

Timing details and diagrams for the analog video camera

WAT-910

when in use with one of the six analog GPS

Video **T**ime **I**nserters

listed below

CUNO

Tim-10

GPSBOXSPRITE3

KIWI-OSD

IOTA

Sven Anderson

WAT-910 non integrating mode		WAT-910 non integrating mode																										
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26
	Camera odd field exposure sequence	O1		O2		O3		O4		O5		O6		O7		O8		O9		O10		O11		O12		O13		
	Camera even field exposure sequence		E1		E2		E3		E4		E5		E6		E7		E8		E9		E10		E11		E12		E13	
	Contents of camera output field sequence		O1	E1	O2	E2	O3	E3	O4	E4	O5	E5	O6	E6	O7	E7	O8	E8	O9	E9	O10	E10	O11	E11	O12	E12	O13	E13
	Event																											
	Field																											
	Frame																											
VTI time stamping	Cuno VTI	t0/t1	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24			
	Tim-10 VTI	t0/t1	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24			
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25			
	KIWI-OSD VTI	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25			
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25			
	IOTA VTI	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25			
	Sven Anderson VTI	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25			
	Field timing correction	Base video field = first video field of output sequence with event visible		Used time in base video field		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]												
		Cuno VTI	first of 2 inserted times (t1)	+0.5	(+/- 0.5)	+0.010	(+/- 0.010)	+0.008	(+/- 0.008)																			
		Tim-10 VTI	first of 2 inserted times (t1)	+0.5	(+/- 0.5)	+0.010	(+/- 0.010)	+0.008	(+/- 0.008)																			
GPSBOXSPRITE3 VTI (2 or 4 line display)		first of 2 inserted times (t2)	-0.5	(+/- 0.5)	-0.010	(+/- 0.010)	-0.008	(+/- 0.008)																				
KIWI-OSD VTI		first of 2 inserted times (t2)	-0.5	(+/- 0.5)	-0.010	(+/- 0.010)	-0.008	(+/- 0.008)																				
GPSBOXSPRITE3 VTI (1 or 3 line display)		inserted time (t3)	-1.5	(+/- 0.5)	-0.030	(+/- 0.010)	-0.025	(+/- 0.008)																				
IOTA VTI		inserted time (t3)	-1.5	(+/- 0.5)	-0.030	(+/- 0.010)	-0.025	(+/- 0.008)																				
Sven Anderson VTI		inserted time (t3)	-1.5	(+/- 0.5)	-0.030	(+/- 0.010)	-0.025	(+/- 0.008)																				
Base video frame = first video frame of output sequence with event visible		Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]														
Cuno VTI		first of 3 inserted times (t0)	+1.0	(+/- 1.0)	+0.020	(+/- 0.020)	+0.017	(+/- 0.017)																				
Tim-10 VTI	first of 3 inserted times (t0)	+1.0	(+/- 1.0)	+0.020	(+/- 0.020)	+0.017	(+/- 0.017)																					
GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t1)	0	(+/- 1.0)	0	(+/- 0.020)	0	(+/- 0.017)																					
KIWI-OSD VTI	first of 3 inserted times (t1)	0	(+/- 1.0)	0	(+/- 0.020)	0	(+/- 0.017)																					
GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t2)	-1.0	(+/- 1.0)	-0.020	(+/- 0.020)	-0.017	(+/- 0.017)																					
IOTA VTI	first of 2 inserted times (t2)	-1.0	(+/- 1.0)	-0.020	(+/- 0.020)	-0.017	(+/- 0.017)																					
Sven Anderson VTI	first of 2 inserted times (t2)	-1.0	(+/- 1.0)	-0.020	(+/- 0.020)	-0.017	(+/- 0.017)																					

WAT-910 mode X2		WAT-910 mode X2																										
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26
	Camera odd field exposure sequence	O1	O1	O2	O2	O3	O3	O4	O4	O5	O5	O6	O6	O7	O7	O8	O8	O9	O9	O10	O10	O11	O11	O12	O12	O13	O13	
	Camera even field exposure sequence		E1	E1	E2	E2	E3	E3	E4	E4	E5	E5	E6	E6	E7	E7	E8	E8	E9	E9	E10	E10	E11	E11	E12	E12	E13	E13
	Contents of camera output field sequence		O1	E1	O2	E2	O3	E3	O4	E4	O5	E5	O6	E6	O7	E7	O8	E8	O9	E9	O10	E10	O11	E11	O12	E12	O13	E13
	Event																											
	Frame																											
VTI time stamping	Cuno VTI	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24				
	Tim-10 VTI	t1/t2	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24				
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25				
	KIWI-OSD VTI	t2/t3	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25				
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25				
	IOTA VTI	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25				
	Sven Anderson VTI	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25				
	Frame timing correction	Base video frame = first video frame of output sequence with event visible		Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]												
		Cuno VTI	first of 3 inserted times (t1)	0	(+/- 1.0)	0	(+/- 0.020)	0	(+/- 0.017)																			
		Tim-10 VTI	first of 3 inserted times (t1)	0	(+/- 1.0)	0	(+/- 0.020)	0	(+/- 0.017)																			
GPSBOXSPRITE3 VTI (2 or 4 line display)		first of 3 inserted times (t2)	-1.0	(+/- 1.0)	-0.020	(+/- 0.020)	-0.017	(+/- 0.017)																				
KIWI-OSD VTI		first of 3 inserted times (t2)	-1.0	(+/- 1.0)	-0.020	(+/- 0.020)	-0.017	(+/- 0.017)																				
GPSBOXSPRITE3 VTI (1 or 3 line display)		first of 2 inserted times (t3)	-2.0	(+/- 1.0)	-0.040	(+/- 0.020)	-0.033	(+/- 0.017)																				
IOTA VTI		first of 2 inserted times (t3)	-2.0	(+/- 1.0)	-0.040	(+/- 0.020)	-0.033	(+/- 0.017)																				
Sven Anderson VTI		first of 2 inserted times (t3)	-2.0	(+/- 1.0)	-0.040	(+/- 0.020)	-0.033	(+/- 0.017)																				

WAT-910 mode X4		WAT-910 mode X4																										
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26
	Camera odd field exposure sequence	O1	O1	O1	O2	O2	O2	O3	O3	O3	O4	O4	O4	O4	O5	O5	O5	O5	O6	O6	O6	O6	O7	O7				
	Camera even field exposure sequence		E1	E1	E1	E2	E2	E2	E3	E3	E3	E4	E4	E4	E4	E5	E5	E5	E5	E6	E6	E6	E6	E7	E7			
	Contents of camera output field sequence		O1	E1	O1	E1	O2	E2	O2	E2	O3	E3	O3	E3	O4	E4	O4	E4	O4	E4	O5	E5	O5	E5	O6	E6	O7	E7
	Event																											
	Frame																											
VTI time stamping	Cuno VTI	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24						
	Tim-10 VTI	t3/t4	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24						
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25						
	KIWI-OSD VTI	t4/t5	t5/t6	t6/t7	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25						
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25						
	IOTA VTI	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25						
	Sven Anderson VTI	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25						
	Frame timing correction	Base video frame = first video frame of output sequence with event visible		Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]												
		Cuno VTI	first of 3 inserted times (t3)	-1.0	(+/- 2.0)	-0.020	(+/- 0.040)	-0.017	(+/- 0.033)																			
		Tim-10 VTI	first of 3 inserted times (t3)	-1.0	(+/- 2.0)	-0.020	(+/- 0.040)	-0.017	(+/- 0.033)																			
GPSBOXSPRITE3 VTI (2 or 4 line display)		first of 3 inserted times (t4)	-2.0	(+/- 2.0)	-0.040	(+/- 0.040)	-0.033	(+/- 0.033)																				
KIWI-OSD VTI		first of 3 inserted times (t4)	-2.0	(+/- 2.0)	-0.040	(+/- 0.040)	-0.033	(+/- 0.033)																				
GPSBOXSPRITE3 VTI (1 or 3 line display)		first of 2 inserted times (t5)	-3.0	(+/- 2.0)	-0.060	(+/- 0.040)	-0.050	(+/- 0.033)																				
IOTA VTI		first of 2 inserted times (t5)	-3.0	(+/- 2.0)	-0.060	(+/- 0.040)	-0.050	(+/- 0.033)																				
Sven Anderson VTI		first of 2 inserted times (t5)	-3.0	(+/- 2.0)	-0.060	(+/- 0.040)	-0.050	(+/- 0.033)																				

WAT-910 mode X8																WAT-910 mode X8															
Integration time = 8 fields / 4 frames																Integration time = 8 fields / 4 frames															
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26			
	Camera odd field exposure sequence	O1	O1	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O3	O3	O3	O3	O3	O3	O3	O3	O3	O7	O7			
	Camera even field exposure sequence	E1	E1	E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E3	E3	E3	E3	E3	E3	E3	E3	E3	E7	E7			
Contents of camera output field sequence																															
		<p>Event</p> <p>Frame</p> <p>Output frame where the event is first visible = Base video frame for time correction</p>																													
VTI time stamping	Cuno VTI	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24													
	Tim-10 VTI	t7/t8	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24													
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25													
	KIWI-OSD VTI	t8/t9	t9/t10	t10/t11	t11/t12	t12/t13	t13/t14	t14/t15	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25													
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25													
	IOTA VTI	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25													
Sven Anderson VTI	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25														
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame	Correction [fields]	Tolerance [fields]	PAL/CCIR Correction [s]	PAL/CCIR Tolerance [s]	NTSC/EIA Correction [s]	NTSC/EIA Tolerance [s]																							
	Cuno VTI	first of 3 inserted times (t7)	-3.0	(+/- 4.0)	-0.060	(+/- 0.080)	-0.050	(+/- 0.067)																							
	Tim-10 VTI	first of 3 inserted times (t7)	-3.0	(+/- 4.0)	-0.060	(+/- 0.080)	-0.050	(+/- 0.067)																							
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t8)	-4.0	(+/- 4.0)	-0.080	(+/- 0.080)	-0.067	(+/- 0.067)																							
	KIWI-OSD VTI	first of 3 inserted times (t8)	-4.0	(+/- 4.0)	-0.080	(+/- 0.080)	-0.067	(+/- 0.067)																							
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t9)	-5.0	(+/- 4.0)	-0.100	(+/- 0.080)	-0.083	(+/- 0.067)																							
	IOTA VTI	first of 2 inserted times (t9)	-5.0	(+/- 4.0)	-0.100	(+/- 0.080)	-0.083	(+/- 0.067)																							
	Sven Anderson VTI	first of 2 inserted times (t9)	-5.0	(+/- 4.0)	-0.100	(+/- 0.080)	-0.083	(+/- 0.067)																							

WAT-910 mode X16																WAT-910 mode X16															
Integration time = 16 fields / 8 frames																Integration time = 16 fields / 8 frames															
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26	t27		
	Camera odd field exposure sequence	O1	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2		
	Camera even field exposure sequence	E1	E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2			
Contents of camera output field sequence																															
		<p>Event</p> <p>Frame</p> <p>Output frame where the event is first visible = Base video frame for time correction</p>																													
VTI time stamping	Cuno VTI	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25																				
	Tim-10 VTI	t15/t16	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25																				
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25	t25/t26																				
	KIWI-OSD VTI	t16/t17	t17/t18	t18/t19	t19/t20	t20/t21	t21/t22	t22/t23	t23/t24	t24/t25	t25/t26																				
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26																				
	IOTA VTI	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26																				
Sven Anderson VTI	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26																					
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame	Correction [fields]	Tolerance [fields]	PAL/CCIR Correction [s]	PAL/CCIR Tolerance [s]	NTSC/EIA Correction [s]	NTSC/EIA Tolerance [s]																							
	Cuno VTI	first of 3 inserted times (t15)	-7.0	(+/- 8.0)	-0.140	(+/- 0.160)	-0.117	(+/- 0.133)																							
	Tim-10 VTI	first of 3 inserted times (t15)	-7.0	(+/- 8.0)	-0.140	(+/- 0.160)	-0.117	(+/- 0.133)																							
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t16)	-8.0	(+/- 8.0)	-0.160	(+/- 0.160)	-0.133	(+/- 0.133)																							
	KIWI-OSD VTI	first of 3 inserted times (t16)	-8.0	(+/- 8.0)	-0.160	(+/- 0.160)	-0.133	(+/- 0.133)																							
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t17)	-9.0	(+/- 8.0)	-0.180	(+/- 0.160)	-0.150	(+/- 0.133)																							
	IOTA VTI	first of 2 inserted times (t17)	-9.0	(+/- 8.0)	-0.180	(+/- 0.160)	-0.150	(+/- 0.133)																							
	Sven Anderson VTI	first of 2 inserted times (t17)	-9.0	(+/- 8.0)	-0.180	(+/- 0.160)	-0.150	(+/- 0.133)																							

WAT-910 mode X32																WAT-910 mode X32															
Integration time = 32 fields / 16 frames																Integration time = 32 fields / 16 frames															
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18	t19	t20	t21	t22	t23	t24	t25	t26	t27		
	Camera odd field exposure sequence	O1	O1	O1	O1	O1	O1	O1	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2		
	Camera even field exposure sequence	E1	E1	E1	E1	E1	E1	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2			
Contents of camera output field sequence																															
		<p>Event</p> <p>Frame</p> <p>Output frame where the event is first visible = Base video frame for time correction</p>																													
VTI time stamping	Cuno VTI	t31/t32	t32/t33	t33/t34	t34/t35	t35/t36	t36/t37	t37/t38	t38/t39	t39/t40	t40/t41																				
	Tim-10 VTI	t31/t32	t32/t33	t33/t34	t34/t35	t35/t36	t36/t37	t37/t38	t38/t39	t39/t40	t40/t41																				
	GPSBOXSPRITE3 VTI (2 or 4 line display)	t32/t33	t33/t34	t34/t35	t35/t36	t36/t37	t37/t38	t38/t39	t39/t40	t40/t41	t41/t42																				
	KIWI-OSD VTI	t32/t33	t33/t34	t34/t35	t35/t36	t36/t37	t37/t38	t38/t39	t39/t40	t40/t41	t41/t42																				
	GPSBOXSPRITE3 VTI (1 or 3 line display)	t33	t34	t35	t36	t37	t38	t39	t40	t41	t42																				
	IOTA VTI	t33	t34	t35	t36	t37	t38	t39	t40	t41	t42																				
Sven Anderson VTI	t33	t34	t35	t36	t37	t38	t39	t40	t41	t42																					
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame	Correction [fields]	Tolerance [fields]	PAL/CCIR Correction [s]	PAL/CCIR Tolerance [s]	NTSC/EIA Correction [s]	NTSC/EIA Tolerance [s]																							
	Cuno VTI	first of 3 inserted times (t31)	-15.0	(+/- 16.0)	-0.300	(+/- 0.320)	-0.250	(+/- 0.267)																							
	Tim-10 VTI	first of 3 inserted times (t31)	-15.0	(+/- 16.0)	-0.300	(+/- 0.320)	-0.250	(+/- 0.267)																							
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t32)	-16.0	(+/- 16.0)	-0.320	(+/- 0.320)	-0.267	(+/- 0.267)																							
	KIWI-OSD VTI	first of 3 inserted times (t32)	-16.0	(+/- 16.0)	-0.320	(+/- 0.320)	-0.267	(+/- 0.267)																							
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t33)	-17.0	(+/- 16.0)	-0.340	(+/- 0.320)	-0.284	(+/- 0.267)																							
	IOTA VTI	first of 2 inserted times (t33)	-17.0	(+/- 16.0)	-0.340	(+/- 0.320)	-0.284	(+/- 0.267)																							
	Sven Anderson VTI	first of 2 inserted times (t33)	-17.0	(+/- 16.0)	-0.340	(+/- 0.320)	-0.284	(+/- 0.267)																							

WAT-910 mode X64										Integration time = 64 fields / 32 frames										WAT-910 mode X64									
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t58	t59	t60	t61	t62	t63	t64	t65	t66	t67	t68	t69	t70	t71	t72	t73	t74	t75			
	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	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	E2			
Contents of camera output field sequence		Event							Frame						Output frame where the event is first visible = Base video frame for time correction														
		O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1				
VTI time stamping	Cuno VTI													t63/t64	t64/t65	t65/t66	t66/t67	t67/t68	t68/t69	t69/t70	t70/t71	t71/t72	t72/t73	t73/t74					
	Tim-10 VTI													t63/t64	t64/t65	t65/t66	t66/t67	t67/t68	t68/t69	t69/t70	t70/t71	t71/t72	t72/t73	t73/t74					
	GPSBOXSPRITE3 VTI (2 or 4 line display)													t64/t65	t65/t66	t66/t67	t67/t68	t68/t69	t69/t70	t70/t71	t71/t72	t72/t73	t73/t74						
	KIWI-OSD VTI													t64/t65	t65/t66	t66/t67	t67/t68	t68/t69	t69/t70	t70/t71	t71/t72	t72/t73	t73/t74						
	GPSBOXSPRITE3 VTI (1 or 3 line display)													t65	t66	t67	t68	t69	t70	t71	t72	t73	t74						
	IOTA VTI													t65	t66	t67	t68	t69	t70	t71	t72	t73	t74						
	Sven Anderson VTI													t65	t66	t67	t68	t69	t70	t71	t72	t73	t74						
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]															
	Cuno VTI	first of 3 inserted times (t63)		-31.0		(+/- 32.0)		-0.620		(+/- 0.640)		-0.517		(+/- 0.534)															
	Tim-10 VTI	first of 3 inserted times (t63)		-31.0		(+/- 32.0)		-0.620		(+/- 0.640)		-0.517		(+/- 0.534)															
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t64)		-32.0		(+/- 32.0)		-0.640		(+/- 0.640)		-0.534		(+/- 0.534)															
	KIWI-OSD VTI	first of 3 inserted times (t64)		-32.0		(+/- 32.0)		-0.640		(+/- 0.640)		-0.534		(+/- 0.534)															
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t65)		-33.0		(+/- 32.0)		-0.660		(+/- 0.640)		-0.551		(+/- 0.534)															
	IOTA VTI	first of 2 inserted times (t65)		-33.0		(+/- 32.0)		-0.660		(+/- 0.640)		-0.551		(+/- 0.534)															
	Sven Anderson VTI	first of 2 inserted times (t65)		-33.0		(+/- 32.0)		-0.660		(+/- 0.640)		-0.551		(+/- 0.534)															

WAT-910 mode X128										Integration time = 128 fields / 64 frames										WAT-910 mode X128									
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t122	t123	t124	t125	t126	t127	t128	t129	t130	t131	t132	t133	t134	t135	t136	t137	t138	t139			
	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	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	E2			
Contents of camera output field sequence		Event							Frame						Output frame where the event is first visible = Base video frame for time correction														
		O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1				
VTI time stamping	Cuno VTI													t127/t128	t128/t129	t129/t130	t130/t131	t131/t132	t132/t133	t133/t134	t134/t135	t135/t136	t136/t137						
	Tim-10 VTI													t127/t128	t128/t129	t129/t130	t130/t131	t131/t132	t132/t133	t133/t134	t134/t135	t135/t136	t136/t137						
	GPSBOXSPRITE3 VTI (2 or 4 line display)													t128/t129	t129/t130	t130/t131	t131/t132	t132/t133	t133/t134	t134/t135	t135/t136	t136/t137	t137/t138						
	KIWI-OSD VTI													t128/t129	t129/t130	t130/t131	t131/t132	t132/t133	t133/t134	t134/t135	t135/t136	t136/t137	t137/t138						
	GPSBOXSPRITE3 VTI (1 or 3 line display)													t129	t130	t131	t132	t133	t134	t135	t136	t137	t138						
	IOTA VTI													t129	t130	t131	t132	t133	t134	t135	t136	t137	t138						
	Sven Anderson VTI													t129	t130	t131	t132	t133	t134	t135	t136	t137	t138						
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]															
	Cuno VTI	first of 3 inserted times (t127)		-63.0		(+/- 64.0)		-1.260		(+/- 1.280)		-1.051		(+/- 1.068)															
	Tim-10 VTI	first of 3 inserted times (t127)		-63.0		(+/- 64.0)		-1.260		(+/- 1.280)		-1.051		(+/- 1.068)															
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t128)		-64.0		(+/- 64.0)		-1.280		(+/- 1.280)		-1.068		(+/- 1.068)															
	KIWI-OSD VTI	first of 3 inserted times (t128)		-64.0		(+/- 64.0)		-1.280		(+/- 1.280)		-1.068		(+/- 1.068)															
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t129)		-65.0		(+/- 64.0)		-1.300		(+/- 1.280)		-1.084		(+/- 1.068)															
	IOTA VTI	first of 2 inserted times (t129)		-65.0		(+/- 64.0)		-1.300		(+/- 1.280)		-1.084		(+/- 1.068)															
	Sven Anderson VTI	first of 2 inserted times (t129)		-65.0		(+/- 64.0)		-1.300		(+/- 1.280)		-1.084		(+/- 1.068)															

WAT-910 mode X256										Integration time = 254 fields / 127 frames										Important note: In mode X256 the camera WAT-910HX integrates only 254 fields or 127 frames (and not 256 fields or 128 frames as expected)										WAT-910 mode X256									
Timing diagram	Real time [UTC]	t0	t1	t2	t3	t4	t5	t6	t248	t249	t250	t251	t252	t253	t254	t255	t256	t257	t258	t259	t260	t261	t262	t263	t264	t265													
	Camera odd field exposure sequence	O1	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	E1	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2													
Contents of camera output field sequence		Event							Frame						Output frame where the event is first visible = Base video frame for time correction																								
		O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1	O1	E1														
VTI time stamping	Cuno VTI													t253/t254	t254/t255	t255/t256	t256/t257	t257/t258	t258/t259	t259/t260	t260/t261	t261/t262	t262/t263	t263/t264															
	Tim-10 VTI													t253/t254	t254/t255	t255/t256	t256/t257	t257/t258	t258/t259	t259/t260	t260/t261	t261/t262	t262/t263	t263/t264															
	GPSBOXSPRITE3 VTI (2 or 4 line display)													t254/t255	t255/t256	t256/t257	t257/t258	t258/t259	t259/t260	t260/t261	t261/t262	t262/t263	t263/t264																
	KIWI-OSD VTI													t254/t255	t255/t256	t256/t257	t257/t258	t258/t259	t259/t260	t260/t261	t261/t262	t262/t263	t263/t264																
	GPSBOXSPRITE3 VTI (1 or 3 line display)													t255	t256	t257	t258	t259	t260	t261	t262	t263	t264																
	IOTA VTI													t255	t256	t257	t258	t259	t260	t261	t262	t263	t264																
	Sven Anderson VTI													t255	t256	t257	t258	t259	t260	t261	t262	t263	t264																
Frame timing correction	Base video frame = first video frame of output sequence with event visible	Used time in base video frame		Correction [fields]		Tolerance [fields]		PAL/CCIR Correction [s]		PAL/CCIR Tolerance [s]		NTSC/EIA Correction [s]		NTSC/EIA Tolerance [s]																									
	Cuno VTI	first of 3 inserted times (t253)		-126.0		(+/- 127.0)		-2.520		(+/- 2.540)		-2.102		(+/- 2.119)																									
	Tim-10 VTI	first of 3 inserted times (t253)		-126.0		(+/- 127.0)		-2.520		(+/- 2.540)		-2.102		(+/- 2.119)																									
	GPSBOXSPRITE3 VTI (2 or 4 line display)	first of 3 inserted times (t254)		-127.0		(+/- 127.0)		-2.540		(+/- 2.540)		-2.119		(+/- 2.119)																									
	KIWI-OSD VTI	first of 3 inserted times (t254)		-127.0		(+/- 127.0)		-2.540		(+/- 2.540)		-2.119		(+/- 2.119)																									
	GPSBOXSPRITE3 VTI (1 or 3 line display)	first of 2 inserted times (t255)		-128.0		(+/- 127.0)		-2.560		(+/- 2.540)		-2.135		(+/- 2.119)																									
	IOTA VTI	first of 2 inserted times (t255)		-128.0		(+/- 127.0)		-2.560		(+/- 2.540)		-2.135		(+/- 2.119)																									
	Sven Anderson VTI	first of 2 inserted times (t255)		-128.0		(+/- 127.0)		-2.560		(+/- 2.540)		-2.135		(+/- 2.119)																									

Example A	for usage of WAT-910 diagrams and tables in field resolution (Non integrating mode)
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Camera: WAT-910
System: PAL/CCIR
Mode: Non integrating
VTI: IOTA VTI

In non integrating mode video evaluation with field resolution is possible.

We have to use a software with the feature to show both video fields of every video frame separated and in single steps.

With the software, the video field where the event is first visible (base video field) has to be determined.

Event occurred and captured by camera in video field E1 between times t1 and t2 (Assumption 21:12:38.014 UTC).

The camera WAT-910 outputs this field E1 delayed between times t3 and t4.

This video field shows the event first and is the base video field for time correction.

The IOTA VTI stamps this base video field with time t3 (Assumption 21:12:38.044 UTC).

From timing diagram and the table we get a correction value of -1.5 fields and a tolerance value of +/-0.5 field.

In PAL/CCIR TV system this means a correction value of -30ms and a tolerance value of +/-10ms.

So in this example A the evaluated real event time is 21:12:38.014 (+/-10ms) UTC.

Example B	for usage of WAT-910 diagrams and tables in frame resolution (Non integrating mode)
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Camera: WAT-910
System: PAL/CCIR
Mode: Non integrating
VTI: IOTA VTI

In non integrating mode video evaluation with frame resolution is possible.

We have to use a software with the feature to show every video frame in single steps.

With the software, the video frame where the event is first visible (base video frame) has to be determined.

Event occurred and captured by camera in video field E1 between times t1 and t2.

The camera WAT-910 outputs the frame with field E1 delayed between times t2 and t4.

This video frame shows the event first and is the base video frame for time correction.

The IOTA VTI stamps this base video frame with two times t2 and t3 (Assumption 21:12:38.024 and 21:12:38.044 UTC).

The first of the inserted times is t2 with time value 21:12:38.024 UTC.

From timing diagram and the table we get a correction value of -1.0 field and a tolerance value of +/-1.0 field.

In PAL/CCIR TV system this means a correction value of -20ms and a tolerance value of +/-20ms.

So in this example B the evaluated real event time is 21:12:38.004 (+/-20ms) UTC.

Example C**for usage of WAT-910 diagrams and tables in frame resolution (Integrating mode X4)**

Camera: WAT-910

System: PAL/CCIR

Mode: X4

VTI: IOTA VTI

In integrating mode video evaluation with frame resolution is possible.

We have to use a software with the feature to show every video frame in single steps.

With the software, the video frame where the event is first visible (base video frame) has to be determined.

Event occurred and captured in video fields O1/E1 between times t1 and t2.

The camera WAT-910 outputs the frame with fields O1/E1 delayed between times t5 and t7.

This video frame shows the event first and is the base video frame for time correction.

The IOTA VTI stamps this base video frame with two times t5 and t6 (Assumption 21:12:38.084 and 21:12:38.104 UTC).

The first of the inserted times is t5 with time value 21:12:38.084 UTC.

From timing diagram and the table we get a correction value of -3.0 fields and a tolerance value of +/-2.0 fields.

In PAL/CCIR TV system this means a correction value of -60ms and a tolerance value of +/-40ms.

So in this example C the evaluated real event time is 21:12:38.024 (+/-40ms) UTC.

Example D**for usage of WAT-910 diagrams and tables in frame resolution (Integrating mode X16)**

Camera: WAT-910

System: PAL/CCIR

Mode: X16

VTI: IOTA VTI

In integrating mode video evaluation with frame resolution is possible.

We have to use a software with the feature to show every video frame in single steps.

With the software, the video frame where the event is first visible (base video frame) has to be determined.

Event occurred and captured in video fields O1/ E1 between times t1 and t2.

The camera WAT-910 outputs the frame with field E1 delayed between times t17 and t19.

This video frame shows the event first and is the base video frame for time correction.

The IOTA VTI stamps this base video frame with two times t17 and t18 (Assumption 21:12:38.324 and 21:12:38.344 UTC).

The first of the inserted times is t17 with time value 21:12:38.324 UTC.

From timing diagram and the table we get a correction value of -9.0 fields and a tolerance value of +/-8.0 fields.

In PAL/CCIR TV system this means a correction value of -180ms and a tolerance value of +/-160ms.

So in this example D the evaluated real event time is 21:12:38.144 (+/-160ms) UTC.

