SLOVENSKI STANDARD
oSIST prEN IEC 63033-1:2021

01-julij-2021

Multimedijski sistemi in oprema za vozila - Sistem prostorskega pogleda - 1. del: Splošno

Multimedia Systems and equipment for vehicle - Surround view system - Part 1: General

Systèmes et équipements multimédias pour véhicules - Système de vision panoramique - Partie 1: Généralités

Ta slovenski standard je istoveten z: prEN IEC 63033-1:2021

ICS:

33.160.60	Večpredstavni (multimedijski) sistemi in oprema za telekonference	Multimedia systems and teleconferencing equipment
43.040.15	Avtomobilska informatika. Vgrajeni računalniški sistemi	Car informatics. On board computer systems

oSIST prEN IEC 63033-1:2021 **en,fr,de**

100/3584/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 63033-1 ED1	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2021-05-21	**2021-08-13**
SUPERSEDES DOCUMENTS:	
100/3512/CD, 100/3577/CC	

IEC TA 17 : MULTIMEDIA SYSTEMS AND EQUIPMENT FOR VEHICLES

SECRETARIAT:	SECRETARY:
Korea, Republic of	Mr Ock-Woo Nam
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐
	Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Multimedia Systems and equipment for vehicle - Surround view system - Part 1: General

PROPOSED STABILITY DATE: 2024

NOTE FROM TC/SC OFFICERS:

In the voting for the maintenance of 63033-1,2,3 and 4, the 63033-1 and 4 received comments.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MULTIMEDIA SYSTEMS AND EQUIPMENT FOR VEHICLES – SURROUND VIEW SYSTEM

Part 1: General

FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 63033-1 has been approved to be transformed into International Standards by technical area 17: Multimedia systems and equipment for vehicles of IEC technical committee 100: Audio, video and multimedia systems and equipment.

126 The text of this International Standard is based on the following documents:

FDIS	Report on voting
100/XX/FDIS	100/XX/RVD

127
128 Full information on the voting for the approval of this International Standard can be found in
129 the report on voting indicated in the above table.

130 This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

131 A list of all parts in the IEC 63033 series, published under the general title *Multimedia*
132 *systems and equipment for vehicles – Surround view system*, can be found on the IEC
133 website.

134 The committee has decided that the contents of this document will remain unchanged until the
135 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
136 the specific document. At this date, the document will be

137 • reconfirmed,
138 • withdrawn,
139 • replaced by a revised edition, or
140 • amended.

141

142 The National Committees are requested to note that for this document the stability date
143 is ....

144 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE
145 DELETED AT THE PUBLICATION STAGE.

146

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INTRODUCTION

The purpose of this document is to specify the model for generating the surrounding visual image of the drive monitor system which provides car users with its visual image. The surround view system is specified by the function of the audiovisual monitoring and recording as car multimedia systems and equipment.

To ensure car position, the rear-view monitor for parking assistance, the blind corner monitor for displaying views of the blind spots at the bad crossing of the prospect, and the bird's-eye view monitor are used. But each surround view system provides a different view to the eye point of car driver. It's a heavy burden for a car driver to switch between these systems and quickly recognize the multiple fields of view. And the fields of view are limited to these camera systems and they cannot freely change the eye point depending on the driving situation. Thus, the usage range of these systems is limited to such as parking assistance. Furthermore, on commercial vehicles such as trucks and buses, and special vehicles such as construction machinery and agricultural machinery, the usage range of these systems is even more limited. Nobody can assist the car driver in ensuring the car's correct position.

In order to solve these problems, this document specifies the model for generating the surrounding visual image of the surround view system, which provides car users with its visual image. With this surround view system, it is possible to quickly ensure the car's good positioning in various driving situations. And not only for passenger cars, but good positioning can also be quickly ensured for commercial vehicles and special vehicles.

Part 1 specifies the model for generating the surrounding visual image of the surround view system. Part 2 specifies the information sets that are provided by the surround view system, and recording methods for that information and visual images. Part 3 specifies the measurement methods of surrounding visual images for the surround view system.

MULTIMEDIA SYSTEMS AND EQUIPMENT FOR VEHICLES – SURROUND VIEW SYSTEM

Part 1: General

1 Scope

This part of IEC 63033 specifies the model for generating the surrounding visual image of the surround view system.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
car
any kind of powered wheeled vehicle

3.2 Abbreviated terms

3D	three dimensional
camera ECU	camera electronic control unit
CAN	controller area network
GUI	graphical user interface

4 System model

4.1 General

The system model of the drive monitor system is described in Figure 1. Cameras, which are mounted on the outside of the car, capture the visual image of outside the car and these visual data are projected onto a 3D projection surface. It can then be displayed as a composite image. The images can be rendered from various viewpoints with the capturing parameters. The number of cameras required on vehicles other than passenger cars may be more than four depending on the size and shape of the car. This model defines the system with four cameras as a general application. The number of cameras actually used for each composite image changes depending on the viewpoint. The mounting positions and angles for the four cameras should be calibrated according to the data described in 4.2 and 4.3.

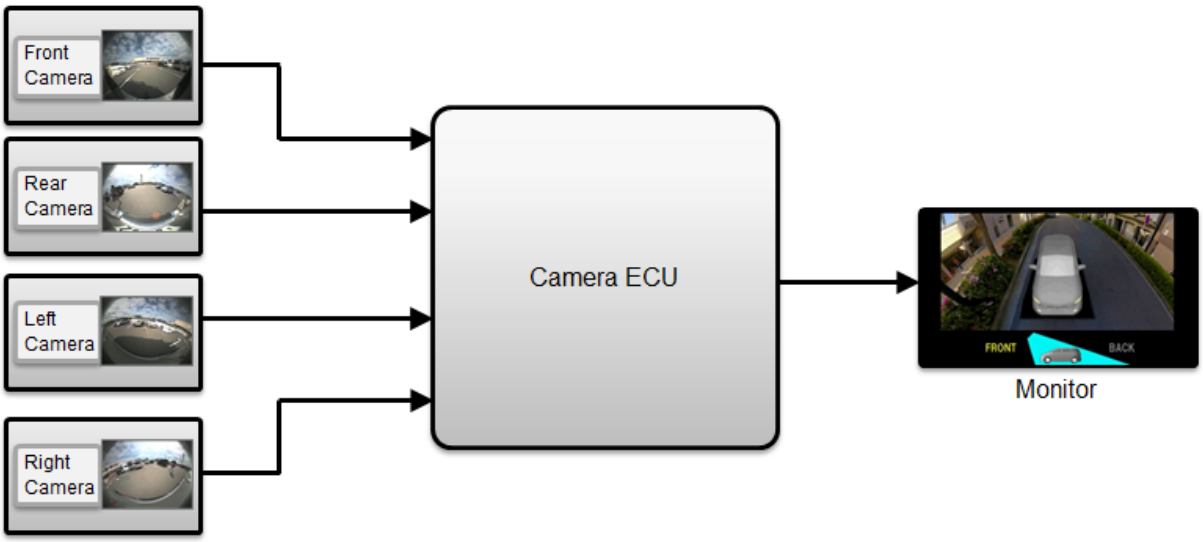

Figure 1 – System model for surround view system

4.2 Number of cameras and camera field of view

The horizontal angle of view of the camera is described in Figure 2. Overlapping areas and blind spots on the horizontal field of view change depending on the number of cameras and the horizontal angle of view of the camera. Overlapping areas should be wide for getting better composite views. The number of cameras and the horizontal angle of view of the camera should be determined for ensuring there are no blind spots. Vertical angle of view and tilt angle ψ_{Front} of the front camera and vertical angle of view and tilt angle ψ_{Rear} of the rear camera is described in Figure 3. The blind spot of the vertical field of view changes depending on the vertical angle of view of the camera and the tilt angle ψ. The vertical angle of view of the camera and the tilt angle ψ should be decided for ensuring that no blind spots are generated. The details are described in Annex A.

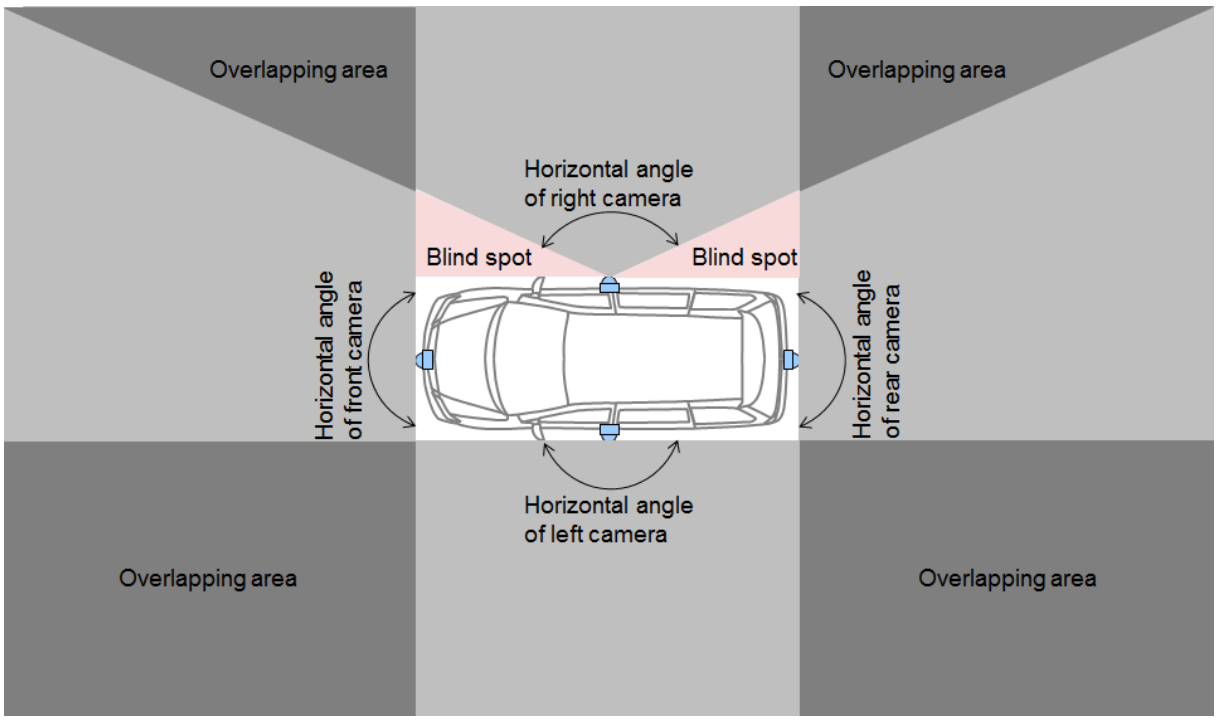

Figure 2 – Horizontal angle of view of the camera

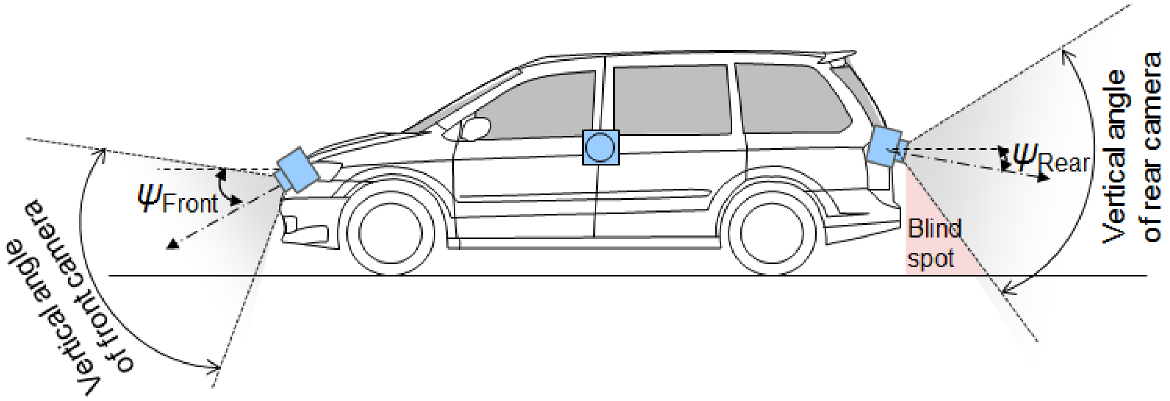

Figure 3 – Vertical angles of view at the camera

4.3 Method for projecting visual image to 3D projection surface

Following the right-handed coordinate system, the length of the car is the Y_{car} axis, the width direction of the car is X_{car} axis and the upper part is the Z_{car} axis. The projection surface of the camera video image is Z_V = 0, the road surface. The 3D projection surface that should be used is described in Figure 4. Projecting to a 3D projection surface is described in Figure 5. The 3D projection surface should deal with 3D surface as the polygon model is similar to a polyhedron. P_V of the one point at 3D projection surface is converted to P_C of the coordinate value at camera coordinate system is based on the optics origin of the car's cameras. This coordinate conversion is defined as:

$$P_C = M_{V \to C} \times P_V$$

$M_{V \to C}$ is the coordinate conversion matrix to the car coordinate system is fixed by the camera mounted position and the angle for the car coordinates. Incident vector V_i when the car's camera photographs the subject at position P_C is defined as:

$$V_i = -\frac{P_C}{|P_C|}$$

The coordinates of the car's camera image records the subject of incident vector V_i calculated by the internal parameter of the car's camera. Projecting the car's cameras to a 3D projection surface is realized by arranging the pixels of four cameras with the relations mentioned above.