

# Remote control protocol for the Maestro M2

## Introduction

This document describes the remote control protocol for controlling the Maestro M2 via the RS232 interface.

## Conventions

□ All values in this document are hexadecimal values, unless otherwise specified.

## Data transfer format

□ Transfer rate: 38400bps.

□ 1 start bit, 8 data bits, 1 stop bit, no parity, no flow control.

## Command and response formats

Communication between the remote controller (RC) and the Maestro M2 takes the form of sequences of ASCII characters, with all commands and responses having the same basic format. The Maestro M2 shall always respond to a received command, but may also send messages at other times (i.e., full-duplex communication).

Each transmission by the RC shall be 7 bytes long, and shall have the following format:

<STR> <CC> <P1> <P2> <ETR>

- STR (Start transmission): 0x50, 0x43, 0x5F ("PC\_")
- CC (Command code): the code for the command
- Px (Parameter code): the parameters for the command
- ETR (End transmission): 0xd

Each response by the Maestro M2 shall be 8 bytes long and shall have the following format:

<STR> <RC> <AC> <P1> <P2> <ETR>

- STR (Start transmission): 0x41, 0x56, 0x5f ("AV\_")
- RC (Reply code): = command code
- AC (Answer code): answer code
- Px (Parameter code): the parameters for the response
- ETR (End transmission): 0xd

The Maestro M2 shall respond to each command from the RC within 5 seconds. The RC may send further commands before a previous command response has been received.

## State changes as a result of other inputs

It is possible that the state of the Maestro M2 may be changed as a result of user input via the front panel buttons or via the IR remote control. Changes resulting from these inputs shall be relayed to the RC using the appropriate message type.

For example, if the user changed the front panel display brightness using the DISPLAY button on the front panel, a display message (defined below) would be sent to the RC. A similar action would be taken for all other state changes (including decode mode changes).

## List of command codes

### **Command Code Description**

Power 0x2a Enter/exit stand-by state.

Display 0x2b Front panel display brightness control.

Open Menu 0x2c Open a menu

Close Menu 0x2d Close a menu  
Mute 0x2e Mute/Unmute audio output  
Volume change 0x2f Increment/decrement the volume of a zone.  
Volume set 0x30 Set the volume of a zone.  
Source select 0x31 Change the audio and video selection for a zone.  
Video select 0x32 Change the Zone 1 video source.  
Direct 0x33 Direct mode on/off.  
Decode two-channel 0x34 Set the decode mode for two channel material.  
Decode multi-channel 0x35 Set the decode mode for multi channel material.  
Effect 0x36 Set the effect mode.  
Select  
Analog / digital  
0x37 Use analog/digital audio input for current source  
Navigation 0x38 Cursor/OK instructions  
Preset 0x39 Increment/decrement the current tuner preset  
Tune 0x40 Change the tuner frequency  
RDS 0x41 Change RDS display mode  
Store 0x42 Store a preset

## **List of answer codes**

### ***Status Code Description***

Command error 0x52 An error occurred relating to the command received. This may be either an invalid command (at this time), or a command formatting error.  
Command OK 0x50 The command has been accepted and processed completely.

## **Command specifications**

### ***Power***

Change the stand-by state of zone 1 or zone 2.

### **Command**

Byte Description

CC 0x2a (Command code)

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 0x30 – Enter stand-by state

0x31 – Enter power-on state

0x39 – Request power state

### **Response**

Byte Description

RC 0x2a (Reply Code)

AC Answer code

P1 0x31 – Zone 1

0x32 – Zone 2

P2 Response:

0x30 – Zone is in stand-by

0x31 – Zone is on

### ***Display brightness control***

Allows the brightness of the front-panel display to be changed.

### **Command**

Byte Description

CC 0x2b (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Request:

0x30 – Front panel display off

0x31 – Front panel display dimmed

0x32 – Front panel display bright

0x39 – Request front panel brightness

### **Response**

Byte Description

RC 0x2b (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

0x30 – Front panel display is off

0x31 – Front panel display is dimmed

0x32 – Front panel display is bright

### **Open Menu**

Open a menu.

#### **Command**

Byte Description

CC 0x2c (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Request:

0x31 – Open the Main Menu

0x32 – Open the Setup Menu

0x33 – Open the Trim Menu

0x34 – Open the Sub Trim Menu

0x35 – Open the Lip Sync Menu

0x39 – Request the open menu state

#### **Response**

Byte Description

RC 0x2c (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

0x30 – No menu is open

*or:* the current open menu shall be returned, as above.

Note: If the Setup menu is closed as a result of opening a different menu, any changes made in the Setup menu shall be lost.

### **Close Menu**

Close a menu.

#### **Command**

Byte Description

CC 0x2d (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Request:

0x31 – Close the Main Menu

0x32 – Close the Setup Menu

0x33 – Close the Trim Menu

0x38 – Close any open menu

### **Response**

Byte Description

RC 0x2d (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

0x30 – No menu is open

0x32 – The Setup menu “Save settings” page is open.

Notes:

1. Using this command to close the Setup menu shall cause the “Save settings” page of the Setup menu to be displayed.
2. An error message shall be returned if the close instruction relates to a menu that is not open. For example, if the Main menu is open and a close instruction for the Setup menu is received, then an error shall be returned.

### **Mute**

Mute/Unmute the output.

### **Command**

Byte Description

CC 0x2e (Command Code)

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Request:

0x30 – Mute the output of the Zone

0x31 – Unmute the output the Zone

0x39 – Request the mute status of the Zone

### **Response**

Byte Description

RC 0x2e (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Response:

0x30 – Zone is muted

0x31 – Zone is not muted

### **Volume change**

Increment/decrement the volume of a zone.

### **Command**

Byte Description

CC 0x2f (Command Code)

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Request:

0x30 – Decrease volume for zone by 1dB

0x31 – Increase volume for zone by 1dB

0x39 – Request the current volume for zone

### **Response**

Byte Description

RC 0x2f (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Response:

0 – 100 (New volume of zone, in dB) + '0' (0x30)

Note: The value returned for the new volume is offset by 0x30. To obtain the correct value, subtract 0x30 from the reported value.

Formula: actual volume = (reported volume – 0x30)

## **Volume set**

Set the volume of a zone.

### **Command**

Byte Description

CC 0x30 (Command Code)

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Value:

0 – 100 (Volume for Zone 1, in dB) + '0' (0x30) or

20 – 83 (Volume for Zone 2, in dB) + '0' (0x30)

### **Response**

Byte Description

RC 0x30 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Response:

0 – 100 (New volume of zone, in dB) + '0' (0x30)

Notes:

The value transmitted for the new volume must be offset by 0x30.

Formula: transmitted volume = (required volume + 0x30)

The value returned for the new volume is offset by 0x30. To obtain the correct value, subtract 0x30 from the reported value.

Formula: actual volume = (reported volume – 0x30)

## **Source select**

Change the audio and video input for a zone.

### **Command**

Byte Description

CC 0x31 (Command Code)

P1 Zone:

0x31 – Zone 1

0x32 – Zone 2

P2 Source:

[0x2a – Follow Zone 1](#)

[\(Zone 2 only\)](#)

0x30 – DVD input

0x31 – SAT input

0x32 – AV input

0x33 – PVR input

0x34 – VCR input

0x35 – CD input

0x36 – FM input  
0x37 – AM input  
0x38 – DVDA input  
0x39 – Request the current input  
for the zone.

### **Response**

Byte Description  
RC 0x31 (Reply Code)  
AC Answer code  
P1 Zone:  
0x31 – Zone 1  
0x32 – Zone 2  
P2 Response:  
The current source shall be returned, as above.

### ***Video select***

Change the Zone 1 video source.

### **Command**

Byte Description  
CC 0x32 (Command Code)  
P1 Zone:  
0x31 – Zone 1  
P2 Video Source:  
0x30 – DVD input  
0x31 – SAT input  
0x32 – AV input  
0x33 – PVR input  
0x34 – VCR input  
0x39 – Request the current video input for the zone.

### **Response**

Byte Description  
RC 0x32 (Reply Code)  
AC Answer code  
P1 Zone:  
0x31 – Zone 1  
P2 Response:  
The current video source shall be returned, as above.

### ***Direct mode***

Set Direct Mode on/off.

### **Command**

Byte Description  
CC 0x33 (Command Code)  
P1 Zone:  
0x31 – Zone 1  
P2 Value:  
0x30 – Set Direct Mode OFF  
0x31 – Set Direct Mode ON  
0x39 – Request the Direct Mode setting

### **Response**

Byte Description  
RC 0x33 (Reply Code)  
AC Answer code  
P1 Zone:  
0x31 – Zone 1

P2 Response:

0x30 – Direct Mode is OFF

0x31 – Direct Mode is ON

### ***Decode Mode two channel***

Set the decode mode for two-channel material.

#### **Command**

Byte Description

CC 0x34 (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Value:

0x2e – Mono

0x2f – Stereo

0x30 – Dolby Pro Logic II Movie Mode

0x31 – Dolby Pro Logic II Music Mode

0x32 – Dolby Pro Logic II Game Mode (if implemented)

0x33 – Dolby Pro Logic IIX Movie Mode

0x34 – Dolby Pro Logic IIX Music Mode

0x35 – Dolby Pro Logic IIX Game Mode (if implemented)

0x36 – Dolby Pro Logic Emulation

0x37 – Neo:6 Cinema

0x38 – Neo:6 Music

0x39 – Request the decode mode setting

#### **Response**

Byte Description

RC 0x34 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

The current decode mode shall be returned, as above.

Note: an error message shall be returned if the selected mode is not available for the current source.

### ***Decode Mode multi channel***

Set the decode mode for multi-channel material.

#### **Command**

Byte Description

CC 0x35 (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Value:

0x2e - Mono Dmix

0x2f - Stereo Dmix

0x30 - Multichannel

0x31 – DD/PL2 Movie (For 2.0 Dolby stream only)

0x32 – DD/PL2x Movie (For either 2.0 or 5.1)

0x33 - DD/PL2x Music (For either 2.0 or 5.1)

0x39 - Request Decode Mode Setting

## **Response**

Byte Description

RC 0x35 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response (current decode mode):

0x2a – DD Mono Dmix.

0x2b - DD Stereo Dmix.

0x2c - DD Dmix.

0x2d - DD 2.0 + PL2 Movie

0x2e - DD 2.0 PL2x Movie

0x2f - DD 2.0 PL2x Music

0x30 - DD 5.1

0x31 - DD Ex

0x32 - DD 5.1 PL2x Movie

0x33 - DD 5.1 PL2x Music

0x34 - DTS Mono Dmix.

0x35 - DTS Stereo Dmix.

0x36 - DTS 5.1

0x37 - DTS-ES 6.1 Matrix

0x38 - DTS-ES 6.1 Discrete

0x39 - DTS-96/24

(DD = Dolby Digital)

## **Effect**

Set the effect mode.

## **Command**

Byte Description

CC 0x36 (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Value:

0x30 – Off

0x31 – Music

0x32 – Party

0x33 – Club

0x34 – Hall

0x35 – Sports

0x36 – Church

0x39 – Request the effect setting

## **Response**

Byte Description

RC 0x36 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

The current effect shall be returned, as above.

Note: an error message shall be returned if the selected effect is not available for the current source.

## **Select analog/digital**

Select an analog/digital audio input for the current source.

## **Command**

Byte Description

CC 0x37 (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Value:

0x30 – Prefer the use of the analog audio for the current source, if available

0x31 – Prefer the use of the digital audio for the current source, if available

0x39 – Request the audio type in use for the current source

## **Response**

Byte Description

RC 0x37 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

0x30 – The analog audio for the current source is being used

0x31 – The digital audio for the current source is being used

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## **Navigation**

Cursor/OK instructions.

## **Command**

Byte Description

CC 0x38 (Command Code)

P1 Zone:

0x31 – Zone 1

P2 Value:

0x3a – Cursor Up

0x3b – Cursor Down

0x3c – Cursor Left

0x3d – OK

0x3e – Cursor Right

## **Response**

Byte Description

RC 0x38 (Reply Code)

AC Answer code

P1 Zone:

0x31 – Zone 1

P2 Response:

The last cursor action shall be returned, as above.

## **Preset**

Increment/Decrement the current tuner preset.

## **Command**

Byte Description

CC 0x39 (Command Code)

P1 0x7e (Reserved)

P2 Value:

0x30 – Decrement tuner preset

0x31 – Increment tuner preset

0x39 – Request the current preset number

## **Response**

Byte Description

RC 0x39 (Reply Code)

AC Answer code

P1 0x7e (Reserved)

P2 Response:

The preset number after the command has been processed,  
+ '0' (0x30)

Notes:

The value returned for the new preset is offset by 0x30.

Formula: actual preset = (received preset + 0x30)

## **Tune**

Increment/Decrement the tuner frequency in 0.05MHz steps (FM) or  
9/10kHz steps (AM).

## **Command**

Byte Description

CC 0x40 (Command Code)

P1 0x7e (Reserved)

P2 Value:

0x30 – Decrement the tuner frequency by one step

0x31 – Increment the tuner frequency by one step

0x39 – Request the current tuner frequency

## **Response**

Byte Description

RC 0x40 (Reply Code)

AC Answer code

P1 AM: New frequency (1000's & 100's kHz) + '0' (0x30)

FM: New frequency (MHz) + '0' (0x30)

P2 AM: New frequency (10's & 1's kHz) + '0' (0x30)

FM: New frequency (kHz) + '0' (0x30)

Notes: The returned frequency is calculated as follows:

AM freq. (kHz) = (((1000's & 100's) – 0x30) \* 100) +  
((10's & 1's) – 0x30))

FM freq. (MHz) = (reported freq. (MHz) – 0x30)

FM freq. (kHz) = (reported freq. (kHz) – 0x30)

## **RDS**

Change the RDS display mode.

## **Command**

Byte Description

CC 0x41 (Command Code)

P1 0x7e (Reserved)

P2 Value:

0x30 – Show the current frequency

0x31 – Show the station name

0x32 – Show the station text

0x39 – Request the current RDS setting

## **Response**

Byte Description

RC 0x41 (Reply Code)

AC Answer code

P1 0x7e (Reserved)

P2 Response:

0x30 – The current frequency is being shown

0x31 – The station name is being shown  
0x32 – The station text is being shown

### **Store**

Store the current frequency in a preset.

### **Command**

Byte Description

CC 0x42 (Command Code)

P1 0x7e (Reserved)

P2 Value:

1-30: the number of the preset to use, + '0' (0x30)

### **Response**

Byte Description

RC 0x42 (Reply Code)

AC Answer code

P1 0x7e (Reserved)

P2 Response:

1-30: the number of the preset used + '0' (0x30)

Notes:

The value transmitted/returned for the preset is offset by 0x30.

Formula: actual preset = (received preset + 0x30)