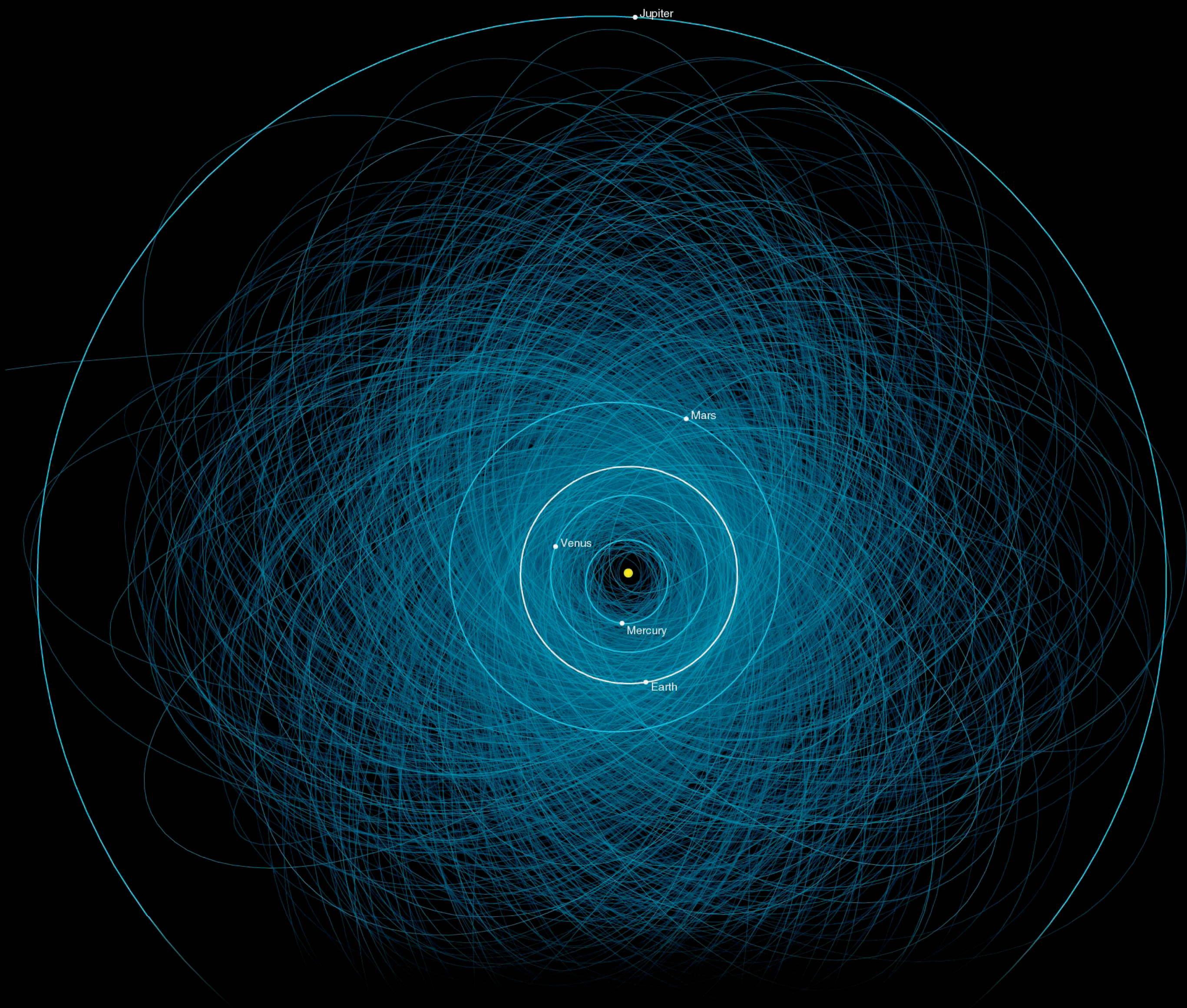
Journal for Occultation Astronomy

2013–03

FORMERLY OCCULTATION NEWSLETTER



Orbits of Potentially Hazardous Asteroids

Are asteroids dangerous? Some are, but the likelihood of a dangerous asteroid striking the Earth during any given year is low. Because some past mass extinction events have been linked to asteroid impacts, however, humanity has made it a priority to find and catalog those asteroids that may one day affect life on Earth. Pictured above are the orbits of the over 1,000 known Potentially Hazardous Asteroids (PHAs). These documented tumbling boulders of rock and ice are over 140 meters across and will pass within 7.5 million kilometers of Earth – about 20 times the distance to the Moon. Although none of them will strike the Earth in the next 100 years – not all PHAs have been discovered, and past 100 years, many orbits become hard to predict. Were an asteroid of this size to impact the Earth, it could raise dangerous tsunamis, for example. Of course rocks and ice bits of much smaller size strike the Earth every day, usually pose no danger, and sometimes creating memorable fireball and meteor displays.   Image Credit: NASA, JPL-Caltech

Journal for
Occultation Astronomy

Dear reader,

some weeks ago there had been a mail-discussion concerning „What to do with my astronomical stuff before I am dead and gone?".

Indeed this seems to be a problem – but it is not!

For more than 50 years I have collected all issues of Sky & Telescope and changed now to the digital version. But what to do with my 600 issues?

I decided to sell them and within a short time an amateur bought it all.

Why selling? Someone who pays for something should need and work with it.

So in case and whatever reason you want to leave your astronomical papers, books and instruments just advertise it first to the officials of your society, second to its members and third astronomical related persons and institutions.

By sure you will succeed in the end in finding the desired person.

Hans-Joachim Bode
Editor in chief

JOA 2013-3 · $ 5.00 · $ 6.25 OTHER · (ISSN 0737-6766)

In this issue:

Writing articles for JOA:

The rules below should be regarded while writing an article; using them will greatly facilitate the production and layout of ON!

If your article does not conform to these rules, please correct it.

There are 3 different possibilities for submitting articles:

- pdf-articles (must be editable – these can be converted)
- unformatted Word *.doc-files containing pictures/graphs or their names (marked red: <figure_01>) at the desired position(s)
- *.txt-files must contain at the desired position the name of each graph/picture

The simplest way to write an article is just use Word as usual and after you have finished writing it, delete all your format-commands by selecting within the push-down-list "STYLE" (in general it's to the left of FONT & FONTSIZE) the command "CLEAR FORMATTING". After having done this you can insert your pictures/graphs or mark the positions of them (marked red: <figure_01>) within the text.

txt-files: Details, that should be regarded

- Format-commands are forbidden
- In case of pictures, mark them within the text like <picture001> where they should be positioned

Name of the author should be written in the 2nd line of the article, right after the title of the article; a contact e-mail address (even if just of the national coordinator) should be given after the author's name.

IMPORTANT:Use only the end-of-line command (press ENTER) if it's really necessary (new paragraph, etc.) and not when you see it's the end of the line!

Sending articles to JOA:

Each country / state has a coordinator who will translate your article to English – if necessary.

In case there is no one (new country) please send a mail to the editorial staff at: **info@occultations.info**

Africa:	NN	
America:	David Dunham	dunham@starpower.net
Australia / NZ	Graham Blow	Graham.Blow@actrix.gen.nz
Europe:	Wolfgang Beisker	wbeisker@iota-es.de
England:	Alex Pratt	alexander.pratt@btinternet.com
Finland:	Matti Suhonen	suhonen@ursa.fi
Germany:	Wolfgang Beisker	wbeisker@iota-es.de
Greece:	Vagelis Tsamis	vtsamis@aegean.gr
Iran:	Atila Poro	iotamiddleeast@yahoo.com
Italy:	C. Sigismondi	costantino.sigismondi@gmail.com
Japan:	Mitsuru Soma	mitsuru.soma@gmail.com
Netherland:	Harrie Rutten	h.g.j.rutten@home.nl
Poland:	NN	
Spain:	Carles Schnabel	cschnabel@foradorbita.com

Journal for Occultation Astronomy

Video exposure time analysis from recordings with video time insertion

Gerhard Dangl, Austria · g.dangl@

My special thanks to

- **David Dunham** from Maryland in USA for providing a PC164C-EX2 camera. So I could make many tests and comparison measurements.
- **Dave Gault** from Hawkesbury Heights, NSW in Australia for sending me a IOTA-VTI Demo3 video time inserter device.
- **Helmut Denzau** from Panker in Germany. The first EXTA measurements on his Mintron 12V1C-EX camera, made during ESOP 2011 in Berlin-Archenhold observatory, showed me the basics about the internal exposure control of this analog video camera.
- **Olivier Thizy** from Revel in France for providing a brand new WAT-910HX/RC video camera for many measurements and comparison with previous WAT-120N.
- **Stefano Sposetti** from Gnosca in Swiss for test recordings in 2010 with his WAT-120N+. His measurements confirmed that a WAT-120N and the newer WAT-120N+ camera are working identical in the same modes.
- **Terrence Redding** from West Palm Beach in USA for providing two new integrating cameras. His PC165DNR and SCB2000N cameras could be tested and compared in many recordings.
- **Tony George** from Pasco in USA, for providing a complete Canon ZR65 NTSC camcorder setup. So I could make DV recordings with several cameras and compare the recordings with DV compression with uncompressed video grabber direct harddisc recordings.
- **Wolfgang Rothe** from Berlin in Germany for providing his Mintron 12V1C-EX video camera in summer 2012. So I could make all the exposure timing measurements with EXTA.

Without providing all this equipment, many of the measurement and test results presented on this page and on some other pages would not have been possible.

- G. Dangl, June 2013

Some terms used in this page

UTC ...... Universal Time Coordinated

GPS ...... Global Positioning System

VTI .... Video Time InserterPAL ... Video colour standard using 50 fields or 25 frames per second (Phase Alternating Line)

NTSC .... Video colour standard using 59.94 fields or 29.97 frames per second (National Television Systems Committee)

CCIR ..... Monochrom (B/W) version of PAL (Consultative Committee for International Radio)

EIA........ Monochrom (B/W) version of NTSC (Electronic Industries Association)

field ...... two interlaced video fields, odd and even, form a complete video image also named as video frame

Odd ...... first interlaced video field with odd numbered lines of a video frame counted from top as 1, 3, 5, ...

Even ..... second interlaced video field with even numbered lines of a video frame counted from top as 2, 4, 6, ...

frame .... complete video image consisting of two interlaced Odd and Even video fields

Preamble

This page was primarily made for help in exposure time analysis of astronomy video records. To get results as accurate as possible we have to know about the relationship between the real exposure time in the camera and the time inserted in the analog camera output signal by the VTI device.

Video exposure, time insertion, digitizing and recording

Typical methodes for video recording with time insertion

Video Time Inserter – VTI time stamping

Example of a short star occultation with camera exposure, signal output and the VTI time stamping

The problem of combining wrong fields to frames

How to determine in which combine sequence the used video system works

The use of field delay for field combine correction

It is recommended to read all the points listed above in chronically order before the useage of any camera specific exposure and timing information below.

Journal for Occultation Astronomy

Timing details and diagrams for video cameras

The video cameras listed below, have been measured until now with my special EXposure Time Analyzer device EXTA. And some of them also with my special Digital Artifical Star COntrol device DASCO.

All the camera specific diagrams and time values on this page for video time evaluation are usable if the VTI device works as shown in the diagrams 2 or 3 below and if the video can be analyzed in a field to frame combining sequence A as shown in the diagram 4 below.

Video camera type	Integration function
WAT-120N	Yes
WAT-120N+	Yes
WAT-910HX	Yes
Mintron 12V1C-EX	Yes
PC165DNR	Yes
SCB-2000N	Yes
WAT-902H2 Ultimate	No
SuperCircuits PC164CEX-2	No
Modul SK-1004XC/SO	No

Typical methodes for video recording with time insertion

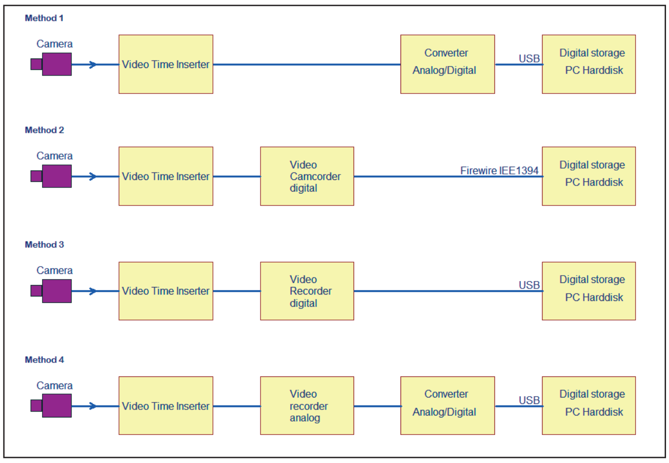


Diagram 1

Video Time Inserters (VTI) using GPS time are working very accurate and are able to time stamp every single video field of the analog video signal with an individual UTC time in a tolerance range of +/- 1 millisecond. The VTI device stamps a current video field on camera output with the times of the two previous video Vsync pulses (see diagram 2 for some well known VTI devices below). A VTI device only inserts time stamps in the current video field signal but never will add a delay to the video signal. So the signal is always passing through the VTI without any noteworthy delay action.

The diagram 2 above shows that all three VTI devices are time stamping the video fields of the camera output signal in a right way. The KIWI-OSD is inserting two times. One for the exposure start and one for the end of every video field. The Sven Anderson device inserts one time stamp for the exposure end of every video field. And in a similar way the IOTA VTI inserts one time stamp for the exposure end of every video field.

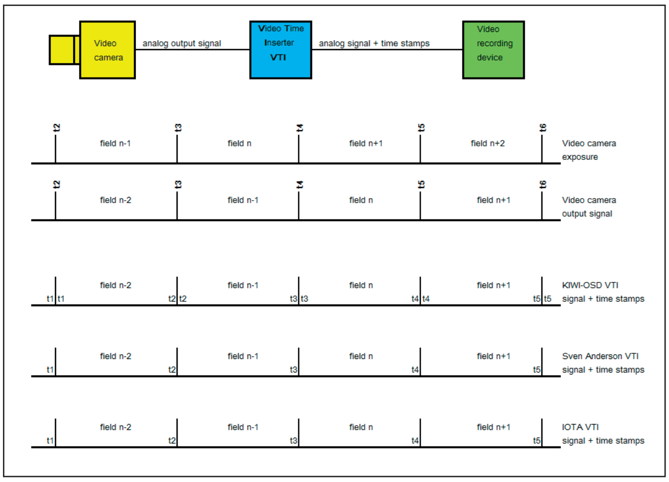


Diagram 2

Example of a short star occultation with camera exposure, signal output and the VTI time stamping

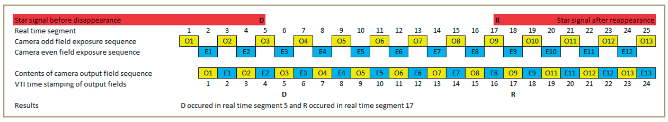


Diagram 3

The example in diagram 3 shows the typical exposure and signal output of a non integrating analog video camera. Immediately after the exposure end every odd or even video field signal will be transmitted at the camera output. The video field will be time stamped in the VTI with the times of the previous field. So the inserted time represents the real exposure time in the camera. I think beside the three well known Video Time Inserter mentioned above many other VTI devices are time stamping in the same way, but may be not all. So before you use the tables of this page the time stamping behaviour of the used VTI device must be well known.

One pair of an odd and an even video field are interlaced to a full video frame. If the wrong pair of fields are interlaced to a full frame the image quality will be worsen. And if this happens in a signal of an integrating video camera different integration times will be represented by the consecutive video frames. This makes the video evaluation and time analysis more difficult and inaccurate.

The problem of combining wrong fields to frames

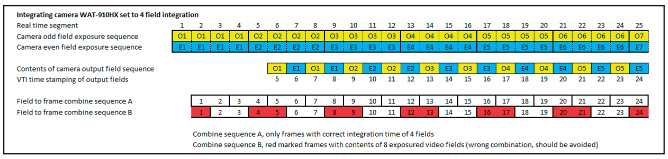


Diagram 4

The problem of wrong fields combined to frames is shown in diagram 4 and can occur in the recording or digitizing process. Possible reasons are the involved camera, recording hardware or the software driver. In short, all parts of the used video system. To avoid inaccurate video time evaluation the field combining behaviour of the used system should be known. While the combine error does not really affect the time evaluation of non integrated videos it can worse the time accuracy of integrated videos. With a video software like free VirtualDub the field combine behaviour of a video recording system can be determined. And with VirtualDub it can be also corrected for the video time evaluation later. This can be easy done with the use of the filter "field delay". So I would suggest to use VirtualDub for field combine correction later if needed. If a software like Limovie or Tangra is used to analyze the video file a new video file with corrected field order should be created and stored with VirtualDub.

How to determine in which combine sequence the used video system works

Here are the steps for the simple setup and test recording:

1.) Set an integrating camera to exposure over four fields or two frames. There is no need of a lens or a telescope mounted. The camera can be used on a desk with CCD front covered. But if the video image is too dark without any noise visible the cover should be opened a little bit to get some noise visible in the video.

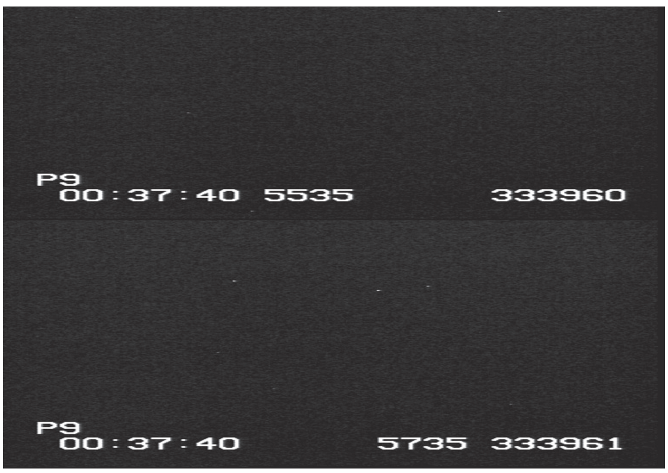
2.) A VTI should be placed in the video output signal line as for a normal event recording. But there is no need for a GPS fix. It is only important to see the VTI field counter running and the numbers inserted in the recorded video fields.

3.) The software used for recording should be VirtualDub or an other video software with some similar features. The individual two fields of every video frame must be visible later. With VirtualDub it is possible to step frame per frame through the video and showing both fields of every frame separated but at once on a PC display. And with the use of VirtualDub it is possible to change the wrong field combine order B to the right field combine order A later if neccessary. Therefor only a special field delay filter has to be activated in VirtualDub.

4.) A short test recording of about 100 video frames should be long enough.

5.) The recorded test video must be opened again with VirtualDub. The video filter "ViewFields" has to be activated. Now it is possible to step through the video with left or right cursor buttons of the PC keypad and to see the individual fields of every frame like in diagram 5. The additional use of the filter for brightness and contrast can help to make the noise pattern better visible.

Diagram 5



CCIR video frame with both fields visible

If a noise pattern change is visible in every frame step but only in one of the two fields, the video grabber works wrong like in the sequence B in the diagram 4 above. But if a noise change is visible only every second frame step and in both fields simultaneously the video grabber works right like in the sequence A in diagram 4. Important note, this description fits only if the integrating camera surely worked in four fields or two frames integrating during recording.

The use of field delay for field combine correction

For a recording system which is producing videos like sequence B, a special field delay setting has to be done in VirtualDub for time evaluation. But you must not use any field delay if your system works right like sequence A!

The steps for a field delay setting (sequence B only).

1.) Open the video file in VirtualDub

2.) Menue Video => Filters => Add => field delay. Select BFF to TFF or TFF to BFF. Which setting is the right one can be checked later with both fields visible. So to turn this ViewFields feature on will be the next step.

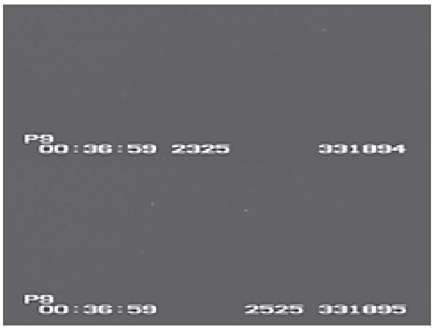
3.) Menue Video => Filters => Add => ViewFields. Now both video fields with the two field numbers of every frame are visble. If the field delay setting was right the two field numbers of a frame are consecutive without a gap between. For instance #331894 and #331895. But if the field delay setting was the wrong one, there is a gap now between the two field numbers of a frame. For instance #331896 and #331893.

4.) Write up and remember the right setting. It should be used for all videos recorded with the same video setup. But if there was a change of the camera, video digitizer, PC system or software, the digitizing sequence A or B should be determined again as described above. And in the case of working in wrong field combine sequence B the right field delay setting for correction should be determined also again.

Three demo videos showing the effects of different field combining

Video with wrong field combine sequence B. The reason for field delay corrections before time evaluation.

Video not yet corrected.



Video sequence B with right field delay correction. Consecutive field numbers. Looks like a right sequence A now.

Corrected with bottom field first to top field first (BFF to TFF)

Video sequence B with wrong field delay correction. Gap between field numbers. Must not be used.

Corrected with top field first to bottom field first (TFF to BFF)

Video camera WAT-120N and WAT-120N+

WAT-120N with 1.25″ Adapter and cable control box

If a WAT-120N+ camera works with shortened exposure times (High 2-6), the shortened exposure window will always be placed at the end of a video field. Because an event could have occurred or started in the unexposured part of a video field before the exposured part it may be appropriate to give correction and tolerance times in Modes High 2-6 to the same values as in Mode High 1.

Important notes:

All times used for video evaluation in step by step are assumed to be the mid time of a video field or a video frame. The only difference between working in field or frame step is that the given tolerance field is slightly different. So for this difference also two tolerance time columns are included in every correction table.

This integrating video camera has an internal delay.

Correction tables for selection:

Use the correction value from a table below to calculate the real event time from inserted video time. Moving throught the video in steps of fields or frames you can also select the right tolerance value.

Example

WAT-120N+ (CCIR) in Mode Slow 4 (Integrating 16 video fields or 8 video frames)

Event frame VTI start time:	22:05:17.654
Event frame VTI end time:	22:05:17.694
Event frame video mid time:	Vt = 22:05:17.674
Values from the table:	It = 0.320s, Ct = -0.190s, Tolerance = ±0.170s
Real event time to report:	Rt = Vt + Ct = 22:05:17.484 (±0.170s)

Video timing diagrams for all types of WAT-120N cameras

WAT-120N (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
Off	0.020	-0.040	-0.040	±0.010	±0.020
Frame 1	0.040	-0.050	-0.050	±0.020	±0.030
Frame 2	0.080	-0.070	-0.070	±0.040	±0.050
Frame 4	0.160	-0.110	-0.110	±0.080	±0.090
Frame 8	0.320	-0.190	-0.190	±0.160	±0.170
Frame 16	0.640	-0.350	-0.350	±0.320	±0.330
Frame 32	1.280	-0.670	-0.670	±0.640	±0.650
Frame 64	2.560	-1.310	-1.310	±1.280	±1.290
Frame 128	5.120	-2.590	-2.590	±2.560	±2.570
Frame 256	10.240	-5.150	-5.150	±5.120	±5.130

WAT-120N+ (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
High 5	0.001	-0.040	-0.040	±0.010	±0.020
High 4	0.002	-0.040	-0.040	±0.010	±0.020
High 3	0.004	-0.040	-0.040	±0.010	±0.020
High 2	0.008	-0.040	-0.040	±0.010	±0.020
High 1	0.020	-0.040	-0.040	±0.010	±0.020
Slow 1	0.040	-0.050	-0.050	±0.020	±0.030
Slow 2	0.080	-0.070	-0.070	±0.040	±0.050
Slow 3	0.160	-0.110	-0.110	±0.080	±0.090
Slow 4	0.320	-0.190	-0.190	±0.160	±0.170
Slow 5	0.640	-0.350	-0.350	±0.320	±0.330
Slow 6	1.280	-0.670	-0.670	±0.640	±0.650
Slow 7	2.560	-1.310	-1.310	±1.280	±1.290
Slow 8	5.120	-2.590	-2.590	±2.560	±2.570
Slow 9	10.240	-5.150	-5.150	±5.120	±5.130

WAT-120N (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
Off	0.017	-0.033	-0.033	±0.008	±0.017
Frame 1	0.033	-0.042	-0.042	±0.017	±0.025
Frame 2	0.067	-0.058	-0.058	±0.033	±0.042
Frame 4	0.134	-0.092	-0.092	±0.067	±0.075
Frame 8	0.267	-0.159	-0.159	±0.134	±0.142
Frame 16	0.534	-0.292	-0.292	±0.267	±0.275
Frame 32	1.068	-0.559	-0.559	±0.534	±0.542
Frame 64	2.136	-1.093	-1.093	±1.068	±1.076
Frame 128	4.271	-2.161	-2.161	±2.136	±2.144
Frame 256	8.542	-4.296	-4.296	±4.271	±4.279

WAT-120N+ (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
High 6	0.0005	-0.033	-0.033	±0.008	±0.017
High 5	0.001	-0.033	-0.033	±0.008	±0.017
High 4	0.002	-0.033	-0.033	±0.008	±0.017
High 3	0.004	-0.033	-0.033	±0.008	±0.017
High 2	0.008	-0.033	-0.033	±0.008	±0.017
High 1	0.017	-0.033	-0.033	±0.008	±0.017
Slow 1	0.033	-0.042	-0.042	±0.017	±0.025
Slow 2	0.067	-0.058	-0.058	±0.033	±0.042
Slow 3	0.134	-0.092	-0.092	±0.067	±0.075
Slow 4	0.267	-0.159	-0.159	±0.134	±0.142
Slow 5	0.534	-0.292	-0.292	±0.267	±0.275
Slow 6	1.068	-0.559	-0.559	±0.534	±0.542
Slow 7	2.136	-1.093	-1.093	±1.068	±1.076
Slow 8	4.271	-2.161	-2.161	±2.136	±2.144
Slow 9	8.542	-4.296	-4.296	±4.271	±4.279

Timing diagrams for all types of WAT-120N cameras

How to read the timing diagrams of the camera WAT-120N

For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.

Video camera WAT-910HX

WAT-910HX/RC with cable control box

This integrating video camera has an internal delay.

Correction tables for selection:

Use the correction value from a table below to calculate the real event time from inserted video time. Moving throught the video in steps of fields or frames you can also select the right tolerance value.

If a WAT-910HX camera works with shortened exposure times down to 10µs, the shortened exposure window will always be placed at the end of a video field. Because an event could have occurred or started in the unexposured part of a video field before the exposured part it may be appropriate to give correction and tolerance times for shortened exposure times to the same values as in normal video timing.

Important notes:

All times used for video evaluation in step by step are assumed to be the mid time of a video field or a video frame. It is important to use the right correction time and the right tolerance value working in field or in frame step evaluation.

Example

WAT-910HX (CCIR) in Mode X4 (Integrating 4 video fields or 2 video frames)

Event frame VTI start time:	22:48:59.569
Event frame VTI end time:	22:48:59.609
Event frame VTI mid time:	Vt = 22:48:59.589
Values from the table:	It = 0.080s, Ct = -0.060s,
	Tolerance = ±0.040s
Real event time to report:	Rt = Vt + Ct = 22:48:59.529 (±0.040s)

Video timing diagrams for all types of WAT-910HX cameras

WAT-910HX (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
1/50s	0.020	-0.020	-0.020	±0.010	±0.020
x2	0.040	-0.030	-0.040	±0.020	±0.020
x4	0.080	-0.050	-0.060	±0.040	±0.040
x8	0.160	-0.090	-0.100	±0.080	±0.080
x16	0.320	-0.170	-0.180	±0.160	±0.160
x32	0.640	-0.330	-0.340	±0.320	±0.320
x64	1.280	-0.650	-0.660	±0.640	±0.640
x128	2.560	-1.290	-1.300	±1.280	±1.280
x256	5.080	-2.550	-2.560	±2.540	±2.540

Note: In the mode x256 the WAT-910HX camera integrates only 254 fields or 127 frames

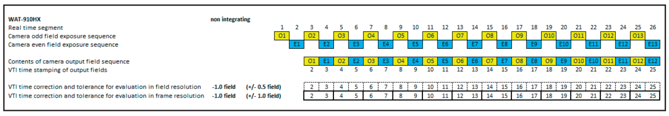
WAT-910HX (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
1/60s	0.017	-0.017	-0.017	±0.008	±0.017
x2	0.033	-0.025	-0.033	±0.017	±0.017
x4	0.067	-0.042	-0.050	±0.033	±0.033
x8	0.134	-0.075	-0.083	±0.067	±0.067
x16	0.267	-0.142	-0.150	±0.134	±0.134
x32	0.534	-0.275	-0.284	±0.267	±0.267
x64	1.068	-0.542	-0.551	±0.534	±0.534
x128	2.136	-1.076	-1.084	±1.068	±1.068
x256	4.238	-2.127	-2.135	±2.119	±2.119

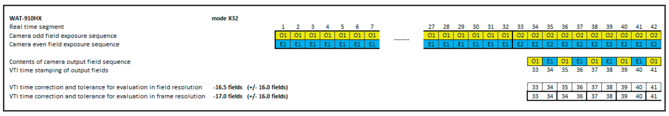
Note: In the mode x256 the WAT-910HX camera integrates only 254 fields or 127 frames

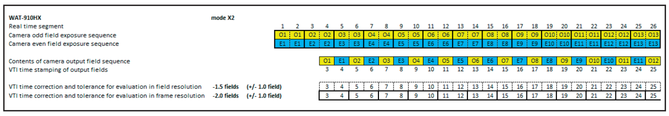
Timing diagrams for all types of WAT-910HX cameras

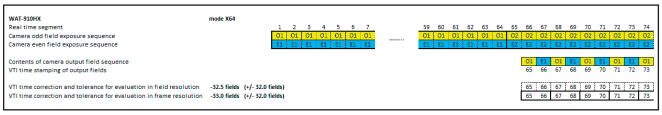
How to read the timing diagrams of the camera WAT-910HX

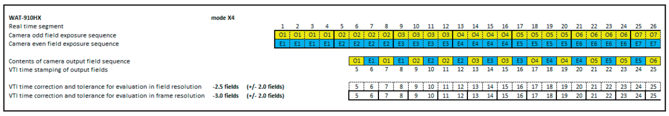
For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.

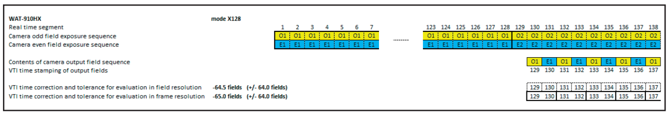


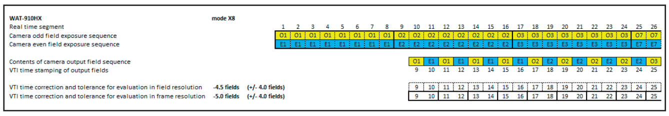


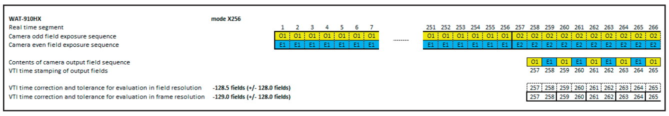


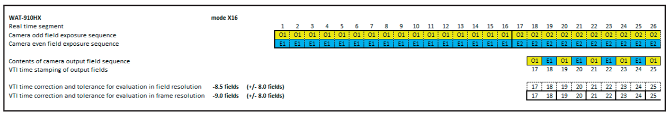












Video camera MINTRON 12V1C-EX

The measured integrating analog CCIR video camera MINTRON 12V1C-EX

In my measurements with the **EXTA** this integrating video camera Mintron 12V1C-EX showed a quite different behaviour in comparison to the integrating video camera WAT-120N.

There is no internal additional delay between exposure end and output start like in the WAT-120N.

In all integration modes the odd and even field storages are exposured simultaneously. So all the odd and even field contents in the output signal are equal within one integration sequence.

The integration time chosen by the user in the camera OSD menue setting point "SENSE UP" is used only as a maximum value by the internal camera electronics. This camera always works in automatic mode and so makes it's own decision about the real length of an integration sequence. The real integration sequence and the real exposure length used by the camera is dependent of the recorded image brightness.

The real used integration sequence length is varied in steps of 2*n fields or n frames. But within one integration sequence the real exposure time can be additional shortened up to nearly 2 fields or one frame. In this case the real exposure has a delayed start within the integration sequence. The raw tuning of the exposure time is done in frame steps and the fine tuning is done with a delayed start (

The change of the real integration sequence length or of the real exposure duration after a setting change or an image brightness change can be very slow and so can last up to minutes until it is in a stable state.

The output of an integrated sequence always starts immediately after the end of this sequence with the next video field. There is no internal additional delay between integration sequence end and output sequence start like in a WAT-120N camera.

On dark night sky recordings with only stars in the image the camera mostly will use the maximum length from OSD menue setting for exposure. But with bright objects like a moon terminator, a planet disk or a filtered sun disk in the image, the real used exposure time could be shorter than chosen in the OSD menue setting.

Evaluation of a Mintron video recording

1.) If no integration mode was used (SENSE UP = OFF) simple report the mid time of the frame or the field where the event is visible.

2.) In all integration modes from X2 up to X128 determine the real number of recorded frames in the integration sequence during the event time. For this, one has to step through the video in single frame steps. Never trust the OSD menue „SENSE UP" setting value without a frame check of the finally recorded video.

3.) The video frame where an event is visible first is also the first frame of a new integration sequence output.

Example

MINTRON 12V1C-EX (CCIR) in Mode X4 (Integrating 4 video fields or 2 video frames)

Event frame VTI start time:	23:56:29.593
Event frame VTI end time:	23:56:29.633
Event frame VTI mid time:	Vt = 23:56:29.613
Values from the table:	It = 0.080s, Ct = -0.040s, Tolerance = ±0.040s
Real event time to report:	Rt = Vt + Ct = 23:56:29.573 (±0.040s)

Video timing diagrams for all types of MINTRON 12V1C-EX cameras

Mintron 12V1C-EX (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
OFF	0.020	0	0	±0.010	±0.020
x2	0.040	-0.010	-0.020	±0.020	±0.020
x4	0.080	-0.030	-0.040	±0.040	±0.040
x6 ***	0.120	-0.050	-0.060	±0.060	±0.060
x8	0.160	-0.070	-0.080	±0.080	±0.080
x12 ***	0.200	-0.090	-0.100	±0.100	±0.100
x16 ***	0.320	-0.150	-0.160	±0.160	±0.160
x24 ***	0.480	-0.230	-0.240	±0.240	±0.240
x32	0.640	-0.310	-0.320	±0.320	±0.320
x48 ***	0.960	-0.470	-0.480	±0.480	±0.480
x64	1.280	-0.630	-0.640	±0.640	±0.640
x96 ***	1.880	-0.930	-0.940	±0.940	±0.940
x128	2.560	-1.270	-1.280	±1.280	±1.280

*** This red marked modes should not be used for astronomical recordings with the purpose for time or magnitude measurements. Integration time and exposure time can be different from the nominal values shown in the tables. See the timing diagrams for the details.

Mintron 12V1C-EX (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
OFF	0.017	0	0	±0.008	±0.017
x2	0.033	-0.008	-0.017	±0.017	±0.017
x4	0.067	-0.025	-0.033	±0.033	±0.033
x6 ***	0.100	-0.042	-0.050	±0.050	±0.050
x8	0.134	-0.058	-0.067	±0.067	±0.067
x12 ***	0.167	-0.075	-0.083	±0.083	±0.083
x16 ***	0.267	-0.125	-0.134	±0.134	±0.134
x24 ***	0.400	-0.192	-0.200	±0.200	±0.200
x32	0.534	-0.259	-0.267	±0.267	±0.267
x48 ***	0.801	-0.392	-0.400	±0.400	±0.400
x64	1.068	-0.526	-0.534	±0.534	±0.534
x96 ***	1.568	-0.776	-0.784	±0.784	±0.784
x128	2.135	-1.059	-1.068	±1.068	±1.068

*** This red marked modes should not be used for astronomical recordings with the purpose for time or magnitude measurements. Integration time and exposure time can be different from the nominal values shown in the tables. See the timing diagrams for the details.

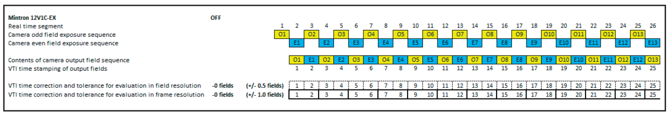
Journal for Occultation Astronomy

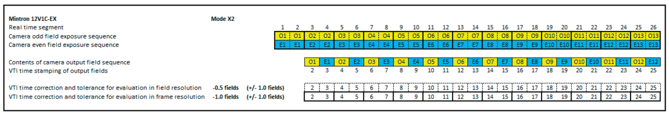
Timing diagrams for all types of the MINTRON 12V1C-EX

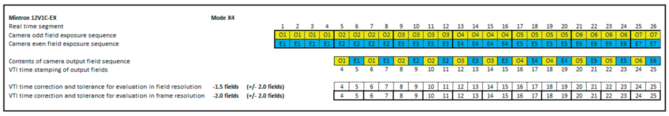
How to read the timing diagrams of the camera MINTRON 12V1C-EX

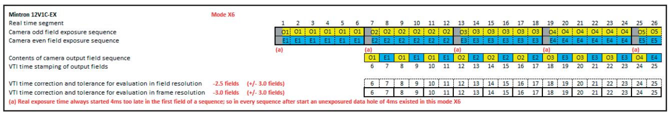
Although image contents were very dark, in some integration modes a strange timing behaviour was detected. In this modes the camera worked with reduced frame numbers or unexposured time holes in the sequences. The comments in the diagrams about this measured variations are in red. Exposure hole values in ms are determined from a CCIR camera measurement. If there is a choice, this red commented modes x6, x12, x16, x24, x48 and x96 should not be used for astronomical recordings with time or magnitude measurements.

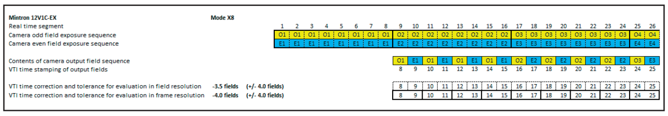
For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.

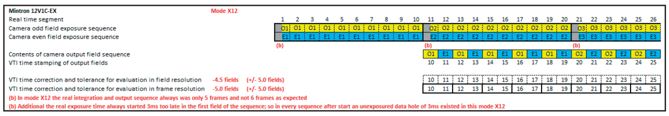


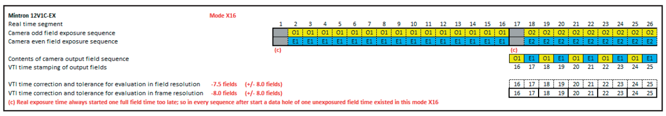


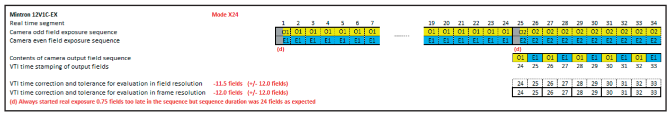


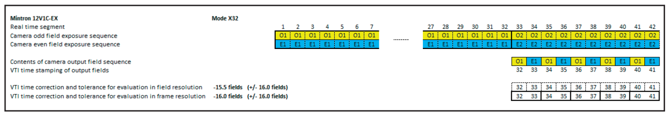


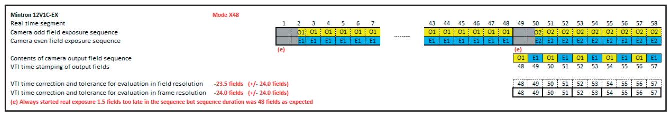


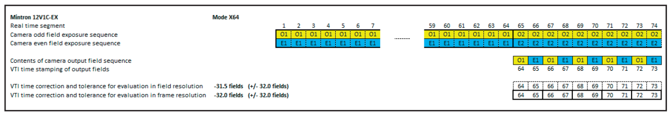


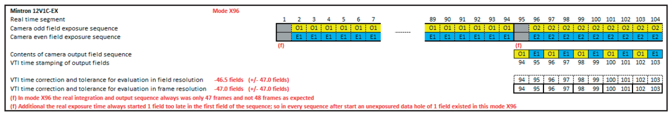


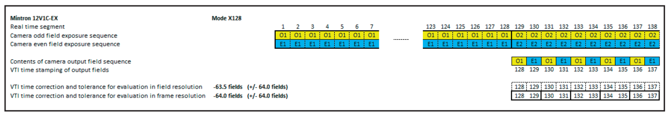












Journal for Occultation Astronomy

Video camera PC165DNR EIA

This integrating video camera has an internal delay.

Correction tables for selection:

Use the correction value from a table below to calculate the real event time from inserted video time. Moving throught the video in steps of fields or frames you can also select the right tolerance value.

If a PC165DNR camera works with shortened exposure times down to 10µs, the shortened exposure window will always be placed at the end of a video field. Because an event could have occurred or started in the unexposured part of a video field before the exposured part it may be appropriate to give correction and tolerance times for shortened exposure times to the same values as in normal video timing.

Important notes:

All times used for video evaluation in step by step are assumed to be the mid time of a video field or a video frame. It is important to use the right correction time and the right tolerance value working in field or in frame step evaluation.

Example

PC165DNR (EIA) in Mode X8 (Integrating 8 video fields or 4 video frames)

Event frame VTI start time: 23:48:46.737
Event frame VTI end time: 22:48:46.770
Event frame VTI mid time: Vt = 22:48:46.753
Values from the table: It = 0.134s, Ct = -0.083s, Tolerance = ±0.067s
Real event time to report: Rt = Vt + Ct = 22:48:46.670 (±0.067s)

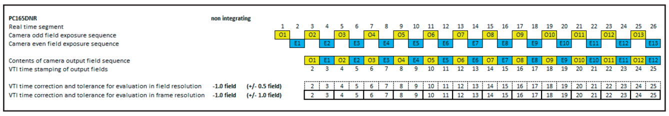
Video timing diagrams for PC165DNR camera

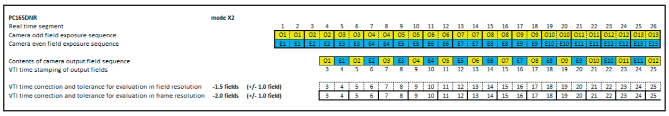
PC165DNR (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
1/60s	0.017	-0.017	-0.017	±0.008	±0.017
x2	0.033	-0.025	-0.033	±0.017	±0.017
x4	0.067	-0.042	-0.050	±0.033	±0.033
x8	0.134	-0.075	-0.083	±0.067	±0.067
x16	0.267	-0.142	-0.150	±0.134	±0.134
x32	0.534	-0.275	-0.284	±0.267	±0.267
x64	1.068	-0.542	-0.551	±0.534	±0.534
x128	2.136	-1.076	-1.084	±1.068	±1.068
x256	4.271	-2.144	-2.152	±2.136	±2.136

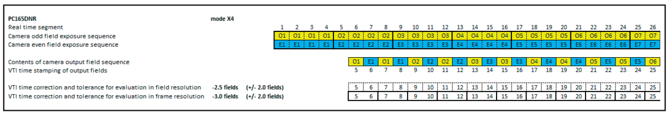
Timing diagrams for PC165DNR camera

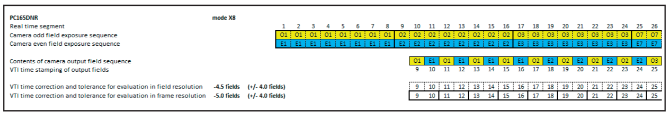
How to read the timing diagrams of the camera PC165DNR

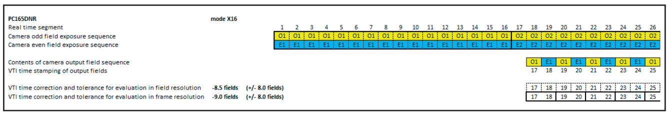
For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.

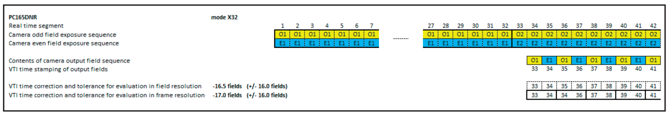


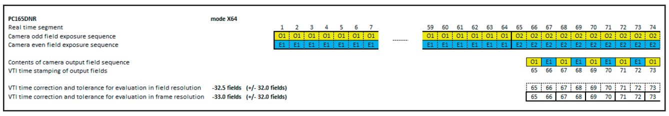


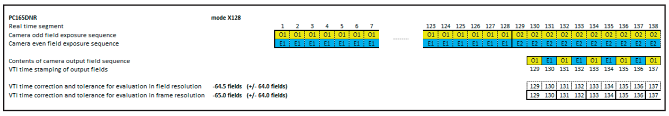


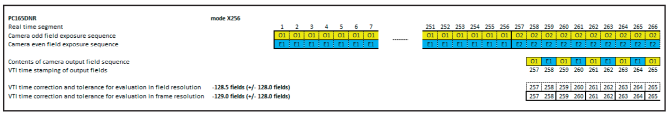












Video camera SCB-2000N EIA

This integrating video camera has an internal delay.

Correction tables for selection:

Use the correction value from a table below to calculate the real event time from inserted video time. Moving throught the video in steps of fields or frames you can also select the right tolerance value.

If a SCB-2000N camera works with shortened exposure times down to 10µs, the shortened exposure window will always be placed at the end of a video field. Because an event could have occurred or started in the unexposured part of a video field before the exposured part it may be appropriate to give correction and tolerance times for shortened exposure times to the same values as in normal video timing.

The integration time chosen by the user in the camera OSD menue setting point „SENSE UP" is used only as a maximum value by the internal camera electronics. This camera always works in automatic mode and so makes it's own decision about the real length of an integration sequence. The real integration sequence and the real exposure length used by the camera is dependent of the recorded image brightness.

The change of the real integration sequence length after a setting change or an image brightness change can be very slow and so can last up to minutes until it is in a stable state. This behaviour has also been previously observed in the Mintron.

Important notes:

All times used for video evaluation in step by step are assumed to be the mid time of a video field or a video frame. It is important to use the right correction time and the right tolerance value working in field or in frame step evaluation.

Example

SCB2000N (EIA) in Mode X8
(Integrating 8 video fields or 4 video frames)

Event frame VTI start time: 01:20:54.606
Event frame VTI end time: 01:20:54.640
Event frame VTI mid time: Vt = 01:20:54.623
Values from the table: It = 0.134s, Ct = -0.100s,
Tolerance = ±0.067s
Real event time to report: Rt = Vt + Ct = 01:20:54.523 (±0.067s)

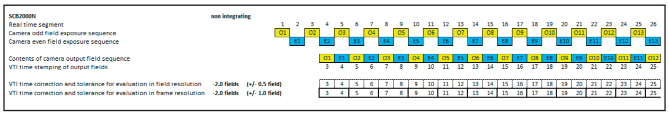
Journal for Occultation Astronomy

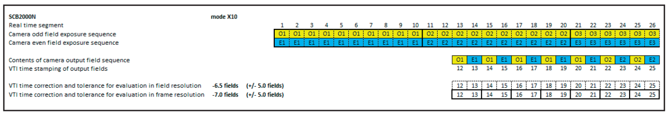
Video timing diagrams for SCB-2000N camera

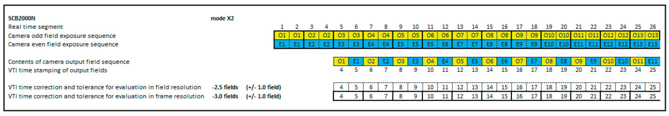
SCB-2000N (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
1/60s	0.017	-0.033	-0.033	±0.008	±0.017
x2	0.033	-0.042	-0.050	±0.017	±0.017
x4	0.067	-0.058	-0.067	±0.033	±0.033
x6	0.100	-0.075	-0.083	±0.050	±0.050
x8	0.134	-0.092	-0.100	±0.067	±0.067
x10	0.167	-0.108	-0.117	±0.083	±0.083
x12	0.200	-0.125	-0.134	±0.100	±0.100
x14	0.234	-0.142	-0.150	±0.117	±0.117
x16	0.267	-0.159	-0.167	±0.134	±0.134
x24	0.400	-0.225	-0.234	±0.200	±0.200
x32	0.534	-0.292	-0.300	±0.267	±0.267
x64	1.068	-0.559	-0.567	±0.534	±0.534
x128	2.136	-1.093	-1.101	±1.068	±1.068
x256	4.271	-2.161	-2.169	±2.136	±2.136
x512	8.542	-4.296	-4.304	±4.271	±4.271

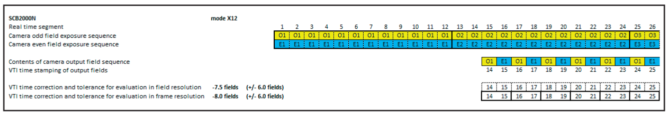
How to read the timing diagrams of the camera SCB-2000N

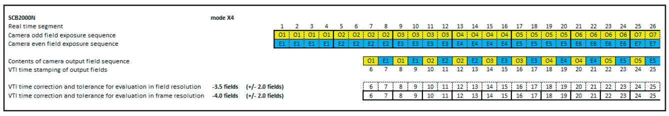
For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.

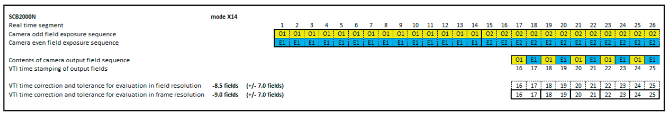


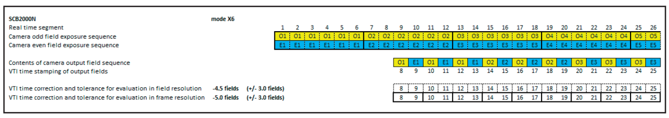


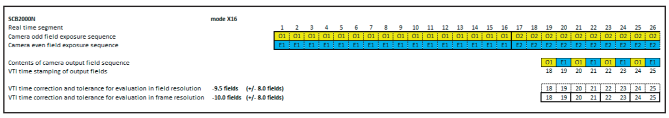


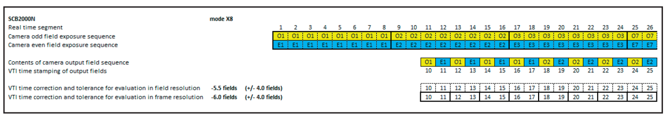


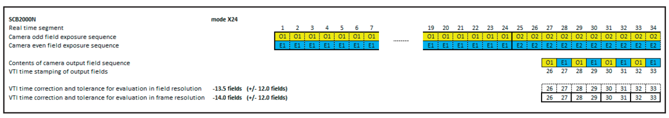












SCB2000N	mode X32																								
Real time segment		1	2	3	4	5	6	7		27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Camera odd field exposure sequence		O1	O1	O1	O1	O1	O1	O1	--------	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
Camera even field exposure sequence		E1	E1	E1	E1	E1	E1	E1		E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2
Contents of camera output field sequence																		O1	E1	O1	E1	O1	E1	O1	E1
VTI time stamping of output fields																		34	35	36	37	38	39	40	41
VTI time correction and tolerance for evaluation in field resolution	-17.5 fields (+/- 16.0 fields)																	34	35	36	37	38	39	40	41
VTI time correction and tolerance for evaluation in frame resolution	-18.0 fields (+/- 16.0 fields)																	34	35	36	37	38	39	40	41

SCB2000N	mode X256																								
Real time segment		1	2	3	4	5	6	7		251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266
Camera odd field exposure sequence		O1	O1	O1	O1	O1	O1	O1	--------	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
Camera even field exposure sequence		E1	E1	E1	E1	E1	E1	E1		E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2
Contents of camera output field sequence																		O1	E1	O1	E1	O1	E1	O1	E1
VTI time stamping of output fields																		258	259	260	261	262	263	264	265
VTI time correction and tolerance for evaluation in field resolution	-129.5 fields (+/- 128.0 fields)																	258	259	260	261	262	263	264	265
VTI time correction and tolerance for evaluation in frame resolution	-130.0 fields (+/- 128.0 fields)																	258	259	260	261	262	263	264	265

SCB2000N	mode X64																								
Real time segment		1	2	3	4	5	6	7		59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Camera odd field exposure sequence		O1	O1	O1	O1	O1	O1	O1	--------	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
Camera even field exposure sequence		E1	E1	E1	E1	E1	E1	E1		E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2
Contents of camera output field sequence																		O1	E1	O1	E1	O1	E1	O1	E1
VTI time stamping of output fields																		66	67	68	69	70	71	72	73
VTI time correction and tolerance for evaluation in field resolution	-33.5 fields (+/- 32.0 fields)																	66	67	68	69	70	71	72	73
VTI time correction and tolerance for evaluation in frame resolution	-34.0 fields (+/- 32.0 fields)																	66	67	68	69	70	71	72	73

SCB2000N	mode X512																								
Real time segment		1	2	3	4	5	6	7		507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
Camera odd field exposure sequence		O1	O1	O1	O1	O1	O1	O1	--------	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
Camera even field exposure sequence		E1	E1	E1	E1	E1	E1	E1		E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2
Contents of camera output field sequence																		O1	E1	O1	E1	O1	E1	O1	E1
VTI time stamping of output fields																		514	515	516	517	518	519	520	521
VTI time correction and tolerance for evaluation in field resolution	-257.5 fields (+/- 256.0 fields)																	514	515	516	517	518	519	520	521
VTI time correction and tolerance for evaluation in frame resolution	-258.0 fields (+/- 256.0 fields)																	514	515	516	517	518	519	520	521

SCB2000N	mode X128																								
Real time segment		1	2	3	4	5	6	7		123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
Camera odd field exposure sequence		O1	O1	O1	O1	O1	O1	O1	--------	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
Camera even field exposure sequence		E1	E1	E1	E1	E1	E1	E1		E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2
Contents of camera output field sequence																		O1	E1	O1	E1	O1	E1	O1	E1
VTI time stamping of output fields																		130	131	132	133	134	135	136	137
VTI time correction and tolerance for evaluation in field resolution	-65.5 fields (+/- 64.0 fields)																	130	131	132	133	134	135	136	137
VTI time correction and tolerance for evaluation in frame resolution	-66.0 fields (+/- 64.0 fields)																	130	131	132	133	134	135	136	137

Video camera WAT-902H2 Ultimate

No internal delay in this video camera.

In electronic shutter mode OFF the two KIWI-OSD timestampes in the video fields on output specify exactly the start and the end of optical exposure time in this video field. As in most video cameras a time shift between exposure window and V-sync signal of around 0.84 millisecond exists (value determined with VEXA). But no correction of time is necessary because inserted time is equal to the time of optical event +/- 1ms.

In electronic shutter ON/Mode 0-7 exposure times can be set to different shorter values. If working with shortened exposure times it is possible that a short event is missed by the video camera.

In electronic shutter ON/Mode 8-9 exposure time is automatic controlled. Because the exact exposure time is unknown we have always to assume and use the longest possible exposure time with the largest tolerance value. If camera is working in automatic controll with shortened exposure times it is possible that a short event is missed by the video camera.

If a WAT-902H2 Ultimate camera works with shortened exposure times (ON/0-9), the shortened exposure window will always be placed at the end of a video field. Because an event could have occurred or started in the unexposured part of a video field before the exposured part it may be appropriate to give tolerance times in Modes ON/0-9 to the same values as in Mode OFF.

Important notes:

All times used for video evaluation in step by step are assumed to be the mid time of a video field or a video frame. The only difference between working in field or frame step is that the given tolerance has to be expanded by one video field time if frame timing is used. So for this difference two tolerance time columns are included in every correction table.

Example

WAT-902H2 Ultimate (EIA) in Mode Off (normal timing)

Event frame VTI start time:	17:38:09.243
Event frame VTI end time:	17:38:09.276
Event frame video mid time:	Vt = 17:38:09.260
Values from the table:	It = 0.017s, Ct = 0s,
	Tolerance = ±0.017s
Real event time to report:	Rt = Vt + Ct = 17:38:09.260 (±0.017s)

Video timing diagrams for all types of WAT-902H2 Ultimate cameras

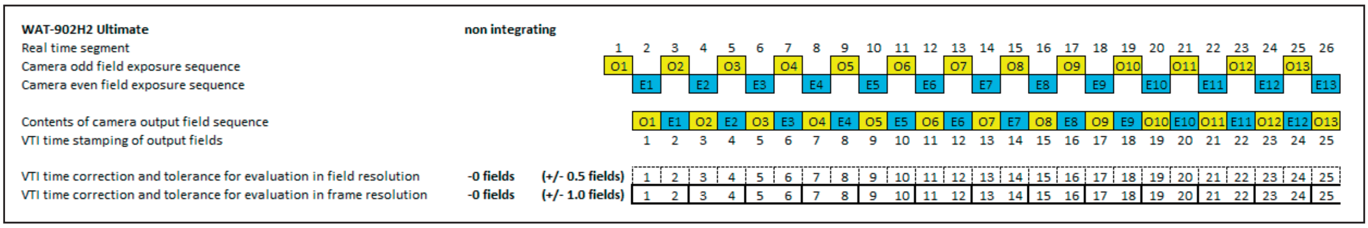
WAT-902H2 Ultimate (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
Off	0.020	0	0	±0.010	±0.020
ON/0	0.008	0	0	±0.010	±0.020
ON/1	0.004	0	0	±0.010	±0.020
ON/2	0.002	0	0	±0.010	±0.020
ON/3	0.001	0	0	±0.010	±0.020
ON/4	500 µs	0	0	±0.010	±0.020
ON/5	200 µs	0	0	±0.010	±0.020
ON/6	100 µs	0	0	±0.010	±0.020
ON/7	10 µs	0	0	±0.010	±0.020
ON/8	10 µs - 20ms	0	0	±0.010	±0.020
ON/9	10 µs - 8ms	0	0	±0.010	±0.020

WAT-902H2 Ultimate (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
Off	0.017	0	0	±0.008	±0.017
ON/0	0.008	0	0	±0.008	±0.017
ON/1	0.004	0	0	±0.008	±0.017
ON/2	0.002	0	0	±0.008	±0.017
ON/3	0.001	0	0	±0.008	±0.017
ON/4	500 µs	0	0	±0.008	±0.017
ON/5	200 µs	0	0	±0.008	±0.017
ON/6	100 µs	0	0	±0.008	±0.017
ON/7	10 µs	0	0	±0.008	±0.017
ON/8	10 µs - 17ms	0	0	±0.008	±0.017
ON/9	10 µs - 10ms	0	0	±0.008	±0.017

Timing diagrams for all types of WAT-902H2 Ultimate cameras

How to read the timing diagrams of the camera WAT-902H2 Ultimate

For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.



Journal for
Occultation Astronomy

Video camera PC164C-EX2 EIA

No internal delay in this video camera.

The two KIWI-OSD timestampes in the video fields on output specify exactly the start and the end time of the video fields in which the optical exposures occured. And the time inserted by the IOTA-VTI device shows the exposure end time of every video field as expected.

In this video camera the exposure time is automatic controlled in the range of 10µs to 16.7ms. In typical astronomical night recordings the longest exposure time of 16.7ms can be assumed. And because the exact exposure time is unknown we have always to assume and use the longest possible exposure time with the largest tolerance value. If working with shortened exposure times on bright image contents this camera starts optical exposure delayed in every video field. So in this case it would be possible that a very short event is missed by the video camera.

Example

PC164C-EX2 (EIA)

Event frame VTI start time: 23:08:57.104
Event frame VTI end time: 23:08:57.137
Event field video mid time: Vt = 23:08:57.121
Values from the table: It = 0.034s, Ct = 0s, Tolerance = ±0.017s
Real event time to report: Rt = Vt + Ct = 23:08:57.121 (±0.017s)

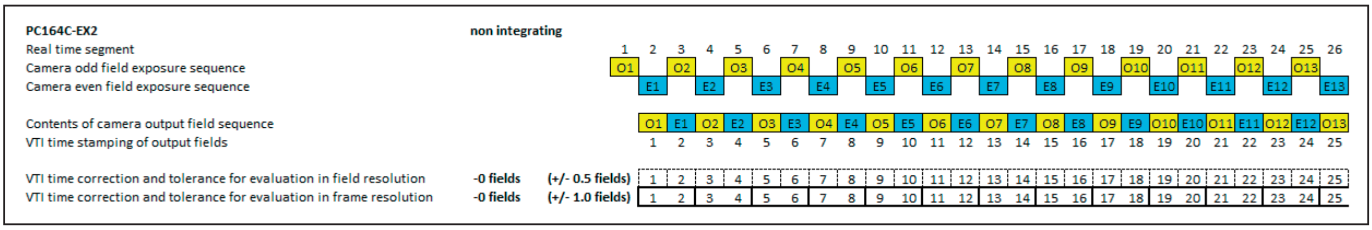
Video timing diagrams for PC164C-EX2 camera

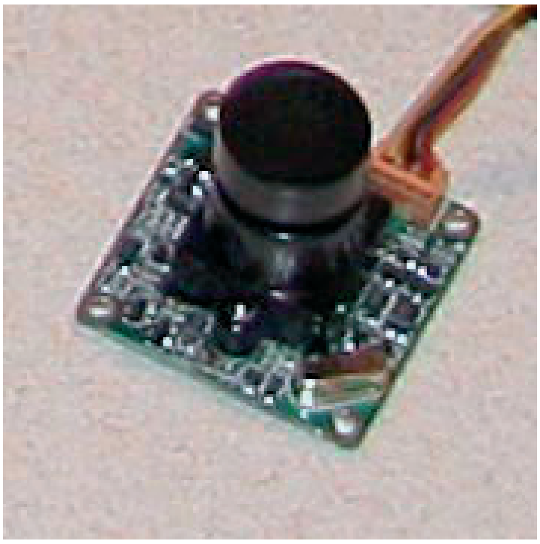
Video camera PC164C-EX2 (EIA)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.017s)	Evaluation in frames (0.033s)	Evaluation in fields (0.017s)	Evaluation in frames (0.033s)
Automatic	0.00001 - 0.0167	0	0	±0.008	±0.017

Timing diagram for video camera PC164C-EX2 EIA

How to read the timing diagrams of the camera PC164C-EX2

For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.





Video camera modul SK-1004XC/SO CCIR

No internal delay in this video modul.

The two KIWI-OSD timestampes in the video fields on output specify exactly the start and the end of optical exposure time in this video field. As in most video cameras a time shift between exposure window and V-sync signal of around 0.76 millisecond exists (value determined with VEXA). But no correction of time is necessary because inserted time is equal to the time of optical event +/- 1ms. The video timing of this video module, runs a little bit too slow, for the first three seconds after power ON.

In this video camera modul the exposure time is automatic controlled in the range of 10µs to 20ms. Because the exact exposure time is unknown we have always to assume and use the longest possible exposure time with the largest tolerance value. If working with shortened exposure times it is possible that a short event is missed by the video camera modul.

Example

SK-1004XC/SO (CCIR)

Event frame VTI start time: 20:07:44.038
Event frame VTI end time: 20:07:44.078
Event field video mid time: Vt = 20:07:44.058
Values from the table: It = 0.040s, Ct = 0s, Tolerance = ±0.020s
Real event time to report: Rt = Vt + Ct = 20:07:44.058 (±0.020s)

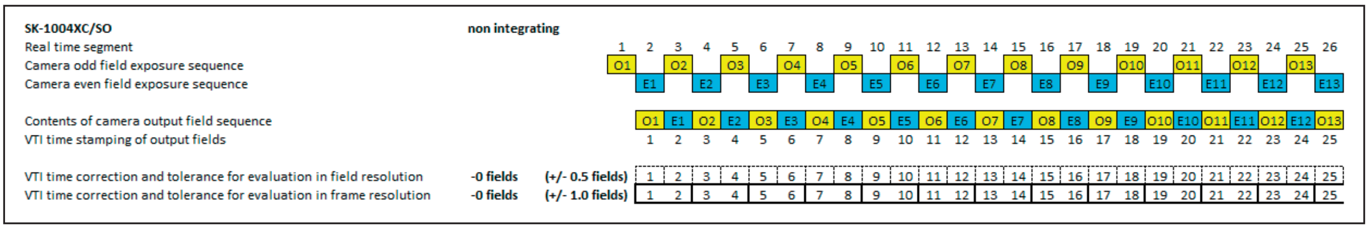
Video timing diagrams for Modul SK-1004X

Video camera modul SK-1004XC (CCIR)					
Mode	Integration time [s]	Correction time [s]		Tolerance value [s]	
		Evaluation in fields (0.020s)	Evaluation in frames (0.040s)	Evaluation in fields (0.020s)	Evaluation in frames (0.040s)
Automatic	0.00001 - 0.020	0	0	±0.010	±0.020

Timing diagram for video camera modul SK-1004XC/SO CCIR

How to read the timing diagrams of the camera modul SK-1004XC/SO

For the determination of the time correction values we have to consider that most Video Time Inserter devices are time stamping the output field sequence with previous field times (see also diagram 2 and 3 of this page). This means that we have to imagine the output field sequence shifted by one field time to the left (previous field time) to get the VTI inserted times and the right correction values.



August 6, 2013, Questions and suggestions to Gerhard Dangl

Journal for Occultation Astronomy

The annual meeting of IOTA/ES

Dr. Eberhard Bredner · IOTA/ES · Eberhard@Bredner.eu

We from IOTA/ES have two outstanding events over the year. At the end of August each year ESOP <European Symposium on Occultation Projects>, we try to wander around with this meeting from country to country – wherever we find a member, willing to care for the organization. This year symposium is arranged by Carles Schnabel and his group in Barcelona/Spain. As tax-exempt association founded in Germany we have to organize a second meeting the annual conference – in most cases in Hannover/Germany.

IOTA/ES organizes around 100 observers in Europe, which is today a smaller part of observers known to us. We had more "paying" members the last years but some quit their connection to IOTA/ES and it is very difficult to get new members… We have powerful organizations in France "club eclipse" and in The Netherlands "DOA = Dutch Occultation Association" but nearly all are correlated via the list "PLANOCCULT".

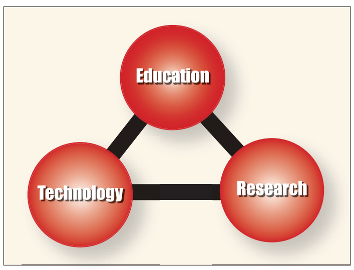
This year our "annual meeting" was convoked at March 19 for the date April 20. We had a provisional agenda that was upgraded to the final agenda by the members so that we could start at 11:30.

First picture: the conference room at the Public Observatory in Hannover

First point: Hans-Joachim Bode – our president – gave a summery over the past year – like most observers in Europe had to experience the situation was somehow disastrous – a lot of well panned observations where "clouded out" or even "rained out".

The financial situation of this (our) JOA publication is solid, the costs are split: 40% IOTA/ES, 40% IOTA/USA, 20% Australia and New Zealand.

One very depressing is the sudden death of Pawel Maksym, our polish representative. Pawel did a great job, we are all very affected.



As point 1.1 came the report of our scientific officer Dr. Wolfgang Beisker -: He reminded us of his triangular showing the main fields of work the milestones of IOTA/ES.

As example for technology he presented the new 20 inch Dobson as a mobile instrument for measurements in an area of about 2000 km. This instrument can observe a star 17 mag with a time constant of the video-camera of 1 (one) second, in most cases observing TNO's this is good value.

The second picture shows the 20 inch Dobson, at the left Michael Busse, right Konrad Guhl

The IOTA/ES Dobson has been modified for video-observations by Michael Busse, the first surveillance mission was planned by Konrad Guhl. He tried to observe the occultation of Uranus at the south of Italy. Preparing for this observation it was necessary at the last moment to arrange a modify so that the camera was right in the focus. Konrad was at his travel to Italy with the demounted Dobson when the weather changed so badly (another time, I was the meteorological advisor connected by cell phone) that he had to cancel his attempt. He learned from this that we (Michael Busse) have to modify the Dobson even more.

The last point of Wolfgang was an overview about the publications IOTAES (mostly Wolfgang) is working on as coworker:

The occultation of HIP 107302 by Jupiter.

Constraints on Charon's Orbital Elements from the Double Star Occultation of 2008 June 2.

The 2009 occultation of the bright star 45 Cap by Jupiter.

Size, shape, albedo, density and atmospheric limit of transneptunia objects (50.000) Quaoar from multi-chord stellar occultation's.

The second point had to be stated by our treasurer – Brigitte Thome-Bode. Our balance shows a positive at about 1.700 Euro if all the open invoices will be regulated. Over the year we had a major expense of our Dobson, over all we paid until now about 4.700 Euro. That was all paid by "paying" members and with donations that were given correlated to the billing of excursions. (A special German tax reduction possibility).

The next major purchase will be the construction of a building for the storage of IOTA / ES own devices at Hans-Joachim's house.

The points 3 and 4 (report of the cash audit) and (exoneration of the members of the board) were approved by the members.

Point 5 was something new. While we had regularly in previous years a "re-election" with the approval of the members at this date, after a long debate, the board members Bredner and Riedel where While it regularly for "re-election" was in previous years, with the approval of the members came up to this date, after a long debate, the board members Dr. Bredner and Dr. Riedel where no more standing for election. So

From left to right: Michael Busse (secretary); Hans-Joachim Bode (president); Brigitte Bode-Thome (treasurer), Dr. Wolfgang Beisker (vice president, scientific projects); Konrad Guhl (public relations)

this officers had to be new and Michael Busse (secretary) and Konrad Guhl (public relations work) were appointed as new board members. President, Vice-President and treasurer where re-elected.

The third picture shows the new board of members.

The president gave an honorable remembrance to the work of the outgoing board members, they had served for more than 20 years.

Point 6 (demonstration of the new IOTA/ES Dobson by Michael Busse) was done in a little break, where we were catered by some snacks, prepared by Brigitte Thome-Bode and Ulla Sperling-Koch: very delightful.

Point 7 (next ESOP's) was encouraging, we have an invitation to ESOP 2013 (Barcelona) and ESOP 2014 (Prague).

Point 8 was tedious work for the association. We had to change some of our rules (articles of incorporation). Details members will find after some time when the changes were registered in the court.

Point 9 (future general assemblies) was discussed, we will have a next meeting in Berlin and the responsible there will state the date in January 2014 so that anybody can arrange his dates in time.

Point 10 (publication of members of IOTA/ES) decided by the members that a copy should send to the webmaster of iota-es.de !

Point 11 (adds on) will be briefly mentioned here. The observation of eclipse observations will be ceased with the eclipse 2017. Then we will check our methods and try to explain the evaluation errors.

At the moment we have no new project for our 20 inch Dobson (but first there must be some modification's finished).

We will propagate more double star observations to get some additional observers.

Otto Farago suggests to archive MP-/TNO Data with the light curves and at the very end the new Watec 910 HX/RC camera was presented by Dr. Eberhard Bredner.

Just then there began a discussion of "Instrumental Methods for Professional and Amateur Collaborations in Planetary Astronomy". A new attack / endeavor will be supported by the IMCCE, Paris for the occultation October 20 in the USA when a twin-asteroid occults a star…

The meeting was closed at 16:13 Central European Summer Time.

2013 is an election year for IOTA (every 3 years)

For this election note that IOTA has new highly qualified candidates willing to serve as President (Steve Preston), Vice President (Roger Venable) and Vice President for Planetary Occultation Services (Brad Timerson).

If the new candidates for President, Vice President positions are elected, outgoing Officers David Dunham and Paul Maley are not retiring, they will remain on IOTA's Board of Directors as consultants and continue to provide the observations, advice and skills as they have in the past.

Jan Manek has served as Vice President for Planetary Occultation services since 1998, his volunteer efforts are highly appreciated !

To vote, respond to me via this email RNugent@wt.net (DO NOT USE THE LISTSERVER OR HIT "REPLY").

Or mail me your vote to: Richard Nugent, P.O. Box 131034 Houston, Texas 77219-1034, USA

Write in candidates are acceptable also. Thanks,

Richard Nugent, IOTA Executive Secretary

Proposed 2013 IOTA Election Ballot:

President: Steve Preston

Vice President: Roger Venable

Executive Secretary: Richard Nugent

Secretary & Treasurer: Chad Ellington

V.P. for Grazing Occultation Services: Mitsuru Soma

V.P. for Planetary Occultation Services: Brad Timerson

V.P. for Lunar Occultation Services: Walt "Rob" Robinson

Journal for Occultation Astronomy

Report on the Seventh Trans-Tasman Symposium on Occultations

By Jacquie Milner · (milnerjacquie@gmail.com) · Perth, Western Australia

From Left, Back Row: Ross Dickie (NZ), Greg Bolt (AUS), Ross Skilton (NZ), Dave Gault (AUS), Tony Barry (AUS), Steve Russell (AUS), Darren Corbett (AUS), Bill Hanna (AUS), Alan Gilmore (NZ), Pam Kilmartin (NZ), Dave Herald (AUS), Murray Forbes (NZ), Peter Graham (NZ), John Talbot (NZ), Mike Broughton (NZ) **From Left, Front Row:** Martin Unwin (NZ), Bill Allen (NZ), Gordon Hudson (NZ), Graeme McKay (NZ), Jacquie Milner (AUS), Graham Blow (NZ), Steve Kerr (AUS), Rory O'Keefe (NZ), Pauline Loader (NZ), Brian Loader (NZ) **Not Present:** Bob Evans (NZ)

The Seventh Trans-Tasman Symposium on Occultations (TTSO7) was held in Invercargill, New Zealand, following the annual conference of the Royal Astronomical Society of New Zealand (RASNZ). Twenty six participants (eighteen New Zealanders and eight Australians) met over two days, the 27th and 28th May, 2013, while the weather delivered an early wintry blast of hail, sleet and snow outside. An additional three participants from Australia presented their talks via Skype or in a pre-recorded format.

The talks presented during the symposium comprised a mix of basic concepts and procedures, reports of interesting results and experiences from the last year or so and the latest developments in equipment.

After a welcome from Graham Blow, Director of the RASNZ Occultation Section, Steve Kerr started the meeting with an Introduction to Occultations, followed by TTSO7 convenor Murray Forbes who discussed where predictions for occultations could be obtained. Steve Russell then showed how to analyse an audio recording to extract times of events, including some good tips on what features to look for in a digital voice recorder. Brian Loader encouraged the continued observation of lunar occultations, especially since they are such a good way of finding and confirming double star suspects. He followed up this presentation after lunch by showing how to use the latest version of LiMovie to analyse and present observation results for reporting. John Talbot then discussed reporting asteroid occultations, including the new file naming conventions for our region to make archiving observation reports easier. He also requested that positive results involving double stars be sent as two separate reports, one for each component. Bill Hanna, a relative newcomer to occultation astronomy, rounded out the session with a summary of his activities to date and what it is like to observe from Alice Springs, right in the middle of Australia.

The end of the first day was focused on video observing, with Tony Barry giving an Introduction to the Technical Aspects of Video, followed by a good discussion on how the level of gamma used can affect the ability to measure the brightness of stars. Steve Kerr returned to give an Introduction to Integrating Video Cameras, then Tony Barry and Dave Gault presented the latest form of the Astronomical Digital Video System they have been developing with Hristo Pavlov. (http://www.astrodigitalvideo.com.au/). Their original concept of an all-in-one box has now morphed into a purpose built GPS receiver and timing device supplied with software which runs on an Ubuntu (and eventually Windows) platform, with a Flea3 (or alternate) video camera purchased separately by the user. Files are saved in the new ADV format, which will not be corrupted or lost if a connection is broken during recording. The ADV format can be analysed using version 3 of Hristo's Tangra software. (http://www.hristopavlov.net/). Everyone was interested to see how the project was coming along and Dave and Tony were kept busy with queries and discussion until the end of the scheduled time slot. The foul weather outside encouraged many participants to linger inside the warm hotel and an impromptu social session over drinks and dinner in the house bar rounded out the day.

The second day began with John Talbot's summary of successful results over the past year by observers in our region. Of note was the possible discovery of a double star during an asteroidal occultation, and

From Right: Ross Dickie, Gordon Hudson, Jacquie Milner, Graeme McKay © GrahamBlow

© JacquieMilner

a rare trans-Pacific success involving Steve Kerr in Queensland and observers in North America. A pre-recorded talk by John Broughton on determining the dimensions of asteroids from occultation observations highlighted that eighty two percent of observations are currently represented by only a single chord, so John emphasized the benefits of two or more observers attempting a predicted event, or the deployment of unattended stations wherever possible. Although not related to total lunar or asteroidal occultations Martin Unwin then led us through his attempt to record and analyse the most recent transit of Venus in June 2012, which included inviting the local school along to experience the rare event in progress. Tony Barry returned to discuss the story behind the setting up of SEXTA, an array of LEDs similar to the device Gerhard Dangl uses to evaluate integrating video cameras, that was developed to test the workings of the ADVS. Greg Bolt then talked about his experience in using SEXTA to evaluate the accuracy of the ADVS, before Brian Loader ran through the steps to report lunar occultations using Occult.

The last presentation before lunch was a discussion session led by the author on the newly launched "Observing Occultations by Video: A Beginners Guide." This "beginner's manual" is the result of two years work, and seeks to comprehensively describe how to capture occultations using video. It includes how to acquire the necessary equipment, prepare for and capture occultation events, the use of video time insertion units, and how to reduce and report results. The genesis of the manual was the realisation that while the introduction of video cameras for recording occultations increased the accuracy of timings (particularly for short duration events) and allowed for multiple stations to be deployed unattended, it was nevertheless quite a daunting change in technology for some. Feedback on this first edition is requested as quickly as possible (please send to the author of this article) and it is hoped that a revised edition will appear shortly. Copies of the manual can be downloaded from the RASNZ Occultation Section website at www.occultations.org.nz

During the lunch break we were treated to a video of the recent annular solar eclipse that occurred over northern Australia only two weeks before the symposium. This was recorded by Steve Kerr, who travelled up to the Gulf of Carpentaria to catch it, and Steve's presentation was followed by a video of the transit of Venus captured by Martin Unwin, which complemented his talk from earlier in the morning. After the break John Talbot summarised his talk from the main RASNZ conference on the Jovian Extinction Events which he observed during 2012. This was followed by Murray Forbes who recounted an unfortunate series of events during a grazing occultation over central New Zealand last September when nearly every one of the participants had a tale of woe of to tell. John Talbot returned to give a run-down of how he pre-points his telescope to catch an event, and then in a pre-recorded talk, Chris Chad from Australia described his experience with a Samsung security camera and other similar cameras he has been trialing for occultation work. The Samsung camera, with the IR filter removed, has been quite successful for him.

For the final session of the symposium Jonathan Bradshaw joined us via Skype from Brisbane, Australia, to talk on the effect of focal length on occultation timing. Jonathan's message was essentially "less focal length is more signal." While larger apertures can generally see fainter magnitudes, limiting magnitude can be maximised by reducing the focal length of the telescope. Following this Graeme McKay described the discrepancy he had discovered in the recorded times from a video feed split between a digital video recorder and a recording made direct to his computer via a framegrabber. He did not have an answer as to why this was occurring but wanted to alert us to the effect. Dave Herald was the last formal speaker for the symposium with a summary of notable occultation events observed around the world since January 2011. To finish we had a short free-form discussion session, which ranged from the timing of future symposiums, to questions about the availability of equipment and how to make reporting observations easier. David Herald also urged us to look at improving our outreach activities and emphasised that even with all the large telescopes available today the occultations recorded by amateurs using modest telescopes can still outperform professional instruments in terms of resolution.

As Graham Blow and the convenor Murray Forbes closed the symposium, Brian Loader paid tribute to Graham, who started the RASNZ Occultation Section in 1977. Graham has inoperable cancer and due to his declining health does not expect to be able to travel to these meetings in future.

The next symposium, TTSO8, will be held in conjunction with the twenty sixth National Australian Convention of Amateur Astronomers (NACAA XXVI) in Melbourne, Australia, over 18-21 April, 2014. Details for this conference, which is held every second year over the Easter weekend at different locations around Australia, can be found at www.nacaa.org.au

Journal for Occultation Astronomy

IOTA's Mission

The International Occultation Timing Association, Inc. was established to encourage and facilitate the observation of occultations and eclipses. It provides predictions for grazing occultations of stars by the Moon and predictions for occultations of stars by asteroids and planets, information on observing equipment and techniques, and reports to the members of observations made.

The Offices and Officers of IOTA

President: David Dunham . . . . dunham@starpower.net
Executive Vice-President: Paul Maley . . . . pdmaley@yahoo.com
Executive Secretary: Richard Nugent . . . . RNugent@wt.net
Secretary & Treasurer: Chad K. Ellington . . . . stellarwave@yahoo.com

Vice President for Grazing Occultation Services: Dr. Mitsuru Soma . . . . . . Mitsuru.Soma@gmail.com
Vice President for Planetary Occultation Services: Jan Manek . . . . . . janmanek@volny.cz
Vice President for Lunar Occultation Services: Walt Robinson . . . . . . webmaster@lunar-occultations.com

IOTA/ES President: Hans-Joachim Bode . . . . president@iota-es.de
IOTA/ES Secretary: Michael Busse . . . . secretary@iota-es.de
IOTA/ES Treasurer: Brigitte Thome . . . . treasurer@iota-es.de
IOTA/ES Research & Development: Dr. Wolfgang Beisker . . . . beisker@iota-es.de
IOTA/ES Public Relations: Konrad Guhl . . . . PR@iota-es.de
Senior-Editor for Journal of Occultation Astronomy: Michael Busse . . . . .mbusse@iota-es.de

IOTA/ME President: Atila Poro . . . . iotamiddleeast@yahoo.com
IOTA/ME Vice-President: Dr. Mohammad Reza Norouzi . . . . norouzi.more@gmail.com
IOTA/ME Secreatry: Arya Sabouri . . . . aryas86@yahoo.com
IOTA/ME Public Relations: Aydin M. Valipoor . . . . ionodet@gmail.yahoo.com
IOTA/ME Research & Development: Mohammad Reza Mirbagheri . . . . mr.mirbagheri@gmail.com

Impressum

Editorial staff: Wolfgang Beisker, Hans-Joachim Bode, Michael Busse, Eberhard Riedel, Brigitte Thome
Responsible in terms of the German press law: Hans-Joachim Bode
Publisher: IOTA/ES Hans-Joachim Bode
Journal of Occultation Astronomy: IOTA/ES; Bartold-Knaust-Straße 8; D-30459 Hannover, Germany
Phone: 00 49-5 11-42 42 88 (in Germany 0511-42 42 88)
email: joa@iota-es.de
Layout artist: IOTA/ES Michael Busse
Webmaster: IOTA/ES Wolfgang Beisker
Membership fee IOTA/ES: 20,– Euro a year
(incl. JOA: free of charge)
Publication dates: 4 times a year
In case of missing articles the publication date has to be shifted!

Press date JOA 2013-4: Oct-Dec.: Sept 15 | Jan.-March: Dec. 15 | April-June: March 15 | July-August.: Juni 15

(IOTA maintains the following web site for your information and rapid notification of events.)

http://www.occultations.org
http://www.iota-es.de

This site contains information about the organization known as IOTA and provides information about joining

IOTA and IOTA/ES, including topics related to the Journal of Occulation Astronomy (JOA), and also has an on-line archive of all issues of Occultation Newsletter, IOTA's predecessor to JOA. On the right side of the main page of this site are included links to IOTA's major technical sites, as well as to the major IOTA sections, including those in Europe, Asia, Australia/New Zealand, and South America. The technical sites include definitions and information about observing and reporting, and results of, lunar, planetary, and asteroidal occultations, and of eclipses and other timely phenomena, including outer planet satellite mutual events and lunar meteor impact flashes.

Journal for Occultation Astronomy
(ISSN 0737-6766) is published quarterly in the USA by the International Occultation Timing Association, Inc. (IOTA)
1267 Sheridan Drive, Owings MD 20736

IOTA is a tax-exempt organization under sections 501(c)(3) and 509(a)(2) of the Internal Revenue Code USA, and is incorporated in the state of Texas. Printed Circulation: 200

Regulations

The Journal of Occultation Astronomy (JOA) is not covenanted to print articles it did not ask for.

The author is responsible for the contents of his article & pictures.

If necessary for any reason JOA can shorten an article but without changing its sense or scientific contents.

JOA will always try to produce an article as soon as possible based to date & time of other articles it received – but actual announcements have the priority!

Articles can be reprinted in other Journals if JOA has been asked for permission.