2hp — Turing Machine

- Manual PDF

Manual PDF

Using the 2hp TM to Create Melodic Material

The attached manual is for the **2hp TM**, a compact probabilistic random sequencer/CV generator. On its own, it does not quantize pitch, clock itself, or generate gates for note articulation beyond responding to an incoming trigger. But as a melodic utility in a Eurorack system, it can be very effective when paired with a **clock/trigger source**, **quantizer**, **VCO/voice**, and optionally **sample & hold, slew, logic, or modulation**.

What the module does

The **TM** outputs a **0–5V random control voltage** at its **OUT** jack whenever it receives a trigger or gate at **TRIG**.

Its key idea is that it does not behave like pure chaos all the time. Instead, it stores a sequence of step voltages and uses a **probability control** to decide whether each step changes or remains the same as the sequence advances.

Core controls

- **TRIG input**
- Advances/generates on incoming trigger or gate
- Threshold: **2.5V**
- **PROB knob + PROB CV**

- Far left = **100% probability** of generating a new random voltage for the active step
- Far right = **0% probability**, effectively locking the existing sequence
- **STEPS knob + STEPS CV**
- Sequence length from **1 to 32 steps**
- **AMP knob**
- Scales output range from **0V to 5V**
- **OUT**
- Random/stored sequence CV output, **0–5V**

Musical interpretation

This is best thought of as a **Turing Machine-style looping random melody source**: - At high probability settings, the melody changes constantly. - At low probability settings, the melody becomes increasingly repeatable. - At 0% probability, it acts like a locked sequence. - Changing **STEPS** changes phrase length. - Changing **AMP** changes melodic range before quantization.

That makes it very useful for: - generative melodies - evolving basslines - semi-repeating motifs - controlled random transposition - modulation of melodic parameters

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How to patch it for melody

1. Basic generative melody patch

Patch

- **Clock/trigger source → TM TRIG**
- **TM OUT → quantizer IN**
- **quantizer OUT → VCO 1V/oct**
- Same clock or a related gate pattern → **envelope/gate input**

- Envelope → **VCA**
- VCO → **filter/VCA/audio chain**

What happens

Each trigger advances the TM. The output voltage is quantized into musical notes, giving you a melody.

Suggested settings

- **PROB** around 9–12 o'clock for evolving repetition
- **STEPS** around 5–8 for short melodic phrases
- **AMP** around 10–1 o'clock to keep pitch movement in a usable range

Why it works

The quantizer turns the TM's raw random voltages into scale tones. The TM's probability memory gives the result more structure than pure sample-and-hold randomness.

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2. Locked looping melody

Patch

Same as above.

Settings

- First, turn **PROB** left so new values are written often.
- Let it run until you hear a phrase you like.
- Then turn **PROB** fully right to **lock the sequence**.

Result

You now have a repeating melodic loop with up to **32 steps**.

Performance trick

Momentarily bring PROB left to let a few notes mutate, then return right. This gives subtle phrase evolution without losing the identity of the melody.

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3. Controlled random bassline

Patch

- Trigger sequencer / clock divider → **TM TRIG**
- **TM OUT** → quantizer set to minor pentatonic / minor scale
- Quantizer out → bass VCO
- Gate pattern → envelope → VCA

Settings

- **STEPS**: 4–8
- **AMP**: low to medium
- **PROB**: low, around 1–3 o'clock if you want mostly stable looping with occasional mutation

Result

Because the output range is reduced with **AMP**, the quantizer sees a narrower CV span, which often creates tighter melodic contours suitable for basslines.

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4. Melodic phrases with variable length

Patch

- Clock → **TM TRIG**
- Slow LFO / random CV / sequencer row → **STEPS CV**
- **TM OUT** → quantizer → voice pitch

Result

The phrase length changes over time, causing the melodic cycle to shift.

Musical use

This is great for: - non-repeating ambient melodies - phase-like pattern changes - evolving techno arps

Tip

Subtle modulation of **STEPS CV** tends to be more musical than wild jumps.

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5. Varying predictability over time

Patch

- Clock → **TM TRIG**
- Slow LFO, envelope, or another random source → **PROB CV**
- **TM OUT** → quantizer → oscillator pitch

Result

The melody moves between: - highly unstable / novel - semi-repetitive - fully locked

Musical use

This is one of the strongest features of the module. You can automate tension and release: - verses: lower probability, more repeatability - transitions: higher probability, more mutation - breakdowns: fully random - choruses: locked phrase

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Best companion modules for melodic use

Since TM is only one module, the "used together" part really means how it works alongside other common Eurorack categories.

1. Quantizer

This is the most important partner.

TM outputs **continuous random CV from 0–5V**, not discrete musical notes. A quantizer converts that into a scale.

Good uses

- Major/minor tonal melodies
- Pentatonic ambient lines
- Modal sequences
- Arpeggio-like note sets

Tip

If the quantizer supports transposition, feed a second CV source into transpose for harmonic movement while TM handles note selection.

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2. Clock / trigger source

TM needs external timing.

Good trigger sources

- steady clock for regular melodies
- Euclidean trigger generator for asymmetrical note timing
- gate sequencer for rhythmic melody placement

- clock divider/multiplier for slower or faster melodic movement

Tip

Changing the trigger rhythm changes the perceived sequence as much as changing the pitch data.

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3. Oscillator or complete synth voice

Once quantized, TM can drive: - a sine or triangle oscillator for simple melodies - a wavetable VCO for animated lead lines - a complex oscillator for experimental phrases - a full voice module for compact patches

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4. Envelope + VCA

TM does not produce note gates for articulation by itself beyond reacting to incoming triggers. So you usually pair the same trigger source, or a related rhythm source, with an envelope/VCA path.

Patch logic

- trigger source branches:
- one copy to **TM TRIG**
- one copy to **envelope gate**
- TM controls pitch
- envelope controls note articulation

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5. Slew limiter / glide

Placing a slew after the quantizer or before the oscillator can create: - portamento - gliding random melodies - smooth ambient pitch transitions

Very effective for generative melodic textures.

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6. Sample & hold / switch / sequential switch

These can further structure TM's output.

Ideas

- Sample the TM less often than it is clocked
- Alternate between TM and another sequencer
- Use a switch to route TM to different voices
- Create call-and-response melodies

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7. Precision adder / offset

Since TM outputs 0–5V, you may want to control register.

Uses

- transpose the melody up/down
- constrain the note center
- combine TM with another sequencer row
- create harmonic movement over a static TM phrase

Practical melodic patch examples

Patch A: Ambient generative lead

- Slow clock → **TM TRIG**
- **TM OUT** → quantizer set to Dorian
- Quantizer → VCO pitch
- Same clock → envelope
- Envelope → LPG/VCA
- Slow triangle LFO → **PROB CV**

- Slow random CV → **STEPS CV**

Outcome

A self-evolving melody with recurring fragments and shifting phrase lengths.

Patch B: Techno riff generator

- 16th-note trigger pattern → **TM TRIG**
- **TM OUT** → quantizer in minor scale
- Quantizer → acid-style VCO pitch
- Trigger pattern → short envelope → VCA/filter env
- **PROB** low enough to preserve groove
- **STEPS** at 8 or 16

Outcome

A stable but mutable riff generator. Great for live performance by nudging PROB.

Patch C: Bass + lead derived from one source

- Clock → **TM TRIG**
- **TM OUT** multed to:
- quantizer 1 → bass oscillator
- quantizer 2 or shifted copy → lead oscillator
- Use different trigger divisions for each envelope

Outcome

Correlated melodic layers from the same evolving sequence.

Patch D: TM as melodic modulation, not primary pitch

Instead of controlling oscillator pitch directly: - **TM OUT** → quantizer → oscillator FM amount CV - or **TM OUT** → filter cutoff CV - or **TM OUT** → wavefolder symmetry

Outcome

You preserve a fixed melody elsewhere while TM adds pseudo-melodic internal motion.

Strengths of the TM for melody

1. Repeatability without rigidity

It sits between random source and sequencer.

2. Excellent for live improvisation

One knob move on **PROB** can move the patch from chaos to motif.

3. Compact

At **2hp**, it gives a lot of melodic utility in very little space.

4. Good phrase control

STEPS from **1–32** lets it do anything from drones to long evolving patterns.

5. Range control via AMP

This is deceptively useful. Lowering amplitude before quantization can keep melodies focused and musical.

Limitations to keep in mind

1. No built-in quantizer

You will usually want an external quantizer for tonal melodies.

2. No internal clock

Needs external triggers.

3. No explicit reset input

This means phrase alignment with other sequencers may be less exact than with a traditional sequencer.

4. Output is unipolar 0–5V

Depending on your oscillator and quantizer, this can span a wide register. You may want attenuation, offset, or transposition management.

Best workflow for composing melodic parts

A strong musical workflow with TM is:

1. **Clock it**

2. **Quantize it**
3. **Set a musical scale**
4. **Adjust AMP** for range
5. **Set STEPS** for phrase length
6. **Set PROB** for stability vs mutation
7. **Lock** the sequence when you find a phrase you like
8. Modulate **PROB CV** and **STEPS CV** slowly for long-term evolution

This makes TM especially strong for: - ambient - Berlin-school style generative sequencing - minimal techno - experimental tonal patches - evolving soundtrack textures

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Summary

The **2hp TM** is best used as a **probabilistic CV melody source**. It becomes a powerful melodic tool when combined with: - a **trigger/clock source** - a **quantizer** - a **voice or oscillator** - and optionally **CV modulation, slew, switching, or transposition**

Its musical sweet spot is generating phrases that feel **alive, semi-repeatable, and gradually mutating**, rather than fully programmed or fully random.

If you want, I can also turn this into: 1. a **patch recipe list**, 2. a **beginner-friendly explanation**, 3. or a **“best companion modules” table**.