

DiGiGrid IOC

User Guide



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Waves Inc
2800 Merchants Drive, Knoxville, TN 37912 USA
1-865-909-9200
www.waves.com



Introduction

Perfect for the control room, the **DiGiGrid IOC** interface offers a wide range of connectivity options, including two mic/line inputs with broadcast-grade preamps, eight line inputs/outputs, sixteen AES/EBU inputs/outputs, one ADAT 8-channel I/O, and two independently adjustable headphone outputs. DiGiGrid IOC can be used as your primary audio interface, or as an additional I/O expansion to an existing SoundGrid system.

A SoundGrid I/O device is part of a SoundGrid network. SoundGrid is the Waves high-speed networking protocol for moving audio, clock, and other information between a host system and I/O devices—and between I/O devices themselves. A SoundGrid host configures the network, assigning servers and I/O devices to mix, process, or record, depending on the host. SoundGrid I/Os link to the SoundGrid network with standard Ethernet cable.

SoundGrid is scalable. Connect one I/O device to a DAW and you have a high-quality sound card. Add more I/Os and your system becomes more flexible and powerful. Depending on the host application, a SoundGrid host can assign up to sixteen I/O devices. Complete SoundGrid systems can be networked together to share devices.

Add a server to a SoundGrid system to offload plugin processing from the host CPU to a SoundGrid DSP server. This dramatically increases processing power and enables greater plugin counts—it also provides very low system latency.



Hardware and Connections

DiGiGrid IOC is a 1U rack-mounted device. Aside from headphone jacks, all connections are on the rear panel.

IOC FRONT PANEL



- 1 Input clipping Red = clipping (level can be set through the control panel)
- 2 Input signal present Green = signal present
- 3 48V phantom power Orange = ON
- 4 Network status indicator
 - Blue: device recognized by the SoundGrid network
 - Red (flashing): device not recognized by the SoundGrid network
 - Yellow: updating
 - White: unit malfunction (e.g., firmware did not load properly, unit did not boot properly)
 - Cycling through colors: This LED is used to identify the unit from the control panel
- 5 Power switch/indicator
- 6 Two ¼-inch TRS headphone jacks with individual volume control knobs (range 8–600 ohms; gain = OFF to +15 dB)



IOC REAR PANEL



1 Mains input: 90–240V AC 50/60 Hz

2 Built-in 1GB Ethernet switch, two ports

The two-port Ethernet switch can connect IOC directly to a host computer and one other device without an external Ethernet switch. For larger systems, a 1GB SoundGrid-approved Ethernet switch is necessary. It is not important which of the Ethernet ports is used to connect to the SoundGrid network.

3 Recovery/reset button

Analog Connections

4 2 mic/line inputs (combo XLR/TRS connectors)

5 8 line in (DB25 8-channel balanced connector)*

6 8 line out (DB25 8-channel balanced connector)*

Digital and Clock Connections

7 16 AES/EBU I/O (2x 25-pin DB25)*

8 1 ADAT I/O (8 channels @ 48 kHz)

9 Clock in and out (BNC connectors for external Word Clock)

* See the Connections diagram in the Technical Specifications section at the end of this user guide.



Getting Started

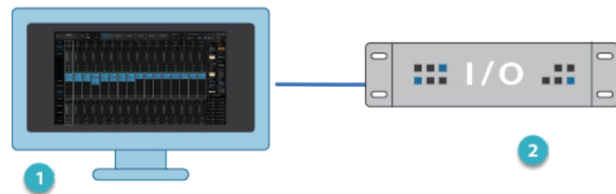
Configure SoundGrid and assign your devices as follows, however large or small your system.

- A** Connect the hardware
- B** Install the software
- C** Configure your system

A CONNECT THE HARDWARE

One I/O

In this example, one DiGiGrid IOC is connected directly to the SoundGrid host computer using a Cat 5e Ethernet cable or better. This provides plugin processing and/or DAW playback/recording via the SoundGrid ASIO/Core Audio driver.



- 1** Host computer with SoundGrid application
- 2** SoundGrid I/O device

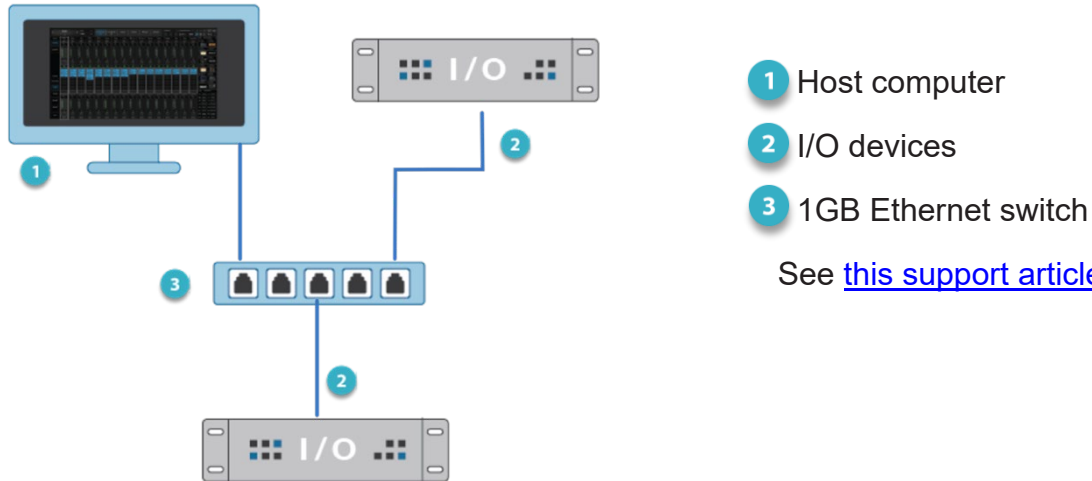
The host computer's LAN port that's connected to the SoundGrid network should be used for SoundGrid only. Do not share this port with the internet or other networks.

In this configuration, all plugin processing is carried out on the host computer. The speed and power of the host defines overall latency.



Add I/Os

Adding I/O devices not only increases the number of I/O channels, but lets you have separate devices for stage and FOH, or live room and control room. Use a "star" network configuration with a 1GB Ethernet switch to connect SoundGrid devices. Only use switches tested and approved by Waves.



See [this support article](#) for a list of supported switches.

You can connect and assign up to 16 SoundGrid I/O devices to the network, depending on the SoundGrid host application. All SoundGrid I/O devices, hosts, and servers are connected through the Ethernet switch. You can also add more computers to enable audio streaming among hosts.

ADD A SERVER

To add a server to your SoundGrid system, just connect it to the Ethernet switch and configure it in your host application. This moves all DSP processing from the host computer to the server, which provides a higher plugin count and enables the eMotion LV1 and eMotion ST mixers. Visit the [waves.com hardware pages](https://www.waves.com/hardware/pages) to learn more about SoundGrid servers. Consult your SoundGrid host application's user guide to learn about using servers.

Consult your host application user guide to learn how to configure additional I/Os and servers.



B Download and Install Software

INSTALLING A NEW SOUNDGRID HOST SYSTEM

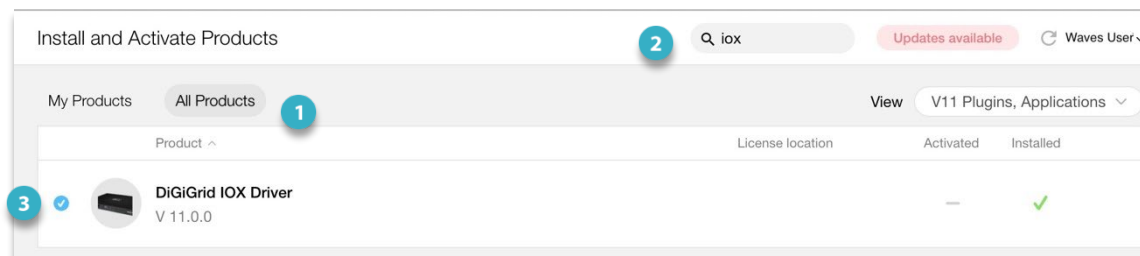
Installing the Waves SoundGrid host application will also install applicable device drivers and ASIO/Core Audio drivers. Your devices will appear in the Inventory of your host system. If a device is not visible in the Inventory, you may need to install a specific driver from **Waves Central**—please see below. First, however, check the device's connections and power.

ADDING AN I/O DEVICE TO AN EXISTING SOUNDGRID HOST SYSTEM

If you are already using a Waves SoundGrid host application and your device does not appear in the Network Devices list, use Waves Central to update the host application, which also updates the device drivers—or install just the missing device driver from Waves Central.¹

Waves Central

All Waves software is downloaded and installed via the Waves Central application. To install a specific device driver, launch Waves Central and follow these steps:



- 1 Choose **All Products**
- 2 Search for the driver by name
- 3 Choose the driver and click **Install**

If you are new to Waves products, begin by downloading the Waves Central installer from the Waves Download Page. See the Waves Central User Guide for instructions on how to install drivers, plugins, and applications.

LICENSES

You do not need a license to use this device. However, many hosts or specific host configurations do require a license. Refer to your host's [product page](#) for details.

¹ The SoundGrid QRec host is installed with any I/O.



C Configure the System

A SoundGrid network is configured and devices are assigned in a host's **Setup** window. At the heart of this window are racks where devices are assigned. Any compatible device that's part of the host's SoundGrid network will be available for assignment. This collection of devices is called the **Inventory**. Setup is similar with all hosts: identify the host's LAN port, select a device slot, and use the drop-down menu to choose an available device.

Please consult the user guide of your host application for specific instructions.



SoundGrid QRec

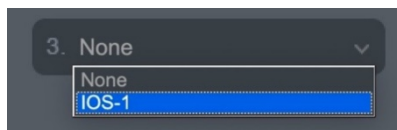


SoundGrid Studio Setup Window

All SoundGrid devices are configured in a similar manner. Throughout this section, we show DiGiGrid IOS as an example.



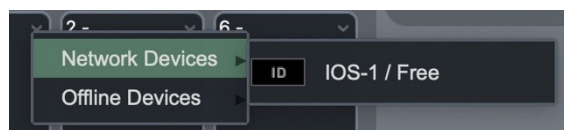
Manual Device Configuration



SoundGrid QRec

You can assign, remove, and manage a device manually. Click on the **plus** or **arrow** symbol in a device slot to open the **Device Menu**, then select a device.

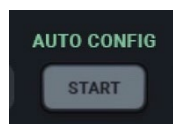
Any device not already used will be available for assignment. If no other devices are assigned, the current device will become your clock master. Drivers and servers are assigned in the same manner.



SoundGrid Studio

See the user guide of your host system for specific instructions on device assignment and I/O channel patching.

Automatic Device Configuration



Certain SoundGrid hosts—including SoundGrid Studio, eMotion LV1 or SuperRack SoundGrid—offer an **Auto-Config** tool. Once your devices are connected and powered up, click **Auto** to start the configuration.

Auto-Config chooses the correct LAN port on the host computer and scans the SoundGrid network for devices. It then patches the devices to the host. We recommend that you let Auto-Config take care of things, at least when you are getting started. If later you add, remove, or swap a device, Auto-Config will reconfigure your inventory and re-patch.

Note that SoundGrid Studio assigns the SoundGrid driver automatically. SuperRack SoundGrid and eMotion LV1 require that the SoundGrid ASIO/Core Audio driver is assigned manually.

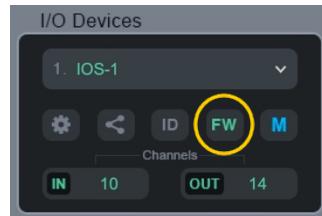


Device Firmware

An I/O that is using outdated or incompatible firmware will not work properly in a SoundGrid network until its firmware is updated. The color of the **FW** button in a device slot indicates the current firmware status.



SoundGrid Studio



SoundGrid QRec

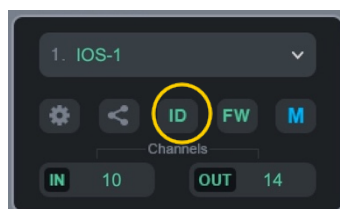
Grey	Compatible firmware
Blue	Compatible firmware, but a newer version exists
Red	Firmware not compatible and must be updated in order to use

If a device requires updated firmware, click on the FW button to start a hardware scan. Do not disconnect the device or turn off the computer before **Done** appears. Once the update is ready, turn the device off and on to reset.

Identify a Device on the SoundGrid Network



SoundGrid Studio



SoundGrid QRec

Click on the **ID** button to activate a hard-to-miss LED on the front panel of the corresponding hardware device. You can also activate the front panel from the top bar of the device's control panel.

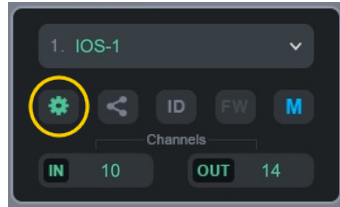
IOC Control Panel

There are two ways to open the device control panel:

FROM THE DEVICE RACK



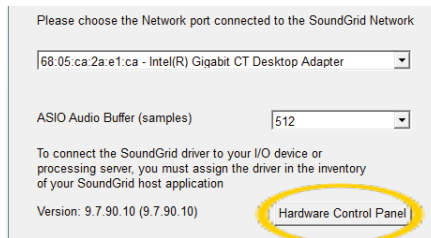
SoundGrid Studio



SoundGrid QRec

Click on the **Gear** button on a device in the rack slot.

FROM THE DRIVER CONTROL PANEL



Open the driver control panel and then click the Hardware Control Panel button. The driver control panel is located here in the host computer:

PC: C:\Program Files (x86)\Waves\SoundGrid\Driver Control Panel

Mac: System HD/Applications/Waves/SoundGrid

CONTROL PANEL PAGES

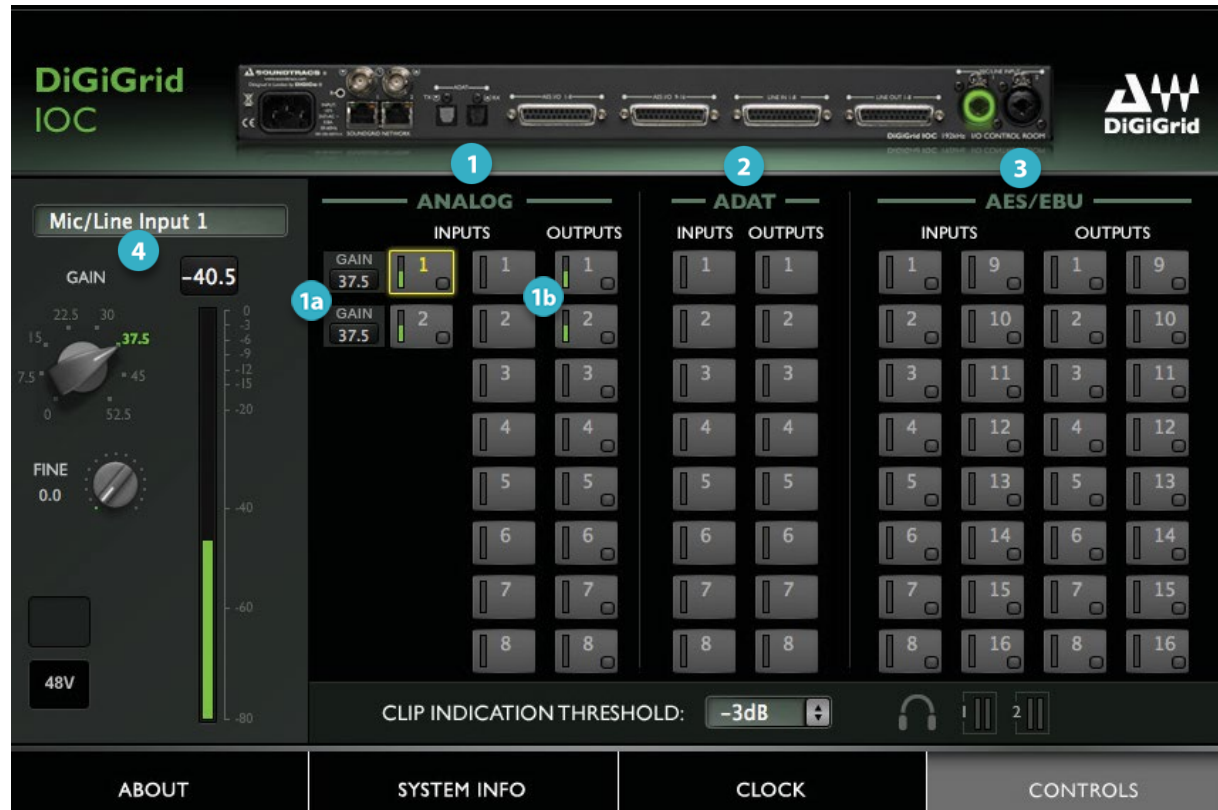


The **About** and **System Info** pages provide information about the unit, such as MAC address, SOE master MAC Address, firmware version, and more. The **Clock** and **Controls** pages are used to set up and manage the IOC.



Controls Page

This is where you configure the inputs and outputs of the IOC: mic preamps, line inputs and outputs, digital I/O, level control, and metering.



- 1 Analog section
 - 1a 2 mic/line combo
 - 1b 8 line in + 8 line out (DB25)
- 2 ADAT I/O section
- 3 AES/EBU I/O section
- 4 Focus section: analog input and output levels and 48V phantom power are controlled from here.



ANALOG SECTION

There are two mic preamps, eight line inputs, and eight line outputs. Select a channel and it will appear in the Focus section.

Analog Input Controls



Use the Focus section to set preamp levels and turn the 48V phantom on and off. The long meters range from -80 dBFS to 0 dBFS.

Mic/Line knob gain range: 0 dB to 52.5 dB in 7.5-dB steps

Fine knob digital gain range: 0 dB to 7 dB in 0.5-dB steps

A clip indicator holds for two seconds or for as long as clipping persists. Peak hold persists until you reset it by clicking on the indicator or switching to a different input.



An orange light on a channel button indicates that phantom power for that channel is active. This status is also shown in the Focus section.

REMOTE PREAMP CONTROL

You can control input preamp functions directly from the channel strip of SoundGrid applications, including eMotion LV1 and eMotion ST mixers, and SuperRack SoundGrid.



Control	Function
48V Phantom	On or Off
Preamp Gain Input	Controls analog gain in an assigned I/O device that includes a controllable preamp.
Input Polarity	Mono channels have one polarity reverse button; stereo channels have two. Buttons are latching and are colored green when polarity is reversed.
Digital Input Trim	Controls input level from digital sources. Separate controls for L/R when input is stereo.

This allows you to control preamps “on the fly,” without leaving your monitor mixer. Refer to your host application’s user guide for details.

ANALOG OUTPUT CONTROLS



In addition to meters and clip and peak indicators—which are identical to those in the input controls—there is a Headroom switch that provides a -10 dB pad.



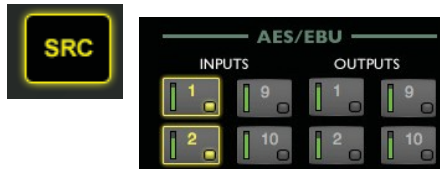
A green LED indicates the presence of a -10 dB. pad on the analog output.



DIGITAL SECTION

There are two types of digital inputs/outputs for you to select from: AES/EBU and ADAT.

Upon selection, a higher-resolution meter will appear in the Focus section.



In the **AES/EBU** section, sample conversion rate (SRC) can be selected independently for inputs and for outputs.

Inputs and outputs are each divided into two groups: 1-2 and 3-16. Each group is internally linked, so that changing the sample rate for Input 1 will also change the sample rate for Input 2; changing the sample rate for Output 3 will change the sample rate for Outputs 4-16.

Inputs: To gain access to the SRC button, select any of the AES/EBU inputs. Use the SRC button to enable input sample rate conversion. When SRC is selected, the IOC converts the incoming digital stream to the sample rate of the clock to which the device is locked. A yellow light on the channel button indicates that sample rate conversion is active for that channel.

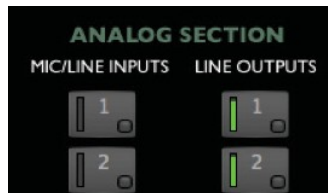


Outputs: To gain access to the SRC button, select any of the AES/EBU outputs. Once you select SRC, you can also choose any of the following sample rates: 44.1, 48, 88.2 or 96.



CLIP INDICATION AND SMALL METERS

Clip Indication Threshold sets the level where clipping is shown on the meter in the Focus section. The threshold can be set to 0 dB, -1 dB, -2 dB, or -3 dB. This setting is global: it affects level indication for all channels, inputs and outputs.

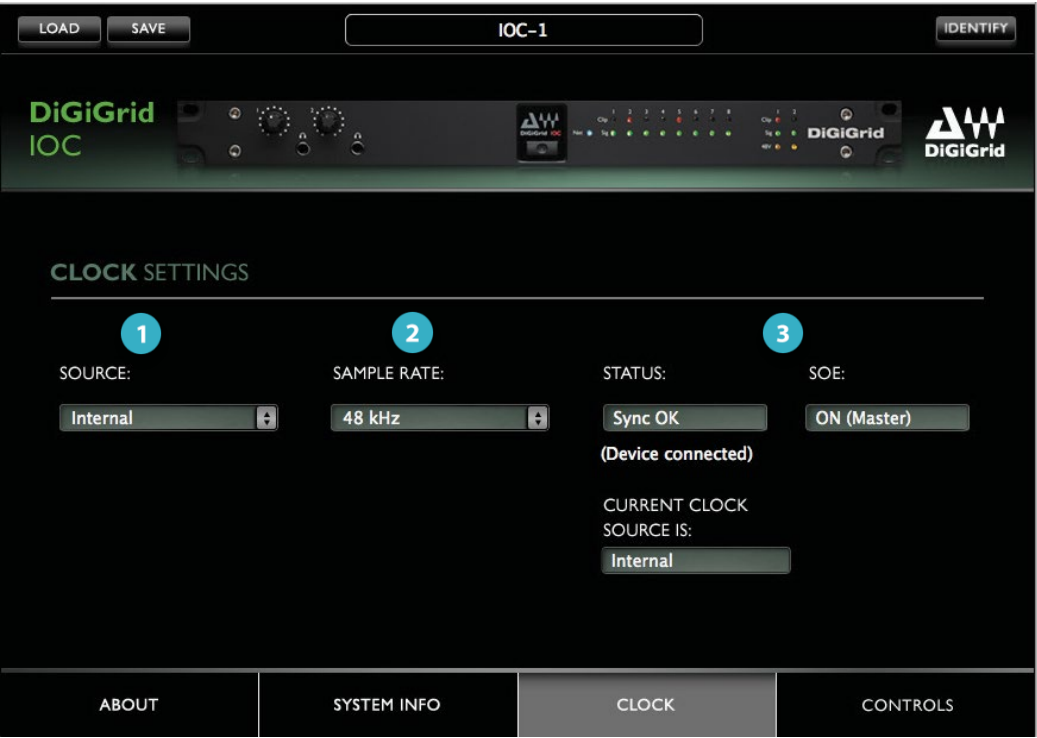


Each channel button—analogue or digital, input or output—has a small level meter that indicates when signal is present and provides a rough idea of level. A red light on the channel button indicates clipping.



Clock Page

Use the Clock page to set the clock source and sample rate for the device and to assess clock status.



1 SOURCE sets the requested clock source.

Internal	The device itself provides the SEO clock.
External WC	Clock is provided by an external device via the Word Clock Input connector.
Sync over Ethernet	The device receives clock from the SoundGrid network.
AES/EBU CH1	IOC clocks to an incoming AES/EBU stream



2 SAMPLE RATE sets the sample rate when Clock Source is set to Internal. Range: 44.1 / 48 / 88.2 / 96 kHz.

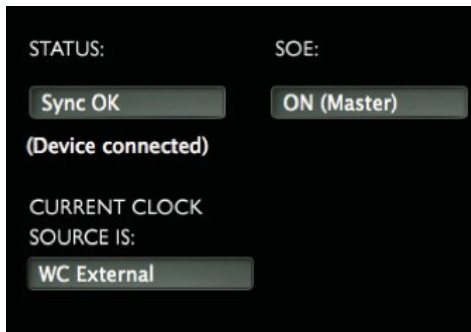


If the device is the network (SOE) clock master, as determined in the Device Racks of the SoundGrid host, then this setting determines the sample rate of the SoundGrid network.

If Clock Source is set to an external clock source, you cannot change the sample rate from the host. The Sample Rate menu is grayed out and inoperative.

3 CLOCK STATUS INDICATORS

Three windows on the right side of the Clock control panel help you to quickly assess the network status of the device.



Status	Reports the presence or absence of sync between the IOC and the SoundGrid network.
Current Clock Source	Displays the current sync method. This may differ from the choice made in the Source menu.
SOE	Indicates whether this IOC is the master or a slave in the SoundGrid network. This mirrors the status information in the SoundGrid Studio Device Rack

When the device is a slave in the SoundGrid network, you will likely sync it to the SoundGrid network clock (via SOE).

Even when the device is an SOE slave, you can lock it to an external clock source. For example, if another SoundGrid I/O device is the SOE master and is locked to a word clock device, you may choose to receive clock from the same external device over word clock from the master device rather than via network SOE.

In the event that the selected clock source fails, IOC has a series of clock fallback layers, in the following order: WC, SOE, Internal. If the I/O is clocked to external source and that clock source fails, the device will seek an alternate source of clock, in this priority: word clock, Digital 1, Digital 2, and then SOE. If this fails, the device will fall back to Internal.



System Info Page and About Page

The **About** page contains a description of the device. The **System Info** page contains technical details about the device, including MAC address, Firmware version, and Module version. This information is useful for troubleshooting. Please have this information handy if you contact Waves technical support concerning the device.

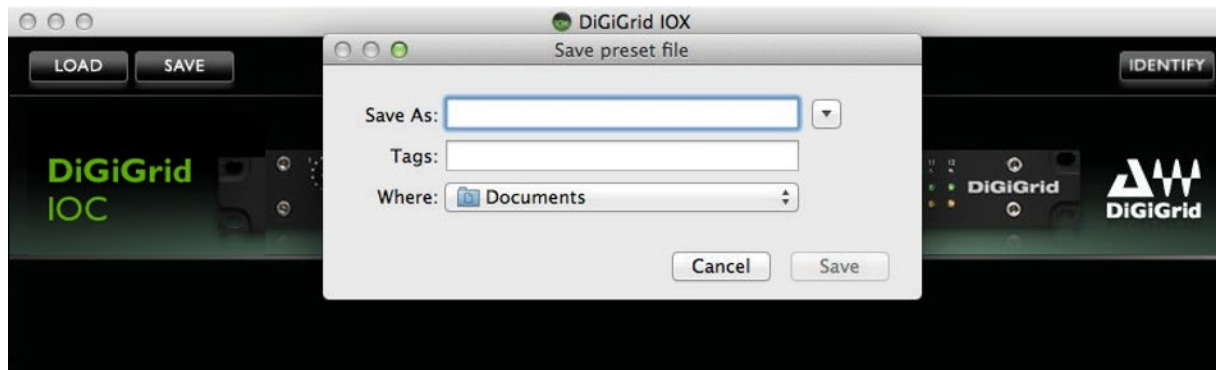


Presets

The Top Bar is used to load and save device presets and to identify device hardware.



A saved preset includes all Clock and Control panels parameters. Save IOC presets to use on future sessions or copy them to another computer to duplicate a configuration.



Click the **Identify** button to indicate which IOC hardware device belongs to this Control Panel. Clicking the button causes the Network LED on the front panel of the IOC to flash in a rather psychedelic manner.

Using an I/O Device with a DAW

Setting up SoundGrid devices with a DAW involves these steps:

PATCH THE I/O DEVICE AND THE SOUNDGRID ASIO/CORE AUDIO DRIVER

When using a DAW on a SoundGrid network, the SoundGrid ASIO/Core Audio driver serves as a bridge between the I/O device and the DAW. It enables the I/O to communicate with the DAW, and it provides patches. Patching an I/O to the SoundGrid ASIO/Core Audio driver differs slightly among hosts. When you use a host's Auto-Config tool, the host input channels are patched automatically, in an order based on rack. The order of the devices in the Device Rack determines the default patching order. Please refer to your SoundGrid host's user guide for details.

CONFIGURE THE DAW FOR SOUNDGRID

1. Set the DAW playback engine to "Waves SoundGrid." The SoundGrid driver channels will now appear in the DAW I/O preferences and in the Input/Output selector in each DAW channel.
2. Route the DAW inputs and outputs to SoundGrid.



Specifications

- 1U rack-mounted (standard 19" rack-mount wide, 4U high, 380mm deep excluding connectors)
- Supported sample rates: 44.1, 48, 88.2 and 96 kHz (176.4 and 192 kHz will be supported in the future)
- 2 mic inputs (XLR/TRS combo)
- 8 line inputs (25-pin DB25)
- 8 line outputs (25-pin DB25)
- 16 AES/EBU I/O (2x 25-pin DB25)
- 1 ADAT I/O: 8 channels @ 48 kHz
- 2 headphone outputs with analog level knobs
- Word Clock I/O
- Clock synchronization via Word Clock input, AES/EBU, SoundGrid (SOE), Internal
- 2 SoundGrid ports (RJ45s)
- Reset switch

Analog Inputs

- Input Impedance: Mic: 2.5 kilohm / Line: 8 kilohms
- Gain Range: Mic: 0 dB to 52.5 dB in 7.5 dB steps
- Fine control provides additional 0 dB to 7 dB in 0.5-dB steps
- Maximum Input Level: Mic: +26 dBu / Line: +36 dBu
- Mic Equivalent Input Noise: > -126 dB (150 ohm source, gain +59.5 dB)
- Harmonic Distortion: Typically < 0.01% @ unity gain, -10 dB input @ 1 kHz
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)



Analog Outputs

- Maximum Output Level: +22 dBu
- Residual Output Noise: < 90 dB (20 Hz to 20 kHz)
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Output Impedance: 50 ohms
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)
- Harmonic Distortion: Typically < 0.01% @ unity gain, -10 dB output @ 1 kHz

XLR CONNECTORS

Phase	Termination Point
Positive (+)	Pin 2
Negative (-)	Pin 3
Signal Ground	Pin 1
Chassis Ground	Case

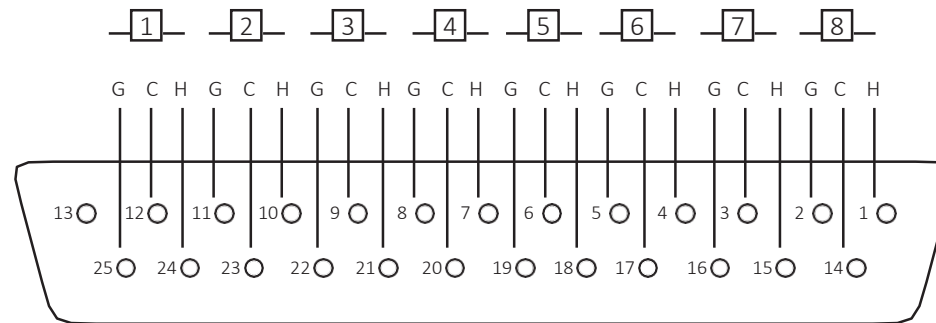
1/4" TRS CONNECTORS

Phase	Termination Point
Positive (+)	Tip
Negative (-)	Ring
Signal Ground	Sleeve



IOC Analog Connectors

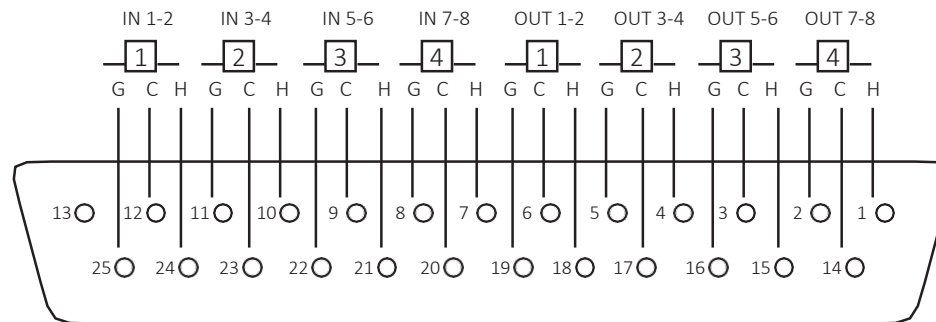
DB25 8-channel balanced connector AES59-2012



G=Ground C=Cold H=Hot

IOC AES Connectors

DB25 8-channel balanced connector AES59-2012



G=Ground C=Cold H=Hot



Resetting the Unit

If an unsuccessful firmware update results in the device no longer being recognized by the host, follow these steps to reset the unit:

1. Turn off the unit.
2. Press and hold the Reset button.
3. Restart the unit while holding the button.
4. Release the Reset button once the device has fully booted.

The unit is now in “force update” mode and a new firmware update can be performed.

