



(12) UK Patent (19) GB (11) 2 175 422 (13) B

(54) Title of Invention

Computer system and key input apparatus for use in the computer system

✓ (51) INT CL⁴; G06F 12/14

(21) Application No
8519944

(22) Date of filing
8 Aug 1985

✓ (30) Priority data

(31) 60/100585

(32) 14 May 1985

(33) Japan (JP)

(43) Application published
26 Nov 1986

(45) Patent published
23 Nov 1988

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(52) Domestic classification
(Edition J)
G4A AP

(56) Documents cited
GB A 2145856
GB A 2123597
EP A2 0115395
EP A2 0089876
EP A2 0084441

(58) Field of search
G4A
Selected US
specifications from
IPC sub-class G06F

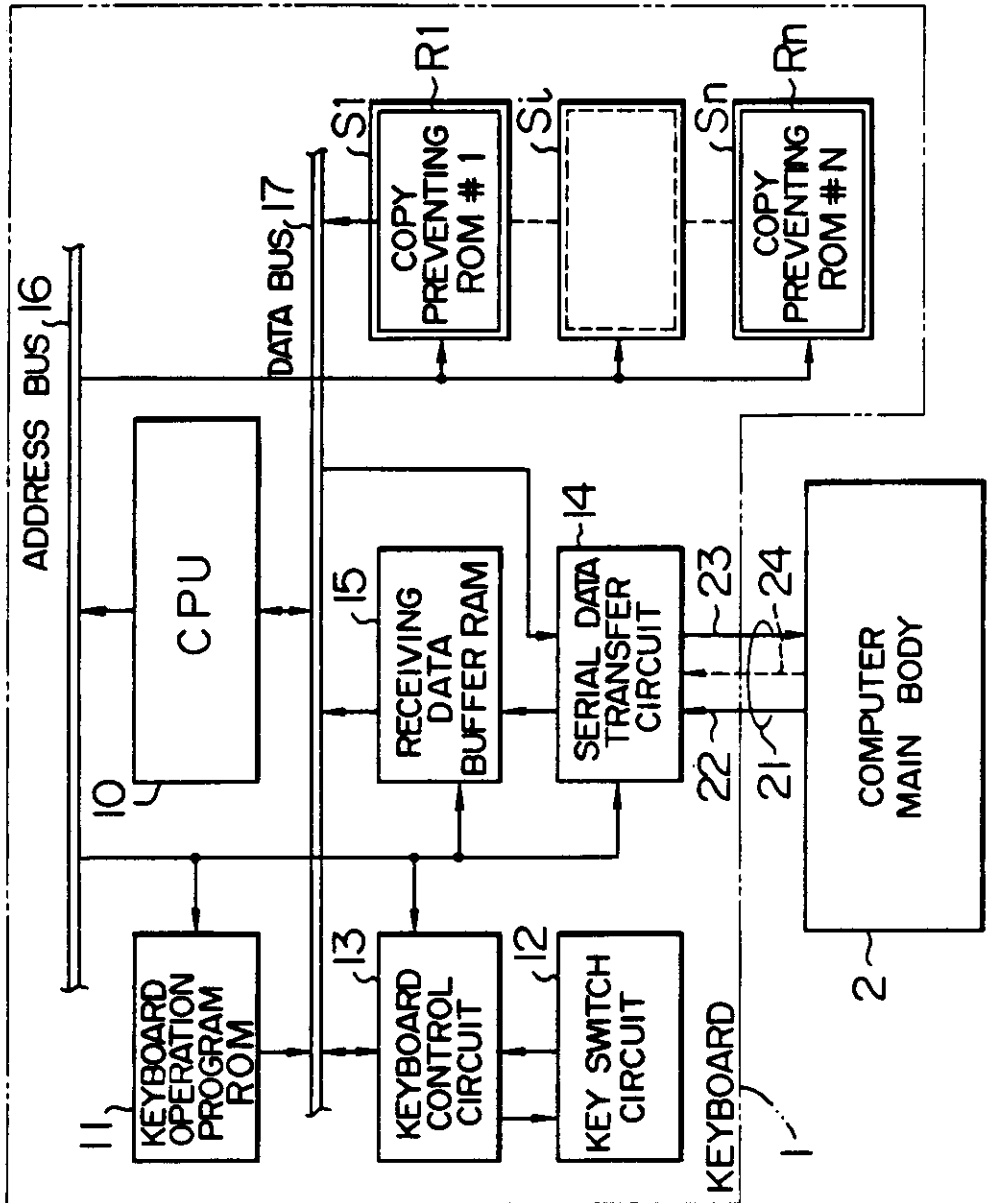


FIG. 1

FIG. 2

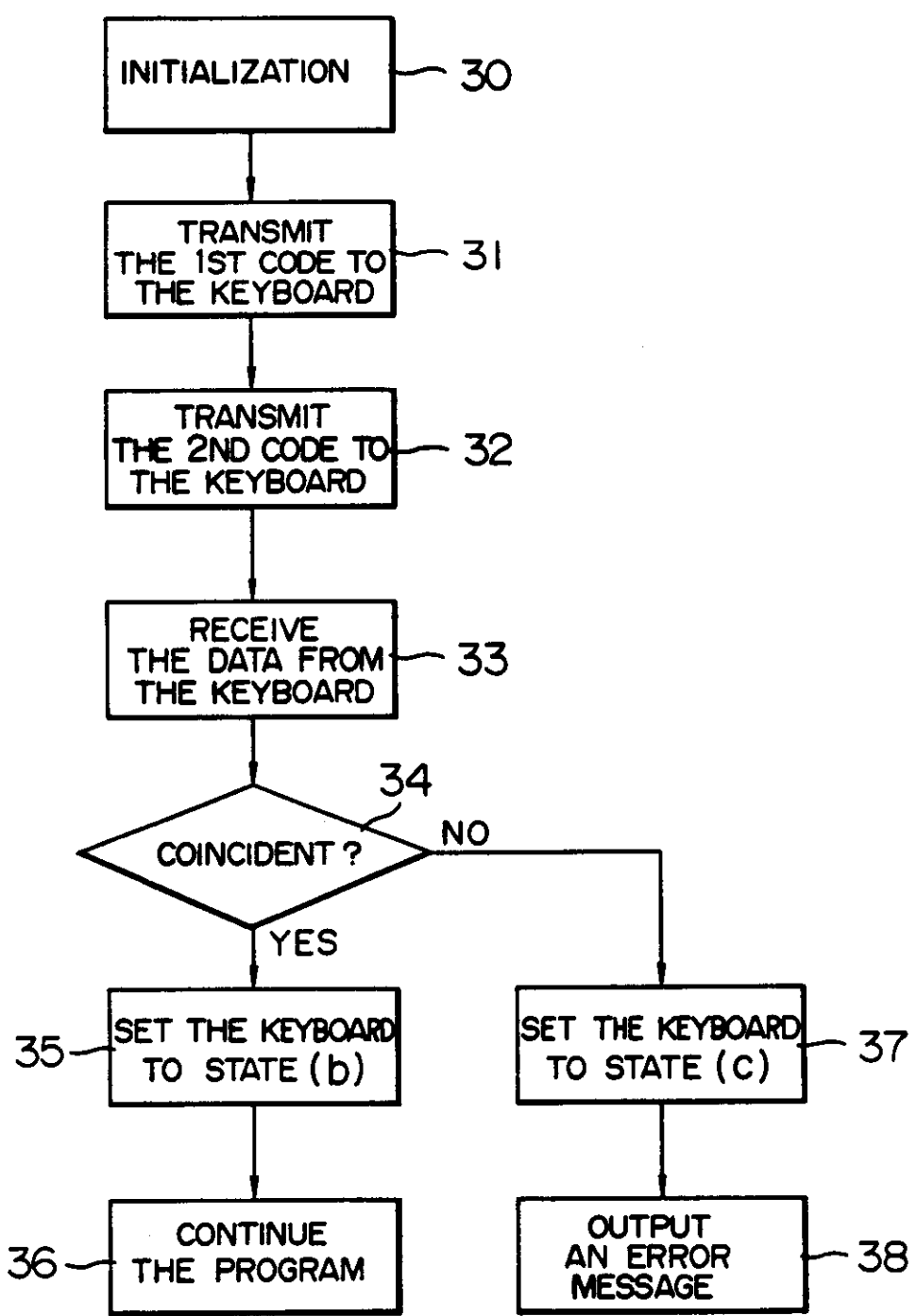
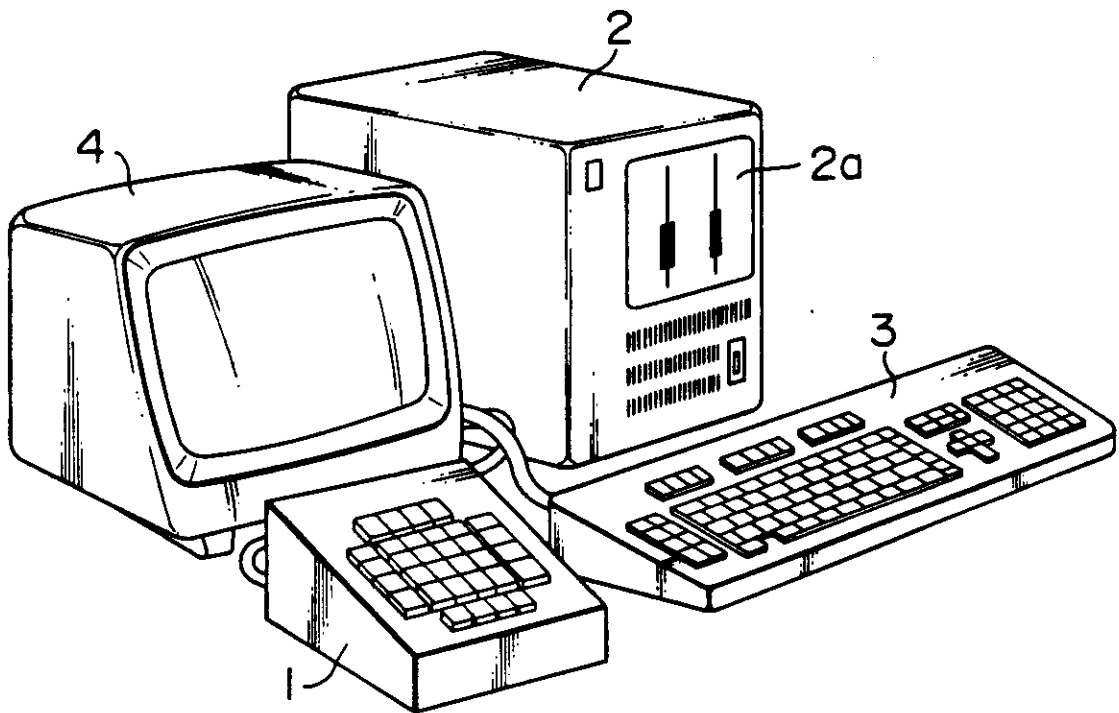


FIG. 3



"Computer System and Key Input Apparatus
for use in the Computer System."

1 The present invention relates to a key data
input apparatus and, more particularly, to a key data
input apparatus for use in a computer system.

 In recent years, the illegal copy of computer
5 programs has become a serious problem and it is
necessary to prevent such an illegal copy and to
protect software by taking some countermeasures. As
methods for preventing the copy of computer programs,
in general, there are a method whereby by using a
10 special recording method when a program is recorded on
a recording medium (for example, a floppy disk), it
is made impossible to read out the program stored on
the recording medium by an ordinary reading method,
and a method whereby by giving a special design to the
15 software program, although the program can be read
out from the recording medium copied, the operation
is locked when a user tries to execute the program
read out. However, when a new copy preventing method
is adopted, a method to release this preventing means
20 is considered in correspondence to this new copy
preventing method; consequently, it is the actual
circumstances that such a problem cannot be solved by
a copy preventing method which is merely considered for
only the recording medium.

25 The present invention is made to solve the

foregoing problem and it is an object of the invention to provide a key data input apparatus having a copy preventing function of a program which is executed in a computer system.

5 In accordance with the invention, a key data input apparatus, for use in a computer system, comprises:

 key input means for generating an output code corresponding to a position of a key pressed by an operator;

10 attaching means for attaching at least one memory device in which predetermined data is stored;

 communicating means for performing a communication with a computer of the computer system; and

 control means, connected to said key input
15 means, said attaching means and said communicating means, for making it possible to transfer the output code from said key input means to said computer through said communicating means,

 wherein said communicating means is adapted
20 such that it can communicate with said computer only when the memory device corresponding to a software which is executed by the computer in said computer system is properly attached to said attaching means.

 In the operation of the computer system, said
25 control means controls an inhibition and a permission of the communication through said communicating means between the computer in said computer system and said key

data input apparatus, and only when the memory device corresponding to the software which is executed by said computer is properly attached to said attaching means, said control means permits said communicating means to
5 communicate with said computer.

In accordance with the invention, a computer system includes user-operable input means for providing user control of a programme-controlled part of the computer system, and communication means linking the user-
10 operable input means to the programme-controlled part of the computer system, wherein the computer system is arranged to check for release data provided by release-data storage means and to allow the communication means to link the user-operable input means to the programme-
15 controlled part of the computer system only in the presence of release data corresponding in predetermined respects with programme data to be executed by the programme-controlled part of the computer system.

Preferably, the computer system is arranged
20 to operate initially in a first state in which enquiry data from the programme-controlled part is sent to the input means which can send only release data, and, following the exchange of correct release data for enquiry data, to operate in a second state in which the
25 sending of release data by the input means is prevented and only the exchange of operational data is permitted.

In accordance with the invention, a computer

system comprises:

keyboard input means for generating output codes corresponding to key presses,

attaching means belonging to the keyboard means
5 for attaching at least one memory device in which pre-determined data is stored,

communicating means between the keyboard input means and programme-execution means of the computer system; and,

10 control means connected to the attaching means and the communicating means, for making it possible to transfer the output codes from said keyboard input means to the programme-execution means of the computer system,

wherein the communicating means is so arranged
15 that it can communicate with the programme-execution means only when a memory device including predetermined data corresponding to programme data to be executed by the computer system is properly attached to the attaching means.

20 In the operation of the computer system, the control means controls the communicating means between the keyboard input means and the programme-execution means of the computer system, and permits communication only when the memory device corresponding to the programme
25 data which is to be executed by the computer system is properly attached to the attaching means.

5 In the invention, an attention is paid to the point such that the user executes a computer program through a key data input apparatus (for example, a keyboard) as one of peripheral apparatuses of a computer system. Conventional copy preventing methods are
10 considered mainly for the recording medium. On the other hand, the invention has a feature such that a computer software is protected by a combination of a computer program and a key data input apparatus.

 Practically speaking by use of a proper
15 example, a software maker supplies a software program to a user and a read only memory (hereinafter, simply referred to as a "ROM") in which the particular information (for example, codes) relative to this program were written or supplies, together with the program,
20 the dedicated keyboard in which the foregoing ROM was installed. The user can execute the program through the keyboard only by inserting this ROM into a proper location in the keyboard which is designated by the program or by using the dedicated keyboard supplied.
25 The computer main body checks to see if the ROM corresponding to the program is inserted into the keyboard or not by way of the program. If the computer main body determines that the suitable ROM is not inserted

1 into the keyboard, the computer main body rejects the
communication with the keyboard, that is, the number of
keyboards which can be used for the program is limited
to the number of ROMs (ordinarily, one ROM) which are
5 added to the program and are supplied. Therefore,
even if the user could illegally copy the program,
this copied program cannot be executed by an ordinary
keyboard. In addition, the present invention is
constituted such that a plurality of copy preventing
10 ROMs which differ depending on the kinds of the programs
can be inserted into the keyboard. In this way, even
in the case where the user having the keyboard
according to the invention can execute a certain
program, he cannot execute the other kinds of programs
15 copied illegally.

As described above, software can be more
certainly protected by use of the key data input
apparatus according to the present invention.

The above and other objects, features and
20 advantages of the present invention will be more clear
from the following description with reference to the
accompanying drawings, in which:

Fig. 1 is a schematic arrangement diagram of
one embodiment of a keyboard of the present invention;

25 Fig. 2 is a schematic flowchart showing an
example of the checking operation of a computer main
body to which the keyboard shown in Fig. 1 is connected;
and

1 Fig. 3 is a perspective view showing a schematic
arrangement of a computer system to which the invention
is applied.

One embodiment of a key data input apparatus
5 according to the present invention will now be described
hereinbelow with reference to the drawings.

Fig. 1 is a schematic arrangement diagram
of a keyboard of one embodiment of the invention. In
the diagram, in a keyboard 1, there are provided: a
10 central processing unit (hereinafter, referred to as a
"CPU") 10 to control the operation of the keyboard
1; a ROM 11 to store the keyboard operation program
showing the procedure of the operation of the CPU 10;
a key switch circuit 12 to generate an output indicative
15 of the position of the key pressed by the program user
who operates the keyboard; a keyboard control circuit
13 to decode the key scan control and key position
output of the key switch circuit 12 into the key input
data; a serial data transfer circuit 14 which converts
20 the serial data from a computer main body 2 in the
computer system into the parallel data and converts
the parallel data from the keyboard 1 into the serial
data and then transmits to the computer main body 2,
thereby performing a communication between the computer
25 main body 2 and the keyboard 1; a reception data buffer
RAM 15 to temporarily store the data which is trans-
mitted from the computer main body 2 through the transfer
circuit 14 and to transmit the data to the CPU 10 in

1 timed relation to the data read of the CPU 10; and
a plurality of ROM inserting sockets $S_1, \dots, S_i, \dots,$
 S_n into which a plurality of ROMs R_1, \dots, R_n can be
installed. These ROMs are the characteristic components
5 in the invention and predetermined codes which differ
in dependence on the programs which are executed by the
computer system are stored in the ROMs R_1 to R_n , respec-
tively. A reference numeral 16 denotes an address bus
to transfer an address signal from the CPU 10. By
10 properly decoding the address signal on this address bus,
each component element in the keyboard is selected or
an address in the memory is designated. Although not
shown, various kinds of control lines are also supplied
from the CPU 10 to respective component elements. A
15 data bus 17 serves to transfer data which is outputted
from the CPU 10 to each component element, and vice
versa.

The operation of one embodiment of the present
invention will then be explained with reference to
20 Fig. 1.

In the diagram, the serial data transfer
circuit 14 and the computer main body 2 are connected
by a communication cable 21. In the case of this
embodiment, the transmission and reception of data
25 between the transfer circuit 14 and the computer main
body 2 are performed by way of an asynchronous data
communication system in which the data length is eight
bits and no parity bit is used and the stop bit is 1

1 (hereinafter, this system is referred to as a "serial transfer system").

When the computer system is activated, accordingly, when a power supply of the keyboard 1 is turned
5 on, the CPU 10 initializes the keyboard 1 in accordance with the program in the ROM 11. In this embodiment, the CPU 10 sets the transfer circuit 14 in such a manner that although the transfer circuit 14 can receive
10 the data from the computer main body 2, it cannot transmit the data from the keyboard 1 to the computer main body 2.

Thereafter, in accordance with the state instruction data (for example, a predetermined ASCII code sequence) which is transmitted from the computer
15 main body 2 to the keyboard 1, the CPU 10 of the keyboard 1 sets the transfer circuit 14 into either one of the following three states (a), (b) and (c) of the keyboard 1.

(a) The state in that the data from the
20 computer main body 2 can be received and only the data in the copy preventing ROMs R_1 to R_n in the keyboard 1 can be transmitted to the computer main body 2, but the key codes typed by means of the keys on the keyboard 1 cannot be transmitted.

25 (b) The state in that the data from the computer main body 2 can be received and the key codes typed by the keys on the keyboard 1 can be transmitted to the computer main body, but the data in the copy

1 preventing ROMs R_1 to R_n cannot be transmitted.

(c) The state in that the data from the computer main body 2 can be received similarly to the initial state, but the data from the keyboard 1 cannot
5 be transmitted at all.

In the above-mentioned initial state, when a predetermined state instruction data (hereinafter, this data is referred to as a "first code") is transmitted from the computer main body 2 through a trans-
10 mission data line 22 to the keyboard 1, the CPU 10 sets the transfer circuit 14 into the state (a). Thus, the computer main body 2 can read out the content of the copy preventing ROMs in the keyboard 1 through a reception data line 23. However, in this state,
15 the key input data from the keyboard 1 is not read out yet.

Next, when another state instructing data (hereinafter, this data is referred to as a "second code") is transmitted from the computer main body 2
20 to the keyboard 1, the CPU 10 transmits the contents of the ROMs inserted in the ROM inserting sockets S_1 to S_n to the computer main body 2. In this case, the contents of all of the ROMs inserted into the sockets S_1 to S_n may be transmitted or the content of
25 only the ROM (for example, only the ROM R_n) corresponding to the program which is executed by the computer main body 2 may be transmitted. This selection in transmission of the content of the ROM can be changed in

1 dependence on the specifications of the program.

In the computer main body 2, the content of the ROM transmitted from the keyboard 1 is checked. If the content coincides with the expected one, the
5 computer main body 2 determines that the ROM corresponding to the program to be executed is inserted in the keyboard 1. Thus, the computer main body 2 further transmits another state instruction data. The keyboard 1 is set into the state (b) in response to this another
10 state instruction data. Due to this, the key input data from the keyboard 1 is accurately transmitted to the computer main body 2. Subsequently, the program of the computer main body 2 is continued while performing the data transfer with the keyboard 1. In this embodi-
15 ment, when the keyboard 1 is set into the state (b), only the key input data is sent to the computer main body 2 but the contents of the copy preventing ROMs R_1 to R_n cannot be read out from the computer main body 2. This is done to prevent the contents of the ROMs
20 R_1 to R_n from being interpreted by the user when the program operation is being normally executed.

If it is decided that the content of the copy preventing ROM from the keyboard 1 is incorrect, the computer main body 2 transmits still another state
25 instruction data to the keyboard 1. In response to this data, the keyboard 1 is forcedly set into the state (c). Thereafter, the program in the computer main body 2 cannot be executed.

1 As described above, in the case where the
keyboard 1 shown in Fig. 1 is not connected to the
computer main body 2 but the quite different keyboard
having no copy preventing ROM attaching means is con-
5 nected, the computer main body 2 can reject the execution
of the program. Even if the keyboard 1 shown in Fig. 1
is connected, the computer main body 2 can obviously
reject the execution of the program so long as the ROM
corresponding to the program to be executed is not
10 inserted; therefore, the software can be more securely
protected.

Fig. 2 shows a schematic flowchart showing
an example of the above-mentioned checking operation
which is executed by the side of the computer main
15 body 2. In the flowchart, when the computer system
is activated, the system is initialized in STEP 30.
In next STEP 31, the computer main body 2 sends the
first code to the keyboard 1 and sets the keyboard 1
into the state (a). In this case, a special code
20 representing that the keyboard was set into the state
(a) may be transmitted from the keyboard side. The
transmission of this special code makes it possible
to discriminate whether the keyboard is of the designated
type or not at the state of STEP 31. Next, in STEP
25 32, the computer main body 2 sends the second code,
thereby allowing the data from the keyboard 1 to be
read in STEP 33. The data from the keyboard 1 is
compared with the data preliminarily stored in the

1 program in STEP 34. If they are coincident, STEP 35
follows and the state instruction data to set the
keyboard 1 into the state (b) is transmitted to the
keyboard 1. Thereafter, in STEP 36, the program is
5 continued. Unless those data coincide in STEP 34,
STEP 37 follows and the state instruction data to set
the keyboard 1 into the state (c) is transmitted. If
necessary, a message indicating that the program cannot
be executed is outputted in STEP 38 and the subsequent
10 execution of the program is stopped.

Fig. 3 shows an example of a computer system
to which the keyboard of the present invention having
such a software protecting function as described above
is applied. In the diagram, a reference numeral 2
15 denotes the computer main body. By inserting a disk
(not shown) on which a program was recorded into a disk
drive 2a and turning on a power supply, the program
is started. In the ordinary program, the process is
performed in accordance with the key input from a key-
20 board 3 of the typewriter key type and the result of
the process is outputted to a display 4 or a printer
(not shown). The keyboard 1 according to the invention
is connected to the computer main body 2. Although the
keyboard 1 in Fig. 3 has a special shape in correspondence
25 to the program to be executed, it may obviously have an
ordinary shape such as the keyboard 3. The program is
started by inserting the disk on which the program to
designate the use of the keyboard 1 was stored into the

1 disk drive 2a. The computer main body 2 performs the
check in the step as shown in Fig. 2 and executes the
program if the keyboard 1 is the correct one. Unless
otherwise, the computer main body rejects the execution
5 of the program.

Although the inhibition and permission of
the communication with the computer main body 2 by
the transfer circuit 14 as communicating means are
controlled by way of the CPU 10 in the keyboard 1 in the
10 foregoing embodiment, for instance, a control line 24
is supplied from the computer main body 2 through the
communication cable 21 to the transfer circuit 14 and
the inhibition and permission of the communicating
operation of the transfer circuit 14 may be controlled
15 by the computer main body 2.

As described above, according to the present
invention, the copy of a program is prevented due to a
combination of the computer program and the key data
input apparatus which is operated by the user, so that
20 there is an effect such that the software can be more
certainly protected.

CLAIMS:

1. A key data input apparatus for use in a computer system, comprising:

key input means for generating an output code corresponding to a position of a key pressed by an operator;

attaching means for attaching at least one memory device in which predetermined data is stored;

communicating means for performing a communication with a computer of the computer system; and

control means, connected to said key input means, said attaching means and said communicating means, for making it possible to transfer the output code from said key input means to said computer through said communicating means,

wherein said communicating means is adapted such that it can communicate with said computer only when the memory device corresponding to a software which is executed by the computer in said computer system is properly attached to said attaching means.

2. A key data input apparatus according to claim 1, wherein said control means controls an inhibition and a permission of the communication through said communicating means between the computer in said computer system and said key data input apparatus, and only when the memory device corresponding to the software which is executed by said computer is properly attached to said

attaching means, said control means permits said communicating means to communicate with said computer.

3. A key data input apparatus according to claim 2, wherein upon initialization of said key data input apparatus, said control means sets said communicating means into an initial state in which the transmission data from said computer can be received but the data from said key data input apparatus cannot be transmitted to said computer,

4. A key data input apparatus according to claim 3, wherein said control means transmits the data stored in said memory device attached to said attaching means to said computer in response to a first and a second predetermined code data which is transmitted from said computer,

5. A key data input apparatus according to claim 4, wherein in response to other state instruction data which is generated when said computer determines that the memory device attached to said attaching means corresponds to the software to be executed by reading out the data in said memory device, said control means permits said communicating means to transmit said output code from said input means to said computer.

6. A key data input apparatus according to claim 4, wherein in response to a predetermined code data which is generated when said computer determines that the memory device attached to said attaching means does not correspond to the software to be executed by reading out the data in said memory device, said

control means sets said communicating means into a state such that the data from said key data input apparatus cannot be transmitted to said computer.

7. A key data input apparatus according to any one of claims 1 to 6, wherein said memory device is a ROM and said attaching means is at least one ROM socket.

8. A key data input apparatus according to any of claims 1 to 7, wherein said control means includes a CPU.

9. A key data input apparatus according to any one of claims 1 to 8, wherein said communicating means performs the communication with said computer by way of a serial transfer system.

10. Key data input apparatus substantially as herein described with reference to, and as illustrated by, Fig. 1 or Figs. 1 and 3, of the accompanying drawings.

11. A computer system including user-operable input means for providing user control of a programme-controlled part of the computer system, and communication means linking the user-operable input means to the programme-
5 controlled part of the computer system, wherein the computer system is arranged to check for release data provided by release-data storage means and to allow the communication means to link the user-operable input means to the programme-
10 controlled part of the computer system only in the presence of release data corresponding in predetermined respects with programme data to be executed by the programme-controlled part of the computer system.

12. A computer system, as claimed in claim11, arranged to operate initially in a first state in which enquiry
15 data from the programme-controlled part is sent to the input means which can send only release data, and, following the exchange of correct release data for enquiry data, to operate in a second state in which the sending of release data by the input means is prevented and only the exchange
20 of operational data is permitted.

13. A computer system, as claimed in claim11 or claim12, wherein the release-data storage means is a random access memory device.

14. A computer system, as claimed in claim13, wherein
25 the user-operable input means includes the random access

memory device and means arranged to control the transmission means.

15. A computer system, comprising:
keyboard input means for generating output codes
5 corresponding to key presses,
attaching means belonging to the keyboard means for
attaching at least one memory device in which pre-
determined data is stored,
communicating means between the keyboard input
10 means and programme-execution means of the computer system;
and,
control means connected to the attaching means
and the communicating means, for making it possible to
transfer the output codes from said keyboard input means
15 to the programme-execution means of the computer system,
wherein the communicating means is so arranged
that it can communicate with the programme-execution
means only when a memory device including predetermined
data corresponding to programme data to be executed by
20 the computer system is properly attached to the attaching
means.
16. A computer system, as claimed in claim 15, wherein
the control means controls the communicating means
between the keyboard input means and the programme-execution
25 means of the computer system, and permits communication
only when the memory device corresponding to the programme

data which is to be executed by the computer system is properly attached to the attaching means.

17. A computer system as claimed in claim 16, wherein upon the initialization of the keyboard input means
5 the control means sets the communicating means into an initial state in which data from the programme-execution means of the computer system can be received but in which data from the keyboard input means cannot be transmitted.

18. A computer system, as claimed in claim 17, wherein
10 the control means is arranged to transmit the data stored in the memory device attached to the attaching means to the programme-execution means of the computer system in response to a first and a second predetermined code from the programme-execution means of the computer system.

15 19. A computer system as claimed in claim 18, wherein the control means is arranged to permit the keyboard input means to transmit keyed data in response to other state instruction data which the programme-execution means is arranged to provide when it determines that the data
20 from the memory device attached to the attaching means corresponds to the programme data to be executed.

20. A computer system, as claimed in claim 18 or 19, wherein the control means is arranged to block the transmission of keyed data in response to a predetermined code
25 which the programme-execution means is arranged to provide when it determines that the data from the memory device

attached to the attaching means does not correspond to the programme data to be executed.

21. A computer system, as claimed in any one of claims 15 to 20, wherein the memory device is a ROM and the
5 attaching means includes at least one ROM socket.

22. A computer system, as claimed in any one of claims 15 to 21, wherein the control means includes a Central Processing Unit.

23. A computer system, as claimed in any one
10 of claims 15 to 22, wherein the communicating means includes serial transfer means.

24. A computer system substantially as herein described with reference to, and as illustrated by, Fig. 1, or Figs. 1 and 2, or Figs. 1 to 3, of the accompanying drawings.



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Switchboard 01-831 2525

RENEWAL DETAILS

PATENT No 2175422

RENEWAL DATE

RENEWAL FEE ~~£5.00~~ ^{DUE} 8th Aug. 1989 ~~YEAR ON~~ R. Morchett

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FOR THE COMPTROLLER

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Form 02

2175422

Publication No.
2175422 A dated 26 November 1986

Patent Granted: WI. PATENT FROM SECTION 1 23 NOV 1988

Application No.
8519944 filed on 8 August 1985

Priority claimed:
14 May 1985 in Japan doc: 60/100585

Title: *COMPUTER SYSTEM AND KEYBOARD APPARATUS FOR USE IN THE COMPUTER*
~~Program keyboard mechanism~~ *SYSTEM* *VA. 1.12.88*

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Examination Requested: 8 August 1985

Classified to:
G4A

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APPROVED FOR GRANT

2175422

Publication No.
2175422 A dated 26 November 1986

Patent Granted: W. O. PATENT OFFICE
SEARCHED 23 NOV 1988

Application No.
8519944 filed on 8 August 1985

Priority claimed:
14 May 1985 in Japan doc: 60/100585

Title: *COMPUTER SYSTEM AND KEY INPUT APPARATUS FOR USE IN THE COMPUTER*
~~Program keyboard mechanism~~ *SYSTEM (VA. 112.88)*

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Examination Requested: 8 August 1985

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SECTION 32 (1977 ACT) APPLICATION FILED 17/3/89
*4/4/89: Notification of a change of name and address from CADAM SERVICES COMPANY INC. to CADAM SYSTEMS COMPANY INC. of
52 Ohshiki 3 chome, Shinjuku-ku Tokyo, Japan. Effective from 27/9/88. Official evidence filed on 2175422.*



I certify this to be a true copy:
12 MAY 1989 *W Russell*
Acting for Comptroller.



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Switchboard 01-831 2525

RENEWAL DETAILS

PATENT No 2175422

RENEWAL DATE 8-8

RENEWAL FEE ^{DUE} ~~PAID~~ FOR 5th YEAR ON 8-8-89

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IN THE RECORDS

Page 05

PATENTS ACT 1977

PATENTS FORM No. 20/77 (Revised 1982)
(Rule 45)

The Comptroller
The Patent Office

REQUEST FOR ALTERATION OF NAME, ADDRESS OR ADDRESS FOR SERVICE IN THE REGISTER OF PATENTS

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- 2 Any of categories (a)–(c) which are inapplicable should be deleted and the desired alteration specified.
- 3 Where the request is for alteration in a name evidence of the alteration must be furnished.
- 4 Attention is directed to rules 90 and 106 of the Patents Rules 1982.

In the matter of Patent Application/Patent No. 2 175 422

We ~~.....~~ ABEL & IMRAY

request that the (a) name and
(b) address
~~and address for service~~

now on the register of patents be altered to:

Cadam Systems Company Inc.

5-2, Ohsaki-3-chome, Shinagawa-ku, Tokyo, Japan.

Signature
(see note 4)

Name of Agent (if any) ABEL & IMRAY

Address for service in the Northumberland House,
United Kingdom to which 303-306 High Holborn,
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should be sent