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AN HME COMPANY

ProGrid™
PG16-FX and PG8-FX User Guide

Document Reference

Clear-Com PG16-FX and PG8-FX User Guide

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Legal Disclaimers

Clear-Com Offices are located in California, USA; Cambridge, UK; Dubai, UAE; Montreal, Canada; and Beijing, China. Specific addresses and contact information can be found on Clear-Com's corporate website:

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Contents

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.

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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.

CAUTION

**RISK OF ELECTRIC SHOCK
DO NOT OPEN**
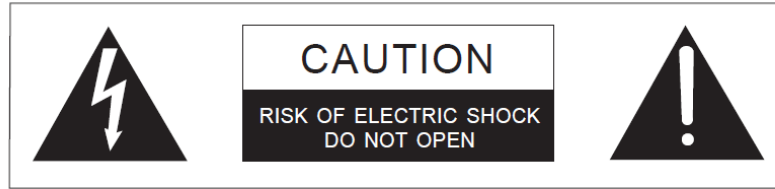
This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

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

Figure 1-1: Safety symbols

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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.

12 in 1 - the PG16/PG8-FX is a network converter unit for OPTOCORE and SANE with the highest degree of flexibility with regards to the I/O configuration. Six different card types enable the complete customisation of the I/O card, whether for the conversion of analogue signals - 16 inputs, 16 outputs, 8 inputs and 8 outputs, dual microphone inputs with dual independent adjustable gains – to AES/EBU, 8 AES/EBU channels switchable to IN or OUT in groups of four or a sample rate converter for AES/EBU input signals as required. The PG16/PG8-FX is designed for sample rates up to 192 kHz. Twelve different versions are available:

- 16 microphone inputs (PG16) resp. 8 microphone inputs (PG8)
- 16 line inputs (PG16) resp. 8 line inputs (PG8)
- 16 line outputs (PG16) resp. 8 line outputs (PG8)
- 8 microphone and 8 line inputs (only PG16)
- 8 microphone inputs and 8 line outputs (only PG16)
- 8 line inputs and 8 line outputs (only PG16)
- 8 microphone inputs with two independent preamps each (only PG16)
- 8 AES/EBU inputs (16 audio channels) with sample rate converters (only PG16)
- 8 AES/EBU channels (I/O switchable in groups of four) (only PG16)
- 4 AES/EBU inputs or outputs + 8 microphone inputs
- 4 AES/EBU inputs or outputs + 8 line inputs
- 4 AES/EBU inputs or outputs + 8 line outputs

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 PG16/PG8-FX and PG16/PG8-TP can be used together in a SANE CAT5 Network (64 audio channels + Ethernet). Combinations of SANE and O (up to 1024 channels) can be done by PG16/PG8-FX and other Revolution FX devices to exchange audio channels and Ethernet. All parameters on the converters 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 I/O channels at different locations throughout your digital ProGrid and/or SANE network.

The PG16/PG8-FX is especially designed for rack mounted applications and permanent installation. All cards are equipped with Euroblock / Phoenix connectors. These common installation interfaces provide a simple and cost-efficient connection with other audio equipment.

The PG16-FX with the dual microphone input card removes the problem where only one of the FOH or Monitor engineers can have full gain control of a single microphone input channel. Every microphone input incorporates two independent microphone preamps meaning both can be adjusted individually. Therefore, analogue split boxes with

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two stage racks to give FOH and monitor engineers the freedom to adjust their mic preamps directly at their own console can be a thing of the past.

The PG16-FX with sample rate converters enables the connection of audio devices operating at different sample rates.

The PG16-FX with combination of an AES/EBU and analogue card allows using 8 AES/EBU channels switchable to inputs or outputs in groups of four, or using 4 AES/EBU channels and 8 analogue channels. The entire configuration can be done by the Optocore Control software.

The PG16/PG8-FX with analogue mic input, line input and line output cards allow customised I/O configuration per device. Two/one card slots can be equipped with different cards, so six combinations with 16 inputs, 16 outputs or 8 inputs and 8 outputs can be assembled for the PG16 according to the customer's requirements.

The microphone inputs include a high quality microphone preamp, phantom power and selectable gains in 1 dB steps from -4 dB to +66 dB at a maximum input level of 22 dBu. The line inputs are equipped with selectable maximum channel levels of 27 dBu, 22 dBu, 18 dBu, 8 dBu and the line output with a selectable maximum channel level of 22 dBu, 18 dBu, 12 dBu, 8 dBu. The high quality preamps, A/D- and D/A converters make the PG16 units ideal for the incorporation into audio systems even if no ProGrid network is present. They provide a wide dynamic range with negligible distortion and extremely low noise.

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 PG16/PG8-FX units can be operated and controlled via the ProGrid network with OPTOCORE CONTROL software without the need for any external data cable. For control in stand-alone applications, 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 PG16/PG8-FX units allow an instant overview regarding the status of each channel. They indicate if audio is present on a channel, if a user defined or peak level is reached and the activation of the phantom power per channel.

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3   *Card Types*

Six types of cards with Euroblock / Phoenix connectors can be incorporated into the card slots

- 8 microphone inputs

- 8 line inputs

- 8 line outputs

- 8 microphone inputs with two independent preamps each

- 8 AES/EBU inputs with sample rate converters

- 8 AES/EBU channels switchable to inputs or outputs in groups of four

The PG16/PG8-FX is shipped preconfigured with I/O cards according to the order placed with Clear-Com.

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4   Front Panel

4.1   PG16-FX
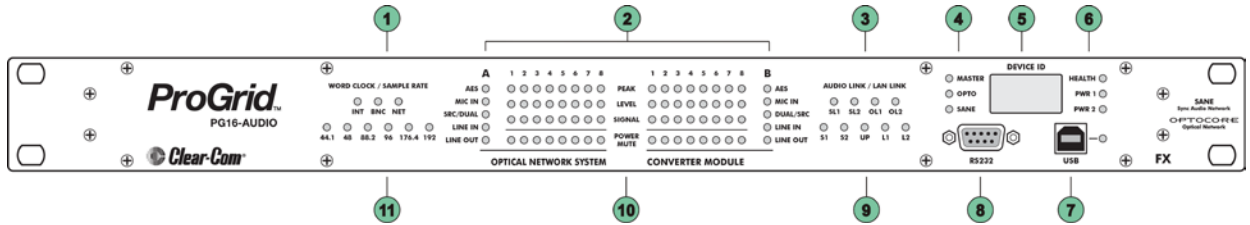
4.2   PG8-FX
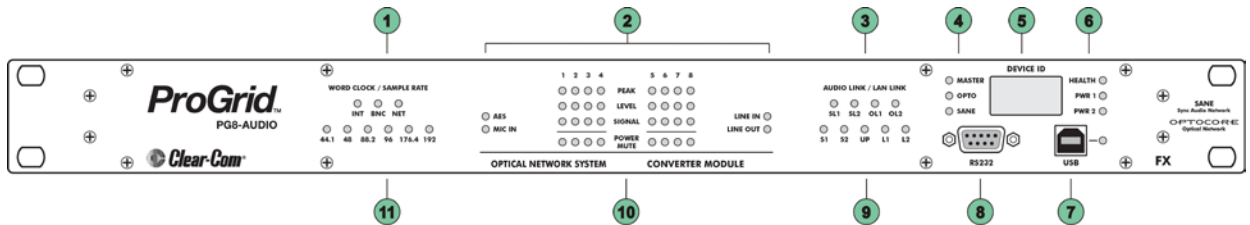
①	**Word Clock LED:**	Indicates the selected word clock source: INT: Internal word clockBNC: External via BNC Input AES: External via AES

② Card and Signal Monitor for the 2 x 8 Channels (1 x 8 for PG8)

	A and B	Card in slot A and B: AES IN: 16 channel sample rate conversion card MIC IN: 8 channel microphone input card DUAL: 16 channel microphone input card with 8 microphone inputs and two independent preamps each LINE IN: 8 channel line input card LINE OUT: 8 channel line output card
	PEAK	Red: Overflow, input level exceeds max. input level of 0dBFS
	LEVEL	Yellow: Warning level, input level exceeds -10dBFS
	SIGNAL	Green: Signal present ≥ -60dBFS, brightness controlled

③ AUDIO LINK:

	SL1:	Communication is established via SANE 1 (rear panel)
	SL2:	Communication is established via SANE 2 (rear panel)
	OL1:	Communication is established via Optocore LINK 1 (rear panel)
	OL2:	Communication is established via Optocore LINK 2 (rear panel)

④	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:

S1: Ethernet communication is established via SANE 1 (rear panel)
S2: Ethernet communication is established via SANE 2 (rear panel)
**UP:** 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) POWER / MUTE Mic Card Phantom Power / Output Card Mute

(11) Sample rate LED: Yellow: 44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz

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5 Rear Panel

5.1 PG16-FX with Analogue Input- and Output Cards
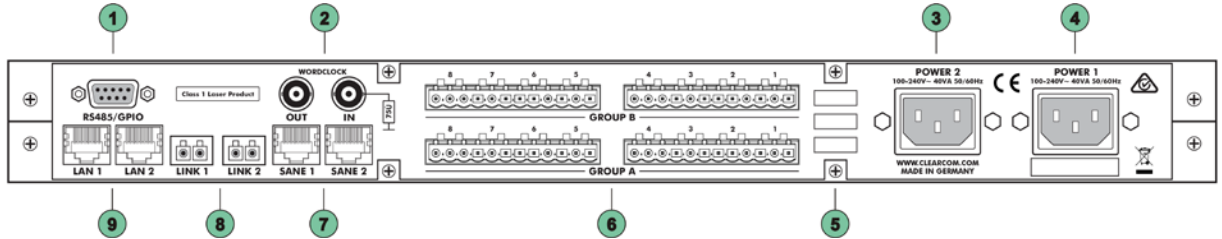
5.2 PG8-FX or PG16-FX with Dual Microphone
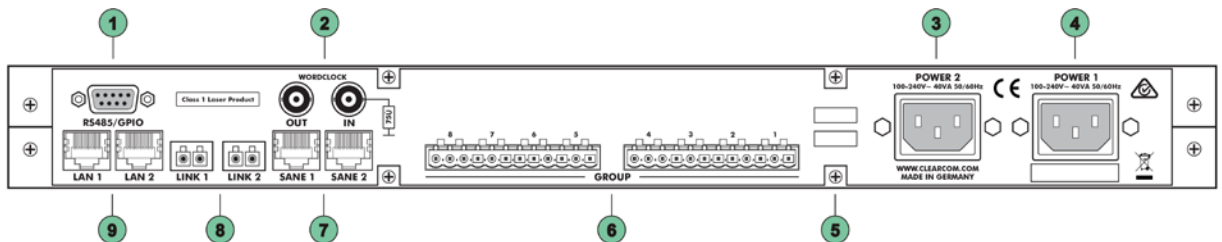
1	**RS485/GPIO plug:**	D-Sub-9 RS485 AUXILIARY PORT for data transmission
2	**Word Clock IN:**	BNC Word clock input allows synchronization of ProGrid devices to an external word clock source
	Word Clock OUT:	BNC Word clock output for synchronization of external devices
3	**POWER 2:**	Mains input for power supply 2 (100 … 240 V)
4	**POWER 1:**	Mains input for power supply 1 (100 … 240 V)
5	**Labels:**	Information about card types in the slots
6	**GROUP:**	Cards with Euroblock / Phoenix connectors (8 channels) in slot GROUP A and GROUP B at a PG16 or in slot GROUP at a PG8
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

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6   *Device Details*

6.1   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.

6.2   A/D and D/A Converter

24-bit converters supporting sample rates of 44.1, 48, 88.2, 96, 176.4, 192 kHz ensure the high-quality conversion of analogue audio signals.

6.3   Analog Inputs

The microphone inputs include preamps with selectable gain between -4 dB to 66 dB in analogue 1 dB steps Phantom Power (+48V) can be activated individually on each input. The maximum input level is +22 dBu.

The line inputs gain controls can be individually adjusted in four steps of maximum input level 27 dBu, 22 dBu, 18 dBu and 8 dBu.

6.4   Analog Outputs

The outputs gain controls can be individually adjusted in four steps of maximum output level 22 dBu, 18 dBu, 12 dBu and 8 dBu.

6.5   SANE Ports

All FX units are equipped with two RJ45 200MBit SANE Ports for 64 channels synchronous audio + 100MBit Ethernet.

6.6   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.

6.7   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 PG16/PG8-FX units are equipped with an internal, high quality and extremely low jitter word clock. Any PG16/PG8-FX can act as master to pass the word clock to further ProGrid or 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.

6.8   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.

6.9   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 mains 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!

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7 Control

All system and device parameters are set using OPTOCORE CONTROL on a PC. If the PG16/PG8-TP units are connected to a FX Device using SANE or PG32-AES-FX using the BI-B cables as shown in Mains-Connection.

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8 Channel Allocation

8.1 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 transport of Ethernet compatible data the capacity is reduced to one CVBS video channel plus 100 Mbps Fast Ethernet.

8.2 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 connectors. 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. (Please refer to Product Brochure available at www.clearcom.com).

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 RS485 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 an 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 shielded twisted-pair-cable (Cat-3, Cat-5) with RJ-45 connector.

9.9　Word Clock-Connection

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

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9.10   Mains-Connection

Standard power cords with IEC C13 sockets can be used.

9.11   Hardware Connection Example

The PG16-FX can be used as a SANE to ProGrid converter. The PG16-FX with analog I/O cards is connected with three PG16-TPs with different types of cards and one PG8-TP by CAT5 cables. The word clock is transmitted by SANE and ProGrid, so there is no need to use 75 Ω cables. The following figure demonstrates the configuration of a 32 send, 8 AES and 24 return SANE system which can be combined with a bigger ProGrid ring. In this example there are two ProGrid PG16-TP units using two input cards each - one PG16-TP with two input cards, one PG16-TP with AES in/out card and output card. There is also one PG8-TP with one output card, one PG16-TP with one DualMic card and one PG16-FX with one input and one output card. All those devices are creating a CAT5 SANE network. The PG16-FX device is used as a bridge between SANE and ProGrid network.
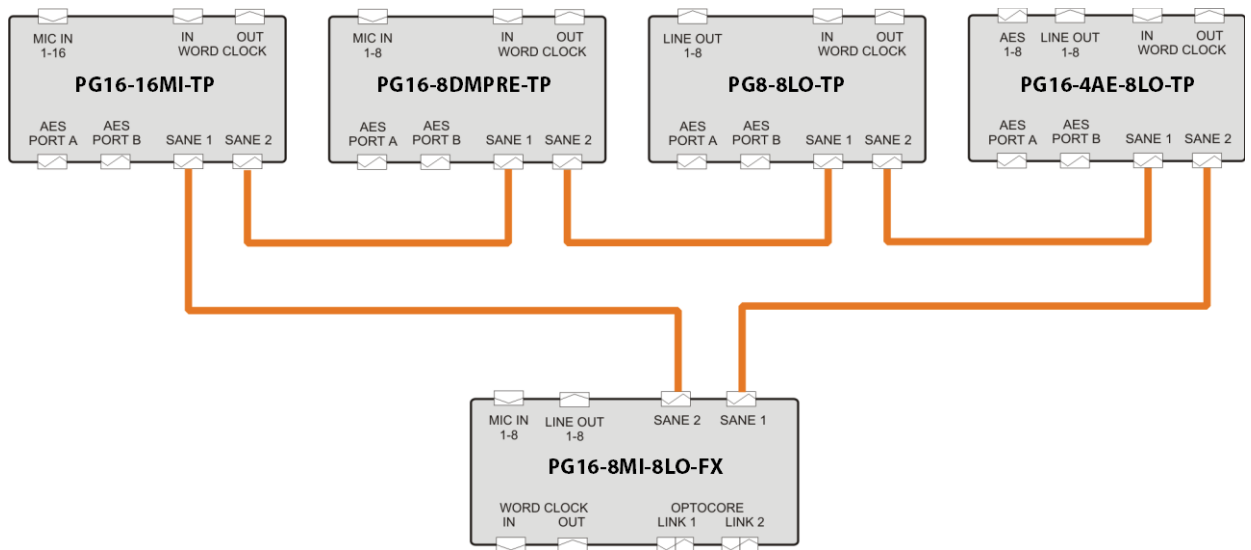
Fig. 1: Connection of three PG16-TP units, one PG8-TP and one PG16-FX.

Each of the devices in this example is an analogue converter with SANE network interface. It is possible to use AES ports which are built in each TP device to input or extract digital audio channels to/from the network. The configuration of the AES ports as inputs and/or outputs and the routing is carried out with OPTOCORE CONTROL. It is possible to route input channels from other devices in an ProGrid ring to the –TP outputs.

The same single CAT5 connection transports audio data, word clock and 100 Mbit Ethernet.

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 PG16-FX or PG8-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 PG16-FX and PG8-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.

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   Connection Tables

Pin-out	Balanced Mic/Line Inputs, Line Outputs		
	Each Channel		
	+	-	GND
Euroblock			

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.
		1	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
		VBUS	D -	D +	
					USB device-connector
	Pin	1	2	3	4

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12   *Technical Specifications*

Analog Audio Mic Inputs	ADC			
Impedance, Gain / steps	Single and Dual	4.5kΩ	-4 dB to +66 dB	1 dB steps
Maximum input level	@ -4 dB Gain	+22 dBu	@ +66 dB Gain	-48 dBu
SNR	@ -4 dB Gain	122.5 dB(A)	@ +66 dB Gain	81.5 dB(A)
THD+N @ -1dBFS	@ -4 dB Gain	≤ -102 dB	@ +40 dB Gain	≤ -100 dB

Analog Audio Line Inputs	ADC			
Impedance, Gain / steps		10kΩ	-9, -4, 0, +10 dB	4 steps
Maximum input level	@ -9 dB Gain	+27 dBu	@ +10 dB Gain	+8 dBu
SNR	@ -9 dB Gain	127.5 dB(A)	@ +10 dB Gain	108 dB(A)
THD+N @ -1dBFS	@ -9 dB Gain	≤ -102 dB	@ +10 dB Gain	≤ -102 dB

Analog Audio Line Outputs	DAC			
Impedance, Gain / steps		22Ω	+4, 0, -6, -10 dB	4 steps
Maximum output level	@ +4 dB Gain	+22 dBu	@ -10 dB Gain	+8 dBu
SNR	@ +4 dB Gain	123 dB(A)	@ -10 dB Gain	108 dB(A)
THD+N @ 0dBFS	@ +4 dB Gain	≤ -100 dB	@ -10 dB Gain	≤ -103 dB

Conditions	Reference 0dBFS ≡ 18dBu, Input / Output Termination 150R / 300R, Sample Rate 48kHz. Specs noticed as typical, if not otherwise stated

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	IEEE - 802.3	10/100 Mbit/s

SANE, LAN	Convention	
Audio	TIA - 568A/B, Optocore	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

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

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13   *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 ≡ 4.41 lbs

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

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14   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 PG16-FX and PG8-FX products comply 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

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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 14-1: WEEE Symbol

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15   *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.