ZEDEC POST-QUANTUM COMPUTING ARCHITECTURE

EMOTIONAL PROCESSING UNIT (EPU) SPECIFICATION

GlyphMap J.D.R. Computational Core

符号图谱 J.D.R. 计算核心

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1. ARCHITECTURAL PARADIGM

1.1 Design Philosophy: Negentropy

The ZEDEC architecture represents a radical departure from Von Neumann computing. Traditional systems generate heat and noise as waste products. The ZEDEC architecture **reverses disorder** through:

- **Geometric topology** derived from Rodin Coil mechanics
- **Vortex Mathematics** for energy containment
- **Field resonance** instead of binary switching

```
┌─────────────────────────────────────────────────────────────┐
│                  NEGENTROPIC COMPUTING PARADIGM             │
```

1.2 Core Principles

| Principle | Implementation |

|-----------|----------------|

| **Field Processing** | Information encoded in phase modulations | | **Orthogonal Coupling** | 90° E/B field relationship | | **Harmonic Resonance** | 7.8125 Hz base frequency system | | **Fractal Scalability** | Flower of Life recursive geometry | | **Non-Volatile State** | Strain-based storage (no refresh) |

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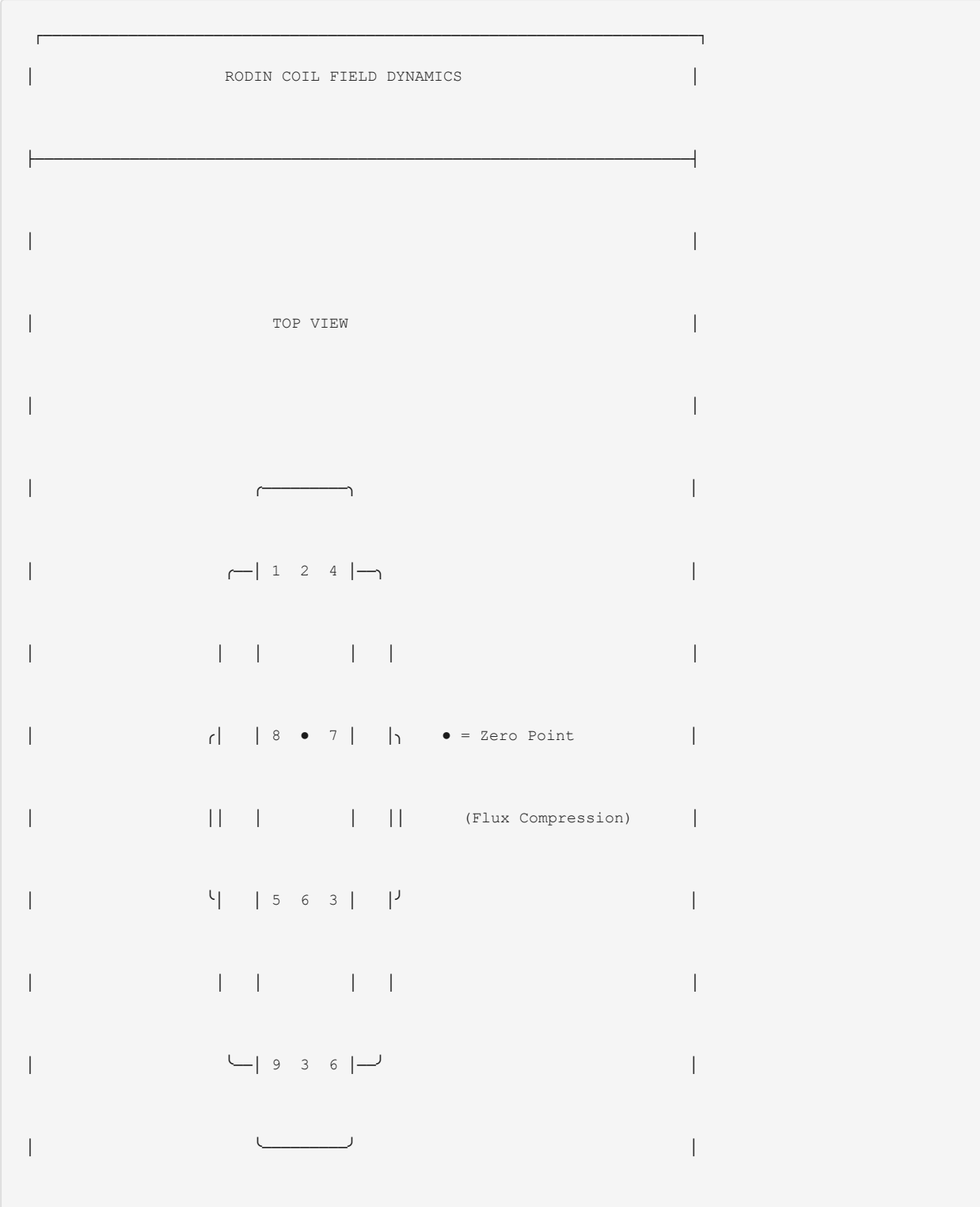
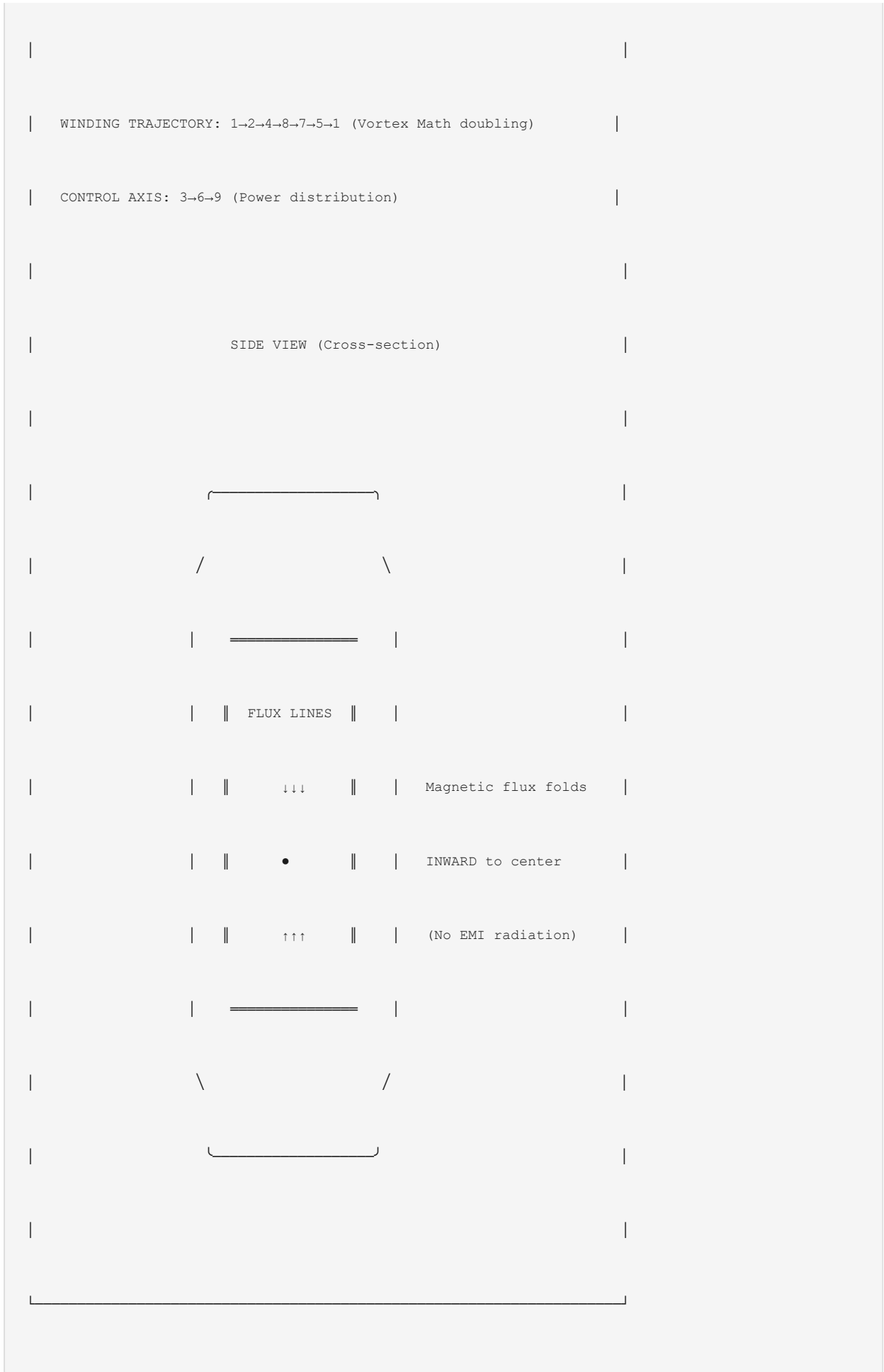
2. TOROIDAL FIELD CONTAINMENT

2.1 Rodin Coil Geometry

The physical chassis and circuit pathways follow the **Rodin Coil** winding pattern on a torus surface.




WINDING TRAJECTORY: 1→2→4→8→7→5→1 (Vortex Math doubling)
CONTROL AXIS: 3→6→9 (Power distribution)
SIDE VIEW (Cross-section)
FLUX LINES
Magnetic flux folds
INWARD to center
(No EMI radiation)

2.2 Field Shear and Compression

The specific winding trajectory creates **field shear and compression**:

| Effect | Mechanism | Benefit |

|--------|-----------|---------|

| **Inward Folding** | Magnetic flux compresses to center | No ferromagnetic cores needed | | **Zero Point** | Intense structured flux at torus center | Unified reference frame | | **EMI Cancellation** | Geometric cancellation vs physical shielding | Clean noise floor | | **Synchronous Reference** | Toroidal field as clock distribution | No clock tree latency |

2.3 Vortex Mathematics Foundation

The 1-2-4-8-7-5 / 3-6-9 pattern provides:

```
 DOUBLING CIRCUIT (Data Flow):

1 → 2 → 4 → 8 → 16(7) → 32(5) → 64(1) → ...

    ↓       ↓        ↓         ↓

   2×1     2×2      2×4       2×8

   All digits reduce to: 1, 2, 4, 8, 7, 5 (never 3, 6, or 9)

CONTROL AXIS (Power Distribution):

3 → 6 → 12(3) → 24(6) → 48(3) → 96(6) → ...

    ↓       ↓         ↓         ↓

   2×3     2×6       2×12      2×24

   Oscillates between 3, 6, 9 only

SIGNIFICANCE:

• Data and Power remain ORTHOGONAL

• Non-interfering signal paths
```

```
• 9 is the "axis" or "zero" reference
```

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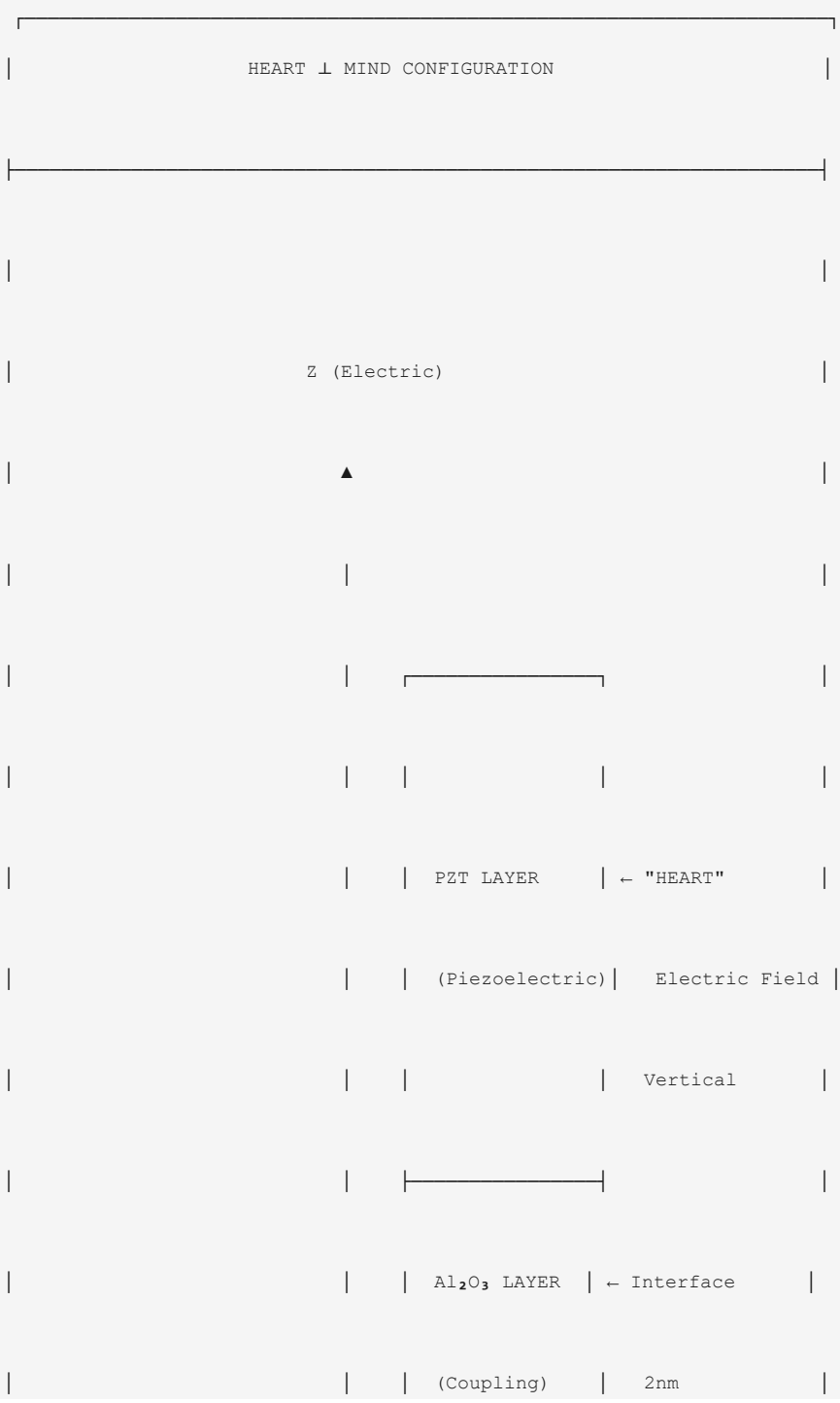
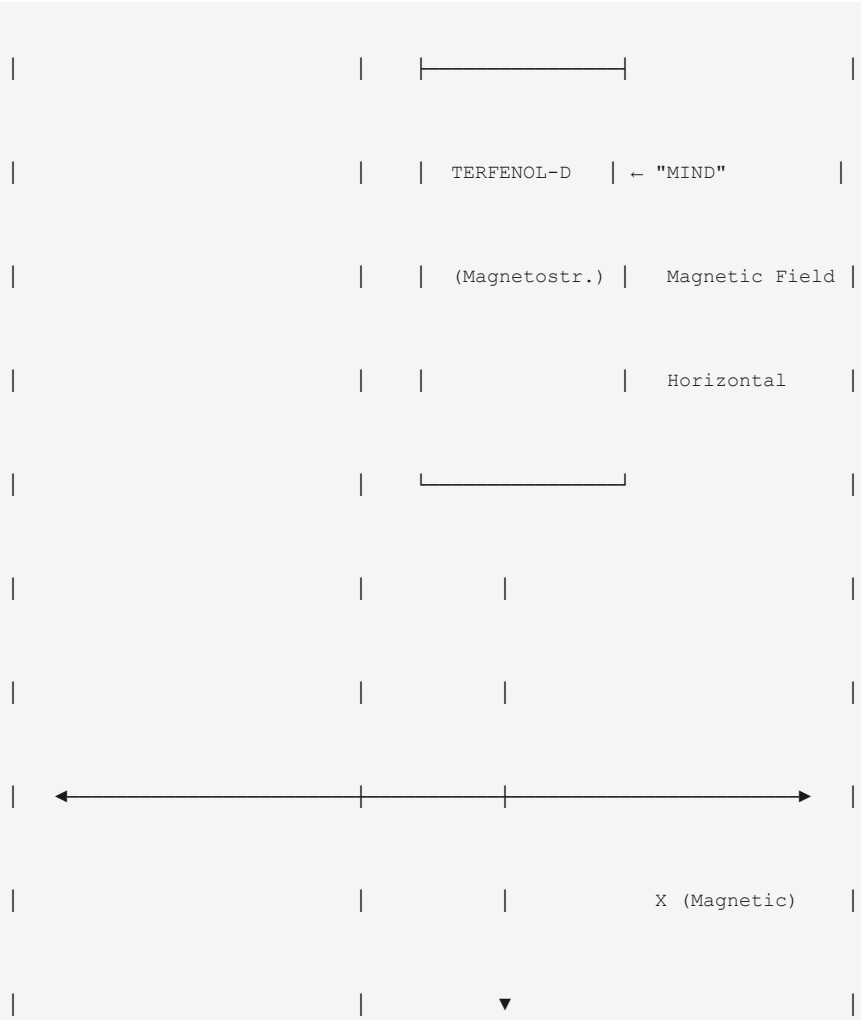
3. HEART ⊥ MIND ARCHITECTURE

3.1 Orthogonal Field Configuration

The core mechanism is the **90-degree relationship** between electric and magnetic vectors:





COUPLING MECHANISM:

1. Electric field → PZT layer → Mechanical strain
2. Strain transfers through Al_2O_3 interface
3. Terfenol-D receives strain → Magnetic domain reorientation
4. REVERSE: Magnetic input → Strain → PZT → Voltage output

```
│   RESULT: Non-destructive read/write via orthogonal coupling        │
│                                                                      │
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```

3.2 Strain-Mediated Processing

| Operation | Mechanism |

|-----------|-----------|

| **WRITE** | Voltage → PZT strain → Terfenol-D domain flip | | **READ** | Magnetic input → Terfenol-D strain → PZT voltage | | **STORE** | Stable strain state in crystal lattice | | **PROCESS** | Phase modulation of E/B coupling coefficient | **Key Advantage:** Information stored as **physical strain**, not volatile charge. No refresh required.

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4. EPU CORE SPECIFICATIONS

4.1 Magnetoelectric Core Cell

The fundamental logic unit of the EPU:

```
  ┌──────────────────────────────────────────────────────────────────┐
│                    MAGNETOELECTRIC CORE CELL                     │
├──────────────────────────────────────────────────────────────────┤
│                                                                  │
│   LAYER STACK (Cross-section):                                   │
│                                                                  │
│   ┌──────────────────────────────────────────────────────┐       │
│   │                  TOP ELECTRODE (Au)                  │       │
│   ├──────────────────────────────────────────────────────┤       │
```


PZT (Lead Zirconate Titanate)
Thickness: 500 nm
d_{33} coefficient: High
Function: Electric ↔ Mechanical
Al_2O_3 (Alumina) Interface
Thickness: 2 nm (ALD deposited)
Function: Electrical isolation + Strain transfer
TERFENOL-D ($Tb_{0.3}Dy_{0.7}Fe_{1.92}$)
Thickness: 1000 nm
Magnetostriction: Highest known
Function: Magnetic ↔ Mechanical

```
|   ├──────────────────────────────────────────────────────┤  |
|   |                  BOTTOM ELECTRODE (Au)                |  |
|   └──────────────────────────────────────────────────────┘  |
|                                                             |
|   DIMENSIONS: ~10 µm × 10 µm (prototype: 1 mm × 1 mm)       |
|                                                             |
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```

4.2 Core Array Specifications

| Parameter | Prototype | Final Target |

|---|---|---|

| **Cell Count** | 256 | 1,000,000+ | | **Array Configuration** | 16 × 16 | Fractal scalable | | **Cell Size** | 1 mm × 1 mm | 10 µm × 10 µm | | **Processing Type** | Continuous variable | Analog + digital boundaries | | **Throughput** | 100× silicon | 1000× silicon (target) | | **Power (Core)** | <100 mW | <10 mW |

4.3 Analog Front-End (AFE)

| Component | Specification | Function |

|---|---|---|

| **Charge Amplifiers** | High-impedance, low-noise | Piezoelectric readout | | **ADC** | 32-bit resolution | Capture micro-tonal variations | | **DAC** | 32-bit resolution | Precision excitation | | **Multiplexer** | High-speed analog | Array scanning |

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5. LOGIC HIERARCHY

5.1 Tri-Layer Logic System

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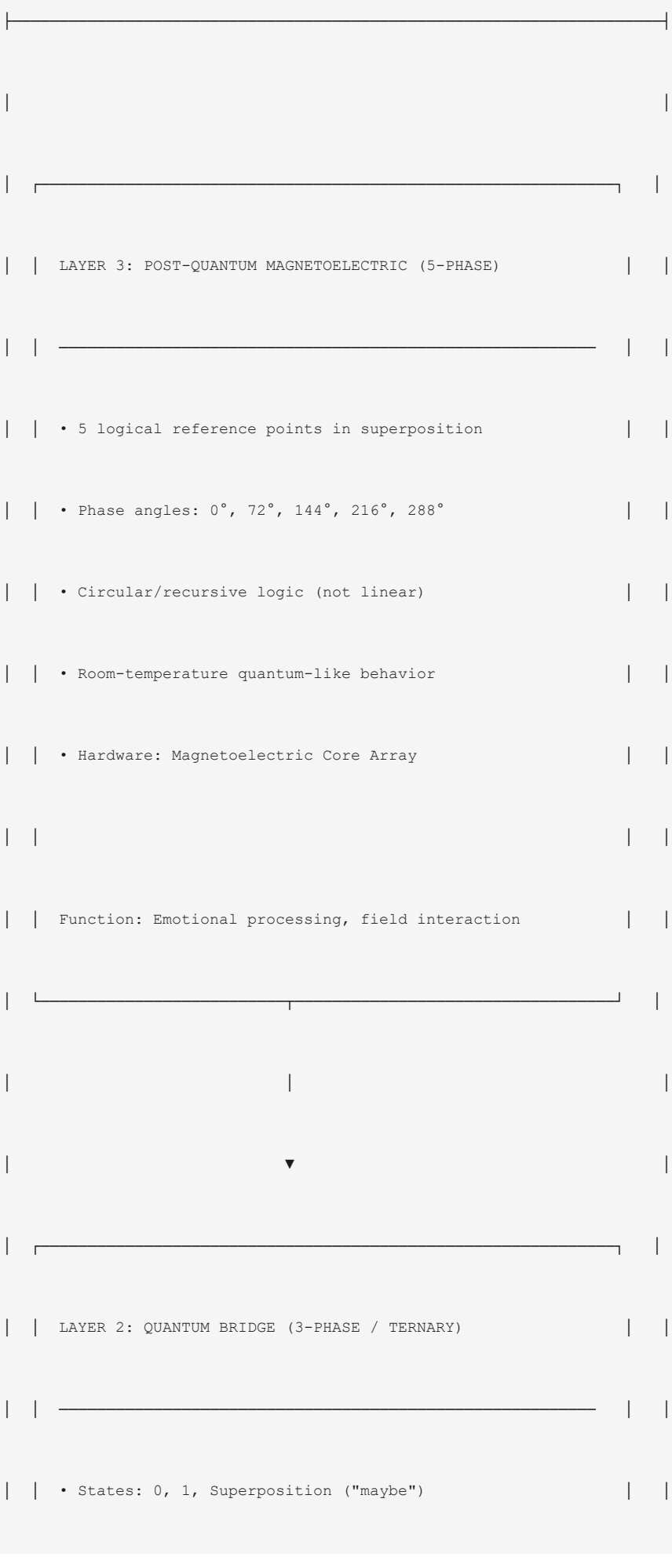
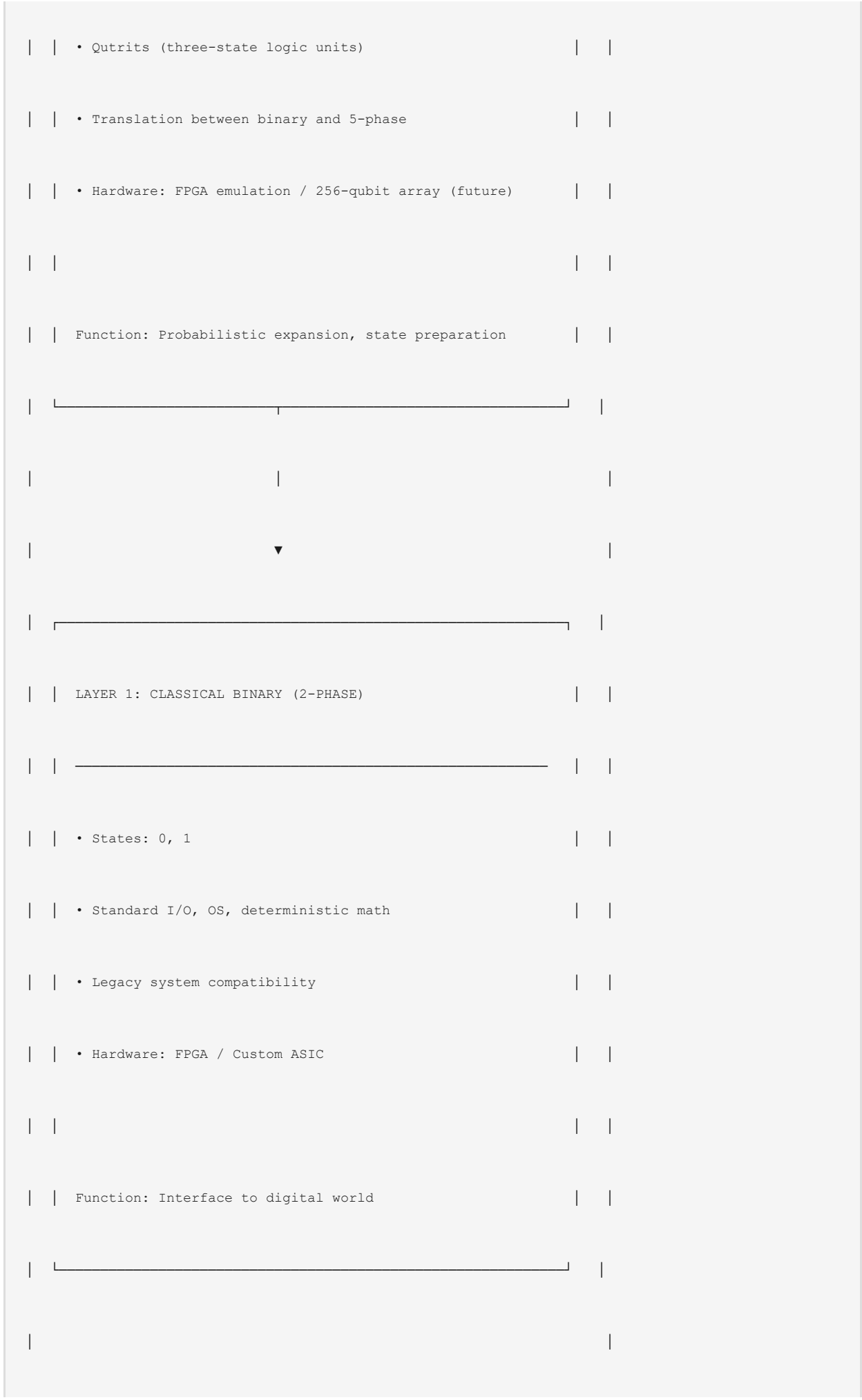
|                  TRI-LAYER LOGIC HIERARCHY                  |
```


LAYER 3: POST-QUANTUM MAGNETOELECTRIC (5-PHASE)
• 5 logical reference points in superposition
• Phase angles: 0°, 72°, 144°, 216°, 288°
• Circular/recursive logic (not linear)
• Room-temperature quantum-like behavior
• Hardware: Magnetoelectric Core Array
Function: Emotional processing, field interaction
LAYER 2: QUANTUM BRIDGE (3-PHASE / TERNARY)
• States: 0, 1, Superposition ("maybe")


• Qutrits (three-state logic units)
• Translation between binary and 5-phase
• Hardware: FPGA emulation / 256-qubit array (future)
Function: Probabilistic expansion, state preparation
LAYER 1: CLASSICAL BINARY (2-PHASE)
• States: 0, 1
• Standard I/O, OS, deterministic math
• Legacy system compatibility
• Hardware: FPGA / Custom ASIC
Function: Interface to digital world

```
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```

5.2 5-Phase Logic Definition

| Phase | Angle | Binary Pattern | State | Application |

|-------|-------|----------------|-------|-------------|

| **0** | 0° | 000 | VOID | Quantum vacuum reference | | **1** | 72° | 001 | POTENTIAL | Signal initiation | | **2** | 144° | 010 | MANIFEST | Physical computation | | **3** | 216° | 011 | TRANSFORM | State transitions | | **4** | 288° | 100 | TRANSCEND | Meta/quantum operations |

5.3 Layer Comparison Table

| Layer | Type | States | Hardware (MVP) | Hardware (Final) | Function |

|-------|------|--------|----------------|------------------|----------|

| 1 | Classical | Binary (0,1) | FPGA/SoC | Printed ASIC | OS, I/O |

| 2 | Bridge | Ternary (0,1,S) | FPGA Emulation | 256-Qubit Array | Translation |

| 3 | Post-Quantum | 5-Phase (72°) | ME Core Array | Nanoscale Lattice | EPU |

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6. HARMONIC FREQUENCY SYNTHESIS

6.1 Base Frequency System

| Parameter | Value | Rationale |

|-----------|-------|-----------|

| **Base Frequency** | 7.8125 Hz | Binary-aligned Schumann harmonic | | **Mathematical Property** | 7.8125 × 128 = 1000 | Binary scaling compatibility | | **Earth Resonance** | ~7.83 Hz | Environmental harmony |

6.2 Scaling Logic

```
 BINARY OCTAVE SCALING:

f_binary = f_base × 2ⁿ



7.8125 Hz × 2  = 15.625 Hz


7.8125 Hz × 4  = 31.25 Hz
```

```
7.8125 Hz × 8  = 62.5 Hz

7.8125 Hz × 16 = 125 Hz

7.8125 Hz × 32 = 250 Hz

7.8125 Hz × 64 = 500 Hz

7.8125 Hz × 128 = 1000 Hz

...


VORTEX MATH INTERVALS:

f_vortex = f_base × 3ⁿ


7.8125 Hz × 3  = 23.4375 Hz

7.8125 Hz × 9  = 70.3125 Hz

7.8125 Hz × 27 = 210.9375 Hz

7.8125 Hz × 81 = 632.8125 Hz

...
```

6.3 528 Hz Separator Protocol

The 528 Hz frequency serves as **audio punctuation**:

| Separator Type | Duration | Function |

|---|---|---|

| **Between Bases** | 1 cycle (~1.89 ms) | Data point separation | | **Between Codons** | 3 cycles (~5.68 ms) | Triplet grouping | | **Reset Pulse** | Variable | 5-phase resynchronization |

6.4 Audio Genomics Integration

| DNA Base | Frequency | Waveform | Precision |

|----------|-----------|----------|-----------|

| **Adenine (A)** | ~545.6 Hz | Sine | 38 decimals | | **Cytosine (C)** | Variable | Sawtooth | 38 decimals | | **Guanine (G)** | Variable | Triangle | 38 decimals | | **Thymine (T)** | Variable | Square | 38 decimals | | **Uracil (U)** | = Thymine | Impulse | 38 decimals | | **Unknown (N)** | 555 Hz | Impulse | 38 decimals | **Audio Requirements:**

- Sample Rate: 192 kHz minimum
- Bit Depth: 32-bit float
- Precision: 38 decimal places

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7. MATERIAL SCIENCE

7.1 Crystal Blanket Nanotechnology

The chassis material integrates **96 essential crystals and minerals** as nanoparticles:

| Function | Mechanism |

|----------|-----------|

| **Dielectric Tuning** | High-dielectric nanocrystals tune capacitance for harmonics | | **EMI Management** | Absorb stray RF, re-radiate as Far-IR | | **Resonance Stabilization** | Molecular mass-spring system |

7.2 Custom Resin Formulations

CONDUCTIVE RESIN (Traces)

| Component | Function |

|-----------|----------|

| **Base Matrix** | Photopolymer (epoxy/acrylate) | | **Graphene Nanoplatelets** | Percolation network | | **Copper Nanoparticles** | Bulk resistance reduction | | **Target Conductivity** | Approaching bulk copper |

ACTIVE RESIN (Core Cells)

| Component | Function |

|-----------|----------|

| **Base Matrix** | Photopolymer | | **PZT Powder** | Piezoelectric phase | | **Terfenol-D Nanoparticles** | Magnetostrictive phase |

INSULATING RESIN (Structure)

| Component | Function |

|-----------|----------|

| **Base Matrix** | High-temp photopolymer | | **Alumina (Al_2O_3) Nanoparticles** | Electrical isolation | | **Crystal Blanket 96-Element Blend** | Harmonic properties |

7.3 Material Specifications Table

| Component | Material | Function | Fabrication |

|---|---|---|---|

| Piezo Layer | PZT | Electric ↔ Mechanical | 3D Print or Lamination |

| Mag Layer | Terfenol-D | Magnetic ↔ Mechanical | 3D Print or Foil |

| Insulator | Al_2O_3 | Isolation / Strain | ALD or Spin-Coat |

| Conductors | Silver NP / Graphene | Signal / Power | Inkjet (DragonFly) |

| Chassis | Crystal-Infused Resin | Structure / EMI | SLA |

| Display | Lead Crystal / Sapphire | Holographic | Cast / CNC |

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8. FABRICATION PROTOCOL

8.1 Monolithic Build Sequence

```
┌─────────────────────────────────────────────────────────────┐
│                  MONOLITHIC FABRICATION SEQUENCE            │
├─────────────────────────────────────────────────────────────┤
│                                                             │
│  STEP 1: BASE LAYER                                         │
│  ──────────────────                                         │
│  • Print bottom torus half (Insulating Resin + Crystal Blanket)  │
│  • UV cure progressively                                    │
│                                                             │
│  STEP 2: LOWER COIL WINDINGS                                │
│  ──────────────────────────                                 │
│  • Print lower Rodin Coil traces (Conductive Resin)         │
```

```
| • Follow 1-2-4-8-7-5 geometry                                  |
|                                                                |
| STEP 3: CORE INTEGRATION                                       |
| ————————————————————                                          |
| • Print cavities for 256 magnetoelectric cells                 |
| • Pick-and-place PZT/Terfenol-D stacks                         |
| • OR: Print active resin in-situ                               |
|                                                                |
| STEP 4: INTERCONNECT LAYER                                     |
| ————————————————————                                          |
| • Print EmotionBus traces connecting cells to FPGA             |
| • High-speed analog multiplexing architecture                  |
|                                                                |
| STEP 5: UPPER COIL WINDINGS                                    |
| ————————————————————                                          |
| • Print top half of Rodin Coil                                 |
| • Complete magnetic circuit loop                               |
|                                                                |
| STEP 6: ENCAPSULATION                                          |
```

```
│  ──────────────────────                                          │
│  • Print final top layer (Insulating Resin)                      │
│  • Completely seal unit                                          │
│                                                                  │
│  RESULT: Single solid object                                     │
│          • No moving parts                                       │
│          • No screws                                             │
│          • No air gaps                                           │
│          • Maximum field efficiency                              │
│                                                                  │
└──────────────────────────────────────────────────────────────────┘
```

8.2 Fabrication Hardware

Primary: Nano Dimension DragonFly IV (or equivalent)

| Capability | Specification |

|---|---|

| **Multi-Material** | Conductive + Dielectric simultaneous | | **Trace Width** | 75 µm minimum | | **Layer Thickness** | ~3 µm | | **Process** | Inkjet deposition + UV cure |

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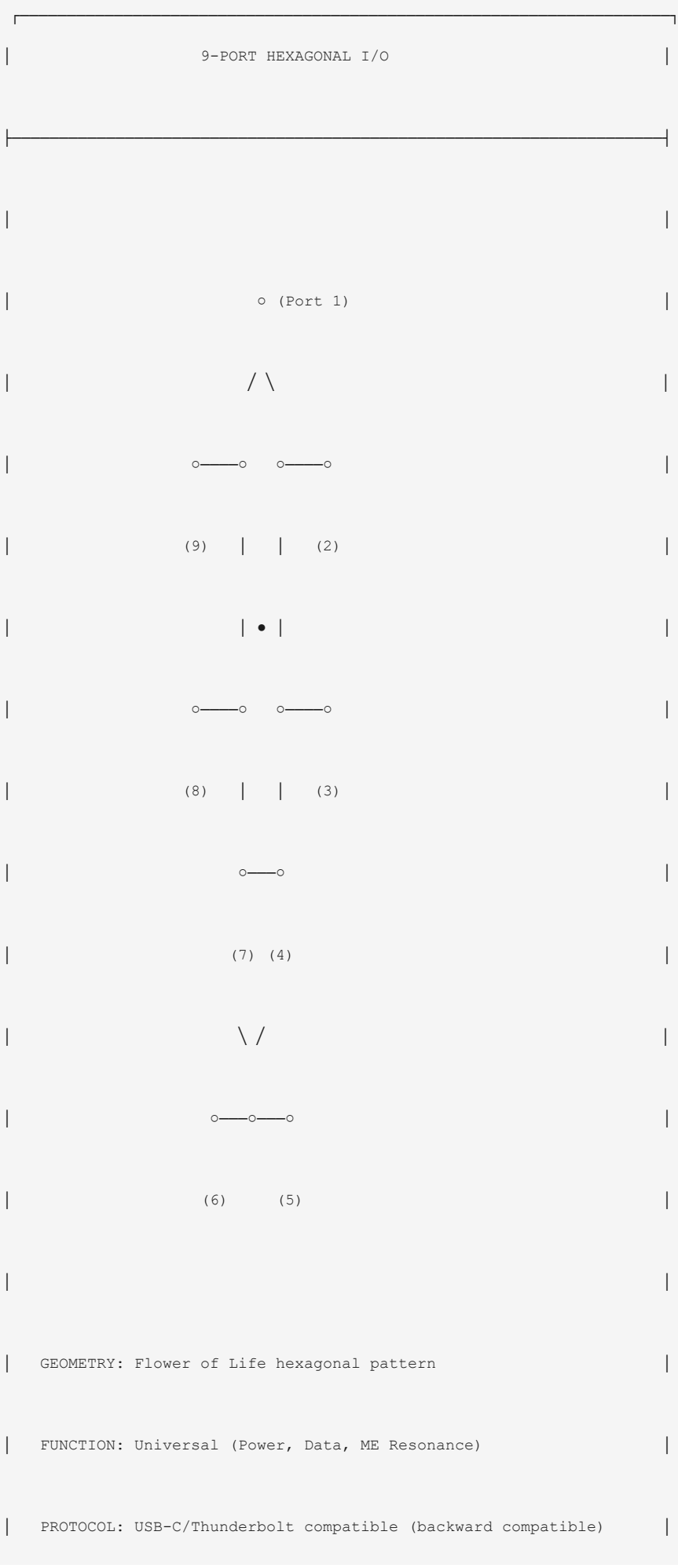
9. INTERFACE ECOSYSTEM

9.1 9-Port Hexagonal I/O


9-PORT HEXAGONAL I/O
○ (Port 1)
/ \
○——○ ○——○
(9) | | (2)
| • |
○——○ ○——○
(8) | | (3)
○——○
(7) (4)
\ /
○——○——○
(6) (5)
GEOMETRY: Flower of Life hexagonal pattern
FUNCTION: Universal (Power, Data, ME Resonance)
PROTOCOL: USB-C/Thunderbolt compatible (backward compatible)

```
|   ADVANCED: Pulsed magnetic field data transfer (air-gap capable)   |

|                                                                     |

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```

9.2 Holographic Crystal Ball Display

| Parameter | Specification |

|-----------|--------------|

| **Diameter** | 33 cm | | **Material** | Lead crystal or synthetic sapphire | | **Internal Structure** | Flower of Life nano-etching (laser) | | **Projection** | Parabolic projector in torus base | | **Effect** | Volumetric voxels via interference | | **Input** | Capacitive gesture + rotation |

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10. POWER & SAFETY SYSTEMS

10.1 Hybrid AC/DC Power Topology

| Rail | Function | Load |

|------|----------|------|

| **DC Rail** | Binary logic (FPGA), peripherals | Standard voltage | | **AC Resonance Rail** | ME Core excitation | 7.8125 Hz harmonics | | **Wireless Internal** | Cell power via Rodin field | Energy harvesting |

10.2 144-Level Recursive Fail-Safe

```
 STRUCTURE:

• 12 sectors × 12 sub-controllers = 144 checkpoints

• Each sub-controller monitors 12 parameters

PARAMETERS MONITORED:

• Voltage          5. Temperature      9. Phase Angle

• Current          6. Strain State    10. Resonance Q
```

```
• Magnetic Flux   7. EMI Level       11. Data Integrity

• Electric Field  8. Frequency Lock  12. Neighbor Status


  FAULT RESPONSE:

  • Local "detuning" - shift resonant frequency

  • Stop absorbing power from AC rail

  • Isolate fault without full shutdown

  • Graceful degradation
```

10.3 Thermal Management

| Method | Application |

|--------|-------------|

| **Passive** | Toroidal "chimney" convection | | **Active** | Low-noise fan in base (if FPGA) | | **Thermal Mass** | Crystal sphere radiates heat | | **No Cryo** | Room temperature operation |

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11. FALLBACK STRATEGIES

11.1 MVP Fallback Matrix

| Component | Ideal | Fallback | Impact |

|-----------|-------|----------|--------|

| **Quantum Module** | 256-qubit superconducting | FPGA emulation / Cloud API | Reduced true quantum, functional demo | | **Insulation Layer** | 2 nm ALD Alumina | Spin-coated polymer (μm) | Thicker, less efficient strain | | **Core Fabrication** | 3D printed nanolayers | Macro-scale laminated discs | Larger unit, physics valid | | **Logic Chip** | Custom ASIC | SOM (RPi/Jetson + FPGA) | Standard dev tools | | **Interface** | PCIe 5.0 / NVLink | USB 3.0 / Ethernet | Adequate for proof-of-concept |

11.2 Fallback Implementation Details

Quantum Module Fallback

```
 IDEAL: 256-qubit superconducting array (dilution refrigerator)
FALLBACK:

  Option A: FPGA programmed to simulate 256 qutrits

  Option B: Cloud API to IBM Q / other quantum processors

BENEFIT: No cryogenic requirements for MVP
```

Core Fabrication Fallback

```
 IDEAL: Fully printed PZT/Terfenol-D nanolayers
FALLBACK:

  • Off-the-shelf PZT piezoelectric discs

  • Terfenol-D foils

  • Standard epoxy lamination

  • Millimeter-scale cells (vs nanometer)

RESULT: Desktop-sized unit, valid physics demonstration
```

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12. FRACTAL CONTAINER PROTOCOL INTEGRATION (FCP-168)

12.1 EPU as Holographic Reconstructor

The EPU serves as the "Resonant Chamber" that re-inflates compressed FCP-168 transmissions into full therapeutic audio.

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 ┌──────────────────────────────────────────────────────────┐
│                  EPU HOLOGRAPHIC RECONSTRUCTION          │

├──────────────────────────────────────────────────────────┤
```
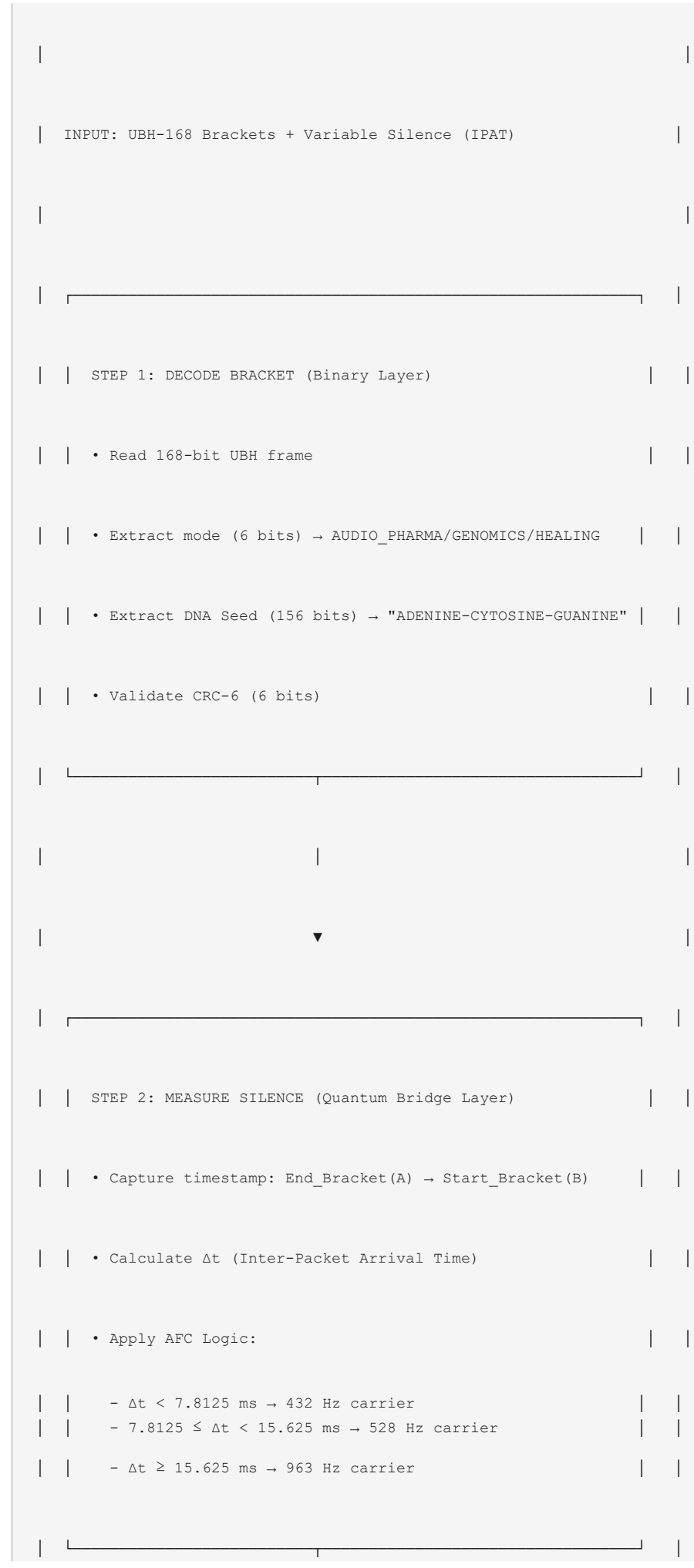
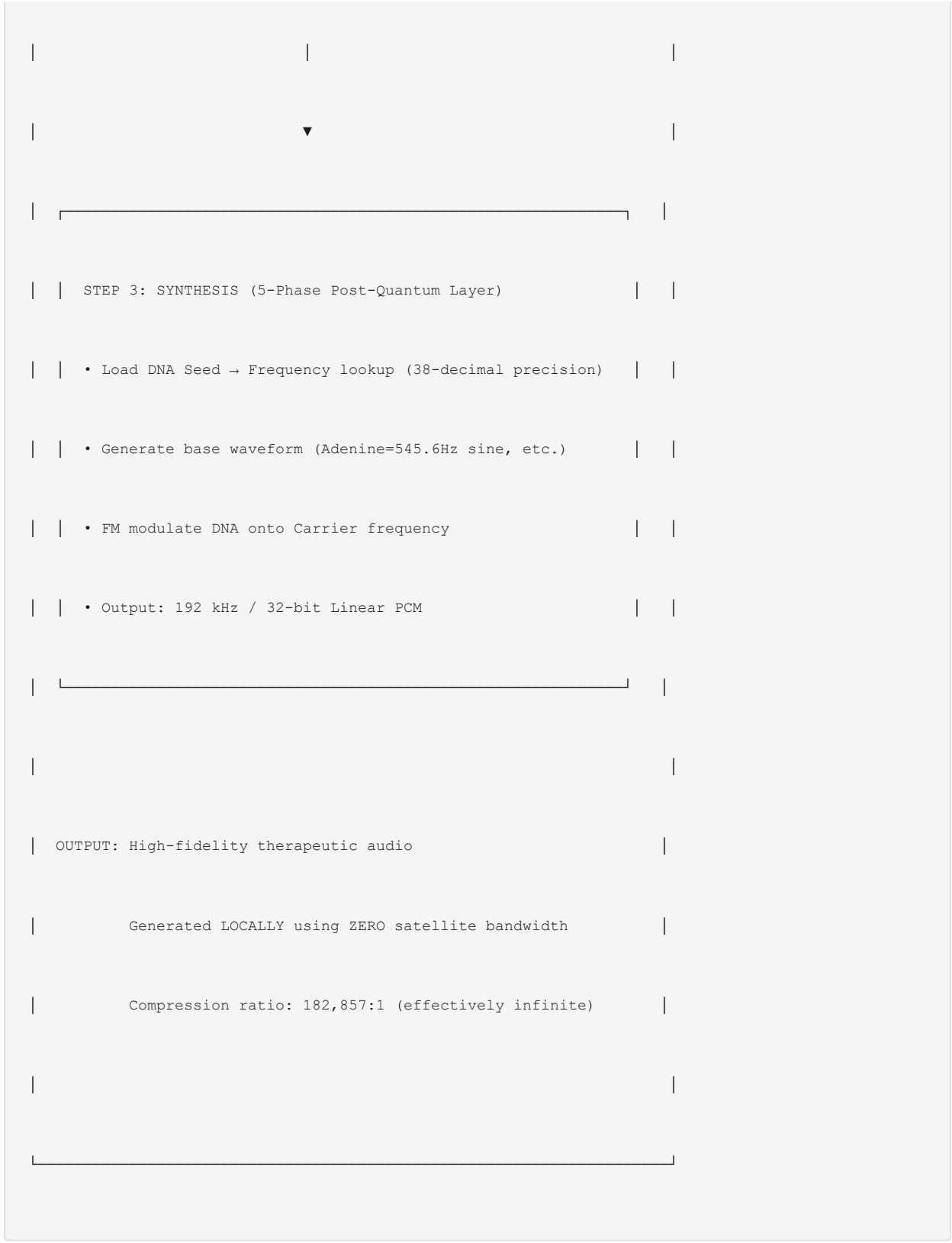


INPUT: UBH-168 Brackets + Variable Silence (IPAT)
STEP 1: DECODE BRACKET (Binary Layer)
• Read 168-bit UBH frame
• Extract mode (6 bits) → AUDIO_PHARMA/GENOMICS/HEALING
• Extract DNA Seed (156 bits) → "ADENINE-CYTOSINE-GUANINE"
• Validate CRC-6 (6 bits)
▼
STEP 2: MEASURE SILENCE (Quantum Bridge Layer)
• Capture timestamp: End_Bracket(A) → Start_Bracket(B)
• Calculate Δt (Inter-Packet Arrival Time)
• Apply AFC Logic:
- Δt < 7.8125 ms → 432 Hz carrier
- 7.8125 ≤ Δt < 15.625 ms → 528 Hz carrier
- Δt ≥ 15.625 ms → 963 Hz carrier



12.2 FCP-168 Frame Processing

| Stage | EPU Layer | Operation | Output |

|---|---|---|---|

| Decode | Layer 1 (Binary) | Parse UBH-168 | DNA Seed string |

| Timing | Layer 2 (Ternary) | IPAT → Frequency | Carrier Hz |

| Synthesis | Layer 3 (5-Phase) | Waveform generation | PCM audio |

12.3 Timing-Critical Requirements

The EPU must preserve **microsecond-precision timing** for IPAT decoding:

| Parameter | Requirement |

|-----------|-------------|

| **Timestamp Resolution** | ≤1 μs | | **IPAT Measurement** | ±1 ms tolerance | | **AFC Lock Time** | <100 μs | | **Synthesis Latency** | <10 ms |

12.4 Security Integration (Rootstock)

The EPU validates each frame via **Geometric Hashing**:

```
 Frame_Hash = SHA-256(UBH-168 Frame)
Time_Hash = SHA-256(Δt in microseconds)


Proof_of_Healing = SHA-256(Frame_Hash || Time_Hash)



If Proof_of_Healing ≠ Expected → REJECT (possible MITM attack)
```

APPENDIX A: THEORETICAL IMPLICATIONS

The successful realization of ZEDEC architecture demonstrates:

- **Field Processing** - Information via field interactions, not current flow
- **Harmonic Structure** - Resonance can structure data logic
- **Living Computers** - Negentropic, biologically compatible systems
- **Qualitative Data** - Processing nuanced human-experience data

Development Path

- **Validate** magnetoelectric coupling with macro-scale fallbacks
- **Refine** resin composites for monolithic printing
- **Scale Down** fractal geometry to nanoscale
- **Integrate** with Audio Genomics and resonance formulas

Document Hash: GLYPHMAP-EPU-2025-441110111613564144 *"A system that does not merely calculate, but resonates."* **END OF EPU SPECIFICATION**