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(54) Update processing system for an automated teller machine.

(57) An update processing system for an automated teller machine connected to a host computer, including: a holding memory for storing accumulated data consisting of reference data and transaction data; a holding date management unit operatively connected to the holding memory, and for reading the accumulated data from the holding memory, updating the reference data based on the data already updated by the host computer, and writing the transaction data to the holding memory; a pending transaction unit operatively connected to the holding data management unit and the host computer, and for controlling the update processing of the holding data management unit based on the reception request from the host computer, and sending the transaction data read out by the holding data management unit to the host computer based on the transmission request from the host computer; and a transaction unit operatively connected to the holding data management unit, and for requesting a read or write of the accumulated data from or to the holding data management unit.

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UPDATE PROCESSING SYSTEM FOR AN AUTOMATED TELLER MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an automated teller machine (ATM) connected to a host computer and used in various banking organizations, more particularly, it relates to an update processing system for the automated teller machine to perform high speed update processing of the data accumulated therein.

2. Description of the Related Art

Recently, automated teller machines are widely provided in banking organizations. In general, this type of machine is installed at a counter and is operated by a customer to perform a customer's transaction, for example, a deposit, payment, inquiry, etc. Such transactions are performed by insertion of a customer's card and by operation of a keyboard by the customer. In general, a plurality of automated teller machines are provided at the counter, and each of the automated teller machines is connected in parallel to a host computer through certain lines.

In this case, there are two application modes of the automated teller machine, i.e., an ON-line transaction mode and an OFF-line transaction mode. In the former, the line is connected between the host computer and the automated teller machine, and the transaction is performed after an inquiry of contents between the host computer and the machine. In the later, the line is disconnected between the host computer and the machine, and the transaction is performed after an inquiry of contents at the machine itself. In general, many machines have both modes, and the ON-line mode is changed to the OFF-line mode when the host computer is busy or the machine does not receive a response from the host within a predetermined time interval (time-out). The present invention is particularly advantageous in the OFF-line mode.

The host computer transfers various data to the machine, for example, reference data including negative account data and various parameters, and update data thereof. Meanwhile, the machine transfers an OFF-line transaction data to the host computer to update a master file therein. In the OFF-line mode, the machine judges whether the transaction is proper or not by referring to the various data accumulated (below, accumulated data) therein.

The update processing of the accumulated data in the machine is usually performed before opening of a line between the machine and the host computer.

Many problems occur, however, in the update processing. For example, it is often necessary to open the line between the machine and the host computer and it is troublesome to recover the system when a failure accidentally occurs in the transmission/reception of the accumulated data.

SUMMARY OF THE INVENTION

The object of the present invention is to provide an update processing system for an automated teller machine enabling high speed update processing of the accumulated data.

In accordance with the present invention, there is provided an update processing system for an automated teller machine connected to a host computer, including: a holding memory for storing accumulated data consisting of reference data and transaction data; a holding data management unit operatively connected to the holding memory for reading the accumulated data from the holding memory, updating the reference data based on the data already updated by the host computer, and writing the transaction data to the holding memory; a pending transaction unit operatively connected to the holding data management unit and the host computer, and for controlling the update processing of the holding data management unit based on the reception request from the host computer, and sending the transaction data read out by the holding data management unit to the host computer based on the transmission request from the host computer; and a transaction unit operatively connected to the holding data management unit, and for requesting a read or write of the accumulated data from or to the holding data management unit

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Fig. 1 is a schematic block diagram of a conventional transaction system;

Fig. 2 is a flowchart for explaining transaction and update processing in the transaction unit 5 in the ATM 4 shown in Fig. 1;

Fig. 3 is a schematic block diagram of an update processing system according to the present invention;

Fig. 4 is a schematic block diagram of an

update processing system according to an embodiment of the present invention;

Fig. 5 is a flowchart for explaining an OFF-line transaction;

Fig. 6 is a flowchart for explaining pending transaction processing; and

Fig. 7 is a basic structure of an automated teller machine to which the present invention is applied.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before describing the preferred embodiments, an explanation is given of a conventional system.

Figure 1 is a schematic block diagram of a conventional transaction system. In Fig. 1, reference number 1 denotes a host computer (HOST), 2 a transaction unit provided in the host computer, and 3 a management unit also provided in the host computer. Reference number 4 denotes an automated teller machine (ATM), 5 a transaction unit (TU), 6 a management unit, 7 an ON-line transaction unit, 8 a switching unit, 9 an OFF-line unit, 51 an OFF-line transaction data storage unit, and 52 a negative account data storage unit. These units 7 to 9 and 51, 52 are provided in the transaction unit 5. Reference number 27 denotes a customer operation unit, and 31 a line control unit.

In the system having the ON-line and OFF-line transaction function, a transaction route and management route are always provided in the system. In the transaction route, the transaction data TD and the accumulated data AD are controlled and managed in the transaction unit 2 of the HOST 1 and the transaction unit 5 of the ATM 4 through the line control unit 31. In the management route, the system is controlled and managed by transferring management/control data MD between the management unit 3 of the HOST 1 and the management unit 6 of the ATM 4 through the line control unit 31.

In the transaction unit 5 of the ATM 4, the ON-line transaction unit 7 performs the transaction to the customer after inquiry to the transaction unit 2 in the HOST 1. The OFF-line transaction unit 9 performs the transaction to the customer after judging whether the transaction is proper or not in the ATM itself. The switching unit 8 switches from the ON-line transaction unit 7 to the OFF-line transaction unit 9 when the ATM 4 does not receive an acknowledgement response from the HOST 1 in the ON-line transaction mode.

Figure 2 is a flowchart for explaining the transaction and update processings in the transaction unit 5 in the ATM 4 shown in Fig. 1.

Opening line to HOST

In step 1, when the ATM sends a request to open a line (OPENING-REQUEST) to the HOST, the HOST returns an acknowledgement of opening the line (OPENING-ACKNOWLEDGE). At the same time, the HOST sends the data, for example, the negative account data to be referred to in the OFF-line transaction, to the ATM. When the ATM receives the above data and stores the data in the ON-line transaction unit 7, the ATM is then accessible by the customer.

ON-line Transaction

In step 2, when the customer inserts his own card, passbook, or bills into the ATM and inputs the type of transaction from the keyboard, the ATM sends a transaction request message to the HOST based on the customer's transaction information. When the ATM receives a transaction acknowledgement message from the HOST, the ATM performs the transaction, for example, reception of bills and recording of the transaction.

Change-over to OFF-line mode

In step 3, the switching unit 8 supervises the response from the HOST. In the ON-line mode, if the response does not reach the ATM after a predetermined time lapse, the ATM returns the medium such as the card and the passbook to the customer and switches the ON-line transaction unit 7 to the OFF-line transaction unit 9. After these operations, the ATM is set to a waiting state for a customer's operation.

OFF-line transaction

In step 4, the OFF-line transaction unit 9 refers to the negative account storage unit 52 based on the transaction information input from the customer, and starts the transaction after judging whether the transaction is proper or not. The concluded transaction data is stored in the OFF-line transaction unit 51.

Re-opening of ON-line mode

In step 5, when the ATM receives the transaction acknowledgement message from the HOST, the switching unit 8 is switched from the OFF-line transaction unit 9 to the ON-line transaction unit 7. The ATM sends a cancellation message to the

HOST and receives a cancellation acknowledgement from the HOST. The cancellation message is necessary for cancelling the previous transaction request in step 4. Next, as mentioned in step 1, when the ATM sends a request to open the line (OPENING-REQUEST) to the HOST, the HOST returns an acknowledgement of opening the line (OPENING-ACKNOWLEDGE). At the same time, the ATM sends the OFF-line transaction data stored in the unit 51 to the HOST. After these operations, the ATM is set to a waiting state for a customer's operation.

Stop state of OFF-line transaction

In step 6, when the HOST sends a request to change or update the negative account data stored in the unit 51 to the ATM, the ATM is set to a transaction stop state and the negative account data updated by the HOST is stored in the unit 52. After the above-operation, the stop state of the transaction is released.

As explained above, in the conventional art, various transmission/reception of the ON-line transaction data, the negative account data, the OFF-line transaction data and like (i.e., accumulation data, is performed between the transaction unit 2 of the HOST 1 and transaction unit 5 of the ATM 4. During this transmission/reception of the accumulated data, the ATM is set to a "waiting state for line opening" or a "transaction stop state". Accordingly, the customer must wait a long time until the ATM can come into use.

An update processing system for an automated teller machine in various banking organizations to update the accumulated data will be explained in detail below.

Figure 3 is a schematic block diagram of an update processing system according to the present invention. In Fig. 3, reference number 10 denotes a host computer, and 20 denotes an automated teller machine (ATM). In automated teller machine 20, reference number 21 denotes a transaction unit (TU), 22 a pending transaction unit, 27 a customer operation unit, 28 a holding data management unit, and 29 a holding memory.

As shown in the drawing, the pending transaction route consisting of units 22, 28, and 29 is independently provided from the transaction route consisting of the unit 21. Accordingly, the access to the HOST is also independently performed between these routes as explained below.

The holding memory 29 stores the accumulated data AD consisting of the transaction data TD and the reference data RD. The transmission/reception of the accumulated data AD between the unit 21 and the unit 22 is performed by the holding data management unit 28. Further, the unit 28 performs the update of the data stored in the holding memory 29.

Accordingly, the transaction unit 21 performs the OFF-line transaction after requesting the read of the reference data (for example, negative account data) to the unit 28. The record of the OFF-line transaction data is controlled by the unit 28.

When the pending transaction unit 22 receives the request of the reference data from the HOST, the pending transaction unit 22 receives the accumulated data AD from the HOST, stores the received data AD into the holding memory and updates the received data AD. Further, the pending transaction unit 22 sends the OFF-line transaction data TD to the HOST when the OFF-line transaction data TD, which is not yet sent to the HOST, remains in the holding memory 29.

As explained above, since the update processing of the accumulated data AD is only controlled and managed in the pending transaction route regardless of the transaction route, it is possible to avoid the delay of the opening and stopping state of the transaction.

Figure 4 is a schematic block diagram of the update processing system according to an embodiment of the present invention. In the explanation, the reference data corresponds to the negative account data ND and the transaction data corresponds to the OFF-line transaction data OFD.

In Fig. 4, in the HOST 10, 11 denotes a transaction unit, 12 a pending transaction unit, and 13 a holding file. In the automated teller machine 20, 23 denotes an ON-line transaction unit, 24 an OFF-line transaction unit, and 30 a line control unit. In the OFF-line transaction unit (OFTU) 24, 25 denotes an OFF-line transaction data storage unit and 26 a negative account detection unit.

The holding memory 29 stores the accumulated data such as the OFF-line transaction data OFD and the negative account data ND. The pending data management unit 28 reads or writes the accumulated data from or to the holding memory 29 and updates the same. The customer operation unit 27 comprises a card reader, a printer, cash dispensing unit, a keyboard, display unit and the like. The line control unit 30 connects line between the HOST and the ATM. In the HOST 10, the pending transaction unit 12 has a different address from the transaction unit 11 and corresponds the accumulated data to the pending transaction unit 22. The holding file 13 stores the OFF-line transaction data OFD and the newest negative account data ND.

The ON-line transaction is performed in the ON-line transaction unit 23. The ON-line transaction unit 23 sends the opening request to the transaction unit 11 of the HOST 10. When the ON-line

transaction unit 23 receives the opening acknowledgement from the HOST, the ATM is set to the waiting state for the customer. The ON-line transaction mode is switched to the OFF-line transaction mode by the switching unit 8 when the response time from the HOST is over. The OFF-line transaction is explained in detail below.

Figure 5 is a flowchart for explaining an OFF-line transaction. When the response time from the HOST is over, the switching unit 8 is switched from the ON-line mode to the OFF-line mode (step 1) and the ATM is set to the waiting state for the customer's transaction (step 2). During this time, the transaction unit 21 checks whether the holding memory 29 is full or not (step 3). If the holding memory 29 is not full, the negative account data ND in the holding memory 29 is checked (step 4). When the transaction unit 21 judges that the transaction is proper (YES), the customer inserts own card or the passbook and operates the keyboard (step 5). In this case, if the transaction unit 21 judges that the transaction is not proper (NO), the ATM holds the waiting state of the OFF-line mode (step 6).

When the card or passbook is inserted, the transaction unit 21 reads a magnetic portion thereof (step 7) and checks whether the negative account and transaction bank are proper or not (step 8). After these steps, the account to be deposited into is designated by the customer (step 9). When the bills are inserted by the customer, the bills are stored (step 10). The resultant transaction is printed into the passbook and the magnetic portion thereof is updated (step 11) and the passbook is returned to the customer (step 12). Finally, the resultant transaction is stored in the holding memory 29 as the OFF-line transaction data OFD (step 13). After these steps, the ATM returns to the step 2, i.e., the waiting state for the customer's transaction.

As explained above, the OFF-line transaction unit 24 receives the customer's transaction after confirming the reception of the negative account data ND in the holding memory 29, and the negative account data is held in the pending memory 29 by controlling the holding data management unit 28.

Figure 6 is a flowchart for explaining pending transaction processing. The pending transaction unit 22 of the ATM 20 receives a message from the HOST and judges that the message indicates either a request for a transmission or a request for an update of the negative account data (step 1). When the message indicates a transmission request to the HOST (NO), the pending transaction unit 22 checks whether the accumulated data is stored or not in the holding memory 29 (step 2). When the accumulated data (OFF-line transaction data) is stored (YES), the data is read from the holding memory 29 (step 3) and the read data is sent to the pending transaction unit 12 of the HOST (step 4). The HOST returns the response of the reception of the message (step 5) to the unit 22 and the transmission from the unit 22 to the unit 12 is completed.

Meanwhile, when the message indicates a request to update the negative account data in step 1, the HOST informs the closing of the negative account data to the OFF-line transaction unit 24 (step 7). The transaction unit 24 checks the stop state of the OFF-line transaction (step 8) and receives the negative account data from the HOST (step 9). The ATM send a response to the transmission of the message to the HOST (10) and the negative account data stored in the holding memory 29 is changed and updated by control of the pending transaction unit 22 (step 11). When the update is completed (step 12), the HOST informs the opening of the negative account data to the OFF-line transaction unit 24 (step 13).

As explained above, in the present invention, the accumulated data, i.e., transaction data (OFF-line transaction data) and reference data (negative account data), are independently controlled and managed by the pending transaction route. Accordingly, it is possible to perform the update processing of the accumulated data between the HOST and the ATM regardless the transaction route so that the delay of the opening of the line to the host and the stop of the transaction of the ATM can be avoided when the customer operates the ATM.

Figure 7 is a basic structure of the automated teller machine to which the present invention is applied. The card is inserted into or taken out from the card reader/inner printer and the detailed account of the transaction appears therefrom after the transaction. Bills are inserted into or taken out from the recycle unit. Coins are also inserted into or taken out from the coin recycle unit. The passbook is inserted into or taken out from the printer. The structures of the present invention shown in Figs. 3 and 4 are provided in the control unit. The line control unit 30 shown in Fig. 4 corresponds to the interface control unit and this unit is connected to the HOST computer. Since the satellite, remote supervision controller and control program file are not related to the present invention, the detailed explanations thereof are omitted.

Claims

1. An update processing system for an automated teller machine connected to a host computer, comprising:
a holding memory for storing accumulated data

consisting of reference data and transaction data;
a holding data management means operatively connected to said holding memory, and for reading said accumulated data from said holding memory, updating said reference data based on the data already updated by said host computer, and writing said transaction data to said holding memory;
a pending transaction means operatively connected to said holding data management means and said host computer, and for controlling the update processing of said holding data management means based on a reception request from said host computer, and sending said transaction data read out by said holding data management means to said host computer based on a transmission request from said host computer; and
a transaction means operatively connected to said holding data management means, and for requesting a read or write of said accumulated data from or to said holding data management means.

2. An update processing system as claimed in claim 1, wherein said transaction data stored in said holding memory is OFF-line transaction data.

3. An update processing system as claimed in claim 1, wherein said reference data stored in said holding memory is negative account data.

4. An automatic teller machine for performming a transaction by sending and receiving data to and from a central unit, comprising;
input means for inputting transaction data including input verification data,
first memory means for storing check data corresponding to verification data for allowing a transaction,
communication means for sending said input verification data to said central unit and for receiving data indicating allowance of a transaction, and
validity check and control means coupled to said input means, said first memory means and communication means for performing a transaction according to said input transaction data after a verification of said input verification data, and
said validity check and control means including means for monitoring said central which is able to communicate, second memory means for storing said transaction data under a control of said validity check and control means during said monitor means and detecting that said central unit cannot communicate, and means for reading out and sending said transaction data from said second memory means after said monitoring means detect a recovery of said communication with said central unit.

5. An automatic teller machine as claimed in claim 4, wherein said reading out and sending means send said central unit said data stored in said second memory means at a time between transactions so that said reading out and sending means does not disturb a communication for said transactions.

6. An automatic teller machine as claimed in claim 5, wherein communication means having a means for receiving account numbers being invalid for a transaction when said automatic teller machine is ready to perform a transaction, and means for storing said receiving account numbers into said first memory means so that said validity check and control means could perform an off-line verification by using said received account number stored in said first memory means until said monitoring means detect said recovery of said communication with said central unit.

7. An automatic teller machine to perform a predetermined access and a record of said predetermined access in cooperation with a central unit comprising;

(a) operation means for inputting data for said predetermined access,

(b) interface control means coupled to said central unit and for making communication with said central unit,

(c) holding memory means for storing data

(d) access program means coupled to said operation means, said interface control means and said holding memory means and including means for performing a program having steps of;
performing a predetermined access according to said data from said operation means,
generating a record data being able to discriminate said predetermined access,
sending said central unit said record data during said communication via said interface control means being available to send said record data,
storing into said holding memory means said record data as non-send record data while said communication is invalid to send, and
sending said central unit said non-send record data read from said holding memory means after the recovery.

Fig. 1

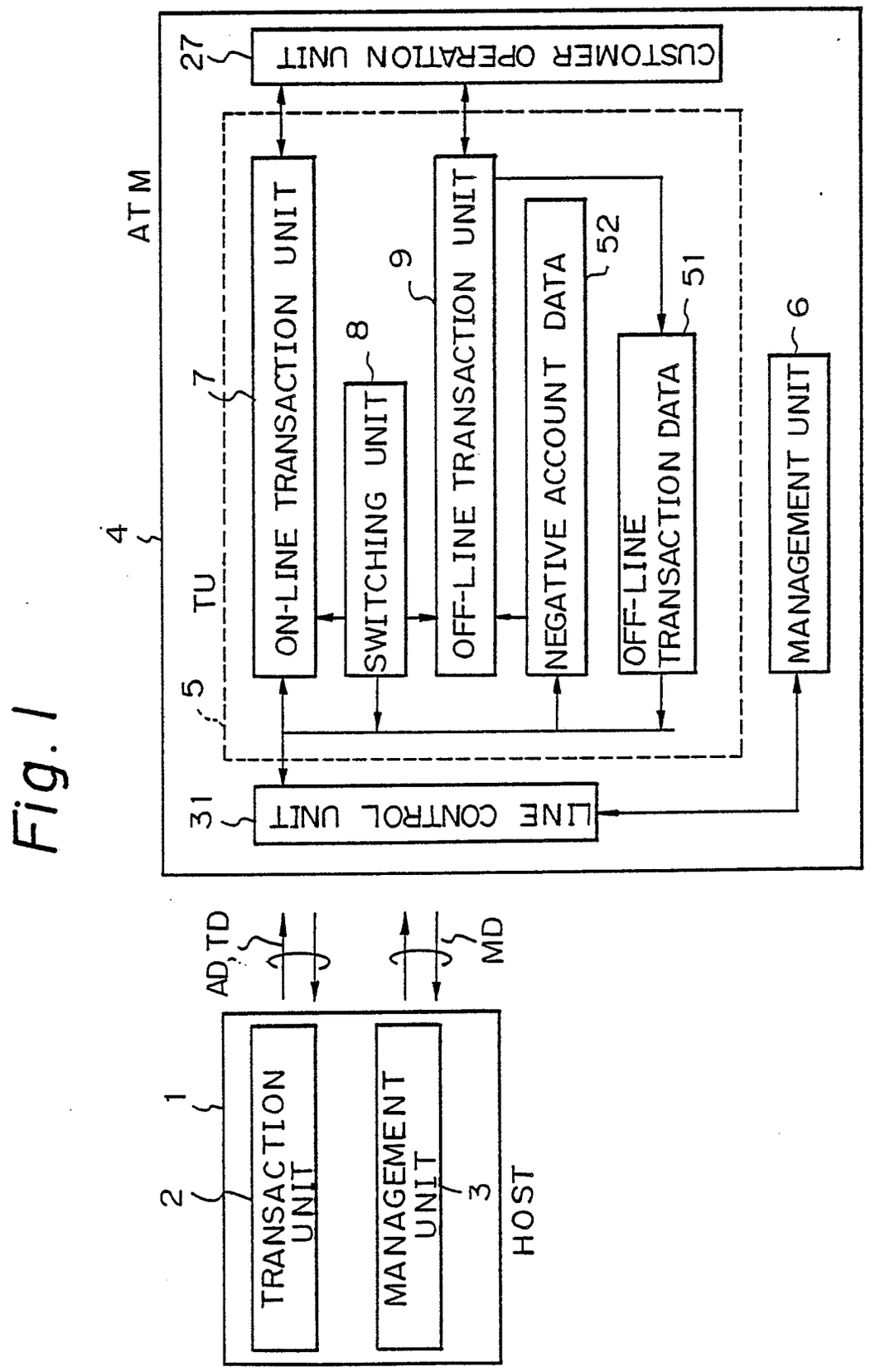

HOST
TRANSACTION UNIT
MANAGEMENT UNIT
1
2
3
AD, TD
MD
ATM
4
TU
5
7
ON-LINE TRANSACTION UNIT
8
SWITCHING UNIT
9
OFF-LINE TRANSACTION UNIT
52
NEGATIVE ACCOUNT DATA
51
OFF-LINE TRANSACTION DATA
6
MANAGEMENT UNIT
27
CUSTOMER OPERATION UNIT
31
LINE CONTROL UNIT

Fig. 2

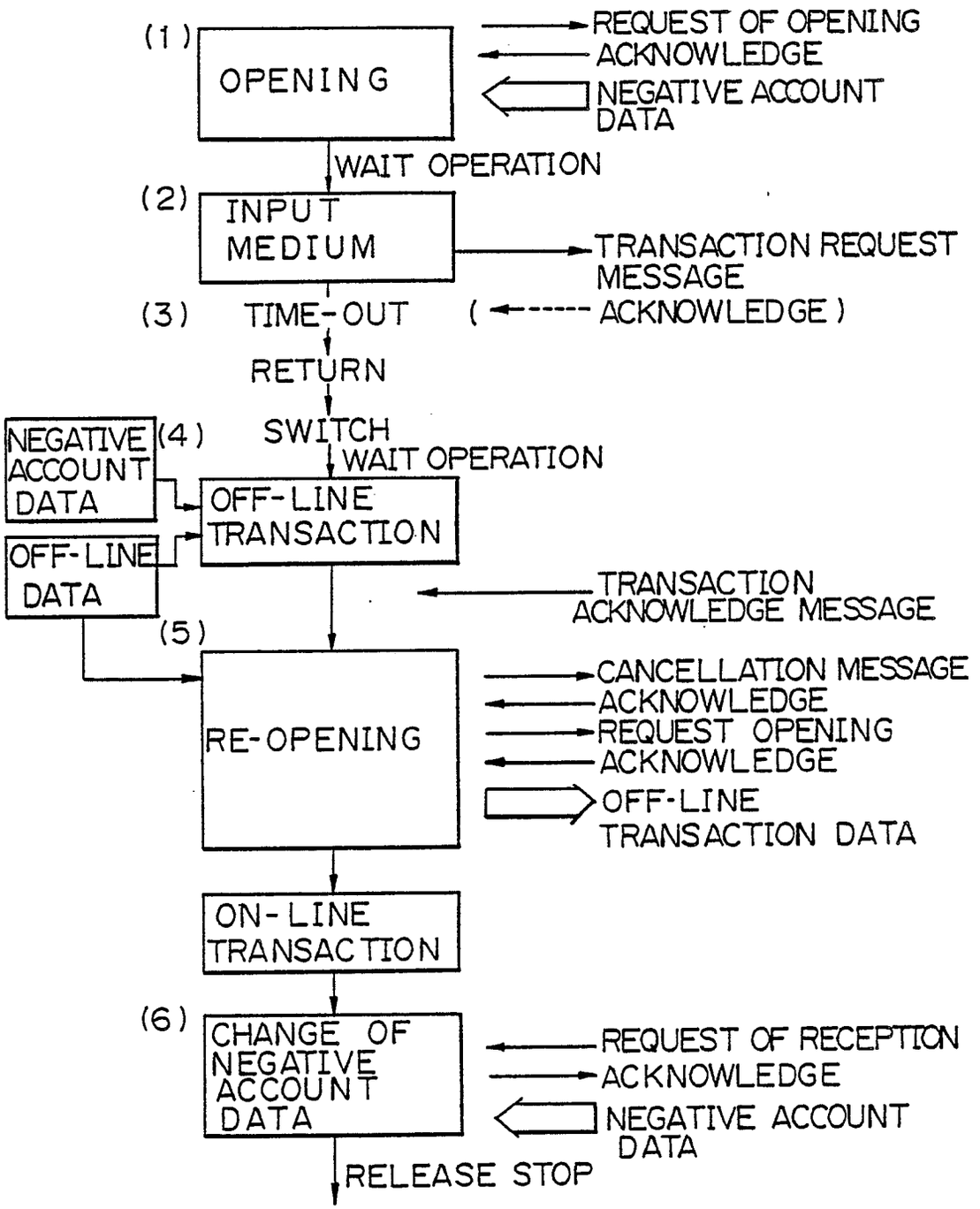

(1)
OPENING
REQUEST OF OPENING
ACKNOWLEDGE
NEGATIVE ACCOUNT DATA
WAIT OPERATION
(2)
INPUT MEDIUM
TRANSACTION REQUEST MESSAGE
(3)
TIME-OUT
(ACKNOWLEDGE)
RETURN
SWITCH
(4)
WAIT OPERATION
NEGATIVE ACCOUNT DATA
OFF-LINE TRANSACTION
OFF-LINE DATA
TRANSACTION ACKNOWLEDGE MESSAGE
(5)
RE-OPENING
CANCELLATION MESSAGE
ACKNOWLEDGE
REQUEST OPENING
ACKNOWLEDGE
OFF-LINE TRANSACTION DATA
ON-LINE TRANSACTION
(6)
CHANGE OF NEGATIVE ACCOUNT DATA
REQUEST OF RECEPTION
ACKNOWLEDGE
NEGATIVE ACCOUNT DATA
RELEASE STOP

Fig. 3

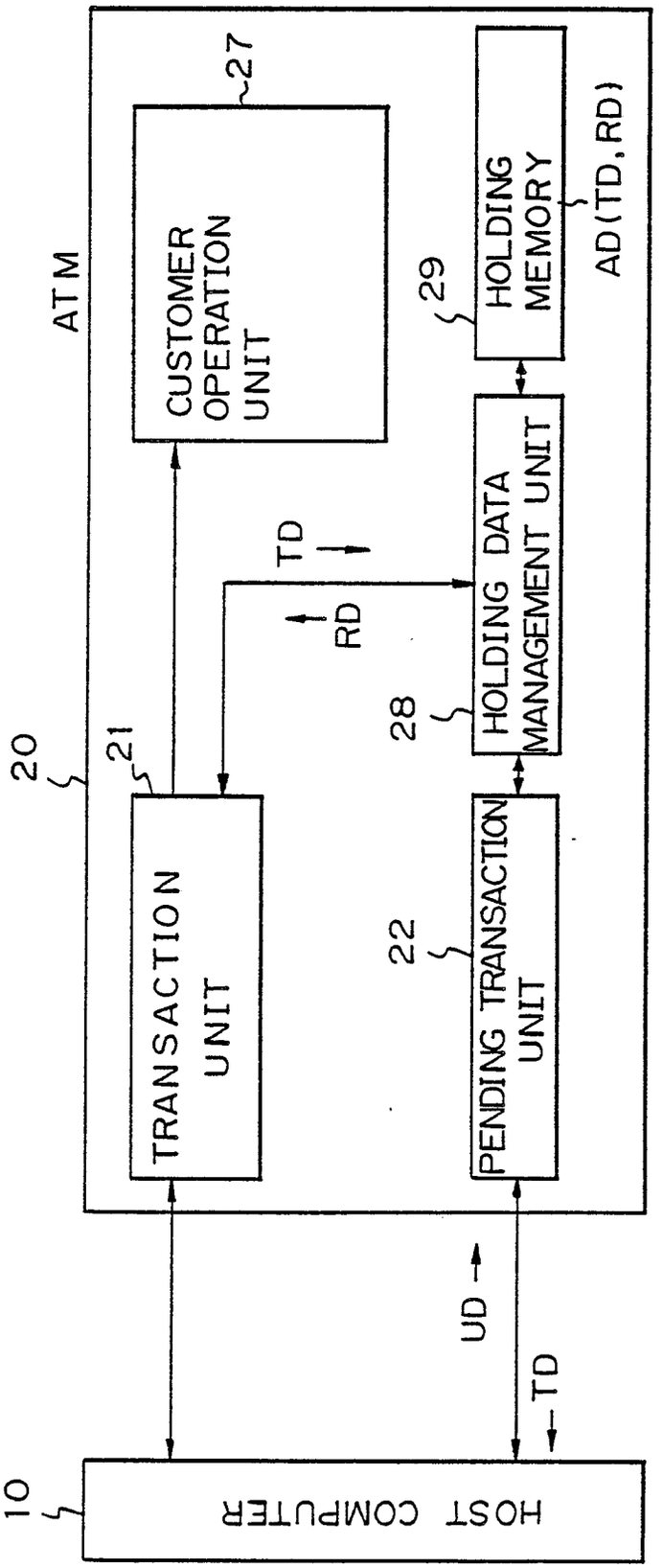

ATM
20
21
TRANSACTION UNIT
CUSTOMER OPERATION UNIT
27
TD
RD
28
HOLDING DATA MANAGEMENT UNIT
29
HOLDING MEMORY
AD(TD, RD)
22
PENDING TRANSACTION UNIT
UD
TD
10
HOST COMPUTER

Fig. 4

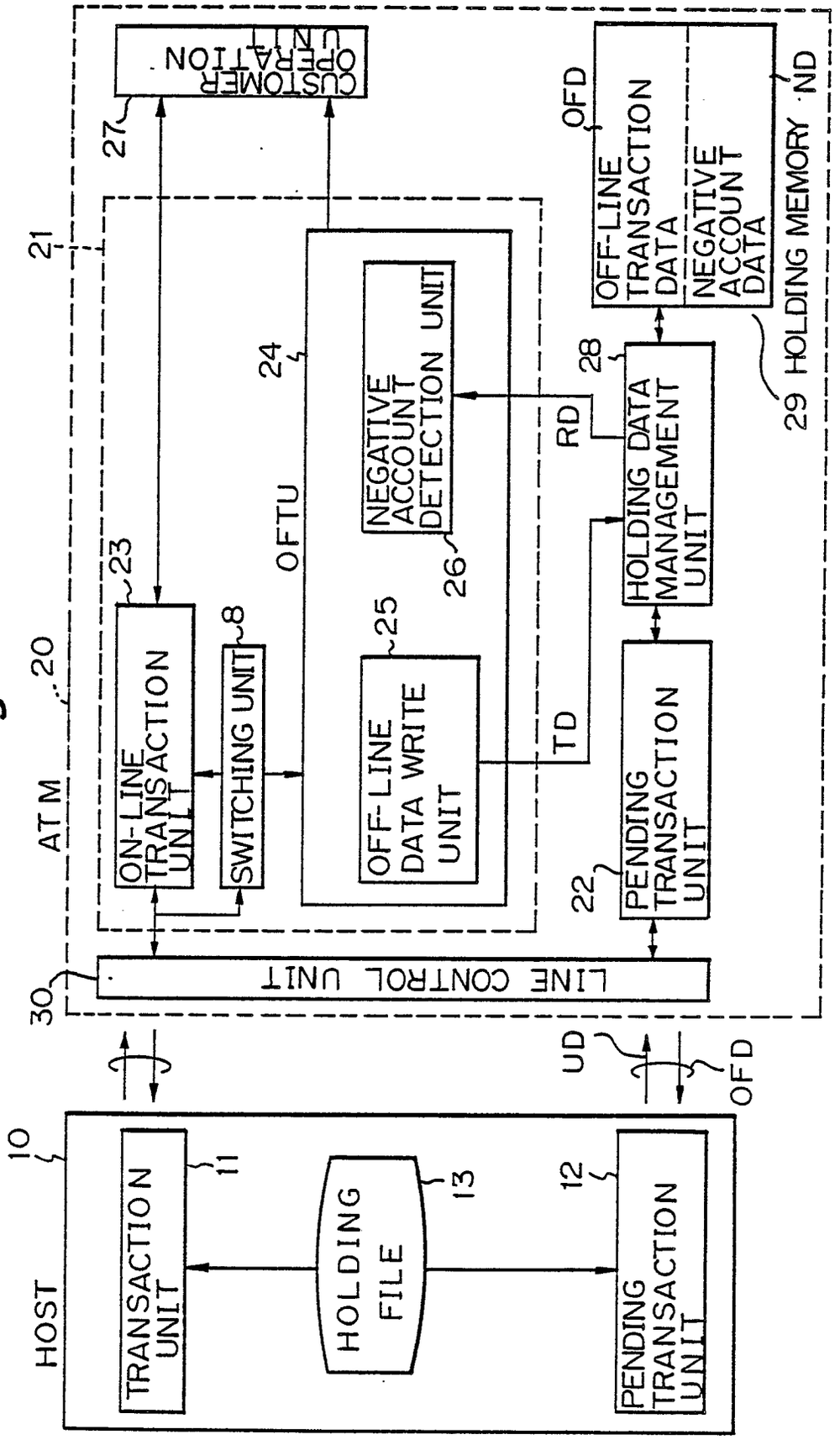

HOST
10
TRANSACTION UNIT
11
HOLDING FILE
13
PENDING TRANSACTION UNIT
12
UD
OFD
ATM
20
21
30
LINE CONTROL UNIT
ON-LINE TRANSACTION UNIT
23
SWITCHING UNIT
8
OFTU
24
OFF-LINE DATA WRITE UNIT
25
NEGATIVE ACCOUNT DETECTION UNIT
26
TD
RD
22
PENDING TRANSACTION UNIT
HOLDING DATA MANAGEMENT UNIT
28
27
CUSTOMER OPERATION UNIT
OFD
OFF-LINE TRANSACTION DATA
NEGATIVE ACCOUNT DATA
ND
29 HOLDING MEMORY

Fig. 5

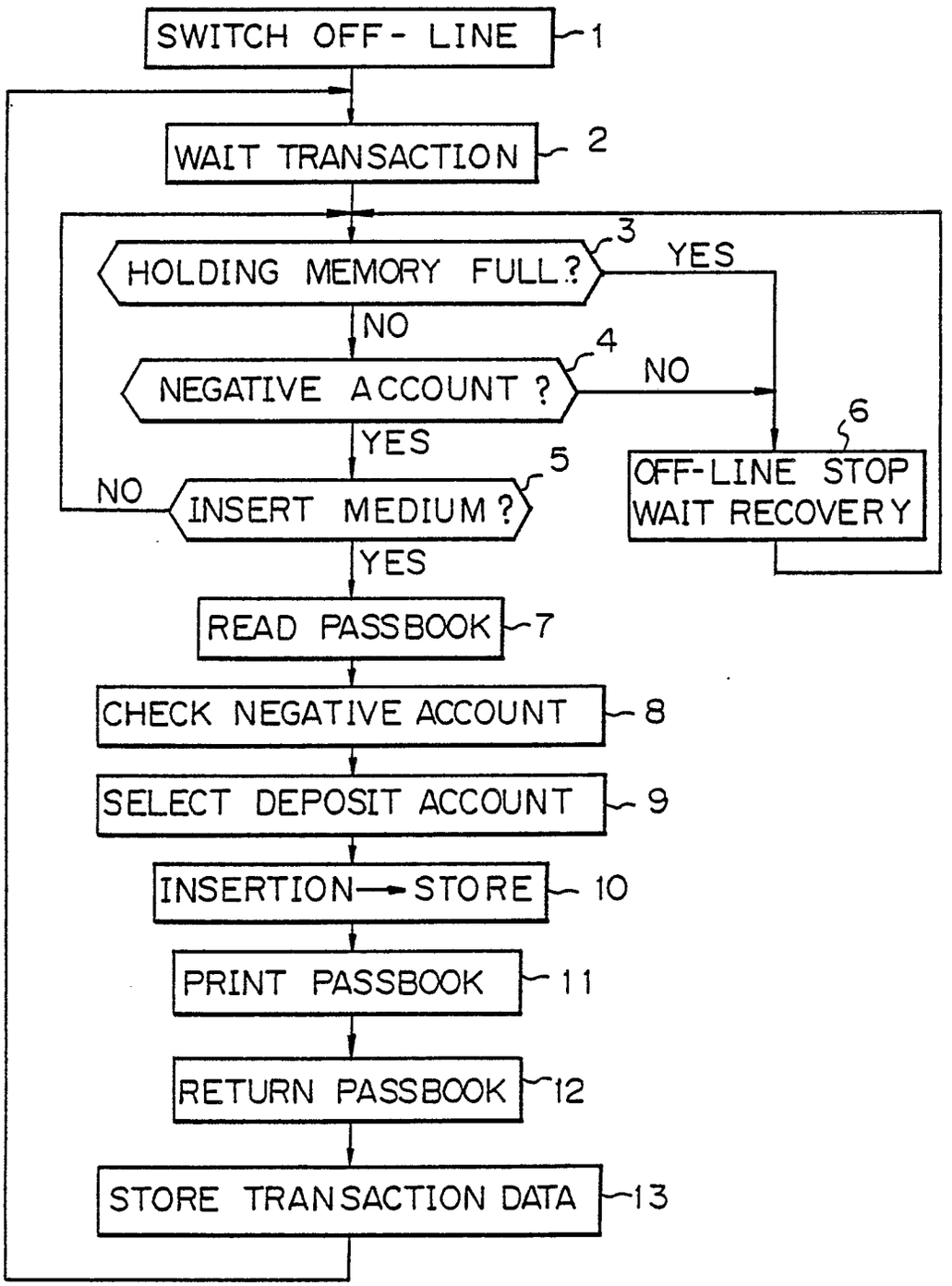

SWITCH OFF- LINE
1
WAIT TRANSACTION
2
HOLDING MEMORY FULL?
3
YES
NO
NEGATIVE ACCOUNT ?
4
NO
YES
INSERT MEDIUM ?
5
NO
YES
OFF-LINE STOP
WAIT RECOVERY
6
READ PASSBOOK
7
CHECK NEGATIVE ACCOUNT
8
SELECT DEPOSIT ACCOUNT
9
INSERTION → STORE
10
PRINT PASSBOOK
11
RETURN PASSBOOK
12
STORE TRANSACTION DATA
13

Fig. 6

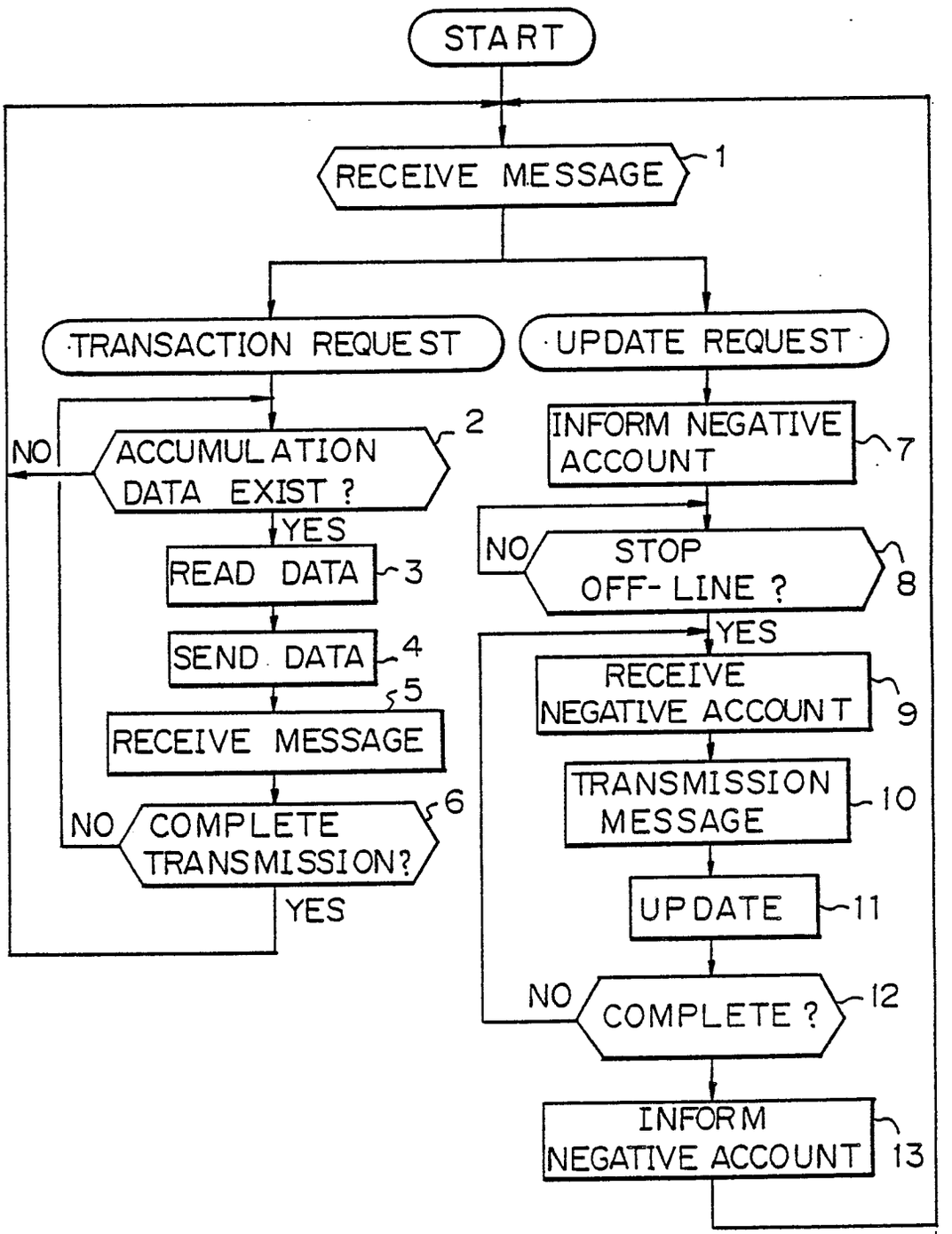
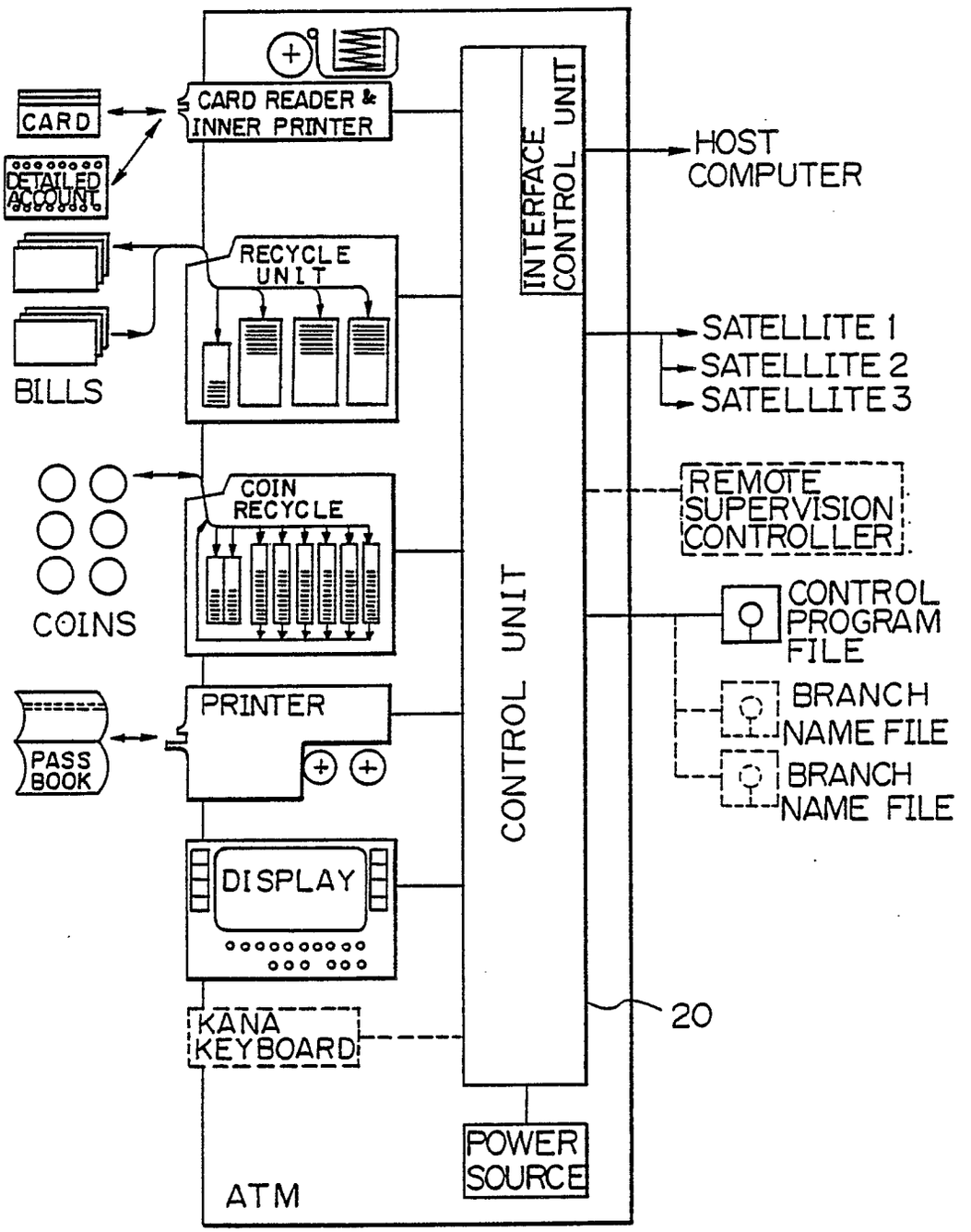

START
RECEIVE MESSAGE
1
TRANSACTION REQUEST
UPDATE REQUEST
NO
ACCUMULATION DATA EXIST ?
2
YES
READ DATA
3
SEND DATA
4
RECEIVE MESSAGE
5
NO
COMPLETE TRANSMISSION?
6
YES
INFORM NEGATIVE ACCOUNT
7
NO
STOP OFF-LINE ?
8
YES
RECEIVE NEGATIVE ACCOUNT
9
TRANSMISSION MESSAGE
10
UPDATE
11
NO
COMPLETE ?
12
INFORM NEGATIVE ACCOUNT
13

Fig. 7


CARD
DETAILED ACCOUNT
CARD READER & INNER PRINTER
RECYCLE UNIT
BILLS
COIN RECYCLE
COINS
PRINTER
PASS BOOK
DISPLAY
KANA KEYBOARD
CONTROL UNIT
INTERFACE CONTROL UNIT
POWER SOURCE
ATM
HOST COMPUTER
SATELLITE 1
SATELLITE 2
SATELLITE 3
REMOTE SUPERVISION CONTROLLER
CONTROL PROGRAM FILE
BRANCH NAME FILE
BRANCH NAME FILE
20