# SuM upgrade guide
# 2025-04-14
www.subseapulse.com

**TARGET:** This guide is intended for owners of SubSeaPulse SuM devices that want to use the modem's new analog audio transmission features.

Modems shipped after 2025-04-14 already support analog audio transmission software-wise. Hence, these users must skip section 1 of this guide and directly proceed with section 2 (hardware upgrade).

## SECTION 1: SOFTWARE UPGRADE
*Only applies to SuM devices shipped before 2025-04-14*

In order to use the new features, the modem's software must be updated. SubSeaPulse will provide updated binaries upon request: refer to the company website for contact information.

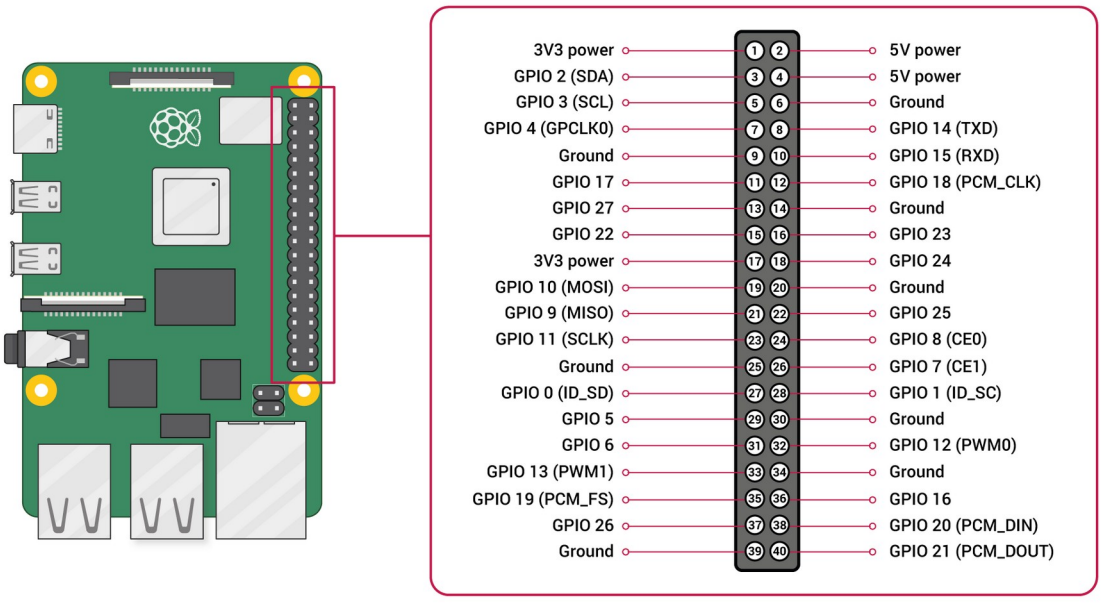
New binaries must be placed in the modem's SD card overwriting all previous files when prompted.

After this step is completed, you may proceed with the hardware upgrade.

# SECTION 2: HARDWARE UPGRADE

This section consists of two steps, both are strictly necessary for proper operation.

1. *Push-To-Talk (PTT) button*
   In order to use the analog audio communication features it is necessary to install a button on the modem for PTT functions: it will be used to toggle between reception and transmission mode.
   The button must be wired between PIN GPIO 17 (pin 11) and Ground (pin 9). Open circuit between the pins makes the modem work as a receiver while shorting the two pins (i.e. pushed button) makes the modem transmit.



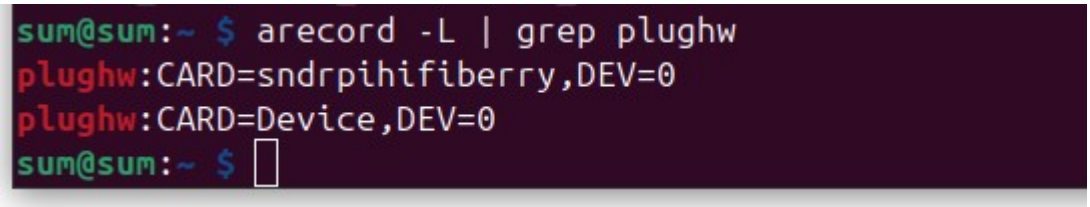

*Raspberry PI pinout. Image taken from the official Raspberry PI documentation at [https://www.raspberrypi.com/documentation/computers/raspberry-pi.html](https://www.raspberrypi.com/documentation/computers/raspberry-pi.html)*

2. *USB sound card installation*

   The modem will use a USB sound card both as an input (line-in for audio to transmit) and as an output (line-out for received audio).
   Given the different sound card models available on the market, it is necessary to configure the modem's software to interface with the right audio device.
   As a first step, please connect your USB sound card to the SuM and turn it on. After the bootstrap is completed, connect to the modem and run the command

   ```
   arecord -L | grep plughw
   ```

   This command lists the available sound interfaces. The screenshot below visualizes the command output you are likely to have.




*"arecord" command output on the SuM.*

   You will most likely have two entries on the list: the *hifiberry* interface, that is the HAT-shaped sound card part of the base SuM, and another entry, that is the USB sound card.
   Copy this line and paste it inside the

   ```
   $HOME/.asoundrc
   ```

   file, inside the **pcm.SUMdeviceBB** section, **pcm** field.
   The figure below shows how a correct configuration looks, in relation to the device name shown above.

```
pcm.SUMdeviceBB {
        type plug
        slave {
                pcm "plughw:CARD=Device,DEV=0"
        }
}
```

*Part of the printout of the "$HOME/.asoundrc" file showing correct configuration in relation to the previous "arecord" output.*

   After these steps, the modem's analog audio TX/RX features should be fully functional.