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(54) Driver guidance system for motor vehicle

(57) The position of a vehicle is determined by dead-reckoning and is displayed as shown on a cathode ray tube. As the vehicle approaches a predetermined position such as V_1; V_2; V_3 the guide system produces a make-turn instruction, the direction of which may be either predetermined or determined from the bearing of the next predetermined point or destination D. The indication may be supplemented by e.g. a buzzer.

FIG.2

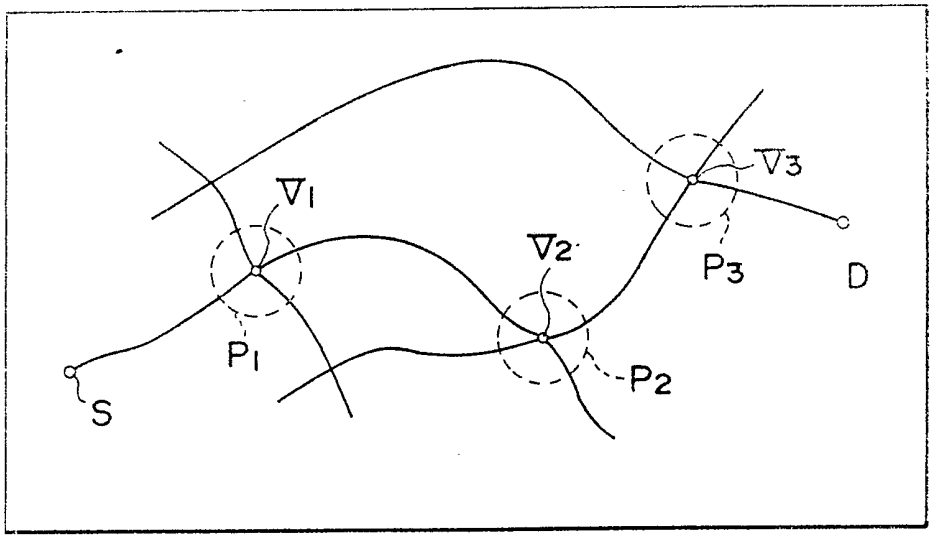

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FIG.1

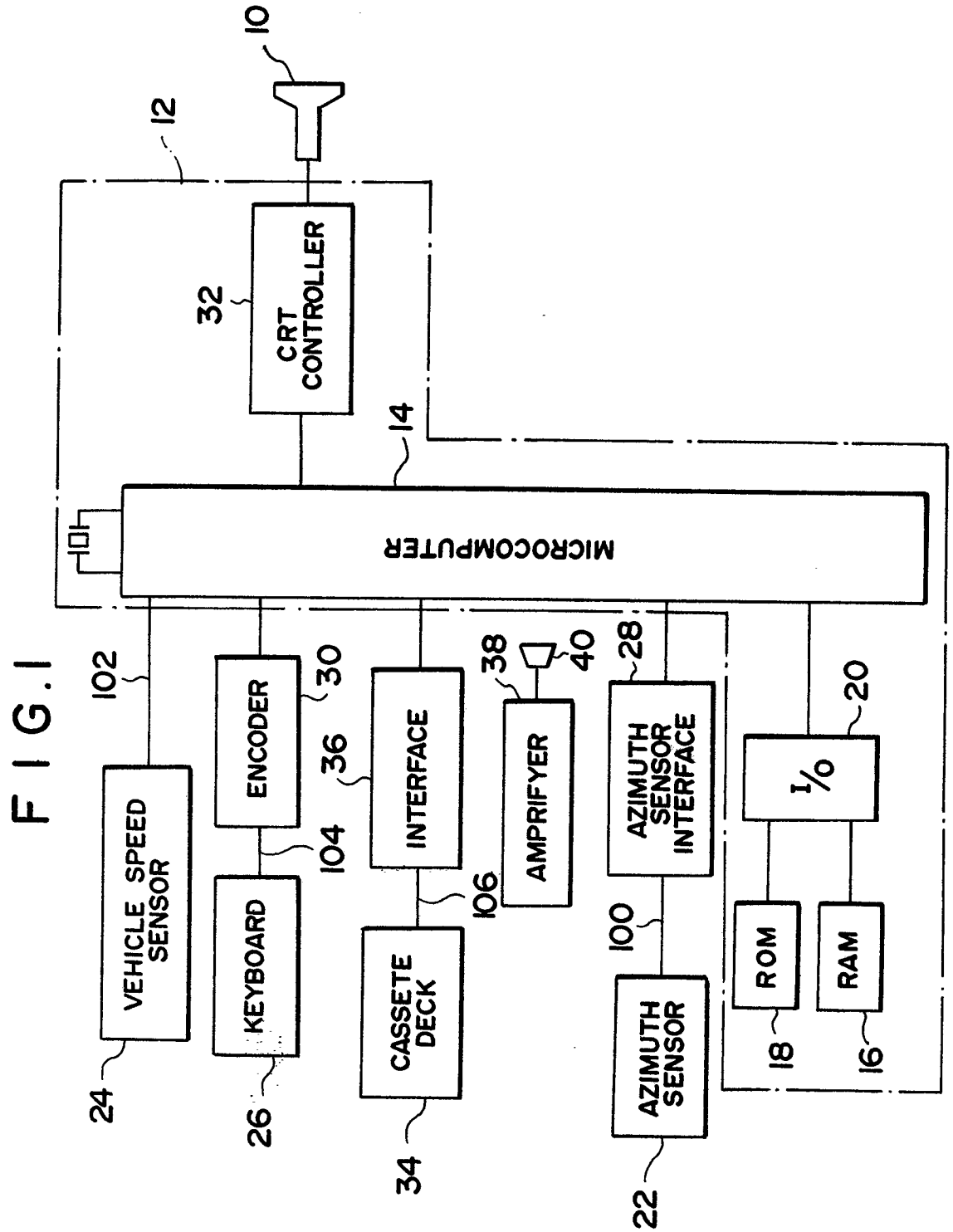

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FIG.2

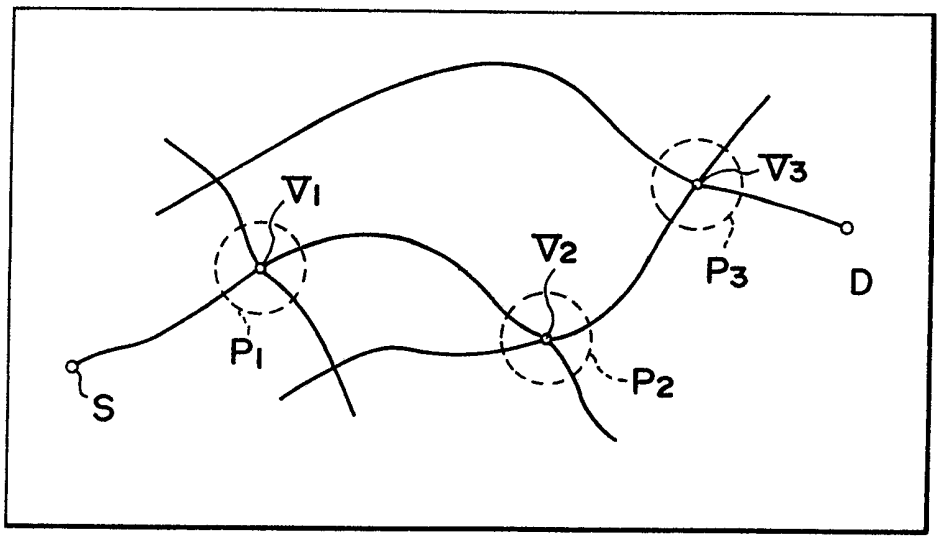

FIG.3

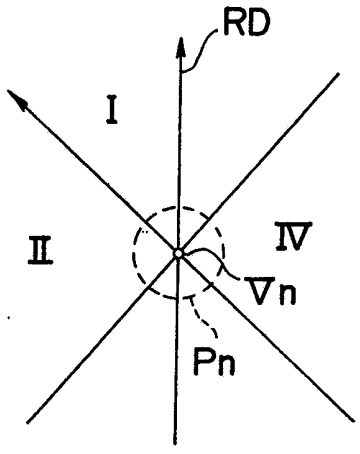

FIG.4

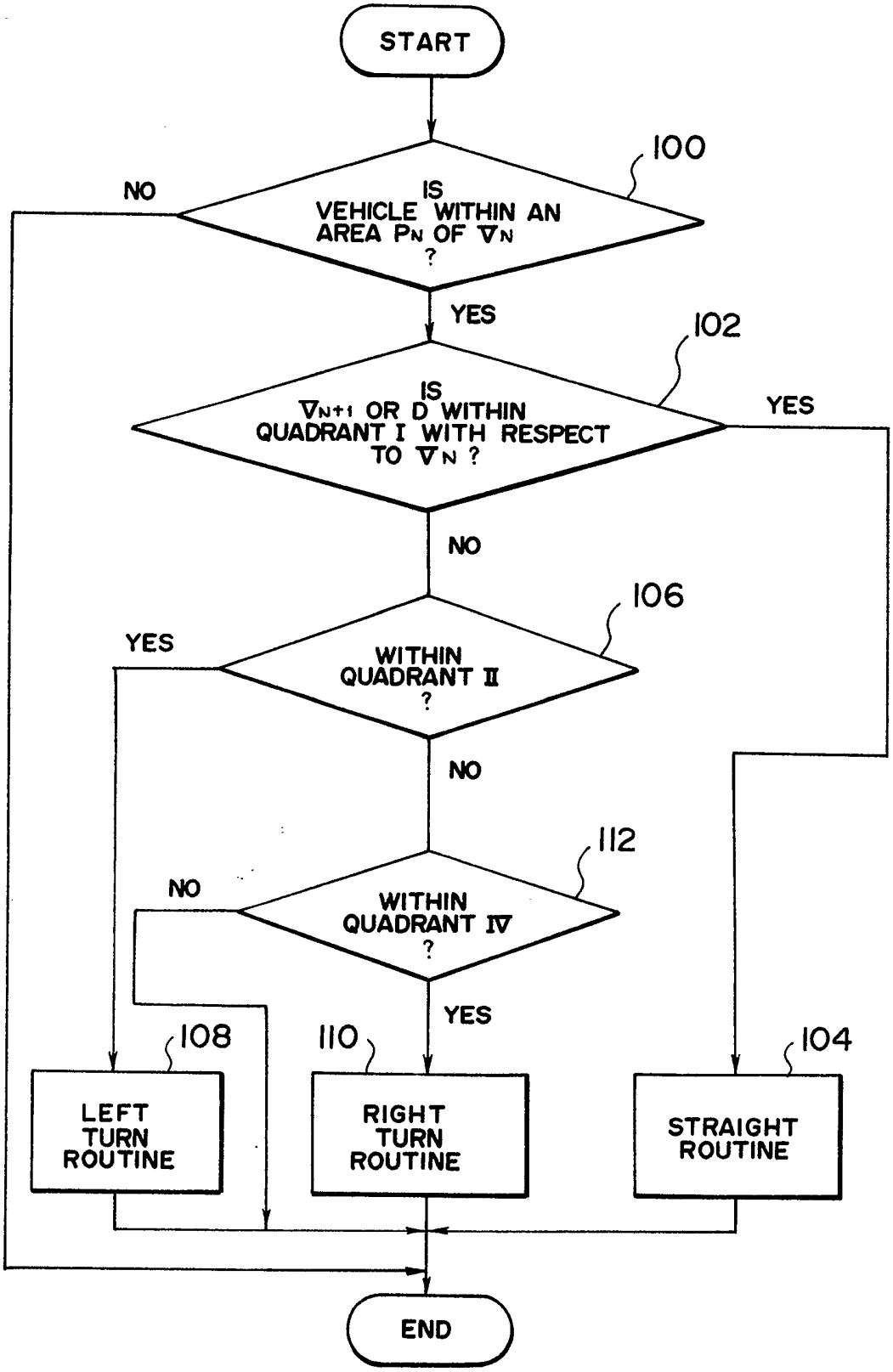
START
100
IS VEHICLE WITHIN AN AREA P_N OF ∇_N ?
NO
YES
102
IS ∇_{N+1} OR D WITHIN QUADRANT I WITH RESPECT TO ∇_N ?
YES
NO
106
WITHIN QUADRANT II ?
YES
NO
112
WITHIN QUADRANT IV ?
NO
YES
108
LEFT TURN ROUTINE
110
RIGHT TURN ROUTINE
104
STRAIGHT ROUTINE
END

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FIG.5

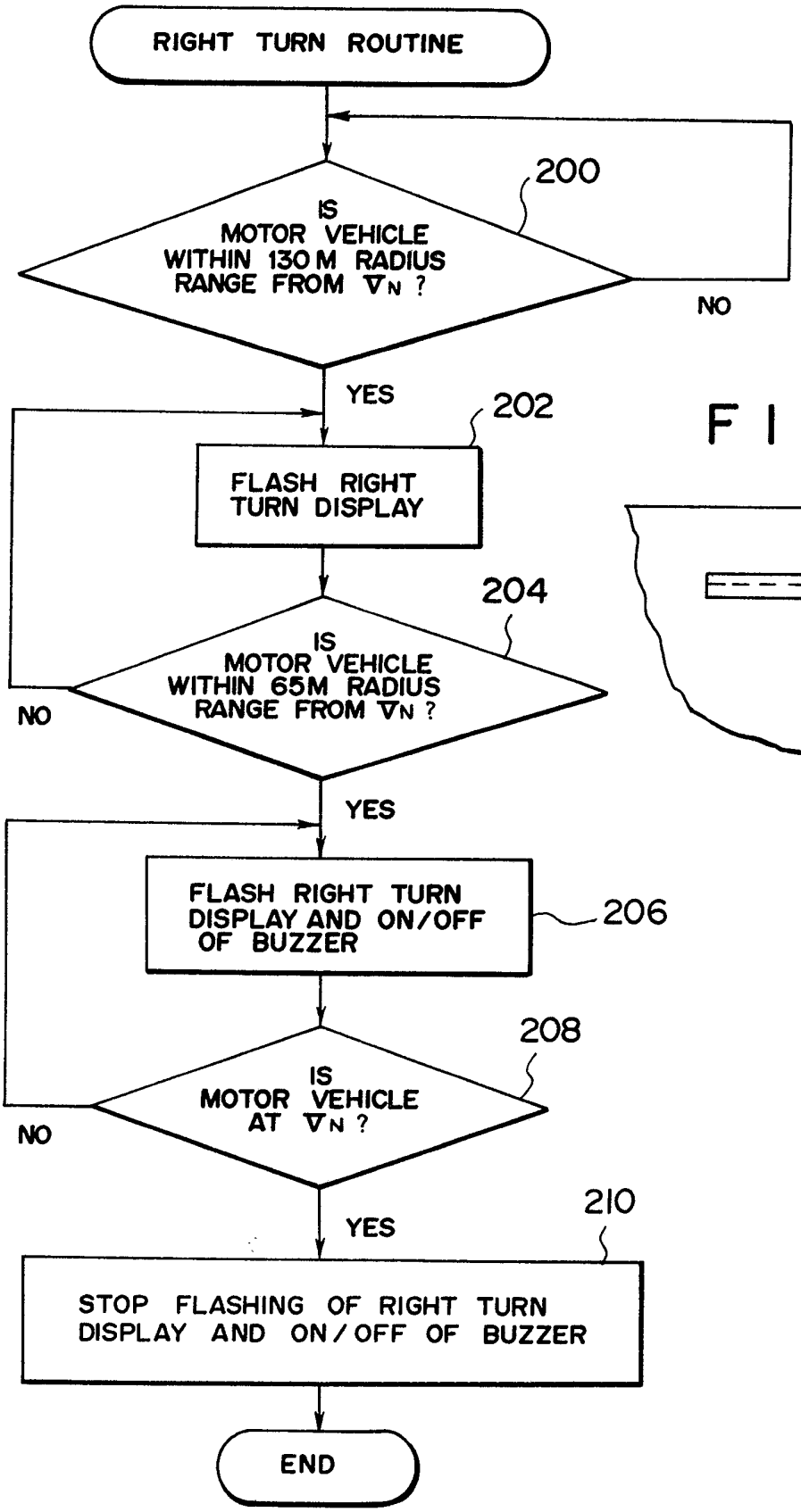

FIG.6

SPECIFICATION

Drive guide system for motor vehicle

The present invention relates to a drive guide system for a motor vehicle, and more particularly to a drive guide system for a motor vehicle suitable for guiding the drive of the motor vehicle by displaying a drive route map to a destination point of the motor vehicle and a drive locus.

The drive guide system has a display such as a CRT on which the drive route map to the destination point of the motor vehicle, the drive locus of the motor vehicle and the destination point to guide the motor vehicle to the destination point are displayed.

A prior art drive guide system can display the drive route map to the destination point of the motor vehicle and the drive locus but cannot display a direction of travel of the motor vehicle to be taken at a target point (e.g. a cross-point) on the drive route to the destination. Accordingly, a driver must determine the direction of travel of the motor vehicle at the target point by referring a map.

It is an object of the present invention to provide a drive guide system for a motor vehicle which can inform to a driver of a direction of travel of the motor vehicle to be taken near a target point on a drive route of the motor vehicle.

In accordance with the present invention, there is provided a drive guide system for a motor vehicle comprising:

(A) A travel distance sensor for sensing a travel distance of said motor vehicle;

(B) an azimuth sensor for sensing a direction of travel of said motor vehicle;

(C) a display controlled by display control means for displaying a road map, a start point, a destination point, a target point therebetween, and a current position of said motor vehicle derived from a distance signal from said travel distance sensor and an azimuth signal from said azimuth sensor;

(D) input means for inputting information on said road map, said start point, said destination point and said target point to said display control means; and

(E) alarm means for outputting a direction of travel to be taken by said motor vehicle when said motor vehicle approaches to said target point.

According to the present invention, the direction of travel of the motor vehicle to be taken can be informed to the driver in advance to a predetermiend target point between a start point and a destination point of the motor vehicle, so that the driver drives the motor vehicle to the destination point without drive route map.

In the drawings:—

Fig. 1 shows a configuration of one embodiment of the present invention,

Fig. 2 illustrates setting of position information of a target point of the motor vehicle,

Fig. 3 illustrates sectioning of quadrants to a direction of travel of the motor vehilcle,

Fig. 4 shows a flow chart for determining the direction of travel of the motor vehicle,

Fig. 5 shows a flow chart for a right turn routine, and

Fig. 6 shows an example of right turn display.

Fig. 1 shows one embodiment of the present invention which uses a CRT 10 as a display for displaying a drive locus of a motor vehicle. A display screen on the CRT 10 has a resolution power of 256 dots in horizontal line by 192 dots in vertical line and information including the drive locus and a target point is displayed by selected dots on the coordinates. Numeral 12 denotes a display control unit for controlling the CRT 10 which comrises a microcomputer 14 for carrying out various arithmetic and logic operations, a RAM 16, a ROM 18, an interface 20 between the microcomputer 14 and the RAM 16 and the ROM 18 and a CRT controller 32 which is controlled by the microcomputer 14. An azimuth sensor 22 for sensing an azimith of travel of the motor vehicle, a vehicle speed sensor 24 as a travel distance sensor for sensing a travel distance of the motor vehicle and a keyboard 26 for entering various instruction data including the azimuth data and the distance data to the microcomputer 14 are provided. An azimuth signal 100 from the azimuth sensor 22 is supplied to the microcomputer 14 through the interface 28, a distance signal 102 from the vehicle speed sensor 24 is directly supplied to the microcomputer 14, and instruction data 104 from the keyboard 26 are supplied to the microcomputer 14 through an encoder 30.

A casette deck 34 is provided to present map information of a drive route map to the destination point of the motor vehicle. When a casette tape is loaded to the cassette deck 34, a video signal 106 is supplied from the cassette deck 34 to the microcomputer 14 through a cassette interface 36. A speaker 40 is connected to the cassette interface 36 through an audio amplifier 38 to produce a sound signal such as a guidance for the map or an alarm.

In the present embodiment thus constructed, the drive route map to the destination point of motor vehicle is displayed on the display screen of the CRT 10 in accordance with the video signal 106 from the cassette deck and the drive locus is displayed on the map in accordance with the vehicle speed signal 102 and the azimuth signal 100 as the motor vehicle travels.

Referring to Fig. 2, assuming that the motor vehicle is to travel from a start point S to a destination point D via target points V_1, V_2 and V_3, position information on the start point S, the target points V_1, V_2 and V_3 and the destination point D are entered by the keyboard 26. The position information is set by the coordinates of the display screen. Areas P_1, P_2 and P_3 at which the display of the direction of travel of the motor vehicle is started are set at the target points V_1, V_2 and V_3, respectively. The areas P_1, P_2 and P_3 each has a radius of 130 meters centered at the target points V_1, V_2 and V_3, respectively. The position

data of the areas P_1, P_2 and P_3 are prerecorded on the cassette tape and it is read out and stored in the RAM 16 when the map information recorded on the cassette tape is read. When the drive locus of the motor vehicle is displayed in one of those areas P_1, P_2 and P_3, the microcomputer 14 carries out an operation to display the direction of travel to be taken by the motor vehicle.

The detection of the direction of travel of the motor vehicle is now explained.

Referring to Fig. 3, an area sectioned by a pair of 45° lines with respect to the direction of travel RD of the motor vehicle, centered at the target point Vn, is defined as a first quadrant, an area which is left-adjacent to the first quadrant is defined as a second quadrant and an area which is right-adjacent to the first quadrant is defined as a fourth quadrant. When the motor vehicle position is displayed in the area Pn of the target point Vn, the direction of travel of the motor vehicle is determined depending on which quadrant the next target point V_{n+1} or the destinatin point D is included in. The determination of the direction of travel of the vehicle is done by a conventional technique.

More specifically, the direction of travel of the motor vehicle is determined in accordance with a sequence shown in a flow chart of Fig. 4. As the motor vehicle travels along the drive route in accordance with the drive route map to the destination point, it is checked in a step 100 if the drive locus at a current position of the motor vehicle is within the area Pn of the target point Vn. If the decision in the step 100 is NO, the process goes to END and carries out other routine. If the decision in the step 100 is YES, the process goes to a step 102 where it is checked if the next target point V_{n+1} or the destination point D is within the first quadrant shown in Fig. 3 with respect to the target point Vn. If the decision in the step 102 is YES, the process goes to a step 104 to carry out a straight routine. If the decision in the step 102 is NO, the process goes to a step 106 where it is checked if the next target point V_{n+1} or the destination point D is within the second quadrant with respect to the target point Vn. If the decision in the step 106 is YES, the process goes to a step 108 to carry out a left turn routine. If the decision in the step 106 is NO, the process goes to a step 112 where it is checked if the next target piont V_{n+1} or the destination point D is within the fourth quadrant with respect to the target point Vn. If the decision in the step 112 is YES, the process goes to a step 110 to carry out a right turn routine. If the decision in the step 112 is NO, the process goes to the END to carry out other routine.

Referring to a flow chart of Fig. 5, the right turn routine is explained.

When the process has been shifted to the right turn routine in the step 110 shown in the flow chart of Fig. 4, the right turn routine shown in Fig. 5 is carried out. In a step 200, it is checked if the drive locus of the motor vehicle is within the area Pn of the target point Vn. If the decision in the step 200 is NO, the step 200 is repeated again. If the decision in the step 200 is YES, the process goes to a step 202 where a display indicating the right turn as shown in Fig. 6 is flashed on the display screen of the CRT 10, and the process then goes to a step 204 where it is checked if the drive locus of the motor vehicle has reached within a 65 meter radius area centered at the target point Vn. If the decision in the step 204 is NO, the steps 202 and 204 are repeated again. If the decision in the step 204 is YES, the process goes to a step 206 where the right turn display is flashed and an intermittent sound is generated from the speaker 40 to inform to the driver of the approach of the motor vehicle to the target point Vn. Then, in a step 208, it is checked if the drive locus of the motor vehicle has reached the target point Vn. If the decision in the step 208 is NO, the steps 206 and 208 are repeated again. If the decision in the step 208 is YES, the process goes to a step 210 where the flashing right turn display and the intermittent sound from the speaker 40 are stopped.

While the right turn routine has been explained above, the straight routine and the left turn routine are carried out in a similar manner.

In the present embodiment, when the motor vehicle approaches to the target point, the travel of direction of the motor vehicle is determined depending on which quadrant the next target point or the destination point is included in with respect to the current target point. Alternatively, the directions of travel at the respective target points may be previously determined on the map and the data of the directions of travel may be stored in the RAM 16 to allow the display of the direction of travel of the motor vehicle.

Claims

1. A drive guide system for a motor vehicle comprising:

(A) a travel distance sensor for sensing a travel distance of said motor vehicle;

(B) an azimuth sensor for sensing a direction of travel of said motor vehicle;

(C) a display controlled by display control means for displaying a road map, a start point, a destination point, a target point therebetween, and a current position of said motor vehicle derived from a distance signal from said travel distance sensor and an azimuth signal from said azimuth sensor;

(D) input means for inputting information on said road map, said start point, said destination point and said target point to said display control means; and

(E) alarm means for outputting a direction of travel to be taken by said motor vehicle when said motor vehicle approaches to said target point.

2. A drive guide system for a motor vehicle according to Claim 1 further comprising:

decision means for determining the direction of travel to be taken by said motor vehicle near said target point.

3. A drive guide system for a motor vehicle according to Claim 1 further comprising:

memory means for storing the direction of travel to be taken by said motor vehicle at said target point, said stored direction of travel of said motor vehicle being read out for display when said motor vehicle approaches to said target point.

4. A drive guide system for a motor vehicle according to Claim 1, wherein said alarm means outputs right turn information, left turn information and straight information.

5. A drive guide system for a motor vehicle according to Claim 1, wherein said alarm means outputs an alarm sound in addition to said information when said motor vehicle approaches to said target point and goes further close to said target point.

6. A drive guide system for a motor vehicle according to any one of Claim 1 to 5, wherein said alarm means is deactivated when said motor vehicle reaches said target point.

7. A drive guide system for a motor vehicle according to any one of Claims 1 to 5, wherein said display is a cathode ray tube.

8. A drive guide system for a motor vehicle, which system is substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

9. A motor vehicle having a drive guide system as claimed in any preceding Claim.

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