13H1 LOOP REPEATER

FOR DIRECT LEG OPERATION IN

NOS. 2 AND 9B SERVICE BOARD OFFICES

CONTENTS

1.00 GENERAL

1.01 This section describes the 13H1 loop repeater developed for use in Nos. 2 and 9B telegraph service board offices for direct leg connections between a loop and a relay-type line repeater.

1.02 The 13H1 repeater consists of one polar relay and associated apparatus with provisions for optional connections for either half or full duplex (send only) operation. The circuit is arranged for the desired operating option by simple strapping at the terminal strip on the unit.

2.00 DESCRIPTION OF CIRCUIT AND TYPICAL CONNECTIONS

2.01 Fig. 1 is a detail drawing of the 13H1 loop repeater. The B, T and R1 leads connect to the loop or loops while the R and S leads connect to the relay-type line repeater. Operating arrangements and wiring options used for each arrangement are listed in Table 1.

2.02 Protection against kick off of the (K1) relay during transmission from the relay-type line repeater to the loop is provided by the R3 resistor for loops up to approximately 20 miles of 19-gauge cable or equivalent. For loops of 20 to 30 miles of 19-gauge cable or equivalent, the central office wave shaping network circuit shown on SD-70563-01, Fig. 5 is used.

2.03 For full duplex (send only) operation, —130-volt battery taps B and C are provided. The higher resistor in the B battery tap aids in the adjustment of loop currents to 62.5 milliamperes in the shorter loops.

2.04 Relay contact protection is provided for the (K1) relay by resistor R1 and capacitors C1 and C2.

2.05 A clean break is not obtainable with this repeater. In circuits where this feature is required the 90C1 loop repeater should be used.

(A) Half Duplex Operation

2.06 Fig. 2 shows a typical half duplex arrangement. During transmission from the line repeater to the loop, polar voltages (+130-volt mark) are transmitted from the contacts of the receive relay in the line repeater to the loop equipment via the jacks in the facility position, the 3-6 winding of the loop repeater (K1) relay and returning to —130-volt telegraph battery via the loop pad and jacks in the facility position.

2.07 When a mark signal is transmitted from the line repeater and the loop is closed, a current of 62.5 milliamperes flows in the 3-6 winding of the (K1) relay in such a direction to operate the (K1) relay to its marking contact. At the same time a current of approximately 28.0 milliamperes flows in the bias winding 2-7 of the (K1) relay in the direction to operate the relay to its spacing contact. Since the current is greater in the 3-6 winding the (K1) relay operates to its marking contact.

2.08 When a space signal is transmitted from the line repeater —130-volt battery is applied to the loop, via jacks in the facility position and the 3-6 winding of the (K1)relay returning to —130-volt battery at the office via the loop pad and jacks in the facility position. This results in approximately zero current in the 3-6 winding of the (K1) relay and loop. At the same time current from the —130-volt battery at the line repeater flows through the 2-7 winding of the (K1) relay resulting in 34.0 milliamperes of current in the direction to operate the (K1) relay to its marking contact. A mark signal,

therefore, continues to be transmitted to the line repeater during transmission from the line repeater to the loop.

2.09 During transmission from the loop, open and close signals are transmitted by the sending contacts of the loop equipment which results in loop currents of zero for space and 62.5 milliamperes for mark. Since the (R) relay of the line repeater is in the marking position, the (K1) relay will respond to these signals, as the bias winding (2-7) current is in the direction to operate the relay to its spacing contact when the loop is open and current in the 3-6 winding is approximately zero. When the loop is closed, 62.5 milliamperes of current again flows in the 3-6 winding operating the relay to its marking contact. Polar signals are, therefore, transmitted from the (K1) relay contacts to the line repeater send relay.

(B) Full Duplex (Send Only) Operation

2.10 Fig. 3 shows a typical full duplex circuit arrangement. It should be noted that the transmission path from the line repeater (R) relay to the receive loop does not involve the 13H1 repeater. Polar voltages are transmitted from the receive relay in the line repeater to the receive loop returning to —130-volt battery via the loop pad and jacks in the facility position.

2.11 When transmission is from the equipment connected to the send only loop, the circuit operates as described under half duplex operation.

2.12 For full duplex (send only) operation +130-volt battery is connected to the 3-7 terminals of the (K1) relay in place of the lead from the receive relay in the line repeater. This omits 250 ohms resistance, normally in the line repeater, from the circuit and it is necessary to increase the bias resistance.

This is accomplished by the addition of the R5 resistor in series with the bias winding.

3.00 OPERATING LIMITS AND ADJUSTMENTS

3.01 This repeater should not be used with loops exceeding 30 miles of 19-gauge cable or equivalent. For longer loops the 90C1 loop repeater should be used.

3.02 No adjustments are required in the 13H1 repeater other than the adjustment of the 255A relay per BSP requirements. Loop currents are adjusted with the loop pads to 62.5 milliamperes.

4.00 DESCRIPTION OF EQUIPMENT

4.01 The 13H1 repeater consists of one polar relay (255A) and associated apparatus with provisions for optional wiring for either half or full duplex (send only) operation.

4.02 Fig. 4 shows a face view of the 13H1 repeater unit which is shop wired and consists of two repeaters mounted on a mounting plate 3-1/2 inches wide and 19 inches long for bay mounting. Thirty-three repeater units may be mounted in one 11-foot, 6-inch bay.

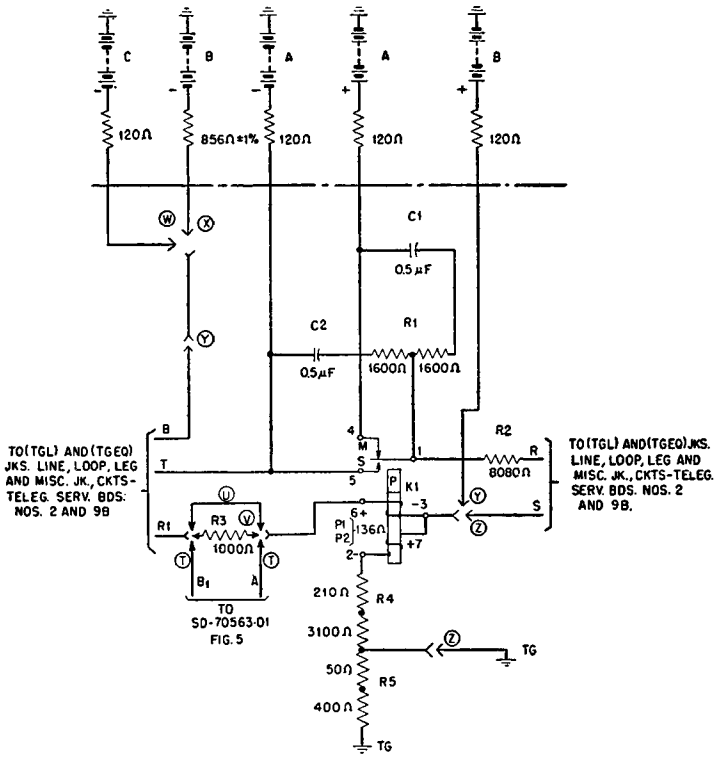

FIG. 1
13HI LOOP REPEATER

TABLE 1

OPERATING ARRANGEMENT	OPTIONS USED
HALF DUPLEX ON LOOP LENGTHS TO APPROXIMATELY 20 MILES OF 19 GA. CABLE OR EQUIVALENT.	V AND Z
HALF DUPLEX ON LOOP LENGTHS OF 20 TO 30 MILES OF 19 GA. CABLE OR EQUIVALENT.	T AND Z
FULL DUPLEX ON SHORT LOOPS.	U, X AND Y
FULL DUPLEX ON LONG LOOPS.	U, W AND Y

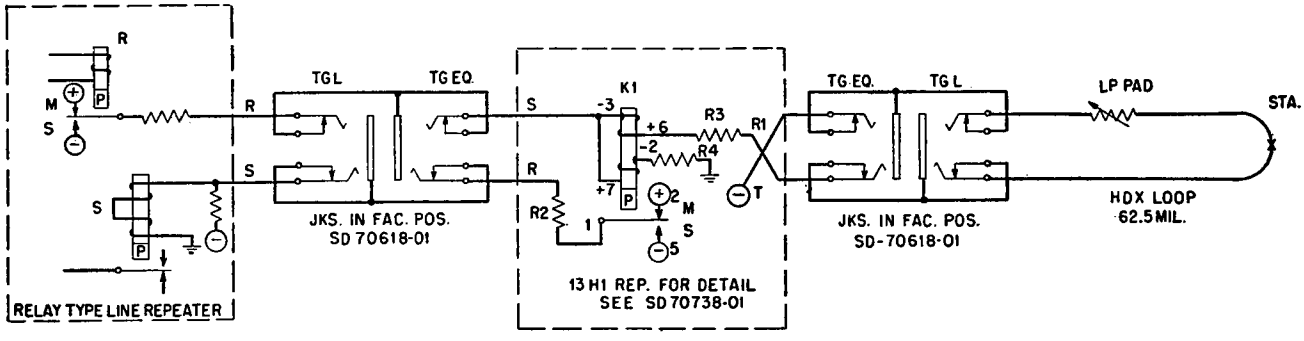

FIG. 2
13H1 REPEATER CONNECTED
FOR PLS., D-L, HDX OPERATION

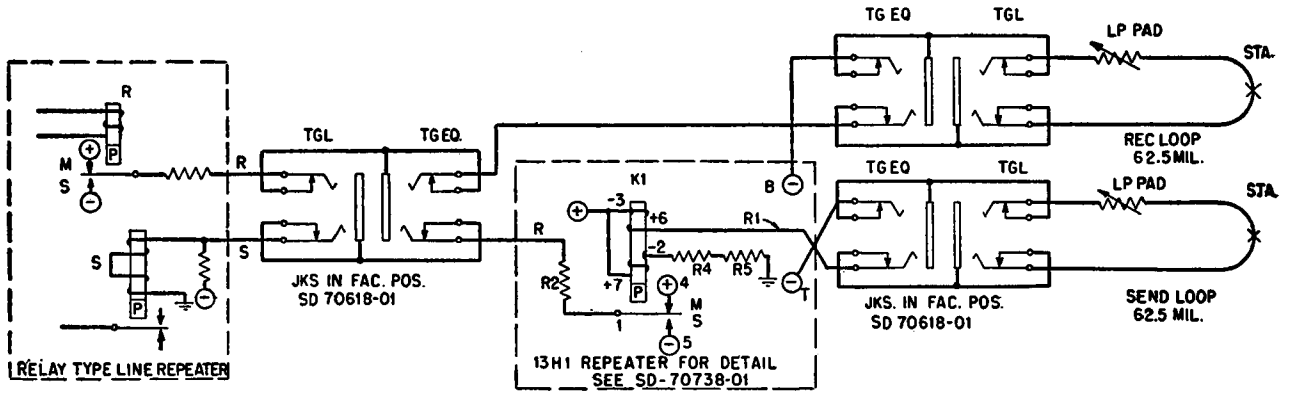

FIG. 3
13H1 REPEATER CONNECTED
FOR PLS., D-L, FDX OPERATION

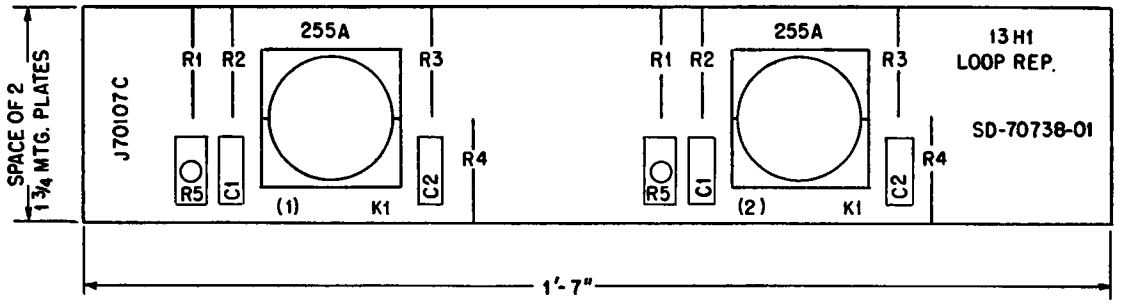

FIG. 4—13H1 LOOP REPEATER UNIT