



ProGrid™

PG32-AES-FX User Guide



Document Reference

Clear-Com PG32-AES-FX User Guide

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1 **Important Safety Instructions**

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Do **not** use this apparatus near water.

Clean only with dry cloth.

Do **not** block any ventilation openings. Install in accordance with the manufacturer's instructions.

Do **not** install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Do **not** defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

Only use attachments/accessories specified by the manufacturer.

Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-cord supply or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning: To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

1.1 **Operating and Storage Temperature**

Operating temperature: -20°C ...50°C ≡ -4°F ... 122°F; ensure proper ventilation

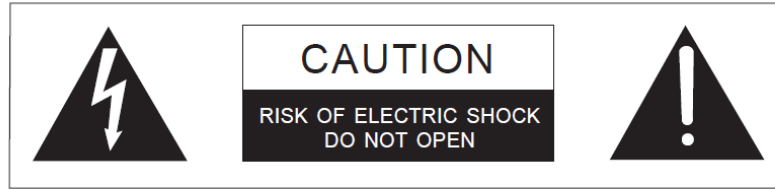
Storage temperature: -20°C ...60°C ≡ -4°F ... 140°F

1.2 **Eye Safety**

This product is a Laser Class 1 product. It complies with IEC 60825-1, FDA 21 CFR 1040.10, and 1040.11.

1.3 Safety symbols

Familiarize yourself with the safety symbols in **Figure 1: Safety symbols**. These symbols are displayed on the apparatus and warn you of the potential danger of electric shock if the system is used improperly.



This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.



This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1-1: Safety symbols

2 *Device Description*

Optocore TECHNOLOGY

Optocore™ is a technology platform for sending large amounts of audio, with very low latency around a fiber-based network. This transport (and management system) is of very high quality, suitable for concerts, recording studios, and broadcast applications. SANE™ is a spin-off technology that adapts this same technique to a smaller network (Ethernet) and at a lower cost. The SANE connections are used to provide expansion units at any fiber node. ProGrid interfaces use both Optocore and SANE technologies to provide a high quality low latency media transport system. ProGrid will interface with all other OEM products utilizing the Optocore technology, for example Yamaha, DiGiCo and AVID.

The DIGITAL I/O UNIT PG32-AES-FX is a digital interface device of the ProGrid Signal Transport Solution. It offers four principal ports for connection and transport of a total of 32 AES/EBU digital audio channels i.e. 64 mono channels. Sample rates up to 192 kHz are possible. These channels are user defined as input or output in groups of four. Redundant fiber and/or SANE connections can be established using both of the two provided optical and CAT5 LINK-interfaces. The dual redundant ring structure provides maximum safety in a comprehensible network with an outstanding low latency. It facilitates the use of the advantages of fiber optical transmission in all sorts of temporary and permanent applications, especially when long distance connections and high-quality audio are required.

The PG32-AES-FX is equipped with SANE Links, Ethernet Ports and the 2 GBit optical duplex-LC Links. The device also includes a word clock in- and output and bi-directional composite video interfaces. Four RS485 ports allow the transport of a wide range of standards such as RS422, DMX, MIDI, and CAN. In addition to the audio signals a 100MBit Ethernet is transmitted by the fiber and SANE connection. The dual power supply unit, with automatic switchover, permits a redundant power supply and safeguards against malfunctions of the unit if one power supply fails to run.

In combination with the other ProGrid devices, the PG32-AES-FX offers a great flexibility to build the network exactly suiting an applications need. For example, in combination with a PG16-AUDIO-FX device on stage it is the perfect interface to a digital console at FOH. A PG32-AES-FX on stage can be used as an interface to all microphone preamps with AES/EBU outputs. With Yamaha and ProGrid microphone preamps the PG32-AES-FX enables the gain control of the preamps on stage from a Yamaha digital console at FOH. The PG32-AES-FX is not only an audio interface, but also a video and data interface for a broad range of control data standards. If analogue inputs and outputs are needed the PG32-AES-FX serves as the I/O unit for the converter units of the PG16/PG8-series. Networks with several PG32-AES-FX and other ProGrid or SANE devices allow the transport of a huge amount of digital data, e.g. 256 audio channels with a sample rate of 48 kHz, 32 RS485 channels and three video channels, 100MBit Ethernet (double in 2Gbit fiber network). Depending on the fiber optic transceivers, distances from 700 m up to 70 km can be covered (100m by SANE).

Redundant fiber connections can be established using the two provided LC multimode or singlemode 2 GBit optical LINK-interfaces. The dual redundant ring structure provides maximum safety in a network with an outstanding low latency. It facilitates the use of the advantages of fiber optical transmission in all sorts of temporary and permanent applications, especially when long distance connections and high-quality audio are required.

The PG32-AES-FX and PG16-AUDIO-TP/PG8-AUDIO-TP devices can be used together in a SANE CAT5 Network (64 audio channels + Ethernet). Combinations of SANE and OPTOCORE (up to 1024 channels) can be made with the PG32-AES-FX and other Revolution FX devices to exchange audio channels, Ethernet and Gain Control. All parameters on the I/O Module can be controlled and monitored with the same software application as all other ProGrid devices, OPTOCORE CONTROL software. They allow for the distribution of various channels of I/O at the different locations throughout your digital ProGrid and/or SANE network.

The Word Clock IN and OUT connections enable the synchronisation of the units to an external source and are used to pass the word clock from one unit to the next. For stand-alone applications, the devices are equipped with an internal word clock.

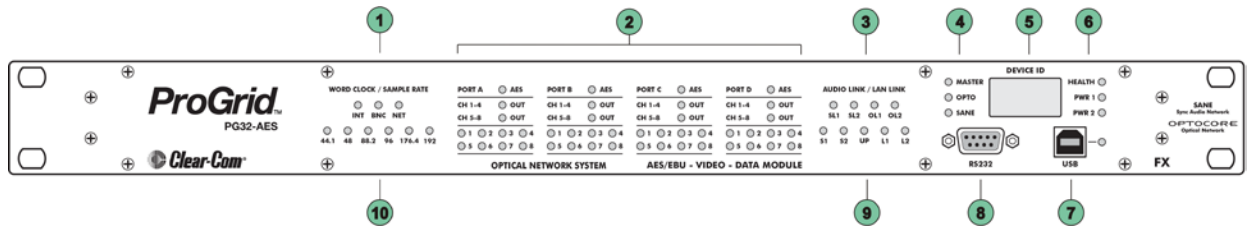
The PG32-AES-FX without the need for any external data cable. For control the USB, RS232 or LAN ports on the

front / rear panels can be used.

The FPGA (field programmable gate array) based concept of the internal logic circuitry allows updating of the firmware ensuring a continual state-of-the-art device. OPTOCORE CONTROL software provides all configuration and control tools including naming, gain setting and phantom power activation for attached devices, storage and recall of configurations on the computer, off- and online operational modes, as well as real-time level display of the individual channels when in online mode.

The LEDs on the front panel of the PG32-AES-FX allow an instant overview regarding the status of each channel.

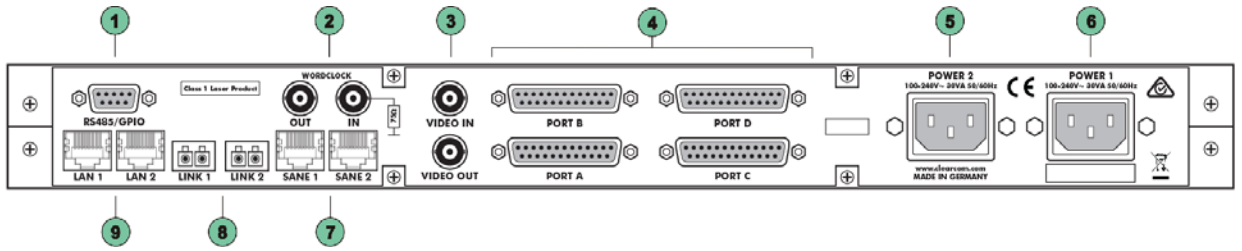
3 Front Panel



- 1 Word Clock LED:** Indicates the selected word clock source:
 INT: Internal word clock
 BNC: External via BNC Input
 NET: Word clock received from network
- 2 AES status LED:** Indicates that the entire port (exit on the rear panel) is ready for data transmission of:
 LED ON: AES/EBU digital audio
 LED OFF: Data
- Out LED:** Configuration of channels 1-4 or 5-8:
 LED ON: Outputs
 LED OFF: Inputs
- ACT LED** Signal status of channels 1-4 or 5-8:
 LED ON: At least one signal is present
 LED OFF: No signal is present
- 3 AUDIO LINK:** Indicates the audio link status
 SL1: Communication is established via SANE 1 (rear panel)
 SL2: Communication is established via SANE 2 (rear panel)
 OL1: Communication is established via ProGrid LINK 1 (rear panel)
 OL2: Communication is established via ProGrid LINK 2 (rear panel)
- 4 System status**
- Master LED:** Indicates the master unit
OPTO LED: OPTOCORE communication is established
SANE LED: SANE communication is established
- 5 Device ID Display:** Indicates the identification number of the device
- 6 HEALTH LED:** Green: Power supply is correctly working, temperature is below the limit
PWR 1 LED: Power supply 1 is working correctly
PWR 2 LED: Power supply 2 is working correctly
- 7 USB plug and LED:** USB connection for remote control via PC
 Green: Indicates data activity
- 8 RS232 plug:** D-Sub-9 RS232 connection for remote control and update via PC

- 9 **LAN LINK:** Indicates the Ethernet link status
S1: Ethernet communication is established via SANE 1 (rear panel)
S2: Ethernet communication is established via SANE 2 (rear panel)
There is other device with physical Ethernet port enabled on the network
L1: Ethernet communication is established via LAN 1 (rear panel)
L2: Ethernet communication is established via LAN 2 (rear panel)
- 10 **Sample Rate LED:** Indicates the selected sample rate
44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz

4 Rear Panel



- 1** **RS485/GPIO plug:** D-Sub-9 RS485 AUXILIARY PORT for data transmission
- 2** **Word Clock IN:** BNC Word clock input allows synchronization of ProGrid devices to an external word clock source
Word Clock OUT: BNC Word clock output for synchronization of external devices
- 3** **Video IN:** BNC Video input for composite video
Video OUT: BNC Video output for composite video
- 4** **PORT A ... D:** 4 x D-Sub-25 PRINCIPAL PORTS with 8 channel RS422 for AES/EBU or data transmission
- 5** **POWER 2:** Mains input for power supply 2 (100 ... 240 V)
- 6** **POWER 1:** Mains input for power supply 1 (100 ... 240 V)
- 7** **SANE 1:** SANE RJ-45 interface for data transmission + 100 Mbit Ethernet
SANE 2: SANE RJ-45 interface for data transmission + 100 Mbit Ethernet
- 8** **LINK 1:** Full-duplex, full bandwidth LC-type optical interface for data transmission
LINK 2: Full-duplex, full bandwidth LC-type optical interface for data transmission
- 9** **LAN 1:** 100 Mbit RJ-45 Ethernet interface
LAN 2: 100 Mbit RJ-45 Ethernet interface

5 *Device Details*

5.1 **Fiber Optic Connection**

The ProGrid Signal Transport Solution uses a digital Time Division Multiplex technology (TDM) with a fiber channel based 8B10B-NRZI-coding. Static time slots guarantee the synchronous transmission of all channels at any time with no demand for dynamic bandwidth. All signals attached to the audio, video, word clock and auxiliary ports of the device are transmitted simultaneously on one fiber. The second fiber of one LINK-Interface is used to receive data. The second LINK-Interface has the same features as the first; therefore one of the LINK-Interfaces can always be used for redundancy.

5.2 **Principal Ports for AES/EBU**

According to the AES/EBU standard each physical channel contains two audio channels, i.e. with the 32 digital channels of the four principle ports 64 audio channels are available. The ports feature the unique possibility to define them freely as AES/EBU inputs or AES/EBU outputs in groups of four.

Defining the 32 digital channels as inputs or outputs in groups of four is done with OPTOCORE CONTROL software.

5.3 **SANE Ports**

PG32-AES-FX is equipped with two RJ45 200MBit SANE Ports for 64 channels synchronous audio + 100MBit Ethernet.

5.4 **RS485 Auxiliary Ports**

The auxiliary ports provide four RS485 interfaces to establish a maximum of four half-duplex or two full-duplex connections between the devices. A wide range of bi-directional and unidirectional standards can be connected, such as RS485, CAN-Bus (bi-directional), or RS422, DMX, MIDI (unidirectional). The interfaces will sense automatically whether they send or receive control data. OPTOCORE CONTROL software is used for setting the destination of each interface.

5.5 **Word Clock**

All units are equipped with a Word Clock IN and OUT. Word Clock is also transmitted via the fiber and SANE Ports. In network configurations no extra BNC cable is needed. The PG32-AES-FX units are equipped with an internal, high quality and extremely low jitter word clock. Any PG32-AES-FX can act as master to pass the word clock to further ProGrid™, SANE units or other devices. The word clock is available at the word clock OUT BNC-connector of this device. The Word Clock IN is terminated internally, so that no further external termination at the Word Clock Out is needed to avoid cable reflections.

5.6 Transmission Delay

The ProGrid system delay including the matrix is fixed to 41,6 μs @ 48 kHz for all channels. The transport delay per ProGrid unit (<200 ns) in the network is insignificant. The transmission delay is constant from any point to any point. Overall delay depends on converters and fiber cable length, with 'normal' cable lengths of <700 m it can also be considered as marginal.

5.7 Power Supply

The device is optionally equipped with two power inputs and power supply units. If one power supply fails, due to malfunction of the feeding power line or the power supply unit itself, the device will automatically switch over to the other power supply unit. In order to make the power supply redundant, both power inputs must be connected to the main supply, if possible to different phases, power supply systems, or even better, one of them to an uninterrupted power supply (UPS).

The power supply units operate with mains voltage of 100 ... 240 V and frequency of 50 ... 60 Hz. Thus the device can be used throughout the world without any modifications or transformers.

Be aware that the switched-mode power supplies operate with high voltages! Coming into contact with them can lead to considerable electric shock that may result in death! To prevent electric shocks do not remove any covers!

6 *Control*

All system and device parameters are set using OPTOCORE CONTROL on a PC. If the PG32-AES-FX units are connected to further network devices using SANE or fiber as shown in Connection Tables the control and audio data is transmitted over SANE resp. the optical interfaces. OPTOCORE CONTROL can control all PG32-AES-FX and other ProGrid units in a network. In network applications, the RS232, LAN or USB port enables the configuration and monitoring of one unit attached directly to the PC.

6.1 **Third party control**

Third party protocols for device controlling can be used, if previously adapted by Clear-Com. It is possible to control ProGrid preamps directly from Yamaha, Studer/Soundcraft, SSL and Lawo with Special Emulation Mode configured. A Multiple Emulation Mode feature enables you to control preamps in ProGrid from four different consoles.

7 Channel Allocation: FX

The standard channel allocation is as follows:

Audio	256 Channels @ 48 KHz – 1 Gbit network 768 Channels @ 48 kHz – 2 Gbit network
RS485 Data	32 Channels
Video	3 CVBS Video Channels *
Ethernet	100 MBit Fast Ethernet *

* If the network is used for the transport of Ethernet compatible data the capacity is reduced to one CVBS video channel plus 100 Mbps Fast Ethernet.

8 Channel Allocation: SANE

The standard channel allocation is as follows:

Audio	64 Channels @ 48 KHz
Ethernet	100 MBit Fast Ethernet

9 Connectors and Cables

9.1 SANE Ports

Use shielded twisted-4-pair-cable (Cat-5, Cat-5e, Cat-6), with RJ-45 connector. SANE technology utilises all 4 pairs of Cat-5 cable – two for standard Ethernet transmission, two for SANE. Maximum distance between two devices connected by SANE is 100m.

9.2 Optical Connection

The dual optical LINK-interfaces are equipped with duplex LC connectors. Standard LC cables with two fibers can be used. Worst case reach is 700 m with multimode transceivers and a 50 μm fiber, while with singlemode transceivers and a 9 μm fiber, up to 70 km are possible. For rugged applications e.g. touring and other temporary installations, HMA Expanded Beam Connectors mounted on 1 RU panel are available, along with matching, inter-connection cables transported on cable drums.

9.3 Principal, Auxiliary, and AES Ports

According to the RS422/RS485 hardware standard used for transport of AES/EBU, each channel requires a twisted pair. A common braided shield should enclose the pairs.

For the Analog audio ports, a shielded cable is to be used.

9.4 RS232 Connection

Shielded, standard RS232 cable must be used for the RS232 port.

9.5 RS485 Connection

Shielded, cable must be used for the RS285 port.

9.6 Connector Hood Quality

Applied locking screws for the D-Sub-types must be acc. to 4-40 UNC. Care should be taken in selecting the right types of connector hoods in order to fulfil the requirements of EMI-radiation directives. Full metal connector hoods should be used, approved acc. to VDE 0871, FCC 20780 and EMC directive 2004/108/EG, providing a reduction >40 dB on 30 MHz up to 1 GHz. The shielding harness of the cable should have complete contact to the connector hood.

9.7 USB Connection

To the USB port, use a standard PC/device cable.

9.8 LAN-Connection

Use standard twisted-pair-cable (Cat-5, Cat-5e, Cat-6) with RJ-45 connector.

9.9 Word Clock-Connection

Use 75 Ω -coaxial-cable with BNC-connector.

9.10 Video-Connection

Use 75 Ω -coaxial-cable with BNC-connector.

9.11 Mains-Connection

Standard power cords with IEC C13 socket can be used.

10 Starting Up

10.1 Software Installation

Installation requirement for the software is a functioning computer system with Microsoft® Windows 2k (Requires installation of GDIplus.dll), XP 32&64Bit, Vista 32&64Bit, Server2003&2008, Windows7 32&64Bit or Mac: Intel based Macs with above OS using Bootcamp/Parallels/VMWare. The computer should be equipped with an USB interface for configuration and remote controlling, and a RS232 interface (or an appropriate USB / RS232 converter) for firmware upgrade. COM 1...4 can be used with a transfer rate of 57 600 Baud. Monitor resolutions of 800 x 600 or 1024 x 768 with 16 Bit color rendering are recommended to view the program. The installation requires approx. 2.5MB of hard-disk space and is carried out in the usual Windows-program manner.

Please note that the serial interfaces on computers are usually not capable of “Hot Plugging”. Switch off the computer to avoid damage before establishing the serial connection between the ProGrid device and the computer.

The set-up software *785G041X_PROGRID_CLIENT_SERVER_X_XX.EXE* can be downloaded from www.clearcom.com or provided by the Clear-Com support team. OPTOCORE CONTROL for configuration and remote controlling, and OPTOCORE UPGRADE for firmware upgrading are installed on a PC or Laptop by double-clicking on the *785G041X_PROGRID_CLIENT_SERVER_X_XX.EXE*. The set-up executable program is self-extracting and provides the OPTOCORE CONTROL SETUP WIZARD. It will establish the necessary directories, a desktop icon for the OPTOCORE CONTROL and firmware upgrade software.

The uninstall procedure of OPTOCORE CONTROL can be carried out with the *ADD OR REMOVE PROGRAMS* tool of Windows, which is usually found under *START / CONTROL PANEL*.

For details about features and handling of OPTOCORE CONTROL please refer to the *HELP* menu of the software. It is strongly recommended to familiarize yourself with the OPTOCORE CONTROL software.

10.2 ProGrid Network Setup

Before connecting a PG32-AES-FX to any other device and before establishing the optical LINK connection make sure that all devices have a basic set-up in order to be able to operate correctly. For operation safety reasons, some settings (e.g. “ID”) may only be made when locally connected to a device.

All devices in the network must operate with the same firmware version. The firmware version can be revised under *SET / LOCAL SETTINGS*. The update of the firmware is done with the OPTOCORE UPGRADE software under *START / PROGRAM / OPTOCORE / UPGRADE*. Please refer to the *HELP* Menu for further information. For firmware update the PC has to be connected via the RS232 or USB Port on the front of the device.

The best approach to check the settings is to connect locally to every single device of the ProGrid network with a PC using either RS232 or USB connection, run the OPTOCORE CONTROL software and enter menu *SET / LOCAL SETTINGS*. This dialog enables the definition of the ID, ports, etc.

- **General:** Set each device in the optical network to a unique ID. Device IDs must be unique in the entire ProGrid network. Usually the device with the lowest ID and a word clock input will determine the clock of the network. It is advisable to assign ID 1 to the device with word clock input connected to the most important console, e.g. the FOH console.

Master Priority allows forcing a device to act as word clock master of the network. The device with the lowest ID, a checked Master Priority and a word clock input will act as master.

Devices with a word clock input such as PG32-AES-FX, PG16-FX, PG8-FX, PG16-TP, and PG8-TP always have priority prior to devices without word clock input. Thus even if the Master Priority is checked in the local settings of a device without word clock input, the device with the lowest ID and word clock

input acts as word clock master of the network, when present.

- **Clock Setup:** All devices in the network must work with the same sample rate. *CLOCK SOURCE* allows the selection of Auto (BNC priority), *INT* (internal) or *BNC* (external) word clock signal.
- **RS485 Ports:** The *RS485 SETUP* is used to define, which signal is given out at the specific port of the device. There are 32 data channels available in the network. It is necessary to allocate physical inputs as the 4-channel bank. Four output it is possible to choose one of 32 channels per each port.
- **Video / Ethernet setup:** In order to use ProGrid for Ethernet transport, the option System Ethernet should be enabled globally. In PG32-AES-FX Local Setting it is possible to enable or disable Local Ethernet as well. While System Ethernet is enabled it is possible to use only the first video channel. Video setup can be done by allocating video input in a proper channel. This channel can be outputted on every device which is equipped with video output.
- **Port Setup:** The D-Sub-25 PRINCIPAL PORTS ports can be configured under *PORT SETUP* while locally connected to the device. The settings can be changed only in *OFFLINE* Mode with *LOCAL SETTINGS* or with the *ACTION / SEND ALL* command.

Click on *WRITE* first, confirm with *OK*, and then click *CLOSE* to exit the dialog.

You may now connect the optical LINK cables between all ProGrid devices.

Check your setup by connecting to any device using either RS232 or USB connection, running the OPTOCORE CONTROL software and starting *ONLINE MODE* in the *SET* menu. The entire network at its current state is now displayed in the control software. Check the *LOG WINDOW* for any error messages. All ProGrid devices memorize the current setup, even if they are switched off or disconnected from the power supply.

Never switch on power amplifiers before the complete system is stable and the OPTOCORE CONTROL level meters indicate a normal level.

11 Hardware Connection

The PG16 units are connected to a PG32-AES-FX using BI-B cables as shown in Connection Tables. The word clock is transmitted by the word clock I/Os and standard 75 Ω cables. The following figure demonstrates the configuration of a 48 send and 16 return system with two PG16units using two input cards each, two PG16 units with one input and one output card each and one PG32-AES-FX.

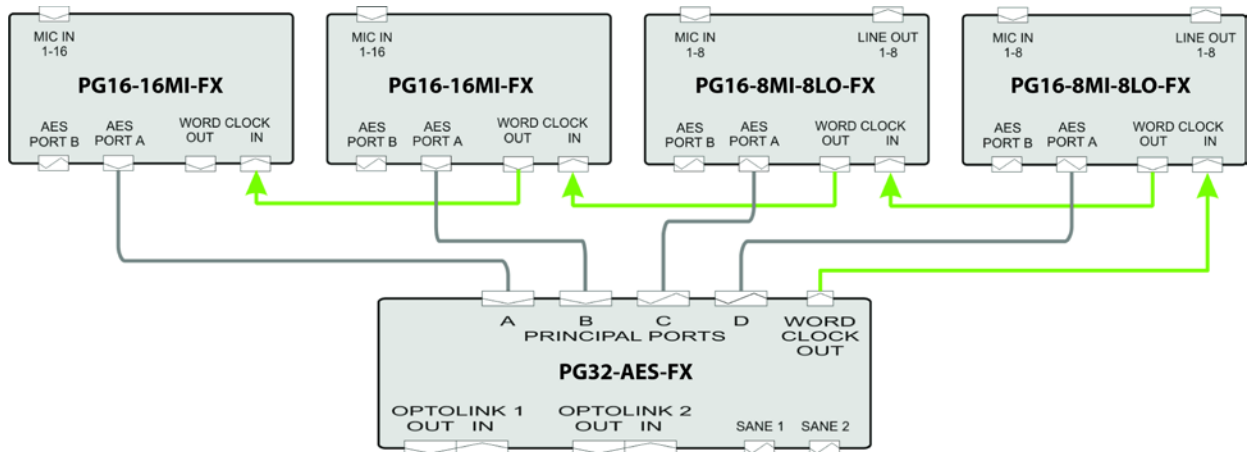


Fig. 1: Connection of four PG16 units and one PG32-AES-FX

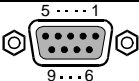
In this example Ports A and B of the PG32-AES-FX are inputs, receiving their signals from two PG16s with 16 inputs each. Ports C and D are connected to two PG16s with 8 inputs and 8 outputs each. Each of these PG16s transmits four AES/EBU (8 audio channels) outputs and receives four AES/EBU inputs. The configuration of the ports as inputs and/or outputs and the routing is carried out with OPTOCORE CONTROL. The control data is transmitted via the AES ports and the BI-B cables, the control of the preamps by software or from the console is possible without any further wiring. For word clock distribution, the Word Clock OUT of the PG32-AES-FX is connected to the Word Clock IN of one PG16. Then using a daisy chain of BNC cables, the word clock is passed on to the other PG16s in the system, from the Word Clock OUT to the Word Clock IN of the next PG16. The BI-B cables (audio and control data transmission) and the BNC cables (word clock) are connected as shown in Fig. 1.

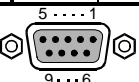
11.1 Word Clock Distribution in Stand-Alone Applications

In a stand-alone application any PG16 can act as word clock master by setting the *CLOCK SOURCE* to *INT* and selecting the correct sample rate via OPTOCORE CONTROL menu *SET / LOCAL SETTINGS*. The internally generated word clock is then available on the word clock OUT BNC-connector of this device and is passed on to the other PG16s using BNC cables. The *CLOCK SOURCE* in OPTOCORE CONTROL software menu *SET / LOCAL SETTINGS* of these devices has to be set to *AUTO* or *BNC*.

12 Connection Tables

Pin-out		Principal Ports A - D										
	AES Channel	AES/EBU In or Output				AES/EBU In or Output				Special use		GND
		1	2	3	4	5	6	7	8	9	10	
	Audio Channel	1+2	3+4	5+6	7+8	9+10	11+12	13+14	15+16			
Pin	+	1	2	3	4	5	6	7	8	11	24	10, 12, 13, 23, 25
	-	14	15	16	17	18	19	20	21	9	22	
D-Sub-25- female						Locking system acc. to 4-40 UNC						

Pin-out		Auxiliary Ports 4 x RS485						
	Channel	RS485				GND	Please assure correct polarity "+" and "-" at both (!) sides / devices when connecting external equipment to the RS485 ports.	
			2	3	4			
Pin	+	1	2	3	4	5		
	-	6	7	8	9			
D-Sub-9- female						Locking system acc. to 4-40 UNC		

Pin-out		RS232-Port					
	Channel	RS232		Internally bridged	Power		Use standard RS232 cable, male – female, to connect to PC
		RXD	TXD		+5VS	GND	
Pin	3	2	1, 4, 6	7, 8	9	5	
D-Sub-9- female						Locking system acc. to 4-40 UNC	

Pin-out	USB-Port					
	Channel	USB			GND	USB device-connector
		VBUS	D -	D +		
	Pin	1	2	3	4	

13 Technical Specifications

AES Ports		Convention EIA / TIA - 422
Channels	AES/EBU	4 x 8
	Audio channels	4 x 16
Data rate	Depending on selected sample rate	Up to 30 Mbit/s per channel
Impedance	Termination	120 Ω-switchable / ≥ 96 kΩ
	Source	≤ 10 Ω, Multi-drop feature
Drive level	Output	≥ 2 V _{pp}
Zero level	Referring to GND	+ 1.7 V
Sense level	Input	≥ 400 mV _{pp}
CM-voltage at bus terminals	Referring to GND	- 7 V ... + 12 V

Word clock		Hardware standard BNC - 75 Ω
Data rate	Depending on selected sample rate	Up to 192 kHz
Impedance	Output	≤ 5 Ω
	Input	75 Ω
Drive level	Output	≥ 1 V _{pp}
Zero level	Referring to GND	+ 1.7 V
Sense level	Input	≥ 400 mV _{pp}

Remote Control		Convention
RS232	EIA / TIA - 232	57 600 Baud
USB	USB 2.0 - Device	12 Mbit/s
LAN	TIA-568A/B, IEEE - 802.3	10/100 Mbit/s

SANE, LAN		Convention
Audio	TIA - 568A/B, ProGrid™	200 Mbit/s
LAN	TIA - 568A/B, IEEE - 802.3	10/100 Mbit/s

Optical Connection	Complies with 21 CFR 1040.10 and 1040.11
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Power supply	
Type	Switch-mode, universal input
Mains voltage	100 ... 240 V
Frequency	50 ... 60 Hz
Power consumption	Depending on device, 32VA – Max
Security classification	Class 1: basic insulation, connected to the protective grounding conductor
Security regulations	Harmonised European standard EN60065
Mains connector	acc. to IEC-950
Cooling	Passive, via surface and ventilation-slits on both sides

14 *Dimensions and Weight*

Front panel: width 483 mm / 19 inch
height 44 mm / 1.73 inch
depth 200 mm / 7.87 inch

Rear panel: width 438 mm / 17.25 inch

Weight

2.7 kg \equiv 4.41 lbs

Modifications that serve the purpose of technical improvement of the device may be carried out without prior notification.

15 Compliance

FCC notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by Clear-Com, LLC, an HM Electronics, Inc. company could void the user's authority to operate this equipment.

IC Notice:

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférences, et (2) cet appareil doit supporter toute interférence, y compris des interférences qui pourraient causer un mauvais fonctionnement de l'appareil.

Industry Canada Compliance Statement

This Class[A] digital device complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la class[A] est conforme à la norme NMB-003 du Canada.

The PG32-AES-FX product complies with the following specifications:

EN55022 Emissions

EN55024 Immunity

Electromagnetic Compatibility Directive 2004/108/EC

Low Voltage Directive 2006/95/EC

Warning:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Waste Electrical And Electronic Equipment (WEEE)

The European Union (EU) WEEE Directive (2002/96/EC) places an obligation on producers (manufacturers, distributors and/or retailers) to take-back electronic products at the end of their useful life. The WEEE Directive covers most Clear-Com products being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers are obliged to finance the costs of

recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging which indicates that this product was put on the market after August 13, 2005 and must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of WEEE. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local authority, your household waste disposal service or the seller from whom you purchased the product.



Figure 15-1: WEEE Symbol

16 *Warranty and Liability*



The Clear-Com product that you have purchased is covered by the Clear-Com Standard Limited Warranty, the terms and conditions of which can be found at www.clearcom.com/support/warranty-support-policies. We encourage you to review the Standard Limited Warranty to determine its coverage, exclusions from coverage and duration.

EXCEPT AS SET FORTH IN THE STANDARD LIMITED WARRANTY, CLEAR-COM MAKES NO WARRANTIES REGARDING THE PRODUCT, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT OF THIRD PARTY RIGHTS, OR FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED.

NOTE: Warranty of the ProGrid devices will be invalidated by the use of fiber transceivers not approved or supplied through Clear-Com or its approved dealers.