Synth Studio v3.3 - Composition Manual

The .synth file format is simply a text file (JSON format) that tells the synth engine what to play. You can edit these files in Notepad, TextEdit, or VS Code.

1. File Structure (The Skeleton)

Every file starts with curly braces { }. Inside, you define the global settings and your tracks.

```
{
  "bpm": 120,
  "loop": true,
  "length": 4.0,
  "tracks": [
    {
      "wave": "sine",
      "notes": []
    }
  ]
}
```

Global Settings

- **"bpm"**: (Integer) Beats Per Minute. Controls the speed of the song.
- **"loop"**: (Boolean) true to repeat endlessly, false to play once and stop.
- **"length"**: (Float) The total length of the loop in beats.
  - *Tip:* If you set this to 4.0, the loop will restart exactly when beat 4 ends.

2. The Sound Bank (Wave Types)

You can set the instrument for an entire track, or change it for a single note.

Wave Name	Sound Character	Best Used For
"sine"	Smooth, pure, round.	Sub-bass, simple melodies.
"triangle"	Mellow but brighter than sine.	Flute-like leads, soft chords.
"square"	Hollow, woody, retro game sound.	NES-style leads, bass.

"sawtooth"	Buzzing, sharp, aggressive.	High energy leads, heavy bass.
"noise"	**(NEW)** Pink Noise. Deep static.	Drums (Snares, Hi-hats), wind fx.
"bell"	Metallic, ringing, FM-style.	Chimes, melody accents.
"organ"	Harmonic, church-like.	Chords, background pads.
"trance"	Thick, detuned, wide.	Dance music leads (Supersaw).
"scifi"	Wobbly, alien modulation.	FX, weird intros.
"crush"	Lo-fi, crunchy, distorted.	Glitchy textures.

3. Writing Tracks & Notes

A **Track** is a collection of notes that usually share the same instrument.

```
{
  "wave": "sawtooth",
  "notes": [
    { "time": 0.0, "note": "C4", "dur": 0.5, "vol": 0.8 }
  ]
}
```

Note Parameters

Every note inside the [] brackets needs these parameters:

1. **"time"**: (Float) When the note starts (in Beats).
   - 0.0: Start of the song.
   - 1.0: Start of the 2nd beat.
   - 0.5: The "and" of the 1st beat (eighth note).
   - 0.25: Sixteenth note.
2. **"note"**: (String) The Pitch.
   - Format: NoteName + Octave.
   - Examples: "C4" (Middle C), "A#2" (Low sharp), "F5".
   - *Note:* Use Sharps (#) instead of Flats (b). Use "D#" not "Eb".
3. **"dur"**: (Float) Duration. How long the note lasts in beats.
   - 1.0: Quarter note.

- ○ 0.5: Eighth note.
4. **"vol"**: (Float) Volume, from 0.0 (silent) to 1.0 (max).
5. **"wave"** (Optional): Overrides the track's sound for this specific note.

4. How to Make Drums

Since v3.3 uses **Pink Noise**, you can make realistic drum patterns by varying the duration and volume of noise notes.

- **Hi-Hats:** Short duration, low octave (pitch doesn't matter much for noise, but keeps it organized).
  - ○ {"time": 0.0, "note": "C1", "dur": 0.05, "vol": 0.3, "wave": "noise"}
- **Snares:** Longer duration, louder volume.
  - ○ {"time": 1.0, "note": "C1", "dur": 0.15, "vol": 0.8, "wave": "noise"}

5. Complete Example: "Cyber Punk Beat"

Copy this into a new text file and save it as cyber.json.

```
{
  "bpm": 128,
  "loop": true,
  "length": 4.0,
  "tracks": [
    {
      "comment": "--- KICK & SNARE (Noise) ---",
      "wave": "noise",
      "notes": [
        { "time": 0.0, "note": "C1", "dur": 0.1, "vol": 0.9 },
        { "time": 1.0, "note": "C1", "dur": 0.2, "vol": 0.9 },
        { "time": 2.0, "note": "C1", "dur": 0.1, "vol": 0.9 },
        { "time": 3.0, "note": "C1", "dur": 0.2, "vol": 0.9 }
      ]
    },
    {
      "comment": "--- FAST HI-HATS ---",
      "wave": "noise",
      "notes": [
        { "time": 0.5, "note": "C1", "dur": 0.05, "vol": 0.4 },
        { "time": 1.5, "note": "C1", "dur": 0.05, "vol": 0.4 },
        { "time": 2.5, "note": "C1", "dur": 0.05, "vol": 0.4 },
        { "time": 3.5, "note": "C1", "dur": 0.05, "vol": 0.4 }
      ]
    },
    {
```

```
  "comment": "--- BASSLINE ---",
  "wave": "sawtooth",
  "notes": [
    { "time": 0.0, "note": "C2", "dur": 0.25, "vol": 0.7 },
    { "time": 0.25, "note": "C2", "dur": 0.25, "vol": 0.6 },
    { "time": 0.5, "note": "G1", "dur": 0.25, "vol": 0.7 },
    { "time": 1.5, "note": "F2", "dur": 0.5,  "vol": 0.7 }
  ]
},
{
  "comment": "--- ARPEGGIO ---",
  "wave": "square",
  "notes": [
    { "time": 0.0, "note": "C4", "dur": 0.1, "vol": 0.5 },
    { "time": 0.75, "note": "G4", "dur": 0.1, "vol": 0.5 },
    { "time": 1.5, "note": "A#4", "dur": 0.1, "vol": 0.5 },
    { "time": 2.25, "note": "C5", "dur": 0.1, "vol": 0.5 }
  ]
}
]
}
```

6. Pro Tips

1. **Chords:** To make a chord, simply write multiple notes with the exact same "time".
2. **Live FX:** You cannot control the Filter or Delay inside the .synth file. You must control those with your arrow keys and spacebar while the song plays.
3. **Silence:** To add a rest/silence, simply don't put a note there.