Orange Box and Orange Box Controller V1.7

User Guide

March 2017

Contents.

1   The Orange Box

1.0   Introduction

The Orange Box is a 2U Bi-Directional Multi-Channel audio format converter that utilises DiGiCo's range of DMI cards. The box has two DMI ports:- DMI 1 (MASTER) which is used to provide the Orange Box's sync source if no Work Clock is present and DMI 2 (SLAVE).

The Orange Box with Orange Box Controller V1.6 currently supports the following DMI Cards when running the firmware listed below:-

DMI ADC – 16 Ch Line input card 48k/96k	*Firmware V82*	*FPGA 08/12/2015*
DMI DAC – 16 Ch Line output card 48k/96k	*Firmware V82*	*FPGA 08/12/2015*
DMI AES – 16 AES IO card with SRC 48k/96k	*Firmware V82*	*FPGA 08/12/2015*
DMI Aviom – 16 Ch D16 Aviom Output Card 48k/96k	*Firmware V82*	*FPGA 08/12/2015*
DMI H2 – 56 IO Calrec Hydra 2 interface 48k only	*Firmware V222*	*FPGA 08/12/2015*
DMI DANTE – 64/32 Ch DANTE IO card 48k/96k	*Firmware V82*	*FPGA 02/03/2016*
DMI MADI B – 128/64 Ch MADI BNC IO Card 48k/96k	*Firmware V129*	*FPGA 16/01/2017*
DMI MADI C – 128/64 Ch MADI Cat5e IO Card 48k/96k	*Firmware V129*	*FPGA 16/01/2017*
DMI Optocore – 128/64Ch Optocore IO Card 48k/96k	Firmware V191	FPGA 10/01/2017
DMI Waves – 64Ch Waves SoundGrid IO Card 48k/96K	Firmware V82	FPGA 22/02/2016

1.1   Inserting a DMI Card

IMPORTANT:- The Orange Box should be powered Off when inserting or removing any DMI card.

Slide the DMI card into the locating guides on each side of the port as show below.

Slowly push the card in until it clicks into place.

Secure each card into the Orange Box using the four retaining screws.

1.2   DMI Card Pin outs and Hardware setup

DMI ADC, DAC and AES use 25 pin DSub connectors.   In addition, DMI MADI C has physical switches on it that determine its CAT5e wiring configuration.

This is all specified in TN 339 which is included within the Orange Box Controller installer package or is available separately from DiGiCo Support – support@digiconsoles.com

2 Orange Box Controller

2.1 Installing the Orange Box Controller

The Orange Box Controller Installer will install the current version on to your PC.

It is currently compatible with Windows XP, Windows 7, Windows 8 and Windows 10.

The installer contains the Orange Box Controller program as well as all current DMI card firmware.

The installer will create the folder C:\Orange Box Controller. All files required will be extracted to this location.

1. Run the program "DiGiCo_Orange Box Controller_VX.XX_Installer.exe". The welcome screen will appear.

2. Click "*Next*". This will take you to the Licence Agreement information.

3. Click on "*Install*". The program will now install Orange Box Controller on your PC. A short cut to the Orange Box Controller program will be placed on your desktop.

4. Once the installation process has completed, click "*Finish*".

2.2 Introduction and Connection

The Orange Box Controller (OBC) program, when run on Windows PC, allows configuration and firmware updates of the DMI cards contained within the Orange Box.

It is currently compatible with Windows XP, Windows 7, Windows 8 and Windows 10.

The OBC uses a standard FTDI USB to Serial Adaptor, the driver for which should automatically install on first connection. If Automatic installation does not occur, the drivers are available from http://www.ftdichip.com/FTDrivers.htm

As an example, the picture below shows Windows Device Manager with an Orange Box connected to the PC using a standard USB A-B cable. Each DMI port is controlled by a separate COM port. Here, the Orange Box has been assigned COM ports 60 & 61. The COM port assignment is managed by Windows and the assignment will differ on each PC.
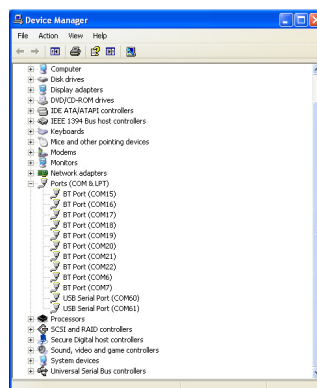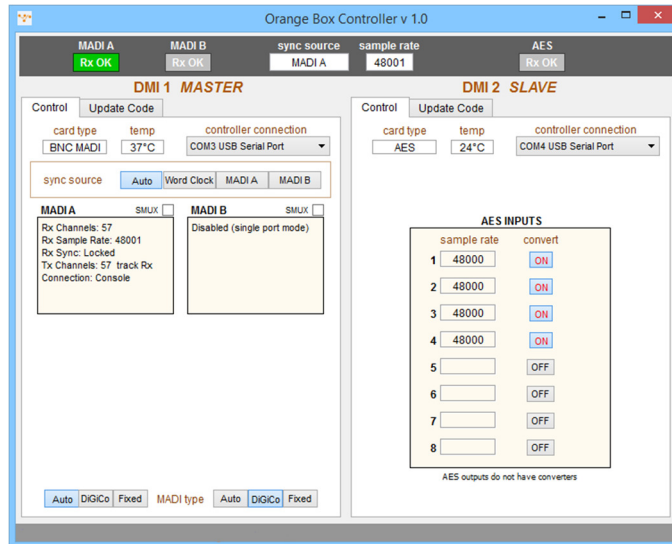
2.3 The OBC Interface

When connected to an Orange Box, the OBC main **Control** display shows the contents of the two DMI ports, Orange Box Sync Source information plus any data or controls specific to each DMI card.

The picture below shows the OBC main **Control** page. There is a DMI MADI B in DMI 1 MASTER port and DMI AES in DMI 2 SLAVE port.


The DMI cards will retain their settings after a power cycle.

Only DMI MADI B, DMI MADI C, DMI AES, DMI Optocore and DMI H2 have variable settings. This will be covered later in this document.

2.4 Sync Source Setup

The Orange Box Clock is controlled by the DMI card in the MASTER (DMI 1) port. Any DMI card in the MASTER slot will show its clocking options in its **Sync Source** panel as shown below.
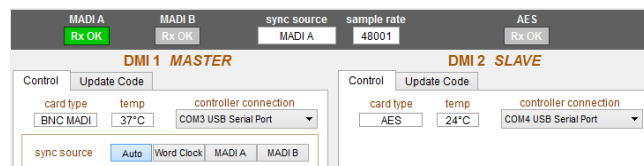
When set to **AUTO**, the sync priority for that card will be as shown. In the case of the MADI card shown above, clock priority is **Word Clock>MADI A>MADI B**. Each DMI card shows its available Sync Source options. The Sync source in use is displayed in the top status bar along with the sample rate.

If the Sync Source is not set to **AUTO** and a specific Sync Source has been selected and that source becomes unavailable or the DMI card cannot lock to the incoming Sync (RX SYNC), the DMI card will revert to its internal clock.

The DMI card in the SLAVE (DMI 2) port will always be clocked to the MASTER (DMI 1) port.

2.5   Upgrading DMI card Firmware

When OBC is started, it will check the DMI Firmware Codes are up to date with the codes contained within the Orange Box Controller Folder. If either DMI card requires a change in firmware the ***Update Code*** tab will automatically be selected.

In ***Update Code***, both the code the DMI card is currently running and the available code is displayed.

The picture below shows the ***Update Code*** sections for both DMI ports. Both cards are running up to date codes.
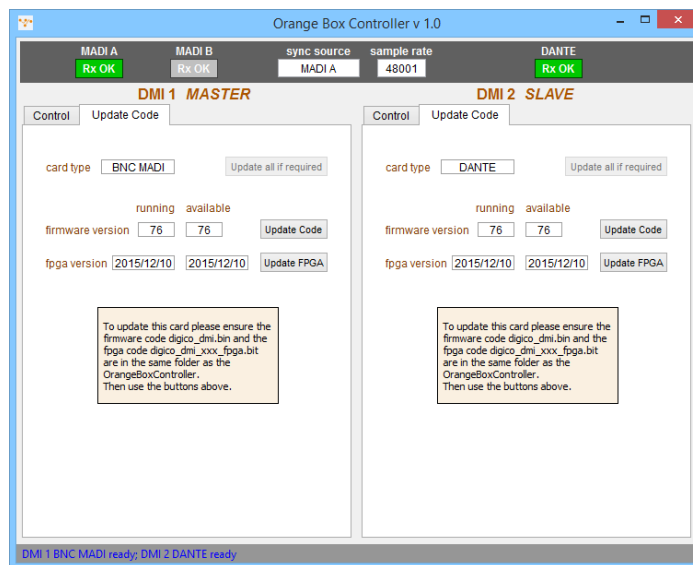
IMPORTANT:- Remove ALL Audio connections from the DMI cards before beginning the update process.

Clicking "***Update all if required***" will update both the Firmware and FPGA codes. Alternatively, each code can be individually updated using the "***Update Code***" or "***Update FPGA***" buttons.

The update process can be run simultaneously on both DMI cards if required.

Please note:- Some of this firmware is not the same as the DMI firmware included in the S21 V1.01, V1.1, V1.2 or V1.3 releases.

DMI cards running S21 V1.01 or V1.1 Firmware WILL NOT work correctly in an Orange Box.

3   DMI Card Settings

In addition to *Sync Source* Selection, DMI AES, DMI H2, DMI MADI B, DMI MADI C and DMI Optocore have variable settings which are adjusted using the OBC.

These settings are stored on the card until either the Firmware is changed or the DMI card is used in a DiGiCo S21 Console.

This section will detail the possible settings for each card.

Please note:-
*DMI Dante card will need Dante Network configuration in addition to its **Sync Source** settings. All DANTE devices should be configured using Dante Controller which is available from:-*
https://www.audinate.com/products/software/dante-controller

*DMI Waves Card will need Soundgrid Network configuration in addition to its **Sync Source** settings. This is done using either Waves MultiRack or SoundGrid Studio, both of which are available from:-*
http://www.waves.com/downloads

3.1   DMI AES

The DMI AES card has SRC controls on each pair of inputs. The default setting for the SRCs is ON.
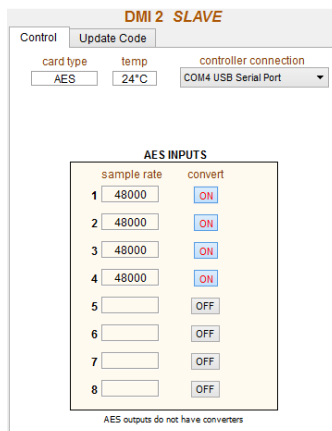
OBC will also display the incoming sample rate of each AES stream.

The AES outputs do not have SRCs and will therefore be at system sample rate.

3.2 DMI H2 (Hydra 2)

The DMI H2 card requires an ID to be set before joining a Hydra 2 network. The Hydra Network must be running V3.2 or above software.

Please note the DMI Hydra card will only work when in the Slave Slot of the Orange Box
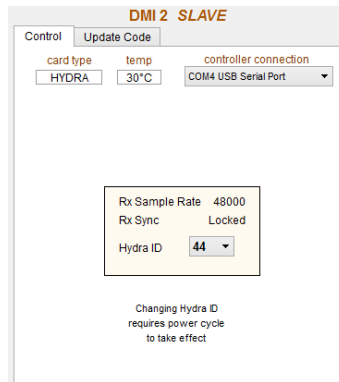
3.3 DMI MADI C Hardware Switch.

DMI MADI C has a physical hardware switch which sets whether the card is acting as a "console" or "rack". The switch is located on the main pcb to the rear of the RJ45 connectors as shown below.
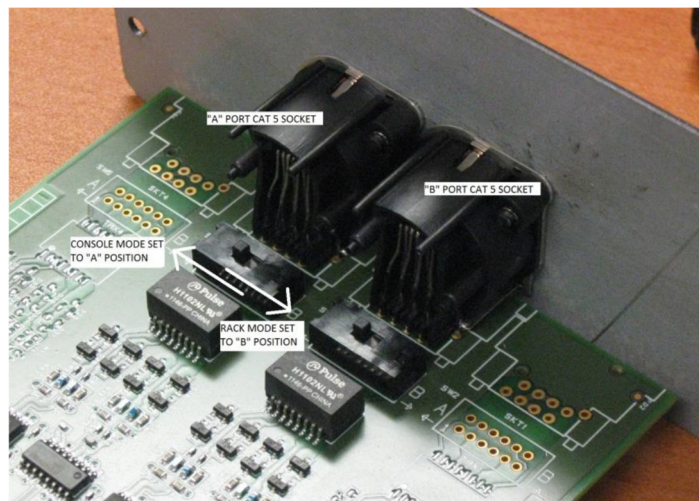
Further detail on this is included in TN339 which is included with the OBC installer package.

3.4.1 DMI MADI B and DMI MADI C.

At the bottom of the OBC MADI DMI display is a **MADI type** connection. There are three options for each connection.

Auto – When **Auto** is selected, the DMI card will set its transmit channel count and sample rate to match that of the received MA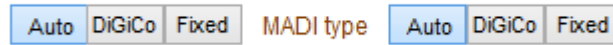DI stream. When connected to an SD Series console, it will also detect and respond to DiGiCo CH57 Control Data where applicable and report the Orange Box as an IO Device.

The picture below shows an SD series Audio IO Page. The Console is connected to an Orange Box with MADI with a DMI MADI in the MASTER port and a DMI AES in the SLAVE port. The DMI MADI type is set to **Auto**.

Conforming all ports in Audio IO detects the Orange Box as an IO Device type. The DMI AES in the slave slot is also detected and the card slots are populated to allow for routing within the console.
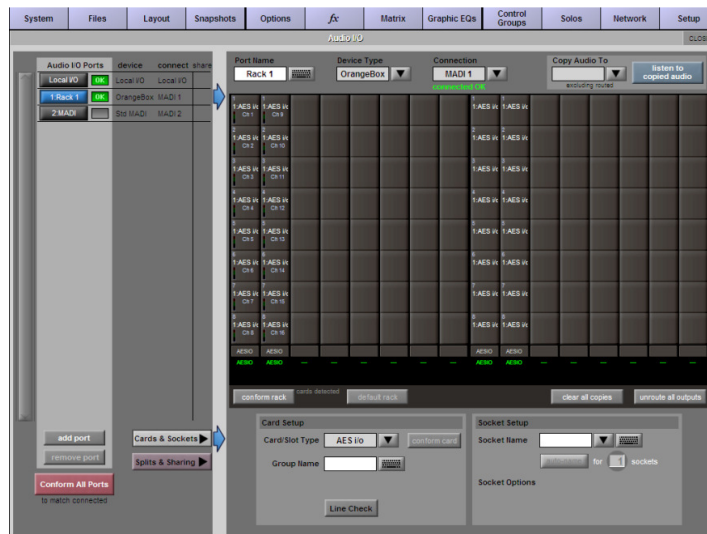
If the SLAVE was a DANTE DMI, Audio IO would report 64 DANTE IO.

DiGiCo – When **DiGiCo** is selected, the DMI MADI card no longer responds to DiGiCo Ch57 control Data being received from an SD series console but acts as a pass through device.

An additional function of the DMI MADI card is to allow the transparent transportation of DiGiCo CH57 Control Data, either as a MADI extender or across and 3 Party Digital Network. This allows an SD Series rack to be detected and controlled without a direct connection.

Here is an example.

SD Console>MADI>Orange Box MADI/DANTE>DANTE Network>Orange Box DANTE/MADI>SD Rack.

- The SD console is connected using BNCs to an Orange Box configured as MADI/DANTE.
- A second Orange Box configured as DANTE/MADI is connected to an SD Rack with BNC.
- Using OBC, in both Orange Boxes set DMI MADI Type to **DiGiCo.**
- Using DANTE Controller, create a 57CH Bi Directional connection between the two DMI DANTE cards.
- When Conform all ports is pressed in Audio IO, the console will report the SD rack as a device type and the console will have full control over all socket parameters eg, gain, +48v, pad.

In the above set up, both Orange Boxes transparently pass the DiGiCo control data across the DANTE Network allowing the console to directly communicate with the SD Rack.

Fixed – When **Fixed** is selected, the MADI channel RX/TX count is fixed to 64 Channels and the DMI card will not respond to DiGiCo Ch57 Control Data.

3.4.2   MADI Connection details.

Directly below the *Sync Source* selection are two boxes labelled **MADI A** and **MADI B**, one for each connection to the DMI card. The following information is displayed in each box:-

RX Channels – Number of MADI channels being received.

RX Sample Rate – Sample rate of the connected MADI input.

RX Sync – When locked is displayed, the incoming, outgoing MADI and DMI MADI Cards are synchronised.

TX Channels – Number of channels in the outgoing MADI Stream.

Connection – Displays either Generic, Console (connected to a DiGiCo Console). Rack (connected to an SD Rack) or DiGiCo (control pass through mode).

*Rack type/Rack code – When connected to an SD series rack and the MADI type is set to **Auto**, the rack type and Sharc firmware dates will be displayed.*

In addition to the Rack type and Code dates, the contents of each card slot will be displayed as will rack power supply diagnostic data.

The picture below shows a DMI MADI B in the "SLAVE" slot of an Orange Box connected to an SD Rack at 48 kHz.

DMI 2 SLAVE

Control | Update Code

card type | temp | controller connection
BNC MADI | 31°C | COM4 USB Serial Port

MADI A SMUX ☐

Rx Channels: 57
Rx Sample Rate: 48001
Rx Sync: Locked
Tx Channels: 57 track Rx
Connection: Rack
Rack type: SD-rack
Rack code: 20/5/2013

MADI B SMUX ☐

Disabled (single port mode)

rack slots

1	ADC	8	DAC
2	ADC	9	DAC
3	ADC	10	DAC
4	ADC	11	DAC
5	ADC	12	DAC
6	ADC	13	DAC
7	ADC	14	

rack slots

1	ADC	8	DAC
2	ADC	9	DAC
3	ADC	10	DAC
4	ADC	11	DAC
5	ADC	12	DAC
6	ADC	13	DAC
7	ADC	14	

PSU	+5v	+7v	+15v	-15v
A				
B	5.6	6.6	14.9	14.8

PSU	+5v	+7v	+15v	-15v
A				
B	5.6	6.6	14.9	14.8

Auto DiGiCo Fixed MADI type Auto DiGiCo Fixed

3.4.3   96 kHz MADI

There are 2 MADI standards when running at 96 kHz, SMUX (48k frame) and High Speed (true or 96k frame). For a detailed explanation on the differences between the two standards, please consult DiGiCo Technical Note TN294.

The DMI MADI card auto detects sample rate changes between 48 kHz and 96 kHz. SMUX MADI uses a native 48 kHz clock which the DMI detects and reports. This 48 kHz SMUX clock cannot be differentiated from a standard 48 kHz without intervention.

If the DMI card is connected to an SD Series console and its MADI type is set to **AUTO**, the DiGiCo CH57 Control Data will instruct the DMI card to set itself to SMUX mode therefore providing the Slave DMI card with a 96 kHz clock.

In any other **MADI type** mode, the SMUX mode needs to be manually set. This is done by clicking the SMUX box located above each MADI details box.

In the following picture, the incoming sample rate in the MADI details box is being correctly reported as 48 kHz. By activating SMUX mode, the Orange Box sample rate is set to 96 kHz. Consequently, the DMI Card in the slave slot is being provided a 96 kHz sync source and audio will appear on the correct channels.
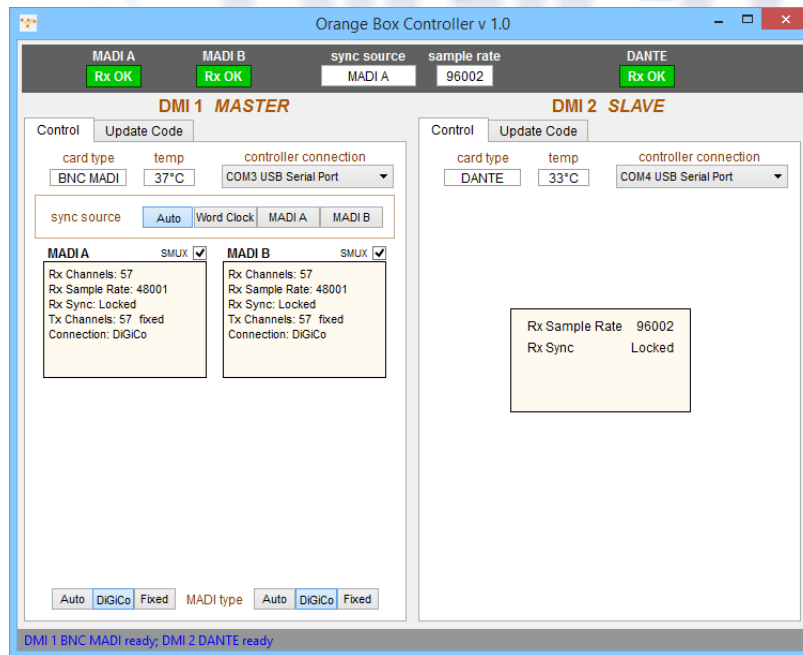
An Orange Box containing two DMI MADI cards can be used to convert 96 kHz MADI between the SMUX and High Speed Formats.

3.5   DMI Optocore

This card enables an Orange Box to be added to an existing Digico Optocore Network. The card runs V221 Optocore firmware and so can only be integrated into systems using SD Racks.

The Optocore card will need its ID, Fibre speed and channel count set using OBC before it is added to a network.

The picture below shows a DMI Optocore card in the master slot of the Orange box. In the audio IO page of an SD Console, this would appear as an Orange Box, Optocore ID 14 with 48 inputs and 32 outputs.
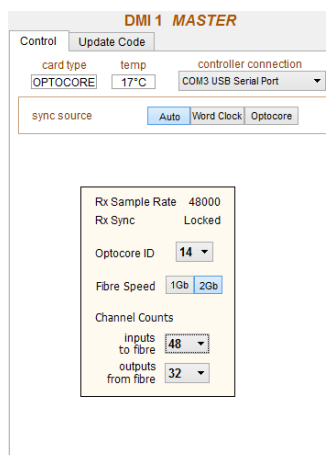
3.5.1 Channel Count set up

When a DMI card is paired with a DMI Optocore card in an Orange Box, the OBC control panel will provide controls to set the required input and output channels to the Optocore system in groups of 8 channels. The Sample rate of the system will dictate the number of available channels.

DMI Optocore has extra configuration options when used with DMI MADI. At 48kHz, up to 128 inputs and outputs can be used using MADI A (64Ch) and MADI B (64Ch). At 96kHz, up 64 channels can be used but this can be configured as one 64 channel port or two independent 32 channel ports. This configuration will determine how the Orange Box is displayed in the SD consoles audio IO.

The picture below shows DMI Optocore panel at 96kHz configuring its MADI channel count. It is set as 2 x 32ch MADI connections with MADI A as 32in 32out and MADI B as 16in 16out.
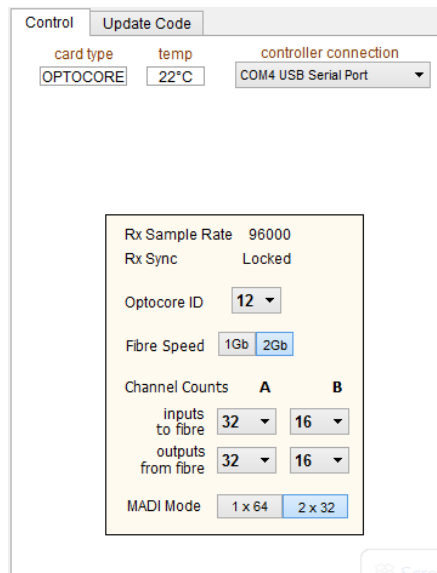
If the MADI mode was set to 1x64, then only one 64ch port would be displayed.

3.5.2 Optocore System clock

The location of the DMI Optocore card in the Orange Box will have a direct impact on the clock set up of the Optocore network.

When located in the Master slot, the card will get its clock from the Optocore Network.

When the card is in located in the Master slot and a Word clock is applied to the Orange Box then the DMI Optocore will become the master clock for the Optocore Network.

When the card is located in the slave slot, it will automatically become the Optocore Network clock master and will get its reference clock from the DMI card located in the Master slot.