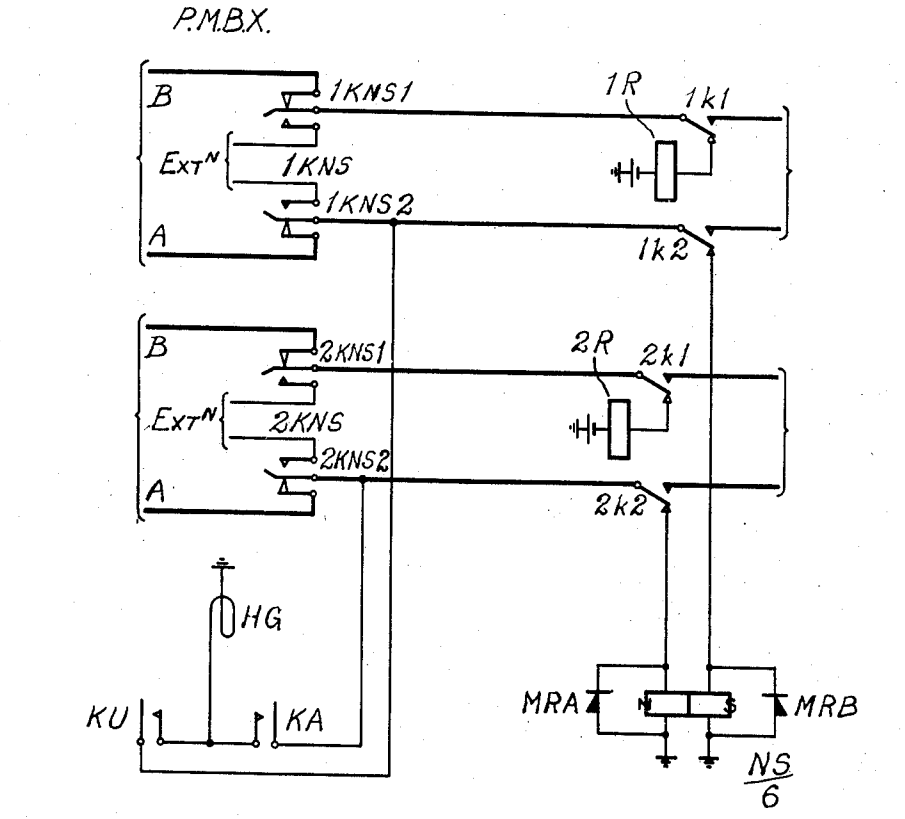
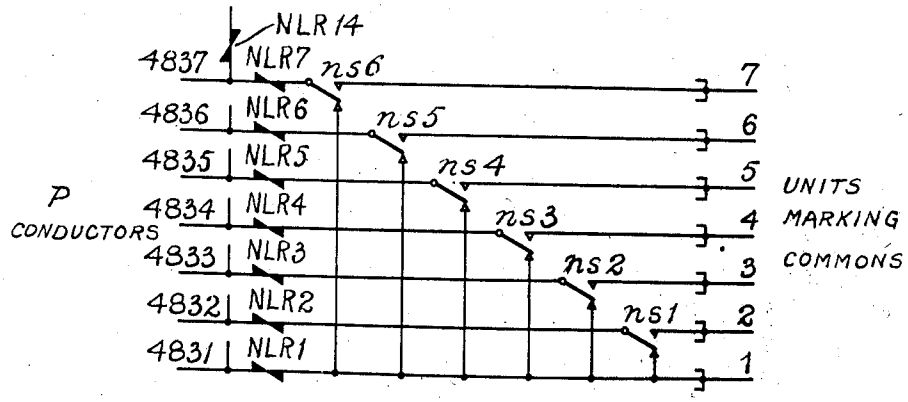
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TELEPHONE OR LIKE SYSTEM

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INVENTOR
REGINALD TAYLOR
BY
Chas. Tu. Candy
ATTORNEY

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TELEPHONE OR LIKE SYSTEM

Reginald Taylor, Liverpool, England, assignor to Associated Telephone & Telegraph Company, Chicago, Ill., a corporation of Delaware

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8 Claims. (Cl. 179—27)

The present invention concerns improvements in or relating to electrical signalling systems and is particularly concerned with arrangements for identifying lines in telephone or like systems.

The general object of the invention is to provide for the identification of lines which may have a different signification according to their condition of use. For instance the lines extending between private manual branch exchanges or private automatic branch exchanges (hereinafter termed P. M. B. X. or P. A. B. X.) and the public manual or automatic telephone system may have a different signification at night time from that which they have in the day time.

For instance a P. M. B. X. is usually allocated a block of consecutive directory numbers, the first of which when used by a party calling such an exchange indicates that searching will be performed, either manually by the operator or automatically by a final selector switch, for a free line in the wanted group, while any of the intermediate numbers when so used indicates that the specified line, of the group only will be tested. As regards outgoing calls from the P. M. B. X. during day conditions when it is staffed by an operator, all such calls must be set up via the operator's position. In the case of trunk and toll calls originating from such exchange there is a possibility that the main exchange trunk or toll operator may later wish to call back the P. M. B. X. when the connection has been set up and for this purpose the number of the first line of the P. M. B. X. group must be given to her either verbally by the P. M. B. X. operator or by means of calling line identification equipment so as to indicate to her that if she subsequently calls back she can use any idle line in the group. Under night conditions or at other times when the P. M. B. X. operator is not in attendance, the exchange lines are directly connected at the P. M. B. X. through to selected extension lines and in this case when a trunk or toll call is originated the individual line number in the group must be given to the main exchange in case it should be necessary for the trunk or toll operator to call back.

The same remarks also apply to P. A. B. X.'s except that under day conditions access to exchange lines may in some cases only be obtained via the P. A. B. X. operator as in the previous case, and in other conditions access may be had to exchange lines by certain privileged subscribers either by dialling certain pre-arranged digits or via the P. A. B. X. operator.

The use of the first line number of the group when originating calls from a P. M. B. X. or P. A. B. X. under staffed or day conditions as against the use of individual line numbers under unstaffed or night conditions presents no problems where the number is given verbally by the originating party or originating branch exchange operator to the main exchange operator, but when automatic calling line identification equipment is employed to supply the identity of the calling line to the main exchange operator then the differences obtaining at the P. M. B. X. or P. A. B. X. during such alternative conditions necessitate the provision of special arrangements at the main exchange.

According to one feature of the invention a calling line identification arrangement for use in telephone or like systems in which a given line has different significations depending upon its condition of use switching means are provided which when operated upon the condition of use changing cause the identification of the line to be changed.

According to a further feature of the invention a line identification arrangement is provided for use in telephone systems in which a number of lines extending between a main and a branch exchange have a common signification under one condition of use while certain of said lines have an individual signification under another condition of use, switching means controlled from the branch exchange being adapted to change the identification of said latter lines from the common signification to the individual signification and vice versa.

The invention will be better understood from the following description of one method of carrying it into effect, reference being had to the accompanying drawing which shows certain elements of the circuits at a P. M. B. X. board and certain elements of line equipment at the public exchange and also certain elements of the line marking equipments at the main exchange, which elements suffice for an explanation of the invention. The main exchange is assumed to be provided with calling line identification equipment of the kind described in United States application Ser. No. 380,226, filed Feb. 24, 1941, although it will be understood that the invention is equally applicable to other kinds of line identification equipment.

Brief consideration will first of all be given to the particular method of calling line identification to which the invention is shown applied, and it will be understood that this is of the type in which each line of an exchange is allotted a

code indicative thereof. In the cases where connections are set up to trunk or toll positions and the like where information as to the identity of the calling party is required, the marking signals in extending over the connections are received on suitable equipment which brings about audible announcement or visual indication of the calling number to the trunk or toll operator. All subscribers' private or test conductors, over which line marking code signals are transmitted to the receiving points, are connected together for line marking purposes. Two or more static devices of the non-linear resistance type having normally a high resistance are provided per private conductor and are interposed between each P conductor and the commoning points, a number of code marking and group switching relays being controlled from a stepping switch in order to apply alternating current signals to the different groups of non-linear resistance discs in order to break them down and pass signals indicative of the various lines over the respective private conductors.

Referring now to the drawing, it will be assumed for the purpose of the description that the P. M. B. X. has seven main exchange lines numbered respectively **4831**—**4837**, two of which are shown in some detail.

At the P. M. B. X. each of the exchange lines extends via contacts 1KNS1, 1KNS2, 2KNS1, 2KNS2 of night switching keys 1KNS, 2KNS, . . ., to the P. M. B. X board, while during night conditions when the board is not attended, certain keys are thrown to connect the exchange line directly to a selected extension telephone in the P. M. B. X. group. Each exchange line is terminated at the main exchange, which may be either of the manual or automatic type, in the usual line and cut-off relay combination, the line relays 1R and 2R of the exchange lines **4831** and **4832** being shown, while armatures *1k1* and *1k2*, *2k1* and *2k2* of the corresponding cut-off relays 1K and 2K are also shown.

For the purpose of signalling to the main exchange the different conditions obtaining at the P. M. B. X. during day and night conditions, use is made of the A leg of two or the exchange lines in the group and at the main exchange a double wound two-position magnetically-polarised relay NS is provided, one winding of which is placed in series with the earth feed to one of the two selected exchange lines, while the other winding is placed in series with the earth feed to the other selected exchange line.

During day conditions when the P. M. B. X. is attended, relay NS at the main exchange is normal as shown and all the P. M. B. X. night switching keys occupy the normal position shown. As explained in the application previously referred to, two non-linear resistance devices are connected to the P conductor of each line, for instance NLR7 and NLR14 are shown provided for line **4837**. Over NLR7 the impulses characteristic of the units and possibly the hundreds digits are transmitted, while over NLR14 the impulses characteristic of the tens and possibly the thousands digits are transmitted. With armatures *ns1* to *ns6* the P wires of the six lines **4832**—**4837** of the P. M. B. X. group at the main exchange are connected via their respective non-linear resistance devices NLR2—NLR7 to the units-marking common lead 1 so that if a call set up from the P. M. B. X. is of the type requiring calling line identification then the units digit of the number calling will be identified by the line marking equipment as "1" irrespective of which of the lines **4831**—**4837** the call was originated over, the other digits **483** of the number being identified in the precise manner described in the previously mentioned specification. Hence the calling line will be identified as **4831** irrespective of the particular line of the P. M. B. X. group which is calling.

Whenever the P. M. B. X. is unattended the various night switching keys 1KNS, 2KNS, . . . are thrown, while the non-locking "P. M. B. X. unattended" key KU is also operated momentarily and the switchboard hand generated HG is turned during this time. As a result ringing current is extended over the A leg of the upper exchange line shown to energize relay NS on its right hand winding, rectifier MRB being connected in parallel therewith to ensure that the current is in the right direction to enable the relay to respond satisfactorily to alternating current signals.

On completion of signalling the armature of this relay remains in its operated position due to the holding action of its permanent magnet.

Relay NS in operating connects the units marking commons 2—7 via its operated armatures *ns1*—*ns6* and the non-linear resistance discs NLR2—NLR7 to the P wires of the lines **4832**—**4837** in the P. M. B. X. group so that now the identification of each line is effected individually and hence when a call requiring identification is set up from the P. M. B. X. the identity of the particular line in the group which is calling will be ascertained.

When it is subsequently required to open the P. M. B. X. the night switching keys are restored and the key KA is momentarily operated during which time the hand generator HG is again turned and energises relay NS over its left hand winding. This winding due to the relation between the direction of the winding with respect to the direction of the rectifier on being energised produces a flux in opposition to the permanent magnet and relay NS thereupon restores and remains in the normal position until it is required to re-operate it.

What I claim as new and desire to secure by Letters Patent is:

1. In a telephone system, an exchange, a line outgoing from said exchange, automatic line identification equipment at said exchange, means normally connecting said line to said identification equipment in a way indicative of a particular directory number, and remotely controlled means for altering the way said line is connected to said equipment, thereby to cause said line to be connected to said equipment in ways indicative of different directory numbers at different times.

2. A telephone system as claimed in claim 1, wherein said last means is controlled over said line.

3. In a telephone system, an exchange, a line outgoing from said exchange, said line having on it a condition indicative of the directory number of said line, automatic identification equipment at said exchange operated at times to test said line and to discover from said condition thereon the directory number of said line, and remotely controlled means for altering said condition on said line, thereby to change the directory number which will be discovered by said identification equipment upon such test of said line.

4. In a telephone system, an exchange, a line outgoing from said exchange, said line having on it a condition indicative of the directory num-

ber of said line, automatic identification equipment at said exchange operated at times to test said line and to discover from said condition thereon the directory number of said line, and means at said exchange controlled over said line for altering said condition on said line, thereby to change the directory number which will be discovered by said identification equipment upon such test of said line.

5. In a telephone system, an exchange, a plurality of lines outgoing from said exchange, each of said lines having a different directory number, automatic line identification equipment at said exchange operative at times for determining the directory number of any desired one of said lines, means connecting each of said lines to said identification equipment in a way indicative of its respective directory number, and remotely controlled means for altering the way that said lines are connected to said equipment, thereby to cause said lines to be connected to said equipment in a way indicative of the same directory number for all of said lines.

6. In a telephone system, an exchange, a plurality of lines outgoing from said exchange, automatic line identification equipment at said exchange operative at times for determining the directory number of any desired one of said lines, means for transmitting a signal at will over one of said lines to said exchange, means for transmitting a signal at will over another of said lines to said exchange, a device at the exchange responsive to a signal transmitted over said one line to connect said lines to said identification equipment in a way indicative of a different directory number for each of said lines, said device responsive to a signal transmitted over said other line to connect said lines to said identification equipment in a way indicative of the same directory number for all of said lines.

7. A system as claimed in claim 6, wherein said device is a polarized relay operated in one way over said one line and operated in another way over said other line.

8. In a telephone system wherein a branch exchange is connected to the central office by a plurality of trunk lines and wherein the same central office directory number is assigned to all of said lines for one condition of their use but different central office directory numbers are assigned respectively to the different ones of said lines for another condition of their use, automatic line identification equipment at the central office operated at times to test said lines and to discover by such test the directory number of any desired one of said lines, and means at the branch exchange for variably controlling said identification equipment to cause said equipment to discover different directory numbers for a particular line at different times in accordance with the different conditions of that line's use at said times.

REGINALD TAYLOR.