Seeing Monitor Software

Installation and user manual

May 18th, 2015 revision



Table of Contents

1	Soft	ware installation	3
	1.1	File copy	3
	1.2	First time software startup and basic settings	3
2	Hard	dware installation	6
	2.1	Optical setup, pointing considerations	6
	2.2	First steps	11
3	Adva	anced operation with telescope controls using ASCOM	18
4	Trou	ibleshooting	25
5	Proc	luct terms of use	27

1 <u>Software installation</u>

1.1 File copy

Just open the USB stick, and start **Setup_seeinMonitor.exe**, please follow instructions.

Name	-	Date modified	Туре	Size		
👸 setup_seeingMonitor.exe		15/10/2014 22:51	Application	1 852 KB		



Camera drivers must be installed and the camera shall be DirectShow compliant otherwise this software will not get images from the camera and will simply not work.

Important notice: this version of the software requires user/operator to attend the telescope the whole night. This is not a software that does all the process of starting up and running measurement the whole night and closing measurement session in an unattended fashion.

It is possible to overcome this, but please contact us for more information.

1.2 First time software startup and basic settings

The dongle key shall be present all the time when the software runs and of course, during startup.

On startup, here is how looks like the software.

Seeing monitor analyser - v2.30 - May, 17th 2015 DirectShow Version [7161-9473-4387]	<u> </u>
File Camera Telescope (Via ASCOM)	
Camera Telescope Results	
Camera Telescope Results	System parameters BackGround Box definition Focal length (mm) 1985.0 Hole diameter (mm) 55.0 Hole distance (mm) 200.0 Wavelength (µm) 0.5 Pixel size (µm) 3.8 System noise (pixels) 0.0 Mean<(ADU) = Max<(ADU) = Telescope offsets RA offset (arcsec) 10 DEC offset (arcsec) 10 Seeing
4	Control
Acquisition parameters	
Star Box (pixels)	U to 100% (Mean pixel value)
Amount of trames for seeing computing	0 to 100% (Maximum pixel value)
Signal to background noise ratio 5 🚖 Force AirMass=1	
Min distance other spot (pixels) 50 Stack incoming frames (SNR improvement) Max distance from 1st meas. (pixels) 540 Amount of frames to stack.	Allocated memory :

Fig. 2 Main's software panels

Set up the system parameters, as follows, according to your telescope, home diameter and separation.

System parameters	
Focal length (mm)	1985.0
Hole diameter (mm)	55.0
Hole distance (mm)	200.0
Wavelength (µm)	0.5
Pixel size (μm)	3.8
System noise (pixels)	0.0

Fig. 3

It is strongly advised to get good measurement accuracy, to get a maximum sampling rate per pixel of your camera of 0.5 arcscec/pixel. In this documentation, a camera with pixels size of 3.75 μ m and 1985 mm focal length has been used leading to sampling rate of 0.39 arcsec/pixel, which is a proper sampling rate for the experiment.

Then setup this group box with these figures, this is a small part of the image dedicated to compute noise and background level.

BackGr	ound Box d	efinition						
X left (p	5	\$						
XRigh	X Right (pixels)							
Y Botto	m (pixels)	17	¢					
Y Top	30	\$						
Noise	(ADU) =	3.38						
Mean	(ADU) =	2.5						
Мах	18.0							
	Fig. 4	ļ						

To connect a camera follow this menu and all Directshow[™] cameras that are recognized and operable in your system are listed here:

File Ca	imera Telescope (Via ASCOM)	
Came	Start Acquisition	Simulation camera
	Set exposure and gain	DMK 51AU02.AS
	Set video format	DMK 23U445
	Pause	ASI120MM Camera (ZWO Design)
		ASI120MM-S Camera (ZWO Design)

Fig. 5

Select the camera that see the two images of a star for seeing measurement.

Capture Properties	X
Stream Format	
- Video Format	Compression
Video Standard: None	
Frame Rate: 15.000	I Frame Interval:
Flip Horizontal: 🔲 Snap Shot	P Frame Interval:
Color Space / Compression:	· · · ·
Y800 💌	
Output Size:	Quality:
1280 x 960 (default 💌	
ОК	Cancel Apply

Fig. 6 Directshow camera setup panel

In **Capture Properties**, select monochrome codecs, such as Y800, and frame rate of 15 frames per second (fps), this is the highest available for this camera.

Measurements can be achieved up to 50 fps, and this is strongly advised not use not more than 20 ms exposure time, and set the highest frame rate possible. If longer exposures is used, seeing measurement might not be valid. So seeing measurement requires bright stars, such as magnitude 1 to 2, because of the 55 mm hole diameter and the very long F/ ratio (i.e. F/35 to F/50).

2 Hardware installation

2.1 Optical setup, pointing considerations

If the Alcor-System's mask has been purchased, on delivery the tunable prism are set so that the Prism performs a minimum deviation of the optical beam, and the two white arrow indicate the position of the minimum deviation.



Fig. 7 ALCOR SYSTEM deviation tunable prism

The star separation can be increased/ decreased by un-screwing the three small crews (red arrows), and rotating the upper part of the prism's holder.



Fig. 8 ALCOR SYSTEM deviation tunable prism : how to adjust beam deflection

It is recommended to look at the image at the telescope to assess the star separation while rotating the prism.

Rotate in a very slow and smooth fashion.

Do not get the star image with too much distance, because it will quickly exits the field of view of your camera, and the portion of star that is deflected will be too much distorted (spectral elongation).

In the next image star separation is 200 pixels, so this is 1arcmin and 18 arcsec of separation. This is a good setup.

Since the field of view of this camera is 8.3' x 6.2', good pointing accuracy of the mount shall be achieved (so meaning good polar alignment and mount with pointing model enabled).

Also good focus has to be performed so that the star have the sharpest/smallest shape, and most of the time the airy disk is visible on good seeing conditions, such as follows with a 10" telescope and 1982 mm focal length.



Fig. 9 Two images of a single star



Fig. 10 Complete mask on top of a 10" RC telescope

Pointing requirements to get the star to be used for measurement, can be difficult/challenging to center in the camera. Either a flip mirror can be used or setting up an electronic finder on telescope piggy back. This can be used such as shown hereafter. This is an image from a 1/1.8" Sony CCD camera combined with a 100 mm focal length lens.



Fig. 11 Camera and 100 mm focal lens on piggy-back of the same 10" RC telescope from previous picture

This provides a field of view of 4°x3° and in this case, the red arrow indicate where the user must put the star to get the double star image into the seeing monitor measurement camera that has a much smaller field of view. This is achieved with the PRISM+ software suite.

The star visible in the next image is 14 Gam Lyra.



Fig. 12 Example of electronic camera viewfinder

This is a magnitude 3.2 star and is the faintest star that can be used for a 55 mm diameter hole and 1982 mm focal length. The exposure time is 1/65s and gain set to the maximum of the camera.

Source Properties		23
UVC Video Controls	VC Special Controls Camera Control Video F	Proc Amp
Gain] [1023	Auto
Exposure	1/65 sec	÷ □ Auto
Auto Reference	128	- ·
Auto Max Value	1/15 se	c 📩 🔽 Auto

Fig. 13

So, do not use fainter stars than magnitude, say 2.5. Since there are plenty of those, it is possible to get one. The software does air mass correction to display zenith seeing, but selected star must always be above 45° of elevation with respect to the horizon.

Another way to center the star to measure, is to use a flip mirror, an eyepiece, and a viewfinder that is aligned properly to the telescope.



Fig. 14 Flip mirror and eyepiece for field centering

Finally do not forget to have a mount able to track accurately the star. Typically, in a field of 8x6 arcmin, the "double star image" shall stay inside the field for half of an hour. The software can track and correct the mount if your mount is ASCOM compliant (see section below in this documentation).

2.2 First steps

Once the star (and its deflected image) is selected and centered, seeing measurements can start.

			*	System parameters		BackGroun	nd Box de	finition	
				Focal length (mm)	1985.0	X left (pixe	els)	5	\$
				Hole diameter (mm)	55.0	X Right (pi	ixels)	59	\$
				Hole distance (mm)	200.0	Y Bottom ((pixels)	17	\$
				Wavelength (µm)	0.5	Y Top (pix	els)	30	
				Pixel size (µm)	3.8	Noise /2		29	
				System noise (pixels)	0.0	Mean (A	$\Delta DU = 0$).6	
					- (<u>***</u>	Max (A	ADU)= e	5.0	
				Telescope offsets		Ma			
			E	RA offset (arcsec)	10 1	E Gol	Objec	t's name	e
				DEC offset (arcsec)	10	S Go!		7	
				Guiding last correction	n	<u> </u>			-
				seeing					
					-				
∢ mean=0.11 max=240.00 Min=0.00	×=745 Y=848	III I=0 14.85 fps 1318	Control						
∢ mean=0.11 max=240.00 Min=0.00	X=745 Y=846	III I=0 14.85 fps 1318	Control	NG computations [Discard seeing	results above	(arcsec)	5.0	0
∢ mean=0.11 max=240.00 Min=0.00 *Acquisition parameters [Star Box (pixels)	X=745 Y=846	III I=0 14.85 fps 1318 Keep brightest pixels for centroid computation ⊽	Control Enable SEEI	NG computations	Discard seeing	results above	(arcsec)	5.0	0
✓ mean=0.11 max=240.00 Min=0.00 Acquisition parameters [Star Box (pixels)] [Amount of frames for seeing computing]	×=745 Y=846	I=0 14.85 fps 1318 Keep brightest pixels for centroid computation	Control Enable SEEI 0 to 100% (Mean pixe	NG computations sl value)	Discard seeing	results above	(arcsec)	5.0	0
✓ mean=0.11 max=240.00 Min=0.00 Acquisition parameters [Star Box (pixels)] [Amount of frames for seeing computing [Signal to back ground poise ratio]	X=745 Y=846	I=0 14.85 fps 1318 Keep brightest pixels for centroid computation	Control Enable SEEI 0 to 100% (Mean pixe 0 to 100% (Maximum	NG computations [el value) pixel value) 0 pixels satu	Discard seeing	results above	(arcsec)	5.0	0
Mean=0.11 max=240.00 Min=0.00 Acquisition parameters Star Box (pixels) Amount of frames for seeing computing Signal to background noise ratio	X=745 Y=848 16 € 100 € 5 €	III I=0 14.85 fps 1318 Keep brightest pixels for centroid computation	Control Enable SEEI 0 to 100% (Mean pixe 0 to 100% (Maximum	NG computations el value) pixel value) 0 pixels satu	Discard seeing rated	results above	(arcsec)	5.0	0
 mean=0.11 max=240.00 Min=0.00 Acquisition parameters Star Box (pixels) Amount of frames for seeing computing Signal to background noise ratio Min distance other spot (pixels) 	X=745 Y=848 16 € 100 € 5 € 50	III I=0 14.85 fps 1318 Keep brightest pixels for centroid computation	Control Enable SEEI 0 to 100% (Mean pixe 0 to 100% (Maximum Allocated memory (B	NG computations el value) pixel value) 0 pixels satur iytes) : 9 412 324	Discard seeing rated	results above	(arcsec)	5.0	0

Fig. 15 Checking star saturation level

First, pay attention that the exposure time is not too high, and that the two dots does not saturate. Performing measurement with saturated star images will lead to inaccurate seeing measurements, so this is an important point.

						System parameters		BackGround Box de	finition	
						Focal length (mm)	1985.0	X left (pixels)	5	\$
						Hole diameter (mm)	55.0	X Right (pixels)	59	\$
						Hole distance (mm)	200.0	Y Bottom (pixels)	17	\$
						Wavelength (µm)	0.5	Y Top (pixels)	30	\$
	1					Pixel size (µm)	3.8	Noise (ADU)= 3	3.30	
/						System noise (pixels)	0.0	Mean (ADU)= 2 Max (ADU)= 2	.4 1.0	
1.						Telescope offsets		den l		
						RA offset (arcsec)	10 +	E Gol Objec	t's nam	ne
						DEC offset (arcsec)	10 +	TS Gol V	ega	
						Guiding last correction	n	•		
						Seeing				
						Seeing =	2.7 arcse	c R0= 38.2 mm		
						,	1			
4					•	/				
mean=0.48 max=255.00 Min=0.00	X=709	Y=791 I=3	14.84 fps	38811	Control	1				
Acquisition parameters					Enable SEEI	NG computation	Discard seeing	; results above (arcsec)	5	.0
Star Box (pixels)	32	\$	Keep brightest pixels for	centroid computation 🔽	0 to 100% (Mean pix	el value)				
Amount of frames for seeing computing	100	\$]	% to keep 20 🚖	1					
Signal to background noise ratio	5	⇒ Sh	ow used pixels for centroi	ding · SNR based · 🕅 Force AirMass=1 🗔	0 to 100% (Maximum	pixel value) 55 pixels sati	urated			-
Min distance other spot (pixels)	50	Sta	ack incoming frames (SNF	(improvement)						
Max distance from 1st meas. (pixels)	540	_	Amount of frames to :	stack 5 🔶 🕞	Allocated memory (E	sytes) : 9 497 000				

Fig. 16 Checking star saturation level

The blue bar indicates the dynamic range used and the number of saturated pixels. Keep this value to 0 saturated pixels, (or sometime can be 1 to 5 because of scintillation). This is achieved by changing the exposure time and/or the gain of the camera.

Control Control Discard seeing results above (arcsec)	5.0
0 to 100% (Mean pixel value)	
0 to 100% (Maximum pixel value) 0 pixels saturated 🚽	
Allocated memory (Bytes) : 9 487 784	

Fig. 17 Checking star saturation level

Then the seeing measurement can be turned on.

Control		
Enable SEEING computations	Discard seeing results above (arcsec)	5.0

Fig. 18

If the shape and the light level of the star images is correct, a red and yellow square appear. These square defines where the centroiding is going to take place.

Seeing monitor analyser - v2.30 - N	lay, 17th 2015 DirectShow Versio	n [7161-9473-4387]					0	2
File Camera Telescope (Via ASCON	A)							
Camera Telescope Results								
			System (parameters		BackGroun	d Box definitio	on
			Focal le	ength (mm)	1985.0	X left (pixel	s) 5	\$
			Hole di	ameter (mm)	55.0	X Right (pix	els) 59	\$
			Hole di	stance (mm)	200.0	Y Bottom (p	oixels) 17	\$
		E	Wavele	ength (μm)	0.5	Y Top (pixe	els) 30	\$
			Pixel siz	e (µm)	3.8	Noise (A	DU)= 22.1	3
			System	noise (pixels)	0.0	Mean (A Max (A	DU)= 21.5 DU)= 105.	0
			Telesco	pe offsets		1		
	75/100		RA offs	et (arcsec)	10 + 1	TE Gol	Object's n	ame
			DEC of	fset (arcsec)	10 -	S Gol	-	
		1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 - 1947 -	Guidin	g last correction		Tracking disat	oled !	
			Seeing					
				Seeing =	1.8 arcsec	R0= 57.6	mm	
mean=3.88 max=243.00 Min=0.00	X=928 Y=946 I=51 14.8	5 fps 50405		Control				
Acquisition parameters				Enable	SEEING com	putations	Discard se	eing resul
Star Box (pixels)	12 🔹 Keep brightest p	bixels for centroid comput	ation 🔽	0 to 100% (Me	an pixel value)			
Amount of frames for seeing computing	100 🔹		48 🗊	0.1.10004.4.1				
Signal to background noise ratio		Force AirMa	iss=1	0 to 100% (Ma	ximum pixet valu	iej į U pixels sal	urated	
Min distance other spot (pixels)	50 Stack incoming fram	nes (SNR improvement)		Allocated men	noru (Butes) · 9 ·	502 572		
Max distance from 1st meas. (pixels)	540 Amount of fr	ames to stack 5 🚊	-	I mostion mon				
280 x 960 Amount c	of frame : 75 / 100	Major Type: Video	- Sub Tvr	e: UnKnown	Format: Video	Info Y800 128	0X960, 8 bit	s

Fig. 19 Running Software

It is possible to adjust the size of the box (**Star Box** field), and this must be adjusted so that all the light of star is inside the square and not too large to border the star shape. This is an important figure, and if set too large can impact measurement by lowering seeing figures!

The amount of frames to be acquired to perform valid seeing measurement shall be set to 50 at least, even 100 to 500 can be selected. The frame rate of the camera is so fast nowadays, that this is not an issue anymore. If the number of frame is too low, measurements will exhibit a lot of noise.

Acquisition parameters			
Star Box (pixels)	32	1	Keep brightest pixels for centroid computation 🔽
			% to keep 🛛 20 🜩
Amount of frames for seeing computing	100	÷	Show used pixels for centroiding - SNB based -
Signal to background noise ratio	5	\$	Force AirMass=1
Min distance other spot (pixels)	50		Stack incoming frames (SNR improvement)
Max distance from 1st meas. (pixels)	540		Amount of frames to stack 5 🚊 -

Fig. 20 Main software setup for star image extraction and centroiding

Leave **signal to background noise ratio** to 5. The large red circle is defined by the 540 pixel radius in this documentation, tells, that nothing outside this circle will be searched as the second image of the star. So select a diameter to enclose the two images of the star. The **Min distance**, set that nothing will be seek inside as a second image of the star. Those figures are not paramount for the experiment and are just to avoid the software picks up spurious spots from cosmic ray impacting the sensor, for instance.



Fig. 21 Inclusion / exclusion areas

Another powerful feature, is to keep only the brightest pixels in the box, making centroiding more robust. Also the used pixel, that are above the Signal to background noise ratio" can be displayed.



Colored pixels are not unused pixels for centroiding.



Fig. 23 Displaying unused pixels

The seeing figure is computed at the star elevation, and then computed as if it was at zenith position according to the current star elevation and air-mass by the means of a mathematical formula.

The telescope tab shows list of stars sorted from highest elevation to lowest elevation.

If the telescope's mount is not an ASCOM compliant mount and/or this software not connected to it, the user MUST have to click on the star' list to tell the software which star is been used for the measurement, and thus compute the proper air mass and perform zenith correction.

Say, the telescope is aimed at GAMMA CAS, the user shall click on GAMMA CAS star name on the list:

Telescope status			Name	Alpha2000	Delta2000	Magnitude	Elevation (*)	Mer. Angle (H)
Telescope	e not connected	30	BSC4554	11h53m49.800s	+53°41'41.00"	2.44	35	4.3
Enable automid	o on abot model model	31	BSC5235	13h54m41.100s	+18°23'52.00"	2.68	34	2.3
	e on start measurments	32	BSC4301	11h03m43.700s	+61°45'03.00"	1.79	34	5.2
Current te	elescope position	33	BSC8650	22h43m00.100s	+30°13'17.00"	2.94	33	-6.5
RA (2000)	????	34	Gamma Cass	00h56m42.500s	+60*43'00.00"	2.47	32	-8.7
DEC (2000)	2222	35	Alpha Cas	00h40m30.500s	+56*32'14.00"	2.23	31	-8.4
020(2000)		36	BSC6175	16h37m09.500s	-10°34'02.00"	2.56	31	-0.4
Currently selected sta	ar for seeing computation	37	BSC4295	11h01m50.500s	+56*22'57.00"	2.37	30	5.2
1997 - 1997 - 1997		38	BSC8308	21h44m11.200s	+09*52'30.00"	2.39	30	-5.5
RA 00 h	56 m 42.500 s 🎤	39	Delta Cass	01h25m49.000s	+60*14'07.00"	2.68	29	-9.2
DEC 60 *	43 ' 00.000 " IZ N	40	BSC8775	23h03m46.500s	+28*04'58.00"	2.42	28	-6.8
100	140 100.000 12 14	41	BSC6378	17h10m22.700s	-15°43'29.00"	2.43	28	-0.9
Calibrate scope position with this star Updated when measurments are active		42	BSC5685	15h17m00.400s	-09*22'59.00"	2.61	24	1.0
		43	BSC7264	19h09m45.800s	-21*01'25.00"	2.89	21	-2.9
		44	BSC8232	21h31m33.500s	-05°34'16.00"	2.91	20	-5.3
🔰 Object status 📋	Object going up !	45	BSC5984	16h05m26.200s	-19°48'20.00"	2.62	20	0.2
Airmass	1.86829 (32.251*)	46	BSC8781	23h04m45.700s	+15*12'19.00"	2.49	20	-6.8
UTC time :	18/05/2015 01:57:35	47	BSC4932	13h02m10.600s	+10*57'33.00"	2.83	19	3.2
		48	BSC8414	22h05m47.000s	-00*19'11.00"	2.96	19	-5.9
		49	BSC6913	18h27m58.200s	-25°25'18.00"	2.81	19	-2.2
10 D - 2		50	Alpha And	00h08m23.300s	+29*05'26.00"	2.06	18	-7.9
ographical location-		151	10007101	10655m15 000	00*17'40 00"	202	17	27
Place MyPlac	e in the second s	Uncl	ick or on slew to ti	he object, the star is shi	owed by PRISM :	software on si	(ymap	
				Telesci	ope guiding / trac	king status		
Latitude 45	[32] [0] [☑] North							
Longitude 4	* 21 ' 0 "🔽 East							
Flavorian P	200							
Elevation .	300							
Country	MyCountry							

Fig. 24

The correct air mass will be computed accordingly to the star used for measurement. Warning, selecting a new star will delete all previous measurements from the result plot.

Otherwise, the user can check the "Force AirMass=1" and the software will not do this air mass correction, but awareness has to be about this feature!



Fig. 25

After a while, measurement curve builds up, and data can be saved into a text file, or plot can be pasted ...



Fig. 26

After some hours, actual seeing fluctuation can be seen.



Fig. 27 Resulting seeing plot

The plot can be moved by right click and pan, can be zoomed and un-zoomed by selecting part of it with mouse right and left buttons.

3 Advanced operation with telescope controls using ASCOM

This is a very convenient feature, so we recommend to use an ASCOM compliant mount to operate the seeing monitor software with.

This will allow this software to interact with your telescope mount, for slewing toward stars to be used for seeing measurement, and perform autoguiding, avoiding the pair of star image to escape from the field, and causing measurement to halt.

Please check out here for more information about ASCOM : <u>http://ascom-standards.org/</u>

Your mount must be ASCOM capable and the ASCOM platform be installed as well as the mount ASCOM driver.

First setup ASCOM to your mount model

ile Camera	Telescope (Via ASCOM)	Telescope (Via ASCOM)							
Camera Telesc	Setup								
	Connect Calibrate guiding Enable guiding								

Fig. 28

In this sample the ASCOM mount system is MCMT II, but can be Astrophysics, ASA, Paramount, 10micron ... mount. Select "**Properties**", set the right parameters for your mount and close this window.

ASCOM Telescope Chooser	×
Trace	
Select the type of telescope you Properties button to configure	i have, then be sure to click the the driver for your telescope.
ASCOM MCMTII	Properties
Click the logo to lea	rn more OK
ASCOM astronomy software.	peration of Cancel

Fig. 29

Then do "Connect"



The telescope status group box changes to "Tracking"

Telescope status							
	Т	ackin	g				
Enable au	toguide	e on sta	irt measurn	nents			
Cu	rrent te	lescope	e position				
RA (2000)		2	0h41m25s	:			
DEC (2000)		-	+45°16'50"				
RA 00 DEC 60 Calibrate sc		56 m 43 '	42.500 00.000	s " 🔽 N is star			
Updated	l when	measu	rments are	active			
Object sta	tus	ОЫ	ect goin	g up !			
Airmass			Object se	ŧ!			
LITC time :		18/0	05/2015 02	2:13:31			

Fig. 31

Now, by clicking the star list, the telescope can slew to the star that has been selected. Warning, this is up to the user to take care of mount alignment and mount slewing performance to have the image of the two star inside the field of the camera. Either use an electronic camera finder, as explained above, or an eye finder to correct mount position to get the star you plan to measure.

	Name	Alpha2000	Delta2000	Magnitude	Elevation (*)	Mer. Angle (H)	
1	Vega	18h36m56.300s	+38*47'01.00"	0.03	83	-0.2	
2	BSC7528	19h44m58.500s	+45°07'51.00"	2.87	80	-1.4	
3	BSC6705	17h56m36.400s	+51°29'20.00"	2.23	79	0.5	
4	BSC6536	17h30m26.000s	+52°18'05.00"	2.79	75	0.9	
5	BSC7796	20h22m13.700s	+40°15'24.00"	2.2	72	-2.0	
6	Deneb	20h41m25.900s	+45°16'49.00"	1.25	70	-2.3	
7	BSC7949	20h46m12.700s	+33°58'13.00"	2.46	65	-2.4	
3	BSC6132	16h23m59.500s	+61*30'51.00"	2.74	64	2.0	
9	BSC8162	21h18m34.800s	+62*35'08.00"	2.44	63	-2.9	
0	BSC6212	16h41m17.200s	+31*36'11.00"	2.81	62	1.7	
11	BSC7235	19h05m24.600s	+13°51'48.00"	2.99	58	-0.7	
12	BSC6556	17h34m56.100s	+12*33'36.00"	2.08	53	0.8	
3	BSC7525	19h46m15.600s	+10°36'48.00"	2.72	53	-1.4	
4	BSC6148	16h30m13.200s	+21*29'23.00"	2.77	53	1.9	
5	BSC5563	14h50m42.300s	+74*09'20.00"	2.08	52	3.6	
6	Altair	19h50m47.000s	+08°52'06.00"	0.77	51	-1.4	
7	BSC5958	15h59m30.200s	+25°55'13.00"	2	51	2.4	
18	BSC5793	15h34m41.300s	+26°42'53.00"	2.23	47	2.8	
9	BSC6603	17h43m28.400s	+04*34'02.00"	2.77	47	0.7	
20	Alpha Umi	02h31m48.700s	+89°15'51.00"	2.02	45	-8.1	
21	BSC8650	22h43m00.100s	+30°13'17.00"	2.94	43	-4.3	
57	Poto Com	00609-10 700-	. Ea•00'Ea 00"	2.27	40	RO	

Fig. 32

A message is displayed to warn the user that the telescope will slew to this location.

This star has been selected : Deneb RA= 20h41m25.900s DEC= +45°16'49.00", do you want the telescope to slew towards this star, if NO, this object will become the default object ?

Fig. 33

To be able to perform guiding, the user needs to select "Calibrate Guiding"



Fig. 34

A warning message is displayed, remove the two holes mask, or hide one hole.

Confirmer



Then ONLY one image of the star shall be visible to perform guiding calibration



Fig. 36 Single image of a star required for calibration

Then enter calibration parameters, adjust time in seconds so that star moves by 200 to 500 pixel without exiting the image frame. ASCOM mount must support PULSEGUIDE capability. Check your mount user manual.



Fig. 37

Calibration takes place, and the star moves following a square or polygon shape.



Fig. 38 Guiding Calibration sequence

Once completed a message pops up.

If successful the guiding can start by just checking this menu item.

Seeing moni	tor a	nalyser - v2.30 - May, 17	th 2015 Direct	Show Version	[7161-9473-4387	1	
File Camera	Tele	escope (Via ASCOM)					
Camera Telesc		Setup Connect Calibrate guiding Enable guiding					
				٠			

Fig. 39

During the measurement, a green indicator is displayed, the circle be the reference position and the line be the guiding error vector to be compensated.



Fig. 40 Guiding while measuring seeing

If coming back to the telescope's tab, the status changes to "Guiding" and some guiding information is provided below the star list.

Tele	scone status		Name	Alpha2000	Delta2000	Magnitude	Elevation (*)	Mer, Angle (H		
Guiding		1	Vega	18h36m56.300s	+38*47'01.00"	0.03	83	-0.2		
	diding	2	BSC6705	17b56m36.400s	+51*29'20.00"	2.23	81	0.5		
 Enable autoguide 	e on start measurments	3	BSC7528	19h44m58.500s	+45°07'51.00"	2.87	78	-1.4		
Current te	elescope position	4	BSC6536	17h30m26.000s	+52°18'05.00"	2.79	77	0.9		
BA (2000)	20b/1m55s	5	BSC7796	20h22m13.700s	+40°15'24.00"	2.2	70	-2.0		
	20114111335	6	Deneb	20h41m25.900s	+45°16'49.00"	1.25	68	-2.3		
DEC (2000)	+45"18'37"	7	BSC6132	16h23m59.500s	+61*30'51.00"	2.74	65	2.0		
month colocial sta	r for ecoing computation	8	BSC6212	16h41m17.200s	+31*36'11.00"	2.81	64	1.7		
anentiy selected sta	intor seeing computation	9	BSC7949	20h46m12.700s	+33°58'13.00"	2.46	63	-2.4		
BA 18 h	36 m 56.300 s	10	BSC8162	21h18m34.800s	+62°35'08.00"	2.44	61	-2.9		
		11	BSC7235	19h05m24.600s	+13°51'48.00"	2.99	58	-0.7		
DEC [30	[47 [01.000]♥ N	12	BSC6148	16h30m13.200s	+21°29'23.00"	2.77	55	1.9		
Calibrate scope position with this star		13	BSC6556	17h34m56.100s	+12*33'36.00"	2.08	55	0.8		
		14	BSC5958	15h59m30.200s	+25°55'13.00"	2	53	2.4		
		15	BSC5563	14h50m42.300s	+74*09'20.00"	2.08	52	3.6		
Object status	Object going up !	16	BSC7525	19h46m15.600s	+10*36'48.00"	2.72	52	-1.4		
Airmass	1.07690 (68.188°)	17	Altair	19h50m47.000s	+08*52'06.00"	0.77	50	-1.4		
UTC time :	18/05/2015 02:37:41	18	BSC5793	15h34m41.300s	+26°42'53.00"	2.23	49	2.8		
1010		19	BSC6603	17h43m28.400s	+04*34'02.00"	2.77	47	0.7		
		20	Alpha Umi	02h31m48.700s	+89°15'51.00"	2.02	45	-8.1		
		21	BSC5191	13h47m32.400s	+49*18'48.00"	1.86	43	4.6		
graphical location		- 100	DOCEORA	12h22m55 500a	·E4*55'21.00"	2.07	10	5.0		
Place MyPlac	e	Oncl	ick or on slew to t	he object, the star is sh	owed by PRISM s	oftware on sl	kymap			
Lastrata Den 1		T <mark>elescope guiding / tracking status</mark>								
Latitude 45	32 U V North									
Longitude 4	21 0 "₩ East	18/0	5/2015 04:37:33.	470 : mack bisc=12.10 477 : rcosdelt=1.00 RA	r=-939ms DECr=-	13 DEC- 01113 339ms				
Elevation 6	200	18/0	18/05/2015 04:37:33.477 :DRA=12.15p [0] DDEC= 1p [1]							
Lievation 3		18/0	5/2015 04:37:40. 5/2015 04:27:40	217 : Track Dist.=12.06 219 : recordel#=1.00 BA	5 pixels RA=-464m	ns DEC= Oms 220mo				
Country	dyCountry	18/0	572015 04.37:40. 572015 04.37:40	210.1003060=1.00 BA 210.000A_12.055.0010		520115				

Fig. 41 Guiding information

4 Troubleshooting

This will provide some hints about trouble shooting the system in case of failure to get seeing measurements.

Issue	There is a very significant signal level difference between the star and the prism deflected star image.
Cause	This can be due by using a prism that has no anti-reflection coating or dew can form into the prism's surface
Remedies	ALCOR-SYSTEM sells tunable prism set that has anti reflection coating or use an air dryer to remove dew
Issue	No seeing figure can be computed, the red and yellow square cannot be seen around the two images of the star.
Cause	Signal level is too low, or star shape is too distorted or fuzzy
Remedies	Increase exposure time and gain

	or
	perform a better focus, or be sure about the prism optical quality
	or
	check that not dawn or dusk is preventing from seeing stars

Issue	Measurement halts, and the two images of stars disappear after a while
Cause	Mount polar alignment is poor, or sidereal speed rate are
Remedies	Improve mount polar alignment, or perform tracking with an ASOM compliant mount or check sidereal speed rate

Issue	Seeing figures are incredibly low and unexpected (less than 1 arcsec !)
Cause	Exposure time too long, or Star box size set to high
	Acquisition parameters Star Box (pixels) Amount of frames for seeing computing Signal to background noise ratio Signal to background noise ratio 5 Min distance other spot (pixels) Max distance from 1st meas. (pixels) 540
Remedies	Reduce exposure time, seek for another star that will be brighter or decrease Star box size or enable this feature Keep brightest pixels for centroid computation % to keep 50 Show used pixels for centroiding - SNR based - Force AirMass=1 Stack incoming frames (SNR improvement)

5 Product terms of use

The use of this product is solely for monitoring the current sky turbulence levels, night and day, entertaining, educational or scientific purposes.

Use of this product involving people's lives is the responsibility of the user and in no way ALCOR SYSTEM will be held liable for injuries to persons or property theft as the use of this software and hardware described in this manual.

---000----