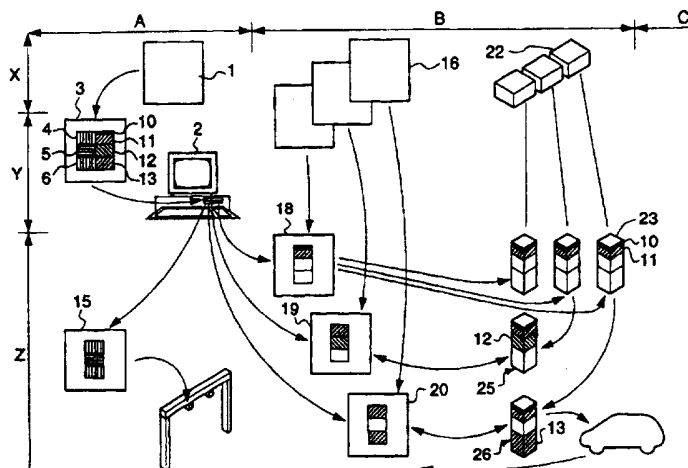




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<p>(21) International Application Number: PCT/SE97/00061</p> <p>(22) International Filing Date: 16 January 1997 (16.01.97)</p> <p>(30) Priority Data: 9600191-2 17 January 1996 (17.01.96) SE</p> <p>(71) Applicant (for all designated States except US): COMBITECH TRAFFIC SYSTEMS AB [SE/SE]; P.O. Box 1063, S-551 10 Jönköping (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): STRANDBERG, Stefan [SE/SE]; Världungstigen 7, S-556 32 Jönköping (SE). CARLSSON, Carl-Olov [SE/SE]; Björkängsvägen 32, S-565 32 Mullsjö (SE). PICKFORD, Andrew [GB/GB]; 21 Spring Terrace, Weston Colville, Cambridge, Cambs. CB1 5PB (GB).</p> <p>(74) Agent: LUNDQUIST, Arne; Saab AB, Patent Dept., S-581 88 Linköping (SE).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Swedish).</p>

(54) Title: A METHOD AND A DEVICE FOR FINALIZING DATA CARRYING COMMUNICATION EQUIPMENT IN TRAFFIC CONTROL SYSTEMS



(57) Abstract

End or concluding production of data carrying communication equipment in traffic checking systems, which comprise a plurality of stationary communication equipments for remotely checking passing vehicles which are provided with mobile data carrying units (23) for remote communication. The data carrying communication equipment of the stationary equipment and the vehicle units are manufactured initially in serial production in non-defined shape without any storing of the data required for the communication. For end production including storing of data a plurality of computers (2) for general data processing and data storage media (1, 16) which are associated therewith and can be individually handled are used. A system administrator (AY) produces a storage medium (3) containing all the data for the communication. Therefrom separate media (15, 18-20) are produced containing those data which are required for storing data in both the respective stationary equipments and in the respective vehicle units, and they are sent to the system operator (AZ) for the stationary equipments and the system distributor (BZ), respectively, which performs storing of data and distribution of the vehicle units.

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TITLE:

A method and a device for finalizing data carrying communication equipment in traffic control systems.

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TECHNICAL FIELD:

The present invention relates to a method and device
10 for production of data carrying communication equipment
in traffic checking systems, more particularly to end
or concluding production for adaption to different
uses. The invention can in particular be applied to
such equipment which is used for checking traffic and
15 for collecting traffic fees.

STATE OF THE ART:

In various traffic situations some form of
communication between the vehicle and an installation
20 in a passage place can be required. Such communication
can be a check that the vehicle is authorized to pass
the checkpoint or a recording that a definite vehicle
has passed at a particular time. Another frequent
situation comprises that an operation for collecting/
25 recording a fee is performed, where the fee can be a
toll fee for passing a particular road section, a
bridge or a tunnel or a fee for accessing a parking
area. The invention is in particular related to
communication for collecting fees.

30

Such checkpoints exist which are provided with service personnel, a checking guard and a paying station for paying the fee. Also partly automatized systems exist in which the vehicle driver possesses some identifying means which can be read in the checkpoint. In an operation for paying the fee it is then common that the driver has a magnetic card which is inserted and read in an automatic device which records the fee on an account in order to charge the owner of the card.

10

These systems described as examples require the vehicle to stop in order to make it possible to perform the operation. However, there is a desire to avoid such stops in order to obtain a more flexible traffic flow and thus systems have been devised which work using remote sensing of an identifying means carried by the vehicle. Then often transponder methods are used which comprise that the checkpoint is provided with an active radio transmitter/receiver and that the vehicle is provided with a similar passive device which is arranged to receive the signal carrying codes from the radio equipment of the checkpoint, modulate it in order to carry a response message and retransmit it to the radio equipment of the checkpoint. Such a passive transmitter/receiver is called a transponder and provides as a response signal in its simplest shape only an identification of the vehicle. However, as it can be expanded in order to store and process further data in an advanced manner so that also relatively complicated paying operations can be executed. They then comprise

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that after an identifying operation it is communicated that the fee can be drawn from an account set up for the purpose or from the balance of electronic money stored in the transponder and also further operational
5 steps can exist. A system of this kind is described in US-A-4,303,904 for Chasek.

For such operations based on stored data and programs sometimes the transponder is connected to a computer
10 which most advantageously has the shape of a so-called smart card, thus a minicomputer in the shape of a card, which can be inserted in a reader connected to or accommodated in the transponder unit. This arrangement has in particular the advantage that the same
15 transponder can be used for different purposes and by different users of the vehicle, thereby including a selective recording of fees and other data for the respective user.

20 Such an arrangement will then be complicated physically and has a higher cost than arrangements including only a transponder even if it is provided with a relatively large storage and processing capacity. Therefore, it has appeared that a need exists for an intermediate
25 shape of the transponders, which are used today and which do not allow the described selective operation in a secure way, and the more complicated shape including the transponder supplemented with a separate data carrying unit such as a smart card.

DISCLOSURE OF THE INVENTION

The object of the present invention is to provide a method and a device for producing transponders in such a way that they can be provided with selective storing
5 and data processing functions and in particular in the purpose of allowing these operations to be associated with definite users which have own access to the computer of the transponder.

- 10 It is accomplished according to the invention by using a separate data system for producing programming means in a hierarchic structure for a final adaption of basic transponder units. Thereby transponders which are similar in their physical construction and can be made
15 in large series, can be adapted for secure use by definite users or for use for different purposes respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

- 20 In the following an embodiment of the method and the device respectively for using the transponder are described. The method and the device are then illustrated by the figure on the accompanying drawing.

25 PREFERRED EMBODIMENT

- In the figure different data storage and processing units are illustrated which cooperate to form the system by means of which the method is carried out. The figure is divided in a plurality of vertical fields A,
30 B, C and horizontal fields X, Y, Z. The field X then

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shows the non-defined data media which are used and which thus are to be adapted by means of the method. They are manufactured in their physical shape in large series and are open for storing data. The next field Y indicates the operation of a system administrator. The system administrator processes all data for using the system and is in that way the only person that can supply means for using the system. The next field Z indicates both an operator of the system and one or generally a plurality of distributors of the vehicle equipment which can deliver transponders adapted for each purpose to users. The field then also indicates the work made in this adaption operation.

15 The figure is also divided in vertical fields A, B, C. The field X, indicating the manufacture of the physical units, then extends through the two fields A and B. However, the field Y, indicating the system administrator, is restricted to the field A and in the field Z in column A the system operator is indicated and in B the system distributors are indicated, whereas the remaining field C indicates the users of the system to which the transponder units are distributed in order to be installed in the respective vehicle.

25 The field AZ, indicating the operator of the system, i.e. the person that possesses a plurality of equipments placed at road sides for communicating with passing vehicles through the transponder units thereof.

30 Hereby fees are recorded for the passage which are

reported to a paying institution for charging the owners of the transponder units of the passing vehicles, so that due fees can be provided to the operator.

5

Thus, if manufacturers of physical equipment, "hardware" such as road side equipment, transponder units and for carrying out the method data storage units such as diskettes and computers for processing them, are not considered, the actors of the system are the following:

The system administrator (field AY) which has installed the system, has the exploitation right thereof and which has the responsibility for the operations which are required for installing it and take it into operation.

The operator, which possesses, as has been mentioned, the road side equipments which are arranged for remote communication with passing vehicle transponder units. The operator is the person which primarily collect the fees by recording according to the remote communication carried out. The operator is associated with some paying system in which the recordings are transferred to money through debiting of fees due on the respective user of the system, thus owners of the vehicle units.

The system distributor, which finally prepares the transponder units for dedicating them to the users

which want to use the system. The distributor co-operates with the operator and can be included in the same organization. A delivery of a transponder unit means simultaneously that data thereof have been re-
5 corded in the respective road side units within the area of the operator and that an account has been established in the paying institution.

The user is the person which from the distributor has
10 bought a transponder unit which by storing data is associated with the system and thereby can be used for communication with the roadside equipment within the area of the operator. The task of the system administrator is, as has been indicated above, to
15 provide data for creating programs in the roadside equipment in transponder units, which data are to control the communication between the roadside equipment and the transponder units. The requirements are then:
20 - that the road side equipment is given a definite system assignment, in the shape of system data for the operator in question;
- that the road side is provided with code keys for a secure, individual identification of the respective
25 transponder unit;
- that the road side equipment possesses store data for the owner of each transponder unit that is identifiable by the respective code key, which data can be vehicle class (in the case where the fee is defined according
30 to different vehicle classes), an account for debiting

and credit state;

- that the road side equipment possibly also has process data for access to data storage fields in the respective transponder units for reading and/or writing data in addition to the individual data mentioned which are stored in the road side equipment for the respective transponder units;
- that the road side equipment possesses process data for calculating, recording and reporting collected fees;
- that the transponder unit is provided with system data which indicate its assignment in the system of the operator, in the road side equipments of which the system data in question have been stored;
- that the transponder units are given identifying data and process data for a secure collection of these data using the said code key of the road side equipment; and
- that in the case where the mentioned additional data are to be stored for reading and/or writing, process data are stored corresponding to those process data which according to the above have been installed in the road side equipment for accessing said fields.

The task of the system administrator is then to create basic data to be stored in the computer of the road side equipment and in the transponder unit respectively. These data are then to be transferred to a plurality of road side equipments and a large number of transponder units, so that the communication as described can be carried out. Then it is known that

this data storing operation can be made by the fact that the system administrator has a direct access to said equipment, at least to some portions of the road side equipment and the transponder units, so that this
5 equipment can be delivered to the operator and the distributors respectively in a finally produced state. However, such a method implies large disadvantages by the fact that said end production of the physical
10 equipment mostly must be carried out centrally and the equipment then be transported to the operator and the distributor respectively. In particular this is disadvantageous in the case where modifications of the systems are made, when the system administrator must again have access to the physical equipment. The same
15 condition is true in the case where the system is to be expanded for more users than what have been intended from the start.

This problem is solved according to the invention by
20 transferring said data from the system administrator to the operator and the distributor respectively by means of data processing and data storage equipment and media which can be made easily available to all parts. The physical communication equipment can in contrast be
25 manufactured in a non-defined shape what can be made in a mass production, and be transferred from the manufacturer to the operator and the distributor respectively in this shape for a local end or concluding production by means of said equipment and
30 media. The manner in which this is made appears from

10

the following:

The data processing equipment which is used according to the invention comprises common computers such as
5 those of the PC type. Such a computer is referenced 1 in the figure and is indicated by the division in fields as owned by the system administrator.

In this computer, on a data storage medium, which preferably is a master diskette 2, the following data are
10 stored, which are indicated by different fields on a diskette 3. In these fields, the fields 4 - 6 represent data for storing in the road side equipment and the fields 10 - 13 data for storing in the respective
15 transponder units, whereas the two fields 12 - 13 represent a large number of separate data for individual transponder units.

By means of these data on one or several diskettes 3
20 the system administrator can by means of the computer 1 produce diskettes having selected data. Then a number of diskettes 15 are produced having only data of the fields 4 - 6 stored thereon. By transferring these data to data storage equipment of the road side equipments
25 they can be arranged to operate in the system. It is indicated that the non-defined diskette for storing was fetched from a supply 16 of mass produced diskettes.

From the same supply diskettes 18 - 20 can be fetched
30 for end production of the transponder units. It is

supposed to be made in two steps, so that from a diskette 18 having fields corresponding to the fields 10 and 11 of the master diskette 3, a lot of transponder units collected from a supply 22 of mass produced, non defined transponder units, are subjected to a data storing operation common to the system. Thereupon each transponder unit is subjected to a storing operation individual to it, as is indicated in the figure, by the method that in a transponder unit 25 of the first user data is stored corresponding to the field 12 on the master diskette, whereas in a transponder 26 of the second user data is stored corresponding to the field 13. Of course, the described data units to be stored which correspond to said fields need not to be distributed in different diskettes but they can totally or in part be stored in the same diskette provided that they are given an individual address. As has been mentioned, the fields 12 - 13 represent a large number of individual data dedicated to each individual transponder unit. In the same way the transponder units 25 and 26 represent a large number of such units which are to be used in the system.

25 For carrying out the different operations, in addition to data equipment of the system administrator, in the figure represented by the computer 1, also data equipment is required at the operator and the distributor for reading and transferring data from the

30 diskettes which have been obtained from the

administrator. Such an equipment is supposed to be computers of standard type which can easily be bought at the local market by the respective parts. For transferring data through such a computer to the
5 transponder units special equipment can be required, a modem, between the computer and the transponder units.

The data storage fields shown are intended to represent the following data:

10 The field 4 comprises system data for the road side equipment, the fields 5 and 6 code key and individual data for different copies of the transponder unit, thus a large number of fields. In addition thereto process data are to be there. As to data for end production of
15 the transponder units the field 10 is intended to contain data for initiating the transponder units, i.e. for converting them to the state for data storing, the field 11 system data for use within the system according to the field 4 for the road side equipment,
20 the fields 12 and 13 individual data for a large number of transponder units.

The fields 5, 6 and 12, 13 respectively for individual data must not be comprised on the diskettes 15 and 19,
25 20 but only certain basic data and process data for adding more data. Then in the computer equipment of the operator and the distributor or in common the diskettes can be supplemented with such information as account numbers of respective users, paying institution, etc.

The invention thus means that from standard units such as mass produced diskettes and transponder units system data can be composed on one or a plurality of master diskettes, which in turn are used for producing data diskettes having data selected from the master diskette. These diskettes can be sent to the operator and the distributor for end production of the road side equipments and the required number of transponder units for operating within the system. Also modifications and additions can be carried out in this way. In the technical aspect there is no obstacle for transferring the data in question by means of remote communication. However, such communication implies that such a leak could exist that the system could be abused. A great advantage of the invention is thus that it provides a method and means for a more physical shape of transferring data where it is more easy to check that no tapping of data has been made than when using remote communication.

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The previous description has as an embodiment of the invention been associated with a system for collecting fees in a traffic context. However, it does not preclude that the invention,

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25 following claims, can be applied associated with other
traffic checks such as access checks of certain areas,
checking of goods transports and similar things. The
equipment described can also be of different kinds
than directly pointed out by the terms used. Thus, the
30 concept of road side equipment can also mean other

traffic checking equipment for remote communication and the concept transponder can also mean other data carrying units which are mounted in the vehicles for remote communication, e.g. provided with active
5 communication equipment instead of a passive transponder.

CLAIMS

1. A method for end production of data carrying communication equipment in traffic checking systems, which comprise a plurality of stationary communication equipments for remote checking of passing vehicles equipped with mobile data carrying units (23) for remote communication, preferably transponders, the data carrying communication equipment of the stationary equipment and the vehicle units initially being produced in a serial manufacturing process in a non-defined shape without storing the data required for the communication, characterized in that for the end production including storing said data a production system is used comprising a plurality of computers (2) for general data processing and data storage media, which are associated therewith and can be handled individually, such as data diskettes (1, 16), a system administrator (AY) by means of its computer equipment (2) on said data storage medium (3) stores substantially all data which are required for carrying out the communication between the stationary equipment and the vehicle units, that from this storage medium additional, separate media (15, 18-20) are produced, preferably in the shape of said diskettes, of a first type (15) containing those data which are required for storing data in the respective stationary equipments and of a second type or types (18, 19, 20) containing data required in the respective vehicle units, these data comprising data for assignment to a definite

checking system for restriction to vehicle units (23) dedicated to the system in question, data for identifying individual vehicle units (23), which can be communicated in both the stationary equipment and in
5 the vehicle units in question, and recording and process data for carrying out the checking operations or other operations which are to be performed by means of the remote communication, of the separate media of which copies of the first type (15) containing data for
10 controlling the respective stationary equipments are sent to a system operator (AZ) of said equipments and are used thereby for storing these data in the respective stationary equipment, whereas copies of the second type (18, 19, 20) containing data for
15 controlling the respective vehicle units (23) are sent to such a system distributor (BZ), which performs distribution of vehicle units and are used thereby for storing these data in the vehicle units, which are to be distributed to users of the traffic checking system
20 to be utilized in the respective vehicles thereof.

2. A method according to claim 1, characterized in that the separate media (15, 18-20) are transferred in their physical shape during their distribution.

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3. A device for end production by means of the method according to claim 1 or 2 of data carrying communication equipment in traffic checking systems, which comprise a plurality of stationary communication
30 equipments for remote checking of passing vehicles

provided with mobile data carrying units (23) for remote communication, preferably transponders, the data carrying communication equipment of the stationary equipment and the vehicle units are initially

5 manufactured in series production in non-defined shape without any storing of data required for the communication, characterized by, with a system administrator (AY), a plurality of computers (2) for general data processing and data storage media, which

10 are associated therewith, and can be individually handled, such as data diskettes (1, 16) which are arranged for storing by means of said computer equipment (2) on said data storage medium (3) of substantially all data which are required for carrying

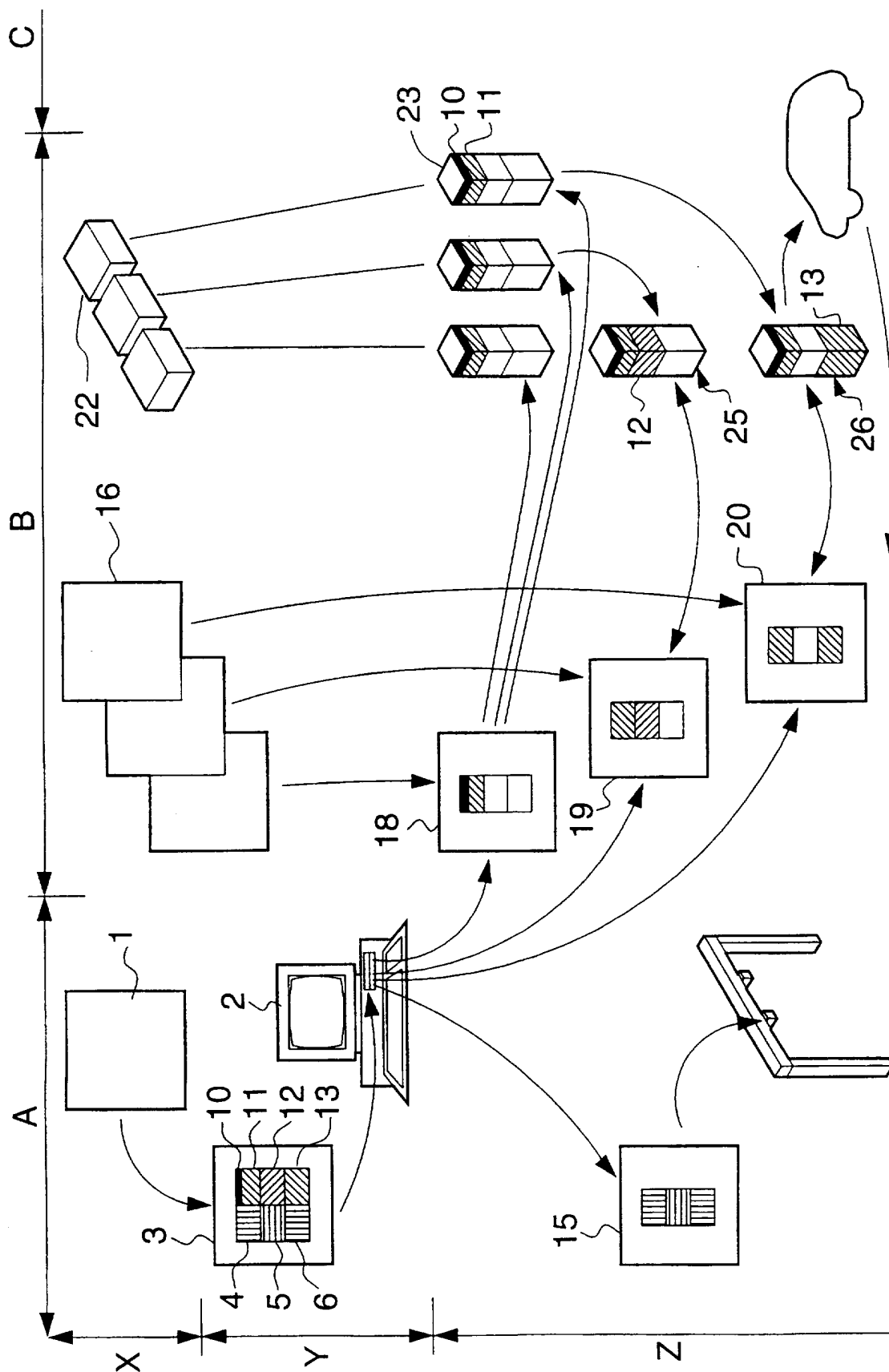
15 out the communication between the stationary equipment and the vehicle units, and for producing from this storage medium of additional, separate media (15, 18 - 20), preferably in the shape of said diskettes, of a first type (15) containing those data which are

20 required for storing data in the respective stationary equipments and of a second type or types (18, 19, 20) containing data which are required for storing in the respective vehicle units, these data comprising data for assignment to a definite checking system for

25 restriction to vehicle units (23), which are dedicated to the system in question, data for identifying individual vehicle units (23), which can be communicated in both a stationary equipment and in the vehicle units in question, and recording and process

30 data for carrying out the checking operations or other

operations, which are to be performed by means of the remote communication; with a system operator (AZ), an additional plurality of computers for general data processing and equipped for transferring from said
5 separate media of the first type (15) containing data for controlling the respective stationary equipments, of these data to the respective stationary equipment; and with a system distributor, which performs the distribution of vehicle units (23), an additional
10 plurality of computers for general data processing and equipped for transferring from separate media of the second type or types (18, 19, 20) of these data to vehicle units, which are to be distributed to users of the traffic checking system to be utilized in the
15 respective vehicles thereof.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00061

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G07B 15/00

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)

IPC6: G06F, G07B

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5144553 A (J.J. HASSETT ET AL.), 1 Sept 1992 (01.09.92), column 7, line 25 - column 8, line 44; column 11, line 45 - column 12, line 59, figures 3-5 --	1-3
X	WO 9407206 A1 (AT/COMM INCORPORATED), 31 March 1994 (31.03.94), page 13, line 11 - page 15; line 11, figures 5,6 --	1-3
A	DE 3927236 A1 (THOMAS GERSTNER ET AL.), 28 February 1991 (28.02.91), column 4, line 4 - column 5, line 53, figures 1,2 --	1-3



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00061

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 4140859 A1 (DIETER HUMMEL), 17 June 1993 (17.06.93), figure 1, abstract --	1-3
A	DE 4339438 A1 (SMM SOFTWARE GMBH), 5 October 1995 (05.10.95), column 4, line 17 - column 6, line 34, figures 1,2 -- -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/04/97

International application No.

PCT/SE 97/00061

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				WO	9118354 A	28/11/91

WO	9407206	A1	31/03/94	AU	5128293 A	12/04/94

DE	3927236	A1	28/02/91	NONE		

DE	4140859	A1	17/06/93	NONE		

DE	4339438	A1	05/10/95	NONE		
