

COMMON SYSTEMS
DIAL LONG LINE CIRCUIT
COMPOSITE SIGNALING, TYPE B
SUPPLIES LINE SUPERVISION FOR
SUBSCRIBER LINES IN CROSSBAR,
PANEL OR STEP BY STEP OFFICE OR
STATION LINES IN PEX'S
WITH OR WITHOUT TELEPHONE REPEATER

CHANGES

B. CHANGES IN APPARATUS

<p>B.1 Superseded</p> <p style="padding-left: 20px;">Option (F) (H) Diode KS-15724,L1</p>	<p>Superseded by</p> <p style="padding-left: 20px;">Option (ZB) (H) Diode KS-15724,L1 (H) Resistor 190J</p>
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D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 Circuit Note 103 is revised to reflect Issue 12-B.
- D.2 Circuit Note 106 is added.
- D.3 To make relay H slow in operating in order to meet the 6 PPS per cent break requirement, Option ZB is added.

1. PURPOSE OF CIRCUIT

1.1 To provide a dial long line circuit for use on long subscribers lines from dial offices. It is also for use in long trunk circuits and PEXs, long subscriber stations from dial PEXs or manual PEXs with through dialing from the station to the dial central office.

2. WORKING LIMITS

- 2.1 Min. Ring. Volt. 60V 65V 72V
- Max. Ext. Ckt. Loop 1900Ω 2750Ω 3200Ω
- 2.2 Min. Ins. Res. 30,000Ω.
- 2.3 Dial speed 8 to 11 pulses per second.

3. FUNCTIONS

- 3.1 To transmit a signal over the signaling circuit when ringing current is received over the loop.
- 3.2 To close the loop towards the central office or PEX when a signal is received from the distant end.

3.3 To repeat and correct dial pulses received.

3.4 To repeat switchhook supervision towards the central office or PEX.

4. CONNECTING CIRCUITS

When this circuit is listed on a key-sheet, the connecting information thereon is to be followed:

- 4.01 Subscriber Line Circuit - SD-32123-01.*
- 4.02 Station Line Circuit - SD-65661-01.*
- 4.03 Long Line Circuit - SD-96009-01.*
- 4.04 CX Signaling Circuit - SD-95028-01.*
- 4.05 Repeating Coil Circuit - SD-95015-01.
- 4.06 CX Set and Repeating Coil Circuit - SD-95004-01.
- 4.07 NL Carrier Application Schematic - SD-95121-01.
- 4.08 Patching Jack Circuit - SD-59329-01.*
- 4.09 4 Wire Terminating Circuit - SD-96463-01.
- 4.10 Repeating Coil Hybrid Circuit - SD-95144-01.
- 4.11 Line and Balancing Repeating Coil Circuit - SD-96452-01.

*Typical Circuit

DESCRIPTION OF OPERATION

5. RINGING

When ringing current is received over the loop the (R) relay operates, in turn, operating the (R1) relay which removes the normal ground or battery from the "M" lead to the signaling circuit substituting battery through the 13A lamp or ground, respectively. When the ringing current is disconnected the (R) relay

releases, in turn releasing the (R1) relay which reconnects the normal condition to the "M" lead.

6. INCOMING SIGNALS

When ground is received on the "E" lead from the signaling circuit due to a call being originated at the distant end the (D) relay operates, operating the (B) relay, removing the short circuit from the 500 ohm resistance (D) in series with the (D) relay winding to reduce current drain and prepares a circuit for operating the (E) relay when ground is removed from the "E" lead. The (B) relay operated, disconnects the (R) relay from the loop and short circuits its winding and the (R) condenser in order that the condenser shall be discharged when it is reconnected to the loop. The (B) relay operated, also removes the telephone repeater termination through the (B) resistance when provided, closes the talking circuit through the repeating coil, closes the supervisory bridge through the (A) retardation coil and operates the (F) relay. The (F) relay operated, supplies the ground for the (E) relay operation when the ground is removed from the "E" lead.

6.1 Dialing

The first pulse received removes ground from the "E" lead permitting the (E) relay to operate in series with the (D) relay which holds. The (E) relay operated, opens the original operating path for the (D) relay so that reconnecting ground to the "E" lead will not shunt down the (E) relay. The (E) relay operated, closes a parallel path to that through the break contact of the (J) relay, operates the (H) relay, opens the circuit for the (F) relay and operates the (P) relay. The (P) relay operated, removes the 2000 ohm shunt from the (E) relay winding and also closes a parallel path to that through the break contact of the (J) relay. The (F) relay having a noninductive shunt through the (F) resistance is somewhat slow in releasing and when it has released the (E) relay is released. If there is no ground on the "E" lead at this time the (D) relay also will release. However, if the "E" lead is grounded the (D) relay may release momentarily but will immediately reoperate. The (H) relay operated, operates the (J) relay and supplies ground for holding the (B) relay operated. The (D) relay released, removes its ground from the (B) relay and closes a path for holding the (J) relay operated under control of the (B) relay ground. The (E) relay released, removes its shorting path for the (J) relay break contact but this circuit is still maintained by a contact on the operated (P) relay. The (E) relay released also releases the (P) relay and opens the circuit for the (H) relay. The (P) relay released, removes its short

circuit from across the (J) relay contact, thus opening the loop at the beginning of the pulse transmitted, reoperates the (F) relay and re-establishes the 2000 ohm shunt around the winding of the (E) relay. This 2000 ohm shunt is to insure that the (D) relay holds when the (E) relay operates in series with it. The (H) relay is slow to release because of the shunt across its winding. The (H) relay released, removes its ground from the (B) relay winding and removes ground from the winding of the (J) relay. During dialing the (D) relay will have reoperated by this time on the closure of ground to the "E" lead so that the locking path for the (J) relay is open and the (J) relay will release, reclosing the loop. The (D) relay reoperated also supplies ground to the winding of the (B) relay. From the above it will be seen that the open period of the pulse transmitted is the release time of the (H) relay plus the release time of the (J) relay less the release time of the (P) relay. However, if the dial pulses are received at a somewhat higher rate the (D) relay will reoperate and then the (E) relay will be reoperated by the removal of ground from the "E" lead from the next pulse before the (J) relay has had time to release. In this case the (E) relay reoperated, recloses the loop terminating the pulse. The (E) relay reoperated, reoperates and holds the (H) relay. Thus at the higher rates of pulsing the closed period of the pulse is determined by the release time of the (F) relay, the release time of the (E) relay and the release time of the (P) relay.

6.2 Flashing

Flashing supervision will be received the same as dialing but at somewhat slower speeds. The operation of the relays will be the same as described above for dialing at the slower speeds except that the (D) relay will undoubtedly still be normal when the (H) relay releases so that the (J) relay remains locked through the break contact of the (D) relay to ground from the (B) relay. The (B) relay is somewhat slow to release and if the flash is sufficiently slow after an interval the (B) relay will release, opening the loop at its contacts and at the same time releasing the (J) relay. At the end of the flash the relays will operate the same as described for the original seizure. A disconnect also causes the same relay operation as described above for a slow flash. The (B) relay released, reconnects the (R) relay and condenser to the loop, supplies the termination for a telephone repeater when required through the (B) resistance and as described above, removes the supervisory bridge through the (A) retardation coil, opens the talking circuit and removes ground restoring the (F) relay to normal.

7. MISCELLANEOUS

7.1 The (T) and (P) jacks are furnished for maintaining this circuit to percent break requirements. In order to have the make period correct for dialing at high speeds continuous pulsing at 12 pulses per second is supplied at the (T) jack and is measured at a percentage break meter at the (P) jack. The tension of the springs of the (F) relay are adjusted to bring the reading of the meter to the desired value. Also the pulsing speed input is used at 6 pulses per second at which time the tensions of the springs on the (H) relays are changed to give the desired reading of the meter. This test establishes the desired fixed open period which is effective at the slower dial speeds. As described above the (F) resistance is used to make the

(F) relay somewhat slow to release, the (H) resistance or (H) diode are used to make the (H) relay somewhat slow to release, the (E) resistance to insure that the (D) relay holds when the (D) relay operates in series with it and the (D) resistance to reduce the current drain during the time that the circuit is off-normal with the (D) relay operated. The (C) condenser and (C) resistance are used to supply the proper pulsing network. The (B) resistance is furnished as described above for a termination for the telephone repeater when the loop is open. The (A) resistance is used to compensate the loop.

7.2 The network (Option E) is connected across the winding of relay J to protect contacts 1 & 2T of relay H.

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