System/Prescription Data

File : C:\tbida\zemax\dct\RC_D11\WFS_bench_pinhole_140_MLM.ZMX
Title:
Date : FRI MAY 14 2010

GENERAL LENS DATA:

```
Surfaces               :              39
Stop                   :               9
System Aperture        : Float By Stop Size = 11.5
Glass Catalogs         : SCHOTT
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  :       -55.64409 (in air at system temperature and pressure)
Effective Focal Length  :       -55.64409 (in image space)
Back Focal Length       :        35.03016
Total Track             :        352.1919
Image Space F/#         :        2.763501
Paraxial Working F/#    :        3.331037
Working F/#             :        17.44663
Image Space NA          :       0.1484405
Object Space NA         :      0.08185135
Stop Radius             :           -11.5
Paraxial Image Height   :       0.5853253
Paraxial Magnification  :       0.5471357
Entrance Pupil Diameter :        20.13536
Entrance Pupil Position :       -258.5533
Exit Pupil Diameter     :        4.995436
Exit Pupil Position     :        19.22528
Field Type              : Angle in degrees
Maximum Radial Field    :             0.5
Primary Wavelength      :            0.55 µm
Lens Units              :   Millimeters
Angular Magnification   :       -4.030753

Fields          : 2
Field Type: Angle in degrees
#        X-Value        Y-Value         Weight
 1       0.000000       0.000000       1.000000
 2       0.000000       0.500000       1.000000

Vignetting Factors
#       VDX       VDY       VCX       VCY       VAN
1  0.000000  0.000000  0.000000  0.000000  0.000000
2  0.000000  0.000000  0.000000  0.000000  0.000000

Wavelengths     : 1
Units: µm
#          Value         Weight
 1       0.550000       1.000000
```

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic	Comment
OBJ	STANDARD	Infinity	135.9664		2.139598	0	
1	COORDBRK	-	0		-	-	
2	STANDARD	156.67	2.5	SF5	30	0	01LAO139
3	STANDARD	59.14	6.5	BK7	30	0	
4	STANDARD	-93.22	0		30	0	
5	COORDBRK	-	257.951		-	-	
6	STANDARD	Infinity	20		23.49192	0	
7	SZERNPHA	Infinity	0	MIRROR	23.18695	0	DM
8	COORDBRK	-	-20		-	-	
STO	STANDARD	Infinity	0		23	0	Stop
10	COORDBRK	-	-50		-	-	
11	COORDBRK	-	0		-	-	
12	STANDARD	Infinity	0	MIRROR	33.79072	0	Pellicle
13	COORDBRK	-	55		-	-	
14	COORDBRK	-	0		-	-	
15	STANDARD	Infinity	0	MIRROR	34.98689	0	
16	COORDBRK	-	-43.8475		-	-	
17	STANDARD	-93.22	-6.5	BK7	30	0	01LAO139
18	STANDARD	59.14	-2.5	SF5	30	0	
19	STANDARD	156.67	0		30	0	
20	COORDBRK	-	-135.978		-	-	
21	STANDARD	Infinity	-7		2.141262	0	Focus
22	STANDARD	Infinity	-20	N-BK7	20	0	Beamsplitter
23	STANDARD	Infinity	-3.4	N-BK7	20	0	FL 011-1365
24	STANDARD	36.33	-54.35517		20	0	
25	STANDARD	-32.13957	-2	N-KZFS11	20	0	Coll 1
26	STANDARD	-12	-8	N-FK51A	20	0	Coll 2
27	STANDARD	92.28585	-4.401554		20	0	
28	STANDARD	Infinity	0		9.848085	0	Pupil
29	USERSURF	-39.6	-2	N-BK7	9.848124	0	0768-86 S MLM
30	STANDARD	-46.71	-12.517		20	0	OS 015-0147

31	STANDARD	-19.04589	-6.1	N-FK51A	19	0	Cam 1
32	STANDARD	25.91594	-5.419989		19	0	
33	STANDARD	13.95997	-2	N-KZFS11	19	0	Cam 2
34	STANDARD	19.93321	-14.67273		19	0	
35	STANDARD	10.38	-2	N-BK7	12.7	0	FF 015-0066
36	STANDARD	Infinity	-2.5	N-BK7	12.7	0	Window
37	STANDARD	Infinity	-2		30	0	
38	COORDBRK	-	0		-	-	
IMA	STANDARD	Infinity			6.656	0	CCD67

SURFACE DATA DETAIL:

Surface OBJ : STANDARD
Surface 1 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 0
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface 2 : STANDARD 01LAO139
Aperture : Floating Aperture
Maximum Radius : 15
Surface 3 : STANDARD
Aperture : Floating Aperture
Maximum Radius : 15
Surface 4 : STANDARD
Aperture : Floating Aperture
Maximum Radius : 15
Surface 5 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 0
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface 6 : STANDARD
Surface 7 : SZERNPHA DM
Mirror Substrate : Curved, Thickness = 4.63739E-001
Coating : BEAMSPLIT
Extrapolate? : 0
Number of terms: 11
Maximum rad ap : 10
Zernike Term 1: 0
Zernike Term 2: 0
Zernike Term 3: 0
Zernike Term 4: 0
Zernike Term 5: 0
Zernike Term 6: 0
Zernike Term 7: 0
Zernike Term 8: 0
Zernike Term 9: 0
Zernike Term 10: 0
Zernike Term 11: 0
Surface 8 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 0
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface STO : STANDARD Stop
Aperture : Circular Obscuration
Minimum Radius : 0
Maximum Radius : 3.9
Surface 10 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 0
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface 11 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 45
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface 12 : STANDARD Pellicle
Mirror Substrate : Curved, Thickness = 6.75814E-001
Coating : BEAMSPLIT
Surface 13 : COORDBRK
Decenter X : 0
Decenter Y : 0
Tilt About X : 45
Tilt About Y : 0
Tilt About Z : 0
Order : Decenter then tilt
Surface 14 : COORDBRK

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 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
 Mirror Substrate : Curved, Thickness = 6.99738E-001
 Coating        : BEAMSPLIT
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 01LAO139
 Aperture       : Floating Aperture
 Maximum Radius :               15
Surface  18     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :               15
Surface  19     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :               15
Surface  20     : COORDBRK
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  21     : STANDARD Focus
Surface  22     : STANDARD Beamsplitter
 Aperture       : Rectangular Aperture
 X Half Width   :               10
 Y Half Width   :               10
Surface  23     : STANDARD FL 011-1365
Surface  24     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :               10
Surface  25     : STANDARD Coll 1
 Aperture       : Floating Aperture
 Maximum Radius :               10
Surface  26     : STANDARD Coll 2
 Aperture       : Floating Aperture
 Maximum Radius :               10
Surface  27     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :               10
Surface  28     : STANDARD Pupil
Surface  29     : USERSURF (US_ARRAY.DLL) 0768-86 S MLM
        Number X:                  32
        Number Y:                  32
         Width X:               0.768
        Height Y:               0.768
Surface  30     : STANDARD OS 015-0147
 Aperture       : Floating Aperture
 Maximum Radius :               10
Surface  31     : STANDARD Cam 1
 Aperture       : Floating Aperture
 Maximum Radius :              9.5
Surface  32     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              9.5
Surface  33     : STANDARD Cam 2
 Aperture       : Floating Aperture
 Maximum Radius :              9.5
Surface  34     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              9.5
Surface  35     : STANDARD FF 015-0066
 Aperture       : Floating Aperture
 Maximum Radius :             6.35
Surface  36     : STANDARD Window
 Aperture       : Floating Aperture
 Maximum Radius :             6.35
Surface  37     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :               15
Surface  38     : 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
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 Y Half Width   :   3.328

COATING DEFINITIONS:

Coating Name: BEAMSPLIT (TABLE)

EDGE THICKNESS DATA:

Surf	X-Edge	Y-Edge
OBJ	135.966417	135.966417
1	0.719723	0.719723
2	3.714162	3.714162
3	3.351378	3.351378
4	1.214737	1.214737
5	257.951000	257.951000
6	20.000000	20.000000
7	0.000000	0.000000
8	-20.000000	-20.000000
STO	0.000000	0.000000
10	-50.000000	-50.000000
11	0.000000	0.000000
12	0.000000	0.000000
13	55.000000	55.000000
14	0.000000	0.000000
15	0.000000	0.000000
16	-45.062241	-45.062241
17	-3.351378	-3.351378
18	-3.714162	-3.714162
19	-0.719723	-0.719723
20	-135.977998	-135.977998
21	-7.000000	-7.000000
22	-20.000000	-20.000000
23	-1.996622	-1.996622
24	-57.353853	-57.353853
25	-5.771443	-5.771443
26	-2.089855	-2.089855
27	-4.944949	-4.944949
28	-0.001261	-0.001261
29	-3.081728	-3.081728
30	-13.972451	-13.972451
31	-1.757566	-1.757566
32	-3.492929	-3.492929
33	-3.321624	-3.321624
34	-14.913240	-14.913240
35	-4.168916	-4.168916
36	-2.500000	-2.500000
37	-2.000000	-2.000000
38	0.000000	0.000000
IMA	0.000000	0.000000

SOLVE AND VARIABLE DATA:

 Semi Diameter   2   : Fixed
 Semi Diameter   3   : Fixed
 Semi Diameter   4   : Fixed
 Semi Diameter   9   : Fixed
 Parameter 3 Surf 10 : Solve, Pickup from surface 5 scaled by 1, offset by 0
 Parameter 3 Surf 13 : Solve, Pickup from surface 11 scaled by 1, offset by 0
 Parameter 3 Surf 16 : Solve, Pickup from surface 14 scaled by 1, offset by 0
 Semi Diameter 17   : Fixed
 Semi Diameter 18   : Fixed
 Semi Diameter 19   : Fixed
 Semi Diameter 22   : Fixed
 Semi Diameter 23   : Fixed
 Semi Diameter 24   : Fixed
 Semi Diameter 25   : Fixed
 Semi Diameter 26   : Fixed
 Semi Diameter 27   : 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 39   : Fixed

INDEX OF REFRACTION DATA:

System Temperature: 20.0000 Celsius
System Pressure   :   1.0000 Atmospheres
Absolute air index: 1.000273 at wavelength 0.550000 µm
Index data is relative to air at the system temperature and pressure.
Wavelengths are measured in air at the system temperature and pressure.

Surf	Glass	Temp	Pres	0.550000
0		20.00	1.00	1.00000000
1	<CRD BRK>			1.00000000

2	SF5	20.00	1.00	1.67711784
3	BK7	20.00	1.00	1.51852239
4		20.00	1.00	1.00000000
5	<CRD BRK>			1.00000000
6		20.00	1.00	1.00000000
7	MIRROR	20.00	1.00	1.00000000
8	<CRD BRK>			1.00000000
9		20.00	1.00	1.00000000
10	<CRD BRK>			1.00000000
11	<CRD BRK>			1.00000000
12	MIRROR	20.00	1.00	1.00000000
13	<CRD BRK>			1.00000000
14	<CRD BRK>			1.00000000
15	MIRROR	20.00	1.00	1.00000000
16	<CRD BRK>			1.00000000
17	BK7	20.00	1.00	1.51852239
18	SF5	20.00	1.00	1.67711784
19		20.00	1.00	1.00000000
20	<CRD BRK>			1.00000000
21		20.00	1.00	1.00000000
22	N-BK7	20.00	1.00	1.51852239
23	N-BK7	20.00	1.00	1.51852239
24		20.00	1.00	1.00000000
25	N-KZFS11	20.00	1.00	1.64095082
26	N-FK51A	20.00	1.00	1.48779356
27		20.00	1.00	1.00000000
28		20.00	1.00	1.00000000
29	N-BK7	20.00	1.00	1.51852239
30		20.00	1.00	1.00000000
31	N-FK51A	20.00	1.00	1.48779356
32		20.00	1.00	1.00000000
33	N-KZFS11	20.00	1.00	1.64095082
34		20.00	1.00	1.00000000
35	N-BK7	20.00	1.00	1.51852239
36	N-BK7	20.00	1.00	1.51852239
37		20.00	1.00	1.00000000
38	<CRD BRK>			1.00000000
39		20.00	1.00	1.00000000

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf	Glass	TCE *10E-6
0		0.00000000
1	<CRD BRK>	0.00000000
2	SF5	8.20000000
3	BK7	7.10000000
4		0.00000000
5	<CRD BRK>	0.00000000
6		0.00000000
7	MIRROR	0.00000000
8	<CRD BRK>	0.00000000
9		0.00000000
10	<CRD BRK>	0.00000000
11	<CRD BRK>	0.00000000
12	MIRROR	0.00000000
13	<CRD BRK>	0.00000000
14	<CRD BRK>	0.00000000
15	MIRROR	0.00000000
16	<CRD BRK>	0.00000000
17	BK7	7.10000000
18	SF5	8.20000000
19		0.00000000
20	<CRD BRK>	0.00000000
21		0.00000000
22	N-BK7	7.10000000
23	N-BK7	7.10000000
24		0.00000000
25	N-KZFS11	6.56000000
26	N-FK51A	12.74000000
27		0.00000000
28		0.00000000
29	N-BK7	7.10000000
30		0.00000000
31	N-FK51A	12.74000000
32		0.00000000
33	N-KZFS11	6.56000000
34		0.00000000
35	N-BK7	7.10000000
36	N-BK7	7.10000000
37		0.00000000
38	<CRD BRK>	0.00000000
39		0.00000000

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

Reference Surface: 1

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

0	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	-1.359664167E+002	
1	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	0.000000000E+000	
2	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	01LAO139
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	0.000000000E+000	
3	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.500000000E+000	
4	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	9.000000000E+000	
5	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	9.000000000E+000	
6	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.669510000E+002	
7	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	DM
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.869510000E+002	
8	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.869510000E+002	
9	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Stop
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.669510000E+002	
10	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.669510000E+002	
11	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.7071067812	-0.7071067812	0.000000000E+000	
	0.0000000000	0.7071067812	0.7071067812	2.169510000E+002	
12	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Pellicle
	0.0000000000	0.7071067812	-0.7071067812	0.000000000E+000	
	0.0000000000	0.7071067812	0.7071067812	2.169510000E+002	
13	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	-1.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	2.169510000E+002	
14	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.7071067812	-0.7071067812	-5.500000000E+001	
	0.0000000000	0.7071067812	0.7071067812	2.169510000E+002	
15	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.7071067812	-0.7071067812	-5.500000000E+001	
	0.0000000000	0.7071067812	0.7071067812	2.169510000E+002	
16	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	2.169510000E+002	
17	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	01LAO139
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	1.731034959E+002	
18	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	1.666034959E+002	
19	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	1.641034959E+002	
20	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	1.641034959E+002	
21	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Focus
	0.0000000000	1.0000000000	0.0000000000	-5.500000000E+001	
	0.0000000000	0.0000000000	1.0000000000	2.812549773E+001	
22	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Beamsplitter

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      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000  2.112549773E+001

 23   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 FL 011-1365
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000  1.125497732E+000

 24   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -2.274502268E+000

 25   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Coll 1
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -5.662966894E+001

 26   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Coll 2
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -5.862966894E+001

 27   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -6.662966894E+001

 28   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Pupil
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -7.103122301E+001

 29   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 0768-86 S MLM
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -7.103122301E+001

 30   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 OS 015-0147
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -7.303122301E+001

 31   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Cam 1
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -8.554822301E+001

 32   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -9.164822301E+001

 33   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Cam 2
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -9.706821238E+001

 34   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -9.906821238E+001

 35   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 FF 015-0066
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -1.137409387E+002

 36   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Window
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -1.157409387E+002

 37   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -1.182409387E+002

 38   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -1.202409387E+002

 39   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 CCD67
      0.0000000000   1.0000000000   0.0000000000 -5.500000000E+001
      0.0000000000   0.0000000000   1.0000000000 -1.202409387E+002


GLOBAL SURFACE CENTER OF CURVATURE POINTS:

Reference Surface: 1

Surf             X              Y              Z
  0              -              -              -
  1              -              -              -
  2   0.0000000000   0.0000000000 156.6700000000 01LAO139
  3   0.0000000000   0.0000000000  61.6400000000
  4   0.0000000000   0.0000000000 -84.2200000000
  5              -              -              -
  6              -              -              -
  7              -              -              - DM
  8              -              -              -
  9              -              -              - Stop
 10              -              -              -
 11              -              -              -
 12              -              -              - Pellicle
```

13	-	-	-	
14	-	-	-	
15	-	-	-	
16	-	-	-	
17	0.0000000000	-55.0000000000	79.8834959353	01LAO139
18	0.0000000000	-55.0000000000	225.7434959353	
19	0.0000000000	-55.0000000000	320.7734959353	
20	-	-	-	
21	-	-	-	Focus
22	-	-	-	Beamsplitter
23	-	-	-	FL 011-1365
24	0.0000000000	-55.0000000000	34.0554977324	
25	0.0000000000	-55.0000000000	-88.7692368336	Coll 1
26	0.0000000000	-55.0000000000	-70.6296689385	Coll 2
27	0.0000000000	-55.0000000000	25.6561841791	
28	-	-	-	Pupil
29	0.0000000000	-55.0000000000	-110.6312230051	0768-86 S MLM
30	0.0000000000	-55.0000000000	-119.7412230051	OS 015-0147
31	0.0000000000	-55.0000000000	-104.5941095594	Cam 1
32	0.0000000000	-55.0000000000	-65.7322795000	
33	0.0000000000	-55.0000000000	-83.1082470645	Cam 2
34	0.0000000000	-55.0000000000	-79.1349980254	
35	0.0000000000	-55.0000000000	-103.3609387123	FF 015-0066
36	-	-	-	Window
37	-	-	-	
38	-	-	-	
39	-	-	-	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 2 to 3	2.192674	4.070000	8.924185
Element surf 3 to 4	3.486490	2.510000	8.751090
Element surf 17 to 18	3.486490	2.510000	8.751090
Element surf 18 to 19	2.192674	4.070000	8.924185
Element surf 22 to 23	0.000000	2.510000	0.000000
Element surf 23 to 24	0.849147	2.510000	2.131358
Element surf 25 to 26	1.141927	3.196000	3.649598
Element surf 26 to 27	1.665929	3.675000	6.122289
Element surf 29 to 30	0.444041	2.510000	1.114542
Element surf 31 to 32	1.125561	3.675000	4.136438
Element surf 33 to 34	0.734545	3.196000	2.347607
Element surf 35 to 36	0.385387	2.510000	0.967322
Element surf 36 to 37	1.767146	2.510000	4.435536
Total Mass:			60.255239

F/# DATA:

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

Wavelength: 0.550000

#	Field	Tan	Sag
1	0.0000, 0.0000 deg:	17.4466	17.4466
2	0.0000, 0.5000 deg:	17.5703	17.4748

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 = 0.550000 (Primary)		
Focal Length :	55.644086	55.644086
Focal Planes :	-34.265710	33.030158
Principal Planes :	-89.909796	-22.613928
Anti-Principal Planes :	21.378375	88.674244
Nodal Planes :	21.378375	88.674244
Anti-Nodal Planes :	-89.909796	-22.613928

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
Output Pilot Radius : Best Fit
1 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
   Output Pilot Radius                    : Best Fit
  2 STANDARD             01LAO139
   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
   Output Pilot Radius                    : Best Fit
  3 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
   Output Pilot Radius                    : Best Fit
  4 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
   Output Pilot Radius                    : Best Fit
  5 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
   Output Pilot 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
   Output Pilot Radius                    : Best Fit
  7 SZERNPHA                   DM
   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
   Output Pilot Radius                    : Best Fit
  8 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
   Output Pilot Radius                    : Best Fit
STO STANDARD                 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
   Output Pilot Radius                    : Best Fit
 10 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
   Output Pilot Radius                    : Best Fit
 11 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
   Output Pilot Radius                    : Best Fit
 12 STANDARD             Pellicle
   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
   Output Pilot Radius                    : Best Fit
 13 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
   Output Pilot 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
   Output Pilot 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
   Output Pilot 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
  Output Pilot Radius                    : Best Fit
17 STANDARD            01LAO139
  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
  Output Pilot 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
  Output Pilot 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
  Output Pilot Radius                    : Best Fit
20 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
  Output Pilot Radius                    : Best Fit
21 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
  Output Pilot Radius                    : Best Fit
22 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
  Output Pilot Radius                    : Best Fit
23 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
  Output Pilot Radius                    : Best Fit
24 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
  Output Pilot Radius                    : Best Fit
25 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
  Output Pilot Radius                    : Best Fit
26 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
  Output Pilot Radius                    : Best Fit
27 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
  Output Pilot Radius                    : Best Fit
28 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
  Output Pilot Radius                    : Best Fit
29 USERSURF        0768-86 S MLM
  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
  Output Pilot Radius                    : Best Fit
30 STANDARD          OS 015-0147
  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
  Output Pilot Radius                    : Best Fit
31 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
    Output Pilot 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
    Output Pilot Radius                    : Best Fit
  33 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
    Output Pilot 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
    Output Pilot Radius                    : Best Fit
  35 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
    Output Pilot Radius                    : Best Fit
  36 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
    Output Pilot Radius                    : Best Fit
  37 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
    Output Pilot Radius                    : Best Fit
  38 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
    Output Pilot 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
    Output Pilot Radius                    : Best Fit

FILES USED:

ZEMAX File
  C:\TBIDA\ZEMAX\DCT\RC_D11\WFS_BENCH_PINHOLE_140_MLM.ZMX
Session File
  C:\TBIDA\ZEMAX\DCT\RC_D11\WFS_BENCH_PINHOLE_140_MLM.SES
Glass Catalogs
  C:\PROGRAM FILES\ZEMAX\GLASSCAT\SCHOTT.AGF
Coating Data
  C:\PROGRAM FILES\ZEMAX\COATINGS\COATING.DAT
Surface DLL's
  C:\PROGRAM FILES\ZEMAX\DLL\US_ARRAY.DLL
```