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COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5, OR PANEL OFFICES

CHANGES

D. Description of Changes

D.1 This circuit is modified to allow parallel operation of alarm sending circuits (SD-95417-01 or SD-27594-01) and the interface and control circuit (SD-28075-01).

D.2 This change also removes from the SD any reference to CSACS.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5243-AAA-ABVL-BT

COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5, OR PANEL OFFICES

CHANGES

D. Description of Changes

D.1 Figure 10 is redrawn to show the 2-ampere fuses, which are part of the cable that is supplied with the meter, in double lined box.

D.2 Circuit Note 303 is added to indicate that the fuses are part of the cable that is supplied with the meter.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5243-RND-ABVL-VK

COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5 OR PANEL OFFICES

CHANGES

D. Description of Changes

D.1 Connection information is added (lead LC) to EADAS/NM control interconnecting circuit.

D.2 Circuit Note 103 and the Option Index Table is modified to reflect the above change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5243-AAA-ABVL-VK

COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5 OR PANEL OFFICES

CHANGES

D. Description of Change

D.1 This is a record change only to document the option V symbol on Issue 19D of contacts 6 and 7B of relays AB and AC.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5243-RAS-ABVL-VM

COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5 OR
PANEL OFFICES

CHANGES

A. Changed and Added Functions

A.1 To signal Interface and Control Circuit for Centralized Status, Alarm and Control System (CSACS) on alarm conditions.

D. Description of Changes

D.1 Wiring option V is added to signal the interface and control circuit for CSACS over Lead LL on alarm conditions.

F. Changes in Description of Operation

F.1 Under SECTION II, at the end of 4.01, add:

. . . Option V provides a signal to the Interface and Control Circuit for Centralized Status, Alarm and Control System (CSACS) over lead LL when these alarm conditions occur.

F.2 Under SECTION III, 4.01 add:

(v) Interface and Control Circuit - SD-28075-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5241-RAS-RBC-DM

COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5 OR PANEL OFFICES

CHANGES

B. Changes in Apparatus

B.1 Added

MBB Lamp, E1, Red, Fig. 11
F Resistor, 19BM, Fig. 11

D. Description of Changes

D.1 Figure 11 is added to provide an additional all markers busy lamp, MBB, where a No. 5 crossbar marker group has more than four dial tone markers. The MBA lamp in existing Fig. 7 serves subgroup A, and the MBB lamp in Fig. 11 serves subgroup B.

D.2 A circuit note is added, and Circuit Notes 101, 103, and 107 are modified as a result of the addition of Fig. 11.

D.3 Figure 59, 60, and 62 are modified as a result of the addition of Fig. 11.

D.4 Circuit Note 107 is modified to clarify that the all markers busy lamp, MBA, of Fig. 7 may be associated with a group of completing markers arranged for originating line identification.

D.5 Information is added to Circuit Note 101 to reflect that -48 volt signal fuse A serves Fig. 9.

F. Changes in Description of Operation

F.1 Add the following paragraph to SECTION II, 7. ALL-ORIGINATING-REGISTERS AND ALL-MARKERS-BUSY LAMPS - FIG. 7:

7.04 Where a marker group has more than four dial tone markers, the dial tone markers are divided into two subgroups, A and B. Subgroup A serves the higher numbered line link frames, and subgroup B serves the lower numbered line link frames. The MBA lamp in Fig. 7 provides an all markers busy indication for subgroup A, and the MBB lamp in Fig. 11 provides an all markers busy indication for subgroup B.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5611-GSW-RBC-GW

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COMMON SYSTEMS
LINE LOAD CONTROL CIRCUIT
FOR USE IN CROSSBAR NO. 1, NO. 5 OR PANEL OFFICES

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides means for controlling the operation and release of line load control relays of all line link frames, line finder groups, or line switch groups in the office. The circuit includes optional facilities for providing visual indications of overload conditions.

2. GENERAL DESCRIPTION OF OPERATION

2.01 When the line load control feature is provided, the lines on each line link frame or in each line finder or line switch group are divided into three classes; A, B, and C. Line load control relays are provided for lines in class B and class C only. These relays are controlled from a central point in the office by means of this circuit. The facilities for classes B and C are entirely separate, with the exception of the alarm release key.

2.02 When it is desired to indicate line group overload conditions, a lamp is provided per line link frame, line finder group or line switch group which lights when an overload condition exists in the associated frame or group. In addition, for No. 5 crossbar offices, a lamp per marker group is provided to indicate originating registers and marker overload conditions.

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SECTION II - DETAILED DESCRIPTION

1. OPERATION OF CLASS C LOAD CONTROL RELAYS

1.01 When it is desired to operate the class C load control relay of a certain number of frames or line groups, the C keys of the proper Fig. 1 will be operated, closing the C lead from the associated frame or group through to the contacts of relay C, Fig. 2. The CLC key of Fig. 3 will then be operated. The operation of this key: (a) lights the CLC pilot lamp; and (b) operates relay HC.

1.02 Relay HC operated: (a) operates the C relays of Fig. 2; (b) operates relay AC and prepares a locking path for itself on lead AC; (c) provides an auxiliary ground for keeping the CLC lamp lighted; and (d) with W option, connects grounds to leads CGTL and CGTR to the master test frame, jack, lamp, and key circuit, crossbar No. 5 office, to cancel marker ground test and light the associated lamp.

1.03 The operated C relays of Fig. 2 connect ground through all the operated C keys to the C leads, operating the associated load control relays of the selected frames or groups. When the last relay of each selected frame or group operates, it connects ground to lead LC as an indication that all the load control relays for class C lines of that frame or group have operated. Also every operated relay connects ground to lead AC, holding relays HC and AC independent of the CLC key. When relay AC operates it: (a) with Y option for crossbar No. 1 and panel offices, grounds leads G and DL and with X option for crossbar No. 5 offices grounds lead MJ to the alarm circuit to provide a major alarm; (b) prepares a future locking path for relay RC; (c) provides an auxiliary ground for keeping the CLC lamp lighted; and (d) with W option, connects grounds to leads CLPTL and CLPTR to the master test frame, jack, lamp, and key circuit for crossbar No. 5 offices to cancel marker loop test and light associated lamp.

1.04 When Z option is furnished in panel line switch offices, relay AC, operating, also grounds lead SO, operating relays associated with the service observing line circuits, which removes battery through relays in the observing line circuits, from any lines which may be plugged up for service observing. The removal of this battery prevents the line relays of any lines which have been removed from service, from operating and starting calls falsely, due to a backup through the common battery supply lead.

1.05 To silence the alarm, the nonlocking AR key is momentarily operated, operating relays RB and RC. The operation of relay RB at this time performs no useful function, and releases when the AR key is released. Relay RC however: (a) locks to relay AC; and (b) opens lead G and DL (Y option) or lead MJ (X option) silencing the alarm.

This sequence of operations is desired even on regular operation of the CLC key to insure against any false or premature operation of this key. The class C load control relays of other frames or groups may now be operated by operating the C key of the associated Fig. 1.

1.06 See Part 10.

2. RELEASE OF CLASS C LOAD CONTROL RELAYS

2.01 When it is desired to release the operated class C load control relays of the various frames or groups, the C keys of the associated Fig. 1 are restored, one at a time, releasing the relays and extinguishing the C lamp. When the last frame or group relay is released, ground is removed from lead AC and, if the CLC key is restored, relays HC, AC, and RC release, restoring the circuit to normal. If the CLC key is restored before the frame or group relays are released, it performs no function, as relays HC, AC, and RC are locked to lead AC, keeping the CLC lamp lighted. This arrangement is provided to insure against accidental simultaneous release of all frame or group load control relays due to premature restoral of key CLC.

2.02 See Part 10.

3. OPERATION AND RELEASE OF CLASS B LOAD CONTROL RELAYS

3.01 The information described in 1.01 and 2.01 applies under this condition except relays HB, B, AB, and RB; keys B and CLB; lamps B and CLB; and leads B, LB, and AB are involved instead of relays HC, C, AC, and RC, keys C and CLC; lamps C and CLC; and leads C, LC, and AC, respectively.

3.02 See Part 10.

4. ALARMS

4.01 Should any frame or group load control relay operate falsely, the B or C lamp of the corresponding Fig. 1 will light, and ground will be connected to lead AB or AC, operating relay AB or AC and, thus, originating a major alarm and lighting lamp CLB or CLC. Should key CLB or CLC be falsely operated, or relay HB or HC be operated due to a trouble ground, the alarm will also be brought in. Any alarm can be locked out under control of the alarm relay by the operation of the AR key, as described in 1.01 and 3.01. Should an alarm in either class be locked out, a trouble condition in the other class will still bring in an alarm.

5. LINE GROUP OVERLOAD LAMPS - FIG. 4 AND 5

5.01 When this feature is required one Fig. 4 is provided for every two line link frames, line finder groups, or line switch groups. One Fig. 5 will be required for each No. 1 crossbar line link frame. See Part 10.

FOR NO. 1 CROSSBAR OFFICES

5.02 When a dial-tone-delay condition exists on a crossbar line link frame due to no districts or senders being available for approximately 2 seconds, a dial-tone-delay register is operated in the traffic register circuit. The G relay winding of this circuit is connected in multiple with the register, and the operating ground for the register is extended over lead E through the winding of relay G to battery on lead B, operating relay G. The ground on lead H from the back contact of relay G is in multiple with ground from the back contact of the register and provides a locking path for the register help relay in the traffic register circuit, to insure that the register and relay G both are completely operated before their operating path is opened. Relay G in operating removes ground from lead H and lights lamp G as an indication of the dial-tone-delay condition. Relay G is slow in releasing so that it keeps the lamp lighted for a short interval after the register operates. If the dial-tone-delay condition persists on the next call, the G relay will reoperate at the end of the dial-tone-delay timing interval, relighting the lamp. It will thus be seen that in case of a persistent delay condition the lamp signal received will be a flashing signal.

FOR NO. 5 CROSSBAR OFFICES

5.03 When an overload condition exists in a No. 5 crossbar line link frame, as indicated by a predetermined delay in serving any or all waiting calls, ground will be connected to the corresponding G lead lighting the associated G lamp of Fig. 4. This lamp will remain lighted thereafter until all waiting calls have been served.

FOR PANEL OFFICES

5.04 When an overload condition exists in a panel line finder or line switch group the associated lamp G will be lighted by the connection of ground on lead G from the start circuit or miscellaneous register circuit. The exact conditions under which lead G will be grounded vary for different types of offices, as listed below:

(a) Link Type Offices - Call waiting with all districts or links busy.

(b) Line Finder Sender Selector Office - Call waiting with all districts busy.

(c) Line Switch Office - All districts busy.

6. FRAME LINE JACKS - FIG. 6

6.01 Jacks, per Fig. 6, are provided when a load control panel is provided to permit establishment of a talking connection to other frames in the office when a telephone set plug is inserted in the TEL jacks.

7. ALL-ORIGINATING-REGISTERS AND ALL-MARKERS-BUSY LAMPS - FIG. 7

7.01 These lamps are provided for No. 5 crossbar offices to give additional indications of overload conditions. See Part 9 and 10.

7.02 When the group busy circuit, for use with originating registers, functions as a result of the marker having found all originating registers busy, ground is connected to lead RBL to light the ORST-0 lamp. When the ground busy circuit functions it also causes the originating registers to transfer to "short timing" and lights an ORST lamp at the master test frame. Ground is maintained on the RBL lead to keep the ORST-0 lamp lighted as long as all originating registers are found busy and for a timed interval of 9 through 17 seconds, thereafter. The

timing for the 9 through 17-second interval does not start until the "all-registers-busy" condition disappears and is recycled each time an all-registers-busy condition is detected.

7.03 The MBA lamp lights when the all markers busy circuit functions to ground the BA lead. This occurs when an all-markers-busy condition persists for approximately 40 through 68 seconds. The all-markers-busy circuit will cause a corresponding MBA lamp to light at the master test frame and bring in a minor alarm. The MBA lamp will remain lighted until the alarm is retired.

8. CONTROL OF LINE LOAD FROM A SHELTER AREA - FIG. 8

8.01 An extension of the master class keys and alarm release key is provided in Fig. 8 which is located at a remote point such as a shelter area. During an emergency, the operation of the load control relays, B and C of Fig. 2, may be controlled by operation of the master class keys located at the shelter area.

8.02 The B and C keys, Fig. 1, of the groups or frames which it may be necessary to remove from service are first operated at the frames, closing the B and C leads from the associated frames or groups through to the contacts of relays B and C. The operation of the CLC or CLB key at the shelter area causes the circuit to function as described in Part 1., 2., and 3. The major alarm is released by the operation of the AR key at the shelter area. A 48-volt current supply meter, Fig. 10, which is located in shelter area line load control cabinet, is used to indicate the office load.

9. ADDITIONAL ALL-ORIGINATING-REGISTERS-BUSY LAMPS - FIG. 9

9.01 These ORST- lamps are provided in addition to Fig. 7 for No. 5 crossbar offices where more than one originating register group busy circuit is provided in the marker group. One Fig. 9 is provided for each two originating register group busy circuits that are provided in addition to the group busy circuit that is associated with Fig. 7. The lamps provide the same function that is described in Part 7. (See part 10.)

10. LAMP RESISTANCES IN FIG. 1, 3, 4, 7, AND 9

10.01 Resistances A, B, C, D, and E are provided for connection in series with E1 lamps to provide the proper current flow for these lamps from 48-volt battery. E1 lamps are used to minimize the heating effects of a number of lamps in a strip remaining lighted for a considerable length of time.

11. OFFICE LOAD METER - FIG. 10

11.01 The office load meter is a millivolt meter which is bridged across the power board shunt to give an indication of the total current being supplied from the 48-volt supply. The meter has a scale reading 0 to 100 arranged to read 100 when 50 mV is present across the power board shunt. It permits the maintenance personnel to observe the effect of operating the line load control keys, and is located at or near the remainder of the line load control equipment. Also, the meter, Fig. 10, is provided in the shelter area if Fig. 8, shelter area control circuit, is provided. The shelter area meter is also connected across the power board shunt.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 None.

3. FUNCTIONS

3.01 To provide means for manual preselection of class B or C load control relays of line link frames or of line finder or line switch groups on which it is desired to operate the load control relays.

3.02 To provide means for operating all the preselected class B or C load control relays under control of a master key.

3.03 To provide lamp signals indicating that the preselected load control relays of each frame or group have operated properly.

3.04 To provide a pilot lamp associated with the master class key, which remains lighted while any load control relay of that class is operated.

3.05 To prevent release of the frame or group load control relays when the master class key is restored, thereby insuring release of these relays under control of the individual frame or group class keys used for preselection.

3.06 In conjunction with the connecting frame or group circuits, to light the associated individual frame or group lamp, and class pilot, and originate a major alarm, in case any load control relay operates falsely.

3.07 To originate a major alarm whenever any master class key is operated.

3.08 To provide for originating an alarm for each class separately.

3.09 To provide means for silencing the major alarm and locking it out under control of the operated alarm relay.

3.10 In conjunction with the connecting traffic register circuit, to provide a flashing lamp indication of a dial-tone-delay condition existing in the associated No. 1 crossbar line link frame (Fig. 4 and 5 provided).

3.11 In conjunction with the connecting start circuit or miscellaneous register circuit, to provide a steady lamp indication while an overload condition exists in the associated panel line finder or line switch group (Fig. 4 provided).

3.12 In No. 5 crossbar offices, in conjunction with the line, line link, and connector circuit, to provide a lamp indication of a calls-waiting condition in a line link frame.

3.13 In No. 5 crossbar offices, in conjunction with the group busy circuit for use with originating registers, to provide a lamp indication when all originating registers have been found busy and the originating registers have been caused to transfer to short timing.

3.14 In No. 5 crossbar offices, in conjunction with the all markers busy circuit, to provide a lamp indication when all markers remain busy for a predetermined interval.

3.15 In No. 5 crossbar offices, in conjunction with the master test frame jack, lamp and key circuit, to provide for canceling marker ground tests and loop tests and lighting the associated lamps at the master test frame when line load control has been made effective.

3.16 To provide means for establishing a talking connection between a load control cabinet and other frames in the office.

3.17 To provide means for operating the master class keys from a remote point such as a shelter area during an emergency.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) (No. 1 Crossbar Office) Subscriber Line, Line Link, and Controller Circuit - SD-25553-01.

(b) (No. 5 Crossbar Office) Line, Line Link, and Connector Circuit - SD-25548-01; Line, Line Link, and Marker Connector Control Circuit - SD-26030-01.

(c) (Panel Office) Line, Trip, Start, and Link Circuit - SD-20294-01.

(d) (Panel Office) Trip and Start Circuit - SD-21713-01.

(e) (Panel Office) Line and Trip Circuit - ES-240292.

(f) (Panel Office) Line Switch Circuit - ES-207698.

(g) (No. 1 Crossbar Office) Aisle Pilot Circuit - SD-25087-01.

(h) (No. 1 Crossbar Office) Audible and Visual Alarm Circuit - SD-96188-01.

(i) (No. 5 Crossbar Office) Alarm Circuit - SD-25671-01.

(j) (Panel Office) Floor Alarm Board Miscellaneous and Auxiliary Alarm Circuit - SD-21203-01.

(k) (Panel Office) Miscellaneous Alarms Circuit - ES-20241-01.

(l) (No. 1 Crossbar Office) Traffic Register Circuit - SD-25942-01.

(m) (Panel Office) Start Circuit - ES-207197.

(n) (Panel Office) Miscellaneous Register Circuit - SD-21537-01.

(o) (No. 5 Crossbar Office) Master Test Frame Jack, Lamp, and Key Circuit - SD-25762-01.

(p) (No. 5 Crossbar Office) Group Busy Circuit for Use With Originating Registers - SD-25795-01.

(q) (No. 5 Crossbar Office) All Markers Busy Circuit - SD-25695-01.

(r) Frame Line Circuit - SD-21501-01.

(s) Local Frame Line Circuit - SD-96379-01.

(t) (Panel Office) Service Observing Line Circuit - SD-21425-01.

(u) Power Systems Battery Control Circuit - SD-81121-01 (typical).

5. TAKING EQUIPMENT OUT OF SERVICE

5.01 In order to take this line load control circuit out of service when the load control relays are operated, release the load control relays as described in Parts 2 and 3.

GENERAL PRECAUTIONS TO BE FOLLOWED WHEN WORKING ON THE APPARATUS

5.02 The apparatus should be worked on during periods of light traffic. The operation of relay HB or HC will cancel the marker ground test and light the associated lamp when option W is provided. The operation of relay AB or AC will cancel the marker loop test and light the associated lamp when option W is provided. The operation of relay AB or AC will, with Y option, ground leads G and DL or, with X option, ground lead MJ to the alarm circuit and provide a major alarm.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1 Added

Office Load Meter - G-Type mV Meter - Fig. 10

B.2 Superseded	Superseded By
TEL A Jack - 223A - Fig. 6	TEL A Jack - 223AM - Fig. 6
TEL B Jack - 223A - Fig. 6	TEL B Jack - 223AM - Fig. 6

D. Description of Changes

D.1 Figure 60 for Fig. 7 and 9 and Fig. 62 for Fig. 3, with options X and W, are clarified to facilitate wiring.

D.2 Provision is made to show the office load meter on the schematic. The office load meter has been mounted with the line load control equipment for several years. The office load meter is shown on the schematic for two reasons:

(a) The meter is a function of the line load control circuit because it permits the maintenance personnel to observe the effect of operating the line load control keys; and

(b) Power Systems 300-Type Plants Battery Control Circuit, SD-81121-01, shows leads + and - connecting to the line load control circuit.

(1) The office load meter is shown in Fig. 10 with leads + and - connecting to the power systems battery control circuit. The meter is a G-type mV meter.

(2) Reference to Fig. 10 is shown in the feature or option Note 103.

(3) A circuit note is added to show that Fig. 10 was added on Issue 17D.

(4) An equipment note is added to explain in what quantities Fig. 10 may be provided in No. 1 crossbar and panel offices.

(5) An equipment note is added to explain what quantities Fig. 10 may be provided in No. 5 crossbar offices.

(6) An information note is added to explain how the office load meter code is determined.

(7) Information is added to Fig. 52 and 60 to reflect the addition of leads + and - to the power systems battery control circuit.

D.3 Jacks TEL A and TEL B, code 223A, which is a solder-type jack, are superseded by code 223AM, which is a solderless-wrap-type jack, for cost reduction.

(a) Figure 6 is changed to show the additional code for jacks TEL A and TEL B.

(b) A circuit note is added to explain the application and rating of the two jack codes.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5611-GSW-MFF-PB