

# SyncAxes

## Closed loop Stepper motor controller

### G/M Code instruction

# REVISION HISTORY

Rev.	Date	History
Rev. 1.0.0	2019/05/07	Version 1.0.0 Released

# CONTENTS

- Normal G/M Code
- Exclusive M Code for Motion9D
  - Controller
  - Machine
  - Pin Definition
  - PWM
  - Work Coordinate Systems
  - Encoder

NORMAL G/M CODE

# MOVEMENT

- G0 -> G1
- G1 - Coordinated Movement X Y Z A B C
- G2 - Clockwise Arc
- G3 - Counter-clockwise Arc
- G4 - Dwell S<seconds> or P<ms>
- G17 - Arc plane -- XY
- G18 - Arc plane -- XZ
- G19 - Arc plane -- YZ
- G92 - Set the "current position" for X Y Z A B C
- M400 - Finish all moves
- M999 - Restart after an Emergency Stop

# SD CARD

- M20 - List SD card
- M21 - Init SD card
- M22 - Release SD card
- M23 - Select an SD file by DOS path (M23 dospath/to/file.g)
- M24 - Start/resume SD print
- M25 - Pause SD print
- M26 - Set SD position in bytes
- M27 - Report SD print status
- M28 - Start SD write
- M30 - Delete file from SD
- M31 - Print the time since SD print started, or since the most recent M109 command
- M32 - Select file and start SD print. Can be used within G-Code files to include other files.
- M928 - Start SD logging. Stop logging with M29.

# HARDWARE CONTROL

- M3 - Change Digital Output Ch5 status High.
- M5 - Change Digital Output Ch5 status Low.
- M6 - Change Digital Output Ch6 status High.
- M7 - Change Digital Output Ch6 status Low.
- M8 - Change Digital Output Ch7 status High.
- M9 - Change Digital Output Ch7 status Low.
- M70 - Change Digital Output Ch8 status High.
- M71 - Change Digital Output Ch8 status Low.
- M72 - Change Digital Output Ch9 status High.
- M73 - Change Digital Output Ch9 status Low.
- M85 - Set inactivity shutdown timer with parameter S<seconds>. Disable with "M85" or "M85 S0".
- M112 - Emergency stop. Requires hardware reset!!
- M226 - Wait for a pin to be in some state: P<pin number> S<pin state>

# OTHER

- M114 - Output current position to serial port
- M300 - Play a beep sound.
- G53 - Tool machine coordinate selection (mechanical coordinate system)
- G54~G59 - Tool machine coordinate selection (working coordinate system)
- G90 - Use Absolute Coordinates
- G91 - Use Relative Coordinates
- M92 - Set axis\_steps\_per\_unit
- M220 - Set speed factor override percentage: S<factor in percent>
- G28 - Home one or more axes.



# OTHER

- M17 - Enable/Power all stepper motors
- M18 -> M84
- M84 - Disable steppers until the next move, or set the inactivity timeout after which steppers should be disabled.
- M665 - Set Delta configurations: S<segments/s>
- M666 - Set Delta endstop adjustment: X<x-adjustment> Y<y-adjustment> Z<z-adjustment>

EXCLUSIVE M CODE FOR  
MOTION9D

# M86000

- Description :  
Load default setting.(on current disk)
- Parameters :  
S0~S999. (Number represent the file name index)
- Returns :  
SUCCESS / ERROR
- Example :  
M86000 S1 : Load Motion9D\_SETTINGS001.INI setting  
M86000 S17 : Load Motion9D\_SETTINGS017.INI setting

# M86001

- Description :  
Save current setting (On current Disk)
- Parameters :  
S0~S999 (Number represent the file name index)
- Returns :  
SUCCESS / ERROR
- Example :  
M86001 S1 : Save current setting to  
MOTION9D\_SETTINGS001.INI

# M86002

- Description :  
Display/Reset Working time history
- Parameters :  
Non – Show Working Time  
C – Clear Working Time
- Returns :  
Working Time/Clear Working Time
- Example :  
M86002 : Display machine has Working XX Hr: XX Mins: XX  
Secs

# M86005

- Description :  
Select G Code file source disk
- Parameters :  
S – Selected Disk  
    (1) Master Disk  
    (2) Slave Disk
- Returns :  
    SUCCESS / ERROR
- Example :  
    M86005 S1 : G Code source is Master Disk

# M86006

- Description :  
Return SD Card or USB remain space
- Parameters :  
S – Selected Disk
  - (0) Internal Disk
  - (1) Master Disk
  - (2) Slave Disk
- Returns :  
Remain Space
- Example :  
M86006 S1 : Master Disk Remain Space

# M86007

- Description :  
The input message is displayed on the RH software
- Parameters :  
S – message
- Returns :  
Input message
- Example :  
M86007 SMotion9D :  
RH Software will show " Motion9D"



# M86008

➤Description :

Set Delta endstop adjustment

➤Parameters :

X – x-Adjustment

Y – y-Adjustment

Z – z-Adjustment

A – Tower A Position Correction

B – Tower B Position Correction

C – Tower C Position Correction

I – Tower I Radius Correction

J – Tower J Radius Correction

K – Tower K Radius Correction

# M86008

➤Parameters :

R – Delta Radius

D – DELTA\_DIAGONAL\_ROD

H – Z-Height

➤Returns :

Non

➤Example :

M86008 X1 Y1 Z0.5 ∙∙∙: Set Delta parameters (same as M666)

# M86009

➤Description :

Calculated for each axis steps/mm

➤Parameters :

S – Mode

(0) Belt Driven Systems

(1) Leadscrew Driven Systems

A – Motor step angle

(0) 1.8 (200 per revolution)

(1) 0.9 (400 per revolution)

(2) 7.5 (48 per revolution)

B – Belt Pitch (mm)

P – Pulley tooth count

L – Leadscrew Pitch (mm/revolution)

# M86009

## ➤Parameters :

D – Driver microstepping

(0) 1 : full step

(1) 1/2 : half step

(2) 1/4: quater step

(3) 1/8 : ustep

(4) 1/16 : ustep

(5) 1/64 : ustep

R – Gear ratio

## ➤Returns :

After calculated steps/mm

## ➤Example :

M86009 S0 A0 D4 B2 P20 : After entering the parameter belt drive system to get step per mm : 80

# M86017

- Description :  
Display Internet IP / Port
- Parameters :  
Non
- Returns :  
IP and Port
- Example :  
M86017 : Display Internet IP / Port

# M86901

- Description :  
Enable DMP function
- Parameters :  
Non
- Returns :  
Non
- Example :  
M86901
- Remark :  
Please add M86901 to the beginning(G Code)

# M86902

- Description :  
Disable DMP function
- Parameters :  
Non
- Returns :  
Non
- Example :  
M86902
- Remark :  
Please add M86902 to the end(G Code)

# M86903

- Description :  
Close sound
- Parameters :  
Non
- Returns :  
Non
- Example :  
M86903



[CONTROLLER]

[КОНТРОЛЛЕР]

# M86100

➤Description :

Set Machine Type

➤Parameters :

S – Machine Type

(0) Normal

(1) H-Bot / Core-XY

(2) Delta

(3) MANIPULATOR

➤Returns :

SUCCESS / ERROR

➤Example :

M86100 S1

# M86101

- Description :  
Set Baudrate (FTDI Chipset version)
- Parameters :  
S – Baudrate
- Returns :  
SUCCESS / ERROR
- Example :  
M86101 S1000000

# M86102

- Description :  
Set pulse generating algorithms
- Parameters :  
S – pulse generating algorithms  
(0) Linear Approximate  
(1) precise Discretization
- Returns :  
SUCCESS / ERROR
- Example :  
M86102 S1

# M86103

➤Description :

Set Maximum Pulse Speed

➤Parameters :

S – Pulse Speed (Hz)

Support speed :10000/40000/50000/100000/200000/250000

➤Returns :

SUCCESS / ERROR

➤Example :

M86103 S250000

# M86104

- Description :  
Set Pulse Duty Ratio
- Parameters :  
S – Pulse Duty Ratio (0.0~1.0)
- Returns :  
SUCCESS / ERROR
- Example :  
M86104 S0.5

# M86105

- Description :  
Set each block Min pulse number
- Parameters :  
S – Pulse number
- Returns :  
SUCCESS / ERROR
- Example :  
M86105 S0

# M86106

- Description :  
Max / Min Software limit Switch
- Parameters :  
S – Min software limit  
T – Max software limit  
(0 : disable; non zero : enable)
- Returns :  
SUCCESS / ERROR
- Example :  
M86106 S1 T1



# M86107

- Description :  
G2 /G3 Circular interpolation parameter settings
- Parameters :  
S – mm Per arc segment  
T – Number arc correction
- Returns :  
SUCCESS / ERROR
- Example :  
M86107 S1 T25

# M86108

➤Description :

Hardware Minimum Limit Switch

➤Parameters :

X – X Min Endstop Enable

Y – Y Min Endstop Enable

Z – Z Min Endstop Enable

A – A Min Endstop Enable

B – B Min Endstop Enable

C – C Min Endstop Enable

( 0 : disable; 1 : enable)

➤Returns :

SUCCESS / ERROR

➤Example :

M86108 X1 Y1 Z1 A1 B1 C1

# M86109

➤Description :

Hardware Maximum Limit Switch

➤Parameters :

X – X Max Endstop Enable

Y – Y Max Endstop Enable

Z – Z Max Endstop Enable

A – A Max Endstop Enable

B – B Max Endstop Enable

C – C Max Endstop Enable

( 0 : disable; 1 : enable)

➤Returns :

SUCCESS / ERROR

➤Example :

M86109 X0 Y0 Z0 A0 B0 C0

# M86115

➤Description :

Auto print after boot

➤Parameters :

S – Auto print

(0) Disable

(1) Enable

T – Time (ms)

F – File name

➤Returns :

SUCCESS / ERROR

➤Example :

M86115 S1 T3000 Fauto.gcode

# M86116

➤Description :

SD card print added start / end of the G Code

➤Parameters :

S –Add start G Code

T –Add end G Code

(0) Disable

(1) Enable

➤Returns :

SUCCESS / ERROR

➤Example :

M86116 S1 T1

# M86121

- Description :  
SET USED\_AXIS
- Parameters :  
S – AXIS Number (3~9)
- Returns :  
SUCCESS / ERROR
- Example :  
M86121 S6
- Remark : Need to Save and reboot controller

# M86122

- Description :  
Enable Ethernet
- Parameters :  
S –Ethernet enable  
(0) Disable  
(1) Enable
- Returns :  
SUCCESS / ERROR
- Example :  
M86122 S0

# M86123

- Description :  
Enable DHCP
- Parameters :  
S –DHCP Enable  
    (0) Disable  
    (1) Enable  
T – IP
- Returns :  
SUCCESS / ERROR
- Example :  
M86123 S1 T192.168.1.199



# M86124

- Description :  
Set Ethernet Port
- Parameters :  
S –Port
- Returns :  
SUCCESS / ERROR
- Example :  
M86124 S8867

# M86125

- Description :  
G Code transmission Timeout time
- Parameters :  
S –Time (Must >20000 ms)
- Returns :  
SUCCESS / ERROR
- Example :  
M86125 S30000

# M86126

- Description :  
Set motors sleep time
- Parameters :  
S –Time (Set to 0, mean disable)
- Returns :  
SUCCESS / ERROR
- Example :  
M86126 S180000

# M86128

- Description :  
Enable buzzer
- Parameters :  
S – buzzer  
(0) Disable  
(1) Enable
- Returns :  
SUCCESS / ERROR
- Example :  
M86128 S1

# M86130

## ➤Description :

Before motor sleep mode, enable return to home position

## ➤Parameters :

S – switch

(0) Disable

(1) Enable

## ➤Returns :

SUCCESS / ERROR

## ➤Example :

M86130 S1

# M86131

- Description :  
Forbid single axis return to home
- Parameters :
  - X – X Axis
  - Y – Y Axis
  - Z – Z Axis
    - (0) Disable
    - (1) Enable
- Returns :  
SUCCESS / ERROR
- Example :  
M86131 X1 Y1 Z0

# M86132

➤Description :

Connection RH software related settings

➤Parameters :

T – Timeout (ms)

A – M105 connection

B – M110 connection

(0) Disable

(1) Enable

➤Returns :

SUCCESS / ERROR

➤Example :

M86132 T5000 A1 B0

# M86133

- Description :  
Respond command after M86902
- Parameters :  
S – Switch  
    (0) Disable  
    (1) Enable
- Returns :  
    SUCCESS / ERROR
- Example :  
    M86133 S0



# M86135

- Description :  
when power on, needs to homing.
- Parameters :  
S – Switch  
(0) Disable  
(1) Enable
- Returns :  
SUCCESS / ERROR
- Example :  
M86135 S1

[MACHINE]

[MACHINE]

# M86200

➤Description :

Set each axis Steps Per mm (Motor space)

➤Parameters :

X – X axis Steps per mm

Y – Y axis Steps per mm

Z – Z axis Steps per mm

A – A axis Steps per mm

B – B axis Steps per mm

C – C axis Steps per mm

➤Returns :

SUCCESS / ERROR

➤Example :

M86200 X40.0 Y40.0 Z201.93 A47.99 B47.99 C40.0

# M86201

- Description :  
Set default acceleration
- Parameters :  
S – default acceleration (mm/sec<sup>2</sup>)
- Returns :  
SUCCESS / ERROR
- Example :  
M86201 S1000.0

# M86202

➤Description :

Set each motors MAX acceleration

➤Parameters :

X – X motor MAX acceleration (mm/sec<sup>2</sup>)

Y – Y motor MAX acceleration (mm/sec<sup>2</sup>)

Z – Z motor MAX acceleration (mm/sec<sup>2</sup>)

A – A motor MAX acceleration (mm/sec<sup>2</sup>)

B – B motor MAX acceleration (mm/sec<sup>2</sup>)

C – C motor MAX acceleration (mm/sec<sup>2</sup>)

➤Returns :

SUCCESS / ERROR

➤Example :

M86202 X3000.0 Y3000.0 Z20.0 A9000.0 B20 C20

# M86203

➤Description :

Set the Min feed rate and Jerk

➤Parameters :

S – Min feed speed (mm/sec)

T – Travel feed speed (mm/sec)

X – XY motor Jerk (mm/sec)

Z – Z motor Jerk (mm/sec)

A – A motor Jerk (mm/sec)

B – B motor Jerk (mm/sec)

C – C motor Jerk (mm/sec)

➤Returns :

SUCCESS / ERROR

➤Example :

M86203 S0.0 T0.0 X20.0 Z0.4 A5.0 B5.0 C5.0

# M86204

➤Description :

Set each Motor MAX feed speed

➤Parameters :

X – X motor MAX feed speed (mm/sec)

Y – Y motor MAX feed speed (mm/sec)

Z – Z motor MAX feed speed (mm/sec)

A – A motor MAX feed speed (mm/sec)

B – B motor MAX feed speed (mm/sec)

C – C motor MAX feed speed (mm/sec)

➤Returns :

SUCCESS / ERROR

➤Example :

M86202 X100.0 Y100.0 Z10.0 A100.0 B100.0 C10.0

# M86205

- Description :  
Set XYZ axis Home procedure
- Parameters :  
S – Order
  - (0) XYZ
  - (1) XZY
  - (2) YXZ
  - (3) ZXY
  - (4) YZX
  - (5) ZYX
- Returns :  
SUCCESS / ERROR
- Example :  
M86205 S2



# M86206

➤Description :

Set each axis Home speed

➤Parameters :

X – X axis Home speed (mm/min)

Y – Y axis Home speed (mm/min)

Z – Z axis Home speed (mm/min)

A – A axis Home speed (mm/min)

B – B axis Home speed (mm/min)

C – C axis Home speed (mm/min)

➤Returns :

SUCCESS / ERROR

➤Example :

M86206 X100.0 Y100.0 Z10.0 A100.0 B100.0 C10.0

# M86207

➤Description :

Set each axis Home direction

➤Parameters :

X – X axis Home direction

Y – Y axis Home direction

Z – Z axis Home direction

A – A axis Home direction

B – B axis Home direction

C – C axis Home direction

(1 : Positive direction; -1 : Negative direction)

➤Returns :

SUCCESS / ERROR

➤Example :

M86207 X-1 Y1 Z-1 A1 B1 C1

# M86208

## ➤Description :

Set each Axis Home procedure, move back distance after the touch limit

## ➤Parameters :

X – X axis move back distance (mm)

Y – Y axis move back distance (mm)

Z – Z axis move back distance (mm)

A – A axis move back distance (mm)

B – B axis move back distance (mm)

C – C axis move back distance (mm)

## ➤Returns :

SUCCESS / ERROR

## ➤Example :

M86208 X5 Y5 Z2 A5 B5 C5

# M86209

➤Description :

Set each axis home coordinate

➤Parameters :

X – X axis Home coordinate (mm)

Y – Y axis Home coordinate (mm)

Z – Z axis Home coordinate (mm)

A – A axis Home coordinate (mm)

B – B axis Home coordinate (mm)

C – C axis Home coordinate (mm)

➤Returns :

SUCCESS / ERROR

➤Example :

M86209 X0 Y100 Z0 A0 B0 C0

# M86210

➤Description :

Set each axis Home position offset (Offset calculation on software)

➤Parameters :

X – X axis Home position offset (mm)

Y – Y axis Home position offset (mm)

Z – Z axis Home position offset (mm)

A – A axis Home position offset (mm)

B – B axis Home position offset (mm)

C – C axis Home position offset (mm)

➤Returns :

SUCCESS / ERROR

➤Example :

M86210 X0 Y0 Z0 A0 B0 C0

# M86211

➤Description :

Set each axis Home position offset (Hardware actual offset)

➤Parameters :

X – X axis Home position offset (mm)

Y – Y axis Home position offset (mm)

Z – Z axis Home position offset (mm)

A – A axis Home position offset (mm)

B – B axis Home position offset (mm)

C – C axis Home position offset (mm)

➤Returns :

SUCCESS / ERROR

➤Example :

M86211 X0 Y0 Z0 A0 B0 C0

# M86212

- Description :  
Set X axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86212 S0 T100

# M86213

- Description :  
Set Y axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86213 S0 T100



# M86214

- Description :  
Set Z axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86214 S0 T150

# M86215

- Description :  
Set Delta type parameters
- Parameters :  
S – SMOOTH ROD OFFSET  
E – EFFECTOR OFFSET  
C – CARRIAGE OFFSET
- Returns :  
SUCCESS / ERROR
- Example :  
M86215 S175 E33 C18

# M86216

➤Description :

Set Delta type parameters

➤Parameters :

X – x-Adjustment

Y – y-Adjustment

Z – z-Adjustment

A – Tower A Position Correction

B – Tower B Position Correction

C – Tower C Position Correction

I – Tower I Radius Correction

J – Tower J Radius Correction

K – Tower K Radius Correction

# M86216

## ➤Parameters :

R – Delta Radius

D – DELTA\_DIAGONAL\_ROD

H – Z-Height

## ➤Returns :

Non

## ➤Example :

M86216 X1 Y1 Z0.5 ...: set Delta parameters (same as Marlin M666)

# M86217

➤Description :

Set Delta parameters, How much segment per second

Parameters :

S – Segment

➤Returns :

SUCCESS / ERROR

➤Example :

M86217 S200

# M86218

- Description :  
Set A axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86218 S0 T150

# M86219

- Description :  
Set B axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86219 S0 T150

# M86220

- Description :  
Set C axis travel range
- Parameters :  
S – Min travel (mm)  
T – Max travel (mm)
- Returns :  
SUCCESS / ERROR
- Example :  
M86220 S0 T150



[PIN DEFINITION]

[PIN DEFINITION]

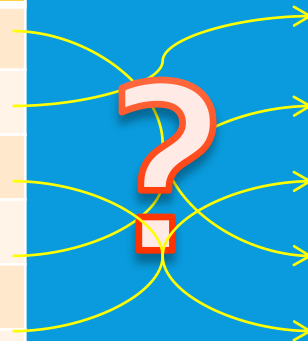
# M86302

## ➤Description :

Change each axis negative direction limit switch input source

X\_MIN\_ENDSTOP\_MAPPING  
Y\_MIN\_ENDSTOP\_MAPPING  
Z\_MIN\_ENDSTOP\_MAPPING  
A\_MIN\_ENDSTOP\_MAPPING  
B\_MIN\_ENDSTOP\_MAPPING  
C\_MIN\_ENDSTOP\_MAPPING

Software
(X) X_MIN_ENDSTOP_MAPPING
(Y) Y_MIN_ENDSTOP_MAPPING
(Z) Z_MIN_ENDSTOP_MAPPING
(A) A_MIN_ENDSTOP_MAPPING
(B) B_MIN_ENDSTOP_MAPPING
(C) C_MIN_ENDSTOP_MAPPING



Hardware
(0) X-STOP
(1) Y-STOP
(2) Z-STOP
(3) A-STOP
(4) B-STOP
(5) C-STOP
(-1) Not Used

# M86302

(Cont.)

## ➤Parameters :

X – the specified value of X\_MIN\_ENDSTOP\_MAPPING

Y – the specified value of Y\_MIN\_ENDSTOP\_MAPPING

Z – the specified value of Z\_MIN\_ENDSTOP\_MAPPING

A – the specified value of A\_MIN\_ENDSTOP\_MAPPING

B – the specified value of B\_MIN\_ENDSTOP\_MAPPING

C – the specified value of C\_MIN\_ENDSTOP\_MAPPING

## ➤Returns :

SUCCESS/ERROR

# M86302 (Cont.)

## ➤ Examples :

M86302 X0 Y1 Z2 A3 B4 C5

(X\_MIN\_ENDSTOP\_MAPPING = 0)

(Y\_MIN\_ENDSTOP\_MAPPING = 1)

(Z\_MIN\_ENDSTOP\_MAPPING = 2)

(A\_MIN\_ENDSTOP\_MAPPING = 3)

(B\_MIN\_ENDSTOP\_MAPPING = 4)

(C\_MIN\_ENDSTOP\_MAPPING = 5)

Software	Hardware
(X) X_MIN_ENDSTOP_MAPPING	(0) X-STOP
(Y) Y_MIN_ENDSTOP_MAPPING	(1) Y-STOP
(Z) Z_MIN_ENDSTOP_MAPPING	(2) Z-STOP
(A) A_MIN_ENDSTOP_MAPPING	(3) A-STOP
(B) B_MIN_ENDSTOP_MAPPING	(4) B-STOP
(C) C_MIN_ENDSTOP_MAPPING	(5) C-STOP

# M86303

## ➤Description :

Change each axis positive direction limit switch input source

X\_MAX\_ENDSTOP\_MAPPING

Y\_MAX\_ENDSTOP\_MAPPING

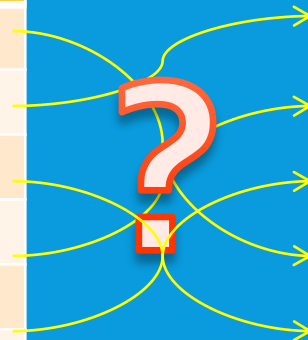
Z\_MAX\_ENDSTOP\_MAPPING

A\_MAX\_ENDSTOP\_MAPPING

B\_MAX\_ENDSTOP\_MAPPING

C\_MAX\_ENDSTOP\_MAPPING

Software
(X) X_MAX_ENDSTOP_MAPPING
(Y) Y_MAX_ENDSTOP_MAPPING
(Z) Z_MAX_ENDSTOP_MAPPING
(A) A_MAX_ENDSTOP_MAPPING
(B) B_MAX_ENDSTOP_MAPPING
(C) C_MAX_ENDSTOP_MAPPING



Hardware
(0) X-STOP
(1) Y-STOP
(2) Z-STOP
(3) A-STOP
(4) B-STOP
(5) C-STOP
(-1) Not Used

## M86303 (Cont.)

### ➤Parameters :

X – the specified value of X\_MAX\_ENDSTOP\_MAPPING

Y – the specified value of Y\_MAX\_ENDSTOP\_MAPPING

Z – the specified value of Z\_MAX\_ENDSTOP\_MAPPING

A – the specified value of A\_MAX\_ENDSTOP\_MAPPING

B – the specified value of B\_MAX\_ENDSTOP\_MAPPING

C – the specified value of C\_MAX\_ENDSTOP\_MAPPING

### ➤Returns :

SUCCESS/ERROR

# M86303 (Cont.)

## ➤ Examples :

M86303 X0 Y1 Z2 A3 B4 C5

(X\_MAX\_ENDSTOP\_MAPPING= 0)

(Y\_MAX\_ENDSTOP\_MAPPING = 1)

(Z\_MAX\_ENDSTOP\_MAPPING= 2)

(A\_MAX\_ENDSTOP\_MAPPING= 3)

(B\_MAX\_ENDSTOP\_MAPPING= 4)

(C\_MAX\_ENDSTOP\_MAPPING= 5)

Software	Hardware
(X) X_MAX_ENDSTOP_MAPPING	(0) X-STOP
(Y) Y_MAX_ENDSTOP_MAPPING	(1) Y-STOP
(Z) Z_MAX_ENDSTOP_MAPPING	(2) Z-STOP
(A) A_MAX_ENDSTOP_MAPPING	(3) A-STOP
(B) B_MAX_ENDSTOP_MAPPING	(4) B-STOP
(C) C_MAX_ENDSTOP_MAPPING	(5) C-STOP

# M86304

## ➤Description :

Change each axis negative direction limit switch polarity

X\_MIN\_ENDSTOP\_POLARITY

Y\_MIN\_ENDSTOP\_POLARITY

Z\_MIN\_ENDSTOP\_POLARITY

A\_MIN\_ENDSTOP\_POLARITY

B\_MIN\_ENDSTOP\_POLARITY

C\_MIN\_ENDSTOP\_POLARITY

HW Signal	Polarity	SW Signal
0	0	0
1	0	1
0	1	1
1	1	0



# M86304

(Cont.)

➤Parameters :

X – the specified value of X\_MIN\_ENDSTOP\_POLARITY

Y – the specified value of Y\_MIN\_ENDSTOP\_POLARITY

Z – the specified value of Z\_MIN\_ENDSTOP\_POLARITY

A – the specified value of A\_MIN\_ENDSTOP\_POLARITY

B – the specified value of B\_MIN\_ENDSTOP\_POLARITY

C – the specified value of C\_MIN\_ENDSTOP\_POLARITY

➤Returns :

SUCCESS/ERROR

➤Examples :

M86304 X0 Y0 Z0 A0 B0 C0

(X\_MIN\_ENDSTOP\_POLARITY = 0)

(Y\_MIN\_ENDSTOP\_POLARITY = 0)

(Z\_MIN\_ENDSTOP\_POLARITY = 0)

(A\_MIN\_ENDSTOP\_POLARITY = 0)

(B\_MIN\_ENDSTOP\_POLARITY = 0)

(C\_MIN\_ENDSTOP\_POLARITY = 0)

# M86305

## ➤Description :

Change each axis positive direction limit switch polarity

X\_MAX\_ENDSTOP\_POLARITY

Y\_MAX\_ENDSTOP\_POLARITY

Z\_MAX\_ENDSTOP\_POLARITY

A\_MAX\_ENDSTOP\_POLARITY

B\_MAX\_ENDSTOP\_POLARITY

C\_MAX\_ENDSTOP\_POLARITY

HW Signal	Polarity	SW Signal
0	0	0
1	0	1
0	1	1
1	1	0

# M86305 (Cont.)

## ➤Parameters :

- X – the specified value of X\_MAX\_ENDSTOP\_POLARITY
- Y – the specified value of Y\_MAX\_ENDSTOP\_POLARITY
- Z – the specified value of Z\_MAX\_ENDSTOP\_POLARITY
- A – the specified value of A\_MAX\_ENDSTOP\_POLARITY
- B – the specified value of B\_MAX\_ENDSTOP\_POLARITY
- C – the specified value of C\_MAX\_ENDSTOP\_POLARITY

## ➤Returns :

SUCCESS/ERROR

## ➤Examples :

M86305 X0 Y0 Z0 A0 B0 C0

- (X\_MAX\_ENDSTOP\_POLARITY = 0)
- (Y\_MAX\_ENDSTOP\_POLARITY = 0)
- (Z\_MAX\_ENDSTOP\_POLARITY = 0)
- (A\_MAX\_ENDSTOP\_POLARITY = 0)
- (B\_MAX\_ENDSTOP\_POLARITY = 0)
- (C\_MAX\_ENDSTOP\_POLARITY = 0)

# M86306

## ➤Description :

Change each motor output port

QX\_MOTOR\_MAPPING

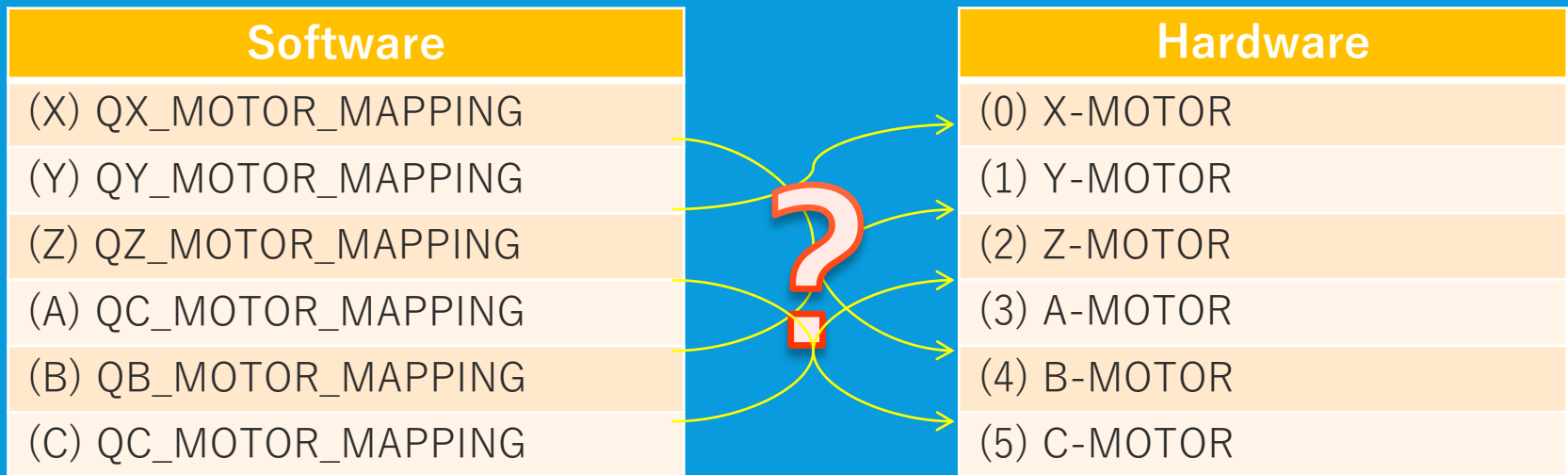
QY\_MOTOR\_MAPPING

QZ\_MOTOR\_MAPPING

QA\_MOTOR\_MAPPING

QB\_MOTOR\_MAPPING

QC\_MOTOR\_MAPPING



# M86306

(Cont.)

## ➤Parameters :

- X – the specified value of QX\_MOTOR\_MAPPING
- Y – the specified value of QY\_MOTOR\_MAPPING
- Z – the specified value of QZ\_MOTOR\_MAPPING
- A – the specified value of QA\_MOTOR\_MAPPING
- B – the specified value of QB\_MOTOR\_MAPPING
- C – the specified value of QC\_MOTOR\_MAPPING

## ➤Returns :

SUCCESS/ERROR

# M86306 (Cont.)

## ➤ Examples :

M86306 X0 Y1 Z2 A3 B4 C5

(QX\_MOTOR\_MAPPING = 0)

(QY\_MOTOR\_MAPPING = 1)

(QZ\_MOTOR\_MAPPING = 2)

(QA\_MOTOR\_MAPPING = 3)

(QB\_MOTOR\_MAPPING = 4)

(QC\_MOTOR\_MAPPING = 5)

Software	Hardware
(X) QX_MOTOR_MAPPING	(0) X-MOTOR
(Y) QY_MOTOR_MAPPING	(1) Y-MOTOR
(Z) QZ_MOTOR_MAPPING	(2) Z-MOTOR
(A) QA_MOTOR_MAPPING	(3) A-MOTOR
(B) QB_MOTOR_MAPPING	(4) B-MOTOR
(C) QC_MOTOR_MAPPING	(5) C-MOTOR

# M86307

## ➤Description :

Change each axis motor pulse signal polarity

QX\_PULSE\_POLARITY




QY\_PULSE\_POLARITY

QZ\_PULSE\_POLARITY

QA\_PULSE\_POLARITY

QB\_PULSE\_POLARITY

QC\_PULSE\_POLARITY

PULSE Output	Polarity	Actual Output
	0	
	1	

# M86307 (Cont.)

## ➤Parameters :

- X – the specified value of QX\_PULSE\_POLARITY
- Y – the specified value of QY\_PULSE\_POLARITY
- Z – the specified value of QZ\_PULSE\_POLARITY
- A – the specified value of QA\_PULSE\_POLARITY
- B – the specified value of QB\_PULSE\_POLARITY
- C – the specified value of QC\_PULSE\_POLARITY

## ➤Returns :

SUCCESS/ERROR

## ➤Examples :

```
M86307 X0 Y0 Z0 A0 B0 C0
(QX_PULSE_POLARITY = 0)
(QY_PULSE_POLARITY = 0)
(QZ_PULSE_POLARITY = 0)
(QA_PULSE_POLARITY = 0)
(QB_PULSE_POLARITY = 0)
(QC_PULSE_POLARITY = 0)
```



# M86308

## ➤Description :

Change each motor direction polarity

QX\_DIR\_POLARITY




QY\_DIR\_POLARITY

QZ\_DIR\_POLARITY

QA\_DIR\_POLARITY

QB\_DIR\_POLARITY

QC\_DIR\_POLARITY

DIR Output	Polarity	Actual Output
	0	
	1	

# M86308 (Cont.)

## ➤Parameters :

- X – the specified value of QX\_DIR\_POLARITY
- Y – the specified value of QY\_DIR\_POLARITY
- Z – the specified value of QZ\_DIR\_POLARITY
- A – the specified value of QA\_DIR\_POLARITY
- B – the specified value of QB\_DIR\_POLARITY
- C – the specified value of QC\_DIR\_POLARITY

## ➤Returns :

SUCCESS/ERROR

## ➤Examples :

```
M86308 X1 Y1 Z1 A0 B0 C0
(QX_DIR_POLARITY    = 1)
(QY_DIR_POLARITY    = 1)
(QZ_DIR_POLARITY    = 1)
(QA_DIR_POLARITY    = 0)
(QB_DIR_POLARITY    = 0)
(QC_DIR_POLARITY    = 0)
```

# M86309

## ➤Description :

Change each motor Enable signal polarity

QX\_ENABLE\_POLARITY




QY\_ENABLE\_POLARITY

QZ\_ENABLE\_POLARITY

QA\_ENABLE\_POLARITY

QB\_ENABLE\_POLARITY

QC\_ENABLE\_POLARITY

ENABLE Output	Polarity	Actual Output
	0	
	1	

# M86309

(Cont.)

➤Parameters :

X – the specified value of QX\_ENABLE\_POLARITY

Y – the specified value of QY\_ENABLE\_POLARITY

Z – the specified value of QZ\_ENABLE\_POLARITY

A – the specified value of QA\_ENABLE\_POLARITY

B – the specified value of QB\_ENABLE\_POLARITY

C – the specified value of QC\_ENABLE\_POLARITY

➤Returns :

SUCCESS/ERROR

➤Examples :

M86309 X1 Y1 Z1 A1 B1 C1

(QX\_ENABLE\_POLARITY = 1)

(QY\_ENABLE\_POLARITY = 1)

(QZ\_ENABLE\_POLARITY = 1)

(QA\_ENABLE\_POLARITY = 1)

(QB\_ENABLE\_POLARITY = 1)

(QC\_ENABLE\_POLARITY = 1)

[PWM]

[ьММ]

# M86400

## ➤Description :

Sent PWM Command

## ➤Parameters :

E – Specifies PWM Number

0) PWM 0

1) PWM 1

2) PWM 2

P – Specify PWM period (unit:10ns)

D – Select PWM duty (unit:10ns)

## ➤Returns :

SUCCESS/ERROR

## ➤Examples :

M86400 E0 D200000000 P500000000

(PWM0 High 2 sec than Low 3 sec per cycle)

# [WORK COORDINATE SYSTEMS]

SYSTEMS]  
COORDINATE  
[WORK

# M86500

- Description :  
Set G54 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86500 X10, Y-10 Z0 A0 B0 C0



# M86501

- Description :  
Set G55 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86501 X10, Y-10 Z0 A0 B0 C0

# M86502

- Description :  
Set G56 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86502 X10, Y-10 Z0 A0 B0 C0

# M86503

- Description :  
Set G57 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86503 X10, Y-10 Z0 A0 B0 C0

# M86504

- Description :  
Set G58 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86504 X10, Y-10 Z0 A0 B0 C0

# M86505

- Description :  
Set G59 Work coordinate origin
- Parameters :  
XYZABC – axis origin position
- Returns :  
SUCCESS / ERROR.
- Example :  
M86505 X10, Y-10 Z0 A0 B0 C0

# M86506

- Description :  
Set current position to G54 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86506 XYZABC

# M86507

- Description :  
Set current position to G55 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86507 XYZABC

# M86508

- Description :  
Set current position to G56 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86508 XYZABC



# M86509

- Description :  
Set current position to G57 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86509 XYZABC

# M86510

- Description :  
Set current position to G58 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86510 XYZABC

# M86511

- Description :  
Set current position to G59 Work coordinate origin
- Parameters :  
XYZABC – which axis be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86511 XYZABC

[ENCODER]

[ENCODER]

# M86600

- Description :  
Get Encoder position
- Parameters :  
XYZABC – which axis Encoder position be get
- Returns :  
SUCCESS / ERROR.
- Example :  
M86600 X (only get one axis encoder position at a time)

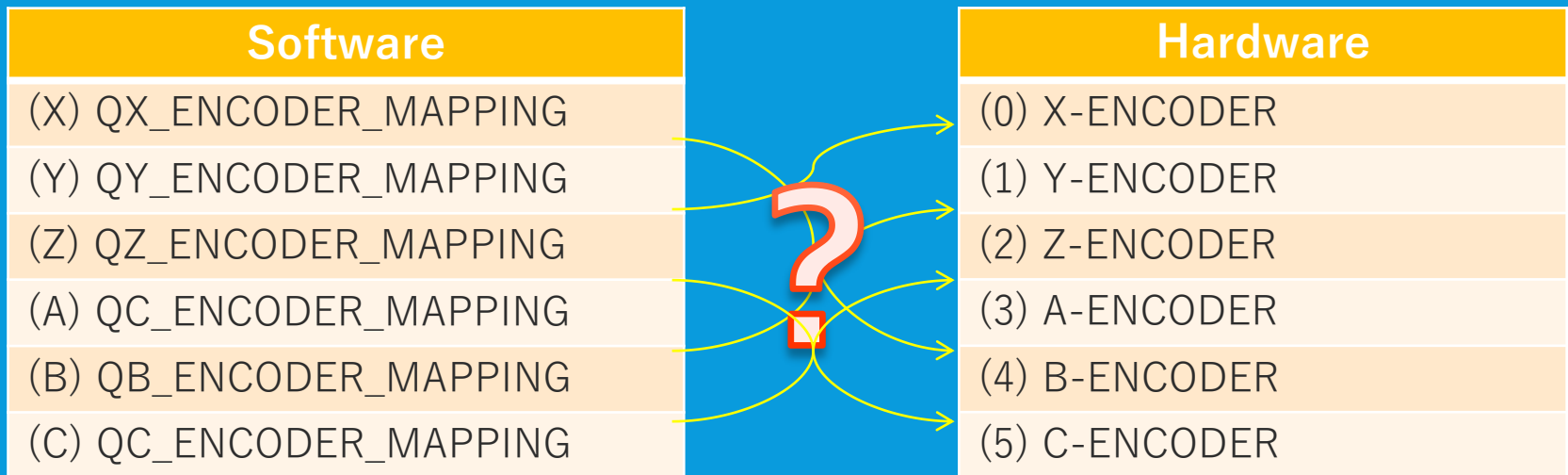
# M86601

- Description :  
Set Encoder position
- Parameters :  
XYZABC – which axis Encoder position be setting
- Returns :  
SUCCESS / ERROR.
- Example :  
M86601 X0 Y0

# M86602

## ➤Description :

Encoder output port mapping  
QX\_ENCODER\_MAPPING  
QY\_ENCODER\_MAPPING  
QZ\_ENCODER\_MAPPING  
QA\_ENCODER\_MAPPING  
QB\_ENCODER\_MAPPING  
QC\_ENCODER\_MAPPING



# M86602

(Cont.)

## ➤Parameters :

- X – the specified value of QX\_ENCODER\_MAPPING
- Y – the specified value of QY\_ENCODER\_MAPPING
- Z – the specified value of QZ\_ENCODER\_MAPPING
- A – the specified value of QA\_ENCODER\_MAPPING
- B – the specified value of QB\_ENCODER\_MAPPING
- C – the specified value of QC\_ENCODER\_MAPPING

## ➤Returns :

SUCCESS/ERROR



# M86602 (Cont.)

## ➤ Examples :

M86602 X0 Y1 Z2 A3 B4 C5

(QX\_ENCODER\_MAPPING = 0)

(QY\_ENCODER\_MAPPING = 1)

(QZ\_ENCODER\_MAPPING = 2)

(QA\_ENCODER\_MAPPING = 3)

(QB\_ENCODER\_MAPPING = 4)

(QC\_ENCODER\_MAPPING = 5)

Software		Hardware
(X) QX_ENCODER_MAPPING	→	(0) X-ENCODER
(Y) QY_ENCODER_MAPPING	→	(1) Y-ENCODER
(Z) QZ_ENCODER_MAPPING	→	(2) Z-ENCODER
(A) QA_ENCODER_MAPPING	→	(3) A-ENCODER
(B) QB_ENCODER_MAPPING	→	(4) B-ENCODER
(C) QC_ENCODER_MAPPING	→	(5) C-ENCODER

# M86603

➤Description :

Set each Encoder Count direction

➤Parameters :

X – X Encoder Count direction

Y – Y Encoder Count direction

Z – Z Encoder Count direction

A – A Encoder Count direction

B – B Encoder Count direction

C – C Encoder Count direction

(0 : Positive direction; 1 : Negative direction)

➤Returns :

SUCCESS / ERROR

➤Example :

M86207 X1 Y1 Z1 A1 B1 C1

END