TYPE 33A6-A
P-A-B-X

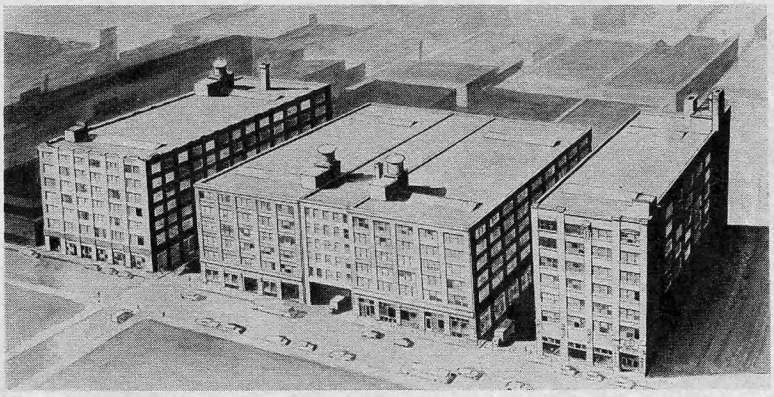
Bulletin 411

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus...Electrical Engineers, Designers and Consultants

Factory and General Offices: 1033 West Van Buren Street, Chicago 7, U.S.A.



Factory and General Offices of Automatic Electric Company, Chicago, U. S. A.

AUTOMATIC ELECTRIC COMPANY is an organization of designing, engineering, and manufacturing specialists in the fields of communication, electrical control and allied arts. For more than sixty years the company has been known throughout the world as the originator and parent manufacturer of the Strowger Automatic Telephone System. Today Strowger-type equipment serves over 75% of the world's automatic telephones. The same experience and technique that have grown out of the work of Automatic Electric engineers in the field of telephone communication are also being successfully applied on an ever-increasing scale to the solution of electrical control problems in business and industry.

PRINCIPAL PRODUCTS

Strowger Automatic Telephone Systems—Complete automatic central office equipment for exchange areas of any size, from small towns to the largest metropolitan networks.

Community Automatic Exchanges—Unattended automatic units for small rural or suburban areas, with facilities for switching into attended exchanges.

Automatic Toll Boards—An adaptation of Strowger principles to toll switching, resulting in simplification of operators' equipment and greater economy of operating and toll circuit time.

Private Automatic Exchanges—Available in various capacities, with or without central office connections, and with facilities for special control services to meet the needs of the user.

P.B.X. Switchboards—A complete range of cordless and cord types for the modern business.

Telephone Instruments—Modern designs for automatic or manual exchanges, including the Monophone—the world's most attractive and efficient handset telephone.

Exchange Accessory Equipment—Auxiliary exchange and substation equipment, including manual desks, testing apparatus, transmission equipment, and all accessories needed for the operation and maintenance of the modern telephone exchange.

Makers also of electrical control apparatus for industrial, engineering and public utility companies, telephone apparatus for railroads and pipe line companies, private telephone systems of all types, electrical and communication devices for aircraft and airways control, and special communication apparatus for military and naval departments.

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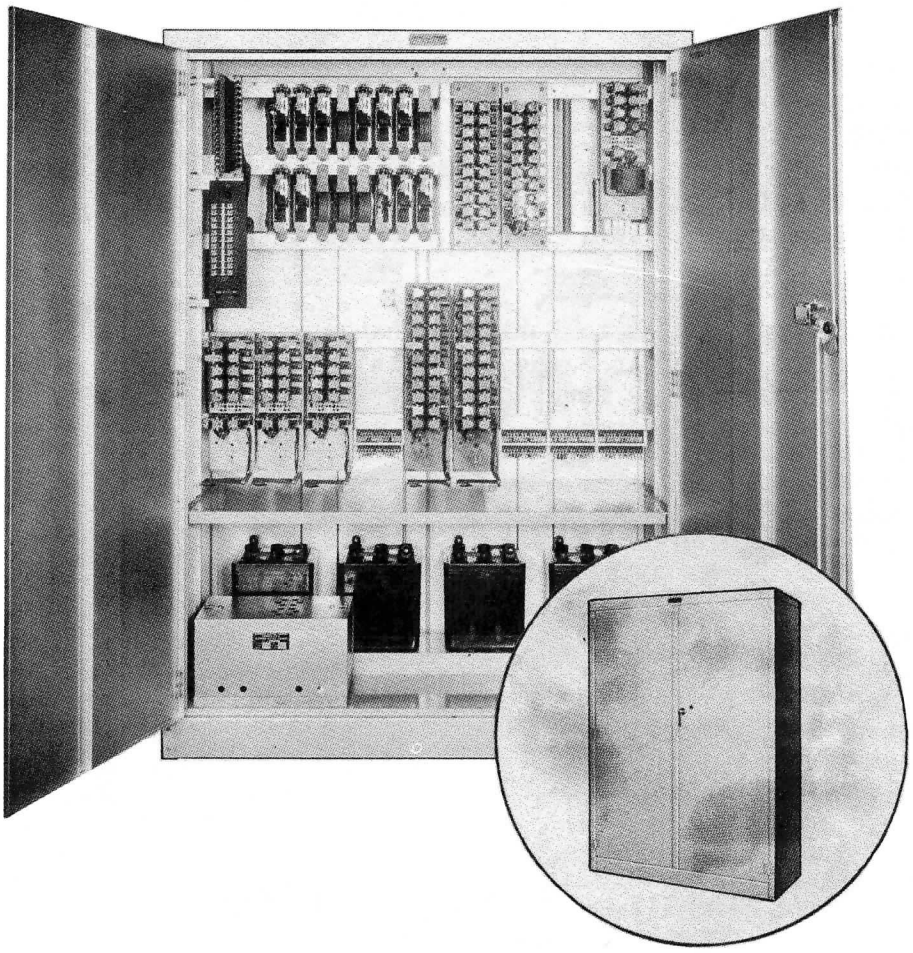


THE UNIT SHOWN IS EQUIPPED WITH THREE LOCAL FINDER-CONNECTORS, TWO TRUNK SWITCHES, AND THE ASSOCIATED RELAY EQUIPMENT.

FIG. 1

THE TYPE 33A6-A P-A-B-X

TYPE 33A6-A
Private Automatic Branch Exchange

Part I General

1. CAPACITIES

The Type 33A6-A Private Automatic Branch Exchange has a capacity of 20 local lines and 5 two-way trunks to the central office. Simultaneous conversations may include up to 4 local and 5 trunk calls, all secret. A typical Type 33A6-A P-A-B-X is illustrated in Fig. 1.

An attendant's cabinet is available and may be provided for concentrating the handling of incoming calls from the public exchange, if so desired. Fig. 3 on page 2 is a photograph of the small attendant's telephone cabinet which is used for this purpose. This cabinet and telephone can be switched in or out of service at any time by merely turning a key. When the cabinet is switched out of service, the system operates on an unattended basis.

The switchboard can be arranged for trunk connection to automatic, manual central battery, or manual magneto central office equipment. It is designed for operation on 24 volts D.C.

2. SERVICES

The Type 33A6-A P-A-B-X provides the following services:

(a) Local service (station to station calls).

(b) Outgoing trunk service to a manual or automatic public exchange for all or part of the stations.

(c) Incoming trunk service from a manual or automatic public exchange to all or part of the stations.

(d) Transfer of trunk calls between local stations.

(e) Attendant cabinet operation, when specified.

(f) Automatic code call service, when specified.

A service diagram is shown in Fig. 2.

An outstanding feature of the Type 33A6-A system is the arrangement whereby trunk calls are trans-

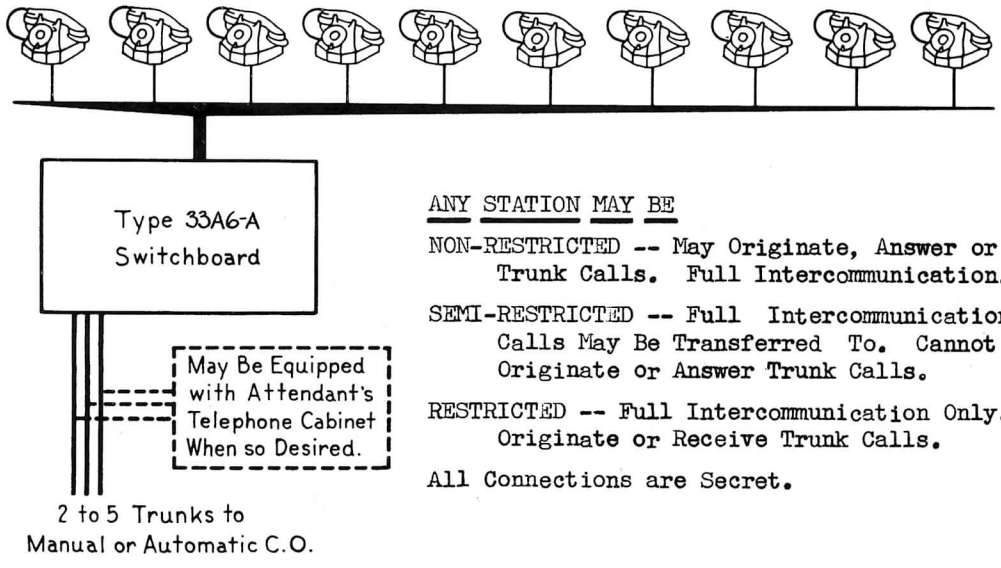


FIG. 2 SERVICE DIAGRAM

ferred from one station to another when the system is not attended. Public-exchange calls can be answered at any non-restricted station and transferred to any other non-restricted station, or to any semi-restricted station, merely by pressing a push-button and dialing the number of the wanted station. When an attendant's cabinet is provided, trunk calls may also be transferred from and to the attendant.

Since any non-restricted station may answer and transfer incoming calls, no special provision is required for night service.

3. AUTOMATIC CODE CALL

Equipment for automatic code call service may be included with the initial installation or may be added at a later date, if desired.

Automatic code call service permits any P-A-B-X party to page any other P.A.B.X. party who is not at his desk or regular location. Audible signals (loud bells, horns, whistles) or lamp signals are distributed about the premises for this purpose. When a P-A-B-X party (or attendant) receives no answer to an attempted call, he hangs up momentarily and then again takes down his receiver and dials a number to sound the code signal of the party wanted. The wanted individual, hearing his code, goes to the nearest telephone, dials a fixed answering number and is immediately connected to the calling party.

4. ATTENDANT CABINET

It is usually desirable to have an attendant handle the incoming calls from the public exchange during the busy periods of the day. For this purpose, an attendant cabinet is available. If desired, this cabinet may be placed on the desk of a regular employee assigned to handle the incoming telephone calls and also perform other duties as time permits.

The attendant cabinet is illustrated in Fig. 3. It consists of a Monophone desk set mounted on a compact box containing five lever keys, one turn key and two supervisory lamps on a single escutcheon plate. The associated signals, condensers, induction coil, and terminal block are located inside the cabinet. The two lever keys at the right-hand end of the escutcheon plate are used for making and answering public-exchange calls. These keys provide facilities for handling two calls at one time. The lever key at the left-hand end of the escutcheon plate serves as a transfer key. It is associated with the handset telephone circuit of the attendant cabinet, and is used for the same purpose as the transfer buttons associated with the non-restricted and semi-restricted telephones.

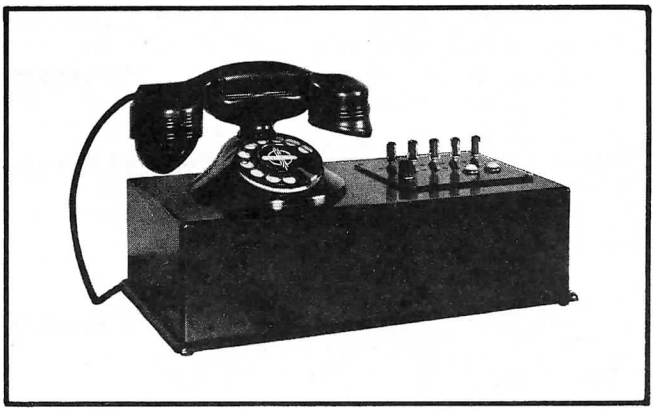


FIG.3 ATTENDANT'S CABINET

The two lever keys located between the trunk keys and the transfer key are connected with an information, or attendant's trunk. One key is used for answering or calling, and the second key for "holding" a call on the trunk.

The information trunk serves as a non-restricted local line to and from the attendant cabinet. Using it, the attendant can perform all the functions possible on any non-restricted line. Non-restricted and semi-restricted stations may use the trunk to request the attendant to obtain public-exchange calls for them. The attendant can set up the necessary connections to the public exchange and then transfer such calls to non-restricted or semi-restricted local stations, i.e., make "delayed calls." Stations restricted to local service only may also use the information trunk to communicate with the attendant.

The attendant can make connections directly to the public exchange using the C.O. trunk keys, independent of the information trunk. Thus, the information trunk is available for local calls to and from the attendant cabinet while delayed calls are being established.

The turn key is used for switching the public-exchange common signal circuit from the common trunk signals to the direct-current buzzer in the attendant cabinet. The cabinet is placed into service by operating the turn key, which causes incoming trunk calls to operate the attendant's buzzer. The attendant can answer a public-exchange call by operating either C.O. trunk key, and can transfer calls by using the transfer key located at the left-hand end of the escutcheon plate. In case the attendant is unable to make a prompt transfer of a call, it may be necessary for her to answer a second call while holding the first call. This is done by returning the first trunk key to normal and operating the second trunk key.

The attendant can also answer or originate any public-exchange call over the information trunk by dialing "8" to answer a call and "9" to originate one, the same as is done at any non-restricted P-A-B-X station. Hence, the attendant is in a position actually to handle three public-exchange calls if necessary (two by means of the C.O. trunk answer keys, and the third over the information trunk).

If the attendant is making or receiving any local or public-exchange calls over the information trunk, and wishes to answer a public-exchange call with a C.O. trunk answer key, the operation of the "HOLD" key will place a holding bridge across the information trunk. The attendant can then restore the information trunk key, which releases her Monophone for answering the incoming trunk call.

After a non-restricted or semi-restricted station has received a public-exchange call from the attendant, the call may be transferred to another non-restricted or semi-restricted station without the assistance of the attendant. Incoming calls from the public exchange can be answered at a non-restricted station while the attendant cabinet is in service, providing that the station is located within hearing distance of the trunk buzzer signal in the attendant cabinet. Any non-restricted station may also originate a call to the public exchange regardless of whether the attendant cabinet is in service or not. If desired, such calls (incoming or outgoing) may be transferred to the attendant later, via the information trunk, the attendant merely operating the transfer key to accept the public-exchange call.

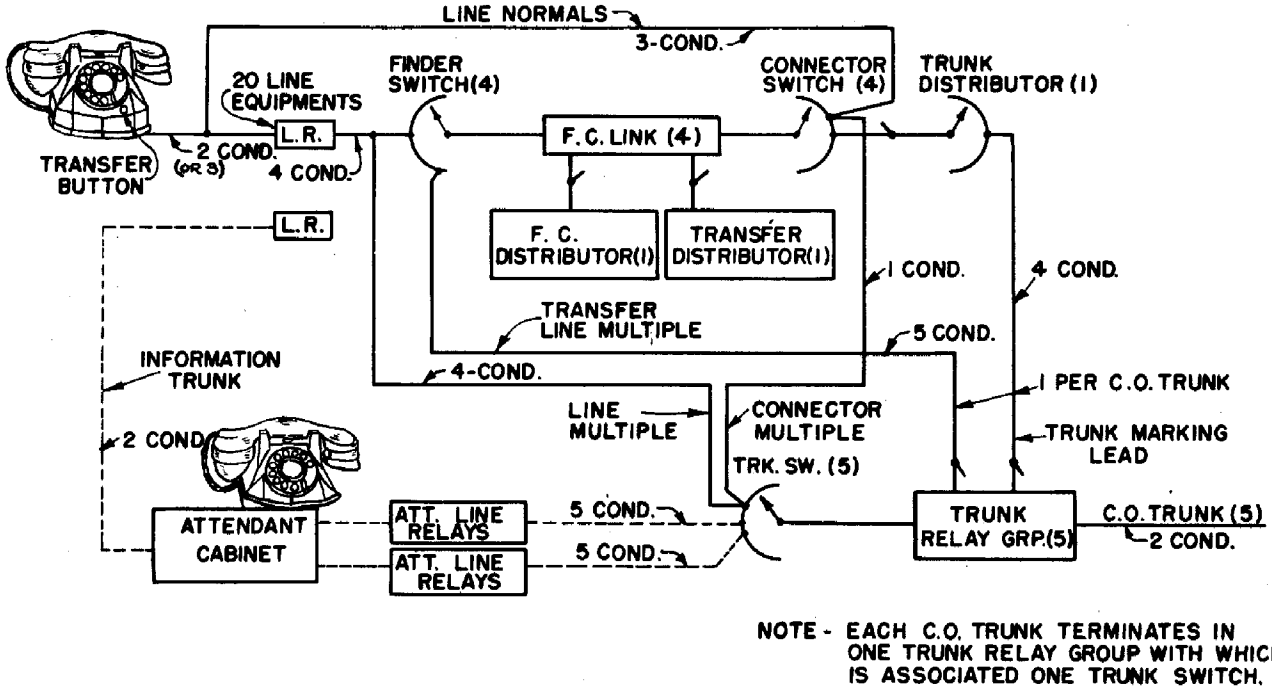
5. OPERATION

Fig. 4 is a one-line drawing of the Type 33A6-A P-A-B-X. Only the essential connections necessary for understanding the operation of the system have been shown, and only one of duplicate units. Thus, only one F.C. (Finder-Connector) Link with its associated Finder and Connector switches is shown. Also, note that only one C.O. Trunk with its associated Trunk Relay Group and Trunk Switch is shown. There are five such trunk equipments (one for each C.O. Trunk).

The following sub-sections describe the operation of the P-A-B-X for various types of calls. The paths taken by the calls and the interconnections of the various equipment units may be traced on Fig. 4.

5.1 Local Calls

The calling person lifts the handset from the cradle and listens for dial tone. A finder switch, preselected by the F.C. Distributor, finds the calling line and dial tone is con-



NOTE - EACH C.O. TRUNK TERMINATES IN ONE TRUNK RELAY GROUP WITH WHICH IS ASSOCIATED ONE TRUNK SWITCH.

FIG. 4 TYPE 33A6-A P-A-B-X

nected to the calling line as an indication that dialing may commence. The wanted P-A-B-X number, consisting of one, two, or three digits, is then dialed. The connector switch follows the dial pulses and steps around to the called line, which it seizes and rings if it is idle, or returns busy tone if the line is already engaged.

The talking circuit for a local call is from the calling telephone through the associated line equipment, finder switch, connector switch, and over the normals of the called station. Both lines and the finder-connector link are held busy until both handsets have been returned to their respective cradles.

5.2 Outgoing Calls to Public Exchange

Any non-restricted station may originate a call to the public exchange. The operation of the system for such a call is as follows:

When the calling person lifts the handset from the cradle, the line is extended through to a connector switch and dial tone is returned the same as for a local call. However, when the digit "9" is dialed, the connector switch is advanced to a contact associated with the trunk distributor, and the calling line is marked (via the line multiple) in the banks of the trunk switches. The trunk distributor seizes the preselected C.O. trunk and causes the associated trunk switch to find the calling line and extend it through to this C.O. trunk. At this point the finder-connector link releases from the connection and the trunk distributor steps its wipers to the next idle trunk in preparation for another call.

The local subscriber, upon receiving dial tone from the public exchange, dials the directory number of the desired station, or, if the call is being made to a manual exchange, gives the number verbally when the manual operator answers.

The talking circuit for an outgoing call is from the calling telephone through its associated line equipment, over the line multiple, through the trunk switch and trunk relay group, and out over the associated C.O. trunk. The P-A-B-X equipment used for the final connection will be held busy until the local P-A-B-X party hangs up and the trunk is released at the public exchange (by the called party hanging up, or, in the case of a manual exchange, by the manual operator taking down the associated front cord connection).

5.3 Incoming Public-Exchange Calls

Incoming calls from the public exchange can be answered only at non-restricted stations. An incoming call operates the common trunk signal, which is usually located so that it may be heard at several stations. The common trunk signal is not associated with any particular trunk, but merely indicates an incoming call.

The operation of the system for an incoming call is as follows: When a call is made to the P-A-B-X, the particular C.O. trunk which has been seized at the public exchange will be marked in the banks of the trunk distributor via the trunk marking lead (see Fig. 4). At the same time, the P-A-B-X trunk signal will operate.

The call may be answered at any non-restricted P-A-B-X station by lifting the handset and dialing the digit "8". Upon so doing, a finder-connector link is seized, the connector is advanced to a contact associated with the trunk distributor, and the answering line is marked (via the line multiple) in the banks of the trunk switches. The trunk distributor steps to the calling C.O. trunk and causes the associated trunk switch to find the answering line. The finder-connector link now releases and the trunk distributor steps its wipers to the next idle trunk.

The talking circuit is completed from the answering P-A-B-X telephone through its associated line equipment, over the line multiple, through the trunk switch and trunk relay group, and over the calling C.O. trunk. This equipment, as in the case of an outgoing public exchange call, will be held busy until the local P-A-B-X party hangs up and the trunk is released at the public exchange.

5.4 Transferring a Trunk Call

A trunk call, either incoming or outgoing, may be transferred from the P-A-B-X station to any other non-restricted station or any semi-restricted station. This is sometimes referred to as the "passing call" feature.

To establish a transfer, the P-A-B-X party momentarily presses the push-button in the base of the telephone. The desired local station is then dialed and requested to "pick up" the trunk call. The latter party presses his push-button momentarily which causes the trunk call to be transferred to his telephone. The transferring person waits on the connection until he is advised by a tone that the transfer has been completed.

The call is completely guarded from start to finish. No one can accept the transfer except the station dialed, and the station dialed can connect only with the trunk upon which the transferring party is waiting. The second person can in turn transfer the call to another non-restricted or semi-restricted station; in fact, the call can be repeatedly transferred in this manner. Once a station is in on a trunk con-

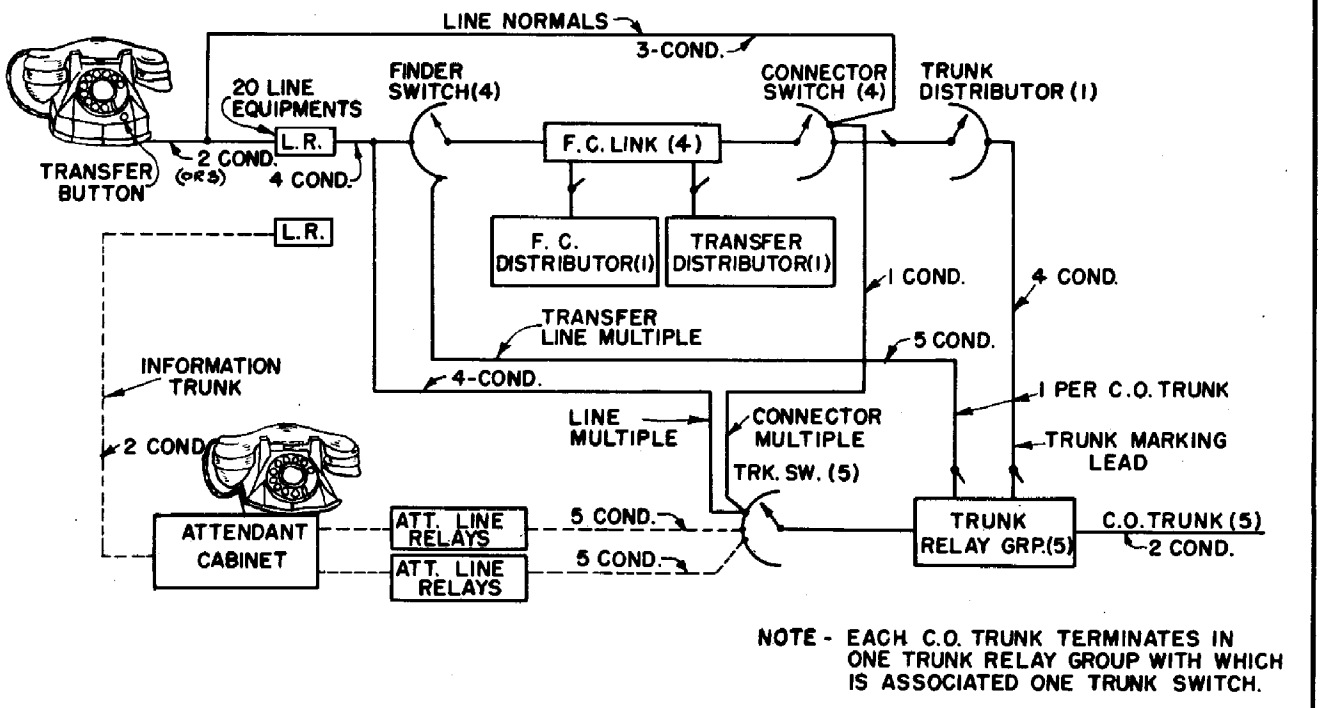


FIG. 4 TYPE 33A6-A P-A-B-X
(REPEATED)

nection, that station cannot answer a second call until the first call is released or transferred.

A person who is connected to a public-exchange trunk may wish to speak with another local station while holding the trunk. This can be accomplished by proceeding as for a transfer, with the exception that the called station is not instructed to take the call. The first person is disconnected from the trunk while talking locally, but may be re-connected to the public-exchange trunk by again pressing the push-button momentarily. In all cases of transfer, the public-exchange party cannot hear the local conversation.

Referring to Fig. 4, the operation of the P-A-B-X system when a trunk call is transferred is as follows: Assume that a trunk call has been established from a P-A-B-X station, over the line multiple and out over a C.O. trunk; and that the P-A-B-X party wishes to transfer the call to another P-A-B-X station and, therefore, presses his transfer button. This places a holding bridge in the trunk relay group across the C.O. trunk, and also marks this particular trunk in the finder switch banks, via the transfer line multiple. The preselected finder switch finds the trunk, thereby extending the connection to the associated connector switch.

Upon receiving dial tone, the P-A-B-X party dials the number of the P-A-B-X station to which the call is to be transferred, and requests that the waiting public-exchange call be "picked up." The talking circuit for this local conversation is from the original P-A-B-X station through its associated line equipment, over the line multiple, through the trunk switch, over the transfer line multiple, through the finder-connector link, and over the line normal to the second P-A-B-X station.

To pick up the waiting trunk call, the second P-A-B-X party presses his transfer button. This causes the transfer distributor to mark the new P-A-B-X line in the banks of the trunk switch, via the connector switch and the connector multiple. At this point, transfer tone (busy tone) is sent to the transferring P-A-B-X party as a signal that he may hang up. Also, the circuit over the transfer line multiple is opened.

The trunk switch steps to the second P-A-B-X line, releases the finder-connector link and the transfer distributor, and then removes the holding bridge from the C.O. trunk, thus completing the connection from the C.O. trunk to the second P-A-B-X line. The talking circuit is now established from the second P-A-B-X station through its associated line equipment, over the line multiple, through the trunk switch and

trunk relay group, and over the calling C.O. trunk to the public exchange.

The public-exchange call may be transferred from station to station within the P-A-B-X as many times as desired. For each transfer, the operation is the same as just described. The local P-A-B-X equipment will be released when the last P-A-B-X party hangs up and the C.O. trunk is released at the public exchange.

5.5 Attendant Cabinet

The attendant cabinet is merely one station of the P-A-B-X arranged to answer and handle simultaneously more than one incoming public-exchange call. As seen in Fig. 4, two direct lines are provided from the banks of the trunk switches to the attendant cabinet. These terminate in the attendant cabinet on C.O. trunk keys. A third line is available via the information trunk. The latter line terminates on regular line equipment and thus provides means for local calls between the attendant cabinet and any of the regular local P-A-B-X stations. It is also available for handling a third trunk call, if required.

Referring to Fig. 4, calls to and from the attendant cabinet may be traced as follows:

Local Calls

All local calls are made via the information trunk. This trunk goes from the attendant cabinet directly to a regular line equipment. From this point on, the paths taken by local calls are exactly the same as for any other P-A-B-X station. Such calls have been explained in a previous sub-section and this explanation need not be repeated here.

Outgoing Trunk Calls

Each of the two C.O. trunk keys is associated with one of the two direct lines to the banks of the trunk switches. To originate an outgoing call, the attendant removes the Monophone handset and operates one of the C.O. trunk keys to the "ANS" position. This marks the associated direct line in the banks of the trunk switches.

Inasmuch as the trunk distributor has preselected an idle trunk switch, this trunk switch now finds the attendant's line and extends it through to the associated C.O. trunk. The trunk distributor now steps its wipers to the next idle trunk in preparation for another call.

When the attendant's line is extended through to the C.O. trunk, dial tone will be returned from the public exchange. This is the signal for the attendant to dial the directory number of the desired public-exchange party. In the case of a manual exchange, the number is given verbally when the manual operator answers.

When the C.O. trunk key was operated, the circuit of the associated supervisory lamp was

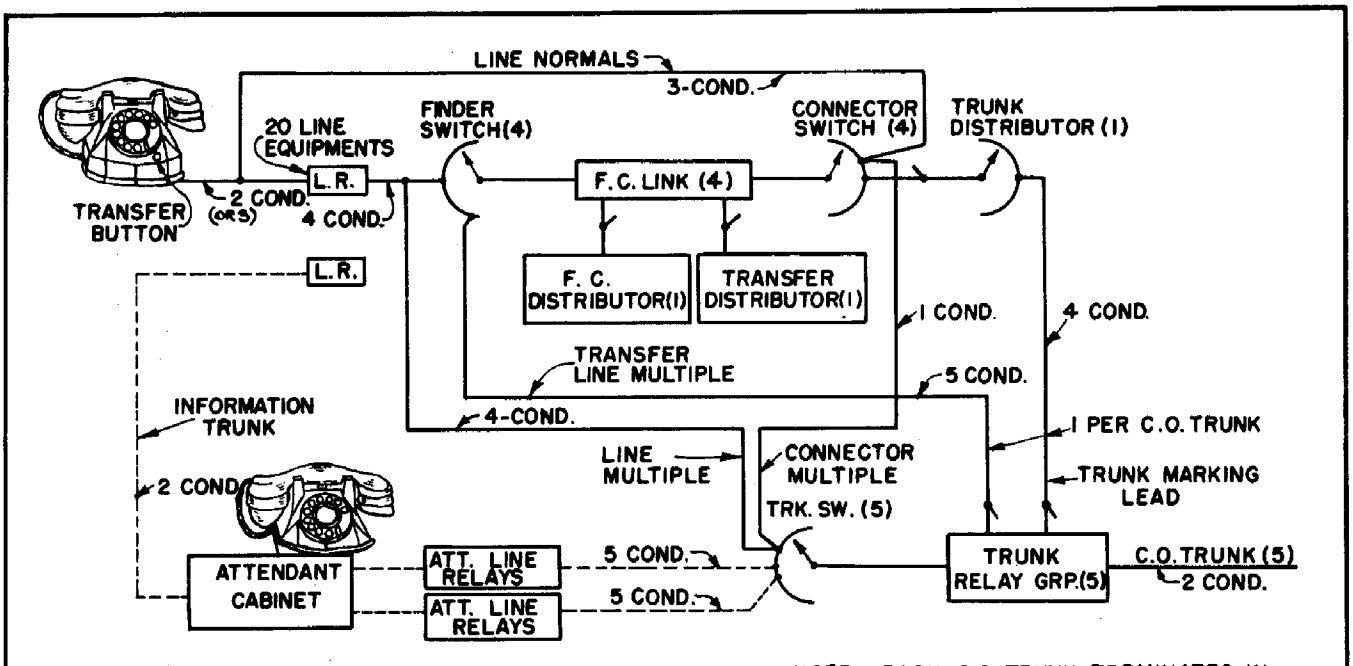


FIG. 4 TYPE 33A6-A P-A-B-X (REPEATED)

closed. When the call is completed and the attendant wishes to release from the connection she operates the key momentarily to the release position, after which the lamp will be extinguished when the trunk is released at the public exchange. If the trunk is released at the public exchange before the attendant operates the key, the lamp will be extinguished immediately upon the operation of the key to the release position.

When the attendant transfers a public-exchange call to a second P-A-B-X station, she merely restores the C.O. trunk key to normal. In this case, the supervisory lamp will be extinguished when the transfer is completed at the second P-A-B-X station.

Incoming Trunk Calls

When a C.O. trunk is seized at the public exchange, the attendant's audible trunk signal will sound. At the same time the trunk in question will be marked in the banks of the trunk distributor, via the trunk marking lead.

The attendant removes the Monophone handset and operates one of the two C.O. trunk keys to the "ANS" position, thus marking the associated direct line in the banks of the trunk switches. The trunk distributor finds the calling trunk and causes the associated trunk switch to find the attendant's line and thus extends the C.O. trunk to the attendant cabinet. The trunk distributor then preselects the next idle trunk.

When the C.O. trunk is extended to the attendant cabinet, the supervisory lamp associated with the operated C.O. trunk key will light. When the conversation is completed, the attendant operates the key momentarily to the release position, after which the lamp will be extinguished when the trunk is released at the public exchange. If the trunk is released at the public exchange before the attendant operates the key, the lamp will be extinguished immediately upon the operation of the key to the release position.

When the attendant transfers a public-exchange call to a second P-A-B-X station, she merely restores the C.O. trunk key to normal. In this case, the supervisory lamp will be extinguished when the transfer is completed at the second P-A-B-X station.

Transferring a Trunk Call

A trunk call, either incoming or outgoing, may be transferred from the attendant cabinet to any non-restricted or semi-restricted P-A-B-X station. The transfer key on the cabinet corresponds to the transfer button provided at each P-A-B-X station.

The path from the attendant cabinet to the trunk switch banks may be either over the information trunk and its associated regular line equipment, or over one of the two direct lines. From this point on, the operation of the system for a transfer is the same as explained in Sub-section 5.4 entitled "Transferring a Trunk Call."

When making a transfer, the attendant need not wait for the P-A-B-X party to answer but may retire from the connection immediately upon dialing the desired P-A-B-X number and receiving ring-back tone. The attendant retires by restoring the C.O. trunk "ANS" key to the normal position. When the dialed P-A-B-X party removes the handset, busy tone will inform him that a public exchange call has been transferred to his station. Pressing the transfer button connects this P-A-B-X party to the waiting public-exchange party.

The above feature enables the attendant to use her time more efficiently and pass quickly from one call to the next. When transferring a call in this manner, the supervisory lamp will continue to glow even though the associated key has been restored to normal. The lamp will be extinguished when the transfer is completed at the called P-A-B-X station.

Part II
Description of Equipment

6. DRAWINGS

A set of drawings is supplied with the P-A-B-X. These drawings together with the information in this bulletin will serve as instructions for installing and operating the equipment.

7. SWITCHBOARD ARRANGEMENT

The switchboard consists of rotary switches and relay groups mounted on a steel framework, and encased in an aluminum-finished all-metal cabinet. As seen in Fig. 1, the upright is single-sided, and is arranged to mount two shelves of equipment. Below the shelves is a space designed for housing one battery of 12 cells, 50 ampere-hour capacity; also charging equipment.

Fig. 5 shows the relative positions of the equipment. The top shelf holds the following: terminal strip, fuse panel, rotary switches for finders and connectors, rotary switches for central office trunks, rotary switch distributors, line relay group, distributor relay group, attendant cabinet relay group (when equipped), and ringing converter. The lower shelf is arranged for relay groups associated with the finder, connector, and trunk switches.

8. NUMBERING

The local telephone line numbers consist of one, two and three digits as follows:

1 to	7 inclusive
01 to	09 inclusive
001 to	004 inclusive

Digit "9" is dialed to obtain a trunk for outgoing public-exchange calls; digit "8" to answer an incoming trunk call.

When code call service is provided, line number 07 is required for the call number, and 08 for the answering number.

When an attendant cabinet is provided, a local line number (non-restricted) is required for the information trunk associated with the attendant cabinet.

9. TELEPHONES

Standard common battery automatic telephones are used, with or without push-buttons, according to the class of service assigned. (See Service Diagram in Section 2). The non-restricted and semi-restricted stations are provided with telephones equipped with push-buttons, and the restricted stations with telephones not equipped with push-buttons. The push-buttons, however, need not be incorporated in the telephones, but can be mounted separately and connected to the lines at the ringer boxes or line terminals.

10. LINES AND TRUNKS

The local line circuits to the telephones require one pair of conductors and a ground connection. The ground, or third, wire is not required for restricted stations, but should be included in order that such stations may be readily converted for semi-restricted or non-restricted service, should occasion demand. The loop resistance of local lines (exclusive of telephones) should not exceed 400 ohms.
Each public-exchange trunk requires a pair of conductors. Transmitter current is normally supplied from the public-exchange and the loop resistance of the trunk plus the resistance of the local line should not exceed 500 ohms. If transmitter current is supplied from the P-A-B-X, the loop resistance of the trunk may be 750 ohms. It should be noted, however, that in the latter case, special repeaters (trunk relay groups) are required and must be specified on the initial order. The positive side of the central office trunk must be free from ground at the central office.

11. TRUNK SIGNALS

One set of signals will serve all five public-exchange trunks. The signals may be A.C. tel-

ephone ringers or any desired type of 24-volt D.C. signal. The number of signals connected in multiple to the signal circuit should not exceed four. If more than four signals are required, a relay can be used to operate the signals from the commercial current supply or from the storage battery.

12. POWER

The switchboard operates from a 12-cell, 24-volt, 50 ampere-hour storage battery. The battery may be charged from a rectifier, from D.C. commercial power, from a motor-generator set, or over cable pairs from the public exchange.

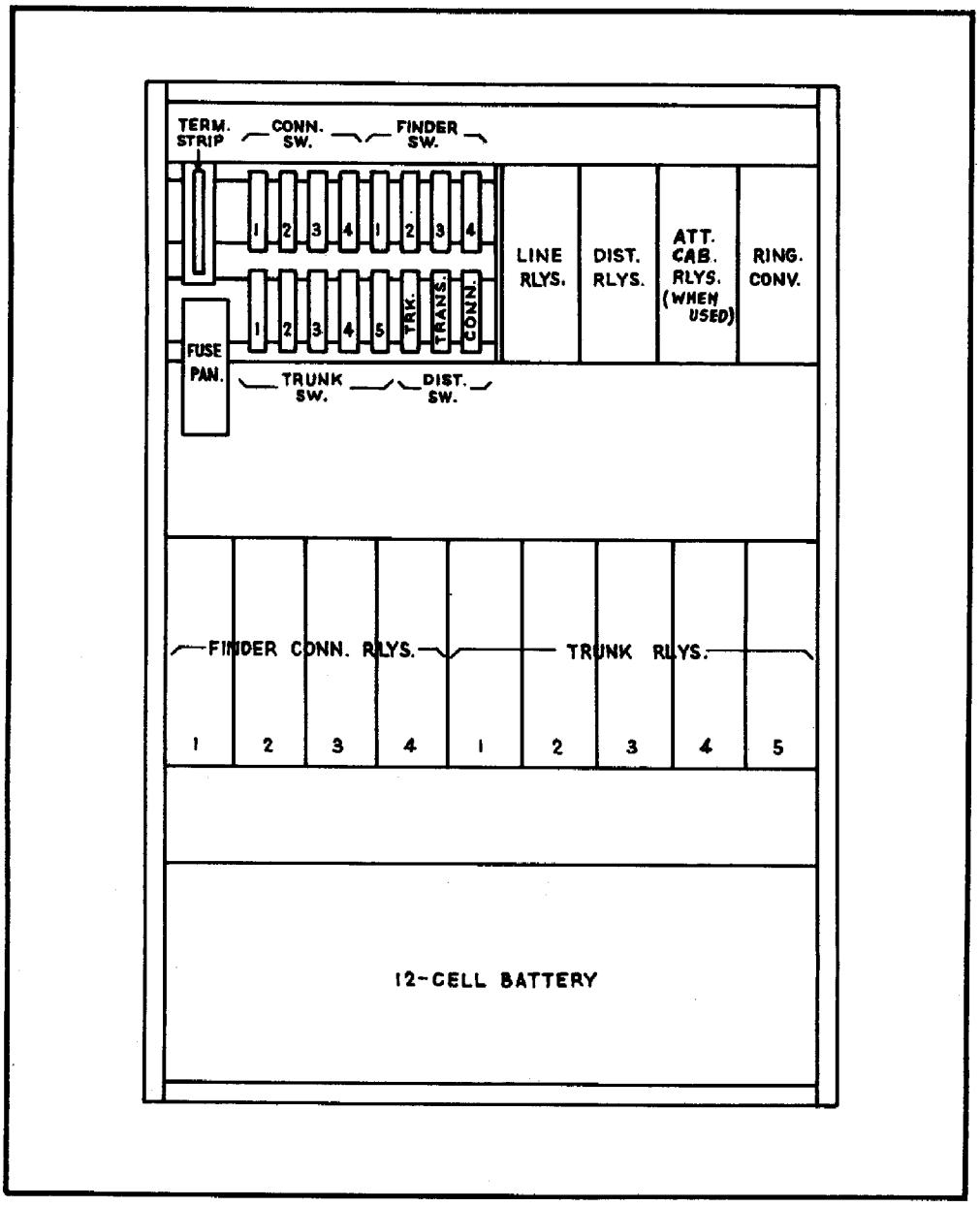


FIG.5 TYPE 33A6-A P-A-B-X SWITCHBOARD ARRANGEMENT (FRONT VIEW)

Part III

Installation and Maintenance

13. SWITCHBOARD AND COVER

The switchboard is a complete unit; that is, it contains all of the apparatus including the power equipment. The first step is to place the upright in the location selected, and then assemble the cover. The Method of Assembly drawing shows the floor drillings required, and also gives the overall dimensions of the cover.

The Cover Assembly drawing shows the cover assembly details and the piece numbers of the individual parts. It is important that the upright be as near level on the floor as possible to permit free operation of the doors. The order of assembly is as follows: First bolt the front and rear battery shelf assemblies to the sides of the upright. Then mount the two end covers and bolt them at the bottom to the battery shelf assemblies. Next mount the top cover, and fasten with bolts to the tops of the two end covers.

Weather strip gasket is furnished with an adhesive substance on one side, which will cause it to cling to the frame when placed. The white tape should be removed from the strip just before placing, and the surface of the metal should be free from dirt or grease.

Four pieces of weather stripping should be cut the length of the doors and placed between the doors and frame, both front and rear. Another two pieces should be cut the width of the two doors and placed across the top of the opening both front and rear. The bottom opening, front and rear, is arranged in a similar manner. When the strip is in position, it will be pressed

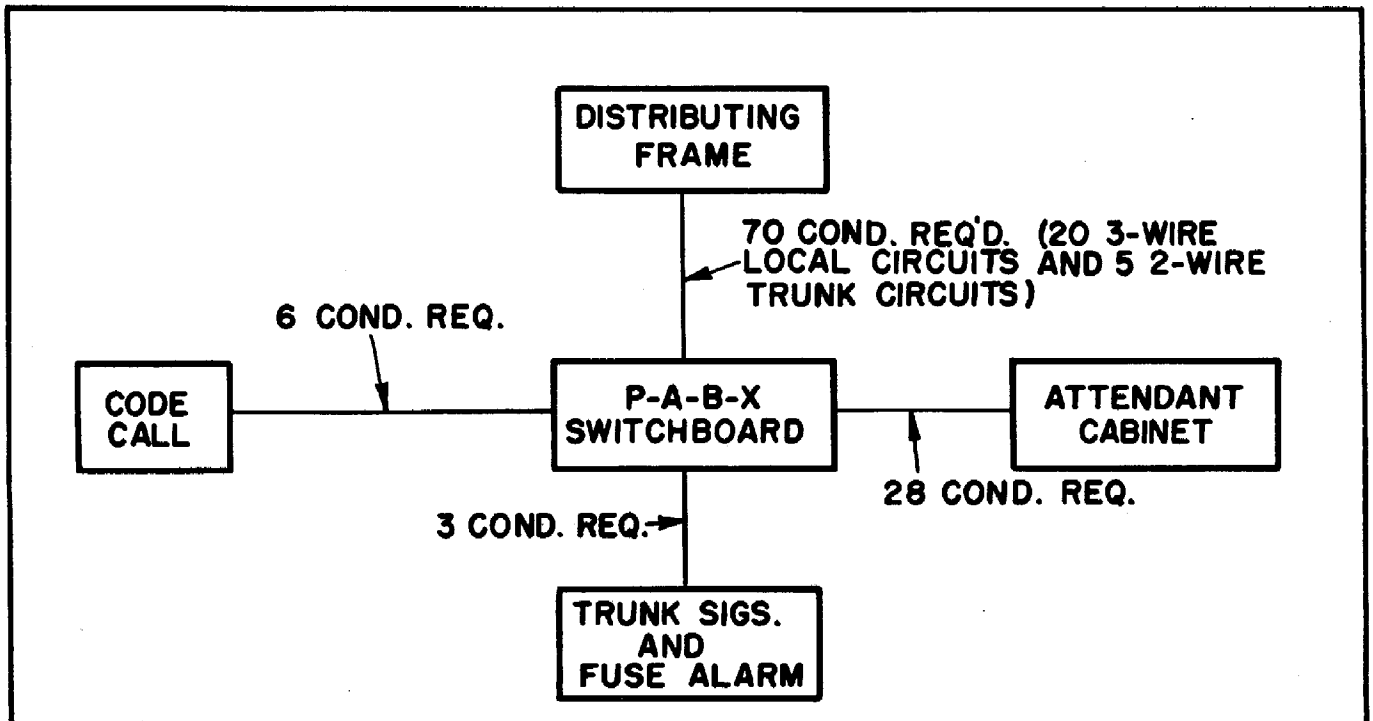


FIG.6 WIRING INVOLVED

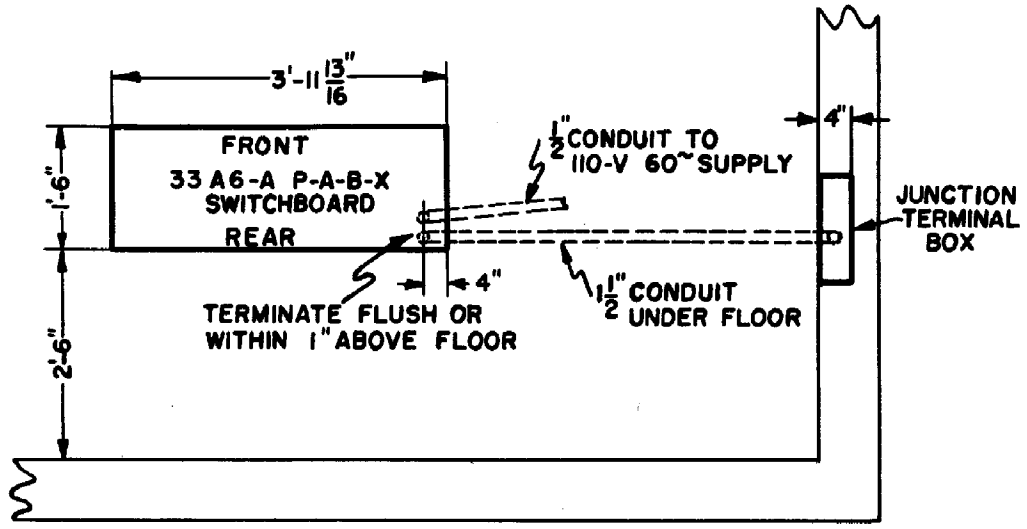


FIG.7 SUGGESTED CONDUIT LOCATION

tightly between the doors and the frame when the doors are closed, thereby affording protection against dust. The remaining operation is to hang the four doors as shown on the drawings.

14. CABLING AND CONDUIT

Threadless steel tube conduit is recommended for carrying the line cable to the switchboard. The opening in the top of the cover is designed for 1-1/2" conduit. When commercial power is used for charging purposes, the installer should drill a hole in the cover at the most convenient point and use the A3 Federal porcelain bushing which is supplied with the equipment.

The cabling arrangement will vary since code call equipment, attendant's cabinet, etc., are optional. Fig. 6 shows the wiring. Note that the diagram simply shows the number of circuits which may be involved and bears no relation to the placing of equipment or cabling.

When the battery is charged by floating from the public exchange, additional circuits as required should be furnished. This wiring is not shown in Fig. 6.

A suggested location of conduit and flush type junction terminal box is shown in Fig. 7. As an alternative, the switchboard conduit may be run overhead from the top of the cabinet to the terminal box; in this case, a surface type terminal box should be used. Overhead conduit and surface box would be placed during P-A-B-X installation, whereas the floor conduit and flush box should be placed during building construction.

The minimum space required between the front or rear of the cabinet and nearest wall is 2'-6" to permit access to both sides of the equipment.

The length of lead-covered cable for connecting the switchboard to the terminal box is 9'-0" plus the length of conduit for underfloor conduit; for overhead conduit, the cable length is 6'-0" plus the length of conduit.

15. WIRING

The method of terminating the line cable on the switchboard is shown on Drawing H-62616 Fig. 1. The line circuits are terminated on the "+", "-", and "G" terminals on the first twenty rows from the top. The numbering corresponds to the telephone numbers (See Section 8).

The public-exchange trunk circuits are terminated on the "+" and "-" terminals of the next two rows and opposite the designation "Trunk to Auto. or C.B. Man. C.O."

The common trunk signal circuit is terminated on "TRK. SIG. 2" and "GRD," on the third row from the bottom and opposite the designation "TO TRK. SIG." On this row also the installer should connect with a jumper the terminals designated "DIR GEN" and "TRK SIG 1," provided A.C. bells are to be used on the common signal circuit. If direct-current signals such as buzzers, etc., are used, the jumpering just described should be omitted and a jumper connecting "TRK SIG 1" and "MB" run instead.

The installer should wire the battery to the fuse panel, with #8 BRC wire, and connect as

shown on Drawing H-62616, Fig. 15. If the battery is to be float-charged from the public exchange, the cable conductors carrying the charging current should be extended to the fuse panel and connected to the battery side of the fuse clip.

The fuse alarm signal circuit may be connected through a relay to the public exchange or other supervisory point. This signal will indicate blown fuses.

On the first twenty rows of the terminal block, terminals "TC," "B" and "RS" are arranged to control restricted and non-restricted service. The jumpering is as follows:

On any line that is to be permitted to originate calls to, or answer calls from the public exchange, jumper "TC" and "B." This is for non-restricted service. On any line that is not allowed this service, but may receive these calls by transfer, jumper "B" and "RS." This is for semi-restricted service.

On any line that is not to have any access to the public-exchange trunks, jumper "B" and "RS." This is for restricted service. Restricted service lines are provided with telephones not equipped with push-buttons. The ground, or third, wire is not required, but should be included in order that such stations may be readily converted to semi-restricted or non-restricted service, if desired later.

For a common signal circuit, the installer should run a pair of wires throughout the premises and connect one or more bells or other signals so located that the persons assigned to answer incoming calls, can hear the bell or signal.

When an attendant cabinet is provided, the cabinet should be located on a desk or table. The terminal box which is connected to the key cabinet by means of a short flexible cable, may be located underneath the desk or table. Wiring between the terminal box and the automatic switchboard terminal block requires 28 wires.

The cable should be connected to the terminal strip in the attendant cabinet terminal box in accordance with drawing H-59161. At the automatic switchboard, the cable should be connected to the terminal block as shown on drawing H-62616 Fig. 1, on the five horizontal rows of terminals designated "TO ATT CAB WHEN SPECD." The conductors marked "P" on Drawing H-59161 should be run in twisted pairs in the connecting cable. If spare conductors are available, both wires of a pair should be used for the "-" battery lead, and another pair for "+" battery.

The jumper connecting terminals TS and TS1 (on the fourth horizontal row from the bottom) of the automatic switchboard terminal block should be removed. A pair of strap wires should be run from terminals + and - on the fifth row from the bottom of the terminal block to + and - terminals of the line number assigned for the information trunk. This line should be jumpered for non-restricted service, i.e., jumper the "TC" and "B" terminals of that line.

16. EQUIPMENT TESTS

Following the completion of the installation work, the following tests should be made:

(a) Dialing and Transmission

Originate one or more local calls at each telephone. Answer one or more calls at each telephone. While making these calls note the operation of the dial tone, ring-back tone, and check for satisfactory transmission.

Test the busy tone by dialing the number of the telephone from which the call is made.

(b) Public-Exchange Trunks

Make an outgoing call to the public exchange from a non-restricted station by dialing the digit #9. Use a public-exchange number which will route the call back over another trunk to the P-A-B-X, i.e., dial the P-A-B-X's own directory number. Or, in the case of a manual exchange, request the operator to route the call back over one of the other P-A-B-X trunks. When the common signal operates, answer the call from another non-restricted station by dialing the digit #8. Test the transmission between these two stations as they are now connected through the two public-exchange trunks. Repeat this test until each non-restricted station is tested for making outgoing calls and receiving incoming calls.

Test restricted and semi-restricted stations for restriction against outgoing calls by dialing digit #9, and against incoming calls by dialing digit #8. When attempting to call out from these stations, dial tone should be received after dialing to indicate that the service is denied.

(c) Transferring Calls

Make an outgoing call from a non-restricted station to the public exchange, returning over a second trunk as previously explained under "Public-Exchange Trunks." When the call is answered at one of the non-restricted stations, the connection is established and the transfer test may be made at either station. To transfer the call, press the push button momentarily, and then dial a third station, which may be either non-restricted or semi-restricted. Request this station to pick up the call by momentarily pressing

the push button. Listen for the transfer tone (busy tone) which should appear as soon as the trunk call has been transferred to the third station. Also have the station picking up the call listen for the transfer tone, indicating when to start communication. Test the transmission on the trunk connection at the third station. Repeat this test until all non-restricted stations have transferred calls and both non-restricted and semi-restricted stations have picked up calls.

If the transfer operation fails with certain telephones, the jumpering on the switchboard terminal may be at fault. This may be checked, comparing the jumpering with the instructions outlined in Section 15 entitled "Wiring."

(d) Attendant Cabinet (When Supplied)

Operate turn key to "IN" position. Operate the information trunk key to the "ANS & DIAL" position. Perform tests (a), (b), and (c), noting that the attendant's bell rings for local calls and the buzzer for trunk calls. Note also that on trunk calls, the P-A-B-X common trunk signals remain silent. The transfer key is used in the same manner as the transfer buttons at other stations.

Check the "HOLD" key as follows: Originate a local call with the "ANS & DIAL" key operated, then operate the "HOLD" key and restore the "ANS & DIAL" key to normal. Reoperate the "ANS & DIAL" key and restore the "HOLD" key. The called station should still be on the line. Restore the "ANS & DIAL" key.

Test the C.O. trunk keys for incoming trunk calls as follows: Originate a public-exchange call at another P-A-B-X station, dialing the P-A-B-X's own directory number. When the attendant's buzzer sounds, operate one of the two C.O. trunk keys to the "ANS" position. Note that the associated supervisory lamp comes on when the call is answered, and continues to glow until the key is operated to the "RLSE" position and the handset is returned to the cradle at the P-A-B-X station which originated the call. If the key is operated to the "RLSE" position first the lamp should continue to glow until the handset at the other P-A-B-X station is returned to the cradle. In the case of a manual exchange, the lamp will continue to glow until the manual operator removes the cord circuit from the trunk. Repeat the test for an incoming trunk call, using the other C.O. trunk key.

Test the C.O. trunk keys for outgoing trunk calls as follows: Operate a C.O. trunk key to the "ANS" position. Originate a public-exchange call, dialing the P-A-B-X's own directory number. When the buzzer sounds, answer the call at one of the other P-A-B-X stations. Test the C.O. trunk key for "holding" the call by restoring it to the normal position. When the key is reoperated to the "ANS" position, the other station should still be on the line. Note that the supervisory lamp has remained on throughout the above procedure, and continues to glow until the C.O. trunk key is operated to the "RLSE" position and the handset is returned to the cradle at the other P-A-B-X station. Here again, if the key is operated to the "RLSE" position first, the lamp should continue to glow until the handset is replaced at the other P-A-B-X station. Repeat the test for an outgoing trunk call, using the other C.O. trunk key.

Test the "immediate withdrawal from a transfer" feature as follows: Originate a trunk call at the attendant cabinet and answer at another P-A-B-X station as explained in the preceding paragraph. Operate the transfer key at the attendant cabinet momentarily and then dial the number of a third P-A-B-X station. As soon as ring-back tone is received, retire from the connection by restoring the C.O. trunk key to the normal position (supy. lamp continues to glow). Remove the handset at the called third P-A-B-X station--busy tone should be received there. When the transfer key is pushed at the third station, the supy lamp should be extinguished. The two regular P-A-B-X stations should now be connected together via the public exchange. Replace all handsets to their respective cradles.

17. Maintenance

Routine tests and search for faulty operation can be made in a manner similar to the methods outlined under "Equipment Tests." If a circuit fault is indicated, the approximate location can be determined by referring to Section 5 entitled "Operation" which includes a one-line drawing and an explanation of the operation of the system. The "H" circuit blueprints and "E" circuit explanations, furnished with the P-A-B-X, should then be referred to for details of the piece of equipment which is indicated to be at fault. If readjustments are required, the information can be obtained from the "AH" drawings which are also furnished. The piece number of any apparatus part may be obtained from the stocklist drawings associated with the particular apparatus unit involved.

Part IV
Operating Instructions

Note: A supply of Automatic Electric Company "Telephone Directory" cards (form FM-2056) accompanies each Type 33A6A switchboard shipment. On the back of each card are instructions for use of the P-A-B-X system. Customers will be sent reasonable additional quantities of these cards gratis at any time upon request.

It is advisable to inform each P-A-B-X party of the services available to his telephone.

18. ORIGINATING AND ANSWERING CALLS (NO ATTENDANT CABINET)

All persons using non-restricted and semi-restricted stations should be individually instructed that when they answer the local telephone bell and are requested to accept a public-exchange call on a transfer, they should press the push button promptly to avoid unnecessary delay. The principal reason for requiring promptness is that the waiting public-exchange party cannot hear or converse on the connection from the moment when the original answering station started the transfer of the call, until the called station accepts the call. Another reason is that the completion of the transfer may be slightly delayed when the push button is pressed at the accepting station due to two or more transfers taking place at the same time.

Another instruction should be given to the same persons to the effect that when they press the push button to accept a call on a transfer, they should not attempt to converse with the waiting public-exchange party until they hear the transfer tone. The transfer tone indicates that the transfer has been completed, and, as stated in the preceding paragraph, there may be a short time interval between the pressing of the push button and the actual completion of the transfer. The transfer tone is heard by both the person making the transfer and the person accepting the transfer.

The following instructions are typical, and may require modification to correspond with a particular installation. For example, an installation may be equipped with only non-restricted telephones--with both non-restricted and semi-restricted telephones--or with all three classes of telephones.

(a) To make a Local Call (From any Station)

1 - Lift handset from cradle.
2 - Listen for dial tone.
3 - When dial tone is heard, dial number of desired station.
4 - If an error is made in dialing, return handset to cradle one second and start call over again.
5 - Ringing tone is heard if called station is idle.
6 - Busy tone is heard if called station is busy.
7 - Return handset to cradle when through talking or when called station is busy.

(b) To Answer a Local Call (At Any Station)

1 - When bell rings, lift handset from cradle.
2 - Bell stops ringing immediately.
3 - Answer call by giving individual name or department number.
4 - Return handset to cradle when through talking.

(c) To Make a Call to an Automatic Public Exchange (Non-Restricted Stations Only)

1 - Lift handset from cradle.
2 - Listen for dial tone.
3 - When dial tone is heard, dial digit "9."
4 - If an error is made in dialing, return handset to cradle one second and start call over again.
5 - Listen for dial tone from public exchange.
6 - If busy tone is heard, all public-exchange trunks are busy. Return handset to cradle, and wait a few moments before starting call over again.

7 - When public-exchange dial tone is heard, dial directory number of desired line.
8 - If an error is made in dialing, return handset to cradle one second and start call over again.
9 - Ringing tone is heard if called line is idle.
10- Busy tone is heard if called line is busy.
11- Return handset to cradle when through talking or when called line is busy.

(d) To Make a Call to a Manual Public Exchange (Non-Restricted Stations Only)

1 - Lift handset from cradle.
2 - Listen for dial tone.
3 - When dial tone is heard, dial digit "9."
4 - If an error is made in dialing, return handset to cradle one second and start call over again.
5 - If busy tone is heard, all public-exchange trunks are busy. Return handset to cradle, and wait a few moments before starting call over again.
6 - When public-exchange operator answers, give directory number of desired line.
7 - Return handset to cradle when through talking or when called line is busy.
8 - If it is desired to recall public-exchange operator before hanging up, move handset plunger slowly up and down a few times.

(e) To Answer A Call From Public Exchange (Non-Restricted Stations Only)

1 - When trunk signals are sounded, lift handset from cradle.
2 - Listen for dial tone.
3 - When dial tone is heard, dial digit "8."
4 - Trunk signals cease ringing.
5 - Answer call by giving name of company and individual name or department.
6 - Return handset to cradle when through talking.

(f) To Transfer a Call From Public Exchange (Non-Restricted Stations Only)

1 - Answer call from public exchange as outlined in preceding section (e).
2 - When ready to transfer call, press push button one second.
3 - Listen for dial tone.
4 - When dial tone is heard, dial number of desired local station.
5 - If an error is made in dialing, press push button one second, release push button, press push button a second time, listen for dial tone, and then dial number again.
6 - Ringing tone is heard if called station is idle.
7 - Busy tone is heard if called station is busy.
8 - When called station answers, request answering party to press push button one second and take the incoming public-exchange call.
9 - When transfer tone is heard, return handset to cradle.

(g) To Transfer a Call Made to Public Exchange

1 - Make call to public exchange as outlined in either section (c) or (d).
2 - When ready to transfer call, press push button one second.
3 - Listen for dial tone.
4 - When dial tone is heard, dial number of desired local station.
5 - If an error is made in dialing, press push button one second, release push button, press push button a second time, listen for dial tone, and then dial number again.
6 - Ringing tone is heard if called station is idle.
7 - Busy tone is heard if called station is busy.
8 - When called station answers, request answering party to press push button one second and take the public-exchange call.
9 - When transfer tone is heard, return handset to cradle.

(h) To Transfer a Public-Exchange Call After Having Received Call on a Transfer (Non-Restricted and Semi-Restricted Stations)

1 - Press push button one second.
2 - Listen for dial tone.
3 - When dial tone is heard, dial number of desired local station.
4 - If an error is made in dialing, press push button one second, release push button, press push button a second time, listen for dial tone, and then dial number again.
5 - Ringing tone is heard if called station is idle.
6 - Busy tone is heard if called station is busy.
7 - When called station answers, request answering party to press button one second and take the public-exchange call.
8 - When transfer tone is heard, return handset to cradle.

(i) To Return to the Public-Exchange Party When Transfer is not Completed (Non-Restricted and Semi-Restricted Stations)

1 - When transfer is not completed because called station is busy, does not answer, or refuses to accept transfer, press push button one second.
2 - Talk to waiting public-exchange party.
3 - If desired, transfer can be made to another local station as outlined in preceding section (h).
4 - If a second transfer is not required, return handset to cradle when through talking to public-exchange party.

19. INSTRUCTIONS FOR ORIGINATING AND ANSWERING CALLS (ATTENDANT CABINET)

Where an attendant cabinet is provided, the methods of operation at the P-A-B-X telephones vary from those described in section #18 in two general respects.

First, non-restricted and semi-restricted stations may call the attendant over the local information trunk and request her to set up connections to the public exchange for them. These are known as "delayed calls."

Second, non-restricted and semi-restricted stations should be instructed that when they hear a busy tone on answering a call, it is a signal that the attendant has extended a public-exchange call to their telephone and then withdrawn from the trunk; and, consequently, they should press the push button associated with their telephone to complete the transfer.

If the attendant, however, waits on a connection she has extended until the called local station answers, the busy tone will not be heard by the answering party. The attendant in this case instructs the answering party to press the push button one second to accept the call, and withdraws from the connection when she receives transfer tone.

(a) To Switch the Attendant Cabinet in Service

1 - Operate turn key to position stenciled "IN."

(b) To Switch Attendant Cabinet out of Service

1 - Operate turn key to position stenciled "OUT."

(c) To Answer a Call From Public-Exchange (At Attendant Cabinet)

1 - When buzzer signal sounds, lift handset from cradle.
2 - Operate either C.O. trunk key to "ANS" position.
3 - Buzzer signal ceases to operate.
4 - Supervisory lamp associated with trunk key glows.
5 - Answer call by giving name of company.
6 - When through talking, operate trunk key to "RLSE" position one second and return handset to cradle.
7 - Supervisory lamp is extinguished when public-exchange party disconnects. If lamp flashes public exchange operator is recalling -- re-enter connection by operating the trunk key to "ANS" position.

(d) To Answer A Call From Public Exchange using the Information Trunk (At Attendant Cabinet)

1 - Use information trunk for answering public-exchange calls only when both C.O. trunk keys are already in use. This keeps the information trunk free for making and receiving local P-A-B-X calls.
2 - When buzzer signal sounds, lift handset from cradle.
3 - Operate information trunk key to the "ANS & DIAL" position.
4 - When dial tone is heard, dial digit "8".
5 - Buzzer signal ceases to operate.
6 - Answer call by giving name of company.
7 - When through talking, restore information trunk key to normal.

(e) To Transfer a Call from Public Exchange (At Attendant Cabinet)

1 - Answer call from public exchange as outlined in preceding sections (c), or (d).
2 - When ready to transfer call, operate transfer key one second.
3 - Listen for dial tone.
4 - When dial tone is heard, dial number of of desired local station. If an error is made in dialing, operate transfer key one second, restore transfer key, operate transfer key a second time, listen for dial tone, and then dial number again.
5 - Ringing tone is heard if called station is idle.
6 - Busy tone is heard if called station is busy.

7 - When called station answers, request answering party to press push button one second and take the incoming call.
8 - Supervisory lamp is extinguished when transfer is completed at called station.
9 - When transfer tone is heard, restore trunk key to normal and return handset to cradle.

(f) To Return to the Public-Exchange Party (At Attendant Cabinet) When transfer is Not Completed

1 - When transfer is not completed because called station is busy, does not answer, or refuses to accept transfer, operate transfer key one second.
2 - Talk to waiting public-exchange party.
3 - If desired, transfer can be made to another local station as outlined in preceding section (e).
4 - If a second transfer is not required, operate trunk key to "RLSE" position one second and return handset to cradle when through talking to public-exchange party.
5 - Supervisory lamp is extinguished when public-exchange party disconnects.

(g) To Withdraw From a Public-Exchange call (At Attendant Cabinet)

1 - Restore trunk key to normal after dialing number of station to which call is to be extended.
2 - Supervisory lamp associated with trunk key glows until called station completes the transfer.
3 - Attendant is free to attend to other calls or duties.

(h) To Return to a Public-Exchange Trunk (At Attendant Cabinet) After Having Withdrawn From Trunk and Transfer is Not Completed

1 - The supervisory lamp glows to indicate that called local party has not completed the transfer.
2 - Operate associated trunk key to "ANS" position and challenge local station.
3 - If local station does not answer or refuses to accept transfer, operate transfer key one second.
4 - Talk to waiting public-exchange party.
5 - If desired, transfer can be made to another local station as outlined in section (e).
6 - If a second transfer is not required, operate trunk key to "RLSE" position one second and return handset to cradle when through talking to public-exchange party.
7 - Supervisory lamp is extinguished when public-exchange party disconnects.

(i) To Answer a Local Call on Information Trunk (At Attendant Cabinet)

1 - When information trunk bell rings, lift handset from cradle.
2 - Operate information trunk key to "ANS & DIAL" position.
3 - Bell stops ringing immediately.
4 - Answer call by saying "Operator" or giving individual name.
5 - When through talking, restore trunk key to normal and return handset to cradle.

(j) To Make a Local Call on Information Trunk (At Attendant Cabinet)

1 - Lift handset from cradle.
2 - Operate information trunk key to "ANS & DIAL" position.
3 - Listen for dial tone.
4 - When dial tone is heard, dial number of desired station.
5 - If an error is made in dialing, restore information trunk key to normal position one second and start call over again.
6 - Ringing tone is heard if called station is idle.
7 - Busy tone is heard if called station is busy.
8 - When through talking or when called line is busy, restore information trunk key to normal and return handset to cradle.

(k) To Make a Call to an Automatic Public Exchange (At Attendant Cabinet)

1 - Lift handset from cradle.
2 - Operate either C.O. trunk key to "ANS" position.
3 - Listen for dial tone.
4 - Supervisory lamp glows. If lamp does not glow, all public-exchange trunks are busy--restore trunk key to normal position one second, return handset to cradle and wait a few moments before starting call over again.

5 - When public-exchange dial tone is heard, dial directory number of desired line.
6 - If an error is made in dialing, operate trunk key to "RLSE" position one second, and start call over again.
7 - Ringing tone is heard if called line is idle.
8 - Busy tone is heard if called line is busy.
9 - When through talking or when called line is busy, operate trunk key to "RLSE" position one second, and return handset to cradle.
10- Supervisory lamp is extinguished when public-exchange party disconnects.

(l) To Make A Call to a Manual Public Exchange (At Attendant Cabinet)

1 - Lift handset from cradle.
2 - Operate either C.O. trunk key to "ANS" position.
3 - Supervisory lamp glows. If lamp does not glow, all public-exchange trunks are busy-- restore trunk key to normal position one second, return handset to cradle, and wait a few moments before starting call over again.
4 - When public-exchange operator answers, give directory number of desired line.
5 - When through talking, or when called line is busy, operate trunk key to "RLSE" position one second, and return handset to cradle.
6 - Supervisory lamp is extinguished when public-exchange operator releases the trunk. If lamp flashes, public-exchange operator is recalling -- re-enter connection by operating the trunk key to "ANS" position.

(m) To Make a Call to an Automatic Public-Exchange Via the Information Trunk (At Attendant Cabinet)

1 - Use information trunk for public-exchange calls only when both C.O. trunk keys are already in use. This keeps the information trunk free for making and receiving local P-A-B-X calls.
2 - Operate information trunk key to "ANS & DIAL" position.
3 - When dial tone is heard, dial digit "9".
4 - If an error is made in dialing, restore information trunk key to normal position one second and start call over again.
5 - Listen for dial tone from public-exchange.
6 - If busy tone is heard, all public-exchange trunks are busy. Restore information trunk key to normal position, return handset to cradle, and wait a few moments before starting call over again.
7 - When public-exchange dial tone is heard, dial directory number of desired line.
8 - If an error is made in dialing, restore information trunk key to normal position one second and start call over again.
9 - Ringing tone is heard if called line is idle.
10- Busy tone is heard if called line is busy.
11- When through talking, or when called line is busy, restore trunk key to normal.

(n) To Make a Call to a Manual Public-Exchange Via the Information Trunk (At Attendant Cabinet)

1 - Use information trunk for public-exchange calls only when both C.O. trunk keys are already in use. This keeps the information trunk free for making and receiving local P-A-B-X calls.
2 - Operate information trunk key to "ANS & DIAL" position.
3 - When dial tone is heard, dial digit "9."
4 - If an error is made in dialing, restore information trunk key to normal position one second and start call over again.
5 - If busy tone is heard, all public-exchange trunks are busy. Restore information trunk key to normal, return handset to cradle, and wait a few moments before starting call over again.
6 - When public-exchange operator answers, give directory number of desired line.
7 - When through talking, or when called line is busy, restore information trunk key to normal.

(o) To Transfer a Call Made to Public Exchange (At Attendant Cabinet)

1 - Make call to public-exchange as outlined in either section (k), (l), (m), or (n).
2 - When ready to transfer call, operate transfer key one second.
3 - Listen for dial tone.
4 - When dial tone is heard, dial number of desired local station.
5 - If an error is made in dialing, operate transfer key one second, restore transfer key, operate transfer key a second time, listen for dial tone, and then dial number again.
6 - Ringing tone is heard if called station is idle.

7 - Busy tone is heard if called station is busy.
8 - When called station answers, request answering party to press push button one second and take the public-exchange call.
9 - When transfer tone is heard, restore trunk key to normal and return handset to cradle.
10- Supervisory lamp is extinguished when transfer is completed at called station.

(p) To Return to the Public-Exchange Party (At Attendant Cabinet) When Transfer is Not Completed

1 - When a transfer is not completed because called station is busy, does not answer, or refuses to accept transfer. operate transfer key one second.
2 - Talk to waiting public-exchange party.
3 - If desired, transfer can be made to another local station as outlined in preceding section (o).
4 - If a second transfer is not required, operate trunk key to "RLSE" position for one second and return handset to cradle when through talking to public-exchange party.
5 - If public-exchange party was on the information trunk, restore information trunk key to normal and return handset to cradle when through talking to public-exchange party.

(q) To "Hold" a Connection on a Central Office Trunk (At Attendant Cabinet)

1 - When it is desired to withdraw temporarily from a central office trunk, restore the associated C.O. trunk key to normal. Supervisory lamp will continue to glow.
2 - Attendant is free to attend to other calls or duties.
3 - To return to the central office trunk, reoperate the trunk key to the "ANS" position.
4 - Supervisory lamp will be extinguished when a transfer is completed, or when the attendant operates the trunk key to the "RLSE" position for one second and the trunk is released at the central office.
5 - Do not have two C.O. trunk keys operated to the "ANS" position at the same time.

(r) To "Hold" a Connection on the Information Trunk (At Attendant Cabinet)

1 - When it is desired to withdraw temporarily from the information trunk (either local or public-exchange call), operate "HOLD" key.
2 - Restore information trunk "ANS & DIAL" key to normal.
3 - Attendant is free to attend to other calls or duties.
4 - To return to the information trunk, reoperate the "ANS & DIAL" key.
5 - Restore "HOLD" key to normal.
6 - When through talking, restore "ANS & DIAL" key to normal and return handset to cradle.

20. INSTRUCTIONS FOR ORIGINATING AND ANSWERING CODE CALLS

When code call equipment is provided, any station (including the attendant) may establish a code call by dialing the number 07 and then the digits of the code call number of the party wanted. The code of the called party will be sounded on the code signals until the call is answered or the calling party abandons the call. The called party, upon hearing his code, steps to the nearest telephone and dials the number 08 to connect with the calling party.

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