

HUST CNC

BENDING MACHINE OPERATION MANUAL

H4CL-B 3-AXIS

2008-03

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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.

**開機資料處理中
Data Loading
請稍候.....
Please Wait.....**

1. Non Mode Page (Freedom editor)

HUST CNC

億圖實業股份有限公司

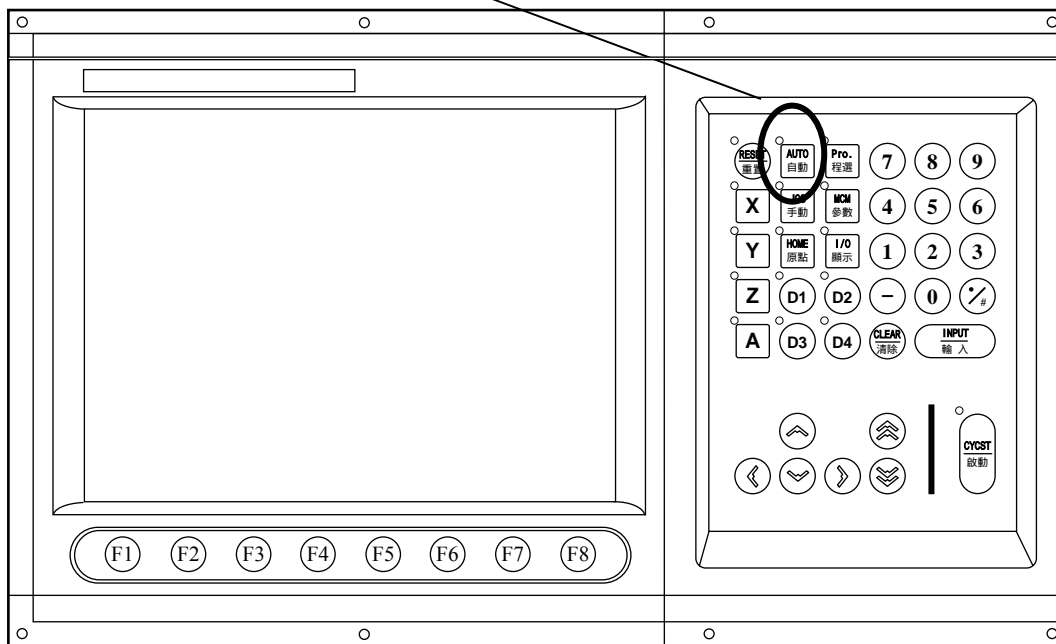
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To main page : Press “AUTO” on the key board.



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				Assign the graph	
L-POS : -0000.000		D-POS : -0000.000		R-POS : -0000.000		None Graph	
N	X	R	α	Vice	BL	C α	
00	0000.00	-000.00	000.00	00	0000	-00.00	
01	UP:00 000.000	05	M: 0 Aluminum	09	C α : -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	Fold	Lock	Pre	GRAPH

Function key :

- (1) 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.
- (2) RESET :
CNC gives an order to controller that let it stay on the non-mode, and the frame jumps to the non-mode page.
- (3) 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.
- (4) 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), SD-Pos., Total-number(T-Time) **【Material】**, **【Depth】**, **【Pre.-BL】** and Count number(C-Time).
- (5) 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.

(6) 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

(7) Lock :

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

Press again to cancel.

(8) Fold-Selection

Push this key and enter Fold-Selection and establish pages.

(9) Pre.-BL

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

(10) Graph for reference (Graph)

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

Additional description : When the setting key is highlight:

(1) 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- D = 0.01).

Set in the mode of Edit - FOLD - UN-SET.

b. $G = 5.000$ (total correction)

c. The unit of the total correction is

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

EX 2 :

a. The Y-axis (D-axis) movement of one unit is set as 0.04 (P- D = 0.04).

Set in the mode of Edit - FOLD - UN-SET.

b. $G = 5.000$ (total correction)

c. The unit of the total correction is

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

(2) 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.

(3) T-Time :

Set total number of pieces

(4) C-Time :

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

(5) Material : (Establish the range 0-2)

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

(6) Pre.-BL

(7) Calculate the Bending-Force condition needed

(8) Thickness :

Input the Bending Machine of project

AUTO		FILE000		PRO-RUN		Adtion	
Bending-Force:000.00 Ton.				Calculate the bending-force must setting the item of 5.6.7			
L-POS : -0000.000						Assign the graph	
D-POS : -0000.000						None Graph	
R-POS : -0000.000							
N	X	R	α	Vice	BL	C α	
00	0000.00	-000.00	000.00	00	0000	-00.00	
01	UP:00 000.000	05	M: 0 Aluminum	09	C α : -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	
Fold		Lock		Pre		GRAPH	

The situation shows the position

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
- b. UP-H 0
- c. UN-H 0
- d. UN-V 0
- e. TH 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.

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

(10) Graph delete (Del.-Graph)

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

(11) 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

(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.

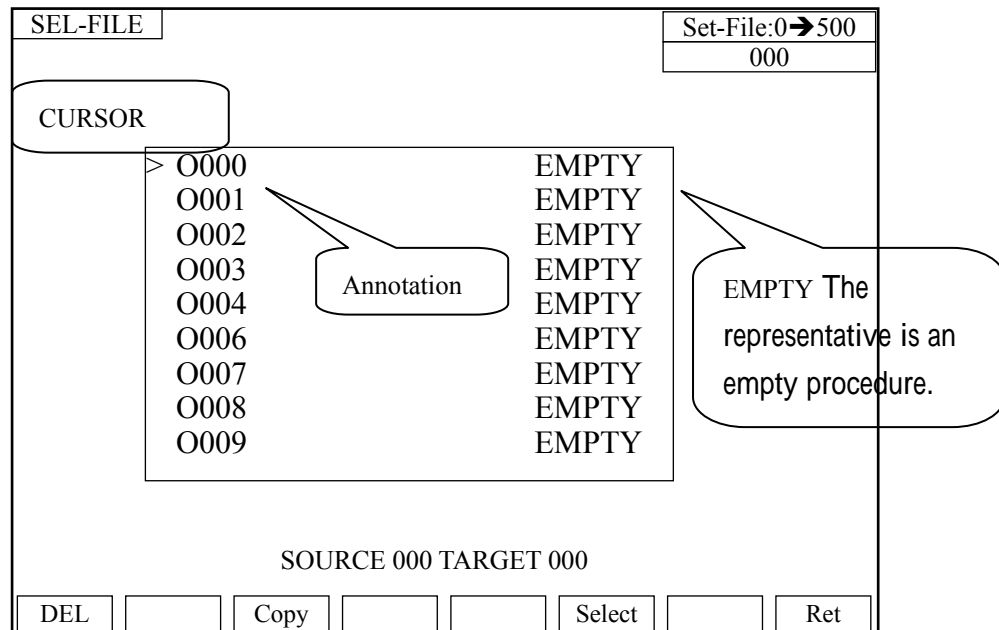
(2) Delay Time : (Time) Range from 0 to 9.9s

5. Editing mode

EDIT		01 M : Aluminum		Set-File:0→500			
None Graph		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	α	Vice	BL	C α	
00	0000.00	-000.00	000.00	00	0000	-00.00	
INS	DEL	V.MCM	BTO	F.Pro-S	GRAPH	Del Graph	Ret

- (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.

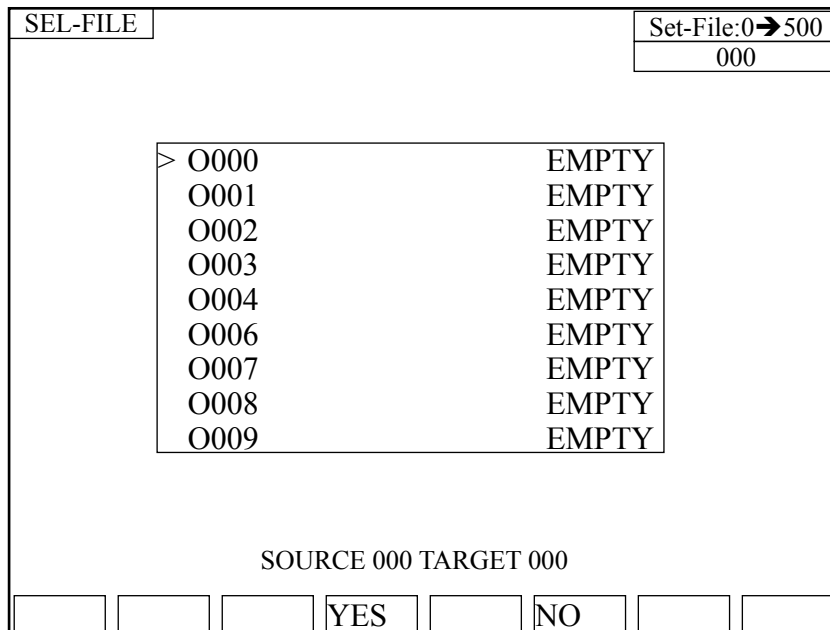
6. The main page of program number selection



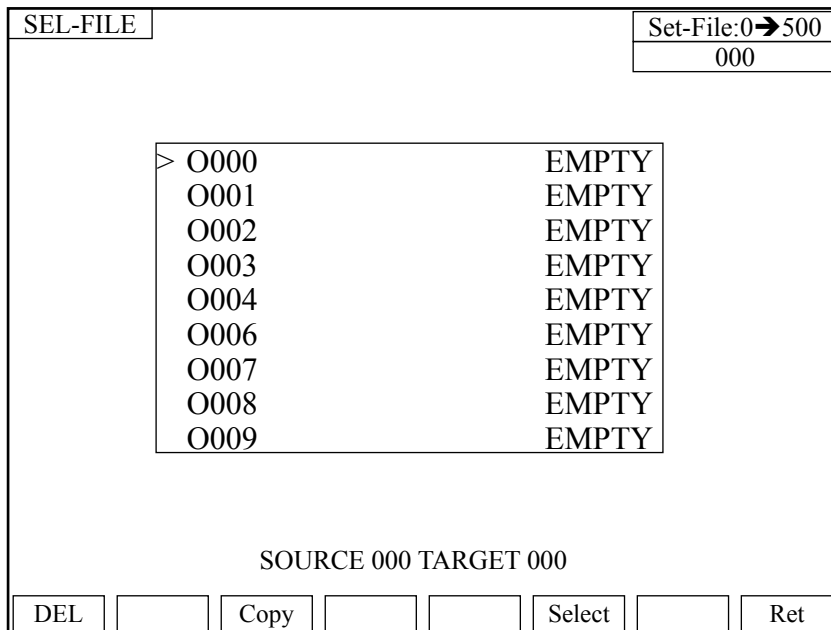
- (1) Press **【PAGE】** or **【CURSOR】** key to move the cursor.
- (2) **【Ret】** key : back to the File setting page.
- (3) **【COPY】** key : go to the PRO-COPY page.
- (4) Move to the set number then press the SELECT **【SEL】** key.
- (5) Editor key : After choosing the procedure, to editor's page editor's 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.



The program-copy page



- (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)

Fold		Upper-Choice 1~20/Lower-Choice 1~40	
UP-SET:00			
UP	UP-H	UP	UP-H
01	0000.000	11	0000.000
02	0000.000	12	0000.000
03	0000.000	13	0000.000
04	0000.000	14	0000.000
05	0000.000	15	0000.000
06	0000.000	16	0000.000
07	0000.000	17	0000.000
08	0000.000	18	0000.000
09	0000.000	19	0000.000
10	0000.000	20	0000.000

Tool Used

UP-H : 000.000

UN-H : 000.000

UN-V : 00.000

K-Out B : 000.000

K-Out S : 000.000

UN-Set Edit Ret


- (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 , 小禁區、大禁區、一度進刀量)
- (4) UN-SET :
Total file setting of UN-SET is40

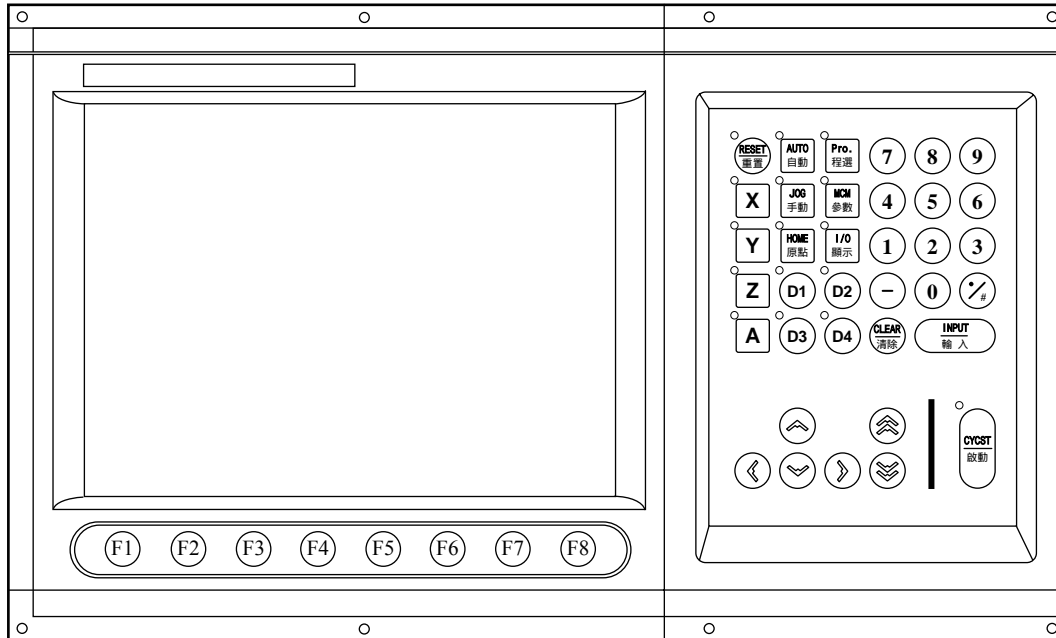
- Turn back : Get back to the automatic way.
- UP(DOWN) page : Switch over the UP(DOWN) page of establishing.

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)



- (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.

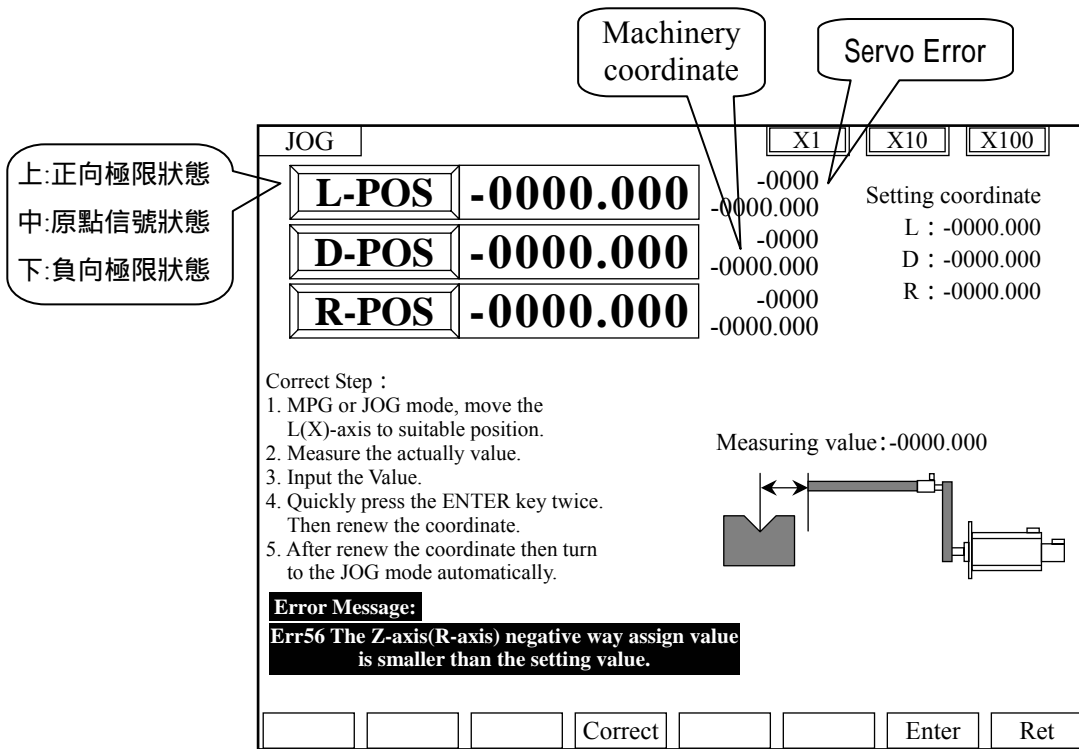
L-axis(X)、 D-axis(Y)

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



- (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.

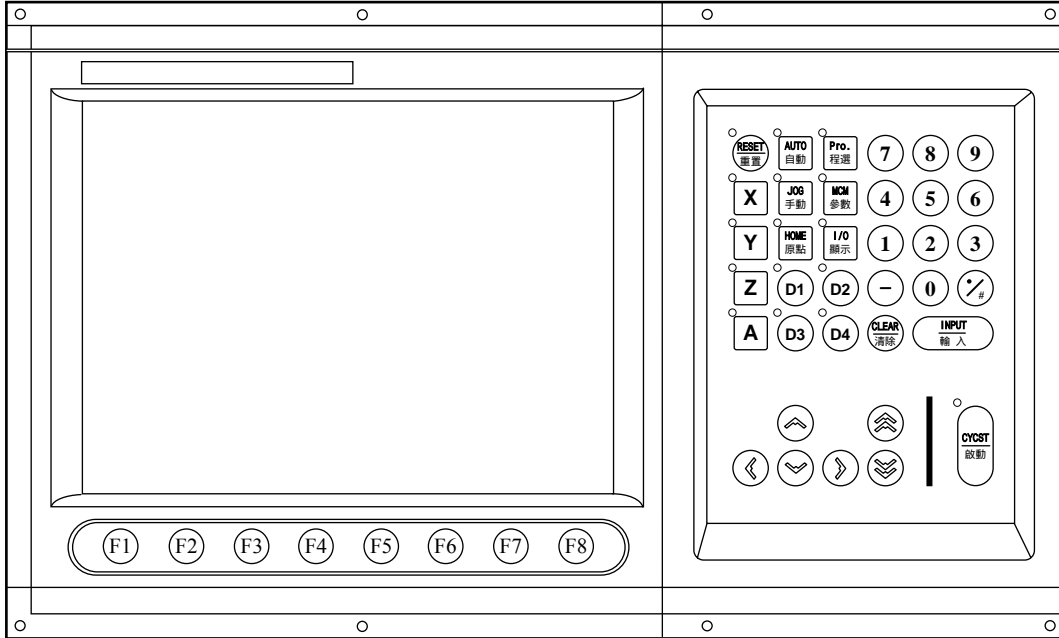
Err 56 : The Z -axis (R-axis) negative way assign value is smaller than the setting value.

- (5) DX :(add pressure limit)

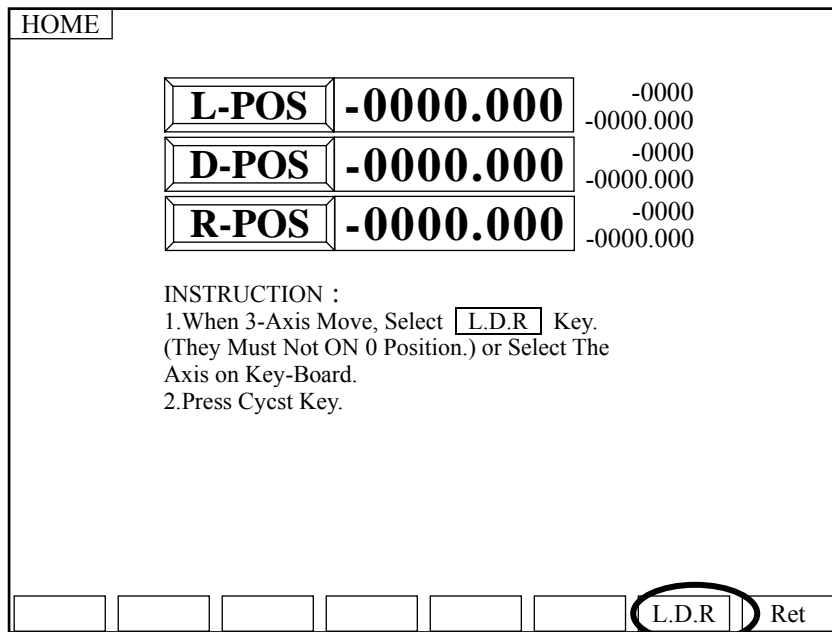
When this function is on, it will highlight. When the DX signal (I007 = 1) is coming in, the X-axis will do the operation of DX. The distance is based on the VICE of the 10th group of EDIT MODE.

9. HOME mode

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



- (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.



10. Error and Absolve (total Error page)

11. Graph for reference (Graph)

Show that chooses the serial number of the figure

Input the position



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.

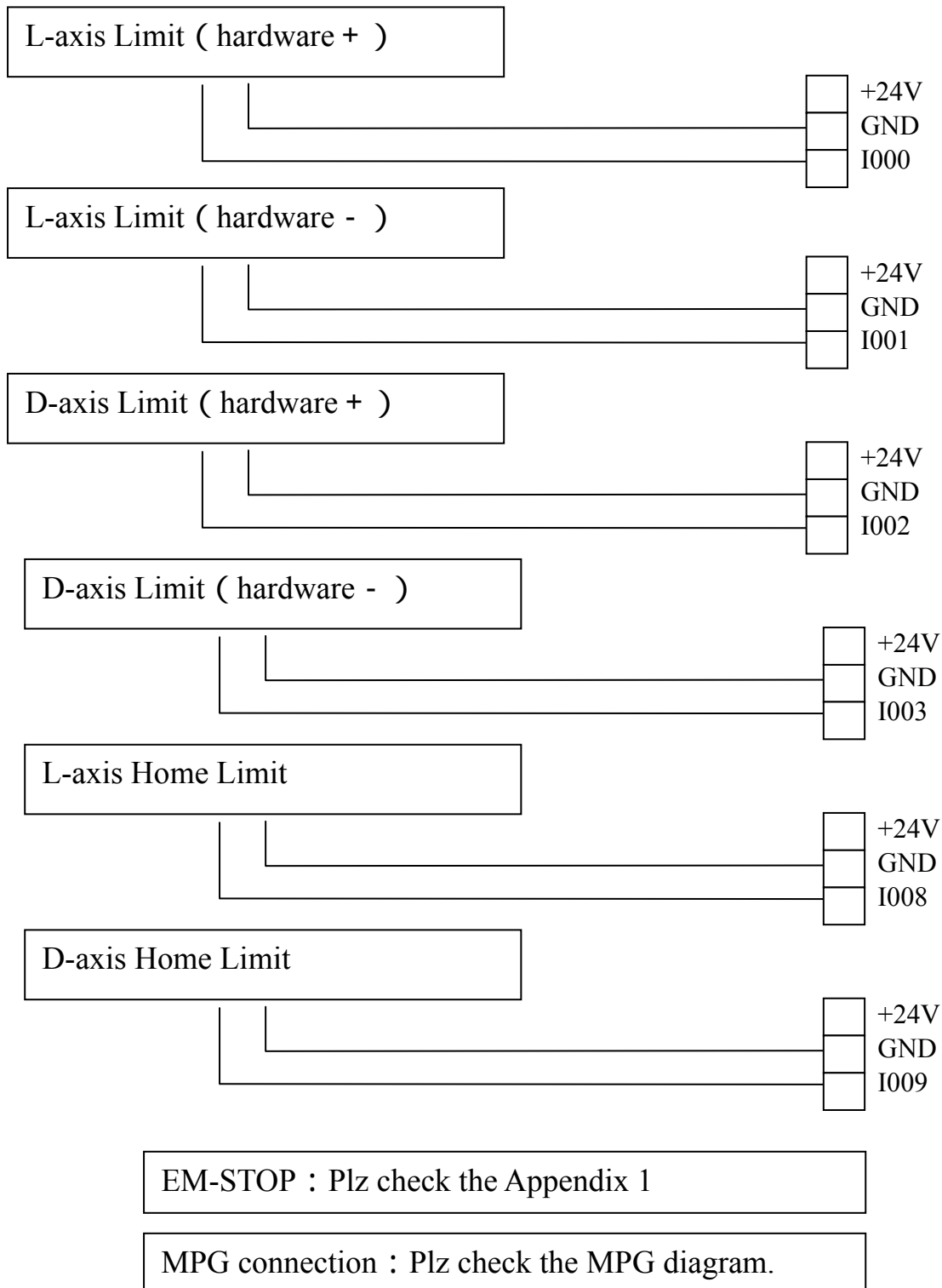
Press this  key, the I/O signal will be shown :

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	

13. Machine Connection Diagram

Input Signal

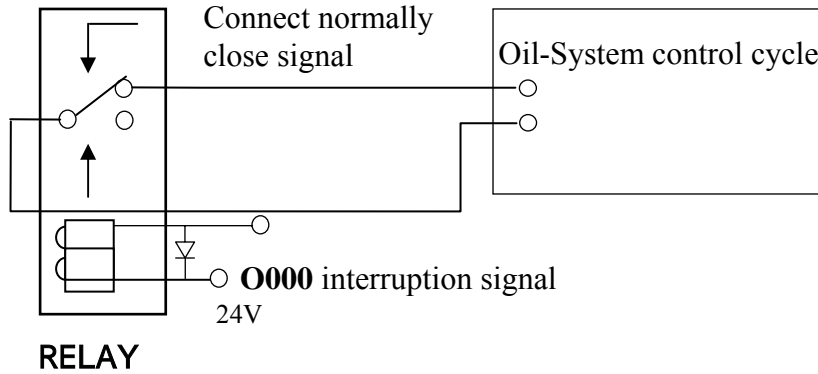
(Input Board) Connect signal line to input board of HUST, and then connect to input connector on the H3BN through DB25LF of the input board. Using HUST input board has an advantage that it will protect the controller lines of H3BN series. This connecting way is only suit for the input connector of NPN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



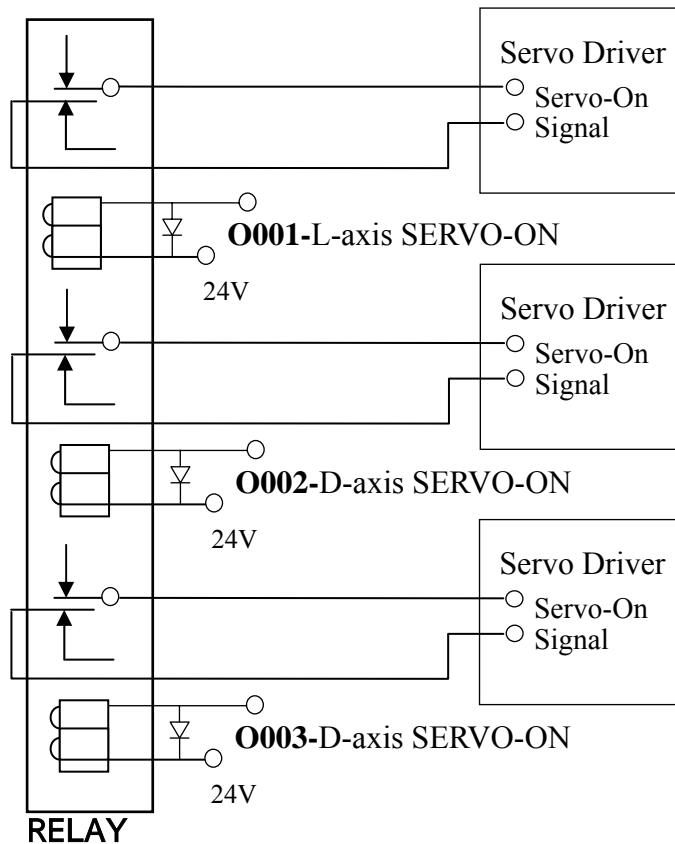
Output Signal Type

- (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

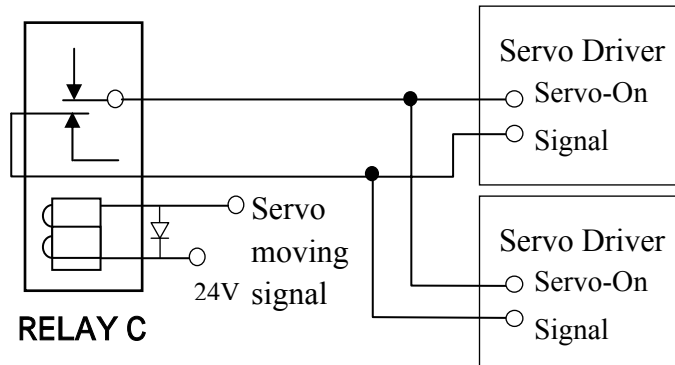


L-axis、 D-axis、 R-axis SERVO-ON

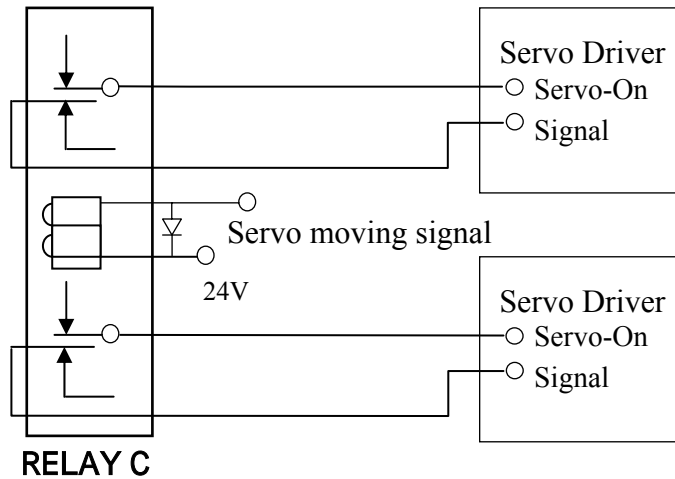


Appendix 2 : Servo Driver Servo-On Connection Diagram

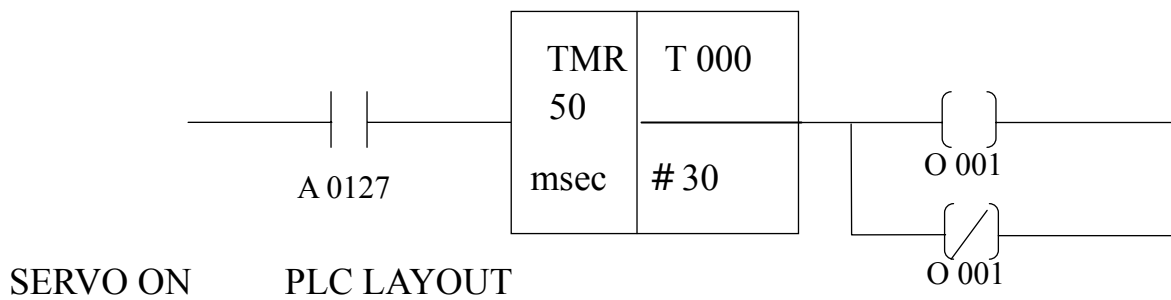
Wrong way :



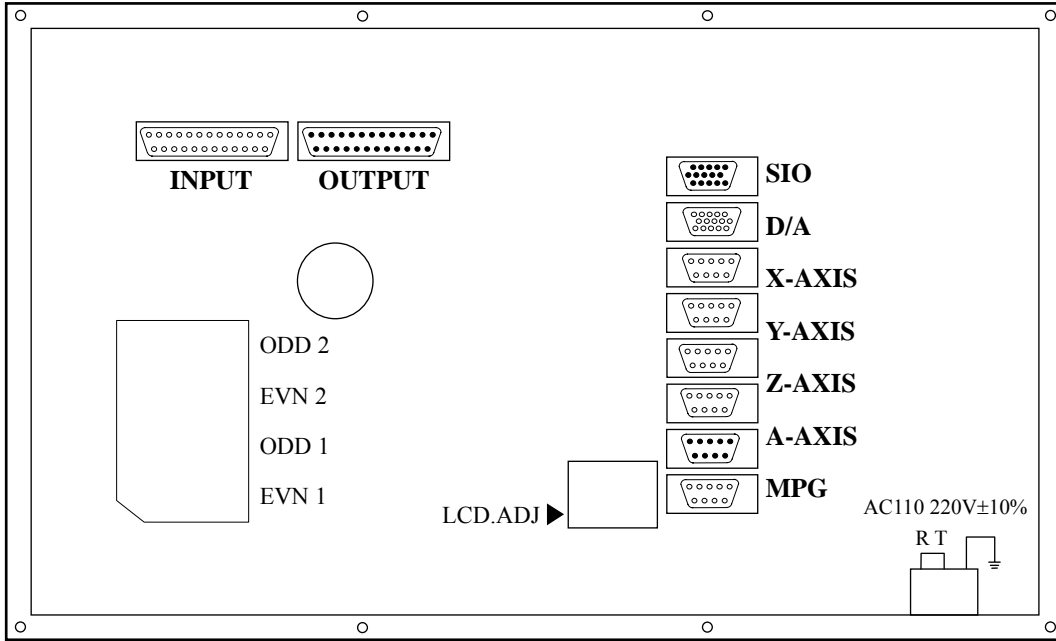
Right way:



Right and Wrong way of driver connection

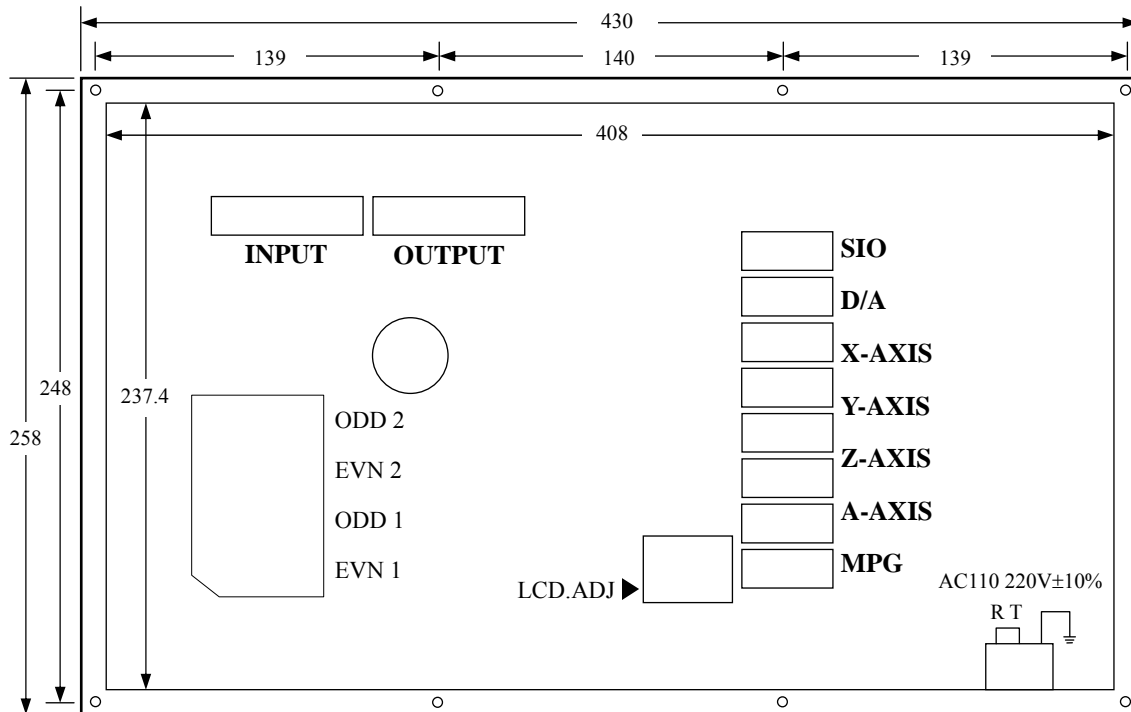


Appendix 3 : H4CL-B Controller size

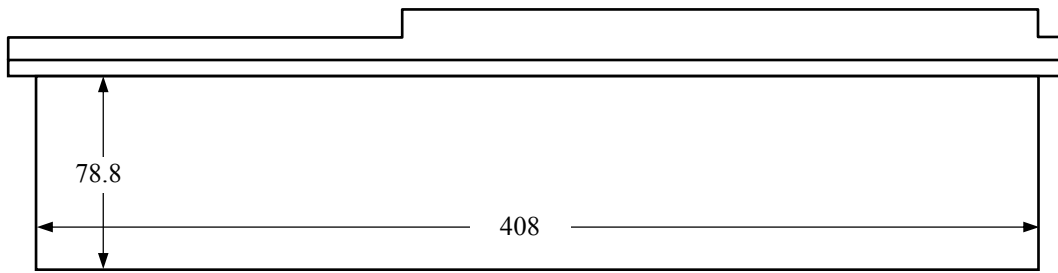


H4CL-B CPU Main Board Connectors

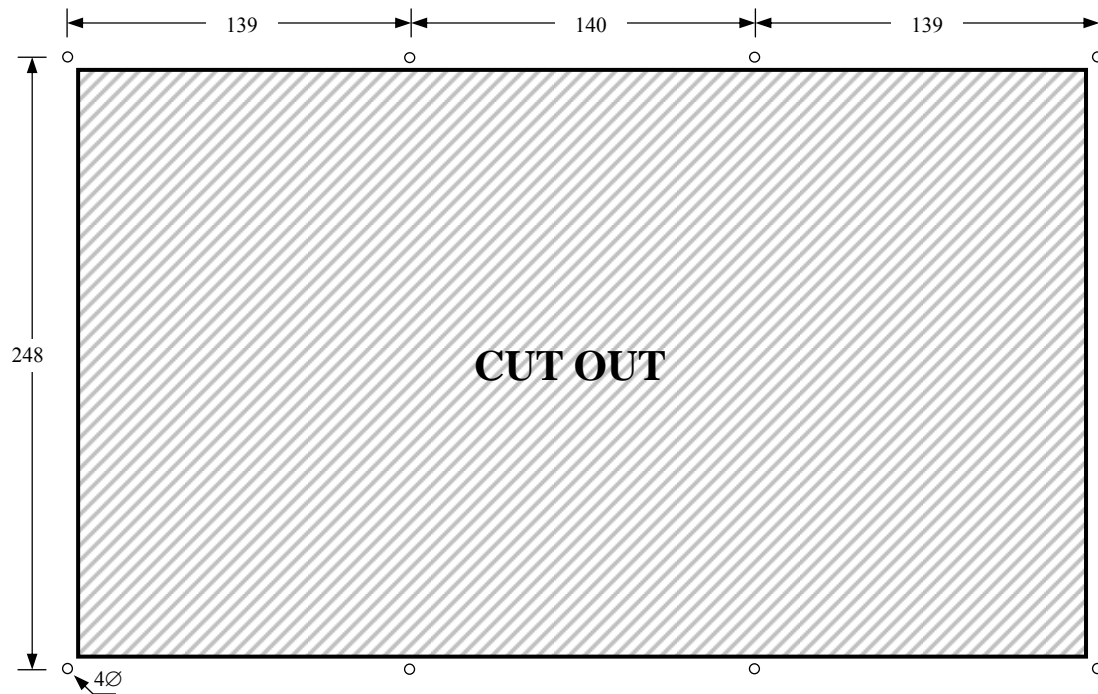
H4CL-B The Size of Box (Back)



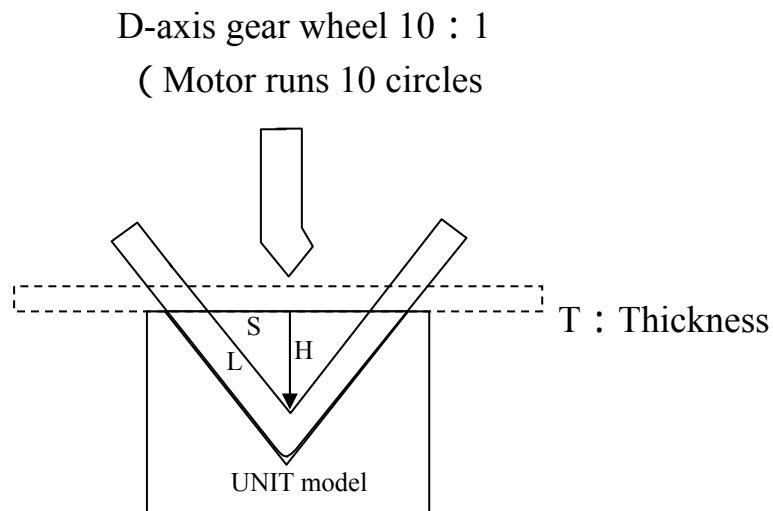
H4CL-B The Size of Box (Upper)



H4CL-B CUT OUT Size



Appendix 4 : Bending Angle Conception



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

Ex1 :

UNIT-CHICE model is 30mm width (S = 15mm) ; angle 90 degree ; the piece 2mm thickness (actual calculation uses μ 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) 13 mm Pressing Down Depth

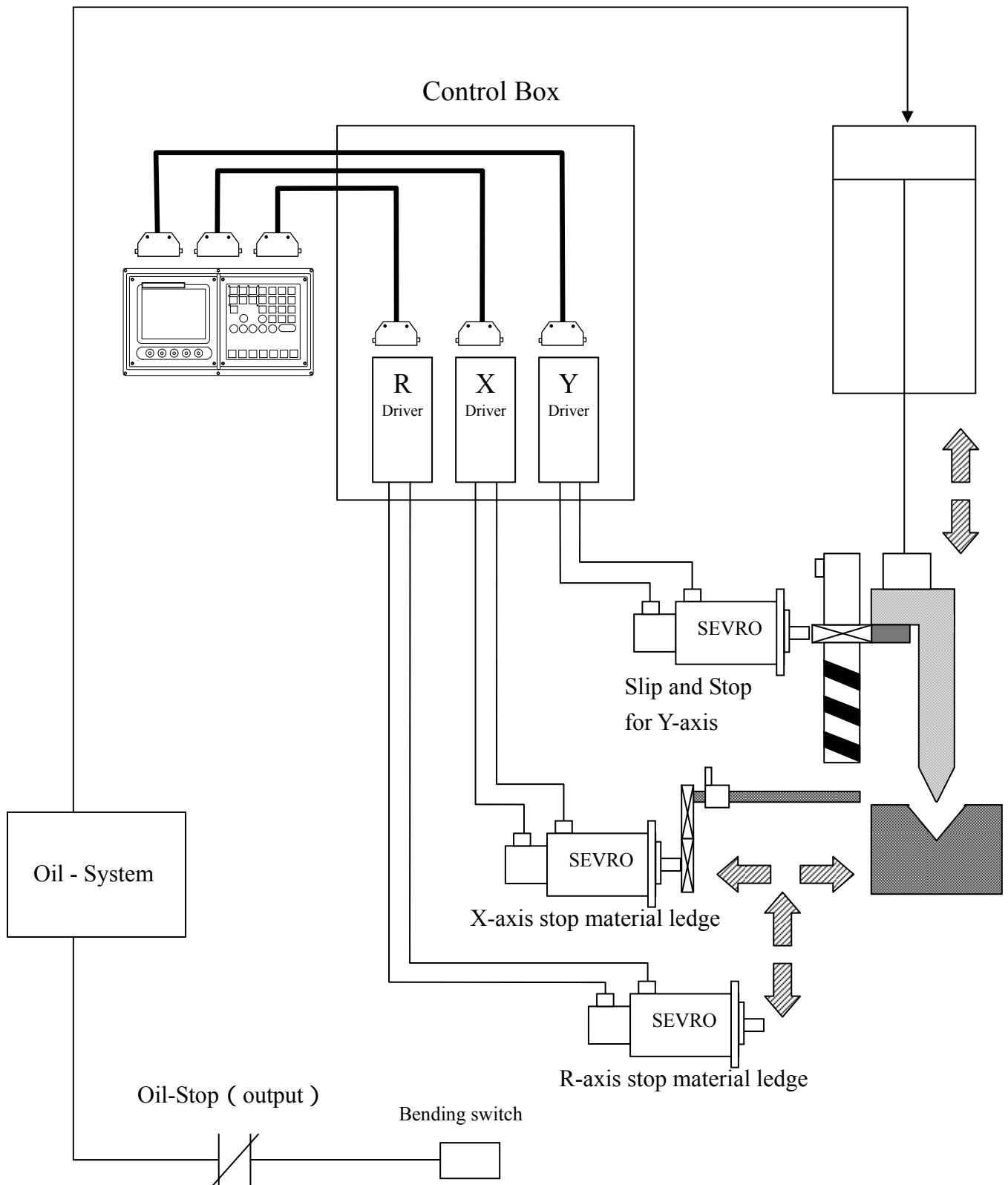
EX2 :

UNIT-CHICE model is 30mm width (S = 15mm Actual calculation uses μ 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) 2.019 mm Pressing Down Depth

Appendix 5 : H4CL-B Control Structure of Bending Machine



Appendix 6 : MCM (Parameter).

Parameter cipher
0, if you first into
the parameter page,
it will ask you input
the cipher code.

Input the password

1 : * * * *

2 : * * * *

Edition date

SYSTEM	2005	316
PLC	2005	322
PROGRAM	2005	301

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

B_MCM	B_VAR	CLR_P	LD VAR	LD MCM
-------	-------	-------	--------	--------

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

再快按”參數”鍵兩次進入以下頁面

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

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

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

- 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:

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

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

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

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

Setting by engineer.

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 = $3000 * 100 / 60000 = 5 \text{ mm}$

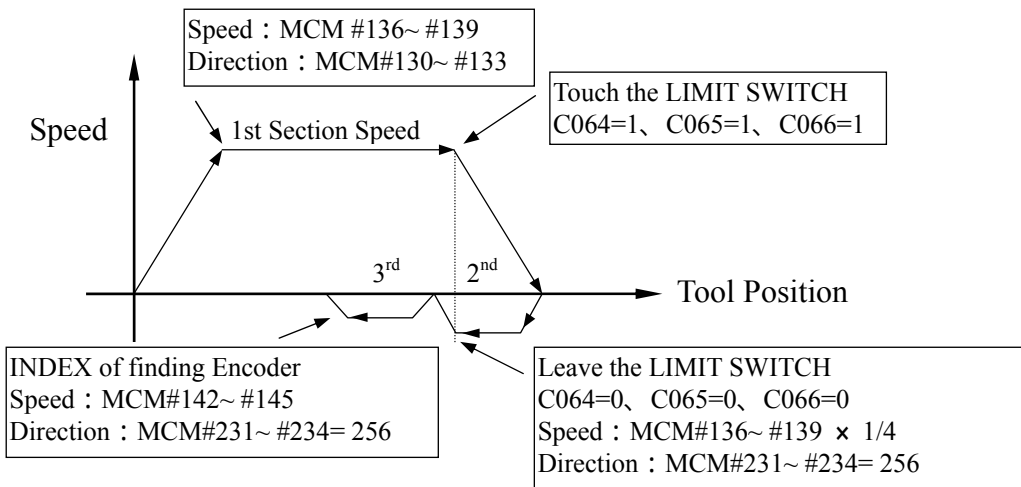


Fig A Homing Speed and Direction of finding (GRID)

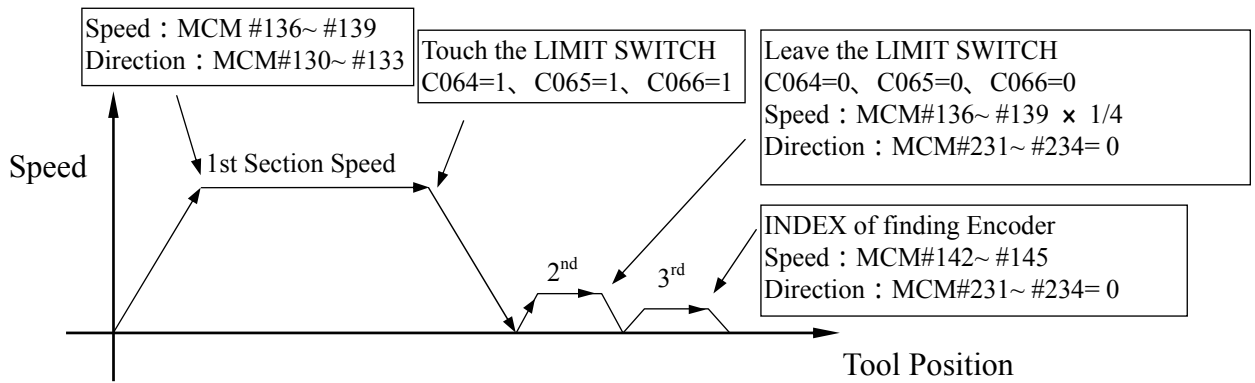


Fig B Homing Speed and Direction of finding (GRID)

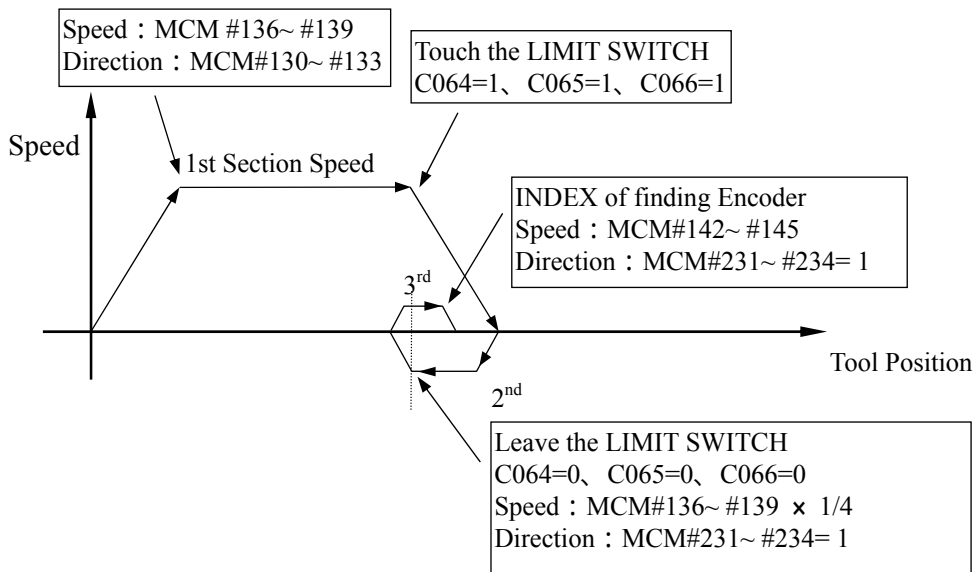


Fig C Homing Speed and Direction of finding (GRID)

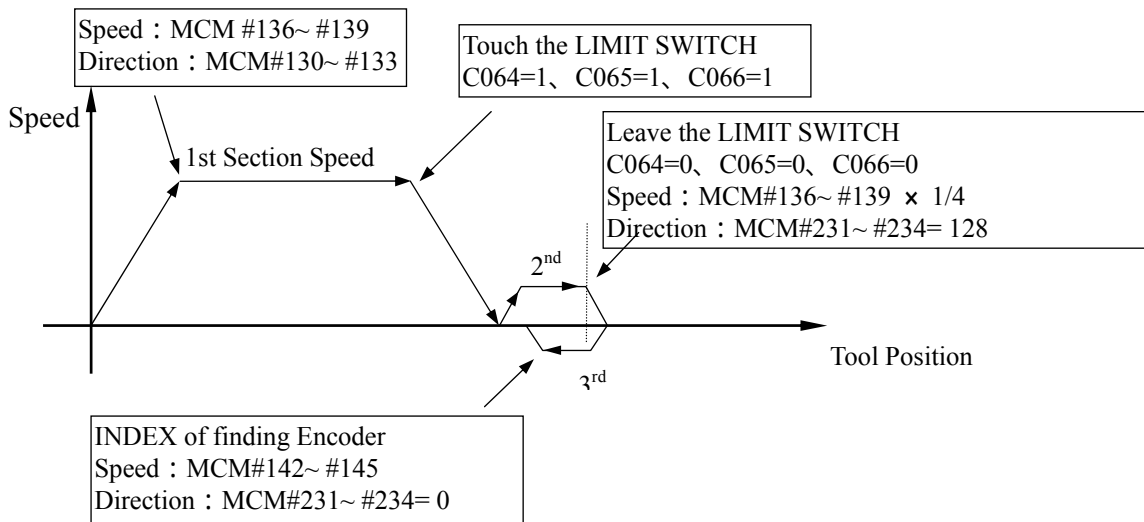


Fig D Homing Speed and Direction of finding (GRID)

The resolution for Y-axis = $500/200 = 2.5 \mu\text{m}/\text{pulse}$.

If MPG hand-wheel moves 1 notch (=100 pulses), the feed length in

Y-axis = $100 \times (500/200) = 250 \mu\text{m} = 0.25 \text{ mm}$.

Setting by engineer.

14. Software Program-Pos. OT +

Format : (Default = 9999.999)

15. Software Program-Pos. OT -

Format : - (Default = -9999.999)

16. JOG Feed-Rate

Format : (Default = 1000)

JOG mode, setting the speed of the Feed-Rate.

17. Setting the range of Grid

Format : . (Default = 1000.000)

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

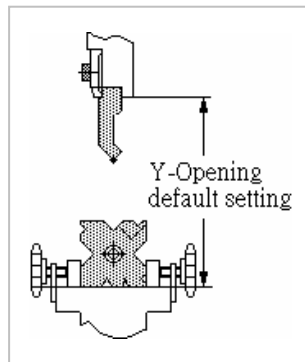
EX 2.

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)

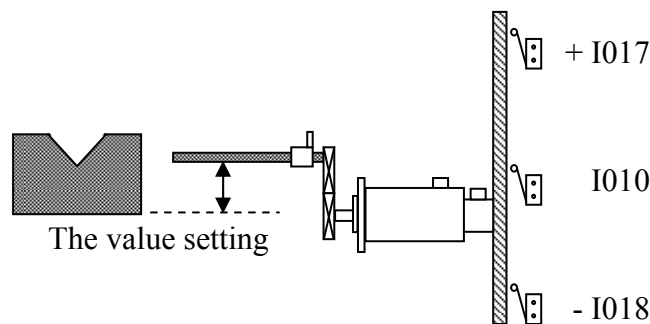


22. D-axis HOME Limit setting Format : □□□□.□□□ (Default = 0.000)

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



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 :

PARAMETER LIST :

MCM No.	Factory Default Setting	Unit	Description	Setting
93	0		Master/Slave mode, 0=CNC, 1=X-axis, 2=Y-axis 3=z-axis,4=A-axis	
106	0	pulse	X-axis, Backlash compensation, 0~255	
107	0	pulse	Y-axis, Backlash compensation, 0~255	
108	0	pulse	Z-axis, Backlash compensation, 0~255	
109	0	pulse	A-axis, Backlash compensation, 0~255	
110	0	pulse	System Reserved !	
111	0	pulse	System Reserved !	
112	1000.0	mm/min	X-axis, JOG Feed-rate & power-on G01 speed	
113	1000.0	mm/min	Y-axis, JOG Feed-rate & power-on G01 speed	
114	1000.0	mm/min	Z-axis, JOG Feed-rate & power-on G01 speed	
115	1000.0	mm/min	A-axis, JOG Feed-rate & power-on G01 speed	
116	1000.0	mm/min	System Reserved !	
117	1000.0	mm/min	System Reserved !	
118	100	pulse	X-axis,Denominator,resolution calc.(Encoder pulse)	
119	100	μm	X-axis,Numerator,resolution calculation.(Ball-screwpitch)	
120	100	pulse	Y-axis,Denominator,resolutioncalc.(Encoder pulse)	
121	100	μm	Y-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
122	100	pulse	Z-axis,Denominator,resolutioncalc.(Encoder pulse)	
123	100	μm	Z-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
124	100	pulse	A-axis,Denominator,resolutioncalc.(Encoder pulse)	
125	100	μm	A-axis,Numerator,resolutioncalc.(Ball-screwpitch)	
126	100	pulse	System Reserved !	
127	100	μm	System Reserved !	
128	100	pulse	System Reserved !	
129	100	μm	System Reserved !	
130	0		X-axis, HOME direction, 0=+ dir.1=-dir	
131	0		Y-axis, HOME direction, 0=+ dir.1=-dir	
132	0		Z-axis, HOME direction, 0=+ dir.1=-dir	
133	0		A-axis, HOME direction, 0=+ dir.1=-dir	
134	0		System Reserved !	
135	0		System Reserved !	
136	2500.0	mm/min	X-axis, HOME speed 1	
137	2500.0	mm/min	Y-axis, HOME speed 1	
138	2500.0	mm/min	Z-axis, HOME speed 1	
139	2500.0	mm/min	A-axis, HOME speed 1	
140	2500.0	mm/min	System Reserved !	
141	2500.0	mm/min	System Reserved !	
142	40.0	mm/min	X-axis, Home grid speed during HOME execution	
143	40.0	mm/min	Y-axis, Home grid speed during HOME execution	

MCM No.	Factory Default Setting	Unit	Description	Setting
144	40.0	mm/min	Z-axis, Home grid speed during HOME execution	
145	40.0	mm/min	A-axis, Home grid speed during HOME execution	
146	40.0	mm/min	System Reserved !	
147	40.0	mm/min	System Reserved !	
148	10000.0	mm/min	X-axis, G00 Traverse speed limit	
149	10000.0	mm/min	Y-axis, G00 Traverse speed limit	
150	10000.0	mm/min	Z-axis, G00 Traverse speed limit	
151	10000.0	mm/min	A-axis, G00 Traverse speed limit	
152	10000.0	mm/min	System Reserved !	
153	10000.0	mm/min	System Reserved !	
154	0		X-axis, Direction of motor rotation, 0=CW, 1=CCW	
155	0		Y-axis, Direction of motor rotation, 0=CW, 1=CCW	
156	0		Z-axis, Direction of motor rotation, 0=CW, 1=CCW	
157	0		A-axis, Direction of motor rotation, 0=CW, 1=CCW	
158	0		System Reserved !	
159	0		System Reserved !	
160	4		X-axis,Encoder pulse multiplicationfactor,1,2,or 4	
161	4		Y-axis,Encoder pulse multiplicationfactor,1,2,or 4	
162	4		Z-axis,Encoder pulse multiplicationfactor,1,2,or 4	
163	4		A-axis,Encoder pulse multiplicationfactor,1,2,or 4	
164	4		System Reserved !	
165	4		System Reserved !	
166	100	msec	G00 Linear accel./decel. Time, 4~512	
167	100	msec	G01 Linear accel./decel. Time, 4~1024	
168	38400		RS232 Baud rate, 38400, 19200 / EVEN /2 Bit	
169	0		Current counter (M02, M30, M99)	
170	0		Counter limit (Max 9,999,999)	
171	9999999	mm	X-axis, Software OT limit, (+) direction	
172	9999999	mm	Y-axis, Software OT limit, (+) direction	
173	9999999	mm	Z-axis, Software OT limit, (+) direction	
174	9999999	mm	A-axis, Software OT limit, (+) direction	
175	9999999	mm	System Reserved !	
176	9999999	mm	System Reserved !	
177	-9999999	mm	X-axis, Software OT limit, (-) direction	
178	-9999999	mm	Y-axis, Software OT limit, (-) direction	
179	-9999999	mm	Z-axis, Software OT limit, (-) direction	
180	-9999999	mm	A-axis, Software OT limit, (-) direction	
181	-9999999	mm	System Reserved !	
182	-9999999	mm	System Reserved !	
183	0	mm	X-axis, HOME shift data	
184	0	mm	Y-axis, HOME shift data	
185	0	mm	Z-axis, HOME shift data	
186	0	mm	A-axis, HOME shift data	

MCM No.	Factory Default Setting	Unit	Description	Setting
187	0	mm	System Reserved !	
188	0	mm	System Reserved !	
189			System Reserved !	
190	0		X-axis, Cycle clearing w/ M02, M30, M99	
191	0		Y-axis, Cycle clearing w/ M02, M30, M99	
192	0		Z-axis, Cycle clearing w/ M02, M30, M99	
193	0		A-axis, Cycle clearing w/ M02, M30, M99	
194	0		System Reserved !	
195	0		System Reserved !	
196	1		X-axis,0=incrementalcoord.,1=absolute coordinate	
197	1		Y-axis,0=incrementalcoord.,1=absolute coordinate	
198	1		Z-axis,0=incrementalcoord.,1=absolute coordinate	
199	1		A-axis,0=incrementalcoord.,1=absolute coordinate	
200	1		System Reserved !	
201	1		System Reserved !	
202			System Reserved !	
215	0		Flag, R000~R199 to be saved when power off. 0=No, 256=Yes	
222	0		Motor Accel/Decel mode, 0=linear, 1="S" curve	
225	3000	rpm	Max. spindle rpm @ 10 volts	
226	100	msec	Time Setting for spindle acceleration	
231	0	0/1	X-axis,Home grid direction during HOME execution	
232	0	0/1	Y-axis,Home grid direction during HOME execution	
233	0	0/1	Z-axis,Home grid direction during HOME execution	
234	0	0/1	A-axis,Home grid direction during HOME execution	
235	0	0/1	System Reserved !	
236	0	0/1	System Reserved !	
238	64	ms	Set Acceleration/Deceleration Time for MPG (4~512)	
240	0		0=Metric mode, 1=inch mode	
241	100		X-axis, Denominator, MPG resolution calc.	
242	100		X-axis, Numerator, MPG resolution calc.	
243	100		Y-axis, Denominator, MPG resolution calc.	
244	100		Y-axis, Numerator, MPG resolution calc.	
245	100		Z-axis, Denominator, MPG resolution calc.	
246	100		Z-axis, Numerator, MPG resolution calc.	
247	100		A-axis, Denominator, MPG resolution calc.	
248	100		A-axis, Numerator, MPG resolution calc.	
259	3		Error in Circular Cutting, ideal value=1	

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		

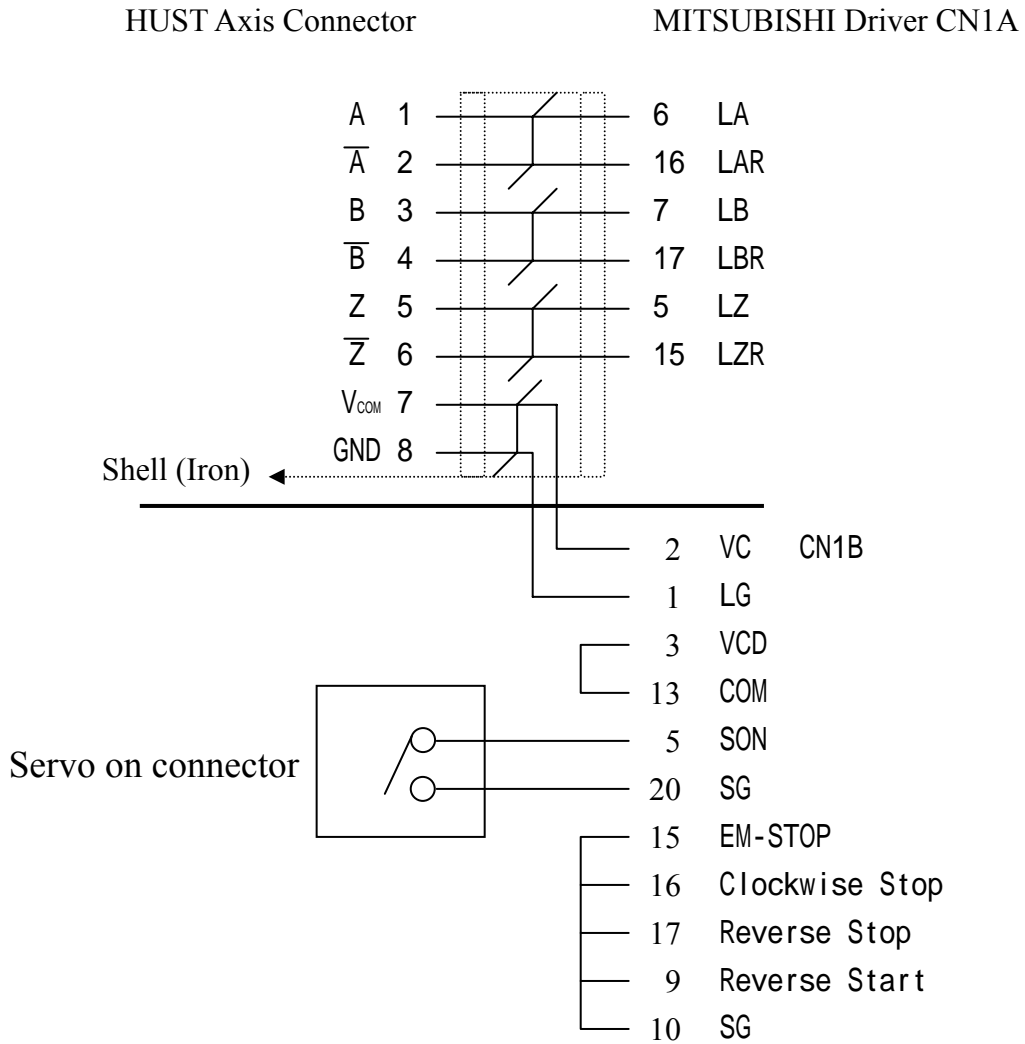
SANYO servo motor setting value (Voltage Command)

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)



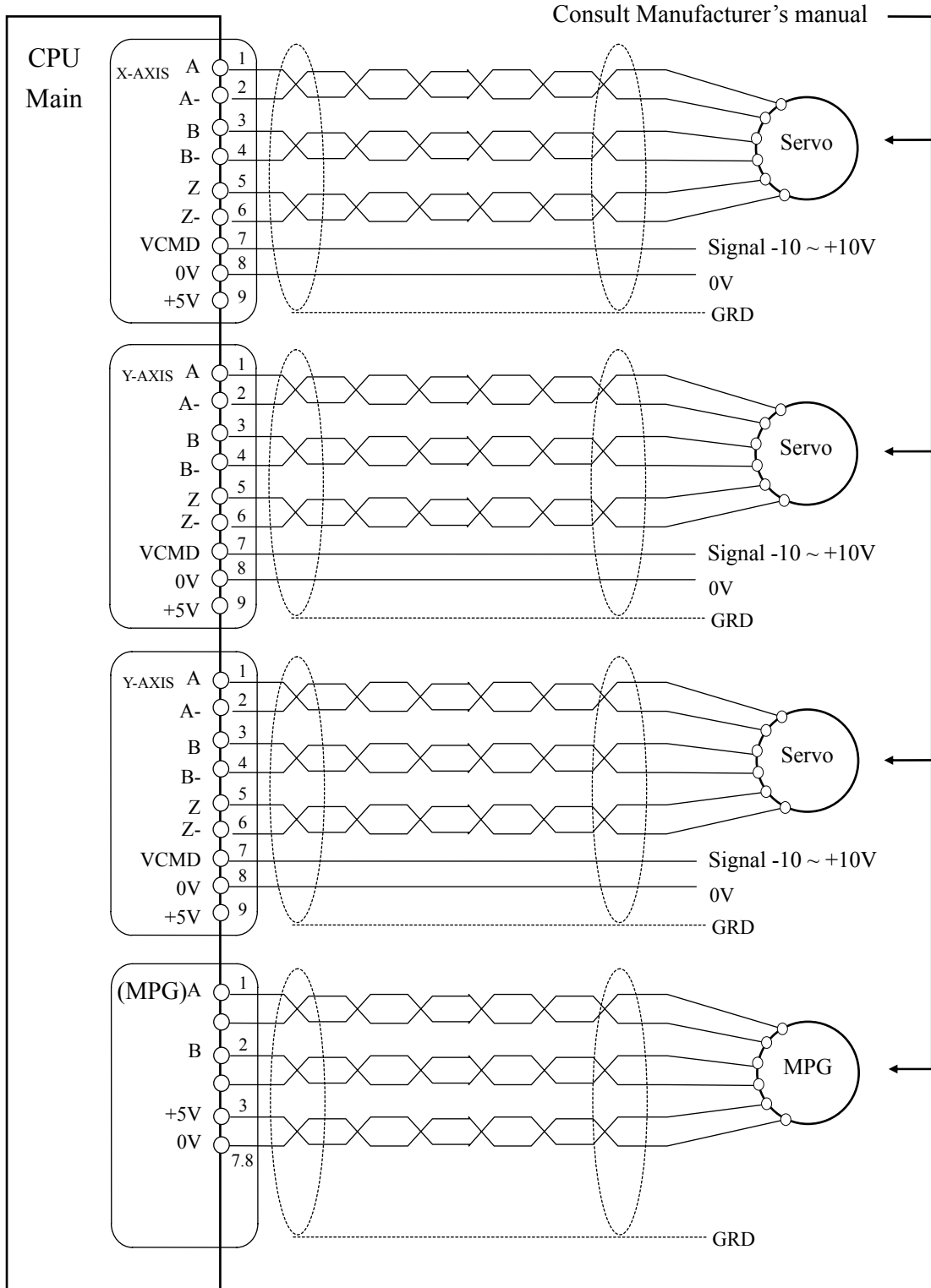
Driver MCM setting:

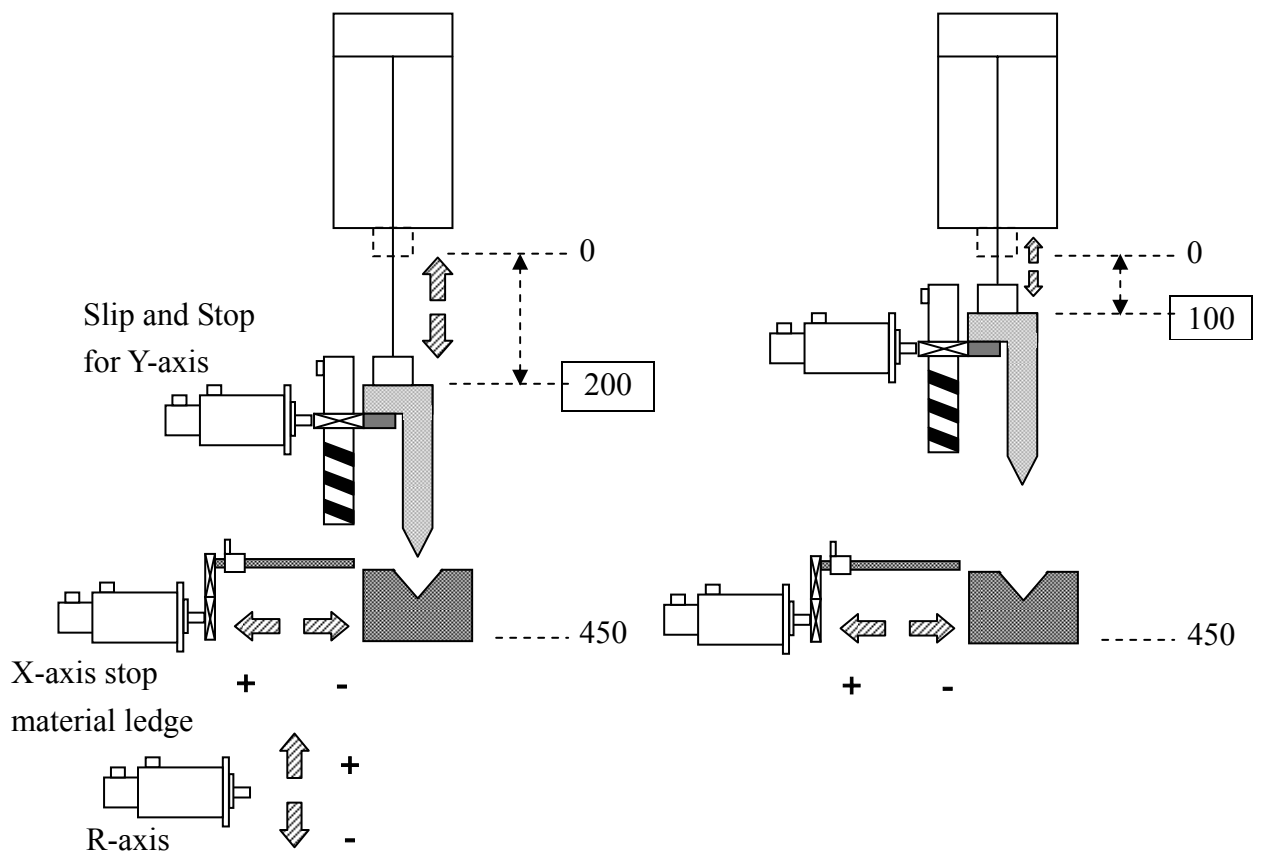
P00 = 0002

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.



EX 2. D-TYPE (Distance Type)

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

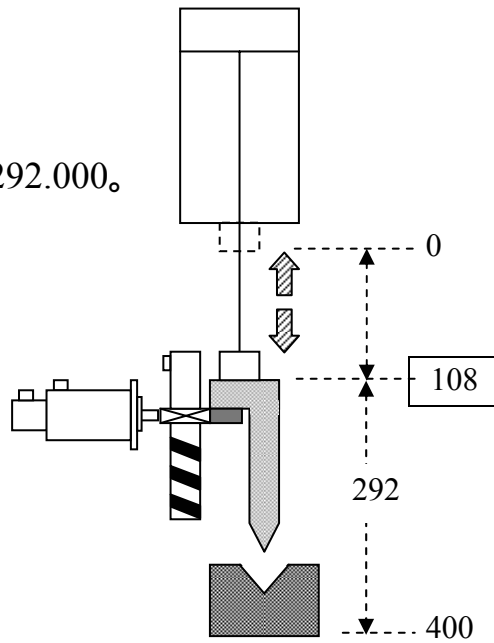
The value is shut Height or MOPM.

MOPM : Machine Opening Position Modul

- (5) Test if each axis' resolution is correct :
- Move the X-axis some distance and measure it if correct ; If not, please change the resolution.
 - 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 :
- Move the X-axis to the proper position for measuring easily.
 - In the condition that Basic parameter cipher code has been solved, there will be the **▣correct▣** function key.
 - Get in the correction displaying page and input actual measuring value.
 - 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.

$$400.000-108.000 = 292.000。$$



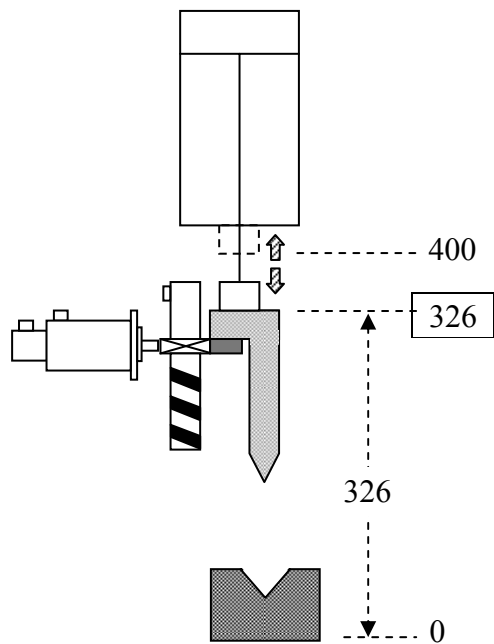
Way to ascertain the 『O-TYPE』 : Increase the value and the opening will getting big.

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



** 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

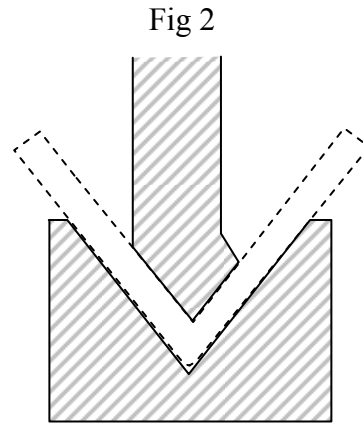
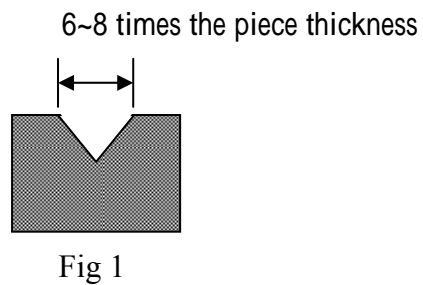
- a. D-axis adjust value. (Parameter page 3)
- b. Y- Opening default setting. (Parameter page 3)
- c. D-axis HOME limit setting. (Parameter page 3)
- d. The calculation of Y- opening default. (Parameter page 4)
- e. Input the value in the Edit、 FOLD and TYPE mode.
- f. Cα = Empty
- g. Gα = 0.000

(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)

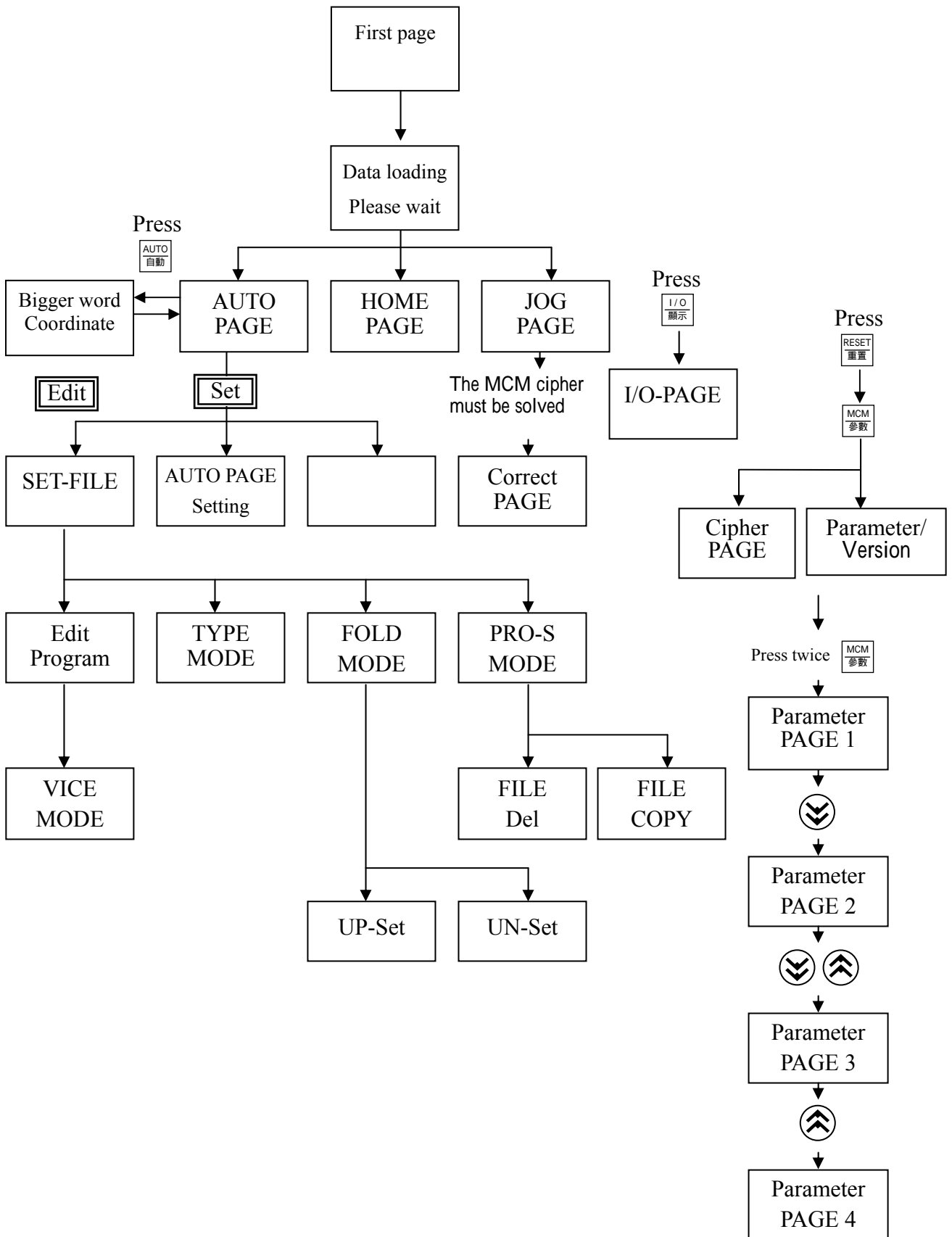
If the machine factory can not sure the 90 degree's position.

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



- (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.

H4CL-B LCD flow-process diagram



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 P Parameter page 2 is larger than the distance servo motor turning one round

EX :

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

then P 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 - .

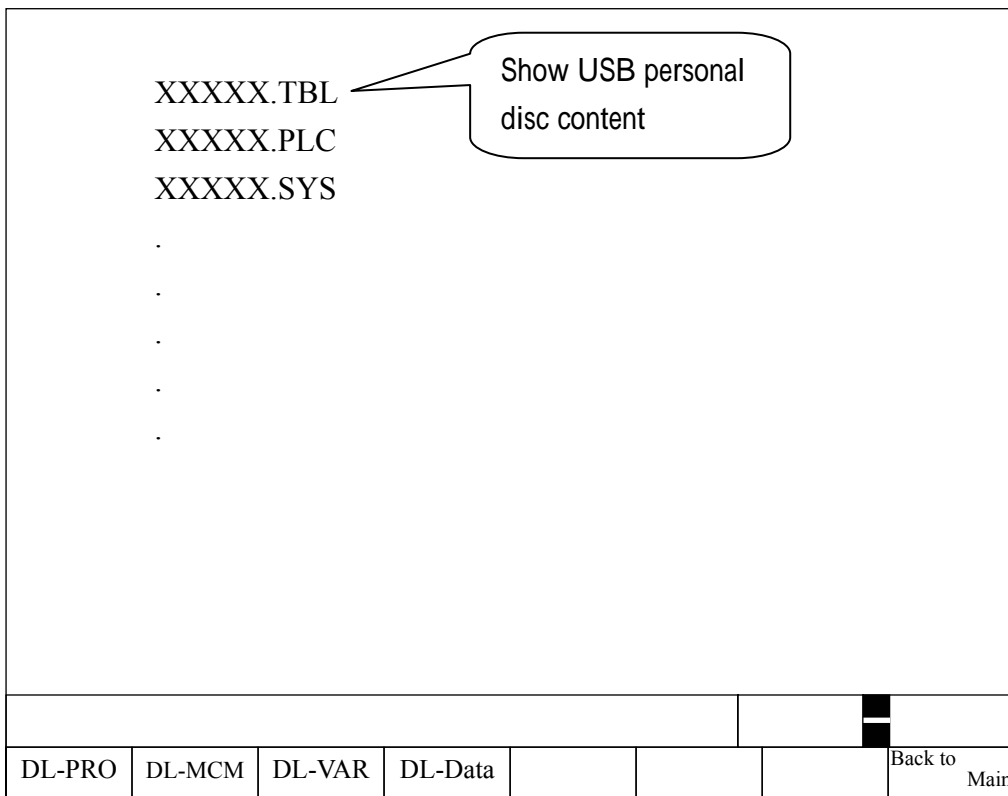
Recommended Remedy:

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.



- (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)

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

Input The distance seeing value of each angle here.

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

(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

(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→500		
			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	α	Vice	BL	C α	
00	0000.00	-000.00	000.00	00	0000	-00.00	
INS	DEL	V.MCM	BTO	F.Pro-S	GRAPH	Del Graph	Ret

Input real BL here

