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ALLIED ANALOGIC INC.

## Data Capture Using Audio Recordings

Version 1.1



# Application Note

MLT2400A – ADMPC – ADM2400

# **Application Note**

## **Data Capture Using Audio Recordings**

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## Overview

The MLT2400A, ADMpc, and ADM2400 are used to decode modem data between an origination point, usually a point of sale terminal, and destination, usually a transaction processing host. The connection of the equipment is normally attached directly to the phone line as illustrated in Figure 1.

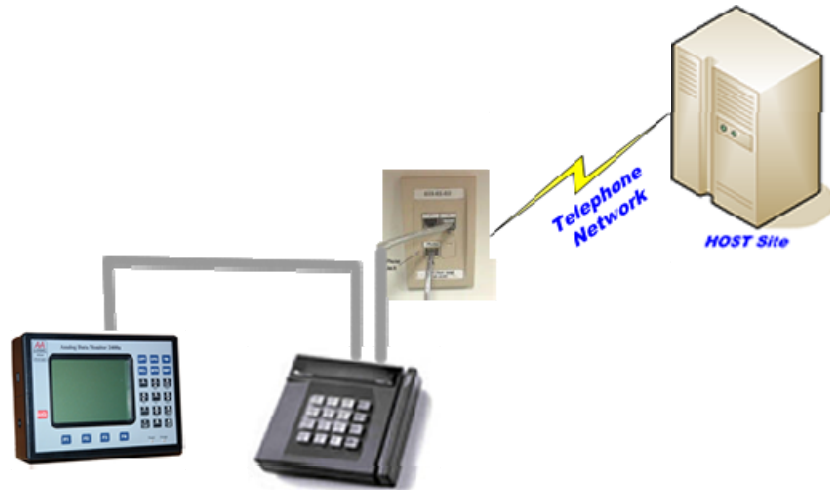


Figure 1 Normal Connection

Some test situations make it impractical to place the ADM or MLT at the test site. In these cases, it may be possible to record the modem communications at the test site and then play the audio back to the ADM or MLT for decoding.

This document describes this process.

## Disclaimer

Allied Analogic, Inc. does not warrant or guarantee success using this process. The equipment is intended for direct connection to the phone line at either the origination or destination location of the communications.

The MLT2400A, ADMpc, and ADM2400 are test devices are intended for testing and diagnostics of modem data communications equipment, protocols, and environments for legitimate and legal purposes only. Allied Analogic, Inc. assumes no responsibility and does not support any unauthorized use of these products.

## Audio Recording Process

The first step is to record the audio for the modem communications. Figure 2 shows a typical connection.

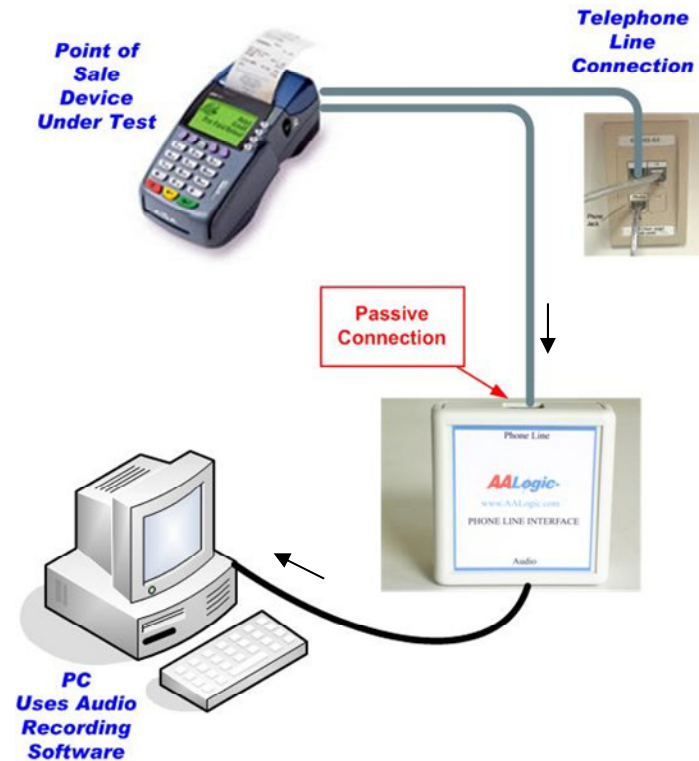


Figure 2 Recording Audio

A two-line adapter can also be used and connected to the wall plate if necessary. This allows the device under test to be connected and the recording device to be connected to the line at the same time.



Figure 3 Two-Line Adapter

Most recording devices, including PCs, cannot be connected directly to a phone line. An interface device, such as the Phone Line Interface (PLI) shown, must be used to

match the impedances of the line to the recording device. The phone line also has potentially harmful voltages that need to be isolated.

A PC and an audio recording software program can be used to record the modem signals. AALogic does not provide the recording software with the PLI, MLT or ADM products. Programs for the PC are available as commercial software or shareware.

Other recording devices may also be used. Criteria for the recording device are discussed in Audio Recording and Playback Devices below.

The output of the PLI is connected to the audio input of the PC or recording device. The recording should be made using the highest quality and sample rate settings available. Compression and other audio processing options should be disabled. Equalization should be flat for all frequencies.

The recording should include the initial carrier and all the audio until the connection is dropped. It is not necessary to record the dialing tones or pulses.

The recording device should create a file that can be directly played back to the MLT or ADM equipment. Re-recording from a device to another usually introduces distortions which introduces errors in the decoding process.

## **Audio Recording and Playback Devices**

The audio recording is critical to successful decoding of data. The modem signals must be recorded with good volume levels and with low distortion. The sample rate of the device is also very important.

### **PC Audio Cards**

Most PC audio cards should be able to adequately record the audio. You may need to try the MIC input or the Line input. This may vary depending on your equipment.

### **Recording Software**

The software selected must be able to record audio from the audio card and store it in an appropriate file format. Some file formats may lose some of the quality of the audio. MP3 and WAV files should be acceptable. You will also need to be able to play the audio for the MLT or ADM device.

Software that allows you to see the audio waveform is useful when troubleshooting recording problems.

The software should be configured so that:

1. No compression is done
2. Use the highest sample rate available
3. Select the highest available quality for the saved file type

4. No equalization or flat equalization is selected
5. Amplitude is as high as possible without distortion of the signal

#### **Playback Software**

The playback software may be the same as the recording software.

The playback software should not introduce any changes in the signal. This includes equalization. A volume control will allow adjustment of the audio levels for optimum decoding by the MLT or ADM equipment.

### **Audio Playback Process**

Decoding the data for an audio recording is the same as decoding for a direct connection. Refer to Figure 4 Audio Playback. You will need a device to connect from the playback device to the MLT or ADM. We recommend the Phone Line Interface (PLI) for this purpose. The impedance of the MLT and ADM equipment is matched for a phone line. Using the PLI will improve the audio levels received by the MLT and ADM.

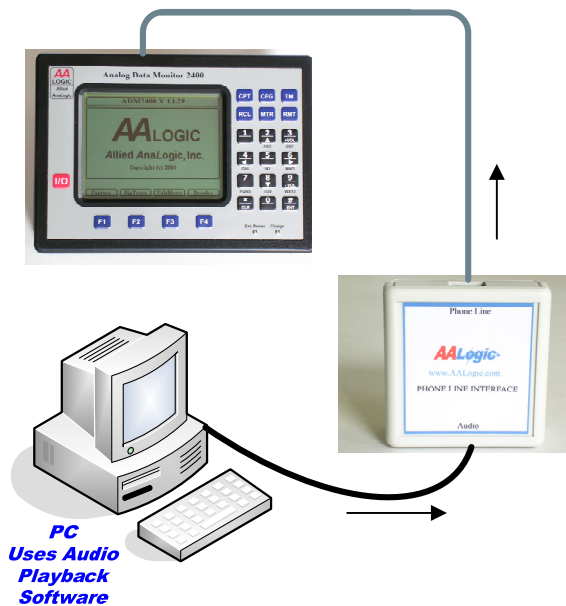


Figure 4 Audio Playback

Setup the MLT or ADM equipment as you would for a direct connection. Refer the user's guides for the equipment you are using. User Guides for AALogic equipment is on the CD provided with the equipment. It can also be downloaded from the web site at <http://www.aalogic.com/support.html>.

Now set the equipment for the appropriate capture parameters for the signal. You will need to set the Async/Sync, speed, and data word format depending on the equipment you are using.

Next, playback the modem recording. You should see the decoded data. You may need to adjust the audio level on the playback device or software if you are having trouble. Replay the recording at different audio levels until you have a good capture. You should be able to decode all the data in the recording after the audio level is properly adjusted.

The playback decoding may not decode 100% of the data. This happens even when directly connected to the line. Noise from a variety of sources can prevent proper decoding.



## Troubleshooting

The best first step in troubleshooting is to connect the MLT or ADM directly to the phone line and complete a test transaction to ensure the audio signals for the line and the modem settings are correct.

Most problems that involve seeing data that is not readable is a result of an incorrect modem setting. Ensure that the settings for Sync/Async, speed, and data word format are set correctly. The MLT2400A should also have the input set to MODEM and the Output set to COMB.

Locate the symptom in the table below and make any necessary changes to correct the indicated problem.

<i>Symptom</i>	<i>Problem</i>
Nothing is displayed	<ul style="list-style-type: none"><li>• Audio is not connected from the playback device output to the MLT or ADM equipment. line jack.</li><li>• Audio level is too high or too low</li><li>• Async/Sync setting is incorrect</li><li>• Recording does not include the initial carrier signals</li><li>• Recorded audio is not useable</li></ul>
Data is displayed but it is not readable	<ul style="list-style-type: none"><li>• Audio level is too high or too low</li><li>• Async/Sync setting is incorrect</li><li>• Data word format is incorrect</li><li>• Excessive noise</li><li>• Data is encrypted</li><li>• Recorded audio is not useable</li></ul>
There are random data at the end of the transaction data	<ul style="list-style-type: none"><li>• Random data is generated during the disconnection process. This is normal.</li></ul>