Vail Adapter Button Hat - User Guide

Welcome to your Vail Adapter with Button Hat! This guide will help you get started with the three-button interface that lets you adjust settings without using a computer.

What Can the Buttons Do?

The button hat gives you control over three important settings:
- **Speed** - Adjust your keyer speed (5-40 WPM)
- **Tone** - Change your sidetone frequency (42 different pitches)
- **Key Type** - Switch between Straight Key, Iambic A, and Iambic B modes

All feedback is through Morse code and tones played on your piezo buzzer!

Button Layout

When looking down at your Vail Adapter from above (button side up), with the USB port on the left:

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      USB   [1]   [2]   [3]
```

- **Button 1** (Leftmost, closest to USB) - Speed settings
- **Button 2** (Middle) - Tone settings
- **Button 3** (Rightmost, furthest from USB) - Key type settings

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Understanding Button Presses

There are two types of button presses you'll use:

Quick Press

Press and release quickly (less than 1 second)
- Used to adjust values up or down

Long Press

Hold for 2 seconds until you hear audio feedback
- Used to enter settings modes or save changes
- You can release the button once you hear the announcement

Quick Reference Card

Action	What It Does
Hold Button 1 (2 sec)	Enter Speed Mode - hear "SPEED"
Hold Button 2 (2 sec)	Enter Tone Mode - hear "TONE"
Hold Button 3 (2 sec)	Enter Key Type Mode - hear "KEY"
In any setting mode:	
Quick press Button 1	Increase value
Quick press Button 3	Decrease value
Hold Button 2 (2 sec)	Save and exit - hear "RR"
Wait 30 seconds	Auto-save and exit - hear descending tones

How to Adjust Speed (WPM)

Speed controls how fast your keyer sends code, from 5 WPM (slow) to 40 WPM (fast).

Step by step:

1. **Hold Button 1** for 2 seconds
2. When you hear "SPEED" in Morse, release the button
3. **Adjust the speed:**
4. **Button 1** (quick press) = Increase speed by 1 WPM
5. **Button 3** (quick press) = Decrease speed by 1 WPM
6. Each adjustment plays a beep (higher pitch for increase, lower for decrease)
7. **Try it out!** Use your paddle to test the new speed
8. **When you hit the limits:**
9. Minimum is 5 WPM, maximum is 40 WPM
10. If you try to go beyond, you'll hear a low buzz error tone
11. **Save your new speed:**
12. **Hold Button 2** for 2 seconds
13. When you hear "RR" in Morse, release the button
14. You're back to normal mode with your new speed saved!

OR just wait 30 seconds - it will auto-save and you'll hear descending tones.

How to Adjust Tone (Sidetone Frequency)

Tone controls the pitch of your sidetone when keying.

Step by step:

1. **Hold Button 2** for 2 seconds
2. When you hear "TONE" in Morse, release the button
3. **Adjust the tone:**

4. **Button 1** (quick press) = Higher pitch
5. **Button 3** (quick press) = Lower pitch
6. Each adjustment plays a 100ms beep at the NEW frequency
7. **Try it out!** Use your paddle to hear the new tone
8. **When you hit the limits:**
9. There are 42 different tones available (middle range of frequencies)
10. If you try to go beyond either end, you'll hear a low buzz error tone
11. **Save your new tone:**
12. **Hold Button 2** for 2 seconds
13. When you hear "RR" in Morse, release the button
14. You're back to normal mode with your new tone saved!

OR just wait 30 seconds - it will auto-save and you'll hear descending tones.

How to Change Key Type

Key type controls how your paddle input is processed.

The three key types:
- **Straight (S)** - Acts like a straight key, no automatic timing
- **Iambic A (IA)** - Automatic alternating dits and dahs
- **Iambic B (IB)** - Like Iambic A with squeeze timing (most popular!)

Step by step:

1. **Hold Button 3** for 2 seconds
2. When you hear "KEY" in Morse, release the button
3. **Cycle through key types:**
4. **Button 1** (quick press) = Next type forward
5. **Button 3** (quick press) = Previous type backward
6. You'll hear the type identifier in Morse:
    - **S** = ... (dit dit dit) for Straight
    - **IA** = .. .- (I then A) for Iambic A

    - **IB** = .. -... (I then B) for Iambic B
7. **Try it out!** Use your paddle to test the keyer behavior
8. **Cycling order:**
9. Forward: Straight → Iambic A → Iambic B → Straight...
10. Backward: Straight → Iambic B → Iambic A → Straight...
11. **Save your key type:**
12. **Hold Button 2** for 2 seconds
13. When you hear "RR" in Morse, release the button
14. You're back to normal mode with your new key type saved!

OR just wait 30 seconds - it will auto-save and you'll hear descending tones.

Audio Feedback Guide

All feedback comes through your piezo buzzer in Morse code and tones.

Morse Announcements

Sound	Meaning
"SPEED"	Entered speed setting mode
"TONE"	Entered tone setting mode
"KEY"	Entered key type mode
"RR"	Settings saved, returning to normal mode
"S" (dit dit dit)	Straight key mode
"IA" (I then A)	Iambic A mode
"IB" (I then B)	Iambic B mode

Special Tones

Sound	Meaning
Short beep (higher pitch)	Increased a setting
Short beep (lower pitch)	Decreased a setting
Low buzz (200 Hz)	Error - you hit the minimum or maximum limit
Descending tones (7 steps)	Auto-save timeout - settings saved
100ms beep at new frequency	New tone frequency preview (in tone mode)

Tips & Tricks

Testing While Adjusting

Unlike other CW devices, you can **test while you adjust**:
- In Speed Mode: Key with your paddle to hear the new speed
- In Tone Mode: Key with your paddle to hear the new tone
- In Key Type Mode: Key with your paddle to test the keyer behavior

Changes take effect immediately, so you can find the perfect setting before saving!

Activity Timeout

The 30-second auto-save timer resets whenever you:
- Press any button
- Use your paddle or straight key

So feel free to take your time testing different settings!

What Gets Saved

All three settings are saved to EEPROM and survive power cycles:
- Your speed (WPM)
- Your tone (frequency)
- Your key type (Straight/Iambic A/Iambic B)

Starting From Scratch

If you ever want to know your current settings:
- Enter each mode (the announcement plays at your current setting)
- Speed: Watch the serial monitor for "Current speed: XX WPM"
- Tone: Watch for "Current tone: MIDI note XX (XXX Hz)"
- Key Type: Watch for "Current keyer type: [name]"

No Computer Needed

Once you're comfortable with the buttons, you can adjust all three settings without ever connecting to a computer. Perfect for field operations or portable setups!

Troubleshooting

Problem: Buttons don't seem to respond
- Make sure you're holding long enough (2 seconds for mode entry)
- Wait for the audio announcement before releasing
- Try a single button at a time first

Problem: I'm not hearing any audio feedback
- Check that your piezo buzzer is connected
- Verify you haven't disabled the buzzer (hold DIT for 5 seconds re-enables it)

Problem: Settings don't save
- Make sure you either hold Button 2 for "RR" confirmation
- Or wait for the descending tones (30-second auto-save)
- If you exit accidentally (power loss), changes are NOT saved

Problem: I don't know which mode I'm in
- Just wait - if you don't press anything for 30 seconds, you'll auto-exit
- Or try entering a mode - you can always save without changing anything

Problem: Speed or tone is at the wrong limit
- Press the opposite button to move away from the limit
- Speed range: 5-40 WPM
- Tone range: MIDI notes 43-85 (42 different tones)

Default Settings

When you first flash the firmware or reset EEPROM:
- **Speed:** 12 WPM
- **Tone:** MIDI note 69 (440 Hz - concert A)
- **Key Type:** Iambic B

Summary Cheat Sheet

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MODE ENTRY (hold 2 seconds):
├─ Button 1 → Speed Mode   ("SPEED")
├─ Button 2 → Tone Mode    ("TONE")
└─ Button 3 → Key Type Mode ("KEY")

IN ANY SETTING MODE:
├─ Button 1 (quick) → Increase
├─ Button 3 (quick) → Decrease
├─ Button 2 (hold 2s) → Save & exit ("RR")
└─ Wait 30s → Auto-save (descending tones)

TEST WHILE ADJUSTING:
└─ Use your CW paddle to test immediately!
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Getting Help

If you have questions or run into issues:
- Check the serial monitor (9600 baud) for detailed feedback
- Review this guide for step-by-step instructions
- Make sure your firmware is up to date

Happy keying! 73