

## 1-2 AND 1-4 REMOTE CONTROL PROGRAM SWITCHING ARRANGEMENTS

### DESCRIPTION

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#### 1. GENERAL

1.01 This section describes the transmission features, circuit arrangements, office equipment, wiring and operation of remotely controlled program switching equipment. This switching equipment provides the following features:

- (1) An arrangement for switching under remote control one line\* to either of two lines. This will be referred to hereinafter as the 1-2 switching arrangement.
- (2) An arrangement for switching under remote control one line to any one of four other lines. This will be referred

\* In this section the general term "line" will be used to represent either the circuit between toll program offices, or the local loop between the telephone office and the broadcasting company studio. The line which is switched will be referred to as a "switched line" and the line to which the switch is made will be referred to as a "selected line."

\*\*Reprinted to comply with  
modified final judgment.

to hereinafter as the 1-4 switching arrangement.

(3) In the case where a loop between the studio and the toll telephone office is the "switched line" an arrangement for monitoring the program on the selected line to which the loop is to be switched, is provided for use only with 1-2 switching.

(4) The control point\* of the switch may be located at a broadcast studio or at a telephone office, while the switching point\* may be located at a telephone office adjacent to the control point or at a more remote telephone office. The control system is independent of the Program Transmission Paths.

(5) The 1-2 and 1-4 switching arrangements may complete the remotely controlled switch, at the switching point, by means of line switching relays provided only for this purpose or by means of line switching relays in the locally controlled preselection and switching system which is described in Section 320-235-100.

(6) Remotely controlled switching may be used with reversible or non-reversible lines using the 12C, 14A, 14B or 14C amplifiers and C, D, F, G, J or K type bridges. When used with reversible circuits, the reversing control leads of the individual lines are carried through the switching equipment, and the direction of transmission is controlled in the usual manner by the standard program transmission reversing arrangements.

(7) With the control point at a broadcast studio, the switching control circuit between the studio and the adjacent telephone office may be arranged for operation from 16 or 20 cycle ringing current or d-c battery supplied from the adjacent telephone office or from d-c battery supplied at the studio. The 1-2 arrangement employs in addition to the program pair, one pair of wires between the studio and the adjacent telephone office for the control channel when a-c ringing current from the

\* In this section the term "control point" refers to the studio or telephone office at which the switching control keys are located and the term "switching point" refers to the telephone office at which the switching relays actually complete the connection between the switched and selected line.

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telephone office or d-c battery supplied at the studio is used. A battery feeder pair is employed when supplying d-c battery from the telephone office. The 1-4 arrangement employs two pairs, in addition to the program pair, between the studio and adjacent telephone office for the control channel in all cases.

(8) The control pairs between the studio and adjacent telephone office are also used for the talking circuit and for monitoring the selected line to which the loop is to be connected, where the monitoring feature is furnished.

(9) The control channel between telephone offices, which is operated on a d-c basis, utilizes standard message line or telegraph facilities. If it is desired to extend the monitoring channel between the studio and the adjacent telephone office to a more remote switching point, a separate cable pair is employed.

(10) Visual indications of the key selection, condition of the control circuit and completion of the switch are provided at all the telephone offices involved. Visual and audible alarms are provided at the telephone office adjacent to the studio to indicate a failure of the control at any point in the circuit.

1.02 The general arrangements of the 1-2 remote control switching system, indicating the various optional arrangements, are covered in Fig. 1 and the 1-4 switching arrangement in Fig. 2.

1.03 Equipment at the broadcast studio is contained in a single shop assembled and wired unit, single sidemounted, depressed panel design, arranged for mounting in a 19" relay rack or cabinet. Equipment at the telephone office is designed to mount in 19" relay rack bays of channel or I-beam construction. Control and signaling relay equipment is contained in a shop assembled and wired unit with leads brought to a terminal strip on the unit for external connection. Jacks, keys, lamps, line switching relays and associated apparatus are arranged on 19" jack mountings and mounting plates.

## 2. TRANSMISSION FEATURES

2.01 The remote control program switching circuits have been designed for application to existing open wire and cable program circuits with a minimum of change in wiring. The program facilities may be either reversible or non-reversible circuits and may or may not be arranged for locally controlled preselection and switching. The transmission circuits consist of the standard program transmission facilities, and associated bridging

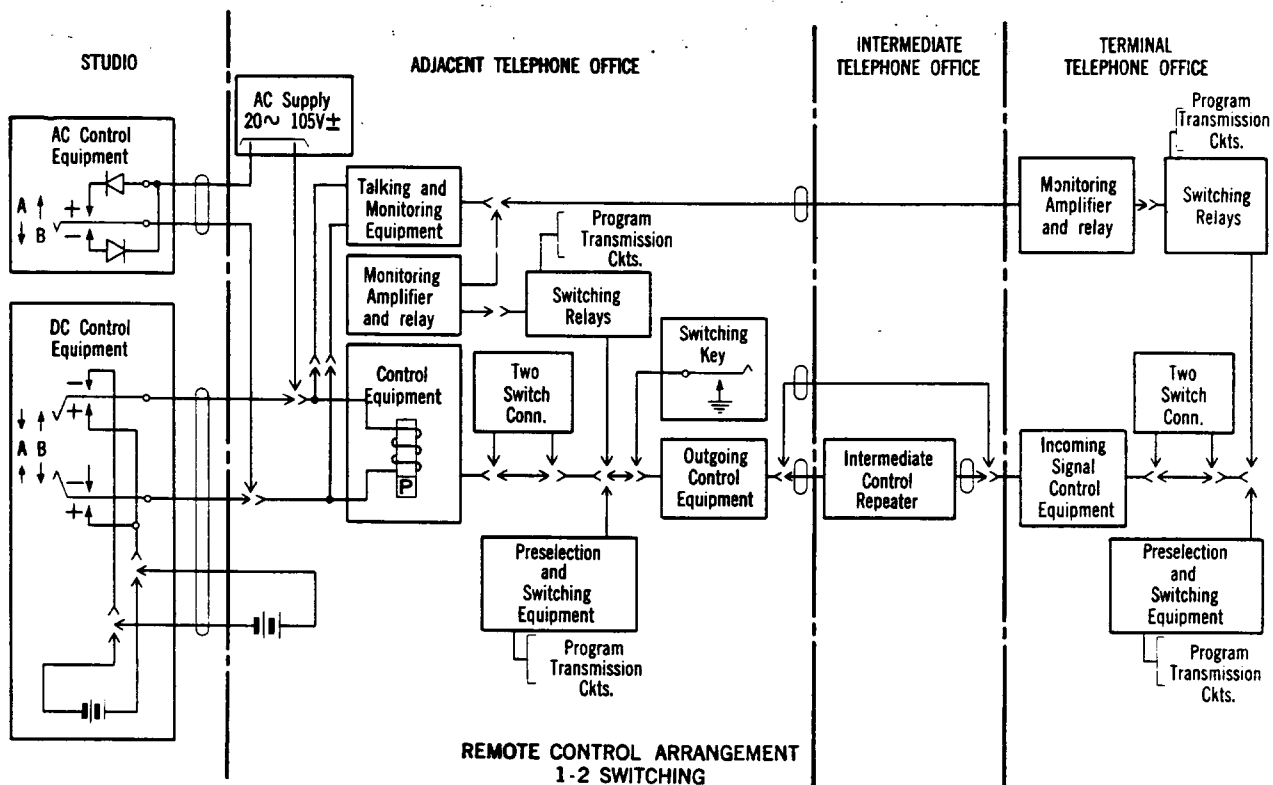


Fig. 1

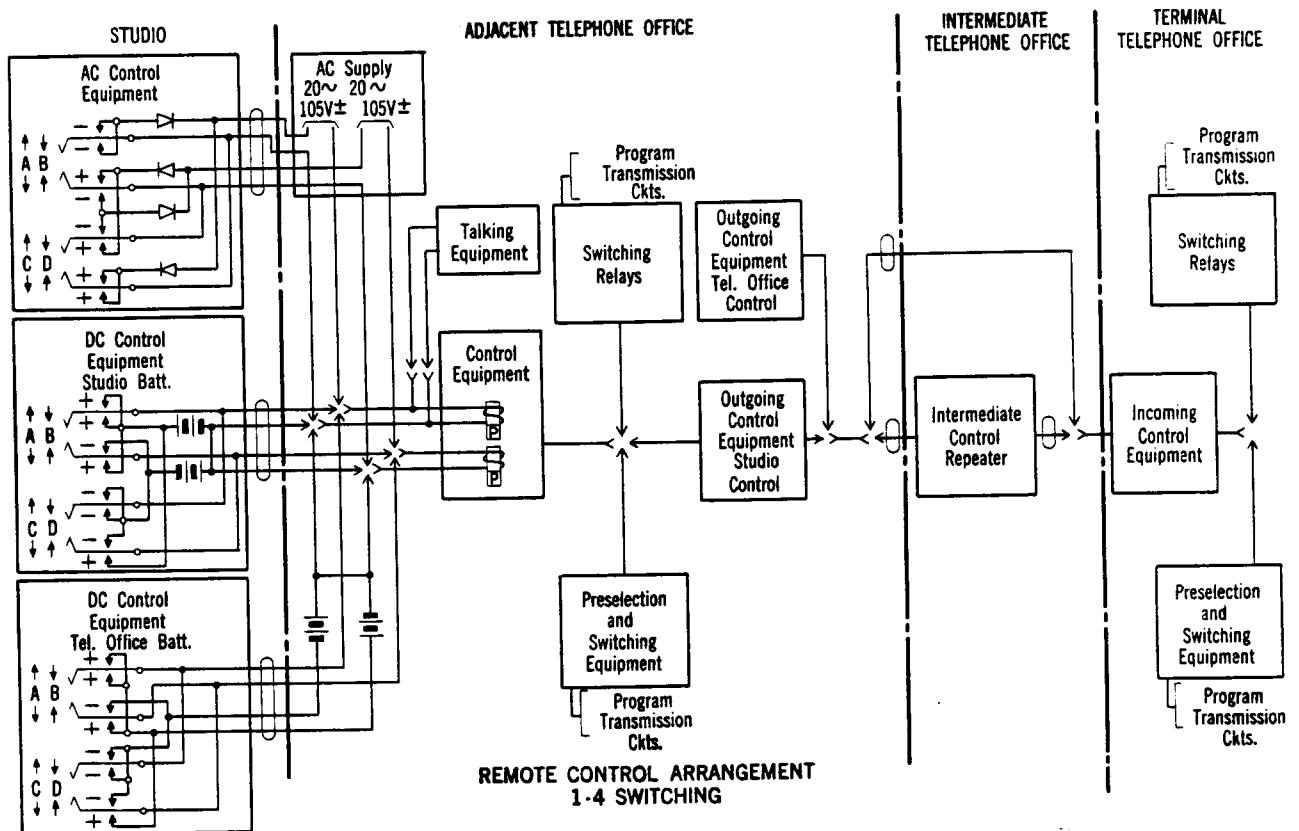


Fig. 2

arrangements, carried through contacts of the switching relays. They do not otherwise enter into the switching circuit, which is purely for control purposes, except for the low grade continuity monitoring circuit to the control studio, furnished only with 1-2 switching. This monitoring circuit is carried over message facilities between telephone offices and over the switching control pair to the controlling studio. Transmission schematics of the switching relays for various program facilities are covered in Figs. 3, 4, 5, and 6.

2.02 Fig. 3 shows a single line transmission schematic of the switching relays for remotely controlled switching applied to non-reversible program circuits, equipped with 14C program amplifiers and G type bridges, not arranged for locally controlled preselection and switching. A non-reversible switched line is arranged to receive from selected bridging multiples. When receiving from the bridge the operation of the (L) switching relay, connects leads T and R of the switched line directly to a branch of the bridge to which a selected line is transmitting.

2.03 The monitoring arrangement, including the monitoring relay (M), pad, monitoring amplifier and monitoring jacks is available

only with the 1-2 switching when the remote switching system provides its own line switching relays and control keys are located at a broadcast studio. It provides a low grade continuity monitoring circuit to the controlling studio for cues on the selected line not connected to the switched line. The monitoring circuit is carried over an ordinary telephone facility between telephone toll offices and superposed on the switching control pair between the studio and adjacent telephone office. The operation or release of the (M) relay under control of the switching circuit, connects the monitoring circuit to the proper selected line.

2.04 Fig. 4 shows a single line transmission schematic of the switching relays for remotely controlled switching applied to reversible program circuits equipped with 14C program amplifiers and G type bridges, not arranged for locally controlled preselection and switching. Operation of the (L) switching relay associated with the bridge containing the selected line, connects the T and R leads of the switched line to the bridge. It also connects the J1 lead to its associated secondary reversing relay and the SX lead to SX leads of other lines associated with the bridge. Direction of transmission is determined by the

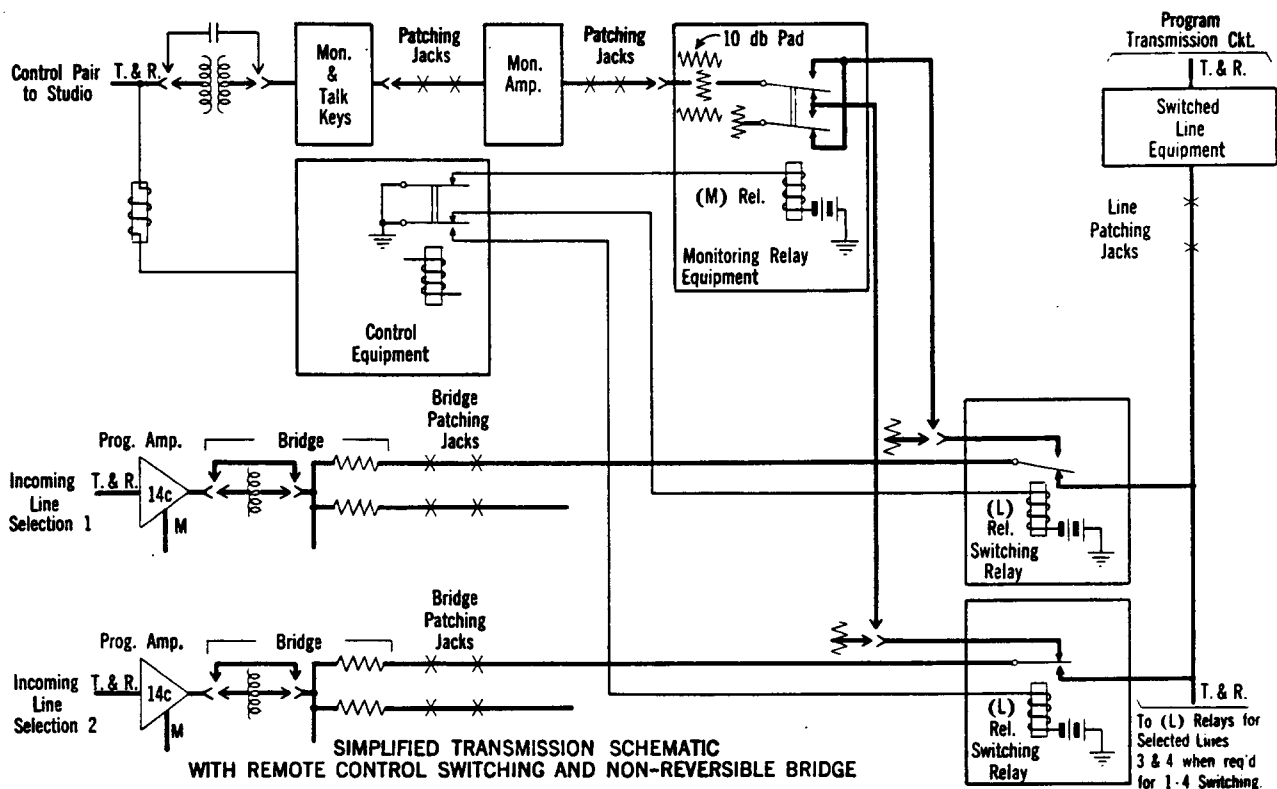


Fig. 3

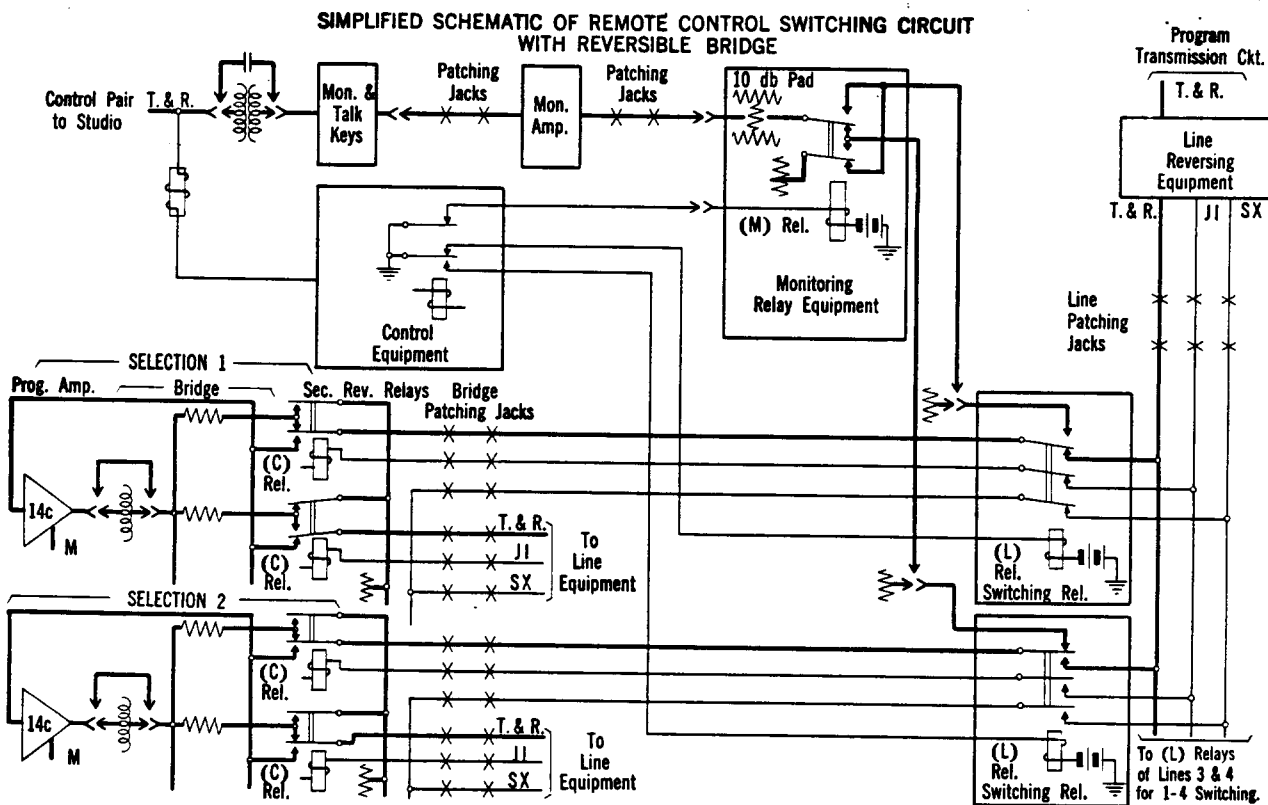


Fig. 4

standard reversing arrangements. The monitoring arrangements for 1-2 switching are the same as covered in Paragraph 2.03.

2.05 Fig. 5 shows a single line transmission schematic of the switching relays for remotely controlled switching applied to non-reversible program circuits, equipped with 12C, 14A and 14B program amplifiers and associated bridging arrangements, not arranged for locally controlled preselection and switching. A non-reversible switched line will always be either permanently receiving from or permanently transmitting to the selected line. When receiving from the bridge the operation of the (L) switching relay connects leads T and R of the switched line directly to a branch of the bridge to which a selected line is transmitting. When transmitting to the bridge, the operation of the (L) switching relay connects leads T and R of the switched line to the repeating coil input, when an F type bridge is used or to a bridge branch when any other type bridge is used. The monitoring arrangements for 1-2 switching are the same as covered in Paragraph 2.03.

2.06 Fig. 6 shows a single line transmission schematic of the switching relays for remotely controlled switching circuits applied to reversible program circuits, equipped with

12C, 14A or 14B program amplifiers and associated bridging arrangements, not arranged for locally controlled preselection and switching. It will be noted that T1-R1 and T2-R2 leads are shown from the amplifier jacks of the switched line, through the switching relays. The T1-R1 leads are always wired, but the T2-R2 leads are wired only in those cases employing 12C, 14A or 14B amplifiers with F type bridges. Since the F type bridge contains a repeating coil in the input, these additional leads and contacts are required in the switching circuit to provide the proper input connection when the associated amplifier is transmitting into the bridge. When transmitting to an F type bridge, the reversing circuit has disconnected the T1-R1 leads from the amplifier and the operation of the (L) switching relay connects leads T2-R2 of the switched line to the input of the bridge containing the selected line. When receiving from an F type bridge the reversing circuit has disconnected the T2-R2 leads from the amplifier and the operation of the (L) switching relay connects leads T1-R1 of the switched line to a branch of the bridge to which the selected line is transmitting. When transmitting to or receiving from any other type bridge, the operation of the (L) switching relay connects the T1-R1 leads of the switched line to a branch of the bridge containing the selected line.

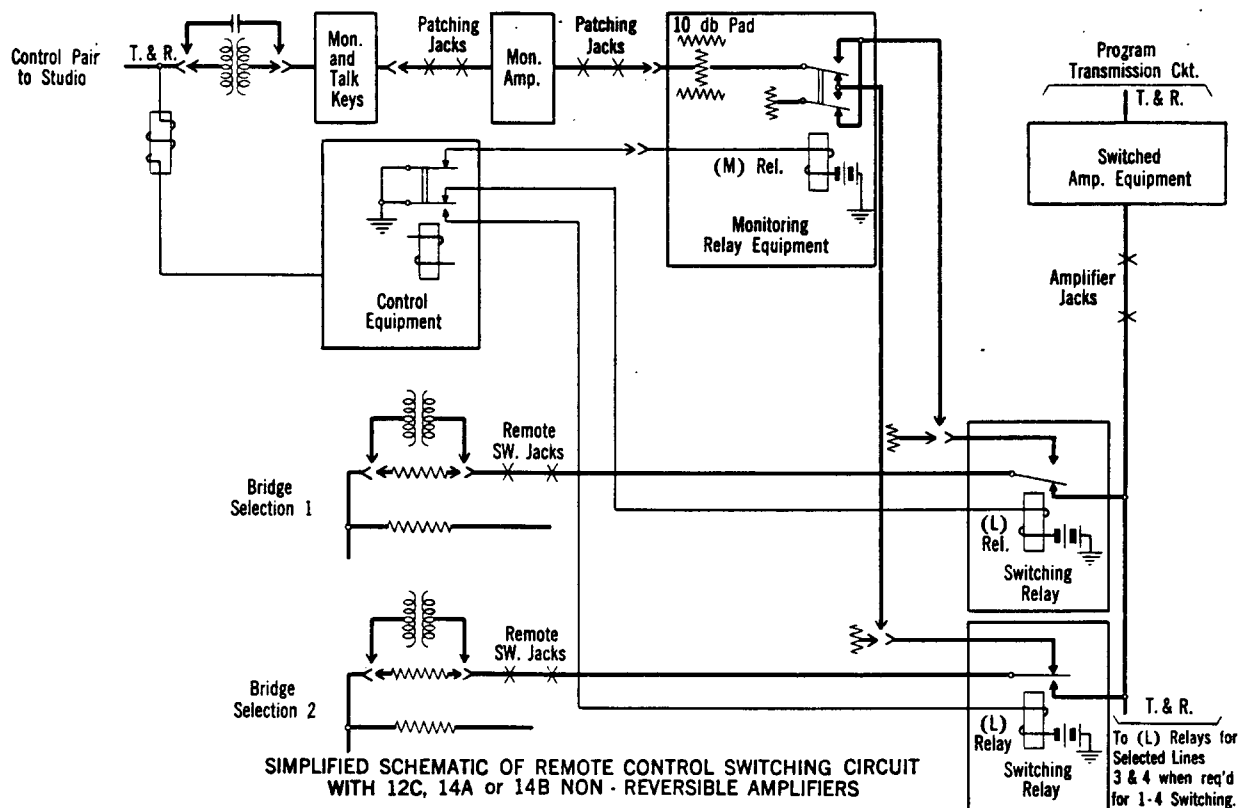


Fig. 5

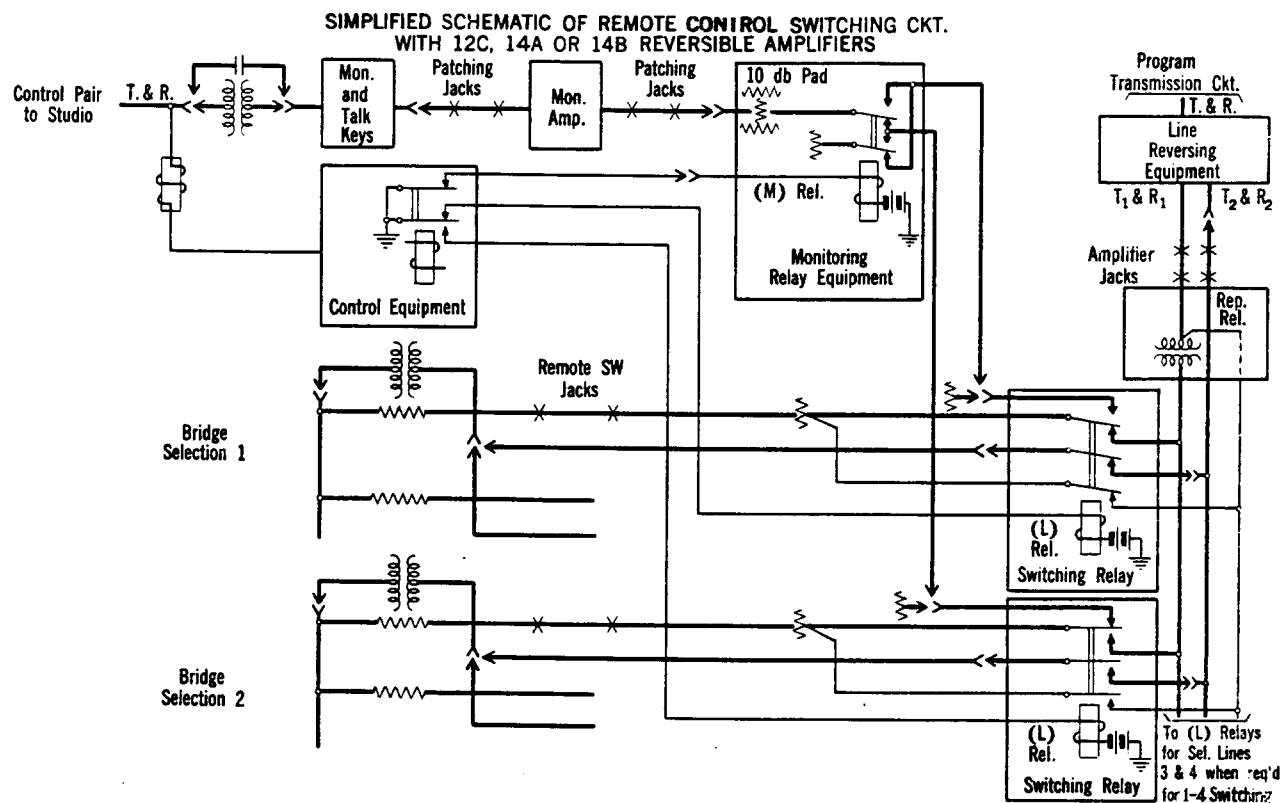


Fig. 6

2.07 Direction of transmission is determined by the standard reversing arrangements described in other sections of practices. The reversing current is carried over the T1-R1 leads and the repeating coil in these leads is employed to isolate the switching circuit from the simplex battery carried on the tip and ring conductors in the amplifier reversing circuit. The repeating coil used in this manner prevents clicks which would otherwise occur on the program circuit with the switching contacts of relay (L) carrying reversing current and not opening and closing simultaneously. The simplex lead from the amplifier side of the repeating coil carries the reversing control current through the switching relay contacts to the high impedance resistance simplex which impresses it on the tip and ring conductors of the bridge. The repeating relays are employed to repeat the control current. The monitoring arrangements for 1-2 switching are the same as covered in Paragraph 2.03.

2.08 When remotely controlled switches are completed in a locally controlled preselection and switching system, the transmission circuits of the switching relays are those normally used for the locally controlled switching, the switching relays being operated

by remote control instead of local control. These circuits are covered in detail, in the section of practices describing the relay preselection and switching system.

### 3. CIRCUIT AND EQUIPMENT FEATURES

#### (A) General

3.01 Equipment for remote control switching of program lines is functionally separated into three divisions (1) Control equipment consisting of keys, and when required, lamps at the control point in the switching system. (2) Control and signaling relay equipment at control, intermediate and terminating points in the switching system. (3) Line switching relay equipment and patching jacks at the terminating points in the switching system. Equipment and circuit arrangements are designed to permit flexibility in meeting variable requirements of the particular switching system.

#### (B) Broadcast Studio Equipment

3.02 Control and signaling equipment at the studio consists of one shop wired and assembled unit (J68617AQ) of the depressed panel design. The unit contains the switching,

talking and signaling keys and equipment for a switching circuit, a talking and low grade continuity monitoring circuit and a circuit for obtaining 20 cycle a-c or d-c power supply from the telephone office. It is arranged to connect through a terminal strip on the unit, to a telephone set, monitoring head set or loud-speaker and to local battery supply instead of telephone office power supply when required. The signaling key provides a means of signaling the attendant at the telephone office and the talking key provides a means of disconnecting the trunk to the telephone office from the monitoring circuit and connecting it to the telephone set.

3.03 The circuit arrangements provide for 1-2 switching with or without order wire and monitoring facilities, and for 1-4 switching with or without order wire and without monitoring facilities. The power supply for the switching circuits may be a-c or d-c obtained over the switching control cable pair from the telephone office, or d-c supplied from a battery located at the studio.

#### (C) Telephone Office Switching Control Equipment

3.04 Control and signaling relay equipment at a telephone office consists of one shop wired and assembled panel arranged for mounting on 19" frameworks of channel or I-beam construction. All leads are brought out to terminal strips on the panel for external connection. Four arrangements of the control panel are available to fit conditions of 1-2 or 1-4 switching at a controlling, adjacent, intermediate or terminating point of the remote control switching system. Keys, lamps, patching jacks and line switching relay equipment external to the control panel are mounted on jack mountings and mounting plates for mounting on 19" frameworks.

3.05 With control of the switch at the studio, one cable pair, in addition to the program pair, is employed between the studio and adjacent telephone office for 1-2 switching using a-c ringing supply from the telephone office or d-c battery at the studio for the control current. For 1-2 switching using d-c battery from the telephone office as the control current and for 1-4 switching, two cable pairs are employed. These cable pairs provide for switching control, talking, signaling, continuity monitoring and power supply. The control panel provides relay circuits for switching the monitoring trunk to the selected line not connected to the switched line; and for controlling the switching current and extending it to line switching relays in the same office or to a distant office. Lamp indications on the panel with external connections to the office visual and audible alarm system, are provided to indicate failure of the control current, and for use as a calling-in signal from the studio. Talking and signaling keys are located external to the panel,

for use in calling in the studio attendant and in disconnecting the trunk between the studio and telephone office from the monitoring circuit and connecting it to the telephone set.

3.06 With control of the switch at a telephone office the control panel is arranged to provide a relay circuit for controlling the switching current, extending it to a distant office and receiving an acknowledgment of the switch completion from the distant office. It also provides a lamp indication on the panel and an external connection to the office visual and audible alarm system to indicate a failure of the switch completion. The switching keys and associated lamps indicating the switch selection and completion are externally located.

3.07 At intermediate offices the control panel provides a relay circuit for repeating the control current and acknowledgment signal, and for lighting lamps located externally to indicate the switch selection and completion.

3.08 At terminating offices the control panel provides a relay circuit for receiving the control current, extending it to the line switching relays, and returning an acknowledgment signal when the switch has been completed.

#### (D) Line Switching Equipment without Locally Controlled Preselection and Switching

3.09 At a terminating point not equipped with a locally controlled preselection and switching system, line switching relays are provided for completing the switch. One relay is provided for each switch selection. They provide contacts for switching the transmission leads, for carrying the reversing leads through the switching relays, and for the necessary terminations and monitoring connections to the lines not selected.

3.10 With reversible lines utilizing 14C program amplifiers, the reversing control current is carried through the switching circuit in separate leads from the switched line to the selected line and the bridge patching jacks provided with the 14C program amplifier and associated G type bridge are used for patching.

3.11 With reversible lines utilizing 12C, 14A and 14B program amplifiers, a repeating coil is furnished in the transmission leads between the switched line and switching relays to isolate the transmission contacts of the switching relay from the reversing control current. The function of this coil is described in detail in Paragraph 2.07. Repeating relays are provided to repeat the reversing current from the switched line to the selected line and vice versa. With both reversible and non-reversible lines patching jacks are provided in the transmission leads between the

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switching relays and switched lines to permit flexibility in patching the remote switching system to different groups of lines, when required.

3.12 The 24 volt battery supply for operating the line switching relays and monitoring switching relay, is furnished through a filter located with the program equipment to eliminate the possibility of noise entering the program transmission leads from this source. The battery supply to the relays is supplied through non-adjacent parallel fuses to reduce the possibility of interruptions due to fuse failure.

### (E) Line Switching Equipment with Locally Controlled Preselection and Switching

3.13 At terminating points equipped with a locally controlled preselection and switching system, the switch is completed through the line switching relays provided in that system, and separate line switching relays and associated repeating coils, repeating relays and patching jacks are not required. Remote control relays associated with the switched line and steering relays associated with the switched and selected lines are provided for remotely controlling the switch. These relays are located in the program switching bays of the locally controlled preselection and switching system.

3.14 Lines equipped for remote control switching are also arranged for local switching in the preselection and switching system. The selected lines are switched to the remote control condition, by switching them to bridge branches, under local control as covered in sections of practices covering the relay preselection and switching system. A separate remote control switching multiple, similar to the local switching multiple, is added in the preselection and switching panel, for use in switching to the remote control condition, lines which are to be switched under remote control. In the remote control multiple, a control unit with associated (A), (B), and (RC) relays is provided for each line which is to be switched under remote control. In locally switching the line to the remote control condition, the (RC) relays function to condition the associated line switching relays for operation under remote control.

3.15 The remote control switch is completed by connecting the switched line to a branch of the same bridge, to which the selected line has previously been connected by the local switching system. The proper line relay is operated under control of the remote control relay associated with the switched line and the steering relay associated with the line selected by the remote switching operation.

3.16 Remote control patching jacks associated with each line equipped for remote control

switching and switch patching jacks associated with each remote control switching system are provided to permit flexibility in grouping lines to a particular switching system. These jacks are located in the same jack field used for the line patching jacks of the locally controlled preselection and switching system.

### (F) Monitoring Equipment

3.17 With the 1-2 switching system providing its own switching relays a low grade continuity monitoring circuit to the studio may be provided for monitoring on the selected line to which the switched line is not connected. The monitoring switching relay in the control panel connects the transmission leads from the selected line to which the switched line is not connected, through an impedance matching pad to a monitoring amplifier (J68635F). The output of the monitoring amplifier is connected to the studio trunk directly if the amplifier is located at an adjacent office or through a message cable pair if located at a distant office. Patching jacks are provided on the input and output sides of the amplifier to permit flexibility.

## 4. OPERATION

4.01 Remote control switching is straightforward in operation. The switching operation is completed by operating the switching key at the control point, for the line selection required. Failure of the switch to complete, brings in a visual and audible alarm at the telephone office adjacent to the broadcast studio, or at the controlling office when the switch is controlled at a telephone office. Visual indications appear at the intermediate offices to indicate in which direction the failure has occurred. The studio and adjacent telephone office attendants signal each other over the two-way signaling and talking circuit by operating their respective (SIG) keys and switch the monitoring trunk to their telephone sets by operation of their respective (TALK) keys. Communication between telephone offices is accomplished over the normal order wire facilities. A more detailed discussion of the operation of remote control switching is covered in the following paragraphs.

4.02 Figs. 7, 8, and 9 cover the control circuits of the remote switching system in schematic form. For descriptive purposes the 1-2 switching system is shown with a-c supplied from the adjacent telephone office, used as the operating current to the studio. The principles of operation are the same for the conditions where d-c battery is supplied from the telephone office or at the studio. The 1-4 switching system is similarly arranged for operation on either a-c or d-c as desired. With a-c operation for either the 1-2 or 1-4 switching system, varistors are employed at the studio to provide, in effect, a d-c signal.



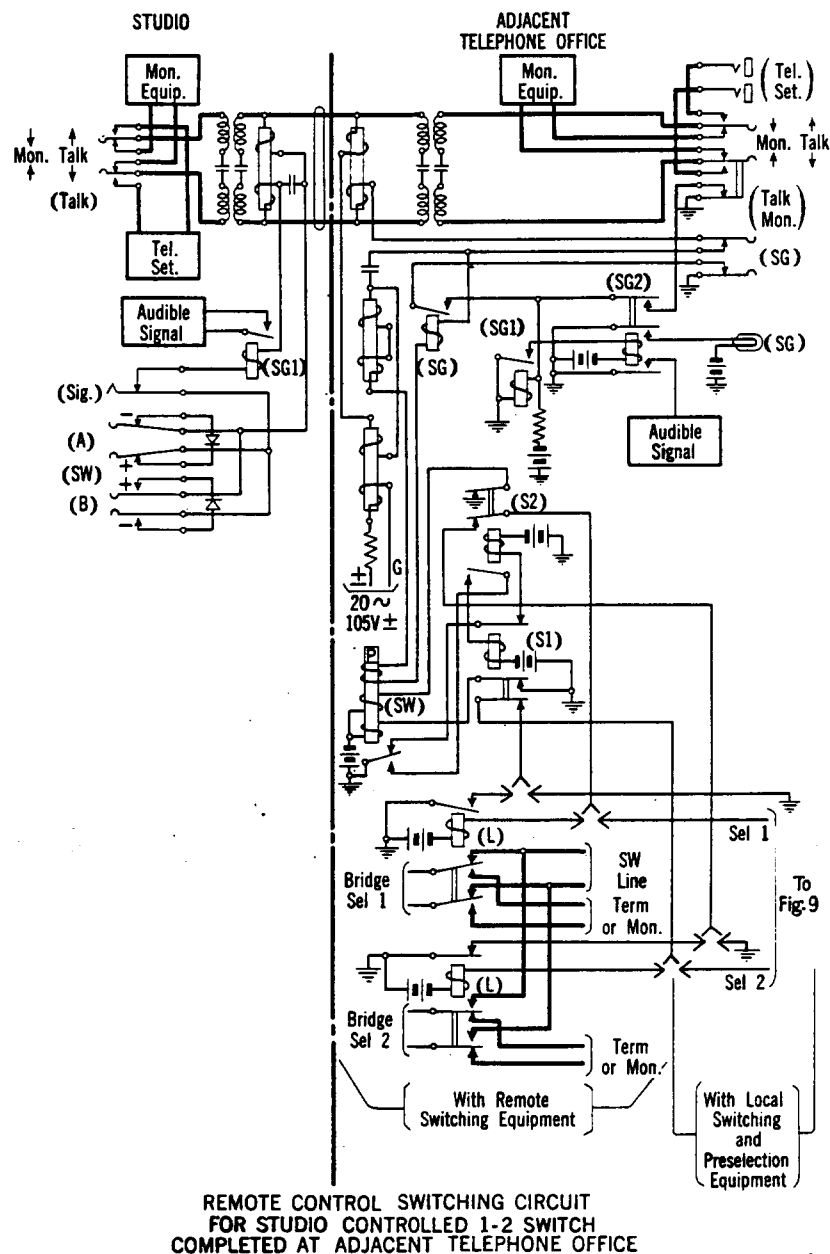


Fig. 7

In the 1-2 switching arrangement, the switching relays in the telephone office are controlled by reversing the polarity of the control signal by means of reversing keys at the studio control point. In the 1-4 switching system the 4 selections are obtained by applying, by means of control keys at the studio, plus battery on the tip conductor for selection A, plus battery on the ring conductor for selection B, minus battery on the tip conductor for selection C, and minus battery on the ring conductor of the signaling pair for selection D.

4.03 Fig. 7 covers the remote control switching circuit for control at the studio with the switch completed at the adjacent telephone office. The switched line is always connected to one of the selected lines. Current over the cable pair from the studio maintains the (SG) relay in an operated condition. If this current should fail, the (SG) relay releases bringing in a visual and audible alarm at the adjacent office. Referring to Fig. 7 and wiring to switching relays provided with the remote switching system, the switched

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line is shown connected to the "A" line selection. Operation of the (B) key at the studio releases the (A) key and reverses the varistor and the flow of current over the cable pair to the telephone office, releasing the (SW) relay. Release of the (SW) relay releases the (S2) relay and the (L) relay associated with selected line 1 disconnects that selected line from the switched line. It also operates the (S1) relay and the (L) relay associated with selected line 2 connecting the "B" line selection to the switched line. Operation of the (A) key at the studio reverses the selection. Completion of the switch in the preselection and switching system is covered in Paragraph 4.10.

4.04 To talk to the telephone office attendant, the studio attendant operates the (TALK) key which disconnects the monitoring equipment and connects the monitoring trunk to his telephone set. Momentary operation of the (SIG) key, releases the (SG) and (SG1) relays and operates the (SG2) relay at the telephone office bringing in a visual and audible signal. The telephone office attendant answers by plugging his telephone set into the (TEL SET) jacks, and operating the (TALK MON) key to the (TALK) position, which cuts off the signal. To signal in the reverse direction the telephone office attendant operates his (SG) key releasing the (SG) relay in the studio and bringing in an audible signal at the studio.

4.05 Fig. 8 covers the remote control switching circuit for control at the studio or at a telephone office, with the switch completed at a distant telephone office. Signaling and talking between the studio and telephone office is the same as covered in Paragraph 4.04. Here also the switched line is always connected to one of the selected lines. Referring to Fig. 8 with wiring covering the connection to switching relays provided with the remote switching system, the switched line is shown connected to the "A" line selection. Operation of the (A) or (B) keys at the studio, performs the same functions as covered in Paragraph 4.03 except that in this case the operation and release of the (S2) relay causes the release and operation, respectively, of the (B) relay. When control is at the telephone office, the release and operation of the (SW) key performs the same functions.

4.06 With the (B) relay non-operated, the (A CON) lamp in the adjacent or control office is lighted, and positive 130 volt battery from the adjacent or control office, over the "T" lead is repeated at the intermediate office causing the (A CON) lamp to light at the intermediate office and operating relay (A1) in the terminating office. Operation of the (A1) relay releases the (B2) and causes the (A2) and associated line switching relay (L) to operate. The operated (L) relay connects the switched line to the selected line and causes the (A3) relay to operate and return

positive 130 volt battery over the "R" lead through the intermediate repeater, causing the (A ACK) lamp to light at the intermediate office and operating relay (A) at the adjacent or control office. The operated (A) relay causes the (D) relay to operate, lighting the (A ACK) lamp and the (C) relay to operate preventing the operation of the (E) relay and alarm circuit. Should the switch be incomplete or the control current fail at any point, the (E) relay will operate bringing in a visual and audible alarm at the adjacent or control office. The condition of the (CON) and (ACK) lamps will indicate the section of the line where the trouble occurred. Where the monitoring feature is furnished, the operation of line switching relay (L) associated with the "A" line selection releases the (M) relay which connects the "B" line selection to the monitoring circuit.

4.07 With the (B) relay at the adjacent or control office operated, the (A CON) and (A ACK) lamps are extinguished, the (B CON) lamp is lighted and positive 130 volt battery over the "R" lead to the terminating office releases the operated (L) relay, operates the (L) relay associated with the "B" line selection and lights the associated lamps in the same manner as described above. The release of the (L) relay associated with the "A" line selection causes the operation of the (M) relay and connects the "A" line selection to the monitoring circuit. Completion of the switch in the preselection and switching system is covered in Paragraph 4.10.

4.08 When the remotely controlled switch is completed in a locally controlled preselection and switching system, the lines involved are arranged for both local and remote control switching and are switched under local control to the remote control condition, previous to switching under remote control. Fig. 9 covers the circuit arrangement for locally switching the remotely switched line to the remote control switching condition and for remote control switching completed in the preselection and switching system. A line used as a selected line in the remote control switching system is switched to the remote control switching condition by preselecting and switching it to a branch of a bridge multiple in the normal manner for performing a local switch as covered in other sections of these practices. It is also returned to the local switching condition in the normal manner.

4.09 Referring to Fig. 9 a line arranged as a switched line in the remote control switching system is locally switched to the remote control condition by operating the associated control unit in the remote control switching multiple. Operation of the control unit closes the contacts of its key (OPR RLS) and causes the (RC), (RC1) and (ST) relays associated with the line to operate, and the red lamp in the control unit to light, indicating

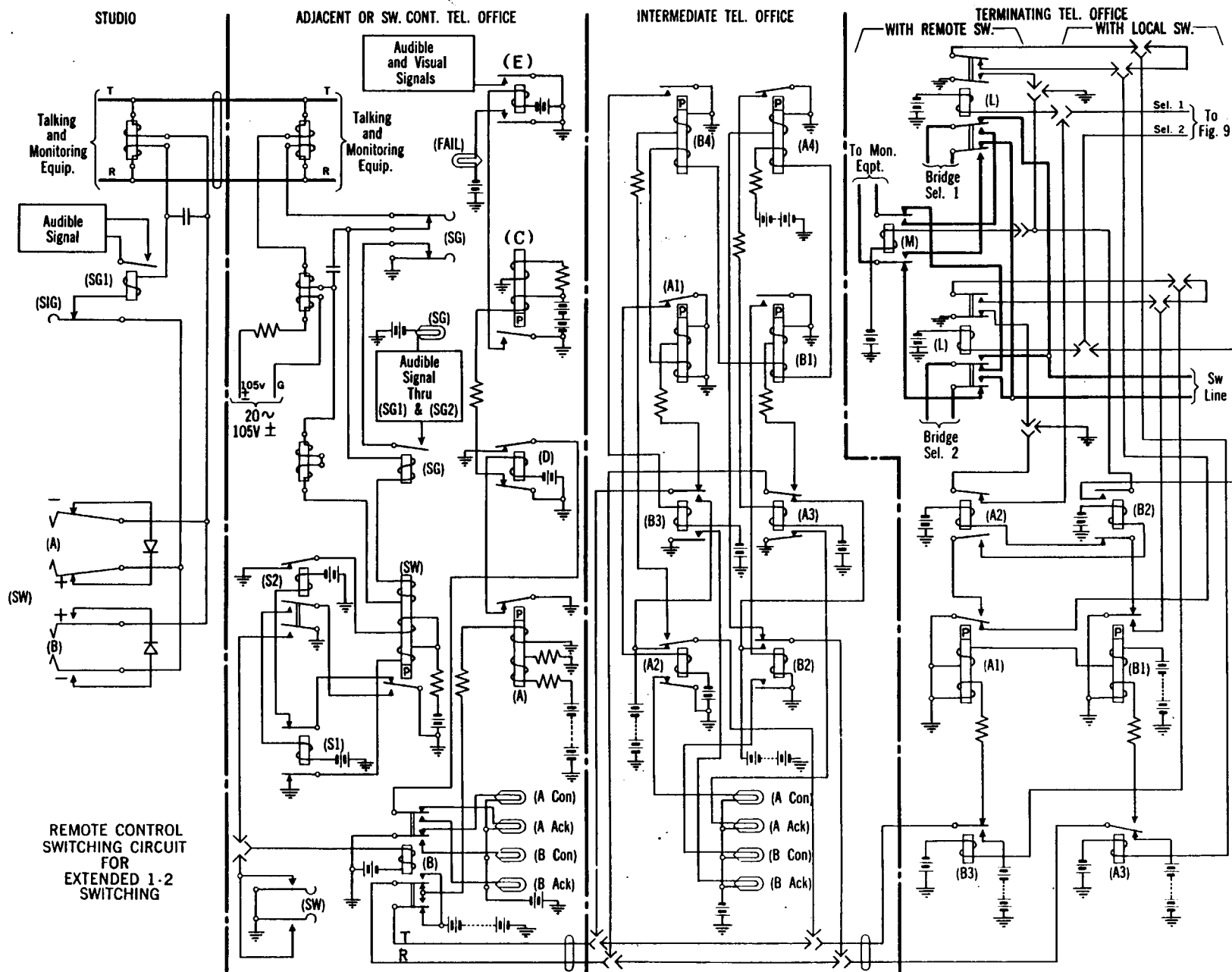
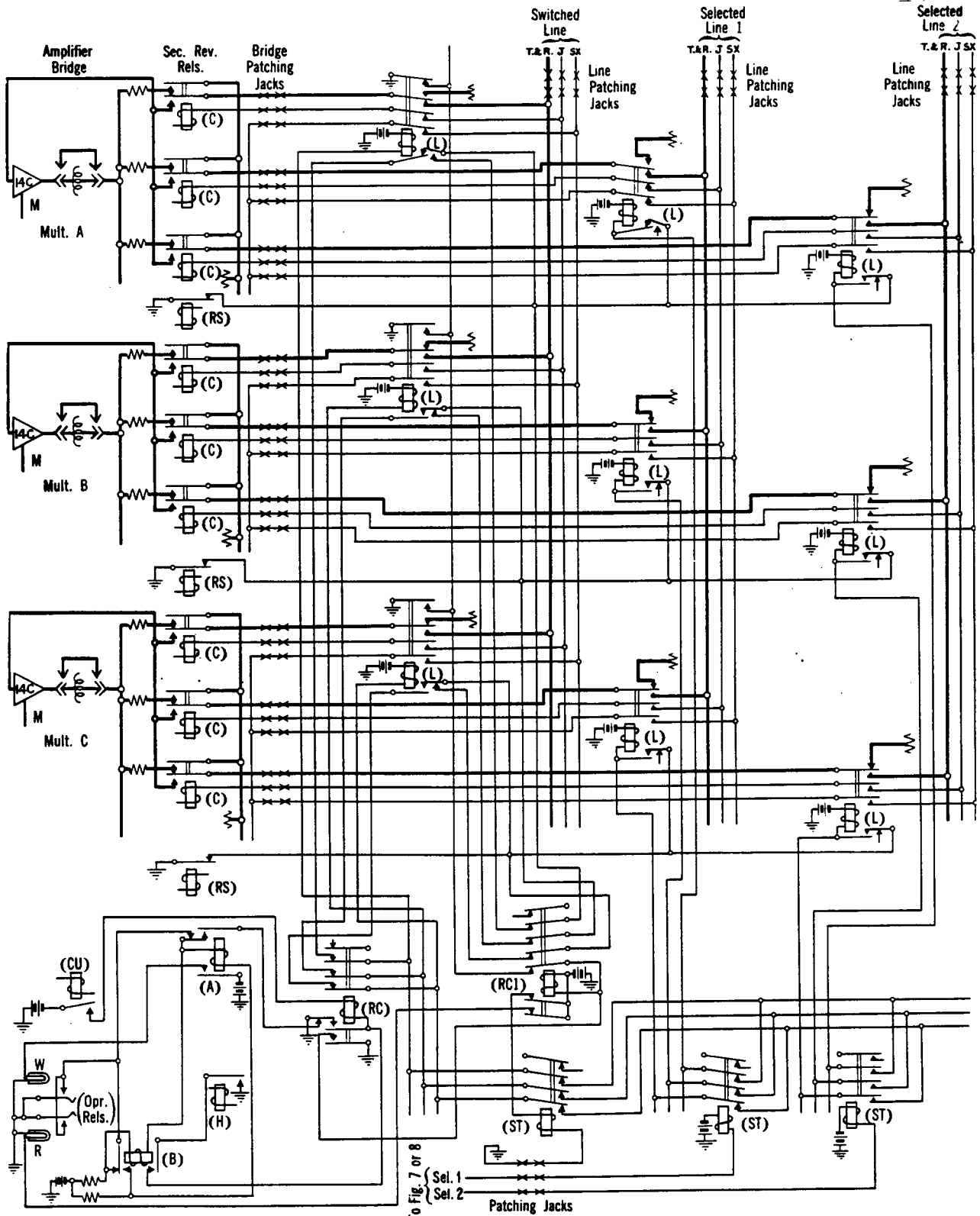


Fig. 8



REMOTE CONTROL SWITCHING CIRCUIT WITH LOCAL SWITCHING

Fig. 9

that the line is switched to the remote control condition. A line in the remote control condition may be returned to the local switching condition by locally switching it to another bridge multiple or to the cut multiple as covered in other sections of AT&T Practices. The (RC1) and (ST) relays are held operated by the (L) relay. The (RC) relay is released by the operation of the (CU) relay.

4.10 A remote control switch is completed in the preselection and switching system by connecting the switched line to a branch of the same bridge to which the selected line is connected. Referring to Figs. 7 and 8 and wiring to local switching and preselection equipment, ground is connected to the SEL1 lead when the (S2) or (A2) relays are operated and to the SEL2 lead when the (S1) or (B2) relays are operated. Referring to Fig. 9, ground on the (SEL1) lead operates the (ST) relay associated with the selected line in the preselection and switching system. Ground through contacts of the switched line (L) relay which was operated when the line was locally switched to the remote switching condition, and through-back contacts of the (RC) relay and contacts of the switched line (ST) relay and contacts of the selected line (ST) relay causes the line switching relay (L), associated with the selected line in the same bridge multiple as the switched line, to operate. The operation of the (L) relay connects the transmission leads of the switched line to those of the selected line through the bridge. Removal of ground from the (SEL1) lead releases the (ST) and (L) relays of the selected line and application of ground to the (SEL2) lead connects the switched line to the (B) line selection in the same manner as covered above.

4.11 Lines in the preselection and switching panel equipped for remote control switching may be associated with another remote switching system, by cross-connecting or by patching between the remote control patching jacks and the switch patching jacks.

## 5. OFFICE ARRANGEMENTS

5.01 Remote control switching equipment is usually located in available space in existing program line bays or program switching bays. Where space in the program bays is not available, the equipment may be located in any convenient 19" bay. The control unit and relay equipment may be located at any height above the floor. The jack, key and lamp equipment should be located in an existing jack field or at the equivalent height above the floor.

## 6. WIRING AND CABLING

6.01 Ground connections for the individual apparatus are obtained from ground leads soldered to the relay rack ground wire running down the left side of the bay.

6.02 Switchboard cable is used for all connections to the distributing terminal strips. To minimize crosstalk, transmission leads carrying different programs, such as leads between switching relays and patching jacks and between switching relays and monitoring equipment, are run one circuit per two quad cable (500CL). All switching control and signaling leads are run in the same cable. In all cases the cable covering is kept intact as far along the run as possible to maintain proper separation of circuits. Detailed cabling arrangements are covered on the cross-connection figures of SD-55142-01, SD-55143-01 and SD-64782-01, not attached.

## 7. LIST OF DRAWINGS

### 7.01 Drawings for Reference but not Attached

<u>Title</u>	<u>Drawing No.</u>
Studio Remote Control Switching Ckt.	SD-55142-01
Telephone Office Remote Control Switching Ckt.	SD-55143-01
Program Switching and Line Pre-selection Ckt.	SD-64782-01
Program Switching and Line Pre-selection Equipment	ED-61699-01
Studio Remote Control Switching Panel	ED-61945-01
Remote Control Switching Term. or Outgoing Unit	ED-62014-01
Remote Control Switching Term. or Intermediate Unit	ED-62015-01
Remote Control Switching Term. or Intermediate Unit	ED-62016-01
Remote Control Switching Term. or Outgoing Unit	ED-62017-01
Remote Control Switching Equipment	ED-62030-01