TPF Telescope Front End RFP
Exhibit II- HCIT Optical Prescription
7/24/2003

HCIT System/Prescription Data

File : AL-HRC_FS_23c.zmx

GENERAL LENS DATA:

Surfaces	:	47
Stop	:	7
System Aperture	:	Object Space NA = 0.0406717
Glass Catalogs	:	SCHOTT
Ray Aiming	:	Paraxial Reference, Cache On
X Pupil shift	:	0
Y Pupil shift	:	0
Z Pupil shift	:	0
Apodization	:	Uniform, factor = 0.00000E+000
Effective Focal Length	:	-1355.84 (in air at system temperature and pressure)
Effective Focal Length	:	-1355.84 (in image space)
Back Focal Length	:	302.2016
Total Track	:	2056.95
Image Space F/#	:	0.6839882
Paraxial Working F/#	:	36.7691
Working F/#	:	37.80093
Image Space NA	:	0.01359712
Object Space NA	:	0.0406717
Stop Radius	:	31
Paraxial Image Height	:	4.987006
Paraxial Magnification	:	-2.993401
Entrance Pupil Diameter	:	-1982.256
Entrance Pupil Position	:	-25110.39
Exit Pupil Diameter	:	112.4722
Exit Pupil Position	:	-4135.488
Field Type	:	Object height in Millimeters
Maximum Field	:	1.666
Primary Wave	:	0.633
Lens Units	:	Millimeters
Angular Magnification	:	-17.62441

Fields : 7
Field Type: Object height in Millimeters

#	X-Value	Y-Value	Weight
1	0.000000	0.000000	0.100000
2	0.000000	1.200000	1.000000
3	0.000000	1.666000	1.000000
4	0.000000	-1.200000	1.000000
5	0.000000	-1.666000	1.000000
6	1.666000	0.000000	1.000000
7	-1.666000	0.000000	1.000000

Wavelengths : 1
Units: Microns

#	Value	Weight
1	0.633000	1.000000

SURFACE DATA SUMMARY:

Surf	Type	Comment	Radius	Thickness	Glass	Diameter	Conic
OBJ	STANDARD	SOURCE	Infinity	761.57		3.332	0
1	COORDBRK	DUMMY FOR F/#	-	-761.57		-	-
2	COORDBRK	RETURN TO SOURC	-	761.57		-	-
3	STANDARD	DM COLLIM. OAP	-1523.14	-761.57	MIRROR	445.65	-1
4	COORDBRK	OFFAXIS OFFSET	-	0		-	-
5	COORDBRK	TELECENTRIC	-	-23.82		-	-
6	COORDBRK	DM TILT	-	0		-	-
STO	STANDARD	DM	Infinity	0	MIRROR	61.99999	0
8	COORDBRK	DM TILT CONT'	-	761.57		-	-
9	COORDBRK	TELECENTRIC	-	23.82		-	-
10	COORDBRK	OFFAXIS RETURN	-	0		-	-
11	STANDARD	DM IMG. OAP	-1523.14	-450	MIRROR	445.6889	-1
12	COORDBRK	FLD MIRR OFFAXI	-	0		-	-
13	COORDBRK	FLD MIRR TILT	-	0		-	-
14	STANDARD	FOLD MIRR #1	Infinity	0	MIRROR	50.8	0
15	COORDBRK	FLD MIRR TILT	-	0		-	-
16	COORDBRK	FLD OA RETURN	-	311.57		-	-
17	COORDBRK	CORO PLATE TILT	-	0		-	-
18	STANDARD	CORO. SURF #1	Infinity	2.29	BK7	8	0
19	STANDARD	CORO. SURF #2	Infinity	-2.29		8	0
20	COORDBRK	SPOT SHIFT	-	0.78		-	-
21	COORDBRK	CORO TILT RETN	-	0		-	-
22	COORDBRK	DIS TO FLD MIRR	-	300		-	-
23	COORDBRK	FLD OFFAXIS	-	0		-	-
24	COORDBRK	FLD MIRR TILT	-	0		-	-
25	STANDARD	FOLD MIRR #2	Infinity	0	MIRROR	50.8	0
26	COORDBRK	FLD MIRR TILT	-	0		-	-
27	COORDBRK	FLD OA RETURN	-	-461.57		-	-
28	STANDARD	LYOT OAP	1523.14	761.57	MIRROR	445.719	-1
29	COORDBRK	TELECENTRI	-	23.82		-	-
30	COORDBRK	LYOT OFFAXIS	-	0		-	-
31	STANDARD	LYOT STOP	Infinity	761.57		80	0
32	COORDBRK	TELECENTRIC	-	23.82		-	-
33	COORDBRK	LYOUT OA RETN	-	0		-	-
34	STANDARD	IMG. OAP	-1523.14	-761.57	MIRROR	445.7423	-1
35	COORDBRK	IMG STOP TILT	-	0		-	-
36	STANDARD	IMG STOP	Infinity	0		4	0
37	COORDBRK	CAM OPA TILT	-	0		-	-
38	COORDBRK	DIST TO CAM OPA	-	-152.83		-	-
39	STANDARD	CAMERA OPA	305.66	152.83	MIRROR	127.7459	-1
40	COORDBRK	TELECENTRIC	-	10.23		-	-
41	COORDBRK	APERT OFFAXIS	-	0		-	-
42	STANDARD	APERTURE STOP	Infinity	457.48		20	0
43	COORDBRK	TELECENTRIC	-	37.5		-	-

44	COORDBRK	CAM IMG OAP OA	-	0		-	-
45	STANDARD	CAMERA IMG OAP	-914.96	-457.48	MIRROR	392.9885	-1
46	COORDBRK	IMG TILT	-	0		-	-
IMA	STANDARD		Infinity			20	0

SURFACE DATA DETAIL:

```
Surface OBJ     : STANDARD SOURCE
Surface   1     : COORDBRK DUMMY FOR F/#
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   2     : COORDBRK RETURN TO SOURC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :           14.257
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   3     : STANDARD DM COLLIM. OAP
 Aperture       : Circular Aperture
 Minimum Radius :             0
 Maximum Radius :         44.44
 X- Decenter    :                0
 Y- Decenter    :           190.49
Surface   4     : COORDBRK OFFAXIS OFFSET
 Decenter X     :                0
 Decenter Y     :           190.49
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   5     : COORDBRK TELECENTRIC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   6     : COORDBRK DM TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                8
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface STO     : STANDARD DM
Surface   8     : COORDBRK DM TILT CONT'
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                8
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   9     : COORDBRK TELECENTRIC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  10     : COORDBRK OFFAXIS RETURN
 Decenter X     :                0
 Decenter Y     :          -190.49
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  11     : STANDARD DM IMG. OAP
 Aperture       : Circular Aperture
 Minimum Radius :             0
 Maximum Radius :         44.44
 X- Decenter    :                0
 Y- Decenter    :           190.49
Surface  12     : COORDBRK FLD MIRR OFFAXI
 Decenter X     :                0
 Decenter Y     :             79.3
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  13     : COORDBRK FLD MIRR TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                5
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  14     : STANDARD FOLD MIRR #1
 Aperture       : Floating Aperture
 Maximum Radius :          25.4
Surface  15     : COORDBRK FLD MIRR TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                5
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  16     : COORDBRK FLD OA RETURN
 Decenter X     :                0
 Decenter Y     :            -79.3
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 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  17     : COORDBRK CORO PLATE TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :           14.257
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  18     : STANDARD CORO. SURF #1
 Aperture       : Floating Aperture
 Maximum Radius :              4
Surface  19     : STANDARD CORO. SURF #2
 Aperture       : Floating Aperture
 Maximum Radius :              4
Surface  20     : COORDBRK SPOT SHIFT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  21     : COORDBRK CORO TILT RETN
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :          -14.257
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  22     : COORDBRK DIS TO FLD MIRR
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  23     : COORDBRK FLD OFFAXIS
 Decenter X     :                0
 Decenter Y     :            -76.5
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  24     : COORDBRK FLD MIRR TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -13
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  25     : STANDARD FOLD MIRR #2
 Aperture       : Floating Aperture
 Maximum Radius :          25.4
Surface  26     : COORDBRK FLD MIRR TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -13
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  27     : COORDBRK FLD OA RETURN
 Decenter X     :                0
 Decenter Y     :             76.5
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  28     : STANDARD LYOT OAP
 Aperture       : Circular Aperture
 Minimum Radius :              0
 Maximum Radius :         44.44
 X- Decenter    :                0
 Y- Decenter    :          -190.49
Surface  29     : COORDBRK TELECENTRI
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  30     : COORDBRK LYOT OFFAXIS
 Decenter X     :                0
 Decenter Y     :          -190.49
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  31     : STANDARD LYOT STOP
Surface  32     : COORDBRK TELECENTRIC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  33     : COORDBRK LYOUT OA RETN
 Decenter X     :                0
 Decenter Y     :          -190.49
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
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Surface  34     : STANDARD IMG. OAP
 Aperture       : Circular Aperture
 Minimum Radius :             0
 Maximum Radius :         44.44
 X- Decenter    :                0
 Y- Decenter    :           190.49
Surface  35     : COORDBRK IMG STOP TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :          -14.257
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  36     : STANDARD IMG STOP
Surface  37     : COORDBRK CAM OPA TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :           20.734
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  38     : COORDBRK DIST TO CAM OPA
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  39     : STANDARD CAMERA OPA
 Aperture       : Circular Aperture
 Minimum Radius :             0
 Maximum Radius :         19.04
 X- Decenter    :                0
 Y- Decenter    :           -55.92
Surface  40     : COORDBRK TELECENTRIC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  41     : COORDBRK APERT OFFAXIS
 Decenter X     :                0
 Decenter Y     :           -55.92
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  42     : STANDARD APERTURE STOP
Surface  43     : COORDBRK TELECENTRIC
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  44     : COORDBRK CAM IMG OAP OA
 Decenter X     :                0
 Decenter Y     :          -185.24
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  45     : STANDARD CAMERA IMG OAP
 Aperture       : Circular Aperture
 Minimum Radius :             0
 Maximum Radius :         19.04
 X- Decenter    :                0
 Y- Decenter    :           185.24
Surface  46     : COORDBRK IMG TILT
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :           -22.89
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface IMA     : STANDARD
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