

Using AndFlmsg for VOA Radiograms

For Version 1.2.0

John Douyere (VK2ETA) on 10-Sept-2015

- **Quick start**

Although not designed for that purpose originally, the AndFlmsg app can be used successfully to receive VOA Radiograms, including MFSK pictures. Since it also now support UTF-8 characters decoding, it will print all Left-to-Right alphabets and most (maybe all) Asian characters which use that encoding scheme.

To install, using the device's browser, download the .apk file at www.w1hkj.com/vk2eta. Note that “Allow unknown sources” needs to be selected first in the security or application section of the device settings.

When first launched, you will be prompted for a location of the NBEMS.files folder. It is best to choose the default location which is the “sdcard”. If choosing another location, navigate **to inside** the desired folder then click OK.

On subsequent launches, the application will directly displays the terminal screen.

Navigate to the Modem screen by a left swipe movement on the screen (see below).

Make sure the “Rx Rsid” checkbox is ticked.

Ensure that the squelch level, represented by the more transparent indicator in the “S2N” bar just above the buttons, is set to a low level, typically 1/5 of the screen on the left of the bar, or less. Higher values may prevent reception of text during fades and interferences.

If you want to see the waterfall, press the “W.Fall On/Off” button.

The menu button (earlier phones) or menu icon on the screen (tablets/latest phones) brings a menu to exit the application and setup the preferences.

Important Note: as long as AndFlmsg is running (I.e has not been “exited”), it will use the microphone as its input and therefore will prevent other apps like Skype for example from using it.

Always press Menu then Exit when you are finished with AndFlmsg.

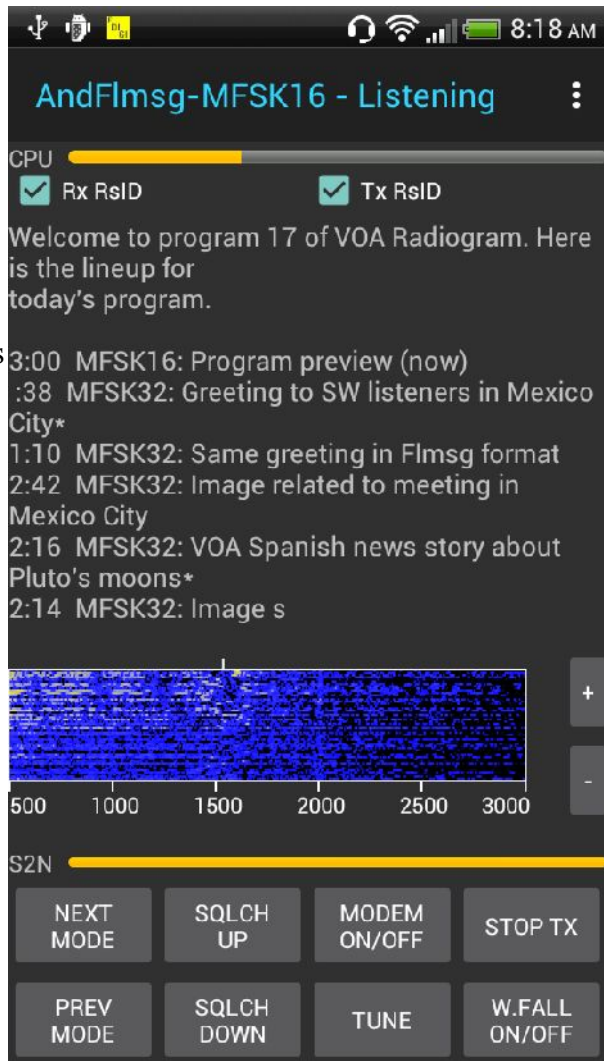
A yellow “Fldigi” icon is displayed as a reminder at the top or bottom of the screen while the modem is running.

- **Operation**

1. The simplest way to get the audio in the Android device is by using the built-in microphone. This is called audio-coupling. It provides quite acceptable results provided a few precautions are taken:
 - The microphone hole on the device is placed as close as practical to the radio's speaker. A distance of a few centimeters works well.
 - The place is not noisy.
 - The device is not moved or bumped against the radio during listening.
2. As text is received, it is displayed in the Modem screen. If you want to copy and save the received text, simply **stop the modem** by pressing on the “Modem On/Off” button, then long-press anywhere on the received text.

This will bring up the select/copy tool. Once the text is copied, it can be pasted in another app like an email. Since the modem is stopped when doing the select/copy it is better done after the broadcast is completed.

3. When an MFSK image is received, a window will pop-up in front of the Modem screen. The image will be updated as reception progresses. The received image will be saved automatically in the “Images” directory of the NBEMS.Files directory structure.
4. Closing the image popup view does NOT stop the image reception. Therefore the “Return button” can be pressed at any time, either during or after the reception of the image. The reception of text will resume as soon as the image is saved.
5. The images are automatically inserted in the Android Gallery. Open the Gallery app, and select either the “Images” folder (faster) or the “All Images” folder. The received images are in order of reception. The file names carry the time stamp formatted as per the AndFlmsg preferences (in the “Date / Time Format” section).
6. The CPU load, displayed as a horizontal bar at the top of the Modem screen, should not be higher than 75% (¾ to the right) on average. If it is higher than that, go to the menu, select preferences, then navigate to Modem/Slow CPU and tick the check box. Note that displaying the waterfall also increases the CPU load.



- **Interfaces between the Radio and the Android Device**

Simple audio coupling (speaker to microphone) is giving good results, but for best performance an interface cable is required.

Important: Simply plugging a stereo or mono jack to jack cable between the radio speaker/headphone output and the plug on the Android device is almost guaranteed NOT do what it is expected to do.

On some devices (e.g HTC phones) there is a visual icon which tells you if the external mic is being used. If, at the top of your screen, you simply have the headset icon, the internal mic is in use (see picture on the right).



If the icon shows both the headset and the mic icon, the external mic is in use (see picture on the right).



But a number of devices (e.g. Motorola Xoom and Samsung Galaxy Tab 2 to name the two I tested) do not show any icon. You have to rely on audio tests to determine which mic is in used.

Here is our experience with some commercial cables (Thank you for the tests Kim):

1. This one only works with a mono plug:

<http://www.startech.com/Cables/Audio-Video/Audio-Cables/35mm-4-Position-to-2x-3-Position-35mm-Headset-Adapter-Male-to-Female~MUYHSMFF>

2. This one works with a stereo plug:

<http://www.sescom.com/product.asp?item=IPHONE-MIC35-1&IPHONE-MIC35-1>

3. This adapter on the right (eBay for example) seems to work with older devices but not newer ones. The issue is that the mic input is connected directly to the TRRS plug. Maybe by inserting a 1.2KOhms in series with the mic tip it may work.



Technical explanation about the 4 way jack on Android devices:

Most Android devices can either use the built-in microphone or an external one through the 3.5mm plug. That plug has four connections internally and carry the two stereo outputs, the ground plus the mono microphone input. It is called a TRRS plug (for Tip, Ring, Ring, Sleeve).

A circuit at the end of this manual explains the circuit requirements in more details, but in a nutshell, the device will switch from it's internal mic to the external one ONLY if there is a defined DC load on the external mic connection.

That same mic input is also used for controlling some of the devices functions like accepting or hanging-up an incoming call, stopping or starting a music player and skipping to the previous or next song.

The action is determined by the DC load (typically a resistance) that the device sees on that mic pin. Different values equal different actions (E.g. Zero Ohms = Play/Stop/Answer/Hangup, 220 Ohms = Back, 600 Ohms = Forward, from around 1K to 1.5K is mic input alone).

This is why a simple jack to jack cable will most likely not make the device switch between internal and external mic.

- **More detailed Installation Instructions**

Download the AndFlmsg apk file from the website at:

<http://www.w1hkj.com/vk2eta/>

And save it to the SD card, either from within the phone or on a PC to which the Android device is connected to and has the USB driver installed for that device to allow access to the SD card content from the PC.

From there use a file explorer to install the .apk file.

You have to allow non-Android market application to be installed for this to work.

This is found under Settings / Security / Unknown Sources OR Setting / Applications / Unknown Sources, for older versions of Android.

You will be asked to accept a series of permissions that are explained below:

- a. Your location: to provide GPS time when out of cellular range (available but not displayed yet).
- b. Storage: Read and write to the SD card. For storing and accessing the working files under the "NBEMS.files" directory.
- c. Your Personal Information (log data): to allow reporting of the context of an error in case of an application crash (the user can decide to send or not the information after reviewing it).
- d. Network Communication as in Bluetooth and Full Internet access: to allow connection to the Bluetooth handsfree kits or headsets used as audio interfaces AND to share / Forward messages over the internet.
- e. Phone calls (as in reading phone status): to disconnect the Bluetooth interface when AndFlmsg is running through the Bluetooth interface AND a phone call comes in. This is to prevent the call's audio from going to the radio.
- f. Hardware controls (audio settings and recording): required for receiving and transmitting sound.
- g. Bluetooth administration: to redirect the sound via Bluetooth.

In your applications list you should now have an Flmsg icon called AndFlmsg.

- **The Modem Screen in more details**

Use to display the data received by the software modem and see an indicator of CPU load.

The top bar represents the CPU load with zero load on the left and 100% on the right. This is an indication of how much reserve the CPU has, rather than a true load indicator.

RX and TX RSID can be selected here. They are remembered between AndFlmsg sessions and so is the last mode used.

The bottom bar (2 overlaying bars in fact) represents both the squelch level and the current received signal quality. The brighter one is the signal quality and the darker one the squelch. The signal quality moves in a comparable way to the Fldigi green bar on the right hand side of the waterfall.

The squelch up and down increases/decreases the squelch value and stores it for later use so that it is set to the same value the next time the application starts.

The Next Mode and Prev Mode buttons will cycle either through your custom list of modes as set in the preferences OR through the whole list of modes available if the “Use custom list of modes” preferences is not set.

Modem ON/OFF stops/restarts reception and processing of incoming audio. This is to conserve processing and therefore batteries as well as freeing the microphone input for other applications.

Note: Digital Modem reception is very CPU intensive and the battery drain increases quite a lot compared with a device in standby, particularly on phones. Use the Modem On/Off button to conserve battery.

The Stop TX button is for immediate silencing of the modem in case of unwanted transmission.

The decoded RSID mode and center frequency are also displayed in the Modem screen.

The received modem data can be selected for copy and paste in another application like a text editor. Just “Long Press” on the text to bring the select/copy dialog on the screen. This is only available on devices with Android version 3.0 and above.

Note: The text can only be selected when the Modem is Off (Modem On/Off Button) as it makes the selection much easier and prevents the flickering of the screen when data is received.

The waterfall can be displayed by pressing the W.FALL on/off button. See screen copy below.



Be aware that the CPU load increases when displaying the waterfall and on some (old and slow) devices doing so while on multi-carrier PSKR or any of the THOR modes can lead to losses of data AND making RSID not detectable.

Use the waterfall display sparingly on these devices.

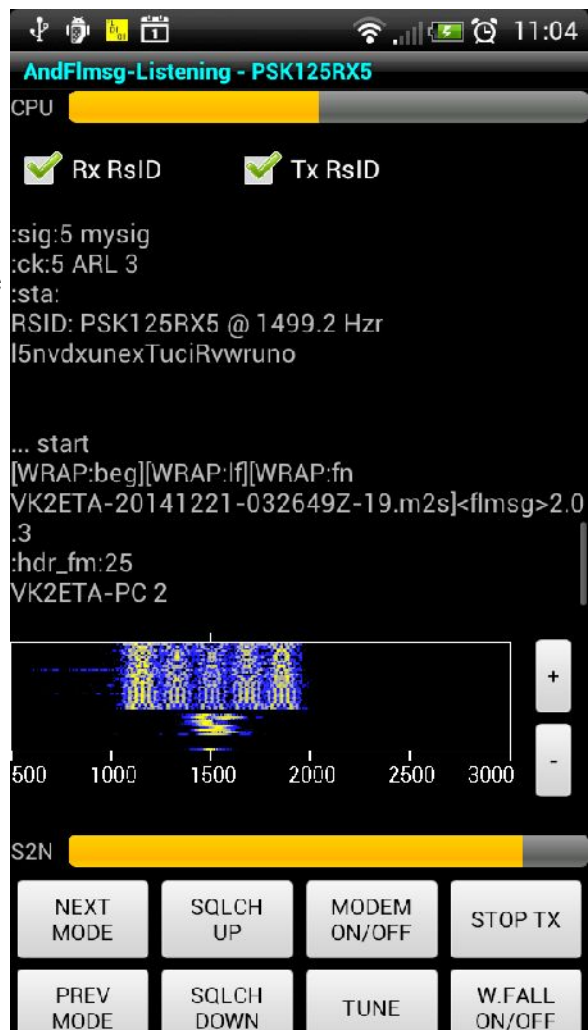
On most modern devices there is no significant load difference with or without waterfall display.

Modem screen with waterfall:

Note the tick mark on the top side of the waterfall which represents the current signal centre frequency.

It is recommended to use a custom list of modes in the preferences to make the cycling through the desired modes faster.

There is a slight delay when changing modes as the previous audio buffer needs to be cleared completely before switching mode.

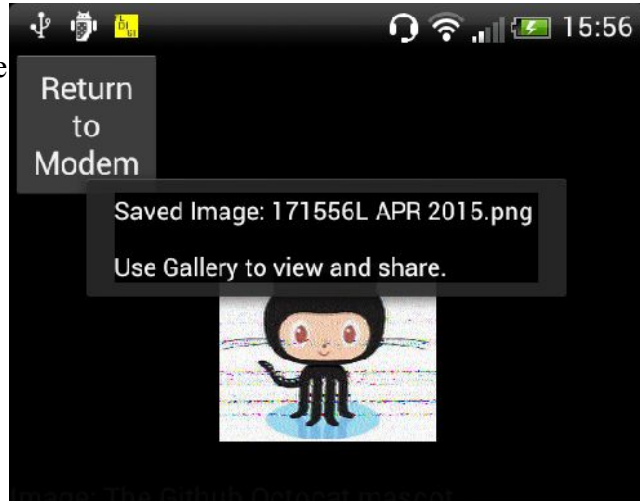


Modem screen while receiving an MFSK picture:

At the end of the Picture reception, a message will inform of the image being saved and three extra buttons will become available for correcting the picture if it is slanted (skewed to one side, as if it was wrapped around at the bottom).

The save button will re-save the corrected image.

To cancel the reception of an image, return to the modem screen and cycle the modem on – off by pressing the press “Modem On/Off” button twice.



You can return to the Modem screen at any time during or after the reception of an MFSK image without affecting the image received. The “Saved image” message will advise the end of the image reception.

The usage of an interface cable rather than simple audio coupling produces the best results:

1. Image received without a cable (Speaker to Mic):

Note the wave effect on the right hand side of the picture due to the presence of audio echos (table, walls etc..).



2. Image received with an interface cable (schematic below):



3. Image received with an interface BUT with the Slow CPU option turned ON:



4. Reference image received by Fldigi using Audio Playback:

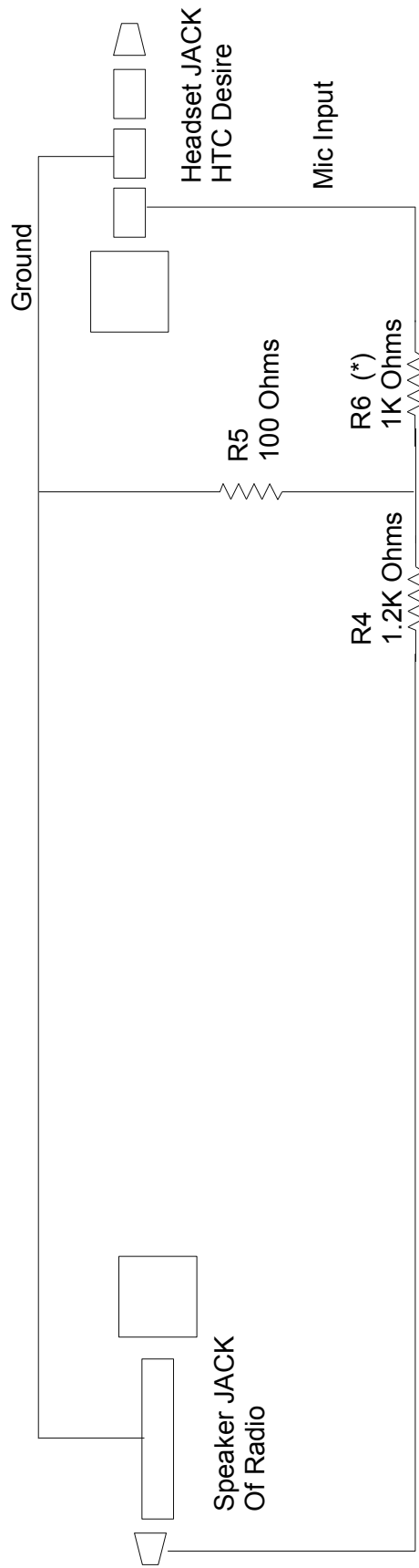


Enjoy,

73 John (VK2ETA)

P.S: Next page is a circuit diagram for a simple audio interface cable.

Simple audio interface cable for Short Wave Radio



Note (*):
If changing the R6 value, be mindful that two low values are read as control inputs by the Android device (call/hangup etc...)