(19) Europäisches Patentamt
European Patent Office
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(11) **EP 1 791 096 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.05.2007 Bulletin 2007/22

(51) Int Cl.:
G07F 9/08 *(2006.01)*

(21) Application number: **06021535.7**

(22) Date of filing: **09.05.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
97925566.8 / 1 008 120

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Remarks:
This application was filed on 13 - 10 - 2006 as a divisional application to the application mentioned under INID code 62.

(54) Collection system for multiple money-actuated machines

(57) A soft count tracking system for a currency operated host gaming machine including a currency note validator (16), a storage mechanism (20) to store both currency notes and record data associated with the gaming machine and validator, and a soft count supervisor (24) for receiving the data from the storage mechanism at a remote location. The storage mechanism (20) has a non-volatile memory and can be taken to a remote soft count supervisor (computer) at a remote location in which the data is downloaded and cash is removed. This greatly reduces the potential for errors necessary in the prior art associated with an individual interrogating each machine and also avoids the problem of machine down time.

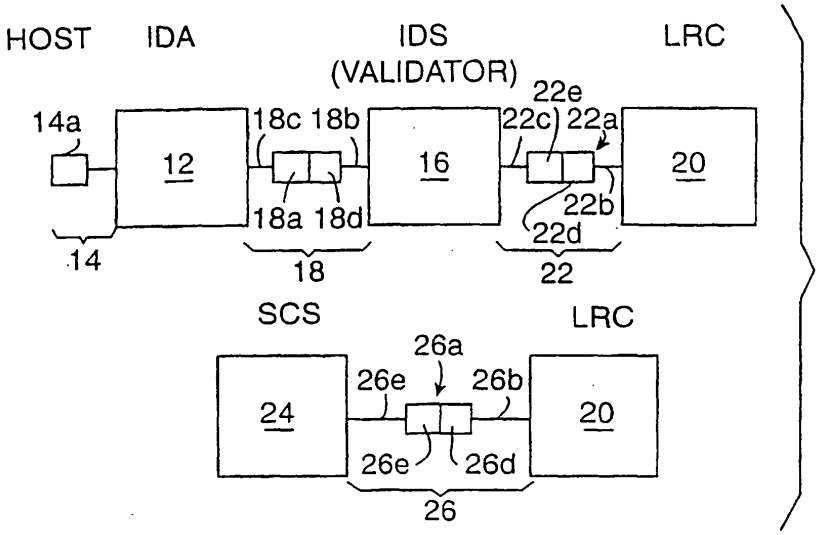

FIG.1

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Description

Field of the Invention

[0001] This invention relates to a method and apparatus for the storing of data of a validation system and, more particularly, to a detachable system to reliably download data from an operating machine and display the same in usable form.

Background of the Invention

[0002] The present invention is particularly adapted for use with the validator system of a coin or currency operated gaming devices of the type used in gambling casinos or similarly large volume operations. The validator includes mechanical and electronic hardware to keep track of a given machine's operation. That is to say, each machine includes electronic hardware or a mechanism that keeps track of the machine's performance, money intake, output of winnings and the like. The data that is collected and intended to be stored include such operational parameters as down time, maintenance routines, payouts, machine uses (activity), faults, credit card use and the like. The problem is that at present neither the machine builders nor their customers have a simple, systematic and reliable way to retrieve the information that a given machine has compiled in its validator. In the past and in order to access the information, an employee is sent to each machine or selected machines which are then taken out of service for repair or downloading.

Prior art

[0003] A relevant known prerequisite will appear from US 5,257,179, which is associated with the drawback that audit information for a particular machine will typically be recorded manually by the collector, for later use by the operator in determining that the correct monetary receipts have been turned in by the collector. GB 2 105 892A similarly requires that a suitable printer unit may be provided for plugging into the recording apparatus, for example by a cash-collector before emptying the cash-box, to print out the recorded values.

[0004] When more than a few machines are involved (and some casinos have hundreds of machines), such past practice is expensive and error prone. Therefore, a need exists for a method and apparatus for reliably retrieving and utilizing the data compiled in a given machine.

Object of the invention

[0005] The object of the invention is to provide an automated means for extracting and downloading data accumulated in a machine.

Summary of the invention

[0006] The object of the invention is obtained in that the apparatus contains a currency note validator, a storage mechanism to store both currency notes and record data associated with the gaming machine and validator, and a soft count supervisor for receiving the data from the storage mechanism at a remote location. Use of the storage mechanism with non-volatile memory results in the surprising technical effect that permits the cash in the machine and the data from the machine to be removed and reliably collected without having to have an individual physically extract such information from the machine or take the machine out of service due to that fact that a replacement storage mechanism can immediately replace the removed storage mechanism. The storage mechanism can then be taken to a remote soft count supervisor (computer) at a remote location in which the data is downloaded and cash is removed. This greatly reduces the potential for errors necessary in the prior art associated with an individual interrogating each machine and also avoids the problem of machine down time.

Description of the Drawings

[0007] Other objects and features of the present invention will be apparent from the following detailed description considered in connection with the accompanying drawings. It is to be understood, however, that the drawings are designed for purposes of illustration only and not as a definition of the limits of the invention for which reference should be made to the appended claims.

[0008] In the drawings, the same reference numerals denote the same element throughout the figures:

Fig. 1 is a block diagram of the inventive apparatus;

Fig. 2 is a schematic diagram showing how a Dallas Semiconductor DS1994 and a Dallas Semiconductor DS2400 are connected to an 8052 CPA;
Fig. 3 is a flow chart of write function assembly code according to the present invention;
Fig. 4 is an enlarged perspective view of the detachable buss or harness used in the present system; and
Fig. 5 is a perspective view of an LRC containing the DS1994 or DS1993 touch memory clip.

Detailed Description of the Invention

[0009] Referring now to Fig. 1, there is shown a block diagram of the inventive apparatus seen generally as reference number 10. An Identification System (IDS), (i.e., currency validator) unit 16 acts as a downstacker for the operating machine receiving all the data generated by an identification adaptor (IDA) 12. The IDS unit contains the conventional currency sensors and detectors as well as the CPU or computer device and display. The IDA reads and analyzes all information including the currency value, unequal amounts, cash receipts and efficiency of the machine. The inventive system is a closed loop design for the automatic accounting of cash in gaming and other markets (machines) using coin or currency validators. In other words, the inventive system provides for an accountability routine for currency handling in currency validators and stacking mechanisms. The IDA 12 is built into a wiring harness as an integral active electronic component and is provided with a unique serial number. The IDA 12 electrically communicates with one end of a harness section 14, the other end of which terminates in a host machine interface connector 14a. During use and operation, described below, connector 14a plugs into a host gaming machine, not shown, for electrical and data communication therewith. The validator or IDS unit 16, a Dallas Semiconductor DS2250, about which more is said below, is placed in electrical or data communication with IDA adapter 12 via a detachable buss or harness 18 shown in detail in Fig. 4. Harness 18 includes a muting or quick disconnect between the IDA 12 and the IDS or validator 16. More particularly, harness 18 comprises harness sections 18b and 18c each, on one end, respectively terminating in associated mating quick disconnect elements 18d and 18e.

[0010] The validator or IDS unit 16 is a currency note validator with microcontroller in which the DS2250 interrogates IDA 12 for identification number. IDS 16 validates notes, security papers and bar coded coupons used as money substitutes. A lockable removable cassette (LRC) 20 is placed in electrical or data communication with IDS 16 by means of a harness of harness segment 22. As with harness 18, noted above, harness 22 includes a mating or quick disconnect IDS-LRC connector 22a. More particularly, harness 22 is formed of harness buss sections 22b and 22c each, on one end, respectively terminating in associated mating quick disconnect elements 22d and 22e.

[0011] L.C. 20 is a storage mechanism, such as a box of lockable container, for the secure stacking and transportation of notes and coupons. The L.C. 20 is portable and designed with a stacking mechanism 34 to hold the currency and notes securely once they pass through the validator. Integral to L.C. 20 is a nonvolatile storage memory to receive and hold the IDA and IDS information generated by these units. The L.C. is provided with a connector buss 34 for connection to a power source, motor sensors and to provide for the memory output to the CPU.

[0012] Additionally, the inventive system includes a soft count supervisor (SCS) 24 which is preferably portable or located at a remote position from the validator or IDS 16. The SCS 24, about which more is said below, is detachably placed in data or electrical communication with L.C. 20 by means of harness or harness segment 26. Similar to harnesses 18 and 22, harness 26 includes a mating or quick disconnect SCS-L.C. connector 26a. More particularly, harness 26 is formed of harness sections 26b and 26c on one end, respectively terminating in associated detachable disconnect elements 26d and 26e. Typically, SCS 24 is a personal computer (PC), laptop computer or handheld data storage device that, with harness 26, can be detachably coupled to L.C. 20 to download data therefrom. SCS 24 interrogates the memory device within L.C. 20 once the L.C. is removed from the host system. The SCS provides spread sheet type accounting of notes and coupons as well as status and performance information of system components. Since the L.C. is removed frequently, maintenance personnel may be directed accurately to systems performing efficiently or performing only marginally. L.C. 20 may be optionally interrogated through the communication port of validator IDS 16.

[0013] Referring now to Fig. 2, there is shown in schematic form how the DS1994 and DS2400 are electrically connected or placed in data communication with a host CPU 210. A single wire or data lead 212 is, on one end, electrically connected to data port 214 of CPU 210. The other end of wire 212 is electrically connected to Dallas Semiconductor Memory Device DS1994, as shown. Line 212 is "pulled-up" by pull-up resistor 216. A single wire or data lead 218 is, on one end, electrically connected to data port 220 of CPU 210. The other end of wire 218 is electrically connected to a Dallas Semiconductor DS2400, as shown. Wire 218 is electrically pulled-up by resistor 222.

[0014] Referring now to Fig. 3, there is shown the Flow Chart for the Write Function Assembly Code according to the present invention.

[0015] In operation or in operational sequence, all components are connected via power-on and reset switch (POR). The validator or IDS unit 16 loads the unique serial number of IDA 12 into its local nonvolatile memory and L.C. 20 is interrogated by IDS 16 for identification (ID). If L.C. 20 has no ID, as in the case of cash collection, the L.C. 20 is returned to system and IDS 16 will load the L.C. 20 with serial number and the following information:

time and data stamp	factory ID
validation histogram	manufacture date
malfunction summary	IDS configuration
CPU revision	case and coupon accounting data

[0016] The L.C. 20 wil further be strung with the various reasons for rejection of currency (optically and/or magnetically sensed), i.e., a full stack of bills, channel jams and whatever other data is supplied.

[0017] Overall, the inventive system will store:

a) time - stacker was attached;
b) time - stacker was removed;
c) date - stacker was attached;
d) date - stacker was removed;
e) asset number - a serial identification number for the gaming machine;
f) registers for note denominations and running totals;
g) registers for coupon information storage;
h) registers for fault determination and running totals;
i) self-determining mode;
j) providing performance data; and
k) flexible data conversion format so data can be displayed on any PC with simple programs.

[0018] There are two main components to this system feature. The first is the DS1990A, noted earlier, and the second is the DS2405 Addresssable Switch, also noted above. In the DS2250, data is transferred serially via a one-wire protocol. This protocol requires only a single data lead and a ground return. The DS2405 is an open drain N-channel field effect transistor that can be turned on and off to follow the standard Dallas one-wire protocol. This protocol is implemented with a single port of an 8052 microcontroller CPU. Data is transferred to the DS2250 via a stacker connector, and data in binary form is written to the touch memory device as described in the flow chart of the Write Function Assembly Code. The DS2405 Addressable Switch is housed in the cabling assembly so each machine has a unique identification and not the stacker. This provides flexibility for putting any given stacker on any given machine.

[0019] Since the memory device is housed within the money stacker or containers, it is easy for a user to receive the data. When the stacker is removed and emptied of coins or currency, the data can be retrieved by a fixture and downloaded to a PC, laptop, or handheld data storage device.

[0020] Time and date stamps are used for accounting purposes. This information will tell the user when the stackers are accessed and provide detailed information on hourly activity, and thus provide the user with a system for scheduling maintenance, stacker removal, and various other needed activity. According to the present invention, an asset number is assigned to a given gaming machine, i.e., it is the "name" of a given machine. This feature eliminates the need for the user or maintenance personnel to write down which currency stacker or data provider goes to which machine. In the inventive apparatus, since the read/write memory is nonvolatile, the removed stacker does not have to be replaced in the same machine. When a stacker is replaced, the asset number of the machine into which it is placed is written to memory.

[0021] The registers set up for bill denominations will keep a running total of how many bills of a particular denomination were inserted. This will give the user an instant tally of the amount of notes in the stacker and the total dollar value contained in the stacker. Other registers are set up to handle bar coded coupons. In this case, the complete encoded bar code number will be stored in memory. This eliminates the need for the user to hand read the coupons into the system because in the inventive technique it can now be downloaded directly from the stacker.

[0022] In the inventive implementation, other registers are set up to handle fault counts. More particularly, these registers are set up to handle optical window faults and optical ratio faults, magnetic faults, power faults, stacker faults, unrecognizable bill faults and front-end sensor faults. Such data will give the user insight into how well the machine is performing and which areas need improving. Knowledge of this fault data will also allow the inventive system to warn the user of potential problems. For example, if the machine records an excessive number of faults, it can be programmed to warn the user via network connection or by flashing LED's. The user now has a reliable way systematically to maintain the gaming machine at the highest possible performance level, thus increasing the machine's profit potential.

[0023] To ensure the integrity of the data and provide the highest possible level of accuracy, CRC and write verify read procedures are employed in the inventive system.

[0024] It is to be understood that in this application use of the terms electrical and data communication are meant to be synonymous - that is, where an element is said to be in electrical communication it can be read as meaning in data

communication, and, of course, to those in this area, data communication also includes wireless communication wherein the link can be RF radio frequency, light and infrared, to name a few.

Claims

1. A soft count tracking system for a currency operated host gaming machine, including:

a currency note validator (16) to receive currency notes input to the host gaming machine;
a storage mechanism (20) detachably coupled to said currency note validator (16) to store currency notes received by said currency note validator (16), the storage mechanism (20) including a storage memory to store data associated with said host gaming machine; and
a soft count supervisor (24) for receiving said storage mechanism (20) and downloading said data from said storage memory.

2. The soft count tracking system of claim 1, wherein said soft count supervisor (24) includes a computer, including software means to provide spread sheet data manipulation of the data extracted from said second storage memory.

3. The soft count tracking system of claim 1, wherein said data includes a unique identifier associated with said host gaming machine.

4. The soft count tracking system of claim 3, wherein said data further includes information relating to the currency notes received by said currency note validator (16), including the number and amount of currency notes received.

5. The soft count tracking system of claim 1, further comprising a second storage memory to store data associated with the host gaming machine.

6. The soft count tracking system of claim 5, wherein data is transferred from the second storage memory to the storage memory of the storage mechanism (20).

7. A soft count tracking system for a currency operated host gaming machine of claim 1 and including:

a first storage memory to store data, the data including a unique identifier corresponding to the host gaming machine;
a second storage memory associated with said storage mechanism (20) to store data, including said unique identifier, said unique identifier being communicated from said first storage memory to said second storage memory; and
said soft count supervisor (24) being arranged for extracting data from said second storage memory.

8. The soft count tracking system of claim 7, wherein the soft count supervisor (24) includes a computer, including software means to provide spread sheet data manipulation of the data extracted from said second storage memory.

9. The soft count tracking system of claim 7, wherein said first storage memory is coupled to said currency note validator (16).

10. The soft count tracking system of claim 7, wherein said second storage memory is nonvolatile memory.

11. The soft count tracking system of claim 7, wherein the soft count supervisor (24) includes a computer, and said storage mechanism (20) is adapted to be detachably coupled to said soft count supervisor (24) to enable data communication therebetween.

12. The soft count tracking system of claim 7, wherein said currency notes include money substitutes such as coupons and security papers.

13. The soft count tracking system of claim 7, wherein said data to be stored by the second storage memory includes information relating to the currency notes received by said currency note validator (16), including the number and amount of currency notes received.

14. The soft count tracking system of claims 1 or 7 and comprising a soft count supervisor (24) for extracting data from said portable storage mechanism (20), the soft count supervisor (24) comprising:

means for placing the soft count supervisor (24) in data communication with said portable storage mechanism (20); and
a computer to extract the data associated with said gaming machine.

15. The soft count tracking system of claims 1-14, wherein said means for data communication includes one of an RF, light and infrared communications link.

16. The soft count tracking system of claims 1-14, wherein the data includes a unique identifier associated with said gaming machine.

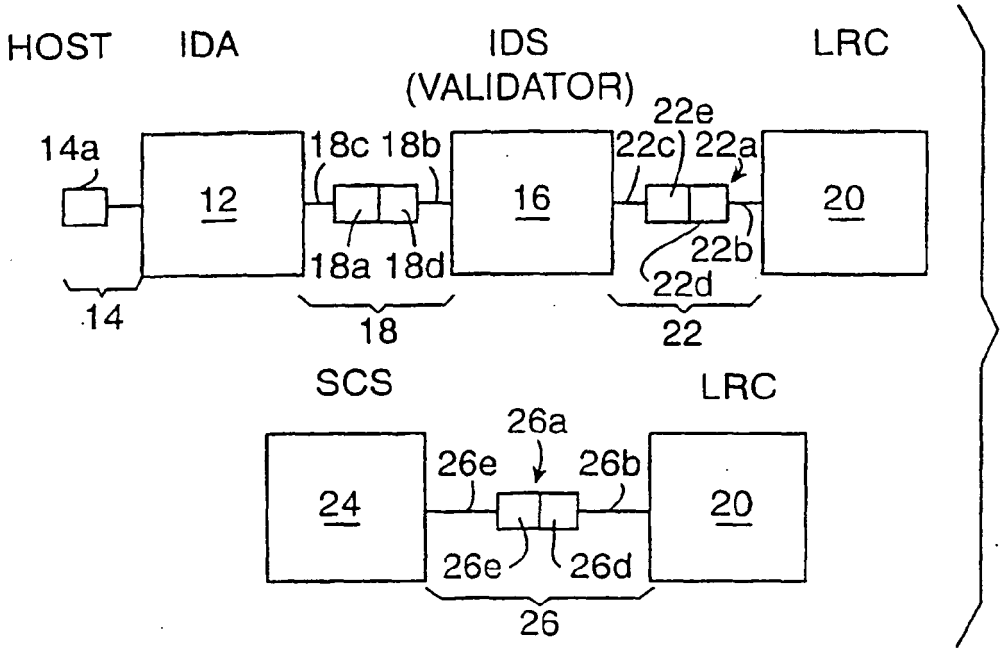
HOST
IDA
IDS
(VALIDATOR)
LRC
14a
12
18c 18b
16
22e
22c
22a
20
18a 18d
22b
22d
14
18
22
SCS
LRC
26a
26e
26b
24
20
26e
26d
26

FIG.1

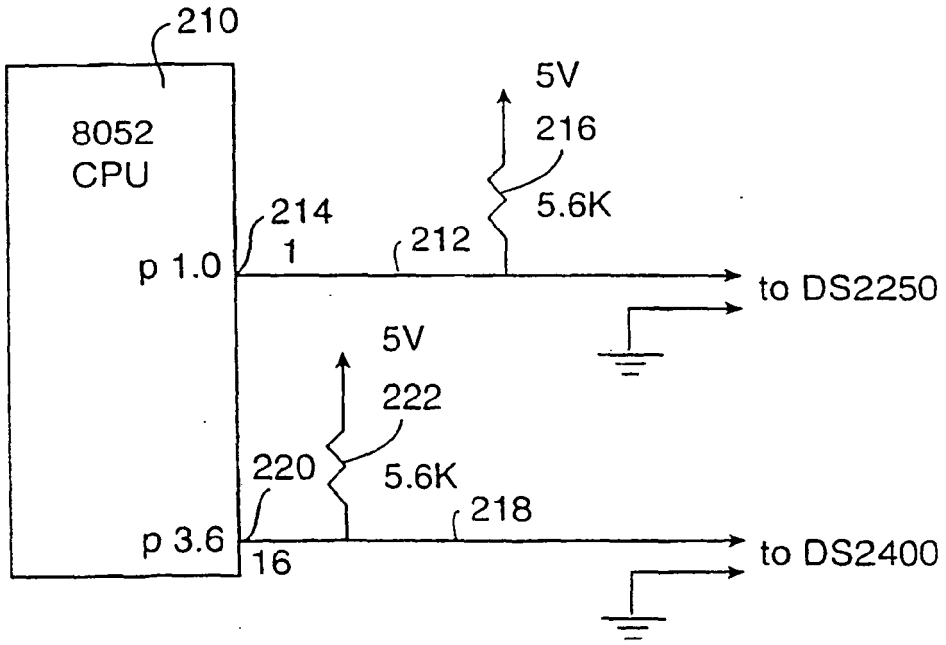
210
8052
CPU
5V
216
5.6K
214
1
212
p 1.0
to DS2250
5V
222
220
5.6K
218
p 3.6
16
to DS2400

FIG.2

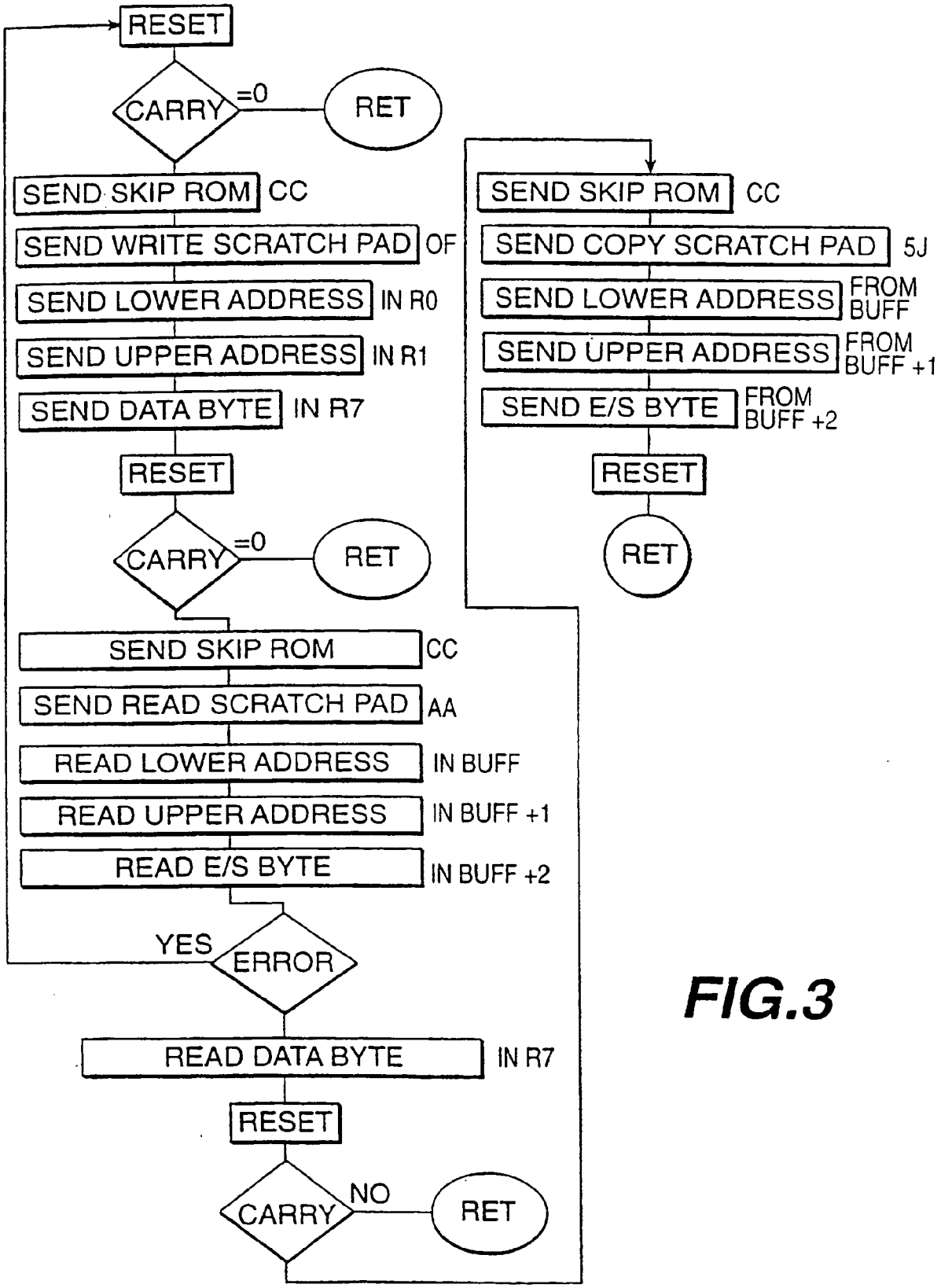
RESET
CARRY
=0
RET
SEND SKIP ROM
CC
SEND WRITE SCRATCH PAD
OF
SEND LOWER ADDRESS
IN R0
SEND UPPER ADDRESS
IN R1
SEND DATA BYTE
IN R7
RESET
CARRY
=0
RET
SEND SKIP ROM
CC
SEND READ SCRATCH PAD
AA
READ LOWER ADDRESS
IN BUFF
READ UPPER ADDRESS
IN BUFF +1
READ E/S BYTE
IN BUFF +2
YES
ERROR
READ DATA BYTE
IN R7
RESET
CARRY
NO
RET
SEND SKIP ROM
CC
SEND COPY SCRATCH PAD
5J
SEND LOWER ADDRESS
FROM BUFF
SEND UPPER ADDRESS
FROM BUFF +1
SEND E/S BYTE
FROM BUFF +2
RESET
RET

FIG.3

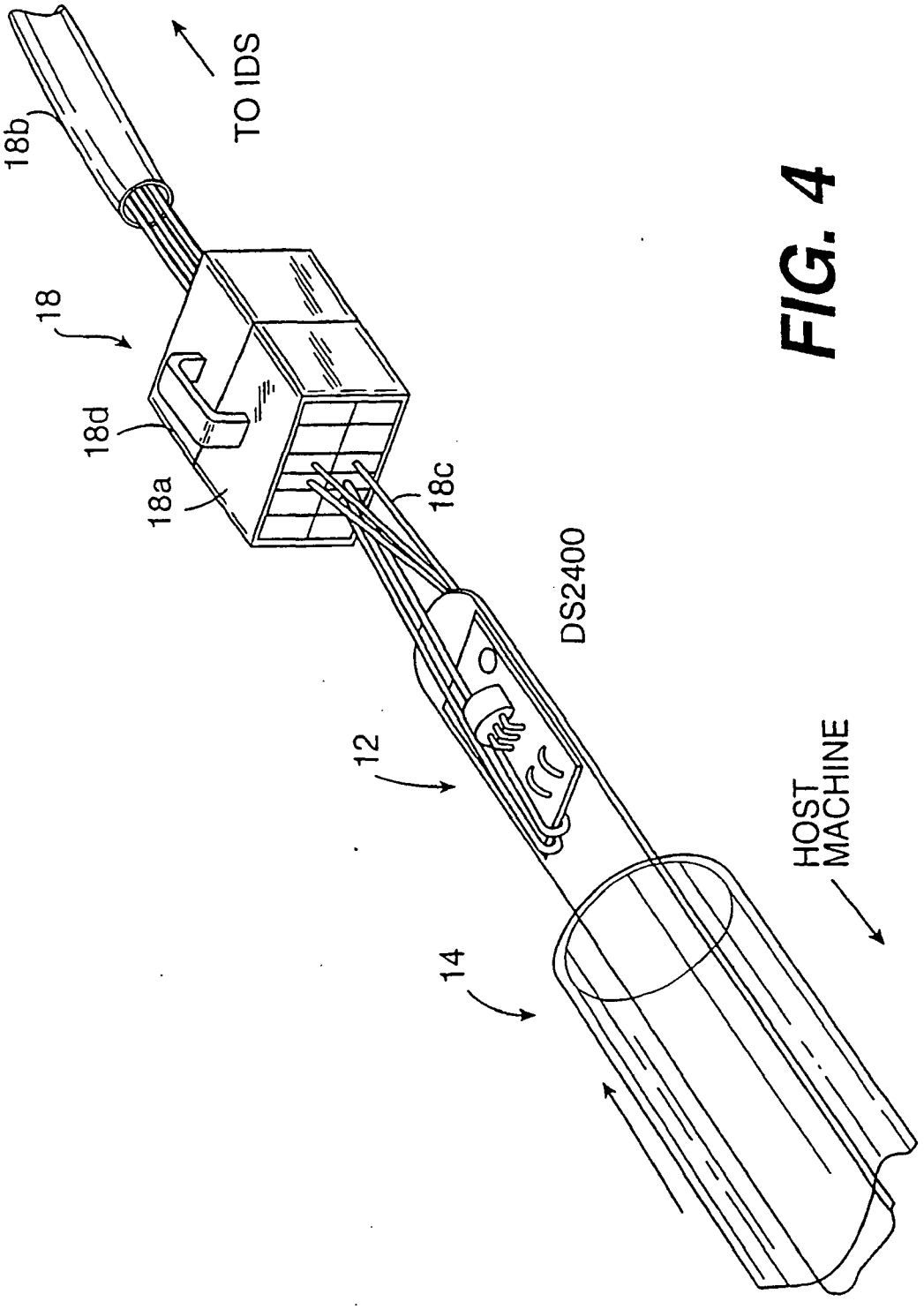

FIG. 4

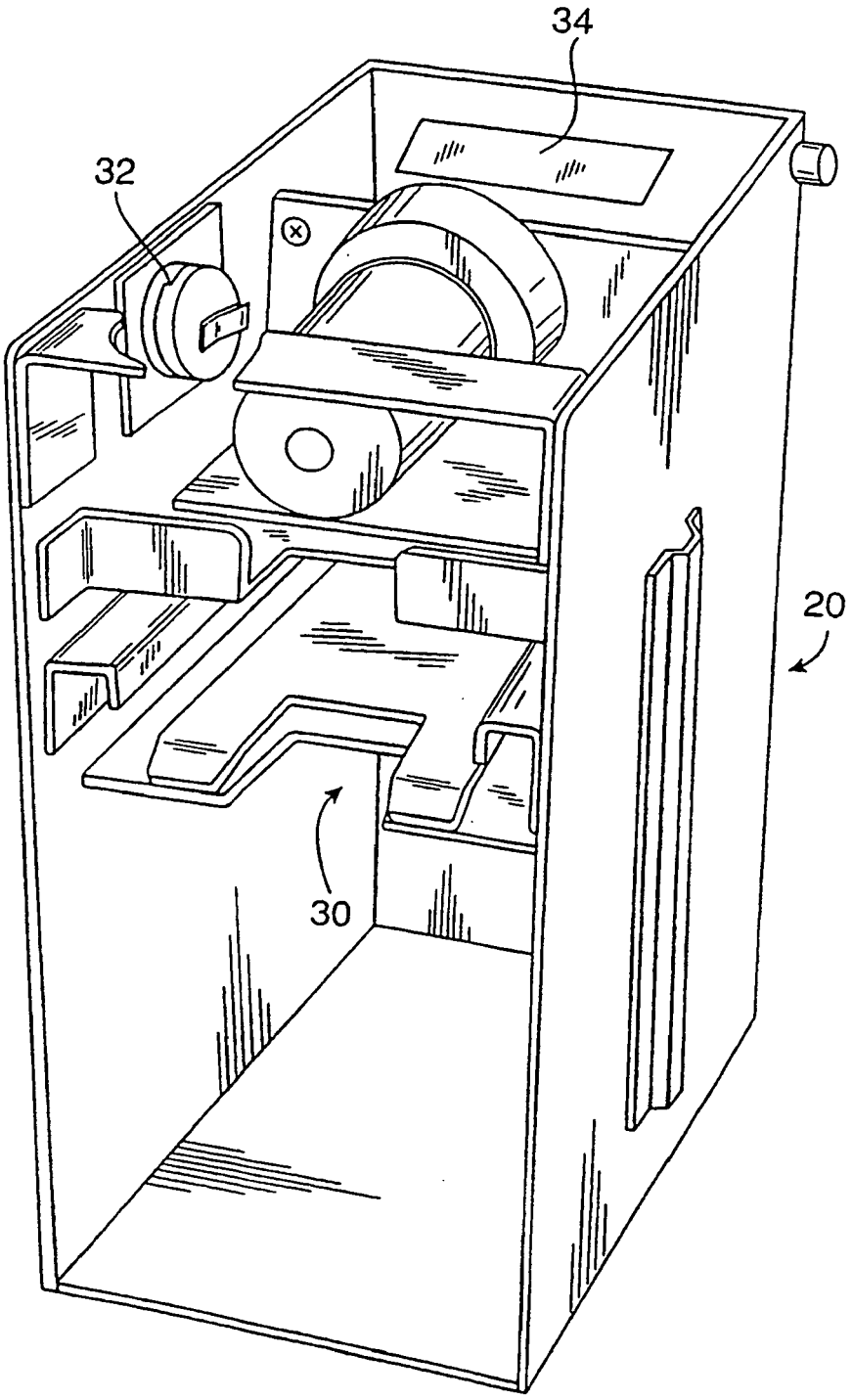

FIG.5

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EUROPEAN SEARCH REPORT

Application Number
EP 06 02 1535

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 041 457 B1 (SERRES BERNARD [FR]; DECRAE JEAN [FR]; DOUCET JOEL [FR]) 27 August 1986 (1986-08-27) * column 1, line 1 - line 37 * * column 3, line 12 - line 44 * * column 10, line 28 - column 12, line 5 * * figures 1,4 *	1-16	INV. G07F9/08
X	WO 92/02903 A (TIMETILL SECURITY LTD [GB]) 20 February 1992 (1992-02-20) * the whole document *	1-16	
A	EP 0 307 375 A2 (INTER INNOVATION AB [SE]) 15 March 1989 (1989-03-15) * the whole document *	1-16	

TECHNICAL FIELDS SEARCHED (IPC)

G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 February 2007	Kling, Jonas

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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28-02-2007

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- GB 2105892 A **[0003]**