HAMMER User Guide

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Section 1: Overview

HAMMER (Handheld Acoustic Modem for Mobile Exchanges with Radios) is an ATAK plugin that acts as a software modem and allows transmission/receipt of Cursor on Target (CoT) messages over voice communications. This means that two ATAK devices can communicate with each other over any voice-capable radio, e.g., commercial off the shelf walkie talkies, or even direct phone-to-phone (no radios). Currently HAMMER supports sending and receiving CoT map markers, self-reported locations and chat messages.

Fig 1. Plugin loaded in ATAK with TRRS Cable and Radio

HAMMER supports sending CoT over radios with or without cables (e.g., TRRS) between the Android device and the radio. This can work with just the speaker/microphone of the phone and the radio, *though using cables is recommended* as it eliminates background noise interference and leads to significantly better reliability. If used with a cable, it is recommended that one sets the radio to VOX (voice operated transmission) mode, which allows radio-transmission to be triggered via detection of an audio signal and removes the need for manually pressing a push-to-talk (PTT) button (where applicable). No special software is required to use a TRRS cable, though different radios have different levels of compatibility with existing cables.

The plugin itself runs on ATAK, supporting ATAK 4.1 through 4.9 (either CIV or MIL). When installed, HAMMER runs in the background listening for incoming modulated audio frequencies. This background operation feature can be toggled off in the settings menu.

The plugin integrates directly with the ATAK map, allowing the user to transmit CoT items directly from the radial menu of the main view, or via the plugin's tool window. See section 1 for details.

On the main screen, the user is presented with a few options:
1. Map Markers / Location (see section 1)
2. Chat (see section 2)
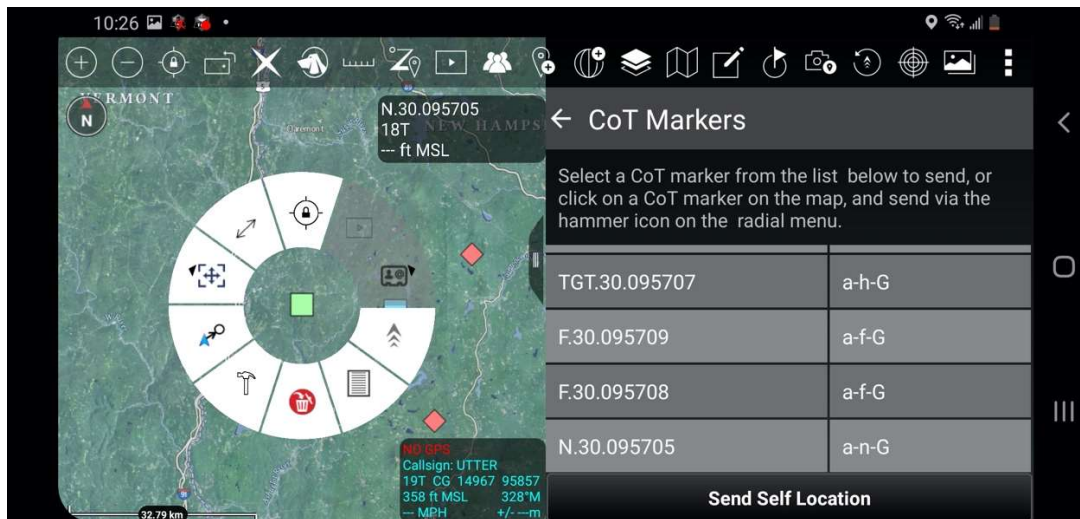3. Settings (see section 3)

Section 2: View CoT Markers

Fig 2. CoT Markers

The user has two methods of sending CoT marker messages. The first option is via clicking on a CoT marker on the map and selecting the hammer icon from the radial menu. The second option is via the "Map Markers / Location" view within the HAMMER tool, where the user can view all markers on the map by name and type. The user simply clicks on one of the CoT markers from the list to transmit.

To send your own location you can simply click on the "Send Self Location" button at the bottom of this view.
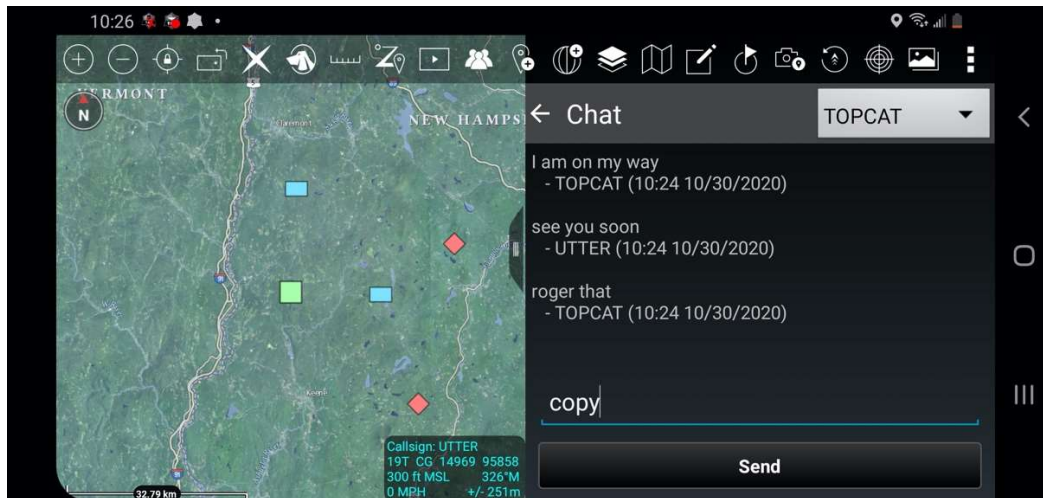
Section 3: Chat Messages

Fig. 2 Sending Chat Messages

In the chat view, the user has the option to chat with all users or specify which callsign they would like to chat with. Selecting a callsign will open a chat session with the given user.

Note that this capability is not yet integrated into ATAK's built-in chat function, and exists in parallel to it, providing only basic chat capabilities.
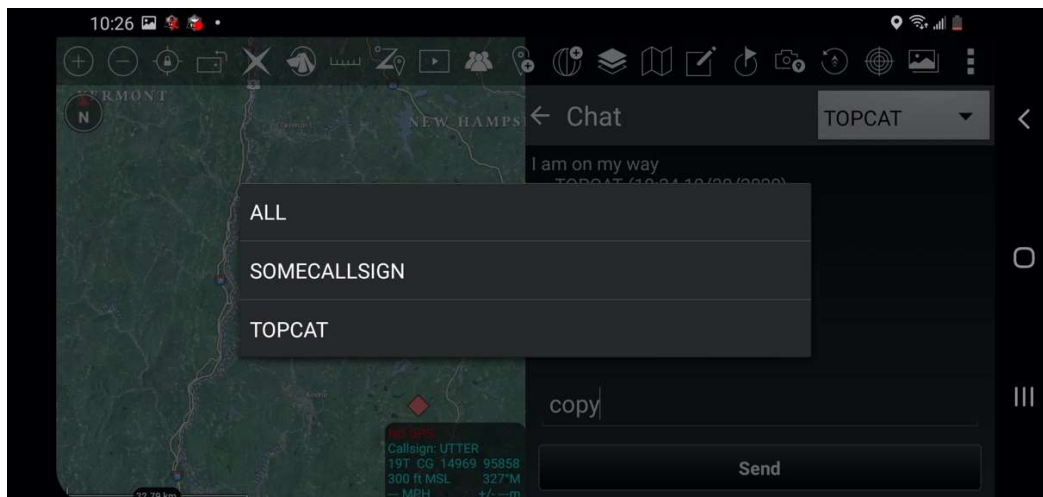

Fig. 3 Selecting a callsign to chat with
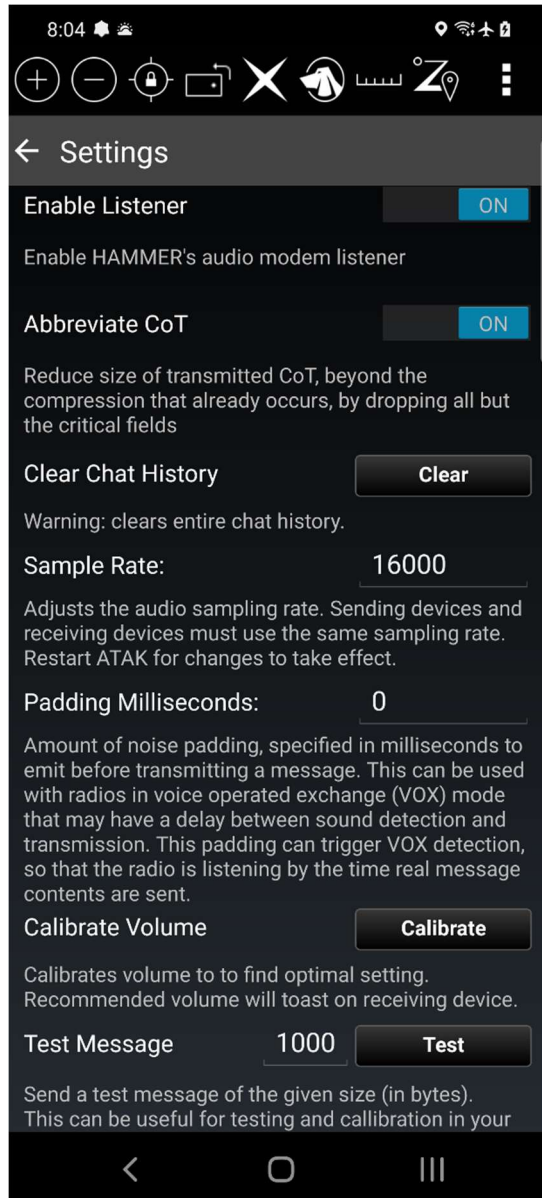
Section 4: Settings

Fig. 4 Settings View

The settings view allows for adjusting various parameters of HAMMER operation, calibrating the device (primarily useful when not using cables, to adjust volume output), and sending test messages.

Enable Listener

Disabling this setting will turn off the ability for CoT messages to be received via HAMMER, and prevent it from operating in the background.

Abbreviate CoT
Abbreviating CoT allows for sending more concise messages, sacrificing data completeness for smaller message sizes. All fields except for the core CoT fields (when, were, what) will be removed from the message. This may be useful in some contexts where access to the transmission medium is very constrained. Note that starting in version 1.1 of the HAMMER plugin, all CoT messages are compressed before sending, typically yielding a 50-60%+ size reduction.

Clear Chat History
Clicking this button simply clears the chat windows history of chat messages.

Sample Rate
This adjusts the sampling rate of the HAMMER algorithm. Note that it should be adjusted on both sending and receiving devices together, so that they match.

Padding Milliseconds
Setting a non-0 value here will cause HAMMER to emit a configurable amount of noise (if using cables, this is not audible) prior to sending each message. This can be useful when using VOX mode on push to talk radios. VOX mode allows the user not to have to push the PTT button to talk on a radio, instead the radio listens for sound and begins transmitting when it hears it. However, there is typically a period during which sounds is being emitted, yet the VOX processing has not yet picked up on it, or has picked up on it, but not yet started transmitting. For spoken words this is not a big deal, as humans can account for a missing 200ms of sound, and still understand a sentence. In the HAMMER context, however, the missing sound might be the first set of bytes of a CoT message, and missing it would result in an incomplete and invalid message. Adding a small amount of noise to the start of a transmission can let VOX pick up on the sound and begin transmitting, before the actual message contents begin to be sent.

Calibrate Volume
Clicking this button will cause HAMMER to emit a small test message repeatedly, with increasing volume (from 0 to 100% of the device's capable speaker levels, stepping up in defined increments). If you have another device listening (over a radio, or just nearby the transmitting device, using speakers/microphone) the other device will popup a message telling you when it first successfully receives and interprets such a test message (and for each successful receipt after that). This message will let you know the volume level that the transmitting device used (this info is embedded in the message that is sent) – e.g., 30%. This can allow you to adjust the transmission volume (or microphone sensitivity) for optimal communications.

Test Message

This button will allow you to send a test message to any listening devices, where the message has a N-byte payload, where N is specified by the user via the text box next to the test message button. This allows you to test sending, for example, a 50-byte payload and a 1500-byte payload, and understanding transmission success rates at those sizes.

Section 4: Known Limitations

- Particularly when used without cables, the system may need some tuning to experience consistently reliable transmissions. The tuning is a matter of adjusting volume and/or microphone sensitivity of the Android device, and may require some testing to identify the levels that are best suited for your particular devices and background noise level. Adjusting the distance between the Android device and the radio (or two Android devices if using without any radios) may also be helpful – typically distances measured in low number of inches is ideal when not using cables.
- Cables used between the Android device and the radio can dramatically improve performance. Unfortunately each radio is different, and even radios with the same cable port may experience different level of compatibility with different cables.