13F1 ONE-WAY POLAR TELEGRAPH REPEATER

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1. GENERAL

1.01 This section gives the principles of operation and description of the circuits and equipment of the 13F1 one-way polar telegraph repeater. It is reissued to include information concerning the use of a single 13F1 repeater to send polar signals to a group of subscriber station loops connected in parallel. Marginal arrows are used to indicate changes from the previous issue.

1.02 This repeater provides means for receiving neutral signals from a loop, inverse neutral signals from a No. 1 service board, or polar signals from a line, and repeating them as one-way polar signals to a line.

1.03 The 13F1 repeater supersedes the 13B1 and 13B2 repeaters for telegraph test-board offices and the 13D1 repeater for offices employing No. 1 service boards.

2. DESCRIPTION OF CIRCUITS AND OPERATION

2.01 Fig. 1 shows a schematic of the repeater circuit. Neutral signals from a loop, polar signals from a line, or inverse neutral signals from a No. 1 service board operate relay PC, which transmits polar signals through the noise killer to a line.

2.02 When relay PC is arranged to receive neutral signals it is biased to spacing with a bias current of 30 milliamperes. For inverse neutral signals it is biased to marking with a current of 10 milliamperes. For polar signals the bias winding is left open. These options are obtained by straps on the terminal strip.

2.03 When the repeater is used for inverse neutral operation a wave shaping network consisting of capacitor C in series with resistor M is connected from one terminal of the relay winding to ground.

2.04 Resistor A and capacitors A and B provide spark protection for the relay contacts.

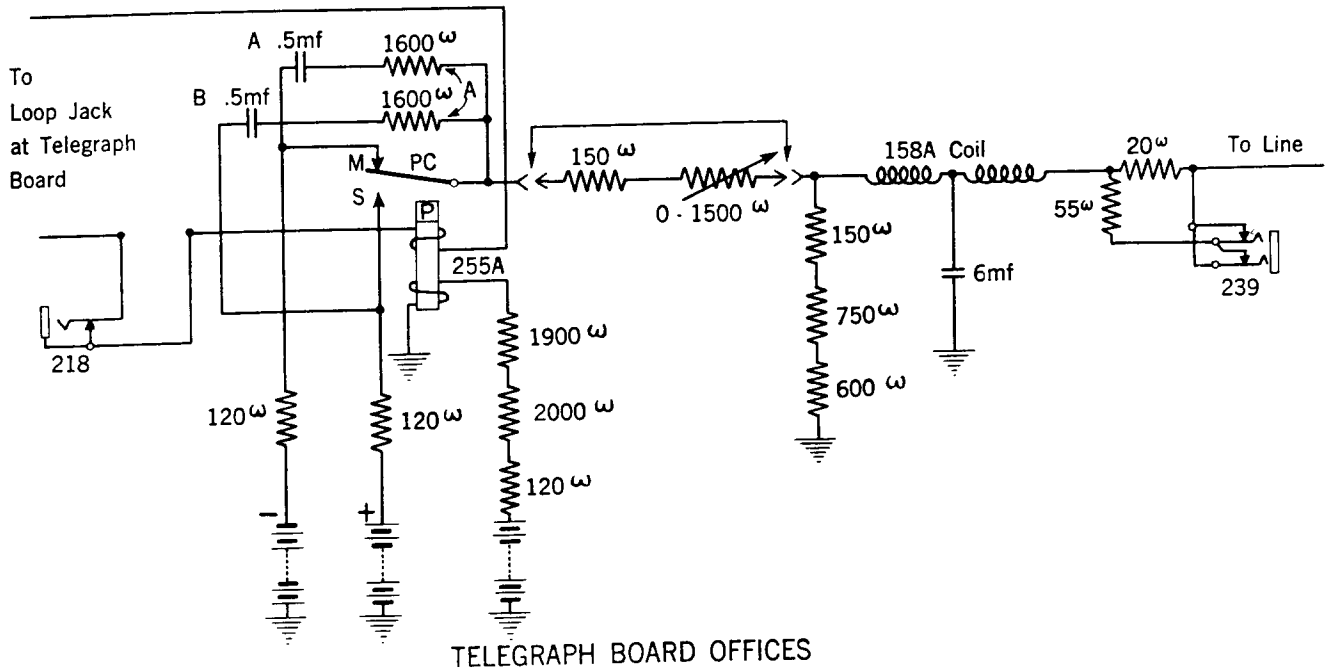
2.05 When the repeater is used in balanced loops a 218-type jack is provided in series with the relay winding for test purposes. In No. 1 service board offices a 246-type jack is connected to the relay winding for this purpose.

2.06 A potentiometer limits the current and voltage applied to the line. If the required line current of .030 ampere can not be obtained with this potentiometer it may be omitted by making appropriate strapping changes.

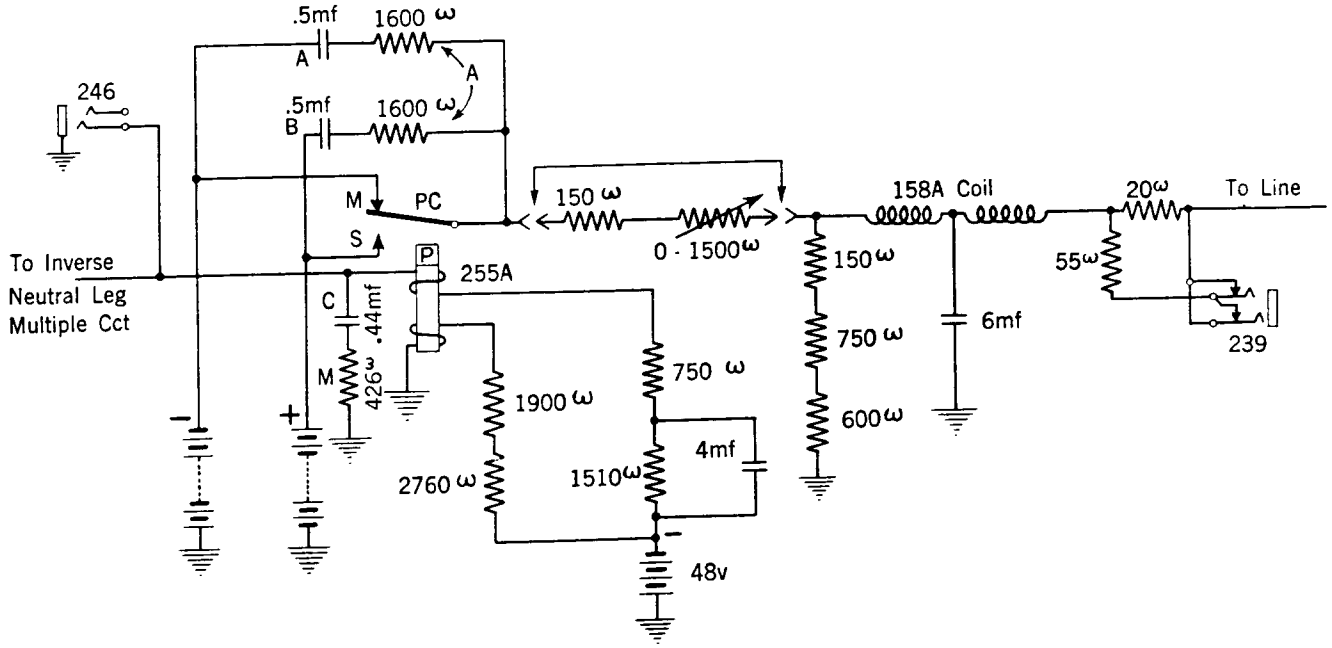
2.07 A jack is provided in the line circuit for making current measurements.

2.08 The repeater may be converted to inverse neutral operation for No. 1 service board offices by making strapping changes as indicated on Drawing SD-70412-01 and by adding the resistors and capacitor designated as "X" equipment on this drawing. A 246-type jack is used in place of the 218-type jack in the winding circuit of the relay.

2.09 The 13F1 repeater can be used to operate parallel polar loops to receiving-only stations. Fig. 2 illustrates this application of the repeater. A maximum of 10 such station loops may be connected to a repeater. The maximum contact current of 100 ma establishes this limit. Each loop operates polar-to-ground on either a metallic or ground return basis with an operating current of ± 10 ma produced by the application of $\pm$ 130-volt battery.



TELEGRAPH BOARD OFFICES



NO. 1 SERVICE BOARD OFFICES

Fig. 1

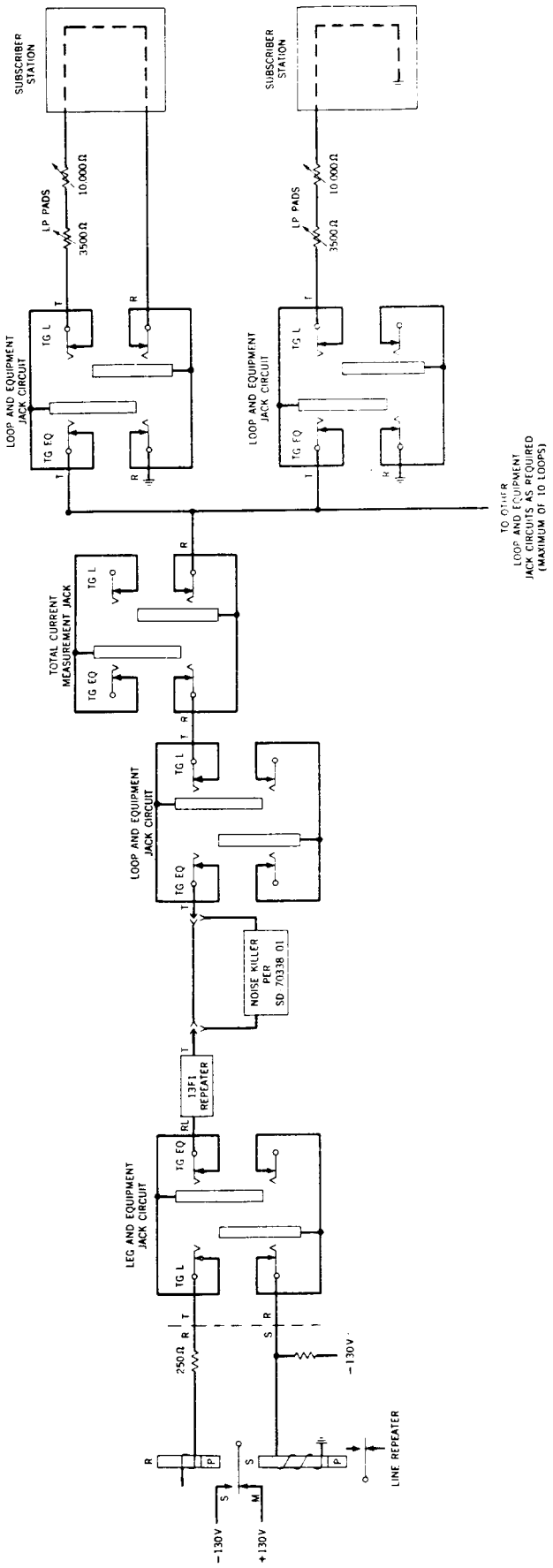

SUBSCRIBER STATION
SUBSCRIBER STATION
LP PADS
10,000Ω
3500Ω
LOOP AND EQUIPMENT JACK CIRCUIT
TG L
TG FQ
TO OTHER LOOP AND EQUIPMENT JACK CIRCUITS AS REQUIRED (MAXIMUM OF 10 LOOPS)
TOTAL CURRENT MEASUREMENT JACK
TG EQ
NOISE KILLER PER SD 70338 01
13F1 REPEATER
LEG AND EQUIPMENT JACK CIRCUIT
250Ω
-130V
+130V
LINE REPEATER

Fig. 2

2.10 Strapping changes for parallel polar loop operation are shown on SD-70412-01 as option "T".

2.11 Since polar transmission over long loops is susceptible to characteristic distortion, 50 miles of 19-gauge cable or equivalent has been established as a maximum loop length for 60-speed operation.

3. LINE-UP AND ADJUSTMENT INFORMATION

3.01 For No. 1 service board offices a 163B1 portable test unit may be provided for measuring line currents. In telegraph testboard offices the 163A2 portable test unit is used for the same purpose. These units are suspended from the repeater by two extended mounting screws. For telegraph testboard offices the current in the relay operating winding should be 60 to 65 milliamperes for neutral operation of the relay (62.5 milliamperes when the sum of the positive and negative battery voltages is 260 volts) and 30 to 35 milliamperes for polar operation. This current should be measured at the telegraph board. For No. 1 service board offices this current should be 20 milliamperes. This current is limited to the correct value by resistors K and L in the repeater circuit. The line current may be measured at the LM jack by means of the test unit and adjusted to 30 to 35 milliamperes by means of the LINE potentiometer.

3.02 When the 13F1 repeater is used to operate parallel polar loops, the current in each loop is adjusted individually. For this purpose a 10,000-ohm pad is used to supplement the usual 3,500-ohm pad.

4. EQUIPMENT INFORMATION

4.01 The 13F1 repeater is a single circuit unit requiring the space of three 1-3/4-inch mounting plates on a 19-inch relay rack bay. Twenty-two units can be mounted on one 11-foot 6-inch relay rack bay.

4.02 A designation card holder, No. 91D, is provided which mounts under the repeater mounting screws at the right-hand side of the bay.

5. REFERENCES

SD-70412-01 Schematic of 13F1 Repeater
ED-70525-01 13F1 Equipment