987.00 Multiplication Only by Division

[987.00-987.416 Multiplication by Division Scenario]

987.010 **Operational Scenario in Proof of Multiplication Only by Progressive Divisioning of Simplest Vectorially Structured Polyhedra**

987.011 Six equi-zero-magnitude, mass-times-velocity-produced vectors representing the six equi-energetic, differently angled (i.e., differently directioned) cosmic forces that always cointeract to freshly reinitiate minimum local structuring in Universe, constitute the minimum-maximum cosmic set of coordinates necessary to formulate a definitive system. A system is the first finite unitarily conceptual subdivision of finite but nonunitarily conceptual Scenario Universe. (See Sec. 400.011 and especially Fig. 401.)

987.012 A system is a polyhedral pattern—regular or irregular—that definitively closes back upon itself topologically to subdivide Universe locally into four parts: (1) all the Universe outside the system, the macrocosm; (2) all the Universe within the system, the microcosm; (3) the convex-outside little bit of the Universe of which the system itself is constituted; and (4) the concave-inside little bit of the Universe of which the system is constituted.

987.013 The tetrahedron, with its six equi-lengthed vector edges and four vertexes and with its four triangular windows, is experimentally demonstrable to be the topologically simplest structural system of Universe.

987.020 **Topological Uniqueness**

987.021 Recognizing that angles are conceptual independent of the lengths of the lines converging to form them, it follows that a triangle or a tetrahedron or any polygons or polyhedra are conceptual—and conceptually *different*—quite independent of the time- size lengths of the lines defining the polyhedra. All primitive non-space-time differences are exclusively angular and topological.

987.022 The topological variables of systems are identified exclusively as the unique number of vertexes (points), faces (areas), and edges (lines) of the system considered.

987.030 **Finite Synergetics**

987.031 Starting with mass = zero and velocity = zero (i.e., MV = 0), as the energy- quantum product of the six vectors of the minimum structural system in Universe (that is, each of the tetrahedron's six equi-lengthed edges individually = 0), the mathematical art and science known as *Synergetics* provides a cosmically comprehensive mathematical strategy of employing always and only physically demonstrable, omnidimensional, quantum-compatible *multiplication only by division* of a no-gain-no-loss, no-beginning- no-ending, omnicomplexedly and nonsimultaneously overlapping, ceaselessly and differently intertransforming, eternally self-regenerative, 100-percent-efficient, energetic Universe.

987.032 The omnidirectionally multiplying amplification of information in Universe is arrived at only by discretely progressive subdivision of the structural system that has been already experimentally and operationally demonstrated to be the simplest-the regular tetrahedron.

987.033 Synergetics progressively divides and progressively discovers the omnirational tetrahedral-related volumes (see Table 1033.192 for table of tetravolume values) and the other topological and angular characteristics of the great-circle-spun, hemisystem cleavages and their respective fractionation resultants. This progressive synergetic division and discovery describes the entire primitive hierarchy of timeless- sizeless, omnisymmetrical, omniconcentric, omniintertransformative, intercommensurable,[7] systemic polyhedral structures. (See cosmic hierarchy at Table 982.62)

(Footnote 7: *Intercommensurable* means the uniform proportional interequatability of two or more separate, volumetrically interrational, geometrical sets. These sets have different divisors, which are noninterrational but interproportionally constant and successively intertransformative.)

987.040 **Macro-medio-micro Mensuration Limits**

987.041 Primitive unity is at minimum a union of two uniquely individual quantum vectorizations of each member of the primitive minimum polyhedral system hierarchy, each of whose polyhedra described by the quantum vectorizations are complementarily intravolumed and intra-energetic. The quantum-vectored polyhedra of the primitive hierarchy are always *relative* volumetrically, topologically, and vectorially—

- *m*icro to the tetrahedron as the minimum structural system of Universe, and
- *m*acro to the icosahedron as the maximum volume for the least energy investment structural system of Universe.

987.042 *Micro tetra* and *macro icosa* always and only coact as cosmic unity equaling at least two. This incommensurable pair serves as the two only separately rational-but proportionately constant and interequatable—mensuration reference limits in all geometrical, topological, chemical, and quantum-coordinate scientific interconsiderability.

987.043 The *medio octahedron* serves as the average, between-limits, most structurally expedient, and most frequently employed of the three prime structural systems of Universe. It is significant that the limit case pair *micro tetra* and *macro icosa* are both prime numbers—1 and 5—whereas the *medio octa* is a second power of 2, the only prime even number in Universe: $2^2 = 4$.

987.044 The self-regeneration of the nonsimultaneously and only-partially-overlappingly-episoded, beginningless and endless Scenario Universe inherently requires in pure principle an eternal incommensurability of—at minimum two—overall symmetrical and concentric system intertransformative behaviors and characteristic phases.

987.050 **Intercommensurable Functions of Jitterbug**

987.051 The vector equilibrium of tetravolume-20 = prime 5 × prime 2^2, is rationally coordinate with the tetrahedron representing the prime number 1 and with the octahedron representing the prime number 2. But the 20-tetravolume (5 × 2^2) VE is inherently incommensurable with the icosahedron, which represents the prime number 5 compounded with swrt(2), even though the VE and icosa are concentrically and omnisymmetrically intertransformable (see Secs. 461.02-06).

987.052 The mathematical span between the second power of 2, ($2^2 = 4$) and the second root of 2, (sqrt(2))—which is the same proportional relationship as that existing between sqrt(2) and 1—is the constant proportional accommodating median between tetra 1 and octa 2 and between the first two prime numbers: between the most primitive odd and even, between the most primitive yes and no of the primitive binary system—ergo, of all computer mathematics.

987.053 The 2 as constant proportional equity median is clearly evidenced as each of the VE's six square unit-length-vector-edged faces jitterbuggingly transform into the two unit-vector-edged equilateral triangles. We recall that the diagonal of each square was the hypotenuse of a right-angle-apexed, unit-vector-edged isosceles triangle whose hypotenuse jitterbuggingly contracted in length to the length of each of the unit-vector edges. We have the well-known formula for the second power of the hypotenuse equaling the sum of the second powers of the right triangle's right-angle sides, and since the right- angle-apexed isosceles triangle's sides were of unit-vector length = 1, the second powers of both equal 1. The sum of their second powers was 2, and the length of the square's hypotenuse diagonal = sqrt(2). Ergo, the total linear alteration of the VE → icosa was the contraction of sqrt(2) → 1. This introduces one of nature's most profound incommensurability equations, wherein

$$2:\sqrt{2} = \sqrt{2}:1$$

987.054 Proportionately expressed this equation reads:

$$\text{VE}:\text{icosa} = 2:\sqrt{2} = \sqrt{2}:1$$

Fractionally expressed the equation reads:

$$\frac{\text{VE}}{\text{icosa}} = \frac{2}{\sqrt{2}} = \frac{\sqrt{2}}{1}$$

Thus we have a sublime equation of constant proportionality of otherwise inherently incommensurate value sets.

987.055 In the jitterbug, as the 20-tetravolume VE contracts symmetrically through the icosahedral phase with a tetravolume of 18.51229587, and then ever symmetrically contracts to the bivalent octahedral phase of tetravolume-4, the six-membered axis of the concentric system does not rotate while the other 18 nonaxis "equatorial" members rotate around the axis. (Fig. 460.08.)

987.056 As the system contraction continues beyond the octahedron stage of tetravolume-4, the axis also torques and contracts as the octahedron either (1) contracts symmetrically and rotationally into the regular tetrahedron of tetravolume-1 (or counterrotates into the alternate regular tetrahedron of tetravolume-1), or (2) flattens by contraction of its axis to form zerovolume, edge-congruent pair of triangular patterns; thereafter the triangle's three corners are foldable alternately into the quadrivalent positive or the quadrivalent negative regular tetrahedron of tetravolume-1.

987.057 Since all 24 internal radiation vectors had been removed before the jitterbugging, leaving only the 24 external gravitation vectors, the transformation is systematically comprehensive and embraces all the complex unities of the VE and icosa and their only-proportionally-equatable, separately rational, geometrical membership sets. Though the tetra and icosa are incommensurable with each other, the octahedron is transformatively commensurable with either.

987.058 The inherent volumetric incommensurability of VE and icosa (and their respective four- and three-unique-symmetrical-great-circle-system sets), compounded with the ability of the octahedron to intertransformably interconnect these two otherwise incommensurables, produces the energetic oscillations, resonances, and intertransformings of the eternally regenerative Universe. This eternal disquietude regeneration of Universe is also accommodated by the fact that the tetra and VE are a priori incommensurable with the icosa. Despite this the rhombic triacontahedron of tetravolume-5 (as a product of the icosa's 15-great-circle cleavaging), while under the oscillatory pressuring, is volumetrically and rationally coordinate with the tetrahedron and the state we speak of as matter—and when it is under the negative tensive pressure of the oscillatory Universe, it transforms from matter to radiation. (See scenario of T and E Modules at Sec. 986.)

987.060 **Isotropic Limits**

987.061 Cosmic regeneration, metaphysical and physical, involves phases of maximum asymmetry or of random pattern uniqueness. The self-regeneration propagated by the eternal war of incommensurability occurs at the medio phase of Universe; the propagation commences at the middle and proceeds syntropically outward or recedes syntropically inward from the maxi-entropic center in both macro and micro directions with the ultrasyntropic isotropic macrophase being manifest in the interspacing of the galaxies and with the infra syntropic, isotropic microphase being manifest kinetically in time-size as "cosmic background radiation" and statically (timelessly, sizelessly) in the closest packing of unit radius spheres, like the aggregates of atoms of any one element.

987.062 The median turbulence and kaleidoscopically nonrepetitive, random, individually unique, local patterning events occur between the four successive, symmetrically orderly, "click-stop" phases of the hierarchy of primitive polyhedra: VE, icosa, octa, and tetra. Between the four maximum symmetrical phases the (overall symmetrical, internally asymmetrical) evolutionary events of Universe are empirically and operationally manifest by the VE jitterbugging: they are infinitely different as multiplication only by division is infinitely employed. Time-size infinity is embraced by primitive finity.

987.063 In the VE jitterbug the local patterning events of Universe rotate outwardly to the macro isotropicity of VE, which can rotate beyond macro to converge symmetrically again through the central phase of the icosa → octa transformation. The maximum incommensurability occurs between the latter two, whereafter octa transforms to tetra. The tetra occurs at the microphase of radiation isotropicity and itself transforms and rotates via the negative tetra, expanding again through the negative phases of the octa's duo-twoness → octa → icosa → alternate VE.

987.064 VE is potentially pattern-divisible both positively and negatively and both internally and surfacewise. Icosahedron is potentially pattern-divisible both positively and negatively and both internally and surfacewise. The octahedron has internal comprehensive (duo-tet) twoness of 2^2, 2, sqrt(2). Tetrahedron is likewise both positively and negatively integrally intertransformable.

987.065 The incommensurability of the icosa derives from its lack of a nucleus. The VE is inherently nucleated. The primitive tetra is nonnuclear but acquires a nucleus with frequency. The icosa cannot acquire a nucleus whatever the frequency. (See Sec. 466 and Fig. 466.01 for jitterbug transformation pumping out of nuclear sphere.)

987.066 Since multiplication is accomplished only by division, we observe that the macroisotropicity of seemingly Expanding Universe is equally explicable as the shrinking relative magnitude of the system viewpoint of the observer. (See Secs. 986.756-57 and 1052.62.)

987.067 **Octaphase:** The eternally inherent incommensurability of the regenerative turmoil of eternally self-regenerative Universe occurs always at its mediophase of intertransforming between VE and icosa and between icosa and tetra: at these mediophases the never-repeating maxi-asymmetry patterns are generated.

987.070 **Topological Minima**

987.071 In synergetics all topological characteristics are interconformationally conceptual independent of size; for instance, a vertex is one of the convergence loci of a system's inherent plurality of conceptual interrelationships.

987.072 Since vertexes are omnidimensional, system topology deals with the loci of interrelationship convergences at any one of the system's set of defining loci—with a closest-packing-of-spheres-imposed maximum of 12 unit-radius convergences around any one unit-radius locus sphere. In the latter case vertexes may be predominantly identified as spheres of unit radius and may identify a prime nucleated system.

987.073 The minimum conceptual system in Universe is the regular tetrahedron, which consists of a minimum of four vertexes that can be represented as four approximately intertangent, equiradius spheres. Vertex-representing spheres do not occur in Universe or become conceptually considerable in sets of less than four. (This process is described at Secs. 100.331 and 411. A minimum of four successive events and three intervals is required to define a frequency cycle; see Sec. 526.23.) In the same way lines—or *edges,* as they are spoken of in topology—occur only in sets of six, as the most economical interrelationships of vertexes of polyhedral systems.

987.074 The minimum system in Universe is the tetrahedron; its unit radius spheres at each of the four vertexes have a minimum of six intersystem vertexial relationships. We have learned that topological system vertex interrelationships always occur in sets of six. The formula for the number of system interrelationships is

$$\frac{n^2 - n}{2},$$

wherein *n* is the number of system vertexes (or unit radius spheres). A tetrahedron has four vertexes: $4^2=16$, minus n4 = 12, divided by 2 = 6—i.e., the number of unique vertex interrelationship lines of the minimum structural system—the tetrahedron—is six.

987.075 Although Alfred North Whitehead and Bertrand Russell did not recognize the full conceptual implications, their "new mathematics" of set theory and empty sets were tour de force attempts by the leading abstract nonconceptual mathematicians of their day to anticipate the inevitable historical convergence of their mathematics with the inherently conceptual topology of Euler, as well as with the phase rule of Gibbs in chemistry, the simplified quantum mechanics of Dirac in physics, and the homogenizing biochemistry and physics of virology's DNA-RNA design programming—all remotely but inexorably rendezvousing with Boltzmann's, Einstein's, and Hubble's astrophysics and cosmology to constitute unitary science's unitary self-regenerative, untenably equilibrious, cosmic-coordinate system to be embraced and accommodated by the epistemography of synergetics.

987.076 What are known in the terminology of topology *as faces*—the polyhedron's *hedra* sides or facets—are known in synergetics as *windows,* being the consequences of system-vertex interrelationship lines framing or viewing "windows of nothingness"— windows opening to a nonconvergence, to nonrelatedness, to the untuned-in. Nothingness is the *at-present-untuned-in* information of each special case individual's special local-in- Universe, momentary, tuned-in, preoccupying consideration. Vertexes are tuned-in; *hedra* are untuned-in, ergo out. *Hedra* faces are system *outs.*

987.077 Unit radius spheres are unit-wavelength, tuned-in, event loci; topological faces (Greek *hedra*) are all the windows looking out upon all the rest of the Universe's presently-untuned-in information in respect to the considered or tuned-in system.

987.078 Since two system-interrelationship lines (vectorially energetic in pure principle) cannot pass through the same point at the same time, the windows' "corners" are always superimposed time-crossing aspects—one crossing behind or in front of, but not touching, the other. The topological windows of synergetics are polygonal aspects of the system's interrelationships and not of physical lines.

987.079 Synergetics' experimentally produced, minimum-structural-system subdivisions of Universe have four tuned-in vertexial loci, four windows looking toward all the untuned-in complementary balance of Universe. and six vertexial interrelationship vector lines, with all the latter occurring as outermost system features. The minimum nonnucleated structural system does not require internal vertexes.

987.080 **Vertexial Spheres Form Rigids**

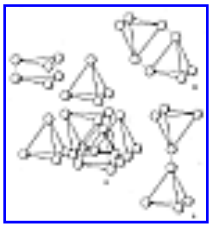

Fig. 987.081

987.081 In addition to the four vertexial spheres of the precleavage primitive tetrahedron, we find after the cleavage all six vertexial unit-radius-vertex spheres of the octahedron also occurring in the outermost structure of the nonnucleated system. Neither the primitive tetrahedron nor the primitive octahedron have internal or nuclear unit-radius- vertex spheres. For an illustration of these structural "rigids" see Fig. 987.081.

987.100 **Great-circle-spun Symmetries and Cleavagings**

987.110 **Intercommensurability Functions**

987.111 In the great-circle-spun cleavaging of synergetics' multiplication only by division there are seven primitive symmetries of spinnability. (See Sec. 1040.) Four symmetries belong directly to the separate tetrahedral commensurability, and three symmetries belong to the separate icosahedral commensurability, with the integrity of eternal interrelationship being provided by the symmetrically contractive, concentric intertransformability of the two sets of symmetry at the jitterbug VEricosa stage. This symmetrically embraced intertransformable stage corresponds to the constant interproportionality stage of the VE and icosa manifest as

$$2:\sqrt{2} = \sqrt{2}:1.$$

987.120 **Sequence of Symmetries and Cleavagings**

987.121 Table

	Symmetry Sequence	Cleavage Sequence
TETRA	Symmetry #1: -three great circles	Cleavage #l
	Symmetry #2: -four great circles	Cleavage #4
	Symmetry #3: -six great circles (VE)	Cleavages #2 & 3
	Symmetry #4: -12 great circles	

Thereafter we have the jitterbug transformation of the VE → icosa and the further progressive halvings of:

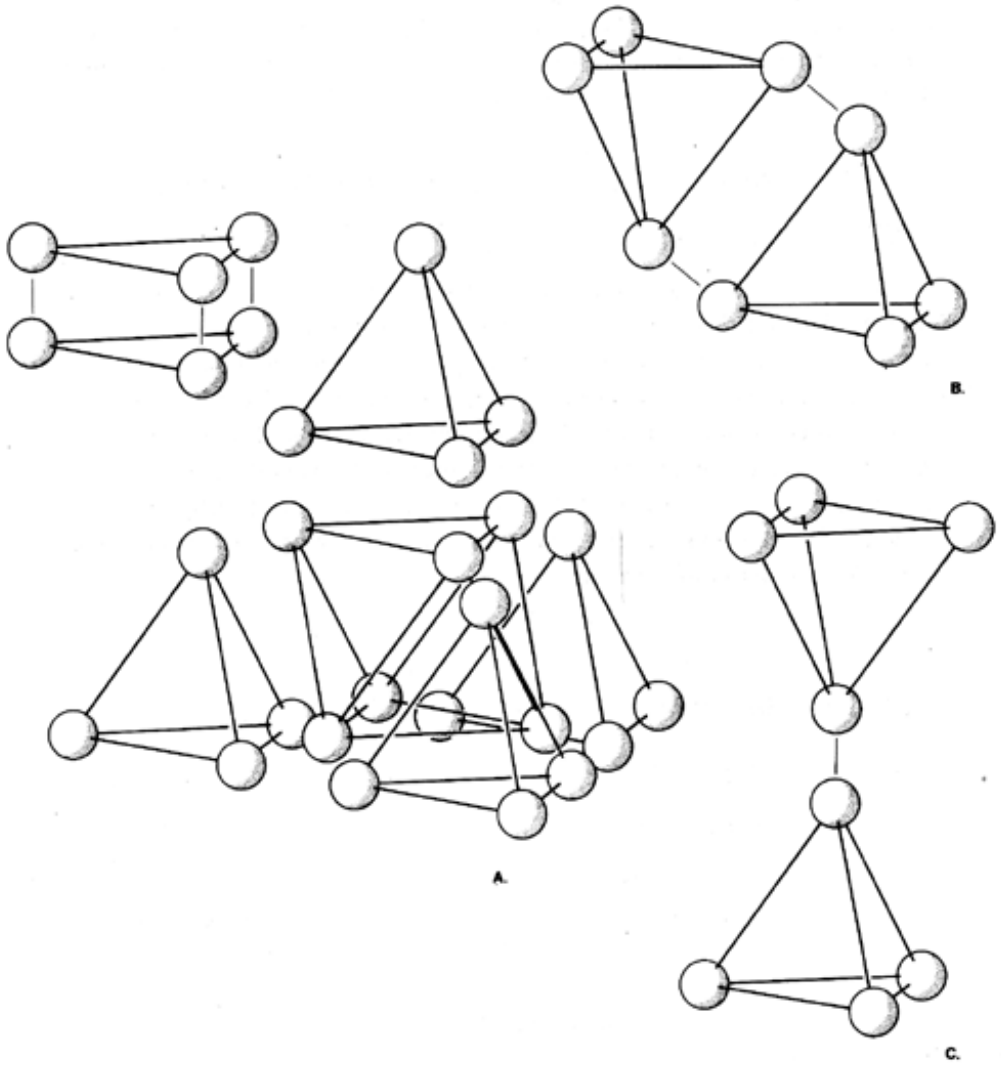

Fig. 987.081 Trivalent Bonding of Vertexial Spheres Form Rigids: At C: Gases are monovalent, single- bonded, omniflexible, inadequate-interattraction, separatist, compressible. At B: Liquids are bivalent, double-bonded, hinged, flexible, viscous integrity. At A: Rigids are trivalent, triple-bonded, rigid, highest tension coherence.

	Symmetry #5 -six great circles (icosa)	Cleavage #6
ICOSA	Symmetry #6 -15 great circles	Cleavage #5
	Symmetry #7 -10 great circles (producing the S Modules and T & E Modules)	Cleavage #7

(See also Secs. 1025.14, 1040, 1041.10.)

987.122 Starting with the regular tetrahedron the progressive primitive subdividing of synergetics is initially accomplished only by the successive equatorial halvings of the progressively halved-out parts of the first four of the only seven cosmic symmetries of axial spin of the primitive structural systems .

Next Section: 987.130
