

# AstroDigital.Net for HP-12c Platinum calculators

## 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>
000			program start
001	36	ENTER	input scope aperture
002	44 48 1	STO . 1	save scope aperture -> .1
003	2	2	number 2
004	10	/	calculate lens radius
005	2	2	number 2
006	21	y^x	y^2
007	3	3	
008	48	.	
009	1	1	
010	4	4	
011	1	1	
012	5	5	
013	9	9	number $\pi = 3.14159$
014	20	x	Output lens surface mm^2
015	31	R/S	input scope focal length
016	44 48 2	STO . 2	save scope focal length -> .2

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017	45	48	1	RCL .	1	recall aperture
018	22			1/x		
019	20			x		output f-ratio
020	31			R/S		input eyepiece focal length (EPFL)
021	44	48	3	STO .	3	save EPFL -> .3
022	22			1/x		
023	45	48	2	RCL .	2	recall focal length
024	20			x		output magnification
025	44	48	4	STO .	4	save magnification -> .4
026	43	31		g PSE		wait 1 second
027	22			1/x		
028	45	48	1	RCL .	1	recall scope aperture
029	20			x		output exit pupil
030	44	48	7	STO .	7	save exit pupil -> .7
031	31			R/S		input eyepiece FOV
032	45	48	4	RCL .	4	recall magnification
033	10			/		output FOV visual
034	44	48	8	STO .	8	save FOV visual -> .8
035	31			R/S		input CCD pixel size
036	44	48	5	STO .	5	save CCD pixel size-> .5
037	1			1		
038	1			1		
039	5			5		number 115
040	36			ENTER		
041	45	48	1	RCL .	1	recall aperture
042	10			/		output max. resolution
043	43	31		g PSE		wait 1 second
044	45	48	5	RCL .	5	recall CCD pixel size
045	36			ENTER		
046	45	48	2	RCL .	2	recall scope focal length
047	10			/		
048	2			2		
049	0			0		
050	6			6		number 206
051	20			x		output system resolution
052	31			R/S		input light freq. (nm)
053	44	48	6	STO .	6	save LF ->.6

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054	45	48	1	RCL .	1	recall aperture
055	1			1		
056	0			0		number 10
057	10			/		
058	45	48	6	RCL .	6	recall light frequency
059	10			/		
060	2			2		number 2
061	21			y^x		y^2
062	36			ENTER		
063	45	48	1	RCL .	1	recall aperture
064	1			1		
065	0			0		number 10
066	10			/		
067	45	48	6	RCL .	6	recall light frequency
068	10			/		
069	2			2		number 2
070	21			y^x		
071	36			ENTER		
072	45	48	1	RCL .	1	recall aperture
073	1			1		
074	0			0		number 10
075	10			/		
076	45	48	2	RCL .	2	recall scope focal length
077	1			1		
078	0			0		number 10
079	10			/		
080	10			/		
081	2			2		number 2
082	21			y^x		y^2
083	20			x		output scope light power
084	43	33	000	g GTO 000		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

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## 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>