

System/Prescription Data

File : C:\Documents and Settings\abouchez\My Documents\palm3000\zemax\LLT_telescope_004.ZMX.txt
 Title: PALMAO LLT option
 Date : MON FEB 25 2008

LENS NOTES:

Features 5" radius parabolic surface, Newport SBX061 lens
 The fast tip/tilt mirror for uplink is outside the volume of the LLT

GENERAL LENS DATA:

Surfaces : 32
 Stop : 2
 System Aperture : Entrance Pupil Diameter = 428
 Glass Catalogs : SCHOTT INFRARED MISC
 Ray Aiming : Off
 Apodization : Uniform, factor = 2.25000E+000
 Temperature (C) : 2.00000E+001
 Pressure (ATM) : 1.00000E+000
 Effective Focal Length : -17662.48 (in air at system temperature and pressure)
 Effective Focal Length : -17662.48 (in image space)
 Back Focal Length : 1986.004
 Total Track : 2584.889
 Image Space F/# : 41.26748
 Paraxial Working F/# : 39.67586
 Working F/# : 39.85661
 Image Space NA : 0.01260112
 Object Space NA : 2.377751e-006
 Stop Radius : 214
 Paraxial Image Height : 0
 Paraxial Magnification : 0
 Entrance Pupil Diameter : 428
 Entrance Pupil Position : 1000
 Exit Pupil Diameter : 2.093809
 Exit Pupil Position : 83.71022
 Field Type : Angle in degrees
 Maximum Field : 0
 Primary Wave : 0.589
 Lens Units : Millimeters
 Angular Magnification : 0

Fields : 1
 Field Type: Angle in degrees

#	X-Value	Y-Value	Weight
1	0.000000	0.000000	5.000000

Vignetting Factors

#	VDX	VDY	VCX	VCY	VAN
1	0.000000	0.000000	0.000000	0.000000	0.000000

Wavelengths : 1
 Units: μm

#	Value	Weight
1	0.589000	10.000000

SURFACE DATA SUMMARY:

Surf	Type	Comment	Radius	Thickness	Glass	Diameter	Conic
OBJ	STANDARD		Infinity	9e+007		0	0
1	STANDARD		Infinity	1000		427.9952	0
STO	STANDARD	PRIMARY	-1900	-883.92	MIRROR	500	-1
3	STANDARD	FOCUS ADJ	Infinity	-0.3725003		30.15766	0
4	STANDARD	M2	-139.1416	-8.29	F_SILICA	38.1	0
5	STANDARD		-127.4115	0	MIRROR	38.1	-1
6	STANDARD		-127.4115	8.29	F_SILICA	38.1	0
7	STANDARD		-139.1416	0.3725003		26.86023	0
8	STANDARD		-139.1416	883.92		38.1	0
9	STANDARD	PRIMARY VERTEX	Infinity	10.97357		11.27167	0
10	STANDARD	FOCUS	Infinity	-10.97357		0.005140461	0
11	STANDARD		Infinity	159.36		0.3239185	0
12	STANDARD	WAVEPLATE	Infinity	0.66	QUARTZ	4.454729	0
13	STANDARD		Infinity	66.04		4.467544	0
14	COORDBRK		-	0		-	-
15	STANDARD	FOLD MIRROR	Infinity	0	MIRROR	25.4	0
16	COORDBRK		-	-33.02		-	-
17	STANDARD	SBX064	-228.587	-5.831	SILICA	50.8	0
18	STANDARD		228.587	-295.51		50.8	0
19	STANDARD		Infinity	-18.05246		7.504685	0
20	STANDARD	PUPIL	Infinity	18.05246		7.505063	0
21	STANDARD		Infinity	0		7.504685	0
22	COORDBRK		-	0		-	-
23	STANDARD	FAST TT MIRROR	Infinity	0	MIRROR	11.47377	0
24	COORDBRK		-	18.05246		-	-
25	STANDARD	PUPIL	Infinity	-18.05246		7.505063	0
26	STANDARD		Infinity	179.07		7.504685	0
27	STANDARD	IRIS	Infinity	116.84		7.508434	0
28	STANDARD	BEAMSPLITTER	Infinity	0		7.51088	0

29 STANDARD	M4	Infinity	1097.28	7.51088	0
30 PARAXIAL		-	300	7.533855	-
31 STANDARD		Infinity	0	0.006281394	0
IMA STANDARD		Infinity		0.006281394	0

SURFACE DATA DETAIL:

```

Surface OBJ      : STANDARD
Surface  1      : STANDARD
Surface STO      : STANDARD PRIMARY
Aperture        : Floating Aperture
Maximum Radius  : 250
Surface  3      : STANDARD FOCUS ADJ
Surface  4      : STANDARD M2
Aperture        : Floating Aperture
Maximum Radius  : 19.05
Surface  5      : STANDARD
Aperture        : Floating Aperture
Maximum Radius  : 19.05
Surface  6      : STANDARD
Aperture        : Floating Aperture
Maximum Radius  : 19.05
Surface  7      : STANDARD
Surface  8      : STANDARD
Aperture        : Floating Aperture
Maximum Radius  : 19.05
Surface  9      : STANDARD PRIMARY VERTEX
Surface 10      : STANDARD FOCUS
Surface 11      : STANDARD
Surface 12      : STANDARD WAVEPLATE
Surface 13      : STANDARD
Aperture        : Circular Aperture
Minimum Radius  : 0
Maximum Radius  : 10
Surface 14      : COORDBRK
Decenter X      : 0
Decenter Y      : 0
Tilt About X    : 45
Tilt About Y    : 0
Tilt About Z    : 0
Order           : Decenter then tilt
Surface 15      : STANDARD FOLD MIRROR
Aperture        : Floating Aperture
Maximum Radius  : 12.7
Surface 16      : COORDBRK
Decenter X      : 0
Decenter Y      : 0
Tilt About X    : 45
Tilt About Y    : 0
Tilt About Z    : 0
Order           : Decenter then tilt
Surface 17      : STANDARD SBX064
Aperture        : Floating Aperture
Maximum Radius  : 25.4
Surface 18      : STANDARD
Aperture        : Circular Aperture
Minimum Radius  : 0
Maximum Radius  : 12.5
Surface 19      : STANDARD
Surface 20      : STANDARD PUPIL
Surface 21      : STANDARD
Surface 22      : COORDBRK
Decenter X      : 0
Decenter Y      : 0
Tilt About X    : 49.15
Tilt About Y    : 0
Tilt About Z    : 0
Order           : Decenter then tilt
Surface 23      : STANDARD FAST TT MIRROR
Surface 24      : COORDBRK
Decenter X      : 0
Decenter Y      : 0
Tilt About X    : 49.15
Tilt About Y    : 0
Tilt About Z    : 0
Order           : Decenter then tilt
Surface 25      : STANDARD PUPIL
Surface 26      : STANDARD
Surface 27      : STANDARD IRIS
Surface 28      : STANDARD BEAMSPLITTER
Surface 29      : STANDARD M4
Surface 30      : PARAXIAL
Focal length    : 300
OPD Mode        : 0
Surface 31      : STANDARD
Surface IMA     : STANDARD

```

COATING DEFINITIONS:

PHYSICAL OPTICS PROPAGATION SETTINGS SUMMARY:

OBJ STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

1 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

STO STANDARD

PRIMARY

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

3 STANDARD

FOCUS ADJ

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

4 STANDARD

M2

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

5 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

6 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

7 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

8 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

9 STANDARD

PRIMARY VERTEX

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

10 STANDARD

FOCUS

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

11 STANDARD

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off
 Use Angular Spectrum Propagator : Off
 Use Parallel Probing Rays : Off
 Reference Radius : Best Fit

12 STANDARD

WAVEPLATE

Use Rays To Propagate To Next Surface : Off
 Recompute Pilot Beam : Off
 Do Not Rescale Beam Size Using Ray Data: Off

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Use Angular Spectrum Propagator      : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
13 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
14 COORDBRK
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
15 STANDARD      FOLD MIRROR
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
16 COORDBRK
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
17 STANDARD      SBX064
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
18 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
19 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
20 STANDARD      PUPIL
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
21 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
22 COORDBRK
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
23 STANDARD      FAST TT MIRROR
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
24 COORDBRK
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator       : Off
Use Parallel Probing Rays             : Off
Reference Radius                      : Best Fit
25 STANDARD      PUPIL
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off

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Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Use Parallel Probing Rays              : Off
Reference Radius                      : Best Fit
26 STANDARD
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
27 STANDARD      IRIS
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
28 STANDARD      BEAMSPLITTER
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
29 STANDARD      M4
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
30 PARAXIAL
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
31 STANDARD
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit
IMA STANDARD
  Use Rays To Propagate To Next Surface : Off
  Recompute Pilot Beam                  : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator       : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                      : Best Fit

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EDGE THICKNESS DATA:

Surf	X-Edge	Y-Edge
OBJ	900000000.0000000	900000000.0000000
1	983.552632	983.552632
ST0	-867.472632	-867.472632
3	-1.682746	-1.682746
4	-8.403890	-8.403890
5	-0.008049	-0.008049
6	9.072523	9.072523
7	-0.288083	-0.288083
8	885.230245	885.230245
9	10.973572	10.973572
10	-10.973572	-10.973572
11	159.360000	159.360000
12	0.660000	0.660000
13	66.040000	66.040000
14	0.000000	0.000000
15	0.000000	0.000000
16	-34.435574	-34.435574
17	-2.999851	-2.999851
18	-296.925574	-296.925574
19	-18.052459	-18.052459
20	18.052459	18.052459
21	0.000000	0.000000
22	0.000000	0.000000
23	0.000000	0.000000
24	18.052459	18.052459
25	-18.052459	-18.052459
26	179.070000	179.070000
27	116.840000	116.840000
28	0.000000	0.000000
29	1097.280000	1097.280000
30	300.000000	300.000000
31	0.000000	0.000000
IMA	0.000000	0.000000

SOLVE AND VARIABLE DATA:

```

Semi Diameter  2      : Fixed
Thickness of   3      : Variable
Semi Diameter  4      : Fixed
Semi Diameter  5      : Fixed
Semi Diameter  6      : Fixed
Thickness of   7      : Solve, pick up value from 3, scaled by -1.00000, plus 0.00000
Thickness of   8      : Solve, pick up value from 2, scaled by -1.00000, plus 0.00000
Semi Diameter  8      : Fixed
Thickness of   9      : Solve, marginal ray height = 0.00000
Semi Diameter  9      : Fixed
Thickness of  10      : Solve, pick up value from 9, scaled by -1.00000, plus 0.00000
Semi Diameter 15      : Fixed
Parameter 3 Surf 16   : Pickup from 14 times 1.000000, plus 0.000000
Semi Diameter 17      : Fixed
Semi Diameter 18      : Fixed
Thickness of  19      : Solve, chief ray height = 0.00000
Thickness of  20      : Solve, pick up value from 19, scaled by -1.00000, plus 0.00000
Thickness of  24      : Solve, chief ray height = 0.00000
Parameter 3 Surf 24   : Pickup from 22 times 1.000000, plus 0.000000
Thickness of  25      : Solve, pick up value from 24, scaled by -1.00000, plus 0.00000

```

INDEX OF REFRACTION DATA:

System Temperature: 20.00
System Pressure : 1.00

Surf	Glass	Temp	Pres	0.589000
0		20.00	1.00	1.00000000
1		20.00	1.00	1.00000000
2	MIRROR	20.00	1.00	1.00000000
3		20.00	1.00	1.00000000
4	F_SILICA	20.00	1.00	1.45841321
5	MIRROR	20.00	1.00	1.45841321
6	F_SILICA	20.00	1.00	1.45841321
7		20.00	1.00	1.00000000
8		20.00	1.00	1.00000000
9		20.00	1.00	1.00000000
10		20.00	1.00	1.00000000
11		20.00	1.00	1.00000000
12	QUARTZ	20.00	1.00	1.54423754
13		20.00	1.00	1.00000000
14	<CRD BRK>			1.00000000
15	MIRROR	20.00	1.00	1.00000000
16	<CRD BRK>			1.00000000
17	SILICA	20.00	1.00	1.45841320
18		20.00	1.00	1.00000000
19		20.00	1.00	1.00000000
20		20.00	1.00	1.00000000
21		20.00	1.00	1.00000000
22	<CRD BRK>			1.00000000
23	MIRROR	20.00	1.00	1.00000000
24	<CRD BRK>			1.00000000
25		20.00	1.00	1.00000000
26		20.00	1.00	1.00000000
27		20.00	1.00	1.00000000
28		20.00	1.00	1.00000000
29		20.00	1.00	1.00000000
30		20.00	1.00	1.00000000
31		20.00	1.00	1.00000000
32		20.00	1.00	1.00000000

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf	Glass	TCE *10E-6
0		0.00000000
1		0.00000000
2	MIRROR	0.00000000
3		0.00000000
4	F_SILICA	0.51000000
5	MIRROR	0.00000000
6	F_SILICA	0.51000000
7		0.00000000
8		0.00000000
9		0.00000000
10		0.00000000
11		0.00000000
12	QUARTZ	0.00000000
13		0.00000000
14	<CRD BRK>	0.00000000
15	MIRROR	0.00000000
16	<CRD BRK>	0.00000000
17	SILICA	0.00000000
18		0.00000000
19		0.00000000
20		0.00000000
21		0.00000000
22	<CRD BRK>	0.00000000

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23          MIRROR      0.00000000
24          <CRD BRK>    0.00000000
25          0.00000000
26          0.00000000
27          0.00000000
28          0.00000000
29          0.00000000
30          0.00000000
31          0.00000000
32          0.00000000

F/# DATA:

F/# calculations consider vignetting factors and ignore surface apertures.

          Wavelength:      0.589000
#          Field          Tan      Sag
1  0.0000, 0.0000 deg:  39.8566  39.8566

GLOBAL VERTEX COORDINATES, ORIENTATIONS, AND ROTATION/OFFSET MATRICES:

Reference Surface: 2

Surf          R11          R12          R13          X
              R21          R22          R23          Y
              R31          R32          R33          Z

0  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -9.000100000E+007

1  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -1.000000000E+003

2  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 PRIMARY
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000  0.0000000000E+000

3  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 FOCUS ADJ
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.839200000E+002

4  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 M2
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.842925003E+002

5  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.925825003E+002

6  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.925825003E+002

7  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.842925003E+002

8  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000 -8.839200000E+002

9  1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 PRIMARY VERTEX
   0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
   0.0000000000  0.0000000000  1.0000000000  0.0000000000E+000

10 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 FOCUS
    0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  0.0000000000  1.0000000000  1.097357184E+001

11 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  0.0000000000  1.0000000000  0.0000000000E+000

12 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 WAVEPLATE
    0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  0.0000000000  1.0000000000  1.593600000E+002

13 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  1.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  0.0000000000  1.0000000000  1.600200000E+002

14 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000
    0.0000000000  0.7071067812 -0.7071067812  0.0000000000E+000
    0.0000000000  0.7071067812  0.7071067812  2.260600000E+002

15 1.0000000000  0.0000000000  0.0000000000  0.0000000000E+000 FOLD MIRROR
    0.0000000000  0.7071067812 -0.7071067812  0.0000000000E+000
    0.0000000000  0.7071067812  0.7071067812  2.260600000E+002
```

16	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 0.000000000E+000 2.260600000E+002	
17	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 3.302000000E+001 2.260600000E+002	SBX064
18	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 3.885100000E+001 2.260600000E+002	
19	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 3.343610000E+002 2.260600000E+002	
20	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 3.524134593E+002 2.260600000E+002	PUPIL
21	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.0000000000 1.0000000000	0.0000000000 -1.0000000000 -0.0000000000	0.000000000E+000 3.343610000E+002 2.260600000E+002	
22	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.7564245504 0.6540809579	0.0000000000 -0.6540809579 -0.7564245504	0.000000000E+000 3.343610000E+002 2.260600000E+002	
23	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.7564245504 0.6540809579	0.0000000000 -0.6540809579 -0.7564245504	0.000000000E+000 3.343610000E+002 2.260600000E+002	FAST TT MIRROR
24	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.343610000E+002 2.260600000E+002	
25	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.369669844E+002 2.081966260E+002	PUPIL
26	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.343610000E+002 2.260600000E+002	
27	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.602108649E+002 4.886561695E+001	IRIS
28	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.770774434E+002 -6.675057624E+001	BEAMSPLITTER
29	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 3.770774434E+002 -6.675057624E+001	M4
30	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 5.354766157E+002 -1.152537434E+003	
31	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 5.787834760E+002 -1.449395171E+003	
32	1.0000000000 0.0000000000 0.0000000000	0.0000000000 -0.9895257891 -0.1443562010	0.0000000000 0.1443562010 -0.9895257891	0.000000000E+000 5.787834760E+002 -1.449395171E+003	

ELEMENT VOLUME DATA:

For centered elements with plane or spherical circular faces, exact volumes are computed by assuming edges are squared up to the larger of the front and back radial aperture.

For all other elements, approximate volumes are numerically integrated to 0.1% accuracy. Zero volume means the volume cannot be accurately computed.

Single elements that are duplicated in the Lens Data Editor for ray tracing purposes may be listed more than once yielding incorrect total mass estimates.

Element surf	4 to	5	Volume cc	Density g/cc	Mass g
Element surf	6 to	7	9.517462	2.200000	20.938416
Element surf	12 to	13	0.010346	0.000000	0.000000
Element surf	17 to	18	8.952287	0.000000	0.000000
Total Mass:					42.299902

CARDINAL POINTS:

Object space positions are measured with respect to surface 1.
Image space positions are measured with respect to the image surface.
The index in both the object space and image space is considered.

	Object Space	Image Space
W = 0.589000 (Primary)		
Focal Length :	17662.479511	-17662.479511
Focal Planes :	3611424.789183	-2.696007
Principal Planes :	3593762.309672	17659.783504
Anti-Principal Planes :	3629087.268694	-17665.175518
Nodal Planes :	3593762.309672	17659.783504
Anti-Nodal Planes :	3629087.268694	-17665.175518