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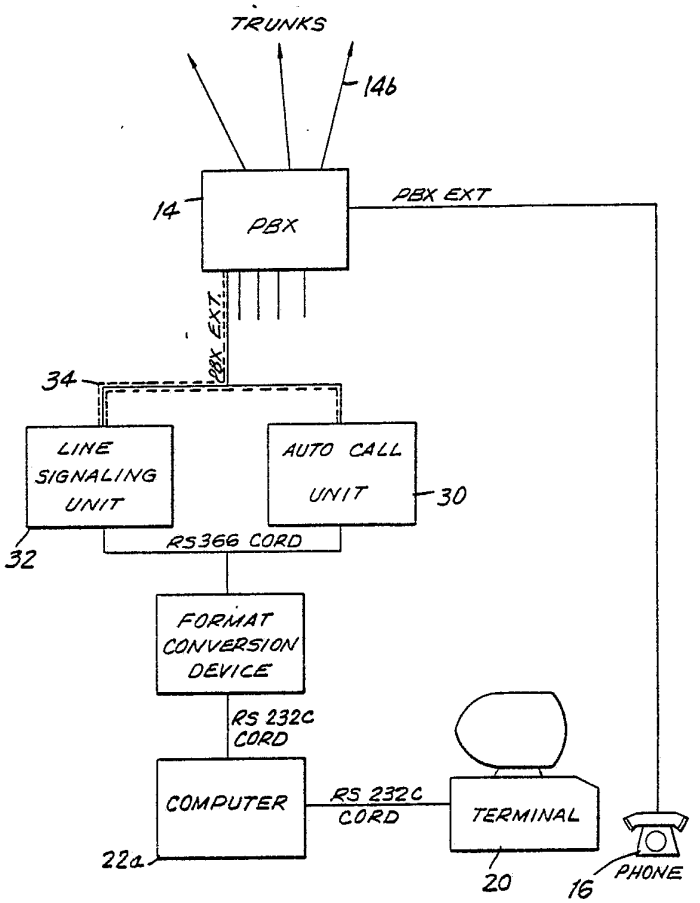
(57) Abstract

To provide plural, automatic dial-up telephone voice connections, a computer (22a) contains a data base of potential call recipients and is associated with an EIA RS-232 Data Communication Equipment interface which drives an auto-call unit or dialer (30) through a format conversion device (36) compatible with a dialer EIA RS-366 automatic calling equipment interface. A line signalling device (32) monitors the dial digit stream for paired-receivers voice connection commands and establishes under control of the computer a voice connection between an external or remote station (via 14b) and an internal or local extension (16a) upon receipt of such commands. The computer then disengages itself from the connection, which is maintained. While a previously established voice connection may continue to be in progress, the computer is free to process a new sequence of dial digits from the data base to establish a voice connection between a next successive pair of receivers in an automated, high-speed repetitive manner.



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AUTOMATED SYSTEM FOR ESTABLISHING TELEPHONE VOICE CONNECTIONS

BACKGROUND OF THE INVENTION

Field of the Invention

The invention generally relates to telephone switching systems, and more specifically to an automated system for establishing telephonic voice connections on a high speed repetitive basis.

Description of the Prior Art

Well known in the prior art are computer-communications facilities that integrate computer telecommunication devices which are adapted to establish a telecommunications path for data transfer between two modems on a dial-up basis. See, for example, U.S. Patent Nos. 3,362,015 and 4,125,872. U.S. Patent No. 4,125,872 discloses a multi-line automatic calling system adapter which is intended for controlling automatic dialing apparatus to automatically connect a telephone line to a modem for the transfer of data.

Also known are computer peripherals such as the IBM Series/1 Auto-call Originate or Teleprocessing Card (RPQ DO2013), which allows the IBM Series/1 to automatically connect, via switched telephone lines, to a distant station for the purpose of transmitting data.

However, to date, the use of a computer or data terminal to control a telecommunications system including private branch exchanges (PBX's) for the purpose of establishing voice connections between successive groups of remote receivers each having an individual telephone address, on a high speed repetitive basis, has not been broached.

Thus, while automatic connections for data communications have been known and used, systems for establishing telephone voice connections have continued to rely on manual operations and, therefore, have continued to be slow and inefficient. In applications, for example, requiring multiple operators to be connected with a large number of potential telephone call recipients, systems for establishing telephone voice connections have not made efficient use of existing staff, has resulted in tedious manual functions and related errors, has maintained low operator productivity, and has made it difficult for management to be made timely aware of contacts, results and planned follow-up. The lack of an available automated system for establishing telephone voice connections to perform certain common and important operations, such as collections, fund raising, polls, tele-marketing and the like has made these undertakings costly, less productive and inefficient.

SUMMARY OF THE INVENTION

It is a primary object of this invention to provide a system for establishing telephone voice connections which permits an external data generating device, such as a computer or data terminal, to control a telecommunications switching device for establishing telephonic voice conference connections between successive groups of remote receivers.

It is another object of the present invention to provide a system as aforementioned which uses a computer to control a telecommunications switching device for making a three-way voice conference connection, and subsequently disengaging the computer, while maintaining the connection between the other parties, thereby enabling the computer to establish another connection between a next successive group of receivers or parties on an automated basis.

It is still another object of the present invention to provide a system for establishing telephone voice connections for establishing telephonic voice conference connections between successive groups of remote receivers on a high speed repetitive basis.

It is a further object of the present invention to provide a system for establishing telephone voice connections of the type above-suggested which can be driven by a computer or data terminal which has either an interface between data terminal equipment and automatic calling equipment for data communications (EIA Standard RS-366) or an interface betwen data processing terminal equipment and data communication equipment (EIA Standard RS-232).

In order to achieve the above objects, as well as others which will become apparent hereafter, the present invention consists of an automated system for establishing telephonic voice connections between successive groups of remote receivers each having individual telephone addresses. The system includes telecommunications means for receiving dialing information for dialing the receivers having the telephone addresses within each of said groups. The telecommunications means includes connecting means for connecting at least two of said receivers within each group to each other upon the presentation of connection commands to said telecommunications means. Data generating means is provided having an interface for outputing said dialing information and connection commands to said telecommunications means in predetermined sequences. In this manner, said data generating means controls the dialing and connecting functions of said telecommunications means to thereby provide voice connections between successive groups of remote receivers.

In accordance with the presently preferred embodiment of the invention, the data generating means consists of a computer programmed to generate specifically formated data in a form acceptable to a line signalling device and a telecommunication dialer.

The formated data contains an internal and an external telephone number or address and unique control characters designed to be interpreted by the various components as instructions to perform the specific tasks. The combination of telephone numbers of addresses and control characters, when acted upon by the various system components and when connected to a telecommunications switching device, with proper capability, allows a telephone voice connection between two remote parties without manual intervention. An important feature of the present invention is the disengagement, after the telephone connection is completed, of the computer or data terminal from the conference connection to allow the telecommunications switch to be reused for further telephone connections with successive groups of remote receivers.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the invention will be apparent from the following description of the preferred embodiments of the invention, as illustrated in the accompanying drawings.

FIG. 1 is a simplified block diagram of the automated system for establishing telephone voice connections in accordance with the present invention;

FIG. 2 is a block diagram illustrating in somewhat greater details the system shown in FIG. 1; and

FIG. 3 is a block diagram of one embodiment of the interface unit shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Overview

Turning now to the drawings, in which identical or similar parts are designated by the same reference numerals throughout, and first referring to FIG. 1, the general overview of the system in accordance with the present invention is generally designated by the reference numeral 10. The system 10 includes a call recipient data base 12 and a telecommunications switching device such as a private branch exchange (PBX) telephone switch 14. The unit 14 may comprise any compatible conventional telephone switch such as the Bell System "Dimension". The switch 14 has an input line 14a and output lines 14b and 14c. The output lines 14b are connected to the telephone trunk lines which emmanate from the central telephone office and are ultimately connected to remote parties or recipient equipment or station. The output lines 14c are connected to local extensions or station 16 which may be manned by local operators.

The switch 14 and a terminal controller 18 connected to a management unit 22 by means of input lines 14a and 18a, respectively, the output lines 18b of the terminal controller 18 being connected to a bank of data terminals 20 one associated with each of the local extensions or station 16 to form an operational station 23 with the respective equipment.

Referring to FIG. 2, the data base 12 can consist of a number of different sources or media. Thus, the data base 12 may be derived from a master system 12a, or a data terminal 12b. The data base may also be stored on a magnetic tape 12c or a diskette 12d. The data base potential telephone call recipients may, in accordance with the invention, be on any compatible computer-readable medium. Thus, typical data bases which are contemplated for use in connection with the present invention include, by way of example, recent telephone numbers of customers which can typically be used for collections, prospects for telemarketing, donors for blood drives, contributors for fund raisers, voters for polls consumers for solicitations, and the like.

The management unit 22 includes a processor 22a which may be a computer or data terminal which has an interface for outputing data to a telecommunications network. The data base 12 is made available to the computer 22a and the computer 22a processes the information to drive the telephone switch 14 through an interface 22b to be more further described below. Optional computer control devices, such as a console 24 and a log 26 may be used to interact with the computer 22a. The controller 18 is shown connected to the computer 22a through modems or alternately a local interface.

The management unit 22 performs the functions of data acquisition, call equipment control, operator monitoring and response to data processing. With the system 10, multiple operators are supported with continuous call-making and coordinated display of

related data. Operator activity is limited to conversing with the data base recipients and entering the responses. Call making for each terminal is started and stopped by operator actions which are inputs to an audit trail.

Referring to FIG. 3, a specific embodiment of the interface 22b is shown. The interface 22b is shown to include an autocall unit (ACU) or dialer 30 such as the Bell System data auxiliary set 801C. The ACU is connected in parallel with a line signalling unit 32, such as the Western Electric part no. ED-5P040-30. The ACU 30 and the line signalling unit 32 are connected to the switch 14 by means of a cable 34 such as the Western Electric part No. 842990756.

As will be described below, the present invention contemplates connection of the ACU 30 directly to the data generating device when the latter includes an EIA Standard RS-366 interface. However, where the data generating device outputs the information through an EIA Standard RS-232 interface, the invention contemplates the use of a format conversion device 36 which makes it possible for the data generating device 22a, which generates serial ASCII data in accordance with the RS-232 interface specification, to drive or operate an RS-366 based ACU 30. As noted above, when the computer 22a is provided with an RS-366 interface, such as the IBM Series/1 which includes an autocall originate or teleprocessing card (IBM Part No. RPQ DO2013) the format conversion device 36 can be eliminated.

The system 10 establishes telephonic voice connections between successive groups of remote or local receivers or stations each having an individual telephone address. For purposes of the present description, a "group" is intended to include two or more telephone receivers which may be proximate to each other or remote from each other. In a typical application, a group consists of a local telephone receiver or internal extension of the telephone switch 14 and a remote telephone station connected by trunk lines through the telephone central office. The telephone switch 14 is adapted to receive dialing information for dialing the receivers, whether remote or local, and includes conference connection capability which connects at least two of the receivers within each group to each other upon the presentation of a suitable connection command. The computer 22a has a suitable interface, to be discussed below, for outputing the dialing information to the switch 14 and outputing connection commands in predetermined sequences. With such arrangement, the computer 22a controls the telephone switch 14 and creates voice conference connections between successive groups of such telephone receivers. An important feature of the present invention is the ability of the computer 22a to disengage itself from the conference connection in progress between the other telephone station of a group while maintaining the voice connection between such receivers so that

the management unit 22 can obtain information from the data base 12 for the next group of receivers and proceed to set up the next telephone voice group connection with the next succeeding group. This procedure continues until all of the desired telephone connections have been made.

Telephone Switch (PBX)

As noted above, the telephone switch may be any conventional switch, such as a PBX. Such switches normally accept dual tone multi-frequency or dial pulse information from a dialer and connects to the lines of the selected parties and performs the connect function. The line impedance transmission characteristics are typically 600 Ohms. An important property of such telephone switches, insofar as the present invention is concerned, is that they respond to a "hookswitch" flash which is characterized by a temporarily lifting of the line impedance from 600 Ohms to an open circuit. However, a hookswitch flash must be properly timed and must generally last only from 0.25 to 1.0 second. Flashing the hookswitch for less than the necessary time will not be sufficient for the PBX to recognize the conferencing or connection command. Opening the line for a period of more than the requisite time may be taken by the telephone switch as a hang-up or "on-hook" condition signalling the termination of a call. However, when the hookswitch flashes within the specified time limit, the switch 14 places a first call in progress on "hold" and prepares to make a second call to a second telephone address.

The two calls, one of which may be external and one an internal or local extension are then conferenced or connected to each other. In the case of the system 10 shown in FIGS. 1 and 2, management unit 22 accepts a first number of a group from the data base 12, generates a "hook-switch flash" to cause the switch 14 to place the first call in progress on hold and the second number of the group from the data base is then accepted and dialed through the switch 14. The first number may be the telephone address for a telephone recipient through a trunk line 14b and the second telephone address may be that of a local extension telephone station 16. The remote telephone station is then connected to the local extension 16 in a conventional manner so that the operator manning a Station 23 can communicate by means of a telephone voice connection to the remote telephone recipient. As will be clear to one skilled in the art the address sequences can be reversed without adversely effecting the principle of operation of the system.

One feature of the invention is the provision of the terminal controller 18 which controls the data terminal 20, the management unit 22 synchronizing or coordinating the terminals with the local extensions so that the operator is provided with means for accessing and updating data with regard to the specified account or recipient at the remote extension which has been connected to the operator's local extension.

If the remote connection is made and the operator communicates with the remote recipient, the operator can update the data on the data terminal 20 and the data base 12 can be corrected or updated. On the other hand, if the telephone connection is not possible, the operator can make a suitable entry on the terminal 20 to either permit the station to be used for a further connection or logging off. The interaction of the computer 22a and the terminals 20 are well known and conventional hardware and available software may be used.

Automatic Calling Unit (ACU)

The autocall unit (ACU) or dialer 30 is intended to accept formulated data via its RS-366 interface and reformats it to a form acceptable to the telecommunications switch 14. Normally, such reformatting causes the input information to be converted to dual tone multi-frequency or dial pulse signals acceptable to the switch 14.

One example of a dialer 30 is the data auxiliary set 801C which is described in publication 41603, dated November 1976, published by the American Telegraph & Telephone Company. Because ACU 801C is described in detail in the aforementioned publication, the details will not be repeated here.

Dialing instructions and the telephone number of the called station are passed between the computer or data-terminal 22a and the dialer or ACU in the form of parallel binary coded decimal (BCD) signals. The digits of the called number are transmitted one at a time for the data terminal to

the ACU. The ACU transmits each digit as dual tone multi-frequency or dial pulse signals to the telephone central office or to a PBX switch 14.

The ACU interface circuits between the computer 22a and the dialer 30 conform to the Electronic Industries Association Standard (EIA) RS-366. For proper operation, therefore, the computer or data terminal 22a should also conform to these standards. The signal and interface mechanical characteristics and the functional description of the interchange circuits in accordance with the EIA RS-366 Standard are described, for example, in Publication EIA Standard RS-366-A (revision of RS-366) dated March 1979 and published by the Engineering Department of the Electronic Industries Association, Washington, D. C. 20006. The EIA Standard RS-366 protocol is well-known to those skilled in the art and the details will not, therefore, be set forth here.

Some of the highlights of the EIA Standard RS-366 protocol which are particularly germane to this invention will, however, be briefly discussed. Call Request (CRQ) to the dialer 30 is issued when the data terminal or computer terminal 22a commences making a call. This is equivalent to a hand set "off-hook" condition during manual operation. The CRQ signal must be maintained during the complete call origination period in order to hold the communication line "off-hook". Removal of the CRQ signal indicates that the automatic calling unit or dialer 30 is no longer needed and that the call is terminated. The CRQ signal must be turned off between calls.

When the dialer is ready to read data representing the telephone number to be dialed, the dialer 30 generates a Present Next Digit (PND) signal. During the dialing function, the presence of this signal indicates that the dialer is ready to accept the next digit.

When the data terminal or computer 22a is ready with the next digit for the dialer, the computer or data terminal 22a generates a Digit Present (DPR) signal to indicate to the dialer that it may now read the next digit. After the dialer has accepted the last digit and turned off the PND signal, the DPR signal is maintained in the off condition.

The dialer generates an abandon call and retry (ACR) signal when a pre-set time has elapsed since the last change of state of PND. The on condition of the ACR signal indicates to the data terminal or computer 22a that the call in progress is to be abandoned and tried again later if the connection has not yet been completed.

Pursuant to the EIA Standard RS-366 protocol, the data supplied to the dialer 30 representing the digits to be called are in the nature of parallel binary (BCD) signals, NB1, NB2, NB4, and NB8, each of which is a four bit signal. The information presented on these leads may either be transmitted as a called number or used locally as a control signal (e.g. end-of-number, and separation characters). The digit signal character set in accordance with the EIA Standard RS-366 protocol contemplates use of digits 1-13 (up to binary "1101").

The equivalents of decimal digits 14 and 15 are unassigned and invalid signals which are ignored by EIA Standard RS-366 interface circuitry.

Line Signalling Unit

The line signalling unit 32, when connected to the autocall unit or dialer 801C by means of Western Electric Cable 842990756 allows the line signalling unit 32 to serve as a hookswitch flasher. The line signalling unit 32 is essentially connected in parallel to the autocall unit or dialer 30. As noted in the last section, the ACU or dialer 30 input interface ignores the decimal digit 15 (binary signal "1111") which it considers to be an invalid signal. Line signalling unit 32, however, only recognizes the digit 15 or binary signal "1111" and, when such a signal is presented at the input to the line signalling unit 32 it causes an internal relay within the ACU or dialer 30, via the cable 34, to be actuated thereby simultating a momentary "on-hook" condition which effectively lifts the 600 Ohm impedance at the output of the dialer 30 and interupts the current flow between the switch 14 and the dialer 30. This momentary removal of the 600 Ohm line impedance is interpreted by the PBX switch 14 as a conferencing or connection command and an instruction to activate its conferencing or connection function.

Format Conversion Device

As noted above, when the computer or data terminal 22a has an EIA Standard RS-366 interface, it can be connected directly to the autocall unit or dialer 30. However, most computers or data terminals have an EIA Standard RS-232 interface. In order to use such a computer or data terminal to drive a dialer or ACU it is essential to first convert the format of the information from the EIA Standard RS-232 format to the EIA Standard RS-366 format. One such format conversion device is the Racal-Vadic adapter model No. VA 831A/B. This adapter is described in great detail in the Racal-Vadic "VA 831A/B Adapter" Installation/Operation Manual, Publication No. 18008-041/090, dated September 1980 and January 1981. The Racal-Vadic format conversion device is also described in U.S. Patent No. 4,125,872, issued on November 14, 1978.

The Racal-Vadic adapter format conversion device 36 is an EIA Standard RS-232C to EIA Standard RS-366 converter that allows a data terminal to initiate automatic dialing through an EIA Standard RS-232C interface. Using the adapter, the computer may send and receive all dialing information to accommodate a variety of user equipment. The adapter independently generates the EIA Standard RS-366 protocol necessary to place a call through an automatic dialer. The Racal-Vadic Model No. VA 831B interfaces to an 801-compatible single line dialer, and eliminates the need for a specialized EIA Standard RS-366 compatible interface at the computer front end.

The VA 831B adapter acts as a programmable peripheral that accepts and stores a telephone number from an EIA Standard RS-232C terminal port, then independently controls the dialing sequence through an automatic dialer. For single-line applications, the sequence of data applied to the conversion device 36 physically includes an Start Text (STX) character, the telephone number or telephone digits, a Buffer Empty (SO) character and End Text (ETX) character. The Start Text (STX) character resets the adapter conversion device and places it in the "Write Mode". Succeeding characters will be stored in a RAM buffer until an End Text (ETX) character is presented or the RAM overflows. The End Text (ETX) places the adapter in the "Read Mode", initiating the adapter/dialer handshaking sequence. A Buffer Empty (SO) character terminates the adapter Read Mode.

The telephone digits which are recognized by the conversion device 36 include the ASCII characters 0-9 which correspond to the original telephone digits. The remaining digits are all invalid except for the digit 12 (ASCII "<") and digit 13 (ASCII "="). The ASCII "<" is treated as an end of number (EON) code. When this character is included in the character string following the telephone digits, the dialer will immediately transfer control to the modem at the end of the dial sequence. The ASCII "=" character serves as a tandem dial (TD) code. When the aforementioned ASCII = is included within the telephone number digits, the adapter will interrupt the dial sequence at that point and await a second dial tone before dialing the remaining digits. The decimal digits 10, 11, 14 and 15 are not recognized by the Racal-Vadic conversion device 831B.

As mentioned above in connection with line signalling unit 32, a "flash hook" signal generated by the computer or data terminal 22a must be transmitted through the conversion device 36 to the line signalling unit 32. Since the line signalling unit 32 recognizes the decimal digit 15, it is important for the format conversion device 36 to transmit this digit. In order to permit the digit "15" to be treated as a normal digit in accordance with the RS-366 protocol a wiring change in the Radcal-vadic 831B is necessary. This change involves breaking contact of pin 2 of "M32" from the printed circuit board and connecting a jumper from pin 4 of "M29" to pin 2 of "M32". This modification enables the 831B to recognize and transmit decimal digit "15" (BCD signal "1111") as a normal telephone digit.

Thus, serial data from the data terminal or computer received by the format conversion device 36 is converted to parallel form and applied to the 831B RAM buffer. If the first character received is STX, the adapter will store the succeeding characters in the buffer until ETX (End Text) is received (or the RAM overflows as above noted). When ETX is received the RAM buffer address resets to zero and the adapter asserts CRQ (call request) to the dialer 30, initiating the Read Mode. If the ACU responds with PND (Present Next Digit), the adapter places the first digit from RAM on output lines NB1-NB8, increments RAM, and asserts DPR (Digit Present). The ACU 30 accepts the digit, returns PND to the adapter, and the handshaking continues until buffer empty (SO) is encountered in RAM. When the adapter 36 decodes SO it drops DPR, inhibiting further adapter/ACU exchange.

Operational Illustration

In the illustration described below, it will be assumed that the computer or data terminal has an EIA Standard RS-232 interface so that a format conversion device 36 such as the Racal-Vadic 831B converter must be used. The line signalling unit 32 is the Bell System Line Signalling Unit Model No. ED-5P040-30, connected through cable 34 such as Western Electric Part No. 842990756. The ACU or dialer in the example is the Bell System 801C data auxiliary set.

The computer or data terminal 22a outputs a Serial ASCII data stream through its EIA Standard RS-232C interface which begins with an STX (Hexidecimal Code "02") character which is an instruction to the 831B to begin to fill its buffer. The STX character also brings up CRQ which, translated through the dialer or ACU 30, signals to the PBX switch to provide local or PBX dial tone. The PBX switch only provides a second dial tone, which is an external or trunk dial tone, when an appropriate level access code is received at the beginning of a digit dial sequence. Thus, for example, if the digit "9" is received after the STX character this normally means that an outside or trunk dial tone is requested.

The presentation of the dial digit 13 (ASCII "=") will interrupt the dial sequence and the ACU 30 will be instructed to wait for a second dial tone. The ACU will not proceed any further until a second dial tone is received, and will not issue a PND digit until a dial tone is presented. Once the dial tone is received, the character string includes the dial digits (0-9 only) required to call the first desired party. These digits are followed with the digits "15" and "13" in order (Hexidecimal 3F and 3D, respectively). As described above, the digit "15" is monitored by the line signalling unit 32 and, upon detection, will momentarily lift the 600 Ohm line impedance at the output of the autocall unit or dialer 30. This procedure will provide a hookswitch flash and the first telephone number to be called on the trunk line 14b will be placed on "hold". The digit "13" that follows (ASCII "=") will again instruct ACU to wait for local PBX or switch 14 dial tone. The next digit in the sequence of dial digits that follows defines the telephone address of the next station or voice connection to be made. If the telephone address is to be of a local extension, not to be transmitted over a trunk line, the next sequence of dial digits cannot start with the digit "9" since this would represent an external trunk line access code as described above. This procedure can be reversed if the subscriber makes use of the telephone comany's switching equipment, such as CENTREX® in lieu of a local switch (PBX).

After the PBX or switch 14 returns the local dial tone, the next sequence of dial digits 0-9 are processed to call the second party.

The second set of dial digits, representing the telephone address of the second station to be connected, is followed by the character SO which instructs the converter 831B to terminate the Read Mode. Subsequently, the character ETX issues which causes the 831B to utilize all of the information stored in the buffer to initiate the adapter/dialer handshaking sequence. It is at this point that the 831B transmits the various dialing information and conferencing or connection commands to the dialer or ACU 30 in accordance with the EIA Standard RS-366 protocol, each digit being outputed serially. As noted above, upon reaching the digit "15" (which the electronic modifications to the 831B applicable to this invention enables it to function and handle the digit "15" in the normal EIA Standard RS-366A), the 831B will output on its EIA Standard RS-366 port the proper EIA specified supervision. The dialer or ACU 30 will ignore the binary coded digit "15" but the line signalling device 32 (also monitoring EIA Standard RS-366 interface) whose design allows it to recognize only the digit "15" will activate. The line signalling device 32 will thereupon remove the 600 Ohm line impedance (placed by the 801C dialer) momentarily which will be interpreted by the telecommunications switching device 14 as an instruction to place the first call in progress on hold and return local dial tone to the dialer 30.

The next digit in the data stream, as noted, is a "13" which when received by the dialer 30 will instruct it to wait for a dial tone generated by the telecommunications switch. Upon recognition of the dial tone, the dialer 30 will instruct the 831B to continue feeding it the digits required to place the call to the second party.

Upon transmission of the last digit the 831B will enter into a waiting mode. The dialer 30, whose abandon call and retry timer has been activated will run its alloted time and generate an ACR signal on the EIA Standard RS-366A interface. The 831B will, upon detection of the ACR signal being activated, drop the EIA Standard RS-366A CRQ signal which will force the dialer to go to an "on-hook" condition with respect to the PBX or switch 14. An ASCII "B" character will be returned to the computer or data terminal 22a by the 831B via the EIA Standard RS-232 interface.

Upon lowering of the CRQ lead and receipt of the "B" character by the computer or data terminal 22a, the circuit between the PBX switch 14 will become available for the operational sequence to begin again provided that a 2000 milliseconds time is alloted beween operations. Therefore, upon receiving the "B" character, the computer commences a two second timer which commences when the CRQ lead is dropped or the 600 Ohm impedance is removed from the line. It is important that the next sequence of digits cannot be initiated for approximately 1.75 seconds since the premature presentation of characters may cause the PBX 14 to attempt to reconnect the computer 22a to the conference or connection that has been established between the group of receivers, namely, the one external receiver or station and the internal or local

extension. However, once the preset delay has been observed, the computer can disengage from the conference or connection just established while the remote station and the local extension remain connected to each other. The computer may thereupon transmit the next character string from the data base and commence establishing a second conference or connection with a second group of receivers. As noted previously, this procedure can continue until the entire data base has been exhausted.

As will be appreciated, the above-described automated system can be used for establishing telephone voice connections. For example, when the input information is a national data base of late-paying customers, the management unit 22 can coordinate ten operators and nine WATS® lines and terminals. Response data obtained by the operators are responses and follow-up codes. One possible output is an operator performance report.

Typical data bases and uses for an automated system for establishing telephone voice connections have already been illustrated above. These, of course, are only exemplary and numerous other data bases and uses are possible for this versatile and flexible system.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention. Thus, while the system described has utilized a PBX telephone switch 14, it is also possible to use this invention through a central office switch (CENTREX®) through suitable

arrangements with the telephone company. Also, while the hook switch flasher has been disclosed to comprise a line signalling unit manufactured by the Bell System it should be also clear that the use of this unit is not critical and that any other suitable device which serves to temporarily remove the 600 Ohm output line impedance of the autocall unit or dialer upon the presentation of the digit "15" at the input to the dialer can also be used. The same holds true for the Racal-Vadic 831B adapter. Clearly, any suitable format conversion device which converts a serial stream of data from the EIA Standard RS-232 to the EIA Standard RS-366 protocols, and which transmits the digit "15" can also be used. Of course, as noted, if the computer or data terminal itself has a EIA Standard RS-366 interface then the format conversion device 36 can be totally eliminated. This would be true, for example, if the computer 22a is the IBM Series/1 provided with the autocall originate teleprocessing card RPQ D02013.

While PBX or telephone switches are presently limited to making conference calls between two internal and one external telephone station, it will also be clear from the above description that expanded telephonic voice conference connections can be made with more than two stations or receivers in a group as long as the PBX 14 and the autocall unit 30 are provided to have the added capability.

WHAT IS CLAIMED IS:

1. An automated system for establishing telephonic voice connections between successive groups of remote receivers each having individual telephone addresses comprising:

(a) telecommunications means for receiving dialing information for dialing the receivers having the telephone addresses within each of said groups, and including connecting means for connecting at least two of said receivers within each group to each other upon the presentation of connection commands to said telecommunications means; and

(b) data generating means having an interface for outputing said dialing information and connection commands to said telecommunications means in predetermined sequences, whereby said data generating means controls the dialing and connecting functions of said telecommunications means to thereby provide voice connections between successive groups of remote receivers.

2. A system as defined in Claim 1, wherein said telecommunications means has input means for accepting dialing information and connection commands in a predetermined format, and further comprising dialing means between said data generating and telecommunications means for translating the information stream from said data generating means into said predetermined format.

3. A system as defined in Claim 2, wherein said interface of said data generating means and said dialing means comply with the EIA RS-366 Standard.

4. A system as defined in Claim 2, wherein said dialing means has an input interface which complies with the EIA RS-366 Standard, and said interface of said data generating means complies with the EIA RS-232 Standard, and further comprising conversion means between said data generating and said dialing means for converting said dialing information and connection commands from RS-232 to RS-366 Standards.

5. A system as defined in Claim 2, wherein said telecommunications means initiates the connection or conferencing function upon detection of an impedance level change at the output of said dialing means, and further comprising line signalling means for monitoring said dialing information and connection commands at the input to said dialing means and changing the impedance level at the output of said dialing means upon detection of said connection commands.

6. A system as defined in Claim 5, wherein said telecommunications means comprises a telephone switch responsive to a hookswitch flash to initiate the conferencing function, and said line signalling means comprising flashing means for simulating a hookswitch flash upon detection of a connection command.

7. A system as defined in Claim 1, further comprising means for disconnecting said telecommunications means from the voice conference connection with all the receivers of a specified group while maintaining said voice connection between said receivers of said specified group to thereby enable said telecommunications means to commence and establish a voice conference connection with the next successive group of remote receivers.

8. A system as defined in Claim 1, further comprising terminal means associated with at least one of said receivers of each group in communication with said data generating means for displaying data and allowing updating of said data in said data generating means in response to the conference connection with each respective group of receivers.

9. A system as defined in Claim 8, wherein said terminal means comprises a plurality of terminals one associated with a receiver of each group of remote receivers.

10. A system as defined in Claim 8, wherein each group of remote receivers includes a remote telephone station and a local extension station, said terminal means being associated with and provided at each local extension station.

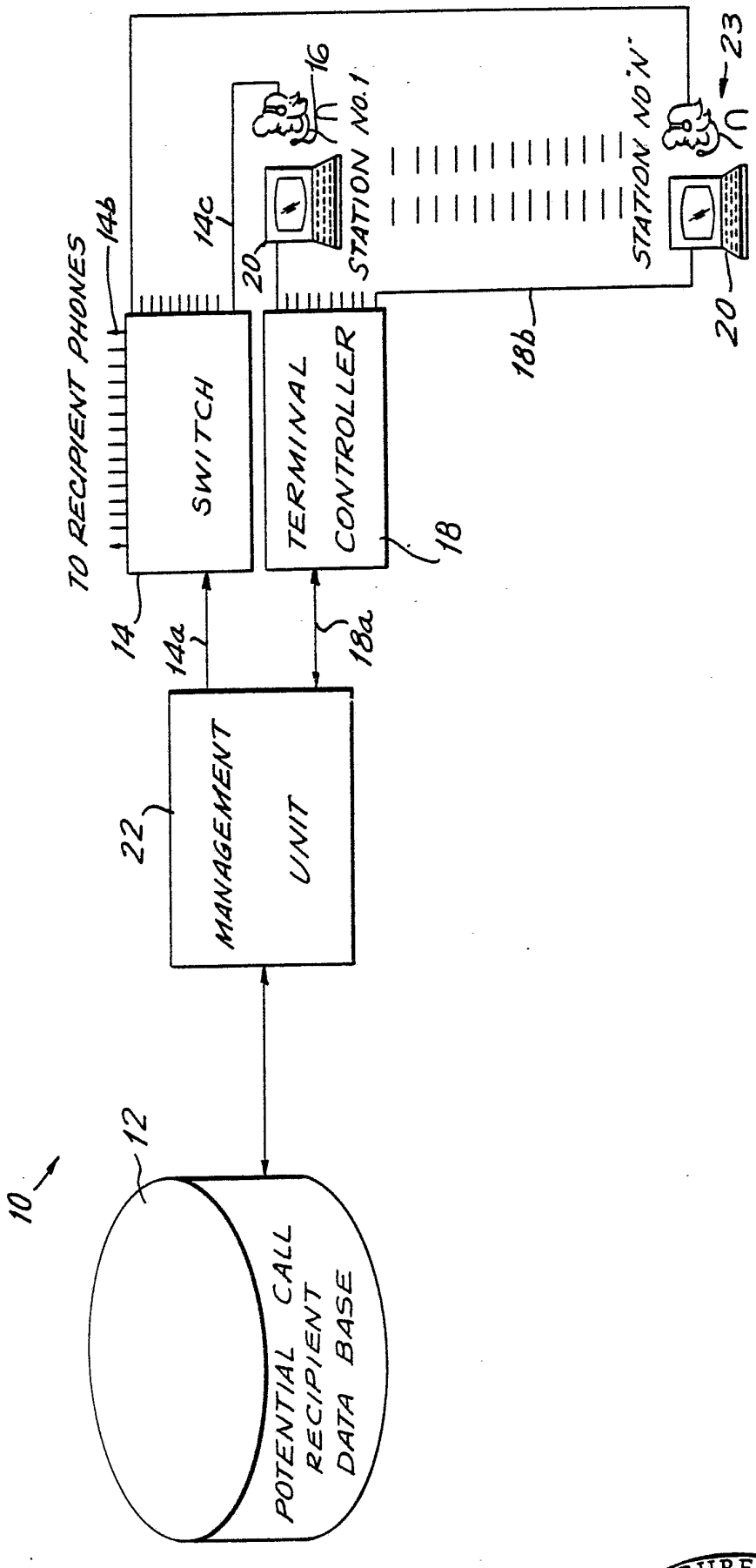


FIG. 1

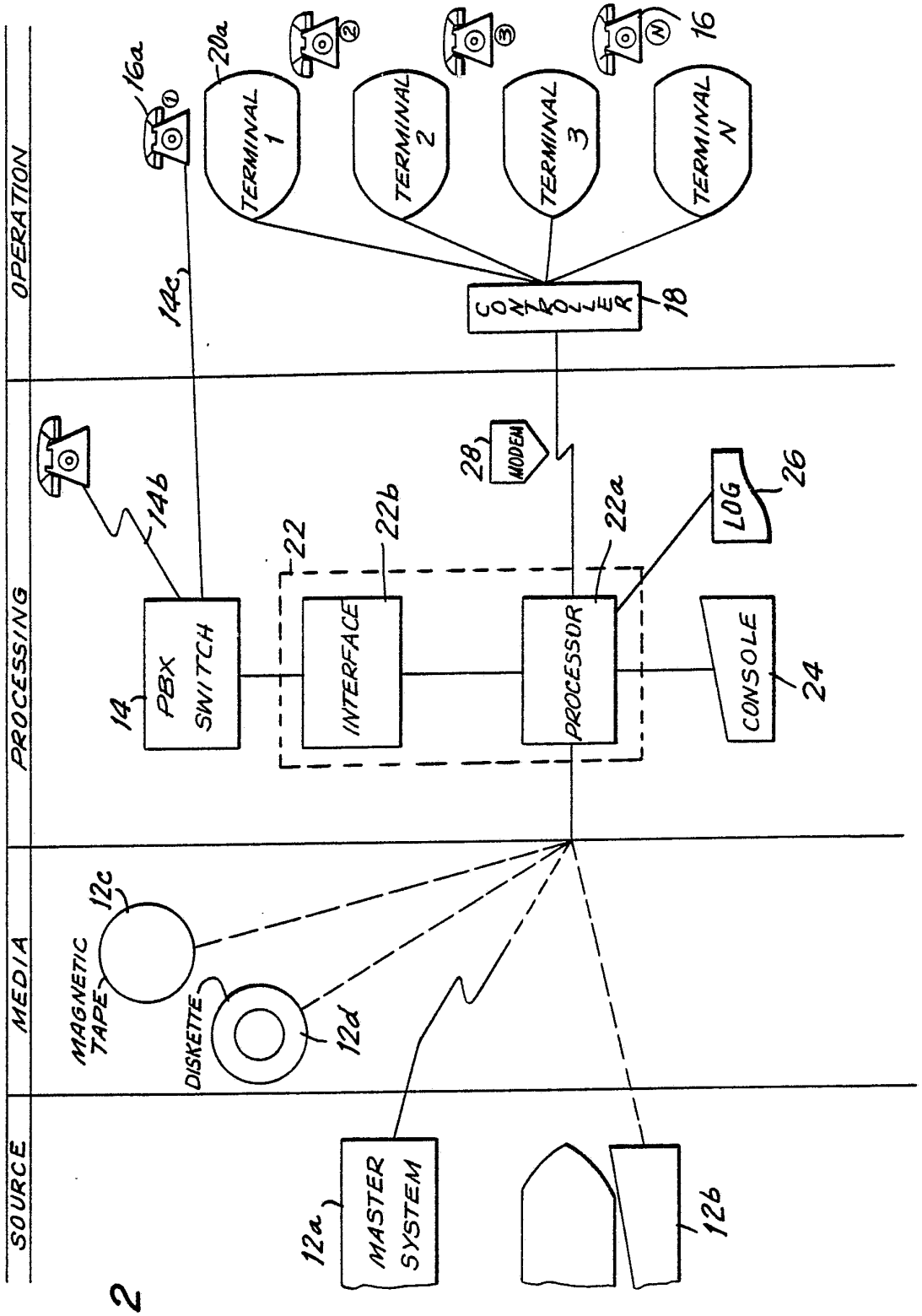
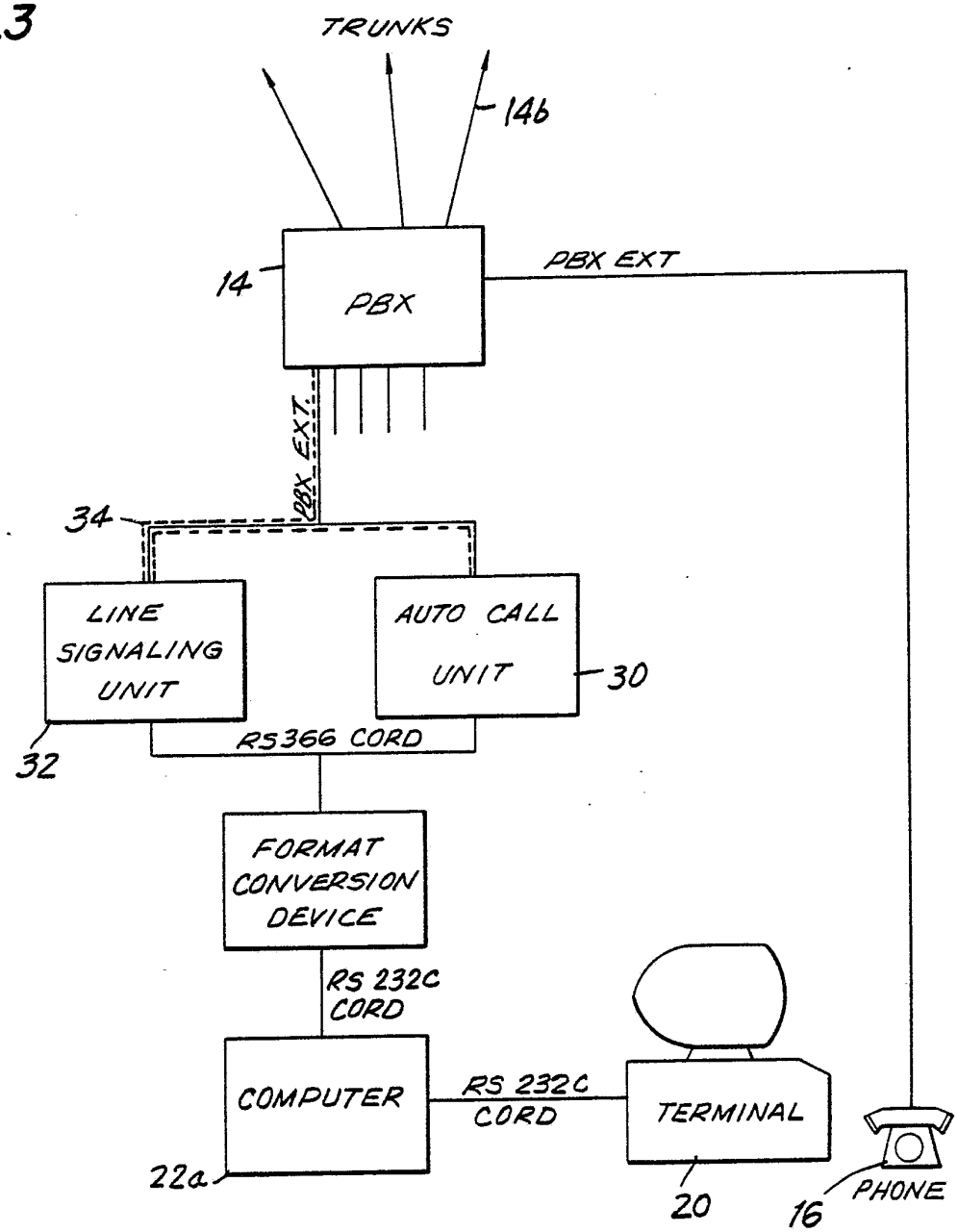


FIG.2

FIG.3



INTERNATIONAL SEARCH REPORT

International Application No PCT/US84/01620

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL.[3] H04M 3/46, 3/56
US. CL. 179/18BC, 90BD

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U S	2AM, 2AS, 6.02, 18AD, 18B, 18BA, 18BC, 90B, 90BB, 90BD

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	US, A, 3,697,672, 10 OCTOBER 1972, REISCH	1
Y	US, A, 3,733,440, 15 MAY 1973, SIPES	8-10
A	US, A, 3,868,640, 25 FEBRUARY 1975, BINNIE etal.	
X	US, A, 3,912,874, 14 OCTOBER 1975, BOTTERELL et al.	1
A	US, A, 3,943,289, 09 MARCH 1976, SHELDON et al.	
A	US, A, 3,975,596, 17 AUGUST 1976, POMMERENING	
A	US, A, 4,086,443, 25 APRIL 1978, GORHAM et al.	
A	US, A, 4,160,124, 03 JULY 1979, LAW	
Y	US, A, 4,313,036, 26 JANUARY 1982, JABARA et al.	2-7
A	US, A, 4,356,348, 26 OCTOBER 1982, SMITH	
Y	US, A, 4,125,872, 14 NOVEMBER 1978, MAXWELL	2-7
Y,P	US, A, 4,438,296, 20 MARCH 1984, SMITH	2-7
A,P	US, A, 4,468,529, 28 AUGUST 1984, SAMUEL et al.	
A,E	US, A, 4,481,383, 06 NOVEMBER 1984, MADON	
A	JP, A, 57-39664, 04 MARCH 1982	

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
03 DECEMBER 1984	07 DEC 1984
International Searching Authority [1]	**Signature of Authorized Officer [20]**
ISA/US	Thomas W. Brown

Form PCT/ISA/210 (second sheet) (October 1981)