USER MANUAL

19” Bridge Display
Type Approved by ABS

Owner Record

Here is an easy-to-locate form to record the unit's serial number, and from the invoice, record the invoice date. The unit's serial number is located on the back panel.

If the unit ever requires service, please refer to this information when contacting the MarinePC Service Center.

Product	Serial Number	Invoice Date
MPC-MI19	___ ___ ___ ___ ___	____ / ____ / ____

CAGE CODE 3W7C2
GSA Contract GS-07F-0154T
1-480-515-1838

WARNING

TO PREVENT FIRE OR SHOCK HAZARDS, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE. ALSO DO NOT USE THIS UNIT'S POLARIZED PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLETS UNLESS THE PRONGS CAN BE FULLY INSERTED.
DO NOT OPEN THE CABINET. THERE ARE HIGH VOLTAGE COMPONENTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION

RISK OF ELECTRIC SHOCK. DO NOT OPEN.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER OR BACK, NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol warns the user that un-insulated voltage within the unit may be large enough to cause electric shock. Therefore, it is dangerous to touch any part inside the unit.

This symbol alerts the user that important literature about the operation and maintenance of this unit has been included. Read it carefully to avoid any problems.

TABLE OF CONTENTS

CONTENTS

SHIPPING CARTON CONTENTS

Thank you for purchasing this MarinePC MPC-MI19 Display.

The carton contains the items listed below:

- 19 INCH MPC-MI19 Display
- Mounting Accessory Kit
- Product CD containing:
  - User's Guide
  - Data Sheet
- ECDIS CD with Color Tables (Optional)

I/O cable kits are available separately.

Please check the carton and its content for damage that may have occurred during shipment.

Report any damage to the shipping agent immediately and do not operate the display if it appears to have been damaged. All warranty returns must use the original shipping carton and packaging materials to prevent shipping damage.

INTRODUCTION

With this purchase of this Marine Grade Bridge Display, the MPC-MI19, we welcome you to MarinePC's family of ruggedized marine grade products.

Serious mariners require serious products for their demanding applications. MarinePC has been dedicated to providing exceptional computing and display products for the maritime industry for many years. We are proud to be a chosen supplier of many Navies and Coast Guards around the world, Commercial Maritime, military and para-military forces, state and local law enforcement, as well as recreational users.

MarinePC is based in Phoenix, Arizona USA. This product is designed, manufactured and tested in the United States, and is certified compliant with the IMO Standard IEC60945 for Maritime Bridge Electronics by the American Bureau of Shipping (ABS).

MarinePC offers a full range of marinized LCD Displays and Computers, from our outdoor waterproof 8.4", 10.4", 12.1" and 15" MPC-AWM Professional Series (also available in MIL-STD version), to our standard duty and ABS Type Approved Bridge Displays, Indoor and Outdoor Integrated PanelPC's, fanless ruggedized computers and our 19" rack mount fully configurable computers and servers. All of our computer products are open architecture and use genuine Intel Core processors.

PRODUCT SAFETY PRECAUTIONS

- Follow all warnings and instructions marked on the display.
- Do not attempt to service this display yourself. Removing the display cover or back may expose you to dangerous voltage or other risks. Refer all servicing to qualified service personnel.
- Adequate ventilation must be maintained to ensure reliable and continued operation and to protect the display from overheating.
- To protect from electrical shock, unplug the display from the power source before relocating.
- This display should be operated from the type of power source indicated on the displays rating label.
- Do not place any heavy objects on the power cord. Damage to the cord may cause shock or fire.
- Unplug this displays power source and refer servicing to qualified service personnel in the event that:
  - Power cord or plug is damaged or frayed.
  - The display does not operate normally when the operating instructions are followed.
  - The display has been dropped or the cabinet damaged.
  - The display exhibits a distinct change in performance, indicating a need for service.

ABBREVIATIONS

ACK – Acknowledge
AMLCD – Active Matrix Liquid Crystal Display
cd/m^2 – Candelas per meter squared
DVI-D – Digital Video Interface
ENC – Electronic Navigational Charts
ESD – Electrostatic Discharge
ECDIS – Electronic Chart Display and Information Systems
Hz – Hertz
IAW – In Accordance With
IHO – International Hydrographic Organization
kHz – Kilohertz
LCD – Liquid Crystal Display
LED – Light Emitting Diode
NAK – Negative Acknowledge
NTE – Not To Exceed
OSD – On Screen Display
PBP – Picture By Picture
PIP – Picture In Picture
RX – Receive
RGB – Red, Green, Blue video
SCOM – Serial Communication interface
TX – Transmit
VAC – Volts, Alternating Current
VDC – Volts, Direct Current
VESA – Video Electronics Standards Association
VGA – Video Graphics Adaptor

MPC-MI19 DISPLAY FEATURES

- **Capable of displaying 16,772,166 colors:** The display's high-contrast LCD enhances color vibrancy and improves focus with no geometric distortion.
- **Auto Screen size adjustment**: Will adjust display for optional performance and provide full screen images on even non-native formats.
- **Wide viewing angle:** ±89° typical all directions.
- **Anti-Reflective Screen:** All models are supplied with Anti-reflective Anti-glare protective safety glass.
- **Low power consumption**.

INSTALLATION

General Installation and Mounting Instructions

General Installation and Mounting

- Our displays are designed for various installation mountings (panel mounting, bracket mounting and VESA mounting). For details please see our installation drawings.
- When mounting the display in a confined area, i.e. console, adequate ventilation must be provided to limit the maximum temperature to 55°C.
- The distance of each electronics unit from the magnetic standard compass or the magnetic steering compass must not be less than the permitted safe compass distance of the device. See the safe compass distance later in this section.
- The maximum cable lengths must not exceed the recommended industry recommended lengths.
- The display must be properly grounded. A short wide cable (braid) gives the best results.
- For ECDIS applications, the calculated nominal recommended viewing distance is 1,013 mm. (IEC62288, Part 7.5 Screen resolution).

Mounting Instructions

The display can be mounted to a custom mounting bracket (not supplied), panel mounted or VESA mounted. The following is a list the required mounting hardware (not supplied):

Panel mounting	x4 - 6.2mm Dia. holes left and right sides
Panel mounting	x4 – m6 inserts on rear top and bottom
VESA mounting	x4 – m4 inserts on rear cover
Bracket mounting	x8 – m6 inserts, 4 per side on rear cover

Cables

Only high quality shielded signal cables should be used. Video cables should be kept as short as possible to preserve the quality of the video signal. The maximum signal cable length will depend on the signal type, resolution and frequency, in addition to the quality of the signal output of the video source.

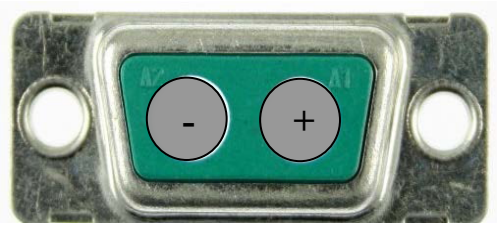
DC power input connector assembly

The mating two pin DC Power connector, two contacts and back shell are available separately. For installation follow the following procedure.

1. Select the smallest compression insert that will fit over the DC power wires
2. Insert the wires through the compression insert.

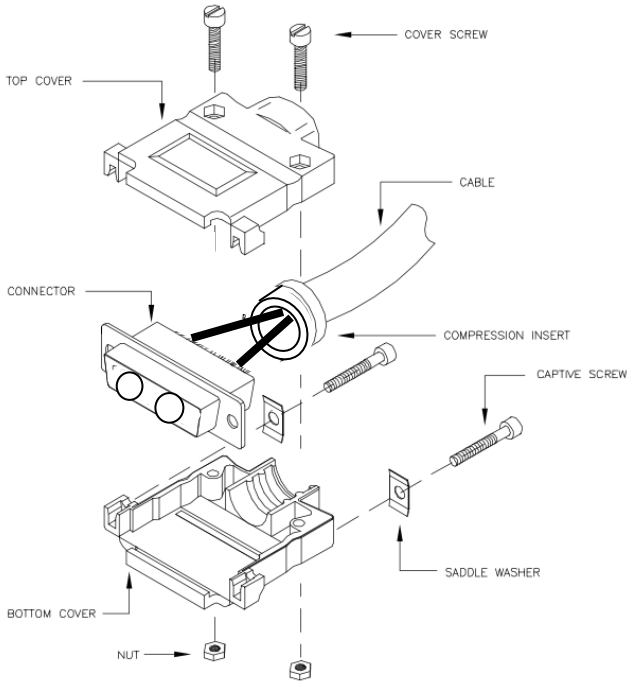
   NOTE: Wires must be properly sized to support the current related to the input voltage being used and the length of the wires.

3. Solder the contacts to the +24 VDC wire and the 24 VDC return wire.
4. Insert the contacts into the connector housing noting the proper polarity.

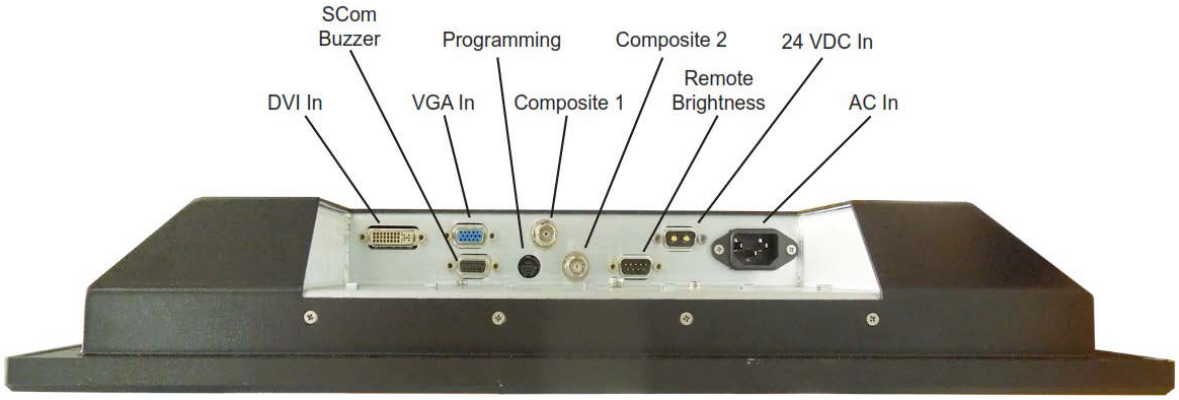


Mating Side

5. Open the back shell by removing the two cover screws.
6. Assemble the connector and back shell as shown below



Cable Connections



AC Power Input

AC operating input voltage is 90-264 VAC Auto-ranging, 47-400 Hz, IEC-320 display connector. Mating power cord is available separately.

DC Power Male Connector (24V DC IN)

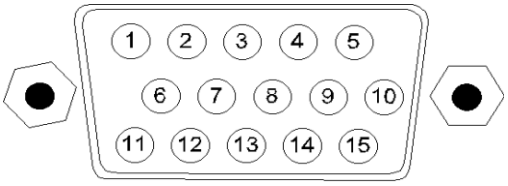
Connect the DC Power input connector to the two pin male connector and secure the cable with the two jack screws. The input voltage is 24 VDC nominal (9-32 VDC) is supported. Mating DC power connection kit is available separately.

Mating Side

NOTE: The display will accept both AC and DC inputs at the same time. In this configuration the AC power is the primary power. If AC power is lost or shut off, the display will automatically switch over to the DC power input without affecting the operation of the unit.

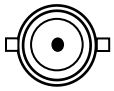
RGB HD15 Female Signal Connector (RGB IN)

The LCD Display RGB input can be connected to a video source using a HD15-male to HD15-male cable available separately.



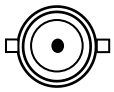
COMPOSITE BNC Connector (COMP 1)

Connect the BNC cables (not provided) to the COMP 1 BNC connector on the back of the display as shown below.



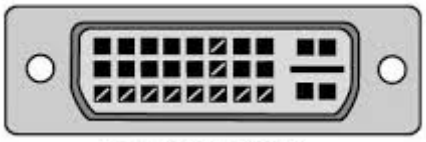
COMPOSITE BNC Connector (COMP 2)

Connect the BNC cables (not provided) to the COMP 2 BNC connector on the back of the display as shown below.



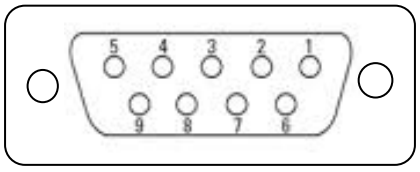
DVI-D VIDEO Signal Female Connector (DVI-D IN)

The DVI-D input is Digital Video input only. The DVI-D input connector uses a DVI-I female connector to accept both DVI-I and DVI-D video cables. The LCD should be connected to a video source using the DVI-D-male/male cable available separately.



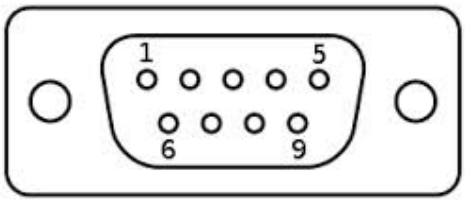
SCOM (RS232) and Buzzer control input Female Connector (SCOM/BUZZER)

Connect an RS232 Serial Cable (not provided) from the DB9 female input connector on the back of the unit to the host computer RS232 Interface.



Remote Brightness Interface Male Connector (REMOTE BRIGHTNESS)

Connect the remote brightness Cable (not provided) to the DB9 male input connector on the back of the unit. The brightness of the LCD Display can be controlled remotely through this interface connector using two push button switches for brightness up and brightness down. Also, the remote brightness potentiometer (10K pot) can be connected through this interface connector.



Programming / Field Service Interface (PROG)

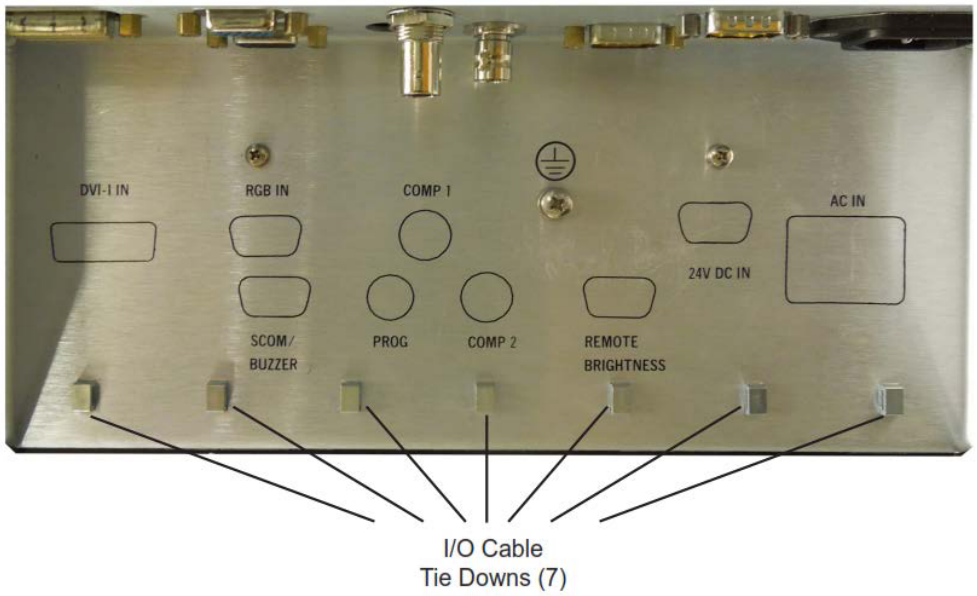
This interface is only for field service and manufacturing use.

Earth Ground

An M4 screw is provided for earth ground. It should be connected using a braid or wire.

CABLE TIEDOWNS

After the I/O cables are attached to the input connector, secure them with a cable tie (provided) to the appropriate tie-down.



Compass Safe Distance

The following is the compass safe distance for the MPC-MI19 19 inch display:

Front of unit: 200mm 0.3° deflection

Rear of unit: 300mm 0.3° deflection

Left side of unit: 0° deflection

Right side of unit: 0° deflection

ECDIS Installation Setup

For ECDIS applications, the calculated nominal recommended viewing distance is 1,013 mm. (IEC62288, Part 7.5 Screen resolution).

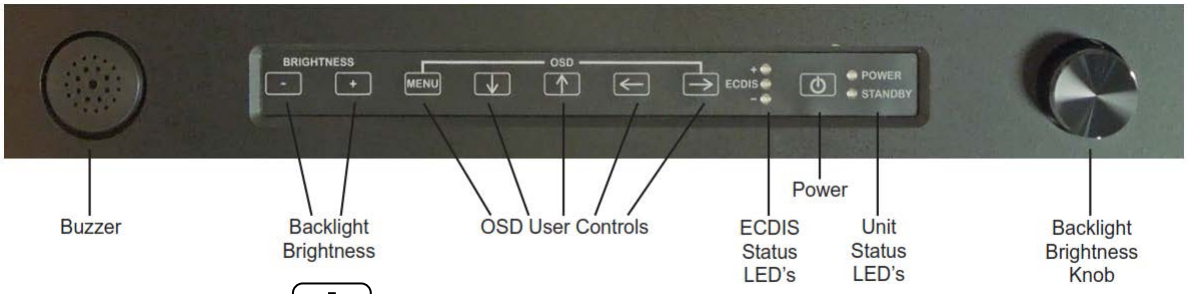
The VGA and DVI-D ECDIS tables are provided on a CD along with the display. These tables must be loaded onto the ECDIS computer for proper operation of the display.

After the display has been mounted and cabled up, it must be checked for proper ECDIS operation see ECDIS Operation section on page 23.

OPERATION

FRONT PANEL DISPLAY USER CONTROLS

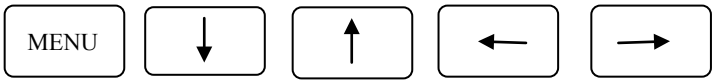
The operator front panel user controls are described below.



Power ON/OFF

The POWER Button is used to power the display ON and OFF. Press and hold the POWER Button for 3 to 5 seconds to power the unit ON or OFF. When power is first applied to the display it will power ON automatically.

OSD CONTROL BUTTONS



MENU

Turns the OSD menu on

Return to previous OSD menu page

Exit the OSD menu (will also auto time out)

↓ SELECT DOWN

Moves the selector to the next function (down)

↑ SELECT UP

Moves the selector to the previous function (up)

← SELECT LEFT

Moves the main selector to the left

Decrease the OSD parameter values

→ SELECT RIGHT

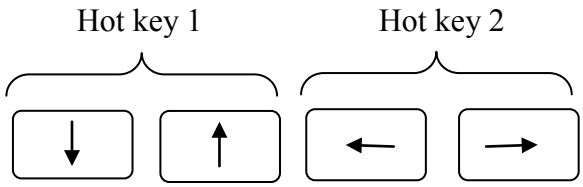
Moves the main selector to the left

Confirm to select the OSD function

Increase the OSD parameter values

OSD HOT KEYS

The OSD Hot key adjustment is disabled.

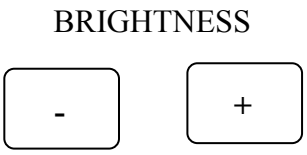


Hot key 1 function is initiated by either the up arrow or down arrow. Hot key 2 function is initiated by either the left arrow or right arrow. Pressing any of these keys will cause a small screen to appear with an adjustment bar. Pressing the arrow keys again will cause the level indicator to move but no adjustment will be made since the Hot key adjustment is disabled. The adjustment box will time out or can be removed by pressing the MENU button.

FRONT PANEL Backlight Dimming Control

NOTE: Use of a Brightness control may inhibit visibility of ECDIS information, particularly when using the night color tables

Backlight Buttons



The backlight brightness is increased and decreased by pushing the Plus and Minus buttons respectively.

Backlight Knob

The backlight brightness is increased and decreased by turning the knob clockwise and counter-clockwise respectively.

FRONT PANEL INDICATORS

POWER (Green) – Indicates that the display is powered ON.

STANDBY (Amber) – Indicates that there is no video input or format is out of range.

ECDIS

ECDIS (Green) – Calibrated for ECDIS when illuminated
ECDIS + (Red) – Brightness is above the calibrated value
ECDIS – (RED) – Brightness is below the calibrated value

FRONT PANEL ALARMS

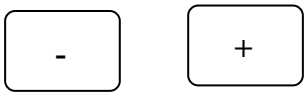
Buzzer – Remotely controlled

The Buzzer can be activated through a remote switch or through the SCOM (RS232) interface.

Remote Backlight Dimming Control

NOTE: Use of a Brightness control may inhibit visibility of ECDIS information, particularly when using the night color tables

Remote Backlight Buttons



The backlight brightness is increased and decreased by pushing the remote Plus and Minus buttons respectively.

Remote Backlight Potentiometer

The maximum backlight brightness is increased and decreased by turning the Remote Backlight Potentiometer knob clockwise and counter-clockwise respectively. This pot sets the maximum backlight brightness of the display. **This pot must be disconnected for ECDIS operation**

OSD FUNCTIONS

The OSD settings highlighted in green are the preferred settings. See the shipped OSD configuration in the APPENDIX.

Picture :

Brightness — Increase/decrease panel brightness level, total: 100 steps

Contrast — Increase/decrease panel contrast level, total: 100 steps

NOTE: Use of the Brightness or Contrast controls may inhibit visibility of ECDIS information, particularly when using the night color tables.

Saturation — Increase/decrease saturation, total: 100 steps

Hue ** — Increase/decrease Hue level, total: 100 steps

Sharpness* — Increase/decrease sharpness, total: 30 steps

Backlight — **(OSD CONTROL DISABLED)**

Position#

Move the image position upward

Move the image position downward

Move the image position to the left

Move the image position to the right

Aspect / Size ▸

- Fill Screen : Enable full screen expansion for lower resolution Image
- Fill to Aspect Ratio: Enable fill screen expansion for lower resolution image according to aspect ratio
- 4 : 3 : scaling format in 4:3
- 16 : 9 : scaling format in 16:9
- 16 : 10 : scaling format in 16:10
- 2.35 : 1 : scaling format in 2.35:1
- 2 : 1 : scaling format in 2:1
- 1 : 1 : Display the exact image resolution on the screen without image expansion.
- Custom Sizing## :
  - Overscan
  - Normal
  - Custom ▸

H Size

V Size

H Pan

V Pan

* : DISPLAY IN VIDEO MODE ONLY
** : FUNCTION IN ARGB/ DVI / VIDEO NTSC MODE ONLY
# : FUNCTION IN ARGB MODE ONLY
: DISPLAY IN VIDEO MODE ONLY

Input : Select the input video signal

MAIN Input Source:

VGA
DVI
Composite 1
Composite 2***

PIP Setup ▸

PIP Source ▸

VGA / DVI / Composite 1 / Composite 2 / Off

PIP Size : Off / Small / Medium / Large / PBP

4 possible input groups that can be mixed for PIP :

a) VGA
b) DVI
c) Composite 1 / Composite 2

Not allow to select signal source from the same group for PIP. [See Appendix – PIP mix table]

PIP Position :

 Move the PIP position upward

 Move the PIP position downward

 Move the PIP position to the left

 Move the PIP position to the right

PIP Swap : Swap between the main window and PIP window

PIP Auto off : 

: OFF / ON

ON : When PIP has no signal input after 30 seconds, the PIP window will turn off automatically.

OFF : PIP window stays on

*** DISPLAY WHEN SETTING 'ON' UNDER SETUP → AUTO SOURCE SEEK

Utilities :

Setup ▸

Auto Picture Setup# : Auto adjust the image position, phase and size
Auto Color Gain# : Auto Color Calibration (See appendix)
Wide Screen Mode detection# ▸ : Recognize the wide screen mode coming from ARGB port

- Off
- 1280x768
- 1366x768

Manual Clock# :  Adjust the image horizontal size
Manual Phase# :  Fine tune the data sampling position (adjust image quality)

Auto Source Seek :

- Auto :  : OFF / ON
  ON – Auto source select always enable
  OFF – Disable auto source select function
- Setup ▸ Selection for the corresponding input sources detection

HD/SD SDI 1  : OFF / ON
HD/SD SDI 2  : OFF / ON
VGA  : OFF / ON
DVI  : OFF / ON
HD Component  : OFF / ON
Composite 1  : OFF / ON
Composite 2  : OFF / ON
S-Video  : OFF / ON
SD Component  : OFF / ON
The corresponding input port name display on OSD menu will disappear once setting “OFF”.

Auto Power :  OFF / ON
ON – Enable soft power off function if absence of input signals
OFF – Disable soft power function
Video Standard (SD)* : Auto / NTSC / NTSC 4.43 / PAL / PAL M / SECAM
Image Orientation : Normal / Horizontal flip / Vertical flip / Rotate
Gamma : 1.0 / 1.6 / 1.7 / 1.8 / 1.9 / 2.0 / 2.1/ 2.2 / 2.3 / 2.4 / 2.5 / 2.6 / User Setting
De-interlacing Mode* ▸

AFM  : Auto Film Mode
TNR  : Temporal Noise Reduction
MADI  : Motion Adaptive De-interlacing
LADI  : Low Angled De-interlacing
[See Appendix for AFM, TNR, MADI, LADI function description]

OSD ▸

OSD position :
H POS  : Move the OSD menu image horizontally
V POS  : Move the OSD menu image vertically
OSD Timeout (sec) : ON – 60 : Adjust the OSD menu timeout period in a step of 5 seconds (max 60 seconds)
ON = Continuous to display OSD menu.
60 = 60 seconds later will turn off the OSD menu.
Language : English / Chinese : Select OSD menu language display
Transparency :  : OFF / ON: Set OSD transparency
Display Input :  : OFF / ON: Display input port name when source switching

Zoom ▸

Zoom level :  : Enable the zoom in function on the image displayed.
Use “+” button to zoom in the image
Use “-“ button to decrease the zoomed image

Horizontal pan :  : Pan the image horizontally

Vertical pan :  : Pan the image vertically

Reset to Defaults : Restore to default values

Color Temperature ▸

5000K

R Gain : 

G Gain : 

B Gain : 

Reset to Defaults : Resume to the default values

6500K

R Gain : 

G Gain : 

B Gain : 

Reset to Defaults : Resume to the default values

8000K

R Gain : 

G Gain : 

B Gain : 

Reset to Defaults : Resume to the default values

9300K

R Gain : 

G Gain : 

B Gain : 

Reset to Defaults : Resume to the default values

User setting :

R Gain :  Set to 100%

G Gain :  Set to 100%

B Gain :  Set to 100%

Reset to Defaults : Resume to the default values

Reset All to Defaults : Reset all color temperature settings to the default values.

Hot Key ▸

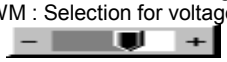
Hot key 1 : Set to Backlight **(OSD CONTROL DISABLED)**

Hot key 2 : Set to Backlight **(OSD CONTROL DISABLED)**

Monochrome Mode ▸

- Color
- Red Monochrome
- Green Monochrome
- Blue Monochrome

Backlight Setup ▸

- B/L Invert :  : Invert for the backlight brightness
- B/L Control : D/A / PWM : Selection for voltage level dimming control
- Backlight Frequency :  100 ~ 440Hz in a step of 20

Default Setting

- Reset to Factory Defaults
- Reset to Factory Defaults with (Color Temp)
- Restore to Calibrated Defaults

* : DISPLAY IN VIDEO MODE ONLY
\# : DISPLAY IN ARGB MODE ONLY

ECDIS OPERATION

The remote brightness pot must be disconnected for ECDIS operation.

This Display has been calibrated for ECDIS operation at the factory and is provided along with an ECDIS Color Calibration CD containing the ECDIS information and color tables.

Setting Controls for route monitoring

It is important that the display be adapted to lighting conditions on the bridge by selecting the correct color table (Day, Dusk or Night).

The controls should only be used for fine adjustment within the appropriate color table.

In-addition to the external backlight brightness controls readily available to the mariner, the LCD Display has internal controls, under the On Screen Display (OSD), available for service engineers. These controls are the contrast and video brightness adjustments.

NOTE: Use of the Video Brightness and Contrast controls may inhibit visibility of ECDIS information, particularly when using the night color tables

To ensure that the controls are always set to a level above that at which information will be lost, the black-adjust symbol BLKADJ (ref. IHO document S-52) shall be used as follows:

1 First set the backlight brightness to the calibrated position. Look at the black-adjust symbol. Then either:

2A If the center square is not visible, turn up the backlight brightness until it just appears.

2B If the center square is clearly visible, turn down the brilliance until the inner square disappears, then turn the backlight brightness back up until the inner square is just visible again.

(If the above adjustment is not successful, select a more appropriate color table and repeat this procedure.)

The “black level” is now correctly set. If a brighter display is required use the backlight brightness control, but it is better not to re-adjust the controls unless lighting conditions on the bridge change.

Note that the black-adjust symbol should be displayed to check that the inner square remains visible on the following occasions:

- Every time that the video brightness or contrast controls are adjusted.
- Every time that the display is switched to the night color table.

Color Differentiation Test Diagram Test

A multi-purpose color differentiation test diagram is illustrated in the IHO ECDIS Presentation Library, Part I, section 15.4. It consists of 20 squares each colored with one of four main background colors and each having a diagonal line in one of six foreground colors. Each diagonal line is two pixels wide.

The diagram is in the form of an ENC and so can be displayed using any of the three color tables.

The color tables should be checked subjectively by means of the color differentiation test diagram as follows:

1. The person carrying out the test should have passed the Isihara color blindness test, or other test used to qualify bridge watch keepers, and should adapt to night viewing for 10 minutes before checking the night display.
2. The controls should be set to their calibrated settings.
3. Under the current ambient condition, display the appropriate color differentiation test diagram. Select each table and ensure that:
    - Each foreground diagonal line is clearly distinguished from its background.
    - The foreground lines representing yellow, orange, magenta (purple), green, blue and grey may be clearly identified.

Grayscale Test

The Grayscale test is a visual test that is used to determine the color tracking of the display. It requires judgment on the part of the operator to use.

The Grayscale shall consist of at least 8 steps from black to white on the screen. The grayscale shall be made of rectangles that are at least 2.5 cm by 10 cm. These can be oriented in either the horizontal or vertical direction. The Grayscale is critically observed by the viewer from a distance of about 50 cm to 100 cm.

The observer will see either a grayscale that is pure and free from coloring, or one which shows varying degrees of shading. If no coloring is seen, then the display is performing properly. If slight shading is seen, then the display is useable. If there is a lot of shading, then the display may be providing false color information.

This test should be used as an indication of performance of the display, but not as an absolute measure. It should be noted that the identification and the degree of acceptance will vary according to the operator, so should not be considered as a quantitative test.

Setting Backlight Brightness for ECDIS Operation

The display is initialized for ECDIS operation by sending the ‘BRT’ command to set the proper backlight level corresponding to the ECDIS color table, DAY, DUSK or NIGHT, being used. The Green ECDIS LED is illuminated indicating that the display is calibrated and ready for ECDIS operation.

The color corrected VGA or DVI-D video data is supplied for presentation on the display.

If the backlight brightness is adjusted up or down the RED ECDIS + LED or the RED ECDIS – LED, respectively, will illuminate indicating the display is out of calibration and in which direction.

OSD ECDIS Calibration Settings

a. The OSD Brightness Control is set to 50%
b. The OSD Contrast Control is set to 50%
c. The OSD Saturation Control is set to 50%
d. The OSD Hue Control is set to zero
e. The OSD Gamma Value is set to 1.0
f. The OSD Color Temperature is set to USER
g. The OSD User Color Temperature Red Level is set to 100%
h. The OSD User Color Temperature Green Level is set to 100%
i. The OSD User Color Temperature Blue Level is set to 100%
j. The OSD Monochrome Mode is set to Color

Backlight Dimming Operation

The Backlight Brightness adjustment allows the operator to adjust the Backlight Brightness of the display from Minimum Brightness to Maximum Brightness depending on the user's needs. The Backlight Brightness level can be adjusted by the Remote Brightness push button controls or Front Panel Brightness controls.

NOTE: The remote Brightness Potentiometer is used as a scaling function to set the LCD max brightness and should not be used to adjust the brightness level of the backlight. **The remote Brightness Potentiometer must not be connected for ECDIS operation.**

The brightness adjustment range can be set using the SCOM interface Backlight Minimum Value Command (BRI) and Backlight Maximum Value Command (BRM). Using these commands the min brightness can be set to a value higher than full OFF and the max brightness can be set to a value less than max brightness. The Front Panel adjustment brightness buttons and brightness knob and the Remote brightness buttons will adjust the unit brightness between the set min and max values.

The Brightness Command (BRT) can be used to set the Backlight Brightness to any value from full OFF to the MAX Brightness setting.

Care must be exercised when using the 'BRI', 'BRM' and 'BRT' commends so that the operator is not prevented from setting the ECDIS calibration value.

The Backlight brightness setting is saved by the firmware ten minutes after the last adjustment.

Front Panel LED Indicator Dimming Operation

The Front Panel Indicators, POWER, STANDBY and the three ECDIS LED indicators are adjustable from full ON to low brightness but not OFF. The Front Panel indicators are dimmable in conjunction with the Backlight Brightness adjustment using the same controls.

MAINTENANCE

Field Maintenance should be limited to front panel adjustments, and external cleaning. Any action that requires opening the display chassis should be deferred to the depot or factory.

PREVENTIVE MAINTENANCE

The only periodic maintenance recommended is exterior surface cleaning when necessary.

Surface Cleaning

The window and exterior surfaces may be cleaned with standard non-abrasive glass cleaners applied with a soft cloth to avoid scratching the anti-reflective coating on the glass panel.

NOTE: INTERIOR CLEANING OF THE DISPLAY IS NEITHER REQUIRED NOR RECOMMENDED.

CORRECTIVE MAINTENANCE

Any corrective maintenance should be deferred to the depot or factory.

SPECIFICATIONS

Display Type:	19.0" TFT
Active Display Area:	14.82"(w) x 11.85"(h) (376.32 x 301.06 mm)
Pixel Pitch:	0.012"
Brightness:	525 nits standard with LED Backlight
Viewing Angle:	Left/Right 89°/89° Up/Down 89°/89°
Contrast Ratio:	2000:1 (Typical Dark Ambient) 6:1 (Typical Bright Ambient) 86,000 Lux Diffuse 6800 cd/m² Glare Source
Response Time:	8 ms GTG
Display Colors:	16.7M
Input Signal:	Analog 0.7V p-p/75 Ω
Sync:	Separate H&V, Combined, SOG
Video Inputs:	HD15 (VGA-XGA) x 1 DVI-D x 1 BNC (NTSC/PAL) x 2
Resolutions Supported:	640 x 480 @ 60, 72, 75 Hz
	800 x 600 @ 56, 60, 72, 75 Hz
	1024 x 768 @ 60, 70, 75 Hz
	1280 x 1024 @ 60, 75 Hz
Native Resolutions:	1280 X 1024 (SXGA)
User Controls:	Power On/Off (Green) Standby (Yellow) Membrane Menu (OSD) Brightness (Rotary Control) Hot Keys Up/Down/Right/Left Buzzer ECDIS Status 3 LED's Green RED +/-

Temperature:	Operating:	-15°C to 55°C	
	Storage:	-30°C to 70°C	
Humidity: (Non-Condensing)	Operating:	10 to 95%	
	Storage:	10 to 95%	
IP Rating:	Protection IP66 Front-IP54 Rear Cooling: Fanless, Conductive/Convective		
Certifications:	ABS Type Approved IEC60945 and IACS-UR-E10		
Power Requirements:	Voltage:	Dual AC/DC* AC: 90-264VAC 47 to 400Hz DC: 9-32VDC, 24VDC 1.9A (Typical)	
	Power:	95 Watts Max	
Dimensions & Weight:		Outside	Cutout
	Height:	17.48" 444 mm	16.38" 416 mm
	Width:	19.02" 483.1 mm	17.24" 438 mm
	Depth:	2.68" (68 mm)	
	Weight:	18 lbs (8.16 kg)	
Touch Options:	Resistive, Projected Capacitive MT		
Touch Interface:	P-Cap USB Only, Resistive USB or Serial		

** NOTE:*
Connection can be made to either AC or DC, or both. If both sources are connected, power will be sourced from AC. If AC fails, there will be an uninterrupted switch over to DC.

Resolutions Supported

NOTE

Resolution is based on horizontal and vertical frequencies only.

ARGB (RGB IN)

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
T_70	720x400 70Hz	28.322	31.469	70.087	Digital Separate Sync
T_70	720x400 70Hz	28.322	31.469	70.087	Sync On Green
V_60	640x480 60Hz	25.175	31.469	59.940	Digital Separate Sync
V_60	640x480 60Hz	25.175	31.469	59.940	Sync On Green
V_60	640x480 60Hz	25.175	31.469	59.940	Composite Sync
V_72	640x480 72Hz	31.500	37.861	72.809	Digital Separate Sync
V_72	640x480 72Hz	31.500	37.861	72.809	Sync On Green
V_72	640x480 72Hz	31.500	37.861	72.809	Composite Sync
V_75	640x480 75Hz	31.500	37.500	75.000	Digital Separate Sync
V_75	640x480 75Hz	31.500	37.500	75.000	Sync On Green
V_75	640x480 75Hz	31.500	37.500	75.000	Composite Sync
SV_56	800x600 56Hz	36.000	35.156	56.250	Digital Separate Sync
SV_56	800x600 56Hz	36.000	35.156	56.250	Sync On Green
SV_56	800x600 56Hz	36.000	35.156	56.250	Composite Sync
SV_60	800x600 60Hz	40.000	37.879	60.317	Digital Separate Sync
SV_60	800x600 60Hz	40.000	37.879	60.317	Sync On Green
SV_60	800x600 60Hz	40.000	37.879	60.317	Composite Sync
SV_72	800x600 72Hz	50.000	48.077	72.188	Digital Separate Sync
SV_72	800x600 72Hz	50.000	48.077	72.188	Sync On Green
SV_72	800x600 72Hz	50.000	48.077	72.188	Composite Sync
SV_75	800x600 75Hz	49.500	46.875	75.000	Digital Separate Sync

SV_75	800x600 75Hz	49.500	46.875	75.000	Sync On Green
SV_75	800x600 75Hz	49.500	46.875	75.000	Composite Sync
X_60	1024x768 60Hz	65.000	48.363	60.004	Digital Separate Sync
X_60	1024x768 60Hz	65.000	48.363	60.004	Sync On Green
X_60	1024x768 60Hz	65.000	48.363	60.004	Composite Sync
X_70	1024x768 70Hz	75.000	56.476	70.069	Digital Separate Sync
X_70	1024x768 70Hz	75.000	56.476	70.069	Sync On Green
X_70	1024x768 70Hz	75.000	56.476	70.069	Composite Sync
X_75	1024x768 75Hz	78.750	60.023	75.029	Digital Separate Sync
X_75	1024x768 75Hz	78.750	60.023	75.029	Sync On Green
X_75	1024x768 75Hz	78.750	60.023	75.029	Composite Sync
SX_60	1280x1024 60Hz	108	63.81	60.020	Digital Separate Sync
SX_60	1280x1024 60Hz	108	63.81	60.020	Sync On Green
SX_60	1280x1024 60Hz	108	63.81	60.020	Composite Sync
SX_75	1280x1024 75Hz	135	79.976	75	Digital Separate Sync
SX_75	1280x1024 75Hz	135	79.976	75	Sync On Green
SX_75	1280x1024 75Hz	135	79.976	75	Composite Sync

COMPOSITE 1 AND COMPOSITE 2 INPUTS

System	Resolution	Horizontal freq [KHz]	Vertical freq [Hz]
NTSC	720x480i	15.7	60
NTSC 4.43	720x480i	15.7	60
PAL	720x576i	15.6	50
PAL M	720x576i	15.6	50
SECAM	720x576i	15.6	50

APPENDIX

SHIPPED OSD CONFIGURATION

The shipped configuration is the changes to the OSD setup from a Factory Reset condition. The changes are as follows:

OSD

PICTURE

ASPECT SIZE – 1:1

MAIN SOURCE

SET TO – DVI

UTILITIES

SETUP

AUTO SOURCE SEEK – VGA, DVI, COMPOSITE 1, and COMPOSITE 2 set to ON, all others set to OFF.

AUTO POWER – ON

OSD

OSD TIMEOUT – 60

COLOR TEMPERATURE – USER
R GAIN – 100
G GAIN – 100
B GAIN – 100

HOT KEYS

HOT KEY 1 – BACKLIGHT

HOT KEY 2 - BACKLIGHT

Function description for de-interlacing mode AFM, TNR, MADI, LADI

AFM = Auto Film Mode :
It is a frame based method which used for the input ODD and EVEN fields have a fixed relation between each other, such as static image, 3:2 pull down mode.
If two fields are correctly merged, it can get the best quality. But if it merges two wrong fields, it will have artifact and get the worst quality.

TNR = Temporal Noise Reduction :
It is a frame based method which assume field to field have a fixed relationship.
If the object moving too fast, it will have image artifact and get worst quality.

MADI = Motion adaptive de-interlacing :
It is a pixel based method which used for the input fields have no fixed relation between them
If the object moving very too fast, it will get worst quality.

LADI = Low angled diagonal interpolation :
This process involves the detection of low angled diagonal pattern in an image and special interpolation process to the local area with diagonal pattern. The result is a smooth edge on moving objects with diagonal pattern.

PIP mix table

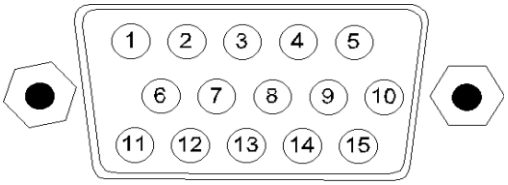
	VGA	Composite 1	Composite 2	DVI-D
VGA	X	☒	☒	☒
DVI-D	☒	☒	☒	X
Composite 1	☒	X	X	☒
Composite 2	☒	X	X	☒

INPUT CONNECTOR PIN ASSIGNMENTS

DC Power Connection Male (24V DC IN)

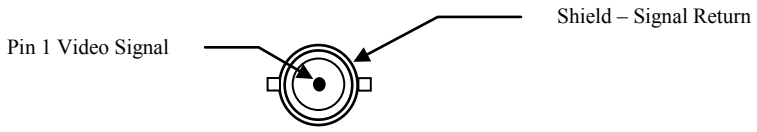
Pin	Signal
1	+ 24 VDC
2	24 VDC Return

RGB HD15 Signal Connections (RGB IN)

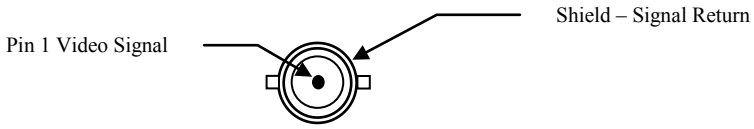


Pin	Signal	Pin	Signal
1	Red Video Signal	9	No Connection
2	Green Video Signal	10	Ground
3	Blue Video Signal	11	Ground
4	Ground	12	No Connection
5	No Connection	13	Horizontal Sync Signal
6	Ground for Red Video Signal	14	Vertical Sync Signal
7	Ground for Green Video Signal	15	No Connection
8	Ground for Blue Video Signal		

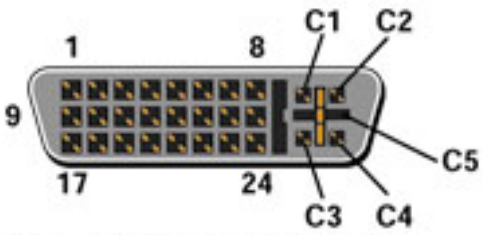
COMPOSITE BNC Connections (COMP 1)



COMPOSITE BNC Connections (COMP 2)

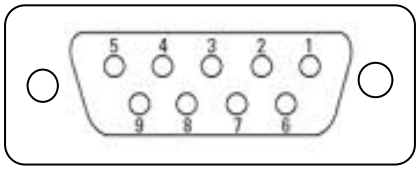


DVI-D VIDEO Signal Connections (DVI-D IN)



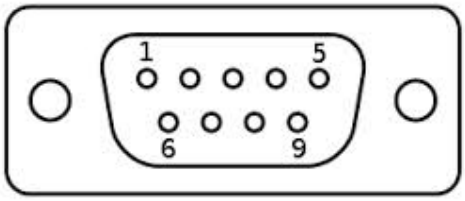
Pin	Signal	Pin	Signal	Pin	Signal
1	T.M.D.S. DATA 2-	11	T.M.D.S. DATA 1/3 SHIELD	21	T.M.D.S. DATA 5+
2	T.M.D.S. DATA 2+	12	T.M.D.S. DATA 3-	22	T.M.D.S. CLOCK SHIELD
3	T.M.D.S. DATA 2/4 SHIELD	13	T.M.D.S. DATA 3+	23	T.M.D.S. CLOCK+
4	T.M.D.S. DATA 4-	14	+5 POWER	24	T.M.D.S. CLOCK-
5	T.M.D.S. DATA 4+	15	GND	C1	NC
6	DDC CLOCK	16	NC	C2	NC
7	DDC DATA	17	T.M.D.S. DATA 0-	C3	NC
8	NC	18	T.M.D.S. DATA 0+	C4	NC
9	T.M.D.S. DATA 1-	19	T.M.D.S. DATA 0/5 SHIELD	C5	NC
10	T.M.D.S. DATA 1+	20	T.M.D.S. DATA 5-		

SCOM (RS232) and Buzzer control input Connections (SCOM/BUZZER)



Pin	Signal	Pin	Signal	Pin	Signal
1	Buzzer In +	4	DTE READY	7	RTS
2	TXD – Data Out	5	SIGNAL GND	8	CTS
3	RXD – Data In	6	DCE READY	9	Buzzer In -

Remote Brightness Interface Connections (REMOTE BRIGHTNESS)



Pin	Signal	Pin	Signal	Pin	Signal
1	NC	4	POT High	7	BRTSW-
2	NC	5	NC	8	BRTSW +
3	NC	6	POT Wiper	9	POT/SWITCH GND

Programming / Field Service Interface (PROG)

This interface is only for field service and manufacturing use only.

TROUBLESHOOTING TIPS

If you experience trouble with your MPC-MI19 LCD display, check the following items before contacting the factory or local dealer:

Trouble	Troubleshooting Tip
No picture	• The signal cable should be completely connected to the display card/computer. • The display card should be completely seated in the slot. • Display power connector should be plugged in and computer power switch should be in the ON position. Make sure that a supported mode has been selected on the display card. Please check your display card or system manual to change graphics mode. • Check the display and your display card for compatibility and recommended settings. • Check the signal cable connector for bent or pushed-in pins. • Check if the correct video input source is selected in the display. • Make certain the computer is not in a power-saving mode (touch the keyboard or mouse.) • Verify the Display Video Controller operation by pushing the MENU button and verifying a Video Source List is displayed.
Image is unstable	• Signal cable should be completely attached to the computer. • Use the controls to focus and readjust the display for optimum operation. When the display mode is changed, settings may need to be readjusted. • Check the display and your display card for compatibility and recommended signal timings.
Power LED on display is not lit.	• Power cable should be connected and power supply plugged into the appropriate source.
Display image is not sized properly.	• Ensure that a supported mode is selected on the display card or system being used. Consult the display card or system manual to change graphics mode. • Check if the desired scaling factor is selected.

If these troubleshooting tips do not solve your problem, contact MarinePC Customer Support at +1-480-515-1838 or E-mail support@marinepc.com

SERIAL COMMUNICATION INTERFACE (SCOM-RS232)

The host interface uses RS-232 standard with the following settings:

Data Rate: 9600 bits/sec
Data Format:

- Start Bit = 1
- Stop Bit = 1
- Data Bits = 8
- Parity Bit = None

Flow Control: RTS/CTS (must be connected for proper operation)

Message Format

Sample:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x50	0x4F	0x54	0x01	0x05	0x00	0xFF

Byte 0; Byte 0 will always be 07 from the host. The display response can either be 06 ACK or 15 NAK.

Byte 1; The display need only respond to inputs where Byte 1 is FF. The display response will always be FF in Byte 1.

Bytes 2/3/4: Bytes 2/3/4 define the message type.

Byte 2	Byte 3	Byte4	ASCII	Message Type
0x42	0x52	0x49	“BRI”	Backlight Brightness Minimum Value
0x42	0x52	0x4D	“BRM”	Backlight Brightness Maximum Value
0x42	0x52	0x54	“BRT”	User Brightness Control
0x42	0x5A	0x5A	“BZZ”	Buzzer Control
0x44	0x4E	0x44	“DND”	Download ECDIS DVI-D Table from Display
0x44	0x4E	0x56	“DNV”	Download ECDIS VGA Table from Display
0x43	0x4D	0x44	“CMD”	Read ECDIS Table Number of Pages
0x45	0x54	0x43	“ETC”	Elapsed Time Counter
0x4D	0x41	0x4E	“MAN”	Manufacturer ID
0x4D	0x43	0x43	“MCC”	OSD Control Functionality
0x53	0x4E	0x42	“SNB”	Serial Number
0x53	0x57	0x49	“SWI”	Main Display Firmware Version
0x54	0x4D	0x50	“TMP”	Temperature Sensor
0x54	0x59	0x50	“TYP”	Model Number

Byte 5: Byte 5 indicates how many data words follow IHCHK.

Byte 6: Byte 6 is an Inverse Header Checksum (IHCHK): Sum the first six bytes, then take the low order eight bits of the result and invert each bit such that the sum plus IHCHK equals FF.

Byte 7: If there is data in the message, Byte 7 is the first data word. If LEN=0, the message ends with IHCHK.

Byte 8: The last byte in a message with data is an Inverse Data Checksum. Sum all of the data bytes, then take the low order eight bits of the result and invert each bit such that the sum plus IDCHK equals FF.

Response Time

The display must initiate a response within 150 msec after receipt of a message from the host.

Backlight Brightness Minimum Value Command (BRI) INPUT:

This command shall be sent to the display to command the backlight minimum brightness control setting. The brightness value shall be sent as 1 byte in the DATA field. A setting of 0x00 shall indicate off. The range is 0x00 to 0xFF (0% to 100%).

Command 19% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x42	0x52	0x49	0x01	0x1B	0x31	0xCE

Acknowledge 19% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x42	0x52	0x49	0x01	0x1C	0x31	0xCE

Backlight Brightness Maximum Value Command (BRM) INPUT:

This command shall be sent to the display to command the backlight maximum brightness control setting. The brightness value shall be sent as 1 byte in the DATA field. A setting of 0x00 shall indicate off. A setting of 0xFF shall indicate maximum brightness.

Command 70% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x42	0x52	0x4D	0x01	0x17	0xB4	0x4B

Acknowledge 70% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x42	0x52	0x4D	0x01	0x18	0xB4	0x4B

Backlight Brightness Command (BRT) INPUT:

This command shall be sent to the display to command the backlight brightness control setting. This command is used to set the backlight brightness to the proper level corresponding to the ECDIS color chart and illuminates the ECDIS LCD. The brightness value shall be sent as 1 byte in the DATA field. A setting of 0x00 shall indicate off. A setting of 0xFF shall indicate maximum brightness.
If the data checksum is valid and the brightness was set, the display shall reply to this command with an ACK attention code. The DATA field in the reply shall indicate the resulting brightness control setting.

Each time a “BRT” command is received by the display, the On Screen Display (OSD) Menu is reset as follows:

a. The OSD Brightness Control is set to 50%
b. The OSD Contrast Control is set to 50%
c. The OSD Saturation Control is set to 50%
d. The OSD Hue Control is set to zero
e. The OSD Gamma Value is set to 1.0
f. The OSD Color Temperature is set to USER
g. The OSD User Color Temperature Red Level is set to 100%
h. The OSD User Color Temperature Green Level is set to 100%
i. The OSD User Color Temperature Blue Level is set to 100%
j. The OSD Monochrome Mode is set to Color

Command 60% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x42	0x52	0x54	0x01	0x10	0x99	0x66

Acknowledge 60% Brightness:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x42	0x52	0x54	0x01	0x11	0x99	0x66

(BZZ) INPUT:

This command shall be sent to the display to set the buzzer ON/OFF. The buzzer value shall be sent as 1 byte in the DATA field. A setting of 0x00 shall turn the buzzer OFF. A setting of 0xFF shall turn the buzzer ON.

If the data checksum is valid the display shall reply to this command with an ACK attention code. If an invalid checksum was received and the message was not broadcast, the display shall reply with an NAK attention code. The DATA field in the reply shall indicate the current buzzer setting.

Command to set buzzer ON:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x42	0x5A	0x5A	0x01	0x02	0xFF	0x00

Acknowledge buzzer ON:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x42	0x5A	0x5A	0x01	0x03	0xFF	0x00

Download ECDIS DVI-D Table from Display Command (DND) INPUT:

This command shall be sent to download one page of data (64 bytes). Before this command is sent a CMD 0x0E commend should be sent to read the ECDIS DVI-D Table Number of Pages that need to be downloaded.

If the data checksum is valid the display shall reply to this command with an ACK attention code.

Command to Download ECDIS DVI-D Table Page:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x44	0x4E	0x44	0x01	0x22	0x01	0xFE

Acknowledge Command to Download ECDIS DVI-D Table Page:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	DATA
0x06	0xFF	0x44	0x4E	0x44	0x40	0xE4	0x01	Data 1

DATA	DATA	DATA	DATA	DATA	DATA	DATA	DATA	IDCHK
Data 2	Data3	……..	Data 60	Data 61	Data 62	Data 63	Data 64	0xXX

Download ECDIS VGA Table from Display Command (DNV) INPUT:

This command shall be sent to download one page of data (64 bytes). Before this command is sent a CMD 0x0C command should be sent to read the ECDIS VGA Table Number of Pages that need to be downloaded.

If the data checksum is valid the display shall reply to this command with an ACK attention code.

Command to Download ECDIS VGA Table Page:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x44	0x4E	0x56	0x01	0x10	0x01	0xFE

Acknowledge Command to Download ECDIS VGA Table Page:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	DATA
0x06	0xFF	0x44	0x4E	0x56	0x40	0xD2	0x01	Data 1

DATA	DATA	DATA	DATA	DATA	DATA	DATA	DATA	IDCHK
Data 2	Data3	……..	Data 60	Data 61	Data 62	Data 63	Data 64	0xXX

Read ECDIS Table Number of Pages Command (CMD) INPUT:

This command shall be sent to the display to read the total number of ECDIS Table Pages. The data field shall be set to the following HEX value to select either the VGA or DVI-D ECDIS Table Number of Pages.

0x0C – Read the ECDIS VGA Table Number of Pages

0x0E – Read the ECDIS DVI-D Table Number of Pages

If the data checksum is valid the display shall reply to this command with an ACK attention code.

Command to read ECDIS VGA Table Number of Pages:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x43	0x4D	0x44	0x01	0x24	0x0C	0xF3

Acknowledge read ECDIS VGA table number of pages (254 pages, 0x00, 0xFE):

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	DATA	IDCHK
0x 06	0xFF	0x43	0x4D	0x44	0x02	0x24	0x00	0xFE	0x01

Elapsed Time Counter Command (ETC) INPUT:

This command shall be sent to the display to read the amount of time on the Elapsed Time Counter. No data shall be sent with this command.

The display shall reply to this command with an ACK attention code. The data field shall be set to a 5 byte string with the MSB byte transmitted first. Each byte has a range of 0 to 9 for a maximum time of 99999 hours.

Command to read Elapsed Time counter:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x07	0xFF	0x45	0x54	0x43	0x00	0x1D

Acknowledge Elapsed Time counter, example 227 hours:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	DATA
0x06	0xFF	0x45	0x54	0x43	0x05	0x19	0x30	0x30

DATA	DATA	DATA	IDCHK
0x32	0x32	0x37	0x04

Request Manufacturer ID (MAN) INPUT:

This command shall be sent to the display to read the Manufacturer ID. No data shall be sent with this command.

The display shall reply to this command with an ACK attention code. The data field shall be set to the ASCII string, fifteen bytes maximum, value specified for the manufacturer i.e. MarinePC.

Command Manufacturer ID:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x07	0xFF	0x4D	0x41	0x4E	0x00	0x1D

Acknowledge Manufacturer ID:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	A	y
0x06	0xFF	0x4D	0x41	0x4E	0x0F	0x0F	0x41	0x79

d	i	n	‘SP’	D	i	s	p	l
0x64	0x69	0x6E	0x20	0x44	0x69	0x73	0x70	0x6C

a	y	s	sp	IDCHK
0x61	0x79	0x73	0x20	0x82

Serial Number Command (SNB) INPUT:

This command shall be sent to the display to obtain the display serial number. No data shall be sent with this command.

The display shall reply to this command with an ACK attention code. The data field shall be set to the ASCII string to indicate the unit serial number, example: S/N 1414M010

S/N configuration: YYWWMNNN

YY – Last two digits in year of manufacturer

WW – Week of manufacturer (01 – 52)

M – Product built in main manufacturing facility

NNN – Unique Three-digit number assigned at time of manufacturer

Command to read unit serial number:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x07	0xFF	0x53	0x4E	0x42	0x00	0x16

Acknowledge unit serial number: S/N 1414M010

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	S	/
0x06	0xFF	0x53	0x4E	0x42	0x0F	0xAE	0x53	0x2F

N	sp	1	4	1	4	M	0	1
0x4E	0x20	0x31	0x34	0x31	0x34	0x4D	0x30	0x31

0	sp	sp	sp	IDCHK
0x30	0x20	0x20	0x20	0x62

Display Firmware Version (SWI) INPUT:

This command shall be sent to the display to read the Display firmware version.

If the data checksum is valid the display shall reply to this command with an ACK attention code. The data field shall be an ASCII string to indicate the software number, i.e. 487-7140-501(REV) where REV = revision digit.

Command to read the Display firmware version:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x07	0xFF	0x53	0x57	0x49	0x00	0x06

Acknowledge Display firmware version: “487-7140-501(-)”

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	4	8
0x06	0xFF	0x53	0x57	0x49	0x0F	0xFB	0x34	0x38

7	-	7	1	4	0	-	5	0
0x37	0x2D	0x37	0x31	0x34	0x30	0x2D	0x35	0x30

1	(	-	)	IDCHK
0x31	0x28	0x2D	0x29	0x20

Temperature Sensor Command (TMP) INPUT:

This command shall be sent to the display to read the internal temperature of the display. The display shall reply with an ASCII string of six bytes indicating the internal temperature in °C, example +042.5.

Command to read current temperature:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x54	0x4D	0x50	0x01	0x07	0x52	0xAD

Acknowledge current temperature:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	DATA
0x06	0xFF	0x54	0x4D	0x50	0x06	0x03	0x2B	0x30

DATA	DATA	DATA	DATA	IDCHK
0x34	0x32	0x2E	0x35	0xDB

Request Type/Model Number (TYP) INPUT:

This command shall be sent to the display to read its model number. No data shall be sent with this command.
If the data checksum is valid the display shall reply to this command with an ACK attention code. The data field shall be an ASCII string, fifteen bytes maximum, to indicate the model number i.e. MPC-MI19.

Command to read Type/model number:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x07	0xFF	0x54	0x59	0x50	0x00	0xFC

Acknowledge Type/model number:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	O	m
0x06	0xFF	0x54	0x59	0x50	0x0F	0xEE	0x4F	0x6D

e	g	a	sp	M	F	P	1	9	sp
0x65	0x67	0x61	0x20	0x4D	0x46	0x50	0x31	0x39	0x20

sp	sp	sp	IDCHK
0x20	0x20	0x20	0x2A

OSD Control Command (MCC) INPUT:

This command allows remote access of the OSD settings. See following tables for valid commands.

If the data checksum is valid the display shall reply to this command with an ACK attention code. The ACK response contains the original command with the data sent, if any, followed by the revised data. If an invalid checksum was received and the message was not broadcast, the display shall reply with an NAK attention code.

On Screen Display (OSD) Control Buttons

Function	Command
Menu button	0xf7

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xF7	0x08

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0xF7	0x08

Function	Command
Left button	0xfd

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xFD	0x02

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0xFD	0x02

Function	Command
Right button	0xfc

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xFC	0x03

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0xFC	0x03

On Screen Display (OSD) Control Buttons

Function	Command
Select-up button	0xfb

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xFB	0x04

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0xFB	0x04

Function	Command
Select-down button	0xfa

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xFA	0x05

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0xFA	0x05

On Screen Display (OSD)

Function	Command
OSD turn off	0xbd

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xBD	0x42

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x02	0x25	0xBD	0x31	0x11

"0" = OSD was not turned OFF
"1" = OSD was turned OFF

Function	Command
OSD menu timeout	0x93, "0""5" to "3""C" | "+" | " -" | "r" | "R" | "?"

"0" "0" = no OSD menu timeout (continuous)
"0" "5" = 5 second OSD menu timeout
"3" "C" = 60 second OSD menu timeout
"+" = increment OSD menu timeout
"-" = decrement OSD menu timeout
"r" or "R" = reset OSD menu timeout to "0" "A" = 10 seconds
"?" = query OSD menu timeout

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0x93	0x30	0x41	0xFB

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0x93	0x30	0x41

Byte #11	Byte #12	Byte #13
0x30	0x41	0x8A

"0" "5" to ""3" "C"= OSD menu timeout
"0" "0" = no OSD menu timeout (continuous)
"0" "5" = 5 second OSD menu timeout
"0" "A" = 10 second OSD menu timeout
"3" "C" = 60 second OSD menu timeout

On Screen Display (OSD)

Function	Command
OSD status enquiry	0xbb

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xBB	0x44

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x02	0x25	0xBB	0X30	0x14

"0" = OSD is turned OFF
"1" = OSD is turned ON

Function	Command
OSD Transparency	0x92, "0" | "1" | "r" | "R" | "?"

"0" = OSD transparency is ON
"1" = OSD transparency is OFF
"r" or "R" = reset OSD transparency to ON
"?" = query OSD transparency

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0x92	0x30	0x3D

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0x92	0x30	0x30	0x0D

"0" = OSD transparency is ON
"1" = OSD transparency is OFF

On Screen Display (OSD)

Function	Command
OSD H position	0x90, “0””0””0” to “0””F””F” | “+” | “ -” | “r” | “R” | “?”

“+” = increment OSD H position
“-“ = decrement OSD H position
“r” or “R” = reset OSD H position to “0” “8” “0” = center of display
“?” = query OSD H position

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	Byte #12
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0x90	0x30	0x38	0x30	0xD7

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x07	0x20	0x90	0x30	0x38	0x30

Byte #12	Byte #13	Byte #14	Byte #15
0x30	0x38	0x30	0x3F

“0””0””0” to “0””F””F” = OSD H position

Function	Command
OSD V position	0x91, “0””0””0” to “0””F””F” | “+” | “ -” | “r” | “R” | “?”

“+” = increment OSD V position
“-“ = decrement OSD V position
“r” or “R” = reset OSD V position to “0” “8” “0” = center of display
“?” = query OSD V position

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	Byte #12
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0x91	0x30	0x38	0x31	0xD5

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x07	0x20	0x91	0x30	0x38	0x31

Byte #12	Byte #13	Byte #14	Byte #15
0x30	0x38	0x31	0x3C

“0””0””0” to “0””F””F” = OSD V position

Display

Function	Command
Brightness control	0x81, “4””E” to “B ””2” | “+” | “ -” | “r” | “R” | “?”

“4” “E” = 0
“B” “2” = 100
“+” = increment brightness control
“-“ = decrement brightness control
“r” or “R” = reset brightness control to “8” “0” = 50
“?” = query brightness control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0x81	0x42	0x32	0x0A

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0x81	0x42	0x32	0x42

Byte #12	Byte #13
0x32	0x96

“4””E” to “B””2” = Brightness control
“4” “E” = 0
“8” “0” = 50
“B” “2” = 100

Display

Function	Command
Contrast control	0x82 0x41 or 0x82 0x61, “1””C” to “E”” 4” | “+” | “ -” | “r” | “R” | “?”

“1” “C” = 0
“E” “4” = 100
“+” = increment contrast control
“-“ = decrement contrast control
“r” or “R” = reset contrast control to “8” “0” = 50
“?” = query contrast control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	Byte #12
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0x82	0x41	0x34	0x45	0xC3

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x06	0x21	0x82	0x41	0x34	0x45

Byte #12	Byte #13	Byte #14
0x34	0x45	0x4A

“1””C” to “E””4” = Contrast control
“1” “C” = 0
“8” “0” = 50
“E” “4” = 100

Display

Function	Command
GAMMA value select	0x9d, “0” | “1” | “2” | “r” | “R” | “?”

“0” = set GAMMA value select to 1.0
“1” = set GAMMA value select to 1.6
“2” = set GAMMA value select to 2.2
“r” or “R” = reset GAMMA value select to “0” = 1.0
“?” = query GAMMA value select

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0x9D	0x30	0x32

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0x9D	0x30	0x30	0x02

“0” = set GAMMA value select to 1.0
“1” = set GAMMA value select to 1.6
“2” = set GAMMA value select to 2.2

Display

Function	Command
Hue control	0x84, “5””3” to “9””F” | “+” | “ -” | “r” | “R” | “?”

“5” “3” = set hue control to-45
“9” “F” = set hue control to +45
“+” = increment hue control
“-“ = decrement hue control
“r” or “R” = reset hue control to “8” “0” = 0
“?” = query hue control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0x84	0x38	0x30	0x13

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0x84	0x38	0x30

Byte #11	Byte #12	Byte #13
0x38	0x30	0xAB

“5””3” to “9””F” = Hue control
“5” “3” = set hue control to -45
“8” “0” = set hue control to 0
“9” “F” = set hue control to +45

Display

Function	Command
Saturation control	0x83, “0””1” to “F ””F” | “+” | “ -” | “r” | “R” | “?”

“0” “1” = set saturation control to 0
“F” “F” = set saturation control to 100
“+” = increment saturation control
“-“ = decrement saturation control
“r” or “R” = reset saturation control to “8” “0” = 50
“?” = query saturation control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0x83	0x38	0x30	0x14

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0x83	0x38	0x30

Byte #11	Byte #12	Byte #13
0x38	0x30	0xAC

“0””1” to “F””F” = Saturation control
“0” “1” = set saturation control to 0
“8” “0” = set saturation control to 50
“F” “F” = set saturation control to 100

Display

Function	Command
Color temperature select	0xb3, “0” | “1” | “2” | “3” | “4” | “?”

“0” = 9300K
“1” = 8000K
“2” = 6500K
“3” = 5000L
“4” = User
“?” = query color temperature select

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0xB3	0x34	0x18

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0xB3	0x34	0x34	0xE4

“0” = 9300K
“1” = 8000K
“2” = 6500K
“3” = 5000L
“4” = User

Display

Function	Command
Blue level for selected color temperature	0xb6, "9""C" to "F""F" | "+" | " -" | "r" | "R" | "?"

"9" "C" = set blue level for selected color temperatureto 0
"F" "F" = set blue level for selected color temperatureto 100
"+" = increment blue level for selected color temperature
"-" = decrement blue level for selected color temperature
"r" or "R" = reset blue level for selected color temperatureto "E" "C" = 80
"?" = query blue level for selected color temperature

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xB6	0x46	0x46	0xBD

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xB6	0x46	0x46

Byte #11	Byte #12	Byte #13
0x46	0x46	0x31

"9""C" to "F"" F" = Blue level for selected color temperature
"9" "C" = set blue level for selected color temperatureto 0
"E" "C" = set blue level for selected color temperatureto 90
"F" "F" = set blue level for selected color temperatureto 100

Display

Function	Command
Green level for selected color temperature	0xb5, "9""C" to "F""F" | "+" | " -" | "r" | "R" | "?"

"9" "C" = set green level for selected color temperatureto 0
"F" "F" = set green level for selected color temperatureto 100
"+" = incrementgreen level for selected color temperature
"-" = decrement green level for selected color temperature
"r" or "R" = reset green level for selected color temperatureto "E" "C" = 80
"?" = query green level for selected color temperature

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xB5	0x46	0x46	0xBE

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xB5	0x46	0x46

Byte #11	Byte #12	Byte #13
0x46	0x46	0x32

"9""C" to "F""F" = Green level for selected color temperature
"9" "C" = set green level for selected color temperatureto 0
"E" "C" = set green level for selected color temperatureto 80
"F" "F" = set green level for selected color temperatureto 100

Display – Color Temperature

Function	Command
Red level for selected color temperature	0xb4, “9””C” to “F””F” | “+” | “ -” | “r” | “R” | “?”

“9” “C” = set red level for selected color temperature to 0
“F” “F” = set red level for selected color temperature to 100
“+” = increment red level for selected color temperature
“-“ = decrement red level for selected color temperature
“r” or “R” = reset red level for selected color temperature to “E” “C” = 80
“?” = query red level for selected color temperature

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xB4	0x46	0x46	0xBF

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xB4	0x46	0x46

Byte #11	Byte #12	Byte #13
0x46	0x46	0x33

“9””C” to “F””F” = Red level f or selected color temperature
“9” “C” = set red level for selected color temperature to 0
“E” “C” = set red level for selected color temperature to 80
“F” “F” = set red level for selected color temperature to 100

Video

Function	Command
Input main select	0x98, 0x41, 0x31 | 0x42, 0x31 | 0x46, 0x31 | 0x42, 0x32 | "?"

0x41, 0x31 = ARGB
0x42, 0x31 = Composite #1
0x46, 0x31 = DVI-D
0x42, 0x32 = Composite #2
"?" = query input main select

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0x98	0x46	0x31	0xF0

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0x98	0x46	0x31

Byte #11	Byte #12	Byte #13
0x46	0x31	0x79

0x41, 0x31 = ARGB
0x42, 0x31 = Composite #1
0x46, 0x31 = DVI-D
0x42, 0x32 = Composite #2

Video

Function	Command
Display Video Source Select	0xbc, "0" | "1" | "?"

"0" = after switching to a new video source the name of the video source is not displayed
"1" = after switching to a new video source the name of the video source is displayed
"?" = query display video source select

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0xBC	0x31	0x12

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0xBC	0x31	0x31	0xE1

"0" = after switching to a new video source the name of the video source is not displayed
"1" = after switching to a new video source the name of the video source is displayed

Video

Function	Command
Query video input status	0xc9

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xC9	0x36

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xC9	0x46	0x31

Byte #11	Byte #12	Byte #13
0x30	0x30	0x5F

First two hex bytes returned are main input status; the following two hex bytes are PIP input status.
"0" "0" = invalid
"A" "1' = ARGB
"B" "1" = Composite #1
"B" "2" = Composite #2
"F" "1" = DVI-D

Function	Command
Graphic horizontal resolution enquiry	0xb7

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xB7	0x48

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x04	0x23	0xB7	0x35	0x30

Byte #11	Byte #12
0x30	0xB3

Three digit hex number represents horizontal resolution in pixels
0x35, 0x30, 0x30 = 0x500 = 1280 pixels

Video

Function	Command
Graphic horizontal sync frequency enquiry	0xb9

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xB9	0x46

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	B
0x06	0xFF	0x4D	0x43	0x43	0x04	0x23	0xB9	0x33	0x31	0x46	

Three digit hex number represents horizontal sync frequency divided by 100.
To obtain the final horizontal sync frequency multiply the three digit hex number by 100.
0x33, 0x31, 0x46 = 0x31F = 799 = 79.9KHz

Function	Command
Graphic vertical resolution enquiry	0xb8

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xB8	0x47

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x04	0x23	0xB8	0x34	0x30

Byte #11	Byte #12
0x30	0xB3

Three digit hex number represents graphic vertical resolution in pixels.
0x34, 0x30, 0x30 = 0x400 = 1024 pixels

Video

Function	Command
Graphic vertical sync frequency enquiry	0xba

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xBA	0x45

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xBA	0x32	0x45

Byte #11	Byte #12	Byte #13
0x44	0x70	0x1A

Three digit hex number represents graphic vertical sync frequency times 10.
To obtain the final graphic vertical sync frequency divide the three digit hex number by 10.

The fourth hex number represents the scan mode:
"i" = interlace scan mode
"p" = progressive scan mode

0x32, 0x45, 0x44 = 0x2ED = 749 = 74.9 hertz

Function	Command
Auto-setup	0xc3

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9
0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xC3	0x3c

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x02	0x25	0xC3	0x31	0x0B

"0" = Auto-setup was not successful
"1" = Auto-setup was successful

Video - Composite

Function	Command
Video System	0x9b, "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9" | "r" | "R" | "S" | "s" | "?"

"0" = Auto
"1" = NTSC_M_358
"2" = PAL_N_443
"3" = SECAM
"4" = NTSC_M_443
"5" = PAL_M_358
"6" = NTSC_N_358
"7" = PAL_M_443
"8" = NTSC_N_443
"9" = PAL_N_358
"r" or "R" = reset video system to "0" = Auto
"?" = query video system
"s" or "S" = video state query

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0x9B	0x30	0x34

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0x9B	0x30	0x30	0x04

"0" = Auto
"1" = NTSC_M_358
"2" = PAL_N_443
"3" = SECAM
"4" = NTSC_M_443
"5" = PAL_M_358
"6" = NTSC_N_358
"7" = PAL_M_443
"8" = NTSC_N_443
"9" = PAL_N_358

video state query
"0" = no video
"1" = NTSC
"2" = PAL
"3" = SECAM

Picture In Picture (PIP)

Function	Command
PIP source select	0xa7, 0x41, 0x31 | 0x42, 0x31 | 0x46, 0x31 | 0x42, 0x32 | "?"

0x41, 0x31 = ARGB
0x42, 0x31 = Composite #1
0x46, 0x31 = DVI-D
0x42, 0x32 = Composite #2
"?" = query PIP source select

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xA7	0x42	0x31	0xE5

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xA7	0x42	0x31

Byte #11	Byte #12	Byte #13
0x42	0x31	0x72

0x41, 0x31 = ARGB
0x42, 0x31 = Composite #1
0x46, 0x31 = DVI-D
0x42, 0x32 = Composite #2

Picture In Picture (PIP)

Function	Command
PIP window size select	0xa6, “0””0” | “0””1” | “0””2” | “0””3” | “?”

“0” “0” = PIP window off
“0” “1” = small PIP window
“0” “2” = medium PIP window
“0” “3” = large PIP window
“?” = query PIP window size

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xA6	0x30	0x33	0xF6

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0xA6	0x30	0x33	0xF6

Picture In Picture (PIP)

Function	Command
PIP brightness control	0xa2, “4””E” to “B””2” | “+” | “ -” | “r” | “R” | “?”

“4” “E” = 0
“B” “2” = 100
“+” = increment PIP brightness control
“-“ = decrement PIP brightness control
“r” or “R” = reset PIP brightness control to “8” “0” = 50
“?” = query PIP brightness control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xA2	0x38	0x30	0xF5

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xA2	0x38	0x30

Byte #11	Byte #12	Byte #13
0x38	0x30	0x8D

“4””E” t o “B””2” = PIP brightness control
“4” “E” = 0
“8” “0” = 50
“B” “2” = 100

Picture In Picture (PIP)

Function	Command
PIP contrast control	0xa3, “1””C” to “E””4” | “+” | “ -” | “r” | “R” | “?”

“1” “C” = 0
“E” “4” = 100
“+” = increment PIP contrast control
“-“ = decrement PIP contrast control
“r” or “R” = reset PIP contrast control to “8” “0” = 50
“?” = query PIP contrast control

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x07	0xFF	0x4D	0x43	0x43	0x03	0x23	0xA3	0x38	0x30	0xF4

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x05	0x22	0xA3	0x38	0x30

Byte #11	Byte #12	Byte #13
0x38	0x30	0x8C

“1””C” to “E””4” = PIP contrast control
“1” “C” = 0
“8” “0” = 50
“E” “4” = 100

Picture In Picture (PIP)

Function	Command
PIP H position	0xa4, “0””0””0” to “0””6””4” | “+” | “ -” | “r” | “R” | “?”

“+” = increment PIP H position
“-“ = decrement PIP H position
“r” or “R” = reset PIP H position to “0” “5” “5” = upper right corner of display
“?” = query PIP H position

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	Byte #12
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0xA4	0x30	0x35	0x35	0xC1

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x07	0x20	0xA4	0x30	0x35	0x35

Byte #12	Byte #13	Byte #14	Byte #15
0x30	0x35	0x35	0x27

“0””0””0” to “0””6””4” = PIP H position
“0” “5” “5” = upper right corner of display

Picture In Picture (PIP)

Function	Command
PIP V position	0xa5, “0””0””0” to “0””6””4” | “+” | “ -” | “r” | “R” | “?”

“+” = increment PIP V position
“-“ = decrement PIP V position
“r” or “R” = reset PIP V position to “0” “1” “4” = upper right corner of display
“?” = query PIP V position

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11	Byte #12
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0xA5	0x30	0x31	0x34	0xC5

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x07	0x20	0xA5	0x30	0x31	0x34

Byte #12	Byte #13	Byte #14	Byte #15
0x30	0x31	0x34	0x30

“0””0””0” to “0””6””4” = PIP V position
“0” “1” “4” = upper right corner of display

Miscellaneous

Function	Command
Scaling Mode	0x8c, "0" | "1" | "2" | "9" | "A" | "B" | "C" | "D" |"?"

"0" = 1:1
"1" = fill screen
"2" = fill to aspect ratio
"9" = 4:3
"A" = 16:9
"B" = 16:10
"C" = 2.35:1
"D" = 2:1
"?" = query scaling mode

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0x8C	0x30	0x43

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x06	0xFF	0x4D	0x43	0x43	0x02	0x25	0x8C	0x30	0x43

Miscellaneous

Function	Command
Set display orientation	0x8e, "0" | "1" | "2" | "3" | "r" | "R" | "?"

"0" = normal
"1" = vertical inverse
"2" = horizontal inverse
"3" = inverted
"r" or "R" = reset displays orientation to "0" = normal
"?" = query display orientation

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0x8E	0x30	0x41

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0x8E	0x30	0x30	0x11

"0" = normal
"1" = vertical inverse
"2" = horizontal inverse
"3" = inverted

Miscellaneous

Function	Command
Soft Power On/Off	0xc8, "0" | "1" | "?"

"0" = turn off the display backlight
"1" = turn on the display backlight
"?" = query soft power on/off

MCC Command Example

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10
0x07	0xFF	0x4D	0x43	0x43	0x02	0x24	0xC8	0x31	0x06

Acknowledge Response

Byte #1	Byte #2	Byte #3	Byte #4	Byte #5	Byte #6	Byte #7	Byte #8	Byte #9	Byte #10	Byte #11
0x06	0xFF	0x4D	0x43	0x43	0x03	0x24	0xC8	0x31	0x31	0xD5

"0" = display backlight turned off
"1" = display backlight turned on

INPUT ERRORS AND RESPONSES

ADDR (Byte 1) Error

Display disregards any message where the second byte is not FF. No response required.

IHCHK (Byte 6) Error

If the IHCHK is incorrect, the display should respond with a NAK message and no data field. CMD0, CMD1 and CMD3 should be sent back as received.

ATTN (Byte 0) Error

Display disregards any message not starting with 07. No response required.

CMD (Byte 2/3/4) Error

If CMD0/CMD1/CMD2 does not match any of the fourteen legitimate combinations, the display should respond with the following response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x74	0x41	0x4E	0x00	0x1D

LEN (Byte 5) Error

If the word count is something other than 01 for BRI, BRM, BZZ, DND, DNV, CMD, MCC, TMP and BRT inputs, or 00 for ETC, MAN, SNB, SWI, VER or TYP inputs the display should respond with a NAK message as delineated below.

Request Elapsed Time Counter (ETC) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x45	0x54	0x43	0x00	0x 0F

Request Manufacturer ID (MAN) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x4D	0x41	0x4E	0x00	0x0F

Request Serial Number (SNB) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x53	0x4E	0x42	0x00	0x08

Request Display Firmware Version (SWI) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x53	0x57	0x49	0x00	0xF8

Request Display Model number (TYP) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x54	0x59	0x50	0x00	0xEE

Brightness Command (BRI) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x49	0x01	0x0D	0xxx	0xyy

xx = last valid minimum BRT data (00 – FF)

Brightness Command (BRM) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x4D	0x01	0x09	0xxx	0xyy

xx = last valid maximum BRT data (00 – FF)

Brightness Command (BRT) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x54	0x01	0x02	0xxx	0xyy

xx = last valid BRT data (00 – FF)

Buzzer Command (BZZ) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x5A	0x5A	0x01	0xF4	0xxx	0xyy

xx = last valid BZZ command (00 = OFF and FF = ON)

Download ECDIS DVI-D Table from Display Command (DND) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x44	0x4E	0x44	0x00	0xFA

Download ECDIS VGA Table from Display Command (DNV) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x44	0x4E	0x56	0x00	0x03

Read ECDIS Table Number of Pages Command (CMD) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK
0x15	0xFF	0x43	0x4D	0x44	0x00	0x17

OSD Control (MCC) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK

0x15	0xFF	0x4D	0x43	0x43	0x00	0x18

Temperature Sensor (TMP) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x54	0x4D	0x50	0x01	0xF9	0x52	0xAD

DATA (Byte 7) Error

If the data byte is something other than 00 or FF, the monitor should respond with a BZZ NAK as shown below.

Buzzer Command (BZZ) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x5A	0x5A	0x01	0xF4	0xxx	0xyy

xx = last valid BZZ command

IDCHK (Byte 8) Error

If the IDCHK is incorrect (BRI, BRM and BRT only), the monitor should respond with a NAK as shown below.

Brightness Command (BRI) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x49	0x01	0x0D	0xxx	0xyy

xx = last valid minimum BRT data

Brightness Command (BRM) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x4D	0x01	0x09	0xxx	0xyy

xx = last valid maximum BRT data

Brightness Command (BRT) response:

ATTN	ADDR	CMD0	CMD1	CMD2	LEN	IHCHK	DATA	IDCHK
0x15	0xFF	0x42	0x52	0x54	0x01	0x02	0xxx	0xyy

xx = last valid BRT data

Hex, DEC, ASCII conversion table

Hex	Decimal	Character	
0x00	0	**NULL**	(Null character)
0x01	1	**SOH**	(Start of Header)
0x02	2	**STX**	(Start of Text)
0x03	3	**ETX**	(End of Text)
0x04	4	**EOT**	(End of Transmission)
0x05	5	**ENQ**	(Enquiry)
0x06	6	**ACK**	(Acknowledgement)
0x07	7	**BEL**	(Bell)
0x08	8	**BS**	(Backspace)
0x09	9	**HT**	(Horizontal Tab)
0x0A	10	**LF**	(Line feed)
0x0B	11	**VT**	(Vertical Tab)
0x0C	12	**FF**	(Form feed)
0x0D	13	**CR**	(Carriage return)
0x0E	14	**SO**	(Shift Out)
0x0F	15	**SI**	(Shift In)
0x10	16	**DLE**	(Data link escape)
0x11	17	**DC1**	(Device control 1)
0x12	18	**DC2**	(Device control 2)
0x13	19	**DC3**	(Device control 3)
0x14	20	**DC4**	(Device control 4)
0x15	21	**NAK**	(Negative acknowledgement)
0x16	22	**SYN**	(Synchronous idle)
0x17	23	**ETB**	(End of transmission block)
0x18	24	**CAN**	(Cancel)
0x19	25	**EM**	(End of medium)
0x1A	26	**SUB**	(Substitute)
0x1B	27	**ESC**	(Escape)
0x1C	28	**FS**	(File separator)
0x1D	29	**GS**	(Group separator)
0x1E	30	**RS**	(Record separator)
0x1F	31	**US**	(Unit separator)
0x20	32		(space)
0x21	33	**!**	(exclamation mark)
0x22	34	**"**	(Quotation mark)
0x23	35	**#**	(Number sign)
0x24	36	$	(Dollar sign)
0x25	37	%	(Percent sign)
0x26	38	&	(Ampersand)
0x27	39	'	(Apostrophe)
0x28	40	(	(round brackets or parentheses)
0x29	41	)	(round brackets or parentheses)

0x2A	42	*	(Asterisk)
0x2B	43	+	(Plus sign)
0x2C	44	,	(Comma)
0x2D	45	-	(Hyphen)
0x2E	46	.	(Full stop , dot)
0x2F	47	/	(Slash)
0x30	48	0	(number zero)
0x31	49	1	(number one)
0x32	50	2	(number two)
0x33	51	3	(number three)
0x34	52	4	(number four)
0x35	53	5	(number five)
0x36	54	6	(number six)
0x37	55	7	(number seven)
0x38	56	8	(number eight)
0x39	57	9	(number nine)
0x3A	58	:	(Colon)
0x3B	59	;	(Semicolon)
0x3C	60	<	(Less-than sign)
0x3D	61	=	(Equals sign)
0x3E	62	>	(Greater-than sign ; Inequality)
0x3F	63	?	(Question mark)
Hex	Decimal	Character	
0x40	64	@	(At sign)
0x41	65	A	(Capital A)
0x42	66	B	(Capital B)
0x43	67	C	(Capital C)
0x44	68	D	(Capital D)
0x45	69	E	(Capital E)
0x46	70	F	(Capital F)
0x47	71	G	(Capital G)
0x48	72	H	(Capital H)
0x49	73	I	(Capital I)
0x4A	74	J	(Capital J)
0x4B	75	K	(Capital K)
0x4C	76	L	(Capital L)
0x4D	77	M	(Capital M)
0x4E	78	N	(Capital N)
0x4F	79	O	(Capital O)
0x50	80	P	(Capital P)
0x51	81	Q	(Capital Q)
0x52	82	R	(Capital R)
0x53	83	S	(Capital S)
0x54	84	T	(Capital T)
0x55	85	U	(Capital U)

0x56	86	V	(Capital V)
0x57	87	W	(Capital W)
0x58	88	X	(Capital X)
0x59	89	Y	(Capital Y)
0x5A	90	Z	(Capital Z)
0x5B	91	[	(square brackets or box brackets)
0x5C	92	\	(Backslash)
0x5D	93	]	(square brackets or box brackets)
0x5E	94	^	(Caret or circumflex accent)
0x5F	95	_	(underscore, under strike, underbar or low line)
0x60	96	`	(Grave accent)
0x61	97	a	(Lowercase a)
0x62	98	b	(Lowercase b)
0x63	99	c	(Lowercase c)
0x64	100	d	(Lowercase d)
0x65	101	e	(Lowercase e)
0x66	102	f	(Lowercase f)
0x67	103	g	(Lowercase g)
0x68	104	h	(Lowercase h)
0x69	105	**i**	(Lowercase i)
0x6A	106	j	(Lowercase j)
0x6B	107	k	(Lowercase k)
0x6C	108	l	(Lowercase l)
0x6D	109	m	(Lowercase m)
Hex	Decimal	Character	
0x6E	110	n	(Lowercase n)
0x6F	111	o	(Lowercase o)
0x70	112	p	(Lowercase p)
0x71	113	q	(Lowercase q)
0x72	114	r	(Lowercase r)
0x73	115	s	(Lowercase s)
0x74	116	t	(Lowercase t)
0x75	117	u	(Lowercase u)
0x76	118	v	(Lowercase v)
0x77	119	w	(Lowercase w)
0x78	120	x	(Lowercase x)
0x79	121	y	(Lowercase y)
0x7A	122	z	(Lowercase z)
0x7B	123	{	(curly brackets or braces)
0x7C	124	|	(vertical-bar, vbar, vertical line or vertical slash)
0x7D	125	}	(curly brackets or braces)
0x7E	126	~	(Tilde ; swung dash)
0x7F	127	DEL	(Delete)
0x80	128	Ç	(Majuscule C-cedilla)

0x81	129	ü	(letter "u" with umlaut or diaeresis ; "u-umlaut")
0x82	130	é	(letter "e" with acute accent or "e-acute")
0x83	131	â	(letter "a" with circumflex accent or "a-circumflex")
0x84	132	ä	(letter "a" with umlaut or diaeresis ; "a-umlaut")
0x85	133	à	(letter "a" with grave accent)
0x86	134	å	(letter "a" with a ring)
0x87	135	ç	(Minuscule c-cedilla)
0x88	136	ê	(letter "e" with circumflex accent or "e-circumflex")
0x89	137	ë	(letter "e" with umlaut or diaeresis ; "e-umlaut")
0x8A	138	è	(letter "e" with grave accent)
0x8B	139	ï	(letter "i" with umlaut or diaeresis ; "i-umlaut")
0x8C	140	î	(letter "i" with circumflex accent or "i-circumflex")
0x8D	141	ì	(letter "i" with grave accent)
0x8E	142	Ä	(letter "A" with umlaut or diaeresis ; "A-umlaut")
0x8F	143	Å	(letter "A" with a ring)

0x90	144	É	(Capital letter "E" with acute accent or "E-acute")
0x91	145	æ	(Latin diphthong "ae")
0x92	146	Æ	(Latin diphthong "AE")
0x93	147	ô	(letter "o" with circumflex accent or "o-circumflex")
0x94	148	ö	(letter "o" with umlaut or diaeresis ; "o-umlaut")
0x95	149	ò	(letter "o" with grave accent)
0x96	150	û	(letter "u" with circumflex accent or "u-circumflex")
0x97	151	ù	(letter "u" with grave accent)
0x98	152	ÿ	(letter "y" with diaeresis)
0x99	153	Ö	(letter "O" with umlaut or diaeresis ; "O-umlaut")
0x9A	154	Ü	(letter "U" with umlaut or diaeresis ; "U-umlaut")
Hex	Decimal	Character	
0x9B	155	ø	(slashed zero or empty set)
0x9C	156	£	(Pound sign ; symbol for the pound sterling)
0x9D	157	Ø	(slashed zero or empty set)
0x9E	158	×	(multiplication sign)
0x9F	159	*ƒ*	(function sign ; f with hook sign ; florin sign)

0xA0	160	á	(letter "a" with acute accent or "a-acute")
0xA1	161	í	(letter "i" with acute accent or "i-acute")
0xA2	162	ó	(letter "o" with acute accent or "o-acute")
0xA3	163	ú	(letter "u" with acute accent or "u-acute")
0xA4	164	ñ	(letter "n" with tilde ; enye)
0xA5	165	Ñ	(letter "N" with tilde ; enye)
0xA6	166	ª	(feminine ordinal indicator)
0xA7	167	º	(masculine ordinal indicator)
0xA8	168	¿	(Inverted question marks)
0xA9	169	®	(Registered trademark symbol)
0xAA	170	¬	(Logical negation symbol)
0xAB	171	½	(One half)
0xAC	172	¼	(Quarter or one fourth)

0xAD	173	¡	(Inverted exclamation marks)
0xAE	174	«	(Guillemets or angle quotes)
0xAF	175	»	(Guillemets or angle quotes)

0xB0	176	▒	
0xB1	177	▒	
0xB2	178	▓	
0xB3	179	│	(Box drawing character)
0xB4	180	┤	(Box drawing character)
0xB5	181	Á	(Capital letter "A" with acute accent or "A-acute")
0xB6	182	Â	(letter "A" with circumflex accent or "A-circumflex")
0xB7	183	À	(letter "A" with grave accent)
0xB8	184	©	(Copyright symbol)
0xB9	185	╣	(Box drawing character)
0xBA	186	║	(Box drawing character)
0xBB	187	╗	(Box drawing character)
0xBC	188	╝	(Box drawing character)
0xBD	189	¢	(Cent symbol)
0xBE	190	¥	(YEN and YUAN sign)
0xBF	191	┐	(Box drawing character)

0xC0	192	└	(Box drawing character)
0xC1	193	┴	(Box drawing character)
0xC2	194	┬	(Box drawing character)
0xC3	195	├	(Box drawing character)
0xC4	196	─	(Box drawing character)
0xC5	197	┼	(Box drawing character)
0xC6	198	ã	(letter "a" with tilde or "a-tilde")
0xC7	199	Ã	(letter "A" with tilde or "A-tilde")
Hex	Decimal	Character	
0xC8	200	╚	(Box drawing character)
0xC9	201	╔	(Box drawing character)
0xCA	202	╩	(Box drawing character)
0xCB	203	╦	(Box drawing character)
0xCC	204	╠	(Box drawing character)
0xCD	205	═	(Box drawing character)
0xCE	206	╬	(Box drawing character)
0xCF	207	¤	(generic currency sign)

0xD0	208	ð	(lowercase "eth")
0xD1	209	Ð	(Capital letter "Eth")
0xD2	210	Ê	(letter "E" with circumflex accent or "E-circumflex")
0xD3	211	Ë	(letter "E" with umlaut or diaeresis ; "E-umlaut")
0xD4	212	È	(letter "E" with grave accent)
0xD5	213	ı	(lowercase dot less i)
0xD6	214	Í	(Capital letter "I" with acute accent or "I-acute")
0xD7	215	Î	(letter "I" with circumflex accent or "I-circumflex")

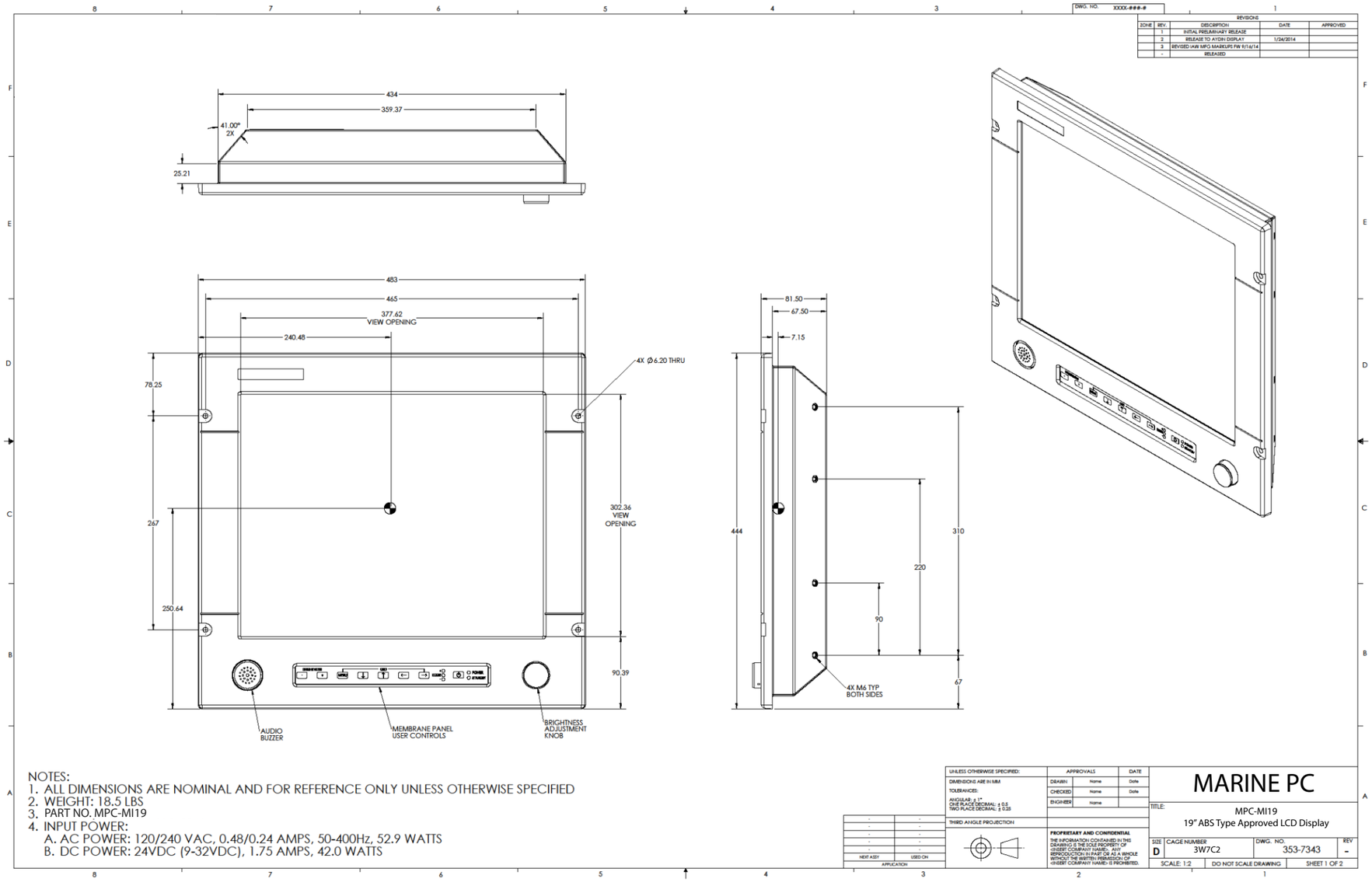
0xD8	216	Ï	(letter "I" with umlaut or diaeresis ; "I-umlaut")
0xD9	217	┘	(Box drawing character)
0xDA	218	┌	(Box drawing character)
0xDB	219	█	(Block)
0xDC	220	▄	
0xDD	221	¦	(vertical broken bar)
0xDE	222	Ì	(letter "I" with grave accent)
0xDF	223	▀	

0xE0	224	Ó	(Capital letter "O" with acute accent or "O-acute")
0xE1	225	ß	(letter "Eszett"; "scharfes S" or "sharp S")
0xE2	226	Ô	(letter "O" with circumflex accent or "O-circumflex")
0xE3	227	Ò	(letter "O" with grave accent)
0xE4	228	õ	(letter "o" with tilde or "o-tilde")
0xE5	229	Õ	(letter "O" with tilde or "O-tilde")
0xE6	230	µ	(Lowercase letter "Mu" ; micro sign or micron)
0xE7	231	þ	(capital letter "Thorn")
0xE8	232	Þ	(lowercase letter "thorn")
0xE9	233	Ú	(Capital letter "U" with acute accent or "U-acute")
0xEA	234	Û	(letter "U" with circumflex accent or "U-circumflex")
0xEB	235	Ù	(letter "U" with grave accent)
0xEC	236	ý	(letter "y" with acute accent)
0xED	237	Ý	(Capital letter "Y" with acute accent)
0xEE	238	¯	(macron symbol)
0xEF	239	´	(Acute accent)

0xF0	240	¬	(Hyphen)
0xF1	241	±	(Plus-minus sign)
0xF2	242	‗	(underline or underscore)
0xF3	243	¾	(three quarters)
0xF4	244	¶	(paragraph sign or pilcrow)
Hex	Decimal	Character	
0xF5	245	§	(Section sign)
0xF6	246	÷	(The division sign; Obelus)
0xF7	247	¸	(cedilla)
0xF8	248	°	(degree symbol)
0xF9	249	¨	(Diaeresis)
0xFA	250	•	(Interpunct or space dot)
0xFB	251	¹	(superscript one)
0xFC	252	³	(cube or superscript three)
0xFD	253	²	(Square or superscript two)
0xFE	254	■	(black square)
0xFF	255	nbsp	(non-breaking space or no-break space)

MPC-MI19 DISPLAY DIMENSIONS

For clarity, displays are shown without signal and power cables.



DISPLAY DIMENSIONS CONT.