GRAMMAR OF CHANGES

I - INTRODUCTION - THE CUBE - This book deals with the changes of certain regular, geometrical figures, of lower & higher dimensions & polarity & discovers laws of the utmost generality. The study begins with what is most familiar, the Cube, a figure in three dimensions (or principals = ways) with two poles (= sexes) in each principal, called G-2.

First make the tablocks (Vex & Cave) as explained in "TROPERMIC CALCULUS". Here (Fig.1) we show the Idemfactorial total-posture of the Convex Tablock. You see the "bottom" or "Y" face, Upright = 1357; the "back" of "I" = 2165 & the "left" or "A" face = 4321.

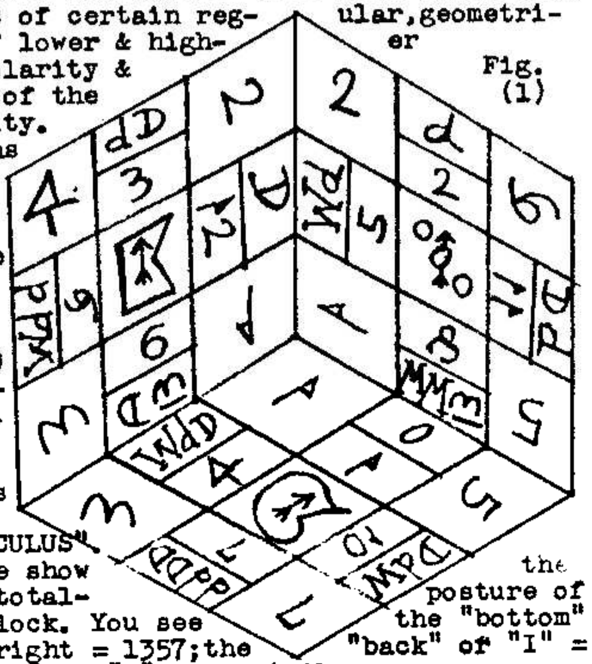
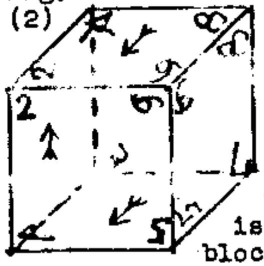


Fig. (1)

Below (Fig.2) is the Cube in the "standard" position to indicate the relationship of its eight points(#s) or corners= vertices & in (Fig.3) see the same from the "front" upright = 8743, the "O" face. The Upright "U" face = 6824; upright "E" = 6587.

Each general face = side comprises four particular or exact-faces, governed by the four corners, respectively. Thus, each side has four different postures = upright(U), prone (P), averse(A) & supine(S)-by the slope of the arrow when the immediate # is, itself, upright. Each block has 24 exact - faces.

Fig. (2)



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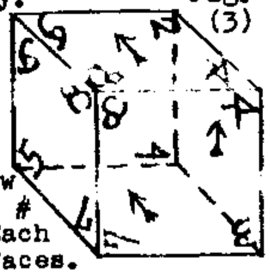
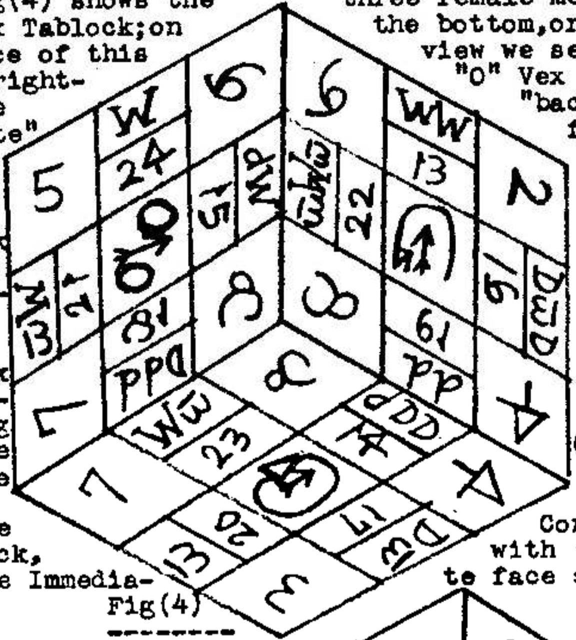




Fig(4)

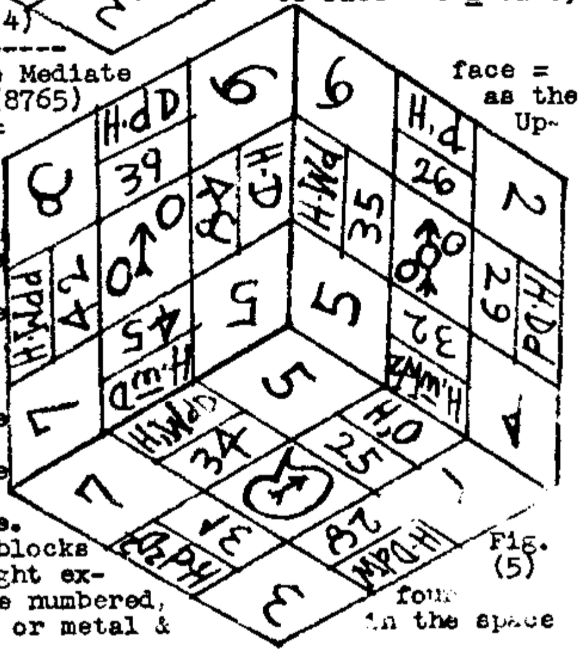


Fig. (5)

Fig(4) shows the three female metals of the Vex Tablock;on the bottom,or immediate face of this view we see (8743),or Upright-"O" Vex (U-O-V; on the "back" or "mediate" face of this view is (6824) = Upright-U-Vex & on the left,or Re-mote face of this view is Prone-E-Vex = (5768). Below in Fig (5) we see (the male & one female) faces of the Concave Tablock, with (5713) as the Immediate face = U-Y-Cave; (6521) as the Mediate face = U-I-Cave & (8765) as the Remote face = Upright E Cave. On page 3, in Fig (6)we see the two female metals of the cave tablock & the other male face; viz - (4231) = Supine A Cave (8473) = Supine O Cave (6284) = Supine U Cave.

On the tablocks all forty-eight exact faces are numbered, on each side or metal & four in the space

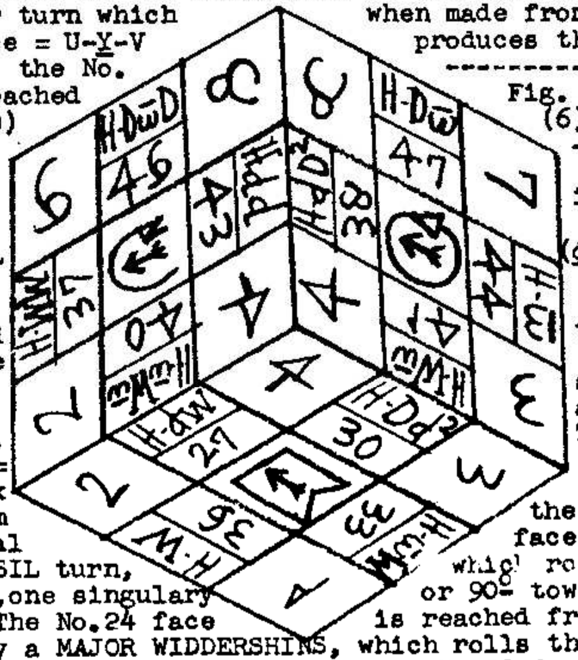


Fig. (6)

above the number of the exact-face is the name of the trope or turn which when made from the No.1 face = U-Y-V produces this face. Thus, the No. 1 face is reached by a zero (0) turn from itself; the No.2 face is reached by a (d) MINOR DEOSIL turn,which rolls the block toward the observer one single, or sim-ple,singulary turn of 90°. The No.12 face = Supine-A-Vex is reached from the idemfactorial face by a MAJOR DEOSIL turn, which rolls the tablock,one singulary or 90° toward the right. The No.24 face is reached from the idem. by a MAJOR WIDDERSHINS, which rolls the block one quarter toward the left. The No.20 face= Averse-O-Vex is reached from No.1 by a MINOR WIDDERSHINS which rolls one quarter,away from the observer. Thus, there are two dimensions in which to roll- (1)- the vertical,or forward & backward = away & toward, called MINOR & (2) the horizontal, or leftward & rightward,called MAJOR; then there are two directions (signs or senses) in each dimension,the forward & leftward being called WIDDERSHINS, while the backward (toward) & rightward are DEOSIL.

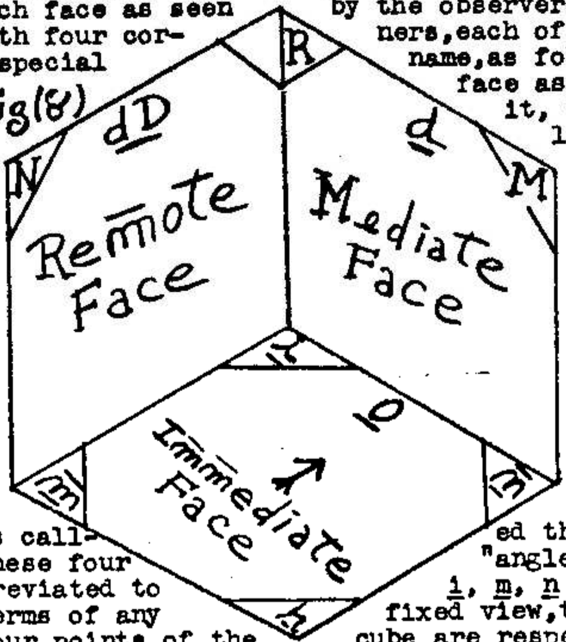
Fig (7)

	Major	Minor
Deosil -	D	d
Widdershins-	W	w

All of the 24 exact-faces on one tablock are reached from No.1 by combinations of these four singulary turns; thus, each face is named or written in terms of the combination of singulary turns &/or the horizontal reflection, which is symbolised by H,which is placed before each trope on the cave tablock,to mean that before making the said turn,first make a horizontal reflection of the No.1 face = U-Y-Vex = 1 3 5 7 .

Posture arrows are marked on each side of the tablock; the arrow on a salt face points to the male quicksilver metal; on quicksilver & sulphur faces the arrows all point toward the female salt metal. Each face as seen by the observer is a square with four corners, each of which has a special name, as follows. Cf any face as you look at it, the upper left-hand corner is called the immediate point; the lower left-hand corner is the mediate #; the upper right-hand corner is the neoteric # & the lower right-hand corner is called the remote #. These four "angles" are abbreviated to i, m, n & r; then in terms of any fixed view, the remaining four points of the cube are respectively "reciprocals" of these first four #s when they are the other end of the cubic diagonal- reciprocals are written as capital letters in the figures (8) & (9). A standard view of three faces of the block relates these three as shown in the pictures as Immediate Face, Mediate & Remote. Thus the Immediate or i face has the i,m,n,& r #s; the Mediate face has the R # for its own i#, the original i# is its m#, the reciprocal of the original m# is the n# of the mediate face & so on. The face reached (See Fig 9) from the i face by a double major turn, as WW or DD is called the major reciprocal face & if the immediate

Fig(8)



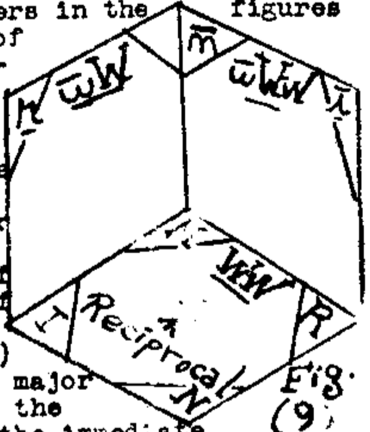
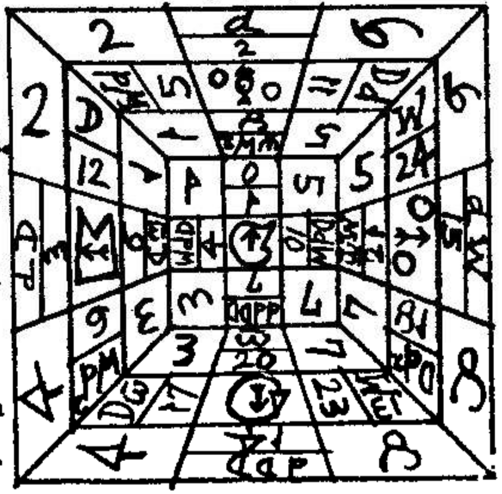


Fig. (9)

face be upright, then the major reciprocal is also upright; if the immed. face has a horizontal posture, it will be reversed on the major reciprocal face, thus, e.g., the major reciprocal face of Supine I Vex is Prone O Vex, & so on. When we make a picture of the cube showing five faces as in Fig (10) it is called a Logical Frame. Here, in Fig (10) the face in the center of the view is U-Y-Vex, whose i# is #1; with this No.1 face as immediate, the mediate face is No.2, Upright I Vex & the Remote face is No.3 = Up.A-Vex. These three faces, counting widdershins around the i#, making O, d, & dD turns to reach them, are the first three faces or degrees of the rational cradle of all 48 faces & together constitute what is called an Astral Toperm of the first three degrees; when these three are known the whole posture of the block is fixed. These three can be calculated when the first, or immediate face is adequately named, so that by knowing this name we can set the tablock in the position, or "total-posture" with this given exact-face as immediate & its own immediate point in the proper corner. Having done this, we will know precisely where every other point of the cube is located, since the block is rigid, & just which one of the four postures is shown on any one of the six sides, as we turn to it through any possible series of turns. Thus, in the view of Fig (10) which is named from the face in the center & therefore called Upright Y Vex, we see that the four angles of the immediate face are respectively as i,m,n,r 1 3 5 7. This specific enumeration of the four #s of G-2, in this sequence, is called the PUNCTUAL PERM of the face & from it we can calculate all the categories of the particular total-posture, as given.

-Fig (10)-



II - TRIGRAMMIC ANALYSIS - In the pictures here we show the cube (vex) from two different viewpoints such that in Fig (11) we see the three male & in Fig (12) the three female metals of the convex tablock; the metals are indicated by the numerals, 1, 2; 3,4; 5,6 marginally & the #s are numbered within. In Fig (11) the three topermic faces are: immediate 1 3 5 7; mediate 2 1 6 5; remote 4 3 2 1; in Fig(12) they are (imm) 8 7 4 3;(med) 6 8 2 4;(rem) 5 7 6 8. Male metals are represented by odd numbers or yangs (——), & female metals by even numbers or yins(— —). In the 2nd degree cube, viz G-2, the total-posture is adequately expressed when we state or imply the four #s of the immediate face, so that we can write them without error in the i, m, n, r # set, as #1357 for Fig (11) & #8743 for Fig (12),above. This same thing is effected if we write the metals of the three faces (i, m & r),in which case we have the sexed-principal components of the exact-face which is also the rational index of the total-posture uniquely. In the case of Fig (11), or 1357, the astral toperm is (faces) i-m-r = 1 3 5; with Fig(12) = 8743, it is 4 2 6. These three astral digits in each case are called,respectively, A V H,i.e. the Astral, Vertical & Horizontal components. The A is the sexed-principal or metalic component of the immediate face; with Fig (11) it is Y, silver,or 1 = male salt; with Fig (12) it is O, tin, or 4 = female quicksilver. The astral,metalic,or sexed-principal

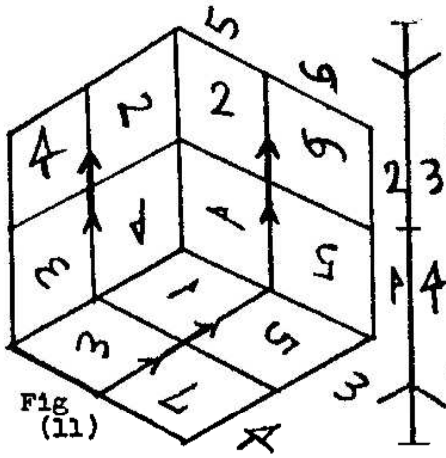


Fig (11)

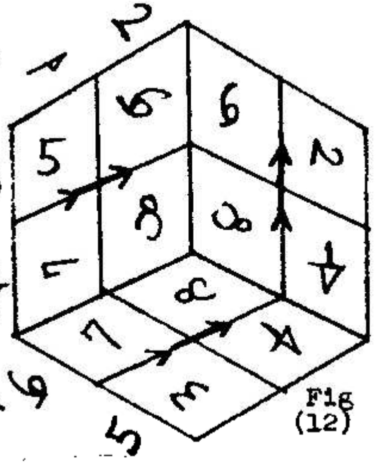


Fig (12)

constituent (A) of the toperm is the metal whose gram occurs in the trigram of each # of the punctual perm of the immediate face. Thus, with Fig (11) = 1 3 5 = 1 3 5 7, the i, m, n, & r #s are represented respectively by the following four trigrams.

———	———	— —	— —	Sulphur
———	— —	———	— —	Quicksilver
———	———	———	———	Salt
i=#1	m=#3	n=#5	r=#7	Fig (11-bis)

Here we see that a yang (——)persists throughout the salt principal or way.

Now, when the #s are written,as above, with trigrams in the horizontal sequence, imnr, with their grams,respectively, in the vertical sequence, reading from the bottom up, QJX = Salt,Quicksilver, Sulphur, as above; then we shall find the Vertical Component of the exact-face,or toperm, in that way (principal) where the poles or sexes of the grams do alternate one at a time, viz- yang-yin;yang-yin as here in Quicksilver; when the yang comes first as here,the sex is male,but if the alternation is yin-yang,yin-yang where the yin appears first then the sex of the metal is **female**; in the first instance the i# is always less than the m# & the n# is always less than the r#. Since the relative differences are always the same,we need consider only the i & m #s for this. If this difference is 1,the metal is of salt, if the difference is 2, it is of quicksilver & if 4, then sulphur. Above, since 1 from 3 is 2 it is J & since 1 is less than 3 it is male J = I = 3,the vertical component.

The horizontal component is found by comparing the i# with the n#,or what amounts to the same,the m# with the r#;it is always found in the way where the grams alternate in sex two at a time,as, here, in sulphur where we have two yangs followed by two yins, the first also showing the sex of the metal, viz, male of sulphur = A = 5;#1 from #5 = 4,hence sulphur & 1 is less.

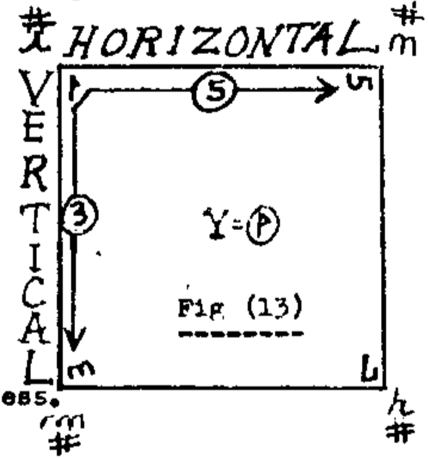


Fig (13)

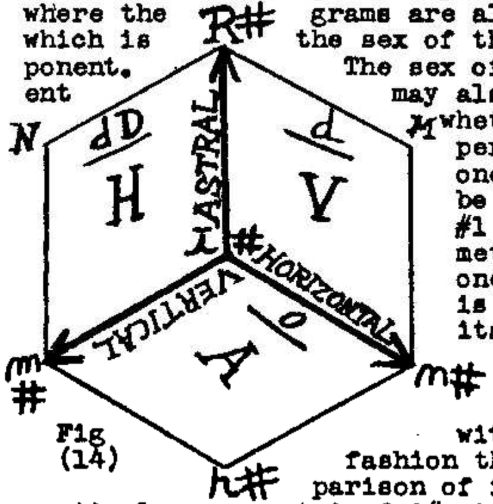


Fig (14)

As already explained, the Astral component may be found from the trigrammic punctual perm in the way where the grams are all of the same sex, which is the sex of the metal of this component. The sex of this Astral component may also be found by noting whether the punctual perm contains #1 or #8, one of which will always be on the exact-face. If #1 is on the face, the metal is male; if #8 is one of its #s the metal is the female pole of its way. A third method is to compare the i# with the reciprocal of the remote # (i# with R#), in the same fashion that we made the comparison of i# with m# for the vertical component & of i# with n# for the horizontal, the difference showing the principal & the sign of the inequality, as lesser or greater, showing the sex. Thus, with (13) as from (11-bis & 11) = <u>1 3 5 7</u>, <u>i R</u> = <u>1 2</u>, where 1 from 2 leaves 1, = Q, & 1 is less than 2, = male; male Q = Y = 1 as the Astral component of this exact-face&/or total-posture. In the above figure(14) we see the mutual relationship of these three exact components illustrated. <u>A</u> is the Astral = the sexed-principal component of the Immediate Face & also of the Astral Crystal = i#-R. <u>V</u> is the Vertical = metal of the Mediate Face, also of the vertical crystal = i#-m. <u>H</u> = Horizontal component = metal of the Remote Face, also of the horizontal crystal = i#-n. In terms of the idemfactorial face of G-2, then, we have the following table of correspondences.

<u>Faces</u>	<u>Points</u>	<u>Toperm</u>	
-----	i-m-n-R	A V H	
-----	-------	-----	
Immed.	1 3 5 2	1 3 5	= A V H
Med.	2 1 6 4	3 2 5	= V a H
Rem.	4 3 2 8	5 2 4	= H a v

This is of Fig (1.), now, of Fig (12) the analogous correspondences are as shown below, where the Imm. Face = U-<u>Q</u>-V.

(Here we use instead of the regular punctual perm, the "<u>crystal toperm</u>."

A = 8 7 4 6 = 4 2 6 = A V H
V = 6 8 2 5 = 2 3 6 = V a H
H = <u>5 7 6 1</u> = 6 3 1 = H a v.

III - METALIC CRADLES - This is a table of all the metals in a figure, arranged as an array of particles with the principals (ways) for its major parameter & the poles (sexes of the principals, or degrees of the figure) for its minor parameter. The idemfactorial cradle is such that according to a conventional selection of digits from the cradle we get the idemfactorial exact-face of the figure. Then, since there are the same number of changes of the cradle as of the figure each change of cradle yields according to the same conventional selection of digits that exact-face which is the immediate index of the corresponding change of the total-posture of the figure.

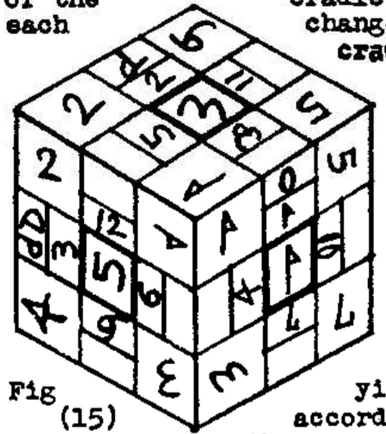


Fig (15)

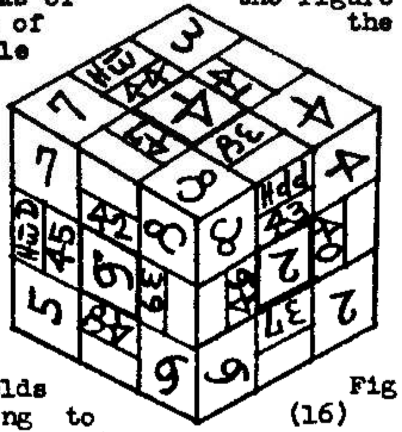


Fig (16)

The No.1 & idemfactorial face of G-2 = <u>1 3 5</u>, whose punctual perm is <u>1 3 5 7</u>. If we write the reciprocals of these metalic digits beneath the identicals as in Fig(17) we have the idemfactorial form of the metalic cradle of G-2. If now we change this idem by a simple transposition of the two minors without any major alteration we have the cradle change as in Fig (18) which represents the change from Fig (15) to Fig (16), where we take <u>2 4 6</u> = <u>8 6 4 2</u> as the immediate face = No.43, with No.44 as the mediate & No.45 as the remote. Here, for practice, we note that the crystoperm is <u>8 7 6 4</u>, where <u>8 7</u> is the astral component = female salt (2); <u>8 6</u> is the vertical = female quicksilver (4) & <u>8 4</u> is the horizontal= female sulphur (6); the crystoperm of <u>1 3 5</u> for AVH = <u>1 2 3 5</u> = <u>i R m n</u> #s, similarly.

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1 3 5
2 4 6

Fig (17)

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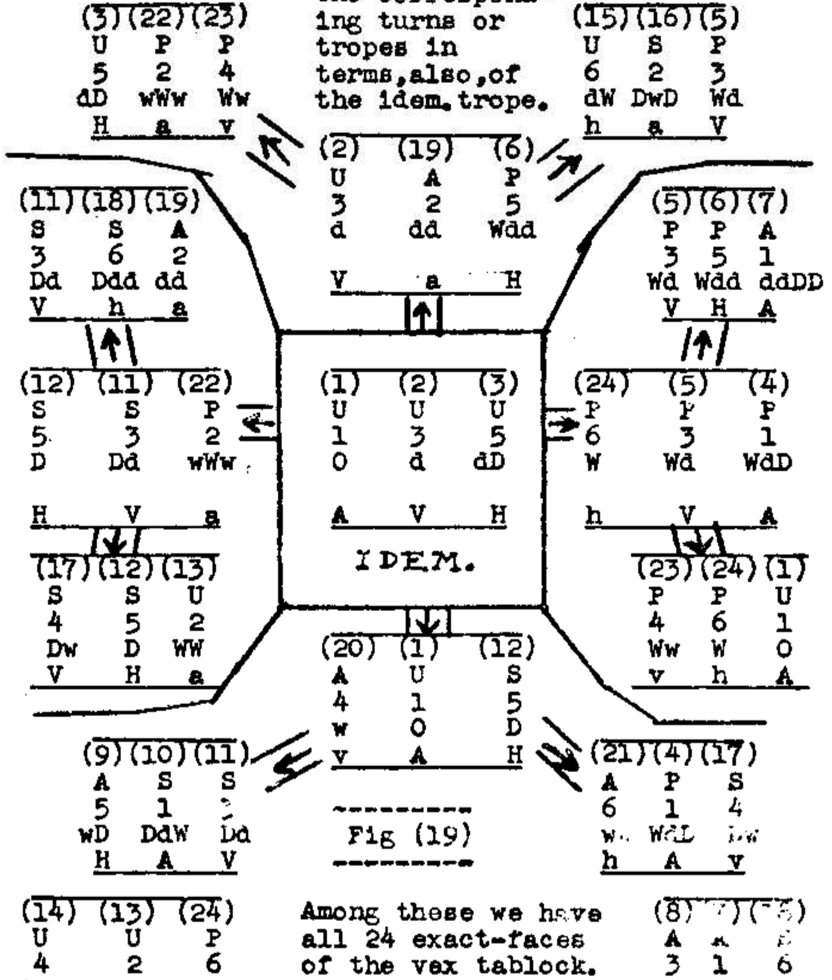
2 4 6
1 3 5

Fig (18)

IV - LOGICAL FRAME OF THE 22 TOPERMIC FACES AROUND UPRIGHT-Y-VEX PLUS THE TWO EXTRA FACES-

showing the degrees in the AVH sequence in terms of the unit &/or idemfactor as AVH- with the numbers of the exact-faces, respectively, the postures of the three(i,m,r) faces in each toperm, the digital-astral toperms & the corresponding turns or tropes in terms, also, of the idem. trope.



(3)	(22)	(23)
U	P	P
5	2	4
dD	wWw	Ww
H	a	v

(15)	(16)	(5)
U	S	P
6	2	3
dW	DwD	Wd
h	a	V

(2)	(19)	(6)
U	A	P
3	2	5
d	dd	Wdd
V	a	H

(11)	(18)	(19)
S	S	A
3	6	2
Dd	Ddd	dd
V	h	a

(5)	(6)	(7)
P	P	A
3	5	1
Wd	Wdd	ddDD
V	H	A

(12)	(11)	(22)
S	S	P
5	3	2
D	Dd	wWw
H	V	a

(1)	(2)	(3)
U	U	U
1	3	5
O	d	dD
A	V	H

IDEM.

(24)	(5)	(4)
P	P	P
6	3	1
W	Wd	WdD
h	V	A

(17)	(12)	(13)
S	S	U
4	5	2
Dw	D	WW
V	H	a

(23)	(24)	(1)
P	P	U
4	6	1
Ww	W	O
v	h	A

(20)	(1)	(12)
A	U	S
4	1	5
w	O	D
v	A	H

(9)	(10)	(11)
A	S	S
5	1	[illegible]
wD	DdW	Dd
H	A	V

(21)	(4)	(17)
A	P	S
6	1	4
[illegible]	WdD	Dw
h	A	v

(14)	(13)	(24)
U	U	P
4	2	6
dDD	WW	W
Y	a	h

(8)	(7)	[illegible]
A	A	[illegible]
3	1	6
wWW	ddDD	Ddd
V	A	h

Fig (19)

Among these we have all 24 exact-faces of the vex tablock. which please turn through this table to understand it more clearly in its arrangement.

In the Fig (20), below, we see the same arrangement as in Fig (19), above, showing the immediate, mediate & remote faces of each particular total-posture of the tablock (vex), with the astral digit postured on each face, respectively. Counting the "bottom","back" & "left" of each block we have the toperms. The first ("bottom") digit of each being the O turn, the second("back") being the d turn & the third ("left"), the dD turn, the whole design is mapped as shown in the Key (21) design below where only the degree of the immediate face of each is shown.

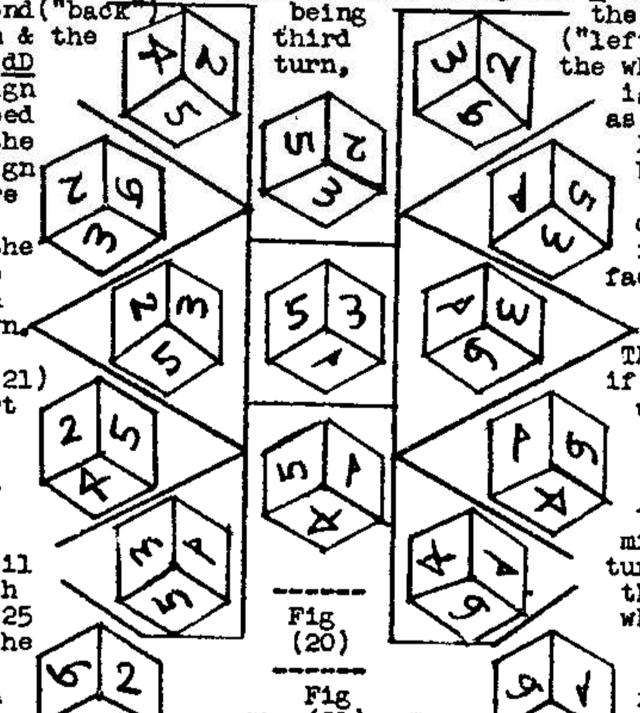


Fig (20)

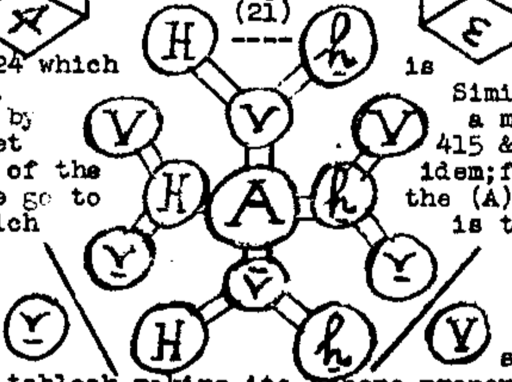


Fig (21)

Thus in Fig(21) if we start with the (A)of the Idem =135 then make the d or minor deosil turn,we reach the (A) of 325 which is the (V) of the Idem; then from there we go by D to the (A) of 524 which is the H of the Idem. Similarly, from 135 by a minor wid, (w),we get 415 & its (A) is the v of the idem;from there by D we go to the (A) of No.9 = 13 which is the H of the idem & so on with the others. The student for an exercise do the same with the cave tablock,making its scheme properly.

V- TABLE OF Q, d, dD TOPERMS WITH DIGITAL PARAMETERS AS EXPLAINED BELOW- (Fig 22) -

	3	3	4	4	5	5	6	6
V-1-A	ASS 513	613	514	APS 614	315	AUS 415	316	416
H-1-P	531	PPP 631	541	641	PPA 351	451	361	PPU 461
V-2-U	523	USP 623	UPP 524	624	UAP 325	425	326	426
H-2-S	SSP 532	SSP 632	SSS 542	SSS 642	SSA 352	SSU 452	SSA 362	SSU 462
V-3-U	...	...	...	...	135	235	136	236
H-3-S	...	...	...	...	153	253	163	263
V-4-A	...	...	...	...	145	245	146	246
H-4-P	...	...	...	...	154	254	164	264

The digits here are in the AVH sequence; in a few cases we have put the corresponding postures above the digits;the student can fill in the remaining postures. The mediate corner of the table has no perms, for in any perm either the vertical component is 1,2,3,or 4 or else 1,2,3,or 4 is the horizontal component. Should 5 or 6 be the V or H, then the H or V would necessarily be 1,2,3,or 4. The parameters show the second digit of the toperm according to the rule such that where the minor index shows V the 2nd digit comes from the minor parameter (1,2,3,or 4);on the H ranks the 2nd digits come from the major parameter (3,4,5 or 6). In every case the 3rd digit comes from the other parameter than that from which the 2nd is chosen as prescribed. Thus,e.g. with <u>532</u> = Spine A Vex, the horizontal 2 is less than the vertical 3,hence the posture is horizontal & with 2 it is supine. Details of posture analysis are given in Book Ta-Khu, Tropermic Calculus,etc;here we will give a summary for reference. Consider the three component degrees, as <u>A V H</u>, then if V is less than H the posture of A is vertical; if H is less than V the posture of A is horizontal; if the vertical is 2 or 3 the posture of A is upright; if it is a vertical posture with 1 or 4 as the vertical it is averse; if it is a horizontal with 2 or 3 as that horizontal itis supine, if 1 or 4 it is prone.

VI - TABLE OF POSTURES FOR THREE DEGREES OF TOPERMS ARRANGED AS IN THE GRAND 48-fold CRADLE, IDEMFACTORIAL - beginning with Upright-Y-Vex & going widdershins around the immediate #. - Fig (23)-

	VEX		CAVE	
	Male	Female	Male	Female
SULPHUR				
Remote	P S S P	P S S P	P S S P	P S S P
Mediate	P P S S	S S P P	S S P P	P P S S
Immediate	U P A S	U S A P	U S A P	U P A S
QUICKSILVER				
	P A S A	P U S U	P A S A	P U S U
	A P A S	U S U P	A S A P	U P U S
	U P A S	U S A P	U S A P	U P A S
SALT				
	U U U U	A A A A	U U U U	A A A A
	U U U U	A A A A	U U U U	A A A A
	P A S	U S A P	U S A P	U P A S

Inspection of this table gives the following rules. (i) For Immediate Faces - in all three principals - both flexual & sexual changes reverse horizontal postures only- (m) For Mediate Faces - flexual change (Q) changes nothing (J) & (X) reverses the horizontals only: a sexual change (Q) reverses the verticals (J) reverses all postures (X) reverses the horizontals: (r) For remote faces - a flexual change does nothing- a sexual(Q,J)reverses verticals.

VII - EFFECT OF DISPLACEMENTS ON ASTRAL COMPONENTS-

A flexual change, viz- reflection (horizontal) affects only the remote face which then becomes its reciprocal. A sexual change reciprocates the immediate face, repeats the mediate & reciprocates the remote; thus a reflex multiplies by a polar 5 & a reciprocal by 6. E.g., with 2 5 3 which is S A A, the reciprocal is 1 5 4 whose postures are P U U. Here the horizontal S has been reversed to P; the vertical A to U both in the V & H digits. The immediate 2 is reciprocated to 1, the mediate 5 is repeated & the remote 3 is reciprocated to 4.

VIII - TABLE OF POLAR DISPLACEMENTS - viz- when we multiply by the polar perms, respectively, we make the following series of changes from the multiplicand to the product.

Multiplier	Effect	Fig (24)
(1)= (111)	- no change	= (1) x (1)
(2)= (211)	- flexual & sexual	= (5) x (6)
(3)= (121)	- flexual & aversion	= (5) x (7)
(4)= (221)	- sexual & aversion	= (6) x (7)
(5)= (112)	- flexual only	= (5) x (1)
(6)= (212)	- sexual only	= (6) x (1)
(7)= (122)	- aversion only	= (7) x (1)
(8)= (222)	- flex, sex & averse	= (5)x(6)x(7)

By (7) aversion of posture the particle is moved to the opposite vertical or horizontal place in the same sex, as when prone becomes supine, or upright becomes averse; or vice versa. By (6) a sexual change or reciprocation, the particle moves to the same ordinal place in the opposite sex, as when No.1 becomes No.13; No.17 becomes No.5, etc. By (5) a flexual move the face is reflected horizontally to the other (reflex) tablock, as when No.10 becomes No.34; No 33 becomes No.9 & so forth.

IX - TABLE OF PRINCIPAL TRANSFORMATIONS - To consider abstractly permutation of the principal components of a toperm without polar change of the digits is to observe the effect of mult [illegible] b, one of the six triples, as by -

(1 2 3)	(1 3 2)	(2 1 3)	(2 3 1)	(3 1 2)	(3 2 1)
-1-	-2-	-3-	-4-	-5-	-6-

Note that the principal perm does not change the immediate # of the face, for since we find the i# by counting the sexes of the digits in the QJX sequence, the given sequence of digits is apart from the resulting sequence of sexes. - Fig (25)-

- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
A V H	A H V	V A H	V H A	H A V	H V A
O	H-DdW	H-wWW	W d	w D	H-W

X - GRAND IDEMFACTORIAL 48-FOLD CRADLE showing the flexual, sexual, posture & principal location of the immediate faces asnumbered in the closed-integral astralit. Fig-(26)-

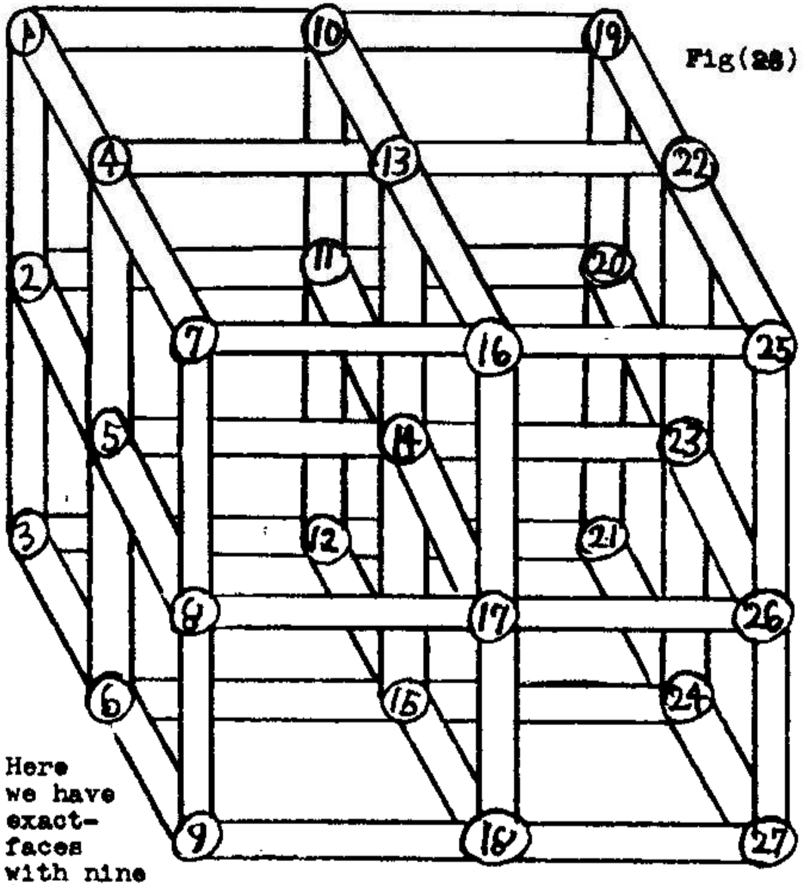
FLEX															
(1) Vex								Cave (2)							
Sex															
(1) Male				(2) Female				(1) Male				(2) Female			
Postures															
U	P	A	S	U	S	A	P	U	S	A	P	U	P	A	S
(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
					Sul(3)phur										
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
			Quick(2)silver												
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47
						Sa(1)lt									
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46

XI CONCERNING G-3 = A FIGURE IN THREE PRINCIPALS WITH THREE POLES (degrees) IN EACH PRINCIPAL-

The metalic cradle of this figure is shown in Fig (27). The method of changing this metalic cradle is the same as that for G-2, viz- permutation of principal files times permutation of the minor parameter in each major separately. In G-2 we had 6 principal perms x 2 x 2 x 2 = 8 polar perms, making 48 cradle perms; in [illegible] e have the same number of principal perms(6) but there are 6 x 6 x 6 = 216 polar perms, hence 6 x 216 = 1296 cradle perms & the same number of changes of the G-3 figure, as in Fig (28) page 16.

	Q	J	X
1-	(1)	(4)	(7)
2-	(2)	(5)	(8)
3-	(3)	(6)	(9)

In Fig (28), below, we illustrate in outline the 3° cube, or G-3, seated in what would be the U-Y-V posture if it were G-2, viz. with the bottom up. The exact-faces of G-2 are point-sets with four #s.



Fig(28)

Here we have exact-faces with nine #s on each, as, e.g. 1-4-7 10-13-16 19-22-25, shown at the top here & 7-8-9 16-17-18 25-26-27 at the back, the former upright, the latter averse "O". Note the principal differences; between consecutive salt #s the difference is 1; between quicksilver #s it is 3 & between sulphur the difference is 9. The three poles in each dimension need a new nomenclature, as, e.g. male, neuter & female, or, simply,

(1), (2) & (3), using numerals conveniently instead of yaos or grams.

XII GRAMMIC MULTIPLICATION IN G-2 - With bi-polar grams if the two factors are of the same sex the product is male, viz- a yang (——); if they are of the opposite sex, it is a yin (– –). Thus in Fig (29) here, we have the times table of monograms.

It is evident that the multiplication is commutative; 1 x 2 = 2 x 1.

x	1	2
1-	1	2
2-	2	1

(In numerals we use 1 for a yang & 2 for a yin.)

——— times ——— = ———
——— x — — = — —
— — x ——— = — —
— — x — — = ———

When multiplying trigrams together, for our purpose here, we put together the grams in the same principal of both multiplier & multiplicand; in the following table the multiplier is on the minor margin & the multiplicand on the major parameter, the numbers standing for the trigrams or #s from 1 to 8 .

- Fig (30) - TRIGRAMMIC TIMES TABLES - G-2.

#		1 111	2 211	3 121	4 221	5 112	6 212	7 122	8 222
# 1 -	111 -	1	2	3	4	5	6	7	8
2-	211 -	2	1	4	3	6	5	8	7
3-	121 -	3	4	1	2	7	8	5	6
4-	221 -	4	3	2	1	8	7	6	5
5-	112 -	5	6	7	8	1	2	3	4
6-	212 -	6	5	8	7	2	1	4	3
7-	122 -	7	8	5	6	3	4	1	2
8-	222 -	8	7	6	5	4	3	2	1

This is also called the Logical Apron of G-2. The student should learn this table by heart. For further analyses of G-2 grammic products see Book G-W, B-W, etc. The polarity of G-2 is a duality; here, transposition is its only permutation. With G-3 there is a trinity of poles; hence there are as many polar perms as there are principal perms, viz- six, which are symbolised severally by the same six trigrams as tabulated at the bottom of page 14. The multiplication, like that in G-2 can be one pole by one pole (monogrammic) or three by three (trigrammic); in both case it is non-commutative, for 2 x 3 does not necessarily = 3 x 2, for reflexions reverse the sequence of rotations, from probite to rebite.

XIII - Fig (31)- METALIC TIMES TABLE OF G-3 FOR ROTATIONS-

x	-1-	-2-	-3-
	1..	.2.	..3
-1-	(1)	(2)	(3)
-2-	(2)	(3)	(1)
-3-	(3)	(1)	(2)

The meaning of this is that we start with the multiplicand & count forward as many poles as the multiplier, counting the multiplicand itself as "1". The process is "Cometary". Thus, as shown here, Fig (32) extend the series 1 2 3 1 2 3 1 2 & so on in every direction, then we see that ,e.g. 2 x 3 begins with 3 & counts 2, thus--

1	2	3	1	2	3	1	2	3
3	1	2	3	1	2	3	1	2
2	3	1	2	3	1	2	3	1
1	2	3	1	2	3	1	2	3
3	1	2	3	1	2	3	1	2
2	3	1	2	3	1	2	3	1
1	2	3	1	2	3	1	2	3

Multiplicand = 3 (1 2

Multiplier = 2 # #

Hence, "1" "2"

Product = 1.

Or,e.g. 3 x 2,begins with 2 & counts, 1, 2, 3,thus-

1 2 3 1 2 3

1 2 3 & so, arrives at "1".

XIV - Fig (32) - TIMES TABLE OF TRIPLES, VIZ, OF EITHER POLAR PERMS OR PRINCIPAL PERMS - G-3 -

x	(1) 123	(2) 132	(3) 213	(4) 231	(5) 312	(6) 321
(1)-123	(1)	(2)	(3)	(4)	(5)	(6)
(2)-132	(2)	(1)	(4)	(3)	(6)	(5)
(3)-213	(3)	(5)	(1)	(6)	(2)	(4)
(4)-231	(4)	(6)	(2)	(5)	(1)	(3)
(5)-312	(5)	(3)	(6)	(1)	(4)	(2)
(6)-321	(6)	(4)	(5)	(2)	(3)	(1)

Here, the products may be obtained by using the algorithm, thus- e.g. 3 x 4 = 6.

Multiplicand= 2 3 1

Idemfactor = 1 2 3

Multiplier = 2 1 3

Product = 3 2 1.

Connect the digit of the multiplier with the same digit to be found in the idem, then put down in the product beneath the **digit of the** multiplier the same digit which is above the same digit in the idem. Thus, here, 2 connectswith 2 & brings down 3; 1 [illegible] & brings down 2; 3 goes with 3 & brings down 1. Thus, the ratio between the multiplicand & the product is the same as that between the idem & the multiplier. The times algorithm is a proportion or equality of ratios. The sixtriples constitute a "group"; 123 =(1) is the identity operator. Two numbers whose product is (1) are called "inverses";here each number except (4) & (5) is its own inverse; (4)&(5)are mutually inverse. Except with(1)&-inverses,there is no commutation.

XV - CHANGES OF G-3 -

Every change of the figure has its corresponding change in the cradle & the toperm which expresses this change & describes the total-posture or change of the figure. In Fig. (28) page 16, we have an outline picture of G-3, which we transfer,now, to the technically idemfactorially postured change as shown below in Fig. (33). The two-dimensional matrix (cradle) which stands for this three dimensional figure (G-3) is the idemfactorial cradle of G-3,as given here in Fig(33-bis) below.

1	4	7
2	5	8
3	6	9

The figure,as already explained, is susceptible of 1296 changes- viz, by rotation, reflection, & metalic permutation. Let us make or effect one of these changes, getting that represented by the posture shown [illegible] in Fig (34),whose cradle will be as given [illegible] Fig (34-bis). In Fig (33), the idem, the 1# is #1; counting from the 1# the A-crystal which is perpendicular to the Immediate Face of this total-posture,we have #1-2-3; the V-crystal which is perpendicular to the Mediate face = #1-4-7; & the H-crystal which is perpendicular to the Remote Face = #1-10-19. Given these three, then by polar-differences we can enumerate the whole posture.

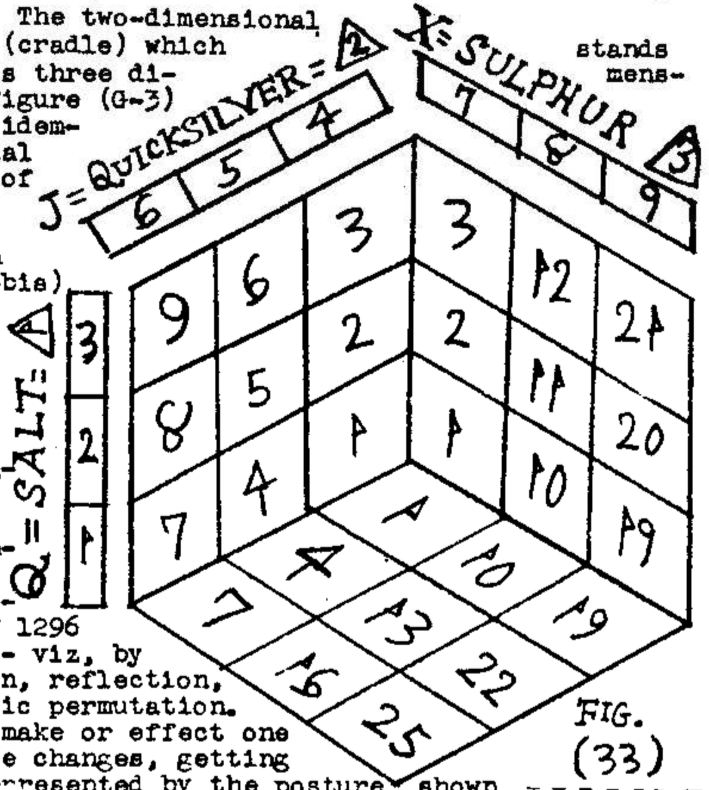


FIG. (33)

8	3	5
[illegible]	2	4
7	1	[illegible]

In Fig (34),whose metalic cradle is given in (34-b), we see that the AVH-crystal toperm = #15(24-6)(14-13)(12-18). If we draw the figure as a blank frame & fill in these seven #s where they belong, then we can fill in all the other twenty #s where they belong without difficulty. How much, then, of the cradle do we need in order to do this? The top rank = (8 3 5) gives us the 1# 15. The second rank of the (9 2 4) cradle gives us the # in the center of the (7 1 6) cube & the third minor gives the # which is the reciprocal of the 1#,viz- at the other end of the same cubic diagonal(primary). (#7-1-6) = #7 & (9 2 4)=#20. The primary diagonal of this is #15-#20-#7. Note that the sum of these three #s is 42 which is the total-posture sum of any of the 36 different diagonals of this G-3 figure. How do we tell, from the three metals which combine to make a #, what the number of that # is? We get the answer to this question in the same way we would find what # of G-2 is expressed by any particular trigram. It can be done by referring to a table, or by a separate calculation. We will give the table & then we will explain how to calculate the number of any point of G-3. Below is the table of the 27#s- Fig. (35)---

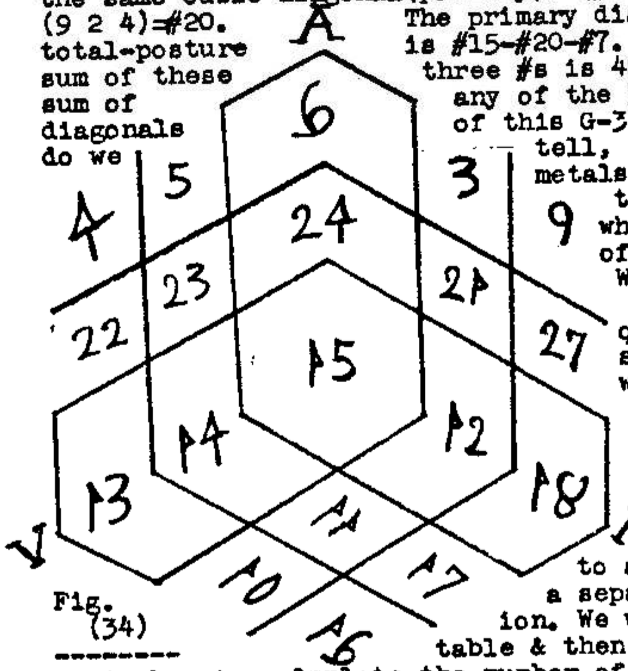


Fig. (34)

7									8									9								
4			5			6			4			5			6			4			5			6		
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

XVI - HOW TO FIND THE NUMBER OF A POINT - In the two figures below the #s of G-2 & G-3 are tabulated with the metals as parameters. There are as many different ways of doing this as there are factors,or combinations of factors in each array of points, viz- in 8 & 27.

Fig(36)

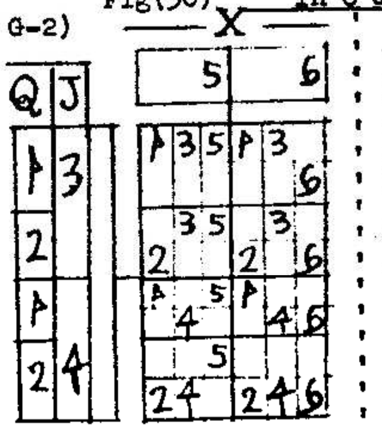
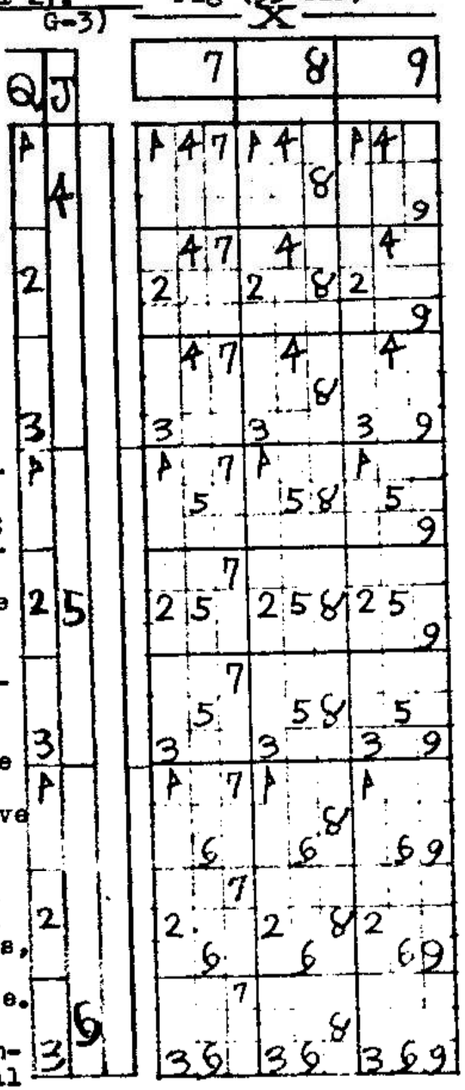


Fig (35-bis)



Thus, for G-2 we could make a rectangular table with 8 majors & 1 minor = a linear table; or we could have 4 majors & 2 minors; or 2 majors & 4 minors as we have above,or,finally, 1 major & 8 minors. With G-3, the combinations of major & minor would be as follows: 27,1; 9,3; 3;9(which we have); 1,27. In the G-2 table we have eight particles or #s, which we have divided each into six parts;in G-3 we have 27 #s each divided into nine parts, to show the metalic, cradular correspondence. The minor margins in both cases are sectioned for clarity; in full

the parameters of the G-2 table would be,for the 2,4 style, as shown in Fig (36-bis).
The full indices of the G-3 parameters are shown below in Fig.(37). It thus becomes clear just how each point is a combination of metals, one from each principal of the figure. Now,to make the calculation which will give the same result got by the parametric method,we simply work with the same facts that are disclosed by the tables themselves & make up in each case a permutation using the PLUS-ONE ALGORITHM with which thestudent is familiar.(See Book Ta-Khu, Tropermic Calculus,etc.) It will be easiest totake the degrees or places of the perms in the XJQ sequence, male & female. Then, with G-2 we have the places of the perm occupied by -

	5	6
13 -	(1)	(5)
23 -	(2)	(6)
14 -	(3)	(7)
24 -	(4)	(8)

Fig (36-bis)

	7	8	9
14-	(1)	(10)	(19)
24-	(2)	(11)	(20)
34-	(3)	(12)	(21)
15-	(4)	(13)	(22)
25-	(5)	(14)	(23)
35-	(6)	(15)	(24)
16-	(7)	(16)	(25)
26-	(8)	(17)	(26)
36-	(9)	(18)	(27)

Fig (37)

Let us take as a perm of G-2,the combination of metals as in (7),e.g.

X ' J ' Q (prin.)
1 2' 1 2'1 2 (poles)
Possible Occupants = 5 6' 3 4'1 2 (metals)
Places = -I-' -II'III-
Occupancy Formula = 2 'x 2x 2 = 8 (#s)
Moduli = 4 ' 2 ' 1 (Innings)
viz- Qjx = YOE = 146 or Digits= 6 ' 4 ' 1 = (perm)
(1)3 5
The choice cradle is 2(4|6) 2 2 1 (ordinals)
Ordinal Remainders = --1 1 0
Ordinal-Remainders x Moduli = 4 + 2 + 0 = 6 (sum)
+

Verifying the result by the reverse method, # 7 we have, dividing successively by the particular moduli,

4/ #7 / 1 + 1 = 2nd choice for 1st place=(6)
4
2 / 3/ 1 + 1 = 2nd choice for 2nd place= (4)
2
1/ 1/ 1 = 1st choice for 3rd place = (1)
1
0

Hence the perm = (6)(4)(1),Q.E.D.

These are imprimitive perms, there being in the case of G-2, six candidates to fill all three places, but each particular place has only two of these from which to choose. Now, with G-3 we have nine candidates or metals, three places to fill, each of which has a choice of one at a time from a particular three out of the nine,the plus-one algorithm being built up as follows, for,say, #16 = 168, or - in the XJQ sequence, 861 - the metalic perm. The choice cradle is the same as the metalic, (7,8 or 9)(4,5,or 6)(1,2,or 3).

3 x 3 x 3 = 27 (Occupancy Formula)
9 3 1 = Moduli
8 6 1 = Digits of Perm
2nd 3rd 1st = Ordinals Chosen
1 2 0 = Ordinal Remainders
(1 x 9) + (2 x 3) + (0 x 1) = O - R x Moduli
= 9 + 6 + 0 + 1 = #16 the 861 perm.

Verify by reversing the algorithm as follows.

Moduli
9/ #16 / 1 + 1 = 2nd 7,8,9 = (8)
9
3/ 7/ 2 + 1 = 3rd of 4,5,6 = (6)
6
1/ 1/ 1 = 1st of 1,2,3 = (1)
1
0

Therefore the perm = (861),Q.E.D.

Thus , by the plus-one algorithm we are able to find the number of the # when its constituent metals are given & when the # alone is given we are able by the reverse of the plus-one algorithm to find the component metals.

[illegible] • ERECTING THE GEOMETRICAL FIGURE (G-3) WHEN THE CRADLE PERM IS GIVEN - For example -

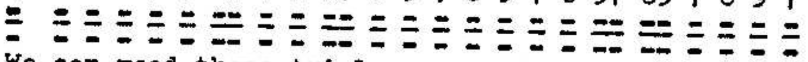
Inspection of the cradle as shown in Fig (38) here will disclose any # that we wish to know ; so that you may understand this yet more clearly,we will put the particles of this change of the idem in the proper idemfactorial

Fig(38)-

8 1 6 = 1#
9 3 5 = central #
7 2 4 = I#(reciprocal of 1#)

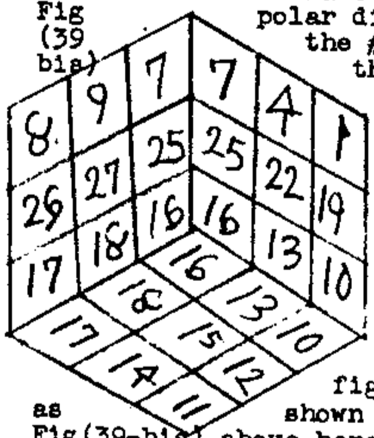
places of Fig (35)as follows---Fig (38-bis)-------

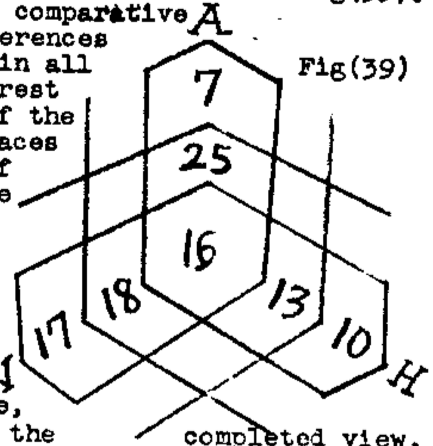
6			5			4		
1	3	2	1	3	2	1	3	2
8 9 7	8 9 7	89 7	8 97	8 9 7	8 9 7	8 97	89 7	8 9 7



We can read these triples up or down & get the triad of metals which = the # which occupies each of the 27 places or points of the 3rd degree cube in the given change thereof. The critical #s are those of the three topermic crystals, A,V & H,which in the idem are #s 1,2,3; 1,4,7; 1,10,19: here we find in these same places #s 16,25,7; 16,18,17; 16,13,10, which we proceed to arrange properly in the framework of the geometrical figure,as shown in Fig(39). Then we can calculate by comparative polar differences the #s in all the rest of the places of the figure, as shown in the completed view, Fig(39-bis) above,here; thus 16 from 18 is 2, so 2 + 13 = 15 for the center of the bottom; 10 from 16 = 6, hence 18 minus 6 = 12 & so on. Or [illegible]ly fill in the numbers,using the idem [illegible] where instead of#1 we put #16; instead of #2 we put #25; instead of #3 we put #7; instead of #4 we put #18, & so on. When the geometrical figure is already numbered completely & we wish to determine its metalic cradle,we simply reverse the above described process, by writing the metalic triads of enough #s,so that we can tell which principals & metals thereof occupy the cradular places.

Fig (39 bis)





Fig(39)

816
935
724

The three metals in supposititious salt are those of the first major, 897; those of the supposititious quicksilver are 132; those of supposititious sulphur are 654; hence arrange these on the margins of the cube as in the picture, Fig (40) below. We see then that the metal on the very bottom,instead of (1) of salt is the second sulphur metal, viz- (8); the metal on the very back,instead of (4) the first quicksilver metal is the first salt metal which is (1); the metal on the very left instead of the first sulphur(7), is the third quicksilver,(6); the # in the #1 place,then is that which has the metals, 8-1-6; look at the table of Fig (37),where these three metals meet & see the 8 on the major margin, & the 16 on the minor & the particle indicated is (16) = #16 to go in the #1 place of the G-3 figure. The # directly above this combines the metals 916, hence is #25 & so on, with the rest. Now,with #16 in the first place & postured so that the whole figure has the cradle as shown in the upper left hand (immediate) corner of this page(25), suppose we wish to find out what # occupies the 15th place (as of the idem),all we need do is put our finger on the 15th place (as of the idem) & note what # is there, namely, the middle of the "top",whose metals will be 7 3 5 = #6. Another & better way is to use the algorithmic method,but we must use the [illegible]le cradles in the algoperm,as follows. When an algorithm of this type is considered as something whose terms (I,II,III & IV) can be permuted,then we call it an algoperm,which is in its idem an equality of ratios such that I is to IV as II is to III,or,here, #16 : #6 :: #1 : #15;where #15 x #16 = #6 x #1.

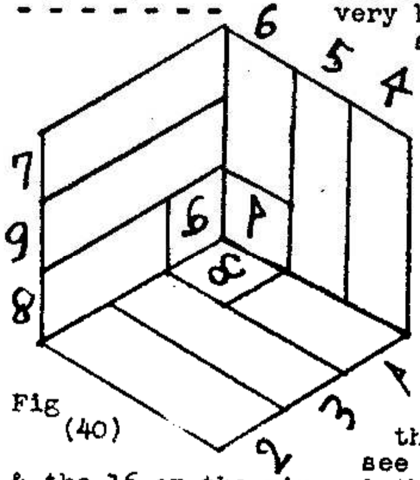
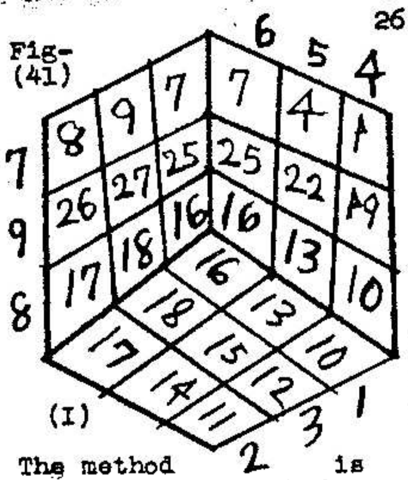


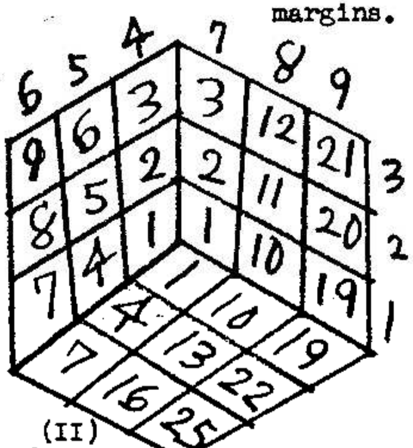
Fig (40)

#16		#1	#15		#6
M-cand		M-plier	Idem		Product
8 1 6	/	1 4 7	3 5 8	/	7 3 5
9 3 5	/	2 5 8	1 6 9	/	8 2 4
2 4	/	3 6 9	2 4 7	/	9 1 6
(I)		(II)	(III)		(IV)

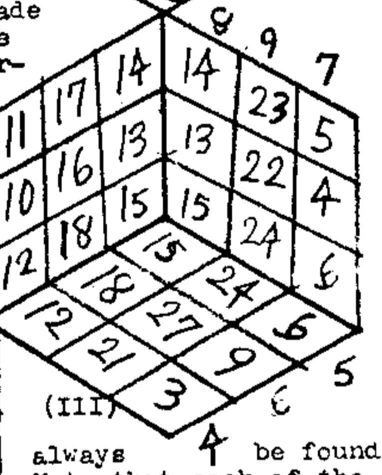
Fig-(41)

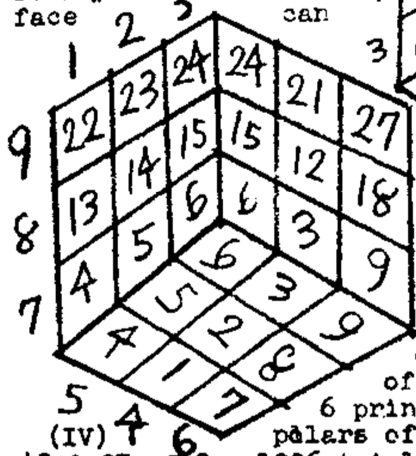


Here we show the algoperm with the four terms of G-3 postures punctually completed with their metalic margins.



The method is as already described. Begin & work systematically with the A, V & H crystals, or if these cannot be found, then any row of three will do if co-ordinate rows can be made so that whole faces can be calculated by polar differences; that is, all that is needed is to have two rows to cross each other on each face, then the other four #s of the face can always be found. Note that each of the 27 different #s can be in the 1st place 48 times, each time with a different total-posture of the figure; for there are 6 principal perms x 2 x 2 x 2 pàlars of the 2nd & 3rd minors = 48 & 27 x 48 = 1296 total-postures of G-3.





XVIII - CONCERNING D-2, A GEOMETRICAL FIGURE WITH FOUR PRINCIPALS (Ways) & TWO POLES IN EACH-

The most common four-dimensional figure is called a Tetrak & is illustrated in Fig (42), below. Since it is bipolar its points can be represented by using grams (yangs & yins), four for each point, making a Tetragram for each of its sixteen #s. The first three ways are those with which we are familiar, Q(1), J(2), (X), 3, & the fourth is called D (4) & its metals are Nickel (7) or (N) & Zinc (8) or (Z), the female pole of D. In Fig (42-b) below we show the successive dichotomies which produce the sixteen #s. The polar differences are 1 for Q, 2 for J, 4 for X & 8 for D. Thus it is an easy matter to connect the #s, each of which is the meeting place of four crystals (edges), by using the polar differences.

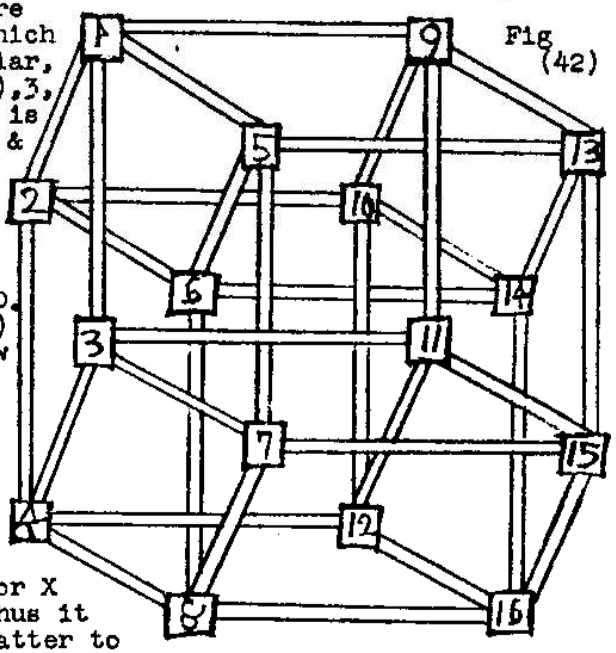


Fig (42)

---Fig (42- bis)---

7								8							
5				6				5				6			
3		4		3		4		3		4		3		4	
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2

XIX - HOW TO STAGGER THE #S & DRAW THE D-2 FIGURE-

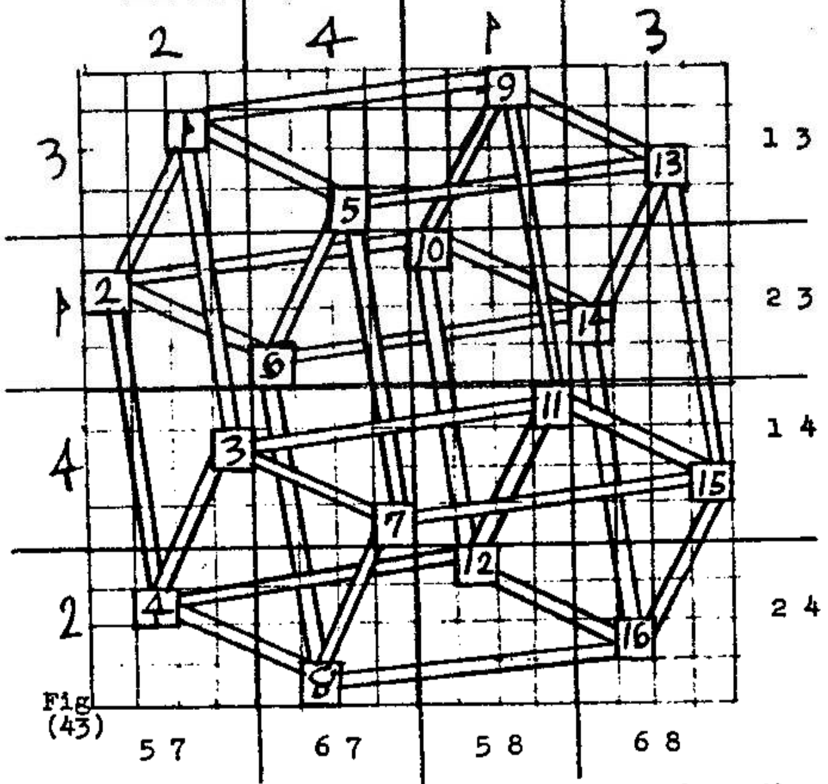


Fig (43)

In order to draw this figure neatly, to have the lines clear & overlapping properly, the #s should be staggered in both ways, vertically & horizontally, with the whole figure slightly on the bias. To achieve this rule off a square, as above, Fig (43), into 16 x 16 small squares inside 4 x 4 larger ones. The two marginal indices, top & left, show how to count, down & across (toward the right), to [illegible] the small square for the # inside the 16th appropriated to it. E.g., #5 is 4 down & 3 across in the space where the metals 13 & 67 meet; #1[illegible] is 1 down & 4 across in the space where metals 1[illegible] 5 meet to make this point. The right & bottom parameters show the constituent metals of the several points. When it is desired not to show the guide lines locate the #s on a second sheet laid over the first where they are first worked out, as we

did with Fig (42). If the figure is made with straws tied together it can be unfolded or opened out; then the formula for bridging or lapping-over is important; if the #s are connected in the following sequence the over & under relationship will be as it is wanted. One, three, eleven, nine, one, five, thirteen, fifteen, seven, eight, four, three, seven, five, six, two,

four, twelve, sixteen, fifteen, eleven,

twelve, ten, nine, fourteen thirteen, eight, six, sixteen, fourteen, ten, two, one.

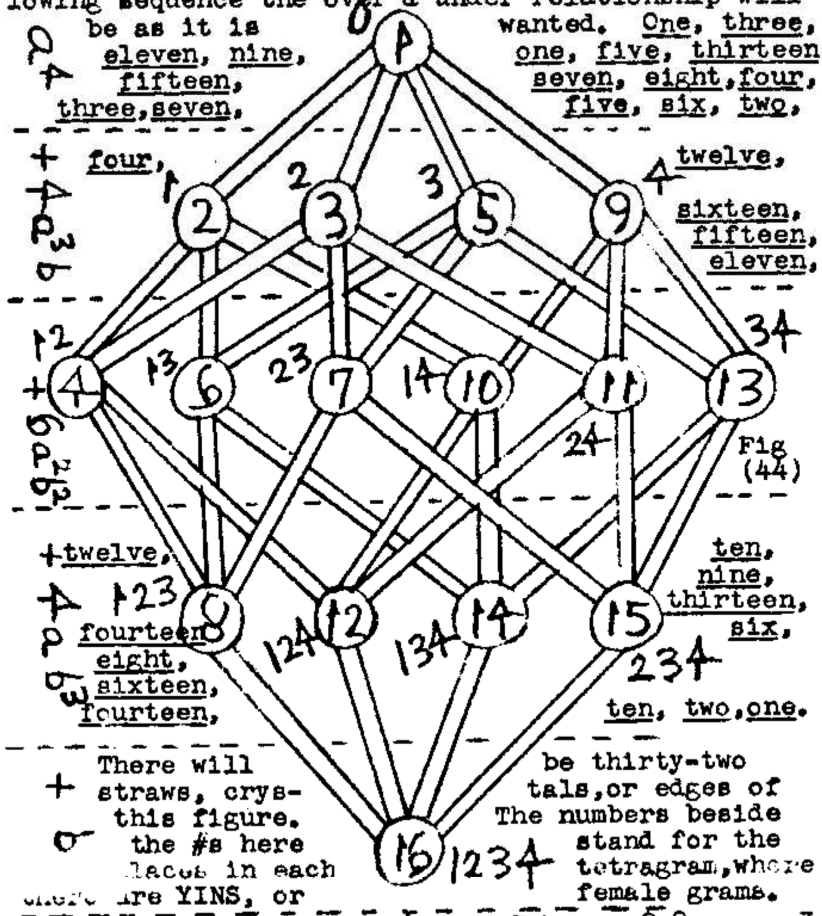


Fig (44)

There will be thirty-two straws, crystals, or edges of this figure. The numbers beside the #s here stand for the places in each tetragram, where there are YINS, or female grams.

The algebraic formula, $a^4 + 4 a^3b + 6 a^2b^2 + 4a b^3$ [illegible]^4, shows the five levels of generation; a is for yang & b is for yin. Thus, e.g. $4 a^3b$ means 4 #s or tetragrams each of which contains 3 yangs & 1 yin; b^4 = 1 # with 4 yins; etc. The 16 #s are divided into five groups or levels by this formula & the junctions are only between adjacent levels.

XX - METALIC TABLE OF TETRACTIC #S (D-2)-Fig(45)-

	57	67	58	68
1 3 -	1357	1367	1358	1368
2 3 -	2357	2367	2358	2368
1 4 -	1457	1467	1458	1468
2 4 -	2457	2467	2458	2468

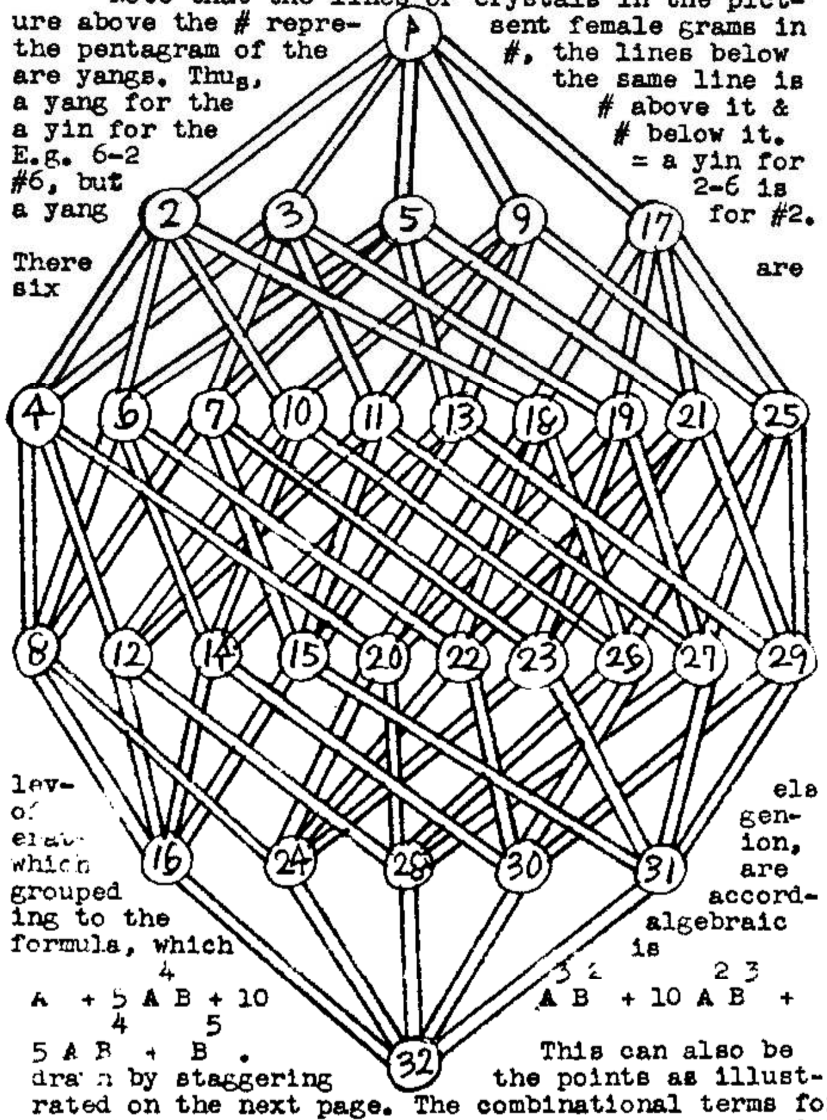
Note that the metalic digits of these #s are in the No.1 principal perm,here. There are 4! = 4 x 3 x 2 x 1 = 24 different principal perms of D-2 #s & 2 x 2 x 2 x 2 = 16 polar perms; hence 24 x 16 = 384 total-postures of this figure,&/or its #s. The cradle is 1 3 5 7 Now, if we make an algebraic analysis 2 4 6 8. or allocation of the #s severally,we get the following table,which shows merely the bi-polar components of each #. - Fig (46)-

The grammic constituency of a # can be found by using the plus-one algorithmic method as explained on page 22 et seq. The student can easily work this out.

Q	J	A		B		
		A	B	A	B	=D =X
A	A	AAAA (1)	AABA (5)	AAAB (9)	AABB (13)	
B	A	BAAA (2)	BABA (6)	BAAB (10)	BABB (14)	
A	B	ABAA (3)	ABBA (7)	ABAB (11)	ABBB (15)	
B	B	BBAA (4)	BBBA (8)	BBAB (12)	BBBB (16)	

To draw the figure,connecting the #s,note that each crystal must have a pole or end at each sex,on each metal of its principal & four crystals,one from each way meet at each #. Using the combinational terms as shown in Fig (44),page 29,note that "0" goes with "1","2","3" & "4"; "1" goes with"0", "12","13" &"14", viz-each combination which contains the digit,"1". "2" goes with "0","12", "23", & "24", viz- each combination on the next level with "2" in it. "14" goes with "1", "4", above & "124" & "134" below it. the latter two containing the combination "14"; study of these linkages will develop understanding of the system involved,which applies generally.

XXI - ILLUSTRATION OF H-2= 5-Way,2-Pole Figure (47)

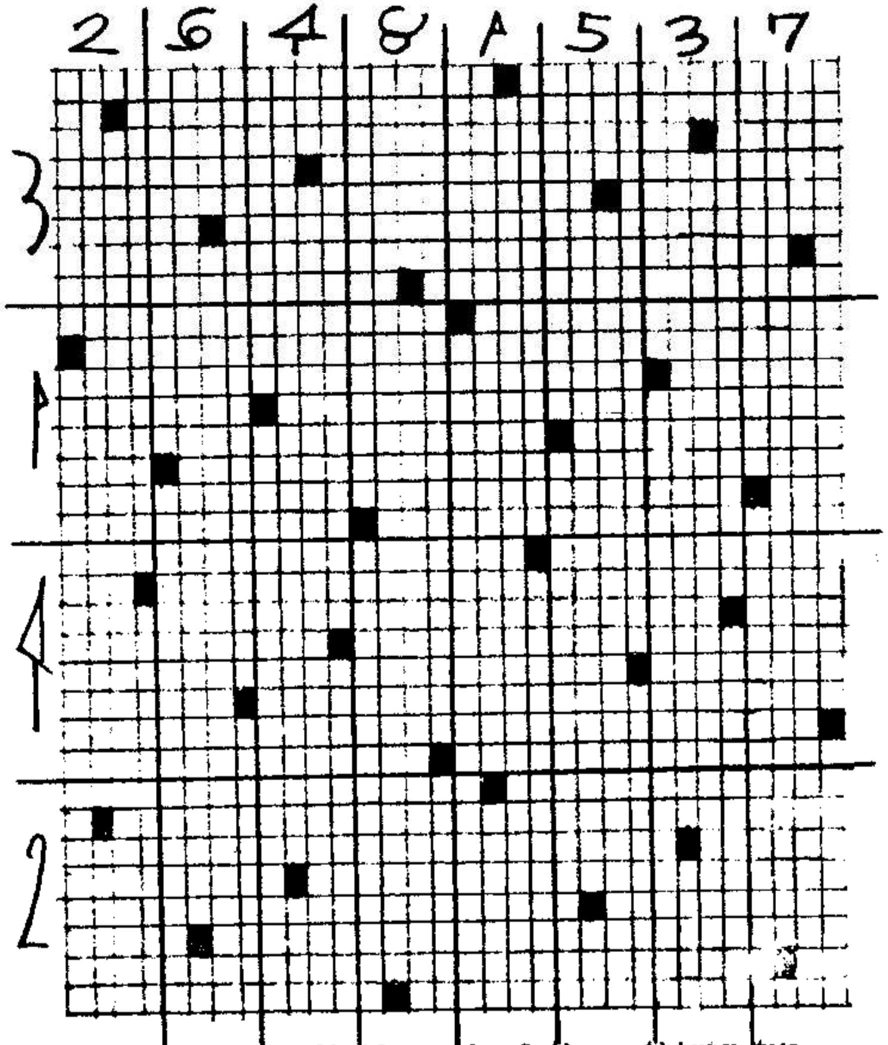


Note that the lines or crystals in the picture above the # represent female grams in the pentagram of the #, the lines below are yangs. Thus, the same line is a yang for the # above it & a yin for the # below it. E.g. 6-2 = a yin for #6, but 2-6 is a yang for #2.

There are six levels of generation, which are grouped according to the algebraic formula, which is $A + 5A^4B + 10A^3B^2 + 10A^2B^3 + 5AB^4 + B^5$. This can also be drawn by staggering the points as illustrated on the next page. The combinational terms for the above are made simply by counting the grams in the QJXDH sequence & numbering the principals which have female poles, or yins;e.g.#13 = ..xd. = 34.

XXII - ILLUSTRATION OF STAGGERING THE #S FOR H-2-

Draw a large square eight wide Fig (48)-

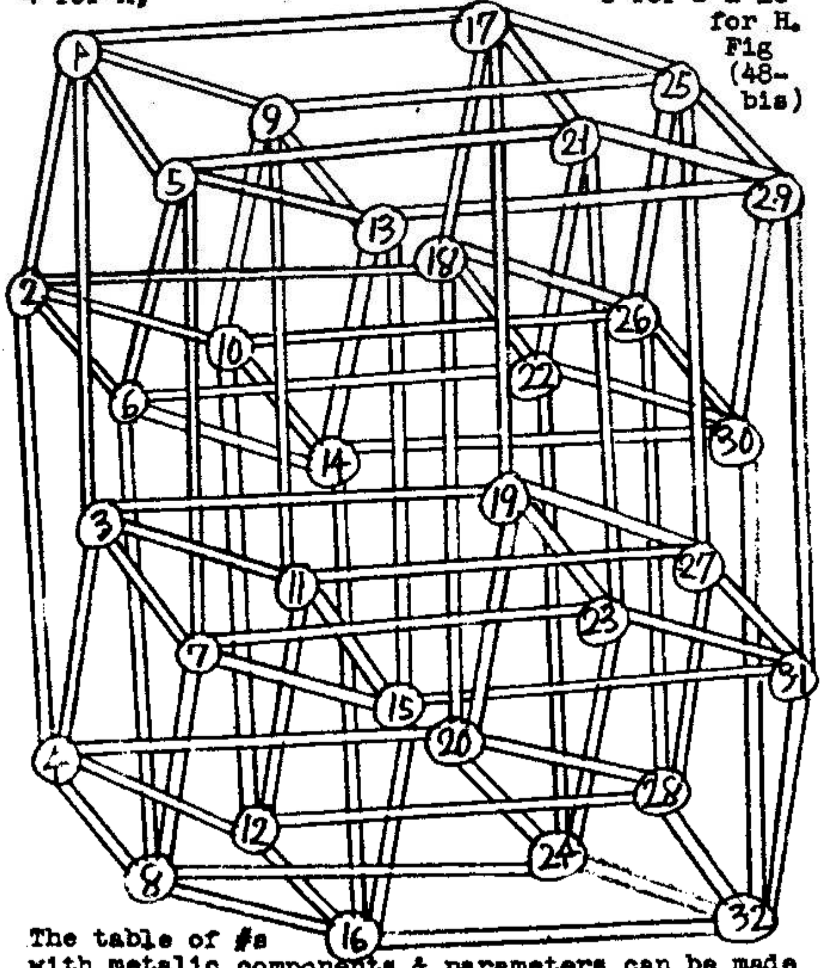


by four deep & divide each of these thirty-two squares four wide by eight deep;then count down & across to find the locations as shown above.

XXIII - ILLUSTRATION OF CONNECTING H-2 #S LOCATED ON A STAGGERED FRAMEWORK OF POINTS TRACED-

It is a simple matter to connect the right #s by using polar differences, here 1 for salt, 2 for J, 4 for X, 8 for D & 16 for H.

Fig (48-bis)

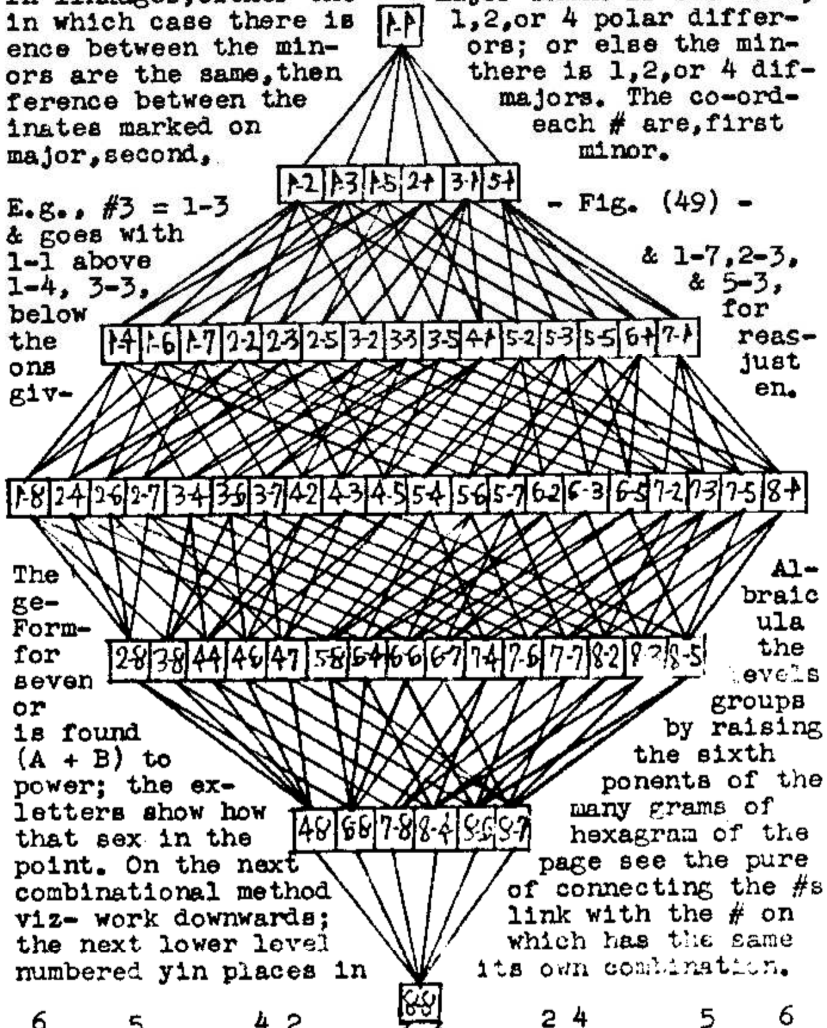


The table of #s with metalic components & parameters can be made with QJX on the minor margin & DH on the major. Thus, e.g. #15 will be that particle with 146 on the minor & 89 on the major parameter; this can also easily be found by the reverse of the plus-one algorithm,the moduli being 16,8,4,2,& 1, by which successively to divide the given number.

XXIV - ILLUSTRATION OF V-2 CONNECTED BY MAJOR & MINOR TRIGRAMMIC OR PUNCTUAL PARAMETERS.

The 64 #s are arranged on 7 levels of generation. In linkages, either the major index is the same, in which case there is 1,2,or 4 polar difference between the minors; or else the minors are the same, then there is 1,2,or 4 difference between the majors. The co-ordinates marked on each # are, first major, second, minor.

E.g., #3 = 1-3 & goes with 1-1 above & 1-7,2-3, 1-4, 3-3, & 5-3, below for the reasons just given.



- Fig. (49) -

The Algebraic Formula for the seven levels or groups is found by raising (A + B) to the sixth power; the exponents of the letters show how many grams of that sex in the hexagram of the point. On the next page see the pure combinational method of connecting the #s: viz- work downwards; link with the # on the next lower level which has the same numbered yin places in its own combination.

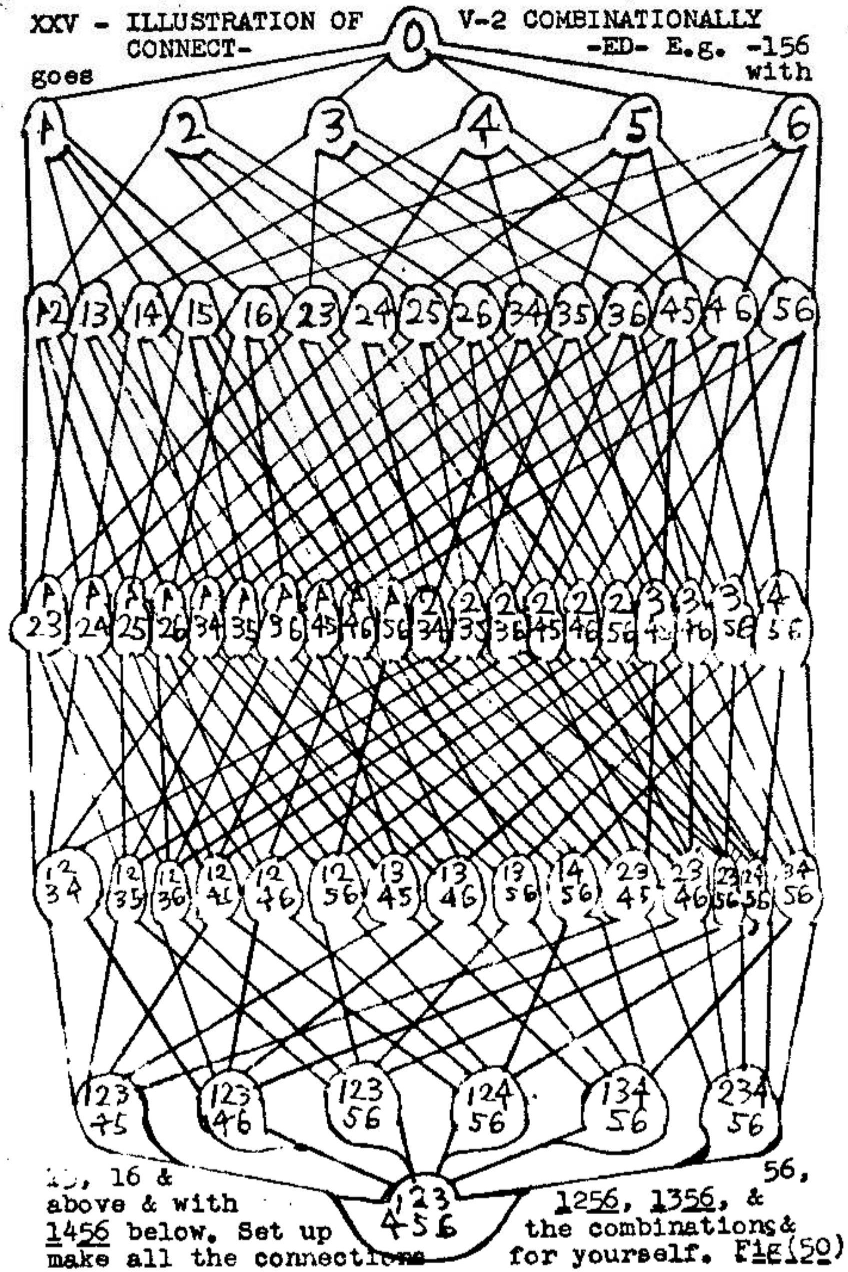
$$A^6 + 6A^5B + 15A^4B^2 + 20A^3B^3 + 15A^2B^4 + 6AB^5 + B^6 .$$

- -

#1 +(2+3+5+9+17+33)+(4+6+7+10+11+13+18+19+21+25+34+35+37+41+49)+(8+12+14+15+20+22+23+26+27+29+36+38+39+42+43+45+50+51+53+57)+16+24+28+30+31+40+44+52+54+55+58+59+61)+32+48+56+60+62+63+(64)= #s of above.

XXV - ILLUSTRATION OF V-2 COMBINATIONALLY CONNECTED-

-ED- E.g. -156 goes with



15, 16 & 56, above & with 1256, 1356, & 1456 below. Set up the combinations & make all the connections for yourself. Fig(50)

XXVI - GENERATIVE TERMS OF THE 64 #s of V-2 ARRAYED IN THE LOGICAL ORDER- Fig (51) -

Here the digits are the combinational terms-showing the places in each hexagram where there are yins-as of the top & left parameters: on the right & bottom we see the minor & major punctual parameters.

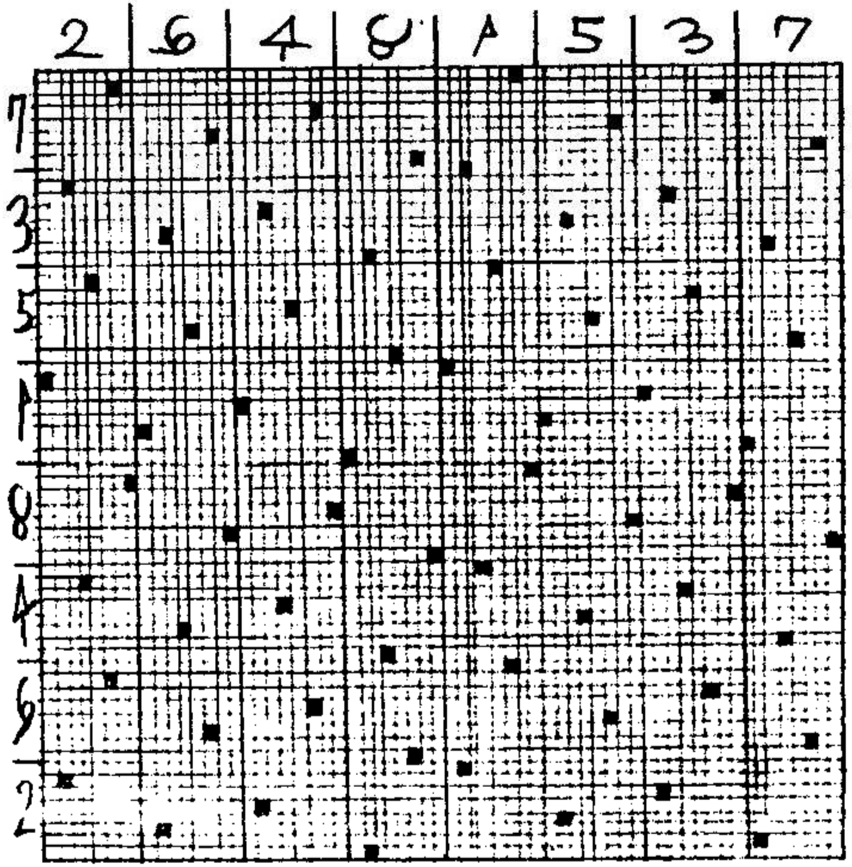
Thus, e.g., the particle whose minor is 5 & the major 6 is the generative or combinational term "346", which means that in the hexagram of this number, the grams in the 3rd, 4th & 6th places are yins - the other three grams are yangs; the polar expression of this #, then is 1 1 2,2 1 2 . But 112 = 5 & 212 = 6, hence this #45 = 5 x 6- viz- 6 major & 5 minor, on the punctual parameters (bottom & right), as shown above, here.

	•••	4••	•5•	45•	••6	4•6	•56	456	
•••	0	4	5	45	6	46	56	456	1
••1	1	14	15	145	16	146	156	1456	2
•2•	2	24	25	245	26	246	256	2456	3
•21	12	124	125	1245	126	1246	1256	124 56	4
3•	3	34	35	345	36	346	356	3456	5
3•1	13	134	135	1345	136	1346	1356	134 56	6
32	23	234	235	2345	236	2346	2356	234 56	7
321	123	1234	1235	123 45	1236	123 46	123 56	123 456	8
	1	2	3	4	5	6	7	8	

- Fig (51) -

XXVII - ILLUSTRATION OF STAGGERING THE #S FOR V-2 -

Draw a large square, 8 x 8 & divide each of these sixty-four squares, also into 8 x 8; then write the numbers, to count down, across the top- 2, 6, 4, 8, 1, 5, 3, 7 & down the left margin, the numbers to count across, viz- 7, 3, 5, 1, 8,4,6, 2. The #s to connect will be the tiny squares where these criss-cross countings meet, as, e.g. with the hexagrammic # 5 x 6 = #45, found in the 64th where minor 5th meets major 6th; in this we count down five & over eight to find the tiny square in which to locate the #. On the next page we have traced the above locations in order to draw the V-2 geometrical figure itself: six dimensions, two poles in each.



-Fig (52)-

XXVIII - ILLUSTRATION OF V-2 DRAWN ON STAGGERED FRAMEWORK - The #s can be connected simply by using the six polar differences- 1 for Q, 2 for J, 4 for X, 8 for D, 16 for H, 32 for V, added or subtracted from the number of the # as given, here.

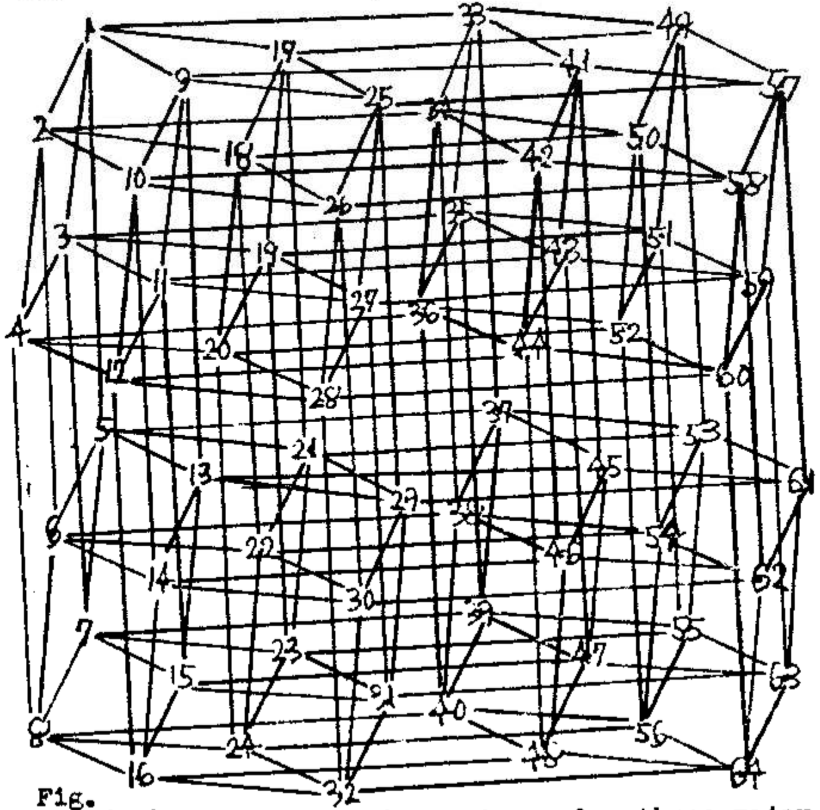


Fig.
----(53)-- There are three minor plus three major crystals from each #. With 64 #s in the whole figure, 6 x 64 = 384, which must be divided by 2, since 2 #s make one crystal, then 384/2 = 192 crystals in all. Or, we may calculate this same sum another way: Divide 64 by 2 = 32 #s on each pole of the six dimensions to be connected each with the other pole, making 32 crystals in each principal, times 6 ways (principals) = 6 x 32 = 192 crystals, or lines in the above V-2 geometrical figure. It is also possible to calculate all categorical parts, such as #s, lines, surfaces, cubes, tetraks, pentraks, & sextraks.

XXIX - STRUCTURAL DESCRIPTION - We can classify figures according to their punctual quantity, linear quantity, or according to the number of planes they contain, or the number of solids, or tetraks, or pentraks, or sextraks, or higher configurations & the primitives of these are principals & degrees in each. With the data, numerical & otherwise, fixed & the rules & conditions of structure, we can build up certain geometrical figures & acquire a definite knowledge of their categorical parts. The sort of figure described here is called "closed", for all of its #s are connected with other #s, there are no loose ends, or lines left dangling. Each figure is in the first place a set of points, next it is a set of lines, then of surfaces, then of solids, & so on; these are its categories. A set of connected #s where every # in the set is connected with every other # in the same setis called a complete point-set. Figures are symmetrical when their various parts of the same category are congruent. The degree of a # is counted by the number of different categories of which it is a part. When a # is part of a set it is said to be"on" that set & the set is also "on" it. If one whole set is part of another whole set, whether of the same or a higher or lower sort, we say that the one set is on the other & vice versa. Thus "on" is synonymous with "intersection". If two #s intersect or are on each other, they are totally congruent. If two lines, which are 2# sets, are wholly congruent, then both #s of each line would be on the #s of the other line, respectively, but this respective congruence might or might not constitute a a correspondence of similarity or analogy, for each figure has form, or order, arrangement of its component parts.

Suppose two lines which are 2# sets to have numbers ascribed to their #s as #1 & #2. Call the one set A & the other B, then we have four #s : A-1, A-2; B-1, B-2. If now we make the two sets, A & B, congruent, #A-1 may coincide with B-1 or B-2, then A-2 will be on whichever # is left, viz- B-2 or B-1; thus there are two congruent possibilities here.

Now, call the two #s of A, 1 & 2 & those of B, 3 & 4. According to the system of numbering, 1 is to 2 as 3 is to 4. Then if the chosen congruence be 1 with 3 & 2 with 4 it is similar or analogous; if it be 1 with 4 & 2 with 3, it is dissimilar or incongruous. If we take the particular position, posture or change of A, as 1 - 2, as the idemfactor, then 3 -4 will be the idemfactorial posture of B; since, in this case only two different postures of a figure are possible,we can call the posture, 2 - 1, or 4 - 3, reciprocal, or simply, reverse. The figure, A, or B, has but one dimension or principal,but it has two poles or degrees. If we take a straight line, C,which contains three #s, say,5, 6 & 7, then we have a figure or #-set in one principal with three poles, or a 1-way,3-degree figure.

XXX - STRUCTURAL FORMULAS & TABULATION - Each geometrical figure or structure can be described in terms of its categorical parts & their relationship with each other. Thus in a figure which is a complete 2# set, the degree of a # may be specified with respect to each category of the figure, & similarly with the line which is the other categorical part of this figure..thus, there is one line(the same line, by the way) on each # of the figure; there are two #s on each line of the figure. Considering complete point-sets we can begin to tabulate them as follows. ---Fig.(54)---

Figure	1# sets	2# sets	3# sets	4#sets	5#sets	6# sets
A-	1	•	•	•	•	•
B-	2	1	•	•	•	•
G-	3	3	1	•	•	•
D-	4	6	4	1	•	•
H-	5	10	10	5	1	•
V-	6	15	20	15	6	1

Thus, Figure A,here, is a complete #-set with one # in the set & by definition,every # in this set is connected with every # (itself & other) inthe same set. Fig.B is a complete 2#-set,similarly connected; it contains two 1# sets & one 2# set. Fig.G is a complete 3# set (viz- graphically,a triangle),containing three 1# sets, three 2# sets & one 3# set. Fig.D is a complete 4# set,containing four 1# sets, six 2# sets, four 3# sets & 1 4# set,graphically a tetrahedron. Fig.H is a complete 5# set, containing 5 1# sets,10 2# sets, 10 3# sets, 5 4# sets & 1 5# set, graphically D-1,or a species of one-degree tetrak with four lines meeting at each #, & so on. The formula for finding the particles of the above table is that for getting the combinations of N things taken R at a time, viz-

$$\frac{N \times (N - 1) \times (N - 2) \ldots \times (N - R + 1)}{(1 \times 2 \times 3 \ldots \times R)} = R!$$

Thus, the numerator of

this fraction is the product of the descending digits for the same number of terms as the digits of the denominator ascend from 1 to R. E.g., the number of combinations of five things taken three at a time (N = 5, R = 3) is $\frac{5 \times 4 \times 3}{1 \times 2 \times 3} = \frac{60}{6} = 10$, where each of the five #s can connect with each of the other four in the 5# set, to make a sub-set of three #s. Thusthere are ten 3# sets in one 5# set. Below in Fig (55) we show a complete 5# set. Note the location & number of each of the different categorical parts. There are $\frac{5 \times 1}{1} = 5$ 1# sets. The number of 2# sets will be the coefficient of the third term in the expansion of(A + B) to the 5th power, which is found by dividing the product of the coefficient of the second term by the exponent of A, by two,i.e. the number of the term whose coefficient & exponent are used. Thus, $\frac{5 \times 4}{2} = 10$.

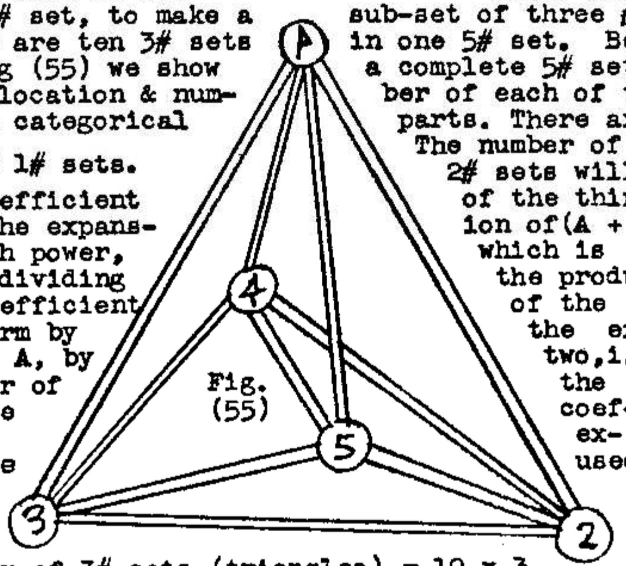


Fig. (55)

The number of 3# sets,(triangles) = $\frac{10 \times 3}{3} = 10$.

The number of 4# sets(tetrahedrons) = $\frac{10 \times 2}{4} = 5$.

The number of 5# sets = $\frac{5 \times 1}{5} = 1$, which is the coefficient of B^5.

$A^5 + 5A^4B + 10A^3B^2 + 10\,A^2B^3 + 5\,AB^4 + B^5$

Now, the 1# sets of Fig (55) are #1, #2, #3, #4 & #5. The 2# sets are 1-2, 1-3, 1-4, 1-5, 2-3, 2-4, 2-5, 3-4, 3-5, 4-5. The 3# sets are 1-2-3, 124, 125,134,135, 145,234, 235, 245, 345. The 4# sets are 1234,1235, 1245, 1345, & 2345. The 5# set is 1-2-3-4-5.

XXXI - THE BI-POLAR THEOREM - The Binomial Theorem givesthe categories for complete # sets.Now let us consider # sets whose principals have two poles or degrees in each, such that each # goes with only a limited number of other #s, not all.

Fig.(56)- - - Here, the first term of the expansion is the # of 1# sets in the figure; the second term is the number of 2# sets in the figure; the 3rd term is the number of 3# sets in the figure, & so on, with 8#, 16#, 32# sets, etc.

$(2+1)^0 = 1 = 1$

$(2+1)^1 = 2 + 1 = 3$

$(2+1)^2 = 4 + 4 + 1 = 3^2 = 9$

$(2+1)^3 = 8 + 12 + 6 + 1 = 3^3 = 27$

$(2+1)^4 = 16 + 32 + 24 + 8 + 1 = 3^4 = 81$

$(2+1)^5 = 32 + 80 + 80 + 40 + 10 + 1 = 3^5 = 243$

$(2+1)^6 = 64 + 192 + 240 + 160 + 60 + 12 + 1 = 3^6 = 729$

1# 2# 4# 8# 16# 32# 64# sets.

XXXII - THE TRI-POLAR THEOREM - Here, we have figures with three poles in each principal; the first term is the number of 1# sets, the 2nd is the number of 3# sets; the 3rd is the number of 9# sets, the 4th of 27# sets.

-Fig(57)-

$(3+1)^0 = 1 = 1 = 4^0$

$(3+1)^1 = 3 + 1 = 4 = 4^1$

$(3+1)^2 = 9 + 6 + 1 = 16 = 4^2$

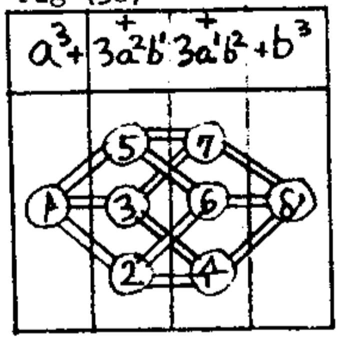
$(3+1)^3 = 27 + 27 + 9 + 1 = 64 = 4^3$

$(3+1)^4 = 81 + 108 + 54 + 12 + 1 = 256 = 4^4$

$(3+1)^5 = 243 + 405 + 270 + 90 + 15 + 1 = 4^5 = 1024$

XXXIII - CATEGORICAL PARTS OF G-2 = BIPOLAR 8# SET-

-Fig (58)-



This is the common second degree cube. In the table here the majors are the # sets in the cube = an 8# set & the minors are the # sets contained in the majors as they are contained in the cube itself.

	1#	2#	4#	8#
1#-	1	2	4	8
2#-	3	1	4	12
4#-	3	2	1	6
8#-	1	1	1	1

Fig(58-b)

Thus, the cube contains 8 1# sets (reading the 4th major file), 12 2# sets (edges or crystals), 6 4# sets (sides or metals), & 1 8# set (cube).

XXXIV - CATEGORICAL PARTS OF D-2 = TETRAK(2nd deg) = BIPOLAR 16# SET-

	1#	2#	4#	8#	16#
1# -	1	2	4	8	16
2# -	4	1	4	12	32
4# -	6	3	1	6	24
8# -	4	3	2	1	8
16#-	1	1	1	1	1

- Fig (59) -

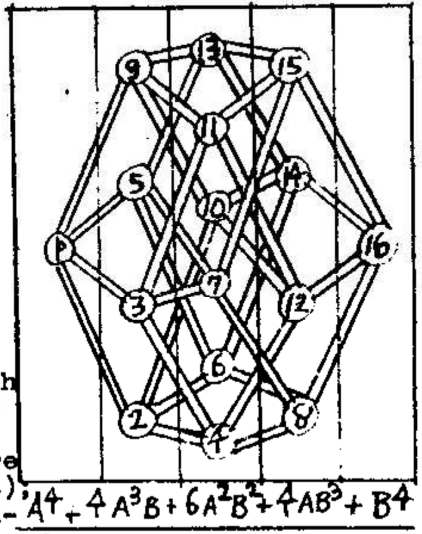


Fig (59-bis) -

Here, we see the figure & its table of categorical parts, which answers the question, e.g. how many squares (4# sets) on each cube (8# set) of the 16# set? = six. Or, e.g., how many cubes on each square (= 8# sets on each 4#set), i.e., given any particular square of the figure, say #1-3-9-11, how many different cubes have this same square as one of their sides, respectively? The answer is two. Again, how many 2# sets on each 8# set, i.e. how many lines on each cube; the answer is 12. How many cubes on each line, viz- 8# sets on each 2# set? The answer is 3.

XXXV- CATEGORICAL PARTS OF H-2 = 2nd deg. PENTRAK = BIPOLAR 32# SET * Fig (47) - (*page 31) - -

Fig (47-bis)- - answers such questions as - How many squares on each point? The answer is $\frac{5x4}{1x2} = 10$. Or, say, how many lines on each tetrak = 32. Or, say, how many tetraks on the same line = 4, & so on, with the interpretation of the whole table, here, Fig (47- bis). This requires careful & exhaustive study.

	1#	2#	4#	8#	16#	32#
1# -	1	2	4	8	16	32
2# -	5	1	4	12	32	80
4# -	10	4	1	6	24	80
8# -	10	6	3	1	8	40
16#-	5	4	3	2	1	10
32#-	1	1	1	1	1	1

XXXVI - CATEGORICAL PARTS OF V-2 = 2nd deg. SEXTRAK = BI-POLAR 64# set- see fig (53) page 38.

Here we find the answers to the same sort of questions as already considered with respect to the other bi-polar figures. Six lines meet at each #; there are five squares on each line; four cubes on each square; ten tetraks on each line, & so on. The calculation of the answer is by the bi-polar theorem: see Fig (56). E.g. =64 x 15/16=60 for 16# sets on the 64# set figure.

Fig (53- bis)-

V-2	ᚹ#	2#	4#	8#	16#	32#	64#
ᚹ#	ᚹ	2	4	8	16	32	64
2#	6	ᚹ	4	12	32	80	192
4#	15	5	ᚹ	6	24	80	240
8#	20	10	4	ᚹ	8	40	160
16#	15	10	6	3	ᚹ	10	60
32#	6	5	4	3	2	ᚹ	12
64#	ᚹ	ᚹ	ᚹ	ᚹ	ᚹ	ᚹ	ᚹ
	POINT	LINE	SQUARE	CUBE	TETRAK	PENTRAK	SEXTRAK

XXXVII - CATEGORICAL PARTS ON PARTS OF G-3 -see Fig (28)

- Here we have a trichotomous situation in which each line is divided into thirds for the three #s which comprise the line; then the generations of #s can be found by raising three-thirds to the required power. (See section III,15 of Book PIH, page III,9). Here we have 2 squares, (9# sets) on each line, (3# set); & six lines on each square; & so on.

Fig (28 - bis) -

	1#	3#	9#	27#
1#-	1	3	9	27
3#-	3	1	6	27
9#-	3	2	1	9
27#-	1	1	1	1

XXXVIII - CATEGORICAL PARTS ON PARTS OF D-4 =

4-Way, 4-degree figure. This can be constructed easily by making first the outline of D-2 according to the stagger-system of Fig (43), then add two #s to each line, making the eztra in-between lines that are necessary. The table is shown here in Fig. (60). -

The size of the pages of this book prevents drawing this figure here with clarity, but the student should make it up on a large sheet for practice.

	1#	4#	16#	64#	256#
1#-	1	4	16	64	256
4#-	4	1	6	48	256
15#-	6	3	1	12	96
64#-	4	3	2	1	16
256#-	1	1	1	1	1

XXXIX - CO-ORDINATE TRANSFORMATIONS - D-2 EXAMPLE-

The punctual metalic table of the 16#s of this figure is shown in Fig (45), page 30. The metalic cradle is $\overline{1\ 3\ 5\ 7}$, which has 4! = 24 principal perms & $\underline{2\ 4\ 6\ 8}$ 2^4 = 16 polar perms, so that, all told, there are 24 x 16 = 384 changes of this D-2 figure. (Tetrak). In the idem the first place is occupied by #1 = 1357 metalically. Now, let us put in the first place the postured point whose crystoperm = 4627, then the new cradle of this will be $\overline{4\ 6\ 2\ 7}$ & the first minor of the new punctual $\underline{3\ 5\ 1\ 8}$ metalic table will have 46 as the ordinate or minor index & 27 as the abscissa or major index. From the new cradle we derive the new parameters in the same way that the idemfactorial cradle yields the parameters of the Fig (45), q.v.

The first major of the cradle gives the ordinates in sequence for the first digits of the minor parameter, thus- $\boxed{1}$ for the idem & $\boxed{4}$ for the new change. Compare $\boxed{2}$ the cradles & $\boxed{3}$ tables as shown below in Fig's(61)&(62). The second major of the cradle gives the second digits of the minor parameter, thus: Idem = 3 & 6 for the new change.

3 6
3 6
4 5
4 5

Fig (61)-

1	3	5	7
2	4	6	8

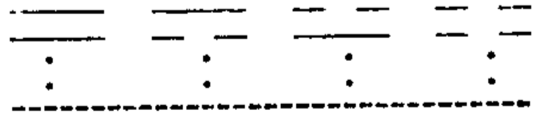
	57	67	58	68
13 -	1	5	9	13
23 -	2	6	10	14
14-	3	7	11	15
24 -	4	8	12	16

Fig (62)-

4	6	2	7
3	5	1	8

	27	17	28	18
46 -	8	7	16	15
36 -	6	5	14	13
45 -	4	3	12	11
35 -	2	1	10	9

The third major of the cradle gives the first digits of the major parameter, as 5 . 6 . 5 . 6. for the **idem** & for the new change, 2 . 1 . 2 . 1. & the cradle's fourth major gives the major parameter's second digits, thus:/idem = .7 . 7 . 8 . 8 Consequently, the /new change = .7 . 7 . 8 . 8 . whole parameters become as shown above in the Fig (61) & Fig(62). The particular #s in each are those which combine the metalic co-ordinates, which can be found identically from the idem, as.e.g., 45-17 is the same # as 14-57, viz #3; the arrangement of the metalic digits in the # shows the posture of the #, which will be the same for all 16 in the table, viz, for the idem = as 1357 & for the other = 4627, the # in first place, all #s in the figure being uniformly postured. Note that the same result can be achieved by using a grammic scheme, or by a combinational process. Thus, with grams, the major parameter of the idem is -



WHEREAS the major parameter of the new change is -

These same parameters can be expressed as

combinational terms, thus for the new change, we get the major = 1 - C - 14 - 4 & the minor of the same = (reading down) 23 - 3 - 2 - C. Thus, the #s or particles are sums of the co-ordinates, respectively-e.g. where the minor is "3" & the major "14", the particle = "134" = "2368" or "3628", postured.

XL - CONCERNING V-2 TRANSFORMATIONS - Now, apply the same method to the V-2 figure whose idem-factorial metalic cradle is

1	3	5	7	9	11
2	4	6	8	10	12

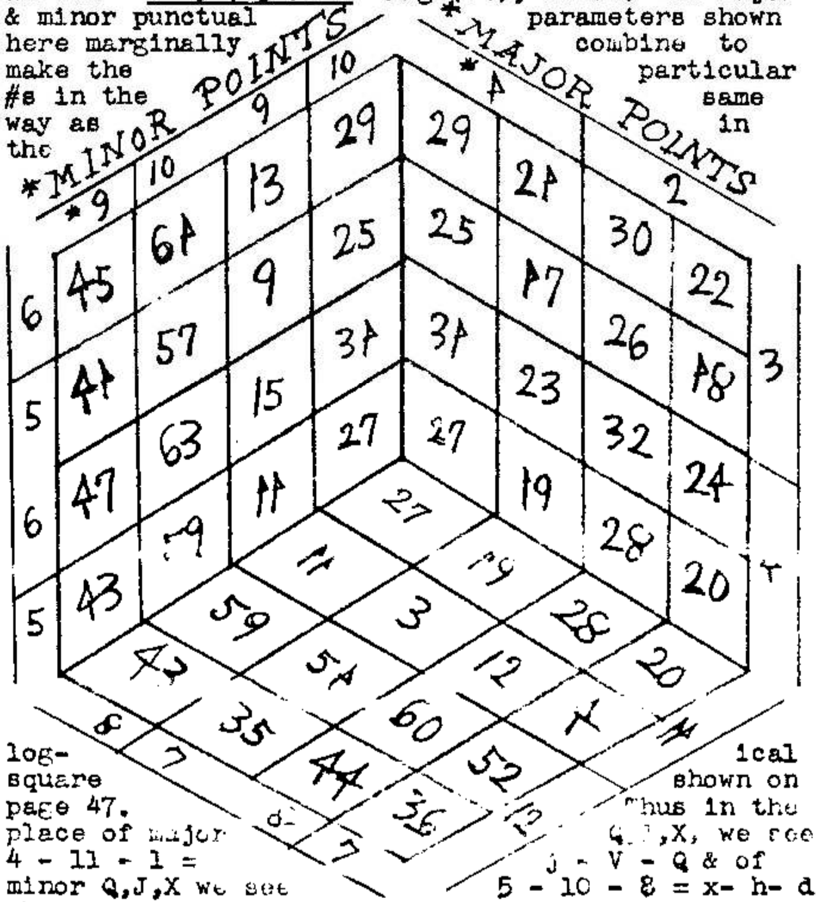
The parameters are: major- 7-9-11; 8-9-11; 7-10-11; 8-10-11; 7-9-12; 8-9-12; 7-10-12; 8-10-12. The minor is 135, 235, 145, 245, 136, 236, 146, 246, (to be read down). Now put, say #27 in the first place postured as "5-10-8-4-11-1"; then the co-ordinates of the first # of the new logical square are 5-10-8 for the minor & 4-11-1 for the major. The new metalic cradle is-

5	10	8	4	11	1
6	9	7	3	12	2

therefore the major parameter is to read (across)-4-11-1, 3-11-1, 4-12-1, 3-12-1, 4-11-2, 3-11-2, 4-12-2, 3-12-2, whereas the minor parameter is to read (down)- 5-10-8, 6-10-8, 5-9-8, 6-9-8, etc. The form is the same as Fig (53), but the punctual array is transformed as below- **Fig.**(63) - -

	4-11-1	3-11-1	4-12-1	3-12-1	4-11-2	3-11-2	4-12-2	3-12-2
8 10 5	27	25	59	57	28	26	60	58
8 10 6	31	29	63	61	32	30	64	62
8 9 5	11	9	43	41	12	10	44	42
8 9 6	15	13	47	45	16	14	48	46
7 10 5	19	17	51	49	20	18	52	50
7 10 6	23	21	55	53	24	22	56	54
7 9 5	3	1	35	33	4	2	36	34
7 9 6	7	5	39	37	8	6	40	38

XLI - ILLUSTRATION OF THE V-2 CHANGE WHOSE CRADLE IS 5 10 8 4 11 1 / 6 9 7 3 12 2. Logically, this can be as in the Fig (64), below. The major & minor punctual parameters shown here marginally combine to make the particular #s in the same way as in the log-ical square shown on page 47. Thus in the place of major 4 - 11 - 1 = Q,J,X, we see J - V - Q & of minor Q,J,X we see 5 - 10 - 8 = x- h- d.



The primary diagonal of this figure as shown in cubic form above is #27- #7- #58 - #38.
The V-2 [illegible] %/or figure [illegible] principal [illegible]
[illegible] 64 pellars = 46,[illegible] changes. The above is found by the plus-one algorithm to be **No.18,237.** Thus, the occupancy formula = 12x10x8x6x4x2 & the Moduli = 3840,384,48,8,2,1; the O-I of 5-10-8-4-11-1 are 4-7-5-3-2-0, x the Mod. = 15,360 + 2,608 + 240 + 24 + 4 + 0, + 1 = 18,237. The student should work out many examples of each problem to fix the rules & conceptions in the mind. Thanks to everything!