FILE FORMAT
PCScanIV Calibrated throughput DATA FILE

Document History

File Name xmx.doc
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Introduction

This is a description of the data file that is used in the PCscanIV software to store the data recorded from the EX.

FILE ID and Version

This description is for file ID number 4040 version 3.1

General

This file is a binary data file. The first record is a header record. These files generally have the file extension .XMX.

Definition of Terms

long 32 bit signed integer

short 16 bit signed integer

nctime array of 7 shorts defined as
[0]= Year [yy or yyyy]
[1]= Month [1-12]
[2]= Day [1-31]
[3]= Hour [0-23]
[4]= Minute [0-59]
[5]= Second [0-59
[6]= Milliseconds [0-999]

char 8 bit ASCII data

float 32 bit floating point

NTHuge 64 bit signed integer

File Structure

General Header

The first part of the file is the general header and starts at byte 0 of the file.

Byte offset	Type	Comment
0	long	Unique file type For XMX files should always be 4040
4	long	File Version currently = 3
8	long	Sub version currently = 1
12	short [8];	Creation date and time. Element [7] is spare
28	long	Number of channels in the file
32	long	Byte offset of the start of the channel header
36	long	Byte offset of the first event header
40	long	File contains triggered data 0 = false, 1 = true
44	long	Pre/Post history percent
48	long	Total number of events in the file
52	long	1 – if mike data present, 0 – if not
56	float	Sample rate of the front panel microphone
60	long	No of bits the system was using – 16 or 32.
64	long [3]	Spare bytes reserved for future use

Channel Header

The byte offset to the start of this section is define in the general header offset 32

Byte offset	Type	Comment
0	char [34]	Channel title – 32 chars plus null + 1 spare
34	short	Input Module Type
36	short	Input Module Sub Type
38	char [10]	Engineering units – 8 chars plus null + 1 spare
48	short	Input Range index
50	short	Pad – for long word alignment
52	long	Measurement Group number [1-8]
56	long	Input Module number [1-6]
60	long	IM channel number [1-4]
64	long [4]	Reserved for future use
80	float	Sample rate for this channel
84	float	Calibration Slope Volts to engineering units
88	float	Calibration Offset engineering units for zero volts
92	long	XYZ direction [has value 1,2 or 3]
96	long	XYZ position
100	long [4]	Reserved for future use

The input module, input module sub type and input range index take the values as defined in the SPT document ActiveX_Spec_Release3.0_030711.

The next channel definition starts at byte offset 116. All other channels continue from the end of the previous one and are 116 bytes long.

Event Header

The byte offset to the start of this section is defined in the general header offset 36. The value at byte offset 16 of this event header points to the start of the next event header. The last event header has an event number of –1 and contains no data.

Byte offset	Type	Comment
0	long[4]	Identifier of the event header – currently 99,2,2,99 Last blank header = 99,1,1,99
16	NTHuge	Offset to the next event header
24	NTHuge	Offset to the start of the data – In a triggered event this is the first data point after the pre-history
32	long	Event number (-1=end of last event)
36	long	Number of pre-history buffers
40	long	Buffer number of the last bit of pre-history
44	long	The buffer number of the start of data
48	long	The total number of buffers for this event
52	long [3]	spare to pad the event header to 64 bytes

Data Header

The data header follows the event header. Before each data buffer is written to the disk a data header is written.

Byte offset	**Type**	**Comment**
0	long [4]	Identifier of the data header – data= 99,11,11,99 voice= 99,12,12,99
16	long	MG number of the data =0 voice
20	long	IM number of the data =0 voice
24	long	Channel number of the data =0 voice
28	long	Length in bytes of the data that follows this header
32	long	Sequential buffer number of the data header Including the pre-history
36	long	Relative position from the trigger to the start of data
40	long	Relative position from the trigger to the end of record
44	long	Position of the trigger in this buffer
48	long [4]	Reserved for future use

Data

For non digital channels – as specified by the Module type and subtype - the data is stored as 32 bit floating point calibrated engineering units. For digital channels the data is stored in raw digital format there are always 32 bits for each sample. When the system is in 32 bit mode then all 32 bits are valid. When the system is in 16 bit mode then the data is stored as 32 bits but only bits **8 – 23** are valid as shown below the other bits should be ignored.

31 30 29 28 27 26 25 24 **23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8** 7 6 5 4 3 2 1 0

Layout

The XMX file for a single MG with 2 IM's each with four channels is given below. The example also assumes 2 trigger events. The order of the data in the file is the order it comes in from the activeX control.

General Header
Channel Header 1.1.1
Channel Header 1.1.2
Channel Header 1.1.3
Channel Header 1.1.4
Channel Header 1.2.1
Channel Header 1.2.2
Channel Header 1.2.3
Channel Header 1.2.4
Event header 1
Data header 1.1.1
Data 1.1.1
Data header 1.1.2
Data 1.1.2
Data header 1.1.3
Data 1.1.3
Data header 1.1.4
Data 1.1.4
Data header 1.2.1
Data 1.2.1
Data header 1.2.2
Data 1.2.2
Data header 1.2.3
Data 1.2.3
Data header 1.2.4
Data 1.2.4
etc
etc
Event Header 2
Data header 1.1.1
Data 1.1.1
etc
etc
Event Header -1

Pre-history

If the XMX file is storing data on the disk from a triggered event that contains a pre-history then the data is written in a circular fashion. An example is shown in the table and is data from a single channel that has a 10 buffer pre-history. Blank cells indicate that no data is written in that buffer.

Buffer Type	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8
Event Head		Full	Full	Full	Full	Full	Full	Full
pre 1		Buf 1	Buf 1	Buf 11	Buf 11	Buf 11	Buf 21	Buf 21
pre 2			Buf 2	Buf 2	Buf 12	Buf 12	Buf 22	Buf 22
pre 3			Buf 3	Buf 3	Buf 13	Buf 13	Buf 23	Buf 23
pre 4			Buf 4	Buf 4	Buf 14	Buf 14	Buf 24	Buf 24
pre 5			Buf 5	Buf 5	Buf 15	Buf 15	Buf 15	Buf 15
pre 6			Buf 6	Buf 6	Buf 16	Buf 16	Buf 16	Buf 16
pre 7			Buf 7	Buf 7	Buf 7	Buf 17	Buf 17	Buf 17
pre 8			Buf 8	Buf 8	Buf 8	Buf 18	Buf 18	Buf 18
pre 9			Buf 9	Buf 9	Buf 9	Buf 19	Buf 19	Buf 19
pre 10			Buf 10	Buf 10	Buf 10	Buf 20	Buf 20	Buf 20
data 1								Buf 25
data 2								Buf 26
data 3								Buf 27

The above table shows the first thirteen buffers after the event header. Each buffer consists of a data header followed by the data.

Stage 1 : Shows the file without any data.
Stage 2: The event header and the first buffer of data has been written
Stage 3: All of the pre-history is now full
Stage 4: The pre-history now wraps back to the start of the event.
Stage 5: The data continues into the pre-history buffer.
Stage 6: The pre-history is now full for a second time.
Stage 7: The pre-history is now full up to buffer 24 which contains the trigger.
Stage 8: The trigger has occurred so data continues after the first post history buffer.

Data is then written until the end of the recording when an event header with the event number –1 is written.

All channels follow a similar pattern.

The XMX reading software has to re-order the data in buffer order. The information required to unwind this is held in the data headers.