

RTC-1

USER MANUAL

Release Time Calculator

Device Visualizer

AI Settings Assistant

Compression Lab

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Welcome to RTC-1

RTC-1 connects musical time to compressor behavior. Enter or tap a tempo, choose a rhythmic note value, and RTC-1 calculates its duration in milliseconds, seconds, and microseconds. You can then view that timing on a growing collection of compressor, limiter, gate, expander, de-esser, and multiband-inspired device faces.

RTC-1 also includes:

- A device visualizer with calibrated hardware-style position markers
- An AI Settings Assistant for source-, sound-, tempo-, and device-aware starting points
- Compression Lab, which explains compression visually and lets you hear A/B comparisons
- Built-in practice sources plus local audio-file import
- Save and Load favorites
- Brushed Chrome, Dark Brushed Chrome, and optional Liquid Glass appearances
- Adjustable haptic feedback and button sounds

RTC-1 is an educational and creative reference. It does not process audio in the calculator or device visualizer, and its settings are intended as informed starting points rather than absolute rules.

1. Quick Start

- 1 Open RTC-1. The calculator opens in the original Brushed Chrome appearance by default.
- 2 Enter a tempo using the number pad, or tap **Tap Tempo** at least twice.
- 3 Tap a musical-note button.
- 4 Read the calculated result in **ms**, **sec**, and **µs**.
- 5 Tap **Choose Device**, then select a device.
- 6 RTC-1 displays the calculated timing and places the device's result marker at the closest valid hardware position when the control uses fixed settings.
- 7 Swipe left or right to move through the calculator and device carousel.

If you only want to explore the hardware artwork, open **Choose Device** before entering a tempo. Device screens remain blank until a timing result or recommendation is available.

2. The Calculator

Entering tempo

Use the numeric keypad to enter BPM. The decimal button supports fractional tempos, and the red backspace button removes the latest digit. **Clear** resets the current calculation.

Tap Tempo

Tap **Tap Tempo** in time with the music. RTC-1 averages the interval between taps and displays the resulting BPM. If a note value is already selected, the millisecond, second, and microsecond results update with the new tempo.

If more than two seconds pass between taps, RTC-1 begins a new tap sequence.

BPM + and -

The **+** and **-** buttons change the tempo by one BPM. If the current tempo has a decimal, RTC-1 first moves to the next or previous whole BPM. An active timing result recalculates immediately.

Choosing a rhythmic value

Tap any musical-note button to calculate that duration at the displayed BPM. RTC-1 includes straight note values and alternate rhythmic values.

To access triplet values, press and hold the decimal button until it glows, then tap the desired note button. Release the decimal button to return to the normal note set.



The RTC-1 calculator in its default Original Brushed Chrome appearance.

Understanding the result display

RTC-1 presents the same calculated duration in three units:

- **ms** - milliseconds
- **sec** - seconds
- **µs** - microseconds

The conversion is exact before display rounding:

```
1 second = 1,000 milliseconds = 1,000,000 microseconds
```

Example: 31.25 ms = 0.03125 sec = 31,250 µs.

The active note button glows so you can see which rhythmic value produced the result.

3. Save and Load

Saving a favorite

- 1 Enter a BPM and select a note equation.
- 2 Tap **Save**.
- 3 Accept the suggested name or enter a custom name.
- 4 Tap **Save** again.

RTC-1 stores the BPM, rhythmic factor, calculated timing, custom label, and save date. Up to 100 favorites are retained, with the newest shown first.

Loading a favorite

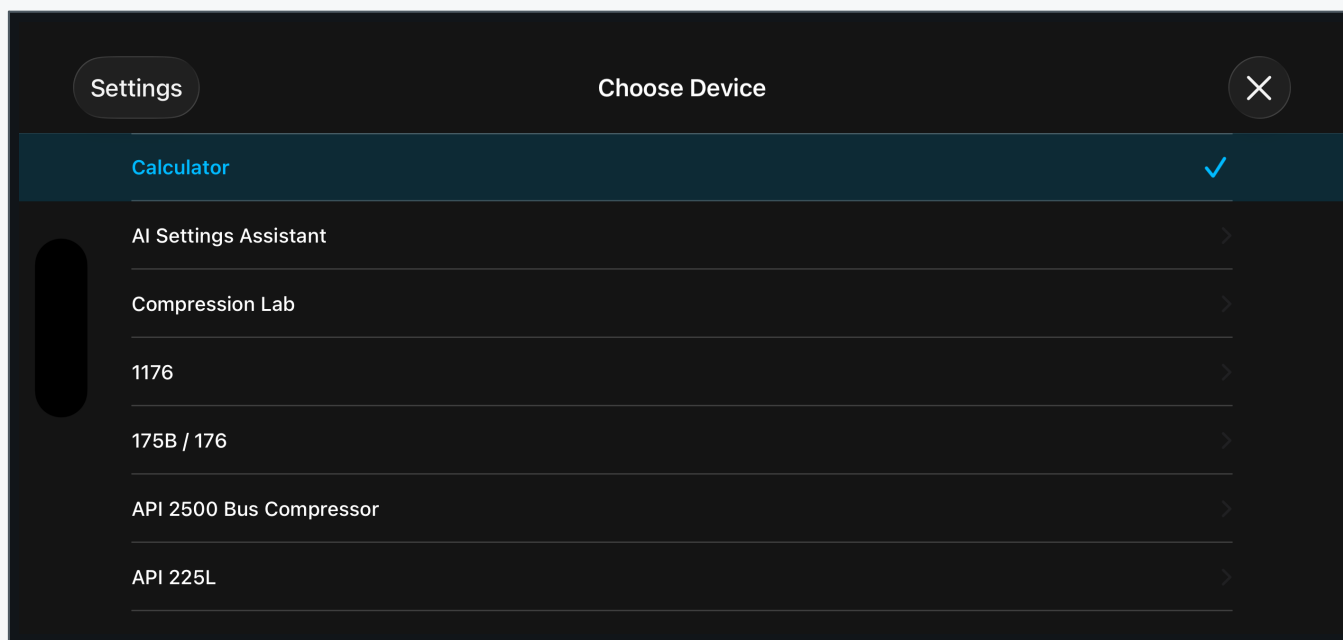
Tap **Load** and choose a saved result. RTC-1 restores the BPM and calculated timing, then briefly shows the recalled preset name and current device in the main display.

The Load menu shows the first 12 saved favorites. Use **Clear All Favorites** only when you want to remove the complete saved list; RTC-1 asks for confirmation before deleting it.

Favorites saved on the calculator are available from device screens, and favorites recalled from a device return the same timing result.

4. Choosing and Navigating Devices

Tap **Choose Device** to open the scrollable navigation menu. The menu contains:



The Choose Device menu provides the calculator, learning tools, hardware profiles, Settings, and a Cancel control.

- **Calculator** - return to the RTC-1 calculator
- **AI Settings Assistant** - ask for compression guidance
- **Compression Lab** - explore and hear compression behavior
- Every available device profile

The current device is highlighted in blue. Tap the **X** or Cancel control to return without changing screens.

Swipe navigation

- From the calculator, swipe left to enter the first device or right to enter the device at the opposite end of the carousel.
- From any device, swipe left or right to move visually through the carousel.
- The calculator is included in the swipe sequence.

Device-screen buttons

Every device screen provides a consistent control group:

- **Save** - save the current timing result
- **Load** - recall a saved result
- **Choose Device** - open the device and feature menu

- **RTC-1** - return directly to the calculator

These buttons follow the selected appearance and interaction settings.

5. Device Results and Position Markers

RTC-1 maps calculated timing to each device's real operating range.



A populated device view showing the shared three-row result display, hardware controls, timing readouts, and illuminated positions.

Continuous controls

On a continuously variable knob, the position marker interpolates between measured faceplate references. The marker rotates from the invariant center of the knob face so that it behaves like a physical pointer.

Fixed or stepped controls

If a device offers only fixed attack or release values, RTC-1 selects the closest available hardware setting. The result display can still show the actual musical calculation while the device marker identifies the practical selector position.

Switches and buttons

Rotary controls use center-origin pointer lines. Non-rotary selectors, buttons, and switches use illuminated position indicators so they remain visually distinct from knobs.

Result windows

Device result windows display timing or control values in the unit appropriate to that faceplate. Empty calculator data produces empty device timing displays. AI recommendations can also populate supported Ratio, Threshold, mode, filter, mix, gain, and other control readouts.

Supported device profiles

The current RTC-1 device library includes:

- 1 1176
- 2 175B / 176
- 3 API 2500 Bus Compressor

- 4 API 225L
- 5 API 235L Gate/Expander
- 6 Avalon VT-737sp
- 7 CS Channel Strip EX-1 Compressor
- 8 Empirical Labs EL7 FATSO Sr.
- 9 LA-6176 Signature Channel Strip
- 10 Manley Stereo Variable Mu
- 11 Manley VOXBOX Channel Strip
- 12 Neve 88RS Dynamics
- 13 Neve 2254/E Limiter/Compressor
- 14 Neve 33609 Limiter/Compressor
- 15 Precision Buss Compressor
- 16 Precision Channel Strip
- 17 Precision De-Esser
- 18 Precision Limiter
- 19 Precision Multiband
- 20 SSL 4000 E Compressor
- 21 SSL 4000 G Bus Compressor

Some profiles expose dual compressor/limiter, gate/expander, channel, band, or fixed/variable timing sections. RTC-1 presents the relevant timing positions and supported structured control results for each faceplate.

6. AI Settings Assistant

The AI Settings Assistant turns a natural-language request into device-mapped starting settings.

×

AI Settings Assistant

Ask for a sound, source, tempo, device, or a documented engineer technique.

1176 ▾

Q Try: Punchy snare at 98 BPM on the SSL 4000

Natural Vocal

Punchy Snare

Mix Bus Glue

Ready

Your recommendation, device-mapped settings, reasoning, and sources will appear here.

Show Settings on Device

The AI Settings Assistant with device selection, a natural-language prompt, quick examples, a recommendation area, and Show Settings on Device.

Opening the assistant

Choose **AI Settings Assistant** from the Choose Device menu. You may open it before entering a tempo or from any device screen.

Asking for settings

- 1 Choose the destination device.
- 2 Enter a request in the search field.
- 3 Include any useful context: source, desired sound, tempo, device, performance style, or engineer-inspired direction.
- 4 Press Search.

Example requests:

- Natural lead vocal on the VOXBOX
- Punchy snare at 98 BPM on the SSL 4000
- Gentle mix-bus glue on the API 2500
- Fast bass control without losing the front edge

The **Natural Vocal**, **Punchy Snare**, and **Mix Bus Glue** buttons provide quick example prompts.

Understanding AI results

The assistant can return:

- Independent Attack and Release values
- Ratio and Threshold
- Other supported device controls
- A short explanation and listening goal
- Source links when a connected research service supplies them
- An evidence label describing whether the answer is documented, general guidance, style-inspired, or offline guidance

Tap **Show Settings on Device** to open the chosen faceplate and apply the structured recommendation to its displays and supported markers.

Online and offline behavior

When a protected web AI gateway is configured, RTC-1 can use connected research and show its evidence level and sources. The app does not place an AI provider credential in the application bundle.

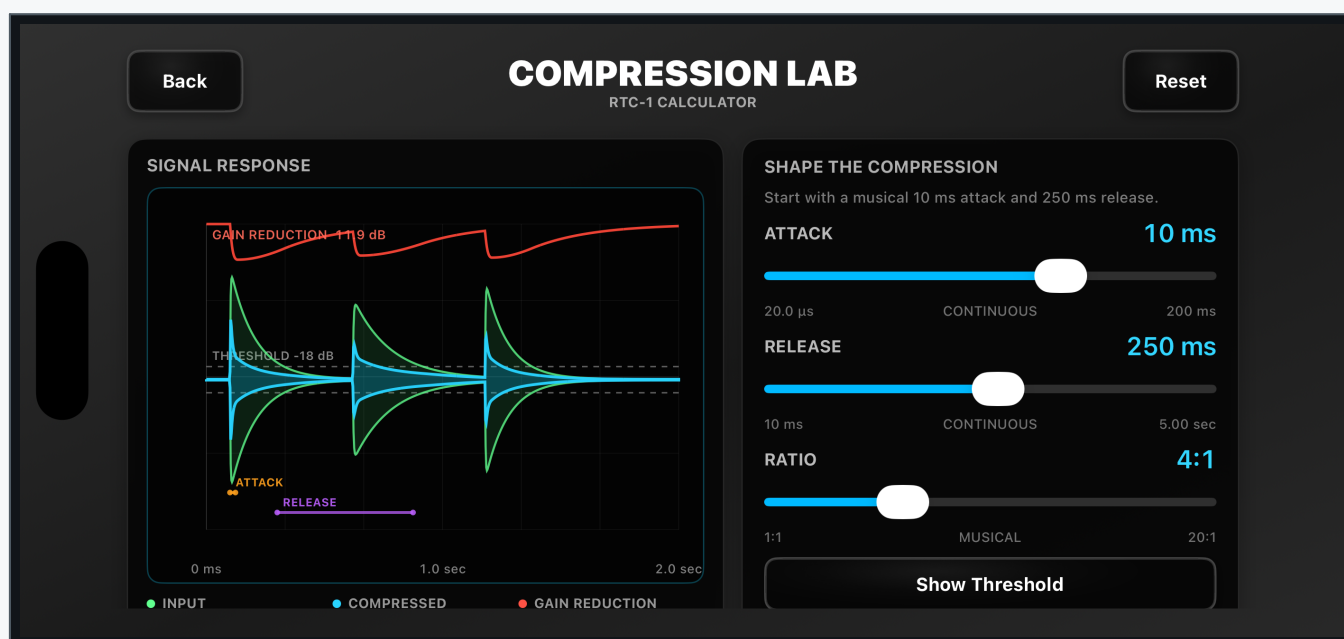
If the gateway is unavailable or not configured, RTC-1 provides built-in offline device guidance. The result screen clearly identifies offline guidance.

Responsible use

AI settings are starting points. Threshold depends on the actual signal level, and attack, release, ratio, and detector behavior interact with the performance and recording. Level-match your comparisons, refine by ear, and avoid treating an engineer-inspired suggestion as an exact documented preset unless RTC-1 labels and sources it that way.

7. Compression Lab

Compression Lab is an always-dark educational workspace that makes compression visible and audible.



Compression Lab combines a signal-response graph with musical Attack, Release, Ratio, and optional Threshold controls.

Open it from **Choose Device > Compression Lab**. When opened from a device, the Lab begins with that device's timing range and current result where applicable.

Main controls

- **Attack** - how quickly gain reduction builds after the signal crosses the threshold
- **Release** - how quickly gain reduction returns toward zero
- **Ratio** - how strongly signal above the threshold is reduced
- **Threshold** - the level that begins compression; tap **Show Threshold** to reveal or hide this advanced control

Controls marked **FIXED** follow the discrete positions available on the selected hardware profile. Controls marked **CONTINUOUS** move smoothly across the device's range.

The response graph

The graph compares the input envelope, output envelope, and gain reduction. Its attack and release regions reveal when the compressor is engaging and recovering.

The three analysis readouts summarize:

- **Transient Retained** - how much of the initial transient remains
- **Peak Reduction** - maximum gain reduction in decibels
- **90% Recovery** - the estimated time needed for most recovery to occur

The explanation panel translates the current settings into plain musical language.

Listening Lab

The Listening Lab sits beneath **What the Compressor Is Doing** and can be collapsed or expanded by tapping its header.

Choose from the built-in practice sources:

- Kick
- Snare
- Vocal

- Bass
- Acoustic Guitar
- Full Mix

Then press Play and change settings while listening.

Dry, Compressed, and Delta

- **Dry** - the uncompressed source
- **Compressed** - the processed result
- **Delta** - only the energy removed by compression

Delta listening is especially useful for hearing whether the compressor is removing transient, sustain, low-frequency energy, or ambience.

Level Match

Level Match balances Dry and Compressed playback so the comparison is based on tone and dynamics rather than the natural preference for the louder signal. Turn it off when you intentionally want to hear the compressor's uncompensated output level.

Audio transport

The traditional transport includes:

- Return to start
- Rewind 5 seconds
- Play/Pause
- Stop and return to start
- Forward 5 seconds
- Waveform/playhead scrubbing
- Current time and duration
- Loop on/off

Importing audio

Tap **Import Audio** or choose **Import Audio File...** from the source menu. Select one audio file from the Files interface. RTC-1 imports the file locally for auditioning and displays its waveform in the Lab.

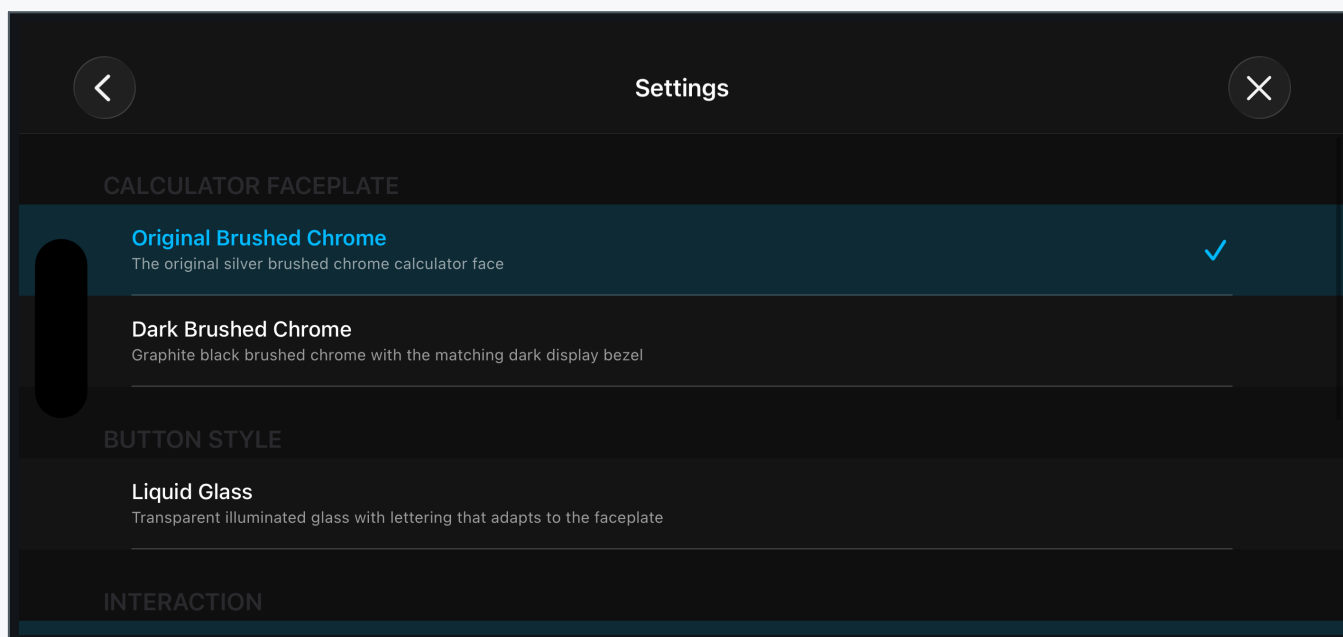
Imported material is limited to the first 60 seconds for responsive comparison. RTC-1 reports when a longer file has been trimmed. Only one imported source is active at a time; cancelling the picker leaves the previous source unchanged.

Reset and exit

- **Reset** restores the starting settings and built-in Kick source.
- **Back** returns to the previous RTC-1 screen.

8. Appearance and Interaction Settings

Open **Choose Device**, then tap **Settings**.



RTC-1 Settings showing calculator faceplate and button-style choices in a scrollable, high-contrast menu.

Calculator faceplate

- **Original Brushed Chrome** - the default silver RTC-1 calculator face
- **Dark Brushed Chrome** - graphite black brushed chrome with a matching dark display bezel

Liquid Glass

Liquid Glass is an independent on/off button treatment. When it is off, button finish follows the selected faceplate:

- Original Brushed Chrome face uses original chrome buttons
- Dark Brushed Chrome face uses black brushed-chrome buttons with white lettering

When Liquid Glass is on, lettering adapts to the faceplate. The backspace symbol remains red in every style.

Haptics

Turn **Button Haptics** on or off. Choose **Haptic Intensity** to select:

- Subtle
- Balanced
- Strong

Button sounds

Turn **Button Sounds** on or off. RTC-1 uses the familiar native iOS input-click behavior at the configured level.

The interface previews enabled feedback and retains the user's choices.

9. Accessibility and Platform Behavior

RTC-1 includes VoiceOver labels, values, hints, selected-state announcements, and result announcements for key controls. Device markers expose their control name and resolved position. Compression Lab exposes its graph, sliders, source selector, transport, audition mode, waveform playhead, loop state, and collapsible sections.

The Choose Device and Settings menus are scrollable, use a consistent high-contrast dark presentation, and identify the current selection in blue.

RTC-1 is designed for landscape use. On supported macOS configurations, RTC-1 also provides menu commands and keyboard navigation for Calculator, Choose Device, Compression Lab, and AI Settings Assistant.

10. Practical Workflow Examples

Tempo-synced release on a device

- 1 Enter or tap the song tempo.
- 2 Select the rhythmic value whose decay you want to explore.
- 3 Open the target device.
- 4 Read the actual calculated duration.
- 5 Set the hardware or plug-in near the position shown by RTC-1.
- 6 Adjust by ear for groove, pumping, and sustain.

AI-assisted vocal starting point

- 1 Open AI Settings Assistant.
- 2 Choose a vocal-appropriate device.
- 3 Ask for a natural or forward vocal sound and include tempo if relevant.
- 4 Review the evidence label, settings, reasoning, and sources.
- 5 Show the settings on the device.
- 6 Match Threshold to the actual recording and level-match the result.

Learning attack and release by ear

- 1 Open Compression Lab.
- 2 Choose Snare or Kick.
- 3 Enable Loop and Level Match.
- 4 Compare slow and fast Attack while watching **Transient Retained**.
- 5 Compare short and long Release while listening for pumping, sustain, and ambience.
- 6 Switch to Delta to hear exactly what is being removed.

11. Troubleshooting

A device display is blank

Enter a tempo and select a note equation, recall a saved favorite, or apply an AI recommendation. Blank timing displays are intentional when no result exists.

A fixed knob does not show the exact calculated number

The main or local display can show the actual calculation, while the marker snaps to the closest position the real device offers. This is expected for stepped controls.

Tap Tempo does not update a timing result

Tap a note value first if you want an active equation to follow tempo changes. Tap Tempo always updates BPM after at least two valid taps.

Ratio or Threshold markers are not visible

Tempo alone does not determine Ratio or Threshold. Those controls appear when a structured preset or AI recommendation supplies real values.

AI says offline guidance

The protected online gateway is unavailable or not configured. RTC-1 is using its built-in device guidance; you can still show those settings on a device.

Imported audio is shorter than the source file

Compression Lab intentionally uses the first 60 seconds of imported material.

I cannot hear playback

Check the device volume and output route, select Dry or Compressed, press Play, and confirm the chosen file is a supported audio format.

I cannot find a device

Scroll the Choose Device list. You can also swipe left or right through the carousel.

12. Safety, Accuracy, and Legal Notes

- Protect your hearing. Begin playback at a moderate monitoring level, especially when changing Threshold, Ratio, makeup gain, or audition mode.
- RTC-1 calculations are mathematical references. Analog hardware tolerances, plug-in modeling, program-dependent circuits, detector behavior, ratio, sample rate, and source material can change the audible result.
- Device artwork and descriptive names are provided for identification and educational mapping. Third-party product and company names remain the property of their respective owners. Inclusion does not imply sponsorship, endorsement, or affiliation.
- Engineer-inspired AI requests should be treated as educational style guidance unless the result is explicitly labeled as documented and accompanied by reliable sources.

13. Glossary

Attack - Time between crossing Threshold and the onset/build-up of gain reduction. **Auto release** - Program-dependent recovery whose timing changes with the signal. **Compressor** - A processor that reduces dynamic range above or around a threshold. **Delta** - The difference between Dry and Compressed signals; what processing removes. **Expander** - A processor that increases dynamic contrast, commonly by reducing signal below a threshold. **Gain reduction** - The amount by which the processor lowers signal level. **Gate** - A processor that attenuates signal below a threshold. **Knee** - The shape of the transition into compression. **Level match** - Loudness balancing used for a fair processed/unprocessed comparison. **Limiter** - A high-ratio dynamics processor used to control peaks. **Milliseconds (ms)** - Thousandths of a second. **Microseconds (µs)** - Millionths of a second. **Ratio** - The relationship between input change and output change after compression begins. **Release/Recovery** - Time for gain reduction to cease after signal falls below Threshold. **Sidechain** - The detector/control path that tells a dynamics processor how to respond. **Threshold** - The signal level at which dynamics processing begins. **Transient** - The short initial burst of energy at the beginning of a sound.

14. Support and Manual Maintenance

This manual reflects the live RTC-1 feature set as of August 2026. Device profiles and educational features may expand over time. For the website or in-app Help, publish this Markdown file as the master source so the downloadable manual and Help content can be regenerated from the same text.

When requesting support, include:

- RTC-1 app version

- iPhone or iPad model and iOS version
- The device profile or feature involved
- The tempo, note value, and displayed result when relevant
- A screenshot or short screen recording if the issue is visual

RTC-1 by ZAO Music/Media Designed to make compressor timing more musical, visual, and intuitive.