DQ & MQ-Rack User Guide

Issue A - August 2021

DiGiCo UK Ltd

EC DECLARATION OF CONFORMITY

This is to certify that the:

DIGICO MQ and DQ RACK

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EN55032 2015 Emission standard
EN55103-2 2009 Immunity standard
EN62368-1 2014 Safety requirements

Signed: *John Stadius* Position: Technical Director

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Contents

1.1 Introduction

1.1.1 Q-Rack Unit and Modules, Installation Notes .....

The Q-Rack Unit is a 19-inch chassis with a control panel and PSUs at the top. It is a standard 19" rack mount wide - Dimensions: 482.7mm (w) x 253mm (d) x 265.9mm (h). Weight: 11kg

Rack Mains Earthing

The Q-Rack Unit must be earthed to the mains earth according to the safety instructions included with the rack. The rack has twin supplies each with their own separate mains power connections, with 2 IEC mains inputs per rack, which must be separately connected to the mains earth.

Rack Control Panel Connections

MADI I/O BNC 4 sockets (2 Pairs) of I/O to Console

USB type B

Mains Power IEC power x 2 Dual redundant supplies

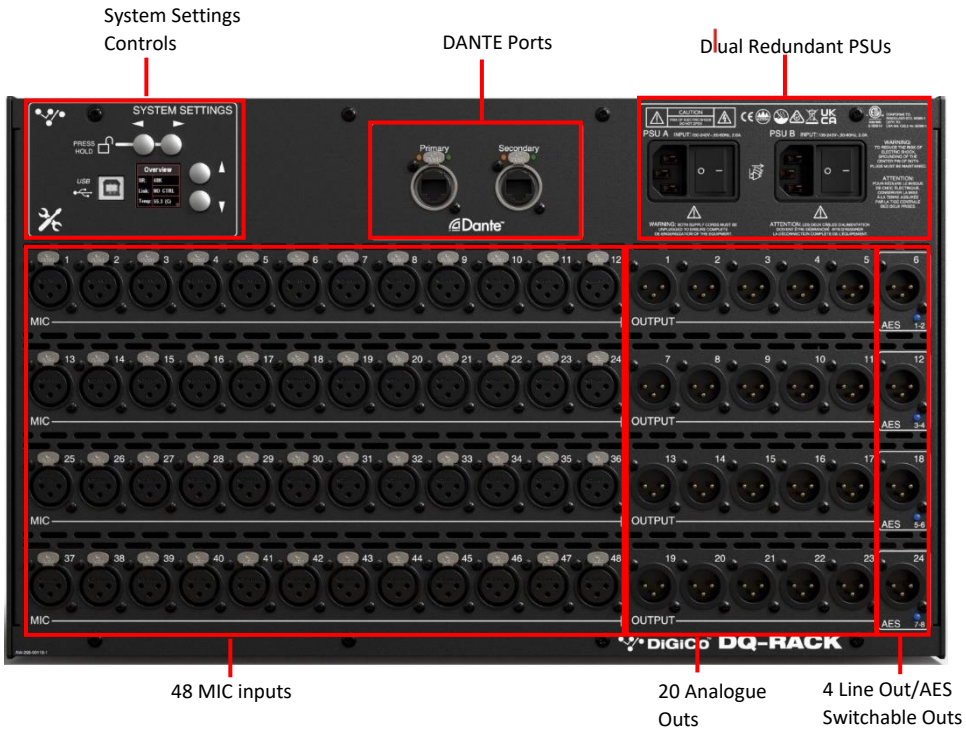
Power Requirements: 100-240V~, 50-60Hz, 2.0A

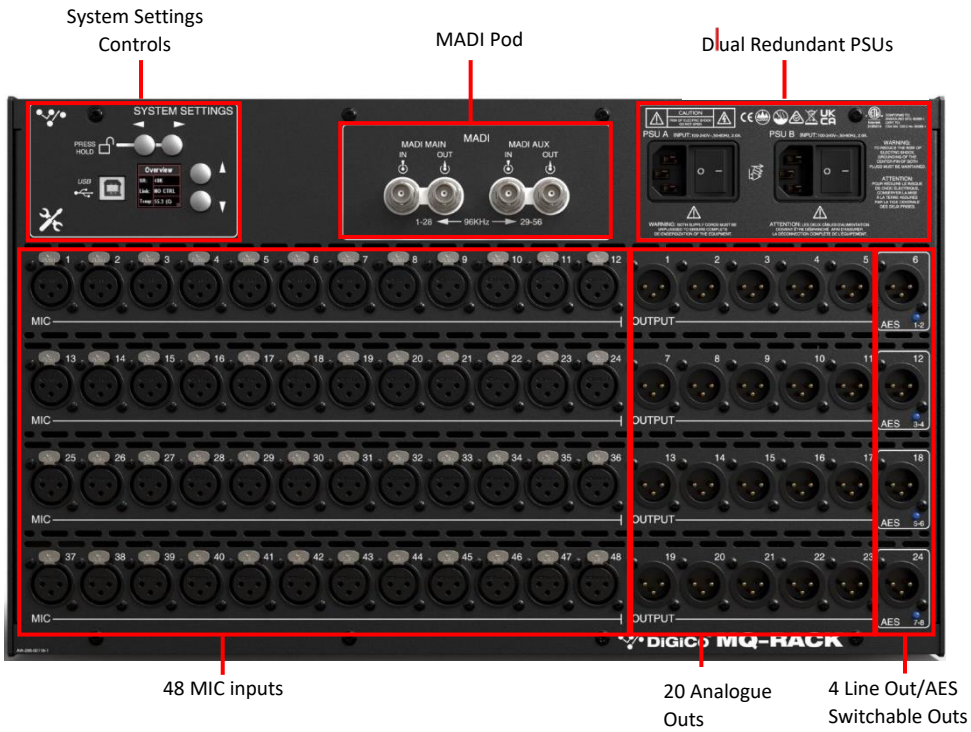
Requires 2 separate mains connections.

Input / Output Slots

Below the panel, the Rack Unit has Input and Output slots consisting of 48 Analogue Mic/Line Inputs and 24 Analogue outputs (4 of these are switchable to AES Mode).

NOTE: DQ & MQ-Racks are only compatible with SD and Quantum consoles running V1454+ of application software





1.2 Q-Rack Power

The Q-Rack has dual redundant power supplies. The rack should be operated with both power supplies on whenever possible.

1.3 Q-Rack Clocking

The Q-Rack will receive clock sync from the connected console in normal operation. It can run at 48KHz or 96KHz when clocked by the console.

The MQ-Rack can also receive sync from its own internal clock- see section 1.5.13 Internal SR Menu.

1.4 Q-Rack Sockets

The Q-Racks have a set of 48 mic inputs and 24 line outputs, 4 of which can be changed to AES or line out via the system settings on the rack.

Note: On Quantum consoles, the status of the 4 switchable Line Out/AES sockets can be viewed and changed between AES and Line outputs in the Audio I/O panel.

1.4.1 Analogue Line/AES Output sockets .....

The 4 switchable output sockets (6, 12, 18 and 24) have a LED indicator light below the socket.

A blue light on one of the switchable AES/Line output sockets indicates that the socket is set to be an AES output in its current state.

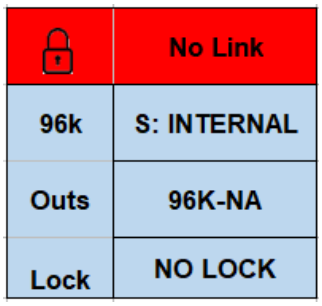
1.5 Using the Q-Rack Menu System

The LCD Menu System on the rack is normally in a locked state and cannot be accessed.

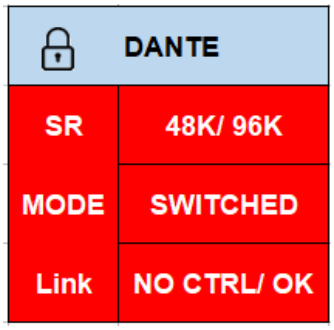
The main display will be visible and if the rack is not connected to a console the background colour will be light blue with a band of red on the MQ-Rack and flashing red on the DQ-Rack.

If the rack is connected to a console the display will flash green.

MQ-Rack Lock screen



DQ-Rack Lock screen



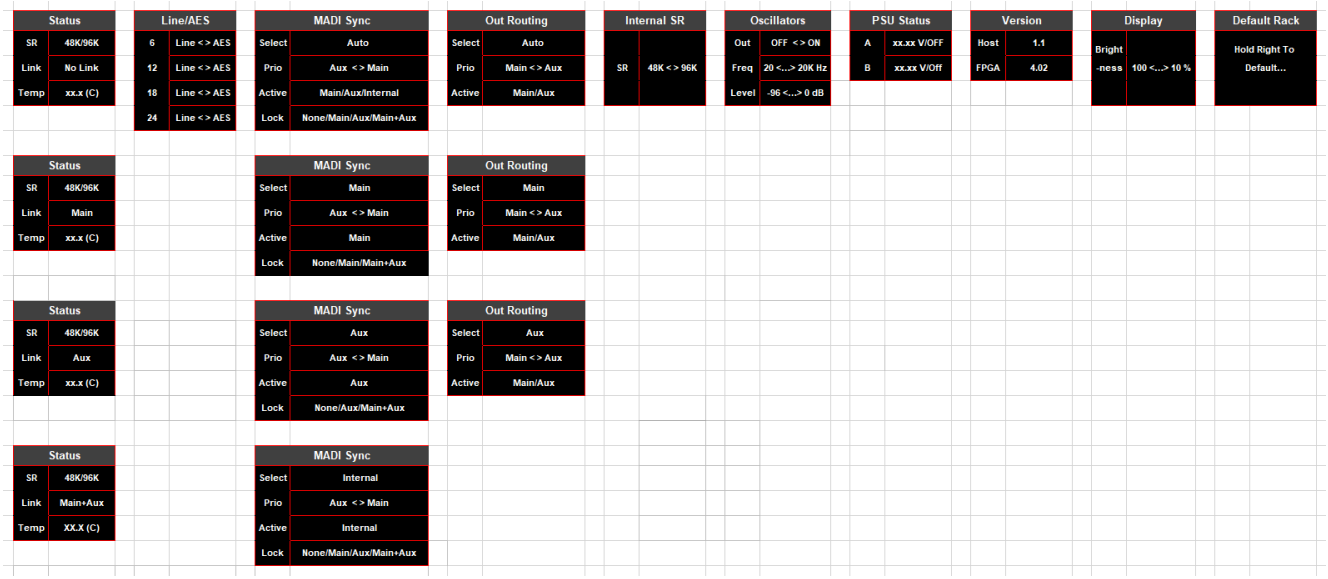
Pressing and holding the 2 buttons marked with left and right arrows for 2 seconds unlocks the Menu System.

The Left/Right buttons scroll through the pages in the Menu System and the Up/Down buttons are used to select each item within pages that have multiple items. When an item's value can be changed the Left/Right arrows are used for this.

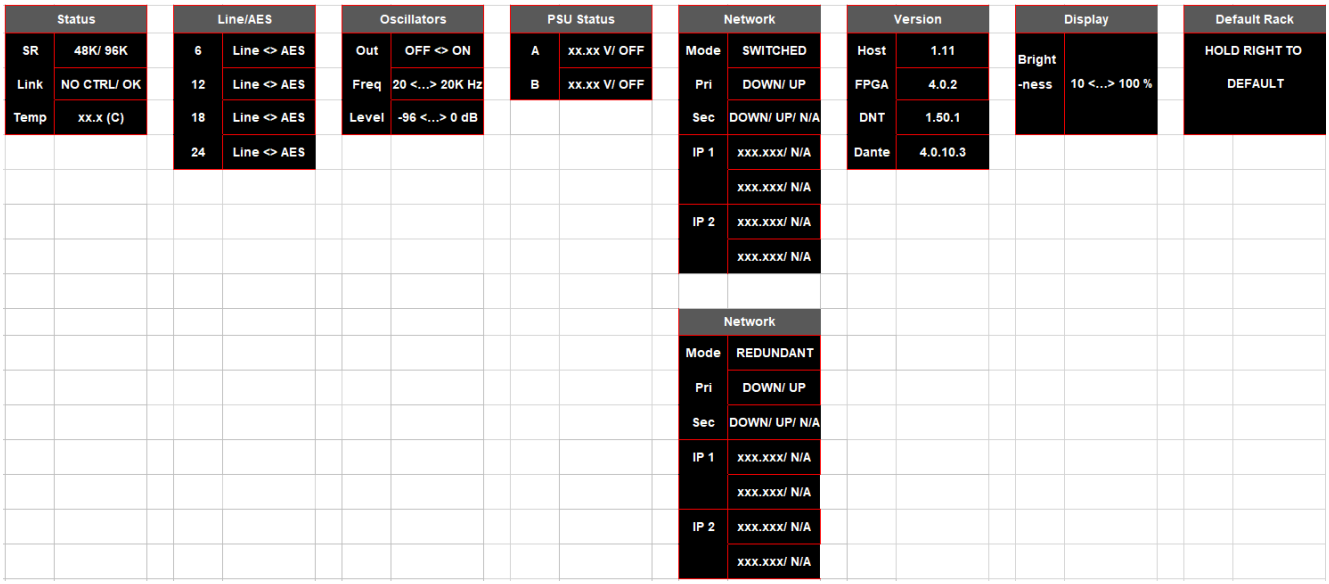
If the rack is left in an idle state for 2 minutes, it will relock itself.

Please refer to the following diagram for menu navigation details.

1.5.1 MQ-Rack navigation



1.5.2 DQ-Rack navigation



Note: The Q-Rack navigation maps display DQ-Rack and MQ-Rack menu pages in order from left to right. Wherever a "/" (or alternatively a menu page has been created underneath another menu page) has been used, the messages listed can be displayed depending on the rack's connections. These cannot be changed by the user in the rack menu. Where a "<" or ">" has been used this means the displayed parameter values can be changed by the user in rack system settings using the left and right arrows, the use of "<...>" means there is a selection of values to choose from in between the displayed parameter values.

1.5.3 Main Display.....

The main display is always visible when the Menu System is in a locked state.

On the MQ-Rack it indicates:

Link: whether the rack and the console are linked.

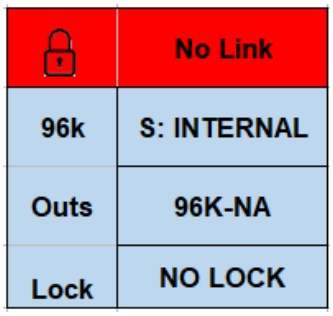
96k/48k: the current sample rate of the rack.

S: the clock source to which the rack is syncing.

Outs: which MADI input has control/access to the output sockets.

Lock: this reports whether the incoming MADI clock is stable (**LOCK**) or not (**NO LOCK**).

MQ-Rack Main Display



On the DQ-Rack it indicates:

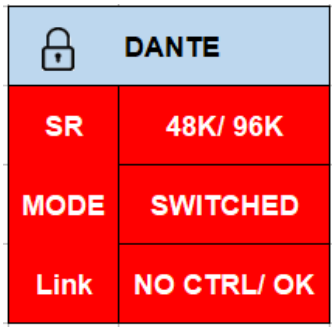
SR: sample rate at which the rack is running at.

Mode: whether the rack is in switched or redundant connection mode.

Link: this shows if the rack is receiving control information from the connected device. When receiving control data, the rack will display **OK** and when not receiving control data it will display **NO CTRL**.

Note: On a DQ-Rack, the DANTE device name (which can be set in DANTE Controller) is displayed at the top of the system setting LCD screen when in a locked state.

DQ-Rack Main Display



1.5.4 Status Menu.....

The **Status** menu is the first menu visible once the rack is unlocked. No adjustments are possible from this menu.

On the MQ-Rack the status menu page displays the sample rate the rack is working at, whether it has a link via the **MADI MAIN**, **MADI AUX** or both and the current temperature of the rack.

MQ-Rack Status Menu

Status	
SR	48K/96K
Link	No Link
Temp	xx.x (C)

On the DQ-Rack the status menu shows the working sample rate, whether the rack is receiving control information and the current internal temperature of the rack.

DQ- Rack Status Menu

Status	
SR	48K/ 96K
Link	NO CTRL/ OK
Temp	xx.x (C)

1.5.5 Line/AES Menu .....

In the **Line/AES** menu page, the user can change the state of the 4 switchable Line/AES outputs, by selecting the desired socket and changing it between **Line** and **AES** using the left and right buttons. When the socket is in **AES** mode the LED light below the socket will light up blue.

Note: On Quantum consoles, this setting's status can be displayed and switched from within the Audio I/O panel on the console.

Line/AES	
6	Line < > AES
12	Line < > AES
18	Line < > AES
24	Line < > AES

1.5.6 Oscillators Menu.....

In the **Oscillators** menu, the user can apply the rack's internal oscillator signal all output sockets. To enable the oscillator, select the out option, hold the right button down and a bar next to the word **OFF** will begin to fill, when the bar fills, the word will change to **ON** and signal will be applied to all 24 outputs.

From within the **Oscillators** menu one of 8 frequencies can be selected between **20Hz** and **20KHz**, on default settings the frequency is set to **1KHz**.

The level of the oscillator can also be changed to be a range of volumes between a value of **-96dB** and **0dB**, at default setting the level is **-96dB**.

Oscillators	
Out	OFF <> ON
Freq	20 <...> 20K Hz
Level	-96 <...> 0 dB

1.5.7 PSU Status Menu .....

The **PSU Status** menu page shows readings for all rack PSU voltages. No adjustments are possible from this menu.

PSU Status	
A	xx.xx V/OFF
B	xx.xx V/Off

1.5.8 Version Menu .....

The **Version** menu page shows the software versions of the **Host** and **FPGA** currently installed in the rack.

No adjustments are possible from this menu.

MQ-Rack version menu

Version	
Host	1.1
FPGA	4.02

On the DQ-Rack there are additional versions displayed, for the **DNT** and **Dante** software versions.

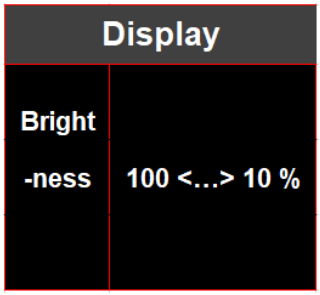
DQ-Rack version menu

Version	
Host	1.11
FPGA	4.0.2
DNT	1.50.1
Dante	4.0.10.3

1.5.9 Display Menu .....

The brightness of the LCD system settings screen can be adjusted from within the rack in the **display** menu.

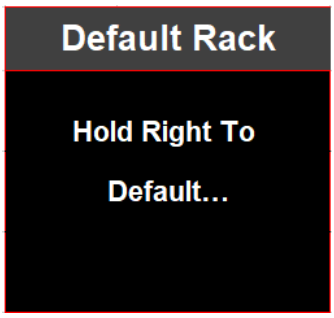
The default value is set to 100% brightness and can be adjusted using the left and right buttons in increments of 10%, down to a minimum of 10% brightness.



1.5.10 Default Rack Menu .....

This page allows the user to set all rack parameters to their default values.

When the display shows **Hold Right To Default…** as highlighted, hold the Right arrow button to confirm and a bar will begin to fill underneath the text, when the bar fills the rack will reset and the system setting will lock again.



1.5.11 MADI Sync Menu (MQ-Rack only) .....

This page allows selection of the MQ-Rack sync source.

When selecting a sync source:

Auto will automatically sync to any connection with a clock signal. If the rack is not receiving a connection with a valid clock signal it will use its internal sync. **MADI MAIN** and **MADI AUX** sockets can be given priority so that if a clock signal comes into the rack it will sync to the port with priority.

Selecting the **Main** or **Aux** setting in the **Select** parameter forces the active sync source to be the selected connection and is not affected by the priority option.

The **Active** parameter shows which socket the rack is currently syncing to.

The **Lock** parameter displays from which sources a stable clocking source is received.

MADI Sync	
Select	Auto
Prio	Aux < > Main
Active	Main/Aux/Internal
Lock	None/Main/Aux/Main+Aux

1.5.12 Out Routing Menu (MQ-Rack only) .....

The **Out Routing** menu is for selecting which MADI inputs from a console can output via the MQ-Rack's 24 physical outputs.

Out Routing	
Select	Auto
Prio	Main < > Aux
Active	Main/Aux

1.5.13 Internal SR Menu (MQ-Rack only) .....

The **Internal SR** menu allows selection of the rack's sample rate.

This is only possible to sync from the internal clock if the **MADI Sync Active** is internal.

Available options are **48K** and **96K**

Internal SR	
SR	48K < > 96K

1.5.14 Network Menu (DQ-Rack only) .....

The DQ-Rack has two ethernet ports (**Primary** and **Secondary**) which can be used to connect the rack to a DANTE network. The rack can either operate in **SWITCHED** or **REDUNDANT** mode which can be set in DANTE Controller. Primary and secondary port status are reported in the DQ-Rack **Network** menu as either **UP** meaning the port is connected with a valid IP address or **DOWN** meaning the port is not connected with a valid IP address. The IP address for each ethernet port is reported below primary and secondary port status.

Note: When first powering on a DQ-Rack, whilst the rack is initialising a "Reset" message will be displayed in network mode field.

Network	
Mode	SWITCHED
Pri	DOWN/ UP
Sec	DOWN/ UP/ N/A
IP 1	xxx.xxx/ N/A
	xxx.xxx/ N/A
IP 2	xxx.xxx/ N/A
	xxx.xxx/ N/A

Network	
Mode	REDUNDANT
Pri	DOWN/ UP
Sec	DOWN/ UP/ N/A
IP 1	xxx.xxx/ N/A
	xxx.xxx/ N/A
IP 2	xxx.xxx/ N/A
	xxx.xxx/ N/A

1.6 Connecting a DANTE rack

PLEASE NOTE that for the connection and use of the A168D & A164D Dante IO boxes and DQ Rack, there is a requirement for the following firmware updates to the Dante 64@96 DMI card:

1. DMI Dante 64@96 firmware update (v103) which is currently available (June 2021) as part of the Quantum 2 V1454 update package and all other DMI equipped SD/Quantum consoles running software application version v1280+.

2. A Dante firmware update (4.0.20) for the DMI Dante 64@96 card is required for control of the DQ-Rack, details on how to update the DMI firmware can be found in TN514 available on the website and is included in the Quantum 2 V1454 update package.

3. If A168D and A164D Dante IO Racks are used with SD/Quantum applications earlier than V1454 they should remain using Dante DMI firmware version 4.0.19 which can be updated using Dante Updater in Dante Controller.

Users who wish to use A164D and A168D with SD/Quantum applications V1454 or higher, need to upgrade the Digico firmware in these IO devices to V1.5. This is done using the new DiGiCo Dante Rack Utility and can be done over an IP Network. The update process is detailed in TN515.

Socket parameters on A168D, A164D and DQ-racks can be controlled in the same way as other DiGiCo I/O racks when connected to a Dante 64@96 DMI card and routed in Audinate's "Dante Controller" software.

With a DMI Dante 64@96 card installed in a console, access to 64 channels of IO to/from the Dante network is provided.

A Dante IO box can provide a specific number of IO on the Dante network according to the rack's capability.

168D = 16 analogue In and 8 analogue Out.

DQ-Rack = 48 analogue In and 24 analogue Out of which 4 are switchable AES Outs.

Any Dante network may have many more devices on it than just a single console and rack.

There might be multiple Dante equipped consoles, multiple racks and other Dante devices.

When a console has a DMI Dante fitted, it "sees" that DMI as a 64 channel interface device to/from the Dante network.

The source device of the audio signals it is receiving across that interface and the destination device of any signals that it is sending out across that interface are generally "unknown" to the console.

The critical component in determining where the audio is going to/from is the Dante network controller which is responsible for setting up audio paths (routing) on the network.

As an example, using just a single console and a single rack, the console could use its DMI Dante channel 1 as an input signal to its own console Input Channel 1 but the audio signal which appeared on that DMI Dante channel could be any signal from the Dante IO rack and is determined by the routing in the Dante Controller.

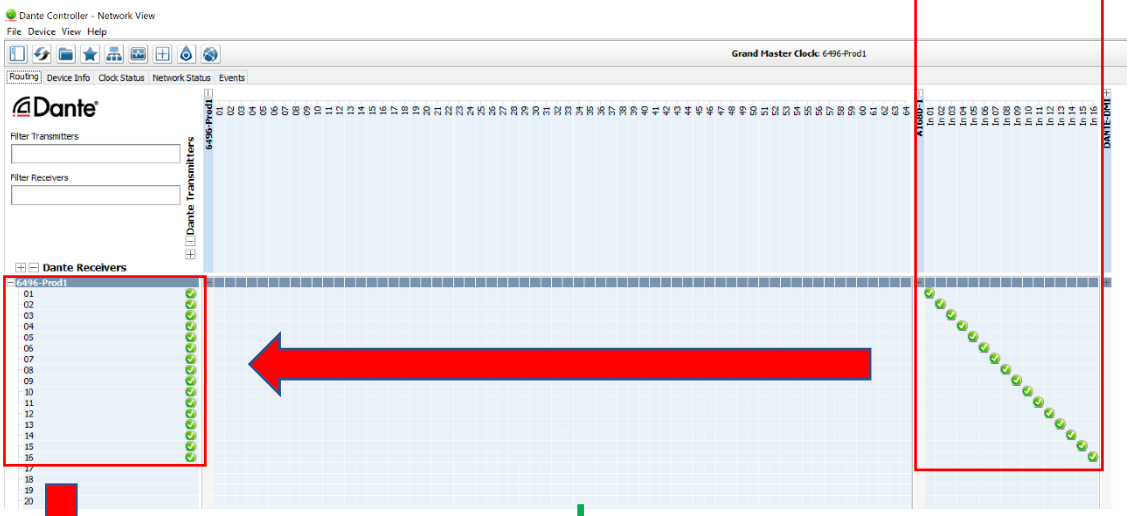
With the following routing in place, a console that selects any of the DMI card channels 1-16 as an input source will receive the signal from the same numbered Rack Input socket – this is a logical setup.

Dante Rack Inputs

DANTE Rack is a Transmitter in this case.

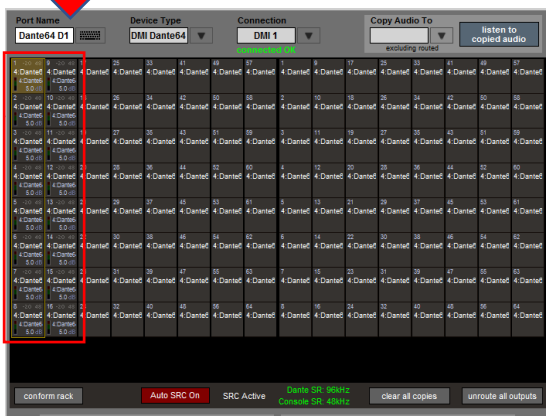
Each of the 16 Rack input sockets are routed to the same numbered DMI 64@96 channel

Dante Controller & Routing



Network Switch

Console 1



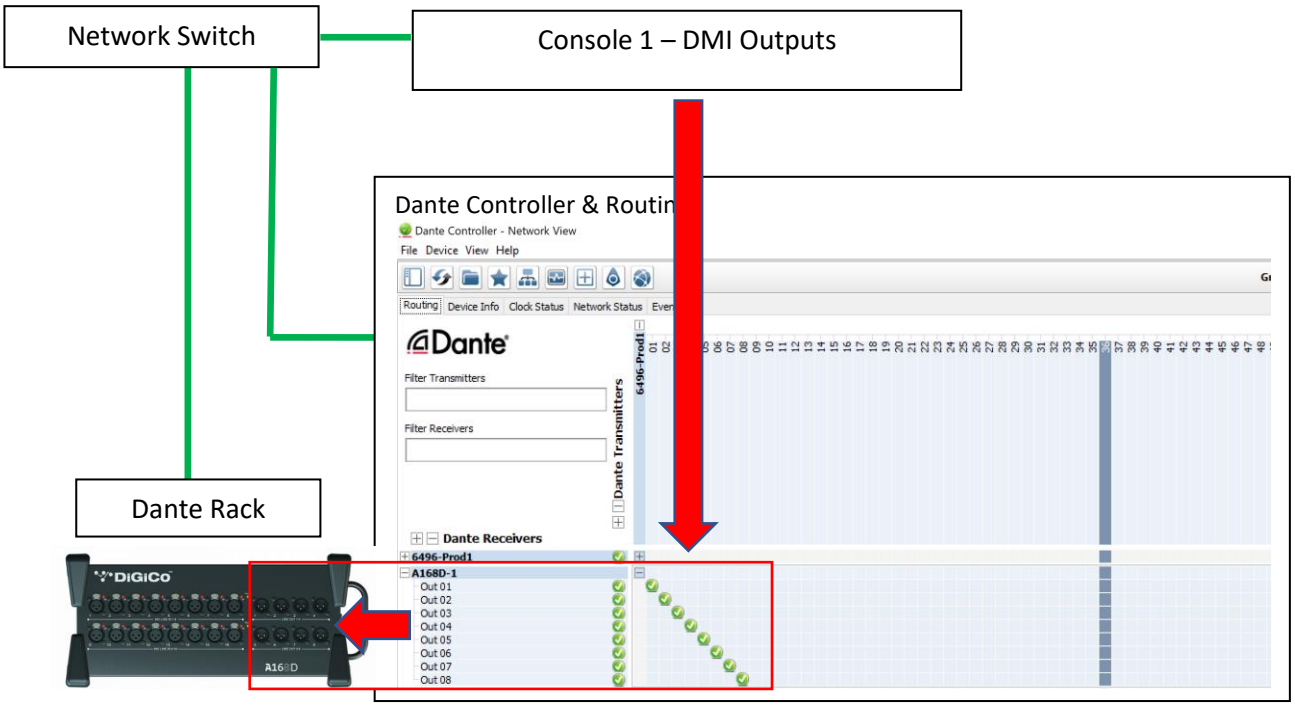
DMI 64@96 is a Receiver in this case.

Each channel receives the same numbered input socket from the rack.

In this example, a console that routes signal to DMI card output channels 1-8 will be sending them to the same numbered Rack Output socket.

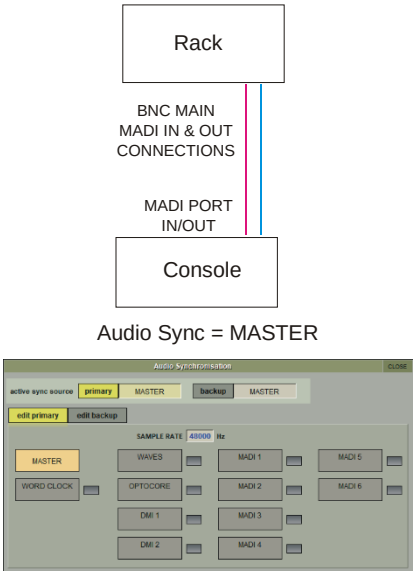
Console 1 DMI is a Transmitter in this case.

Each of the DMI 64@96 outputs 1-8 are routed to same numbered Rack output sockets



1.7 Rack Connections with MADI

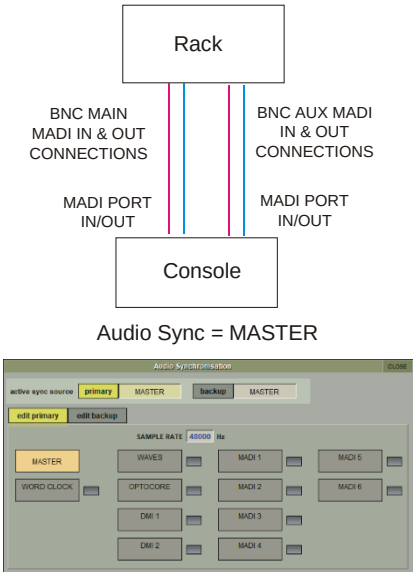
1.7.1 Single Console to Rack with MADI at 48KHz



Connect Console MADI BNC IN socket to Rack BNC OUT MAIN socket.

Connect Console MADI BNC OUT socket to Rack BNC IN MAIN socket.

1.7.2 Single Console to Rack with MADI at 96KHz



Connect Console MADI BNC IN socket to Rack BNC OUT MAIN socket.

Connect Console MADI BNC OUT socket to Rack BNC IN MAIN socket.

Connect Console MADI BNC IN socket to Rack BNC OUT AUX socket.

Connect Console MADI BNC OUT socket to Rack BNC IN AUX socket.

1.7.3 Sharing Racks with MADI

If the system is running at a sample rate of 48KHz a D2-Rack, SD-Rack, SD-MINIRack or MQ Rack can be shared between 2 consoles (Two QUANTUM 2s or a QUANTUM 2 and another Quantum or SD-Series console) with the connection system shown below.

In this setup:

1) All inputs can be shared by the two consoles but only one console controls the rack analogue gains (the "Master" console)

2) The console which is not controlling the gains (the "Slave" console) can automatically adjust its digital trims to compensate for the gain changes using a system known as "Gain Tracking" (see below)

3) Only the "Master" console can use the outputs of the shared rack

The recommended connection between the Monitor (Slave) console and Stage Rack is a single MADI OUT from the Shared Rack's AUX MADI connected to the console's MADI A IN

The FOH (Master console) is connected via MADI A IN and OUT to the stage rack.

A similar method can be used if the Monitor console requires gain control and the FOH console will track the gain changes.

MADI OUT from the Shared Rack's AUX MADI connected to the FOH console's MADI A IN.

The Monitor (Master console) is connected via MADI A IN and OUT to the stage rack.

Note: The "Master" console should be set to provide "Master Sync" (Setup>Audio Sync menu - see diagram below) to the Shared rack

The "Slave" console should be set to receive its Audio Sync from the MADI slot that is connected to the Shared Rack.

1) The operators should agree on and set a level of analogue gain that provides enough headroom for the required application.

2) The second console should connect to the Shared rack in **Receive Only** mode (only MADI Input cable connected)

3) **Gain Tracking** (the **GT ON/OFF** button at the top of the Input channel setup view) can be switched on for the console that is in "**Receive Only"** mode for all the channels that are being shared.

4) When an analogue gain control is changed on the "Master" console, the "Slave" console's analogue gain should reflect the changes and the digital trim control should compensate for this change by moving by the same amount in the opposite direction.

IMPORTANT Note: If Gain Tracking is active on a channel, the digital trim control will still respond to the local gain adjustment by compensating locally for the displayed gain change.

If the "Slave" console loads a session where the Analogue Gain and +48V settings do not match the current state of the racks, the Master console should then reload its session to update the state of these controls on the "Slave" console

FOH & MONITORS WITH SHARED RACK at 48KHz USING MADI