Several improvements to the circuit have necessitated some modifications to the JackAL Vo4 beta PCB. These improvements include:

- Change power supply connections to Audio preamp. This reduces the max output form the Audio Preamp to the Teensy Audio adapter, lessening the chance of overload.
- Move the ground connection from Teensy Gnd to Teensy AGND. This reduces the cross-talk between the Audio and Digital portions of the circuit.
- Change several Resistor values in the Audio Preamp to accommodate the new lower supply voltage.
- Change the connections to the Analog AGC circuit to turn it on and off.
- Change the receive audio input to the Teensy from ADC pin 16 to the left channel of the Audio adapter. This is to allow simultaneous use of Audio input and Analog read of the S-Meter and Supply voltage.
- Move the Mic input circuit to the Audio Adapter Right Line In connection.
  - Requires adding an external DC bias to allow use of condenser mics.
- Add Isolation transformer to output of Audio adapter Right Channel mic circuit to reduce ground loop noise.

Step by step modifications:

1. **Audio Preamp Supply modifications**
   - 3.3V supply connection

   ![Figure 1](image)

   - If already installed, remove Resistor R1
   - Cut trace by Resistor R1 closest to the 5V regulator on either side of the board. R1 is shown in Figure 1.
Install a 10 ohm resistor in R1 location
Run jumper wire from R1 pad closest to 5V regulator to Teensy 3.3 V pin as shown in Figure 2. This may involve carefully cutting the socket header and attaching a small wire to the pin of 3.3V. Alternately, drill a small hole in the PCB between the traces near the 3.3V pin and threading a small insulated wire thru the hole to make the connection to the 3.3V on the under-side of the PCB.

Figure 2

- Ground connections
  - The JackAl V04 board does not have a ground connection to the audio preamp section.

Figure 3
- To add a GND connection, attach a small wire from any ground point in the preamp section, such as the via as shown in figure 3. Attach the other end to the bottom Teensy AGND pin.
• Resistor changes
  ◦ R5 becomes 680 ohms
  ◦ R6 becomes 39K
  ◦ R8 becomes 75K (note: R5 and R8 can be swapped)

• Change output from Audio Preamp
  ◦ Cut trace leading to Teensy Pin 16 as shown in Figure 4. Cut this trace close to the Audio Preamp section.

  ![Figure 4](image)

  ◦ Install a pin header or socket to TP2 for later attachment to Audio adapter.
2. AGC section changes
   - Remove unused parts: (Figure 5)
     - R22, Q7, Q6, C23, R26, R27
   - Install jumper or 0 ohm resistor across R27 pads
   - Install 1K resistor across C23 pads (Figure 6)
   - Run jumper from top C23 pad to Q11 collector
   - Install header pin to top pad of C23 position that now has a 1K resistor, as shown in Figure 6. Carefully place a dot of glue on the foot of this header pin. This header pin will connect to the AGC on-off switch.
• Attach another header pin to the top vacant pad of R22. (See Figure 6 also.) This will be the filtered +12V supply connection to go to the AGC switch.

3. **Mic input circuit.**
   • To use a condenser mic a DC bias is necessary.
   • Wire up the Mic input circuit as shown in Figure 7. This wiring can either be located near the Mic jack or the PCB. In my case there was ample space to locate it near the Mic jack.

![Mic input circuit diagram](image1)

*Figure 7*

• Because of the low level signals from the Mic, it is suggested to either use a tightly twisted pair for the mic signal lines or a small shielded cable. Figure 8 shows the wired-up phone Jack.

![Wired-up phone Jack](image2)

*Figure 8*
4. *Mic channel output.*
   - The Mic output comes from the Teensy audio adapter board to the uBITX mic input lines (purple and blue wires on the Teensy Audio connector).
   - A 1:1 600 ohm isolation transformer is used to separate the grounds to avoid digital noise.
   - The circuit is shown in Figure 9.

*Figure 9*
5. **Teensy Audio Adapter connections.**
   - Install 10 pin header socket to the input/output connections to the audio adapter. Note that some of the pin locations are not used. Simply remove the pins from the header socket prior to installing on the Teensy Audio Adapter.

   - Figure 10 shows the completed hookup for all connections. In most cases no ground connection is used, but a twisted wire pair with one end of the ground connection will provide some shielding. Alternately, small diameter shielded cable may be used, connecting only one end of the shield.