

## User Manual **Multi-display Control Module Protocol**



### **MCS**

**Multi-display control solution**

Designed and manufactured by Austin Hughes

# Contents

## < Part. 1 > Interface

1.1	Connection	P.1
1.2	Connection Standard	P.2 - 3

## < Part. 2 > Command

		P.4
2.1	CAN Bus Registry	P.5
2.2	Get Address	P.6
2.3	Get Name	P.7
2.4	Get Power Status	P.8
2.5	Get Display Status	P.9
2.6	Get Screen Status	P.10
2.7	Get PIP Status	P.11
2.8	Set Display ID	P.12
2.9	Set Display Name	P.13
2.10	Show Display ID & Name	P.14
2.11	Volume Control	P.15
2.12	Mute Control	P.16
2.13	Input Source Select	P.17
2.14	OSD Button Control	P.18
2.15	Infrared Remote Control	P.19
2.16	Sound Select Control	P.20
2.17	Contrast Control	P.21
2.18	Brightness Control	P.22
2.19	Auto Adjust Control	P.23
2.20	Power Control	P.24
2.21	PIP Control	P.25
2.22	PIP Source Control	P.26 - 27
2.23	PIP Swap Control	P.28
2.24	PIP Location Control	P.29

# < Part 1 > Interface

## < 1.1 > Connection

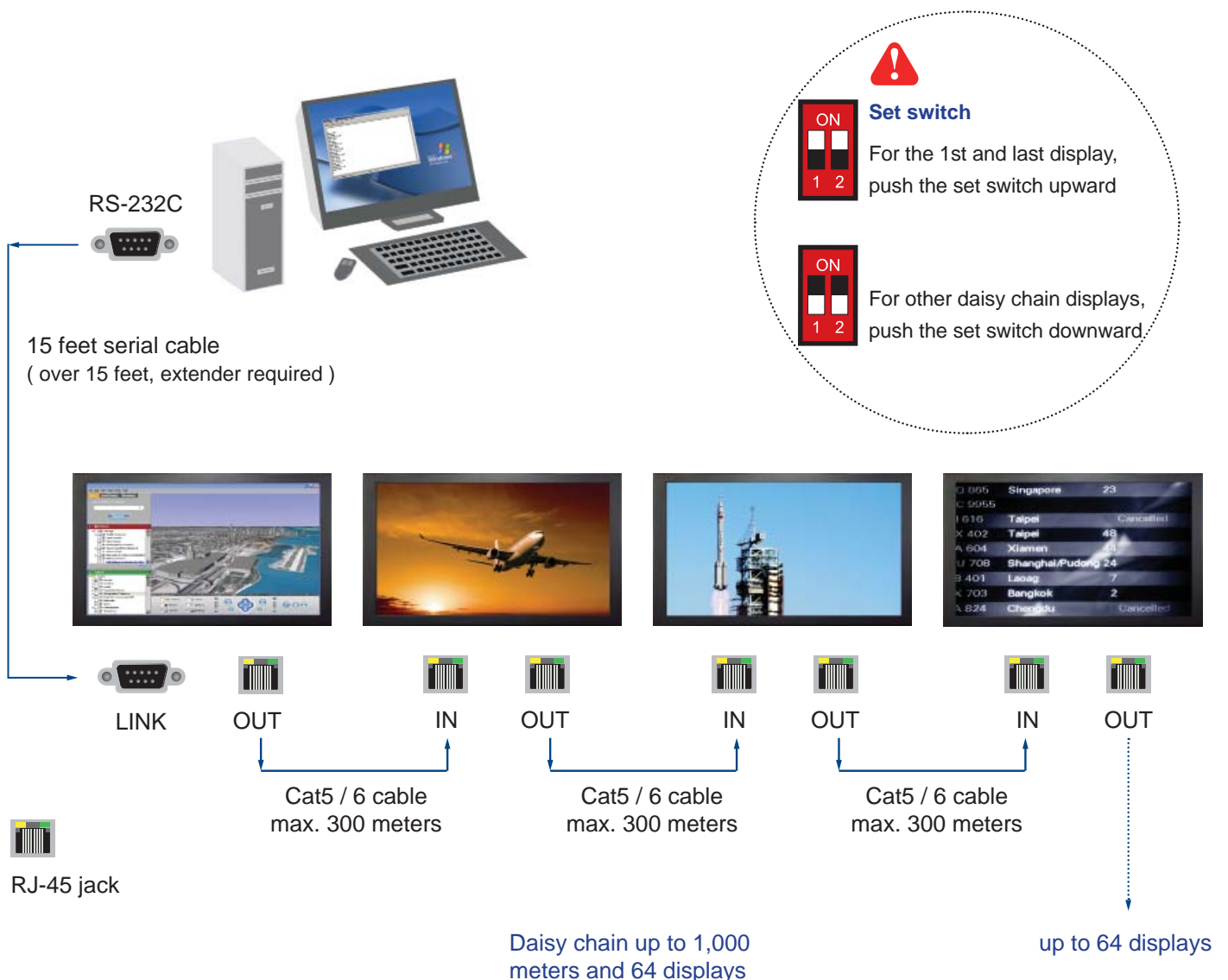
- As shown in Fig. 1-1, first, connect the personal computer's RS-232C serial port to the 1st LCD display's LINK port and then begin to add connections from a LCD display, starting from the OUT port.

- The first & last LCD displays located at both ends of daisy chain connection must be terminated by setting the pin 1 & 2 of DIP switch ( Set ) to ON position, located next to OUT port. For other daisy chain LCD display(s), please keep the pin 1 & 2 of DIP switch at OFF position ( Pin 1 & 2 are default at OFF position ).

\*The new DIP switch setting requires a power cycle of LCD display to take effect.

- The MCS module of LCD display will automatically assign an available ID number from 1 to 64 to each LCD display when connected to the daisy chain, to eliminate LCD displays trying to use the same IDs simultaneously.

Fig. 1-1 Connecting the PC & LCD Displays



## < 1.2 > Connection Standard

- 1) Computer to LCD display connection standard
  - Conducts bi-directional communication using serial RS232.
  - Use three signal wires of TxD, ( pin 2 ), RxD ( pin 3 ) and GND ( pin 5 ), among the RS232 standard wires, as Fig. 2-1.
  - Use DTR ( pin 4 ), RTS ( pin 7 ) for hot-plug detect.
  - The distance between the PC computer to LCD display is limited 15 feet.
  
- 2) LCD display to LCD display connection standard
  - Conducts bi-directional communication using CAN bus
  - A maximum of 64 LCD display units can be daisy chained to one CAN bus, up to 1,000 meters.
  - The distance between LCD Displays is limited 300 meters via Cat 5/ 6 cable.
  
- 3) Command communications
 

The CAN bus requires the MCS module of LCD display registration by sending command < 0x01 > to add or remove the LCD display(s) from the CAN bus before command communications. Please refer to page 6 for more details.

All communications are conducted in the form of hexadecimal number, and the checksum calculation method as below :

Total = Command + ID + Val1 + Val2 + Val3 + Val4 + Val5 + Val6;

Checksum = 256 – Total;

\* Unsigned character of Checksum, Total=0;

Get Power Status ( e.g. Power ON & ID=1 )

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43,0x06	0x04		Power	0x00	0x00	0x00	0x00	0x00		0x0D, 0x0A



Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43,0x06	0x04	0x01	0x01	0x00	0x00	0x00	0x00	0x00	0xFA	0x0D, 0x0A

Here, each set functions according to the commands received and responds with ACK at the same time.

Therefore, the operation of each set should be checked after this process.

## < 1.2 > Connection Standard

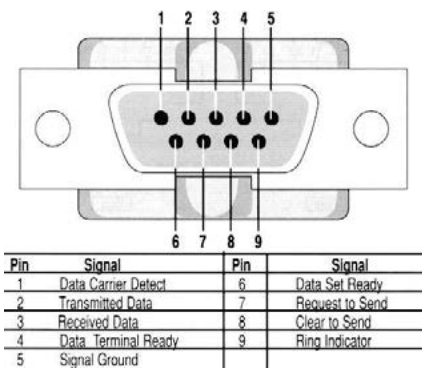
### 4) The status lights ( LED )

Port	Color	Activity
IN	Green	Solid LED indicates that the MSC board is powered on. No light indicates the board is powered off.
IN	Orange	Blinking LED indicated that the data is being transmitted through the connection. No light indicates no data is transmitted

**Table 2-1** RS-232 Communication Standards

Bit Rate	9600 bps
Data Bits	8 bits
Parity	None
Stop Bits	1 bit
Flow Control	None

**Fig. 2-1** RS-232 pin out DB-9 pin used for Asynchronous Data



## < Part 2 > Command

No.	Type of Command	Command	Range of Value ( Decimal )	Wait ACK (ms)
1	CAN Bus Registry	0x01	--	2,000
2	Get Address	0x02	--	200
3	Get Name	0x03	--	200
4	Get Power Status	0x04	0 ~ 1	200
5	Get Display Status	0x05	--	200
6	Get Screen Status	0x06	--	200
7	Get PIP Status	0x07	--	200
8	Set Display ID	0x15	1 ~ 64	200
9	Set Display Name	0x16	--	200
10	Show Display ID & Name	0x17	5 ~ 255	200
11	Volume Control	0x20	0 ~ 100	200
12	Mute Control	0x21	0 ~ 100	200
13	Input Source Select	0x22	--	2,000
14	OSD Button Control	0x23	0 ~ 1	200
15	Infrared Remote Control	0x24	0 ~ 1	200
16	Sound Select Control	0x25	--	200
17	Contrast Control	0x26	0 ~ 100	200
18	Brightness Control	0x27	0 ~ 100	200
19	Auto Adjust	0x28	0	5,000
20	Power Control	0x45	0 ~ 1	7,000
21	PIP Control	0x50	--	200
22	PIP Source Select	0x51	--	200
23	Main-PIP Swap Control	0x52	0	200
24	PIP Locate Control	0x53	--	200

## < 2.1 > Detailed Description of Commands

### 1) CAN Bus Registry

- Function

The computer registers the MCS module of LCD display(s) to CAN bus daisy chain connection.

\*Registration requires when add or remove the LCD displays from the CAN bus connection.

- Register MCS Module(s)

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x01	0x00	0x00	0x00	0x00	0x00	0x00	0x00		

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x01		<b>MAC1</b>	<b>MAC2</b>	<b>MAC3</b>	<b>MAC4</b>	0x00	0x00		

**MAC1** : The 1st byte of MAC address for the LCD display

**MAC2** : The 2nd byte of MAC address for the LCD display

**MAC3** : The 3rd byte of MAC address for the LCD display

**MAC4** : The 4th byte of MAC address for the LCD display

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x01		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		

**ERR** : Error code that shows the type of error that occurred

0x10	Display controller error
0x11	Serial controller error
0x12	Unsupported Command
0x13	Checksum error
0x14	Bad parameter
0x15	Unknown error

## < 2.2 > Get Address

- Function

The computer shows the 32-bit MAC address of the LCD display

- Get LCD Display Address

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x02		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x02		MAC1	MAC2	MAC3	MAC4	0x00	0x00		0x0D, 0x0A

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x02		ERR	0x00	0x00	0x00	0x00	0x00		0x0D, 0x0A



## < 2.3 > Get Name

- Function

The computer shows the name of the LCD display

- Get LCD Display Address

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x03		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x03		<b>Char1</b>	<b>Char2</b>	<b>Char3</b>	<b>Char4</b>	<b>Char5</b>	<b>Char6</b>		0x0D, 0x0A

**Char1** : The 1st character of the name

**Char2** : The 2nd character of the name

**Char3** : The 3rd character of the name

**Char4** : The 4th character of the name

**Char5** : The 5th character of the name

**Char6** : The 6th character of the name

\*The default value of the character of the name is 0xFF

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Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x03		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.4 > Get Power Status

- Function

The computer shows the power status of the screen of LCD display

- Get Power Status

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x04		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x04		<b>Power</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Power** : The power code for the LCD display

0x00	Power OFF
0x01	Power ON

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x04		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.5 > Get Display Status

- Function  
The computer shows the current setting of the LCD display

- Get LCD Display Address

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x05		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Check-sum	Footer
0x4D, 0x43, 0x06	0x05		<b>Vol</b>	<b>Mute</b>	<b>Input</b>	<b>OSDB</b>	<b>IR</b>	<b>Sound</b>		0x0D, 0x0A

**Vol :** The volume value of the LCD display ( 1~100 )

**Mute :** The mute code for the LCD display

**Input :** The input source code for the LCD display

**OSDB :** The OSD button control code for the LCD display

**IR :** The infrared remote control code for the LCD display

**Sound :** The sound select code for the LCD display

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x05		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x0D, 0x0A

## < 2.6 > Get Screen Status

- Function

The computer shows the current screen setting of the LCD display

- Get Screen Status

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x06		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x06		<b>Ctrast</b>	<b>Bright</b>	0x00	0x00	0x00	0x00		0x00

**Ctrast** : The contrast value of the display

**Bright** : The brightness value of the display

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x06		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.7 > Get PIP Status

- Function

The computer shows the PIP setting of the LCD display

The PIP function may or not be available on a particular LCD display depending on the model selected

- Get PIP Status

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x07		0x00	0x00	0x00	0x00	0x00	0x00		0x00

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x07		<b>PIP</b>	<b>P.Sour</b>	<b>P.Loc</b>	0x00	0x00	0x00		0x0D, 0x0A

**PIP** : The PIP status value code for the display

**P.Sour** : The PIP source code for the display

**P.Loc** : The PIP location code for the display

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x07		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x0D, 0x0A

## < 2.8 > Set Display ID

- Function

The computer changes the LCD display ID number.

- Set Display ID number

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x15		NewID	0x00	0x00	0x00	0x00	0x00		0x00

**NewID** : Changes the LCD display's ID to New ID number (1~64).

\*The new ID number will be treated as bad parameter, if the number is 0, 65 ~ 255 or the new ID number already occupied by other LCD display.

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x15		<b>NewID</b>	<b>0x00</b>	<b>0x00</b>	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x15		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.9 > Set Display Name

- Function  
The computer sets the name of the LCD display.

- Set Display Name

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x16		<b>Char1</b>	<b>Char2</b>	<b>Char3</b>	<b>Char4</b>	<b>Char5</b>	<b>Char6</b>		0x0D, 0x0A

**Char1** : The 1st character of the name

**Char2** : The 2nd character of the name

**Char3** : The 3rd character of the name

**Char4** : The 4th character of the name

**Char5** : The 5th character of the name

**Char6** : The 6th character of the name

\*Character of the name can allow [ a~z ], [ A~Z ] , [ 0-9 ] & space character.

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x16		<b>Char1</b>	<b>Char2</b>	<b>Char3</b>	<b>Char4</b>	<b>Char5</b>	<b>Char6</b>		0x0D, 0x0A

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x16		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.10 > Show Display ID & Name

- Function

The LCD Display shows the ID number & name on the screen

- Show Display ID and Name

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x17		<b>Time</b>	<b>0x00</b>	<b>0x00</b>	<b>0x00</b>	<b>0x00</b>	<b>0x00</b>		<b>0x00</b>

**Time** : The second value for the screen shows the display ID no. & name ( 5~255 )

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x17		<b>Time</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x17		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00



## < 2.11 > Volume Control

- Function

The computer changes the volume level of the LCD display

The audio function may or not be available on a particular LCD display depending on the model selected

- Set Volume

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x20		<b>Vol</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Vol**: The volume level value code of the LCD display (0~100)

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x20		<b>Vol</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x20		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.12 > Mute Control

- Function

The computer turns the mute ON or OFF of the LCD display

The audio function may or not be available on a particular LCD display depending on the model selected

- Set Mute Control

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x21		<b>Mute</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Mute** : The mute code for the LCD display

0x00	Mute OFF
0x01	Mute ON

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x21		<b>Mute</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x21		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.13 > Input Source Select

- Function

The computer changes the input source of the LCD display

Some of inputs may or not be available on a particular LCD display depending on the model selected

- Set Input Source

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x22		<b>Input</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Input :** The input source code for the LCD display

0x10	VGA
0x11	S-Video
0x12	Composite
0x13	DVI-D
0x14	HDMI
0x15	SDI
0x16	YPbPr
0x17	TV

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x22		<b>Input</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x22		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.14 > OSD Button Control

- Function  
The computer switches the OSD button function ON /OFF
- Set OSD Button

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x23		<b>OSDB</b>	0x00	0x00	0x00	0x00	0x00		0x00

**OSDB** : The OSD membrane button control code for the LCD display

0x00	OFF
0x01	ON

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x23		<b>OSDB</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x23		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.15 > Infrared Remote Control

- Function

The computer enables and disables the infrared reception feature of the LCD display

- Set Infrared Remote

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x24		<b>IR</b>	0x00	0x00	0x00	0x00	0x00		0x00

**IR** : Reception enable / disable code for the LCD display infrared remote control

0x00	Remote Disable
0x01	Remote Enable

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x24		<b>IR</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x24		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.16 > Sound Select Control

- Function

The computer switches the sound setting of the LCD display

The PIP function may or not be available on a particular LCD display depending on the model selected

- Set Sound

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x25		<b>S.Sel</b>	0x00	0x00	0x00	0x00	0x00		0x00

**S.Sel** : The sound select code for the LCD display

0x01	Main
0x02	PIP

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x25		<b>S.Sel</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x25		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.17 > Contrast Control

- Function  
The computer adjusts the contrast of the LCD display

- Set Contrast

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x26		<b>ContV</b>	0x00	0x00	0x00	0x00	0x00		0x00

**ContV** : The contrast value code for the LCD display ( 0~ 100 )

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x26		<b>ContV</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x26		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.18 > Brightness Control

- Function  
The computer adjusts the brightness of the LCD display

- Set Brightness

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x27		<b>Bright</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Bright** : The brightness value code for the LCD display ( 0~ 100 )

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x27		<b>Bright</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x27		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00



## < 2.19 > Auto Adjust Control

- Function  
Auto adjusts the VGA picture position on the screen  
Available only when input source is VGA

- Set Auto Adust

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x28		A.Adj	0x00	0x00	0x00	0x00	0x00		0x00

**A.Adj**: The auto adjust code for the LCD display ( 0x00 )

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x28		A.Adj	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x28		ERR	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.20 > Power Control

- Function

The computer switches the power for the screen of LCD display

- Set Power

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x45		<b>Power</b>	0x00	0x00	0x00	0x00	0x00		0x00

**Power** : The power code for the screen of LCD display

0x00	Power OFF
0x01	Power ON

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x45		<b>Power</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x45		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.21 > PIP Control

- Function

The computer turns the PIP function of the LCD display.

The PIP function may or not be available on a particular LCD display depending on the model selected

- Set PIP Control

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x50		<b>PIP</b>	0x00	0x00	0x00	0x00	0x00		0x00

**PIP** : The PIP function code for the LCD display

0x10	PIP OFF
0x11	Small
0x12	Large
0x13	Side by side

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x50		<b>PIP</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x50		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.22 > PIP Source Control

- Function

The computer adjusts the PIP source of the LCD display

The PIP function may or not be available on a particular LCD display depending on the model selected

Available only when PIP function is ON

- Set PIP Source

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x51		<b>P.Sour</b>	0x00	0x00	0x00	0x00	0x00		0x00

**P.Sour** : The PIP source code for the LCD display

0x10	VGA
0x11	S-Video
0x12	Composite
0x13	DVI-D
0x14	HDMI
0x15	SDI
0x16	YPbPr
0x17	TV

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Check-sum	Footer
0x4D, 0x43, 0x06	0x51		<b>P.Sour</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x51		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.22 > PIP Source Control

\*\*The PIP is operable in the following table:

Main \ PIP	VGA	S-Video	Compos-ite	DVI-D	HDMI	SDI	YPbPr	TV
VGA	X	O	O	O	O	O	O	O
S-Video	O	X	X	O	O	O	O	X
Composite	O	X	X	O	O	O	O	X
DVI-D	O	O	O	X	X	O	O	O
HDMI	O	O	O	X	X	O	O	O
SDI	O	O	O	O	O	X	X	O
YPbPr	O	O	O	O	O	X	X	O
TV	O	X	X	O	O	O	O	X

## < 2.23 > PIP Swap Control

- Function

The computer swaps the main screen with PIP screen

The PIP function may or not be available on a particular LCD display depending on the model selected

Available only when the PIP function is ON

- Set PIP Swap

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x52		<b>P.Swp</b>	0x00	0x00	0x00	0x00	0x00		0x00

**P.Swp** : 0x00 ( always )

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x52		<b>P.Swp</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x52		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

## < 2.24 > PIP Location Control

- Function

The computer adjusts the PIP position of the display

The PIP function may or not be available on a particular LCD display depending on the model selected

Available only when the PIP is in small or large size state

- Set PIP location

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x06, 0x4D, 0x43	0x53		<b>P.Loc</b>	0x00	0x00	0x00	0x00	0x00		0x00

**P.Loc**: The PIP location code for the LCD display

0x10	Upper Left
0x11	Upper Right
0x12	Lower Left
0x13	Lower Right

- Ack

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x06	0x53		<b>P.Loc</b>	0x00	0x00	0x00	0x00	0x00		0x00

- Nak

Header	Command	ID	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Checksum	Footer
0x4D, 0x43, 0x15	0x53		<b>ERR</b>	0x00	0x00	0x00	0x00	0x00		0x00

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