System/Prescription Data

File : C:\tbida\zemax\dct\rc\RC ADC Guider no_MLM_wide_field_4.zmx
Title: NGLT Ritchey-Chretien Focus -- F/6.4
Date : FRI SEP 11 2009
Configuration 2 of 5

LENS NOTES:

Notes...

GENERAL LENS DATA:

```
Surfaces               :              41
Stop                   :               2
System Aperture        : Entrance Pupil Diameter = 4200
Glass Catalogs         : SCHOTT INFRARED OHARA
Ray Aiming             : Off
Apodization            : Uniform, factor =   0.00000E+000
Temperature (C)        :    2.00000E+001
Pressure (ATM)         :    1.00000E+000
 Adjust Index Data To Environment  : Off
Effective Focal Length :       -13676.46 (in air at system temperature and pressure)
Effective Focal Length :       -13676.46 (in image space)
Back Focal Length      :        6.778179
Total Track            :        8025.014
Image Space F/#        :        3.256301
Paraxial Working F/#   :        3.264657
Working F/#            :        3.311719
Image Space NA         :       0.1510117
Object Space NA        :   2.099999e-007
Stop Radius            :            2100
Paraxial Image Height  :        22.81544
Paraxial Magnification :               0
Entrance Pupil Diameter :           4200
Entrance Pupil Position :           6000
Exit Pupil Diameter    :        744.7423
Exit Pupil Position    :        4613.835
Field Type             : Angle in degrees
Maximum Radial Field   :      0.09558227
Primary Wavelength     :             0.5 µm
Lens Units             :   Millimeters
Angular Magnification  :        776.4879
```

Fields : 9
Field Type: Angle in degrees

#	X-Value	Y-Value	Weight
1	-0.011400	0.072100	1.000000
2	0.000000	0.072100	1.000000
3	0.011400	0.072100	1.000000
4	-0.011400	0.083500	1.000000
5	0.000000	0.083500	5.000000
6	0.011400	0.083500	1.000000
7	-0.011400	0.094900	1.000000
8	0.000000	0.094900	1.000000
9	0.011400	0.094900	1.000000

Vignetting Factors

#	VDX	VDY	VCX	VCY	VAN
1	0.000000	-0.005113	0.000014	0.005113	0.000000
2	0.000000	-0.005111	0.000014	0.005111	0.000000
3	0.000000	-0.005113	0.000014	0.005113	0.000000
4	0.000000	-0.006211	0.000014	0.006211	0.000000
5	0.000000	-0.006210	0.000014	0.006210	0.000000
6	0.000000	-0.006211	0.000014	0.006211	0.000000
7	0.000255	-0.007307	0.000274	0.007309	0.000000
8	0.000000	-0.007308	0.000014	0.007308	0.000000
9	-0.000255	-0.007307	0.000274	0.007309	0.000000

Wavelengths : 5
Units: µm

#	Value	Weight
1	0.370000	1.000000
2	0.400000	1.000000
3	0.500000	1.000000
4	0.650000	1.000000
5	0.800000	1.000000

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic	Comment
OBJ	STANDARD	Infinity	Infinity		0	0	
1	STANDARD	Infinity	6000		1400	0	
STO	STANDARD	Infinity	137.7		0	0	APERTURE STOP
3	STANDARD	-16000	-5619.743	MIRROR	4201	-1.082674	PRIMARY
4	STANDARD	-6926.407	5619.743	MIRROR	1310	-4.500899	SECONDARY
5	STANDARD	Infinity	400		0	0	Primary hole
6	TILTSURF	-	20		470	-	ADC 1A
7	TILTSURF	-	20		470	-	ADC 1B

8	STANDARD	Infinity	10		470	0		
9	STANDARD	64329.84	20		470	0	ADC 2A	
10	TILTSURF	-	20		470	-	ADC 2B	
11	TILTSURF	-	610		470	-		
12	STANDARD	Infinity	362.4985		224.4174	0	Mounting flange	
13	STANDARD	Infinity	130		168.7211	0	Fold Mirror	
14	STANDARD	-3658.611	25	F_SILICA	350	0	Element 1	
15	STANDARD	-1509.665	204.8154		350	0		
16	STANDARD	-699.8357	15	F_SILICA	310	0	Element 2	
17	STANDARD	-2007.457	50		310	0		
18	COORDBRK	-	0		-	-		
19	COORDBRK	-	0		-	-		
20	BICONICX	Infinity	0	MIRROR	70	0	Pickoff Mirror	
21	COORDBRK	-	-75		-	-		
22	STANDARD	Infinity	-40.6224		21.50669	0		
23	STANDARD	Infinity	-7		18.52394	0	TEL FOCUS	
24	STANDARD	Infinity	-20	N-BK7	20	0	Beamsplitter	
25	STANDARD	Infinity	-3.4	N-BK7	20	0	FL 011-1365	
26	STANDARD	36.33	-56.02982		20	0		
27	STANDARD	-33.55502	-2	N-KZFS11	20	0	Coll 1	
28	STANDARD	-12	-8	N-FK51A	20	0	Coll 2	
29	STANDARD	79.45987	-3.149863		20	0		
30	STANDARD	Infinity	0		24	0	Pupil	
31	STANDARD	Infinity	-4	N-BK7	20	0	Filter	
32	STANDARD	Infinity	-12.1114		20	0		
33	STANDARD	-18.94463	-6.1	N-FK51A	19	0	Cam 1	
34	STANDARD	25.11346	-4.654781		19	0		
35	STANDARD	14.17474	-2	N-KZFS11	19	0	Cam 2	
36	STANDARD	18.93688	-13.13852		19	0		
37	STANDARD	10.38	-2	N-BK7	12.7	0	FF 015-0066	
38	STANDARD	Infinity	-2.5	N-BK7	12.7	0	Window	
39	STANDARD	Infinity	-4		30	0		
40	COORDBRK	-	0.1366725		-	-		
IMA	STANDARD	Infinity			10.36973	0	CCD67	

SURFACE DATA DETAIL:

```
Surface OBJ     : STANDARD
Surface   1     : STANDARD
 Aperture       : Circular Obscuration
 Minimum Radius :              0
 Maximum Radius :            700
Surface STO     : STANDARD APERTURE STOP
 Aperture       : Circular Aperture
 Minimum Radius :            500
 Maximum Radius :           2100
Surface   3     : STANDARD PRIMARY
 Mirror Substrate : Curved, Thickness = 8.40200E+001
 Aperture       : Circular Aperture
 Minimum Radius :            500
 Maximum Radius :         2100.5
Surface   4     : STANDARD SECONDARY
 Mirror Substrate : Curved, Thickness = 2.62000E+001
 Aperture       : Circular Aperture
 Minimum Radius :              0
 Maximum Radius :            655
Surface   5     : STANDARD Primary hole
Surface   6     : TILTSURF ADC 1A
 X Tangent      :      0.0019296299
 Y Tangent      :                 0
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface   7     : TILTSURF ADC 1B
 X Tangent      :     -0.016552752
 Y Tangent      :                 0
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface   8     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface   9     : STANDARD ADC 2A
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface  10     : TILTSURF ADC 2B
 X Tangent      :       0.018515571
 Y Tangent      :                 0
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface  11     : TILTSURF
 X Tangent      :      0.0019230692
 Y Tangent      :                 0
 Aperture       : Floating Aperture
 Maximum Radius :            235
Surface  12     : STANDARD Mounting flange
Surface  13     : STANDARD Fold Mirror
Surface  14     : STANDARD Element 1
 Aperture       : Floating Aperture
 Maximum Radius :            175
Surface  15     : STANDARD
 Aperture       : Floating Aperture
```

```
 Maximum Radius :           175
Surface  16     : STANDARD Element 2
 Aperture       : Floating Aperture
 Maximum Radius :           155
Surface  17     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :           155
Surface  18     : COORDBRK
 Decenter X     :               0
 Decenter Y     :            37.2
 Tilt About X   :               0
 Tilt About Y   :               0
 Tilt About Z   :               0
 Order          : Decenter then tilt
Surface  19     : COORDBRK
 Decenter X     :               0
 Decenter Y     :               0
 Tilt About X   :              45
 Tilt About Y   :               0
 Tilt About Z   :               0
 Order          : Decenter then tilt
Surface  20     : BICONICX Pickoff Mirror
 Mirror Substrate : Curved, Thickness = 1.40000E+000
 X Radius       :               0
 X Conic        :               0
 Aperture       : Floating Aperture
 Maximum Radius :            35
Surface  21     : COORDBRK
 Decenter X     :               0
 Decenter Y     :               0
 Tilt About X   :              45
 Tilt About Y   :               0
 Tilt About Z   :               0
 Order          : Decenter then tilt
Surface  22     : STANDARD
Surface  23     : STANDARD TEL FOCUS
Surface  24     : STANDARD Beamsplitter
 Aperture       : Rectangular Aperture
 X Half Width   :            10
 Y Half Width   :            10
Surface  25     : STANDARD FL 011-1365
Surface  26     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  27     : STANDARD Coll 1
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  28     : STANDARD Coll 2
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  29     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  30     : STANDARD Pupil
Surface  31     : STANDARD Filter
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  32     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            10
Surface  33     : STANDARD Cam 1
 Aperture       : Floating Aperture
 Maximum Radius :           9.5
Surface  34     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :           9.5
Surface  35     : STANDARD Cam 2
 Aperture       : Floating Aperture
 Maximum Radius :           9.5
Surface  36     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :           9.5
Surface  37     : STANDARD FF 015-0066
 Aperture       : Floating Aperture
 Maximum Radius :          6.35
Surface  38     : STANDARD Window
 Aperture       : Floating Aperture
 Maximum Radius :          6.35
Surface  39     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            15
Surface  40     : COORDBRK
 Decenter X     :               0
 Decenter Y     :               0
 Tilt About X   :               0
 Tilt About Y   :               0
 Tilt About Z   :               0
 Order          : Decenter then tilt
Surface IMA     : STANDARD CCD67
 Aperture       : Rectangular Aperture
```

```
 X Half Width   :         3.328
 Y Half Width   :         3.328

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        APERTURE STOP
    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              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
   4 STANDARD            SECONDARY
    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         Primary hole
    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 TILTSURF              ADC 1A
    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 TILTSURF              ADC 1B
    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              ADC 2A
    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 TILTSURF              ADC 2B
    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 TILTSURF
    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      Mounting flange
  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
13 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
14 STANDARD            Element 1
  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
  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 STANDARD            Element 2
  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
  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 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
19 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
20 BICONICX       Pickoff 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
21 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
22 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
23 STANDARD            TEL 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
24 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
25 STANDARD          FL 011-1365
  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
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               Coll 1
  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               Coll 2
  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
  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 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
31 STANDARD               Filter
  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
32 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
33 STANDARD                Cam 1
  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
34 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
35 STANDARD                Cam 2
  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
36 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
37 STANDARD          FF 015-0066
  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
  38 STANDARD              Window
    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
  39 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
  40 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
 IMA STANDARD               CCD67
    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

EDGE THICKNESS DATA:

Surf         X-Edge         Y-Edge
   1    6000.000000    6000.000000
 STO      -0.129054      -0.129054
   3   -5512.645616   -5512.645616
   4    5650.474670    5650.474670
   5     400.453463     400.000000
   6      15.656640      20.000000
   7      23.889897      20.000000
   8      10.429235      10.429235
   9      23.921925      19.570765
  10      16.100762      20.000000
  11     609.548079     610.000000
  12     362.498460     362.498460
  13     125.812272     125.812272
  14      19.010441      19.010441
  15     197.612150     197.612150
  16      26.387686      26.387686
  17      55.992884      55.992884
  18       0.000000       0.000000
  19       0.000000       0.000000
  20       0.000000       0.000000
  21     -75.000000     -75.000000
  22     -40.622400     -40.622400
  23      -7.000000      -7.000000
  24     -20.000000     -20.000000
  25      -1.996622      -1.996622
  26     -58.957927     -58.957927
  27      -5.842019      -5.842019
  28      -2.001490      -2.001490
  29      -3.781623      -3.781623
  30       0.000000       0.000000
  31      -4.000000      -4.000000
  32     -14.665515     -14.665515
  33      -1.679703      -1.679703
  34      -2.866359      -2.866359
  35      -3.099283      -3.099283
  36     -13.524929     -13.524929
  37      -4.168916      -4.168916
  38      -2.500000      -2.500000
  39      -4.000000      -4.000000
  40       0.136673       0.136673
 IMA       0.000000       0.000000

MULTI-CONFIGURATION DATA:

Configuration   1:

  1 Thickness  22 :     -31.44092 Variable
  2 Param 2    18 :             0
  3 Param 3    40 :             0
  4 Y-field     1 :       -0.0114
  5 Y-field     2 :       -0.0114
  6 Y-field     3 :       -0.0114
  7 Y-field     4 :             0
  8 Y-field     5 :             0
```

```
  9 Y-field     6 :             0
 10 Y-field     7 :        0.0114
 11 Y-field     8 :        0.0114
 12 Y-field     9 :        0.0114

Configuration   2:

  1 Thickness  22 :      -40.6224
  2 Param 2    18 :          37.2
  3 Param 3    40 :             0
  4 Y-field     1 :        0.0721
  5 Y-field     2 :        0.0721
  6 Y-field     3 :        0.0721
  7 Y-field     4 :        0.0835
  8 Y-field     5 :        0.0835
  9 Y-field     6 :        0.0835
 10 Y-field     7 :        0.0949
 11 Y-field     8 :        0.0949
 12 Y-field     9 :        0.0949

Configuration   3:

  1 Thickness  22 :      -40.6099
  2 Param 2    18 :          74.3
  3 Param 3    40 :             0
  4 Y-field     1 :        0.1551
  5 Y-field     2 :        0.1551
  6 Y-field     3 :        0.1551
  7 Y-field     4 :        0.1665
  8 Y-field     5 :        0.1665
  9 Y-field     6 :        0.1665
 10 Y-field     7 :        0.1779
 11 Y-field     8 :        0.1779
 12 Y-field     9 :        0.1779

Configuration   4:

  1 Thickness  22 :      -40.6408
  2 Param 2    18 :         111.7
  3 Param 3    40 :             0
  4 Y-field     1 :        0.2386
  5 Y-field     2 :        0.2386
  6 Y-field     3 :        0.2386
  7 Y-field     4 :          0.25
  8 Y-field     5 :          0.25
  9 Y-field     6 :          0.25
 10 Y-field     7 :        0.2614
 11 Y-field     8 :        0.2614
 12 Y-field     9 :        0.2614

Configuration   5:

  1 Thickness  22 :      -40.7138
  2 Param 2    18 :         134.3
  3 Param 3    40 :             0
  4 Y-field     1 :        0.2886
  5 Y-field     2 :        0.2886
  6 Y-field     3 :        0.2886
  7 Y-field     4 :           0.3
  8 Y-field     5 :           0.3
  9 Y-field     6 :           0.3
 10 Y-field     7 :        0.3114
 11 Y-field     8 :        0.3114
 12 Y-field     9 :        0.3114

SOLVE AND VARIABLE DATA:

 Semi Diameter   1      : Fixed
 Semi Diameter   2      : Fixed
 Semi Diameter   3      : Fixed
 Thickness of    4      : Solve, Pickup from surface 3 scaled by -1, offset by 0
 Semi Diameter   4      : Fixed
 Semi Diameter   5      : Fixed
 Semi Diameter   6      : Fixed
 Semi Diameter   7      : Solve, pickup from surface 6 scaled by 1
 Semi Diameter   8      : Solve, pickup from surface 6 scaled by 1
 Semi Diameter   9      : Solve, pickup from surface 6 scaled by 1
 Semi Diameter  10      : Solve, pickup from surface 6 scaled by 1
 Semi Diameter  11      : Solve, pickup from surface 6 scaled by 1
 Semi Diameter  14      : Fixed
 Semi Diameter  15      : Solve, pickup from surface 14 scaled by 1
 Semi Diameter  16      : Fixed
 Semi Diameter  17      : Solve, pickup from surface 16 scaled by 1
 Semi Diameter  20      : Fixed
 Parameter  3 Surf  21  : Solve, Pickup from surface 19 scaled by 1, offset by 0
 Semi Diameter  24      : Fixed
 Semi Diameter  25      : Fixed
 Semi Diameter  26      : Fixed
 Semi Diameter  27      : Fixed
 Semi Diameter  28      : Fixed
```

```
 Semi Diameter  29      : Fixed
 Semi Diameter  30      : Fixed
 Semi Diameter  31      : Fixed
 Semi Diameter  32      : Fixed
 Semi Diameter  33      : Fixed
 Semi Diameter  34      : Fixed
 Semi Diameter  35      : Fixed
 Semi Diameter  36      : Fixed
 Semi Diameter  37      : Fixed
 Semi Diameter  38      : Fixed
 Semi Diameter  39      : Fixed
 Config 1, Oper 1 Thickness  22 :     -31.44092 Variable

INDEX OF REFRACTION DATA:

System Temperature:   20.0000 Celsius
System Pressure   :    1.0000 Atmospheres
Absolute air index:    1.000274 at wavelength 0.500000 µm
Index data is relative to air at the system temperature and pressure.

Surf                  Glass    Temp    Pres      0.370000    0.400000    0.500000    0.650000    0.800000
   0                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   1                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   2                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   3                  MIRROR   20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   4                  MIRROR   20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   5                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   6                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   7                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   8                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   9                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  10                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  11                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  12                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  13                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  14                F SILICA   20.00    1.00    1.47382578  1.47011612  1.46232649  1.45653497  1.45331725 source:  The Infrare
  15                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  16                F SILICA   20.00    1.00    1.47382578  1.47011612  1.46232649  1.45653497  1.45331725 source:  The Infrare
  17                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  18               <CRD BRK>                    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  19               <CRD BRK>                    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  20                  MIRROR   20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  21               <CRD BRK>                    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  22                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  23                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  24                  N-BK7    20.00    1.00    1.53539019  1.53084854  1.52141448  1.51452031  1.51077623
  25                  N-BK7    20.00    1.00    1.53539019  1.53084854  1.52141448  1.51452031  1.51077623
  26                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  27                N-KZFS11   20.00    1.00    1.67450387  1.66508647  1.64642778  1.63359372  1.62703322
  28                 N-FK51A   20.00    1.00    1.49984209  1.49661694  1.48986747  1.48493748  1.48231487
  29                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  30                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  31                  N-BK7    20.00    1.00    1.53539019  1.53084854  1.52141448  1.51452031  1.51077623
  32                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  33                 N-FK51A   20.00    1.00    1.49984209  1.49661694  1.48986747  1.48493748  1.48231487
  34                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  35                N-KZFS11   20.00    1.00    1.67450387  1.66508647  1.64642778  1.63359372  1.62703322
  36                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  37                  N-BK7    20.00    1.00    1.53539019  1.53084854  1.52141448  1.51452031  1.51077623
  38                  N-BK7    20.00    1.00    1.53539019  1.53084854  1.52141448  1.51452031  1.51077623
  39                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  40               <CRD BRK>                    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  41                           20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf                  Glass     TCE *10E-6
   0                            0.00000000
   1                            0.00000000
   2                            0.00000000
   3                  MIRROR    0.00000000
   4                  MIRROR    0.00000000
   5                            0.00000000
   6                            0.00000000
   7                            0.00000000
   8                            0.00000000
   9                            0.00000000
  10                            0.00000000
  11                            0.00000000
  12                            0.00000000
  13                            0.00000000
  14                F_SILICA    0.51000000 source:  The Infrared & Electro-Optical Systems Handbook V. III
  15                            0.00000000
  16                F_SILICA    0.51000000 source:  The Infrared & Electro-Optical Systems Handbook V. III
  17                            0.00000000
  18               <CRD BRK>    0.00000000
  19               <CRD BRK>    0.00000000
  20                  MIRROR    0.00000000
  21               <CRD BRK>    0.00000000
  22                            0.00000000
```

23		0.00000000
24	N-BK7	7.10000000
25	N-BK7	7.10000000
26		0.00000000
27	N-KZFS11	6.56000000
28	N-FK51A	12.74000000
29		0.00000000
30		0.00000000
31	N-BK7	7.10000000
32		0.00000000
33	N-FK51A	12.74000000
34		0.00000000
35	N-KZFS11	6.56000000
36		0.00000000
37	N-BK7	7.10000000
38	N-BK7	7.10000000
39		0.00000000
40	<CRD BRK>	0.00000000
41		0.00000000

F/# DATA:

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

	Wavelength:	0.370000		0.400000		0.500000	
#	Field	Tan	Sag	Tan	Sag	Tan	Sag
1	-0.0114, 0.0721 deg:	3.3264	3.3083	3.3214	3.3027	3.3219	3.3017
2	0.0000, 0.0721 deg:	3.3010	3.2631	3.2960	3.2574	3.2965	3.2565
3	0.0114, 0.0721 deg:	3.3264	3.3083	3.3214	3.3027	3.3219	3.3017
4	-0.0114, 0.0835 deg:	3.2903	3.2893	3.2843	3.2834	3.2824	3.2818
5	0.0000, 0.0835 deg:	3.2700	3.2489	3.2639	3.2430	3.2621	3.2414
6	0.0114, 0.0835 deg:	3.2903	3.2893	3.2843	3.2834	3.2824	3.2818
7	-0.0114, 0.0949 deg:	3.3445	3.3200	3.3376	3.3139	3.3340	3.3118
8	0.0000, 0.0949 deg:	3.3210	3.2753	3.3140	3.2691	3.3103	3.2667
9	0.0114, 0.0949 deg:	3.3445	3.3200	3.3376	3.3139	3.3340	3.3118

	Wavelength:	0.650000		0.800000	
#	Field	Tan	Sag	Tan	Sag
1	-0.0114, 0.0721 deg:	3.3302	3.3089	3.3372	3.3153
2	0.0000, 0.0721 deg:	3.3049	3.2637	3.3119	3.2701
3	0.0114, 0.0721 deg:	3.3302	3.3089	3.3372	3.3153
4	-0.0114, 0.0835 deg:	3.2892	3.2886	3.2953	3.2948
5	0.0000, 0.0835 deg:	3.2689	3.2481	3.2750	3.2543
6	0.0114, 0.0835 deg:	3.2892	3.2886	3.2953	3.2948
7	-0.0114, 0.0949 deg:	3.3394	3.3182	3.3449	3.3241
8	0.0000, 0.0949 deg:	3.3156	3.2729	3.3210	3.2788
9	0.0114, 0.0949 deg:	3.3394	3.3182	3.3449	3.3241

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

Reference Surface: 23

Surf	R11	R12	R13	X	
	R21	R22	R23	Y	
	R31	R32	R33	Z	
1	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	-8.025013892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
2	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	APERTURE STOP
	0.0000000000	0.0000000000	1.0000000000	-2.025013892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
3	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	PRIMARY
	0.0000000000	0.0000000000	1.0000000000	-1.887313892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
4	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	SECONDARY
	0.0000000000	0.0000000000	1.0000000000	-7.507056998E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
5	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Primary hole
	0.0000000000	0.0000000000	1.0000000000	-1.887313892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
6	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	ADC 1A
	0.0000000000	0.0000000000	1.0000000000	-1.487313892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
7	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	ADC 1B
	0.0000000000	0.0000000000	1.0000000000	-1.467313892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
8	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	-1.447313892E+003	
	0.0000000000	-1.0000000000	0.0000000000	1.528224000E+002	
9	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	ADC 2A
	0.0000000000	0.0000000000	1.0000000000	-1.437313892E+003	

```
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

10   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 ADC 2B
     0.0000000000   0.0000000000   1.0000000000 -1.417313892E+003
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

11   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -1.397313892E+003
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

12   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Mounting flange
     0.0000000000   0.0000000000   1.0000000000 -7.873138924E+002
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

13   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Fold Mirror
     0.0000000000   0.0000000000   1.0000000000 -4.248154324E+002
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

14   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Element 1
     0.0000000000   0.0000000000   1.0000000000 -2.948154324E+002
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

15   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -2.698154324E+002
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

16   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Element 2
     0.0000000000   0.0000000000   1.0000000000 -6.500000000E+001
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

17   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -5.000000000E+001
     0.0000000000  -1.0000000000   0.0000000000  1.528224000E+002

18   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000  0.000000000E+000
     0.0000000000  -1.0000000000   0.0000000000  1.156224000E+002

19   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.7071067812   0.7071067812  0.000000000E+000
     0.0000000000  -0.7071067812   0.7071067812  1.156224000E+002

20   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Pickoff Mirror
     0.0000000000   0.7071067812   0.7071067812  0.000000000E+000
     0.0000000000  -0.7071067812   0.7071067812  1.156224000E+002

21   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000  1.156224000E+002

22   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000  4.062240000E+001

23   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 TEL FOCUS
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000  0.000000000E+000

24   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Beamsplitter
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -7.000000000E+000

25   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 FL 011-1365
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -2.700000000E+001

26   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -3.040000000E+001

27   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Coll 1
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -8.642981708E+001

28   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Coll 2
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -8.842981708E+001

29   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -9.642981708E+001

30   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Pupil
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -9.957968005E+001

31   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Filter
     0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.0000000000   1.0000000000 -9.957968005E+001
```

```
 32   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.035796801E+002

 33   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Cam 1
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.156910810E+002

 34   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.217910810E+002

 35   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Cam 2
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.264458617E+002

 36   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.284458617E+002

 37   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 FF 015-0066
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.415843846E+002

 38   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Window
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.435843846E+002

 39   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.460843846E+002

 40   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.500843846E+002

 41   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 CCD67
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -1.499477121E+002


GLOBAL SURFACE CENTER OF CURVATURE POINTS:

Reference Surface: 23

Surf             X              Y              Z
  1              -              -              -
  2              -              -              - APERTURE STOP
  3   0.0000000000 -17887.3138923960 152.8224000000 PRIMARY
  4   0.0000000000 -14433.4639735618 152.8224000000 SECONDARY
  5              -              -              - Primary hole
  6              -              -              - ADC 1A
  7              -              -              - ADC 1B
  8              -              -              -
  9   0.0000000000 62892.5226835877 152.8224000000 ADC 2A
 10              -              -              - ADC 2B
 11              -              -              -
 12              -              -              - Mounting flange
 13              -              -              - Fold Mirror
 14   0.0000000000 -3953.4266851662 152.8224000000 Element 1
 15   0.0000000000 -1779.4799558024 152.8224000000
 16   0.0000000000 -764.8356611012 152.8224000000 Element 2
 17   0.0000000000 -2057.4572085590 152.8224000000
 18              -              -              -
 19              -              -              -
 20              -              -              - Pickoff Mirror
 21              -              -              -
 22              -              -              -
 23              -              -              - TEL FOCUS
 24              -              -              - Beamsplitter
 25              -              -              - FL 011-1365
 26   0.0000000000   0.0000000000   5.9300000000
 27   0.0000000000   0.0000000000 -119.9848419237 Coll 1
 28   0.0000000000   0.0000000000 -100.4298170752 Coll 2
 29   0.0000000000   0.0000000000 -16.9699449909
 30              -              -              - Pupil
 31              -              -              - Filter
 32              -              -              -
 33   0.0000000000   0.0000000000 -134.6357150481 Cam 1
 34   0.0000000000   0.0000000000 -96.6776163322
 35   0.0000000000   0.0000000000 -112.2711224879 Cam 2
 36   0.0000000000   0.0000000000 -109.5089772759
 37   0.0000000000   0.0000000000 -131.2043845940 FF 015-0066
 38              -              -              - Window
 39              -              -              -
 40              -              -              -
 41              -              -              - CCD67

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.

	Volume cc	Density g/cc	Mass g
Element surf 14 to 15	2117.663826	2.200000	4658.860416
Element surf 16 to 17	1559.267873	2.200000	3430.389320
Element surf 24 to 25	0.000000	2.510000	0.000000
Element surf 25 to 26	0.849147	2.510000	2.131358
Element surf 27 to 28	1.152743	3.196000	3.684167
Element surf 28 to 29	1.652097	3.675000	6.071455
Element surf 31 to 32	1.256637	2.510000	3.154159
Element surf 33 to 34	1.115012	3.675000	4.097668
Element surf 35 to 36	0.706075	3.196000	2.256617
Element surf 37 to 38	0.385387	2.510000	0.967322
Element surf 38 to 39	1.767146	2.510000	4.435536
Total Mass:			8116.048019

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 = 0.370000		
Focal Length	13681.293705	13681.293705
Focal Planes	-10563107.040527	2.939967
Principal Planes	-10576788.334233	-13678.353738
Anti-Principal Planes	-10549425.746822	13684.233673
Nodal Planes	-10549425.746822	13684.233673
Anti-Nodal Planes	-10576788.334233	-13678.353738
W = 0.400000		
Focal Length	13666.212393	13666.212393
Focal Planes	-10570255.119163	2.951212
Principal Planes	-10583921.331556	-13663.261180
Anti-Principal Planes	-10556588.906770	13669.163605
Nodal Planes	-10556588.906770	13669.163605
Anti-Nodal Planes	-10583921.331556	-13663.261180
W = 0.500000 (Primary)		
Focal Length	13676.463654	13676.463654
Focal Planes	-10613608.669466	2.914852
Principal Planes	-10627285.133120	-13673.548802
Anti-Principal Planes	-10599932.205812	13679.378506
Nodal Planes	-10599932.205812	13679.378506
Anti-Nodal Planes	-10627285.133120	-13673.548802
W = 0.650000		
Focal Length	13714.977431	13714.977431
Focal Planes	-10665210.490084	2.841389
Principal Planes	-10678925.467515	-13712.136042
Anti-Principal Planes	-10651495.512653	13717.818821
Nodal Planes	-10651495.512653	13717.818821
Anti-Nodal Planes	-10678925.467515	-13712.136042
W = 0.800000		
Focal Length	13745.295525	13745.295525
Focal Planes	-10698258.054877	2.785420
Principal Planes	-10712003.350402	-13742.510105
Anti-Principal Planes	-10684512.759352	13748.080945
Nodal Planes	-10684512.759352	13748.080945
Anti-Nodal Planes	-10712003.350402	-13742.510105