sup>th</sup> Work coordinate (origin)	
62	0	mm	G57 Y-axis 4 <sup>th</sup> Work coordinate (origin)	
63	0	mm	G57 Z-axis 4 <sup>th</sup> Work coordinate (origin)	
64	0	mm	G57 A-axis 4 <sup>th</sup> Work coordinate (origin)	
65	0	mm	G57 B-axis 4 <sup>th</sup> Work coordinate (origin)	
66	0	mm	G57 C-axis 4 <sup>th</sup> Work coordinate (origin)	
67	0	mm	G57 U-axis 4 <sup>th</sup> Work coordinate (origin)	
68	0	mm	G57 V-axis 4 <sup>th</sup> Work coordinate (origin)	
69	0	mm	G57 W-axis 4 <sup>th</sup> Work coordinate (origin)	
70-80			System Reserved !	
81	0	mm	G58 X-axis 5 <sup>th</sup> Work coordinate (origin)	
82	0	mm	G58 Y-axis 5 <sup>th</sup> Work coordinate (origin)	
83	0	mm	G58 Z-axis 5 <sup>th</sup> Work coordinate (origin)	
84	0	mm	G58 A-axis 5 <sup>th</sup> Work coordinate (origin)	
85	0	mm	G58 B-axis 5 <sup>th</sup> Work coordinate (origin)	
86	0	mm	G58 C-axis 5 <sup>th</sup> Work coordinate (origin)	
87	0	mm	G58 U-axis 5 <sup>th</sup> Work coordinate (origin)	

MCM No.	Factory Default Setting	Unit	Description	Setting
88	0	mm	G58 V-axis 5 <sup>th</sup> Work coordinate (origin)	
89	0	mm	G58 W-axis 5 <sup>th</sup> Work coordinate (origin)	
90-100			System Reserved !	
101	0	mm	G59 X-axis 6 <sup>th</sup> Work coordinate (origin)	
102	0	mm	G59 Y-axis 6 <sup>th</sup> Work coordinate (origin)	
103	0	mm	G59 Z-axis 6 <sup>th</sup> Work coordinate (origin)	
104	0	mm	G59 A-axis 6 <sup>th</sup> Work coordinate (origin)	
105	0	mm	G59 B-axis 6 <sup>th</sup> Work coordinate (origin)	
106	0	mm	G59 C-axis 6 <sup>th</sup> Work coordinate (origin)	
107	0	mm	G59 U-axis 6 <sup>th</sup> Work coordinate (origin)	
108	0	mm	G59 V-axis 6 <sup>th</sup> Work coordinate (origin)	
109	0	mm	G59 W-axis 6 <sup>th</sup> Work coordinate (origin)	
110-120			System Reserved !	
121	0	mm	X-axis, G28 reference point coordinate	
122	0	mm	Y-axis, G28 reference point coordinate	
123	0	mm	Z-axis, G28 reference point coordinate	
124	0	mm	A-axis, G28 reference point coordinate	
125	0	mm	B-axis, G28 reference point coordinate	
126	0	mm	C-axis, G28 reference point coordinate	
127	0	mm	U-axis, G28 reference point coordinate	
128	0	mm	V-axis, G28 reference point coordinate	
129	0	mm	W-axis, G28 reference point coordinate	
130-140			System Reserved !	
141	0	mm	X-axis, G30 reference point coordinate	
142	0	mm	Y-axis, G30 reference point coordinate	
143	0	mm	Z-axis, G30 reference point coordinate	
144	0	mm	A-axis, G30 reference point coordinate	
145	0	mm	B-axis, G30 reference point coordinate	
146	0	mm	C-axis, G30 reference point coordinate	
147	0	mm	U-axis, G30 reference point coordinate	
148	0	mm	V-axis, G30 reference point coordinate	
149	0	mm	W-axis, G30 reference point coordinate	
150-160			System Reserved !	
161	0	mm	X-axis, Backlash compensation (G01), 0~9.999	
162	0	mm	Y-axis, Backlash compensation (G01), 0~9.999	
163	0	mm	Z-axis, Backlash compensation (G01), 0~9.999	
164	0	mm	A-axis, Backlash compensation (G01), 0~9.999	
165	0	mm	B-axis, Backlash compensation (G01), 0~9.999	
166	0	mm	C-axis, Backlash compensation (G01), 0~9.999	
167	0	mm	U-axis, Backlash compensation (G01), 0~9.999	
168	0	mm	V-axis, Backlash compensation (G01), 0~9.999	
169	0	mm	W-axis, Backlash compensation (G01), 0~9.999	
170-180			System Reserved !	
181	0	mm	X-axis, Backlash compensation (G00), 0~9.999	
182	0	mm	Y-axis, Backlash compensation (G00), 0~9.999	
183	0	mm	Z-axis, Backlash compensation (G00), 0~9.999	
184	0	mm	A-axis, Backlash compensation (G00), 0~9.999	
185	0	mm	B-axis, Backlash compensation (G00), 0~9.999	
186	0	mm	C-axis, Backlash compensation (G00), 0~9.999	
187	0	mm	U-axis, Backlash compensation (G00), 0~9.999	
188	0	mm	V-axis, Backlash compensation (G00), 0~9.999	
189	0	mm	W-axis, Backlash compensation (G00), 0~9.999	
190-200			System Reserved !	
201	1000	mm/min	X-axis, JOG Feed-rate	

MCM No.	Factory Default Setting	Unit	Description	Setting
202	1000	mm/min	Y-axis, JOG Feed-rate	
203	1000	mm/min	Z-axis, JOG Feed-rate	
204	1000	mm/min	A-axis, JOG Feed-rate	
205	1000	mm/min	B-axis, JOG Feed-rate	
206	1000	mm/min	C-axis, JOG Feed-rate	
207	1000	mm/min	U-axis, JOG Feed-rate	
208	1000	mm/min	V-axis, JOG Feed-rate	
209	1000	mm/min	W-axis, JOG Feed-rate	
210-220			System Reserved !	
221	10000	mm/min	X-axis, G00 Traverse speed limit	
222	10000	mm/min	Y-axis, G00 Traverse speed limit	
223	10000	mm/min	Z-axis, G00 Traverse speed limit	
224	10000	mm/min	A-axis, G00 Traverse speed limit	
225	10000	mm/min	B-axis, G00 Traverse speed limit	
226	10000	mm/min	C-axis, G00 Traverse speed limit	
227	10000	mm/min	U-axis, G00 Traverse speed limit	
228	10000	mm/min	V-axis, G00 Traverse speed limit	
229	10000	mm/min	W-axis, G00 Traverse speed limit	
230-240			System Reserved !	
241	100	pulse	X-axis,Denominator,resolution calc.(Encoder pulse)	
242	100	μm	X-axis,Numerator,resolution calculation.(Ball-screwpitch)	
243	100	pulse	Y-axis,Denominator,resolutioncalc.(Encoder pulse)	
244	100	μm	Y-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
245	100	pulse	Z-axis,Denominator,resolutioncalc.(Encoder pulse)	
246	100	μm	Z-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
247	100	pulse	A-axis,Denominator,resolutioncalc.(Encoder pulse)	
248	100	μm	A-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
249	100	pulse	B-axis,Denominator,resolutioncalc.(Encoder pulse)	
250	100	μm	B-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
251	100	pulse	C-axis,Denominator,resolutioncalc.(Encoder pulse)	
252	100	μm	C-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
253	100	pulse	U-axis,Denominator,resolutioncalc.(Encoder pulse)	
254	100	μm	U-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
255	100	pulse	V-axis,Denominator,resolutioncalc.(Encoder pulse)	
256	100	μm	V-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
257	100	pulse	W-axis,Denominator,resolutioncalc.(Encoder pulse)	
258	100	μm	W-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
259-280			System Reserved !	
281	0		X-axis, HOME direction, 0=+ dir.1=-dir	
282	0		Y-axis, HOME direction, 0=+ dir.1=-dir	
283	0		Z-axis, HOME direction, 0=+ dir.1=-dir	
284	0		A-axis, HOME direction, 0=+ dir.1=-dir	
285	0		B-axis, HOME direction, 0=+ dir.1=-dir	
286	0		C-axis, HOME direction, 0=+ dir.1=-dir	
287	0		U-axis, HOME direction, 0=+ dir.1=-dir	
288	0		V-axis, HOME direction, 0=+ dir.1=-dir	
289	0		W-axis, HOME direction, 0=+ dir.1=-dir	
287-300			System Reserved !	
301	2500	mm/min	X-axis, HOME speed 1	
302	2500	mm/min	Y-axis, HOME speed 1	
303	2500	mm/min	Z-axis, HOME speed 1	
304	2500	mm/min	A-axis, HOME speed 1	
305	2500	mm/min	B-axis, HOME speed 1	
306	2500	mm/min	C-axis, HOME speed 1	

MCM No.	Factory Default Setting	Unit	Description	Setting
207	2500	mm/min	U-axis, HOME speed 1	
308	2500	mm/min	V-axis, HOME speed 1	
309	2500	mm/min	W-axis, HOME speed 1	
310-320			System Reserved !	
321	40	mm/min	X-axis, Home grid speed during HOME execution	
322	40	mm/min	Y-axis, Home grid speed during HOME execution	
323	40	mm/min	Z-axis, Home grid speed during HOME execution	
324	40	mm/min	A-axis, Home grid speed during HOME execution	
325	40	mm/min	B-axis, Home grid speed during HOME execution	
326	40	mm/min	C-axis, Home grid speed during HOME execution	
327	40	mm/min	U-axis, Home grid speed during HOME execution	
328	40	mm/min	V-axis, Home grid speed during HOME execution	
329	40	mm/min	W-axis, Home grid speed during HOME execution	
330-340			System Reserved !	
341	0	0/1	X-axis,Home grid direction during HOME execution	
342	0	0/1	Y-axis,Home grid direction during HOME execution	
343	0	0/1	Z-axis,Home grid direction during HOME execution	
344	0	0/1	A-axis,Home grid direction during HOME execution	
345	0	0/1	B-axis,Home grid direction during HOME execution	
346	0	0/1	C-axis,Home grid direction during HOME execution	
347	0	0/1	U-axis,Home grid direction during HOME execution	
348	0	0/1	V-axis,Home grid direction during HOME execution	
349	0	0/1	W-axis,Home grid direction during HOME execution	
350-360			System Reserved !	
361	0	mm	X-axis Home grid setting	
362	0	mm	Y-axis Home grid setting	
363	0	mm	Z-axis Home grid setting	
364	0	mm	A-axis Home grid setting	
365	0	mm	B-axis Home grid setting	
366	0	mm	C-axis Home grid setting	
367	0	mm	U-axis Home grid setting	
368	0	mm	V-axis Home grid setting	
369	0	mm	W-axis Home grid setting	
370-380			System Reserved !	
381	0	mm	X-axis, HOME shift data	
382	0	mm	Y-axis, HOME shift data	
383	0	mm	Z-axis, HOME shift data	
384	0	mm	A-axis, HOME shift data	
385	0	mm	B-axis, HOME shift data	
386	0	mm	C-axis, HOME shift data	
387	0	mm	U-axis, HOME shift data	
388	0	mm	V-axis, HOME shift data	
389	0	mm	W-axis, HOME shift data	
390-400			System Reserved !	
401	10.000	mm	X-axis,Setting the value of search servo grid	
402	10.000	mm	Y-axis,Setting the value of search servo grid	
403	10.000	mm	Z-axis,Setting the value of search servo grid	
404	10.000	mm	A-axis,Setting the value of search servo grid	
405	10.000	mm	B-axis,Setting the value of search servo grid	
406	10.000	mm	C-axis,Setting the value of search servo grid	
407	10.000	mm	U-axis,Setting the value of search servo grid	
408	10.000	mm	V-axis,Setting the value of search servo grid	
409	10.000	mm	W-axis,Setting the value of search servo grid	
410-420	0		System Reserved !	

MCM No.	Factory Default Setting	Unit	Description	Setting
421	0		X-axis Origin switch (+ :N.O (normallyopen) node; -:N.C (normally closed) node)	
422	0		Y-axis Origin switch (+ :N.O node; -:N.C node)	
423	0		Z-axis Origin switch (+ :N.O node; -:N.C node)	
424	0		A-axis Origin switch (+ :N.O node; -:N.C node)	
425	0		B-axis Origin switch (+ :N.O node; -:N.C node)	
426	0		C-axis Origin switch (+ :N.O node; -:N.C node)	
427	0		U-axis Origin switch (+ :N.O node; -:N.C node)	
428	0		V-axis Origin switch (+ :N.O node; -:N.C node)	
429	0		W-axis Origin switch (+ :N.O node; -:N.C node)	
430-440			System Reserved !	
441	0		X-axis, Direction of motor rotation, 0=CW, 1=CCW	
442	0		Y-axis, Direction of motor rotation, 0=CW, 1=CCW	
443	0		Z-axis, Direction of motor rotation, 0=CW, 1=CCW	
444	0		A-axis, Direction of motor rotation, 0=CW, 1=CCW	
445	0		B-axis, Direction of motor rotation, 0=CW, 1=CCW	
446	0		C-axis, Direction of motor rotation, 0=CW, 1=CCW	
447	0		U-axis, Direction of motor rotation, 0=CW, 1=CCW	
448	0		V-axis, Direction of motor rotation, 0=CW, 1=CCW	
449	0		W-axis, Direction of motor rotation, 0=CW, 1=CCW	
450-460			System Reserved !	
461	4		X-axis,Encoder pulse multiplicationfactor,1,2,or 4	
462	4		Y-axis,Encoder pulse multiplicationfactor,1,2,or 4	
463	4		Z-axis,Encoder pulse multiplicationfactor,1,2,or 4	
464	4		A-axis,Encoder pulse multiplicationfactor,1,2,or 4	
465	4		B-axis,Encoder pulse multiplicationfactor,1,2,or 4	
466	4		C-axis,Encoder pulse multiplicationfactor,1,2,or 4	
467	4		U-axis,Encoder pulse multiplicationfactor,1,2,or 4	
468	4		V-axis,Encoder pulse multiplicationfactor,1,2,or 4	
469	4		W-axis,Encoder pulse multiplicationfactor,1,2,or 4	
470-480			System Reserved !	
481	5		X-axis impulse command width adjustment (4=625KPPS)	
482	5		Y-axis impulse command width adjustment (4=625KPPS)	
483	5		Z-axis impulse command width adjustment (4=625KPPS)	
484	5		A-axis impulse command width adjustment (4=625KPPS)	
485	5		B-axis impulse command width adjustment (4=625KPPS)	
486	5		C-axis impulse command width adjustment (4=625KPPS)	
487	5		U-axis impulse command width adjustment (4=625KPPS)	
488	5		V-axis impulse command width adjustment (4=625KPPS)	
489	5		W-axis impulse command width adjustment (4=625KPPS)	
490-500	6		System Reserved !	
501	0		Master/Slave mode, 0=CNC, 1=X-axis, 2=Y-axis 3=Z-axis,4=A-axis,5=B-axis,6=C-axis,7=U-axis, 8=V-axis, 9=w-axis, 256= non-stop mode in a single block	
502	0		Accel/Decel mode,0=exponential,1=linear,2="S" curve	
503	0		Home command mode setting.	
			BIT0 = 0 , X axis find Home grid available, = 1 , no need to find.	
			BIT1 = 0 , Y axis find Home grid available, = 1 , no need to find.	
			BIT2 = 0 , Z axis find Home grid available, = 1 , no need to find.	
			BIT3 = 0 , A axis find Home grid available, = 1 , no need to find.	

MCM No.	Factory Default Setting	Unit	Description	Setting
			BIT4 = 0 , B axis find Home grid available, = 1 , no need to find.	
			BIT5 = 0 , C axis find Home grid available, = 1 , no need to find.	
			BIT6 = 0 , U axis find Home grid available, = 1 , no need to find.	
			BIT7 = 0 , V axis find Home grid available, = 1 , no need to find.	
			BIT8 = 0 , W axis find Home grid available, = 1 , no need to find.	
504	100	msec	G00 Linear accel./decel. Time, 4~512 ms	
505	100	msec	G01 Linear accel./decel. Time, 10~1024 ms	
506	100	msec	Accel/Decel time when in G99 mode (mm/rev)	
507	100	msec	Time Setting for spindle acceleration	
508	0		System Reserved !	
509	4096	pulse	Spindle encoder resolution (pulse/rev)	
510	3000	rpm	Max. spindle rpm at 10 volts	
511	0	v	Spindle voltage command zero drift correction (open circuit)	
512	0		Spindle voltage command acce/dece slope correction (open circuit)	
513	0	rpm	Spindle RPM correction (based on feedback from the encoder)	
514	0		Start number for program block number generation	
515	0		Increment for program block number generation	
516	1		Denominator of feed-rate when in MPG test mode	
517	1		Numerator of feed-rate when in MPG test mode	
518	0		MPG direction	
519	64	ms	Set Acceleration/Deceleration Time for MPG (4~512)	
520	38400		RS232 Baud rate, 38400, 19200 / EVEN /2 Bit	
521	0		Setting whether R000~R99 data in PLC are stored when power is cut off. 0=NO, 256=YES	
522	0	pulse	Servo Error Counter	
523	0		Radius/Diameter Programming mode	
524	0		0=Metric mode, 25400=inch mode mcm541=0,1	
525	3		Error in Circular Cutting, ideal value=1	
526	0		Pulse settings 0: pulse + direction 1: +/- pulse 2: A/B phase	
527	1000		Setting G01 speed value at booting	
528	0		Setting tool compensation direction =1 FAUNC, =0 HUST	
529	0		It is used for adjusting the G01's acceleration/deceleration time when the acceleration/deceleration type is set to an "S" curve. When MCM 502=2, the function can then be sustained.	
530	0		G31 input motion stop at hardware	
531	0		Format setting =0 standard, =1 the system will automatically add a decimal point to even numbers, =2 line editing, =4 automatically added with a decimal point in programming	
532	2.000	mm	Mill mode : Setting the backlash of G83	
533	4096	pulse	Setting the following error count for testing	
534			Testing the function of axial setting of the servo following error ( bit0-X.. )	
535			Controller ID number	
536			Minimum slope setting of the Auto Teach function (with use of C040)	

MCM No.	Factory Default Setting	Unit	Description	Setting
537			First distance setting of the Auto Teach function ( with use of C040)	
538	0		G41 and G42 processing types	
539			System reserved	
540	0		Adjustment of the axis feedback direction.	
541	0		Arc type	
541-560			System Reserved !	
561	0		"S" curve accel./decel. profile setting for the X-axis	
562	0		"S" curve accel./decel. profile setting for the Y-axis	
563	0		"S" curve accel./decel. profile setting for the Z-axis	
564	0		"S" curve accel./decel. profile setting for the A-axis	
565	0		"S" curve accel./decel. profile setting for the B-axis	
566	0		"S" curve accel./decel. profile setting for the C-axis	
567	0		"S" curve accel./decel. profile setting for the U-axis	
568	0		"S" curve accel./decel. profile setting for the V-axis	
569	0		"S" curve accel./decel. profile setting for the W-axis	
570~580			System Reserved !	
581	9999999	mm	X-axis, Software OT limit, (+) direction (Group 1)	
582	9999999	mm	Y-axis, Software OT limit, (+) direction (Group 1)	
583	9999999	mm	Z-axis, Software OT limit, (+) direction (Group 1)	
584	9999999	mm	A-axis, Software OT limit, (+) direction (Group 1)	
585	9999999	mm	B-axis, Software OT limit, (+) direction (Group 1)	
586	9999999	mm	C-axis, Software OT limit, (+) direction (Group 1)	
587	9999999	mm	U-axis, Software OT limit, (+) direction (Group 1)	
588	9999999	mm	V-axis, Software OT limit, (+) direction (Group 1)	
589	9999999	mm	W-axis, Software OT limit, (+) direction (Group 1)	
590-600			System Reserved !	
601	-9999999	mm	X-axis, Software OT limit, (-) direction (Group 1)	
602	-9999999	mm	Y-axis, Software OT limit, (-) direction (Group 1)	
603	-9999999	mm	Z-axis, Software OT limit, (-) direction (Group 1)	
604	-9999999	mm	A-axis, Software OT limit, (-) direction (Group 1)	
605	-9999999	mm	B-axis, Software OT limit, (-) direction (Group 1)	
606	-9999999	mm	C-axis, Software OT limit, (-) direction (Group 1)	
607	-9999999	mm	U-axis, Software OT limit, (-) direction (Group 1)	
608	-9999999	mm	V-axis, Software OT limit, (-) direction (Group 1)	
609	-9999999	mm	W-axis, Software OT limit, (-) direction (Group 1)	
610-620			System Reserved !	
621	9999999	mm	X-axis, Software OT limit, (+) direction (Group 2)	
622	9999999	mm	Y-axis, Software OT limit, (+) direction (Group 2)	
623	9999999	mm	Z-axis, Software OT limit, (+) direction (Group 2)	
624	9999999	mm	A-axis, Software OT limit, (+) direction (Group 2)	
625	9999999	mm	B-axis, Software OT limit, (+) direction (Group 2)	
626	9999999	mm	C-axis, Software OT limit, (+) direction (Group 2)	
627	9999999	mm	U-axis, Software OT limit, (+) direction (Group 2)	
628	9999999	mm	V-axis, Software OT limit, (+) direction (Group 2)	
629	9999999	mm	W-axis, Software OT limit, (+) direction (Group 2)	
630-640			System Reserved !	
641	-9999999	mm	X-axis, Software OT limit, (-) direction (Group 2)	
642	-9999999	mm	Y-axis, Software OT limit, (-) direction (Group 2)	
643	-9999999	mm	Z-axis, Software OT limit, (-) direction (Group 2)	
644	-9999999	mm	A-axis, Software OT limit, (-) direction (Group 2)	
645	-9999999	mm	B-axis, Software OT limit, (-) direction (Group 2)	
646	-9999999	mm	C-axis, Software OT limit, (-) direction (Group 2)	
647	-9999999	mm	U-axis, Software OT limit, (-) direction (Group 2)	

MCM No.	Factory Default Setting	Unit	Description	Setting
648	-9999999	mm	V-axis, Software OT limit, (-) direction (Group 2)	
649	-9999999	mm	W-axis, Software OT limit, (-) direction (Group 2)	
650-660			System Reserved !	
661	0		X-axis, Cycle clearing w/ M02, M30, M99	
662	0		Y-axis, Cycle clearing w/ M02, M30, M99	
663	0		Z-axis, Cycle clearing w/ M02, M30, M99	
664	0		A-axis, Cycle clearing w/ M02, M30, M99	
665	0		B-axis, Cycle clearing w/ M02, M30, M99	
666	0		C-axis, Cycle clearing w/ M02, M30, M99	
667	0		U-axis, Cycle clearing w/ M02, M30, M99	
668	0		V-axis, Cycle clearing w/ M02, M30, M99	
669	0		W-axis, Cycle clearing w/ M02, M30, M99	
670-680	0		System Reserved !	
681	1		X-axis,0=incrementalcoord.,1=absolute coordinate	
682	1		Y-axis,0=incrementalcoord.,1=absolute coordinate	
683	1		Z-axis,0=incrementalcoord.,1=absolute coordinate	
684	1		A-axis,0=incrementalcoord.,1=absolute coordinate	
685	1		B-axis,0=incrementalcoord.,1=absolute coordinate	
686	1		C-axis,0=incrementalcoord.,1=absolute coordinate	
687	1		U-axis,0=incrementalcoord.,1=absolute coordinate	
688	1		V-axis,0=incrementalcoord.,1=absolute coordinate	
689	1		W-axis,0=incrementalcoord.,1=absolute coordinate	
690-700	1		System Reserved !	
701	64	pulse	X-axis, Position gain, standard=64	
702	64	pulse	Y-axis, Position gain, standard=64	
703	64	pulse	Z-axis, Position gain, standard=64	
704	64	pulse	A-axis, Position gain, standard=64	
705	64	pulse	B-axis, Position gain, standard=64	
706	64	pulse	C-axis, Position gain, standard=64	
707	64	pulse	U-axis, Position gain, standard=64	
708	64	pulse	V-axis, Position gain, standard=64	
709	64	pulse	W-axis, Position gain, standard=64	
710-720	64	pulse	System Reserved !	
721	10	pulse	X-axis,Break-over point for position gain, std=10	
722	10	pulse	Y-axis,Break-over point for position gain, std=10	
723	10	pulse	Z-axis,Break-over point for position gain, std=10	
724	10	pulse	A-axis,Break-over point for position gain, std=10	
725	10	pulse	B-axis,Break-over point for position gain, std=10	
726	10	pulse	C-axis,Break-over point for position gain, std=10	
727	10	pulse	U-axis,Break-over point for position gain, std=10	
728	10	pulse	V-axis,Break-over point for position gain, std=10	
729	10	pulse	W-axis,Break-over point for position gain, std=10	
727-740	10	pulse	System Reserved !	
741	100		X-axis, Denominator, MPG resolution calc.	
742	100		X-axis, Numerator, MPG resolution calc.	
743	100		Y-axis, Denominator, MPG resolution calc.	
744	100		Y-axis, Numerator, MPG resolution calc.	
745	100		Z-axis, Denominator, MPG resolution calc.	
746	100		Z-axis, Numerator, MPG resolution calc.	
747	100		A-axis, Denominator, MPG resolution calc.	
748	100		A-axis, Numerator, MPG resolution calc.	
749	100		B-axis, Denominator, MPG resolution calc.	
750	100		B-axis, Numerator, MPG resolution calc.	
751	100		C-axis, Denominator, MPG resolution calc.	



MCM No.	Factory Default Setting	Unit	Description	Setting
752	100		C-axis, Numerator, MPG resolution calc.	
753	100		U-axis, Denominator, MPG resolution calc.	
754	100		U-axis, Numerator, MPG resolution calc.	
755	100		V-axis, Denominator, MPG resolution calc.	
756	100		V-axis, Numerator, MPG resolution calc.	
757	100		W-axis, Denominator, MPG resolution calc.	
758	100		W-axis, Numerator, MPG resolution calc.	
760-780			System Reserved !	
781	0		Set X-axis as Rotating (1) / Linear axis (0)	
782	0		Set Y-axis as Rotating (1) / Linear axis (0)	
783	0		Set Z-axis as Rotating (1) / Linear axis (0)	
784	0		Set A-axis as Rotating (1) / Linear axis (0)	
785	0		Set B-axis as Rotating (1) / Linear axis (0)	
786	0		Set C-axis as Rotating (1) / Linear axis (0)	
787	0		Set U-axis as Rotating (1) / Linear axis (0)	
788	0		Set V-axis as Rotating (1) / Linear axis (0)	
789	0		Set W-axis as Rotating (1) / Linear axis (0)	
790-800			System Reserved !	
801	0 · 000	mm	Distance of S bit sent before the X-axis reaches in position. (S176)	
802	0 · 000	mm	Distance of S bit sent before the Y-axis reaches in position. (S177)	
803	0 · 000	mm	Distance of S bit sent before the Z-axis reaches in position. (S178)	
804	0 · 000	mm	Distance of S bit sent before the A-axis reaches in position. (S179)	
805	0 · 000	mm	Distance of S bit sent before the B-axis reaches in position. (S180)	
806	0 · 000	mm	Distance of S bit sent before the C-axis reaches in position. (S181)	
807	0 · 000	mm	Distance of S bit sent before the U-axis reaches in position. (S182)	
808	0 · 000	mm	Distance of S bit sent before the V-axis reaches in position. (S183)	
809	0 · 000	mm	Distance of S bit sent before the W-axis reaches in position. (S184)	
810-820			System Reserved !	
821	0	msec	Set Acceleration/Deceleration Time for X-axis	
822	0	msec	Set Acceleration/Deceleration Time for Y-axis	
823	0	msec	Set Acceleration/Deceleration Time for Z-axis	
824	0	msec	Set Acceleration/Deceleration Time for A-axis	
825	0	msec	Set Acceleration/Deceleration Time for B-axis	
826	0	msec	Set Acceleration/Deceleration Time for C-axis	
827	0	msec	Set Acceleration/Deceleration Time for U-axis	
828	0	msec	Set Acceleration/Deceleration Time for V-axis	
829	0	msec	Set Acceleration/Deceleration Time for W-axis	
830-840			System Reserved !	
841	0		X-axis allowable compensation of back screw pitch	
842	0		Y-axis allowable compensation of back screw pitch	
843	0		Z-axis allowable compensation of back screw pitch	
844	0		A-axis allowable compensation of back screw pitch	
845	0		B-axis allowable compensation of back screw pitch	
846	0		C-axis allowable compensation of back screw pitch	
847	0		U-axis allowable compensation of back screw pitch	
848	0		V-axis allowable compensation of back screw pitch	
849	0		W-axis allowable compensation of back screw pitch	
847-850	0		System Reserved !	
851	20000	mm	X-axis length compensation of back screw pitch	
852	20000	mm	Y-axis length compensation of back screw pitch	
853	20000	mm	Z-axis length compensation of back screw pitch	
854	20000	mm	A-axis length compensation of back screw pitch	
855	20000	mm	B-axis length compensation of back screw pitch	

MCM No.	Factory Default Setting	Unit	Description	Setting
856	20000	mm	C-axis length compensation of back screw pitch	
857~860			System Reserved !	
861-940	0		X-axis,Pitch error compensation of each segment.	
941-1020	0		Y-axis,Pitch error compensation of each segment.	
1021-1100	0		Z-axis,Pitch error compensation of each segment.	
1101-1180	0		A-axis,Pitch error compensation of each segment.	
1181-1260	0		B-axis,Pitch error compensation of each segment.	
1261-1340	0		C-axis,Pitch error compensation of each segment.	
1341	0	mm	Tool #1 radius compensation	
1342	0	mm	X-axis, Tool #1 offset compensation	
1343	0	mm	Y-axis, Tool #1 offset compensation	
1344	0	mm	Z-axis, Tool #1 offset compensation	
1345	0	mm	A-axis, Tool #1 offset compensation	
1346	0	mm	B-axis, Tool #1 offset compensation	
1347	0	mm	C-axis, Tool #1 offset compensation	
1348	0	mm	Tool #2 radius compensation	
1349	0	mm	X-axis, Tool #2 offset compensation	
1350	0	mm	Y-axis, Tool #2 offset compensation	
1351	0	mm	Z-axis, Tool #2 offset compensation	
1352	0	mm	A-axis, Tool #2 offset compensation	
1353	0	mm	B-axis, Tool #2 offset compensation	
1354	0	mm	C-axis, Tool #2 offset compensation	
1355	0	mm	Tool #3 radius compensation	
1356	0	mm	X-axis, Tool #3 offset compensation	
1357	0	mm	Y-axis, Tool #3 offset compensation	
1358	0	mm	Z-axis, Tool #3 offset compensation	
1359	0	mm	A-axis, Tool #3 offset compensation	
1360	0	mm	B-axis, Tool #3 offset compensation	
1361	0	mm	C-axis, Tool #3 offset compensation	
1362	0	mm	Tool #4 radius compensation	
1363	0	mm	X-axis, Tool #4 offset compensation	
1364	0	mm	Y-axis, Tool #4 offset compensation	
1365	0	mm	Z-axis, Tool #4 offset compensation	
1366	0	mm	A-axis, Tool #4 offset compensation	
1367	0	mm	B-axis, Tool #4 offset compensation	
1368	0	mm	C-axis, Tool #4 offset compensation	
1369	0	mm	Tool #5 radius compensation	
1370	0	mm	X-axis, Tool #5 offset compensation	
1371	0	mm	Y-axis, Tool #5 offset compensation	
1372	0	mm	Z-axis, Tool #5 offset compensation	
1373	0	mm	A-axis, Tool #5 offset compensation	
1374	0	mm	B-axis, Tool #5 offset compensation	
1375	0	mm	C-axis, Tool #5 offset compensation	
1376	0	mm	Tool #6 radius compensation	
1377	0	mm	X-axis, Tool #6 offset compensation	
1378	0	mm	Y-axis, Tool #6 offset compensation	
1379	0	mm	Z-axis, Tool #6 offset compensation	
1380	0	mm	A-axis, Tool #6 offset compensation	
1381	0	mm	B-axis, Tool #6 offset compensation	
1382	0	mm	C-axis, Tool #6 offset compensation	
1383	0	mm	Tool #7 radius compensation	
1384	0	mm	X-axis, Tool #7 offset compensation	
1385	0	mm	Y-axis, Tool #7 offset compensation	
1386	0	mm	Z-axis, Tool #7 offset compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1387	0	mm	A-axis, Tool #7 offset compensation	
1388	0	mm	B-axis, Tool #7 offset compensation	
1389	0	mm	C-axis, Tool #7 offset compensation	
1390	0	mm	Tool #8 radius compensation	
1391	0	mm	X-axis, Tool #8 offset compensation	
1392	0	mm	Y-axis, Tool #8 offset compensation	
1393	0	mm	Z-axis, Tool #8 offset compensation	
1394	0	mm	A-axis, Tool #8 offset compensation	
1395	0	mm	B-axis, Tool #8 offset compensation	
1396	0	mm	C-axis, Tool #8 offset compensation	
1397	0	mm	Tool #9 radius compensation	
1398	0	mm	X-axis, Tool #9 offset compensation	
1399	0	mm	Y-axis, Tool #9 offset compensation	
1400	0	mm	Z-axis, Tool #9 offset compensation	
1401	0	mm	A-axis, Tool #9 offset compensation	
1402	0	mm	B-axis, Tool #9 offset compensation	
1403	0	mm	C-axis, Tool #9 offset compensation	
1404	0	mm	Tool #10 radius compensation	
1405	0	mm	X-axis, Tool #10 offset compensation	
1406	0	mm	Y-axis, Tool #10 offset compensation	
1407	0	mm	Z-axis, Tool #10 offset compensation	
1408	0	mm	A-axis, Tool #10 offset compensation	
1409	0	mm	B-axis, Tool #10 offset compensation	
1410	0	mm	C-axis, Tool #10 offset compensation	
1411	0	mm	Tool #11 radius compensation	
1412	0	mm	X-axis, Tool #11 offset compensation	
1413	0	mm	Y-axis, Tool #11 offset compensation	
1414	0	mm	Z-axis, Tool #11 offset compensation	
1415	0	mm	A-axis, Tool #11 offset compensation	
1416	0	mm	B-axis, Tool #11 offset compensation	
1417	0	mm	C-axis, Tool #11 offset compensation	
1418	0	mm	Tool #12 radius compensation	
1419	0	mm	X-axis, Tool #12 offset compensation	
1420	0	mm	Y-axis, Tool #12 offset compensation	
1421	0	mm	Z-axis, Tool #12 offset compensation	
1422	0	mm	A-axis, Tool #12 offset compensation	
1423	0	mm	B-axis, Tool #12 offset compensation	
1424	0	mm	C-axis, Tool #12 offset compensation	
1425	0	mm	Tool #13 radius compensation	
1426	0	mm	X-axis, Tool #13 offset compensation	
1427	0	mm	Y-axis, Tool #13 offset compensation	
1428	0	mm	Z-axis, Tool #13 offset compensation	
1429	0	mm	A-axis, Tool #13 offset compensation	
1430	0	mm	B-axis, Tool #13 offset compensation	
1431	0	mm	C-axis, Tool #13 offset compensation	
1432	0	mm	Tool #14 radius compensation	
1433	0	mm	X-axis, Tool #14 offset compensation	
1434	0	mm	Y-axis, Tool #14 offset compensation	
1435	0	mm	Z-axis, Tool #14 offset compensation	
1436	0	mm	A-axis, Tool #14 offset compensation	
1437	0	mm	B-axis, Tool #14 offset compensation	
1438	0	mm	C-axis, Tool #14 offset compensation	
1439	0	mm	Tool # radius compensation	
1440	0	mm	X-axis, Tool #15 offset compensation	
1441	0	mm	Y-axis, Tool #15 offset compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1442	0	mm	Z-axis, Tool #15 offset compensation	
1443	0	mm	A-axis, Tool #15 offset compensation	
1444	0	mm	B-axis, Tool #15 offset compensation	
1445	0	mm	C-axis, Tool #15 offset compensation	
1446	0	mm	Tool #16 radius compensation	
1447	0	mm	X-axis, Tool #16 offset compensation	
1448	0	mm	Y-axis, Tool #16 offset compensation	
1449	0	mm	Z-axis, Tool #16 offset compensation	
1450	0	mm	A-axis, Tool #16 offset compensation	
1451	0	mm	B-axis, Tool #16 offset compensation	
1452	0	mm	C-axis, Tool #16 offset compensation	
1453	0	mm	Tool #17 radius compensation	
1454	0	mm	X-axis, Tool #17 offset compensation	
1455	0	mm	Y-axis, Tool #17 offset compensation	
1456	0	mm	Z-axis, Tool #17 offset compensation	
1457	0	mm	A-axis, Tool #17 offset compensation	
1458	0	mm	B-axis, Tool #17 offset compensation	
1459	0	mm	C-axis, Tool #17 offset compensation	
1460	0	mm	Tool #18 radius compensation	
1461	0	mm	X-axis, Tool #18 offset compensation	
1462	0	mm	Y-axis, Tool #18 offset compensation	
1463	0	mm	Z-axis, Tool #18 offset compensation	
1464	0	mm	A-axis, Tool #18 offset compensation	
1465	0	mm	B-axis, Tool #18 offset compensation	
1466	0	mm	C-axis, Tool #18 offset compensation	
1467	0	mm	Tool #19 radius compensation	
1468	0	mm	X-axis, Tool #19 offset compensation	
1469	0	mm	Y-axis, Tool #19 offset compensation	
1470	0	mm	Z-axis, Tool #19 offset compensation	
1471	0	mm	A-axis, Tool #19 offset compensation	
1472	0	mm	B-axis, Tool #19 offset compensation	
1473	0	mm	C-axis, Tool #19 offset compensation	
1474	0	mm	Tool #20 radius compensation	
1475	0	mm	X-axis, Tool #20 offset compensation	
1476	0	mm	Y-axis, Tool #20 offset compensation	
1477	0	mm	Z-axis, Tool #20 offset compensation	
1478	0	mm	A-axis, Tool #20 offset compensation	
1479	0	mm	B-axis, Tool #20 offset compensation	
1480	0	mm	C-axis, Tool #20 offset compensation	
1481	0	mm	Tool #21 radius compensation	
1482	0	mm	X-axis, Tool #21 offset compensation	
1483	0	mm	Y-axis, Tool #21 offset compensation	
1484	0	mm	Z-axis, Tool #21 offset compensation	
1485	0	mm	A-axis, Tool #21 offset compensation	
1486	0	mm	B-axis, Tool #21 offset compensation	
1487	0	mm	C-axis, Tool #21 offset compensation	
1488	0	mm	Tool #22 radius compensation	
1489	0	mm	X-axis, Tool #22 offset compensation	
1490	0	mm	Y-axis, Tool #22 offset compensation	
1491	0	mm	Z-axis, Tool #22 offset compensation	
1492	0	mm	A-axis, Tool #22 offset compensation	
1493	0	mm	B-axis, Tool #22 offset compensation	
1494	0	mm	C-axis, Tool #22 offset compensation	
1495	0	mm	Tool #23 radius compensation	
1496	0	mm	X-axis, Tool #23 offset compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1497	0	mm	Y-axis, Tool #23 offset compensation	
1498	0	mm	Z-axis, Tool #23 offset compensation	
1499	0	mm	A-axis, Tool #23 offset compensation	
1500	0	mm	B-axis, Tool #23 offset compensation	
1501	0	mm	C-axis, Tool #23 offset compensation	
1502	0	mm	Tool #24 radius compensation	
1503	0	mm	X-axis, Tool #24 offset compensation	
1504	0	mm	Y-axis, Tool #24 offset compensation	
1505	0	mm	Z-axis, Tool #24 offset compensation	
1506	0	mm	A-axis, Tool #24 offset compensation	
1507	0	mm	B-axis, Tool #24 offset compensation	
1508	0	mm	C-axis, Tool #24 offset compensation	
1509	0	mm	Tool #25 radius compensation	
1510	0	mm	X-axis, Tool #25 offset compensation	
1511	0	mm	Y-axis, Tool #25 offset compensation	
1512	0	mm	Z-axis, Tool #25 offset compensation	
1513	0	mm	A-axis, Tool #25 offset compensation	
1514	0	mm	B-axis, Tool #25 offset compensation	
1515	0	mm	C-axis, Tool #25 offset compensation	
1516	0	mm	Tool #26 radius compensation	
1517	0	mm	X-axis, Tool #26 offset compensation	
1518	0	mm	Y-axis, Tool #26 offset compensation	
1519	0	mm	Z-axis, Tool #26 offset compensation	
1520	0	mm	A-axis, Tool #26 offset compensation	
1521	0	mm	B-axis, Tool #26 offset compensation	
1522	0	mm	C-axis, Tool #26 offset compensation	
1523	0	mm	Tool #27 radius compensation	
1524	0	mm	X-axis, Tool #27 offset compensation	
1525	0	mm	Y-axis, Tool #27 offset compensation	
1526	0	mm	Z-axis, Tool #27 offset compensation	
1527	0	mm	A-axis, Tool #27 offset compensation	
1528	0	mm	B-axis, Tool #27 offset compensation	
1529	0	mm	C-axis, Tool #27 offset compensation	
1530	0	mm	Tool #28 radius compensation	
1531	0	mm	X-axis, Tool #28 offset compensation	
1532	0	mm	Y-axis, Tool #28 offset compensation	
1533	0	mm	Z-axis, Tool #28 offset compensation	
1534	0	mm	A-axis, Tool #28 offset compensation	
1535	0	mm	B-axis, Tool #28 offset compensation	
1536	0	mm	C-axis, Tool #28 offset compensation	
1537	0	mm	Tool #29 radius compensation	
1538	0	mm	X-axis, Tool #29 offset compensation	
1539	0	mm	Y-axis, Tool #29 offset compensation	
1540	0	mm	Z-axis, Tool #29 offset compensation	
1541	0	mm	A-axis, Tool #29 offset compensation	
1542	0	mm	B-axis, Tool #29 offset compensation	
1543	0	mm	C-axis, Tool #29 offset compensation	
1544	0	mm	Tool #30 radius compensation	
1545	0	mm	X-axis, Tool #30 offset compensation	
1546	0	mm	Y-axis, Tool #30 offset compensation	
1547	0	mm	Z-axis, Tool #30 offset compensation	
1548	0	mm	A-axis, Tool #30 offset compensation	
1549	0	mm	B-axis, Tool #30 offset compensation	
1550	0	mm	C-axis, Tool #30 offset compensation	
1551	0	mm	Tool #31 radius compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1552	0	mm	X-axis, Tool #31 offset compensation	
1553	0	mm	Y-axis, Tool #31 offset compensation	
1554	0	mm	Z-axis, Tool #31 offset compensation	
1555	0	mm	A-axis, Tool #31 offset compensation	
1556	0	mm	B-axis, Tool #31 offset compensation	
1557	0	mm	C-axis, Tool #31 offset compensation	
1558	0	mm	Tool #32 radius compensation	
1559	0	mm	X-axis, Tool #32 offset compensation	
1560	0	mm	Y-axis, Tool #32 offset compensation	
1561	0	mm	Z-axis, Tool #32 offset compensation	
1562	0	mm	A-axis, Tool #32 offset compensation	
1563	0	mm	B-axis, Tool #32 offset compensation	
1564	0	mm	C-axis, Tool #32 offset compensation	
1565	0	mm	Tool #33 radius compensation	
1566	0	mm	X-axis, Tool #33 offset compensation	
1567	0	mm	Y-axis, Tool #33 offset compensation	
1568	0	mm	Z-axis, Tool #33 offset compensation	
1569	0	mm	A-axis, Tool #33 offset compensation	
1570	0	mm	B-axis, Tool #33 offset compensation	
1571	0	mm	C-axis, Tool #33 offset compensation	
1572	0	mm	Tool #34 radius compensation	
1573	0	mm	X-axis, Tool #34 offset compensation	
1574	0	mm	Y-axis, Tool #34 offset compensation	
1575	0	mm	Z-axis, Tool #34 offset compensation	
1576	0	mm	A-axis, Tool #34 offset compensation	
1577	0	mm	B-axis, Tool #34 offset compensation	
1578	0	mm	C-axis, Tool #34 offset compensation	
1579	0	mm	Tool #35 radius compensation	
1580	0	mm	X-axis, Tool #35 offset compensation	
1581	0	mm	Y-axis, Tool #35 offset compensation	
1582	0	mm	Z-axis, Tool #35 offset compensation	
1583	0	mm	A-axis, Tool #35 offset compensation	
1584	0	mm	B-axis, Tool #35 offset compensation	
1585	0	mm	C-axis, Tool #35 offset compensation	
1586	0	mm	Tool #36 radius compensation	
1587	0	mm	X-axis, Tool #36 offset compensation	
1588	0	mm	Y-axis, Tool #36 offset compensation	
1589	0	mm	Z-axis, Tool #36 offset compensation	
1590	0	mm	A-axis, Tool #36 offset compensation	
1591	0	mm	B-axis, Tool #36 offset compensation	
1592	0	mm	C-axis, Tool #36 offset compensation	
1593	0	mm	Tool #37 radius compensation	
1594	0	mm	X-axis, Tool #37 offset compensation	
1595	0	mm	Y-axis, Tool #37 offset compensation	
1596	0	mm	Z-axis, Tool #37 offset compensation	
1597	0	mm	A-axis, Tool #37 offset compensation	
1598	0	mm	B-axis, Tool #37 offset compensation	
1599	0	mm	C-axis, Tool #37 offset compensation	
1600	0	mm	Tool #38 radius compensation	
1601	0	mm	X-axis, Tool #38 offset compensation	
1602	0	mm	Y-axis, Tool #38 offset compensation	
1603	0	mm	Z-axis, Tool #38 offset compensation	
1604	0	mm	A-axis, Tool #38 offset compensation	
1605	0	mm	B-axis, Tool #38 offset compensation	
1606	0	mm	C-axis, Tool #38 offset compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1607	0	mm	Tool #39 radius compensation	
1608	0	mm	X-axis, Tool #39 offset compensation	
1609	0	mm	Y-axis, Tool #39 offset compensation	
1610	0	mm	Z-axis, Tool #39 offset compensation	
1611	0	mm	A-axis, Tool #39 offset compensation	
1612	0	mm	B-axis, Tool #39 offset compensation	
1613	0	mm	C-axis, Tool #39 offset compensation	
1614	0	mm	Tool #40 radius compensation	
1615	0	mm	X-axis, Tool #40 offset compensation	
1616	0	mm	Y-axis, Tool #40 offset compensation	
1617	0	mm	Z-axis, Tool #40 offset compensation	
1618	0	mm	A-axis, Tool #40 offset compensation	
1619	0	mm	B-axis, Tool #40 offset compensation	
1620	0	mm	C-axis, Tool #40 offset compensation	
1621	0	mm	Tool #1 radius wear compensation	
1622	0	mm	X-axis, Tool #1 wear compensation	
1623	0	mm	Y-axis, Tool #1 wear compensation	
1624	0	mm	Z-axis, Tool #1 wear compensation	
1625	0	mm	A-axis, Tool #1 wear compensation	
1626	0	mm	B-axis, Tool #1 wear compensation	
1627	0	mm	C-axis, Tool #1 wear compensation	
1628	0	mm	Tool #2 radius wear compensation	
1629	0	mm	X-axis, Tool #2 wear compensation	
1630	0	mm	Y-axis, Tool #2 wear compensation	
1631	0	mm	Z-axis, Tool #2 wear compensation	
1632	0	mm	A-axis, Tool #2 wear compensation	
1633	0	mm	B-axis, Tool #2 wear compensation	
1634	0	mm	C-axis, Tool #2 wear compensation	
1635	0	mm	Tool #3 radius wear compensation	
1636	0	mm	X-axis, Tool #3 wear compensation	
1637	0	mm	Y-axis, Tool #3 wear compensation	
1638	0	mm	Z-axis, Tool #3 wear compensation	
1639	0	mm	A-axis, Tool #3 wear compensation	
1640	0	mm	B-axis, Tool #3 wear compensation	
1641	0	mm	C-axis, Tool #3 wear compensation	
1642	0	mm	Tool #4 radius wear compensation	
1643	0	mm	X-axis, Tool #4 wear compensation	
1644	0	mm	Y-axis, Tool #4 wear compensation	
1645	0	mm	Z-axis, Tool #4 wear compensation	
1646	0	mm	A-axis, Tool #4 wear compensation	
1647	0	mm	B-axis, Tool #4 wear compensation	
1648	0	mm	C-axis, Tool #4 wear compensation	
1649	0	mm	Tool #5 radius wear compensation	
1650	0	mm	X-axis, Tool #5 wear compensation	
1651	0	mm	Y-axis, Tool #5 wear compensation	
1652	0	mm	Z-axis, Tool #5 wear compensation	
1653	0	mm	A-axis, Tool #5 wear compensation	
1654	0	mm	B-axis, Tool #5 wear compensation	
1655	0	mm	C-axis, Tool #5 wear compensation	
1656	0	mm	Tool #6 radius wear compensation	
1657	0	mm	X-axis, Tool #6 wear compensation	
1658	0	mm	Y-axis, Tool #6 wear compensation	
1659	0	mm	Z-axis, Tool #6 wear compensation	
1660	0	mm	A-axis, Tool #6 wear compensation	
1661	0	mm	B-axis, Tool #6 wear compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1662	0	mm	C-axis, Tool #6 wear compensation	
1663	0	mm	Tool #7 radius wear compensation	
1664	0	mm	X-axis, Tool #7 wear compensation	
1665	0	mm	Y-axis, Tool #7 wear compensation	
1666	0	mm	Z-axis, Tool #7 wear compensation	
1667	0	mm	A-axis, Tool #7 wear compensation	
1668	0	mm	B-axis, Tool #7 wear compensation	
1669	0	mm	C-axis, Tool #7 wear compensation	
1670	0	mm	Tool #8 radius wear compensation	
1671	0	mm	X-axis, Tool #8 wear compensation	
1672	0	mm	Y-axis, Tool #8 wear compensation	
1673	0	mm	Z-axis, Tool #8 wear compensation	
1674	0	mm	A-axis, Tool #8 wear compensation	
1675	0	mm	B-axis, Tool #8 wear compensation	
1676	0	mm	C-axis, Tool #8 wear compensation	
1677	0	mm	Tool #9 radius wear compensation	
1678	0	mm	X-axis, Tool #9 wear compensation	
1679	0	mm	Y-axis, Tool #9 wear compensation	
1680	0	mm	Z-axis, Tool #9 wear compensation	
1681	0	mm	A-axis, Tool #9 wear compensation	
1682	0	mm	B-axis, Tool #9 wear compensation	
1683	0	mm	C-axis, Tool #9 wear compensation	
1684	0	mm	Tool #10 radius wear compensation	
1685	0	mm	X-axis, Tool #10 wear compensation	
1686	0	mm	Y-axis, Tool #10 wear compensation	
1687	0	mm	Z-axis, Tool #10 wear compensation	
1688	0	mm	A-axis, Tool #10 wear compensation	
1689	0	mm	B-axis, Tool #10 wear compensation	
1690	0	mm	C-axis, Tool #10 wear compensation	
1691	0	mm	Tool #11 radius wear compensation	
1692	0	mm	X-axis, Tool #11 wear compensation	
1693	0	mm	Y-axis, Tool #11 wear compensation	
1694	0	mm	Z-axis, Tool #11 wear compensation	
1695	0	mm	A-axis, Tool #11 wear compensation	
1696	0	mm	B-axis, Tool #11 wear compensation	
1697	0	mm	C-axis, Tool #11 wear compensation	
1698	0	mm	Tool #12 radius wear compensation	
1699	0	mm	X-axis, Tool #12 wear compensation	
1700	0	mm	Y-axis, Tool #12 wear compensation	
1701	0	mm	Z-axis, Tool #12 wear compensation	
1702	0	mm	A-axis, Tool #12 wear compensation	
1703	0	mm	B-axis, Tool #12 wear compensation	
1704	0	mm	C-axis, Tool #12 wear compensation	
1705	0	mm	Tool #13 radius wear compensation	
1706	0	mm	X-axis, Tool #13 wear compensation	
1707	0	mm	Y-axis, Tool #13 wear compensation	
1708	0	mm	Z-axis, Tool #13 wear compensation	
1709	0	mm	A-axis, Tool #13 wear compensation	
1710	0	mm	B-axis, Tool #13 wear compensation	
1711	0	mm	C-axis, Tool #13 wear compensation	
1712	0	mm	Tool #14 radius wear compensation	
1713	0	mm	X-axis, Tool #14 wear compensation	
1714	0	mm	Y-axis, Tool #14 wear compensation	
1715	0	mm	Z-axis, Tool #14 wear compensation	
1716	0	mm	A-axis, Tool #14 wear compensation	



MCM No.	Factory Default Setting	Unit	Description	Setting
1717	0	mm	B-axis, Tool #14 wear compensation	
1718	0	mm	C-axis, Tool #14 wear compensation	
1719	0	mm	Tool #15 radius wear compensation	
1720	0	mm	X-axis, Tool #15 wear compensation	
1721	0	mm	Y-axis, Tool #15 wear compensation	
1722	0	mm	Z-axis, Tool #15 wear compensation	
1723	0	mm	A-axis, Tool #15 wear compensation	
1724	0	mm	B-axis, Tool #15 wear compensation	
1725	0	mm	C-axis, Tool #15 wear compensation	
1726	0	mm	Tool #16 radius wear compensation	
1727	0	mm	X-axis, Tool #16 wear compensation	
1728	0	mm	Y-axis, Tool #16 wear compensation	
1729	0	mm	Z-axis, Tool #16 wear compensation	
1730	0	mm	A-axis, Tool #16 wear compensation	
1731	0	mm	B-axis, Tool #16 wear compensation	
1732	0	mm	C-axis, Tool #16 wear compensation	
1733	0	mm	Tool #17 radius wear compensation	
1734	0	mm	X-axis, Tool #17 wear compensation	
1735	0	mm	Y-axis, Tool #17 wear compensation	
1736	0	mm	Z-axis, Tool #17 wear compensation	
1737	0	mm	A-axis, Tool #17 wear compensation	
1738	0	mm	B-axis, Tool #17 wear compensation	
1739	0	mm	C-axis, Tool #17 wear compensation	
1740	0	mm	Tool #18 radius wear compensation	
1741	0	mm	X-axis, Tool #18 wear compensation	
1742	0	mm	Y-axis, Tool #18 wear compensation	
1743	0	mm	Z-axis, Tool #18 wear compensation	
1744	0	mm	A-axis, Tool #18 wear compensation	
1745	0	mm	B-axis, Tool #18 wear compensation	
1746	0	mm	C-axis, Tool #18 wear compensation	
1747	0	mm	Tool #19 radius wear compensation	
1748	0	mm	X-axis, Tool #19 wear compensation	
1749	0	mm	Y-axis, Tool #19 wear compensation	
1750	0	mm	Z-axis, Tool #19 wear compensation	
1751	0	mm	A-axis, Tool #19 wear compensation	
1752	0	mm	B-axis, Tool #19 wear compensation	
1753	0	mm	C-axis, Tool #19 wear compensation	
1754	0	mm	Tool #20 radius wear compensation	
1755	0	mm	X-axis, Tool #20 wear compensation	
1756	0	mm	Y-axis, Tool #20 wear compensation	
1757	0	mm	Z-axis, Tool #20 wear compensation	
1758	0	mm	A-axis, Tool #20 wear compensation	
1759	0	mm	B-axis, Tool #20 wear compensation	
1760	0	mm	C-axis, Tool #20 wear compensation	
1761	0	mm	Tool #21 radius wear compensation	
1762	0	mm	X-axis, Tool #21 wear compensation	
1763	0	mm	Y-axis, Tool #21 wear compensation	
1764	0	mm	Z-axis, Tool #21 wear compensation	
1765	0	mm	A-axis, Tool #21 wear compensation	
1766	0	mm	B-axis, Tool #21 wear compensation	
1767	0	mm	C-axis, Tool #21 wear compensation	
1768	0	mm	Tool #22 radius wear compensation	
1769	0	mm	X-axis, Tool #22 wear compensation	
1770	0	mm	Y-axis, Tool #22 wear compensation	
1771	0	mm	Z-axis, Tool #22 wear compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1772	0	mm	A-axis, Tool #22 wear compensation	
1773	0	mm	B-axis, Tool #22 wear compensation	
1774	0	mm	C-axis, Tool #22 wear compensation	
1775	0	mm	Tool #23 radius wear compensation	
1776	0	mm	X-axis, Tool #23 wear compensation	
1777	0	mm	Y-axis, Tool #23 wear compensation	
1778	0	mm	Z-axis, Tool #23 wear compensation	
1779	0	mm	A-axis, Tool #23 wear compensation	
1780	0	mm	B-axis, Tool #23 wear compensation	
1781	0	mm	C-axis, Tool #23 wear compensation	
1782	0	mm	Tool #24 radius wear compensation	
1783	0	mm	X-axis, Tool #24 wear compensation	
1784	0	mm	Y-axis, Tool #24 wear compensation	
1785	0	mm	Z-axis, Tool #24 wear compensation	
1786	0	mm	A-axis, Tool #24 wear compensation	
1787	0	mm	B-axis, Tool #24 wear compensation	
1788	0	mm	C-axis, Tool #24 wear compensation	
1789	0	mm	Tool #25 radius wear compensation	
1790	0	mm	X-axis, Tool #25 wear compensation	
1791	0	mm	Y-axis, Tool #25 wear compensation	
1792	0	mm	Z-axis, Tool #25 wear compensation	
1793	0	mm	A-axis, Tool #25 wear compensation	
1794	0	mm	B-axis, Tool #25 wear compensation	
1795	0	mm	C-axis, Tool #25 wear compensation	
1796	0	mm	Tool #26 radius wear compensation	
1797	0	mm	X-axis, Tool #26 wear compensation	
1798	0	mm	Y-axis, Tool #26 wear compensation	
1799	0	mm	Z-axis, Tool #26 wear compensation	
1800	0	mm	A-axis, Tool #26 wear compensation	
1801	0	mm	B-axis, Tool #26 wear compensation	
1802	0	mm	C-axis, Tool #26 wear compensation	
1803	0	mm	Tool #27 radius wear compensation	
1804	0	mm	X-axis, Tool #27 wear compensation	
1805	0	mm	Y-axis, Tool #27 wear compensation	
1806	0	mm	Z-axis, Tool #27 wear compensation	
1807	0	mm	A-axis, Tool #27 wear compensation	
1808	0	mm	B-axis, Tool #27 wear compensation	
1809	0	mm	C-axis, Tool #27 wear compensation	
1810	0	mm	Tool #28 radius wear compensation	
1811	0	mm	X-axis, Tool #28 wear compensation	
1812	0	mm	Y-axis, Tool #28 wear compensation	
1813	0	mm	Z-axis, Tool #28 wear compensation	
1814	0	mm	A-axis, Tool #28 wear compensation	
1815	0	mm	B-axis, Tool #28 wear compensation	
1816	0	mm	C-axis, Tool #28 wear compensation	
1817	0	mm	Tool #29 radius wear compensation	
1818	0	mm	X-axis, Tool #29 wear compensation	
1819	0	mm	Y-axis, Tool #29 wear compensation	
1820	0	mm	Z-axis, Tool #29 wear compensation	
1821	0	mm	A-axis, Tool #29 wear compensation	
1822	0	mm	B-axis, Tool #29 wear compensation	
1823	0	mm	C-axis, Tool #29 wear compensation	
1824	0	mm	Tool #30 radius wear compensation	
1825	0	mm	X-axis, Tool #30 wear compensation	
1826	0	mm	Y-axis, Tool #30 wear compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1827	0	mm	Z-axis, Tool #30 wear compensation	
1828	0	mm	A-axis, Tool #30 wear compensation	
1829	0	mm	B-axis, Tool #30 wear compensation	
1830	0	mm	C-axis, Tool #30 wear compensation	
1831	0	mm	Tool #31 radius wear compensation	
1832	0	mm	X-axis, Tool #31 wear compensation	
1833	0	mm	Y-axis, Tool #31 wear compensation	
1834	0	mm	Z-axis, Tool #31 wear compensation	
1835	0	mm	A-axis, Tool #31 wear compensation	
1836	0	mm	B-axis, Tool #31 wear compensation	
1837	0	mm	C-axis, Tool #31 wear compensation	
1838	0	mm	Tool #32 radius wear compensation	
1839	0	mm	X-axis, Tool #32 wear compensation	
1840	0	mm	Y-axis, Tool #32 wear compensation	
1841	0	mm	Z-axis, Tool #32 wear compensation	
1842	0	mm	A-axis, Tool #32 wear compensation	
1843	0	mm	B-axis, Tool #32 wear compensation	
1844	0	mm	C-axis, Tool #32 wear compensation	
1845	0	mm	Tool #33 radius wear compensation	
1846	0	mm	X-axis, Tool #33 wear compensation	
1847	0	mm	Y-axis, Tool #33 wear compensation	
1848	0	mm	Z-axis, Tool #33 wear compensation	
1849	0	mm	A-axis, Tool #33 wear compensation	
1850	0	mm	B-axis, Tool #33 wear compensation	
1851	0	mm	C-axis, Tool #33 wear compensation	
1852	0	mm	Tool #34 radius wear compensation	
1853	0	mm	X-axis, Tool #34 wear compensation	
1854	0	mm	Y-axis, Tool #34 wear compensation	
1855	0	mm	Z-axis, Tool #34 wear compensation	
1856	0	mm	A-axis, Tool #34 wear compensation	
1857	0	mm	B-axis, Tool #34 wear compensation	
1858	0	mm	C-axis, Tool #34 wear compensation	
1859	0	mm	Tool #35 radius wear compensation	
1860	0	mm	X-axis, Tool #35 wear compensation	
1861	0	mm	Y-axis, Tool #35 wear compensation	
1862	0	mm	Z-axis, Tool #35 wear compensation	
1863	0	mm	A-axis, Tool #35 wear compensation	
1864	0	mm	B-axis, Tool #35 wear compensation	
1865	0	mm	C-axis, Tool #35 wear compensation	
1866	0	mm	Tool #36 radius wear compensation	
1867	0	mm	X-axis, Tool #36 wear compensation	
1868	0	mm	Y-axis, Tool #36 wear compensation	
1869	0	mm	Z-axis, Tool #36 wear compensation	
1870	0	mm	A-axis, Tool #36 wear compensation	
1871	0	mm	B-axis, Tool #36 wear compensation	
1872	0	mm	C-axis, Tool #36 wear compensation	
1873	0	mm	Tool #37 radius wear compensation	
1874	0	mm	X-axis, Tool #37 wear compensation	
1875	0	mm	Y-axis, Tool #37 wear compensation	
1876	0	mm	Z-axis, Tool #37 wear compensation	
1877	0	mm	A-axis, Tool #37 wear compensation	
1878	0	mm	B-axis, Tool #37 wear compensation	
1879	0	mm	C-axis, Tool #37 wear compensation	
1880	0	mm	Tool #38 radius wear compensation	
1881	0	mm	X-axis, Tool #38 wear compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1882	0	mm	Y-axis, Tool #38 wear compensation	
1883	0	mm	Z-axis, Tool #38 wear compensation	
1884	0	mm	A-axis, Tool #38 wear compensation	
1885	0	mm	B-axis, Tool #38 wear compensation	
1886	0	mm	C-axis, Tool #38 wear compensation	
1887	0	mm	Tool #39 radius wear compensation	
1888	0	mm	X-axis, Tool #39 wear compensation	
1889	0	mm	Y-axis, Tool #39 wear compensation	
1890	0	mm	Z-axis, Tool #39 wear compensation	
1891	0	mm	A-axis, Tool #39 wear compensation	
1892	0	mm	B-axis, Tool #39 wear compensation	
1893	0	mm	C-axis, Tool #39 wear compensation	
1894	0	mm	Tool #40 radius wear compensation	
1895	0	mm	X-axis, Tool #40 wear compensation	
1896	0	mm	Y-axis, Tool #40 wear compensation	
1897	0	mm	Z-axis, Tool #40 wear compensation	
1898	0	mm	A-axis, Tool #40 wear compensation	
1899	0	mm	B-axis, Tool #40 wear compensation	
1900	0	mm	C-axis, Tool #40 wear compensation	
1901			Tool-tip #1 radius compensation	
1902			Tool-tip #2 radius compensation	
1903			Tool-tip #3 radius compensation	
1904			Tool-tip #4 radius compensation	
1905			Tool-tip #5 radius compensation	
1906			Tool-tip #6 radius compensation	
1907			Tool-tip #7 radius compensation	
1908			Tool-tip #8 radius compensation	
1909			Tool-tip #9 radius compensation	
1910			Tool-tip #10 radius compensation	
1911			Tool-tip #11 radius compensation	
1912			Tool-tip #12 radius compensation	
1913			Tool-tip #13 radius compensation	
1914			Tool-tip #14 radius compensation	
1915			Tool-tip #15 radius compensation	
1916			Tool-tip #16 radius compensation	
1917			Tool-tip #17 radius compensation	
1918			Tool-tip #18 radius compensation	
1919			Tool-tip #19 radius compensation	
1920			Tool-tip #20 radius compensation	
1921			Tool-tip #21 radius compensation	
1922			Tool-tip #22 radius compensation	
1923			Tool-tip #23 radius compensation	
1924			Tool-tip #24 radius compensation	
1925			Tool-tip #25 radius compensation	
1926			Tool-tip #26 radius compensation	
1927			Tool-tip #27 radius compensation	
1928			Tool-tip #28 radius compensation	
1929			Tool-tip #29 radius compensation	
1930			Tool-tip #30 radius compensation	
1931			Tool-tip #31 radius compensation	
1932			Tool-tip #32 radius compensation	
1933			Tool-tip #33 radius compensation	
1934			Tool-tip #34 radius compensation	
1935			Tool-tip #35 radius compensation	
1936			Tool-tip #36 radius compensation	

MCM No.	Factory Default Setting	Unit	Description	Setting
1937			Tool-tip #37 radius compensation	
1938			Tool-tip #38 radius compensation	
1939			Tool-tip #39 radius compensation	
1940			Tool-tip #40 radius compensation	

PS: Press PAGE↑ or PAGE↓ once will change twelve items.

## Appendix 7 : Sanyo Servo Machinery Connection

### PY-PZ 【Voltage Command】 Connection Diagram

PY & PZ Driver  $\longrightarrow$  Controller

Sanyo PZ Sanyo PY			HUST CNC		Cable (3M 以下)
3M 50 PIN F(D-connector)			9 PIN M(D-connector)		PIN Number
Blue	3		1	Blue	A
Green	4		2	Green	A-
Brown	5		3	Brown	B
Purple	6		4	Purple	B-
White	7		5	White	C
Yellow	8		6	Yellow	C-
Orange	21	( Red )	7	Orange	VCMD
Light Blue	20		8	Light Blue	GND
Grey	12		8	Grey	GND
White	23		+5V , +24V input		
Black	37		SERVO ON		

### SANYO servo motor setting value ( Voltage Command ) PY SERVO

MODE	PAGE	ABBREVIATE	NAME & ABOUT	STANDARD VALUE	SETTING VALUE
1	4	ENCR	Output pulse frequency division ratio	1/ 1	1/ 3
1	14	VCMS	Analog speed command maximum output	500	200
2	1	FUNC0	SW0 (Bit 5 = 1)	00000000	00100000

### Appendix 8 : Mitsubishi Servo Machinery Connection

#### HUST CPU LINE & MITSUBISHI J2-S CONNECTION (Voltage Command)

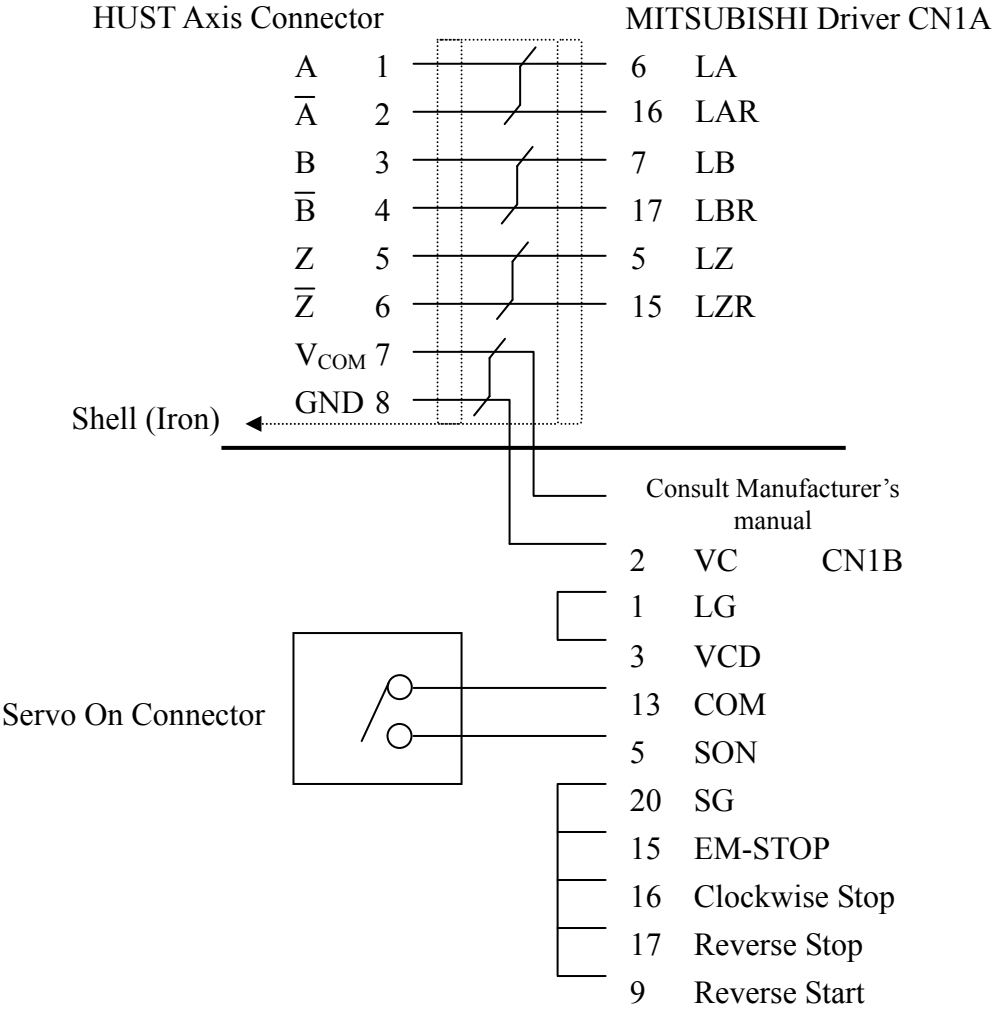


Fig 57

Driver MCM setting:

P00 = 0002

P27 = 8000 PULSE (Feed back per round)

## Appendix 9 : Servo Motor And MPG Connection

Connect servo drivers to X-AXIS, Y-AXIS, and Z-AXIS connectors and connect MPG hand-wheel to MPG connector as shown below. Note that the connections may vary depending on the type of servo motor and the MPG hand-wheel that customers use. Please consult manufacturer's manual before connection.

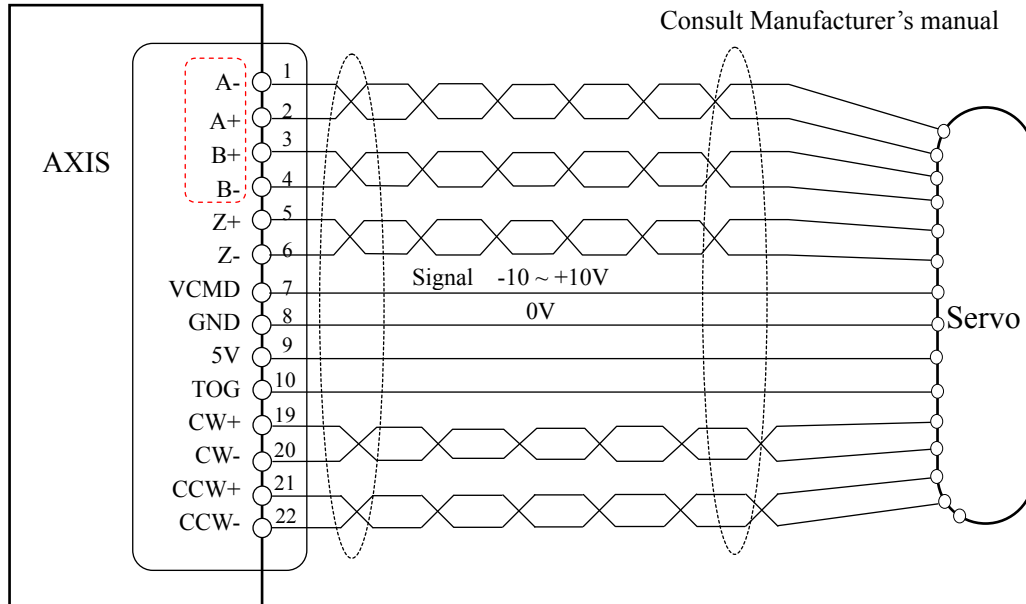


Fig 58

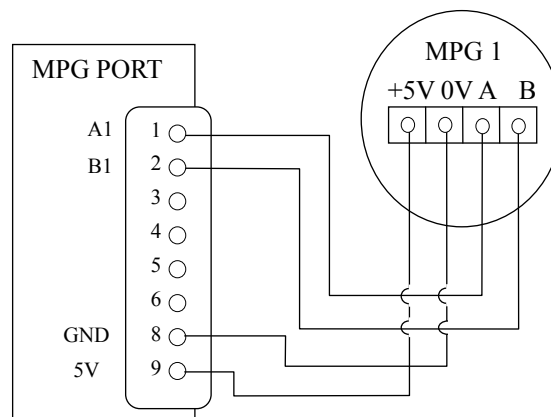


Fig 59



# Appendix 10 : Install Manual

- (1) Test the I/O signal.
- (2) Adjust the parameter of servo motor and controller.
- (3) Check the direction of servo motor:  
The Y (D) axis direction must depend on the machine.  
Illustration is below :

## EX 1. O-TYPE (Open Type)

Y – opening default

= 450

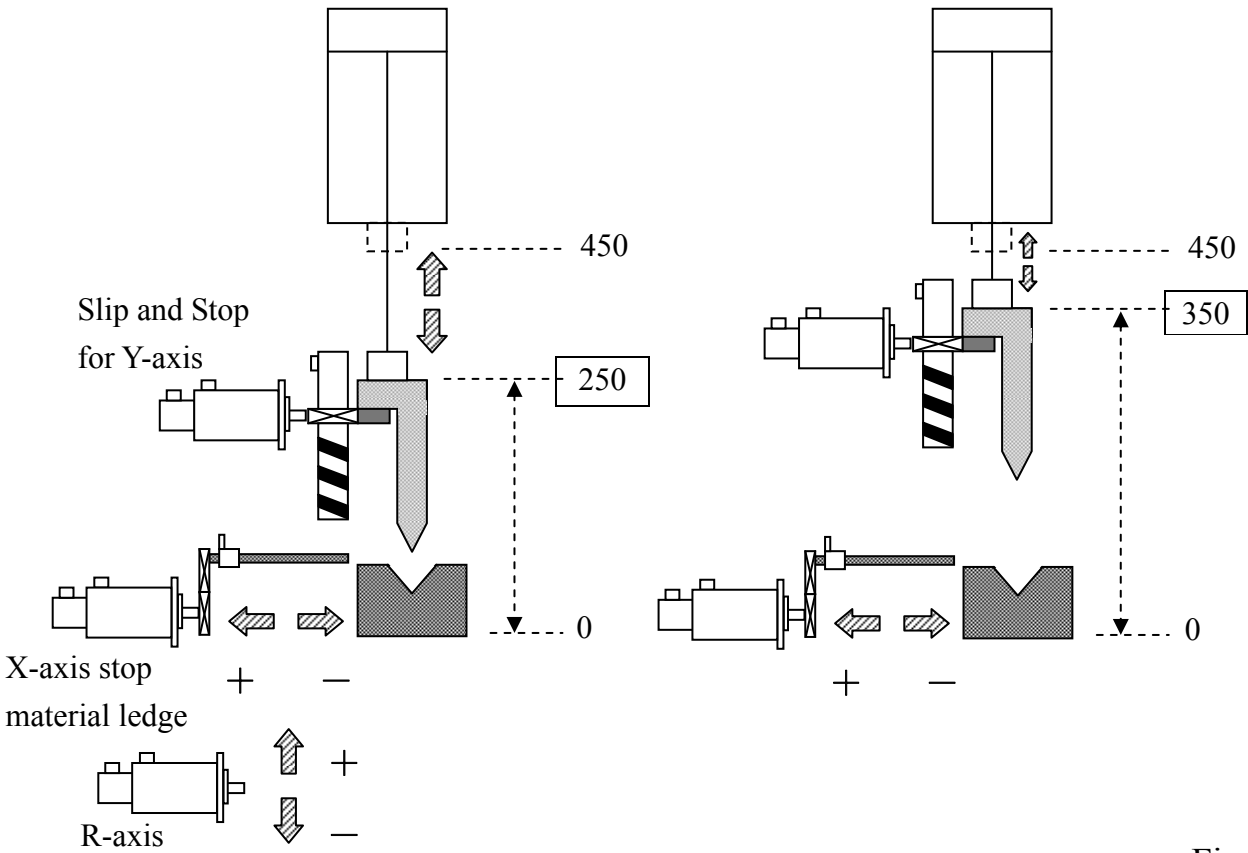


Fig 60

※ The coordinate displayed by controller is the actual position when machine opening.

**EX 2. D-TYPE (Distance Type)**

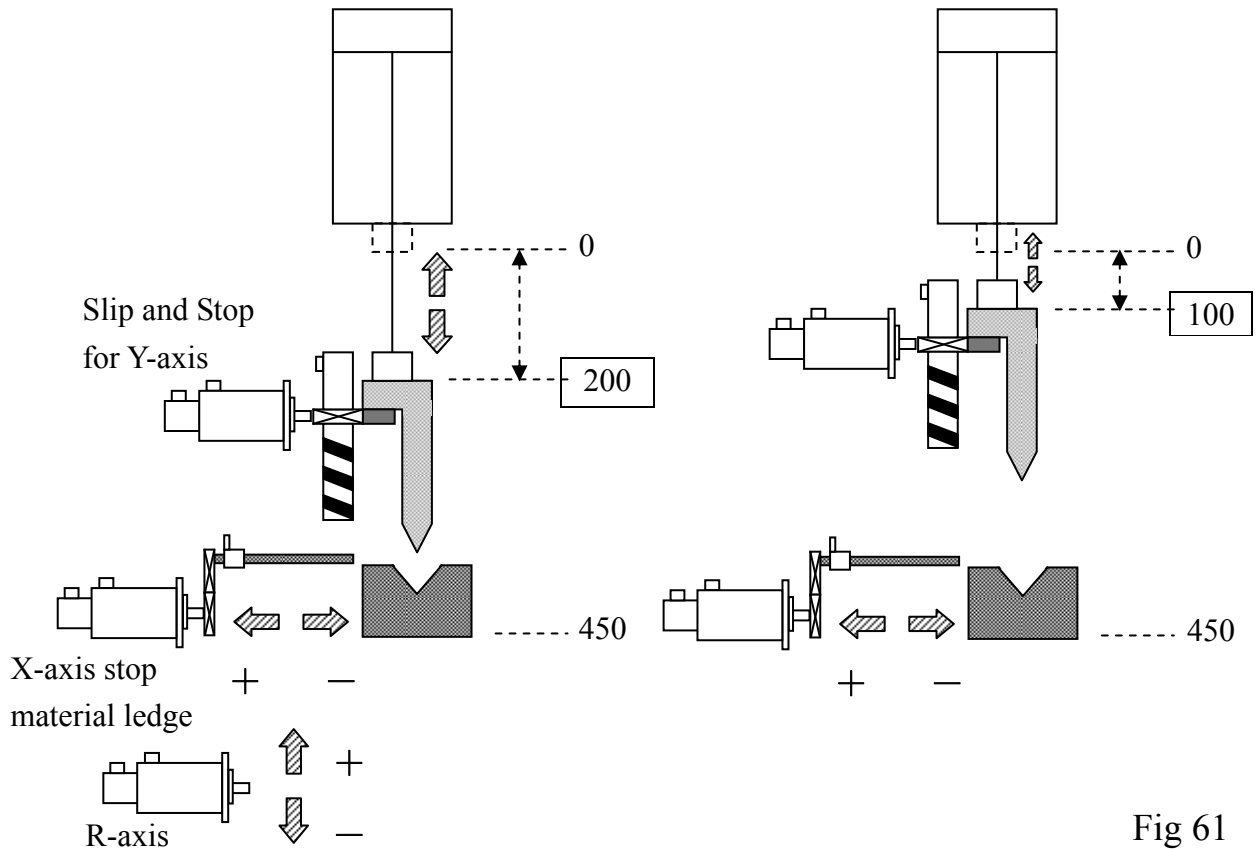


Fig 61

※ **The coordinate displayed by controller is the position from the origin point.**

(4) HOME operation

a. HOME operation of X-axis and Z-axis.

b. JOG mode, move the Y axis to machine coordinate, then Y set 0.

The way of the Y SET 0 is below :

(a) Parameter page 4.

(b) Lock the function key on the mcm page = 1

(c) Press the 『Reset』 key.

(d) Get in the Parameter page 4 again.

(e) Press the 『Y Set-0』 key 6 sec.

c. After Y-axis going back to HOME , input the new program position. (HOME limit)

Parameter page 3 : D-axis HOME limit setting

The value is shut Height or MOPM.

MOPM : Machine Opening Position Modul

(5) Test if each axis' resolution is correct :

- a. Move the X-axis some distance and measure it if correct; If not, please change the resolution.
- b. Y-axis is mainly for checking the MOPM(Machine Opening Position Module). After traveling some distance, check the value of MOPM if the same with Y-axis' coordinate. If not, please change the resolution.

***If there is no MOPM, please measure the act. ( Step 3 EX 1 )***

(6) Revise the X(L)-axis coordinate :

- a. Move the X-axis to the proper position for measuring easily.
- b. In the condition that Basic parameter cipher code has been solved, there will be the 『correct』 function key.
- c. Get in the correction displaying page and input actual measuring value.
- d. Press 『ENTER』 key twice quickly. The X-axis coordinate will change to the default value automatically.

(7) Check if the setting of MOPM(Machine Opening Position Module) is correct :

**Way to ascertain the 『D-TYPE』 : Increase the value and the opening will getting small.**

**Consult the Step 3 EX 2.**

**The calculation of Y- opening default = 0 (Parameter page 4)**

When the Y(D)-axis has arrived at HOME, the MOPM value = 108.00 and the Y-Opening default setting = 400.000 (Parameter page 3)

Then let the UP-TOOL go down to the position of STOP POINT slowly. And measure the distance of machine opening.

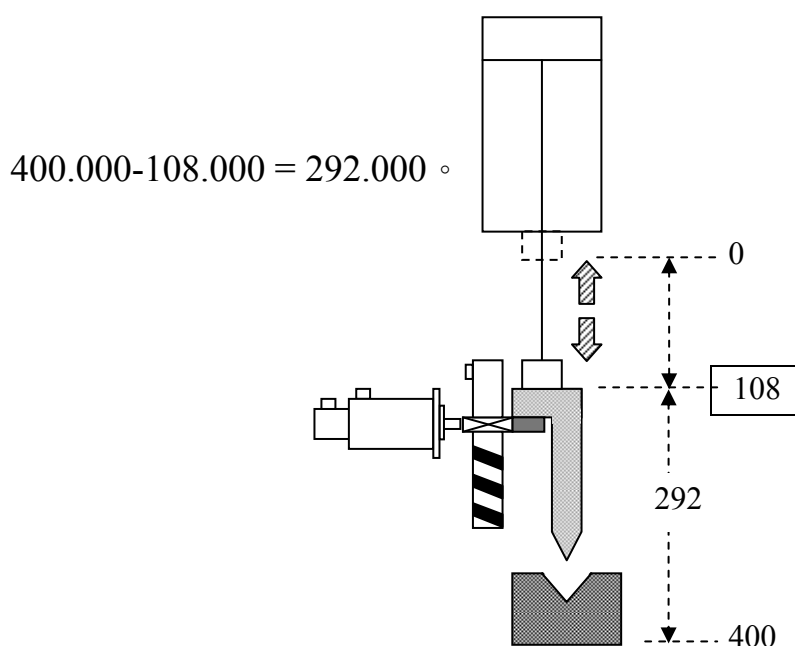


Fig 62

**Way to ascertain the 『 O-TYPE 』 : Increase the value and the opening will getting big.**

**Consult the Step 3 EX 1.**

**The calculation of Y- opening default = 1 (Parameter page 4)**

When the Y(D)-axis has arrived at HOME, move the STOP POINT to the position that it won't crash. Then the value of MOPM= 326.00.(For ex.)

Move the UP-TOOL to go down to the position of STOP POINT slowly. And measure the distance of machine opening = 326.000

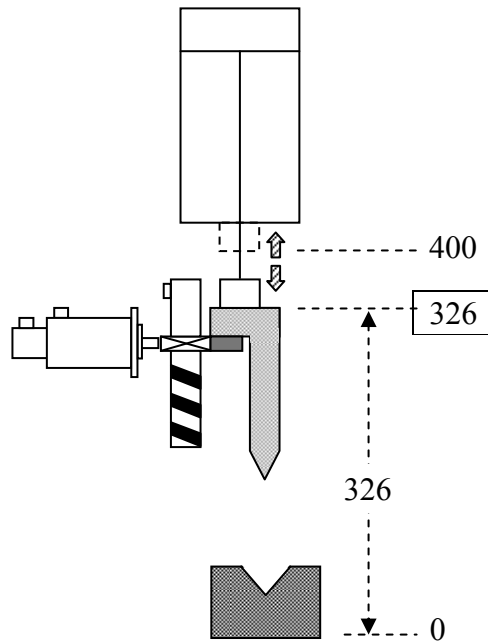


Fig 63

**\*\*** When the measuring value has some error, user can change the setting value of MOPM or set it in the 『 D-axis adjust value 』 of controller. (Parameter page 3)

EX 1.

MOPM = 326.00

Measure the distance of machine opening = 327.319

『 D-axis adjust value 』 = 1.319 (Parameter page 3)

EX 2.

MOPM = 326.00

Measure the distance of machine opening = 325.117

『 D-axis adjust value 』 = -0.883 (Parameter page 3)

(8) Ascertain each parameter of controller below

a. D-axis adjust value. (Parameter page 3)

b. Y- Opening default setting. (Parameter page 3)

- c. D-axis HOME limit setting. (Parameter page 3)
- d. The calculation of Y- opening default. (Parameter page 4)
- e. Input the value in the Edit 、 FOLD and TYPE mode.
- f.  $C\alpha = \text{Empty}$
- g.  $G\alpha = 0.000$

(9) Ask the machine factory to ascertain the 90 degree's position of Y(D)-axis and to record the position.

When doing the bending test, the setting value of trough width is recommended as 6~8 times the piece thickness. (Fig 1)

If the machine factory can not sure the 90 degree's position.

- a. Let the tool like Fig 2.
- b. Record the MOPM position.

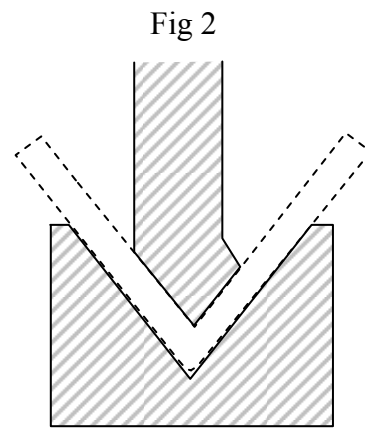
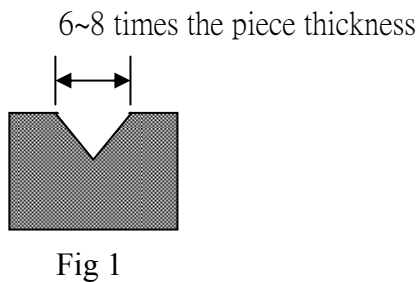


Fig 64

(10) As editing simple program, it is major for testing 90 degree's. Then execute the program and observe if the controller location is close to the record value of 9th. If adjust the value of 『D-axis adjust value』 directly, it can be done till the standard 90 degree being tested out. ; If it is not close to the record value of 9th , please ascertain the Y-axis' settings again and then test again.

(11) After working hard so long, please remember to burn the parameters into the FlashRom and then download them as copy.

H6D-B LCD flow-process diagram

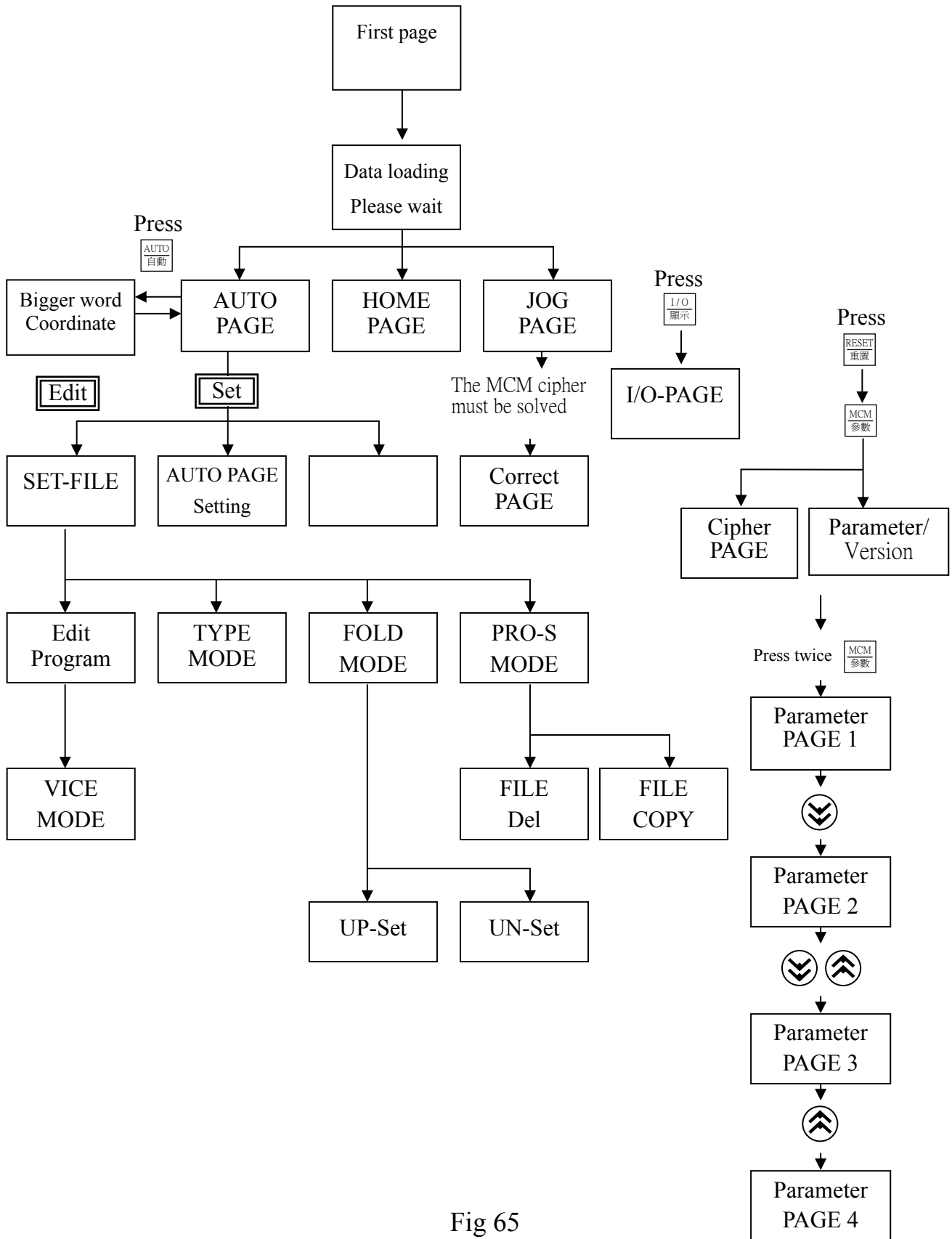


Fig 65

## Appendix 11 : ERROR MESSAGES

### **ERROR-01** MCM Data Error or Battery Fail

Message: MCM parameter setting is incorrect or the backup battery has failed.

Recommended Remedy:

- (1) Check if MCM parameter setting data are correct. Or, execute LD MCM to reset the parameters.
- (2) If the controller has not been turned on for months, the data in the memory will be lost. The controller will show “BT1” message. In this case, change the battery.

### **ERROR-02** Servo Alarm or Return “Home” again

Message:

Servo position control (servo feedback) error. Possible causes are:

- (1) The voltage command from the controller is too fast for the motor to response.
- (2) The controller does not receive any feedback signal from the servo motor.

Recommended Remedy:

- (1) Check if the feed-rate "F" in the part program is too fast.
- (2) Check if the resolution settings of MCM parameters are correct. (Parameters Page 1)
- (3) Check if the worktable being overloaded, or any obstruction in the motor. Also check the servo system including the connections.

### **ERROR-10** RS232 Error.

Message: RS232 communication error.

Recommended Remedy:

- (1) Check the baud rate in MCM #168 if compatible with the one in PC.
- (2) Check the communication cable connection from PC to CNC controller.

### **ERROR-11** Program Memory Error

Message:

Error in program memory due possibly from lack of charge in battery or memory being overloaded.

Recommended Remedy:

- (1) Clear all programs.
- (2) Check battery for memory chip. If the controller has not been turned on for 3 months, the data in the memory will be lost. The controller will show “BT1” message. In this case, change the battery.

#### **ERROR-14** Axis Over-travel.

Message: The cutting tool traveled beyond the hardware limit.

Recommended Remedy:

Use MPG hand-wheel (or by hand) to manually move the tool in the X-axis within the operating range (or inside the hardware limit switch).

#### **ERROR-15** HOME GRID

Message: When servo motor searching the GRID signal, the distance exceeds the setting range

Recommended Remedy::

- (1) Check if the settings of 『Parameter page 2』 larger than the distance servo motor turning one round

EX :

The distance of X-axis servo motor turning one round = 5.000 mm

then 『Parameter page 2』 = 5.200

- (2) Check CPU connection.

#### **ERROR-18** End of File Not Found

Message: Error in the program ending or no program content.

Recommended Remedy:

**Contact the engineer.**

#### **ERROR-20** Software Over-travel

Message: The cutting tool has traveled beyond the bounding limit as set by the software.

Recommended Remedy:



Check the program or revise the settings in 『Parameter page 1 』 for software travel limit.

**ERROR-22** Em-Stop, Home Again

Message: Controller is in emergency stop state.

Recommended Remedy:

Resolve the cause for emergency stop. Restore Emergency-STOP button and press RESET.

**ERROR-30.1** BATT.LOW

Message: The battery (BT1) for data storage is out of charge or service.

Recommended Remedy:

Replace the battery BT1 or power on for 5 hours.

**ERROR-31** None PLC

Message: There is no PLC ladder program in the memory.

Recommended Remedy:

**Contact the engineer.**

**ERROR-51**

Message:

The machine coordinate of X(L)-axis > The setting of software OT +.

Recommended Remedy:

Ascertain the value of Parameter page 1 『Software OT +1 』 .

**ERROR-52**

Message:

The machine coordinate of X(L)-axis < The setting of software OT - .

Recommended Remedy:

Ascertain the value of Parameter page 1 『Software OT - 1 』 .

### **ERROR-53**

Message:

The machine coordinate of Y(D)-axis>The setting of software program-pos. OT +.

Recommended Remedy:

Ascertain the value of Parameter page 2 『 Software Program-Pos. OT + 』 .

### **ERROR-54**

Message:

The machine coordinate of Y(D)-axis<The setting of software program-pos. OT－.

Recommended Remedy:

Ascertain the value of Parameter page 2 『 Software Program-Pos. OT－ 』 .

### **ERROR-55**

Message:

The machine coordinate of Z(R)-axis > The setting of software OT+.

Recommended Remedy:

Ascertain the value of Parameter page 1 『 Software OT+1 』 .

### **ERROR-56**

Message:

The machine coordinate of Z(R)-axis < The setting of software OT－.

Recommended Remedy:

Ascertain the value of Parameter page 1 『 Software OT－1 』 .

## Appendix 12 : USB Operation instructions:

Sequence :

- (1) Establish pages to open USB function from the parameter
- (2) After “RESET” , enter the automatic way (Main control method).
- (3) Open the USB device power, Controller Board D3 key,It represents the line to succeed that the light gets up only .
- (4) After the line after pressing for one second of function key of D3 can present USB and use pages.

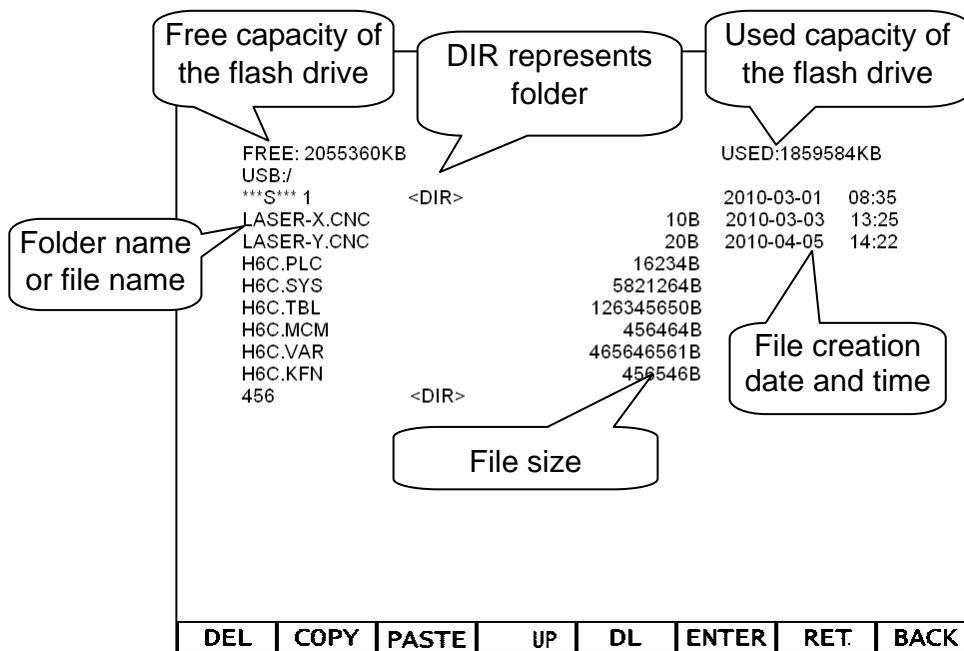


Fig 66

- (5) Upload materials : Utilize the upper and lower directions keyboard, move cursors to the file that wants to convey, Press【Upload materials】Function key and use the next way to look for the function upload.

Download the materials : File name of direct input,Press 【Download the materials】 Function key, can choose download function.

- (6) After finishing, Press ESC key ,can get back to the automatic way

※ Confirm function key as the button passing in and out the materials and inserting.

※ Upload USB → CNC .

※ Download CNC → USB .

※ Function and form of the file paying attention to being uploaded need to be the same , please consult the summary statement of the form .

## USB file form summary statement

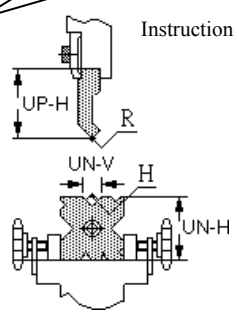
Bending Program	*CNC 、 *.NCD
MCM Parameter	*.MCM
User Value	*.VAR
System	*.SYS
PLC	*.PLC
LCD	*.TBL
F-KEY	*.FSK
F-TABLE	*.KFN
Bending Program	*CNC 、 *.NCD

### Appendix 13 : BL-Compensation Operation instructions :

- (1) Reach (UN ) Lower parameter to establish in pages first , write into the distance seeing value of each angle. (The following picture)

Input The distance seeing value of each angle here.

UN-SET:00 Upper-Choice 1~20/Lower-Choice 1~40					
UN	UN-H	UN-V	K-Out S	K-Out B	P-αD
01	0000.000	00.000	00.000	00.000	00.000
02	0000.000	00.000	00.000	00.000	00.000
03	0000.000	00.000	00.000	00.000	00.000
04	0000.000	00.000	00.000	00.000	00.000
05	0000.000	00.000	00.000	00.000	00.000
06	0000.000	00.000	00.000	00.000	00.000
07	0000.000	00.000	00.000	00.000	00.000
08	0000.000	00.000	00.000	00.000	00.000
09	0000.000	00.000	00.000	00.000	00.000
10	0000.000	00.000	00.000	00.000	00.000
11	0000.000	00.000	00.000	00.000	00.000
12	0000.000	00.000	00.000	00.000	00.000
13	0000.000	00.000	00.000	00.000	00.000
14	0000.000	00.000	00.000	00.000	00.000
15	0000.000	00.000	00.000	00.000	00.000
16	0000.000	00.000	00.000	00.000	00.000
17	0000.000	00.000	00.000	00.000	00.000
18	0000.000	00.000	00.000	00.000	00.000
19	0000.000	00.000	00.000	00.000	00.000
20	0000.000	00.000	00.000	00.000	00.000



Instruction

Tool Used

UP-H : 000.000  
 UN-H : 000.000  
 UN-V : 00.000  
 K-Out B : 000.000  
 K-Out S : 000.000

UP-Set 
PAGE 
Edit 
Ret

Fig 67

- (2) Establish pages in BL, input every BL size , input the unit needing to compensation, a unit equals The distance seeing value of each angle. (The following picture)

Input the unit of BL-Compensation here

BL-DEEPER					
BL	DEEPER	BL	DEEPER	BL	DEEPER
100	-0000.00	1700	-0000.00	3300	-0000.00
200	-0000.00	1800	-0000.00	3400	-0000.00
300	-0000.00	1900	-0000.00	3500	-0000.00
400	-0000.00	2000	-0000.00	3600	-0000.00
500	-0000.00	2100	-0000.00	3700	-0000.00
600	-0000.00	2200	-0000.00	3800	-0000.00
700	-0000.00	2300	-0000.00	3900	-0000.00
800	-0000.00	2400	-0000.00	4000	-0000.00
900	-0000.00	2500	-0000.00	4100	-0000.00
1000	-0000.00	2600	-0000.00	4200	-0000.00
1100	-0000.00	2700	-0000.00	4300	-0000.00
1200	-0000.00	2800	-0000.00	4400	-0000.00
1300	-0000.00	2900	-0000.00	4500	-0000.00
1400	-0000.00	3000	-0000.00	4600	-0000.00
1500	-0000.00	3100	-0000.00	4700	-0000.00
1600	-0000.00	3200	-0000.00	4800	-0000.00

NOTE 
UN-V 
+TH 
Ret

Fig 68

(3) At the time of editor's procedure , in BL project of choosing , input real BL.(The following picture) (The following picture)

EDIT		None Graph		01 M : Aluminum	Set-File:0→400	
				02 TH : 00.000	File:000	
				03 UP : 00 0000.000		
				04 UN : 00 0000.000	06 K-Out B:-0000.000	
				05 V : -000.000	07 K-Out S:-0000.000	
N	X	R	$\alpha$	Vice	BL	C $\alpha$
00	0000.00	-000.00	000.00	00	0000	-00.00
<input type="button" value="Fold"/> <input type="button" value="V.MCM"/> <input type="button" value="BTO"/> <input type="button" value="F.Pro-S"/> <input type="button" value="GRAPH"/> <input type="button" value="Del Graph"/> <input type="button" value="Ret"/>						

Input real BL here

Fig 69