

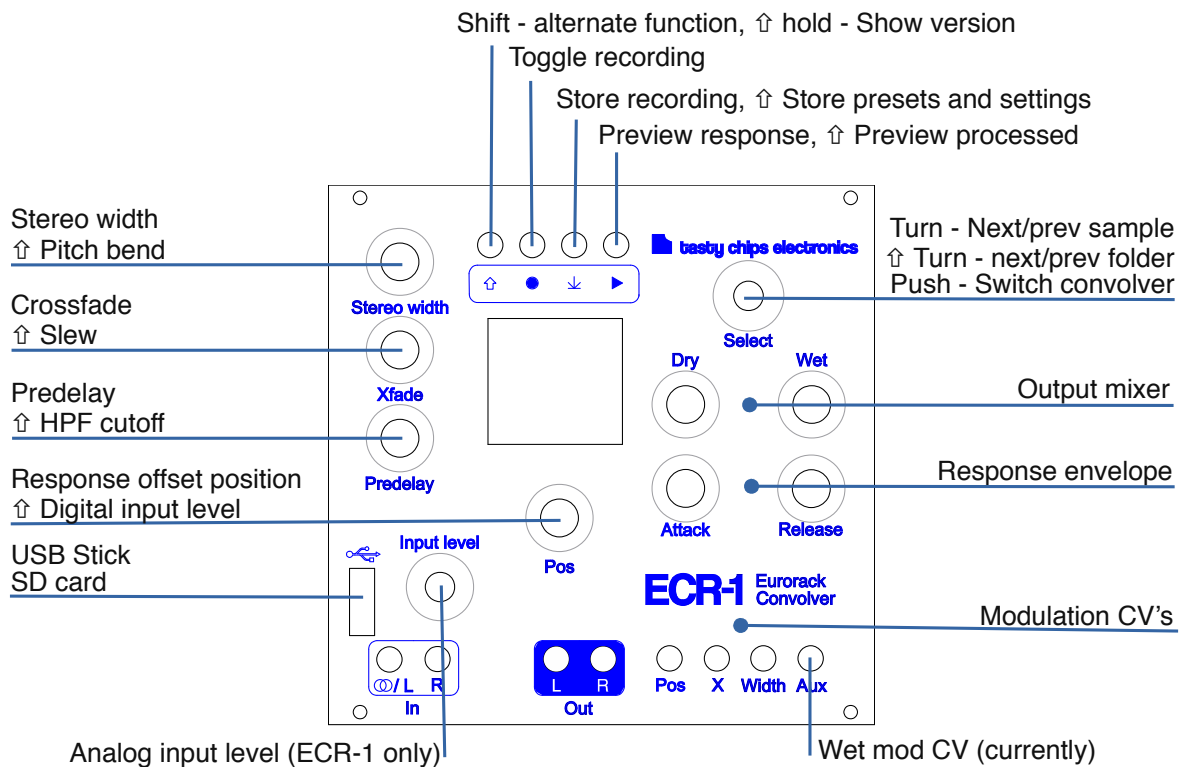
Tasty Chips Electronics ECR-1/ECR+ User manual

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Introduction

We originally designed this module to offer the Eurorack community access to long and lush natural stereo reverbs, and to allow tweaks in real-time with minimal delay. But it goes well beyond a mere reverb module.

The ECR series offers various modulation options: for instance, the position in the response sample, allowing for filter-like sweeps. Another example is modulating between two reverb spaces. It's even possible to pitch bend the response sample in real-time. Want to record your own response and use that right away? No problem. That's what a modular system is for, right?



Contents of the box

- ECR module.
- Ribbon cable for power.
- USB stick. This comes pre-installed with a pack of unique response samples. Earlier units came with a USB-SD adapter.

- A bag of 4x M3 bolts and 4x M2.5 bolts.

Warranty

The ECR-1 and ECR+ come with a 1 (one) year warranty on factory defects. Warranty is effective from the date of shipping of the unit.

“Factory defects” covers:

- Missing parts (see previous section)
- Broken parts (for instance: cracked screen, broken buttons, or knobs)
- Non-functional unit (“dead on arrival”)
- Semi-functional unit with serious defect (for instance: inability to access the SD card, mute audio inputs or outputs).

In case of such defects, you can reach us at info@tastychips.nl, and claim your unit to be repaired. We’ll contact you with all the necessary information for return shipping and will refund all postage costs incurred. Please understand that shipping and repairs may take several weeks depending on the severity of the defect and your location in the world.

We’ll first attempt to repair your unit. If, and only if, the unit is damaged beyond repair, we’ll send a new unit.

Document version

Document version 2.0.0

Applicable firmware version: 2.0.x

Installation

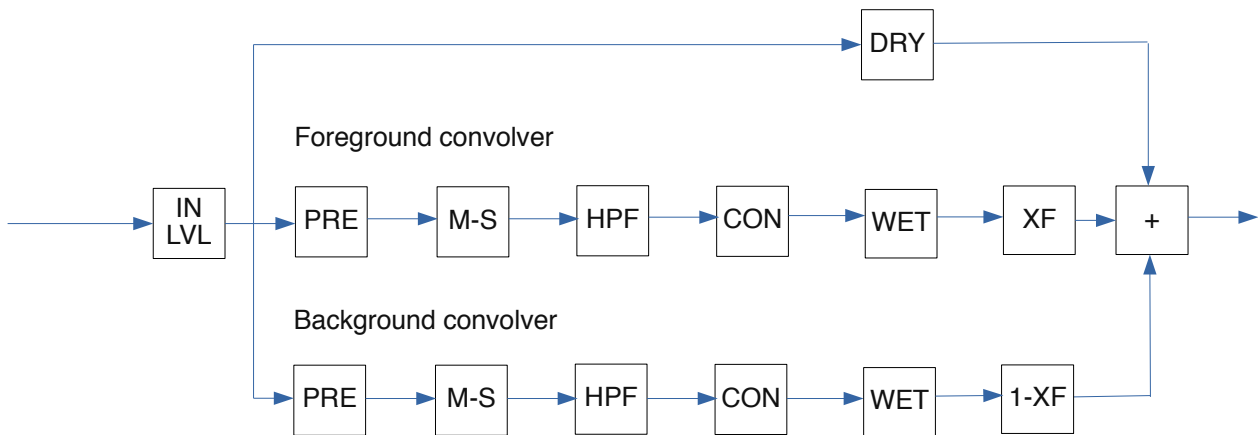
1. Power down your rack.
2. Optional: remove the bit of anti-static foam from the back of the module.
3. Use the included power cable to connect the ECR to your bus board. Don’t worry, the connection is impossible to get wrong, because the ECR is fitted with a shrouded IDC header. This makes sure the orientation of the power cable is OK. And even if you still manage to mix up the orientation on your bus board, the ECR has protection diodes to guard against polarity inversion. It will not be damaged by it.
4. Screw the module onto your rack casing’s rails.
5. Power up and wait a few seconds until the display is initialized.

Getting started

1. Hook up audio output cables.
2. Press Play ► to test the output of the selected response.
3. Press Play ► again to stop the test.
4. Hook up the audio input. Either try the stereo input and hook this up to your phone or laptop, or use both inputs in mono mode and connect them to your modular sources.

5. Make sure the Predelay is completely 0, Xfade is maximized, and Wet is also maximized. The Pos knob should be 0. The Attack knob should be 0, and Release should be maximized, enabling the full response to be used.
6. Adjust the “Input level” knob until the red “C” clipping indicator only seldomly appears.
7. Enjoy the reverberated sound!
8. Turn the Select knob right to try the next response.

Signal path



As you can see the two internal convolvers both have their own preprocessing chain: PRE for predelay, M-S for Mid-Side, or stereo width, followed by the high-pass filter. The actual convolution is followed by wet attenuation. Finally, the convolver outputs are crossfaded and summed with the dry signal.

Setting the audio input level

ECR-1:

A single knob at the bottom left sets the input level. Turn it down, and the ECR-1 will accept Doepfer audio levels. Turn it up and it will accept studio audio levels or headphone audio levels. This is an analog control and cannot be modulated or saved.

ECR+:

Hold down Shift \hat{u} and turn Pos at the same time. This controls the digital input level. Turned down completely, this will mute all input. This setting is digital and can be modulated and saved. This control is also available on ECR-1 with firmware 2.0.

Configuring the output mixer

The knobs “Dry” and “Wet” control the output mix. These are digital controls, and their values are displayed on the display. They range from -100 dB attenuation up to 0 dB. Dry and wet are global controls that work on both internal convolutions.

Understanding the display

The display shows the response sample in an understandable way, along with its name at the bottom, and an action message at the top. Such an action may be “WET -6.0DB”, “ATTACK 0.500s”, “CONVOLVER A”. So either value updates, or discrete actions.

The display shows up to 4 sample channels. Everything you need for true stereo reverbs. From top to bottom, these are:



So, if a plain stereo sample is loaded instead of a 4 channel sample, only the upper two channels are visible.

The samples are always displayed at full length, and cannot be zoomed in. The amplitude is logarithmic so that details in the reverb tail may be better visible. Between the channels the difference in amplitude is exaggerated. This quickly tells you if the response is off-center.

Using the envelope controls

An attack-release type envelope allows attenuation of parts of the response sample. The start position (time) of this envelope can also be set using the “Pos” knob. Setting the position will completely skip over any sample data that comes before this position in the response sample. The combination of these three knobs allows you to precisely focus on any specific part of the response, for instance the tail, or only the early reflections. The position control has a precision of 1024 steps. The attack and release knobs have the same resolution, and using their exponential control curve you can achieve very short attacks or releases and still accurately control them. The attack and release time are displayed on screen down to milliseconds.

The applied envelope attenuates the response in places. To have no attenuation at all (to actually disable the envelope’s function): turn attack and pos to 0, and turn release to its maximum. Note that the ECR-1 uses normalization after applying the envelope. This will preserve signal power, however it can also significantly boost the wet signal. You can compensate by turning this down.

Note that when attack is non-zero, you may experience a gap in the audio. Each time the envelope is changed the convolver recomputes and restarts. Since a longer attack will result in low volume, you may hear short gaps in the output as you continue to change the envelope. This can be compensated by increasing Slew.

Recording responses

Press record ●. This starts the recording process. The convolution engine will be disabled while recording and only dry output is heard. The recording stops when record is pressed again, or when it has recorded 20 seconds. You can now use the recording as if it were a response, apply the envelope, position, and modulation. Madness will ensue. When a USB stick or the furnished MicroSD card with the USB adapter is inserted, you can press store ○. Otherwise the button will

pulse two times to indicate no storage medium is present. When storing the recording is automatically assigned a filename `recXXXXXX.wav` and it can be found by using the “select” knob in the top right.

WARNING: DO NOT REMOVE STORAGE MEDIUM WHEN STORING RECORDING. PLEASE WAIT A FEW SECONDS BEFORE DOING SO. IF YOU DO NOT, DATA LOSS MAY OCCUR.

Using the remaining parameters

Predelay: 0-2.0s in with an exponential control curve. Using this often influences the perception of the size of a reverberating space. For instance, you can make a short reverb of a small room appear bigger by turning this up a little. Adjustment of this control causes the convolver to recompute its data. This may take a short while. Also note that the convolver restarts after adjustment and it starts with playing back the delay!

Stereo width: This is a Mid-Side matrix control that either turns the input into mono (turn it down to 0), or exaggerates the stereo effect (turn it completely right). The center keeps the stereo input audio signal exactly as it is.

Pitch [\hat{u} +Stereo width]: Hold down shift and turn the stereo width knob to pitch bend the response. Completely left means -2 octaves, completely right means +2 octaves. Center keeps the response the same pitch.

Highpass filter cutoff [\hat{u} +Predelay]: To keep the convolution from blowing up you can cut away some sub-bass from the audio input.

Xfade (crossfade): Crossfade between foreground convolution and background convolution. Please read the section “Using the dual convolvers”.

Slew time [\hat{u} +Xfade]: recomputation slew time controls the crossfading time between newly computed response and old response. Such a cross fade occurs when a new impulse response is offered to the convolver. For instance when a new response is selected by turning the select knob, or when the envelope or envelope position is changed. A short slew time sounds more choppy, but you’ll hear the new response earlier. A larger slew is especially useful with longer envelope attack.

Control voltages

Insert Doepfer level CV sources to modulate some of the ECR’s parameters.

0V: or disconnected, no modulation,
+5V: maximum positive modulation,
-5V: maximum negative modulation.

Modulation clips the affected control its minimum and maximum. That means it will never exceed beyond the levels you can manually set it to by using the knob.

“Pos”: Modulates the position knob. This control forces a re-computation of the envelope and hence also a re-computation of the response. There will be a lag depending on the size of the envelope, exactly like with the Pos knob itself. If the envelope is small enough, and you apply a CV envelope waveform, this allows for smooth sweeps over your response.

“X”: Xfade, or crossfade. -5V will crossfade completely to the background convolution. +5V will crossfade completely to the foreground convolution. this is a direct control that takes effect in about 10ms.

“Width”: Modulates stereo width. -5V will force the input signal to mono. +5V will exaggerate the stereo effect. This is a direct control that takes effect in about 10ms.

“Aux”: This currently modulates Wet. In future firmwares other destinations may be configured.

Using the dual convolvers

The ECR runs two internal convolvers simultaneously. There's one in the foreground, which is directly controlled by the knobs, and there's one in the background. The background convolver cannot be controlled by the knobs. It's basically a "frozen" copy of the foreground convolver at one point in time. The Xfade (crossfade) knob creates a mix of background and foreground convolutions.

1. Set up your foreground convolver using the "select knob" to choose a response, and turn the other knobs (except crossfade!) until you have a satisfying convolution.
2. Now press "select". This copies the foreground convolver into the background. The display will let you know: "CONVOLVER B"
3. Turn xfade to the left a bit to hear the background convolver.
4. Select a nice new foreground convolution by turning "select", and set the parameter knobs to your liking.
5. Wiggle xfade. If you're using reverb responses, you are now traveling between spaces!
6. Optional: hook up a CV to the X modulation input to automate this travel in a pattern of your liking. A simple sine wave is already quite convincing.

At the moment of writing, only the foreground convolver can be modulated. The background convolver cannot be modulated. We're evaluating if this will be possible in a future firmware update.

Using an external storage medium

The ECR's USB A port allows you to use the furnished USB stick or in early models the furnished Micro SD card (via the USB-SD adapter). It also comes pre-formatted and with loads of original responses recorded by the Tasty Chips Team.

Once this SD card is inserted the ECR will automatically register all the `.wav` files in the root directory, and in the folders in the root directory. Note that it does not scan any deeper than 1 level! This means that folders in folders are skipped! It slurps up all the sample file names and compiles them into a big list you can scroll through. Just turn Select to enter the list.

It may take a few seconds before the ECR has correctly mounted and processed all the files. The list is updated live on screen when it's ready. Browse a bit to the right and after the 8th response, you're browsing the external medium.

Of course you are free to remove and add `.wav` files at your leisure, using your PC. Since there are a lot of responses on the SD card, you may want to hold down Shift [`↑`] when turning the Select knob. This jumps from folder to folder instead of from file to file.

While browsing, the ECR shows the current folder at the top of the screen. This helps you to distinguish if samples are in internal memory or are external. Browsing automatically loads and activates new samples. When Play ► is active, you can easily preview sounds this way.



The ECR accepts USB sticks other than the one we've supplied, but your mileage may vary. Some (cheap) USB sticks are very slow. Only FAT, ExFat, and Linux Ext filesystems are properly supported.

WARNING: DO NOT REMOVE STORAGE MEDIUM WHEN STOPPING RECORDING. PLEASE WAIT A FEW SECONDS BEFORE DOING SO. IF YOU DO NOT, DATA LOSS MAY OCCUR.

System menu

Enter the system menu by holding down Shift [↑] and pressing Select. Here you'll find the following:

- DIRECT SHIFT: toggle this so you don't have to keep shift pressed. Often beneficial, because it frees up one hand for wiggling.
- BACKGND CONV: enable/disable background convolver. Less power consumption. May disappear in new firmwares as it was primarily a development feature.
- AUX: Which destination should the Aux CV control: WET, TUNE (aka Pitch), or INL (Input Level).
- SAVE: Screensaver time. 10 s, 30 s, 2 minutes, or 5 minutes.
- PICKUPS: Enable or disable potentiometer pickups. With pickups enabled the potentiometers will only respond if you turn them to the displayed position. When it is locked, a small lock icon will be displayed and the current internal setting of the potentiometer will be displayed in the center of the screen. Turn to this point to unlock!



- EXIT: Exit the menu.

Note that these system settings will be saved when you press the Shift [↑ + Store ⏻]. This shortcut is available in any screen.

Further functionality

Hold down Shift [⌘] for 5 seconds to show the firmware version. If it doesn't show it, then it's firmware 1.0 (shipped on only the very first units before May 2020). Note that v1.0 outputs at line level instead of at 10VPP Doepfer level. V1.1 has a higher SNR. Upgrade is recommended and free (if you send us back the old DIMM located at the back of the module).

Features

- Long true-stereo natural reverbs (23s max).
- Dual simultaneous reverbs (foreground and background), with their own presets.
- Multi-channel display with envelope and parameter-value overlays, and a clipping indicator.
- Predictive gain control (to preemptively stop the output from blowing up).
- Stereo or dual-mono input, accepts line level or Doepfer Eurorack level. Adjustable using gain control knob.
- Separate dry and wet knobs.
- Attack-Release Envelope with direct controls (2 knobs).
- Cross fade knob (cross fades between the foreground and background response)
- Pre-delay up to 2 seconds.
- Rotary encoder to quickly select responses (internal presets and the ones present on USB/SD).
- High-pass (12 dB/oct) filter with adjustable cutoff.
- Real-time pitch adjustment of response (-2 .. +2 octave).
- Dual mono (stereo pair) output.
- Record responses to USB. 23 s max.
- Use responses from USB.
- 4 modulation CV's:
 - Response sample position
 - Crossfade
 - Stereo width
 - Aux: Wet, Pitch & input level.
- Audition feature to quickly evaluate responses.
- High quality ALPS potentiometers.

Specifications

- 48 kHz stereo input
 - ECR+ : 114 dB input and output SNR
- 1.5" true color 128×128 pixel OLED
- USB2.0 port with USB stick included.
- Saves samples as 32 bit float stereo WAV files.

- 10 bit resolution and ~50 Hz refresh on potentiometer action.
- +12V, -12V powered (5V busboard line not used)
- Scratch proof and solvent proof anodized front plate.

Measurements

ECR-1:

- 130 mm / 25.6 HP wide
- approx 5cm deep (counting from the front plate)

ECR+:

- 131.9 mm / 26 HP wide
- approx 3cm deep (counting from the front plate)

Power consumption

ECR-1:

- +12V: 180 mA (idle) – 400 mA (longest reverbs and continuously modulating)
- 12V: 21 mA

ECR+:

- +12V: 180 mA (idle) – 270 mA (longest reverbs and continuously modulating)
- 12V: 30 mA

Troubleshooting

The ECR-1 receives a full functional test when leaving the factory. The v2.0.0 firmware has been meticulously tested for stability over a 24 hour period with all kinds of inputs and control changes. However, in the rare case of a crash or hang, or any other strange glitch, please contact us at info@tastychips.nl.

Things to keep in mind:

- Always turn the unit off for at least 10 seconds before powering back up again. Otherwise it might start up with unresponsive controls.

- The ECR-1 can be quickly reset without powering down your rack. Hold down the 4 buttons:

[Shift ↑, Record ●, Store ⏸, Play ▶] for 4 seconds. The screen will black out for a while, but the main screen will quickly re-appear.

Firmware upgrades

The ECR-1 can receive firmware upgrades or even alternative firmwares by replacing the DIMM (the Raspberry CM3 module) on the back of the unit. Firmware 2.0.0 is the last release that will be distributed this way. From firmware 2.0.0 onwards the ECR accepts updates via USB. Find firmware zip files at www.tastychips.nl.

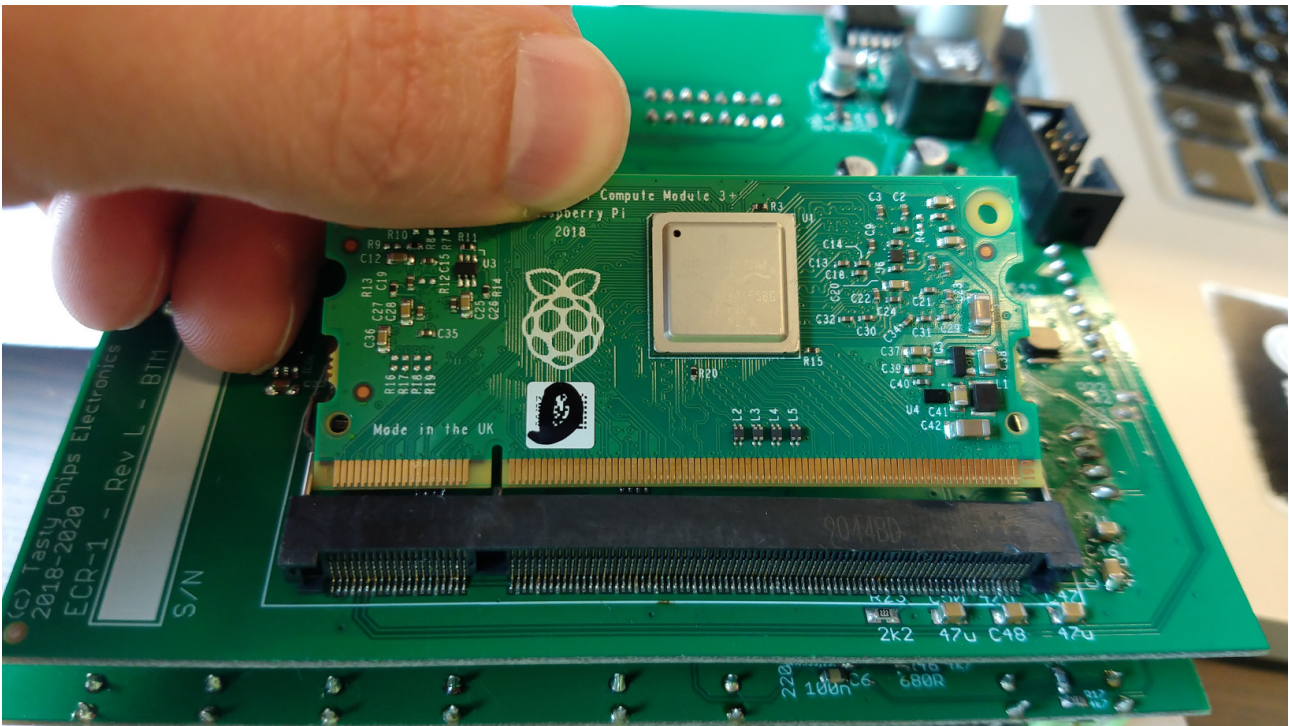
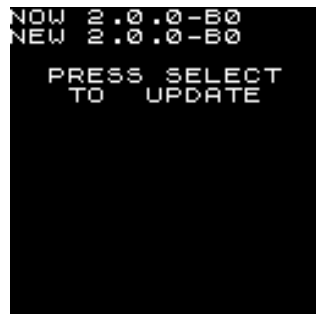


Illustration 1: Replacing the DIMM compute module on the back of the ECR-1.

Firmware update via USB



1. Download the firmware zip file from our site tastychips.nl **TODO: exact page**
2. Copy the file to the root of the USB stick.
3. Safely eject the stick from your PC, and insert it into your ECR's USB port. Wait a few seconds..
4. The ECR will now enter its update screen, waiting for you to press Select. If you don't press it it, will return to the main screen and resume normal operation after about 20 seconds.
5. The ECR will install and automatically restart. This shouldn't take more than 2 seconds.

You can now remove the USB stick and delete the ZIP file.

Credits

Internal reverbs are creative commons (CC BY-SA 3.0) <https://creativecommons.org/licenses/by-sa/3.0/> licensed responses that were available from openairlib.net. They're all resampled to 48 kHz: the ECR-1's native sample rate.

Falkland Palace Bottle Dungeon: Dr. Damian T. Murphy

Falkland Palace Royal Tennis Court: Dr. Damian T. Murphy

Hamilton Mausoleum: Dr. Damian T. Murphy

Lady Chapel, St Albans Cathedral: Audiolab, University of York

Marcin Gorzel

Gavin Kearney

Aglaia Foteinou

Sorrel Hoare

Simon Shelley

Middle tunnel: ?? Author unknown ?? Please contact us if you read this.

R1 Nuclear Reactor Hall: Audiolab, University of York, Dr. Damian T. Murphy

Terry's Factory Warehouse: Audiolab, University of York, Dr. Damian T. Murphy

York minster: Audiolab, University of York, Damian T. Murphy

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Contact

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