SPEED-OF-ANSWER AND AUXILIARY OBSERVING CIRCUITS
GENERAL DESCRIPTIVE INFORMATION
NO. 12 SERVICE OBSERVING DESK

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1. GENERAL

1.01 This section covers general descriptive information on the speed-of-answer and key-ended service observing circuits and how each is used with the No. 12 service observing desk (covered in Section 953-110-100).

1.02 This section is reissued to include information on service observing of direct inward dialed (DID) calls to PBX offices in crossbar tandem systems equipped for in-dialing.

1.03 A multiline service observing circuit is available for observing the speed with which an operator answers a line lamp signal. (See Part 2.)

1.04 A 26-line key-ended service observing circuit can also be used for speed-of-answer observing. This circuit is described in Part 3.

1.05 A 100-line key-ended service observing circuit is available for use in observing on direct inward dialed (DID) calls to PBX attendants and stations in crossbar tandem systems equipped for in-dialing. The associated key-ended service observing circuit at the desk has been modified to provide for identification of a maximum of 100 loop connectors. (See 3.56 through 3.78.) For observing on direct outward dialed (DOD) calls from PBX attendants and stations in crossbar tandem systems, a local dial-type multiline service observing circuit is available. (See 953-114-100.) The CAMA service observing circuit is modified to include DOD observing when the crossbar tandem system is equipped with CAMA. (See 953-115-100.)

2. SPEED-OF-ANSWER SERVICE OBSERVING CIRCUITS

2.01 This circuit can be used to observe on trunks such as recording-completing, information, intercepting, "121" circuits terminating at inward boards, or ringdown trunks. Observations can be made on incoming or 2-way trunks with answering appearances at No. 1, No. 3-type, and No. 15C and 15D DSA switchboards. Observations can also be made on No. 19 and 23 operating room desks and on No. 2 and 7 information desks. The trunks to be observed must have grounded answering lamps. They may have ground or busy potential applied to the sleeve. The speed-of-answer service observing circuit can be used for observing on a maximum of 100 incoming trunks. A block diagram of speed-of-answer service observing is given in Fig. 1.

A. Equipment Elements

2.02 The multiline speed-of-answer service observing circuit provides a maximum of 100 loop-allotter (connector) circuits. A service observing connection is made by means of a shoe and plug-ended cord.

2.03 On one end of the cord is a plug or shoe. This shoe clamps onto four leads of the incoming trunk at the distributing frame terminals. Connection is made to the tip, ring, sleeve, and lamp (or lamp relay) leads. Application of this cord at the distributing frame terminals (soldered type) is shown in Fig. 2.

2.04 A twin plug is on the other end of the cord. The plug is plugged into a jack box located at the top of the distributing frame. The loop-allotter or connector circuits terminate in the jack boxes which may be multipled along the frame in a full multiple or graded multiple, as required.

2.05 Thus, a service observing connection is made between the incoming trunk terminals and the allotter jack box. Any allotter circuit may be patched to any incoming trunk which the cord will reach. The shoe and plug-ended cord are shown in Fig. 3.

2.06 The loop-allotter circuit provides means for connecting a call on an incoming trunk to the service observing trunk. The loop allotters are located on a relay rack frame with the service observing trunk.

2.07 The speed-of-answer service observing trunk provides means for recognizing seizure of the trunk. Various signals are sent to the service observing desk. These signals are discussed in 2.20 through 2.28.

2.08 The speed-of-answer service observing trunk requires four conductors between the observed office and the service observing desk.

2.09 One service observing trunk with the associated equipment occupies less than one relay rack frame. The trunk equipment is located in the observed office.

2.10 A group identification feature may be provided on an optional basis. (See Section 953-110-100.)

2.11 A loop-reduction feature may be provided on an optional basis. This feature is discussed in Section 953-110-100.

2.12 A feature is provided to indicate when a call is abandoned before the operator plugs up her cord.

2.13 A high-impedance monitoring connection is provided in the tip and ring conductors of the service observing circuit to the connected trunk. This is done so that the service observing connection has no noticeable effect on the volume or quality of transmission of the commercial connection, or on the operating signals of the toll circuit.

2.14 A voice-frequency amplifier is provided in the trunk circuit if the trunk conductor loss between the observed office and the service observing desk is between 3.0 and 13.5 db at 1000 cycles. This is a plug-in amplifier located in the transmission paths of the service observing trunk.

B. Method of Operation

2.15 The general method of operation of multiline call-distributing circuits is described in Section 953-110-100.

2.16 The loop-allotter circuits contain chain circuit paths. When the speed-of-answer service observing circuit is put into service at the desk, these chains are checked for continuity. If there is a failure on the continuity test, after a delay of 13 to 32 seconds, an alarm is given as described in 2.29. If the continuity test is met, the service observing circuit is enabled to accept calls.

2.17 A busy test of all the loops is made, and incoming trunks on which unanswered calls are waiting are excluded from observation. When a new call is originated in an incoming trunk connected for observing, a seizure signal is sent to the service observing desk. Subsequent calls are locked out.

2.18 The loop allotters are numbered in the chain. If several calls are originated simultaneously, the lowest-numbered allotter is connected.

2.19 If a call-accepted signal is not returned from the desk within a definite time interval (approximately 0.4 to 0.8 second), the call is released. If the call is accepted at the desk, the transmission and signaling paths are completed. The loop-allotter connection is held until the service observing circuit is released at the service observing desk. If the circuit is not released, the same loop-allotter circuit remains connected. Calls on the trunk to which this allotter is patched may be observed indefinitely and the trunk lamp will remain lit until the observing circuit is released.

C. Signals to Observer

2.20 The following signals are received at the service observing desk. These signals are given on a chart in Fig. 4.

2.21 When the speed-of-answer service observing trunk is seized, the trunk lamp lights. If the group identification feature is not provided, this lamp lights steadily. If the service observing circuit serves two groups of trunks, the trunk lamp lights steadily or flashes to indicate in which group the call originates. On calls from the second group, the trunk lamp flashes at a 120-ipm rate. The lamp flashes for 15 to 30 seconds and then lights steadily for the duration of the call. The trunk lamp is extinguished when the service observing trunk is released. If the trunk is not released, no distinctive signal will be received by the observer when the same incoming trunk is seized again.

2.22 When the operator answers the call by plugging up her rear cord, the rear plug-up (RPU) lamp lights.

2.23 On No. 1 toll switchboards arranged for manually preset pad control, the plug-up signal may not be received until the TALK key is operated.

2.24 If the sleeve lead of the trunk is connected to ground, the RPU lamp is extinguished when the operator pulls the plug down. If busy potential is applied to the sleeve lead of the trunk, the RPU lamp remains lighted until the calling customer disconnects.

2.25 When the calling customer disconnects before the operator plugs up her cord, the RPU lamp flashes at a 120-ipm rate. This flashing signal is locked in until the service observing trunk is released by the observer. It is not affected by subsequent plug-up, or by a reseizure of the incoming trunk.

2.26 No abandoned call indication is given on ringdown trunks. The lighted trunk lamp at the switchboard is locked in, and the operator must plug in before determining if the call has been abandoned. The observer determines an abandoned call in this case by hearing the operator's challenge.

2.27 The observer will hear the operator's challenge after plug-up.

2.28 If the RPU lamp is lighted, it is extinguished when the observation is released.

D. Alarm Facilities

2.29 Connection is made from the speed-of-answer service observing circuit to the central office alarm system. When the service observing circuit is placed in service, the chain circuits in the loop allotters are tested for continuity. If there is a break in one of the chains, after an interval of 13 to 32 seconds, the office alarm circuit gives minor audible and visual alarms and the no check (NC) lamp in the trunk equipment lights. An alarm key is operated, cutting off the audible alarm and keeping the NC lamp lit. When the trouble is cleared, the alarm key is released, the lamp is extinguished, and the observing circuit, after a delay of 13 to 32 seconds, is placed back in service.

3. KEY-ENDED CIRCUITS, SPEED-OF-ANSWER, AND MISCELLANEOUS OBSERVING

3.01 The 26-line key-ended service observing circuit which was formerly used with the No. 7 and 9 service observing desks may be used with the No. 12 service observing desk. Existing service observing circuits may be re-used. The service observing circuit connects to the position circuit of the No. 12 service observing desk.

3.02 This multiline key-ended service observing circuit may be used for observing on a maximum of 26 manual customer lines, miscellaneous trunks such as trunks to special service operators, and incoming PBX trunks.

3.03 A 100-line key-ended service observing circuit is provided for use in observing on direct inward dialed (DID) calls to PBX attendants via both direct trunks and switched trunks in crossbar tandem systems equipped for in-dialing. (See 3.56 through 3.78.)

3.04 The key-ended service observing circuits are not recommended for observing on call-distributing auxiliary service desks.

3.05 Block diagrams of the 26-line and 100-line key-ended service observing circuits are given in Fig. 5 and 7, respectively.

A. 26-Line Key-Ended Service Observing Circuit

Equipment Elements

3.06 The different types of service observing circuits in the observed office are discussed in 3.12 through 3.23. The service observing circuit in the observing desk to which these various circuits connect is discussed in 3.24 through 3.33.

3.07 Each service observing circuit may be connected to a maximum of 26 customer lines or trunks.

3.08 Connection may be made to manual customer lines or trunks by one of three methods.

(a) A plug or shoe is clamped onto leads of a customer line or a trunk at the distributing frame terminals. This shoe is on one end of a plug-ended cord. On the other end of the cord is a double plug which is plugged into jacks in a jack box at the top of the frame. The jack boxes may be multipled along the frame in a full or graded multiple, as required. The service observing circuit is wired to the jack boxes. The shoe (for soldered-type terminals) and plug-ended cord are shown in Fig. 3.

(b) A plug or shoe is clamped onto leads of a customer line or a trunk at the distributing frame terminals. This shoe is on one end of a patch cord. The other end of the patch cord is soldered to leads from the service observing circuit on a terminal strip.

(c) The terminal strips of the observed line or trunk and the service observing circuit are cross-connected by jumper wire.

3.09 Method 3.08 (a) is used where it is desired to have more than one location for the plug connection to the service observing circuit. In general, the plug and jack arrangement is used when there are more than 20 observed lines or trunks in an office, or when the distributing frame is so large that the plug-ended cords will not reach all the line or trunk terminal strips from one location. This is the preferred method of connection.

3.10 Method 3.08 (b) is used if only one location is required for the connection to the service observing circuit. This arrangement is used in small offices with 20 or less observed lines or trunks where the cords will reach all the terminal strips from one location.

3.11 Method 3.08 (c) is used only in special cases where a permanent connection is desired for observation over a long period of time.

Manual Customer Lines

3.12 Three service observing circuits are available for observing on manual customer lines. Observations may be made with these three circuits in manual offices with the following switchboards.

(a) No. 1 and 1C switchboards.

(b) No. 1D and 11 switchboards.

(c) No. 10 switchboard.

3.13 The service observing circuit for observing on customer lines in offices with No. 1 or 1C switchboard is composed primarily of the trunk circuit and an amplifier circuit. An amplifier and pad circuit is provided across the tip and ring leads of the service observing circuit. This circuit provides means for the observer to monitor on a call. The amplifier and pad circuit prevents noticeable transmission loss in the line. The service observing circuit connects a call on one of a maximum of 26 lines to the service observing desk. The service observing circuit in the originating office connects to the service observing circuit in the observing office.

3.14 The service observing circuit for observing on customer lines in offices with No. 1D or 11 switchboard is composed of a line selector and control circuit and a monitoring amplifier circuit. These circuits have the same functions as described in 3.13.

3.15 The service observing circuit for observing on customer lines in offices with No. 10 switchboard consists primarily of a trunk circuit which includes the amplifier and pad circuit. The methods of connection to customer lines are the same as described in 3.08.

Miscellaneous Trunks

3.16 The service observing circuit for observing on miscellaneous trunks may be used in manual, panel, step-by-step, No. 1 crossbar, No. 5 crossbar, and toll offices. This circuit is used for observing on trunks such as miscellaneous traffic trunks, trunks to special service operators, intertoll trunks, and auxiliary services.

3.17 This circuit may be used with trunks which have either battery or ground normally connected to the lamps. Different circuit arrangements are provided on an optional basis for connecting to trunks with either battery or ground on the lamps. If the service observing circuit is connected to some trunks with battery and some with ground, a key is provided for switching from one group to the other for observing. This key is located in the switchroom with the trunk equipment.

3.18 The trunk circuit of this service observing circuit includes an amplifier and pad circuit. This circuit prevents noticeable transmission loss in the line. The amplifier circuit provides a means for the observer to monitor on a call, and prevents transfer of noise from the service observing trunk to the trunk under observation.

3.19 A loop identification circuit, a group identification circuit, or both circuits together may be provided in this service observing circuit on an optional basis. (See 3.25 through 3.28.)

PBX Trunks

3.20 For observing on incoming PBX trunks at the desk, a PBX multiline service observing circuit may be used to connect to a maximum of 26 incoming PBX trunks.

3.21 The PBX multiline service observing circuit may be used in manual, panel, step-by-step, and No. 1 and 5 crossbar offices. In addition to the methods of connection discussed above, in No. 1 and 5 crossbar offices, a service observing patching panel may be used. In this case, the leads from the PBX trunk appearance on the line link frame are wired to the patching panel.

3.22 The PBX multiline service observing circuit connects to an incoming service observing circuit. Both of these circuits are located in the observed office. The incoming multiline service observing circuit connects to the service observing circuit in the observing desk.

3.23 An amplifier and pad circuit is included in the incoming multiline service observing circuit. The amplifier and pad circuit is inserted across the tip and ring leads, and has the same functions as in 3.13.

Service Observing Circuit

3.24 The multiline service observing circuit in the observing bureau consists primarily of an observing trunk circuit. The service observing circuit in the observed office connects to this circuit. The observing trunk circuit may be multipled to more than one position in the service observing desk.

3.25 A loop identification feature may be provided whereby the line or trunk being observed is identified. If this feature is provided, an indicating relay circuit is provided on the basis of one per four adjacent positions of the desk. If the positions where this service observing circuit appears are not adjacent, the indicating relay circuit is provided for each two positions. An indicating trunk relay circuit is provided on the basis of one per observing trunk circuit per indicating relay circuit.

3.26 Identification lamps numbered 1 through 26 and an indicating key are provided for each two adjacent positions if the loop identification feature is furnished. (See 3.65.)

3.27 A group identification feature may be provided on an optional basis. This feature may be used when observing on miscellaneous trunks if it is desired to divide the observed trunks into two groups. The two groups may be different types of trunks or trunks in two operating units in the same building.

3.28 Any combination of these features may be provided when observing on miscellaneous trunks: loop identification only, group identification only, or both loop identification and group identification. Only loop identification may be provided when observing on manual customer lines or PBX trunks.

3.29 Trunk lamps are provided for each appearance of the service observing circuit serving two adjacent positions. The service observing circuit may be multipled to more than one desk position.

3.30 A key is provided for each two positions to enable the observers to accept a call for observation.

3.31 A telephone circuit relay is furnished for each appearance of a trunk to connect the observer headset to the service observing circuit.

3.32 The service observing circuit in the observing desk connects a call to the position circuit of the service observing desk.

3.33 A maximum of 16 multiline key-ended service observing circuits may be terminated in one panel serving two observer positions of the No. 12 service observing desk. The face equipment at the desk is shown in Fig. 10.

Method of Operation

3.34 When a call is originated on a customer line or a trunk which is patched for observing, lamps light at the service observing desk to indicate the start of an observation. The listening and signaling paths to the desk are established. Terminating traffic is excluded on customer lines.

3.35 If a call is connected to the service observing desk but not taken by an observer before the operator answers or before the call is abandoned, the observing circuit will release after an interval of approximately 2 seconds, if an answering time recorder is not used. (See 3.40.)

3.36 When observing on PBX incoming trunks, the service observing circuit functions in the same manner. Originating calls from a PBX are not connected. If the call is not accepted at the service observing desk within approximately 3 seconds, the call is disconnected. This feature is provided to prevent partial observation.

3.37 The observer operates a key associated with the service observing circuit in which there is a call. Operation of the key to its upward position connects the call to the left position; operation of the key to its downward position connects the call to the right position.

3.38 The operation of a key associated with a multiline key-ended circuit causes the service observing position to appear busy to call-distributing service observing circuits. Any call-distributing circuit which may be connected to the position is released when the key is operated.

3.39 The observer receives various signals which are discussed in 3.42 through 3.55.

3.40 If an answering time recorder is used on the lines or trunks under observation, when a call is abandoned before the observer accepts the observation, the answering time recorder releases the service observing circuit if approximately 3 seconds have elapsed since the start of the call. If a call is abandoned in less than 3 seconds, the answering time recorder does not release the circuit until the 3-second period has elapsed. When an answering time recorder is used, if the switchboard operator answers the call on a trunk before the observation is accepted, the answering time recorder releases the service observing circuit. If the switchboard operator answers a call on a customer line before the observer accepts the call, the circuit is released immediately.

3.41 The multiline service observing circuit is released from a desk position when the observer operates the release key.

Signals to Observer

3.42 The following signals are received at the service observing desk in connection with observing with multiline key-ended service observing circuits. These signals are given on a chart in Fig. 6.

3.43 When a call is originated on a customer line, the GUARD and SUB lamps light. These lamps are lighted at every position where the service observing circuit appears. (See Fig. 10.)

3.44 When an observer accepts the call by operating the key associated with the service observing circuit, all the SUB and GUARD lamps are extinguished and the lower SUB lamp at the observer position is lighted. (See Fig. 10.) This lamp remains lighted until the calling customer hangs up or the observation is released.

3.45 If the call is abandoned before the switchboard operator answers, the SUB lamp is extinguished after approximately 2 or 3 seconds. (See 3.35 and 3.40.)

3.46 When the switchboard operator answers the call, the OPR lamp lights. This lamp remains lighted until the operator disconnects or the observation is released. When the operator answers the call, the SUB lamp remains lighted.

3.47 If the customer flashes, the SUB lamp follows the flashes.

3.48 If a message register key is operated, the MR/CC lamp is lighted. The buzzer at the desk also operates. If a combined coin-collect and message register key is operated, a tone is also heard by the observer. If a coin-collect key is operated, the MR/CC lamp lights, the buzzer operates, and a tone is heard. If a refund key only is operated, a tone is heard and no lamp signals are given.

3.49 If the loop identification feature is provided, the observer operates the loop identification key. The indicating (IND) lamp lights, and one of the 26 numbered lamps lights to indicate which line is connected. When the key is released, these lamps are extinguished. Operation of the loop identification key may release

the circuit, and therefore, this key should be operated at the end of the observation before the observer releases the call.

3.50 When a call is originated on a trunk which is under observation, the SUB and GUARD lamps light at every position where the service observing circuit appears. The SUB lamp may light steadily or flash when a call is originated if the group identification feature is provided. This lamp indicates in which group of trunks a call originates. The lamp flashes until the circuit is released.

3.51 When an observer accepts the call by operating a key, all the SUB and GUARD lamps are extinguished and the lower SUB lamp at the observer position is lighted on a steady or flashing basis.

3.52 If the call is abandoned before the operator answers, the SUB lamp is extinguished and the service observing circuit is released after approximately 2 or 3 seconds. (See 3.35 and 3.40.)

3.53 When the switchboard operator answers the call, the position SUB lamp is extinguished.

3.54 The connected trunk is identified as in 3.49.

3.55 Any lamps which are lighted are extinguished when the observer releases the service observing circuit by operating the release key.

B. 100-Line Key-Ended (DID) Service Observing Circuit

3.56 The 100-line key-ended circuit is used for observing calls on trunks direct to PBX attendants or on switched trunks to attendants or stations in crossbar tandem offices.

Equipment Elements

3.57 Each service observing circuit may be connected to a maximum of 100 PBX trunks at one time.

3.58 The observed trunks are connected to a maximum of 100 loop connectors by means of a patching panel using dual jacks and patching cords with dual plugs.

3.59 If a patching cord is reversed or circuit functions fail to complete, etc, an alarm lamp will light. A key is provided to cut off the alarm or, where there is no alarm, to make the circuit busy; and, when reoperated, to release the circuit for new calls.

3.60 The loop connector and connector control circuit differentiate between seizures of the connected trunks. A service call seizure by a marker will be observed upon, whereas a test call seizure or a trunk-make-busy will cause recycle and release of the observing circuit.

3.61 Selection of switched trunk calls to attendants can be made by means of a maximum of six number matching circuits. Each circuit contains four rotary switches (one to four digits) which can be preset to observe a specific PBX attendant.

3.62 A special ALL setting on the first number matching circuit enables observation of all calls to attendants or extensions on all six matching circuits.

Service Observing Circuit

3.63 The multiline service observing circuit in the observing bureau consists primarily of an observing trunk circuit. The service observing circuit in the observed office connects to this circuit. The observing circuit may be multipled to more than one position in the service observing desk.

3.64 A loop identification feature is provided whereby the line or trunk being observed is identified. With this feature, an indicating relay circuit is provided on the basis of one per four adjacent positions of the desk. If the positions where this service observing circuit appears are not adjacent, an indicating key is provided on a basis of one per observing trunk per indicating relay circuit.

3.65 At each two adjacent positions, where the loop identification feature is furnished, provision is made for 25 loop-identification lamps; four group lamps designated GA, GB, GC, and GD; and an indicating key. (See 3.26.)

3.66 Other features are discussed in 3.29 through 3.33.

Method of Operation

3.67 Origination of a call on a direct trunk to a PBX attendant or a number match on a call on a switched trunk to a PBX will light the GUARD lamp and a SUB lamp at the desk to indicate the arrival of a call for observation.

3.68 If the call is abandoned before the observer takes it, or should the observer not take the call during the 3- to 4-second timed period, both lamps are extinguished and the circuit is restored to normal.

3.69 If the call is abandoned after the observer takes it, the SUB lamp goes out and the observer must operate the release key in order to extinguish the GUARD lamp and to restore the circuit to normal.

3.70 The operation of the OBS key associated with the multiline key-ended circuit causes the service observing position to appear busy to call-distributing service observing circuits. Any call-distributing circuit which may be connected to the position is released when the OBS key is reoperated.

3.71 The observer receives various signals which are discussed in 3.73 through 3.78.

3.72 The multiline service observing circuit is released from a desk position when the observer operates the RELEASE key.

Signals to Observer

3.73 The following signals are received at the service observing desk in connection with observing on the 100-line key-ended service observing circuits.

3.74 When a call to be observed is originated to a PBX attendant or station, a GUARD and a SUB lamp are lighted at each position where the circuit appears. When the call is accepted by operating the OBS key, the SUB lamp at the observer's position lights.

3.75 In order to identify the trunk, the observer must operate the INDICATE key, which, at the same time, lights the indicating-pilot lamp at the observer's position.

3.76 Operation of the INDICATE key also causes one lamp out of the four group lamps and one lamp from the 25 individual lamps to light to indicate the seized-connector number as:

GROUP LAMP		LINE LAMP		CONN. NO.
A	+	1 through 25	=	1 through 25
B	+	1 through 25	=	26 through 50
C	+	1 through 25	=	51 through 75
D	+	1 through 25	=	76 through 100

3.77 When the INDICATE key is released, the indicating pilot lamp and the two identification lamps are extinguished. These may be lighted again by operating the INDICATE key again.

3.78 Any lamps which are lighted, are extinguished when the observer releases the service observing circuit by operating the RELEASE key.

C. Single-Line Key-Ended Service Observing Circuit

3.79 The single-line key-ended service observing circuit which was formerly used with the No. 7 and 9 service observing desks may be terminated in the No. 12 service observing desk. Existing circuits may be re-used in the No. 12 service observing desk.

3.80 This service observing circuit may be used for observing on manual customer lines in manual offices with No. 1, 1D, 10, or 11 switchboards. The circuit may also be used for observing on miscellaneous trunks such as trunks to traffic desks, supervisors, and special service operators.

3.81 The single-line service observing circuit is arranged so that one appearance of the circuit at the service observing desk may serve two observer positions. A key associated with the circuit is operated to connect a call to the headset of one observer or the other.

3.82 A block diagram of the single-line key-ended service observing circuits is given in Fig. 9.

Equipment Elements

3.83 The single-line service observing circuit at the observing desk connects to a single-line service observing circuit at the observed

office. The latter circuit is connected to a customer line or a trunk by several means which are discussed in the following paragraphs.

Manual Customer Lines

3.84 Connection is made to a customer line at the distributing frame terminals. A plug or shoe clamps onto the terminal strip of the distributing frame. This shoe is on one end of a cord. The other end of the plug-ended cord may be connected to the service observing circuit in two ways.

(a) A double plug on the other end of the cord is plugged into jacks in a jack box at the top of the distributing frame. The jack boxes may be multipled along the frame in a full or graded multiple as required. The service observing circuit has leads to the jack boxes. The jack-box method of connection is provided in offices where it is desirable to connect to the observing circuit at more than one point, or where the observing circuit is arranged for observing on both customer lines and trunks.

(b) The leads of the patch cord are soldered to leads from the service observing circuit on a terminal strip. With either method of connection, the plug or shoe of the cord may be connected to any customer line which the cord will reach.

3.85 In general, method (a) is used where there are more than 20 observed lines in an office, or where the size of the distributing frame is such that the cords are not long enough to reach all line terminals. Method (b) is used in small offices where the total number of observed lines is 20 or less, and where the cords will reach all line terminals.

3.86 In addition, a third method of connection of a customer line to a service observing circuit may be used. The terminal strips of the observed line and the service observing circuit may be cross-connected by jumper wire. This method is used in special cases where a semipermanent connection is desired for observation over a long period of time.

3.87 The single-line service observing circuit consists primarily of a service observing circuit for customer lines and an amplifier circuit. The amplifier circuit includes an amplifier and pad circuit. This circuit provides means for the observer to monitor on a call. It has a high-impedance input so that there is no noticeable transmission loss in the circuit.

3.88 A coin control indicating circuit is provided when signals to indicate coin collect of return are required.

3.89 Optional circuit arrangements are provided for use when the customer cord circuits use 24-volt talking battery, and when the customer cord circuits use 48-volt talking battery.

3.90 The service observing circuit in the observed office connects to the service observing circuit in the observing office.

3.91 All the elements of the single-line key-ended service observing circuit are provided for each position, with the exception of the keys, trunk lamps, and single-line relay circuits. These are provided for each trunk.

3.92 The keys for the single-line service observing circuit at the observing end are provided on the basis of one per trunk per two positions of the service observing desk. A customer line observing circuit is provided for each position. This circuit connects to the key circuit. The leads may be multipled to the keys associated with other trunks from the observed office which appear in the same position. The customer line observing circuit connects to a relay observing circuit provided for each position. The relay observing circuit connects to the position circuits of the service observing desk.

3.93 A single-line relay circuit is provided on the basis of one per trunk. A trunk lamp is provided for each trunk appearance.

3.94 A feature of position transfer formerly provided with the single-line service observing circuit is not used in the No. 12 service observing desk. The circuit can be multipled to more than one desk position, and two adjacent positions can handle a particular call.

3.95 A maximum of 24 single-line key-ended service observing circuits may be terminated in one panel serving two observer positions of the No. 12 service observing desk. The face equipment at the desk is shown in Fig. 10.

Miscellaneous Trunks

3.96 Connection is made to a trunk at the distributing frame terminals by the same three methods described in 3.84 through 3.86.

3.97 When observing on trunks, the service observing circuit at the observed office consists primarily of the amplifier circuit.

3.98 Different circuit arrangements are provided when a service observing connection is made to trunks with the following conditions.

(a) Trunks which normally have ground on the lamps.

(b) Some trunks which normally have ground and some trunks which normally have 24-volt battery on the lamps.

(c) Trunks which normally have 48-volt battery on the lamps.

3.99 The service observing circuit in the observed office connects to the service observing circuit in the observing office. The circuit in the observing office is the same as described in 3.87 through 3.95, except that a trunk observing circuit is used in place of the customer line observing circuit. One trunk observing circuit is provided for each position of the desk. This circuit connects to the key circuit. The leads may be multipled to the keys associated with other trunks from the observed office which appear in the same position.

Method of Operation

3.100 When a call is originated by a manual customer or when a call comes in on an auxiliary service trunk that is patched for service observing, a lamp at the service observing desk lights to indicate the start of an observation. The observer operates the key associated with the service observing circuit to accept the call. When the key is operated to the upward position, the call is connected to the left position; when the key is operated to the downward position, the call is connected to the right position.

3.101 The operation of a key associated with a key-ended service observing circuit makes the position appear busy to call-distributing service observing circuits. If a call-distributing circuit is connected to the position, it is released when the key is operated. The key-ended service observing circuit is released when the key is returned to the normal position.

Signals to Observer

3.102 The following signals are received at the service observing desk in connection with observing on single-line key-ended service observing circuits.

3.103 When a call is originated on a customer line or trunk under observation, a trunk lamp is lighted at each position where the circuit appears. When an observer accepts a call by operating the key associated with the lighted lamp, the trunk lamps are extinguished. Further signals are given on the lamps at the particular position. These lamps are shown in Fig. 10. The lamps are common to two adjacent positions, as are the keys.

3.104 The trunk lamps are extinguished if an operator answers the call before an observer accepts the call, or if the call is abandoned.

3.105 When an observer accepts the call, the trunk lamps are extinguished and the subscriber (SUB) lamp lights. This is the only lamp provided if observing on trunks only. (See 4.05.) When a switchboard operator answers the call, the operator (OPR) lamp lights.

3.106 The SUB lamp flashes if the calling customer flashes. This lamp is extinguished when the customer hangs up. The OPR lamp is extinguished when the operator disconnects.

3.107 If the operator operates a message register key, the MR/CC lamp is lighted and the buzzer is operated. If a coin-collect key is operated, the MR/CC lamp is lighted, the buzzer is operated, and a tone is also heard by the observer. The operation of a coin-return key causes a tone to be heard by the observer. No lamp signal is given for coin return.

3.108 The service observing circuit is released when the observer returns the key to the normal position. Any lamps which are lighted are extinguished when the circuit is released.

4. POSITION CIRCUIT

A. Speed-of-Answer Class Circuit

4.01 The call-distributing service observing circuits for speed-of-answer and all other classes of service observing are brought into the service observing desk through the incoming trunk and distribution circuit. This circuit connects the service observing circuits to the position circuits of the desk. (See Section 953-110-100.)

4.02 A toll supervisory lamp designated RPU is required for speed-of-answer observing. No other supervisory lamps are required for this type of observing.

4.03 If speed-of-answer service observing circuits are arranged for group identification, a figure for trunk lamp control is required.

B. Auxiliary Signal, Jack and Operator Position Circuit

4.04 The auxiliary signal, jack and operator position circuit is used in conjunction with the No. 12 desk position circuit when key-ended service observing circuits are used.

4.05 A single appearance of a key-ended service observing circuit may serve two adjacent positions of the desk, as discussed in 3.29, 3.30, and 3.81. An observer position pilot and buzzer circuit is provided for each position where key-ended service observing circuits may be connected. This circuit provides SUB, OPR, and MR/CC lamps and a buzzer. If only single-line key-ended circuits are used, and only trunks are observed with these circuits, an observer position pilot circuit is provided. This circuit furnishes a SUB lamp only.

4.06 When multiline key-ended service observing circuits appear in the desk, a sounder circuit is provided on the basis of one per desk section or one per two positions. The sounder gives an audible signal when a call is originated. An auxiliary signal circuit is also provided for each desk section to operate the sounder.

5. MAINTENANCE FEATURES

A. Speed-of-Answer Service Observing Circuit

5.01 The speed-of-answer observing feature is tested by employing one position of the No. 12 service observing desk.

5.02 A talking circuit between the service observing desk and its relay frame is required and established as shown in a figure in Section 953-110-100.

B. Auxiliary Circuits

5.03 The key-ended service observing features are tested by employing one position of the No. 12 service observing desk.

5.04 A talking circuit between the service observing desk and its relay frame is required and established as shown in a figure in Section 953-110-100.

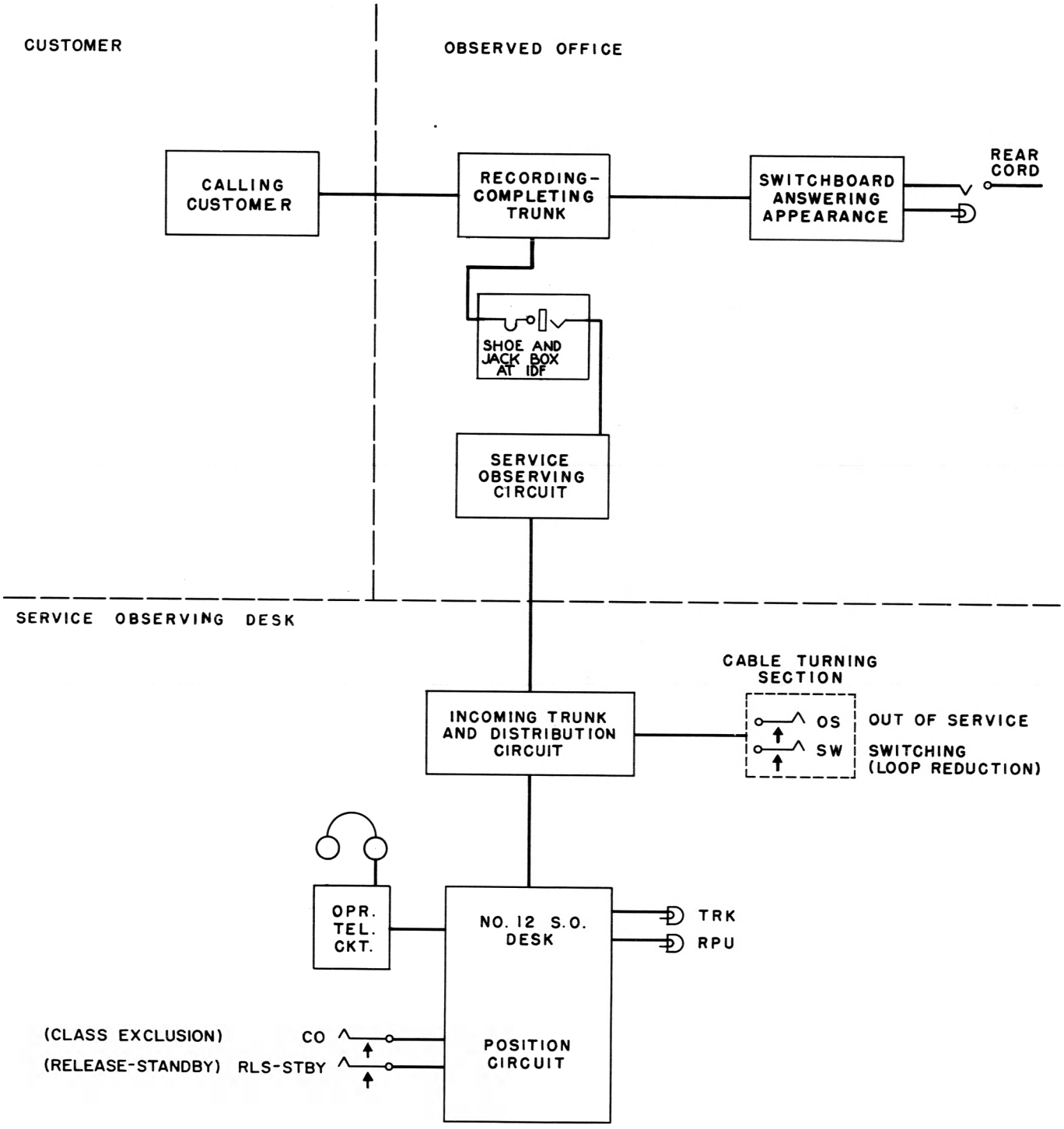
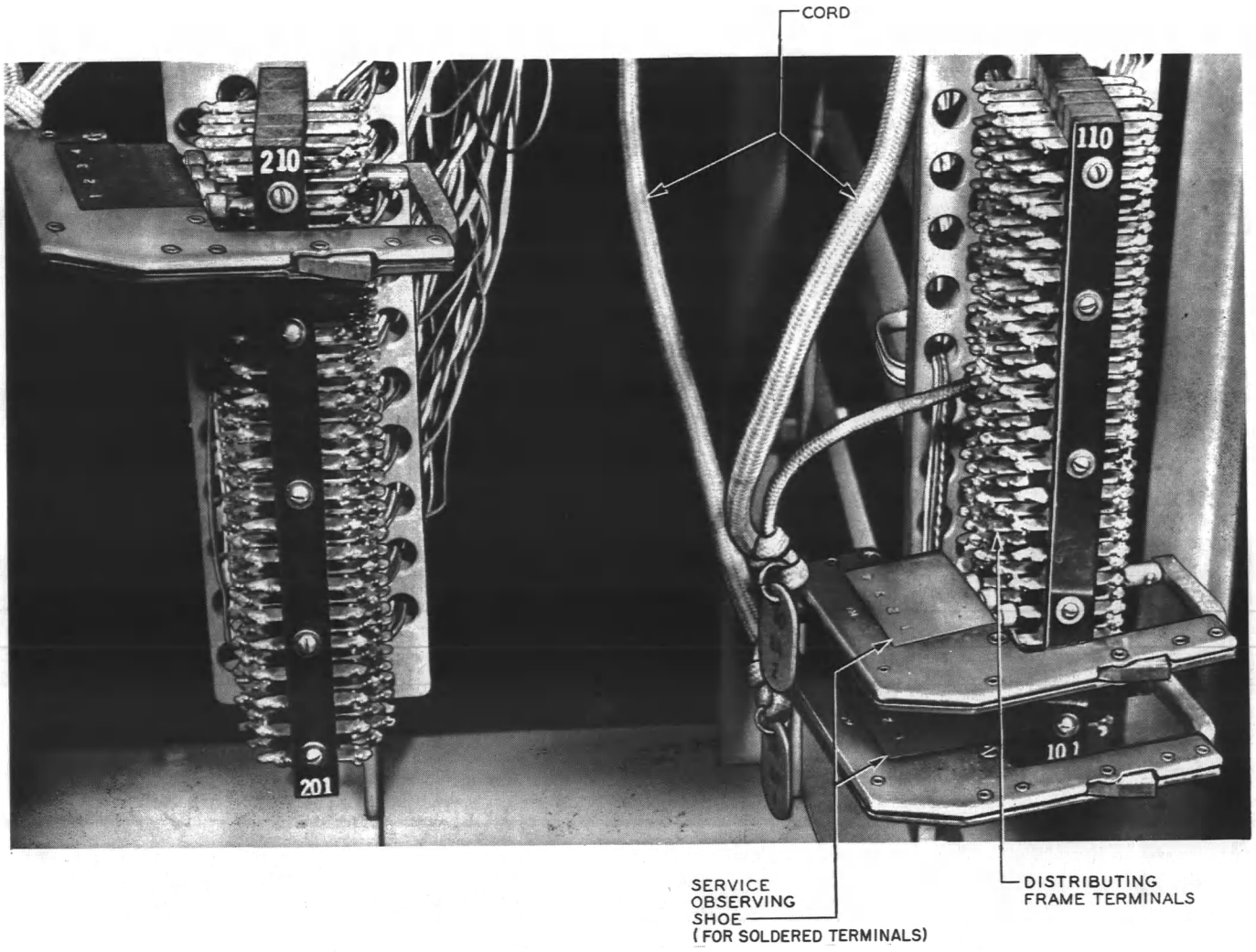
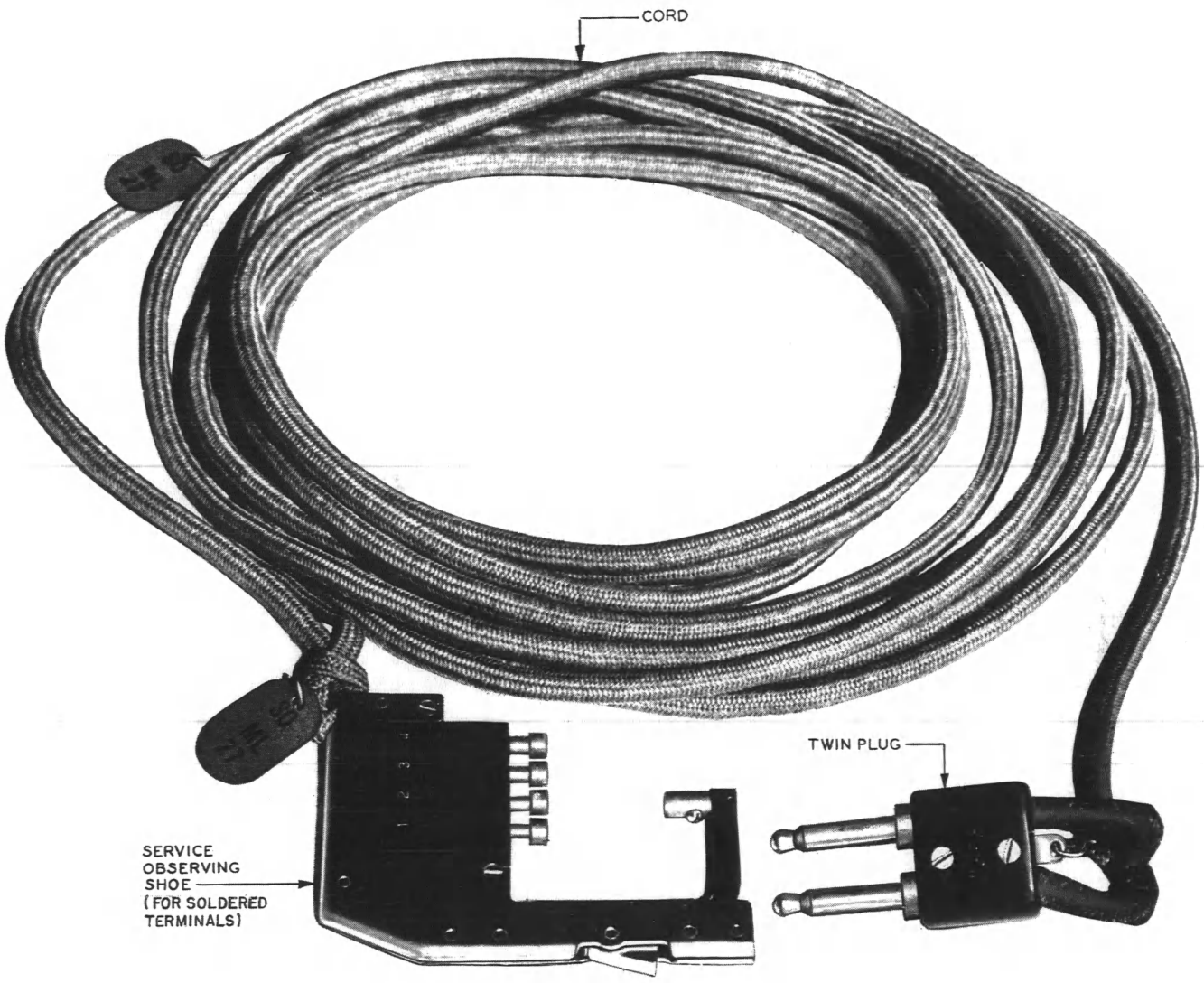


Fig. 1 – Speed-of-Answer Service Observing (Typical Arrangement, Observing on Recording-Completing Trunk)



Note: A service observing shoe is also available for wire wrapped terminals.

Fig. 2 – Speed-of-Answer Service Observing — Application of Service Observing Shoe and Plug-Ended Cord at IDF



Note: A service observing shoe is also available for wire wrapped terminals.

Fig. 3 – Speed-of-Answer Service Observing — Shoe and Plug-Ended Cord

SWITCHBOARD AND SERVICE OBSERVING LAMP SIGNALS

EVENTS	SWBD. POS.		SERV OBS DESK		NOTES
	TRK	RSV	TRK	RPU	
TYPICAL CALL SEQUENCE:					
CALL ORIGINATED	○		○ (1)		1
OPERATOR PLUGS UP	●		↓	○	
OBSERVATION RELEASED			●	●	
TYPICAL CALL SEQUENCE: (PBX OPERATION)					
CALL ORIGINATED	○		○ (1)		1
OPERATOR PLUGS UP	●		↓	○	
PBX EXTENSION DISCONNECT:			↓	↓	
A. NON-THRU SUPERVISION					
B. THRU SUPERVISION		○	↓	↓	
OBSERVATION RELEASED		●	●	●	
OTHER CONDITIONS:					
CALL ABANDONED BEFORE OPERATOR PLUGS UP:					
A. TRUNKS OTHER THAN RINGDOWN				⊕	
B. RINGDOWN TRUNKS	○				
C. PBX - NON THRU SUPERVISION	○				
D. PBX - THRU SUPERVISION				⊕	
CALL ABANDONED AFTER OPR PLUGS UP		○		(2)	2
OPERATOR PLUGS UP AND PULLS DOWN:					
A. RECORDING-COMPLETING TRUNKS	● → ○			○ (2) → ●	2
B. OTHER THAN RECORDING-COMPLETING TRUNKS				○ (2) → ●	2
OPERATOR RINGS AGAINST ON HOOK		○		○	

○ LAMP ON

● LAMP OFF

⊕ LAMP FLASHES (120 IPM)

↓ CONTINUING LIGHTED CONDITION

( ) NOTES

NOTES:

1. IF GROUP IDENTIFICATION IS PROVIDED, THE TRK LAMP LIGHTS STEADILY FOR THE FIRST GROUP AND FLASHES FOR THE SECOND GROUP.
2. IF THE OBSERVED TRUNK IS A 2-WAY TRUNK WITH BUSY POTENTIAL, THE RPU LAMP IS EXTINGUISHED WHEN THE CALLING SUBSCRIBER DISCONNECTS; OTHERWISE THE RPU LAMP IS EXTINGUISHED WHEN THE OPERATOR PULLS DOWN.

Fig. 4 – Signal Chart for Speed-of-Answer Service Observing

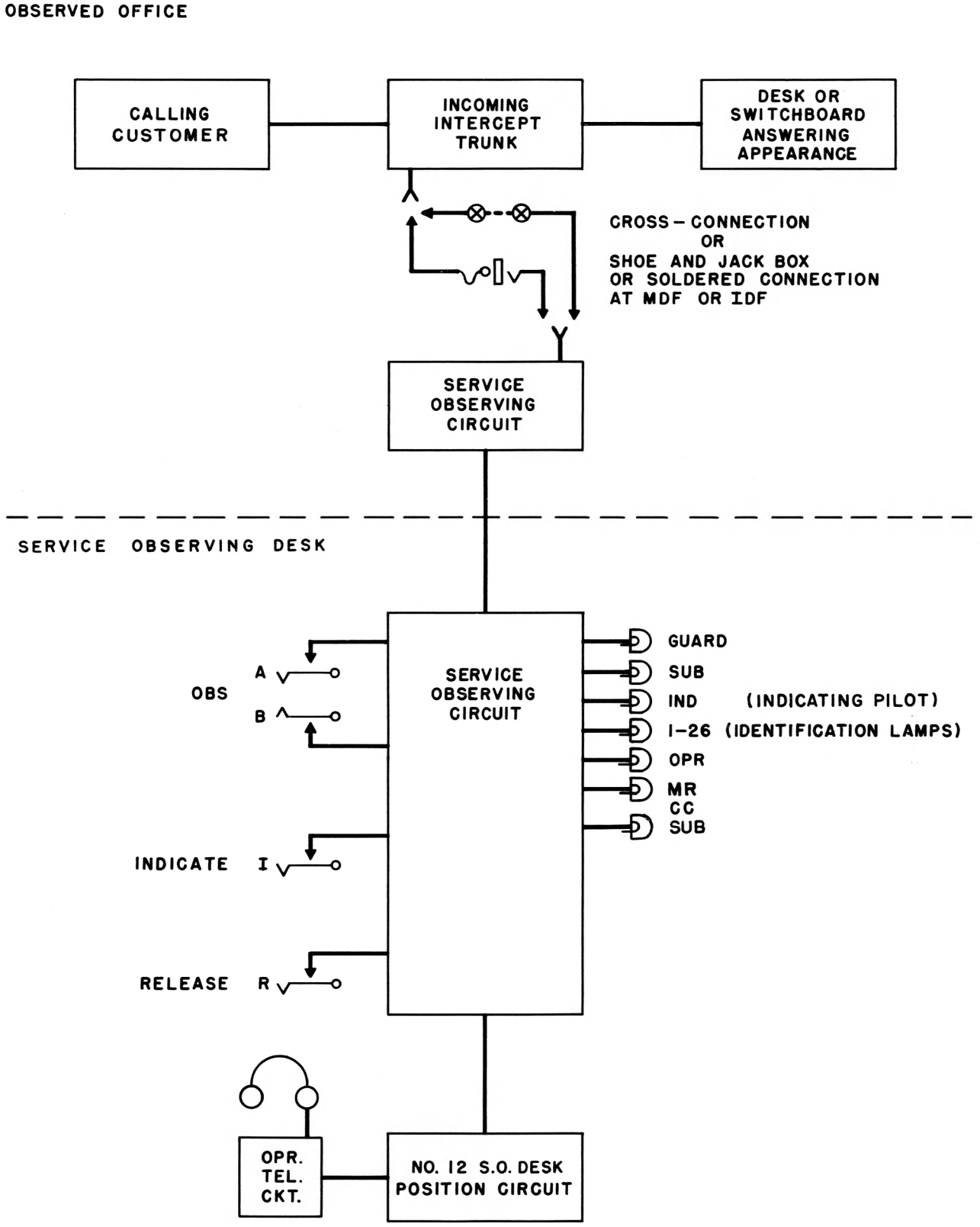


Fig. 5 – 26-Line Key-Ended Trunk (Typical Arrangement, Observing on Intercept Trunk)

SERVICE OBSERVING DESK LAMP SIGNALS

EVENTS	TRK LAMPS AT ALL S.O. DESK POSITIONS		LAMPS AT S.O. POSITION WHICH ACCEPTS CALL					NOTES
	GUARD	SUB	SUB	OPR	MR CC	IND	LOOP IDENT 1-26	
MANUAL CUSTOMER LINE OBS.- TYPICAL CALL SEQUENCE:								
CALL ORIGINATED	○	○						
CALL ACCEPTED FOR OBSERVATION	●	●	○					
SWITCHBOARD OPERATOR ANSWERS			↓	○				
MESSAGE REGISTER KEY OPERATED			↓	↓	○(1,2,4)			1, 2, 4
COIN COLLECT KEY OPERATED			↓	↓	○(1,3,4)			1, 3, 4
REFUND KEY OPERATED			↓	↓				
OPERATOR DISCONNECTS			↓	●				
CUSTOMER HANGS UP			●					
LOOP IDENTIFICATION (OPERATION OF KEY)						○(5)	○(5)	5
OTHER CONDITIONS:								
CALL ABANDONED BEFORE OPR ANSWERS			●					
CUSTOMER FLASHES			⊕					
MISC TRUNK OBSERVING - TYPICAL CALL SEQUENCE:								
CALL ORIGINATED	○	○(6)						6
CALL ACCEPTED FOR OBSERVATION	●	●	○(6)					6
SWITCHBOARD OPERATOR ANSWERS			●					
OPERATOR DISCONNECTS								
LOOP IDENTIFICATION (OPERATION OF KEY)						○(5)	○(5)	5
OTHER CONDITIONS:								
CALL ABANDONED BEFORE OPR ANSWERS			●					

○ LIGHT ON

● LIGHT OFF

⊕ LIGHT FLASHES (120 IPM)

↓ CONTINUING LIGHTED CONDITION

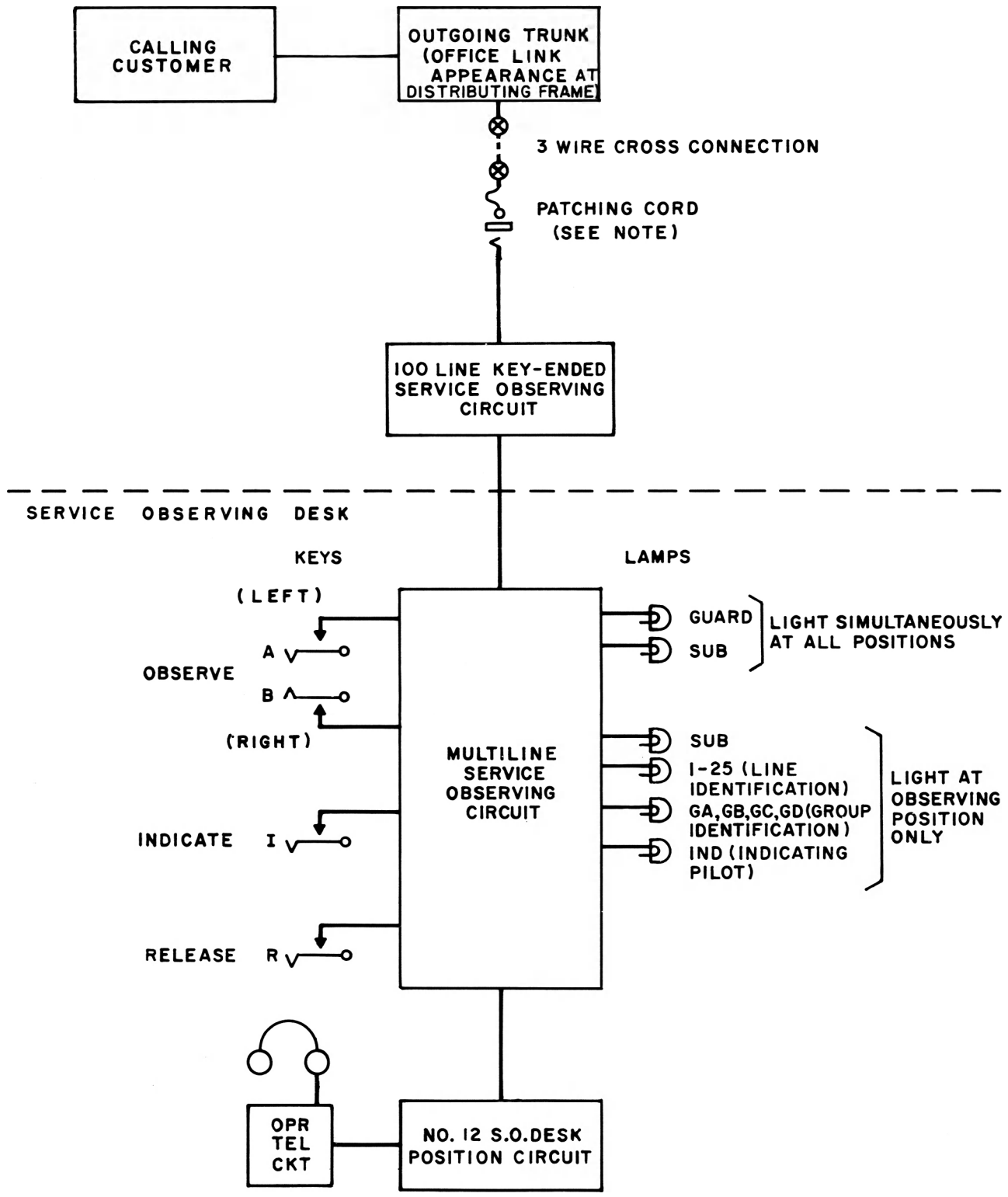
( ) NOTES

NOTES:

1. THE BUZZER ALSO OPERATES.
2. IF A COMBINED COIN COLLECT AND MESSAGE REGISTER KEY IS OPERATED, A TONE IS ALSO HEARD BY THE OBSERVER.
3. A TONE IS HEARD BY THE OBSERVER.
4. THESE LAMPS LIGHT ONLY WHILE THE KEY IS HELD OPERATED BY THE OPERATOR.
5. THESE LAMPS LIGHT ONLY WHILE THE KEY IS HELD OPERATED BY THE OBSERVER.
6. LIGHTS STEADILY OR FLASHES IF GROUP IDENTIFICATION FEATURE IS PROVIDED.

Fig. 6 – Signal Chart for 26-Line Service Observing Trunk

OBSERVED DID OFFICE (CROSSBAR TANDEM OFFICE EQUIPPED FOR PBX IN DIALING ON OUTGOING TRUNKS)



Note: Dual jacks and plugs are used. If they are inserted incorrectly, an alarm sounds.

Fig. 7 – 100-Line Key-Ended (DID) Service Observing Trunk

SERVICE OBSERVING DESK LAMP SIGNALS

EVENTS	TRK LAMPS AT ALL S.O. DESK POSITION		LAMPS AT S.O. POSITION WHICH ACCEPTS CALL					NOTES
	GUARD	SUB	SUB	IND	IDENTIFICATION LINE	IDENTIFICATION GROUP		
PBX LINE (OPERATOR OR STATION) TYPICAL CALL SEQUENCE:					01-25	A,B,C,D		
CALL ORIGINATED (OUTGOING TRUNK SEIZED)	○	○						
CALL ACCEPTED FOR OBSERVATION BY OPERATING OBSERVE KEY.	●	●	○					
CALLING PARTY HANGS UP			●					
OBSERVER OPERATES INDICATE KEY				○				
LOOP IDENTIFICATION				↓	○	○		(1)
OBSERVER RELEASES INDICATE KEY				●	●	●		(2)
OTHER CONDITIONS:								
CALL ABANDONED BEFORE CONNECTED TO POSITION	●	●						
CALL ABANDONED AFTER CONNECTED TO POSITION			●					

○ LAMP ON

● LAMP OFF

NOTES:

1. THESE LAMPS LIGHT ONLY WHILE THE KEY IS HELD OPERATED BY THE OBSERVER.
2. UNTIL THE OBSERVER OPERATES THE RELEASE KEY WHICH RESTORES CIRCUIT FOR NEXT OBSERVATION, THE RE-OPERATION OF THE IND KEY WILL RELIGHT THE IND LAMP AND BOTH IDENTIFICATION LAMPS.

Fig. 8 – Signal Chart for 100-Line Key-Ended (DID) Service Observing Trunk

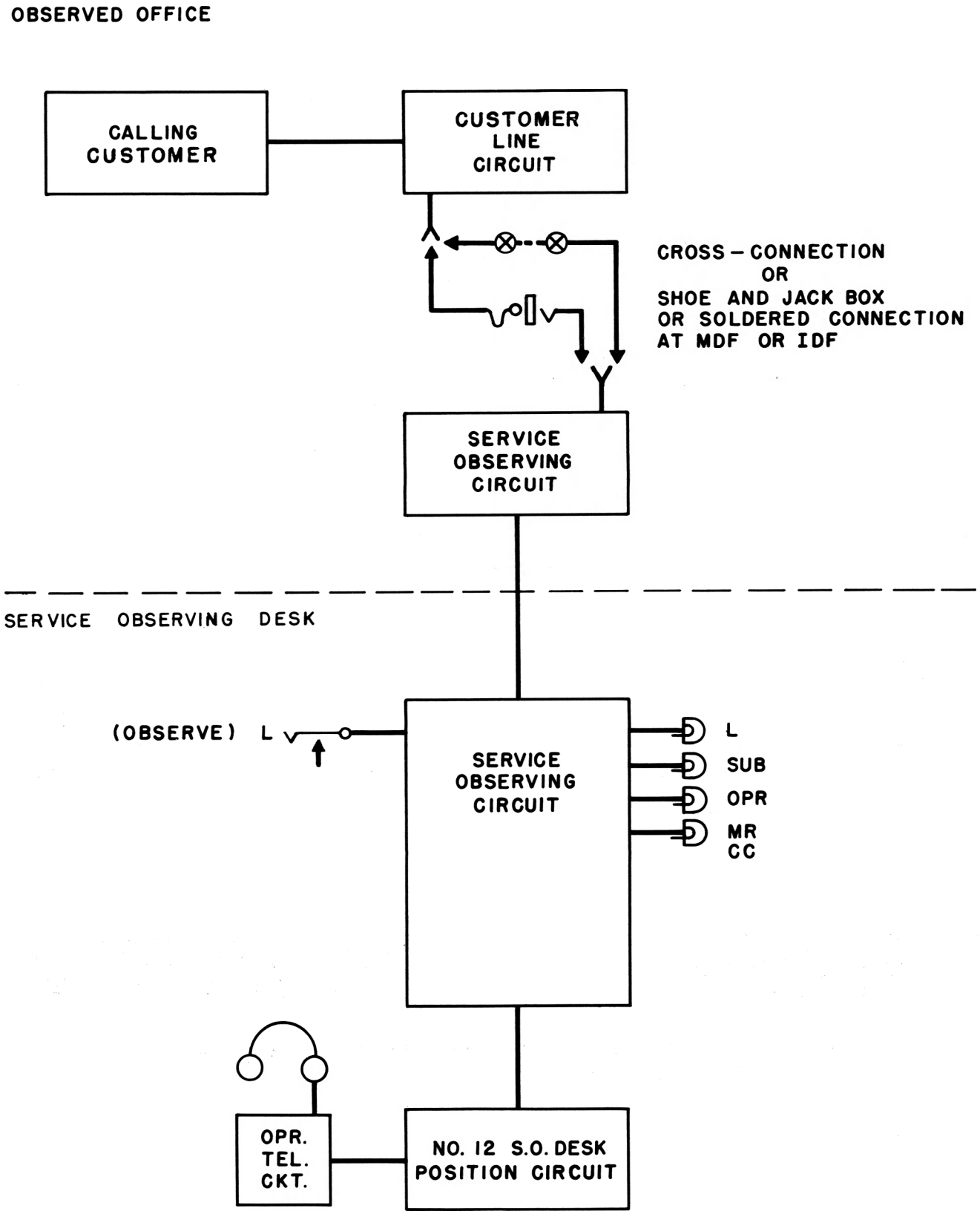


Fig. 9 – Single-Line, Key-Ended Trunk (Typical Arrangement, Observing on One Customer Line)

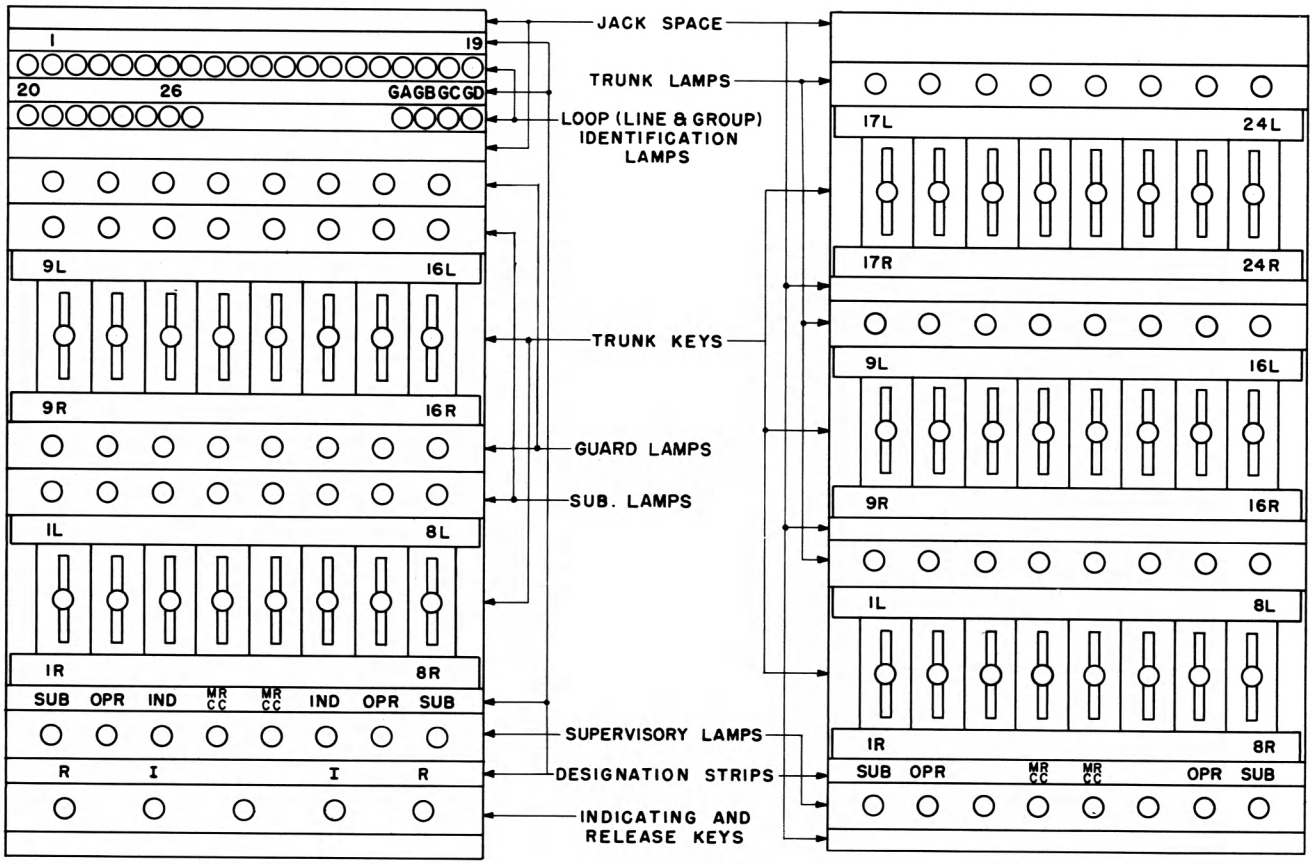


FIG. 10A– TYPICAL ARRANGEMENT OF SWBD. PANEL FOR TERMINATING 16 KEYENDED MULTILINE SERVICE OBSERVING TRUNKS AVAILABLE TO TWO SERVICE OBSERVERS
KEY UP CONNECTS TO S.O. AT LEFT POSITION
KEY DOWN CONNECTS TO S.O. AT RIGHT POSITION

FIG. 10B–TYPICAL ARRANGEMENT OF SWBD. PANEL FOR TERMINATING 24 KEYENDED SINGLE LINE SERVICE OBSERVING TRUNKS AVAILABLE TO TWO SERVICE OBSERVERS
KEY UP CONNECTS TO S.O. AT LEFT POSITION
KEY DOWN CONNECTS TO S.O. AT RIGHT POSITION

Fig. 10 – Typical Arrangement of Switchboard Panel for Key-Ended Service Observing Trunks