

COMMON SYSTEMS
SIGNALING
SIGNAL LEAD EXTENSION CIRCUIT
FOR EXTENDING E AND M LEADS
FROM SIGNALING CIRCUITS

SECTION I - GENERAL DESCRIPTION1. PURPOSE OF CIRCUIT

1.01 This circuit is designed for connection to a signaling circuit to interconnect a signaling circuit and a trunk circuit when the distance between them is too great to connect them directly through the E and M leads.

SECTION II - DETAILED DESCRIPTION1. GENERAL

1.01 When the conductors between a trunk circuit and a signaling circuit exceed the allowable resistance for the proper operation of either circuit, it is necessary to use a signal lead extension circuit at the signaling circuit end of the conductors, and either a signal lead extension circuit or a DX signaling circuit at the trunk circuit end.

1.02 This signal lead extension circuit is associated with a CX Signaling Circuit or a 1600- or 2000-Cycle Signaling Circuit.

1.03 The R relay has quadded windings which are used in pairs. Terminal 1 is the apex of the 2-4 and 2-3 windings. Terminal 7 is the apex of the 7-1 and 7-8 windings. Winding 2-3 is connected in series with the operating wire. Winding 7-1 is in series with the neutralizing wire. Winding 2-4 and 7-8 are the balancing windings for the 2-3 and 7-1 windings, respectively. Resistor B is a potentiometer which applies -19.2 volts for 48-volt office battery to apex terminal 7. Apex terminal 2 is connected through the A resistor to a pole-changing device in the trunk or signaling circuit.

1.04 In the normal released condition, the E lead from the signaling circuit is open, the S relay is released, and ground is applied to the apex (terminal 2) through contact 5 of the S relay. Current will flow through the 2-4 and 7-8 windings of the R relay. This current causes the R relay to be operated to contact 6. With the relays thus operated, ground is connected over the M lead to the signaling circuit.

1.05 The R relay at the trunk circuit end responds to changes from ground sent by the S relay.

1.06 The R relay at the signaling circuit end responds to changes from ground to battery applied by the trunk circuit over the M lead and its armature opens the ground and connects battery on the M lead to the signaling circuit.

2. NEUTRALIZATION AND BATTERY COMPENSATION

2.01 The neutralizing wire is connected to the R relay winding circuit in a manner identical to the operating wire except that the windings are reversed. Therefore, dc or ac earth potentials or other longitudinal interference are cancelled out.

2.02 The potential applied to the apex of the neutralizing circuit from the midpoint of the B resistor partially compensates for battery variation between the two signal lead extension circuits.

3. Z OPTION

3.01 When Fig. 1 is supplied and the A and B leads are connected to a trunk through repeating coil windings and are shunted by 4-uf capacitor, the Z option is provided to prevent kickoff of the R relay when signals are sent from the signaling circuit to the trunk circuit.

3.02 When Fig. 2 or 3 are supplied, the W and V options permit the connection of 0-, 4-, or 6-uf capacitor in the biasing network of the R relay to prevent kickoff under various loop and repeating coil conditions.

4. TESTING R RELAYS

4.01 The TST Jack is provided for testing and adjusting the R relay. Current flow tests may be made as indicated in the Circuit Requirements Table.

5. PATCHING PACKAGE - Q OPTION

5.01 Q option is provided when this circuit is part of a patching package which is used to make good central office equipment in private line service.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The maximum conductor loop resistance is: for Fig. 1, 1500 ohms; for Fig. 2 or Fig. 3, 5000 ohms.

1.02 The maximum circuit length is: for Fig. 1, 15 miles; for Fig. 2 or 3, 75 miles; or when E-type repeater is used, 15 miles.

1.03 The minimum insulation resistance is 100,000 ohms.

1.04 The maximum dc earth potential is ± 45 volts.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 When a signal lead extension circuit is connected to either another signal lead extension circuit or a DX signaling circuit associated with a trunk circuit, it will perform the following functions.

3.02 Signals received on the E lead from the signaling circuit will be retransmitted to the E lead of the trunk circuit.

3.03 Signals transmitted over the M lead of the trunk circuit are retransmitted to the M lead of the signaling circuit.

3.04 Signals may be transmitted in either direction without interfering with signals being transmitted in the opposite direction.

3.05 Earth potentials and interference are neutralized by the symmetrical arrangement of an operating circuit and a neutralizing circuit.

3.06 Battery potential differences are minimized by the potentials applied to the neutralizing wire.

3.07 This circuit may be part of a patching package.

4. CONNECTING CIRCUITS

4.01 When this drawing is listed on a key-sheet, the connecting information thereon is to be followed.

(a) 1600- or 2000-Cycle Signaling Circuit - SD-56202-01.

(b) CX Signaling Circuit - SD-95048-01.

(c) Repeating Coil Circuit - SD-96452-01.

(d) 4-Wire Terminating Circuit - SD-96463-01.

(e) Patching Package Application Schematic - SD-99405-01.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 This circuit may be part of a patching package.

B. Changes in Apparatus

B.1 ADDED:

185A Network (P) Option K, Fig. 2

B.2 SUPERSEDED

SUPERSEDED BY

Fig. 2

Fig. 3

D. Description of Changes

D.1 The circuit is arranged to specify options that will provide improved signaling with specified cable length. The maximum cable loop length that the circuit should be used for signaling is changed to 15 miles where E-type repeaters are used. As a cost reduction item, the TST jack is changed. Fig. 2 is rated Mfr Disc. and replaced by Fig. 3. Where Fig. 2 is installed, options are provided to arrange the Fig. 2 to agree with Fig. 3 insofar as the network is concerned (see Table A).

D.2 Fig. 2 is rated Mfr Disc., connection to 4-wire terminating set is added, and option K is added.

D.3 Fig. 3 is added.

D.4 Circuit Notes 102, 104, 106, 304, and 305 are changed.

D.5 Circuit Notes 107, 308 (A), and Table A are added.

D.6 The working limits and Options Used Table are changed.

D.7 The voltage limits are changed to specify 42.75 to 52.5 volts for No. 1 ESS office.

D.8 Option Q is added in Fig. 2 and is shown in Fig. 3 for use when this circuit is part of a patching package in private line service.

D.9 Option R, which was formerly part of Fig. 2, is designated in Fig. 2 and 3 for use when this circuit is a regular signal lead extension circuit.

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