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Road vehicles — Multimedia data exchange format for impact tests

Véhicules routiers — Format d'échange de données multimédia pour les essais de choc

Related electronic document A

Examples and hints

— Version 1.3 —

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RED A : Examples and hints

A.1 Examples of files

A.1.1 Example of test descriptor file

File name : 2001ISO1.MME

Data format edition number :1.3
Laboratory name :ALPHA Car Test Laboratory
Laboratory contact name :Frank N. Stein
Laboratory contact phone :+49-222/123-4567
Laboratory contact fax :+49-222/123-8901
Laboratory contact email :frank.stein@alpha.cartest.com
Laboratory test ref. number :2001WG3
Customer name :ISO/TC22/SC12/WG3 Safety Laboratory
Customer test ref. number :2001ISO1
Customer project ref. number :ISOTC22
Customer order number :SC12WG3
Customer cost unit :2001/0
Customer test engineer name :Mary Land
Customer test engineer phone :+44-123/555-123
Customer test engineer fax :+44-123/555-456
Customer test engineer email :mary.land@iso.tc22.sc12.wg3.uk
Title :Simulation Test
Medium No./number of media :1/1
Timestamp :2001-07-07 09:25:15
Type of the test :Vehicle into Vehicle
Subtype of the test :40% Offset both
Regulation :AMS
Reference temperature :285.5
Relative air humidity :75
Date of the test :2001-03-03
Number of test objects :2
Comments :
Comments : The following block describes test object 1
Comments :
Name of test object 1 :Vehicle A
Velocity test object 1 :15.72
Mass test object 1 :1430.00
Driver position object 1 :1
Impact side test object 1 :FR
Type of test object 1 :1
Class of test object 1 :A0
Code of test object 1 :LittleCar
Ref. number of test object 1 :007-008
Comments :
Comments : The following block describes test object 2
Comments :
Name of test object 2 :Vehicle B
Velocity test object 2 :0.00
Mass test object 2 :1500.00
Driver position object 2 :1
Impact side test object 2 :LE
Type of test object 2 :2
Class of test object 2 :C
Code of test object 2 :BigCar
Ref. number of test object 2 :1111-012

A.1.2 Example of test comment file

File name : 2001ISO1.TXT

The car to car test was performed on 3rd of March 2001 at ALPHA Car Test Laboratory. The airbags of vehicle A had to be exchanged before the test. ...

A.1.3 Example of channel comment file

File name : CHANNEL.TXT

Following problems occurred:
11HEAD0000H3ACXA: large deviations at post test calibration ...

A.1.4 Example of diagram comment file

File name : DIAGRAM.TXT

The plots and diagrams of the test are stored as postscript files. ...

A.1.5 Example of movie comment file

File name : MOVIE.TXT

The 16 mm films are scanned with an EPSILON film scanner in 1.020 x 1.360 pixel resolution. The images are resized to 576 x 768 pixel with the program TAU. The creation of the AVI container files was performed with the program AVIMAKER. ...

A.1.6 Example of photo comment file

File name : PHOTO.TXT

All pictures photographed with the ETA 007 are resized from 5.850 x 5.000 to 1.170 x 1.000 pixel. The resizing and the colour correction are performed with the program TAU. ...

A.1.7 Example of report comment file

File name : REPORT.TXT

The name of the report file is 2001ISO1_REPORT.TXT. It contains plain text with up to 80 characters per line and each line is separated by a 'carriage return' and a 'line feed' (CR/LF). ...

A.1.8 Example of static comment file

File name : STATIC.TXT

The ID-number of the points starts with 7, because the first 6 points define our reference system for side impacts. ...

A.1.9 Example of channel information file

File name : 2001ISO1.CHN

```

Instrumentation standard :ISO 6487 (1987) / SAE J211 (MAR95)
Number of channels      :13
Name of channel 001    :11HEAD0000H3ACXA / Head Acceleration X
Name of channel 002    :11HEAD0000H3ACYA / Head Acceleration Y
Name of channel 003    :11HEAD0000H3ACZA / Head Acceleration Z
Name of channel 004    :11CHST0000H3DSXC / Chest Displacement X
Name of channel 005    :14BPILLO0000ACXC / B-Pillar Acceleration X
Name of channel 006    :11NECKUP00H3FOZA / Neck upper Force Z
Name of channel 007    :11NECKUP00H3MOYB / Neck upper Moment Y
Name of channel 008    :21RIBSLEUPSIACYC / Rib left upper Acceleration Y
Name of channel 009    :21RIBSLELEOSIACYC / Rib left lower Acceleration Y
Name of channel 010    :21SPIN1200SIACYC / Spine lower (T12) Acceleration Y
Name of channel 011    :11TIBILEUPH3FOZB / Tibia left upper Force Z
Name of channel 012    :11TIBILEUPH3MOXB / Tibia left upper Moment X
Name of channel 013    :11TIBILEUPH3MOYB / Tibia left upper Moment Y
    
```

A.1.10 Example of test channel file

Filename : 2001ISO1.001

```

Test object number      :1
Name of the channel     :Head Acceleration X
Laboratory channel code :HEAD01AX
Customer channel code   :1HEAD_X_ACC
Channel code            :11HEAD0000H3ACXA
Comments                : next 4 items are optional and part of the channel code
Location                :Head (=HEAD at code position 3-6)
Dimension               :Acceleration (=AC at code position 13-14)
Direction               :Longitudinal (=X at code position 15)
Channel frequency class :1000 (=A at code position 16)
Unit                    :m/(s*s)
Reference system        :Local
Transducer type         :TAU 7270 A
Pre-filter type         :Butterworth, 6 pole
Cut off frequency       :2000.0
Channel amplitude class :2000.0
Reference channel       :implicit
Reference channel name  :NOVALUE
Data source             :transducer
Data status             :ok
Sampling interval       :0.0001
Bit resolution          :12
Time of first sample    :0.0000
Number of samples       :2500
Comments                : next 6 items for proofing
First global maximum value :+1.237802E+02
Time of maximum value    :+0.18450
First global minimum value :-5.489905E+02
Time of minimum value    :+0.06860
Start offset interval    :-0.0500
End offset interval      :+0.0000
-4.788391E-01
-7.182586E-01
...
+3.064578E+01
    
```

A.1.11 Examples of moving image information files

A.1.11.1 Example of moving image information file

File name : 2001ISO1.MII

```

Number of movies           :7
Comments                   :
Comments                   : the following block describes movie 1
Comments                   :
ID-number 1                :1
Origin 1                   :Crashtest
Description 1              :total view of vehicle A from the left side
Camera type 1              :KAPPA ROC
Camera ID-number 1        :KAPPA12
Lens ID-number 1          :14579435
Lens type 1                :Schneider
Focus 1                    :infinite
Lens focal length 1       :10
Number of images 1        :350
Film speed 1              :1000
Shutter time 1            :0.0001
Aperture 1                :5.6 - 8
Time zero 1               :50
Time vector filename 1    :NO
Reference system 1        :middle of the test block, on the floor
Location X 1              :-25.0
Location Y 1              :-9.5
Location Z 1              :1.2
Theta X 1                 :90
Theta Y 1                 :0
Theta Z 1                 :270
Width of image 1          :512
Height of image 1         :384
Aspect ratio of pixels 1  :1.00
Colour 1                  :RGB
Name of movie file 1      :LEFTATOT.AVI
Format of movie file 1    :AVI
Keyframes 1               : 3
Codec used 1              :Indeo video 5.11
Compression 1             :5.1 %
Distortion index 1        :NOVALUE
Movie images corrected 1  :NO
Correction parameter file 1 :KAPPA12_14579435.COR
Image history filename 1  :KAPPA12.IMH
Comments                   :
Comments                   : the following block describes movie 2
ID-number 2               :2
...

```

A.1.11.2 Example of image history file

File name : see MII file descriptor Image history filename i

```

Image processing system    :SICON V5.2.3
Image interpolation        :SICON V1.2
Sharpening 1              :5
Colour matrix 1           :R(113 / 38 / -50), G(-25 / 144 / -19), B(-25 / -50 / 175)
White balance 1           :175 / 175 / 240
Brightness 1              :R(15 / 135 / 255), G(15 / 135 / 255), B(15 / 135 / 255)
Contrast 1                :NOVALUE

```

Saturation 1 :1.0
Hue 1 :NOVALUE
Gamma 1 :1.5
Sharpening 2 :8

A.1.11.3 Example of correction parameter file for bundle adjustment

File name : see MII file descriptor Correction parameter file i

Distortion correction type :bundle adjustment
Pixel distance x :0.016
Pixel distance y :0.016
Principle point x :-9.38
Principle point y :-8.25
Calibrated focal length :10.128
Distortion unit :mm
Distortion correction A1 :-1.1685e-003
Distortion correction A2 :5.3873e-006
Distortion correction A3 :2.8685e-007
Distortion correction B1 :-1.4558e-005
Distortion correction B2 :-3.2337e-005
Distortion correction C1 :6.6139e-007
Distortion correction C2 :3.6798e-005
Distortion correction R0 :3.413
+Method :simple
+Date of the calibration :2001-03-03

A.1.12 Example of photo information file

File name : 2001ISO1.PHO

Number of photos :6
Comments :
Comments : the following block describes photo 1
Comments :
ID-number 1 :1
Test object number :2
Camera type 1 :ETA 007
Post-test / Pre-test 1 :POST
Description 1 :partial view of the frontcar of vehicle B
Direction 1 :right
Aperture 1 :8.0
Exposure time 1 :0.008
Comments : original area of the camerachip 5850 x 5000 pixel
Width of image 1 :1170
Height of image 1 :1000
Aspect ratio of pixels 1 :1.00
Colour 1 :RGB
Name of photo file 1 :BRIGPOST.TIF
Format of photo file 1 :TIFF
Compression 1 :LZW
Comments :
Comments : the following block describes photo 2
ID-number 2 :2
...

A.1.13 Example of static data file**File name : 2001ISO1.SD1**

Number of measurements :30
Comments : the following block describes point 1
Comments : the first point of the origin
ID-number 1 :7
...
Comments : the following block describes point 7
ID-number 007 :13
Description 007 : Suspension dome right
X Pre 007 :0.017
Y Pre 007 :-0.466
Z Pre 007 :0.545
X Post 007 :0.287
Y Post 007 :-0.398
Z Post 007 :0.589
Comments : the following block describes point 8
ID-number 008 :14
Description 008 : Sill at B-Pillar
...

A.2 Hints and changes

A.2.1 MME file

A.2.1.1 MME file - Additional descriptors

To handle the information about the test type more automatically it is meaningful to introduce additional descriptors to specify the subtype of a certain main test type and the regulation for the test. If for example the test type is a "frontal impact" possible values for subtype and regulation could be "ODB" and "Euro NCAP".

Additional descriptors for the specification of a test:

Subtype of the test	alphanumeric
Regulation	alphanumeric

A.2.2 Test channel files, CHN file and channel comment file

A.2.2.1 Test channel files - Additional descriptors

Additional descriptors for time channel reference:

Reference channel	possible values: implicit Time reference is given with the descriptor values 'Time of first sample' and 'Sampling interval' explicit Explicit time channel exists in test data. Channel name is given with the descriptor 'Reference channel name' NOVALUE No time reference is available. For example in case of constant channels (filter class 'X').
Reference channel name	Name of reference channel in test data if reference channel value 'explicit' is required. Then use ??TIRS?????TI?0 otherwise NOVALUE

Additional descriptor for channel data source and status:

Data source	possible values: transducer Channel data has been generated by transducer calculation Channel data has been calculated from other channels camera Channel data has been generated by film analysis simulation Channel data has been generated by simulation parameter Channel data can be constant or limit curve
Data status	possible values: ok channel failed meaningless data no data questionable data scaling factor applied system failed NOVALUE

The descriptor "Errors occurred" should not be used any longer.

A.2.2.2 Test channel files and CHN file - Hint: Sign convention

The directions X, Y and Z of RED B refer to the SAE J211 sign convention. For any other sign convention, which shall be defined as value of the descriptor *Instrumentation standard* in the Channel Information File or as value of the descriptor *Reference system* in every Test Channel File, the directions 1, 2 and 3 shall be used.

A.2.2.3 Test channel files - Hint: Order of fine locations

If there is a need for more than one fine location in the channel code you shall use LE / RI for fine location 1.

A.2.2.4 Test channel files - Hint: Data from film analysis

For the exchange of trajectories from film analysis it is possible to use the channel files. Up to now no specific channel code for such data is defined, but the code described in the RED B may be used. Therefore the trajectories shall be split into the distinct directions. *Test Object, Position, Main Location, Fine Locations* and *Direction* are also usable similar to transducer channels. To distinguish between film analysis data and other data use "V" as *Filter Class* for data from film analysis. For the descriptor *Data source* you shall use the value camera.

A.2.2.5 Test channel files - Hint: Barrier load cell channel code

For barrier load cells the channel code has to be L?FBAR??nnmm???? , where nn gives the row in percent of the total height and mm gives the column in percent of the total width of the load cell matrix. The values nn and mm are the positions of the load cell center rounded to the nearest integer. The barrier is seen as a vehicle with a coordinate system according to SAE J211/1 MAR95 Instrumentation for Impact Test. This means the row points into the Y-, the column into the Z-direction and the origin is in the left upper corner of the load cell matrix looking from the barrier to the other test object.

A.2.2.6 Channel comment file - Hint: Channel specific information

Channel codes may also be used to mark channel specific information.

A.2.3 MII file**A.2.3.1 MII file - Correction**

The data format for the descriptor '*Aperture i*' was specified as a float value. In practice it is often necessary to store an intermediate value like 5.6 - 8. Therefore the new data format specification is alphanumeric.

A.2.3.2 MII file - Hint: Single image sequences

In most cases of movie exchange container files like AVI are used. Especially for film analysis it could be necessary to exchange the original single images. To avoid equivocal filenames the best method is to store every sequence of single images within an own subdirectory of the movie directory. The name of the subdirectory shall be equal to the container filename without extension. The names of the single image files shall contain numbers for sorting. The descriptive parameters of the container file and the image sequence are partly different. Therefore it is necessary to use two distinct information blocks within the MII file if both are exchanged. For the whole image sequence only one descriptor '*Name of moviefile i*' can be used. It shall contain only the subdirectory name without dots and pathnames.

Example for the image sequence F00000.IMG ... F00299.IMG in the subdirectory LEFT1 together with the container file LEFT1.AVI:

```

...
Number of images 1          200
Time zero 1                5
Width of image 1           512
Height of image 1          512
Colour 1                   RGB

```

Name of movie file 1	LEFT1.AVI
Format of movie file 1	AVI
Codec used 1	Indeo video 5.11
Compression 1	5 %
...	
Number of images 2	300
Time zero 2	10
Width of image 2	1024
Height of image 2	1024
Colour 2	RGB
Name of movie file 2	LEFT1
Format of movie file 2	TIFF
Codec used 2	uncompressed
Compression 2	NOVALUE
...	

All other descriptive data should be equal for both kinds of movie.

A.2.3.3 MII file - Additional descriptors for 3D film analysis

Camera ID-number i	alphanumeric
Lens ID-number i	alphanumeric
Lens type i	alphanumeric
Focus i	alphanumeric

A.2.3.4 MII file - Additional descriptor and hint for AVI format files

Keyframes i	integer
-------------	---------

Recommended codec for the use in AVI files is Indeo® video 5.11. This codec may be used with quality value 70% and keyframes 7 to get little file sizes and at the same time achieve good visual quality.

A.2.3.5 MII file - Additional information about the history of image processing and distortion correction

A.2.3.5.1 MII file - Additional descriptors for image processing and distortion correction

The history of the image processing and also the parameters for the distortion correction may be stored in special files in the movie subdirectory referenced by:

Image history filename i	alphanumeric	according to the filename convention
Correction parameter file i	alphanumeric	according to the filename convention

Additional information about the distortion correction and the quality of the optical chain shall be given by:

Distortion index i	float	[%] Distortion index according ISO 8721
Movie images corrected i	alphanumeric	YES or NO are the images corrected with the distortion parameters?

A.2.3.5.2 Structure of an image history file

The image history file is optional. The descriptors are not mandatory. They are unique but their position order shall show the time history of the single processing steps. The numbering of the descriptors is used to decide between twice or more usage of the same processing item.

Image processing system	alphanumeric	with version number
Image interpolation	alphanumeric	with version number

Sharpening i	alphanumeric	typically 1 integer value
Colour matrix i	alphanumeric	
White balance i	alphanumeric	typically 3 integer values
Brightness i	alphanumeric	single or matrix of integer
Contrast i	alphanumeric	single or matrix of integer
Saturation i	alphanumeric	integer or float
Hue i	alphanumeric	typically integer
Gamma i	alphanumeric	typically 1 float value

A.2.3.5.3 Structure of a correction parameter file for bundle adjustment

The correction parameter file is optional. The file content for the correction method *bundle adjustment* shall be:

Distortion correction type	alphanumeric	bundle adjustment
Pixel distance x	float	[mm]
Pixel distance y	float	[mm]
Principle point x	float	deviation from the centre of the image (positive from left to right)
Principle point y	float	deviation from the centre of the image (positive from top to bottom)
Calibrated focal length	float	[mm] as positive value
Distortion unit	alphanumeric	pixel or mm unit for all following distortion parameters
Distortion correction A1	float	1. corr. coeff. for radial symmetrical distortion
Distortion correction A2	float	2. corr. coeff. for radial symmetrical distortion
Distortion correction A3	float	3. corr. coeff. for radial symmetrical distortion
Distortion correction B1	float	1. corr. coeff. for radial asymmetrical distortion
Distortion correction B2	float	2. corr. coeff. for radial asymmetrical distortion
Distortion correction C1	float	affinity
Distortion correction C2	float	non-orthogonality
Distortion correction R0	float	2. zero crossing of the distortion curve

Additional descriptors shall start with a '+' sign.

The descriptors for other correction methods shall be agreed between the partners.

A.2.4 Data exchange with the NHTSA

The additional information for data exchange with the NHTSA shall be placed in special files in the subdirectory NHTSA . For detailed specification see RED D Version 1.2 .

A.2.5 Calculated value codes and channels

It is possible now to exchange calculated value codes and channels. For detailed specification see RED E Version 1.3 .

A.2.6 Channel code – Hint: Naming convention for the position field

Positions for more than 3 passenger rows shall be named in hexadecimal notation. Therefore the old code value "D" for Motorcycle Driver is now changed into "2", the old code value "S" for Motorcycle Sozius is changed into "5".

A.2.7 MME directory structure – Hint: Missing media objects

Subdirectories and their information files for missing media objects are no longer mandatory.