

Mauell Controller Protocol Reference Manual

For Firmware MCP2.00

**Firmware P/N: 99-50-105
Manual P/N: 90-50-105**

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Chapter 1

Mauell Controller Protocol Overview

Chapter 1 Mauell Controller Protocol Overview

1.1 Introduction to Mauell Controller Protocol

The Mauell Controller Protocol is used to communicate with a system of Mauell Controllers connected to an RS-485 network. There are two controller types supported by the protocol, including the DO128 and the BCD32. Each DO128 can be used to drive up to 128 discrete outputs and the BCD32 can be used to drive up to eight 4-digit single color BCD displays, four 8-digit single color BCD displays, four 4-digit dual color BCD displays or two 8-digit dual color BCD displays.

1.2 Communications Settings

The Mauell Controller Protocol supports baud rates of 4800, 9600, 19200 and 38400. The baud rate is selectable via dipswitches. Parity = none, data bits = 8, stop bits = 1 and handshaking = none.

1.3 Command Message Format

Mauell Controller Protocol command messages are based on the ASCII character set with the Line Feed character (0x0Ah) denoting the start of a command message and the Carriage Return character (0x0Dh) denoting the end of a command message. All improperly formatted command messages are ignored. All characters, received between a carriage return character and the next linefeed character, are ignored. Controller addresses are in hexadecimal and are sent as two ASCII characters in the range '0' – '9', 'A' – 'F' (0x30h – 0x39h, 0x41h – 0x46h respectively).

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Chapter 2

Command Message Reference

Chapter 2 Command Message Reference

2.1 Normal Mode

The Normal Mode command message sets all controllers on the network to Normal mode. Lamp Test mode, Flash mode and Blink mode are canceled and all outputs are restored to their most recent states.

Format

\$0

Response

None.

2.2 Lamp Test Mode

The Lamp Test Mode command message turns all outputs on for all controllers on the network. While in Lamp Test Mode all output states are retained but not output. BCD displays will display all 8s and dual color BCD displays will alternate between red and green.

Format

\$1

Response

None.

2.3 Flash Mode

The Flash Mode command message sets all outputs to Flash for all controllers on the network. While in Flash Mode all output states are retained but not output. BCD displays will display all 8s and dual color BCD displays will alternate between red and green.

Format

§2

Response

None.

2.4 Blink Mode

The Blink Mode command message sets all outputs to Blink for all controllers on the network. While in Blink Mode all output states are retained but not output. BCD displays will display all 8s and dual color BCD displays will alternate between red and green.

Format

§3

Response

None.

2.5 Reset

The Reset command message resets all DO128 outputs to off and all BCD displays to blanks for all controllers on the network. All controllers are also returned to Normal Mode.

Format

§4

Response

None.

2.6 Life Test

The Life Test command message queries a controller for a response indicating that the controller is still processing command messages. The Life Test command message can be included in Random and Group command messages by sending the '>' character at the end of the Random or Group command message before the carriage return character.

Format

\$5aa or > appended to the end of a Group or Random command message.

where aa is the controller address.

Response Format

aa:b

where aa is the controller address and b is the controller type.

Valid values for b are:

- '1' – DO128
- '2' – BCD32 with 4 displays
- '3' – BCD32 with 8 displays

Note:

When the '>' character is appended to the end of a Random command message to request a Life Test response, only the controller for the last point or display in the command message will respond with the Life Test Response message.

2.7 Controller Info

The Controller Info command message queries a controller for a series of information including: firmware version, controller type, current mode and errors since last Controller Info command message.

Format

`$9aa`

where `aa` is the controller address.

Response Format

`MCP2.00:aa:t:m:ee`

where `aa` is the controller address, `t` is the controller type, `m` is the current mode and `ee` is any stored error codes.

2.8 Synchronization

The Synchronization command message is used to keep all blinking and flashing points and displays synchronized. The controller firmware maintains the blink and flash timing internally; however, due to variations in the crystal oscillator frequency within their specified tolerances, the blink and flash rate will drift after a period of approximately ten to twenty minutes. A Synchronization command message should be sent periodically to keep the controllers' blink and flash timing synchronized. The time between Synchronization command messages should be an increment of 2 seconds.

Note:

The controllers will respond to the Synchronization command message immediately and may cause a visual anomaly in blinking or flashing indicators if the 2-second increment is not adhered to.

Format

\ or \bf

Note:

The \bf format of the Synchronization command message is supported for backward compatibility only. In this format, **b** is the blink synchronization bit pattern and **f** is the flash synchronization bit pattern. To use this format, rotate through the following sequence of Synchronization command messages one every 250ms:

\<55h><0Fh>, \<AAh><87h>, \<55h><C3h>, \<AAh><E1h>, \<55h><F0h>, \<AAh><78h>, \<55h><3Ch>, \<AAh><1Eh>.

The \ format of the Synchronization Command Message is the preferred form and is equivalent to \<55h><0Fh> and should be sent every 2 seconds or a multiple of 2 seconds.

Response

None.

2.9 DO128 Random Update

The DO128 Random Update command message is used to update multiple points on multiple controllers in one command message. While in any mode other than Normal Mode (Lamp Test, Flash or Blink), all updates are processed and retained but will not be output until the controllers are returned to Normal Mode. The maximum number of points per DO128 Random Update command message for each controller is 49. The total number of points that can be updated per DO128 Random Update command message is only limited by 49 times the number of controllers on the network.

Note:

Keep in mind the amount of time it takes to transmit the message at the baud rate being used. No points will update until the entire message is processed.

Format

* $F_1:F_2:\dots:F_n$

where F is a sub command for each point to be updated in the following format:

$aa:bb:c$

where aa is the controller address, bb is the point address and c is the desired state for that point. Values for c are:

'0' (0x30) – Off
'1' (0x31) – On
'2' (0x32) – Flash
'3' (0x33) – Blink

Response

None.

Note:

When the '>' character is appended to the end of a DO128 Random command message to request a Life Test response, only the controller for the last point in the command message will respond with the Life Test Response message.

Example

The following example will set point 00 on controller 00 to On, point 00 on controller 01 to Flash and point 10 on controller 127 to Blink:

```
<lf>*00:00:1:01:00:2:7F:0A:3<cr>
```

2.10 DO128 Group Update

The DO128 Group Update command message is used to update multiple points on a single controller in one command message. While in any mode other than Normal Mode (Lamp Test, Flash or Blink), all updates are processed and retained but will not be output until the controller is returned to Normal Mode. All 128 points can be updated in a single DO128 Group Update command message.

Format

`&aa:bb:cc:d1d2...dn`

where `aa` is the controller address, `bb` is the starting point address, `cc` is the ending point address and `d` is state for that point. Values for `d` are:

- '0' (0x30) – Off
- '1' (0x31) – On
- '2' (0x32) – Flash
- '3' (0x33) – Blink

Response

None.

Example

The following example will set points from A0 to AF on controller 00 to Flash:

```
<lf>&00:A0:AF:2222222222222222<cr>
```

2.11 BCD32 Random Update

The BCD32 Random Update command message is used to update multiple BCD displays on multiple controllers in one command message. While in any mode other than Normal Mode (Lamp Test, Flash or Blink), all updates are processed and retained but will not be displayed until the controllers are returned to Normal Mode. There is no limit to the number of BCD displays per controller that can be updated using a single BCD32 Random Update command message. The total number of BCD displays that can be updated per BCD32 Random Update command message is only limited by the number of controllers on the network.

Note:

Keep in mind the amount of time it takes to transmit the message at the baud rate being used. No points will update until the entire message is processed.

Format

***F₁:F₂:...F_n**

where **F** is a sub command for each point to be updated in the following format:

aa:c:fsdd...d

where **aa** is the controller address, **c** is the display channel number, **f** is the desired state for that display, **s** is an optional sign character and **dd...d** is the value to be displayed.

Valid values for **c** are as follows:

- Eight 4-digit monochrome BCD displays: **c** range from 0 to 7.
- Four 8-digit monochrome BCD displays: **c** ranges from 0 to 3.
- Four 4-digit dual color BCD displays: **c** is 0, 2, 4 or 6 for Red and 1, 3, 5 or 7 for Green.
- Two 8-digit dual color BCD displays: **c** is 0 or 2 for Red and 1 or 3 for Green.

Valid values for **f** are as follows:

- '0' (0x30) – Off
- '1' (0x31) – On
- '2' (0x32) – Flash
- '3' (0x33) – Blink

Valid values for **s** are ' ', '+', and '-'.

The number of digits in `aa...a` varies depending on the size of the BCD display.

Response

None.

Note:

When the '>' character is appended to the end of a BCD32 Random command message to request a Life Test response, only the controller for the last display in the command message will respond with the Life Test Response message.

Example

The following example will display 1234 on the BCD display at channel 0 on controller 00 and display 5678 on the BCD at channel 3 on controller A0:

```
<lf>*00:0:1 1234:A0:3:1 5678<cr>
```

2.12 BCD32 Group Update

The BCD32 Group Update command message is used to update multiple displays on a single controller in one command message. While in any mode other than Normal Mode (Lamp Test, Flash or Blink), all updates are processed and retained but will not be output until the controller is returned to Normal Mode. All BCD displays connected to a controller can be updated using a single BCD32 Group Update command message.

Format

***F₁:F₂:...F_n**

where **F** is a sub command for each display to be updated in the following format:

aa:fsdd...d

where **aa** is the controller address, **f** is the desired state for that display, **s** is an optional sign character and **dd...d** is the value to be displayed.

Valid values for **f** are:

- '0' (0x30) – Off
- '1' (0x31) – On
- '2' (0x32) – Flash
- '3' (0x33) – Blink

Valid values for **s** are ' ', '+', and '-'.

The number of digits in **dd...d** varies depending on the size of the BCD display.

Response

None.

Example

The following example will update all eight 4-digit BCD displays on controller 00:

```
<lf>#00:1 1234:1 5678:1 1234:1 5678:1 1234:1 5678:1 1234:1
5678:<cr>
```

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