

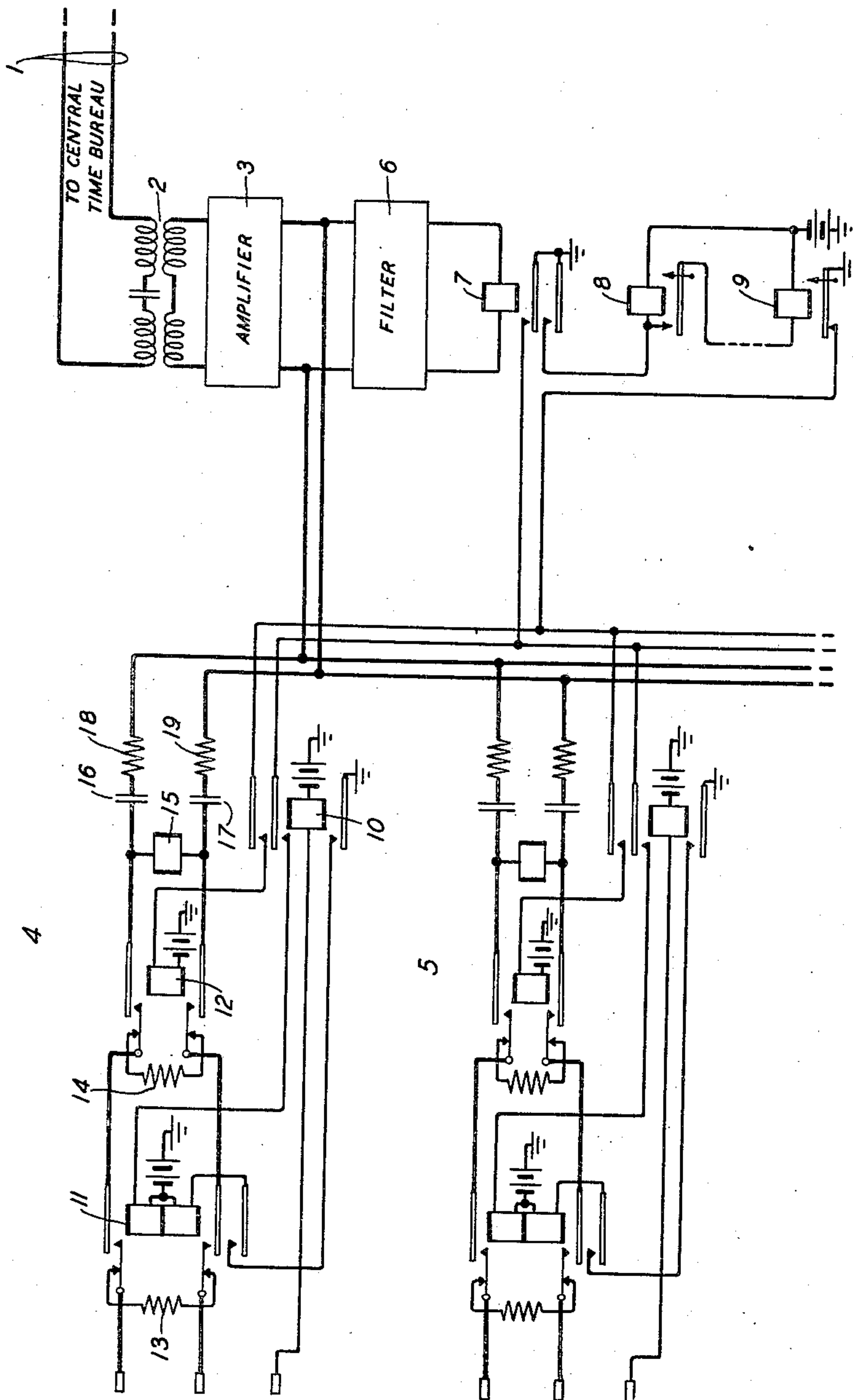
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TIME OF DAY ANNOUNCING SYSTEM

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TIME OF DAY ANNOUNCING SYSTEM

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This invention relates to telephone exchange systems and more particularly to circuits for enabling the extension of time-of-day service from time-of-day service bureaus serving local exchange areas to outlying toll areas.

Time-of-day service has heretofore been supplied in large metropolitan areas from time bureaus therein accessible from subscribers' lines terminating in offices of such areas over special trunk networks. Thus, when any subscriber in such an area desires to be informed of the correct time it is only necessary for him to call a directory number assigned to the time bureau whereupon his line will be extended manually or automatically, dependent upon the character of the switching facilities of the office in which his line terminates, either directly or through intermediate distribution centers to a trunk terminating in the time bureau. An operator at the time bureau upon receiving a signal indicating a request for the time of day will announce the correct time to the calling subscriber and to such other subscribers as may at the time have become connected to the time bureau. A system of this character is disclosed in Patent No. 1,863,139 granted June 14, 1932 to R. F. Massonneau.

Since it is not economical to provide time bureaus in small exchange areas, it is the object of the present invention to supply time service to such small exchange areas over toll trunks extending therefrom to the large exchange areas now equipped with time bureaus. Such an extension of time service over toll trunks necessitates the provision of means for transmitting the time announcements and synchronizing signals from the time bureau over the toll trunk to the toll point, the synchronizing signals being effective to insure that no connection from any calling subscriber's line shall be cut through over the toll trunk to the time bureau except during a silent interval between time announcements whereby no subscriber will receive an incomplete announcement.

In accordance with the present invention a toll trunk extending from the time bureau to the toll point is terminated at the toll point in the input side of a speech amplifier, the output side of which is branched to a plurality of local trunks. Access to the local trunk branches may be had in any desired manner dependent upon the switching facilities of the toll point, for example, over manual connection jacks or over the banks of toll incoming or final selector switches. The output of the toll trunk amplifier is also connected through a filter circuit to the winding of a tone responsive relay which may, for example, be responsive to a 1000 cycle tone current applied over the toll trunk at the time bureau during the silent intervals between time announcements.

Each local trunk is provided with a pick-up

relay and a cut-through or announcement relay operable under the control of the tone relay when the local trunk is seized. As soon as the local trunk is seized the pick-up relay of that trunk operates and locks during the silent interval preceding the next time announcement since at that time the tone relay is operated in response to the 1000 cycle silent interval tone current. The tone relay at the beginning of the silent interval also causes the operation of a train of slow-to-operate relays and with the last relay of the train operated the circuit of the cut-through relay is maintained open. At the end of the silent interval the tone relay releases in turn releasing the train of relays and thereupon the circuit of the cut-through relay is established. With both the pick-up and cut-through relays operated the local trunk is cut through to the toll trunk and the subscriber whose line has been connected to the local trunk hears the entire succeeding time announcement. At the end of the announcement the tone relay again operates in response to the silent interval tone current and after a predetermined interval the cut-through relay is released, but during the interval between the application of the silent interval tone current and the start of release of the cut-through relay, the subscriber hears a spurt of tone as an indication of the exact time previously announced.

For a more complete understanding of the invention reference may be had to the accompanying drawing.

The outgoing end of the toll trunk 1 extending from a toll point to the time bureau of a distance office is shown in the right portion of the drawing. This toll trunk would be connected through a distributing network to a time bureau such as is disclosed in the patent to Massonneau previously referred to. At the toll point the toll trunk 1 terminates in the primary winding of the repeating coil 2, the secondary winding of which is connected to the input side of an amplifier indicated by the box 3. The output side of the amplifier is branched to as many local trunks as are required to handle the time-of-day traffic, two of such local trunks 4 and 5 having been shown. The output side of the amplifier is also connected to a filter indicated by the box 6 to the winding of the tone responsive relay 7. The filter 6 may be tuned, for example, to pass only 1000 cycle tone current transmitted from the time bureau during the silent intervals between time announcements.

Each local trunk such as 4 or 5 may be accessible at the toll point from a toll operator's position, or as disclosed, from a selector switch bank and is equipped with a sleeve relay 10, a pick-up relay 11, a cut-through or announcement relay 12, normally bridged holding resistances 13 and 14, bridged retard coil 15 and serially connected condensers 16 and 17, and resistances 18, and 19.

The tone responsive relay 7 operates at the beginning of each silent interval and remains operated until the termination of such interval and is effective upon operating to establish operating circuits for the pick-up relays of all calling local trunks and to control a delay circuit comprising slow-to-operate relays 8 and 9 for controlling the operating circuits for the cut-through relays of all calling local trunks. The delay circuit has been disclosed as comprising two successively operating slow-to-operate relays 8 and 9, but it is to be understood that should a longer delay period be desired between the time of operation of tone relay 7 and the operation of relay 9, additional slow-to-operate relays could be interpolated between relays 8 and 9.

When a subscriber in the toll area, desiring to receive an announcement of the time of day, initiates a call for such service, his line is connected over a switching train of any well-known type to an idle one of the local trunks. It will be assumed that the trunk 4 is idle and that upon the seizure thereof the sleeve relay 10 of the trunk is operated. Relay 10 upon operating prepares operating circuits for the pick-up relay 11 and for the cut-through relay 12 and prepares a locking circuit for the pick-up relay 11. If the sleeve relay 10 operates during an announcement interval at which time relays 7 and 9 will not be operated, the circuit of cut-through relay 12 will be established from battery, over the upper contact of relay 10 to ground at the back contact of relay 9, but its operation will be ineffective to establish a listening connection over the local trunk 4 and the toll trunk 1 to the time bureau since with relay 7 unoperated the pick-up relay 11 cannot operate.

As soon thereafter as the announcement interval ceases, tone relay 7 will operate at the beginning of the following silent interval and with the sleeve relay 10 operated will establish an operating circuit from battery through the upper winding of cut-through relay 11, over the inner upper front contact of sleeve relay 10 to ground at the inner contact of tone relay 7 whereupon relay 11 will operate, lock through its lower winding and lower front contact to ground at the lower contact of sleeve relay 10 and at its transfer contacts remove the holding bridge through resistance 13 from across the local trunk and extend the trunk to the transfer contacts of the cut-through relay 12. Relay 11 will now remain operated until the connection with the incoming terminal of the local trunk is released. With the cut-through relay 12 operated the incoming end of the local trunk is now extended to the output side of the amplifier 3 through the condenser 16 and resistance 18 connected serially in the tip conductor and through the condenser 17 and resistance 19 connected serially in the ring conductor of the local trunk. At this time the retard coil 15 bridged across the talking conductors serves to hold the connection established at the selector switches. Since the subscriber's line has been cut through to the time bureau during a silent interval the calling subscriber hears the silent interval tone.

When tone relay 7 operated at the beginning of the silent interval it also caused the operation of the delay circuit relays 8 and 9 and at the end of a predetermined interval relay 9 operated to open the operating circuit of cut-through relay 12 which upon releasing opens at its transfer contacts the talking conductors of the local

trunk and bridges the holding resistance 14 across the trunk conductors to hold the connection to the local trunk. The spurt of silent interval tone which the subscriber hears is thus determined by the elapsed time between the operation of tone relay 7 and the operation of relay 9, but has no significance at this time.

At the end of the silent interval the tone current is removed from the toll trunk at the time bureau and tone relay 7 thereupon releases followed immediately by the release of the relays 8 and 9 of the delay circuit. Thus, at the beginning of the following time announcement interval when relay 9 releases the operating circuit of cut-through relay 12 is established whereby the connection between the calling subscriber's line and the time bureau is again established and the subscriber is enabled to hear the following complete time announcement.

At the end of the time announcement, or at the beginning of the following silent interval, tone relay 7 again operates and causes the reoperation of relay 8 and 9 of the delay circuit, but during the interval between the beginning of the silent interval and the operation of relay 9, the subscriber hears a spurt of silent interval tone since until relay 9 operates the cut-through relay 12 remains operated. The spurt of tone which the subscriber thus hears is effective at this time as a signal to the subscriber of the attainment of the exact time just previously announced. So long as the calling subscriber maintains the connection to the local trunk he will repeatedly hear time announcements followed by signaling tone at fifteen-second intervals. When, however, the calling subscriber no longer desiring to hear time announcements, restores his receiver to the switchhook, the release of the connection to the local trunk is initiated and the sleeve relay 10 is released in turn releasing the pick-up relay 11 and opening the operating circuits of the pick-up relay 11 and the cut-through relay 12.

It will, of course, be obvious that several calling subscribers may concurrently receive time-of-day announcements over the several local trunk branches of the toll trunk, cross-talk or line disturbances between the parallelly connected local trunk branches being prevented by the condensers 16 and 17 and resistances 18 and 19 connected into the talking conductors of these local trunks.

What is claimed is:

1. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, means responsive to the operation of said relay during a silent interval and further means responsive to the release of said relay at the end of said silent interval to connect said local trunk to said toll trunk whereby the succeeding time announcement is transmitted over said local trunk.

2. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau and terminating at said toll office in the input side

of an amplifier, a filter circuit connected to the output side of said amplifier and tuned to be responsive to the frequency of said silent interval tone current, a relay associated with said filter circuit responsive to said tone current, means responsive to the operation of said relay during a silent interval and further means responsive to the release of said relay at the end of said silent interval to connect said local trunk to the output side of said amplifier whereby the succeeding time announcement is transmitted over said local trunk.

3. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, a plurality of outgoing trunks local to said toll office available from calling subscribers' lines, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, means associated with each of said local trunks responsive when said trunks are in a calling condition to the operation of said relay during a silent interval and further means associated with each of said local trunks responsive when said trunks are in a calling condition to the release of said relay at the end of said silent interval to connect said calling local trunks to said toll trunk whereby the calling subscribers may receive the succeeding time announcement.

4. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, means associated with said local trunk responsive to the operation of said relay at the end of said silent interval to connect said local trunk to said toll trunk whereby the succeeding time announcement is transmitted over said local trunk, and delay means controlled by said relay for maintaining the connection between said local trunk and said toll trunk for a predetermined interval following the termination of the announcement interval whereby a short spurt of said silent interval tone current is transmitted over said local trunk.

5. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, a plurality of outgoing trunks local to said toll office available from calling subscribers' lines, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, means associated with each of said local trunks responsive when said trunks are in a calling condition to the operation of said relay at the end of a silent interval to connect said trunks to said toll trunk whereby the calling subscribers may receive the succeeding time announcement, and delay means controlled by said relay for maintaining the connection between said local trunks and said toll trunk for a predetermined interval following the termination of the announcement interval whereby a short spurt

of silent interval tone current is received by said calling subscribers.

6. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, a pick-up relay associated with said local trunk operable in response to the operation of said tone responsive relay for partially connecting said local trunk to said toll trunk, a time delay circuit responsive to the operation of said tone responsive relay, and a cut-through relay associated with said local trunk and operable by said time delay circuit at the beginning of the succeeding announcement interval for completing the connection of said local trunk with said toll trunk.

7. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, a pick-up relay associated with said local trunk operable in response to the operation of said tone responsive relay for partially connecting said local trunk to said toll trunk, a cut-through relay associated with said local trunk operable to complete a connection between said local trunk and said toll trunk, and a train of slow-to-operate relays controlled by said tone responsive relay for controlling the operation of said cut-through relay at the end of a silent interval and for maintaining said cut-through relay operated during the succeeding announcement interval and for a predetermined period following the termination of such announcement interval.

8. In a telephone system having a time announcing bureau from which time-of-day announcements and a silent interval tone current are alternately transmitted, a toll office, an outgoing trunk local to said toll office, a toll trunk extending from said toll office to the time bureau, a relay associated with said toll trunk at the toll office and responsive to said silent interval tone current, a sleeve relay for said local trunk operable upon the seizure of said trunk, a pick-up relay for said local trunk operable in response to the operation of said sleeve relay and the operation of said tone responsive relay for partially connecting said local trunk to said toll trunk, said pick-up relay upon operating being maintained operated under the control of said sleeve relay, a cut-through relay associated with said local trunk operable following the operation of said sleeve relay to complete a connection between said local trunk and said toll trunk, and a delay circuit controlled by said toll responsive relay for controlling the operation of said cut-through relay at the end of a silent interval and for maintaining said cut-through relay operated during the succeeding announcement interval and for a predetermined period following the termination of such announcement interval.

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