7. GETTING STARTED

7.1 Protocol of SC08A

Like SC16A, SC08A has two types of protocol but the protocols are different with SC16A.

The 1st protocol is important which is uses to send command to SC08A, further control a particular servo to a position with a defined speed. 2nd protocol is for host to request the current position of servo. The 2nd protocol is alternative to user, if position reporting is not requirement, it can be ignored. If position reporting is required, please do remember to connect the Tx pin of SC08A to Rx pin of host.

Activate Servo Channel Command

The initial status for servo motor is deactivate. Users need to send this command to SC08A to activate selected channels or all channels before running the servo motor.

a) The command is being sent in packet format. Each packet consists of 2 bytes. Servo motor channel is from 0-16. Select '0' to activate/deactivate all servo motor from channel 1 to 8(if single SC08A used) or 1 to 16 (if double SC08A used).

    i.   1st byte: Mode + Servo motor channel

0b	1	1	0	x	x	x	x	x

Mode to activate servo channel

Servo motor channel

    ii.   2nd byte: On/Off

0b	0	0	0	0	0	0	0	x
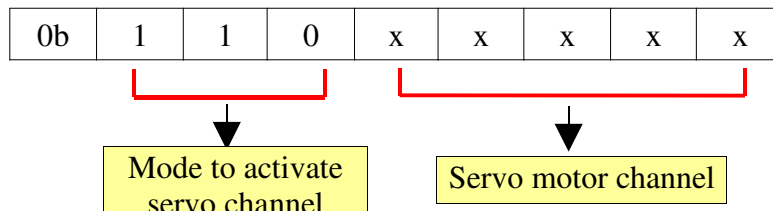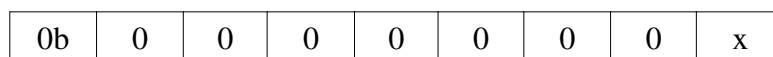
1 = activate motor
0 = deactivate motor

Position and Speed Command

Both computer and microcontroller actually send command to SC08A serially. This section explains the protocol to send command.

a) The command is being sent in packet format. Each packet consists of 4 bytes.

      i.   1st byte: Mode + Servo motor channel

      ii.   2nd byte: Position (Higher 7 bit)

      iii.   3rd byte: Position (Lower 6 bit)

      iv.   4th byte: Speed (0-100)

b) SC08A translate four bytes of data into three parameter:

Byte	Binary	Hexadecimal	Decimal
1st Byte	0b111XXXXX	0xE1 to 0xF0	224 to 240
2nd Byte	0b0XXXXXXX	0x00 to 0x7F	0 to 127
3rd Byte	0b00XXXXXX	0x00 to 0x3F	0 to 63
4th Byte	0b0XXXXXXX	0x00 to 0x64	0 to 100

      i.   1st byte is combination of mode and servo motor channel. Servo motor channel is from 0-16. Select '0' to activate all servo motor from channel 1 to 8(if single SC08A used) or 1 to 16 (if double SC08A used).

0b	1	1	1	x	x	x	x	x

Mode for position and speed command   Servo motor channel
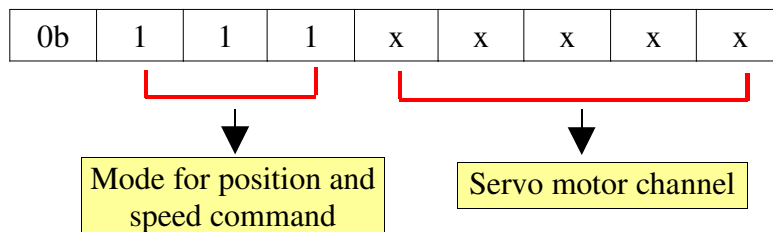
      ii.   2nd and 3rd byte combined to provide 13 bit data of servo position, 0-8000. The resolution of SC08A is 0.5us. It will start from 0.5ms and increase the duty cycle of pulses according to value of Position. Thus, following formula show the duty cycle of pulses generated:
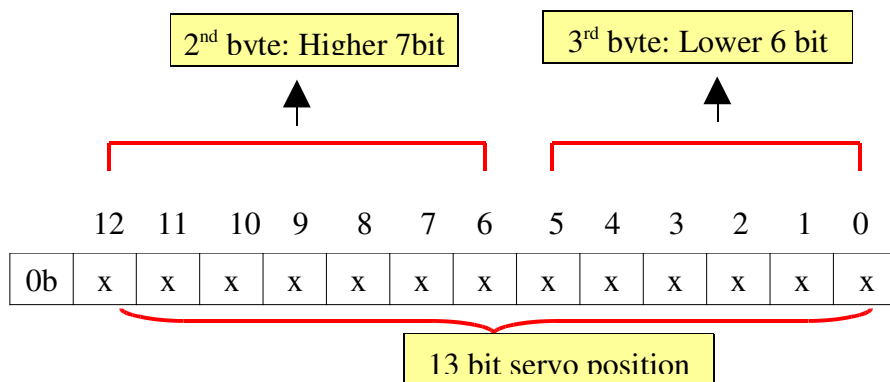
$$\text{Duty cycle} = (\text{resolution} \times \text{Servo Position}) + 0.5\text{ms}$$
$$= (0.25\text{us} \times \text{Servo Position}) + 0.5\text{ms}$$

2nd byte: Higher 7bit

0b	0	x	x	x	x	x	x	x
	7	6	5	4	3	2	1	0

3rd byte: Lower 6 bit

0b	0	0	x	x	x	x	x	x
	7	6	5	4	3	2	1	0

2nd byte: Higher 7bit   3rd byte: Lower 6 bit

	12	11	10	9	8	7	6	5	4	3	2	1	0
0b	x	x	x	x	x	x	x	x	x	x	x	x	x

13 bit servo position

iii.   4th byte represents the speed of servo rotation. The speed is from 0 –
100. The higher value, the faster and the lower value is servo will rotate to its
position. Decimal value '1' indicates that the servo will run at slowest speed
and decimal value '100' will run at fastest speed. However, value '0' is special
value. Value '0' is more faster than value '100'.

0b	0	x	x	x	x	x	x	x

Servo motor speed
from 0 - 100
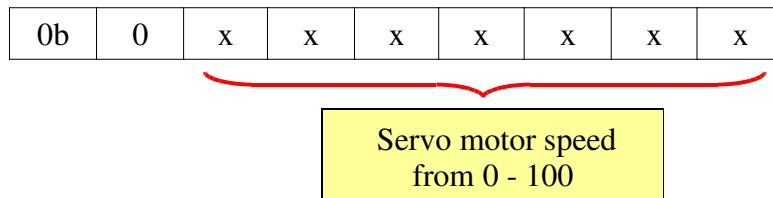
c) The speed of servo motor is depending on the brand of servo motors. Therefore,
different type of servo would result in different speed. For Cytron C36S servo, the
approximate time of speed range from 0 degree to 180 degree of rotation is shown as
follows:

Decimal value 0-100 for servo speed.

|	
0 = 0.3 seconds	64 = 3.60 seconds
1 = 2.0 minutes	80= 2.80 seconds
16 = 14 seconds	96 = 2.2 seconds
32 = 7.0 seconds	99 = 1.9 seconds
48 = 4.14 seconds	

d) For more details, user may refer to sample source code provided. Comments are being provided in the sample code to help user understanding.

Servo position reportingCommand

This section explains the position reporting command.

a) If position report is needed, the host (computer or microcontroller) should send this command to SC08A. The command is being sent in packet format. Each packet consists of a byte.

    i.   1st byte: Mode + Servo motor channel

0b	1	0	1	x	x	x	x	x

Mode for position reporting command

Servo motor channel (1-16).If '0' SC08A will ignore this command
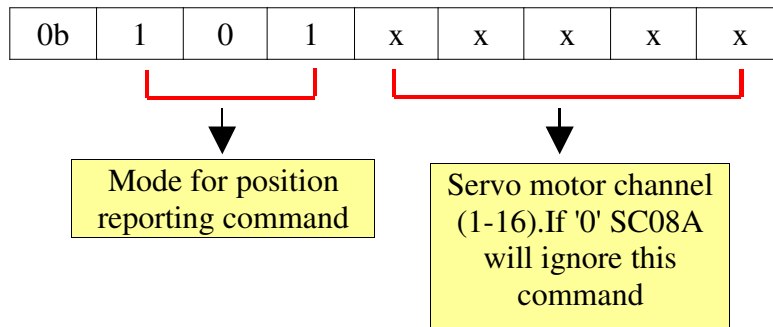
b) After receive reporting command, SC08A will reply the position for the regarding servo channel in 2 bytes. Please refer back to Position and Speed Command section (b)ii for the description of these 2 bytes.

    i.   1st bye: Position (Higher 7 bit)

    ii.   2nd byte: Position (Lower 6 bit)

c) User is requires to receive and process these 2 bytes. User may refer to sample source code provided. Comments are being provided in the sample code to help user understanding. Please refer to sample program named "SK40C_16F877A_SC08A.c".

Servo starting position Command

a) This command useful for users to initialize the starting position for servo motors. To initialize starting position, the command is being sent in packet format. Each packet consists of 3 bytes.

      i. 1st byte: Mode + Servo motor channel

      ii. 2nd byte: Position (Higher 7 bit)

      iii. 3rd byte: Position (Lower 6 bit)

b) 1st byte is combination from mode and servo motor channel. Servo starting position command mode is '100' which is 3 MSB bits from 1st byte. Servo motor channel is from 0-16. Select '0' to activate all servo motor from channel 1 to 8(if single SC08A used) or 1 to 16 (if double SC08A used).

0b	1	0	0	x	x	x	x	x

Mode for servo starting position command

Servo motor channel
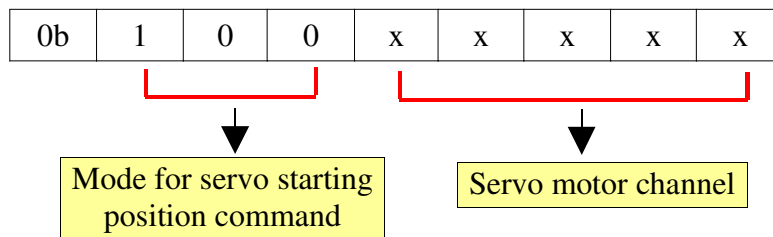
c) 2nd and 3rd byte is combined to provide 13 bit servo position. Please refer back Position and Speed command section (b)ii for description for these 2nd and 3rd byte.

d) After received starting position command, SC08A will reply one byte (0x04) to microcontroller.

8.WARRANTY

➢ Product warranty is valid for 6 months.

➢ Warranty only applies to manufacturing defect.

➢ Damage caused by misuse is not covered under warranty.

➢ Warranty does not cover freight cost for both ways.

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