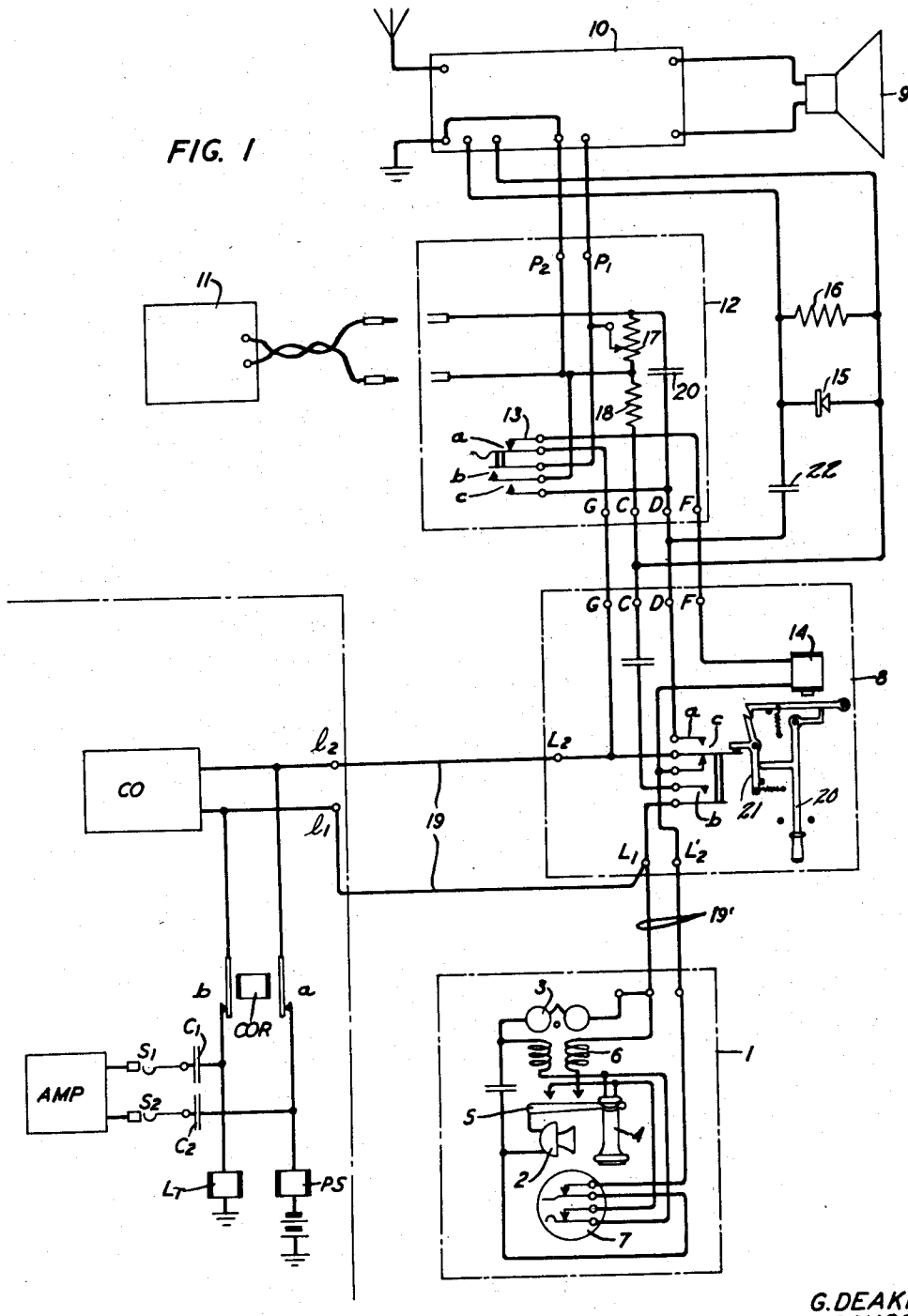
Nov. 20, 1934. G. DEAKIN ET AL 1,981,689

PROGRAM DISTRIBUTING SYSTEM

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FIG. 1



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FIG. 2

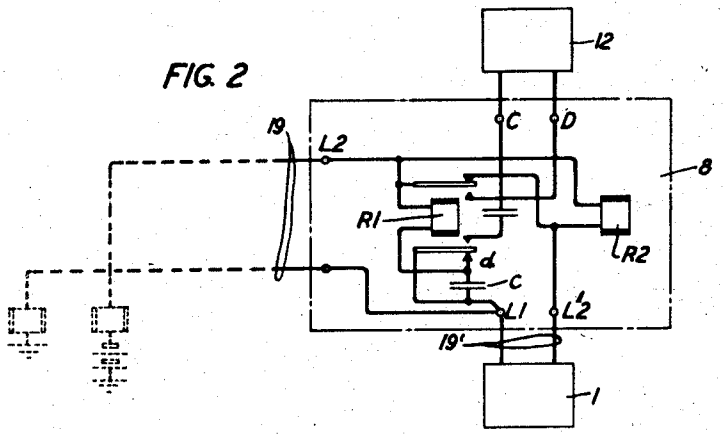
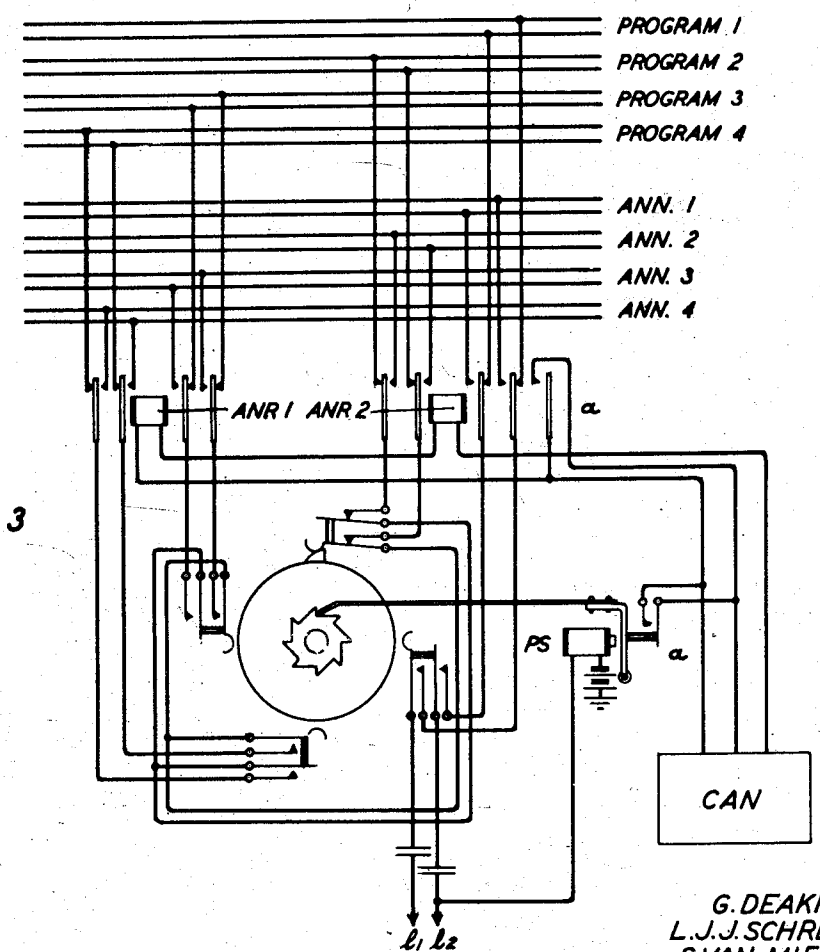


FIG. 3



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1,981,689

PROGRAM DISTRIBUTING SYSTEM

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In France October 29, 1932

11 Claims. (Cl. 179—2)

The present invention relates to improvements in "teleprogram" systems, that is to say, in systems permitting the transmission of one or several programs by means of audio-frequency currents on a network, for instance, on a telephone network, in order to give to subscribers, provided with the necessary equipment, the facility of receiving one or more of the programs transmitted.

The present invention has for an object to adapt economically an existing telephone installation for the transmission to certain subscribers of teleprograms, and to do so with a minimum of changes or additions of the equipment provided at the central exchange and at the telephone subscribers' substations.

Another object of the invention is to provide an improved teleprogram system in which the secrecy of the telephone communication is maintained.

Another object of the invention resides in the provision of means to permit the addition of a teleprogram system to an existing telephone system without affecting its working.

According to one feature of the invention, the interference which might be produced between the ringing current on the telephone line and the teleprogram receiving arrangement is reduced to an acceptable level by means of a rectifying arrangement (for instance, a copper oxide rectifier) adapted to rectify the ringing current, either partly or totally, and to produce a corresponding voltage drop in a resistance, which drop is used to bias the amplifier sufficiently negatively so that the latter opposes the reproduction of the ringing current in the loudspeaker.

According to another feature of the invention, a program selector is provided at the central exchange and actuated from the subscriber's installation in order to permit the latter to connect his line to any one of the feeders corresponding to the different programs to be transmitted, the arrangement being such that the connection of the subscriber's line with a selected feeder is preceded by the connection of the subscriber's line with a warning device indicating the nature of, or any other useful information regarding the program, to which the subscriber's line will be switched.

Other equally important features of the invention will appear more clearly from a reading of the following description based on the accompanying drawings, in which:

Fig. 1 represents the arrangement of a subscriber's station provided with teleprogram service and with a broadcast receiver as well as with a phonograph pick-up.

Fig. 2 represents a modification in the coupling box for the station of a subscriber to a teleprogram.

Fig. 3 represents schematically an automatic program announcing device.

Fig. 1 represents, by way of example, the installation to be provided at the subscriber's station for the teleprogram service. In this figure, the subscriber's station 1 is a standard station and comprises a microphone 2, a ringer 3, a receiver 4, a switchhook 5, an induction coil 6 and a calling dial 7. The telephone line 19 is associated with the subscriber's station 1 by means of a coupling box 8 comprising a suitable switching device permitting the operative association of the telephone line 19, either with the subscriber's station 1 by means of a branching line 19', or with the teleprogram receiving equipment shown in the upper part of Fig. 1. This equipment may be constituted by a device adapted to amplify the teleprogram signals in order to permit their reproduction in a loudspeaker 9.

In the case of Fig. 1, there is used, as an amplifier, a portion of a radio receiving set 10 which may also be used for operating a phonograph pick-up 11; a volume control device 12, independent or not of the amplifier, may be provided in the leads associating the coupling device 8 with the amplifier 10. Associated with the volume control device for the teleprogram signals, there is provided a push button 13 which may be actuated by the subscriber, thus permitting the sending of signals to the central exchange for choosing the desired program.

The working of the installation is as follows:

Establishment of a teleprogram connection

It is assumed that the apparatus is in normal condition and that the subscriber wishes to be connected with a certain program. For this purpose, the subscriber will first close the switch (not shown on Fig. 1) feeding the amplifier 10, then he will manually actuate the mechanically locking clutch relay 14 provided in the coupling de-

vice 8, by moving key 20 to the left. In this position the arm 21 is moved upward and permits the closure of contacts *a* and *b* and the opening of contact *c*, thus establishing the following circuit: ground at the central exchange, battery, rotary electromagnet PS of the program finder, contact *a* of the cut-off relay COR, telephone line l_2, contact *a* of 14, terminal D of the volume control device 12.

If the subscriber actuates his selecting push-button 13, a ground is placed on terminal D by the following circuit: ground from amplifier 10, terminal P_2, closed contacts *b* and *c* of push-button 13 and terminal D. This ground completes the circuit for the rotary electromagnet PS which causes the program-selection switch, placed at the central exchange, to advance one step. It will be noted that the selector, instead of advancing one step when energized, could be adapted to advance one step only when deenergized. The subscriber can thus place the switch for program-selection in the desired position by actuating his push-button 13 a suitable number of times.

When the program-selection switch PS reaches the connections corresponding to the desired program, it stops and establishes the following circuit: power amplifier AMP of the central exchange for the set program to be distributed on the subscribers' lines, wipers S_1 and S_2 of switch PS, series condensers C_1 and C_2, contacts *a* and *b* of relay COR, telephone line 19, terminals L_1 and L_2 of the coupling box 8, closed contacts *a* and *b* of clutch relay 14, terminals C and D of coupling box 8, terminals C and D of volume control device 12, resistance 18 and condenser 20, adjustable attenuator 17, terminals P_1 and P_2 and amplifier 10. The currents received from amplifier AMP of the central exchange, are amplified locally and reproduced through the loudspeaker 9. The attenuator 17 is associated with a resistance 18 in series in wire l_1 of the telephone line, in order to avoid harmful unbalance in the line. Condenser 20 is provided in order to avoid flow from the central exchange battery through attenuator 17.

If the subscriber desires to interrupt the program reception, he simply has to cut off the current feed of amplifier 10.

The teleprogram system of Fig. 1 does not affect the normal operation of telephone station 1, that is to say, the subscriber can always receive incoming calls and can himself effect calls at any moment during a program reception.

The working of the telephone installation is as follows:

Case of an incoming call

Supposing that the subscriber's program reception is operating, and that calling current is sent by the central exchange on the telephone line, after the usual working of the cut-off relay COR normally equipped at the central exchange, the clutch-relay 14 is energized under the influence of such current, and releases its arm 21, thus opening its contacts *a* and *b* and closing its contact *c*. The clutch-relay 14 is energized over the following circuit: calling current on the telephone line l_1, terminal L_1 of 8, ringer 3, terminal L'_2, winding of clutch-relay 14, terminal F of 8, terminal F of 12, contact *a* of push-button 13, terminal G of the device 12, terminal G of the coupling box 8, terminal L_2 of the said box, line l_2; lines l_1 and l_2 lead to the switch-equipment CO at the central exchange. It will be noticed that by the operation of COR the connection is cut off between the telephone line 19 and power amplifier AMP.

When the armature of clutch-relay 14 releases, the connection is then broken between the teleprogram apparatus and the telephone line, and the subscriber's station 1 is directly connected through contact *c* of relay 14 with the terminal L_2 of 8. In this manner, the secrecy of the telephone communication is maintained.

It will be noted that the mechanically locking relay 14 takes only a very short time to release its armature and to open contacts *a* and *b*, however, during this short interval of time a small part of the ringing current can reach amplifier 10 and be reproduced by the loudspeaker 9, this effect is often undesirable and, to remedy this, a part of the ringing current can be diverted into a rectifying device (for instance, into a rectifier or a combination of dry rectifiers such as copper oxide or selenium rectifiers associated with a resistance), the drop in voltage produced in such resistance being used to block one or several stages of amplifier 10. This device may include a condenser 22 in series and a rectifier 15 in parallel with a resistance 16, associated with the grid circuit of one or several stages of amplifier 10.

It will be seen therefore that the rectified ringing current will permit the blocking of stages of the amplifier in order to avoid any spurious distortion on account of ringing current in the loudspeaker 9. Spurious noise in the loudspeaker, due to ringing current, can also be eliminated by arranging that two practically even parts of calling current reach the loudspeaker 9, sensibly in phase opposition.

Outgoing call

Assuming that the installation is in the teleprogram reception position and that the subscriber wishes to make a telephone call, he lifts his receiver, thus closing contacts of switch hook 5. The subscriber's loop current will be closed over the following circuit: ground, battery, winding of the rotary electromagnet PS, contact *a* of relay COR, telephone line l_2, terminal L_2 of 8, terminal G of 8, terminal G of 12, contact *a* of button 13, terminal F of 12, terminal F of 8, winding of relay 14, terminal L'_2 of 8, contact of the dial 7, microphone 2, contact of switchhook 5, winding of coil 6, terminal L_1 of 8, telephone line l_1, contact *b* of relay COR, winding of relay L_r and ground from the central exchange. The rotating electromagnet PS does not operate in this circuit, as it is now in series with line relay L_r. The mechanically locking relay 14 is energized, opens its contacts *a* and *b*, and closes its contact *c* and short circuits its own winding by the latter contact over the following circuit: contact *c*, winding of relay 14, terminal F of 8, terminal F of 12, contact *a* of button 13, terminal G of 12, terminal G of 8, contact *c*. By the breaking of contacts *a* and *b*, the program reception device is disconnected from the telephone line 19, the subscriber can then make his call in the usual manner, either automatically by his calling dial 7, or by asking a telephone operator at the central exchange.

If, after having used his telephone set, the subscriber desires to connect again with the teleprogram circuit to which he was listening previous to his call, he simply has to operate manually the mechanically locking relay 14.

Means may be provided to automatically con-

nect either the subscriber's station or the program reception equipment with the telephone line. Such means is disclosed in Fig. 2. When the automatic coupling box is employed it is substituted for the coupling box 8 of Fig. 1, the connections to the contacts *a* of push-button 13 of volume control device 12 being omitted. Relays R_1 and R_2 of the coupling box of Fig. 2 are mechanically coupled, relay R_1 being shown in the position of rest.

When there is no telephone communication in progress relay R_1 energizes over the following circuit: battery, program switch selector PS, conductor l_2 of the telephone line, winding of relay R_1, back contact *d* of relay R_1, conductor l_1 of the telephone line to ground through the winding of line relay L_r. Condenser C bridged around the back contact *d* of relay R_1 enables relay R_1 to operate completely although contact *d* is open during the energization of relay R_1. When relay R_1 is completely energized its armatures are mechanically locked by relay R_2 and terminals L_1 and L_2 are now connected to terminals C and D and thence to terminals C and D of the volume control device 12. The subscriber at substation 1 may operate push-button 13 to select any desired teleprogram as discussed in connection with Fig. 1.

Should a call be incoming over the telephone line 19 and relay COR be operated the operating circuit of relay R_1 will be opened but relay R_1 being mechanically locked will not release. Ringing current from the central office will be applied over line conductor l_2, winding of relay R_2 through the substation ringer 3 and line conductor l_1. When the subscriber lifts his receiver, to answer the call, relay R_2 is operated by direct current coming from the central exchange, thus releasing relay R_1. The high resistance of the winding of relay R_1 is then shunted by the induction coil and the microphone of station 1, and relay R_1 will remain in the position of rest until the end of the conversation.

Should the calling subscriber at substation 1 initiate a call while relay R_1 is operated, relay R_2 will operate in a circuit from battery through the program selector magnet PS, line conductor l_2, winding of relay R_2, the substation loop, line conductor l_1 to ground through line relay L_r. Relay R_2 operates, unlocking relay R_1 which releases since its high resistance winding is now shunted by the induction coil and microphone of station 1. With relay R_1 released because the subscriber has either answered an incoming call or has initiated an outgoing call, the station 1 is connected directly to the telephone line 19 and the teleprogram apparatus is disconnected.

Fig. 3 represents the arrangement provided at the central exchange for indicating automatically to the subscriber the nature of the program to which he will be connected after he has actuated his push-button 13 a certain number of times.

The installation of Fig. 3 comprises bus bars Program 1, Program 2, Program 3, Program 4, etc., to which are applied currents corresponding to the various programs provided 1, 2, 3, 4, etc. A corresponding series of bus bars, fed by currents corresponding to the information to be given to the teleprogram subscribers is provided; these bus bars are shown in ANN_1, ANN_2, ANN_3, ANN_4, etc., on Fig. 3. The announcement of programs can be furnished by means of phonographs, telegraphones, or any other suitable device, actuated at the proper time, or continuously during the transmission of teleprograms. It should also be noted that instead of announcing the program by means of sound recording and reproducing devices, use may be made of particular tone or code signals corresponding to each one of the programs, thus permitting a simple and economical installation for announcing the programs. The working of the program announcing device, shown in Fig. 3, is as follows:—

As soon as the subscriber causes the opening and the closing of the circuit, by actuating his push-button 13, shown on Fig. 1, the rotary electromagnet of the program selector PS energizes and causes the latter to advance one step. This operation is repeated until the selector reaches the desired position, for instance, that corresponding to Program 2. As soon as PS attracts its armature, its contact *a* closes, thus causing the starting of a finder in the combined alarm and announcing circuit CAN. When this finder has reached the wanted subscriber's line, it closes the circuit for relays ANR_1 and ANR_2, which operate; the relay ANR_2 closes its contact *a*, thus maintaining the said finder on the said subscriber's line, during a lapse of time determined by the circuit CAN. Relays ANR_1 and ANR_2 effect the transfer of the subscriber's line from the program bus bars Program to the announcing bus bars ANN. The subscriber whose selector has been placed in position 2 therefore receives the announcement corresponding to the chosen Program 2. After a lapse of time determined by the circuit CAN, relays ANR_1 and ANR_2 release, and the subscriber's line is automatically retransferred from the bus bars ANN to the program bus bars Program. From this moment the subscriber receives the selected program.

It is clear that the preceding embodiments are given simply by way of example, and are not limited, as various important modifications can be realized without departing from the limits of the present invention.

What is claimed is:

1. In a system for distributing program service over telephone wires, a telephone line, an amplifier and a loud-speaking receiver for receiving program service over said line, and means to minimize the effect of ringing current applied to said line on said loudspeaker comprising a rectifier in a branch of said line, and means to apply said rectified current to said amplifier to block said amplifier.

2. In a system for distributing program service over telephone wires, a telephone line, an amplifier and a loud-speaking receiver for receiving program service over said line, and means to minimize the effect of ringing current applied to said line on said loudspeaker comprising a branch of said line circuit, a rectifier element in said branch circuit arranged to provide a negative potential, and means to apply said negative potential to said amplifier to block said amplifier.

3. In a system for distributing program service over telephone wires, a telephone line, an amplifier and a loudspeaking receiver for receiving program service over said line, and means to minimize the effect of ringing current applied to said line on said loudspeaker comprising a branch of said line circuit, a rectifier element in parallel with a resistance connected across said branch circuit arranged to provide a negative potential, and means to apply said negative po-

tential to said amplifier to block said amplifier.

4. In a system for distributing program service over telephone wires, a telephone line, a multi-stage amplifier and a loudspeaking receiver for receiving program service over said line, and means to minimize the effect of ringing current applied to said line on said loudspeaker comprising a rectifier in a branch of said line, and means to apply said rectified current to one or more stages of said amplifier to block said amplifier.

5. In a system for distributing program service over telephone wires, a telephone line, a multi-stage amplifier and a loudspeaking receiver for receiving program service over said line, and means to minimize the effect of ringing current applied to said line on said loudspeaker comprising a branch of said line circuit, a rectifier element in parallel with a resistance connected across said branch circuit arranged to provide a negative potential, and means to apply said negative potential to one or more stages of said amplifier.

6. In a system for distributing program service over telephone wires, a telephone line, an amplifier and a loudspeaking receiver for receiving program service over said line, means responsive to ringing current applied to said line to disconnect said loudspeaker from said line, and means to minimize the effect of the initial application of said ringing current to said line on said loudspeaker comprising a rectifier in a branch of said line, and means to apply said rectified current to said amplifier to block said amplifier.

7. In a program distributing system, a subscriber's line, means for selecting a particular program service, separate announcing means for each program service, and means for automatically connecting said line with the announcing means corresponding to said selected program service prior to the establishment of the program service.

8. In a program distributing system, a subscriber's line, means for selecting a particular program service, separate announcing means for each program service, and means for automatically connecting said line with the announcing means corresponding to a selected program service for a predetermined time.

9. In a program distributing system, a plurality of program carrying circuits, a plurality of announcement carrying circuits corresponding to said program circuits, means for selecting a particular program carrying circuit and means for automatically substituting the corresponding announcement carrying circuit for the selected program circuit for a predetermined interval.

10. In a program distributing system, a plurality of program carrying circuits, a plurality of announcement carrying circuits corresponding with said program circuits, a subscriber's line, means controlled over said line for selecting a particular program carrying circuit, and means for automatically connecting said line with the corresponding announcement circuit before connecting said line with said program circuit.

11. In a program distributing system, a plurality of program carrying circuits, a plurality of announcement carrying circuits corresponding with said program carrying circuits, a subscriber's line, a program selecting means, an announcement connecting means individual to each line, means to operate said program selecting means over said line, means responsive to the operation of said program selecting means to energize said announcement connecting means, said program selecting means and said announcement connecting means being jointly effective to connect said line to the announcement circuit corresponding to the selected program circuit for a predetermined interval.

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