



Topic: TwoToneDetect from A-Z

Last Updated: March/2022

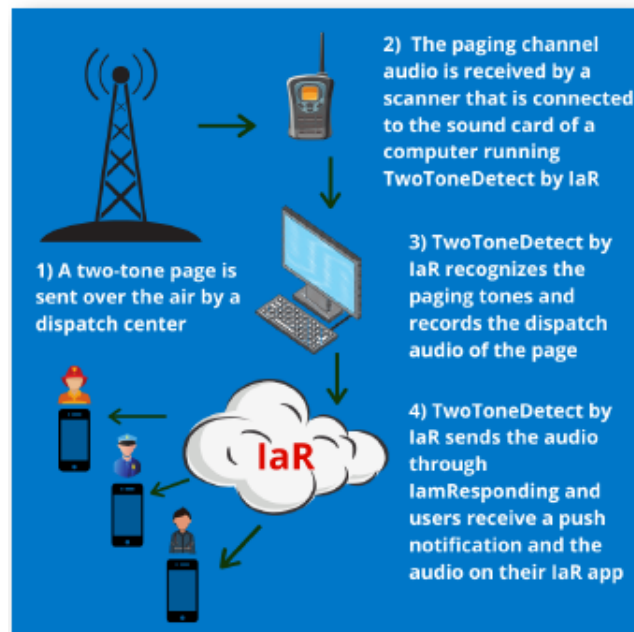
TwoToneDetect is a part of the laR system that interfaces with a radio receiver or scanner. It uses the computer's sound card to listen to the received audio and detect two-tone sequential paging sequences (Quick-Call 2 and similar formats). This type of paging is commonly used for fire, EMS and police department alerting. Upon detecting known two-tone pages, the system will record dispatch audio and send that audio to your members through your lamResponding system.

Check out the Step-by-Step training Videos:

[Windows TTD Video](#)






























[Raspberry Pi TTD Video](#)

Process Flow



As this is an early release there will be new features added in the future. The current release provides audio alerts in laR's iOS & Android apps for your members. Future updates will include text notifications, apparatus app-notifications, station alerting, do not disturb settings, a custom display tile, a file directory of your dispatches and more.

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TwoToneDetect on a Raspberry Pi

Raspberry Pi's are small Linux devices which can run TwoToneDetect. If your agency does not have a reliable PC or needs to purchase a new computer to run TwoToneDetect we strongly recommend checking out a Raspberry Pi due to their low cost and excellent reliability.

Before getting started we recommend checking out our Raspberry Pi Training video [HERE](#) which walks you through the equipment and setup.

Our Raspberry Pi Image download with TTD Version 73L can be found [HERE](#). The image file includes the full Raspberry Pi operating system with TwoToneDetect preinstalled and is configured to automatically start TwoToneDetect on boot.

We have tested the image successfully with both a Raspberry Pi 3 Model B and Raspberry Pi 4 Model B 2GB version. As the image is designed to work with a Raspberry Pi 3 & 4, older Raspberry Pi hardware such as the 1, 2, Zero & Zero W are much more likely to run slower or have issues due to the older specs. At this time, our recommendation will be only to use a Raspberry Pi 3 or 4 with the TwoToneDetect image.

Example Raspberry Pi Shopping List

Many departments have requested a shopping list to purchase the items shown in the training video [HERE](#). While IaR does not sell hardware, we have put together a list from several retailers with the items linked below.

*The radio listed below (Baofeng UV-5R) works for many agencies it may or may not work for you depending on your local radio system. If you have a spare radio/scanner with an audio output jack you can use that instead to connect to your Raspberry Pi.

Raspberry Pi 4
Micro HDMI to HDMI cable
Raspberry Pi enclosure
USB-C power supply
Micro SD card (16GB or larger)
USB to micro SD card adapter
Sabrent USB sound card
Baofeng UV-5R radio
Battery eliminator
AC/DC adaptor
Audio cable

Checklist to get started

- 1) Radio or scanner with an audio output capability. A reliable, clear signal is necessary for the system to be able to identify an A Tone & B Tone and is also important for playback of the audio.
- 2) Auxiliary audio cable, usually 3.5mm to 3.5mm or 3.5mm to 2.5mm. The connector size depends on your radio or scanner output size.
- 3) Windows PC or a Raspberry Pi Model 3 or 4 with a USB sound card.
- 4) Reliable internet connection. Your network will need to allow access to Port 443 for HTTPS traffic. Also, if you have a proxy server setup on your network that intercepts traffic, you will need to setup a bypass to allow access to ttd.iamresponding.com.
- 5) Your pager tone frequencies. You should be able to get that information from your dispatch center or Radio Vendor.
- 6) UPS "Uninterruptible Power Supply", this is an optional item but helpful in the event of power outages and during generator test cycles. Keep in mind, if your internet connection goes down you will not be able to send audio notifications to IAR.

Programming – Set Up, Part 1 (Windows PC)

Step 1: Enable "Permitted to manage TTD settings" on your IAR Web Profile under Manage Members → Edit Member.

Step 2: Generate a TwoToneDetect API key by going to Administrative Functions → TwoToneDetect Settings → Generate TwoToneDetect API Key, and select the button that says, "Generate".

Support Tip → Copy the computer-generated API Key and keep available for a later step in these instructions.

Step 3: Create your first pager group by going to the Administrative Functions → TwoToneDetect Settings → Manage Pager Groups.

- NAME the Group. Many agencies will simply input "FIRE", "EMS", "Officer". Whatever suits your situation.
- The A Tone and B Tone frequencies will need to be provided to you by your dispatch center. Most users can get started with A Tone and B Tone frequencies and leave all other settings at the default values.
- Click SAVE at the bottom.

Go to:

Administrative Functions → TwoToneDetect Settings → Generate TwoToneDetect API Key

See the link at the bottom of the page to download the latest version of TwoToneDetect.

The download will be TwoToneDetect version 73g (or later).

TwoToneDetect will be downloaded as a ZIP file. The ZIP file should be extracted to a location where the user has full read/write privileges on the computer such as C:\Users\Public or C:\Users\username\Desktop*

- This is easily done by opening the ZIP File, highlight all the contents (about 12-13 items), and COPY them.
- On your Desktop, ADD a new Folder, label/title it something that you can easily find/reference.
- PASTE the 12-13 items into the folder you just created. This is where you will now access the TTD files.

*Keep in mind that some user accounts block write access to the root C:\ drive.

*If your PC is on a managed network, you will likely need to contact your IT personnel for assistance.

Hardware – Set Up (Windows PC)

Connect speakers to your computer (sound card) and configure your radio or scanner to monitor your dispatch channel and connect your radio or scanner to your PC's sound card as well. A reliable computer with a stable internet connection is vital to make sure the software is up and running 24/7.

This step is required before launching TTD.

Support Tip → *If the TTD Debug program launches and then closes after a few seconds, it is not "hearing" anything from your hardware connection. Your computer may not be allowing access to sound card.*

Support Tip → *On your Radio/Scanner, if you have a mechanical Squelch Control, turn it up (Open) 90-95%.*

Support Tip → *On your Radio/Scanner, turn your mechanical volume up 20-30%.*

Support Tip → *On your PC, you may likely have a computer-controlled INPUT VOLUME for your Audio Input. Set this volume to 80% to start with. You may want to finesse it in the future for more/less volume in your recorded audio.*

Support Tip → *With a Sabrent USB Sound Card, both the speaker/line output and the microphone/line input cables must be connected to your sound card.*

Programming – Set Up, Part 2 (Windows PC)

In the folder that you created with the 12-13 items, open the item called, "TwoToneDetect73g_debug".

Support Tip → *Give it about 10-20 seconds to launch.*

When "TwoToneDetect73g_debug" fully launches you will see a small TTD icon in your system tray*. Right click on the TTD icon and select "Open TwoToneDetect GUI", the TTD GUI will then launch in your computer's Default Browser.

*The system tray on your computer is down near your clock in the lower Right of your screen.

-You may see the TTD icon (circled in Red)

-If you don't readily see the TTD icon, click the Up Arrow (circled in Green)



Support Tip → *If the TTD GUI does not open correctly, you may have an incompatible Web browser. Please use the most current version of Google Chrome.*

- *Close the TTD Debug program.*
- *Go into your Computer's Settings and make Google Chrome your DEFAULT WEB BROWSER.*
- *Re-open the TTD Debug program from your newly created folder. Give it about 10-20 seconds to launch.*
- *Go back to the TTD GUI in the System Tray. When you open it, it should open in Google Chrome.*

Support Tip → *If you accidentally open more than 1 instance of TTD you will see multiple TTD icons in the system tray. It is important that you make sure only a single instance of TTD is running otherwise you will run into issues such as duplicate notifications. Close any additional instances of TTD by opening the GUI (click the icon) and select shut down for each additional instance. A quick and easy way to solve this, is to Power your computer Off and On.*

Programming – Set Up, Part 1 (Raspberry Pi)

Step 1: Enable “Permitted to manage TTD settings” on your IaR Web Profile under Manage Members → Edit Member.

Step 2: Generate a TwoToneDetect API key by going to Administrative Functions → TwoToneDetect Settings → Generate TwoToneDetect API Key, and select the button that says, “Generate”.

Support Tip → Copy the computer-generated API Key and keep available for a later Step in these instructions.

Step 3: Create your first pager group by going to the Administrative Functions → TwoToneDetect Settings → Manage Pager Groups.

- NAME the Group. Many agencies will simply input “FIRE”, “EMS”, “Officer”. Whatever suits your situation.
- The A Tone and B Tone frequencies will need to be provided to you by your dispatch center. Most users can get started with A Tone and B Tone frequencies and leave all other settings at the default values.
- Click SAVE at the bottom.

Hardware Set Up (Raspberry Pi)

*Before you get started:

You must download the TwoToneDetect Raspberry Pi Image [HERE](#)*

The below tutorial follows the Raspberry Pi Imager steps at the following link on the RaspberryPi.org website: [HERE](#)

- 1) Insert the SD card into your SD card reader. You can use the SD card slot if you have one, or an SD adapter in a USB port. Note the drive letter assigned to the SD card. You can see the drive letter in the left-hand column of Windows Explorer, for example “G:”.
- 2) Download the [Raspberry Pi Imager](#) from the Raspberry Pi website.
- 3) Run the Raspberry Pi Imager from your desktop or menu.
- 4) Under "Operating System" select "Choose OS", scroll to the bottom of the list and select "Use Custom". Then select the .img file that you downloaded from IAR
- 5) Under "Storage" select "Choose Storage", then select the SD card that you will be installing the Raspberry Pi image on.
- 6) Click “Write” and wait for the write to complete.
- 7) Exit the imager and Eject the SD card.
- 8) Put SD card into Pi.
- 9) Plug in USB sound card prior to powering up Pi.
- 10) Power up Pi with keyboard, mouse, and monitor attached (optionally, SSH and VNC access are also enabled for advanced users who know how to use those tools and know how to find the IP address of the Pi on their network - default password is: **iamresponding**)
- 11) Change time zone to local (raspi-config via GUI)
- 12) Change password (optional - default is: **iamresponding**)
- 13) Setup WiFi if necessary. Hardwired ethernet preferred for reliability reasons.

Programming Set Up, Part 2 (Raspberry Pi)

- TTD will automatically start on bootup (may take a minute or two).

An icon should be visible in the system tray once it is running:



- Click on the taskbar icon to open the TwoToneDetect GUI in a web browser. Alternatively, you can browse to this location to access the GUI: <http://localhost:8080/index.html>

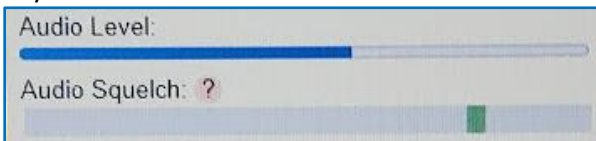
On the TTD GUI
(Windows PC & Raspberry Pi)

Set the “Audio Input Device” as the input that your radio is plugged into. If you are using laptop (and some PCs) you likely have 2 sound card options. One will be the built-in microphone of the laptop, and the other will be the Microphone (Audio Input plug).

Support Tip → (On a Raspberry Pi), your Audio Input Device will be, “PULSE”

Support Tip → (On a Windows Laptop/PC), if the TTD GUI “Tone Frequency” is populating with tone frequencies while you say the ABC’s, you are having TTD listen to your Laptop’s built in Microphone. You will need to select the “other” Audio Input Device from your list.

Set the GUI’s Green “Audio Squelch” indicator slightly to the Right of the Blue “Audio Level” indicator when there is not any radio traffic.



If the squelch is set correctly “No Audio” should display next to TONE FREQUENCY when there is not any radio traffic.

Tone Frequency: No Audio

Support Tip → If the “Tone Frequency” is populating with tone frequencies when the Green “Audio Squelch” is towards the Left, then we know that the TTD program is properly listening to and “hearing” your hardware.

Go to the TTD GUI button labeled “Edit Config Info” to enable the IAR Integration and add your API key.

- Check the box labeled, “Use IamResponding for alerting: ?” This what we want to do.
- In the field labeled, “IamResponding.com API Key: ?”, paste the API Key that you copied in Step #2 of these instructions. If needed, you can go back to the Administrative Functions → TwoToneDetect Settings → Generate TwoToneDetect API Key, and copy the API Key, to Paste into this field.
- Leave all other fields BLANK, unchanged.
- Click SAVE at the bottom of the screen. Close this Tab of your TTD GUI Browser but keeping open the main GUI Browser Tab.

If you have made it this far, you are 99% of the way done.

Running TTD Tests (Windows PC & Raspberry Pi)



On a Windows Laptop/PC:

I like to suggest that you have the TTD Debug Program minimized and on one side of your screen, while simultaneously having the TTD GUI minimized on the other side of your screen. This allows you to easily monitor both programs at once.

You will want to ask your dispatcher, (unless you can do it yourself) to have your tones tested/paged over your Radio/Scanner.

When this happens, you will want to watch two things.

- 1) On the TTD GUI, does the Blue “Audio Level” indicator jump to the Right when the tones are played, and above (to the Right of) the Green “Audio Squelch” indicator?
 - If Yes, Good.
 - If the Blue “Audio Level” moves, but not to the Right of the Green “Audio Squelch”, move the Green Audio Squelch” lower (to the Left).

- 2) On the TTD Debug Program, you want to see rows of data populate on the screen as your tones are played and as there is information spoken over the channel. This is a direct relation to the Green “Audio Squelch” control.



On a Raspberry Pi:

The TTD GUI is your TTD screen/interface.

On the TTD GUI, does the Blue “Audio Level” indicator jump to the Right when the tones are played, and above (to the Right of) the Green “Audio Squelch” indicator?

- If Yes, Good.
- If the Blue “Audio Level” moves, but not to the Right of the Green “Audio Squelch”, move the Green Audio Squelch” lower (to the Left).

Support Tip →

- ***If the Green “Audio Squelch” control is too far Right, you will not see the “Tone Frequency” populate.***
- ***If the Green “Audio Squelch” control is too far Left, you will see the “Tone Frequency” populate constantly as it hears static and white noise.***
- ***Ideally you want the Green “Audio Squelch” control set so that static and white noise don’t cause it to populate, but when tones are played and the dispatcher speaks ,the “Tone Frequency” does populate.***
- ***The “Tone Frequency” will populate when ANY tones are played, not just yours. This is OK. TTD will not record and send you anything until it hears YOUR programmed tones.***

On the GUI use the button for View Debug Info:

If your programmed Tones are properly heard by TTD, you will see a Rows in the TTD GUI’s View Debug Info, that look like this:

```
- Page Tone Set Found
```

&

```
successfully sent IaR prealert
starting new alert
```

If you do not see any mention of a “success”, you will want to look at your Debug Info Log File to see if you can recognize if ANY tones were heard.

Log Files
(Windows PC & Raspberry Pi)

- On TTD GUI, go the button that says, VIEW DEBUG INFO.
- Go to the Very Bottom of the Log after it is opened. *(the bottom is the most RECENT data recorded).*

What to look for as your scroll upwards through the data:

- 1) Visually search for what you believe is your A Tone and B Tone.

Support Tip → ***On the log, click Control-F (Ctrl key and F key) on your keyboard. This will open the SEARCH tool, typically along the Top/Bottom of your screen.***

- 2) If you don't locate your exact A Tone and B Tone (which is very common), look for "blocks" of the same data. (see image)

1145.5243902439024	227	15968142
365.7073170731707	15937	1596814
365.7073170731707	11794	1596814
365.7073170731707	11803	1596814
365.7073170731707	11731	1596814
365.7073170731707	11779	1596814
365.7073170731707	12379	1596814
989.560975609756	11961	15968142
989.560975609756	11995	15968142
989.560975609756	11968	15968142
989.560975609756	12026	15968142
989.560975609756	11979	15968142
989.560975609756	11972	15968142
989.560975609756	11988	15968142

This image shows an A Tone of 365.7 and then immediately a B Tone of 989.5.

Many dispatch centers will tell you that your tones are "X". Their margin for error may be greater than TTD. You may find that the tones found in the TTD "logfile" are slightly off, even a few "whole numbers" different from what you were told. This is OK. We will just program the TTD Pager Groups according to what TTD hears.

Support Tip → ***You may have been told that your A Tone is, 363.7. TTD may have heard 365.7 as seen in the image above. Look for the "blocks" of the same information, an A Tone adjacent to the B Tone.***

Support Tip → ***On the DeBug Info, Remember the OLDER information is at the TOP of the data.***

Support Tip → ***On the DeBug Info, each row of data represents a fraction of a second of time. When you see 5-10 Rows of data that are EXCATLY the same, you know that is an electronic sound being played (tones).***

Support Tip → ***On the DeBug Info, if you see a lot of the same frequency, appearing in large blocks or consistently appearing, but no blocks of identical tones, you likely have some "interference" between your Hardware and TTD.***

Support Tip → ***On the DeBug Info, the second column represents the VOLUME of what TTD is "hearing". 30,000+ is TOO LOUD. TTD will not recognize your tones because they are being "washed out". Please turn your device's volume knob down to about 5-20%.***

**Setting up your Members to get TTD Alerts
(Windows PC & Raspberry Pi)**

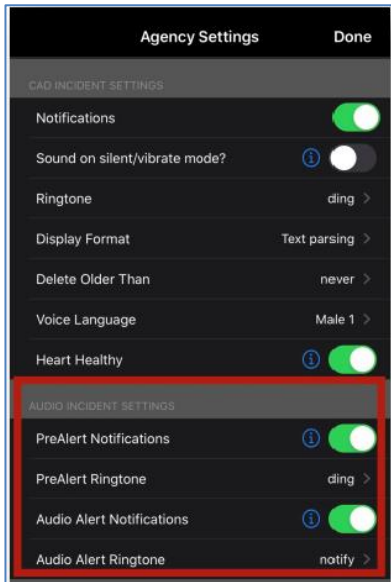
- Now that you have added pager groups and installed TTD, your members will have to subscribe to them to be able to receive alerts.
- Go to Administrative Functions → TwoToneDetect Settings → Edit a Member and select the member you would like to update. There will be a new section in the member profile called “Two Tone Detect – Pager Groups”.
- Each pager group you have created will be listed with two check boxes: “Pre-Alert” and “Alert”. Pre-alerts are notifications that arrive immediately when your pagers are activated, Alerts are notifications that arrive shortly thereafter with the recorded audio.

Two Tone Detect - Pager Groups		
Pager Group Name	Pre-Alert	Alert
AMBER F/R	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
APULIA F/R	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BREWERTON F/R	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bville sta 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bville sta2Lakeside St.2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bville Station 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

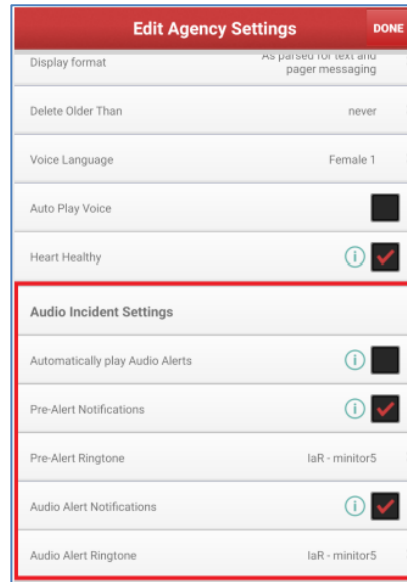
- As an Administrator, you can check both boxes for each Pager Group, and members within their App can control whether they would like to receive audible notifications of Pre-Alerts and/or Alerts.

Download the latest IAR app, go to My Settings → Audio Incident Settings, and enable Pre-Alert and/or Audio Alerts

iOS Devices



Android Devices



- The Android app has a unique feature labeled “Automatically play Audio Alerts” that will mimic your pager’s functionality.
 - Your Android phone will play the audio immediately even if you do not open the app or unlock your phone. However please make sure to read the information popup next to the checkbox in the app to fully understand how this works.

Mutual-Aid Management of Pager Groups

Many agencies are not able to setup their own PC to run TwoToneDetect due to budget constraints, lack of hardware or may not have a quality radio signal in their area. Linking IAR agencies using the Mutual Aid feature allows an agency to send audio dispatches to another agency using a single instance of TwoToneDetect. This can also be used for 911 centers to setup a single TTD system to send to numerous lamResponding systems (check with our sales team to setup an account for your 911 team).

To setup the Mutual Aid feature go to the Main Administrative Page → System Settings → Dept ID. / Mutual Aid ID's. The agency that would like you to manage their TwoToneDetect Pager Groups will need your "Subscriber ID" at the top of the page. Once they have your "Subscriber ID" it will need to be entered in the "Mutual Aid Subscriber ID" field within their IAR system. Then the agency that is allowing you to manage their pager group selects the checkbox labeled "Allow to manage our Pager Groups". You can then select that agency when creating Pager Groups.

If you are not familiar with the "Mutual Aid" feature, before moving ahead Mutual Aid Help Guide, please follow this link: [Mutual Aid Help Guide](#)

TTD Tips & Troubleshooting

- **Getting Pager Tone Frequency Information**

Some dispatch centers or radio shops may provide their pager tone information in "cap code" format rather than as actual tone frequencies. These can get a little confusing to decode since they vary by paging tone format. A good list of most common formats and cap codes can be found [HERE](#) & [HERE](#).

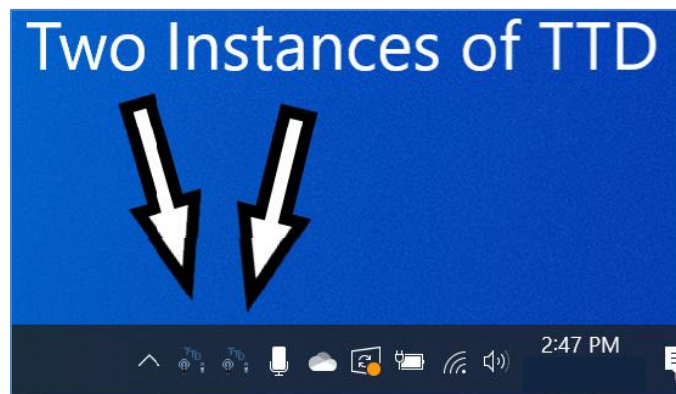
If an agency is having trouble getting pager tone info from their dispatch agency, there are several other ways to get the info, including reading it from a pager (if they have the pager programming software)

- **Running TwoToneDetect on Windows**

We strongly recommend that users do not leave the web-browser GUI open while running TwoToneDetect unattended. It is okay to open the GUI to check operation or make changes, but when not using it make sure to close it down. We also recommend having the computer that TwoToneDetect is running on perform an automatic reboot at least every couple days, if not daily. The automatic restarts can be set up using [Task Scheduler](#), and automatic startup of TTD can be done by [Putting a Shortcut to the EXE in the Startup Folder](#). The computer can also be set up to [Restart Automatically After a Power Failure](#).

- **Simultaneous Alerts**

If you receive simultaneous alerts the typical cause would be multiple instances of the TwoToneDetect software running. If you accidentally open TTD more than once, each instance will create alerts and cause duplicates. To see if this is occurring go to your system tray or task manager and make sure only one TTD icon is showing. To close an additional instance open the GUI and select shutdown.



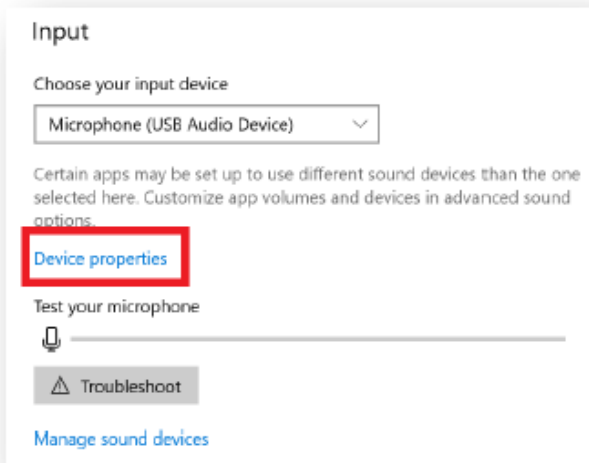
- **Interference**

- When using a Radio/Pager/Scanner that plays its own sound when your agency is "toned". Turn these additional alert sounds OFF. This additional sound from the Hardware is likely interfering with your TTD program hearing the broadcasted A Tone and B Tone come through the hardware itself.
- THIS INCLUDES A VIBRATION. If your hardware vibrates when a call is received, turn the Vibration OFF.
- When using a Radio/Pager/Scanner that has a charging "cradle", TTD will likely pick up a quiet "hum" of white noise from the "cradle" charging process. You will want to try the device when it is NOT in the "cradle" to see if the "interference" goes away.
- PLACEMENT- you will want to make sure that your hardware and your computer running TTD are as far apart as your Auxiliary Audio Cable allow.
- Ensure that your Auxiliary Audio Cable is "shielded" from outside interference. If not, it may pick up electronic sounds and static like it was itself an antenna.
- If your VOLUME column of the Debug Info is 30,000+, turn your device's volume knob down, to 5-20%.

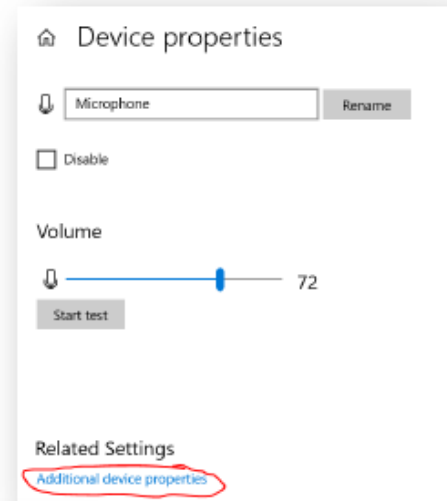
- **Low Audio or No Audio**

If you are not receiving audio or audio levels are low, verify the sound input quality and whether the soundcard is receiving audio. Open Windows Settings → System → Sound

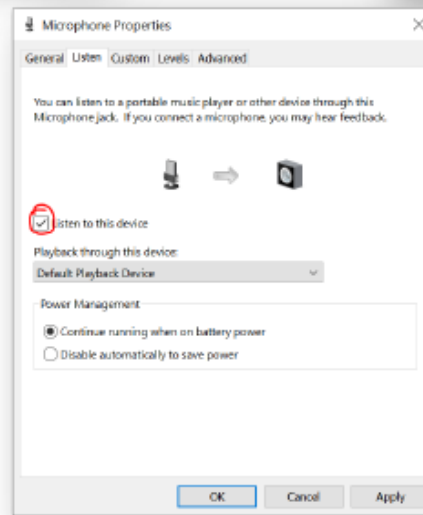
1) Open Device Properties



2) Check Volume Level, Click "Additional Device Properties"



3) Select "Listen to this device" and click apply. You should hear your radio over your speakers and be able to confirm audio quality. If you do not hear your radio traffic, confirm the radio is on and plugged into the correct input port on your soundcard.



Thank you for your interest in using this new feature!
Our goal at lamResponding.com is to reduce response times and help get more complete crews to your incidents, faster.

For help or feedback specifically related to the TwoToneDetect feature please contact us at: TTD@EmergencySMC.com

If you know of other agencies that would benefit from using this feature and they are not setup with lamResponding.com, please let us know.

Stay safe and thank you for using lamResponding.com!