PLAYER SYSTEM — COMPLETE SPECIFICATION (v1.0)

1. PLAYER CORE ARCHITECTURE

1.1 Base Stats

- HP (Health Points)
- Armor
- Energy
- Resonance Level
- Crit Chance
- Crit Damage
- Beat Accuracy Rating
- Drop Reaction Rating
- BPM Sync Tolerance

1.2 Derived Stats

- Effective HP
- Damage Multiplier
- Speed Modifier
- Heal Efficiency

1.3 States

- Idle
- Beat Listening
- Beat Window Active
- Card Charging
- Trigger Response
- Low HP State (<30%)
- Overdrive State

2. ENERGY LOOP

- Energy Pool (0-10)
- Gain per Beat
- Gain per Drop Trigger
- Consumption per Card
- Bonus from Perfect Beat chains

2.1 Energy Events

- On Beat: +1 Energy
- On Perfect Sync: +2 Energy
- On Drop Trigger: +3 Energy

- On Miss: -1 Energy

3. DAMAGE SYSTEM

3.1 Damage Types

- Base Damage
- Beat Damage
- Drop Damage
- Crit Damage
- Overdrive Damage

3.2 Damage Formula

Damage = (Card Base × Player Multiplier) × Beat Window Modifier × Resonance State

3.3 Beat Window Types

- Perfect (±80ms)
- Good (±150ms)
- Poor (±250ms)
- Miss (>250ms)

3.4 Beat Window Modifiers

- Perfect: ×1.5
- Good: ×1.2
- Poor: ×1.0
- Miss: 0

4. RESONANCE SYSTEM

4.1 Resonance Meter

- Fills with every beat hit
- Fills more with drop triggers
- Decays on misses

4.2 Resonance Stages

1. Normal
2. Elevated
3. Charged
4. Overdrive

4.3 Overdrive Bonuses

- +30% Damage

- +20% Energy Generation
- +10% BPM Sync Tolerance

5. COMBAT RHYTHM ENGINE

5.1 Core Loop

1. Audio Playing
2. Beat Detector Running
3. Player Input
4. Timing Window Calculation
5. Outcome Determined
6. Card Activated
7. Trigger Effects Applied

5.2 Timing Sync

- AudioStreamPlayer Position → Beat Interval
- Beat Δ = |inputTime – expectedBeat|

5.3 Window Definitions

- perfectWindow = 0.080s
- goodWindow = 0.150s
- poorWindow = 0.250s

6. PLAYER–CARD INTERACTION

6.1 Card Requirements

- Energy Cost
- Timing Requirement
- Trigger Requirement (optional)

6.2 Card Output

- Damage
- Armor
- Heal
- Buff/Debuff

6.3 Multipliers

FinalValue = CardValue × BeatModifier × ResonanceModifier × TriggerBonus

7. TRIGGER REACTION SYSTEM

7.1 Trigger Types

- Drop
- Peak
- Bass Hit

7.2 Player Responses

- Damage Spike
- Energy Surge
- Overdrive Entry
- Armor Surge

8. PROGRESSION SYSTEM

8.1 XP Events

- Victory
- Beat Chains
- Trigger Perfects

8.2 Level Rewards

- Stat Points
- Resonance Expansion
- Energy Cap increase

9. JSON SCHEMA

```
{
  "player": {
    "hp": 100,
    "armor": 0,
    "energy": 3,
    "resonance": 0,
    "stats": {
      "crit_chance": 0.05,
      "crit_damage": 1.5,
      "sync_tolerance": 0.15
    },
    "progression": {
      "level": 1,
      "xp": 0,
      "next_level": 100
    }
```

```
    }
}
```

10. GODOT IMPLEMENTATION

10.1 Nodes

- Player
- BeatDetector
- CombatManager
- CardHand

10.2 Signals

- onBeat
- onPerfect
- onDrop
- onPlayerDamage
- onPlayerEnergyChange

10.3 Script Functions

- apply_damage()
- grant_energy()
- apply_resonance()
- enter_overdrive()

11. FUTURE EXPANSIONS

- House-based modifiers
- Player equipment
- Skill trees
- Resonance perks
- Card mastery system