

RSC-SPX6 SOC and MCU Protocol ver.1.10

SoC 與 MCU 之 Uart 通訊定義

Baudrate : 115200 bps (8,N,1)

通訊架構 :

Start Code (1 byte)	Command Address (2 byte)	Command Request (1 byte)	Command Data (n byte)	End Code (1 byte)
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架構說明 :

Start Code : 0xF1 (MCU to SoC) 、 0xF2 (SoC to MCU) 。

Command Address : 各項通訊命令之 Title (ex: Device Type → 0x0000) , 詳見 Command List 。

Command Request : 此命令之通訊意義, 分為 Write (0x01) 、 Read(0x02)和 Return(0x03) 。(Return 表示回復 Read 之訊息)

Command Data : 此命令之傳遞資料, 詳見 Command List 。

End Code : 0xE1 (First) 、 0xE2 (Second)

Command List :

1. SoC Read Device Type : (Command Address : 0x0000)

SoC Read MCU :

0xF2	0x00 0x00	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x00	0x03 (Return)	String by ASCII	0xE1 0xE2
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Command Define : SoC 讀取 Device 型號, Device 型號暫定為 "RSC-SPX6"

2. SoC Read FW Version : (Command Address : 0x0002)

SoC Read MCU :

0xF2	0x00 0x02	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x02	0x03 (Return)	String by ASCII	0xE1 0xE2
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Command Define : SoC 讀取 FW 版本, FW 版本暫定為 "Ax.YYMMDD" (ex:A0.170515)

3. SoC Clear watch dog timer by Read : (Command Address : 0x0004)

SoC Read MCU :

0xF2	0x00 0x04	0x02 (Read)	0x01	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x04	0x03 (Return)	0x01	0xE1 0xE2
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Command Define : SoC 定時通知 MCU 自己正常, MCU 回復已接收

4. MCU Send Key Function to SoC by Write : (Command Address : 0x0005)

MCU Write SoC :

0xF1	0x00 0x05	0x01 (Write)	Pushed Key Function (Contained Multi	0xE1 0xE2
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			Key) by ASCII	
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7x5 Key Function : (左下為第一個按鍵)

'S'	'T'	'U'	'V'	'W'	'X'	'Y'
'L'	'M'	'N'	'O'	'P'	'Q'	'R'
'E'	'F'	'G'	'H'	'I'	'J'	'K'
'7'	'8'	'9'	'A'	'B'	'C'	'D'
'0'	'1'	'2'	'3'	'4'	'5'	'6'

Null Key : '\r'、'\n' (放開所有按鍵後傳送)

Command Define : MCU 告知 SoC KeyPad 使用情形，各按鍵皆由單一 ASCII 表示，當按鍵使用完全結束時，MCU 會發送 Null Key 告知 SoC

5. SoC Read Write Control Type : (Command Address : 0x0015)

SoC Read MCU :

SoC Write MCU :

0xF2	0x00 0x15	0x02 (Read)	No data	0xE1 0xE2
0xF1		0x01 (Write)	Data(1byte)	

MCU Return SoC :-

0xF1	0x00 0x15	0x03 (Return)	Control Type by byte (1 byte)	0xE1 0xE2
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Control Type :

0x00 → Treadmill

0x01 → Bike

若以後有新機種(ex.後揚升馬達)再追加

0x02 → Elliptical

0x03 → Stepper

0x04 → Elevation Motor

0x05 → Climb

0x06 → Rower

0x07 → Swing

0x08 → Strength

Command Define : SoC 讀取 Device 為何種運動器材

Note:

跑步機 : CT900 : data = 0 (Treadmill series)

腳踏車 : CU900 : data = 1 (Bike series)

橢圓機 : CE900 : data = 1 (Bike series)

6. SoC Control Buzzer by Write : (Command Address : 0x0016)

SoC Write MCU :

0xF2	0x00 0x16	0x01 (Write)	On/Off (1 byte) 、Time (1 byte, Only for Buzzer On)	0xE1 0xE2
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Command Define : SoC 令 Buzzer 發聲或停止。

發聲之 Data 為 2 byte, On → 0x01、Time → 1 ~ 255 (單位為 0.1 sec)

停止之 Data 為 1 byte，Off → 0x00

7. SoC Read/Write KeyPad Sound Enable/Disable : (Command Address : 0x0017)

SoC Write MCU :

0xF2	0x00 0x17	0x01 (Write)	On/Off (1 byte)	0xE1 0xE2
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Command Define : SoC 開啟/關閉當 KeyPad 被使用時 Buzzer 之聲音。

開啟(On)之 Data 為 0x01。

關閉(Off)之 Data 為 0x00。

SoC Read MCU :

0xF2	0x00 0x17	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x17	0x03 (Return)	On/Off (1 byte)	0xE1 0xE2
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Command Define : SoC 查詢 KeyPad 被使用時 Buzzer 發聲之功能是否開啟/關閉。

開啟(On)之 Data 為 0x01。

關閉(Off)之 Data 為 0x00。

8. SoC Read/Write WDT Setting : (Command Address : 0x0018)

SoC Write MCU :

0xF2	0x00 0x18	0x01 (Write)	Time (2 byte)	0xE1 0xE2
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Command Define : SoC 設定自身 Watch Dog Timer 之時間。

Data 為 2byte(Time1、Time2)，Time → 1 ~ 9000。(單位為 0.1 sec，Time1 << 8 | Time2)

SoC Read MCU :

0xF2	0x00 0x18	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x18	0x03 (Return)	Time (2 byte)	0xE1 0xE2
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Command Define : SoC 查詢自身 Watch Dog Timer 之時間。

Data 為 2byte(Time1、Time2)，Time → 1 ~ 9000。(單位為 0.1 sec，Time1 >> 8 | Time2)

9. SoC Read External RPM : (Command Address : 0x0026)

SoC Read MCU :

0xF2	0x00 0x26	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x26	0x03 (Return)	Data(2byte)	0xE1 0xE2
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Command Define : SoC 讀取外部 RPM。

10. MCU to Motor Baud Rate Control: (Command Address : 0x0027)

SoC Write MCU :

0xF2	0x00 0x27	0x01 (Write)	Data (2 byte)	0xE1 0xE2
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Command Define : SoC control MCU-to-Motor Baud Rate (only for Treadmill)

Data(2 byte): 0000 -> 19200(Default), 0001 -> 9600

SoC Read MCU :

0xF2	0x00 0x27	0x02 (Read)	No data	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x27	0x03 (Return)	Data (2 byte)	0xE1 0xE2
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11. MCU return Motor Command Timeout: (Command Address : 0x0029)

MCU Return SoC :

0xF1	0x00 0x29	0x03 (Return)	Data (2 byte)	0xE1 0xE2
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Command Define : MCU return Motor Command Timeout (only for Treadmill)

Data(2 byte): Motor command Address

Motor Command List :

新加 ERP command(ERP_EN drive high till Power off) to notify 電源控制板

1. Acceleration Time Command : (Command Address : 0x0009)

SoC Write MCU :

0xF2	0x00 0x09	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x09	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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SoC Read MCU :

0xF2	0x00 0x09	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x09	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2. Deceleration Time Command : (Command Address : 0x000A)

SoC Write MCU :

0xF2	0x00 0x0A	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x0A	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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SoC Read MCU :

0xF2	0x00 0x0A	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x00 0x0A	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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3. Main Motor Operation Command : (Command Address : 0x2000) WO

SoC Write MCU :

0xF2	0x20 0x00	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x00	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2000H	Bit 1-0	0: No function 1: Stop 2: Run 3: Jog + Run
	Bit 5-4	00B: No function 01B: FWD 10B: REV 11B: Change direction
	Bit 12~6	Reserved
	Bit 14~13	00: No function 01B: Operation command controlled by PU Keypad 10B: Operation command by Pr. Setting 11B: change operation source
	Bit 15	Reserved

Note: Data=0x11(Stop) ,0x16(Run),0x17(Jog+Run)

4. Main Motor Speed Command : (Command Address : 0x2001) WO

SoC Write MCU :

0xF2	0x20 0x01	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x01	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2001H	Bit 15-0	Main Motor Speed Hz command (unit:0.01Hz)
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Min: 0

~~Max: 160000 (160Hz) Note: 超過 16000, MCU 會自動修正為 16000(160Hz)~~

Max: 170000 (170Hz) Note: 超過 17000, MCU 會自動修正為 17000(160Hz)

5. Main Motor Command : (Command Address : 0x2002) WO

SoC Write MCU :

0xF2	0x20 0x02	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x02	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2002H	Bit 0	1: EF (external fault) on
	Bit 1	1: Fault Reset
	Bit 2	Reserved
	Bit 15-3	Reserved

Note: Data=02 可 reset error code

6. TreadMill Command : (Command Address : 0x2050) WO

SoC Write MCU :

0xF2	0x20 0x50	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x50	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2050H	Bit 15-0	Incline Motor Force command: (by P02-27)
		0: Disable
		1:UP
		2:Down
		3:STOP

7. TreadMill Command : (Command Address : 0x2051) WO

SoC Write MCU :

0xF2	0x20 0x51	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x51	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2051H	Bit 15-0	Incline Motor1 Position Command:
		(1)By VR(when P02-28=0),position is absolute value 0~32767 (by P02-20). If position value bit15=1 is Reverse.
		(2)By Pulse(when P02-28=1), position is signed value -32768~32767(by P02-29).

Note: min/max 約略 3000/26500 ,MCU 會將 data 直達傳給 Motor

8. TreadMill Command : (Command Address : 0x2052) WO (reserve,不使用)

SoC Write MCU :

0xF2	0x20 0x52	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x52	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2052H	Bit 15-0	Incline Motor2 Position Command:
		(1)By VR(when P02-28=0),position is absolute value 0~32767 (by P02-20). If position value bit15=1 is Reverse.
		(2)By Pulse(when P02-28=1), position is signed value -32768~32767(by P02-30).

9. TreadMill Command : (Command Address : 0x2053) WO (reserve,不使用)

SoC Write MCU :

0xF2	0x20 0x53	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x53	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2053H	Bit 15-0	Hearbeat Rate Initial Value(by P02-40)
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10. TreadMill Command : (Command Address : 0x2054) WO

SoC Write MCU :

0xF2	0x20 0x54	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x54	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2054H	Bit 15-0	Main Motor Speed RPM Command(by P03-09)+Run/Stop Command
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11. TreadMill Command : (Command Address : 0x2055) WO

SoC Write MCU :

0xF2	0x20 0x55	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x20 0x55	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2055H	Bit 15-0	<p>MCU Sleep Command:</p> <p>0:Disable Sleep Command</p> <p>1:Enable MCU Sleep Command</p> <p>PS: Master can disable sleep command by 2055H=0 during the Sleep Delay Time about 1.3sec.</p> <p>When VFD entered Sleep mode after 1.3sec, Master must use IO port(by P05-18) about 0.2sec Low level to control MCU Wakeup.</p>
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12. TreadMill Command : (Command Address : 0x2100) RO

SoC Read MCU :

0xF2	0x21 0x00	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x00	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2100H	Bit7~0	Error code
	Bit15~8	Warn Code

13. TreadMill Command : (Command Address : 0x2101) RO

SoC Read MCU :

0xF2	0x21 0x01	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x01	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2101H	Bit1-0	AC Drive Operation Status 00b: Drive stops 01b: Drive decelerating 10b: Drive standby 11b: Drive operating
	Bit2	1: JOG Command
	Bit4-3	Operation Direction 00b: FWD run 01b: from REV run to FWD run 10b: from FWD run to REV run 11b: REV run
	Bit8	1: Master frequency controlled by communication interface
	Bit9	1: Master frequency controlled by analog signal
	Bit10	1: Operation command controlled by communication interface
	Bit11	1: Parameter locked
	Bit12	1: Enable to copy parameters from keypad
	Bit15~13	Reserved

14. Main Motor monitor : (Command Address : 0x2102) RO

SoC Read MCU :

0xF2	0x21 0x02	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x02	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2102H	Bit 15-0	Frequency command by Hz(XX.XX)
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15. Main Motor monitor : (Command Address : 0x2103) RO

SoC Read MCU :

0xF2	0x21 0x03	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x03	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2103H	Bit 15-0	Output frequency by Hz (XX.XX)
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16. Main Motor monitor : (Command Address : 0x2104) RO

SoC Read MCU :

0xF2	0x21 0x04	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x04	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2104H	Bit 15-0	Output current (XX.X)
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17. Main Motor monitor : (Command Address : 0x2105) RO

SoC Read MCU :

0xF2	0x21 0x05	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x05	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2105H	Bit 15-0	DC-BUS Voltage (XXX.X)
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18. Main Motor monitor : (Command Address : 0x2106) RO

SoC Read MCU :

0xF2	0x21 0x06	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x06	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2106H	Bit 15-0	Output voltage (XXX.X)
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19. Main Motor monitor : (Command Address : 0x2107) RO

SoC Read MCU :

0xF2	0x21 0x07	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x07	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2107H	Bit 15-0	Heat Sink temperature (XX.X)
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20. Main Motor monitor : (Command Address : 0x2108) RO

SoC Read MCU :

0xF2	0x21 0x08	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x08	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2108H	Bit 15-0	TreadMill Status same as 2250H
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21. Main Motor monitor : (Command Address : 0x2109) RO

SoC Read MCU :

0xF2	0x21 0x09	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x09	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2109H	Bit 15-0	Output Power(xxx W)
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22. Main Motor monitor : (Command Address : 0x210A) RO

SoC Read MCU :

0xF2	0x21 0x0A	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x0A	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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210AH	Bit 15-0	Output Torque(x.xx N-m)
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23. Main Motor monitor : (Command Address : 0x2112) RO

SoC Read MCU :

0xF2	0x21 0x12	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x21 0x12	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2112H	Bit 15-0	FW Version(XX.XX)
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24. TreadMill Status Monitor : (Command Address : 0x2250) RO

SoC Read MCU :

0xF2	0x22 0x50	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x22 0x50	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2250H	Bit0	1:Incline motor Downward
	Bit1	1:Incline motor Upward
	Bit2	1:Main motor action
	Bit3	1:Speed Encoder action

	Bit5~4	Economy Detection: 00b:No Impact 01b:Impact Acceleration(Reserve) 10b:Impact Deceleration(Reserve) 11b:Impact action
	Bit6	1:Slaver Fault
	Bit7	1:Reserve
	Bit8	1:SafeKey action
	Bit15~9	Reserve

25. TreadMill Status Monitor : (Command Address : 0x2251) RO

SoC Read MCU :

0xF2	0x22 0x51	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x22 0x51	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2251h	Bit 15-0	Incline Motor1 Current Position by VR(P02-21)/by Pulse(P02-29)
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26. TreadMill Status Monitor : (Command Address : 0x2252) RO

SoC Read MCU :

0xF2	0x22 0x52	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x22 0x52	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2252h	Bit 15-0	Incline Motor2 Current Position by VR(P02-21)/by Pulse(P02-30)
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27. TreadMill Status Monitor : (Command Address : 0x2253) RO

SoC Read MCU :

0xF2	0x22 0x53	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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MCU Return SoC :

0xF1	0x22 0x53	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
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2253h	Bit 15-0	Incline Motor1 Minimum Position(Reserved)
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28. TreadMill Status Monitor : (Command Address : 0x2254) RO

SoC Read MCU :

0xF2	0x22 0x54	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x54	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2254h	Bit 15-0	Incline Motor1 Maximum Position(Reserved)
-------	----------	---

29. TreadMill Status Monitor : (Command Address : 0x2255) RO

SoC Read MCU :

0xF2	0x22 0x55	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x55	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2255h	Bit 15-0	Incline Motor2 Minimum Position(Reserved)
-------	----------	---

30. TreadMill Status Monitor : (Command Address : 0x2256) RO

SoC Read MCU :

0xF2	0x22 0x56	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x56	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2256h	Bit 15-0	Incline Motor2 Maximum Position(Reserved)
-------	----------	---

31. TreadMill Status Monitor : (Command Address : 0x2257) RO

SoC Read MCU :

0xF2	0x22 0x57	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x57	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2257h	Bit 15-0	Main Motor Communication Speed(RPM) Minimum (by P03-10)
-------	----------	---

32. TreadMill Status Monitor : (Command Address : 0x2258) RO

SoC Read MCU :

0xF2	0x22 0x58	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x58	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2258h	Bit 15-0	Main Motor Communication Speed(RPM)Maximum (by P03-11)
-------	----------	--

33. TreadMill Status Monitor : (Command Address : 0x2259) RO

SoC Read MCU :

0xF2	0x22 0x59	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x59	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

2259h	Bit 15-0	Main Motor Communication Output Speed(RPM) (by P03-12)
-------	----------	---

34. TreadMill Status Monitor : (Command Address : 0x225A) RO

SoC Read MCU :

0xF2	0x22 0x5A	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x5A	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

225Ah	Bit 15-0	Heartbeat Rate Counter (by P02-40)
-------	----------	------------------------------------

35. TreadMill Status Monitor : (Command Address : 0x225B) RO

SoC Read MCU :

0xF2	0x22 0x5B	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x5B	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

225Bh	Bit 15-0	Impact meter Step Counter (by P01-36)
-------	----------	---------------------------------------

36. TreadMill Status Monitor : (Command Address : 0x225C) RO

SoC Read MCU :

0xF2	0x22 0x5C	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x22 0x5C	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

225Ch	Bit 15-0	Impact meter Time Interval by 2ms base (by P01-37)
-------	----------	--

37. TreadMill ErP : (Command Address : 0x2260)WO

SoC Write MCU :

0xF2	0x22 0x60	0x01 (Write)	Data(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

MCU Return SoC :

0xF1	0x22 0x60	0x03 (Return)	No data	0xE1 0xE2
------	-----------	---------------	---------	-----------

2260h	Bit 7-0	1. Data range 0~255sec 2. Notify MCU enter Erp
-------	---------	---

		3. MCU wait xxx sec enter Erp
--	--	-------------------------------

台達電後揚升馬達專用 command

Note: 因後揚升馬達的 **command address** 跟前揚升馬達一樣,
故將後揚升馬達的 **command address** 調整為 **0x3XXX**,
由 **MCU remap** 到後揚升馬達的真實 **command address**

38. Main Motor Command : (**Command Address : 0x3002**) WO

SoC Write MCU :

0xF2	0x30 0x02	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	--------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x30 0x02	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3002H	Bit 0	1: EF (external fault) on
	Bit 1	1: Fault Reset
	Bit 2	Reserved
	Bit 15-3	Reserved

Note: Data=02 可 reset error code

39. TreadMill Command : (**Command Address : 0x3050**) WO

SoC Write MCU :

0xF2	0x30 0x50	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	--------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x30 0x50	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3050H	Bit 15-0	Incline Motor Force command: (by P02-27)
		0: Disable
		1:UP
		2:Down
		3:STOP

40. TreadMill Command : (**Command Address : 0x3051**) WO

SoC Write MCU :

0xF2	0x30 0x51	0x01 (Write)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	--------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x30 0x51	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3051H	Bit 15-0	Incline Motor1 Position Command: (1)By VR(when P02-28=0),position is absolute value 0~32767 (by P02-20). If position value bit15=1 is Reverse. (2)By Pulse(when P02-28=1), position is signed value -32768~32767(by P02-29).
--------------	----------	---

Note: min/max 約略 3000/26500 ,MCU 會將 data 直達傳給 Motor

41. TreadMill Command : (Command Address : 0x3100) RO

SoC Read MCU :

0xF2	0x31 0x00	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x31 0x00	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3100H	Bit7~0	Error code
	Bit15~8	Warn Code

42. Main Motor monitor : (Command Address : 0x3112) RO

SoC Read MCU :

0xF2	0x31 0x12	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x31 0x12	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3112H	Bit 15-0	FW Version(XX.XX)
--------------	----------	-------------------

43. TreadMill Status Monitor : (Command Address : 0x3250) RO

SoC Read MCU :

0xF2	0x32 0x50	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x32 0x50	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3250H	Bit0	1:Incline motor Downward
	Bit1	1:Incline motor Upward
	Bit2	1:Main motor action
	Bit3	1:Speed Encoder action
	Bit5~4	Economy Detection: 00b:No Impact 01b:Impact Acceleration(Reserve) 10b:Impact Deceleration(Reserve) 11b:Impact action

Bit6	1:Slaver Fault
Bit7	1:Reserve
Bit8	1:SafeKey action
Bit15~9	Reserve

44. TreadMill Status Monitor : (Command Address : 0x3251) RO

SoC Read MCU :

0xF2	0x32 0x51	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x32 0x51	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3251h	Bit 15-0	Incline Motor1 Current Position by VR(P02-21)/by Pulse(P02-29)
--------------	----------	---

45. TreadMill Status Monitor : (Command Address : 0x3253) RO

SoC Read MCU :

0xF2	0x32 0x53	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x32 0x53	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3253h	Bit 15-0	Incline Motor1 Minimum Position(Reserved)
--------------	----------	---

46. TreadMill Status Monitor : (Command Address : 0x3254) RO

SoC Read MCU :

0xF2	0x32 0x54	0x02 (Read)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	-------------	------------------------------------	-----------

MCU Return SoC :

0xF1	0x32 0x54	0x03 (Return)	Data0(high byte) , Data1(low byte)	0xE1 0xE2
------	-----------	---------------	------------------------------------	-----------

後揚升 3254h	Bit 15-0	Incline Motor1 Maximum Position(Reserved)
--------------	----------	---

Heart Rate Board Command List :

1. 5Khz name to Console : (Command Address: 0x0C01)

(Note:0x0C01 ,0C mapping to class code,01mapping to sub-class code)

MCU Return SoC :

0xF1	0x0C 0x01	0x03 (Return)	DATA(1-n)	0xE1 0xE2
------	-----------	---------------	-----------	-----------

2. BLE name and Address to Console : (Command Address: 0x0C02)

MCU Return SoC :

0xF1	0x0C 0x02	0x03 (Return)	DATA(1-n)	0xE1 0xE2
------	-----------	---------------	-----------	-----------

3. ANT name to Console : (Command Address: 0x0C03)

MCU Return SoC :

0xF1	0x0C 0x03	0x03 (Return)	DATA(1-n)	0xE1 0xE2
------	-----------	---------------	-----------	-----------

4. BLE HR DATA : (Command Address: 0x0C20)

MCU Return SoC :

0xF1	0x0C 0x20	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

5. ANT HR DATA : (Command Address: 0x0C21)

MCU Return SoC :

0xF1	0x0C 0x21	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

6. 5KHZ HR DATA : (Command Address: 0x0C22)

MCU Return SoC :

0xF1	0x0C 0x22	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

7. CONTACT HR DATA : (Command Address: 0x0C23)

MCU Return SoC :

0xF1	0x0C 0x23	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

8. BLE RR DATA : (Command Address: 0x0F11)

MCU Return SoC :

0xF1	0x0F 0x11	0x03 (Return)	DATA(1-n byte)	0xE1 0xE2
------	-----------	---------------	----------------	-----------

9. ANT RR DATA : (Command Address: 0x0F12)

MCU Return SoC :

0xF1	0x0F 0x12	0x03 (Return)	DATA(1-n byte)	0xE1 0xE2
------	-----------	---------------	----------------	-----------

10. CONTACT RR DATA : (Command Address: 0x0F14)

MCU Return SoC :

0xF1	0x0F 0x14	0x03 (Return)	DATA(1-n byte)	0xE1 0xE2
------	-----------	---------------	----------------	-----------

11. ERROR CODE : (Command Address: 0x0C05)

MCU Return SoC :

0xF1	0x0C 0x05	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

5KHZ ERROR CODE	
Connection lost	0x01
Corrupted HR	0x02
Relearn	0x03
Code Noisy	0x04

Code Noisy Off	0x05
Code Over Limit	0x06
Cross Talk	0x07

COMMON ERROR	
Connection lost	0x31
Connection failed	0x32
No device found	0x33

PACKET ERROR	
Garbled	0x41

CONTACT ERROR	
Connection lost	0x51
Corrupted HR	0x52
Relearn	0x53
Code Noisy	0x54
Code Noisy Off	0x55
Code Over Limit	0x56

12. SYSTEM STATUS : (Command Address: 0x0C06)

MCU Return SoC :

0xF1	0x0C 0x06	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

SYSTEM STATUS	
Disconnected	0x01
Searching device	0x02
Device not found	0x03
Device found	0x04
Idle Mode	0x05
Connected	0x06
Scanning	0x07
Stop Scanning	0x08
Workout started	0x09
workout stopped	0x0A
5KHZ WL active	0x0B
Contact active	0x0C
FEC Status	0x0D

13. ACKNOWLEDGEMENT : (Command Address: 0x0C07)

MCU Return SoC :

0xF1	0x0C 0x07	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

ACLK	0x01
------	------

14. SOFTWARE VERSION : (Command Address: 0x0C08)

MCU Return SoC :

0xF1	0x0C 0x08	0x03 (Return)	DATA(1-n byte)	0xE1 0xE2
------	-----------	---------------	----------------	-----------

15. CONTACT STATE : (Command Address: 0x0C09)

MCU Return SoC :

0xF1	0x0C 0x09	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

CONTACT STATE	
CONTACT ACTIVE	0x01
CONTACT NOT ACTIVE	0x02
CONTACT HAND ON	0x03
CONTACT HAND OFF	0x04

16. 5Khz name RSSI : (Command Address: 0x0D01)

MCU Return SoC :

0xF1	0x0D 0x01	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

17. BLE RSSI Data : (Command Address: 0x0D10)

MCU Return SoC :

0xF1	0x0D 0x10	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

18. ANT+RSSI Data : (Command Address: 0x0D20)

MCU Return SoC :

0xF1	0x0D 0x20	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

19. ANT+RSSI Data : (Command Address: 0x0D20)

MCU Return SoC :

0xF1	0x0D 0x20	0x03 (Return)	DATA(1 byte)	0xE1 0xE2
------	-----------	---------------	--------------	-----------

20. Sending 5Khz Name to MCU : (Command Address: 0x1C01)

SoC Write MCU :

0xF2	0x1C 0x01	0x01 (Write)	DATA(1 -n byte)	0xE1 0xE2
------	-----------	--------------	-----------------	-----------

21. Sending BLE address to MCU : (Command Address: 0x1C02)

SoC Write MCU :

0xF2	0x1C 0x02	0x01 (Write)	DATA(1 -n byte)	0xE1 0xE2
------	-----------	--------------	-----------------	-----------

22. Sending ANT ID address to MCU : (Command Address: 0x1C03)

SoC Write MCU :

0xF2	0x1C 0x03	0x01 (Write)	DATA(1 –n byte)	0xE1 0xE2
------	-----------	--------------	-----------------	-----------

23. WORKOUT : (Command Address: 0x1C04)

SoC Write MCU :

0xF2	0x1C 0x04	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

WORKOUT	
Start workout with RSSI option 1	0x01
Start workout with RSSI option 2	0x02
Start workout with RSSI option 3	0x03
Stop Workout	0x04
Start Workout with RSSI data(-dbm)	0xYY

24. SCANNING : (Command Address: 0x1C05)

SoC Write MCU :

0xF2	0x1C 0x05	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

Start Scanning	0x01
----------------	------

25. GET STATUS : (Command Address: 0x1C06)

SoC Write MCU :

0xF2	0x1C 0x06	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

GET STATUS		
Get state status	0x01.	Data 會從 cmdAddr:0x0C06/0x0C09 自動傳回
Get software version	0x02	Data 會從 cmdAddr:0x0C08 自動傳回

26. 5KHZ CONNECTION OPTION : (Command Address: 0x1C07)

SoC Write MCU :

0xF2	0x1C 0x07	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

5KHZ CONNECTION OPTION	
Auto connect	0x01
Disable auto connect	0x02

27. CONTACT OPTION : (Command Address: 0x1C08)

SoC Write MCU :

0xF2	0x1C 0x08	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

CONTACT OPTION	
Contact override ON	0x01
Contact override OFF	0x02
R-R interval enable	0x03
R-R interval disable	0x04

28. BLE OPTION : (Command Address: 0x1E01)

SoC Write MCU :

0xF2	0x1E 0x01	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

BLE OPTION	
Start OTA BLE Broadcast	0x01
Stop OTA BLE Broadcast	0x02
BLE R-R interval enable	0x03
BLE R-R interval disable	0x04

29. BLE OPTION : (Command Address: 0x1E12)

SoC Write MCU :

0xF2	0x1E 0x12	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

BLE OPTION	
Disable BLE full name	0x00
Enable BLE full name	0x01

30. FEC display option : (Command Address: 0x1E02)

SoC Write MCU :

0xF2	0x1E 0x02	0x01 (Write)	DATA(1 byte)	0xE1 0xE2
------	-----------	--------------	--------------	-----------

FEC display option	
Enable FEC display profile	0x01
Disable FEC display profile	0x02
ANT R-R interval enable	0x03
ANT R-R interval disable	0x04

Bike Command List :

與 Motor Command 相同，不論進行讀或寫(Read or Write)，皆會得到回傳資料(Return)。

1. Bike RPM Read : (Command Address : 0x00B0)

SoC Read MCU :

0xF2	0x00 0xB0	0x02 (Read)	No Data	0xE1 0xE2
------	-----------	-------------	---------	-----------

MCU Return SoC :

0xF1	0x00 0xB0	0x03 (Return)	RPM Value (1 byte)	0xE1 0xE2
------	-----------	---------------	--------------------	-----------

2. Bike Resistance Level Command : (Command Address : 0x00B1)

SoC Write MCU :

0xF2	0x00 0xB1	0x01 (Write)	Resistance Level (2 byte)	0xE1 0xE2
------	-----------	--------------	---------------------------	-----------

MCU Return SoC :

0xF1	0x00 0xB1	0x03 (Return)	Command Type (1 byte) 回覆要設定的 阻力階數(2 byte)	0xE1 0xE2
------	-----------	---------------	---	-----------

SoC Read MCU :

0xF2	0x00 0xB1 0xB8	0x02 (Read)	No Data	0xE1 0xE2
------	-------------------	-------------	---------	-----------

MCU Return SoC :

0xF1	0x00 0xB1 0xB8	0x03 (Return)	Command Type (1 byte) → Resistance Level (2 byte) 回覆目前的阻力階數(2 byte)	0xE1 0xE2
------	-------------------	---------------	--	-----------

Command Type : 0x01(Write) 、 0x02(Read) ◦

3. Bike Error Code Command : (Command Address : 0x00B2)

SoC Read MCU :

0xF2	0x00 0xB2	0x02 (Read)	No Data	0xE1 0xE2
------	-----------	-------------	---------	-----------

MCU Return SoC :

0xF1	0x00 0xB2	0x03 (Return)	Error Code (1 byte)	0xE1 0xE2
------	-----------	---------------	---------------------	-----------

Error Code → (目前 Spec 異常，測試時都讀回 0x2D)

Description	Value
無錯誤	0x00
OCP	0x01
RS485 通訊錯誤	0x02
OCP + RS485 通訊錯誤	0x03
MCU ERROR	0x04
OCP + MCU ERROR	0x05
MCU ERROR + RS485 通訊錯誤	0x06
OCP + MCU ERROR + RS485 通訊錯誤	0x07

4. Bike into ERP Command : (Command Address : 0x00B3)

SoC Write MCU :

0xF2	0x00 0xB3	0x01 (Write)	No Data Data(1byte)	0xE1 0xE2
------	-----------	--------------	--------------------------------	-----------

MCU Return SoC :

0xF1	0x00 0xB3	0x03 (Return)	0x23 (1 byte)	0xE1 0xE2
------	-----------	---------------	---------------	-----------

Data	Bit 7-0	1. Data range 0~255sec 2.Notify MCU enter Erp 3.MCU wait xxx sec enter Erp
------	---------	--

5. Bike EMS Version Read Command : (Command Address : 0x00B4)

SoC Read MCU :

0xF2	0x00 0xB4	0x02 (Read)	No Data	0xE1 0xE2
------	-----------	-------------	---------	-----------

MCU Return SoC :

0xF1	0x00 0xB4	0x03 (Return)	HW code (1 byte) 、 SW code (1 byte)	0xE1 0xE2
------	-----------	---------------	-------------------------------------	-----------

6. Bike Communication Overtime Command : (Command Address : 0x00B5)

SoC Read MCU :

0xF2	0x00 0xB5	0x01 (Write)	Overtime (2 byte)	0xE1 0xE2
------	-----------	--------------	-------------------	-----------

MCU Return SoC :

0xF1	0x00 0xB5	0x03 (Return)	Overtime (2 byte)	0xE1 0xE2
------	-----------	---------------	-------------------	-----------

Overtime → 1 ~ 9999 。 (單位為 1 sec , Time1 << 8 | Time2) Default 為 5 秒

7. Bike Clear Error Code Command : (Command Address : 0x00B6)

SoC Write MCU :

0xF2	0x00 0xB6	0x01 (Write)	No Data	0xE1 0xE2
------	-----------	--------------	---------	-----------

MCU Return SoC :

0xF1	0x00 0xB6	0x03 (Return)	0x3C (1 byte)	0xE1 0xE2
------	-----------	---------------	---------------	-----------

Heart Rate board 常用 command 參考.

1.WORKOUT,有以下 4 種 dbm 值,只對 BLE 有效,若一段時間不用,可 Stop workout

```
F2 1C 04 01 01 E1 E2 @WORKOUT [RSSI-1] (-90dbm)
F2 1C 04 01 02 E1 E2 @WORKOUT [RSSI-2] (-80dbm)
F2 1C 04 01 03 E1 E2 @WORKOUT [RSSI-3] (-70dbm)
F2 1C 04 01 04 E1 E2 @WORKOUT [Stop]
F2 1C 04 01 0xYY E1 E2 @WORKOUT [RSSI(-dbm)](user define)
```

建議 configuration 的值,可在 initial 時就決定並下 command,之後再下 workout command

Contact override
Contact RR Interval
BLE RR Interval
5Khz auto connect....

2. RR interval

Step1.set contact RR enabled
Step2.start workout
Step3.receive data automatically

<pre>F1 0F 14 03 44 E1 E2 F1 0C 23 03 48 E1 E2 F1 0F 14 03 44 E1 E2 F1 0C 23 03 47 E1 E2 F1 0F 14 03 48 E1 E2 F1 0C 23 03 47 E1 E2 F1 0F 14 03 3E E1 E2 F1 0C 23 03 47 E1 E2 F1 0F 14 03 3E E1 E2 F1 0C 23 03 47 E1 E2 F1 0F 14 03 41 E1 E2 F1 0C 23 03 47 E1 E2 F1 0F 14 03 3A E1 E2 F1 0C 23 03 48 E1 E2 F1 0F 14 03 44 E1 E2 F1 0C 23 03 48 E1 E2</pre>	<p>Receive</p> <p>auto report contact HR data contact RR data</p>	<pre>F2 1C 04 01 04 E1 E2 @WORKOUT [Stop] F2 1C 04 01 0xYY E1 E2 @WORKOUT [RSSI(-dbm)] F2 1C 05 01 01 E1 E2 @SCANNING F2 1C 06 01 01 E1 E2 @GET STATUS F2 1C 06 01 02 E1 E2 @GET STATUS [SW version] F2 1C 07 01 01 E1 E2 @5KHZ CONNECTION [Auto connect] F2 1C 07 01 02 E1 E2 @5KHZ CONNECTION [Disable auto connect] F2 1C 08 01 01 E1 E2 @CONTACT OPTION [Override On] F2 1C 08 01 02 E1 E2 @CONTACT OPTION [Override Off] F2 1C 08 01 03 E1 E2 @CONTACT OPTION [RR interval Enable] F2 1C 08 01 04 E1 E2 @CONTACT OPTION [RR interval Disable] F2 1E 01 01 01 E1 E2 @BLE OPTION [Start OTA BLE] F2 1E 01 01 02 E1 E2 @BLE OPTION [Stop OTA BLE] F2 1E 01 01 03 E1 E2 @BLE OPTION [RR interval Enable]</pre>	<p>Send</p> <p>1.</p>
--	---	---	-----------------------

3.OTA(只對 BLE 有效)

建議 command 重覆 2 次,間隔 1sec, 效果較好

Start OTA ->wait 1sec->Start OTA.

```
F2 1E 01 01 01 E1 E2 @BLE OPTION [Start OTA BLE]
F2 1E 01 01 02 E1 E2 @BLE OPTION [Stop OTA BLE]
```

4. ANT+ 配對.

```
//ANT+ 配對
send
-> F2 1C 04 01 01 E1 E2 (Start Work out)
-> F2 1C 05 01 01 E1 E2 (Scanning)

receive
<- F1 0C 03 03 97 02 E1 E2 (ANT 最後2個byte為ANT ID-0x97 0x02, ID會因Device不同而迥異)
<- F1 0D 20 03 32 E1 E2 (ANT RSSI)

send ID for ANT connection(ID會因Device不同而迥異)
-> F2 1C 03 01 97 02 E1 E2
完成後即可自動收到ANT HR DATA
```


5. BLE 配對.

```
//BLE 配對
send
-> F2 1C 04 01 01 E1 E2 (Start Work out)
-> F2 1C 05 01 01 E1 E2 (Scanning)

receive
<- F1 0C 02 03 48 52 4D 20 44 55 41 4C 1F 03 54 33 F7 7E EB E1 E2 (BLE:HRM DUAL335403,最後6個byte為addr)
<- F1 0D 10 03 33 E1 E2(BLE RSSI)

send ID for BLE connection(Addr會因Device不同而迥異)
-> F2 1C 02 01 03 54 33 F7 7E EB E1 E2
完成後即可自動收到BLE HR DATA
```

6. HeartRate SW version

```
-> F2 1C 06 01 02 E1 E2 (Get STATUS-SW version)
<- F1 0C 08 03 38 37 30 30 20 32 33 30 36 43 E1 E2 (return SW version)
```

7. Get STATUS (有些 status ,error 會在過程中直接 report ,不須下 command)

```
->F2 1C 06 01 01 E1 E2 (Get STATUS)
<-F1 0C 06 03 04 E1 E2 (return 目前的STATUS)
```

8. Heart Rate command list

```
=====[HeartRate]====
F2 1C 01 01 XX XX XX XX E1 E2 @Sending 5Khz Name to MCU
F2 1C 02 01 XX XX XX XX E1 E2 @Sending BLE address to MCU
F2 1C 03 01 XX XX XX XX E1 E2 @Sending ANT ID address to MCU
F2 1C 04 01 01 E1 E2 @WORKOUT [RSSI-1] (-90dbm)
F2 1C 04 01 02 E1 E2 @WORKOUT [RSSI-2] (-80dbm)
F2 1C 04 01 03 E1 E2 @WORKOUT [RSSI-3] (-70dbm)
F2 1C 04 01 04 E1 E2 @WORKOUT [Stop]
F2 1C 04 01 0xYY E1 E2 @WORKOUT [RSSI(-dbm)](user define)
F2 1C 05 01 01 E1 E2 @SCANNING
F2 1C 06 01 01 E1 E2 @GET STATUS
F2 1C 06 01 02 E1 E2 @GET STATUS [SW version]
F2 1C 07 01 01 E1 E2 @5KHZ CONNECTION [Auto connect]
F2 1C 07 01 02 E1 E2 @5KHZ CONNECTION [Disable auto connect]
F2 1C 08 01 01 E1 E2 @CONTACT OPTION [Override On]
F2 1C 08 01 02 E1 E2 @CONTACT OPTION [Override Off]
F2 1C 08 01 03 E1 E2 @CONTACT OPTION [RR interval Enable]
F2 1C 08 01 04 E1 E2 @CONTACT OPTION [RR interval Disable]
F2 1E 01 01 01 E1 E2 @BLE OPTION [Start OTA BLE]
F2 1E 01 01 02 E1 E2 @BLE OPTION [Stop OTA BLE]
F2 1E 01 01 03 E1 E2 @BLE OPTION [RR interval Enable]
F2 1E 01 01 04 E1 E2 @BLE OPTION [RR interval Disable]
F2 1E 12 01 00 E1 E2 @BLE [Disable BLE full name]
F2 1E 12 01 01 E1 E2 @BLE [Enable BLE full name]
```

Motor 常用 command 參考

1. 在 2.5sec 內傳送任一 command 給 Motor (建議 2259H or 2103H get speed command), Motor 會持續動作,包含 main motor & incline motor.

若超過 2.5sec 不傳送任何 command 給 Motor.

Motor 判定失聯,停止 main motor & incline motor

2. 實驗數據 - Speed 加速&減速 (下圖為 MCU return 值,請自行調整 command)

每個 command 間隔約 500ms~1000ms

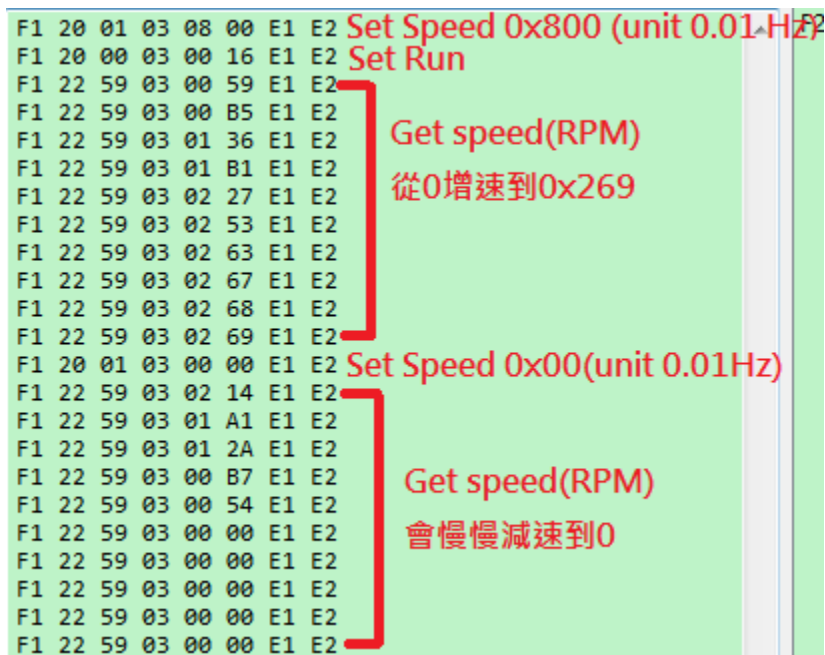
Step a. Set speed 0x0800

Step b. Set Run

Step c. Get speed rpm, 觀察到馬達會加速到 0x0269 rpm

Step d. Set speed 0x0000

Step e. Get speed rpm, 觀察到馬達會減速到 0x0000 rpm



3. 實驗數據 - safe key(下圖為 MCU return 值,請自行調整 command)

每個 command 間隔約 500ms~1000ms

下圖為 Motor 在運轉中,啓動 safe key

```

F1 20 01 03 12 00 E1 E2 set speed 0x1200
F1 20 00 03 00 16 E1 E2 set Run
F1 22 59 03 00 74 E1 E2
F1 22 59 03 00 FD E1 E2
F1 22 59 03 01 97 E1 E2
F1 22 59 03 02 36 E1 E2
F1 22 59 03 02 D6 E1 E2
F1 22 59 03 03 84 E1 E2
F1 22 59 03 04 25 E1 E2
F1 22 59 03 04 C5 E1 E2
F1 22 59 03 05 3F E1 E2
F1 22 59 03 05 60 E1 E2
F1 22 59 03 05 68 E1 E2
F1 22 59 03 05 6A E1 E2
F1 22 59 03 05 6B E1 E2
F1 22 59 03 05 6B E1 E2
F1 22 59 03 05 6A E1 E2
F1 22 59 03 00 00 E1 E2 ← 啓動Safekey
F1 22 59 03 00 00 E1 E2
F1 22 59 03 00 00 E1 E2
F1 22 59 03 00 00 E1 E2
F1 22 59 03 00 00 E1 E2
F1 22 59 03 00 00 E1 E2
F1 21 00 03 00 15 E1 E2 Get Error code 0x15

```

get speed (rpm)
 逐步增速到0x056A
 啓動Safekey
 get speed(rpm) -0
 motor會在很短時間停止

下圖為 safe key 啓動然後關閉,如何讓 Motor 再次運轉(示意圖, 請自行調整 command)

Safe key 回覆後

```

F1 21 00 03 00 15 E1 E2 Get Error code 0x15(21),safe key拔出
F1 20 02 03 00 02 E1 E2 Clear Error code
F1 21 00 03 00 00 E1 E2 Get Error code 0x00,無error
F1 20 01 03 12 00 E1 E2 Set speed 0x1200
F1 20 00 03 00 16 E1 E2 Set Run
F1 22 59 03 00 74 E1 E2
F1 22 59 03 00 FC E1 E2
F1 22 59 03 01 97 E1 E2
F1 22 59 03 02 36 E1 E2
F1 22 59 03 02 D6 E1 E2
F1 22 59 03 03 76 E1 E2
F1 22 59 03 04 16 E1 E2
F1 22 59 03 04 B7 E1 E2
F1 22 59 03 05 3A E1 E2
F1 22 59 03 05 5F E1 E2
F1 22 59 03 05 68 E1 E2
F1 22 59 03 05 6A E1 E2
F1 22 59 03 05 6A E1 E2
F1 22 59 03 05 6B E1 E2

```

Get speed(RPM)
 Motor逐步增速到0x056B

4.實驗數據 – 停止通訊超過 3sec ,然後重新啓動 Motor
 (停止通訊時 frequency 會 keep ,可由 command “Get frequency”得知)

```

F1 20 01 03 08 00 E1 E2 Set speed 0x800 (0.01Hz)
F1 20 00 03 00 16 E1 E2 Set Run
F1 21 02 03 08 00 E1 E2 Get frequency 0x800(0.01Hz)
F1 21 03 03 02 68 E1 E2
F1 21 03 03 04 58 E1 E2
F1 21 03 03 06 6A E1 E2
F1 21 03 03 07 A6 E1 E2
F1 21 03 03 07 F3 E1 E2
F1 21 03 03 08 05 E1 E2
F1 21 03 03 08 0A E1 E2
F1 21 03 03 08 0B E1 E2
F1 21 03 03 08 0B E1 E2
F1 21 03 03 00 00 E1 E2 Get output frequency 變為0
F1 21 02 03 08 00 E1 E2 Get frequency 保持在0x800(0.01Hz)
F1 20 00 03 00 16 E1 E2 Set Run
F1 21 03 03 01 62 E1 E2
F1 21 03 03 03 1E E1 E2
F1 21 03 03 05 1E E1 E2
F1 21 03 03 07 16 E1 E2
F1 21 03 03 07 CF E1 E2
F1 21 03 03 07 FC E1 E2
F1 21 03 03 08 07 E1 E2
F1 21 03 03 08 0A E1 E2
F1 21 03 03 08 0B E1 E2
F1 21 03 03 08 0B E1 E2

```

Get output frequency(0.01Hz)
 逐步增速到0x800

超過3sec 不對Motor通訊

Get output frequency(0.01Hz)
 逐步增速到0x800

5. 實驗數據 -Stop Motor 然後重新啓動 Motor

```

F1 20 01 03 10 00 E1 E2 Set speed 0x1000(0.01Hz)
F1 20 00 03 00 16 E1 E2 Set Run
F1 21 03 03 01 D1 E1 E2
F1 21 03 03 03 E8 E1 E2
F1 21 03 03 06 44 E1 E2
F1 21 03 03 08 47 E1 E2
F1 21 03 03 0A 38 E1 E2
F1 21 03 03 0C 74 E1 E2
F1 21 03 03 0E 48 E1 E2
F1 21 03 03 0F 90 E1 E2
F1 21 03 03 0F EE E1 E2
F1 21 03 03 10 06 E1 E2
F1 20 00 03 00 11 E1 E2 Set Stop
F1 21 03 03 08 B5 E1 E2
F1 21 03 03 00 00 E1 E2 Get output frequency 短時間到0x00
F1 21 02 03 10 00 E1 E2 Get frequency 仍是0x1000
F1 20 00 03 00 16 E1 E2 Set Run
F1 21 03 03 02 75 E1 E2
F1 21 03 03 04 78 E1 E2
F1 21 03 03 06 86 E1 E2
F1 21 03 03 08 99 E1 E2
F1 21 03 03 0A AE E1 E2
F1 21 03 03 0C C5 E1 E2
F1 21 03 03 0E D6 E1 E2
F1 21 03 03 0F C3 E1 E2
F1 21 03 03 0F FC E1 E2
F1 21 03 03 10 0A E1 E2
F1 21 03 03 10 0D E1 E2
F1 21 03 03 10 0E E1 E2

```

Get output frequency
 逐步加速到0x1000(unit 0.01Hz)

Get output frequency 短時間到0x00

Get output frequency
 逐步加速到0x1000

6. 實驗數據-0 到 max(160Hz) 的時間&速度關係

Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)
1	366	11	5595	21	10942	31	15973
2	813	12	6127	22	11477	32	16023
3	1326	13	6662	23	12013	33	16035

4	1856		14	7197		24	12547		34	16039
5	2388		15	7731		25	13081		35	16041
6	2922		16	8267		26	13616			
7	3457		17	8801		27	14155			
8	3991		18	9336		28	14692			
9	4525		19	9871		29	15227			
10	5060		20	10405		30	15757			

7. 實驗數據- Stop : Max Speed(160Hz) 到 0 的時間關係圖

Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)	Time (sec)	Speed (0.01Hz)
1	16036	11	13186	21	10144	31	7104	41	4062	51	1007
2	15940	12	12880	22	9836	32	6811	42	3755	52	700
3	15634	13	12572	23	9544	33	6504	43	3447	53	395
4	15325	14	12279	24	9236	34	6197	44	3140	54	0
5	15018	15	11971	25	8929	35	5890	45	2833		
6	14710	16	11665	26	8622	36	5584	46	2527		
7	14404	17	11358	27	8326	37	5276	47	2219		
8	14110	18	11063	28	8023	38	4983	48	1926		
9	13790	19	10758	29	7718	39	4676	49	1619		
10	13494	20	10450	30	7410	40	4369	50	1313		

8. 實驗數據- Set "2210H" Speed(Hz) 跟 Get "2259H" RPM 關係圖

2210h Speed (Hex)	2259H RPM (Hex)	2210h Speed (Hex)	2259H RPM (Hex)	2210h Speed (Hex)	2259H RPM (Hex)	2210h Speed (Hex)	2259H RPM (Hex)
0x700	0x21D	0x1000	0x4D0	0x2000	0x99F	0x3000	0xE6D
0x800	0x25A	0x1100	0x51D	0x2100	0x9E1	0x3100	0xEBA
0x900	0x2B6	0x1200	0x56A	0x2200	0xA38	0x3200	0xF07
0xA00	0x303	0x1300	0x5B7	0x2300	0xA83	0x3300	0xF48
0xB00	0x350	0x1400	0x604	0x2400	0xAD3	0x3400	0xFA0
0xC00	0x390	0x1500	0x651	0x2500	0xB1F	0x3500	0xFEE
0xD00	0x3EA	0x1600	0x69E	0x2600	0xB6C	0x3600	0x103B
0xE00	0x437	0x1700	0x6EB	0x2700	0xBB9	0x3700	0x1088
0xF00	0X484	0x1800	0x738	0x2800	0xC06	0x3800	0x10D6
		0x1900	0x785	0x2900	0xC53	0x3900	0x1122
		0x1A00	0x7D1	0x2A00	0xCA0	0x3A00	0x116F
		0x1B00	0x81F	0x2B00	0xCEC	0x3B00	0x11BA
		0x1C00	0x86B	0x2C00	0xD3A	0x3C00	0x120C
		0x1D00	0x8B8	0x2D00	0xD87	0x3D00	0x1256
		0x1E00	0x905	0x2E00	0xDD1	0x3E00	0x12A3
		0x1F00	0x952	0x2F00	0xE20	0x3E80	0x12CA

9. Motor Command list

```
=====[Motor]=====(Data is 2byte)
F2 20 00 01 00 11 E1 E2 @Operate_Cmd [Stop]
F2 20 00 01 00 16 E1 E2 @Operate_Cmd [Run]
F2 20 00 01 00 17 E1 E2 @Operate_Cmd [Jog+Run]
F2 20 01 01 08 00 E1 E2 @Motor_Speed (0~160_Hz)(100為1_Hz)
F2 20 02 01 00 02 E1 E2 @Err code reset
F2 20 50 01 00 00 E1 E2 @Incline_Force_Cmd [Disabled]
F2 20 50 01 00 01 E1 E2 @Incline_Force_Cmd [UP]
F2 20 50 01 00 02 E1 E2 @Incline_Force_Cmd [Down]
F2 20 50 01 00 03 E1 E2 @Incline_Force_Cmd [STOP]
F2 20 51 01 12 00 E1 E2 @Incline_Motor1_Position
F2 20 52 01 12 00 E1 E2 @Incline_Motor2_Position
F2 20 53 01 00 00 E1 E2 @HeartBeat Rate initial
F2 20 54 01 00 00 E1 E2 @Speed RPM + Run/Stop
F2 20 55 01 00 00 E1 E2 @MCU Sleep disabled
F2 20 55 01 00 01 E1 E2 @MCU Sleep enabled
F2 20 60 01 00 05 E1 E2 @Assert ERP_En to enter motor Erp after xx sec(data 1byte.0~255sec)
F2 20 61 01 00 00 E1 E2 @Motor initial(500ms,combine 10 cmd-speed0,stop,clrErr,acceTime,deceTime,max freq,incline,user,operate)

F2 21 00 02 E1 E2 @Get-Error code
F2 21 01 02 E1 E2 @Get-Operate status
F2 21 02 02 E1 E2 @Get-Frequency cmd by Hz(XX.XX)
F2 21 03 02 E1 E2 @Get-Output Frequency cmd by Hz(XX.XX)
F2 21 04 02 E1 E2 @Get-Output current(XX.X)
F2 21 05 02 E1 E2 @Get-DC_BUS Voltage(XXX.X)
F2 21 06 02 E1 E2 @Get-Output Voltage(XXX.X)
F2 21 07 02 E1 E2 @Get-HeatSink temperature(XX.X)
F2 21 08 02 E1 E2 @Get-Status(same as 2250H)
F2 21 09 02 E1 E2 @Get-Output Power(xxx W)
F2 21 0A 02 E1 E2 @Get-Output Torque(xx.x N-m)
F2 21 12 02 E1 E2 @Get-FW version
F2 22 50 02 E1 E2 @Get-Status
F2 22 51 02 E1 E2 @Get-Incline Motor1 position
F2 22 52 02 E1 E2 @Get-Incline Motor2 position
F2 22 53 02 E1 E2 @Get-Incline Motor1 minimun position
F2 22 54 02 E1 E2 @Get-Incline Motor1 maximun position
F2 22 55 02 E1 E2 @Get-Incline Motor2 minimun position
F2 22 56 02 E1 E2 @Get-Incline Motor2 maximun position
F2 22 57 02 E1 E2 @Get-Motor speed(RPM) minimun
F2 22 58 02 E1 E2 @Get-Motor speed(RPM) maximun
F2 22 59 02 E1 E2 @Get-Motor output speed(RPM)
F2 22 5A 02 E1 E2 @Get-Heartbeat Rate counter
F2 22 5B 02 E1 E2 @Get-impact meter Step counter
F2 22 5C 02 E1 E2 @Get-impact meter Time interval by 2ms base
```

Bike 常用 command 參考

1. 在 5sec 內傳送任一 command 給 BIKE (建議 command 0x00B0 get Bike RPM), BIKE 會持續動作,包含阻力.
若超過 5sec 不傳送任何 command 給 BIKE.
BIKE 會判定失聯,並停止阻力,產生 Error code.
若要讓 BIKE 再次 work ,請先清除 Error code(command 0x00B6)即可
2. F2 00 B3 01 xx E1 E2(Bike ERP command) , xx 為 sec ,
當 MCU 收到此 command 後會在 xx sec 後,通知 Bike 進入 ERP
3. Bike command list

```
=====[Bike]=====  
F2 00 B0 02 E1 E2 @Bike_RPM_Read  
F2 00 B1 01 01 23 E1 E2 @Set Resistance_Level_(2 byte)  
F2 00 B8 02 E1 E2 @Get Bike_Resistance_Level  
F2 00 B2 02 E1 E2 @Bike_Error_Code_Command  
F2 00 B3 01 05 E1 E2 @Bike_into_ERP after xx sec(1 byte)  
F2 00 B4 02 E1 E2 @Bike_EMS_Version_Read_Command  
F2 00 B5 01 00 05 E1 E2 @Bike_Communication_Overtime_(2 byte)  
F2 00 B6 01 E1 E2 @Bike_Clear_Error_Code_Command
```

MCU self-function.

1. Recovery mode

```
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
_3_4_5  
reset iMX6  
disabled WDT  
assertRecoverPinHi:15  
assertRecoverPinHi:14  
assertRecoverPinHi:13  
assertRecoverPinHi:12  
assertRecoverPinHi:11  
assertRecoverPinHi:10  
assertRecoverPinHi:9  
assertRecoverPinHi:8  
assertRecoverPinHi:7  
assertRecoverPinHi:6  
assertRecoverPinHi:5  
assertRecoverPinHi:4  
assertRecoverPinHi:3  
assertRecoverPinHi:2  
assertRecoverPinHi:1  
de-assertRecoverPinLo: de-assert Recovery pin low
```

key 3.4.5
hold over 5sec

assert Recovery pin high
(預設3min)

de-assert Recovery pin low

2. Motor safe Key

當 MCU detect Motor safe key,會下 stop command 給 Motor (三次)