System/Prescription Data

File : G:\2010 EXES\IRTF\EXES IRTF SYSTEM 10 non-lacy solution\20100718 IRTF and foreoptics - 12 micron.zmx
Title:
Date : MON JUL 19 2010

GENERAL LENS DATA:

```
Surfaces                :               24
Stop                    :                2
System Aperture         : Entrance Pupil Diameter = 3007.5
Glass Catalogs          : SCHOTT INFRARED
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  :        2012.054 (in air at system temperature and pressure)
Effective Focal Length  :        2012.054 (in image space)
Back Focal Length       :        1136.033
Total Track             :        8989.512
Image Space F/#         :       0.6690121
Paraxial Working F/#    :       0.6690121
Working F/#             :        16.72543
Image Space NA          :       0.5986512
Object Space NA         :   1.503737e-007
Stop Radius             :        122.2352
Paraxial Image Height   :       0.1053509
Paraxial Magnification  :               0
Entrance Pupil Diameter :          3007.5
Entrance Pupil Position :         86373.2
Exit Pupil Diameter     :        30.52208
Exit Pupil Position     :        62.26217
Field Type              : Angle in degrees
Maximum Radial Field    :           0.003
Primary Wavelength      :              12 µm
Lens Units              :   Millimeters
Angular Magnification   :       -5163.484
```

Fields : 3
Field Type: Angle in degrees

#	X-Value	Y-Value	Weight
1	0.000000	0.000000	1.000000
2	-0.000949	-0.002846	1.000000
3	0.000949	0.002846	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
3	0.000000	0.000000	0.000000	0.000000	0.000000

Wavelengths : 4
Units: µm

#	Value	Weight
1	12.000000	1.000000
2	7.000000	1.000000
3	0.633000	1.000000
4	25.000000	1.000000

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic	Comment
OBJ	STANDARD	Infinity	Infinity		0	0	
1	STANDARD	-15284.45	-7021.012	MIRROR	3200.4	-1	IRTF primary
STO	STANDARD	-1330.875	7021.012	MIRROR	244	-1.314627	IRTF secondary
3	STANDARD	Infinity	1602.74		69.79053	0	dummy@primary
4	STANDARD	Infinity	365.76		29.90963	0	dummy@MOUNT
5	COORDBRK	-	0		-	-	tilt @TM
6	STANDARD	Infinity	0	MIRROR	200	0	TM
7	COORDBRK	-	-355.6		-	-	mv to IRTF focus
8	STANDARD	Infinity	0		100	0	IRTF focus
9	COORDBRK	-	-1788.413		-	-	tilt&mv to vx
10	STANDARD	511.4274	0	MIRROR	1440.226	-0.5098429	Ellipse
11	COORDBRK	-	1788.413		-	-	mv back to f1
12	COORDBRK	-	-1189.79		-	-	tilt&mv to Ell
13	COORDBRK	-	897.0001		-	-	mv L1L2+Leg2
14	COORDBRK	-	0		-	-	tilt onto majoraxis
15	COORDBRK	-	-176.2036		-	-	mv ae-a
16	STANDARD	508.9502	0	MIRROR	553.678	-3.566133	Hyperbola

17	COORDBRK	-	176.2036		-		-	mv -ae+a
18	COORDBRK	-	0		-		-	tilt back
19	COORDBRK	-	-292.808		-		-	mv -Leg2
20	COORDBRK	-	-171.4503		-		-	tilt&mv on Leg1
21	STANDARD	-88.00867	-8.745001	KBR	50.8		0	Window/Lens
22	STANDARD	Infinity	-121.2018		13.95479		0	
23	STANDARD	Infinity	-573		100		0	window focus
IMA	STANDARD	Infinity			100		0	pupil

SURFACE DATA DETAIL:

```
Surface OBJ     : STANDARD
Surface   1     : STANDARD IRTF primary
 Mirror Substrate : None
 Aperture       : Floating Aperture
 Maximum Radius :        1600.2
Surface STO     : STANDARD IRTF secondary
 Mirror Substrate : Curved, Thickness = 4.88000E+000
 Aperture       : Floating Aperture
 Maximum Radius :           122
Surface   3     : STANDARD dummy@primary
Surface   4     : STANDARD dummy@MOUNT
Surface   5     : COORDBRK tilt @TM
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :            -67.5
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   6     : STANDARD TM
 Mirror Substrate : None
 Aperture       : Floating Aperture
 Maximum Radius :           100
Surface   7     : COORDBRK mv to IRTF focus
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :            -67.5
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   8     : STANDARD IRTF focus
Surface   9     : COORDBRK tilt&mv to vx
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :        -37.01318
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  10     : STANDARD Ellipse
 Mirror Substrate : None
 Aperture       : Elliptical Aperture
 X Half Width   :          38.1
 Y Half Width   :          38.1
 X- Decenter    :                0
 Y- Decenter    :          716.252
Surface  11     : COORDBRK mv back to f1
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  12     : COORDBRK tilt&mv to Ell
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :         37.01318
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  13     : COORDBRK mv L1L2+Leg2
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :               90
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  14     : COORDBRK tilt onto majoraxis
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :         66.98992
 Tilt About Y   :                0
```

```
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  15     : COORDBRK mv ae-a
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  16     : STANDARD Hyperbola
 Mirror Substrate : Curved, Thickness = 2.50000E+001
 Aperture       : Elliptical Aperture
 X Half Width   :          25.4
 Y Half Width   :          25.4
 X- Decenter    :                0
 Y- Decenter    :         -269.511
Surface  17     : COORDBRK mv -ae+a
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  18     : COORDBRK tilt back
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :        -66.98992
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Tilt then decenter
Surface  19     : COORDBRK mv -Leg2
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  20     : COORDBRK tilt&mv on Leg1
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :               90
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  21     : STANDARD Window/Lens
 Aperture       : Floating Aperture
 Maximum Radius :          25.4
Surface  22     : STANDARD
Surface  23     : STANDARD window focus
Surface IMA     : STANDARD pupil

COATING DEFINITIONS:


EDGE THICKNESS DATA:

Surf         X-Edge         Y-Edge
   1   -6942.833948   -6942.833948
 STO    7026.600130    7026.600130
   3    1602.740000    1602.740000
   4     365.760000     365.760000
   5       0.000000       0.000000
   6       0.000000       0.000000
   7    -355.600000    -355.600000
   8       0.000000       0.000000
   9    -920.292686    -920.292686
  10    -868.120631    -868.120631
  11    1788.413316    1788.413316
  12   -1189.789861   -1189.789861
  13     897.000140     897.000140
  14       0.000000       0.000000
  15    -111.474283    -111.474283
  16     -64.729351     -64.729351
  17     176.203634     176.203634
  18       0.000000       0.000000
  19    -292.807987    -292.807987
  20    -175.195332    -175.195332
  21      -5.000000      -5.000000
  22    -121.201838    -121.201838
  23    -573.000000    -573.000000
 IMA       0.000000       0.000000
```

SOLVE AND VARIABLE DATA:

```
 Semi Diameter   1      : Fixed
 Semi Diameter   2      : Fixed
 Semi Diameter   6      : Fixed
 Parameter  3 Surf   7  : Solve, Pickup from surface 5 scaled by 1, offset by 0
 Semi Diameter   8      : Fixed
 Curvature of  10       : Variable
 Thickness of  11       : Solve, Pickup from surface 9 scaled by -1, offset by 0
 Parameter  3 Surf  12  : Solve, Pickup from surface 9 scaled by -1, offset by 0
 Curvature of  16       : Variable
 Thickness of  17       : Solve, Pickup from surface 15 scaled by -1, offset by 0
 Parameter  3 Surf  18  : Solve, Pickup from surface 14 scaled by -1, offset by 0
 Semi Diameter  21      : Fixed
 Semi Diameter  23      : Fixed
 Semi Diameter  24      : Fixed
```

INDEX OF REFRACTION DATA:

System Temperature: 20.0000 Celsius
System Pressure : 1.0000 Atmospheres
Absolute air index: 1.000268 at wavelength 12.000000 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	12.000000	7.000000	0.633000	25.000000	
0		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
1	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
2	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
3		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
4		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
5	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
6	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
7	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
8		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
9	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
10	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
11	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
12	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
13	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
14	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
15	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
16	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
17	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
18	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
19	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
20	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
21	KBR	20.00	1.00	1.51992216	1.53053303	1.55641258	1.46677682	source: ISP Optics data sheet (
22		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
23		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
24		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf	Glass	TCE *10E-6	
0		0.00000000	
1	MIRROR	0.00000000	
2	MIRROR	0.00000000	
3		0.00000000	
4		0.00000000	
5	<CRD BRK>	0.00000000	
6	MIRROR	0.00000000	
7	<CRD BRK>	0.00000000	
8		0.00000000	
9	<CRD BRK>	0.00000000	
10	MIRROR	0.00000000	
11	<CRD BRK>	0.00000000	
12	<CRD BRK>	0.00000000	
13	<CRD BRK>	0.00000000	
14	<CRD BRK>	0.00000000	
15	<CRD BRK>	0.00000000	
16	MIRROR	0.00000000	
17	<CRD BRK>	0.00000000	
18	<CRD BRK>	0.00000000	
19	<CRD BRK>	0.00000000	
20	<CRD BRK>	0.00000000	
21	KBR	0.00000000	source: ISP Optics data sheet (www.ispoptics.com)
22		0.00000000	
23		0.00000000	
24		0.00000000	

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

Reference Surface: 24

Surf	R11	R12	R13	X	
	R21	R22	R23	Y	
	R31	R32	R33	Z	
1	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	IRTF primary
	0.0000000000	0.7071067812	0.7071067812	-1.996131852E+003	
	0.0000000000	-0.7071067812	0.7071067812	-2.062932390E+003	
2	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	IRTF secondary
	0.0000000000	0.7071067812	0.7071067812	-6.960737055E+003	
	0.0000000000	-0.7071067812	0.7071067812	-7.027537593E+003	
3	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	dummy@primary
	0.0000000000	0.7071067812	0.7071067812	-1.996131852E+003	
	0.0000000000	-0.7071067812	0.7071067812	-2.062932390E+003	
4	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	dummy@MOUNT
	0.0000000000	0.7071067812	0.7071067812	-8.628235293E+002	
	0.0000000000	-0.7071067812	0.7071067812	-9.296240673E+002	
5	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	tilt @TM
	0.0000000000	-0.3826834324	0.9238795325	-6.041921530E+002	
	0.0000000000	-0.9238795325	-0.3826834324	-6.709926910E+002	
6	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	TM
	0.0000000000	-0.3826834324	0.9238795325	-6.041921530E+002	
	0.0000000000	-0.9238795325	-0.3826834324	-6.709926910E+002	
7	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	mv to IRTF focus
	0.0000000000	-1.0000000000	0.0000000000	-6.041921530E+002	
	0.0000000000	0.0000000000	-1.0000000000	-6.709926910E+002	
8	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	IRTF focus
	0.0000000000	-1.0000000000	0.0000000000	-6.041921530E+002	
	0.0000000000	0.0000000000	-1.0000000000	-3.153926910E+002	
9	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	tilt&mv to vx
	0.0000000000	-0.7984970540	-0.6019987165	-6.041921530E+002	
	0.0000000000	0.6019987165	-0.7984970540	-3.153926910E+002	
10	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Ellipse
	0.0000000000	-0.7984970540	-0.6019987165	4.724303681E+002	
	0.0000000000	0.6019987165	-0.7984970540	1.112650074E+003	
11	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	mv back to f1
	0.0000000000	-0.7984970540	-0.6019987165	4.724303681E+002	
	0.0000000000	0.6019987165	-0.7984970540	1.112650074E+003	
12	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	tilt&mv to Ell
	0.0000000000	-1.0000000000	0.0000000000	-6.041921530E+002	
	0.0000000000	0.0000000000	-1.0000000000	-3.153926910E+002	
13	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	mv L1L2+Leg2
	0.0000000000	0.0000000000	1.0000000000	-6.041921530E+002	
	0.0000000000	-1.0000000000	0.0000000000	8.743971700E+002	
14	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	tilt onto majoraxis
	0.0000000000	0.9204360995	0.3908930629	2.928079870E+002	
	0.0000000000	-0.3908930629	0.9204360995	8.743971700E+002	
15	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	mv ae-a
	0.0000000000	0.9204360995	0.3908930629	2.928079870E+002	
	0.0000000000	-0.3908930629	0.9204360995	8.743971700E+002	
16	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	Hyperbola
	0.0000000000	0.9204360995	0.3908930629	2.239312088E+002	
	0.0000000000	-0.3908930629	0.9204360995	7.122129844E+002	
17	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	mv -ae+a
	0.0000000000	0.9204360995	0.3908930629	2.239312088E+002	
	0.0000000000	-0.3908930629	0.9204360995	7.122129844E+002	
18	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	tilt back
	0.0000000000	0.0000000000	1.0000000000	2.928079870E+002	
	0.0000000000	-1.0000000000	0.0000000000	8.743971700E+002	

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 19   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 mv -Leg2
      0.0000000000   0.0000000000   1.0000000000  2.928079870E+002
      0.0000000000  -1.0000000000   0.0000000000  8.743971700E+002

 20   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 tilt&mv on Leg1
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  8.743971700E+002

 21   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 Window/Lens
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  7.029468390E+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  6.942018380E+002

 23   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 window focus
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  5.730000000E+002

 24   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  0.000000000E+000


GLOBAL SURFACE CENTER OF CURVATURE POINTS:

Reference Surface: 24

Surf             X              Y              Z
  1   0.0000000000 -12803.8700934725 -12870.6706314724 IRTF primary
  2   0.0000000000 -7901.8075801085 -7968.6081181085 IRTF secondary
  3              -              -              - dummy@primary
  4              -              -              - dummy@MOUNT
  5              -              -              - tilt @TM
  6              -              -              - TM
  7              -              -              - mv to IRTF focus
  8              -              -              - IRTF focus
  9              -              -              - tilt&mv to vx
 10   0.0000000000 164.5517045416 704.2767679245 Ellipse
 11              -              -              - mv back to f1
 12              -              -              - tilt&mv to Ell
 13              -              -              - mv L1L2+Leg2
 14              -              -              - tilt onto majoraxis
 15              -              -              - mv ae-a
 16   0.0000000000 422.8763165709 1180.6691336098 Hyperbola
 17              -              -              - mv -ae+a
 18              -              -              - tilt back
 19              -              -              - mv -Leg2
 20              -              -              - tilt&mv on Leg1
 21   0.0000000000   0.0000000000 614.9381690000 Window/Lens
 22              -              -              -
 23              -              -              - window focus
 24              -              -              - pupil

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  21 to  22      13.956891       2.750000      38.381452
Total Mass:                                                38.381452

F/# DATA:

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

             Wavelength:       12.000000            7.000000            0.633000
 #                Field        Tan       Sag       Tan       Sag       Tan       Sag
 1   0.0000, 0.0000 deg:   16.7220   16.7323   16.4698   16.4800   15.8856   15.8954
 2 -0.0009, -0.0028 deg:   16.2307   16.8279   15.9797   16.5808   15.3988   16.0075
 3   0.0009, 0.0028 deg:   17.1955   16.6056   16.9432   16.3486   16.3579   15.7541
```

```
            Wavelength:       25.000000
 #                Field        Tan       Sag
 1   0.0000, 0.0000 deg:   18.1109   18.1221
 2 -0.0009, -0.0028 deg:   17.6169   18.1853
 3   0.0009, 0.0028 deg:   18.5813   18.0244

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 = 12.000000 (Primary)
Focal Length          :        -2012.053944        -2012.053944
Focal Planes          :     10302834.357715          441.831137
Principal Planes      :     10304846.411659         2453.885081
Anti-Principal Planes :     10300822.303771        -1570.222807
Nodal Planes          :     10300822.303771        -1570.222807
Anti-Nodal Planes     :     10304846.411659         2453.885081

W = 7.000000
Focal Length          :        -1951.326585        -1951.326585
Focal Planes          :     10302360.993797          449.581898
Principal Planes      :     10304312.320382         2400.908482
Anti-Principal Planes :     10300409.667213        -1501.744687
Nodal Planes          :     10300409.667213        -1501.744687
Anti-Nodal Planes     :     10304312.320382         2400.908482

W = 0.633000
Focal Length          :        -1817.533741        -1817.533741
Focal Planes          :     10301318.091467          466.651035
Principal Planes      :     10303135.625208         2284.184776
Anti-Principal Planes :     10299500.557726        -1350.882705
Nodal Planes          :     10299500.557726        -1350.882705
Anti-Nodal Planes     :     10303135.625208         2284.184776

W = 25.000000
Focal Length          :        -2383.589177        -2383.589177
Focal Planes          :     10305730.439066          394.375741
Principal Planes      :     10308114.028243         2777.964917
Anti-Principal Planes :     10303346.849889        -1989.213436
Nodal Planes          :     10303346.849889        -1989.213436
Anti-Nodal Planes     :     10308114.028243         2777.964917

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 STANDARD         IRTF 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
    Output Pilot Radius                    : Best Fit
 STO STANDARD       IRTF 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
    Output Pilot Radius                    : Best Fit
   3 STANDARD        dummy@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
    Output Pilot Radius                    : Best Fit
   4 STANDARD          dummy@MOUNT
    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             tilt @TM
    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                   TM
  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 COORDBRK     mv to IRTF 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
 8 STANDARD           IRTF 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
 9 COORDBRK        tilt&mv to vx
  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 STANDARD              Ellipse
  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        mv back to f1
  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 COORDBRK       tilt&mv to Ell
  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         mv L1L2+Leg2
  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  tilt onto majoraxis
  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 COORDBRK              mv ae-a
  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 STANDARD            Hyperbola
  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 COORDBRK             mv -ae+a
  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 COORDBRK            tilt back
  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 COORDBRK             mv -Leg2
    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      tilt&mv on Leg1
    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          Window/Lens
    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
    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         window 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
 IMA 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

FILES USED:

ZEMAX File
  G:\2010 EXES\IRTF\EXES IRTF SYSTEM 10 NON-LACY SOLUTION\20100718 IRTF AND FOREOPTICS -  12 MICRON.ZMX
Session File
  G:\2010 EXES\IRTF\EXES IRTF SYSTEM 10 NON-LACY SOLUTION\20100718 IRTF AND FOREOPTICS -  12 MICRON.SES
Glass Catalogs
  C:\USERS\DLYNCH\MY DOCUMENTS\ZEMAX\GLASSCAT\SCHOTT.AGF
  C:\USERS\DLYNCH\MY DOCUMENTS\ZEMAX\GLASSCAT\INFRARED.AGF
Coating Data
  C:\USERS\DLYNCH\MY DOCUMENTS\ZEMAX\COATINGS\COATING.DAT
```