COMMON SYSTEMS
SUBSCRIBER LOOP
BRIDGE LIFTING CIRCUIT

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides a means of electrically reducing transmission losses on bridged subscriber loops when a branch is idle by insertion of a 1574- or 1680-type inductor.

SECTION II - DETAILED DESCRIPTION

1. GENERAL

1.01 A 1574- or 1680-type inductor, to be used as a bridge lifter on a subscriber loop, is inserted in a conductor pair with its windings in series with each side of the line. Either inductor will pass ringing and dialing currents with almost negligible distortion. They will work on dial or manual lines where the dc line current is 20 ma or greater when the most distant telephone set is off-hook and also where the current will not drop below about 12 ma in any branch when two or more telephone sets are off-hook at one time. The 1680-type inductor is the 1574 inductor mounted in a high-permeability metal can for additional shielding. It should be used where additional crosstalk protection is required.

2. NORMAL BRIDGING

Line Condition with Branch On-Hook

2.01 When the telephone on a branch is on-hook, the impedance of the 1574- or 1680-type inductor is very high, as no current is flowing through it. This high impedance adds to the normal impedance of the line, resulting in a low bridging loss.

Line Condition with Branch Off-Hook

2.02 When the telephone on a branch is off-hook, current flows through the inductor, saturating the molypermalloy tape core. As a result, its inductance and impedance are sharply reduced to values such that the speech frequencies can pass through the coil with little insertion loss. The line remains adequately balanced against longitudinal power currents because of the tight coupling between the two windings even though the leakage currents in the tip and ring conductors are not equal.

2.03 To be effective, inductors must be inserted on the customer side of branches or taps at the bridging point.

3. BRIDGING LINES SUBJECT TO INDUCTIVE INTERFERENCE

3.01 When it may be necessary to bridge subscriber loops where the possibility exists of inductive pickup from a 60-cycle source, a 1574B or 1680B inductor may be used. Either inductor with a resistor across each winding acts to shift the resonant frequency of the circuit away from 60 cycles, thereby reducing the effect of inductive pickup at this frequency. The appropriate coil may be inserted in any of the conditions described in Part 4, but will result in an added loss of -0.3 db over the 1574A or 1680A inductor.

4. BRIDGING REQUIREMENTS

A. Central Office Bridging

Both Lines Nonloaded

4.01 Inductors will always be inserted in both lines when either exceeds 6000 feet.

Either or Both Lines Loaded

4.02 An inductor must be placed in the loaded line or lines and also in the nonloaded branch.

B. Bridging Remote from Central Office

Nonloaded Lines

4.03 Inductors will usually not be needed where the total length of bridge tap does not exceed 6000 feet. Where more than 6000 feet of bridged tap does exist, inductors should be placed in the longest lines until the equivalent total of all bridged taps with respect to any station is less than 6000 feet. The number of inductors in tandem between any one subscriber and the central office should not exceed three.

Loaded Lines

4.04 These inductors make it possible to ease the restrictions now applicable to bridged tap on loaded lines. The rules concerning bridging on loaded loops are now:

(a) Generally avoid bridging between load coils.

(b) Where bridging between load coils is economically necessary, always locate an inductor beyond the tap and within the load section. Also place an inductor on the tap if the length of the section plus the length of tap exceeds the maximum limit of section length.

(c) Limit maximum number of inductors between any station and the central office to three.

C. Secretarial Service

4.05 Inductors should be used as follows:

(a) Direct trunks to the secretarial service should be equipped with inductors if (1) they are loaded, (2) they are not nonloaded and exceed 6000 feet, or (3) the customer line is loaded.

(b) Customer lines should be equipped with inductors if (1) they are loaded, (2) they are nonloaded and exceed 6000 feet, or (3) the secretarial trunk is loaded.

(c) Concentrator identifier trunks do not require inductors.

D. Telephone Office Cutovers, Area Transfers, or Large PBX Moves

4.06 Application of the inductors to central office cutovers will make it unnecessary to add or remove bridged taps immediately before or after the operation.

4.07 Where an office is to be replaced by another located nearby, no inductors should be required, as the relatively short multiple pairs would result in small transmission impairment.

4.08 Where the new office is relatively distant, some of the new subsidiary subscriber cables might run close to the new office, others distant. Inductors should be applied to the new cable branch if this is long enough to cause transmission impairment or if the pairs are loaded. Inductors should also be applied to what will be the old branch when the new office is in operation, especially if these pairs are loaded. This will be the only instance where the inductors are inserted on the office side of a bridged point. When the cutover is completed, the bridged taps and inductors may be removed when convenient.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

None.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 This circuit provides a means of reducing transmission losses on bridged subscriber loops by:

(a) Acting as a high impedance when the telephone on a branch is on-hook.

(b) Acting as a low impedance when the telephone on a branch is off-hook, so the speech frequencies can pass through the inductor with little insertion loss.

3.02 It also provides additional crosstalk shielding when required.

4. CONNECTING CIRCUITS

When this circuit is listed on a keysheet, the connecting information thereon should be followed:

(a) No. 1 ESS - Line Switching Circuit (typical) SD-1A106-01

(b) Manual - No. 11 Switchboard - Subscriber Line Circuit (typical) SD-11560-01

(c) Manual - No. 12 Switchboard - Subscriber Line Circuit (typical) SD-15021-01

(d) Panel - Subscriber Line Circuit (typical) SD-21712-01

(e) No. 1 Crossbar - Subscriber Line Circuit (typical) SD-25553-01

(f) No. 5 Crossbar - Subscriber Line Circuit (typical) SD-26030-01

(g) Step-by-Step - Subscriber Line Circuit (typical) SD-31531-01

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 The circuit drawing is reissued to provide additional shielding when it is needed to prevent crosstalk in the inductors. This is achieved by mounting the present coil in a high-permeability metal can.

D.2 App Fig. 3 is added to provide a single 1680A inductor in a molypermalloy can. Except for the can, the coil is similar to the 1574A coil, two of which are provided in App Fig. 1.

D.3 App Fig. 4 is added to provide a single 1680B inductor which is similar to the 1574B coil of App Fig. 2 except that is mounted in a molypermalloy can.

D.4 Reference to Notes 105 and 106 is added to FS1 and FS2.

D.5 Notes 105 and 106 are added to give electrical characteristics of the 1574A and B and the 1680A and B inductors.

D.6 Terminals and terminal designations are added to FS1 and FS2.

D.7 Note 402 is added to provide information on multipling terminals.

D.8 CAD 6 is added to show connections for single or multiple inductor applications.

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