LNC
Enable intelligent machines

LNC Lathe Series

Software Manual

2020/08 Version：V01.00 (LN4408110118)

Enable intelligent machines

寶元數控股份有限公司

LNC Technology Co., Ltd

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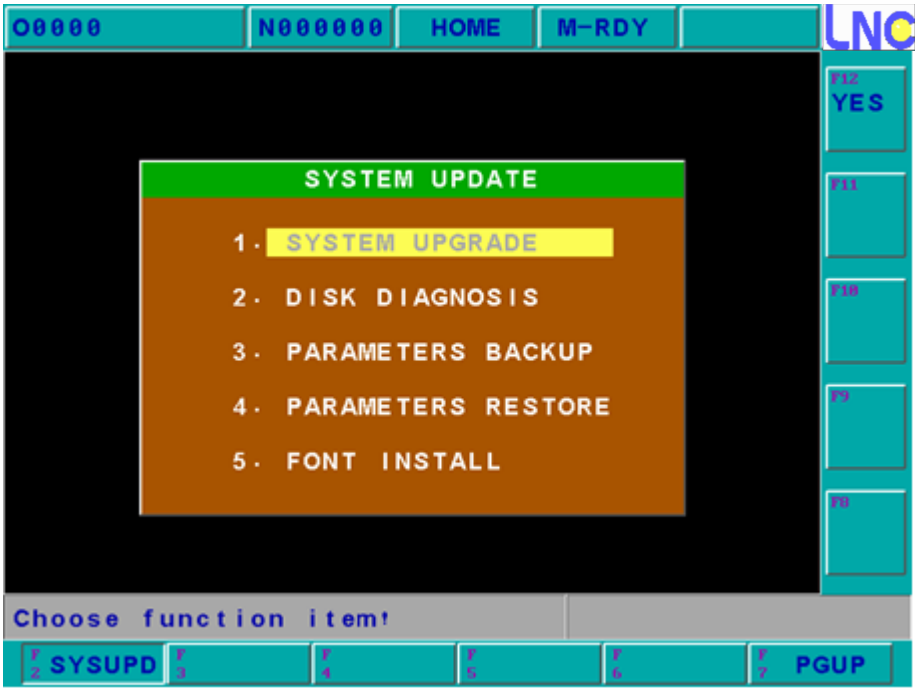
1 System Update

1.1 **Large Screen** (LNC-615i/600/520i/520HC/522HC/515i/516i/508A/518A…..)

This function can only be executed under incomplete preparation status “NO-RDY”, press **<EMG-STOP>** and press system update, below picture will be shown on the screen, users can choose each item to continue：

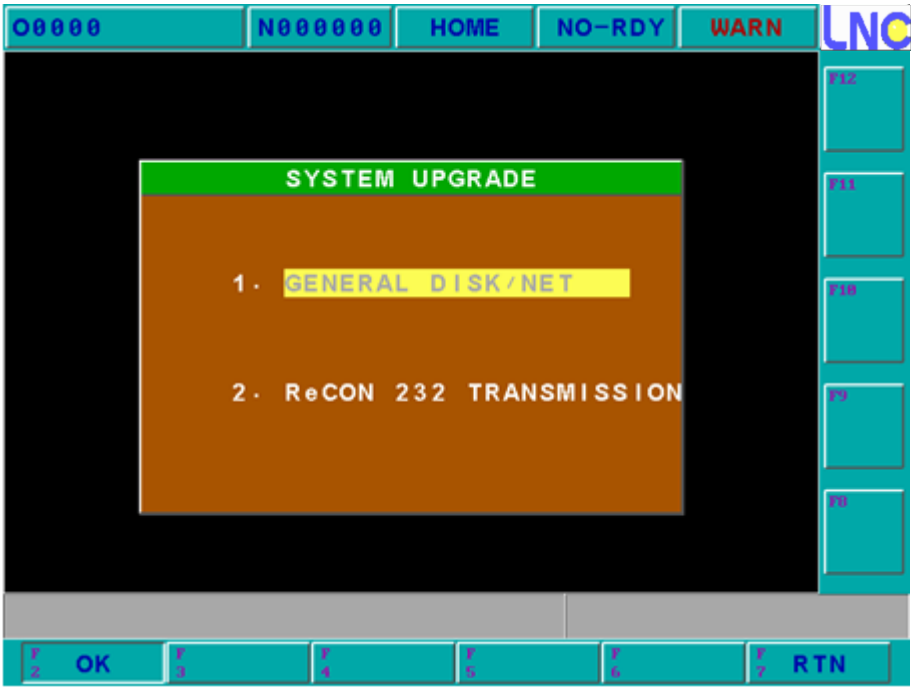
System Update Main Page



System Update：

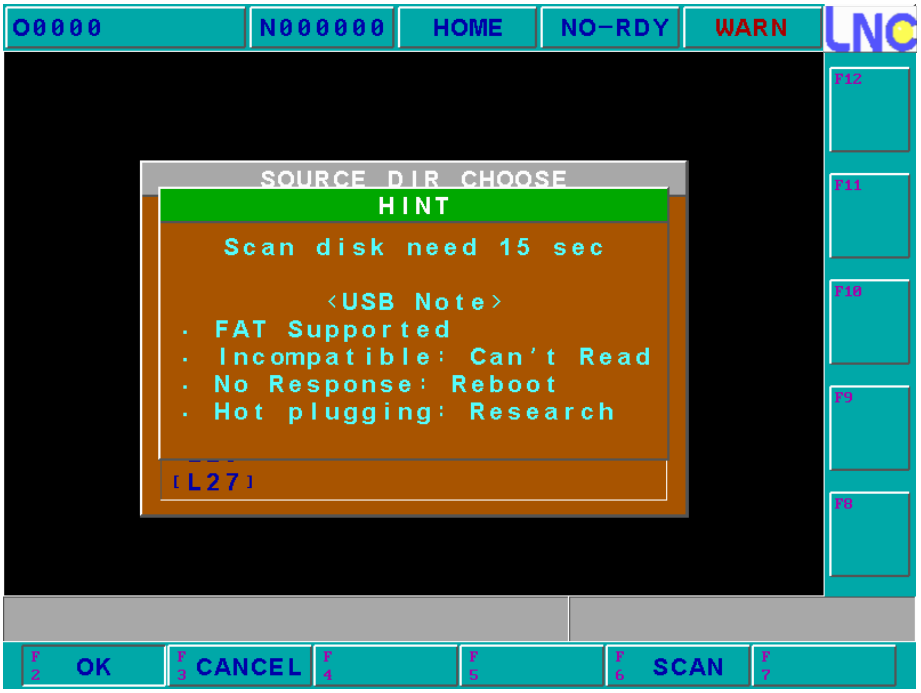
This system offers three ways for updating: general disk/Ethernet,RS232,and RECON connection transmission. If using RECON connection method to upgrade, you could directly using the RECON Maintenance at PC side. Please install LNC Technology Co., Ltd. latest version software if choosing this function. Pressing【YES】, the installation screen will occur. There is installation program instruction during installation so you only need to follow the instruction to upgrade the system. There are instructions steps below for updating by General Disk/Ethernet & RS232:

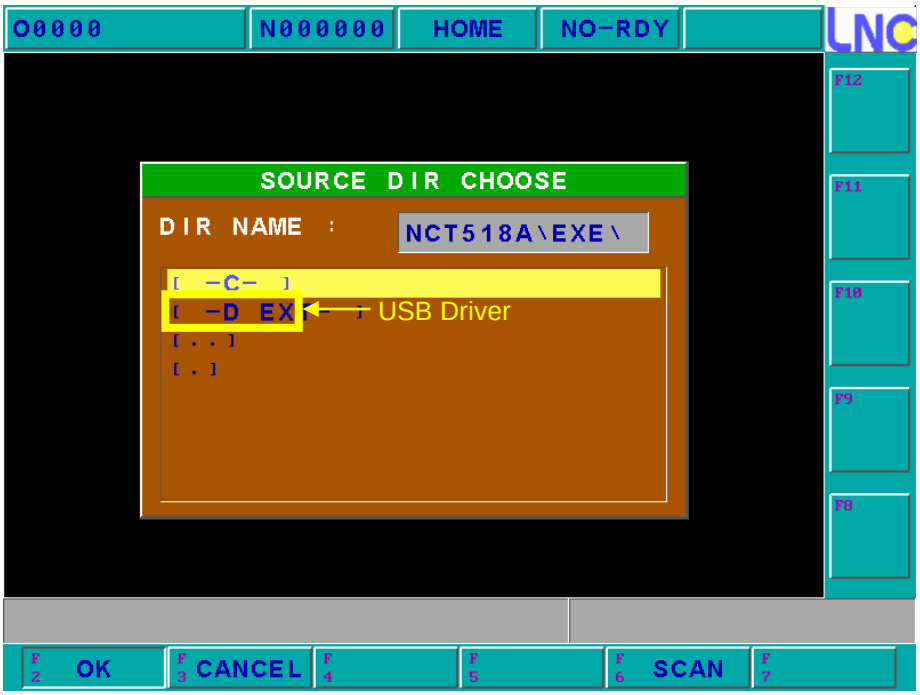
1. Enter the system.
2. Press DGNOS key at the screen right side; please switch page into diagnosis group after getting into the system.
3. Press 【EMG Stop】Switch
4. Press System Upgrade Function Key
5. Move the cursor to 【1. System Upgrade】 selection and after press OK, there will be a dialogue box pop up to ask the user to select upgrading method. If your upgrading files soures are from disk or other computers on the net, please select " General Disk / NET"; If the source is from another commnunication cable from other computer, please select "RECON RS232 Transmission"



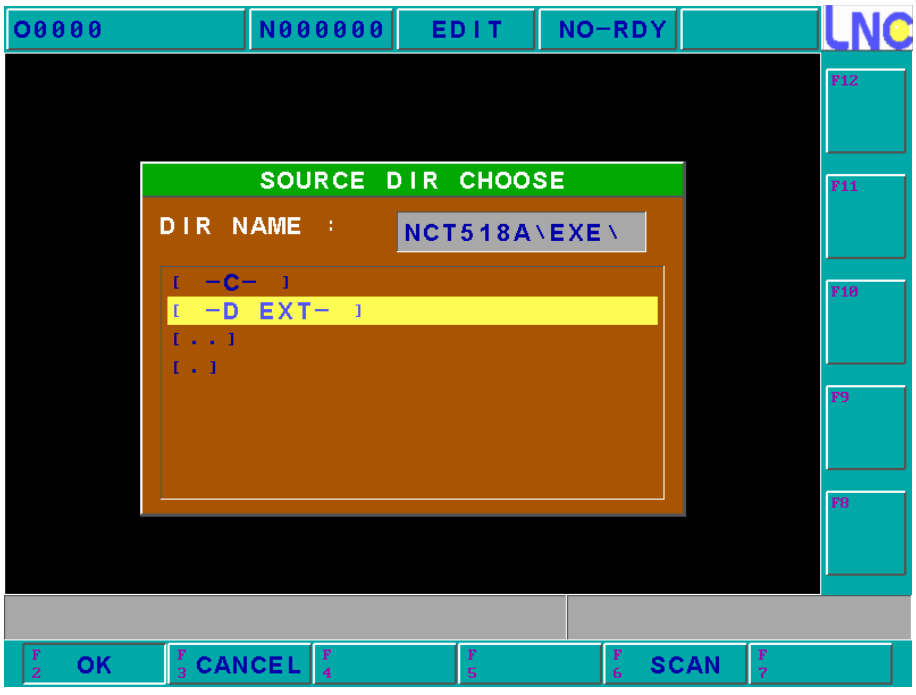
1. Select “ General Disk / NET ” display as below:

2. If you select USB to upgrade but you could not see the USB driver to select, at this time, you could press “ Search” to search for USB driver which takes about 15 secs. See illustration below:

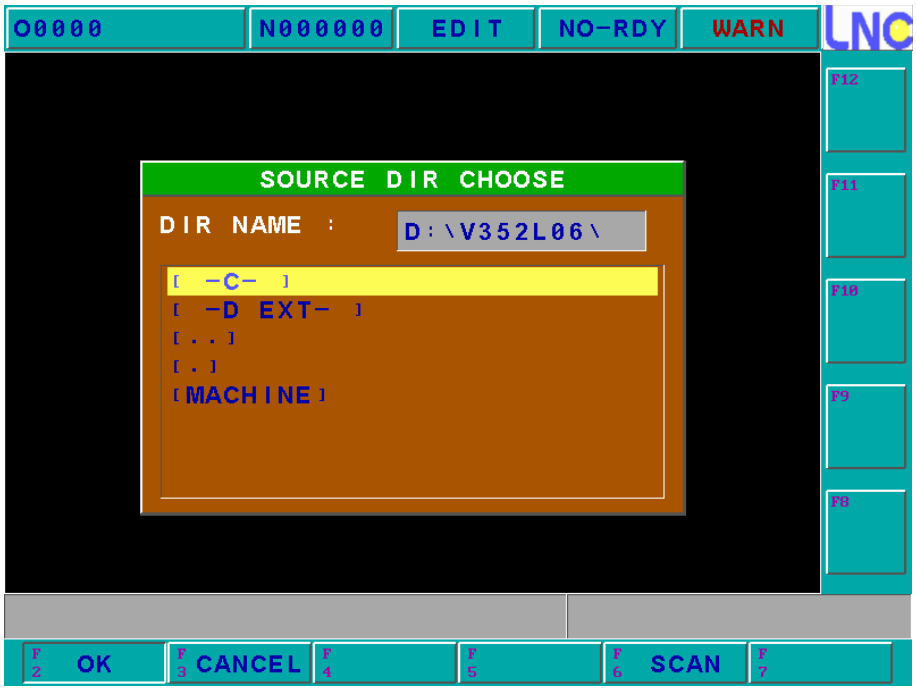




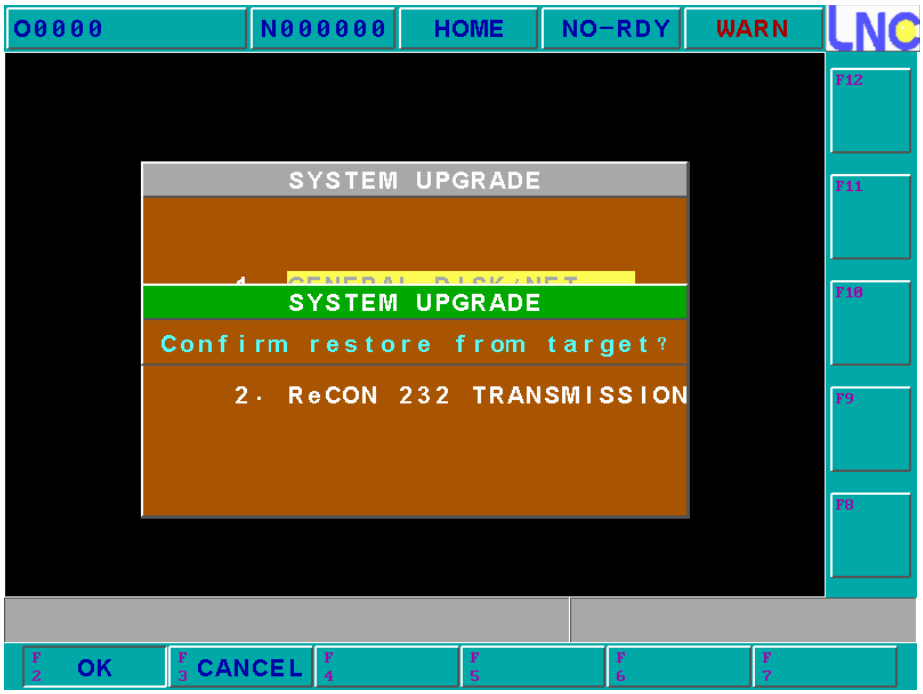
3. Please press Up/Down key to move the cursor and select the soruce path and then press “OK” key at the bottom. Kindly pay attention that finally the cursor should stop at the input line, and then you could press “OK” key and execute next step. The display illustrates as below:




O0000
N000000
EDIT
NO-RDY
WARN
LNC
F12
F11
F10
F9
F8
SOURCE DIR CHOOSE
DIR NAME :
D:\
[-D EXT-]
[LNCT300]
[LNCT518A]
[V352011]
[V352L06]
[V353004]
[V353L27]
F2 OK
F3 CANCEL
F4
F5
F6 SCAN
F7

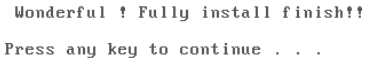

O0000
N000000
EDIT
NO-RDY
WARN
LNC
F12
F11
F10
F9
F8
SOURCE DIR CHOOSE
DIR NAME :
D:\V352L06\
[-C-]
[-D EXT-]
[..]
[.]
[MACHINE]
F2 OK
F3 CANCEL
F4
F5
F6 SCAN
F7


O0000
N000000
EDIT
NO-RDY
WARN
LNC
SOURCE DIR CHOOSE
DIR NAME :
D:\V352L06\
[-C-]
[-D EXT-]
[..]
[.]
[MACHINE]
F12
F11
F10
F9
F8
F2 OK
F3 CANCEL
F4
F5
F6 SCAN
F7


O0000
N000000
HOME
NO-RDY
WARN
LNC
SYSTEM UPGRADE
SYSTEM UPGRADE
Confirm restore from target?
2. ReCON 232 TRANSMISSION
F12
F11
F10
F9
F8
F2 OK
F3 CANCEL
F4
F5
F6
F7

4. Once again after you press【OK】 key, if the source path is correct, it will automatically pop out of the system and enter into another system installation display screen. Like Follow Illustrations:

5. Please make sure after the version making number, you must press Y to confirm the installation. If you don't want to install, you could press "N" to cancel. After confirming installation, the system will start installing programs until it finishes and displays as below illustrations.



6. After press "OK" key, the system will restart the controller itself and then get into the system.

1.2 Small Screen Series (LNC-320i/300i….)

This function can only be executed under EDIT mode and machine not ready. Press EMG STOP and then press**【System Upgrade】key, there will be system update display screen showing as below. Users can select one of the function items by pressing Up/Down key to select system upgrading item. After selecting, press【YES】key, the system will execute it.**

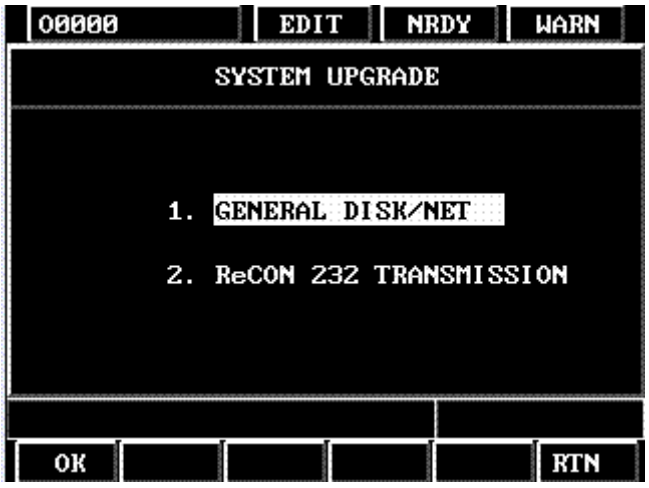
System Update Main Page

A. System Upgrade：

After selecting system upgrade, press**【OK】key, it will provide two kinds of upgrading methods.**

「1.GENERAL DISK/NET」：through NET or USB driver to upgrade.

「2. ReCON 232 TRANSMISSION」：through RS232 to upgrade.



Upgrading Selecting Display

Please follow your requirement to select the preferred method and press【OK】key.

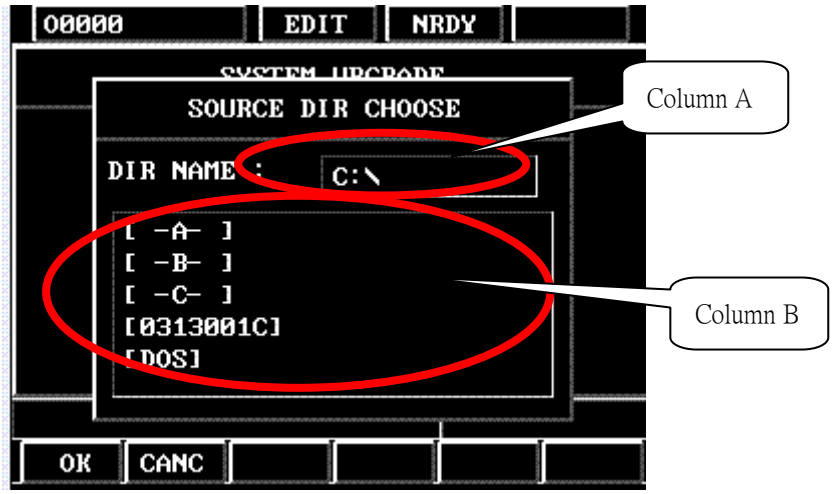
1. Use「1. GENERAL DISK/NET」Upgrading Illustration：

Select this method, system will pop up a window as follows to select file's source path.

While the cursor stops at this column B, you could use Up/Down key to select source path. This column is to display upgrading file source catalogue.

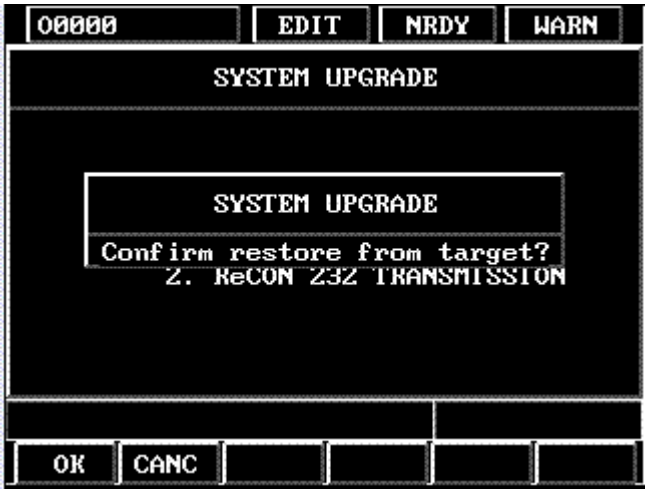
Secondly, you could use Left/Right key to make the cursor move to column A area. This column is to select upgrading file source catalogue which display content includes driver's code and content's name. Press Up/Down key and make the cursor to move to appointing content and then press【INPUT】key, at this time, column A will show the selecting path. And column B will show files under this path and all drivers codes.

After selecting source path, make the cursor move to column A position and then press【OK】key.



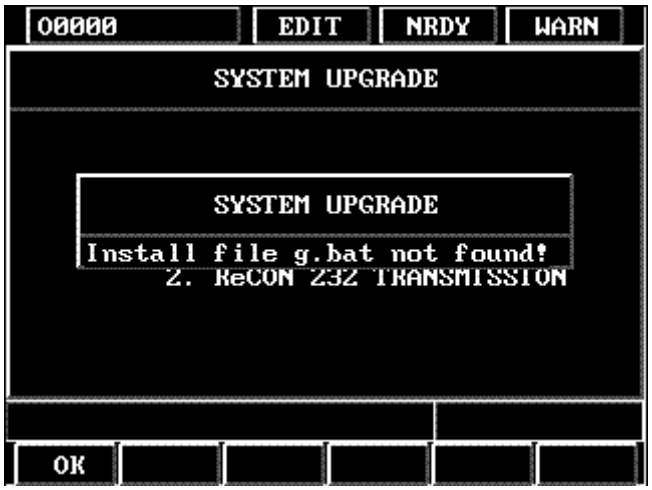
Upgrading Path Select Display

After selecting the path, system will pop up a window to ask again if you want to execute this upgrading from this path, if yes, please opress【OK】key.



Upgrading Path Confirmation Display

If there is appointing path error, the screen will display following error message.



Upgrading Path Error Hint Display

If source path is correct, it will pop out automatically and enter system installation screen display.

System Installation Illustration：

After leaving the system, you will see below display screen. It will display the software current version number that has already installed inside the CF card. If it is the first installation, it will show “Not install”, and is going to be installing software version number. If you don’t execute the system installation, just press ”N” and the controller will re-power on itself and enter to the system. If you want to execute system installation, press ”Y” and it will start installing the system, after finishing installing, the controller also will automatically re-power on itself and then enter into the system.

```
=====================================
WELCOME TO INSTALL LNC-M300 SERIES
=====================================
Current Version:
   Not install

Installing Version:
   M300i_VER_03.00.013U1

Are you sure to install?[Y,N]?
```

Illustration Screen Display Before Upgrading

2 PLC Maintenace -- C，S BITS & Register

Parameters for more than 4 Axis only for few models applications; if your system does not displays, pls ignore the parameters or C/S bits.

2.1 C Bits Definition

C BIT PLC→CNC

BIT #	SYMBOL	DESCRIPTION	PAGE
000	ST	CYCLE START	**20**
001	SP	FEED HOLD	**20**
003	PPROT	ENABLE PROGRAM PROTECTION	**20**
004	MANRET	ENABLE MANUAL RETURN	**20**
005	MWSWT	INPUT SIGNAL OF MEASURING WORKING PIECE COORDINATE MANUALLY	**20**
006	+X	SELECT AXIS & DIRECTION：＋X	**20**
007	-X	SELECT AXIS & DIRECTION：－X	**20**
008	+Y	SELECT AXIS & DIRECTION：＋Y	**20**
009	-Y	SELECT AXIS & DIRECTION：－Y	**20**
010	+Z	SELECT AXIS & DIRECTION：＋Z	**20**
011	-Z	SELECT AXIS & DIRECTION：－Z	**20**
012	+4	SELECT AXIS & DIRECTION：＋4^{th} AXIS	**20**
013	-4	SELECT AXIS & DIRECTION：－4th AXIS	**20**
014	MOFSIN	MANUALLY TOOL SHAPE OFFSET AMOUNT MEASURING MODE ENTERING SIGNAL	**21**
015	MWSRQ	MANUALLY MEASURING WORKING PIECES STATUS REQUEST	**24**
016	HX	MPG SELECT AXIS & DIRECTION：X AXIS	**24**
017	HY	MPG SELECT AXIS & DIRECTION：Y AXIS	**24**
018	HZ	MPG SELECT AXIS & DIRECTION：Z AXIS	**24**
019	H4	MPG SELECT AXIS & DIRECTION：4th AXIS	**24**
020	MPGDRN	ENABLE MPG DRY RUN	**24**
021	SCNSAV	STOP SCREEN SAVER MODE	**25**
022	CUTREL	CUTTING COMMAND RELEASE SIGNAL	**25**
023	RT	RAPID TRAVEL	**25**
024	SRVOFF	SERVO OFF	**25**
031	HOMEX	HOME DOG：X AXIS	**25**
032	HOMEY	HOME DOG：Y AXIS	**25**
033	HOMEZ	HOME DOG：Z AXIS	**25**
034	HOME4	HOME DOG：4TH AXIS	**25**
036	ESP	EMG STOP COMMAND	**25**
037	ERS	EXTERNAL RESET COMMAND	**25**
038	FIN	M、S、T CODE FINISH FEEDBACK SIGNAL	**26**
040	SBK	ENABLE SINGAL BLOCK	**26**
041	BDT	ENABLE OPTIONAL BLOCK SKIP	**26**
042	DRN	PROGRAM DRY RUN	**26**
043	MLK	MACHINE LOCK	**26**
044	OPS	M01 OPTIONAL STOP	**27**
045	ZNG	IGNORE SERVO AXIS：Z AXIS SERVO AXIS	**27**
046	AFL	M、S、T CODE IGNORE（AUXILIARY FUNCTION LOCK）	**27**
049	4NG	SERVO AXIS IGNORE SERVO AXIS：4TH AXIS	**27**
050	+LX	AXIS OVER TRAVEL：＋X	**27**

BIT #	SYMBOL	DESCRIPTION	PAGE
051	-LX	AXIS OVER TRAVEL：－X	**27**
052	+LY	AXIS OVER TRAVEL：＋Y	**27**
053	-LY	AXIS OVER TRAVEL：－Y	**27**
054	+LZ	AXIS OVER TRAVEL：＋Z	**27**
055	-LZ	AXIS OVER TRAVEL：－Z	**27**
056	+L4	AXIS OVER TRAVEL：＋4TH AXIS	**27**
057	-L4	AXIS OVER TRAVEL：－4TH AXIS	**27**
059	INTLKX	ENABLE INTERLOCK：X AXIS	**28**
060	INTLKY	ENABLE INTERLOCK：Y AXIS	**28**
061	INTLKZ	ENABLE INTERLOCK：Z AXIS	**28**
062	INTLK4	ENABLE INTERLOCK：4TH AXIS	**28**
064	WINRW	PLC Window READ/WRITE	**38**
065	WINREQ	PLC Window COMMAND	**38**
066	HIX	HANDLE INTERRUPT：X AXIS	**28**
067	HIY	HANDLE INTERRUPT：Y AXIS	**28**
068	HIZ	HANDLE INTERRUPT：Z AXIS	**28**
069	HI4	HANDLE INTERRUPT：4TH AXIS	**28**
072	S1JOG	1^{st} SPINDLE JOG	**29**
073	S2JOG	2^{nd} SPINDLE JOG	**29**
074	S3JOG	3^{RD} SPINDLE JOG	**29**
075	SVAX	SERVO ALARM：X AXIS	**29**
076	SVAY	SERVO ALARM：Y AXIS	**29**
077	SVAZ	SERVO ALARM：Z AXIS	**29**
078	SVA4	SERVO ALARM：4TH AXIS	**29**
079	PLCSFM	PLC FILE OPEN MODE	**29**
080	S3CW	3^{RD} SPINDLE CW SIGNAL	**30**
081	S3CCW	3^{RD} SPINDLE CCW SIGNAL	**30**
082	S1CW	1^{ST} SPINDLE CW SIGNAL	**30**
083	S1CCW	1^{ST} SPINDLE CCW SIGNAL	**30**
085	ORT	SPINDLE ORIENTATION	**30**
087	S2CW	2^{ND} SPINDLE CW SIGNAL	**30**
088	S2CCW	2^{ND} SPINDLE CCW SIGNAL	**30**
089	MRX	ENABLE MIRROR：X AXIS	**30**
090	MRY	ENABLE MIRROR：Y AXIS	**30**
091	MRZ	ENABLE MIRROR：Z AXIS	**30**
092	MR4	ENABLE MIRROR：4TH AXIS	**30**
095	SFPOS	SELECT SPINDLE HALF ORIENTATION MODE	**30**
097	S1GR1	1^{ST} SPINDLE 1^{ST} GEAR	**31**
098	S1GR2	1^{ST} SPINDLE 2^{ND} GEAR	**31**
099	S1GR3	1^{ST} SPINDLE 3^{RD} GEAR	**31**
100	UI0	MACROVariable$120	**31**
101	UI1	MACROVariable$121	**31**
102	UI2	MACROVariable$122	**31**
103	UI3	MACROVariable$123	**31**
104	UI4	MACROVariable$124	**31**
105	UI5	MACROVariable$125	**31**
106	UI6	MACROVariable$126	**31**
107	UI7	MACROVariable$127	**31**
108	UI8	MACROVariable$128	**31**
109	UI9	MACROVariable$129	**31**
110	UI10	MACROVariable$130	**31**
111	UI11	MACROVariable$131	**31**

BIT #	SYMBOL	DESCRIPTION	PAGE
112	UI12	MACROVariable$132	**31**
113	UI13	MACROVariable$133	**31**
114	UI14	MACROVariable$134	**31**
115	UI15	MACROVariable$135	**31**
116	S2GR1	2^{ND} SPINDLE 1^{ST} GEAR	**31**
117	S2GR2	2^{ND} SPINDLE 2^{ND} GEAR	**31**
118	S2GR3	2^{ND} SPINDLE 3^{RD} GEAR	**31**
119	ZP2ZDC	MOTION PROHIBITION FOR AREA BELOW THE 2^{ND} ZERO POINT OF Z AXIS	**32**
120	PMCGO	PMC AXIS COMMAND SIGNAL	**32**
121	S3GR1	3^{RD} SPINDLE 1^{ST} GEAR	**31**
122	S3GR2	3^{RD} SPINDLE 2^{ND} GEAR	**31**
123	S3GR3	3^{RD} SPINDLE 3^{RD} GEAR	**31**
125	RTST	RIGID TAPPING MODE ENTERING	**32**
128	+MIT1	MANUALLY TOOL SHAPE OFFSET MEASURE AXIS DIRECTION TOUCH SIGNAL：＋X	**21**
129	-MIT1	MANUALLY TOOL SHAPE OFFSET MEASURE AXIS DIRECTION TOUCH SIGNAL：－X	**21**
130	DTX	SERVO AXIS DETACH COMMAND：X AXIS	**32**
131	DTY	SERVO AXIS DETACH COMMAND：Y AXIS	**33**
132	DTZ	SERVO AXIS DETACH COMMAND：Z AXIS	**33**
133	DT4	SERVO AXIS DETACH COMMAND：4TH AXIS	**33**
134	PRTCLR	CLEAR PARTS COUNTING NUMBER	**33**
136	TCDE	LATHE THREAD CUTTING CYCLE: ENABLE RIGHT ANGLE APPROCH SIGNAL（CANCEL CHAMFERING APPROACH）	**33**
137	TCUE	LATHE THREAD CUTTING CYCLE: ENABLE RIGHT ANGLE DEPARTURE SIGNAL（CANCEL CHAMFERING DEPARTURE）	**33**
138	+MIT2	MANUALLY TOOL SHAPE OFFSET MEASURE AXIS DIRECTION TOUCH SIGNAL：＋Z	**21**
139	-MIT2	MANUALLY TOOL SHAPE OFFSET MEASURE AXIS DIRECTION TOUCH SIGNAL：－Z	**21**
140	2NDSLX	ENABLE 2ND SOFTWARE LIMIT：＋X	**33**
141	2NDSLX	ENABLE 2ND SOFTWARE LIMIT：－X	**33**
142	2NDSLY	ENABLE 2ND SOFTWARE LIMIT：＋Y	**33**
143	2NDSLY	ENABLE 2ND SOFTWARE LIMIT：－Y	**33**
144	2NDSLZ	ENABLE 2ND SOFTWARE LIMIT：＋Z	**33**
145	2NDSLZ	ENABLE 2ND SOFTWARE LIMIT：－Z	**33**
146	2NDSL4	ENABLE 2ND SOFTWARE LIMIT：＋4TH AXIS	**33**
147	2NDSL4	ENABLE 2ND SOFTWARE LIMIT：－4TH AXIS	**33**
172	UCLF1	1^{ST} SPINDLE RELEASE FINISH	**35**
173	CLF1	1^{ST} SPINDLE LOCK FINISH	**35**
174	DIAC4C	VERTICAL AXIS NOT AFFECTED BY LINEAR AXIS MOTION COMMAND	**36**
175	E1SNGA	ENABLE 1^{ST} PROHIBITED SOFTWARE LIMIT AREA FUNCTION	**37**
176	E2SNOA	ENABLE 2^{ND} PROHIBITED SOFTWARE LIMIT AREA FUNCTION	**37**
178	FPRS2	RPM REFER TO 2^{ND} SPINDLE	**37**
179	FPRS3	RPM REFER TO 3^{RD} SPINDLE	**37**
181	XINFH	HIDE SERVO AXIS: X AXIS	**37**
182	YINFH	HIDE SERVO AXIS: Y AXIS	**37**
183	ZINFH	HIDE SERVO AXIS: Z AXIS	**37**
184	4INFH	HIDE SERVO AXIS: 4^{TH} AXIS	**37**
201	AERSTX	ABSOLUTE ENCODER RESET READY SIGNAL：X AXIS	**37**
202	AERSTY	ABSOLUTE ENCODER RESET READY SIGNAL：Y AXIS	**37**

BIT #	SYMBOL	DESCRIPTION	PAGE
203	AERSTZ	ABSOLUTE ENCODER RESET READY SIGNAL：Z AXIS	**37**
204	AERST4	ABSOLUTE ENCODER RESET READY SIGNAL：4TH AXIS	**37**
207	AERDYX	ABSOLUTE ENCODER DATA READY SIGNAL：X AXIS	**37**
208	AERDYY	ABSOLUTE ENCODER DATA READY SIGNAL：Y AXIS	**37**
209	AERDYZ	ABSOLUTE ENCODER DATA READY SIGNAL：Z AXIS	**37**
210	AERDY4	ABSOLUTE ENCODER DATA READY SIGNAL：4TH AXIS	**37**
213	AEB0X	ABSOLUTE ENCODER DATABit 0TRANSMITTING SIGNAL：X AXIS	**38**
214	AEB0Y	ABSOLUTE ENCODER DATABit 0TRANSMITTING SIGNAL：Y AXIS	**38**
215	AEB0Z	ABSOLUTE ENCODER DATABit 0TRANSMITTING SIGNAL：Z AXIS	**38**
216	AEB04	ABSOLUTE ENCODER DATABit 0TRANSMITTING SIGNAL：4TH AXIS	**38**
219	AEB1X	ABSOLUTE ENCODER DATABit 1TRANSMITTING SIGNAL：X AXIS	**38**
220	AEB1Y	ABSOLUTE ENCODER DATABit 1TRANSMITTING SIGNAL：Y AXIS	**38**
221	AEB1Z	ABSOLUTE ENCODER DATABit 1TRANSMITTING SIGNAL：Z AXIS	**38**
222	AEB14	ABSOLUTE ENCODER DATABit 1TRANSMITTING SIGNAL：4TH AXIS	**38**
230	S2FB	SELECT 2ND SPINDLE ENCODER AS FEEDBACK SIGNAL SOURCE	**38**
231	S3FB	SELECT 3RD SPINDLE ENCODER AS FEEDBACK SIGNAL SOURCE	**38**
241	PMCNCX	X AXIS PMCOR NC SELECT SIGNAL	**38**
242	PCMNCY	Y AXIS PMCOR NC SELECT SIGNAL	**38**
243	PMCNCZ	Z AXIS PMCOR NC SELECT SIGNAL	**38**
244	PMCNC4	4TH AXIS PMCOR NC SELECT SIGNAL	**38**
253	SUCASX	X AXIS SERVO ABS COORDINATE UPDATING ACTIVATE	**38**
254	SUCASY	Y AXIS SERVO ABS COORDINATE UPDATING ACTIVATE	**38**
255	SUCASZ	Z AXIS SERVO ABS COORDINATE UPDATING ACTIVATE	**38**
256	SUCAS4	4TH AXIS SERVO ABS COORDINATE UPDATING ACTIVATE	**39**
259	SOSASX	X AXIS SERVO ABS HOME POSITION UPDATING ACTIVATE	**39**
260	SOSASY	Y AXIS SERVO ABS HOME POSITION UPDATING ACTIVATE	**39**
261	SOSASZ	Z AXIS SERVO ABS HOME POSITION UPDATING ACTIVATE	**39**
262	SOSAS4	4TH AXIS SERVO ABS HOME POSITION UPDATING ACTIVATE	**39**
265	PRMCX	X AXIS PLC RETURN MACHINE POSITION FUNCTION	**39**
266	PRMCY	Y AXIS PLC RETURN MACHINE POSITION FUNCTION	**39**
267	PRMCZ	Z AXIS PLC RETURN MACHINE POSITION FUNCTION	**39**
268	PRMC4	4TH AXIS PLC RETURN MACHINE POSITION FUNCTION	**39**
271	PSMCX	X AXISPLC SAVE MACHINE POSITION FUNCTION	**39**
272	PSMCY	Y AXIS PLC SAVE MACHINE POSITION FUNCTION	**39**
273	PSMCZ	Z AXIS PLC SAVE MACHINE POSITION FUNCTION	**39**
274	PSMC4	4TH AXIS PLC SAVE MACHINE POSITION FUNCTION	**39**

2.2 S Bits Definition

S BIT CNC→PLC

BIT #	SYMBOL	DESCRIPTION	PAGE
000	STL	CYCLE START	**40**
001	SPL	FEED HOLD	**40**
002	EDITL	MODE：EDIT	**40**
003	MEML	MODE：MEM	**40**
004	MDIL	MODE：MDI	**40**
005	JOGL	MODE：JOG	**40**
006	INCJOG	MODE：INC JOG	**40**
007	MPGL	MODE：MPG	**40**
008	HOMEL	MODE：HOME	**40**
010	MREADY	MACHINE READY	**40**
011	MDIPRS	MDI KEYS	**40**
016	ZP1X	X AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL	**40**
017	ZP1Y	Y AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL	**40**
018	ZP1Z	Z AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL	**40**
019	ZP14	4TH AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL	**40**
020	ZP2X	X AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL	**40**
021	ZP2Y	Y AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL	**40**
022	ZP2Z	Z AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL	**40**
023	ZP24	4TH AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL	**40**
028	WRN	SYSTEM WARNING	**41**
029	MF	M CODE STROBE(WHEN NC READ M CODE)	**41**
030	DEN	MOVING COMMAND INTERPOLATION FINISH	**41**
031	AL	SYSTEM ALARM	**41**
032	RST	SYSTEM RESET	**41**
033	NCRDY	SYSTEM READY	**41**
035	X1000	STATUS OF MPG RATE：x1000	**41**
036	X1	STATUS OF MPG RATE：x1	**41**
037	X10	STATUS OF MPG RATE：x10	**41**
038	X100	STATUS OF MPG RATE：x100	**41**
040	SBKL	STATUS OF SINGLE BLOCK	**41**
041	BDTL	STATUS OF OPTIONAL BLOCK SKIP	**42**
042	DRNL	STATUS OF DRY RUN	**42**
043	MLKL	STATUS OF MACHINE LOCK	**42**
044	OPSL	STATUS OF OPTIONAL STOP	**42**
045	RTL	STATUS OF RAPID TRAVERSE	**42**
046	ZNGL	STATUS OF Z-AXIS NEGLECT	**42**
047	AFLL	STATUS OF AUXILIARY FUNCTION LOCK (M,S,T CODE IGNORE)	**42**
052	S2ZSA	2^{ND} SPINDLE ZERO SPEED ARRIVAL CHECK	**46**
053	S2SA	2^{ND} SPINDLE SPEED ARRIVAL CHECK	**46**
054	S1STB	S CODE STROBE (WHEN NC READ S CODE)	**42**
055	S2STB	2^{ND} SPINDLE S CODE STROBE	**42**
056	S3STB	3^{RD} SPINDLE S CODE STROBE	**42**
057	S3ZSA	3^{RD} SPINDLE ZERO SPEED CHECKING	**46**
058	S3SA	3^{RD} SPINDLE RPM ARRIVAL CHECKING	**46**
061	SK2	SOFT KEY SIGNAL: Z-AXIS NEGLECT	**43**
062	SK3	SOFT KEY SIGNAL：MPG DRY RUN	**43**
063	SK4	SOFT KEY SIGNAL：M、S、T CODE NEGLECT（AUXILIARY FUNCTION LOCK）	**43**

BIT #	SYMBOL	DESCRIPTION	PAGE
067	SVOFF	Servo Off	**44**
068	MPGDRN	MPG DRY RUN	**44**
069	TSTB	T CODE STROBE (WHEN NC READ T CODE)	**44**
071	SK6	SOFT KEY SIGNAL：MACHINE LOCK	**44**
072	SK7	SOFT KEY SIGNAL：DRY RUN	**44**
073	SK8	SOFT KEY SIGNAL：OPTIONAL BLOCK SKIP	**45**
074	SK9	SOFT KEY SIGNAL：OPTIONAL STOP	**45**
079	PLCFN	PLC WINDOW COMPLETE	**45**
080	M00	M00 STROBE	**45**
081	M01	M01 STROBE	**45**
082	M02	M02 STROBE	**45**
083	M30	M30 STROBE	**45**
086	ORTFIN	SPINDLE ORIENTATION(INC. MACHINE TUNING) FINISH SIGNAL	**45**
088	S1SA	1^{ST} SPINDLE RPM ARRIVAL	**46**
091	G80	STATUS OF G080 IN CANNEL CYCLE	**46**
092	S1ZSA	THE 1ST SPINDLE REACHES ZERO SPEED	**46**
094	S1PLS	SPINDLE COMMAND FORMAT IS PULSE SIGNAL	**46**
095	SFPOSF	SPINDLE HALF FIXED ORIENTATION FINISH SIGNAL	**46**
096	UCLR1	1^{ST} SPINDLE RELEASE REQUEST SIGNAL	**46**
097	CLR1	1^{ST} SPINDLE LOCK REQUEST SIGNAL	**46**
100	UO0	MACROVariable$320	**46**
101	UO1	MACROVariable$321	**46**
102	UO2	MACROVariable$322	**46**
103	UO3	MACROVariable$323	**46**
104	UO4	MACROVariable$324	**46**
105	UO5	MACROVariable$325	**47**
106	UO6	MACROVariable$326	**47**
107	UO7	MACROVariable$327	**47**
108	UO8	MACROVariable$328	**47**
109	UO9	MACROVariable$329	**47**
110	UO10	MACROVariable$330	**47**
111	UO11	MACROVariable$331	**47**
112	UO12	MACROVariable$332	**47**
113	UO13	MACROVariable$333	**47**
114	UO14	MACROVariable$334	**47**
115	UO15	MACROVariable$335	**47**
120	PMCFIN	PMC AXIS FINISH SIGNAL	**47**
128	RTMODE	RIGID TAPPING MODE	**47**
130	MOVX	MOTION STATUS OF SERVO AXIS：X AXIS	**47**
131	MOVY	MOTION STATUS OF SERVO AXIS：Y AXIS	**47**
132	MOVZ	MOTION STATUS OF SERVO AXIS：Z AXIS	**47**
133	MOV4	MOTION STATUS OF SERVO AXIS：4TH AXIS	**47**
134	WPARV	MAX. WORKING PIECES ARRIVAL	**47**
141	FDSN1	1^{ST} FAN DETECTION SIGNAL	**48**
142	FDSN2	2^{ND} FAN DETECTION SIGNAL	**48**
154	MOVDX	MOTION DIRECTION OF SERVO AXIS：X AXIS	**48**
155	MOVDX	MOTION DIRECTION OF SERVO AXIS：Y AXIS	**48**
156	MOVDX	MOTION DIRECTION OF SERVO AXIS：Z AXIS	**48**
157	MOVDX	MOTION DIRECTION OF SERVO AXIS：4^{TH} AXIS	**48**
160	XEPE	X AXIS ENCODER WIRING ERROR	**48**
161	YEPE	Y AXIS ENCODER WIRING ERROR	**48**
162	ZEPE	Z AXIS ENCODER WIRING ERROR	**48**

BIT #	SYMBOL	DESCRIPTION	PAGE
163	4EPE	4TH AXIS ENCODER WIRING ERROR	**48**
175	MCI1GA	1ST SOFTWARE LIMIT FUNCTION FINISH SIGNAL	**48**
176	MCI2GA	2ND SOFTWARE LIMIT FUNCTION FINISH SIGNAL	**48**
182	RZSX	X AXISSERVO ABS HOME READY FINISH SIGNAL	**48**
183	RZSY	Y AXISSERVO ABS HOME READY FINISH SIGNAL	**48**
184	RZSZ	Z AXISSERVO ABS HOME READY FINISH SIGNAL	**48**
185	RZS4	4TH AXISSERVO ABS HOME READY FINISH SIGNAL	**48**
201	AETFX	ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：X AXIS	**48**
202	AETFY	ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：Y AXIS	**48**
203	AETFZ	ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：Z AXIS	**48**
204	AETF4	ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：4TH AXIS	**49**
207	AETFRX	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：X AXIS	**49**
208	AETFRY	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：Y AXIS	**49**
209	AETFRZ	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：Z AXIS	**49**
210	AETFR4	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：4TH AXIS	**49**
213	AERSTX	ABSOLUTE ENCODER RESET：X AXIS	**49**
214	AERSTY	ABSOLUTE ENCODER RESET：Y AXIS	**49**
215	AERSTZ	ABSOLUTE ENCODER RESET：Z AXIS	**49**
216	AERST4	ABSOLUTE ENCODER RESET：4TH AXIS	**49**
219	FUCASX	X AXIS SERVO ABS COORDINATE UPDATING COMPLETE	**49**
220	FUCASY	Y AXIS SERVO ABS COORDINATE UPDATING COMPLETE	**49**
221	FUCASZ	Z AXIS SERVO ABS COORDINATE UPDATING COMPLETE	**49**
222	FUCAS4	4TH AXIS SERVO ABS COORDINATE UPDATING COMPLETE	**49**
225	FOSASX	X AXIS SERVO ABS HOME UPDATING COMPLETE	**49**
226	FOSASY	Y AXIS SERVO ABS HOME UPDATING COMPLETE	**49**
227	FOSASZ	Z AXIS SERVO ABS HOME UPDATING COMPLETE	**49**
228	FOSAS4	4TH AXIS SERVO ABS HOME UPDATING COMPLETE	**49**
240	XSLA	X AXIS: Servo Lag ALARM	**49**
241	YSLA	Y AXIS: Servo Lag ALARM	**49**
242	ZSLA	Z AXIS: Servo Lag ALARM	**49**
243	4SLA	4TH AXIS: Servo Lag ALARM	**50**
246	XECOA	X AXIS: Error Counter Overflow ALARM	**50**
247	YECOA	Y AXIS: Error Counter Overflow ALARM	**50**
248	ZECOA	Z AXIS: Error Counter Overflow ALARM	**50**
249	4ECOA	4TH AXIS: Error Counter Overflow ALARM	**50**
265	PRMCFX	X AXISPLCRETURN MACHINE POSITION FUNCTION	**50**
266	PRMCFY	Y AXISPLCRETURN MACHINE POSITION FUNCTION	**50**
267	PRMCFZ	Z AXISPLCRETURN MACHINE POSITION FUNCTION	**50**
268	PRMCF4	4TH AXISPLCRETURN MACHINE POSITION FUNCTION	**50**
271	PSMCFX	X AXISPLCSAVE MACHINE POSITION FUNCTION	**50**
272	PSMCFY	Y AXISPLCSAVE MACHINE POSITION FUNCTION	**50**
273	PSMCFZ	Z AXISPLCSAVE MACHINE POSITION FUNCTION	**50**
274	PSMCF4	4TH AXISPLCSAVE MACHINE POSITION FUNCTION	**50**

2.3 REGISTER DIFINITION

REGISTER

NO	SYMBOL	DESCRIPTION	PAGE
001	M_CODE	M CODE	**51**
002	S_CODE	S CODE	**51**
003	T_CODE	T CODE	**51**
004	SPAS	ACTUAL SPINDLE RPM	**51**
005	S2_CODE	2ND SPINDLE RPM COMMAND	**51**
006	S2AS	2ND SPINDLE ACTUAL RPM	**51**
007	S3_CODE	3RD SPINDLE RPM COMMAND	**51**
008	S3AS	3RD SPINDLE ACTUAL RPM	**51**
012	TMNO	MANAUL TOOL SHAPE MEASUREMENT OFFSET NUMBER	**51**
013	OPMDOE	OP MODE SELECTION 1：EDIT，2：MEM，3：MDI，4：JOG，5：INCJOG，6：MPG，7：HOME	**52**
014	INCFED	MPG RATE 2：x10，3：x100，OTHERS：x1 INCREMENTAL JOG OVERRIDE 2：x10，3：x100，4：x1000，OTHERS：x1	**52**
015	SPDOV	SPINDLE RPM PERCENTAGE（OVERRIDE）SET VALUE 0 ~ 12 INDIVIDUALLY REPRESENTS 0% ~ 120%，OTHERS：SET VALUE * 0.01	**53**
016	FEEDOV	CUTTING FEEDRATE PERCENTAGE（OVERRIDE）SET VALUE 0 ~ 20INDIVIDUALLY REPRESENTS0% ~ 200%，OTHERS：SET VALUE * 0.001	**53**
017	JOGOV	JOG FEEDRATE PERCENTAGE（OVERRIDE）SET VALUE 0 ~ 20INDIVIDUALLY REPRESENTS0% ~ 200%，OTHERS：SET VALUE * 0.001	**54**
018	RTOV	RAPID TRAVERSE FEEDRATE PERCENTAGE（OVERRIDE）SET VALUE 0、1：F0，2：25%，3：50%，4：100%，OTHERS：SET VALUE * 0.01	**54**
019	S2OV	2ND SPINDLE RPM PERCENTAGE(OVERRIDE)	**53**
020	S3OV	3RD SPINDLE RPM PERCENTAGE(OVERRIDE)	**53**
021	PMCF	PMC AXIS FUNCTION FEEDRATE SET VALUE, UNIT：mm/min	**54**
022	PMCC	PMC AXIS FUNCTION CONTROL CODE	**55**
024	PMCXMM	MOTION COMMAND OF PMC AXIS：X AXIS，mm PART	**55**
025	PMCXUM	MOTION COMMAND OF PMC AXIS：X AXIS，um PART	**55**
026	PMCYMM	MOTION COMMAND OF PMC AXIS：Y AXIS，mm PART	**55**
027	PMCYUM	MOTION COMMAND OF PMC AXIS：Y AXIS，um PART	**55**
028	PMCZMM	MOTION COMMAND OF PMC AXIS：Z AXIS，mm PART	**55**
029	PMCZUM	MOTION COMMAND OF PMC AXIS：Z AXIS，um PART	**55**
030	PMC4MM	MOTION COMMAND OF PMC AXIS：4TH AXIS，mm PART	**55**
031	PMC4UM	MOTION COMMAND OF PMC AXIS：4TH AXIS，um PART	**55**
036	PRTOV	PMC AXIS RAPID POSITIONING FEEDRATE %	**55**
037	PFDOV	PMC AXIS CUTTING FEEDRATE %	**55**
040	OPMES1	PLC ALARM	**56**
041	OPMES2	PLC ALARM	**56**
042	OPMES3	PLC ALARM	**56**
043	OPMES4	PLC ALARM	**56**
044	OPMES5	PLC ALARM	**56**
045	OPMES6	PLC ALARM	**56**
046	HWSN1	HARDWARE NO.-1ST PART	**56**

NO	SYMBOL	DESCRIPTION	PAGE
047	HWSN2	HARDWARE NO.-2ND PART	**56**
048	HWSN3	HARDWARE NO.-3RD PART	**56**
050	MOTOC	MAX. ALLOWING CORNERING OFFSET VALUE (um)	**56**
058	FNIPLC	FILE NAME UNDER PLC FILE OPEN MODE	**56**
060	PLCFN	PLC WINDOW FUNCTION ITEM CODE	**56**
061	PLCSF1	PLC WINDOW FUNCTION SUB-ITEM CODE 1	**56**
062	PLCSF2	PLC WINDOW FUNCTION SUB-ITEM CODE 2	**56**
063	PLCD1	PLC WINDOWFUNCTION READ/WRITE VALUE 1	**56**
064	PLCD2	PLC WINDOWFUNCTION READ/WRITE VALUE 2	**56**
065	PLCD3	PLC WINDOWFUNCTION READ/WRITE VALUE 3	**56**
066	PLCD4	PLC WINDOWFUNCTION READ/WRITE VALUE 4	**56**
067	PLCD5	PLC WINDOWFUNCTION READ/WRITE VALUE 5	**56**
068	PLCD6	PLC WINDOWFUNCTION READ/WRITE VALUE 6	**56**
069	PLCD7	PLC WINDOWFUNCTION READ/WRITE VALUE 7	**56**
070	PLCD8	PLC WINDOWFUNCTION READ/WRITE VALUE 8	**56**
071	PLCD9	PLC WINDOWFUNCTION READ/WRITE VALUE 9	**56**
072	PLCD10	PLC WINDOWFUNCTION READ/WRITE VALUE 10	**56**
073	PLCD11	PLC WINDOWFUNCTION READ/WRITE VALUE 11	**56**
074	PLCD12	PLC WINDOWFUNCTION READ/WRITE VALUE 12	**56**
143	ICCV	INVERTER CURRENT CURRENT VALUE	**57**

2.4 C Bits Description

C Bit 000	Cycle Start

Description： In MEM or MDI mode, to set C000 from OFF to ON actuates the system to enter CYCLE START status. At the same time, the system will set S000 as ON to notify the ladder to turn on the cycle start light. If the system is at FEED HOLD or BLOCK STOP status, the system will make S001 to OFF to notify the ladder to turn off the feed hold light. However, C000 is not accepted by the system in the following conditions:

a. When the system is not under MEM or MDI mode.
b. When the system is at “NC NOT READY or “CYCLE START status.
c. When the system is having alarms.

C Bit 001	Feed Hold

Description： Assumed the system is at MEM or MDI mode and also under【NC Ready】conditions, while the C Bit 001 signal is ON,it will drive the system into【F-HOLD】 condition. Meanwhile, the system will set S BIT 000 signal to OFF in order to provide LADDER to turn off the CYCLE START LED;if make S BIT 001 as ON to enable LADDER to turn on FEED HOLD LED. However, please notice that this signal is disabled (ineffective) to PMC axis function.

C Bit 003	Program Protect

Description： While this signal is set as ON, programs editing is prohibited.

C Bit 004	Enable Manual Return

Description： Assumed NC is under MEM or MDI mode,if switching to JOG or MPG these manual modes during program executing and also manually moves the machine away from the original program interrupting position, at this time,users want to keep executing unfinished commands, there are two options below:

1. Manual Return: Moving the machine back to the original program interrupting position first and then continue to execute the unfinished commanding.
2. Directly to execute the unfinished commanding from the current position, but there will be an OFFSET amount of coordinate.

When C004 ON is to enable “Manual Return” function. Otherwise, Off means close.

C Bit 005	Input Signal of Measuring Working Piece Coordinatae Manually

Description： Users move tools under manual mode, and make the tool shape contact the face of working piece. We’re setting this signal as ON to notify NC executing working piece coordinate offset amount calculation and make the calculating result automatically fill into 00 coordinate system.

C Bit 006	SELECT AXIS & DIRECTION：＋X
C Bit 007	SELECT AXIS & DIRECTION：－X
C Bit 008	SELECT AXIS & DIRECTION：＋Y
C Bit 009	SELECT AXIS & DIRECTION：－Y
C Bit 010	SELECT AXIS & DIRECTION：＋Z
C Bit 011	SELECT AXIS & DIRECTION：－Z
C Bit 012	SELECT AXIS & DIRECTION：＋4TH AXIS
C Bit 013	SELECT AXIS & DIRECTION：－4TH AXIS

Description： These individual signals are the selection commanding of system corrosponding to axes. Under every type of mode,they have their own corresponding motion.

a. JOG Mode
When axis direction signal is ON, the system will send out moving commanding signal to the designated axis direction in JOG speed until the signal is OFF.

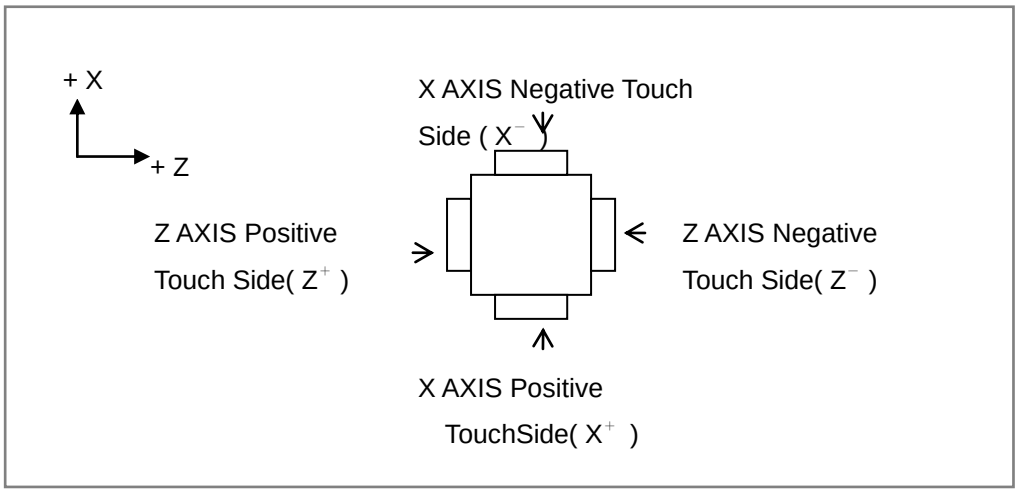
b. RAPID Mode
When axis direction signal is ON, the system will send out moving commanding signal to the designated axis direction in RAPID speed until the signal is OFF.

c. ZRN Mode (HOME)
When axis direction signal changes from OFF to ON, it will start moving back to execute HOME procedure.

C Bit 014	Manually Tool Shape Offset Amount Measuring Mode Entering Signal
C Bit 128	Manually Tool Shape Offset Amount Measuring Direction Touch Signal:+ X
C Bit 129	Manually Tool Shape Offset Amount Measuring Direction Touch Signal：－X
C Bit 138	Manually Tool Shape Offset Amount Measuring Direction Touch Signal：＋Z
C Bit 139	Manually Tool Shape Offset Amount Measuring Direction Touch Signal：－Z

Description：

Turning Machine Manually Measure Tool Length
Users could manually move tool to conact any side of Touch Sensor, once triggering touch signal, NC will automatically estimate tool shape offset amount and set the value into the indicated tool shape offset number and clear the wearing amount of this tool shape offset number.



Touch Sensor
Each axis all provides positive and negative direction of touch sides. Users could select touch side according to the tool shape. Find illustration as below:

X^+： Definition is touch signal of moving along with X AXIS positive direction.（X AXIS Coordinate Increasing Direction）
X^-： Definition is touch signal of moving along with X AXIS negative direction.（X AXIS Coordinate Decreasing Direction）
Z^+： Definition is touch signal of moving along with X AXIS positive direction.（X AXIS Coordinate Increasing Direction）
Z^-： Definition is touch signal of moving along with Z AXIS negative direction.（Z AXIS Coordinate Decreasing Direction）

C BIT 014：Manual tool shape offset amount mode entering signal. When NC is at JOG,MPG,RAPID and M-Ready Status, PLC could use C014 to be triggered (ON) to notify NC entering manual tool shape offset measuring mode. At this time, HMI screen “status” column will display【Tool Shape Measurement】, and automatically switch to tool【Shape Offset】page, users then can proceed manual tool shape offset amount measuring operation. Once NC gets into manual tool shape offset amount measurement mode, it will not accept any other signals from other modes.

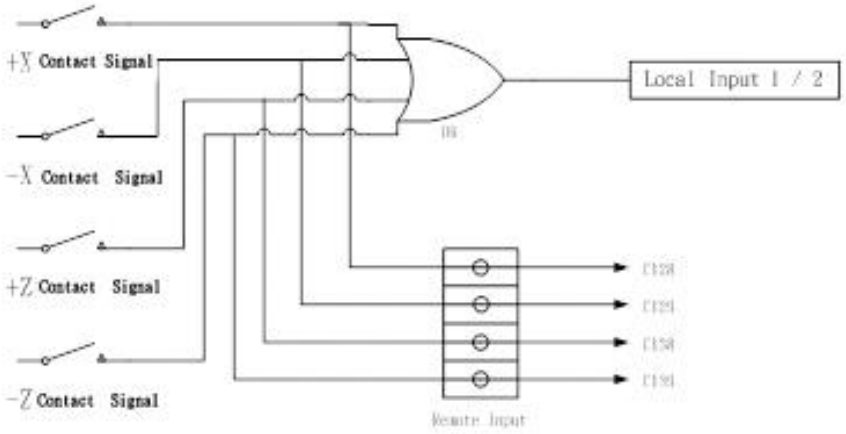
C BIT 128：X AXIS positive direction touch signal while manual tool shape offset amount measuring.

C BIT 129：X AXIS negative direction touch signal while manual tool shape offset amount measuring.

C BIT 138：Z AXIS positive direction touch signal . while manual tool shape offset amount measuring.

C BIT 139：Z AXIS negative direction touch signal while manual tool shape offset amount measuring..

Manual tool shape offset amount measuring Touch Sensor for each axis direction contact signal wiring digram, please refer to below illustration. The purpose of connecting to Local Input is to catch current machine position fast,which position could be the function of calculating later tool offset amount and pin each axis direction down. Afterwards, NC will start to read touch signal’s C bits of each axis direction in order to judge correct touch direction and release the pinned motion from the rest of the axis direction.Only by pinning down touch direction servo axis forward, this pinned motion will again to be released until the Touch Sensor contact signal disappears. For example, use manual function to make tool moving X positive direction, while moving forward, it will trigger X Axis positive touch signal so that the tool cannot moving to X positive direction any further; it can only move to X AXIS negative direction or other directions.



If NC is reading more than two touch direction signal C BITs at the same time or after receiving touch signal within one minute but still does not have any touch direction C BIT turn ON, this will trigger system alarm【MOT 4075 Touch Direction Reading Error】, meaning NC could not get correct touch direction C BIT, at this time, you should re-check Touch Sensor each direction’s touch signal and the PLC accuracy. While reading touch direction C BIT, it will be based on sending out upper edge signal C BIT first.

R Register 012：Manual Tool Shape Measuring Offset Number. Tool shape offset value from

manual tool shape offset value measuring calculation will directly write into 【Shape Offsets】 page cursor stops in the number so NC provides two kinds of deciding the cursor stops position of tool shape offset page methods.

Use P/No 0868 SET VALUE as default manual tool shape offset number. When P/No 0868 SET VALUE is not zero, it means the default manual tool shape offset number will be decided and set by this parameter value. Once getting into manual tool shape offset measuring mode, 【Shape Offset】page cursor will automatically move to the number that P/No 0868 sets; if you want to modify the offset number, you could directly use direction key to move tool shape offset page cursor and make it stop at the number which is going to do the offsetting.

PLC appointed manual tool shape offset number. When P/No 0868 SET VALUE as 0, it means manual tool shape offset number is decided by R012. Therefore, once you enter manual tool shape offset measurement mode,【Shape Offset】page cursor will move to R012 appointing number; if you want to modify the appointed umber, you cannot use direction keys to move the tool shape offset page cursor. You must use PLC to modify R012 value to make the cursor to move to the offset number you want.

Tool Shape Offset Amount Formula：

Tool Shape Measurement Offset Amount ＝ Machine Position While Touching － the Distance between Touching Surface and Machine Home Position

Xp：Distance from machine home position to detector X AXIS positive direction surface (P/No.1

Xm: Distance from machine home position to detector X AXIS negative direction surface (P/No.1161)

Zp：Distance from machine home position to detector Z AXIS positive direction surface (P/No.1162)

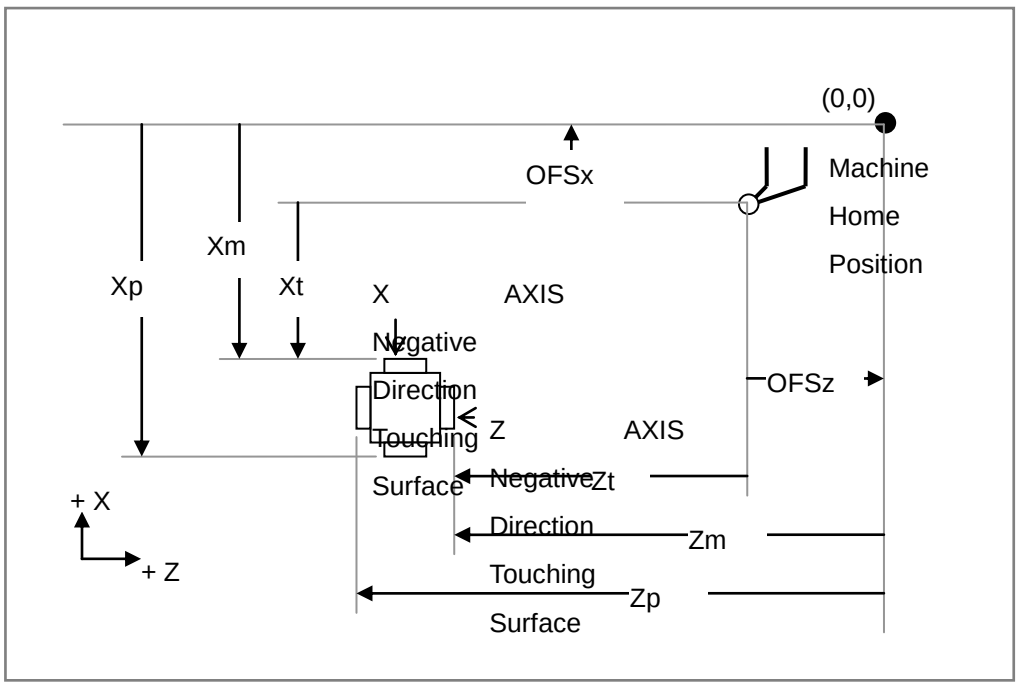
Zm：Distance from machine home position to detector Z AXIS negative direction surface (P/No.1163)

Xt：While tool is touching X AXIS negative surface, X AXIS direction gets machine coordinate.

Zt：While tool is touching Z AXIS negative surface, Z AXIS direction gets machine coordinate.

OFSx：X AXIST to tool shape measurement offset value，OFSx = Xt – Xm

OFSz：Z AXIS to tool shape measurement offset value，OFSz = Zt – Zm



C Bit 015	Manual Working Piece Coordinate Measurement Status Request

Description： While NC at manual mode, machine ready and no other status request, if PLC sends out "entering manual working piece coordinate measurement status request signal to make C15=ON ",then NC will automatically switch into "Coordinate Offset" and HMI status column will display "Coordinate Measurement". This means NC has accepted and entered manual working piece coordinate measurement status.

REMARK 1：After entering this status, cannot accept other status requests.

REMARK 2：While manual working piece coordinate measurement status request signal disappears (15=OFF), NC will leave manual working piece coordinate measurement status immidately and HMI's status column will get back to its original status.

C Bit 016	MPGSELECT AXIS & DIRECTION：X AXIS
C Bit 017	MPG SELECT AXIS & DIRECTION：Y AXIS
C Bit 018	MPG SELECT AXIS & DIRECTION：Z AXIS
C Bit 019	MPG SELECT AXIS & DIRECTION：4TH AXIS

Description： These signals are used under MPG mode, which are to indicate the present selecting servo axis. For example, if C BIT 016 signal is ON, it indicates that the present MPG axis direction is X axis. So, turning the MPG rotary Hx switch will moving the servo axis toward X axis.

C Bit 020	MPG Dry Run

Description： While NC at MEM or MDI mode, when this signal is ON, using MPG is considered as feedrate control; if you rotate MPG faster, the axis moves faster; if MPG stops, the moving will stop.

C Bit 021	Wake Up the Screen Saver Signal

Description： This signal is to be used by notifying the system(PLC) to stop screen saver mode and re-counting cycle start timing.

C Bit 022	Cutting Command Release Signal

Description： Using C bit 22 can restrict NC if it wants to proceed cutting or not, When this signal is ON, cutting G code is releasing. When this signal is OFF, cutting G code is retricted, cannot releasing.

Remark: P/No. 870 could enable this setting.

C Bit 023	Rapid

Description： While at JOG mode, If this signal is ON, feedrate becomes rapid speed, which is equal to RAPID mode. Therefore, while at HOME mode, please make this signal ON, too, so that you ccould do the homing fast.

C Bit 024	Servo Off (Cancel Servo Connection)

Description： While using mchanical MPG, enable this signal in order to notify the system to cancel servo connection.

C Bit 031	HOME DOG：X AXIS
C Bit 032	HOME DOG：Y AXIS
C Bit 033	HOME DOG：Z AXIS
C Bit 034	HOME DOG：4TH AXIS

Description： **To notify NC the present HOME DOG signal.**
Remark: When Parameter # 0175 is set 1 and when HOME DOG uses REMOTE key-in point, this signal will be effective.

C Bit 036	EMG Stop

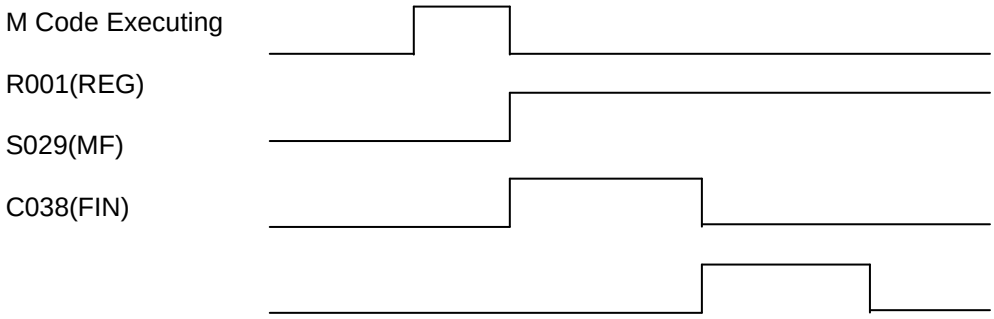
Description： **When this signal is ON, the system is in RESET condition and all motions stop, which means the system is at NOT READY status.**

C Bit 037	External Reset

Description： System outer RESET signal which is the same function as pressing RESET bottom.

C Bit 038 **M、S、T Code Finish Feedback Signal**

Description： While NC is at MEM or MDI mode, When the program executes M code interpretation, the content of M Code will be sent by R001. At the same time, it will send out M Code Read（S029）signal, when LADDER finishes executing the related M Code and replies it back to M，S，T Finish（C038）signal, the signal will inform the system that the executing of M code is completed. The correct sequence is as follows.



a. When executing M77, 77 will be filled in R00.
b. If M code and motion command are at the same BLOCK and you want M Code to execute after motion command is completed, then M code must coordinate with S030 command under LADDER control.
c. M00, M01, M02, M30, M98, M99 are not suitable for this application..

C Bit 040 **Single Block**

Description： If NC is under auto-executing condition at MEM mode and this signal is ON, the system will stop after a single BLOCK of program is finishing executing. At this time, the cycle start status signal S000 is OFF and the system status is BLOCK STOP.

C Bit 041 **Optional Block Skip**

Description： Assumed NC is in auto-executing of MEM mode and this signal is ON. If there is a such symbol, "／", in a program, any key-in after this symbol to EOB will be neglected.

C Bit 042 **Dry Run**

Description： Assumed NC is in MEM or MDI mode. If this signal is ON, feedrate commanded by program will be neglected and program executed under the below feedrate：

G00：When RT is ON = RAPID feed.
When RT is OFF =JOG feed.
G01：JOG feed.

C Bit 043 **Machine Lock**

Description： Assumed NC is under manual and auto modes, all moving command will NOT send to position control servo system. But, software interpolation value is still executing which means that the program coordinatea will still be renewed.

C Bit 044 **Optional Stop (M01)**

Description： If this signal is ON, the program execution meets M01, system will be paused and S000 signal is OFF. This implies that the system will continue executing programs after pressing Cycle Start (C000) bottom.

C Bit 045	Ignore Servo Axis：Z AXIS SERVO AXIS

Description： Assumed NC is in manual and auto modes. If this signal is ON, Z axis will be locked, which means that Z axis moving command will NOT be sent to loop control servo system. But, Z axis software interpolation value is still executing. So, program coordinate will be renewed.

C Bit 046	M、S、T Code Ignore（AUXILIARY FUNCTION LOCK）

Description： Assumed this signal is ON. When M, S and T codes are executing, content code and reading signal are not sending out which means not to execute M, S and T simultaneously. (Not send to PLC)

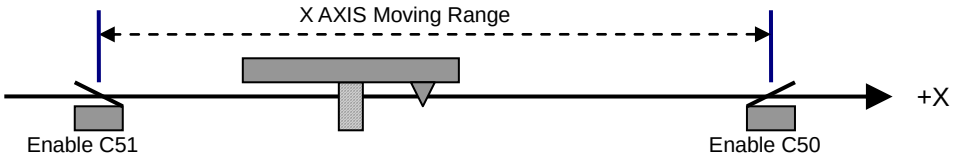
C Bit 049	Servo Axis Ignore Servo Axis：4TH AXIS

Description： When this signal is ON, the corresponding axis commanding will NOT be executed.
For example: Enable 4th axis neglect which means when executing part program G01 X10 Z10 C10, C10 commanding will be neglected.

C Bit 050	AXIS OVER TRAVEL：＋X
C Bit 051	AXIS OVER TRAVEL：－X
C Bit 052	AXIS OVER TRAVEL：＋Y
C Bit 053	AXIS OVER TRAVEL：－Y
C Bit 054	AXIS OVER TRAVEL：＋Z
C Bit 055	AXIS OVER TRAVEL：－Z
C Bit 056	AXIS OVER TRAVEL：＋4TH AXIS
C Bit 057	AXIS OVER TRAVEL：－4TH AXIS

Description： Each axis sends out the machine hardware over traveling signal in order to inform the system to display it. These C Bits are PLC travel limit signals for each axis. When these C BIT signals are on, the system alarm will be triggered. So the servo axis can only move toward the opposite direction. The following list is the definition for each C BIT:

C BIT	Purpose / Definition
50	X AXIS Positive PLC Travel Limit
51	X AXIS Negative PLC Travel Limit
52	Y AXIS Positive PLC Travel Limit
53	Y AXIS Negative PLC Travel Limit
54	Z AXIS Positive PLC Travel Limit
55	Z AXIS Negative PLC Travel Limit
5	4^{th} Axis Positive PLC Travel Limit
57	4^{th} Axis Negative PLC Travel Limit



Below lists are the alarms that triggers PLC Travel Limit.

Alarm No.（ ARNING ID）	Warning Message
OP 6001	X AXIS Over Positive PLC Travel Limit
OP 6002	X AXIS Over Negative PLC Travel Limit
OP 6003	Y AXIS Over Positive PLC Travel Limit
OP 60 4	Y AXIS Over Negative PLC Travel Limit
OP 6005	Z AXIS Over Positive PLC Travel Limit
OP 60	Z AXIS Over Negative PLC Travel Limit
OP 6007	4TH AXIS Over Positive PLC Travel Limit
OP 6008	4TH AXIS Over Negative PLC Travel Limit

Warning/Alarm Cancel:

After the above mentioned system warning message is triggered, need to wait until the servo moves toward the opposite direction, and the corresponding C BIT changes from ON to OFF; the warning message will be removed automatically.

In JOG/RAPID or MPG mode, if the system warning message (OP 6001 ～ OP 6008) of PLC travel limit occurs, it is okay not to remove the warning message and directly moving to the reverse direction away from where the warning message occurs. After getting away from the software limitation range, the warning message will be removed.

Under modes of MEM, MDI or HOME, if the system warning message (OP 6001 ～ OP 6008) of PLC travel limit occurs, OP will send out the warning message. In this case, users must press “RESET” to reset the system.

Alarm No.（ALARM ID）	Warning Message	Alarm Message
OP 1020	Over PLC Travel Limit	OVER PLC TRAVEL LIMIT

C Bit 059	**ENABLE INTERLOCK：X AXIS**
C Bit 060	**ENABLE INTERLOCK：Y AXIS**
C Bit 061	**ENABLE INTERLOCK：Z AXIS**
C Bit 062	**ENABLE INTERLOCK：4TH AXIS**

Description： When the corresponding axis is ON, the axis will NOT move. But, the coordinate value will be renewed.

C Bit 066	**HANDLE INTSELECT AXIS & DIRECTION：X AXIS**
C Bit 067	**HANDLE INTSELECT AXIS & DIRECTION：Y AXIS**
C Bit 068	**HANDLE INTSELECT AXIS & DIRECTION：Z AXIS**
C Bit 069	**HANDLE INTSELECT AXIS & DIRECTION：4TH AXIS**

Description： Assumed NC is under MEM mode. User can use Manual Handle Interrupt function to increase/decrease tool shifting amount in order to modify program path. However, before using this function, user must set Handle Interrupt axis selection signal and MPG ratio (R REGISTER 014). Then, user can use MPG to modify tool position. However, absolute coordinate will NOT

be modified by Handle Interrupt; there will be an OFFSET amount of the initial program path and afterward tool path. This OFFSET amount will be cleared only by using manual reference point return.

C Bit 072	**1st Spindle JOG**
C Bit 073	**2nd Spindle JOG**
C Bit 074	**3rd Spindle JOG**

Description： When C bit ON, controller can release original SP RPM command, switch to the JOG speed which defined by parameter. SP will not control by Override during C bit ON, if C bit OFF, it comes to normal.

SP	Related parameter
1st SP	P 1121
2nd SP	P 1076
3rd SP	P 1077

C Bit 075	**SERVO ALARM：X AXIS**
C Bit 076	**SERVO ALARM：Y AXIS**
C Bit 077	**SERVO ALARM：Z AXIS**
C Bit 078	**SERVO ALARM：4TH AXIS**

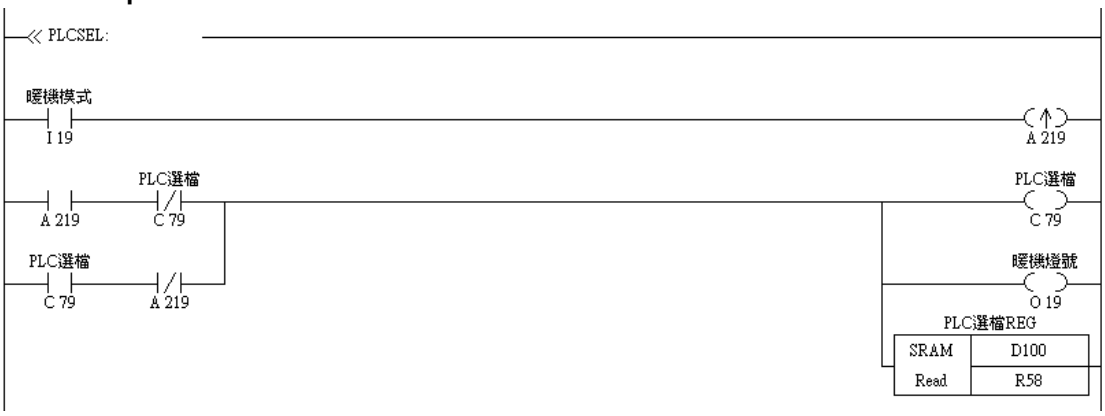
Description： This signal will notify system if motor driver of any axis has any extraordinary phenomenon.

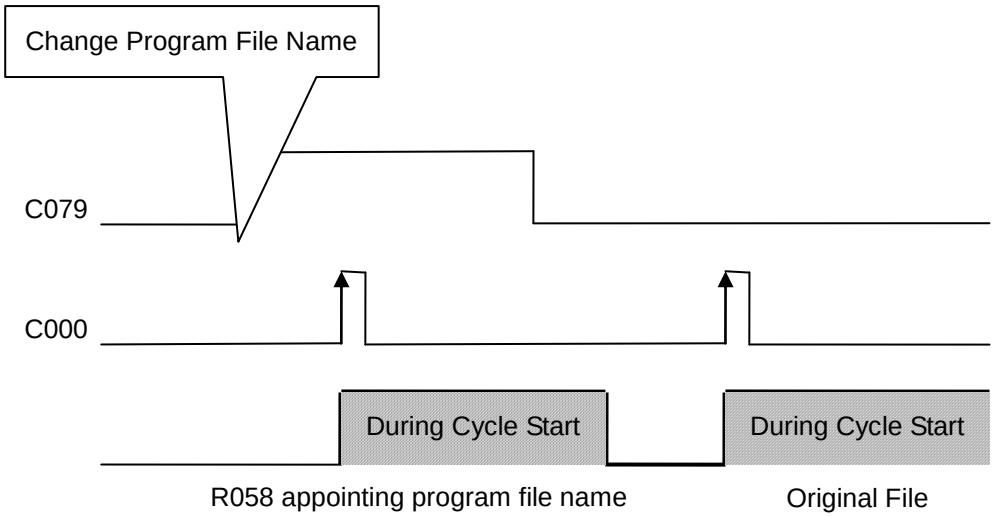
C Bit 079	**PLC File Open Mode**

Description： Steps:

1. Under『Machine Ready』status，while C079 = ON, NC will enter PLC file open mode.
2. C079 upper edge signal triggers NC, from R058 taking PLC open file name（File Name should be 'O' + R058 the four digits in the back will be combinded by numbers. Ex: Oxxxx）
3. Afterwards triggering cycle start signal C000, the system will then use R058 appointing file name to proceed the program.

PLC Example：





C Bit 080	**3rd Spindle CW**
C Bit 081	**3rd Spindle CCW**
C Bit 082	**1st Spindle CW**
C Bit 083	**1st Spindle CCW**
C Bit 087	**2nd Spindle CW**
C Bit 088	**2nd Spindle CCW**

Description： When C bit of clockwise is ON, it drives spindle rotating in clockwise direction.
When C bit of counter-clockwise is ON, it drives spindle rotating in counter-clockwise direction.
If the above two are both OFF, spindle stops rotating.
Remark 1：The above C bits are only effective in normal spindle speed control mode, which is spindle is running clockwise, counter-clockwise and stopping.
Remark 2：If the spindle CW and CCW are controlled by the inventor's CW and CCW connection point control, the above signals will only notify NC that the current spindle is in CW or CCW condition.

C Bit 085	**Spindle Orientation Command**

Description： This signal could be triggered when spindle orientation is decided by encoder JOG mode. The related parameters are # 0019, 1055, 1056. If orientation position does not falling within the setting value range , spindle will be re-orientated again.

C Bit 089	**ENABLE MIRROR：X AXIS**
C Bit 090	**ENABLE MIRROR：Y AXIS**
C Bit 091	**ENABLE MIRROR：Z AXIS**
C Bit 092	**ENABLE MIRROR：4TH AXIS**

Description： When mirror image signal is ON under Auto mode, this axis will be in reverse moving direction.

C Bit 095	**Select Spindle Half Orientation Mode**

Description： Turning machine half fixed type M code。

C Bit 097	**1st Spindle Gear #1**
C Bit 098	**1st Spindle Gear #2**
C Bit 099	**1st Spindle Gear #3**
C Bit 116	**2nd Spindle Gear #1**
C Bit 117	**2nd Spindle Gear #2**
C Bit 118	**2nd Spindle Gear #3**
C Bit 121	**3rd Spindle Gear #1**
C Bit 122	**3rd Spindle Gear #2**
C Bit 123	**3rd Spindle Gear #3**

Description： Setting the gear ratio between spindle motor and spindle. Every spindle provides 4sets of parameter # of gear ratio. The system default setting is to use the 4th set of gear ratio. If user wants to modify gear ratio for other sets, user can select the suitable gear ratio from each spindle's corresponding gear ratio C bit.

Spindle	Gear	C bit	# of Motor Tooth	# of Spindle Tooth
1st Spindle	1	C97=ON	Parameter # 0049	Parameter # 0050
	2	C98 ON	Parameter # 0051	Parameter # 0052
	3	C9 =ON	Parameter # 0178	Parameter # 0179
	4	C97,98,99=OFF	Parameter # 0181	Parameter # 0182
2nd Spindle	1	C116=ON	Parameter # 0664	Parameter # 0665
	2	C117=ON	Parameter # 0666	Parameter # 0667
	3	C118=ON	Parameter # 0668	Parameter # 0669
	4	C116,117,118=OFF	Parameter # 0670	Parameter # 0671
3rd Spindle	1	C12 =ON	Parameter # 0672	Parameter # 0673
	2	C122=ON	Parameter # 0674	Parameter # 0675
	3	C123=ON	Parameter # 0676	Parameter # 0677
	4	C121,122 123=OFF	Parameter # 0678	Parameter # 0679

C Bit 100	**MACROVariable$120**
C Bit 101	**MACROVariable$121**
C Bit 102	**MACROVariable$122**
C Bit 103	**MACROVariable$123**
C Bit 104	**MACROVariable$124**
C Bit 105	**MACROVariable$125**
C Bit 106	**MACROVariable$126**
C Bit 107	**MACROVariable$127**
C Bit 108	**MACROVariable$128**
C Bit 109	**MACROVariable$129**
C Bit 110	**MACROVariable$130**
C Bit 111	**MACROVariable$131**
C Bit 112	**MACROVariable$132**
C Bit 113	**MACROVariable$133**
C Bit 114	**MACROVariable$134**
C Bit 115	**MACROVariable$135**

Description： These signals are the same as the MACRO system variables $120~$135. They provide input points of MACRO for LADDER. Example: If set C100 to ON in LADDER, then $120 will be 1 in MACRO. These MACRO input point signals will provide order determination for MACRO.

C Bit 119	Motion Prohibition For Area Below the 2nd ZERO Point of Z Axis

Description： When this signal is ON, the local Z axis motion will be inhibited after the 2nd reference point. This signal is to protect tool exchanging and to prevent tool collusion after tool magazine moves toward left.

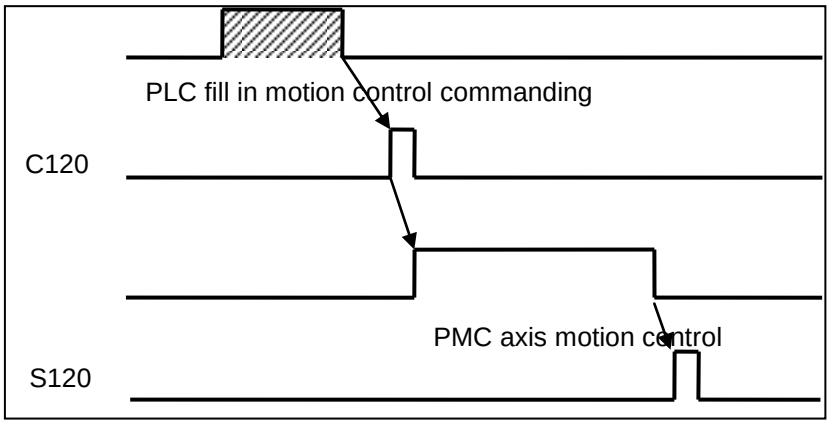
C Bit 120	PMC Axis Command Signal

Description： Get ready all information that PMC axis moving requires and set this signal to be ON to enable PMC axis moving.

Though PMC axis function, PLC could directly control any axis motion(including moving distance and feedrate), doesn't need to be through program command. Therefore, PLC could make servo turret, working plate,index table and other accessories control come true.

Before using PMC axis function, PLC must announce wanted axis to be PMC axis through C241 ~ C246. (Corrosponding to X、Y、Z). Once the axis has been announced to be PMC axis, this axis cannot proceed motion control through program command any more, or it will trigger system alarm MOT 4104 ~ 4109. On the contrary, axes not announced as PMC axis is called NC axis. PLC cannot proceed motion control through PMC axis function or it will trigger system alarm MOT 4104 ~ 4109. No matter the command is NC or PMC, the system only accept home return command under HOME mode.

After announcing the axis as PMC axis, PLC will make motion command from each axis fill in corresponding R Registers (R021 ~ R022、R024 ~ R035、R036 ~ R037), then use C120 to notify NC to enable PMC axis function. When NC finishes motion commands, S120 will notify PLC(this signal shall be put in the Level to and only maintain one scan time.) PMC axis function is only enabled(one shot) when C120's value from 0 to 1, and after enabling, it is at not effective status before finishing executing the commands. PLC sequence diagram is as follows:



C Bit 125	Rigid Tapping Mode Entering

Description： **Rigid tapping (M29). When this signal is on, Z axis moving amount will follow the spindle encoder's pulse amount. So user must use M28 to delete the signal when rigid tapping is done in order to prevent the system has any error motion happening.**

C Bit 130	SERVO AXIS DETACH COMMAND：X AXIS

C Bit 131	**SERVO AXIS DETACH COMMAND：Y AXIS**
C Bit 132	**SERVO AXIS DETACH COMMAND：Z AXIS**
C Bit 133	**SERVO AXIS DETACH COMMAND：4TH AXIS**

Description： When this signal is ON, it means this axis was detached. This signal is enabled and disable by M code.M code numbers could be customized by users.

C Bit 134	**Clear Parts Counting Number**

Description： When M02, M30, parameter 89 are the appointed M code,NC will add the working piece counting by 1. If the working piece number is larger than or equals to that of the maximum working piece setting, NC will send out S134 to notify PLC to do the corresponding action. When PLC sends out C 134, NC will clear the working piece number to zero.

C Bit 136	**Lathe Thread Cutting Cycle: Enable Right Angle Approch Signal (Cancel Chamfering Approach)**
C Bit 137	**Lathe Thread Cutting Cycle: Enable Right Angle Departure Signal (Cancel Chamfering Departure)**

Descrirption： While C136 = ON, enable lathe thread cutting cycle right angle approach function(cancel chamfering approach)，

While C137 = ON, enable lathe thread cutting cycle right angle departure function(cancel chamfering departure)，

C Bit 140	**ENABLE 2ND SOFTWARE LIMIT：＋X**
C Bit 141	**ENABLE 2ND SOFTWARE LIMIT：－X**
C Bit 142	**ENABLE 2ND SOFTWARE LIMIT：＋Y**
C Bit 143	**ENABLE 2ND SOFTWARE LIMIT：－Y**
C Bit 144	**ENABLE 2ND SOFTWARE LIMIT：＋Z**
C Bit 145	**ENABLE 2ND SOFTWARE LIMIT：－Z**
C Bit 146	**ENABLE 2ND SOFTWARE LIMIT：＋4TH AXIS**
C Bit 147	**ENABLE 2ND SOFTWARE LIMIT：－4TH AXIS**

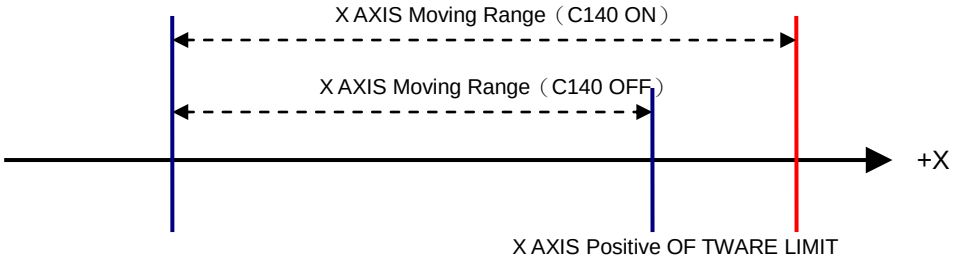
Description： 1st software limit: Using parameter 1006 ~ 1013 to set the limit. After executing zero return procedure, the parameter setting value will be enabled. The booting default value of positive direction is 99999.999mm and the booting default value of negative direction is -99999.999mm.

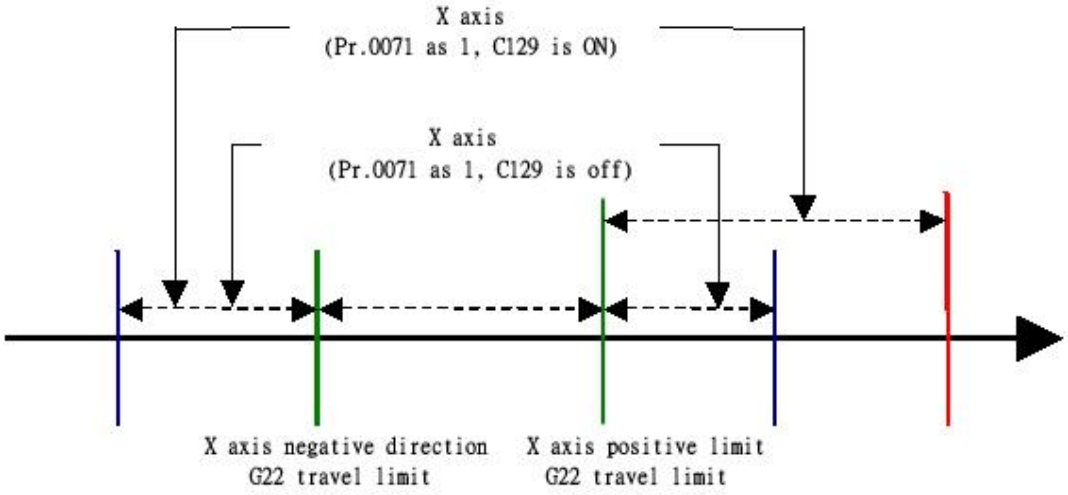
2nd software limit: Using parameter 1034 ~ 1041to set the limit. After executing zero return procedure, the parameter setting value will be enabled. The booting default value of positive direction is 99999.999mm and the booting default value of negative direction is -99999.999mm.

The corresponding C BIT of each axis can be s between switched with each other between the 1st software limit and the 2nd software limit. This means that only one set/combination can be enabled at one time within the limit of the 1st software limitation and the 2nd software limitation.

Software Limit	C BIT
X axis +ive direction software limit	C140： When OFF, use 1st software limit; When ON, using 2nd software limit.
X axis -ive direction software limit	C141： When OFF, use 1st software limit; When ON, using 2nd software limit.
Y axis +ive direction software limit	C142： When OFF, use 1st software limit; When ON, using 2nd software limit.

Y axis -ive direction software limit	C143：When OFF, use 1st software limit; When ON, using 2nd software limit.
Z axis +ive direction software limit	C144：When OFF, use 1st software limit; When ON, using 2nd software limit.
Z axis -ive direction software limit	C145：When OFF, use 1st software limit; When ON, using 2nd software limit.
4th axis +ive direction software limit	C146：When OFF, use 1st software limit; When ON, using 2nd software limi .
4th axis -ive direction software limit	C147：When OFF, use 1st software limit; When ON, using 2nd software limit.



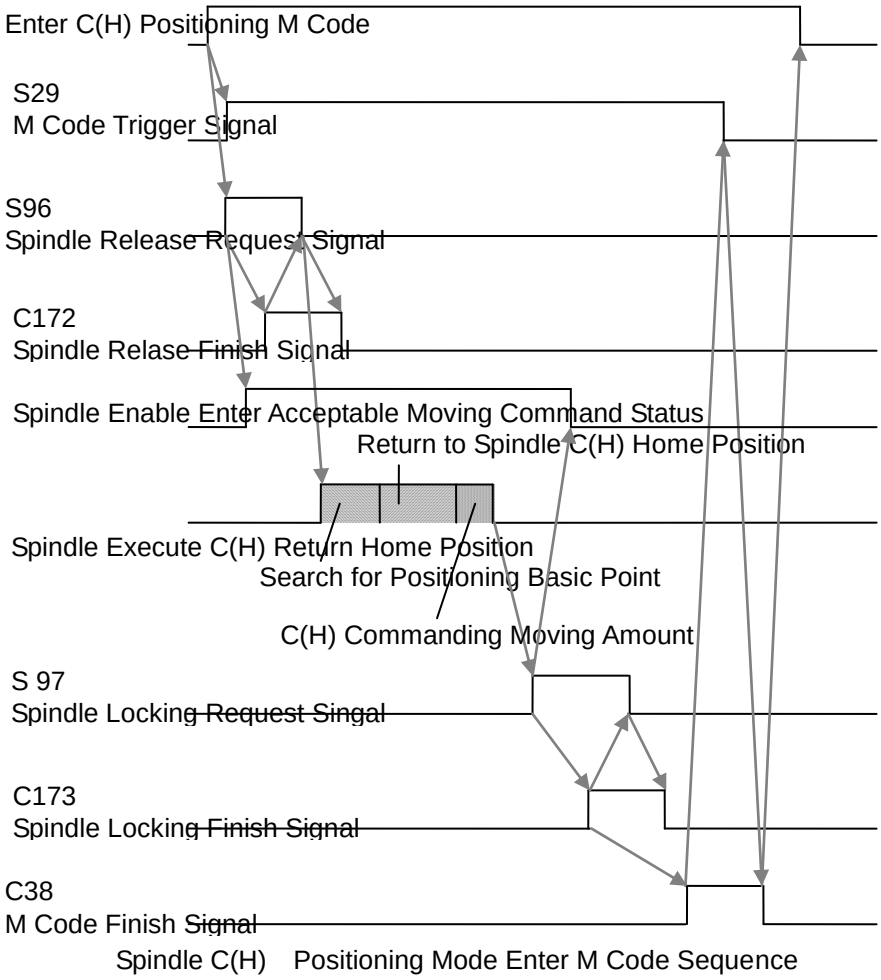


C Bit 172	1st Spindle Release Finish
C Bit 173	1st Spindle Lock Finish

Description： C 172、173 apply to CH positioning：

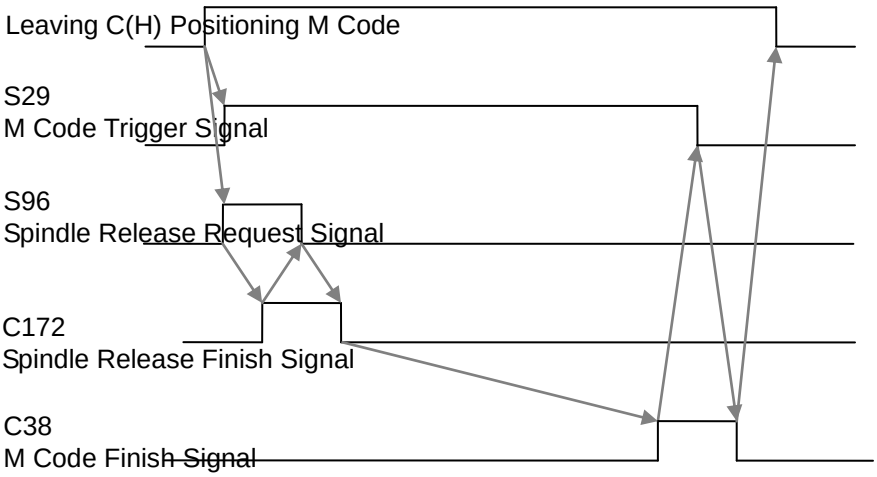
In running program, it could execute C(absolute angle, related to spindle orientation home angle) program code, to make spindle position at C, H program code appointing angle.

1. Enter Spindle C(H) Positioning M Code（P/No. 0835）Sequence



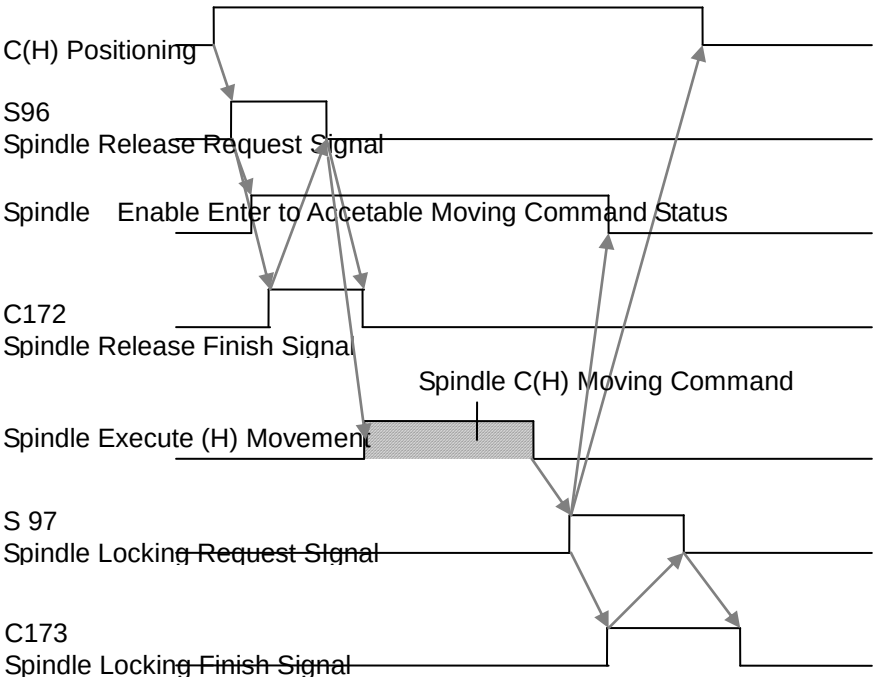
Spindle C(H) Positioning Mode Enter M Code Sequence

2. Leaving Spindle C(H) Positioning M Code (P/No. 836) Motion Sequence



Spindle Leaving C(H) Positioning Mode M Code Motion Sequence Diagram

3. Spindle C(H) Positioning Motion Sequence



SpindleC(H)Positioning

C Bit 174	Vertical Axis Not Affected By Linear Axis Motion Command

Description： When C174 sets as 1, only linear axis has linear axis control function, under this situation, to linear axis motion commanding will be transferred as angle coordinate; vertical axis will not be affected by linear axis command. When C bit 174 sets as 1, tool has movement along with linear axis will result in coordinates errors. It must proceed manually reference point return.
If C174 sets as 0, linear axis and vertical axis are both affected by linear axis control function.
Remark：Please refer to the description of P/No 680 for linear axis related functions and settings.

C Bit 175	Enable 1st Prohibited Software Limit Area Function
C Bit 176	Enable 2nd Prohibited Software Limit Area Function

Description： Software limit area function could be enabled by this C bit.
REMARK：Please refer to the description of P/No.500 for its using instructions.

C Bit 178	RPM Refer to 2nd Spindle

Description： When feedrate speed is set feedrate per rotation and this C bit is ON, the speed of each feedrate per rotation refers to 2nd spindle rpm.

C Bit 179	RPM Refer to 3rd Spindle

Description： When feedrate speed is set feedrate per rotation and this C bit is ON, the speed of each feedrate per rotation refers to 2nd spindle rpm.

C Bit 181	Hidden X AXIS Information Signal
C Bit 182	Hidden Y AXIS Information Signal
C Bit 183	Hidden Z AXIS Information Signal
C Bit 184	Hidden 4TH AXIS Information Signal

Description：

- If the parameters of each servo axis functions are not opened, the corresponding axis information will then not display.
- If the parameters of each servo axis functions are opened,it could be base on the parameters setting to let axis info display hidden or not. If the parameter is set as 0 => display axis information; 1=> hide axis information; 2=> when corresponding C bit is ON, the axis is hidden. Each corresponding are listing as below:

	Servo Axis Function Func. Corrosponding Param	Axis Info Hidden Corrosponding Param	Axix Info Hidden Corrosponding C Bit
X AXIS Param	4010	0231	0181
Y AXIS Param	4011	0232	0 82
Z AXIS Param	4012	0233	0183
4th AXIS Param	4013	0234	184

C Bit 201	ABSOLUTE ENCODER RESET READY SIGNAL：X AXIS
C Bit 202	ABSOLUTE ENCODER RESET READY SIGNAL：Y AXIS
C Bit 203	ABSOLUTE ENCODER RESET READY SIGNAL：Z AXIS
C Bit 204	ABSOLUTE ENCODER RESET READY SIGNAL：4TH AXIS

Description： After LADDER finishes absolute encoder returning zero, it needs to send out this signal to notify NC, abosolute encoder has return zero finish.

C Bit 207	ABSOLUTE ENCODER DATA READY SIGNAL：X AXIS
C Bit 208	ABSOLUTE ENCODER DATA READY SIGNAL：Y AXIS
C Bit 209	ABSOLUTE ENCODER DATA READY SIGNAL：Z AXIS
C Bit 210	ABSOLUTE ENCODER DATA READY SIGNAL：4TH AXIS

Description： Drivers enter ABS transmitting mode and driver's infor has get ready; LADDER uses this signal to notify NC.

C Bit 213	ABSOLUTE ENCODER DATA Bit 0 TRANSMITTING SIGNAL：X AXIS
C Bit 214	ABSOLUTE ENCODER DATA Bit 0 TRANSMITTING SIGNAL：Y AXIS
C Bit 215	ABSOLUTE ENCODER DATA Bit 0 TRANSMITTING SIGNAL：Z AXIS
C Bit 216	ABSOLUTE ENCODER DATA Bit 0 TRANSMITTING SIGNAL：4TH AXIS

Description： Absolute encoder info reading is transmitting by series method and each transmition will send out 2 bits from the encoder's information, when this bit is ON, it means drivers send to NC lower bit signal out of 2 digits is 1.

C Bit 219	ABSOLUTE ENCODER DATA Bit 1 TRANSMITTING SIGNAL：X AXIS
C Bit 220	ABSOLUTE ENCODER DATA Bit 1 TRANSMITTING SIGNAL：Y AXIS
C Bit 221	ABSOLUTE ENCODER DATA Bit 1 TRANSMITTING SIGNAL：Z AXIS
C Bit 222	ABSOLUTE ENCODER DATA Bit 1 TRANSMITTING SIGNAL：4TH AXIS

Description： Absolute encoder info reading is transmitting by series method and each transmition will send out 2 bits from the encoder's information, when this bit is ON, it means drivers send to NC upper bit signal out of 2 digits is 1.

C Bit 230	Select 2nd Spindle Encoder As Feedback Signal
C Bit 231	Select 3rd Spindle Encoder As Feedback Signal

Description： Spindle feedback Selection: while using 2nd spindle to do rigid tapping, PLC will use C125 to notify NC entering rigid tapping mode. At the same time, make C230 ON to notify NC to select 2nd spindle encoder feedback as the source while doing rigid tapping. If entering rigid tapping mode and you do not appoint C230 and C231, then it means the system will select 1st spindle to be rigid tapping feedback source.
C230 select 2nd spindle encoder as the feedback source
C231 select 2nd spindle encoder as the feedback source

C230	C231	FUNCTION
OFF	OFF	Select 1st Spindle
ON	OFF	Select 2nd Spindle
ON	ON	
OFF	ON	Select 3rd Spindle

C Bit 064	PLC Window READ/WRITE Signal
C Bit 065	PLC Window REQUEST Signal

Description： Please refer to the description of **4.7 PLC Window mechenism**

C Bit 241	PMC/NC Switch Signal:X AXIS(0:NC,1:PMC)
C Bit 242	PMC/NC Switch Signal:Y AXIS(0:NC,1:PMC)
C Bit 243	PMC/NC Switch Signal:Z AXIS(0:NC,1:PMC)
C Bit 244	PMC/NC Switch Signal:4TH AXIS(0:NC,1:PMC)

Description： 0：Command From NC。
1：Command From PMC。
T800：[S1]C241~244，[S2]C741~744。

PMC Axis using method: please refer to the description of C120.

C Bit 253	Servo Communication ABS Updating Coordinate Activation:X AXIS
C Bit 254	Servo Communication ABS Updating Coordinate Activation:Y AXIS
C Bit 255	Servo Communication ABS Updating Coordinate Activation:Z AXIS

C Bit 256	Servo Communication ABS Updating Coordinate Activation:4TH AXIS

Description： Servo Communication ABS Updating Coordinate Activation Signal

C Bit 259	Servo Communication ABS Updating Home Position Activation:X AXIS
C Bit 260	Servo Communication ABS Updating Home Position Activation:Y AXIS
C Bit 261	Servo Communication ABS Updating Home Position Activation:Z AXIS
C Bit 262	Servo Communication ABS Updating Home Position Activation:4TH AXIS

Description： Servo Communication ABS Updating Home Position Activation Signal

C Bit 265	PLC Return System Coordinate Activation:X AXIS
C Bit 266	PLC Return System Coordinate Activation:Y AXIS
C Bit 267	PLC Return System Coordinate Activation:Z AXIS
C Bit 268	PLC Return System Coordinate Activation:4TH AXIS

Description： PLC Return System Coordinate Activation Signal

C Bit 271	PLC Save System Coordinate Activation:X AXIS
C Bit 272	PLC Save System Coordinate Activation:Y AXIS
C Bit 273	PLC Save System Coordinate Activation:Z AXIS
C Bit 274	PLC Save System Coordinate Activation:4TH AXIS

Description： PLC Save System Coordinate Activation Signal

2.5 S Bits Description

S Bit 000	Cycle Start

Description： When the system accepts to enable “CYCLE START” key and enters into automatic executing condition, this signal will be ON, which means the system is in the “Cycle Start” condition. When the automatic executing finishing or the system is at “FEED HOLD” condition, this signal will be OFF..

S Bit 001	Feed Hold

Description： When this signal is ON, it means the system is entering “FEED HOLD” condition. At this time, this system is at “Machine Stop” condition.

S Bit 002	MODE：EDIT
S Bit 003	MODE：MEM
S Bit 004	MODE：MDI
S Bit 005	MODE：JOG
S Bit 006	MODE：INC JOG
S Bit 007	MODE：MPG
S Bit 008	MODE：HOME

Description： When these signals are ON, it means the system is entering into relative operation mode status.

S Bit 010	Machine Ready

Description： When this signal is ON, the system is at “Machine Ready” condition.

S Bit 011	MDI Keys

Description：
1. This signal will be sent from system when pressing MDI keys.
2. This signal can notify PLC to turn on LCD power and recount time to turn off LCD power.

S Bit 016	X AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL
S Bit 017	Y AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL
S Bit 018	Z AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL
S Bit 019	4TH AXIS STOP AT THE 1ST ZERO POINT STATUS SIGNAL

Description： When these signals are ON, it means the system relative axis has completed the zero return procedure and stop at the zero point.

S Bit 020	X AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL
S Bit 021	Y AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL
S Bit 022	Z AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL
S Bit 023	4TH AXIS STOP AT THE 2ND ZERO POINT STATUS SIGNAL

Description： When these signals are ON, it means the system relative axis has completed the 2nd reference return procedure and stop at the 2nd reference point.

S Bit 028	System Warning

Description： When system warning occurs, this signal will notify PLC. After cause of warning is eliminated, system warning is off automatically and this signal is OFF.

S Bit 029	M Code

Description： When executing to M codes, this signal will be “ON” so as to provide LADDER to be M code to execute until FIN signal sends back. Please refer to the description of M code finish signal (C BIT 038).

S Bit 030	Moving Command Interpolation Finish

Description： In MEM or MDI mode, when the moving command interpolation is completed, this signal will be sent out. So when M code and the moving G code are on the same BLOCK, please use this signal to control and to execute M code after moving G code.

S Bit 031	System Alarm

Description： When the system alarm is on, this signal is ON.

S Bit 032	System Reset

Description： When the system receives the RESET command, this signal will be ON. Remain one scanning time in order to provide LADDER for reset purpose.

S Bit 033	System Ready(NC Ready)

Description： When the controller’s power is on, after executing program normally , this signal will be ON.

S Bit 035	STATUS OF MPG RATE：x1000
S Bit 036	STATUS OF MPG RATE：x1
S Bit 037	STATUS OF MPG RATE：x10
S Bit 038	STATUS OF MPG RATE：x100

Description： These four signals are used to indicate the current using MPG ratio.

MPG Ratio	S035	S 36	S0 7	S038
x1	0	1		0
x10	0	0	1	0
x100	0	0	0	
x1000	1	0	0	0

S Bit 040	Single Block（SINGLE BLOCK）

Description： Related to single block （SBK）。

S Bit 041	Status of OPTIONAL BLOCK SKIP

Description： Related to Optional Block Skip （BDT）。

S Bit 042	Status of DRY RUN

Description： Related to Dry Run （DRN）。

S Bit 043	Status of MACHINE LOCK

Description： Related to Machine Lock （MLK）。

S Bit 044	Status of OPTIONAL STOP(M01)

Description： Related to Optional Stop （OPS）。

S Bit 045	Status of RAPID TRAVERSE

Description： Related to Rapid Traverse （RT）。

S Bit 046	Status of Z-AXIS NEGLECT

Description： Related to Z Axis Cancel （ZNG）。

S Bit 047	Status of AUXILIARY FUNCTION LOCK(M,S,T Code Ignore)

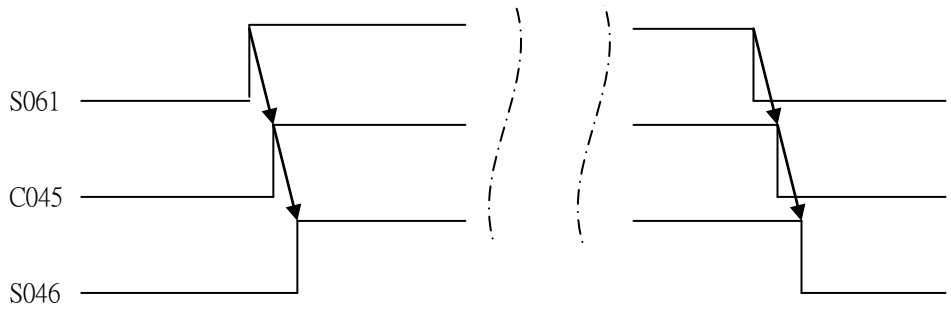
Description： Related to Auxiliary Function Lock （AFL）。

S Bit 054	S Code Strobe (When Read S Code)
S Bit 055	2nd Spindle S Code Strobe
S Bit 056	3rd Spindle S Code Strobe

Description： **When NC executes some S codes, S054 will be ON to notify LADDER to be as S code executing purpose until FIN signal sends back.**

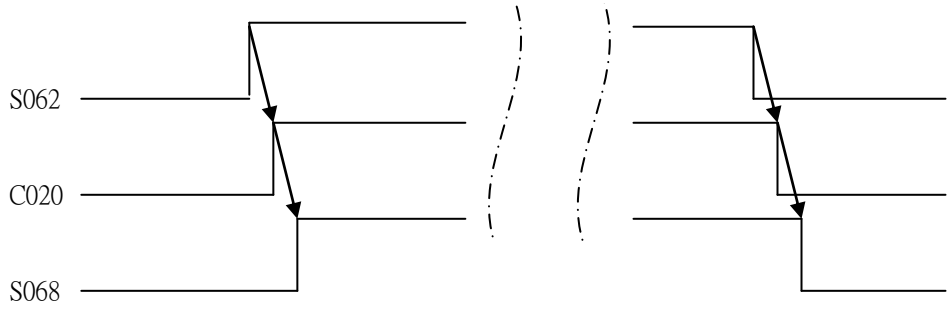
S Bit 061 **SOFT KEY SIGNAL： Z-AXIS NEGLECT**

Description： For Z-AXIS NEGLECT key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as following:



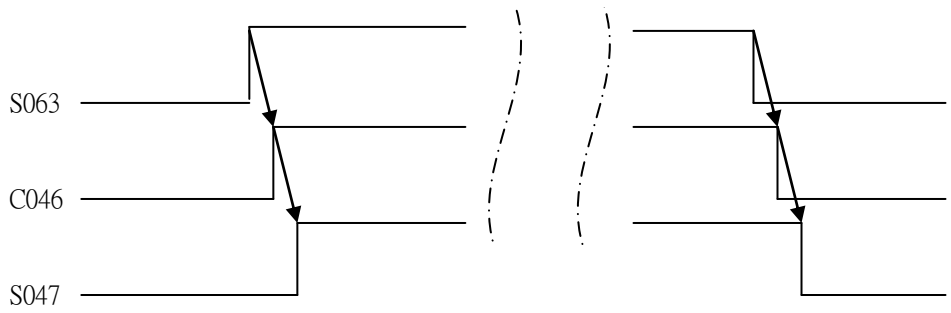
S Bit 062 **SOFT KEY SIGNAL： MPG DRY RUN**

Description： For MPG Dry Run key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as following:



S Bit 063 **SOFT KEY SIGNAL：M、S、T Code Neglect（AUXILIARY FUNCTION LOCK）**

Description： For AUXILIARY FUNCTION LOCK key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as following:



S Bit 067	Servo Off

Description： Same with C024 (cancel servo connection), if C24 is triggered to be ON, the PLC will notify S67 to output ON.

S Bit 068	MPG DRY RUN

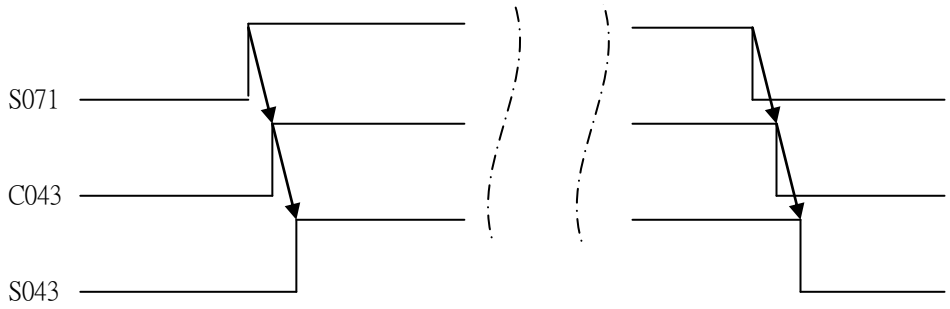
Description： Related to MPG Dry Run（MPGDRN）。

S Bit 069	T Code Strobe (When NC Read T Code)

Description： **When executing to T code, this signal will be ON in order to provide LADDTER to be as T code executing purpose until FIN signal is sending back.**

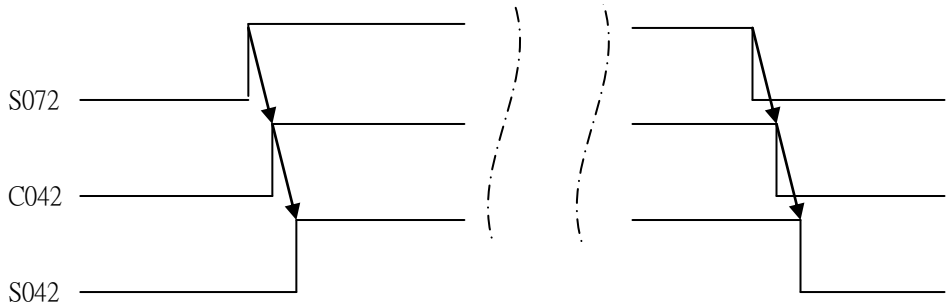
S Bit 071	SOFT KEY SIGNAL：MACHINE LOCK

Description： For Machine Lock key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as follows:



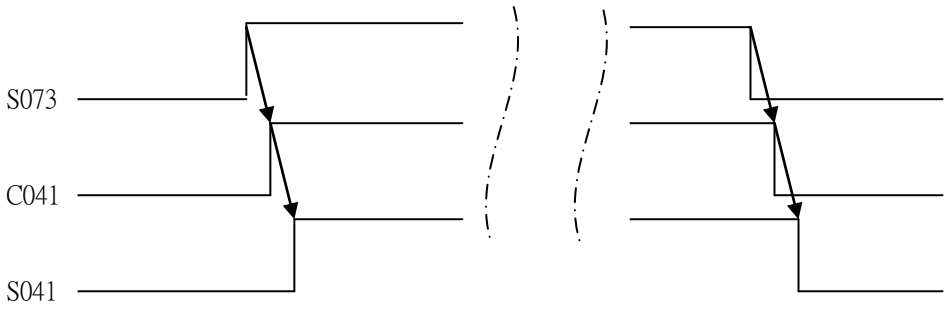
S Bit 072	SOFT KEY SIGNAL：DRY RUN

Description： For Dry Run key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as follows:



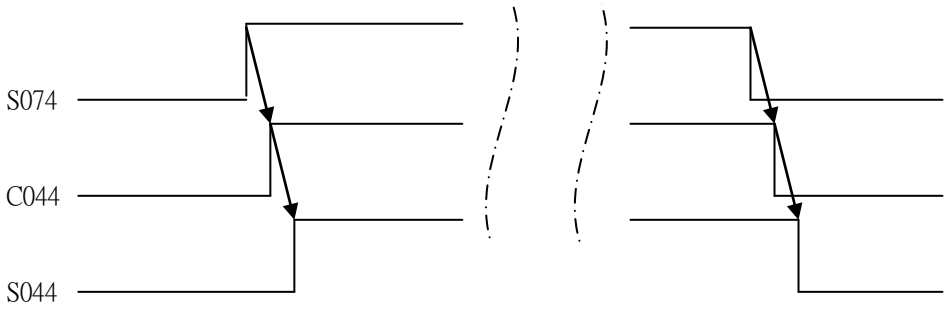
S Bit 073	SOFT KEY SIGNAL： OPTIONAL BLOCK SKIP

Description： For Optional Block Skip key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as follows:



S Bit 074	SOFT KEY SIGNAL： OPTIONAL STOP

Description： For Optional Stop key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The sequence is as follows:



S Bit 079	PLC WINDOW Complete

Description： Please refer to 4.7 PLC Window structure for detailed description.

S Bit 080	M00 Strobe
S Bit 081	M01 Strobe
S Bit 082	M02 Strobe
S Bit 083	M30 Strobe

Description：
M00：after interpreting as M00, this signal is ON（remain one scanning time）
M01：after interpreting as M01, this signal is ON（remain one scanning time）
M02：after interpreting as M02, this signal is ON（remain one scanning time）
M30：after interpreting as M03, this signal is ON（remain one scanning time）

S Bit 086	Spindle Orientation(Inc. Machine Tuning) Finish Signal

Description： When spindle orientation is completed, this signal is ON. If PLC cancels the spindle orientation command (C85), this signal will become OFF.

S Bit 053	**2nd Spindle RPM Arrival Checking**
S Bit 058	**3rd Spindle RPM Arival Checking**
S Bit 088	**1st Spindle RPM Arrival**

Description： **When the spindle speed reaches the expected speed, these signals will be ON. Parameter 1054 can set the tolerance rage of spindle speed arrival.**

SP	Parameter
1ST SP	1054
2ND SP	0298
3RD SP	0881

S Bit 091	**Status of G80 In Cannel Cycle**

Description： **When the system is in Canned Cycle mode, if this signal is under OFF status, effective G code of Group G09 is not 80. On the other hand, if the system is not under Canned Cycle mode but this signal is ON, then the effective G code of Group G09 is 80.**

S Bit 052	**2nd Spindle Zero Speed Arrival Check**
S Bit 057	**3rd Spindle Zero Speed Arrival Check**
S Bit 092	**1st Spindle Zero Speed Arrival Check**

Description： When the rotation speed of each spindle is lower than the value set by the following parameters, the system will send this signal to notify PLC.
The 1st spindle: Pr. 1063.
The 2nd spindle: Pr. 0299.
The 3rd spindle: Pr. 0882.

S Bit 094	**Spindle Command Format is Pulse Signal**

Description： When spindle control format is pulse mode, this signal is ON.

S Bit 095	**Spindle Half Fixed Orientation Finish Signal**

Description： While the program executes to spindle half type orientation M code, the system will wait for thissignal C095,; when C95=ON, spindle will do rotating half fixed type orientation angle, NC will send out the signal S95 after the system finishes this action.

S Bit 096	**1st Spindle Release Request Signal**
S Bit 097	**1st Spindle Lock Request Signal**

Description： S96、S97 apply for CH orientation：
Can execute C(Absolute Angle, Related to Spindle Orentation Reference Point Angle), H(Relative Angle, Related to Last Time Spindle Orientation Position Angle) program code, make spindle stops at the C,H program code appointing angle.
S96：Request Asking 1st Spindle Signal
S97：Request Locking 1st Spindle Signal

S Bit 100	**MACROVariable$320**
S Bit 101	**MACROVariable$321**
S Bit 102	**MACROVariable$322**
S Bit 103	**MACROVariable$323**
S Bit 104	**MACROVariable$324**

S Bit 105	**MACROVariable$325**
S Bit 106	**MACROVariable$326**
S Bit 107	**MACROVariable$327**
S Bit 108	**MACROVariable$328**
S Bit 109	**MACROVariable$329**
S Bit 110	**MACROVariable$330**
S Bit 111	**MACROVariable$331**
S Bit 112	**MACROVariable$332**
S Bit 113	**MACROVariable$333**
S Bit 114	**MACROVariable$334**
S Bit 115	**MACROVariable$335**

Description： These signals are the MACRO system variables $320~$335, which are MACRO outputs to LADDER points. For example, set $320 as 1 in MACRO, then UO0 will be ON in LADDER, which means that MACRO output signals will be used as external control for LADDER.

S Bit 120	**PMC Axis Finish Signal**

Description： This signal is ON when PMC axis moving is completed.

S Bit 128	**Rigid Tapping MODE**

Description： **NC notifies PLC that whether NC is in rigid tapping mode or not .**

S Bit 130	**MOTION STATUS OF SERVO AXIS：X AXIS**
S Bit 131	**MOTION STATUS OF SERVO AXIS：Y AXIS**
S Bit 132	**MOTION STATUS OF SERVO AXIS：Z AXIS**
S Bit 133	**MOTION STATUS OF SERVO AXIS：4TH AXIS**

Description： Moving condition of each axis：
ON：Moving；
OFF：Stop.

S Bit 134	**Max. Working Piece Arrival**

Description： When the number of working piece is greater than or equal to that of the maximum setting of working piece, S134 will be sent out to inform PLC. If the maximum working piece is set zero, then this signal will not be sent out. PLC will use C134 to inform NC to clear working piece quantity.

Application Description:

Entering user Parameter to do function selection.When the value of parameter No. 12 is set as 1, it means the working piece number reaches the setting working piece number, it will enter Feed Hold condition and send out warning message (Wrokpiece is full).
At this time, user can do any needed motion. If there is no need to do any other motion, please press “Cycle Start” key directly, then the working piece number will be cleared to zero automatically. Furthermore, it will start working automatically and counting working piece number from zero.
If no need this function at all, and then when setting parameter No.12 value as 0,circulating work of working piece will not be affected.

01	Program Editing	0	11	Power Off Delay Time	5
02	Home Search Priority While Power ON	1	12	Work Piece Alarm	1
03	Return Home Axis Priority	1	13		
04	Rapidly Moving 50%	0	14		

05	Total Number of Turret	0	15		
06	Safety Door		16		
07	Enforce Track Lubrication	0	17		
08	Lubricate ON Time	5	18		
09	Lubricate OFF Time	30	19		
1	Auto Power Off Function	1	20		

S Bit 141	**1st Fan Detection Signal**

Description： For 520i Series, if using the first fan, this bit will be ON, or it is OFF when no use.

S Bit 142	**2nd Fan Detection Signal**

Description： For 520i Series, if using the second fan, this bit will be ON, or it is OFF when no use

S Bit 154	**MOTION DIRECTION OF SERVO AXIS：X AXIS**
S Bit 155	**MOTION DIRECTION OF SERVO AXIS：Y AXIS**
S Bit 156	**MOTION DIRECTION OF SERVO AXIS：Z AXIS**
S Bit 157	**MOTION DIRECTION OF SERVO AXIS：4th AXIS**

Description： **When axis is under moving status,these S BITs express the moving direction of each axis.**
ON：positive direction
OFF：negative direction

S Bit 160	**X AXIS ENCODER Wiring Error**
S Bit 161	**Y AXIS ENCODER Wiring Error**
S Bit 162	**Z AXIS ENCODER Wiring Error**
S Bit 163	**4TH AXIS ENCODER Wiring Error**

Description： When these S bits are on, it means the encoder's wiring of the corresponding axis has problem.

S Bit 175	**Machine Coordinate Has Signal In 1st Software Off-Limit Area (0: NO,1: YES)**
S Bit 176	**Machine Coordinate Has Signal In 1st Software Off-Limit Area (0: NO,1: YES)**

Description： You could know whether current machine coordinate is in the off-limit area or not by these S bits. Please refer to the description of Param500 for its using method.

S Bit 182	**X AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)**
S Bit 183	**Y AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)**
S Bit 184	**Z AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)**
S Bit 185	**4TH AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)**

Description： Using this singal to notify servo drivers home return finish.
0: Not Finish
1: Finished

S Bit 201	**ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：X AXIS**
S Bit 202	**ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：Y AXIS**
S Bit 203	**ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：Z AXIS**

S Bit 204	ENTER INTO ABSOLUTE ENCODER DATA TRANSMITTING MODE REQUEST SIGNAL：4TH AXIS

Description： Using this signal to notify servo drivers to enter ABS transmitting mode.

S Bit 207	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：X AXIS
S Bit 208	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：Y AXIS
S Bit 209	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：Z AXIS
S Bit 210	ABSOLUTE ENCODER DATA TRANSMITTING REQUEST：4TH AXIS

Description： Using this signal to provide ABS transmittion request to servo drivers; make drivers proceed information transmitting sequence.

S Bit 213	ABSOLUTE ENCODER RESET：X AXIS
S Bit 214	ABSOLUTE ENCODER RESET：Y AXIS
S Bit 215	ABSOLUTE ENCODER RESET：Z AXIS
S Bit 216	ABSOLUTE ENCODER RESET：4TH AXIS

Description： **Use this signal to notify servo driver to eliminate absolute Encoder zero return motion.**

S Bit 219	SERVO ABS COORDINATE UPDATING COMPLETE:X AXIS
S Bit 220	SERVO ABS COORDINATE UPDATING COMPLETE:Y AXIS
S Bit 221	SERVO ABS COORDINATE UPDATING COMPLETE:Z AXIS
S Bit 222	SERVO ABS COORDINATE UPDATING COMPLETE:4TH AXIS

Description： Using this sigal to notify servo drivers SERVO ABS COORDINATE UPDATING COMPLETE motion.

S Bit 225	SERVO ABS HOME UPDATING COMPLETE:X AXIS
S Bit 226	Servo Communication ABS Updating Home Position Finish:Y AXIS
S Bit 227	Servo Communication ABS Updating Home Position Finish:Z AXIS
S Bit 228	Servo Communication ABS Updating Home Position Finish:4TH AXIS

Description： Using this signal to notify servo drivers SERVO ABS HOME UPDATING COMPLETE motion.

S Bit 240	X AXIS: Servo Lag ALARM

Description： If system happens 4006 alarm (X AXIS following offset value Over Param2 SET VALUE), this BIT will be triggered as ON at the same time.

S Bit 241	Y AXIS: Servo Lag ALARM

Description： If system happens 4007 alarm(Y AXIS following offset value Over Param3 SET VALUE), this BIT will be triggered as ON at the same time.

S Bit 242	Z AXIS: Servo Lag ALARM

Description： If system happens 4008 alarm(Z AXIS following offset value Over Param4 SET VALUE), this BIT will be triggered as ON at the same time.

S Bit 243	4TH AXIS: Servo Lag ALARM

Description： If system happens 4009 alarm(4TH AXIS following offset value Over Param5 SET VALUE), this BIT will be triggered as ON at the same time.

S Bit 246	X AXIS: Error Counter Overflow ALARM

Description： If system happens 4001 alarm(X AXIS following offset value Over hardware limited value, please press EMG buttom to clear the alarm), this BIT will be triggered as ON at the same time.

S Bit 247	Y AXIS: Error Counter Overflow ALARM

Description： If system happens 4002 alarm(Y AXIS following offset value Over hardware limited value, please press EMG buttom to clear the alarm), this BIT will be triggered as ON at the same time.

S Bit 248	Z AXIS: Error Counter Overflow ALARM

Description： If system happens 4003 alarm(Z AXIS following offset value Over hardware limited value, please press EMG buttom to clear the alarm), this BIT will be triggered as ON at the same time.

S Bit 249	4TH AXIS: Error Counter Overflow ALARM

Description： If system happens 4004 alarm(4TH AXIS following offset value Over hardware limited value, please press EMG buttom to clear the alarm), this BIT will be triggered as ON at the same time

S Bit 265	PLC Recover System Coordinate Finish:X AXIS
S Bit 266	PLC Recover System Coordinate Finish:Y AXIS
S Bit 267	PLC Recover System Coordinate Finish:Z AXIS
S Bit 268	PLC Recover System Coordinate Finish:4TH AXIS

Description： PLC Recover System Coordinate Finish Signal.

S Bit 271	PLC Save System Coordinate Finish:X AXIS
S Bit 272	PLC Save System Coordinate Finish:Y AXIS
S Bit 273	PLC Save System Coordinate Finish:Z AXIS
S Bit 274	PLC Save System Coordinate Finish:4TH AXIS

Description： PLC Save System Coordinate Finish Signal.

2.6 Register Description

R 001	M Code

Description： R001 sends out M code value when M code is being executed.
Range: 00 ~ 99

R 002	S Code

Description： R002 sends out S code value when S code is being executed.
Range: 0000 ~ 9999。

R 003	T Code

Description： R001 sends out T code value when T code is being executed.
Range: 0000 ~ 9999.

R 004	Spindle Actual RPM

Description： The actual rotation speed of the spindle.

R 005	2nd Spindle RPM Command

Description： The command of the 2nd spindle's rotational speed.

R 006	2nd Spindle Actual RPM

Description： The actual rotation speed of the 2nd spindle.

R 007	3rd Spindle RPM Command

Description： The command of the 3rd spindle's rotational speed.

R 008	3rd Spindle Actual RPM

Description： The actual rotation speed of the 3rd spindle.

R 012	Manual Tool Shape Measurement Offset Number

Description： **When Param868 is set as 0, it means R12 from PLC is to decide manual manual measurement of tool shape offset number. When Param868 is set as other value (not zero) and enters into manual measurement status,it could decide tool shape offset number from this parameter value.**

R 013	**OP Mode Selection** **1：EDIT，2：MEM，3：MDI，4：JOG，5：INCJOG，6：MPG，7：HOME**

Description： The register value of each operation mode is listed as the chart below:

Operation Mode	REG 0 3
EDIT	1
EM	2
MDI	3
JOG	4 （C23=OFF）
RAPID	4 （C23=ON ）
INCJOG	5
MPG	
HOME	7

R 014	**MPG Rate 2：x10，3：x100，OTHERS：x1** **Incremental JOG Override 2：x10，3：x100，4：x1000，OTHERS：x1**

Description： The register value of each MPG rate is listed as the chart below:

MPG Ratio	REG 014
x1	1（ Or Others）
x10	2
x100	3

R 015	**Spindle RPM Percentage（OVERRIDE）SET VALUE** **0 ~ 12INDIVIDUALLY REPRESENTS0% ~ 120%，OTHERS：SET VALUE * 0.01**
R 019	**2nd Spindle RPM Percentage**
R 020	**3rd Spindle RPM Percentage**

Description： The register value of each spindle rotation speed’ s override is listed as the chart below:

%	REG 015
0	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
1%	Others

R 016	**Cutting Feedrate Percentage（OVERRIDE）SET VALUE** **0 ~ 20INDIVIDUALLY REPRESENTS0% ~ 200%，OTHERS：SET VALUE * 0.001**

Description： The register value of each cutting override is listed as the chart below:

%	REG 016
0%	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
130%	13
140%	14
150%	15
160%	16
170%	17
180%	18
190%	19
200%	20
‰（Thousandth）	Others

R 017

JOG Feedrate Percentage（OVERRIDE）SET VALUE
0 ~ 20INDIVIDUALLY REPRESENTS0% ~ 200%，OTHERS：SET VALUE * 0.001

Description： The register value of each manual override is listed as the chart below:

%	REG 017
0%	0
10%	1
20%	2
30%	3
0%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
130%	13
140%	14
150%	15
160%	16
170%	17
180%	18
190%	19
200%	20
‰（Thousandth）	Others

R 018

Rapid Traverse Percentage（OVERRIDE）SET VALUE
0、1：F0，2：25%，3：50%，4：100%，OTHERS：SET VALUE * 0.01

Description： The register value of each rapid feed override is listed as the chart below:

%	REG 18
F0%	0
F0	1
25	2
50%	3
100%	4
1%	Others

NOTE: The actual rapid override of F0% is set by Pr. 0040.

R 021

PMC Axis Function Feedrate Set Value, Unit：mm/min

Description： Set PMC axis federate.

R 022	PMC Axis Function Control Code

Description： Setting PMC Control Axis
Bit 1，Bit 0：00 for G00，01 for G01，10 for G53
Bit 2：1 Spindle
Bit 3：Reserve
Bit 4：1 X AXIS
Bit 5：1 Y AXIS
Bit 6：1 Z AXIS
Bit 7：1 4TH AXIS

R 024	MOTION COMMAND OF PMC AXIS：X AXIS，mm PART
R 025	MOTION COMMAND OF PMC AXIS：X AXIS，um PART
R 026	MOTION COMMAND OF PMC AXIS：Y AXIS，mm PART
R 027	MOTION COMMAND OF PMC AXIS：Y AXIS，um PART
R 028	MOTION COMMAND OF PMC AXIS：Z AXIS，mm PART
R 029	MOTION COMMAND OF PMC AXIS：Z AXIS，um PART
R 030	MOTION COMMAND OF PMC AXIS：4TH AXIS，mm PART
R 031	MOTION COMMAND OF PMC AXIS：4TH AXIS，um PART

Description： R024 ~ R029 set the assigned motion distance for each PMC axis when executing a motion command. Motion distances must be set by entering two parts, mm & um, respectively into each register.

R 036	PMC Axis Rapid Positioning Feedrate %

Description： When PMC axis function appointing motion mothod is G00 or G53, this register could be set feedrate percentage of each axis.
Feed rate % definition as following:：
0：F0%。
1：F0%。
2：25%。
3：50%。
4：100%。
Others：1%。
Note：F0% By Param0040 decided
T800：[S1]R036，[S2]R536。

R 037	PMC Axis Cutting Feedrate %

Description： While PMC axis function appointing motion method is G01, this register could be set as cutting feedrate percentage.
Cutting feed rate definition as following chart:
0：0%。
1：10%。
2：20%。
3：30%。
4：40%。
5：50%。
6：60%。
7：70%。
8：80%。
9：90%。
10：100%。
11：110%。
12：120%。
13：130%。
14：140%。
15：150%。
16：160%。
17：170%。
18：180%。
19：190%。
20：200%。
Others：0.1%
T800：[S1]R037，[S2]R537。

R 040	PLC ALARM
R 041	PLC ALARM
R 042	PLC ALARM
R 043	PLC ALARM
R 044	PLC ALARM
R 045	PLC ALARM

Description： R040 ~ R045 enables alarms. There are 6 registers (word), and 96 messages in total for definition and actuation. For example, if the alarms #1 & #3 are to be enabled, LADDER must enter R40 into constant 5 (bit 1 & bit 3) with a MOV command. At the same time, messages must be pre-defined in the corresponding position in ENG_ PLC.ERR. To clear the PLC alarm, simply set R40 to 0.

R 046	HARDWARE 1st PART
R 047	HARDWARE 2nd PART
R 048	HARDWARE 3rd PART

Description： Make current controller hardware part divided into three R register column and fill in order, which is R046、R047,and R048.

R 050	Max.Allowing Conering Offset Value(um)

Description： Param808 : corner decerlerating function 0)close 1)open 2)R vlaue ,if setting as 2, then corner checking range value would be set by R value R50.

R 058	File Name Under PLC File Open Mode

Description：
PLC file open function must apply with C079.
Use the 4 digit number as file name, if it is negative then define as no action.
E.g.:
R058 = 123，then Open O123
R058 = 12345，then Open O2345
R058 = -678，then Open file failed, use the original file which selected in UI.

R 060	PLC WINDOW Item Code
R 061	PLC WINDOW Sub-Item Code1
R 062	PLC WINDOW Sub-Item Code2
R 063	PLC WINDOWFUNCTION READ/WRITE VALUE 1
R 064	PLC WINDOWFUNCTION READ/WRITE VALUE 2
R 065	PLC WINDOWFUNCTION READ/WRITE VALUE 3
R 066	PLC WINDOWFUNCTION READ/WRITE VALUE 4
R 067	PLC WINDOWFUNCTION READ/WRITE VALUE 5
R 068	PLC WINDOWFUNCTION READ/WRITE VALUE 6
R 069	PLC WINDOWFUNCTION READ/WRITE VALUE 7
R 070	PLC WINDOWFUNCTION READ/WRITE VALUE 8
R 071	PLC WINDOWFUNCTION READ/WRITE VALUE 9
R 072	PLC WINDOWFUNCTION READ/WRITE VALUE 10
R 073	PLC WINDOWFUNCTION READ/WRITE VALUE 11
R 074	PLC WINDOWFUNCTION READ/WRITE VALUE 12

Description： Please refer to the description of 2.7 PLC Window mechanisms.

R 143	Inverter Current Current Value

Description： If using LNC inverter and using digital function, then through R143 can get the current working electric current value

2.7PLC Window Function

Ladder could READ or Write NC information through PLC Window function.

After Ladder key-in the desired item codes in R60 ～ R62, setting C064 (0: Read, 1 Writes). While completing, using C065 to inform NC. NC will fill the desired item into the corresponding R register (C064 is 0) according to the setting of R060 ～ R062 and C064. Or read the setting value (C064 is 1) from the corresponding R register. After finishing the task, using S079 to inform Ladder. This function is enabled (raising edge trigger) when C065 becomes 1 from 0; S79 will become OFF after C065 has become OFF.

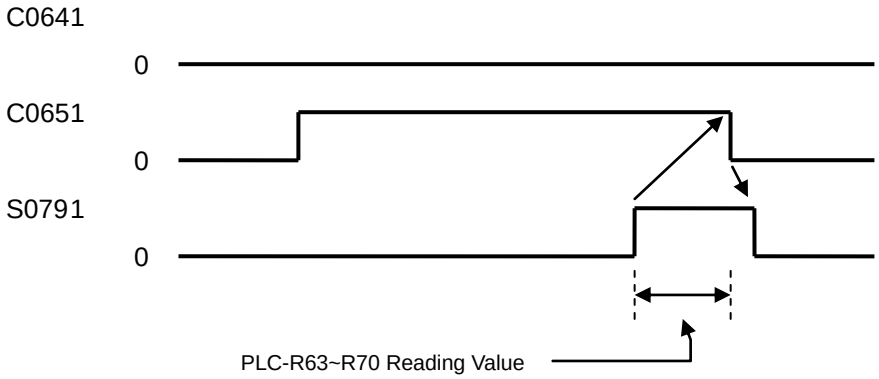
R Register Definition：

R Register	Definition	Remark
060	Item Code 1：read absolute coordinate value； 2：read machine coordinate value； 3：read & write macro global variables； 4：read parameter value；	1：read only； 2：read only； 3：read & write。 4：read only；
061	Sub-Item Code 1 (different depends on R60) R060：3，meaning reading and writing macro global variables with beginning numbers（1 ~ 500）。 R060：4，the starting parameter #s that are read	
062	Sub-Item Code 2 (different depends on R060 and R061) R060：3，means the desired read/write macro global variables numbers (starting from the number that is designated by R061)，maximum 8 pcs. R060：4，means the desired read/write parameter variables numbers(starting from the number that is designated by R061) ，maximum 8 pcs.	Using R061 and R062 to appoint read and write multiple macro global variables continuously (max 8 variables),or the designated parameter continuously
063	Read/Write Value (different depends on R060~R062) R060：1，means X axis absolute coordinate mm part； R060：2，means X axis machine coordinate mm part； R060：3，means the present value of the1st macro global variable that is designated by R61 and R062. R060：4，means the value of 1st parameter that is designated by R061 and R062.	Please refer to Attention.
064	Read/Write Value (different depends on R060~R062) R060：1，means X axis absolute coordinate um part； R060：2，means X axis machine coordinate um part； R060：3，means the present value of the 2nd macro global variable that is designated by R061 and R062. R060：4，means the value of 2nd parameter that is designated by R061 and R062.	Please refer to Attention.

065	Read/Write Value (different depends on R060~R062) R060：1，means Y axis absolute coordinate mm part； R060：2，means Y axis machine coordinate mm part； R060：3，means the present value of the 3rd macro global variable that is designated by R61 and R062. R060：4，means the value of 3rd parameter that is designated by R061 and R062.	Please refer to Attention.
066	Read/Write Value (different depends on R060~R062) R060：1，means Y axis absolute coordinate um part； R060：2，means Y axis machine coordinate um part； R060：3，means the present value of the 4th macro global variable that is designated by R61 and R062. R60：4，means the value of 4th parameter that is designated by R061 and R062.	Please refer to Attention.
067	Read/Write Value (different depends on R060~R062) R060：1，means Z axis absolute coordinate mm part； R060：2，means Z axis machine coordinate mm part； R060：3，means the present value of the 5th macro global variable that is designated by R061 and R062. R060：4，means the value of 5th parameter that is designated by R061 and R062.	Please refer to Attention.
068	Read/Write Value (different depends on R060~R062) R060：1，means Z axis absolute coordinate um part； R060：2，means Z axis machine coordinate um part； R060：3，means the present value of the 6th macro global variable that is designated by R061 and R062. R060：4，means the value of 6th parameter that is designated by R061 and R062.	Please refer to Attention.
069	Read/Write Value (different depends on R060~R062) R060：1，means 4th axis absolute coordinate mm part； R060：2，means 4th axis machine coordinate mm part； R060：3，means the present value of the 7th macro global variable that is designated by R61 and R062. R060：4，means the value of 7th parameter that is designated by R061 and R062.	Please refer to Attention.
070	Read/Write Value (different depends on R060~R062) R060：1，means 4th axis absolute coordinate um part； R060：2，means 4th axis machine coordinate um part； R060：3，means the present value of the 8th macro global variable that is designated by R61 and R062. R060：4，means the value of 8th parameter that is designated by R061 and R062.	Please refer to Attention.
071	Read/Write Value (different depends on R060~R062) R060：1，means 5th axis absolute coordinate um part； R060：2，means 5th axis machine coordinate um part； R060：3，means the present value of the 9th macro global variable that is designated by R61 and R062. R060：4，means the value of 9th parameter that is designated by R061 and R062.	Please refer to Attention.

072	Read/Write Value (different depends on R060~R062) R060：1，means 5th axis absolute coordinate um part； R060：2，means 5th axis machine coordinate um part； R060：3，means the present value of the 10th macro global variable that is designated by R61 and R062. R060：4，means the value of 10th parameter that is designated by R061 and R062.	Please refer to Attention.
073	Read/Write Value (different depends on R060~R062) R060：1，means 6th axis absolute coordinate um part； R060：2，means 6th axis machine coordinate um part； R060：3，means the present value of the 11th macro global variable that is designated by R61 and R062. R060：4，means the value of 11th parameter that is designated by R061 and R062.	Please refer to Attention.
074	Read/Write Value (different depends on R060~R062) R060：1，means 6th axis absolute coordinate um part； R060：2，means 6th axis machine coordinate um part； R060：3，means the present value of the 12th macro global variable that is designated by R61 and R062. R060：4，means the value of 12th parameter that is designated by R061 and R062.	Please refer to Attention.

Time Sequence Diagram：



Attention：

1. For read only items, if Ladder sets C064 to 1, NC will ignore it. Using the same principle for writing items, if Ladder sets C64 to 0, NC will also ignore it.
2. Macro variables belong to DOUBLE type. But the present Ladder can only take care of the value in INT type. So if Ladder reads macro global variables via PLC Window, NC will check whether or not the macro global variable value is between -32768 ~ 32767. If yes, the macro global variables will transfer to INT type and then enter the corresponding R registers. If not, then the alarm【OP 1019 DESIRED MACRO VARIABLES OVER RANGE】will occur.
3. Using R061 and R062, Ladder can read/write multiple macro global variables (maximum 8 variables) continuously. Example: set R060 to 3, R061 to 200 and R062 to 5. When C064 is OFF, it means the total current value of the designated reading/writing @200 ~ @204, total 5 macro global variables. But, if (R61 + R62 – 1) > 500, then alarm message【OP 1018 DESIRED MACRO GLOBAL

VARIABLES NOT EXISTED】will occur.

4. Macro local variables are not able to be executing reading and writing via MLC Window.
5. The reading parameter value must be an integrate number (INT) or long integrate number (LONG). But the present Ladder can only take care of the values in INT type. So if Ladder reads parameter value via MLC Window, NC will check whether or not that parameter value is between -32768 ~ 32767. If yes, the parameter will change to INT type, and then enter into the corresponding R register. If not, the alarm message 【OP 1022 DESIRED PARAMETER VARIABLES OVER RANGE】 will occur.
6. Using R061 and R062, Ladder can read/write multiple parameter variables (maximum 12 variables) continuously. Example: set R60 to 3, R061 to 200 and R62 to 5. When C064 is OFF, it means the total value of the reading parameter variables 0200 ~ 0204, total 5 parameter variables. If it is over the valid parameter range, the alarm message【OP 1023 DESIRED PARAMETER VARIABLES NOT EXISTED】will occur.

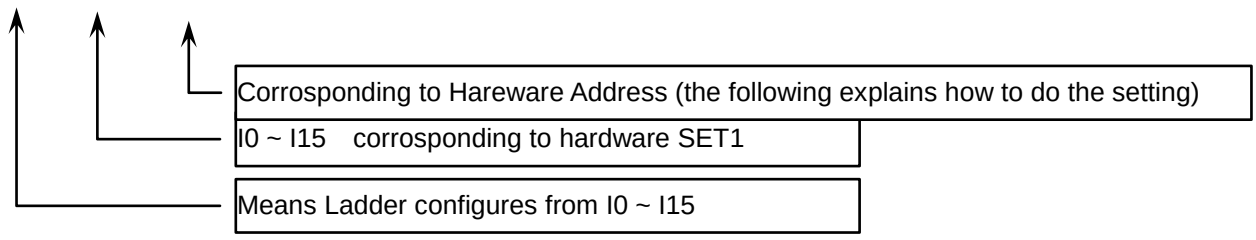
   Valid parameter variable range： 0 ~ 1200。
7. Parameter is not able to execute reading and writing via PLC Window.

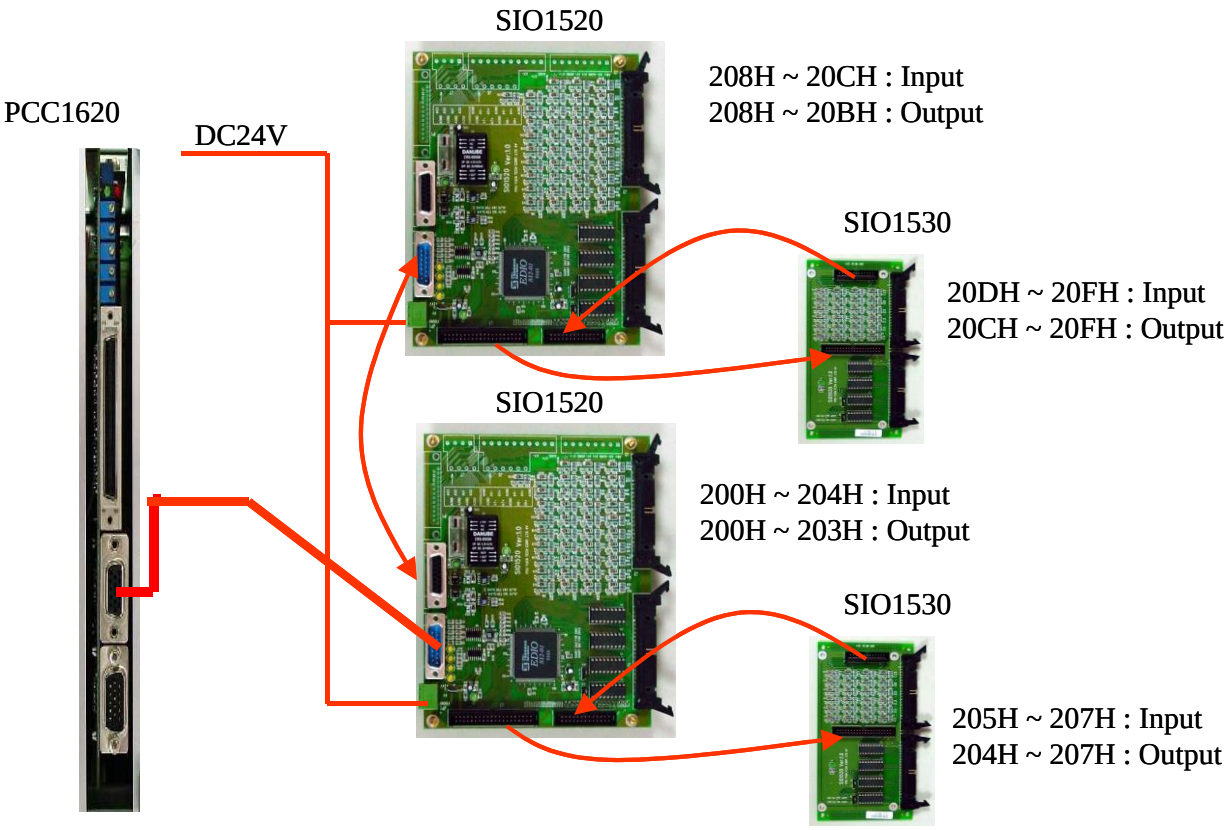
2.8 PLC Initialize Setting Illustration（PLCIO.CFG）

Under LNCLATHE\MACHINE, fill name is PLCIO.CFG, this file is to set PLC I/O configuration and definition, file content is as follows:

```
InputSignalInverse=0        // Ipoint is reversing, 0=No , 1=Yes
OutputSignalInverse=0       // Opoint is reversing, 0=No , 1=Yes
BaseAddress=0x200           // pcc1620 base address
Set1Slave1=1                    // whether to use Set1's Slave1，  0=No, 1=Yes
Set1Slave2=0                    // whether to use Set1's Slave2，  0=No, 1=Yes
Set2Slave1=1                    // whether to use Set2's Slave1，  0=No, 1=Yes
Set2Slave2=0                    // whether to use Set2's Slave2，  0=No, 1=Yes
I    0    1    0x200（Note） // COLUMN [I or O][NMMBER][SET][ADDRESS][CAN ADD FOOTNOTE]
I    16   1    0x202              // no blank and space in between
I    32   1    0x204              // I or i is ok
I    48   2    0x200              // O or o is ok
I    64   2    0x202              // SET=1 means SET1，  SET=2 means SET2
I    80   2    0x204              // must be starting from I0
O    0    1    0x200              // Due to EPCIO,O point must be set as even number.
O    16   1    0x202
O    32   2    0x200
O    48   2    0x202
```

（Note）I 0 1 0x200





According to user's selecting I/O boards and different wiring methods, it needs to define different I/O address. For the above diagram, due to connect to RIO1, the I/O address must be defined to SET 1.

3 Parameters

Some parameters for 4 axis are only provided by certain models, if your system does not display, please ignore this parameters or C/S Bits.

Parameters divided to 7 types, they are servo parameter, machine parameter, spindle parameter, MPG parameter, compensation parameter, zero point parameter, and operation parameter.

Note:

1. Four effective times due to different parameter setting values.
   a：EffectiveImmediately
   b：Effective After RESET（R）
   c：Effective After Rebooting（⊙）
   d：Effective After Re-Power on（ㄣ）
2. Parameters are divided into two types authorization status according to the difference of its using purpose and importance. However, under 【End-User】status, some parameters will NOT occur：
   a：End-user
   b：Machine maker
3. Part of parameters are using Bit method to do the setting of whether or not to enable a certain function of each axis. Usually, Bit0 corresponds to X axis, Bit1 corresponds to Y axis, Bit2 corresponds to Z axis. The setting method is as below:
   Bit0：1 means 1 in 1, 2, 4, 8, 16, 32 and so on
   Bit1：1 means 2 in 1, 2, 4, 8, 16, 32 and so on；
   Bit2：1 means 4 in 1, 2, 4, 8, 16, 32 and so on；
   Bit3：1 means 8 in 1, 2, 4, 8, 16, 32 and so on；
   Bit4：1 means 12 in 1, 2, 4, 8, 16, 32 and so on；
   So, if want to set a certain Bit to 1, only need to adding up the corresponding value into the parameter. For example, if want to set both Bit1 and Bit3 to 1, the setting value of this parameter is 10（2 + 8）.

3.1 Parameter List

NO.	Group	Description & Unit	Effective	Level	Page
1	Servo	SYSTEM LOOP GAINS FOR V CMD 1/sec	⊙	Machine Maker	**51**
2	Servo	MAX. SERVO LAG OF X AXIS, μm	R	Machine Maker	**51**
3	Servo	MAX. SERVO LAG OF Y AXIS, μm	R	Machine Maker	**51**
4	Servo	MAX. SERVO LAG OF Z AXIS, μm	R	Machine Maker	**51**
5	Servo	MAX. SERVO LAG OF THE 4TH AXIS, μm	R	Machine Maker	**51**
6	Servo	IN-POSITION CHECK WINDOW OF X AXIS, μm	R	Machine Maker	**51**
7	Servo	IN-POSITION CHECK WINDOW OF Y AXIS, μm	R	Machine Maker	**51**
8	Servo	IN-POSITION CHECK WINDOW OF Z AXIS, μm	R	Machine Maker	**51**
9	Servo	IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm	R	Machine Maker	**82**
10	Servo	G00'S ACCEL. /DECEL. TIME OF X AXIS, ms	⊙	Machine Maker	**82**
11	Servo	G00'S ACCEL. /DECEL. TIME OF Y AXIS, ms	⊙	Machine Maker	**82**
12	Servo	G00'S ACCEL. /DECEL. TIME OF Z AXIS, ms	⊙	Machine Maker	**51**
13	Servo	G00'S ACCEL. /DECEL. TIME OF THE 4TH AXIS, ms	⊙	Machine Maker	**52**
14	Servo	G01 ACCEL. /DECEL. TIME ms	⊙	Machine Maker	**52**
15	MPG	Setting MPG Simulated Axis That Corrponds to Mechanical Axis	⊙	Machine Maker	**53**
16	Spindle	ACC/DEC TIME OF EACH THOUSAND ROTATION OF 1ST SPINDLE	⊙	Machine Maker	**53**
18	Servo	THREAD CUTTING ACC/DEC TIME	⊙	Machine Maker	**54**
19	Zero Point	SOLUTIONS WHEN HOME IS ON DOG	R	Machine Maker	**53**
20	Zero Point	DEFAULT SETTING OF HOME RETURN BIT	⊙	Machine Maker	**53**
21	Spindle	RPM OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**54**
24	Servo	CORRESPONDING SERVO AXIS NUMBER OF X AXIS	⊙	Machine Maker	**55**
25	Servo	CORRESPONDING SERVO AXIS NUMBER OF Y AXIS	⊙	Machine Maker	**55**
26	Servo	CORRESPONDING SERVO AXIS NUMBER OF Z AXIS	⊙	Machine Maker	**55**
27	Servo	CORRESPONDING SERVO AXIS NUMBER OF THE 4TH AXIS	⊙	Machine Maker	**55**
28	MPG	MPG CONNECTION PORT OF X AXIS	⊙	Machine Maker	**55**
29	Spindle	THE CORRESPONDING SERVO AXIS NUMBER OF THE 1ST SPINDLE	⊙	Machine Maker	**55**

NO.	Group	Description & Unit	Effective	Level	Page
30	Zero Point	OFFSET AMOUNT OF HOME RETURN: X AXIS μm	R	Machine Maker	**55**
31	Zero Point	OFFSET AMOUNT OF HOME RETURN: Y AXIS μm	R	Machine Maker	**55**
32	Zero Point	OFFSET AMOUNT OF HOME RETURN: Z AXIS μm	R	Machine Maker	**119**
33	Zero Point	OFFSET AMOUNT OF HOME RETURN: THE 4TH AXIS μm	R	Machine Maker	**119**
34	Zero Point	IDLE DURATION FOR X AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**120**
35	Zero Point	IDLE DURATION FOR Y AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**120**
36	Zero Point	IDLE DURATION FOR Z AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**55**
37	Zero Point	IDLE DURATION FOR THE 4TH AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**55**
38	Compensation	BACKLASH COMPENSATION UNIT 0)PULSE 16)μm	⊙	Machine Maker	**112**
40	Servo	G00 Min.OVERRIDE Percentage Value At F0	R	End User	**56**
41	Operation	SYNCHRONIC MOTION OF G00 COMMAND 0)NO 1)YES	R	End User	**56**
43	Operation	Interpolation Correct Stop Mode Setting BIT 0-4	R	End User	**56**
44	Compensation	BACKLASH COMPENSATION AMOUNT OF X AXIS μm	R	Machine Maker	**56**
45	Compensation	BACKLASH COMPENSATION AMOUNT OF Y AXIS μm	R	Machine Maker	**56**
46	Compensation	BACKLASH COMPENSATION AMOUNT OF Z AXIS μm	R	Machine Maker	**56**
47	Compensation	BACKLASH COMPENSATION AMOUNT OF THE 4TH AXIS μm	R	Machine Maker	**56**
48	Zero Point	Zero Point Forced Mode BIT	⊙	Machine Maker	**56**
49	Spindle	MOTOR'S TOOTH NUMBER OF THE 1ST SPINDLE IN 1ST GEAR	⊙	Machine Maker	**97**
50	Spindle	THE 1ST SPINDLE'S TEETH NUMBER IN 1ST GEAR	⊙	Machine Maker	**56**
51	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 2ND GEAR	⊙	Machine Maker	**97**
52	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 2ND GEAR	⊙	Machine Maker	**98**
53	Servo	ENCODER FEEDBACK MULTIPLIER OF THE 4TH AXIS 1/2/4	⊙	Machine Maker	**83**
54	Servo	ENCODER FEEDBACK MULTIPLIER OF X AXIS 1/2/4	⊙	Machine Maker	**83**
55	Servo	ENCODER FEEDBACK MULTIPLIER OF Y AXIS 1/2/4	⊙	Machine Maker	**83**
56	Servo	ENCODER FEEDBACK MULTIPLIER OF Z AXIS 1/2/4	⊙	Machine Maker	**83**
57	Spindle	FEEDBACK RATE OF THE 1ST SPINDLE	⊙	Machine Maker	**98**
58	Servo	Pulses of Each Roation of X Axis Encoder	⊙	Machine Maker	**56**
59	Servo	Pulses of Each Roation of Y Axis Encoder	⊙	Machine Maker	**84**
60	Servo	Pulses of Each Roation of Z Axis Encoder	⊙	Machine Maker	**56**

NO.	Group	Description & Unit	Effective	Level	Page
61	Spindle	Pulses of Each Roation of 1st Spindle Encoder	⊙	Machine Maker	**56**
62	Machine	UNIT OF Pr.0104 ~ Pr.0107 0) METRIC 1) IMPERIAL	⊙	Machine Maker	**56**
63	Operation	SET RELATIVE COORDINATES ACCORDING TO ABSOLUTE COORIDNATES 0)NO 1)YES	R	End User	**56**
64	Zero Point	HOME DOG SENSOR IS 0)NC 1)NO	⊙	Machine Maker	**56**
65	Servo	ABSOLUTE ENCODER BIT 0-3	⊙	Machine Maker	**56**
66	Servo	SET THE 4TH AXIS AS A 0)RATORY 1)LINEAR AXIS	⊙	Machine Maker	**56**
67	Servo	Pulses of Each Roation of 4th Axis Encoder	⊙	Machine Maker	**56**
68	Machine	SIDE TOOTH NUMBER OF X AXIS MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**56**
69	Machine	SIDE TOOTH NUMBER OF Y AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**56**
70	Machine	SIDE TOOTH NUMBER OF Z AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**56**
71	Operation	PATH CHECK G22 ADOPTS 0) EXTERNAL 1)INSIDE	R	End User	**56**
72	Machine	SIDE TOOTH NUMBER OF THE 4TH AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**56**
73	Operation	ACCELERATION/DECELERATION OF G31 0)NO 1)YES	⊙	Machine Maker	**56**
74	Operation	ENABLE MACRO UNDER SINGLE BLOCK MODE	R	End User	**56**
75	MPG	MPG CONNECTION PORT OF THE 4TH AXIS	⊙	Machine Maker	**111**
76	Zero Point	SET ABSOLUTE COORD. AFTER HOME RETURN 0)NO 1)YES	R	Machine Maker	**121**
77	Zero Point	Not Home Return's G00 0)Disable 1)Effective	R	End User	**121**
79	Zero Point	X AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**122**
80	Zero Point	Y AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**122**
81	Zero Point	Z AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**122**
82	Zero Point	THE 4TH AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**122**
83	Operation	G00 IS 0)DISABLED 1)EFFECTIVE IN DRY RUN	R	End User	**133**
84	Spindle	THE 1ST SPINDLE ORIENTATION 0)SENSOR 1)ENCODER	R	Machine Maker	**99**
85	Servo	100 Times P2-P5 Max. Servo Lag Setting	R	Machine Maker	**84**
87	MPG	MPG CONNECTION PORT OF Y AXIS	⊙	Machine Maker	**111**
88	MPG	MPG CONNECTION PORT OF Z AXIS	⊙	Machine Maker	**111**
89	Operation	SET M CODE COMMAND FOR PARTS COUNTING BY USERS	R	End User	**134**
90	Spindle	THE 1ST SPINDLE DISPLAYS 0)COMMAND 1) SENSOR		Machine Maker	**99**
92	Spindle	Setting Spindle Motor 10V Is Corresponding To how many RPM	R	Machine Maker	**99**
94	Operation	EDIBILITY OF 09XXX 0)NO 1)YES		Machine Maker	**134**

NO.	Group	Description & Unit	Effective	Level	Page
95	Spindle	MIN. SPEED OF THE 1ST SPINDLE	R	Machine Maker	**100**
96	Spindle	1st Spindle Max. RPM	R	Machine Maker	**100**
98	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 1ST SPINDLE'S RPM	R	Machine Maker	**100**
100	Machine	BALL SCREW'S SIDE TOOTH NUMBER OF X AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**93**
101	Machine	BALL SCREW'S SIDE TOOTH NUMBER OF Y AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**93**
102	Machine	BALL SCREW'S SIDE TOOTH NUMBER OF Z AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**93**
103	Machine	BALL SCREW'S SIDE TOOTH NUMBER OF THE 4TH AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**93**
104	Machine	BALL SCREW PITCH. OF X AXIS	⊙	Machine Maker	**93**
105	Machine	BALL SCREW PITCH. OF Y AXIS	⊙	Machine Maker	**93**
106	Machine	BALL SCREW PITCH. OF Z AXIS	⊙	Machine Maker	**93**
107	Machine	BALL SCREW PITCH. OF THE 4TH AXIS	⊙	Machine Maker	**93**
108	Servo	RPM TO VOLTAGE RATIO FOR X AXIS RPM/1V	⊙	Machine Maker	**85**
109	Servo	RPM TO VOLTAGE RATIO FOR Y AXIS RPM/1V	⊙	Machine Maker	**85**
110	Servo	RPM TO VOLTAGE RATIO FOR Z AXIS RPM/1V	⊙	Machine Maker	**85**
111	Servo	RPM TO VOLTAGE RATIO FOR THE 4TH AXIS RPM/1V	⊙	Machine Maker	**85**
112	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF X AXIS	⊙	Machine Maker	**112**
113	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Y AXIS	⊙	Machine Maker	**112**
114	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Z AXIS	⊙	Machine Maker	**112**
115	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF THE 4TH AXIS	⊙	Machine Maker	**112**
116	Servo	Reverse Direction Moving Command Output for Each Axis BIT0-4	⊙	Machine Maker	**85**
117	Compensation	BACKLASH COMPENSATION FUNCTION BIT	R	Machine Maker	**113**
118	Compensation	DIRECTION OF PITCH ERROR COMPENSATION BIT	⊙	Machine Maker	**113**
119	Compensation	PITCH ERROR COMPENSATION FUNCTION BIT	⊙	Machine Maker	**113**
120	Zero Point	DIRECTION OF HOME RETURN FOR EACH AXIS BIT	⊙	Machine Maker	**122**
122	Operation	NAME THE 4TH AXIS 0...5(ABCUVW)	⊙	Machine Maker	**134**
123	Operation	UNIT SYSTEM 0)G21 METRIC 1)G20 IMPERIAL	⊙	End User	**134**
124	Operation	INITIAL MOTION COMMAND 0)G00 1)G01	⊙	End User	**135**
125	Operation	Tool Compensation T Codes 0)Back 2 Digits 1)Front 2 Digits	R	Machine Maker	**135**
126	Operation	T0 Cancel Tool Compensation or not 0)NO 1)YES	R	End User	**135**

NO.	Group	Description & Unit	Effective	Level	Page
127	Operation	T Code Digits Number 0)4 digits 1)2 digits	R	Machine Maker	**135**
128	Operation	T4 Code,the front 2 digits are defined to be 00 or the same with the later 2 digits	R	Machine Maker	**136**
130	Operation	UNIT OF INPUT VALUE	R	End User	**136**
131	Operation	CUTTER COMPENSATION TYPE 0)A 1)B	R	Machine Maker	**136**
132	Operation	X Axis is 0)Diameter 1) Radius Command	⊙	Machine Maker	**136**
135	Operation	Power ON Coordinates 0) Absolute G90 1)Incremental G91	⊙	End User	**136**
140	Operation	GLOBAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED	R	End User	**137**
141	Operation	LOCAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED	R	End User	**137**
145	Operation	Power ON Plane Default Setting 0)XY 1)ZX 2)YZ	⊙	Machine Maker	**137**
146	Operation	M CODE FOR MACRO O9001	R	Machine Maker	**138**
147	Operation	M CODE FOR MACRO O9002	R	Machine Maker	**138**
148	Operation	M CODE FOR MACRO O9003	R	Machine Maker	**138**
149	Operation	DEFAULT FEED RATE	⊙	End User	**138**
150	Operation	TOOL ESCAPE AMOUNT IN DRILLING CYCLE	R	End User	**138**
151	Operation	Tool Length Compensation 0)Radius 1)Diameter	R	Machine Maker	**139**
152	Operation	ROTARY PATH OF THE 4TH AXIS	R	End User	**140**
153	Operation	G CODE USE TYPE 0)B 1)A 2)C	⊙	Machine Maker	**140**
154	Operation	G71/G72 Appereance Over Cut Checking 0)YES 1) NO	R	End User	**140**
155	Operation	UNIT OF INITIAL FEED RATE 0)MM/REV 1)MM/MIN	⊙	End User	**141**
156	Servo	COMMAND TYPE OF X AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**86**
157	Servo	COMMAND TYPE OF Y AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**86**
158	Servo	COMMAND TYPE OF Z AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**86**
159	Servo	COMMAND TYPE OF THE 4TH AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**86**
160	Spindle	1st Spindle Encoder 0)Spindle1) Motor	R	Machine Maker	**100**
161	Operation	M CODE FOR MACRO O9004	R	Machine Maker	**141**
162	Operation	M CODE FOR MACRO O9005	R	Machine Maker	**141**
163	Operation	M CODE FOR MACRO O9006	R	Machine Maker	**141**
164	Operation	M CODE FOR MACRO O9007	R	Machine Maker	**141**
165	Operation	M CODE FOR MACRO O9008	R	Machine Maker	**141**
166	Operation	G CODE FOR MACRO O9010	R	Machine Maker	**141**

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168	Operation	G CODE FOR MACRO O9012	R	Machine Maker	**141**
169	Operation	T CODE CALLS O9020	R	Machine Maker	**141**
172	Servo	G00 ACC/DEC Format 0)Straight Line1) S Curve	⊙	Machine Maker	**86**
173	Servo	G01 ACC/DEC Format 0) Index 1)S Curve	⊙	Machine Maker	**87**
175	Zero Point	HOME DOG I POINT 0)LOCAL 1)REMOTE	⊙	Machine Maker	**123**
176	Operation	LOCAL PORT NO FOR G31 P1	R	Machine Maker	**141**
177	Operation	G31 SIGNAL SOURCE TYPE 0)NC 1)NO	R	Machine Maker	**142**
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179	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 3RD GEAR	⊙	Machine Maker	**101**
180	Operation	ENABLE MANUAL RETURN	R	End User	**142**
181	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**101**
182	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 4TH GEAR	⊙	Machine Maker	**102**
183	Spindle	COMMAND TYPE OF THE 1ST SPINDLE'S SPEED	⊙	Machine Maker	**102**
184	Spindle	LOCAL INPUT OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**103**
185	Servo	INV POS FEEDBACK OF EACH AXIS	⊙	Machine Maker	**88**
187	Operation	AUTO ARC FEED RATE CLAMP 0)NO 1)YES	R	End User	**143**
188	Servo	POSITION LOOP GAIN OF SERVO AXIS IN PULSE COMMAND 1/sec.	R	Machine Maker	**88**
189	Spindle	DEFAULT RPM INITIAL SPEED OF THE 1ST SPINDLE WHILE POWER ON	⊙	End User	**104**
190	Spindle	SPINDLE ORIENTATION COMMAND TYPE 0)AB 1)CW 2)PLS/D	⊙	Machine Maker	**104**
191	Servo	ENCORDER SIGNAL FORMAT OF X AXIS	⊙	Machine Maker	**88**
192	Servo	ENCORDER SIGNAL FORMAT OF Y AXIS	⊙	Machine Maker	**88**
193	Servo	ENCORDER SIGNAL FORMAT OF Z AXIS	⊙	Machine Maker	**88**
194	Servo	ENCORDER SIGNAL FORMAT OF THE 4TH AXIS	⊙	Machine Maker	**88**
195	Spindle	SIGNAL FORMAT OF THE 1ST SPINDLE'S ENCODER	⊙	Machine Maker	**105**
196	Operation	G78(G92) Approach Chamfering Length (0.1 thread thread)	R	End User	**144**
197	Operation	G78(G92) Approach Chamfering Angle(Degree)	R	End User	**144**
198	Operation	G78(G92) Departure Chamfer Length(0.1 thread)	R	End User	**144**
199	Operation	G78(G92) Departure Chamfering Angle(Degree)	R	End User	**144**
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203	Operation	Auto Mode Program RESET 0)NO 1)YES	R	End User	**145**
204	Zero Point	ZERO POINT RECORDED BY NC BIT	R	Machine Maker	**123**
205	Operation	TOOL COMPENSATION 0)ABSOLUTE 1) RELATIVE INPUT	R	End User	**145**
211	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
212	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
213	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
214	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
215	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
216	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
217	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
218	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
219	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
220	Operation	STOP PRE-INTERPRETATION OF M CODE	R	End User	**145**
221	Operation	DIGITAL FILTER FREQUENCY (KHZ)	⊙	Machine Maker	**146**
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231	Operation	HIDE INFORMATION OF X AXIS		Machine Maker	**146**
232	Operation	HIDE INFORMATION OF Y AXIS		Machine Maker	**146**
233	Operation	HIDE INFORMATION OF Z AXIS		Machine Maker	**146**
234	Operation	HIDE INFORMATION OF THE 4TH AXIS		Machine Maker	**146**
238	Operation	Appereance Compensation Value 0)Absolute 1)Incremental Input	R	End User	**147**
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240	Spindle	CLOSE LOOP GAIN OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**105**
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244	Operation	P4 Signal Source HS Connector Port Code	R	Machine Maker	**141**
245	Operation	P2 Signal Source Connection Type 0)NC 1)NO	R	Machine Maker	**142**
246	Operation	P3 Signal Source Connection Type 0)NC 1)NO	R	Machine Maker	**142**
247	Operation	P4 Signal Source Connection Type 0)NC 1)NO	R	Machine Maker	**142**
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300	Compensation	PITCH ERROR COMPENSATION OF 001 SESSION OF X AXIS μm	R	Machine Maker	**114**
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351	Operation	UNIT OF CUTTING OVERRIDE FEED RATE	⊙	Machine Maker	**147**
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371	Operation	SET THE NUMBER FOR LIGHT GREEN (0~16)	⊙	End User	**148**
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377	Operation	SET THE NUMBER FOR CURSOR (0~16)	⊙	End User	**148**
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380	Operation	SET THE NUMBER FOR LOWER FRAME (0~16)	⊙	End User	**148**
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501	Operation	X -1st Soft No Go Area (um)	R	Machine Maker	**149**
502	Operation	Y +1st Soft No Go Area (um)	R	Machine Maker	**149**
503	Operation	Y -1st Soft No Go Area (um)	R	Machine Maker	**149**
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516	Operation	Z +2ND Soft No Go Area (um)	R	Machine Maker	**149**
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518	Operation	4TH AXIS +2ND Soft No Go Area (um)	R	Machine Maker	**149**
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600	Compensation	PITCH ERROR COMPENSATION OF 001 SESSION OF Z AXIS μm	R	Machine Maker	**114**
649	Compensation	PITCH ERROR COMPENSATION OF 050 SESSION OF Z AXIS μm	R	Machine Maker	**114**
663	Spindle	1ST SPD ORIENT ACC/DEC TIME	⊙	Machine Maker	**105**
664	Spindle	MOTOR'S TOOTH NUMBER OF THE 2ND SPINDLE IN 1ST GEAR	⊙	Machine Maker	**97**
665	Spindle	THE 2ND SPINDLE'S TEETH NUMBER IN 1ST GEAR	⊙	Machine Maker	**97**
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667	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 2ND GEAR	⊙	Machine Maker	**98**
668	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 3RD GEAR	⊙	Machine Maker	**101**
669	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 3RD GEAR	⊙	Machine Maker	**101**
670	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**101**
671	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 4TH GEAR	⊙	Machine Maker	**102**
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675	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 2ND GEAR	⊙	Machine Maker	**98**
676	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 3RD GEAR	⊙	Machine Maker	**101**
677	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 3RD GEAR	⊙	Machine Maker	**101**
678	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**101**
679	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 4TH GEAR	⊙	Machine Maker	**102**
680	Operation	Enable Slant Axis Control Function	⊙	Machine Maker	**151**
681	Operation	Enable Distanced Reference Point Come Back and Forth Along with the Slant Axis	⊙	Machine Maker	**151**
682	Operation	Setting Angle of Slant Axis	⊙	Machine Maker	**151**
683	Operation	Setting Slant Axis No. Controlled by Slant Axis	⊙	Machine Maker	**151**
684	Operation	Setting Vertical Axis No. Controlled by Slant Axis	⊙	Machine Maker	**151**
750	Compensation	PITCH ERROR COMPENSATION OF 001 SESSION OF THE 4TH AXIS μm	R	Machine Maker	**114**
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800	Servo	G00'S IN-POSITION CHECK WINDOW OF X AXIS, μm	R	Machine Maker	**89**
801	Servo	G00'S IN-POSITION CHECK WINDOW OF Y AXIS, μm	R	Machine Maker	**89**
802	Servo	G00'S IN-POSITION CHECK WINDOW OF Z AXIS, μm	R	Machine Maker	**89**
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806	Operation	Max. Allowed Tolerance Value of Cornering um	R	End User	**152**
808	Operation	Cornering Deceleration Function 0) Cancel 1) USE	R	End User	**152**
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811	Compensation	BALL BAR COMPENSATION G CODE 0)G2 G3 1) ALL	R	Machine Maker	**114**
812	Compensation	REVERSAL SPIKE COMPENSATION: ＋X	R	Machine Maker	**115**
813	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: ＋X	R	Machine Maker	**115**
814	Compensation	REVERSAL SPIKE LAG COMPENSATION: ＋X	R	Machine Maker	**115**
815	Compensation	REVERSAL SPIKE COMPENSATION: －X	R	Machine Maker	**115**
816	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －X	R	Machine Maker	**116**
817	Compensation	REVERSAL SPIKE LAG COMPENSATION: －X	R	Machine Maker	**116**
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825	Compensation	REVERSAL SPIKE COMPENSATION: －Y	R	Machine Maker	**115**
826	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －Y	R	Machine Maker	**116**
827	Compensation	REVERSAL SPIKE LAG COMPENSATION: －Y	R	Machine Maker	**116**
828	Compensation	REVERSAL SPIKE COMPENSATION: ＋Z	R	Machine Maker	**115**
829	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: ＋Z	R	Machine Maker	**115**
830	Compensation	REVERSAL SPIKE LAG COMPENSATION: ＋Z	R	Machine Maker	**115**
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832	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －Z	R	Machine Maker	**116**
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834	Zero Point	READING DURATION TIME OF ABSOLUTE ENCODER	R	Machine Maker	**124**
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836	Spindle	Spindle CH Orientation Release M Code	⊙	Machine Maker	**106**
837	Spindle	Spindle Orientation Starts At M CODE	R	Machine Maker	**106**
838	Spindle	Spindle Orientation Using M CODEN Number	R	Machine Maker	**106**
839	Spindle	1st Spindle Orientation Allowing Error Amount	R	Machine Maker	**107**
840	Compensation	X Axis Heat Shape Transforming Compensation0) OFF 1)ON	⊙	Machine Maker	**116**
841	Compensation	X Axis Total Compensation Amount Working Compensation Time SEC	⊙	Machine Maker	**117**
842	Compensation	X Axis Heat Shape Transforming Total Compensation Amount UM	⊙	Machine Maker	**117**
843	Compensation	X Axis Total Compensation Amount Stop RecoveringTime SEC	⊙	Machine Maker	**117**
851	Compensation	Y Axis Heat Shape Transforming Compensation0) OFF 1)ON	⊙	Machine Maker	**116**
852	Compensation	Y Axis Total Compensation Amount Working Compensation Time SEC	⊙	Machine Maker	**117**
853	Compensation	Y Axis Heat Shape Transforming Total Compensation Amount UM	⊙	Machine Maker	**117**
854	Compensation	X Axis Total Compensation Amount Stop RecoveringTime SEC	⊙	Machine Maker	**117**
856	Compensation	Z Axis Heat Shape Transforming Compensation0) OFF 1)ON	⊙	Machine Maker	**116**
857	Compensation	Z Axis Total Compensation Amount Working Compensation Time SEC	⊙	Machine Maker	**117**
858	Compensation	Z Axis Heat Shape Transforming Total Compensation Amount UM	⊙	Machine Maker	**117**

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861	Compensation	4th Axis Heat Shape Transforming Compensation0) OFF 1)ON	⊙	Machine Maker	**116**
862	Compensation	4th Axis Total Compensation Amount Working Compensation Time SEC	⊙	Machine Maker	**117**
863	Compensation	4th Axis Heat Shape Transforming Total Compensation Amount UM	⊙	Machine Maker	**117**
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866	Operation	Manually Measure Signal Source HS Connecting Port Code 1/2	R	Machine Maker	**153**
867	Operation	Manually Measure Signal Conneting Points Type 0)NC 1)NO	R	Machine Maker	**153**
868	Operation	Manually Measure Setting Default Offset Number	R	End User	**153**
869	Operation	While Manually Measuring, ACC/DEC 0)NO 1) YES	⊙	Machine Maker	**153**
870	Operation	Use Cutting Releasing Signal	R	Machine Maker	**154**
871	Operation	Waiting Time Before Cutting Releasing	R	Machine Maker	**154**
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879	Spindle	MAX. RPM OF THE 3RD SPINDLE	R	Machine Maker	**100**
880	Spindle	MIN. RPM OF THE 3RD SPINDLE	R	Machine Maker	**100**
881	Spindle	RPM REACHES SET RANGE OF THE 3RD SPINDLE	R	Machine Maker	**107**
882	Spindle	THE 3RD SPINDLE REACHES ZERO SPEED RPM	R	Machine Maker	**108**
883	Spindle	CORRESPONDING RPM OF THE 2ND SPINDLE MOTOR'S INPUT VOLTAGE 10V	R	Machine Maker	**99**
884	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 2ND SPINDLE'S RPM	R	Machine Maker	**100**
885	Spindle	ACC/DEC TIME OF 2ND SPINDLE	⊙	Machine Maker	**96**
886	Spindle	CORRESPONDING RPM OF THE 3rd SPINDLE MOTOR'S INPUT VOLTAGE 10V	R	Machine Maker	**99**
887	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 3RD SPINDLE'S RPM	R	Machine Maker	**100**
888	Spindle	ACCEL. /DECEL. TIME PER KILO-REV.OF THE 3RD SPINDLE	⊙	Machine Maker	**96**
889	Spindle	PPR OF THE 2ND SPINDLE'S ENCODER	⊙	Machine Maker	**99**
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893	Spindle	PPR OF THE 3RD SPINDLE'S ENCODER	⊙	Machine Maker	**99**
894	Spindle	FEEDBACK RATE OF THE 3RD SPINDLE	⊙	Machine Maker	**98**
895	Spindle	SIGNAL FORMAT OF THE 3RD SPINDLE'S ENCODER	⊙	Machine Maker	**105**
896	Spindle	INSTALL THE 3RD SPINDLE'S ENCODER ONTO THE 0)SPINDLE 1)MOTOR	R	Machine Maker	**100**
897	Spindle	THE 2ND SPINDLE DISPLAYS 0)COMMAND 1) SENSOR	R	Machine Maker	**99**
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899	Operation	APPLY CE REGULATIONS 0)NO 1)YES	R	Machine Maker	**155**
1000	Servo	G00 MAX. SPEED OF X AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**89**
1001	Servo	G00 MAX. SPEED OF Y AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**89**
1002	Servo	G00 MAX. SPEED OF Z AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**89**
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1004	Servo	G01 MAX. SPEED OF LINEAR CUTTING, μm/min	R	Machine Maker	**89**
1006	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +X μm	R	Machine Maker	**155**
1007	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: -X μm	R	Machine Maker	**155**
1008	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Y μm	R	Machine Maker	**155**
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1010	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Z μm	R	Machine Maker	**155**
1011	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: -Z μm	R	Machine Maker	**155**
1012	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +THE 4TH μm	R	Machine Maker	**155**
1013	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: -THE 4TH AXIS μm	R	Machine Maker	**155**
1014	Zero Point	ABSOLUTE COORDINATES OF X AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**124**
1015	Zero Point	ABSOLUTE COORDINATES OF Y AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**124**
1016	Zero Point	ABSOLUTE COORDINATES OF Z AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**124**
1017	Zero Point	ABSOLUTE COORDINATES OF THE 4TH AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**124**
1018	Compensation	SESSION INTERVAL OF PITCH ERROR COMPENSATION: X AXIS μm	⊙	Machine Maker	**117**
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1024	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
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1026	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1027	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1028	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1029	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1030	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1031	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1032	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1033	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**125**
1034	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +X μm	R	Machine Maker	**156**
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1036	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Y μm	R	Machine Maker	**156**
1037	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Y μm	R	Machine Maker	**156**
1038	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Z μm	R	Machine Maker	**156**
1039	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Z μm	R	Machine Maker	**156**
1040	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +4TH AXIS μm	R	Machine Maker	**156**
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NO.	Group	Description & Unit	Effective	Level	Page
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1043	Operation	G83 Face Drilling Mode Setting 0)High Spee 1) Normal		End User	**156**
1044	Operation	G87 Face Drilling Mode Setting 0)High Spee 1) Normal		End User	**157**
1045	Operation	P2 Pause Time(ms)		End User	**157**
1046	Compensation	START POSITION OF PITCH ERROR: X AXIS μm	⊙	Machine Maker	**118**
1047	Compensation	START POSITION OF PITCH ERROR: Y AXIS μm	⊙	Machine Maker	**118**
1048	Compensation	START POSITION OF PITCH ERROR: Z AXIS μm	⊙	Machine Maker	**118**
1049	Compensation	START POSITION OF PITCH ERROR: THE 4TH AXIS μm	⊙	Machine Maker	**118**
1054	Spindle	RPM REACHES SET RANGE OF THE 1ST SPINDLE	R	Machine Maker	**107**
1056	Spindle	SPD ORIENTATION OFFSET ANGLE	R	Machine Maker	**107**
1059	Spindle	ACCEL. /DECEL. TIME PER KILO-REV. OF THE 1ST SPINDLE DURING RIGID TAPPING	R	Machine Maker	**107**
1061	Servo	MAX. SPEED OF LATHE TAPPING	R	Machine Maker	**90**
1062	Spindle	Spindle Orientation Basic Angle Shift Amount	R	Machine Maker	**108**
1063	Spindle	THE 1ST SPINDLE REACHES ZERO SPEED RPM	R	Machine Maker	**108**
1064	Spindle	COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING	R	Machine Maker	**108**
1065	Spindle	COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S ACCELERATION DURING RIGID TAPPING	R	Machine Maker	**108**
1066	Spindle	COMPENSATIVE FILTER INTENSITY OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING	R	Machine Maker	**109**
1069	Spindle	1st Spindle Rigid Tapping Spindle Stop Checking Range	R	Machine Maker	**109**
1070	Spindle	1st Spindle Rigid Tapping Accelerating Speed Compensation Filter Strength	R	Machine Maker	**109**
1072	Servo	Setting Paulse Raise Up Width US	⊙	Machine Maker	**90**
1075	Spindle	TOLERANCE OF THE 1ST SPINDLE IN CONTROL MODE	R	Machine Maker	**110**
1076	Spindle	1ST SPD RIGTAP DEC TIME/1000 RPM	R	Machine Maker	**110**
1081	Operation	G71/G72 Multiple Deep Cutting um	R	End User	**157**
1082	Operation	G71/G72 Multiple Back Moving Default um	R	End User	**157**
1083	Operation	G73 X Axis Shrinking Amount Default um	R	End User	**157**
1084	Operation	G73 Z Axis Shrinking Amount Default um	R	End User	**157**
1085	Operation	G73 Cutting Number Default um	R	End User	**158**
1086	Operation	G74/G75 Return Amount Default um	R	End User	**158**
1087	Operation	G76 Repeating Times mm / Charmfering Length rr(4 digits)	R	End User	**158**
1088	Operation	G76 Tool Nose Angle Default	R	End User	**158**
1089	Operation	G76 Min. Cutting Volumn Default um	R	End User	**158**
1090	Operation	G76 Fine Cutting Volumn Default um	R	End User	**159**
1095	Spindle	SpindleC(H) Orientation Zero Point Position	R	Machine Maker	**110**

NO.	Group	Description & Unit	Effective	Level	Page
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1101	Servo	JOG SPEED FOR Y AXIS μm/min	R	Machine Maker	**91**
1102	Servo	JOG SPEED FOR Z AXIS μm/min	R	Machine Maker	**91**
1103	Servo	JOG SPEED FOR THE 4TH AXIS μm/min	R	Machine Maker	**91**
1104	Zero Point	HOME RETURN AT THE 1ST SPEED: X AXIS μm/min	R	Machine Maker	**126**
1105	Zero Point	HOME RETURN AT THE 1ST SPEED: Y AXIS μm/min	R	Machine Maker	**126**
1106	Zero Point	HOME RETURN AT THE 1ST SPEED: Z AXIS μm/min	R	Machine Maker	**126**
1107	Zero Point	HOME RETURN AT THE 1ST SPEED: THE 4TH AXIS μm/min	R	Machine Maker	**126**
1108	Zero Point	HOME RETURN AT THE 2ND SPEED: X AXIS μm/min	R	Machine Maker	**126**
1109	Zero Point	HOME RETURN AT THE 2ND SPEED: Y AXIS μm/min	R	Machine Maker	**126**
1110	Zero Point	HOME RETURN AT THE 2ND SPEED: Z AXIS μm/min	R	Machine Maker	**126**
1111	Zero Point	HOME RETURN AT THE 2ND SPEED: THE 4TH AXIS μm/min	R	Machine Maker	**126**
1117	Spindle	Spindle CH Orientation RPM	R	Machine Maker	**110**
1118	Zero Point	Open Reference Point Protecting Function	R	End User	**126**
1121	Spindle	JOG RPM OF THE 1ST SPINDLE	R	Machine Maker	**110**
1122	Spindle	2nd Spindle JOG RPM	R	Machine Maker	**110**
1123	Spindle	3rd Spindle JOG RPM	R	Machine Maker	**110**
1158	Operation	SHOW F2~F12 FOR FUN. KEY	⊙	End User	**159**
1159	Operation	PROGRAM READING OVERTIME		End User	**159**
1160	Operation	X+ Distance Between Machine Zero Point and Touch Side	R	Machine Maker	**159**
1161	Operation	X- Distance Between Machine Zero Point and Touch Side	R	Machine Maker	**159**
1162	Operation	Z+ Distance Between Machine Zero Point and Touch Side	R	Machine Maker	**159**
1163	Operation	Z- Distance Between Machine Zero Point and Touch Side	R	Machine Maker	**159**
1164	Spindle	2nd Spindle Rigid Tapping ACC/DEC TIME	R	Machine Maker	**107**
1165	Spindle	3rd Spindle Rigid Tapping ACC/DEC TIME	R	Machine Maker	**107**
1166	Spindle	2nd Spindle Rigid Tapping Speed Compensation Amount	R	Machine Maker	**108**
1167	Spindle	3rd Spindle Rigid Tapping Speed Compensation Amount	R	Machine Maker	**108**
1168	Spindle	2nd Spindle Rigid Tapping Accelerating Speed Compensation Amount	R	Machine Maker	**108**
1169	Spindle	3rd Spindle Spindle Rigid Tapping Accelerating Speed Compensation Amount	R	Machine Maker	**108**
1170	Spindle	2nd Spindle Rigid Tapping Speed Filter Stregth	R	Machine Maker	**109**

NO.	Group	Description & Unit	Effective	Level	Page
1171	Spindle	3rd Spindle Rigid Tapping Speed Filter Stregth	R	Machine Maker	**109**
1172	Spindle	2nd Spindle Rigid Tapping Acceleration Speed Filter Stregth	R	Machine Maker	**109**
1173	Spindle	3rd Spindle Rigid Tapping Acceleration Speed Filter Stregth	R	Machine Maker	**109**
1174	Spindle	2nd Spindle Rigid TappingSpindle Stop Checking Range	R	Machine Maker	**109**
1175	Spindle	3rd Spindle Rigid TappingSpindle Stop Checking Range	R	Machine Maker	**109**
1176	Spindle	2nd Spindle Rigid Tapping Deceleration Time Per Thousand RPM	R	Machine Maker	**110**
1177	Spindle	3rd Spindle Rigid Tapping Deceleration Time Per Thousand RPM	R	Machine Maker	**110**
1806	Operation	COM1 address (0:Disable 744~1016)	⊙	Machine Maker	**160**
1807	Operation	COM2 address (0:Disable 744~1016)	⊙	Machine Maker	**160**
1808	Operation	COM1 Interrupt number (3~7)	⊙	Machine Maker	**161**
1809	Operation	COM2 Interrupt number (3~7)	⊙	Machine Maker	**161**
1810	Operation	COM1 (0:Non 1:File 2:ABS 3:Spindle)	⊙	Machine Maker	**161**
1811	Operation	COM1 address (0:Disable 744~1016)	⊙	Machine Maker	**161**
1824	Servo	Servo communication type(0:NO 1:M)	⊙	Machine Maker	**91**
1825	Servo	X Axis Servo Communication Booth No. (0: Not Using 1~15)	⊙	Machine Maker	**91**
1826	Servo	Y Axis Servo Communication Booth No. (0: Not Using 1~15)	⊙	Machine Maker	**91**
1827	Servo	Z Axis Servo Communication Booth No. (0: Not Using 1~15)	⊙	Machine Maker	**91**
1828	Servo	4th Axis Servo Communication Booth No. (0: Not Using 1~15)	⊙	Machine Maker	**91**

3.2Servo Parameters

1	SYSTEM LOOP GAINS FOR V CMD 1/sec

Range： 1 ~ 20000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 30
Unit ： 1/sec
Description： This parameter is to set maximum following error amount of X axis (SERVO LAG). When the following error amount of X axis is over this parameter setting value, System Alarm [MOT 4006 X Axis Servo LAG Over Para. 2 Setting Value] will occur.
lag = F/Kp
F is the feedrate; Kp is the position Loop incremental value.
From the above formula, the bigger the feedrate, the bigger the following error amount. So, user only needs to key-in maximum speed into the above formula to get the maximum following error amount of the axis.
Example:
gain is $100(\frac{1}{s})$, the speed of G00 is 20000mm/min, and the servo lag would be:

$$lag = \frac{20000000(\mu m)}{60(s)\times 100(\frac{1}{s})} = 3333.3\mu m$$

When the machine functions normally, the servo lag amount of X axis should not exceed 3334 μm at any time. Hence, the recommendation is to multiply this value by a safe coefficient (about 1.1) and enter the product into Pr. 0002.

2	MAX. SERVO LAG OF X AXIS, μm
3	MAX. SERVO LAG OF Y AXIS, μm
4	MAX. SERVO LAG OF Z AXIS, μm
5	MAX. SERVO LAG OF THE 4TH AXIS, μm

Range： 1 ~ 30000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 30000
Unit ： um
Description：

For Example:
This parameter is to set maximum following error amount of each axis (SERVO LAG). Once the following servo lag of each axis is over this parameter setting value, it will trigger system alarm [MOT The Axis Servo LAG Over Para. Setting Value]. Servo axis under uniform speed movement, following error amount value could get from below formula:

lag = F/Kp

F is the feedrate; Kp is the position Loop incremental value.
From the above formula, the bigger the feedrate, the bigger the following error amount. So, user only needs to key-in maximum speed of each axis into the above formula to get the maximum following error amount of the axis.
Example:
X axis position gain is 100sec-1, the speed of G00 is 20000mm/min. Under rapid traverse uniform speed movement, the servo lag amoung would be:

$$lag = \frac{20000000(\mu m)}{60(s)\times 100(\frac{1}{s})} = 3333.3\mu m$$

lag = （20000000 μm / 60s） / （100s-1） = 3333.3 μm
When the machine functions normally, the servo lag amount of each axis should not exceed more than 3334μm at any time. Hence, the recommendation is to multiply this value by a safe coefficient (about 1.1) and enter the value into Pr. 0002.

6	**IN-POSITION CHECK WINDOW OF X AXIS, μm**
7	**IN-POSITION CHECK WINDOW OF Y AXIS, μm**
8	**IN-POSITION CHECK WINDOW OF Z AXIS, μm**
9	**IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm**

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 50
Unit ： um
Description： This parameter sets the in-position check window range of each axis in the Exact Stop mode. (Using G09 or G61 command) When some axis's
| command position – actual position | ≦ this parameter's set value,
This means that this axis has completed cutting feed and stopped. Please also refer to the setting description of Pr. 0043.

10	**G00'S ACCEL. /DECEL. TIME OF X AXIS, ms**
11	**G00'S ACCEL. /DECEL. TIME OF Y AXIS, ms**
12	**G00'S ACCEL. /DECEL. TIME OF Z AXIS, ms**
13	**G00'S ACCEL. /DECEL. TIME OF THE 4TH AXIS, ms**

Range： 3 ~ 1500
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 230
Unit ： ms
Description： This parameter sets each axis's acceleration & deceleration time of rapid traverse. The smaller the parameter is, the faster each axis reaches the designated motion speed. However, this might also cause vibration of each axis.
For 486IPC version (IPO is 5ms), the maximum value of this parameter is 2000.
For 586IPC version (IPO is 3ms), the maximum value of this parameter is 1500.
If the set value is smaller than IPO cycle or exceeds the tolerance of the above values, the alarm "MOT4031 ~ 4034 G00 ACC/DCC (Pr. 10~13) SET PAR ERROR" will be triggered.

14	**G01 ACCEL. /DECEL. TIME ms**

Range： 3 ~ 1500
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 100
Unit ： ms
Description： This parameter is to set the acceleration/deceleration time of G00 of all servo axes. The smaller this parameter is, the faster the servo axis reaches the specified speed; vibration, however, would be more indispensable. For 486IPC version (the IPO is 10ms), the max. Value is 2000; for 586IPC version (the IPO is 3ms), the max. Value is 1500.
If the set value exceeds the above limit, the alarm "MOT 4030 SET PAR 14 ERROR" will be triggered.

18	THREAD CUTTING ACC/DEC TIME

Range： 1 ~ 1000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 50
Unit ： ms
Description： This parameter is to set acceleration/deceleration time of cutting axis under thread cutting command. The smaller value of this parameter, the faster the cutting axis reaches to specific speed. Vibration, however, would be more indispensable. For 486IPC version (the IPO is 5ms), the max. Value is 1000; for 586IPC version (the IPO is 3ms), the max. Value is 1000.
If the set value exceeds the above limit, the alarm "MOT 4056 SET PAR 18 ERROR" will be triggered.

24	CORRESPONDING SERVO AXIS NUMBER OF X AXIS
25	CORRESPONDING SERVO AXIS NUMBER OF Y AXIS
26	CORRESPONDING SERVO AXIS NUMBER OF Z AXIS
27	CORRESPONDING SERVO AXIS NUMBER OF THE 4TH AXIS

Range： 0 ~ 6
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： If the lead of X (Y, Z, the 4^{th}) axis is connected to the N^{th} axis of the transit card, then set this parameter to N; if not connected to a motor, set to 0.

40	G00 Min.OVERRIDE Percentage Value At F0

Range： 0 ~ 25
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 10
Unit ： %
Description： This parameter sets the actual override value in percentage when the override rotary switch of rapid traverse is turned to 0%. For example, if this parameter is set to 10, and the rotary switch of rapid traverse is turned to 0%, then the actual corresponding value is 10%.

53	ENCODER FEEDBACK MULTIPLIER OF THE 4TH AXIS 1/2/4
54	ENCODER FEEDBACK MULTIPLIER OF X AXIS 1/2/4
55	ENCODER FEEDBACK MULTIPLIER OF Y AXIS 1/2/4
56	ENCODER FEEDBACK MULTIPLIER OF Z AXIS 1/2/4

Range： 1 ~ 4
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 4
Unit ： None
Description： This parameter sets the encoder feedback multiplier of each axis. This parameter is valid only when the types of encoder feedback signals are A/B PHASE.(setting value is 0); if each axis's encoder feedback signals are the

CW/CCW or PULSE/DIRECTION type (the set value is 1 or 2, respectively), then the encoder feedback multiplier factor would always be 1.
In Pulse Command mode, the setting value of this parameter multiplying the output pulse number for each motor encoder to make one revolution(rotation) is equal to the pulse command amount that NC demands to enable each axial motor to make send out. (one revolution).

58	**Pulses of Each Roation of X Axis Encoder**
59	**Pulses of Each Roation of Y Axis Encoder**
60	**Pulses of Each Roation of Z Axis Encoder**
67	**Pulses of Each Roation of 4th Axis Encoder**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 2500
Unit ： pulse
Description： Assuming the motor ENCODER of this axis, the pulse amount of one revolutionout put is 2500. Then this parameter should be set 2500. You could refer each axis feedback multiply factor setting description.

65	**ABSOLUTE ENCODER BIT 0-3**

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT 0：Set 0=X use Incremental encoder, set1= X use ABS encoder.
BIT 1：Set 0=Y use Incremental encoder, set1= Y use ABS encoder.
BIT 2：Set 0=Z use Incremental encoder, set1= Z use ABS encoder.
BIT 3：Set 0=4TH use Incremental encoder, set1= 4TH use ABS encoder.

66	**SET THE 4TH AXIS AS A 0)RATORY 1)LINEAR AXIS**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0: Rotary axis;
1: Linear axis.
If the 4th ~6th axes are linear axes, their ball screw's pitch should be set according to its actual value; if the axes are rotary axes, the ball screw's pitch should be set to 360 (which indicate 360◦).

85	**100 Times P2-P5 Max. Servo Lag Setting**

Range： 0 ~ 15
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT 0 =1, X axis max. servo lag amount (Pr.0002) magnify 100 times;
BIT 1=1, X axis max. servo lag amount (Pr.0003) magnify 100 times;

BIT 2=1, X axis max. servo lag amount (Pr.0004) magnify 100 times; ;
BIT 3=1, X axis max. servo lag amount (Pr.0005) magnify 100 times;

108	**RPM TO VOLTAGE RATIO FOR X AXIS RPM/1V**
109	**RPM TO VOLTAGE RATIO FOR Y AXIS RPM/1V**
110	**RPM TO VOLTAGE RATIO FOR Z AXIS RPM/1V**
111	**RPM TO VOLTAGE RATIO FOR THE 4TH AXIS RPM/1V**

Range： 1 ~ 20000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 200
Unit ： RPM/1V
Description：

This parameter sets the RPM that corresponds to 1V of input voltage for each axis motor. For example, if the input voltage is 10V, and the rotation speed of each axis motor is 2000RPM, then this parameter's set value would be 200.

This parameter is only effective when the control mode of each axis is V Command.

116	**Reverse Direction Moving Command Output for Each Axis BIT0-4**

Range： 0 ~ 31
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description：

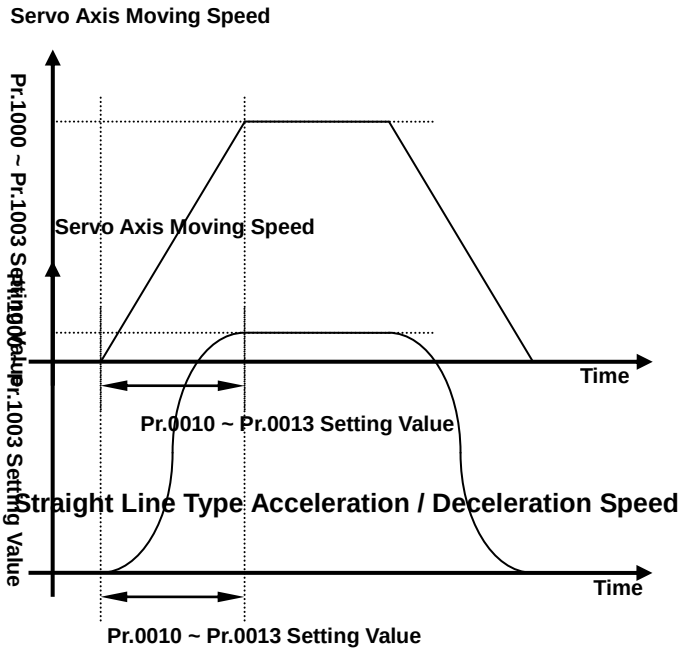
BIT0：When set as 1, the X-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT1：When set as 1, the Y-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT2：When set as 1, the Z-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT3：When set as 1, the 4^{TH}-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT4：When set as 1, the spindle-axis should rotate in reverse direction against previous. When set as 0, there is no reverse rotation. This only effects only when the spindle is under PULSE COMMAND, such as spindle orientation and rigid tapping.
Description: Take the X-axis for example, under JOG mode, if you pressed the +x button on the OP panel, the machine X-axis moves in negative direction, it means motor's positive rotation is in reverse to +X axis direction. Please set BIT0 as 1. If you pressed the +x button on the OP panel, the machine X-axis moves in positive direction as well, please set BIT0 as 0. Such is the same with the entire rest axis.

156	COMMAND TYPE OF X AXIS 0)AB 1)CW 2)PD 3)V
157	COMMAND TYPE OF Y AXIS 0)AB 1)CW 2)PD 3)V
158	COMMAND TYPE OF Z AXIS 0)AB 1)CW 2)PD 3)V
159	COMMAND TYPE OF THE 4TH AXIS 0)AB 1)CW 2)PD 3)V

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：A/B PHASE；
1：CW/CCW；
2：PULSE/DIRECTION。
3：Voltage。
Except pulse command type is set at NC side, the same pulse command type must be also set at the motor driver's side. . If the set value is 1 or 2, users must either set the rising width of output pulse (Pr. 1072) or enable Pr. 0186 so the rising width of output pulse will be adjusted to 50% automatically. For A/B PHASE, NC motion card shall adjust itself to 50% duration automatically and does not require additional settings.

172	G00 ACC/DEC Format 0)Straight Line1) S Curve

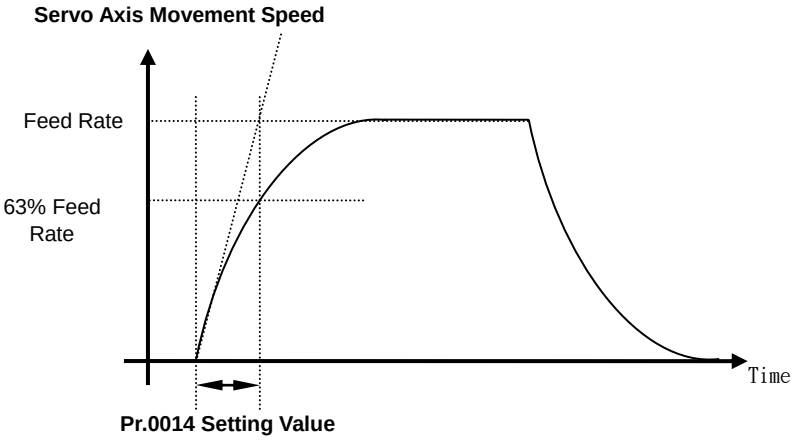
Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：Straight Line Type Acceleration / Deceleration Speed；
1：S Curve Line Type Acceleration / Deceleration Speed;



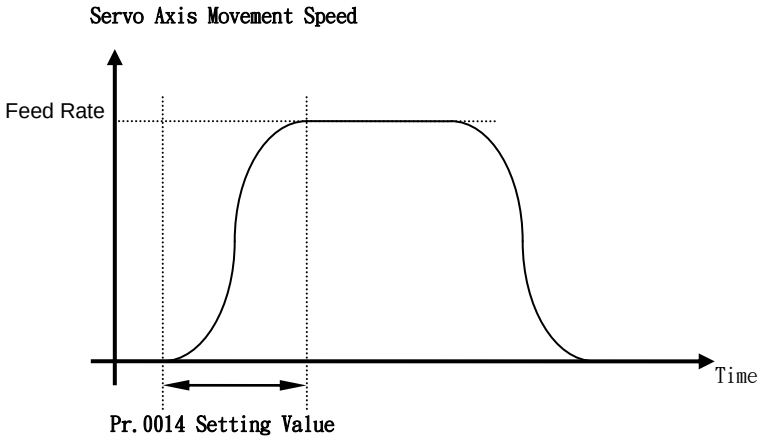
S Curve Line Type Acceleration / Deceleration Speed

173	G01 ACC/DEC Format 0) Index 1)S Curve

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：Index Type Acceleration / Deceleration Speed;
1：S Curve Line Type Acceleration / Deceleration Speed;



Index Type Acceleration / Deceleration Speed



S Curve Type Acceleration / Deceleration Speed

185	INV POS FEEDBACK OF EACH AXIS

Range： 0 ~ 31
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT0：when set as 1, means reverse X-axis ENCODER feedback signal
BIT1：when set as 1, means reverse Y-axis ENCODER feedback signal
BIT2：when set as 1, means reverse Z-axis ENCODER feedback signal
BIT3：when set as 1, means reverse 4^{TH}-axis ENCODER feedback signal
BIT4：when set as 1, means reverse spindle ENCODER feedback signal
【Setting timing】
Take X-axis for example, if X-axis is set as PULSE TYPE, when you press the +X button of OP panel, the machine X-axis moves in positive direction, but the value of system data #000(X-axis following error) continuously increases, and this value doesn’t decrease down to the range of ±1, it means that you have to reverse the X-axis ENCODER signal.
(Usually this is caused when the BIT0 of parameter # 0116 is set as 1.) In this case, please set the BIT0 of parameter # 0116 as 1. If the above didn’t occur, please set the BIT0 of parameter # 0116 as 0. If X-axis is under V COMMAND mode, when you press the +X button of OP panel, the machine X-axis rushes, it means that you have to reverse the X-axis ENCODER signal. In this case, please set the BIT0 of this parameter as1.
So is the same with the other entire axis.

188	POSITION LOOP GAIN OF SERVO AXIS IN PULSE COMMAND 1/sec.

Range： 1 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 30
Unit ： 1/sec
Description： This parameter is to calculate the actual contour of ARCH error set by ARCH FEEDRATE AUTO CLAMP function (please refer to Pr.187 for further details of this function.) Under Pulse Type, because position control loop is processed by servo driver, NC is unable to obtain the set value of this parameter. In order to allow NC to obtain the set value of this parameter when ARCH FEEDRATE AUTO CLAMP function is enabled, a position loop gain must be set manufally in advance. Please note that the position loop gain of each axis must be the same, otherwise, the actual contour of ARCH command will become an ellipse(oval shape).
Please also refer to the descriptions of related parameters: Pr 0187 & 0809.

191	ENCORDER SIGNAL FORMAT OF X AXIS
192	ENCORDER SIGNAL FORMAT OF Y AXIS
193	ENCORDER SIGNAL FORMAT OF Z AXIS
194	ENCORDER SIGNAL FORMAT OF THE 4TH AXIS

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None

Description： 0：A/B PHASE；
1：CW/CCW；
2：PULSE/DIRECTION；
3：None。
This parameter is to set the output signal format of X axis's motor encoder. Please refer to the setting of motor driver. If X axis does not have an encoder (ex. a stepping motor), please set this parameter to 3.

800	**G00'S IN-POSITION CHECK WINDOW OF X AXIS, μm**
801	**G00'S IN-POSITION CHECK WINDOW OF Y AXIS, μm**
802	**G00'S IN-POSITION CHECK WINDOW OF Z AXIS, μm**
803	**G00'S IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm**

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1000
Unit ： um
Description： This parameter is to set the in-position check window range of each axis when the exact stop function of rapid positioning is enabled. When some axis's
| command position – actual position | ≦ this parameter's set value,
This means that this axis has already completed rapid positioning and stopped correctly.

1000	**G00 MAX. SPEED OF X AXIS IN RAPID TRAVERSE, μm/min**
1001	**G00 MAX. SPEED OF Y AXIS IN RAPID TRAVERSE, μm/min**
1002	**G00 MAX. SPEED OF Z AXIS IN RAPID TRAVERSE, μm/min**
1003	**G00 MAX. SPEED OF THE 4TH AXIS IN RAPID TRAVERSE, μm/min**

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 5000000
Unit ： um/min
Description： This parameter is to set the max. movement speed of each axis in-position during rapid traverse.The max. movement speed this time is not indicated by F code feed rate.

1004	**G01 MAX. SPEED OF LINEAR CUTTING, μm/min**

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2000000
Unit ： um/min
Description： This parameter setting value decides following value:
1. The max. feed rate of the linear cutting command G01;
2. The max. feed rate of the curve cutting command G02/03;
3. The feed rate of the cutting commands G01/02/03 in DRY RUN mode.
This parameter's set value is taken by NC as the maximum allowed feedrate even when the actual feedrate set on the operation panel (F code) might exceed this parameter's set value.

1042 **G31 DEFAULT FEED RATE**

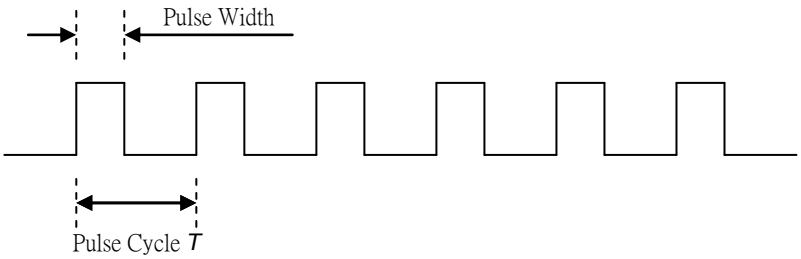
Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2000
Unit ： um/min
Description： If assigning a feed rate in the block of G31 command, the block would take the command value as its feed rate; if there is no feed rate assigned in the block of G31 command, the feed rate is set by this parameter.

1061 **MAX. SPEED OF LATHE TAPPING**

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 10000000
Unit ： um
Description： The cutting feed rate is decided by the spindle's rotation speed and thread pitch during lathe tapping. If the feed rate produced by these two elements exceeds the set value of this parameter, the alarm "MOT 4061: LATHE TAPPING SPEED OVER SETTING VALUE" will be triggered to prevent any danger that might be caused by false programming.

1072 **Setting Paulse Raise Up Width US**

Range： 1 ~ 50
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 20
Unit ： us
Description： When the pulse command type is CW/CCW or PULSE/DIRECTON, this parameter sets the pulse width as shown in the figure below.



Below is the formula for pulse cycle
(take linear axis as an example)：

$$1/T = \frac{feedrate}{pitch} \times GR \times Pulse/rev \times \frac{1}{60000}$$ ，Unit : ms

Example：
In this example, the thread pitch of X axis is 10mm, the gear ratio is 2 (Deceleration ratio: When the motor makes 2 rev., the ball screw makes 1 rev.), the pulse/rev. is 10000, and the feed rate is 2000mm/min., and the required

output pulse/1ms would be:

$$Pulses = \frac{2000}{10} \times 2 \times 10000 \times \frac{1}{60000} \approx 67\, pulses / ms$$

And the command pulse cycle would be：

$$T = \frac{1000}{67} \approx 15us$$

Under this condition, the pulse width should be set as 7us to keep the pulse command as 50% of DURATION. If the set value of this parameter is too large, the pulse width might exceed the pulse cycle during high-speed motion, and the motor driver could not read the overlapping pulse command lines to actuate the motor’ s rotation normally.

However, if the set value is too small, the motor driver might also be unable to identify the pulse command lines. Therefore, the max value of this parameter should be set according to the max width within which tolerance that pulse command lines do not overlap each other. And the min. value should be set according to the min. width within which tolerance the motor can identify pulse command lines.

1100	**JOG SPEED FOR X AXIS μm/min**
1101	**JOG SPEED FOR Y AXIS μm/min**
1102	**JOG SPEED FOR Z AXIS μm/min**
1103	**JOG SPEED FOR THE 4TH AXIS μm/min**

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2000000
Unit ： um/min
Description： This parameter sets the moving speed of each axis in JOG mode

1824	**Servo communication type(0:NO 1:M)**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Set Servo communication servo motor brand

0:Not use
1:M

1825	**X Axis Servo Communication Booth No. (0: Not Using 1~15)**
1826	**Y Axis Servo Communication Booth No. (0: Not Using 1~15)**
1827	**Z Axis Servo Communication Booth No. (0: Not Using 1~15)**
1828	**4th Axis Servo Communication Booth No. (0: Not Using 1~15)**

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None

Description： Set each servo axis corresponding to its servo motor’s station number. This parameter must be the same with the setting of servo motor driver station. If set to 0 means this axis is not using servo communication function.

3.3 Machine Parameters

62	UNIT OF Pr.0104 ~ Pr.0107 0) METRIC 1) IMPERIAL

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： This parameters sets the unit system of Pr.0104 ~ Pr.0107 to be metric or imperial.

68	SIDE TOOTH NUMBER OF X AXIS MOTOR (DENOMINATOR IN GEAR RATIO)
69	SIDE TOOTH NUMBER OF Y AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)
70	SIDE TOOTH NUMBER OF Z AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)
72	SIDE TOOTH NUMBER OF THE 4TH AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of each axis motor, which equals to the setting an axis's denominator in gear ratio.

$$\text{Gear ratio of some axis} = \frac{\text{Ball screw's tooth number}}{\text{Motor's tooth number (this parameter)}}$$

If the gear ratio of some axis is larger than 1, motor speed is decelerated by ball screw; if smaller than 1, motor speed is accelerated by ball screw. Please refer to the following formula for the setting method:

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Ball screw's tooth number} \times \text{Ball screw's rotation speed}$$

100	BALL SCREW'S SIDE TOOTH NUMBER OF X AXIS (NUMERATOR IN GEAR RATIO)
101	BALL SCREW'S SIDE TOOTH NUMBER OF Y AXIS (NUMERATOR IN GEAR RATIO)
102	BALL SCREW'S SIDE TOOTH NUMBER OF Z AXIS (NUMERATOR IN GEAR RATIO)
103	BALL SCREW'S SIDE TOOTH NUMBER OF THE 4TH AXIS (NUMERATOR IN GEAR RATIO)

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the ball screw's tooth number of each axis, which equals to setting the numerator in gear ratio of each axis.

$$\text{Gear ratio of some axis} = \frac{\text{Ball screw's tooth number (this parameter)}}{\text{Motor's tooth number}}$$

If the gear ratio of some axis is larger than 1, motor speed is decelerated by ball screw; if smaller than 1, motor speed is accelerated by ball screw. Please refer to the following formula for the setting method:

$$\text{Motor's tooth number} \times \text{motor's rotation speed} = \text{Ball screw's tooth number} \times \text{ball screw's rotation speed}$$

104	BALL SCREW PITCH. OF X AXIS
105	BALL SCREW PITCH. OF Y AXIS
106	BALL SCREW PITCH. OF Z AXIS
107	BALL SCREW PITCH. OF THE 4TH AXIS

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 360
Unit ： um
Description： This parameter sets the ball screw pitch for each axis.

Additional Machine Parameters Setting Description:

In general，

$$\text{Gear Ratio GR} = \frac{\text{Passive Side Teeth No.}}{\text{Active Side Teeth No.}} = \frac{\text{Active Side Revolution No.}}{\text{Passive Side Revolution No.}},$$

If this ratio is bigger than 1, it means the tranmit structure is the deceleration structure. On the otherhand, if the ratio is less than 1, it means the transmit structure is the acceleration structure. If this ratio is 1, then this is a direct transmit structure.

For linear axis, the above machine parameter is set according to the machine structure setting value.For rotary (i.e. the 4th axis), parameter 0072 and 0103 are set according to the machine structure setting value. But parameter 0107 must be set as 360(please set 0 for parameter 0066)

For unit, the degree (°) for rotary axis is equal to “mm” in the linear axis. Assumed 36000 should beentered in parameter 1017 initially. However, because this parameter is an INT type (integrate number)that means 360000 is out of setting range. In this case, please use NC to multiply 1000 by the setting number.

The above parameters will addition of parameters 0053~0056(each servo ENCODER feedback multiple factor), parameters 1112~1115(each servo motor ENCODER total pulse per roation) are mainly used to calculate each servo’s CMR(COMMAND MODIFICATION RATIO).

CMR(COMMAND MODIFICATION RATIO), the smallest moving unit to the corresponding PULSE value. Under metric unit system, the smallest moving unit is um; under inch unit system, the smallest moving unit is 0.0001 inch. For rotary axis, the smallest unit is 0.001 degree. The calculating formula is as follows.

$$CMR = \frac{Motor\_ENCODER一No.Pulse/\text{Rev.} \cdot ENCODER\_Feedback\_Multiple\_Factor}{BallScrew\_Pitch} \times \frac{Ball\_Screw\_Side\_Teeth}{Motor\_Side\_Teeth}$$

Example: total pulse per roation of a servo motor ENCODER is 2500 PULSE/REV, ENCODER feedback multiple factor is 4, denominator of motor gear ratio is 1, numerator of ball screw gear ratio is 2, ball screw pitch 10000um, then CMR of this spindle is :

$$CMR = \frac{2500 \cdot 4}{10000} \times \frac{2}{1} = 2(PULSES / \mu m)$$

This means if you want to move 1um of this spindle, NC needs to send out 2 PULSES to the motor driver.

The truth is that after receiving command, the NC internal will use the smallest unit to calculate the moving distance for each spindle. Then, it will multiply the moving distance by CMR of each spindle and then NC will send the PULSE value to each driver spindle. For some special application cases, need to use X axis – Z axis as rotary axis. Now only able to use linear axis to simulate rotating axis. At this time, please refer to the above mathematic formula for those parameter's setting.

Example: Assumed on an application example, needs to use X axis as rotary servo axis, then this the total pulse per roation of the spindle motor ENCODER is 2500 PULSE/REV, ENCODER feedback multiple factor is 4, denominator of motor gear raptor is 5, numerator of ball screw ratio is 2262, the CMR will be:

$$CMR = \frac{2500 \cdot 4}{360000} \times \frac{2262}{5} = \frac{2500 \cdot 4}{360} \times \frac{2262}{5000} \approx 12.567\ (PULSES / 0.001\_\deg ree)$$

This means if you want to make X axis to turn 0.0001°, NC needs to send out 12.566 PULSES to motor driver. From the above calculateion, the pitch of X axis needs to be set as 360000. But, as mentioned before, this parameter is an INT (integrate number) type, so 360000 is out of the range. If we take out the factor, which is 1000, from 3600 and then multiply it by the denominator of motor gear ratio(i.e.., 5 in this case), the whole formula is unchanged. So the parameter setting for the spindle is as follows. Parameters 0054 is set as 4, parameter 1112 is set as 2500, parameter 0068 is set as 5000 and parameter 0100 is set as 2262 and parameter 0104 is set as 360.

3.4 Spindle Parameters

16	ACC/DEC TIME OF EACH THOUSAND ROTATION OF 1ST SPINDLE
885	ACC/DEC TIME OF EACH THOUSAND ROTATION OF 2ND SPINDLE
888	ACC/DEC TIME OF EACH THOUSAND ROTATION OF 3RD SPINDLE

Range： 0 ~ 10000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 500
Unit ： None
Description： This parameter can set Spindle RPM corresponding voltage, Pulse command acceleration speed.
When Spindle RPM use voltage control, it must set the offset and 10V corresponds to RPM.

21	RPM OF THE 1ST SPINDLE'S ORIENTATION

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 100
Unit ： RPM
Description： This parameter sets the spindle's rotation speed during orientation. This parameter also decides the spindle's rotation speed when the spindle is being oriented. To prevent deviation caused by different rotation speeds, please do not change the set value of this parameter after finishing the orientation adjustment of the spindle.

29	THE CORRESPONDING SERVO AXIS NUMBER OF THE 1ST SPINDLE
294	THE CORRESPONDING SERVO AXIS NUMBER OF THE 2ND SPINDLE
295	THE CORRESPONDING SERVO AXIS NUMBER OF THE 3RD SPINDLE

Range： 0 ~ 6
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： If the spindle's wiring is connected to the N^{th} axis of the transit card, set this parameter to N; if there is no spindle, set to 0.

49	**MOTOR'S TOOTH NUMBER OF THE 1ST SPINDLE IN 1ST GEAR**
664	**MOTOR'S TOOTH NUMBER OF THE 2ND SPINDLE IN 1ST GEAR**
672	**MOTOR'S TOOTH NUMBER OF THE 3RD SPINDLE IN 1ST GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the motor' s tooth number of some spindle in 1st gear, which equals to setting the denominator in gear ratio of some spindle in 1st gear. When some spindle is in 1st gear (C097 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0050)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle' s gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

50	**THE 1ST SPINDLE'S TEETH NUMBER IN 1ST GEAR**
665	**THE 2ND SPINDLE'S TEETH NUMBER IN 1ST GEAR**
673	**THE 3RD SPINDLE'S TEETH NUMBER IN 1ST GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the motor' s tooth number of some spindle in 1st gear, which equals to setting the numerator in gear ratio of some spindle in 1st gear. When some spindle is in 1st gear (C097 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0049)}}$$

If the spindle' s gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

51	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 2ND GEAR**
666	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 2ND GEAR**
674	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 2ND GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle's motor in 2nd gear, which equals to setting the denominator in gear ratio of some spindle in 2nd gear. When some spindle is in 2nd gear (C098 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0052)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

52	**TOOTH NUMBER OF THE 1ST SPINDLE IN 2ND GEAR**
667	**TOOTH NUMBER OF THE 2NDSPINDLE IN 2ND GEAR**
675	**TOOTH NUMBER OF THE 3RD SPINDLE IN 2ND GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle in 2^{nd} gear, which equals to setting the numerator in gear ratio of some spindle in 2^{nd} gear. When some spindle is in 2^{nd} gear (C098 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0051)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

57	**FEEDBACK RATE OF THE 1ST SPINDLE**
890	**FEEDBACK RATE OF THE 2ND SPINDLE**
894	**FEEDBACK RATE OF THE 3RD SPINDLE**

Range： 1 ~ 4
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the feedback rate multiplier of some spindle's encoder and is only effective when the feedback signal type is AB PHASE (Pr.0195 is set to 0). If the feedback signal type of the spindle's encoder is CW/CCW or PULSE/DIRECTION (Pr.0195 is 1 or 2, respectively), the feedback rate multiplier would always be 1.
When the spindle's control mode is PULSE COMMAND (in SPINDLE ORIENTATION or RIGID TAPPING modes), the product of this parameter's set value and Pr.1116's set value (pulse/rev of the spindle motor's encoder) is the pulse command amount of NC to make one revolution of the spindle motor. If the spindle's control mode is V Command, the product of this parameter's set value and Pr.1116's set value is used to calculate the spindle's actual rotation speed only.

61	**Pulses of Each Roation of 1st Spindle Encoder**
889	**Pulses of Each Roation of 2ND Spindle Encoder**
893	**Pulses of Each Roation of 3RD Spindle Encoder**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1024
Unit ： pulse
Description： Assumed motor Encoder Pulse number is 2500 per rotation, then this parameter is set to 2500.

84	**THE 1ST SPINDLE ORIENTATION 0)SENSOR 1)ENCODER**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Use a positioning sensor as the reference for spindle orientation.
1：Use an encoder index as the reference for spindle orientation.

90	**THE 1ST SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**
897	**THE 2ND SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**
898	**THE 3RD SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：Display the command value
1：Display the actual value, meanwhile NC calculates the actual rotation speed according to the feedback signal of the spindle’ s motor ENCODER and displays the product on HMI

If some spindle motor does not have an encoder, please set this parameter to 0 in case RPM check cannot reach the assigned speed.

92	**Setting Spindle Motor 10V Is Corresponding To how many RPM**
883	**Setting 2ND Spindle Motor 10V Is Corresponding To how many RPM**
886	**Setting 3RD Spindle Motor 10V Is Corresponding To how many RPM**

Range： 1 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 6000
Unit ： RPM
Description： Assume 10V of the spindle is corresponding to 3000RPM, and then set this parameter to 3000. This parameter is effective only when the spindle’s driver in Velocity Command mode.

95	**MIN. SPEED OF THE 1ST SPINDLE**
96	**1st Spindle Max. RPM**
876	**MAX SPEED OF 2ND SPINDLE**
877	**MIN. RPM OF THE 2nd SPINDLE**
878	**INITIAL RPM OF THE 3RD SPINDLE**
879	**MAX. RPM OF THE 3RD SPINDLE**
880	**MIN. RPM OF THE 3RD SPINDLE**

Range： 0 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： RPM
Description： This parameter sets the RPM range to prevent any part's damage of the machine caused by executing a command at a RPM that exceeds the acceptable range.

98	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 1ST SPINDLE'S RPM**
884	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 2ND SPINDLE'S RPM**
887	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 3RD SPINDLE'S RPM**

Range： -5000 ~ 5000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： 0.3mV
Description： This parameter sets the offset value of the spindle's voltage command. After the required voltage command is deduced based on the spindle command RPM, minus this parameter's set value from the voltage command, then the user can obtain the actual voltage command that needs to be sent to the spindle's A/C. The present DAC of the system's motion card is 16 bits, which corresponds to ±10V, so the dpi is 10/32768 = 0.3mV, which is the unit of this parameter.

160	**1st Spindle Encoder 0)Spindle1) Motor**
892	**2nd Spindle Encoder 0)Spindle1) Motor**
896	**3rd Spindle Encoder 0)Spindle1) Motor**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Setting Spindle Encoder Feedback Device Installation Location
0：Spindle Side
1：Motor Side

178	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 3RD GEAR**
668	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 3RD GEAR**
676	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 3RD GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle' s motor in 3rd gear, which equals to setting the denominator in gear ratio of some spindle in 3rd gear. When some spindle is in 3rd gear (C099 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0179)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle' s gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

179	**TOOTH NUMBER OF THE 1ST SPINDLE IN 3RD GEAR**
669	**TOOTH NUMBER OF THE 2ND SPINDLE IN 3RD GEAR**
677	**TOOTH NUMBER OF THE 3RD SPINDLE IN 3RD GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle in 3rd gear, which equals to setting the numerator in gear ratio of some spindle in 3rd gear. When some spindle is in 3rd gear (C099 is OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0178)}}$$

If the spindle' s gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

181	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 4TH GEAR**
670	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 4TH GEAR**
678	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 4TH GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle' s motor in 4TH gear, which equals to setting the denominator in gear ratio of some spindle in 4TH gear. When some spindle is in 4TH gear (C097 ~ C099 are all OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0182)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle’ s gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method:

$$\text{Motor' s tooth number} \times \text{Motor' s rotation speed} = \text{Spindle' s tooth number} \times \text{Spindle' s rotation speed}$$

182	**TOOTH NUMBER OF THE 1ST SPINDLE IN 4TH GEAR**
671	**TOOTH NUMBER OF THE 2ND SPINDLE IN 4TH GEAR**
679	**TOOTH NUMBER OF THE 3RD SPINDLE IN 4TH GEAR**

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tooth number of some spindle in 4^{th} gear, which equals to setting the numerator in gear ratio of some spindle in 4^{th} gear. When some spindle is in 4^{th} gear (C097 ~ C099 are all OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0181)}}$$

If the spindle’ s gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor' s tooth number} \times \text{Motor' s rotation speed} = \text{Spindle' s tooth number} \times \text{Spindle' s rotation speed}$$

183	**COMMAND TYPE OF THE 1ST SPINDLE’S SPEED**
296	**COMMAND TYPE OF THE 2ND SPINDLE’S SPEED**
297	**COMMAND TYPE OF THE 3RD SPINDLE’S SPEED**

Range： 0 ~ 4
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Setting spindle is under general speed mode, the below list is the signal format of spindle output to drivers(or inveters).
This parameter sets the command type of some spindle’s rotation speed. The system’s preset command type is voltage output. If the motor driver of the spindle has a PG card or the spindle motor is a servo motor, the output command type of the spindle can be set in the pulse type that the motor driver accepts.

Setting Value	Output Signal Format	Output Axis No.	Description
0	Voltage Command(0~10V)	**Defined by Pr.29**	(1) Spindle CW/CCW switch by ladder switch inverter terminal. (2) P16=0, accelerate controlled by inverter. If P16 has any value, the acceleration control by controller.
1	Pulse Output (A/B Phase)	4	(1) Spindle direction define by C82，C83

2	Pulse Output (CW/CCW)	4	(2) Accelerate control by P16 (3) Output axis not effect by P29 (Spindle's servo no.) It fixed to 4TH, used for TRF1720 P5 (SPD AXIS) sends pulse. (4) Under speed control, NC won't check Servo lag.
3	Pulse Output (Pulse/Dir.)	4	
	V-command (-10V~10V)	**Defined by Pr.29**	(1) Spindle direction define by C82，C83 (2) Accelerate control by P16
5	Pulse Output A/B Phase	**Defined by Pr.29**	(1) Spindle direction define by C82，C83 (2) Accelerate control by P16 (3) Output axis not effect by P29 (Spindle's servo no.) (4) Under speed control, NC won't check Servo lag.
6	Pulse Output CW/CCW	**Defined by Pr.29**	
7	Pulse Output Pulse/Dir	**Defined by Pr.29**	

Note:
C82,C83 control method
C82 = ON ,C83=OFF => Spindle CW
C82 = OFF ,C83=ON => Spindle CCW
Other Status => Spindle Stop

184 **LOCAL INPUT OF THE 1ST SPINDLE'S ORIENTATION**

Range： 1 ~ 10
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 9
Unit ： None
Description：

Bit2	Bit1	Bit0	Description
0	0	1	Connected to Local input 1 (HS1 on the transit card) (Default Setting)
0	1	0	Connected to Local input 2 (HS2 on the transit card)

Bit3	Description
0	Normally Close
1	Normally Open. (Default Setting)

Bit 0 ~ Bit 2：Set the input number of the spindle's orientation sensor signal. Set to 1, the local input is connected to HS1 on the transit card; set to 2, the local input is connected to HS2 on the transit card.
Bit 3：Set the signal type of the spindle's orientation sensor. Set to 0: Normally Close (NC); set to 1: Normally Open. (NO).
Set to 1：The local input port of spindle positioning sensor signal is HS1, the signal type is Normally Close (NC);
Set to 9：The local input port of spindle positioning sensor signal is HS1, the signal type is Normally Open (NO);
Set to 2：The local input port of spindle positioning sensor signal is HS2, the

signal type is Normally Close (NC);
Set to 10：The local input port of spindle positioning sensor signal is HS2, signal type is Normally Open (NO).

189 **DEFAULT RPM INITIAL SPEED OF THE 1ST SPINDLE WHILE POWER ON**
875 **DEFAULT RPM INITIAL SPEED OF THE 2ND SPINDLE WHILE POWER ON**

Range： 0 ~ 20000
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： RPM
Description： When the system is starting, this parameter is the preset initial rotation speed of the spindle.

190 **SPINDLE ORIENTATION COMMAND TYPE 0)AB 1)CW 2)PLS/D**

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：A/B PHASE
1：CW/CCW
2：PULSE/DIRECTION
3：Voltage
Under spindle and rigid tapping mode, the system is using PULSE COMMANDto drive Spindle, this parameter is to set the command PULSE format. Please do the setting according to the command pulse format that spindle inverter could accept.

value	Signal type	axis	description
0	Pulse Output (A/B Phase)	1. 4	● Usually Spindle drive have position card(PG card) **2. ※ Use pulse form TRF1720 P5**
1	Pulse Output (CW/CCW)	4	
2	Pulse Output，(Pulse /Dir.)	4	
3	V command (-10V~10V) Controller inner hardware do the close loop control	**Defined by P.29**	● Use with Spindle drive have close loop vector control, and accept ±10V control(+ for CW, - for CCW) ● Spindle output V-cmd by TRF1720 P5(SPD AXIS) , and read SP encoder through SPD ENC.
4	Pulse Output (A/B Phase)	**Defined by P.29**	● Use with Spindle and position card(PG card)
5	Pulse Output (CW/ CW)	**Defined by P.29**	
6	Pulse Output (Pulse/Dir.)	**Defined by P.29**	
7	M-II		

195	SIGNAL FORMAT OF THE 1ST SPINDLE'S ENCODER
891	SIGNAL FORMAT OF THE 2ND SPINDLE'S ENCODER
895	SIGNAL FORMAT OF THE 3RD SPINDLE'S ENCODER

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Setting Encoder feedback signal format
0：A/B PHASE
1：CW/CCW
2：Pulse/Dir
3：None

222	Spindle CH Orientation ACC/DEC Speed

Range： 1 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 100
Unit ： None
Description： Acceleration and deceleration time of spindle executes C(H) orientation.

240	CLOSE LOOP GAIN OF THE 1ST SPINDLE'S ORIENTATION

Range： 0 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 30
Unit ： 1/S
Description： When the spindle's command format in control mode is V command (parameter No. 0190 = 3), this parameter sets the spindle's proportional gain during positioning.

354	OVERRIDE UNIT OF THE 1ST SPINDLE'S RPM
355	OVERRIDE UNIT OF THE 2ND SPINDLE'S RPM
356	OVERRIDE UNIT OF THE 3RD SPINDLE'S RPM

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：The 1st (2nd & 3rd) spindle's rotation override speed = R015 (R019、R020) register value * 10%；
1：The 1st (2nd & 3rd) spindle's rotation override speed = R015 (R019、R020) register value* 1%。

663	1ST SPD ORIENT ACC/DEC TIME

Range： 0 ~ 32767
Effective： Effective After Rebooting

Acess Level： Machine Maker
Default ： 100
Unit ： ms
Description： This parameter is to set the acceleration and deceleration time of Spindle orientation (including Spindle Tuning).

835 Spindle CH Orientation Enter M Code

Range： 0 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： While the system is executing the defined M codes, spindle will enter into C(H)orientation mode.

836 Spindle CH Orientation Release M Code

Range： 0 ~ 32767
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： While the system is executing the defined M codes, spindle will leave into C(H)orientation mode.

837 Spindle Orientation Starts At M CODE
838 Spindle Orientation Using M CODE Number

Range： -1 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 5
Unit ： None
Description： The corresponding augment amount of angle shift value for M code can be deduced as the chart below by having the information of the semi-fixing starting M code (α)（Pr. 0837）, the numbers（n）（Pr.0838）of semi-fixing positioning M code and the basic angle（ β ）（Pr.1062）,you could obtain incremental angle shifting amount which M code is corresponding to. Please refer below list.

Relationship of M Code & Positioning Angle

M code	Angle Shifting Amount	Example：the shift amount of baseic angle β =30°
M α	β	30°
M (α +1)	2 β	60°
M (α +2)	3 β	90°
M (α +3)	4 β	120°
：	：	：
M (α + n)	(n + 1) β	

839	1st Spindle Orientation Allowing Error Amount

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1000
Unit ： 0.001degree
Description： This parameter is to see the allowable error amount of Spindle Orientation. If the difference between Spindle stopping position and the actual orientation position is smaller than this parameter setting value, Spindle orientation task can be meant as accomplish. However, if the difference amount is larger than this parameter setting value, System Alarm 【MOT 4049 Spindle Orientation Exceed Allowable Error】will occur.

298	RPM REACHES SET RANGE OF THE 2ND SPINDLE
881	RPM REACHES SET RANGE OF THE 3RD SPINDLE
1054	RPM REACHES SET RANGE OF THE 1ST SPINDLE

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 50
Unit ： RPM
Description： Under the condition that parameter 0090 is 1 (Spindle rotational speed is the actually speed), the system will calculate the actual rotational speed according to the spindle ENCODER feedback signal.
When | Spindle actual rotational speed – spindle command rotational speed | is less than or equal to this parameter setting value, the system will set S BIT 088 to ON. Also, it will inform PL that the spindle actual rotational speed to is arrived to the commanding value. If this parameter setting value is too small, it is possible to cause the system's checking spindle actual rotational speed not able to arrive within the error range, which will not set S BIT 088 to ON. This further causes S code or M3, and M4 commands not able to end.

1056	SPD ORIENTATION OFFSET ANGLE

Range： -360000 ~ 360000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 30000
Unit ： 0.001degree
Description： During Spindle orientation, this parameter sets the OFFSET amount of positioning final point and basic point. Parameter # 0248 can assign pulse or 0.001 degree as OFFSET amount unit.

1059	ACCEL. /DECEL. TIME PER KILO-REV. OF THE 1ST SPINDLE DURING RIGID TAPPING
1164	2nd Spindle Rigid Tapping ACC/DEC TIME
1165	3rd Spindle Rigid Tapping ACC/DEC TIME

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： ms
Description： Setting under the rigid tapping mode, spindle's acc/deceleration time. Since

under the rigid tapping mode, the movement amount of Z-axis is calculated by the spindle movement so this parameter also set the acc/deceleration time for Z-axis.

1062	**Spindle Orientation Basic Angle Shift Amount**

Range： -360000 ~ 360000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 30000
Unit ： 0.001 degree
Description： This parameter sets the spindle semi-constant position basic angle shifting amount（β）. When the angle is a positive value, spindle rotates in encoder increasing direction. On the other hands, when the angle is a negative value, spindle rotates in encoder decreasing direction.

299	**THE 2ND SPINDLE REACHES ZERO SPEED RPM**
882	**THE 3RD SPINDLE REACHES ZERO SPEED RPM**
1063	**THE 1ST SPINDLE REACHES ZERO SPEED RPM**

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 10
Unit ： RPM
Description： Under the condition that parameter 0090 is 1 (display actual value of spindle rotational speed), the system ENCODER feedback signal will calculate the actual rotational speed. When the spindle actual rotational speed is less than or equal to this parameter setting value, the system will set S BIT 092 to ON and also inform the PLC that the spindle actual rotational speed has reached zero speed already.

1064	**COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING**
1166	**2nd Spindle Rigid Tapping Speed Compensation Amount**
1167	**3rd Spindle Rigid Tapping Speed Compensation Amount**

Range： 0 ~ 100000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： when the rigid tapping machine adjustment is completed,
Please set the commanding compensation value as the display value from data system #023 at (Diagnostic) DGNOS page.

1065	**COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S ACCELERATION DURING RIGID TAPPING**
1168	**2nd Spindle Rigid Tapping Accelerating Speed Compensation Amount**
1169	**3rd Spindle Spindle Rigid Tapping Accelerating Speed Compensation Amount**

Range： 0 ~ 100000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0

Unit : None
Description : after rigid tapping is completed, please set the commanding compensation value as the display value of data system #022 at (Diagnostic) DGNOS page.

1066	**COMPENSATIVE FILTER INTENSITY OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING**
1170	**2nd Spindle Rigid Tapping Speed Filter Stregth**
1171	**3rd Spindle Rigid Tapping Speed Filter Stregth**

Range : 0 ~ 20
Effective : EFFECTIVE AFTER RESET
Acess Level : Machine Maker
Default : 0
Unit : None
Description : The bigger the value, the less vibration will occur. , but the bigger the rigid tapping following error will be. When enter 0, this means there is no filtering effect. When enter the maximum value (i.e., 20), this means there is a completely filtering effect, which means the signal is filtered completely. Please adjust this parameter setting value during the rigid tapping machine adjustment.

1069	**1st Spindle Rigid TappingSpindle Stop Checking Range**
1174	**2nd Spindle Rigid TappingSpindle Stop Checking Range**
1175	**3rd Spindle Rigid TappingSpindle Stop Checking Range**

Range : 0 ~ 200
Effective : EFFECTIVE AFTER RESET
Acess Level : Machine Maker
Default : 20
Unit : Pulse
Description : To set the maximum distortion amount of encoder while spindle stops under rigid tapping mode. The recommending setting value is 2. Please notice that is the setting value is too small, the system will not determin when spindle should stop, which will cause spindle to stay at hole bottom and not returning back during rigid tapping. On the other hands, if the setting value is too big, tapping error may increase.

1070	**1st Spindle Rigid Tapping Accelerating Speed Compensation Filter Strength**
1172	**2nd Spindle Rigid Tapping Acceleration Speed Filter Stregth**
1173	**3rd Spindle Rigid Tapping Acceleration Speed Filter Stregth**

Range : 0 ~ 20
Effective : EFFECTIVE AFTER RESET
Acess Level : Machine Maker
Default : 0
Unit : None
Description : The bigger the value, the less vibration will occur and the smaller of the following error. But, it is NOT absolute, which means there is an optimal value under certain filter intensity. When enter 0, it means there is no filtering effect. When enter the maximum value (i.e., 20), it means there is a completely filtering effect, which means the signal is filtered completely. Please adjust this parameter setting value during the rigid tapping machine adjustment.

1075	TOLERANCE OF THE 1ST SPINDLE IN CONTROL MODE

Range： 0 ~ 100000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 4096
Unit ： Pulse
Description： When rigid tapping machine tuning completes, please set the value or the allowable following error that is 5-10 times larger of the display value from data system #26 at DGNOS page. If this setting value is too small, it is possible to cause the system alarm【MOT 055 rigid tapping spindle servo error is over the allowable limit) to occur during rigid tapping】。

1076	1st Spindle Rigid Tapping Deceleration Time Per Thousand RPM
1176	2nd Spindle Rigid Tapping Deceleration Time Per Thousand RPM
1177	3rd Spindle Rigid Tapping Deceleration Time Per Thousand RPM

Range： 0 ~ 100000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1000
Unit ： ms
Description： This parameter sets the time per 1000rpm needed for the spindle to stop in rigid tapping mode. It also affects the hole's bottom position of rigid tapping.

1095	SpindleC(H) Orientation Zero Point Position

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： 0.001degree
Description： The zero point of spindle' s C(H) positioning is corresponding to shifting angleto the index point.

1117	Spindle CH Orientation RPM

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 36000
Unit ： None
Description： The speed when spindle excutes C(H) positioning.

1121	JOG RPM OF THE 1ST SPINDLE
1122	2nd Spindle JOG RPM
1123	3rd Spindle JOG RPM

Range： 1 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 200
Unit ： RPM
Description： While C BIT 072 is ON, this parameter sets the spindle's RPM.

3.5 MPG PARAMETERS

15	**Setting MPG Simulated Axis That Corrponds to Mechanical Axis**

Range： 1 ~ 19
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 6
Unit ： None
Description： This is used to set connection port number of the hand wheel under MPG dry fun mode (works only in MEM or MDI modes).

28	**MPG CONNECTION PORT OF X AXIS**
75	**MPG CONNECTION PORT OF 4TH AXIS**
87	**MPG CONNECTION PORT OF Y AXIS**
88	**MPG CONNECTION PORT OF Z AXIS**

Range： 1 ~ 19
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 6
Unit ： None
Description： Under MPG mode, each axis MPG acceleration time.

3.6 Compensation PARAMETERS

Compensation can do the setting about backlash, gear tolerance and ball bar. Also can refer the description to 5.2 Laser Compensation Procedure(P190) and 5.3 Double Ball Bar Measure – Backlash or Circular Spike Backlash (P193).

38	BACKLASH COMPENSATION UNIT 0)PULSE 16)μm

Range： 0 ~ 16
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 16
Unit ： None
Description： to set units for backlash compensation parameters (parameters 0044~ 0047) and pitch compensation parameters (parameters 0300 ~ 0349、0450 ~0499、0600 ~ 0649、0750 ~ 0799).

44	BACKLASH COMPENSATION AMOUNT OF X AXIS μm
45	BACKLASH COMPENSATION AMOUNT OF Y AXIS μm
46	BACKLASH COMPENSATION AMOUNT OF Z AXIS μm
47	BACKLASH COMPENSATION AMOUNT OF THE 4TH AXIS μm

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： To set backlash compensation of each axis.

112	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF X AXIS
113	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Y AXIS
114	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Z AXIS
115	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF THE 4TH AXIS

Range： 1 ~ 50
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 20
Unit ： None
Description： To set total section of each axis pitch error compensation. The multiple product of this parameter setting value and parameter 1018(1019, 1020, 1021) setting value should be the total length of X-axis ball screw pitch error compensation. Now the max compensation section is 50 sections for each axis.

117 **BACKLASH COMPENSATION FUNCTION BIT**

Range： 0 ~ 15
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT0: for X axis, 1 means to enable X-axis backlash compensation function; 0 means not to enable.
BIT1：For Y axis, 1 means to enable Y axis backlash compensation function; 0 means not to enable.
BIT2：For Z axis, 1 means to enable Z axis backlash compensation function; 0 means not to enable.
BIT3：For 4th axis, 1 means to enable 4th axis backlash compensation function; 0 means not to enable.

118 **DIRECTION OF PITCH ERROR COMPENSATION BIT**

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT0：for setting X axis, 1 means pitch error compensation starts from –ive direction X axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT1：for setting Y axis, 1 means pitch error compensation starts from –ive direction Y axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT2：for setting Z axis, 1 means pitch error compensation starts from –ive direction Z axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT3：for setting 4th axis, 1 means pitch error compensation starts from –ive direction 4th axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.

119 **PITCH ERROR COMPENSATION FUNCTION BIT**

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT0：For X axis, 1 means to enable X axis pitch error compensation function; 0 means not to enable.
BIT1：For Y axis, 1 means to enable Y axis pitch error compensation function; 0 means not to enable.
BIT2：For Z axis, 1 means to enable Z-axis pitch error compensation function; 0 means not to enable.
BIT3：For 4th axis, 1 means to enable 4th axis pitch error compensation function; 0 means not to enable.

300	PITCH ERROR COMPENSATION OF 001 SESSION OF X AXIS μm
349	PITCH ERROR COMPENSATION OF 050 SESSION OF X AXIS μm

Range： -20000 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed pitch error on the nth section of X axis is M (um), the parameter # (300+N – 1) is set as M, and parameter 0038 is set as 16.

450	PITCH ERROR COMPENSATION OF 001 SESSION OF Y AXIS μm
499	PITCH ERROR COMPENSATION OF 050 SESSION OF Y AXIS μm

Range： -20000 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed pitch error on the nth section of Y axis is M (um), the Parameter # (450+N – 1) is set as M, and parameter 0038 is set as 16.

600	PITCH ERROR COMPENSATION OF 001 SESSION OF Z AXIS μm
649	PITCH ERROR COMPENSATION OF 050 SESSION OF Z AXIS μm

Range： -20000 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed pitch error on the nth section of Z axis is M (um), the Parameter # (600+N – 1) is set as M, and parameter 0038 is set as 16.

750	PITCH ERROR COMPENSATION OF 001 SESSION OF THE 4TH AXIS μm
799	PITCH ERROR COMPENSATION OF ~050 SESSION OF THE 4TH AXIS μm

Range： -20000 ~ 20000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed pitch error on the nth section of Z axis is M (um), the parameter # (750+N – 1) is set as M, and parameter 0038 is set as 16.

811	BALL BAR COMPENSATION G CODE 0)G2 G3 1) ALL

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： When parameter setting is 0, this means the spike compensation value, set by using circular testing, can only be applied on G02/03 arch interpolation command. When it is 1, the spike compensation value can be applied on all moving G codes, which means as long as servo axis is doing reverse direction motion; the setting spike compensation value will be added.

812	**REVERSAL SPIKE COMPENSATION: ＋X**
818	**REVERSAL SPIKE COMPENSATION: ＋Y**
828	**REVERSAL SPIKE COMPENSATION: ＋Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed doing the circular testing. When the spike value of +ive X axis direction is 0, this means NOT to enable the spike compensation function of +ive X-axis direction.

813	**DURATION OF REVERSAL SPIKE COMPENSATION: ＋X**
819	**DURATION OF REVERSAL SPIKE COMPENSATION: ＋Y**
829	**DURATION OF REVERSAL SPIKE COMPENSATION: ＋Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Please check the controller’s actual disconnecting time interval first and then set the desired value. Assumed doing circular testing. When set the spike time interval to 0, it means NOT to enable the spike compensation function of +ive X-axis direction.

814	**REVERSAL SPIKE LAG COMPENSATION: ＋X**
820	**REVERSAL SPIKE LAG COMPENSATION: ＋Y**
830	**REVERSAL SPIKE LAG COMPENSATION: ＋Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Please check the controller’s actual disconnecting time interval first and then set the value. Assumed doing circular testing. Delay time interval between the spike point of +ive X-axis direction and the direction changing point.

815	**REVERSAL SPIKE COMPENSATION: －X**
825	**REVERSAL SPIKE COMPENSATION: －Y**
831	**REVERSAL SPIKE COMPENSATION: －Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed doing the circular testing. When the spike value of -ive X axis direction is 0, this means NOT to enable the spike compensation function of -ive X-axis direction.

816	**DURATION OF REVERSAL SPIKE COMPENSATION: －X**
826	**DURATION OF REVERSAL SPIKE COMPENSATION: －Y**
832	**DURATION OF REVERSAL SPIKE COMPENSATION: －Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Please check the controller’ s actual disconnecting time interval first and then set the value. Assumed doing canned cycle testing. When set the spike time interval to 0, it means NOT to enable the spike compensation function of -ive X-axis direction.

817	**REVERSAL SPIKE LAG COMPENSATION: －X**
827	**REVERSAL SPIKE LAG COMPENSATION: －Y**
833	**REVERSAL SPIKE LAG COMPENSATION: －Z**

Range： 0 ~ 200
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Please check the controller’ s actual disconnecting time interval first and then set the value. Assumed doing canned cycle testing. Delay time interval between the spike point of X axis -ive direction and the direction changing point.

840	**X Axis Heat Shape Transforming Compensation0) OFF 1)ON**
851	**Y Axis Heat Shape Transforming Compensation0) OFF 1)ON**
856	**Z Axis Heat Shape Transforming Compensation0) OFF 1)ON**
861	**4TH Axis Heat Shape Transforming Compensation0) OFF 1)ON**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Set to 0: disable each axis TDC function
Set to 1: enable each axis TDC function

841	X Axis Total Compensation Amount Working Compensation Time SEC
852	Y Axis Total Compensation Amount Working Compensation Time SEC
857	Z Axis Total Compensation Amount Working Compensation Time SEC
862	4TH Axis Total Compensation Amount Working Compensation Time SEC

Range： 0 ~ 18000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 60
Unit ： sec
Description： When machining starts, NC compenstates the amount set by this parameter whenever the interval time set by parameter No. 0843,0854,085&0864 is due. When machining stops, NC returns to the original amount set by this parameter whenever the interval time set by parameter No. 0844,0855,0860 &0865 is due.

842	X Axis Heat Shape Transforming Total Compensation Amount UM
853	Y Axis Heat Shape Transforming Total Compensation Amount UM
858	Z Axis Heat Shape Transforming Total Compensation Amount UM
863	4TH Axis Heat Shape Transforming Total Compensation Amount UM

Range： -1000 ~ 1000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： To set each axis total TDC comp. value.

843	X Axis Total Compensation Amount Stop RecoveringTime SEC
854	Y Axis Total Compensation Amount Stop RecoveringTime SEC
859	Z Axis Total Compensation Amount Stop RecoveringTime SEC
864	4TH Axis Total Compensation Amount Stop RecoveringTime SEC

Range： 0 ~ 18000
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 60
Unit ： sec
Description： To set each axis TDC max. comp. in time stop.

1018	SESSION INTERVAL OF PITCH ERROR COMPENSATION: X AXIS μm
1019	SESSION INTERVAL OF PITCH ERROR COMPENSATION: Y AXIS μm
1020	SESSION INTERVAL OF PITCH ERROR COMPENSATION: Z AXIS μm
1021	SESSION INTERVAL OF PITCH ERROR COMPENSATION: THE 4TH AXIS μm

Range： 0 ~ 99999999
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 30000
Unit ： um
Description： Assumed pitch error compensation interval is 10000 μm of every X axis section, so please set this parameter to 1000.

1046	**START POSITION OF PITCH ERROR: X AXIS μm**
1047	**START POSITION OF PITCH ERROR: Y AXIS μm**
1048	**START POSITION OF PITCH ERROR: Z AXIS μm**
1049	**START POSITION OF PITCH ERROR: 4TH AXIS μm**

Range： -99999999 ~ 99999999
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： When the starting position of X axis pitch error compensation is 0 μm（machine coordinate）, please set this parameter to 0.

3.7 Zero Point Parameters

Regarding to home sequence, please refer to the last description of this chapter.

19	SOLUTIONS WHEN HOME IS ON DOG

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Warning from the system in order to inform user to move away the servo axis. Then the system will execute the zero return procedure. Each axis warning message is as following:
X Axis：【MOT 0014 X axis is on HOME DOG】
Y Axis：【MOT 0015 Y axis is on HOME DOG】
Z Axis：【MOT 0016 Z axis is on HOME DOG】
4^{th} Axis：【MOT 0017 4^{th} axis is on HOME DOG】
1：NC moves away the servo axis automatically (moves toward the reverse direction from the reference point). After getting away from DOG, it will execute home/zero return procedure.

20	DEFAULT SETTING OF HOME RETURN BIT

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： After turning on the machine, check if each axis is preset to having returned to reference point.
Bit 0：X axis
Bit 1：Y axis
Bit 2：Z axis
Bit 3：The 4th axis

30	OFFSET AMOUNT OF HOME RETURN: X AXIS μm
31	OFFSET AMOUNT OF HOME RETURN: Y AXIS μm
32	OFFSET AMOUNT OF HOME RETURN: Z AXIS μm
33	OFFSET AMOUNT OF HOME RETURN: THE 4TH AXIS μm

Range： -32768 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed each axis moves N distance toward machine reference point. Setting this parameter to N if want to get the offset amount of N distance (um). Different setting value will change the reference point due to different offset amount. But, this setting value will NOT change the display coordinate after returning home. When the setting value is positive, it makes the machine home point of this axis moves away from DOG direction.
When the setting value is positive, it makes the machine home point of this axis moves close to DOG direction.

34	**IDLE DURATION FOR X AXIS TO SEARCH FOR ZERO POINT 10ms**
35	**IDLE DURATION FOR Y AXIS TO SEARCH FOR ZERO POINT 10ms**
36	**IDLE DURATION FOR Z AXIS TO SEARCH FOR ZERO POINT 10ms**
37	**IDLE DURATION FOR THE 4TH AXIS TO SEARCH FOR ZERO POINT 10ms**

Range： 100 ~ 2000
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 100
Unit ： 10 ms
Description： the required dwell time that is set by this parameter can be used in the following three places:

a. Dwell time of decelerating stop when X axis moves toward the reference point in 1st speed and reaches DOG.
b. dwell time of decelerating stop when X axis gets away from DOG in 2nd speed and finds motor INDEX.
c. Dwell time of decelerating stop when X axis returns back the desired motor INDEX position.

48	**Zero Point Forced Mode BIT**

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT 0：Setting 0 to indicate X axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate X axis re-searching HOME point method is force setting.
BIT 1：Setting 0 to indicate Y axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate Y axis re-searching HOME point method is force setting.
BIT 2：Setting 0 to indicate Z axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate Z axis re-searching HOME point method is force setting.
BIT 3：Setting 0 to indicate the 4th axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate the 4th axis re-searching HOME point method is force setting.

64	**HOME DOG SENSOR IS 0)NC 1)NO**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： this parameter works only when the home DOG sensor signal is connected to LOCAL INPUTS (Transit Board HS1 ～ HS4 connect points). (Parameter 0175 setting value is 0). If the home dog sensor signal is connected REMOTE INPUTS, then PLC ladder diagram program needs to change each axis home DOG signal state to C BIT 0031 ～ 0035 in order to inform NC.

76 **SET ABSOLUTE COORD. AFTER HOME RETURN 0)NO 1)YES**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： please refer to 1014 ~ 1017 for absolute coordinate setting Value. After each servo axis returns home, display value of absolute coordinate is determined by following three points:

a. setting value of parameters 1014 ~ 1017;
b. 00 coordinated system, setting value of G54 ~ G59 coordinate system；
c. Setting value in G52 area coordinate system.

$$Para\#1014 \sim 1017\ value - \begin{pmatrix} 00\ coordinate\ value \\ +G54 \sim G59\ coordinate\ value \\ +G52\ regional\ coordinate\ value \end{pmatrix}$$

In addition,

a. setting value of parameters 1014 ~ 1017: use this parameter to decide whether or not they are effective；
b. 00 coordinate system, G54 ~ G59 coordinate system setting values: effective permanently；
c. Setting value in G52 area coordinate system: use parameter 0133 to decide whether or not it is effective.

77 **Not Home Return's G00 0)Disable 1)Effective**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description：

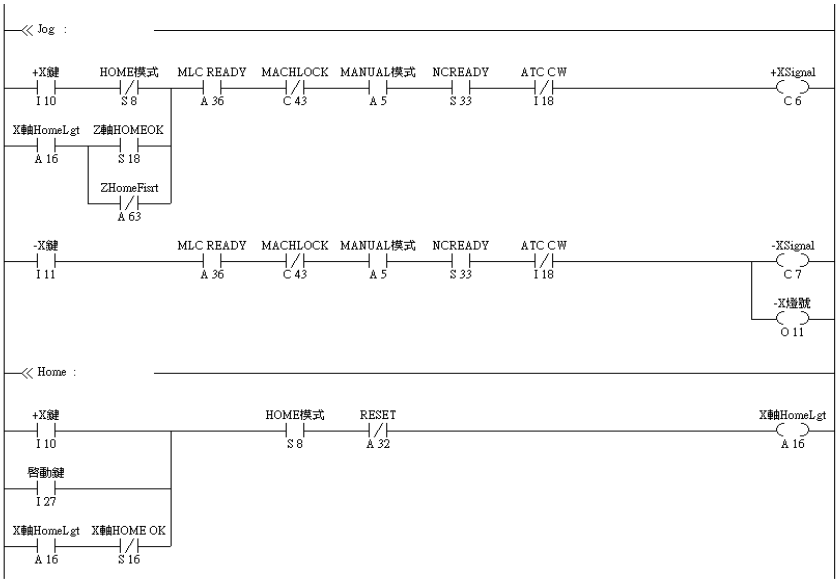
	Parameter 77setting value is 1, G00 is effective before zero return	**Parameter 77 setting value is 0,G00 is NOT effective before Return Home**
MEM, MDI Automatic mode	G00 motion normally, each axis feedrate is deci ed by the setting value of parameters 1000 ~ 1003.	Automatically change G00 motion to G01 motion, feedrate is the present F code designated value (use parameter 149 to set the default value).
JOG, RAPID Manual mode	Under JOG, each axis feedrate is decided by the Setting value of parameter 1100 ~ 1103; under RAPID, each axis feedrate is decided by the setting value of parameters 1000 ~ 1003.	Motion of RAPID and motion of JOG, each axis feedrate is decided by the setting value of parameter1100 ~ 1103.

79	X AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG
80	Y AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG
81	Z AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG
82	THE 4TH AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG

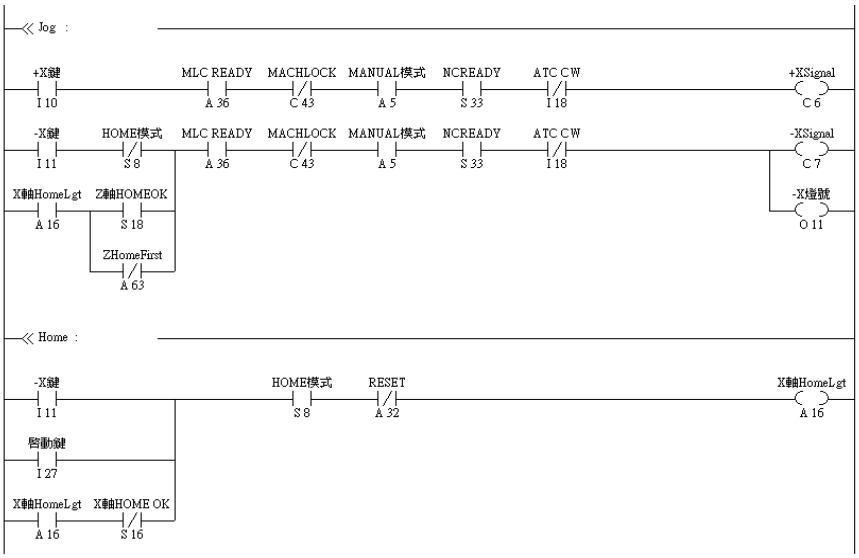
Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：when reference point is behind DOG, after each axis reaches DOG, each axis will continue moving toward the same direction and look for the reference point；
1：Home position is ahead of DOG, after each axis reaches DOG; each axis will continue moving toward the reverse direction and look for the reference point.

120	DIRECTION OF HOME RETURN FOR EACH AXIS BIT

Range： 0 ~ 15
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： About home return direction, other than this parameter setting, PLC also needs to do the corresponding modification according to this setting. Home return procedure that is written by PLC of the controller machine version uses the home point is at +ive direction as the standard.
Also, in the safety concern to prevent mistakenly touching, the <+> direction signal will be sent out (using X axis as an example, which is C6) no matter which servo axis key (<+> <->) that the user presses. So, under the condition that the home point is at the －ive servo axis direction, not only needs to set the corresponding BIT of this parameter to 1 but also needs to modify the corresponding returning home program in PLC.
Use X axis as an example, the diagram of PLC return home procedure from +ive direction is as following:



If X axis returns home at the －ive direction, other than setting this parameter BIT0 to 1, PLC modification is as following:



175 **HOME DOG I POINT 0)LOCAL 1)REMOTE**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：means the HOME DOG signal is connected LOCAL INPUTS （transit board HS1 ~ HS4）, must setting the type of DOG signal to（parameter 0064）;
1：means the HOME DOG signal is connected REMOTE INPUTS, PLC must change each axis reference point DOG signal to the corresponding C BIT 0031 ~ 0034（please refer to C BIT 0031 ~ 0034 for description）

204 **ZERO POINT RECORDED BY NC BIT**

Range： 0 ~ 15
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT 0：0 means when X axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when X axis is in Home point mode, the system uses NC record’s Home point when executing return Home process.
BIT 1：0 means when Y axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when Y axis is in Home point mode, the system uses NC record’s Home point when executing return Home process.
BIT 2：0 means when Y axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when Y axis is in Home point mode, the system uses NC record’s Home point when executing return Home process.
BIT 3：0 means when 4th axis is in Home point mode, the system must research Home point when executing return Home process.

1 means when 4th axis is in Home point mode, the system uses NC record’ s Home point when executing return Home process.

293	REFERENCE OF SERVO AXIS’S ZERO POINT

Range： 0 ~ 63
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： BIT0：0 means X axis uses DOG for machine reference point reference and 1 means X uses motor INDEX signal for reference.
BIT1：0 means Y axis uses DOG for machine reference point reference and 1 means Y uses motor INDEX signal for reference.
BIT2：0 means Z axis uses DOG for machine reference point reference and 1 means Z uses motor INDEX signal for reference.
For a linear axis, please set the mechanical reference point as DOG(set the corresponding BIT of this parameter to 0); for a rotary axis, given motor teeth/screw ball’s teeth is an integer, use the index of the motor encoder as the mechanical reference(set the relative BIT of this parameter to1). For a rotary axis, and motor teeth/screw ball’s teeth is not an integer, it is not recommended to use INDEX of the otor encoder as the mechanical reference point, as doing so wil produce multiple mechanical reference points.

834	READING DURATION TIME OF ABSOLUTE ENCODER

Range： 0 ~ 10
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 5
Unit ： s
Description： To set time restriction of NC executes Encoder reading movement.

1014	ABSOLUTE COORDINATES OF X AXIS AFTER RETURNING TO HOME POINT μm
1015	ABSOLUTE COORDINATES OF Y AXIS AFTER RETURNING TO HOME POINT μm
1016	ABSOLUTE COORDINATES OF Z AXIS AFTER RETURNING TO HOME POINT μm
1017	ABSOLUTE COORDINATES OF THE 4TH AXIS AFTER RETURNING TO HOME POINT μm

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Assumed the desired X axis absolute coordinate is 300 um after home return, so the setting value must be 300. This parameter setting value only changes the coordinate display value after X-axis returns home.
This will NOT change the actual machine position when X-axis returns home. So must set the parameter 0076 setting value to 1 for this setting to be effective.

1022	**THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm**
1023	**THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm**
1024	**THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm**
1025	**THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm**

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： This parameter is to set the offset amount of the 1st reference point corresponding to the 2nd reference point of X axis. Assumed the desired corresponding offset amount of the 1st reference point is 2000 um, so set the offset amount to 2000.

1026	**THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm**
1027	**THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm**
1028	**THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm**
1029	**THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm**

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： This parameter is to set the offset amount of the 1st reference point corresponding to the 3rd reference point of X axis. Assumed the desired corresponding offset amount of the 1st reference point is 2000um, so set the offset amount to 2000.

1030	**THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm**
1031	**THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm**
1032	**THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm**
1033	**THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm**

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： This parameter is to set the offset amount of the 1^{st} reference point corresponding to the 4^{th} reference point of X axis. Assumed the desired corresponding offset amount of the 1^{st} reference point is 2000um, so set the offset amount to 2000.

1104	**HOME RETURN AT THE 1ST SPEED: X AXIS μm/min**
1105	**HOME RETURN AT THE 1ST SPEED: Y AXIS μm/min**
1106	**HOME RETURN AT THE 1ST SPEED: Z AXIS μm/min**
1107	**HOME RETURN AT THE 1ST SPEED: THE 4TH AXIS μm/min**

Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2000000
Unit ： um/min
Description： during each axis zero return procedure, moves toward this axis Reference point in this parameter setting speed (set by parameter 0120). After reaching the home DOG, please use the 2nd gear speed, which is set By parameter 1108 ~ 1111, to move and to search for motor reference point.

1108	**HOME RETURN AT THE 2ND SPEED: X AXIS μm/min**
1109	**HOME RETURN AT THE 2ND SPEED: Y AXIS μm/min**
1110	**HOME RETURN AT THE 2ND SPEED: Z AXIS μm/min**
1111	**HOME RETURN AT THE 2ND SPEED: THE 4TH AXIS μm/min**

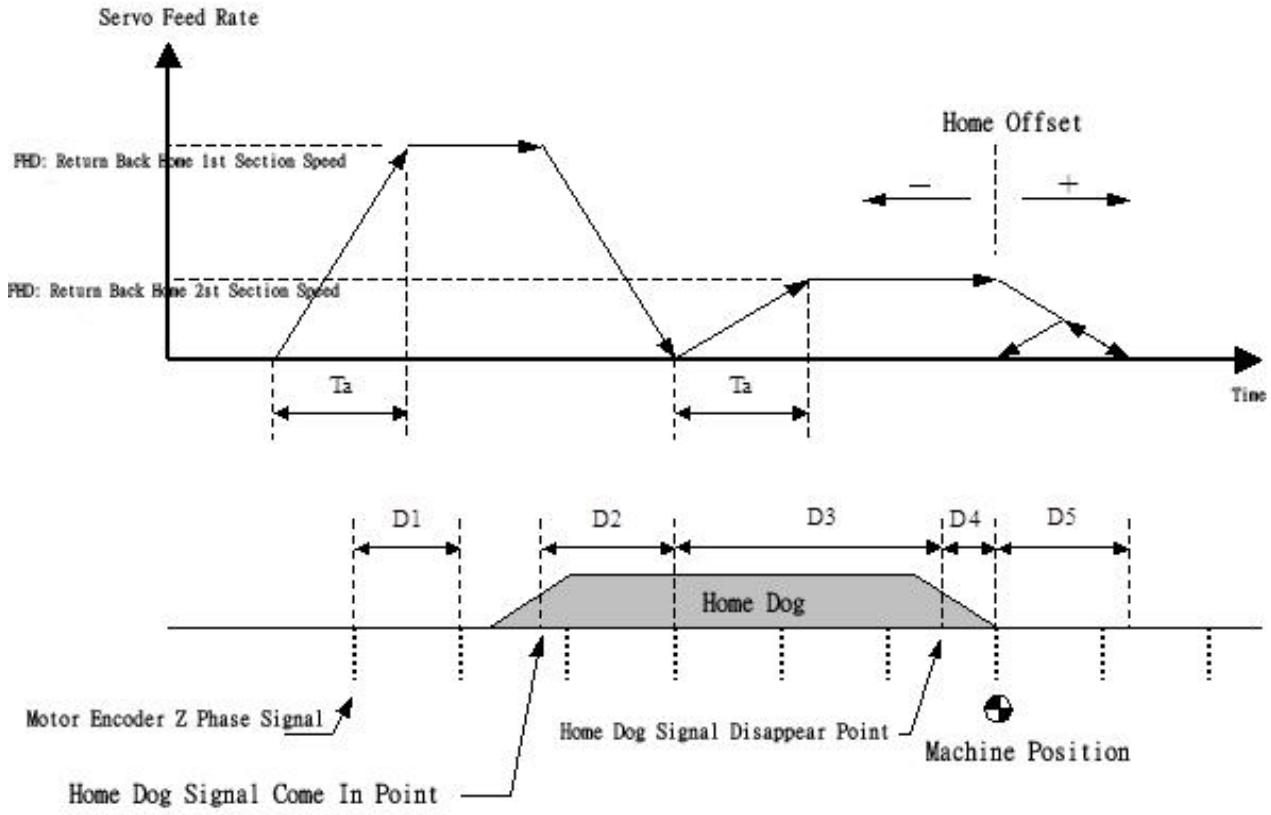
Range： 1 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 200000
Unit ： um/min
Description： during each axis zero return procedure, moves toward this axis Reference point in Parameter #1104 ~ #1107's setting speed. (Set by parameter 0120). After touching the home DOG, please use the 2^{nd} gear speed, which is set by this parameter, to move and to search for motor reference point.

1118	**Open Reference Point Protecting Function**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： When the distance between the 1st index and limit switch is less than 1/5 or more than 4/5 revolution of the encoder, grid protection function will activate so the next index mark will be used to make the distance between the 1st index and limit switch over 1/2 revolution of the encoder if the distance in-between is less than 1/2 revolution. This function ensures that the zero point is always the original one.

Zero Return Procedure Description

When Reference Point is Behind DOG



1. D1is the distance between two Z phase signals that are close together of servo motor ECNODER.
2. D2 is the distance between the HOME DOG input points to the servo axis by using the 1st gear speed decelerating stop. The calculating formula is as follows:

   D2 ≒ servo lag + deceleration distance ≒ $\frac{F_{H1}}{K_p}+\frac{F_{H1}\cdot T_a}{2}$

   Kp is the servo position loop gain （sec-1），, Ta is the servo axis G00 acc/decelerating time.

   If the length between the Home DOG input point and the disappear point is smaller than D2, then warning message (MOT 0027 Home DOG length is too short) will occur.
3. D3 is the traveling distance at the time when servo motor starts from complete stop and accelerates to 2nd gear speed to when Home DOG signal disappears. In order to catch the Z phase signal under the condition of the same speed, the distance of D3 must be long enough in order for the servo motor to be able to reach the 2nd gear speed. Calculating formula is as following:

   D3 ≧ $\frac{F_{H2}\cdot T_a}{2}$ ，Ta is servo axis G00 acc/deceleration time.

So, the length of the Home DOG must be at least (D2 + D3) long.

4. is the time interval from the disappear point of Home DOG to the next Z phase signal of servo motor ECNODER. In order to prevent any confusion that is caused by the electric and the machine delay, D4 must be approximately one-half of D1, which means the disappear point of Home DOG must be approximately at the mid-point of the two Z phase signals that are close to the servo motor. If the motor rotates one time but not able to find the Z phase signal after the Home Dog signal is disappear, then the alarm message (MOT0045 not able to find the Zl light of motor) will occur. Please check whether there is motor connection error.
5. is the traveling distance from the 1st Z phase signal of servo motor ENCODER after getting away DOG to servo axis in 2nd gear decelerating stop. The calculating formula is as follows:

$$D5 \fallingdotseq \text{servo lag + deceleration distance} \fallingdotseq \frac{F_{H2}}{K_p} + \frac{F_{H2} \cdot T_a}{2}$$

Kp is the servo position loop gain （sec-1），, Ta is the servo axis G00 acc/decelerating time.

The distance between the machine reference point of servo axis and the traveling limit must be at least greater than D5. Or it will mistakenly cause travel limitation during zero return.

Recommanding to set the offset amount of the servo axis reference point (parameters 0030 ~ 0033) greater than D5 in order to prevent any reverse direciton moving of servo axis.

【Example】Assumed a servo axis home return in 1st gear speed is 10m/min, the 2nd gear speed is 200mm/min, G00 acc/decelerating time is 150ms, position loop gain is 100sec-1. Under the condition that the reference point is behind DOG, the calculating formula of the shortest needed length of DOG is as follows:

$$D2 \fallingdotseq \frac{10000/60}{100} + \frac{10000/60 \cdot 0.15}{2} \fallingdotseq 14.17mm$$

$$D3 \fallingdotseq \frac{200/60 \cdot 0.15}{2} \fallingdotseq 0.25mm$$

So, the shortest needed length of DOG is（D2 + D3） ≒ 14.42mm

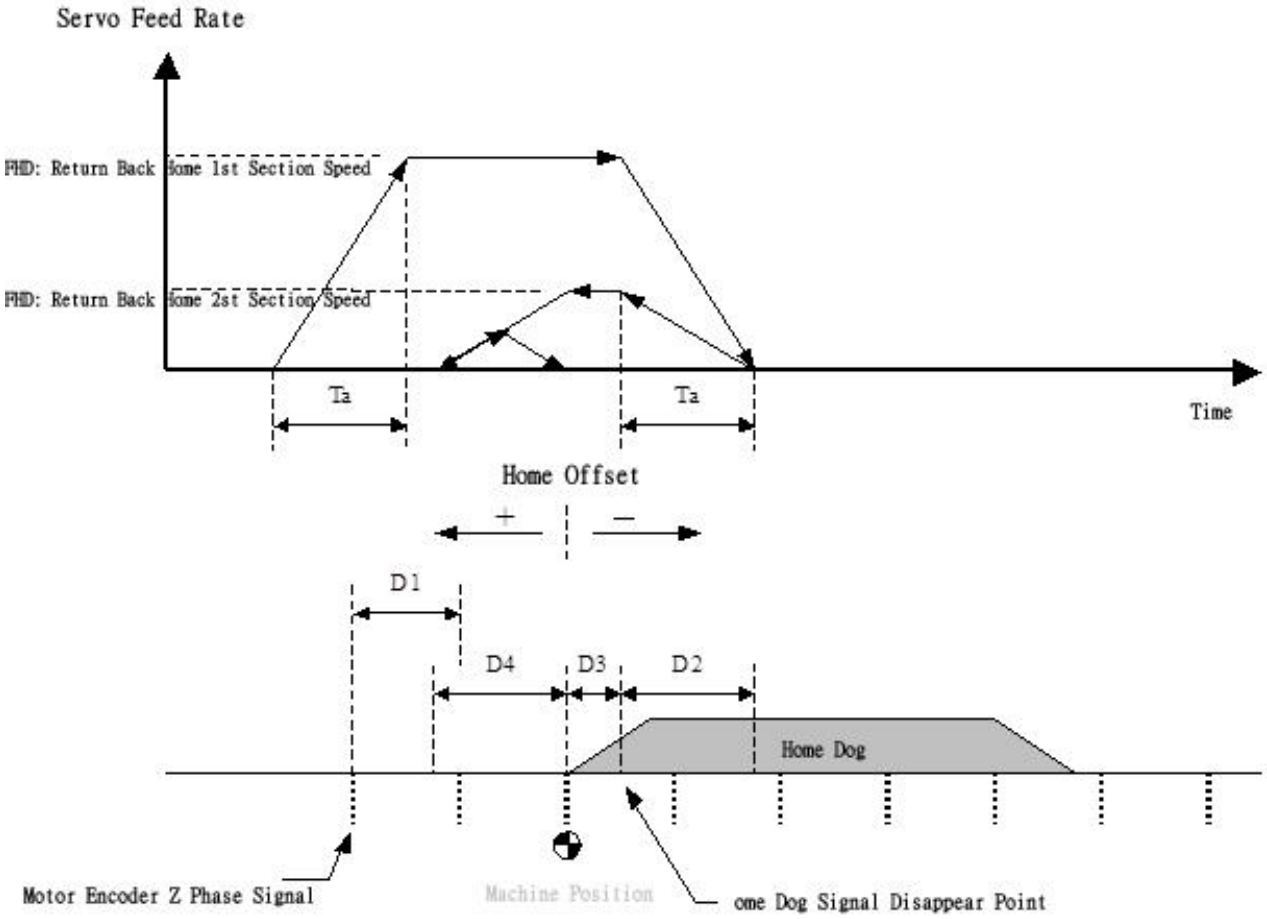
Also,

$$D5 \fallingdotseq \frac{200/60}{100} + \frac{200/60 \cdot 0.15}{2} \fallingdotseq 0.28mm$$

If the setting vaule for the offset amount of this axis reference point is larger than 0.28mm, it

will be able to prevent this axis to do the reverse direction moving at the last step of the home return procedure.

When Reference Point is Ahead DOG



1. D1is the distance between two Z phase signals that are close together of servo motor ECNODER.
2. D2 is the distance between the HOME DOG input points to the servo axis by using the 1st gear speed decelerating stop. The calculating formula is as follows.

   D2 ≒ servo lag + deceleration distance ≒ $\frac{F_{H1}}{K_p} + \frac{F_{H1} \cdot T_a}{2}$

   Kp is the servo position loop gain （sec-1），, Ta is the servo axis G00 acc/decelerating time.

   If the length between the Home DOG input point and the disappear point is smaller than D2, then warning message (MOT 0027 Home DOG length is too short) will occur
3. D2 is the traveling distance at the time when servo motor starts from complete stop and accelerates to 2nd gear speed to when Home DOG signal disappears General speaking, the 2nd gear speed is smaller than the 1st gear speed, so the length of D2 must be long enough for the servo motor to accelerate to the 2nd gear speed, which means catching the servo motor Z

phase signals in the same speed.

4. D3 is the time interval from the disappear point of Home DOG to the next Z phase signal of servo motor ECNODER. In order to prevent any confusion that is caused by the electric and the machine delay, D4 must be approximately one-half of D1, which means the disappear point of Home DOG must be approximately at the mid-point of the two Z phase signals that are close to the servo motor. If the motor rotates one time but not able to find the Z phase signal after the Home Dog signal is disappear, then the alarm message (MOT0045 not able to find the Zl light of motor) will occur. Please check whether there is motor connection error.
5. is the traveling distance from the 1st Z phase signal of servo motor ENCODER after getting away DOG to servo axis in 2nd gear decelerating stop. The calculating formula is as following:

   D5 ≒ servo lag + deceleration distance ≒ $\frac{F_{H2}}{K_p} + \frac{F_{H2} \cdot T_a}{2}$

   Kp is the servo position loop gain （sec-1），, Ta is the servo axis G00 acc/decelerating time.

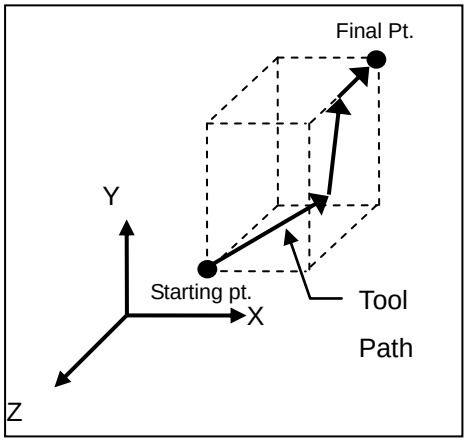
   Recommanding to set the setting value for the offset amount of the servo axis reference point that is greater than D4 in order to prevent the servo axis to do the reverse direction moving.

3.8 Operation Parameters

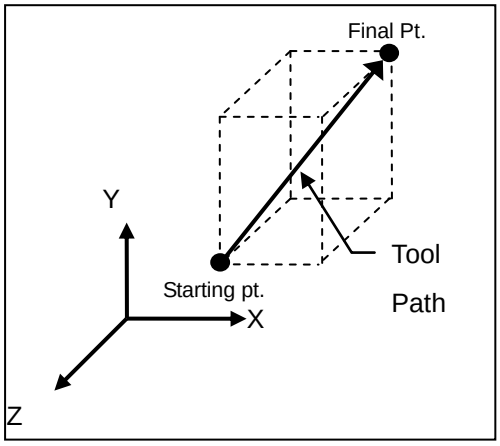
41	SYNCHRONIC MOTION OF G00 COMMAND 0)NO 1)YES

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： 0：For G00 command, each servo axis will move by its setting G00 speed, NOT to do compensation motion simultaneously.
1：for G00 command, each servo does compensation motion simultaneously, the valid range is as following:

a. G00 commands in MEM and/or MDI modes
b. Same G00 motion commands under MEM and/or MDI modes, such as G27 ~ G30、G53;
c. G00 and G53 commands of PMC axis function



Parameter 0041 setting value is 0



Parameter 0041setting value is 1

43 **Interpolation Correct Stop Mode Setting BIT 0-4**

Range： 0 ~ 31
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 16
Unit ： None
Description： Bit0：1 means X axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit1：1 means Y axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit2：1 means Z axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit3：1 means 4th axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit4：1 means starting rapid traverse (G00) of exact stop checking function is canceled.
For straight-line cutting command (G01), if want to enable the exact stop checking function, not only needs to set this parameter corresponding bit but also needs to order G09 command (exact stop command, works for a single block), or G61 command (exact stop mode, permanently effective, so must use G64 command to cancel.)
Once activating the exact stop checking function of G01 command, NC system will wait until each enabled servo axis enters into the checking windows range (parameters 0006 ~ 0009) after completed interpolation of any one of G01 command, then it will execute the next single block.
For the RAPID TRAVERSE command, G00, only need to set BIT 4 of this parameter to 1 in order to active the exact stop checking function. Under the condition that the exact stop function can be enable, NC system will wait until the actual position of each servo axis already enters into the checking windows range (parameters 0800 ~ 0803) after the interpolation is completed, then it will execute the next signal block. But if the former single block and the latter single block of a certain rapidly orientation command are both rapid traverse commands, then this rapid traverse command will NOT execute the exact stop checking.

63 **SET RELATIVE COORDINATES ACCORDING TO ABSOLUTE COORIDNATES 0)NO 1)YES**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： the valid range of this parameter setting value is as following:
1. Reboot coordinate display value；
2. After zero return procedure is completed, coordinate display value；
3. G54 ~ G59 commands（work coordinate system selection）;
4. G92 command（coordinate value setting）

71 **PATH CHECK G22 ADOPTS 0) EXTERNAL 1)INSIDE**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None

Description： 0：The embedded travel checking function that is set by G22 is the external prohibit area. When there is command that will move the tool to outside of the setting range, the system alarm will be enabled.
1：The embedded travel checking function that is set by G22 is the external prohibit area. When there is command that will move the tool to outside of the setting range, the system alarm will be enabled.
About system alarm, please refer to the description of MOT 4058、9009 ~ 9014.

73 ACCELERATION/DECELERATION OF G31 0)NO 1)YES

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：after G31 SKIP SIGNAL enters, immediately stop without decelerating;
1 ：After G31 SKIP SIGNAL enters, use parameter 0041 to set the acc/decelerating time in order to precede stop in decelerating speed.

74 ENABLE MACRO UNDER SINGLE BLOCK MODE

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： 0：Macro command (not NC command) Not execute single block;
1：Macro command (not NC command) execute single block.

83 G00 IS 0)DISABLED 1)EFFECTIVE IN DRY RUN

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description：

Under Dry Run, Motion of RAPID TRAVERSE Command

	Para #0083			
	0		0	
	Para #0041		Para #0041	
	0	1	0	1
RAPID mode	（1）			
In MEM and MDI modes, G00 command and/or motion with G00 command	（2）	（3）	（1）	（4）
G00 and G53 commands of PMC axis function	C23 OFF：（1）	C23 OFF：（3）	（1）	（4）

	C23 ON：（1）	C23 ON：（4）		

Each axis moves according to its G00 speed.

Each axis moves according to its JOG speed

Each axis moving speed will NOT excess its setting JOG speed.

Each axis moving speed will NOT excess its setting G00 speed.

89 **SET M CODE COMMAND FOR PARTS COUNTING BY USERS**

Range： 1 ~ 99
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 99
Unit ： None
Description： Other than M02 and M03, users can use this parameter to set another working piece counter control of M code command. But, must avoid using normal M code commands, such as M00 (program stop), M01 (optional stop), M3 (Spindle Positive Rotating) and est. Please refer to the program manual for a full detailed description of M code commands. When the program executes this M code, working piece will be added up at the POS page. At the same time, machine working time will return to zero automatically. If the adding-up sum of working piece is larger than the max sum of working piece which is set by users, the system will send out S BIT 134 signal to inform PLC.

94 **EDIBILITY OF 09XXX 0)NO 1)YES**

Range： 0 ~ 1
Effective： Instant Activity
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Set the edibility of files No. O9000~O9999, etc.

122 **NAME THE 4TH AXIS 0...5(ABCUVW)**

Range： 0 ~ 5
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 2
Unit ： None
Description： Setting Value is 0, name of the 4^{th} Axis is A;
Setting Value is 1, name of the 4^{th} Axis is B;
Setting Value is 2, name of the 4^{th} Axis is C;
Setting Value is 3, name of the 4^{th} Axis is U;
Setting Value is 4, name of the 4^{th} Axis is V;
Setting Value is 5; name of the 4^{th} Axis is W.

123 **UNIT SYSTEM 0)G21 METRIC 1)G20 IMPERIAL**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0

Unit : None
Description : This parameter is to set the system starting unit after rebooting the system. Please use G20 (inch command)/G21 (metric command) to exchange the system starting unit.

124 INITIAL MOTION COMMAND 0)G00 1)G01

Range : 0 ~ 1
Effective : Effective After Rebooting
Acess Level : End User
Default : 1
Unit : None
Description : This parameter is used to set the moving command after NC starts. After entering into NC system, user needs to execute the following command under MEM or MDI mode:
G91 X100. Y100. Z100.
When parameter setting value is 0, the above command equals to:
G91 G00 X100. Y100. Z100.
When parameter setting value is 1, the above command equals to:
G91 G01 X100. Y100. Z100.

125 Tool Compensation T Codes 0)Back 2 Digits 1)Front 2 Digits

Range : 0 ~ 1
Effective : EFFECTIVE AFTER RESET
Acess Level : Machine Maker
Default : 0
Unit : None
Description : 1：Using the first two digits of T code as tool compensation code.
0：Using the last two digits of T code as tool compensation code.

126 T0 Cancel Tool Compensation or not 0)NO 1)YES

Range : 0 ~ 1
Effective : EFFECTIVE AFTER RESET
Acess Level : End User
Default : 1
Unit : None
Description : When user commands TO, this parameter sets whether to cancel tool compensation. When this parameter is 1, T01 command can be used as “Cancel Tool Compensation Command”.

127 T Code Digits Number 0)4 digits 1)2 digits

Range : 0 ~ 1
Effective : EFFECTIVE AFTER RESET
Acess Level : Machine Maker
Default : 0
Unit : None
Description : When this parameter is 0, T code key-in format is Taabb, which indicates aa as tool number and bb as compensation number.
When this parameter is 1, T code key-in format is Taa, which indicates aa as both tool number and compensation number.

128 **T4 Code,the front 2 digits are defined to be 00 or the same with the later 2 digits**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： When T code format is set as 4 digits and the T code key-in format is 2 digits Txx:
Para.#0128=0, Txx is T0.
Para#0128=1, Txx which means tool number and compensation number is the same.

130 **UNIT OF INPUT VALUE**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： 【Example】Under the metric unit system, if set this parameter to 0, user will order the following commands in MDI mode：
G90G00X100F1000
X axis moves 0.1mm position in 1mm/min speed
G90G00X100.F1000.
X axis moves to 100mm position in 1000mm/min speed
If set this parameter to 1：
G90G00X100F1000
X axis moves to 100mm position in 1000mm/min speed
G90G00X100.F1000.
X axis moves to 100mm position in 1000mm/min speed

131 **CUTTER COMPENSATION TYPE 0)A 1)B**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：path compensation by using Type A；
1：Path compensation by using Type B.
Please refer to program manual for the full detailed description of path compensation type.

132 **X Axis is 0)Diameter 1) Radius Command**
201 **Y Axis is 0)Diameter 1) Radius Command**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： This parameter sets the command key-in coordinate is diameter or radius mode.

135 **Power ON Coordinates 0) Absolute G90 1)Incremental G91**

Range： 0 ~ 1

Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description： 0：setting absolute coordinate（G90）as the coordinate type when starting system
1：setting incremental coordinate（G91）as the coordinate type when starting system.

140 GLOBAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： There are 500 command variables and all level programs share these common variables. The default value is VACANT for common variables @1 ~ @400 when rebooting. But, whether or not clear means VACANT is decided by this parameter when press RESET. For common
variables @401 ~ @500, remaining as the original value after pressing RESET key and also remaining power-discontinue memory. @0 means VACANT permanently.

141 LOCAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： There are 33 local variables and program in each level program has its own 33 local variables. Only need to end that level program to clear local variables of that level. Since pressing RESET key will return back to the main program level, the content of local variables in the main program level will use this parameter to set whether or not to clear when pressing RESET. If rebooting, local variables will be cleared no matter in which local level. #0 means VANCANT permanently.

145 Power ON Plane Default Setting 0)XY 1)ZX 2)YZ

Range： 0 ~ 2
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：after entering into the system, default setting is XY panel（G17）
1：after entering into the system, default setting is ZX panel（G18）
2：after entering into the system, default setting is YZ panel（G19）

146	**M CODE FOR MACRO O9001**
147	**M CODE FOR MACRO O9002**
148	**M CODE FOR MACRO O9003**

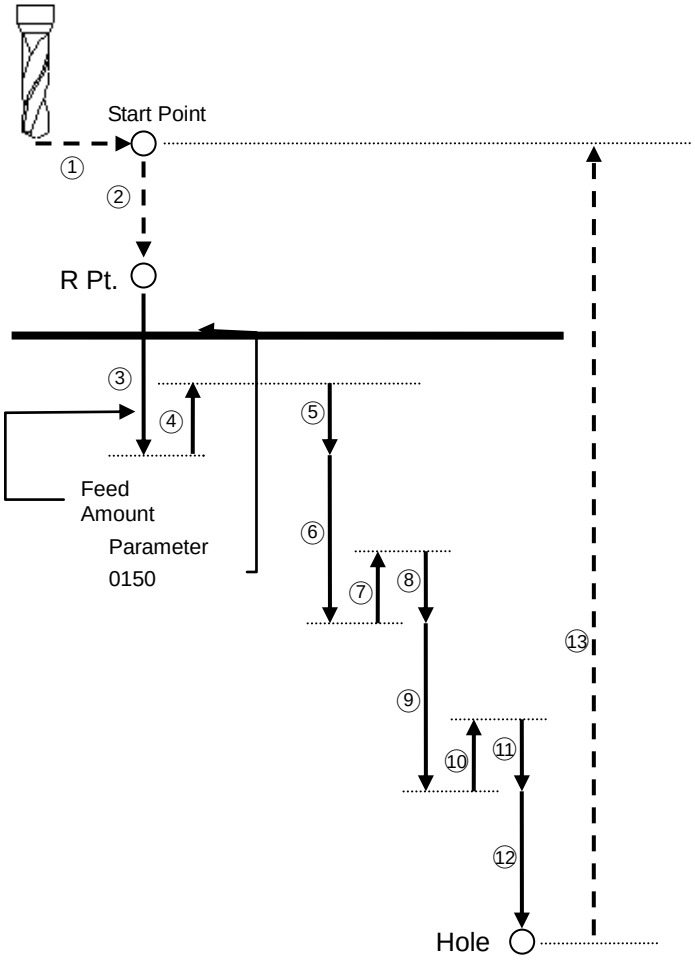
Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： O9001 is the automatic tool changing of MACRO program of the system. When the system executes to this parameter's setting M code, it will call and execute MACRO program O9001, which is to change tool automatically. The setting value of this parameter must avoid all normal M code commands. Please refer to program manual for a full detailed M code command list.

149	**DEFAULT FEED RATE**

Range： 0 ~ 32767
Effective： Effective After Rebooting
Acess Level： End User
Default ： 1000
Unit ： mm/min
Description： This parameter is to set the default feedrate of the system under MEM or MDI mode.

150	**TOOL ESCAPE AMOUNT IN DRILLING CYCLE**

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 200
Unit ： um
Description： This parameter is to set the shrinking amount that every time X-axis feed into a constant value in G73 peak drilling command. The following shows the separate motion of a peak drilling command. Please refer to program manual for a full detailed description.

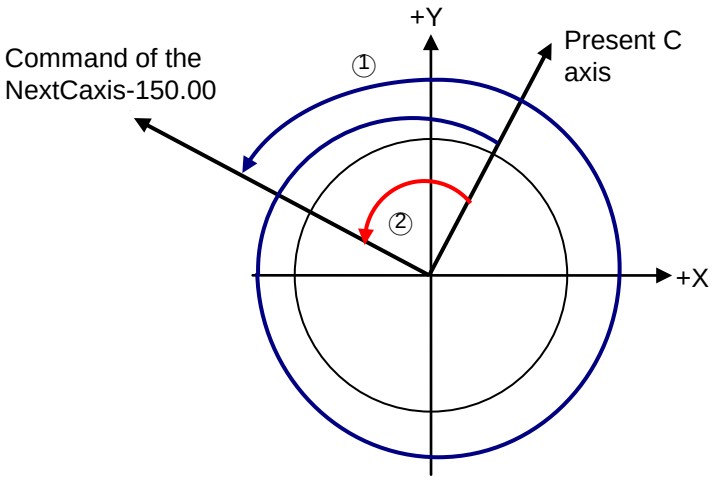


151	**Tool Length Compensation 0)Radius 1)Diameter**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： This parameter sets the tool radius compensation value key-in coordinate is diameter or radius mode.

152 **ROTARY PATH OF THE 4TH AXIS**

Range： 0 ~ 3
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： The following diagram shows when C axis moves from 300.000° position to -150.000° position, whether or not C axis takes into account the difference if take the shortest path: the path in ① means using the linear-type axis method of the rotatory axis. After completed, C axis coordinate display value is －150.000. The path in ② means to take the shortest path. When completed, C axis coordinate display value is 210.0000.



153 **G CODE USE TYPE 0)B 1)A 2)C**

Range： 0 ~ 2
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： This parameter assign A,B or C type for G code.

154 **G71/G72 Appereance Over Cut Checking 0)YES 1) NO**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： This parameter set enables shape checking or not when executing G71/G72.

155	UNIT OF INITIAL FEED RATE 0)MM/REV 1)MM/MIN

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description： This parameter is to set the default unit of the cutting federate under MEM or MDI mode, but this is not valid for the rapid traverse command (G00).
0：Using G95, under metric: unit is mm/rev; under inch: unit is inch/rev. In this situation, must match with the spindle rotating for the cutting command (G01/G02/G03) to be effective;
1：using G94，under metric: Unit is mm/min; under inch: unit is inch/min.

161	M CODE FOR MACRO O9004
162	M CODE FOR MACRO O9005
163	M CODE FOR MACRO O9006
164	M CODE FOR MACRO O9007
165	M CODE FOR MACRO O9008
166	G CODE FOR MACRO O9010
167	G CODE FOR MACRO O9011
168	G CODE FOR MACRO O9012
169	T CODE CALLS O9020

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： when NC executes this parameter’s setting M code, it will call and execute MACRO program O9004(O9005 ~ O9008、O9010 ~ O9012、O9020). Users can write the content of this MACRO themselves and then copy this file to the desired MACRO program menu (default: C:\[system path]\MACRO) in the system. The setting value of this parameter must avoid all normal M code commands. Please see program manual for the full detailed M code commands.

176	LOCAL PORT NO FOR G31 P1
242	G31 P2 Signal Source HS Connector Port Code
243	P3 Signal Source HS Connector Port Code
244	P4 Signal Source HS Connector Port Code

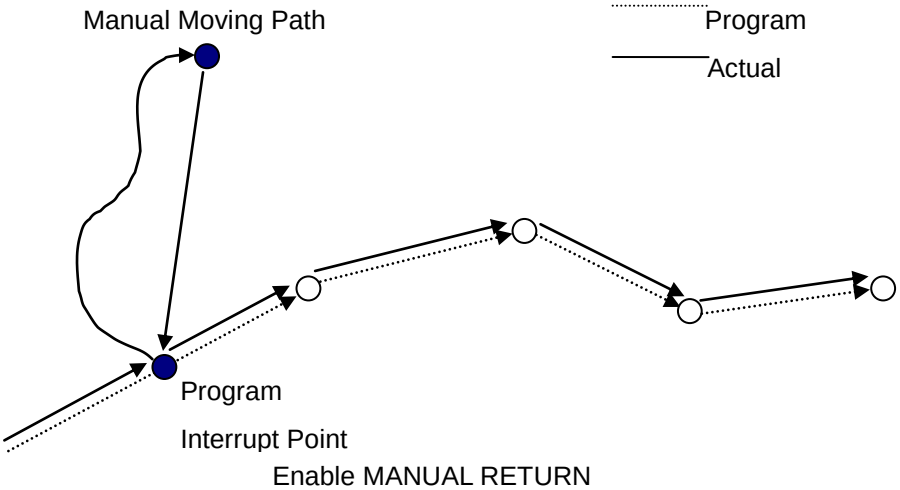
Range： 0 ~ 4
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 1：G31 SKIP signal to 1st LOCAL INPUT point（HS1 on Transit Board）
2：G31 SKIP signal to 2nd LOCAL INPUT point（HS2 on Transit Board）
G31 SKIP signal must be connected to LOCAL INPUT on Transit board. This parameter is to set connector point number. Since G31 signal must use LOCAL INPUT to latch absolute position record value of each axis, must use the 1st and the 2nd point of LOCAL INPUT.

177	**G31 Signal Source Connection Type 0)NC 1)NO**
245	**P2 Signal Source Connection Type 0)NC 1)NO**
246	**P3 Signal Source Connection Type 0)NC 1)NO**
247	**P4 Signal Source Connection Type 0)NC 1)NO**

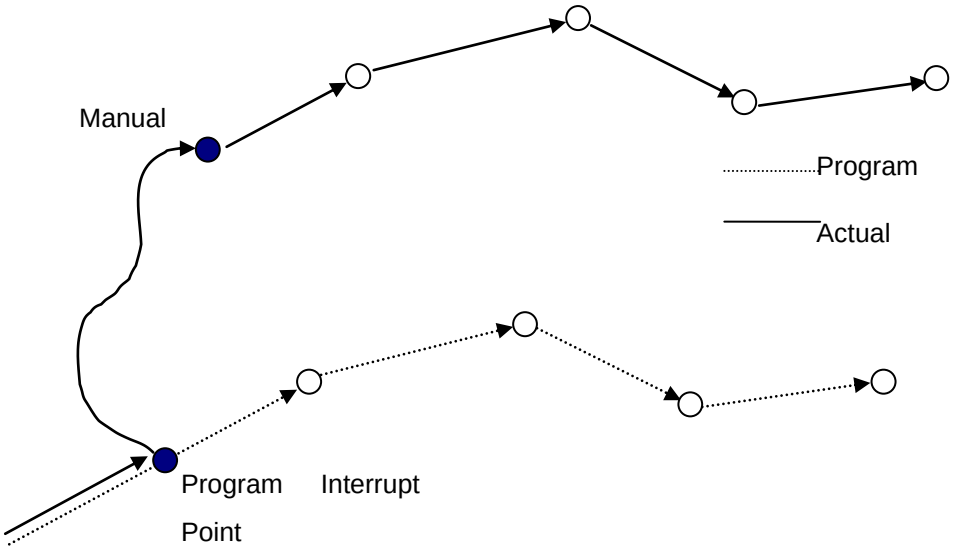
Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： None
Description： 0：G31 SKIP signal is NC. When SKIP signal changes from 1 to 0, this G31 signal blocks stops immediately and executes the next signal block.
1：G31 SKIP signal is NO. When SKIP signal changes from 0 to 1, this G31 signal block stops immediately and executes the next signal block.

180	**ENABLE MANUAL RETURN**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： 0：No
1：Yes
Assumed the system is in MEM or MDI mode. If switching to JOG, MPG and/or RAPID modes during program executing, system will enter into 【Free Hold】. If user uses this manual function to move the machine from the initial program interrupting position and then continue executing the unfinished command in MEM or MDI mode, user has two choices. One is to move the machine back to the initial program interrupting position and continue the unfinished commanding, which is called MANUAL RETURN. The other one is to continue the unfinished commanding from the present position. But, there will be an OFFFET amount between the program path and afterward working path. Please refer the below diagrams for the difference between the above two methods.



Enable MANUAL RETURN



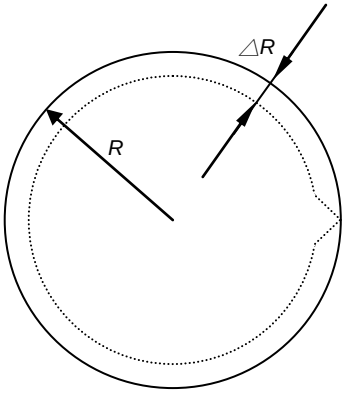
Disable MANUAL RETURN

Other than using this parameter to set MANUAL RETURN function, C BIT 0004 can also be used:
If C BIT 004 is ON, it means enable MANUAL RETURN function.
If C BIT 004 is OFF, it means disable MANUAL RETURN function.
Moreover, if the Parameter #0180 is 1, MANUAL RETURN function will be enabled no matter C BIT 004 is enable or not. On the other hand, if Parameter #0180 is 0, C BIT 004 does matter whether or not to enable this function.

187 **AUTO ARC FEED RATE CLAMP 0)NO 1)YES**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： 0：No
1：Yes

There will be an error amount ΔR between arch commanding and actual path.

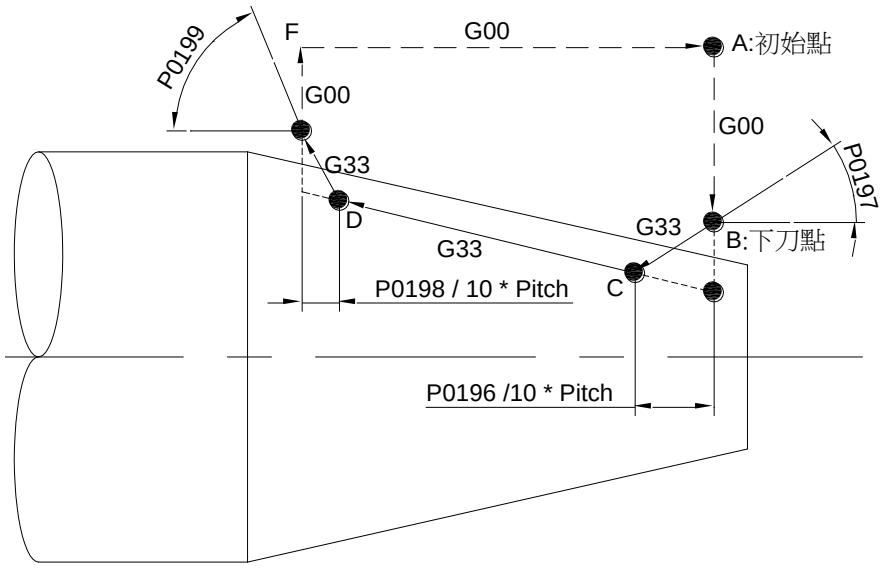


$$\Delta R = (\frac{1}{2K_p^2 R} + \frac{T^2}{24R})V^2$$

Calculating formula is ： . K_p Is position loop incremental? T is acceleration and deceleration time integer number. R is arch radius and V is the assigned feedrate. This formula is used only when the corresponding speed of speed loop is 3 ~ 10 times faster than position loop.
Please also refer to description of Parameter 0188 and 0809 for detailed description.

196	**G78(G92) Approach Chamfering Length (0.1 thread thread)**
197	**G78(G92) Approach Chamfering Angle(Degree)**
198	**G78(G92) Departure Chamfer Length(0.1 thread)**
199	**G78(G92) Departure Chamfering Angle(Degree)**

Range： 0 ~ 85
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 45
Unit ： None
Description： As shown in the drawing below, Pr.0196 & Pr.0197 set the cutting angle and the length to be preserved. Pr.0198 & P0199 set the lifting length and angle of the tool when thread cutting is finished.



200	**FEEDRATE DISPLAY 0)COMMAND 1)ACTUAL FEEDBACK**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： 0：HMI panel displays feedrate commanding value
1：System will calculate the actual feedrate according to each axis motor ENCODER (or linear scale) and then will display it on HMI panel.

202	OPERATION LANGUAGE 0)ENGLISH 1)TRADITIONAL CHINESE 2)SIMPLIFIED CHINESE

Range： 0 ~ 2
Effective： Effective After Rebooting
Acess Level： End User
Default ： 1
Unit ： None
Description： 0：English
1：Traditional Chinese
2：Simplify Chinese

203	Auto Mode Program RESET 0)NO 1)YES

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： When switch to MDI mode, whether moving the cursor to the file head or not.

205	TOOL COMPENSATION 0)ABSOLUTE 1) RELATIVE INPUT

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： Using this parameter to set the entering tool compensation value at OFFSET page, either absolute value or relative value.

211	STOP PRE-INTERPRETATION OF M CODE
212	STOP PRE-INTERPRETATION OF M CODE
213	STOP PRE-INTERPRETATION OF M CODE
214	STOP PRE-INTERPRETATION OF M CODE
215	STOP PRE-INTERPRETATION OF M CODE
216	STOP PRE-INTERPRETATION OF M CODE
217	STOP PRE-INTERPRETATION OF M CODE
218	STOP PRE-INTERPRETATION OF M CODE
219	STOP PRE-INTERPRETATION OF M CODE
220	STOP PRE-INTERPRETATION OF M CODE

Range： 0 ~ 299
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 209
Unit ： None
Description： If some M code must wait for outside signals, it must be registered here to prevent any false action caused by pre-interpretation of part programs.

221	DIGITAL FILTER FREQUENCY (KHZ)

Range： 0 ~ 6666
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： Please go to the reference chart below for the valid ranges of digital filter frequency. If the frequency is set between two ranges, NC will use the closest value as the filter frequency. For example, parameter No. 221 is set as 250 KHz while the actual filter frequency is 256 KHz.

Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)
6667	256	131	81	53	28
3333	247	128	80	52	27
2222	238	126	79	51	26
1667	230	123	78	50	
1333	222	121	77	49	
1111	215	119	76	48	
952	208	117	75	47	
833	202	115	74	46	
741	196	113	73	45	
667	190	111	72	44	
606	185	109	71	43	
556	180	108	67	42	
513	175	106	66	41	
476	171	104	63	40	
444	167	101	65	39	
417	163	100	64	38	
392	159	98	63	37	
370	155	95	62	36	
351	152	94	61	35	
333	148	93	60	34	
317	145	90	59	33	
303	142	88	58	32	
290	139	85	57	31	
278	136	83	56	30	
267	133	82	54	29	

231	HIDE INFORMATION OF X AXIS
232	HIDE INFORMATION OF Y AXIS
233	HIDE INFORMATION OF Z AXIS
234	HIDE INFORMATION OF THE 4TH AXIS

Range： 0 ~ 3
Effective： Instant Activity
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Show relative HMI information of X (Y, Z, the 4th, the 5th, the 6th) axis.
1：Hide relative HMI information of X (Y, Z, the 4th, the 5th, the 6th) axis.
2：Set by C Bit 0181(0182、0183、0184、0185、0186). OFF: Show；ON: Hide.

238 **Appereance Compensation Value 0)Absolute 1)Incremental Input**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： None
Description： The present mode of geometry compensation input.
0: Absolute input mode.
1: incremental input mode.

239 **Wearing Input Checking Range**

Range： 1 ~ 10000
Effective： Instant Activity
Acess Level： End User
Default ： 1000
Unit ： LU
Description： The maximum value of wear compensation for each input:

- Wearing compensation input is in “absolute mode”: The deviation between the input value and the present value cannot be larger than the value set by PR.0239.
- Wearing compensation input is in “incremental mode”: The input value cannot be larger than the value set by PR. 0239.

249 **CLOSE LOOP GAIN OF THE 1ST SPINDLE’S ORIENTATION**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：When RAMDISK error, did not show alarm message.
1：When RAMDISK error, show alarm message.

351 **UNIT OF CUTTING OVERRIDE FEED RATE**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Cutting override feed rate = R016 register value* 10%；
1：Cutting override feed rate = R016 register value* 1%。

352 **UNIT OF JOG OVERRIDE**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Jog override unit feed rate = R017 register value* 10%；

1：Jog override unit feed rate = R017 register value* 1%。

353	UNIT OF RAPID TRAVERSDE OVERRIDE

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：Rapid traverse override are F0, 25%, 50%, & 100%, respectively；
1：Rapid traverse override = R018 register value* 1%。

360	SET OPERATION SCREEN COLOR (0~3)

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description： 0：Screen color setting is not applied.
1：Screen color setting is white words over a black background
2：Screen color setting is black words over a white background
3：Screen color setting is customized by users.

361	SET THE NUMBER FOR BLACK (0~16)
362	SET THE NUMBER FOR BLUE (0~16)
363	SET THE NUMBER FOR GREEN (0~16)
364	SET THE NUMBER FOR CYAN (0~16)
365	SET THE NUMBER FOR RED (0~16)
366	SET THE NUMBER FOR PURPLE (0~16)
367	SET THE NUMBER FOR BROWN (0~16)
368	SET THE NUMBER FOR WHITE (0~16)
369	SET THE NUMBER FOR GRAY (0~16)
370	SET THE NUMBER FOR LIGHT BLUE (0~16)
371	SET THE NUMBER FOR LIGHT GREEN (0~16)
372	SET THE NUMBER FOR LIGHT CYAN (0~16)
373	SET THE NUMBER FOR LIGHT RED (0~16)
374	SET THE NUMBER FOR LIGHT PURPLE (0~16)
375	SET THE NUMBER FOR YELLOW COLOR (0~16)
376	SET THE NUMBER FOR BRIGHT WHITE COLOR (0~16)
377	SET THE NUMBER FOR CURSOR (0~16)
378	SET THE NUMBER FOR HIGHLIGHT (0~16)
379	SET THE NUMBER FOR UPPER FRAME (0~16)
380	SET THE NUMBER FOR LOWER FRAME (0~16)

Range： 0 ~ 16
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description： Only valid when parameter No. 0360 is set to 3.
0：Not applied.
1~16：Applied and change to the selected color.

394	**Screen Saver Saving Time**

Range： 0 ~ 9999
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description：
1. When this parameter is set to 0, the screensaver is not applied.
2. When this parameter is not 0, the screensaver activates automatically after the system is not operated for a specified amount of time (time length set by the parameter). If screensaver has not activated and some key is pressed, wait time will be counted from the last keystroke. If screensaver already activates, pressing any key will immediately terminate it, and wait time will be counted from zero.

500	**X +1st Soft No Go Area (um)**
501	**X -1st Soft No Go Area (um)**
502	**Y +1st Soft No Go Area (um)**
503	**Y -1st Soft No Go Area (um)**
504	**Z +1st Soft No Go Area (um)**
505	**Z -1st Soft No Go Area (um)**
506	**4TH AXIS +1st Soft No Go Area (um)**
507	**4TH AXIS -1st Soft No Go Area (um)**
512	**X +2ND Soft No Go Area (um)**
513	**X -2ND Soft No Go Area (um)**
514	**Y +2ND Soft No Go Area (um)**
515	**Y -2ND Soft No Go Area (um)**
516	**Z +2ND Soft No Go Area (um)**
517	**Z -2ND Soft No Go Area (um)**
518	**4TH AXIS +2ND Soft No Go Area (um)**
519	**4TH AXIS -2ND Soft No Go Area (um)**

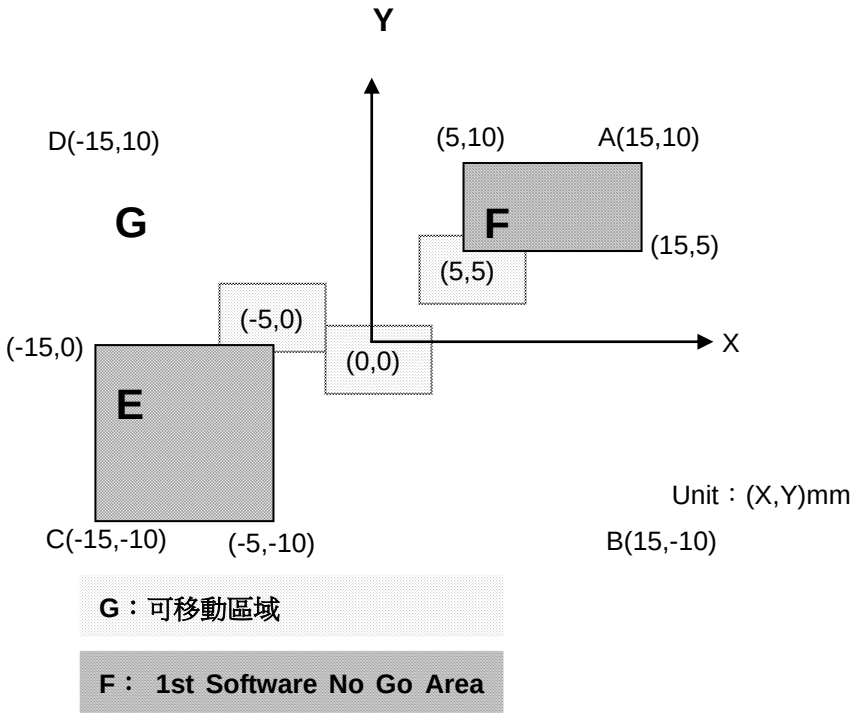
Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um
Description： Forbid to Move the Area

Software's forbidden area function is enable by C bit. Currently, machine coordinates are in the forbidden or not can be known by S bits. Secondly, no go area setting could be set by the parameters as below illustrated.

C175 ON 1st Software No Go Area
C176 ON 2nd Software No Go Area

S175 Machine Position at 1st Software No Go Area Signal (0:NO:YES)
S176 Machine Position at 1st Software No Go Area Signal (0:NO:YES)

Example:
If you want to plan to set a movable area as below illustrated on X-Y plane surface, the related setting are described in the followings.



1. Setting oblong shape ABCD area software limit, parameters are setting in the following. This setting will be effective after home return. If using absolute type encoder, it will be effective after power on.

Pr. No.	Description	Setting Value
P1006	X Axis Software 1st Travel Positive Value(um)	15000
P1007	X Axis Software 1st Travel Negative Value(um)	-15000
P1008	Y Axis Software 1st Travel Positive Value(um)	10000
P1009	Y Axis Software 1st Travel Negative Value(um)	-10000
P1010	Z Axis Software 1st Travel Positive Value(um)	99999999
P1011	Z Axis Software 1st Travel Negative Value(um)	- 99999999
P1012	4th Axis Software 1st Travel Positive Value(um)	99999999
P1013	4th Axis Software 1st Travel Negative Value(um)	- 99999999

2. Setting 1st Software No Go Area F, parameters setting as below. C175 needs to be ON and then effective. If current machine coordinate is in1st Software No Go Area F, then S175 shall be ON, if not in the 1st Software No Go Area F, then S175 will be OFF. Please make ◦Please make the defined no go area setting value as zero, meaning the axis is not using; but not including axis's travel positive value and negative value.

Pr. No.	Description	Setting Value
P0500	1st Software No Go Area X Axis Travel Protection Positive Value(um)	15000
P0501	1st Software No Go Area X Axis Travel Protection Negative Value(um)	5000
P0502	1st Software No Go Area Y Axis Travel Protection Positive Value(um)	10000
P0503	1st Software No Go Area Y Axis Travel Protection Negative Value(um)	5000
P0504	1st Software No Go Area Z Axis Travel Protection Positive Value(um)	0
P0505	1st Software No Go Area Z Axis Travel Protection Negative Value(um)	0
P0506	1st Software No Go Area 4th Axis Travel Protection Positive Value(um)	0
P0507	1st Software No Go Area 4th Axis Travel Protection Negative Value(um)	0

3. Setting 2nd Software No Go Area E, parameters setting as below. C176 needs to be ON and then effective. If current machine coordinate is in 2nd Software No Go Area F, then S176 shall be ON, if not in the 1st Software No Go Area F, then S176 will be OFF. Please make ◦ Please make the defined no go area setting value as zero, meaning the axis is not using; but not including axis's travel positive value and negative value.

Pr. No.	Description	Setting Value
P0512	2nd Software No Go Area X Axis Travel ProtectionPositive Value(um)	-5000
P0513	2nd Software No Go Area X Axis Travel ProtectionNegative Value(um)	-15000
P0514	2nd Software No Go Area Y Axis Travel ProtectionPositive Value(um)	0
P0515	2nd Software No Go Area Y Axis Travel ProtectionNegative Value(um)	-10000
P0516	2nd Software No Go Area Z Axis Travel ProtectionPositive Value(um)	0
P0517	2nd Software No Go Area Z Axis Travel ProtectionNegative Value(um)	0
P0518	2nd Software No Go Area 4th Axis Travel ProtectionPositive Value(um)	0
P0519	2nd Software No Go Area 4th Axis Travel ProtectionNegative Value(um)	0

680	**Enable Slant Axis Control Function**
681	**Enable Distanced Reference Point Come Back and Forth Along with the Slant Axis**
682	**Setting Angle of Slant Axis**
683	**Setting Slant Axis No. Controlled by Slant Axis**
684	**Setting Vertical Axis No. Controlled by Slant Axis**

Range： 0 ~ 3
Effective： Effective After Rebooting

Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： When the included angle of the angular axis and vertical axis is not 90 degree, angular axis control function controls the motion distance of each axis according to the angular angle. The parts program is written by presuming the included angle of the angular axis and vertical axis is perpendicular, but the actual motion distance is controlled based on the angular angle.

806 **Max. Allowed Tolerance Value of Cornering um**

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 50
Unit ： um
Description： This parameter influences the precision of machining. The smaller the set value is, the more the semblance is closer to the part program, nevertheless, the time required for machining is relatively longer. Also, because of some factors such as the fabrication of the machine, friction, etc., it is possible that the machine position could not reach the preset checking range, and hence the system could not finish the execution of the block in the part program. The recommended minimum value of this parameter is around 10 μm.

808 **Cornering Deceleration Function 0) Cancel 1) USE**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1
Unit ： None
Description： It the corner deceleration function is enabled, the system will accelerate/decelerate the corner between tool paths automatically to make path offset remain within the preset tolerance.（Pr.0806）。

809 **Max. Allowing Error Range of Circular UM**

Range： 1 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 30
Unit ： um
Description： This parameter influences the precision of spike. The smaller the set value is, the better the spike effect is, nevertheless, the time required for machining is relatively longer. Please set this parameter according to the offset range acceptable for the setting of arc sizes in actual practice. The recommended minimum set value of this parameter is around 10 μm.

866 **Manually Measure Signal Source HS Connecting Port Code 1/2**

Range： 1 ~ 2
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： none
Description： 1: Local Input No. 0 is used as the input point of measuring signal
2: Local Input No. 1 is used as the input point of measuring signal.

867 **Manually Measure Signal Conneting Points Type 0)NC 1)NO**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1
Unit ： none
Description： 0: The type of tool measuring signal is “Normal Close”, meaning, the tool measuring signal is active at high level.
1: The type of tool measuring signal is “Normal Open”, meaning, the tool measuring signal is active at low level.

868 **Manually Measure Setting Default Offset Number**

Range： 0 ~ 30
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 0
Unit ： none
Description： 0: The geometry compensation number of manual measurement is set by the register R12 of MLC.
Numbers other than 0: The geometry compensation number of manual measurement is set by this parameter

869 **While Manually Measuring, ACC/DEC 0)NO 1) YES**

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 0
Unit ： none
Description： When a measuring signal is input, acceleration/deceleration function is:
0: Not applied.
1: Applied.

870 **Use Cutting Releasing Signal**

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： none
Description： Pr870=1: means while NC is executing parts program under MEM mode, needs to wait “ cutting releasing signal” to be ON, then can keep proceeding cutting.
Pr870=0: means no need to wait for “ cutting releasing signal”.

871 **Waiting Time Before Cutting Releasing**

Range： 0 ~ 32767
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 1000
Unit ： ms
Description： When Pr.0870 is set to 1, the cutting permission signal will not be checked until the specified wait time as set by this parameter is due.

872 **G78(G92) Approach Speed Rate**

Range： 1 ~ 10
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2
Unit ： none
Description： When thread cutting cycle G78 (Type A is G92) is executed, this parameter sets whether the cutting speed is accelerated.
1: The cutting speed is the same as the set F___.
2: The cutting speed is doubled of F____, and so on.

873 **G78(G92) Departure Speed Rate**

Range： 1 ~ 10
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 2
Unit ： none
Description： When thread cutting cycle G78 (Type A is G92) is executed, this parameter sets if the tool’s lifting speed is accelerated.
1: The tool’s lifting speed is the same as the set F___.
2: The tool’s lifting speed is doubled of F____, and so on.

899	APPLY CE REGULATIONS 0)NO 1)YES

Range： 0 ~ 1
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： None
Description： 0：No use CE regulation.
1：Use CE regulation.

1006	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +X μm
1008	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Y μm
1010	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Z μm
1012	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +4TH μm

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 99999999
Unit ： um
Description： This parameter sets the travel limit value of the 1st soft path for each axis. It is effective only when each axis has executed HOME return, otherwise the initial value 99999.999 μm will be applied. If this parameter's set value is smaller than the negative X-axis software travel limit, the system alarm "MOT 4005, SET FIRST SOFELIMIT ERROR" will be triggered. The positive 1st and 2nd soft travel limit for each axis can be switched from each other by using the corresponding C Bit. When these parameters are enabled, if some axis is about to exceed the travel limit, the system alarm "MOT 9001 X AXIS OVER SOFTLIMIT (+)" or "MOT 4058 OVER SOFTLIMIT" will be triggered. Please refer to the description of the warning messages.

1007	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - X μm
1009	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - Y μm
1011	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - Z μm
1013	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - 4TH μm

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： -99999999
Unit ： um
Description： This parameter sets the travel limit value of the 1st soft path for each axis. It is effective only when each axis has executed HOME return, otherwise the initial value 99999.999 μm will be applied. If this parameter's set value is smaller than the positive X-axis software travel limit), the system alarm "MOT 4005, SET FIRST SOFELIMIT ERROR" will be triggered. The positive 1st and 2nd soft travel limit for each axis can be switched from each other by using the corresponding C Bit. When these parameters are enabled, if some axis is about to exceed the travel limit, the system alarm "MOT 9002/4/6 X/Y/Z AXIS OVER SOFTLIMIT (+)" or "MOT 4058 OVER SOFTLIMIT" will be triggered. Please refer to the description of the warning messages.

1034	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +X μm**
1036	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Y μm**
1038	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Z μm**
1040	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +4THμm**

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 99999999
Unit ： um
Description： This parameter sets the travel limit value of the 1st soft path for each axis. It is effective only when each axis has executed HOME return, otherwise the initial value 99999.999 μm will be applied. If this parameter’s set value is smaller than Pr.1007 (negative X-axis software travel limit), the system alarm “MOT 4005, SET FIRST SOFELIMIT ERROR” will be triggered. The positive 1st and 2nd soft travel limit for each axis can be switched from each other by using the corresponding C Bit. When these parameters are enabled, if some axis is about to exceed the travel limit, the system alarm “MOT 9001 X AXIS OVER SOFTLIMIT (+)” or “MOT 4058 OVER SOFTLIMIT” will be triggered. Please refer to the description of the warning messages.

1035	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -X μm**
1037	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Yμm**
1039	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Z μm**
1041	**SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -4TH μm**

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： -99999999
Unit ： um
Description： This parameter sets the travel limit value of the 1st soft path for each axis. It is effective only when each axis has executed HOME return, otherwise the initial value 99999.999 μm will be applied. If this parameter’s set value is smaller than Pr.1007 (negative X-axis software travel limit), the system alarm “MOT 4005, SET FIRST SOFELIMIT ERROR” will be triggered. The positive 1st and 2nd soft travel limit for each axis can be switched from each other by using the corresponding C Bit. When these parameters are enabled, if some axis is about to exceed the travel limit, the system alarm “MOT 9001 X AXIS OVER SOFTLIMIT (+)” or “MOT 4058 OVER SOFTLIMIT” will be triggered. Please refer to the description of the warning messages.

1043	**G83 Face Drilling Mode Setting 0)High Spee 1) Normal**

Range： 0 ~ 1
Effective： Instant Activity
Acess Level： End User
Default ： 0
Unit ： None
Description： When this parameter is set to 0, high speed peak drilling is referred; when set to 1, peak drilling is referred.

1044	G87 Face Drilling Mode Setting 0)High Spee 1) Normal

Range： 0 ~ 1
Effective： Instant Activity
Acess Level： End User
Default ： 0
Unit ： None
Description： When this parameter is set to 0, high speed peak drilling is referred; when set to 1, peak drilling is referred.

1045	P2 Pause Time(ms)

Range： 0 ~ 99999
Effective： Instant Activity
Acess Level： End User
Default ： 1000
Unit ： None
Description： The second dwell time setting; meaning, when the tool returns to R point or start point, this parameter can set the tool’ s dwell time.

1081	G71/G72 Multiple Deep Cutting um
1082	G71/G72 Multiple Back Moving Default um

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1000
Unit ： um
Description： Parameter #1081 assigns cutting depth of composite cutting cycle G71 and G72.
Parameter #1082 assigns tool escape amount of composite cutting cycle G71 and G72.
Parameter #1081 and #1082 assign U and R of G71 and G72 commands when they are not commanded by user.

1083	G73 X Axis Shrinking Amount Default um
1084	G73 Z Axis Shrinking Amount Default um

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1000
Unit ： um
Description： Parameter # 1083 assigns X axis direction escape amount of composite cutting cycle G73.
Parameter # 1084 assigns Z axis direction escape amount of composite cutting cycle G73.
Parameters # 1083 and 1084 assign U and W of G73 command when they are not commanded by user yet.

1085 **G73 Cutting Number Default um**

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 5
Unit ： None
Description： This parameter assigns division number of composite cutting cycle G73.

1086 **G74/G75 Return Amount Default um**

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 1000
Unit ： um
Description ： This parameter assigns the value of composite cutting cycle G74 and return value of G75.

1087 **G76 Repeating Times mm / Charmfering Length rr(4 digits)**

Range： 101 ~ 9999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 101
Unit ： None
Description ： To set the default value of fine repetitive time (mm) and chamfer angle tool escape length (rr, min.) while executing G76. This setting value should be 4 digits. The first two digits mean working repetitive time (mm) and the last two digits means chamfer tool escape angle (rr).

1088 **G76 Tool Nose Angle Default**

Range： 0 ~ 90
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 60
Unit ： um
Description ： Tool noise angle (aa) default value while executing G76.

1089 **G76 Min. Cutting Volumn Default um**

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 50
Unit ： um
Description ： This parameter assigns the minimum cutting depth default value of composite cutting cycle G76.

1090	G76 Fine Cutting Volumn Default um

Range： 0 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： End User
Default ： 50
Unit ： um
Description ： This parameter value assigns the allow amount of composite cutting cycle G76. Please notice that this parameter can set the R value of G76 command when it is not commanding yet.

1158	SHOW F2~F12 FOR FUN. KEY

Range： 0 ~ 1
Effective： Effective After Rebooting
Acess Level： End User
Default ： 0
Unit ： None
Description ： Because inconvenience could occur when operators use commercial PC keyboard to operate controller, F2~F12 characters are shown on the function keys on the screen for users' convenience during operation.

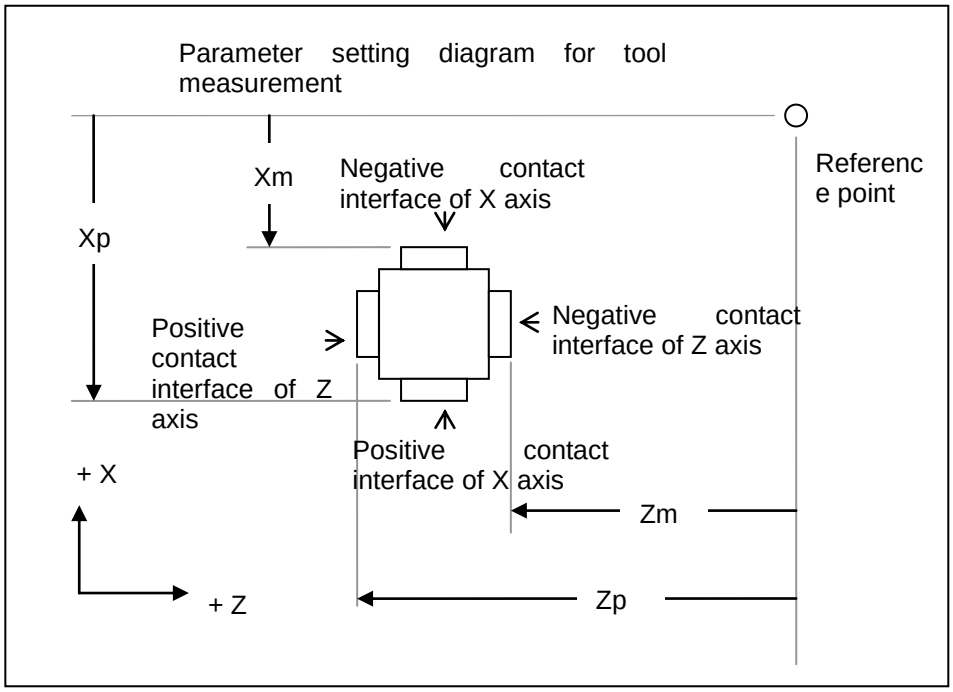
1159	PROGRAM READING OVERTIME

Range： 0 ~ 30000
Effective： Instant Activity
Acess Level： End User
Default ： 30
Unit ： sec
Description ： During machining, if file-reading of the controller takes too long time, an alarm dialog box will appear to notify users about the abnormal situation, it will also remind users to reset the system to ensure efficiency of the controller and the machine.

1160	X+ Distance Between Machine Zero Point and Touch Side
1161	X- Distance Between Machine Zero Point and Touch Side
1162	Z+ Distance Between Machine Zero Point and Touch Side
1163	Z- Distance Between Machine Zero Point and Touch Side

Range： -99999999 ~ 99999999
Effective： EFFECTIVE AFTER RESET
Acess Level： Machine Maker
Default ： 0
Unit ： um

Description :



Para. # 1160: Distance from machine reference point to Face X+. And also, distance from machine reference point to X+ Touch Sensor face, such as Figure Xp.

Para. # 1161: Distance from machine reference point to Face X-. And also, distance from machine reference point to X- Touch Sensor face, such as Figure Xm.

Para. # 1162：Distance from machine reference point to Face Z+. And also, distance from machine reference point to Z+ Touch Sensor face, such as Figure Zp.

Para. # 1163：Distance from machine reference point to Face Z-. And also, distance from machine reference point to Z- Touch Sensor face, such as Figure Zm.

1806 **COM1 address (0:Disable 744~1016)**

Range： 0 ~ 1016
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 1016
Unit ： None
Description ： Setting COM1 Basic Address
0：No Use

1807 **COM2 address (0:Disable 744~1016)**

Range： 0 ~ 1016
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default ： 760

Unit : None
Description : Setting COM2 Base Address
0：No Use

1808 COM1 Interrupt number (3~7)

Range： 3 ~ 7
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default : 4
Unit : None
Description : Set COM1 IRQ Number

1809 COM2 Interrupt number (3~7)

Range： 3 ~ 7
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default : 3
Unit : None
Description : Set COM 2 IRQ Number

1810 COM1 (0:Non 1:File 2:ABS 3:Spindle)

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default : 0
Unit : None
Description : Setting COM Port Function
0:No Use
1: File Transfer
2: Absolute Encoder
3:Spindle Communication

1811 COM1 address (0:Disable 744~1016)

Range： 0 ~ 3
Effective： Effective After Rebooting
Acess Level： Machine Maker
Default : 0
Unit : None
Description : Setting COM Port Function
0:No Use
1: File Transfer
2: Absolute Encoder
3:Spindle Communication

4 SYSTEM ALARM（Alarm）AND WARNING（Warning）

When the system alarm message (ALARM) occurs, operation will stop. User must check the whole machine according to the alarm message. If able to solve problems, then only need to click RESET again to clear the condition. (However, if need to change parameter, then must exit the system software and then re-enter for the system to work.)

Three types of alarm message which are MOT (MOTION) ALARM, OP (OPERATION) ALARM or INT (INTERPREATATION) ALARM. Definitions of the above alarm message are as following：

4.1 OP OPERATION ALARM

OP 1001：X SERVO ALARM
OP 1002：Y SERVO ALARM
OP 1003：Z SERVO ALARM
OP 1004：4TH SERVO ALARM

(1) Alarm message from SERVO driver.
(2) Please check ERROR message from the SERVO driver to know the cause.
(3) Please re-booting.

OP 1013: SWITCH TO CONTROL/MONITOR WHILE X MOVING

a Trigger C bit 130 while X moving.
b Press RESET to clear move command and C 130

OP 1014: SWITCH TO CONTROL/MONITOR WHILE Y MOVING

a Trigger C bit 131 while Y moving.
b Press RESET to clear move command and C 131

OP 1015: SWITCH TO CONTROL/MONITOR WHILE Z MOVING

a Trigger C bit 132 while Z moving
b Press RESET to clear move command and C 132

OP 1016: SWITCH TO CONTROL/MONITOR WHILE 4th axis MOVING

a Trigger C bit 133 while 4TH axis moving
b Press RESET to clear move command and C 133

OP 1017：LNC SYSTEM EXPIRED

(1) Please contact with distributor or machine makers.

OP 1018：DESIRED MACRO VARIABLES NOT EXIST.

a Check Macro variables.
b Please check if R061 + R062 smaller than 121 or not

OP 1019 : DESIRED MACRO VARIABLES OVER RANGE

Check parameter range if it is betweenb-32768 ~ 32767.

OP 1020 : OVER MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Check why the axis is over travel limit.

(3) Move the axis towards to opposite direction of travel limit manually.

(4) Check each axis hardware travel limit.

OP 1021 : GEAR SIGNAL ERROR

(1) Please check if it is trigger multiple gear signals on the same spindle at the same time. (1st Axis C97~C99, 2nd Axis C116~C118, 3rd Axis C121~C123)

(2) Check if gear is correct.

OP 1022 : PARAMETER VALUE OVER

Check parameter range if it is betweenb-32768 ~ 32767.

OP 1023 : PARAMETER NOT EXIST

Check parameter number if R061 + R062 is smaller than 1200.

OP 1027 : HSP LONG, NEED TO CONTACT WITH SYSTEM PROVIDER

Please contact with distributor or machine makers

OP 1028 : AT ZRN MODE, PMC AXIS PROHIBIT

Under ZRN mode, forbidden using PMC axis function. Please switch to other modes.

OP 1029 : X AXIS OVER POSITIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1030 : X AXIS OVER NEGATIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1031 : Y AXIS OVER POSITIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1032 : Y AXIS OVER NEGATIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1033 : Z AXIS OVER POSITIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1034 : Z AXIS OVER NEGATIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1035 : 4TH AXIS OVER POSITIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1036 : 4TH AXIS OVER NEGATIVE MLC TRAVEL LIMIT

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 6001 : X AXIS OVER POSITIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6002 : X AXIS OVER NEGATIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6003 : Y AXIS OVER POSITIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6004 : Y AXIS OVER NEGATIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6005 : Z AXIS OVER POSITIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6006 : Z AXIS OVER NEGATIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6007 : 4TH OVER POSITIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

OP 6008 : 4TH OVER NEGATIVE MLC TRAVEL LIMIT

Move to the opposite side out of limit manually

4.2 INT Interpreter Alarm

INT 3001：NO SUCH TOKEN

(1) Part program enter data has invalid symbols or characters.

(2) Modify program error.

(3) Press RESET to clear the wrong warning message.

INT 3002：GRAMMAR ERROR

(1) Part program enter data has invalid symbols or characters.

(2) Modify program error.

(3) Press RESET to clear the wrong warning message.

INT 3003：**OUT OF MEMORY**

(1) MACRO grammar has too complicate showing program such as too many brackets.

(2) Simplify complexity degree or make it to be 2 blocks.

(3) Press RESET to clear the wrong warning message.

INT 3004：EXECUTE NODE ERROR

(1) System executes mathematics calculation that is not allow to execute

(2) Press RESET to clear the warning message

INT 3005：FUNCTION ERROR

(1) System executes invalid function that is not allow to execute.（Won't happen under normal system condition.）

(2) System error, please contact the supplier.

INT 3006：DIVIDED BY 0

(1) MACRO is divided by 0.

(2) Modify numerator of the division. Must NOT be 0.

(3) Press RESET to clear the warning message

INT 3007：VARIABLE OVER RANGE

(1) One/some of local variables, common variables and global variables are out of range.

(2) Modify variable numbers that are out of their number range.

(3) Press RESET to clear the wrong warning message

INT 3008：MACRO DOMAIN ERROR

(1) MACRO function domain error. If square (SQRT) argument is negative or ATAN arguments are two zeros.

(2) Modify domain value.

(3) Press RESET to clear the warning message

INT 3010：NOT ALLOWABLE DECIMAL POINT

(1) NC address has not allowable decimal point.

(2) Modify decimal point in NC address.

INT 3011：WORD DATA OVER RANGE

(1) NC address word data is out of range.

(2) Modify word data in NC address.

(3) Press RESET to clear wrong warning message.

INT 3012：MACRO ILLEGAL MACRO PARAMATER INPUT（G、L、N、O、P）

(1) Illegal arguments（G，L，N，O，P）in MACRO program.

(2) Correcting these illegal arguments.

(3) Press RESET to clear wrong warning message.

INT 3013：PART PROGRAM HAS GRAMMER ERROR

(1) INPUT DATA HAS GRAMMAR ERROR.

(2) PART PROGRAM ERROR.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3014：THE ARGUMENT IS ERROR IN GET FUNCTION

(1) Part program has number error in GET.

(2) Modify part program error.

(3) Press RESET to clear wrong warning message.

INT 3100：ILLEGAL G CODE

(1) Illegal G code in part program.

(2) Delete illegal G code.

(3) Press RESET to clear wrong warning message.

INT 3101：PFM INITIAL ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3102：TRANS INITIAL ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3103：TABLE1 INITIAL ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3104：POST INITIAL ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3110：FETCH ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3111：LACK OF FILENAME（P ADDRESS IS NOT ENTERED

(1) Lack of filenames in part program. (P address is not entered.）

(2) Increase number of filenames.

(3) Press RESET to clear wrong warning message.

INT 3112：ILLEGAL FILENAME

（1） Illegal filename in part program.

（2） Modify filename.

（3） Press RESET to clear wrong warning message.

INT 3113：FILE NOT FOUND

（1） File not found in the system.

（2） Making/modifying the executing file.

（3） Press RESET to clear wrong warning message.

INT 3114：END OF FILE

(1) Main program or sub program have been added in the end of the program file, not including program return(M99) or program ending command (M30).

(2) Please check this program and add return or ending command into this program.

INT 3120：POST ERROR

(1) System normal will not happen

(2) System error contact supplier

INT 3121：LACK OF SUB RETURN（M99）

(1) No returning to the main program command in the sub-program.

(2) Add returning back to the main program command in the sub-program.

(3) Press RESET to clear wrong warning message.

INT 3122：PROGRAM OVERFLOW

(1) Total numbers of calling Sub-program or MACRO is over the total level limit.（i.e., 8）

(2) Decrease numbers of calling program level.

(3) Press RESET to clear the wrong warning message.

INT 3123：MACRO OVERFLOW（4）

(1) Total numbers of calling MACRO is over the total level limit. (i.e., 4).

(2) Decrease numbers of calling program level.

(3) Press RESET to clear the wrong warning message.

INT 3124：MACRO UNDERFLOW（G67）

(1) Under G67, but give G67 command again.

(2) Delete G67.

(3) Press RESET to clear warning.

INT 3125：WITHOUT LABEL

(1) NO such LABEL .

(2) Please check LABEL name.

(3) Press RESET to clear wrong message error.

INT 3126：BLOCK NOT FOUND

(1) The designated BLOCK is not found.

(2) Check whether or not the designated BLOCK is exist in part program.

(3) Press RESET to clear wrong message error.

INT 3127：ILLEGAL_LABEL

(1) Press RESET to clear alarm.

(2) Confirm and modify illegal label name in parts program.

INT 3128：FEEDRATE OUT OF RANGE，CHECK G94/G95

(1)Check whether or not the FEEDRAT F value is too big. And, check G94 and G95 are used correctly.

(2) Press RESET to clear the error and adjust G94, G95 and F value.

INT 3129：ILLEGAL A COMMAND

(1) Confirm logic input function(logic command) at certain format, its angle(A command) and X,Z language cannot make command at the same block.

(2) Press RESET to clear warning message.

(3) Modify logic input function parts program to make angle (A command), X,Z separate at different block.

INT 3130：COORDINATE ERROR

(1) This alarm is system inner error.

(2) System Error, Please Contact LNC.

INT 3131：UNKNOWN PLANE

(1) While using G107 Cylinder interpolation, select wrong coordinate machining surface.

(2) Check machining program and adjust using YZ coordinate surface.

(2) Check machining program’s coordinate surface if it is correct.

(3) Press RESET to clear the error.

INT 3132：ILLEGAL RADIUS

(1) USING G02, G03 ARCH CUTTING COMMAND, THE FINAL COORDINATE IS NOT ON THE ARCH

(2) CHECK THE POSITION OF CENTER POINT, DIRECTION AND FINAL POINT’S COORDINATE VALUE

(3) PRESS RESET TO CLEAR ERROR.

INT 3133：ILLEGAL A COMMAND IN G73 CAN CYCLE

(1) Using G73 CAN CYCLE cutting command, cannot using A command.

(2) Press RESET to clear error.

(3) Check parts program G73 if there is A command between PQ, if yes, please modify the program and delete A command.

INT 3135：ILLEGAL COMMAND IN CAN CYCLE PQ

(1) Check the path between PQ if it fits the corresponding cycle cutting command.

(2) Press RESET to clear the error.

INT 3140：SEND TABLE1 ERROR

(1) System normal will not happen

(2) System Error, Please Contact LNC.

INT 3141：NO FREE VARIABLES

(1) System normal will not happen

(2) System Error, Please Contact LNC.

INT 3150：INSUFFICIENT DATA

(1) NOT ENOUGH EXECUTING G CODE DATA.（LACK OF G10’ S P，R，Z）

(2) SUPPLY THE NEEDED DATA.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3151：IP MAINTAIN ERROR

(1) System normal will not happen

(2) System Error, Please Contact LNC.

INT 3152：CAN CYCLE EXECUTE G27，G28，G29，G30 (CC R RETURN)

(1) EXECUTING G27，G28，G29，G30 IN THE CANNED CYCLE.

(2) CANCEL THE ABOVE G CODES IN CANNED CYCLE BEFORE EXECUTING.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3153：NO SUCH R POINT

(1) WRONG REFERENCE POINT NUMBER IN G30.

(2) MODIFY THE ENTERED REFERENCE POINT NUMBER.

(3) Press RESET to clear wrong warning message.

INT 3154：ILLEGAL IN CC

(1) EXECUTING ILLEGAL MOTION IN CANNED CYCLE.

(2) PLEASE CANCEL ANY ILLEGAL MOTION IN CANNED CYCLE BEFORE EXECUTING.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3155：CAN CYCLE SHAPE ERROR（OVER CUT）

(1) LOOP CUTTING, COMMAND SHAPE ERROR（OVER CUT）

(2) CHANGE SHAPE IN LOOP CUTTING.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3156：ILLEGAL G31 IN COMPENSATION

(1) G31 Skip signal stop SBK cannot be used under G41/G42, adjust program to prevent G31

in G41/G42.

(2) Press RESET to clear warning message

INT 3157：G10 P CODE OUT OF RANGE

(1) P argument is over command legal usage range.

(2) Press RESET to clear warning message

(3) Modify P argument

INT 3159：G10 Q CODE OUT OF RANGE

(1) Q argument out of command legal using range

(2) Press RESET to clear warning message

(3) Modify Q argument information.

INT 3160：INCORRECT READ SEQUENCE

(1) CHECK WHETHER OR NOT THERE IS INCORRECT SUB-PROGRAM OR JUMP SEQUENCE FROM THE PART PROGRAM.

(2) PRESS RESET TO CLEAR WRONG WARNING MESSAGE, AND MODIFY PART PROGRAM.

INT 3161：DNC RS232 LOSS DATA PACKET

(1) DNC RS232 INFO LOST WHEN TRANSMISSION.

(2) TRANSMISSION CABLE LOOSE OR BRAKE.

(3) LOWER TRANSMISSION SPEED PARAMETER

(4) PRESS RESET TO CLEAR WARNING OR REBOOT.

INT 3162：DNC RS232 PROGRAM BUFFER OVERFLOW

(1) PROGRAM BUFFER OVERFLOW WHILE DNC RS232 IS TRANSMITTING PROGRAM.

(2) CHECK WHETHER OR NOT THE CONNECTING LINE IS DISCONNECT OR FALL.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE OR REBOOT.

INT 3180：ILLEGAL SP C(H) PART PROGRAM

(1) Check if there is illeagle spindle orientation program code(G00/G01) in the parts program.

(2) Press RESET to clear warning message, and modify parts program.

INT 3200：GOTO LINE IS THE SAME WITH CURRENT ONE

(1) Check the program if GOTO line number and current line number the same.**(EXAMPLE:**: N500 GOTO 500; **)**

(2) Press RESET to clear warning message，and modify parts program.

INT 3201：COMP UNIT VECTOR 0

(1) COMPENSATION UNIT VECTOR IS 0.

(2) SYSTEM ERROR, PLEASE CONTACT SUPPLIER.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE

INT 3202：COMP START UP ARC

(1) Compensating start-up is arch.

(2) Please start compensating according to G00/G01.

(3) Press RESET to clear wrong warning message.

INT 3203：COMP CANCEL ARC

(1) COMPENSATING CANCEL IS ARCH.

(2) PLEASE CANCEL COMPENSATION ACCORDING TO G00/G01.

(3) PRESS RESET TO CLEAR WRONG WARNING MESSAGE.

INT 3205：COMP VECTOR LENGTH 0

(1) DETERMINE VALUES IS 0.

(2) CHECK PART PROGRAM.

(3) SYSTEM ERROR, PLEASE CONTACT SUPPLIER.

INT 3206：COMP INTERFERENCE

(1) OVER CUTTING INTERFERENCE OCCURS.

(2) DECREASE COMPENSATION RADIUS OR MODIFY PART PROGRAM PATHWAY.

(3) PRESS RESET TO CLEAR WRONG MESSAGE ERROR.

INT 3209：CHAMFERING (,C) 1 SINGLE BLOCK NO G01,G02,G03 OR NO MOVE

Press RESET to clear warning message and modify errors in parts program

INT 3210：CHAMFERING (,C) 2 SINGLE BLOCK NO G01,G02,G03 OR NO MOVE

Press RESET to clear warning message and modify errors in parts program

INT 3211：CHAMFERING (,C) LENGTH TOO LONG, OVER 1 SINGLE BLOCK LENGTH

Press RESET to clear warning message and modify errors in parts program

INT 3212：CHAMFERING (,C) LENGTH TOO LONG, OVER 2 SINGLE BLOCK LENGTH

Press RESET to clear warning message and modify errors in parts program

INT 3213：CHAMFERING (,C) 1 SINGLE BLOCK ARK LENGTH TOO SHORT

Press RESET to clear warning message and modify errors in parts program

INT 3214：CHAMFERING (,C) 2 SINGLE BLOCK ARK LENGTH TOO SHORT

Press RESET to clear warning message and modify errors in parts program

INT 3215：CHAMFERING (,C) ANGLE ERROR BETWEEN 1 AND 2

Press RESET to clear warning message and modify errors in parts program

INT 3216：CHAMFERING (,R) 1 SINGLE BLOCK NO G01,G02,G03 OR NO MOVE

Press RESET to clear warning message and modify errors in parts program

INT 3217：CHAMFERING (,R) 2 SINGLE BLOCK NO G01,G02,G03 OR NO MOVE

Press RESET to clear warning message and modify errors in parts program

INT 3218：CHAMFERING (,R) ANGLE ERROR BETWEEN 1 AND 2

Press RESET to clear warning message and modify errors in parts program

INT 3219：CHAMFERING (,R) RADIUS TOO BIG, OVER 1 BLOCK LENGTH

Press RESET to clear warning message and modify errors in parts program

INT 3220：CHAMFERING (,R) RADIUS TOO BIG, OVER 2 BLOCK LENGTH

Press RESET to clear warning message and modify errors in parts program

INT 3221：CHAMFERING (,R) 1 BLOCK ARK COMMAND ERROR

Press RESET to clear warning message and modify errors in parts program

INT 3222：CHAMFERING (,R) 2 BLOCK ARK COMMAND ERROR

(1) Auto chamfering program error

(2) Press RESET to clear warning message and modify errors in parts program

4.3 MOT Motion Alarm

MOT 4001 : X AXIS FOLLOWING OFFSET VALUE OVER HARDWARE LIMITED VALUE, PLEASE PRESS EMG BUTTOM TO CLEAR THE ALARM

(1) MOTION BOARD SERVO AXIS ERROR COUNTER OVERFLOW（16-BIT）

(2) CHECK OR NOT THE COMMANDING SPEED IS TOO FAST.

(3) CHECK WHETHER OR NOT SERVO DRIVER IS WORKING NORMALLY.

(4) CHECK WHETHER OR NOT THE MACHINE IS RUNNING NORMALLY.

(5) CHECK WHETHER OR NOT THE BOARD IS NORMAL.

MOT 4002 : Y AXIS FOLLOWING OFFSET VALUE OVER HARDWARE LIMITED VALUE, PLEASE PRESS EMG BUTTOM TO CLEAR THE ALARM

(1) MOTION BOARD SERVO AXIS ERROR COUNTER OVERFLOW（16-BIT）

(2) CHECK OR NOT THE COMMANDING SPEED IS TOO FAST.

(3) CHECK WHETHER OR NOT SERVO DRIVER IS WORKING NORMALLY.

(4) CHECK WHETHER OR NOT THE MACHINE IS RUNNING NORMALLY.

(5) CHECK WHETHER OR NOT THE BOARD IS NORMAL.

MOT 4003 : Z AXIS FOLLOWING OFFSET VALUE OVER HARDWARE LIMITED VALUE, PLEASE PRESS EMG BUTTOM TO CLEAR THE ALARM

(1) MOTION BOARD SERVO AXIS ERROR COUNTER OVERFLOW（16-BIT）

(2) CHECK OR NOT THE COMMANDING SPEED IS TOO FAST.

(3) CHECK WHETHER OR NOT SERVO DRIVER IS WORKING NORMALLY.

(4) CHECK WHETHER OR NOT THE MACHINE IS RUNNING NORMALLY.

(5) CHECK WHETHER OR NOT THE BOARD IS NORMAL.

MOT 4004 : 4TH AXIS FOLLOWING OFFSET VALUE OVER HARDWARE LIMITED VALUE, PLEASE PRESS EMG BUTTOM TO CLEAR THE ALARM

(1) MOTION BOARD SERVO AXIS ERROR COUNTER OVERFLOW（16-BIT）

(2) CHECK OR NOT THE COMMANDING SPEED IS TOO FAST.

(3) CHECK WHETHER OR NOT SERVO DRIVER IS WORKING NORMALLY.

(4) CHECK WHETHER OR NOT THE MACHINE IS RUNNING NORMALLY.

(5) CHECK WHETHER OR NOT THE BOARD IS NORMAL.

MOT 4005 : SET FIRST SOFT LIMIT ERROR

(1) Error setting of 1st soft limit parameter (i.e., +ive soft limit is smaller than －ive soft limit)
Please check parameter numbers 1006~1013、1142~1145.

(2) Clicking RESET to set new parameter.

(3) After changing the parameter, please reboot.

MOT 4006 : X AXIS SERVO LAG OVERFLOW MORE THAN PR.0002

(1) X AXIS SERVO LAG OVER PARAMETER 0002 SETTING VALUE.

(2) CHECK WHETHER THE SETTING SPEED IS TOO FAST OR THE PARAMETER 0002 SETTING VALUE IS TOO SMALL.

(3) CLICKING RESET TO CONTINUE OPERATING.

(4) IF RESET PARAMETER, MUST REBOOT.

MOT 4007 : Y AXIS SERVO LAG OVERFLOW MORE THAN PR.0003

(1) Y AXIS SERVO LAG OVER PARAMETER 0003 SETTING VALUE.

(2) CHECK WHETHER THE SETTING SPEED IS TOO FAST OR THE PARAMETER 0003 SETTING VALUE IS TOO SMALL.

(3) CLICKING RESET TO CONTINUE OPERATING.

(4) IF RESET PARAMETER, MUST REBOOT.

MOT 4008 : Z AXIS SERVO LAG OVERFLOW MORE THAN PR.0004

(1) Z AXIS SERVO LAG OVER PARAMETER 0004 SETTING VALUE.

(2) CHECK WHETHER THE SETTING SPEED IS TOO FAST OR THE PARAMETER 0004 SETTING VALUE IS TOO SMALL.

(3) CLICKING RESET TO CONTINUE OPERATING.

(4) IF RESET PARAMETER, MUST REBOOT.

MOT 4009 : 4TH AXIS SERVO LAG OVERFLOW MORE THAN PR.0005

(1) 4TH AXIS SERVO LAG OVER PARAMETER 0005 SETTING VALUE.

(2) CHECK WHETHER THE SETTING SPEED IS TOO FAST OR THE PARAMETER 0005 SETTING VALUE IS TOO SMALL.

(3) CLICKING RESET TO CONTINUE OPERATING.

(4) IF RESET PARAMETER, MUST REBOOT.

MOT 4010 : SP G25/G26 FIND ERROR

(1) Spindle make G25/G26 rpm check error.

(2) Check Param57，61，92 setting value correct or not.

(3) Check spindle if it is ok.

(4) Press RESET and go on operating.

(5) If parameter has modified, it needs to restart, the new value shall be effective.

MOT 4011 : SP VIBRATION ABNORMAL OVER PARAM NO. 97 SET VALUE

(1) Spindle vibration value is larger than Param97 value.

(2) Check Param57，61，92，97 setting value if they are correct or not.

(1) Check SP.

(2) Press RESET to continue.

(3) If parameter has changed, need to reboot.

MOT 4012 : SINGLE BLOCK COMMAND ERROR

(1) Please contact service engineer.

(2) Press RESET and then can go on operate.

MOT 4014 : X AXISON HOME DOG

(1) X AXIS ON HOME DOG

(2) Press RESET, use JOG to take the machine axis away from HOME DOG then will be able to return to the reference point.

MOT 4015 : Y AXISON HOME DOG

(1) Y AXIS ON HOME DOG

(2) Press RESET, use JOG to take the machine axis away from HOME DOG then will be able to return to the reference point.

MOT 4016 : Z AXISON HOME DOG

(1) Z AXIS ON HOME DOG

(2) Press RESET, use JOG to take the machine axis away from HOME DOG then will be able to return to the reference point.

MOT 4017 : 4TH AXISON HOME DOG

(1) 4TH AXIS ON HOME DOG

(2) Press RESET, use JOG to take the machine axis away from HOME DOG then will be able to return to the reference point.

MOT 4018 : NO RETURN HOME AFTER POWER ON

(1) NOT RETURN TO THE REFERENCE POINT AFTER REBOOTING.

(2) CLICKING RESET AND RETURN TO THE REFERENCE POINT FIRST.

MOT 4020 : MOT MODULE HAS NO EXTRA MOVEMENT

(1) Record this alarm and contact system maker, LNC.

(2) Press RESET and keep going operating

MOT 4023 : SET THE SECOND SOFT LIMIT ERROR

(1) MAXIMUM PARAMETER VALUE OF THE 2ND SOFT LIMIT IS SMALLER THAN THE SMALLEST VALUE.

(2) CHECKING PARAMETERS 1034~1041.

(3) RESET PARAMETER AND THEN REBOOT.

MOT 4025 : G10 P RANGE ERROR

(1) P VALUE IS OVER RANGE.

(2) Please check the part program.

MOT 4026 : X AXIS ENCODER WIRING ERROR

(1) ENCODER DISCONNECT OR 5V POWER PROBLEM

(2) CHECKING WHETHER OR NOT THE ENCODER OR POWER PORT IS CONNECTED.

MOT 4027 : HOME DOG LENGTH TOO SHORT

(1) CHECK WHETHER OR NOT HOME DOG IS TOO SHORT OR THE SPEED IS TOO FAST.

(2) EXTEND DOG OR SLOW DOWN THE ZERO RETURN SPEED.

MOT 4030 : G01 ACC（PR.0014）SETTING ERROR

(1) CHECK PR.0014 IF THERE IS SETTING ERROR.

(2) RESET AND REBOOT.

MOT 4031 : X AXIS G00 ACC/DEC(PR.0010) SETTING ERROR

(1) Check Param0010 if there is setting error.

(2) Reset the parameter and reboot.

MOT 4032 : Y AXIS G00 ACC/DEC(PR.0011) SETTING ERROR

(1) Check Param0011 if there is setting error.

(2) Reset the parameter and reboot.

MOT 4033 : Z AXIS G00 ACC/DEC(PR.0012) SETTING ERROR

(1) Check Param0012 if there is setting error.

(2) Reset the parameter and reboot.

MOT 4034 : 4TH AXIS G00 ACC/DEC(PR.0013) SETTING ERROR

(1) Check Param0013 if there is setting error.

(2) Reset the parameter and reboot.

MOT 4035 : CMR SETTING ERROR

(1) CMR setting error.

(2) Check Param No. 0053 ~ 0056，0067 ~ 0070，0072，0100 ~ 0107，1112 ~ 1115

(3) Reset the parameter and reboot.

MOT 4036 : SERVO AXIS CHECK WINDOW ERROR

(1) Position window setting error.

(2) Check Pr.0006 ~ 0009

(3) Reset parameter and reboot.

MOT 4037 : MOTOR ENCODER FEEDBACK RATIO SETTING WRONG

(1) CMR setting error.

(2) Check Pr.0053 ~ 0057

(3) Reset parameter and reboot.

MOT 4038 : MOTOR ENCODER FEEDBACK PULSE NUMBER SETTING WRONG

(1) Motor ENCODER pulse number setting wrong.

(2) Check Param No. 58~60, 67

(3) Reset the parameter and reboot.

MOT 4039 : HOME LOW SPEED ERROR

(1) 2nd home speed setting error.

(2) Checking whether or not the setting value is over setting parameter 1108-1111 range

(3) Reset the parameter and reboot.

MOT 4040 : X AXIS CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0112 range.

(3) Reset the parameter and reboot.

MOT 4041 : Y AXIS CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Check Param0113

(3) Reset the parameter and reboot.

MOT 4042 : Z AXIS CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Check Param0114

(3) Reset the parameter and reboot.

MOT 4043 : 4TH AXIS CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Check Param0115

(3) Reset the parameter and reboot.

MOT 4044 : CMP INTERVAL ERROR

(1) Pitch compensation section setting error.

(2) Check Param1018~1021.

(3) Reset the parameter and reboot.

MOT 4045 : NO INDEX INTERRUPT

(1) REFERENCE POINT INDEX DISCONNECT SIGNAL ERROR OR HOME DOG TOO SHORT.

(2) CHECKING CONNECTION FOR MOTOR TO SERVO.

MOT 4046 : HOME RETURN FAILURE

(1) Checking whether nor not machine lock or other machine problems.

(2) Press RESET to clear the condition.

MOT 4047 : I/O COMMUNICATION ERROR

(1) Check I/O board

(2) Check all connectors and cables on I/O board.

(3) Check PLCIO.CFG if it is setting wrong.

MOT 4048 : SPINDLE ORITENTATION SIGNAL NOT RELEASE

Assumed executing machine adjustment and orientation. If initially, the spindle is positioned on the sensor, the spindle will move away automatically. After the orientation signal is off, user will be able to execute machine adjustment or orientation. However, if the spindle already rotates one cycle but the orientation signal has not been released, then this alarm message will occur.

(1) Checking whether or not there is connection problem on the spindle orientation sensor.

(2) Checking whether or not the spindle orientation sensor signal and type setting is correct (Parameter # 184).

(3) Checking whether or not the spindle orientation sensor is broken.

MOT 4049 : SPINDLE ORITENTATION FAULT

(1) When executing spindle orientation, the spindle is NOT able to reach the correct orientation point

(2) Please go to DGNOS page. If the data system NO. 10 are changing, but the spindle is not rotating. Then, it means the spindle motor ENCDER signal has external distribution that makes the system misunderstood.

(3) Please check whether or not the setting orientation rate is too high by parameter 0021 that makes spindle motor has missing step in the Pulse Mode.

MOT 4050 : SPINDLE ORITENTATION SIGNAL NOT FOUND

Assumed the spindle has rotated one time already but it hasn't found the orientation position sensor while executing machine adjustment or while orientation program is running. The following alarm messages will occur.

(1) Checking whether or not there is connection problem on the spindle orientation sensor

(2) Checking whether or not the spindle orientation sensor signal and type setting is correct (Parameter # 0184).

(3) Checking whether or not the spindle orientation sensor is broken.

MOT 4051 : NO SPINDLE SPEED DEFINE

(1) SP speed is not defined or blank.

(2) Key in S_ before making tapping command.

MOT 4055 : SP SERVO LAG OVER PR.1075

(1) Check Ladder if there is error.

(2) Check if SP rotate while rigid tapping, if not, check SP driver / inverter.

(3) Check SP Encoder wiring if it is getting loose or breaking.

(4) Check if the value of Pr.1075 too small.

MOT 4056 : **TEETH ACC/DEC TIME（PR.18）SETTING WRONG**

(1) Please check parameter setting if the value is too big.

(2) If fix parameter right, please re-boot.

MOT 4057 : Z TRAVEL IS OVER 2ND HOME LIMIT

When Z is at second home position, stop moving down.

MOT 4058 : OVER SOFTLIMIT

(1) RESET system.

(2) Move axis out of limit manually.

MOT 4059 : SP ERROR COUNTER OVER

(1) SP ERROR COUNTER overflow.
(2) Check if command speed too big.
(3) Check if driver is ok.
(4) Check if machine is ok.
(5) Check if board is ok.

MOT 4061 : TEETH SPEED OVER

(1) While using thread cutting cycle（G78）or G33 threading, the speed of X AXIS or Z AXIS is over the max. speed threading value of Param1061.
(2) Check make threading pitch command if it is too large or spindle rpm too large.
(3) Check Param1061threading max. limited speed if it is too small.
(4) If using thread cutting cycle (G78) cutting thread, please check Param872（Cut Down Feed Ratio）and Param873（Cut Up Feed Ratio）if they are setting too big. If Param0872 setting value is too large, it will result G78 in alarm while cutting down; if the value of Pr873 is setting too large, it will resulte G78 in alarm while raising the tool.

MOT 4063 : X AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

(1) When NC is doing X axis absolute encoder reading, if it didn't finish the reading action within Pr. 0834 setting time, it will trigger alarm.
(2) Check if servo drives set to be absolute encoder.
(3) Check hardware cable connections.
(4) Check if X axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)
(5) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4064 : X AXIS ABSOLUTE ENCODER CHECK SMM ERROR

(1) X axis reading-absolute encoder has CHECK SMM error.
(2) Check hardware cable connections if there is any loosing or contacting not well.
(3) Please check whether or not X Axis ladder has error.

MOT 4066 : Y AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

(1) When NC is doing Y axis absolute encoder reading, if it didn't finish the reading action within Pr. 0834 setting time, it will trigger alarm.
(2) Check if servo drives set to be absolute encoder.
(3) Check hardware cable connections.
(4) Check if Y axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)
(5) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4067 : Y AXIS ABSOLUTE ENCODER CHECK SMM ERROR

(1) Y axis reading-absolute encoder has CHECK SMM error.
(2) Check hardware cable connections if there is any loosing or contacting not well.
(3) Please check whether or not Y Axis ladder has error.

MOT 4069 : Z AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

(1) When NC is doing Z axis absolute encoder reading, if it didn't finish the reading action within Pr. 0834 setting time, it will trigger alarm.

(2) Check if servo drives set to be absolute encoder.

(3) Check hardware cable connections.

(4) Check if Z axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)

(5) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4070 : Z AXIS ABSOLUTE ENCODER CHECK SMM ERROR

(1) Y axis reading-absolute encoder has CHECK SMM error.

(2) Check hardware cable connections if there is any loosing or contacting not well.

(3) Please check whether or not Y Axis ladder has error.

MOT 4072 : 4TH AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

(4) When NC is doing 4^{TH} axis absolute encoder reading, if it didn't finish the reading action within Pr. 0834 setting time, it will trigger alarm.

(5) Check if servo drives set to be absolute encoder.

(6) Check hardware cable connections.

(7) Check if 4^{TH} axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)

(8) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4073 : 4TH AXIS ABSOLUTE ENCODER CHECK SMM ERROR

(1) 4^{TH} axis reading-absolute encoder has CHECK SMM error.

(2) Check hardware cable connections if there is any loosing or contacting not well.

(3) Please check whether or not Y Axis ladder has error.

MOT 4074 : M CODE REPEAT OR THE SAME WITH SYSTEM M CODE, CHECK PR.89,835,836,837

(1) If Param835 spindle enters into orientation mode M code, Param836 spindle leaves orientation mode M code, half fixed type series M code(Mα ~ Mα + n), Param89 parts counting M code and defined M code in the system(M0、M1、M2、M30、M98、M99、M100、M101、M102、M103、M104、M198、M199), have repeating situation.

(2) Check Param835 spindle enters into orientation mode M code.

(3) Check Param836 spindle leaves oreientation mode M code.

(4) Check Param89 parts counting M code。

(5) Check defined M code in the system (M0、M1、M2、M30、M98、M99、M100、M101、M102、M103、M104、M198、M199), have repeating situation.

MOT 4075 : TOUCH DIRECTION READ ERROR

When reading touch direction C bits, if cannot receive any touch C bits signal in 1 mins, the system will have this alarm signal.

MOT 4076 : HAS TOUCH SENSOR IN MANUAL MODE

While entering manully tool shape measuring status, if touch signal has happens, then NC cannot judge the correct touch position; therefore, NC will have this alarm signal.

MOT 4077 : NOT GO TO SP POSITION M CODE

1. NC currently no at half fixed type orientation M code, but receive half fixed type orientation rotation signal C95.
2. Check if making half fixed type command M code.
3. Check half fixed type related parameters if they are reasonable.

MOT 4078 : AXIS MOVEMENT NOT ENOUGH WHILE RIGID TAPPING, SLOW DOWN SP SPEED

1. Under current rpm executing rigid tapping command（如 G84,G88,G188）, the appointed moveable distance too small which leads to the result that there is not enough distance to let spindle rotate CCW on the hole bottom.
2. Check G84,G88,G188 command if there is appointed moveable amount.
3. Lower down spindle rpm.
4. Increasing tapping distance.

MOT 4085 : ARC DESTINATION IS NOT ON ROUND

Please check parts program if there is error. (G02/G03 command)

MOT 4086 : CORNER CHECK NOT PASS

Please record related operation procedure and parts program and contact system supplie.

MOT 4087 : HOLE TOO DEEP WHILE RIGID TAPPING, CHECK PR.1076

Predict hole bottom too deep while rigid tapping, please adjust Param.1076 and related parameters of rigid tapping.

MOT 4088 : Y AXIS ENCODER WIRING ERROR

1. ENCODER BREAK OR 5V POWER ERROR
2. Stop machine and check wiring and connector if there is any loose situation.

MOT 4089 : Z AXIS ENCODER WIRING ERROR

1. ENCODER BREAK OR 5V POWER ERROR
2. Stop machine and check wiring and connector if there is any loose situation.

MOT 4090 : 4TH AXIS ENCODER WIRING ERROR

(1) ENCODER BREAK OR 5V POWER ERROR

(2) Stop machine and check wiring and connector if there is any loose situation.

MOT 4104 : X AXIS PMC/INT OUT PUT ERROR

Modify command source to make it fit PMC axis’ s regulation.

MOT 4105 : Y AXIS PMC/INT OUT PUT ERROR

Modify command source to make it fit PMC axis’ s regulation.

MOT 4106 : Z AXIS PMC/INT OUT PUT ERROR

Modify command source to make it fit PMC axis’ s regulation.

MOT 4107 : 4TH AXIS PMC/INT OUT PUT ERROR

Modify command source to make it fit PMC axis’ s regulation.

MOT 4121 : X AXIS COMMANDED UNDER DETACHED

(1) The axis currently is not controllered by NC, and cannot take the command of the axis or manual command.

(2) RESET system to clear alarm

(3) Check if PLC sends C bit 130 and clear it

MOT 4122 : Y AXIS COMMANDED UNDER DETACHED

(1) The axis currently is not controllered by NC, and cannot take the command of the axis or manual command.。

(2) RESET system to clear alarm

(3) Check if PLC sends C bit 131 and clear it

MOT 4123 : Z AXIS COMMANDED UNDER DETACHED

(4) The axis currently is not controllered by NC, and cannot take the command of the axis or manual command.。

(5) RESET system to clear alarm

(6) Check if PLC sends C bit 132 and clear it

MOT 4124 : 4TH AXIS COMMANDED UNDER DETACHED

(1) The axis currently is not controllered by NC, and cannot take the command of the axis or manual command.。

(2) RESET system to clear alarm

(3) Check if PLC sends C bit 133 and clear it

MOT 4125 : SP ACC/DEC TIME SETTING WRONG

Please check Param663 if it is setting error.

MOT 4127 : TILT AXIS NEED TO HOME FIRST

Execute home return procedure, TILT axis must be independtly homing first, then make vertical axis return home.

MOT 4128 : TILT AXIS PARAMETER SETTING WRONG

(1) Confirm Param0682 value between -60000~-20000 or20000~60000 range.

(2) Confirm Param0683 and 0684 value are within 1~3 range.

(3) Confirm Param0683 is 0684 value without repeating.

MOT 4129 : LIMIT AND INDEX HAS CERTAIN SAFE DISTANCE, USE GRID TO PROTECT

(1) While home returning, home dot distance motor z phase signal is within 1/2 rotation of the encoder.

(2) Please make the home dot move to distance motor z phase signal more than 1/2 rotation of the encoder.

(3) Please re-execute home returning.

MOT 4130 : WHEN X AXIS STOP, SERVO LAG BIG, CHECK WIRING OR PR.1180

X AXIS stop servo lag error too large, please check wiring if it is lose or Param1180setting too small.

MOT 4131 : WHEN Y AXIS STOP, SERVO LAG BIG, CHECK WIRING OR PR.1181

Y AXIS stop servo lag error too large, please check wiring if it is lose or Param1181setting too small.

MOT 4132 : WHEN Z AXIS STOP, SERVO LAG BIG, CHECK WIRING OR PR.1182

Z AXIS stop servo lag error too large, please check wiring if it is lose or Param1182setting too small.

MOT 4133 : WHEN 4TH AXIS STOP, SERVO LAG BIG, CHECK WIRING OR PR.1183

4TH AXIS stop servo lag error too large, please check wiring if it is lose or Param1183setting too small.

MOT 4134 : X AXIS ABS ENCODER COMMUNICATION ERROR

(1) Means reading by servo transmitting abosulte type encoder value of this axis failed.

(2) Please check series transmitting wiring correct or not.

(3) The settings of parameters related to series transmitting wiring at servo driver’ s side are correct or not.

(4) PLC SEQUENCE CORRECT OR NOT.

(5) Press RESET key can clear alarm.

MOT 4135 : Y AXIS ABS ENCODER COMMUNICATION ERROR

(1) Means reading by servo transmitting abosulte type encoder value of this axis failed.

(2) Please check series transmitting wiring correct or not.

(3) The settings of parameters related to series transmitting wiring at servo driver’ s side are correct or not.

(4) PLC SEQUENCE CORRECT OR NOT.。

(5) Press RESET key can clear alarm.

MOT 4136 : Z AXIS ABS ENCODER COMMUNICATION ERROR

(1) Means reading by servo transmitting abosulte type encoder value of this axis failed.

(2) Please check series transmitting wiring correct or not.

(3) The settings of parameters related to series transmitting wiring at servo driver’ s side are correct or not.

(4) PLC SEQUENCE CORRECT OR NOT.

(5) Press RESET key can clear alarm.

MOT 4137 : 4TH AXIS ABS ENCODER COMMUNICATION ERROR

(1) Means reading by servo transmitting abosulte type encoder value of this axis failed.

(2) Please check series transmitting wiring correct or not.

(3) The settings of parameters related to series transmitting wiring at servo driver’ s side are correct or not.

(4) PLC SEQUENCE CORRECT OR NOT.

(5) Press RESET key can clear alarm.

MOT 4138 : COM PORT REPEATED SETTING, CHECK PR.1810 AND 1811

(1) Please check if Pr 1810 and 1811 setting the same value.

(2) Press RESET key to clear the alarm

MOT 4139 : RIGID TAPPING MODE NEEDS TO APPLY WITH THE SAME COMMAND

(3) Please check if there is using non-rigid tapping command after activating rigid tapping mode in parts program.

MOT 4140 : X AXISMULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) X AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR(Pr 691、692 smaller than or equal to 0)。

(2) Please refer linear scale manuals and system Pr 691、692 description and do the resetting.

MOT 4141 : Y AXISMULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) Y AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR(Pr 693、694 smaller than or equal to 0)。

(2) Please refer linear scale manuals and system Pr 693、694 description and do the resetting.

MOT 4142 : Z AXISMULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) Z AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR(Pr 695、696 smaller than or equal to 0)。

(2) Please refer linear scale manuals and system Pr 695、696 description and do the resetting.

MOT 4143 : 4TH AXISMULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) 4TH AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR(Pr 697、698 smaller than or equal to 0)。

(2) Please refer linear scale manuals and system Pr 697、698 description and do the resetting.

MOT 4145 : STOP INT M CODE AND USE SYSTEM M CODE, CHECK PR.211~220

Please check if Param211~220 using system M codes.(Example:M0, M1, M2, M30, M98, M99)

MOT 4146 : SP CH GO TO M CODE AND STOP INT M CODE REPEAT,CHECK PR.835

(1) Spindle CH orientation enters into M code and stop interpreting M code repeating.

(2) Please check if the setting value of Param835 is repeating with the setting value of Param211~220.

MOT 4147 : SP CH GO TO M CODE AND REPEAT WITH SYSTEM M CODE, CHECK PR.835

(1) Spindle CH orientation enters M code is repeating with system M codes.

(2) Please check if the setting value odf Param835 is repeating with system M codes.(Example:M00、M01、M02、M30、M98、M99)

MOT 4148 : SP CH GO TO M CODE AND STOP INT M CODE REPEAT, CHECK PR.836

(1) Spindle CH orientation releases M codes and stops interpreating repeated M codes.

(2) Please check if the setting value of Param836 is repeating with the setting value of Param211~220

MOT 4149 : SP CH GO TO M CODE AND REPEAT WITH SYSTEM M CODE, CHECK PR.836

(1) Spindle CH orientation releases M codes and system uses repeating M codes.

(2) Please check if the setting value odf Param836 is repeating with system M codes.(Example:M00、M01、M02、M30、M98、M99)

MOT 4150 : I/O CARD COMMUNICATION ERROR (RIO2)

RS232 communication failure. Please check wiring and re-booting.

MOT 4153 : 1ST SOFTWARE NO GO AREA SETTING ERROR

(1) Travel protection negative value of Pr500~507 in 1st Software No Go Area cannot be more than its positive value.

(2) After modifying this parameter’ s setting, please press RESET to make it effective.

MOT 4154 : 2ND SOFTWARE NO GO AREA SETTING ERROR

(3) Travel protection negative value of Pr512~519 in 1st Software No Go Area cannot be more than its positive value.

(4) After modifying this parameter’ s setting, please press RESET to make it effective.

MOT 4162 : OUT X AXIS HOME DOG, PLS CHECK PARAM1890 OR DOG SIGNAL

Check Pr 1890 if setting too small, Check X AXIS home dog signal if falling or abnormal.

MOT 4163 : OUT Y AXIS HOME DOG, PLS CHECK PARAM1891 OR DOG SIGNAL

Check Pr 1891 if setting too small, Check Y AXIS home dog signal if falling or abnormal.

MOT 4164 : OUT Z AXIS HOME DOG, PLS CHECK PARAM1892 OR DOG SIGNAL

Check Pr 1892 if setting too small, Check Z AXIS home dog signal if falling or abnormal.

MOT 4165 : OUT C AXIS HOME DOG, PLS CHECK PARAM1893 OR DOG SIGNAL

Check Pr 1893 if setting too small, Check 4TH AXIS home dog signal if falling or abnormal.

MOT 4300 : 1ST SP COMMUNICATION ERROR

Check hardware wiring, BIOS parameter, and controller and inverter parameter, press RESET to make it reconnect and clear alarm.

MOT 4301~MOT 4340 : ALARM

This is inverter alarm, refer to inverter's manual and do the trouble shootings.

Press RESET to clear the alarm.

MOT 4341 : 1ST SP POLES SETTING CONFLICT, CHECK SYSTEM P.1681& INVERTER P.4-04

(1) Check controller P.1681 & inverter P.4-04, check if both setting are the same.
(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4342 : 1st SP FREQUENCY GAIN SETTING CONFLICT, CHECK SYSTEM P.1685& INVERTER P.0-23

(1) Check controller P.1685 & inverter P.0-23, check if both setting are reasonable.
(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4343 : 1ST SP MAX. FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.1682& INVERTER P.1-00

(1) Check controller P.1682 & inverter P.1-00, check if both setting are reasonable.
(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4344 : 1ST SP UP LIMIT OUTPUT FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.1683& INVERTER P.1-21

(1) Check controller P.1683 & inverter P.1-21, check if both setting are reasonable.
(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4345 : 1ST SP DOWN LIMIT OUTPUT FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.1684& INVERTER P.1-22

(1) Check controller P.1684 & inverter P.1-22, check if both setting are reasonable.
(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4901 : SYSTEM ALARM

Record this alarm and contact system maker, LNC.

MOT 4950 : SYSTEM ALARM

Record this alarm and contact system maker, LNC.

MOT 4951 : SYSTEM ALARM

Record this alarm and contact system maker, LNC.

MOT 9001 : X AXIS OVER　POSITIVE SOFTWARE TRAVEL LIMIT

Please make the warning X AXIS move into software limit area and it could clear the warning message.

MOT 9002 : X AXIS OVER　NEGATIVE SOFTWARE TRAVEL LIMIT

Please make the warning X AXIS move into software limit area and it could clear the warning message.

MOT 9003 : Y AXIS OVER　POSITIVE SOFTWARE TRAVEL LIMIT

Please make the warning Y AXIS move into software limit area and it could clear the warning message.

MOT 9004 : Y AXIS OVER　NEGATIVE SOFTWARE TRAVEL LIMIT

Please make the warning Y AXIS move into software limit area and it could clear the warning message.

MOT 9005 : Z AXIS OVER　POSITIVE SOFTWARE TRAVEL LIMIT

Please make the warning Z AXIS move into software limit area and it could clear the warning message.

MOT 9006 : Z AXIS OVER　NEGATIVE SOFTWARE TRAVEL LIMIT

Please make the warning Z AXIS move into software limit area and it could clear the warning message.

MOT 9007 : 4TH AXIS OVER　POSITIVE SOFTWARE TRAVEL LIMIT

Please make the warning 4TH AXIS move into software limit area and it could clear the warning message.

MOT 9008 : 4TH AXIS OVER　NEGATIVE SOFTWARE TRAVEL LIMIT

Please make the warning 4TH AXIS move into software limit area and it could clear the warning message.

MOT 9009 : X AXIS OVER G22 POSITIVE　TRAVEL LIMIT

Please make the warning X AXIS move into software limit area that G22 sets.

MOT 9010 : X AXIS OVER G22 NEGATIVE　TRAVEL LIMIT

Please make the warning X AXIS move into software limit area that G22 sets.

MOT 9011 : Y AXIS OVER G22 POSITIVE　TRAVEL LIMIT

Please make the warning Y AXIS move into software limit area that G22 sets.

MOT 9012 : Y AXIS OVER G22 NEGATIVE　TRAVEL LIMIT

Please make the warning Y AXIS move into software limit area that G22 sets.

MOT 9013 : Z AXIS OVER G22 POSITIVE　TRAVEL LIMIT

Please make the warning Z AXIS move into software limit area that G22 sets.

MOT 9014 : Z AXIS OVER G22 NEGATIVE　TRAVEL LIMIT

Please make the warning Z AXIS move into software limit area that G22 sets.

MOT 9015 : OVER CUTTING FEED START SIGNAL WAITTING

Check cutting releasing signal (C 22) if it is correct or Param871value setting too small.

5 Machine Tuning

5.1 Lathe Rigid Tapping Command

Description：

G94（G95）

Mode	Thread Pitch Calculation	**F_ Unit**
G94	F_ / S_	mm/min
G95	F_	mm/rev

G98、G99

G98 ： Returning back to the initial height.

G99 ： Returning back to R point

G84（G74）X_Y_Z_R_P_F_K_：

G84：Right helical.

G74：Left helical.

X_Y_：Tapping position.

Z_：Tapping’s lowest point (hole bottom).

R_：Tapping’s starting point.

P_：Tapping’s stop time.

F_：Tapping’s Z axis feed speed（G94）or pitch（G95）.

K_：Repeating tapping numbers.

Example：

G94（G95）; //Set Feedrate unit

M29 S_; // To enable rigid tapping mode and to command spindle to the desired rotational speed.

G98（G99）G84（G74）X_Y_Z_R_P_F_K_;

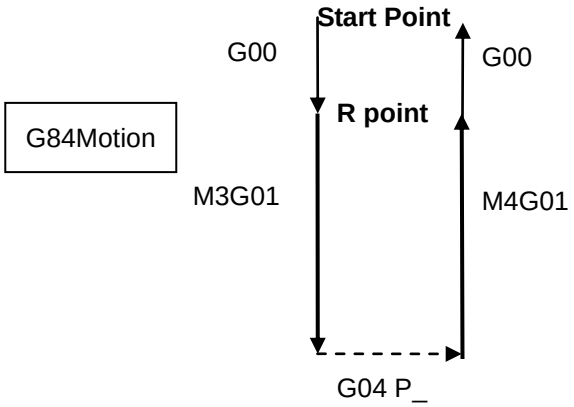
G80; //or Group 0 commands（G00、G01、G02、G03）, diable rigid mode.

Returning Acceleration Function

Setting parameter 1060, which will be able to accelerate the Z axis returning speed under rigid tapping and to decrease working time.

Override

Under rigid tapping, Feed Override and Spindle Speed Override will be disabled.



MLC Rigid Tapping C BIT

C BIT	SYMBOL	Description
C125	RT START	When C125 is ON, it will inform NC to start rigid tapping mode. MLC needs to wait until NC S128 = ON and then to disable C125.
C124	RT STOP	Disable rigid tapping mode. Under normal situation, rigid tapping mode will be disabled automatically after reading G80 or Group 1's G code. If there is special need, please set bit to ON and then rigid tapping will be disabled automatically.
S128	RT STATE	Rigid Tapping Mode Status When NC enters into the rigid tapping mode, S128 remains ON until it exits rigid tapping mode. If user press RESET under rigid tapping, NC will set S128 OFF.
Notice: When user press RESET, please disable rigid tapping mode in order to prevent any unpredicted situation.		

Rigid Tapping System Information

Rigid Tapping System Information #	Description
#21	Max error in rigid tapping travel
#22	Estimate value of rigid tapping 1st speed compensation value
#23	Estimate value of rigid tapping 1st acceleration speed compensation value
#24	Estimate value of rigid tapping 2nd speed compensation value
#25	Estimate value of rigid tapping 2nd acceleration compensation value
#26	Rigid tapping spindle following error

● **Rigid Tapping Machine Adjustment Procedure**

1. Please increase the maximum allowable following error of Z axis direction (Para. # 1058 is approximately set to 3000). Also increase the maximum servo error of the spindle (Para. # 1075 is approximately set to encoder size per rotation of the spindle*10) in order to prevent warning when doing machine adjustment.
2. Confirm Spindle Rotational Direction（Para. # 1071）

   Executing the following program：M29S500

   G91G84R-10Z-50F500

   M28

   M30

   Check whether or not the spindle rotational direction is the same direction as M3 direction under non-rigid tapping mode. If not the same, please set Para. # 1071 to 1.

3. Acc/Deceleration Time Adjustment

   To adjust acc/deceleration time (parameter 1059) and execute the following program:

   M29S2500 ; rotational speed setting is the maximum rigid tapping speed.

   G91G84R-10Z-50F2500

   M28

   M30

   During executing, must make the spindle drive device's current lower than the saturation value, and make the spindle to turn smoothly.

   Please pay attention to whether or not the needed maximum rotational speed can be reached at the upper enter frequency limit of the spindle. Using Toshiba as an example, adjust Para. # 373, 425, 426, 427, and 428.

   If the spindle rotational speed is not smooth in high rotational speed, please refer to Para. # 371.◦\

4. Speed Compensation

a. Please set parameters 1064、1065、1073、1074 to zero and reboot the system after modifying.
b. Executing the following program in dry run one time (no need to put on any material)

   M29S2500

   G91G84R-10Z-50 F2500 P1000

   M28

   M30

   To observe system data #22, and to enter this value into speed compensation parameter 1064. This value should be between 100~8000. After entering system data #24 into parameter 1073（S22 → P1064，S24→P1073）, reboot the system.

a. Executing the above part program again. If there is any shaking, please adding parameter 1066 from 0 to 20 in order to decrease shaking. This value shouldn't be as too big as possible, or the following error will increase. Recommending value is between 3~5.。

5. Acceleration Speed Compensation

a. Executing Step 4 program one more time, enter system data # 23 and #25 separately into acceleration speed compensation parameter 1065 and 1074 and then reboot the system. This value should be between 100~8000.

b. If shaking occurs, please adding parameter 1070 from 0 to 20 in order to decrease shaking. Recommending value is 10~15.

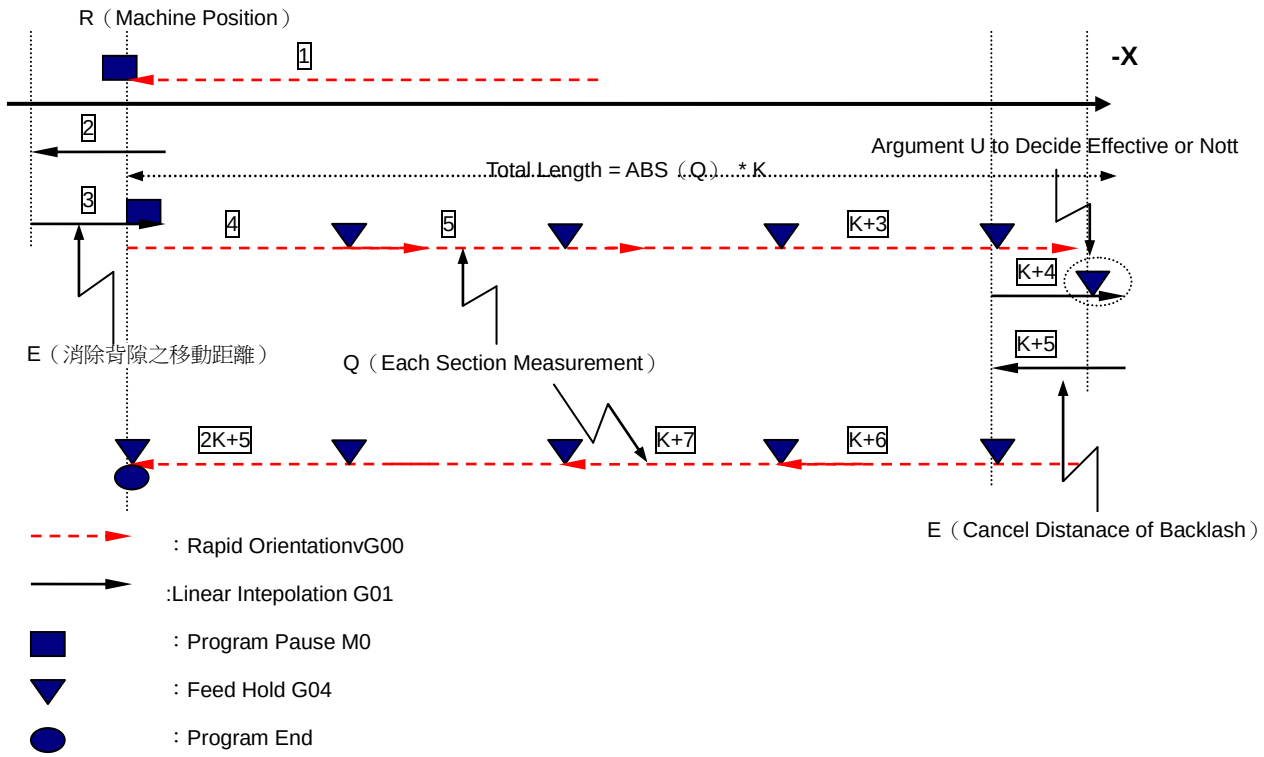
c.After completed, please observe system data #21. This is the biggest error of Z axis direction during tapping.

6. Servo Error Amount Checking

a. Reset Para. # 1058 as the allowable error amount and it must be larger than system data #21. Recommend setting this value as 5 – 10 times larger than system parameter 21. During rigid tapping, when the error is over this setting value, tapping will stop.

b. Using the same principle to set Para. # 1075 as the allowable error amount for the spindle servo. Recommend to set this value as 5-10 times larger than the system parameter #26. During rigid tapping, when the error is over this setting value, tapping will stop.

5.2 Laser Compensation Procedure



Program Argument Description

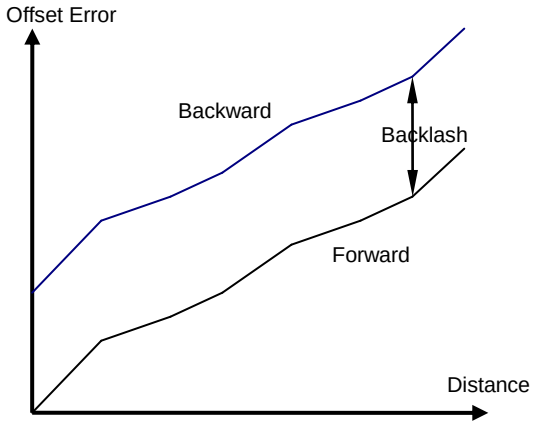
1. A：Axis direction, 1 means X axis, 2 means Y axis and 3 means Z axis
2. E：Delete backlash moving distance. If it is a positive value, at beginning of measuring, the program should move ABS（E）distance toward this axis positive direction. Then moving ABS（E）distance toward negative direction (Step 2 and Step 3 from the above Diagram). After measuring forward direction, first moving ABS（E）distance toward negative direction and then moving ABS（E）distance toward positive direction (Steps K+4 and K+5 from the above diagram). If it is a negative value, then using the opposite method. If it is a negative direction compensation, then this argument must be set as positive To delete backlash motion is to execute G01 and the feedrate is constant to 800mm/min. In order to catch the first point of Backward direction (which equals to the last point of the Forward direction, final point of Step K+3 or the starting point of Step K+6), so the setting value of this argument should be bigger than the setting value of Laser measuring software (such as RENISHAW, HP and etc). If not, Step K+4 and Step K+5 should stop for a while..
3. K：Measure section, this argument value must be the same as the total section setting value of the pitch error compensation (Parameters 0112 – 0115) for the corresponding axis direction in NC system.

4. Q：Each section's measuring length. If it is positive direction compensation, please set setting value as positive value. If it is negative direction, please set setting value as negative value. This argument value must be the same as each pitch error compensation distance's setting value for the corresponding axis in NC system. (Parameters 1018 – 1021, NC system parameter values are positive permanently. Parameter 0118 will set the compensation direction.)

5. R：Measure starting coordinate (machine coordinate), this argument value must be the same as the starting position's setting value of pitch error compensation (Parameters 1046 – 1049) for the corresponding axis direction in NC system.
6. T：For each section's pause time, unit is sec.
7. U：When the setting is 1, after executing K+4 Step, pause argument T will continue moving toward the reverse direction at the desired time. When the setting is 0, pause argument T will continue moving toward the reverse direction immediately after executing K+4 Step. Please refer to Argument E for a description.。

Executing Steps

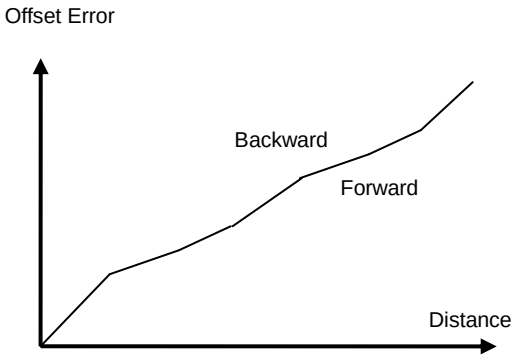
1. Check NC parameter 0038 (Backlash and pitch error compensation unit) setting value is correct or not.
2. Correct O0000 content and modify each argument's (E, K, Q, R) corresponding NC parameter setting value.
3. Disable backlash or pitch error compensation function (Parameters 0117 and 0119); reboot system.
4. Executing reference point procedure.
5. After resetting laser measure software (such as RENISHAW、HP and est.), executing O0000 program and measuring the error amount of each section's compensation length. The measure result is as below：：



6. Putting the measured backlash（From the upper diagram, the vertical difference between two

lines）into NC parameter（Parameters 0044 ~ 0047）, and enable the backlash function（Parameter 0117）; reboot the system.

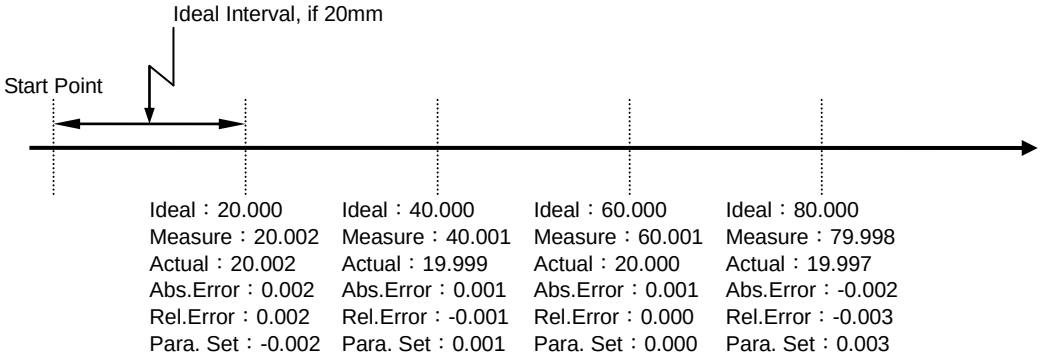
7. After looking for the reference point, re-executing Step 5 and the measure result should be as following：



8. Setting pitch error compensation values（NC Parameters 0300 ~ 0349、0450 ~ 0499、0600 ~ 0649 and 0750 ~ 0799）. Assumed the LNC system pitch error compensation value uses the relative value setting. If the laser measure software (such as RENISHAW, HP, and est.) able to execute exchanging, there will be no problem. But, if can only use the absolute value to indicate, the exchanging method is as following:：

   The N^{th} section relative error = the N^{th} section absolute error – the $(N-1)^{th}$ section absolute error；

   The N^{th} section compensation setting value = -ive N^{th} section relative error.

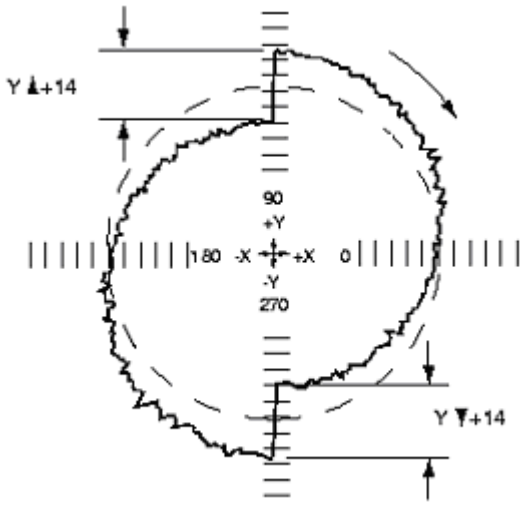


9. After rebooting the system, re-executing Step 7 until the compensation effect is within the acceptable range.。

5.3 Double Ball Bar Measure – Backlash or Circular Spike

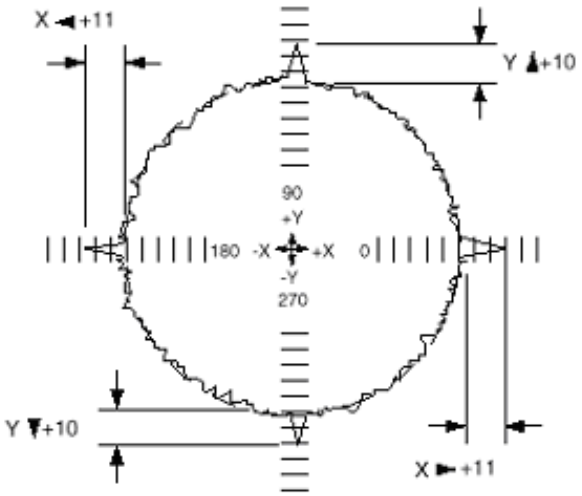
- Backlash

  Using DOUBLE BALL BAR to measure backlash, the result analyzing diagram is as following (only the Y axis part, which is called Positive Backlash). Able to see the Y axis backlash is 14um from the diagram. So please set this value (i.e., 14um) into Para. # 0045 and set BIT1 of Para. # 0117 to 1 in order to enable Y axis backlash compensation functions



- Reversal Spikes

  Using DOUBLE BALL BAR to executing canned cycle testing, the result analyzing diagram is as below. In the diagram, the sticking out path in the direction changing area of each axis is called the circular spikes phenomenon.



Using +ive X axis direction as an example, each related parameter setting for circular spikes compensation value is as following：

1. Parameter 0812：+ X Axis Direction of Reversal Spikes Value

   Unit：um

   Description: This parameter is to set the circular compensation value of +ive X axis direction. Using the above diagram as an example. The +ive X axis direction circular spike is 11. So based on the principle, the parameter setting value is 11. However, since the present LNC series controller is using PULSE COMMAND control mode (spike compensation is added to CURRENT LOOP value), there will be some delay between the actual corresponding of servo motor and the commanding value. Based on past experience, the circular compensation value should be set as 8-9 times of the actual value. So according to the result from the above diagram, the recommend setting value for this parameter is 90. If this parameter setting value is 0, it means not to enable the + X axis spike compensation function.

2. Parameter 0813: Reversal Spikes Time Interval of +ive X Axis Direction

   Unit: disconnecting time interval

   486IPC is 10.6ms

   586IPC is 3.6ms

   Description: To use this parameter to set the maintaining time of +ive X axis direction spike compensation. The corresponding +ive X axis spike maintaining time (spindle width) is displayed on the result analyzing diagram. The measure software will provide each measured Sampling Rate. Using RENISHAW as an example,【Sample: 7.81 per sec information will be displayed on the left side of analysis diagram. This means the time interval for two closing points is $\frac{1}{7.81} = 128ms$. Need at least 3 points (during time $2 \times 128 = 256ms$) if want the analysis diagram to display multiple-angle sharp. Under this requirement, the parameter setting value is $\frac{256}{3.6} = 71$（586IPC）. If this parameter setting value is zero, this means not to enable the +ive X axis spike compensation function.

3. Parameter 0814: Reversal Spikes Delay Time of +ive X axis

   Unit: discounting time interval

   486IPC is 10.6ms

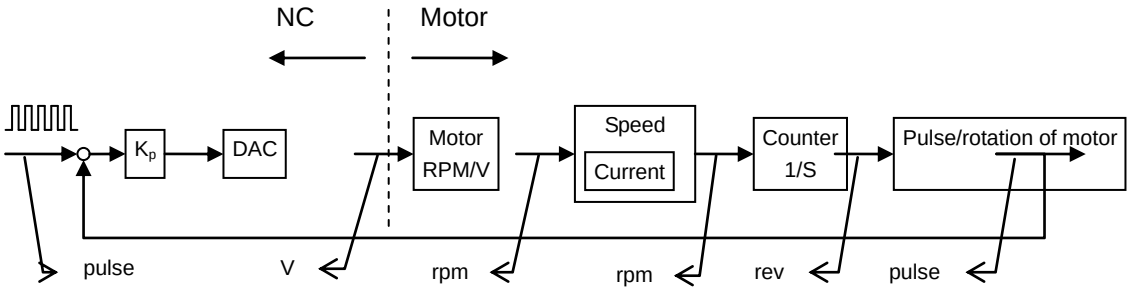
   586IPC is 3.6ms

   Description: Assumed the circular spike occurring point of +ive X axis is not in the direction changing center (on the X axis), but it occurs after direction changing. Then, need to set this parameter. Please refer to the description of parameter 0813 for the calculating method of this setting value.

6 APPENDIX Parameter Adjustment Example

A1 V Command Control Parameter Adjustment

Using X axis as an example, the following is the diagram of CONTROL BLOCK DIAGRAM when motor ENCODER has the position feedback signal



1. K_p：position gain on PCC1620 motion control card, P control.
2. PCC1620 motion control board DAC specification：

   16-bit，output ±10V → DAC analogy degree = $\frac{10}{2^{16-1}-1}=\frac{10}{32767}$

3. Motor incremental gain = 1V, the corresponding motor rotational speed rpm, is decided by motor specification（motor driver also needs to be set）.
4. The speed of motor driver and the responding speed of the current feedback is much faster than the speed of position feedback, so it is able to set it as 1.
5. Total pulse per rotation of Motor = total Encoder output pulse per rotation of motor * multiple feedback factor.

Example：X axis selects motor 2000rpm/10V, the total encoder output pulse per rotation of motor is 2500; for machine structure, gear ratio is 4; pitch is 10mm. Under V command control method, if users hope the system feedback loop gain is 30 for this axis, then how to set the related parameters?

Answer: Parameter #0001：30（system feedback loop gain）.

Parameter # 0054：4（X axis multiple feedback factor）.

Parameter #1112：2500（total encoder output pulse per rotation of X axis motor）.

Parameter # 0108：200（X axis motor loop gain）.

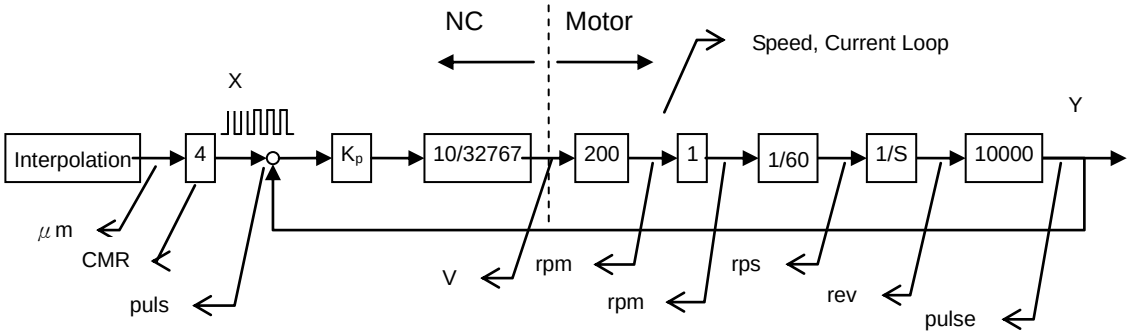
Parameter #0156：3（X axis control commanding mode）.

Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：4（numerator of X axis ball screw）.

Parameter #0104：10000（pitch of X axis ball screw）.

So the control loop at this time is as below：



Relationship between Position Control Feedback Output and Input：

$$Y=\frac{K_p\cdot 10/32767\cdot 200\cdot 1/60\cdot\frac{1}{S}\cdot 10000}{1+K_p\cdot 10/32767\cdot 200\cdot 1/60\cdot\frac{1}{S}\cdot 10000}X=\frac{10.17284K_p}{S+10.17284K_p}X\ ,$$

At this time, the position feedback loop gain is $10.17284K_p$. Since the user requires the desired position loop gain is 30, so the K_p value needs to be set as $\frac{30}{10.17284}=2.949^{i}$ on motion control board.

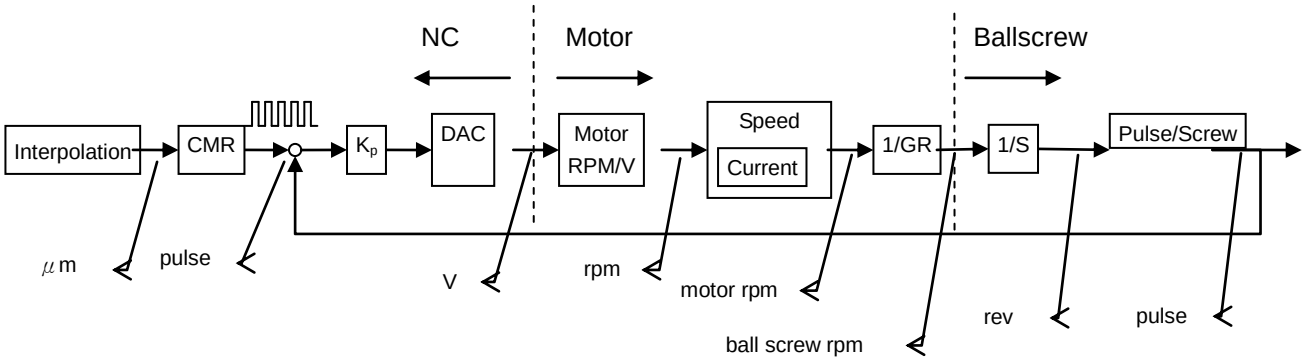
Testing Method：

$e=\frac{F}{K}$ ，e is the following error under stable condition（X axis reaches equal speed）， please check system data # 000, unit is the smallest unit of the system; F is the feedrate; K is the position feedback loop gain. In this example, when K is 30 and under the condition that feedrate is 2000mm/min, following error should be $e=\frac{2000000/60}{30}=1111$ when X axis is in equal speed. When X axis is already in

equal speed and the value of system data #000 is 1111 (or close to this number, sometimes there will be some difference due to moving forward one space), it means the parameter setting is correct.。

A2 Parameter Adjustment when Encoder is installed besides Ball Screw

1. Connecting ball screw encoder feedback signal to NC, using it as position control.
2. Connecting motor encoder feedback signal to motor driver, using it as speed (velocity) and voltage control



1. Since the position feedback signal is returning back from ball screw at this time, must set gear ratio to 1 even there is gear ratio is between motor and ball screw. Putting the gear ratio factor into the position control feedback.
2. Assumed the initial parameter # 1112 is to set the encoder total output pulse value per rotation of motor. At this time, changing it to as the encoder total output pulse value per rotation of ball screw.

Example：X axis selects 2000rpm/10V motor，encoder total output pulse value per rotation of motor is 2500; for machine structure, gear ratio is 4, pitch is 10mm, Please to install an additional 3000pulses/rev encoder on the ball screw side and also to connect the feedback signal to NC for position control. Under the condition that V command control method and the system loop gain is 30, how to set the related parameters?

Answer：Parameter #0001：30（system feedback loop gain）.

Parameter #0054：4（X axis multiple feedback factor）.

Parameter #1112：3000（encoder total output pulse value per rotation of X axis ball screw）.

Parameter #0108：????（X axis motor loop gain）→explain later.

Parameter #0156：3（X axis control commanding mode）.

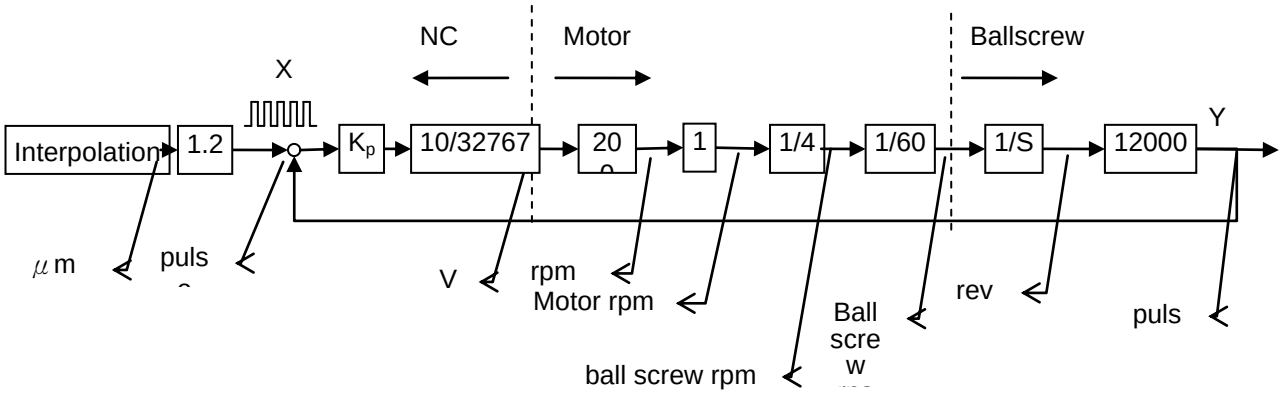
Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：1（numerator of X axis ball screw）.

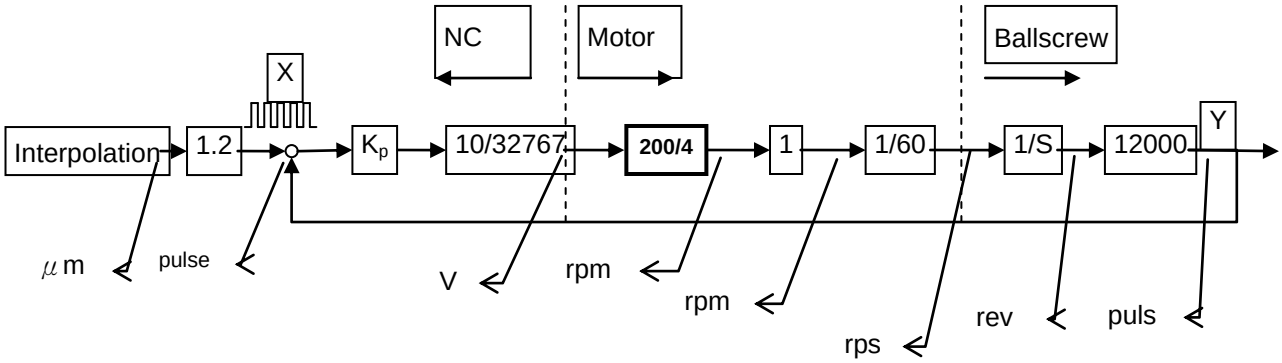
Parameter #0104：10000（Pitch of X axis ball screw）.

$CMR = \frac{3000 * 4}{10000} = 1.2\, pulses / um$，which means 1um on X axis is correspond to 1.2 pulses that is the encoder total output signal of ball screw.。

Control Loop is as below：



But, since there is no extra parameters for GR factor setting in position feedback, modification is as following：



Input and Output Relationship：

$$Y = \frac{K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 12000}{1 + K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 12000} X$$

$$= \frac{K_p \cdot 10/32767 \cdot 200/4 \cdot 1/60 \cdot 1/S \cdot 12000}{1 + K_p \cdot 10/32767 \cdot 200/4 \cdot 1/60 \cdot 1/S \cdot 12000} X = \frac{3.05185 K_p}{S + 3.05185 K_p} X$$

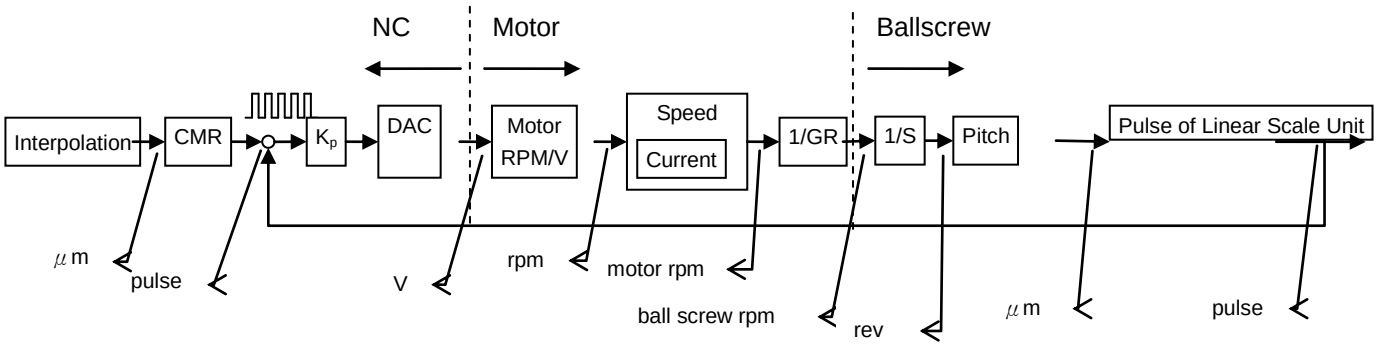
So, in this application example, parameter #0108 setting value is 200/4=50 and the K_p setting value is $\frac{30}{3.05185} = 9.83$ on PCC1620 motion control board.

Weakness: under the present structure, when the motor actual loop gain cannot be completely divided by gear wheel ratio, please enter the closest integrate value. Also, there is a little bit difference between the whole position loop gain values and Parameter #0001 value. But, the position control has no problem at all.

Strength: able to clear backlash error.

A3 Parameter Adjustment when using Linear Scale Control Method

1. Connecting linear scale feedback signal to NC, using it as position control.
2. Connecting motor encoder feedback signal to motor driver, using it as velocity (speed) and voltage control.



3. Since the position feedback signal is returning back from table at this time, must set the gear ratio to 1 even there is gear ratio between motor and ball screw. Putting the gear ratio factor into the position control loop.

Example：X axis selects 2000rpm/10V motor, the total encoder output pulse value per rotation of motor is 2500; for the machine structure, gear ratio is 4, pitch is 10mm. Also, please install an addition linear scale: every 20um will output one A/B pulse set, every 50mm will output one Z phase pulse and also sending the feedback signal to NC. Under the condition of V command control method and the system loop gain value is 30, how to set the related parameters?

Answer：Parameter #0001：30（system loop gain）.

Parameter #0054：4（X axis multiple feedback factor）.

Parameter #1112：????（total encoder output pulse value per rotation of X axis motor）.→explain later.

Parameter #0108：????（X axis motor loop gain）.→explain later.

Parameter #0156：3（X axis control commanding mode）.

Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：1（numerator of X axis ball screw）.

Parameter #0104：????（X axis pitch）.→explain later.

（Parameter #1112 * Parameter #0054）the initial definition is the total encoder output pulse value per rotation of X axis motor. This value is used as the distance between each index in zero return procedure. So after changing to linear scale, Parameter #1112 also needs to change to the pulse value that is sent out by linear scale. In this example, every 50 mm linear scale will produce one Z phase pulse, every 20 um will produce one A/B pulse set, so the pulse value that is produced by linear scale between each index is 50 * 1000 / 20 = 2500 → the setting value of Parameter #1112 is

2500.

For linear scale, every 20 um will produce one A/B pulse set. This means every 5um will produce one pulse after 4 ratio so the CMR = 1 / 5 = 0.2. But for NC,

$$CMR = \frac{P0058 \times P0054}{P0104} \times \frac{P100}{P68}$$

Since Parameter #1112 is to set the pulse value, which is produced by linear scale, between each index, Parameter #0104 must set the distance between each linear scale index in order to make the CMR in NC the same as that in linear scale. In this example, Parameter #0104 must be set as 50000.

Control loop is as below：

4. Since the position feedback signal is returning back from table at this time, must set the gear ratio to 1 even there is gear ratio between motor and ball screw. Putting the gear ratio factor into the position control loop.

Example：X axis selects 2000rpm/10V motor, the total encoder output pulse value per rotation of motor is 2500; for the machine structure, gear ratio is 4, pitch is 10mm. Also, please install an addition linear scale: every 20um will output one A/B pulse set, every 50mm will output one Z phase pulse and also sending the feedback signal to NC. Under the condition of V command control method and the system loop gain value is 30, how to set the related parameters?

Answer：Parameter #0001：30（system loop gain）.

Parameter #0054：4（X axis multiple feedback factor）.

Parameter #1112：????（total encoder output pulse value per rotation of X axis motor）.→explain later.

Parameter #0108：????（X axis motor loop gain）.→explain later.

Parameter #0156：3（X axis control commanding mode）.

Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：1（numerator of X axis ball screw）.

Parameter #0104：????（X axis pitch）.→explain later.

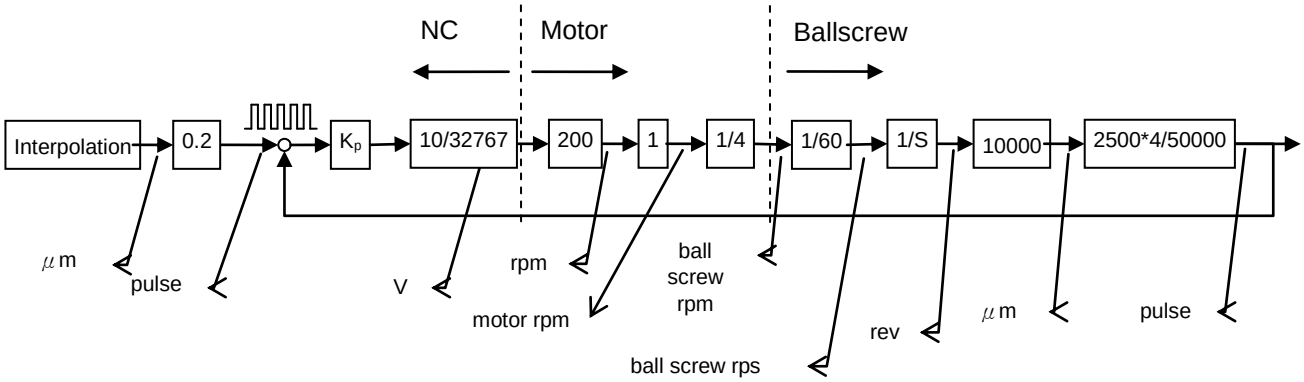
（Parameter #1112 * Parameter #0054）the initial definition is the total encoder output pulse value per rotation of X axis motor. This value is used as the distance between each index in zero return procedure. So after changing to linear scale, Parameter #1112 also needs to change to the pulse value that is sent out by linear scale. In this example, every 50 mm linear scale will produce one Z phase pulse, every 20 um will produce one A/B pulse set, so the pulse value that is produced by linear scale between each index is 50 * 1000 / 20 = 2500 → the setting value of Parameter #1112 is 2500.

For linear scale, every 20 um will produce one A/B pulse set. This means every 5um will produce one pulse after 4 ratio so the CMR = 1 / 5 = 0.2. But for NC,

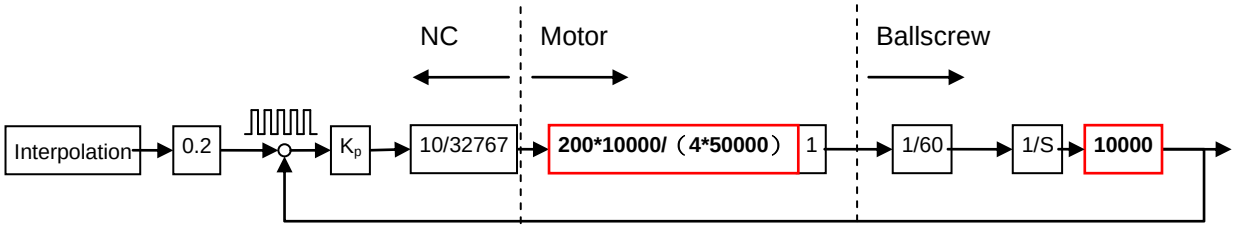
$$CMR = \frac{P0058 \times P0054}{P0104} \times \frac{P100}{P68}$$

Since Parameter #1112 is to set the pulse value, which is produced by linear scale, between each index, Parameter #0104 must set the distance between each linear scale index in order to make the CMR in NC the same as that in linear scale. In this example, Parameter #0104 must be set as 50000.

Control loop is as below：



Since there is no extra parameter for pitch and numerator of X axis ball screw setting, the control loop is modified as following：



Output and Input Relationship：

$$Y = \frac{K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 10000 \cdot 10000/50000}{1 + K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 10000 \cdot 10000/50000} X$$

$$= \frac{K_p \cdot 10/32767 \cdot (200 \cdot 10000)/(4 \cdot 50000) \cdot 1/60 \cdot 1/S \cdot 10000}{1 + K_p \cdot 10/32767 \cdot (200 \cdot 10000)/(4 \cdot 500000) \cdot 1/60 \cdot 1/S \cdot 10000} X = \frac{0.50864}{S + 0.50864 K_p} X$$

So, in this application case, the setting value of Parameter 0108 is 200*10000/（4*50000）=10. The K_p setting value is $\frac{30}{0.50864} = 58.9808$ on PCC1620 Motion Control Board.

Weakness: Under current structure, when Parameter 0108 cannot be an integrate number, please enter the closest integrate

number. At this time, there will be some difference between the whole position loop gain and parameter 0001, but the position control will not have any problem.

Strength: able to clear backlash error and pitch error.

7 APPENDIX B Internet Setting Description

Network Connection Settings for the Controller

This controller can obtain the resource of a remote disk in Microsoft Network by “Internet Connection Sharing.” Below are the steps to be made at the controller side & PC side, respectively, to install and to make relative settings to enable network connection sharing function.

At the controller side:

Install network software at the controller side. To install, boot the system with an OS floppy disk and select the installation option 3 “INSTALL NETWORK UTILITIES.” (This step can be skipped if there is already a NET directory in the path of “C:\NET.”)

Modify network configuration of the controller. There are two ways to make the modifications: by DOS or by the operating interface of LNC software.

Method 1: By DOS

Modify the file “C：\config.sys” of the controller.

Modify

```
REM  device=C：\NET\ifshlp.sys
```

into

```
device=C：\NET\ifshlp.sys
```

Edit “C:\Net\2net.bat.” Modify this line according to your needs:

```
C：\NET\net△use△N：△\\PCNET\share△12345△YES
```

Below are the definitions for each field in the line.

△ represents a blank character.

”PCNET” is the computer name in the Network, and “share” is the folder name shared by the computer.

”N” is the (virtual) disk of N: which is mapping to the sharing resource “`\\PCNET\ share`“ in the network. (Please do not use “D:” which is used for different purposes; using “D:” will cause errors.)

“12345” indicates the password to log on PC. Passwords may or may not be required for different operating systems.

Window98：For this system, instead of adding a new account, users can connect some network disk by sharing a folder with each other. Therefore, users must log on with the same password as set by PC for “folder-sharing” function.

Window2000 & WindowXP：The two systems have higher security levels for access permissions, so users of different identifications are required to enter different passwords as set by PC. If no password is set at PC side, network connection would fail unless PC permission is open for guest access (the setup of guest access is described in the later chapter).

For OS versions Ver.2.5 or versions earlier than Ver.2.5, some disk codes that are no longer applicable can still be shown. If this occurs when the controller is on-line, add the line `C:\NET\net stop /yes` before the line `C:\NET\ net initialize`.

Verify if the settings are correct for the controller's file `C：\NET\SYSTEM.INI` and also for other relative settings in Network Neighborhood. Some programs might need to be modified as below (Please DO NOT change the settings that are not mentioned here):

```
[network]
:
computername=LNCDOS
:
username=LNCDOS
:
workgroup=WORKGROUP
:
logondomain=WORKGROUP
:
```

a. ”computername=” is the controller name in the Network. Each controller should have its own unique name that is different from other disks in the Network. The default computer name is LNCDOS. Therefore, if there is more than one controller in a domain, this default name must be modified.

b. ”username=” is the controller name to log on PC. Except for Window98, all other operating systems require PC side to add a new user with the same name at the same time unless access permission is open to guests. The default user name is LNCDOS. Since a user can use the same name to log on repeatedly, there is no need to modify this name even if there is more than one controller in a domain.

”workgroup=” is the work group name of the controller when logging on the internet. Please set this value according to the Network which the controller belongs to. By default, it is set as “WORKGROUP.”

”logondomain=” is the domain name of the controller when logging on the internet. Please set this value according to the domain that the controller belongs to. The setting method is basically the same as that of “WORKGROUP.”

Method 2. By the operating interface of LNC software

A. For 600 & 520 Series, the path to go to the configuration interface is <PARAM> → **NET SET**; for 500i/510i & 300i/310i Series, it is < PARAM > →**NET**, as shown in the figures below.

Networking configuration screen for 600 & 520 Series

Networking configuration screen for 500i/510i & 300i/310i Series

B. FIELD DEFINITIONS：

c. NC NAME: “computername” in the `C:\Net\system.ini` file. One name should not be used twice in the same domain. The default name is LNCDOS.

d. USERNAME: “username” in the `C:\Net\system.ini` file. This is the user to log on PC. The default name is LNCDOS.

GROUP: “workgroup” in the `C:\Net\system.ini` file. This is the work group name of the controller when logging on the internet. The default name is WORKGROUP.

STATUS(for 600 & 520 Series) or STAT (for 500i/510i & 300i/310i Series):

Disk codes are used in `C:\Net\2net.bat` when logging on the internet.

Disk codes start from “E” to “N.” There are 10 codes in total.

The drive codes are assigned by the system; users are not allowed to set the codes by themselves.

◯ & X after drive codes indicate the network status of the drive. X means off-line; ◯ means on-line.

Disk codes other than E ~ N existing before network setting is configured will be deleted after networking configuration is finished.

PC NAME: Enter the full computer name for the controller to get connected with PC. The maximum length allowed is 12 characters.

SHARE DIR: Enter the share folder name for the controller to get connected with PC. The maximum length allowed is 12 characters.

PWD.: Set the password to get connected with PC. The content of the password is visible when being entered, but it will be converted into “******” as soon as “Enter” key is pressed. The maximum length allowed is 12 characters.

DEFINITIONS OF FUNCTION KEYS

e. Press the keys **UP**, **DOWN**, **LEFT**, & **RIGHT** to move cursor to the desired field.

f. Enter the information in the input text box, then press **INPUT** to upload the information to the field assigned by cursor.

Pressing **INPUT** without any information in the input text box will delete the original information in the field.

Press **PageUp** & **PageDown** to switch between pages.

SAVE: Press **SAVE** to save changes.

RECON: Press emergency button then press **RECON,** the changes will be validated.

Due to connectivity issues, sometimes the controller fails to log on the network. If this happens when the above functions are in use, the controller will try to connect to the same disk for 3 times before connecting to the next disk. After all connections are tried, the controller will then enter the system.

NETWORK SETTINGS AT PC SIDE

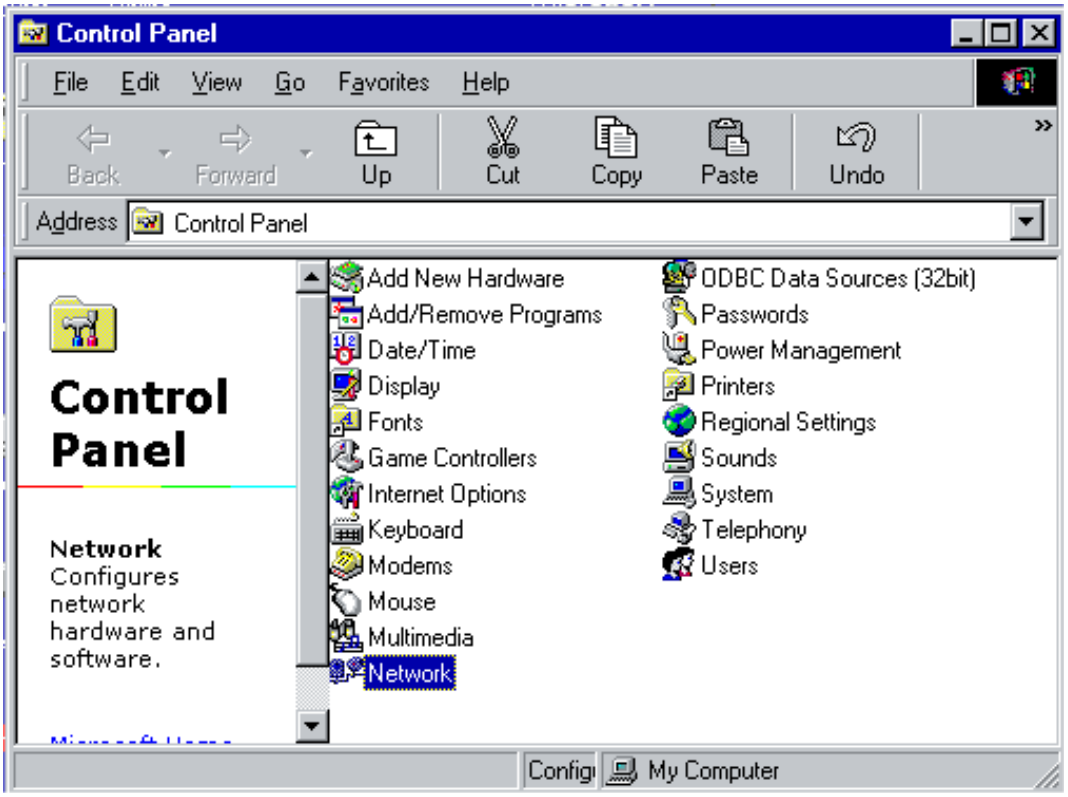
Network Settings for Windows 98

A. Verify if the network card, internet cables, and relative protocols have been installed properly.

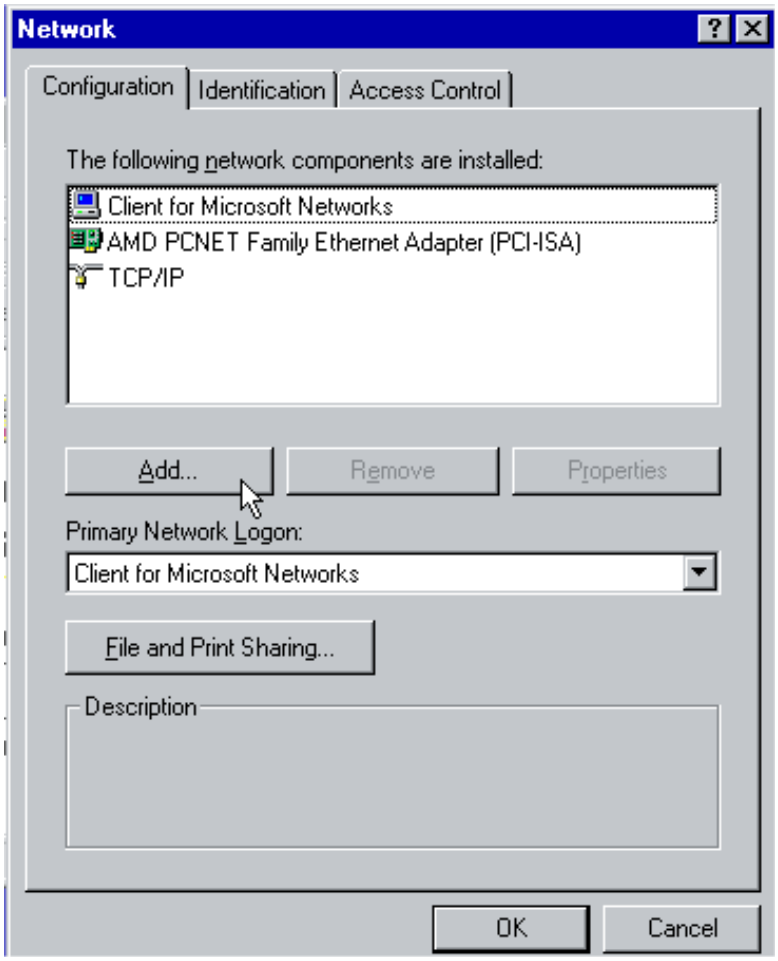
Verify if the “NetBEUI” protocol & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “NWlink NetBIOS” which would cause network connection to fail.)

g. Click **Start → Settings → Control Panel**.

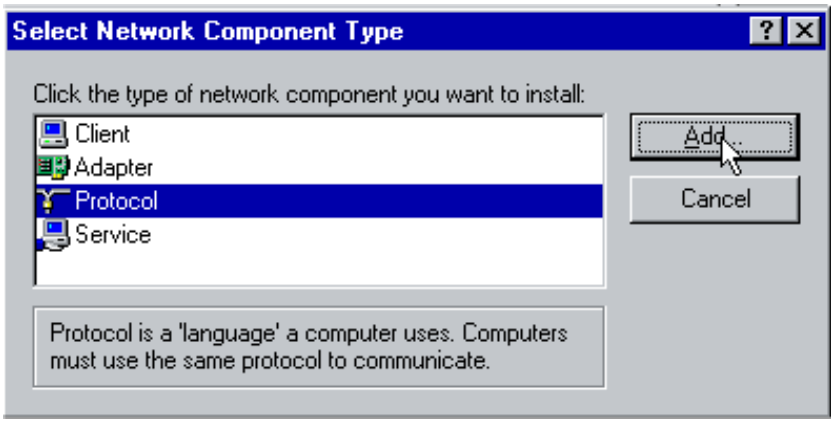
h. Double-click on the **Network** icon to configure network settings.



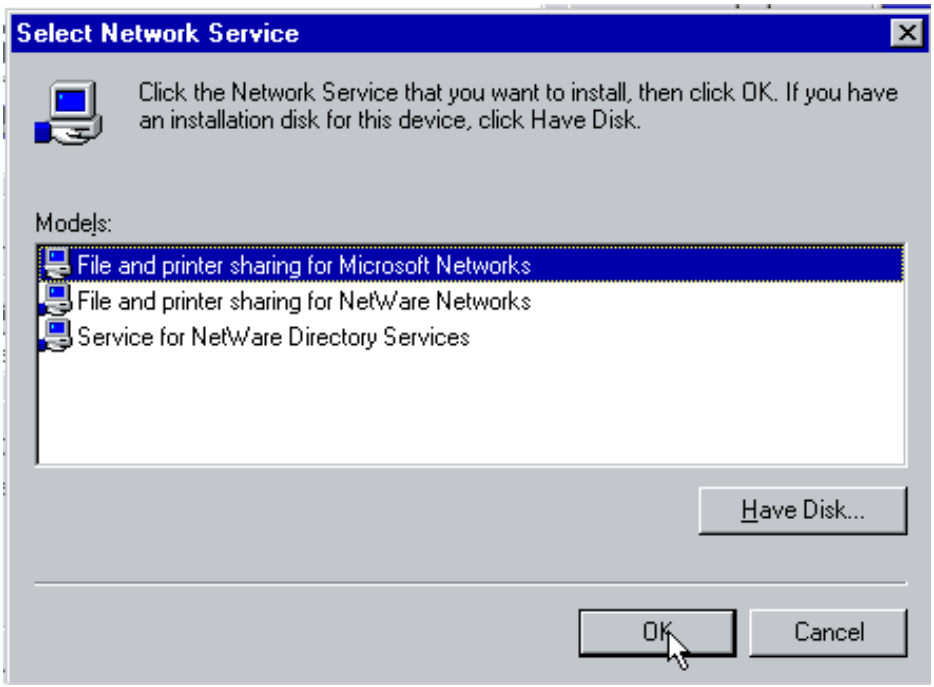
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI” are not installed, please press **Add**.



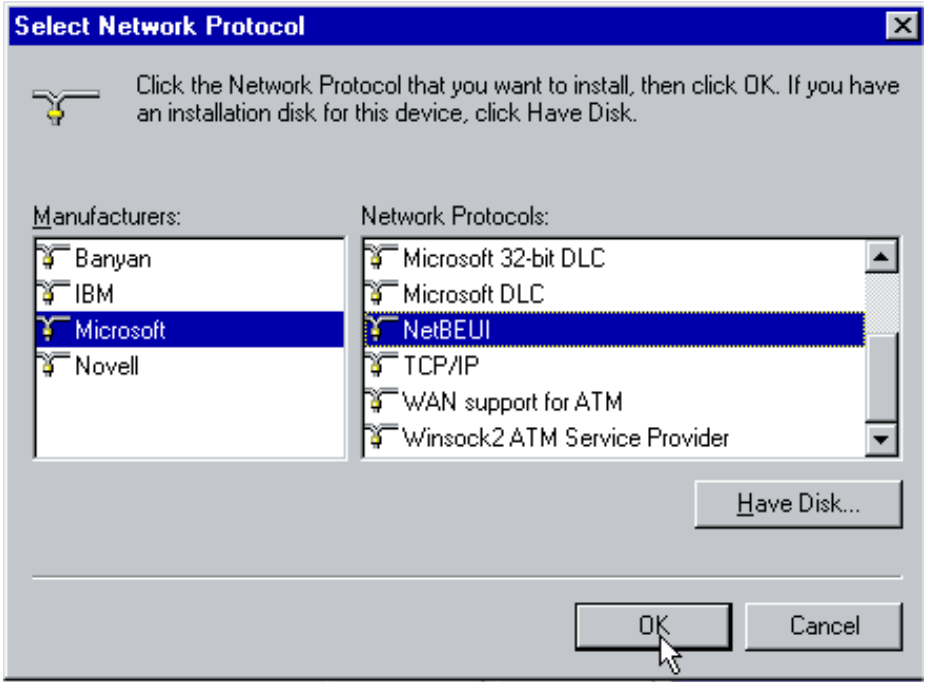
If “File and Printer Sharing for Microsoft Networks” is not installed, please select **Service**; if “NetBEUI” protocol is not installed, please select **Protocol**. Then click **Add**.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the service menu then click **OK** to complete installation.



If the network protocol “NetBEUI” is not installed, please highlight it on the menu as shown in the diagram below then click **OK** to complete installation.



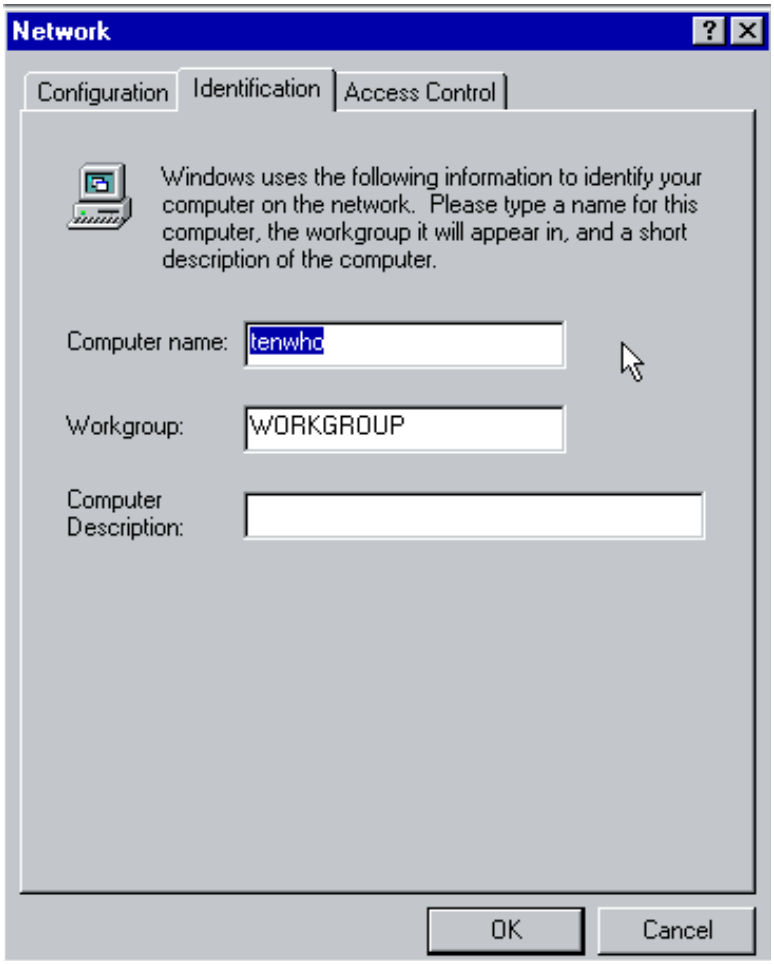
Verify if Computer Name & Workgroup are set correctly.

（The setting of workgroup and logondomain in `C：\net\system.ini` must be the same as those at PC side. The computername in `C:\net\2net.bat` must be the same as PC’s computer name.）

i. Select Start → Settings → Control Panel.

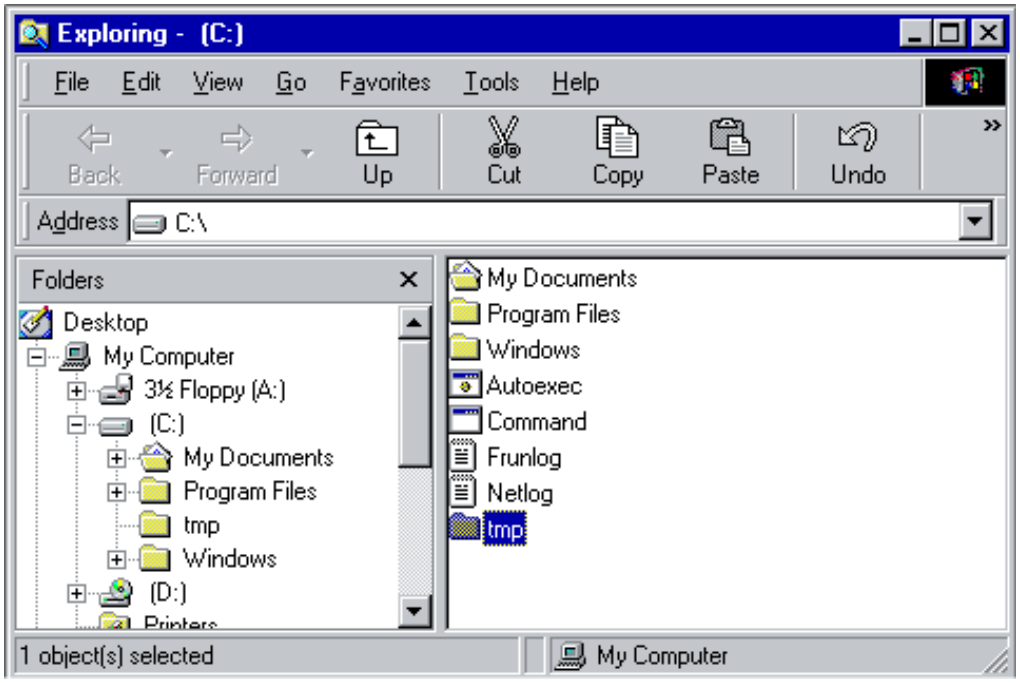
j. Double-click on the Network icon.

Verify if the settings of Computer Name & Workgroup are the same as those in `C:\NET\2net.bat` & `C:\NET\system.ini`. (Take the diagram below as an example, computername of `2net.bat` should be set to “tenwho”；workgroup of `system.ini` should be set to “Workgroup”).

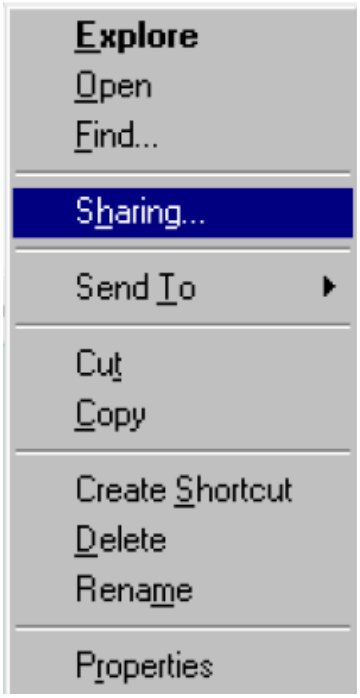


Share a directory at PC side

k. Go to **Windows Explorer** and create a new folder with the name “tmp” (The folder can be named differently by users).



Left-click to select the “tmp” folder, then right-click and choose **Sharing**.



Please follow the steps below for configuration:

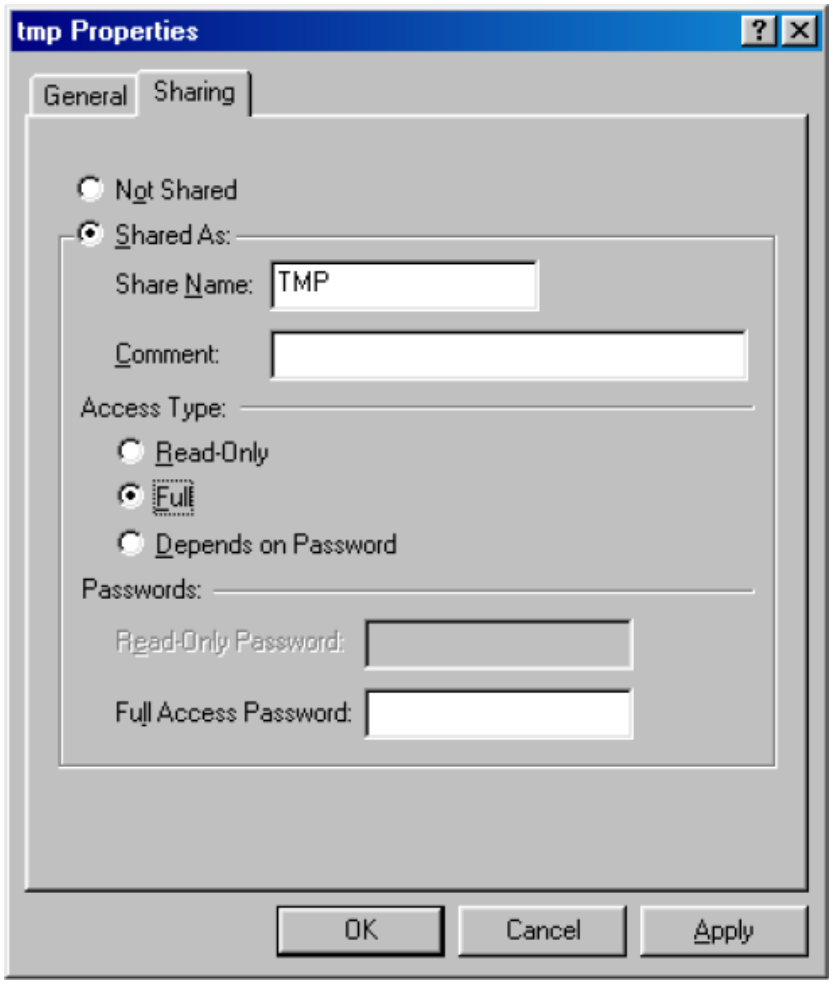
Click the **Sharing** tab.

By default, the **Share** Name and the newly-created folder are the same.

Users can change name of the new folder, but it must be the same as the folder name in `2net.bat`.

Verify the box of **Full** for **Access Type**.

You can choose either to set a password or not. If set, the password must be the same as that in `2net.bat`.

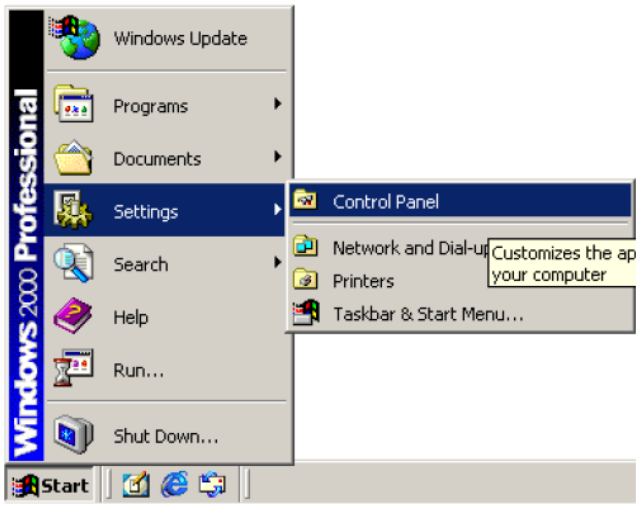


NETWORK SETTING FOR WINDOWS 2000

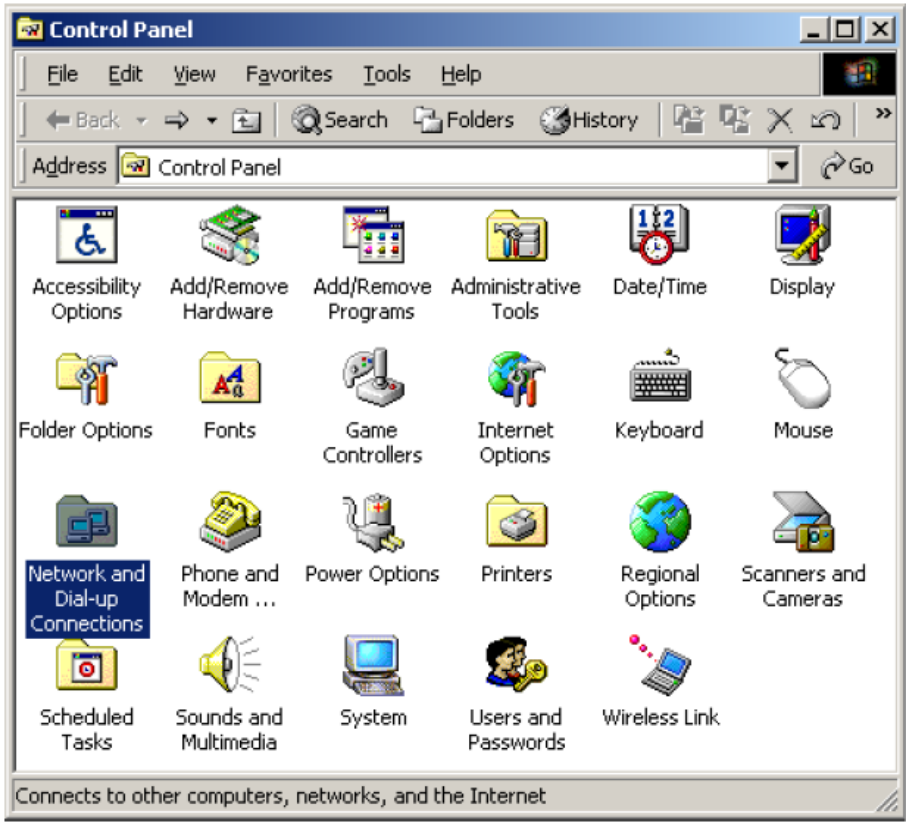
A. Verify if a network card, internet cables, and the relative protocols have been installed properly.

Verify if the “NetBEUI” protocol & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “Nwlink NetBIOS” which would cause network connection to fail.)

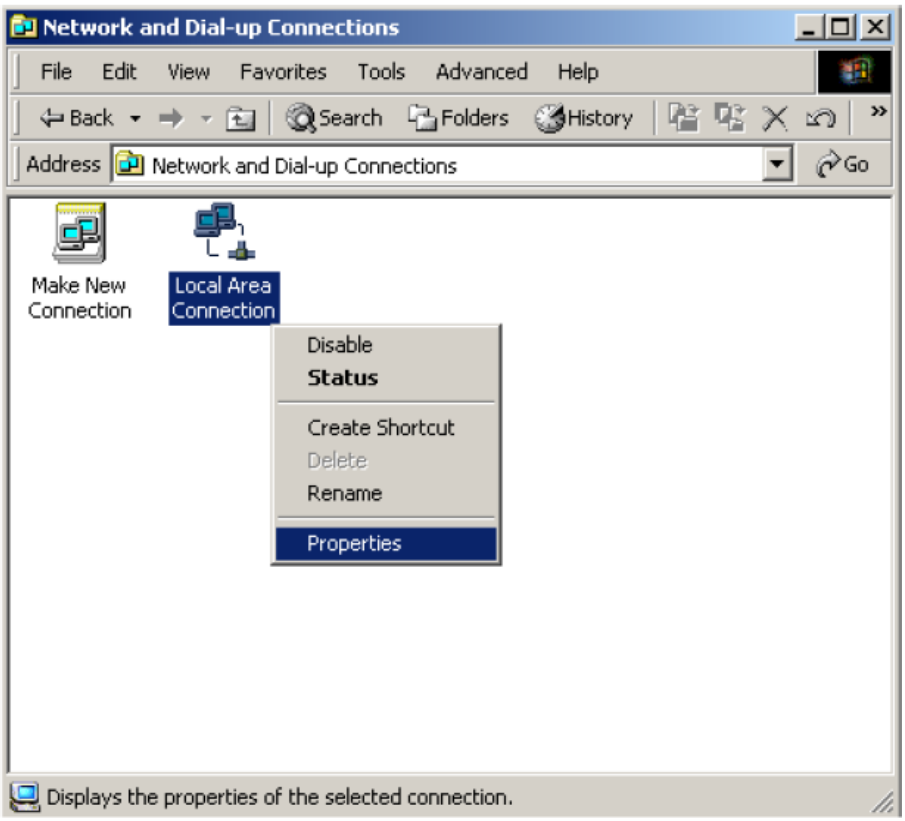
I. Select Start → Settings → Control Panel.



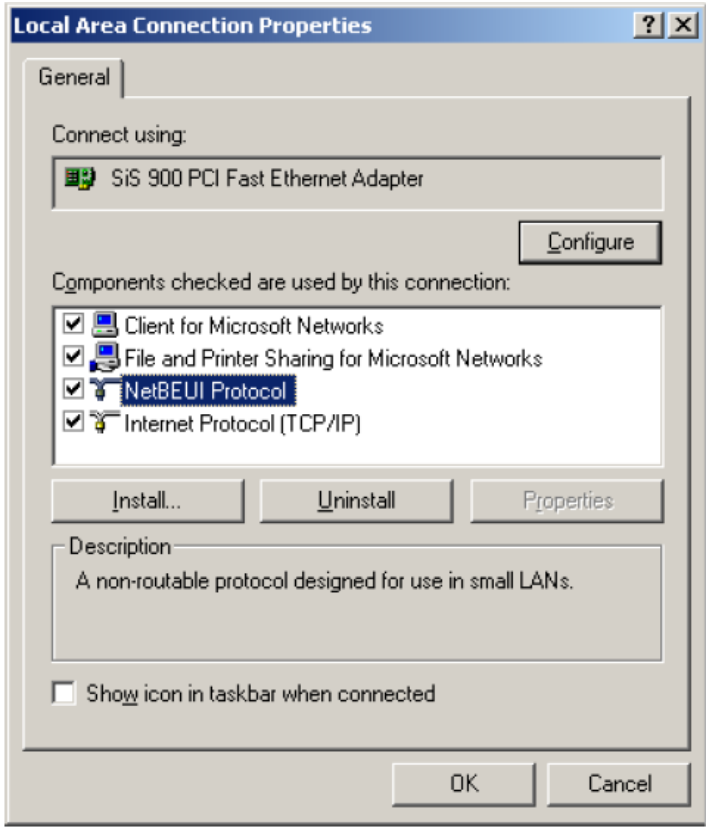
m. Double-click on the Network and Dial-up Connections icon.



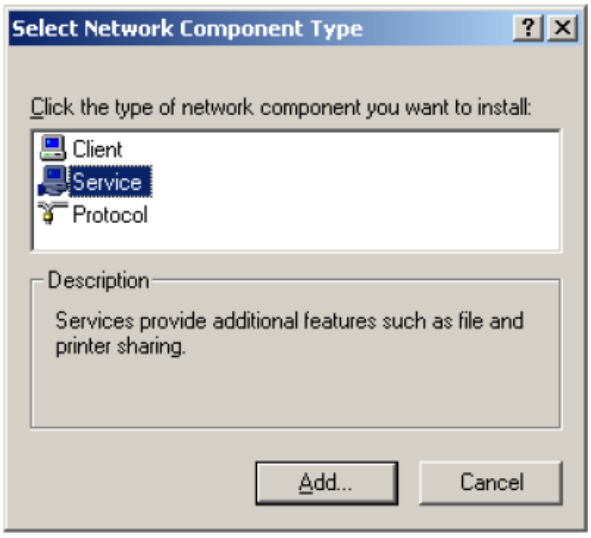
Right-click on the **Local Area Connection** icon and left-click properties.



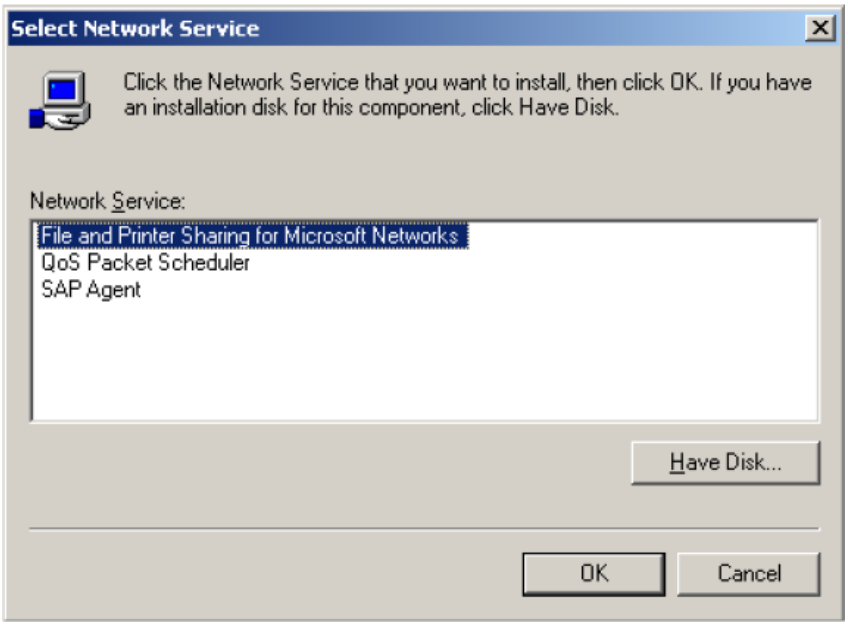
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI Protocol” are not installed, verify the boxes and press **Install** to install them.



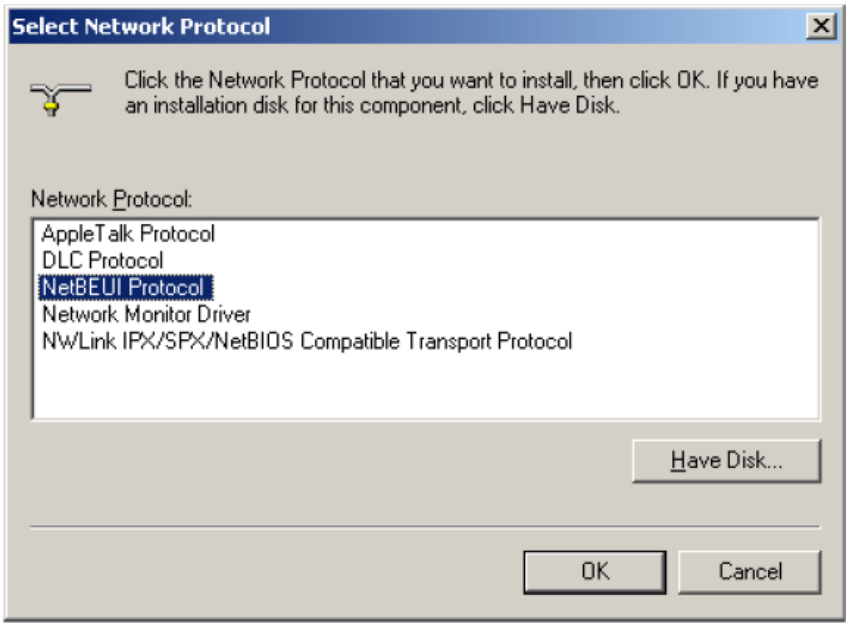
If “File and Printer Sharing for Microsoft NetWorks” is not installed, please select **Service**; if “NetBEUI Protocol” is not installed, please select **Protocol**. Then click **Add**.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the menu then click **OK** to complete the installation.



If “NetBEUI Protocol” is not installed, highlight it on the menu then click **OK** to complete the installation.

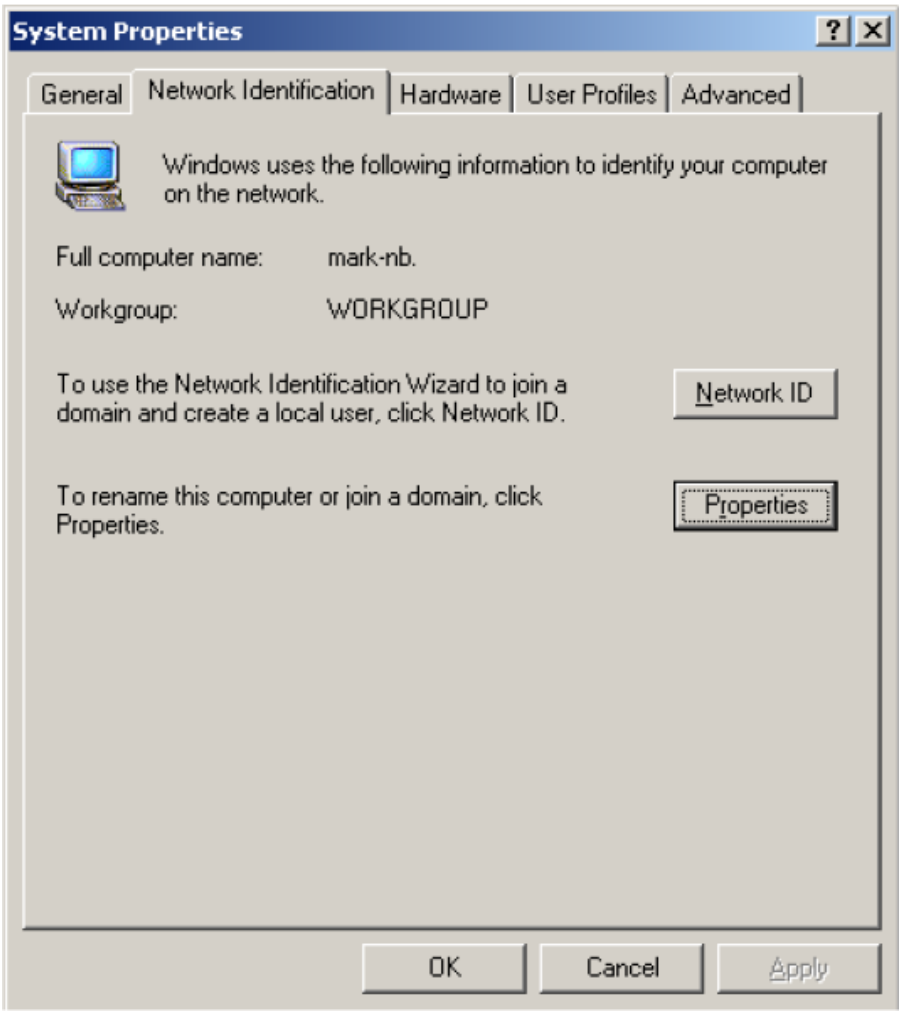


Verify if “computername” & “workgroup” are set correctly.

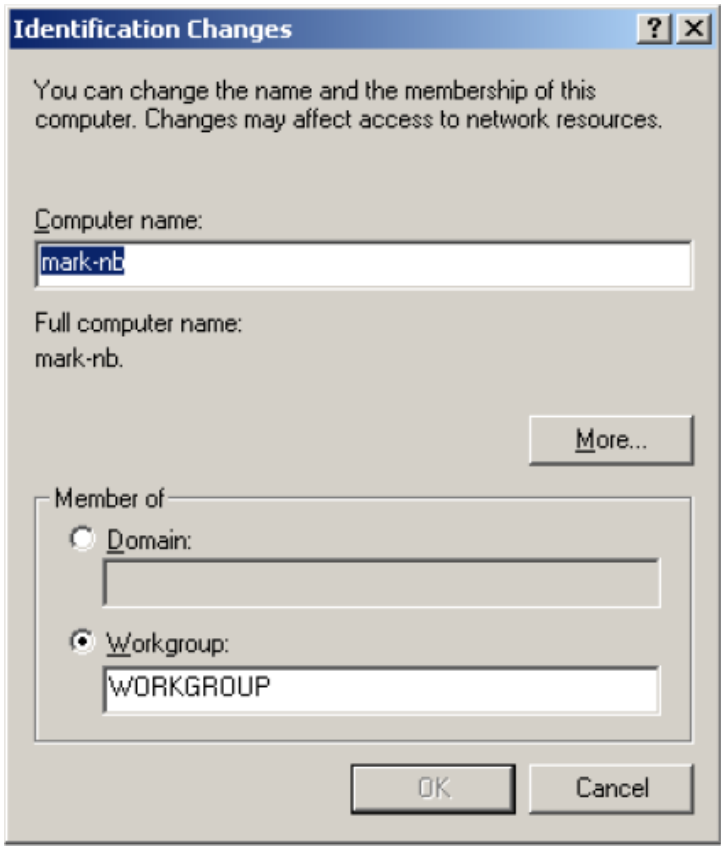
（The setting of workgroup and logondomain in `C：\net\system.ini` must be the same as those at PC side. The computername in `C:\net\2net.bat` must be the same as PC’s computer name.）

n. Right-click on “My Computer” icon on the desktop then left-click properties.

o. Select the **Network Identification** tab. Verify if the settings of **Full computer name** & **Workgroup** are the same as those in `C:\NET\2net.bat` & `C:\NET\system.ini`. (Take the diagram below as an example, computername of `2net.bat` should be set to “mark-nb”；workgroup of `system.ini` should be set to “WORKGROUP”). Press **Properties** to change **Full computer name** & **Workgroup.**

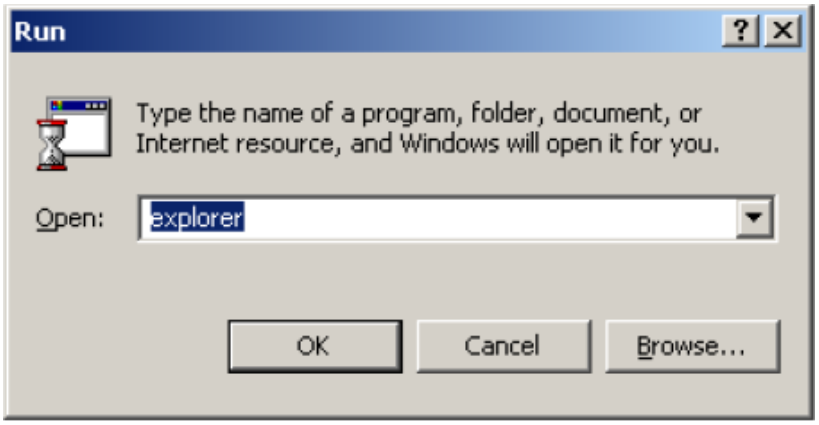


To change a computer or workgroup name, modify it directly in the corresponding text box.

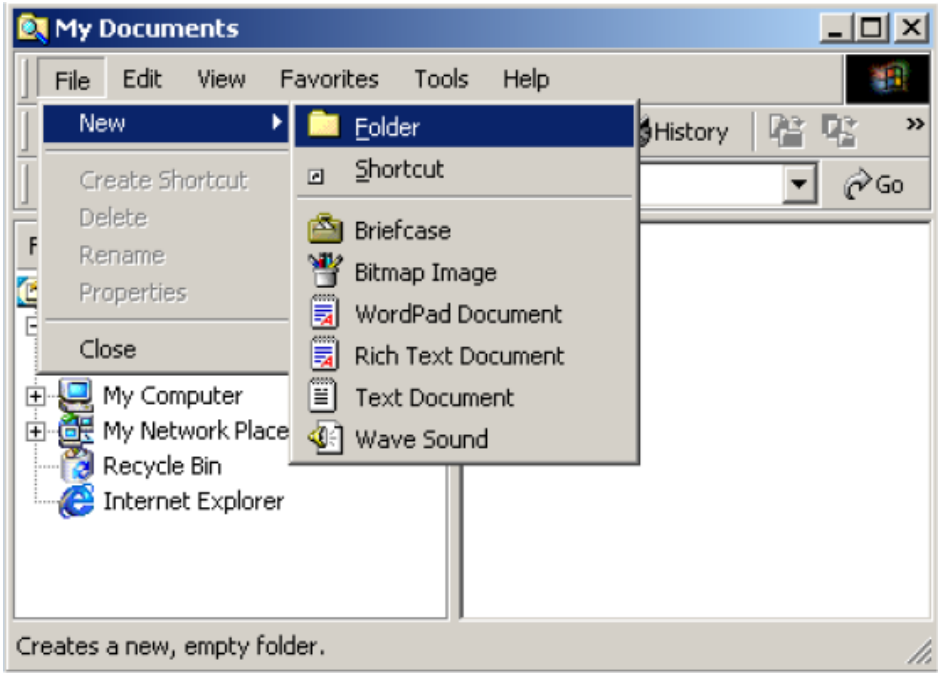


Share a directory at PC side

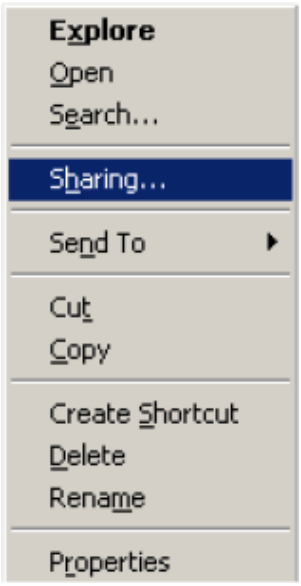
p. Press **Start → Run**, enter “explorer,” and press **OK** to open **explorer**.



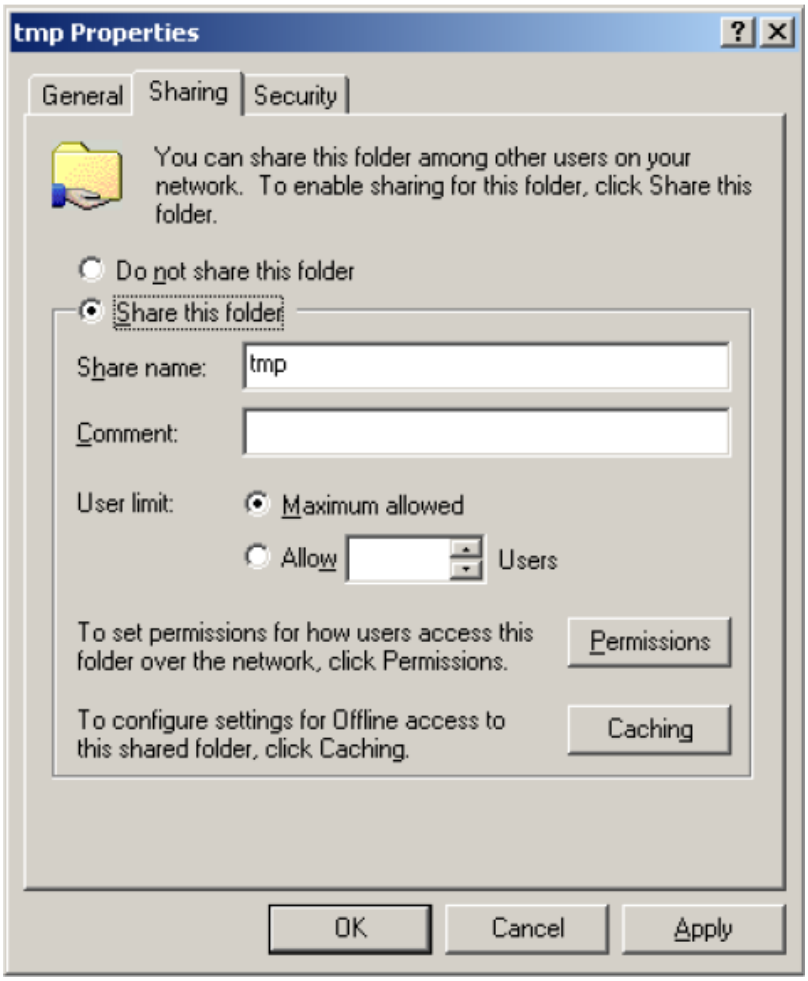
q. Create a new folder for sharing.



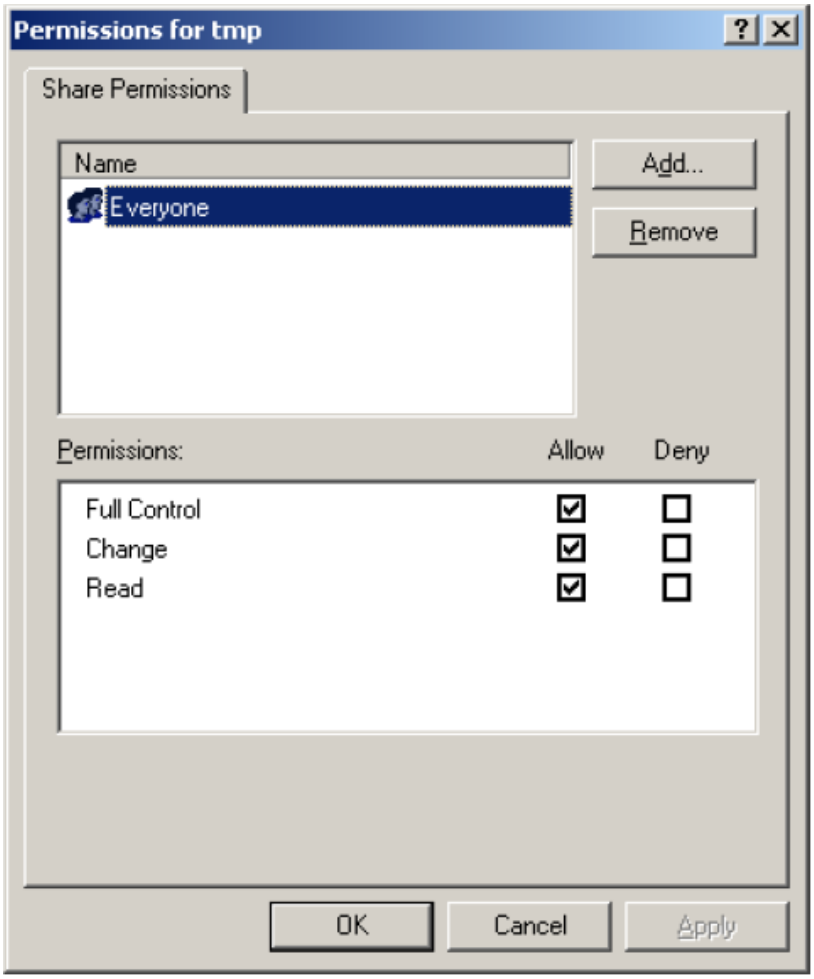
Left-click the new folder, and then right-click **Sharing.**



Click the **Sharing** tab, click to select **Share this folder**, and verify if the name in the **Share name** text box is the same as that in the `2net.bat` file. Then click **Permissions**.



Select “Everyone” in the **Share Permissions** section, and check all the **Allow** boxes in the **Permissions** section. Then press **OK**.



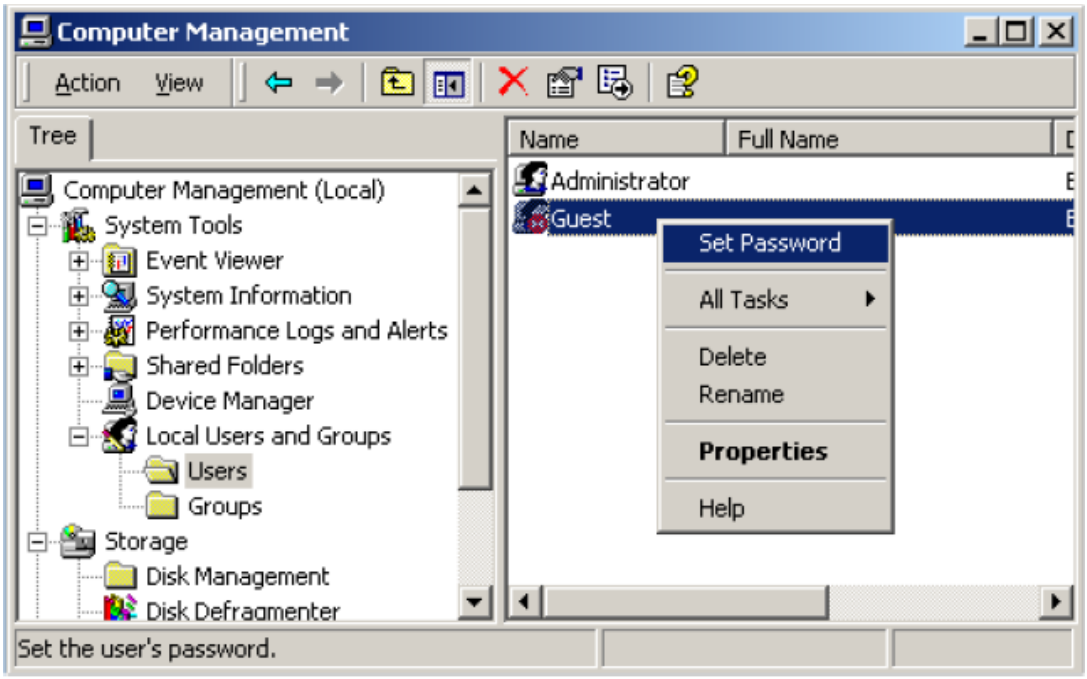
ENABLE USER ACCESS:

There are two ways to enable user access. Please choose either one according to your need. The advantage of method 1 (recommended) is its convenience for installation, and there is no need to add a new user if each controller has its own username; however, the disadvantage is that its security level is low. On the contrary, the second method has a higher security level. But if there are different user names for different controllers, users are required to add a new user each time. Depending on the types of operating systems, there are different steps for setup as listed below:

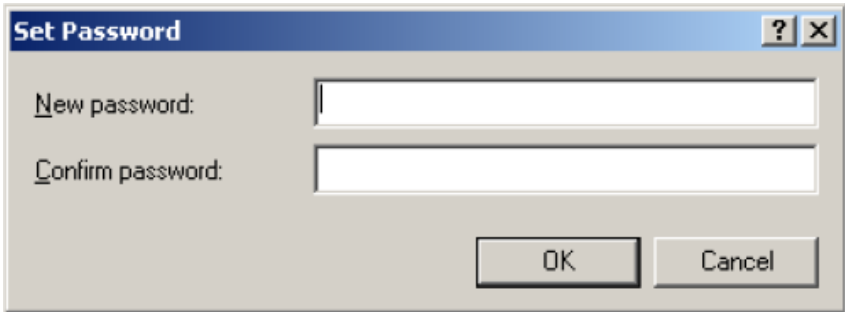
Method 1:

r. Right -click the **My Computer** icon on the desktop, and Left-click **Manage**.

s. In the **Manage** pop-up menu, in the **Users** folder, left-click **Guest**, right-click,and then left -click "Set Password."

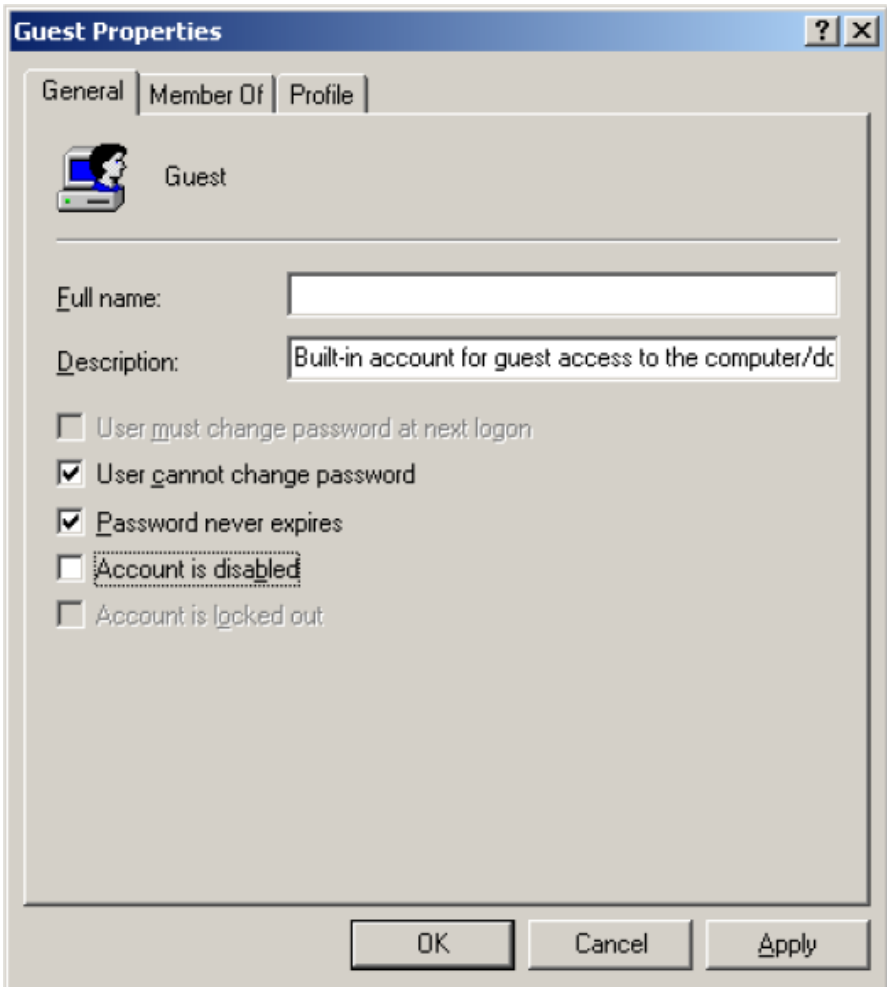


Leave the password boxes blank, and press **OK**.

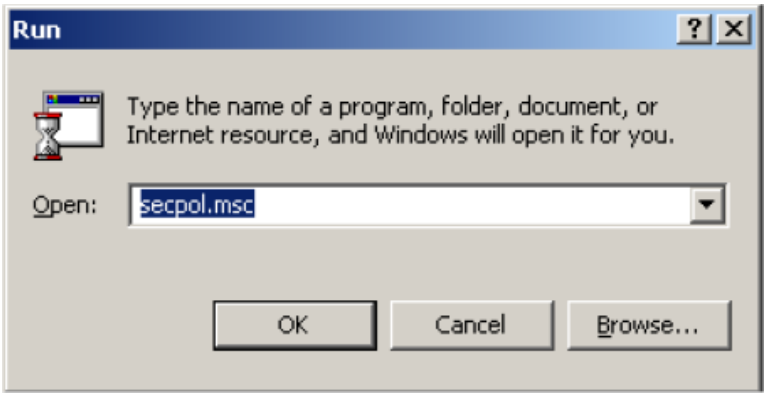


Press **OK** again, and finish the procedure of password modification.

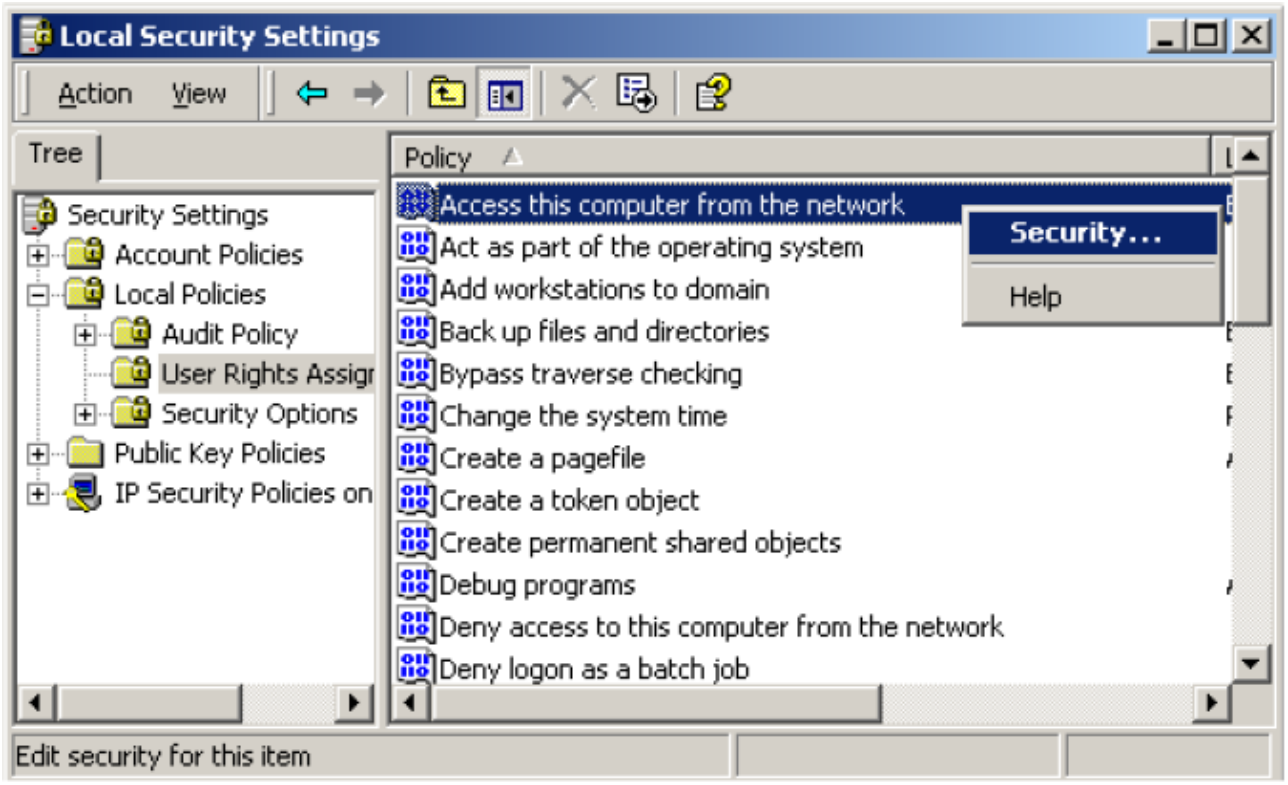
If there is a red cross over the Guest icon in the **Users** folder, right-click on **Guest** and select **Properties**. A dialogue box will appear as the figure below, check the boxes of “User cannot change password” & “Password never expires” and uncheck the box of “Account is disabled.”



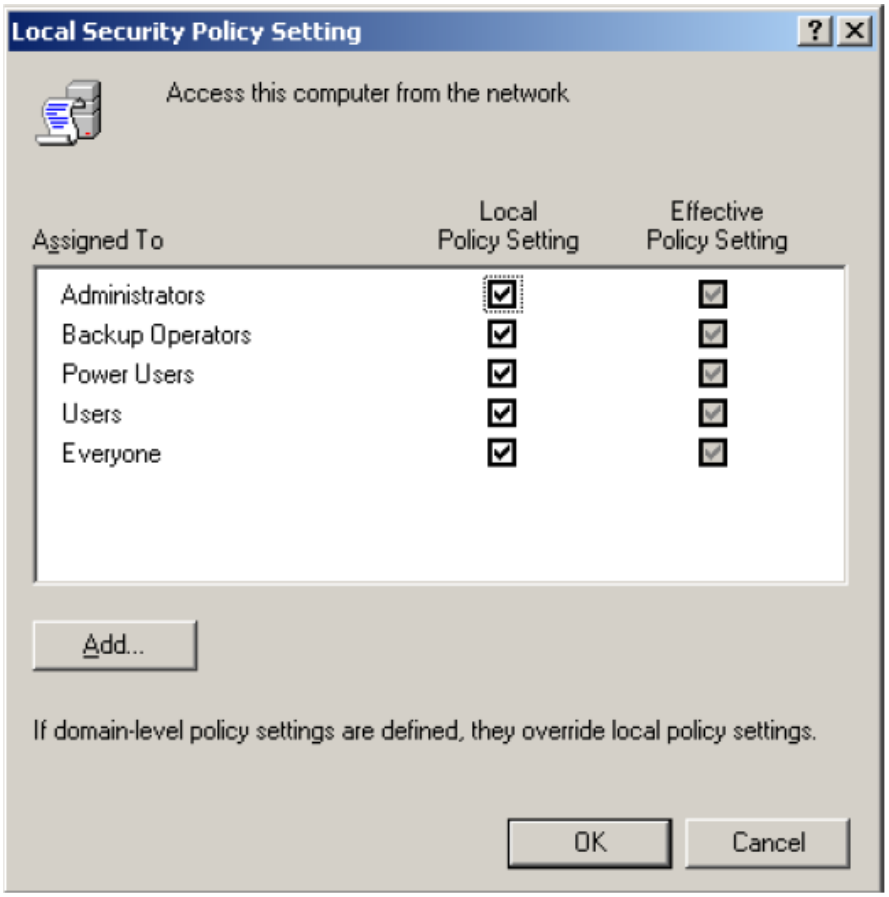
Next, set a higher access level for Guest. To do so, click **Start** → **Run**, and enter **secpol.msc** in the text box. Then press **OK**.



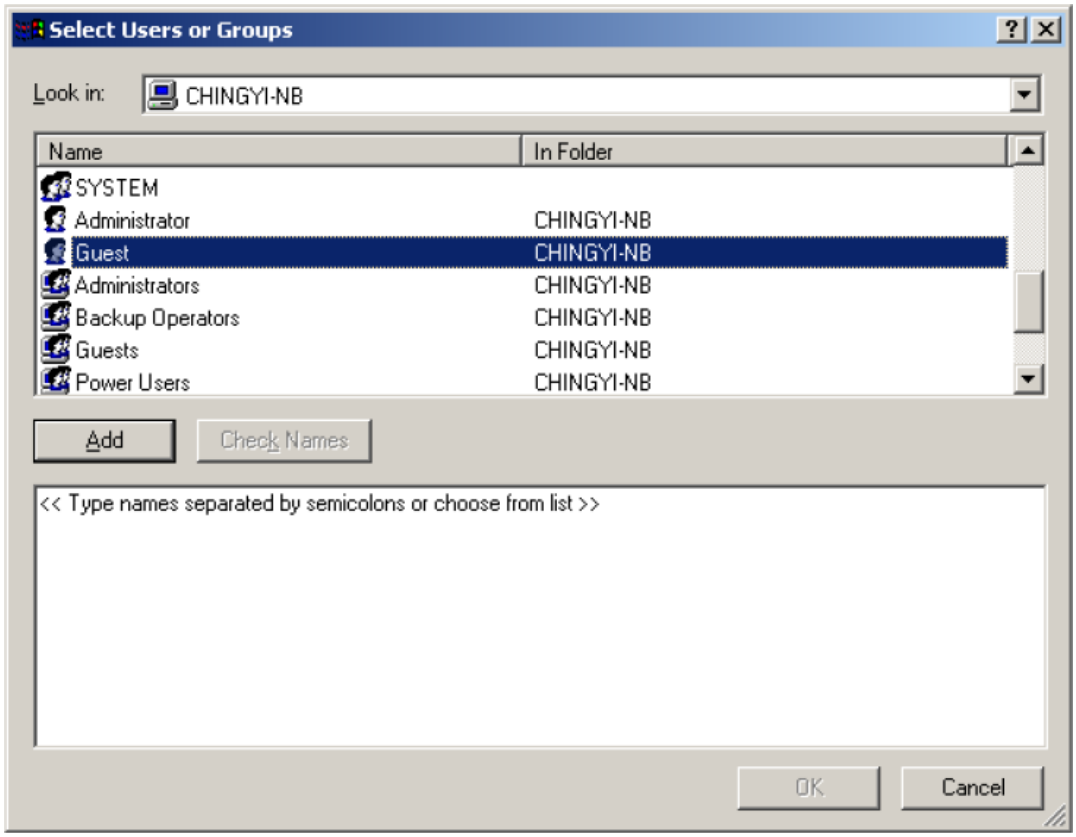
Click Local Policies → User Rights Assignment. Right-click the Access this computer from the network method, and then left-click Security.



Click the **Add** button.



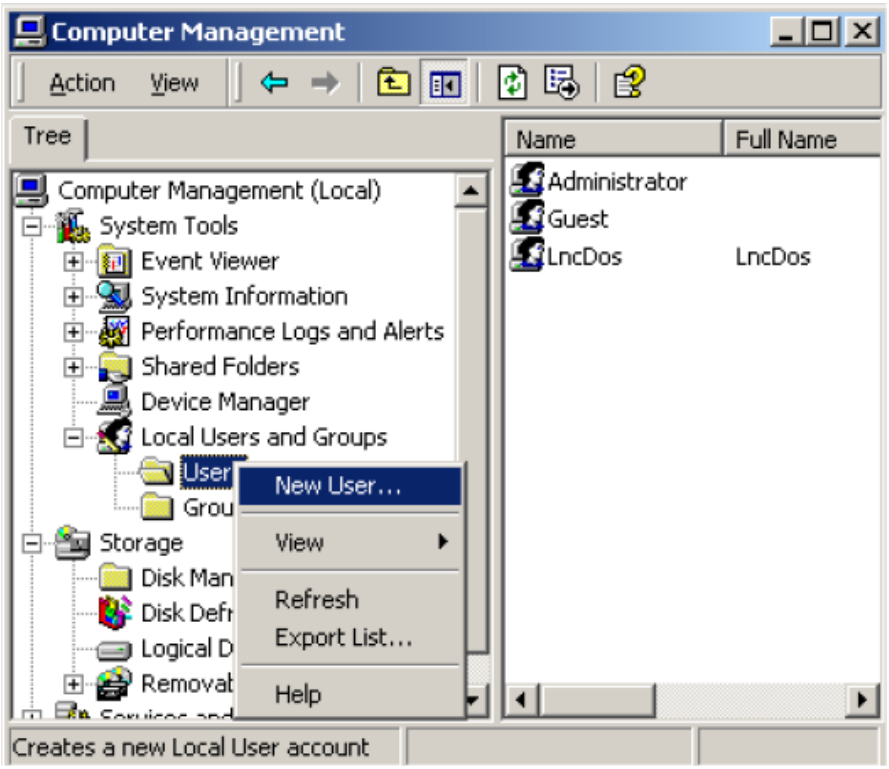
After **Add** is clicked, a new dialog box will appear as the figure below. Click **Guests**, click **Add**, and press **OK**. Then the procedure to enable guest access is finished.



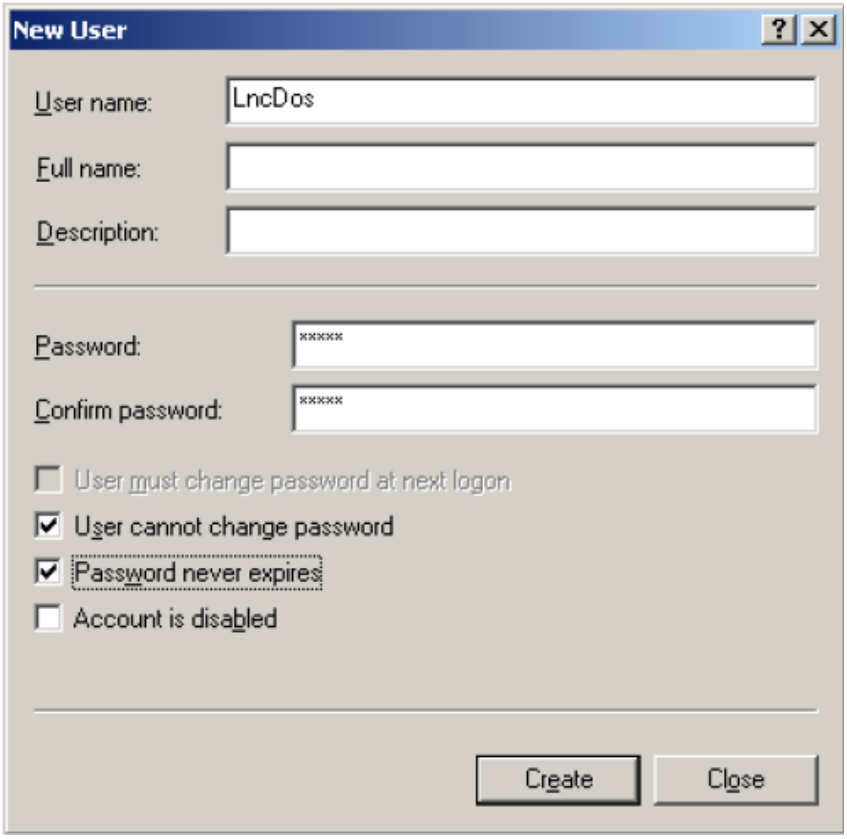
Method 2:

t. Right-click the **My Computer** icon on the desktop, and Left-click **Manage**.

u. Right-click the **User** folder, and left-click **New User**.



A dialog box will appear as the figure below. Please enter the username same as that in the `system.ini` file, and enter the password same as that in the **2net.bat** file. Check the boxes as the figure shown below, and then press **Create** to finish the procedure of enabling user access.



Network Settings for Windows XP Professional

A. Verify if a network card, internet cables, and the relative protocols have been installed properly.

Verify if the “NetBEUI Protocol” & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “NWlink NetBIOS” which would cause network connection to fail.)

v. Because Microsoft does not support the network protocol “NetBIOS” (NetBEUI) in Windows XP, users must install the network protocol NetBEUI additionally from the Windows XP CD. Please follow the steps below for installation:

Insert the Windows XP CD-ROM into the CD-ROM drive. Browse the `Valueadd\MSFT\Net\NetBEUI` folder.

Copy **Nbf.sys** to the directory `%SYSTEMROOT%\System32\Drivers`.

Copy **Netnbf.inf** to the hidden directory **%SYSTEMROOT%\Inf.**

Note: To make the hidden directory visible, execute the following steps:

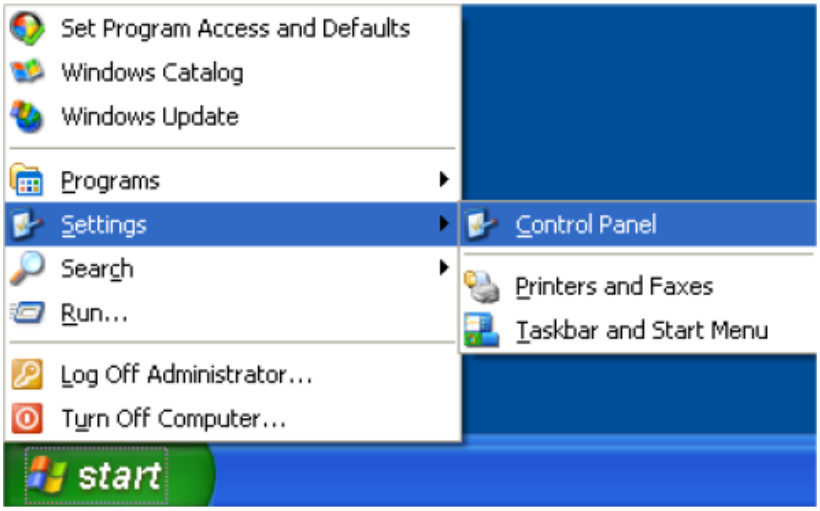
Click Start, click Run, enter “explorer” in the text box, and then press ENTER.

Click Tools, click Folder Options, then click the View tab.

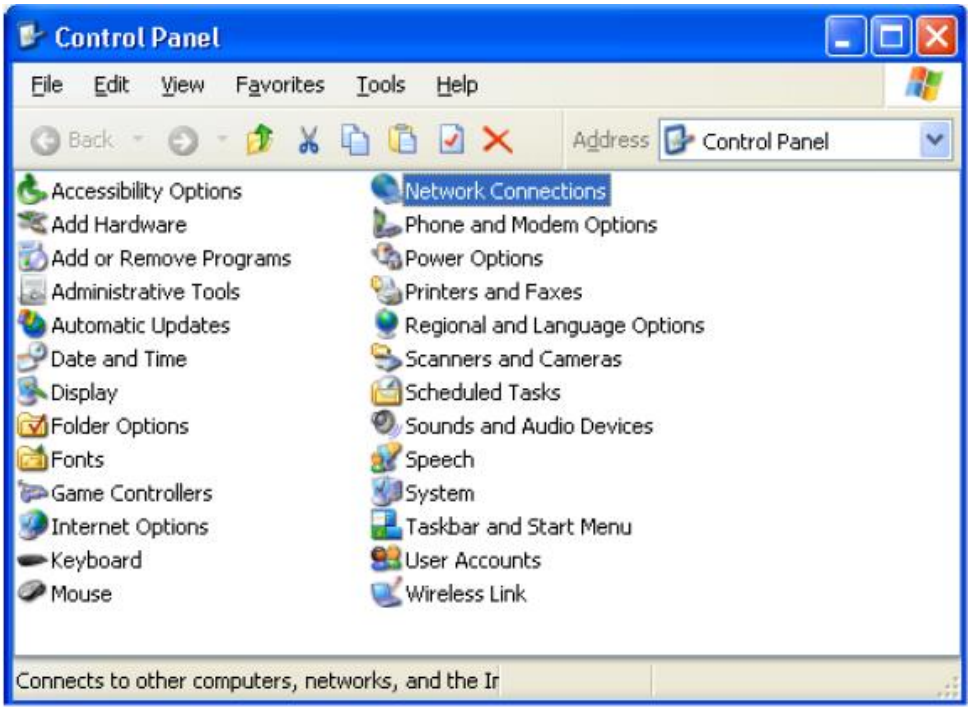
Under Advanced Settings, and under Hidden files and folders, click Show hidden files and folders.

Note: **%SYSTEMROOT%** is a Windows environment variable for discerning the directory installed in Windows XP (Ex. C:\Windows). If users want to view the relative values of **%SYSTEMROOT%** or other environment variables, please enter “set” in the Command Prompt window, then press “ENTER.”

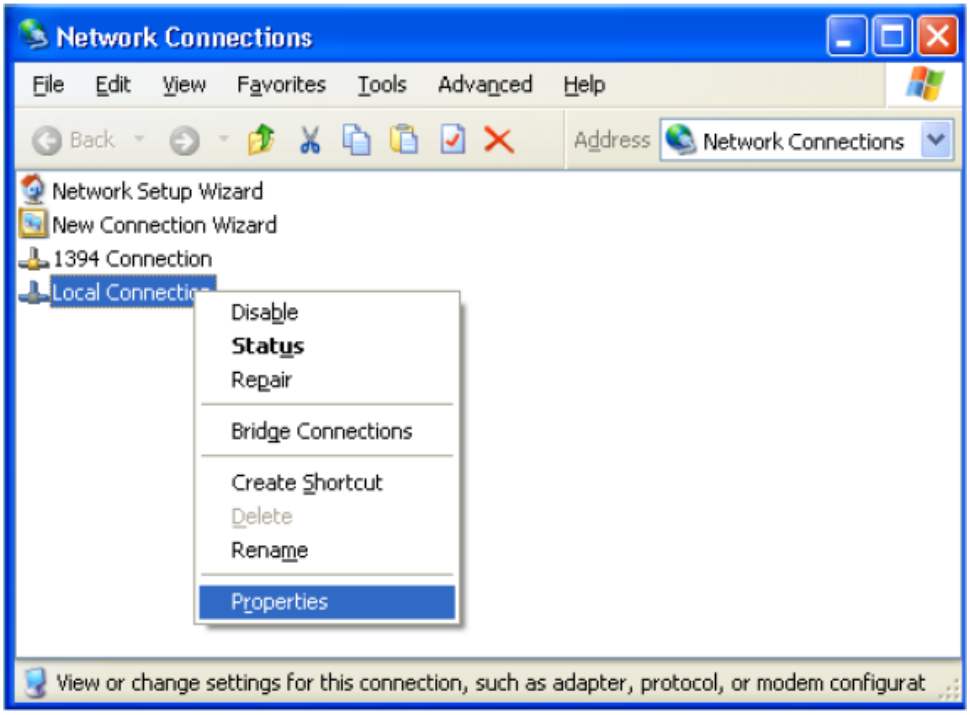
Click Start → Control Panel.



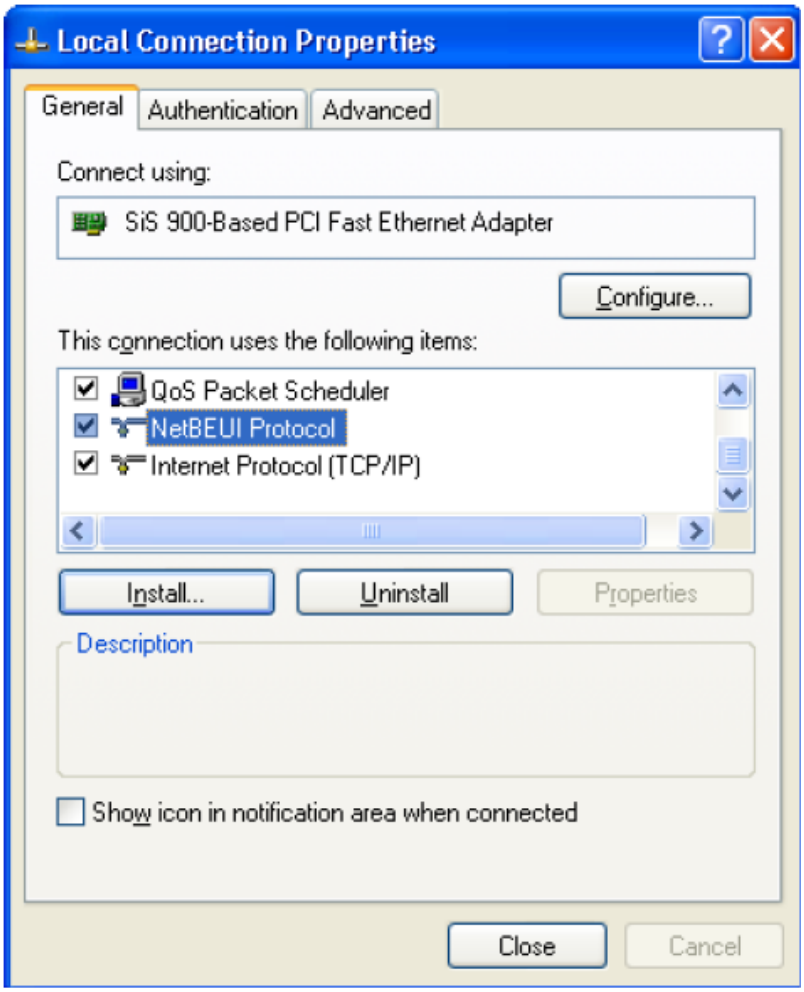
Double-click Network Connections.



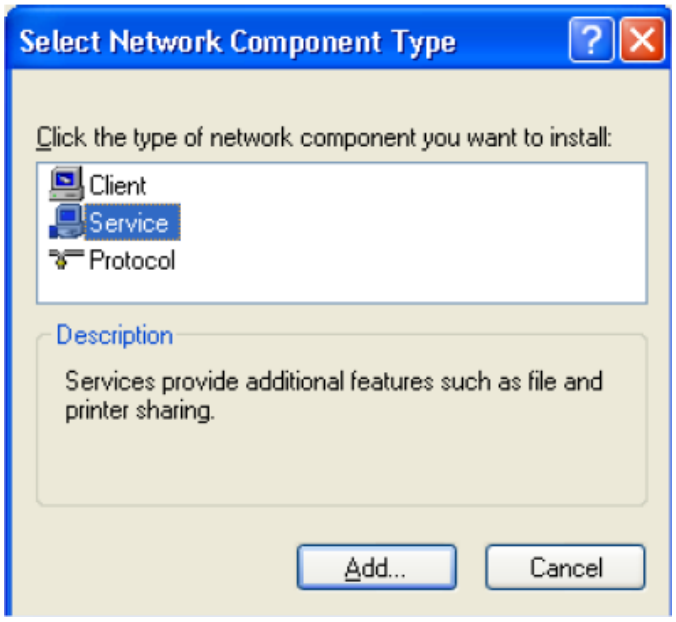
Right -click the **Local Connection** icon, then left-click properties.



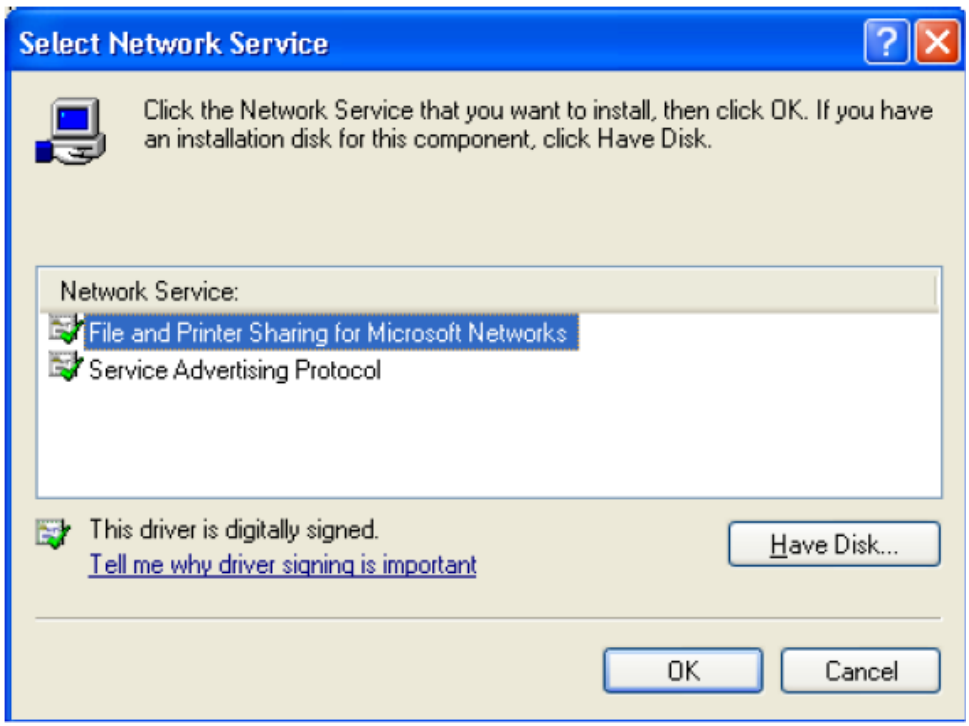
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI Protocol” are not installed, please press **Install** for installation.



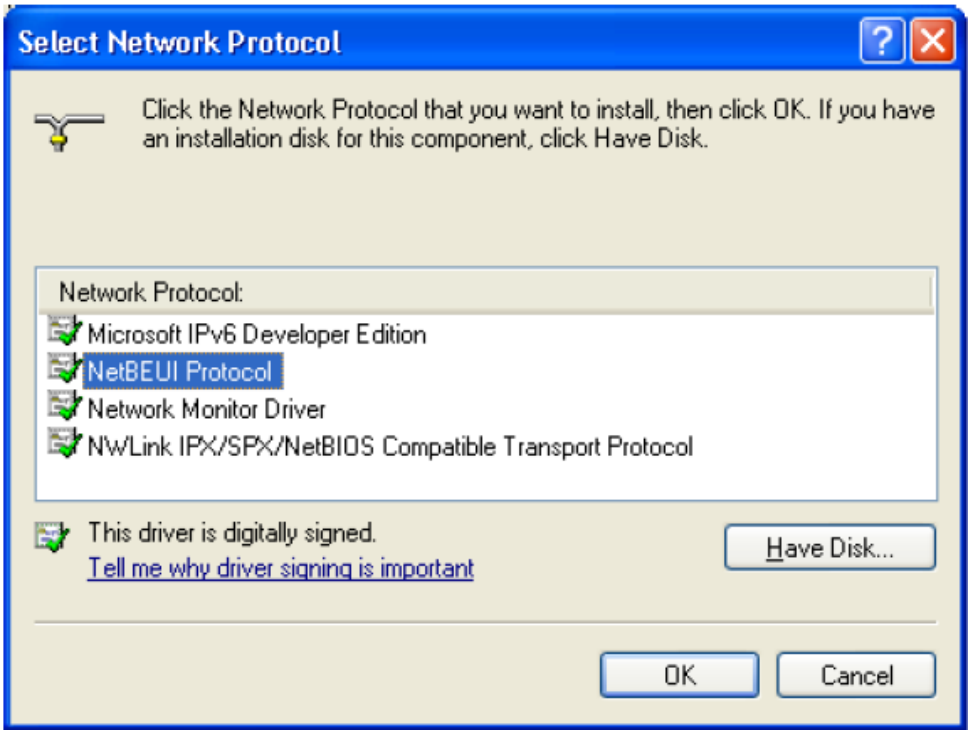
If “File and Printer Sharing for Microsoft Networks” is not installed, please select **Service**; if “NetBEUI Protocol” is not installed, please select **Protocol**. Then click **Add**.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the service menu then click **OK** to complete installation.



If the “NetBEUI Protocol” is not installed, please highlight it on the menu as shown in the diagram below then click **OK** to complete the installation. To validate the configuration, please reboot the system.

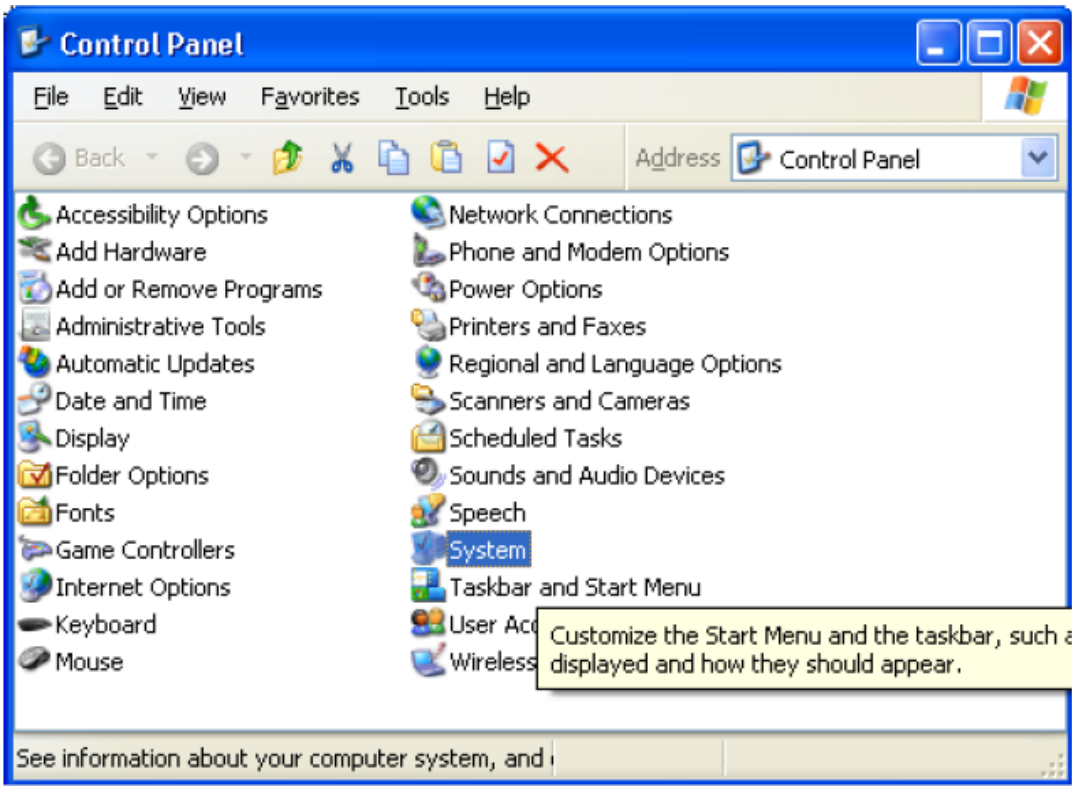


Verify if Computer name & Workgroup are set correctly.

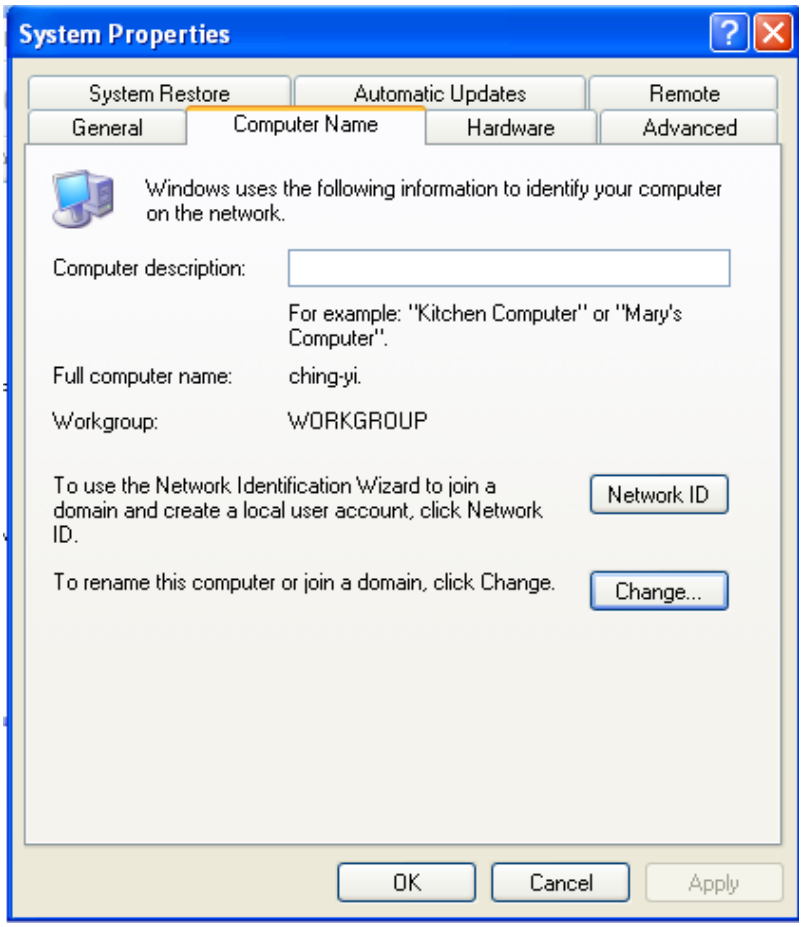
（The settings of workgroup & logondomain in `C：\net\system.ini` must be the same as those at PC side. The computername in `C:\net\2net.bat` must be the same as PC's computer name.）

w. Click **Start → Control Panel**.

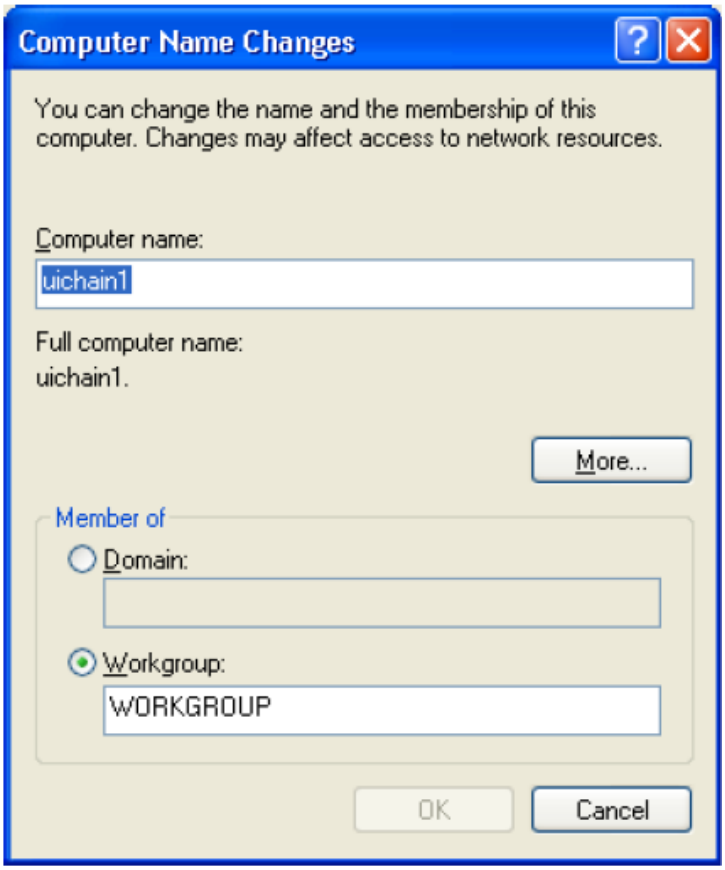
x. Double-click **System**.



Select the **Computer Name** tab, and verify if the settings of **Full computer name** & **Workgroup** are the same as those in `C:\NET\2net.bat` & `C:\NET\system.ini` at the controller side. (Take the figure below for example, computername of `2net.bat` must be set to “uichain1,” and workgroup of `system.ini` must be set to “WORKGROUP.” If you need to change the computer name or workgroup name, click **Change** to modify it.

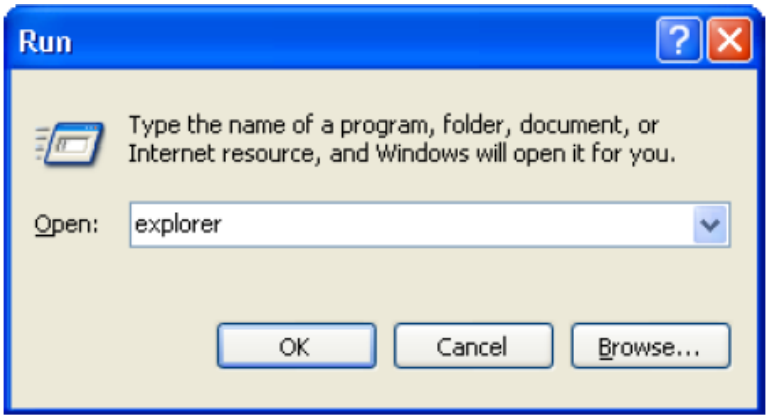


To modify the computer name or workgroup name, make the revision directly in the corresponding text box.

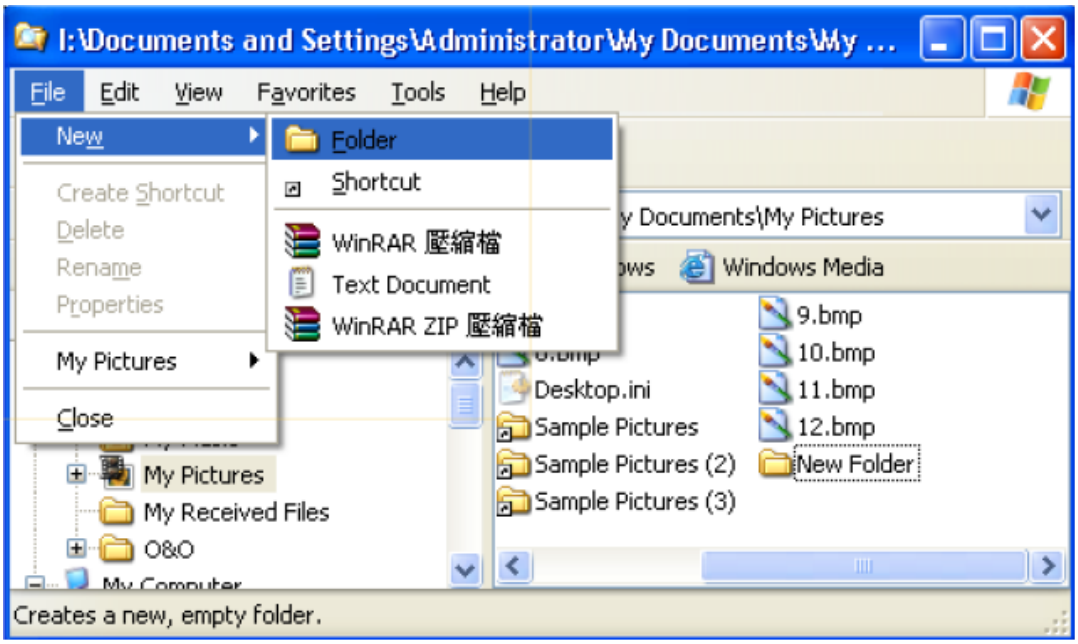


Share a directory at PC side

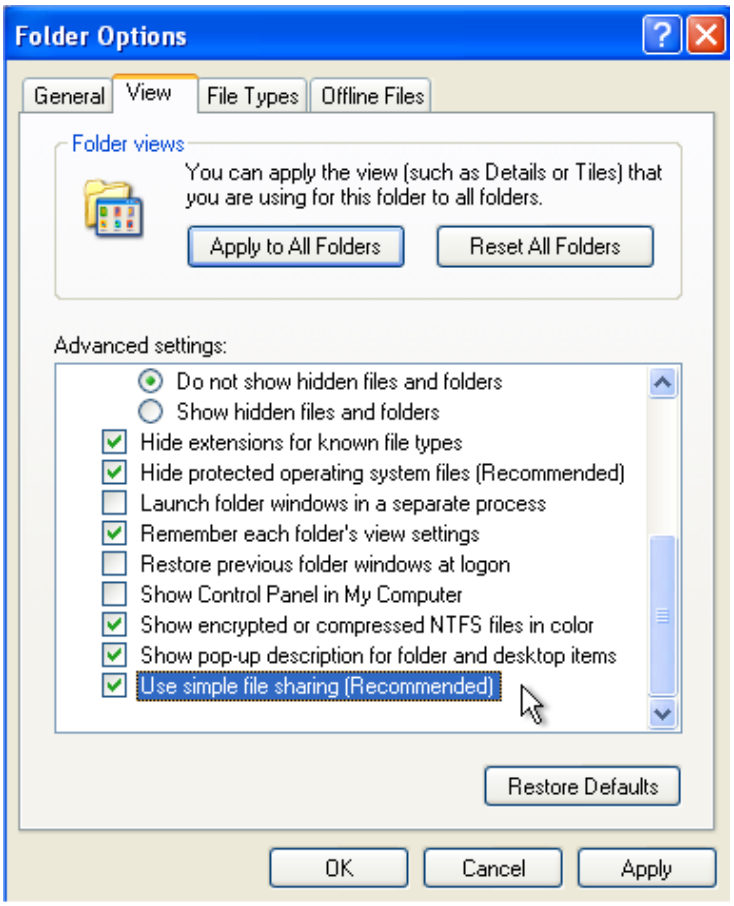
y. Click **Start** → **Run**, enter “explorer” in the text box, and then press **OK**.



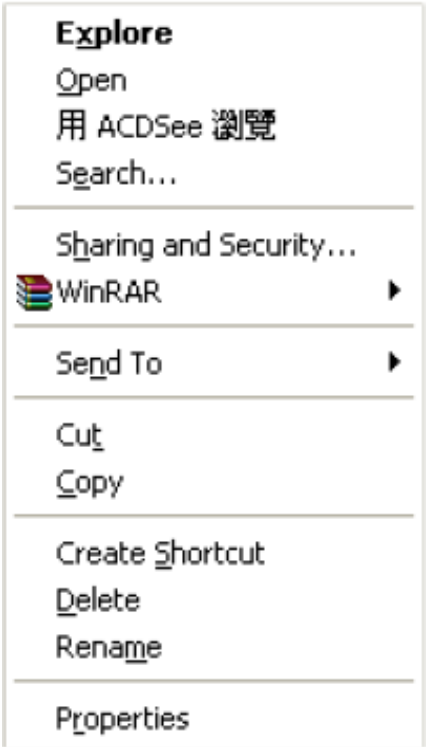
In **Windows Explorer**, select **File** → **New** → **Folder**. Name the new folder after the corresponding folder at the controller side such as **share**, **pcscan**, and so on.



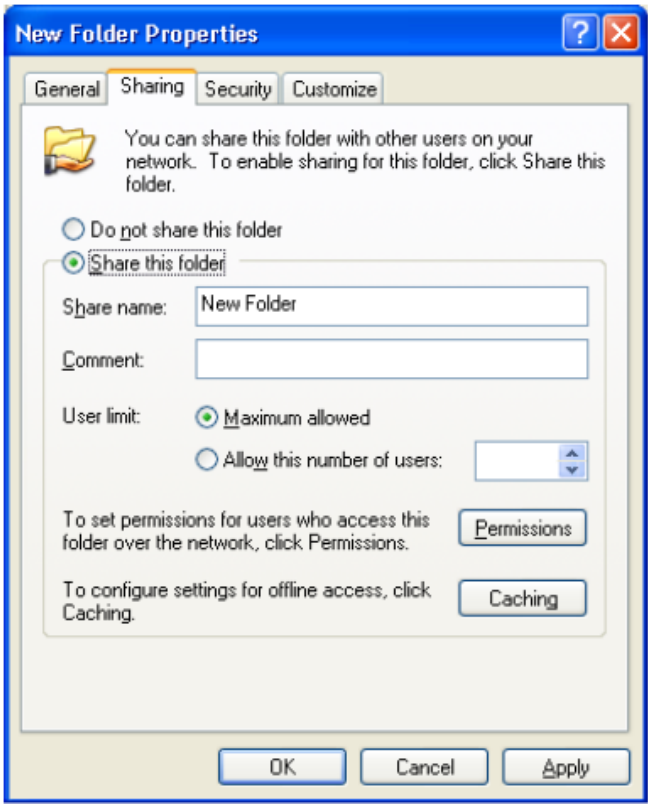
Uncheck Use simple file sharing mode. In Windows Explorer, select Tools→Folder Options, click the View tab, and uncheck the box of Use simple file sharing.



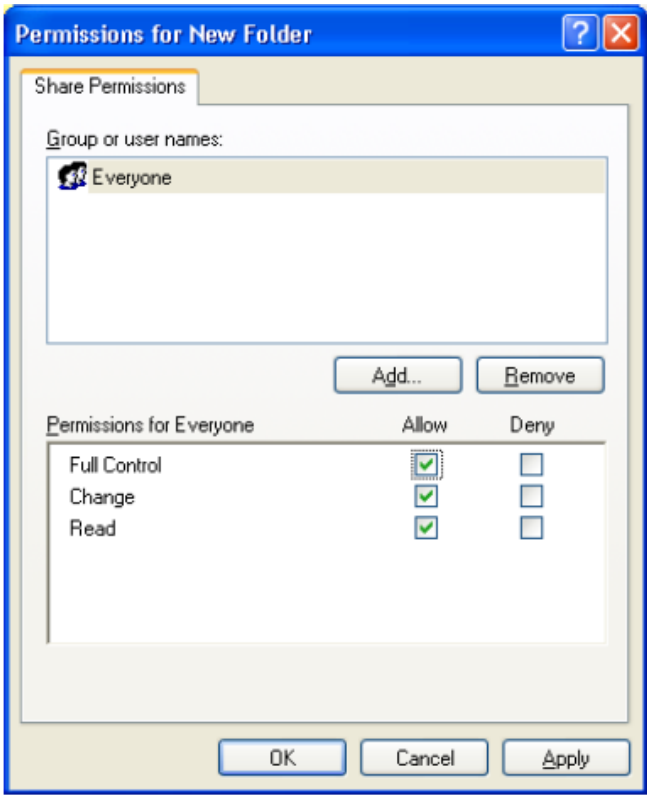
Right-click the new folder, and left-click **Sharing and Security**.



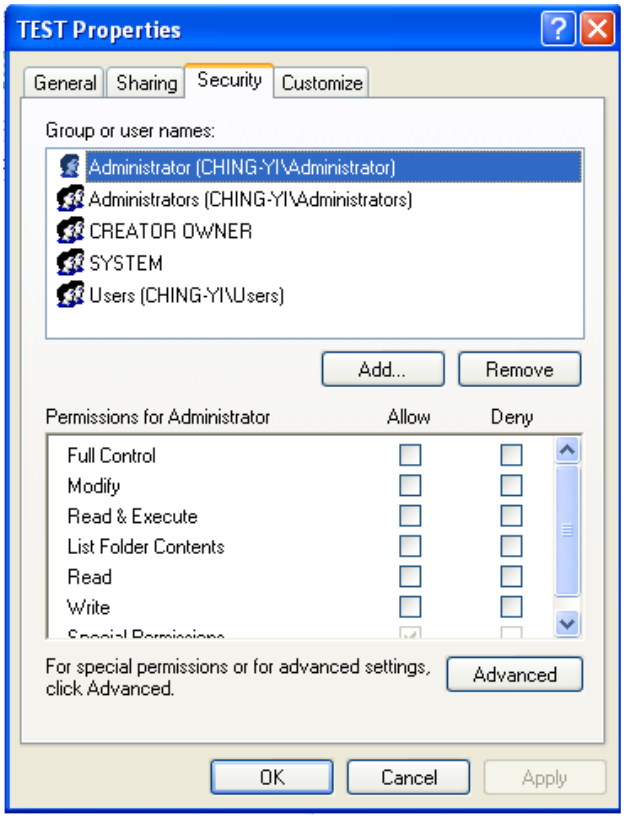
Click the **Sharing** tab, check the box of **Share this folder**, and verify if the name in the **Share name** text box is the same as that in the `2net.bat` file. Then click [Permissions].



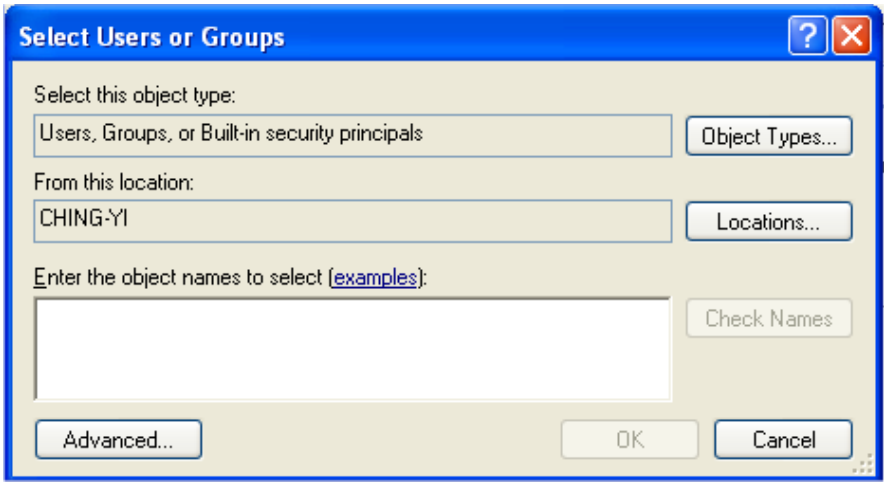
Select “Everyone” as Group or user names, and check all the **Allow** boxes in the **Permissions for Everyone** section.



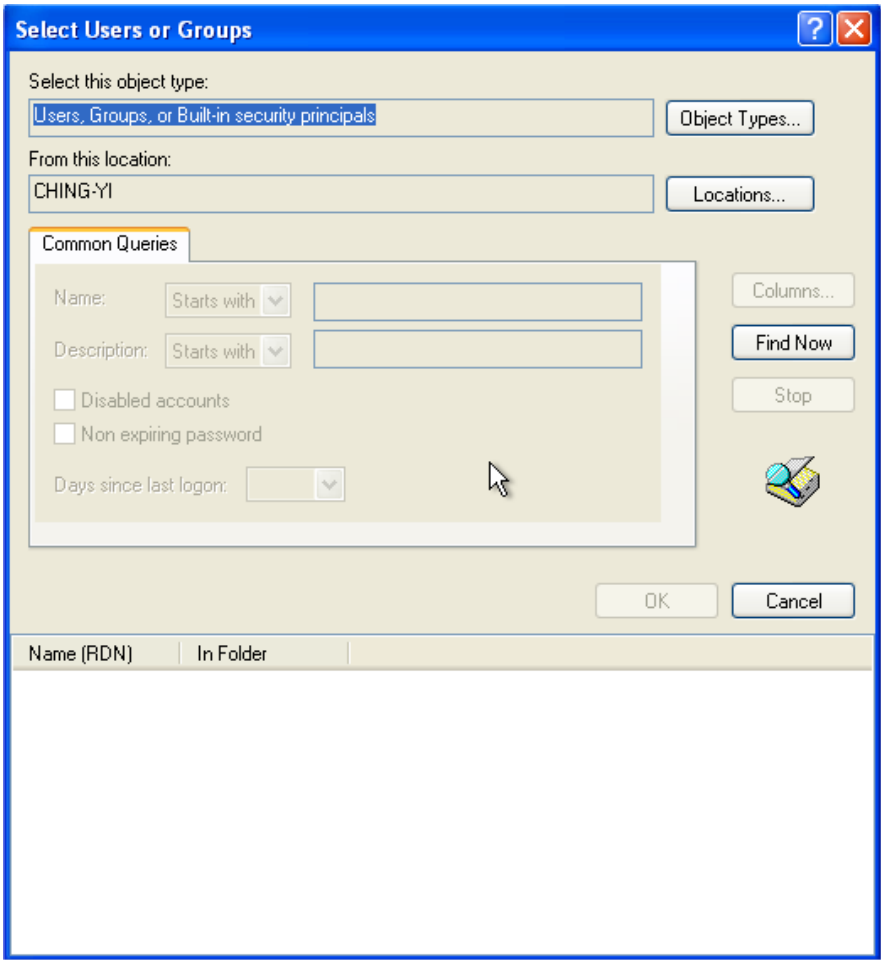
If there is no **Security** tab in the dialog box, the steps for folder sharing is then finished. If there is, please click the **Security** tab, and the following figure is shown:



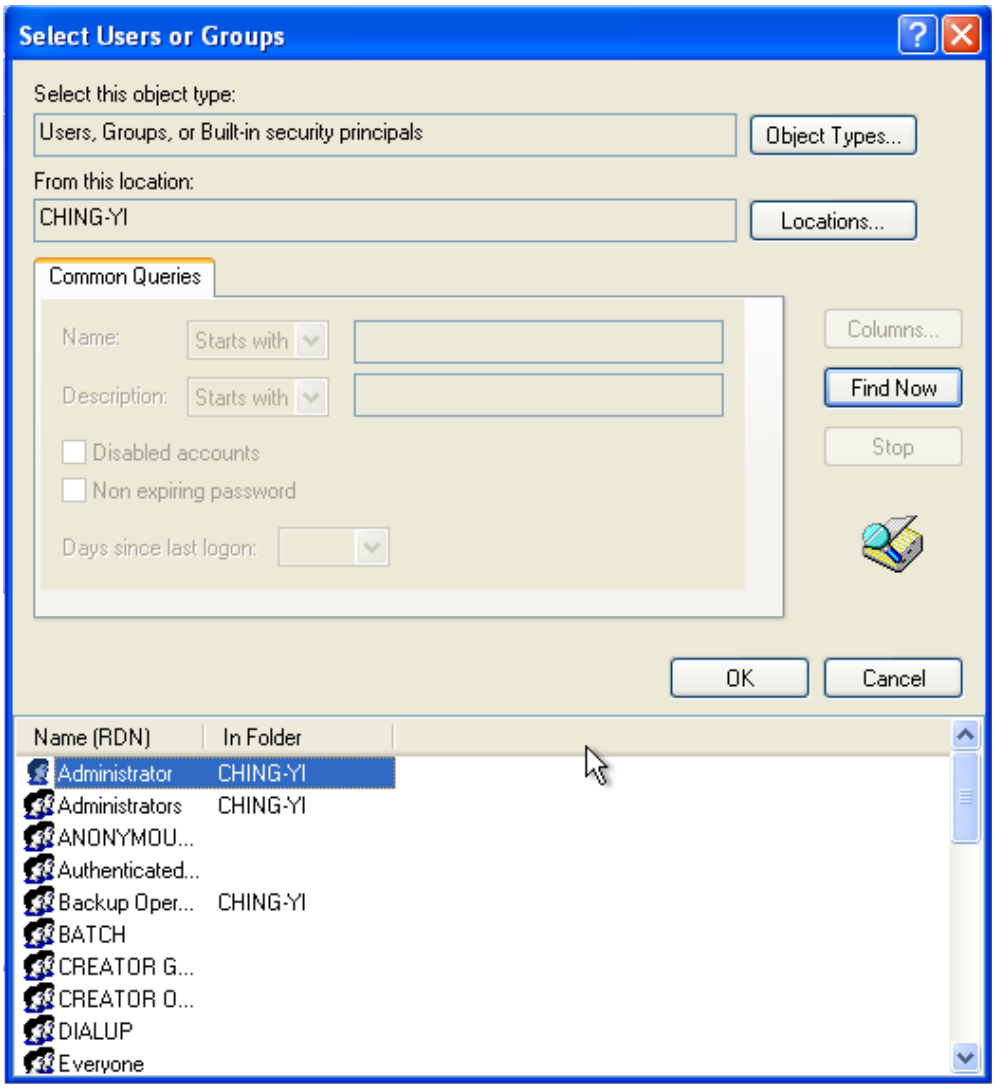
Click the **Add** button, and the **Select users or Groups** dialog box will appear as the figure below:



Click the **Advanced** button, and the following dialog box will be shown:



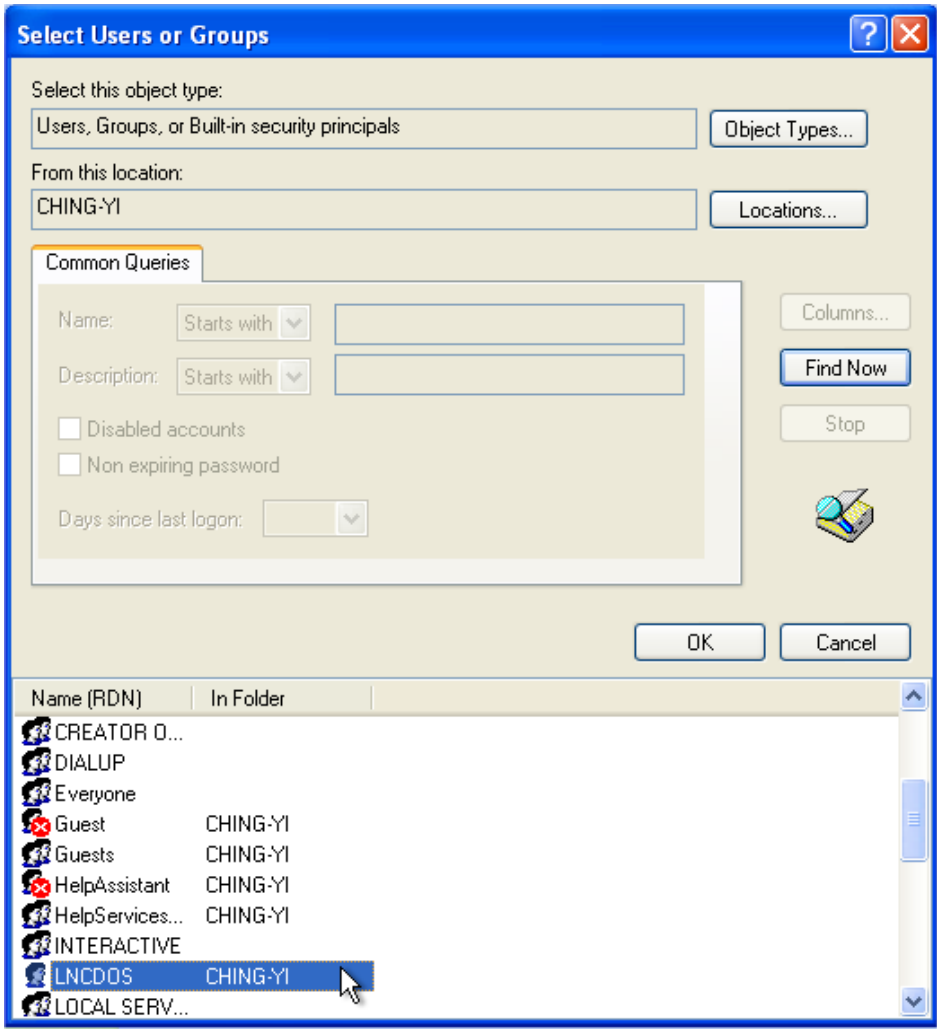
Press the **Find Now** button, and a list of users will appear in the bottom section of the dialog as shown below:



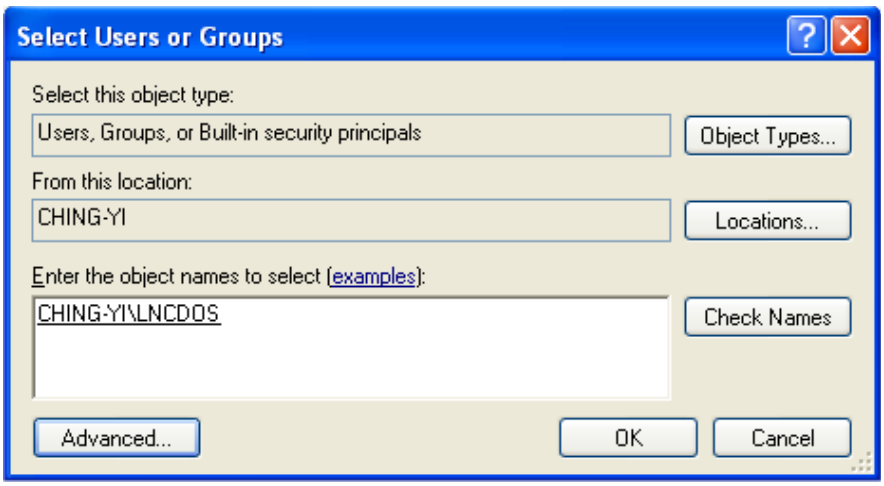
Click to select in the list the user that needs to be added. There are two ways to do this:

Method 1：Open permissions to Everyone by selecting Everyone in the menu.

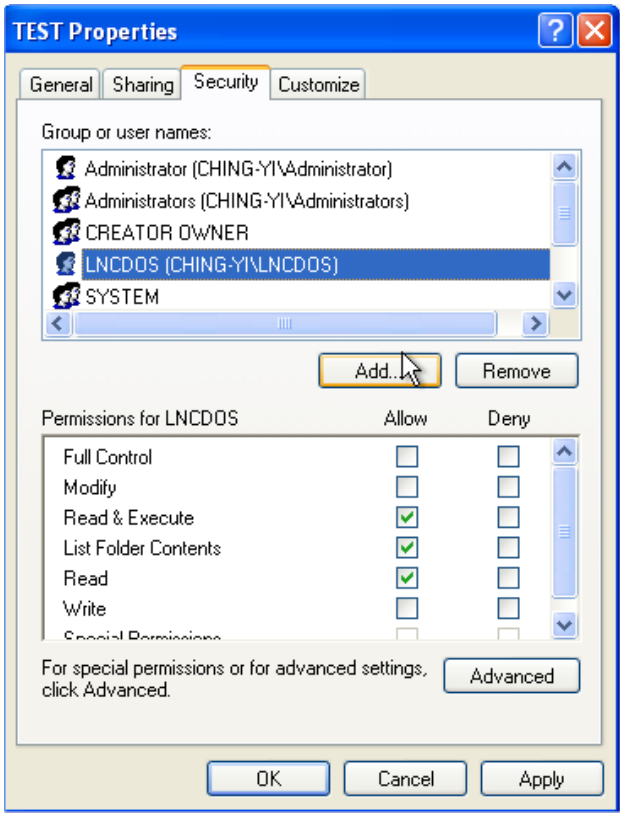
Method 2：Add the user “lncdos” as assigned by〝username=lncdos〞in the `c:\net\system.ini` file. The username may not be “lncdos;” for its setting, please refer to the setting in `system.ini`.


Select Users or Groups
Select this object type:
Users, Groups, or Built-in security principals
Object Types...
From this location:
CHING-YI
Locations...
Common Queries
Name:
Starts with
Description:
Starts with
Disabled accounts
Non expiring password
Days since last logon:
Columns...
Find Now
Stop
OK
Cancel
Name (RDN)
In Folder
CREATOR O...
DIALUP
Everyone
Guest
CHING-YI
Guests
CHING-YI
HelpAssistant
CHING-YI
HelpServices...
CHING-YI
INTERACTIVE
LNCDOS
CHING-YI
LOCAL SERV...

Take the example of adding the new user “lncdos,” after clicking to select the new user in the list, press **OK**, and the following figure will be shown:



Press **OK** again, and the following dialog box will appear. Please check the box of **Full Control**, and then press **OK** to complete the procedure of adding a new folder.



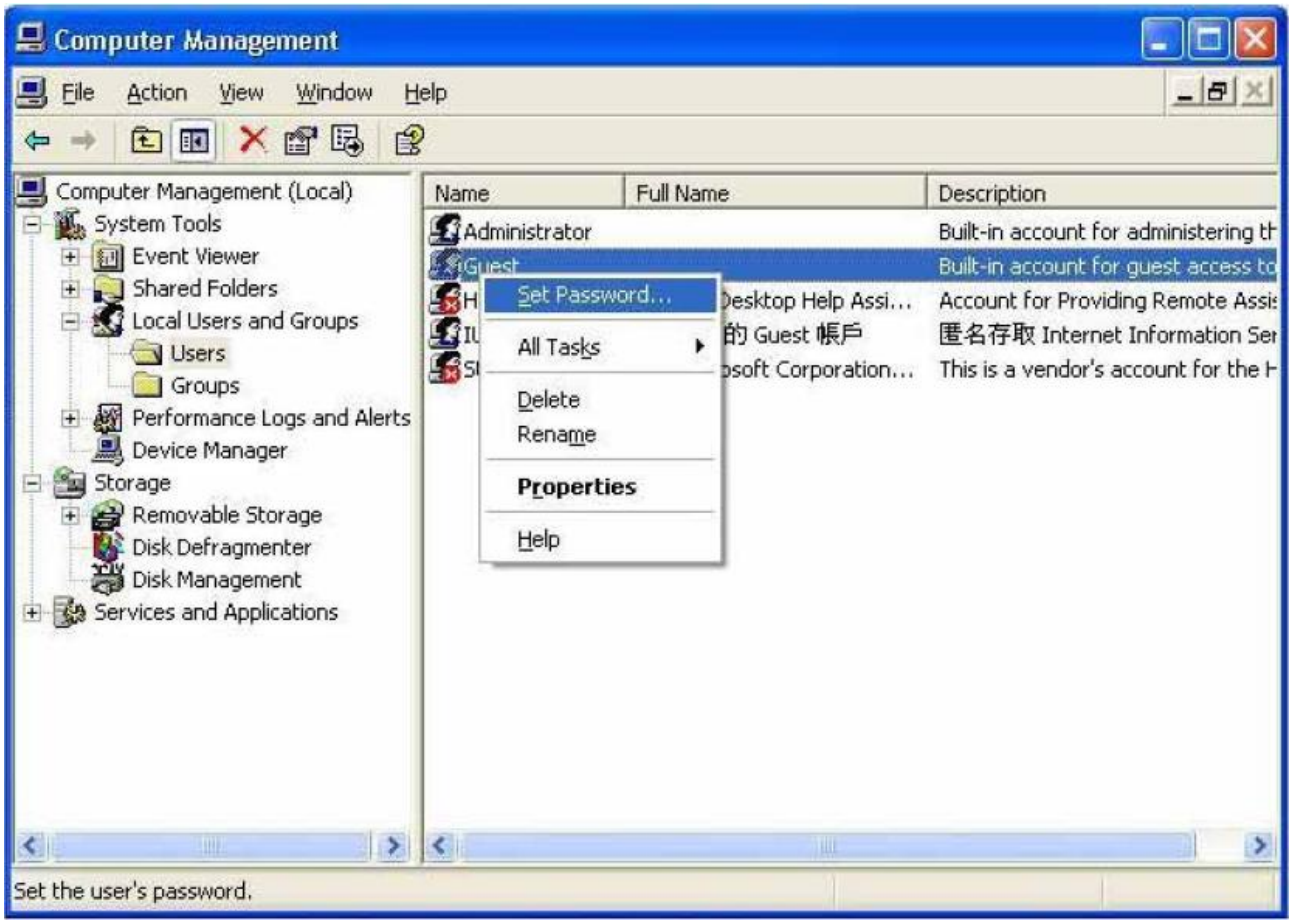
ENABLE USER ACCESS:

There are two ways to enable user access. Please choose either one according to your need. The advantage of method 1 (recommended) is its convenience for configuration, and there is no need to add a new user for controllers with different usernames; however, it has the disadvantage of a low security level. On the contrary, the second method has a higher security level. But if there are multiple controllers with different names, users are required to add a new user for each controller separately. Depending on the types of operating systems, there are different steps for setup as listed below:

Method 1:

z. Press Start → My Computer → Manage.

Click to select the folder **Local Users and Group → Users**, Right-click **Guest**, and then left-click **Set Password**.

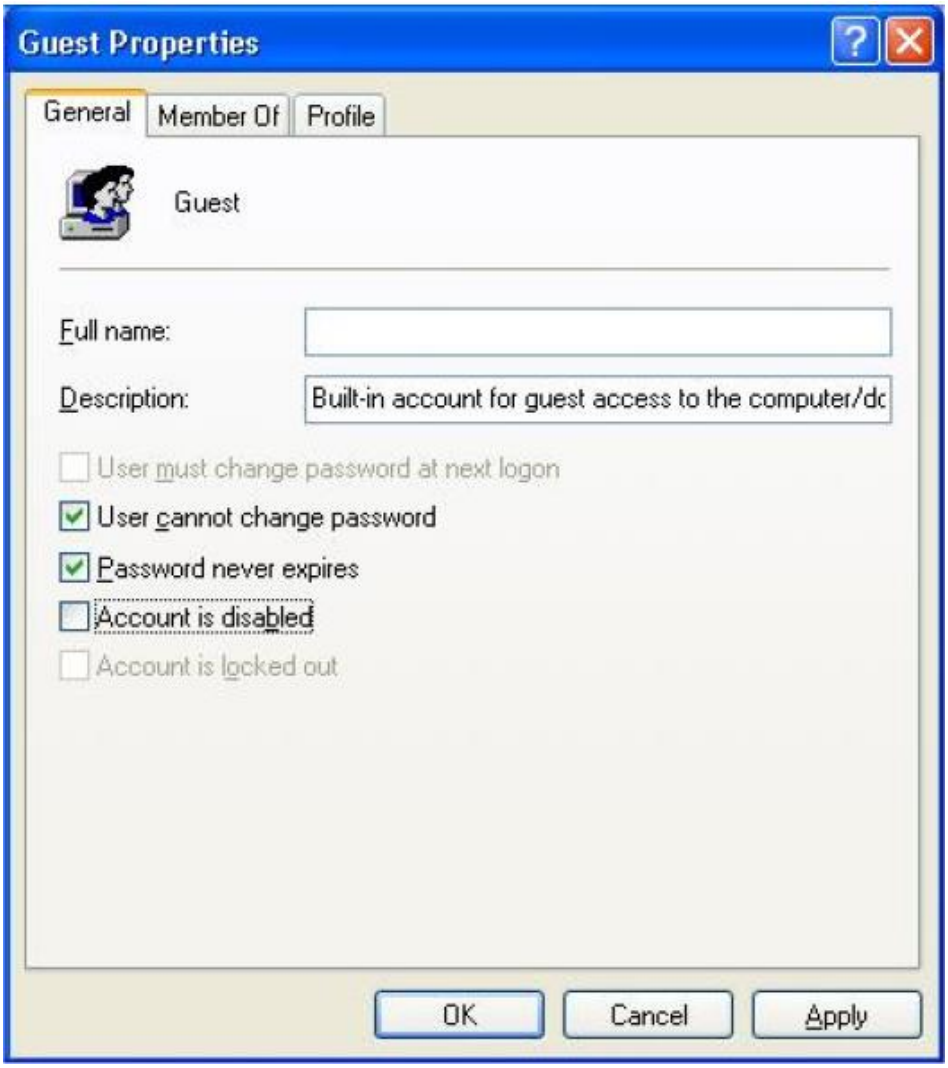


The following dialog box will appear, press the **Proceed** button to close the dialog box.

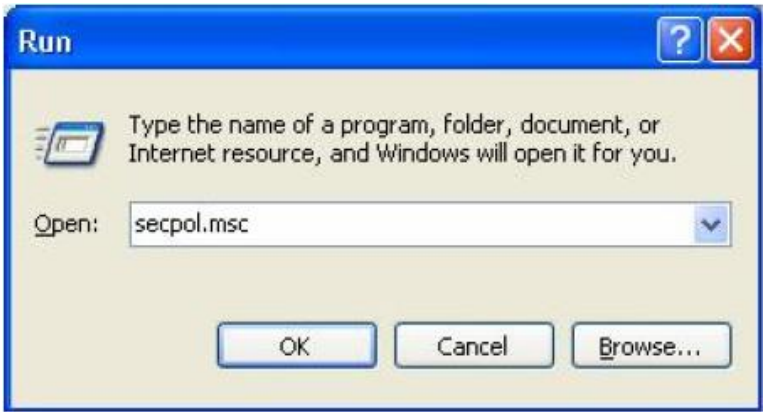
Leave the password boxes blank, and press **OK**.

Press **OK** again to finish password modification.

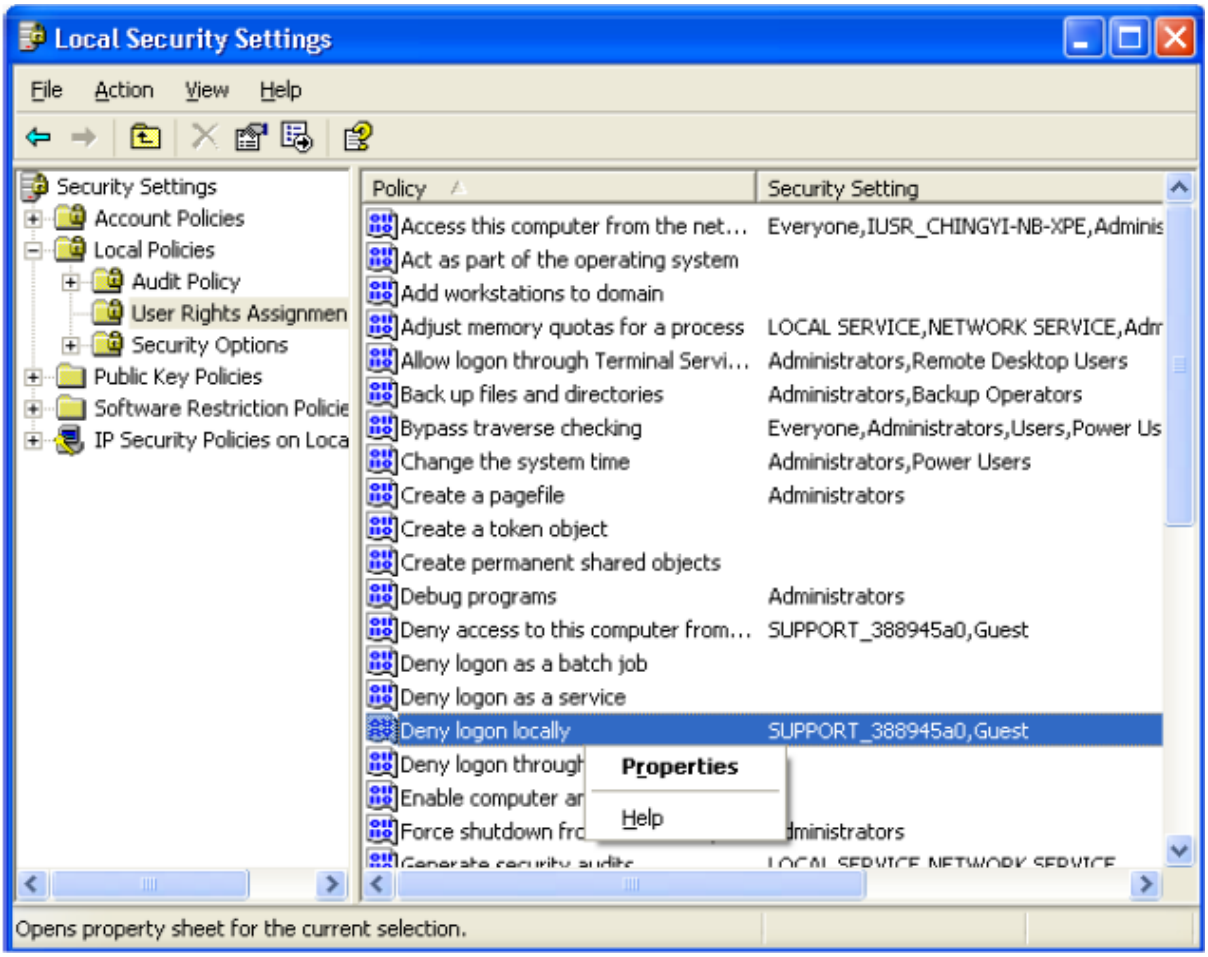
If there is a red cross over the **Guest** icon in the **Users** folder, right-click on **Guest** and select **Properties**. A dialogue box will appear as the figure below, check the boxes of **User cannot change password** & **Password never expire**s and uncheck the box **Account is disabled**.



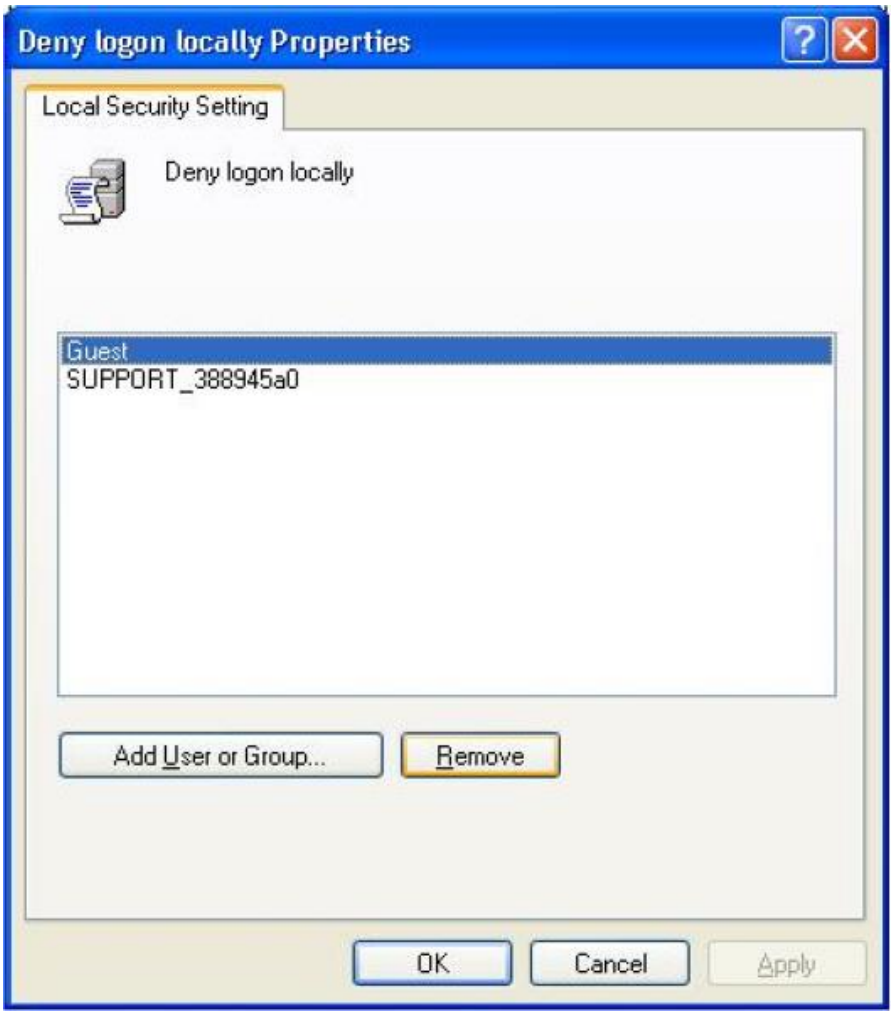
Next, set a higher access level for **Guest**. To do so, click **Start** → **Run**, and enter **secpol.msc** in the text box. Then press **OK**.



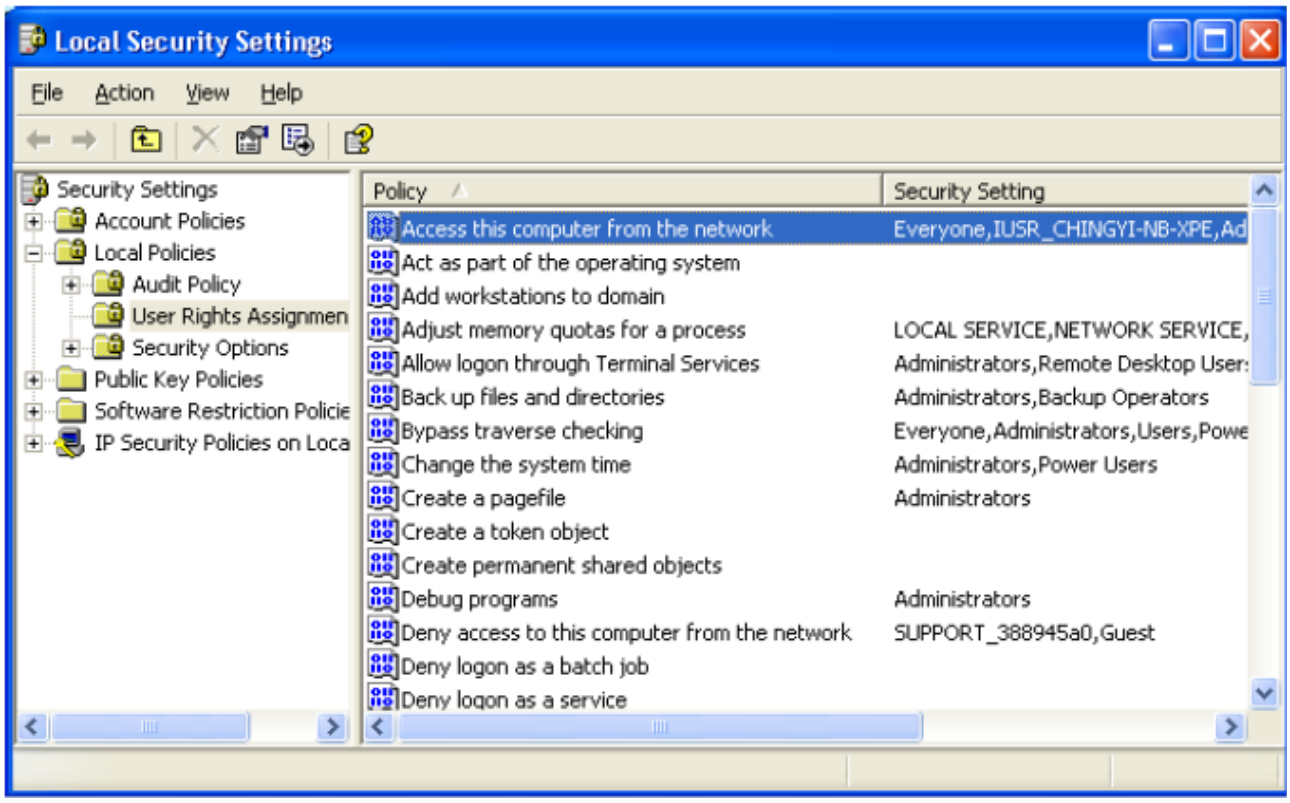
Click **Local Policies → User Rights Assignment**, right-click the **Deny logon locally** policy, and then left-click properties.



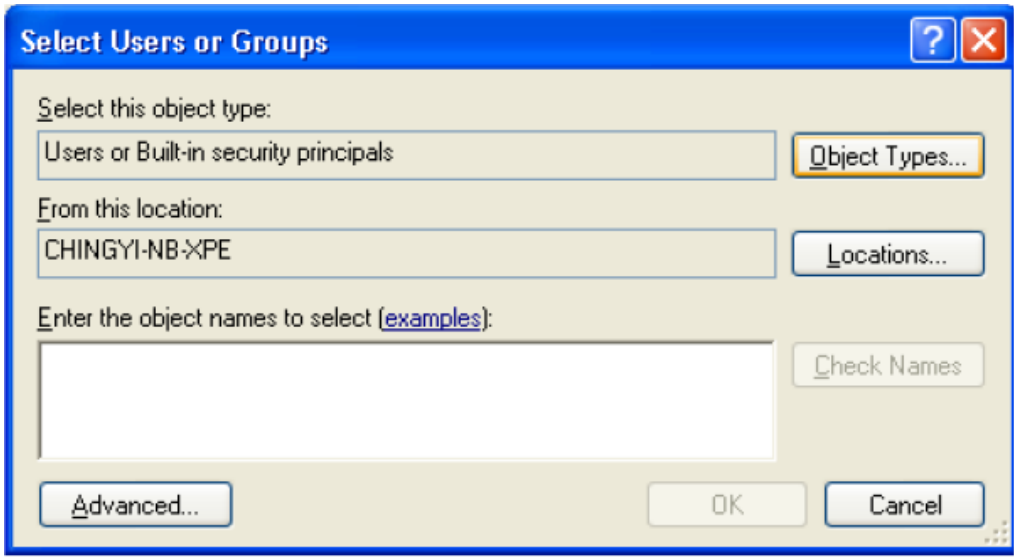
Left-click **Guest**, and press the **Remove** button. After the access permission for **Guest** is open, press **OK** to close the dialog box.



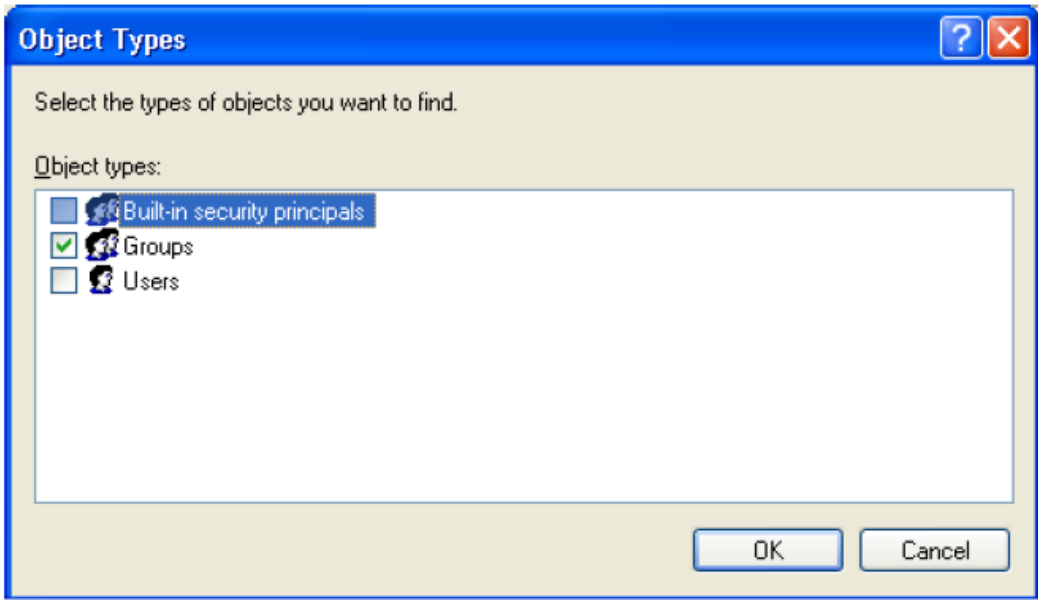
Right -click the **Access this computer from the network** policy, left-click properties.



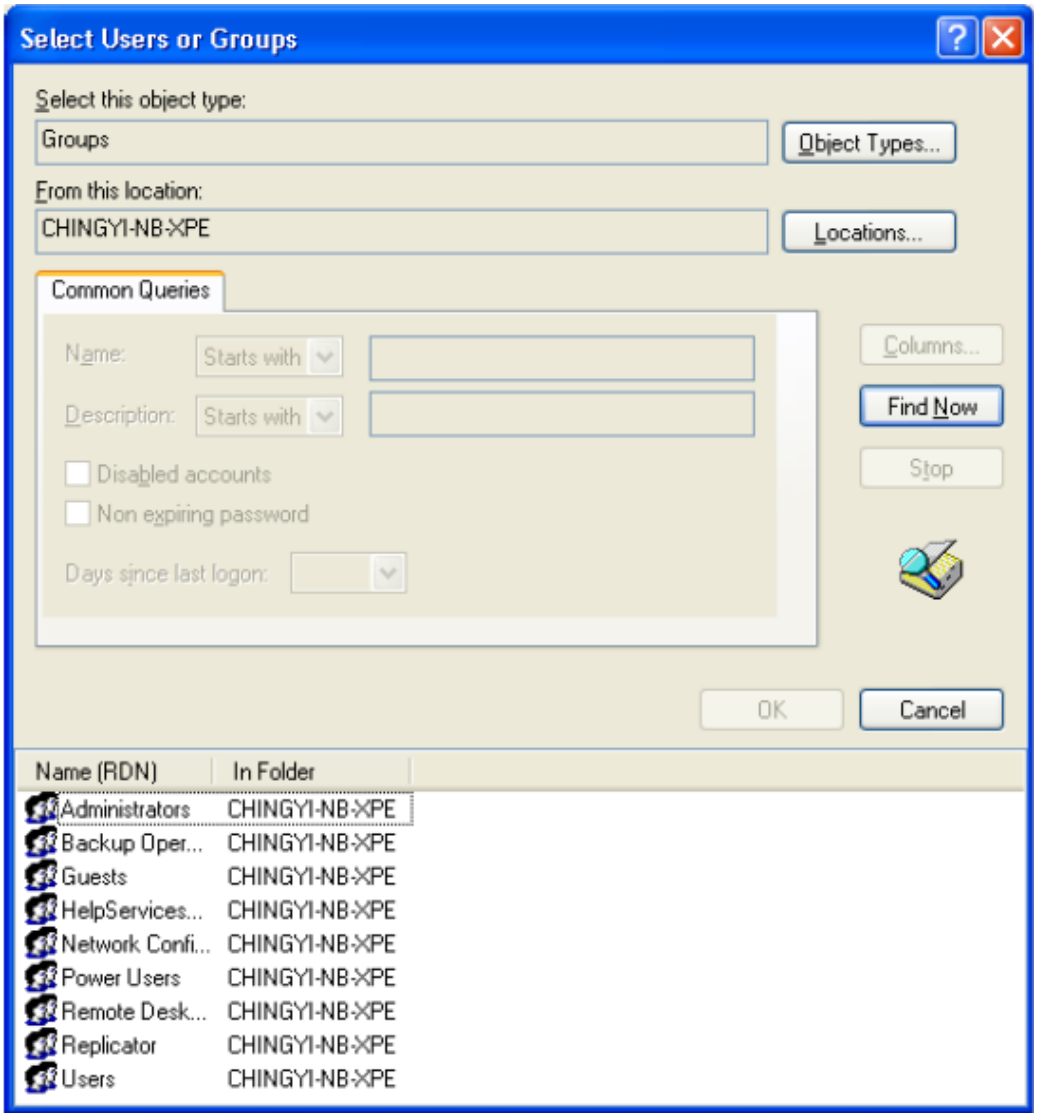
Click the **Object Types** button.



Check the box of **Groups**, and then press **OK**.



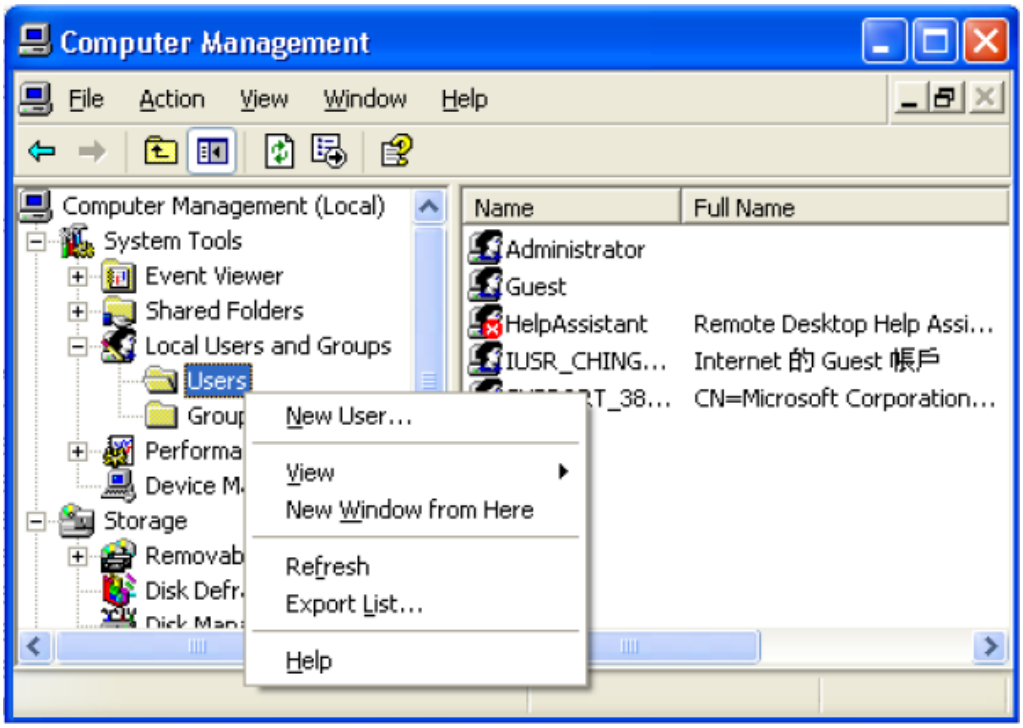
Press the **Advanced** button, press the **Find Now** button, and a list of users will be shown in the bottom section of the dialog box. Select **Guests** in the list, and press **OK** to complete the procedure of enabling guest access.



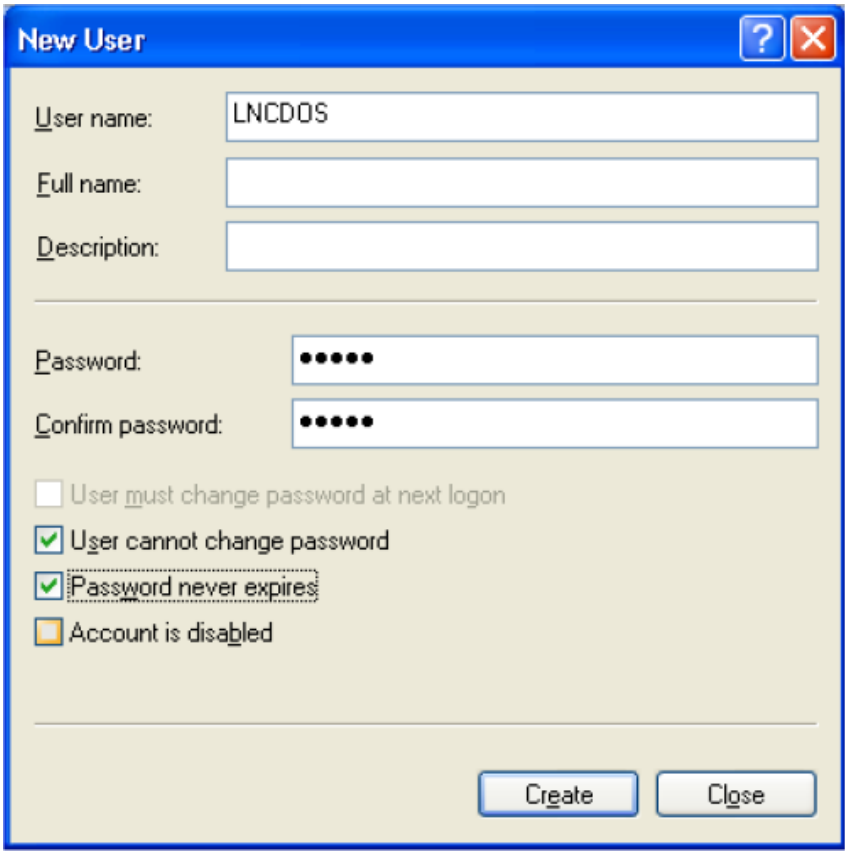
Method 2:

aa. Click Start → My Computer → Manage.

bb. Right-click the Users folder, and left-click New User.



A dialog box will appear as the figure below. Please enter the username same as that in the `system.ini` file, and enter the password same as that in the `2net.bat` file. Verify the boxes as the figure shown below, and then press **Create** to finish the procedure of enabling guess access.



Network Settings for Windows XP HOME Edition

A. Verify if the network card, internet cables, and relative protocols have been installed properly.

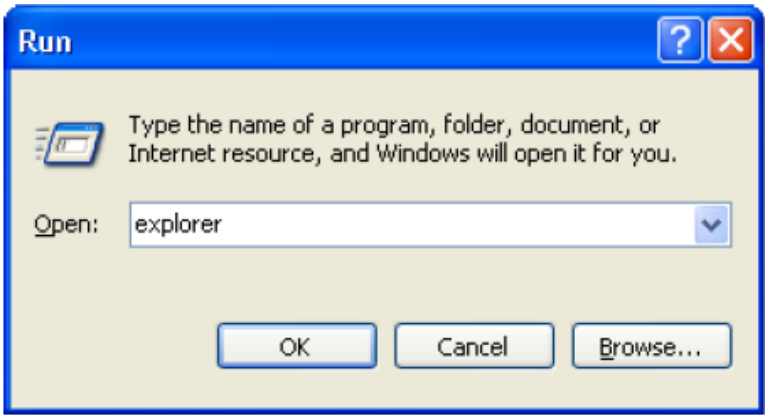
   For this section, please refer to the above setting procedure of Windows XP Professional.

B. Verify if Computer name and Workgroup have been set correctly.

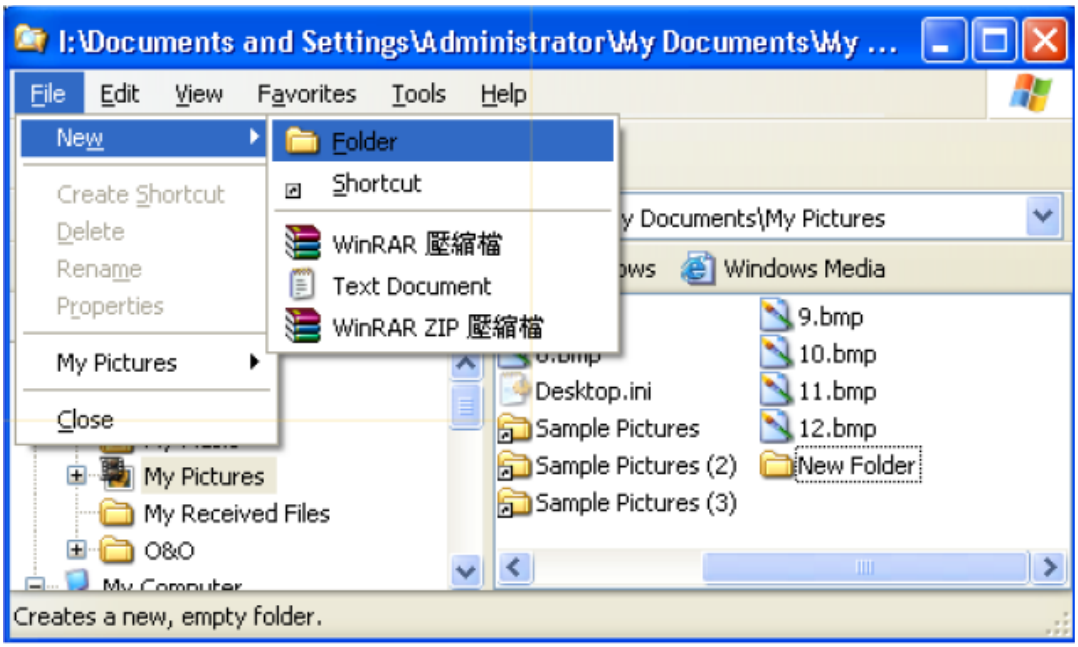
   For this section, please refer to the above setting procedure of Windows XP Professional.

Share a directory at PC side.

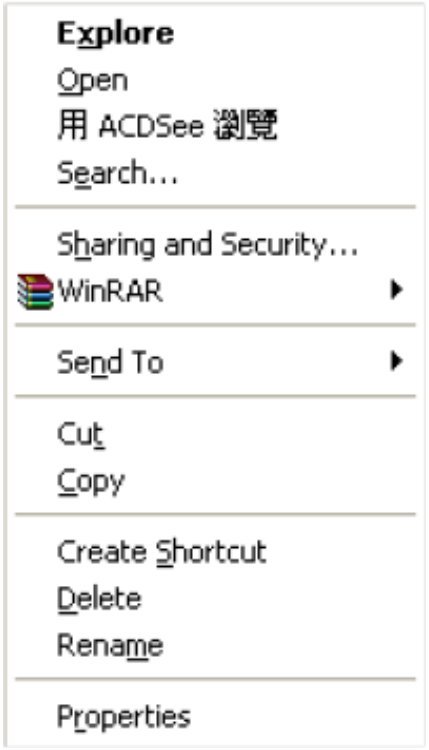
cc. Click **Start → Run**, enter “explorer” in the text box, and then press **OK**.



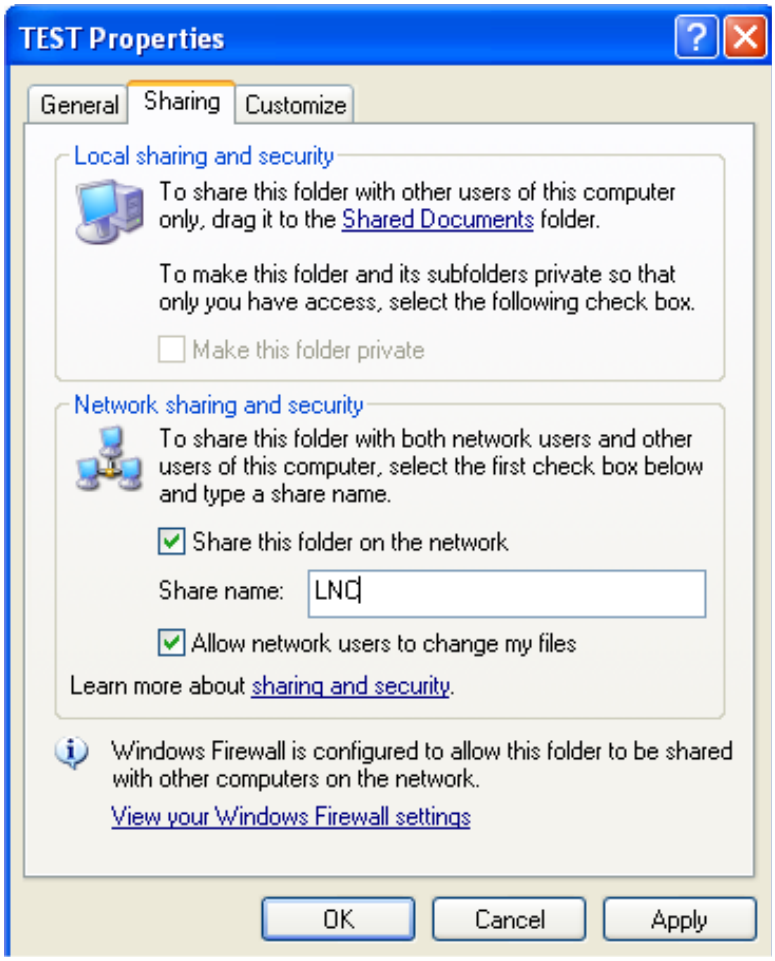
dd. In **Windows Explorer**, select **File → New → Folder**. Name the new folder after the corresponding folder at the controller side such as **share**, **pcscan**, and so on.



Right-click the new folder, and left-click **Sharing and Security**.

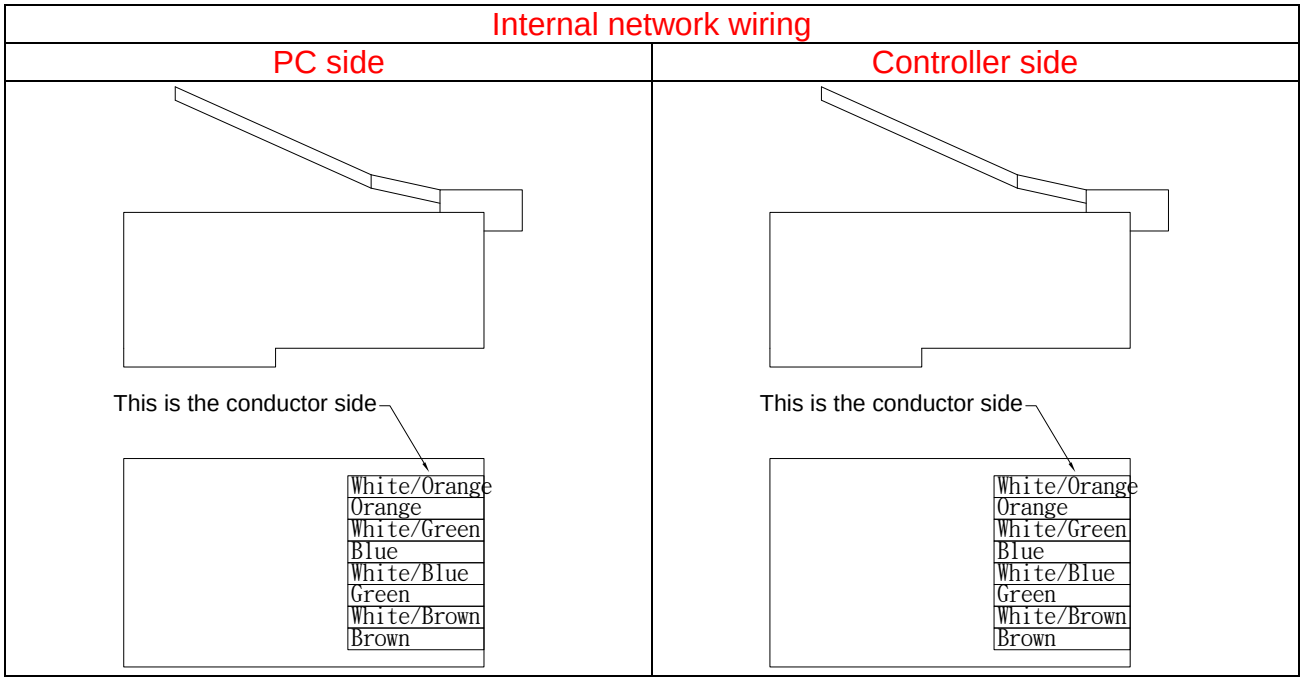


Click the **Sharing** tab, and verify the boxes of **Share this folder on the network** & **Allow network users to change my files**. Check that the name in the **Share name** text box is the same as that in the `2net.bat` file, and then press **OK** to complete the procedure of file-sharing.

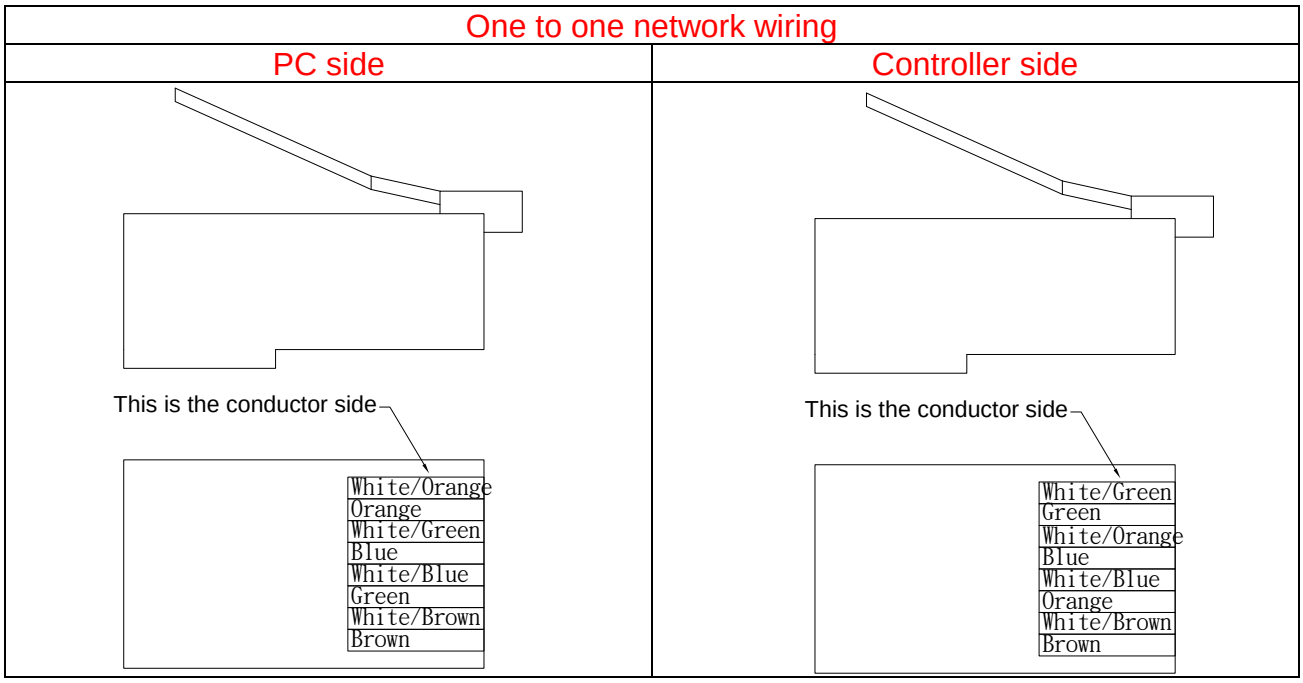

TEST Properties
General
Sharing
Customize
Local sharing and security
To share this folder with other users of this computer only, drag it to the Shared Documents folder.
To make this folder and its subfolders private so that only you have access, select the following check box.
Make this folder private
Network sharing and security
To share this folder with both network users and other users of this computer, select the first check box below and type a share name.
Share this folder on the network
Share name:
LNC
Allow network users to change my files
Learn more about sharing and security.
Windows Firewall is configured to allow this folder to be shared with other computers on the network.
View your Windows Firewall settings
OK
Cancel
Apply

NETWORK WIRING: STEPS TO WIRE A CONNECTOR WITH CABLE

Network cable from controller to HUB:



Network cable from the controller to PC



DISCONNECTION & IDLE TIME-OUT SETTINGS

There are two possible causes for users to experience a disconnection problem for “over idle time-out limit” when sharing a folder with network disks on-line:

C. Operating system: For the operating system at PC side that is Windows 2000 or Windows XP, by default, the idle time-out limit is set to 15 minutes.

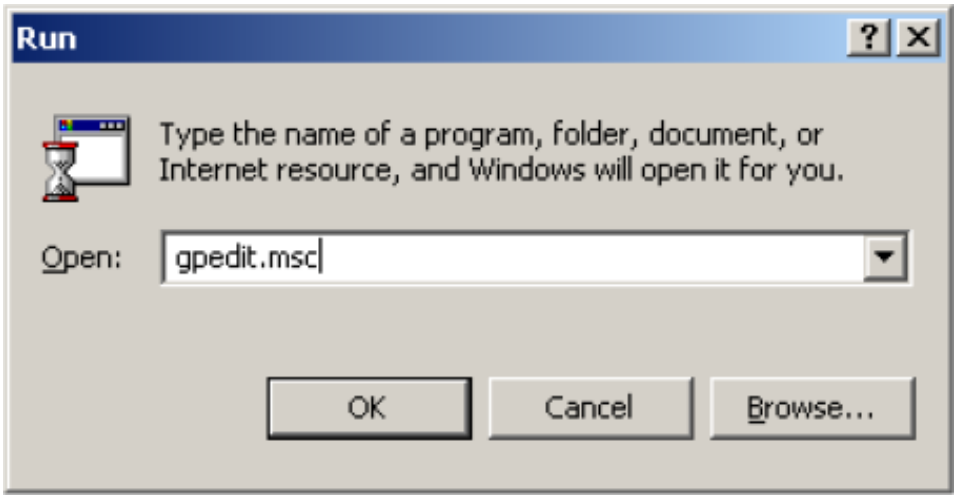
D. Network card: PC side automatically shuts down the power of network cards. This usually happens for laptop users.

Below are the procedures to disable idle time-out limit.

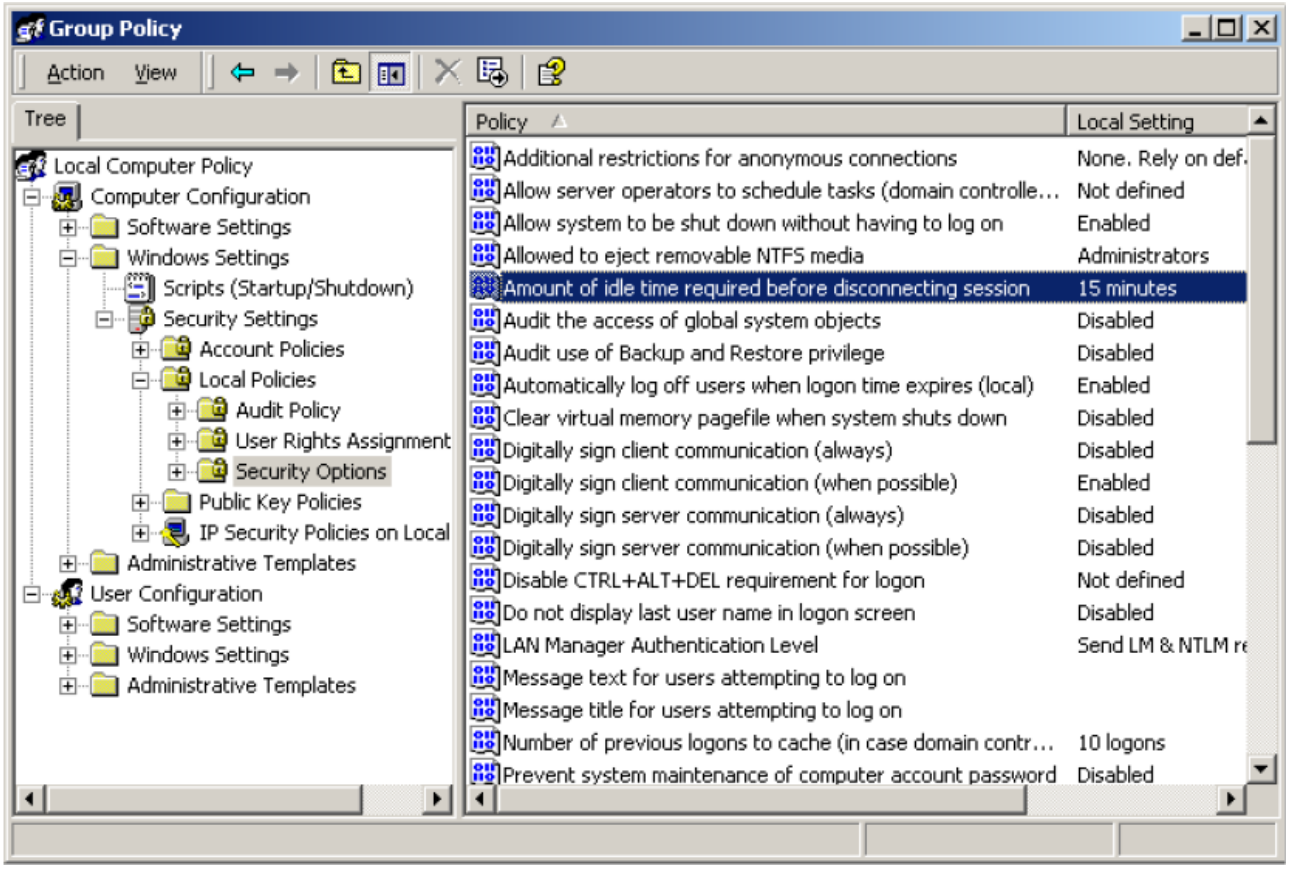
OPERATING SYSTEMS

For Windows 2000:

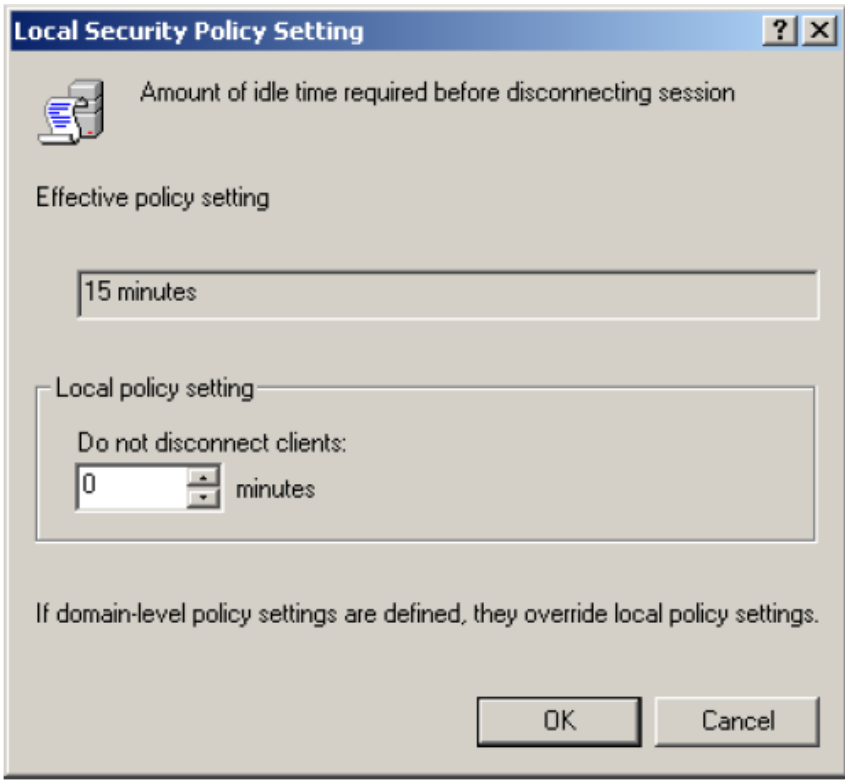
ee. Click **Start** → **Run**, enter “gpedit.msc” in the text box, and press **OK** to open the **Group Policy** configuration dialog box.



ff. Set the policy Amount of idle time required before disconnecting session in Computer Configuration\ Windows Settings\ Security Settings\ Local Policies\ Security Options.



Double-click on the principle, and a dialog box will appear as the figure below. Enter “0” in the text box, which means no disconnection at all time. To validate the configuration, please reboot the system.

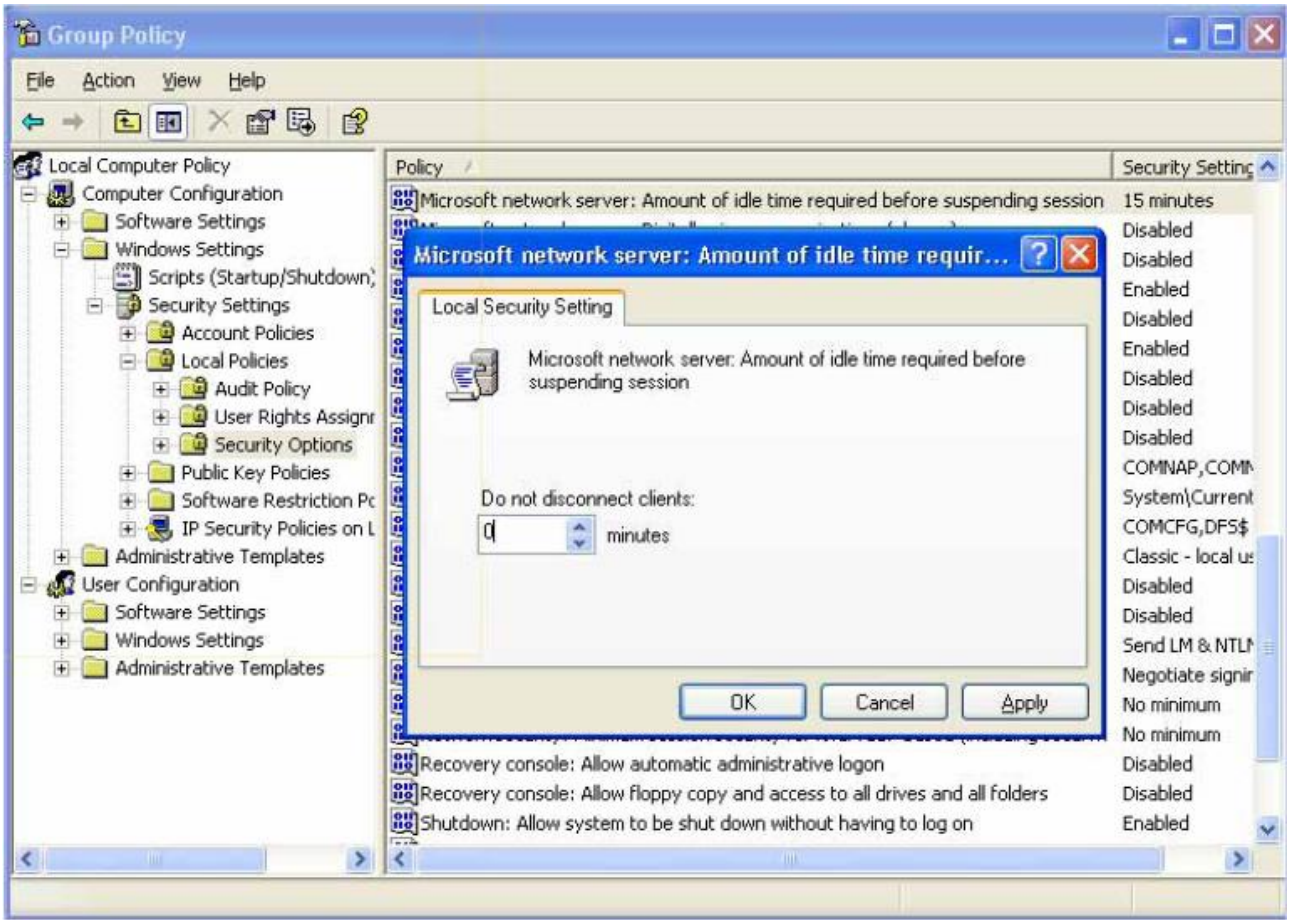


For Windows XP:

gg. Click **Start → Run**, enter “gpedit.msc” in the text box, and press **OK** to open the **Group Policy** configuration dialog box.

hh. Set the policy Miscrosoft network server: Amount of idle time required before suspending session in Computer Configuration\ Windows Settings\ Security Settings\ Local Policies\ Security Options.

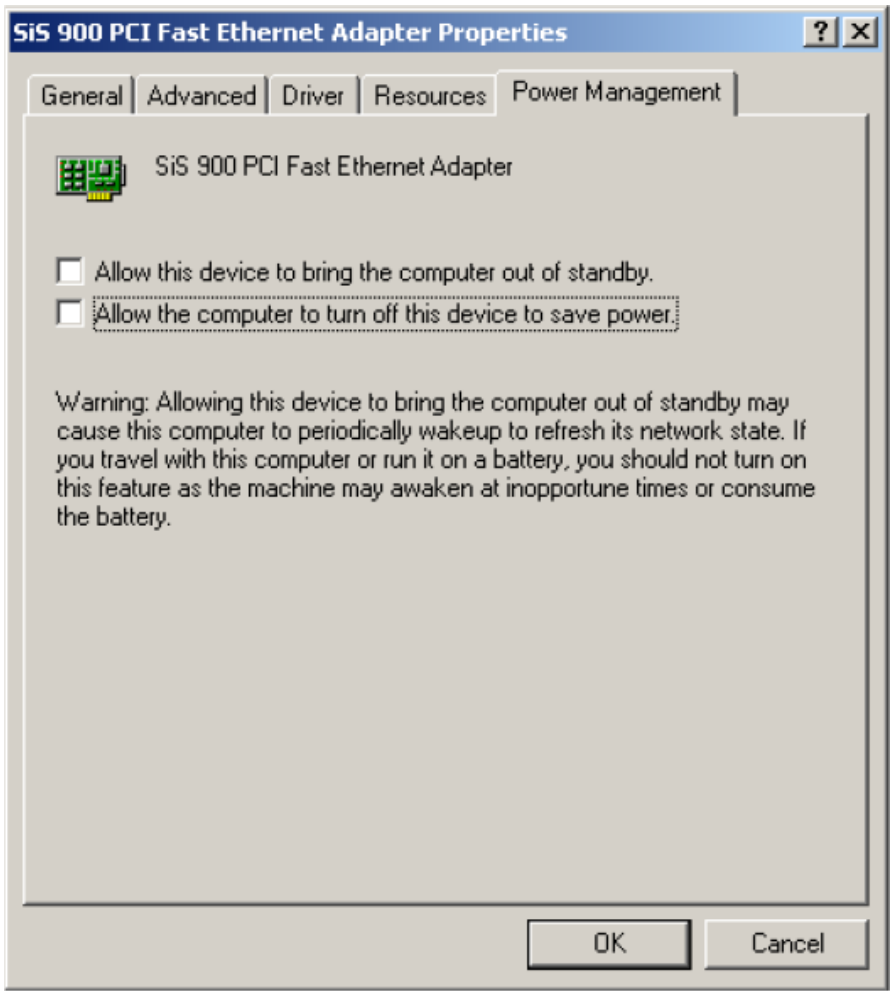
Double-click on the principle, and a dialog box will appear as the figure below. Enter “0” in the text box, which means no disconnection at all time. To validate the configuration, please reboot the system.



NETWORK CARD

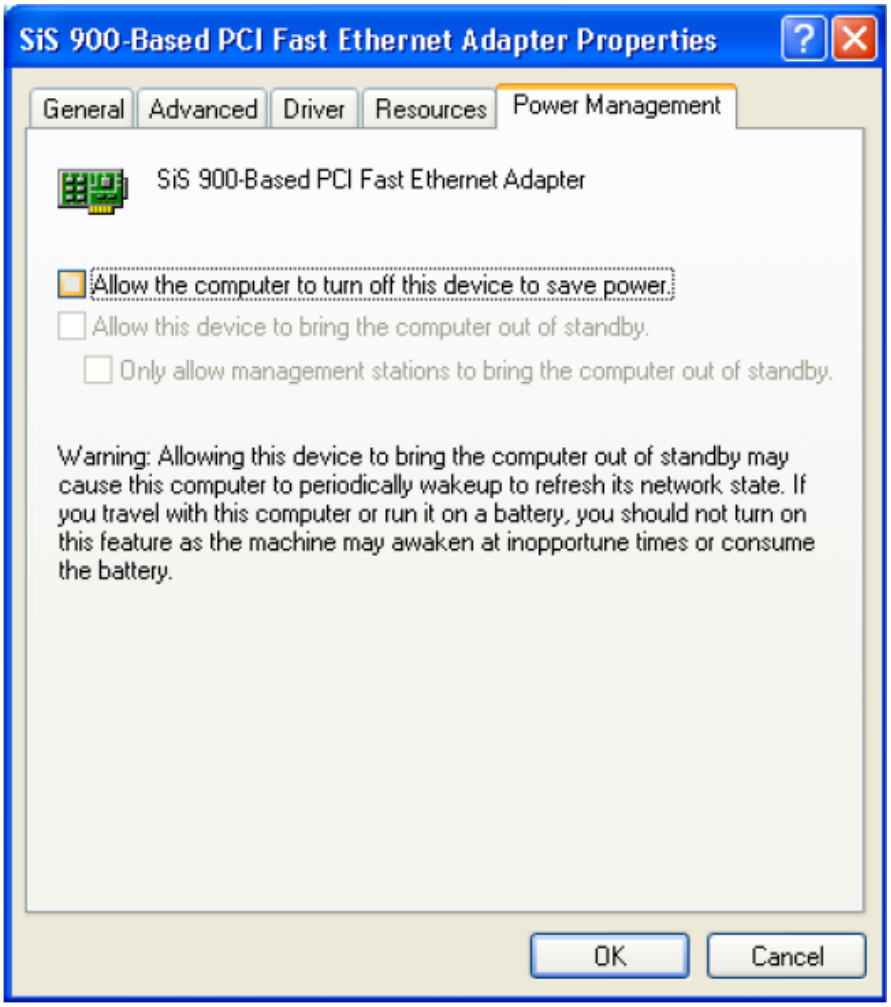
For Windows 2000:

Click **My Network Places** → Right-click properties → **Local Area Connection** → Right-click properties → Click the **Configure** button of **General** tab → Click the **Power Management** tab, and uncheck the box of **Allow the computer to turn off this device to save power** as the figure below:



For Windows XP:

ii. Click **My Network Places** → Right-click properties → **Local Area Connection** → Right-click properties → Click the **Configure** button of **General** tab → Click the **Power Management** tab, and uncheck the box of **Allow the computer to turn off this device** to save power as the figure below:

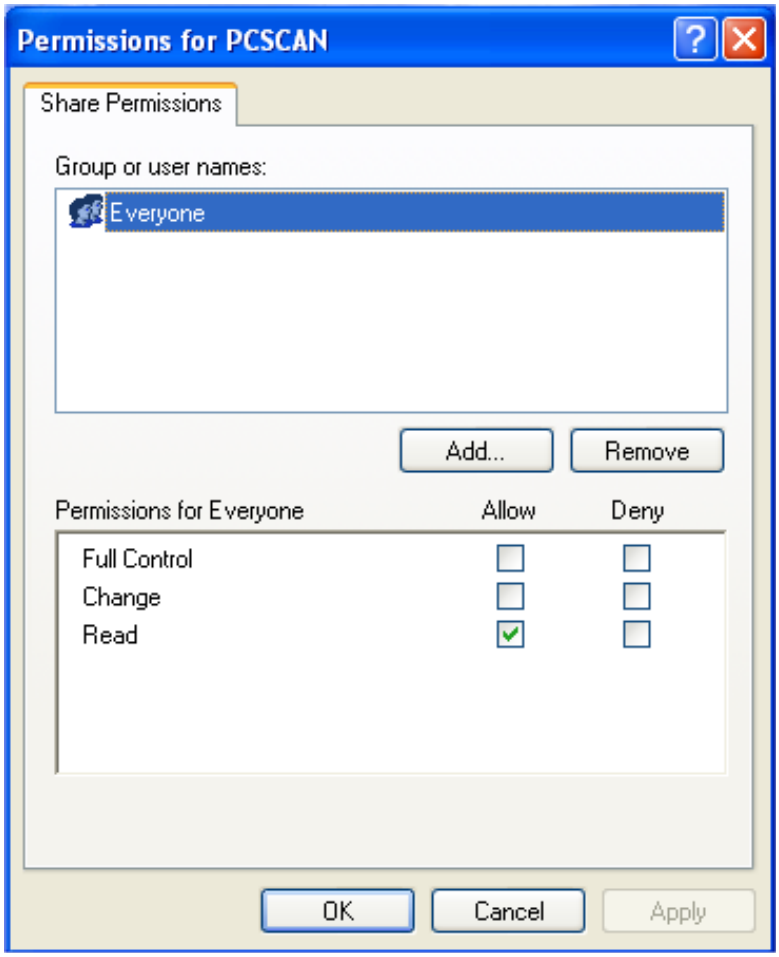


VIRUS SCAN BY A NETWORK DRIVE

If the controller is infected with a virus, enter the system and scan for virus. If the virus cannot be removed, you can try to scan the virus by a network drive. The setting procedure is as below:

1. Follow the installation method of the virus scan program to install the program in the `C:\PCSCAN` directory at PC side. Or, double-click the `PCSCAN.EXE` file in the directory of network settings to decompress and move the files automatically to the `C:\PCSCAN` directory.

Please set access permission of the **PCSCAN** file to “read-only.”



Make an emergency boot disk.

E. Insert a disk into the PC drive.

F. Double-click the program NRC1.0.exe.

“1.0” of NRC1.0.exe indicates the version of the program.

Modify the following contents in the boot disk:

G. A:\NET\SYSTEM.INI

H. The shared file **PCSCAN** in **A:\NET\2NET.BAT**.

For example A:\net\net use u: **\\uichain1\pcscan** /yes

For further details, please refer to Appendix D “Networking Settings.”

After the boot disk has been reconfigured and set to “read-only,” insert the disk into the controller drive and reboot the system. Please change the system configuration to boot off by a disk; in so doing, the controller will connect to network disks at the same time as entering the system.

During initial connection, because the disk is set to “read-only” and the network drive cannot write to the disk, the message “Write protect error writing drive A, Abort, Retry, Fail?” will appear. When this occurs, please press “f” to discharge the message and continue to connect to the network.

When the connection is successful, switch manually to the **pcscan** directory. For the above example, switch to U disk (`U:\\pcscan`).

Execute `pcscan.exe`.

COMMON PROBLEMS OF NETWORK DISKS

Common network errors at the controller side:

◆ Error 5: Access has been denied.

Definition: Access has been denied.

Troubleshooting:

a. Verify if there is any new username in the `system.ini` file at PC side; and also verify if guest access of the file is enabled.

b. Verify if the file names at PC side and in the `2net.bat` file are the same.

◆ Error 52: Duplicate workgroup or computer name exists on the network.

Definition: Duplicate workgroup or computer name exists on the network.

Troubleshooting: Change the computer name of the controller; meaning, change "computername" in the **system.ini** file.

◆ Error 53: The computer name specified in the network path cannot be located.

Definition: The specified computer name does not exist or is not open for access.

Troubleshooting:

a. Verify if the network connection light of network cable has turn on.

Verify if the NetBEUI Protocol has been installed.

Verify if the contents of computername and workgroup are the same as those in `2net.bat` & `system.ini` at the controller side.

Reboot the system with the emergency boot disk to connect to a network disk and scan the system by using the connected disk.

◆ Error 55: This resource does not exist on the network.

Definition: The share file does not exist, or the share file at the controller side does not have authority to access.

Troubleshooting:

b. Verify if the file names at PC side and in the `2net.bat` file at the controller side are the same.

c. Verify if the file at PC side is open for access, and the access method is set to full control.

Verify if the user password at PC side has expired. To verify, reset the user password and check the box of Password never expires. Then reconnect to see if the connection works.

- Error 58: The network has responded incorrectly.
  Definition: Incorrect response of the network.
  Troubleshooting:
  d. Verify if the user password at PC side has expired.
  e. Verify if the user password at PC side is the same as that in the `2net.bat` file at the controller side.
- Error 67: The specified shared directory cannot be found.
  Definition: The specified share directory cannot be found.
  Troubleshooting:
  f. Verify if the file of PC side has the permission for file sharing.
  g. Verify if the file names at PC side and in the `2net.bat` file are the same.
- Error 85: The local device name is already in use.
  Definition: The local device name is already in use.
  Troubleshooting: Verify if there is any duplicate disk code in the 2net.bat file at the controller side.
- Error 2184: The service has not been started.
  This error message can be ignored.
- Error 3658: The `IFSHLP.SYS` driver is not installed.
  Definition: The `IFSHLP.SYS` driver is not installed.

Troubleshooting: Verify if “rem” of `rem device=C:\NET\ifshlp.sys` in the `C:\config.sys` file has been deleted.

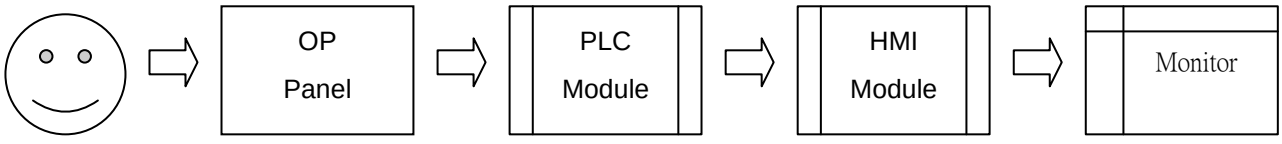
8 APPENDIX C KeyCode Swich

Summary

This controller offers the standard keyboard and the transformation between C bit and S bit codes, this can increase the convenience of CNC controller operation and control.

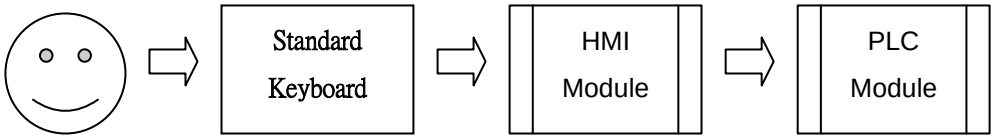
Description

How C bit transfer to the ASCII Code



User	User operate the OP panel to launch the I bit	PLC module follows the I bit to launch the C	HMI module follows the C bit to send ASCII	Display ASCII letters

How ASCII transfer to the S bit



User	User use the Keyboard to activate the ASCII Code.	HMI module follows the ASCII Code to launch S bit	PLC module launches processes by S bit

HMI Operating Description

- From ASCII Code to S bit is a real-time output. .When the related key activates, the S bit and HMI will response the input method.
- C bit to ASCII Code is for stimulation the standard keyboard by C bit. While the settled C bit been activating, HMI will output to the remaining key, also activate the code relay to the key.
- Except the Shift key function, the C bit and ASCII Code only activate single C bit.

C/S bit Range

- C bit to ASCII range located at C401~ C488
- ASCII to S bit range located at S401~ S488

Standard PC keyboard corresponds to S bit

Keyboard Button	S bit	Keyboard Button	S bit	Keyboard Button	S bit	Keyboard Button	S bit
ESC	401	[	426	,	451	Num5	476
1	402	]	427	.	452	Num6	477
2	403	Enter	428	/	453	+	478
3	404	Left Ctrl	429	Right Shift	454	Num1	479
4	405	A	430	*	455	Num2	480
5	406	S	431	Left Alt	456	Num3	481
6	407	D	432	Space	457	Num0	482
7	408	F	433	Caps Lock	458	.	483
8	409	G	434	F1	459	F11	487
9	410	H	435	F2	460	F12	488
0	411	J	436	F3	461		
-	412	K	437	F4	462		
=	413	L	438	F5	463		
BackSpace	414	;	439	F6	464		
Tab	415	'	440	F7	465		
Q	416	`	441	F8	466		
W	417	Left Shift	442	F9	467		
E	418	\	443	F10	468		
R	419	Z	444	Num Lock	469		
T	420	X	445	Scroll Lock	470		
Y	421	C	446	Num7	471		
U	422	V	447	Num8	472		
I	423	B	448	Num9	473		
O	424	N	449	-	474		
P	425	M	450	Num4	475		

C bit corresponds to standard PC keyboard, Table 1

C bit	Shift Key Status		C bit	Shift Key Status	
	OFF	ON		OFF	ON
401	Esc	Esc	426	[	{
402	1	!	427	]	}
403	2	@	428	Enter	Enter
404	3	#	430	A	A
405	4	$	431	S	S
406	5	%	432	D	D
407	6	^	433	F	F
408	7	&	434	G	G
409	8	*	435	H	H
410	9	(	436	J	J
411	0	)	437	K	K
412	-	_	438	L	L
413	=	+	439	;	:
414	BackSpace	BackSpace	440	'	"
415	Tab	Tab	441	`	~
416	Q	Q	442	Left Shift	Left Shift
417	W	W	443	\	|
418	E	E	444	Z	Z
419	R	R	445	X	X
420	T	T	446	C	C
421	Y	Y	447	V	V
422	U	U	448	B	B
423	I	I	449	N	N
424	O	O	450	M	M
425	P	P	451	,	<

C bit corresponds to standard PC keyboard, Table 2

C bit	Shift Key Status		C bit	Shift Key Status	
	OFF	ON		OFF	ON
452	.	>	481	Num3	PgDn
453	/	?	482	Num0	Ins
454	Right Shift	Right Shift	483	.	Del
455	*	*	487	F11	F11
457	Space	Space	488	F12	F12
459	F1	F1			
460	F2	F2			
461	F3	F3			
462	F4	F4			
463	F5	F5			
464	F6	F6			
465	F7	F7			
466	F8	F8			
467	F9	F9			
468	F10	F10			
471	Num7	Home			
472	Num8	UP			
473	Num9	PgUp			
474	-	-			
475	Num4	Left			
476	Num5				
477	Num6	Right			
478	+	+			
479	Num1	End			
480	Num2	Down			

Remark:

- Due to HMI used some of the keyboard for controlling the interface, users should be careful on C bit to ASCII transferring.
- Because of ASCII to S bit is real-time output, the application of the activated S bit will decide by Ladder.

HMI Keyboard Table

Keyboard Button	C/S bit	HMI Operating Description
`	441	CNC Reset
F2	460	Main Menu 01
F3	461	Main Menu 02
F4	462	Main Menu 03
F5	463	Main Menu 04
F6	464	Main Menu 05
F7	465	Main Menu 06
F8	466	Sub Menu 01
F9	467	Sub Menu 02
F10	468	Sub Menu 03
F11	487	Sub Menu 04
F12	488	Sub Menu 05
Num0	482	<POS>Group
Num1	479	<PROG>Group
Num2	480	<OFFSET>Group
Num3	481	<CAM>Group
Num4	475	<GRAPH>Group
Num5	476	<DGNOS>Group
Num6	477	<SOFTPL>Group
Num7	471	<PARAM>Group

C1 Related Parameters:

Param0658

Add and Modify	Modification
Chinese Display	Param0658 Keyboard Transformation (code) Function 0)Disable 1)Enable
English Display	Pr0658 KEY CODE 0)DISABLE 1)ENABLE
Classification	Operate
Effective	Rebooting

Timing	
Permissions	Manufacturers
Setting Range	0~1
Default Value	0
Unit	None
Applicable Model No.	Milling machine V3, milling machine V6 and V3 series system of lathe
Description	0：Disable 1：Enable

C2 Related MLC Signals

S401~488

Chinese Display	S401~488 Key code:
English Display	S401~488 Key code:
Applicable Model No	Milling machine V3, milling machine V6 and V3 series system of lathe
Description	Please refer to the instructions.

C401~488

Chinese Display	C401~488 Key code:
English Display	C401~488 Key code:
Applicable Model No	Milling machine V3, milling machine V6 and V3 series system of lathe
Description	Please refer to the instructions.

9 APPENDIX D Mitsubishi Absolute Encoder Servo Communication Function Description

Summary

Reading absolute encoder feedback value by series communication protocol, and update the coordinates of the controllers. However, servo motors need to support series COMM. PROTOCOL.

Description

Reading absolute encoders value by servo communication requires to set servo drivers parameters, series connection cabble and controller's parameter's setting, its related PLC editing. Please follow below steps to proceed the setting and wiring. Take singal system X、Y、Z、4th axis as an example, series communication cable is connecting to COM2 port.

D1 Servo Drivers Parameters Setting

According to the difference of each servo motor brand, their parameters setting shall be also different. Please refer the details of Servo Motor User's Manual.

Servo Motor Brand：Mitsubishi Servo Motor M Brand J2 Series			
System Axis Name	Param No.	SET VALUE	Param Description
X、Y、Z、4th	No.01	0002	Input filter, mechanism selection, absolute position detecting system selection.
X、Y、Z、4th	No.16	1100	Comm. Baut Rate selection and Alarm Clear
X、Y、Z、4th	No.53	0000	Series Comm. Protocol Selection
X	No.15	1	Station No. Setting
Y	No.15	2	Station No. Setting
Z	No.15	3	Station No. Setting
4th	No.15	4	Station No. Setting

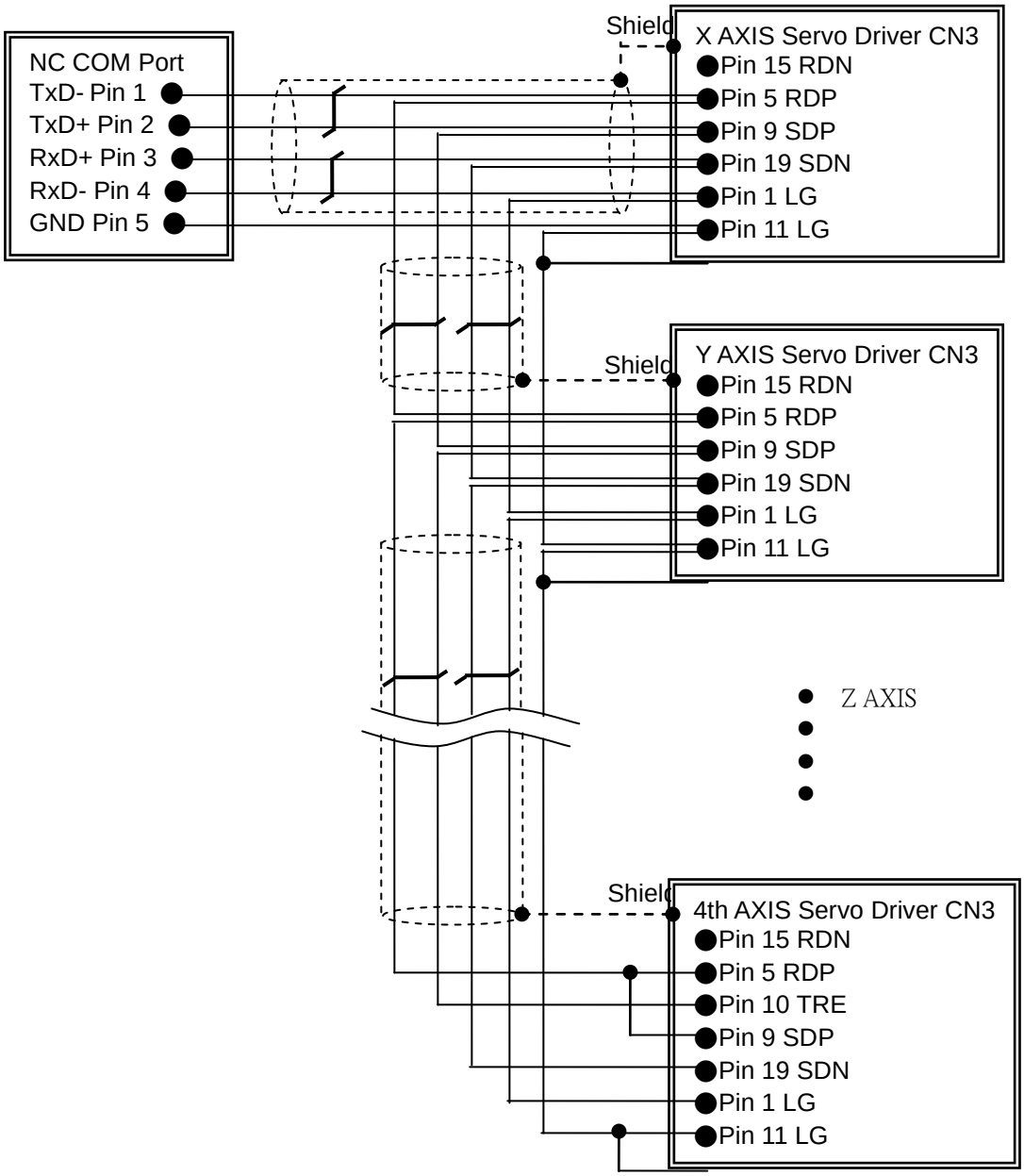
Servo Motor Brand：Mitsubishi Servo Motor M Brand J3 Series			
System Axis Name	Param No.	SET VALUE	Param Description
X、Y、Z、4th	PA.03	0002	Input filter, mechanism selection, absolute position detecting system selection.
X、Y、Z、4th	PC.21	0100	Comm. Baut Rate selection and Alarm Clear
X	PC.20	1	Station No. Setting
Y	PC.20	2	Station No. Setting
Z	PC.20	3	Station No. Setting
4th	PC.20	4	Station No. Setting

D2 Series Connecting Cable

According to the difference of servo motor brands, series connecting cable will be different, please refer the user's manual of servo motor.

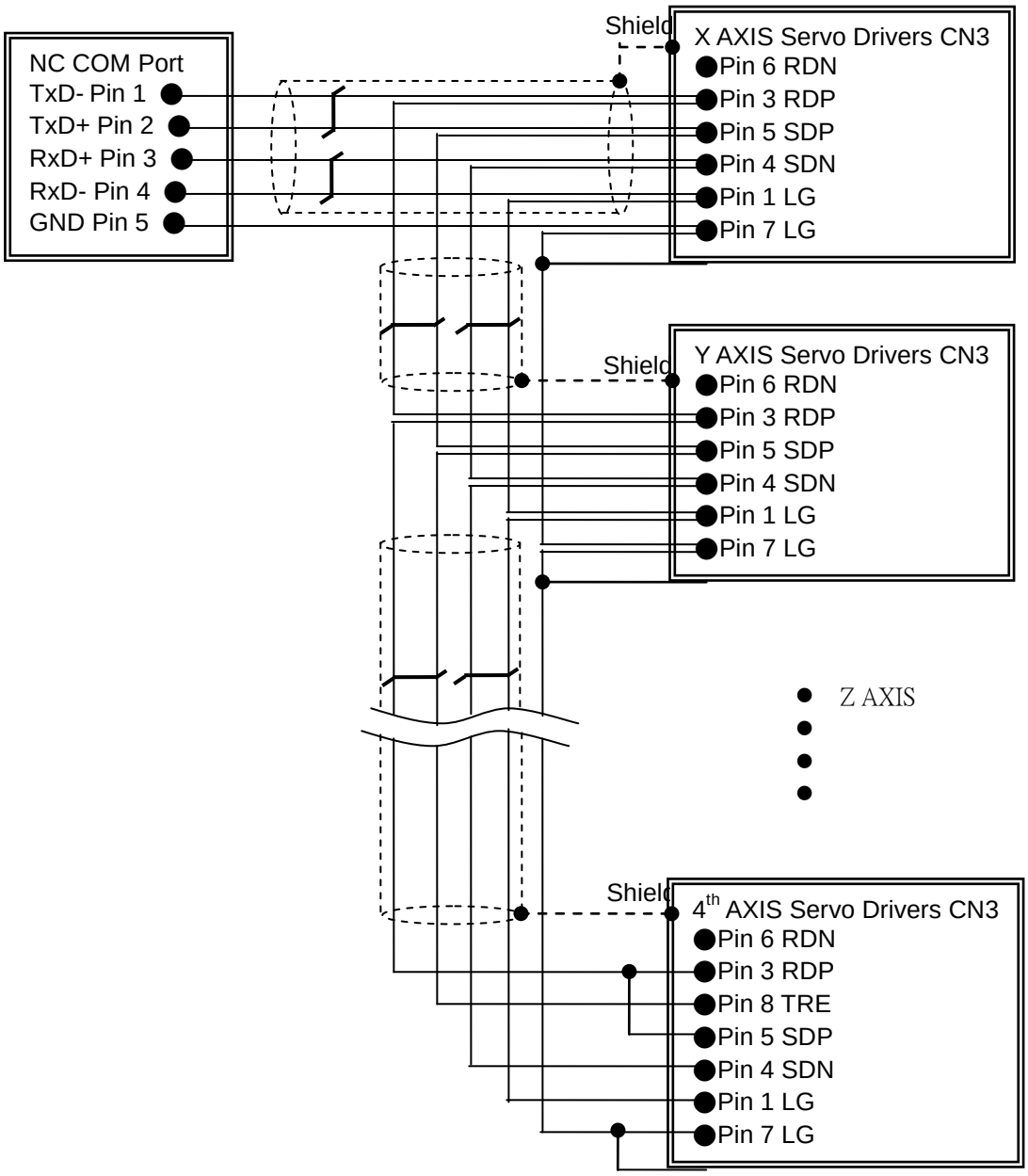
Servo Motor Brand：M Brand J2 Series

- Last Axis PIN 10(TRE) and PIN 15(RDN) need short circuited.
- Series connecting cable total length needs to smaller than 30M.



Servo Motor Brand：M Brand J3 Series

- Last Axis PIN 8(TRE) and PIN 6(RDN) need short circuited.
- Series connecting cable total length needs to smaller than 30M.



D3 Controllers Param Setting

Because series transmitting cable selects connecting controller COM2 port, the corresponding parameters setting as follows.

Param No.	Description	SET VALUE
P1807	COM2 base address(0:Disable,744~1016)	760
P1809	COM2 Cycle Scan Number (3~7)	3
P1811	COM2 Function (0None 1 File 2 Absolute 3 Spindle)	2

Because the servo motor brand is M brand, its corresponding parameters setting is as below.

Param No.	Description	SET VALUE
P1824	Servo Communication Types (0:Not Use,1:M)	1

Setting X、Y、Z、4th Axis station numbers, this part requires servo motors station numbers must be the same with each corrosponing servo driver’s parameters Station No. setting.

Param No.	Description	SET VALUE
P1825	X AXIS Servo Communication Station(0: Not Use,1~15)	1
P1826	Y AXIS Servo Communication Station(0: Not Use,1~15)	2
P1827	Z AXIS Servo Communication Station(0: Not Use,1~15)	3
P1828	4TH AXIS Servo Communication Station(0: Not Use,1~15)	4

Because using absolute type encoders, setting X、Y、Z、4th home return are based on NC’s record.

Param No.	Description	SET VALUE
P0204	Using NC Record’s Home Position (+1:X,+2:Y,+4:Z,+8:4th)	15
P65	Using Absolute Type Encoders BIT 0-3	0

D4 Related PLC Editing

Setting X、Y、Z、4th Servo Communication ABS updating home position, it is enabled by corresponding C bits of each axis and let corresponding S bits are the setting to finish the signal.

C bit No.	Description
C259	Servo Communication ABS Updating Home Position Activation:X AXIS
C260	Servo Communication ABS Updating Home Position Activation:Y AXIS
C261	Servo Communication ABS Updating Home Position Activation:Z AXIS
C262	Servo Communication ABS Updating Home Position Activation:4TH AXIS

S bit No.	Description
S225	SERVO ABS HOME UPDATING COMPLETE:X AXIS
S226	SERVO ABS HOME UPDATING COMPLETE:Y AXIS
S227	SERVO ABS HOME UPDATING COMPLETE:Z AXIS
S228	SERVO ABS HOME UPDATING COMPLETE: 4TH AXIS

The operation of this parts will be different according to the customer’s different requirements. Below diagram is the servo transmitting ABS home position setting operate PLC example, A36 is as RESET signal.

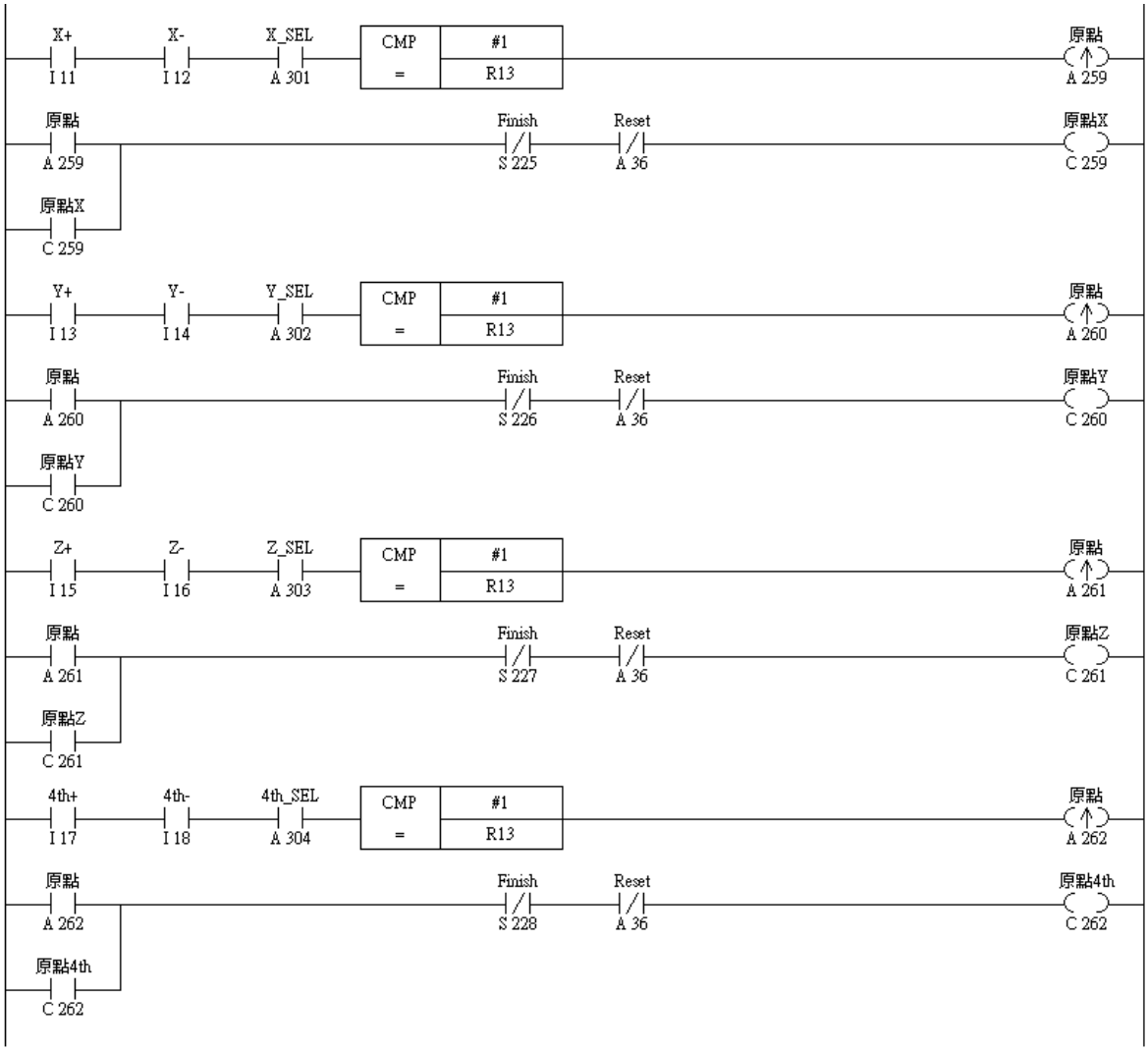
i. Please be at SERVO ON status for all servo motors.

ii. Using user’s parameters to control D registers, select whether using servo transmitting ABS

setting ome position servo axis. (X：A301，Y：A302，Z：A303，4th：A304)

iii. Controller mode,please switch to EDIT mode.(To ensure that during home position setting procedure,servo axis won't take any movement command), and make sure you do not use tool offset and no use of G92 setting abosulte coordinates.

iv. Setting X AXIS please pressX+(I11) and X-(I12) at the same time, if the setting succeed,the value of system data No.122 and No.123 will be the same.
Setting Y AXIS please pressY+(I13) and Y-(I14) at the same time,if the setting succeed,the value of system data No.127 and No.128 will be the same.
Setting Z AXIS please pressZ+(I15) and Z-(I16) at the same time, if the setting succeed,the value of system data 1 No.32 and No.133 will be the same.



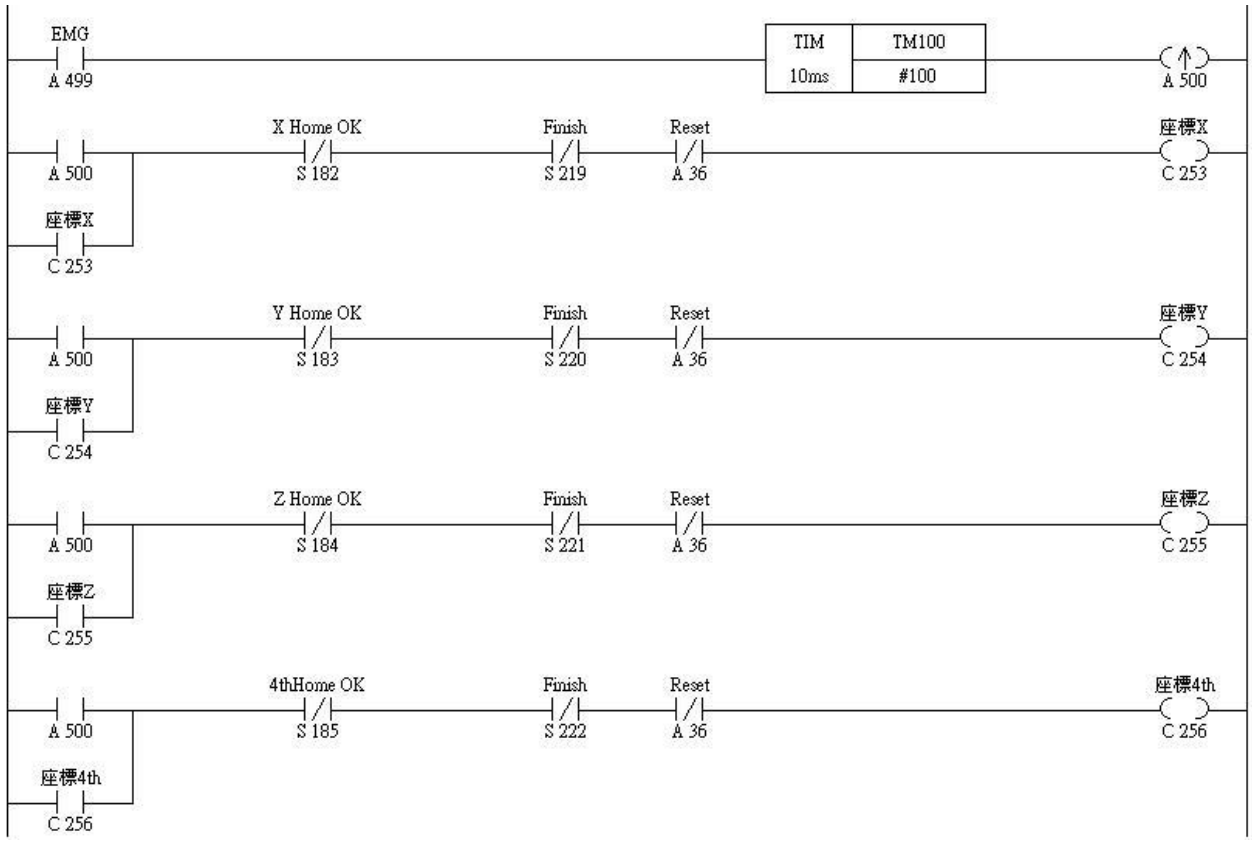
X、Y、Z、4th are using servo communication to read ABS to update the coordinates. They are enabled by corresponding C bits of each axis and have finish signal by corresponding S bits' setting. After ABS finishing updating coordinates, it means home return signal has been accomplished, the corresponding S bits shall be ON.

C bit No.	Description
C253	Servo Communication ABS Updating Coordinate Activation:X AXIS
C254	Servo Communication ABS Updating Coordinate Activation:Y AXIS
C255	Servo Communication ABS Updating Coordinate Activation:Z AXIS
C256	Servo Communication ABS Updating Coordinate Activation:4TH AXIS

S bit No.	Description
S219	SERVO ABS COORDINATE UPDATING COMPLETE:X AXIS
S220	SERVO ABS COORDINATE UPDATING COMPLETE:Y AXIS
S221	SERVO ABS COORDINATE UPDATING COMPLETE:Z AXIS
S222	SERVO ABS COORDINATE UPDATING COMPLETE: 4TH AXIS

S bit No.	Description
S182	X AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)
S183	Y AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)
S184	Z AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)
S185	4TH AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)

Below diagram is an example of reading ABS updating coordinates by servo communication. This part requires to read only once while servo on after power on. A499 is EMG switch signal, it will trigger A500 after delaying 1 sec. A36 is the RESET signal.


EMG
A 499
TIM
10ms
TM100
#100
A 500
X Home OK
S 182
Finish
S 219
Reset
A 36
座標X
C 253
A 500
座標X
C 253
Y Home OK
S 183
Finish
S 220
Reset
A 36
座標Y
C 254
A 500
座標Y
C 254
Z Home OK
S 184
Finish
S 221
Reset
A 36
座標Z
C 255
A 500
座標Z
C 255
4thHome OK
S 185
Finish
S 222
Reset
A 36
座標4th
C 256
A 500
座標4th
C 256

D5 Related Parameters

Param1806

Add and Modify	New Added
Chinese Display	Param1806 COM1 Address (0:Disable,744~1016)
English Display	Pr1806 COM1 base address(0:Disable,744~1016)
Catagory	Operate
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcture
Setting Range	0 ~ 1016
Default Value	1016
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting COM1 Base Address. 0：Not Use

Param1807

Add and Modify	New Added
Chinese Display	Param1807 COM2 Address (0:Disable,744~1016)
English Display	Pr1807 COM2 base address(0:Disable,744~1016)
Catagory	Operate
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	0 ~ 1016
Default Value	760
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting COM2 Base Address. 0：Not Use

Param1808

Add and Modify	New Added
Chinese Display	Param1808 COM1 Cycle Scanned Number (3~7)
English Display	Pr1808 COM1 IRQ number(3~7)
Catagory	Operate

Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	3 ~ 7
Default Value	4
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting COM1 IRQ Number

Param1809

Add and Modify	New Added
Chinese Display	Param1809 COM2 Cycle Scanned Number (3~7)
English Display	Pr1809 COM2 IRQ number(3~7)
Catagory	Operate
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	3 ~ 7
Default Value	3
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting COM2 IRQ Number

Param1810

Add and Modify	New Added
Chinese Display	Param1810 COM1 Function (0:None 1: File 2 Absolute 3 Spindle)
English Display	Pr1810 COM1 func.(0No 1File 2ABS 3SPD)
Catagory	Operate
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	0 ~ 3
Default Value	0
Unit	None
Applicable Model No.	All Series in Lathe Machines

Description	Setting Tramsittion Port Function 0: Not Use 1: File Transmitting 2: Absolute Encoders 3: Spindle Commuication

Param1811

Add and Modify	New Added
Chinese Display	Param1811 COM2 Function (0 None 1 File 2 Absolute 3 Spindle)
English Display	Pr1811 COM2 func.(0No 1File 2ABS 3SPD)
Catagory	Operate
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	0 ~ 3
Default Value	0
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting Tramsittion Port Function 0: Not Use 1: File Transmitting 2: Absolute Encoders 3: Spindle Commuication

Param1824

Add and Modify	New Added
Chinese Display	Param1824 Servo Communication Type (0: Not Use,1:M)
English Display	Pr1824 Servo communication type
Catagory	Servo
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	0 ~ 1
Default Value	0
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting Servo Communication Use Servo Motor Brand 0: Not Use 1:M

Param1825~1828

Add and Modify	New Added
Chinese Display	Param1825 X AXISServo Communication Station(0: Not Use 1~15) Param1826 Y AXISServo Communication Station(0: Not Use 1~15) Param1827 Z AXISServo Communication Station(0: Not Use 1~15) Param1828 4TH AXISServo Communication Station(0: Not Use 1~15)
English Display	Pr1825 X axis address for servo com. Pr1826 Y axis address for servo com. Pr1827 Z axis address for servo com. Pr1828 4th axis address for servo com.
Catagory	Servo
Effective Timing	Effective After Rebooting
Permissions	Machine Manuafcturer
Setting Range	0 ~ 15
Default Value	0
Unit	None
Applicable Model No.	All Series in Lathe Machines
Description	Setting station numbers of each axis corrosponding to servo motors. This parameter station no. setting must be the same with station no. setting of servo drivers. If setting equals to zero, it means this servo axis does not use servo communication function.

D6 Related MLC Signals

C253~256

Chinese Display	C253Servo Communication ABS Updating Coordinate Activation:X AXIS C254Servo Communication ABS Updating Coordinate Activation:Y AXIS C255 Servo Communication ABS Updating Coordinate Activation:Z AXIS C256 Servo Communication ABS Updating Coordinate Activation:4TH AXIS
English Display	C253 Start update coordinate by ABS servo communication:X axis C254 Start update coordinate by ABS servo communication:Y axis C255 Start update coordinate by ABS servo communication:Z axis C256 Start update coordinate by ABS servo communication:4th axis
Applicable Model No.	All Series in Lathe Machines
Description	

C259~262

Chinese Display	C259Servo Communication ABS Updating Home Position Activation:X AXIS C260Servo Communication ABS Updating Home Position Activation:Y AXIS C261Servo Communication ABS Updating Home Position Activation:Z AXIS C262Servo Communication ABS Updating Home Position

	Activation:4TH AXIS
English Display	C259 Start origin setting by ABS servo communication:X axis C260 Start origin setting by ABS servo communication:Y axis C261 Start origin setting by ABS servo communication:Z axis C262 Start origin setting by ABS servo communication:4th axis
Applicable Model No.	All Series in Lathe Machines
Description	

S219~222

Chinese Display	S219 SERVO ABS COORDINATE UPDATING COMPLETE:X AXIS S220 SERVO ABS COORDINATE UPDATING COMPLETE:Y AXIS S221 SERVO ABS COORDINATE UPDATING COMPLETE:Z AXIS S222 SERVO ABS COORDINATE UPDATING COMPLETE:4TH AXIS
English Display	S219 Finish update coordinate by ABS servo communication:X axis S220 Finish update coordinate by ABS servo communication:Y axis S221 Finish update coordinate by ABS servo communication:Z axis S222 Finish update coordinate by ABS servo communication:4th axis
Applicable Model No.	All Series in Lathe Machines
Description	

S225~228

Chinese Display	S225 SERVO ABS HOME UPDATING COMPLETE:X AXIS S226Servo Communication ABS Updating Home Position Finish:Y AXIS S227Servo Communication ABS Updating Home Position Finish:Z AXIS S228Servo Communication ABS Updating Home Position Finish:4TH AXIS
English Display	S225 Finish origin setting by ABS servo communication:X axis S226 Finish origin setting by ABS servo communication:Y axis S227 Finish origin setting by ABS servo communication:Z axis S228 Finish origin setting by ABS servo communication:4th axis
Applicable Model No.	All Series in Lathe Machines
Description	

S182~185

Chinese Display	S182 X AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished) S183 Y AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished) S184 Z AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished) S185 4TH AXIS Home Return Finish Signal(0: Not Finish 1: Has Finished)
English Display	S182 Return zero signal of X axis(0:None,1:OK) S183 Return zero signal of Y axis(0:None,1:OK) S184 Return zero signal of Z axis(0:None,1:OK) S185 Return zero signal of 4th axis(0:None,1:OK)
Applicable Model No.	All Series in Lathe Machines

Description	

D7 Related Alarm /Warning

MOT4134~4137

Chinese Display	MOT4134 X AXIS Absolute Encoder Value Servo Communication Error MOT4135 Y AXIS Absolute Encoder Value Servo Communication Error MOT4136 Z AXIS Absolute Encoder Value Servo Communication Error MOT4137 4TH AXIS S Absolute Encoder Value Servo Communication Error
English Display	MOT4134 ABS error of X axis for servo communication MOT4135 ABS error of Y axis for servo communication MOT4136 ABS error of Z axis for servo communication MOT4137 ABS error of 4th axis for servo communication
Applicable Model No.	All Series in Lathe Machines
Trouble Shootings	Meaning reading this absolute axis encoder feedback value failed by servo transmitting. 1. Please check series transmitting wiring is correct or not. 2. Check parameters related to servo driver series transmitting are setting correctly or not. 3. PLC sequence is correct or not. 4. Press RESET key to clear the alarm.

MOT4138

Chinese Display	MOT4138 COM port repeating setting,please check Param1810 and 1811
English Display	MOT4138 Repeat COM setting,PLEASE CHECK PR.1810 AND PR.1811
Applicable Model No.	All Series in Lathe Machines
Trouble Shootings	COM1 and COM2 Setting Value are the same. 1. Please check Param1810 and 1811 if the setting value are the same or not. 2. Press RESET key to clear alarm.◦

D8 Related System Information

SYS120

Chinese Display	SYS120 RS-232 Comm. Transmitting Cycle Scan Times
English Display	SYS60 Send RS232 TRNASFER INT. COUNT
Applicable Model No.	All Series in Lathe Machines
Description	Cycle scan times that are triggered by communicating transmitting information.

SYS121

Chinese Display	RS-232 Comm. Receiving Cycle Scan Times
English Display	SYS121 RS232 RECIVE INT. COUNT
Applicable Model No.	All Series in Lathe Machines
Description	Cycle scan times that are triggered by communicating receiving information.

SYS122、127、132、137

Chinese Display	SYS122 Servo Communication ABS Reference Point Record Value :X AXIS SYS127 Servo Communication ABS Reference Point Record Value :Y AXIS SYS132 Servo Communication ABS Reference Point Record Value :Z AXIS SYS137 Servo Communication ABS Reference Point Record Value :4 Ax
English Display	SYS122 X ABS HOME REC. OF COMM. SYS127 Y ABS HOME REC. OF COMM. SYS132 Z ABS HOME REC. OF COMM. SYS137 4 ABS HOME REC. OF COMM.
Applicable Model No.	All Series in Lathe Machines
Description	Record the absolute value that is related to the axis reference point of the machine.

SYS123、128、133、138

Chinese Display	SYS123 Servo Communication ABS Reading Value:X AXIS SYS128 Servo Communication ABS Reading Value:Y AXIS SYS133 Servo Communication ABS Reading Value:Z AXIS SYS138 Servo Communication ABS Reading Value:4 Axis
English Display	SYS123 X ABS READ VALUE OF COMM. SYS128 Y ABS READ VALUE OF COMM. SYS133 Z ABS READ VALUE OF COMM. SYS138 4 ABS READ VALUE OF COMM.
Applicable Model No.	All Series in Lathe Machines

Description	Reading Absolute Encoder Value

SYS124、129、134、139

Chinese Display	SYS124 Servo Communication ABS renew the coordinates value:X AXIS SYS129 Servo Communication ABS renew the coordinates value:Y AXIS SYS134 Servo Communication ABS renew the coordinates value:Z AXIS SYS139 Servo Communication ABS renew the coordinates value:4 AXIS
English Display	SYS124 X ABS UPDATE COOR. OF COMM SYS129 Y ABS UPDATE COOR. OF COMM SYS134 Z ABS UPDATE COOR. OF COMM SYS139 4 ABS UPDATE COOR. OF COMM
Applicable Model No.	All Series in Lathe Machines
Description	the updating coordinates value of servo transmitting absolute type encoder伺服

SYS125、130、135、140

Chinese Display	SYS125 Servo Communication ABS Status:X AXIS SYS130 Servo Communication ABS Status:Y AXIS SYS135 Servo Communication ABS Status:Z AXIS SYS140 Servo Communication ABS Status:4 AXIS
English Display	SYS125 X ABS STATUS OF COMM. SYS130 Y ABS STATUS OF COMM. SYS135 Z ABS STATUS OF COMM. SYS140 4 ABS STATUS OF COMM.
Applicable Model No.	All Series in Lathe Machines
Description	Reading Status of Servo Transmitting Absolute Type Encoders (0:Normal,-1: Error)

SYS126、131、136、141

Chinese Display	SYS126 Servo Communication ABS Error Code:X AXIS SYS131 Servo Communication ABS Error Code:Y AXIS SYS136 Servo Communication ABS Error Code:Z AXIS SYS141 Servo Communication ABS Error Code:4 AXIS
English Display	SYS126 X ABS ERROR CODE OF COMM. SYS131 Y ABS ERROR CODE OF COMM. SYS136 Z ABS ERROR CODE OF COMM. SYS141 4 ABS ERROR CODE OF COMM.
Applicable Model No.	All Series in Lathe Machines
Description	Servo Transmitting Reading Absolute Type Encoder Error Code 0：Normal。-1：Reading Command Repeating.Please check PLC's sequence. -2：Error Code Sent Back From Servo Drivers. Please check controller's Param Setting is correct or not. -3：Error Code Sent Back From Servo Drivers. Please check controller' s Param

	Setting is correct or not. -4: Transmittion Error. Please check COM port type, servo driver's parameters, series transmitting cables and controller's parameter setting are correct or not.

D9 Machine First Time Using Servo Communication Absolute Type Encoder

Machine first time using servi comm. absolute type encoders operating steps are in the followings.

i. Refer to the description to accomplish servo driver's parameters, series transmitting cable, and controller parameter setting and related PLC editing.

ii. After turning on the controller, loose the EMG button. At this time, the system will read absolute type encoders of each axis and updating the coordinates. HMI will display ABS symbol, this symbol will disappear after the system finishes reading.

iii. After updating the coordinates, if there is over travel limit alarm, please enable servo communication ABS updating reference points function at this time. After finishing updating, the alarm will disappear.And then the operator is able to adjust machine reference point. After adjustment, please enable once again servo communication ABS updating reference points function.。

iv. If it happens Absolute Type Encoder Value Servo Communication Errors Alarm (MOT4134~4137), please exclude them according to the error code of system information.

System Info. No.	Description
SYS126	Servo Communication ABS Error Code:X AXIS
SYS131	Servo Communication ABS Error Code:Y AXIS
SYS136	Servo Communication ABS Error Code:Z AXIS
SYS141	Servo Communication ABS Error Code:4 AXIS
Error CodeDescription	Error Code of Servo Transmitting Reading Absolute Type Encoder (0:OK,-1:S.E., -2:T.E., -3:T.E., -4:E.C.)

0：Normal

-1：Reading Command Repeating. Please check PLC editing if it is correct.

-2：Servo Drivers Sent Back Error Code. Please check controllers parameters setting are correct or not.

-3：Servo Drivers Sent Back Error Code. Please check controllers parameters setting are correct or not.

-4：Transmitting Error. Please check COM port type, servo driver's parameters, series connecting cable and controller's parameter setting are correct or not.