Issue 6

GLENSOUND LTD.

Broadcast Equipment Manufacturers

Copper 29
Glensound Telephone balance Unit
Handbook

GLENSOUND ELECTRONICS LIMITED

Copper 29 HANDBOOK

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Overview

The Glensound Copper 29 is a high performance Telephone Balance Unit designed to interface to analogue telephone lines. A high performance network echo canceller enables the unit to achieve excellent isolation between send and receive circuits.

Two balanced analogue inputs and two balanced analogue outputs are provided. Additionally AES3 inputs and outputs are provided to allow easy interfacing to digital studio equipment.

Provision has been made for a telephone handset for call set up.

The Copper 29 is available in a single (Copper 29/S) or twin (Copper 29/T) 19-inch 1U sub-rack mounted unit, or in a single desktop style case (Copper 29/SD).

Full remote control may be achieved using either the DC loops or RS232 serial interface.

IMPORTANT SAFETY INSTRUCTIONS

Read this safety sheet prior to installation or initial use. This generic safety sheet covers multiple product configurations across our range. The full operating & installation manual and model-specific technical specifications are available online at: www.glensound.com

 DANGEROUS VOLTAGE: This symbol is intended to warn that dangerous voltages within the product are present and constitute a risk of electric shock.	 IMPORTANT INSTRUCTIONS: This symbol is intended to highlight that there are important operating, installation, and maintenance instructions in the literature accompanying this unit.
 **THIS UNIT MUST BE EARTHED (Class I Mains Models):** English: This symbol highlights that the equipment must have a valid earth connection with the protective earthing conductor. Danish: *Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.* Finnish: *Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.* Norwegian: *Apparatet må tilkoples jordet stikkontakt.* Swedish: *Apparaten skall anslutas till jordat uttag.*	 **CAUTION – SHOCK HAZARD: DISCONNECT ALL POWER SOURCES:** This symbol warns that the product can be energised simultaneously from more than one power source (e.g., dual AC mains supplies, external DC power, and/or PoE). Care must be taken if accessing internal components. Ensure that ALL connected power supplies are fully disconnected.

1. Read & Keep Instructions: Read these instructions, keep these instructions, heed all warnings, and follow all instructions.

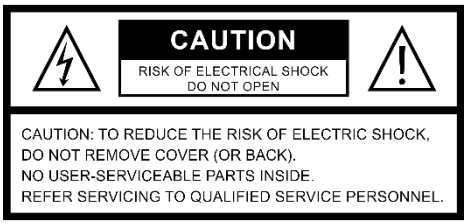
2. Indoor Use & Moisture: Unless otherwise specified in the model-specific manual, this product is intended for indoor use only. Do not use this apparatus near water, and do not expose this product to rain or moisture.

3. Ambient Temperature: The intended ambient operating temperature of this product is 0°C to 40°C (or 0°C to 50°C where specified in the model-specific technical specifications in the online user manual).

4. Cleaning & Heat Sources: Clean only with a dry cloth. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

5. Cable & Cord Protection: Protect all power cords and network cables from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

6. Attachments & Lightning: Only use attachments/accessories specified or supplied by the manufacturer. Unplug this apparatus during lightning storms or when unused for long periods of time.





7. Servicing & No User-Serviceable Parts: The product contains no user-serviceable parts and must not be disassembled or modified in any way. Doing so could result in personal injury and/or product failure. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when a power supply cord 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.

8. Professional Environment: This equipment is not suitable for use in locations where children are likely to be present.

POWER SUPPLY & DISCONNECT INSTRUCTIONS (APPLICABLE BY MODEL CONFIGURATION)

9. Simultaneous / Redundant Power Sources (Mains, DC & PoE): Depending on the model, this product may be powered by a single source or simultaneously by multiple redundant power sources (dual AC mains inlets, an AC mains inlet, an external DC power input, and/or Power over Ethernet [PoE]). Disconnecting a single power lead will NOT isolate the unit if another power source remains connected. To completely de-energize the equipment, unplug ALL connected AC mains cords, DC barrel jack/external DC connectors, and PoE RJ45/etherCON network cables.

10. AC Mains Disconnect Devices (Single or Dual IEC Inlets): Where AC mains inlets are fitted, the mains plug(s) and rear-panel IEC appliance coupler(s) serve as the disconnect device(s). On dual-mains models, both mains' cords must be unplugged to isolate the unit from AC mains power. The socket-outlet(s) used for mains power must be installed near the equipment and be easily accessible.

11. Plug Grounding & Polarization (AC Mains Models): Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has 2 blades with one wider than the other. A grounding-type plug has 2 blades and a third grounding prong provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

12. Approved Detachable Earthed Mains Cords (Class I AC Mains Models): Use only approved detachable 3-core earthed mains cords (minimum H05VV-F 3G0.75 mm² with IEC 60320-1 C13 connector) rated for the country of installation: • United Kingdom: Use a BS 1363-1 approved molded plug fitted with a 5 A ASTA-approved BS 1362 fuse. • European Union: Use a CEE 7/7 (Schuko/French) earthed plug. • Denmark: When connecting to wall socket-outlets in Denmark, use an approved 3-pin earthed plug complying with DS 60884-2-D1 (Standard Sheet DK 2-1a) to ensure protective earthing is maintained. • USA/Canada: Use a UL-listed / CSA-certified 3-conductor grounding power cord [minimum 18 AWG, SVT/SJT] with a NEMA 5-15P plug. • All other regions: Use a nationally safety-approved 3-core earthed mains cord rated for the country of installation.

13. Internal Primary Fusing & Neutral Fusing Warning (AC Mains Models – Service Personnel Only): Internal primary fuse(s) are located between the Live terminal of the IEC inlet and the Live input of the power supply and should only be changed by a qualified service engineer using a correctly rated replacement as specified in the product handbook. WARNING – Neutral Fusing: Because the AC mains plug may be reversible in some electrical distribution systems, the internal primary fuse may be located in the neutral conductor. Always disconnect all AC mains power cords completely from the IEC inlet(s) to de-energize all phase conductors before opening the enclosure or servicing the unit.

14. Power over Ethernet (PoE) Models: Unplugging the RJ45 / etherCON network cable disconnects PoE power from the unit. The Ethernet cable intended to be connected to the unit is for indoor building routing only and must not exit the building structure without appropriate primary surge protection.

15. External DC / USB Power Input Models: Connect only the manufacturer-supplied AC/DC power adaptor (where provided), or a safety-approved external DC or USB power supply complying with BS EN IEC 62368-1 (classified as ES1 and PS2/Limited Power Source [LPS]) that matches the voltage, minimum current rating, and pin polarity marked adjacent to the DC/USB input connector or specified in the product manual. The external power adaptor plug and the DC/USB input connector serve as the DC disconnect devices and must remain readily accessible; unplugging the DC/USB connector disconnects external DC power only and will not isolate the unit if AC mains or PoE remains connected.

INSTALLATION, THERMAL, MECHANICAL & OPTICAL SAFETY (APPLICABLE BY MODEL CONFIGURATION)

16. Ventilation & Sealed Heatsink Enclosures: Do not block any ventilation openings; install in accordance with the manufacturer's instructions. On models where the aluminum enclosure acts as the units heatsink, do not cover the unit or speaker grille with soft furnishings, cloths, or curtains, and allow free airflow around the housing.

17. 19-Inch Equipment Rack Installation (Rack-Mount Models): Rack-mounted models are designed for stationary installation in a standard 19-inch equipment rack. Secure the unit to the front rack rails using all four mounting holes on the integral rack ears with appropriate rack screws (e.g., M6 screws and cage nuts). Ensure that ventilation openings on the chassis are not obstructed by rack walls or cabling.



18. Carts, Stands, Brackets & Tip-Over Hazard: 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.

19. Optical SFP Transceiver Modules (Where fitted): Any optical SFP transceiver modules installed in this product must be certified Class 1 Laser Products in accordance with IEC/EN 60825-1. Do not look directly into open optical ports or fiber-optic cable ends while the equipment is energized.



Disposal (WEEE): the crossed-out wheeled bin symbol means this product must not be disposed of with household waste. Take it to an approved electrical and electronic equipment recycling point, or contact Glensound for advice.

Declaration of conformity: Glensound declares that this product complies with the applicable UK and EU legislation. The full declaration of conformity is available at www.glensound.com.

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CE
DECLARATION OF CONFORMITY

Manufacturers

Name:	Glensound Electronics Ltd
Address:	6 Brooks Place, Maidstone, Kent, ME14 1HE

Equipment

Model Number	GS Copper 29 TBU
Description	Dual Telephone Balance Unit
Year of Manufacture	2010

EMC DIRECTIVE 2004/108/EC

Standards to which conformity is declared

Emissions	EN 61000-6-3
Immunity	EN 61000-6-1
Low Voltage Directive	EN 60065
Telephone Network	ETSI ES 203 021

I the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Signed



Full Name Gavin George Davis

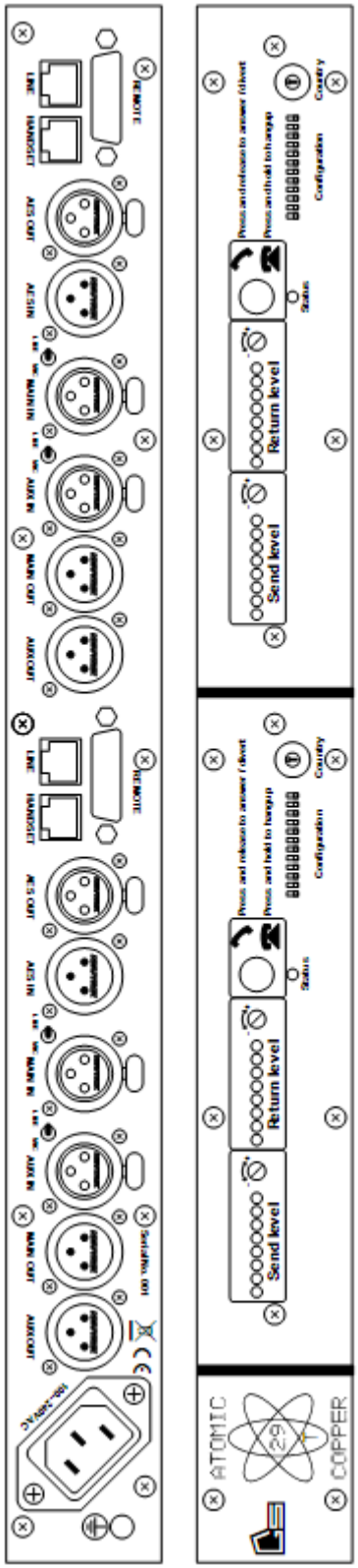
Position in Company **Managing Director**

Date **01/10/2010**

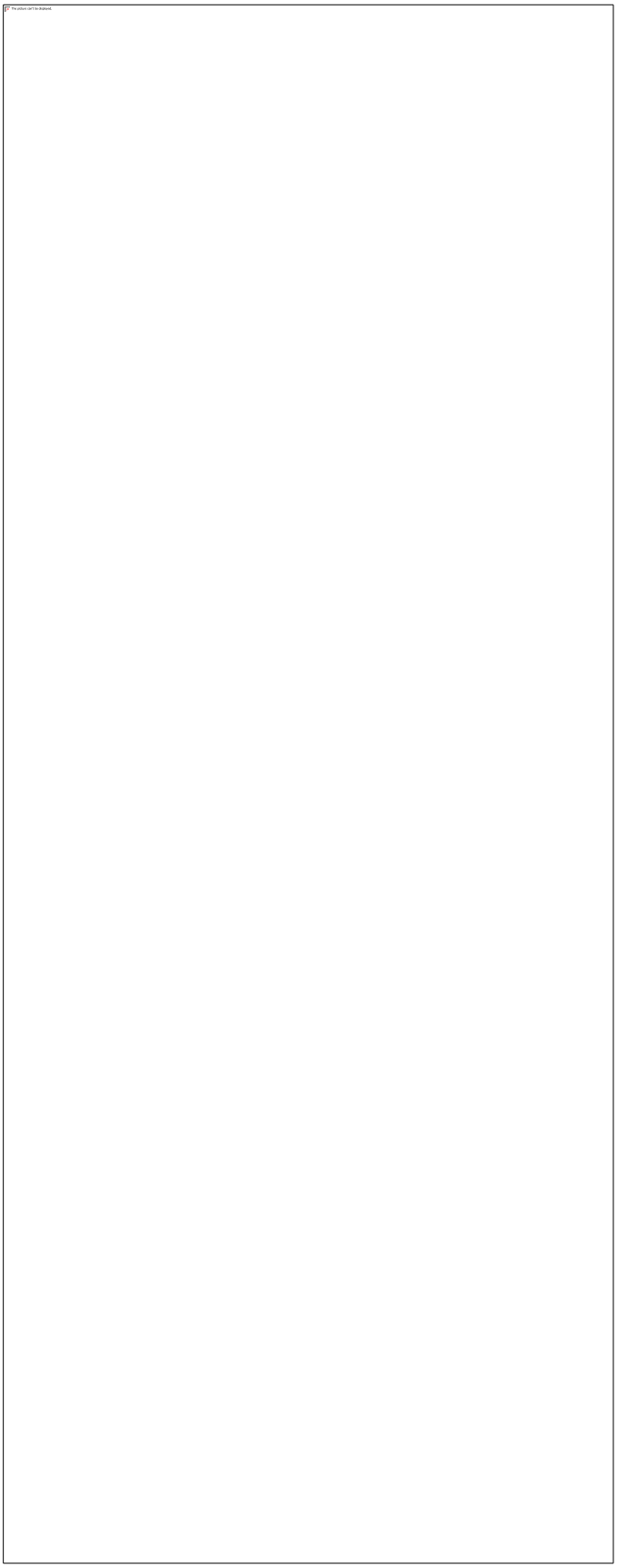
Place Maidstone Kent

Declaration of Conformity number DoC-1001

Panel Drawings



Block diagram



Description

Telephone Line Interface

A Direct Access Arrangement (DAA) chip-set with world wide approvals provides the interface to the telephone line. Data to/from the DAA is processed by DSP1.

DSP1

DSP1 is the main system processor. It performs the following functions:-

- Network echo cancellation.
- Acoustic echo cancellation.
- DTMF generation.
- Disconnect Tone detection.
- System monitoring and control.
- Serial control interface.

The network echo canceller cancels echo's with a tail length of up to 64mS.

DSP2

DSP2 is a dedicated audio processor running at 48KHz sample rate. It provides the following functions.

- Sample rate conversion to and from the AES inputs & outputs.
- Sample rate conversion to and from DSP1.
- Receive noise gating.
- Ducker.
- Audio switching and routing.
- Receive automatic gain control.
- Send and receive level controls
- Send and receive metering

CPLD

The CPLD provides all system clocks and general interface logic.

Power Supply

The Copper 29 TBU is powered by a high reliability mains input switched mode supply. This produces a bulk 5V supply which is used to generate the +3.3V and +/-12V supplies required by the TBU electronics.

Front Panel

Metering

Two eight LED bar-graph meters provide level metering for the send and receive signals.

Gain control

Two Pre-set level controls allow +/-10dB of gain adjustment for send and receive signals.

On hook / Off hook control

An illuminated push button provides on hook /off hook control. The button is illuminated to indicate off hook status, and flashes to indicate an incoming call (ringing). Press and release to go off hook, press and hold for 2 seconds to go on hook.

Power and status indication

The front panel power LED also indicates fault conditions. Under normal conditions the LED should be on. The LED will turn off momentarily in case of receiver overload, or flash to indicate more serious faults.

LED state	Status
On	Normal
Momentarily off	Receiver overload. Can be caused by transient noise on the line.
Off, three short flashes, off	Line current fault. Usually caused by the TBU being disconnected from the line
Off, four long flashes, off	DAA chip set fault
Off, five long flashes, off	CPLD or DSP2 communication fault.

DIP configuration switches

A set of 12 DIP switches allow configuration of the TBU. The switch functions are described in the table below.

DIP Switch Settings	
1	Network echo canceller enable.
2	Acoustic echo canceller enable. **See note below*
3	Auto answer.
4	Auto answer period. Off 2 rings, On 8 Rings
5	DAA full scale. Off 0dBm (normal), On +6dBm
6	Telephone line line-up level.
7	Tone disconnect.
8	K-Break disconnect.
9	Ducker. **See note below*
10	RX AGC.
11	RX noise gate.
12	B leg mix function. When enabled the B leg of the audio output will be a mix of the send and receive signals.

*The acoustic echo canceller may be used to generate a clean feed where the mixing desk cannot generate one. When using a desk without a clean feed the ducker function should not be used.

Country selection switch

A 16 position country selection switch allows the telephone line parameters (AC impedance etc.) to be set to the appropriate Telecom standard.

Switch position	**Region / Country**
0	UK
1	CTR21
2	TBR21
3	USA
4	Thailand
5	South Korea
6	Japan
7	Brazil
8	Bulgaria
9	South Africa
A	Australia
B	New Zealand
C	Nortel PABX
D	PABX 425Hz 500mS/500mS disconnect
E	France
F	Custom configuration via serial port

Rear Panel

Analogue audio I/O

Two analogue audio inputs are provided. They may be individually switched between microphone and line levels. These inputs do not provide phantom power.

Two analogue line level audio outputs are provided.

Digital auidio I/O

AES3 digital inputs and outputs are provided. The output sample rate will follow the input over a range of 32-192KHz. In the absence of any input the output defaults to 48KHz sample rate.

Remote control interface

The Copper 29 TBU may be remotely controlled using the DC loop inputs or the RS232 interface. The DC loop inputs should be shorted to ground to activate the function described in the table below.

Remote control interface 15 way D socket

DB 15 Pin	Direction	Function
1	Output	RS232 Serial TX
2	Input	RS232 Serial RX
3	NC	
4	Output	Open collector Status output. Off = On hook, On = Off hook, On/Off = Ringing
5	Input	On hook switch.
6	Input	Fast hangup option. Open for normal operation, ground to remove 3 second safety delay on hangup.
7	Input	Mute TX B
8	Input	Mute RX B
9	Input/Output	Ground
10	Input/Output	Ground
11	Input/Output	Ground (Optional 5V @ 50mA. Requires V4 PCB)
12	Input	On hook / Off hook. Identical to front panel switch.
13	Input	Reserved
14	Input	Mute TX A
15	Input	Mute RX A

RS232 Serial interface remote control functions.

The serial interface parameters are 57600 baud, 8N1. All commands are case sensitive and must be terminated with a carriage return.

AT commands	Description	Permitted values
ATA	Answer – go off hook	
ATDTnnn..	DTMF Dial the number nnn. Example: ATDT1234<CR>	0-9,*,#,A,B,C,D.
ATH0	Go on hook	None
ATH1	Go off hook	None
The following commands allow direct access to registers in the DSP and should be used with care.		
AGR commands	**Description**	**Permitted values**
AGR parameter,value	Set register value	
AGR 200,nnnnn	Set disconnect tone coefficient	0x00-0xFFFF
AGR 201,nnnnn	Set disconnect tone threshold	0x00-0xFF
AGR 202,nnn	Set disconnect event count	0x00-0xFF
AGR 203,nnn	Set disconnect tone pattern high word	0x00-0xFFFF
AGR 204,nnn	Set disconnect tone pattern low word	0x00-0xFFFF
AGR 205,nnn	Set disconnect tone mask high word	0x00-0xFFFF
AGR 206,nnn	Set disconnect tone mask low word	0x00-0xFFFF
AGR 207,nnn	Reserved	
AGR 208,n	Set acoustic echo canceller state.	1=on, 0=off
AGR 209,n	Set line echo canceller state.	1=on, 0=off
AGR 210,n	Set K-Break disconnect state.	1=on, 0=off
AGR 211,n	Set Tone disconnect state.	1=on, 0=off
AGR 212,n	Set auto answer state.	0=off, 1-15 number of rings
AGR 213,nnn	Set auto answer time-out value.	0-255
AGR 214,n	Set DAA FS.	0=0dBm, 1=+3dBm, 2=+6dBm
AGR 215,nn	set country.	0-15
AGR 216,n	set conference mode	1=on, 0=off
AGR 217,n	mute rx A leg	1=mute, 0=normal
AGR 218,n	mute rx B leg	1=mute, 0=normal
AGR 219,n	mute tx A leg	1=mute, 0=normal
AGR 220,n	mute tx B leg	1=mute, 0=normal
AGR 221,n	Set ducker state.	1=on, 0=off
AGR 222,n	Set agc state.	1=on, 0=off
AGR 223,n	Set noise gate state.	1=on, 0=off
AGR 224,n	Set B leg audio function state.	1=on, 0=off
AGR 100-159,nnn	Set DAA chipset register value.	Values between 0 and 0xFF set new value. >255 or ? read current value
AGW	Write custom configuration to memory.	None.

Serial response and error messages.

Message	
SYSTEM_START_3	DSP1 has rebooted
OFF_HOOK	TBU has gone off hook
ON_HOOK	Front panel switch or DC loop has caused TBU to go on hook
+ON_HOOK	K-BREAK has caused TBU to go on hook
*ON_HOOK	Disconnect tone has caused TBU to go on hook
RING	TBU is ringing
AUTO_ANS	TBU has auto answered a call
E_FR	DAA chip set Framing error
E_LC	Telephone line under or over current fault
E_BF	RS232 Serial buffer full
E_RO	DAA receiver overload
E_IC	An invalid character was sent to the RS232 interface.
E_COM	Communications error with DSP2 or CPLD
POLI	Line Polarity inversion detected
DODI	Line drop out (K-BREAK) detected

Operation

Making a call

Connect the Copper 29 to the telephone line and audio interfaces as required.

Connect a telephone to the 'handset' socket on the rear panel.

Dial the number required using the telephone.

Divert the call to the TBU by pressing the off hook button on the TBU. The telephone will be disconnected and the call will be diverted to the TBU.

Adjust the level controls as required.

When the call has ended, hang up the TBU by pressing the on hook / off hook button for ~2 seconds.

To answer an incoming call press and release the on hook / off hook button.