

# CLOUD CDI-S200

## Serial Control Protocol

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## INTRODUCTION

This document describes the serial protocol used to communicate with the Cloud CDI-S200 serial control card for the Cloud CX263 mixer.

Details for configuring the Serial Interface are in the CDI-S200 installation guide.

Throughout this document all message text is shown in a `mono spaced font`.

## MESSAGE STRUCTURE

There are three types of messages in the CDI-S200 control protocol;

- Control messages.
- Response messages.
- Error and Warning messages.

Control messages are sent to the CDI-S200. Response and error messages are transmitted from the CDI-S200 in reply to a control message.

All control messages use upper case letters; all response messages use lower case letters.

The message body is enclosed within a header character ("`<`") and a terminator sequence ("`/>`"). The CDI-S200 will reset its message decoding software upon reception of a header character, discarding any previously un-decoded partial messages. The CDI-S200 will start to decode a message upon reception of the terminator sequence. If the decoded message is valid it is executed and a response message returned. An error message is returned if the message cannot be decoded or if the command cannot be executed; a warning message is returned if the command has been interrupted by a new message.

## THE CONTROL MESSAGE

Control messages are sent to the CDI-S200 in order to perform a function. The control message has two fields separated by a comma. They are called the destination field and the command field.

```
<DESTINATION, COMMAND/>
```

## DESTINATION FIELD

The destination field is an abbreviated description of the mixer section the command is intended to affect. The field consists of an optional single character **default modifier**, the two character **main destination** and an optional two character **sub destination**. The sub destination is separated from the main destination by a full stop (period).

- **DEFAULT MODIFIER.** The character "D" is used to indicate the message is to set a default value.
- **MAIN DESTINATION.** The CDI-S200 has four possible main destinations;
  1. The Zones.
  2. The Microphones.
  3. The Global Music Channel.
  4. The System.
- **SUB DESTINATION.** The sub destination is used to address the message to a particular part of a main destination. Only the zone and global Music destinations have sub destinations.

### Examples

- <Z1.MU,LA23/> MU is the sub destination of music in the main destination of zone 1.
- <Z1.M1,M/> M1 is the sub destination of microphone 1 in zone 1.

## COMMAND FIELD

The command field identifies the command to be performed on the destination. The command field may have up to three parts; the **command identifier**, the **command modifier** and the **command value**. No white space is permitted between these parts.

- **COMMAND IDENTIFIER.** This part is always required. It has a single alphabetic character to identify the command type.
- **COMMAND MODIFIER.** This part is optional depending on the command type. Some commands take no modifier, some commands always take a modifier and some commands can have the option of a modifier or none. The modifier is a single alphabetic character.
- **COMMAND VALUE.** This part is optional depending on the command type and modifier.
 

For Source and Level commands the value part is numeric. In ASCII Level Mode the command value is decimal ASCII text I.E. "52" gives the command a value of 52. In Byte Level Mode the command value is a single character; the value given to the command is the byte value of the character I.E. "A" gives a value of 65. Non printable characters may be sent E.G. "BEL" = 7, "LF" = 12, to give a range of 0 to 255.

For paging commands the value is three digits representing the state of microphone 1 in each of the three zones. An "X" represents microphone 1 routed to that zone; the letter "O" represents microphone 1 un-routed to that zone.

### Examples

- <Z1 .MU ,M/>                   The command identifier is "M".
- <Z2 .MU ,SD/>                   The command identifier is "S", the command modifier is "D".
- <Z3 .MU ,LA22/>                The command identifier is "L", the command modifier is "A", the command value using ASCII Level Mode is "22" .
- <Z3 .MU ,LA\$/>                The command identifier is "L", the command modifier is "A", the command value using Byte Level Mode is "\$" i.e. a value of 36 .
- <M1 ,PAOXX/>                 The command identifier is "P", the command modifier is "A", the command value is "OXX".
- <M1 ,PR/>                     The command identifier is "P", the command modifier is "R" .

## DESTINATION FIELD IN DETAIL

### DEFAULT MODIFIER

The default modifier is used to set the default value of a parameter. The default values are loaded at initialisation when the initialisation mode is set to default mode. If no default values have been set the factory default values are used.

### MAIN DESTINATIONS

#### MICROPHONE

Microphone does not take a sub destination. The Global Microphone main destination ( "MI" ) is used to set the Mute or Open state of both microphones. Either microphone can be individually set to the Mute or Open state. The Paging command allows microphone 1 to be routed to zones. NB Microphone 1 is available as a sub destination of each zone to set its Mute or Open state in that zone.

The identifiers are: MI, M1, and M2 .

#### ZONE

The Zone destination always takes a sub destination, either Music to set Source, Level and Mute status, or Microphone 1 to set its Mute status.

Valid identifiers are for the three zones are: Z1, Z2, and Z3 .

#### GLOBAL MUSIC

Global music is used to set the Source and Level simultaneously of all zones.

The identifier is: MU.

#### SYSTEM

Used for setting the power up mode system parameter, the value mode system parameter, and to command a system reset.

The identifier is: SY .

## SUB DESTINATIONS

The Zone destinations can take a sub destination. There are two available sub destinations: music and microphone 1.

### MICROPHONE 1

This sub destination allows access to Microphone 1 Mute or Open state in each zone destination.

Example Identifiers combinations are Z1.M1, Z2.M1.

### MUSIC

This sub destination allows access to the Music section of each zone destination. NB Music is also available as a main destination to simultaneously set a parameter in all zones.

Example Identifiers combinations are Z1.MU, Z2.MU.

## COMMAND FIELD DETAIL

Please see the examples table.

### LEVEL "L"

This command is only available to the music sub destinations of zones.

The command is used to set the level of the line input selection (music) of a zone.

The level command requires a modifier. These are ("A") for **Absolute** value ("U") for **Up**, and ("D") for **Down**. All forms take a numeric value. An **Absolute** value is the attenuation required in half dB steps. E.G. an **Absolute** value of 20 represents 20 half dB attenuation or -10dB. An **Up** or **Down** value is the change in attenuation in half dB steps. E.G. an **Up** value of ten will increase the level ten half dB steps or 5dB. Any attempt to set a value greater than the maximum attenuation of 90dB will set the mute state.

An **Up** or **Down** command sent to the Global Music destination will alter the Music level in each zone by the **Up** or **Down** amount.

The response message when sent to a zone destination is always a lower case version of an **Absolute** Level command; this is so that the new level value can be returned in reply to the **Up** or the **Down** command.

The response message when sent to the Global Music destination is lower case version of the transmitted message. I.E. **Up** and **Down** messages may affect each zone differently so it is not possible to return an absolute level.

### MUTE "M"

### OPEN "O"

These commands change the mute status and are available to the global music and microphone destinations, the music sub destination of a zone, the microphone 1 sub destination of a zone, and the individual microphone destinations. The command takes no modifier or value. The response message is a lower case version of the control message.

**SOURCE "S"**

This command is only available to the music sub destinations of zones. The source command requires a modifier. These are ( "A" ) for **Absolute** value ( "U" ) for **Up**, and ( "D" ) for **Down**. Only the form with the **Absolute** modifier takes a numeric value which is the line number to select; values can be in the range 0 to 6. A value of 0 selects none of the line inputs. With the **Up** or the **Down** modifier no value is required as the increment or decrement step is always 1.

An **Up** or **Down** command sent to the Global Music destination will alter the Music source in each zone by the **Up** or **Down** amount.

The response message when sent to a zone destination is always a lower case version of an **Absolute** Source command; this is so that the new source value can be returned in reply to the **Up** or the **Down** command.

The response message when sent to the Global Music destination is lower case version of the transmitted message. I.E. **Up** and **Down** messages may affect each zone differently so it is not possible to return an absolute source.

**PAGE "P"**

This command is used only with the microphone 1 destination. Its purpose is to route microphone 1 to the zones for the purpose of zoned paging.

A modifier is always required. The modifiers are **Access** ("A"), used to change the routing to zones, and **Release** ("R") used to cancel microphone 1's routing to all zones. The **Access** modifier requires a value. The value is three digits representing the state of microphone one in each of the three zones. An "X" represents microphone 1 routed to that zone; an "O" represents microphone 1 un-routed to that zone. The **Release** modifier requires no value.

**SYSTEM LEVEL MODE "L"**

This command is only available to the system destination ( "SY" ). It always takes a modifier and takes no value. There are two modifiers ( "C" ) for **ASCII** level mode and ( "B" ) for **Byte** level mode. The response message is a lower case version of the original message.

**SYSTEM INITIALISATION MODE "I"**

This command is only available to the system destination ( "SY" ). The command is used to set the Initialisation mode of the CDI-S200.

The command must have a modifier to set the boot mode to **Default** mode ( "D" ) or **Last configuration** mode ( "P" for previous ). The response message is a lower case version of the control message.

**SYSTEM RESET "R"**

This command is only available to the system destination ( "SY" ). It has no modifiers and takes no value. The command causes the CDI-S200 to reset all of its parameters to factory settings. All zones' Music level is set at -90dB and their Music source is set at line 1, Muting is Open. Microphone 1 has access released in all zones (== muted in all zones), microphone 2 is set to muting Open. Level mode is set to **ASCII** and Initialisation mode is set to **Default**. The response message is "<sy,r/>".

## THE RESPONSE MESSAGE

The response message is the CDI-S200's reply to a valid message. Response messages are always in lower case. For Mute, Open and commands sent to the System destination the response messages are a lower case version of the message sent. The response message confirms the new state. For Level and Source commands the response message confirms the new value set; the response message is always a lower-case message of the **Absolute** command required to set the new value.

### Examples

- <Z1.MU,LA12/> Set the music level in zone 1 to 12.
- <z1.mu,la12/> Response returns the new value of level in zone 1.
- <Z1.MU,LU3/> Increment the music level in zone 1 by 3.
- <z1.mu,la9/> Response returns the new value of level in zone 1.

## THE ERROR AND WARNING MESSAGE

The error message is the CDI-S200's reply to an invalid message. The error message can have two parts, the **error identifier** and the **returned message**.

- **ERROR IDENTIFIER.** The error identifier has two characters; the first is an exclamation mark ("!"), the second is an upper case alphabetic character to identify the type of error.
- **RETURNED MESSAGE.** Not all error types use a returned message. When present the returned message is a copy of the sent message, either upper or lower case depending on how far the message has been decoded before the error is detected. Some error types will place a caret character ("^") in the returned message at the position the error has been detected.

The warning message is the CDI-S200's reply to an interrupted message. The warning message has one part, the interrupted warning identifier "I".

## ERRORS AND WARNINGS IN DETAIL

There are five error types and one warning.

### INTERRUPTED WARNING

This warning is generated when a header character ("**<**") is detected in the middle of a message. It is identified by the sequence ("**!I**"). It is used to indicate that the interrupted message has been abandoned and that the DCM-1 has started to receive a new message. An interruption is detected when the opening angle bracket of the new message is received; the Interrupted Warning message is transmitted immediately.

### Example

```
<Z1.MU<<!I/>Z2.MU,LA2/>
```

**PARSE ERROR**

This error is generated when a destination or command field cannot be decoded as valid. It is identified by the sequence ("!P"). Its return message is an upper case copy of the sent message. A caret character ("^") is used to indicate where the parse error occurred.

**Example**

```
<Z1.ML,LA23/><!PZ1.M^L,LA23/> NB ML is not a valid sub destination.
```

**BUFFER OVERFLOW ERROR**

This error is generated when a message has overflowed the CDI-S200's receive buffer. It is identified by the sequence ("!B"). It is used to indicate that the current message has been abandoned. It has no return message. All characters received by the CDI-S200 are ignored until it receives a header character ("<") to start a new message.

**Example**

```
<Z1, LAAAAAAAAAAAAA<!B/>
```

**VALIDATION ERROR**

This error is generated when a destination is decoded as invalid.

**Example**

```
<Z4.MU,SA2/><!Vz4.mu,sa2/> NB No Zone 4.
```

**EXECUTION ERROR**

This error is generated when a command has failed to execute. IE the message looks valid but has tried to perform a command that is not available on the destination. It is identified by the sequence ("!E"). Its return message is a lower case copy of the sent message.

**Example**

```
<M1,LU3/><!Em1,lu3/> NB LU3 is a valid command but not allowed on M1.
```

**ABBREVIATION ERROR**

This error is generated when an unexpected end of message is detected whilst decoding. This should not occur in normal operation. It is identified by the sequence ("!A"). It has no return message.

### TABLE OF ERRORS AND WARNINGS

Error/ Warning Type	ID	Fault Condition	Example Message	
			Faulty Message	Response
Parser	P	Message has syntax error.	<MG,M/>	<!Pm^g,m/>
Buffer Overflow	B	Message is too long.	<GGGGGGGGG...>	<!B/>
Interruption Warning	I	Message was interrupted before complete.	<MU.<MI.O/>	<!I/><mi.o/>
Validation	V	Variable is out of scope.	<Z6.MU,SU5/>	<!Vz6.mu,su5/>
Execution	E	Destination and command incompatible.	<M1,LU5/>	<!Em1,lu5/>
Abbreviation	A	Message prematurely terminated.	<M1./>	<!A/>

### TABLE OF COMMANDS

Command		Identifier	Example Message		
			Zone	Microphone	Global Music
Mute		M	<Z1.MU,M/> <Z1.M1,M/>	<MI,M/>	<MU,M/>
Open		O	<Z3.MU,O/> <Z2.M1,O/>	<M2,O/>	<MU,O/>
Source Select	Up	SU	<Z1.MU,SU/>	<b>NA</b>	<MU,SU/>
	Down	SD	<Z2.MU,SD/>		<MU,SD/>
	Absolute	SA	<Z1.MU,SA5/>		<MU,SA3/>
Level	Up	LU	<Z1.MU,LU10/>	<b>NA</b>	<MU,LU10/>
	Down	LD	<Z2.MU,LD8/>		<MU,LD10/>
	Absolute	LA	<Z1.MU,LA22/>		<MU,LA32/>
Page	Access	PA	<b>NA</b>	<M1,PAOXX/>	<b>NA</b>
	Release	PR		<M1,PR/>	
<b>Default Commands</b>					
Level		D[dst],LA	<DZ2.MU,LA10/>	<b>NA</b>	<DMU,LA32/>
Source		D[dst],SA	<DZ1.MU,SA4/>		<DMU,SA4/>
Mute		D[dst],M	<DZ3.MU,M/> <DZ1.M1,M/>	<DMI,M/>	<DMU,M/>
Open		D[dst],O	<DZ3.MU,O/> <DZ2.M1,O/>	<DM2,O/>	<DMU,O/>
<b>System Commands</b>					
			<b>System Destination</b>		
Reset		R	<SY,R/>		
Initialisation Mode	Previous	IP	<SY,IP/>		
	Default	ID	<SY,ID/>		
Level Mode	ASCII	LC	<SY,LC/>		
	Byte	LB	<SY,LB/>		

## EXAMPLES

Each example has a typical CDI-S200 reply in red.

### Music Level

Set the music level.

<Z1.MU, LA12/><z1.mu, la12/>	(* Zone 1 music level to 12 (-6dB)
<Z1.MU, LU7/><z1.mu, la5/>	(* Zone 1 music level up by 7 (Up 3.5dB to -2.5dB)
<Z1.MU, LD3/><z1.mu, la8/>	(* Zone 1 music level down by 3 (Down 1.5dB to -4dB )
<MU, LA12/><mu, la12/>	(* Global music level to 12 (-6dB)

### Music Mute/ Open

<Z1.MU, M/><z1.mu, m/>	(* Zone 1 music mute On.
<Z1.MU, O/><z1.mu, o/>	(* Zone 1 music mute Off.
<MU, M/><mu, m/>	(* Global music mute On.
<MU, O/><mu, o/>	(* Global music mute Off.

### Music Source

Set the music source.

<Z1.MU, SA2/><z1.mu, sa2/>	(* Zone 1 source to 2
<Z1.MU, SD/><z1.mu, sa1/>	(* Zone 1 source down
<Z1.MU, SU/><z1.mu, sa2/>	(* Zone 1 source up
<MU, SA2/><mu, sa2/>	(* Global music 1 source to 2

### Microphone Mute/ Open

<MI, M/><mi, m/>	(* All microphones mute On.
<MI, O/><mi, o/>	(* All microphones mute Off.
<M1, M/><m1, m/>	(* Microphone 1 mute On.
<M1, O/><m1, o/>	(* Microphone 1 mute Off.
<M2, M/><m2, m/>	(* Microphone 2 mute On.
<M2, O/><m2, o/>	(* Microphone 2 mute Off.
<Z2.M1, M/><z2.m1, m/>	(* Microphone 1 in zone 2 mute On.
<Z2.M1, O/><z2.m1, o/>	(* Microphone 1 in zone 2 mute Off.

### Microphone 1 Paging

<M1, PAOXX/><m1, paoux/>	(* Page zones 2 and 3
<M1, PAXXO/><m1, paxxo/>	(* Page zones 1 and 2
<M1, PR/><m1, pr/>	(* Release paging

## Defaults

Defaults are available to commands to the Global Music, Global Microphone and individual Microphone destinations and to the Music and Microphone 1 sub destinations of each Zone.

<DMU, LA2/><dmu, la2/>	(* Default global music level set to 2.
<DMU, SA3/><dmu, sa3/>	(* Default global music source set to 3.
<DMU, M/><dmu, m/>	(* Default global music mute state set to on.
<DMU, O/><dmu, o/>	(* Default global music mute state set to off.
<DMI, M/><dmi, m/>	(* Default microphone mute state set to on.
<DMI, O/><dmi, o/>	(* Default microphone mute state set to off.
<DM1, M/><dml, m/>	(* Default microphone 1 mute state set to on.
<DM1, O/><dml, o/>	(* Default microphone 1 mute state set to off.
<DM2, M/><dml, m/>	(* Default microphone 2 mute state set to on.
<DM2, O/><dml, o/>	(* Default microphone 2 mute state set to off.

## System Commands

### Power up Mode (initialisation)

<SY, ID/><sy, id/> (\* set power up mode to default.  
<SY, IP/><sy, ip/> (\* set power up mode to last (previous hence the 'P' ).

### Level

<SY, LC/><sy, lc/> (\* Set Levels encoding to ASCII.  
<SY, LB/><sy, lb/> (\* Set Levels encoding to Byte.

### Reset

<SY, R/><sy, r/> (\* Reset to factory settings.

