

[54] REPORTING AND SECURITY SYSTEM

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[58] Field of Search 235/61.7 B, 61.6 R, 235/61.7 R; 340/149 A; 194/4 R

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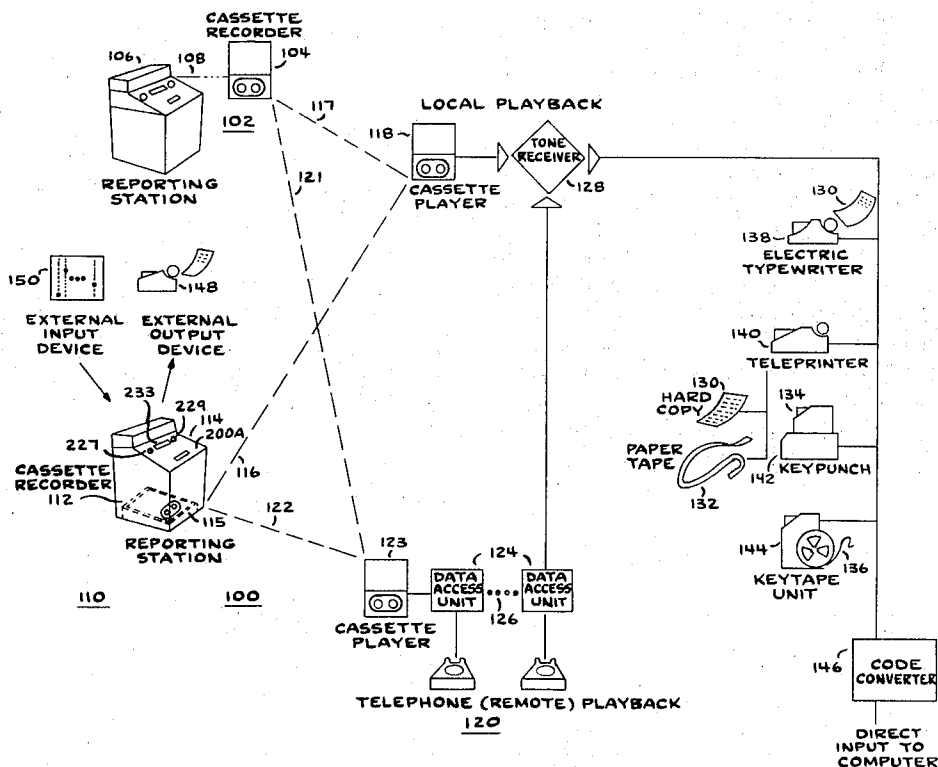
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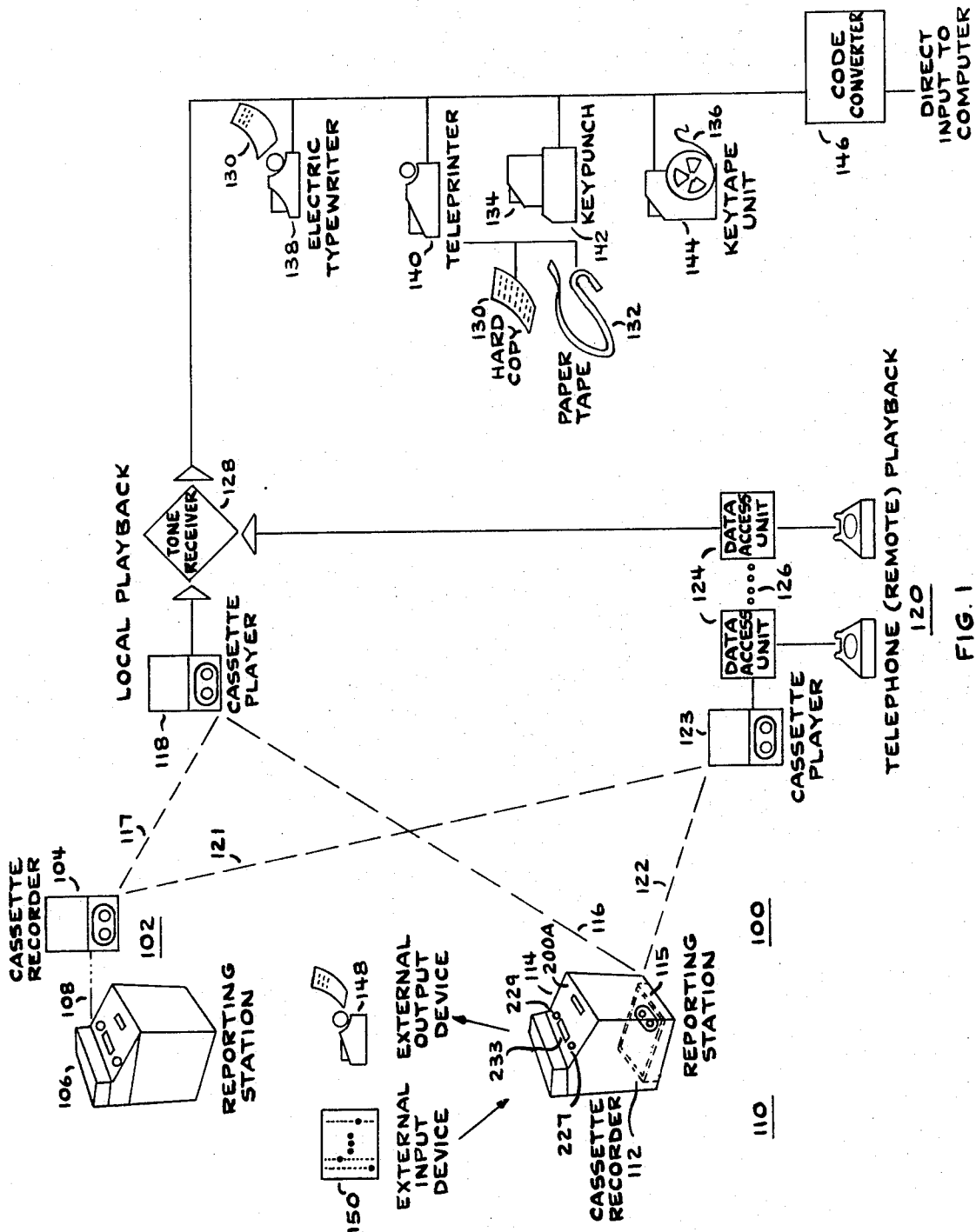
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ABSTRACT

A reporting and security system in which a person identifies himself at a station by means of an identifying indicia bearing member, such as a card which may be inserted in a card reader to provide personal identifying information along with time, date, number of station, and other fixed and/or variable information, the information input being recorded as tones on a low cost cassette recorder associated with the station in a computer compatible form suitable for playback and processing at a convenient time. Authentic indicia bearing members may also be used to operate a security device such as a lock or turnstile when presented to the identification station. The system may be used simply as an attendance reporting system or as a system which provides variable information related to job reporting, inventory control, banking information, and the like.

14 Claims, 8 Drawing Figures





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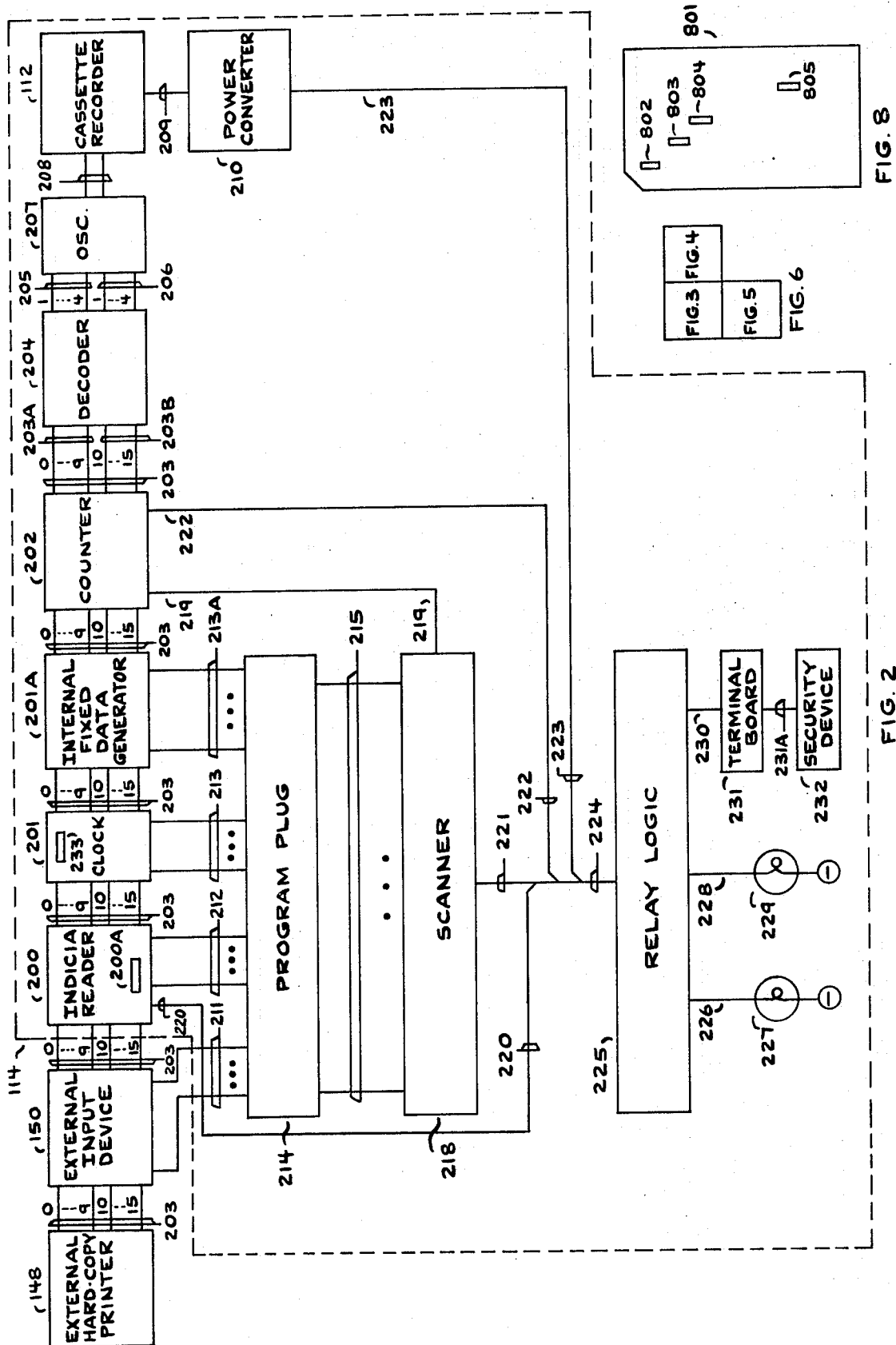
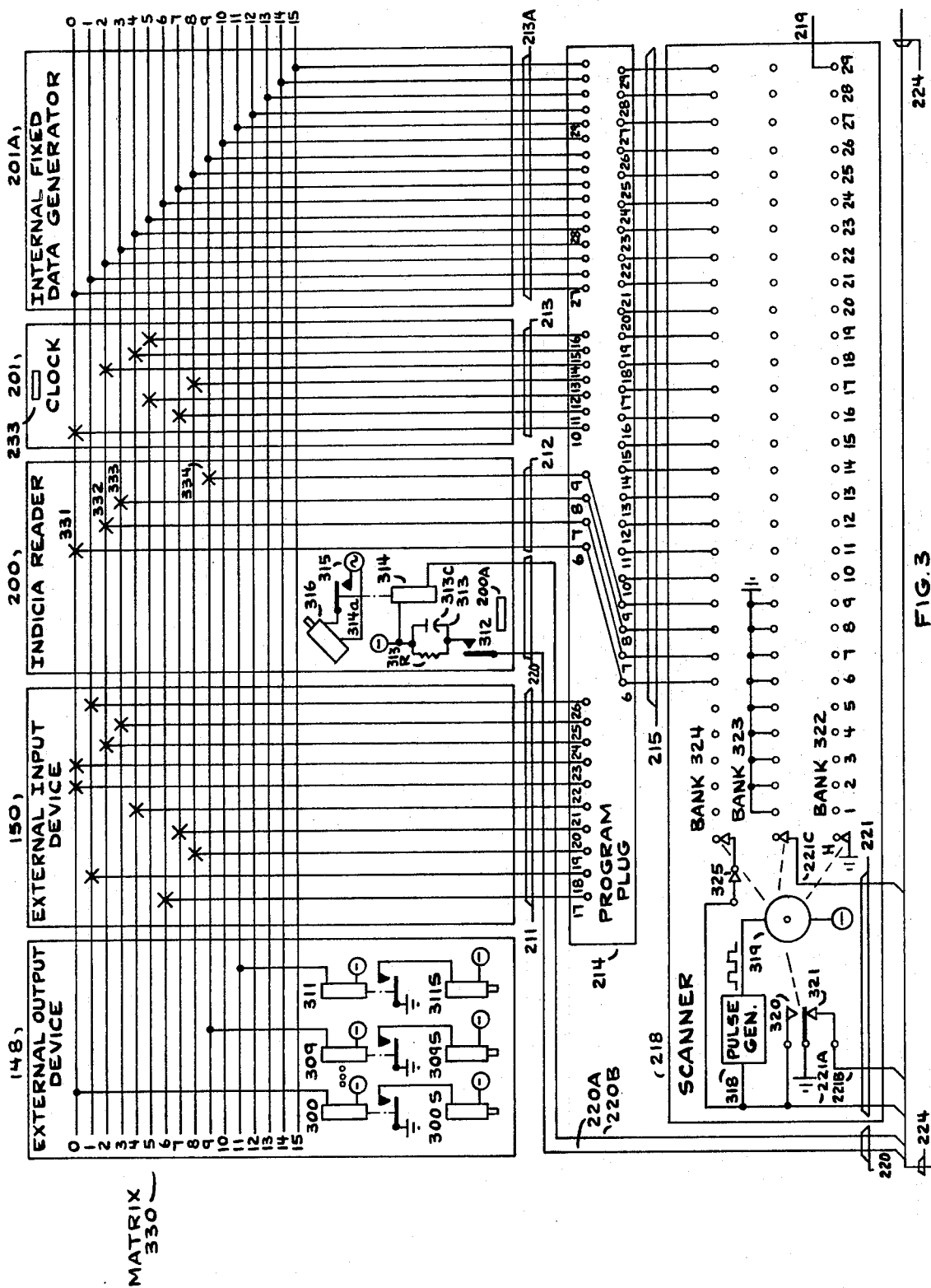


FIG. 2

FIG. 8



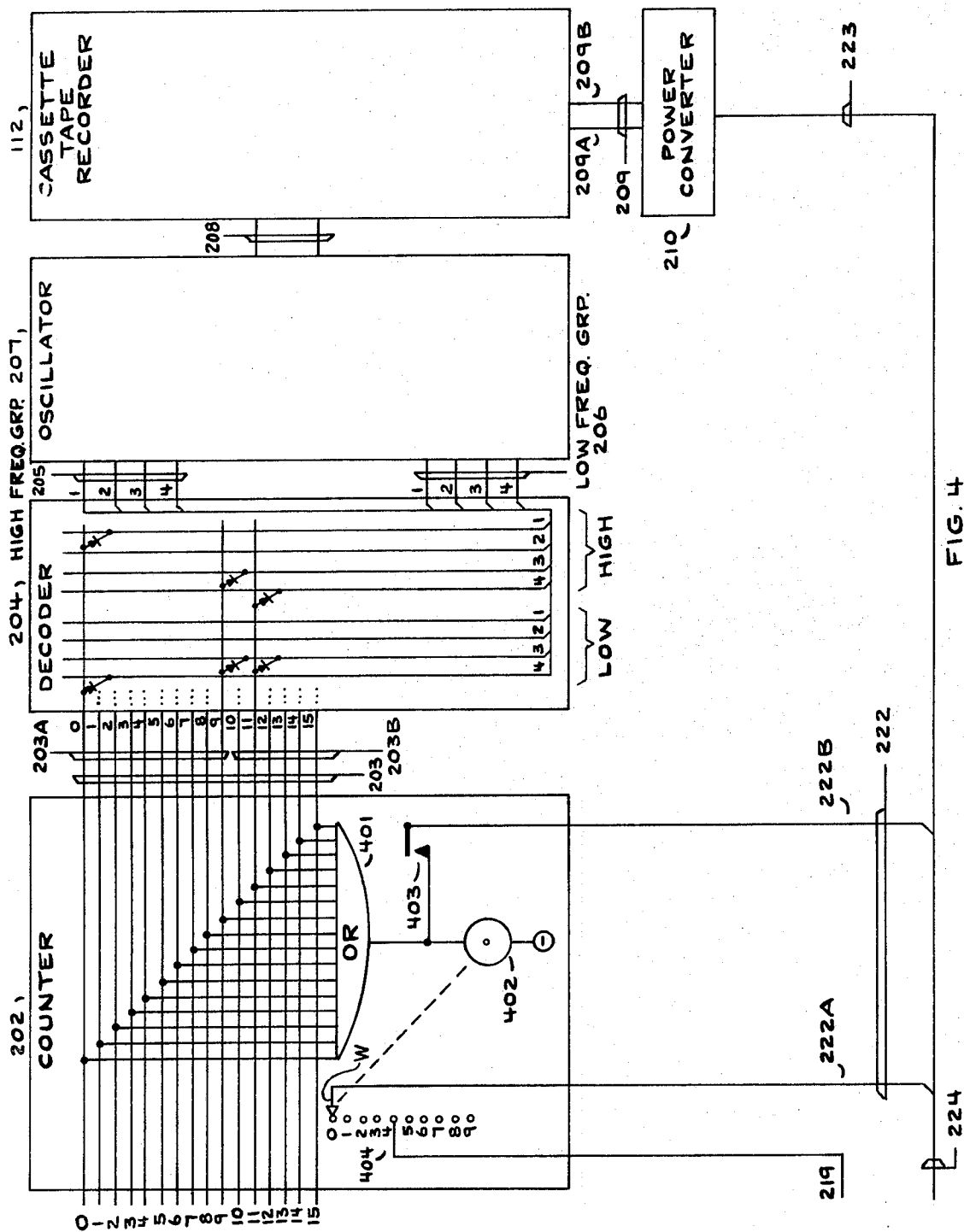
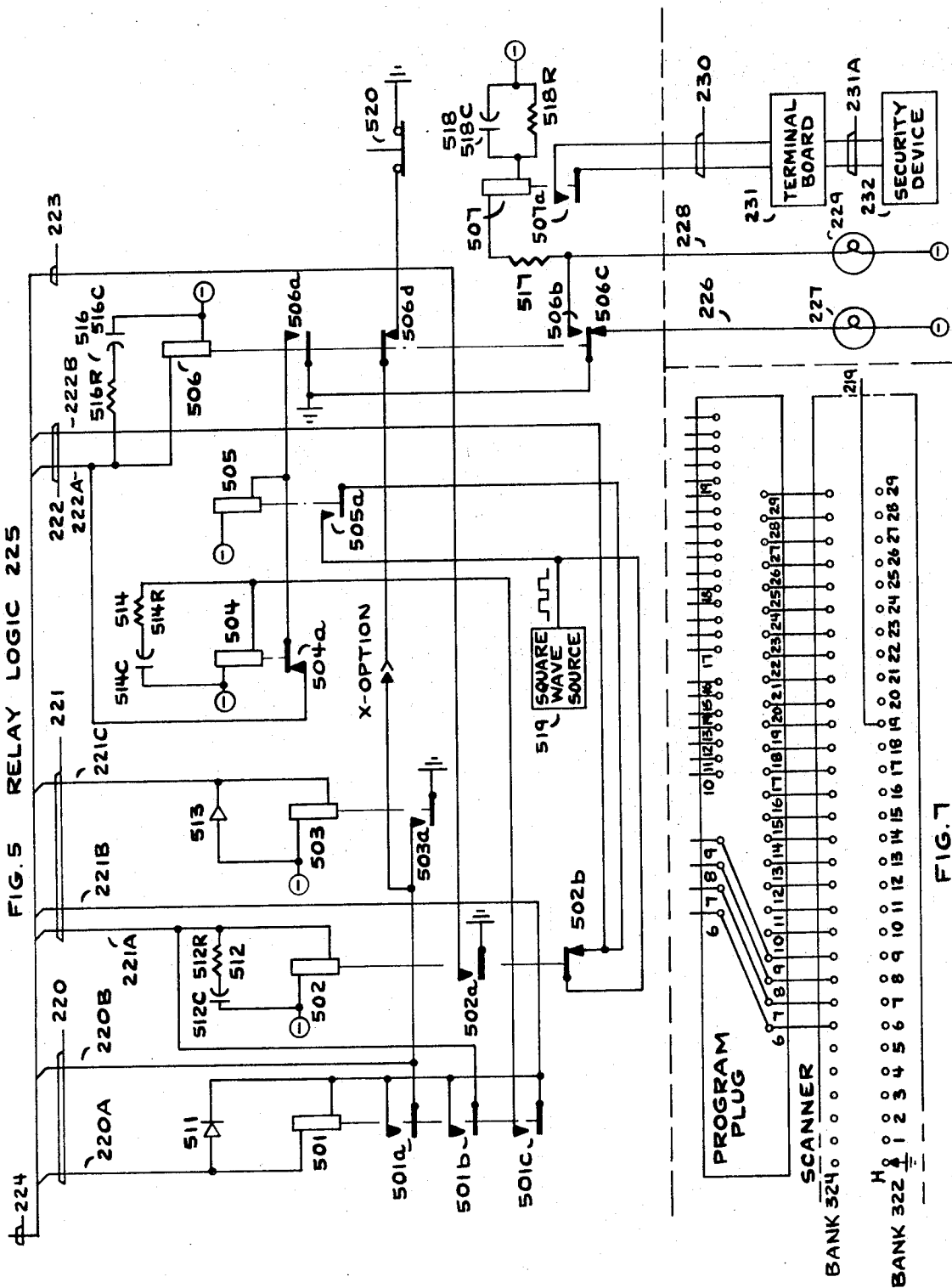


FIG. 4



REPORTING AND SECURITY SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to gathering and recording of attendance, job, labor, and other associated data in a factory, or other environment, and providing such information in a form suitable for generating computer compatible media therefrom.

2. Description of the Prior Art

Currently the more widely accepted method of accumulating attendance information employs a standard time card which is imprinted with the employee's name and is weekly distributed to a specific time clock station in the system. The employee, upon entering and leaving the plant each day, must locate his time card, remove it from a rack, insert it into a clock which stamps the time and date information on the card and return it to an assigned position in the rack. Once a week these tab cards must be retrieved physically from the station and taken to an accounting department where accounting personnel (or their counterpart) must manually calculate the difference between the in-time and the out-time of the employee to ascertain the number of hours of attendance by that employee for the recorded period. Information is usually reduced to computer compatible form by means of manual key-punch equipment or other similar manually operated computer peripheral equipment whereby the resultant record may be used by the computer or other associated data processing equipment in the automatic computation and preparation of the company payroll.

Attempts to automate the daily time-keeping records for the individual employees have generally utilized a central recording station having common electronic circuitry and a number of individual stations connected to such common circuitry. A multiplexer unit in the common circuit monitors and processes the information which is provided by the individual stations. Since the traffic in such type system tends to have peak periods (as, for example, at the time of change of a shift in the plant) the multiplexer must be operative at a relatively high speed. Further it is normally necessary to connect the individual stations to the multiplexer with long cable runs. High speed multiplexers and installations of this type are extremely costly. In addition, if any malfunction should occur to the multiplexer, the information retrieval process is jeopardized for the entire system.

Many of the automatic units now on the market utilize a binary digital signalling scheme or pattern, and record the information derived therefrom on a digital recorder. This type of signalling is subject to external interferences, such as for example, motor noise and other electrical disturbance which are commonly found in a factory environment and as a result, such installations require extreme isolation. Further, if the information is to be sent over phone lines in such format, an additional modum is required. Again such arrangement is somewhat expensive.

SUMMARY OF THE INVENTION

In the system of the present invention, each employee is issued a suitable means, such as an apertured card for identification purposes. On his arrival at the plant, the employee may go to any reporting station and insert his card in the unit for attendance purposes.

The equipment at the recording station will record his identification, and such other information as time and data and station number by means of tones on the magnetic tape of simple low cost cassette recorder. If desired, the employee may set up variable information on an external input device and insert the same identifying card or badge into the reporting station to provide a record of such variable information. As a typical example, such additional information might comprise a report of the particular job or type of work the employee has been performing from the beginning of the shift until the time of his further report.

At a later time the information recorded on the cassette is played back by means of a cassette player at a suitable play-back station and via a tone receiver operates a solenoid pack interface which in turn operates a device such as a standard typewriter, keypunch machine, key-tape unit or the like, which may be a part of the normal data processing equipment in the plant ("in-house" data processing equipment which was purchased and is used for other data processing purposes). Such equipment preferably generates computer compatible records from the information on the cassette tapes, and such records are fed to a computer for automatic processing. The computer may further control peripheral equipment in the provision of a desired record, as for example, an attendance record, productivity record, elapsed time record, payroll records, and the like.

In recording the required information on the cassette at the reporting station, tones are used to represent numerical values and control signals. By using a tone system, the electronic circuitry, power supply and other associated circuitry may be considerably simplified whereby a system of substantially lower cost is achieved. In addition, such arrangement by reason of its inherent nature, does not require a high degree of isolation from external interference. By way of a further feature, the tones which are utilized in recording the information on the cassette may be sent directly over the phone wires if desired, whereby a conventional communication link may be used in the forwarding of information from remote reporting stations to central accounting offices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows illustratively the arrangement of the system and various options which may be included therein;

FIG. 2 is a block diagram of the attendance reporting station with associated external input device means and external hard copy printer device;

FIGS. 3, 4 and 5 arranged as shown in FIG. 6 constitute a schematic diagram corresponding to the block diagram of FIG. 2,

FIG. 7 shows connections for illustrating the reporting station as attendance reporting station only; and

FIG. 8 illustrates an indicia bearing member, such as a Hollerith coded card with apertures therein.

BLOCK DIAGRAM DESCRIPTION OF SYSTEM

Referring now to FIG. 1, the overall system 100 of the invention is shown therein. At the lower left is seen reporting station 114 which may be located in a factory, banking institution, or any place where a reporting station is desired.

The reporting station 114 may be used for the purpose of attendance reporting, job reporting, inventory reporting, or other kinds of reporting. As will be seen in further drawings, a successful attendance reporting may also effect operation of a security device such as a turnstile, lock, etc. Stations also could be used to control access to sensitive areas, being coded to allow only authorized persons to enter. Persons not authorized to enter would be refused entry, but their employee member, time and date would be recorded, indicating the attempt to enter.

When the reporting station is used for attendance reporting, insertion of an indicia bearing member such as a Hollerith card of FIG. 8 into slot such as 200A effects the identification of the card holder. When used for job reporting, for example, an external input device 150 which may be a manually operable switch device or a card reader is set to record data or information prior to insertion of the identification card.

When the card holder approaches the reporting station he observes the time of day in the window 233, sees the green lamp 227, sets up the external input device, if appropriate, and inserts his identification card in slot 200A. His card will be held in the slot against retrieval until reporting is complete at which time green lamp 229 lights, signaling completion of a successful reporting at which time the card holder removes the card.

Data relative to the reporting is automatically recorded in the form of frequencies or tones upon the magnetic tape of cassette 115 of cassette recorder 112 located within reporting station 114 as shown. This data also may be recorded on a hard copy (in the case of attendance reporting) by means of an external output device 148 such as an adding machine or typewriter located at a guard post, for example, allowing a guard to be advised as to persons entering and leaving after hours; by means of a solenoid pack which will become clearer hereinafter.

The cassette 115 at the appropriate time is placed, as indicated by path 116, in a cassette player such as 118 and played back. A tone receiver 128 electrically connected to cassette player 118 extends electrical signals to a solenoid pack associated with a typewriter 138 which prints out a hard copy 130; or a teleprinter 140 which prints out a hard copy 130 or produces a paper tape 132 which can be used as input to a computer; or a keypunch machine 142 which punches a card which can be used with a computer; or a keytape unit 144 which produces a magnetic tape 136 which can be used with a computer. Alternatively the tone signals can be fed to a code converter 146 for direct input to a computer as indicated.

From the data input thereto, the computer can perform many different functions, typical of which are sorting by employee number, sorting by job number, calculation of elapsed time, calculation of productivity; by referencing an employee master file containing shift rate and other data, the computer equipment can make payroll computations, etc., and put out data relative thereto.

If the processing office is remotely located from the cassette player, the cassette can be played back, as indicated by path 112, on a cassette player such as 123 which is electrically connected to a data access unit 124 associated with a telephone. The attendant dials up the processing office and the data passes over a tele-

phone line such as 126 from a local data access unit to a distant data access unit which relays the tone to a tone receiver such as 128.

At the upper left of FIG. 1 is seen reporting station 106 wherein the cassette recorder such as 104 is connected over electrical path 108 to the reporting station 106 but is remotely located therefrom. Cassette 104 can be played back, as indicated by path 117, on a cassette player such as 118 or, as indicated by path 121, on a cassette player such as 123 with the operation and results described above.

BLOCK DIAGRAM DESCRIPTION OF REPORTING STATION

Turning now to FIG. 2, a block diagram of a reporting station such as 114, including an associated external input device 150 and an external hard copy printer device 148 is illustrated thereat. It will be apparent that a reporting station, such as 106, would be connected in a similar manner with the exception that a cassette recorder 104 would be remotely located therefrom.

Assuming the employee at this time wishes to enter job data along with his own identification, the employee goes to the closest reporting station such as 114 and operates the switches on the external input device 150 to indicate the information to be recorded and then inserts his indicia bearing member, such as a Hollerith coded card, into the slot 200a at the recording station 114. When the indicia bearing member (which is assumed to be the Hollerith coded card 801, for example, illustrated in FIG. 8) is inserted into slot 200a of a commercially available indicia reader 200 of the reporting station 114, the card closes a set of contacts in the reader, as described later, which provides a start signal over path 220 to relay logic 225. With the receipt of such signal, relay logic 225 in turn enables scanner 218 to scan the data output from each of the four associated data input circuits including indicia reader 200, clock 201, the internal data generator 201a and the external input device 150. Such scan is controlled through a program plug 214 which permits programming of the data detected at such inputs for recording in a pattern which is compatible with that used by "in-house" data processing equipment which the company normally uses for other purposes.

The data obtained from the data input circuits 200, 201, 201a, 150 in each scan is transmitted via a common path 203 to a decoder 204, which path 203 comprises 15 conductors including digit conductors 0-9 and control conductors 10-15 connected as common conductors selectively accessible to (a) the external hard copy printer 148, (b) the external input device 150, (c) the indicia reader 200, (d) clock 201, (e) internal fixed data generator 201a, and (f) counter 202. The common conductors 0-15 in path 203 are also connected to the inputs of decoder 204.

The output of decoder 204 is fed to a $\frac{1}{4} \times \frac{1}{4}$ tone oscillator circuit 207 to control same in the generation of frequencies which are recorded by the cassette recorder 112. Power for the drive system of the cassette recorder 112 is provided over path 209 from power converter 210, which is in turn selectively enabled by signals from the relay logic circuitry 225 over path 223.

Cassette recorder 104 associated with, but remote from, station 106 receives its power and tone signals in the same manner as cassette recorder 112, the difference being that the power and signals are applied over

the four wire path 108 to the cassette recorder 104 in its remote location. The data representing signals on path 203 may also be transmitted over the same electrical sixteen wire path to external hard copy printer 148 which prints out a hard copy of same.

The counter circuit 202 monitors the signals placed on path 203 and transmitted to decoder 204 and to external hard-copy printer 148 to determine that all points of the message have been scanned. If an accurate scan has been made, the relay logic 225 via path 228 energizes green light 229 and via path 230 enables terminal board 231. As activated, terminal board 231 provides an output over path 231A to the security device 232, such as a remote lock, turnstile or any other type of security device which bars admission to the plant unless the user has the correct indicia bearing member and the system has responded properly thereto. If for any reason the correct number of indicia characters were not counted, red light 227 would be lit and neither green light 229 nor terminal board 231 would be energized.

Also, as indicated above, if it is desirable to produce a hard copy at the same time of the attendance or job transaction is being recorded, a print-out device 148 such as a commercial adding machine or typewriter may be provided. Device 148 would be activated by the same scan signal which creates the tones recorded by the cassette recorder 112, which itself may be placed locally or remote from the attendance and job station.

DETAILED DESCRIPTION OF RECORDING STATION

With reference now to FIGS. 3, 4, and 5 (when assembled as shown in FIG. 6), a more detailed description of the schematic circuits of the reporting station is set forth thereat in conjunction with a specific example of reporting by an employee. For purposes of such example, it will be assumed that an employee having a card with the identification number 0239 inserts his card at 0758 (time of day) on the 245th day of the year (245). In addition, it will be assumed that the employee prior to inserting his card operated the external input device 150 to indicate the machine number (6), the job number (1874), the quantity (0023), and the transaction (1). Addition, the internal fixed data generator 201A has been permanently wired to indicate the station number (04) and the end of message (11).

More specifically in such mode of operation, the employee uses a reporting station such as 114 which includes both attendance reporting and job reporting capabilities. First the employee operates the switches on the external input device 150 to indicate the items identified above, i.e., machine number, job number, quantity transaction. External input device 150 may comprise any type switching arrangement in which each digit to be recorded is selectable by adjusting a corresponding selector switch having a plurality of positions equal in number to the value of each such digit (0-9 in the present example). Alternatively or additionally the external input device may comprise or include a reader for additional indicia bearing card or cards to provide input information.

After the employee has operated the different switches on the manual selector switch 150 to select the corresponding ones of the digits 0-9 to be input to the system, the employee identification card is inserted into slot 200A to initiate the automatic generation of

the data provided by the external input circuits 150, indicia reader 200, clock 201A, and internal fixed data generator 201.

Digressing briefly, if the reporting station 114 is being used for attendance reporting only, the employee will adjust each of the switches on the external input device 150 to the zero position, and the device will effect the recording of only the employee number, time of day, day of year, and station number. It will be apparent that attendance reporting as recorded on the cassette thus appears the same as a job reporting with zeros being located in the job reporting areas.

In yet another mode of operation, a computer may be programmed to neglect any digits in the job reporting area which occur prior to the start of a working day. In such event, it would not be necessary for the employee to set the external input device 150 to indicate all zeros.

With reference once more to FIG. 3, it will be seen that in the present example such adjustment of the switches on external input device 150 results in the connection of the ten vertical conductors in path 211 to horizontal conductors 6, 1, 8, 7, 4, 0, 0, 2, 3, 1 respectively.

The indicia reader 200 includes contact means for selectively connecting four vertical conductors in path 212 to indicated ones of the horizontal lines 0-9 of the path 203. Thus, as the card of FIG. 8 is inserted in indicia reader 200, contacts 331, 332, 333, and 334 will be closed as described hereinafter to connect the four vertical conductors to the corresponding horizontal conductors, 0, 2, 3, 9 respectively.

In a similar manner, the further data input device 201 comprises a clock (which may be North Electric Digital Clock and Calendar Model PEC 7449 or may be the type commercially available from Chronolog Company as Model 2500-2 for time and Model 8310 for calendar) which is operative to selectively connect each of the seven vertical conductors in path 213 selectively to the indicated ones of the horizontal conductors 0-9 in the path 203. In the present example, it is assumed that the time of day is 0758, and accordingly the first four contacts will be closed by clock 201 selectively in a timed manner to connect the first four vertical conductors to horizontal conductors 0758 respectively as illustratively shown by Xs in FIG. 3. In a similar manner, it is assumed in the present example that such entry is made on the 245 day of the year and accordingly the last three contacts are closed to connect the last three conductors to the horizontal conductors 245 respectively.

Internal fixed data generator 201A is pre-programmed to provide further data input for use in the automatic data processing arrangement. In the present example, the internal fixed data generator 201A is shown as hardwired (illustrated by dots in FIG. 3) whereby in path 213A, a hardwired connection of each horizontal conductor 0-15 of path 203 is extended to corresponding portions of program plug 214 which may be selectively strapped to scanning positions of the program plug. As illustrated, the first, fifth and twelfth conductors on path 213A as enabled by the scanner at scanning positions 27, 28, and 29 will place signals on horizontal conductors 9, 4, and 11 respectively.

As will now be shown, the data input which is thus prepared for entry by data input units 150, 200, 201, 201A is fed into the system by signals output by the

scanner unit 218 via program plug 214, cross connected as indicated to the vertical conductors in paths 211, 212, 213, 213A respectively. As will be shown by using appropriate strapping in the program plug the particular sequence in which the data input is read from the indicia reader 200, clock 201, and internal fixed data generator 201A, fixed input device 150 may be programmed to the needs or desires of the existing "in-House" data processing equipment. In the present example, the strapping provides readout of the indicated functions in the following sequence as the scanner progresses from left to right as shown through positions 1-29. (From position 29, the scanner returns to home position H. Actually, the banks are circular as would be understood):

Function	Scan Points	Strapping	Signals Provided
1. Tape Start	0 - 5	None	None
2. Employee Number	6 - 9	Inputs 6-9 of plug 214 to conductor in vertical column 212 of reader 200	0239
3. Time	10 - 13	Inputs 10-13 of plug 214 to first four conductors of vertical column 213 in clock 201	0758
4. Date	14 - 16	Inputs 14-16 of plug 214 to last three conductors of vertical column 213 in clock 201	245
5. Machine Number	17	Input 17 of plug 214 to first conductor of vertical column 211 in external input device 150	6
6. Job	18 - 21	Inputs 18-21 of plug 214 to next four conductors of vertical column in external input device 150	1874
7. Quantity	22 - 25	Inputs 22-25 of Plug 214 to next four conductors of vertical column 211 of external input device 150	0023
8. Transaction	26	Input 26 of Plug 214 to last conductor of vertical column 211 in external input device 150	50
9. Station Number	27 - 28	Inputs 27, 28 of Plug 214 to conductors of vertical column 213A in generator 201A leading to horizontal conductors 0 and 4	1 55 04
10. End of Message	29	Input 29 of Plug 214 to conductor of vertical column 213 A in generator 201A leading to horizontal conductor 11	End of message signal to horizontal conductor 11 65

The manner in which the scanner 218 is operative to successively provide readout signals to input terminals 6-29 of program plug 214 to thereby effect readout of the identification data provided by indicia reader 200, the clock data provided by clock 201, the job information provided by external input device 150 and the station identification provided by 201A in the pattern indicated is now set forth in detail.

Data Readout

As the employee identification card is fully inserted into slot 200A of the indicia reader 200, contacts 312 (FIG. 3) senses such insertion and extend a start signal to relay 501 (FIG. 5), such path extending from negative battery (FIG. 3) through RC network 313 (FIG. 3) consisting of resistor 313R and capacitor 313C, conductor 220A in path 220, path 224, and conductor 220A (FIG. 5), relay 501, path 221B of path 221, path 224, path 221B, and normally closed contacts 321 of stepping switch 319 to ground. Suitable arc suppression for relay 501 is provided through diode 511.

Capacitor 313C of the RC network 313 starts to charge and after a given charging interval will attain a value which causes relay 501 to restore (as the capacitor 313 attains its full charge the current flow over relay 501 is terminated). At this time, relay 501 is restored; however, since the card remains in the indicia unit reader 200, contacts 312 will remain closed.

Relay 501, as operated, closed contacts 501a to complete an energizing path for relay 314 (FIG. 3), which path extends from negative battery over relay 314, conductor 220B in path 220, path 224, conductor 220B in path 220 (FIG. 5), contacts 501a, conductor 221B in path 221 (FIG. 3) and normally closed contacts 321 to ground.

Relay 314 operates and at its contact 314a connects an AC source 315 to solenoid 316 to operate the same. Solenoid 316, upon operating, causes fingers (not shown) to protrude through the card apertures (apertures 802, 803, 804, and 805, for example, in the card shown in FIG. 8 which apertures are located on the card to represent digits 0, 2, 3, 9) thus operating contacts 331, 332, 333, 334 to be made in the indicia reader 200 between the vertical column conductors in path 212 and the corresponding horizontal digit lines 0, 2, 3, and 9 of the conductor 0-9 in the horizontal path 203.

Relay 501 as energized is also operative at contacts 501b to energize stepping switch 319 and pulse generator 318 for the scanner 218. Such energizing path extends from negative battery over stepping switch 319 (FIG. 3), pulse generator 318, conductor 221A in path 221, path 224, conductor 221A in path 221 (FIG. 5), contacts 501b, and conductor 221B in path 221, path 224, conductor 221B (FIG. 3) and normally closed contacts 321 to ground.

Pulse generator 318 as thus energized produces a square wave pulse which controls the stepping switch 319 to advance one step and each successive pulse output from pulse generator 318 thereafter effects a fur-

ther step of stepping switch 218. Digressing briefly, the stepping switch may be of the type identified in the trade as a North Electric Company or L M Ericsson Company RVF stepping switch. Such switch basically includes three banks of contacts 322, 323, 324, each of which banks has 30 contact positions, one of which is a home position. Movable contacts associated with each bank move to successive one of the banks contacts as the pulses are fed to the stepping switch 319.

When the stepping switch 319 is at rest, the movable contacts will be in the home position as shown in FIG. 3.

With the receipt of the first pulse from pulse generator 318 and advance of the movable contacts to the first bank contacts, contacts 321 open and contacts 320 close to place ground on conductor 221A. Although conductor 221A was initially grounded by closure of contacts 501b (and as previously noted contact 501b is closed only for the duration of the charging time of capacitor 313C), the ground connection to conductor 221A is now provided by closed contacts 320, such contacts maintaining the ground on conductor 221A during the entire period that the stepping switch 319 advances over the remaining bank contact positions up to and including bank contact position 29.

When stepping switch 319 completes its cycle and returns to its home position H, contact 320 is once more opened by the stepping switch 319 and ground is removed from conductor 221A to thereby interrupt the ground for the pulse generator 318. As pulse generator 318 is thus disabled, the pulse output to stepping switch 319 is terminated and the advance of the stepping switch 319 is likewise terminated.

As the movable contacts move between the successive positions of the contact banks, contacts 325 are automatically opened by stepping switch 319. When the scanner advances into contact with a contact position, contacts 325 are closed allowing ground on conductor 221A to flow through contact 325, and the contact of bank 324 which is engaged by the movable contact for such bank. By way of specific example, as the stepping switch 319 advances to position 6, the ground is applied via contacts 325 and the movable contact over position 6 to input terminal 6 of program plug 214 and over the illustrated strap to the output terminal identified by digit 6 and the first vertical conductor of path 212 to the connection completed by contacts 331 of the indicia reader 200 to the first one of the horizontal conductors 0-9 of the common path 203.

It will be apparent that as the stepping switch 319 advances the movable contacts over the positions in bank 324, ground is applied successively to program plug input terminals 6 through 29 to thereby enable in succession the vertical conductors which are connected to the output terminals of program plug 214.

It will be further apparent that the changing of the strapping between the input and output terminals of program plug 214 will correspondingly vary the order scan of the vertical conductors in paths 211, 212, 213, 213A and thereby the order in which the information is output from the indicia reader 200, clock 201, external input data device 150 and internal fixed generator 201A to the common path 203. By varying the internal

strapping program plug 214 (or by plugging in alternate plugs prestrapped in different configuration), the customer may readily adjust the pattern in which the desired data is output to the associated recording equipment. Obviously such arrangement makes the equipment extremely flexible in that it can by simple strapping adjustment be made compatible for use with many different types of existing situations.

Summarily in the present example, as the stepping switch 319 is cycled over the bank contacts, marking ground is applied in sequence over scan points 6, 7, 8, 9 to the vertical conductors in the vertical column 212 to effect application of the employee number successively to the horizontal conductors 0, 2, 3, and 9 in path 203; as stepping switch 319 advances over points 10-16, marking ground is successively applied to horizontal conductors 0, 7, 5, 8, 2, 4, 5 to indicate time of day and day of year; as the stepping switch 319 advances over scan point 17-26 marking ground is successively applied to the horizontal conductors 6, 1, 8, 7, 4, 0, 0, 2, 3, 1 to provide the external information relating to job reporting; as the stepping switch 319 advances over contacts 27, 28, horizontal conductors 0 and 4 are successively marked with ground to identify the reporting station and as the stepping switch 319 advances to contact 29, the control conductor 11 is marked to indicate the end of the message. (If desired, a control function of the associated output device such as relay 311 and in turn solenoid 311S is also effected by such signal. This may effect the printing and advance of an adding machine which prints out a hard copy, for example.)

Thus as a complete scan has been effected by stepping switch 319, 24 bits of information have been successively applied over the horizontal conductors in common path 203 to decoder 204, it being apparent that at any step of the cycle only one of the horizontal conductors 0-15 is marked by having ground applied to it by the scanner.

Decoder 204 thus has an input 1/16 over conductors 0-15 and is operative in response thereto to provide a $\frac{1}{4} \times \frac{1}{4}$ output (FIG. 4) to an oscillator 207 which is connected thereto. That is with application of a ground to any one of the horizontal lines 0-15, decoder 204 will create a signal on one of the four conductors of path 205 and one of the conductors of path 206 which identify the conductors in a $\frac{1}{4} \times \frac{1}{4}$ code.

With receipt of the two signals, the multifrequency tone oscillator 207 (FIGS. 2 and 4) which may be of the type conventionally used in telephone tone signaling, and referred to in U.S. Pat. No. 3,076,059 will in turn provide two frequencies over respective conductors in path 208 to cassette recorder 112 for recording thereon. Thus each of the 24 data signals applied to the horizontal conductors 0-10 of common path 203 are converted to tones which are within the pass band of the conventional telephone link. As a result, it is possible to transmit the information recorded on a low cost cassette over a conventional telephone connection to data processing equipment which may be located at a central station geographically remote from the reporting station. Such arrangement results in a low cost reporting station (i.e., a conventional telephone connection may be used as the connecting link rather than dedicated conductors between the reporting station and the central processing area) and an arrangement which by reason of its compatibility with the telephone

link is very reliable in transfer of the accumulated data to the central processing area without requiring expensive data modems.

The system cost is further reduced relative to other systems by reason of the fact that conversion of the tone signals to records for use with computer equipment is effected at a substantially less cost than is required to convert raw data signals provided by other known types of systems to computer compatible records. Other advantages of said arrangement will be apparent to those skilled in the art.

Cassette Recorder Operation

Since the cassette recorder 112 must be started to record the signal tone input from oscillator 207 which represents the data input by the circuits 150, 200, 201, 201A as the system is operative in response to the insertion of the indicia bearing card into slot 200A, the ground on conductor 221A operates relay 502 over a path which extends from negative battery over relay 502, conductor 221A, path 221, conductor 221A (FIG. 3), contacts 320 (which close when stepping switch 319 is enabled) to ground. Suitable arc suppression for relay 502 is provided by an RC network 512 consisting of resistor 512R and capacitor 512C.

When relay 502 operates, contacts 502A close to energize a 48-7.5V power converter 210 (FIG. 4) over the path which extends from power converter 210 over conductor 223, path 224, conductor 223 (FIG. 5) and contact 502A to ground. The power converter 210 as energized supplies 7.5V to the cassette recorder 112. The cassette recorder 112 is thus placed in the start mode as soon as the converter 210 supplies 7.5V over path 209 to the drive circuitry (not shown) and the cassette drive circuitry will advance the tape to make recordings of the signal input over path 208 to the recording mode of cassette 112 from the oscillator 207.

It is noted that the first five positions following the home position H of the scanner contact bank 324 were not wired to any of the data input terminals of the program plug 214, whereby a delay period is provided which permits the cassette drive to reach the proper recording speed prior to the input of data thereto over path 208.

As stepping switch 319 completes its scan, contacts 320 (FIG. 3) will open as described above, to remove ground from conductor 221A. Since relay 501 is restored at this time, contacts 501b will be open. Relay 502 will therefore be restored and contacts 502a will open to remove the ground from conductor 223 to thereby interrupt the path to power converter 210 and disable the drive circuit for the cassette 112.

Return of Card

Since it is desirable to minimize the time each employee uses the recording station, a circuit is provided which ejects or returns the card of the employee as soon as the scan of the employee identification indicia is completed (i.e., even while the scanner is still scanning the time and date columns 213, external data column 211, etc.).

More specifically, as the employee card is inserted, relays 501 and 314 are energized as described above, and stepping switch 319 advances to the first one of the scanning points. At such time, relay 503 is energized over a path which extends from negative battery over relay 503, conductor 221C and path 221, path 224,

path 221 (FIG. 3), conductor 221C and over the control positions (1-9) of bank 323 to ground. Suitable arc suppression is provided for relay 503 through diode 513.

It will be recalled that relay 501 was initially energized as the card was inserted to close contacts 312, which circuit was completed over relay 501 to the ground placed on conductor 221B by contacts 321. As relay 501 operated, contacts 501a extended the ground on conductor 221B over conductor 220B to relay 314. When the stepping switch 319 advances to its first scanning position (i.e., off home position H), contacts 321 open, and the start ground applied by contacts 321 over conductor 221B and conductor 220B to relay 314 as described above is removed. However, with relay 503 now energized over the path established by the first contact in scanner bank 203, ground is now placed on conductor 220B via closed contacts 503A, which ground maintains relay 314 energized. With relay 314 operated, the card is held in the indicia reader. As the stepping switch 218 moves to position 10 of bank 323, the ground is removed from conductor 221C, and relay 503 will restore to remove ground from conductor 220B, and thereby restore relay 314, which via its contacts 314A de-energizes solenoid 316 to return card to the employee.

Counting

Sensing means are provided to ascertain that all items of information are included in the information set provided to the decoder and oscillator circuits. In the event that the proper number of data signals have been provided in each message, an indication signal is generated to inform the employee that the message has been satisfactorily generated. Such sensor means basically comprise a counter 202 (FIGS. 2, 4), which includes an OR gate 401 having input connections to conductors 0-15, and a stepping switch 402 (FIG. 4) which has an associated circular contact bank 404 consisting of fixed contact 0-9 over which wiper W is advanced with each pulse applied to the stepping switch 402. With reference to FIG. 4, OR gate 401 includes 16 inputs connected respectively to each of the horizontal or number representing conductors of common path 203, whereby a signal on any one of the conductors will be extended over OR gate 401 and stepping switch 402 to negative battery. By way of example, as stepping switch 319 advances to scanner position 6, ground is provided over contacts 320, 325 and bank contact position 6, the first vertical conductor of vertical column 212, contacts 331 and horizontal conductor 0 in the common path 203 and the first input of the OR gate 401 to the stepping switch 402 and negative battery.

Stepping switch 402 which is normally reset at the zero position as described hereinafter responsively advances one step as the ground is applied over horizontal conductor 0 and OR gate 401 and as shown causes a negative battery signal to be applied to the contact designated "1" of its circular contact bank 404 (i.e., the negative battery terminal (FIG. 5) through coil 506, conductor 228, and path 224 (FIGS. 3, 4), and conductor 222A to the wiper W of stepping switch 402).

As the scanner 218 operates in a readout operation, and ground is successively connected to ones of the number representing conductors of path 203, which identify the digits which have been marked by the operated contact switches, such as 331, etc., as described

above, the applied ground signal in addition to being fed to decoder 204 is also fed over the inputs of OR gate 401 to stepping switch 402 which responsively advances its wiper W, over the contacts of bank 404 one step for each such ground pulse which appears on the conductor set 203A. As the tenth such step is made the movable wiper re-engages the first (0) contact of circular contact bank 404, and the wiper W is in position to begin a second sweep of the contacts 0-9 in bank 404.

In the present example, it was assumed that 24 bits (ground signals) are input over the conductors 0-15 of the common path 203 in each reporting operation (although scanner 218 operates 29 times in each cycle the first five steps of the 29 steps of scanner 218 having been reserved for tape start purposes there will be no bit readout over conductor 0-15 for the first five steps of scanner 218). Accordingly, if 24 bits have been input over path 203 to decoder 204, the wiper of the stepping switch 402 will have completed two sweeps over the contact bank 404 and will have advanced to the contact designated "4" of contact bank 404. Such contact as shown is connected over conductor 219 to the 29th position of the contact bank 322 of stepping switch 319 (FIG. 3). As a result, when the stepping switch 319 of scanner 218 reaches position 29 of its contact bank 322, and the required 24 bits or data signals have been fed over the common path 203, and OR gate 401 to the stepping switch 402 the wiper W of such switch will be at position 4, and a circuit will be completed for relay 506 which extends from negative battery over relay 506, conductor 222A, in path 222, path 224, path 222, conductor 222A, contact 4 of contact bank 404, conductor 219, contact 29 of contact bank 322, and the movable contact for bank 322 to ground. Suitable arc suppression is provided for relay 506 through RC network 516 consisting of resistor 516R and capacitor 516C.

When relay 506 energizes, contacts 506a are closed to provide a ground over break contacts 504a to lead 222A thereby holding relay 506 in the energized condition. In addition, relay 506 at its contacts 506b energizes green light 229 (FIGS. 2, 5) over a path extending from negative battery over green light 229, conductor 228, contacts 506b to ground. Green light 229 as illuminated indicates to the employee that the message was satisfactorily fed to the decoder 204. Summarily, when the wiper associated with bank 322 of scanner 218 reaches position 29 in each scanning operation, the wiper W of stepping switch 402 should have operated 24 times and its wiper W should be in engagement with contact 4 of bank 404. If such condition occurs, green lamp 229 will light. As will be shown, if 24 digits have not appeared on conductors 203 during the cycle, wiper W will not be in registration with contact 4, the green lamps will not light, and an alarm signal will be provided.

Relay 507 is also energized at this time over a path which extends from negative battery over RC network 518, (which consists of capacitor 518C and resistor 518R) relay 507, voltage drop resistor 517 and contacts 506b to ground. RC network 518 will allow relay 507 to remain energized only until capacitor 518C is charged.

With relay 507 momentarily energized, contacts 507a are closed and an energizing loop is completed over path 230 to terminal board 231. Terminal board 231 responsively provides a signal output over path

231A which energizes a remote lock turnstile or any other type of security device 232 which bars admission until the employee has inserted the correct card and the system has functioned properly. The circuits 507a, 230, etc. for security operation may be connected as required.

If for any reason the exact number of items were not received in a message, then the stepping switch 402 would not be at the proper position (i.e., position 4 in FIG. 5), and at the time stepping switch 319 passed through the scanning position 29 (FIG. 3), the ground on conductor 219 would not find a path to energize relay 506. As the result, red light 227 would be energized over the path which extends from negative battery over red light 227, conductor 226, and normally closed contacts 506C to ground.

Resetting

Since relay 506 is normally held energized to maintain green light 229 illuminated, it is necessary at the beginning of each message to turn off green light 229 so that an indication can be provided at the end of the scan of the fact that the scan was successful. To accomplish such operation, it will be recalled that at the start of each scan, relay 501 is energized momentarily. At its contacts 501c relay 501 is operative to energize relay 504, such circuit extending from negative battery over relay 504, contacts 501C, conductor 221B in path 221, path 224, path 221, conductor 221B (FIG. 3) and contact 321 to ground. Suitable arc suppression is provided for relay 504 through RC network 514 which consists of resistor 514R and capacitor 514C.

As relay 504 operates, contacts 504a are opened to remove the holding circuit for relay 506 which restores to open contact 506a and 506b and to close contacts 506c thus causing green light 229 to be extinguished and red light 227 to be illuminated. As noted above, at the completion of a successful scan, green light 229 is once more illuminated and red light 227 is turned off.

At the end of each scan, it is also necessary to reset stepping switch 402 of counter 202 to the zero contact of bank 404 in preparation for counting of characters output on the next scanning of path 203. Furthermore, the stepping switch 404 of counter 202 should be reset immediately upon obtaining a green light 229 as the result of a successful message.

As noted above, whenever the correct number of characters is detected in a message, an energizing circuit is completed for relay 506 which operates, and at its contacts 506a closes an energizing circuit for relay circuit 505. Such circuit extends from negative battery over relay 505 and contacts 506a to ground. As relay 505 operates, contacts 505a close to connect pulsating DC from square wave source 519 over contacts 505a, conductor 222B in path 222, path 224, path 222, conductor 222B (FIG. 4) and contacts 403 (which are closed in all positions of stepping switch 402 except zero) to the coil of stepping switch 402. Stepping switch 402 will thereupon step at the rate of the pulsating DC applied thereto by square wave source 519 until the switch 202 reaches the zero position at which time contacts 403 will open and stepping switch 402 of counter 202 will be reset.

If an incorrect message has been detected (green light 229 fails to light), it is necessary to reset counter 202 at the end of the scan in an alternative manner. As previously described, at the end of each scan, contacts

320 (FIG. 3) in scanner 218 will open and contacts 321 will close whereby ground is removed from conductor 221A to cause relay 502 to restore and close contacts 502b to connect pulsating DC from the square wave source 519 to conductor 222B in the path described above to the coil of stepping switch 402. As the result, stepping switch 402 advances as described to reset the counter 202 to zero, at which time the operation of the stepping switch 402 opens contacts 403 to terminate advance of the stepping switch.

Hard Copy Output

In some installations, it is also desirable to produce a hard copy at the same time the attendance or job transaction is being recorded. In such event, an arrangement including a relay interface having relays and associated driving solenoids respectively are connected to mechanically actuate the keys of an appropriate output device such as an adding machine or electric typewriter. Digit relays 300-309 of a group of 10 associated with leads 0-9 and control relay 311 of a group of six which could be associated with control leads 11-15 are shown for illustrative purposes.

As noted in the description relating to FIG. 2, the external print-out device 148 (FIGS. 2, 3) may be placed locally or remote from the reporting station 114, and is activated by the use of same data signals which occur on the horizontal conductors 0-15 of common path 203 which are fed to the decoder 204 for use in control of the tone generation by oscillator 207. With reference to the earlier example, as the scanner advanced to the sixth scanning position to place ground on input terminal 6 of program plug 214 to the first vertical conductor in path 212 and over contact 331 to the zero digit line of the common path 203 to decoder 204, oscillator 207 was operated to generate the appropriate tones to represent digit 0. Moreover, the same signal on horizontal digit conductor zero is fed to relay 300 in the external output device which operates, and at its contacts 300a closes an obvious energizing circuit for associated solenoid 300S. Relay 300, being a mercury wetted reed relay, will operate and remain operated for the length of time stepping switch 319 is stopped at position 6.

As solenoid 300S operates, the solenoid plunger associated therewith will operate to depress the key of the device with which it is associated (as for example, the "0" key on an associated typewriter or adding machine).

The use of a solenoid per horizontal digit line (0-9) permits the reproduction of the numerics 0-9. In addition, six additional solenoids such as 311S may be provided to selectively achieve six separate control functions which may be used for carriage return, tab, space, and the like, on a typewriter or as an advance, etc., on an adding machine. Generation of these additional control signals is effected via internal wiring in the program plug 214, as for example, by placing a strap between the 29th position of program plug 214 and the terminal marked 29 in the internal fixed data generator 201A. When the scanner advances to the 29th position, such strapping will cause digit line 11 of path 203 to receive a ground which energizes the associated relay 311 and thereby solenoid 311S. This would cause an adding machine to advance. In addition, such signal generates the appropriate tone character for recording purposes.

Alternative Embodiment

With reference to FIG. 7, there is shown thereat a modified connection for scanner 218 wherein a reporting station such as 114 is used solely as an attendance reporting station. In such an arrangement, it is no longer necessary to provide information or data relating to job, quantity, and the like, and accordingly the message will be of a correspondingly shortened length. In a typical attendance reporting format, the message may contain, for example, four characters for employee number, four characters for time, three characters for day of year, two characters for station number, and one character for end of message, whereby the total message will comprise 14 characters or bits. With the use of the first five positions on the scanner to permit the tape to advance to proper speed, conductor 219 would be attached to the nineteenth contact of contact bank 322. In such pattern there are 14 characters in the message, and the conductor 219 would remain attached to position four of contact bank 404 of stepping switch 402 (FIG. 4). Scanning positions 17, 18, 19 will be cross-connected as shown to the vertical conductors associated with digit lines 0, 4, and 11. The manner of operation of the reporting station having such connection will be obvious from the foregoing description.

While in the disclosed embodiment, a card of FIG. 8 was shown to comprise four identification apertures whereby four identifying digits are provided over the path 203 to control oscillator 207 in the generation of the tones representing the four successive digits, it will be readily apparent that a large number of scanning points may be assigned to the indicia reader 200 and cards with an increased number of apertures may be utilized to effect the provision of a correspondingly increased number of digits over the common path 203 to the decoder 204 for employee identification.

In some arrangements, for example, it may be desirable to include the social security number of the employee, and in such event, a correspondingly increased number of apertures would be placed on the card indicia member 200 of the employee.

Additional Detail

1. The indicia reader 200 may be any commercially available card reader.

Under certain conditions it might be desirable to bring particular attention to failure to light the green light if such should occur. This could be accomplished by retaining the card in the card reader against retrieval until the green light is illuminated by the X-option in FIG. 7 which would provide an alternate holding circuit for relay 314 through break contacts 506d of relay 506, and through normally closed contacts of manual operable switch 520 to ground. Normally, the card would be released at the same time the green light is illuminated. However, if relay 506 did not operate to light the green light, relay 314 would remain energized but could be released by the manual operation of pushbutton 520.

2. The decoder 204, as indicated in FIG. 4, may comprise a matrix of horizontal leads 0-15 and vertical leads H1-H4 and L1-L4 with diodes selectively connected between horizontal and vertical leads to provide a decoding or conversion from 1/16 to $\frac{1}{4} \times \frac{1}{4}$; vertical leads L1-L4 being input to oscillator 207 to enable the oscillator to produce tone fre-

quencies as follows, for example, as individual leads become grounded.

- L1 — 697 Hz
- L2 — 770 Hz
- L3 — 852 Hz
- L4 — 941 Hz;

and vertical conductors H1-H4 being input to oscillator 207 to enable the oscillator to produce tone frequencies as follows, for example, as individual leads become grounded:

- H1 — 1209 Hz
- H2 — 1336 Hz
- H3 — 1477 Hz
- H4 — 1633 Hz

For example, as shown, lead 0 is connected through one diode poled as shown to lead L4 to enable oscillator 207 to produce 941 Hz tone; and through another diode poled as shown to lead H1 to enable oscillator 207 to produce 1209 Hz tone. As shown, lead 9 is connected through one diode to lead L3; and through another diode to lead H3. Also as shown, lead 11 is connected through one diode to lead L4; and through another diode to lead H3. The remaining leads are similarly connected. A resume of such connections is as follows:

Horizontal Lead	Low Frequency Lead	High Frequency Lead	Simultaneous Tones Produced by Oscillator 207
0	L4	H1	941 Hz 1209 Hz
1	L1	H1	697 Hz 1209 Hz
2	L1	H2	697 Hz 1336 Hz
3	L1	H3	697 Hz 1477 Hz
4	L2	H1	770 Hz 1209 Hz
5	L2	H2	770 Hz 1336 Hz
6	L2	H3	770 Hz 1477 Hz
7	L3	H1	852 Hz 1209 Hz
8	L3	H2	852 Hz 1336 Hz
9	L3	H3	852 Hz 1477 Hz
10	L4	H2	941 Hz 1336 Hz
11	L4	H3	941 Hz 1477 Hz
12	L1	H4	697 Hz 1633 Hz
13	L2	H4	770 Hz 1633 Hz
14	L3	H4	852 Hz 1633 Hz
15	L4	H4	941 Hz 1633 Hz

3. The cassette recorders 112 and 104 and cassette players 118 and 123 may all be identical low cost audio machines such as Norelco Model 150. Cassette machine 115, for example, is located in reporting station 114 with its frequency input leads 208 and its power leads 209 connected as shown in FIG. 4. When used for recording, the manual attendant places a tape cassette in reporting station 114 and sets a manual control to the record position. Thereafter signals on lead 223 control power converter 210 which in turn controls the cassette recorder 112. When the cassette is filled, the attendant takes the cassette 115 from cassette machine 112 and places it in cassette machine 118 (or 123) and sets a manual control to the playback position whereby the cassette entirely is played back.

As an alternative to lighting the green light as a function of the DC signals present on the 16 digit lines 203, the lighting of the green light could be provided as a function of reading the tape immediately after recording the data thereon thereby verifying the operation of the preceding circuitry. This could be accomplished by the addition of a playhead on the tape recorder adjacent to the recorder head so as to allow the just recorded tone data to pass under the playhead. This signal would be amplified and detected and used to actuate stepping switch 402 of counter 202 through OR gate 401 in the normal manner thus lighting the green

light 229, verifying that not only has the indicia and other information been scanned, but that the data has actually been recorded on tape.

4. North Electric Company provides a number of "solenoid packs" each of which comprises a plurality of solenoids mounted or packaged in a unitary configuration which fits over the keyboard of a standard adding machine, typewriter, teleprinter, keypunch, or keytape unit so that when the solenoids are selectively energized, they depress the associated keys to produce a hard copy, paper tape, magnetic tape, or punched card as the case may be.

With reference to the external output device 148 shown in FIGS. 1 and 3 this may be, for example, North Electric Company device PEC 7453 which includes an interface containing eleven reed relays 300-309 and 311 which drive solenoids 300S-309S, and 311S which in turn drive an NCR Adding Machine, solenoid 311S when operated as a result of ground on lead 11 causing the machine to advance to the next line.

With reference to FIG. 1, the electric typewriter 138 which may be an IBM Selectric typewriter may be controlled by North Electric Company device PEC 7415 which is a solenoid pack including 12 solenoids, 10 for digits and two for controls. The teleprinter 140, which may be a Teletype Model 33 machine, may be controlled by North Electric Company device PEC-7443 which is a solenoid pack including twelve solenoids.

The keypunch machine 142 which may be an IBM Model 029, may be controlled by a North Electric Company device PEC-7417 which is a solenoid pack including eleven solenoids.

The keytape unit 144, which may be a NCR Machine, may be controlled by a North Electric Company device PEC-7416 which includes eleven solenoids.

5. Under certain conditions, it is desirable to produce sequential messages pertaining to one transaction. For example, this could be done by inserting the normal card badge containing the employee's number upon reporting for work. After completing a job, the employee could insert his employee card badge again. The system would record card badge number, time, date, etc. After the scan ends, the employee would insert a card badge coded with the job number and the system would record the job number, time, date, etc. The time worked on the job could be determined by the computer by sorting by employee number and calculating the difference between transactions having the same employee number and the time to the job number associated with the second transaction. The second insertion of the employee card badge could also be used to define the start time of the next job. In this manner, job labor distribution could be obtained simply.

6. The box 519, designated square wave source, may be a pulsating direct current source.
7. The audio recorder and playback machines could be other than cassette, such as reel to reel or cartridge type.
8. The control leads 10-15 could each be used to operate solenoids and thus selected keys on output machines. If desired, the system could provide additional control leads beyond those shown in the drawings.
9. If desired, the leads in paths 205 and 206 could be connected through the coils of interfacing relays to

battery; the contacts of which could operate the oscillator or oscillators.

What is claimed is:

1. In a system for providing employee attendance records in which each employee has a personal card including a plurality of indicia, each of which indicia represents a number in the decimal system; different cards having different indicia to provide a discrete identification for each employee; the improvement comprising at least one reporting station having a set of number representing conductors, each of which conductors is preassigned to represent a different number in the decimal system, said set of conductors being connected for use with a plurality of different data input means, one of said data input means including a plurality of sets of electrical contact members, each of which sets represents the possible digits of a different one of the card indicia, and each of which is operative to connect an associated marking conductor to a different one of said number representing conductors; reader means for operating the electrical contact members in each set which represent the digits on an employee's card as presented to the reporting station; scanner means for providing marking signals in a preprogrammed sequence to said marking conductors to thereby provide a marking signal on said number representing conductors in a given sequence to identify the card digits on said number representing conductors; converter means having an input circuit connected to each of said number representing conductors for providing different frequency output signals which represent the different digits which are marked on said number representing conductors according to a predetermined code; and output means for coupling the signal output of said converter to an associated recorder equipment.

2. A system as set forth in claim 1 in which one of said plurality of data input means comprises at least one manually adjustable switch means which is operable to different positions to represent correspondingly different numbers in the decimal system, an electrical contact member for each of said different positions of said switch means, each of which is operative with movement of said switch means to its associated position to close a marking path to the one of said number representing conductors which is represented by said switching position.

3. A system as set forth in claim 1 which includes at least one control conductor for providing signals for operating associated data processing equipment, and which includes means for establishing a path to said control conductor and means for connecting said path to said scanner means to receive a marking signal in each cycle of said scanner means.

4. A system as set forth in claim 1 in which said scanner means includes a plurality of scanning positions, and stepping means for successively providing a marking signal to each of said scanning positions, and program means for selectively connecting each of said positions to the marking conductors for the electrical contacts of a different one of said sets to thereby program the order of marking of said representing conductors which are selected by said electrical contact members.

5. A system as set forth in claim 1 in which said scanner means is operative in a system readout to provide a predetermined number of signals over said marker conductors to said number representing conductors in each cycle, and which includes counter means con-

nected to said number representing conductors to count the number of digits which are represented thereon in each cycle of said scanner means, and digit check means controlled by said scanner means and said counter means in response to a signal count other than said predetermined number in a cycle to provide an output signal indicating the receipt of an incomplete data set.

6. A system as set forth in claim 1 in which one of said plurality data input means comprises timer means having further electrical contact members and associated marking conductors positioned for scanning by said scanner means, and clock means in said timer means operable to selectively operate the ones of said further electrical contact members to connect their associated marking conductors to the ones of said number representing conductors which represent the time of day provided by said clock means.

7. A system as set forth in claim 1 which includes further data input means comprising a plurality of selection circuits, each of which is hard wired to a different one of said number representing conductors, and means for connecting said scanner means to apply marking signals to at least certain ones of said selection circuits in each cycle of said scanner means.

8. In a system as set forth in claim 1 which includes an external output device connected to said number representing conductors including means responsive to the signals on said number representing conductors to provide a hard copy print simultaneously with the recording of said frequency output signals which represent the information applied to said number representing conductors.

9. A system as set forth in claim 8 in which said means for providing a hard copy includes a solenoid pack having solenoids for operating the keys of a manual keyboard which are identified by the signals on said number representing conductors.

10. A system as set forth in claim 1 in which said reader means includes sensor means which are closed responsive to complete insertion of the card therein, means enabled by said sensor means to institute operation of said scanner means, and means for retaining said card locked in said reader means during operation of said scanner means to a predetermined position.

11. A system as set forth in claim 1 which includes security means for normally preventing access to a given area, and means responsive to the application of a predetermined number of counts to said number representing conductors to operate said security means.

12. A system as set forth in claim 1 which includes playback means for reading out the frequency signals recorded on said recorder means and tone receiver means connected to the output of said playback means, a permanent record producing means connected to said tone receiver means, and means for providing computer compatible signals responsive to the frequency signals provided by said playback means.

13. A system as set forth in claim 12 which includes data access means for coupling the output of said recorder means to a telephone line, and data access means connected to the remote end of said telephone line for connecting the multifrequency signals received over such links to an associated tone receiver.

14. A system as set forth in claim 5 in which said counter means comprises a stepping switch, and an OR

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gate having a plurality of inputs, each of which is connected to a different one of said number representing conductors, and an output circuit connected to the energizing circuit for said stepping switch; said stepping switch having a contact bank and a wiper which is driven over said contact bank by said stepping switch, and in which said total digit check means includes

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means for establishing a circuit over said wiper and a preselected one of said contacts in the stepping switch bank only when a predetermined number of signals are input over said OR gate to said stepping switch in a given cycle of said scanner means.

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