

PLAYER SYSTEM — FULL EXPANDED SPECIFICATION (v2.0)

NOTE

This document **supplements** but **does not replace** Living_Bible_v4.0. The Living Bible defines the metaphysics, lore, rituals, and universal laws. This Player System defines the *mechanical and technical foundation* of how a player behaves within the Resonantia Combat Engine.

Both documents operate in parallel: - Living Bible = Philosophy, metaphysics, universe logic. - Player System = Gameplay implementation, formulas, structure.

1. PLAYER CORE ARCHITECTURE

1.1 Primary Stats

These represent the player's raw physical and metaphysical attributes. - **HP (Health Points)** — Maximum & current health. - **Armor** — Flat reduction applied before HP. - **Energy (0-10)** — Required to play cards. - **Resonance (0-100)** — Player's sync with The Pulse. - **Crit Chance (%)** — Chance to deal critical damage. - **Crit Damage (x multiplier)** — Total output when crit triggers. - **Beat Accuracy (%)** — Consistency in hitting beat windows. - **Drop Reaction (%)** — Ability to react to drops/peaks. - **BPM Sync Tolerance (ms)** — Player forgiveness window.

1.2 Secondary Stats

Automatically derived using primary stats & Resonance. - **Effective HP:** $HP + \text{Armor} \times \text{mitigation value}$. - **Damage Multiplier:** Base multiplier affected by Resonance. - **Speed Modifier:** Affects animation timings. - **Heal Efficiency:** Affects healing card performance.

1.3 Hidden Stats (used internally)

- **Rhythm Stability Index** — Measures consistency over time.
 - **Resonance Drift Value** — How fast resonance decays.
 - **Trigger Responsiveness** — Latency compensation.
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2. PLAYER STATES

States define the internal machine behavior.

2.1 Major States

- **Idle:** Awaiting beat or player input.
- **Listening:** BeatDetector actively scanning waveform.
- **Beat Window Active:** Player can act.
- **Card Charging:** Player pre-emptively holds a card.
- **Trigger Response:** Player reacting to drop/peak/bass.
- **Low HP (<30%) State:** Gains panic bonuses.
- **Overdrive State:** Maximum resonance, boosted output.

2.2 Overdrive Conditions

- Resonance ≥ 100
- BPM Sync Stability $\geq 85\%$
- No recent "Miss" in last 5 beats

Overdrive lasts **8 beats** unless refreshed.

3. ENERGY LOOP — FULL SYSTEM

Energy is the player's resource to deploy cards.

3.1 Energy Sources

- **+1 Energy per Beat Hit**
- **+2 on Perfect Beat**
- **+3 on Drop Trigger**
- **+5 on Peak Trigger (rare)**
- **+1 for 10-Beat Combo Chain**

3.2 Energy Loss

- **Miss (timing fail): -1**
- **Card Fumble (played outside window): -2**
- **Resonance Collapse: -3**

3.3 Energy Cap Effects

Default: 10 (expandable via progression) - If Energy = 10 and gain occurs → Player generates **Resonance Surge (+5 resonance)** instead.

4. DAMAGE SYSTEM (FULL FORMULAS)

Damage output depends on: 1. Card Base Value 2. Beat Accuracy 3. Resonance State 4. Player Stats (Crit, Multiplier) 5. Drop Effects

4.1 Damage Formula

$$\text{Damage} = \text{Base} \times \text{BeatMod} \times \text{ResonanceMod} \times \text{CritMod} \times \text{TriggerMod}$$

4.2 Beat Window Modifiers

- Perfect ($\pm 80\text{ms}$): $\times 1.50$
- Good ($\pm 150\text{ms}$): $\times 1.20$
- Poor ($\pm 250\text{ms}$): $\times 1.00$
- Miss ($> 250\text{ms}$): $\times 0.00$

4.3 Resonance Modifiers

- Normal: $\times 1.00$
- Elevated: $\times 1.10$
- Charged: $\times 1.25$
- Overdrive: $\times 1.50$

4.4 Critical Hit Logic

```
If random() < CritChance: CritMod = CritDamage
Else: CritMod = 1.0
```

4.5 Trigger Modifiers

- Drop: $\times 1.30$
- Peak: $\times 1.50$
- Bass Hit: $\times 1.15$

5. RESONANCE SYSTEM — FULL MODEL

Resonance is the metaphysical connection between player and The Pulse.

5.1 Resonance Gains

- Beat Hit: +2
- Perfect: +4
- Drop Trigger: +12
- Peak Trigger: +20
- Bass Hit Trigger: +6

5.2 Resonance Loss

- Miss: -5
- Card Fumble: -8
- Idle Too Long: -1 per 2 seconds

5.3 Resonance Stages Breakdown

Stage 1 — Normal (0-39)

- No bonus

Stage 2 — Elevated (40-69)

- +10% damage
- +5% energy gain

Stage 3 — Charged (70-99)

- +25% damage
- +10% crit chance
- -10% decay

Stage 4 — Overdrive (100)

See states above.

6. COMBAT RHYTHM ENGINE — FULL TECHNICAL

6.1 Beat Sync Logic

Beat interval:

```
beatInterval = 60 / BPM
```

Each frame:

```
currentTime = audioPlayer.get_playback_position()
expectedBeat = lastBeatTime + beatInterval
window = abs(currentTime - expectedBeat)
```

6.2 Timing Windows

```
if window ≤ 0.080: PERFECT
elif window ≤ 0.150: GOOD
elif window ≤ 0.250: POOR
else: MISS
```

7. PLAYER-CARD INTERACTION (ADVANCED)

7.1 Card Requirements

- Energy cost
- Beat timing
- Optional trigger timing
- Player state (cannot play while stunned, etc.)

7.2 Output Logic

```
if BeatWindow == MISS:
    Card fails
else:
    Execute card
```

7.3 Synergy System

Some cards gain bonuses if played: - During Overdrive - On Drop/Peak - On specific beat numbers (4, 8, 16, 32...)

8. TRIGGER REACTION — FULL TABLE

Trigger	Energy	Resonance	Bonus Effect
Drop	+3	+12	30% dmg

Trigger	Energy	Resonance	Bonus Effect
Peak	+5	+20	50% dmg
Bass Hit	+1	+6	Minor buff

9. PROGRESSION SYSTEM — FULL TREE OUTLINE

Level Up Rewards

- +HP
- +Armor
- +Energy Cap
- +Crit Chance
- +Resonance Decay reduction
- Unlock passive abilities

Passive Ability Categories

- Rhythm Mastery
- Drop Affinity
- BPM Stability
- Resonance Flow
- Energy Channeling

10. FULL JSON SCHEMA (EXTENDED)

```
{
  "player": {
    "stats": {
      "hp": 100,
      "armor": 0,
      "energy": 3,
      "crit_chance": 0.05,
      "crit_damage": 1.5,
      "sync_tolerance": 0.150,
      "resonance": 0
    },
    "progression": {
      "level": 1,
      "xp": 0,
      "xp_next": 100,

```

```
    "talents": []  
  },  
  "states": {  
    "overdrive": false,  
    "low_hp": false  
  }  
}  
}
```

11. GODOT IMPLEMENTATION — LOW LEVEL

11.1 Key Scripts

- Player.gd
- RhythmEngine.gd
- TriggerManager.gd
- CombatManager.gd
- CardExecutor.gd

11.2 Mandatory Functions

- process_beat()
- process_trigger()
- apply_damage()
- apply_resonance()
- update_state()
- handle_card()
- enter_overdrive()
- exit_overdrive()

12. FUTURE EXPANSIONS

- House-based stat multipliers
- Weapon/Artifact system
- Solo/Co-op modes
- Player roles (DPS/Tank/Support)
- Skill trees per House
- Resonance mutations
- Shadow Overdrive mechanic