ARIEL FILE FORMATS

A.1 ANALOG FILE (*.ANA) DOCUMENTATION

Analog files store up to 100 trials of Analog samples. The file consists of a directory for the trials, followed by records which describe the analog system [environment records], followed by the actual data.

A.1.1 RECORD TYPES

There are three types of records. These are described below:
1) ENVIRONMENT RECORD. System information at time of sampling. This information does not change from sample to sample.
2) EXTENDED ENVIRONMENT RECORD. This record is optional & contains additional system information relevant to force plates, real-time COP, & oscilloscope sampling.
3) DATA RECORDS. These records contain trial information & the actual trial data.

Each record has a 2 word I.D. marker & is terminated by an End of Record [EOR] marker.

1) ENVIRONMENT MARKER	-1 / -1
2) EXTENDED ENVIRONMENT MARKER	-3 / -3
3) DATA MARKER	-2 / -2
4) EOR MARKER	-99 / -99

A.1.2 DESCRIPTION OF ENVIRONMENT RECORD

WORD OFFSET	TYPE	DESCRIPTION
0 - 1	I	-1 / -1 MARKER
2	I	MAX# CHANNELS
3	I	1ST CHAN# [OFFSET ZERO & USUALLY ZERO]
4	I	LAST CHAN# [OFFSET ZERO]
5	I	TRIG CHAN
6 - 7	I*4	#SAMPLES [32BITS]
8 - 9	F	PERIOD [SEC]
10 - 11	F	TRIG LEVEL [USER UNITS]
12 - 13	F	COMBINED ALL CHANNELS RATE
14 - 15	F	PRE-TRIG FRAC
16 - 17	F	MAX SINGLE CHAN RATE
18	I	1ST CHAN TO SAVE
19	I	LAST CHAN TO SAVE
20	I	#MICROSEC PER SAMPLE
21 - 22	F	A/D -> VOLTS CONV FACTOR
23	I	A/D VALUE FOR ZERO VOLTS
24 - 55	F	CONV FACTOR VOLTS -> USER [X16 CHAN]
56 - 87	F	VOLTS OFFSET FOR ZERO UNITS
88	I	INDEX INTO GAIN TABLE
		1=x1 2=x10 3=x100 4=x1000 [PGL]
		1=x1 2=x2 3=x4 4=x8 [PGH]
89 - 90	F	AMPLIFIER GAIN
91 - 170	C	10 CHAR DESC FOR 16 CHANNELS
171 - 218	C	6 CHAR UNITS FOR 16 CHANNELS
219 - 266	I	DISPLAY LISTS [3x16]
267	I	1ST PLATE CHANNEL [OFFSET ONE]
268 - 282	free	

283	I	PLATE DIMENSION UNITS 0=CM 1=M 2=IN 3=FT
284 - 295	C	(3, 6) PRI / SEC / TERC FLAG FOR PLATE CHANNELS PACKED 2 PER WORD
296	I	PLATE TYPE 0=NONE 1=KISTLER 2=AMTI
297 - 299	I	PRI / SEC / TERC FLAG FOR SINGLE / MULT [1/0]
300 - 305	F	PRI / SEC / TERC TIME CONSTANT FOR ENVELOPE
306 - 309	I	ZERO VOLTS OFFSET EACH OF 4 GAINS
310	I	#PLATES ON SYSTEM [0/1/2]
311 - 334	F	(6,2) PLATE DIMENSION FOR 2 PLATES 1) "A" DIST XDUCER TO "X" 2) "B" DIST XDUCER TO "Y" 3) "AZ" DIST IN "Z" FROM XDS TO TOP OF PLATE 4) "X" LENGTH 5) "Y" LENGTH 6) free
335 - 336	F	ANGLE OF 2ND PLATE RELATIVE TO 1ST
337 - 338	F	"X" DIST OF 2ND PLATE REL 1ST [CENTERS]
339 - 340	F	"Y" DIST OF 2ND PLATE REL 1ST [CENTERS]
341 - 346	free	
347	I	IDCODE 1=LABMASTER 2=CES Rev#1 3=CES Rev#3
348 - 349	I	-99 / -99 MARKER

A.1.3 DESCRIPTION OF EXTENDED ENVIRONMENT BLOCK @OFFSET=551 [WORD]

WORD OFFSET	TYPE	DESCRIPTION
0 - 1	I	-3 / -3 MARKER
2	I	1ST CHAN FOR SCOPE DISPLAY [OFFSET ONE]
3	I	LAST CHAN FOR SCOPE DISPLAY [OFFSET ONE]
4 - 91	F	MIN/MAX FOR DISPLAY 16 CHAN + 6 PLATE CHAN
92 - 100	free	
101	I	PLATE FORCE UNITS 1=NT 2=KG 3=LBS
102	I	CHARGE AMP TIME CONST 1=NO 2=YES
103 - 104	I	CHARGE AMP X/Y & Z RANGE SELECTION [1 -> 4]
105	I	FLAG FOR CHARGE AMP RESET <-> OPER. 1=NO 2=YES
106 - 117	I	X/Y/Z PLATE CAL FOR 2PLATES [pC/N] STORED AS INTEGER=F.P. * 100
118	I	CHARGE AMP MODEL# 1=9861 2=9863 3=9865
119	I	FLAG FOR AUTOCALC OF PLATE CHANS CONVERSION 1=YES 2=NO
120 - 124	I	CHARGE AMP RANGES STORED AS INT=FP * 10
125	I	FLAG FOR AMPLIFIER OUTPUT UNITS 1=pC 2=NT
126 - 137	I	X/Y/Z/MX/MY/MZ PLATE CAL 2PLATES [LB/uV/V] STORED AS INTEGER= FP * 1000
138	I	EXCITATION VOLTAGE FOR AMTI PLATES [*100] STORED AS INTEGER = FP * 100
139	I	GAIN FACTOR FOR AMTI ELECTRONICS
140 - 151	free	
151 - 152	F	REALTIME COP BULLSEYE DISTANCE BETWEEN BANDS

153	I	FLAG TO DRAW TRACE REALTIME COP 1=YES 2=NO
154	I	FLAG TO SOUND TONE REALTIME COP 1=YES 2=NO
155	I	PLATE FOR REALTIME COP [1/2/3]
165 - 447	free	
448 - 449	I	-99 / -99 MARKER

A.1.4 DATA RECORD FORMAT

WORD OFFSET	TYPE	DESCRIPTION
0 - 1	I	-2 / -2 MARKER
2 - 3	I*4	POINTER TO ENVIRONMENT RECORD
4 - 13	C	20 CHAR I.D. FOR TRIAL
14 - 17	C	8 CHARACTER DATE
18	I	MAX# CHANNELS (USUALLY 16)
19	I	1ST CHANNEL SAMPLED (OFFSET ZERO USUALLY ZERO)
20	I	LAST CHANNEL SAMPLED (OFFSET ZERO)
21	I	TRIGGER CHANNEL (OFFSET ONE)
22 - 23	I*4	#SAMPLES (32 BIT)
24 - 25	F	PERIOD (SEC)
26 - 27	F	TRIGGER LEVEL (USER UNITS)
28 - 29	F	COMBINED ALL CHANNELS RATE (SAMPLES/SEC)
30 - 31	F	PRE-TRIG FRACTION
32 - 33	F	MAX SINGLE CHANNEL RATE
34	I	1ST CHANNEL TO SAVE (OFFSET ONE)
35	I	LAST CHANNEL TO SAVE (OFFSET ONE)
36	I	#MICROSEC PER SAMPLE (OFFSET ZERO)
37	I	1ST SAMPLE# TO SAVE (OFFSET ZERO)
38	I	LAST SAMPLE# TO SAVE (OFFSET ZERO)
39 - 40	F	DEFAULT X-RANGE FOR PLOTTING IF NOT ZERO
41	I	CURVE LIST TO PLOT 0=1ST 1=2ND 2=3RD
42 - 43	I*4	2nd Save
44 - 59	free	
60 - 59+NS		DATA FOR 1ST SAVED CHANNEL
.....		
60+NS*NCH -> 61+NS*NCH		-99 / -99 MARKER

A.1.5 GENERAL ANALOG FILE FORMAT

WORD OFFSET	DESCRIPTION
0	#DIRECTORY ENTRIES
1-200	TABLE OF POINTERS (32BIT) TO SAVED DATA RECORDS [MAX#-100]
201 - 550	ENVIRONMENT RECORD
551 - 1000	EXTENDED ENVIRONMENT (OPTIONAL)
1001 -	DATA RECORDS
OR	
551 -	DATA RECORDS [NO EXTENDED ENVIRONEMNT]

A.2 FRAME GRABBER (*.VID) FILE FORMAT

WORD	DESCRIPTION
0	Frame grabber ID 0=Vutek 1=Redlake
1	Contrast [0 -> 99]
2	Brightness [0 -> 99]
3	Hue [0 -> 99]
4	Saturation [0 -> 99]
5	Max# saves in file [25]
6	#Saves currently in file
7 - 99	free
100 - 101	Pointer to 1st save record
102 - 103	Pointer to 2nd save record
.....	
200	1st Save Record
.....	

A.2.1 SAVE RECORD FORMAT

Word	Description
0 - 9	20 Character descriptor
10 - 19	free
20	Compression Level [0 -> 5]
21	#frames in record
22 - 29	free
30 - 31	pointer -> 1st frame
32 - 33	pointer -> 2nd frame
34 - 35	pointer -> 3rd frame
36 - 37	pointer -> 4th frame

A.2.2 FRAME FORMAT

Word	Description
0 - 1	Time [fp]
2 - 3	Fx [fp]
4 - 5	Fy [fp]
6 - 7	Fz [fp]
8 - 9	Ax [fp]
10 - 11	Ay [fp]
12 - 13	Mfree [fp]
14 - 19	free
20 - 21	#Bytes Video Data
22 -	Video Data

A.3 DIGITIZER FILE FORMATS (*.CF, *.#T AND *.3D)

A.3.1 COMMON FILE [*.CF] FORMAT

Offset [Word]	Description
0	Units Descriptor 1=mm 2=cm 3=m 4=km 5=in 6=ft 7=mi
1 - 4	unused
5	#Views
6	#Points
7	# Control Points
8 - 46	Title
47	Revision #
48 - 87	Point ID's
270	Sequence type 1=standard 2=user defined
271 -	Joint Names
471 -	u/v for sample figure
575 -	# Segments
577 -	Joint Connection Table
777 -	Segment Information Table [24 bytes/entry]: Label [10b], joint1[1b], joint2[1b], xmass[4b], cgfrac[4b], mom[4b]
1377 -	Segment Color Table
1427	# Segments + Isolated Points

A.3.2 VIEW FILE (*.1T, *2T, … *.9T) FORMAT

Offset [Word]	Description
0 - 15	View ID [32 characters]
16	ReDigitize %
17	Rev#*10. If Rev 3.20+, file will include a frame grabber calibration block [marker= -3/-3], and control data records will include fixed point. DIGI will perform no fixed point subtraction, rather it will be performed by CBA3D.
18 - 19	CLOCK0, timer value @ frame = 0
20	free
21	synch frame
22	Synch time [units: Frame3 * 10 from start]
23 - 26	Camera & lens ID [8 characters]
27 - 29	Film ID [6 characters]
30 - 31	Film Speed [FP]
32 - 37	Camera Location [x, y, z] [FP]
38 - 39	[u,v] of initial FP

A.3.2.1 Control Point Record

40 - 41	Marker [-1/-1]
42 - 137	32 Control Points, 3 words each [32 Controls or FP and 31]

Three words are: | flag | u | v | where flag: 0=Normal, 1=Estimate, -1=Missing

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A.3.2.2 Re-Digitizing Sums Record

```
138 - 139                                   Marker [-2/-2]
          | N | S(x1-x2) | S(X1-X2)**2 | S(Y1-Y2) | S(Y1-Y2)**2 |
          | 2B |   2B    |     4B      |    2B    |     4B      |
-------------------------------------------------------------------------------
```

A.3.2.3 Frame Grabber Calibration Record [Rev 3.20+ Only]

```
420 - 421                                   Marker [-3/-3]
422                                         Frame Grabber ID 1=Vutek 2=Redlake
423                                         #Pixels [x] for frame grabber
424                                         #Pixels [y] for frame grabber
425 - 426                   [LUU0, LVV0] upper left in frame grabber units of calibration box.
427 - 428                   [LXDIG0, LYDIG0] upper left corner in digitizer units of calibration box.
429 - 432                   [XSCRSL, YSCRSL] x/y conversion "digitizer" / "grabber" [FP]
433 - 449                                   free
-------------------------------------------------------------------------------
```

A.3.2.4 Misc. Extra Record [Rev 3.20+ only]

```
450 - 451                                   Marker [-4/-4]
452 - 469                                   free
-------------------------------------------------------------------------------
```

A.3.2.5 Data Record #1

```
420 or 470                                  Start of data records.
If Rev 3.10 or less, LEN= [#points]*3, & record starts @START=420 [words]
If Rev 3.20 or greater, LEN= [#points+1]*3, & record starts @START=470 [words]
START                                       Marker | <image#><0>
START+2                                     1st data frame. No Fixed Pt. for Rev 3.10 or less.
                                            Fixed Pt [Rev 3.20+] then each digitized point.
                                            Three words per point: [flag | u | v ]
                                                     flag: 0 / 1 / -1 = ok / estimated / missing
START+2+LEN                                 Second data frame has same format as first.
. . . . . . . . . . . . . .
```

A.3.2.6 EOF Marker

```
@EOF-2                                      Marker [-99/-99]
```

A.3.3 3-D FILE (*.3D) FORMAT

A.3.3.1 [HEADER BLOCK]

```
WORD OFFSET                                 CONTENTS
==========================================================================
0 - 3                                       ASSOC ROOT SEQUENCE NAME
4                                           FILE TYPE 1=1D 2=2D 3=3D
5                                           #VIEWS USED CREATING 3D FILE
6 - 11                                      VIEW # FOR EACH VIEW USED
```

12	NP = #POINTS PER FRAME
13	NF = #FRAMES IN SEQUENCE
14 - 15	X MIN VALUE [FP]
16 - 17	X MAX VALUE [FP]
18 - 19	Y MIN VALUE [FP]
20 -21	Y MAX VALUE [FP]
22 -23	Z MIN VALUE [FP]
24 - 25	Z MAX VALUE [FP]

A.3.3.2 [SIGMAS BLOCK Optional]

[If Block is Missing LOFS=0. If Present LOFS=NP*12+4]

26	-2 Block Marker
27	-2 Block Marker
28 - 29	SIGMAX-1, ERROR-X POINT #1
	SIGMAY-1, ERROR-Y POINT #1
	SIGMAZ-1, ERROR-Z POINT #1
---	---
	SIGMAX-NP, ERROR-X POINT NP
	SIGMAY-NP, ERROR-Y POINT NP
	SIGMAZ-NP, ERROR-Z POINT NP
---	---

A.3.3.3 [RAW DATA BLOCK]

[@OFFSET=26+LOFS]

0	SYNCH TIME [MS]
1	TIME FRAME #1 [MS]
2 - 3	X POINT #1 [FP]
4 - 5	Y POINT #1 [FP]
6 - 7	Z POINT #1 [FP]
8 - 9	RESIDUAL POINT #1 [FP]
10	VIEWS USED FLAG [1 BIT PER VIEW]
11 - 19	X-Y-Z RESIDUAL-VIEWS_USED POINT #2
.....	.....
2+(N-1)*9 -> 10+(N-1)*9	X-Y-Z RESIDUAL-VIEWS_USED POINT #N
.....	.....
2+NP*9	-1 MARKER FRAME #2
2+NP*9+1	TIME FOR FRAME #2 [MS]
next NP*9 Words	X-Y-Z RESIDUAL-VIEWS_USED, POINTS 1->NP, FRAME #2
---	---
---	---
(N-1) * (2+NP*9)	-1 MARKER FRAME N
(N 1) * (2+NP*9)+1	TIME FRAME N
next NP * 9 Words	X-Y-Z-RESIDUAL-VIEWS_USED, POINTS 1->NP, FRAME N
---	---
---	---
(NF-1) * (2+NP*9)	-1 MARKER FRAME NF
(NF-1) * (2+NP*9)+1	TIME FRAME NF
next NP*9 Words	X-Y-Z-RESIDUAL-VIEWS_USED, POINTS 1->NP, FRAME NF

---	---
NF*(2+NP*9)	-99 MARKER FOR END OF RAW XYZ DATA
NF*(2+NP*9)+1	-99 MARKER FOR END OF RAW XYZ DATA

File ends here after CBA3D processing. Smoothed data follows. Offsets for SMOOTHED data are relative to the start of smoothed data at OFFSET=28+NF*(2+NP*9)+LOFS.

A.3.3.4 [SMOOTHING VALUES USED BLOCK]

[NEG -> Digital Filter 2500 -> Unsmoothed]
[@OFFSET=28+nf*(2+np*9)+LOFS]

---	---
0 - 1	SX1, SMOOTHED X VALUE POINT #1
2 - 3	SY1, SMOOTHED Y VALUE POINT #1
4 - 5	SZ1, SMOOTHED Z VALUE POINT #1
. . . . .	. . . . .
	SX-NP, SMOOTHED X VALUE POINT NP
	SY-NP, SMOOTHED Y VALUE POINT NP
	SZ-NP, SMOOTHED Z VALUE POINT NP
NP*6	0 SEPERATOR FLAG
NP*6+1	0 SEPERATOR FLAG
---	---

A.3.3.5 [SMOOTHED POS/VEL/ACC BLOCK]

[@OFFSET=30+NF*(2+NP*9)+NP*6+LOFS]

---	---
0	-1 MARKER, FRAME #1
1	TIME FRAME #1 [MS]
2 - 3	DX1 SMOOTHED X, POINT #1, FRAME #1
4 - 5	DY1 SMOOTHED Y, POINT #1
6 - 7	DZ1 SMOOTHED Z, POINT #1
8 - 9	VX1 X-VELOCITY, POINT #1
10 - 11	VY1 Y-VELOCITY, POINT #1
12 - 13	VZ1 Z-VELOCITY, POINT #1
14 - 15	AX1 X-ACCELERATION, POINT #1
16 - 17	AY1 Y-ACCELERATION, POINT #1
18 - 19	AZ1 Z-ACCELERATION, POINT #1
. . . . .	. . . . .
	SX-NP SMOOTHED X, POINT NP
4 - 5	SY-NP SMOOTHED Y, POINT #NP
6 - 7	SZ-NP SMOOTHED Z, POINT #NP
8 - 9	VX-NP X-VELOCITY, POINT #NP
10 - 11	VY-NP Y-VELOCITY, POINT #NP
12 - 13	VZ-NP Z-VELOCITY, POINT #NP
14 - 15	AX-NP X-ACCELERATION, POINT #NP
16 - 17	AY-NP Y-ACCELERATION, POINT #NP
18 - 19	AZ-NP Z-ACCELERATION, POINT #NP
---	---
(N-1)*(2*NP*18)	
(N-1)*(2*NP*18)+1	TIME FRAME N [MS]
	SX1 SMOOTHED X, POINT #1, FRAME #N
4 - 5	SY1 SMOOTHED Y, POINT #1
6 - 7	SZ1 SMOOTHED Z, POINT #1

8 - 9	VX1 X-VELOCITY, POINT #1
10 - 11	VY1 Y-VELOCITY, POINT #1
12 - 13	VZ1 Z-VELOCITY, POINT #1
14 - 15	AX1 X-ACCELERATION, POINT #1
16 - 17	AY1 Y-ACCELERATION, POINT #1
18 - 19	AZ1 Z-ACCELERATION, POINT #1
. . . . .	. . . . .
	SX-NP SMOOTHED X, POINT NP
4 - 5	SY-NP SMOOTHED Y, POINT #NP
6 - 7	SZ-NP SMOOTHED Z, POINT #NP
8 - 9	VX-NP X-VELOCITY, POINT #NP
10 - 11	VY-NP Y-VELOCITY, POINT #NP
12 - 13	VZ-NP Z-VELOCITY, POINT #NP
14 - 15	AX-NP X-ACCELERATION, POINT #NP
16 - 17	AY-NP Y-ACCELERATION, POINT #NP
18 - 19	AZ-NP Z-ACCELERATION, POINT #NP
---	---
NF*(2+NP*180	-99 END OF BLOCK MARKER
NF*(2+NP*18)+1	-99 END OF BLOCK MARKER

File ends here after CBAFIT smoothing. Data which follows are KINETICS data. Offsets given are relative to the start of KINETICS data, OFFSET=34+np*6+nf*4+nf*np*27+LOFS.

A.3.3.6 [KINETICS DATA BLOCK]

[@OFFSET=34+NP*6+NF*4+NF*NP*27+LOFS]

0	-3 MARKER FRAME #1
1	TIME, FRAME #1 [MS]
2 - 3	FX-1 X-FORCE, POINT #1, FRAME #1
4 - 5	FY-1 Y-FORCE, POINT #1
6 - 7	FZ-1 Z-FORCE, POINT #1
8 - 9	CX-1 X-COUPLE, POINT #1
10 - 11	CY-1 Y-COUPLE, POINT #1
12 - 13	CZ-1 Z-COUPLE, POINT #1
---	---
NF*(2+NP*12)	-3 MARKER, FRAME NF
NF*(2+NP*12)+1	FX-1 X-FORCE, POINT #1, FRAME #NF
4 - 5	FY-1 Y-FORCE, POINT #1
6 - 7	FZ-1 Z-FORCE, POINT #1
8 - 9	CX-1 X-COUPLE, POINT #1
10 - 11	CY-1 Y-COUPLE, POINT #1
12 - 13	CZ-1 Z-COUPLE, POINT #1
. . . . .	. . . . .
NF*(2+NP*12)	-99 END OF DATA MARKER
NF*(2+NP*12)+1	-99 END OF DATA MARKER

***** End-of-file *****