8-Channel USB Logger

User's Guide

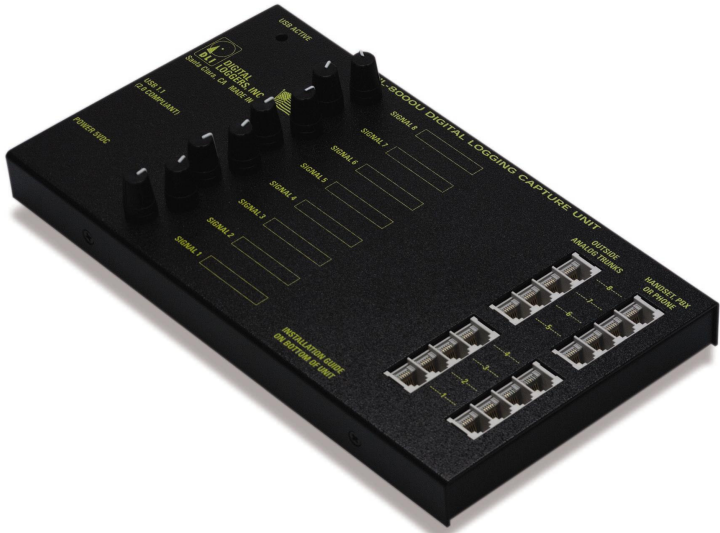**DLI DIGITAL LOGGERS, INC.**

Features

- Eight channels of companded digital recording, with level indicators and recording controls.
- Independent configuration for voice-activated switch (VOX) or continuous (manual) recording.
- Easily adjustable recording trigger level and timeout.
- Transient noise suppression.
- Recordings can be manually started, stopped or paused.
- Digital signatures indicating the time, date, and device used for recording are included in each file.
- Automatic recording startup after login.
- Easily accessible hardware gain controls for each channel.
- Easy Plug and Play USB configuration under Windows 2000, 2003, and XP .
- Maximum recording length can be easily set so large files are split into easily manipulated sections.
- Maximum disk usage can be controlled to conserve disk space.
- Evidence Builder software can be used to analyze calls for Touch-Tones (DTMF) and Caller-ID information.

Requirements

- A **dedicated** PC is recommended for full audio performance, due to the high CPU usage required for real-time audio.
- A 1-GHz or faster processor with 256MB or more of RAM.
- Windows 2000, 2003, or XP. Due to the performance required, Windows 9x and ME aren't supported.
- A free USB 1.0, 1.1, or 2.0 port.

Quick Installation

1. Run windows update from **windowsupdate.microsoft.com** to ensure you have the latest USB drivers available from Microsoft. This is particularly important under Windows 2000.
2. Connect inputs to either handsets with a "Y" tap, or to outside phone lines. When connecting to outside lines, the outside phone line connects to the right jack, and the phone, PBX, or KSU connects to the left jack.
3. Attach the USB cable to a dedicated PC. Connect directly to a primary USB port, not to a hub. We recommend that the logger is the only external USB device attached to your PC. Once attached, the USB configuration on this PC should not be changed.
4. Connect the power adapter to the 5V jack on the logger. Switch the PC power on *after* powering the logger.
5. If USB drivers are needed on your machine, you will be prompted to insert your Microsoft Windows CD for USB HID drivers. Install the drivers as directed.
6. After installing USB drivers, Insert the MIL-8000 distribution CD and follow the instructions to install the logging application. Restart the PC and start the logging application.
7. Test each line and adjust the recording level to prevent distortion. When properly adjusted, the VU meter should never reach the top of the scale during normal conversation.
8. Adjust the recording trigger level (yellow bar) using normal conversation levels.

Hardware Setup

The hardware installation kit includes:

- Qty 8 – Phone to Handset Cords
- Qty 1 – USB "A" to USB "B" cable.
- Qty 8 – Handset to RJ-11 Cords

- Qty 8 – Handset "Y" Connectors
- Qty 8 – RJ-11 "Y" Connectors
- Qty 1 – USB Logging Unit
- Qty 1 – 5V Switching Power Supply

Power

Plug the adapter into the wall outlet and attach the cable end into the jack marked 'Power' on the logger. The LED will not illuminate until the logger is activated and a USB connection is established.

USB to PC connection

The USB cable provided has a rectangular "Type A" plug on one end and a square "Type B" connector on the other. The square connector is the only connector that can be plugged into the logger. Connect the USB cable between the PC and the logger.

At this point, start your computer. Windows will automatically install four 'USB Audio' drivers. The installation should not require you to access files from the Windows installation CD, but have this handy just in case. Follow the Windows installation wizard instructions and restart the computer if necessary.

Microphone Power

DLI loggers use pins 1 and 6 of the RJ-12 to send power to remote microphones. To wire an RJ-12 jack in a single line configuration, just make sure the red and green pair is connected to pins 3 and 4 of the jack. The logger will require a separate external power supply connected to these pins and will then distribute the power internally to all 16 connectors on the logger. A microphone power adapter is available from Digital Loggers, Inc, with the RJ-12 jack pre-wired for your convenience.

Recording Phone Lines

You can easily record from phone lines in three different ways: from the handset, from an outside analog phone line, or from an analog port on your PBX. If you are using a digital PBX, you may connect either to the handsets, to outside analog lines, or to an analog port, but not to the digital station set extensions.

To connect to an outside analog line:

1. Use an RJ-11 to RJ-11 patch cord to connect each outside line the left side of the logger.

2. Use another cord to connect the PBX , CPE, or telephone to the corresponding jack on the right side of the logger.

-or-

Use an RJ-11 "Y" connector and a single cable.

To connect to an analog port on your PBX, attach a single RJ-11 to RJ-11 cord between the logger and the phone switch port.

To connect to a handset:

1) Disconnect the handset cord from the base of your phone – you can also disconnect the cord connecting directly from the handset if you cannot access the base.
2) Attach the handset cord to a "Y" adapter from the bag marked "Handset Ys".
3) Attach a cable from the bag marked "Handset to RJ-11 Cords" between the Y connector and the jack on the right side of the logger.

Software Installation

We highly recommend running a Microsoft Windows update before starting installation. Visit windowsupdate.microsoft.com for more information. Microsoft has made several improvements in Windows USB drivers recently. Updating you PC will improve operation with all USB devices. This update is particularly important for Windows 2000 users.

After updating, insert the logger installation CD into your CD-ROM drive. Installation starts automatically. Select the installation directory and shortcut name. To starting recording automatically, check 'Run the application when a user logs in'.
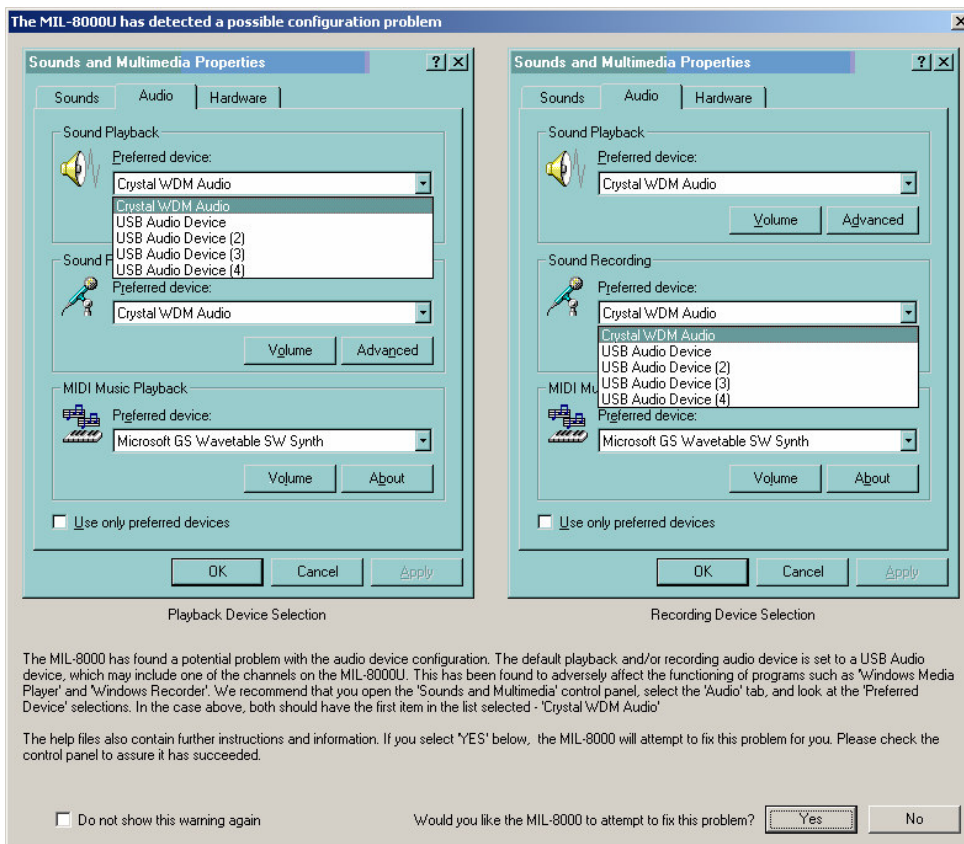
Windows USB Audio Devices

When the logger runs, it scans the current USB and audio configurations. An issue you may encounter involves the functioning of other applications such as Windows Media Player. When installing new audio devices that can record and/or play, Windows may assume that the newly installed audio device should be the default one used. Programs such as Windows Media Player and Winamp will use this 'default' device. Installation of the logger may cause Windows to set the default playback devices to the USB logger. If this occurs, no sound will come from your speakers and this warning appears:

To automatically change the default audio device, click 'Yes'. To ignore configuration warnings, check 'Do not show this warning again'.

To confirm the changes to the audio device configuration, open the 'Sounds and Multimedia' control panel by selecting 'Start Menu|Settings|Control Panel|Sounds and Multimedia'. Click the 'Audio' tab.   Make sure that the newly installed USB Audio Devices are not the preferred devices selected. In the example above, the first items in the list for 'Sound Playback' and 'Sound Recording' should be selected ('Crystal WDM Audio'). If your computer contains a built-in USB microphone, select that device (usually the first in the list) as your preferred recording device.

Using the Logger
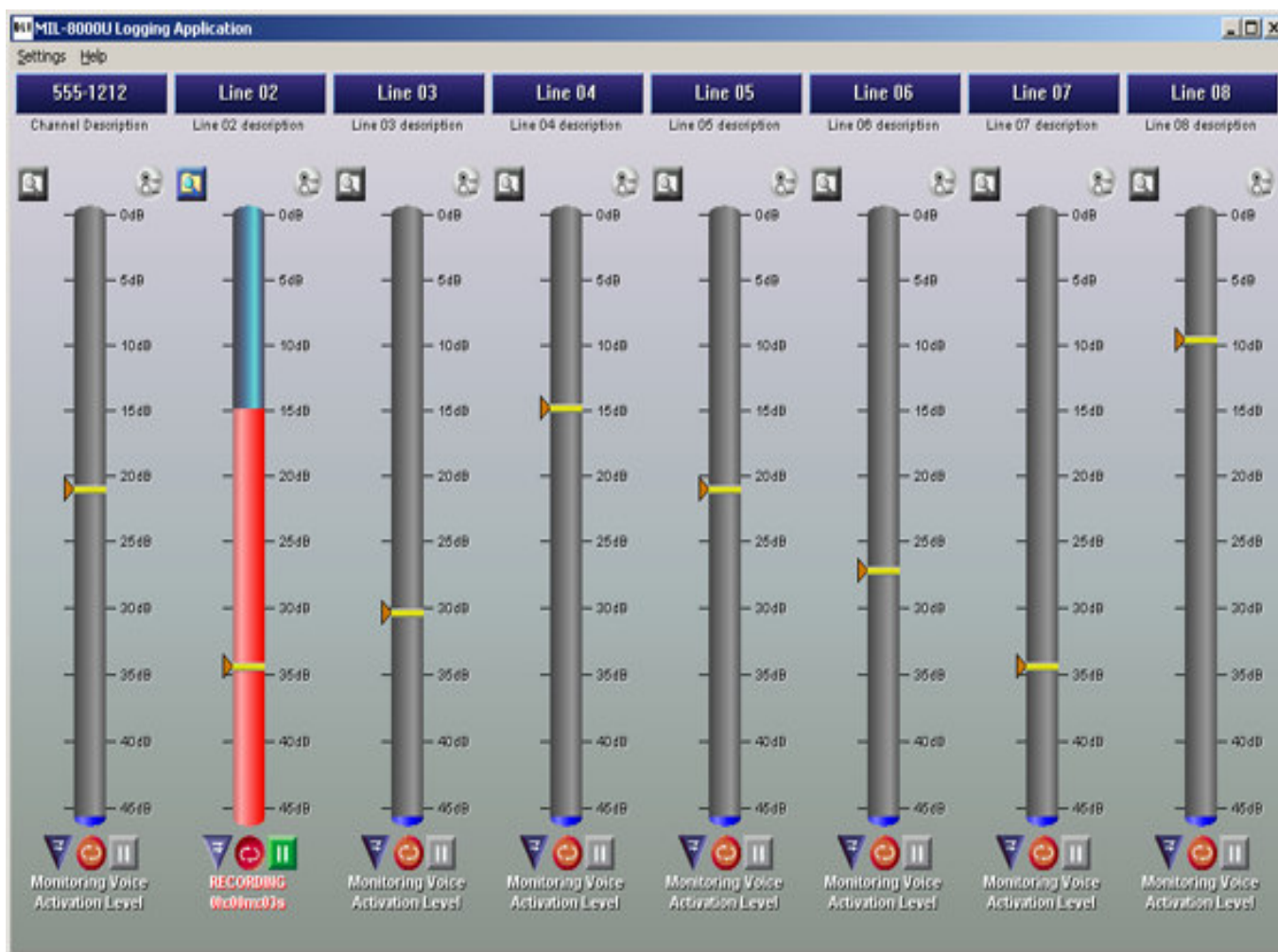
Each channel opens in the default Voice Activated (VOX) mode shown above. Pressing the triangular button places the associated channel in VOX mode. Pressing the red circular button places the channel in Continuous (Manual) mode and immediately starts recording. Sliding the mouse cursor over any button displays a small help menu.

To stop recording or monitoring, press the red circle a second time. Recording continues forever when the application is set to Continuous mode. In VOX mode, recording starts automatically when a sound level is detected above the trigger level.

When recording, the screen display changes, as shown in 'Line 02' above. A recording time indicator appears below the VU meter. The background of the meter turns yellow when recording.   The pause button turns green when the channel is recording. While recording, you can interrupt recording by pressing this button.

Before using the logger, two adjustments must be made: recording volume and trigger level. To adjust the recording volume:

- Pick up a phone attached to line 1 and press and hold down a dialing key.
- While the key is held down, adjust the knob until the level in red indicates just below the top (0 dB) mark.
- Next, release the key and hang up the phone. Be sure that the yellow recording trigger line is above the meter level while the phone is on-hook.
- Repeat this procedure for each remaining line.

After adjusting the recording volume, the trigger level should be set.   The trigger level can be changed at any time – even while recording. To adjust it:

1. Place your mouse cursor over the yellow bar. The cursor becomes an up-down arrow.
2. Press and hold the left mouse button.
3. Move the mouse up or down to adjust the trigger.
4. After releasing the mouse button, the trigger is set. Moving the bar down makes the trigger more sensitive. Moving it up reduces sensitivity. Check the trigger when the attached phone is "on-hook" and the line is not in use. The trigger must be adjusted above the background noise level when the phone is on-hook.

The 'Explore Calls' button

The small blue folder button on the left side of each channel appears when recordings are present. Press it to explore the current day's recordings. From here, you can edit, copy, delete or play.

Channel Configuration

Recording must be stopped to access the channel configuration.   When 'Stopped' appears, you may change these settings:

Channel Name – The name of the channel shown in the blue box at the top of the channel window. Examples are 'Front Desk' or 'Bob's Phone'

Channel Description – A verbose description of the channel. Such as "Bobs help desk open 9-5 ".

Channel Storage Location – This list box indicates where recordings for this channel will be saved. Previous storage paths are shown when you hold down the button. To change the location, press "Browse" and select a new folder.

Startup Mode – This controls recording at start up. Select 'vox' to start in automatic trigger mode, 'continuous' to record immediately on startup, or "disable" to turn off recording.
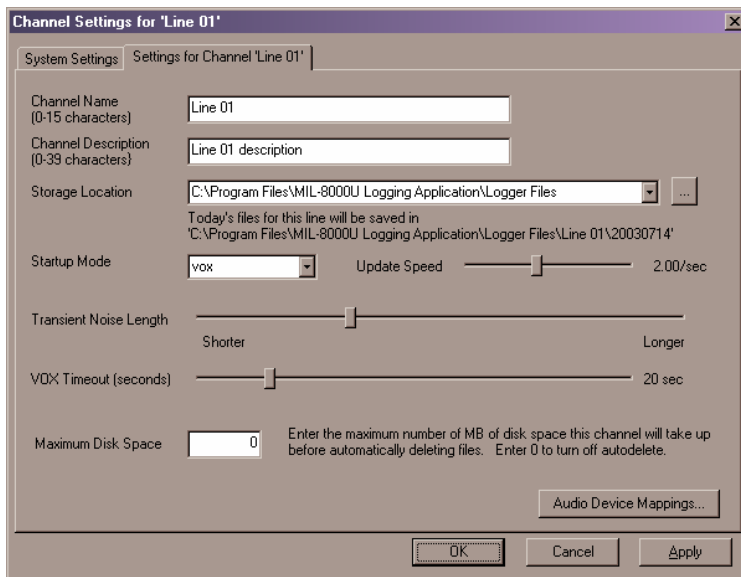
Update Speed – This slider bar indicates how quickly the screen is updated. On slower computers, choose a low setting to conserve CPU resources.

Transient Noise Length – This setting is valid only in VOX mode. Phone lines and other recording sources will occasionally have noise on them. Set transient noise length higher to ignore short clicks and pops when recordings.

VOX Timeout – In VOX mode, this adjusts the amount of silence detected before recording terminates. Typical conversations contain brief pauses and silence. Setting this value too low may cause conversations to

be broken up into several smaller recordings. Setting this value too high can waste disk space by adding excess silence to recordings..   A VOX timeout of 30 seconds typically works well for phone connections, and a setting or 10 seconds is good for most radio recordings. Microphones may require longer timeouts.

Maximum Disk Space – The logger can automatically delete old calls to conserve the amount of disk space used on each channel. This setting controls the maximum amount of disk space used by each channel. Oldest calls are automatically deleted to free disk space. To turn this feature off, set this field to "0".   If you specify a maximum, the logger will check disk space periodically. If recording size exceeds your setting, the logger will automatically delete files starting with the oldest day. The logger will continue deleting calls until disk usage reaches the setting. The logger will never delete the current day's calls.

System Settings

Max Call Duration – This setting controls the maximum length of a recording. A setting of 63-80 minutes is useful when transferring to audio CDs. When the maximum duration is exceeded, a new recording begins. No audio is lost.

Error Messages
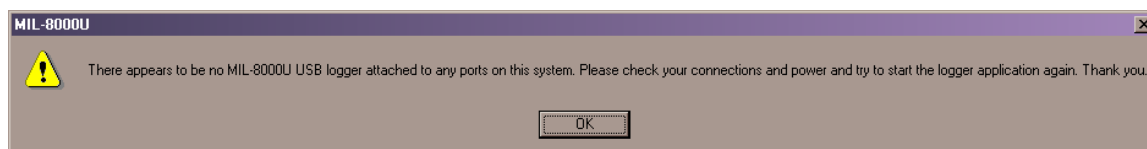
This message appears if the logger is disconnected or powered down. Check the USB connection, and look for a red light on the logger. The light appears only when power is flowing to the logger, the USB cable is correctly wired, and the system has enabled USB power.
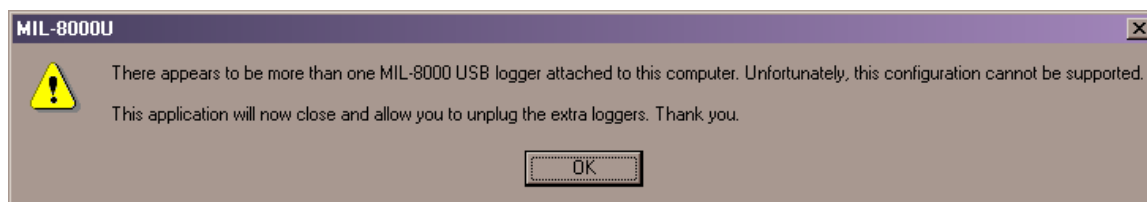
Only one logger can be used at a time. If multiple loggers are detected, this warning appears.

Frequently Asked Questions

How do I connect a radio?

Manufacturers use different radio connectors, so you'll first need to locate a mating connector. After that, it's a simple two-wire connection to the logger. You can directly bridge across the speaker, headset, or ear bud. Connect to the center two pins of the logger connector (red and green phone wires).

How do I connect the logger to a PBX?

There are three easy ways to link your logger to the outside world:

1. ***Record from incoming lines***. This lets you hear the recording from the outside party's perspective. It is commonly used for quality assurance recording. This type of connection is not commonly used in agent analysis or 911 call center recording. Most of these applications use the handset tap (below).

When recording from incoming lines, the level of the calling and answering voices may differ. For a more balanced recording level, use a handset connection.

2. ***Tap the handsets or analog station sets directly***. This method allows you to hear the recording from the agent's perspective. If you are recording in an E-911 dispatch environment, this connection will record things from the dispatcher's perspective, and the recording will typically include the phone conversation, radio dispatch, etc. Essentially, you will hear everything the dispatcher hears in the recording. Handset taps may be connected to the analog output of the phone, or run through a Digital to Analog (D/A) converter. They may also be connected by a digital tap card, such as those sold by Intel. When recording from a handset, Caller-ID will not be stored in the recording files.

3. ***Connect to a PBX port.*** This is the most common method of connecting a logger in large installations (100+ channels). One advantage of this connection scheme is that the PBX can be used to switch the recorder to a large number of lines. Another is that the logger can be switched to any recorder outside trunk or inside extension. Think of this method as "conferencing in" the logger with either an outside caller or an inside extension. This method requires an installer familiar with your PBX.

What's a handset jack? How do I connect a logger to it?

A handset jack is a small 4 pin connector which carries the speaker and microphone signals from your telephone to your handset. This is a good place to connect an audio logger, since all your incoming conversations may be recorded at this point. A typical signal level to the handset earpiece is -20dBm, and this is adequate for most logging applications.

To connect to a handset, use the handset splitter supplied with your logger and the small handset jacks. Pay careful attention as these jacks look very similar to the RJ-11 and RJ-12 jacks described below. Putting a handset plug into a larger RJ-11 or RJ-12 jack will result in an unreliable connection.

What's an RJ-11 jack? How do I connect a logger to it?

Most analog phone lines use an RJ-11 jack and plug in a single line configuration. An RJ-11 jack has four wires and is called a 4P4C connector, since it has 4 conductors in 4 places. Wires on an RJ-11 jack are colored black, red, green, and yellow. The center pair (red and green wires) is used to connect the ring and tip side of a single phone line. The yellow and black wires are reserved for other purposes.

If you are connecting an RJ-21X to an RJ-11 jack, you can use either a rack mount patch panel with 24 RJ-11 jacks, or a "harmonica" or "octopus" cord pictured on the right. An Octopus cord has a single 50 pin AMP connector (RJ-21X type) on one end, and 24 RJ-11 type plugs on the other end. These optional cords are available directly from DLI.

Be careful not to confuse the RJ-11 plug with a handset plug. They look almost identical, but inserting a handset plug into an RJ-11 or RJ-12 jack will give you an unreliable connection.

You'll find that a 6P6C crimp tool will work fine for both RJ-11 and RJ-12 connectors. You'll need a different tool for handset connectors and RJ-45s.

What's an RJ-12 jack? What's an RJ-14 jack? How do I connect a logger to it?

Most analog phone lines use an RJ-11 jack and plug in a single line configuration, but there's a similar connector called an RJ-12 which expands the capacity of this jack to 6 pins. The 6P6C RJ-12 jack has the same physical outline as an RJ-11 jack, but can contains 3 pairs of wires. An RJ-12 plug will fit into an RJ-11 jack and vice versa. If you

insert a 4 pin RJ-11 plug into a 6 pin RJ-12 jack, you will be connected to pins 2,3,4 and 5 of the RJ-12 jack. The "translation" of pin numbers when mismatching jacks and connectors can lead to confusion.

Jack Positions	USOC RJ11	USOC RJ12/14
2		wht/org
3	blue/wht	blue/wht
4	wht/blue	wht/blue
5		org/wht

DLI loggers use pins 1 and 6 of the RJ-12 to send power to remote microphones. To wire an RJ-12 jack in a single line configuration, just make sure the red and green pair is connected to pins 3 and 4 of the jack. The MIL-8000U will require a separate external power supply connected to these pins and will then distribute the power internally to all 16 connectors on the logger.

**What's an RJ-25 jack? How do I connect a logger to it?**

An RJ-25 jack is a standard 6 pin, 3 pair telephone jack. It's wired as shown:

Jack Positions	USOC RJ25
1	wht/grn
2	wht/org
3	blue/wht
4	wht/blue
5	org/wht
6	grn/wht

What's an RJ-31x? How do I connect to it? How do I test it?

Most security lines use a special type of jack, called an RJ-31x. It is an "exclusion type" dialer jack. It is typically a Leviton style 8 pin jack, but similar wiring may be done on KT-66 or W110 punch down blocks. Each 66 block handles 3 lines in the RJ-31x wiring configuration, and all the pin order matches the order of the RJ-31x jack pins. The first jack connects to pins 1-8, the second to pins 9-16, and the third to pins 17-24. This type of wiring is commonly encountered in 911 call centers and in most commercial alarm installations. RJ-31X jacks are required for many security and fire alarm systems that provide exchange to alarm reporting devices. In an RJ-31x installation, the phone line is wired in series through the RJ-31X; from there, tip and ring pass through the dialer. A normally closed relay opens if the alarm is activated, seizing the circuit for alarm use, while temporarily disconnecting lower priority equipment (such as a house phone) to prevent disruption of the dialing sequence.
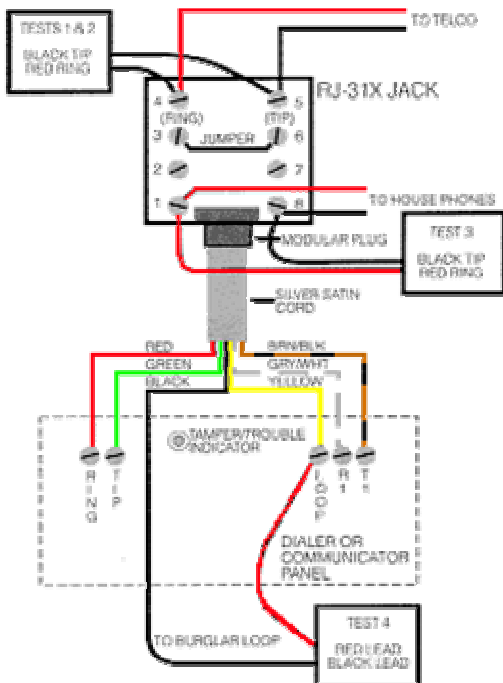
The most common RJ-31x installation is an 8-position, non-keyed miniature jack with shorting bars across terminals 1-4 and 5-8. Inserting the modular plug lifts the contact wires away from the shorting bars, extending the tip and ring circuit to the series leads going into the alarm device. The audio logger connects to pins 4 and 5 of the jack in a "bridging" configuration. When the plug is removed from the jack, metal tabs inside the RJ-31X provide direct connection of tip and ring back to the other locations, bypassing the alarm device. This design lets the dialer control the line for exclusive use when in alarm mode. It also helps isolate defective or improperly wired equipment by disconnecting the RJ-31x plug to route tip and ring directly to lower priority equipment.   In some installations, a 911 dispatch console will be rerouted to a backup console by

connecting the backup console to the "house phone" connections on pins 1 and 8.

Some technicians may install a "shortcut" or de-populated four-terminal version of the dialer jack. In the shortcut dialer jack, the jumpered terminals which supervise the presence of the plug are missing. This "shortcut" jack can't detect the presence of the modular plug. It is best to install a fully populated RJ-31X jack, and properly connect all terminals. All RJ-31 X jacks should be installed in front of any other jacks in the system so that when an alarm occurs, automatic dialing will take priority and seize the line, leaving all other phones disconnected.

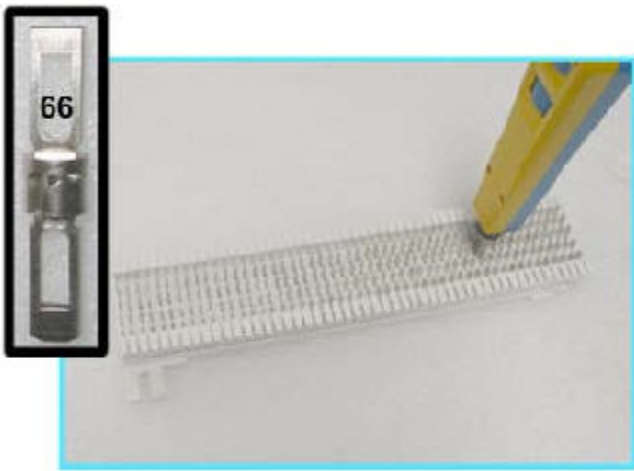**What is an RJ-21X, how do I connect to it?**

An RJ-21X is a standard telephone interface which uses 50 wires to transmit up to 25 channels of digital or analog data. It is called an RJ-21x when it is used as a "demark" or attachment point for telcom equipment. The "demark" attachment point is commonly referred to as a "Network Interface Device". An RJ-21X can be attached to a standard KT-66 or 110 type punchdown block, and is typically installed by the phone company. In many installations, the customer is responsible for all wiring **after** the RJ-21X, and the phone company is responsible for all wiring **before** the RJ-21x. The circuits on an RJ-21x are provided on numbered tip and ring positions on a miniature 50 pin connector of the "Amphenol" or "telco" type. These are very common connectors on PBX, KSU, PBC, and distribution mainframes. The connector itself is sometimes called a "blue ribbon", or "grey L" connector, depending on the type of cable it's connected two. The connectors are polarized (male and female) to prevent an installer from accidentally connecting an internal extension to outside lines (or vice versa). Here's the pinout:

RJ21X Standard Telco Cable Pinout
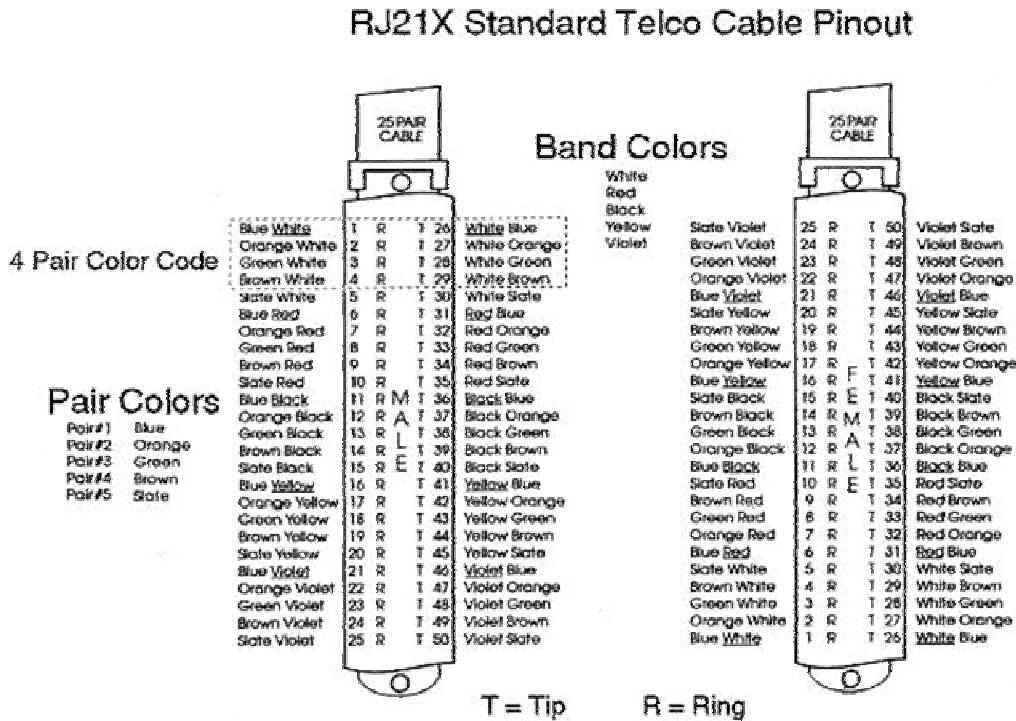
Pins 1 (ring) and 26 (tip) are considered position 1. Pins 2 (ring) and 27 (tip) are position 2 on thru twenty five pairs. Typically, only 24 pairs are used (48 wires). The last pair on pins 25 and 50 (slate-violet and violet-slate color) should be left as a spare pair. The spare pair keeps you from having to run a whole new cable if a single pair fails elsewhere. DLI Loggers use this pair as an earth ground connection. *Watch your polarity when wiring these cables.* Most modern phone equipment is polarity insensitive, but you can ruin a whole installation by reversing one pair of wires. There's also a single line version of the RJ-21X described above. It's called an RJ-31x.
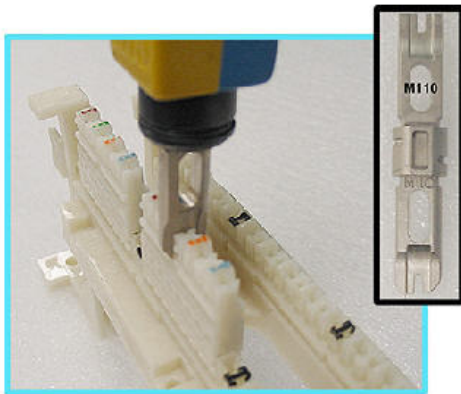
What's a KT-66 Block? How do I connect to it?

 The KT-66 block has been a standard "punch down" connector for telephone interconnects since 1958. It uses 200 bladed split contacts to make reliable connections on 28 gauge solid copper wire. It's one of the most common interconnects used in the telcom industry, and is often used to terminate an RJ-21x.   KT-66 blocks, AKA "66 Blocks" use a plastic snap-on frame to mount on backboards or racks. They are "indoor only" interconnects which will fail if exposed to moisture.

KT-66 blocks come in several styles. Some are "split blocks" in which the two spade terminals on each end of the block are connected together, but the connection is "split" down the center of the block. Other KT-66 blocks may have 50 pin AMP connectors on either side of the block.

To make a reliable connection to a punch down block, you'll need a "punch down tool" as pictured below. Be sure to use the correct "66" style blade to make the connection. One side of the blade will cut the wire, and the other is for "loop through" wiring.

What's a 110 Block? How do I connect to it?

The 110 block has been a standard "punch down" connector for telephone interconnects since 1971. It was intended to be a high density replacement for the KT-66. It uses a plastic frame to which a series of 4 pin connectors may be attached. Up to 50 of these connectors may be attached to the block.   With 110 blocks, connection density is 50% higher than connections made on a 66 frame. KT-66 blocks, AKA "66 Blocks" use a plastic snap-on frame to mount on backboards or racks. Like the "66 Block", a 110 block is "indoor only" and should not be exposed to moisture. You must use the right tool with the right blade to make a reliable connection on a 110 block.

What is an RJ-45 jack? Which wire connects to each pin?

 Although it's not technically correct, the term "RJ-45" is now used to refer to any standard 8 pin jack in telephony or networking applications. RJ-45 jacks are most commonly used in Ethernet applications. Eight pin jacks are often used to carry four analog circuits.

Jack Positions	USOC RJ61	T568A	T568B (AT&T)	100BT (LAN)
1	wht/brn	wht/grn	wht/org	wht/blue
2	wht/grn	grn/wht	org/wht	blue/wht
3	wht/org	wht/org	wht/grn	wht/org
4	blue/wht	blue/wht	blue/wht	
5	wht/blue	wht/blue	wht/blue	
6	Org/wht	org/wht	grn/wht	org/wht
7	Grn/wht	wht/brn	wht/brn	
8	Brn/wht	brn/wht	brn/wht	

How do I connect a microphone?

Your microphone should have an acceptable output level (-20 to 0dBm peak). DLI Microphones are cable-powered and include an internal preamplifier. They are connected using a 6 pin RJ-12 cable. Power to the microphone is provided on pins 1 and 6 of the connector. The MIL-8000U requires an external microphone power supply.

What is a "Balanced Line"? What is an "Unbalanced Line"? How can I connect to them?

Balanced lines are lines use to cancel noise. In balanced phone lines, two wires are twisted together so that each wire picks up the same amount of noise. At the receiving end, the noise is subtracted, and the resulting output is the sent audio, minus the noise. A balanced line becomes "unbalanced" when unintentional leakage to ground occurs. Unbalancing a phone line causes noise. This can be a result of poor insulation somewhere along the line, or a bad connection. The problem is often worse in the winter, when outside lines are wet and leakage to ground occurs along the line.

Audio is usually sent down shorter unbalanced lines using Coaxial shielding. This shielding prevents electromagnetic noise from affecting a single wire. The inputs to all DLI loggers are balanced lines. These inputs may be connected directly to unbalanced (ie. Coaxial) lines, and the ground may be connected to either side of the logger input.

What is a D/A Converter? How do I connect it?

D/A stands for Digital-to-Analog. A D/A converter is installed between digital lines (usually station sets) and an audio logger. D/A converters work by converting the signal stream from a digital station set into the standard analog format used in an audio logger. They are available in single and multi-channel versions.

Since there is no "standard" for digital station set interconnects and line formats, single channel D/A converters are usually best purchased from the manufacturer of the PBX and station sets to which you are connecting.

Multi-channel D/A converters are commonly available on PCI cards. These cards are sold by Dialogic (now Intel) and others. Another common type is built into the base of a KT-66 punchdown block. Again, every phone system has a different format, so there are hundreds of D/A converters available. Make sure you are purchasing the right one for your PBX and station sets.

Support

Please visit www.digital-loggers.com for more frequently asked questions, free driver updates, manuals and accessories. If we haven't answered your questions here, please call (408) 330-5599 or send an email to support@digital-loggers.com. We'll be glad to help.

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