

Description:

This program computes several characteristics of an astronomical telescope.



Preparations:

<u>Address</u>	<u>Opcode</u>	<u>Key strokes</u>	<u>Description</u>
- - -		ON	turn on the calculator
- - -		f PRGM	CAUTION: delete all programs
- - -		f P/R	switch to programming mode

Enter the program:

<u>Address</u>	<u>Opcode</u>	<u>Key strokes</u>	<u>Description</u>
00			program start
01	36	ENTER	input scope aperture
02	44 1	STO 1	save scope aperture -> 1
03	2	2	number 2
04	10	/	calculate lens radius
05	2	2	number 2
06	21	y^x	y^2
07	3	3	
08	48	.	
09	1	1	
10	4	4	
11	1	1	
12	5	5	
13	9	9	number $\pi = 3.14159$
14	20	x	Output lens surface mm^2
15	31	R/S	input scope focal length
16	44 2	STO 2	save scope focal length -> 2

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17	45	1	RCL 1	recall aperture
18	22		1/x	
19	20		x	output f-ratio
20	31		R/S	input eyepiece focal length (EPFL)
21	44	3	STO 3	save EPFL -> 3
22	22		1/x	
23	45	2	RCL 2	recall focal length
24	20		x	output magnification
25	44	4	STO 4	save magnification -> 4
26	43	31	g PSE	wait 1 second
27	22		1/x	
28	45	1	RCL 1	recall scope aperture
29	20		x	output exit pupil
30	44	7	STO 7	save exit pupil -> 7
31	31		R/S	input eyepiece FOV
32	45	4	RCL 4	recall magnification
33	10		/	output FOV visual
34	44	8	STO 8	save FOV visual -> 8
35	31		R/S	input CCD pixel size
36	44	5	STO 5	save CCD pixel size-> 5
37	1		1	
38	1		1	
39	5		5	number 115
40	36		ENTER	
41	45	1	RCL 1	recall aperture
42	10		/	output max. resolution
43	43	31	g PSE	wait 1 second
44	45	5	RCL 5	recall CCD pixel size
45	36		ENTER	
46	45	2	RCL 2	recall scope focal length
47	10		/	
48	2		2	
49	0		0	
50	6		6	number 206
51	20		x	output system resolution
52	31		R/S	input light freq. (nm)
53	44	6	STO 6	save LF -> 6

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54	45	1	RCL 1	recall aperture
55	1		1	
56	0		0	number 10
57	10		/	
58	45	6	RCL 6	recall light frequency
59	10		/	
60	2		2	number 2
61	21		y^x	y^2
62	36		ENTER	
63	45	1	RCL 1	recall aperture
64	1		1	
65	0		0	number 10
66	10		/	
67	45	6	RCL 6	recall light frequency
68	10		/	
69	2		2	number 2
70	21		y^x	
71	36		ENTER	
72	45	1	RCL 1	recall aperture
73	1		1	
74	0		0	number 10
75	10		/	
76	45	2	RCL 2	recall scope focal length
77	1		1	
78	0		0	number 10
79	10		/	
80	10		/	
81	2		2	number 2
82	21		y^x	y^2
83	20		x	output scope light power
84	43	33	00	g GTO 00
				program end

Switch back to run mode:

<u>Address</u>	<u>Opcode</u>	<u>Key strokes</u>	<u>Description</u>
- - -		f P/R	switch back to run mode

Example:

Your telescope has an aperture of 130mm, a focal length of 1000mm, you use a 25mm (70°) eyepiece, and a CCD camera with 4.65µ pixels on it. Please, compute its focal ratio, the achieved magnification, the CCD resolution, the max. separation, and the light power of your telescope.

Run the program:

<u>Address</u>	<u>Opcode</u>	<u>Key strokes</u>	<u>Description</u>
- - -		130	number 130
- - -		R/S	input aperture (mm)
13,273			output surface front lens
- - -		1000	number 1000
- - -		R/S	input focal length (mm)
7.69			output focal ratio
- - -		25	number 25
- - -		R/S	input eyepiece focal length (mm)
40			output magnification (x-times)
3.25			output exit pupil (mm)
- - -		70	number 70
- - -		R/S	input eyepiece FOV (°)
1.75			output telescope FOV visual
- - -		4.65	number 4.65
- - -		R/S	input CCD pixel size (µ)
0.88			output max. separation (")
0.95			output CCD resolution (")
- - -		550	number 550
- - -		R/S	input light frequency (nm)
9.441652 -06			output telescope light power

Quick Reference Card:

Parameter	Example	Memory register
FOV telescope	1,75°	8
Aperture telescope	130 mm	1
Focal length telescope	1000 mm	2
Lamda (light frequency)	550 nm	6
Eyepiece focal length	25 mm	3
Magnification	40x	4
Exit pupil	3,25 mm	7
CCD pixel size	4.65 mu	5

Input	Output
Aperture [mm]: <b>130</b>	
	Light gathering surface [qmm]: <b>13273</b>
Focal length [mm]: <b>1000</b>	
	Focal ratio [f/]: <b>7.69</b>
Eyepiece focal length [mm]: <b>25</b>	
	Magnification [times]: <b>40</b>
	Exit pupil [mm]: <b>3.25</b>
Eyepiece FOV [°]: <b>70</b>	
	Telescope FOV[°]: <b>1.75</b>
CCD pixel size [mu]: <b>4.65</b>	
	Max. separation telescope [“]: <b>0.88</b>
	CCD resolution per pixel [“]: <b>0.95</b>
Light wave length (Lamda)[nm]: <b>550</b>	
	Light power telescope: <b>9.441652 -06</b>