# TELESTO calibration manual

#### When to do a calibration of TELESTO?

 If you ever experience elongated stars during your exposure, it might be a sign that you need to do a calibration



Example of elongated stars during a 60s exposure. Screenshot credits for this manual: Kent Barbey's report

#### How to do a calibration?

A calibration can be done with TPoint.

In order to perform a calibration, the startup procedure for TELESTO needs to be done first, as explained in the User Manual available on

https://plone.unige.ch/astrodome/telesto/usermanual.pdf/view

Once that TELESTO is setup, a calibration can be done with the following steps.

Additional information about TPoint can be found on

https://plone.unige.ch/astrodome/telesto/manuels/manuels/tpoint-add-on-user-guid e.pdf/view

# 1. Open TheSkyX

Then, do the normal procedure to connect the telescope and dome in order to observe. If you do not know how to do it, explanations are provided in the User Manual.

https://plone.unige.ch/astrodome/telesto /observations/usermanual.pdf/view





#### 3. Click on Automated calibration in the Calibration Run tab



# 4. Choose the settings in Setup or leave as default

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#### 5. Choose the number of recalibration targets

In *Create Pointing Targets*, choose the number of targets that you want to use for the recalibration (minimum is 16). Choose targets that are high enough in the sky, as the top of the trees can sometimes get in the way

Adjust number of targets with this slider



#### 6. In Acquire Pointing Samples, click on Run



# 7. Recalibrate permanently mounted telescope

On the new window, in *Type*, click on *Recalibrate permanently telescope* and then *OK* 



# 8. Exporting the pointing model

Calibration on TheSkyX is not the final step. SkyX will create a pointing model, which needs to be imported to Maestro. This can be done using an Excel spreadsheet available on the plone at the following url :

https://plone.unige.ch/astrodome/telesto/manuels/manuels/tpointtodynacorr.xls/vie <u>w</u>

This spreadsheet also contains information on how to proceed with the importation of the pointing model in Maestro.

Basically, SkyX will output some values that one needs to fill in the spreadsheet, which will then generate a file that can be imported into Maestro to update the pointing model.

#### 9. Calibration should start

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	# <u>2</u>	13h 53m 15.53s	+67° 02' 42.3"	13h 57m 48.50s	+66" 58' 34.0"	12 8.396
	#3	13h 55m 57.26s	+58° 07' 39.8"	14h 00m 14,40s	+ 58" 03' 59.0"	12 10.175
	#4	15h 35m 22.64s	+57" 44' 18.8"	15h 39m 39.00s	+57" 40' 02.0"	12 11.020
1 :	#5	16h 11m 07.52s	+63° 49' 33.4"	16h 15m 32.10s	+63" 44' 51.0"	12 11.598
	<b>#</b> 6	17h 51m 52.35s		17h 56m 07.00s		12 12.477
1 :	¥7	17h 20m 31.27s		17h 24m 34,30s		12 13.287
	#8	16h 32m 36.84s		16h 36m 38.80s		12 14.141
	<b>1</b> 9	16h 54m 08.35s		16h 58m 17.90s		12 14.832
	#10	15h 07m 55.61s		15h 12m 04.10s		12 15.726
	#11	14h 01m 17.40s		14h 05m 24.30s		12 16,605
	¥12	16h 54m 14.16s		16h 58m 13.10s		12 17.563
	#13	16h 30m 05.63s		16h 34m 00.20s		12 18.395
	#14	16h 07m 29.56s		16h 11m 25.00s		12 18,939
	*14 #15	15h 16m 18.36s		15h 20m 16.60s		12 20.402
	#15 #16	12h 59m 23.58s		13h 03m 27.70s		12 21.197
	<b>#17</b>	13h 27m 00.71s		13h 31m 01.60s		12 21.752
	#18	13h 20m 58.66s		13h 24m 54.00s		12 26.341
	#19	12h 51m 17.79s		12h 55m 17.40s		12 27.772
	#20	12h 06m 13.59s		12h 10m 14.70s		12 28.522
		11h 57m 31.19s		12h 01m 31.00s		12 29.326
	#22	10h 51m 12.95s		10h 55m 17.10s		12 32,684
	<b>#23</b>	11h 11m 31.50s				12 34.236
	#24	10h 11m 41.34s		10h 15m 46.30s		12 35.938
	#25	09h 55m 49.98s	+26" 09' 44.7"	09h 59m 55.30s	+26" 08' 50.0"	12 36.748
	#26	10h 37m 43.68s	+29° 22' 49.1"	10h 41m 48.10s	+29" 21' 44.0"	12 37.476
	#27	10h 51m 37.23s		10h 55m 41.70s		12 38.026
	¥28	12h 00m 01.21s	+41" 27 01.2"	12h 04m 06.60s	+41" 25' 02.0"	12 38,850
	#29	10h 26m 40.47s	+36° 40' 43.0"	10h 30m 46.20s	+36" 39' 13.0"	12 39.694
	#30	09h 09m 33.91s	+15" 04' 14.0"	09h 13m 40.70s	+15" 03' 57.0"	12 40.531
	#31	08h 33m 15.25s		08h 37m 15.90s	+27" 54' 03.0"	12 41.344
	#32	08h 47m 14.31s	+30° 11' 57.4"	08h 51m 14.40s	+30" 10' 37.0"	12 41.890
1	#33	11h 03m 37.48s		11h 07m 46.00s	+46" 33' 47.0"	12 42,732
1 :	#34	09h 44m 20.92s	+48° 35' 27.1"	09h 48m 31.00s		12 43,551
	#35	08h 30m 59.66s		08h 35m 08.60s		12 44.397
	#36	07h 25m 26.49s		07h 29m 37.10s		12 45.139
	#37	07h 02m 50.37s		07h 07m 05.80s		12 45.843
	#38	08h 18m 52,45s		08h 23m 05.70s		12 46.587
	#39	09h 06m 53.10s				12 47.476
	#40	10h 38m 23.71s		10h 42m 42.40s		12 48.313
	#40 #41	10h 19m 42.41s		10h 24m 23.30s		12 49.061
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- V - 1	#43	00h 42m 52.61s	+75 22 03.0"	06h 47m 34.70s	+75" 18 02.0"	12 50.795

#### 10. Converting the pointing model

Once the previous step is done, go to the *Model* tab and open the Excel sheet

X 2022-05-01_Kent_Barbey - TPoint Add On			- 🗆 ×						
31-PG = 6.17 PD = 11.35	Estig     Calibration Hun     Model     Feature     CommonSize     Paral       Terr Description     Terr Note (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       **     Order Size (encounted)     Same Trace Paral     Same Trace Paral       *     Order Size (encounted)     Same Trace Paral     Same Trace Paral       *     Order Para     Same Trace Paral     Same Trace Paral       *     Order Para     Same Trace Paral     Same Trace Paral	Set	tup Calit	pration Run	Model	Polar Alignment	Command Line	ProTrack	
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Grech: Scatter plot 👻	Show model yector		Cipos						

# 11. Filling TPointToDynaCorr.xls

Fill in the Excel spreadsheet using the corresponding values produced by *TheSkyX* and generate the .txt file. Then, move it to \Program Files \*\Astrometric\Maestro

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scri	ption	Term Value (arcsecsonds)
nda	rd	
$\checkmark$	IH-Index Error in HA	3.577,13
$\checkmark$	ID-Index Error in Dec	342,10
√	NP-Non-perpendicularity of HA and Dec	-86,34
$\checkmark$	CH-Non-perpendicularity Dec & OTA	381,33
$\checkmark$	ME-Polar Axis Elevation	-203,65
$\checkmark$	MA-Polar Axis East-West	-53,87
$\checkmark$	TF-Tube Flexure	166,40
$\checkmark$	HHSH2-HHSH2	14,27
$\checkmark$	HHCH2-HHCH2	-9,44
~	HDSH2-HDSH2	-3,21
$\checkmark$	HDCH2-HDCH2	6,14

	Tpoint term	description	value	units
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		polynomial term producing declination shift		and the second second
	PDD	proportional to declination	0.0	arcseconds/radian
-	NP or NPL	H.A./dec non-perpendicularity	0.0	arcseconds
	DNP	dynamic H.A./dec non-perpendicularity	0.0	arcseconds
-	CH or CHL	east-west collimation error	and the second second second	arcseconds
-	ME	polar-axis misalignment altitude		arcseconds
1	MA	polar-axis misalignment left-right		arcseconds
/ *	TF	tube flexure (sine)		arcseconds
	тх	tube flexure (tangent)	0.0	arcseconds
	FO	fork flexure	38.9	arcseconds
	FLOP	vertical sag		arcseconds
		harmonic term producing hour angle shift		
	HHSHn	proportional to sin(HA)	0.0	arcseconds
	HHCHn	harmonic term producing hour angle shift proportional to cos(HA)	0.0	arcseconds
	Frequency	frequency of above harmonic	1	
	HHSHn	ditto	0.0	arcseconds
	HHCHn	ditto	0.0	arcseconds
	Frequency		2	
	HDSDn	harmonic term producing declination shift proportional to sin(dec)	0.0	arcseconds
	noson	harmonic term producing declination shift	0.0	arcseconus
	HDCDn	proportional to cos(dec)	0.0	arcseconds
	Frequency	frequency of above harmonic	1	
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	HDCDn	ditto	0.0	arcseconds
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# 12. Open Maestro and import the pointing model

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- Index Error Axial Y	-69.9	arcsec	Harmonic 1 Axial X		0.0	+0.		
<- Scale Error Axial X	+0.0	arcsec/re∨	Harmonic 1 Axial Y	11.00	0.0	+0.		
' - Scale Error Axial Y	+0.0	arcsec/rev	Harmonic 2 Axial X	11.00	0.0	+0.		
<-Y/X non-perp.	-0.5	arcsec	Harmonic 2 Axial Y		16.5	+45		
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′-OTA∕Y non-perp.	+147.9	arcsec	Dynamic Correcti	ons —				
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29/05/22 18:43:15 : Maestro: loaded sky object databa 29/05/22 18:43:21 : Status: Local standard date has b	se	
29/05/22 18:43:21 : Status: Local standard time has be		
29/05/22 18:43:27 : Status: Alignment completed.		
ATCS connection: UP	Maestro v3.00.111 © 2004-2018 Astrometric Instruments, Inc.	18:44:40



# Congratulations! You have calibrated TELESTO