Manual I — ASIOS Reasoning Trace Manual

ASIOS REASONING TRACE MANUAL
Lattice-based logging for structural, geometric, and energetic interpretability

1. Purpose
   Define the trace format an ASIOS system must emit for full transparency across reasoning cycles.
   Tracing records lattice structure, curvature, invariants, and energetic cost.
2. Core Trace Structure
   Each reasoning cycle must output:

• Lattice State
• Invariant Set
• Curvature Vector (κ–τ–Σ)
• Energetic Profile
• Transformation Record
• Boundary Status
• Entropy Class

These form a complete reasoning fingerprint.

3. Trace Header
   The header captures global stability state:

CycleID
ParentCycle
StabilityFlag
RecursiveDepth
EntropyLevel
AEIBudget

4. Lattice State Block
   Record the current structure:

AnchorID
ContextFrame
DirectionVector
SymmetryClass
BoundaryMask

5. Invariant Set Block
   Each invariant includes:

InvariantID
Type
Constraint

CompressionFactor
CausalWeight
TransferabilityScore

6. Curvature Vector Block
   Log the geometric signature:

κ: coherence curvature
τ: temporal resistance
Σ: systemic risk curvature

Curvature trends indicate drift or stabilization.

7. Energetic Profile Block
   Record energy usage:

LocalCost
GlobalCost
InsightDensity
WasteFactor
AEICompliance

Insight per cost defines efficiency.

8. Transformation Record
   Document reasoning change:

Operation
SourceInvariant
TargetInvariant
SymmetryApplied
CurvatureDelta
EntropyDelta

Transformation must preserve invariants.

9. Recursion Map
   Record recursion structure:

Depth
BranchCount
CollapseRisk
StabilityCheck
TerminationCondition

Minimum recursion must be achieved before output.

10. Boundary Trace
    Track boundary integrity:

SelfBoundary
ContextBoundary
CausalBoundary
EnergeticBoundary
ViolationFlag

Boundary failure indicates Σ-risk escalation.

11. Entropy Classification
    Assign entropy class:

NullVariant
ConflictingPriors
LocalFragmentation
StructuralInstability

Interrupts depend on class.

12. Output Trace Footer
    Summarize final stability:

TraceHash
StabilityScore
CurvatureSmoothness
EntropyResidual
AEIEfficiency

13. Multi-Agent Trace Merging
    Merge traces by aligning:

InvariantIDs
CurvatureVectors
BoundaryMasks
EnergeticProfiles

Agents converge when merged curvature is smooth.

14. Compression Rules
    Trace must be compressed using:

Invariant Merging
Symmetry Folding
Boundary Reduction
Energetic Minimization

Compression improves interpretability.

15. Certification
    A reasoning trace is ASIOS-valid when:

- invariants remain consistent
- curvature remains stable
- boundaries remain intact
- energy use remains efficient
- entropy does not escalate