108A1 HIT SUPPRESSOR UNIT
DESCRIPTION

1. GENERAL

1.01 This section is reissued to change the rating from Provisional Standard to Standard. It describes the 108A1 Hit Suppressor Unit which has been developed to prevent certain forms of telegraph line interference which occur on private line telegraph facilities from being transmitted in a certain direction beyond the line section or sections in which they occur. This section is based on Bulletin No. 670 prepared by the Bell Telephone Laboratories.

1.02 The information covered in this section is as follows:

1.03 Interference in the form of line "hits," "opens" or "surges" to which this device is responsive are generally short open line circuit conditions or trouble conditions which will cause a spacing signal to be inadvertently transmitted. The "hits" are suppressed while signals are being transmitted toward the branch line section in which the hits originate. While the whole network is idle, either hits or telegraph signals will be transmitted freely in either direction through the suppressor unit provided the circuit has been idle for a period exceeding the time of the delay circuit. The maximum length of the interfering impulse which is suppressed is about two seconds and is equal to the delay interval introduced. The introduction of this delay will necessarily require that break signals sent from the branch line through the suppressor unit to the rest of the line network be of a greater length than two seconds in order to be effective.

1.04 The delay interval of the suppressor unit is obtained by charging a capacity through a high resistance as will be explained in detail later.

1.05 The suppressor unit, consisting essentially of two polar relays and a neutral relay together with associated condensers and resistances is arranged as an applique which can be added in the field to the existing 10-type single line repeaters. Application to these particular repeaters has been made available because they are used in connection with standard telegraph repeaters equipped with balanced loop circuits when three-way or branch line operation is employed.

2. USE OF HIT SUPPRESSOR UNIT

2.01 The most common application of this unit is expected to be to protect main line stations from "hits" occurring on branch lines. Fig. 1 is a simplified circuit layout showing an adaptation to a branch line circuit. While the signals are being transmitted on the main line in either an east or west direction, the hits or forms of interference tending to send a space signal from the branch line to the

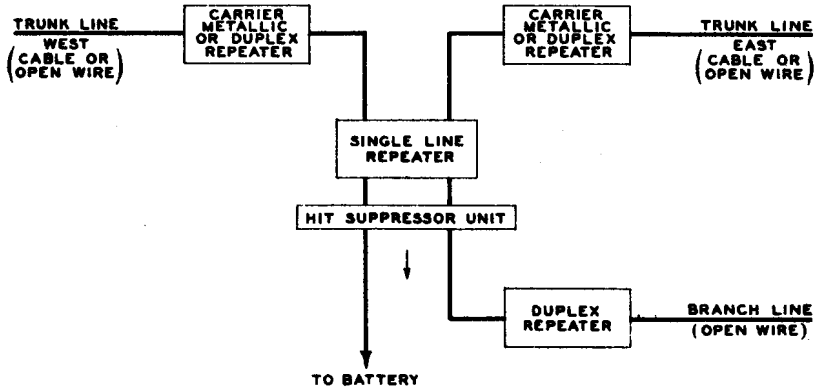

Fig. 1.

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main line will not pass through the suppressor unit unless a single open persists without interruption for more than about two seconds and hence the signals on the main line will not be mutilated.

2.02 Another use for this unit is in connection with a circuit layout as shown in Fig. 2 containing a number of stations only a few of which are both sending and receiving stations. In a layout of this sort two suppressor units could be located in the telegraph repeater office in the same town as the sending station near the center of the layout and one of the units would be connected to a single line repeater to prevent hits passing from the east to the west section and the other connected to another single line repeater to prevent hits from passing from the west to the east section.

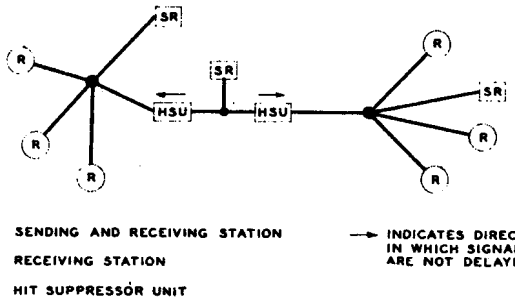

Fig. 2.

2.03 The east side of the repeater (10B1 or 10B2) has been selected for connection to the hit suppressor and hence that side of the repeater should be associated with the line section from which protection is desired.

2.04 Care should be taken in patching not to connect a repeater equipped with a hit suppressor into a circuit where a repeater so equipped is not normally used.

3. DESCRIPTION OF OPERATION

3.01 In connection with the following description of operation reference should be made to Fig. 3.

3.02 The polar relays of the single line repeater will be in positions as shown on Fig. 3 when the circuit is idle and ready for use. The 206 type relay (B) of the 108A1 unit will be on contact 4 due to the retaining spring, the 239 type relay (A) will be on contact 3, due to the bias effect of winding (2-5) and the relay (C) will be released.

3.03 Assume that signals are being transmitted from the west line to the east line. The armatures of the line west and hold east relays will follow signals and the first impulse which operates the hold east relay to contact 5 will apply positive battery to the (1-6) winding of relay (B) and operate it to contact 3. This connects ground to the (1-6) winding of relay (A) which overcomes the bias effect of winding (2-5) and operates it to contact 4 which operates relay (C) thereby short-circuiting the operating contacts of the line east relay. As soon as the (C) relay has operated, the contacts of the line east relay which are in the west line are short circuited and consequently "hits" occurring in the east line will not be transmitted to the west line. The condensers (A) and (B) will have a discharge circuit to ground through contact 3 and armature 7 of the (B) relay. The (B) relay follows the operation of the hold east relay but relay (A) remains on contact 4 and the (C) relay remains operated while the west is sending because while relay (B) is on contact 4 the charging current for condensers (A) and (B) through the (1-6) winding of relay (A) is also in such a direction as to hold it on contact 4. The ampere turns of the (1-6) winding of relay (A) are about 2-1/2 times those of the (2-5) bias winding.

3.04 Assume now that a hit or open occurs in the east line. The line east and hold west relays operate to spacing and negative battery through contact 5 of the hold west relay and (2-5) winding of relay (B) will cause it to operate to contact 4 irrespective of the operating effects of the positive battery from the hold east relay because the force tending to operate the (B) relay due to the current through the (2-5) winding is approximately 3-1/2 times that due to the current through the (1-6) winding. The 8 microfarad capacity (A) and (B) will now start to charge through the 1600-ohm resistance (B), winding (1-6) of the (A) relay and the 100,000 ohm resistance and at the end of about two seconds the charging current will fall to a value such that the effect of the (1-6) winding is slightly less than the bias effect of winding (2-5). Relay (A) will operate to contact 3 releasing relay (C) and the release of relay (C) will remove the short on the line east relay contacts. This allows the open signal to go to the west line. If the hit or open in the east line ceases before the effect of the current in the (1-6) winding is exceeded by the bias effect of winding (2-5) of relay (A), relay (B) will operate to contact 3 provided the west line is closed or sending, and relay (A) remains on contact 4. In other words, if relay (B) has been on contact 4 for less than two seconds the charging current of condenser (A) has held relay (A) on contact 4 and the short circuit on the contacts of the line east relay has been maintained by relay (C). Therefore, when signals are coming from the west, the

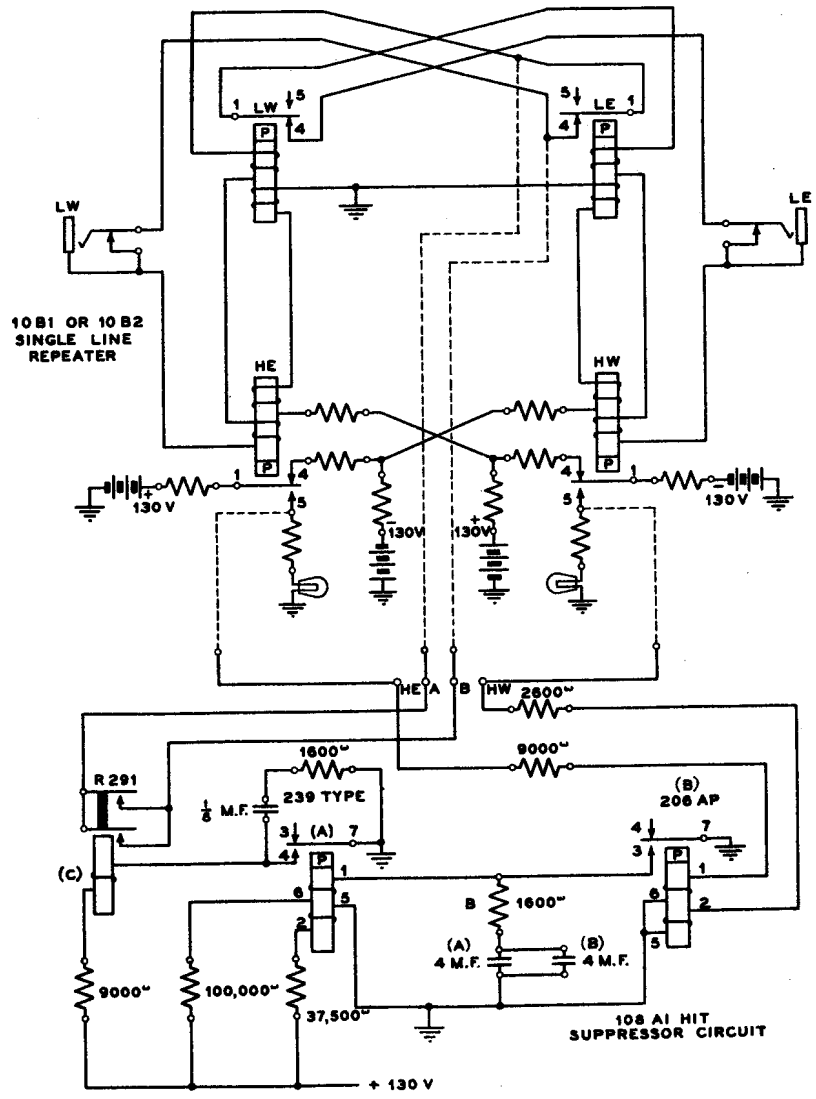

Fig. 3.

west line is not affected by "opens" or "hits" in the east line unless one of them persists without interruption for more than two seconds. This means that a sending station in the east line must send a break for more than two seconds in order to stop a station that is sending on the west side. If signals have not been sent from either line for two or more seconds the repeater and hit suppressor relays will be in the positions as shown on the drawing and in this case hits or opens from the east line will be transmitted to the west l

3.05 When the east is sending the hold west and line east relays follow the signals and relay (B) is held to contact 4 due to the retaining spring and negative battery applied to winding (2-5). Relay (A) therefore mains on contact 3 and (C) relay remains open which causes no effect on east to west transmission. A break signal from the west when the east is sending is not affected because the 130-volt positive battery applied to the (1-6) winding of relay (B) through about 9000 ohms will not overcome the effect of the 130-volt negative battery applied through the (2-5) winding and 2600 ohms tending to hold it on contact 4.

3.06 The contacts of relay (C) are protected by the spark killers of the line east relay in the single line repeater and the condenser and resistance in the timing circuit, serve as a protection for the contacts of relay (B). The contacts of relay (A) are protected by a spark killer.

4. EQUIPMENT MOUNTING ARRANGEMENTS

4.01 The 108A1 Suppressor Unit consists of a two circuit unit arranged on two

1-3/4" mounting plates for 19" relay rack mounting. A terminal strip is provided on the rear of the assembly.

4.02 In the case of the 10B1 repeater, which is a low-bay form of equipment, a mounting detail capable of mounting two suppressor units that is, four circuits, is attached to the top of the bay and the lamp standards are removed. The calling-in lamps are not needed when a single line repeater is associated with telegraph repeaters in branch line operation because the calling-in circuits associated with line repeaters are used.

4.03 In the case of the 10B2 single line repeater, which is a high-bay form of equipment, the suppressor units may be assembled directly on the racks except for 10' 6" relay racks equipped with eight repeaters in which case only two circuits can be assembled on the repeater rack and the remaining six circuits can be assembled on a miscellaneous rack.

4.04 A positive 130-volt battery tap and a ground connection are required for operation of the suppressor unit. The battery is obtained by a connection to a battery key on the single line repeater. Also, the other connections to the suppressor unit are made directly to the apparatus in the repeater through local terminal connections and no external wiring is employed. The connections have been permanently established because the repeaters are generally operated on circuit layouts which are reasonably permanent. By means of a strapping change the 8 mf. capacity providing about a 2 second delay can be changed to 4 mf. to provide about a one second delay.