CONNECTIONS

Soundcraft Si Series MADI Connectivity & Worked Examples

V1.4

Contents

An Introduction to MADI; 2
Application Example1a, Two Si Compact Consoles Sharing Inputs 3
Application Example1b, Two Si Compact Consoles Sharing Inputs 4
Application Example2, Two Si Compact Consoles with Stagebox 5
Application Example3, Si Compact & Vi1 with Stagebox 6
Application Example4, Vi 2/4/6 & Si Compact with Stagebox 7
General Notes: 9

An Introduction to MADI;

Multi-channel Audio Digital Interface, or MADI, is an industry-standard electronic communications protocol that defines the data format and electrical characteristics of an interface carrying multiple channels of digital audio. The original specification (AES10-1991) defined the MADI link as a 56 channel transport for the purpose of linking large-format mixing consoles to digital multi-track recording devices but it soon found itself adopted by large broadcast studios for routing multi-channel audio throughout their facilities.

Typically the format is transmitted over coaxial cable, fibre-optic lines or CAT5 cables; The MADI standard supports 28, 56, or 64 channels with sampling rates of up to 96 kHz and resolution of up to 24 bits per channel.

As noted, the original specification allowed 56 channels at sample rates from 28 to 54 kHz (32–48 kHz ±12.5%), the 2003 revision specifies a narrower sample rate range of 32–48 kHz but allows 64 channels.

MADI offers a number of benefits over other digital protocols and standards such as AES/EBU (AES3), ADAT, TDIF, S/PDIF, CobraNet™ and similar including:

- Greater number of channels per line
- Use of coaxial and optical fibre media (enable the transmission of audio signals over extended distances)
- It is a simple point-to-point system with no need to address channels within the packets
- Low latency

The use of MADI, with respect to mixing consoles, has changed little over the years but its popularity continues to grow as a reliable interface between two or more mixing consoles or between a mixing console and router or digital recording system.

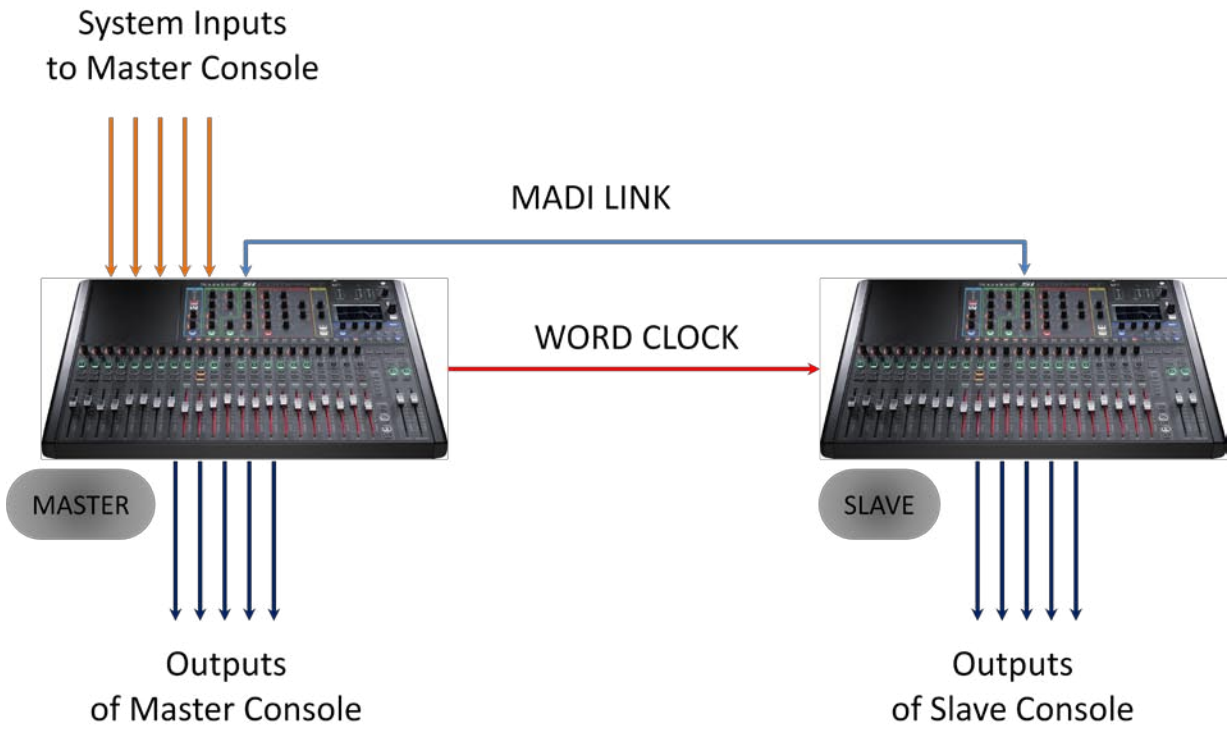
The former example has increased dramatically in popularity as Pro Audio consoles moved into the digital domain and remote stageboxes became more common. This move has enabled a single stagebox to be shared amongst two or more consoles without the need for an analogue split system.

The latter example has seen strong growth as artists and record companies look to multi-track record almost every notable event for later publication and release whilst sound engineers frequently employ multi-channel playback of a rehearsal or previous event to do more comprehensive sound checks without need for the band (virtual sound-check).

Application Example1a, Two Si Compact Consoles Sharing Inputs

This example illustrates the principle of two consoles linked by MADI allowing sharing of the inputs to the master console.

System Diagram:



Setup Procedure:

1. Connect system as illustrated.
2. Patch input channels of master console as required.
3. Patch channel direct outputs of master console to MADI OUT.
4. Patch inputs of client console to MADI IN.
5. Set CLIENT console to EXTernal word clock synchronisation.

Key Benefits:

1. Eliminates need for analogue input connections to 2nd console.
2. MADI link can be dual redundant.
3. Enabling DOGS system on Si Compact allows changes to mic amp gain on master console without affecting input levels to client console.
4. MADI recorder can be connected AUX MADI OUT of either console if not using a dual redundant MADI link.

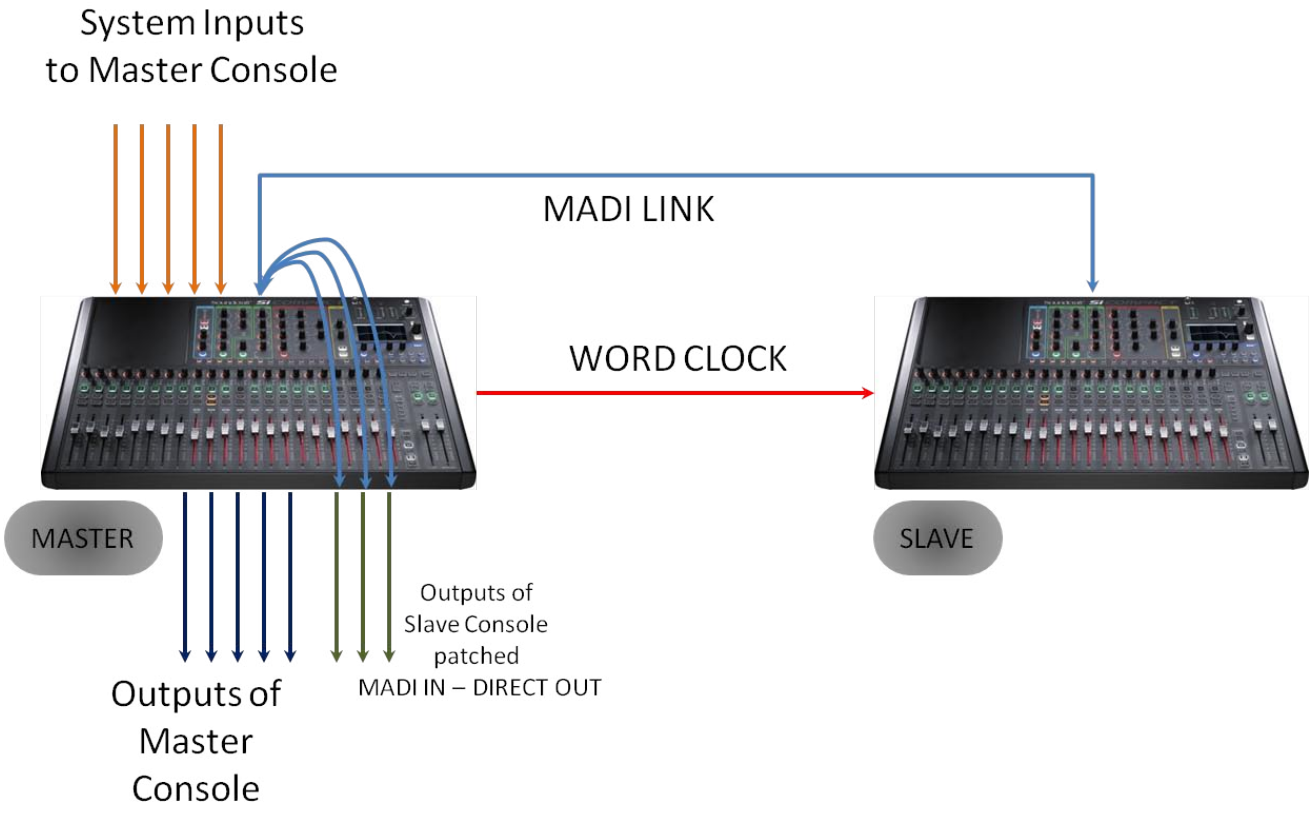
Restrictions:

1. There is no direct output from stereo channels of an Si Compact.
2. Master console must be on with suitable patches made for client console to receive system inputs.

Application Example1b, Two Si Compact Consoles Sharing Inputs

This example is similar to 1a however here the outputs of the client console are passed back down the MADI link in order the client console outputs are available on the master console.

System Diagram:



Setup Procedure:

1. Connect system as illustrated.
2. Patch input channels of master console as required.
3. Patch channel direct outputs of master console to MADI OUT.
4. Patch inputs of client console to MADI IN.
5. Set CLIENT console to EXTernal word clock synchronisation.
6. Patch outputs of client console to MADI OUT.
7. Patch spare inputs of master console to MADI IN.
    a. Patch direct outputs of 'spare inputs' to spare outputs of master console.

Key Benefits:

1. Eliminates need for all analogue connections to 2nd console.
2. MADI link can be dual redundant.
3. Enabling DOGS system on Si Compact allows changes to mic amp gain on master console without affecting input levels to client console.
4. MADI recorder can be connected AUX MADI OUT of either console if not using a dual redundant MADI link.

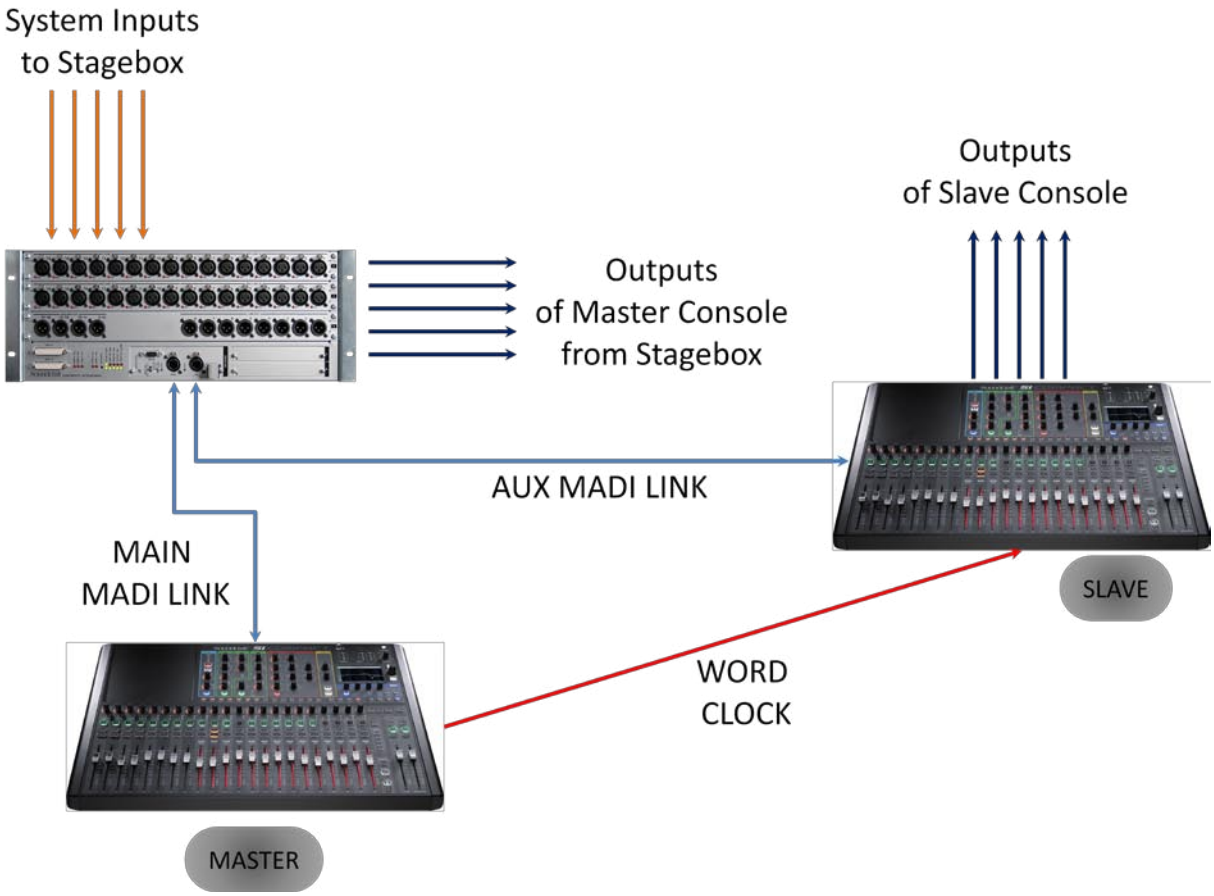
Restrictions:

1. There is no direct output from stereo channels of an Si Compact.
2. Master console must be on with suitable patches made for client console to receive system inputs.
3. Requires spare(unused) input channels and output sockets on master console.

Application Example2, Two Si Compact Consoles with Stagebox

This example illustrates the principle behind two consoles sharing a Compact Stagebox in a 'parallel' configuration.

System Diagram:



Setup Procedure:

1. Connect system as illustrated.
2. Set INPUT SEL switch on stagebox to MAIN.
3. Patch input channels of master console to stagebox as required.
4. Patch inputs of client console to MADI channels as required (NOTE 2nd console will not 'see' mic amps of stagebox only MADI sources).
5. Set client console to EXTernal word clock synchronisation.

Key Benefits:

1. Analogue runs are kept to a minimum.
2. The master console need not be on for the client console to function.
3. Direct out of client console can be used to feed a 3rd console, MADI recorder or similar.

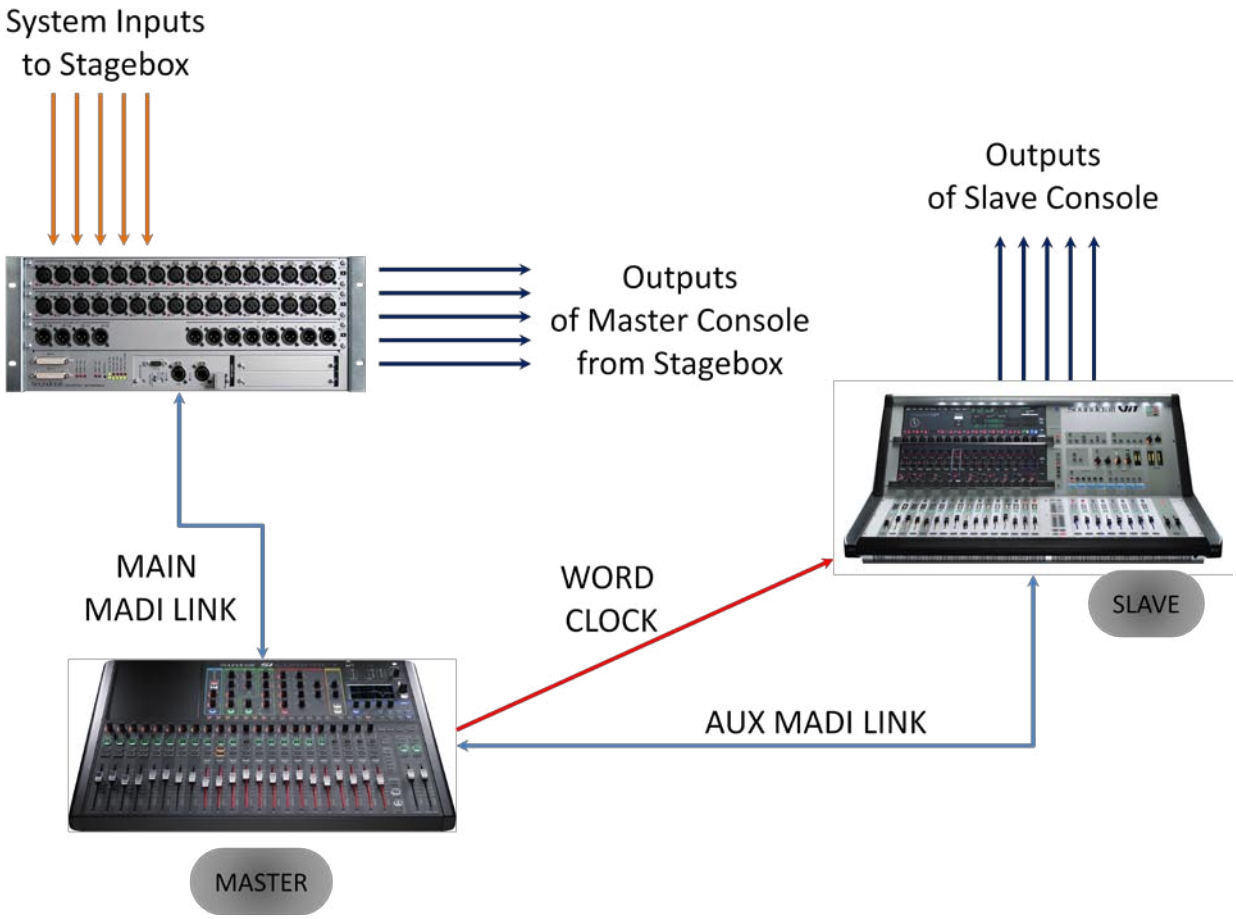
Restrictions:

1. Dual redundant MADI links are not possible.
2. GAIN change made by master console will be affect level at CLIENT; DOGS function can not work in this topology.

Application Example3, Si Compact & Vi1 with Stagebox

This example illustrates the principle behind two consoles sharing a stagebox in a 'series' configuration.

System Diagram:



Setup Procedure:

1. Patch channel direct outputs from Si Compact to MADI starting channel 17 (or higher)[*1].
2. Connect system as illustrated then RESET I/O on the Si Compact.
3. Patch input channels of master console to stagebox as required.
4. Patch inputs of client console to MADI channels as required.
5. Set CLIENT console to EXTernal word clock synchronisation.

*1 – Assumes no additional output cards fitted to stagebox slots K or L, in the case there *are* output cards the 'channel width' of this must be considered when choosing MADI direct out start channel

Key Benefits:

1. Eliminates need for analogue inputs to 2nd console.
2. Analogue runs are kept to a minimum.
3. Enabling DOGS system on Si Compact allows changes to mic amp gain on master console without affecting input levels to client console.
4. Direct out of client console can be used to feed a 3rd console, MADI recorder or similar.

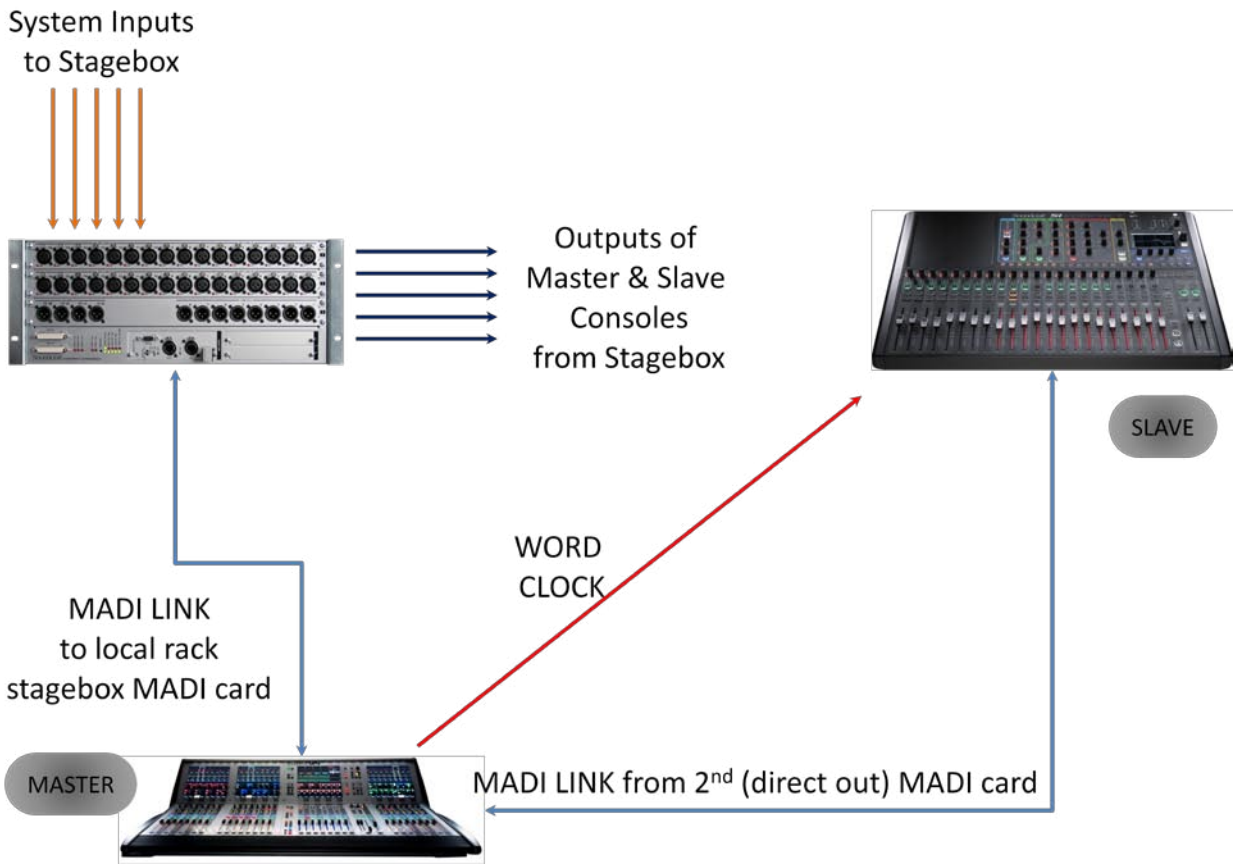
Restrictions:

1. Re-patch of direct outputs to MADI card cannot be changed once the stagebox is discovered.
2. Master console must be ON with suitable patches made for client console to receive any signal.
3. Must heed notices regarding MAIN/AUX connections – see notes in this document.

Application Example4, Vi 2/4/6 & Si Compact with Stagebox

This example also illustrates the principle behind two consoles sharing a stagebox in a 'series' configuration but utilises features in the Vi2/4/6 to deliver an efficient solution.

System Diagram:



Setup Procedure:

1. Connect system as illustrated.
2. Patch input channels of master console to stagebox as required.
3. Patch input channels of master console to local MADI card outputs.
4. Patch inputs of client console to MADI channels as required.
5. Patch outputs of client console to MADI channels as required.
6. Make tie-line patches on Vi between local MADI card and stagebox as required.
7. Set CLIENT console to EXTernal word clock synchronisation.

Key Benefits:

1. Eliminates all analogue connections other than system inputs to stagebox.
2. All MADI links can be dual redundant.
3. Master and client outputs can appear on stagebox.
4. Analogue runs are kept to a minimum.
5. Local rack I/O remains available for use.
6. 3rd MADI card or AUX MADI out can be used for recording or feeding 3rd console.

Restrictions:

1. Gain change made by master console will be affect level at CLIENT; DOGS function can not work inthis topology.
2. Maximum of 24 tie lines can be created.

IMPORTANT: Interaction and function of the stagebox INPUT SEL switch:

The setting of the INPUT SEL switch on the stagebox determines which console 'sees' the stagebox inputs as the controllable mic amp or simply a MADI audio source. If the switch setting is changed the console that was the 'master' will no longer be able to 'see' the mic inputs these will be reported as 'not present'

Since the console had once 'seen' the I/O cards in the stagebox the cards continue to appear on the screen in 'anticipation' that the stagebox will be reconnected; this is the same scenario as if the stagebox was disconnected or turned off. To make the change permanent you must reset the I/O database from the Si SHOW menu.

NOTE: A secondary function of the INPUT SEL switch is to determine if *inputs* to the stagebox come from either the MAIN or AUX MADI links.

IMPORTANT: Interaction between MAIN and AUX ports on console MADI cards.

The MADI cards fitted to consoles treat each of their MADI ports identically. This is of no consequence to the MADI OUT signals which are sent in parallel to both the MAIN and AUX ports however if both MAIN and AUX ports are receiving a valid MADI IN stream the console must decide which port to 'listen to'. The console will try to use the port that 1st received a valid MADI stream, if the console detects any dropout it will switch to the 'other' port.

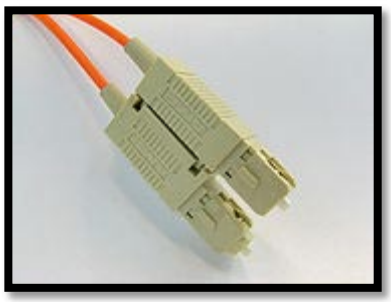
This interaction impacts on configurations such as *Example 3* where the Vi1 must be connected after the Si Compact is connected to the stagebox to ensure the Si Compact does not attempt to 'listens' to the Vi1.

When using optical connections a failsafe approach is *not to complete the CLIENT MADI OUT to MASTER MADI IN connection.*

General Notes:

IMPORTANT: Where possible systems should be locked by word clock for improved system performance and to prevent against potential dropout or spurious noise. Soundcraft do not condone operating any digital audio systems without suitable locking systems being implemented.

There are many MADI recorders and interfaces on the market that allow the MADI stream to be re-distributed or converted into other formats such as an ADAT or analogue that add additional functionality or flexibility to examples outlined above.

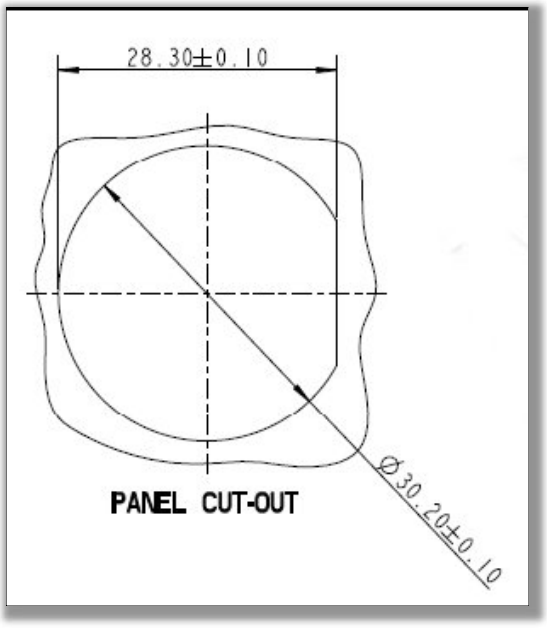


The type of connector used by the Si and Vi optical MADI cards is the 'SC' type as shown. The transceivers and fibre cable (unless otherwise specified) are the 'Multi Mode' type; offering typical distance between nodes of up to 1500m using a single run of multimode 50/125 optical fibre, 600m using 3 X 200m reels of multimode 50/125 optical fibre joined in series.

The most common type of connector & cable are the 'Duplex' type where the fibres are bonded together in a 'figure of 8' shape with the connectors clipped together as a pair.

Some Soundcraft Vi systems employ a 'ruggedised' connector from Fibreco known as the 'Senior' http://www.fibreco.co.uk/products.php?id=0

To enable mating between this form factor and the 'SC' type, a chassis mount RZ2705-01 connector (which includes a captive 1M 'tail' terminated with a pair of SC connectors) is required;



A cut-out diagram for the RZ2705-01 connector assembly is shown in the following page.