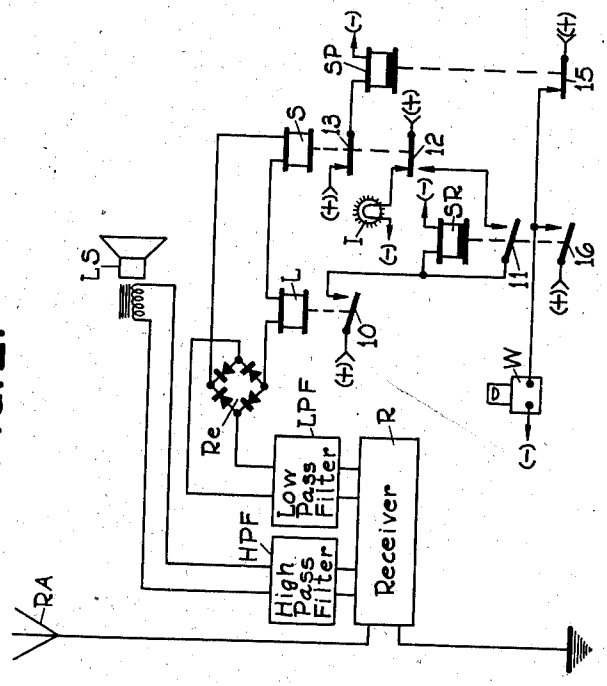
April 21, 1942. V. C. CHAPPELL ET AL 2,280,421

RADIO TELEPHONE SYSTEM

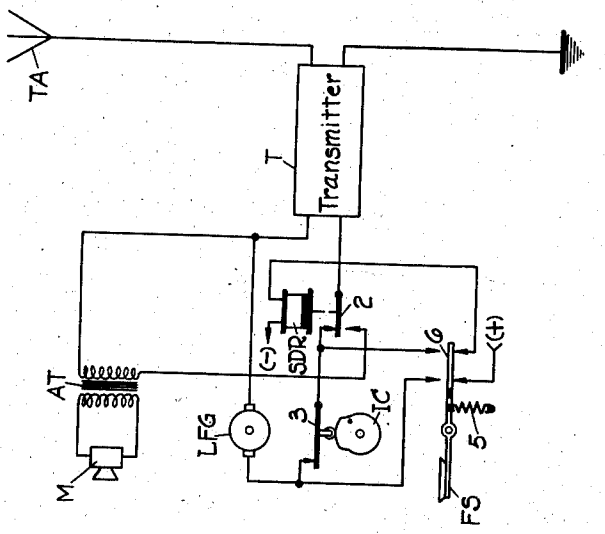
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FIG. 2.



Locomotive Apparatus

FIG. 1.



Hump Operators Apparatus

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RADIO TELEPHONE SYSTEM

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Application January 11, 1941, Serial No. 374,106

20 Claims. (Cl. 250—6)

This invention relates to radio telephone communication apparatus, and more particularly to means for continuously visually indicating to the man at the receiving end of the system that the apparatus is in working condition and to give an audible signal when this apparatus becomes disabled.

In a hump yard train classification system, such as disclosed in the prior patent to N. C. L. Brown, No. 2,045,695 granted June 30, 1936, it is customary for the hump operator, with the aid of an assistant, to uncouple the cars and to allow them to run down the hump either singly or in groups, called cuts of cars, and it is necessary for this hump operator to be able to signal to the engineer to push up his train if and when and at the speed required. This signalling is preferably carried out by a radio telephone, the transmitter of which is preferably located on the ground near the top of the hump and the receiver of which is preferably located in the locomotive cab of the pusher locomotive. It is some times necessary for the hump operator to give the engineer of the pusher locomotive instructions, such, for instance, as "push up your train at a speed of three miles per hour" which instructions are to remain effective until cancelled. If such an instruction is given to the engineer and if thereafter the hump operator tries to cancel such instruction it is important that the telephone communication system be in working order, and if not in working order, that the engineer of the pusher locomotive be informed that it is not in working order so that the engineer may consider the previous instruction cancelled or take such other action as seems proper. For instance, if the engineer has been instructed to "push up his train at a speed of three miles per hour" and he is thereafter informed that the radio communication system has failed the engineer would immediately bring the train to a stop until he receives further instruction either over the radio communicating system or by some other means. If the engineer were not to take such action serious damage might be caused by pushing additional cars over the hump at a time when it is dangerous to do so.

In accordance with the present invention it is proposed to provide a signal lamp I in the locomotive cab which is intermittently lighted over the radio telephone communication system so as to be intermittently illuminated at all times except when the hump operator is speaking into his telephone communicating apparatus, this being based on the assumption that the system is in working order. With such a construction the engineer will under all conditions, except when the apparatus is out of order, either receive a visual signal by having the signal lamp I intermittently illuminated or will receive an audible signal by receiving voice information from the loud speaker also located in the cab. This presence of either a flashing visual signal or voice current from the loud speaker will give adequate information as to the operativeness of the system if the engineer keeps his eye upon the signal lamp, because not only will the radio portion of the system but also the microphone and loud speaker portion will be checked.

In order, however, not to require the engineer to keep his eyes glued upon the visual signal it is proposed in accordance with the present invention to provide an audible signal that is sounded in the event that either the transmitter or receiver of the radio telephone communicating system gets out of order. If the engineer is informed either by a dark signal concurrent with the absence of voice current on the loud speaker or by the sounding of an audible signal that the apparatus is out of order he will bring his locomotive to a stop until either the trouble in the radio telephone communicating system has been corrected or until the engineer has received instructions in some other way to proceed with the humping of the cars of his train.

More specifically it is proposed to transmit from the hump operator's radio apparatus to the locomotive radio apparatus intermittent short impulses of tone current at all times when no verbal instructions are transmitted over the telephone communicating system and to separate the time of transmitting these short impulses and the time of such verbal communication by the transmission of a single long impulse of tone current, these short impulses followed by a long impulse as a matter of fact constituting a code. It is further proposed to provide apparatus in the locomotive cab which will give a flashing visual indication so long as short impulses of intermittent tone current are transmitted and to sound an audible signal if the above-mentioned code consisting of a series of short impulses of tone current terminated by a long impulse of tone current is not received. In order to prevent the sounding of this audible signal during the absence of the reception of short tone current impulses if followed by a long tone current impulse in the locomotive cab, a stick relay is provided which is picked up in response to a long impulse of tone current and is thereafter main-

tained in its then condition so long as no tone current of either short or long impulses is received. In other words, it is proposed in accordance with the present invention to provide apparatus for holding an audible signal inactive so long as a series of short impulses of tone current is transmitted over the telephone communicating system and to also hold such audible signal inactive during the absence of such short impulses of tone current providing that this series of short impulses of tone current is terminated by a long impulse of tone current.

Other objects, purposes and characteristic features of the present invention will appear as the description progresses and will in part be understood from the accompanying drawing in which:

Fig. 1 shows the telephone transmitting and associated apparatus; and

Fig. 2 shows the telephone receiving and associated apparatus.

Referring to Fig. 1 of the drawing the letter M designates the usual microphone which is connected to the primary winding of the audio transformer AT. This audio transformer has its secondary winding connectable through a back contact 2 of a slow dropping relay SDR to a transmitter T. This transmitter T includes the usual source of electrical energy, radio frequency current generating apparatus and a mixer through the medium of which said radio frequency current may be modulated as by current generated in a microphone or by audio tone current of such character as is more specifically pointed out hereinafter. The radio transmitting apparatus also includes a low frequency generator LFG which preferably generates an alternating tone current of substantial sine wave and of a frequency of say 100 cycles per second, includes a transmitting antenna TA, an interrupter contact 3, which is intermittently closed by the interrupter cam IC, and a manually operable contactor conventionally shown as a foot switch FS. Although this generator LFG has been conventionally shown as a generator of the rotary type it may be a generator of the electronic oscillatory type.

This sending apparatus or "hump operator's apparatus" has its various elements so interconnected that with the foot switch FS in its normal biased position, to which it is normally held by the tension spring 5, closes an energizing circuit for the slow dropping relay SDR which extends from the terminal (+) of a suitable source of current through back contact 6 of the foot switch FS, the winding of the relay SDR to the other terminal (—) of this source of current. With the relay SDR in its normal energized position a circuit is intermittently closed by the interrupter contact 3, which circuit supplies low frequency tone current generated by the generator LFG to the transmitter T and includes the tone current generator LFG, the interrupter contact 3 and the front contact 2 of the slow dropping relay SDR in series. The interrupter contact 3 is intermittently closed by the interrupter cam IC as already pointed out. This interrupter cam is so shaped and is operated at such a speed, as by a suitable constant speed motor, to close the contact 3 for intervals of say one-half second spaced by time intervals of say one and one-half seconds. It is thus seen that the radio frequency current generated in the transmitter T is normally modulated intermittently by low frequency tone current for one-half second intervals occurring once for every two second interval. It is also readily seen that if the hump operator wishes to transmit voice current he may operate his foot switch FS and in so doing will deenergize the slow dropping relay SDR and will by the closing of the front contact 6 of the foot switch FS short circuit the interrupter contact 3, so that a long impulse of tone current is supplied to the transmitter T during the period between the instant of deenergization of the slow dropping relay SDR and the time it actually assumes its deenergized position, and that the microphone M is connected to the transmitter T through the medium of the audio transformer AT as soon as the slow dropping relay SDR fully assumes its deenergized position.

Referring now to Fig. 2 of the drawing the receiving apparatus or "locomotive apparatus" includes a receiving antenna RA, a receiver R, a high pass filter HPF, a low pass filter LPF, a loud speaker LS, a rectifier Re, a long pulse relay L, a short pulse relay S, a stick relay SR, a short pulse repeater relay SP, an indicating lamp I and an audible signal or valve controlled whistle W. The receiver R includes the usual amplifier and audio detector for amplifying and detecting or rectifying the audio component of the radio frequency current received by this receiver. It will be seen that the loud speaker LS is connected to the receiver R through a high pass filter HPS. This use of this filter HPS is resorted to in order to allow the voice current to freely pass to the loud speaker LS but to restrict the flow of tone current of preselected frequency which is generated by the low frequency tone generator LFG. The low pass filter LPF is provided and tuned to allow the free flow of tone current of the frequency as generated by the generator LFG, which tone current is then rectified by the full-wave rectifier Re which rectified current is in turn supplied to the relays L and S. These relays L and S may either be connected in series as illustrated or may be connected in multiple, as desired. The long impulse relay L is of such design and construction that it will not pick up in response to a series of short impulses such as are transmitted by the interrupter contact 3, but will pick up in response to a long impulse of tone current of a duration commensurate with the time required for the slow dropping relay SDR to drop away after deenergization thereof. The short impulse relay S, on the other hand, is of a construction to render it sufficiently quick acting to follow the short impulses of tone current applied by the interrupter contact 3. By "following the short impulses" is meant that the relay S picks up for each short impulse and drops away between all impulses.

As clearly shown in Fig. 2 the stick relay SR has a pick-up circuit including a front contact 10 of the long impulse relay L and is provided with a stick circuit including its own stick contact 11 and a back contact 12 of the short impulse relay S. In order to provide means which continuously reflects the intermittent reception of short impulses of tone current a short impulse repeater relay SP, energized through a circuit including the front contact 13 of the short impulse relay S, is provided. This short impulse repeater relay SP picks up in response to the first short impulse of tone current received and remains continuously energized so long as a series of either short or long impulses is received providing that these impulses are not separated by a time period much in excess of the usual one

and one-half second interval between impulses. This short impulse repeater relay SP is provided with a front contact 15 included in an energizing circuit for the normally energized normally inactive valve controlled whistle W, this whistle W being constructed to sound when deenergized. This whistle valve W is provided with a second energizing circuit having included in it a front contact 16 of the stick relay SR. It is thus seen that the whistle will remain silent so long as either the short impulse repeater relay SP or the stick relay SR are energized. Instead of employing a neutral relay having a pick-up and stick circuit a polar mag-stick relay may be employed. Such mag-stick relay would remain in its last operated position and would be operated to one position and remain there upon picking up of relay L and would be operated to the other position and remain there upon picking up of relay S.

Operation

Let us assume that the hump operator located at the sending station shown in Fig. 1 wishes to inform the locomotive engineer, located in the locomotive cab in which the apparatus illustrated in Fig. 2 is located, that he desires the locomotive to proceed toward the hump at say a speed of three miles per hour until further notice. In this connection it should be remembered that under normal conditions the radio communicating apparatus transmits a continuous series of short impulses of tone current generated by the low frequency generator LFG. These short impulses are created by the interrupter contact 3. It should also be remembered that this series of short impulses is received at the locomotive apparatus in the cab (see Fig. 2) and will result in intermittent picking up of the short impulse relay S. This intermittent picking up of the short impulse relay S causes flashing of the indicating lamp I and causes the short impulse relay SP to remain in its energized position continuously, which results in the continuous closure of its front contact 15 and the continuous energization and silencing of the audible whistle W.

In order to transmit the desired information from the hump operator's apparatus to the locomotive apparatus the hump operator will now depress his foot switch FS thereby causing deenergization of the slow dropping relay SDR and the shunting of the interrupter contact 3. It will be seen that from the time that the slow dropping relay SDR has its energizing circuit broken until the time it actually assumes its deenergized position tone current can continuously flow from the tone generator LFG to the transmitter T, resulting in the transmission of a long tone impulse. The transmission of this long impulse of tone current results in the picking up of the long impulse relay L shown in Fig. 2 of the drawing, which in turn results in the closure of the pick-up circuit for the stick relay SR. With the stick relay SR once energized, it being slow dropping as conventionally indicated, it will not begin to drop until the back contact 12 of the short impulsing relay S has been closed, so that this stick relay SR will remain stuck up through its stick so long as tone current is not again transmitted. This functioning of the apparatus will of course extinguish the indicating lamp I but will not sound the whistle W. Since the slow dropping relay SDR at the hump operator's apparatus (see Fig. 1) has now assumed the deenergized position the hump operator may speak in the microphone M and his speech will be reproduced in the loud speaker LS (see Fig. 2). As soon as the hump operator has completed his oral instruction to the locomotive engineer he will withdraw his foot from the foot switch FS thereby reestablishing the normal condition of the apparatus at both the sending and at the receiving station. At the receiving apparatus this results in the intermittent picking up of the short impulse relay S and the stick relay SR is quicker dropping than is relay SP the relay SR will drop by reason of intermittent opening of back contact 12 of relay S whereas relay SP will pick up and remain up continuously.

Should now any trouble develop in either the low frequency generator LFG, the slow dropping relay SDR, or in the transmitter T of the sending apparatus, or should trouble develop in the receiver R the low pass filter LPF, the rectifier Re, or the short impulse relay S, this failure of any of these devices will be manifested by the extinguishment of the lamp I and the sounding of the whistle W. This is true because such a development of trouble in any one of these devices will result in the termination of the short impulses of tone current without the insertion of a terminating long impulse of tone current. The engineer in the locomotive cab would thus be informed that the apparatus is out of order and that any standing order that he may have as to how he is to move his train should immediately be considered cancelled. The apparatus just mentioned, however, does not include either the microphone M, the audio transformer AT, or the loud speaker LS, but these units of the apparatus are also checked because if the engineer finds the indicating lamp I at any time extinguished without experiencing the sounding of the audible signal W and without receiving any speech over the loud speaker he will know that etiher the microphone, the audio transformer AT or the loud speaker LS is out of order. In other words, the checking apparatus illustrated and described checks every element of the entire communicating apparatus.

Instead of intermittently lighting the indicating lamp I through a circuit including a front contact of relay S the lamp I may be energized through a front contact of relay SP, in which case the lamp will not be flashed but will be continuously energized and lighted during the reception of a series of short tone current impulses. There are two advantages in flashing the lamp. First, a flashing indication is more arrestive. Secondly, if radio communication in a direction from the locomotive to the hump on the same carrier radio frequency is to be provided the flashing lamp informs the engineer as to the time periods when no tone current, and its carrier current, is being transmitted, this in order to enable suitable apparatus (not shown) to establish radio communication in the opposite direction. It should be understood that if two-way radio telephone communication is employed the interrupter including cam IC will not only interrupt the tone current but will also interrupt the carrier current of radio frequency. The rear purpose of the short impulses of tone current is to provide or characterize a code which is distinctive from the long impulse which long impulse characterizes the beginning of a radio telephone communication from the hump toward the locomotive. The main purpose of the high pass filter HPF is to keep the tone currents am-

plified in the receiver R out of the loud speaker LS, but it also serves the purpose of allowing more tone current to flow to the relays L and S. The low pass filter LPF, on the other hand, is employed to prevent the relay L or S being picked up by voice current and it incidentally also causes more of the voice current to flow to the loud speaker LS. The whistle valve and associated whistle W is of the normally energized type, that is, is constructed to sound upon failure of its own energizing circuit, and may be of a construction as shown and described in the patent to P. W. Smith, No. 2,201,116, dated May 14, 1940.

Having thus shown and described only one rather specific embodiment of the present invention it should be understood that the specific embodiment illustrated has been illustrated for the purpose of disclosing the nature of the invention and its principles of operation, rather than to illustrate the specific construction preferably employed in practicing the invention, and it should be further understood that various changes, modifications, and additions may be made to adapt the invention to the particular problem encountered in practicing the invention and without departing from the invention except as demanded by the scope of the following claims.

What is claimed as new is:

1. In a radio telephone, the combination with a transmitting station including a tone generator for generating a tone current, a microphone for generating voice currents and a double throw switch for transmitting either the voice current or tone current; and a receiving station including a receiver, an audible signal, a loud speaker, and a filter for passing only said tone current; relay means controlled by said receiver to silence said audible signal when tone current is received and for allowing the sounding of said audible signal when tone current is interrupted due to a fault; and a filter for allowing said voice currents but not said tone currents to flow to said loud speaker.

2. In a radio telephone, the combination with a transmitting station including a transmitter, a tone generator for generating tone current, a microphone for generating voice currents and a double throw contact for transmitting either the voice current or tone current terminated in a particular manner to said transmitter; and a receiving station including a receiver, an audible signal, a loud speaker and a filter for passing only said tone current; and relay means at said receiving station controlled by current passing through said filter to energize said audible signal to hold it inactive when tone current is received and to also hold it inactive after flow of said tone current is terminated if it is terminated in said particular manner, and a second filter connected in the circuit of said loud speaker allowing the flow of voice current but not allowing the flow of tone current.

3. A radio telephone system comprising, a transmitter for generating alternating current of radio frequency modulated in accordance with currents of audio sounds applied thereto, a receiver for amplifying received radio frequency currents and detecting the modulations thereof, a microphone, a tone generator, and means including a switch for at times connecting said microphone and at other times intermittently connecting said tone generator to said transmitter; an audible signal, a visual signal and a loud speaker associated with said receiver; and a relay means also associated with said receiver responsive to the reception of intermittent tone current for flashing said visual signal and holding said audible signal inactive, and means for preventing said loud speaker being sounded by said tone current.

4. A radio telephone system comprising, a transmitter for generating alternating current of radio frequency modulated in accordance with audio sounds applied thereto, a receiver for amplifying received radio frequency currents and detecting the modulations thereof, a microphone, an intermittent tone generator and a switch for connecting either said microphone or said intermittent tone generator to said transmitter; a filter, a signal lamp, an audible signal and a loud speaker associated with said receiver; a relay means controlled through said filter and responsive to the reception of intermittent tone current for intermittently connecting said signal lamp to a source of current and to hold said audible signal continuously inactive; and a second filter connected between said loud speaker and said receiver to allow only voice currents originating at said microphone to flow to said loud speaker.

5. In a radio telephone system of the usual construction including transmitting apparatus comprising a transmitter which generates current of radio frequency, a microphone for applying voice current to said transmitter to modulate said radio frequency current; receiving apparatus including a loud speaker and a receiver for amplifying and detecting the received modulated radio frequency current and for applying the audio component thereof to said loud speaker; and checking means adjacent said receiving apparatus for indicating whether said telephone system is in working order comprising an intermittent tone generator at the transmitting end of said system and a manually operated switch for connecting said tone generator or said microphone to said transmitting apparatus, an indicating lamp and an audible signal at the receiving end of said system, and a relay means associated with said receiving apparatus for intermittently lighting said lamp so long as said tone generator is transmitting a tone current and such tone current is manifested by said receiving apparatus and for sounding said audible signal when said manually operated switch connects said tone generator to said transmitting apparatus but no tone current is received at said receiving apparatus.

6. In combination, transmitting apparatus comprising a transmitter for generating alternating current of radio frequency and having a mixer associated therewith for modulating said radio frequency current in accordance with audio current, a tone generator, a microphone, means for breaking up the tone current generated into short pulses, and means for applying the audio current generated by said microphone or the tone current generated by said tone generator and broken into short pulses or a long pulse to said transmitter, and a transmitting antenna fed by the out-put leads of said transmitter; and receiving apparatus comprising, a receiving antenna, a receiver for amplifying the current received by said receiving antenna and detecting the audio component thereof, a receiving filter for passing only current of the frequency generated by said tone generator, an audible signal, a loud speaker for receiving audio current generated by said microphone, and a relay means connected to the out-put leads of said receiving

filter for sounding said audible signal upon termination of the reception of short pulses of said tone current unless such termination of short pulses of tone current was followed by a long pulse of tone current.

7. In a radio telephone communicating system; the combination with a transmitting antenna, a radio frequency generator for applying radio frequency current to said antenna, a microphone for modulating said radio frequency current located at one station; a receiving antenna, a radio frequency current receiver including an audio detector connected to said receiving antenna, and a loud speaker connected to said detector located at another station; a manually operable switch at said one station, a microphone and a special frequency current generator at said one station; means for modulating said radio frequency current by said special frequency current when said manually operable switch is in its normal position but discontinuing the modulation of said radio frequency current by said special frequency current and connecting said microphone to said transmitter when in its abnormal position; an audible signal located at said another station which is held inactive when energized; and means at said another station rendered effective in response to the reception of current of said special frequency for energizing said audible signal to render it inactive; whereby said audible signal will be sounded upon failure of either said transmitter or said receiver when said microphone is not connected to said transmitter.

8. In a radio telephone communicating system; the combination with a transmitting antenna, a radio transmitter including a radio frequency current generator, and a microphone for modulating said radio frequency current; a receiving antenna, a loud speaker and a receiver for receiving an amplifying said radio frequency current and detecting the audio modulation thereof and applying them to said loud speaker; and means for detecting failure of either said transmitter or said receiver comprising, a tone generator adjacent said transmitter, manually operable means for continuously connecting said microphone or intermittently connecting said tone generator to said transmitter which upon a shift from the intermittent connecting of said tone generator to the continuous connecting of said microphone causes a long intermediate connection of said tone generator to said transmitter, an audible signal adjacent said receiver, and means for holding said audible signal inactive during the reception of intermittent short tone current pulses and during the absence of short tone current pulses providing said intermittent short tone current pulses were terminated by a long tone current pulse.

9. In a radio telephone communicating system; the combination with a transmitting antenna, a radio transmitter including a radio frequency current generator, and a microphone for modulating said radio frequency current; a receiving antenna, a loud speaker and a receiver for receiving and amplifying said radio frequency current, and detecting the audio modulation thereof and applying them to said loud speaker; and means for detecting failure of either said transmitter or said receiver comprising, a tone generator adjacent said transmitter, a slow dropping relay, a contactor for intermittently connecting said tone generator to said transmitter through a front contact of said slow dropping relay to create short tone current pulses, a circuit for connecting said microphone to said transmitter including a back contact of said slow dropping relay, and manually controllable means for normally closing an energizing circuit for said slow dropping relay and when in its actuated condition shunting said contactor to create a long tone current impulse during the drop-away period of said slow dropping relay, an audible signal adjacent said receiver, and means for holding said audible signal inactive during the reception of intermittent short tone current pulses and during the absence of such short tone current pulses provided said intermittent short tone current pulses were terminated by a long tone current impulse.

10. In a radio telephone communicating system; the combination with a transmitting antenna, a radio transmitter including a radio frequency current generator, and a microphone for modulating said radio frequency current; a receiving antenna, a loud speaker and a receiver for receiving and amplifying said radio frequency current, and detecting the audio modulation thereof and applying them to said loud speaker; and means for detecting failure of either said transmitter or said receiver comprising, a tone generator adjacent said transmitter, a slow dropping relay, a contactor for intermittently connecting said tone generator to said transmitter through a front contact of said slow dropping relay to create short tone current pulses, a circuit for connecting said microphone to said transmitter including a back contact of said slow dropping relay, and manually controllable means for normally closing an energizing circuit for said slow dropping relay and when in its actuated condition shunting said contactor to create a long tone current impulse during the drop-away period of said slow dropping relay, a first relay responsive only to a long pulse of tone current, a second relay responsive to both long and short tone current pulses, a stick relay having a pick-up circuit including a front contact of said first relay and a stick circuit including a back contact of said second relay, and an audible signal controlled by said stick relay.

11. In a radio telephone communicating system; the combination with a transmitting antenna, a radio transmitter including a radio frequency current generator, and a microphone for modulating said radio frequency current; a receiving antenna, a loud speaker and a receiver for receiving and amplifying said radio frequency current, and detecting the audio modulation thereof and applying them to said loud speaker; and means for detecting failure of either said transmitter or said receiver comprising, a tone generator adjacent said transmitter, a slow dropping relay, a contactor for intermittently connecting said tone generator to said transmitter through a front contact of said slow dropping relay to create short tone current pulses, a circuit for connecting said microphone to said transmitter including a back contact of said slow dropping relay, and manually controllable means for normally closing an energizing circuit for said slow dropping relay and when in its actuated condition shunting said contactor to create a long tone current impulse during the drop-away period of said slow dropping relay, a first relay responsive only to a long pulse of tone current, a second relay responsive to both long and short tone current pulses, a stick relay having a pick-up circuit including a front contact of said first relay and a

stick circuit including a back contact of said second relay, and an audible signal having two energizing circuits for maintaining it inactive one including a front contact of said second relay and the other including a front contact of said stick relay.

12. In a radio telephone communicating system; the combination with a transmitting antenna, a radio transmitter including a radio frequency current generator, and a microphone for modulating said radio frequency current; a receiving antenna, a loud speaker and a receiver for receiving and amplifying said radio frequency current, and detecting the audio modulation thereof and applying them to said loud speaker; and means for detecting failure of either said transmitter or said receiver comprising, a tone generator adjacent said transmitter, a slow dropping relay, a contactor for intermittently connecting said tone generator to said transmitter through a front contact of said slow dropping relay to create short tone current pulses, a circuit for connecting said microphone to said transmitter including a back contact of said slow dropping relay, and manually controllable means for normally closing an energizing circuit for said slow dropping relay and when in its actuated condition shunting said contactor to create a long tone current impulse during the drop-away period of said slow dropping relay, a first relay responsive only to a long pulse of tone current, a second relay responsive to both long and short tone current pulses, a stick relay having a pick-up circuit including a front contact of said first relay and a stick circuit including a back contact of said second relay, a slow acting relay energized through a circuit including a contact of said second relay, a visual signal controlled by said second relay, and an audible signal controlled by said stick relay and said slow acting relay.

13. A radio telephone system comprising; sending apparatus including a microphone and a transmitter for generating radio frequency current and for modulating said current in accordance with voice current generated in said microphone; receiving apparatus including a loud speaker, a receiver for receiving said radio frequency current and detecting the modulations thereof by producing a direct current correspondingly modulated, and a high pass filter for allowing the modulated direct current if of voice frequency to flow to said loud speaker; and checking means for checking the operativeness of said sending apparatus and receiving apparatus including a tone current generator adjacent said sending apparatus for applying short tone current pulses to said transmitter when said microphone is disconnected from said transmitter and applying a long tone current pulse just before said microphone is reconnected to said transmitter, an audible signal adjacent said receiving apparatus and tone current responsive means for sounding said audible signal upon termination of the reception of short tone current pulses unless such short tone current pulses have been terminated by a long tone current pulse.

14. A radio telephone system comprising; sending apparatus including a microphone and a transmitter for generating radio frequency current and for modulating said current in accordance with voice current generated in said microphone; receiving apparatus including a loud speaker, a receiver for receiving said radio frequency current and detecting the modulations thereof by producing a direct current correspondingly modulated, and a high pass filter for allowing the modulated direct current if of voice frequency to flow to said loud speaker; and checking means for checking the operativeness of said sending apparatus and receiving apparatus comprising, a tone current generator at the sending end of said system, a slow dropping relay, an interrupter contact included in series with a front contact of said slow dropping relay to intermittently supply short tone current pulses to said transmitter, and a manually controlled contact which in its normal position supplies energizing current to said relay and which in its abnormal position shunts said interrupter contact, whereby operation of said manually controlled contact causes a long pulse of tone current to be supplied to said transmitter during the drop-away period of said slow dropping relay, a first relay responsive to short pulses of tone current at the receiving end of said system, a second relay responsive only to a long pulse of tone current, a third relay which is actuated to one position in response to the picking up of said second relay and is actuated to its other position in response to picking up of said first relay, an audible signal, and a control circuit for said audible signal controlled by said third relay.

15. Checking apparatus for checking the operativeness of a radio telephone communicating system including a microphone, a loud speaker and radio communicating means for creating in said loud speaker voice currents conforming to voice currents generated in said microphone comprising; a tone current generator at the microphone end of said system, means for substituting short tone current pulses intermittently followed by a long tone pulse for voice current during the time said microphone is not in use, a visual signal and an audible signal at the loud speaker end of said system, and means for intermittently flashing said visual signal in response to the reception of tone current pulses and for sounding said audible signal upon termination of said tone current pulses unless said tone current pulses were terminated by a long pulse of tone current.

16. Checking apparatus for checking the operativeness of a radio telephone communicating system including a microphone, a loud speaker and radio communicating means for creating in said loud speaker voice currents conforming to voice currents generated in said microphone comprising; a tone current generator at the microphone end of said system, code creating means for substituting a code consisting of short tone current pulses applied intermittently followed by a long tone pulse for voice current during the time said microphone is not in use, an audible signal at the loud speaker end of said system, and code responsive means at the loud speaker end of said system responsive to such tone current pulses to sound said audible signal upon failure of said system and failure of its transmission of the said code.

17. In a radio telephone, the combination with a transmitting station including a transmitter, a tone generator for generating tone current, a microphone for generating voice currents and a manually operable double-throw contact biased to a position to transmit tone current to said transmitter and which is manually depressed against such bias to an actuated position to transmit voice current generated by said microphone; and a receiving station including, an audible signal, a loud speaker and a filter for passing only said tone current; and relay means at said receiving station controlled by tone cur-

rent passing through said filter to energize said audible signal to hold it inactive when tone current is received, other means to hold said audible signal inactive when no tone current is received, and a second filter connected in a circuit of said loud speaker allowing the flow of voice current but not allowing the flow of tone current.

18. In a radio telephone, the combination with a transmitting station including a transmitter, a tone generator for generating tone current, a microphone for generating voice currents and means including a double-throw contact for transmitting short pulses of tone current to said transmitter so long as said contact is in its normal position, transmitting a long pulse of tone current when said contact is moved from said normal to an abnormal position and transmitting voice current generated by said microphone when said contact assumes its abnormal position; and a receiving station including a receiver, an audible signal, a loud speaker and a filter for passing only said tone current; and relay means at said receiving station controlled by current passing through said filter to energize said audible signal to hold it inactive when short pulses of tone current are received and including a stick relay having a pick-up circuit which is closed when a long pulse of tone current is received and having a stick circuit including a contact closed only when no tone current is received, said stick relay when energized holding said audible signal inactive, and a second filter connected in a circuit of said loud speaker allowing the flow of voice current but not allowing the flow of tone current.

19. Apparatus for testing the operativeness of a radio telephone system of which the radio frequency current is modulated by a tone current of short pulses followed by a long pulse of tone current during periods of non-use of the voice communication portion of the radio telephone system comprising, two relays at the receiving station one of which is picked up on short tone pulses and both of which are picked up during a long pulse, a slow dropping repeater relay for repeating said one relay and a slow dropping stick relay having a pick-up circuit including a front contact of the other of said two relays, a stick circuit for said stick relay including a back contact of said one relay, and indicating means controlled by said slow dropping relays.

20. Apparatus for testing the operativeness of a radio telephone system of which the radio frequency current is modulated by a tone current of short pulses followed by a long pulse of tone current during periods of non-use of the voice communication portion of the radio telephone system comprising, two relays at the receiving station one of which is picked up on short tone pulses and both of which are picked up during a long tone pulse, a slow dropping repeater relay for repeating said one relay and a slow dropping stick relay having a pick-up circuit including a front contact of the other of said two relays, a stick circuit for said stick relay including a back contact of said one relay, and a normally energized normally inactive audible signal controlled through front contacts of said slow dropping relays.

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