



ALTAIR and DeweSoft CSV Decom Parameter Import / Export

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Table of Contents

Introduction	3
Formatting Rules for the CSV file	3
CSV File Column Headers	5
Parameter Configuration	6
Polynomial Scaling	6
Decom Configuration	7
UART Configuration	8
Examples of Decom Parameters	9
Normal Commutation Example:	9
Super Commutation Example:	10
Sub Commutation Example:	12
Word Concatenation Example:	14
Spanning Multiple Words Example:.....	15

Introduction

The ALTAIR and DeweSoft CSV Decom Parameter Import / Export is a shared file format for transferring Decom Parameter between the two software packages. The Import / Export uses the Comma Separated Values (CSV) format. CSV is a common file format used in computers to represent the rows and columns found in a table. The CSV file format uses comma between value and a carriage return and line feed at the end of each line. Specifically, the CSV file format is a text-based file that can be opened in Microsoft Excel or in a text editor like Notepad. In Excel, the commas designate different columns and the carriage return and line feed combination designate different rows.

The CSV Decom Parameter file has a base of twenty-seven columns. More columns are added to the CSV file depending on the use of certain Decom features, like Frame Format Indicators, Time Trigger, and extra levels of Polynomial Scaling. This document will first address a typical CSV Decom Parameter file that uses Normal, SubComm, and SuperComm decom words.

Commutation types like Random and RandomNormal complicate the CSV Decom Parameter file. Building a Decom Parameter from multiple bit locations using the Bit Mapping table also complicates the CSV file. For more information on using Random and RandomNormal commutation or using the Bit Map Table, please contact Ulyssix.

Formatting Rules for the CSV file

There are three typical uses for the CSV Decom Parameter Import / Export. One, to transfer Decom Parameters between ALTAIR and DeweSoft. Two, to create a detailed list of the decom parameters for documentation. Three, as part of a software converter to a different format for exchanging Decom setups from other Decom Software.

The easiest way to create a CSV Decom Parameter file by hand is to use an example file created from either ALTAIR or DeweSoft. An example file is included with this manual. An example file can also be created by exporting a default a Decom setup from either ALTAIR or DeweSoft. Often times the easiest way to learn the intricacies of the CSV Decom Parameter file is to create a decom word similar to your desired setup, export the CSV Decom Parameter, and then examine the results.

Base Rules

1. Commas can not be used in strings or numbers in the CSV file because they are the delimiter for defining the column spacing.
2. All strings are case sensitive. This includes the Column Headers.
3. Some columns are Enums. These columns have a finite list of acceptable values. These values must be matched character for character (including case, punctuation, spaces, and any perceived typos or spelling errors).
4. There is not a defined limit for string length, but it is a best practice to keep names and strings as short of length as possible so that is the information readable in ALTAIR or DeweSoft.

CSV File Column Headers

The CSV File Column Headers are broken into groups. Each group contains multiple parameters. Not all groups or columns are required, but the entry cannot be blank. Default values for each column are provided in the sections below.

1. Parameter Configuration
 - a. Name
 - b. Unit
 - c. Description
 - d. Min value
 - e. Max value
 - f. Data type
 - g. Format type
 - h. Bit order
 - i. Bit mask
2. Polynomial Scaling
 - a. A0
 - b. A1
 - c. A2
 - d. A3
 - e. A4
 - f. A5
3. Decom Configuration
 - a. Comm type
 - b. Interval
 - c. Frame
 - d. Word
 - e. Bit
 - f. Length
4. UART Configuration
 - a. UART port
 - b. UART baud rate
 - c. UART bits
 - d. UART parity
 - e. UART stop bits
 - f. UART valid char

Parameter Configuration

The columns in the Parameter Configuration section define attributes for the decom parameter that do not involve the location in the frame.

- a. Name – this is a string used as the name of the decom parameter.
- b. Unit – Defines the units for the value of the decom parameter.
 - a. The default value is a dash.
- c. Description – Defines a text description for the decom parameter.
 - a. The default value is a dash.
- d. Min value – Minimum value for the parameter. Used for the default minimum value on any displays.
- e. Max value – Maximum value for the parameter. Used for the default maximum value on any displays.
- f. Data type – The formatting of the bits in the telemetry stream into a number for the decom. This is an Enum. The acceptable values are listed below:
 - a. Signed 2's com – Twos Compliment Binary notation.
 - b. Signed 1's com – One's Compliment Binary notation.
 - c. Unsigned – Unsigned Binary notation.
 - d. BCD – Binary Coded Decimal notation.
 - e. Float IBM – Floating point number based on the IBM Standard.
 - f. Float IEEE – Floating point number based on the IEEE Standard.
 - g. Float 2's com – Floating point number using two's compliment.
- g. Format type – Defines the byte order for converting bits into a decimal number. This is an Enum. The acceptable values are listed below:
 - a. Big endian – Read bytes from the big end first. This is standard for x86 and x64 CPUs.
 - b. Little endian – Read bytes from the little end first. Abnormal in computers, but sometimes used in telemetry.
- h. Bit order – Defines if the most significant bit or least significant bit is located first. This is an Enum. The acceptable values are listed below:
 - a. MSB first – the most significant bit is first.
 - b. LSB first – the least significant bit is first.
- i. Bit mask – Defines a mask applied to the bit stream extracted from the telemetry stream. The mask allows certain bits to be ignored. The Bit Mask is in hexadecimal. A "1" is defined as keeping the bit. The default value is sixteen "F." This is a 64-bit number that is all binary ones.
 - a. The default value is FFFFFFFFFFFFFFFF.

Polynomial Scaling

The columns in the Polynomial Scaling section define the coefficients for a polynomial scaling calculation. The polynomial scaling in DeweSoft defaults to six coefficients but can be increased to eight coefficients using the Import / Export GUI. ALTAIR supports six coefficients.

$$\text{Output} = A5 \cdot x^5 + A4 \cdot x^4 + A3 \cdot x^3 + A2 \cdot x^2 + A1 \cdot x + A0$$

- a. A0 – The offset of the polynomial scaling.
 - a. The default value is 0
- b. A1 – The slope term of the polynomial scaling.
 - a. The default value is 1
- c. A2 – The squared term of the polynomial scaling.
 - a. The default value is 0
- d. A3 – The power of 3 term of the polynomial scaling.
 - a. The default value is 0
- e. A4 – The power of 4 term of the polynomial scaling.
 - a. The default value is 0
- f. A5 – The power of 5 term of the polynomial scaling.
 - a. The default value is 0

Decom Configuration

The columns in the Decom Configuration section define attributes used to extract the bits for the decom parameter from the telemetry stream.

1. Comm type – Defines the commutation type of the decom parameter. This is an Enum. The acceptable values are listed below:
 - a. Normal – This is a decom parameter that occurs once per minor frame and is always in the same word location in that minor frame.
 - b. SuperComm – This is a decom parameter that occurs multiple times per minor frame with a fixed spacing between words. The spacing between words is defined in the “Interval” column.
 - c. SubComm – This is a decom parameter that always occurs in the same word but does not occur in every minor frame. A SubComm decom parameter uses the “Interval” column to define the spacing between minor frames.
 - d. Random – This is a decom parameter that occurs at random locations in a major frame. Each occurrence in the major frame must be defined by a word number and minor frame number.
 - e. RandomNormal – This is a decom parameter that occurs random places in a minor frame, but the decom parameter occurs in the same place in each minor frame. Each occurrence in the minor frame must be defined by a word number.
2. Interval – The Interval column is used for Comm Types of SuperComm and SubComm only. For SuperComm decom parameters, the Interval is the spacing between words. For SubComm parameters, the Interval is the spacing between minor frames.
 - a. The default value is 1.
3. Frame – The Frame column is only used for CommTypes of SubComm and Random. The first frame is defined as Frame 0 (this is not the IRIG standard notation. For SubComm decom

parameters, the Frame is the frame number for the first occurrence of the decom parameter. For Random decom parameters, the Frame is used to define every entry.

- a. The default value is 0.
4. Word – The word location for the decom parameter in the frame. In ALTAIR, the first word after the Frame Sync Pattern is always Word 1. Please note that in DeweSoft gives several options to the define the word number for the first word after the Frame Sync Pattern. Please contact Ulyssix for more details.
5. Bit – The start bit in the word for the decom parameter. For example, if the decom word is a 16-bit word and uses all the bits then the Bit is 15. This is standard Length – 1 notation for binary numbers.
6. Length – The number of bits used in the decom word. For example, if the decom word is a 16-bit word and uses all the bits then the length is 16.

UART Configuration

The columns in the Decom Configuration section define attributes for the UART option on the Ulyssix PCM cards. UART is a licensed feature on the Ulyssix PCM cards and is not included on most Ulyssix PCM cards. Because UART is not a standard feature, the table below only contains the default values. For more information on UART please contact Ulyssix.

1. UART port – Default value of 0.
2. UART baud rate – Default value of 9600.
3. UART bits – Default value of 8.
4. UART parity – Default value of None.
5. UART stop bits – Default value of 1.
6. UART valid char – Default value of 0.

Examples of Decom Parameters

Below are example values for the Decom Parameters in a Decom Parameter CSV file. These are examples are included in the file ALTAIRandDeweSoftDecomParamExportExample.csv.

Normal Commutation Example:

In this example, a Normal Commutated word named Counter is defined for the minor frame counter. The Unit is Raw, but could also be the default of “-“. The Description is the default value of “-“. The Counter has a minimum value of 0 and a maximum value of 63. Setting the Max value and Min value to these numbers ensures that displays, like a strip chart, are created with the right Y-axis scale. Even though the value only counts from 0 to 63, this is still a 16-bit two’s compliment number, but the negative values are not used. The Counter uses the standard Big-Endian notation and MSB first. No bits are masked off, so the Bit mask is set to the default value of FFFFFFFFFFFFFFFF (sixteen nibbles of F).

There is no polynomial scaling, so all the coefficients are set to zero except for A1. This default configuration allows for the value to be passed directly to the output without scaling

Since the Counter is normally commutated, the Interval is set to its default value of 1 and the Frame is set to its default value of 0. The Word number is set to word 1. In this instance, Word 1 is the first word after the Frame Sync Pattern, but this is dependent on the settings in DeweSoft. The Counter is 16-bits long and uses all the bits. The Bit it is set to 15 and the length is 16.

The UART section is not used, so all of its values are the default.

Name	Counter
Unit	Raw
Description	-
Min value	20
Max value	40
Data type	Signed 2's com
Format type	Big endian
Bit order	MSB first
Bit mask	FFFFFFFFFFFFFFF
A0	0
A1	1

A2	0
A3	0
A4	0
A5	0
Comm type	Normal
Interval	1
Frame	0
Word	1
Bit	15
Length	16
UART port	0
UART baud rate	9600
UART bits	8
UART parity	None
UART stop bits	1
UART valid char	0

Super Commutation Example:

In this example a Super Commutated word named Sinewave is defined. The Unit is Raw, but could also be the default of “-“. The Description is the default value of “-“. The Sinewave uses the full 16-bit two's complement range. It has a minimum value of -32768 and a maximum value of 32767. Setting the Max value and Min value to these numbers ensures that displays, like a strip chart, are created with the right Y-axis scale. The Sinewave uses the standard Big-Endian notation and MSB first. No bits are masked off, so the Bit mask is set to the default value of FFFFFFFFFFFFFFFF (sixteen nibbles of F).

There is no polynomial scaling, so all the coefficients are set to zero except for A1. This default configuration allows for the value to be passed directly to the output without scaling

The Sinewave is Super Commutated, the Interval is set to 4. The Sinewave is every fourth word in the frame starting at Word 2. The Frame is set to its default value of 0. In this instance, Word 1 is the first

word after the Frame Sync Pattern, but this is dependent on the settings in DeweSoft. The Sinewave is 16-bits long and uses all of the bits. The Bit it is set to 15 and the length is 16.

The UART section is not used, so all of its values are the default.

Name	Sinewave
Unit	Raw
Description	-
Min value	-32768
Max value	32767
Data type	Signed 2's com
Format type	Big endian
Bit order	MSB first
Bit mask	FFFFFFFFFFFFFFF
A0	0
A1	1
A2	0
A3	0
A4	0
A5	0
Comm type	SuperComm
Interval	4
Frame	0
Word	2
Bit	15
Length	16

UART port	0
UART baud rate	9600
UART bits	8
UART parity	None
UART stop bits	1
UART valid char	0

Sub Commutation Example:

In this example a Sub Commutated word named SampleCounter is defined. The Unit is Raw, but could also be the default of “-“. The Description is the default value of “-“. The SampleCounter has a minimum value of 0 and a maximum value of 63. Setting the Max value and Min value to these numbers ensures that displays, like a strip chart, are created with the right Y-axis scale. Even though the value only counts from 0 to 63, this is still a 16-bit two’s compliment number, but the negative values are not used. The SampleCounter uses the standard Big-Endian notation and MSB first. No bits are masked off, so the Bit mask is set to the default value of FFFFFFFFFFFFFFFF (sixteen nibbles of F).

There is no polynomial scaling, so all of the coefficients are set to zero except for A1. This default configuration allows for the value to be passed directly to the output without scaling.

The SampleCounter is Sub Commutated, the Interval is set to 4. The SampleCounter is Word 1 in every fourth minor frame starting in Minor Frame 3 (the first frame is defined as Minor Frame 0). In this instance, Word 1 is the first word after the Frame Sync Pattern, but this is dependent on the settings in DeweSoft. The SampleCounter is 16-bits long and uses all the bits. The Bit it is set to 15 and the length is 16.

The UART section is not used, so all of its values are the default.

Name	SampleCounter
Unit	Raw
Description	-
Min value	0

Max value	63
Data type	Signed 2's com
Format type	Big endian
Bit order	MSB first
Bit mask	FFFFFFFFFFFFFFF
A0	0
A1	1
A2	0
A3	0
A4	0
A5	0
Comm type	SubComm
Interval	4
Frame	3
Word	1
Bit	15
Length	16
UART port	0
UART baud rate	9600
UART bits	8
UART parity	None
UART stop bits	1
UART valid char	0

Word Concatenation Example:

In this example we will work with a frame that has 8-bit words and we want to combine two of these 8-bit words to define a 16-bit parameter. This 16-bit word is called Concat16. Because this 16-bit word is the combination of two 8-bit words, it will occupy two lines in the CSV file. In order for these two lines to be combined into one parameter, the two lines must have identical string in the Name Column.

The Unit is Raw, but could also be the default of “-“. The Description is the default value of “-“. The Concat16 has a minimum value of -32768 and a maximum value of 32767. This is the maximum range for a two’s compliment 16-bit number. Setting the Max value and Min value to these numbers ensures that displays, like a strip chart, are created with the right Y-axis scale. The Concat16 uses the standard Big-Endian notation and MSB first (these two parameters have a large impact on how the two 8-bit words are combined and can be used to adjust the concatenation when needed). No bits are masked off, so the Bit mask is set to the default value of FFFFFFFFFFFFFFFF (sixteen nibbles of F). There is no polynomial scaling, so all of the coefficients are set to zero except for A1. This default configuration allows for the value to be passed directly to the output without scaling.

The Start Word is different for the two lines (in yellow in the table below). Whichever line comes first will be the Least Significant Byte in the concatenation. In our example, we will use Start Words = 3 as the first line. The second line will be Start Word = 4. Both lines will have the following values with the same values: Start Frame = 0, StartBit = 7, and Length = 8.

The UART section is not used, so all of its values are the default.

Name	Concat16	Concat16
Unit	Raw	Raw
Description	-	-
Min value	-32768	-32768
Max value	32767	32767
Data type	Signed 2's com	Signed 2's com
Format type	Big endian	Big endian
Bit order	MSB first	MSB first
Bit mask	FFFFFFFFFFFFFFF	FFFFFFFFFFFFFFF
A0	0	0
A1	1	1
A2	0	0
A3	0	0
A4	0	0

A5	0	0
Comm type	Normal	Normal
Interval	1	1
Frame	0	0
Word	3	4
Bit	7	7
Length	8	8
UART port	0	0
UART baud rate	9600	9600
UART bits	8	8
UART parity	None	None
UART stop bits	1	1
UART valid char	0	0

Spanning Multiple Words Example:

In this example we will work with a frame that has 8-bit words and we want to combine two of these 8-bit words to define a 16-bit parameter. This 16-bit word is called Span16. Span16 will start in the word with lowest word number and span into the adjacent word with a higher word number. For example, by setting Word to 3 the parameter can span into Word 4.

The Unit is Raw, but could also be the default of “-“. The Description is the default value of “-“. The Span16 has a minimum value of -32768 and a maximum value of 32767. This is the maximum range for a two’s compliment 16-bit number. Setting the Max value and Min value to these numbers ensures that displays, like a strip chart, are created with the right Y-axis scale. The Span16 uses the standard Big-Endian notation and MSB first (these two parameters have a large impact on how the two 8-bit words are combined and can be used to adjust the concatenation when needed). No bits are masked off, so the Bit mask is set to the default value of FFFFFFFFFFFFFFFF (sixteen nibbles of F). There is no polynomial scaling, so all of the coefficients are set to zero except for A1. This default configuration allows for the value to be passed directly to the output without scaling.

In our example, we will use Start Words as 3, Start Frame as 0, Start Bit as 7, and Length as 16. This will create a 16-bit word that starts in Bit 7 of Word 3 and spans to Bit 0 of Word 4.

The key thing to remember about spanning across word boundaries is that the Parameter is created from Start Bit in the Word you choose and then spans the number of bits defined in Length. This spanning always goes to the higher word numbers.

Name	Span16
Unit	Raw

Description	-
Min value	-32768
Max value	32767
Data type	Signed 2's com
Format type	Big endian
Bit order	MSB first
Bit mask	FFFFFFFFFFFFFFF
A0	0
A1	1
A2	0
A3	0
A4	0
A5	0
Comm type	Normal
Interval	1
Frame	0
Word	3
Bit	7
Length	16
UART port	0
UART baud rate	9600
UART bits	8
UART parity	None
UART stop bits	1
UART valid char	0