MACROTEL X1
MACROTEL X2

User Manual

1 or 2 Telephone Line
Digital Telephone Hybrid

(Rev. 3.0 ENG)

AXEL TECHNOLOGY

SEDE DI BOLOGNA:
VIA CADUTI DI SABBIUNO 6/F • 40011 ANZOLA EMILIA • BOLOGNA • ITALY
PHONE: +39 051 736555 • +39 051 736154 • FAX: +39 051 736170
e-mail:info@axeltechnology.com • http://www.axeltechnology.com

SEDE DI BERGAMO:
VIA ITALIA, 1
24030 MEDOLAGO • BERGAMO • ITALY

SEDE DI LUCCA - Broadcast Audio Devices s.r.l.
VIALE MARCONI, 86
55045 PIETRASANTA • LUCCA • ITALY

SEDE DI ROMA:
VIA SALARIA, 233 C
00015 MONTEROTONDO • ROMA • ITALY

1 CONTENTS

1 INTRODUCTION

MACROTEL X1 AND MACROTEL X2 – AVAILABLE VERSIONS

CODE#	ARTICLE	DESCRIPTION
A112080000	**MACROTEL X1**	Digital telephone hybrid, 1 PSTN/POTS line. DSP audio processing, input and XLR analog output. RX/TX level displayed on LCD display. Possibility of adding 1 optional GSM module. USB and Serial port. GPIN and GPOUT for Telco modules. 19" 1u Rack. Incorporated universal power supply.
A112090000	**MACROTEL X2**	Digital telephone hybrid, 2 PSTN/POTS lines. DSP audio processing, input and XLR analog outputs. RX/TX level displayed on LCD display. Management of 2 optional GSM modules. USB and Serial port. GPIN and GPOUT for Telco modules. 19" 1u Rack. Incorporated universal power supply.

OPTIONAL ITEMS AVAILABLE FOR MACROTEL X1 AND MACROTEL X2

CODE#	ARTICLE	DESCRIPTION
A112080300	**PHX-MCT-GSM**	GSM interface for PHONEX D1-D2 and MACROTEL X1-X2

1.1 MAIN FEATURES

Macrotel X1 and Macrotel X2 are entirely digital telephone hybrids with DSP (Digital Signal Processor) audio processing, expressly studied to offer high audio performance for the broadcast market. Macrotel X1 manages an analog *two-wire* PSTN/POTS line, while Macrotel X2 manages up to two POTS/PSTN lines. There is the option to connect both models (each line) to an external GSM modem (PHX-GSM). The digital audio processing system offers high performance and excellent send/receive separation. Both Macrotel X models can be controlled from the front panel, from PC using dedicated software, via web page and using GPIO and TCP/IP type commands.

1.2 USE OF THIS MANUAL

This manual is for the Macrotel X1 and Macrotel X2. Some functions may not be available on the Macrotel X1 model.

1.3 MACROTEL X1 – MACROTEL X2 – DEPLIANT AND BROCHURE

Macrotel X1

Macrotel X2

HIGHLIGHTS

- Digital Telephone hybrid based on DSP audio process
- 1 or 2 land/wireless lines managed via pots or GSM QuandBand
- Audio controls: AGC Stage, Attenuator, Echo canceller, 2Band Eq
- Integrated DTMF dialer via software with auto-answer and disconnection
- Separate send and receive over balanced XLR with Mic/Line software selection
- 2 Rs232 serial ports, 1 USB B-type, Gpio for Telco N-1 mixing console.

MAIN DESCRIPTION

Macrotel X1 and Macrotel X2 are the Axel Technology's Telephone hybrid third generation for a supreme audio quality. Macrotel X1manages one line pots/pstnwhile Macrotel X2 can operate on two lines pots/pstn.
Moreover, in every landline it's available a switching "land to wireless mode" through one or two optional QuadBand GSM module to establish telephone connection where wired lines are not arranged. Macrotel X1 and Macrotel X2's telephone interface perfectly suits to every phone line all over the world. Via software the user sets the country's operation.
The audio treatment takes place via DSP, together with the automatic gain control (A.G.C) allows to obtain a loud and clear receiving level, always steady even when the audio caller conditions changes quickly. Audio controls available on the series Macrotel X1 and Macrotel X2 are: Echo canceller with a range from 16 to 32ms, 1 A.G.C stage, 2Band Equalizer and Attenuator audio feature.
Furthermore, the Hold function lets you to put the caller on hold before being placed OnAir.

Macrotel X1 and Macrotel X2 front panel controls allows operators to manage phone calls quickly, while the graphic display LCD shows Send and Receive audio levels. The audio inputs and outputs are over electronically balanced XLR connectors, and *send* input has been designed to be managed as *line level* or *microphone level* to match perfectly every single user needs. Both telephone hybrid are manageable via USB and Serial connection, or directly from Telco N-1 mixing console modules. The software manages the phone hybrid operativity globally, it means the user may change the working audio parameters and operative mode without any physical action over the equipments.
Auto-ranging internal switching power supply to use the equipment all around the world. Macrotel X1 and Macrotel X2 occupies 1 standard RU.

TECH SPECS MACROTEL X1 - MACROTEL X2

General Features	Macrotel X1	Macrotel X2
End User / Price List	799 €	1.085 €
Lines	1 Pots/Pstn Line or 1 Gsm Line *(by option)*	2 Pots lines or 2 GSM lines*(by option)* or 1 Pots line + 1 GSM line *(by option)*
Phone Line	1x RJ11 6/4	2x RJ11 6/4
Set Line	1x RJ11 6/4	2x RJ11 6/4
GSM Line	1x RJ10	2x RJ10
Line Mode	Standard 2-Wire connection or GSM*(by option)*	
Telephone Set mode	Worldwide mode, software setup	
Audio Features		
Audio process	24Bit-120Mhz DSP-Based audio process	
A.G.C	Fixed - 1 stage	
Ducking	No	No
Echo canceller	Yes	Yes
De-Noiser	No	No
Attenuator	Yes	Yes
2-Band EQ	Yes	Yes
Tone generator	0 dBu @ 800 Hz	0 dBu @ 800 Hz
Dialer keypad Software	Yes	Yes
DTMF Decoder	No	No
Conference Mode	No	Yes
Auto call Hook/Drop	Yes	Yes
Front Panel operation		
Hook / drop push button	Yes, separate Hook and Drop	Yes, same button for Hook and Drop
Ring light	Hook-1 push button	Hook-1 & Hook-2 push button
LCD Panel	160x32p LCD graphic display	
Level Send & receive	Showed in LCD graphic display	
Audio Input and Output		
Send Analog-1	1x XLR female electronically balanced	1x XLR female electronically balanced
Send Digital-1	No	No
Receive Analog-1	1x XLR male electronically balanced	1x XLR male electronically balanced
Receive Digital-1	No	No
Send Analog-2	1x XLR female electronically balanced	1x XLR female electronically balanced
Send Digital-2	No	No
Receive Analog-2	1x XLR male electronically balanced	1x XLR male electronically balanced
Receive Digital-2	No	No
Microphone Input	Software switch Mic/Line	
Remote Control		
GPIO Connector	SubD 15p HD	
GPIO Type	4x GP In optocoupled, 4x GP Out Open Collector optoisolated	
USB	1x USB – B Type EMI Filtered	
Serial	2x Rs232 EMI Filtered	
Software Remoter	Yes	
GSM Wireless module	*by option*	
Ethernet Port /Web Server	No	
Parser ASCII protocol	No	

1 SAFETY WARNINGS / ISTRUZIONI PER LA SICUREZZA

SAFETY WARNINGS

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(Rel. 2.0)

1.1 FOREWORD

For your own safety and to avoid invalidation of the warranty all text marked with these Warning Symbols should be read carefully.

Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor.

The manufacturer shall not be liable for any loss or damage whatsoever arising from the use of information or any error contained in this manual, or through any mis-operation or fault in hardware contained in the product.

It is recommended that all maintenance and service on the product should be carried out by the manufacturer or its authorised agents. The manufacturer cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel.

2 SAFETY WARNINGS

The installation and servicing instructions in this manual are for use by qualified personnel only.

- **Read All Instructions.** All safety and operating instructions must be read before operating the product. They also must be retained for future reference, as it contains a number of useful hints for determining the best combination of equipment settings for Yr particular application.
- **Heed All Warnings**. All warnings on the product and those listed in the operating instructions must be adhered to.
- **Heat**. This product must be situated away from any heat sources such as radiators or other products (including power amplifiers or transmitters) that produce heat.
- **Power Sources.** This product must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company. Make sure the AC main voltage corresponds to that indicated in the technical specifications. If a different voltage (ex. 110/115 VAC) is available, open the equipment closure and set the voltage switch on the main supply circuit, located behind the AC socket
- **Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product
- **Use only with a 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.
- **Lightning**. For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet and the audio connections. This will prevent damage to the product due to lightning and power line surges
- **Installation**. Configuration and installation should only be carried out by a competent installation engineer
- **Cabling**. Using high quality wires, well protected. Make sure the cable integrity.

This symbol alerts you to the presence of dangerous voltage inside the closure – voltage which may be sufficient to constitute a risk of shock. Do not perform any servicing other than that contained in the operating instructions. Refer all servicing to qualified personnel

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Do not change the voltage setting or replace the mains fuse without first turning the unit off and unplugging the mains cord

Make sure the AC main voltage corresponds to that indicated in the technical specifications. THIS APPARATUS MUST BE EARTHED !

To avoid risk of fire use the correct value fuse, as indicated on the label stuck on the right side of the unit.

This apparatus uses a single pole mains switch and does therefore not separate the unit completely from the mains power. To completely separate from mains power (in the event of danger) unplug mains power cord. As the MAINS plug is the disconnect device, the disconnect device shall remain readily operable.

3 CONSIGNES DE SÉCURITÉ IMPORTANTES

- **Lire ces consignes**
- **Conserver ces consignes**
- **Observer tous les avertissements**
- **Suivre toutes les consignes**
- **Ne pas utiliser cet appareil à proximité de l'eau**
- **Ne pas obstruer les ouvertures de ventilatio**n. Installer en respectant les consignes du fabricant
- **Ne pas installer à proximité d'une source de chaleur** telle qu'un radiateur, une bouche de chaleur, un poêle ou d'autres appareils (dont les amplificateurs) produisant de la chaleur.
- **Ne pas annuler la sécurité de la fiche de terre**, la troisième branche est destinée à la sécurité. Si la fiche fournie ne s'adapte pas à la prise électrique, demander à un électricien de remplacer la prise hors normes.
- **Protéger le cordon d'alimentation** afin que personne ne marche dessus et que rien ne le pince, en particulier aux fiches, aux prises de courant et au point de sortie de l'appareil
- **Utiliser uniquement les accessoires spécifiés par le fabricant**
- **Utiliser uniquement avec un chariot**, un support ou une table spécifié par le fabricant ou vendu avec l'appareil. Si un chariot est utilisé, déplacer l'ensemble chariot–appareil avec précaution afin de ne pas le renverser, ce qui pourrait entraîner des blessures
- **Débrancher l'appareil** pendant les orages ou quand il ne sera pas utilisé pendant longtemps.
- **Confier toute réparation à du personnel qualifié.** Des réparations sont nécessaires si l'appareil est endommagé d'une façon quelconque, par exemple: cordon ou prise d'alimentation endommagé, liquide renversé ou objet tombé à l'intérieur de l'appareil, exposition de l'appareil à la pluie ou à l'humidité, appareil qui ne marche pas normalement ou que l'on a fait tomber.
- **NE PAS exposer cet appareil aux égouttures et aux éclaboussements**. Ne pas poser des objets contenant de l'eau, comme des vases, sur l'appareil

Ce symbole indique la présence d'une tension dangereuse dans l'appareil constituant un risque de choc électrique.

Ce symbole indique que la documentation fournie avec l'appareil contient des instructions d'utilisation et d'entretien importantes.

Avant de modifier le commutateur de changement de tension ou replacer le fusible il faut débrancher l'appareil de la prise électrique. Pendant son usage, l'appareil doit etre branchee à la prise de terre

Utiliser le fusible principal AC avec le valeur qui est indiquée sur l'étiquette collée sur le coffret.

Assurez-vous que la tension principale AC correspond à celle indiquée dans les spécifications techniques.

L'interrupteur d'alimentation interrompt un pôle du réseau d'alimentation excepté le conducteur de terre de protection. En cas de danger, debrancher le cordon d'alimentation. Parce que la prise du réseau de alimentation est utilisée comme dispositif de déconnexion, ce dispositif doit demeuré aisément accessible

4 ISTRUZIONI IMPORTANTI PER LA SICUREZZA

- **Leggere le presenti istruzioni**
- **Conservare queste istruzioni**
- **Osservare tutte le avvertenze**
- **Seguire scrupolosamente tutte le istruzioni**
- **Non usare questo apparecchio in prossimità di acqua**
- **Non ostruire alcuna apertura per il raffreddamento**. Installare l'apparecchio seguendo le istruzioni
- **Non installare l'apparecchio accanto a fonti di calore** quali radiatori, aperture per l'afflusso di aria calda, forni o altri apparecchi (amplificatori inclusi) che generino calore
- **Non rimuovere il terminale di connessione a terra sul cordone di alimentazione**: esso ha lo scopo di tutelare l'incolumità dell'utilizzatore. Se la spina in dotazione non si adatta alla presa di corrente, rivolgersi ad un elettricista per far eseguire le modifiche necessarie.
- **Evitare di calpestare il cavo di alimentazione o di comprimerlo**, specialmente in corrispondenza della spina e del punto di inserzione sull'apparato.
- **Utilizzare solo dispositivi di collegamento e gli accessori specificati dal produttore.**
- **Utilizzare l'apparecchio** solo con un carrello, un sostegno, una staffa o un tavolo di tipo specificato dal produttore o venduto insieme all'apparecchio. Se si utilizza un carrello, fare attenzione negli spostamenti per evitare infortuni causati da ribaltamenti del carrello stesso.
- **Scollegare l'apparecchio dalla presa di corrente** durante i temporali o quando inutilizzato a lungo
- **Per qualsiasi intervento**, rivolgersi a personale di assistenza qualificato. È' necessario intervenire sull'apparecchio ogniqualvolta si verificano danneggiamenti di qualsiasi natura. Ad esempio, la spina o il cavo di alimentazione sono danneggiati, è entrato liquido nell'apparecchio o sono caduti oggetti su di esso, l'apparecchio è stato esposto alla pioggia o all'umidità, non funziona normalmente o è caduto.
- **Non esporre a sgocciolamenti o spruzzi**. Non appoggiare sull'apparecchio oggetti pieni di liquidi, ad esempio vasi da fiori.

Questo simbolo indica la presenza di alta tensione all'interno dell'apparecchio, che comporta rischi di scossa elettrica.

Questo simbolo indica la presenza di istruzioni importanti per l'uso e la manutenzione nella documentazione in dotazione all'apparecchio.

Non sostituire il fusibile o cambiare la tensione di alimentazione senza aver prima scollegato il cordone di alimentazione. L'APPARATO DEVE ESSERE CONNESSO A TERRA.

Sostituire il fusibile generale con uno di identico valore, come indicato sulla etichetta applicata sul mobile dell'apparato

Assicurarsi che la tensione di rete corrisponda a quella per la quale è configurato l'apparecchio

Questo apparato utilizza un interruttore di alimentazione di tipo unipolare e l'isolamento dalla rete elettrica non è pertanto completo. Per ottenere un isolamento totale (ad esempio in caso di pericolo), scollegare il cordone di alimentazione. Inoltre, poichè la spina di alimentazione è utilizzata come dispositivo di sezionamento, essa deve restare facilmente raggiungibile

5 WICHTIGE SICHERHEITSHINWEISE

- **Diese Hinweise LESEN**
- **Diese Hinweise AUFHEBEN**
- **Alle Warnhinweise BEACHTEN**
- **Alle Anweisungen BEFOLGEN**
- **Dieses Gerät NICHT in der Nähe von Wasser verwenden**
- **KEINE Lüftungsöffnungen verdecken**. Gemäß den Anweisungen des Herstellers einbauen
- **Nicht in der Nähe von Wärmequellen**, wie Heizkörpern, Raumheizungen, Herden oder anderen Geräten (einschließlich Verstärkern) installieren, die Wärme erzeugen
- **Die Schutzfunktion des Schukosteckers NICHT umgehen**. Bei Steckern für die USA gibt es polarisierte Stecker, bei denen ein Leiter breiter als der andere ist; US-Stecker mit Erdung verfügen über einen dritten Schutzleiter. Bei diesen Steckerausführungen dient der breitere Leiter bzw. der Schutzleiter Ihrer Sicherheit. Wenn der mitgelieferte Stecker nicht in die Steckdose passt, einen Elektriker mit dem Austauschen der veralteten Steckdose beauftragen
- **VERHINDERN, dass das Netzkabel gequetscht oder darauf getreten wird**, insbesondere im Bereich der Stecker, Netzsteckdosen und an der Austrittsstelle vom Gerät
- N**UR das vom Hersteller angegebene Zubehör** und entsprechende Zusatzgeräte verwenden.
- **NUR in Verbindung** mit einem vom Hersteller angegebenen oder mit dem Gerät verkauften Transportwagen, Stand, Stativ, Träger oder Tisch verwenden. Wenn ein Transportwagen verwendet wird, beim Verschieben der Transportwagen-Geräte- Einheit vorsichtig vorgehen, um Verletzungen durch Umkippen
- **Das Netzkabel dieses Geräts** während Gewittern oder bei längeren Stillstandszeiten aus der Steckdose ABZIEHEN.
- **Alle Reparatur- und Wartungsarbeiten** von qualifiziertem Kundendienstpersonal DURCHFÜHREN LASSEN. Kundendienst ist erforderlich, wenn das Gerät auf irgendwelche Weise beschädigt wurde, z.B. wenn das Netzkabel oder der Netzstecker beschädigt wurden, wenn Flüssigkeiten in das Gerät verschüttet wurden oder Fremdkörper hineinfielen, wenn das Gerät Regen oder Feuchtigkeit ausgesetzt war, nicht normal funktioniert oder fallen gelassen wurde.
- **Dieses Gerät vor Tropf- und Spritzwasser SCHÜTZEN**. KEINE mit Wasser gefüllten Gegenstände wie zum Beispiel Vasen auf das Gerät STELLEN.

Dieses Symbol zeigt an, dass gefährliche Spannungswerte, die ein Stromschlagrisiko darstellen, innerhalb dieses Geräts auftreten.

Dieses Symbol zeigt an, dass das diesem Gerät beiliegende Handbuch wichtige Betriebs- und Wartungsanweisungen enthält.

Vor Änderung der Netzspannung oder Sicherungswechsel Netzkabel trennen.
Das Gerät muss für den Betrieb geerdet werden.

Hauptsicherung nur mit einer gleichwertigen austauschen
(s. entsprechende Etikette).

Vor Einschalten Netzspannungseinstellung am Gerät überprüfen bzw. anpassen.

Inpoliger Netzschalter. In Notfälle oder für Wartungsarbeiten Netzkabel trennen. Der Netzstecker fungiert auch als Trennelement muss deshalb zugänglich bleiben

6 INSTRUCCIONES IMPORTANTES DE SEGURIDAD

- **LEA estas instrucciones**
- **CONSERVE estas instrucciones**
- **PRESTE ATENCION a todas las advertencias.**
- **SIGA todas las instrucciones**
- **NO utilice este aparato cerca del agua**
- **NO obstruya ninguna de las aberturas de ventilación.**Instálese según lo indicado en las instrucciones del fabricante
- **No instale el aparato cerca de fuentes de calor** tales como radiadores, registros de calefacción, estufas u otros aparatos (incluyendo amplificadores) que produzcan calor
- **NO anule la función de seguridad del enchufe polarizado** o con clavija de puesta a tierra. Un enchufe polarizado tiene dos patas, una más ancha que la otra. Un enchufe con puesta a tierra tiene dos patas y una tercera clavija con puesta a tierra. La pata más ancha o la tercera clavija se proporciona para su seguridad. Si el toma corriente no es del tipo apropiado para el enchufe, consulte a un electricista para que sustituya el toma corriente de estilo anticuado
- **PROTEJA el cable eléctrico** para evitar que personas lo pisen o estrujen, particularmente en sus enchufes, en los toma corrientes y en el punto en el cual sale del aparato
- **UTILICE únicamente los accesorios especificados por el fabricante**
- **UTILICESE únicamente** con un carro, pedestal, escuadra o mesa del tipo especificado por el fabricante o vendido con el aparato. Si se usa un carro, el mismo debe moverse con sumo cuidado para evitar que se vuelque con el aparato
- **DESENCHUFE el aparato** durante las tormentas eléctricas, o si no va a ser utilizado por un lapso prolongado.
- **TODA reparación** debe ser llevada a cabo por técnicos calificados. El aparato requiere reparación si ha sufrido cualquier tipo de daño, incluyendo los daños al cordón o enchufe eléctrico, si se derrama líquido sobre el aparato o si caen objetos en su interior, si ha sido expuesto a la lluvia o la humedad, si no funciona de modo normal, o si se ha caído.
- **NO exponga** este aparato a chorros o salpicaduras de líquidos. NO coloque objetos llenos con líquido, tales como floreros, sobre el aparato.

Este símbolo indica que la unidad contiene niveles de voltaje peligrosos que representan un riesgo de choques eléctricos.

Este símbolo indica que la literatura que acompaña a esta unidad contiene instrucciones importantes de funcionamiento y mantenimiento.

Antes de cambiar la alimentacion de voltaje o de cambiar el fusible, desconecte el cable de alimentacion. Para reducir el riesgo de descargas electricas, esta unidad debe ser conectada a tierra.

Remplaze el fusible con lo mismo, que corresponde a lo indicado en el panel del equipo.

Antes de encender, controlar que la linea de alimentacion de voltaje corresponda a la indicada

El interruptor de alimentación es unipolar. En el caso de peligro, desconecte el cable de alimentación. Porque la clavija de conexion a red sirve por la desconection de la unidad, la clavija debe ser ubicada en proximidad de la unidad

7 UNPACKING AND INSPECTION

Your equipment was packed carefully at the factory in a container designed to protect the unit during shipment. Nevertheless, we recommend making a careful inspection of the shipping carton and the contents for any signs of physical damage.

Damage & Claims

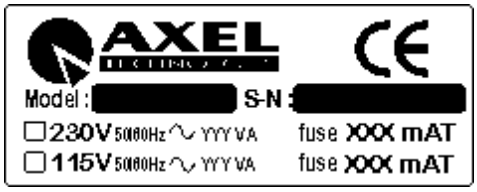
If damage is evident, do not discard the container or packing material. Contact your carrier immediately to file a claim for damages. Customarily, the carrier requires you, the consignee, to make all damage claims. It will be helpful to retain the shipping documents and the waybill number.

Save all packing materials! If You should ever have to ship the unti (e.g. for servicing), it is best to ship it in the original carton with its packing materials because both the carton and packing material have been carefully designed to protect the unit.

Under normal conditions no user maintenance or calibration are required. Internal links and preset controls may be set to configure the unit during installation. **Any service work required should be carried out by qualified service personnel only.**
We are able to offer further product support through our worldwide network of approved dealers and service agents.

To help us provide the most efficient service please would you keep a record of the unit serial number, and date and place of purchase to be quoted in any communication regarding this product.

The actual equipment Serial Number is indicated on the silver label stuck on the rear panel of the equipment closure.



Tools And Equipment Needed

Only standard technician's tools are required to install this equipment.

8 FIRST INSTALLATION RECOMMENDATIONS

8.1 POWER SUPPLY CABLE

A power supply cable of approx. 2 mt length is supplied with the device, which has a moulded IEC plug attached – this is a legal requirement.
The type of plug for the power supply depends on the country in which it is delivered.

If for any reason, you need to use this appliance with a different plug, you should use the following wiring guidelines in replacing the existing plug with the new one:

Earth	Green, or green and yellow
Neutral (N)	Blue
Live (L)	Brown

Supply cables should be laid in such a manner that one does not step or walk on them. They should not be squashed by any objects.

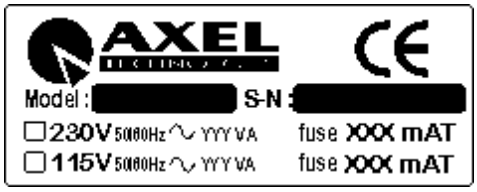
THIS EQUIPMENT MUST BE EARTHED.

The chassis is always connected to mains earth to ensure your safety: check your mains wiring and earthing before switching on.

8.2 AC MAINS VOLTAGE SETTING (230 V / 115 V)

BE SURE THAT THE UNIT IS SET TO THE CORRECT MAINS/LINE VOLTAGE FOR YOUR COUNTRY BEFORE PLUGGING IT INTO THE WALL OUTLET !

The actual Mains voltage is indicated on the label stuck on the equipment closure. Should the type of power at the operation location not be known, please contact your dealer or electricity company.



If, for some reason, the unit is to be operated at a mains input voltage which is different to that as supplied, you need to switch the voltage selector on the right side of the unit. You also need to replace the AC main fuse, according to information provided on the external label or on the Technical Specifications table at the end of this user manual.

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, ALWAYS DISCONNECT THE AC MAINS CABLE BEFORE ALTERING THE CHANGE-OVER SWITCH. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

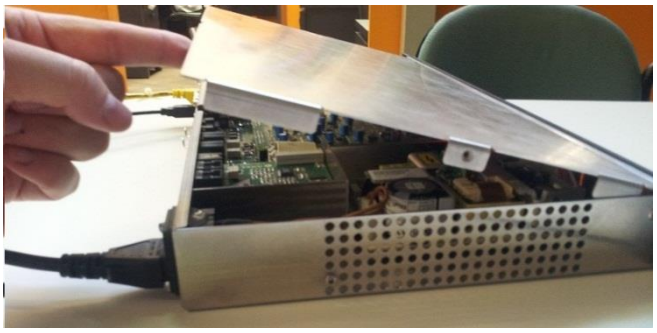
8.3 FUSE REPLACEMENT

The power supply socket has an integral fuse drawer containing the AC power fuse and a spare, both of the same value.

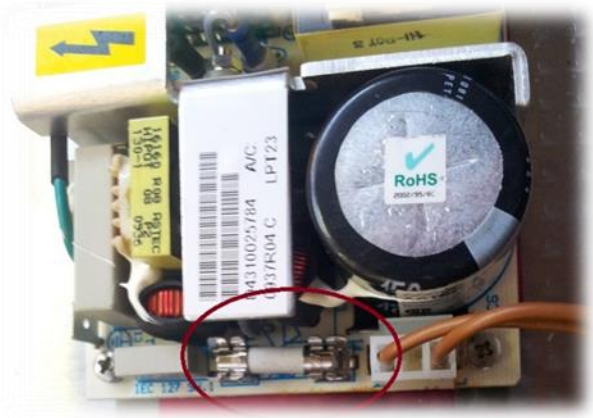
BEFORE REPLACING THE POWER FUSE, MAKE SURE YOU HAVE THE RIGHT TYPE OF FUSE FOR THE VOLTAGE TO BE PROTECTED.
USING WRONG FUSE TYPE WILL RESULT IN INSUFFICIENT PROTECTION.

Make sure that the power is switched off and the power cable is disconnected from the equipment.

a. Open the upper iron cover using a screwdriver.



b. Replace the fuse located at the internal position – Power supply Type-1



c. Replace the fuse located at the internal position – Power supply Type-2

Perform the set-up under static control conditions. Static charges are likely to completely destroy one or more of the CMOS semiconductors employed in the unit. Static damage will not be covered under warranty.

Basic damage prevention consists of minimizing generation, discharging any accumulated static charge on your body and preventing that discharge from being sent to or through any electronic component.

Uninsulated dangerous voltage are inside the enclosure, voltage that may be sufficient to constitute a risk of shock.
Always disconnect to AC Mains before removing the top cover

8.4 PROTECTION AGAINST LIGHTNING

When the upper iron cover is removed, a plastic transparent cover helps the user safety, to avoid from flashlight coming from the switching power supply. After the power cord has been disconnected some parts of the power supply remain electrically loaded for a lot of time.
Axel Technology suggest to don't touch never this parts, and it is not responsible for human flash light or electrical burns.

Should the device be put out of action due to being struck by lightning or excess voltage, disconnect it from the power supply without delay. Do not reconnect until the device has been checked. If in doubt contact the technical support service.

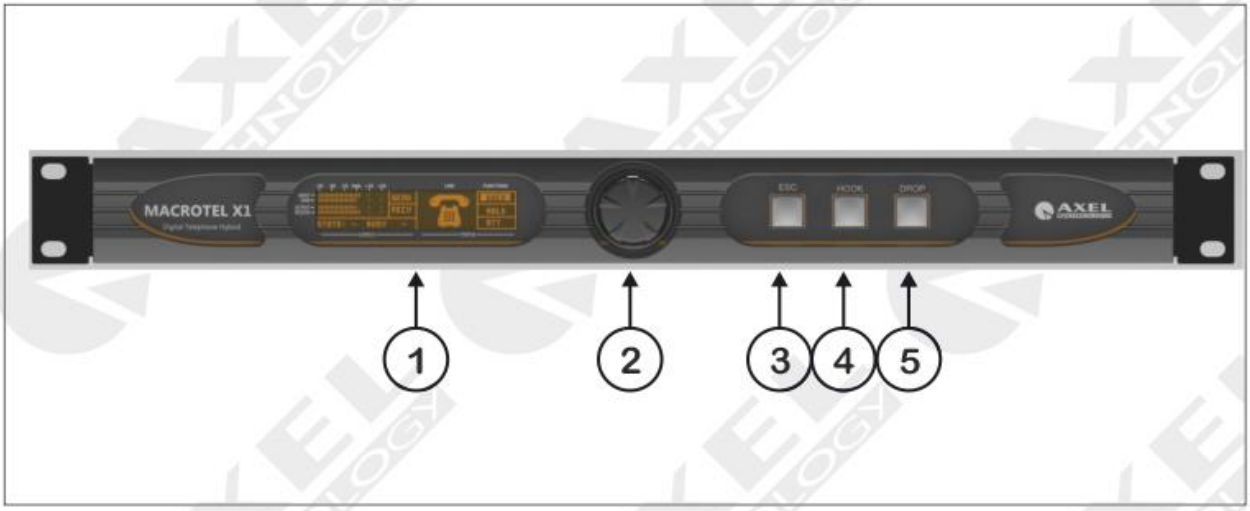
Make sure there is suitable lighting protection to protect the device.
Alternatively you should disconnect all connectors from the device during a storm or when the device is going to be unsupervised or not used for a longer period of time.
These measures will protect against damage by lightning or excess voltage.

8.5 VENTILATION

The equipment will operate as a free-standing unit without requiring any special cooling arrangement.
However, slots and openings in the product are provided for ventilation. They ensure reliable operation of the product, keeping it from overheating. These openings must not be blocked nor covered during operation.
YOU MUST LEAVE AT A MINIMUM ONE RACK UNIT OF EMPTY SPACE ABOVE THE EQUIPMENT TO ENHANCE VENTILATION AND TO GET A LONGER EQUIPMENT LIFE.

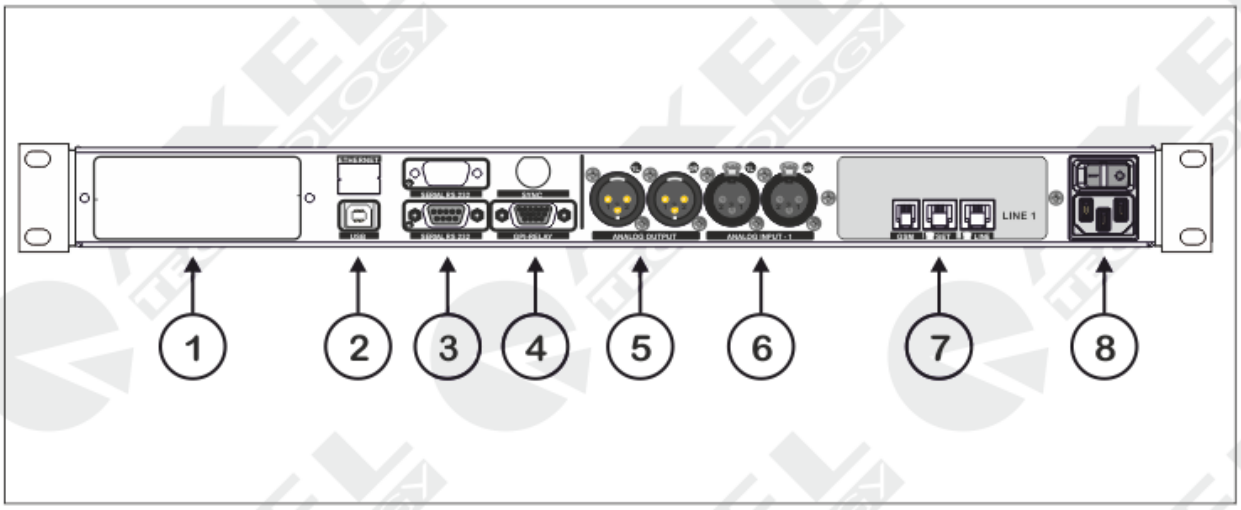
9 MACROTEL X1 MACROTEL X2 GENERAL DESCRIPTION

9.1 MACROTEL X1 FRONT PANEL



N°	CONTROL NAME	FUNCTION
1	LCD DISPLAY	Two line LCD Display that shows the status and operating mode of Macrotel X-D1. The technical parameters of each menu are displayed.
2	JOG-SHUTTLE	Knob (or JogShuttle) to access the various navigation menus and make changes. Press the JogShuttle to confirm selection.
3	"ESC" KEY	Press this key to delete the changes made or exit the selected menu
4	"HOOK" KEY	Call hook key on the PSTN/POTS line. The Hook LED inside the key flashes when there is an incoming call and remains switched on for the entire call from the moment in which the line is hooked. NOTE: the LED only switches on when the telephone line is connected to the 'LINE' socket of the hybrid device.
5	"DROP" KEY	Call unhook key on the PSTN/POTS line. When the DROP key is pressed the call underway is closed and the previously engaged telephone line is freed.

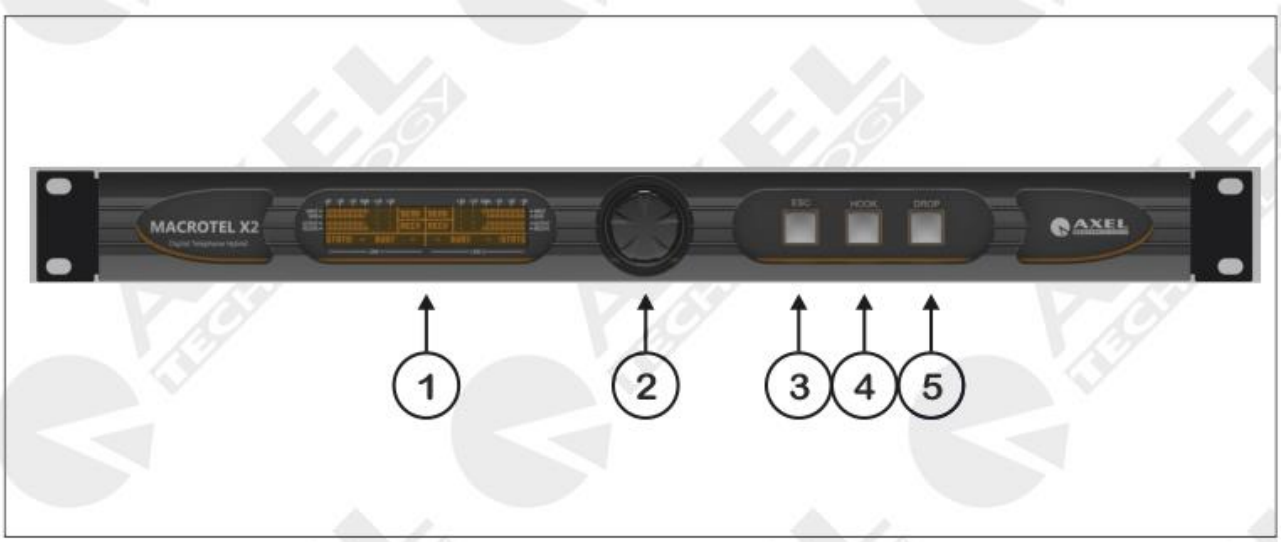
9.2 MACROTEL X1 REAR PANEL



N°	CONTROL NAME	FUNCTION
1	**CLOSING COVER**	Closing cover.
2	**"USB" PORT**	This port is used to remotely control the device using a standard PC. Before connecting this port, it is necessary to connect the device control software contained in the box.
3	**SERIAL -1 RS232 SERIAL PORT 1**	Macrotel X1 features 1 serial port to control the device via remote control software. The *Axel Telephone Hybrid Remoter* control software can be used to modify the operating parameters; the *Axel Telephone Hybrid Address Manager* can be used to set the Target Name (or device name). The Target ID can also be set and the Front Panel locked. Serial Port 1 can also be used to **reprogram the firmware** and to connect the device to an **external 56K analog modem** (for remote control using the phone line). Default port speed is set at 38,400bps
4	**"GPIO" PORT**	15 high density female pin interface, on SubD connector. Determines the Macrotel X1 logic status via the open collector GPOut, while it provides the Macrotel command via GPIn, thanks to the double optocouplers installed. The Macrotel X1 status is also visible from the software panel on the right section of the software: - GPI Status - GPO Status

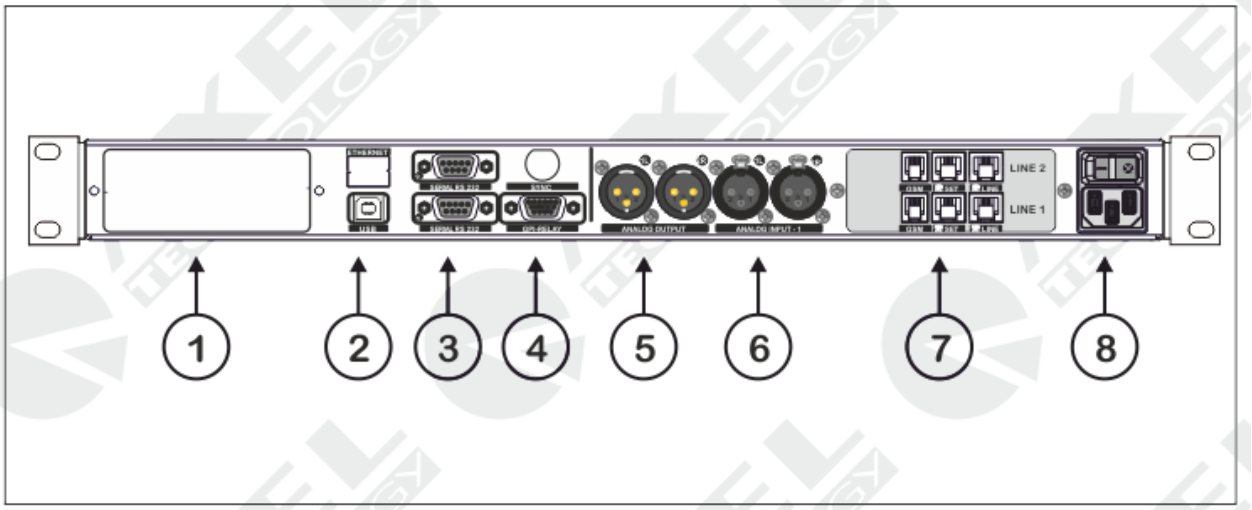
		 As regards the Opto Interface port pinout see the Appendix at the end of this manual. For the operation of each GPI and GPO see the specific section in the next pages of this manual.
5	**ANALOG OUTPUT**	Electronically balanced analog audio output of the hybrid, on Balanced XLR connector, Mono type. The two XLR connectors have the same output signal.
6	**ANALOG INPUT**	Input of telephone hybrid, with electronically balanced XLR connection. This input is for the signal to be sent to the interlocutor via the telephone line. This signal must be of the Mix-Minus type coming from N-1 devices or Telco modules.
7	**TELEPHONE UNIT** **LINE-1** **GSM - SET - LINE**	This unit features the RJ11 6/4 connectors to connect the PSTN/POTS telephone line to the telephone Hybrid n°1 (**LINE** socket) and to connect a telephone device in parallel to the hybrid (**SET** socket) used, for example to dial the number to call or to answer an incoming call. The **GSM** connector on RJ10 connector is used for the audio connection to the Wireless GSM module (*opt*); the connection cable is supplied together with the Wireless **GSM** module, together with a second cable to be connected to the **Serial-2 port**. See the appendix at the end of this manual for the connection.
8	**POWER SUPPLY UNIT**	The power supply unit features a switch to switch on the device and a power socket. To change the fuse see the relevant chapter; the fuse is inside the device near the switching power supply. The fuse is of the slow blow type, 230 Vac and 2,000 A equal to 2000 mA

9.3 MACROTEL X2 FRONT PANEL



N°	CONTROL NAME	FUNCTION
1	**LCD DISPLAY**	Two line LCD Display that shows the status and operating mode of Macrotel X2. The technical parameters of each menu are displayed.
2	**JOG-SHUTTLE**	Knob (or JogShuttle) to access the various navigation menus and make changes. Press the JogShuttle to confirm selection.
3	**"ESC" KEY**	Press this key to delete the changes made or exit the selected menu
4	**"HOOK-1" KEY**	Key to hook and unhook a call on the PSTN/POTS line of the telephone hybrid -1. The Hook LED inside the key flashes when there is an incoming call and remains switched on for the entire call from the moment in which the line is hooked. When the HOOK-1 is pressed again the call is ended and the telephone line is freed. NOTE: the LED only switches on when the telephone line is connected to the 'LINE' socket of the hybrid device.
5	**"HOOK-2" KEY**	Key to hook and unhook a call on the PSTN/POTS line of the telephone hybrid -2. The Hook LED inside the key flashes when there is an incoming call and remains switched on for the entire call from the moment in which the line is hooked. When the HOOK-1 is pressed again the call is ended and the telephone line is freed. NOTE: the LED only switches on when the telephone line is connected to the 'LINE' socket of the hybrid device.

9.4 MACROTEL X2 REAR PANEL



N°	CONTROL NAME	FUNCTION
1	**CLOSING COVER**	Closing cover.
2	**"USB" PORT**	This port is used to remotely control the device using a standard PC. Before connecting this port, it is necessary to connect the device control software contained in the box.
3	**SERIAL 1 – RS232** **SERIAL PORT 1** **+** **SERIAL 2 – RS232** **SERIAL PORT 2**	Macrotel X2 features 2 serial ports to control the device via remote control software. The *Axel Telephone Hybrid Remoter* control software can be used to modify the operating parameters; the *Axel Telephone Hybrid Address Manager* can be used to set the Target Name (or device name). The Target ID can also be set and the Front Panel locked. Serial Port 1 can also be used to **reprogram the firmware** and to connect the device to an **external 56K analog modem** (for remote control using the phone line). Default port speed is set at 38,400bps
4	**"GPIO" PORT**	15 high density female pin interface, on SubD connector. Determines the Macrotel X2 logic status via the open collector GPOut, while it provides the MacrotelX command via GPIn, thanks to the double optocouplers installed. The Macrotel X2 status is also visible from the software panel on the right section of the software: - GPI Status - GPO Status

		 As regards the Opto Interface port pinout see the Appendix at the end of this manual. For the operation of each GPI and GPO see the specific section in the next pages of this manual.
5	**ANALOG OUTPUT**	Electronically balanced analog audio output of the hybrid, on Balanced XLR connector, Mono type. The two XLR connectors feature respectively: 1L = telephone hybrid -1 output 2R = telephone hybrid -2 output
6	**ANALOG INPUT (ANALOG INPUT -A)**	Inputs of telephone hybrid, with electronically balanced XLR connection. These inputs are for the signals to ne sent to the interlocutors via the telephone line. This signal must be of the Mix-Minus type coming from N-1 devices or Telco modules. The two inputs are divided as follows: 1L = telephone hybrid -1 input 2R = telephone hybrid -2 input
7	**TELEPHONE UNIT LINE-1** **GSM-SET-LINE**	This unit features the RJ11 6/4 connectors to connect the PSTN/POTS telephone line to the telephone Hybrid n°1 (**LINE** socket) and to connect a telephone device in parallel to the hybrid (**SET** socket) used, for example to dial the number to call or to answer an incoming call. The **GSM** connector on RJ10 connector is used for the audio connection to the Wireless GSM module (opt); the connection cable is supplied together with the Wireless GSM module, together with a second cable to be connected to the **Serial-2** port. See the appendix at the end of this manual for the connection.
7	**TELEPHONE UNIT LINE-2** **GSM-SET-LINE**	This unit features the RJ11 6/4 connectors to connect the PSTN/POTS telephone line to the telephone Hybrid n°2 (**LINE** socket) and to connect a telephone device in parallel to the hybrid (**SET** socket) used, for example to dial the number to call or to answer an incoming call. The **GSM** connector on RJ10 connector is used for the audio connection to the Wireless GSM module (opt); the connection cable is supplied together with the Wireless GSM module, together with a second cable to be connected to the **Serial-1** port. See the appendix at the end of this manual for the connection.

8	**POWER SUPPLY UNIT**	The power supply unit features a switch to switch on the device and a power socket. To change the fuse see the relevant chapter; the fuse is inside the device near the switching power supply. The fuse is of the slow blow type, 230 Vac and 2.000 A equal to 2000 mA

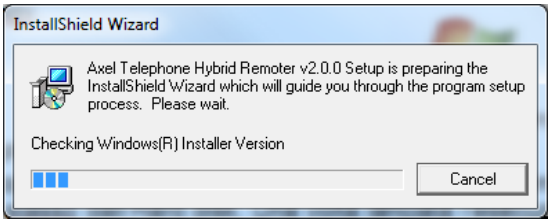
10 INSTALLATION AND USE OF THE CONTROL SOFTWARE

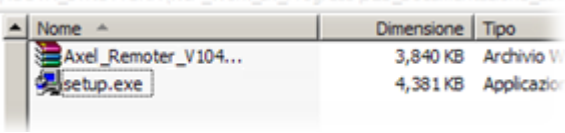
The installation procedure of the Macrotel X1 and Macrotel X2 control software is described below. The program runs on all Windows platforms, including Windows Xp sp3, Windows Vista and Windows 7 32-bit and Windows 7 64-bit and Windows 8 Pro 64bit. The control software must be installed before connecting the devices to the USB port. To install the program follow the instructions below using the program file from the original CD contained in the package with the device, or the file downloaded from the Axel Technology website.

Installation procedure:

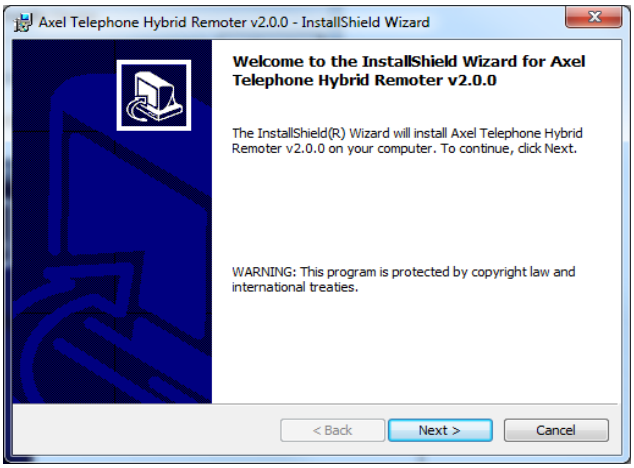
1. Insert the CD in the player
2. Run SETUP.EXE

a. We recommend copying the program CD on the hard disk of the PC you are using and to run the program from the hard disk. The following InstallShield Wizard page will appear

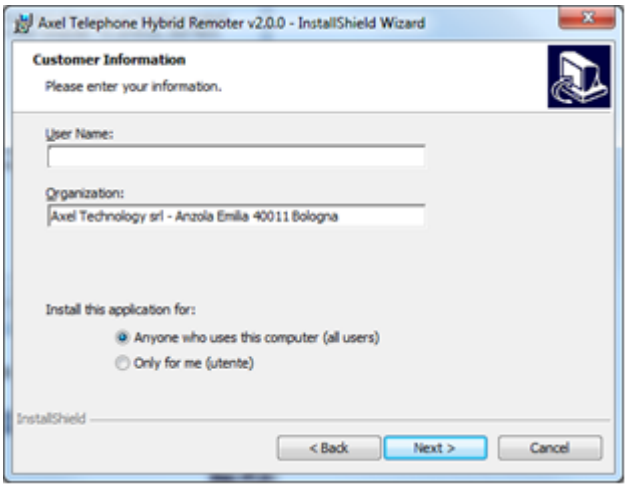




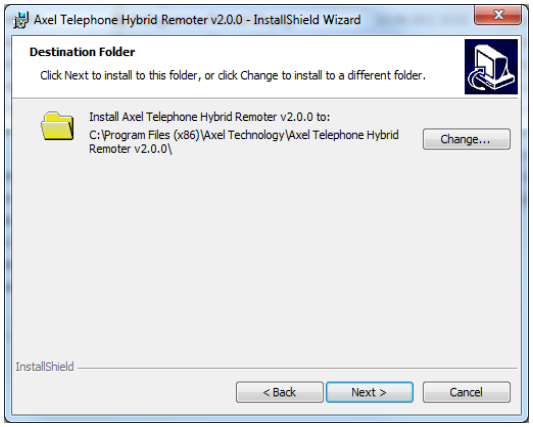
3. The following page will be displayed; click NEXT

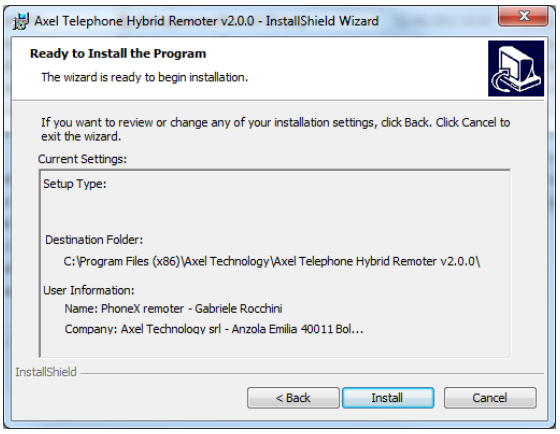


4. Enter user information:

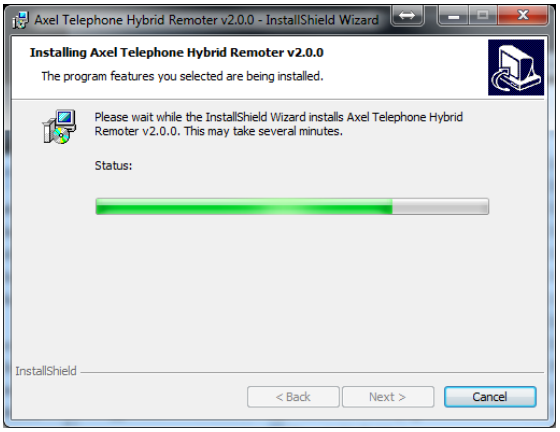


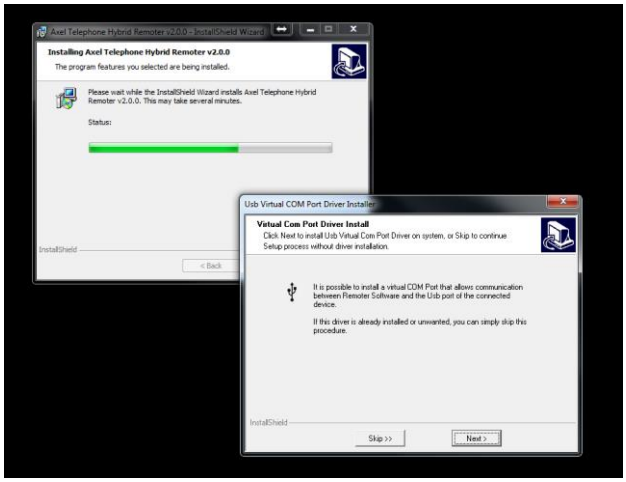
5. Select a destination folder or leave folder unchanged, click NEXT and then INSTALL



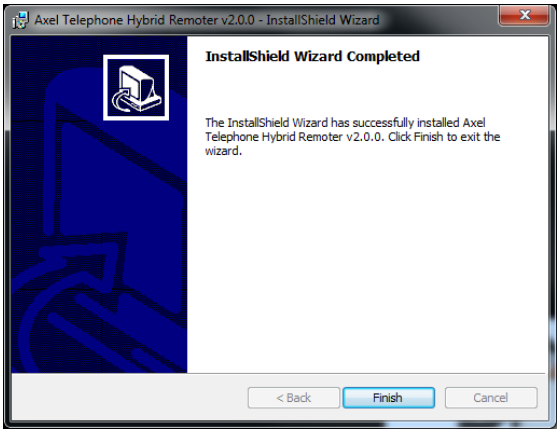


6. The software will start installing the program on the PC; during the installation a request for confirmation to install the USB drivers for the connection to the Macrotel X1 – X2 device will appear.





7. At the end of the installation this page will appear; click Finish and two new icons will be created on the desktop:



a. *Axel Telephone Hybrid Remoter v2.0*
b. *Axel Telephone Hybrid Address Manager v2.0.0*

8. The programs can now be used to control the Macrotel X1 and Macrotel X2 devices.
The following chapters describe the connection procedures and product potential.

11 USE OF THE HYBRID ADDRESS MANAGER SOFTWARE

The Hybrid Address Manager software is used to assign to Macrotel X1 and Macrotel X2 a Target ID, to lock the front panel and set a Target Name. This can be achieved using either the PC's Serial port or the USB port. The following screen will appear when you open the program:

The Hybrid Address Manager is still disconnected from the Macrotel device. Click **CONNECT** to establish a connection between the PC and Macrotel. The default values of the COM port are:

38,400bps 8-N-1

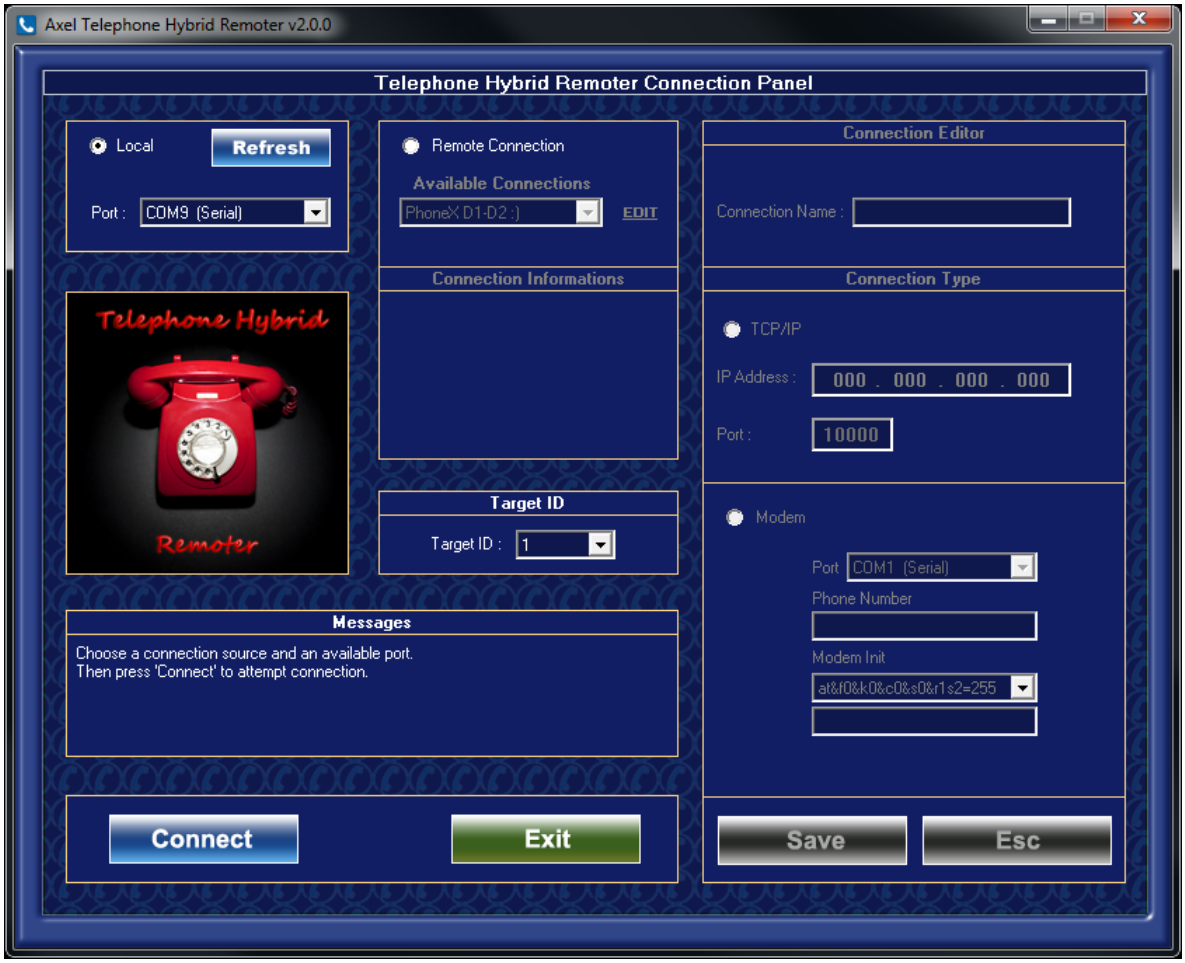
If a USB port is assigned, select the relevant port assigned by the operating system from the list (in this case VCOM Usb Port). Port COM 5 is assigned.

Once the Hybrid Address Manager has been connected to the Macrotel, the machine's configurations are displayed. To change these values position the cursor in the relevant fields and enter the data, then click ***SEND DATA*** to send the changes to the Macrotel device.

To check whether the changes have been made click ***RELOAD DATA***, which refreshes the program which then reads the device values again.

Information concerning the device connected is available in the lower part of the software, above the command keys. Data such as the "***Connected Target***" is available; this shows the device model connected and, in the photo, a Macrotel and the ***firmware release installed*** (v2.0.0). The ***Firmware Code*** is also shown, which indicates the univocal serial number of the firmware and hardware installed on the device. This number could be required for an upgrade of the device or in the case of specific requirements or customisations.

12 USE OF THE SOFTWARE HYBRID REMOTER



Start page of the control software of Macrotel X1 and Macrotel X2

12.1 ACCESS VIA USB AND SERIAL CONNECTION

To operate on the Macrotel, after having allocated the TCP/IP port values using the Hybrid Address Manager it is necessary to use the Axel Telephone Hybrid Remoter program by clicking the special icon. The window below shows the connection between Macrotel and the PC via the Virtual USB serial port.

As can be seen a USB **COM9** port connection is active with the PC in use. The USB and the serial connections are the fastest ones to set up; connect the Pin-to-Pin serial cable or the A-B type USB cable, both supplied in the Macrotel X box and click **CONNECT**; the control panel for the management of the device will appear.

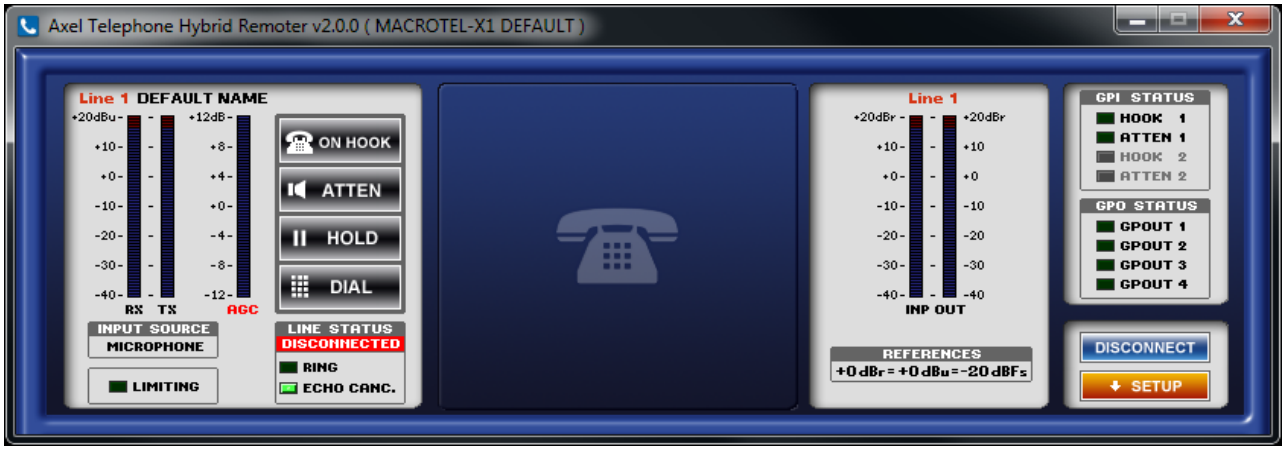
Click Connect to establish a communication between the Hybrid Remoter and Macrotel; all the information concerning the device's memory, status and operating mode is displayed. The control panel will change format and display all the necessary controls to operate the device. The various controls are explained in detail in the next chapters.

13 MACROTEL CONTROL VIA SOFTWARE

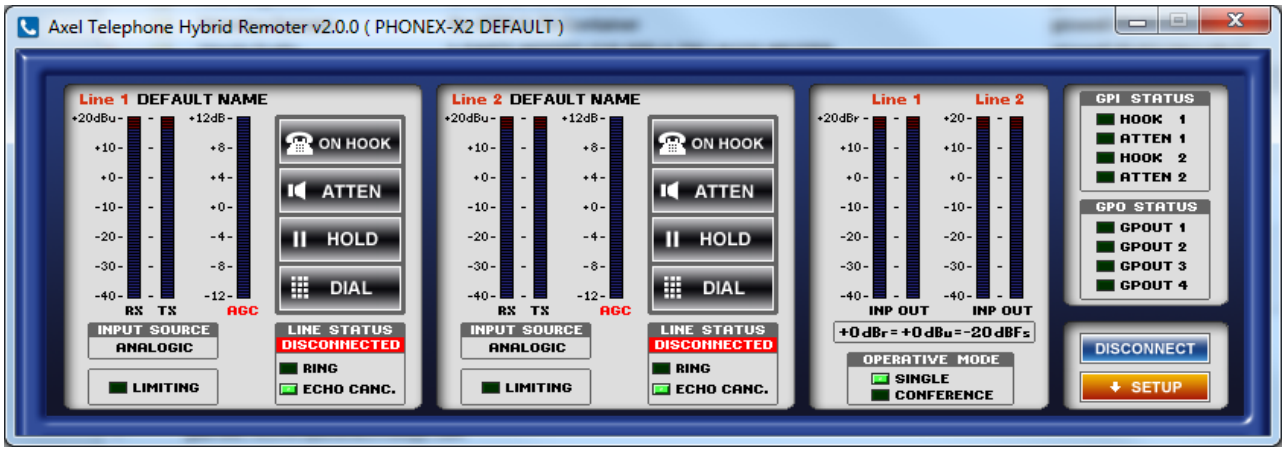
Axel Telephone Hybrid Remoter is a program to manage Macrotel X1 and Macrotel X2 both locally (via serial or USB connection) and remotely via TCP/IP connection. As regards the monitoring functions, the front panel also shows the Send and Receive levels and primary functions such as line hook, ducking, attenuation and hold.

Once you have accessed the Macrotel device the following page will appear:

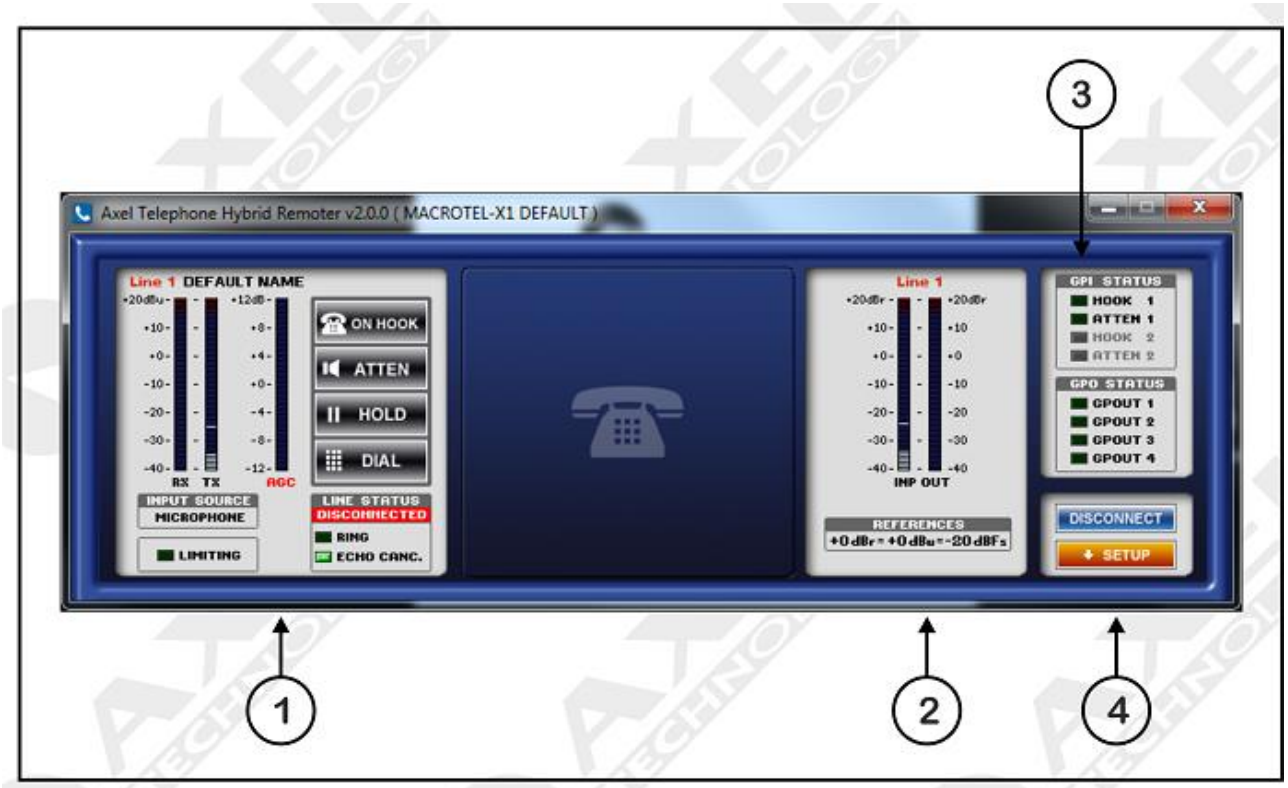
For Macrotel X1



For Macrotel X2



14 DETAIL OF HYBRID REMOTER FOR MACROTEL X1

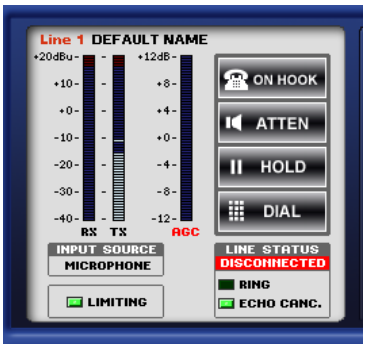


14.1 DESCRIPTION OF MACROTEL X1 CONTROL SOFTWARE

The Macrotel control software (Hybrid Remoter) is basically divided into 4 parts:

1. **Hybrid** section
2. **Levels** section
3. **GPI / GPO status** section
4. **Setup & Disconnect** section

14.2 HYBRID SECTION



The "*Hybrid Section*" features a series of operating and monitoring controls relating to the telephone hybrid connected to a PSTN/POTS line.

The monitoring part concerns the Receive(Rx) and Send (TX) levels and shows whether Macrotel X1 is in Limiting operating mode; it also shows the line status, ring and echo canceller. When a parameter is active the relevant green LED lights up (in this case Echo Canceller is active)

As regards device operation, the controls available are:

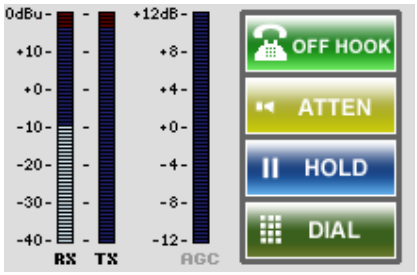
ON HOOK – ATTEN – HOLD – DIAL

ON HOOK: in this status Macrotel X1 can hook an incoming call or open the telephone line. Upon receipt of a call the LED of the incoming call flashes on the front panel and the Hybrid Remoter displays the RINGING Line Status for the hybrid with the incoming call.

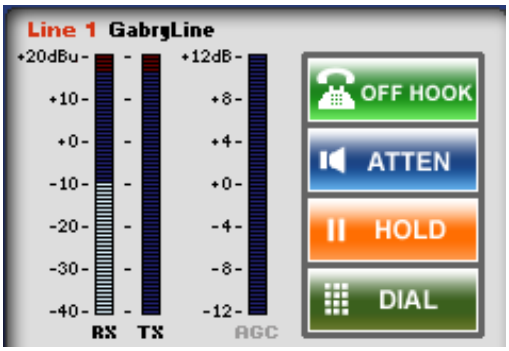
The LED lights up in the GPO Status section. The open collector of the GPIO communication port closes. See the appendix at the end of this manual for the pinout and connections.

To end a call click OFF HOOK or press DROP on the front panel.

ATTEN: when ATTEN is pressed, a dB reduction equal to the "Attenuation" value set in the control software is applied to the Receive signal.



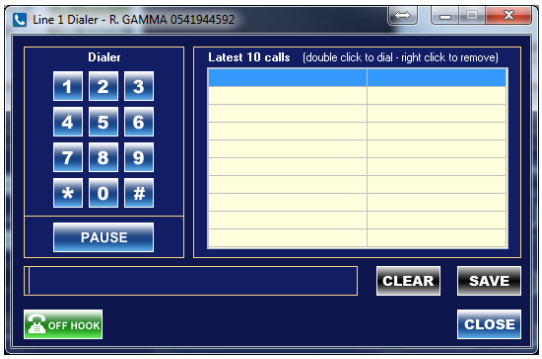
HOLD: when HOLD is pressed via software the Receive (Rx) volume is taken to –infinity without closing the call.



DIAL: when DIAL is pressed the DTMF dialler opens. Dial the number using the numerical keyboard of your PC and then click ON HOOK. In this way the DTMF dials the number to be called on the telephone line. The Latest 10 Calls section displays the last ten calls; click SAVE to permanently save a telephone number. To recall a number double click on it.

Use the right button of the mouse to delete a number (Delete Row #1) or all the numbers(Delete All) from the list of the Latest 10 calls.

The lower section displays the device statuses and any audio functions enabled.

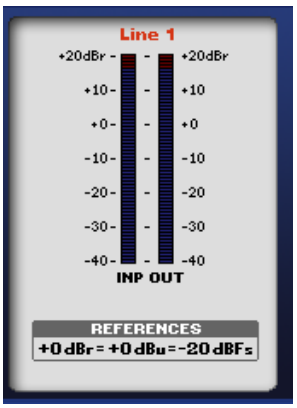


INPUT SOURCE: this shows which source is connected to the Macrotel X input. Analog, Microphone and Tone Gen are available.

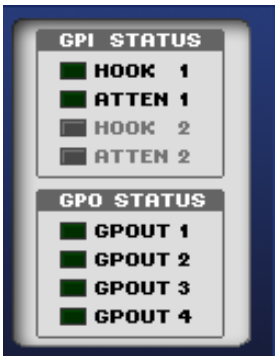
The section below the Input Source shows if the "Limiting" control is enabled. The Line Status section displays the status of the *Ring and Echo Canceller* controls.

14.3 LEVELS SECTION

The levels section shows the Macrotel X1 input level.



14.4 GPI / GPO STATUS SECTION



The GPI / GPO Status section shows the status of the General Purpose Input and Output status. The 15 pin HD female SubD port on the back of the device is used to connect the device; see the technical appendix for the connections and the pinout.

14.4.1 GPI status function

HOOK 1: this is used to hook, by means of a momentary contact, the telephone line of the Macrotel X1 Hybrid; it is usually connected to the **TELCO (N-1)** modules of the Broadcast Mixing consoles that feature a **GPO** contact to answer incoming calls directly from the telephone fader.

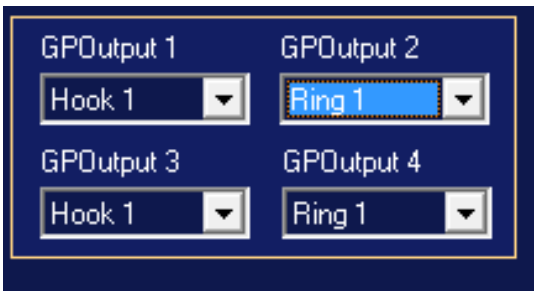
ATTEN1: the closure of this GPI, corresponds to the execution, by the Macrotel X1, of the **ATTEN** command available via control software. The ATTEN command works as follows: "*a dB reduction equal to the "Attenuation" value set in the control software is applied to the Receive signal*". The connection to the **GPOs** provided by the mixing consoles or by commands made available to the broadcast technician or director of a programme on air, is useful if the audio received needs to be attenuated. This is not a *profanity delay*.

HOOK 2: Disabled on Macrotel X1, the control software shows it in grey.

ATTEN2: Disabled on Macrotel X1, the control software shows it in grey.

14.4.2 GPO status function

GPOUT 1: this monitor displays when Macrotel X1 closes one of its open collectors in relation to other configurations. The additional functions can be configured in the "Program Setting" section, and some of the functions listed below can be associated to each GPOut:



OFF: no action
Hook1: when a call is hooked this GPOut remains closed until the call ends.
Ring1: when a call arrives (Ring), this GPOut changes status. It is usually connected to external alarm optical repeaters to signal the arrival of a call to the telephone hybrid.
It is also usually connected to the Telco or N-1 modules.
Hook2: not available on Macrotel X1
Ring2: not available on Macrotel X1

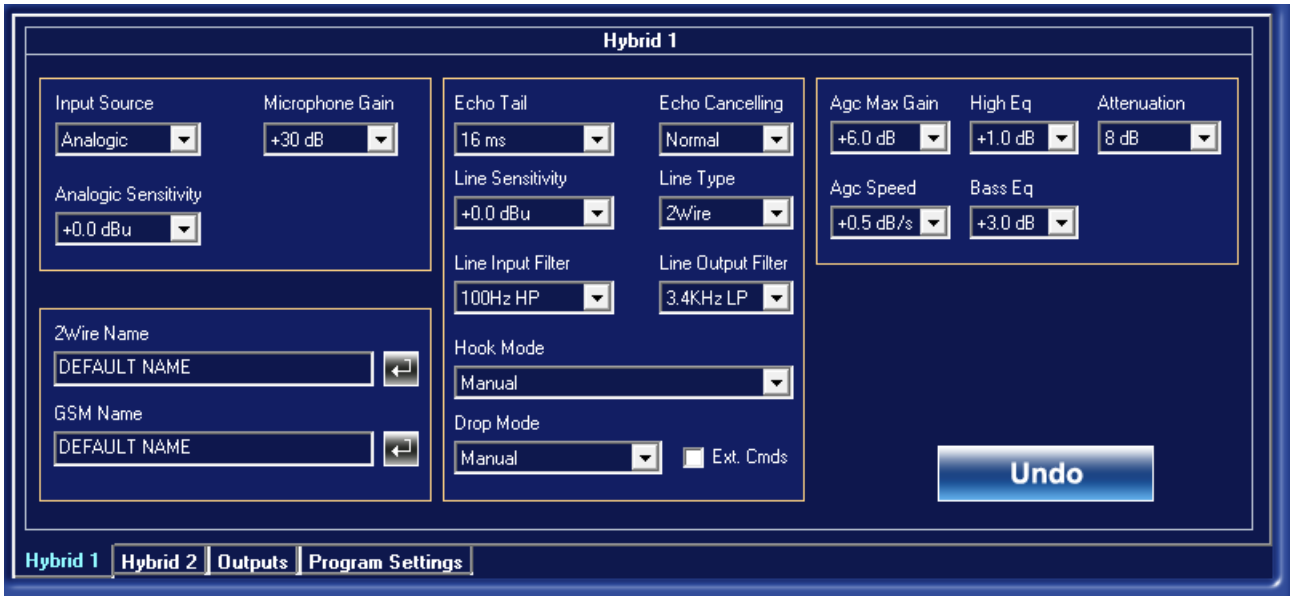
14.5 SETUP SECTION (THE SAME FOR MACROTEL X1 AND MACROTEL X2*)*

The SETUP section is the most important area for the configuration of Macrotel X1 and Macrotel X2. In this section all the operating modes of the hybrid can be set. The SETUP section is divided into four sub-menus:

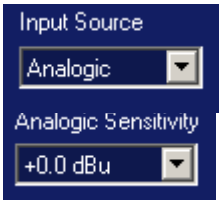
1. **Hybrid 1**
2. **Hybrid 2**
3. **Outputs**
4. **Program Settings**

14.5.1 Hybrid 1 Section (featured on Macrotel X1 and Macrotel X2)

In this section all the parameters relating to the Hybrid-1 (*Hybrid 1*) of Macrotel X1 and Macrotel X2 can be set.

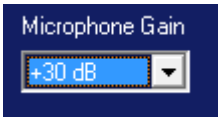


INPUT SOURCE: This is the input of the Hybrid 1, i.e. what is sent (SEND) to the telephone interlocutor. The options available are: Analog, Microphone and Tone Generator.



ANALOG SENSITIVITY: this is the sensitivity of the balanced analog input. Range of allowed values: from -12.0 dBu to a maximum of +12.0 dBu in 0.1 dBu steps.

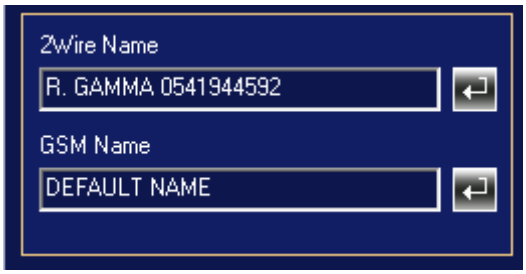
MICROPHONE GAIN: this is the sensitivity of the analog input (send) but with a higher input sensitivity: the analog audio signal amplification values allowed, range from g +10dB to a maximum of +40.0 dBu in 1 dB steps. A +48V phantom power supply is not available for this input.

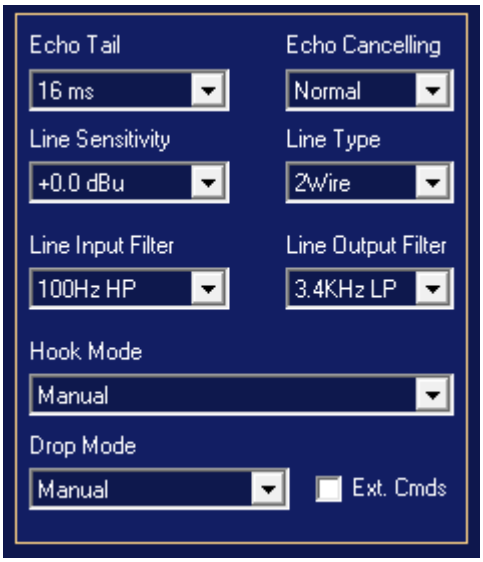


2Wire Name: this field is used to associate a *mnemonic* name to the 2Wire line, which is shown on the Macrotel X1 and Macrotel X2 front LCD panel. To modify the name change the field and press “Return”.

GSM Name: this field is used to associate a *mnemonic* name to the GSM connected line, which is shown on the Macrotel X1 and Macrotel X2 front LCD panel.

These two “names” are important because they make it easy to recognise which line is connected to the Telephone Hybrid 1; in fact the POTS and GSM lines can both be used, but not at the same time. These two lines are mutually exclusive.





Echo Tail: this is the value in ms of the Echo which is eliminated by the DSP of Macrotel X1 and Macrotel X2. It is combined with the **Echo Cancelling** control that adjusts the echo cancelling speed on the telephone line. This parameter acts on an automatic variation filter to cancel the echo. The operating parameters self-adapt to the status of the line, of the input and output levels. The variable parameters are the maximum recoverable echo delay (16ms or 32ms) and the intervention modes (OFF, FAST, NORMAL, SLOW)

Hook Mode: this is the Telephone hybrid answering mode, which can range from **Manual**, i.e. Off-Hook (answer) only when a call is answered manually, to **Auto Off-Hook after n rings**, i.e. the automatic answering of the Telephone Hybrid after n rings. The number of rings available is: 1 – 2 – 3 – 4 – 5.

Drop Mode: this is used to hook (*Drop*) or automatically end a call when the CPTS or closing signal is recognised. The value of the CPTD signal can be set in the Program Settings section under "CPTD Characteristics", after having set the "Country Line Setup"

Line Sensitivity: this is used to adjust the input gain from the telephone line from -6dB ÷ +6dB.

Line Input Filter: this is a high-pass filter (HPf) placed on the telephone line in order to adapt and improve as much as possible the incoming audio of one's phone. Range of allowed values: from 100 Hz to 350 Hz with 50Hz/steps

Line Output Filter: this is a low-pass filter (LPf) placed on the telephone line in order to adapt and improve as much as possible the incoming audio of one's phone. Range of allowed values: from 2.6 kHz to 5.0 kHz

Line Type: this command is used to select the telephone line to connect to the Telephone Hybrid. The Macrotel X1 can be connected to one 2Wire POTS / PSTN line with RJ11 plug (two-wire) or to one Wireless line through the connection of an external **GSM** module(opt.) This command is used to select which line to use, **2Wire** or **GSM**. The **2Wire** line and the Wireless **GSM** line cannot be used at the same time on the same Telephone Hybrid. Macrotel X2 features two POTS / PSTN and External GSM lines.

Accept External Commands: by flagging this checkbox Macrotel X1 an Macrotel X2 are enabled to accept or not accept commands received on the GP In and GP Out (SubD 15p HD) ports.

AGC, EQ, Atten: Section made up of three parameters: AGC, Equaliser and Attenuation.

AGC & AGC Speed: this is the maximum gain value of the Automatic gain Control (AGC). The parameters that can be set are the maximum gain (from +1dB to +12dB) and the variation speed (from OFF (0dB/s) to 2dB/s, in 0.1 steps), i.e. by how many dB per second the signal level is increased (gain).

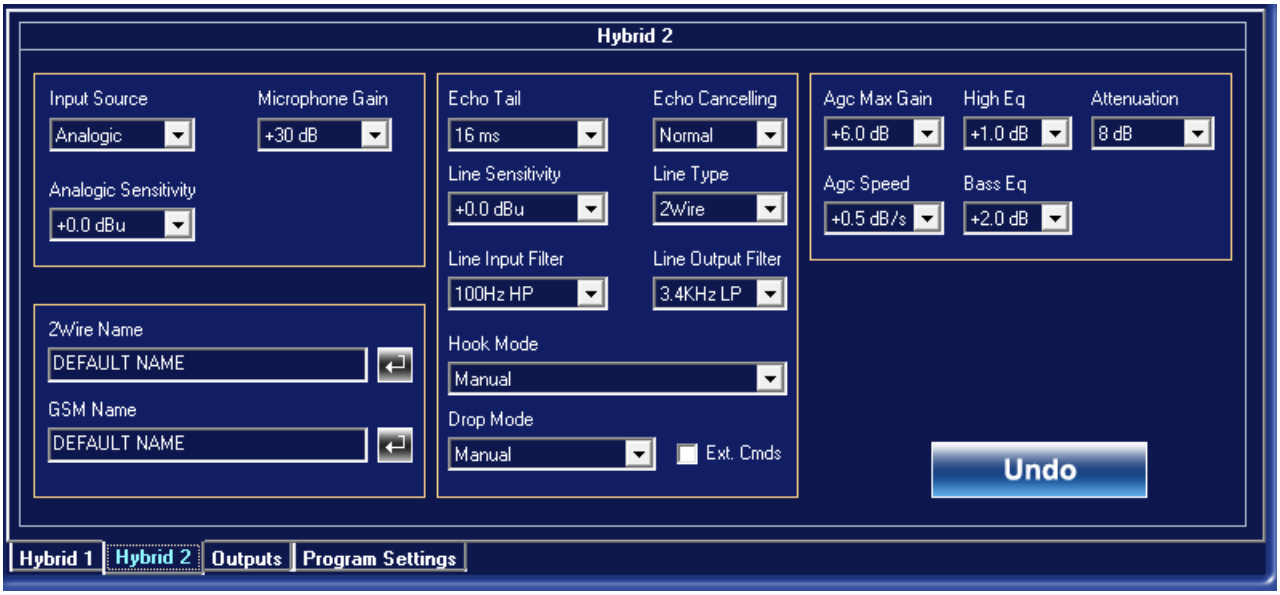
High Eq & Bass Eq: these two parameters act directly on the two-band equaliser inside the Macrotel X audio processor. The gain that can be set ranges from +0.0dB to a maximum of +8.0dB. The equaliser frequencies are set at 300Hz Bass Eq and 2kHz High Eq.

Attenuation: In this section the attenuation values can be adjusted from 1dB a 30dB. Attenuation can be enabled or the interlocutor can be placed on "**HOLD**", which takes attenuation to-∞. See the Special notes concerning Ducking/Conference between Hybrids to disable this parameter when the device is used in certain configurations.

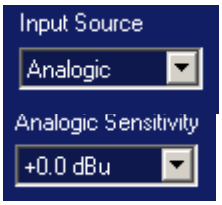
UNDO: press UNDO to reset the values set in the whole Hybrid 1 and Outputs section to the values set on the device before the opening of the control panel.

14.5.2 Hybrid 2 Section (featured only on Macrotel X2)

In this section all the parameters relating to the Hybrid-2 (Hybrid 2) of Macrotel X2 can be set.



INPUT SOURCE: This is the input of the Hybrid 1, i.e. what is sent (SEND) to the telephone interlocutor. The options available are: Analog, Microphone and Tone Generator.



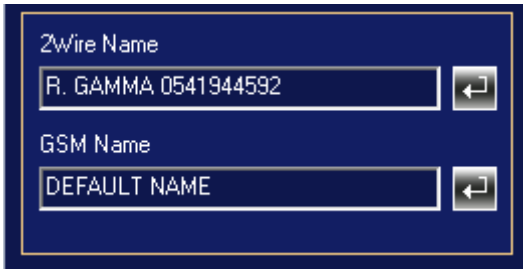
ANALOG SENSITIVITY: this is the sensitivity of the balanced analog input. Range of allowed values: from -12.0 dBu to a maximum of +12.0 dBu in 0.1 dBu steps.

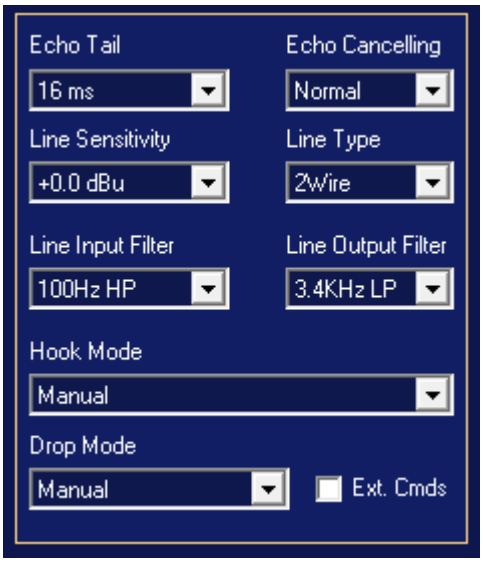
MICROPHONE GAIN: this is the sensitivity of the analog input (send) but with a higher input sensitivity: the analog audio signal amplification values allowed, range from g +10dB to a maximum of +40.0 dBu in 1 dB steps. A +48V phantom power supply is not available for this input.

2Wire Name: this field is used to associate a mnemonic name to the 2Wire line, which is shown on the Macrotel X1 and Macrotel X2 front LCD panel. To modify the name change the field and press “Return”.

GSM Name: this field is used to associate a mnemonic name to the GSM connected line, which is shown on the Macrotel X1 and Macrotel X2 front LCD panel.

These two “names” are important because they make it easy to recognise which line is connected to the Telephone Hybrid 1; in fact the POTS and GSM lines can both be used, but not at the same time. These two lines are mutually exclusive.





Echo Tail: this is the value in ms of the Echo which is eliminated by the DSP of Macrotel X1 and Macrotel X2. It is combined with the Echo Cancelling control that adjusts the echo cancelling speed on the telephone line. This parameter acts on an automatic variation filter to cancel the echo. The operating parameters self-adapt to the status of the line, of the input and output levels. The variable parameters are the maximum recoverable echo delay (16ms o 32ms) and the intervention modes (OFF, FAST, NORMAL, SLOW)

Hook Mode: this is the Telephone hybrid answering mode, which can range from **Manual**, i.e. Off-Hook (answer) only when a call is answered manually, to **Auto Off-Hook after n rings**, i.e. the automatic answering of the Telephone Hybrid after n rings. The number of rings available is: 1 – 2 – 3 – 4 – 5.

Drop Mode: this is used to hook (Drop) or automatically end a call when the CPTS or closing signal is recognised. The value of the CPTD signal can be set in the Program Settings section under "CPTD Characteristics", after having set the "Country Line Setup"

Line Sensitivity: this is used to adjust the input gain from the telephone line from -6dB ÷ +6dB.

Line Input Filter: this is a high-pass filter (HPf) placed on the telephone line in order to adapt and improve as much as possible the incoming audio of one's phone. Range of allowed values: from 100 Hz to 350 Hz with 50Hz/steps

Line Output Filter: this is a low-pass filter (LPf) placed on the telephone line in order to adapt and improve as much as possible the incoming audio of one's phone. Range of allowed values: from 2.6 kHz to 5.0 kHz

Line Type: this command is used to select the telephone line to connect to the Telephone Hybrid. The Macrotel X1 can be connected to one 2Wire POTS / PSTN line with RJ11 plug (two-wire) or to one Wireless line through the connection of an external GSM module(opt.) This command is used to select which line to use, **2Wire** or **GSM**. The **2Wire** line and the Wireless **GSM** line cannot be used at the same time on the same Telephone Hybrid. Macrotel X2 features two POTS / PSTN and External GSM lines.

Accept External Commands: by flagging this checkbox Macrotel X1 an Macrotel X2 are enabled to accept or not accept commands received on the GP In and GP Out (SubD 15p HD) ports.

AGC, EQ, Atten: Section made up of three parameters: AGC, Equaliser and Attenuation.

AGC & AGC Speed: this is the maximum gain value of the Automatic gain Control (AGC). The parameters that can be set are the maximum gain (from +1dB to +12dB) and the variation speed (from OFF (0dB/s) to 2dB/s, in 0.1 steps), i.e. by how many dB per second the signal level is increased (gain).

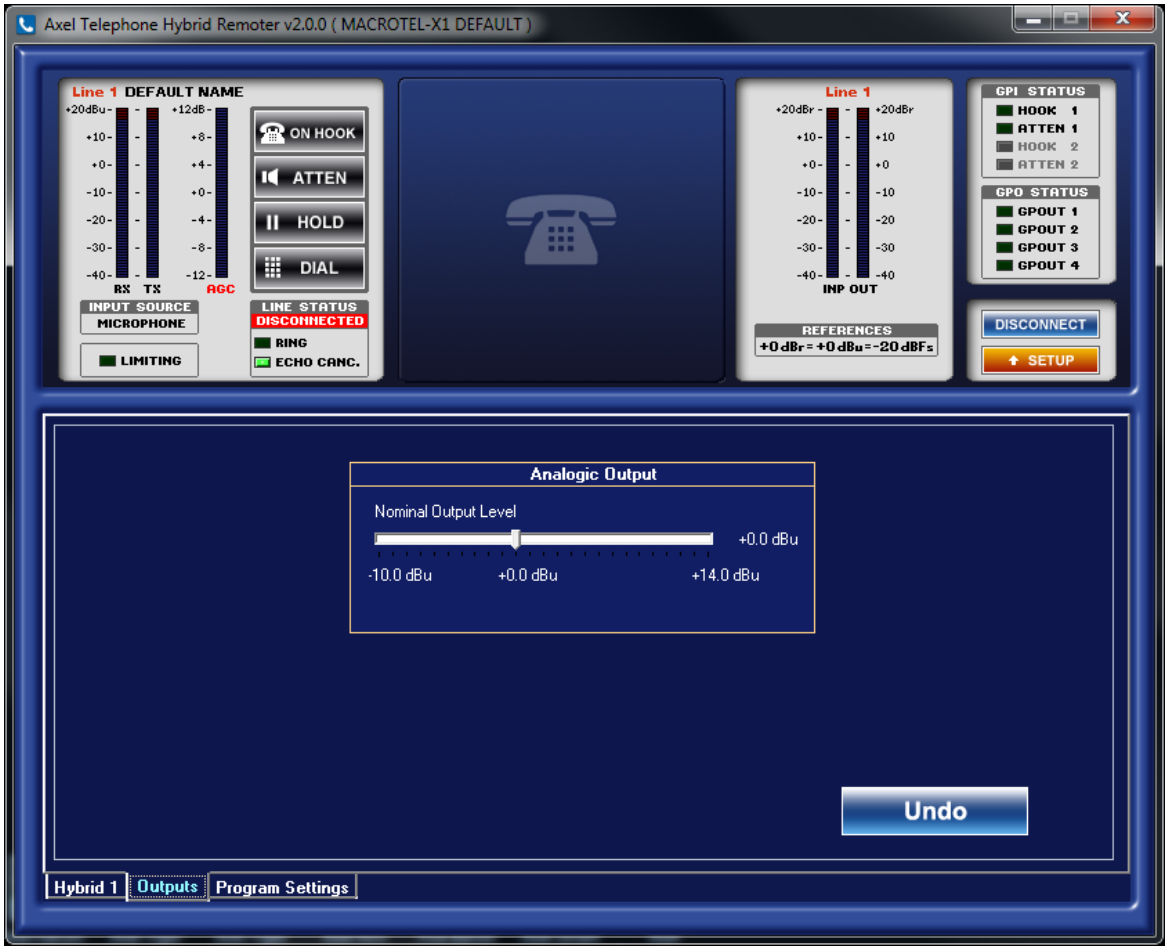
High Eq & Bass Eq: these two parameters act directly on the two-band equaliser inside the Macrotel X audio processor. The gain that can be set ranges from +0.0dB to a maximum of +8.0dB. The equaliser frequencies are set at 300Hz Bass Eq and 2kHz High Eq.

Attenuation: In this section the attenuation values can be adjusted from 1dB a 30dB. Attenuation can be enabled or the interlocutor can be placed on "**HOLD**", which takes attenuation to-∞. See the Special notes concerning Ducking/Conference between Hybrids to disable this parameter when the device is used in certain configurations.

UNDO: press UNDO to reset the values set in the whole Hybrid 1 and Outputs section to the values set on the device before the opening of the control panel.

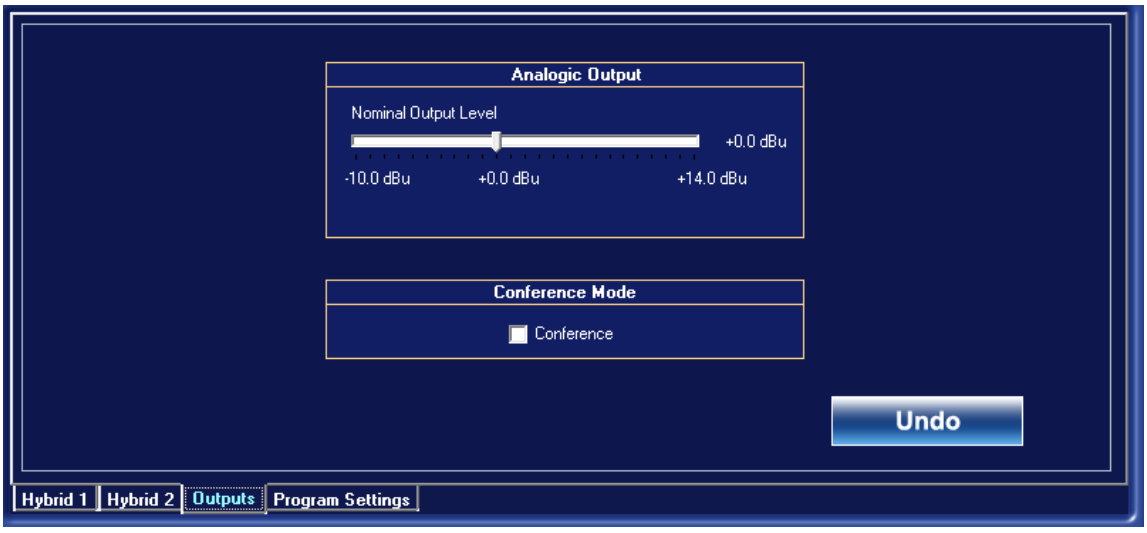
14.5.3 Macrotel X1 Output Section

The Output section of the Macrotel X1 control software shows the Analogic Output control, i.e. the nominal output level. Range of allowed values: from -10.0 dBu to a maximum of +14.0 dBu in 0.1 dBu/steps.



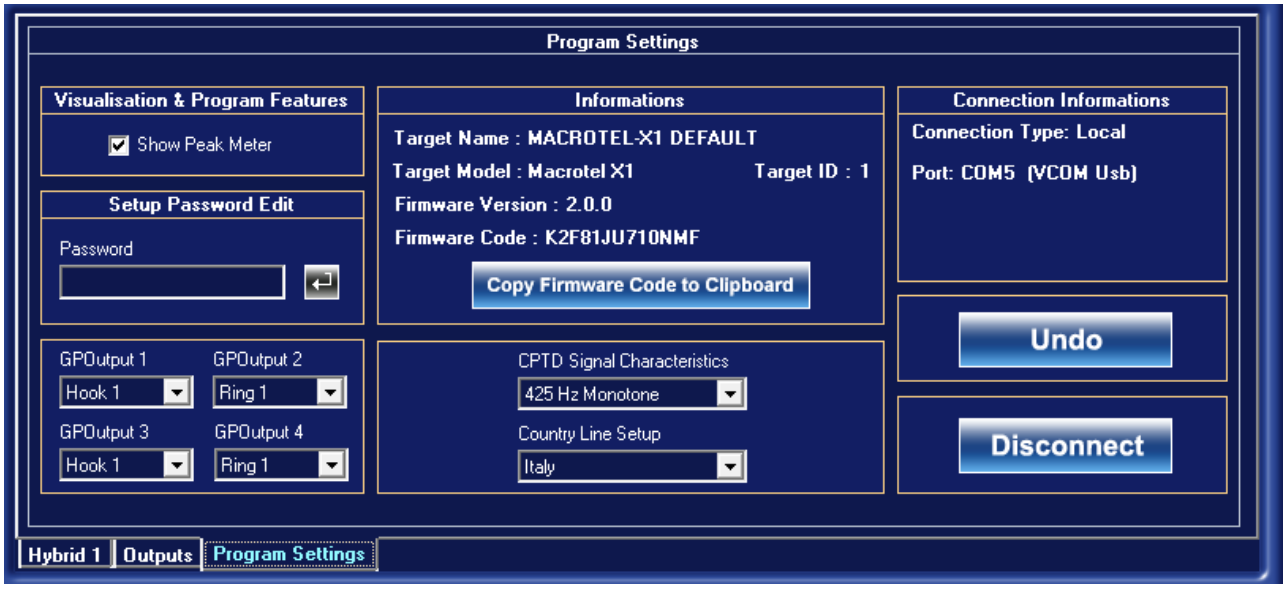
14.5.4 Macrotel X2 Output Section

The Output section of the Macrotel X2 control software shows the Analogic Output control, i.e. the nominal output level. Range of allowed values: from -10.0 dBu to a maximum of +14.0 dBu in 0.1 dBu/steps. It also features the “Conference" checkbox which when enabled allows both the interlocutors to talk to each other even without a mixer.



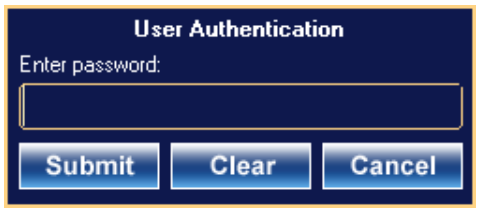
14.5.5 Macrotel X1 and Macrotel X2 Program Settings section

The **Program Settings** section shows all the functions of the Hybrid Remoter Control Software and of the Macrotel X1 and Macrotel X2 devices.

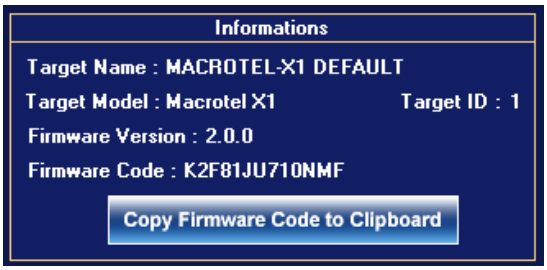


Visualisation & Program Features: The "Show peak meter" checkbox offers the possibility to see the peak meter on the levels section of the two Hybrids.

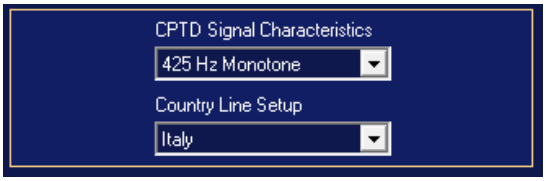
Setup Password: This field is used to enter an alphanumeric Password of maximum 8 digits, which is required to access the device Setup section. Enter the password and click Return. This password must be entered in the User Authentication box to access the Setup section. If you forget the password the device must be returned to the manufacturer in order to be used again. There are no backdoors and Axel Technology's Technical Assistance Service is not authorised to instruct others to tamper with the device.



Information: This panel provides a summary of the Macrotel X1 or Macrotel X2 model in use, the name of the device, the firmware version installed on the DSP of the device and the univocal firmware code assigned to each single device. The Copy Firmware code to Clipboard key is used to save the Firmware code in the notebook, so that this alphanumeric code can be sent to Axel technology to execute Upgrades or improve the product.
The **Connection Information** box shows the type of connection in use. It may be Serial or USB.



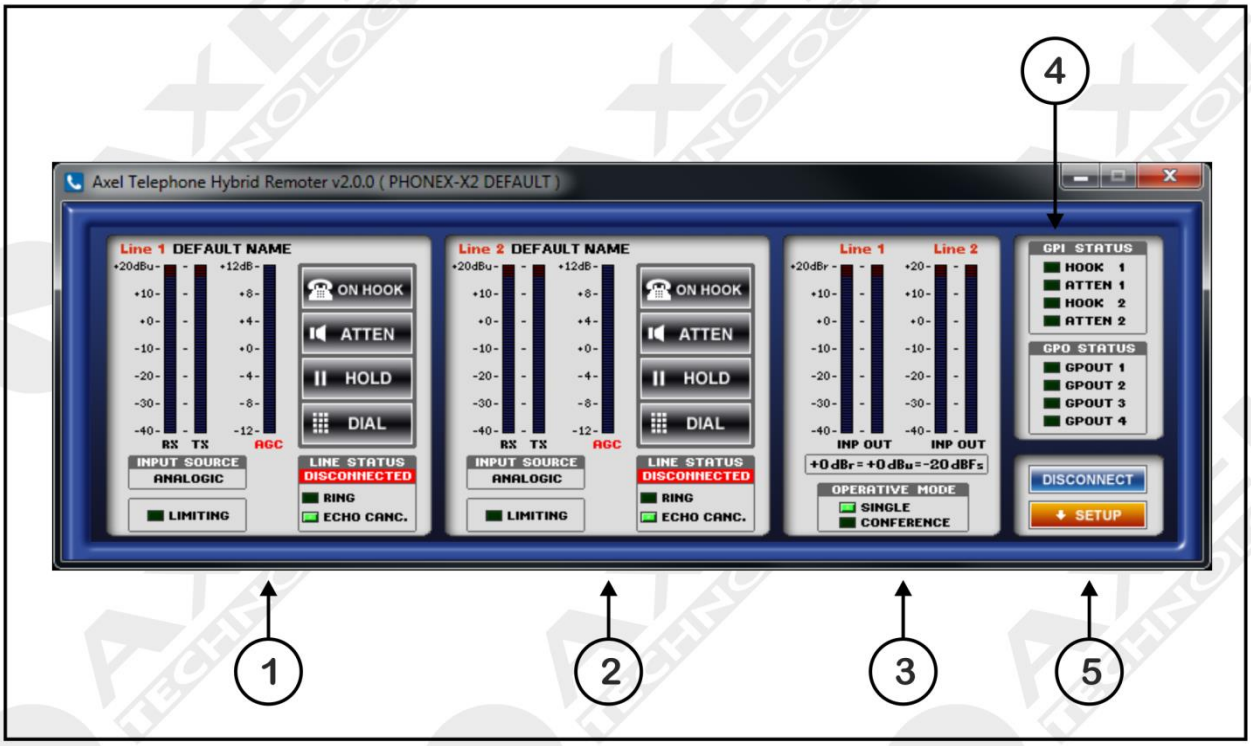
Country Line Setup: Select the country in which Macrotel X1 or Macrotel X2 is installed from this list. This parameter is important for the configuration of the impedance set inside the Macrotel, which will change and adapt the input telephone line with the line provided in the country in which Macrotel is installed.



CPTD Signal Characteristics: the **Call Progress Tone Detector** is a function of the Macrotel which recognises if a call is still active or if it has ended. The CPTD characteristics vary from country to country and the various parameters can be selected from the list.

UNDO: press UNDO to reset the values set in the whole Hybrid 1, Hybrid 2 and Outputs section to the values set on the device before the opening of the control panel. The Disconnect key disconnects the device from the control software.

15 DETAIL OF PHONEX REMOTER FOR MACROTEL X2

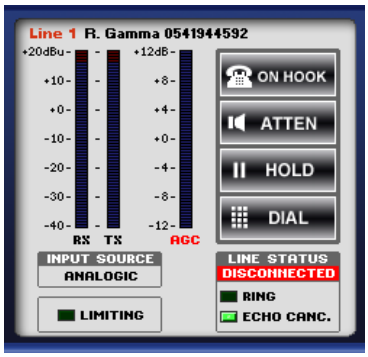


15.1 DESCRIPTION OF MACROTEL X2 CONTROL SOFTWARE

The Macrotel X2 control software (Hybrid Remoter) is basically divided into 5 parts:

1. **Hybrid 1** section
2. **Hybrid 2** section
3. **Levels** section
4. **GPI / GPO status** section
5. **Setup & Disconnect** section

15.2 HYBRID 1 SECTION



The “Hybrid 1 Section” features a series of operating and monitoring controls relating to the telephone hybrid 1 connected to a PSTN/POTS line.

The monitoring part concerns the Receive(Rx) and Send (TX) levels and shows whether Macrotel X2 is in *Limiting* operating mode; it also shows the line status, ring and echo canceller. When a parameter is active the relevant green LED lights up (in this case Echo Canceller is active).

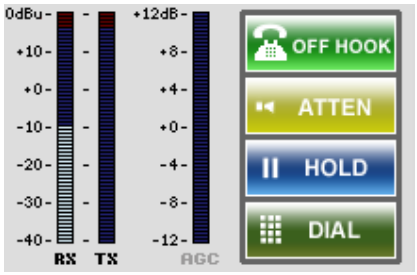
As regards device operation, the controls available are:

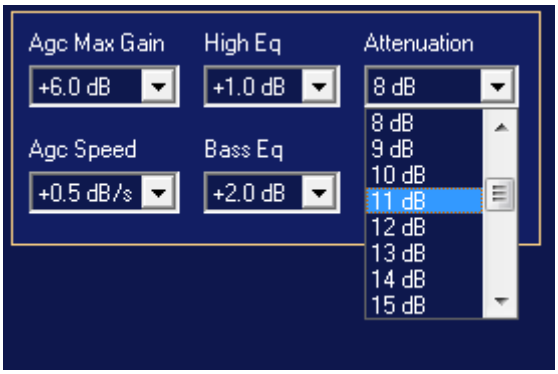
ON HOOK – ATTEN – HOLD – DIAL

ON HOOK: in this status Macrotel X2 can hook an incoming call or open the telephone line. Upon receipt of a call the LED of the incoming call flashes on the front panel and the Hybrid Remoter displays the RINGING Line Status for the hybrid with the incoming call.
The LED lights up in the GPO Status section. The open collector of the GPIO communication port closes. See the appendix at the end of this manual for the pinout and connections.

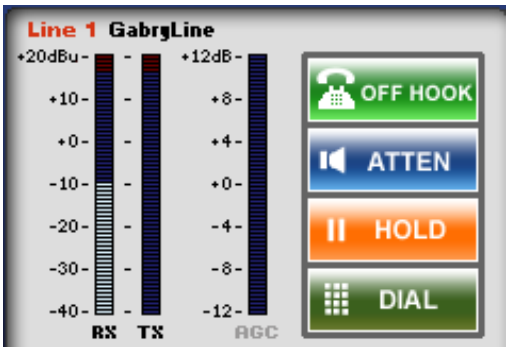
To end a call, click OFF HOOK or press HOOK-1 again on the front panel; the latter remains switched on for the entire time of the telephone call.

ATTEN: when ATTEN is pressed, a dB reduction equal to the "**Attenuation**" value set in the control software is applied to the Receive signal. The ATTEN control becomes YELLOW.





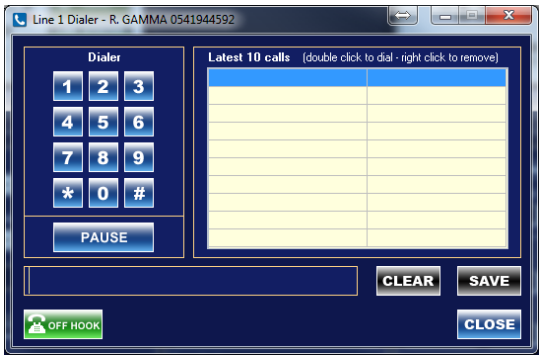
HOLD: when HOLD is pressed via software the Receive (Rx) volume is taken to –infinity without closing the call. The HOLD control becomes RED.



DIAL: when DIAL is pressed the DTMF dialler opens. Dial the number using the numerical keyboard of your PC and then click ON HOOK. In this way the DTMF dials the number to be called on the telephone line. The Latest 10 Calls section displays the last ten calls; click SAVE to permanently save a telephone number. To recall a number double click on it.

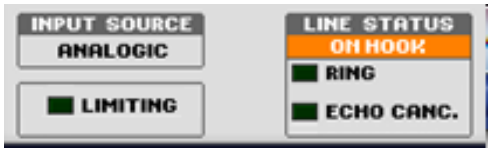
Use the right button of the mouse to delete a number (Delete Row #1) or all the numbers(Delete All) from the list of the Latest 10 calls.

The lower section displays the device statuses and any audio functions enabled.



INPUT SOURCE: this shows which source is connected to the Macrotel X2 input. Analog, Microphone and Tone Gen are available.

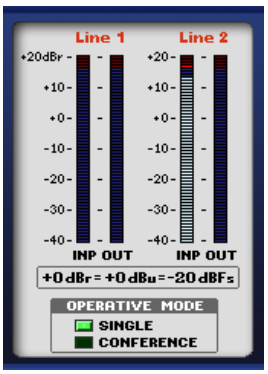
The section below the Input Source shows if the "*Limiting*" controls are enabled. The Line Status section displays the status of the *Ring and Echo Canceller* controls.



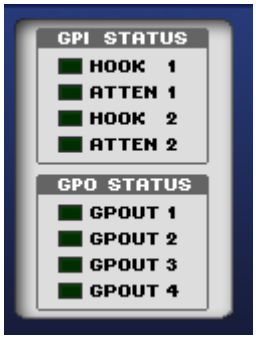
15.3 LEVELS SECTION

The levels section shows the Macrotel X2 Input and Output levels of both telephone lines of each hybrid. The *Operative Mode* area shows whether the Macrotel X2 device is operating in **SINGLE** mode, i.e. used as telephone hybrid for each single telephone line, or in **CONFERENCE**, i.e. sending to Telephone Hybrid 2 (*send*) what is received from Telephone Hybrid 1 (*receive*) and sending to Telephone Hybrid 1 (*send*) what is received from Telephone Hybrid 2 (*receive*). The **CONFERENCE** mode allows the two interlocutors to speak to each other.

In this mode an audio signal can always be sent via the **SEND** input to both interlocutors. The audio signal that comes, for example, from the **TELCO** channel of the mixer, which sends all the mixer console's audio signals, **WITHOUT** what arrives from the telephone channel, i.e. the **RECEIVE**. In this way an audio-loop with the telephone device is avoided.



15.4 GPI / GPO STATUS SECTION



The GPI / GPO Status section shows the status of the General Purpose Input and Output status. The 15 pin HD female SubD port on the back of the device is used to connect the device; see the technical appendix for the connections and the pinout.

15.4.1 GPI status function

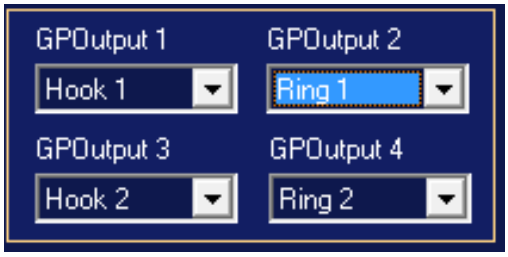
HOOK 1: this is used to hook, by means of a momentary contact, the telephone line of Hybrid **1**; it is usually connected to the **TELCO (N-1)** modules of the Broadcast Mixing consoles that feature a **GPO** contact to answer incoming calls directly from the telephone fader.

ATTEN1: The closure of this GPI, corresponds to the execution, by the Macrotel X, of the **ATTEN** command available via REMOTER control software or via web page; in other words "*a dB reduction equal to the Ducking value set in the control software is applied to the Receive signal*". The connection to the **GPOs** provided by the mixing consoles or by commands made available to the broadcast technician or director of a programme on air, is useful if the audio received needs to be attenuated. This is not a profanity delay.

HOOK 2: this is used to hook, by means of a momentary contact, the telephone line of Hybrid **2**; it is usually connected to the **TELCO (N-1**) modules of the Broadcast Mixing consoles that feature a **GPO** contact to answer incoming calls directly from the telephone fader.

ATTEN2: The closure of this GPI, corresponds to the execution, by the Macrotel X, of the **ATTEN** command available via REMOTER control software or via web page; in other words "*a dB reduction equal to the Ducking value set in the control software is applied to the Receive signal*". A connection to the GPOs provided by the mixing consoles or by commands made available to the broadcast technician or director of a programme on air, if the audio received needs to be attenuated. This is not a profanity delay.

15.4.2 GPO status function



GPOUT 1: this monitor displays when Macrotel X2 closes one of its open collectors in relation to other configurations. The additional functions can be configured in the "Program Setting" section, and some of the functions listed below can be associated with each GPOut:

OFF: no action

Hook1: when a call is hooked on the Hybrid 1, this GPOut remains closed until the call ends.

Ring1: when a call arrives (Ring) on the Hybrid 1, this GPOut changes status. It is usually connected to external alarm optical repeaters to signal the arrival of a call to the telephone hybrid. It is also usually connected to the Telco or N-1 modules.

Hook2: when a call is hooked on the Hybrid 2, this GPOut remains closed until the call ends.

Ring2: when a call arrives (Ring) on the Hybrid 2, this GPOut changes status. It is usually connected to external alarm optical repeaters to signal the arrival of a call to the telephone hybrid. It is also usually connected to the Telco or N-1 modules.

16 MACROTEL X1 - MACROTEL X2 CONNECTION PROCEDURE

16.1 TELEPHONE HYBRID CONCEPT

The hybrid phone is a device capable of interfacing with a telephone line of audio lines. In practice, the audio signals sent toward the hybrid are received from the phone, and vice versa.

The telephone hybrid is widely used in radio and television, as it allows you to create simple audio connections with remote locations in a very low cost. The signal coming from the telephone hybrid is run like a normal audio source.

The hybrids telephone operating in accordance with the principle of separation of the impedance, filtering also the power supply to 60V normally present on telephone lines.

In its simplest form, the hybrid is conceptually an acoustic coupler, ie a device that picks up acoustically signals from the handset. However a hybrid phone is in reality an apparatus more complex, capable of interfacing directly with the telephone line and to carry out the separation necessary to avoid interference. Hybrid complex manage multiple phone lines and can route the audio signals of a line to the other, thus creating a conference call, see how CONFERENCE of Macrotel and Phonex.

16.2 TELCO, N-1 AND MIX-MINUS CONCEPT

Fundamental part of the use of a telephone hybrid, is the knowledge and the proper use of the system TELCO, also called Clean Feed CF, or N-1 and / or mix minus.

All these terms identify the condition below:

The expression n-1 indicates, in professional audio, the audio return signal that is sent from the studio to one or more remote sources, such as a telephone hybrid. This signal is also often called back audio, RX or, in English, mix-minus.

The expression n-1 refers to the notation of the principle of complete recurrence of Henri Poincaré, n +1, and showing the mix of all the audio signals of the study less than that received from the remote unit. From the conceptual point of view, then the remote unit receives back an audio signal that includes the entire product of the study unless itself.

Distancing a bit 'by theory, the n-1 is often a unique signal to all the remote units of a single program. A custom widespread provides for the generation of two or three returns, assigned on the basis of which remote units need to interact with each other: with the same n-1, in fact, two units are not able to hear each other. Sometimes, the return audio is simply an auxiliary audio mixer to which are assigned to the signals to be sent to the remote unit, obtaining a signal that is usable as a return but that is not technically a n-1 (see next capitol)

16.3 CONNECTION TO THE POTS / PSTN TELEPHONE LINE

	CHECK that this device is connected to POTS / PSTN lines (analog)

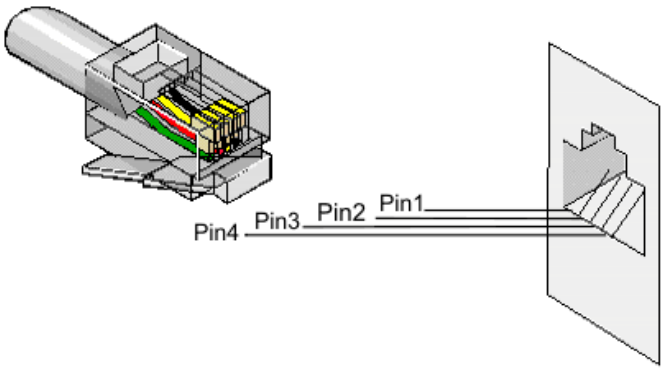
	DO NOT CONNECT this device to digital VoIP telephone lines

	DO NOT CONNECT this device to ADSL lines, even if fitted with filter.

	To avoid any type of hum at 50 Hz and to comply with EMC requirements, the device must be connected to earth by means of the earthing screw on the rear panel or via the power supply cable.

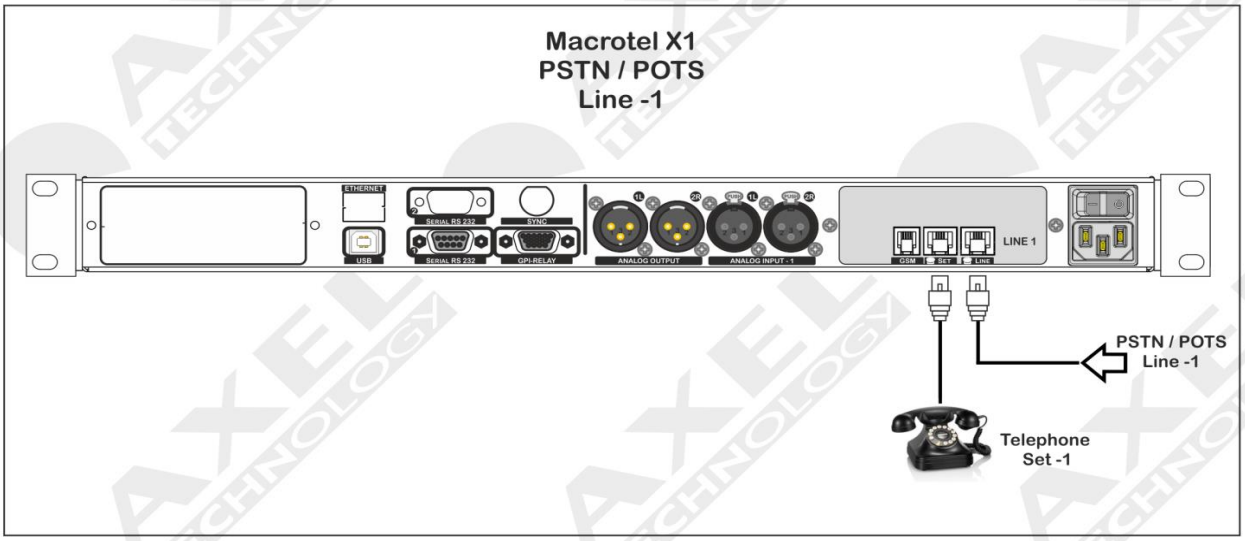
	This equipment must be indirectly connected to the telephone network (i.e. through a switchboard). The user shall be solely responsible for the direct connection to the public telephone network.

The RJ11 connector has 4 wires, but only the two central contacts are used (usually the Red and Green wires – pin 2 and pin 3).

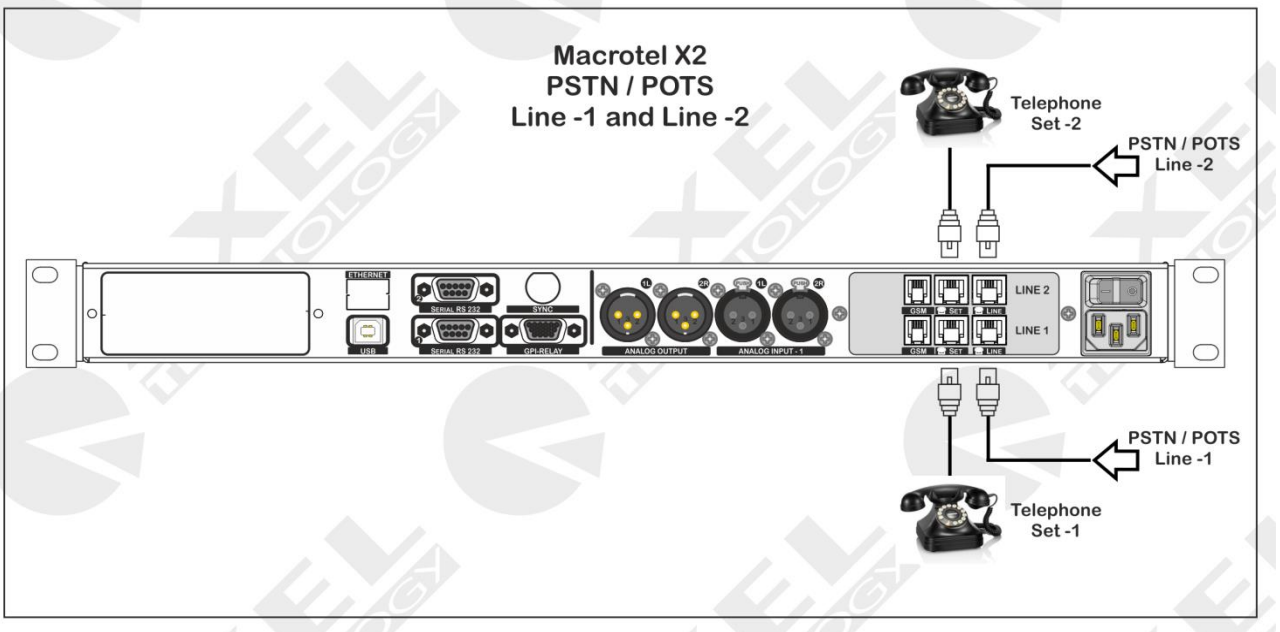


CONNECTOR PINOUT	
Pin	**Description**
1	*Not connected*
2	Telephone line
3	Telephone line
4	*Not connected*

The telephone line from the central office must be connected to the “LINE” connector; a normal telephone set can be connected in parallel to the phone line using the “SET” connector, for example to make calls. Please note that this socket is NOT always active; it depends on the status of the ‘Hook’ key of each Hybrid. When the Hook key is pressed the “SET” socket is not active. The SET socket has the same pinout as the “LINE” socket.



If the unit has operating problems caused by lightening or over voltage, disconnect it immediately from the telephone line and electric power supply; do not reconnect it until the device has been duly checked. If in doubt contact the technical assistance service. Make sure also that your system is fitted with adequate lightening protection. If this is not the case, we recommend disconnecting all connectors during thunderstorms or if the device is not used for long periods of time.

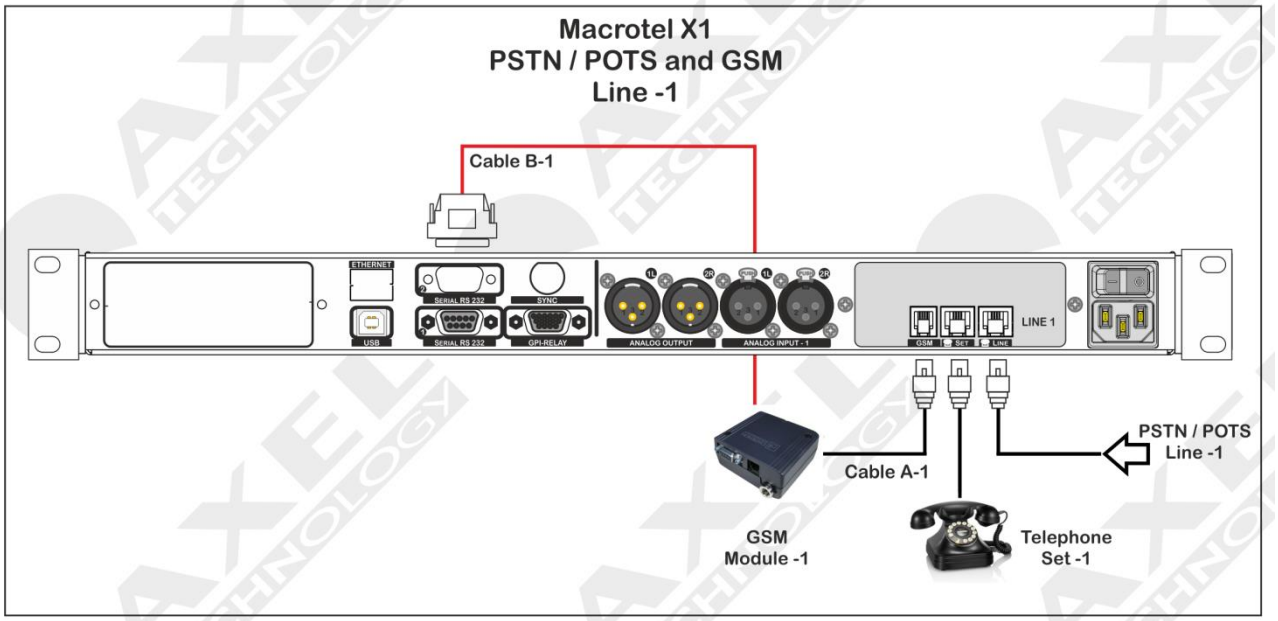


16.4 WIRELESS CONNECTION VIA GSM MODULE 1 AND GSM MODULE 2

Up to two GSM devices can be connected to Macrotel X1 and Macrotel X2 with mute exchange between the POTS/PSTN line and the GSM line. See the LINE TYPE section for the mute exchange of this line. The image below shows how to connect the GSM-1 AND GSM-2 modules.

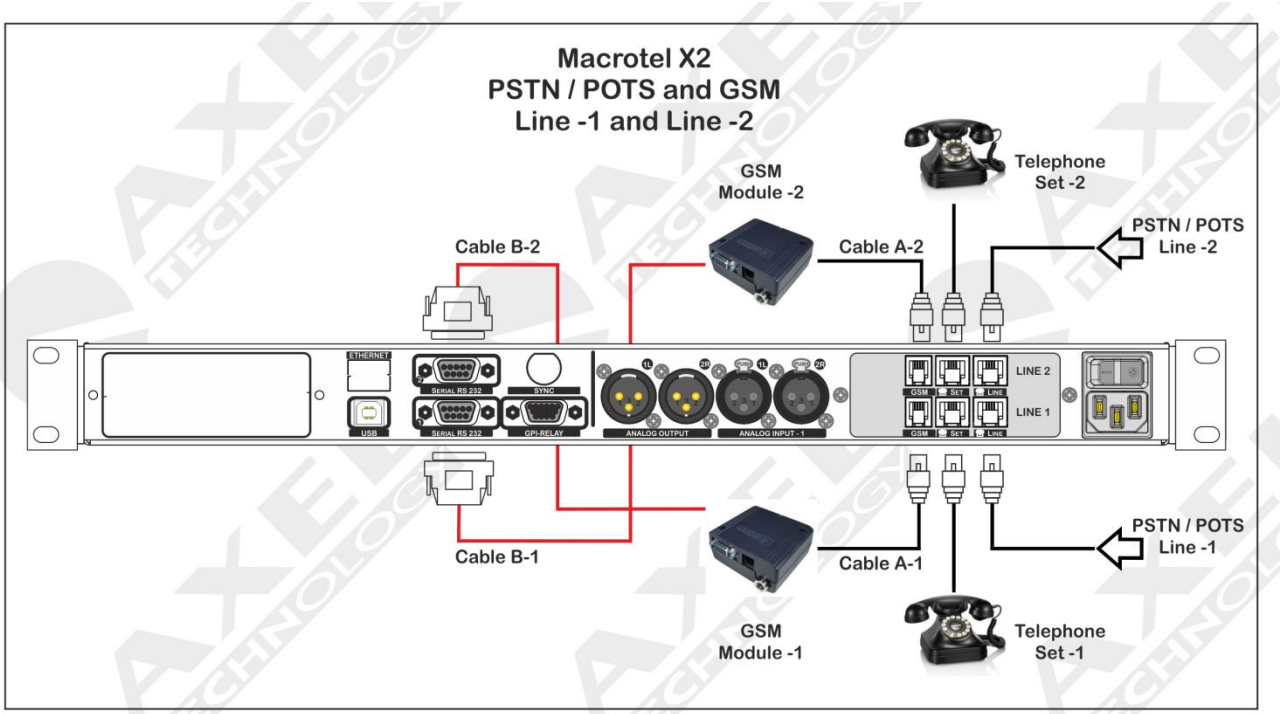
Cable **A-1** is an Audio cable with an RJ10 on one end directly connected to the "**GSM**" port of **LINE 1** of the Macrotel X1.

Cable **B-1** is of the "data" Cross type with SubD 9 pin Male/Male connection to the GSM Module-1 and to the RS232-1 port of the Macrotel X1.



Cable **A-1** is an Audio cable with an RJ10 on one end directly connected to the "**GSM**" port of **LINE 1** of the Macrotel X2. Cable **B-1** is of the "data" Cross type with SubD 9 pin Male/Male connection to the GSM Module-1 and to the RS232-1 port of the Macrotel X2.

Cable **A-2** is an Audio cable with an RJ10 on one end directly connected to the "**GSM**" port of **LINE 2** of the Macrotel X2. Cable **B-2** is of the "data" Cross type with SubD 9 pin Male/Male connection to the GSM Module-2 and to the RS232-2 port of the Macrotel X2.



16.5 AUDIO CONNECTIONS TO AND FROM PHONEX

Macrotel X1 and Macrotel X2 can be connected to other devices such as Mixers or digital consoles in different ways. Macrotel X2 features two possible types of connections, the Single Mode or the Conference Mode. Both are detailed below. The following connections are available in Single Mode:

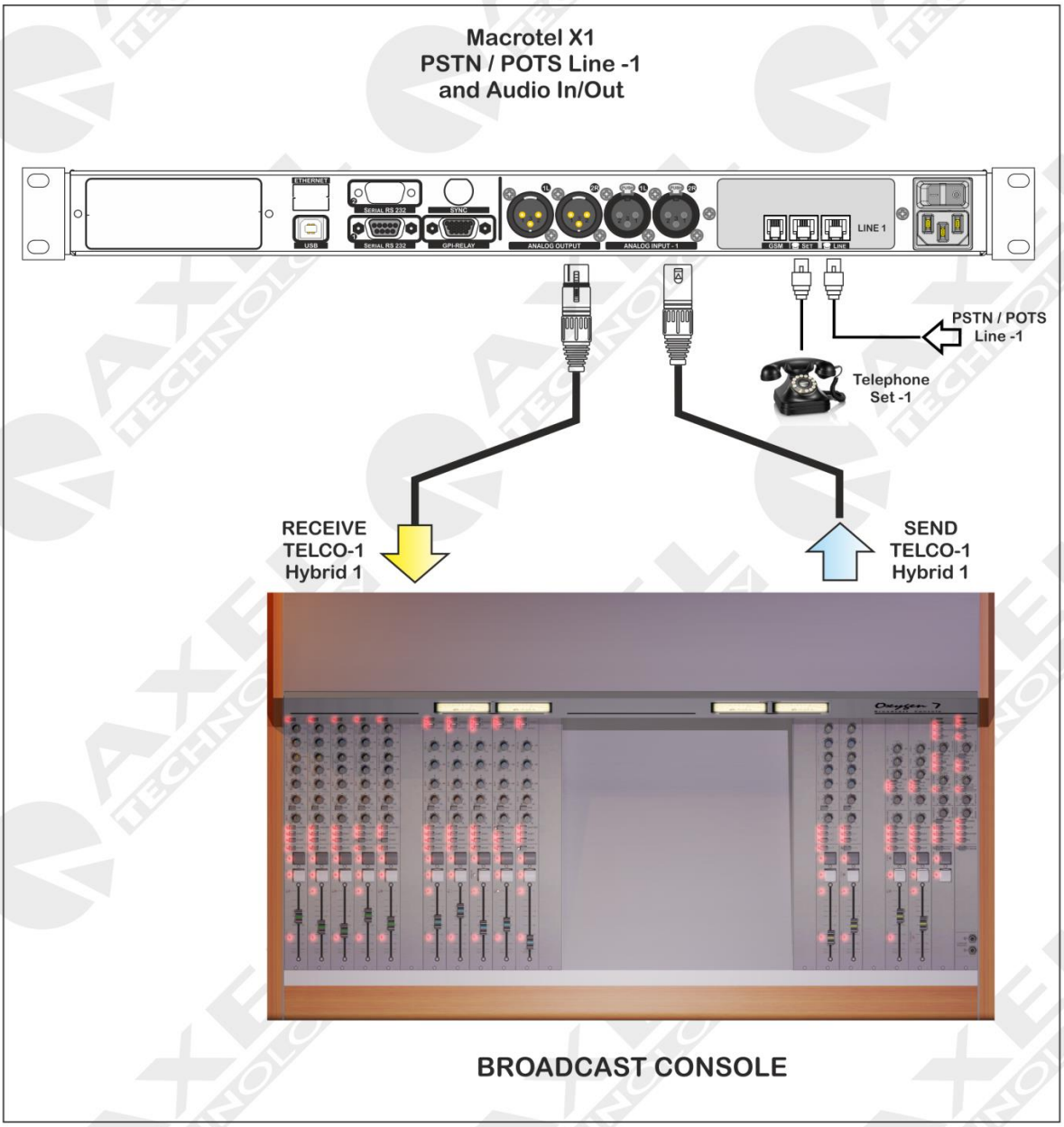
a. Analog connection in Single Mode with one telephone line (Macrotel X1).

b. Analog connection in Single Mode with two telephone lines (Macrotel X2).

For the Conference mode with a number of devices connected:

a. Analog connection, in conference mode, with two telephone lines and three Macrotel X2 devices.

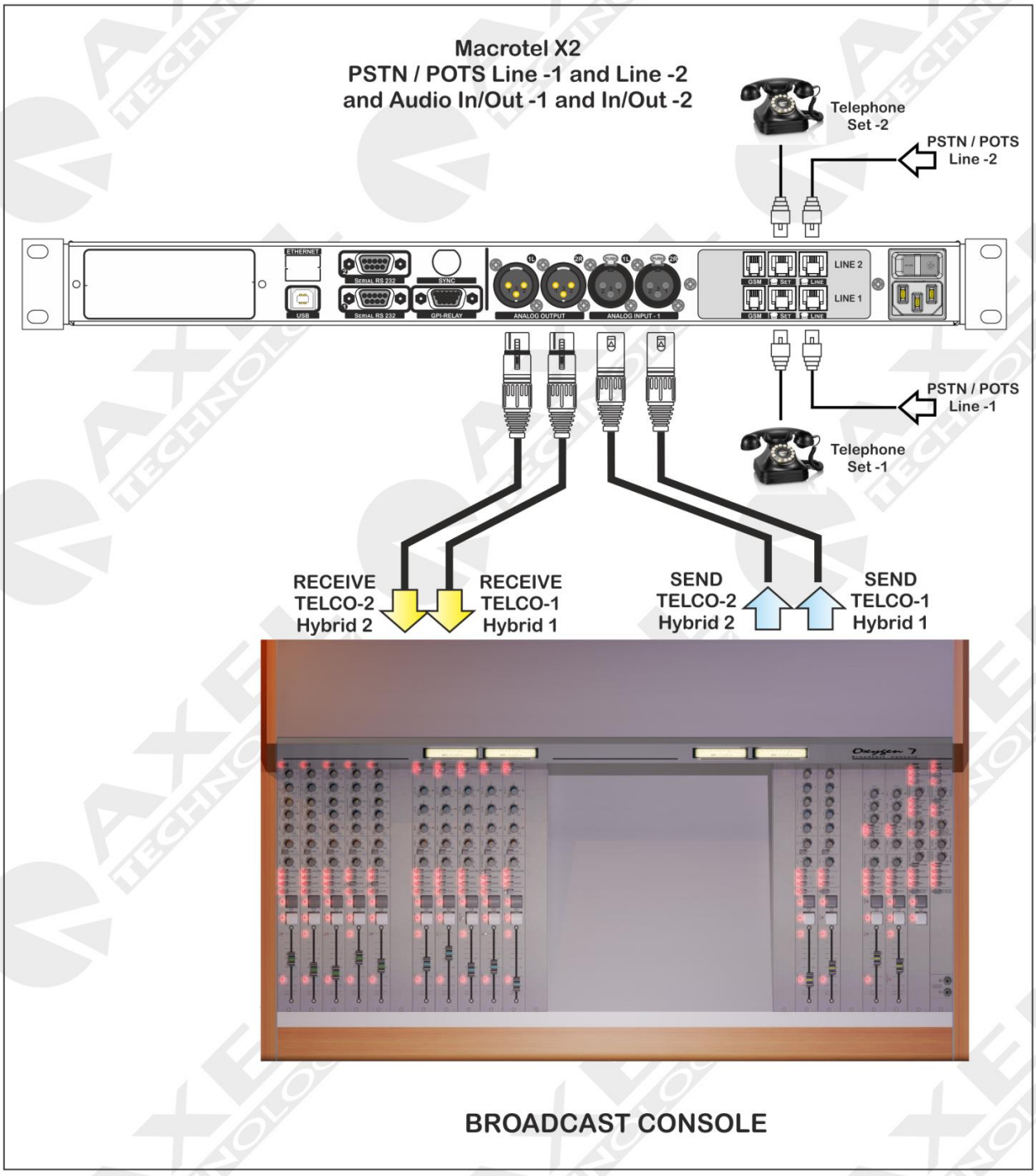
16.6 ANALOG CONNECTION IN SINGLE MODE WITH ONE TELEPHONE LINE (MACROTEL X1)



In this mode the Macrotel X1 device is connected to the console using an analog audio line. The audio signal from the Telco N-1 SEND output of the Mixer is sent to Analog Input -1 of Macrotel X1; the output of Macrotel X1 is sent to the Telco RECEIVE module relating to Hybrid 1.

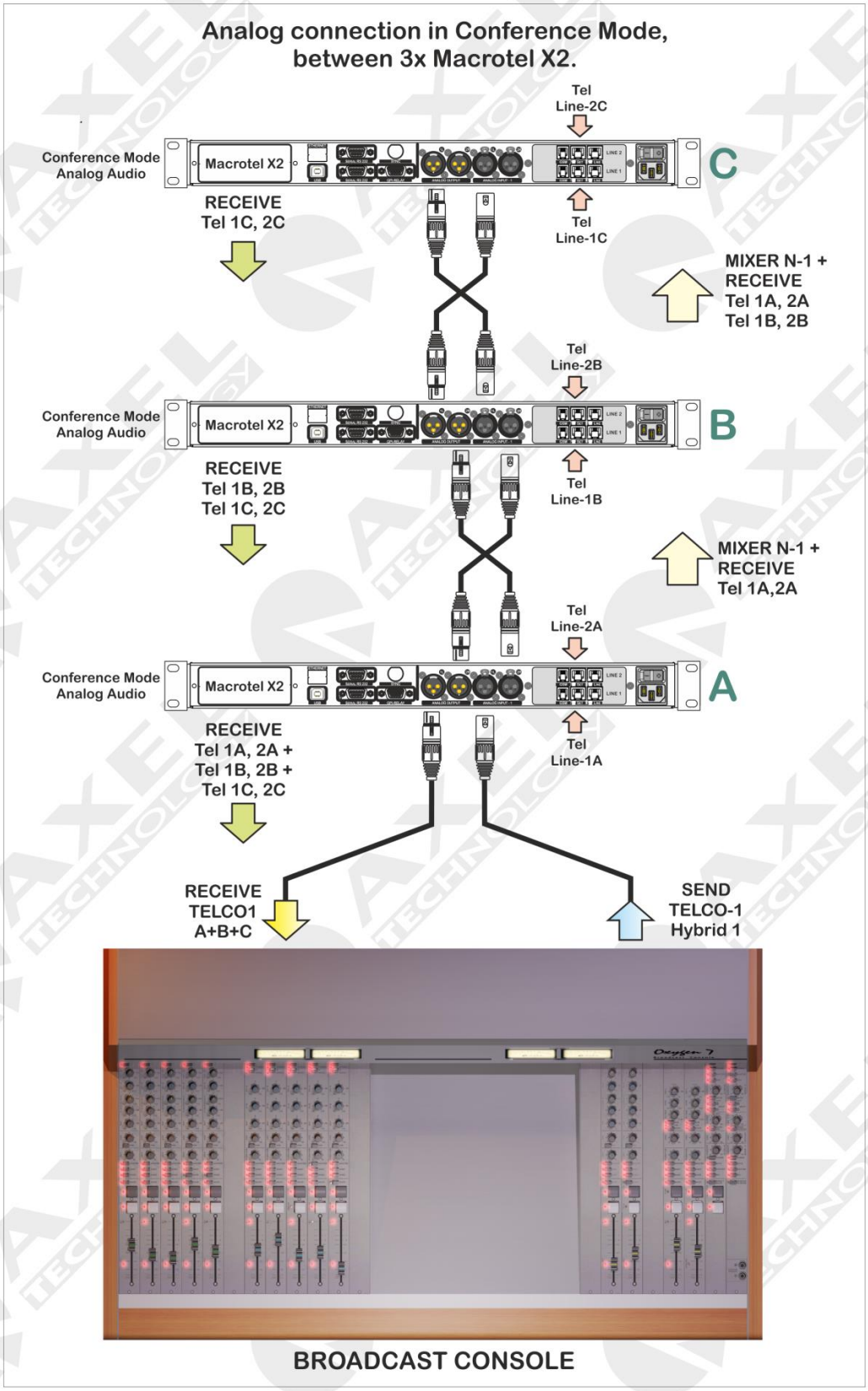
16.7 ANALOG CONNECTION IN SINGLE MODE WITH TWO TELEPHONE LINES (MACROTEL X2).

In this mode the Macrotel X2 device is connected to the console using an analog audio line. The first telephone hybrid is connected to the Telco N-1 SEND output of the Mixer. The audio signal is sent to the Analog Input 1 of Macrotel X2. The output of Macrotel X2 is sent to the Telco RECEIVE module related to Hybrid 1.



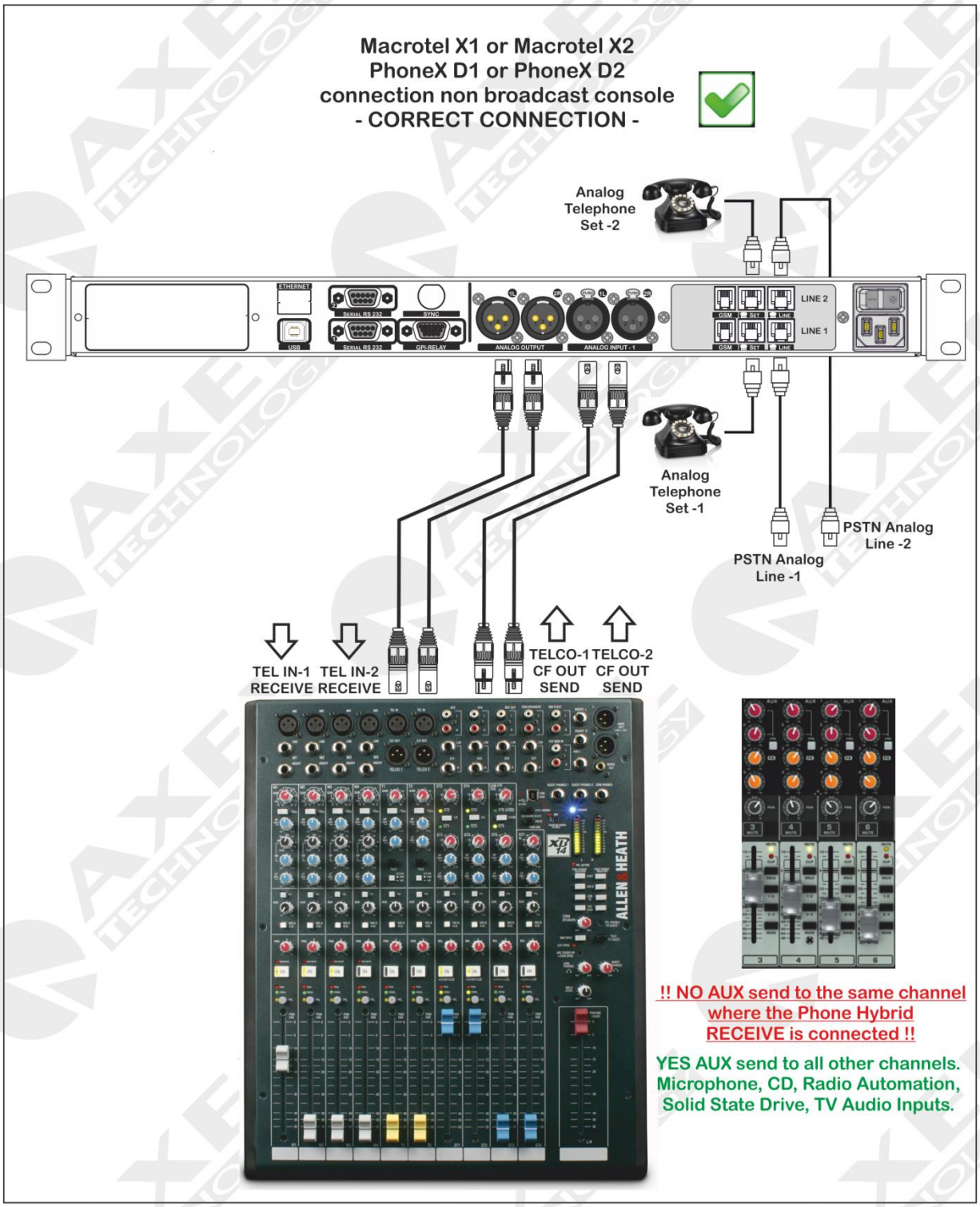
The second telephone hybrid id connected to the Telco N-1 SEND2 output of the Mixer. The audio signal is sent to the Analog Input of Macrotel X2. The output of Macrotel X2 is sent to the Telco RECEIVE module related to Hybrid 2.

16.8 ANALOG CONNECTION, IN CONFERENCE MODE, WITH 2 TELEP. LINES AND 3 MACROTEL DEVICES.



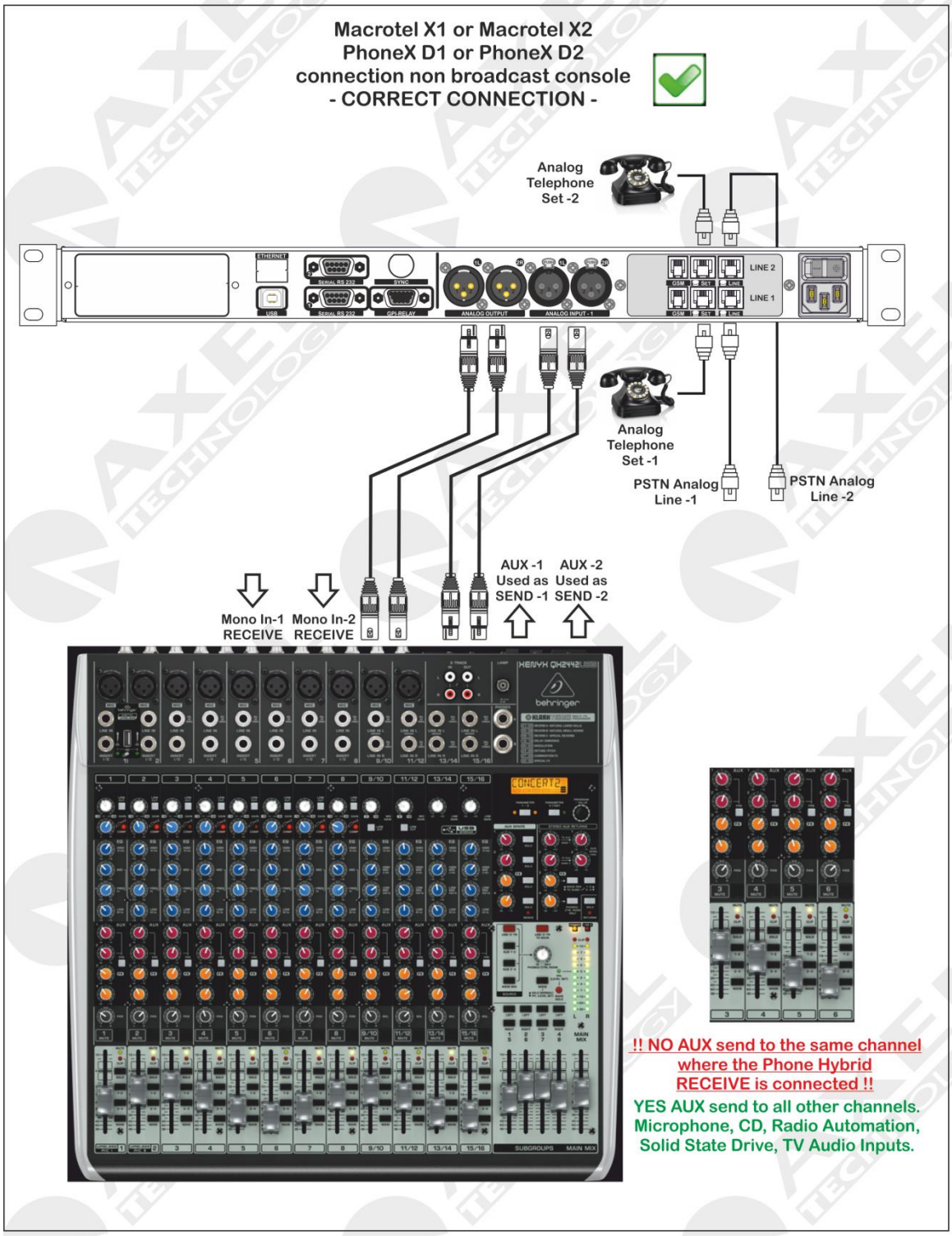
This mode exploits the maximum modularity of the Macrotel X2 device. All the hybrids are connected to each other in “cascade” and all the Macrotel X2 devices can be controlled from the console simply using one single Telco N-1 channel. The Conference mode on the Analog Output of each Hybrid must be enabled to operate in this mode. Up to 3 Macrotel X2 devices can be connected in cascade.

16.9 CONNECTION TO A NON-BROADCAST MIXING CONSOLE -1



This way of connecting the Macrotel or Phonex telephone hybrid, allows the user to connect a “not broadcast” mixing console. In the example above this console not having all the functionality of a console "Broadcast" feature offers a service to connect directly to the telephone hybrid mixer.
The telephone hybrid receive is connected to TEL TEL IN-1 and IN-2 while the SEND, that is what is sent to the other party phone is connected to TELCO CF OUT-1 and OUT-2 TELCO CF.
CF means Clean Feed, and performs a mix minus created without loops and larsen. Otherwise known as N-1, must be sent from the person phone all the "Program" unless the signal received by the other party phone itself.

16.10 CONNECTION TO A NON-BROADCAST MIXING CONSOLE -2

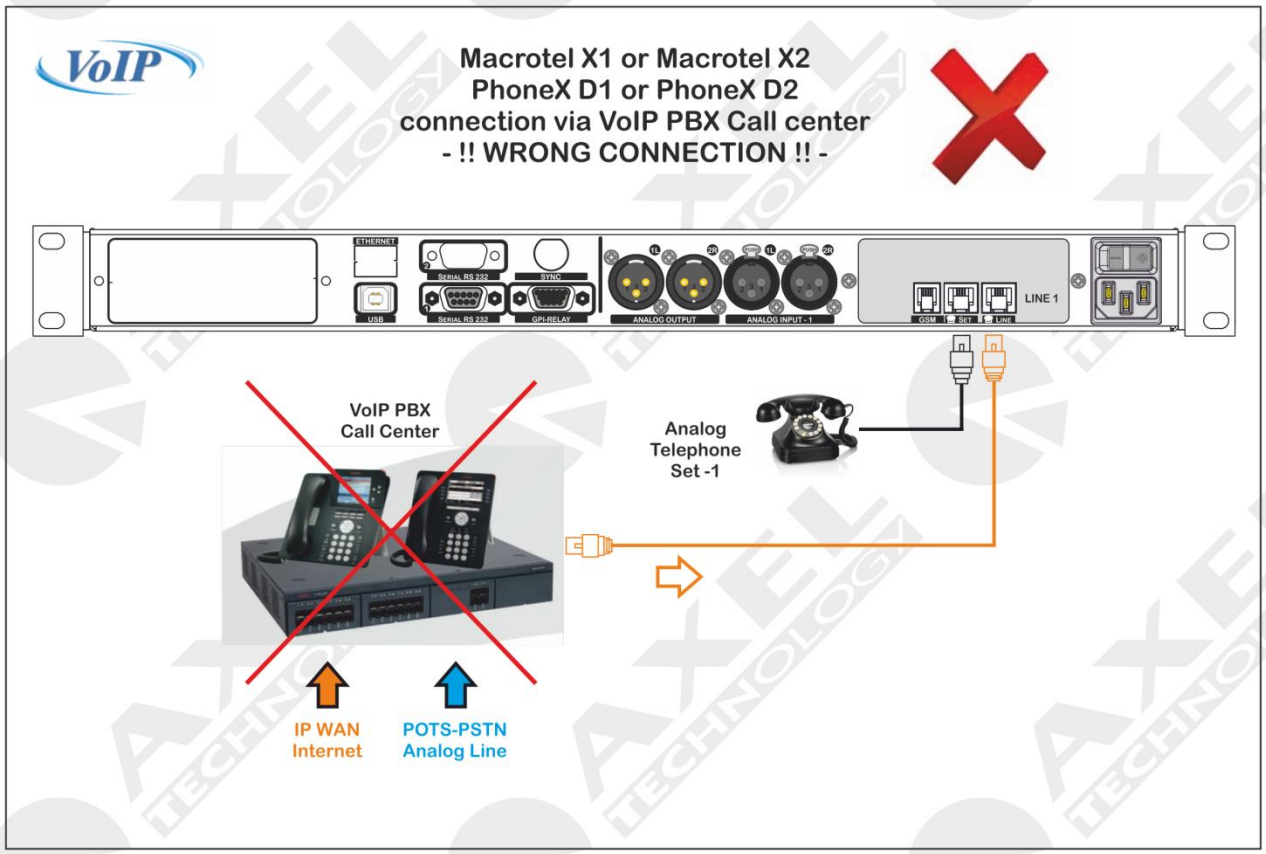


This way of connecting the Macrotel or Phonex, allows users to connect a mixing console that is not “broadcast”. In the example above it is possible to understand that the console in use is completely devoid of the functionality of TELCO, Mix-Minus or N-1. At this point the service of Telco must be created, and executed with what it has available, namely the AUX bus.

In the example above there are two AUX buses (recognizable by both the manual and the red knobs) We could create a hybrid bus that sends to the telephone hybrid ALL the "Program" audio then must be sent to 'AUX-1 and / or AUX-2, the CD Player, directed automatically, the director and studio microphones, BUT will NOT mandate the telephone Hybrid incoming signal. This because it would create larsen and loops very annoying to listen to.

In any case, Axel Technology is not responsible for damages caused to third parties for the improper use of non-broadcast mixing console. In the catalog of Axel Technology is possible to find solutions as a broadcast mixing console.

16.11 CONNECTION TO A DIGITAL LINE OR VOIP -1



It is not technically possible to directly connect a VoIP hybrid phone directly.

You must insert between VoIP and Telephone Hybrid a A.T.A device

16.11.1 What is a A.T.A device?

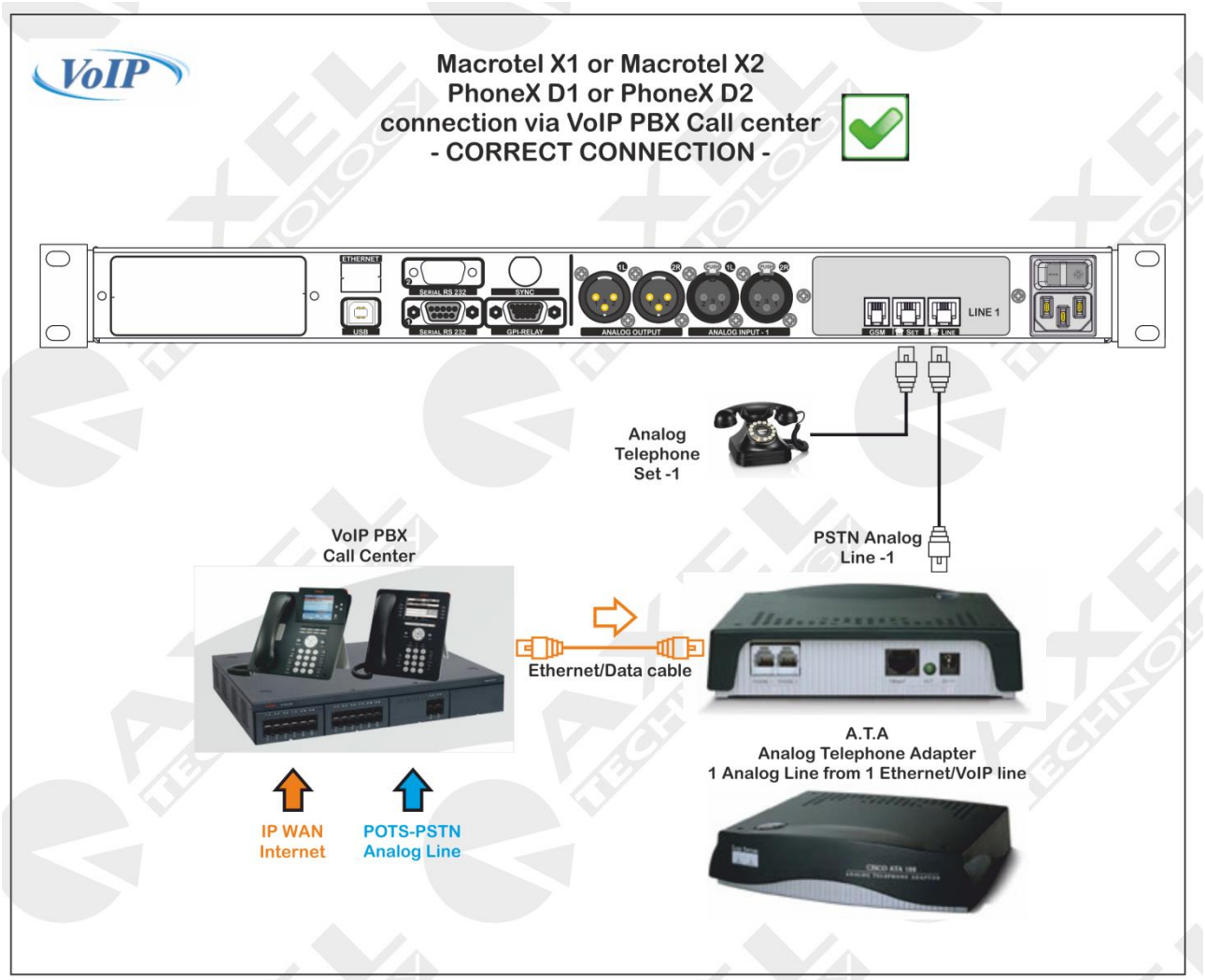
An Analog Telephone Adapter (ATA) (Analog Telephone Adapter) is a device used to connect one or more standard analog phones in order to use them with other systems such as the transport of voice over IP (VoIP)

The ATA is provided by some VoIP providers in order to allow the user to connect their phone from the cable pulling the traditional telephone company. In this case it is possible that the ATA is locked and therefore can only be used with the VoIP provider from whom you purchased it.

An ATA typically has at least one port where you can connect a telephone (normally a RJ11) and one Ethernet port (normally a RJ45) to connect to a LAN connected to the Internet. More complex models can have multiple telephone ports for phones or ISDN PBX and an additional Ethernet port to which you can connect other network objects.

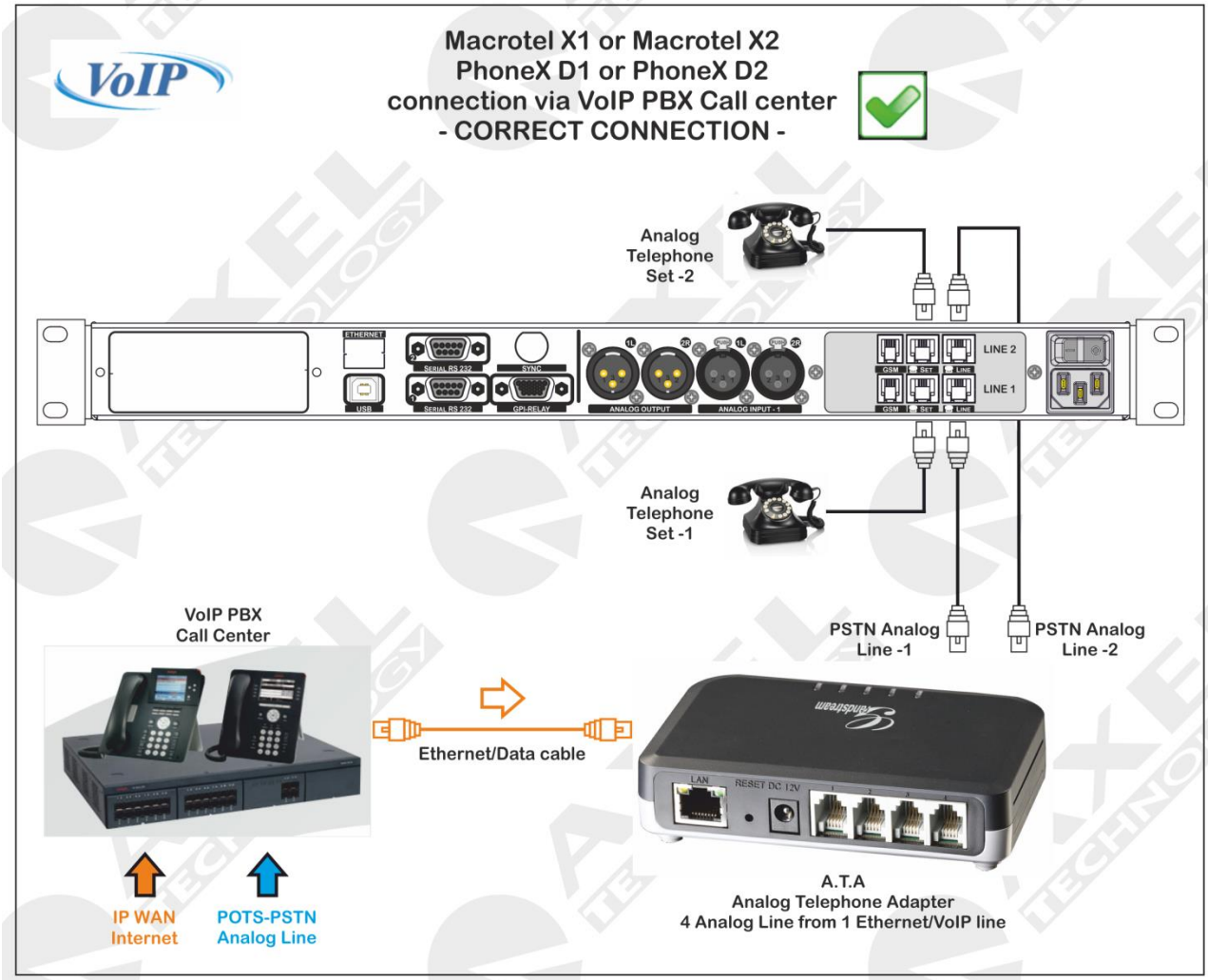
The device is programmed with a dedicated number, which adds a second phone line to the home. Two numbers, the desk phone and the ATA device, share the same line. When a call comes in, the ATA adapter rings even when it is directed to the telephone line. When you dial a number, based on the prefix, the call is routed to a fixed line or the Internet.

16.12 CONNECTION TO A DIGITAL LINE OR VOIP -2



In the event you need to connect a digital line to a hybrid phone, you must enter an ATA which means Analog telephone adapter, or an adapter between a digital line PSTN analog. Each manufacturer has its general, although some still exist generics on the market. Contact your phone service provider for the installation of the same. In the above example an adapter to ONE SINGLE LINE.

16.13 CONNECTION TO A DIGITAL LINE OR VOIP -3



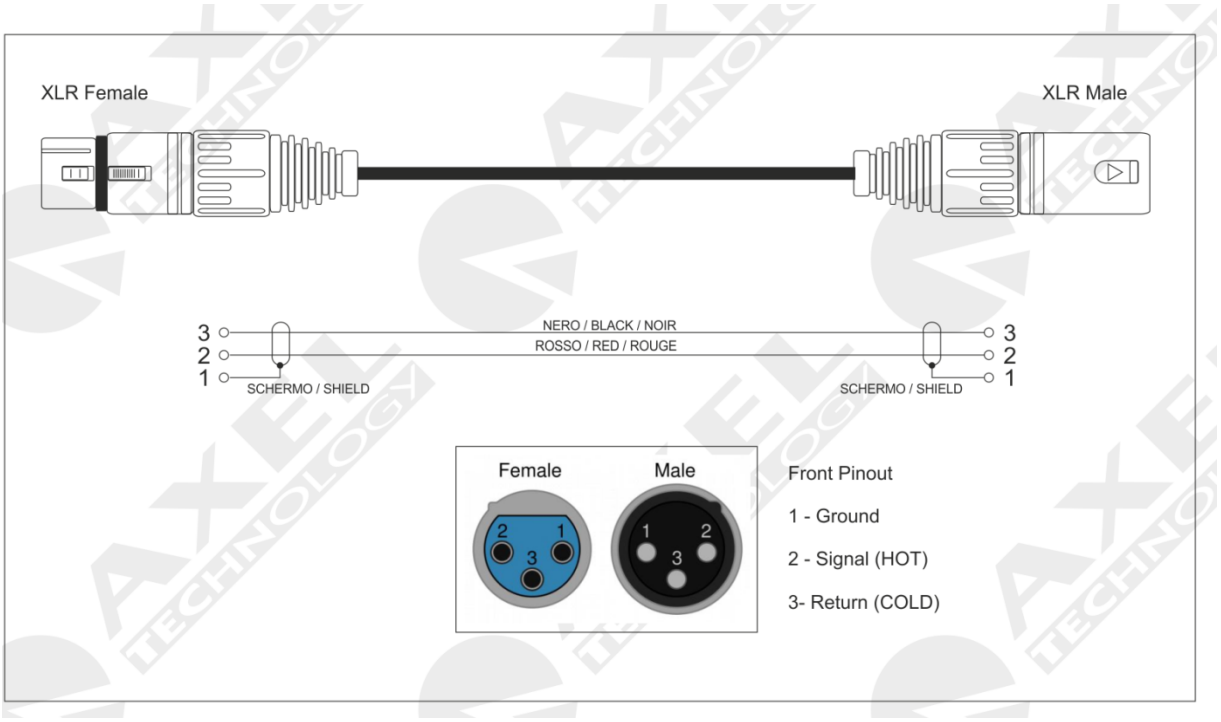
In the event you need to connect a digital line to a hybrid phone, you must enter an ATA which means Analog telephone adapter, or an adapter between a digital line PSTN analog. Each manufacturer has its general, although some still exist generics on the market. Contact your phone service provider for the installation of the same. In the above example an adapter for multiple output lines.

17 TECHNICAL APPENDIX

This section provides all the technical explanations, and the connection pin outs to and from the Macrotel X1 and Macrotel X2 device. Always refer to this technical appendix for connections and connection procedures. In case of differences between the documentation below and the hardware device please contact Axel Technology at the numbers and e-mail addresses shown at the end of this manual. Our technical and assistance department will be pleased to help you!

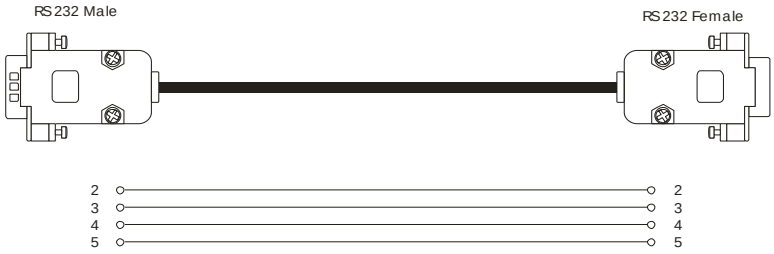
17.1 APPENDIX A – BALANCED AUDIO CONNECTION AND PINOUT

Balanced Audio connection diagram with balanced XLR for **Analog** audio **input** and **output** (Left+Right) and AES/EBU digital audio **input** and **output**.



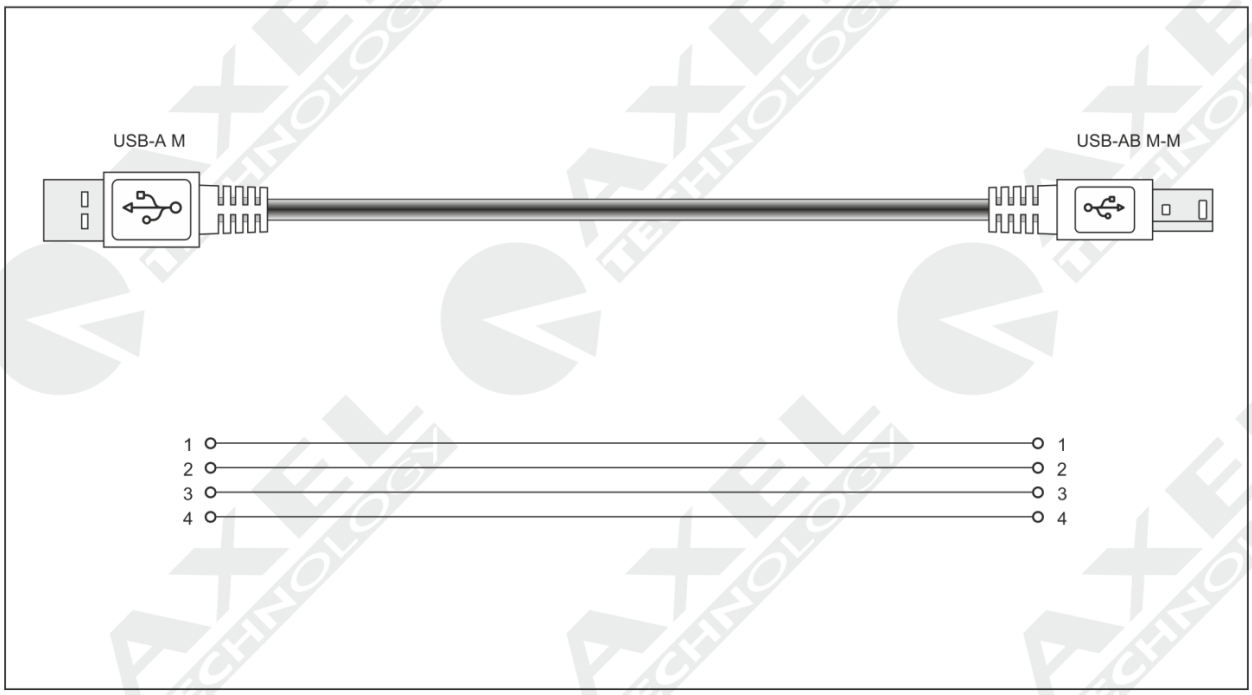
17.2 APPENDIX B – SERIAL CONNECTION E PINOUT

PORT 1		PORT 2,3,4	
2	Tx	2	Tx
3	Rx	3	Rx
4	DTR	4	/
5	GND	5	GND



A standard Pin-to-Pin serial cable is required for the PC connection, not a CROSSOVER one. For a correct connection the cable must not be more than 20 m long. Ports 2 and 3 use only the Tx, Rx and GND for the PC connection while port 1 also has the DTR (Data Terminal Ready) for modem connection. The port connection speed must coincide with the speed of the port of the Macrotel X device and of the PC's serial port.

17.3 APPENDIX C – USB A/B CONNECTION

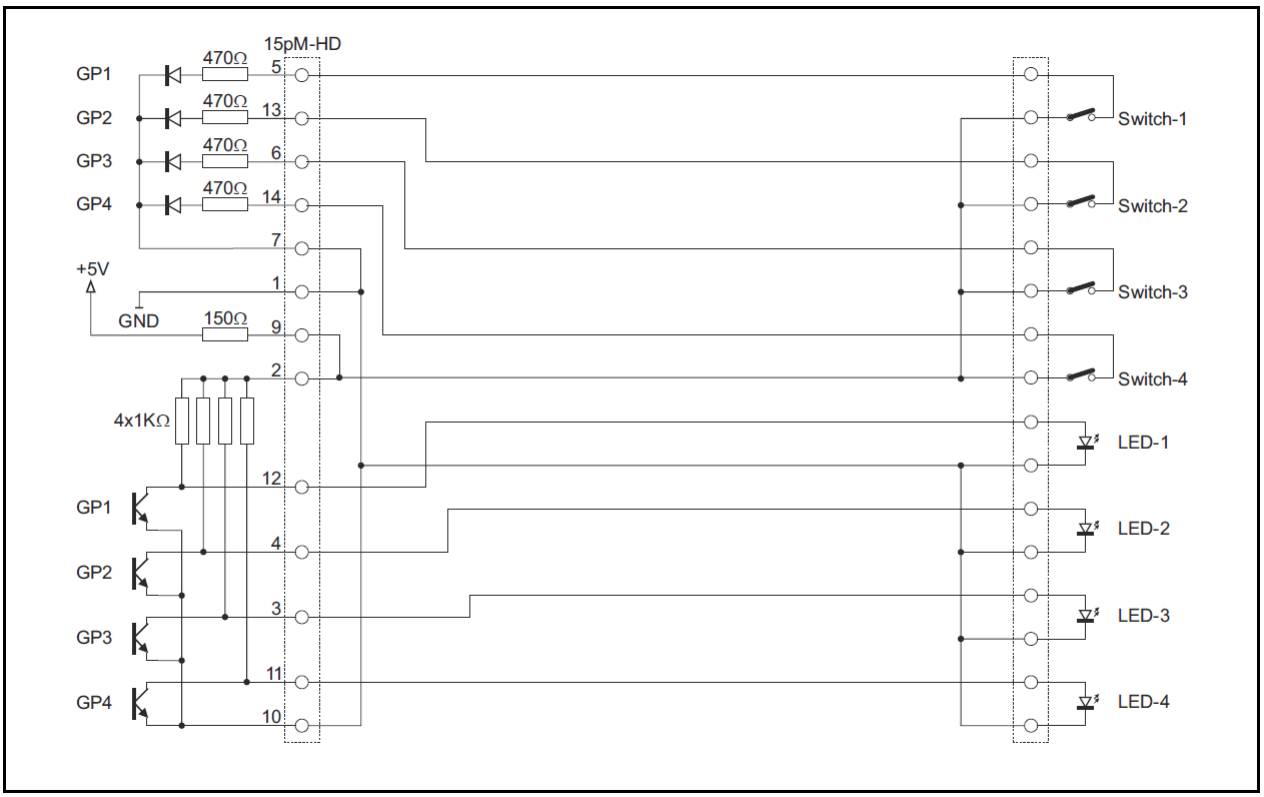


17.4 APPENDIX D – GPIO PORT

The SubD connector 15pole HD GPIO place on the rear of Macrotel, provides 4 inputs General Purpose and 4 outputs General Purpose binary. The inputs are polarized on Opto coupler while the outputs are open collector. They can be used to send commands to Macrotel and perform certain functions. The inputs are constituted by photocouplers polarized on each input and is always inserted, inside, a protection resistor 150 ohms in series. The maximum current that can flow on each photo coupler is 20mA. The voltage supplied between pin 9 and pin 1 is +5 Vdc unregulated.

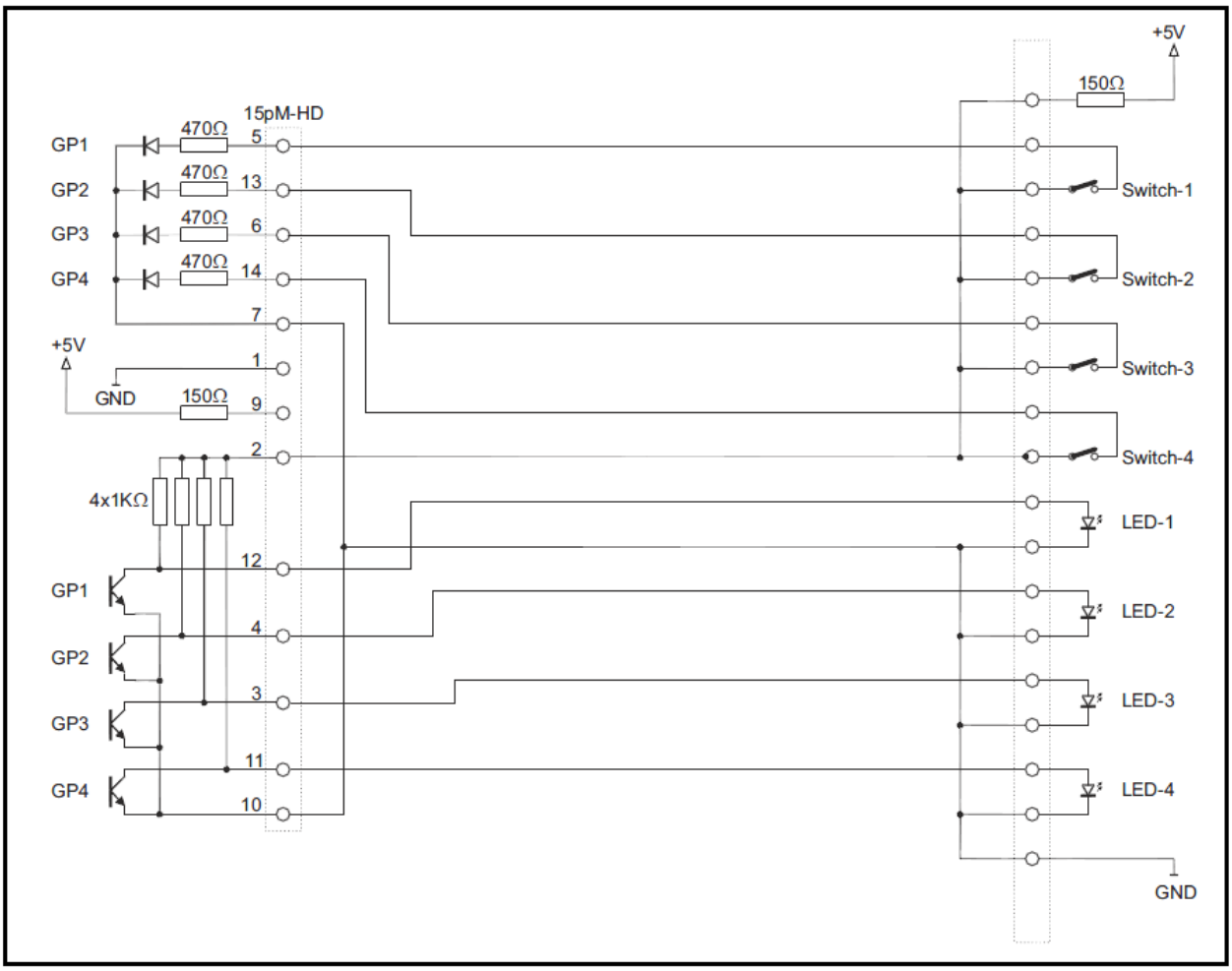
17.4.1 Connection to GPIn and GPOut via internal activation (Relay)

As shown in the diagram below, taking the tension inside the apparatus it is possible to polarize a photo coupler and implement one of the 4 GP Input available. By taking the +5 V from pin9 and applying it to the anode of a photo coupler and then connecting the katodo common (pin 7) to the mass represented by pin1, then you will implement the function. See this section on the switching mode from an external command, represented by a relay or a switch.



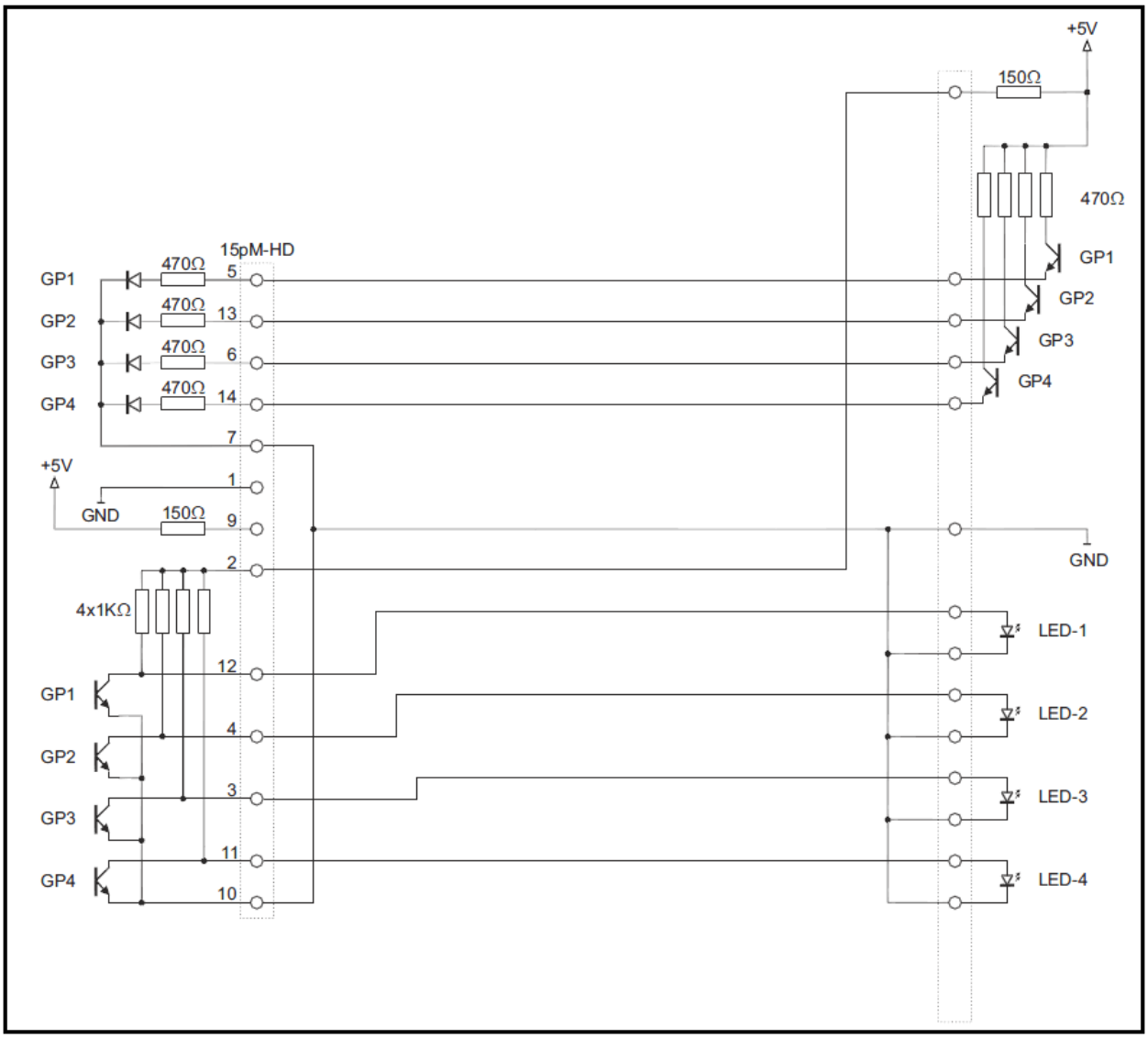
17.4.2 Connection to GPIn and GPOut via external activation (TTL)

As shown in the diagram below, taking the voltage externally apparatus it is possible to polarize a photo coupler and implement one of the 4 GP Input available. Note: in this case the masses of the TTL signals generators are common.

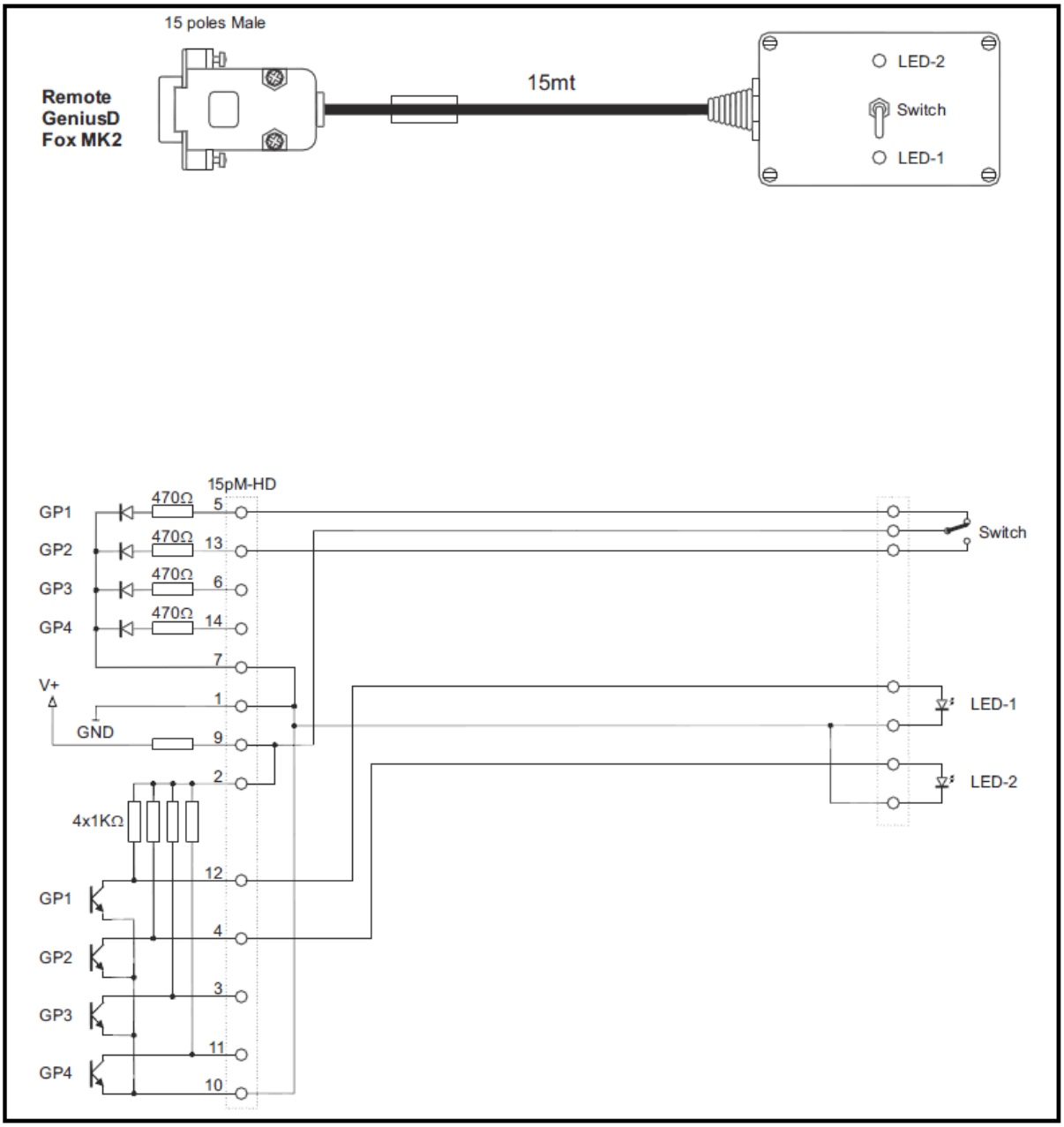


17.4.3 Connection to GPIn and GPOut via external activation -2 (TTL)

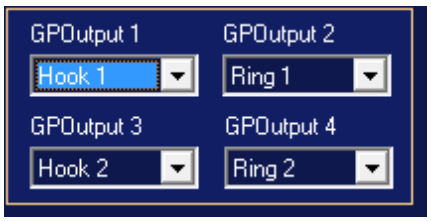
As shown in the diagram below, taking the voltage externally apparatus it is possible to polarize a photo coupler and implement one of the 4 GP Input available. Note: in this case the masses of the TTL signals generators are common.



17.4.4 Operative Example



For the function of each GPO see the Program Settings section, from where various functions can be assigned to the GPOs.



18 APPENDIX E –FIRMWARE UPDATE PROCEDURE

The most recent firmware version is installed by the manufacturer on the Telephone Hybrids Macrotel X1 and Macrotel X2 before they are delivered. Once purchased, the firmware can be updated with the latest version available. The Firmware Upgrade can be carried using the Windows operating system. The suitable operating systems are: Windows Xp Sp3, Windows Vista and Windows 7 Ultimate 32/64 Bit. Check that Microsoft .net 4 is installed on the operating system; if this is not the case go to www.microsoft.com for the installation.

To upgrade the processor follow the procedure below:

Following the initialisation of the device (firmware upgrade), all the user's settings and adjustments may be deleted and/or overwritten by the manufacturer's new configuration! Save your current configuration in a document outside the device before upgrading the firmware.

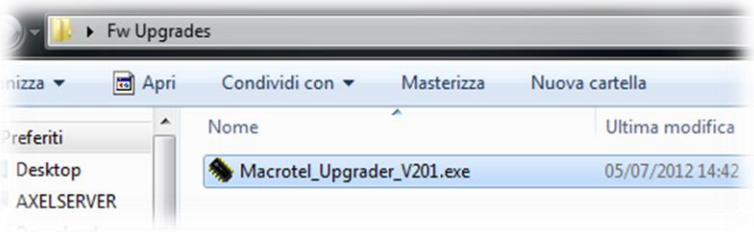
In the firmware upgrade phase remember to install the new version of the associated software for the remote control of the PC. There is a direct correspondence between the firmware and software versions. For example the PC software version 3.0 the installation of the firmware version 3.0 on the unit and vice versa. More precisely, the first two digits must correspond; in so far as possible, the sub-versions (identified by the third digit) are not involved in the firmware/software compatibility.

As a general rule the X.Y.Z software version is executed with the X.Y.K firmware version

18.1 PREPARING THE DEVICE FOR UPGRADING

To correctly update or upgrade a Macrotel X1 or Macrotel X2 device use an Rs232 COM Serial port. If the port is native on the PC's motherboard the port characteristics doo not need to be set; if USB-to-Serial adaptors are use then in some cases it may be necessary to set certain port data such as speed and bit stop. The software upgrader operates with the following port values: ***38,400bps, 8-N-1***
Follow each step of these instructions to correctly execute the upgrade:

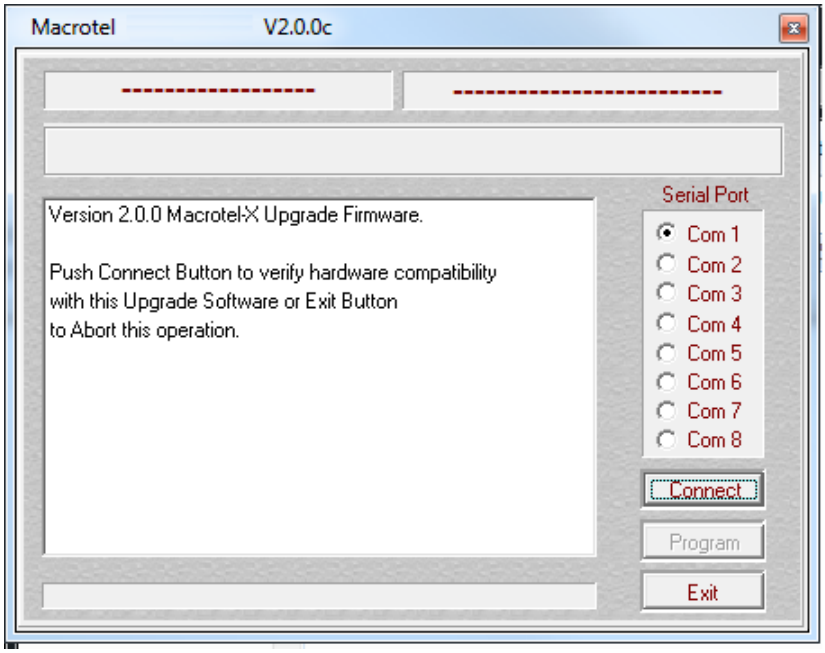
a. Close all open applications.
b. Access the folder Fw UpGrades
c. Double click on the FILE ASSOCIATED to the required upgrade:
d. launch the program _Upgrader_V2xx.EXE



e. **Macrotel_Upgrader_V201.exe**

NB: *to check the current version of your Macrotel X1 or Macrotel X2, go to the Firmware Version page from the system information menu.*

f. The following page will appear:



g. Select the **PC serial port** on the screen
h. **Switch off** the Macrotel X1 or Macrotel X2 device
i. **Switch on** the Macrotel X1 or Macrotel X2 device and within 3 seconds from when it switches on click **CONNECT**
j. **Once the software is connected** to the Macrotel X1 and Macrotel X2 devices the following page will appear: At the same time the front display of the device **remains completely blank,** without showing anything.

k. Once the Macrotel is connected to the software click **PROGRAM**
l. The Firmware upgrade will start; at the end click **EXIT,** switch off the Macrotel and switch it on again.
m. Do not stop or switch off or close the upgrade software as this could compromise the operation of the device.

19 TECHNICAL SPECIFICATION MACROTEL X1 – MACROTEL X2

GENERAL	*VALUE*
Dimension	434x351x44mm (1 rack unit)
AC Rate	230Vac / 110Vac 50 Hz / 60 Hz 30VA
Type of power supply	Switching power supply
Processing architecture	Fully digital, based on DSP 24bit/100Mhz. Signal processing is performed by phase linear filter
Weight	≈ 5 Kg
Operating Temperature	-5°C / +50°C
Compliance	ETSI TBR21, FCC Part68, ICASA, ACAM, AS/ACIF S002, NALTE YD514
ANALOG INPUT MODULE (send)	
A/D Conversion	24bit Sigma-Delta Conversion (Crystal CS4272)
Connectors:	XLR, female - Electronically balanced
AD Clipping Point	+20.0dBu
Operative Nominal Level:	From –12.0dBu to +12.0dBu (0.1dBu Step)
Line Impedance	600 Ω/ 10 kΩ (Electronically balanced selectable) EMI–suppressed
Distortion:	less than 0.01% TDH+NOISE (0.0dBu 1Khz)
AD Dynamic Range:	108 dB RMS (110 dB A weighted)
Input Modes:	Mono
Microphone Impedance	10 kΩ
Microphone gain	+10dB to +50dB
ANALOG OUTPUT MODULE (receive)	
D/A Conversion	24bit Sigma-Delta Conversion (Crystal CS4272)
Connectors	XLR, male - Electronically balanced
Output Level	-12.0dBu to +14.0dBu (0.1dBu Step) – Max (+19dBu)
Impedance Source	10 Ω
Load Impendance	600 Ω or greater
Distorsion	Less than 0.01% TDH+NOISE (0.0dBu @ 1Khz)
TELEPHONE MODULE PSTN / POTS	
Connectors "LINE"	RJ 11 6/4 socket
Connectors "SET"	RJ 11 6/4 socket
Bandwidth telephone line	100Hz – 5kHz, -3dB @ 1 kHz
Telephone line Impedance	Nominally 600 Ω
Isolation	3 kV
TELEPHONE MODULE GSM Module	
Type	Quad-Band GSM 850/900/1800/1900 Mhz
Operating temperature	-30°C ≈ +75°C
Dimensions	90 x 130 x 38 mm
Weight	< 190 g
Supply voltage range	From 8 to 30Vac
Power consuption @12V	Power down 0.5mA, Sleep mode 29mA, Speech mode 184mA
Antenna Interface	SMA 50 Ω
REMOTE INTERFACE	
Digital Inputs GPIn	4x GP In optocoupled,
Digital Outputs GPOut	4x GP Out Open Collector optoisolated

20 WEEE Directive – Informativa RAEE

In line with EU Directive 2002/96/EC for waste electrical and electronic equipment (WEEE), this electrical product must not be disposed of as unsorted municipal waste. Please dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling.

In Übereinstimmung mit der Richtlinie 2002/96/EG des Europäischen Parlaments und des Rates über Elektro- und Elektronik-Altgeräte (WEEE) darf dieses Elektrogerät nicht im normalen Hausmüll oder dem Gelben Sack entsorgt werden. Wenn Sie dieses Produkt entsorgen möchten, bringen Sie es bitte zur Verkaufsstelle zurück oder zum Recycling-Sammelpunkt Ihrer Gemeinde.

Conformément à la Directive 2002/96/EC sur les déchets d'équipements électriques et électroniques (DEEE), ce produit électrique ne doit en aucun cas être mis au rebut sous forme de déchet municipal non trié. Veuillez vous débarrasser de ce produit en le renvoyant à son point de vente ou au point de ramassage local dans votre municipalité, à des fins de recyclage.

In navolging van richtlijn 2002/96/EG van het Europees Parlement en de Raad betreffende afgedankte elektrische en elektronische apparatuur (AEEA) mag dit elektrische product niet als ongescheiden huisvuil worden weggedaan. Breng dit product terug naar de plaats van aankoop of naar het gemeentelijke afvalinzamelingspunt voor recycling.

In ottemperanza alla Direttiva UE 2002/96/EC sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE), questo prodotto elettrico non deve essere smaltito come rifiuto municipale misto. Si prega di smaltire il prodotto riportandolo al punto vendita o al punto di raccolta municipale locale per un opportuno riciclaggio.

De conformidad con la Directiva 2002/96/CE de la UE sobre residuos de aparatos eléctricos y electrónicos (RAEE), este producto eléctrico no puede desecharse con el resto de residuos no clasificados. Deshágase de este producto devolviéndolo al punto de venta o a un punto de recogida municipal para su reciclaje.

I henhold til EU-direktiv 2002/96/EF om affald af elektrisk og elektronisk udstyr (WEEE) må dette udstyr ikke bortskaffes som usorteret husholdningsaffald. Bortskaf dette produkt ved at returnere det til salgsstedet eller til det lokale indsamlingssted, så det kan genbruges.

I linje med EU-direktiv 2002/96/EG om avfall som utgörs av eller innehåller elektriska eller elektroniska produkter (WEEE) får denna elektriska produkt inte bortskaffas som osorterat kommunalt avfall. Bortskaffa den i stället genom att lämna in den på försäljningsstället eller din lokala återvinningsstation.

EU:n sähkö- ja elektroniikkalaiteromudirektiivin (2002/96/EY) mukaisesti tätä elektroniikkalaitetta ei saa laittaa lajittelemattoman yhdyskuntajätteen sekaan. Hävitä laite palauttamalla se ostopaikkaan tai viemällä se elektroniikkaromun keräyspisteeseen.

De acordo com a Directiva Europeia 2002/96/EC sobre resíduos sólidos de equipamento eléctrico e electrónico (WEEE), este produto eléctrico não pode ser deitado fora juntamente com o lixo municipal indiferenciado. Por favor, no final da vida útil deste produto, devolva-o ao estabelecimento de aquisição, ou entregueo no local de recolha apropriado para reciclagem designado pelo seu município.

V souladu se smrnicí EU . 2002/96/ES o odpadních elektrických a elektronických zaYízeních (OEEZ) se tento elektrický výrobek nesmí likvidovat jako netYídný komunální odpad. PYi likvidaci tento výrobek vrat'te prodejci nebo ho odevzdejte k recyklaci do komunálního sbrného zaYízení.

Vastavalt EL direktiivile 2002/96/EÜ, mis käsitleb elektri- ja elektroonikaseadmete jäätmeid (WEEE), ei või antud toodet visata majapidamisjäätmete hulka. Palun tagastage antud toode taaskasutamise eesmärgil müügipunkti või kohaliku piirkonna jäätmekogumise punkti.

V súlade so smernicou 2002/96/ES o odpade z elekrických a elektronických zariadení (OEEZ) sa toto elektrické zariadenie nesmie odstranovat' ako netriedený komunálny odpad. Výrobok odstránte jeho vrátením v mieste nákupu alebo odovzdaním v miestnom zbernom zariadení na recyklovanie.

21 GUARANTEE

The product is covered by a one year guarantee ex-works by the manufacturer.
Do not open the device. The guarantee shall not be valid if the guarantee seals are broken.
The manufacturer shall not be liable for damages of any type deriving from or in relation to the incorrect use of the product.

22 DECLARATION OF ROHS CONFORMITY

To minimize the environmental impact and take more responsibility to the earth we live, in accordance with European Union Directive 2002/95/EC, known commonly as RoHS (*Restriction of Hazardous Substances*),

We herewith declare,

Axel Technology srl
Via Caduti di Sabbiuno 6/F
40011 Anzola Emilia – Bologna - Italy

that the product listed below complies with the requirements of Directive 2002/95/EC, Article 4, paragraph 1 with reference to hazardous chemical substances:

Lead (Pb)
Hexavalent Chromium (CrVI)
Mercury (Hg)
PBB (Flame Retardant)
PBDE (Flame Retardant)
Cadmium (Cd)

Product Description: **MACROTEL X1 – MACROTEL X2**

RoHS 2002/95/EC

Authorized Company Representative:	Title of Signatory:	Date:
	Christian Sighinolfi – Technical Manager	04 January 2013

23 FINAL NOTES AND AXEL TECHNOLOGY CONTACT DETAILS

Main Office BOLOGNA: Via Caduti Di Sabbiuno 6/F
40011 Anzola Emilia - Bologna - Italy
Tel. +39 051 736555 - Fax. +39 051 736170

For Technical information or support
support@axeltechnology.com

For General information and Sales dept
Sales@axeltechnology.com

www.axeltechnology.com