

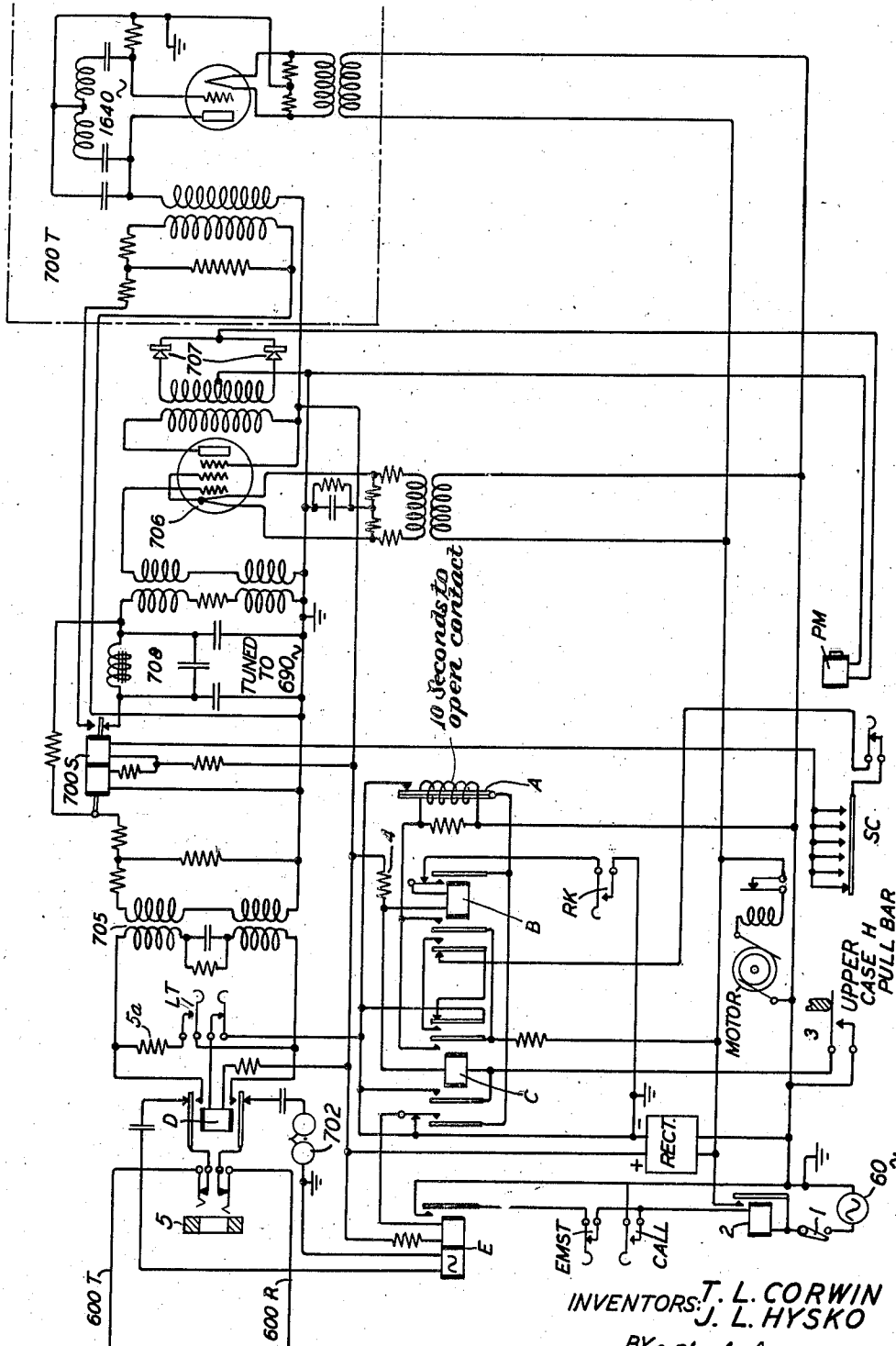
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TELETYPEWRITER STATION

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TELETYPEWRITER STATION

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This invention relates to station circuits for teletypewriter communication systems of the type whereby exchange service may be given to subscribers at outlying points from the nearest teletypewriter switching point over available telephone lines to the subscriber's station.

One object of the invention is to provide improved arrangements whereby recall and disconnect signals may be sent from such a station circuit.

Another object of the invention is to provide circuit arrangements whereby service may be given on an unattended basis, i. e., that messages may be recorded upon the subscriber's teletypewriter instrument when no person is present at the subscriber's station.

Other objects are generally to improve terminal station arrangements of teletypewriter systems.

In the patent of Hysko-Large-Munro, No. 2,093,080, granted Sept. 14, 1937, are disclosed the essential elements of a teletypewriter system for providing teletypewriter switching service to a subscriber without extending to his station a long telegraph line including expensive repeater and terminal equipment. In accordance with that system a subscriber may be connected by a carrier channel extending through his local telephone exchange and other lines of a telephone exchange network to the nearest or other suitable teletypewriter exchange switching point. At the teletypewriter switching point is a teletypewriter jack circuit extending to a circuit consisting of oscillator-modulator-demodulator equipment which may be called a teletypewriter carrier terminal circuit. The carrier channel from said teletypewriter carrier terminal circuit extends to multiple jacks at a telephone toll board through a teletypewriter control circuit and thence through any number of telephone exchange offices to the office at which the subscriber's line terminates and thence to an oscillator-modulator-demodulator circuit at the subscriber's office.

At the teletypewriter switching circuit, a jack is connected to a conductor, lead or line extending, in general, to a teletypewriter exchange system. Means are provided whereby supervisory conversations between the teletypewriter and the telephone toll operators relative to putting through a teletypewriter call proceed to the telephone toll board circuit over a voice circuit, but when the operator at the teletypewriter exchange switching point plugs a teletypewriter cord circuit into the teletypewriter trunk there-

at, the telephone toll line circuit is seized for the transmission of voice frequency waves modulated in accordance with teletypewriter signaling impulses to the outlying subscriber.

A part of the system disclosed in said patent consists of the equipment at the outlying subscriber's station, said equipment being illustrated in Fig. 7. By reference to said Fig. 7, one observes that from the outlying subscriber's station equipment there proceed the tip and ring conductors 600T and 600R of the telephone line extending to a telephone exchange and terminating thereat in the usual supervisory equipment. It will be understood, however, that the operator at said exchange has no teletypewriter instrument for communicating with the outlying subscriber, her sole function with respect to a particular line being to pass the call on by telephone supervision to other operators so that a circuit may ultimately be set up to connect the outlying subscriber to a teletypewriter operator at a teletypewriter switching point. Communication over the telephone lines of the system is solely by voice frequency carrier current modulated telegraphically. Inasmuch as the present invention deals solely with features of the outlying subscriber's station, the rest of the system will not be described, reference being made to the Hysko-Large-Munro patent above referred to for a disclosure thereof. For the purposes of the present invention it may be assumed that the line arriving at the subscriber's station has the transmission characteristics of a local telephone line, that the closure of the tip and ring at the subscriber's station operates a line signal at the subscriber's telephone exchange in accordance with telephone practice, that the operator at the subscriber's telephone exchange may apply ringing current to the ringing side of the line to signal the subscriber, that the operator at the subscriber's telephone exchange may apply ringing current to the tip side of the line to start the motor of the local teletypewriter subscriber's station and perform other functions as will be described hereinafter, that carrier current waves arriving over the line represent spacing impulses sent under the control of distant telegraphic apparatus, that absence of carrier current on the line represents marking impulses sent under control of distant telegraphic apparatus, that carrier wave impulses applied to the line by the outlying subscriber represent spacing impulses and absence of carrier waves represents marking impulses which may be received and inter-

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 5 preted by distant telegraphic apparatus and that at a distant teletypewriter operator's position there will be found apparatus to give a recall or disconnect signal which apparatus is responsive to spacing signals of approximately five or more seconds duration sent by the outlying subscriber from his station. With the understanding of these matters, the following description may be confined to the equipment at the outlying subscriber's station.

10 The essential elements of such equipment are diagrammatically illustrated in the accompanying drawing, the sole figure of which is a diagrammatic representation of the elements constituting the improved subscriber's station in their circuitual relationship to one another.

15 The principal elements of the system as specifically embodied, comprise a ringer 702 normally connected to the ring side 600R of the incoming line; a transmitting relay 700S; a receiving selective circuit 708 tuned to 690 cycles; an amplifying tube 706; detecting rectifiers 707 of any suitable type; a transmitting oscillator 700T adjusted to transmit a frequency different from the incoming frequency, for example, in the present case 1640 cycles; a suitable 60 cycle or other alternating current power source 60 AC; a power rectifier RECT; sending or transmitting contacts SC of the subscriber's teletypewriter instrument; a receiving selector magnet PM of the subscriber's teletypewriter instrument; a call key CALL; an emergency stop key EMST; a recall key RK; a thermal timing relay A; and control relays, keys and other equipment which will hereinafter be described in connection with the operation. The thermal timing relay A is a device which controls its contact several seconds after energizing current is applied to its winding. Such a device is well known in the art. This element typifies, in the general case, any slow-acting device or relay having the time delay characteristic of a thermal relay. In general, such devices are adjustable with respect to their time of delay and in the present case it is assumed that the delay time is approximately ten seconds.

Subscriber calls the central office

Let it be assumed that the equipment is in normal inoperative position and the subscriber wishes to call the teletypewriter operator to be connected through the teletypewriter switching point to some other subscriber. The local subscriber closes the switch 1 and the call key CALL. The relay 1 operates and supplies power to the rectifier RECT. The rectifier immediately energizes the relay E over an obvious circuit and the contact of relay E locks up the relay 2. The contact of relay 2 supplies heating current to the filaments of the tubes in the amplifier 706, the rectifier RECT, the oscillator 700T, and the driving motor of the teletypewriter machine. Current is supplied from the positive side of the rectifier RECT to energize the relay D which, upon operating, connects the tip 600T, 600R to the input circuit of the tuned network 708 and to the armature of the relay 700S through the repeating coil 705 and opens the circuit to the E relay and to the ringer 702. The rectifier RECT supplies current in a path extending from its negative terminal through the right back contact of relay C, left back contact of relay B, through the contacts SC of the teletypewriter to the right-hand winding of relay S and thence to the positive terminal of the rectifier.

75 In the meantime, upon operation of relay D

and closure of the line through the primary of repeating coil 705, a signal lamp has appeared before the telephone operator at the subscriber's local telephone office, and the operator has caused the line 600T, 600R to be extended through to a teletypewriter switching operator at a teletypewriter exchange switching point in the manner described in the aforementioned Hysko-Large-Munro patent, or in any other suitable manner, it being immaterial to the purposes of the present invention how or where the line 600T, 600R terminates at a teletypewriter switching point or at a point capable of sending and receiving and interpreting the kinds of currents which are to be sent and received over said line for the desired communication purposes, provided it does terminate at a point so equipped with the necessary apparatus.

The distant teletypewriter operator will now operate her sending machine which will cause transmission of interrupted or modulated carrier current of 690 cycles which will come in over the line. The interruption will cause corresponding impulses of current to be supplied by the rectifier 707 to operate the printer selector PM. The selector magnet will select for recording on the machine a message of inquiry or notice that the operator is ready to learn the wishes of the local subscriber. The machine will then be operated to control the contacts SC and inform the teletypewriter operator with which station communication is desired. The contacts SC will control the relay 700S to interrupt the carrier current of 1640 cycles frequency in accordance with teletypewriter code and send to the line groups of carrier impulses corresponding to the desired message. After the teletypewriter operator has connected the subscriber through the teletypewriter switching point with the desired distant subscriber, the local subscriber and the distant subscriber may communicate back and forth until they have exchanged and recorded whatever message or messages they desire to send or receive.

Local subscriber receives a call

Let us assume that the apparatus is in normal condition and that a distant subscriber or the operator at the teletypewriter exchange switching point wishes to communicate with the local subscriber. Upon learning over a telephone trunk that communication with the particular local subscriber is desired, the subscriber's telephone operator at his local exchange applies ringing current to the ring side 600R of the line which causes the ringer 702 to sound. Upon hearing the ringer, the subscriber performs exactly the same operations as previously outlined in case he wished to make a call starting with closing the switch 1 and the call key CALL. Thereupon, when the local subscriber types "ready" or his station number, the distant teletypewriter operator receives his message and is immediately enabled to send and cause to be recorded on the subscriber's teletypewriter machine the information concerning who is calling. Communication takes place as before.

Unattended service

Let us assume now that the local subscriber's station is completely unattended but that nevertheless he desires to receive any messages from any teletypewriter station on the communication network which might wish to send a message to him during his absence. In this case, the sub-

scriber must always leave the switch 1 closed during the time the station is unattended. When the switch 1 is closed and the distant teletypewriter operator receives no reply, she communicates this fact to the subscriber's local telephone operator who sends impulses of alternating ringing current over the tip 600T of the line to the local subscriber's unattended station. This current will pass through the alternating current winding of the relay E and cause the relay E to operate. The operation of relay E will produce the same results as would the operation of the calling key CALL in that the relay 2 will be energized and the filaments of the amplifying and oscillating tubes and the drive motor will be energized. Upon operation of the relay E and as soon thereafter as the relay 2 has operated, the relay E will be locked up over a circuit from the positive terminal of the rectifier RECT, through the right-hand winding of relay E and the left-hand make-upon-release contact of relay C, back to the negative side of the rectifier. Under this condition, incoming messages of any length may be recorded on the local subscriber's teletypewriter instrument so long as the instrument is furnished with a suitable and sufficient paper supply and other accessories commonly utilized in such cases.

Termination of a communication

When the local subscriber's station is connected with the teletypewriter exchange operator or through the teletypewriter exchange to a distant station, the communication may be terminated by any operator or party connected to the circuit by the sending of an upper case H code combination. This code combination operates a special pull bar in the teletypewriter machine marked "upper case H" to close the contact 3. This energizes the relay C over a circuit from ground, through the contact 3, through the winding of relay C, a resistance 4 and back to the positive side of the rectifier RECT. Upon operating, the left-hand armature of relay C transfers the holding winding of relay E to a circuit through the contact of the thermal relay A, back to the negative side of rectifier RECT. The inner right make contact of relay C closes the heater circuit of thermal relay A and the outer right make contact of relay C interrupts the circuit through the sending contacts SC, thus causing the sending upon the line of a break signal of a duration lasting until the thermal relay A opens its contact. This break signal on the line energizes a lamp at the teletypewriter operator's position indicating to her that the circuit is to be taken down. Usually she will challenge on the line first before taking the circuit down. The relay C remains operated and the path through the contacts SC remains open until the heater element of the thermal relay A is heated sufficiently to open its contact. The time necessary to do this may be changed by selection of a suitable relay A or adjustment of the relay selected. We assume in the present case that it is approximately ten seconds. When the contact of thermal relay A opens the locking path of relay E through the contacts of relay C it is opened, thereby causing the relay E to release, it being understood that the contact 3 has remained closed only momentarily. The relay E releases, thereby causing the relay 2 to also release. The relay D releases because it receives no further energizing current from the rectifier RECT, thereby restoring the ring and tip of the line to the ringer 702 and the alternat-

ing current winding of relay E, respectively. This gives a disconnect signal on the line 600T, 600R to the local exchange telephone operator. The filaments of the tubes are deenergized and the circuit is fully restored to normal condition.

Recall signal

Assume now again that the subscriber's station circuit is connected through for communication with a distant subscriber and the local subscriber wishes to call the teletypewriter exchange operator for any purpose. The subscriber does this by operating the recall key RK. The circuit is closed from the positive side of the rectifier RECT through resistance 4, winding of relay B, right-hand normally made contact of relay B and key RK to ground. The relay B operates and locks up on its right-hand front contact through the normally made contact of relay A to ground. The inner left front contact of relay B closes a circuit for the heating element of the relay A and the outer left armature of relay B opens the circuit through the contacts SC. This puts a break impulse upon the line which lasts until the relay A opens its contact. As described in the application of Hysko, Large and Munro, this break impulse causes the energization of a supervisory recall signal at the teletypewriter exchange operator's position and upon noting the signal she challenges upon the line to determine the subscriber's wishes. However, the recall signal does not appear until the relay A has opened its contact and caused the restoration of the relay B and reclosing of the circuit through the contacts SC so that when the operator challenges the local subscriber is immediately in a position to answer.

Among the incidental features of the system are a jack 5, by means of which any suitable apparatus may be connected to the line for testing purposes; a switch LT constituting a local test key which may be actuated in case the subscriber wishes to test his teletypewriter machine without impressing signal impulses upon the line. The operation of this key opens the operating circuit to the relay D thus allowing the ringer 702 to remain in the ring side of the line to respond to an incoming call. The key also connects resistance 5 across the repeating coil 705 to terminate the circuit. The circuit may then be operated as described under "Subscriber Calls the Central Office" and any test of the entire equipment can be made without calling the central office. When restoring the circuit to normal, the switch 1 must be opened before the key LT is restored to normal.

The normal method of stopping communication and causing the driving motor of the teletypewriter machine to cease operating is by transmitting a suitable special code combination such as that corresponding to upper case H. However, another key EMST is provided which may be used in emergencies or otherwise for shutting down the local subscriber's station and rendering all the elements thereof normal without transmitting any long break signal to the line. This is done simply by actuating the key EMST to operate the circuit in which it is located to thereby cause the relay 2 to release.

The repeating coil 705 and the impedance balancing network connected to the secondary thereof; the elements constituting the tuned circuit 708; the elements of the oscillator 700T; and other elements, such as resistances and transformers of the circuit, are of such nature

that their purposes and functions will be readily understood by those skilled in the art without further description.

What is claimed is:

1. A teletypewriter station including various instrumentalities having a non-energized non-receiving condition and an energized receiving condition, and including a relay having contact means for holding said station in one of said conditions, said relay being provided with separate direct current and alternating current windings whereby it may be energized with fluctuating current or direct current with the same effect upon its contact means, an incoming line, said alternating current winding being normally included in said incoming line, and said direct current winding being included in a path in series with a direct current source when said relay is energized.
2. A teletypewriter station comprising means for receiving or transmitting messages over a line, said means being normally inoperative, a device having a part movable to a certain position to condition said means for operation, said device being controllable by fluctuating current received over said line to move said part to said position, and an instrumentality operable under control of said part to cause said device to retain said part in said position.
3. A teletypewriter subscriber's station comprising sending contacts for sending telegraph signals, a source of oscillations connected to said contacts to be controlled thereby, and means for impressing upon or removing the oscillations from an outgoing line to produce marking, spacing and break signal impulses, said station also comprising a delayed action relay, a quick acting relay and a key, means whereby said key upon being actuated actuates said quick acting relay to impress a break signal impulse upon said outgoing line, means whereby said quick acting relay after the initiation of said break signal is placed under the influence of said delayed action relay and circuit arrangements whereby upon operating said delayed action relay terminates

said break signal and restores said quick acting relay.

4. A teletypewriter system including a relay delayed in action for several seconds, a teletypewriter machine in said system having a code selected element, a line connectable with said machine, means whereby actuation of said element applies a special condition to said line and also energizes said relay, and devices whereby said relay removes said condition from said line after its operation at the end of several seconds.

5. A teletypewriter station having an incoming line and a slow acting relay having the time delay characteristic of a thermal relay, two distinct instrumentalities operable to control the opening of said line, and energizing paths closed by either of them upon their actuation to cause said relay to delayedly close said line.

6. A station, according to claim 5, in which one of the instrumentalities is operable by suitable potentials on the incoming terminals of said line.

7. A teletypewriter system comprising a transmission line for selecting impulses, a printing telegraph instrument having a number of elements selectable by various combinations of said impulses including one special element, a circuit varying device immediately operable by the selection of said element to condition said line, and another circuit varying device operable after a period of seconds under the control of said element for removing the condition from said line.

8. A teletypewriter station including terminals for connection to an incoming line, teletypewriter mechanism, a control relay, an energizing source of current for said mechanism, said control relay being operable either by alternating currents received over said terminals or by locally produced direct currents to connect said mechanism to said source in energizing relationship, means for conducting alternating currents to said relay from said terminals, and means for applying direct currents thereto from a local source.

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