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To whom it may concern:

I, Frank McGee, a translator fluent in the Japanese and English languages, on behalf of Morningside Translations, do solemnly and sincerely declare that the following is, to the best of my knowledge and belief, an accurate translation of the accompanying Japanese Patent Application No. JP02117935U filed on March 10, 1989, titled Visibility Assisting Device.

*Frank McGee*

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Signature

April 16, 2015

Date

**VALEO EXHIBIT 1005**  
*Valeo v. Magna*  
**IPR2015-\_\_\_\_\_**

**VALEO EX 1005 001**

(19) Japan Patent Office (JP)  
(12) Gazette of Unexamined Utility Model Publications (U)

(11) Unexamined Utility Model Publication Number: 2-117935  
(43) Unexamined Utility Model Publication Date: September 21, 1990

(51) Int. Cl. <sup>5</sup>	Identification Code	Internal File Nos.
B 60 R	1/00	7812-3D
H 04 N	7/18	J 7033-5C

Request for Examination: Not Yet Received  
Number of Claims: 1 (Total of ... Pages)

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(54) Title of Utility Model: Visibility Assisting Device For Vehicle Occupant

(21) Application Number: 1-27739

(22) Application Date: March 10, 1989

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## Specification

### 1. Title of the Utility Model

Visibility Assisting Device For Vehicle Occupant

### 2. Claims

A visibility assisting device for a vehicle occupant comprising an image synthesizing means for creating a series of synthesized images from video output from a plurality of imaging devices installed in a vehicle for imaging the situation outside of the vehicle including the field of view of the occupant, and a display means for displaying the synthesized image information from the image synthesizing means at a location visible to the occupant inside the cabin.

### 3. Detailed Description of the Utility Model

(Field of Industrial Applicability)

The present utility model relates to a visibility assisting device for a vehicle occupant which synthesizes and displays inside the cabin video from a plurality of imaging devices installed in the vehicle.

(Prior Art)

A single video camera is sometimes used to record a portion outside of the field of vision of the vehicle occupant (driver) and display the video at a location visible to the occupant inside the cabin. This is used, for example, to allow the driver of a large bus to view the situation behind the vehicle in order to prevent collisions when the vehicle is backing up (traveling in reverse).

(Problem to be Solved by the Utility Model)

However, the device would be even more effective and useful if the situation outside of the vehicle viewed by the driver from the driver's seat included not only a localized area captured by a single camera, but the entire situation outside of the vehicle including a wide area beyond the field of view of the driver from the driver's seat in front of or behind the vehicle.

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It is an object of the present utility model to solve this problem by providing a visibility assisting device for a vehicle occupant enabling a vehicle occupant from an occupant's seat to view a series of synthesized images synthesized from video images captured by a plurality of imaging devices installed facing the front or rear of the vehicle.

(Means for Solving the Problem)

The present utility model achieves this object by providing a visibility assisting device for a vehicle occupant comprising an image synthesizing means for creating a series of synthesized images from video output from a plurality of imaging devices installed in a vehicle for imaging the situation outside of the vehicle including the field of view of the occupant, and a display means for displaying the synthesized image information from the image synthesizing means at a location visible to the occupant inside the cabin.

(Operation)

In the visibility assisting device for a vehicle occupant of the present utility model, when video output from the plurality of imaging devices is inputted to the image synthesizing means, the image synthesizing means synthesizes the video output while correcting for overlap in the video output to create a series of images, and the series of images is displayed on a display means at a location visible from an occupant's seat inside the vehicle.

(Examples)

The following is an explanation of a visibility assisting device for a vehicle occupant in an example of the present utility model. FIG. 1 is a top view of a vehicle showing an example of imaging device installation for the device, FIG. 2 is a block diagram showing the overall configuration of the device, and FIG. 3 is a diagram showing the synthesized areas in the displayed image. In these drawings, identical components are denoted using the same reference numbers.

First, in the present example, as shown in FIG. 1, three cameras 1, 2, 3 are installed along the edge of the roof of the vehicle A as imaging devices for capturing video in front of the vehicle A. The cameras are oriented differently so as to sufficiently cover the entire field of view of the occupant. The cameras are also arranged so that adjacent portions of each captured image partially overlap. Note that cameras 1-3 are not staggered vertically when attached.

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As shown in FIG. 1, the cameras 1-3 are installed in a radial pattern with the cameras 1-3 centered on a single axis. However, the following arrangements may also be considered.

(1) The cameras 1-3 may be installed in a single row and arranged at a predetermined interval.

(2) The cameras 1-3 may be installed in a central location behind the windshield.

(3) The cameras 1-3 may be installed behind the windshield and along the edge of the roof directly in front of the driver (shifted towards the driver from the central location).

The arrangement of the cameras may be altered depending on the type of vehicle and the location of the driver's seat so that the field of vision is not obstructed by such objects as the front pillar.

In order to capture images of the situation behind the vehicle, multiple cameras, for example, three cameras 1', 2', 3', may be installed in the rear portion of the vehicle A so as to face the rear of the vehicle A in a manner similar to the cameras facing forward.

In this situation, the following arrangements may be considered for the cameras 1'-3'.

(1) The cameras 1'-3' may be installed in a pattern radiating from a single point.

(2) The cameras 1'-3' may be installed in a single row and arranged at a predetermined interval.

(3) The cameras 1'-3' may be installed in a central location along the edge of the roof (see the dotted lines in FIG. 1).

(4) The cameras 1'-3' may be installed in a central location along the outer edge of the rear window (see the solid lines in FIG. 1).

(5) The cameras 1'-3' may be installed in above or below a central location inside the rear window.

The arrangement of the cameras may be altered depending on the type of vehicle so that the entire field of vision behind the vehicle is covered.

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