

MACROTEL

D1 - D2

DIGITAL TELEPHONE HYBRIDS

User Manual

(Rel. 1.3)



Via Caduti Di Sabbiuno 6/F - 40011 Anzola Emilia - Bologna - Italy
Tel. +39 051 736555 – 051 736154 - Fax. +39 051 736170
e-mail: info@axeltechnology.com - web site: www.axeltechnology.com

This manual is for use with the following products :

Macrotel D1
Macrotel D2

Axel Technology SRL

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Tel. +39 051 736555 – + 39 051 736154
Fax. +39 051 736170
e-mail: info@axeltechnology.com - web site: www.axeltechnology.com

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2 INTRODUCTION

2.1 WHAT IS A TELEPHONE HYBRID

Telephone hybrids are required to interface an analog telephone line with a mixer. Audio from the phone interlocutor can then go on-air together with the speaker voice, who goes also to the phone interlocutor. It seems counter-intuitive, but the main goal of a studio hybrid is to make the people in the studio sound better. If the hybrid isn't working well, people speaking from the studio will sound 'hollow' or like they are 'talking into a barrel'. This is due to the strange effect of mixing microphone audio with telephone 'bleed-through'. Of course, Macrotel D1 & D2 hybrids also improve the audio of callers, filtering out hum and noise as well as adjusting levels between loud and soft speakers.

2.2 THE MACROTEL D1 & D2

Macrotel D1 and Macrotel D2 are digital telephone hybrid, especially designed to fit all TV and radio station requirements.

With the variety of telephone systems in the world today, from cellular mobile phones to analog and to digital, it's increasingly difficult to have all callers sound the same on-air in a broadcast environment.

The Macrotel D1 and Macrotel D2 use digital signal processing (DSP) technology to continually adapt to telephone-line conditions and to deliver the maximum isolation between the send and receive audio (> 55 dB).

With no echo and no "bottom of the barrel" sound, the Macrotel D1 and Macrotel D2 are thus ideal when the very best audio quality and uniformity is required for talk shows, news feeds, production, recording studios, and even internet applications.

Several functions (selectable from front panel DIP switches) greatly expand their operation. Automatic gain control (AGC) allows each call to be delivered at the same level. Built-in caller Ducking stage reduces the caller's audio level when the announcer speaks. Auto mix-minus feature allows easy installation to consoles with no mix-minus capability.

Additionally, the hybrid can automatically answer the telephone line after the first ring and automatically disconnect it after the caller hangs up. The REC Output can be configured to contain a mix of send and caller audio or caller audio only.

It has been also added a headphone amplifier so you can connect headphones directly to the unit and monitor callers. The Send input can accept either Line or Micro levels, so that creating a 'Telco' place fitted with – for example – an headphone and a micro can be achieved with no need for external mixers or mic preamplifiers.

The Macrotel D2 performs the functions of two digital hybrids in a single rack mount unit. The two internal hybrids contain a common send audio input and the two telephone lines are internally conferenced. Both callers audio can be combined as a single input on your console or as two separate outputs to two console inputs.

In accordance to mainland Europe, USA, Canada, and UK compliance standards, the Macrotel D1 & D2 are perfect for your telephone application wherever You are.

2.3 MAIN FEATURES

- Easy to install, simple to operate
- The very best audio quality and the deepest, most reliable send/receive separation
- Continual adaptation to telephone line conditions
- On/Off control via front panel and rear panel remote connection
- Variety of selectable functions from the front panel Dip Switches
- Analog receive filter for telephone line noise reduction
- Selectable auto-answer / auto-disconnect
- Selectable AGC to ensure every caller is at the same audio level
- Cross conferencing between callers on the Macrotel D2 lines
- Auxiliary output for recording
- Selectable automatic mix-minus
- Selectable caller control (ducking)
- Headphone socket for easy monitoring of Receive audios
- Selectable Mic or line Send input
- Worldwide compliant

2.4 AVAILABLE OPTIONS (MACROTEL D1 AND MACROTEL D2)

The Macrotel D1 and Macrotel D2 are available in different versions, depending on the Country they will be used.

In particular, three main versions are available: Europe, Australia and America.

In the event of order, please inform Axel Technology representative about the destination Country.



This appliance is connected to telephone networks indirectly through interface (in-house telephone exchange). Direct connection to the public telephone net is under sole responsibility of the user.

3 SAFETY WARNINGS / ISTRUZIONI PER LA SICUREZZA

SAFETY WARNINGS

CONSIGNES DE SÉCURITÉ IMPORTANTES

ISTRUZIONI IMPORTANTI PER LA SICUREZZA

WICHTIGE SICHERHEITSHINWEISE

INSTRUCCIONES IMPORTANTES DE SEGURIDAD

(Rel. 1.1)

3.1 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.

4 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 (f.i. in the event of danger) unplug mains power cord. As the MAINS plug is the disconnect device, the disconnect device shall remain readily operable.

5 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 ventilation.** 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 éclaboussures.** 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 remplacer le fusible il faut débrancher l'appareil de la prise électrique. Pendant son usage, l'appareil doit être branché à la prise de terre



Utiliser le fusible principal AC avec la 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, débrancher le cordon d'alimentation. Parce que la prise du réseau de alimentation est utilisée comme dispositif de déconnexion, ce dispositif doit demeurer aisément accessible.

6 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.

	<i>Questo simbolo indica la presenza di alta tensione all'interno dell'apparecchio, che comporta rischi di scossa elettrica.</i>
	<i>Questo simbolo indica la presenza di istruzioni importanti per l'uso e la manutenzione nella documentazione in dotazione all'apparecchio.</i>
	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.

7 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
- **NUR 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 irgendeine Weise beschädigt wurde, z.B. wenn das Netzkabel oder der Netzstecker beschädigt wurden, wenn Flüssigkeiten in das Gerät verschüttet wurden oder Fremdkörper hineinfließen, 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

8 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 .

	<i>Este símbolo indica que la unidad contiene niveles de voltaje peligrosos que representan un riesgo de choques eléctricos.</i>
	<i>Este símbolo indica que la literatura que acompaña a esta unidad contiene instrucciones importantes de funcionamiento y mantenimiento.</i>
	Antes de cambiar la alimentación de voltaje o de cambiar el fusible, desconecte el cable de alimentación. Para reducir el riesgo de descargas eléctricas, 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 línea de alimentación 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 conexión a red sirve por la desconexión de la unidad, la clavija debe ser ubicada en proximidad de la unidad.

9 FIRST INSTALLATION RECOMMENDATIONS

9.1 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.

9.2 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.

Manufacturer			
Model :	XXX	S-N :	KKKK
☐ 230V 50/60Hz	VA	fuse	mAT
☐ 115V 50/60Hz	VA	fuse	mAT

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 open the top cover and set properly the **voltage change-over switch** which is located inside, close to the transformer. 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.

9.3 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.

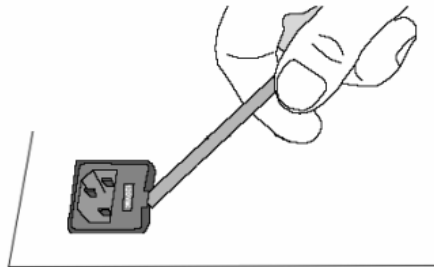
USING WRONG FUSE TYPE WILL RESULT IN INSUFFICIENT PROTECTION.

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

Open the fuse drawer using a small blade screwdriver.

Replace the fuse located at the inner position

Push the fuse socket back into the original position



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

9.4 PROTECTION AGAINST LIGHTNING



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 lightning 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.

9.5 VENTILATION

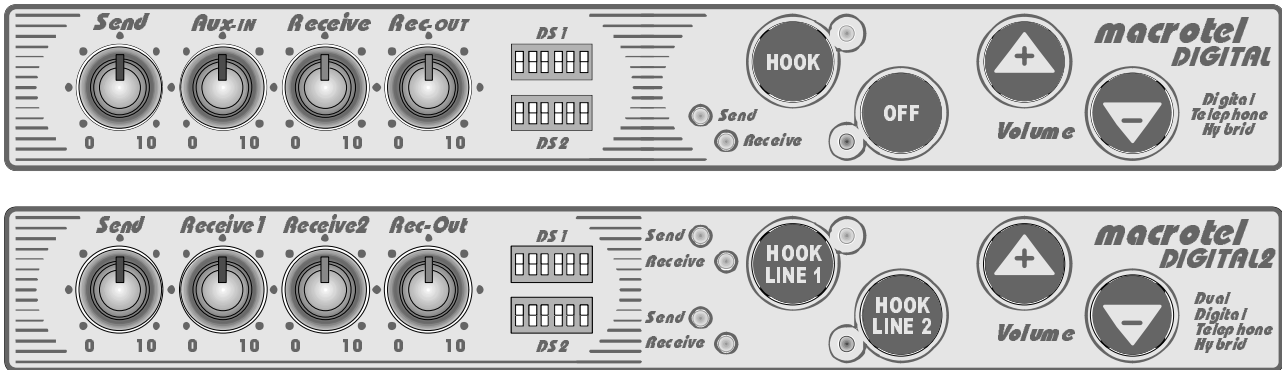
The equipment will operate as a free-standing unit without requiring any special cooling arrangement.

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.

10 EQUIPMENT DESCRIPTION

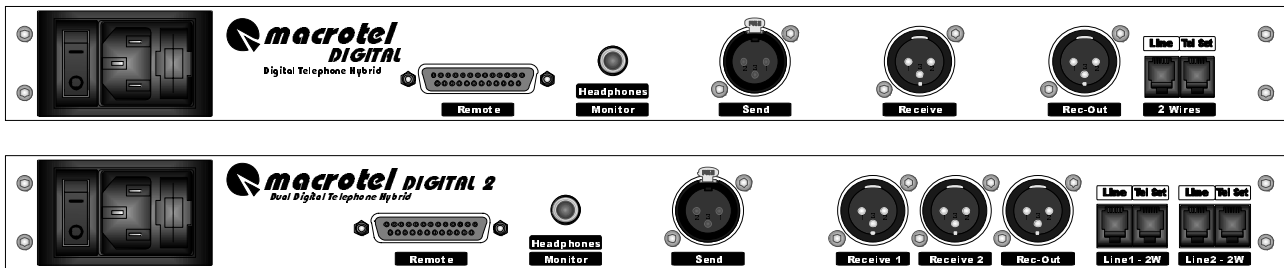
10.1 FRONT PANEL



- SEND control** It adjusts the level of audio signal sent to phone caller. At its midpoint, the potentiometer is set for nominal send level (0 dBm).
- AUX-IN control** **(Macrotel D1)** It adjusts the level of the auxiliary send audio coming from the remote connector input and going onto the telephone line to the caller. At its midpoint, the potentiometer is set for nominal level (0 dBm). On **Macrotel D2**, the AUX-IN control is located inside the equipment, on the main board, just behind the front panel pots.
- RECEIVE control** **(Macrotel D1)** it adjusts the level of audio coming from the telephone caller and provided to the user 's equipment through the 'Receive' connector
- RECEIVE 1 pot** **(Macrotel D2 only)** it adjusts the level of audio coming from the telephone caller connected to the Line 1 and provided to the user 's equipment through the 'Receive 1' connector
- RECEIVE 2 pot** **(Macrotel D2 only)** it adjusts the level of audio coming from the telephone caller connected to the Line 2 and provided to the user 's equipment through the 'Receive 2' connector
- REC-OUT control** It adjusts the level of the audio at the Rec-Out connector. At its midpoint, the control is set for nominal level (0 dBm).
- DIP Switches** These DIP switches configure the hybrid's system. Individual switch functions are explained in the **Calibration** Chapter
- SEND LED(s)** **(Macrotel D1 only)** it indicates the relative level of the audio sent to the telephone caller. Green indicates nominal level, amber indicates caution, red indicates clipping. **(Macrotel D2 only)** the Send LED close to the HOOK LINE 1 button indicates the level of the audio sent to the Line 1, while the Send LED close to the HOOK LINE 2 button indicates the level of the audio sent to the Line 2. Green indicates nominal level, amber indicates caution, red indicates clipping.
- RECEIVE LED(s)** **(Macrotel D1 only)** it indicates the relative level of the incoming caller's audio from the telephone line. Green represents nominal level, amber indicates caution, red indicates clipping. **(Macrotel D2 only)** the Receive LED close to the HOOK LINE 1 button indicates the level of the incoming audio from the tel Line 1, while the Receive LED close to the HOOK LINE 2 button indicates the level of incoming audio from the tel Line 2. Green indicates nominal level, amber indicates caution, red indicates clipping.

HOOK button(s)	(Macrotel D1 only) it is used to connect calls from the telephone line. It can be remoted by using the Remote Interface. (Macrotel D2 only) <i>LINE HOOK 1</i> is used to connect calls to <u>and disconnect</u> calls from the telephone line 1, <i>LINE HOOK 2</i> is used to connect calls to <u>and disconnect</u> calls from the telephone line 2. Both buttons can be remoted from the Remote Interface.
HOOK LED	(Macrotel D1 only) it blinks when a call (ring) is coming in and lights firmly GREEN while line is hooked. Please note: led switches on only if phone line is connected. (Macrotel D2 only) The LED close to HOOK LINE 1 blinks when a call (ring) is coming in on the Line 1 and lights firmly GREEN while line is hooked. It illuminates RED when the hybrid is powered. The LED close to HOOK LINE 2 blinks when a call (ring) is coming in on the Line 2 and lights firmly GREEN while line is hooked Please note: LEDs switch on only if phone line is connected. It illuminates RED when the hybrid is powered.
OFF button	(Macrotel D1 only) it disconnects the hybrid from the telephone line and mutes all audio going to and from the telephone line
Off LED	(Macrotel D1 only) it indicates the hybrid is not connected to an active phone line. The LED illuminates red when the hybrid is powered.
VOLUME Up / Down buttons	(Macrotel D1 & Macrotel D2) these buttons control the audio level on the <u>headphone monitor</u> output. Pressing once changes the level by 1dB. Pressing and holding a button sweeps the level up or down

10.2 REAR PANEL



ON/OFF
Switch,
AC MAINS
FUSE and AC
POWER
RECEPTACLE

(Macrotel D1 & Macrotel D2) main ON/OFF switch, the LED inside switches on/off accordingly. An AC mains fuse is provided which disconnects the unit from the wall outlet's AC power under fault conditions. If this fuse should "blow" for any reason, replace it only with the same value fuse. If it blows a second time, please contact your Axel Technology dealer for service. Two fuses (one for spare) are contained in a small drawer close to the cord receptacle. For 220/230 V AC the fuse is slo-blo 5x20mm rated at 250 mA

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; unplug mains power cord. Never operate unit with ungrounded outlets: plugging the appliance into an ungrounded outlet or defeating the ground pin, can create a potentially hazardous condition. Axel Technology can not be held responsible for problems caused to the unit or any associated equipment with improper AC connection

REMOTE
connector

This DB25 female connector provides remote control and status of the hybrid. Unbalanced send in, Receive out, and Rec out audio are also available at the remote connector. See Connector Pinouts at the relevant Chapter

HEADPHONE
socket

1/4" Mono jack. It provides connection to a headphone or to a small loudspeaker for monitoring the caller audio signal. Capable of 1 watt into an 8 ohm load

SEND
connector

This balanced, female 3-pin XLR input receives audio from the source (microphone or line level, depending on the DIP SWITCH 4 setting) and sends it to the caller. Audio sent to the caller should be a mix-minus. Not mix-minus signal may be also applied by setting the Auto Mix-Minus DIP SWITCH (# 10) to On, even it is not recommended.

RECEIVE
connector

(Macrotel D1 only) Balanced, male, 3-pin XLR output containing the audio from the caller. See DIP SWITCH # 2 for Receive signal extra-amplification.

RECEIVE 1
connector

(Macrotel D2 only) This balanced, male, 3-pin XLR output contains the audio from the caller connected to LINE 1

RECEIVE 2
connector

(Macrotel D2 only) This balanced, male, 3-pin XLR output contains the audio from the caller connected to LINE 2. With the DIP SWITCH # 11 in the on (up) position the telephone lines 1 and 2 receives will be internally mixed and appear at the Receive 1 Output only. This allows two callers to be routed to a single input channel of the mixer.

REC OUT
connector

This balanced, male, 3-pin XLR output contains a mix of caller and send audio or caller audio only, depending on DIP SWITCH # 12 setting (see relevant Chapter). It can be used to feed an external recording device.

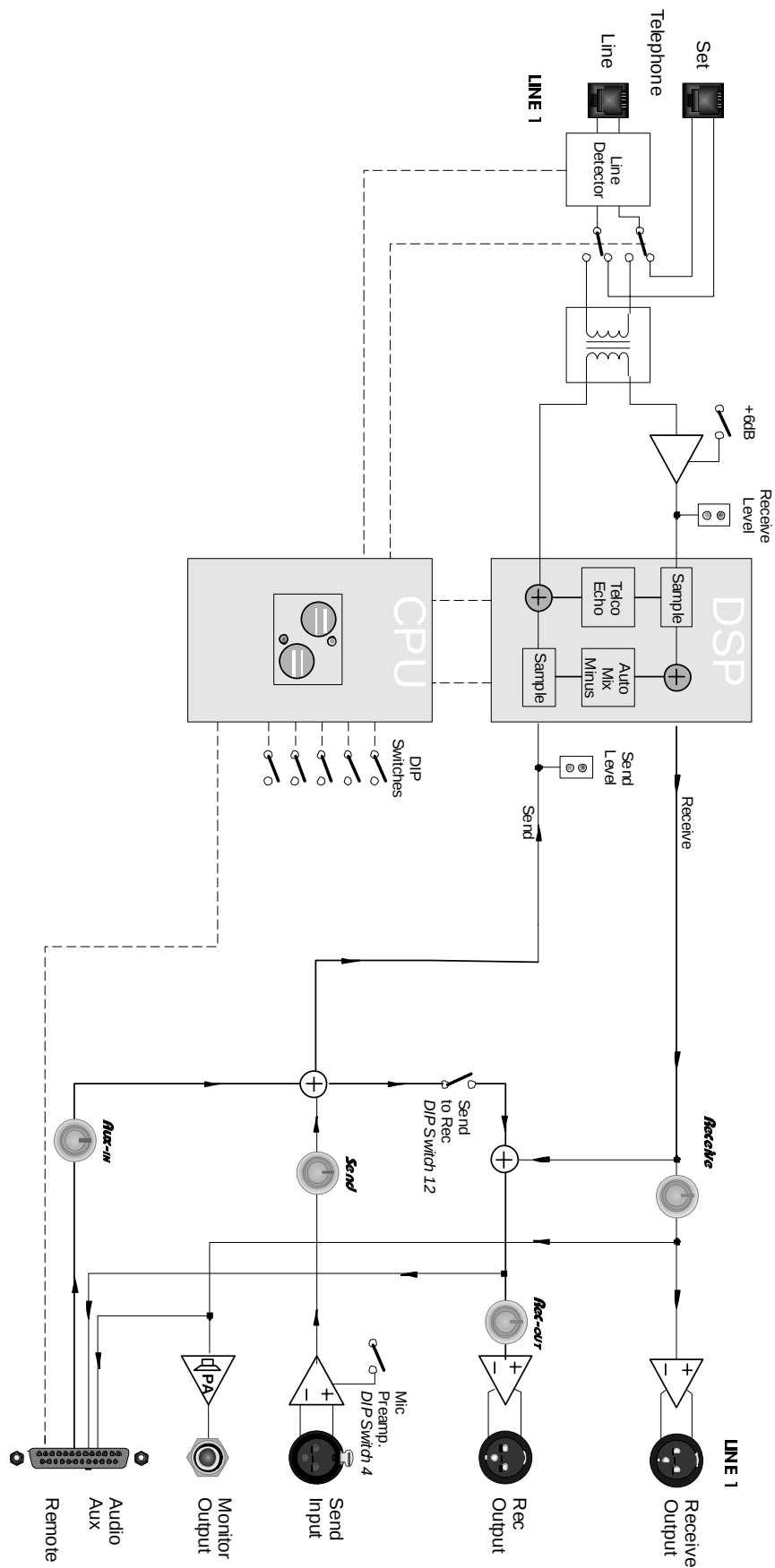
LINE socket

RJ11 connector to provide connection of the telephone line(s) to the hybrid

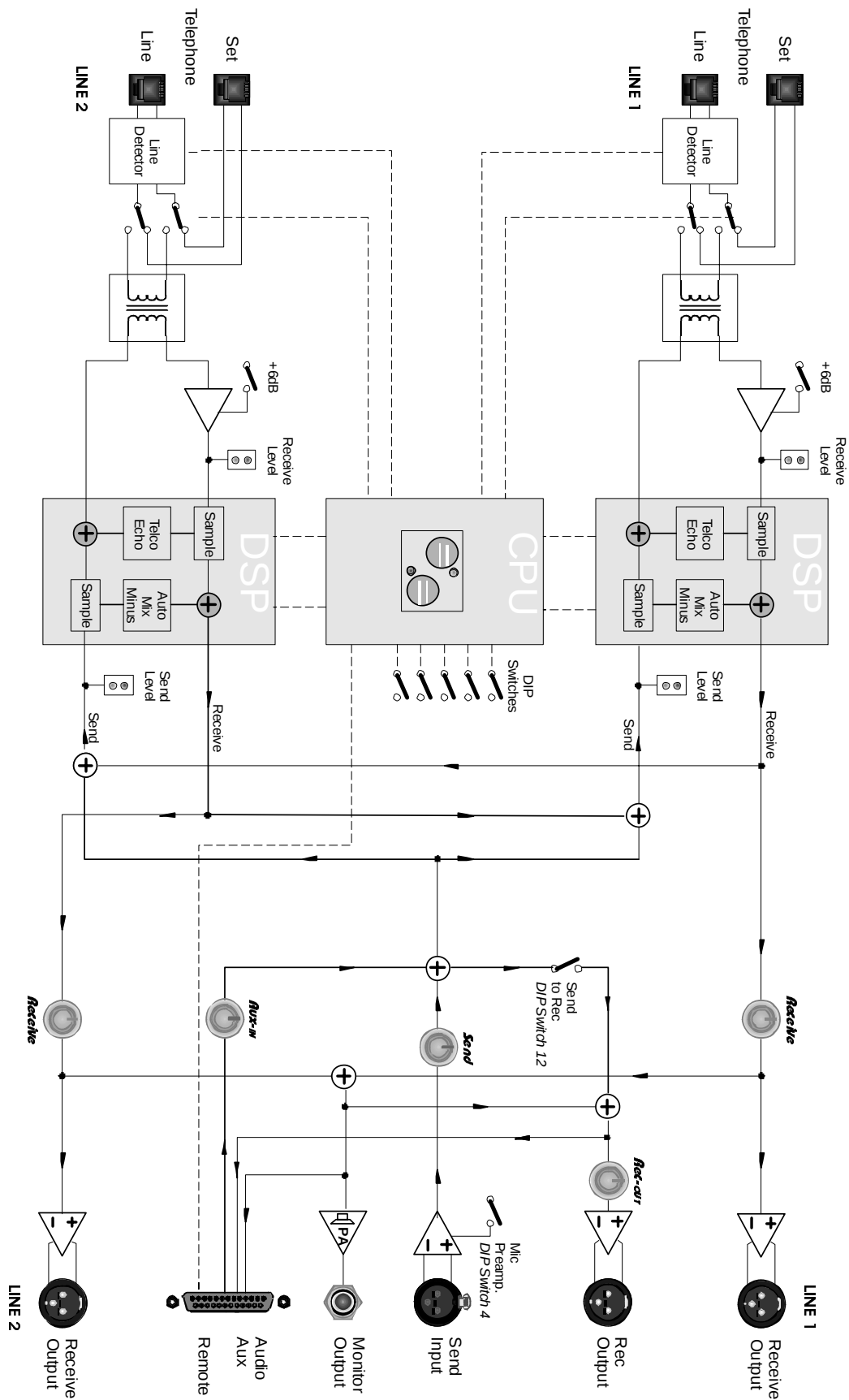
TEL SET
socket

RJ11 connector for connection to a standard analog telephone set. The telephone line is present at this connector only when the hybrid is off.

11 BLOCK DIAGRAM – MACROTEL D1

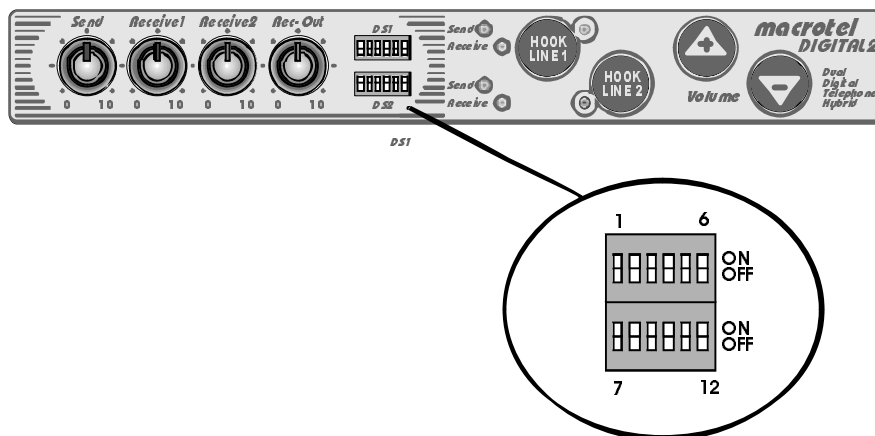


12 BLOCK DIAGRAM – MACROTEL D2



13 SETTINGS & CONFIGURATION

13.1 DIP SWITCHES SETTING



DIP SWITCHES are off in the down position and on in the up position.

1 BURST ADAPT

Enables/disables the **Burst Adapt** feature. In the **off** position (down) the hybrid is in Auto Adapt Mode. In the **on** position (up) the hybrid will send a noise burst to the telephone line and aggressively adapt before returning to Auto Adapt Mode. Each press of the ON button will generate a new noise burst.

In either mode, the hybrid continually monitors and adapts to the changing telephone line conditions in order to digitally cancel the telephone line echo and provide the best send-to-caller separation possible

2 CALLER BOOST

Enables/disables the **Caller Boost** feature. In the **off** position (down) the caller boost feature is disabled. In the **on** position (up) the hybrid adds **6 dB** of **level boost** to the caller's audio at the Receive connector.

3 REMOTE ON/OFF MODE

Allows the hybrid to work with two types of switches for external (**remote**) **control momentary** and **latching**. In the **off** position (down) the ON/OFF control inputs respond to **momentary** closures to ground.

This turns the hybrid on when it receives a momentary closure on the ON control input and off when it receives a closure on the OFF control input.

In the **on** position (up) the OFF control input is disabled and the ON control input responds to a **latching** closure to ground. This will cause the hybrid to turn on when the latching switch is closed to ground and the hybrid will remain on until the closure to ground is opened.

This DIP SWITCH setting also affects the operation of the front panel ON/OFF buttons. See relevant Chapter for REMOTE CONTROL connector pinouts.

4 SEND LINE/MIC LEVEL

Sets the **gain** of the **SEND** connector. In the **off** position (down) the input is a nominal **line level** (0dBu) input. In the **on** position (up) the input is a **mic level** providing +55dBu of input gain.

5 CALLER DUCKING

6

Enables/disables the **Caller Control (Ducking)** feature. In the **on** position (up) the hybrid will provide **caller control**, which is the suppression of caller audio when send audio is present. In the off position (down) caller control is disabled. DIP SWITCH 5, when active, adds **6dB** of caller control and DIP SWITCH 6, when active, adds **12dB** of caller control. If **both** are active, then the sum of the two DIP SWITCHES is used, and **18dB** of caller control is provided

7 AUTO ANSWER

Enables/disables the **Auto Answer** feature. In the **off** position (down) the hybrid will **not** automatically answer the telephone line. In the **on** position (up) the hybrid will **automatically answer** the telephone line after the first ring

8 AUTO DISCONNECT

Enables/disables the **Auto Disconnect** feature. In the **off** position (down) the hybrid will **not automatically disconnect** the telephone line. In the **on** position (up) the hybrid will **automatically disconnect** the telephone line after the caller hangs up.

Note: The telephone line must provide loop drop, loop reversal or call progress signals in order for the Auto Disconnect feature to function. Most telephone systems will provide loop drop shortly after the calling party hangs up. Some PBX systems, but not all, will provide either loop drop or call progress tones such as reorder tones or busy signals. The hybrid will detect most of these signals and then auto disconnect the telephone line

9 Automatic Gain Control (AGC)

Enables/disables the **Automatic Gain Control (AGC)** feature. In the **off** position (down) the AGC feature is **disabled**. In the **on** position (up) the **AGC** feature is **enabled**. When enabled, the AGC feature normalizes the gain of the caller audio, augmenting the level of “soft” callers and attenuating the level of “loud” callers. This helps provide more uniform caller audio levels at the caller output of the hybrid. The AGC works to achieve an equivalent average caller level of -30dBm from the telephone circuit

10 AUTOMATIC MIX-MINUS

Enables/disables the **Automatic Mix-Minus** feature. In the **off** position (down) the Automatic Mix-Minus feature is **disabled**. In the **on** position (up) the Automatic Mix-Minus feature is **enabled**. When Automatic Mix-Minus is enabled, it is not necessary for you to create a mix-minus output with your console/mixer. You can simply feed program audio to the send input of the hybrid, and the hybrid will automatically remove the caller audio from the program mix and prevent it from returning to the caller as echo, which prevents possible feedback.

NOTE: This option should only be enabled when no mix-minus facilities are available through the console or mixer

11 CALLER 1 MIX (Macrotel D2 only)

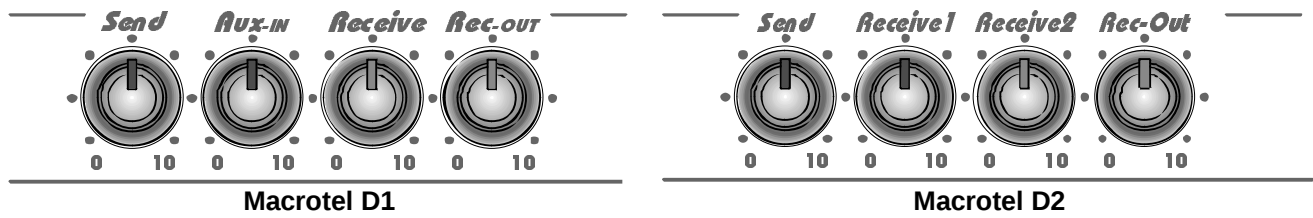
Enables/disables the Caller 1 Mix feature. In the off (down) position the Caller 1 Mix feature is disabled and telephone lines 1 and 2 will appear at the Receive 1 and Receive 2 XLR connectors respectively. This allows each caller to be routed to a separate input channel of a console or mixer.

In the **on** (up) position the Caller Mix feature is enabled and **telephone lines 1 and 2** will be **internally mixed** by the hybrid and appear at the **Receive 1 Output**. This allows two callers to be routed to a single input channel of a console or mixer.

12 REC OUT MODE

Enables/disables the Aux Mix feature. In the .off. (down) position, the Rec OUT and REMOTE Rec OUT will contain caller audio only. In the .on. (up) position the Rec OUT and REMOTE Rec OUT audio will contain a mix of send and caller audio

13.2 FRONT PANEL POTENTIOMETERS



The front panel potentiometers provide level adjustments of the Send, Aux In, Rec Out, and Receive (1 and 2) audio connectors. Separate audio level controls let you optimize the audio level(s) of the Macrotel D1/ Macrotel D2 to match the audio levels required by the interfaced audio equipment.

In order to optimize the audio levels, have someone call the hybrid from another location. Answer the line by pressing the On button and continue through the level adjustments. Be aware that some suppression and/or echo may be heard while calibrating the audio levels. Disregard it and continue until the end of the procedure. When the hybrid is properly calibrated there will be no echo or suppression.

SEND This pot adjusts the send audio. Adjust this pot along with your console audio control until callers verify that the audio level they are receiving is at a comfortable listening level. With comfortable listening levels, the SEND LED should illuminate solid green with an occasional flash of amber on audio peaks. If the SEND LED illuminates red, the audio levels are clipping and should be decreased via the send level adjustments.

RECEIVE 1 This pot adjusts the Receive 1 out audio. Adjust this pot along with your console audio control to set the caller's voice/audio to a comfortable listening level.

RECEIVE 2 This pot adjusts the Receive 2 out audio. Adjust this pot along with your console audio control to set the caller's voice/audio to a comfortable listening level.

*Note: The RECEIVE potentiometers have no effect on the **RECEIVE LED**. That LED indicates actual level from the telephone line only. If the RECEIVE LED flashes green only occasionally with caller audio, the level from the telephone line is too low and you should activate the Caller Boost DIP SWITCH. See DIP Switches Settings.*

REC-OUT This pot adjusts the level of send and caller audio at the REC OUT connector. Adjust this pot along with your console audio control to set the proper level for your recording device or other external devices.

AUX-IN This pot adjusts the level of the auxiliary send audio at the REMOTE CONNECTOR input. Adjust this pot along with your console audio control until callers verify that the audio level they are receiving is at a comfortable listening level.

NOTE: The AUX-IN control is provided on the front panel on Macrotel D1, while it is available on the main internal board on Macrotel D2. To access the AUX-IN trimmer on the Macrotel D2, remove the equipment cover. The trimmer, in blue color, is located close to the front panel.

13.3 TRAINING THE ECHO CANCELLER

Upon connection to the telephone line, the digital hybrid will automatically begin its telephone echo cancellation process. This will optimize the send to caller separation. If the send to caller separation is not sufficient, you may force the hybrid to "train" itself to the telephone line by pressing and holding the On button for one second. After one second, the hybrid will emit a burst of white noise. The noise burst allows the hybrid to aggressively adapt to the echo returning from the telephone network and allows the hybrid to maximize its send-to-caller separation.

This noise burst can be generated at any time by pressing and holding the On button for one second. To force a noise burst on every connection to the telephone line, activate the **Burst Adapt DIP switch 1**. See DIP Switches SETTINGS.

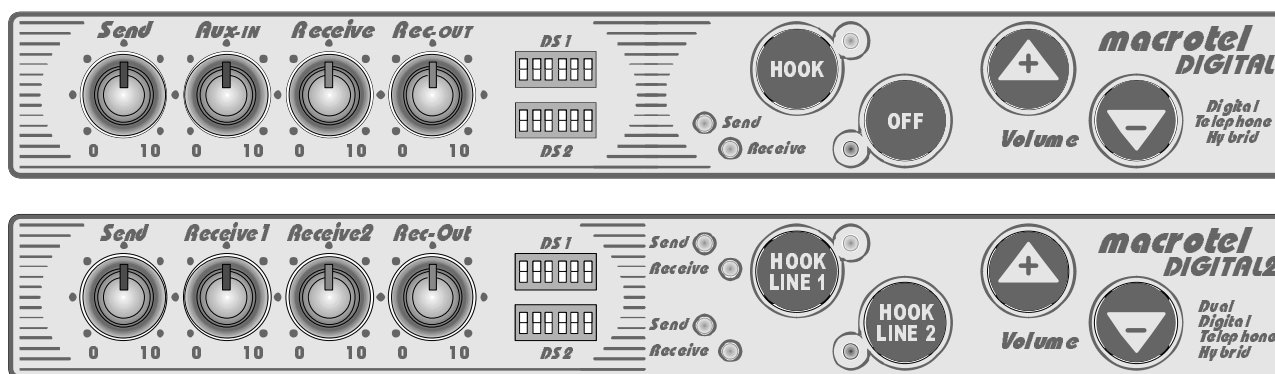
13.4 TRAINING THE MIX-MINUS

Upon connection to the telephone line, the digital hybrid will automatically begin its mix-minus echo cancellation processes. To verify/fine tune the calibration of the mix-minus, watch the Send LED as the caller speaks. If the Send LED is not lighting or only flashing green on the caller's audio peaks, then the calibration is already complete. If the Send LED is lighting solid green on caller audio, decrease the loop gain via the Send Input pot or the console level control and train the telephone echo canceller. As the caller continues to speak, you should notice that the Send LED will begin to illuminate less and less until it no longer illuminates green on caller audio. This process may need to be repeated if the desired results are not achieved or if the caller is complaining of excessive echo.

NOTE:

This appliance is connected to telephone networks indirectly through interface (in-house telephone exchange). Direct connection to the public telephone net is under sole responsibility of the user.

14 OPERATION



14.1 HOOKING THE LINE

Macrotel D1:

Press the Hook button to connect the hybrid to the telephone line. The associated LED turns GREEN.

Press the Off button to disconnect the hybrid from the telephone line. The associated LED turns RED.

When a telephone call comes, the Hook LED flashes GREEN.

Macrotel D2: Press the Hook Line 1 (or 2) button once to connect the hybrid to the telephone line. Press again to disconnect.

When a telephone call comes, the Hook LED flashes GREEN.

NOTES: The On and Off buttons do not turn on/off the power to the Macrotel D1. They just connect and disconnect them from the phone line.

Macrotel D2 Lines only: when both hybrids are active in the On position, telephone callers will be conferenced internally by the hybrid.

14.2 USING THE EXTERNAL TELEPHONE SET

Lift the handset to connect the telephone to the telephone line. Hang up the handset to disconnect the telephone from the telephone line. The telephone line is present at this connector when the hybrid is off.

To place a call, lift the handset and listen for the dial tone. Dial the party you wish to call. Talk to the caller with the telephone set.

For switching a call from the set to the Hybrid, press the hybrid's Hook button: the active call will switch from the phone to the hybrid. For switching back a call from the Hybrid to the Set, make sure the telephone handset is off hook. Then press the hybrid's Off button (or the HOOK button again on Macrotel D2). The active call will switch from the hybrid to the phone.

an

To disconnect the telephone line, the hybrid must be off and the telephone handset must be hung up. If either the hybrid is on or the handset is off hook, then the phone line is still active.

14.3 ADJUSTING THE MONITOR OUTPUT LEVEL

To adjust the level at the monitor output, use the volume buttons. With each press, the '+' volume button increases the monitor output level by 1dB. The '-' volume button decreases the monitor output level by 1dB. Pressing and holding the '+' or '-' button will sweep the level up or down respectively.

14.4 MIX-MINUS & AUTO MIX-MINUS

Mix-minus is a mix of all studio audio sources except caller audio. Without a mix-minus feed from the console, the caller audio sent to the console will be retransmitted to the caller. This can cause hollow sounding audio and can even result in feedback.

The internal mix-minus feature in these hybrids can be effective in removing the caller from the outgoing audio feed (the feed being sent back down the phone line). It does have its limitations, however. Because this mix-minus generation works on the same principles as the send-receive separation, changes in program level (e.g. riding a fader on the console) will cause the mix-minus feed to adapt, causing performance issues and audio distortion. The mix-minus generator is also very sensitive to nonlinear processing (mic processors or compressor-limiters), so these must be left out of the signal chain. For the same reason, the mix-minus generation will cause severe distortion on overdriven audio levels. In practice, whenever practical, we recommend creation of a true mixminus feed in the studio rather than engaging this function.

We consider this feature useful as a last resort, when no true mix-minus is technically possible. If an external mix-minus cannot be obtained, then activate the Macrotel D1 & D2 internal mix-minus feature from the DIP Switch # 10.

14.5 USING THE MIC PREAMPLIFIER

If only microphone audio is being sent to the caller, the internal microphone preamplifier of the hybrid may be used. When doing this, change the SEND IN jack from a line level input to a mic level input by placing DIP SWITCH 4 to the on (up) position.

14.6 CONFERENCING BETWEEN THE CALLERS

The Macrotel D2 is a dual hybrid unit designed for conferencing two telephone lines. The two internal hybrids contain a common Send audio input and the two telephone lines are internally conferenced. This means Caller connected to the Line 1 can listen to the Caller connected to Line 2 and viceversa.

Both callers' audio can be output as a single input on your console or as two separate outputs to two console inputs (see DIP SWITCH # 11).

15 AUDIO CONNECTIONS

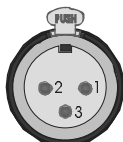
15.1 SOME PRELIMINARY NOTES...

Avoid induced interference: To prevent interference pickup keep audio cables away from mains power units, cables and distribution boards, motors, lighting and computer cables and equipment, and any other heavy duty electrical equipment. Where this cannot be avoided cross the audio and 'dirty' equipment cables at right angles to minimise interference.

Use balanced connections where possible as these provide further immunity by cancelling out interference that may be picked up on long cable runs. To connect an unbalanced source to a hybrid input (balanced), link the cold input (XLR pin 3 or jack ring) to 0V earth (XLR pin 1 or jack ground) at the hybrid. To connect the hybrid output (balanced) to an unbalanced destination, link the cold output to 0V earth at the destination.

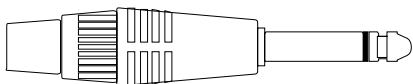
Use good quality cables and connectors and check for correct wiring and reliable solder joints. Allow sufficient cable loop to prevent damage through stretching.

Configuration of XLR pin :



Pin 1 - Reference (Gnd)
Pin 2 - Signal
Pin 3 - Out of phase

15.2 MONITOR HEADPHONES JACK



Mono Jack 6.3 mm- It allows connection to an external headphone set.

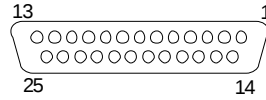
Tip = signal,

Ring = ground,

Total power is 1W output into an 8 Ohm load

16 THE REMOTE INTERFACE

16.1 INTERFACE PIN-OUT



Sub-D 25p Female connector

1	Remote Hybrid 1 On *
2	Remote Hybrid 1 Off *
3	Remote Hybrid 2 On **
4	Remote Hybrid 2 Off **
5	Switch/Indicator Common
6	Hybrid 2 Send Presence Indication **
7	Hybrid 2 Receive Presence Indication **
8	+ 5 Volt DC (supplied via an internal 100 Ohm protection resistor)
9	Unbalanced Send Audio Input (0dBu nominal)
10	Unbalanced Receive Audio Output (0dBu nominal)
11	Unbalanced Aux Audio Output (0dBu nominal)
12	Monitor Mute Control*
13	Audio Common
14	Hybrid 1 On Indication **
15	Hybrid 1 Off Indication **
16	Hybrid 2 On Indication **
17	Hybrid 2 Off Indication **
18	Switch/Indicator Common
19	Hybrid 1 Send Presence Indicator **
20	Hybrid 1 Receive Presence Indicator **
21	Switch/Indicator Common
22	Audio Common
23	Audio Common
24	Audio Common
25	Switch/Indicator Common

* Remote control provided via contact closure to Switch/Indicator Common

** Remote indicators provided via open collector outputs to Indicator Common (<15V, <39mA)

Macrotel D2 only

16.2 'LATCHED' OR 'MOMENTARY' HOOK MODE

The **DIP SWITCH 3** allows to choose between a 'latched' or a 'momentary' hook mode.

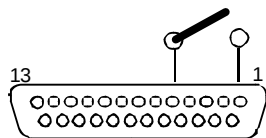
In the **off** DIP SWITCH 3 position (down) the ON/OFF control inputs respond to **momentary** closures to ground.

This turns the hybrid on when it receives a momentary closure on the ON control input and off when it receives a closure on the OFF control input.

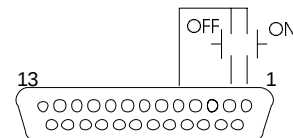
In the **on** DIP SWITCH 3 position (up) the OFF control input is disabled and the ON control input responds to a **latching** closure to ground. This will cause the hybrid to turn on when the latching switch is closed to ground and the hybrid will remain on until the closure to ground is opened.

This DIP SWITCH setting also affects the operation of the front panel ON/OFF buttons.

LATCHED ON-OFF MODE

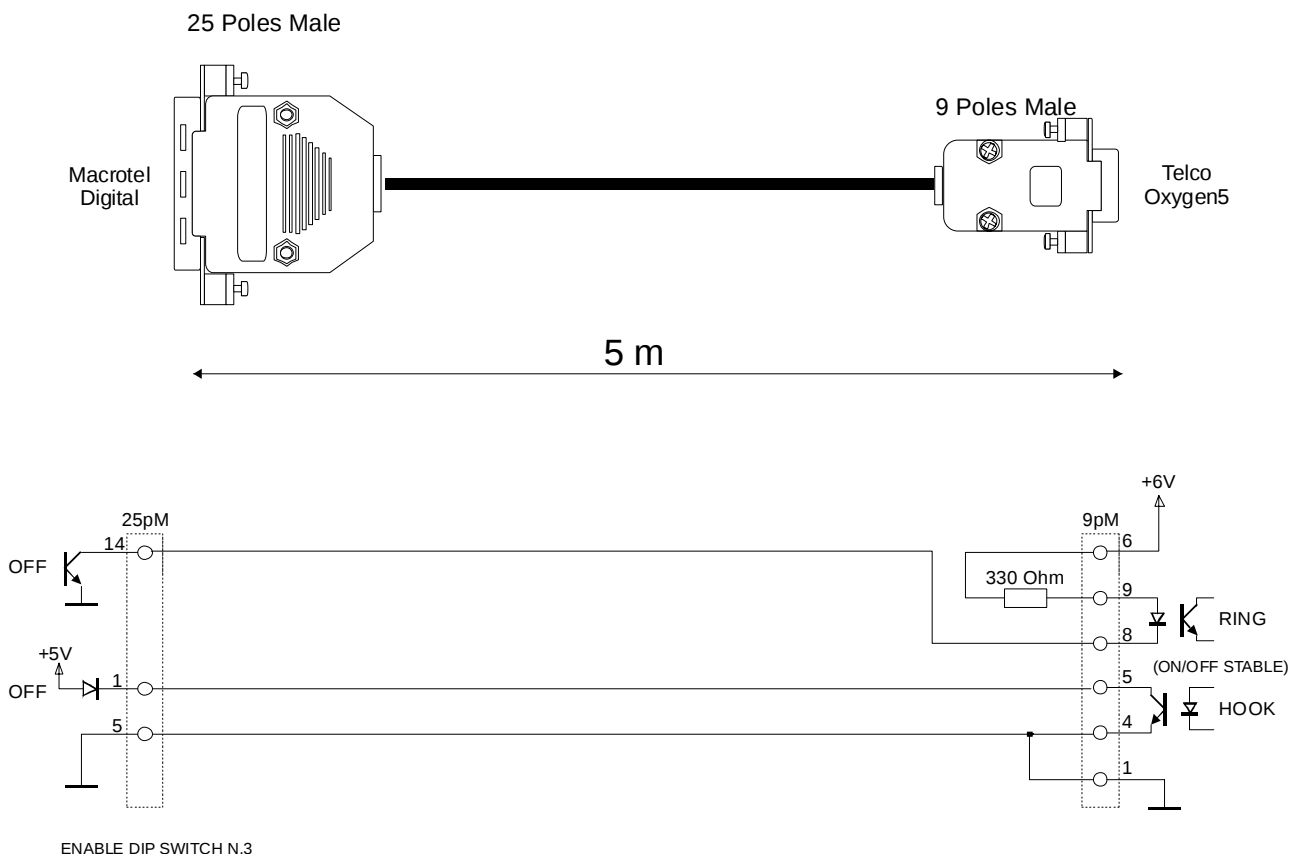


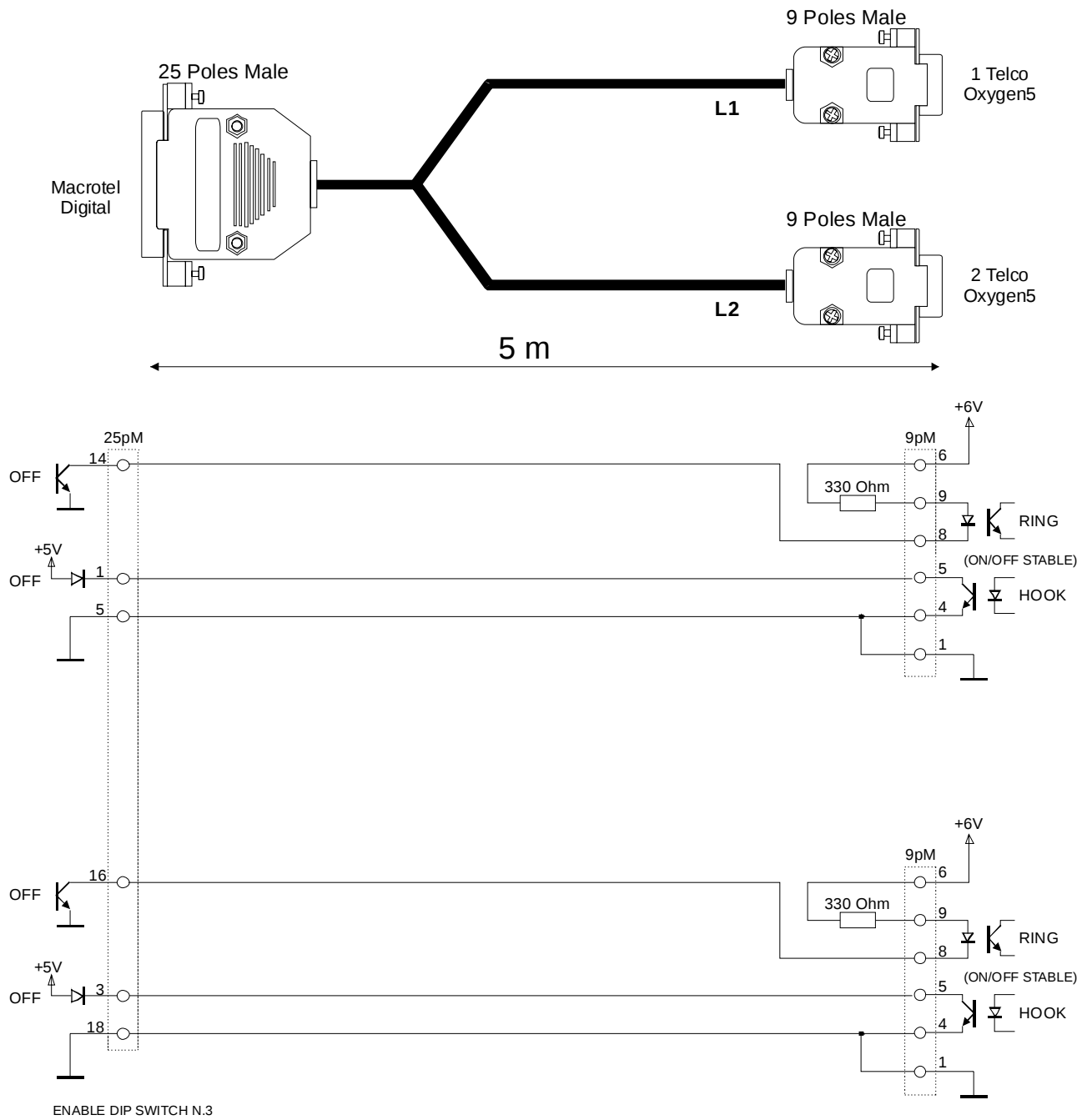
MOMENTARY ON-OFF MODE



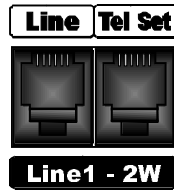
16.3 INTERFACE CABLE BETWEEN MACROTEL D1 AND OXYGEN 5 CONSOLE

A remote cable is available, for connection to the Axel Technology - Oxygen 5 console:



16.4 INTERFACE CABLE BETWEEN MACROTEL D2 AND OXYGEN 5 CONSOLE

17 TELEPHONE LINE CONNECTION



LINE CONNECTOR	
Pin	Description
1	To pin 6 of SET RJ11
2 #	To pin 5 of LINE
3	Tip
4	Ring
5 #	To pin 2 of SET
6	To pin 1 of SET RJ11

TEL. SET CONNECTOR	
Pin	Description
1	To pin 6 of LINE RJ11
2 #	To pin 5 of SET
3	Ring
4	Tip
5 #	To pin 2 of LINE
6	To pin 1 of LINE RJ11

NOTES

Macrotel D1 & D2 hybrids operate on standard POTS (Plain Old Telephone Service) / PSTN (Public Switched Telephone Network) **analog** telephone lines.

The Macrotel RJ11 socket will accept 6 conductor modular plugs, but only the **2 central pins (number 3 and 4)** are typically used.

The 'Tel Set' socket allows the connection on parallel of a standard telephone set (f.i. for dialling). The Tel Set is socket is **active** only **with** the **hybrid disconnected** from the line (i.e. not hooked).

When the ON button is illuminated on the Macrotel D1 and Macrotel D2, an 'A-Lead Closure' is provided between pins 2 and 5 of the LINE and SET jacks. This connection is useful for key telephone system such as the 1A2. If you connect the Macrotel D1 and Macrotel D2 an extension jack of a more modern PBX, you should first check to see if those wires are used for signalling or power.

If so, do not connect them to the Macrotel D1 and Macrotel D2. You may, however, use the pin 2-5 connection to control the hookswitch on a modified PBX phone. Contact Axel Technology technical support for more information.

This appliance is connected to telephone networks indirectly through interface (in-house telephone exchange). Direct connection to the public telephone net is under sole responsibility of the user.

18 TECHNICAL SPECIFICATIONS

GENERAL DATA

Power Supply	220 / 110V 50 / 60 Hz 30VA
Dimension	434x351x44mm (1 rack unit)
Weight	around 4 Kg
Operating Temperature	0-38°C
Compliance	FCC, CSA, CE and CTR21

AUDIO IN / OUT

Send input connector	XLR female, balanced bridging
Send input level	Mic / Line sel. (-55 / 0 dBu) adj
Send Input impedance	20 KOhm
Receive Output connector	XLR, electr. balanced
Receive Output nominal level	0 dBu (adjustable)
Receive Output impedance	50 Ohm
REC Out connector	XLR, electr. balanced
REC Out level	0 dBu (adjustable)
REC Out impedance	50 Ohm
MONITOR Output Connector	Jack ¼", mono
MONITOR Output power	1W into 8 Ω load
Send-to-Receive separation	> 55dB (250 Hz to 3.5 kHz)
Send to Receive Tail time	32 milliseconds
Mix-Minus Rec.to Send separ.	50dB nominal
Mix-Minus Tail time	32 milliseconds

REMOTE INTERFACE

Connector	DB 25 female
Control Inputs	On, Off, and Monitor Mute
Status Outputs	On, Off, Send Audio presence, Receive Audio presence
Status Outputs type	open coll. (< 15V, < 39 mA)
Additional Audio I/O (unbal.)	Receive, REC, Aux-IN, Send

VERSIONS

Different line interfaces for	Europe, Australia, America
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TELCO INTERFACE

Tel line connector	RJ 11 (A-Lead supervision)
Capability	POTS line or dry line (no DC offset voltage).
Tel Set connector	RJ 11 (A-Lead supervision)

TELEPHONE TRANSMIT

Frequency Response	250Hz to 3.5kHz, ±1dB
Signal to noise ratio	>56dB
Distortion	<0.2%
Level	Nominal Send input of 0dBu is referenced to -15dBm across the telephone line

TELEPHONE RECEIVE

Frequency Response	250Hz to 3.5kHz, ±1dB
Signal to noise ratio	>56dB
Distortion	<0.2%
Level	Nominal telephone line level of – 15dBm referenced to Receive output of 0dBu

FRONT PANEL CONTROLS

On/Off	Auto Answer/Disconn Select
Send, Rcv, Rec, Aux-in Level	Ducking Sel. (0, 6, 12, 18dB)
Monitor Volume Up / Down	AGC Select
Receive Boost Select	Auto Mix-Minus Select
Remote Mom/Latching Select	Mic / Line Select
Burst Adapt Select	REC Send / Rcv mix Select

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19 WARRANTY

The manufacturer offers a 1-year ex works warranty.

Do not open the equipment. The warranty shall be voided if any of the warranty seals are broken.

The manufacturer shall not be liable for damage of any kind deriving from or in relation to incorrect use of the product.