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(71) Applicant *(for all designated States except US)*: **HARMAN/BECKER AUTOMOTIVE SYSTEMS (BECKER DIVISION)GMBH** [DE/DE]; Im Stöckmädle 1asse 135, 76307 Karlsbad (DE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **BEHRENS, Ralph** [DE/DE]; Neue Strasse 14, 31174 Schellerten (DE). **BRANDES, Axel** [DE/DE]; Lerchenkamp 36, 31246 Lahstedt OT. Adenstedt (DE). **LAPPE, Dirk** [DE/DE]; Schilling-v.-Canstatt Str. 10A, 76228 Karlsruhe (DE). **BEHRENS, Grit** [DE/DE]; Neue Strasse 14, 31174 Schellerten (DE).

(74) Agent: **WESTPHAL, MUSSGNUG & PARTNER**; Waldstrasse 33, 78048 Villingen-Schwenningen (DE).

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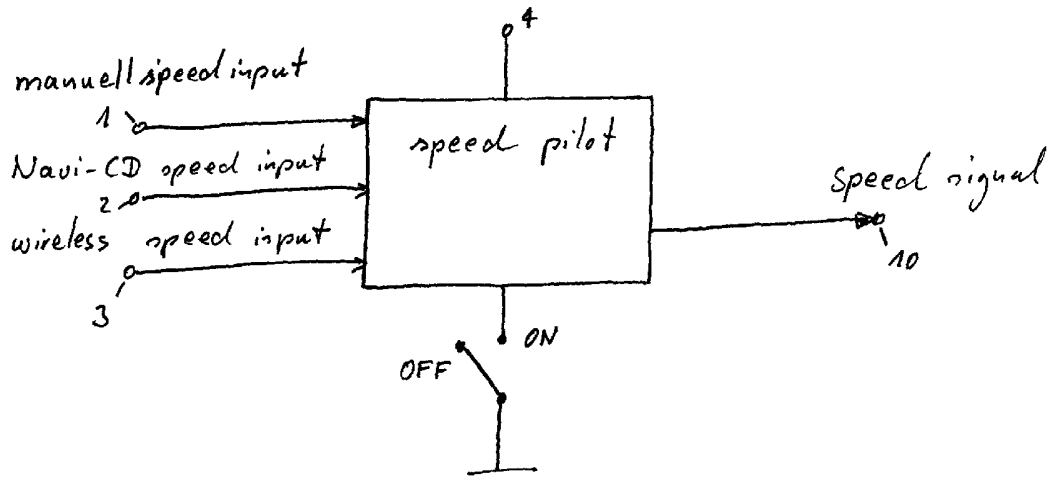
(54) Title: ADAPTIVE SPEED CONTROL SYSTEM COMPRISING A SPEED PILOT FOR AUTOMOBILES



(57) Abstract: The adaptive speed control system comprisis a speed pilot by which the speed of an automobile can be automatically hold at a first speed value. Said speed pilot is connected to an information system in which maximum speed limit information is stored. A control system is provided for changing the first speed value into a second speed value corresponding to the maximum speed limit information.

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Adaptive speed control system comprising a speed pilot for automobiles

This invention relates to an adaptive speed control system comprising a speed pilot for automobiles according to the preamble of claim 1.

Speed pilots as such are known. An example for such speed pilot is disclosed in DE 100 06 780 C1.

With such speed pilots the driver of an automobile can adjust the speed of his car, so that driving at constant velocity is possible. The driver only needs to push a button inside the car and then the actual speed is hold. Usually, the activation of the speed pilot is done on motorways, because there it is possible to hold the speed over a relative long period of time. Using such speed control within a city or town is not reasonable since the driver has to change velocity rather often.

If the driver drives with an activated speed pilot and, therefore, at constant speed on a motorway, he has to reactivate the speed pilot if suddenly there is a speed limit on the motorway due to road works or any other speed reducing situations. Usually, reduction of speed needs to be done by hand.

The object of the present invention is to find a new speed pilot which is more comfortable for the driver and by which more safety traveling is achieved.

This object is achieved with a speed pilot according to claim 1.

Advantageous features of such speed pilot are claimed in the subclaims.

With the present speed pilot it is possible to assist a driver, so that he is automatically informed in advance of any speed change on the road. If the driver is informed about change of maximal allowed speed, he receives this information automatically via wireless data communication, which can be done via the known wireless application protocol WAP by mobile phones or by broadcast signals of a broadcast station. Such broadcast station can send these special signals via RDS - (radio data signals) - protocol.

On the other hand, there can be an example of the present invention in that the speed limits are stored within a navigation-CD. If the driver drives his car on a motorway, this is recognized from the navigation system. With the speed pilot being activated, the car is driven always at or below the allowed maximum speed. If the car drives at the allowed maximum speed and this speed is reduced due to the fact that the road narrows, for example, this information is stored on the navigation-CD. If the driver reaches this area, speed reduction is automatically recognized due to the fact that this information is stored on the navigation-CD. The result is that the car's speed is reduced, too. If the driver reaches the end of the reduced speed area, it is possible according to the present invention that the car automatically accelerates to the speed maximum.

However, if there is an construction work on the road, this information usually is not stored on a navigation-CD. Such information may be sent by a broadcast station via a traffic message channel, for example. This information is received

within the car and then the programmable speed pilot accordingly reduces its speed.

According to one aspect of the present invention, the information about the speed limits sent by a broadcast station or by telephone services has higher priority than the speed limit information stored on a navigation-CD since the wireless received speed limit information is more actual than the information stored on the CD.

According to a further aspect of the present invention an optical or acoustical information can be activated when maximum speed changes. In a further aspect of the present invention change of maximum speed allowed on the road is transmitted such early that the speed is smoothly adapted.

In a further aspect of the present invention there is provided a confirmation button in the speed pilot. This confirmation button needs to be pressed by the driver in case he intends to drive at a new speed which is foreseen by the speed pilot. After such confirmation button having been pressed, the speed pilot automatically controls the new speed of the car.

With the present invention it is possible to assist the driver. The driver is informed in good time about any new maximum speed allowed, which is very important in case maximum speed is reduced like it is for example in construction areas. With the present invention safety of all traffic members is clearly increased, since the car's speed is adapted to the actual situation.

Summarize this invention entails a navigated cruising speed pilot -NC/SP- pertaining to the control of automobile speed on the basis of an adaptive speed control system that utilizes

the prescribed traffic speed limits (as generally indicated on signboards along the road) as the transient target speed whenever no other vehicle is traveling a head of an NC/SP equipped vehicle, at a collision range, an before subsequent route section with a different traffic speed limit is reached an hence a new transient target speed limit is triggered by the navigation system. With this pilot, the prescribed traffic speed limits (e.g. 30 km/h, 50 km/h, 60 km/h, 70 ... 130 km/h on motorways) are respectively stored as part of data on a digital route map used by the navigation system. The speed pilot according to the present invention thus incorporates a conventional automobile navigation system comprising units such as digital memory-stored road maps, Global Positioning System (GPS), gyroscope, computer an other navigation paraphernalia in accordance with the state of the art. Navigation data for the speed pilot is or can be updated via appropriate mobile telecommunication networks (GSM, UMTS, MOST, internet mailbox interface, etc.). The automobile speed control system includes a cruise controller that automatically applies the brakes when automobile speed sufficiently exceeds a prescribed traffic speed as stored on a digital map in the navigation device memory and subsequently accelerates the vehicle unless the driver other wise overrides the speed pilot command.

The invention in question relates to the control of vehicular cruising speed, whereby the latter is provided with an automatic speed control system, and particularly with an adaptive speed control system that adapts to the digitally stored, prescribed traffic speed as determined by the computer processing conventional vehicle navigation system data. In conventional cruise-control-equipped automobiles, a speed control system maintains the desired speed at or near a target speed, which may be set by the driver. The driver can override the cruise control system and personally command the speeding process by

actuating an holding, or by actuating and releasing, the brake pedal or, if the automobile has a manual gearbox, by actuating the clutch pedal. Command is then promptly handed to the driver. Such automobile speed control systems can also be devised to activate the brakes if the vehicle is moving downhill and hence accelerates the vehicle faster than the target speed. Known are automobiles provided with adaptive speed control systems, whereby the driver visually adapts to the speed of the front vehicle, or systems that employ radar technology in order to maintain the distance to the vehicle moving in front. If the displacement between the automobiles falls below a maximum given value, the adaptive cruise control activates the brakes to reduce the speed in order to maintain the initial displacement between the vehicles. In such a case, the target speed is reduced by the automobile speed control system. When automobile trailing displacement increases, the target speed may be increased to the original value, in which case the cruise control causes the automobile to accelerate to the new target speed. Inventors have discovered a problem with such automobile speed control systems. If the cruise control is causing the automobile to brake, and the driver touches the brakes, or clutch, either inadvertently or prior to taking manual control of the speed, then the cruise control is released. The driver then senses a sudden change in automobile movement opposite to his expectation. This can irritate the driver, and in an extreme situation may be dangerous due to an unexpected surge of braking power. Another event in which the cruise control may activate brakes is if the driver actively reduces the target speed. The automobile speed control system will cause the latter to brake until the speed is reduced to the new target speed.

Accordingly, this invention provides an automobile with a speed control system, comprising a cruise controller which

when activated, controls automobile speed according to a target speed - prescribed traffic speed - e.g. 50 km in the city, 70 km on urban roads or 130 km on motorways. It is an object of the invention to provide an automobile with a more convenient automobile speed control system, to avoid running into police monitored photographic radar traps. The automobile speed control system may have a conventional switching arrangement by which a driver may set, reset and cancel cruise control via NC/SP. If the driver uses the reset function to reduce the target speed, then the brakes may gently slow the automobile to the new reduced target speed.

Figure 1 shows a block diagram of an example of the speed pilot according to the present invention.

With an on-off-switch the speed pilot can be activated by the driving person. The speed pilot has several inputs 1, 2, 3 and an output 10. On the first input 1 a signal can be applied which corresponds to a speed which is actually driven at by the driver. Therefore, this input 1 is called manual speed input.

There is another input 2, on which a speed input signal derived from a navigation-CD can be applied. This signal is called navi-CD speed input signal.

On a third input 3 a speed input signal can be applied, which is derived from a wireless received signal, e.g. received by a broadcast signal. Such signal can be transmitted by a traffic message channel TMC in a RDS system.

On the output 10 a speed signal is provided by which the car actually drives. Therefore, the speed pilot decides which one of the signals applied to inputs 1, 2, 3 is chosen.

If the speed pilot is activated, that means the switch in the figure is in its on-position. The manual speed input has higher priority than the wireless speed input and the wireless speed input signal has higher priority than the information applied to the navi-CD speed input.

Claims

1. Adaptive speed control system comprising a speed pilot by which the speed of an automobile can be automatically hold at a first speed value, characterized in that the speed pilot is connected to an information system in which maximum speed limit information is stored and in that a control system is provided for changing the first speed value into a second speed value corresponding to the maximum speed limit information.

2. Adaptive speed control system according to claim 1, characterized in that the second speed value is less than the first speed value.

3. Adaptive speed control system according to claim 1 or 2, characterized in that the information system is a navigation system comprising a navigation-CD on which maximum speed limits are stored.

4. Adaptive speed control system according to one of claims 1 to 3, characterized in that the information system is a wireless information receiving system, in which the speed information is received by a broadcast station via an RDS channel.

5. Adaptive speed control system according to one of claims 1 to 3, characterized in that the information system is a wireless information receiving system, in which the speed information is received by a telephone service station via a telephone channel.

6. Adaptive speed control system according to claims 1 to 5, characterized in that the automobile speed control system

includes a cruise controller that automatically applies the brakes when automobile speed sufficiently exceeds a prescribed traffic speed stored on a digital map in the memory.

7. Adaptive speed control system according to claims 1 to 6, characterized in that the navigated cruising speed pilot includes a cruise controller that allows for the driver's command or activity to override the navigation system command.

8. Adaptive speed control system according to claims 1 to 7, characterized in that the navigated cruising speed pilot can be deactivated an thus permit the automobile to use the navigation system in the conventional manner.

9. Adaptive speed control system according to claims 1 to 8, characterized in that the navigated cruising speed pilot can be or is combined with a distance monitoring system (radar, infra-red, Doppler, laser) to automatically reduce the target speed in accordance with the speed of the vehicle in front an NC/SP equipped vehicle, if and only if the latter's speed is less than the prescribed target traffic speed whereby this state can be overridden should the driver undertake to accelerate when overtaking.

10. Adaptive speed control system according to claims 1 to 9, characterized in that the navigated cruising speed pilot permits the prescribed target traffic speed to be reduced proportionately according to the driver's desire i.e. 10%, 20%, 30% ... or absolutely (e.g. 50 km/h instead of 60 km/h) as input by the driver via manual or acoustic manner.

11. Adaptive speed control system according to claims 1 to 10, characterized in that the navigated cruising speed pilot permits the prescribed target traffic speed to be reduced proportionately according to the driver's desire i.e. 10%, 20% ... or absolutely as input by the driver via manual or acoustic manner.

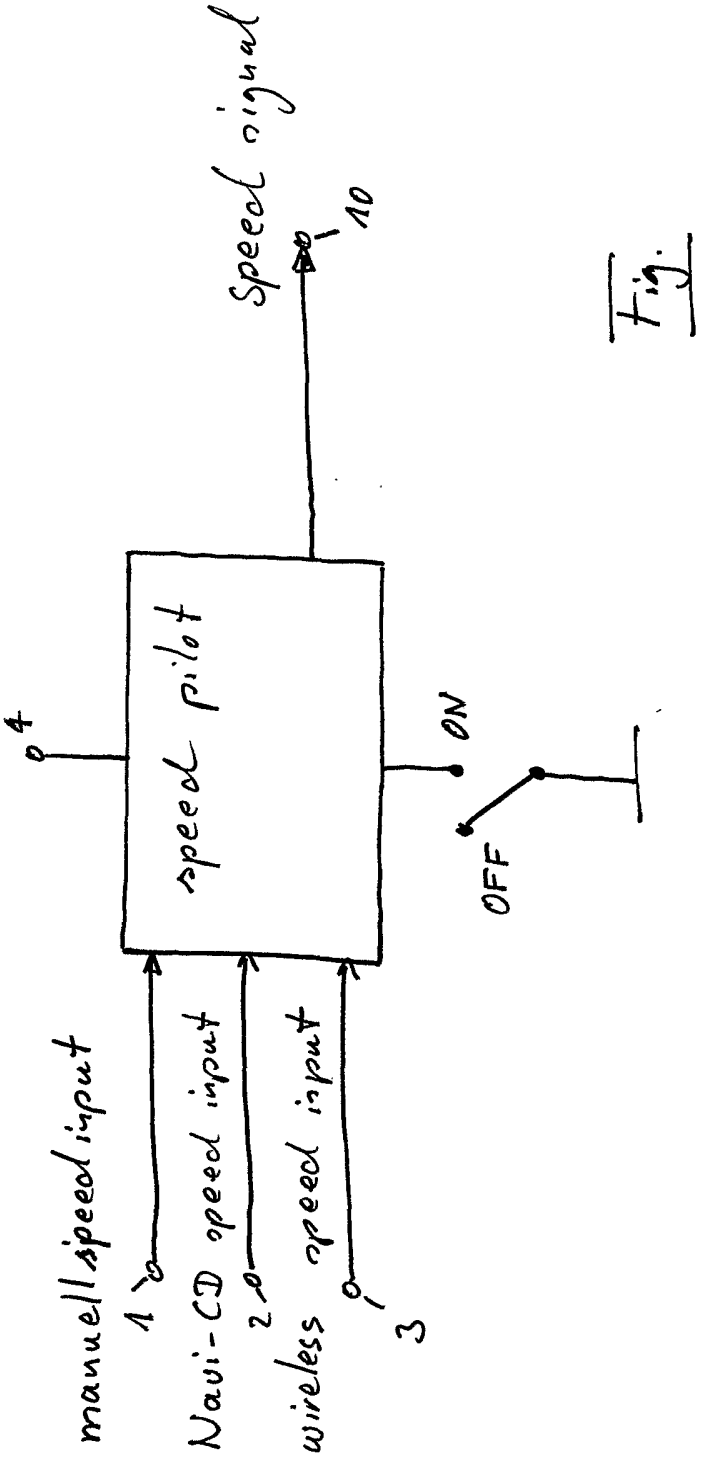
Speed signal
10
speed pilot
4
ON
OFF
manuell speed input
1
Navi-CD speed input
2
wireless speed input
3

Fig.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/06274

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60K31/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 05091 A (LUCAS IND PLC ;BASTEN MARK JONATHAN (GB)) 3 February 2000 (2000-02-03) abstract; figures page 1, last paragraph page 3 -page 6 page 8	1-9
X	US 6 161 072 A (CLAPPER EDWARD O) 12 December 2000 (2000-12-12) abstract; figures column 1 -column 2	1-3,5,7, 10,11
X	DE 198 02 594 A (VOLKSWAGENWERK AG) 29 July 1999 (1999-07-29) abstract; figures column 1, line 24 column 2 -column 3	1-4,6-9

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 October 2002	28/10/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Wagner, H

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INTERNATIONAL SEARCH REPORT

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PCT/EP 02/06274

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 485 161 A (VAUGHN DAVID) 16 January 1996 (1996-01-16) abstract; figures column 2 -column 3	1-8
X	DE 198 21 585 A (KOSTAL LEOPOLD GMBH & CO KG) 25 November 1999 (1999-11-25) abstract; figures	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 02/06274

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