

Encoded data within the shafts and gallery of the Great Pyramid

Abstract

The Great Pyramid of Giza is a well known ancient monument situated on the outskirts of Cairo, Egypt. Within the building are two chambers from which four narrow square shafts are currently known to emanate. The shafts have been explored in recent times by robotic systems that were custom designed for the task and the internal stonework joints of each shaft's walls and roof has been surveyed. The surveys show that the shaft's stonework is comprised of irregular length blocks and the reason for this has not been addressed in any of the surveying reports. Here I show that stone's joint spacing is irregular because it encodes precision numerical data. It was found that the angles of the roof and floor of three of the shafts has been intentionally recorded in the stonework at the time of construction, in radians, and to 15 decimal places of accuracy. The stone joint's numerical descriptions of the shaft's angles were found to relate directly to a geometric system encompassing all four shafts which resulted in precision astronomical data also being extracted from the architecture which compares accurately with data from current ephemerides. The results show that the building's architectural design is considerably more complex than currently thought and involves calculations of such an advanced scientific nature as to be able to conclude that the origins of the pyramid must be drastically different from current assumptions.

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The Great Pyramid papers

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Encoded data within the shafts and gallery of the Great Pyramid

Introduction

The historical explorations of the Great Pyramid of Giza that determined that the upper and lower chambers of the building contain four 22 cm² shafts are well documented. In recent times these shafts were explored by research teams using robotic devices, the first of which was the Upuaut project in 1993. Lead by Rudolf Gantenbrink the team used two techniques to investigate the pyramid's shafts, both techniques employing the same data gathering features on the robots of digital inclinometers, camera systems and a method for accurately measuring the traverse of the robot along the shaft. For the two shafts of the upper chamber, which are open to the air at their top ends, the robotic devices were placed on sledges and then manually pulled up the shafts from the outside which resulted in highly accurate data being gathered regarding the position of the roof stone joints within the two shafts. For the lower southern shaft a second technique was employed because this shaft is fully enclosed within the pyramid and required a motorised propulsion system to be used to move the robotic device up the shaft. Errors were introduced due to unknown reasons during this process and a comparison of the shaft stone joint locations with data from later projects shows that the Upuaut lower southern shaft length contains a significant large error of several meters. The technical drawings from the Upuaut project were published online¹ at the end of the 1990s. In this paper the Upuaut block lengths from the upper shafts are used but only the shape of the stones is used from the lower southern shaft, the block lengths being rejected.

Using a completely different design for a robot which employed bracing actuators to hold the robot firmly in position against the side walls of the shaft, a team from Leeds University in England lead by professor Robert Richardson and robotics engineer Shaun Whitehead re-explored the lower southern shaft in May 2010 under the name of the Djedi project. The team never formally published their data however they supplied me with the spreadsheet of the raw measurements from the project during private correspondence² which contains their field notes and the position of the stone joints within the shaft. In this paper the Djedi project's block length data is combined with the shape of the stonework reported in the Upuaut project to give the accurate shaft stone joint information for the lower southern shaft.

The fourth shaft, the lower northern shaft of the pyramid, is of a different design to the other three shaft as it contains significant bends. It has also been robotically explored, but the shaft stone's joint locations were not recorded during the exploration. The basic details of this shaft^{3,4} and the video⁵ from the robot's ascent through the shaft have been published online.

The data extraction technique

The precise angles of the three straight shafts can be obtained from the roof block joint locations. The measuring technique required to accomplish the decoding is uncomplicated. If a tape measure were to be attached to the robotic devices that explored the shafts and that tape measure had the numbers zero to nine repetitively marked upon it, then as the robots climbed the shaft it would be possible to read out a number on the tape measure at the bottom of the shaft. Diagram N0 shows this mechanism in idealised operation.

In the diagram the robot is halted at a point where the top of the tape measure is in line with a joint in the roof/wall stonework and the tape measure is shown at the bottom of the shaft displaying the number 2. The second tape measure on the diagram, below the first, shows the number that would be read out when the robot is aligned with the previous stone joint as the robot ascended, and the third tape measure shows the same arrangement at the previous stone joint. The number that can be read out at the bottom of the shaft in this diagram is therefore 297 or 792. On the diagrams of the actual shafts that are presented in this paper the same technique is used, but because there are so many stone joints in each shaft there are significantly more of the tape measures displayed on each diagram.

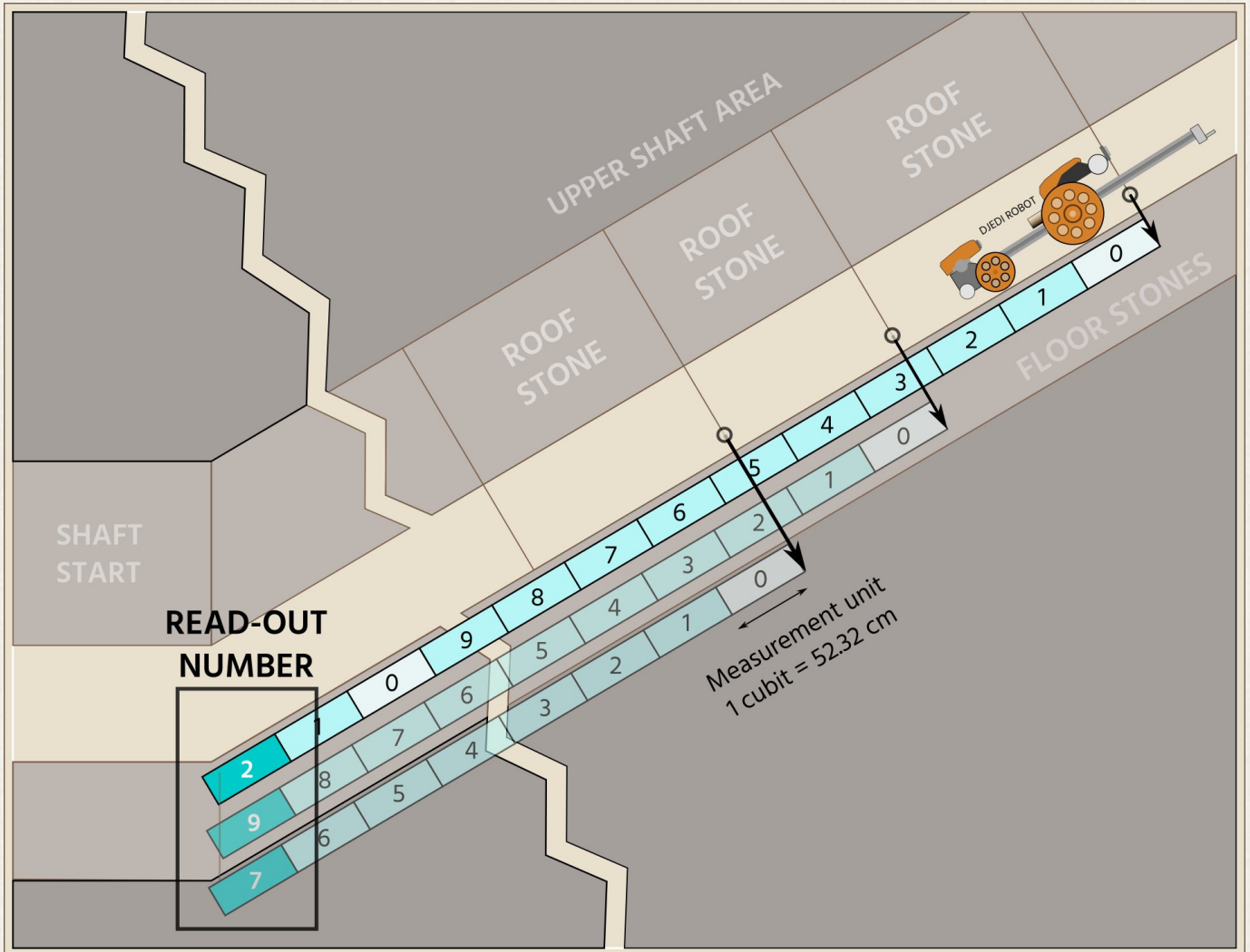


Diagram N0 The measuring system employed in the Great Pyramid shafts.

The length of each segment of the tape is essential in correctly decoding the numerical data from the stone joints. In the first of the three shafts, the upper northern shaft, the length of the segments on the tape measure is one Egyptian cubit in length or 52.33 cm and the segment lengths of the tape measure required in the other shafts are shown also to be logical rational values.

The upper northern shaft, first analysis

Diagram N1 shows the first decoding of the upper northern shaft's stonework which gives the shaft angle in degrees as 32.6124792 and the same angle in radians to 15 significant decimal places of accuracy. The units of degrees and radians are the units that were used when the shafts were built and are not a figment of the modern decoding operation.

The method for obtaining the shaft angle is shown in the lower portion of diagram N1 and involves a straight forward piece of geometry applied to an ellipse. The angle of the line L on the diagram can be shown by algebraic analysis to have a gradient of $4a^2/b.c$ where a and b are the ellipse's radii and c is the circumference. To obtain the angle of the shaft given in the stonework the eccentricity of the ellipse needs to be adjusted until the angle of the line L is identical to the degree value obtained from the shaft stones. When this is done it becomes evident that the ellipse must be a polar cross section of the Earth because the reciprocal polar flattening (RPF) of an ellipsoid required to produce the matching shaft angle from a polar cross section ellipse is 298.255. Final adjustments can then be made so that the angle of line L matches the 15 decimal place radian value given in the shaft, which occurs with an RPF of *exactly* $298 + 23/90$ showing clear intent within the design to rationalise the RPF value. The purpose of this shaft and the 15 decimal place radian value contained within it is to facilitate the shape of the Earth's reference ellipsoid to be determined, which is a prerequisite for decoding the other shafts.

The lower southern shaft

Once the ellipsoidal shape of the Earth has been determined, an axial tilt can be applied to the polar cross section as shown in diagram N2, lower section. The tilt is applied as both a negative and positive angle and the simple tangent line geometry applied to the ellipse is shown in the lower section of the diagram. This system ensures that the two lines, $L1$ and $L2$ have different angles which are then enumerated in the stonework of the lower southern shaft, the radian value being truncated at nine decimal places and the degree value being specified to fifteen decimal places. The shaft's angular data encoded into the stonework can therefore only be resolved using one specific axial tilt of the Earth, that being 23.99613137019311 in which all of the decimal places are significant. Using the astronomy formula⁶ of Jaques Laskar which computes the mean axial tilt of the Earth at a given date and time, but in reverse, this axial tilt can be dated in the astronomical year -2729 (2730 BCE) on 10th May at 07:06 hrs UTC.

All the roof stone joints fall on regular 10 cm intervals and it is statistically improbable that this would be the case if the builder's measuring unit was not also the meter or a value very close to it. The purpose of the shaft's design is to show that this was indeed the measurement unit being used by the builders, as can be seen in the upper southern shaft's design later on.

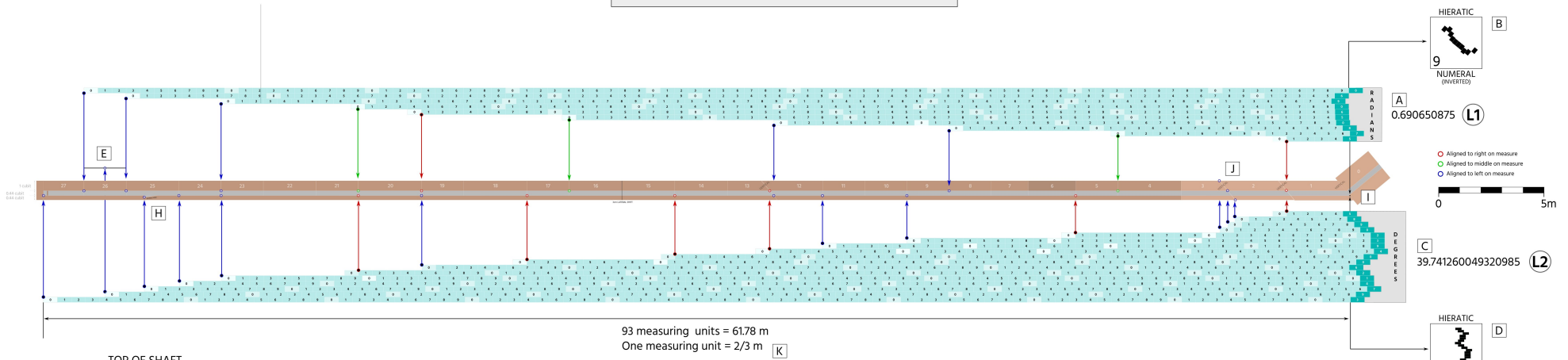
Of great significance is that the irregular alignment of the two read-out numbers in the shaft produces hieratic numerals which correctly identify the integer portion of the shaft's angle in degrees as 39. This shows that the numerical decoding system must be an authentic part of the architectural design and not a contrived modern artifact.

The upper northern shaft, second analysis

Knowing an axial tilt of the Earth it is possible to return to the upper northern shaft and apply a three dimensional rotation to the ellipsoid model as shown in diagram N3.

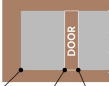
If a rotation is applied around the z-axis of the inertial frame, which is the axis that runs through the north and south pole on the unrotated Earth model, this rotation can be adjusted so that the full fifteen decimal place degree value of the geometric line L can be matched to the stonework joints degree read-out shown above the shaft in diagram N3. The rotation angle is a precision value and can be looked up on the NASA DE441 ephemeris tables⁷ to determine that if the angle is representing the true anomaly of the Earth, which it is, then the event being explicitly defined in the stonework took place on 2729 BCE 15th Jan 11:33:31.

LOWER SOUTHERN SHAFT



93 measuring units = 61.78 m
One measuring unit = 2/3 m [K]

TOP OF SHAFT

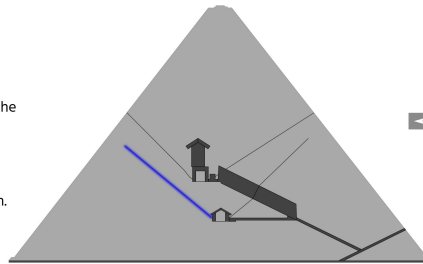


SURVEY DATA (DJEDI PROJECT)

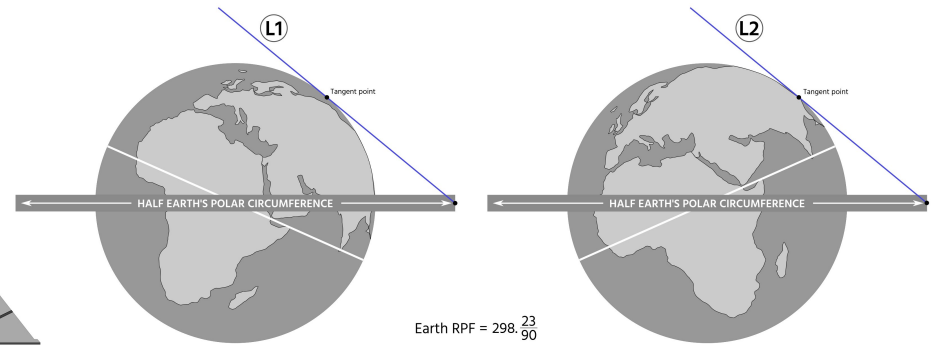
JOINT No.	28 ₀	28 ₅	28 ₅	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DISTANCE	63.78	63.56	63.50	61.80	59.80	57.30	55.30	53.30	50.80	48.80	45.80	43.80	40.80	38.80	36.30	33.80	31.30	29.30	26.80	24.80	22.80	20.80	18.80	17.05	14.80	12.80	9.80	7.60	4.80	2.00

POINTS OF NOTE

- A) The radian value is truncated to 9 decimal places.
- B) The radian value read-out alignment draws the hieratic numeral 9.
- C) The degree value is specified to 15 decimal places.
- D) The degree value read-out alignment draws the hieratic numeral 30.
 - The two read-out values draw the hieratic numerals 30 and 9 to show the integer portion of the shaft's angle in degrees.
- E) The degree and radian values are locked together at roof block 26 to show they are related.
- F) The shaft length to the back of the door at the top of the shaft is 63.56 m, the polar radius of Earth is 63.56×10^5 m.
- G) The length to the top end of the shaft is 63.78 m, the equatorial radius of Earth is 63.78×10^5 m.
- H) The decimal point in the degree value is marked by the unfinished floor block below roof block 25.
- I) Both the radian and degree read-out values align with the start of the angled shaft.
- J) The vertical joint at the start of block 3 is used in its entirety indicating the the roof stone thickness and the floor stone thickness need to be used as part of the system.
- K) The measuring unit is 2/3 of a meter in length.
- L) All of the roof stone joints are at 10 cm multiple intervals.



THE GREAT PYRAMID
LOWER SOUTHERN SHAFT (LSS)



SHAFT MINIMUM ANGLE

Axial tilt = - 23.99613137019311 degrees

L1 = 39.57138030692773 degrees

[L1] L1 = 0.690650875914733 radians

SHAFT MAXIMUM ANGLE

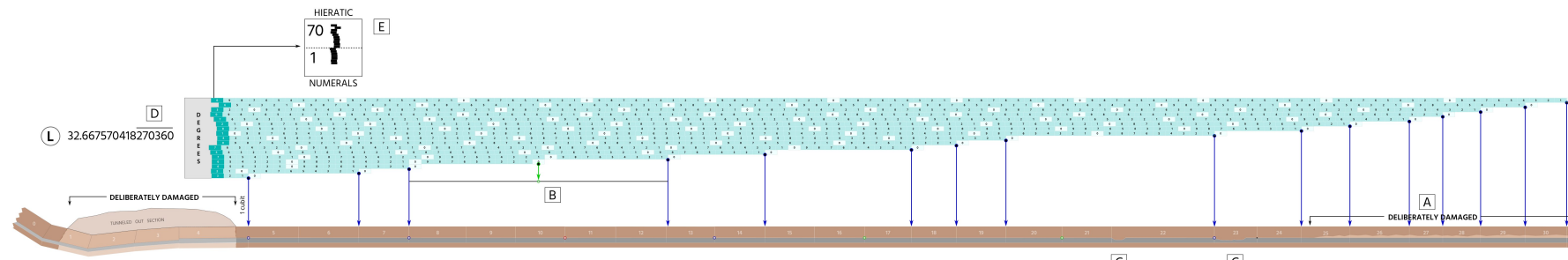
Axial tilt = + 23.99613137019311 degrees

[L2] L2 = 39.741260049320985 degrees

L2 = 0.693615836751935 radians

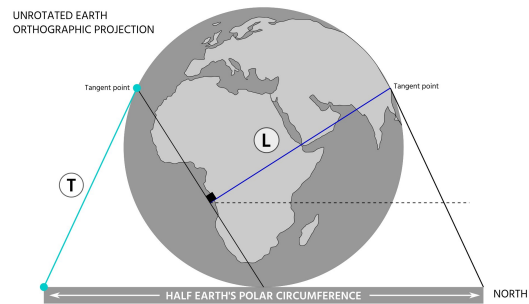
Diagram N2 - The lower southern shaft stonework analysis.

UPPER NORTHERN SHAFT ²



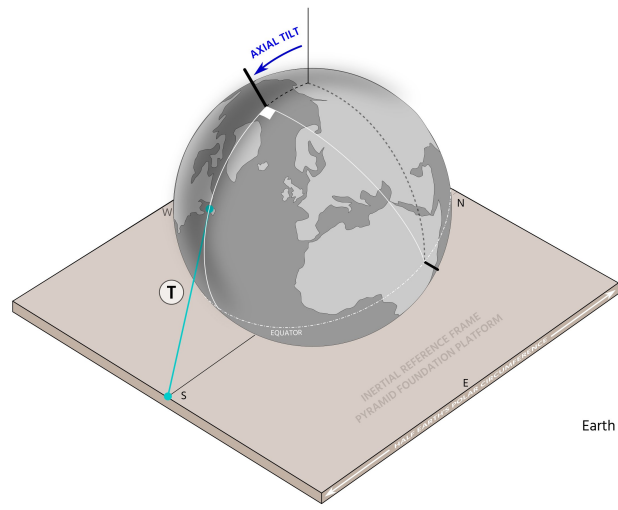
POINTS OF NOTE

- A) The stonework at the top of the shaft is partially destroyed, but is being used in the encoding.
- B) There is an unusual mechanism used to encode the 2nd decimal place digit where it is aligned at the midpoint between its neighbours.
- C) The two features previously identified on blocks 22 and 23 are not used.
- D) The read-out's last 6 digits are entirely in the damaged section and show the shaft's upper end height above the pyramid's lowest point when measured in cubits, shown in the inset drawing. The angle recorded in the stonework is therefore accurate to 9 decimal places
- E) The hieratic number seventy-one is drawn by the read-out alignment blocks in two parts.

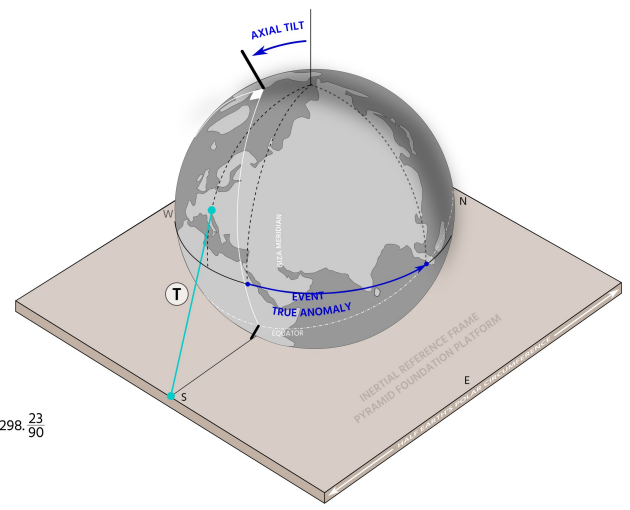


a = Polar cross section ellipse semi-major axis
 b = Polar cross section ellipse semi-minor axis
 c = Polar circumference

L Line gradient = $\frac{4a^2}{b \cdot c}$



Axial tilt = 23.99613137019311
 (Value from the lower southern shaft)



Earth RPF = 298. $\frac{23}{90}$

True anomaly = 71.3268156822 degrees

GIVES
 L Line angle = 32.667570418270360 degrees

Diagram N3 - The upper northern shaft stonework second analysis.

The upper southern shaft

The angular values that exist within the stonework shown in the previous sections were determined through a comprehensive understanding of the system in operation in the two remaining shafts, and not through an arbitrary trial and error approach. That system is now explained.

The definition of the cubit value is essential in decoding the whole shaft system to 15 significant digits and in diagram N4 the cubit definition is shown in the lower section of the diagram, which was determined through extensive analysis of the pyramid over several years. Let the Earth be defined as having a polar circumference of 40 million unit A, the Earth's atmosphere at Stratopause be defined as having a polar circumference of 77 million unit B and the height of the atmosphere below the south pole defined as being 87500 unit B. The model of the Earth that is being used within the Great Pyramid is thereby defined as being a 1:87500 model so that the atmosphere thickness, which symbolically is the foundation platform upon which the pyramid is built, is exactly one unit B. The 1:87500 model of the Earth aligns the geometry of the upper northern shaft from the previous sections precisely to the surveyed floor of the shaft.

Unit B is the royal Egyptian cubit, and unit A is identical to the originally intended length of the meter which was first proposed as being one ten millionth of the distance from the north pole to the equator. Because the meter was subsequently calculated from surveying measurements which contained errors then the two values differ slightly. One unit A, which I call the perfect meter (pm), has a length of 1.0001965635 m.

The value that is encoded into the upper southern shaft's stonework shown in diagram N4 is the number 45935.993629 and is the height of the atmosphere at the equator in perfect meters that is required to produce the atmosphere height of 87500 cubits at the south pole. The equatorial atmosphere height can be calculated to as many decimal places as required and therefore the value of the cubit can also be specified to any precision. The cubit is 0.523325453104595 m to fifteen places of precision.

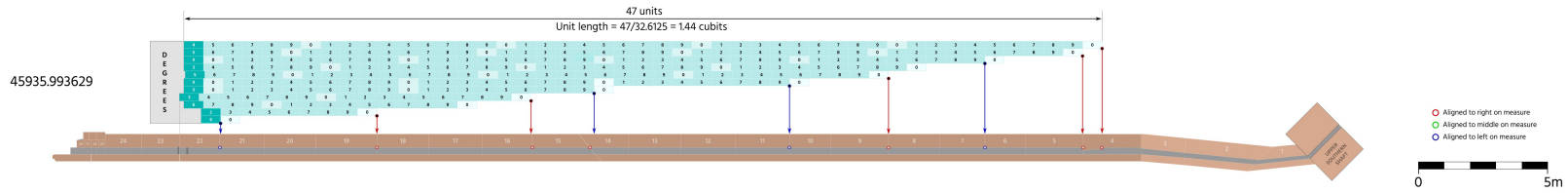
The angle of the shaft from the read out number should be 45.936 degrees but the shaft was built at one degree less than this value at 44.936 degrees, which has then been surveyed as being exactly 45 degrees. The length of the measuring tape unit required for the decoding is a cubit based value and is found by dividing the number of measuring tape units used to encode the value by the degree angle of the upper northern shaft.

Looking back at the previous diagrams it is possible to determine that incorrect or temporary values are shown with their read-out number at the top of the shaft, and the complete 15 decimal place correct values for the shafts always have their read-out number at the bottom of the shaft. From this it can correctly be concluded that the upper southern shaft must contain more data, and diagram N5 shows the completed decoding of this shaft.

It is immediately apparent when looking at diagram N5 that the encoding of the numerical values into the stonework has been carried out to a much higher standard than the previous cases. Whereas there were often stone joints that were unused or alignments to either end of the tape measure sections in the previous shafts, here consecutive stone joints are used for the 12 most significant places, all of which align to the same side of the tape measure sections. From the two fifteen decimal place numbers two more values of the cubit can be obtained, which are marked as cubit₂ and cubit₃ below the illustrations of the Earth.

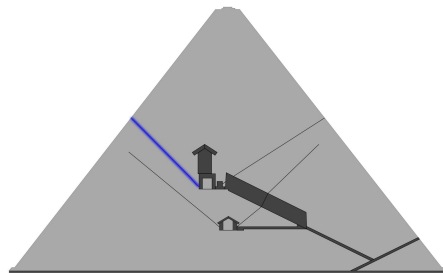
When the shapes of the read-out numbers are combined the resulting hieroglyph that can be discerned from the pattern is the cubit symbol, which is an out-stretched forearm with a cusped hand at the end of it, and a partial upper arm at the opposite end. The hieroglyph shows that the cubit values that have been obtained from this shaft are correctly decoded, original, and accurate to fifteen decimal places.

UPPER SOUTHERN SHAFT¹



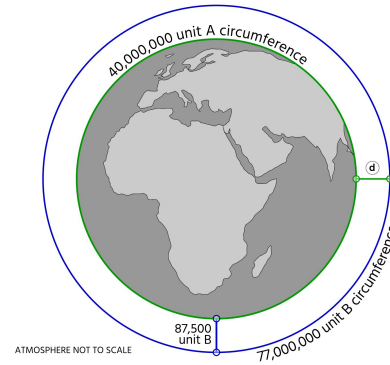
SURVEY DATA (UPJAUT PROJECT)

JOINT No.	28	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
DISTANCE (m)	49.255	48.952	48.699	48.406	48.153	46.766	45.287	43.722	42.025	40.032	37.656	35.655	33.580	31.648	29.421	27.915	25.915	23.810	21.718	20.107	17.882	15.899	14.162	12.597	10.361	8.108	6.455	3.592	1.719	
	FLOOR 28																													
	50.002																													



THE GREAT PYRAMID
UPPER SOUTHERN SHAFT (USS)

Earth reciprocal polar flattening (R.P.F.) = $298 \frac{23}{90}$



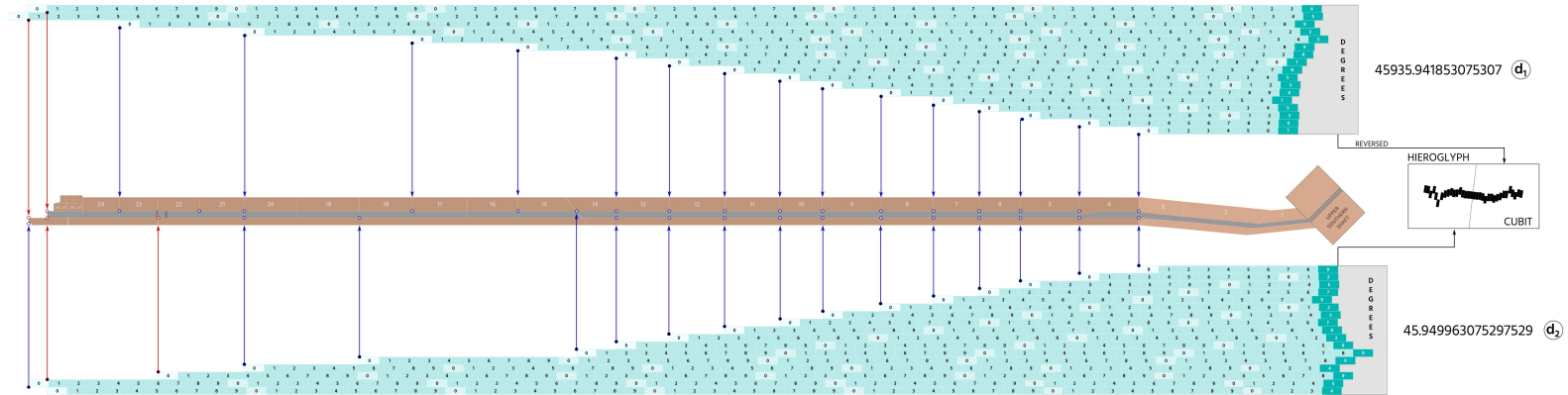
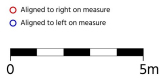
d = 45935.993629358635 unit A

unit A = 1.00019656354621 meters

unit B = 0.523222606613581 unit A

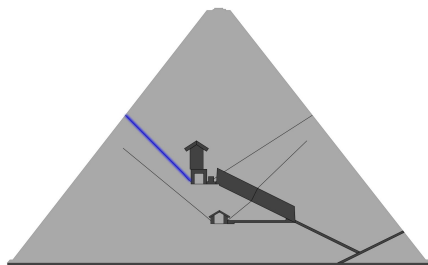
cubit = 0.523325453104595 meters

UPPER SOUTHERN SHAFT ²



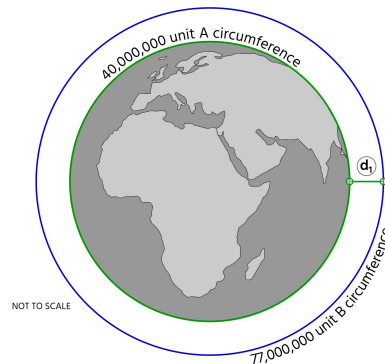
SURVEY DATA (UPUAUT PROJECT)

JOINT No.	28	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DISTANCE (m)	49.255	48.952	48.699	48.406	48.153	46.766	45.287	43.722	42.025	40.032	37.656	35.655	33.580	31.648	29.421	27.915	25.915	23.810	21.718	20.107	17.882	15.899	14.162	12.597	10.361	8.108	6.455	3.592	1.719
FLOOR 28	50.002																												



THE GREAT PYRAMID
UPPER SOUTHERN SHAFT (USS)

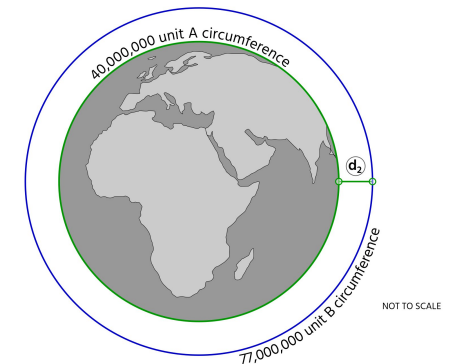
GIVES 2730 BCE APHELION AXIAL TILT



$$d_1 = 45935.941853075307 \text{ unit A}$$

$$\text{Cubit}_2 = 0.523222588368889 \text{ perfect meters}$$

GIVES 2729 BCE WINTER SOLSTICE AXIAL TILT



$$d_2 = 45949.963075297529 \text{ unit A}$$

$$\text{Cubit}_3 = 0.523223744607554 \text{ perfect meters}$$

Earth RPF = $298 \frac{23}{90}$

The lower northern shaft

The lower northern shaft is of a completely different construction to the other three shafts and contains the geometric mechanism for converting the cubit values obtained in the upper southern shaft into pinpoint accurate axial tilt values for the Earth. Diagram N6 shows the three dimensional geometry involved in the shaft's design.

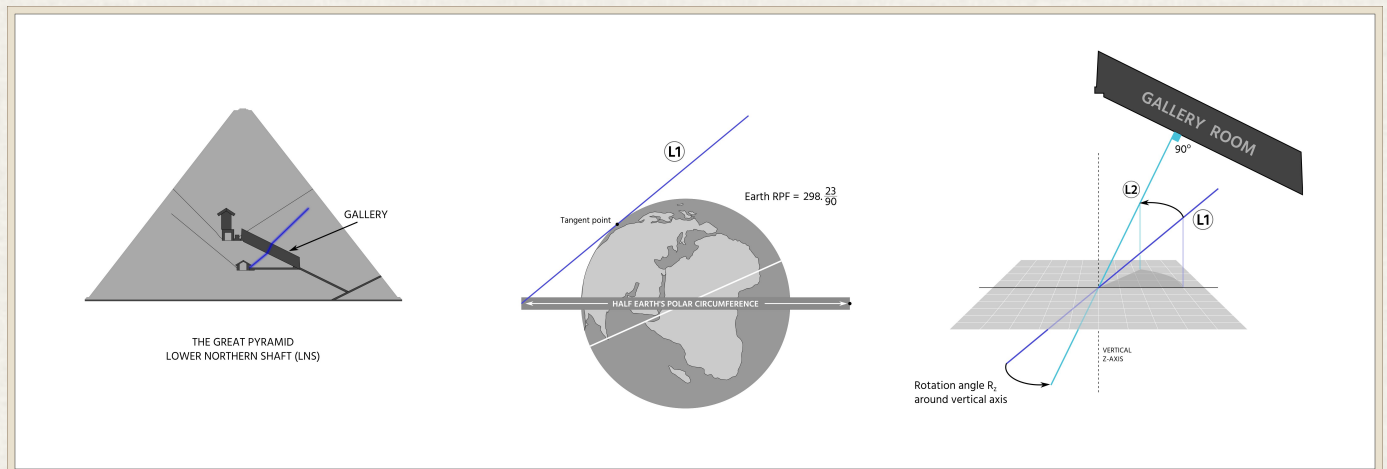


Diagram N6 - The lower northern shaft 3D geometry.

The first part of the geometry within the shaft is identical to that of the lower southern shaft shown in diagram N2 but with the drawing of the Earth and the tangent line reflected in a vertical axis.

If the axial tilt were an unknown quantity, then an arbitrary preliminary value can be applied to the Earth and the resulting tangent $L1$ line rotated in three dimensions around the vertical z-axis by an angle R_z until its orthographic projection becomes perpendicular to the floor of the Gallery room within the pyramid, the Gallery room's longitudinal and vertical axis defining the plane of projection. The resulting value of R_z will, by design, be 90 degrees minus the axial tilt of the Earth. The axial tilt from R_z can be plugged back into the geometry as the Earth ellipse's axial tilt and the system, which is a convergent piece of mathematics, continually repeated until the axial tilt angle stabilises at the fifteenth decimal place.

For this system to produce meaningful results the angle of the Gallery room floor needs to be known with an equal amount of precision to the required result, and this is where the unit definitions from diagram N4 of the lower southern shaft are used. The length of the Gallery is known from surveying measurements⁸ to be 48 pm (perfect meters) in length and, from analysis of the same survey, the Gallery floor is built at a gradient of 1 radian for every 200 cubits in length. Because the unit conversion between the perfect meter and the cubit is defined, then the gallery floor angle must always be $(48 / \text{cubit (pm)} / 200)$ radians, into which different values of the cubit can be placed.

By using the three different values of the cubit that were determined in the upper southern shaft to determine three gallery floor angles then the following table of axial tilts can be obtained from the lower northern shaft's calculation system.

	Value (pm)	Axial Tilt (deg)	Date (DE441 format)	Julian day (JD)
Cubit ₁	0.523222606613581	23.996131370193110	B.C. 2730-May-10 07:06:08	724419.795925926
Cubit ₂	0.523222602395726	23.996131607436002	B.C. 2730-May-09 08:54:46	724418.871365741
Cubit ₃	0.523223744607554	23.996067361256816	B.C. 2729-Jan-14 17:33:52	724669.231851852

Table N7 - The axial tilts extracted from the upper northern and lower southern shafts.

The date and time values in the third column of table 8 were determined using the previously mentioned axial tilt formula of Jaques Laskar.

The first line of the table is nothing more than the chosen value of the cubit that is used in the architecture and the axial tilt value and date does not represent a significant event in the Earth's orbit. The second line in the table gives the value of the Earth's axial tilt at the moment that the Earth was at its furthest distance from the Sun, aphelion, which is tabulated in NASA's DE441 ephemeris tables as occurring at B.C. 2730-May-09 07:56:18. The third line of data gives the Earth's axial tilt at the moment of the first solstice of the year 2729 BCE which is tabulated in DE441 as occurring at B.C. 2729-Jan-14 17:29:26.

The error in the ephemeris tables for the solstice is 4 minutes and 26 seconds which compares favourably with the known limitations of the table, and the 58 minute 28 second difference in the aphelion time is also within the error margins that are taken into account when referencing the DE441 tables over large time spans such as these.

The upper northern shaft, final analysis

The upper northern shaft's final data system is shown in diagram N8. As with the numerical data in the upper southern shaft the encoding uses consecutive stone joints in its highest precision numerals. The format of the read-out number is different to earlier presentations because it is impossible to determine which of the two possible numbers is being represented in the 9th and 10th decimal places and both possibilities are therefore shown. These four numbers are the tolerance of the measurement being displayed as being between 04 and 15 in these positions and therefore another way of representing 9.5 ± 5.5 which is how I have displayed the angular value in the diagram.

Because all numerical displays have so far been to 15 decimal places, then the remaining 5 decimal places have been padded with the number 39.158, the decimal place of which is explicitly built into the shaft stonework, and which shows the level of external stonework on which the final of the roof stone joints used in the encoding falls. This elevation level is encoded deliberately to show that the preceding number has been correctly extracted from the shaft data, the final digits are correct, and the data can be relied upon. The damaged stonework on the right of the joints is not incorporated into the decoding and is present to show that the earlier numerical extraction performed using these stones, which was of the primary cubit axial tilt and which has no astronomical relevance, was not relevant or 'damaged'.

The method of matching the shaft's angle data extracted from the stone joints to the Earth's geometry is the same as was described earlier whereby the Earth has a true anomaly applied to it by rotation around the inertial frame's z-axis once the axial tilt *at the solstice* has been applied. The resulting true anomaly value required for the numerical data to match is 70.14846950331 degrees and because there is an error margin included in their work, the true anomaly can have the same error margin transferred onto it giving 0.127 seconds of time as the tolerance in the displayed value.

Referring to the DE441 ephemeris data this true anomaly angle occurred at B.C. 2729-Jan-14 17:12:57 with the solstice being listed as occurring 16 minutes and 29 seconds later.

UPPER NORTHERN SHAFT³

- DEFINES TRUE ANOMALY -

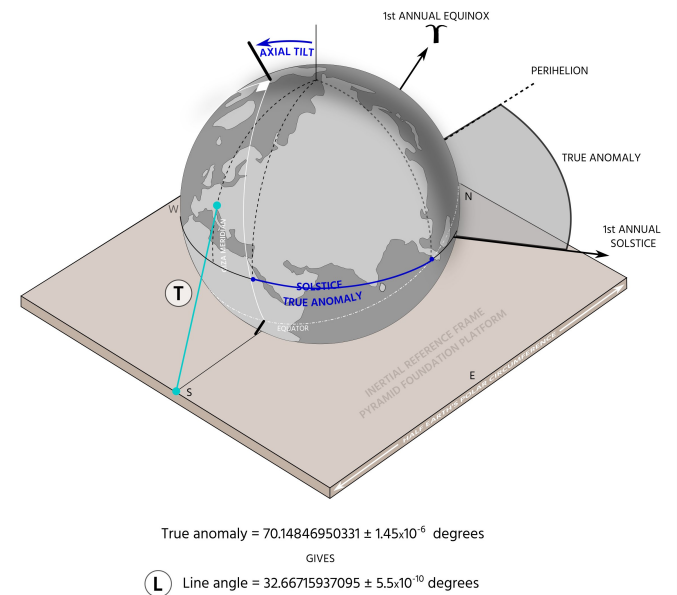
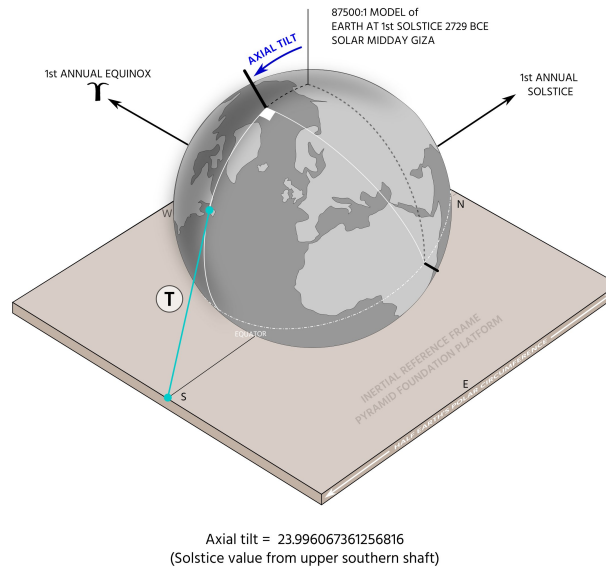
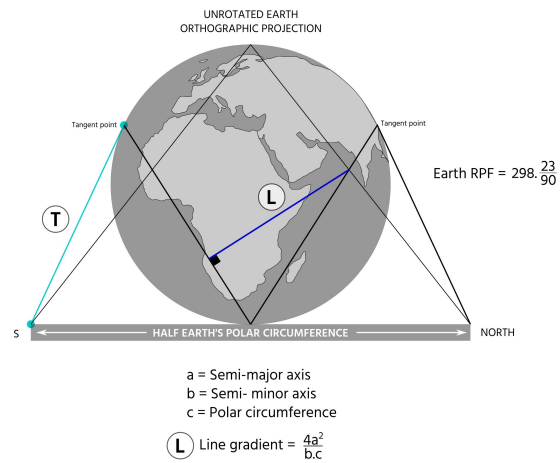
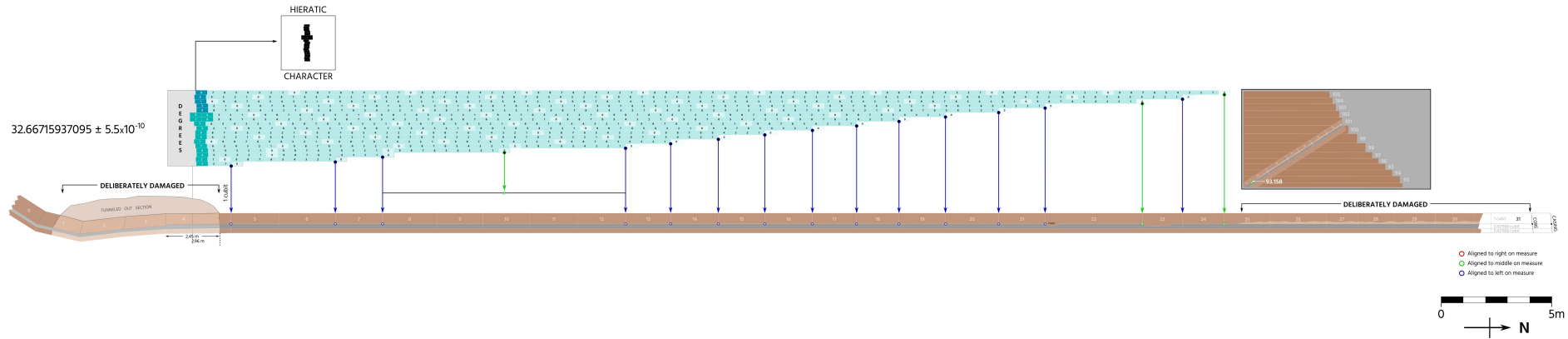


Diagram N8 - The upper northern shaft stonework, third analysis.

The gallery room walls

Diagram N9 shows the gallery room floor and walls in its upper section. The stonework of the walls in the gallery uses the same system as seen in the shafts for encoding numerical data into the joints. The stone joints of the first vertical part of the east and west walls were accurately measured and published in the work⁹ of Prof. Piazzzi Smyth in the 19th century and these survey measurements are shown in diagram N9 in the black boxes, transposed from inches into meters.

The first step in the decoding of the values contained within the stonework in the gallery is to determine the length of the measuring units required on the tape measure. Starting with the logic length of 1 cubit on the tape measure the first few digits of the the gallery's angle in degrees, shown below the upper drawing of the gallery in diagram N9, can be established because the lower precision digits of the angle are known regardless of the high precision digit values. Using a truncated angle of 26.28131, which covers all possible angular values that would produce the axial tilts during the solar year that has been observed in the shafts, it is possible to find an alignment with seven stone joints on the first vertical part of the east wall by adjusting the measurement tape's unit length. The resulting length of the measurement tape unit is 0.9625 cubits. The identified stonework alignments start at the wall joint that is appropriately directly above the 26th of the holes in the raised floor on the east side confirming that they are intentional , in addition to which the encoding once again uses consecutive joints.

The resulting floor angle of 26.28131205235 degrees can be translated into a date reference by applying it to the lower northern shaft 3D geometry system to extract the axial tilt and then using Laskar's formula to give the event date as B.C. 2730-Aug-05 18:03:48 or JD 724507.2526359211.

The west wall of the gallery can be decoded by observing that in the system that has been used in the distribution of the side holes cut into the gallery floor the holes alternate between being one cubit in length along the slope and then one cubit in length horizontally, a fact that was first noticed in the early surveys¹⁰ of the pyramid. The same system needs to be applied to the tape measure sections whereby the measurement lengths alternate between 1 cubit and the 0.9625 cubits used to decode the east wall. When this is done two numbers decode out of the west wall which both use exactly half of the wall's length and which use consecutive stone joints to represent their high precision numerals. The first number, shown on the right above the upper drawing of the gallery in diagram N9 is the semi major axis length of the Earth's orbit in perfect kilometers and the number on the left is the sidereal orbit period of the Earth in solar days. The three numerical values extracted from the walls can be looked up on the NASA DE441 ephemeris and correspond to the following dates :

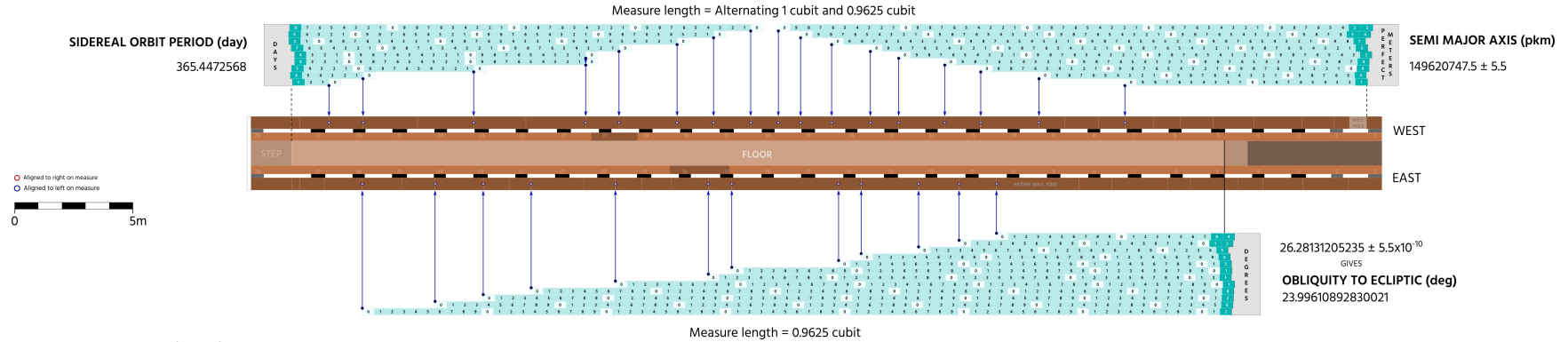
Obliquity to the ecliptic (deg)	23.99610892830021	JD 724507.261493056
Orbital semi major axis (pkm)	149627047.5	JD 724507.268263889
Sidereal orbit period (days)	365.4472568	JD 724507.261145833

The Gallery room roof

Diagram N9 shows the gallery room roof and walls in its lower section. Because the gallery is 8 m in height and the floor is sloping at 26 degrees nobody has yet surveyed the roof of the room. In 2023 a 360 degree VR video was published¹¹ which contains a walk through of the whole gallery from north to south from which it was possible to accurately survey the roof, because these types of videos have the lens distortion removed automatically by the displaying software and it is also simple task to view the video orthogonally to the roof and to zoom in to produce undistorted images of each roof stone that are 1000 pixels in length. From the analysis and measurements it was possible to determine that the upper south end of the gallery roof is 0.9625 pm wide and the north end 2 cubits wide or 1.0464 pm, so that the roof contains a forced perspective effect when looking up the gallery. It was also discovered that the roof stone

THE GALLERY ROOM

WALLS and FLOOR



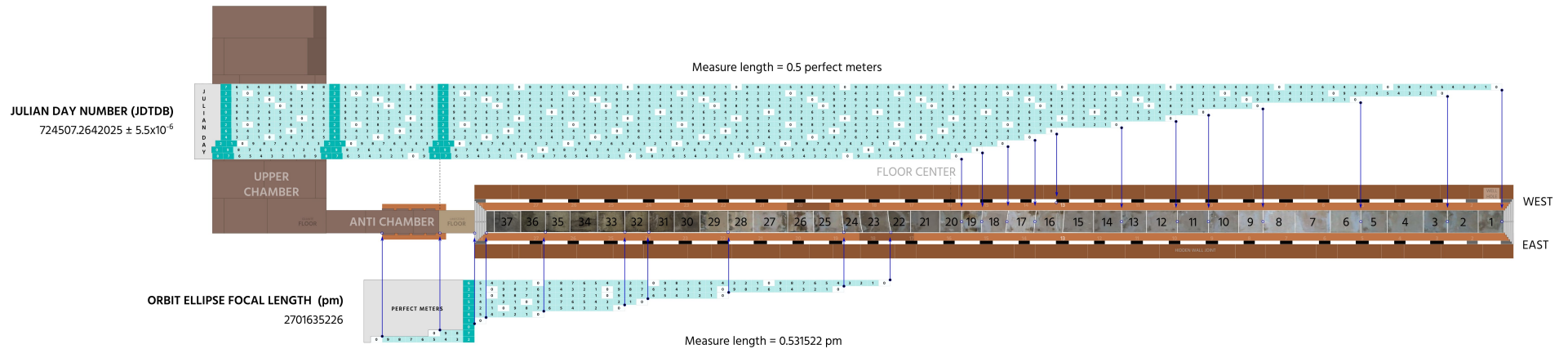
SURVEY DATA EAST WALL (SMYTH)

JOINT No.	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DISTANCE (m)	47.818	46.073	48.750	44.704	43.099	41.427	40.023	37.986	36.894	35.964	33.739	32.400	31.295	30.051	28.476	27.485	22.977	22.012	19.588	17.877	16.294	14.548	12.802	11.420	9.068	8.095	6.076	5.042	3.330	1.412

SURVEY DATA WEST WALL (SMYTH)

JOINT No.	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DISTANCE (m)	47.828	46.116	45.750	44.511	43.071	40.770	38.392	36.187	33.658	32.250	29.797	28.255	26.683	25.514	24.575	23.261	21.626	20.427	18.481	16.960	14.501	13.414	11.971	10.861	9.642	8.524	7.137	5.415	3.378	2.037

ROOF and WALLS



SURVEY DATA ROOF CENTER LINE (BRABIN)

JOINT No.	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DISTANCE (m)	46.84	46.46	45.25	44.11	42.99	41.72	40.45	39.35	38.18	36.99	35.70	34.54	32.96	31.76	30.42	29.60	28.30	27.30	25.96	24.95	24.03	22.86	21.57	20.26	18.87	17.59	16.44	15.02	13.58	12.19	11.07	9.58	7.97	6.56	5.35	3.68	2.58	1.16

Diagram N9 - The Gallery room wall stone analysis.

that is directly above the center of the floor of the gallery, number 20 when counting from one at the lower north end, is exactly 1pm^2 and acts as a calibration measure when fitting the surveyed roof stones to the known overall length of the roof. The resulting surveyed stone joint positions can be considered to be accurate to a centimeter. Several stone joints were noted as not being perpendicular to the walls during the analysis. The photographs of the roof stones are shown in lower portion of diagram 10 and the joint position values displayed in the black boxes below the roof diagram.

The tape measure section length for the first of the two encoded numerical values concealed in the roof was determined as being 0.531522pm by fitting to the architectural features of the roof and the antechamber located to the south of it. The decoded value, which has the read-out number perfectly aligned with the south wall of the gallery, is the focal length of the Earth's orbital ellipse of 2701635226pm which gives a corresponding look up date in the DE441 ephemeris of JD 724507.254027778.

The tape measure length required to extract the second and principal numerical value from the roof stones is exactly half a perfect meter. The stone joint alignments use consecutive joints for the high precision numerals and the extracted numerical value is $724507.2642025 \pm 5.5 \times 10^{-6}$ which, inexplicably, is the Julian date reference of the astronomical event that is being quantified in the gallery with an error margin of exactly half a second being explicitly shown in the encoding. The read-out number is triple aligned to the architecture, aligning with the north end of the antechamber where the floor changes from limestone to granite, the north wall of the upper chamber and the south wall of the upper chamber, with the triple alignment being used so that the value is confirmed 3 times as being intentional and correctly decoded.

Conclusion

To arrive at a rational conclusion it is helpful to list the most elevated of the knowledge and skills that would have been a prerequisite to construct the shaft stone system on display within the architecture.

- Calculating to 15 decimal places of precision
- Determination of the altitude of the Stratopause
- Geometric construction, both planar and three dimensional
- Mathematically able to produce orthographic projections of ellipsoids
- Precision application of the radian angular measurement system
- Measurement of a reference ellipsoid of the Earth,

From this short list alone, which disregards completely how the the construction of the building was achieved, it is self-evident that the pyramid was designed by a society which had a skill set which was, at the very minimum, comparable with our own. In particular the reference ellipsoid data of the Earth is only obtainable to the precision displayed in the architecture from an elevation map of all of Earth's land masses when measured from orbiting satellites - it is impossible to determine from on the planet's surface using rudimentary measurements.

Additionally the shafts of the pyramid are only 22cm^2 and therefore require robotic devices to explore them and digital electronic cameras to be able to see where the stone joints are located within them. As it is inconceivable that the stone joint encoding was not intended to be discovered, by implication the designers of the building must have known that the human race would develop to the point where they would be able to construct such robotic systems.

It can be concluded, beyond all reasonable doubt, that the origins of the human race must be dramatically different to the assumptions that are currently adhered to.

This being the case, then the precision data contained within the shaft and gallery stonework can be used to provide a reference point in 2729 BCE to which our modern ephemeris tables can be calibrated, which 16.

would appear to be the scientific purpose behind the pyramid's construction. The data contained within the gallery room provides the fixed reference point from which the architect's astronomical values can be connected directly to our modern ephemeris tables. The specific and unambiguous use of a Julian date within the architecture suggests that there is highly consequential physical phenomenon which allows the transmission of data backwards through time of which we currently have no understanding or awareness.

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