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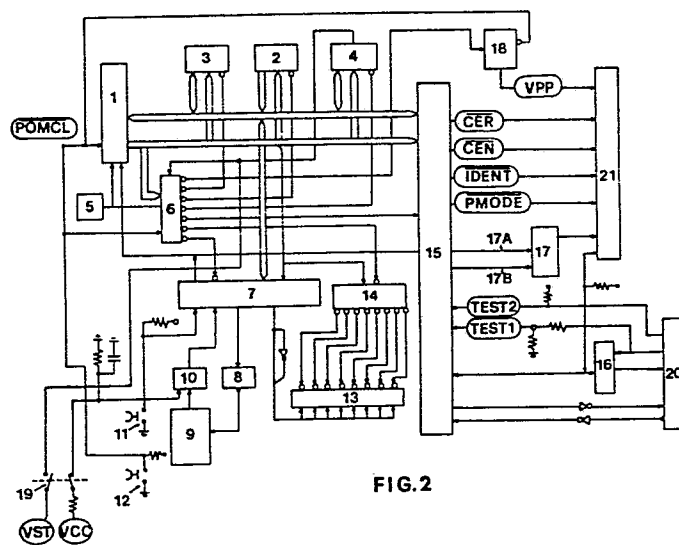
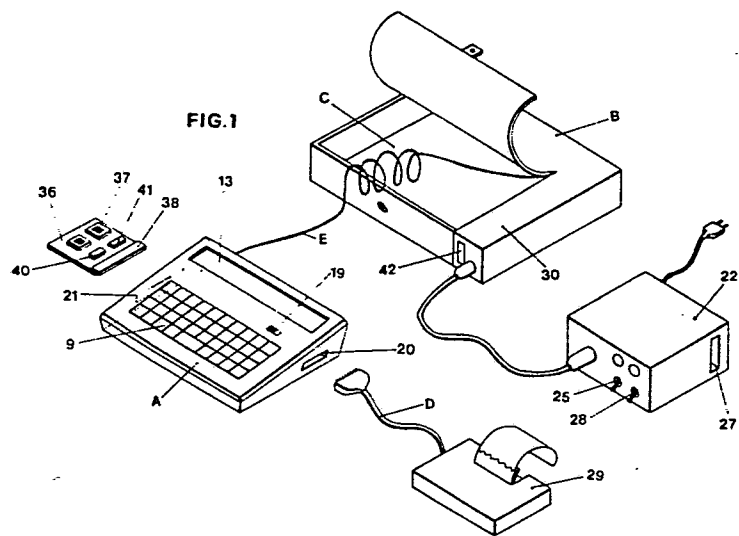
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⑤④ **Miniaturized typewriter.**

⑤⑦ Typewriter miniaturized so as to be pocket-size, equipped with electronic memory of a variable number of lines, corresponding to ten or more typewritten pages. The information may be stored even over long periods, but at the moment of reading may be transferred for viewing to one or more lines of display of 32 characters each, for example, or alternatively to a paper roll printing device or the like either incorporated in the machine or connected externally to it (Figures 1 and 2).



Miniaturized typewriter

This invention concerns a miniaturized typewriter.

There are currently available table-top typewriters equipped with memory for several lines of typing for viewing on a display or video so that the accuracy of the typing can be checked before it is printed. However these machines are obviously not pocket-size, due also to the necessity of connecting them to an electrical outlet so the electronic system for paper printing may function.

Machines of the same size as electronic pocket calculators are also known. In addition to performing the mathematic functions planned, these are programmed to memorize certain data corresponding to a few addresses, names or the like so that they may be viewed as desired on the display. However, these may not be considered typewriters since they have no traditional keyboard which would allow them to be used by anyone with a knowledge of typing. In fact, these machines have the same rectangular structure as most calculators, with the longer side vertical and with the alphabetic characters arranged in simple succession. This arrangement leads to great difficulty and lengthy composition times even for the few simple words which may be typed. On its part, the display is placed on the smaller edge of the rectangle and shows only a few words at a time.

Other display-equipped devices are programmed to translate a few selected phrases from one language to another, but these have neither the traditional keyboard, the possibility of memorizing text nor the capability of printing on paper.

The aim of this invention is to develop a real pocket typewriter which can either be held in one hand and used with the other like a traditional machine or be placed on a flat surface and used with both hands. It will allow each text typed to be viewed on a line of display with subsequent memorization line by line of information corresponding to several pages. This information may be stored even over long periods and redisplayed when needed, or may be transferred to a paper printing device incorporated in the machine or connected to the electronic memory as required.

According to this invention, this aim is achieved with a rectangular structure with the longer edge horizontal equipped with miniaturized keys arranged as the traditional keyboard in addition to multiple function control keys. This arrangement is beneath one or two lines of display (perhaps of the liquid crystal type) with a planned length of approximately 32 characters. Said structure contains a microcomputer programmed to effect the typing performed with said keys; this typing is displayed in succession for visual verification and then is accumulated line by line in the memory. This text is stored

there even when the machine is not in use to be redisplayed on the same display using the read key. There are two variants: one of automatic, timed line succession and another of manually controlled display and
5 disappearance of each line.

This aim is achieved with a portable electronic typewriter composed basically of an alphanumeric display, an alphanumeric keyboard and a RAM access memory capable of
10 storing a text typed on the keyboard and viewed on the display. This memory can store its contents for any number of days, even when the machine is not in use.

Certain keys also have control functions related to the
15 EDIT of the typed text or to the check of peripheral functions, described below. Batteries serve to operate the machine and store memory. The dimensions of the machine and the batteries allow the finding to be used as a portable typewriter.

20

The batteries may be recharged by a line adaptor. This is also equipped with a port for exposing EPROM-type memory cartridges to UV light. When inserted in the typewriter, these cartridges allow the memory of the device
25 to be expanded so that when one or more is used the EDIT-ed typed text may be stored for an indefinite period.

These cartridges are erased by exposure to UV light as described above.

E²ROM-type memory cartridges may also be used which can be erased electrically on the machine itself.

There is also a connector for interfacing with a 24-32
5 column alphanumeric printer, with the parallel exchange type.

In one variant, the E²ROM or EPROM memory cartridge is connected by a cable and placed in a carrying case or
10 suitable container; this allows larger amounts of memory.

One possible preferred example of this device is shown in the enclosed drawings, figures 1-7.

15

Figure 1 shows an axonometric view of the complete device.

Figure 2 shows the scheme of the blocks of components.

20

Figure 3 shows a possible scheme for the power supply.

Figure 4 schematizes the block for generating the standby voltage.

25

Figure 5 indicates a possible realization of a 4 Kbyte EPROM-type memory expansion module.

Figure 6 shows the flow chart P₁ of the control program.

Figure 7 gives the flow chart of the keyboard control process P_2 .

The following particulars are indicated in the figures:

- 5 A = typewriter
- B = carrying case
- C = machine storage space
- D = cable for printer 29
- E = cable for connecting machine A with power supply 30.

10

The following functional blocks are detailed in figure 2:

- 1 - Microprocessor.
- 2 - EPROM, PROM or ROM containing the control program.
- 3 - RAM (256x8bit) whose function is to store data, states, stack; it must be 8 bit.
- 4 - RAM (nKx6 bit) whose function is to store the memorized text in ASCII code. For a set limited to characters it does not have to be 8 bit, and is therefore made up of a 1 bit CHIP (integrated circuit). In this way, for example, 6 CHIPS 4K bit each gives a memory field of 4Kx6 bit.

The first 32 portions of this RAM are reserved for the software used to store data while the machine is off.

This RAM uses a different power supply (VST) than the rest of the circuit since in it the typewritten text is memorized, as mentioned. Preferably, it is a low consumption CMOS or MOS, with battery backup mode properties. That is, data is stored under con-

ditions of approximately 3.5V non qualification.

The size of this unit depends on 4 factors:

- a) bulk
- b) dissipation
- 5 c) cost
- d) combination with removable and command execution programmable memory.
- 5 - Clock generator.
- 6 - Qualification logic for the various units sharing the
- 10 bus.
- 7 - PIO1 carries input and output characterized by 16bit individually programmable input or output and by a programmable timer.
- 8 - Multiplexor for keyboard control.
- 15 9 - Matrix keyboard.
- 10- Priority encoder for receiving data from the keyboard.
- 11- Double function test.
- 12- MASTER-CLEAR key.
- 13- 32 character intelligent display: This consists of 8
- 20 blocks of 4 characters each, each receiving 7 bit ASCII data, 2 bit character address on the impulse of of the typing.
- 14- Multiplexor.
- 15- PIO2, composed of 16 individually programmable I/O
- 25 bits, of a pair of lines synchronized by a hand shaking mechanism and a 16 bit programmable timer.
- 16- Buffer (current amplifier) for the printer parallel line.
- 17- 16 bit counter with increment and reset functions.

- 18- Voltage generator for cartridge programming.
- 19- Memory on/off switch.
- 20- Printer connection.
- 21- Connection for inserting the EPROM/EEROM cartridge.

5

The following functional blocks are detailed in figure 3:

- 22- Line adaptor to generate the following voltages:

- 11V, 2A for battery recharge and typewriter use in fixed positions.

- 10 - 15V $\pm$ 1V for the printer.

- 23- Transformer and rectifier.

- 24- Stabilizer.

- 25- Double switch for activating the above mentioned voltages.

- 15 26- UV lamp for erasing EPROM.

- 27- Space for inserting EPROM cartridges.

- 28- On/off switch for the UV lamp.

- 29- Printer.

- 30- Space in the carrying case to perform the following

- 20 functions:

- control of the VCC system voltage, established at 5V.

- control of the standby voltage.

- control of POMCL (Power on master clear) signal or

- 25 on/off reset.

- 31- Battery.

- 32- Constant voltage generator for recharge.

- 33- Switching relay for battery charging, to go from charging to supplying current.

34- 5V stabilizer. :

With regard to figures 4 and 5:

- 35- Standby circuit: 35A, input for high yield output nonstabilized voltage; 35B, input for medium yield output voltage stabilized at 5 volts; 35C, output for standby voltage; 35D, comparator integrator for POMCL signal control; 35E, high capacity output capacitor.
- 36- Expansion cartridge with two EPROM of 2Kbytes each (total: 4Kbytes).
- 10 37- 2K byte EPROM.
- 38- Application connector for hook-up with connector 21.
- 39- Switching logic for programming impulse.
- 40- Port for reading identification code
- 41- Control logic.
- 15 42- General switch.
- 43- MASTER-CLEAR.
- 44- I/O port initialization.
- 45- Program asks if memory is on: 45A=No, 45B=Yes.
- 46- Output on display: 'Memory not ready'.
- 20 47- Program asks if memory is on: 47A=Yes, 47B=No.
- 48- Memory initialization.
- 49- Determination of number of free lines 'n' stored in reserved area D1 of memory 4.
- 50- Program asks if memory initialized: 50A=Yes, 50B=No.
- 25 51- Read number of lines of memory 'n'.
- 52- Beginning of process P_2 with interrupt every 2ms.
- 53- Output on display: 'n' free lines ready.
- 54- Output on display of the first line of the text.
- 55- Process P_2 asks if a key has been read: 55A=No, 55B=Yes.

- 56- Key interpretation.
- 57- Program asks if key read is a control key: 57A=Yes,
57B=No.
- 58- Memorization of the character in ASCII code.
- 5 59- Output display of line where the character was mem-
orized.
- 60- Process P_2 asks if a character has been read: 60A=
No, 60B=Yes.
- 61- Key interpretation.
- 10 62- Program asks if command was given in repeat mode:
62A=Yes, 62B=No.
- 63- Program asks if a command is the same as the previous
one: 63A=Yes, 63B=No.
- 64- Program asks if it is the command 'repeat': 64A=Yes,
15 64B=No.
- 65- Program asks if it is a command: 65A=Yes, 65B=No.
- 66- Program asks if it is the command 'repeat': 66A=Yes,
66B=No.
- 67- Program asks if it is the command 'print': 67A=Yes,
20 67B=No.
- 68- Calls the subroutine which executes the command.
- 69- The print loop asks if the printer is present:
69A=No, 69B=Yes.
- 70- The print loop asks if the printer is 24 or 32
25 columns: 70A= 24 columns, 70B= 32 columns.
- 71- 24 character buffer line.
- 72- 32 character buffer line.
- 73- Output of buffer line on printer.
- 74- The print loop asks if there is an error: 74A=

Yes, 74B=No.

- 75- The print loop asks if the line printed is the final one: 75B=Yes, 75A=No.
- 76- The print loop asks if a 'STOP' character is in the line: 76A=Yes, 76B=No.
- 77- The print loop asks if process P_2 has read a key: 77A=No, 77B=Yes.
- 78- The print loop asks if the key read is the 'STOP' command: 78A=Yes, 78B=No.
- 79- Output of 'Printer not ready' message on display.
- 80- Activation of P_2 process from interrupt.
- 81- Keyboard control.
- 82- Timer control.
- 83- Cursor handling.
- 84- Process P_2 asks if the memory is on: 84A=No, 84B=Yes.
- 85- Interrupt return.

The EDIT and operations control functions will now be described:

- LRST - Line reverse step - displays the previous line
- RET - Return - displays the subsequent line
- CST - Character step - stops the cursor in front of a character without changing the content of the display
- CRST - Character reverse step - like CST, but behind
- INLIN - Insert line - creates a one line space by shifting the entire text forward starting from the displayed line
- DELIN - Delete line - erases the displayed line and con-

tracts the text while destroying the space so
created

- INCAR - Insert character - creates a space of one character by shifting the entire line to the right;
- 5 starting from the cursor, the last character on the right is lost
- DELCA - Delete character - erases the character indicated by the cursor and covers the space with the remaining part of the line by shifting it to the
- 10 left and the final character to the right by one space

All of the above mentioned commands are possible in the 'repeat mode,' that is, pressing the command 'repeat' and

15 then the desired command. This is then performed in a burst while the key is pressed.

When the key is released, the 'repeat mode' is reset and another command in the repeat mode is possible only by

20 repeating the 'repeat' prefix.

- HOME - Reports the first line of the text on the display
- BOT - (Bottom) goes to the final line of the text
- REPEAT - Initializes the repeat mode
- 25 PRINT - Prints the content of the memory starting from the line displayed. During printing, only the STOP command may be given.
- STOP - During the typing phase, it displays a particular character which will be interpreted either in

- the print phase (PRINT), the temporary viewing phase (TIME), the storage phase (SAVE) as a stop command. In the print phase (execution of the PRINT command), printing will stop and the machine will return to the typing phase. In the temporary display phase (execution of the TIME command), it will return to the typing phase.
- 5
- CLRM -Clear Memory erases the entire memory. As protection against accidental pressure, before performing the erasure, the machine asks the question 'Clear Memory?' (Y/N). If Y=Yes is pressed, the memory is erased; if N=No is pressed, it is not.
- 10
- MCLER Master Clear is a particular command to remove the calculator from an error situation which may be used following an internal error caused, for example, by discharged batteries, improper insertion of the power supply, improper insertion of the printer.
- 15
- FREE - Indicates the number of free lines.
- 20
- ADVP - Advance paper, advances the paper in the printer.
- TIME - Effects a timed display of the text starting from the line on the display until the end of the typed text or until a particular character described above appears.
- 25
- SAVE - (followed by a six letter name) - Stores the typing contained in the RAM in the cartridges by memorizing in a suitable table the name of the file and its initial and final address. This phase may be stopped by the following events:

- the end of the text to be memorized due to the end of the RAM memory
 - the end of the text to be memorized
 - the end of the cartridge; in this case the machine displays a message to insert a new cartridge.
- 5 LOAD - (followed by a six letter name) - Reads the typewritten text from a file contained in the cartridge and memorizes it in the RAM.
- 10 DETER - Asks the machine whether the typewritten text will fit in the present cartridge. The machine responds:
- (OK) if the text will fit;
- (MEMORY END AT) if the text will not fit and displays the first line which would be excluded.
- 15 The following possibilities are then offered:
- Memorizing on two cartridges
 - Leaving a part unmemorized
 - Using a fresh cartridge
 - Performing an EDIT of the text, eliminating the sections of less interest and replacing words with abbreviations.
- 20

The device functions as described below.

All commands are executed by the program contained in

25 EPROM 2 (figure 1).

Operation is illustrated by the general execution flow in figure 6 and by the operation of the system hardware dedicated to peripherals control, tracing the flow of

command execution and standard hardware (CPU, RAM, PROM, I/O seen from the bus side, qualification logic of the resources in the bus).

- 5 The general flow, which effects initialization and the principal loop of memorization of characters as well as commands' execution, also shows the repeat mode which interacts deeply with the above LOOP and the print loop.
- 10 The principal LOOP uses a process P_2 for reading the characters from the keyboard (figure 7) which controls the cursor of the display and the state of the text memory as well as the keyboard itself.
- 15 Data exchange between the two processes is synchronized through a hand shaking mechanism. Process P_2 is activated on a time slicing basis.

As deduced from figure 6, the software must know the
20 state and configuration of the hardware.

The individual pieces of data are acquired as follows:

State of the memory (ON/OFF) is taken from the highest
25 priority bit of the P.E. (10).

Presence of a printer is determined from the TEST 1 signal (TEST 1 = 0, printer absent; TEST 1 = 1, printer present).

The number of lines of the printer is determined from the TEST 2 signal (TEST 2 = 0, 32 column printer; TEST 2 = 1, 24 column printer).

- 5 The presence and configuration of the E²ROM/EPROM cartridge is determined when the IDENT signal is sent to the cartridge interface, and this responds with an 8-bit code (figure 5) from the configuration port 40.
- 10 The matrix keyboard is scanned through multiplexor 8. Any keys pressed are detected by the P.E. (10).

The scanned function is effected by process P₂, which takes care of anti-rebound and supplies the code of
15 the key read to process P₁.

To control the display, the software places the 6bit ASCII data for the character to be displayed on I/O port 7. The seventh bit is the complement of the sixth, and
20 the two bit address inside the display block for later typing is written on one of the 8 blocks through multiplexor 14.

The cursor is controlled by process P₂ through the typing of a special character.
25

The cartridge interface generates 16 address bits in output through the 16bit counter (17). This counter may be incremented by the INC signal (increment) 17A or zer-

oed by the RESET signal 17B. In addition, said interface generates a data signal 15, controlled by port PIO2, which is bidirectional and so allows both writing and reading operations to be effected. Finally, it also generates the following auxiliary signals:

- VPP = programming voltage, software qualifiable
- PHODE = programming qualification
- CE = memory qualification
- CER = memory erasure; used only by E²ROM
- 10 IDENT = qualifies the configuration port

There are two parts to the power supply, one fixed section (22) and one inserted in carrying case B (30). 30 shows the following properties:

15

A) When 22 is connected and turned on, it is recharged by the constant voltage generator 32 and battery 31; through relay 33, switched in position 33A, it supplies energy to stabilizer 34.

20

B) When 22 is disconnected or turned off, section 30 supplies energy to stabilizer 34 through battery 31.

C) In the case of a switch from condition A to B or
25 vice versa, the input and output capacity keeps the output voltage from varying during the switching of relay 33.

D) With power supply 30 either on or off, standby voltage is present. If the charge is removed (switch 19 open)

and the standby power supply receives voltage from terminal 35A (general switch 42 open), the absorption of the latter is zero. If charge is inserted with 19 closed, output voltage is approximately 3.5volts (RAM 4 maintenance voltage). If voltage is supplied through terminal 35B (switch 42 closed), output voltage is established at 5 volts (RAM 4 operating voltage).

E) Upon general ignition, working voltages VCC and VST are achieved. After a certain time, the POMCL signal is deactivated by 35D. If active, this signal keeps the electronic circuit under reset and disables the typing in the memory.

F) When the general switch is opened, the POMCL signal is reactivated before the VCC and VST voltages degrade.

As shown in points E) and F), the POMCL signal has the function not only of starting the system but also of disabling the typing in the memory through logic 6 when the system is functioning improperly (VCC 4.75 volts).

This signal is WIRED-ON with the MCL key.

In other functional variants, the machine may be made with a traditional keyboard coupled with an incorporated printing device of a known type. Alternatively, it may have a terminal connected to the micro-computer in a paper printer, to which the memorized information may be

sent through a cable. In this way, either at the same time as the typing appears on the display or independently of it, actual mechanical typing may be performed.

Claims

1. Miniaturized typewriter, characterized by a rectangular structure with the longer edge horizontal equipped with
5 miniaturized keys arranged as in the traditional keyboard and with one or more lines of display on top (perhaps of the liquid crystal type), with an anticipated length of approximately 32 characters and a micro-computer structure programmed to effect the typing performed
10 with said keys; the typed text is then displayed for visual verification and stored line by line in a memory, where it remains even when the machine is not in use; the read key is then used to make the text reappear on said display, with the lines either in automatic timed succession or in the manually controlled appearance and disappearance of each line; the computer structure includes
15 a series of commands to perform operating functions.

2. Miniaturized typewriter according to claim 1, characterized in that said programmed micro-computer structure
20 for performing the typing with said keys provides for the presence of one or more microprocessors.

3. Miniaturized typewriter according to claims 1 and 2,
25 characterized in that microprocessor(s) 1 allow the command and thus control of a succession of functional blocks arranged as follows:

- 2 - EPROM, PROM or ROM containing the control program;
- 3 - RAM (256x8bit) whose function is to store data,

- states, stack; it must be 8 bit;
- 4 - RAM (nK x 6 bit) whose function is to store the memorized text in ASCII code; for a set limited to characters it does not have to be 8 bit, and is
 - 5 therefore made up of a 1 bit wide CHIP (integrated circuit); in this way, for example, 6 CHIPS 4 bit each give a memory field of 4K x 6 bit; the first 32 positions of this RAM are reserved for the software used to store data the machine is off;
 - 10 5 - Clock generator;
 - 6 - Qualification logic for the various units sharing the bus;
 - 7 - PIO1, carrying input and output characterized by 16 bit individually programmable input or output and by
 - 15 a programmable timer;
 - 8 - Multiplexor for keyboard control;
 - 9 - Matrix keyboard;
 - 10 - Priority encoder for receiving data from the keyboard;
 - 20 11 - Double function test;
 - 12 - MASTER-CLEAR key;
 - 13 - 32 character intelligent display: this consists of 8 blocks of 4 characters each, each receiving 7 bit ASCII data, 2bit character address on the impulse of
 - 25 the typing;
 - 14 - Multiplexor;
 - 15 - PIO2, composed of 16individually programmable I/O bits, a pair of lines synchronized by a hand shaking mechanism and a 16 bit programmable timer;

- 16 - Buffer (current amplifier) for the printer parallel line;
- 17 - 16 bit counter with increment and reset functions;
- 18 - Voltage generator for cartridge programming;
- 5 19 - Memory on/off switch;
- 20 - Printer connection;
- 21 - Connection for inserting the EPROM/EEROM cartridge;
- 22 - Line adaptor to generate the following voltages:
 - 11V - 2A for battery recharge and typewriter use
 - 10 in fixed positions;
 - 15V $\pm$ 1V for the printer;
- 23 - Transformer and rectifier;
- 24 - Stabilizer;
- 25 - Double switch for activating the above mentioned
- 15 voltages;
- 26 - UV lamp for erasing EPROM;
- 27 - Space for inserting EPROM cartridges;
- 28 - On/off switch for the UV lamp;
- 29 - Printer;
- 20 30 - Space in the carrying case to perform the following functions:
 - control of the VCC system voltage, established at 5V;
 - control of the standby voltage;
 - 25 - control of POMCL (Power on master clear) signal or on/off reset;
- 31 - Battery;
- 32 - Constant voltage generator for recharge;
- 33 - Switching relay for battery charging, from the con-

dition in which they are charged to that in which they supply current;

- 34 - 5V stabilizer;
- 35 - Standby circuit: 35A, input for high yield output
- 5 nonstabilized voltage, 35B, input for medium yield output voltage stabilized at 5 volts; 35C, output for standby voltage; 35D, comparator integrator for POMCL signal control; 35E, high capacity output capacitor;
- 10 36 - Expansion cartridge with two EPROM of 2Kbytes each (total: 4Kbytes);
- 37 - 2K byte EPROM;
- 38 - Application connector for hook-up with connector 21;
- 39 - Switching logic for programming impulse;
- 15 40 - Port for reading identification code;
- 41 - Control logic;
- 42 - General switch;
- 43 - MASTER-CLEAR;
- 44 - I/O ports initialization;
- 20 45 - Program asks if memory is on: 45A=No, 45B=Yes;
- 46 - Output on display: 'Memory not ready'
- 47 - Program asks if memory is on: 47A=Yes, 47B=No;
- 48 - Memory initialization;
- 49 - Determination of number of free lines 'n' and storage
- 25 in the reserved area of memory 4;
- 50 - Program asks if memory initialization: 50A=Yes, 50B=No;
- 51 - Read number of lines of memory 'n';
- 52 - Beginning of process P_2 with interrupt every 2ms;
- 53 - Output on display: 'n' free lines ready;

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- 54 - Output on display of the first line of the text;
- 55 - Process P_2 asks if a key has been read: 55A=No,
55B=Yes;
- 56 - Key interpretation;
- 5 57 - Program asks if key read is a control key: 57A=Yes,
57B=No;
- 58 - Memorization of the character in ASCII code;
- 59 - Output display of lien where the character was memorized;
- 10 60 - Process P_2 asks if a character has been read: 60A=No, 60B=Yes;
- 61 - Key interpretation;
- 62 - Program asks if command was given in repeat mode:
62A=Yes, 62B=No;
- 15 63 - Program asks if a command is the same as the previous one: 63A=Yes, 63B=No;
- 64 - Program asks if it is the command 'repeat': 64A=Yes, 64B=No;
- 65 - Program asks if it is a command: 65A=Yes, 65B=No;
- 20 66 - Program asks if it is the command 'repeat': 66A=Yes, 66B =No;
- 67 - Program asks if it is the command 'print': 67A=Yes, 67B=No;
- 68 - Calls the subroutine which executes the command;
- 25 69 - The printing loop asks if the printer is present:
69A=No, 69B=Yes;
- 70 - The printing loop asks if the printer is 24 or 32 columns: 70A=24 columns, 70B=32 columns;
- 71 - 24 character buffer line;

- 72 - 32 character buffer line;
- 73 - Output of buffer line on printer;
- 74 - The print loop asks if there is an error: 74A=Yes,
74B=No;
- 5 75 - The print loop asks if the line printed is the final
one: 75B=Yes; 75A=No;
- 76 - The print loop asks if a 'STOP' character is in the
line: 76A=Yes, 76B=no;
- 77 - The print loop asks if process P_2 has read a key:
10 77A=No, 77B=Yes;
- 78 - The print loop asks if the key read is the 'STOP'
command: 78A=Yes, 78B=No;
- 79 - Output of 'Printer not ready' message on display;
- 80 - Activation of P_2 process from interrupt;
- 15 81 - Keyboard control;
- 82 - Timer control;
- 83 - Cursor handling;
- 84 - Process P_2 asks if the memory is on: 84A=No, 84B=Yes;
- 85 - Interrupt return.

20

4. Typewriter according to claims 1 to 3, characterized
in that the functions of EDIT and of control of compon-
ents 2 to 85, corresponding to keys provided on the key-
board and implicit in said components 2 to 85, are de-
25 signed so that each of the following keys performs the
following respective function:

LRST - Line reverse step - displays the previous line;
RETURN - Return - displays the subsequent line;
CST - Character step - stops the cursor in front of a

character without changing the content of the display;

- CRST - Character reverse step - like CST, but behind;
- INLIN - Insert line - creates a one line space by shifting the entire text forward starting from the displayed line;
- 5 DELIN - Delete line - erases the displayed line and contracts the text while destroying the space so created;
- 10 INCAR - Insert character - Creates a space of one character by shifting the entire line to the right; starting from the cursor, the last character on the right is lost;
- DELCA - Delete character - erases the character indicated by the cursor and covers the space with the remaining part of the line by shifting it to the left and the final character to the right by one space;
- 15 HOME - Reports the first line of the text on the display;
- 20 BOT - (bottom) goes to the final line of the text;
- REPEAT - Initializes the repeat mode;
- PRINT - Prints the contents of the memory starting from the line displayed; during printing, only the STOP command may be given;
- 25 STOP - During the typing phase, it displays a particular character which will be interpreted either in the print phase (PRINT), the timed viewing phase (TIME), the storage phase (SAVE) as a stop command, in the print phase (execution of the

PRINT command), printing will stop and the machine will return to the typing phase, in the timed display phase (execution of the TIME command) it will return to the typing phase;

5 CLRM - CLEAR MEMORY erases the entire memory; as protection against accidental pressure, before performing the erasure, the machine asks the question 'Clear Memory?' (Y/N); if Y=Yes is pressed, the memory is erased; if N=No is pressed, it is not;

10 MCLER - Master Clear is a particular command to remove the calculator from an error situation which may be used following an internal error caused, for example, by discharged batteries, improper insertion of the power supply, improper insertion of the printer;

FREE - Indicates the number of free lines;

ADVP - Advance Paper - advances the paper in the printer;

20 TIME - Effects a timed display of the text starting from the line on the display until the end of the typed text or until the particular character described above appears;

SAVE - (followed by a six letter name) - stores the typing contained in the RAM in the cartridge by memorizing in a suitable table the name of the file and its initial and final address; this phase may be stopped by the following events:

25 - the end of the text to be memorized due to

the end of the RAM memory;
- the end of the text to be memorized;
- the end of the cartridge; in this case the machine displays a message to insert a new cartridge;
5
LOAD - (followed by a six letter name) - reads the typewritten text from a file contained in the cartridge and memorizes it in the RAM;
DETER - Asks the machine whether the typewritten text
10 will fit in the present cartridge. The machine responds:
(OK) if the text will fit;
(MEMORY END AT) if the text will not fit and displays the first line which would be excluded;
15 the following possibilities are then offered:
- memorizing on two cartridges
- leaving a part unmemorized
- using a fresh cartridge
- performing an EDIT of the text, eliminating
20 the sections of less interest and replacing words with abbreviations.

5. Miniaturized typewriter according to claim 1, characterized in that said visual verification on the display
25 occurs by placing on I/Oport 7 the 6 bit ASCII data for the character to be viewed; the seventh bit is the complement of the sixth, and the 2 bit address inside the display block for later typing is written on one of the 8 blocks through multiplexor 14.

6. Typewriter according to claims 1 to 4, characterized in that said timed automatic line succession as well as the LRST and DELCA functions occur in the already known 'repeat mode'; by pressing the REPEAT command followed
5 by the desired command, the latter is executed as long as the button is pressed; upon releasing the corresponding key, the 'repeat mode' is reset and an additional 'repeat mode' is possible only by re-pressing the REPEAT key.

10

7. Miniaturized typewriter characterized in that there are two parts to the power supply, one net adaptor (22) and one inserted in carrying case B (30), in which 30 shows the following properties:

- 15 a) when 22 is connected and turned on, it is recharged by the constant voltage generator 32 and battery 31; through relay 33, switched in position 33A, it supplies energy to stabilizer 34;
- b) when 22 is disconnected or turned off, section 30
20 supplies energy to stabilizer 34 through battery 31;
- c) in the case of a switch from condition a to b or vice versa, the input and output capacity keeps the output voltage from varying during the switching of relay 33;
- 25 d) with power supply 30 either on or off, standby voltage is present; if the charge is removed (switch 19 open) and the standby power supply receives voltage from terminal 35A (general switch 42 open), the absorption of the latter is zero; if charge is inser-

ted with 19 closed, output voltage is approximately
3.5 volts (RAM 4 maintenance voltage); if voltage is
supplied through terminal 35B (switch 42 closed),
output voltage is established at 5 volts (RAM 4 oper-
5 ating voltage);

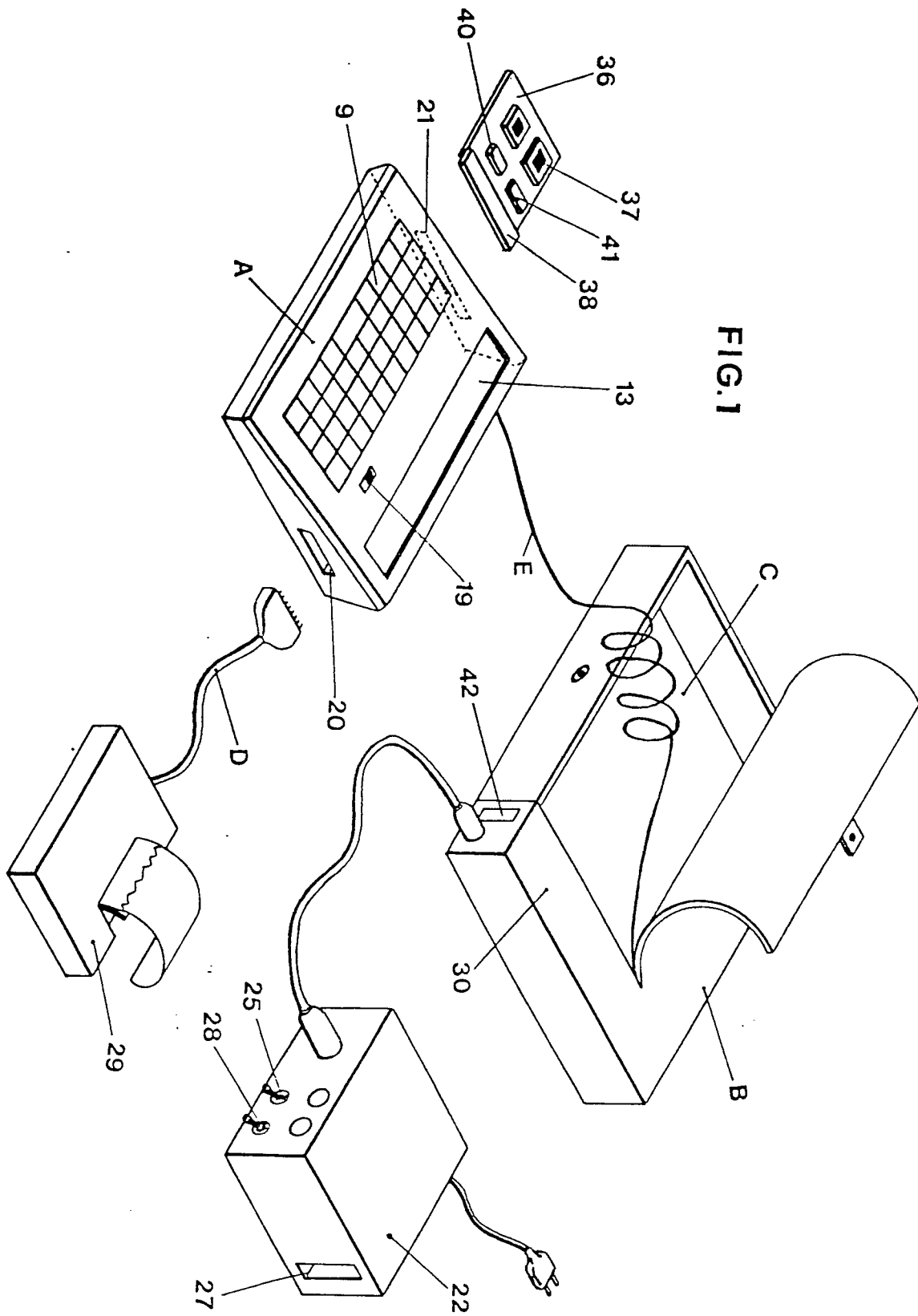
e) upon general ignition, working voltages VCC and VST
are achieved; after a certain time, the POMCL signal
is deactivated by 35D; if active, this signal keeps
the electronic circuit under reset and disables the
10 typing in the memory;

f) when the general switch is opened, the POMCL signal
is reactivated before the VCC and VST voltages de-
grade.

15 8. Miniaturized typewriter according to claim 1, char-
acterized in that electrical power is supplied by re-
placeable electrical batteries.

9. Miniaturized typewriter according to claim 1, char-
20 acterized by the presence of a traditional type key-
board coupled with an incorporated printing device of
a known type.

10. Miniaturized typewriter according to claim 1, char-
25 acterized by the presence of a terminal to be connected
with the micro-computer inside a paper printer, to which
the memorized information may be sent via a cable for
mechanical typing at the same time as the text appears
on the display or independently of its appearance.



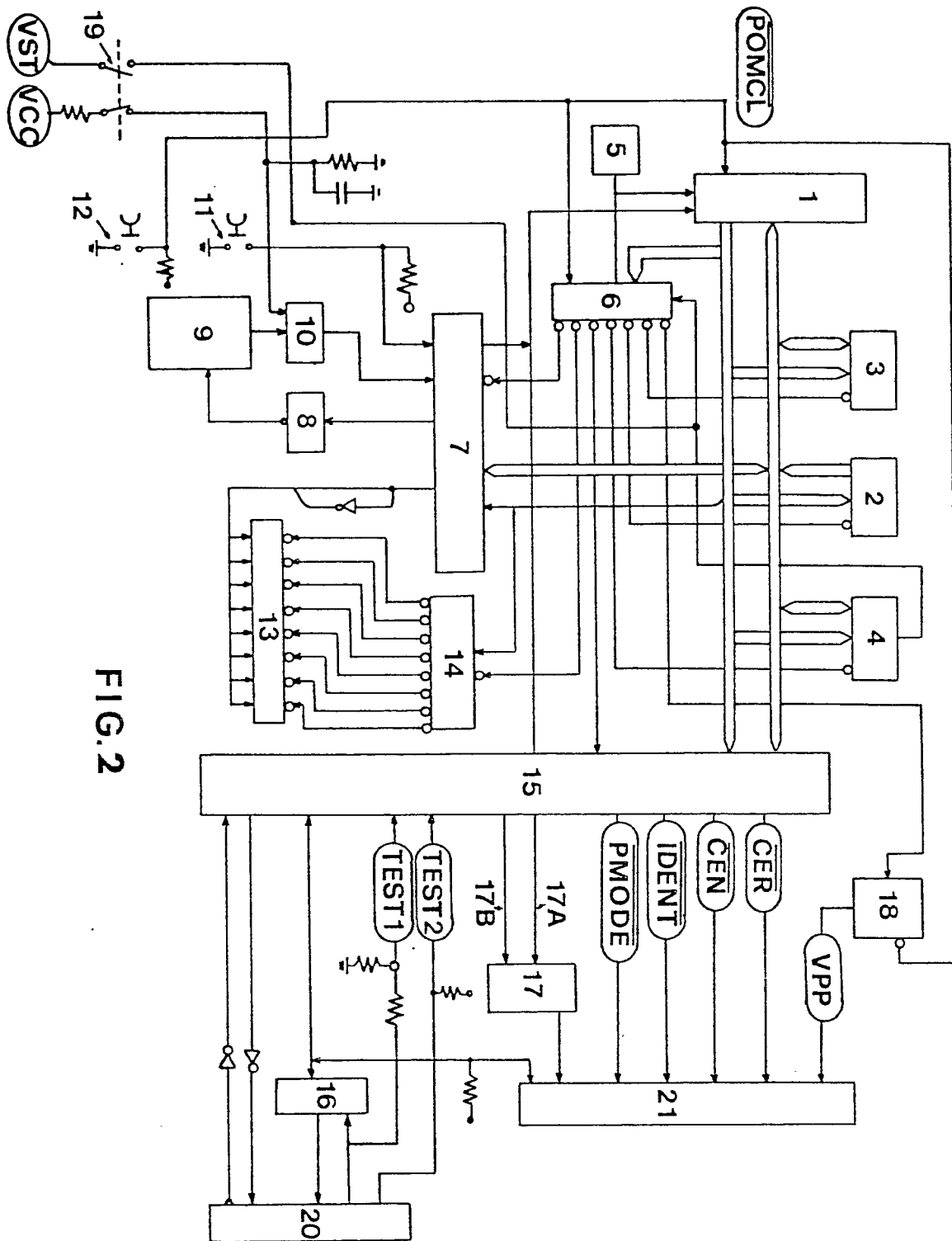


FIG. 2

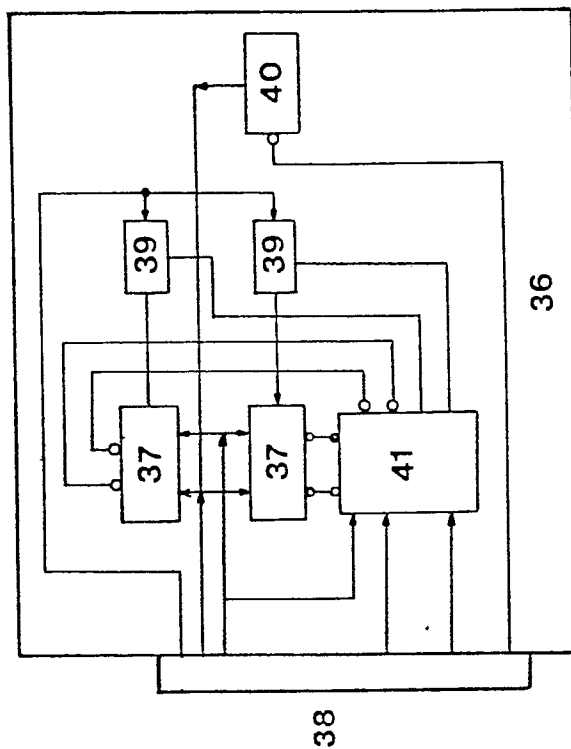


FIG. 5

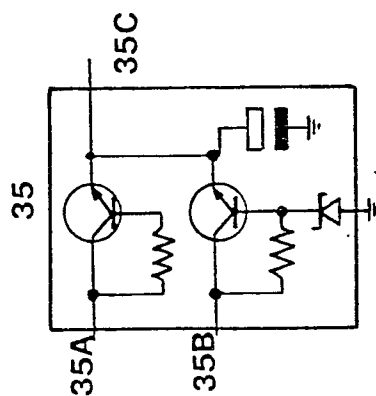


FIG. 4

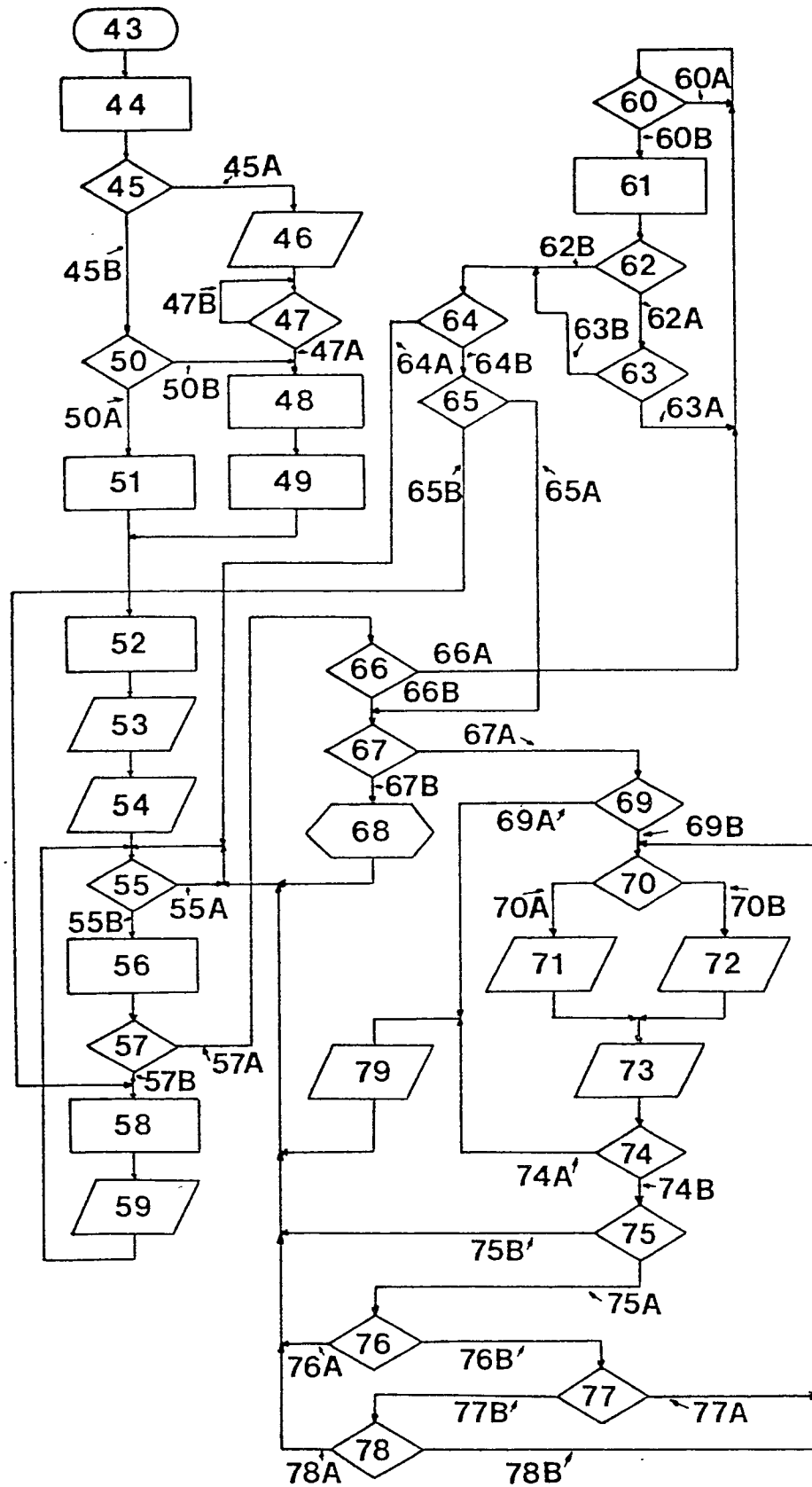


FIG. 6

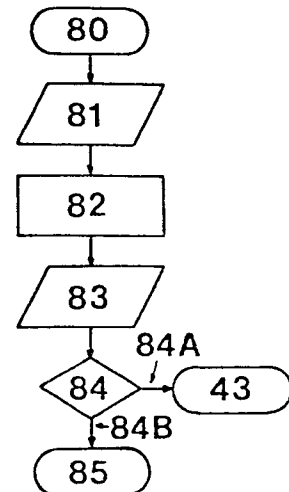


FIG. 7