



# Interchange LTD™

## Intercom Phone Bridge + Digital Hybrid



User Guide

# Welcome

## Thank You

Thank you for purchasing a JK Audio Interchange LTD™ Intercom Phone Bridge. Please read this guide for instructions on setting up and using your new product.

## Getting Assistance

If you have technical or application questions:

In the US & Canada, call us toll free at: **800-552-8346**

All other countries dial: **815-786-2929** (M-F 8:30-5:00pm Central Time Zone)

Email us at: [support@jkaudio.com](mailto:support@jkaudio.com)

Or, check out our FAQ section for answers to common questions.

## Limited Warranty

The Interchange LTD is covered by a 2-Year Warranty to be free from defective workmanship and materials. To obtain service, contact JK Audio by phone or email for return authorization. Once authorized, you will carefully pack and ship the faulty product and all accessories to us. You will pay for shipping to us and we will pay for return back to you.

This warranty does not cover damages due to accident, weather, fire, flood, earthquake, misuse, unauthorized repairs or modifications, or damages occurred in shipping, only defective workmanship or materials.

**There are no expressed or implied warranties which extend beyond the warranty here made.**

## Warnings & Safety Precautions

- Read and keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Clean only with a soft dry cloth.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the three-prong grounding type plug. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Do not use this unit if the electrical power cord is frayed or broken. The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it.
- **CAUTION!** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Use only No. 26 AWG or larger telecommunication line cord.
- Refer all servicing to qualified service personnel.

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**Features**

|                                                  |
|--------------------------------------------------|
| Male and Female 3 Pin<br>XLR Intercom Loop Jacks |
| Male XLR Mix Line Out for Monitoring             |
| Send and Receive LED Metering                    |
| Front Panel Screwdriver<br>Level Controls        |
| Front Panel Channel Select                       |
| Front Panel Cell Phone Interface                 |

|                                                              |
|--------------------------------------------------------------|
| Front Panel TRRS Monitor Headset<br>Jack with Volume Control |
| Listen Always,<br>Talk When Talk-Enabled                     |
| Enable/Disable Auto-Answer                                   |
| 16-bit DSP Technology                                        |
| Front Panel Off-Hook LED                                     |
| Send and Caller Signal Level LEDs                            |

**What's in the Box?**

|                                                |
|------------------------------------------------|
| Universal Power Supply<br>with Detachable Cord |
| RJ11 Phone Cord                                |

|                                                      |
|------------------------------------------------------|
| 3.5 mm TRRS Headset Interface<br>Cable (Part# CN113) |
|------------------------------------------------------|

### **Introducing the Interchange LTD™**

Interchange LTD allows remote access to your party-line intercom system. This 1RU rackmount interface includes a digital hybrid for connection to analog (POTS) phone lines. The front panel headset interface jack allows easy connection to your wireless phone, tablet, or computer allowing remote access through a phone call or conferencing app. The front panel DTMF keypad and headset jack allow easy call setup.

The Listen-Always design allows both the phone hybrid and the mobile phone headset interface to monitor the intercom just like any other belt pack. Listen mode is a high impedance bridging tap on the intercom line. Talk mode is enabled via a front panel switch, either Off, On, or Auto. Auto follows the phone hybrid Auto-Answer mode.

The internal digital hybrid connects intercom audio to a standard analog telephone line without the transmit/receive crosstalk common to analog hybrids. Its DSP continuously monitors both the phone line and audio signals to deliver excellent separation. This proprietary, dual-convergence echo canceller algorithm can achieve excellent separation, typically exceeding 50 dB, without any setup and without sending a noise burst down the line.

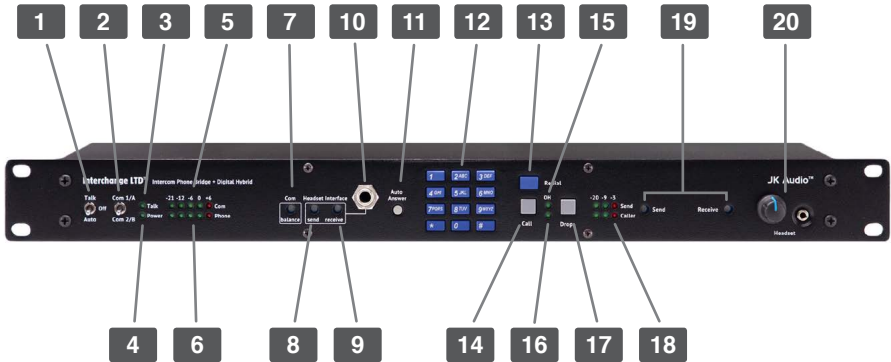
### **Ready to go?**

The Interchange LTD controls and connectors are clearly marked and ready for operation. If this is your first exposure to a hybrid, we suggest that you read the entire manual to allow you to take advantage of all these features.

### **Any Questions?**

Before you pick up the phone... Please thumb through the rest of this manual. You might find those deep technical questions are covered on later pages.

# Getting to Know Your Interchange LTD



## Controls & Indicators

### 1 Talk Control

The position of the three position toggle switch determines when Interchange LTD will send audio into the Party Line intercom.

**Up = Talk:** Interchange LTD sends and receives audio (simultaneously). Use this position with the headset interface.

**Center = Off:** Interchange LTD functions as a listen-only device. No audio will be sent into the Party Line intercom.

**Down = Auto:** Talk function follows the hook state of the innkeeper Phone Hybrid.

### 2 Intercom Channel

**Up** = Audio on Intercom Channel 1/A (Pin 2)

**Down** = Audio on Intercom Channel 2/B (Pin 3)

### 3 Talk LED

Indicates audio transmission into the Party Line intercom.

### 4 Intercom Power LED

Indicates intercom power detected.

### 5 COM Level LEDs

Indicates audio signal level from the Intercom channel. The 0dB LED corresponds to a nominal level of -10 dBu on the intercom channel.

### 6 Phone Level LEDs

Indicates audio signal level from the phone interface.

### 7 Com Balance

Fine tuning for the intercom hybrid function. Optimizes separation between send and receive when pushing audio into the intercom with the **Talk** function.

## Controls Cont'd

### **8 Headset Interface Send Level**

Adjusts audio signal level to the mobile device.

### **9 Headset Interface Receive Level**

Adjusts audio signal level coming from the mobile device.

### **10 Headset Interface Jack**

Connect to the headset jack of your mobile device with supplied CN113 interface cable if no phone line is available.

### **11 Auto-Answer**

When enabled, Interchange LTD automatically answers an incoming call and then disconnects after the caller hangs up. Auto answer will occur on the first ring.

### **12 Numeric Keypad**

Dial a number.

### **13 Redial**

Press this button to instantly redial the last telephone number.

### **14 Call Button**

Takes the line off-hook; press this button to answer a call or you can direct a call from your aux phone through the hybrid.

### **15 OH LED**

Lit when you are on line with a call (off-hook).

### **16 Power LED**

Lit when unit is plugged in and receiving power.

### **17 Drop Button**

Press this button to drop (hang up) a call.

### **18 Signal LEDs**

Send LEDs represent the signal level going out to the telephone line. Caller LEDs represent the signal level coming from the phone line, after the DSP.

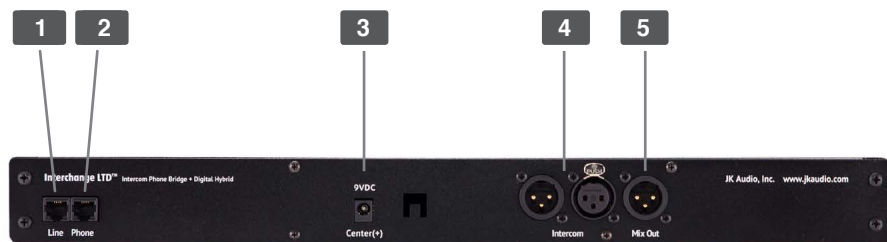
### **19 Send and Receive Level**

Adjusts the audio signal that you are sending down the telephone line and the level of the incoming caller's audio as it is going out the Mixout jack.

### **20 3.5mm TRRS Headset Jack with Volume Control**

Monitor Intercom/Hybrid audio with a TRRS headset.

# Getting to Know Your Interchange LTD



## Inputs & Outputs

### 1 Phone Line

Connect to a standard, single line, analog telephone line.

### 2 Aux Phone

Connect a single line analog telephone for call setup / dialing, or producer call screening.

### 3 Power Jack

For connection only to the supplied 9VDC regulated power supply. AC power to Interchange LTD is only necessary when interfacing a POTS line to your intercom system

### 4 Party Line Intercom

Connect to one or two channel 3-pin unbalanced Party Line intercom system.

### 5 Mix Out XLR Jack

Contains a line level mix of both the phone and intercom audio.



### Start by Connecting to the Intercom

1. Set the **<Talk>** switch to the **<Off>** position, and the **<Com>** switch to the desired channel.
2. Connect Interchange LTD to your intercom network using one or both of the **<Intercom>** XLR jacks.
3. As soon as Interchange LTD is connected to the intercom system, the **<Power>** LED will light, and the **<Com>** LEDs will indicate any audio signal present on the intercom channel.

**If using a Mobile Device** (If using a phone line, please skip to page 6.)

**Note: AC power is not necessary when using with a mobile device.**

1. Connect the supplied CN113 interface cable between the front panel Headset Interface jack and your mobile phone headset jack.
2. Using your mobile phone, place a call to a remote location. You should be able to immediately monitor the intercom signal from the remote location.
3. Adjust the **<Headset Interface Send>** level control for desired signal level at the remote location.
4. Change the **<Talk>** toggle switch to the **<Talk>** position to allow the remote location to be heard on the intercom channel.
5. The return audio path from the remote location into the intercom can be adjusted two ways. The front panel **<Headset Interface Receive>** level control provides adjustment suitable for most mobile devices. However, most mobile devices also have a headphone level control which works along with the Interchange controls.
6. It is best to set the headphone level on your mobile device first, then set the level on Interchange for final adjustment. This signal will appear on the Interchange **<Phone>** LEDs, not necessarily on the **<Com>** LEDs. **Monitor receive levels by listening on an intercom belt pack.**

### Com Balance with Headset Interface

Interchange LTD features an active hybrid to separate the unbalanced 2-wire intercom audio channel into separate (4-wire) send and receive audio paths. While nominal separation is achieved with typical operation, the separation can be fine tuned if the intercom loop offers additional challenges. Perform the tuning operation when the intercom network is not in use. Using your mobile device, play or generate a fixed level tone or white noise into the intercom system. Adjust the signal level to 0 dB on the Interchange **<Phone>** LED display. Be sure that the **<Talk>** control switch is in the **<Talk>** position. Adjust the **<Com Balance>** control while observing the **<Com>** LEDs, to find the minimum (the position where the fewest **<Com>** LEDs are lit). Remove the test signal and proceed with normal operation.

# Operation

## Operation with a Phone Line

1. Connect the supplied RJ-11 phone line cable between the jack marked **<Line>** and your wall jack. Be sure this jack supports standard single line analog telephone operation.
2. Connect the supplied AC power cord to the back of the Interchange LTD and then to an AC power outlet.



This device should be connected to an adequate surge protective device at all times both for the power connector and for the telephone line to avoid damage from lightning or electrical surges.

3. Your Interchange LTD is now ready to take calls. Along with using the front panel keypad, you may also connect an auxiliary telephone to the Interchange LTD **<Phone>** jack so you can dial out and set up calls, or use the **<Auto-Answer>** feature to answer incoming calls.
4. Change the **<Talk>** toggle switch to the **<Auto>** position to allow Interchange LTD to follow the call status of the phone hybrid. During an active call, the remote location can now be heard on the intercom channel.
5. The signal from the remote location will appear on the Interchange LTD **<Phone>** LEDs, not necessarily on the **<Com>** LEDs. Monitor receive levels by listening on an intercom belt pack or TRRS Headset.
6. Changing the **<Talk>** switch to **<Off>** returns the system to a remote Listen-Only configuration.

## Com Balance with Phone Hybrids

Interchange LTD features an active hybrid to separate the unbalanced 2-wire intercom audio channel into separate (4-wire) send and receive audio paths. While nominal separation is achieved with typical operation, the separation can be fine tuned if the intercom loop offers additional challenges. Perform the tuning operation when the intercom network is not in use. Interchange LTD does not have a test tone feature, therefore an alternate tone generator must be used. Be sure that the **<Talk>** control switch is in the **<Talk>** position. Adjust the **<Com Balance>** control while observing the **<Com>** LEDs, to find the minimum (the position where the fewest **<Com>** LEDs are lit). Remove the test signal and proceed with normal operation.

### Auxiliary Telephone

An auxiliary telephone provides you with an easy way to dial out or set up your calls. Interchange LTD will disconnect the auxiliary telephone when you press the **<Call>** button. If you need to take the call back on the aux telephone, simply pick up the telephone handset before the Interchange LTD's **<Drop>** button is pressed.

To use an auxiliary phone equipped with a "Hold" feature to place or screen a call, first set up the call and place the call on hold. When you are ready to take the call on Interchange LTD, press the **<Call>** button on the innkeeper LTD and your telephone will automatically release the hold.

Your phone will operate as a normal telephone anytime you are in Drop mode. Leaving the hybrid connected between the wall jack and your telephone will not affect normal use of your phone. Audio will only pass through the hybrid when you press the **<Call>** button.

### Optional Jumper Settings

If the incoming Caller level is too high and peaking the red -3 dB LED, you may need to change the setting of an internal jumper. Disconnect power from the hybrid and remove the cover of the innkeeper LTD to locate Jumper 1. The default position for this jumper is closed (covering both pins). Changing the jumper to the open position (either remove the jumper or cover just one pin) will provide 6 dB attenuation of the incoming audio signal.

### Auto-Answer

The **<Auto-Answer>** feature will answer on the first ring.

When **<Auto-Answer>** is enabled, you can still make calls manually using the **<Call>** button. When finished, you can either drop the call manually or allow the call to Auto-Disconnect. Interchange LTD will look for a CPC disconnect signal from the phone company to determine when a call has disconnected. This can take up to a minute.

# Technical Information

## Specifications

### Intercom Channel

|                       |                                    |
|-----------------------|------------------------------------|
| Connection            | Male & Female 3-pin XLR            |
| Output Level          | -10 dBu (250 mV RMS) nominal       |
| Terminating Impedance | 200 ohms                           |
| Bridging Impedance    | >15k ohms                          |
| Pin 1                 | Common                             |
| Pin 2                 | Audio + 30 VDC (+12 VDC min) 50 mA |
| Pin 3                 | Audio                              |

### Line Out

|                   |                                                |
|-------------------|------------------------------------------------|
| Balanced Male XLR | 200 ohms / 500 mV RMS (-4 dBu nom) +12 dBu max |
|-------------------|------------------------------------------------|

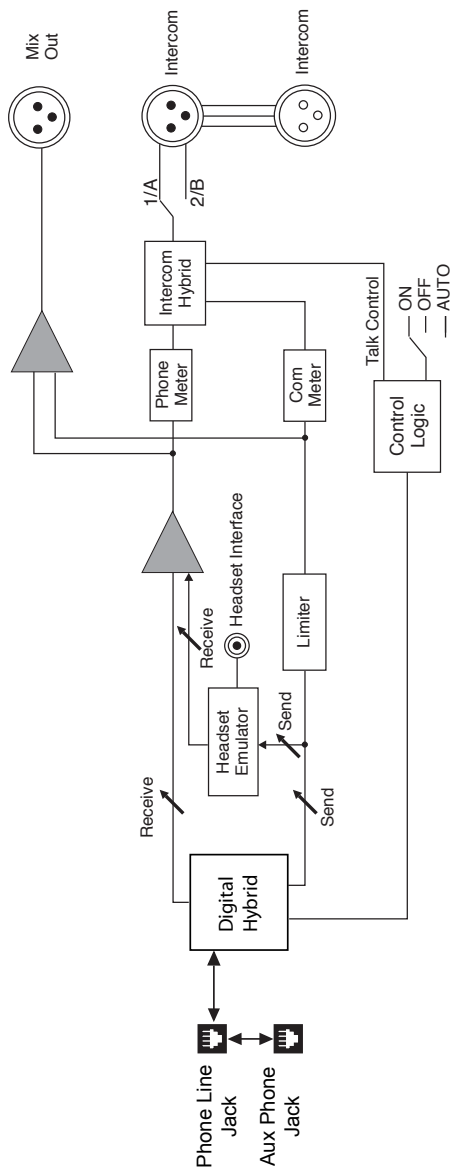
### Headset Interface

|                    |                                             |
|--------------------|---------------------------------------------|
| Connection         | 3.5 mm TRRS                                 |
| Frequency Response | Wireless Interface 50 Hz - 7 kHz (HD Voice) |

### Misc

|                                        |                                     |
|----------------------------------------|-------------------------------------|
| Phone Line                             | RJ11C                               |
| Aux Phone                              | RJ11C                               |
| Ringer                                 | 0.8B REN                            |
| Isolation                              | 1500 VAC                            |
| Frequency Response                     | Telephone Side 200 Hz-3600 Hz       |
| Monitor Headset Jack                   | 3.5 mm TRRS                         |
| Power                                  | 120-240 VAC Power Supply (included) |
| Maximum Ambient Operating Temperature: | 40°C (104°F)                        |
| Size                                   | 19" x 5.4" x 1.75"                  |
| Weight                                 | 5.2 lbs                             |

Interchange LTD Block Diagram



**1. Does the interchange LTD send a burst or beep down the phone line at the beginning of each call like our current hybrid?**

No. Interchange LTD uses the actual transmit signal to evaluate the phone line and tune its algorithm. As you begin to speak, Interchange LTD is hard at work separating intercom audio from phone line audio. Within milliseconds your voice is reduced into the noise floor.

**2. Can I use the innkeeper LTD on a VoIP line?**

Many VoIP lines have an analog telephone adapter you can use to connect Interchange LTD to your VoIP line.

**3. The caller's audio is too high and is always distorted even though I have the Receive level control turned down low. What else can I do?**

The Caller LED meter will indicate the level of audio coming in from the telephone line, just after it passes through the DSP. The Receive Level control will have no effect on the LED meter. If your incoming audio level is unusually hot and already peaking the -3 dB LED, there is a jumper on the circuit board you can change to attenuate the incoming audio. Please see page 7 for more information.

**4. I have my new Interchange LTD connected to the phone jack in my office. Why does it keep dropping the calls as soon as I try to connect it?**

The telephone jack in your office is very likely for a multi-line phone system. The jack may look like a standard phone jack, but it is wired differently and may carry voltage on different pins which could cause serious damage to your hybrid. Interchange LTD should only be connected to a single, analog phone line.

**5. Why isn't my headset working in the Headset Interface jack?**

The 1/4" Headset Interface jack is only compatible with the supplied CN113 cable connected to the headset jack of a mobile device. Instead, plug your TRRS headset into the 1/8" Headset jack.

**6. I've lost my CN113 cable. Can I use any 3.5mm TRRS to 1/4" TRS cable to use a cell phone with Interchange LTD?**

No. CN113 was designed for this product. If you misplace this cable you will have to purchase a new one from us directly or from an authorized dealer.

**7. Can I use the Interchange with both a cell phone AND a phone line call at the same time?**

Yes. The two calls will not be conferenced together so they would not hear each other, but there could be some faint crosstalk through the intercom.

## FCC Registration

Your new JK Audio product has been registered with the Federal Communications Commission (FCC). This product complies with the standards in Part 68 of the FCC rules.

### 1. Connection and use with the nationwide telephone network

The FCC requires that you connect this telephone equipment to the national telephone network through a USOC RJ-11C modular telephone jack. This equipment may not be used with Party Line Service or Coin Telephone Lines. This equipment is hearing aid compatible.

### 2. Information for the telephone company

Upon request from your local telephone company, you are required to provide the following information:

- A. The "line" to which you will connect the telephone equipment (that is, your telephone number), and
- B. The telephone equipment's FCC registration number. This can be found on the bottom of your telephone equipment, and,
- C. The ringer equivalence number (REN) for this equipment. The REN is used to determine the quantity of devices which will be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed 5.0. To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the local telephone company.

### 3. Repair Instructions

If it is determined that your telephone equipment is malfunctioning, the FCC requires that it not be used and that it be unplugged from the modular outlet until the problem has been corrected. Repairs to this telephone equipment can only be made by the manufacturer or its authorized agents or by others who may be authorized by the FCC. For repair procedures, follow the instructions outlined under the warranty section of the manual.

### 4. Rights of the telephone company

If telephone equipment is causing harm to the network, the telephone company may temporarily discontinue your telephone service. If possible, they'll notify you before they interrupt service. If advanced notice isn't practical, you'll be notified as soon as possible. You'll be given the opportunity to correct the problem, and you'll be informed of your right to file a complaint with the FCC. Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your JK Audio product. If such changes are planned, you'll be notified by your telephone company.

## FCC Part 15 Subpart A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Changes or modifications not expressly approved by JK Audio can void the user's authority to operate the equipment.

## **Interchange LTD™**

Intercom Phone Bridge + Digital Hybrid



**User Guide Version 9/22/17**

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