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Call forwarding system and equipment

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2194709

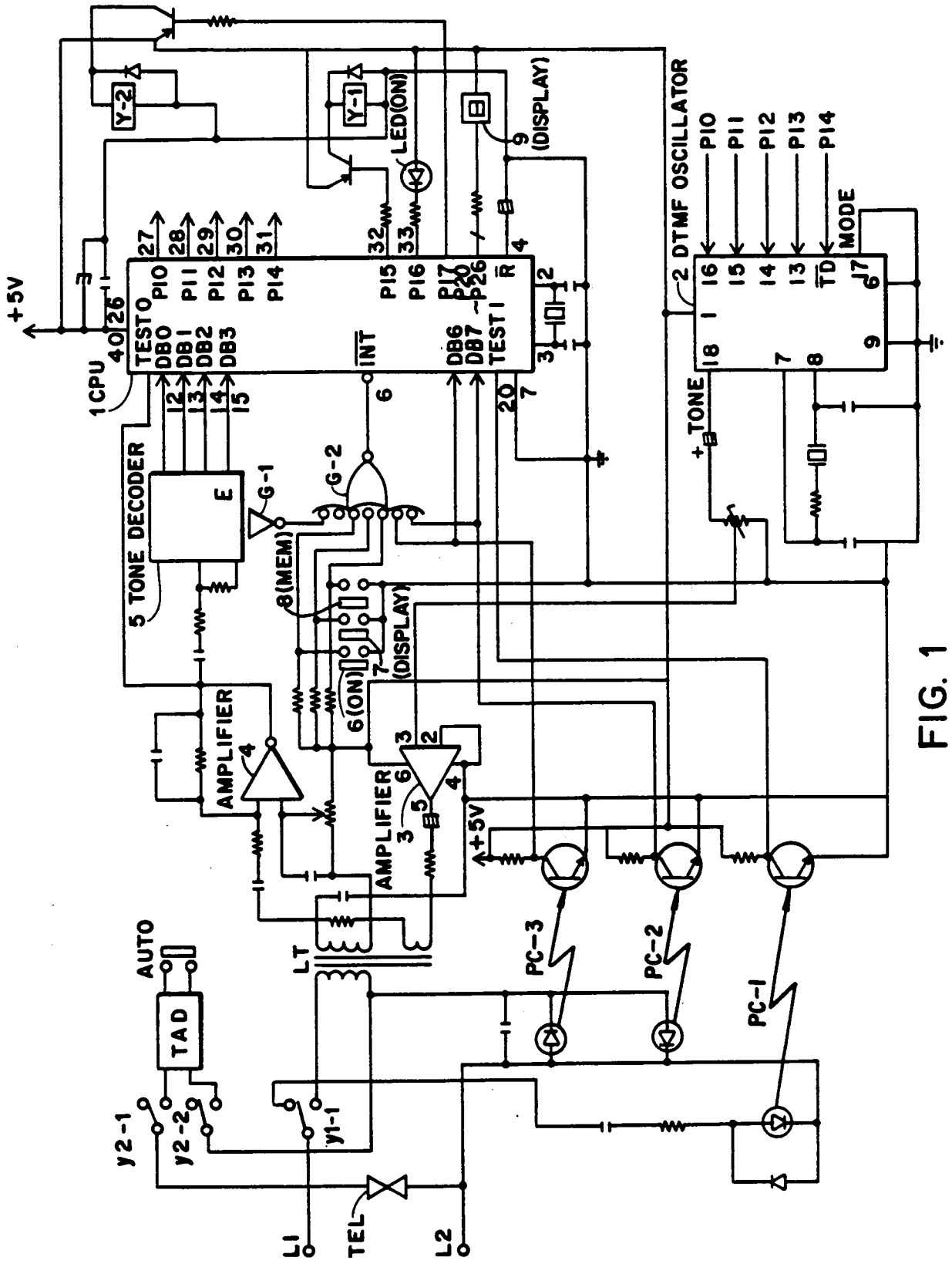

FIG. 1

2134709

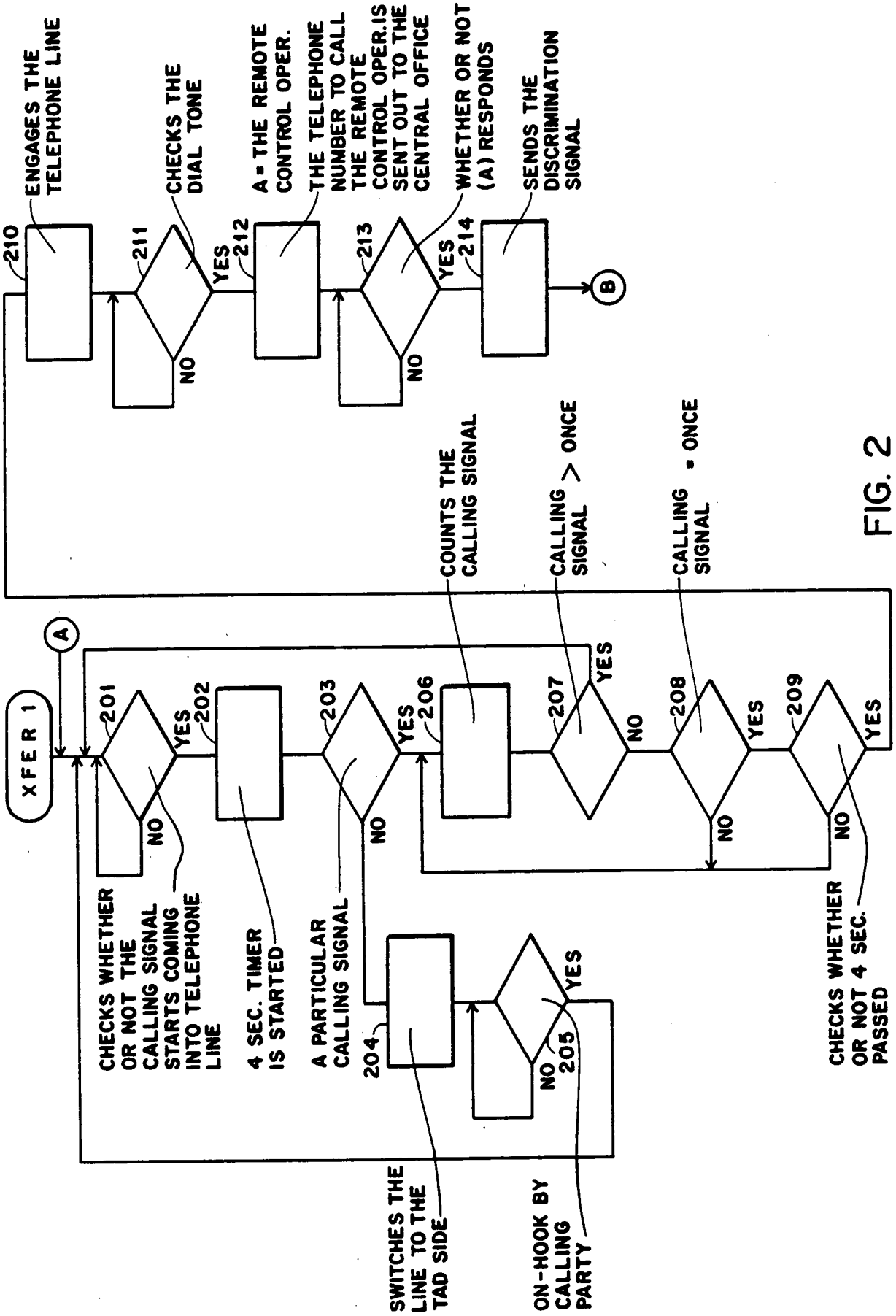

FIG. 2

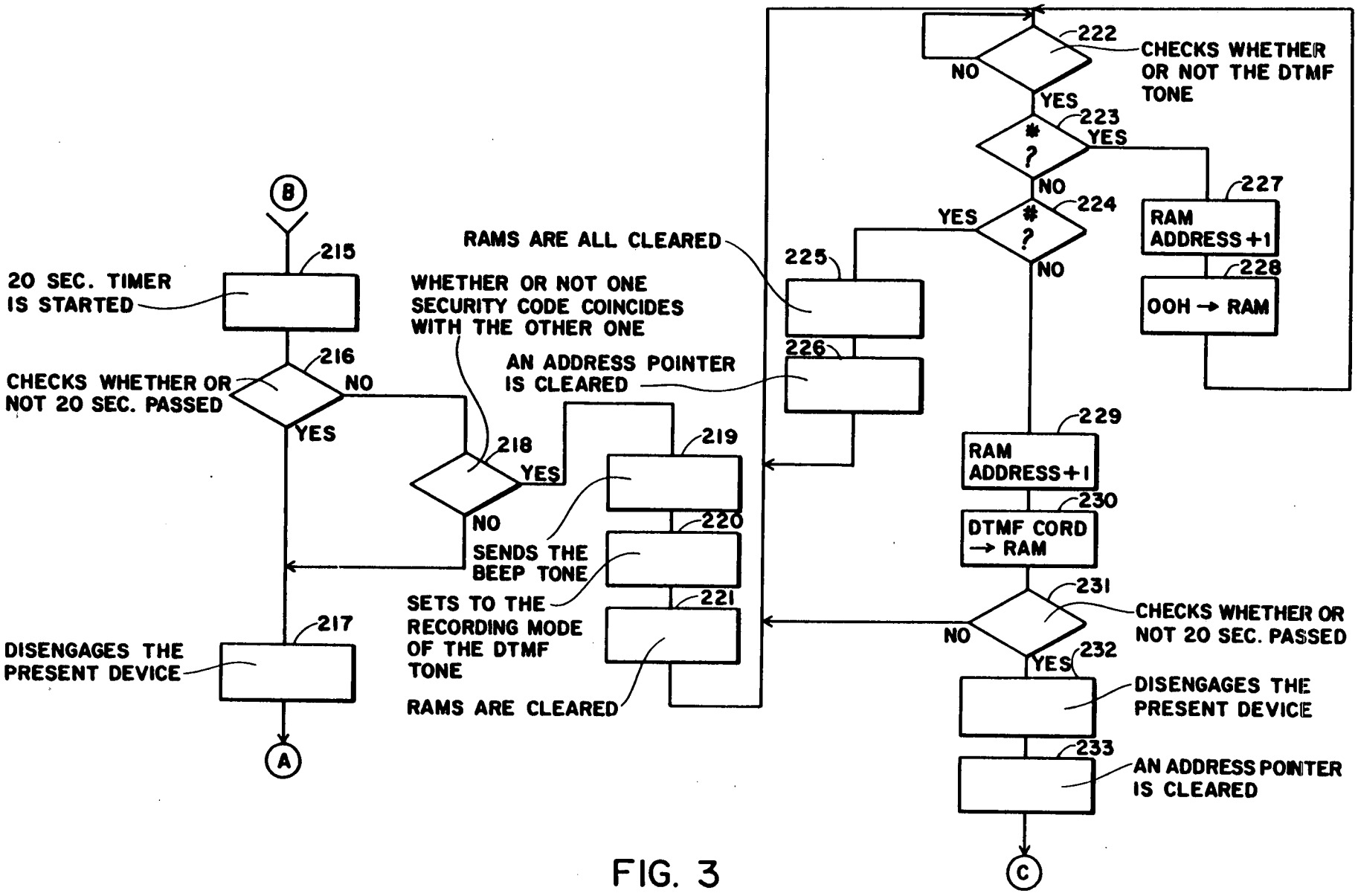

FIG. 3

2134709

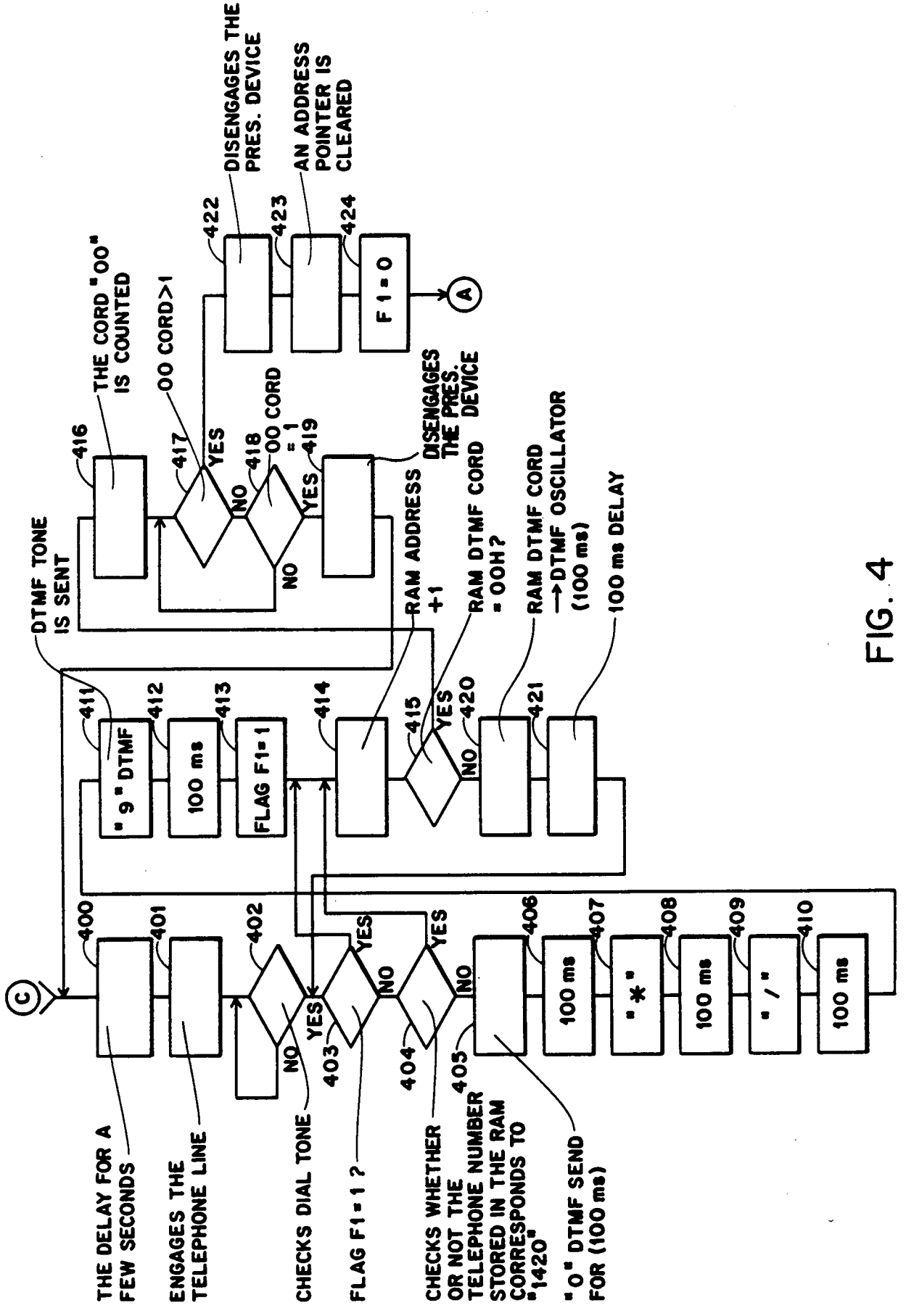

FIG. 4

FIG.5(A)

RAM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TELEPHONE NUMBER		4	1	0	2	2	6	6		1	4	2	1		
CORD	00	04	01	0A	02	02	06	06	00	01	04	02	01	00	00

(HEXADECIMAL)

FIG.5(B)

RAM NUMBER	1	2	3	4	5	6	7
TELEPHONE NUMBER		1	4	2	0		
CORD	00	01	04	02	0A	00	00

(HEXADECIMAL)

2194709

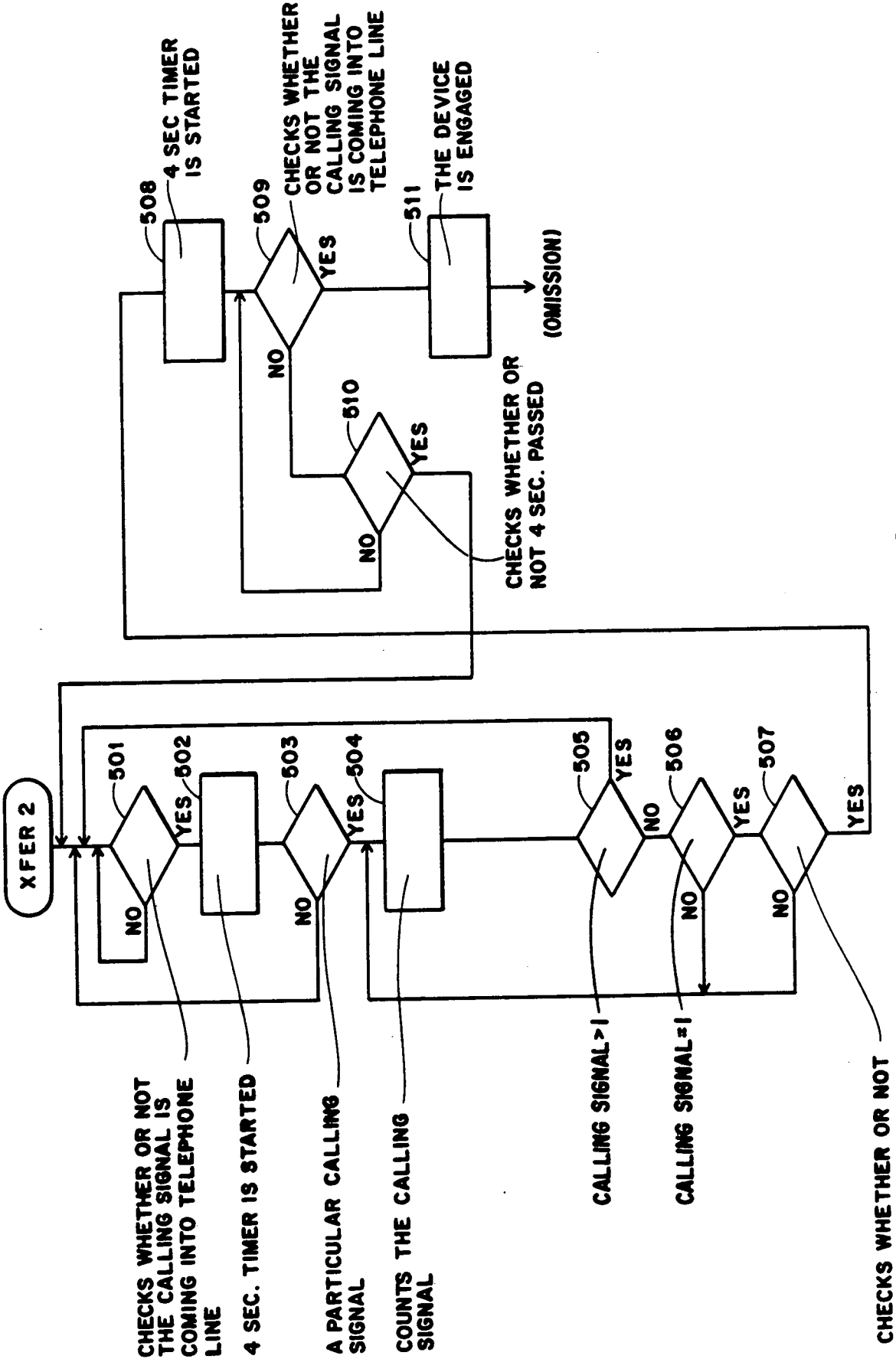
XFER 2
501
NO
YES
502
503
NO
YES
504
505
NO
YES
506
NO
YES
507
NO
YES
508
4 SEC TIMER IS STARTED
509
CHECKS WHETHER OR NOT THE CALLING SIGNAL IS COMING INTO TELEPHONE LINE
NO
YES
511
THE DEVICE IS ENGAGED
(OMISSION)
510
NO
YES
CHECKS WHETHER OR NOT 4 SEC. PASSED
CHECKS WHETHER OR NOT THE CALLING SIGNAL IS COMING INTO TELEPHONE LINE
4 SEC. TIMER IS STARTED
A PARTICULAR CALLING SIGNAL
COUNTS THE CALLING SIGNAL
CALLING SIGNAL>1
CALLING SIGNAL=1
CHECKS WHETHER OR NOT 4 SEC. PASSED

FIG. 6

CALL FORWARDING SYSTEM AND EQUIPMENT

The present invention relates to a telephone call forwarding system and more particularly to a telephone call forwarding system that can be controlled by a user remote from his usual private equipment.

In conventional call forwarding, there are two types of system, one where a local exchange handles operation, and the other, referred to as a call diverter, where privately owned equipment handles operation. The former uses a single telephone line, whereas the latter requires two separate telephone lines since receiving and sending are performed simultaneously. In the former type of system, since only a single telephone line is utilised, it is difficult for the subscriber to cancel the call forwarding service or to change the telephone number of the call forwarded party when at a location that is remote from the private equipment using this service.

In the type of call forwarding system where call forwarding is handled at the local exchange, there are two types of service known. In one, where the local exchange is enabled to provide this service for a subscriber, calls are immediately diverted upon connection request to the call-forward number registered therein. In the other type of service known, typical of systems in Japan and in the United States of America, the call is first placed with the subscriber and only if the subscriber fails to answer the call after a predetermined number of rings, is the call forwarded to the registered call forward number. In this specification, hereinafter, this latter type of service will be referred to as a "call-then-call-forward" type of service. It is this type of service that is considered in the text that follows.

Reference is made here to the specification of United States Patent No. 4,475,009 (Rais et al) in which there is disclosed a system said to allow a user either to cancel the call forwarding service provided for his telephone set, or to initiate registration of a call forward party number for that set, each from a remote location. Operation to change a pre-registered call forward party number however is cumbersome for it

is necessary to cancel first the call forwarding service before effecting a change in the registered number.

The present invention provides an alternative.

According to a first aspect of the present invention here is provided a call forwarding system comprising:

a local exchange;

a first private equipment connected to the local exchange by a first line; and

a second private equipment connected to the local exchange by a second line;

the local exchange having a facility to provide a call-then-call-forward type call forwarding service for the first private equipment and being responsive to telephone number and/or command data sent from the first private equipment to initiate, change, or cancel, the call forwarding service therefore; wherein

the first private equipment is adapted so that a user of the second private equipment may cause either change or cancellation, or both as required, of the call forwarding service provided for the first private equipment, the first private equipment having thus;

determining means for determining whether or not the local exchange is enabled in a call-forwarding mode for the first private equipment;

detecting means for detecting a hang-up cessation of a calling signal sent from the exchange while the exchange is enabled in said call-forwarding mode;

engaging means operable for engaging a call between the first private equipment and the second private equipment while the exchange is still enabled following detection of the hang-up cessation of the calling signal;

store means for storing telephone number and/or command data;

store loading means operable for receiving and entering telephone number and/or command data into the

store means in response to data transmitted during said call; and

registering means for calling the local exchange and causing it to change or cancel the call forwarding service in accordance with data entered into said store means.

The adapted private equipment used in the system just defined might typically comprise:

determining means for determining whether or not the local exchange is enabled in a call-forwarding mode for the private equipment;

detecting means for detecting a hang-up cessation of a calling signal sent from the exchange while the exchange is enabled in said call-forwarding mode;

engaging means operable for engaging a call between the private equipment and a second private equipment while the exchange is still enabled, following detection of the hang-up cessation of the calling signal;

store means for storing telephone number and/or command data;

store loading means operable for receiving and entering telephone number and/or command data into the store means in response to data transmitted during said call; and

registering means for calling the local exchange and causing it to change or cancel the call forwarding service in accordance with data entered into said store means.

According to a second aspect of the present invention there is provided

a private equipment B having storing means and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number previously registered therein by the private equipment B;

the private equipment B further comprising;

detecting means responsive to a telephone hang-up by a calling party A following reception by the party A of a ring-back signal sent from the local exchange;

auto dialling means, operable following detection of said telephone hang-up to call the party A using a first predetermined telephone number previously entered into and currently stored in said storing means;

means for entering into said storing means a second call forwarding telephone number sent subsequently from the calling party A; and

registering means for transferring the second call forwarding telephone number to the local exchange for registration therein to replace the first call forwarding telephone number previously registered therein;

whereby subsequent calls directed first to the private equipment B are transferred by the local exchange to a second predetermined called party C1

corresponding to the second call forwarding telephone number.

According to a third aspect of the present invention there is provided a private equipment B having means for detecting a particular or a usual calling signal, storing means and means for dialling a telephone number stored in said storing means, and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number previously registered therein by the private equipment B;

the private equipment further comprising;

detecting means responsive to a telephone hang up by a calling party A following reception by the party A of a ring-back signal sent from the local exchange;

said detecting means including means for detecting that the calling signal is the particular calling signal, and in response, calling the party A using a first predetermined telephone number stored in said

storing means, and storing in said storing means a command code to cancel said call forwarding service and, following a second telephone hang up by the party A, transferring said command code to said local exchange to cancel said call forwarding service.

According to a fourth aspect of the present invention there is provided

a private equipment B having means for detecting a particular or an usual calling signal, storing means and means for dialling a telephone number stored in said storing means, and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number registered therein by the private equipment B;

the private equipment B further comprising:

detecting means response to a telephone hang up by a calling party A following reception by the party A of a ring back signal sent from the local exchange;

timer means operative after a call transfer

service cancelling by said detecting means when said calling signal is the particular calling signal;

means for storing a second call forwarding telephone number transmitted to said equipment B by said calling party A within a predetermined time duration measured by said timer means during an engaging of B and A;

registering means for transferring a second call forwarding telephone number to the central office for registration therein to replace the first call forwarding telephone number previously registered therein;

whereby subsequent calls reaching the private equipment B through the local exchange are transferred by the local exchange to a second predetermined called party C1 corresponding the second call forwarding telephone number.

A telephone answering device can also be incorporated in the private equipment of the foregoing systems.

In the accompanying drawings:

FIG. 1 is a circuit diagram of a private equipment adapted for performing operations in accordance with the invention;

FIG. 2 - 4 are flow charts of the operation of this private equipment in accordance with a first embodiment;

FIG. 5 is a diagram showing the call forward telephone numbers and commands that are stored in RAM to be registered at the local exchange; and

FIG. 6 is a flow chart of the operation of the private equipment shown in Figure 1 in accordance with a second embodiment.

A detailed description of preferred embodiments of the present invention will be given now and reference will be made to the accompanying drawings. The description that follows is given by way of example only.

Referring to FIG. 1, reference symbols L1 and L2 denote a telephone line wire pair. Reference symbol LT denotes a line transformer. Reference symbol PC-1 denotes a photocoupler for detecting the calling signal; and PC-2 and PC-3 are photocouplers for detecting the on-hook operation of the calling party or the answer of the called party. Reference symbol TAD denotes a telephone answering device, wherein any telephone answering device on the market can be

connected. Reference numeral 1 denotes a one chip microcomputer, wherein an INTEL 8048 is used in the present embodiment, data buses DB0 and DB7 are input terminals, reference symbols P10 to P17 and P20 to P27 denote output ports and reference symbol $\overline{INT}$ denotes an interrupt terminal. Reference numeral 2 denotes a DTMF oscillator for generating an oscillating push phone DTMF tone, which outputs tones of 0 to 9, * and # according to the code of said output ports P10 to P13. Reference numerals 3 and 4 denote amplifiers. Reference numeral 5 denotes a tone decoder for decoding into a binary code the DTMF tone that is received from outside. Reference numeral 6 (ON) denotes a switch for setting the present device to the operation mode; and 7 (DISPLAY) and 8 (MEM), switches for entering the telephone number when the specified person (remote control operator) is automatically called from the present device. Reference symbol Y-1 denotes a relay for loop making which engages the present device to change the call forwarded party; and Y-2, a relay for switching which is energized with the normal calling signal and switches the calling signal to the telephone answering device TAD.

The present device is arranged as described above. Operation will be described with reference to flow charts FIGS. 2 to 5.

In the first embodiment, it is arranged that a user at a prearranged location is called automatically from the present device so that he might change the telephone number of the call forwarded party. Accordingly, it is necessary to enter beforehand the telephone number of the user into the present device. Thus, the switch 7 is pressed once and then on the display 9 a "1" appears first. The switch 7 is pressed again and then "2" is displayed. It is arranged that the digits "1", "2",..."0" appear one by one on the display 9 by pressing the switch 7. Accordingly, if "4" is the first digit of the user's telephone number, the switch 7 is pressed four times and then "4" appears on the display 9. The switch 8 is now pressed and then the code of "4" is stored in the predetermined memory incorporated in CPU 1. When the same operation is repeated and all digits of said telephone number are entered, the switch 6 is turned on to set the present device to the call forwarding mode.

Further, it is assumed that call forwarding via the local exchange is entered beforehand at the local exchange. Incidently, in the call forwarding system by NTT in Japan, dialing 0*19xxxxxxx (x is a digit of the call forwarded party's telephone number) and 1421 enables the entry of the call forwarded party's

number.

When the switch 6 in FIG. 1 is turned on, the program jumps to step 201 in FIG. 2. In step 201, CPU 1 checks whether or not a calling signal is present on the telephone lines L1 and L2. More particularly, when the calling signal arrives via the telephone wires L1 and L2 in FIG. 1, a light-emitting diode of the photocoupler PC-1 flickers in response to a 16Hz calling signal, as is clear from the figure. In response, a phototransistor of the photocoupler PC-1 is energized intermittently. When it is detected that said phototransistor is energized an input signal to terminal TEST 1 of the CPU 1 is changed to L level from H level, and the program advances from step 201 to step 202. In step 202, a 4 sec. timer (described later) is started by the program. In next step 203, the central processor CPU 1 checks whether the calling signal is a particular one (indicating that the local exchange is enabled for call-forwarding) or a normal one. In Japan, the normal calling signal repeats ringing for one second and pausing for 2 seconds, whereas the particular calling signal repeats three or four times ringing for 0.5 second and pausing for 0.5 second.

In the present embodiment, as a means to judge whether it is a normal calling signal or a particular

calling signal, a counter incorporated in the central processor CPU 1, connected to the input terminal TEST1, is used to count the waveform cycles of the 16 Hz calling signal. The count of cycles of the normal calling signal that rings for 1 second amounts to 16, whereas that of the particular calling signal that rings for 0.5 second amounts to 8. Accordingly, in the present embodiment, in case of greater than 13 counted cycles when the calling signal is being input continuously, said calling signal is identified as being normal, and in the case of a count of fewer than 13 and greater than 3 cycles, it is identified as being a particular calling signal.

When the calling signal is normal, the program advances from step 203 to step 204. In step 204, the output port P17 in the CPU 1 of FIG. 1 is maintained at an L level to energize the relay Y-2, and contacts y2-1 and y2-2 of the relay Y-2 are switched to the TAD side of the switch line. A conventional telephone answering device can be used here.

From now on, a detector incorporated in the TAD activates to engage the telephone lines. When the TAD is engaged, either of the photocouplers PC-2 or PC-3 which are inserted in series according to the polarity of the telephone lines is turned on. When the calling party finishes speaking his message and hangs up, or

the telephone answering device TAD returns to the standby mode, the photocoupler PC-2 or PC-3 which was turned on is turned off. The program detects this (step 205) and returns to step 201.

On the other hand, if the calling signal is particular, as described above, the program advances from step 203 to step 206. In step 206, the program counts calling signal rings. As described above, in the case of the particular calling signal, the calling signal causes the device to ring three or four times. By the way, when the user calls the present device and hears the ring back tone, he must then hang up immediately when he intends to change the call forwarded party's number i.e., he must hang up before the local exchange can call the forwarding party, and thus suppress the call forwarding function of the local exchange. In this way, when the user calls the present device and hangs up immediately after the ring back tone sounds, the calling signal (ring) stops ringing after one ring. Accordingly, if the program detects that a calling signal has arrived in step 208 through steps 206 and 207, and there is then no change after the four seconds elapsed by said 4 sec. timer, the program advances to step 210 through the step 209.

In step 210, the output port P15 is turned to an

L level and the relay Y-1 is turned on to engage the telephone line by the contact y1-1 of said relay Y-1. In step 211, the program checks the dial tone. In step 212, the above telephone number to call the user (A) is sent out to the local exchange. When the specified person answers, the polarities of the telephone line wires are reversed, to be detected through the photocouplers PC-2 and PC-3 (step 213). At the time of answering by the user, in order to indicate that it is the present device that is calling him, the DTMF oscillator 2 is driven to generate a tone, such as Morse code, as a discrimination signal (step 214). The program advances to step 215 in FIG. 3 through a connector B.

In step 215, the program starts a 20 sec. timer. The 20 sec. timer is used for limiting the operational time allowed for the user to change the telephone number of the call forwarded party or to cancel call forwarding. It is possible to detect, by interrupt, the polarity reversion that occurs when the user has hung up after completion of the operation.

In step 216, the program checks whether or not the 20 second interval has elapsed. If it is no longer necessary to change the call forwarded party or to cancel call forwarding, the remote control operator may hang up and then after 20 seconds the present

device will turn the relay Y-1 off to disengage the present device (step 217).

The present device returns to the standby mode of step 201 in FIG. 2 through a connector A. If the user wants to change the call forwarded party or to cancel the call forwarding, he sends the same prearranged security code as the one stored in a mask ROM of the CPU 1 (it may be arranged to change the security code by the external digital switch) by the operation on the keypad of the telephone (push-button telephone) at hand. When these two security codes coincide, the program advances from step 218 to step 219.

In step 219, the DTMF oscillator 2 sends a beep tone. In step 220, the present device is set to the recording mode of the DTMF tone used for changing the call forwarded party or cancelling call forwarding. More particularly, when the user sends the DTMF tone by operating the keypad of his push-button telephone, the tone is amplified by the amplifier 4 through the line transformer LT of FIG. 1, converted into the binary code by the tone decoder 5 and then applied to the input terminals DB0 and DB3 of the CPU 1. This code is then starting at a stored predetermined address of the memory RAM incorporated in the CPU 1.

The CPU 1 used in the present device contains 64

byte RAMs, wherein the last bytes are used for storing the DTMF tone code. In step 221, said 20 byte RAMs are cleared. In step 222, the program checks whether or not the DTMF tone (telephone number) from the user arrived. When the DTMF tone is sent by the user and then decoded by the tone decoder 5, an output terminal E generates an H level, so that the interrupt terminal INT is changed to L level through an inverter F-1 and an OR gate G-2. Thus it is possible to check whether or not the DTMF tone has arrived by interrogating the input at terminal INT.

In step 223, the program checks whether or not said DTMF tone is "*". In the present embodiment, when the "*" tone arrives, "00" code is input into the corresponding RAM through steps 227 and 228. Further, when the " " tone arrives in step 224, the 20 byte RAMs are all cleared through steps 225 and 226. The "#" tone is used to reinput the telephone number if an error has occurred during input. In step 226, an address pointer of the RAM (a register R0 or R1) is cleared (initialized) to appoint the first RAM of said 20 byte RAMs.

In order to enter the call forwarded party's telephone number into the device, for instance the number "410-2266", "4" on the keypad of the push-button telephone is pressed initially. Now, the

DTMF tone corresponding to "4" passes from step 222 through steps 223 and 224. In step 229, the address of the RAM is incremented by one. In step 230, the code of the telephone number digit "4" is stored in the corresponding RAM.

As described above, 20 byte RAMs are allocated to store the telephone number. The RAM addresses are designated RAM1 to RAM20 for convenience. However, as the address of the RAM was incremented by one in step 229, the telephone number is in fact stored from RAM2 as described in FIG. 5-A.

As the loop from step 231 to step 222 is repeated within 20 seconds, the next digit of the telephone number "1" is entered and then the code "01" of said "1" is stored in RAM3 in FIG.5-A. After the same operations are repeated and all digits of the telephone number "410-2266" are stored as shown in FIG. 5-A, the user presses "*" on the keypad and the code "00" is stored in RAM9 through steps 222, 223, 227 and 228. This code is for distinguishing the telephone number stored in the RAM from the command for starting the call forwarding (command to the local exchange) "1421". When "1", "4", "2" and "1" on the keypad are pressed successively after "*", the telephone number of the call forwarded party and the command for starting call forwarding are entered into

the device as shown in FIG.5-A. The user control operator now hangs up and then the line is released after 20 seconds have elapsed in step 231. The address pointer is cleared for the next user operation (steps 232 and 233) and the program advances to step 401 of FIG. 4 through a connector C.

In the flow chart of FIG. 4, the telephone number of the call forwarded party and the command for starting the call forwarding stored in the device as described above are sent out automatically and registered at the local exchange. For registering at the local exchange, the number "0*19" is added automatically to precede the telephone number stored in the device. After a delay of a few seconds in step 400, the telephone line is engaged and the program checks the dial tone (step 401 and 402) by introducing the output (alternating current) of the amplifier 4 into the output terminal TEST0 of the CPU. When the dial tone is input, the program checks whether or not a flag F1 is "1" in step 403. As the F1 will be set to "1" in step 413 after "0*19" is sent to the local exchange, the flag F1 is initially "0". Thus the program advances from step 403 to step 404.

In step 404, the program checks whether or not the telephone number stored in the RAM corresponds to "1420" for cancelling call forwarding. Now the

checking results in NO, so the program advances to step 405. In step 405 , the DTMF tone corresponding to "0" is sent for 100mS. After a minimum pause of 100 mS is set in step 406, the DTMF tone corresponding to "*" is sent for 100 mS. In the same way, the DTMF tones corresponding to "1" and "9", separated by the minimum pause, are sent to the local exchange.

In step 413, the flag F1 is set to "1". The program advances to step 414. In step 414, the address of the RAM is incremented by one through the address pointer, so that RAM2 shown in FIG. 5-A is allocated initially. In step 415, the program checks whether or not the code at this RAM address is "00". As said code is "004", the program advances to step 420. In step 420, the code for oscillating the telephone number corresponding to said RAM code is output to the DTMF oscillator from the output ports P10 and P13 and its oscillation output is sent to the line through the amplifier 3. In step 421, the minimum pause is set. This operation is repeated until the code of the RAM reaches "00". Accordingly, the telephone number "410-2266" is sent out to the local exchange.

When the code "00" at address RAM 9 is detected, the number of times of the code "00" is counted in step 416. When the number of occurrences of the code

"00" is confirmed to be one in step 418 through step 417, the line is disengaged in step 419 and the program returns to step 401. Accordingly, as the flag F1 is "1" after the next re-engaging, not "0-19" but "1421" at addresses RAMs 10 to 13 is sent to the local exchange. As the code "00" at address RAM14 is counted in step 417, the number of occurrences of the code "00" becomes two, the checking results in YES, so that the program advances to step 422. The line is released, the address pointer is cleared, further the flag F1 is cleared and then the device returns to the standby mode in step 201 through a connector A. Accordingly, when next the device receives an incoming call, this call is forwarded to the call-forwarding registered number "410-2266".

Further, in order to cancel call forwarding, "1420" may be entered into the device at the time of user operation. The number "1420" is stored in the RAM as shown in FIG. 5-B. When this number is to be sent to the local exchange, the checking results in YES in above step 404 and the number "1420" alone is sent to the local exchange. When the number "1420" is registered at the local exchange, incoming calls to the device are forwarded no longer and normal calling is resumed.

Operation in a second embodiment will be

described now with reference to the flow chart in FIG. 6. In the first embodiment described above, in order to change the call forward party number or to cancel call forwarding, it is necessary to call the user from the device by auto dialing. In the second embodiment, such operation is obviated. Accordingly, the switches 7 and 8 and the display 9 in FIG. 1, as well as the corresponding programs, are not required in the second embodiment. Further, in the first embodiment the user has to be present in the vicinity of his telephone; whereas in the second embodiment it is arranged that he may change the call forwarded party or cancel the call forwarding using any outside telephone set. Steps 501 to 507 in FIG. 6 are identical to steps 201 to 209 in FIG. 2, wherein the user starts calling the device from an outside telephone set, hangs up immediately after the ring back tone sounds and again calls the device immediately by manual dialing provided that the said second calling is performed within the 4 seconds elapsed in step 508, the device is engaged in step 511 through steps 509 and 510. Thus the voice circuit between the user and the device is established. Once the voice circuit is established, the user may change the call forward party number or cancel call forwarding for the device, in the same way as described in the first

embodiment.

Moreover, although omitted in the flow chart, if an incoming call from a third party is received before the user can call the device again after hearing the ring back tone, there is a possibility that the loop circuit between the incoming call from the third party and the device may be established unwillingly. In order to avoid this operation, it is possible to arrange for the user to call the device and hang up after hearing the ring back tone repeatedly many times, and the device is engaged when the number of times of operation by the user coincides with a predetermined number of times preset in the program.

Although certain preferred embodiments have been shown and described, it should be understood that many changes and modifications may be made therein without departing from the scope of the invention.

CLAIMS:

1. A call forwarding system comprising:

a local exchange;

a first private equipment connected to the local exchange by a first line; and

a second private equipment connected to the local exchange by a second line;

the local exchange having a facility to provide a call-then-call-forward type call forwarding service for the first private equipment and being responsive to telephone number and/or command data sent from the first private equipment to initiate, change, or cancel, the call forwarding service therefore; wherein

the first private equipment is adapted so that a user of the second private equipment may cause either change or cancellation, or both as required, of the call forwarding service provided for the first private equipment, the first private equipment having thus;

determining means for determining whether or not the local exchange is enabled in a call-forwarding mode for the first private equipment;

detecting means for detecting a hang-up cessation of a calling signal sent from the exchange while the exchange is enabled in said call-forwarding mode;

engaging means operable for engaging a call between the first private equipment and the second private equipment while the exchange is still enabled following detection of the hang-up cessation of the calling signal;

store means for storing telephone number and/or command data;

store loading means operable for receiving and entering telephone number and/or command data into the store means in response to data transmitted during said call; and

registering means for calling the local exchange and causing it to change or cancel the call forwarding service in accordance with data entered into said store means.

2. A system as claimed in claim 1 wherein said engaging means comprises:

auto-dialling means operable for requesting the local exchange to connect the first private equipment to the second private equipment to engage a call therebetween.

3. A system as claimed in claim 1 wherein said engaging means comprises:

relay means operable for engaging a call between

the first private equipment and the second private equipment, being responsive to receipt of a subsequent calling signal sent from the exchange in response to a connection request issued from the second private equipment.

4. A system as claimed in any one of the preceding claims wherein:

the local exchange is operable in response to an incoming connection request for the first private equipment to send to the first private equipment an usual calling signal when disabled and thus in a usual operative mode, and to send to the first private equipment a particular calling signal when enabled in said call-forwarding mode; and

the determining means includes distinguising means for monitoring calling signals and distinguishing a particular calling signal from a usual calling signal so as to determine whether or not the local exchange is enabled.

5. A system as claimed in any one of the preceding claims wherein:

the first private equipment includes a telephone answering device which is arranged so as to be operable when the local exchange is disabled and thus

in an usual operative mode, and to be inoperable when the local exchange is enabled in said call-forwarding mode, following a cancellation or change of call forwarding service, respectively, caused by a user of the second private equipment.

6. Private equipment, for use in a call forwarding system as claimed in claim 1, said equipment comprising:

determining means for determining whether or not the local exchange is enabled in a call-forwarding mode for the private equipment;

detecting means for detecting a hang-up cessation of a calling signal sent from the exchange while the exchange is enabled in said call-forwarding mode;

engaging means operable for engaging a call between the private equipment and a second private equipment while the exchange is still enabled, following detection of the hang-up cessation of the calling signal;

store means for storing telephone number and/or command data;

store loading means operable for receiving and entering telephone number and/or command data into the store means in response to data transmitted during said call; and

registering means for calling the local exchange and causing it to change or cancel the call forwarding service in accordance with data entered into said store means.

7. Equipment as claimed in claim 6, wherein said engaging means comprises:

auto-dialling means operable for requesting the local exchange to connect the private equipment to the second private equipment to engage a call therebetween.

8. Equipment as claimed in claim 6, wherein said engaging means comprises:

relay means operable for engaging a call between the private equipment and the second private equipment, being responsive to receipt of a subsequent calling signal sent from the exchange in response to a connection request to send, from the second private equipment.

9. Equipment as claimed in any one of the preceding claims 6 to 8 wherein:

the determining means includes distinquishing means for monitoring calling signals and distinguishing a particular calling signal from an

usual calling signal so as to determine whether or not the local exchange is enabled.

10. Equipment, as claimed in any one of the preceding claims 6 to 9, having a telephone answering service which is arranged so as to be operable when the local exchange is disabled and thus in an usual operative mode, and to be inoperable when the local exchange is enabled in said call-forwarding mode, following a cancellation or change of call forwarding service, respectively, caused by a user of the second private equipment.

11. A call forwarding system, or a first private equipment therefor, constructed adapted and arranged to operate substantially as described hereinbefore with reference to and as shown in the accompanying drawings.

12. A call forwarding system comprising:

a private equipment B having storing means and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number previously registered

therein by the private equipment B;

the private equipment B further comprising:

detecting means responsive to a telephone hang-up by a calling party A following reception by the party A of a ring-back signal sent from the local exchange;

auto dialling means, operable following detection of said telephone hang-up to call the party A using a first predetermined telephone number previously entered into and currently stored in said storing means;

means for entering into said storing means a second call forwarding telephone number sent subsequently from the calling party A; and

registering means for transferring the second call forwarding telephone number to the local exchange for registration therein to replace the first call forwarding telephone number previously registered therein;

whereby subsequent calls directed first to the private equipment B are transferred by the local exchange to a second predetermined called party C1 corresponding to the second call forwarding telephone number.

13. A call forwarding system comprising:

a private equipment B having means for detecting a particular or an usual calling signal, storing means and means for dialling a telephone number stored in said storing means, and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number previously registered therein by the private equipment B;

the private equipment further comprising;

detecting means responsive to a telephone hang up by a calling party A following reception by the party A of a ring-back signal sent from the local exchange;

said detecting means including means for detecting that the calling signal is the particular calling signal, and in response, calling the party A using a first predetermined telephone number stored in said storing means, and storing in said storing means a command code to cancel said call forwarding service and, following a second telephone hang up by the party A, transferring said command code to said local exchange to cancel said call forwarding service.

14. A call forwarding system comprising:

a private equipment B having means for detecting a particular or an usual calling signal, storing means and means for dialling a telephone number stored in said storing means, and a local exchange having a facility to provide a call-then-call-forward type call forwarding service between a general calling party and a first predetermined called party C using a first call forwarding telephone number registered therein by the private equipment B;

the private equipment B further comprising:

detecting means response to a telephone hang up by a calling party A following reception by the party A of a ring back signal sent from the local exchange;

timer means operative after a call transfer service cancelling by said detecting means when said calling signal is the particular calling signal;

means for storing a second call forwarding telephone number transmitted to said equipment B by said calling party A within a predetermined time duration measured by said timer means during an engaging of B and A;

registering means for transferring a second call forwarding telephone number to the central office for registration therein to replace the first call forwarding telephone number previously registered

therein;

whereby subsequent calls reaching the private equipment B through the local exchange are transferred by the local exchange to a second predetermined called party C1 corresponding the second call forwarding telephone number.

15. A call forwarding system, as claimed in any one of claims 12 to 14, comprising:

a telephone answering device;

means responsive to an activation of the call forwarding service between the local exchange and the private equipment B for assuming an inoperative condition of the telephone answering device according to a detection of a particular calling signal sent to the private equipment B from the local exchange for a general calling party; and

means responsive to an inactivation of said call forwarding service between the local exchange and the private equipment B for assuming a normal operation of the telephone answering device wherein, upon a detection of a usual incoming calling signal from the local exchange, said telephone answering device sends a prerecorded outgoing message to, and then records an incoming message from, the general calling party.

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