

# TELEPHONE HYBRID-2

## USER MANUAL

Version 1.05 (smd)



Dear Customer,

Thank you for choosing the Telephone Hybrid-2.

This time you are not faced with a huge manual because it is simply not necessary because of the natural recognition of all functions on the user interface. All functions are self-explanatory and you will certainly appreciate the ergonomics of this design.

We are confident that you will be using the Telephone Hybrid for many years to come, and wish you a lot of success with your operation.

With kind regards,

Duco de Rijk  
md

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# INTRODUCTION

D&R’s newest Telephone Hybrid-2 is the active version of the well known passive one, successfully sold over the last 5 years.  
Its concept originates from many demands for a more sophisticated hybrid with more features.  
The Telephone Hybrid-2 is an analogue unit with digital control and features like ducking making intelligibility a lot better in broadcast.



## What is a telephone hybrid?

Telephone hybrids provide the interface between professional audio equipment and the public telephone network. They provide protection for your equipment and the public telephone lines, allowing for varying line signals and line conditions. Automatically canceling out the unwanted signal they also facilitate two-way communication down a single telephone line. Each hybrid has a telephone line connection, a handset connection and separate connectors for audio input and output from a broadcast mixer, or other professional audio source.

A large proportion of D&R hybrids are used in radio and television broadcasting applications allowing external callers to be connected to the studio mixing console. Most of the other units are supplied to communication operations allowing extremely effective conversion between 4-wire audio circuits and standard telephone lines.

|                           |                                                                                                                                                               |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CONNECT BUTTON:<br>(RING) | Line connect switch to connect and disconnect calls from the telephone line.<br>It can be remotely driven by connecting a switch to the GPIO sub D connector. |
| LC:                       | Variable Low Cut filter to filter out unwanted low frequency noise.                                                                                           |
| HC:                       | Variable High Cut filter to filter out unwanted high frequency noise.                                                                                         |
| Ducking                   | Indicates when caller’s signal is reduced.                                                                                                                    |
| RECEIVE:                  | Level control for incoming signal from caller.                                                                                                                |
| SEND:                     | Level control for outgoing signal to caller.                                                                                                                  |





## Back panel lay-out

|              |                                                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Power        | mains power switch.                                                                                                                         |
| Power Cord   | The unit is powered by a removable IEC type power cord. An internal switched power supply is built in to accept voltages between 90V - 245V |
| LINE:        | RJ-12 connector to connect with the public telephone network.                                                                               |
| PHONE:       | RJ-12 connector to connect with a handset.                                                                                                  |
| C-BALANCE:   | 8 pole mini-dip switch to select the optimum side tone attenuation                                                                          |
| R-BALANCE    | Internal potentiometer to adjust for optimum side tone attenuation.                                                                         |
| GPI          | Jack connector for remote control.                                                                                                          |
| AUDIO + GPIO | A combination of audio in/outputs and logic for D&R and other braodacst mixers.                                                             |
| RECEIVE      | Male XLR to be connected to input of the mixer.                                                                                             |
| SEND         | Female XLR input to be connected to Mix Minus/Clean feed (N-1)output of the mixer.                                                          |

## SYSTEM DESCRIPTION.

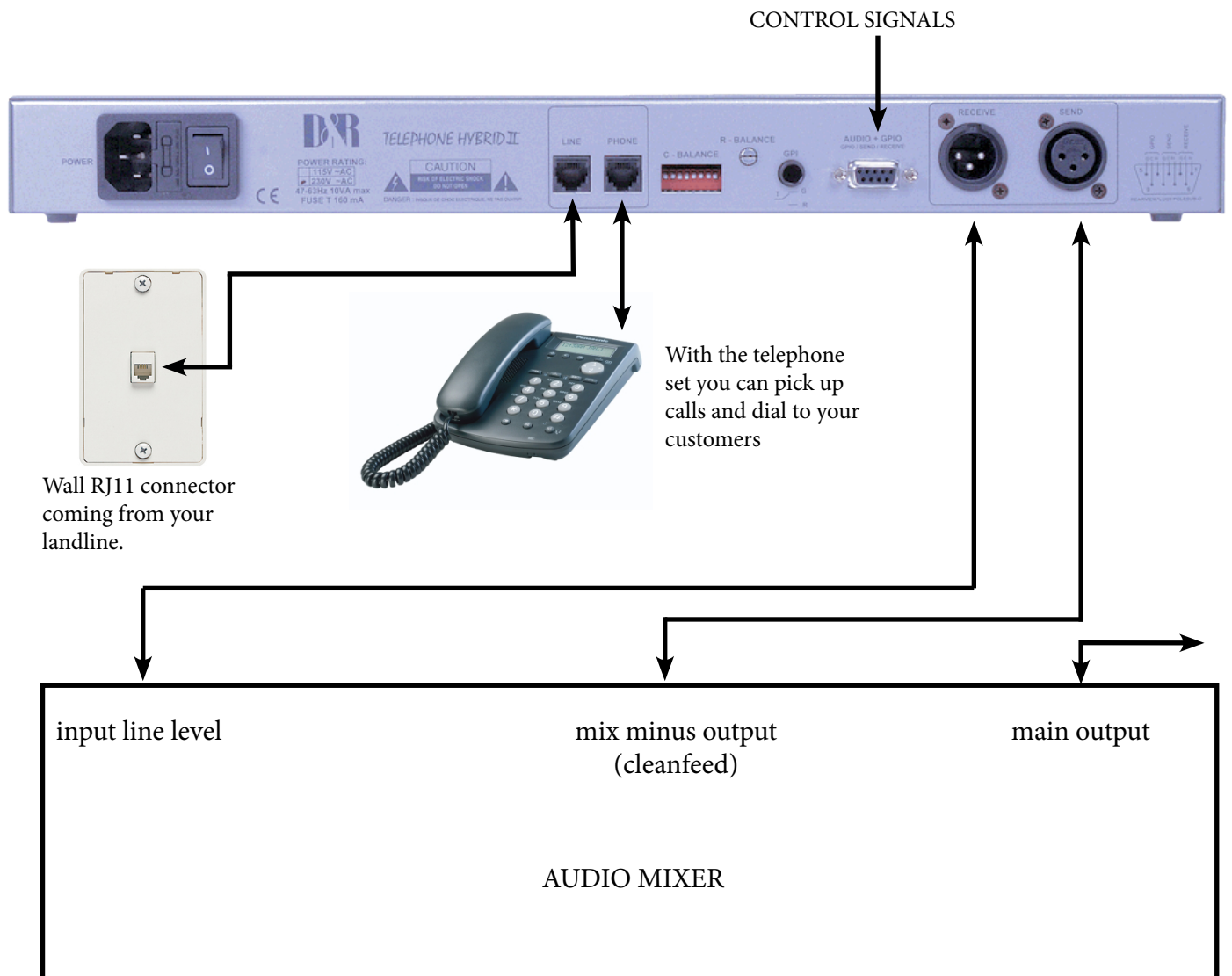
A large ring button enables you to pick up the line from the unit itself or from your mixer when connected via its GPIO to the telephone Hybrid. When a call comes in it lights up green in the rhythm of the ring. When the line is picked up by pushing the button it turns into red. When it starts blinking red the line connection is lost. Both levels of receive and send can be adjusted to suit your requirements. Incoming signals can be tailored by the variable high and low cut signal while talking to people calling the station. A ducking system reduces the incoming signal while talking to people calling the station to provide for an improved intelligibility.

## HIGH LIGHTS

- Active balanced interfacing.
- Variable high and low cut filters.
- Industry standard connectors
- Superb audio separation.
- Externally adjustable R and C balance.
- Remotely controllable.
- GPIO interfacing with mixing consoles.
- Auto Ducking.



# WIRING OF THE TELEPHONE HYBRID-2



# SETTING UP PROCEDURE

Connect the two wires of the telephone line's wall unit to the RJ-11 connector labeled LINE and connect the telephone appliance itself to the Hybrid's RJ-11 connector labeled PHONE. Note that to originate calls, a local phone must be connected to the system.

Now the hybrid is interfaced (fully balanced) between your telephone appliance and its connection to the outside world. The hybrid can now split the send and return signals.

Now connect the hybrid's balanced audio input (SEND on XLR male) to a (preferable) balanced mixer output of around +4dBu. This output has to be the mix of all signals except the signal coming from the hybrid itself to avoid feedback. An Aux. output will do or in broadcast mixers a clean-feed is the best.

The balanced RECEIVE output of the Hybrid has to be connected to a line input of the mixing console.

Note that this signal is NOT to be send to the output where the Hybrid's input is connected to. So in case of use of an Aux send this local channel Aux send needs to be turned off. In case of use of a clean-feed buss, this input channel needs to be disconnected from the clean-feed buss.

Turn the LC control fully counter clockwise and the HC control fully clockwise.

Position RECEIVE and SEND controls in their mid position.

If a local phone is connected, originate a call to a remote side. If no local phone is present, someone at a remote site must call you. When a call comes in the large ring BUTTON on the left side of the unit lights up green in the rhythm of the ring. When the line is picked up by pushing the button it turns into red. When it starts blinking red the line connection is lost.

If you are at the originating side pres the CONNECT button to connect the Telephone Hybrid-2 to the phone line after the call has been established. The phone will be disconnected now. The caller will now hear the signal send to the Hybrid and the output of the Hybrid will present the callers signal only with the send signal heavily attenuated.

To achieve the optimum attenuation you need to adjust the C and R balance first.

This is how it is performed:

1. Check if the telephone connection is established and all connections to the mixing console are correctly wired.
2. Now activate a CUE/PFL/SOLO button of the mixing console channel where the return signal of the Hybrid is connected to. You will faintly hear the send signal coming out of the mixing console.
3. Adjust the R-Balance for minimum feed through of the mixers send signal.
4. Listen now which mini-dip switch gives a further reduction of the return signal.
5. Maybe it is good to re-adjust the R-balance after having selected another dip-switch.
6. Repeat steps 3 and 4 until no further improvement are achieved.

## DUCKING

The Hybrid has an automatic gain adjustment of the incoming signal from the caller when the presenter speaks. This feature both improves the side tone reduction and gives the presenter a level advantage over the caller when he interrupts the caller. When both parties are speaking the caller's signal is reduced then.



# INPUTS / OUTPUTS

## SEND (to caller)

| XLR FEMALE | TYPE         | CONNECTION      |
|------------|--------------|-----------------|
| Pin 1      | Screen       | Audio ground    |
| Pin 2      | In Phase     | Audio + (input) |
| Pin 3      | Out of Phase | Audio – (input) |

## RECEIVE (from caller)

| XLR MALE | TYPE         | CONNECTION      |
|----------|--------------|-----------------|
| Pin 1    | Screen       | Audio ground    |
| Pin 2    | In Phase     | Audio + (input) |
| Pin 3    | Out of Phase | Audio – (input) |

## SUB D-9 AUDIO + GPIO

| GPIO / SEND / RECEIVE | FUNCTION              | CONNECTION               |
|-----------------------|-----------------------|--------------------------|
| Pin 1                 | Receive (from caller) | Audio + (output)         |
| Pin 6                 | Receive (from caller) | Audio - (output)         |
| Pin 2                 | Receive (from caller) | Audio ground             |
| Pin 7                 | Send (to caller)      | Audio + (output)         |
| Pin 3                 | Send (to caller)      | Audio - (output)         |
| Pin 8                 | Send (to caller)      | Audio ground             |
| Pin 4                 | Logic ground          | 47 Ohm to ground         |
| Pin 9                 | GPI                   | + 5volt TTL input        |
| Pin 5                 | GPO                   | Open collector to ground |

## GPI

| GPI    | FUNCTION  | CONNECTION         |
|--------|-----------|--------------------|
| Tip    | Pull down | 47 ohm to ground   |
| Ring   | Pull up   | +5 volt via 10kohm |
| Sleeve | No        | Not connected      |

## PHONE

| PHONE RJ12 | FUNCTION           | CONNECTION |
|------------|--------------------|------------|
| Pin 1      | n.c.               |            |
| Pin 2      | A (telephone line) | In/out     |
| Pin 3      | B (telephone line) | In/out     |
| Pin 4      | n.c.               |            |

## LINE

| PHONE RJ12 | FUNCTION           | CONNECTION |
|------------|--------------------|------------|
| Pin 1      | n.c.               |            |
| Pin 2      | A (telephone line) | In/out     |
| Pin 3      | B (telephone line) | In/out     |
| Pin 4      | n.c.               |            |

*In case you want an external light to clearly see incoming calls use GPO pin 4 and 5 that makes a short by a FET optocoupler*



# SPECIFICATIONS

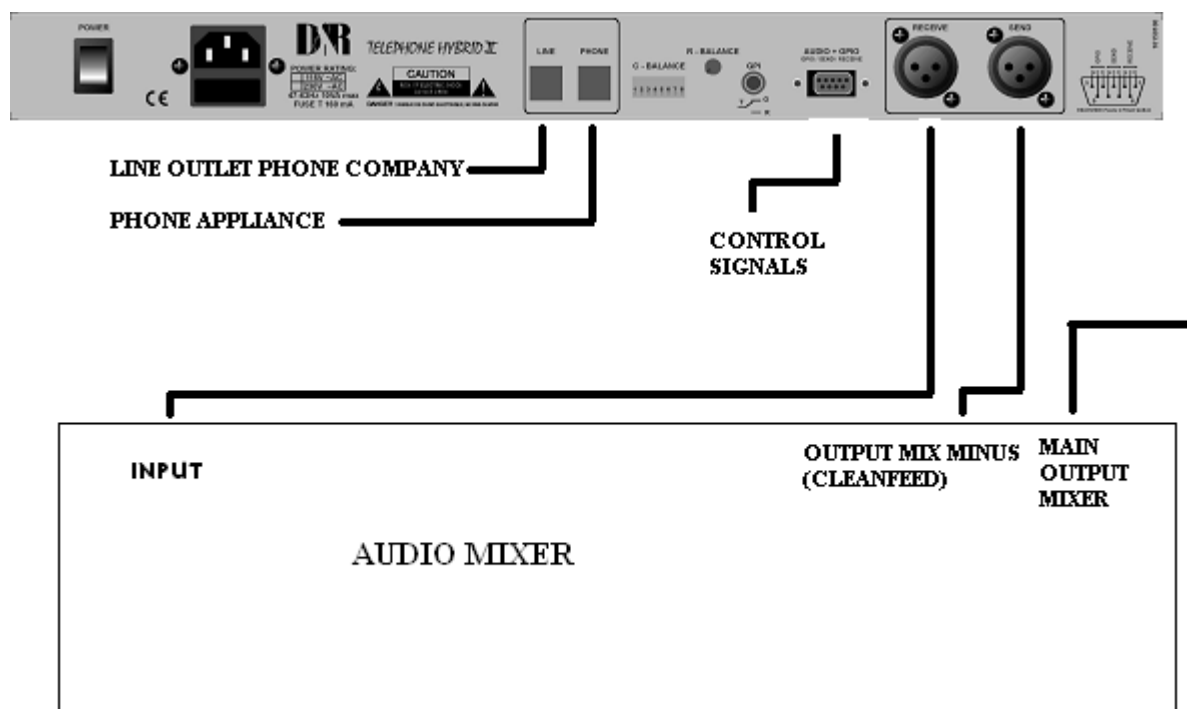
## Audio Inputs

|                            |                                                    |
|----------------------------|----------------------------------------------------|
| SEND                       |                                                    |
| Impedance                  | 10k Ohm, electronically balanced                   |
| Common mode rejection      | >40dB                                              |
| Maximum input level        | +26dBu                                             |
| Nominal input level        | +4 dBu                                             |
| Frequency response         | 20Hz – 15kHz (-3dB variable via HC and LC filters) |
| Connectors                 | XLR type 3 pin female                              |
| Gain range receive control | 40dB                                               |

|                                |                                                               |
|--------------------------------|---------------------------------------------------------------|
| RECEIVE                        |                                                               |
| Impedance                      | < 50 Ohm, electronically balanced                             |
| Common mode rejection          | >40dB                                                         |
| Maximum output level           | +26dBu                                                        |
| Nominal output level           | +4 dBu                                                        |
| Bandwidth to telephone line    | 250Hz – 4kHz, -3dB ref 1 kHz                                  |
| Telephone line impedance       | Nominally 600 ohm                                             |
| Telephone line impedance range | 300 ohm to 1500 ohm                                           |
| Connectors                     | XLR type 3 pin male                                           |
| Gain range send control        | +6dB to -20dB                                                 |
|                                |                                                               |
| GENERAL                        |                                                               |
| Distortion                     | Less than 0.1% (0dBu out)                                     |
| Power supply                   | 115v / 230 v AC / 50/60Hz (factory set, NOT do this yourself) |
| Power consumption              | 10VA Maximum                                                  |
| Dimensions                     | 1 HE front panel: 482x44mm                                    |
|                                | Frame: 430x41x175mm (width x height x depth)                  |
| Weight                         | 2.2 kg net excl packing                                       |



## WIRING



## DECLARATION OF CONFORMITY

Manufacturers Name: D&R Electronica b.v.

Manufacturers Address: Rijnkade 15  
1382 GS Weesp,  
Netherlands

declares that the product

TELEPHONE HYBRID-2

Which refers to this declaration, is in accordance with the following standards or standardized documents:

|            |               |
|------------|---------------|
| EN 50081-1 | EN 55013 A 12 |
| EN 50082-1 | EN 55022      |
| EN 60065   | EN 61000-3-2  |
| EN 55020   | EN 61000-3-3  |

Supplementary Information:

The products herewith complies with the requirements of the EMC Directive 89/336/EWG and 73/23/EWG as amended by the CE Marking Directive 93/68/EEC (1993).

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