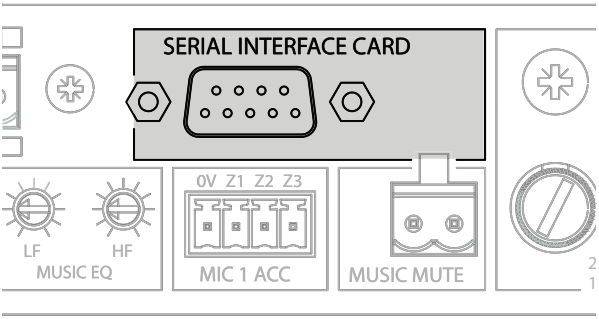
CDI-S200

SERIAL INTERFACE CARD



Installation Guide

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Introduction

The CDI-S200 is an optional RS-232C interface card designed specifically for use with the Cloud CX263 Zone Mixer. It allows the CX263 to be controlled by third-party systems (such as Crestron, AMX, etc.), using RS-232C serial data.

When installed, the CDI-S200 permits the following CX263 functions to be controlled remotely:

- Music source selection for each zone
- Music level in each zone
- Music muting
- Muting of individual microphones
- Activation of Mic 1's paging access

Physically, the CDI-S200 is a small printed circuit board (PCB), which is retrofitted internally in the CX263 such that the 9-pin D-type RS-232C connector is available at the rear panel.

Scope of this manual

This manual describes the mechanical installation of the card and the connections that need to be made to it. It also explains the various configuration options that the card offers, and the various jumper and switch settings that need to be made to the CX263 to achieve correct operation.

The manual also gives a general overview of the RS-232C serial control protocol used by the CDI-S200, and some examples of the most useful commands. This information should be adequate for most installations, but please note that a full description of the RS-232C protocol is beyond the scope of this manual. The full protocol can be found at www.cloud.co.uk.

What's in the box

- CDI-S200 PCB
- Installation Guide (this document)
- 2 qty M3 x 25 mm mounting pillars

Installation

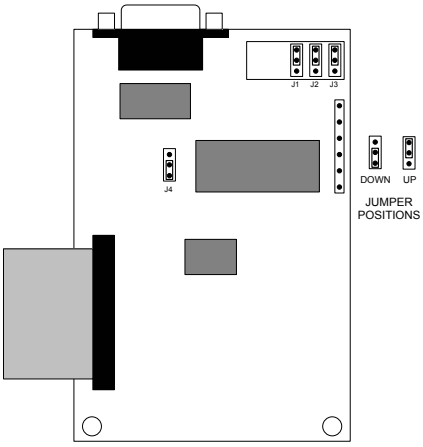
Configuring the CDI-S200

Before installing the CDI-S200 in the CX263, various jumpers on the PCB need to be set correctly. (This step should be performed first because the PCB is installed in the CX263 upside-down, and access to the jumpers is very difficult once it is in position.)

The jumpers are concerned with setting the parameters of the serial port (see "Port parameters" on page 8). The port parameters should be set to suit the control system being used. It is quite likely that the factory default settings will provide correct operation; nevertheless, it is important to check that this is so and alter the settings if necessary.

To move the jumpers, use small pliers to gently pull the jumper off the header pins and replace in the correct position. Do not use undue force, and do not use pliers which are too big.

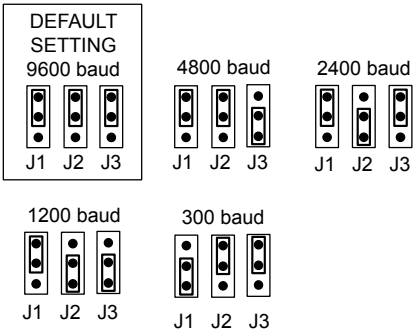
There are four jumpers, J1 to J4.



Not to scale. Only primary components shown.

Baud Rate

Jumpers J1 to J3 set the serial port's baud rate. The default setting is **9600 baud**. Check the baud rate of the controlling equipment. If a different baud rate is required, set the jumpers according to the diagram below:

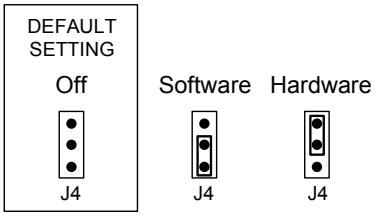


Handshaking

RS-232C serial communication between equipment sometimes requires flow control (or "handshaking"), to confirm that transmitter (the controller) and receiver (the CDI-S200 in this case) are correctly synchronised. PCB jumper J4 controls handshaking.

Handshaking may be via "hardware", "software", or off. Hardware handshaking is also referred to as "RTS/CTS", and needs additional pins of the 9-pin serial connector to be wired (see "Pinout" on page 8). Software handshaking is also referred to as "Xon/Xoff".

The default setting is off (no handshaking); J4 is left attached to the centre pin of the header at the factory. If the controlling equipment requires handshaking, reset the jumper according to the following diagram:



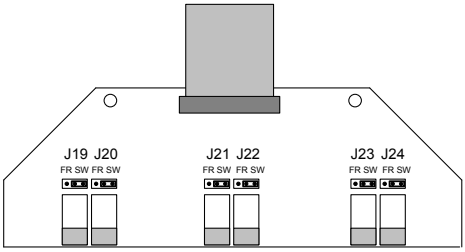
CX263 jumper settings

In order for the CDI-S200 to fully control the CX263, it is necessary to correctly set some jumpers on the CX263 main PCB. These are J4 to J6, and J19 to J24. Because some of these jumpers will be inaccessible once the CDI-S200 PCB is installed, we recommend that they are set before fitting it.

Jumpers J4 to J6 are all on 2-pin headers, and can thus be present or absent. See page 6 for a guide to their location. They determine how the CX263's Mic Input 1 access control operates. When a CDI-S200 PCB is installed, all three jumpers must be absent (we recommend that the jumpers are electrically removed, but left in place on just one pin of the header, in case the unit needs to be reconfigured in the future).

To move the jumpers, use small pliers to gently pull the jumper off the header pins and replace in the correct position. Do not use undue force, and do not use pliers which are too big.

Jumpers J19 to J24 determine how music source selection and music level in each zone are controlled remotely. To allow a CDI-S200 PCB to fully control a CX263, all six jumpers must be in the 'SW' position. These jumpers are all on the small "daughter-board" at the centre-rear of the CX263 which carries the **DIG/AN** and **FR/REM** switches for each zone.



It is possible to configure the CX263 so that only certain unit functions are under the control of the CDI-S200. Refer to "CX263 switch settings" on page 7 for more details.

Mechanical fitting and internal connection

If retrofitting the CDI-S200 to an existing CX263 installation, turn the CX263 off, remove its IEC mains lead and all other rear panel connections (marking as necessary to assist re-connection). If the CX263 is mounted in a rack, remove it.

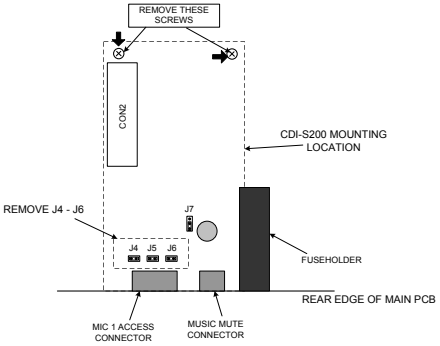
If fitting the CDI-S200 to a new CX263, unpack the CX263.

In either case, place the CX263 on a flat surface, with the rear of the unit facing you.

1. Undo the six screws securing the top panel of the CX263; remove the panel. Retain the screws.

2. Remove the blanking plate covering the serial interface module connector hole in the rear panel by removing the two self-tapping screws securing it.

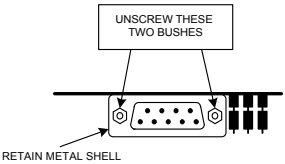
3. Identify the empty 16-pin header labelled CON2 on the main PCB behind the empty serial connector hole. Note there is an M3 screw immediately behind this connector, and another about 45 mm to the right. Both these screws are clearly marked with arrows; remove and retain them.



CX263 PCB: CDI-S200 MOUNTING LOCATION

4. Screw the threaded ends of the two 25 mm mounting pillars supplied with the CDI-S200 into the holes vacated by the screws removed in Step 3.

5. On the CDI-S200 board, remove the two small threaded bushes on the D-type connector; retain them. An M3 nut-driver is the best tool for this. Note that these bushes also retain the metal connector shell – be careful to keep it in place during the next two steps.



REAR VIEW OF CDI-S200 PCB

6. Plug the connector on the end of the ribbon cable into connector CON2 on the CX263 main PCB. Note it can only be inserted one way round, with the cable exiting to the left.

7. With the CDI-S200 PCB upside-down, insert the D-type connector through the hole in the rear panel. You will see that the two holes at the other end of the PCB are aligned with the mounting pillars fitted in Step 4. Fix the board to the pillars using the screws removed in Step 3.

8. Replace the two bushes removed in Step 5 adjacent to the D-type connector by screwing them through the rear panel. The two self-tapping screws removed in Step 2 are no longer required.

CX263 switch settings

After the CDI-S200 card has been fitted, and J4 – J6 and J19 – J24 (on the CX263 main PCB) set as described above, the top cover of the CX263 can be replaced, using the original screws.

The three blue rear panel switches **DIG/AN** (adjacent to the **RSL-6** connectors) should now be set to **DIG** – i.e., in their 'out' position. The three blue rear panel switches **FR/REM** (next to them) should be set to **REM** – i.e. in their 'in' position. The CX263 is now ready for full serial remote control.

Partial music function control

It is also possible to configure the CX263 so that the CDI-S200 only controls certain unit functions, leaving others to be manually controlled, either from the front panel or from a Cloud RSL-6 remote control plate. If this is required, set the rear panel switches and the internal jumpers J19 to J24 according to the table below.

MUSIC SOURCE	MUSIC LEVEL	DIG/AN switch	FR/REM switch	Jumpers J19, J21, J23	Jumpers J20, J22, J24
CDI-S200	CDI-S200	DIG	REM	*	SW
CDI-S200	RSL-6/RL-1	AN	REM	DG	SW
Front panel	CDI-S200	DIG	REM	*	FR

*When the CDI-S200 is to control music level, jumpers J19, J21 and J23 may be set in either the DG or SW position. However, they must NOT be removed altogether.

CDI-S200 Serial Control

Pinout

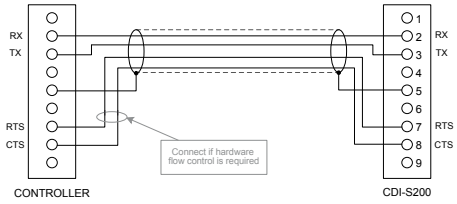
The rear panel serial connector is a female 9-pin Dsub. The pinout is shown in the table:

PIN	FUNCTION
1	n/u
2	Data receive
3	Data transmit
4	DTR
5	0v
6	DSR
7	RTS
8	CTS
9	n/u

For many installations, it will only be necessary to connect pins 2, 3 and 5. If the control system's serial port is also a 9-pin D-type, use a D9-to-D9 "straight" cable (i.e., one wired with pin 1 to pin 1, pin 2 to pin 2, etc.) If the control system's serial port is a screw-terminal (or other type of) connector, the terminals will most likely be marked "Tx", "Rx" and "Gnd", or something similar. In this case, connect "Tx" to pin 3 on the CDI-S200, "Rx" to Pin 2 and "Gnd" to pin 5. See the following illustration for details.

NOTE: Not all control systems interpret "Tx" and "Rx" the same way, and it may be necessary for a "crossed" cable to be used instead. A crossed cable is one with pin 2 connected to pin 3 at the other end, and vice-versa. If your CDI-S200 appears to ignore control system instructions and all connections, programming, etc., appear satisfactory, try reversing pins 2 and 3 at one end of the serial cable.

The installer should also check whether the control system being used requires RS-232C flow control (or "handshaking") to be implemented, and if so, whether hardware control or software control is used. Hardware handshaking (sometimes called RTS/CTS) requires pins 7 and 8 to be connected.



"STRAIGHT" RS-232C SERIAL CABLE

Note that some installation require a "crossed" cable in this case, pins 2 and 3 should be reversed at one end.

Port parameters

PARAMETER	VALUE/SETTING
Data type:	RS-232C serial
Data speed	300/1200/2400/4800/9600 baud, selectable by jumper
Word length	8 bits
Parity	None
Stop bits	One

Abridged command set

The commands listed in the General Format table (page 9) are those most commonly required. For all other commands, data requests and responses, please refer to the CDI-S200's full RS-232C protocol document at www.cloud.co.uk.

The table provides the general format of each type of command. The commands are given in ASCII form; note that all characters in the command, including the non-alphanumeric ones, must be sent. The characters shown in italics must be replaced by specific numeric values when a command is sent.

Following the table, an example of each command type is given; refer to the general format to see how the variable characters are replaced by specific values. The commands in the examples are given in both ASCII and hex form.

GENERAL FORMAT	
FUNCTION	**COMMAND (ASCII)**
MUSIC SOURCE SELECT COMMANDS:	
Select Line Input x as music source in zone y	**<Z*y*.MU,SA*x*/>**
Select next higher-numbered Line Input in zone y	**<Z*y*.MU,SU/>**
Select next lower-numbered Line Input in zone y	**<Z*y*.MU,SD/>**
Select Line Input x as music source in all zones	**<MU,SA*x*/>**
Select next higher-numbered Line Input in all zones	**<MU,SU/>**
Select next lower-numbered Line Input in all zones	**<MU,SD/>**
MUSIC LEVEL COMMANDS:	
Set music level in zone y to –(m/2) dB relative to max volume	**<Z*y*.MU,LA*m*/>**
Reduce music level in zone y by (p/2) dB	**<Z*y*.MU,LD*p*/>**
Increase music level in zone y by (q/2) dB	**<Z*y*.MU,LU*q*/>**
Set music level to –(m/2) dB relative to max volume in all zones	**<MU,LA*m*/>**
Reduce music level by (p/2) dB in all zones	**<MU,LD*p*/>**
Increase music level by (q/2) dB in all zones	**<MU,LU*q*/>**
MUSIC MUTE COMMANDS:	
Mute music in zone y	**<Z*y*.MU,M/>**
Unmute music in zone y	**<Z*y*.MU,O/>**
Mute music in all zones	**<MU,M/>**
Unmute music in all zones	**<MU,O/>**
MIC MUTE COMMANDS:	
Mute both microphones	**<MI,M/>**
Unmute both microphones	**<MI,O/>**
PAGING CONTROL COMMANDS:	
Enable Mic 1 paging in zones a and/or b and/or c	**<M1,PA*abc*/>**
Release Mic 1 paging	**<M1,PR/>**

Examples:

1. Input selection

To directly select a specific music source in a particular zone, the value of *x* in the general format is the number of the Line Input (1 to 6) to be selected, and the value of *y* is the number of the zone (1 to 3) to which the command applies. Note that *x* can also be set to zero to positively de-select all music sources in a zone.

Alternatively, the music sources in any zone may be "stepped through" one at a time (in either direction), using increment or decrement commands. If an increment command is received when Line In 6 is already set, the command is ignored. If a decrement command is received when Line 1 is set, no music source is selected (equivalent to the "Line 0" command mentioned above). Any further decrement commands are ignored.

If wished, all three zones may be set simultaneously to the same music source with a single command; again, the "all-zone" source may also be incremented or decremented as for a single zone. Note that the strings for "all-zone" commands merely omit the three ASCII characters which specify the zone number (Z*y*.).

EXAMPLE	COMMAND (ASCII)	COMMAND (HEX)
Select Zone 2 to Line Input 3	`<Z2.MU,SA3/>`	3C 5A 32 2E 4D 55 2C 53 41 33 2F 3E
Select Line Input to Zone 1 to be one above current	`<Z1.MU,SU/>`	3C 5A 31 3C 4D 55 2C 53 55 2F 3E
Select Line Input to Zone 3 to be one below current	`<Z3.MU,SD/>`	3C 5A 33 3C 4D 55 2C 53 44 2F 3E
Select all zones to Input 5	`<MU,SA5/>`	3C 4D 55 2C 53 41 35 2F 3E

2. Music Level

The music level in any zone (where *y* = 1 to 3) can either be set to an absolute value (in dBs), or increased/decreased by a specified number of dBs. Adjustment can be made in half-dB steps, and the values *m*, *p* and *q* in the General Format table represent the number of half-dB steps.

For absolute levels, the value of *m* corresponds to attenuation rather than gain, thus 0 dB is maximum level and at -90 dB the music channel is effectively muted. The value of *m* in the general format is the attenuation level in half-dBs, and may thus have a value of between 0 and 180. Therefore, to set the output level to 10 dB below the maximum level, *m* must be given a value of 20.

To alter the music level by a specified amount, the ASCII character 'A' is replaced by 'U' (up) or 'D' (down) in the string. The value of *p* or *q* in the general format is the level increase in half-dB steps (0 to 180), or the level decrease in half-dB steps (0 to 180) respectively. A command to increase the level by a number of dBs greater than the current attenuation will set the level to maximum. Similarly, a command to decrease the level by a number of dBs greater than (90 minus the current attenuation) will mute the music channel.

If wished, the music in all three zones may be set to the same level with a single command. Note that the strings for "all-zone" commands merely omit the three ASCII characters which specify the zone number (Z*y*.).

EXAMPLE	COMMAND (ASCII)	COMMAND (HEX)
Set music level in Zone 1 to 12 dB below maximum	<Z1.MU,LA24/>	3C 5A 31 2E 4D 55 2C 4C 41 32 34 2F 3E
Reduce music level in Zone 2 by 10 dB	<Z2.MU,LD20/>	3C 5A 32 2E 4D 55 2C 4C 44 32 30 2F 3E
Increase music level in Zone 4 by 6 dB	<Z4.MU,LU12/>	3C 5A 34 2E 4D 55 2C 4C 55 31 32 2F 3E
Set music level in all zones to 3 dB below maximum	<MU,LA6/>	3C 4D 55 2C 4C 41 36 2F 3E

3. Music Mute/Unmute

Music may be muted or unmuted in any zone by replacing *y* in the General Format table with 1, 2 or 3. The commands to mute or unmute music in all zones contain no variables, thus those given in the General Format table are always applicable.

EXAMPLE	COMMAND (ASCII)	COMMAND (HEX)
Mute music in Zone 2	<Z2.MU,M/>	3C 5A 32 2E 4D 55 2C 4D 2F 3E
Unmute music in Zone 5	<Z5.MU,O/>	3C 5A 35 2E 4D 55 2C 4F 2F 3E
Mute music in all zones	<MU,M/>	3C 4D 55 2C 4D 2F 3E

4. Mute/unmute individual microphones

The CX263's two mic inputs may be muted or unmuted. It is not possible to mute/unmute each mic input individually. There are no variables in the command string and thus those given in the General Format table are always applicable.

EXAMPLE	COMMAND (ASCII)	COMMAND (HEX)
Mute mic inputs	<MI,M/>	3C 4D 49 2C 4D 2F 3E
Unmute mic inputs	<MI,O/>	3C 4D 49 2C 4F 2F 3E

5. Paging control

Paging via Mic 1 input may be enabled for any combination of the CX263's three zones by sending a command which includes the two ASCII characters "PA" followed immediately by a further three characters which define which zones are to be paged. The three zone characters represent zones 1, 2 and 3 respectively, and must be either an ASCII "X" (enable paging) or an ASCII "O" (don't

enable paging). The following examples illustrate this.

Paging may be cancelled – whatever combination of zones has been enabled – with a single "release" command, which contains no variables.

Note that it is not possible to enable paging via Mic Input 2 by serial control.

EXAMPLE	COMMAND (ASCII)	COMMAND (HEX)
Enable paging in Zone 1	<M1,PAXOO/>	3C 4D 31 2C 50 41 58 4F 4F 2F 3E
Enable paging in Zone 2	<M1,PAOXO/>	3C 4D 31 2C 50 41 4F 58 4F 2F 3E
Enable paging in Zones 2 and 3	<M1,PAOXX/>	3C 4D 31 2C 50 41 4F 58 58 2F 3E
Release paging	<M1,PR/>	3C 4D 31 2C 50 52 2F 3E

APPENDIX

Cable lengths

RS-232C serial communication can use either shielded or unshielded cable. The longest cable run that can be practically used for error-free operation in a given installation will depend on several factors: cable type, the baud rate used and the amount and type of electrical noise present in the cable's vicinity.

A realistic figure for maximum cable length is 250 ft. (76 m.) using good-quality shielded cable and 100 ft. (30 m.) using unshielded cable, at 9600 baud (the most common data rate). However, the figure may be higher or lower in a particular installation.

Lowering the baud rate will permit significantly longer cable runs to be used.

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