SALES MANUAL

Copy No. 148

The Pacific Telephone and Telegraph Company

Northern California and Nevada Area

PREFACE

Arrangements of telephone service to meet the requirements of our customers continue to become more complex, resulting in the requirement for reference material concerning these services.

The Sales Manual is designed to provide sales and other commercial employees with a ready reference to cover the requirements for -

A catalogue of the many telephone services and a description of each.

A description of the various types of switching equipment including its operation.

A description of station equipment including its operation.

A statement of sales and market considerations where such are appropriate.

Wherever practicable, it is intended that illustrations shall be included.

For information concerning sales appeals and other contact information helpful in carrying on a sales contact, commercial employees should refer to training manuals. For rates, rules and regulations, reference should be made to our tariffs and practices. For procedures and practices, reference should be made to the Sales Practice and other commercial instructions.

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To be re-issued and Section Indexes to be prepared at a later date

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TELEPHONE SETS

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TELEPHONE SETS

0. INTRODUCTION

The telephone sets covered in this section are available for use in common battery and magneto exchanges. Those to be used in magneto exchanges only are so designated.

In addition to the telephone sets in standard colors (see exhibits), the combined hand sets are available in dark blue, gray green, ivory, old rose, pekin red, dark gold, old brass, oxidized silver, and statuary bronze.

The standard length of cords connecting the desk or hand set mountings with the bell boxes or connecting blocks is 5 feet 6 inches. For other information on cord lengths see Part VII, Section 1.

Telephone sets that are equipped with keys as a part of the instruments, such as key telephone sets, are covered elsewhere in this manual under the types of service with which they are associated.

1. DESK, HAND, AND WALL SETS

These sets, (see exhibits), with the exception of the combined handsets are provided for use in common battery, (manual or dial) and magneto type exchanges. The combined handset is for use in common battery exchanges only.

There are two types of wall sets for use in magneto exchanges, (see exhibits); a large set to be used for either suburban services or services within the base rate area and a small set to be used within the base rate area only. Both of the latter types consist of a wooden cabinet equipped with a transmitter, a receiver, a ringer, and a hand generator. The Plant Department determines which size set is to be used for a given installation.

2. COIN COLLECTOR SETS

2.0 General

Coin collector sets are available for use in either common battery (manual or dial) or magneto type exchanges. When used in magneto exchanges, the associated bell boxes will contain hand generators (see exhibit).

2.1 Wall Type Coin Collector

This type set (see exhibit) consists of a metal box equipped with a transmitter, a hand receiver, a dial, coin slots, and a coin return receptable. When used with manual lines the dial is removed and an apparatus blank substituted.

TELEPHONE SETS - (Cont'd)

2.2 Hand Set Type Coin Collector

The hand set coin collector (see exhibit) is similar to the wall set coin collector except that instead of having a separate transmitter and a separate receiver, it has the transmitter and receiver assembled in a hand set, which hangs from a switch hook on the side of the set when the telephone is not in use.

3. OUTDOOR TELEPHONE SET

This type set, which is available for use in common battery exchanges only, is encased in a dark grey metal housing with a self-closing door. (see exhibit). It is equipped with a hand set with a 12-inch water-proof cord, a dial when needed, a moisture-proof ringer in a sound chamber at the bottom of the set and, where required, a tumbler switch for switching on and off loud ringing bells and other signaling devices. This switch, when provided, is associated with an escutcheon plate to indicate the "on" and "off" positions. The set is arranged for mounting, as may be required.

4. SET FOR EXPLOSIVE ATMOSPHERES

This type set, which is available in common battery exchanges only, is cylindrical in shape and consists of a housing, the ringer, and the hand set. (see exhibit). While the set is designed primarily for wall mounting, a pedestal mounting (see exhibit) is available for use when wall mounting is not feasible.

The elements of the set which might ignite any explosive mixture are completely enclosed and all passages to the outside are designed so that any flame due to an explosion within the set will be cooled to extinction before reaching the outside atmosphere.

5. SALES AND MARKET CONSIDERATIONS

Outdoor telephone sets are for use at exposed locations, such as, on police and taxicab company lines and in parks, or on estates or country club grounds. They are sometimes intended for use by the public but not for exchange service. For example, taxicab companies may have telephones at outdoor locations connected to a P.B.X. for use by patrons in calling taxicabs. In such cases the outdoor telephones should be clearly signed to indicate the specific use for which they are provided.

Sets for explosive atmospheres are designed to provide telephone facilities at locations where explosive gases and vapors may be present as in chemical plants, distilleries, or refineries.

TELEPHONE SETS - (Cont'd)

It may be difficult in all situations to determine readily whether the explosion proof type of set should be installed. The Telephone Company does not accept the responsibility for determining whether or not conditions are hazardous but should call such a condition to the attention of the customer when it is known.

The customer shall provide conduit, suitable to the Telephone Company, to the locations of the explosion proof type sets.

STATION TELEPHONES AND BELL BOXES
COMMON BATTERY TYPE

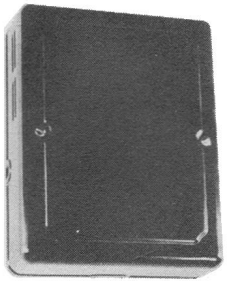
Hand Telephone—oval base
Dimensions: Height 5⅝″
Width 8⅝″
Depth 5⅜″
Finish—Black

Hang-up Type Hand Telephone
Dimensions: Height 12″
Width 4″
Depth 6⅜″
Finish—Black

Hand Telephone with Bell in Base
Dimensions: Height 5¼″
Width 7½″
Depth 8¾″
Finish—Black

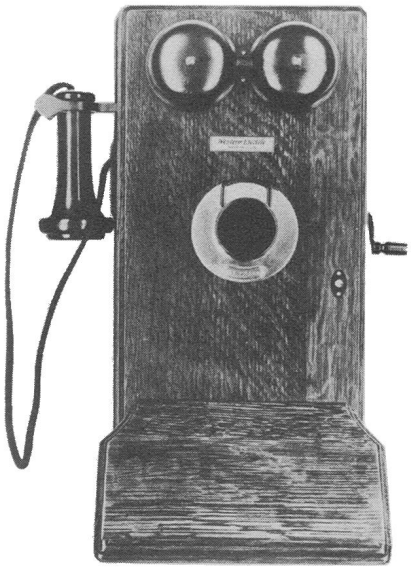
Desk Telephone
Dimensions: Height 10 9/16″
Width 6 5/32″
Finish—Black

Wall Telephone
Dimensions: Height 9 3/16″
Width 9 5/16″
Depth 3 5/32″
Finish—Black



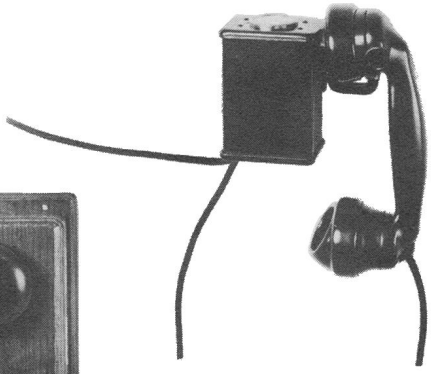
Bell Box
Dimensions: Height 7 9/32″
Width 5 19/32″
Depth 2 5/32″
Finish—Black

STATION TELEPHONES AND BELL BOXES
MAGNETO TYPE

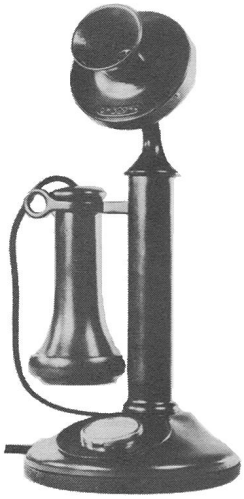


Wall Telephone—Large Size
Dimensions: Height 20½″
Width 12¾″
Depth 9 11/16″
Finish—Oak

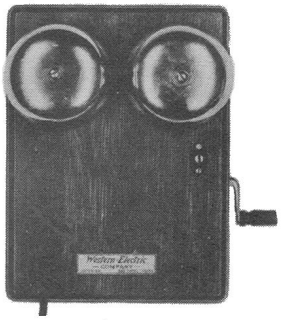
Wall Telephone—Small Size
Dimensions: Height 10⅝″
Width 11 15/16″
Depth 9⅞″
Finish—Oak



Hang-up type Hand Telephone
Dimensions: Height 8¼″
Width 4″
Depth 6⅜″
Finish—Black



Desk Telephone
Dimensions: Height 10 9/16″
Width 6 5/32″
Depth 5⅝″
Finish—Black



Bell Box
Dimensions: Height 9½″
Width 8″
Depth 6⅜″
Finish—Oak

Hand Telephone
Dimensions: Height 5⅝″
Width 8⅝″
Depth 5⅜″
Finish—Black

COIN COLLECTOR TELEPHONES

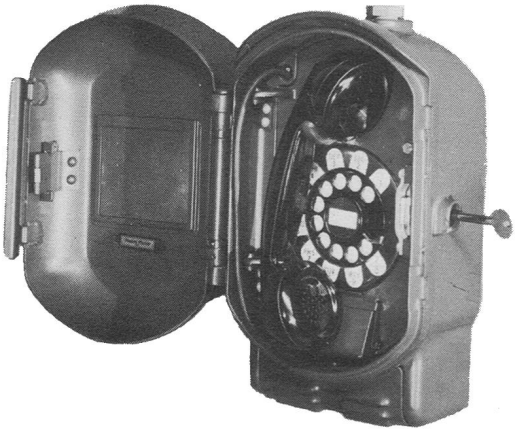
Wall Telephone
for use in dial exchanges
Dimensions: Width 9″
Depth 8¾″
Height 22 7/32″

Wall Telephone
for use in magneto and common
battery manual exchanges
Dimensions: Width 9″
Depth 8¾″
Height 18 3/16″

Hand Telephone for use
in common battery exchanges
Dimensions: Width 9″
Depth 8¾″
Height 18 3/16″

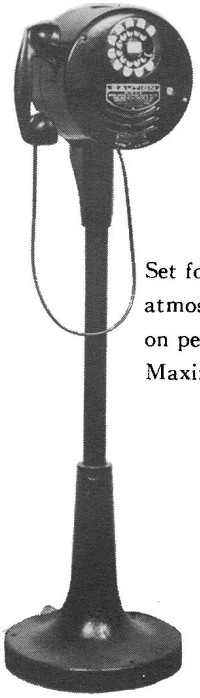
For bell-box see page E-1 for common battery type and E-2 for magneto type.

HAND TELEPHONES FOR SPECIAL CONDITIONS



Hand Telephone for outdoor use
Dimensions: Width 8½″
Depth 6¼″
Height 13″

Hand Telephone for use in
explosive atmospheres
Dimensions: Width 13 3/16″
Depth 6½″
Height 10 7/16″



Set for explosive
atmospheres installed
on pedestal
Maximum Height 65½″

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EXTENSION BELLS

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*Loud Ringing Bell..... E-1

EXTENSION BELLS

0. INTRODUCTION

Extension bells may be associated with any telephone provided the maximum number of bells permitted on the circuit is not exceeded. Only extension bells are described in this section. For other bells or signals designed for locations where the noise conditions are above normal, see section on Station Auxiliary signals.

1. EXTENSION BELLS

1.0 General

An extension bell for common battery operation consists of a ringer mounted in a black finished metal box. This type of extension bell is suitable for residence or business use where a loud ringing signal is not required.

1.1 Loud Ringing Extension Bells

The loud ringing extension bells may be either the 3-inch or 4-inch size. In addition, there is available a 6-inch bell which is no longer manufactured but which may be specified in the service order and will be installed as the supply situation permits. The 3 and 4-inch bells, however, are designed in such a manner as to furnish an equivalent signal to the 6-inch type.

1.2 Extension Bells and Keys

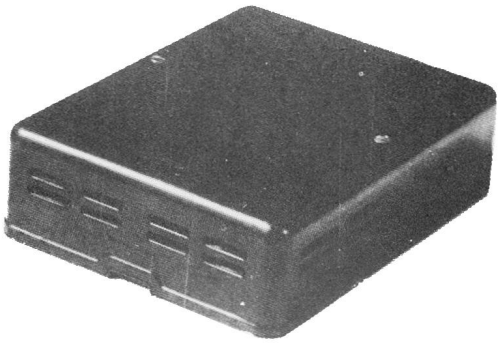
A key may be installed with an extension bell where it is not always desirable to have the extension bell connected permanently to the line.

1.3 Suitable Locations

Extension bells of the regular and loud ringing type are suitable for locations in which the customer is frequently out of hearing distance of the normal station bells, as in a workshop of a garage, planing mill, etc. In all cases, the extension bell should be near enough to the telephone to permit answering the call before it is abandoned. Loud ringing bells may, in some instances be used where a person has impaired hearing.

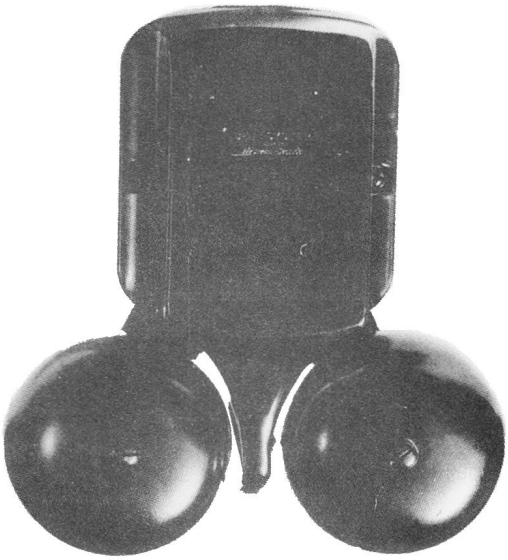
EXTENSION BELLS

Operated by Ringing Current



REGULAR
(Indoor Use)

Dimensions:	Finish:
Height 7 1/4" Width 5 5/8" Depth 2 1/8"	Black



LOUD RINGING
(Indoor and Outdoor Use)

Dimensions:	Finish:
Height 7 1/4" Width 6 11/16" Depth 2 1/8"	Usually Black

Diameter of Gongs: 3" or 4"

Extension Bells and Gongs

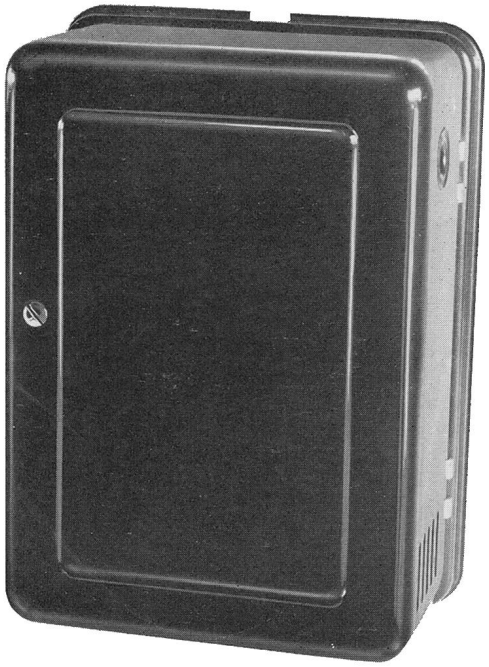


Fig. 1

Regular

Fig. 2

Loud Ringing

Dimensions		*Finish*
Height	9-3/16″	Black
Width	6-3/4″	
Depth	3-5/8″	

Dimensions		*Finish*
Height	11-7/8″	Black with galvanized steel gongs.
Width	13-1/16″	
Depth	4-3/16″	
Diameter of Gongs	6″	

Extension bells are of two types, the regular extension bell which consists of a ringer mounted in a black finished metal box and the loud ringing extension bell or gong which consists of a ringer enclosed in a black metal box with two large galvanized steel gongs, mounted on a metal base.

Extension bells and gongs can be associated with central office or P.B.X. telephones, provided the maximum number of bells permitted on the circuit is not exceeded. Extension bells and gongs are suitable for locations in which the customer is frequently out of hearing distance of the bells at the telephone, as in the workshop of a garage, in a planing mill, etc. The extension bell should in all cases be near enough to the telephone to permit answering the call before it is abandoned. If the proposed extension bell is a considerable distance from the telephone, an extension telephone should be provided. Extension gongs may, in some instances, be used where a person is partially deaf.

A key may be installed with an extension bell where it is not always desirable to have the extension bell connected permanently to the line. This key is installed only as specified under Wiring Plan 150.

SIGNAL CIRCUITS

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EXHIBITS

Push Buttons..... E-1

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*For Exhibits of Signals Operated by Commercial Power see Part II, Section 3, Pages E-1 and E-2.

For Exhibit of Lamp Signal (No. 15A Type), see Part II, Section 3, Page E-3

SIGNAL CIRCUITS

0. INTRODUCTION

Signal circuits are furnished in connection with telephone service only to enable subscribers to signal other telephone locations on the same premises. The signals associated with these circuits are operated by either low voltage power supply or by commercial power.

1. SIGNALS OPERATED BY LOW VOLTAGE POWER SUPPLY

1.0 General

Signaling arrangements operated by low voltage power supply include a push button, the necessary battery, and the circuit connecting the push button to either buzzer, bell or lamp indicator signal as described in the following.

1.1 Buzzer Circuits

Buzzer circuits are generally used in connection with certain wiring plans and multiple line key cabinet services. In many arrangements of these services, buzzer circuits are essential to the proper functioning of the service and should preferably be installed and maintained by the telephone company; however, the subscriber may install and maintain his own buzzer circuits.

1.2 Bell Circuit

A bell circuit is similar to a buzzer circuit with the exception that a 3, 4 or 6-inch vibrating bell is utilized as the signal. The signal operates continuously during the period that the push button associated with the circuit is depressed.

1.3 Lamp Indicator Circuit

The lamp indicator circuit utilizes an individual beehive type lamp as a signal. The lamp may be of the desk or wall type mounting as described in Part II, Section 3 of this manual. The signal operates during the period the push button is depressed as described in 1.2, above.

2. SIGNALS OPERATED BY COMMERCIAL POWER

2.0 Relay Circuit

Where it is desired, because of noise levels or other conditions on the subscriber's premises, to provide a different type of signal than those described in preceding paragraphs, a relay circuit for the control of signals

SIGNAL CIRCUITS - (Cont'd)

operated by commercial power may be installed. The relay circuit consists of a push button and battery and necessary wiring between the push button and the relay and signal. Two types of signals are available; namely, single stroke signals and vibrating signals.

2.1 Single Stroke Signals

Single stroke signals, including the relay on the same mounting, are available in 6-inch, 10-inch and musical tone bells. The signal operates once for each depression of the associated push button. The subscriber installs and maintains a commercial power outlet adjacent to the combined relay and signal. Connection is made to the outlet by plus ended cord.

2.2 Vibrating Signals

Vibrating signals, either 10-inch bells or horns, mounted separately from the associated relays, are also available. The signal operates continuously for as long as the associated push button is depressed. The subscriber installs and maintains the necessary wiring and commercial power supply to the relay. The signal is installed and maintained by the company. The subscriber, if he so elects, may install and maintain his own signals providing they are acceptable to the company.

3. ADDITIONAL PUSH BUTTONS AND SIGNALS

3.0 General

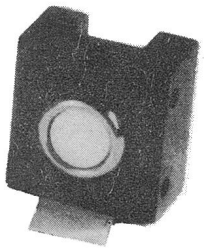
On all types of signal circuits described above, additional push buttons may be installed to permit operation of the associated signal from 2 or more locations. Signal circuits operated by low voltage power supply are the only type of signal circuits which may have additional signals on the same circuit. These additional signals are limited to buzzers.

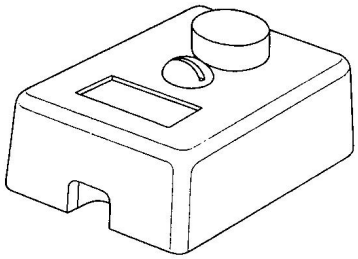
4. SALES AND MARKET CONSIDERATIONS

4.0 General

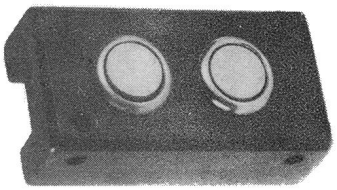
In order to facilitate the handling of telephone traffic, it is frequently necessary to either intercommunicate with, transfer calls to, or signal for other purposes, distant stations on the subscriber's premises. To accomplish this end, signal circuits as described are available and should be recommended where needed. When signal circuits are to be provided for other than telephone usage purposes, the subscriber shall provide his own signal circuits.

PUSH BUTTONS

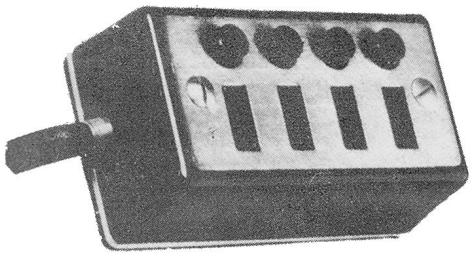




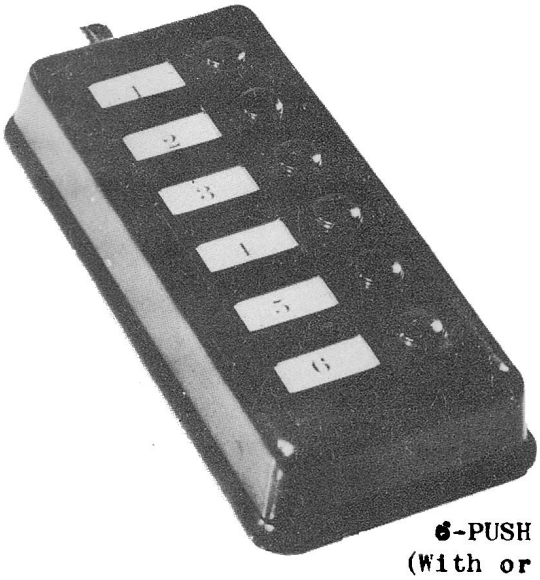
SINGLE PUSH BUTTONS
(For Permanent Mounting)
Dimensions:
1 3/8" x 1 1/2" x 13/16"
Dimensions:
1 3/16" x 1 3/4" x 1/2"



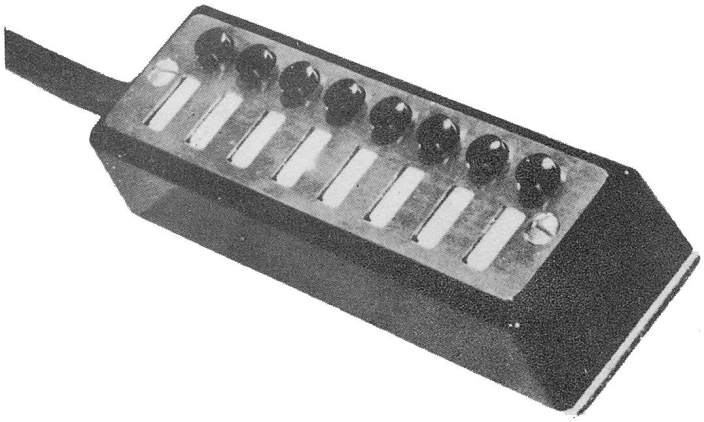
DOUBLE PUSH BUTTON
(For Permanent Mounting)
Dimensions:
1 3/8" x 2 3/4" x 13/16"



4-PUSH BUTTON BLOCK
(With or Without Cord)
Dimensions: 1/4" x 1 3/4" x 3 1/4"

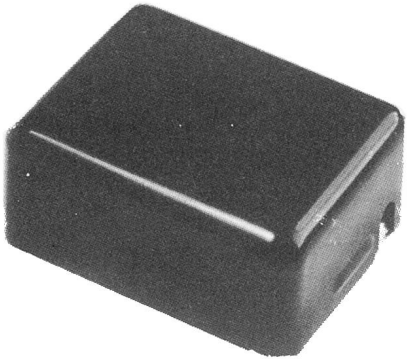


6-PUSH BUTTON BLOCK
(With or Without Cord)
Dimensions: 1" x 2 3/4" x 6 1/16"

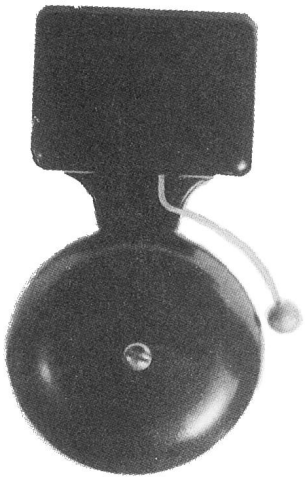


8-PUSH BUTTON BLOCK
(With or Without Cord)
Dimensions: 4 1/8" x 4 5/8" x 1"

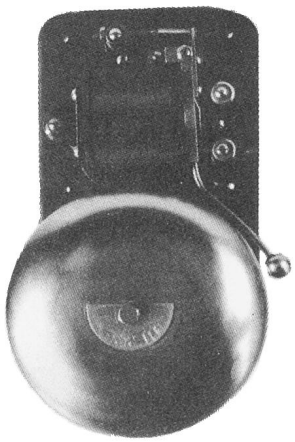
OPERATED BY LOW VOLTAGE BATTERY SUPPLY



BUZZER
(Indoor Use Only)
Dimensions: 1 1/8"x 2 5/8" x 2"



NO. 7 TYPE BELL
(Indoor Use Only)
Dimensions 3 1/2" x 5 1/2" - Depth 1 1/2"
Diameter 3"



VIBRATING BELL - SKELETON TYPE
(Indoor Use Only)
Two Sizes Available:
Diameter - 3" Diameter - 6"

Buzzer Circuits

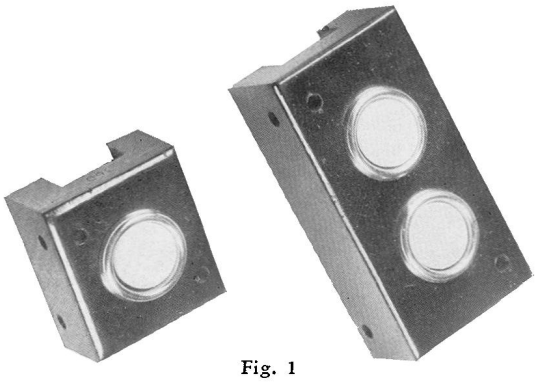


Fig. 1

Push Buttons

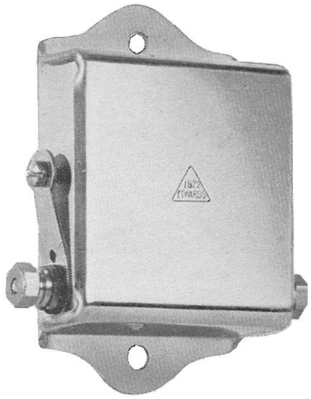


Fig. 2

Buzzer

Buzzer circuits are furnished for use in connection with Wiring Plans, as a signaling arrangement of this kind is necessary for the operation of certain plans where the stations are not within sight or hearing of each other.

Backboard Writing Shelf

Dimensions		*Finish*
Height	9-1/2″	Black
Width	7-1/2″	
Depth	6-1/16″	

A backboard writing shelf is used with a standard manual or dial wall set where a customer has an occasion to do considerable writing at a location where it is impossible to have a desk or table with a desk type instrument. This equipment consists of a metal backboard with a writing shelf and is black in finish. It may be furnished under the rates provided for special assemblies of equipment.

* STATION AUXILIARY SIGNALS

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* STATION AUXILIARY SIGNALS

0. INTRODUCTION

Conditions are frequently encountered on subscriber's premises where standard ringers or loud ringing bells are either not adequate or suitable as telephone signals. There also exists a requirement for subscribers being able to determine when a given central office, P.B.X. station, or local private line is in use by a second party. To meet these conditions, station auxiliary signals have been designed and are available for use in connection with individual central office, P.B.X. station and local private lines in all exchanges.

1. SIGNAL CONTROL EQUIPMENT

1.0 General

The provision of station auxiliary signals requires the installation of signal control equipment, frequently referred to as relays. These relays are of two general types, namely, signal control equipment for busy signals and signal control equipment for operation of line signals. Those provided for operation of busy signals on common battery lines are designed to operate when any station on a given line is in use. Those provided for operation of busy signals on magneto or local private lines are designed to operate only when a particular station on the line is in use. Those provided for operation of line signals are designed to operate when a ringing impulse is received from the central office, P.B.X. or on a local private line. The operation of the signal control equipment causes a source of electrical energy to actuate the station auxiliary signal. Signal control equipment provided for use with busy signals is of one type only. Those provided with line signals are of two types, namely, relays for continuous operation and those for non-continuous operation.

1.1 Relays for Use with Busy Signals

The relays designed for use with busy signals on common battery lines are actuated upon the operation of the switchhook of any instrument on the line with which the relay is associated. On magneto or local private lines the relays are actuated upon the operation of the switchhook of a particular station instrument. The operation of the relay closes an electrical circuit which causes the busy signal to be operated for as long as the switchhook remains released. Restoration of the instrument or receiver to the switchhook causes the relay to release, thus interrupting the flow of electrical energy to the lamp indicator.

1.2 Relays for Use With Line Signals

* STATION AUXILIARY SIGNALS - (Cont'd)

1.20 Continuous Relays

The line signal relays designed for continuous operation are actuated on the first ringing impulse and remain operated until the called party answers. Abandonment of the call has no effect upon the continuous relay, as the signal will continue to operate until the call is answered.

1.21 Non-Continuous Relays

Relays for non-continuous operation are designed to be actuated each time ringing current is applied to the line. The closing of the relay causes the signals associated with it to operate each time ringing current is applied, and to be non-operative between ringing impulses.

2. SIGNAL CONTROL KEYS

2.0 General

Signal control keys are available for the three types of relays. They are designed to cut off the signal control equipment and associated auxiliary signals from the line when their operation is not desired. Signal control keys are optional with the relays for use with busy signals and the non-continuous type relay, but must be provided where relays of the continuous type are used. The signal control key is to be operated by the customer to prevent unnecessary consumption of power and unnecessary signal operation during periods when the station or stations are unattended.

3. BUSY SIGNALS

3.0 General

Busy signals are associated with signal control equipment as described in paragraph 1.1 above. These signals are operated by local or central office battery and consist of lamps known as lamp indicators. These signals operate from battery furnished by means of circuits from the central office, from a local battery plant or a current supply operated from customer furnished commercial power. The source of current furnished is at the option of the Plant Department and will vary according to the distance from the central office, facility conditions and availability of local battery supply. These signals are of two types generally known as beehive type and bull's eye type lamp indicators. Normally, busy signals are required on only one central office line and single beehive type lamps coded 15-A are used. Where busy signaling is required on more than one line, the other beehive type lamps or the bull's eye type lamp indicators described in paragraph 4.2 may be used.

* STATION AUXILIARY SIGNALS

0. INTRODUCTION

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1.2 Relays for Use With Line Signals

* STATION AUXILIARY SIGNALS - (Cont'd)

4. LINE SIGNALS

4.0 General

Various station auxiliary signals for use as line signals have been designed to operate either from commercial power or from central office or local battery power supply.

4.1 Audible Signals Operated by Commercial Power

4.10 General

Signals operated by commercial power are installed so that the operation of the signal control equipment will cause them to operate. They are normally supplied to operate from either 110 volt, 60 cycle alternating current or 110 volt direct current. All commercial power wiring, outlets and electrical energy necessary for the operation of the signals are furnished by the subscriber. Signals operated by commercial power are of two general types, namely, single stroke signals and vibrating signals.

4.11 Single Stroke Signals

Single stroke signals, known as xylophone bar signals, are furnished with a control relay of the non-continuous type on the same mounting as the signal itself. As the name indicates, the signal sounds once for each ringing impulse on the line with which it is associated. The signals are furnished in three types depending upon the pitch desired. The first type is of very low pitch, 245 cycles, the second is higher in range, 490 cycles, and the third is similar to the musical tone bell furnished with code calling equipment and is of 980 cycles. A demonstration unit is available to assist subscribers in selecting the type of xylophone bar signal most suitable.

4.12 Vibrating Signals

Vibrating signals differ from the single stroke signals in that the relay is not a part of the same mounting and may be of either the continuous or non-continuous type. They also differ in that they sound when associated with non-continuous relays for the duration of the ringing impulse which will range from one to three seconds, depending upon the type of central office or P.B.X. station, or private line with which they are associated. When associated with continuous relays they sound until the call is answered. These signals are of two types, namely, 10-inch bell and horn. Each of these signals is available for either indoor or outdoor use.

* STATION AUXILIARY SIGNALS - (Cont'd)

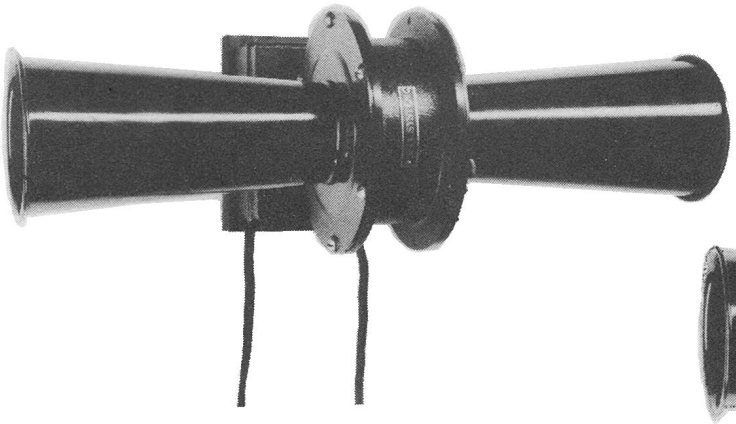
is furnished a considerable number of either line or busy signals may be associated with the signal control equipment. When signal control equipment is furnished as a separate unit for signals operated by commercial power the subscriber may furnish, install and maintain appropriate visual or audible signals.

STATION AUXILIARY SIGNALS

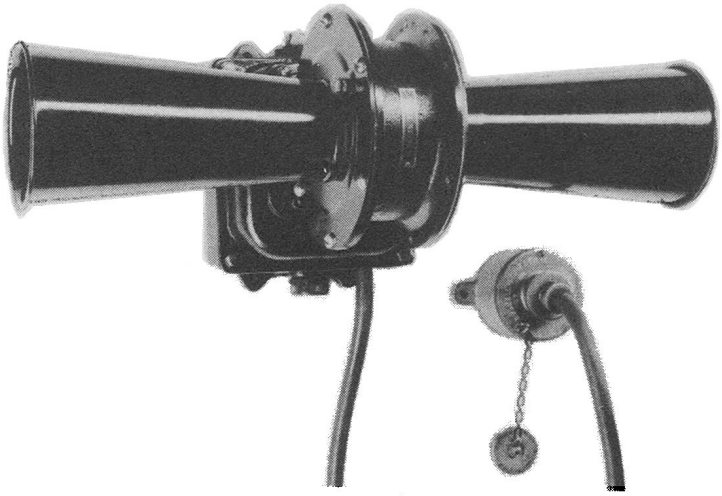
VIBRATING SIGNALS OPERATED BY COMMERCIAL POWER

10 Inch Bell - Indoor

10 Inch Bell - Outdoor



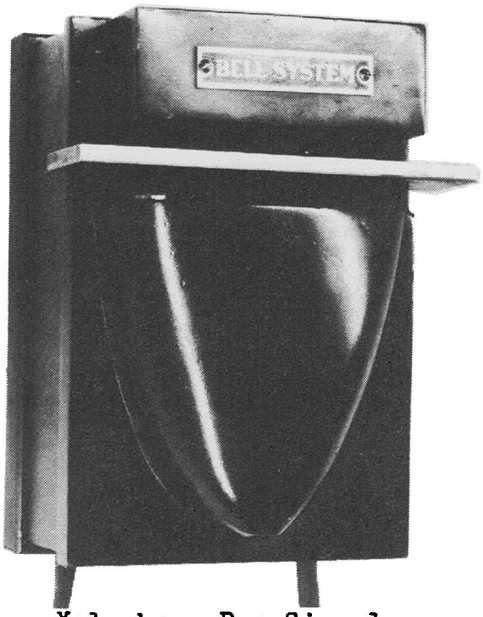
Horn - Indoor



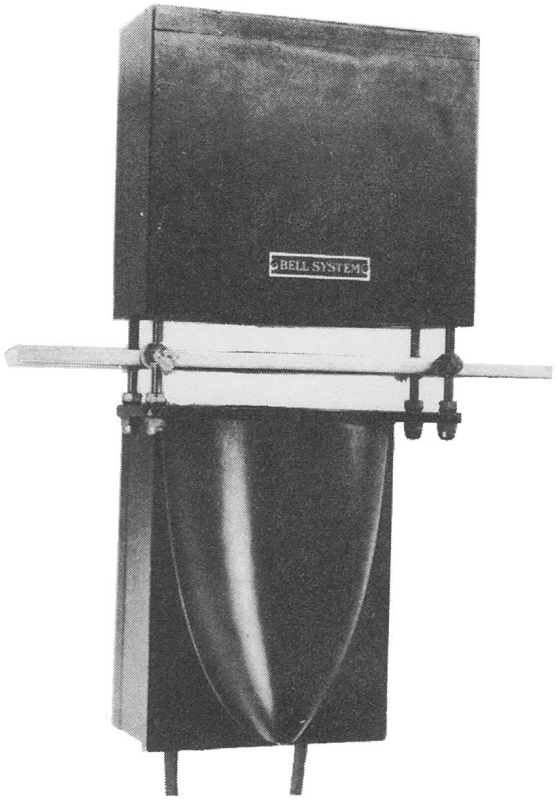
Horn - Outdoor

STATION AUXILIARY SIGNALS

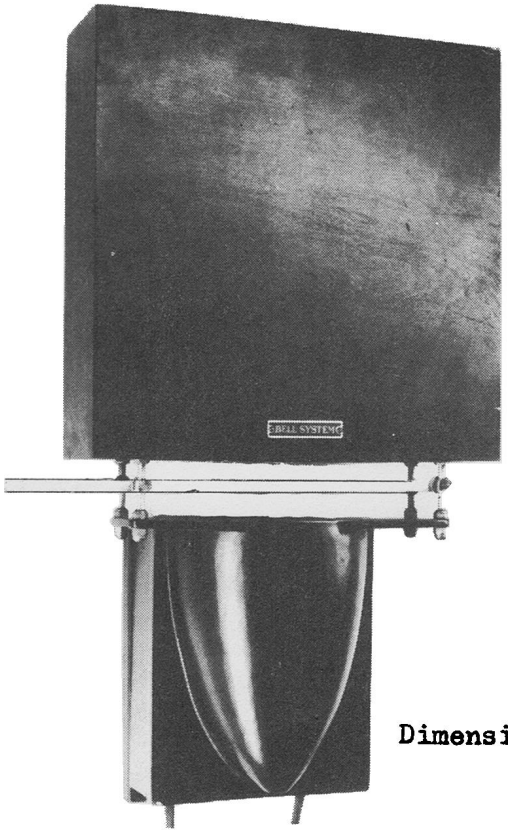
SINGLE STROKE SIGNALS OPERATED BY COMMERCIAL POWER



Xylophone Bar Signal
980 Cycle
Dimensions - Width 4-3/4"
(over-all) Height 6-5/8"
Depth 4-1/4"



Xylophone Bar Signal
490 Cycles
Dimensions - Width 11-1/2"
Height 14"
Depth 4-1/4"



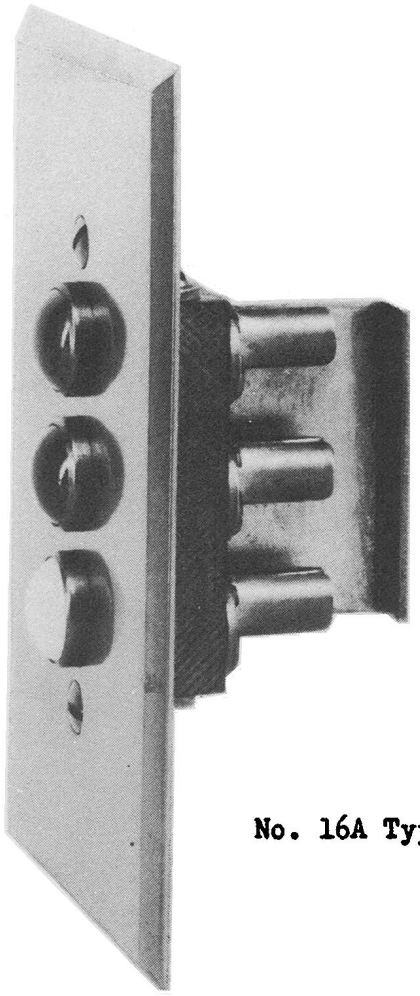
Dimensions (over-all)
Width 15-5/8"
Height 19-7/8"
Depth 5-1/4"

Xylophone Bar Signal
245 Cycles

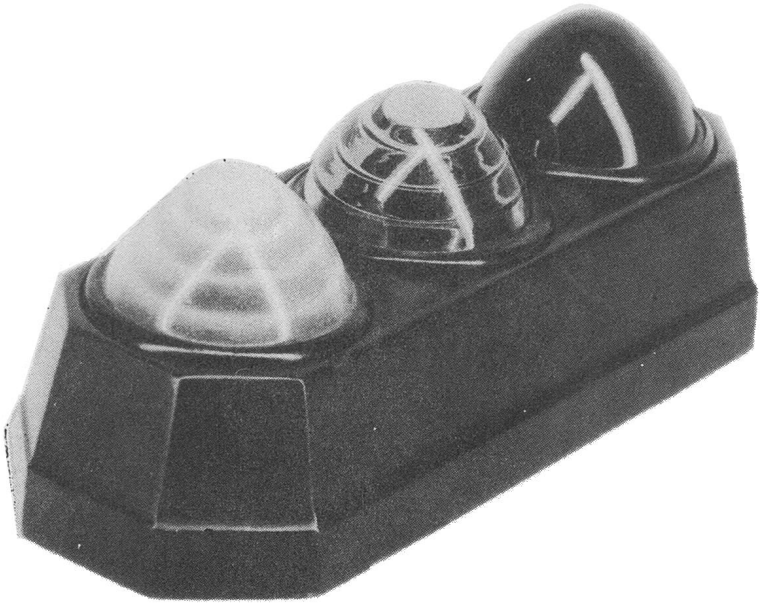
STATION AUXILIARY SIGNALS

LAMP SIGNALS OPERATED BY LOCAL BATTERY

No. 15A Type



No. 16A Type



No. 18A Type

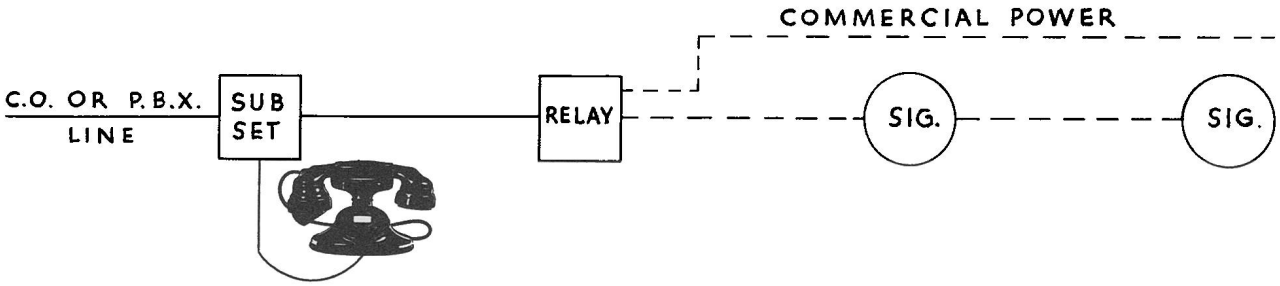
No. 17A Type

Note: All are approximately actual size.

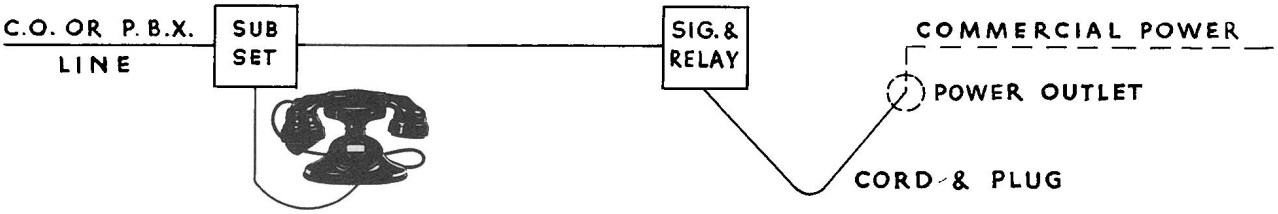
STATION AUXILIARY SIGNALS

INSTALLATION ARRANGEMENTS

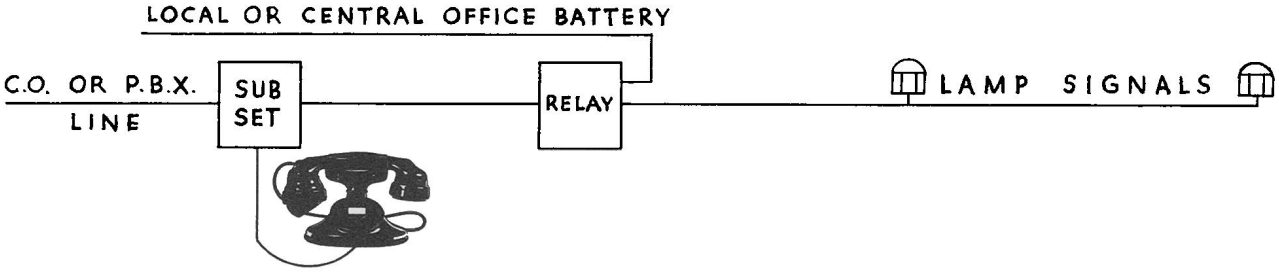
Vibrating Signals Operated by Commercial Power



Single Stroke Signals Operated by Commercial Power



Signals Operated by Local Battery



KEY- *Solid Lines-* Wiring and equipment installed and maintained by the Telephone Company.
Broken Lines- Wiring and equipment installed and maintained by the Subscriber.

CODE CALLING SYSTEMS

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CODE CALLING SYSTEMS

0. INTRODUCTION

Subscribers to telephone service, particularly those occupying large premises, frequently find that key members of their organization are required to move from place to place within the subscriber's establishment and, during the course of this movement, telephone calls for these individuals are received. To facilitate the locating of these individuals so that telephone calls may be completed promptly, signaling devices known as code calling systems are available.

A code call system consists of a sending mechanism either a manual sending set or dial equipment for the operation of signals, associated relays and one or more signals. The manual type systems, utilizing a manual sending set, are subdivided into two groups designated 1A or 1B, as determined by the type of installation. The 1A system involves joint responsibility of the Telephone Company and the subscriber as to installation and maintenance, as all of the wiring between units of the system carries commercial power and must be installed and maintained by the subscriber. The 1B system utilizing low voltage currents is installed and maintained solely by the Telephone Company. Detailed description of equipment and of installation arrangements of each of these types is contained in subsequent paragraphs.

Dial systems which utilize dial equipment for the operation of signals are similarly divided into two groups designated 2A and 2B, as determined by the installation arrangements. The 2A system is similar in installation and maintenance responsibility to the 1A system mentioned above. The 2B system, similar to the 1B, is installed and maintained entirely by the Telephone Company. Detailed description of the installation arrangements for each of these systems is given below.

1. MANUAL SYSTEMS

1.0 General

Manual systems are available in exchanges of magneto or common battery operation and are usually associated with (but not a part of) P.B.X. service. Manual systems are designated 1A or 1B as determined by the type of installation.

1.1 Installation Arrangements

1.10 1A Systems

In the 1A system the Telephone Company installs and maintains

CODE CALLING SYSTEMS - (Cont'd)

the code sending set and the master signal control relay. Wiring between these two units is installed and maintained by the customer. This wiring is terminated in a receptacle (furnished by the Telephone Company) installed by the customer adjacent to the sending set to which connection is made by the cord ended plug of the sending set. The subscriber also wires commercial power to the master signal control relay. The subscriber installs and maintains all wiring from the master signal control relay to each signal of the system and furnishes the electrical energy necessary for the operation of the entire system. The signals may be installed and maintained by either the Telephone Company or the subscriber. If the subscriber elects to furnish the signals, signals other than those described under "Equipment" may be provided.

Where additional signal control relays are required, the Telephone Company installs and maintains the relay, the subscriber installing and maintaining all wiring associated with the relay.

The Telephone Company installs and maintains the night connection relay set and the transfer key, together with the wiring between these two units. The subscriber installs and maintains the wiring between the master signal relay set and the night connection relay set.

1.11 1B System

The Telephone Company installs and maintains the code sending set (includes a transformer relay), additional transformer relay sets and all signals, together with wiring between these various units. The subscriber furnishes a power outlet at the code sending set, at any additional transformer relay sets and at each indoor signal. Each of these units is equipped with a plug ended cord. Electrical energy necessary for the operation of the system is also furnished by the subscriber.

The Telephone Company also installs and maintains the night connection relay set and transfer key, together with all necessary wiring.

1.2 Equipment

1.20 General

Following are the items of equipment furnished with manual code calling systems.

1.21 Sending Set - 1A and 1B Systems

The manual code sending set is furnished in four sizes; namely,

CODE CALLING SYSTEMS - (Cont'd)

10, 20, 40 and 60 code. Equipment is housed in a black finished metal box, on the face of which appear plunger type keys for each code. Also mounted on the face of the sending set is a jewel type red lamp cap which when lighted indicates to the attendant that the equipment is in operation. The dimensions of the sending set are as follows:

Width - 7-3/4 in.
Depth - 7-1/8 in.
Height - 10 & 20 code - 6-3/8 in.
40 " - 7-7/8 in.
60 " - 9-3/8 in.

1.22 Relays - 1A System

A master signal control relay set is furnished with each manual 1A system. The relay is housed in a black metal box which is permanently mounted near the sending set. Access is by means of a up-swinging front cover. The relay is closed once for each pulse sent by the code sending set. With each closing of the relay the current is permitted to flow to each of the signals connected to the circuit, which are thus actuated once for each pulse sent by the sending set. The dimensions of the relay are:

Width - 6-1/4 in.
Depth - 4 in.
Height - 8-7/8 in.

With the 1A system, where the number of signals or length of the circuit involved requires an additional signal control relay be provided, this relay performs the same function as the master signal control relay.

1.23 Relays - 1B System

A transformer relay set is a part of the code sending set in each manual 1B system. The relay is similar to the master signal control relay furnished with the 1A system except that it performs the additional function of transforming the commercial power from 110-V to 48-V. The relay closes once for each pulse transmitted by the sending set, causing the current to flow to each relay associated with each indoor signal and to each additional transformer relay set. Where outdoor type signals are utilized, an additional transformer relay set is required as the outdoor type signal does not contain a relay in the same mounting. For all indoor type signals furnished with the 1B system, a relay is provided in the same mounting.

CODE CALLING SYSTEMS - (Cont'd)

1.24 Night Service Relay and Transfer Key - 1A and 1B Systems

When night service is desired over the code call system (see paragraph 1.31 below), a night service relay is provided which is actuated once upon each ringing impulse received from the central office. A transfer key is also provided which enables the subscriber to transfer the code call system from the manual sending set and master signal control relay (or transformer relay) to the night service relay.

1.25 Signals - 1A System

Signals provided with the 1A system are furnished without additional individual relays and may be one or more of the following:

Horn - indoor or outdoor
Overall length 18-1/4 inches

4-inch Bell - indoor only

6-inch Bell - indoor only

10-inch Bell - indoor or outdoor

Musical tone bell - indoor only
6 inches wide - 7-1/2 inches high - 4-1/2 inches deep

With the 1A system the subscriber may, if he so elects, install and maintain his own signals.

1.26 Signals - 1B System

Indoor signals provided with the 1B system include an individual relay on the same mounting. Other than for the relay housing which is 6-1/8" x 7-1/8" x 2-5/8" in size the appearance of these signals is the same as those described under "Signals - 1A System". Each of these signals is equipped with a cord and plug for connecting to a commercial power outlet.

Outdoor signals, namely, horn and 10-inch bell, do not include the individual relay on the same mounting. An additional transformer relay is required at each of these signal locations. The signals provided for outdoor use are the same as those described under "Signals - 1A System".

1.3 Operation

1.30 General - 1A and 1B Systems

CODE CALLING SYSTEMS - (Cont'd)

When the attendant wishes to locate a given party, she first consults the code call directory to determine the code of the individual desired. The button designated by this code number on the face of the code sending set is then depressed as far as possible and held in this position until the jewel lamp lights, indicating that the equipment has started to operate. The attendant then releases the pressure from the button which will return half way to normal, or to the operating position. The code selected will then sound. For example, if the code selected were 21, all signals associated with the system will sound: .... pause ..... This sounding will be repeated three times, at the end of which the jewel lamp will be extinguished, indicating to the attendant that the equipment is no longer in operation. The button of the last code sounded will always remain half way depressed, indicating to the attendant which code was sounded last. The entire procedure may be repeated by again depressing the key previously sounded, or a new code may be selected and a new series started. The party being called over the code calling system, upon hearing his signal, will go to the nearest telephone and report to the P.B.X. attendant and will be informed by her that he is wanted or that a call is being held for him.

1.31 Night Service

When a night service relay set and transfer key are provided, the code calling system may be connected to one central office line (normally the first trunk) so that when incoming calls are received when the P.B.X. is not attended all signals at the code calling equipment will sound once upon each ringing impulse from the central office. The transfer key is installed near the P.B.X. station to which night connections from the selected trunk are established. The operation of this key from the off to the on position connects the code calling equipment to that station line and causes all signals to sound as described above.

2. DIAL SYSTEMS

2.0 General

Dial code call equipment is available for all dial private branch exchanges with the exception of 740-C, 750-A and 755-A.

2.1 Installation Arrangements

2.10 2A System

The Telephone Company installs and maintains all necessary dial equipment, the signal control relay set, together with the wiring between these

CODE CALLING SYSTEMS - (Cont'd)

units. The subscriber installs and maintains commercial power to the signal control relay together with electrical energy necessary for its operation. The subscriber also installs and maintains all wiring between the signal control relay set and each signal. The Telephone Company or the subscriber may install and maintain signals associated with the system.

2.11 2B System

The Telephone Company installs and maintains the dial equipment necessary, the transformer relay set, each signal, each additional transformer relay set and all wiring between these units. The subscriber provides a power outlet at the transformer relay, each indoor signal, and at each additional transformer relay set, together with electrical energy necessary for the operation of the system. Connection between the power outlet and the transformer relay sets and the signals is made by cord and plug attachments which are part of the transformer relays and signals.

2.2 Equipment

2.20 General

Signal and relay equipment furnished with the dial system is identical with that furnished with the manual system except that there is no sending set, and night service not being available, neither the night service relay nor transfer key is furnished.

2.21 Dial Equipment - 2A and 2B Systems

Dial equipment necessary for the operation of the system is installed in the private branch exchange dial equipment room and is directly associated with the selectors or selector-connectors of the dial P.B.X.

Dial code call equipment is furnished in but one size - namely, 100-code. Of these 100 codes, 81 are normally usable codes. The balance, involving the digits 9 and 0 which require 9 and 10 soundings, respectively, are not recommended for use.

2.3 Operation

2.30 General

The dial code calling system differs from the manual system in that in the manual, signals may be sounded only by the operation of the manual sending set. This normally restricts its use to the private branch exchange

CODE CALLING SYSTEMS - (Cont'd)

attendant. In the dial system, however, anyone may use the code calling system who has access to a station line connected to the switches of the dial P.B.X.

A station user, being unable to locate a desired party by dialing that person's local, will first consult the code call directory and determine the code of the desired party. The station user then removes the receiver from the switchhook of the dial station and, after hearing the dial tone, dials a predetermined code which connects him to the dial code calling equipment. He then dials the code of the desired party. This causes the dial code calling equipment to sound the desired code three times. This code is sounded simultaneously on all signals associated with the system.

The party whose code has been sounded, upon hearing his code, may go to any station associated with the dial P.B.X. and after hearing the dial tone dial a predetermined number which causes him to be connected through the dial code calling equipment to the calling party. The message may be delivered or the conversation carried on through the code calling equipment. However, this method of operation prevents the use of the code calling equipment by any other dial station user. Accordingly, it is recommended that the calling party determine from the called party the number of the local from which he has answered and, having secured this number, instructs the called party to hang up and wait for that local to ring. The calling party then restores his receiver to the switchhook momentarily, lifts it again and, hearing the dial tone, dials the local number from which the called party has answered and the call progresses as any other dial station-to-station call. In the event the called party does not answer on one series of operations of the dial code call system, the calling party may repeat the procedure just as though originating a new dial code call.

3. SALES AND MARKET CONSIDERATIONS

3.0 General

As manual code calling systems are not in any way physically connected to telephone service, the subscriber may purchase from any supplier a manual code calling system. Where a requirement for such service exists, the subscriber should be informed that the Telephone Company does furnish this type of service but that he may if he so elects purchase his own system from any one of several suppliers. Further action will be dependent upon the subscriber's desires.

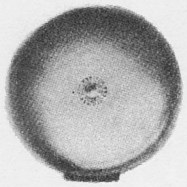
Dial code calling equipment, being physically connected to telephone equipment, will be provided only by the Telephone Company.

CODE CALLING SYSTEMS - (Cont'd)

The 1B or 2B system should generally be recommended in preference to the 1A or 2A system because of the divided responsibility of installation and maintenance of the latter.

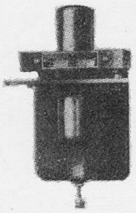
Unless unusual conditions pertain, manual code calling equipment will generally be found more satisfactory than dial service. This is generally due to the fact that all station users must be acquainted with the method of operation of the dial service, whereas only the P.B.X. attendant need be acquainted with the operation of the manual service. Further, when the P.B.X. attendant is required to sound a code on the dial system, she must listen for an answer from the desired party, thus interfering with the normal handling of switchboard traffic. In the manual system the only operation necessary for the P.B.X. attendant is the operation of the button associated with the desired code and the answering of the line signal when the desired party reports to her. Accordingly, manual code calling equipment should be recommended in preference to dial code calling equipment except where code calling service is required when the P.B.X. is not attended.

Code Calling Equipment



Full Tone Bell

Sizes: 4″, 6″, 10″



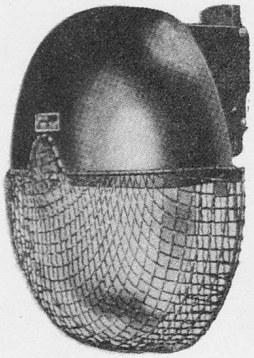
Musical Tone Bell

Size: 5″

Sending Station

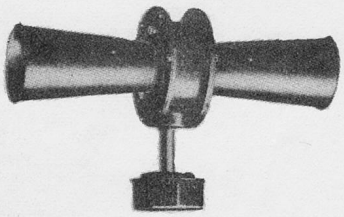
Dimensions

	10 and 20 Call	40 Call	60 Call
Height	6-3/8″	7-7/8″	9-3/8″
Width	7-3/4″	7-3/4″	7-3/4″
Depth	7-1/8″	7-1/8″	7-1/8″



Weatherproof Guarded Bell

Size: 10″

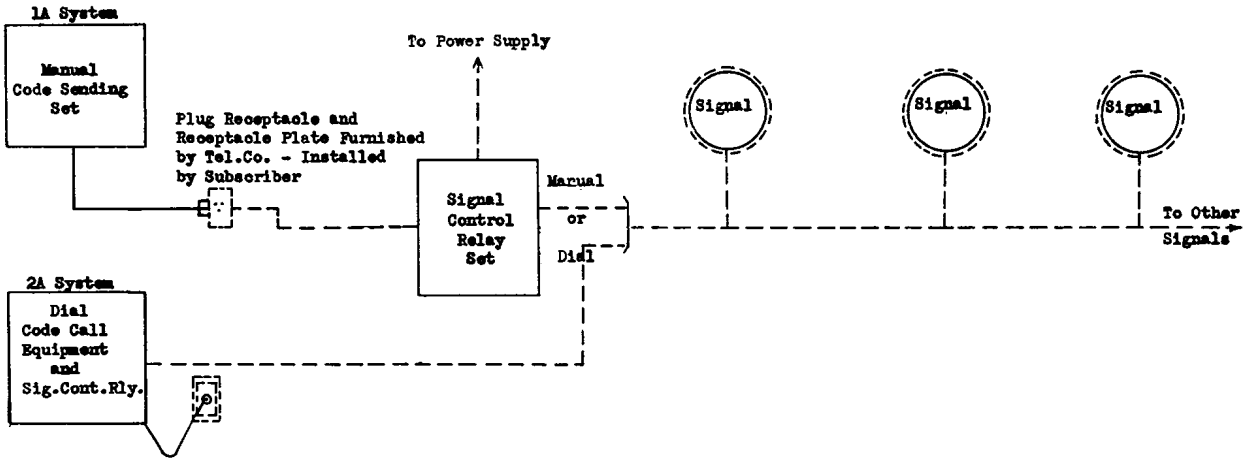


Duplex Horn

CODE CALLING EQUIPMENT INSTALLATION ARRANGEMENTS

MANUAL CODE CALL - 1A SYSTEM

DIAL CODE CALL - 2A SYSTEM



KEY - Solid Lines: Wiring and Equipment Installed and Maintained by the Telephone Company

Broken Lines: Wiring Installed and Maintained by the Subscriber

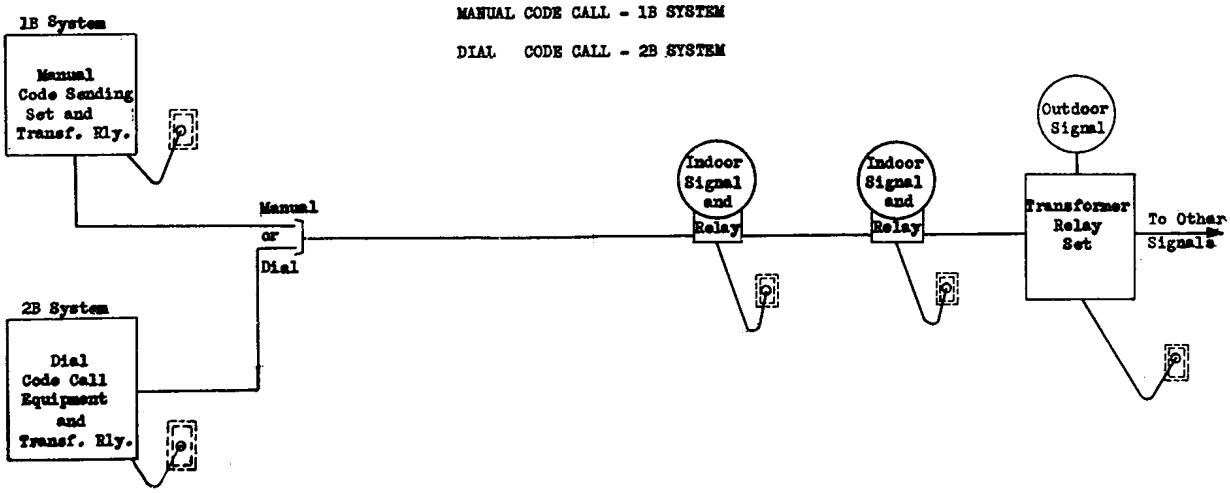
Signal — Signal which may be Installed and Maintained by Either the Telephone Company or the Subscriber

Power Outlet Provided by the Subscriber

Cord and Plug Furnished With Equipment As Shown

MANUAL CODE CALL - 1B SYSTEM

DIAL CODE CALL - 2B SYSTEM



LOUD SPEAKER PAGING SYSTEMS

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LOUD SPEAKER PAGING SYSTEMS

AVAILABLE IN ALL EXCHANGES

0. INTRODUCTION

Loud speaker paging systems are designed to assist the telephone user in completing telephone traffic by summoning persons who are absent from their regular telephone stations, and paging visitors who are wanted on the telephone. They may also be used for announcements to groups of employees of the customer.

A loud speaker paging system which can be used in connection with or separate from a PBX system, consists of two principal units, namely, the transmitting equipment and the speakers.

1. TRANSMITTING EQUIPMENT

1.0 General

Transmitting equipment consists of amplifier and the announcing transmitters, together with the necessary circuits connecting the units.

1.1 Amplifiers

There are two types of amplifiers available, one for use with the regular telephone type transmitter and one for the high quality transmitter. They will be referred to hereafter in this practice as the "regular" and "high quality" amplifiers, respectively. The regular amplifier weighs about 40 pounds and is housed in a black crystalline case whose approximate dimensions are, width 20", height 9", depth 11". The high quality amplifier is also housed in a black crystalline case and is similar in appearance to the regular amplifier. The regular type amplifier is always used when the announcing transmitter is furnished as part of the PBX. Either the high quality or regular type amplifier may be used in conjunction with a system with a separate transmitting station. Both the regular and high quality amplifiers operate on 110 volt, 60 cycle alternating current commercial power furnished by the subscriber. Connection to the commercial power is made by plug ended cords. If direct current only is available, it will be necessary for the customer to provide suitable converter equipment to provide the required alternating current power supply. The advice of the Plant Department should be obtained in determining the location of the amplifiers, the number of amplifiers required in a system, and when a separate transmitting station is involved, whether or not the regular or high quality amplifier and transmitter are required.

As preheating of the amplifier is necessary before an announcement can be made, a two-position power switch is provided adjacent to the amplifier.

LOUD SPEAKER PAGING SYSTEMS - (Cont'd)

This switch is turned by the subscriber to the "standby on" position at the beginning of each daily service period. To prevent unnecessary drain of power, this switch is also operated by the suoscriber to the "off" position at the end of each day. The operation of turning the amplifier equipment from the "standby on" to the "full on" position is described in Paragraphs 3.1 and 3.2.

1.2 Announcing Station Transmitters

1.20 General

Announcing station transmitters are of two types, namely, those furnished separate from the PBX system or those furnished as part of the PBX system.

1.21 Separate Station - Regular

This type of transmitting station is provided for loud speaker paging systems where one individual or more than one individual from a location will make use of the paging system. The transmitter consists of a standard telephone transmitter mounted on a desk stand.

1.22 Separate Station - High Quality

Where the paging system is to operate under difficult room noise conditions or where for other reasons better quality than that available with the regular transmitter is desired, a separate station high quality transmitter is available. It is used only with the high quality amplifier referred to in Paragraph 1.1. This transmitter is also mounted on a desk stand and is similar in appearance to the regular separate station transmitter.

1.23 P.B.X. Attendant's Sets

Where it is desired that the PBX attendant page or make announcements over the system and it is also necessary for PBX station users to page or make announcements, the paging system will be furnished in connection with PBX service. The operation of this system is described in Paragraph 3.2. The PBX attendant's set should be of the arm type for the best quality transmission. The regular operator's chest transmitter may be used, but the quality of transmission will not be quite as satisfactory as when the arm type transmitter is provided. On non-multiple PBX switchboards when the operator's set is of the chest type, arrangements may be made to provide, in addition to the chest type transmitter, a special arm transmitter mounted on the PBX switchboard for use with the loud speaker paging system. Requests for the installation of the special arm transmitter should be referred through the lines of organization to the General Commercial Manager for rate treatment.

LOUD SPEAKER PAGING SYSTEMS - (Cont'd)

2. LOUD SPEAKERS

2.0 General

A loud speaker paging system must have one or more speakers located on a subscriber's premises at strategic points. The speakers are available in two general types, namely, those for indoor use and those for either indoor or outdoor use.

2.1 Speakers for Indoor Use Only

The indoor or cabinet type loud speaker may be mounted on a wall by means of a backboard or placed on a table or other flat surface. It weighs 19 pounds and has approximate dimensions of, height 18", width 11", depth 9", at one end and 5" at the other.

2.2 Speakers for Either Indoor or Outdoor Use

2.20 General

Speakers for either indoor or outdoor use are of two general types, namely, the trumpet type horn and the fan type horn. The advice of the Plant Department should be obtained as to which of the horn type speakers should be installed for best results.

2.21 Trumpet Type Horn - Moderate Volume

Its dimensions are approximately, length 42", diameter of cone 22". Completely satisfactory transmission will not be obtained if the moderate volume trumpet horn is connected to the same amplifier to which the cabinet type loud speakers or the high volume trumpet type or the fan type horns, which are described later in this practice, are connected.

2.22 Trumpet Type Horn - High Volume

A high volume trumpet type horn similar in appearance to the moderate volume type horn is available for locations where greater coverage than that provided by the moderate volume horn is needed, or where because of noise levels a higher volume is necessary. The high volume trumpet type horn may be connected to the same amplifier to which the cabinet type loud speakers are connected, without impairment to the quality of transmission.

LOUD SPEAKER PAGING SYSTEMS - (Cont'd)

2.23 Fan Type Horn - High Volume

The fan type horn is available for use in either indoor or outdoor locations where coverage over a wider angle than that provided by the trumpet type horn, is desired. The volume efficiency along the axis of the fan type horn is somewhat less than with the high volume trumpet type horn but the sound distribution is over a much wider angle. The dimensions of the fan type horn are approximately, height, including the receiver unit, 23", width 23", depth 15".

3. OPERATION

3.0 General

Two general types of paging systems, depending upon the type of operation, are available; namely, the separate announcing station system and the PBX announcing system.

3.1 Separate Announcing Station System

The separate announcing station system is provided where there is no PBX, or if there is a PBX, the announcements over the paging system are to be made by one or more persons other than the PBX attendant from one location only. As described previously, the separate announcing station consists of a transmitter mounted on a desk stand. To make announcements the individual using the transmitting station speaks into the transmitter after having operated the cam lever key installed adjacent to the announcing station, to the "on" position. After the announcement has been completed the announcer operates the key to the "stand-by on" position.

3.2 P.B.X. Announcing Systems

When it is required that the PBX attendant and/or the station users make announcements over a paging system, the system may be provided in conjunction with the PBX. Connection to the paging system is made through the regular PBX cords (or keys in the case of cordless switchboards). The PBX attendant desiring to make the announcement inserts the PBX cord into the loud speaker paging system jack and operates the associated key into the "talk" position and proceeds to make the announcement. The insertion of the cord into the jack automatically turns the equipment to the "full on" position. The removal of the cord automatically turns the amplifier down to the "stand-by on" position. Similarly, any station desiring connection to the paging system after having reached the PBX attendant may be connected in the same manner. When a cordless switchboard is provided it is necessary to install a separate

LOUD SPEAKER PAGING SYSTEMS (Cont'd)

key for turning the amplifier on, the operation being similar to that described for separate announcing systems. Stations associated with the PBX which will have occasion to make announcements over the paging system should be equipped with the latest type telephone transmitters.

4. SALES AND MARKET CONSIDERATIONS

4.0 General

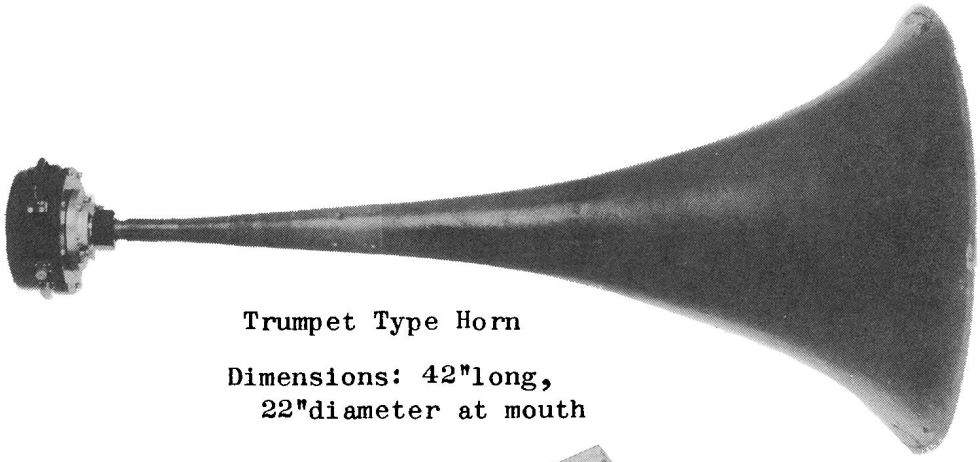
Loud speaker paging systems are designed to supplement the field covered by code calling systems. They are particularly adapted to those cases where individual telephone users are frequently away from their telephones but remain on the premises and also where customers have many visitors who are frequently called by telephone. The loud speaker paging systems are, for example, particularly adapted to requirements of hotels who have need for paging guests, or hospitals to page visiting doctors. When the need for a loud speaker paging system is developed, technical assistance of the Plant Department should be obtained in determining the type and number of amplifiers, type and number of speakers and the locations for these units.

LOUD SPEAKER PAGING SYSTEM

The operator connects her telephone to a special line and pages over the loud speakers.

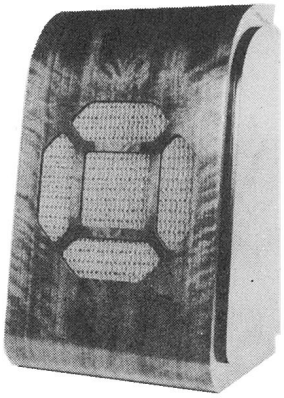
Amplifier
Dimensions: 20" wide
9" high
11" deep

Separate Announcing Station



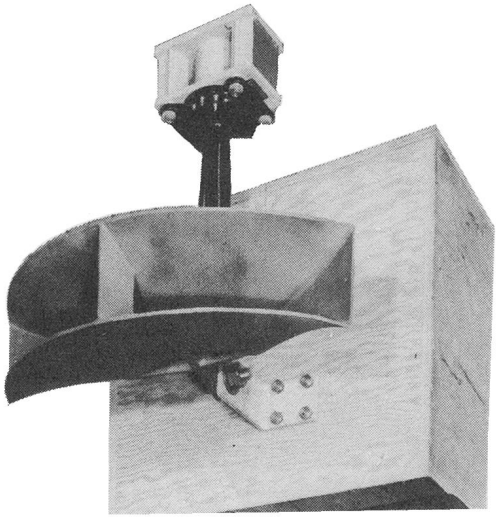
Trumpet Type Horn

Dimensions: 42"long,
22"diameter at mouth



Cabinet Type Speaker

Dimensions: 11"wide, 18"high,
9"deep at base



Fan Type Horn

Dimensions: Approx. 23"wide, 23"high,
20"deep

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Section 2 - 3 AND 6-LINE MULTIPLE LINE KEY CABINET SERVICE

Section 3 - 10-LINE MULTIPLE LINE KEY CABINET SERVICE

Section 4 - WIRING PLANS

Section 5 - 1-A KEY TELEPHONE SYSTEM

Section 6 - 2-A KEY TELEPHONE SYSTEM

KEY EQUIPMENT I.C.S.

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KEY EQUIPMENT INTERCOMMUNICATING SYSTEM SERVICE

15-A AND 23-A KEY EQUIPMENTS

INTRODUCTION

Key Equipment Intercommunicating Service is an equipment arrangement to provide pick-up, holding, intercommunication and automatic cut-off through keys in the base of the hand set; and is for use with either one line (15-A) or two lines (23-A).

These key equipments are, in reality, improved wiring plan arrangements having the following features (see Sales Manual, Wiring Plans, Insert 1):

1. Keys in base of hand set (instead of being mounted separately) to pick up, hold, intercommunicate and signal between key stations.

   The key block is mounted separately at stations with desk stands or wall sets (also at hand sets when desired, although such occasions should be rare). The hang-up type hand set cannot be provided.

2. Central office calls can be originated, answered, held and transferred at all key (master) stations.

3. Intercommunicating service connecting all or any stations.

   One common path between stations. No secrecy features on this path. Code signaling (using key in base of telephone) or selective signaling if desired (using separate buzzer circuits).

4. Automatic cut-off (optional) prevents other stations from connecting to a central office (or P.B.X.) line when it is in use by a station.

   Avoids interference and insures secrecy on such connections. This feature is similar to the automatic cut-off features provided under Wiring Plans 107 and 108.

This bulletin describes these two station key equipments which have been developed to obtain improvements with respect to the convenience of operation and appearance of key equipment apparatus. The station apparatus as well as the service features are, in general, similar to those provided in the 750-A P.B.X. except that only one common channel for intercommunication conversations is provided, and this channel does not have secrecy. The amount of apparatus

required with these new key equipments is substantially less than that required with the 750-A P.B.X.

GENERAL

The 15-A and 23-A key equipments are assemblies of station apparatus which enable the subscriber to pick up and hold on one or two central office or P.B.X. lines, intercommunicate, and automatically cut off other stations. The intercommunication is carried on over a pair of wires common to all stations, the stations being signaled by a buzzer and push-button system. Key equipments 15-A and 23-A are identical in all respects except that the former terminates one individual central office or P.B.X. station line while the latter terminates two.

Keys are provided in the base of the hand telephone set, thereby avoiding the necessity for mounting separate keys on the wall or desk, except where the latter arrangement may be preferred. An apparatus cabinet containing the relays and miscellaneous equipment will be required with all installations. For those installations where direct battery feeders from the central office will not be economical, a battery cabinet containing storage batteries is used, and where charging over cable pairs is impracticable, a trickle charger of the dry disc type is used for charging the storage batteries from a-c lighting supply. The voltage range for operation of the key equipments is 15-26 volts.

SERVICE FEATURES

Types and Number of Lines Terminated -

The new key equipments can be used with any business or residence standard dial or manual common battery central office individual line or common battery P.B.X. line.

The 15-A key equipment is arranged for one central office or P.B.X. line and all stations have access to this line for answering or originating calls except as noted under Number and Classes of Stations.

The 23-A key equipment has two such lines and all stations may originate or answer calls on them except the stations which are restricted for intercommunicating, described in the succeeding section.

Number and Classes of Stations -

Our tariffs provide for a maximum of seven key stations and four keyless stations in the case of the 15-A key equipment, and for eleven key stations and four keyless stations for the 23-A key equipment.

The apparatus cabinet is fully wired but unless otherwise specified is equipped with relays and a retardation coil for six key stations, two restricted service stations, and two central office lines when ordered for use with the 23-A key equipment. When ordered for use with the 15-A key equipment, it is equipped with relays and a retardation coil for four key stations, two restricted stations, and one central office line.

The 15-A key equipment provides for three classes of stations:

1. The first class of station has all the operating features of the plan; that is, it provides access to the central office or P.B.X. station line for answering or originating calls, holding, including transfer of calls, automatic cutoff and intercommunication.

2. The second class of station is similar to the first, except that the intercommunication feature is not used.

3. The third class of station has restricted service as it connects only to the intercommunication circuit and has no access to the line.

Key equipment 23-A has four classes of stations:

1. The first has all of the service features of the plan and provides access to both central office or P.B.X. station lines, holding on both lines with ability to transfer calls, automatic cutoff of the other stations, and intercommunication.

2. The second is similar to the first, but is connected to only one central office line.

3. The third class of station is similar to the second, except that the intercommunication feature is not used.

4. The fourth class of station (keyless) is restricted in that it provides for intercommunicating only and has no access to the central office lines.

Stations should be located within 300 feet, route measurement, of the switching equipment and confined to the same building as the associated relay equipment or located in separate buildings on the subscriber's continuous property from the associated relay equipment by conduit furnished by customer (see General Practices A-36). Usually not more than five pairs (10 conductors) are required at key stations; however, this number may be exceeded where buzzers are operated on a direct signaling basis.

C.O. or P.B.X. Line Pickup and Signals -

When the subscriber desires to answer or originate a telephone call, the button associated with the line, which is marked "1" and "2" and is located on the left side of the hand set cradle mounting, is pressed down until it locks and the hand set is then lifted from the cradle. This energizes the relays associated with the line which are located in the apparatus cabinet. These relays operate to connect the subscriber's telephone to the desired line, and the subscriber may then proceed with the call.

Incoming calls on the central office or P.B.X. lines are indicated by means of the standard station ringers, of either loud or soft tone types, as required for the installation. For the 23-A key equipment, which has two lines, standard gongs of distinctive tones may be employed. It is anticipated that the ringers will not necessarily be installed at the various stations, but will be so located on the premises that their sound can be heard most advantageously at all stations.

Holding and Transfer of Calls -

If a subscriber is talking on a line and wishes to hold the call, he may do so by depressing the non-locking button marked "H". This releases the pickup button, disconnects the telephone from the line and places a hold relay across the line, the relay locking in on central office battery. When the subscriber again wishes to talk on the line, the pickup button associated with the line is depressed. This automatically removes the hold bridge and reconnects the telephone to the line. If the subscriber forgets to pick up the line again after holding, the hold bridge will be automatically removed when another station comes in on the line to originate or answer a call. Because of this condition, if another attendant comes in on a line which is being held, it is necessary for him to depress his hold button if it is desired to continue to hold the party on the line. The hold may also be released from the central office by momentarily opening the line.

If an incoming call is answered at one station and the call is for a person at another station, it may be transferred by depressing the "H" button, then the intercommunicating button "L" and the buzzer signaling button "B". The operation of the "H" button places a hold bridge on the line until the proper party answers. The operation of the "L" button transfers the telephone from the central office line to the intercommunication line, and with the buzzer button "B", the person desired is signaled by means of a pre-arranged code. When the desired person answers on the intercommunicating line, he is told that there is a trunk call waiting. The person at the first station then hangs up and the called person goes in on the line and talks to the outside party, the hold bridge being automatically removed from the line.

Automatic Cutoff on Central Office or P.B.X. Lines -

An automatic cutoff feature is provided for all stations having access to the central office lines to insure privacy of conversation where desired and protection against interference with dialing. The operation of the privacy feature is such that if any station is talking on a line, all other stations are automatically denied access to that line until the conversation is finished.

The automatic cutoff arrangement is flexible, however, in the sense that its operation can readily be modified by minor wiring changes at the terminal strips in the apparatus cabinet, so that they will not cut off other stations. The automatic cutoff feature may be provided on all key stations so as to cut off other key stations connected to the central office or P.B.X. lines but not the intercommunicating line. Possible combinations of cutoff arrangements may be provided as follows:

1. Each station cuts off all other stations.

2. Any station may be arranged not to cut off other stations.

3. A maximum of 5 stations may be arranged so that the stations do not cut off each other, but will cut off all other stations.

It will occasionally happen that a station will try to originate a call on a line from which it is temporarily cut off due to some other station using the line. Under this condition the line will appear dead as the station attempting to call can not obtain dial tone or an operator. Should a more positive indication of the busy condition be desired, a lamp signal consisting of a 15-type indicator can be furnished. This lamp signal will normally be extinguished, but will light whenever the station tries to gain access to a busy line.

Intercommunication -

To make an intercommunicating call, the subscriber depresses the locking button marked "L" and the non-locking button marked "B". The operation of the "L" button connects the telephone to the intercommunication line by means of a relay in the apparatus cabinet, while the "B" button signals the desired station by means of a code buzzing arrangement, that is, the "B" button must be operated a number of times, depending on the number of buzzes in the code of the required station. If the subscriber wishes to buzz several of the stations individually, separate buzzer circuits should be provided at charges shown in the supplemental equipment schedule. These buzzer circuits may also be used for code signaling if desired.

At restricted (keyless) service stations, an intercommunicating call may be made by lifting the receiver from the switchhook and signaling the station desired by means of the push button buzzer system. These stations require the installation of a push button if signaling from this station is desired. This push button may be connected to the common buzzer system.

DESCRIPTION OF APPARATUS

Hand Telephone Set -

The hand telephone set with switching buttons in the base is provided for use with the 15-A and 23-A key equipments. The switching buttons, five in number, are designated from left to right, "1", "2", "H", "L" and "B" and are colored red, green, blue, yellow and black, respectively, to aid in distinguishing one button from the other. The "1" and "2" buttons are locking and are used for central office line pickup. As the 15-A key equipment terminates only one central office line, the "2" button is not used, and it may be blocked up in an inoperative position by means of a stop on the under side of the key. The "H" button is non-locking and restores any other button previously depressed and serves to place the hold bridge on the trunk. The "L" button is locking and serves to connect the telephone to the intercommunicating line. The "B" button is non-locking and is used to summon another station in connection with intercommunicating calls.

Associated with the handset mounting is a ten-conductor cord which connects the mounting to the subscriber set. The diameter of the cord has been brought down to a small size by the use of small diameter cord conductors of special construction.

The conventional finish for the hand telephone set will be black, but it may be obtained in any of the eight standard colored finishes as well.

Subscriber Sets -

A new anti-sidetone subscriber set is used with the new key equipments. This set contains a signaling buzzer in addition to the induction coil and condenser. The buzzer is suitable for operation on 14 volts to 26 volts direct current and is used for signaling between intercommunicating stations.

The subscriber set, intended for kitchens and similar locations, is an anti-sidetone wall set containing induction coil, condenser, switchhook and sufficient connectors for terminating the wiring or cabling from the apparatus cabinet. In addition, the set contains on the right side a connecting block with two terminals on which the buzzer for intercommunicating signaling is terminated. This buzzer is not furnished in the set due to noise which might be caused by the transmitter picking up the mechanical vibration of the buzzer

armature and should therefore be mounted a sufficient distance away from the set to avoid any noise. The ringer is omitted for a similar reason.

Key for Use with Desk and Wall Stations -

A five-button mechanically locking key has been standardized for use at desk and wall stations. The buttons operate in the same manner as those in the hand telephone set and perform the same functions. The designations "1", "2", "H", "L", and "B" may be engraved on the key face or otherwise designated adjacent to the respective buttons. Seven conductors are required in connecting the key to the subscriber set.

Key for Use as Four Push Button Unit -

The four-button signaling key, intended for use where the subscriber desires to buzz certain stations privately instead of by code, is available. The key is provided with designation spaces to indicate the station to be signaled. It may be fastened to the desk or wall or laid on the desk unfastened and connected by a five conductor 5-1/2 foot cord. This key is furnished at special assembly of equipment charges.

Apparatus Equipment Cabinet -

The same relay cabinet is used for both 15-A and 23-A key equipments. It contains the relays required for the operation of the key equipments, a retardation coil and terminals for terminating all the cabling and wiring associated with the key equipments. The cabinet is wired and furnished with terminals for a maximum of 11 key stations and four restricted service stations for both the 15-A and 23-A key equipments. It is equipped, however, with relays and a retardation coil, for six key stations and two restricted service stations for the 23-A key equipment and relays and retardation coil for four key stations and two restricted service stations for 15-A key equipment installations. When ordered for use with the 15-A key equipment the apparatus cabinet contains hold relays, cutoff relays, etc., for one line only, while for the 23-A key equipment it contains relays for two lines.

The cabinet is a mahogany walnut finished wood box having dimensions of approximately 21" x 21" 10-15/16". It has a removable front panel.

Battery Power -

The battery power supply for a key equipment system when connected to a common battery P.B.X., ordinarily is furnished from the P.B.X. battery supply. When not so connected, the battery supply ordinarily is furnished over circuits from the central office or by means of a power supply unit or a storage battery located on the subscriber's premises. The storage battery may

be charged over circuits from the Company's central office or by means of a power rectifier located on the subscriber's premises. The method of providing battery power supply is determined by the Company and all power equipment installed on the subscriber's premises is included in the power plant provided for under the rates.

No additional charge applies to battery power circuits except outside of the Base Rate Area where the mileage rate applies. The mileage charge for battery supply is the charge for a single circuit, irrespective of whether one or more pairs of conductors is used.

Where operating conditions make it necessary to install a power unit or a power rectifier on the subscriber's premises, the subscriber is required to furnish the electrical energy necessary for its operation.

SALES AND MARKET CONSIDERATIONS

The sale of these new key equipments would probably be handled by the business exchange salesmen and those salesmen or service representatives visiting customers in the larger residences.

Some of the prospective customers for the new key equipments are as follows:

Customers with four to eleven stations and one or two central office lines requiring one intercommunicating path, or new customers with similar needs.

Small and medium-sized business customers, and residence customers who should have the more convenient telephone arrangements which this equipment will provide.

Customers who have a need for the service features of a 750-A P.B.X. but who have not been sold this service because of the expense involved or for other reasons.

Since these new key equipments are simpler, more economical and involve relatively less investment than the 750-A system, it would seem advantageous to encourage their use instead of the latter system wherever the features and limitations of the new equipments (particularly those limiting the system to two central office lines and one intercommunicating path) adequately provide for the rquirements of the customer. It is believed that the 15-A and 23-A key equipments can be sold to meet customers' needs in a considerable portion of the field formerly covered by the 750-A system.

It will be noted that Wiring Plans 107 and 108 offer practically the same features as the 15-A key equipment except that the hand set with the key in the base of the instrument is not used. These wiring plans are less expensive service arrangements than the 15-A equipment.

SALES MANUAL

~~Wiring Plans~~
~~Insert 1~~
~~July 1935~~
E 1

Convenience

Key Equipment Intercommunicating System Service

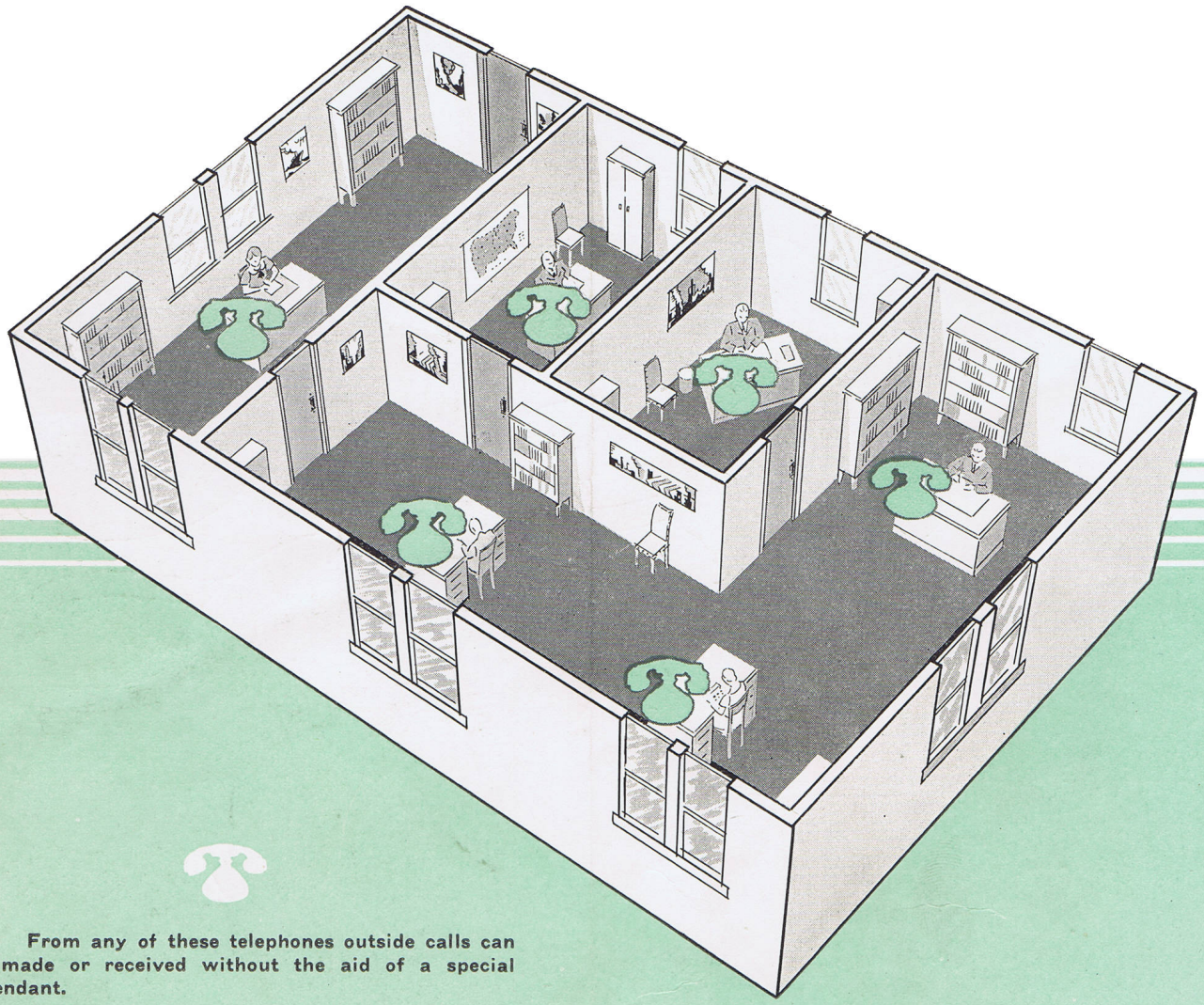
15A and 23A Key Equipment

. . . at your finger tips

KEY CONTROL E

How it is used

IN THE BUSINESS ESTABLISHMENT



From any of these telephones outside calls can be made or received without the aid of a special attendant.

Each telephone station can intercommunicate directly with any of the others in the office by simply depressing the proper keys.

All other telephones are automatically locked out when an outside line is picked up to make or receive a call, providing absolute privacy.

One or more telephones can be restricted to inside intercommunicating calls only, if desired, such as for example the telephones in the file or stock-room.

If desired, all incoming calls can be answered from any one telephone such as from the telephone in the outer office.

These incoming calls can be transferred to the proper person at any of the other telephones having key control equipment.

Visitors can be announced directly over the intercommunicating line to any person in the office having a telephone.

The New Service

UP TO ELEVEN TELEPHONES and
ONE OR TWO CENTRAL OFFICE LINES can be handled by the equipment.

KEY BUTTONS built into the base of the telephone control outgoing, incoming, intercommunicating calls, and interior buzzer signals.

NO SWITCHBOARD or special attendant is required.

OUTSIDE AND INSIDE CALLS can be made from all telephones.

DIRECT CONNECTIONS to a central office or intercommunicating line are made by simply depressing a key button. Certain telephones can be restricted to making or receiving intercommunicating calls only.

SUITABLE for the larger residences and apartments and for business and professional establishments of moderate size.

Its Many Advantages

ALWAYS ON THE JOB—Ready for service day and night.

EASY TO OPERATE—Simple to understand—a superior communication service at your finger tips.

ATTRACTIVE APPEARANCE—Compact hand telephone set—modern and distinctive.

PRIVACY—When one station is connected to a central office line all other stations are locked out, insuring privacy and freedom from interruption.

TRANSFER OF CALLS—Incoming calls may be answered at any telephone and transferred as may be required.

SIMULTANEOUS CONNECTIONS—One or two outside conversations and one inside conversation can take place simultaneously.

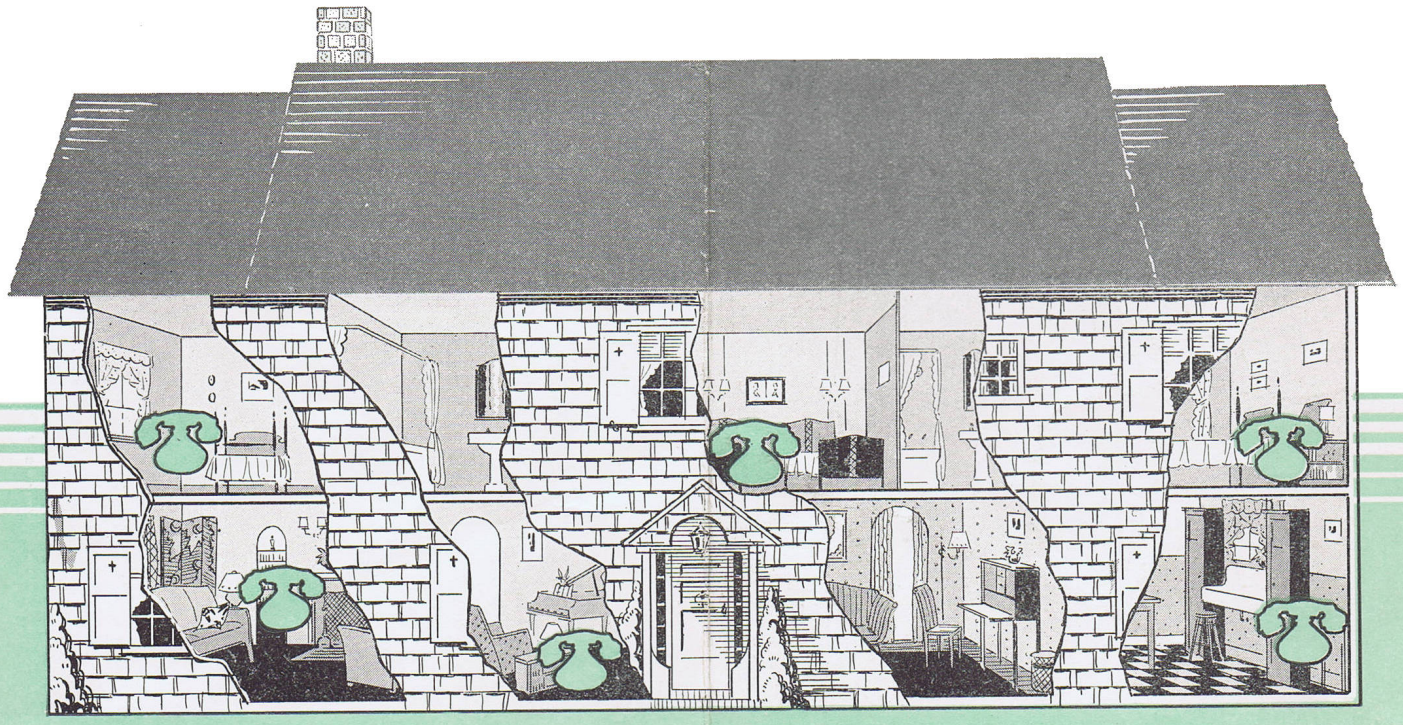
INEXPENSIVE—A modern service providing unusual convenience at a small monthly charge.

DEPENDABLE—A Bell System service.

ephone Convenience

How it is used

IN THE HOUSEHOLD



From the telephone in the bedroom orders may be given directly to the servants in the kitchen. Likewise, incoming calls may be received or outside calls made with a maximum of convenience.

It helps immeasurably to simplify the planning of the whole day's program. Saves time and steps and results in a quiet, smooth-running household.

From the kitchen or pantry telephone the interconnecting line makes it easy to check the menu for the day and orders for supplies with the mistress of the household.

The orders may then be given promptly to the tradesmen over the outside line from the same telephone.

From the telephones in the living-room and sun parlor, friends may be visited, appointments arranged, and business transacted quickly and comfortably with the assurance that no one can listen in from any other telephone in the house.

From these same telephones, by simply depressing a key, servants can be directed without moving from one's chair.

The guest room telephone is quiet evidence of a modern, well-ordered household. Guests will appreciate the provision of a telephone for their own use to receive or make calls.

Many homes have other locations where additional telephones provide a real convenience.

CALL YOUR TELEPHONE COMPANY BUSINESS OFFICE

THEY WILL GLADLY PROVIDE YOU WITH ADDITIONAL INFORMATION

3 AND 6 LINE MULTIPLE LINE KEY CABINET SERVICE

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3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY

0. INTRODUCTION

3 and 6-line Multiple Line Key Equipment is an equipment arrangement whereby a group of lines, either central office, private branch exchange, extension lines, or combinations of such lines, may be multipled at one or several stations equipped to originate, answer, or hold calls on any line in the group.

1. STATION APPARATUS AND SERVICE FEATURES

1.0 General

* Station apparatus consists of key cabinets, attendants telephone sets
* and buzzers. Bells may be used if desired.

1.1 Key Cabinets

* The key cabinets are small wooden boxes with metal face plates. Stan-
* dard finish for the woodwork is walnut with Old Brass used for the metal face
* plates. Key cabinets are made in four types, each of which is of three or six
* line capacity. The first two are arranged for operation by one person and the
* other two are arranged for operation by two persons. For customer convenience
* the cabinets may be mounted on the top or side of an office desk or table. The
* face of each cabinet is equipped with one key, one line lamp (amber) and one
* busy lamp (green) per line. Associated with each row of keys is a designation
* card holder, and a removable designation card protected by celluloid.

* 1.2 One Position Cabinet

* Three or six line cabinets when arranged for operation by one person
* are known as one position three or six line cabinets as may be applicable.

* 1.3 Two Position Cabinet

* The three and six line cabinets are also equipped for operation by two
* persons seated at a double desk with the cabinet in the center of the desk, or
* at adjoining desks with the cabinet between them. To facilitate operation two
* attendants telephone sets are provided as well as two key units. Only one line
* lamp and one busy lamp per line is used.

3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY - (Cont'd)

1.4 Dimensions of Cabinet

The dimensions of the key cabinets are as follows:

Dimensions	3 Line Capacity	6 Line Capacity
Height	4-1/2"	4-1/2"
Width	4-5/8"	7-3/8"
Length - Single Position	7-15/16"	7-15/16"
Length - Double Position	9-1/4"	9-1/4"

For illustrations, see Exhibit page E1.

Where single position key cabinets are mounted on the top of the desk and it is desired that they be tilted toward the user, an inclined wooden base may be used. Where it is desired to mount three-line single position key cabinets on the right or left side of desks a metal bracket has been provided. Key cabinets are infrequently mounted flush with the top of the desk. The disadvantages to the customer's desk are apparent and care should be taken that the customer fully realizes the effect of the hole in the desk top and that drawer space will probably also be sacrificed. The customer is required to arrange for the necessary cabinet work and brackets to support the cabinet which is usually mounted about 3/4 of an inch above the top of the desk. (For illustrations of types of mountings, see Exhibit pages E2 and E3).

Where installations exceed six lines, it is intended that two or more key cabinets be mounted on the desk side by side to give the desired capacity.

The key cabinets are furnished with a base which may be removed if desired so that they may be mounted side by side without space between them.

When orders for multiple line key service are placed, the salesman should decide whether the 3 or 6-line cabinet would be applicable, depending on the number of lines in use at the present time and the number that will be required in the near future.

1.5 Audible Signals

Buzzers used for indicating incoming calls consist of two types, a common a-c. buzzer which operates whenever an incoming call is received on any line, or an individual a-c. buzzer which operates on incoming calls on a particular line of the group for preferential answering. Usually one buzzer per

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3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
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3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY - (Cont'd)

system provides adequate signalling, however additional buzzers not to exceed one per cabinet may be provided where necessary. A bell may be substituted for a buzzer where desired.

Arrangements have also been made whereby one common d-c. buzzer per system can be used where ringing current is not available. In this case, no provision is made for individual d-c. buzzers. D-c. buzzers may be more economically provided when it would be difficult or uneconomical to furnish a cable pair for generator and where individual buzzers are not required.

A buzzer cutoff key of the 6017-B type may be mounted on the side of the subscriber's desk. Normally cutoff keys are not required and when furnished are furnished at the regular rates for keys. The cutoff key may be used to cut off either the common buzzer or buzzers, or individual keys are required to cut off any individual buzzer. For this reason two keys must be used to cut from the common buzzer to the individual buzzer. These keys are furnished at the regular charges.

A ground cutoff snap switch is installed so that at the close of the day's business a responsible employee may operate the switch and thus prevent line lamp and buzzer signals from operating for protracted periods when no one is present to answer calls. The line lamp and buzzer will then only operate while ringing current is applied unless the buzzer cutoff key is thrown.

Note: The buzzers referred to in this section are the buzzers furnished in lieu of bells and should not be confused with buzzers used for signaling between stations.

1.6 Attendants Sets

The attendant's set provided at each position of key cabinet, usually consist of either a desk or handset. Where required a chest transmitter set consisting of transmitter, receiver, jack, cord and plug may be furnished at rates applicable. Where out-dialing is required in connection with a chest transmitter set a dial may be placed either on top of the subscriber's desk or in some other convenient place.

1.7 Key Cabinet Stations

Key Cabinet Stations, directly connected to a line with or without bells, may be installed. In case such an extension station is installed, the busy lamp associated with the particular line to which the station is connected

3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY - (Cont'd)

lights when this station is in use. Not more than one extension station with bell should be furnished per line.

* 2. EQUIPMENT AND SERVICE CONSIDERATIONS

2.0 General

The equipment consists of two major parts; the key, lamp, buzzer, and talking equipment, which mounts on the subscriber's desk; and the relay equipment which mounts in an apparatus cabinet.

2.1 Type of Lines Terminated

Business lines terminating in the Multiple Line Key Equipment may be of three general types; (1) individual, common battery central office lines of either manual or dial type; (2) common battery P.B.X. station lines; and (3) common battery extension lines.

* 2.2 Maximum Number of Cabinets

The number of key cabinets through which a central office or private branch exchange line will be multipled is limited to twelve.

2.3 Apparatus Cabinet

A metal apparatus cabinet, 21 3/16" x 11" x 11", finished in walnut with a removable cover unit and designed to house relay assemblies has been made available. This cabinet has a capacity for four single plate units along with their associated terminal strips. This permits mounting four central office lines with the common buzzer circuit.

All central office or P.B.X. lines terminate in the apparatus cabinet on terminal strips. From these terminal strips six wires per line, exclusive of ground and buzzer leads, extend to the key cabinets. Inside wiring cable is ordinarily used in connecting key cabinets.

For large installations a relay rack may be desirable and relay assemblies on 19-inch mounting plates suitable for relay rack mounting have been made available.

Because of crosstalk considerations, it is recommended that the cable run between the apparatus cabinet and the key cabinets shall not exceed 300 feet.

3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY - (Cont'd)

The apparatus cabinet should be so located that sufficient space will be available in front of the cabinet to allow access. This is usually at least 2 1/2 or 3 feet.

2.4 Battery Supply

For installations inside the Base Rate Area, the battery supply is usually furnished from the central office battery, or from the associated P.B.X. battery, or from local battery, in which latter case the customer may be required to furnish the power outlet, wiring and electrical energy.

3. METHOD OF OPERATION

3.0 Incoming Calls

On central office and P.B.X. lines the application of ringing current to a line causes the buzzer associated with the line to operate and the line lamps to light at each key cabinet where the line appears. The call is answered at any cabinet by operating the key associated with the line to the first downward or talk position and removing the receiver from the switchhook. This retires the line lamp and buzzer and lights the busy lamp. The attendant may now talk on the line. The keys are so wired that it is not possible to bridge the set across more than one line at any one time. If two or more keys are operated to the talk position the talking equipment will be bridged across one line only.

3.1 Outgoing Calls

When an attendant desires to make an out call, he selects an idle line, that is, one on which no lamps are lighted. The key associated with the line is then operated to the talk position and the receiver is removed from the hook, causing the busy lamp to light at each key cabinet where the line appears. The attendant is now ready to talk on the line.

3.2 Holding

If an attendant is talking on a line and desires to hold, he may do so by operating the key associated with the line to its lowest position, in which position it locks, the busy lamp remaining lighted. If he now desires to make an out call on another line or answer another incoming call, the key associated with the other line is operated to its talk position and the conversation begins. At the end of the conversation the talk key is restored to normal and

3 AND 6-LINE
MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY - (Cont'd)

the attendant may now resume the conversation on the first line by restoring its key to the talk position.

A call on a line which is being held can be picked up at any other station while the key at the first station is operated to the hold position with impaired transmission due to the holding bridge unless the holding bridge is released. Any number of lines appearing at a position may be held at the same time.

3.3 Call Circuits (Intercommunicating)

A call circuit may be provided for use as an intercommunicating line between key cabinets. This circuit is terminated on the normal and hold positions of all keys. When an attendant desires to intercommunicate, he signals the desired party and removes the receiver from the hook, which places him on the call circuit if none of the keys are in the talk position. All cabinets provided with the call circuit have access to it at all times, no secrecy feature being provided. Buzzer circuits for signaling purposes should be provided at the regular rates. Keys or push buttons, etc., should not be mounted on the side of the key box. Call circuits may be extended to a station provided for intercommunication only.

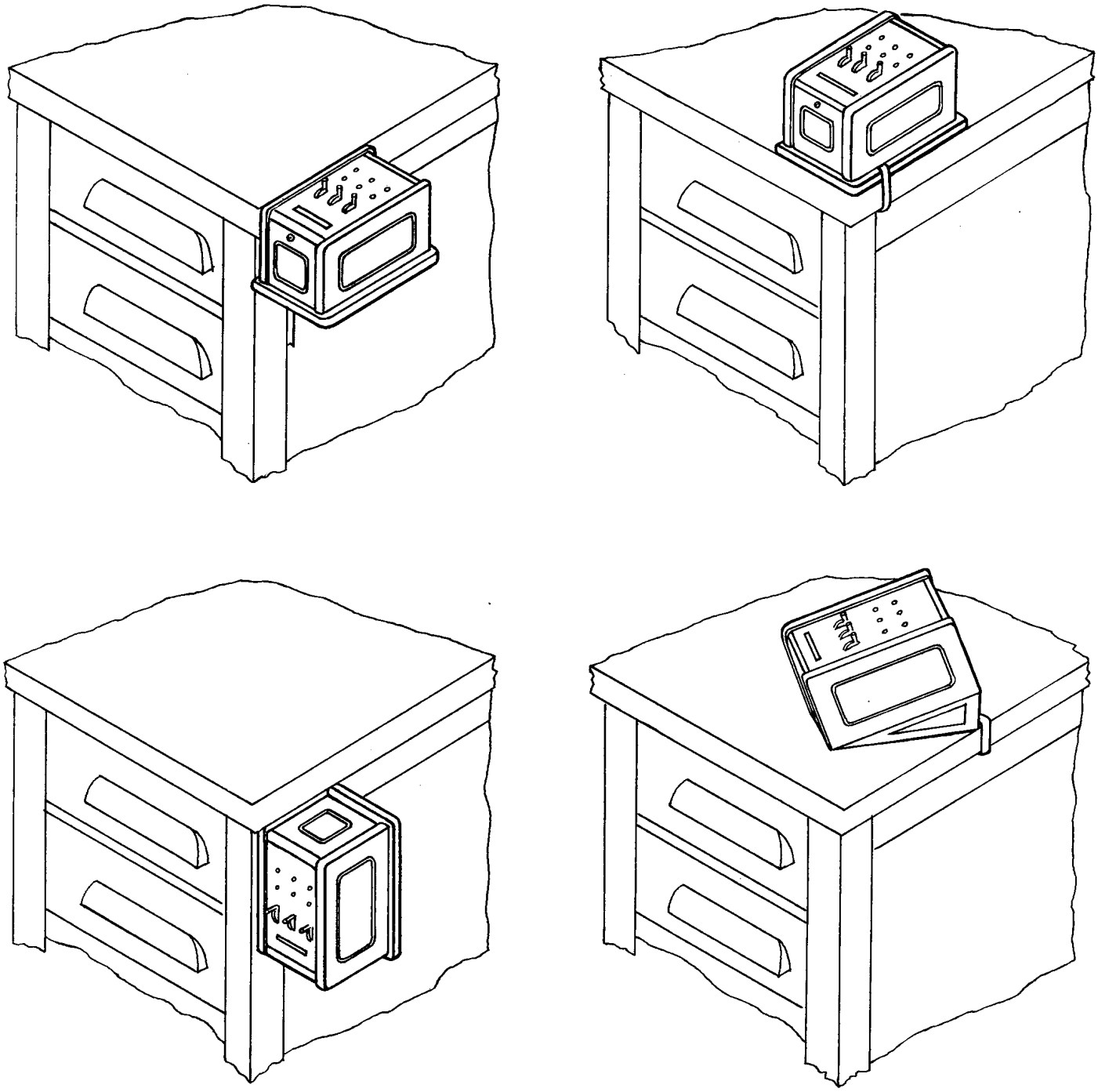
No. 100 Key Equipment

Multiple Line Key Cabinet

Dimensions	*3-Line Capacity*	*6-Line Capacity*	*Finish* - Walnut
Height	4-1/2"	4-1/2"	*Capacity*
Width	4-5/8"	7-3/8"	3 Lines
Length-Single Position	7-15/16"	7-15/16"	6 Lines
Length-Double Position	9-1/4"	9-1/4"	

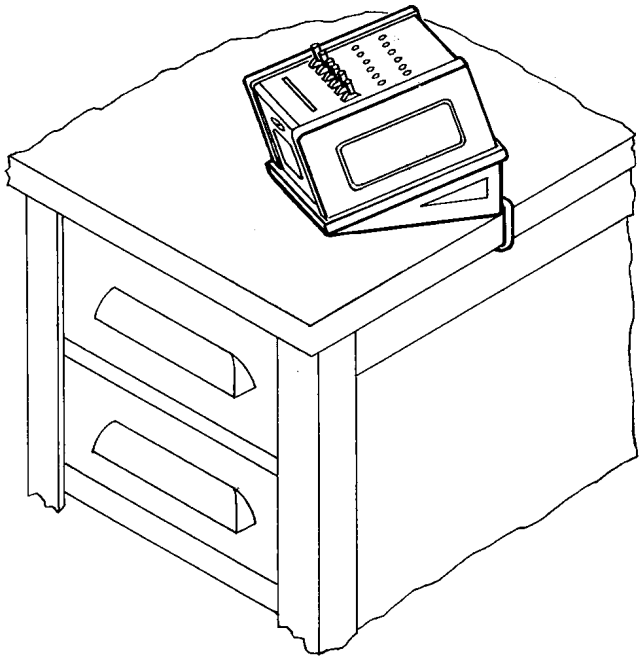
Multiple Line Key Cabinet Service

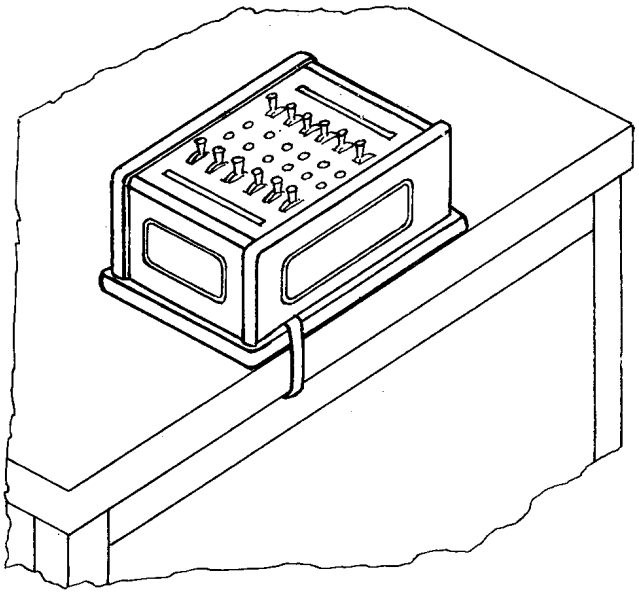
Mounting Positions

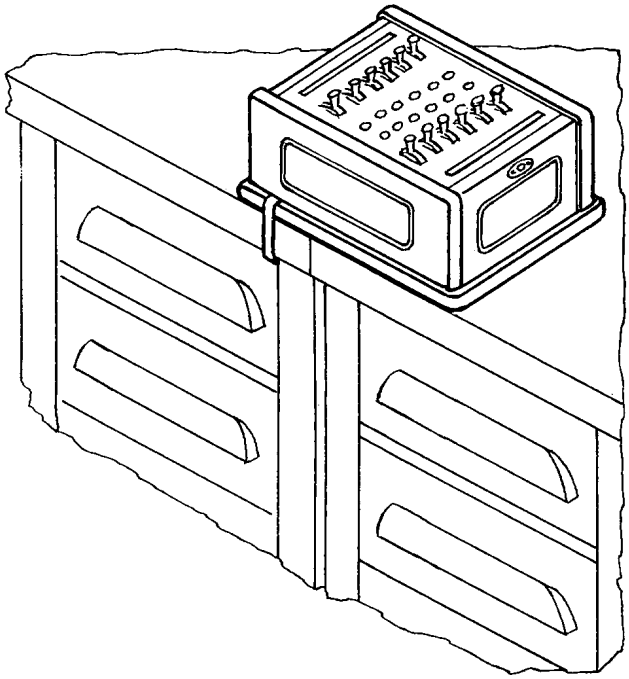


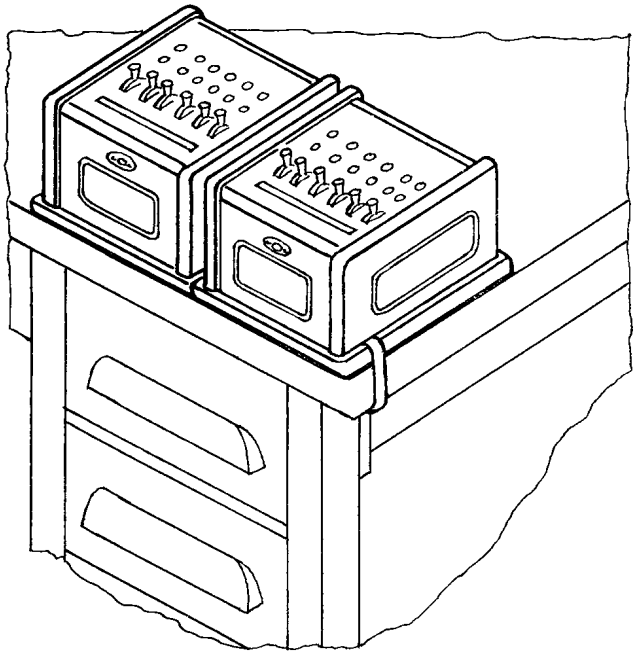
Multiple Line Key Cabinet Service

Mounting Positions









10 LINE MULTIPLE LINE KEY CABINET SERVICE

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10 LINE MULTIPLE LINE KEY CABINET SERVICE
AVAILABLE IN COMMON BATTERY EXCHANGES ONLY

0. INTRODUCTION

10 Line Multiple Line Key Cabinet Service is designed to meet service requirements where it is desired to enable one or more attendants to answer, originate, intercept, or hold calls on groups of lines which may include central office, PBX station, intercommunicating, and ringdown or automatic private lines. The service is available in common battery exchanges only.

The equipment is furnished for three types of operation, namely, non-secretarial, full secretarial, and pickup secretarial. The non-secretarial and full-secretarial service arrangements will be furnished in separate systems or may be combined in a single system. The pickup secretarial service arrangement will be furnished in a separate system only. Each of these service arrangements is described in this section.

1. STATION EQUIPMENT

1.0 General

The station equipment consists of an attendant's set and one or more positions, each position accommodating a key unit with a capacity for 10 lines. The term "key unit" as used in this manual, therefor refers to the key equipment used at one position. The key units are available on both a 1 and 2-position (single or double sided) basis and may be installed either non-flush or flush. The non-flush key units are housed in wooden cabinets for mounting on top of a subscriber's office furniture; the flush type key units are recessed in the subscriber's desk or table top.

1.1 Key Units

1.10 Originating Key Units

The face of the originating key unit includes five 3-position black lever type line keys. The keys are mounted in a single horizontal row, each having access to two lines.

A white "line and busy" lamp and a green "hold" lamp are provided both above and below each line key for the two lines that terminate on the key. The green "hold" lamps are located nearest the keys.

Designation strip holders are mounted both above and below the lamps.

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

A white, 3-position, non-locking, lever type key is mounted to the right * and in line with the line keys. This key permits flashing the central office operator or the PBX attendant, ringing on ringdown private lines, and holding calls on central office, PBX station and automatic private lines.

* NOTE: On 2-position originating key units this key is mounted to the left of the line keys on the second position as described under 2-position key units later in this section.

Buzzer and Battery cut-off keys, when provided, are installed immediately above and below the "flash, ring and hold" key.

1.11 Supplementary Key Unit

Supplementary key units contain only the five line keys, the associated "line and busy" and "hold" lamps and the designation strip holders, as described under Originating Key Unit. These supplementary key units are furnished only for the additional key units required at an attendant's position and for pick-up secretarial service, which is described later in this section.

1.12 Two-Position Key Unit

Originating and supplementary key units are provided on both a 1 and 2-position (single or double sided) basis. The 2-position arrangement consists of duplicate single units installed back to back in one assembly, permitting access to all of the lines in the assembly by two attendants.

The keys are installed from right to left on a 1-position key unit or assembly as described under 1.10. On a 2-position unit or assembly the keys on one side are from right to left while those on the other side are from left to right. This arrangement permits the installation of the "flash, ring and hold" keys, and the line terminations on the line keys to be made directly across the double unit.

1.13 Mounting Arrangement

The non-flush or cabinet type key equipment consists of a metal framework arranged to support the key unit and the wooden base, end, top, rear, and separation panels which may be assembled as required to form one or more 10 line key cabinets on either a 1 or 2-position basis. All of the exposed woodwork is of the standard mahogany walnut finish. The end, base and rear panels of the 1-position cabinet are fastened directly to the metal framework which supports the key unit and the top panel locks into place by means of a single

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

screw so that this panel may be removed to permit access to the key cabinet. The 2-position cabinet is similar to the 1-position arrangement except that the end and top panels are wide enough to house two key units back to back and that no rear panel is required. To provide for assembling two or more key units in a single line, wooden separators are furnished for use between adjacent key units. The dimensions of the key cabinets are as follows:

	Height	Width	Depth
1 - 10 Line Key Cabinet	7-5/16 in.	7-3/8 in.	6-23/32 in.
2 - 10 Line Key Cabinets	7-5/16 in.	13-7/8 in.	6-23/32 in.
3 - 10 Line Key Cabinets	7-5/16 in.	20-3/8 in.	6-23/32 in.
4 - 10 Line Key Cabinets	7-5/16 in.	26-7/8 in.	6-23/32 in.

For each additional cabinet to be added to the line add 6-1/2 inches to the width.

The dimensions of two-position cabinets are the same as the above except the depth which is 12-1/4 in.

The flush-type key equipment is arranged to mount flush with the top of a table or desk, provided and recessed by the subscriber. Frameworks are provided for 20 and 40-line sizes. The standard key units previously described are used and where one or three key units are required the extra space in the framework is covered by a metal plate finished to harmonize with the face plate of the key units. The dimensions of the recess and framework required to provide for the flush type mounting are as follows:

	Depth	Length	Width
Cut out for 1 or 2 Units	-	13-1/8 in.	7-5/16 in.
Cut out for 3 or 4 Units	-	25-7/8 in.	7-5/16 in.
Frame for 1 or 2 Units	7 in.	14-3/4 in.	7-7/8 in.
Frame for 3 or 4 Units	7 in.	27-1/2 in.	7-7/8 in.

When more than 4 units in line are required, additional 2 or 4-unit frames are added. To provide 2-position flush-type key equipment, additional cut outs and frames as described above are added to permit installing the key units back to back.

1.2 Attendant Sets

Desk or hand sets are available for use as attendant sets with the key equipment. Operator sets equipped with cord and plug also may be provided

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

if the required jack equipment is installed. The jack is housed in a mounting of black finish. Its dimensions are:

Width - 1-5/8 in.
Height - 2-3/8 in.
Depth - 5-1/4 in.

2. APPARATUS CABINETS

Apparatus cabinets housing the necessary line equipment units and common equipment are provided. They should be installed as close as practicable to the first key unit or assembly of the system. The cabinets are available in three sizes, as follows:

Depth	Width	Height
11 in.	1' 9-1/4"	11"
11 in.	1' 9-1/4"	1' 11-1/8"
11 in.	1' 9-1/4"	2' 11-1/4"

When required, the salesman should obtain the size of the apparatus cabinet for a given system from a Plant Department representative.

3. LINES

Common battery central office (either manual or dial), PBX station, private (either ringdown or automatic), and intercommunicating lines may be terminated in the 10-line multiple line key cabinet equipment.

4. AUDIBLE SIGNALS

Normally only one audible signal, common to all lines, either a buzzer or bell is furnished with each key equipment system. However, additional audible signals may be installed provided not more than one is furnished at each single or double position key arrangement. No line can be arranged for individual signaling if that line is associated with a common signal at another position.

5. OPERATION

5.0 General

Common battery central office (either manual or dial), PBX station, private (either ringdown or automatic), and intercommunicating lines are

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

terminated on the line keys of the key units. These lines may be terminated in any order desired, with the exception of ringdown private lines which must be terminated on the end keys.

Calls to the system are answered by operating the line keys to the up or down positions according to the termination of the lines. Other operating features are explained under the various types of lines as covered below.

5.1 Central Office and PBX Station Lines

Calls to the system over either a central office or PBX station line, except when pickup secretarial service * is involved, cause the "line and busy" lamp to flash intermittently at all positions where the line terminates. When the line key is operated and the attendant's set has been removed from the switchhook (or immediately if an operator's set is used) the "line and busy" lamp will stop flashing and will light steadily at all positions where the line terminates, indicating a busy condition.

To originate a call, the line key of any line, when the lamps associated therewith are not lighted, is moved to the operated position which connects the attendant's set to the line. This causes the "line and busy" lamp to operate steadily at all cabinets where the line appears.

To hold a call on a central office or PBX station line, the line key must be in the operated position. The "flash, ring and hold" key is then operated upward and held in this position momentarily until the line lamp is extinguished and the green hold lamp lights.

* Pickup secretarial service is described later in this practice.

5.2 Local Private Lines

5.20 General

Local private lines (either ringdown or automatic signaling) may be provided between a 10-line key equipment system and any of the following:

(a) A private line station
(b) A private line turret
(c) Another 10-line key equipment system.

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

5.21 Ringdown

Ringdown private lines must be terminated on the last line key or keys farthest from the "flash, ring and hold" key. However, any line key used in one position for a ringdown private line may be used in its other position for the termination of another type of line.

When the distant station of a ringdown private line causes ringing to be applied to the line, the "line and busy" lamp on the system flashes intermittently as on central office or PBX station lines. When a call is answered or originated the "line and busy" lamp remains steadily lighted for the duration of the call.

Holding is not provided on ringdown private lines. However, when the "flash, ring and hold" key is operated to the hold position, the green hold lamp is lighted at all positions on which the line terminates.

To originate calls from the key equipment, the desired ringdown private line is selected by operating the associated line key to the appropriate position. The "flash, ring and hold" key is then operated downward causing ringing current to be applied to the line as long as the "flash, ring and hold" key is held in the depressed position.

5.22 Automatic Signaling

When an incoming call is originated at the distant end, the "line and busy" lamp will flash and the buzzer will sound until the call has been answered. When the attendant answers the call by operating the key associated with the private line, the flash of the "line and busy" lamp is discontinued and instead it lights steadily at all appearances to indicate the busy condition.

An outgoing call may be originated from the key equipment by operating the associated line key to the appropriate position and removing the receiver from the switchhook. This causes a signal to be received at the called station. At the same time the "line and busy" lamps at all appearances of the key equipment light steadily to indicate that the line is in use.

Calls on automatic signaling private lines may be held as described for central office or PBX station lines.

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

5.3 Intercommunicating Lines

Intercommunication may be provided between key equipment stations and between key equipment stations and station instruments. When provided, each intercommunicating path is associated with a position of one of the line keys. As many intercommunicating paths as there are available key positions may be installed.

Signaling between stations for the purpose of intercommunicating is provided by means of separate push button and buzzer circuits.

5.4 Buzzer and Battery Cutoff Keys

5.40 General

Buzzer and battery cutoff keys with suitable designations are installed immediately above and below the "flash, ring and hold" key on one and only one key unit of a system. That key unit must be of the right originating type, that is, with the "flash, ring and hold" key installed to the right of the line keys.

Buzzer and battery cutoff keys are not provided on pickup secretarial service.

5.41 Buzzer Cutoff Key

When operated to the "off" position, the buzzer cutoff key disconnects the common line signal associated with the attendants' positions.

5.42 Battery Cutoff Key

When operated to the "on" position the "line and busy" lamp flashes intermittently when a call is received and will continue to flash until the call is answered, irrespective of whether the calling party abandons the call or not. When operated to the "off" position, the "line and busy" lamp will flash intermittently only when ringing current is being applied to the line. It will remain inoperative between ringing impulses and will not continue to operate if the calling party abandons the call. It should be operated to the "off" position whenever the key equipment system is to be unattended.

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

6. TYPES OF SYSTEMS

6.0 General

Non-secretarial and full secretarial service may be provided in separate systems or be combined in a single system. The pickup secretarial service arrangement will be provided in a separate system only. Service on a night connection basis is not available to PBX stations whose lines are extended to the key equipment for secretarial purposes.

The regular 10-line key units are utilized with the exceptions noted below.

6.1 Non-Secretarial

The non-secretarial service arrangement is provided where it is desired that one or more attendants have access to at least two of the following types of lines:

(a) direct central office
(b) direct PBX station
(c) private (either or both ringdown or automatic signaling)

Intercommunication lines may also be provided with non-secretarial service.

The operating arrangements described previously for line, busy and hold lamps; the flash, ring and hold keys; and buzzer and battery cutoff keys are available with the non-secretarial service.

6.2 Full Secretarial

Where it is desired that one or more secretaries or clerks answer calls for others who are not at their desks, the service may be provided on a full secretarial basis by terminating lines from principals' stations on the key units.

When an incoming call to a principal's station is received, the signal will be operated at the station and at the key equipment, that is, the "line and busy" lamp on the key equipment will flash intermittently until answered. When the call is answered by the key equipment attendant or by the principal, the flashing of the "line and busy" lamp is discontinued and it lights steadily to indicate the busy condition. The attendant may hold any of the lines terminated on the key equipment as described previously. In the event the principal answers an incoming call or originates an outgoing call, an

10 LINE MULTIPLE LINE KEY CABINET SERVICE - (Cont'd)

automatic lockout feature excludes the key equipment attendant from the line. This lockout feature is optional.

6.3 Pickup Secretarial

Pickup secretarial service which permits picking up lines from principals' stations may be provided at one or two but not more than two 1-position key cabinets or more than one 2-position key cabinet. Calls may be originated from either the principals' stations or the attendants' positions. It differs from the other two types of service arrangements in that:

(a) The "line and busy" lamp flashes on incoming calls at the key equipment only during the application of ringing current to the line. The buzzer or bell will sound only during the ringing.

(b) Holding calls on lines is not provided. Accordingly, supplementary key units are the only type used for this service arrangement.

(c) Automatic cutoff is not provided.

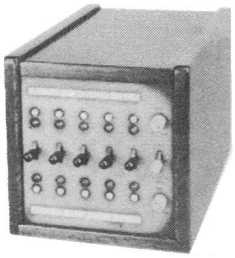
(d) The line and busy lamps at the attendant stations are extinguished when calls are in progress.

7. SALES AND MARKET CONSIDERATIONS

This service for use primarily where a large number of lines are to be provided, generally six or more. As many lines as desired may be terminated at any position by installing the necessary key units. Any one line is limited to twelve appearances in the system in the case of full and non-secretarial service and two appearances in pickup secretarial service.

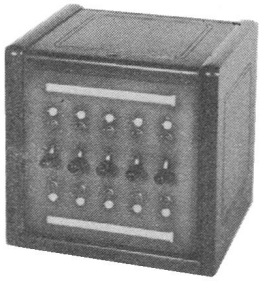
10 LINE MULTIPLE LINE KEY CABINET SERVICE

1 Position (Single-sided) 10 Line
Non-Flush Originating Key Cabinet

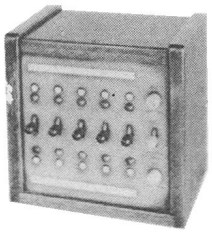


Dimensions:
Width 7-3/8"
Depth 6-3/4"
Height 7-5/16"

1 Position (Single-sided) 10 Line
Non-Flush Supplementary Key Cabinet

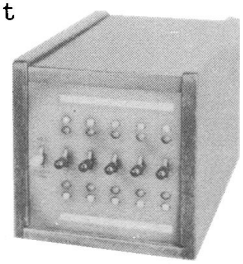


2 Position (Double-sided) 10 Line Non-Flush
Originating Key Cabinet



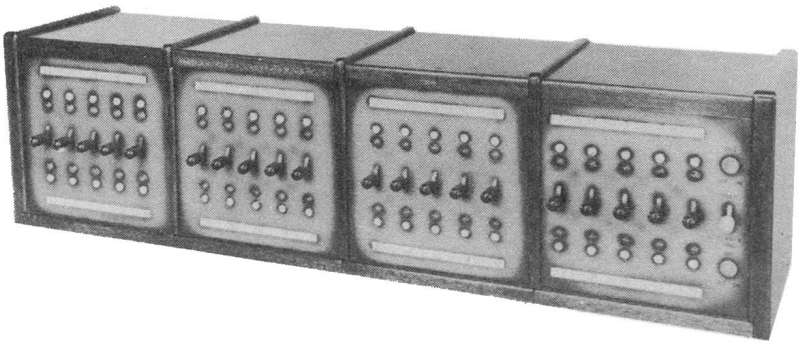
Front view

Dimensions:
Width 7-3/8"
Depth 12-3/4"
Height 7-5/16"



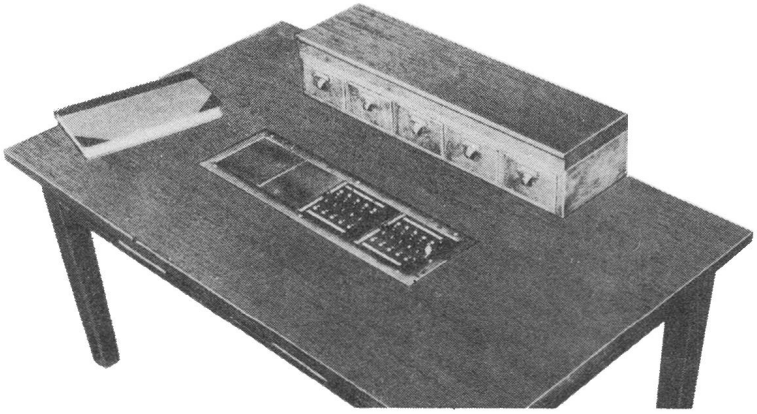
Rear view

Four 1-Position (Single-sided) Non-Flush Key Cabinets consisting of one originating and three supplementary positions (total capacity 40 lines)



Dimensions:
Width 2'2-7/8"
Depth 6-3/4"
Height 7-5/16"

Two 1-Position (Single-sided) Flush Key Units consisting of one originating and one supplementary position (installed capacity 20 lines; recessed capacity 40 lines)



1-A KEY TELEPHONE SYSTEM

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1-A KEY TELEPHONE SYSTEM

0. INTRODUCTION

The 1-A Key Telephone System is an arrangement of station facilities providing various features such as holding, pickup, intercommunication, etc. The service is available for individual and P.B.X. station line service in common battery exchanges only.

1. SERVICE FEATURES

* 1.0 General

* The service features offered by the 1-A Key Telephone System comprise
* pickup, holding, intercommunication, cutoff of stations and other equipment,
* exclusion of stations either on a partial or full automatic basis, local signal-
* ing and line signals of various types, each of these features is described in
* the following.

1.1 Pickup

The pickup feature enables one or more stations of a system to answer and originate calls on central office, P.B.X. station and intercommunicating lines.

1.2 Holding

When holding is provided at a station, it permits that station to retain a call on one central office or P.B.X. station line while answering or originating a call on a second line. The first call is neither disconnected nor interfered with in any way. The second call cannot be overheard by the party held on the first line. Holding is not applicable to intercommunicating lines.

1.3 Intercommunication

This feature permits two or more stations of a system to communicate with each other over a circuit provided for this purpose.

* 1.4 Cutoff

* This feature enables a station to disconnect from a line other sta-
* tions, extension ringers or the ringer of the controlling station, or discon-
* nect the ringer of the controlling station and connect another station or
* ringer. An auxiliary head set may also be disconnected from the station with
* which it is associated.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

1.4A Exclusion

*(Exclusion) permits the disconnection of another station or stations
* from a line. Two types of exclusion are provided. The first excludes by man-
* ual operation with automatic restoral and the second excludes and restores
* subordinate stations automatically.

1.5 Signaling--Local

1.50 General

Local signaling permits the sounding of a buzzer or buzzers at another station or stations of the system. Local signaling may be of three types, manual-selective or code, combined-code and selective, or automatic.

1.51 Manual--Selective or Code

The operation of a signaling key either a part of the set or external to the set causes a buzzer to be sounded at another station or stations of the system. If a buzzer at a single station is sounded, this is known as selective signaling. If buzzers at two or more stations are operated simultaneously by the same signal key, the desired station is signaled by code. This is known as code signaling.

1.52 Combined--Code and Selective

This feature permits a station to sound selectively buzzers at two or more stations by the operation of individual signaling keys, the same buzzers that are operated on a code basis from signaling keys of other stations or the same station of the system.

1.53 Automatic

This feature consists of an arrangement which permits one station to sound, without the operation of a signaling key, a buzzer at a distant station to which the signaling station is connected for intercommunication. This feature can only be provided on a two-station intercommunicating line. Automatic signaling can be furnished on a two-way basis by providing a second automatic signaling feature which will permit the distant station to sound, without a signaling key, a buzzer at the first station.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

1.6 Line Signals

1.60 General

Line signals provided with central office and P.B.X. station lines normally consist of bells; however, other signals both audible and visual may be provided.

1.61 Audible Signals

The audible signals provided in connection with individual and P.B.X. station lines generally consist of bells provided either as a part of a station, or external to the station. When two or more lines terminate at a station, a signal may be arranged to sound when a call is being received on any of the lines. When this common signal is provided, lamp signals (described in paragraph 1.62 following) must be provided on each of the lines. When the line lamps are installed and a common signal other than a bell is desired, a buzzer may be substituted for the common ringing bell. This buzzer will be installed in the base of the telephone set in lieu of the bell.

1.62 Visual Signals--Line

As described in the preceding paragraph, when either common or individual ringers are provided, lamps may be installed which will indicate the line on which the call is being received. Lamp signals must be provided when common signals are installed. These lamps are the same as the lamps utilized as station auxiliary signals, as described in PART VII, Section 4 of the SALES MANUAL.

1.63 Visual Signals--Busy

One or more lines of a system may be equipped with lamps which will indicate a busy condition on the line with which the lamp is associated. These lamps are the same as described in PART VII Section 4 of the SALES MANUAL.

2. LINES

2.0 General

Individual central office and P.B.X. station lines may be terminated at the stations of the 1-A system.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

3. STATIONS

3.0 General

The general appearance of the key telephone sets is similar to that of the combined hand set except that in the case of the 4- and 6- button sets the base has been made somewhat larger to provide space for the keys and the additional circuits required. The key telephone sets are supplied complete with hand set, key or keys, cord and a dial where required. There are four basic key sets, namely, set with exclusion key only, 1-button, 4-button and 6-button sets.

* Where wall, hangup, etc. type sets are required in connection with
* 1A Key Telephone System Service, separately mounted keys are provided. (See
* paragraph 3.5 for information on separately mounted keys.)

3.1 Exclusion Only Set

The external appearance of this set is identical to that of a combined hand set except that the right switch hook plunger is arranged so that it may be operated upward to exclude another station or stations from a predetermined line. This switch hook plunger is identified by a white ring and is grooved to permit grasping by the station user. The restoral of the hand set to the switch hook mounting automatically reconnects the excluded station or stations.

3.2 1-Button Set

The 1-button set, also known as the combined turn and push button set is similar in size and appearance to the combined hand set except that it has in the front left corner of the base a single key which may be rotated for selection of one of two lines or for cutoff of stations or other equipment and depressed in either of its operative positions to provide local signaling. Page E 6 depicts the various feature combinations that may be provided with this set. The 1-button set may be provided with or without the exclusion feature.

3.3 4-Button Set

The 4-button set is somewhat larger than the combined hand set and is equipped with a row of four keys mounted in the base at the front of the set. The various feature combinations that may be provided with this set are shown on Page E 6. The 4-button set may be provided with or without the exclusion feature.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

3.4 6-Button Set

This set is identical in appearance and size to the 4-button set except that the front base of the hand set is equipped with six keys instead of four. The various feature combinations which may be provided with this set are shown on Page E 6. This set may be provided with or without the exclusion feature.

* 3.5 Separately Mounted Keys

* Separately mounted keys for use with wall, hangup, etc. type sets
* are available. The various feature combinations that may be provided with
* separate keys are shown on Page E 7.

4. KEY TELEPHONE UNITS AND APPARATUS CABINETS

4.0 General

The necessary equipment required to perform certain of the features described previously are known as key telephone units and are housed in small apparatus cabinets. These cabinets are mounted on backboards. When more than one cabinet is required, as described in paragraph 4.10 following, they are mounted in series, end to end, with approximately 2 inches separating the cabinets. The dimensions of the apparatus cabinets are:

Height - 7-1/2 in.
Width - 7 in.
Depth - 3-3/8 in.
Finish - Black

4.1 Key Telephone Units

4.10 General

* The key telephone units are of two standard sizes, that is, either 1-3/4" in height known as the single unit, or 3-1/2" in height known as the double unit. This arrangement permits the housing of four single, two single and one double, or two double key telephone units in a single apparatus cabinet. Having determined the features required at the stations of a 1-A Key Telephone System, the number of apparatus cabinets required can be determined approximately by counting the number of key telephone units, both single and double, equating this number into the equivalent single units and dividing by 4. As previously described, each group of four or less single key telephone units or their equivalent, can be housed in a single apparatus cabinet. The various key telephone units are described below.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

4.11 Holding Unit

When holding on central office or P.B.X. station lines is provided, one key telephone unit known as 1A KTU is required for each line arranged to be held. These KTU's are of the double size.

4.12 Battery Feed Unit

For each intercommunicating line provided with the system, one battery feed unit, known as the 2A KTU is required. This is a single unit.

* 4.13 Combined Code and Selective Signaling Unit

For each group of from two to six buzzers which are to be op-
* erated on combined code and selective signaling basis, a 3A KTU is required.
* This is a single unit.

* 4.14 Automatic Signaling Unit

* For each intercommunicating line between two stations equipped
* for either one way or two way automatic signaling a 13A KTU is provided. This
* is a double unit.

4.15 Auxiliary Hold Unit

When a station which is not equipped for holding excludes from a line a station equipped to hold that line, an auxiliary holding unit known as the 5A KTU must be provided. A 5A KTU is also required when a station arranged for holding is cut off by any other station. This is a single unit.

4.16 Busy Lamp Control Unit

For each line which is equipped to operate a busy lamp or lamps, a busy lamp control unit known as the 6A KTU is required. This is a single unit.

4.17 Blank Mounting Plate Unit

A key telephone unit known as the 8-A unit, consisting of blank mounting plate, is sometimes required to provide necessary cross connections in the apparatus cabinet of a 1-A system. The Plant Department determines when this unit is required. This is a single unit.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

4.18 Line Lamp and Common Ringer Unit

For each line which is equipped to operate a line lamp or lamps a line lamp control unit known as the 9A KTU is required.

4.19 Ringer Feeder Unit

For each group of lines arranged to operate a common bell or bells, a 11A KTU, known as a Ringer Feeder Unit is required. This is a single unit.

* 4.20 Exclusion - Automatic Exclusion - Automatic Restoral

* The 10A KTU is provided for each line equipped for automatic
* exclusion and automatic restoral. This is a double unit.

* 4.21 Battery Supply Unit for Use with 4-1/2 Volt Battery

* There are some installations where a requirement exists for a
* battery supply unit suitable for use on intercommunicating lines where a 4-1/2
* volt dry cell battery is used. The 12A KTU has been developed for these special
* cases and will be installed at the discretion of the Plant Department. This is
* a single unit.

5. OPERATION

5.0 General

The operation at the key telephone stations to perform the features of the system vary depending upon the feature itself and the type of set, that is, 1-, 4-, or 6-button. The following paragraphs describe in detail these operations.

5.1 Pickup

The pickup feature as described previously permits a station or stations of the 1-A key telephone system to have access to one or more central office, P.B.X. station, or intercommunicating lines. In the 1-button set the line selection is made by turning the single key. The position of the key is indicated by a white mark on the face of the key. The lines associated with the two positions of the key are further identified on the number plate of the set. In the 4- and 6-button sets the pickup feature is performed by depressing the key associated with the lines desired. These are locking keys, that is,

1-A KEY TELEPHONE SYSTEM - (Cont'd)

they remain depressed unless another pickup or hold key (see paragraph 5.2) is operated at the station.

5.2 Holding

Holding is not provided with the 1-button set. In the 4- and 6-button sets when holding is provided the button farthest to the left is associated with the hold feature. When a call has been answered or originated by depressing a pickup button associated with a central office or P.B.X. station line, the call may be held by operating the hold key momentarily. The hold key is of the spring type and restores to normal as soon as released. The pickup key associated with the line held is also released when the holding key restores. The single hold key will hold any line equipped to be held which terminates at the station.

5.3 Intercommunication

Intercommunication is provided between two or more stations of the system by terminating an intercommunicating line on one of the pickup keys of a station. The 1-button set may be arranged for a single intercommunicating line. The 4- and 6- button sets may be arranged to have access to more than one intercommunicating line if there are available keys in the base of the set for terminating such lines. An intercommunicating line is picked up in the same manner as described under the pickup feature. In addition, a station without keys may be associated with an intercommunicating line. The 4- and 6-button sets may be arranged to have access to more than one intercommunicating line if there are available keys in the base of the set for terminating such lines. An intercommunicating line is picked up in the same manner as described under the pickup feature. In addition, a station without keys may be associated with an intercommunicating line only.

* 5.4 Cutoff (See also Exclusion)

* 5.40 General

* The cutoff feature may be of two types; one utilizes a key in
* the base of the hand set, the other is external to the telephone instrument.
* Both keys are manually operated.

* 5.41 Cutoff Key in Base of Set

* The features for this type of cutoff key is performed by operating a turn button in the base of the hand set. The 1-button set may be arranged for cutoff, but when so equipped the only other features that may be

1-A KEY TELEPHONE SYSTEM - (Cont'd)

provided with the 1-button set are local signaling and exclusion. The 4- and 6-button sets may be provided with one cutoff key in the base of the set. This key is always the key farthest to the right. As described under features of the system, the manual cutoff key cuts off extension stations extension ringers, the ringer in the set, disconnect the ringer in the set and connect either another station with or without bell, or a distant ringer. This cutoff is effective on one line only. A cutoff key may be utilized to disconnect an auxiliary headset from a station.

* 5.41A Cutoff-Separately Mounted Keys

* Separately mounted cutoff keys may be used in addition to the
* key in the base of the set or where all keys are utilized for other purposes.

* 5.42 Exclusion

* 5.43 General

* Exclusion features are different from cutoff in that exclusion
* refers only to the disconnection of another station or stations from a line.
* Two types of exclusion are available as described below.

* 5.44 Exclusion Manual Exclusion-Automatic Restoral

This feature known as exclusion is accomplished by operating the right switch hook plunger upward. When in the operated position another station or stations of the system is excluded from the central office or P.B.X. station line associated with the exclusion key. In the 4- and 6-button sets the exclusion key is always associated with the line that is picked up by the pickup key farthest to the left in the particular set. The station may be arranged to exclude one or more of the stations from the line associated with
* the exclusion key. In a several station system, for example a five station
* system, station A can exclude from line 1 stations B, C, D and E. Station B
* can then exclude stations C, D, and E from the sale line, but not station A.
* Station C can exclude stations D and E from the same line, but not stations A
* and B, etc. When more than one line is provided, station A can exclude all
* other stations from one line by terminating that line on the first pickup but-
* ton at station A. Station B can exclude all other stations from line 2 by
* terminating line 2 at the first pickup button at station B, etc.

* 5.45 Exclusion Automatic Exclusion-Automatic Restoral

The automatic exclusion feature automatically excludes all sub-
* ordinate stations whether using the line or not when one of the principal sta-
* tions use the line.

1-A KEY TELEPHONE SYSTEM - (Cont'd)

* The term principal station refers to any station on a line
* equipped to exclude automatically any subordinate stations on that line. The
* term subordinate station refers to any station that may be excluded automatic-
* ally by a principal station.

* There may be more than one principal and more than one sub-
* ordinate station on a line. Principal stations cannot exclude other principal
* stations and subordinate stations cannot exclude principal stations or other
* subordinate stations.

In considering the use of automatic exclusion, it seems import-
* ant that the customer understand that lifting the receiver at a principal sta-
* tion will automatically connect that station to the outside line and excludes
* any subordinate station which may be using the line. It would seem desirable,
* therefore, to suggest busy line indicators at principal stations to show when
* a line is being used by a subordinate station in order to avoid the possibility
* of inadvertently interrupting such conversations.

5.5 Signaling - Local

5.50 General

As described under Service Feature, local signaling may be pro-
* vided in three ways, namely, manual-selective or code, combined code and selec-
tive, and automatic. In the three types of signaling the buzzer associated
with tne local signaling may be installed in the base of the set when the bell
in the set is not utilized.

5.51 Manual-Selective or Code

With the manual-selective signaling arrangement, a separate
signal key either part of or external to the set is required to sound a buzzer
at each station to be signaled. With a manual code signaling arrangement, one
station being indicated by code. The operation of the signal key at any sta-
tion sounds all buzzers on the circuit, including the buzzer at the signaling
station if provided.

* 5.52 Combined Code and Selective Signaling

This feature enables a station or stations to sound selectively
* the same buzzers which are also arranged to be sounded on a code basis. For
* example, on a four-station system, stations B, C, and D signal each other by
* manual code signaling, that is, a signal key when operated at stations B, C,
* or D sounds buzzers at the same three stations, the desired station being in-

1-A KEY TELEPHONE SYSTEM -- (Cont'd)

* dicated by code. Station A would be equipped with three signal keys, each con-
* nected individually to the buzzers used for code signaling at stations B, C,
* or D. With this arrangement, station A can signal selectively any one of the
* three stations which signal each other by code. Station A may, if desired,
* also be connected by means of a signal key for code signaling to stations B,
* C, and D. Stations B, C, and D can be provided with individual signal keys
* to sound a buzzer at station A if signaling to station A is required.

5.53 Automatic

When two stations, and only two stations, are connected to an intercommunicating line, automatic signaling may be provided one way or both ways, that is, station 1 by depressing the pickup key associated with the intercommunicating line and lifting the hand set from the switch hook mounting will cause a steady buzzing signal to be received at station 2. The signaled station must be equipped with a buzzer individual to the automatic signaling circuit. When station 2 answers by depressing the pickup button associated with the same intercommunicating line and lifting the hand set from the switch hook mounting, the connection is completed and the signaling stops. Station 2 may signal station 1 by manual signaling or may also be equipped to signal station 1 by automatic signaling in the same manner as station 1 signals station 2. In the event the automatically signaled station operates another pickup button at the station to answer or originate another call, the signaling will not be reestablished. It will be necessary for the signaling station to restore the hand set to the mounting or disconnect the station from the intercommunicating line in some other manner and then reestablish the connection to the intercommunicating line before the automatic signaling will be resumed.

5.6 Line Signals

5.60 General

Line signals as described under Service Features may be of the audible or visual type.

5.61 Audible

The audible signal normally consists of a bell for each central office, or P.B.X. station line terminating on the system. One of these bells may be provided as a part of the station set. Any additional bells at a station will be installed external to the set. When line lamps as described in the following are provided, a common signal may be installed. This signal will sound when any of the lines of the types mentioned above are rung, the particular line being designated by the lamp associated with that line. When a common

1-A KEY TELEPHONE SYSTEM - (Cont'd)

signal is provided, it may either be a bell or a buzzer. If a common bell is the type of signal utilized, it is housed in the station set. If a common buzzer is provided, it will be installed in lieu of the bell in the base of the station set.

5.62 Visual Line Signals

When a common audible signal is provided, as described in the preceding, lamps must be provided for each line associated with the common signal. The lamp associated with a particular line is lighted during the ringing impulse on that line and is extinguished between rings. These lamps are those described in Part VII, Section 4.

5.63 Visual Busy Signals

Lamps may be provided which will indicate a busy condition on a line or lines of the system. One lamp must be provided for each line on which it is desired to show a busy condition. The lamps are those described in PART VII, Section 4.

6. SALES AND MARKET CONSIDERATIONS

The 1-A Key Telephone System is designed to serve in addition to wiring plans, multiple line key cabinets, business and residence dial private branch exchanges, key equipment intercommunicating systems, small manual private branch exchanges, and to offer features not heretofore provided. When the requirements of a subscriber are determined, the equipment which will best meet the needs of the individual case and meet those needs most economically should be selected. When additions to service are required, either additional lines, features or stations, these additions should be made to presently installed equipment unless its capacity has been exceeded or unless service features not provided by the existing installation are required.

In the case of existing wiring plans, additional stations should be provided by wiring plan equipment. When additional lines are needed and the capacity of existing wiring plan keys will permit the adding of the line or lines without changing the presently installed keys, these additions should be made to the wiring plan equipment. If it is necessary to remove the wiring plan keys because their capacity has been exceeded, the subscriber should be offered larger capacity wiring plans or 1-A key equipment, whichever is the more economical.

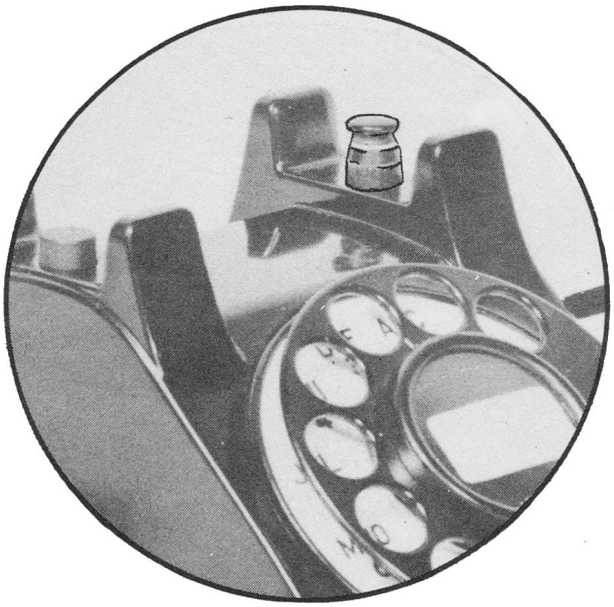
1-A Key Telephone System stations will not be associated with any other services.

KEY TELEPHONE SYSTEMS
1A

Set with Exclusion Key only

KEY TELEPHONE SYSTEMS
1A

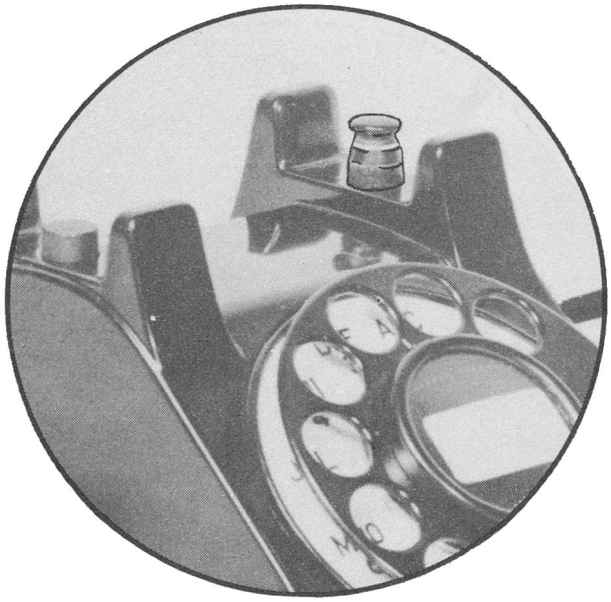
Single Key in Base Set



Exclusion Key Feature
(if desired)

KEY TELEPHONE SYSTEMS
1A

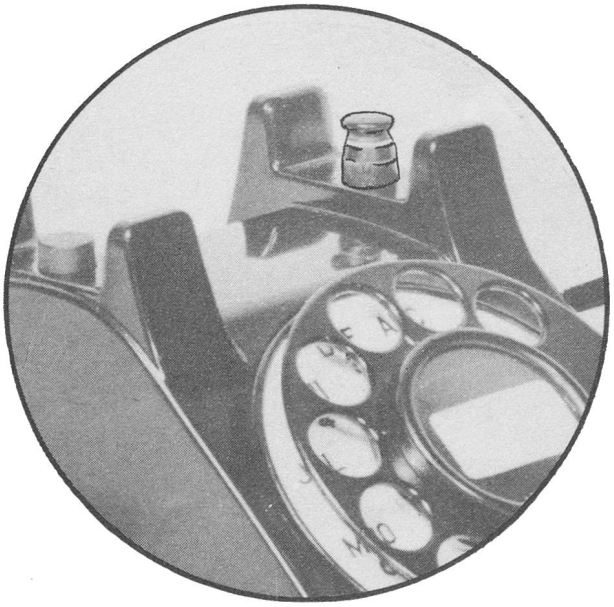
4 Key in Base Set



Exclusion Key Feature
(if desired)

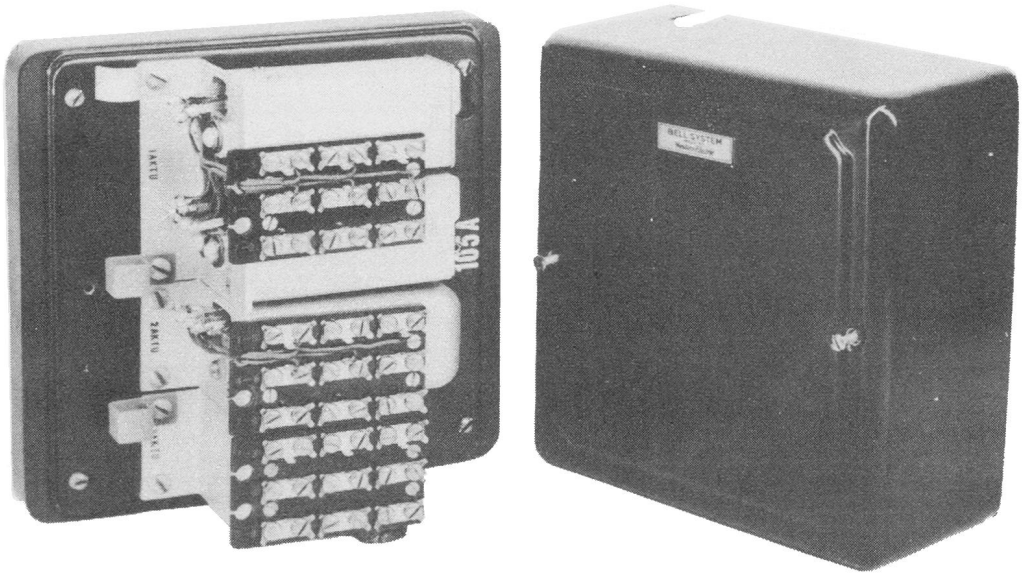
KEY TELEPHONE SYSTEMS
1A

6 Key in Base Set



Exclusion
Feature
(if desired)

KEY TELEPHONE SYSTEMS
1A



Apparatus Box With Typical Equipment

Dimensions

Height 7 1/2"
Depth 3 3/8"
Width 7"

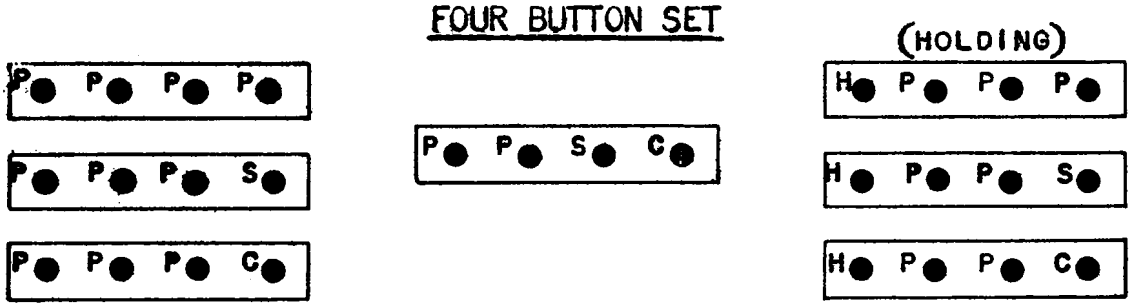
Each apparatus box contains four single Key Telephone units or their equivalent

1A KEY TELEPHONE SYSTEM
FEATURE COMBINATIONS
KEY IN BASE SETS

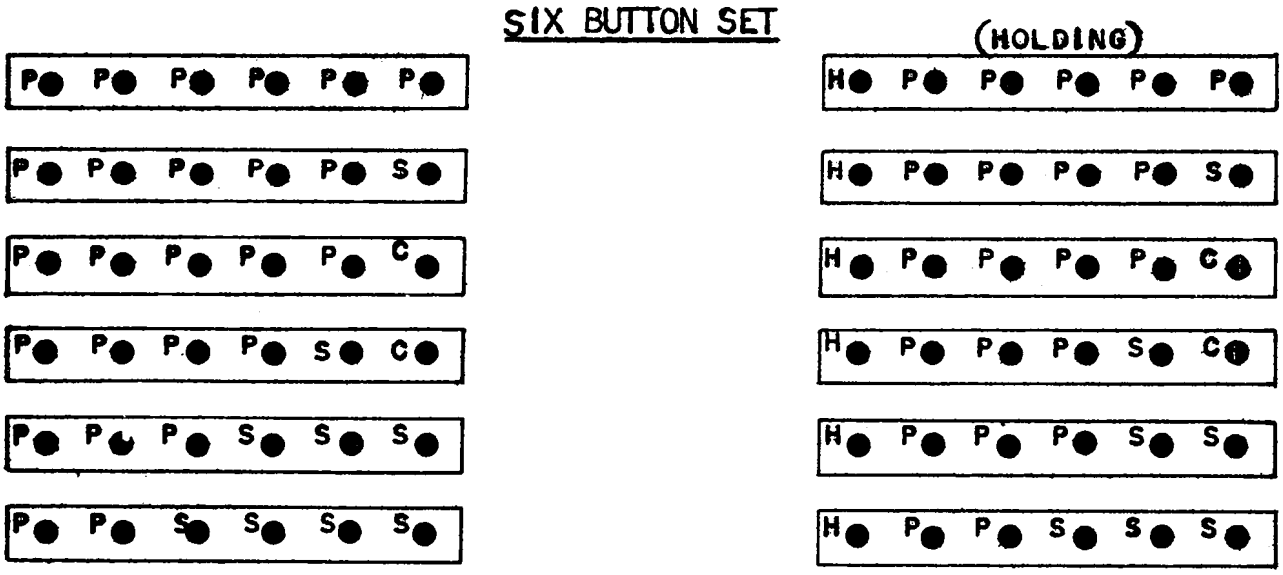
ONE BUTTON SETS

KEY	NO. OF LINES	FEATURES
TURN BUTTON TYPE	1	CUT-OFF EXTENSION STATION EXTENSION BELL EXTENSION STATION AND BELL TRANSFER BELL IN SET HEAD SET SIGNALING
	2	PICKUP CENTRAL OFFICE, PBX STATION AND INTERCOMMUNICATING LINE SIGNALING

FOUR BUTTON SET



SIX BUTTON SET



NOTES: Exclusion is an optional feature with all sets.

Separate signal keys may be provided when required with any set.

1A KEY TELEPHONE SYSTEM
FEATURE COMBINATIONS
SEPARATE KEYS

LEVER TYPE KEYS

2 POSITION KEY — FEATURES: PICKUP 2 LINES (CENTRAL OFFICE, PBX OR INTERCOMMUNICATING LINES)

3 POSITION KEY — FEATURES: PICKUP 3 LINES (CENTRAL OFFICE, PBX OR INTERCOMMUNICATING LINES)

OTHER KEYS

4 BUTTON

P P P S

(HOLDING)

H P P P

5 BUTTON

P P P P P

6 BUTTON

P P P P P P

P P P P P S

P P P P P C

P P P P S C

(HOLDING)

H P P P P P

H P P P P S

H P P P P C

H P P P S C

CODES:
H = HOLD
P = PICKUP
S = SIGNAL
C = CUT-OFF

NOTE: Additional Signal Keys may be installed separate from the above keys when required.

2A KEY TELEPHONE SYSTEM

INDEX

Page

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   1.11 General 1
   1.12 Loud Speaker - Microphone Set 1
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      1.123 Volume Control Switch 2
      1.124 Talking and Signal Control Switch 2
      1.125 Pilot Lamp 3
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   1.2 Secondary Station 3

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EXHIBIT E1

2A KEY TELEPHONE SYSTEM

0. INTRODUCTION

The 2-A Key Telephone System provides for an intercommunicating service which employs a loud speaking receiver and distant talking transmitter combined in a cabinet known as The Loudspeaker-Microphone Set at one location for direct communication on a single intercommunicating path to one or more locations.

This service is used in connection with 1-A Key Telephone Systems only.

The loudspeaker-microphone set is known as the "Master Station" and the other telephone stations known as the "Secondary Stations." These terms are used throughout the paragraphs which follow for convenience in describing the system.

1. APPARATUS

1.1 Master Station

1.11 General

The apparatus provided for use at the master station includes the following:

a. A cabinet containing the loudspeaker-microphone set, buzzer, control switches and associated apparatus.

b. An amplifier mounted in a small metal housing and equipped with a cord and plug for connection to a power outlet.

c. Transfer key for switching the telephone set associated with the master station to the intercommunicating line.

1.12 Loud Speaker-Microphone Set

The loudspeaker-microphone set is housed in an attractive walnut veneer cabinet, approximately 9" long, 6" deep and 6 1/2" high. Openings are provided in the front side, and rear panels, which are covered inside with a fabric which harmonizes with the finish of the cabinet and serves to exclude dirt and dust from the interior. The base is equipped with four cushioned feet to facilitate its use on a customer's desk or table.

2A KEY TELEPHONE SYSTEM - (Cont'd)

1.121 Types of Sets

Two types of loudspeaker-microphone sets are provided, namely, "Locking" and "Non-Locking," depending upon the wiring arrangement of the talking and signal control switch at the master station. (See 1.24)

1.122 Face Equipment of Cabinet

The face equipment of the cabinet includes a volume control switch, a talking and signal control switch and the set is also equipped with a pilot lamp with a red lamp cap. The switches are of the rotary type and are equipped with "bar type" knobs.

1.123 Volume Control Switch

The volume control switch furnished to control the loud speaker volume, has three positions, designated "HIGH," "MEDIUM," and "LOW."

1.124 Talking and Signal Control Switch

The talking and signal control switch is located in the face of the loud speaker microphone cabinet and is used to originate a call from the master station to a secondary station, and except in those cases where "Voice Signaling" is used, (See 2.5) it must be operated to the talk position before the loud speaker-microphone set can be used to carry on a conversation. The switch has three positions designated according to its three functions, namely, "TALK," "OFF," and "SIGNAL."

In the "Non-Locking" type set the names of the switch positions are arranged from top to bottom in the order mentioned. The "OFF" position is in the center and the switch is arranged to return to the central or "OFF" position automatically. To signal, the pointer of the switch is turned down, and to talk, the pointer must be turned upwards and held in that position. When the conversation is completed, the switch is released and returns to the "OFF" position.

In the "Locking" type set the three positions of the switch are arranged to read from top to bottom "SIGNAL", "TALK," and "OFF". The switch in this case locks in the "TALK" and "OFF" positions. The pointer, when turned to "SIGNAL" and released returns to the "TALK" position automatically.

2A KEY TELEPHONE SYSTEM - (Cont'd)

1.125 Pilot Lamp

A pilot lamp with a red cap, is provided on the locking type sets to serve as a reminder that the loudspeaker-microphone set is energized. This is necessary as the switch locks in the talk position and conversations in the vicinity of the set could be overheard at the secondary station. The pilot lamp does not operate, however, unless the receiver at the secondary station is removed from the receiver hook.

1.126 Amplifier

The amplifier employs a Raytheon type tube which combines the functions of a rectifier and a single stage amplifier. The tube and its associated equipment are mounted in a subscriber set housing which is furnished with a 6-foot rubber covered cord and a plug for connection to a standard convenience outlet. A cord switch is also furnished as a part of this cord to control the power supply to the amplifier.

The subscriber furnishes the commercial power and outlet.

1.127 Master Station Transfer Key

This key will be furnished when it is desired to switch the telephone set to the intercommunicating line in place of the loudspeaker-microphone set. It is a two-position lever type key. The Transfer Key is used at the master station only.

1.128 Telephone Set

When the transfer key is provided at the master station, a regular telephone set may be used on the intercommunicating line. If it is desired to utilize the same telephone instrument for central office or PBX lines a 1-A key telephone of the one, two or four button type is used. The 2-A Key Telephone service is designed to be used in connection with 1-A Key Telephone Systems only.

1.2 Secondary Station

The apparatus at the secondary station may be either a telephone set for use on the intercommunication line only or where connection to central office or PBX lines is also desired, a 1-A key telephone of the turn or push button type is used.

2A KEY TELEPHONE SYSTEM - (Cont'd)

The maximum number of secondary stations is the same as for any 1-A key telephone system. The loudspeaker microphone telephone set at the master station counts as one telephone.

2. OPERATION

2.1 General

Since the commercial power must be turned "On" about 20 seconds before the amplifier is ready for use, the amplifier switch is left in the ON position during office hours. At other times the power should be turned off.

2.2 Master Station

To originate a call from the master station to a secondary station the talking and signal key is operated first to the "SIGNAL" position and then to the "TALK" position. If a non-locking key is used it must be held in the "TALK" position during conversation. Additional secondary stations may be signaled by means of a separate push button pad or by code signaling with the talking and signal key where this method would meet the customer's requirements.

2.3 Secondary Station

A secondary station may originate a call to the master station by connecting the station to the intercommunicating line and signaling by push button or automatic signaling. Only one secondary station may be equipped to signal automatically.

2.4 Conference Connections

Where the master station is equipped with a transfer key it may originate conference connections with secondary stations by using the associated telephone set. The use of the loudspeaker microphone for this purpose may be unsatisfactory from the standpoint of transmission.

2.5 Voice Signaling

Voice signaling is a term used to describe a wiring arrangement which permits the master station to receive messages from a secondary station even though the signal control switch at the loudspeaker-microphone set is in the "OFF" position.

Only a one-way conversation is possible under this plan and it is necessary for the master station to operate the signal control switch to the

2A KEY TELEPHONE SYSTEM - (Cont'd)

"TALK" position to reply to the secondary station. This plan would appear to be of value where the master station was located in a store room or file room where a reply was unnecessary.

Should a transfer key be used at the master station it may be advisable to provide for buzzer signaling in the event the key should inadvertently be turned to cut off the loudspeaker-microphone set.

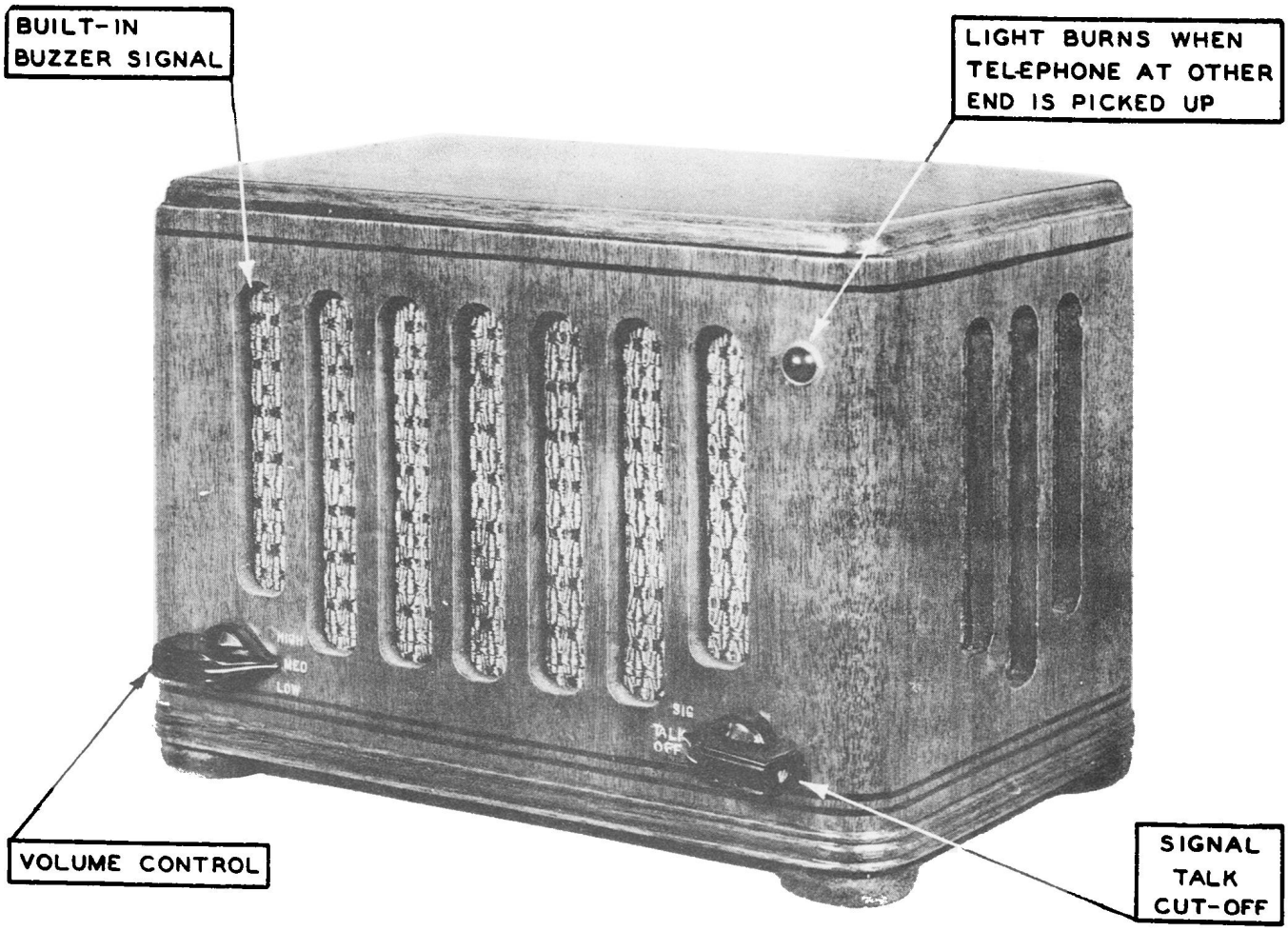
3. SALES AND MARKET CONSIDERATIONS

Broadly speaking, there seems to be two types of use for 2-A Key Telephone system. One would be for intercommunication between an executive using the loudspeaker-microphone set, and his secretary or office assistants. The other would be where the loudspeaker-microphone set would be at some such location as a stockroom or file room where it is desired to talk to people nearby or summon them to the telephone.

It would not seem advisable to make a special canvass in connection with this service; instead, it seems preferable to discuss it during the normal coverage of the business market where it fits customers' particular needs or where they express interest in this type of service.

It should be kept in mind that the 2-A key system has been developed for intercommunication as a feature of regular telephone service rather than for the purpose of entering the market for intercommunicating equipment, not involving connection with regular telephone service.

2-A KEY TELEPHONE SYSTEM



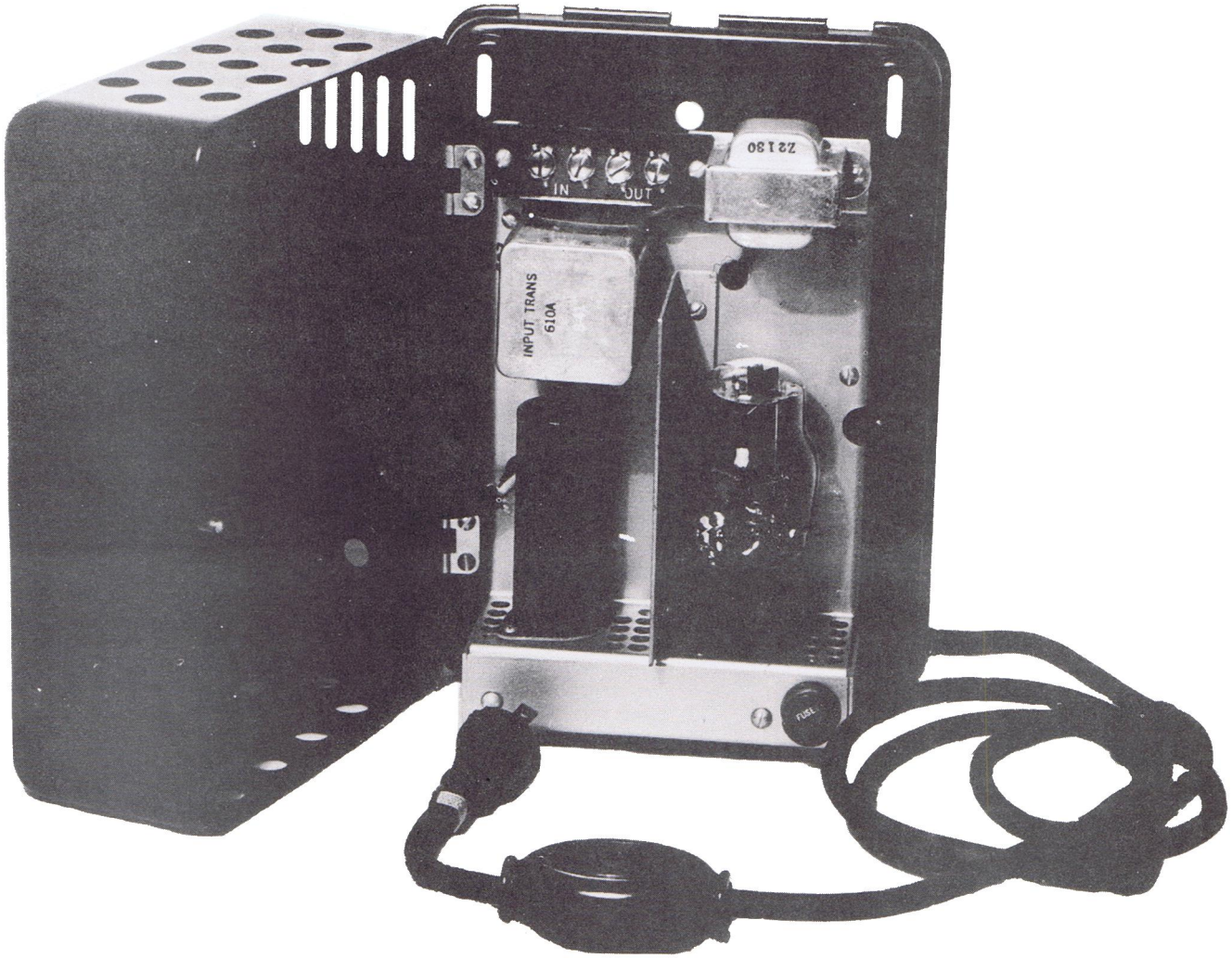
LOUD SPEAKER AND DISTANT TALKING MICROPHONE

External View

Dimensions
Height - 6-1/2"; Width - 9"; Depth - 6"

Finish
Walnut Veneer

2-A KEY TELEPHONE SYSTEM



112-A AMPLIFIER

Dimensions

Height - 9-3/16"; Width - 6-3/4"' Depth - 3-5/8"

SECTION 1 - GENERAL CONSIDERATIONS

SECTION 2 - MANUAL CORDLESS SWITCHBOARDS - 506-A and 506-B

SECTION 3 - MANUAL NON-MULTIPLE CORD SWITCHBOARDS - 551-A and 551-B

SECTION 4 - MANUAL MULTIPLE CORD SWITCHBOARD - 551-D

SECTION 5 - MANUAL MULTIPLE CORD SWITCHBOARD - 605-A

*SECTION 6 - KEY STATION DIAL SYSTEMS - 750-A and 755-A

*SECTION 7 - DIAL SYSTEM WITH CORDLESS SWITCHBOARD - 740-C

*SECTION 8 - DIAL SYSTEM WITH CORDLESS SWITCHBOARD - 740-B

*SECTION 9 - DIAL SYSTEM WITH CORDLESS SWITCHBOARD - 740-A

*SECTION 10 - DIAL SYSTEM WITH MANUAL NON-MULTIPLE CORD SWITCHBOARD - 740-AX

*SECTION 11 - DIAL SYSTEM WITH MANUAL NON-MULTIPLE OR MULTIPLE CORD SWITCHBOARD - 701-A

*SECTION 12 - DIAL SYSTEM WITHOUT ASSOCIATED SWITCHBOARD - 711-A

*SECTION 13 - TELEPHONE SECRETARIAL SWITCHBOARDS

*SECTION 14 - TIE LINES

*SECTION 15 - CONFERENCE EQUIPMENT FOR PBX's

*SECTION 16 - PARTY LINE SERVICE ON DIAL PBX's

*SECTION 17 - NIGHT TERMINAL SERVICE

*These Sections to be added or revised at a later date

GENERAL CONSIDERATIONS

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2. BATTERY SUPPLY..... 1

3. RINGING CURRENT..... 1

4. OPERATORS' CHAIRS..... 2

5. PLATFORMS FOR TWO-POSITION 80-LINE AND 320-LINE NON-MULTIPLE SWITCHBOARDS..... 2

6. SALES AND MARKET CONSIDERATIONS..... 2

EXHIBITS

Miscellaneous Data Involving PBX Equipment.... E-1

GENERAL CONSIDERATIONS

TYPES OF SYSTEMS

PBX systems are either of the manual or dial type. They are suitable for use in common battery manual or dial central office areas and are available for installations of any size.

The standard switchboards for manual and dial type systems are described in the following sections in this Part. There are other switchboards not included in our supply catalogue now in service which will be reused where practicable. They are listed on Page E-1 of this Section.

2. BATTERY SUPPLY

Battery supply for operation may be provided as follows:

For manual systems and for dial systems of the 750-A and 755-A type.

1. By direct battery circuit from the central office.
2. By local storage battery on the customer's premises charged by battery circuit from the central office.
3. By battery circuit from a centralized building storage battery plant.
4. By local storage battery and charging apparatus on the customer's premises, in which case the necessary power outlets and power supply are furnished by the customer.

For dial systems other than the 750-A and 755-A type from the power plant associated with the mechanical equipment.

3. RINGING CURRENT

Supplementing the hand generator furnished with every switchboard, ringing current may be provided as follows:

For all switchboards and for 750-A and 755-A systems:

1. By generator (ringing) circuit from the central office.
2. By installing on the customer's premises a generator which furnishes ringing current only, in which case the necessary power outlets and power supply are furnished by the customer.

3. RINGING CURRENT (Cont'd)

For calls handled through the dial equipment of dial systems with the exception of 750-A and 755-A systems:

1. By the power plant associated with the dial equipment.

4. OPERATORS' CHAIRS

Operators' chairs, of the type used for central office operators, are required for use of PBX attendants at multiple and at two-position 80-line and 320-line non-multiple switchboards. In these instances the chairs are provided at the time of installation of the service without the need of a notation on the service order.

5. PLATFORMS FOR TWO-POSITION 80-LINE AND 320-LINE NON-MULTIPLE SWITCHBOARDS

Platforms, the size of the base of a two-position 80-line or 320-line (551-B) non-multiple switchboard, are provided to raise the switchboards to a sufficient height (6") to permit the use of longer cord pairs. Long cord pairs, that is, cord pairs longer than the standard length used on these one-position non-multiple switchboards, are required to permit of reaching the station jacks in the section of switchboard adjacent to that section with which the cord pairs are associated. Longer cords are not required when a section is added to a 40-line (551-A) switchboard, therefore no platform is provided.

6. SALES AND MARKET CONSIDERATIONS

Manual and dial PBX systems are designed for customers whose demand for telephone service requires a large number of telephones connected to a central system which may perform the function either of routing incoming calls to particular telephones, interconnecting these telephones, or connecting them to trunks which connect the system to the central office or other PBX systems. With the exception of the 750-A and 755-A dial systems, an attendant (or attendants) employed by the customer is required to operate the switchboard.

Some general considerations in the application of manual PBX systems as compared to dial PBX systems are as follows:

Manual: Manual PBX systems meet the requirements of most businesses having a need for PBX service. However, the attendant is required to handle all types of calls, i.e., incoming, outgoing and intercommunicating. Therefore, in large businesses where the volume of intercommunicating and outgoing traffic is a considerable factor, dial type service may be required to render a satisfactory grade of service.

6. SALES AND MARKET CONSIDERATIONS (Cont'd)

Dial: Connections between stations, i.e., intercommunicating calls and outgoing calls, may be established mechanically with a dial PBX system, thus eliminating the necessity of the attendant's handling these calls. When the volume of this type of traffic is high, dial PBX service gives the customer a better grade of service, particularly during peak hours, than can generally be given with manual PBX service.

Since the attendant handles only incoming and special outgoing calls a lesser number of attendants are required, thus saving in operating costs may be effected over a manual PBX system. Further, 24-hour service on outgoing and intercommunicating calls can be obtainable from any telephone on the system without an attendant being on duty.

A comprehensive survey is essential, however, before it can be determined this service is the most suitable to the customer's needs.

Another important consideration in the sale of PBX service is the location of the switchboard, and the following points should be kept in mind:

1. Switchboards should be placed in quiet locations to assist attendants in giving undisturbed attention to their operation.

2. Locations should be chosen that are properly ventilated and heated as this has a direct bearing on the health and comfort and, consequently, the efficiency of attendants.

3. Adequate light is very important and should be, if practicable, a diffused light obtained by indirect methods rather than a light focused directly upon the switchboard.

4. The switchboard should be placed to give adequate space from walls or partitions for efficient operation and easy access to the switchboard by the attendant.

MISCELLANEOUS DATA INVOLVING PBX EQUIPMENT

	Code	Capac. Trunks	Capac. Station Lines	Capac. Cord Pairs or Conn. Paths	Finish	Height	Dimensions Width	Depth
MANUAL CORDLESS SWITCHBOARDS								
3 Trunks and 7 Stations	505-C	3	7	5	Oak, Mahogany	1'2-3/8"	1'5-1/8"	1'3-5/8"
	*506-A	3	7	5	Oak, Mahog.-Walnut	1'2-3/8"	1'5-1/4"	1'3-3/8"
5 Trunks and 12 Stations	*506-B	5	12	5	Oak, Mahog.-Walnut	1'2-3/8"	2'-11/16"	1'3-3/8"
MANUAL NON-MULTIPLE CORD SWITCHBOARDS								
40 Lines or less	550-C	10	30	10	Oak, Mahogany	3'10-1/4"	2'2-1/2"	2'5-1/4"
	*551-A	10	40	10	Oak, Mahog.-Walnut	3'10"	2' -1/2"	2'5-3/8"
41 to 80 Lines	550-C	15	80	15	Oak, Mahogany	4'1"	2'4-1/8"	2'7-1/4"
	*551-B	15	80	15	Oak, Mahog.-Walnut	4'3-3/16"	2'2-7/8"	2'10-1/2"
Over 80 Lines	550-C	15	320	15	Oak, Mahogany	4'3-13/16"	2'4-3/4"	2'11-7/8"
	*551-B	15	320	15	Oak, Mahog.-Walnut	4'3-3/16"	2'2-7/8"	2'10-1/2"
MANUAL MULTIPLE CORD SWITCHBOARDS								
Over 80 Lines	*551-D	**30	**420	15	Oak, Mahog.-Walnut		See Note	
	600-C	120	640	15	Oak, Mahogany		" "	
	*605-A	80	1360	15	Mahogany-Walnut		" "	
DIAL SYSTEMS								
CORD SWITCHBOARDS								
79 Lines or less (740-AX)	*552-A	#	79	15	Oak, Mahog.-Walnut	4'3-3/16"	2'2-7/8"	2'10-1/2"
300 Lines or less (1 position non-multiple)(701-A)	*552-A	#	300	15	Oak, Mahog.-Walnut	4'3-3/16"	2'2-7/8"	2'10-1/2"
420 Lines or less (multiple)(701-A)	*552-D	#	**420	15	Oak, Mahog.-Walnut		See Note	
Over 420 Lines (multiple)(701-A)	*605-A	#	1600	15	Mahogany-Walnut		" "	
CABINET TYPE SWITCHBOARDS								
38 Lines or less (740-B)	-	10	38	##	Mahogany-Walnut	12-1/16"	1'3-5/16"	12-9/16"
38 Lines or less (740-C)	-	4	38	##	" "	10-3/16"	1'2-5/8"	10-3/16"
88 Lines (740-A)	-	19	###88	##	" "	12-1/16"	1'3-5/16"	12-9/16"
SUBSIDIARY SYSTEMS								
No Switchboard Involved-710-C System Used with 700-C Mechanical Equipment	-	-	***	##	-		- -	
No Switchboard Involved-711-A System Used with 701-A Mechanical Equipment	-	-	***	##	-		- -	
KEY EQUIPMENT								
No Switchboard Involved (750-A)	-	2	8	2	-		- -	
No Switchboard Involved (750-A)	-	3	15	3	-		- -	
No Switchboard Involved (755-A)	-	2	8	2	-		- -	
No Switchboard Involved (755-A)	-	3	15	3	-		- -	
No Switchboard Involved (755-A)	-	4	20	3	-		- -	

* Standard equipment - other types are in service and will be reused where practicable.

** When trunk capacity is between 31 and 60 inclusive, the station line capacity is 300.

*** Customer's requirements.

Trunk capacity in the switchboard depends upon the answering jack space and the number of jacks per strip.

Connecting paths dependent upon amount of switching equipment provided.

The station line capacity is reduced by 10 for each group of 10 or less tie lines provided. The sum of the trunks and tie lines cannot exceed 19.

NOTE: Due to the varying dimensions of multiple type private branch exchange equipment and since the type of equipment to be used on each installation is influenced by the supply situation and other factors, dimensions should not be given to customers until the equipment for each installation has been decided upon. Where requests for dimensions of equipment are received the matter should be reviewed with the General Engineering Department before any information is furnished.

MANUAL CORDLESS SWITCHBOARDS

506-A AND 506-B

Page

1. APPLICATION..... 1

2. DESCRIPTION..... 1

3. CAPACITY..... 1

4. OPERATION..... 2

5. NIGHT CONNECTIONS..... 2

EXHIBITS

Switchboard 506-A Type..... E-1

Switchboard 506-B Type..... E-1A

Switchboard Diagram..... E-2

MANUAL CORDLESS SWITCHBOARDS
506-A AND 506-B

1. APPLICATION

This type of PBX system, which can be operated by a typist or clerk along with other duties, is suitable for small offices or factories where other types of switchboards would be too large. It is designed for use in common battery manual and dial central office areas.

2. DESCRIPTION

These switchboards are of the single position turret type and because of their small size are designed to be mounted on a desk or table. All the equipment necessary for operation of this type of PBX (with the exception of local battery where required) is housed within the switchboard cabinet and is accessible through the hinged front and removable cover.

These switchboards are available in oak or mahogany-walnut finish. Special finishes can be provided on request and the additional charge will be based on cost.

On the face panel of the switchboard (see Page E-2 of this section) are three rows of keys with one key in each row associated with each central office trunk, each PBX station line and the attendant's set. Associated with the keys is a row of visual signals, of the drop type in connection with the trunks, and of the shutter type in connection with the PBX station lines. Shutter type signals also are associated with the connecting paths for supervisory purposes. A buzzer is provided which can be connected with the visual signals when an audible signal is desired.

A standard desk or hand telephone may be provided for use of the attendant. In dial system central office areas this instrument is equipped with a dial. When through central office dialing is desired, stations requiring this service must be equipped with dials.

3. CAPACITY

Cordless switchboards are available in two capacities - 7-line (506-A) and 12-line (506-B). (See Page E-1 and E-1A of this section.) The 7-line switchboard permits a maximum of three central office trunks and 7 PBX station lines, and the 12-line switchboard a maximum of 5 central office trunks and 12 PBX station lines. The attendant's telephone is not considered as a station.

Both of these cordless switchboards are arranged for a maximum of 5 simultaneous connections. The 12-line switchboard should be provided only where the intercommunicating calling rate is relatively

3. CAPACITY (Cont'd)

low, since paths for intercommunication are available only to the extent the trunks are not in use.

4. OPERATION

Connections between PBX station lines or between PBX station lines and trunks are established by placing in the same position two properly associated keys that are in the same row, as follows:

(a) Two keys operated upward in the first or top row.

(b) Two keys operated downward in the first or top row.

(c) Two keys operated upward in the second or middle row.

(d) Two keys operated downward in the second or middle row.

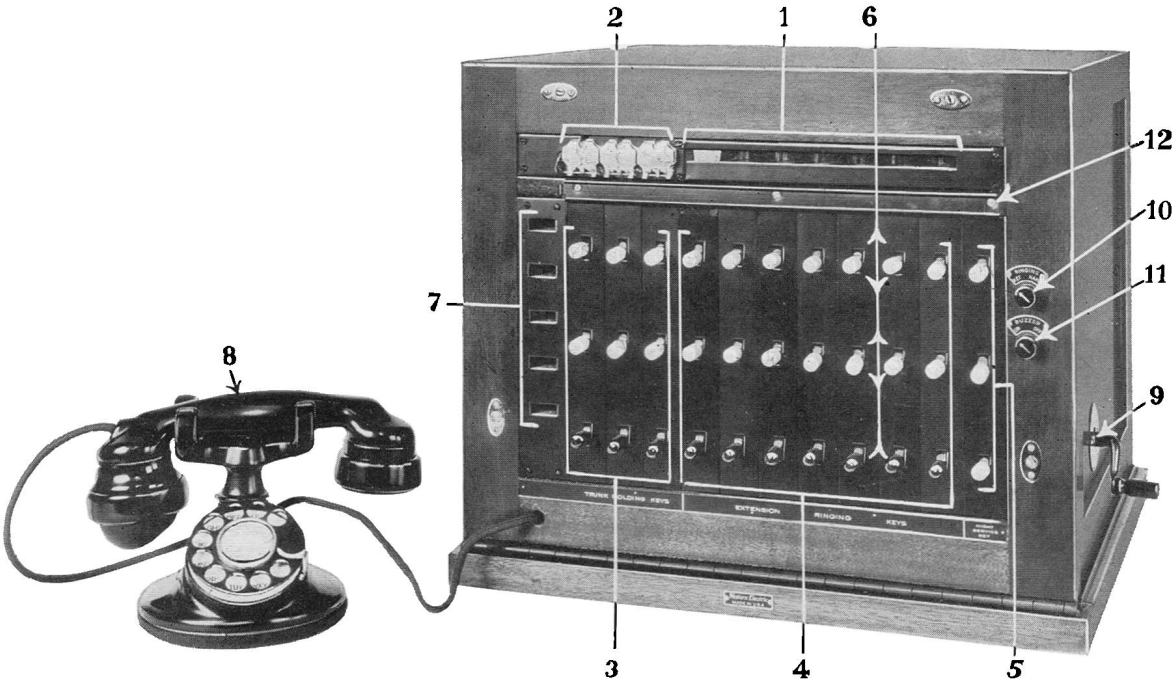
(e) Two keys operated upward in the third or bottom row.

Lowering a trunk key in the bottom row holds the trunk. Lowering a station key in the bottom row rings the station. Lowering the key in the bottom row, associated with the attendant's telephone, cuts off all supervisory signals and allows night connections to be put up. (See Page E-2 of this Section.)

5. NIGHT CONNECTIONS

Night connections are provided between central office trunks and station lines through the operation of trunk keys, station line keys and the lower key associated with attendant's telephone. (See Page E-2 of this Section.)

Manual Cordless P. B. X. Switchboard



506-A Type

Dimensions

	506-A Type	506-B Type
Height	1′ 2-3/8″	1′ 2-3/8″
Width	1′ 5-1/4″	2′ 11/16″
Depth	1′ 3-3/8″	1′ 3-3/8″

Finish—Oak or Walnut

Capacity

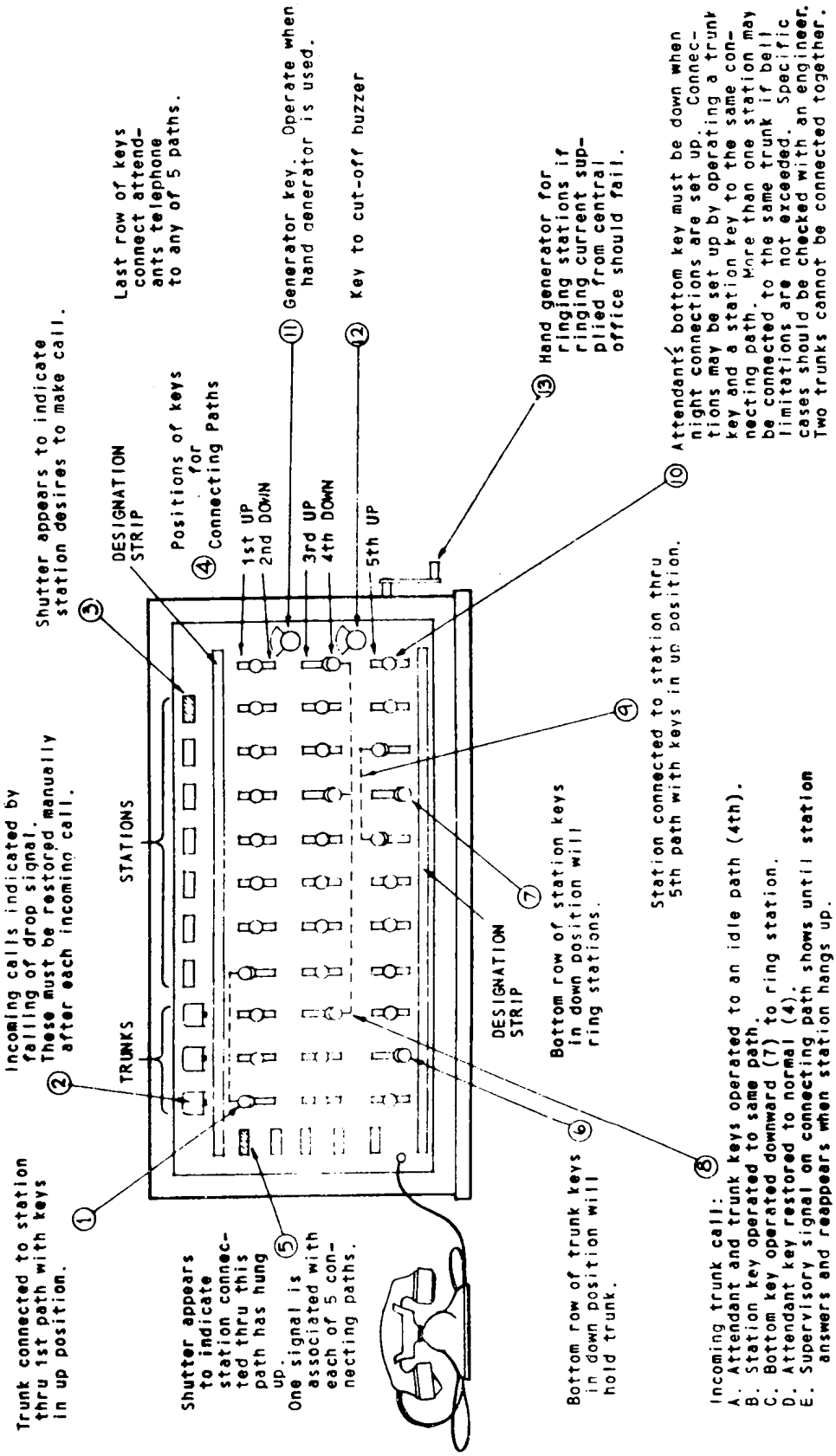
506-A Type	506-B Type
3 Trunks	5 Trunks
7 Lines	12 Lines

Operating Parts

1. Station signals
2. Trunk signals
3. Trunk keys
4. Station keys
5. Talking keys
6. Connecting paths
7. Supervisory signals
8. Attendant's telephone set
9. Hand generator
10. Hand generator key
11. Buzzer key
12. Designation strip

CORDLESS PBX SWITCHBOARD

Showing examples of various types of connections



MANUAL NON-MULTIPLE CORD SWITCHBOARDS

551-A AND 551-B

Page

1. APPLICATION..... 1

2. DESCRIPTION..... 1

3. TRANSFER KEYS..... 2

4. CAPACITY..... 2

5. OPERATION..... 3

6. NIGHT CONNECTIONS..... 3

EXHIBITS

Switchboards 551-A and 551-B..... E-1

Key Shelf Diagram..... E-2

MANUAL NON-MULTIPLE CORD SWITCHBOARDS
551-A AND 551-B

1. APPLICATION

Non-multiple cord switchboards provide a wider range of service than is possible to obtain with the manual cordless switchboard and cover in general the field of service between the latter type and the manual multiple switchboards. This type of PBX meets the needs of customers who have fairly extensive telephone business requiring the sorting and distributing of trunk and tie line calls and the handling of considerable intercommunicating traffic. Other features, not exclusive to this type of service, however, are definite control of station use, personal service and assistance to users, and the opportunity to provide uniform handling of the customer's telephone business.

The 40-line (551-A) boards are designed for ordinary business offices, stores or manufacturing establishments starting with service requirements not apt to expand beyond the board's capacity.

The 80-line (551-B) board meets the requirements of businesses similar to those mentioned above, but which have a present or future need for a larger number of station lines and trunks.

The 320-line (551-B) board is naturally limited to installations where there is a large number of stations with a rather low calling rate, such as hotels or large factories or plants with a large number of infrequently used stations.

These switchboards are arranged for operation in common battery manual or dial central office areas.

2. DESCRIPTION

The cabinet is of compact design arranged to present a neat appearance and to harmonize with standard office equipment. (See Page E-1 of this Section.) The standard finishes are light oak or mahogany-walnut. If other finishes are desired, the charge will be based on cost.

To permit access to the equipment from the rear, the back of the switchboard should be at least 30 inches from the wall. Likewise, a space of 30 or more inches should be allowed in front of the switchboard for seating space for the attendant.

The design of these switchboards is such as to permit the use of an additional section where the traffic load exceeds that which can be handled conveniently by a single attendant. In this case

2. DESCRIPTION (Cont'd)

the sections of the 80-line and 320-line (551-B) switchboard are mounted on a platform in order to provide space for the longer cords required. A platform is not required when a section is added to a 40-line (551-A) switchboard as longer cords are not necessary.

On the face panel of the switchboard there are several rows of jacks (depending upon the equipped capacity) associated with the central office trunks and stations. On the 40- and 80-line boards, the station line jacks are installed in strips of ten each, while on the 320-line board they are installed in strips of twenty each. Trunk jacks are always installed in strips of ten each. Associated with each jack there is a lamp signal and associated with the lamp signals there is a common buzzer which may be disconnected by the attendant when an audible signal is not desired.

On the key shelf there are a number of pairs of plug-ended cords and associated with each pair there are two supervisory lamp signals and two keys. (See Page E-2 of this Section for description of the lamp and keys.)

If the board is connected to a dial office, a dial is mounted on the key shelf. When through central office dialing is desired, the local (extension) stations requiring this service must be equipped with dials.

Either a chest transmitter set, an arm transmitter with head band receiver or an attendant's hand set may be used as the attendant's operating set. Generally the chest transmitter set is most conducive and the hand set least conducive to operating efficiency.

3. TRANSFER KEYS

Transfer keys are used in connection with two-position non-multiple cord switchboards to enable the attendant at the primary position to connect her set to the cord pairs of the other position. The primary position, or the position that is occupied most of the time, is the only one equipped with a transfer key. The key is usually mounted to the left of the key shelf.

4. CAPACITY

The 551-A and 551-B switchboards have the following capacities:

Size	No. of Panels	Trunk Lines	Station Lines	Cord Pairs
40-line	1	10	40	10
80-line	2	15	80	15
320-line	2	15	320	15

5. OPERATION

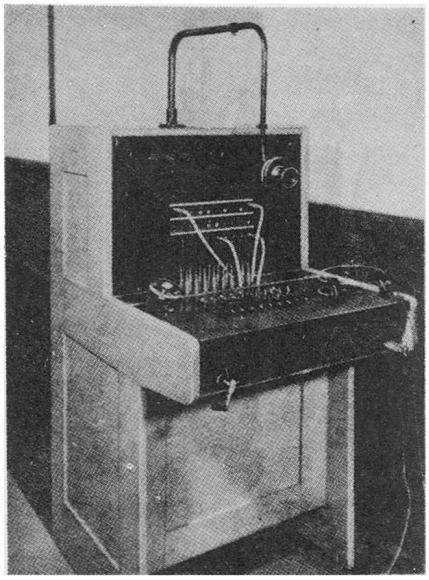
An incoming trunk or station call is indicated by the lighting of the line lamp associated with the trunk or station jack. Calls are answered or completed by means of the plug-ended cords which are inserted in the proper jacks by the attendant. The keys associated with the cord pairs are used for connecting the attendant's set to a trunk or station line and for ringing the stations. The signal is extinguished when the attendant plugs into the associated jack to answer the call. (See Page E-2 of this Section.)

When station telephones have been equipped with dials, the calling person merely asks the attendant for a trunk connection and proceeds to dial the desired central office number.

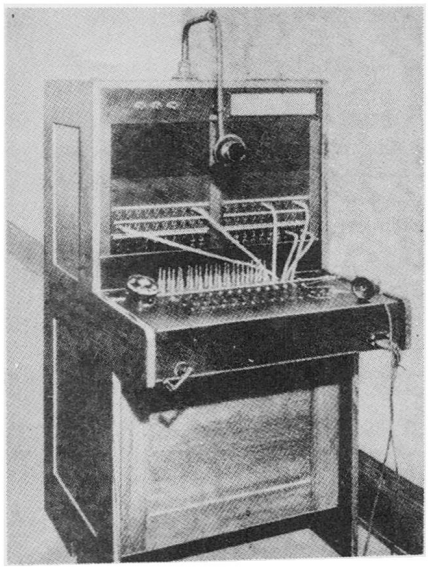
6. NIGHT CONNECTIONS

Night connections between central office trunks and station lines may be established through the regular switchboard cords and operating keys. Only one station line may be connected to a central office trunk. Therefore, the number of possible night connections is limited by the number of trunks. (See Page E-2 of this Section.)

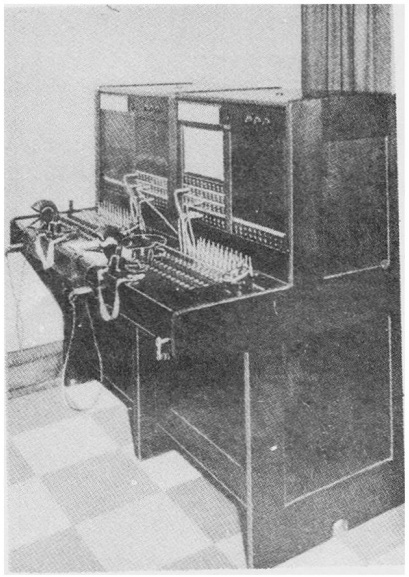
Nos. 551-A AND 551-B P. B. X.'s



No. 551-A
40-LINE MANUAL NON-MULTIPLE
CORD SWITCHBOARD
Dimensions:
Height—3' 10" Width—2' ½"
Depth—2' 5⅛"
(Including 1' 3" Keyshelf)
Finish:
Light Oak or Mahogany-Walnut

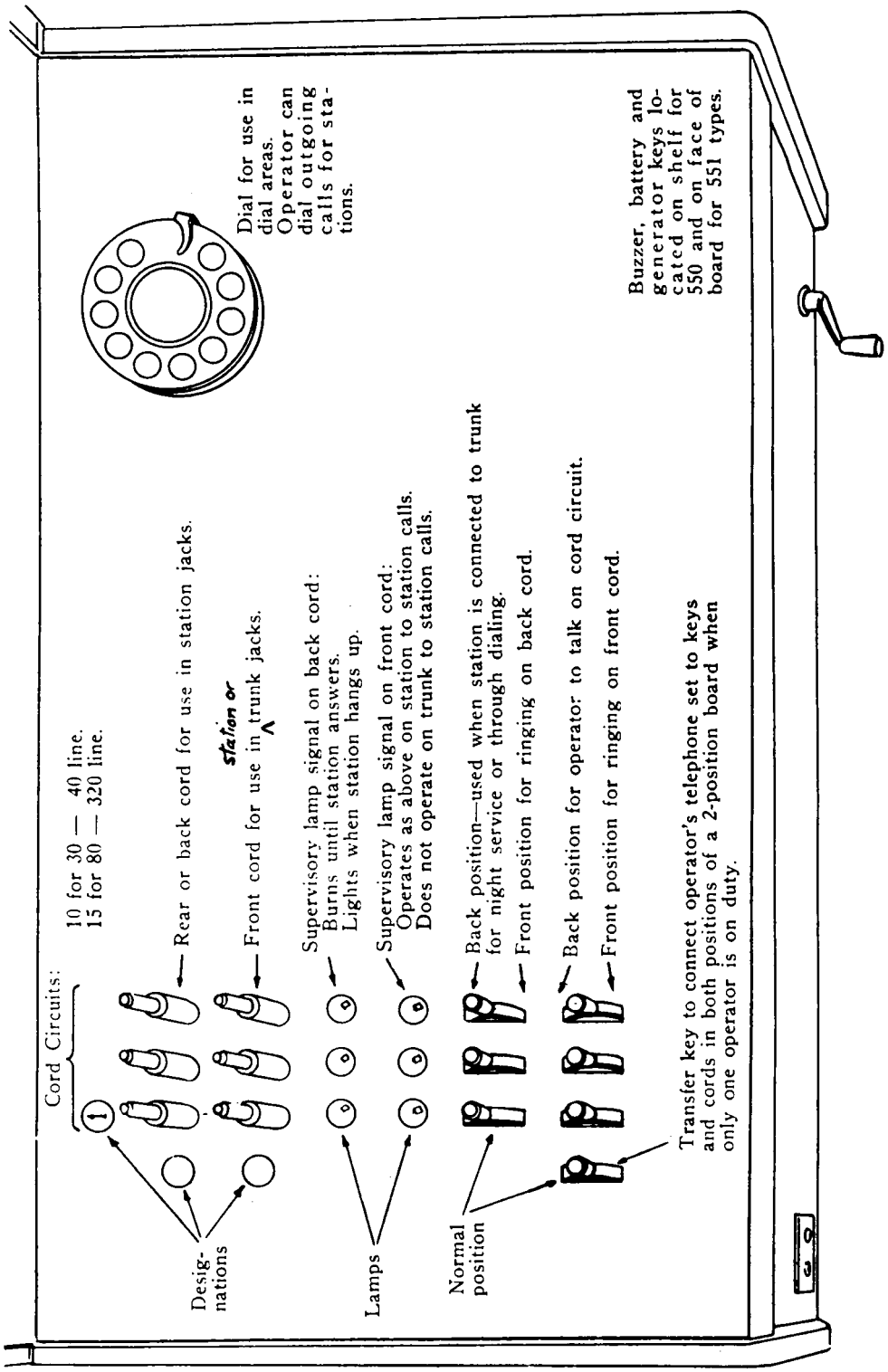


No. 551-B
80- OR 320-LINE MANUAL NON-MULTIPLE
CORD SWITCHBOARD
Dimensions:
Height—4' 3 3/16" Width 2' 2 7/16"
Depth—2' 10½"
(Including 1' 3" Keyshelf)
Finish:
Light Oak or Mahogany-Walnut



TWO POSITION 551-B, 80-LINE P. B. X.
Dimensions:
Height—4' 3 3/16" Width 4' 5¾"
Depth—2' 10½"
Finish:
Light Oak or Mahogany-Walnut

KEYSHELF
NON-MULTIPLE CORD SWITCHBOARD



MANUAL MULTIPLE CORD SWITCHBOARD

551-D

Page

1. APPLICATION..... 1

2. DESCRIPTION..... 1

3. CAPACITY..... 1

4. OPERATION..... 2

5. NIGHT CONNECTIONS..... 2

6. SPACE REQUIREMENTS..... 2

MANUAL MULTIPLE CORD SWITCHBOARD
551-D

1. APPLICATION

A multiple switchboard of the 551-D type can be used where the customer's initial and ultimate requirements come within the capacity of the system. It is particularly adaptable to situations where only three or four positions are required to properly handle the operating load and, due to the nature and operation of the customer's business, a dial system is not required.

In those cases where the customer's ultimate requirements are likely to exceed the capacity of the 551-D PBX within a period of five or six years, the 605-A multiple PBX system (described in Section 5) is recommended.

The 551-D switchboard may be used in either common battery manual or dial central office areas.

2. DESCRIPTION

These switchboards are composed of three to six positions and are arranged for a multiple appearance of central office trunks and PBX station lines so that each operator may have access to all lines. Station jacks are arranged in strips of twenty each, while trunk and tie line jacks in strips of ten.

The 551-D multiple switchboard is made up from standard non-multiple 551-B sections converted for multiple use. (See Part IV, Section 3, Page E-1.)

A distributing frame section is located at the originating end of the board. A storage battery cabinet, similar to that employed in non-multiple installations, is provided. The type of switchboard platforms that are furnished for two-position 551-B switchboards are also employed with the 551-D installations to accommodate the longer cords that are necessary on account of the long reach required with a three-panel arrangement of the face equipment. The outside woodwork of the 551-D board has the standard light oak or mahogany-walnut finish.

3. CAPACITY

The 551-D PBX has a nominal capacity of 30 central office trunks and 420 station lines. If more trunks are required they can be provided by reducing the station line capacity. An additional group of thirty or less trunks over the first 30 reduces the station line capacity by 120.

3. CAPACITY (Cont'd)

Each 551-D position (maximum six positions) has a capacity for 15 cord pairs, which is the same as the cord capacity of the 551-B non-multiple PBX. The station lines and trunks are arranged on a 3-panel multiple basis and as no head or foot sections are provided there are no end panels of multiple.

4. OPERATION

The method of operation of the 551-D multiple manual switchboard is similar to the non-multiple cord type switchboard. (See Part IV, Section 3, Page E-2.) Busy signal lamps are provided with each trunk jack to enable the attendant to readily determine when trunks are in use at other positions. So an attendant may know when a station line is in use at some other position, a busy test signal is provided with each station line jack. To receive this signal the attendant touches the tip of the station cord plug to the edge of the station line jack before fully inserting the plug. A click in her receiver will indicate that the line is busy.

5. NIGHT CONNECTIONS

Night connections between central office trunks and station lines may be established through the regular switchboard cords and operating keys. The first appearance of trunk jacks only are used for setting up night connections. Only one station line may be connected to a central office trunk. Therefore, the number of possible night connections is limited by the number of trunks. (See Part IV, Section 3, Page E-2.)

6. SPACE REQUIREMENTS

The amount of space required for the 551-D manual switchboard positions and associated equipment will, of course, depend upon the initial and ultimate position requirements. Therefore, each individual case should be worked out with the departments concerned to determine the space requirements.

MANUAL MULTIPLE CORD SWITCHBOARD

605-A

Page

1. APPLICATION..... 1

2. DESCRIPTION..... 1

3. CAPACITY..... 2

4. OPERATION..... 3

5. NIGHT CONNECTIONS..... 4

6. POWER PLANT..... 4

7. SPACE REQUIREMENTS..... 4

EXHIBITS

Switchboard 605-A Type..... E-1

Three Position Switchboard Diagram..... E-2

MANUAL MULTIPLE CORD SWITCHBOARD
605-A

1. APPLICATION

605-A manual multiple positions are designed to operate in common battery manual or dial central office areas. They are desirable for large installations where the bulk of calling is inward, while the station to station and outgoing calling rate is correspondingly low, as in large department stores, or where supervision of all calls is necessary as in hotels.

This type of switchboard with certain modifications is also used as the manual switchboard of a large 701-A dial PBX system.

2. DESCRIPTION

These switchboards are composed of three or more positions and are arranged for a multiple appearance of central office trunks and PBX station lines so that each operator may have access to all lines. (See Page E-2 of this Section.) Station jacks are arranged in strips of twenty each, while trunk and tie line jacks may be in strips of ten or twenty.

The multiple switchboard is a self-contained unit. (See Page E-1 of this Section.) In addition to the required operators' single position sections, a complete installation consists of a cable-turning section, head section, foot section, a distributing frame cabinet and usually a relay cabinet. The cable-turning section is only required when the distributing frame is not furnished adjacent to the head section.

An operator's position section is arranged in two panels. The keyboard equipment consists of the necessary cord pairs with the associated supervisory lamps and keys. A dial is provided for each position when the trunks terminate in a dial central office.

A head section and a foot section are provided in each installation of a 605-A PBX to obtain additional space for the face equipment and for mounting miscellaneous apparatus. The head section which adjoins and immediately precedes attendant's position No. 1 has the same general appearance as the attendant's single position section except that the face equipment is different and the key shelf is blank. The panel adjacent to the first position is equipped with a multiple of the station and trunk jacks in the second panel of the second position. This multiple is provided so that the attendant at the first regular position will have within her normal reach access to the entire multiple. Battery, night alarm, fuse alarm keys and the fuse alarm lamps are mounted in the other panel.

2. DESCRIPTION (Cont'd)

The foot section has the same general appearance as the head section, the panel adjacent to the last attendant's position being equipped with a multiple of the equipment in the first panel of the next to the last position so that the attendant at the last position will have access within her normal reach to the entire multiple. The other panel of the foot section is equipped with a blank flush panel.

Two types of distributing frames are available, an enclosed type designed to be placed at the head of the switchboard line-up and an open type arranged to be mounted on the floor away from the PBX switchboard. Central office and PBX station lines are terminated on the distributing frame. By means of cross connecting wires any station or trunk line may be associated with any station or trunk jack in the switchboard. The type of distributing frame to be installed depends upon the ultimate arrangement of the switchboard and the floor space available.

For use in certain cases where mounting space for additional miscellaneous apparatus is required, two types of relay racks are available, an enclosed type and one arranged for floor mounting without a cabinet casing. The enclosed type is designed to be located in the switchboard line-up but may be installed apart from the PBX.

The switchboard must be placed so that access may be had through the rear of each section where the equipment is housed. Also sufficient clearance should be provided in front of the board to permit satisfactory operation and free passage behind the attendants' chairs.

A chest transmitter set with single head receiver is provided for each attendant's position. Additional operators' sets for relief attendants will be furnished at an additional charge.

When it is desired in dial central office areas to restrict through central office dialing, stations without dials are provided. A buzzer is associated with station and trunk line lamps as an audible signal.

The 605-A sections are furnished in mahogany with walnut finish.

3. CAPACITY

The switchboard is made in two standard heights (6' 2" and 7' 3/8") and the maximum capacities are obtained by omitting the designation strips from the station multiple jacks. The arrangement of the station and trunk multiple is on a 4-panel basis. (See Page E-2 of this Section.) Capacities with three standard combinations

3. CAPACITY (Cont'd)

of trunks and station lines for the smaller board (explained subsequently) and additional information regarding similar capacities for the larger size are given in the following table:

TRUNKS AND TIE LINES		STATION LINE MULTIPLE	
10 Jacks Per Strip	20 Jacks Per Strip	With Designation Strips	Without Designation Strips
SMALLER UNIT			
120	240	1040	1520
80	160	1120	1680
40	80	1200	1840
LARGER UNIT			
120	240	1200	1760
80	160	1280	1920
40	80	1360	2080

The station line and trunk capacities are nominal and one may be increased at the expense of the other. In the case of the larger unit the capacities are based on the desirable vertical reach, approximately 30 inches above the key shelf. The jack panel opening of the larger unit is 34-1/2 inches and the space above the station lines may be used for miscellaneous equipment. In the smaller unit, the jack panel opening is 24-1/8 inches which does not permit of any appreciable variation in the nominal capacities.

For operating and circuit reasons not more than four appearances of the line lamps should be provided on any station line. For similar reasons not more than four appearances of the incoming trunk lamps should be provided.

4. OPERATION

The method of operation of the 605-A multiple manual switchboard is similar to the non-multiple type switchboard. (See Part IV, Section 3, Page E-2.) Busy signal lamps are provided with each trunk jack to enable the attendant to readily determine when trunks are in use at other positions. So an attendant may know when a station line is in use at some other position a busy test signal is provided with each station line jack. To receive this signal the attendant places the tip of the station cord plug to the edge of the station line jack before fully inserting the plug. A click in her receiver will indicate that the line is busy.

5. NIGHT CONNECTIONS

Night connections between central office trunks and station lines may be established through the regular switchboard cords and operating keys. Night jacks in addition to the regular trunk answering jacks are provided for establishing night connections. (See Page E-2 of this Section.) Only one station line may be connected to a central office trunk. Therefore, the number of possible night connections is limited by the number of trunks.

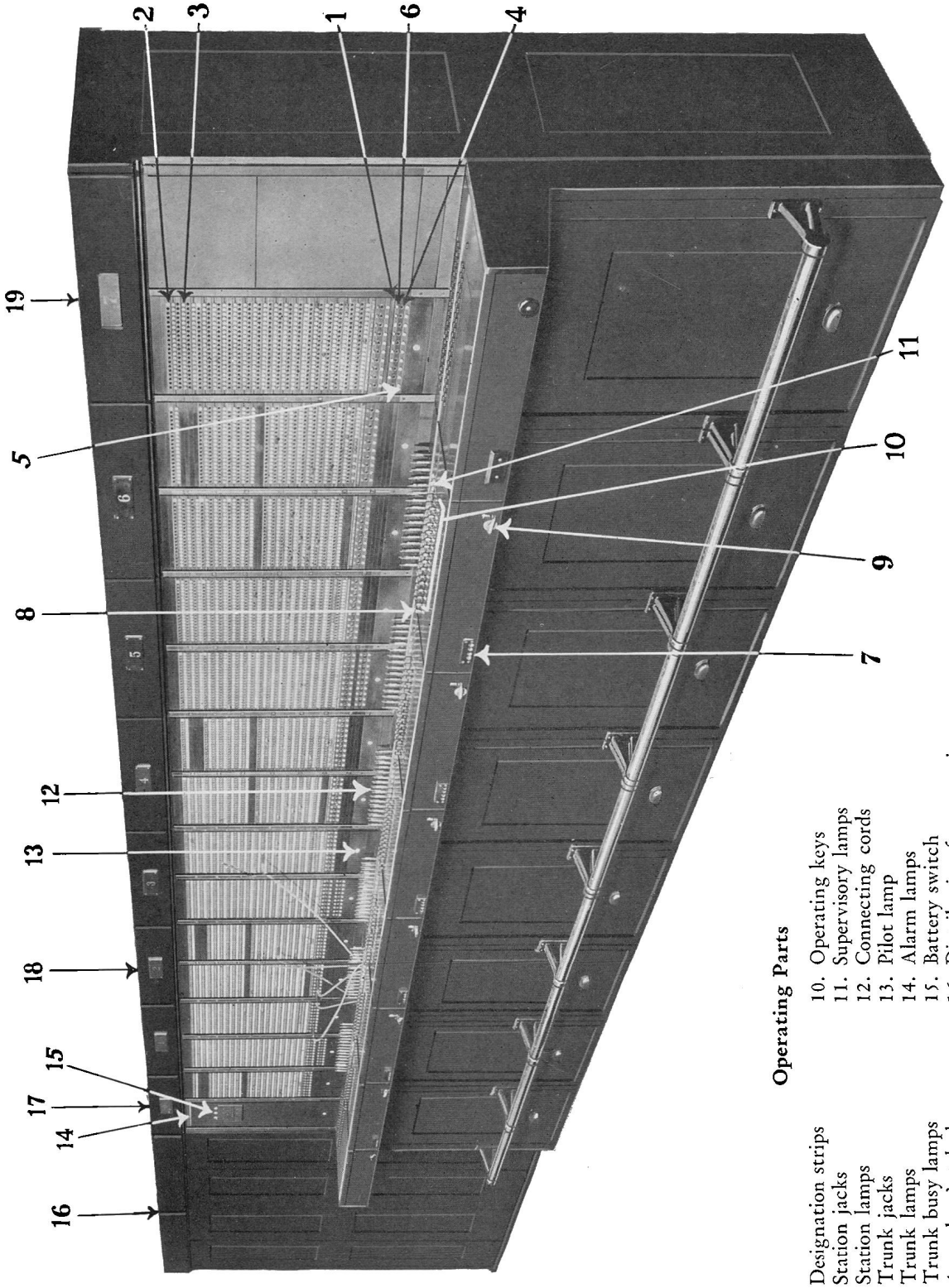
6. POWER PLANT

The power equipment will usually consist of a cabinet, together with the necessary control equipment and an enclosed type battery.

7. SPACE REQUIREMENTS

The amount of space required for the 605-A manual switchboard positions and associated equipment depends upon the initial and ultimate positions to be provided. Therefore, each individual case is worked out with the interested departments.

Manual Multiple Cord Type Switchboard



605-A Type

Dimensions
Vary with installation

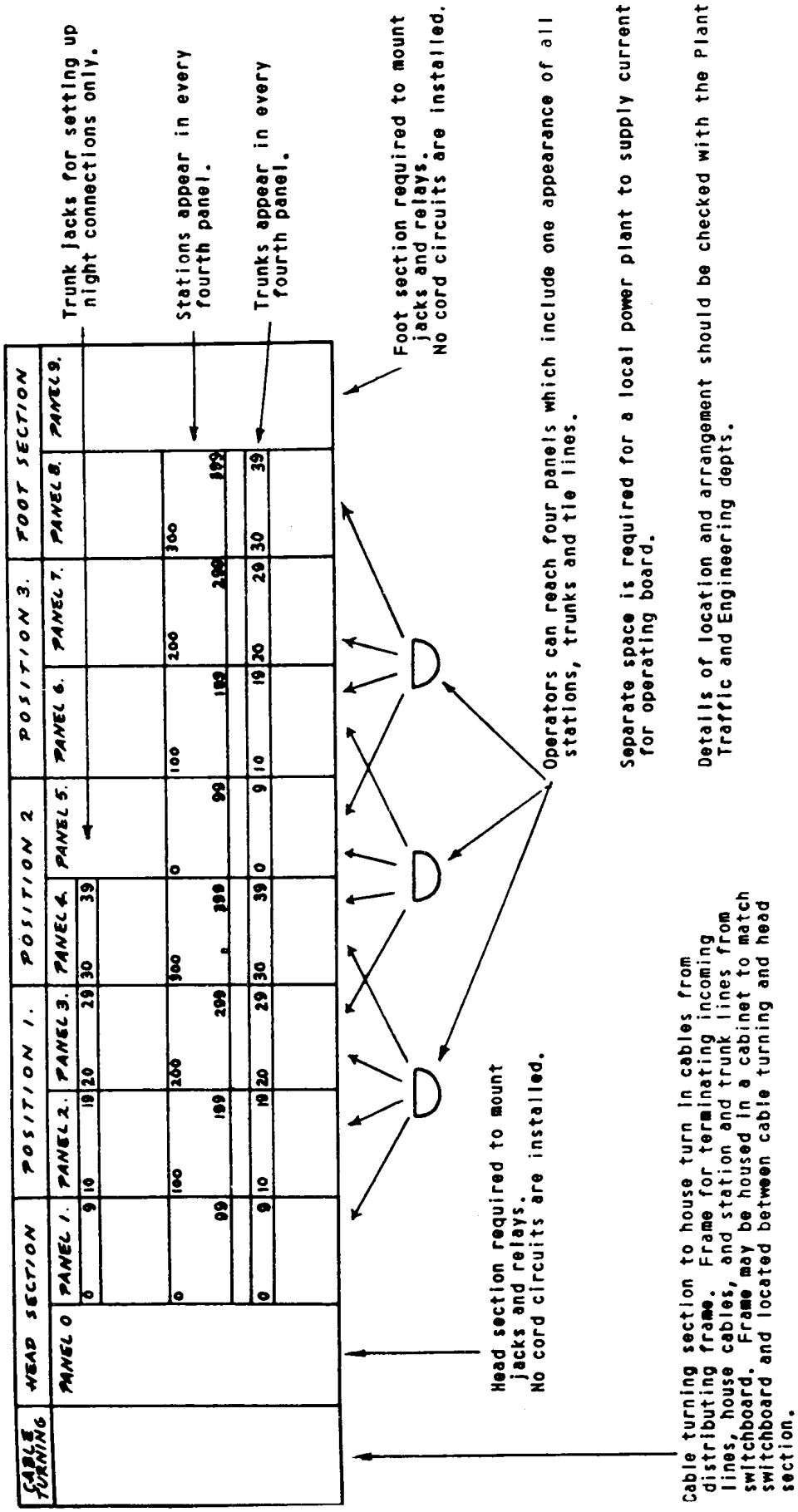
Finish—Walnut
Capacity—See Page 33

Operating Parts

1. Designation strips
2. Station jacks
3. Station lamps
4. Trunk jacks
5. Trunk lamps
6. Trunk busy lamps
7. Attendant's telephone set jacks
8. Hand generator key
9. Hand generator
10. Operating keys
11. Supervisory lamps
12. Connecting cords
13. Pilot lamp
14. Alarm lamps
15. Battery switch
16. Distributing frame section
17. Head section
18. Attendant's position section
19. Foot section

MULTIPLE SWITCHBOARD

3 Positions



BUSINESS AND RESIDENCE DIAL PRIVATE BRANCH EXCHANGE (755A AND 750A DIAL SERVICE)

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BUSINESS AND RESIDENCE DIAL PRIVATE BRANCH EXCHANGE SERVICE

AVAILABLE IN COMMON BATTERY EXCHANGES ONLY

0. INTRODUCTION

Business and residence dial private branch exchange service is now furnished by means of two types of equipment designated 750A and 755A. These equipments are small dial private branch exchanges designed for use in business and residence locations without a P.B.X. attendant. Push button keys are provided at stations to establish connections to the central office trunks. Dials are provided at all stations for local calls, between stations and for calls to dial central offices. Tie trunks to other P.B.X.'s may be provided. Service is available in common battery exchanges only. Although the status of the 750A equipment is rated "manufacture discontinued", this type of dial equipment will continue to be used when available where its capacity will not be exceeded or where the added service features of the 755A equipment are not required. In view of this, careful consideration must be given to customers' initial requirements and growth expectancy to insure against installation of an incorrect type of equipment. The fundamental operating features of the two types of equipment from a subscriber's viewpoint are about the same, however, there are a number of operating and equipment differences. For the purpose of clarity, this section will describe first the switching equipment, station apparatus and service features of the 755A, followed by an enumeration of the differences between the 750A and 755A.

1. EQUIPMENT AND SERVICE FEATURES

1.0 Switching Equipment

Switching equipment consists mainly of cross bar switches and associated relay apparatus housed in a sheet metal cabinet of gray finish. Its dimensions and weight are: Height six feet, depth 18 inches, width 28-1/2 inches. Access to the equipment is by means of individual removable sheet metal casing covers, both front and rear. Clearance to permit ease of access of approximately 18 inches is required both front and rear. Switching equipment capacity is four trunks and 20 station lines. Private branch exchange minimum trunk and station requirements apply to this service.

The switching equipment will normally be furnished in three sizes.

	Trunk Circuits	Station Circuits	Link Circuits
A	2	8	2
B	3	15	3
C	4	20	3

Additions to 755A installations of less than maximum capacity can be made on the subscriber's premises by the regular installation force by means of additional equipment units as required.

1.1 Power Plant

Power plant of the 755A P.B.X. consists of batteries housed in the switching equipment cabinet. These batteries are charged by either central office battery connected by cable pairs or by a rectifier mounted adjacent to the switching equipment.

2. STATION APPARATUS AND SERVICE FEATURES

2.0 General

Two types of stations may be provided with the 755A P.B.X., (1) key stations or (2) keyless stations. Each key station is equipped with a group of mechanically interlocking push button keys which control the connections of the station to the trunks and links. A keyless station is not equipped with keys and therefore cannot be connected to a central office trunk unless the line of this station is equipped with a non-locking control key which is located at a key station. Every station is equipped with a dial.

2.1 Key Stations

Five different types of telephone sets may be provided at key stations as follows: (1) cradle type handset equipped with key in base; (2) wall set with separate key unit; (3) desk set with separate key unit; (4) hang-up handset and separate key unit; (5) cradle type handset with separate key unit.

> Note: It is planned to make available at a later date a 6 button key in base type handset, at which time full information will be furnished regarding it. Reference to this set in discussion with subscribers in the meantime should be avoided.

Each of these sets is equipped with dial. The group of push buttons in the base of the instrument are designated "1", "2", "3", "H" and "L". The separate key units are of the 6-push button type and are designated "H", "1", "2", "3", "4" and "L". The numbered keys are employed to establish connections to the trunks. The "H" key is non-locking button employed to hold connections on any of the central office trunks. The "L" key is employed for connecting the station to an intercommunicating path.

Key stations can be arranged for any of three classes of service in connection with the central office trunks, namely: (1) lockout service, (2)

non-lockout service or (3) restricted service. Lockout service prevents a station from being connected to a trunk while it is busy except when there is a hold condition on the trunk. Non-lockout service permits a station to be connected to a trunk when the trunk is busy. Restricted service prevents a station from originating outgoing trunk calls but permits the station to answer incoming trunk calls and to transfer them to other stations.

Two key stations may be connected to the same line circuit to provide one extension station in addition to a main station. Then either station can answer and originate calls on the line. A connection which has been established from one of the stations will not be altered by lifting the handset and depressing a key at the other station on the same line unless the hold key is depressed. Should the hold key be depressed at one station while the other station on the same line is connected to a trunk circuit, the hold condition will be established on the trunk circuit and the talking path between the stations and the trunk will be cut off. To reestablish conversation over the trunk both stations must first be disconnected from the trunk circuit through the operation of the station switchhooks or by the releasing of the trunk push button keys.

2.2 Keyless Stations

The telephone sets for keyless lines are the same types provided with an individual subscriber line to a dial central office. Keyless stations are provided where it is desired to restrict a station from direct access to central office trunks or at locations where key stations cannot be provided.

2.3 Visual and Audible Signals

2.30 General

Incoming calls from the central office are indicated by the flashing of lamps or by the sounding of bells or buzzers or a combination of the three. A call to a station over a link circuit is generally indicated by the sounding of a bell, but lamp signals can also be provided for this purpose.

The lamps are housed in indicators of various types. Three types of such indicators are available: (1) beehive type indicators coded 15A for one lamp, 17A for 2 lamps and 18A for 3 lamps; (2) surface mounted indicators of the bullseye type coded 14A for 3 lamps and 20A for 4 lamps; and (3) a flush mounted indicator of the bullseye type for 3 lamps which is coded 16A.

The lamps provided for trunk circuits are of the 14A, 16A and 20A types only. They are steadily lighted when their associated trunks are busy, and flash at the rate of about 2 times per second to indicate incoming calls. The flashing of the lamps is started when ringing current is received over the trunk from the

central office, and thereafter the flashing continues until the call is answered or if the call is abandoned the flashing ceases after an interval of time not less than 4 seconds or more than 14 seconds after the central office ringing ceases.

The beehive type lamps, 15A, 17A and 18A are for use on station lines only.

To provide a lamp at a station to indicate local calls, the associated station line circuit must be specially equipped. This lamp flashes when a link completes a local connection to the line and the flashing continues until the call is answered or until the calling party abandons the call. This lamp can be arranged to be either lighted steadily or extinguished while its associated station is busy.

The audible signals which indicate incoming calls on trunks may consist of separate ringers or buzzers mounted on a wall or desk. An individual bell or buzzer may be provided for each of the trunks and the different bells may be equipped with distinctively toned gongs; or where lamp signals are provided a single bell or buzzer may be arranged to sound when a call occurs on any one of the several trunks in a group. Facilities are provided to permit a single bell or buzzer at one location to be associated with one group of trunks while a single bell or buzzer at another location is associated with a different group of trunks. Not more than three different groups of trunks can be provided.

The audible signals for indicating local calls may be produced by individual ringers on the local lines or by a ringer or buzzer which is common to a group of trunks in addition to being associated with the local line. The common ringer is provided only in connection with lamps. Therefore the usual arrangement will consist of a separate ringer for indicating the local calls.

2.31 Signal Limitations

The filed rate includes one bell or buzzer per trunk, or one bell or buzzer common to all trunks.

In addition to the bells included in the rates, additional bells may be furnished at the extension bell rate quoted in Supplemental Equipment Schedule No. A-28, in accordance with the following:

	Maximum Additional Bells Which May Be Furnished
Where a bell common to all Trunks is Furnished with a:	
1 Trunk System	15 Bells
2, 3 or 4 Trunk Systems	2 Bells individual to each trunk and 13 bells common to all trunks.
Where a bell individual to each trunk is furnished with a:	
1 Trunk System	15 Bells
2, 3 or 4 Trunk Systems	1 Bell individual to each trunk and 14 bells common to all trunks.
Where a Buzzer common to all trunks is furnished with a:	
1 Trunk System	12 Bells
2, 3 or 4 Trunk Systems	2 Bells individual to each trunk and 10 bells common to all trunks.
Where a Buzzer individual to each trunk is furnished with a:	
1 Trunk System	12 Bells
2 Trunk System	1 Bell individual to each trunk and 6 bells common to all trunks.
3 Trunk System	1 Bell individual to each trunk and 2 bells common to all trunks.
4 Trunk System	1 Bell individual to each trunk.

When any trunk is equipped with an individual buzzer or two individual bells, no keyless station line may have more than two bells.

* A maximum of twelve (trunk) lamp indicators may be furnished with the
* 755-A Dial P.B.X. System in addition to bells and buzzers. The maximum of four
* (trunk) lamp indicators on a 750-A Dial P.B.X. System still applies.

2.4 Local Connections

2.40 General

Local connections between P.B.X. stations are established by the link circuits. One of the 2 or 3 link circuits provided is automatically connected to a station when a local call is originated at the station.

2.41 Local Connections Between Key Stations

To originate a local call at a key station the local push button key is depressed and the handset is lifted from the switch. Then the station line is connected to a link, and dial tone is heard, except that if all links are busy, busy tone is heard instead of dial tone. After dial tone is heard the number of the desired station is dialed. This number consists of two digits, the first digit being either 2 or 3 and the second digit any number from 0 to 9. The digit 1 can be dialed any number of times before the digit 2 or 3 is dialed, without affecting the proper completion of the call. This feature is provided to care for preliminary pulses which may result from inadvertent fumbling of the switchhook when the telephone handset is lifted to originate a call. After the number has been dialed audible ringing tone is heard if the called line is free. However, if the called line is busy, busy tone is heard. If the number dialed corresponds with a line to which no station apparatus is connected, no tone is heard.

When the handset is restored to its mounting at the calling station this station is disconnected from the link and is free to originate or receive other calls, but the link is held busy until both stations are disconnected. If the called party restores his handset to its mounting before the calling party, the called party's line tests busy until the calling party disconnects. However, while the link is held by the calling party the called party can disconnect his station from the link and connect it to a trunk to originate a new call by depressing the push button key of the trunk and lifting the handset from its mounting. After a called station has been disconnected from a link in this manner, it is free to originate and receive calls in the normal manner. If the local push button key is depressed again at a called station after a trunk button has been depressed to disconnect the station from a link which is held by a calling station, the called station will not be reconnected to the link being held but will be connected to an idle link as on the origination of a new call.

When a local call is made to a key station, the local push button key at the called station must be depressed in order to answer this call. If a trunk call occurs simultaneously with the local call, the local call must be answered before the trunk call can be answered. If an attempt is made to answer the trunk call first or if under any condition the handset is lifted from its mounting

with a trunk button depressed after the terminating end of a link has been connected to the station line, the talking connection through the link is not completed and audible ringing tone is heard by the called party the same as that which is heard by the calling party. When the local push button key is depressed the connection through the link is completed in the normal manner.

The hold key is effective only in connection with trunks and therefore its operation while the local key is depressed will not establish a hold condition on the link but will cause a disconnection of the station from the link.

2.42 Local Connections Between Keyless Stations

Local connections between keyless stations are established by dialing after lifting the telephone instrument from the switchhook in the usual manner.

2.43 Local Conference Connections

Local conference connections can be originated by dialing from any P.B.X. station. A third station can be connected to a link after the usual type of local connection has been established over the link if the number of the third station is dialed at the calling station after the receiver is restored to the hook at the called station. A more detailed explanation of the method of establishing a local conference connection is as follows:

Station B is called from Station A in the normal manner. Then the telephone set is restored to the hook at Station B and the number of Station C is dialed at Station A without operating the switchhook at Station A. Dial tone is not heard at Station A. After the first digit of the number for Station C has been dialed the bell at Station B starts to ring in accordance with the regular machine ringing cycle. After the second digit of the number for Station C has been dialed either of two conditions occurs:

(1) If Station C is busy, busy tone is heard at Station A and the ringing ceases at Station B. The discontinuance of ringing is the signal to the person at Station B to return to the connection. Then when the person at Station B lifts the telephone set from the hook the busy tone ceases and stations A and B are connected together as originally.

(2) If station C is free, the bell at Station C rings in synchronism with that at Station B and audible ringing tone is heard at Station A.

When the telephone set is lifted from the hook either at Station B or C the ringing ceases at both stations. Normally, the person at Station B waits until the ringing ceases, as a result of the answer of the person at Station C, and then lifts the telephone set from the hook. The answering in this manner at

Stations B and C connects these stations in multiple to the link and this completes the conference connection.

If the person at Station C does not answer, the person at Station B returns to the connection before the ringing ceases and is thereby connected to Station A as originally, except that the line circuit of Station C continues to test busy until the link is released by the disconnection of Stations A and B.

When a conference connection is completed the link is held busy until all three of the stations are disconnected. Station A (which is the calling station) can be disconnected from the link before Stations B and C. If Stations B and C (which are the called stations) are of the keyless type, neither of these two stations can be disconnected from the link until the telephone sets are on the hooks at both of the other two stations. If Stations B and C are of the key type one of these two called stations can not be disconnected from the link by the depression of a trunk push button key unless the telephone set is on the hook at the other one of these two called stations.

2.44 Automatic Hunting on Station Lines

Optional wiring arrangements are provided in the link circuits to permit line hunting on lines Nos. 26 and 27, and on lines Nos. 36 and 37. This wiring is individual to each link circuit. Where the hunting arrangement is provided, a connection will be completed to the higher numbered line of the pair if the lower numbered line is busy when a calling station dials the lower numbered line. Busy tone will not be heard at the calling station after dialing the lower number of the pair unless both lines of the pair are busy. However, dialing the higher number while the higher numbered line is busy will not cause the connection to be completed to the lower numbered line if it is free.

This line hunting feature may be advantageous for two station lines terminating at the same location and also for two tie trunks to another P.B.X. which are terminated on station line circuits.

2.5 Trunk Connections

2.51 Incoming Trunk Calls to Key Stations

An incoming call on a trunk from the central office is indicated by the ringing of one or more bells or buzzers associated with this trunk or by the flashing of one or more lamps or by both, and this call can be answered at any key station having a push button key associated with this trunk. The incoming trunk call is answered by the depression of the proper trunk button and the removal of the telephone set from the hook. Then the bells or buzzers are silenced and the lamps, if provided, are steadily lighted.

If the incoming call is for a person located at another key station, the call is transferred to this other station in the following manner: First the hold key is depressed to hold the call on the central office trunk. Then the local key is depressed and the desired station is dialed as on a regular local call. When this local call is answered, the person who answers is advised that he is wanted on a central office trunk and the number of the trunk on which the call is held is announced. This person then depresses the push button key at his telephone which is associated with this trunk and the incoming trunk call is thereby completed. The person who originally answered the trunk call performs no further functions in connection with this call after the desired party has been advised of the call over the local connection other than to restore his telephone set to the hook.

The trunk call can be transferred from the second key station to another key station in the same manner as it was transferred from the first key station.

2.52 Outgoing Trunk Calls from Key Stations

An outgoing call to a central office trunk from a key station is originated by the operation of a trunk push button key at the station and lifting the handset from the switchhook. The particular one of the group of trunk push button keys to be depressed is selected by either of three methods, depending on the station facilities provided: (1) If trunk lamps are provided, these lamps are observed to determine which of the trunks are free for use, a free trunk being indicated by an extinguished lamp; (2) if trunk lamps are not provided and the station is arranged for lockout service, any one of the trunk push buttons is depressed, although the highest numbered trunk button should be first selected. Then if busy tone is heard in the station receiver, the next lower number trunk button is depressed. The depressing of trunk buttons is repeated successively until a connection to a trunk is completed; (3) if the station is arranged for non-lockout service and trunk lamps are not provided, the procedure is the same as (2) above except that no busy tone is heard when the push button of a busy trunk is depressed, and it is necessary to listen for conversation or challenge in order to determine whether the trunk is busy.

At key stations arranged for restricted service no attempts to make outgoing trunk calls are normally made, but the occurrence of such an attempt causes busy tone to be heard unless an unanswered incoming call or hold condition is on the trunk. Under either of these conditions any key station can be connected to a trunk by the depressing of an associated key in the normal manner.

If a station is unintentionally connected to a trunk when an unanswered incoming call is waiting on the trunk, the incoming call should be completed in normal manner from this station because the trunk lamps are extinguished and the bells silenced by this connection and a disconnection of this station without

completing the call, would generally prevent the call from being completed and cause the calling party to be charged. If a station is unintentionally connected to a trunk on which a call is being held the hold key should be depressed at this station before the station is disconnected from this trunk in order to avoid a cut-off on the call being held.

2.53 Restricted Service

Key stations which are arranged for restricted service cannot be connected to trunk circuits to originate outgoing calls but they can be connected to trunks to answer incoming calls or to answer transferred calls or to originate calls after the hold condition has been established on the trunk from a non-restricted station. The restricted service feature can be provided in connection with a few or all of the trunk circuits at any key station. All keyless stations have restricted service.

2.54 Trunk Connections to Keyless Stations by Control Key

The simplest arrangement for the keyless stations does not permit the connection of central office trunks to these stations under any conditions. However, facilities for connecting a keyless station to the central office trunks can be provided by equipping the line circuit of the keyless station with a control key. This key may be located at any one of the key stations. The station at which it is located is known as the control station. The control key is a two-way non-locking lever type key. Two keyless stations can be associated with the same key, one of its operated positions being for one station and the other operated position for another station.

To originate an outgoing call from a keyless station to a central office trunk the key station at which the control key is located is first called in the normal manner from the keyless station and the person who answers is requested to connect the keyless station to a central office trunk. If the trunk terminates in a dial central office, this person is also advised of the central office number desired as the dialing of the number must be performed from the control station. After receiving instructions from the keyless station the person at the control station connects his telephone to a central office trunk in the normal manner. Trunk lamp signals should be provided at the control station in order that when all trunks are busy, this condition can be detected without the station being disconnected from the local call from the keyless station. If the control station should be disconnected from this local call and then discover that all trunks were busy, it could not be connected again to the keyless station until the receiver was restored to the hook at the keyless station. After the control station is connected to a trunk circuit and the desired number dialed if dialing is required, the control key is operated to its position associated with this keyless station. The operation of this key automatically connects the

keyless station to the central office trunk in multiple with the control station. The key is held operated until this connection is completed and this will generally occur within an interval of about one second. Then the key is released. The subscriber at the control station is advised of the completion of this connection by a characteristic click and change in sidetone. The party at the keyles station remains at the telephone during this procedure and becomes aware of the completion of the connection when he hears the audible ringing signal or the answe of the called operator or subscribers. The telephone instrument at the control station is restored to the hook after this connection is completed. This disconnects the control station from the trunk and thereafter this key station is free for use on other calls in the normal manner. The connection of the keyless statio to the trunk remains until the receiver is restored to the switchhook at the keyless station. When the switchhook is thus operated the connection is automatically released.

To complete an incoming trunk call to a keyless station, the call is answered at the control station or if answered at some other key station, it is transferred to the control station. Then the hold key is depressed at the control station to hold the call on the trunk and the keyless station is called over a link circuit in the normal manner. When the person at the keyless station answers he is advised of the incoming call and requested to hold the line a moment. Then the person at the control station returns to the trunk connection by operating the trunk button in the normal manner and then operates the control key associated with the keyless station. The operation of this key connects the trunk to the keyless station as described above and the control key is released when the completion of the connection is indicated by a characteristic click and change in sidetone. Then the person at the control station advises the others that the connection is completed and after hearing the conversation restores his receiver to the hook. This disconnects the control station and it is free for other service in the normal manner. The connection to the keyless station remains until the receiver is restored to the hook at this station. Then it is automatically released.

2.6 Line Pickup Keys

2.60 General

As discussed under Paragraph 2.1 key stations with keys in base associated with the 755A P.B.X. will be equipped with three trunk keys. When a fourth trunk is required, an additional line pickup key must be furnished. Also a station may be arranged to be connected through pickup keys to more than one local line or to one or more central office lines in addition to those terminated in the PBX trunk circuits. The pickup keys for this purpose may consist of one of the following:

1. Spare trunk push buttons at key stations.

2. Non-locking keys separate from the trunk push buttons at key stations.

Where the pickup keys are provided for more than one local line they will permit a station to be used in answering calls to another station as may be desired when nobody is present at the other station. These keys will also permit two stations to use two lines in common under conditions where they are provided at the same location to handle a relatively large number of telephone calls. The line hunting feature may sometimes be advantageous in connection with these keys.

The provision of pickup keys for additional central office lines which are not terminated in the regular PBX trunk circuits may be desirable under either of the following conditions:

1. Where a central office line is desired for the exclusive use of one or two stations.

2. Where more than four central office trunks are desired because of a relatively large volume of traffic.

The pickup key arrangements for key stations do not include facilities for holding calls. The operation of the hold push button key during a connection through one of these arrangements will not produce a holding condition but will release the connection. Therefore it will generally not be practicable to transfer calls on the additional central office lines from one PBX station to another unless one station remains connected to the line until the other station is connected to it.

The equipment arrangements for these line pickup keys are discussed in the following sections. None of these arrangements is furnished when the P.B.X.'s are assembled in the factory. It is intended that these will be added locally.

2.61 Key Station Buttons As Line Pickup Keys

Where the number of trunks to which a key station has access is less than the maximum number which can be accommodated by the push button keys at the station, one or more of the regular trunk push button keys are available for other use and each of these available buttons may be employed as a line pickup key to connect the station to the local line of another station of the same PBX or to a central office line which is not otherwise associated with the P.B.X. With each push button key which is employed for this purpose extra equipment in the P.B.X. cabinet is required.

2.62 Separate Non-Locking Pickup Keys at Key Stations

At a key station where all of the regular push buttons are employed for regular service, one or more separate non-locking pickup keys can be installed to connect the station to one or more local lines of other stations or central office lines not otherwise associated with the P.B.X. These keys are associated with the regular local push button key at each of the stations. The local push button key is depressed and the telephone is lifted from the switchhook before the non-locking key is operated to establish a connection. The operation of this key causes the transfer of the telephone set to the line associated with this key. A connection established by the operation of the external non-locking key is released by either the release of the local push button or by restoring the station instrument to the switchhook.

2.7 Tie Trunks

2.70 General

The 755A P.B.X. has been designed with provision for tie trunks to other P.B.X.'s of the manual and dial types. The following types of tie trunks are now available:

2.71 Trunk to Station Tie Trunks

A tie trunk which is terminated in a central office trunk circuit at the 755A P.B.X. can be connected to key stations but cannot be connected to keyless stations unless they are equipped with control keys. This arrangement requires the use of key station push buttons which are not needed for regular central office trunks or the use of separate pickup keys. If the distant P.B.X. is of the dial type, calls from the 755A P.B.X. can be completed by dialing. Where the distant P.B.X. is of the manual type, the distant P.B.X. attendant will receive supervision from the 755A P.B.X. stations.

A tie trunk which is terminated in a keyless station line circuit at the 755A P.B.X. is arranged for the completion of connections to the 755A P.B.X. by dialing at the distant P.B.X. Such a tie trunk would be terminated in a central office trunk circuit at the distant P.B.X. Switchhook supervision from the 755A stations would not be obtained at the distant P.B.X. The line hunting features of the 755A P.B.X. may be advantageously employed in connection with tie trunks of this type.

2.8 Trouble Alarm Bell and Key

An alarm bell is provided to indicate when a fuse is operated in the P.B.X. cabinet. This bell is located at some point near a station from which

trouble can be conveniently reported to the central office. A non-locking lever type key is associated with this bell and the operation of the key when the alarm bell is ringing causes the bell to stop ringing.

3. COMPARISON OF 755A AND 750A P.B.X.'s

3.0 General

As stated previously, business and residence dial private branch exchange service will be furnished by either 755A or 750A P.B.X.'s depending on stock conditions and customer requirements. To prevent improper installation a clear understanding of the equipment and service features of both types is necessary.

The fundamental features of the 750A are about the same as those of the 755A. However, there are a number of differences between these two P.B.X.'s in the station apparatus, equipment arrangements and operating features. These differences are enumerated below. Common features are not covered in this enumeration.

FEATURES	755A PBX	750A PBX
3.1 STATION APPARATUS		
1. Cradle type handset	(a) Handset with 5 push buttons	Handset with 5 push buttons.
	(b) Handset with separate key containing 6 push buttons.	None available.
2. Hang-up Type Handset	Handset with separate key containing 6 push buttons.	None available.
3. Wall Set	Wall set with separate key containing 6 push buttons.	Wall set with separate key containing 5 push buttons
4. Desk Set	Desk set with separate key containing 6 push buttons.	Desk set with separate key containing 5 push buttons.
5. Number of Wires to key stations.	9 wires for 4 trunks.	6 wires for 3 trunks.

FEATURES	755A PBX	750A PBX
6. Key station extensions	2 key stations may be connected to the same station line.	Only one key station should be connected to each line circuit. Where it is determined in advance that extensions on key stations are required 755A PBX equipment should be installed. As special equipment is necessary to provide extensions to key stations on 750A PBX they should be discouraged.
7. Trunk Holding Key	The depression of the Hold Button releases any other previously operated buttons in the same set.	The depression at the hold button does not affect the other buttons in the set.
8. Line Pick-up Keys	Regular trunk push button keys, or non-locking keys external to Key Station sets may be connected to extra lines.	No facilities provided to connect key stations to extra lines.
9. Control key for connecting trunks to keyless stations	Non-locking lever type key for connecting one or two keyless station lines. Key station free while connection remains. Connection automatically disconnected.	Keybox about 3"x3"x6" for one, two, or three keyless station lines. Key station is held bush while connection remains. Key station manually disconnects after monitoring.
10. Visual Signals	Lamps may be provided for station lines and trunks. The lamps flash to indicate incoming calls and are steadily lighted while associated trunks are busy. On station lines the lamps may be either extinguished	Lamps should be provided for trunks only. Lamps lighted steadily to indicate incoming calls and are extinguished under all other conditions.

FEATURES	755A PBX	750A PBX
10. Visual Signals (Cont'd)	or steadily lighted when the station is busy. Surface type lamp assembly for 3 or 4 lamps and flush type for 3 lamps used for signalling on trunk lines. Beehive type for 1,2 or 3 lamps are available for signalling lines.	Surface and flush type for 3 lamps for signalling on trunk lines.

3.2 SWITCHING APPARATUS

1. Switches	Crossbar switches and links.	Selector switches and links.
2. Capacity	Furnished in three sizes.	Furnished in two sizes.

	A	B	C	A	B
Trunk Lines	2	3	4	2	3
Station Lines	8	15	20	8	15
Links	2	3	3	2	3

3. Dimensions		
Height	6 Ft.	5 Ft.
Depth	18 Inches	20-5/8 inches
Width	28-1/2 inches	31 inches
4. Weight fully equipped	450 lbs.	700 lbs.
5. Access	Front and rear by individual removal casings.	Front by means of full width swinging door.
6. Clearance for access	Approximately 18" front and rear.	Approximately 33" front only.
7. Changes in capacity after installation.	Station line, trunk and link units may be added to or removed from equipment cabinets of existing installations without changing the apparatus cabinet.	Any additions or removal of station line, trunk or link units only by removing one capacity apparatus cabinet and installing the other size cabinet.

FEATURES	755A PBX	750A PBX
3.3 OPERATING FEATURES		
1. All station keys normal	When all push button keys at a station are normal and the station receiver is removed from the switchhook, no connection is established and generally no tone is heard.	When all station keys are normal and the station receiver is removed from the switchhook, the station is connected to a link circuit the same as if the local push button were depressed.
2. Successive calls to different trunks after hold key has been operated.	After the hold key has been depressed to hold a call on one trunk, a connection to another trunk or to the same trunk can be established by depressing the corresponding trunk key without restoring the station receiver to the switchhook.	After the hold key has been depressed to hold a call on one trunk another trunk key should not be operated until the local button has been depressed or until the station switchhook has been operated. This operation required to release the lock-out feature.
3. Station numbering plan	The station lines are numbered from 20 to 39.	The station lines are numbered from 2 to 9 and from 02 to 08.
4. Preliminary Dial pulses	Preliminary pulses are absorbed by the switching equipment and do not affect subsequent dialing.	A preliminary pulse causes busy tone to be heard at the calling station and requires that the receiver be restored to the hook and a new call originated.

FEATURES	755A PBX	750A PBX
5. Line hunting	Station line hunting may be provided on lines 26 and 27 in one pair and lines 36 and 37 in another pair. When line hunting is not provided on either or both of these pair the line circuits may be used as regular non-hunting station lines.	No station line hunting facilities are provided.
6. Vacant Station Terminals	If a number is dialed for a line to which station apparatus is not connected no tone will be heard.	If a number is dialed for a line to which station apparatus is not connected busy tone will be heard.
7. Local Machine Ringing Cycle	Ringing current on approximately 1 second and off approximately 3 seconds.	Ringing current on approximately 2 seconds and off approximately 4 seconds.
8. Conference Connections	Local conference connections with 3 stations connected to the same link can be established by dialing from any station.	No facilities for local conference connections.
9. Lock-out service	Available but not furnished unless specified. Optional at individual key stations.	Available and usually furnished unless otherwise specified. Optional at individual key stations.
10. Simultaneous local and trunk calls.	When a local call and a trunk call occur simultaneously the local call must be answered first. If an attempt is made to answer the trunk call first, no connection will be established and ringing tone will be heard. After the local call has been answered, the	When a local call and trunk call occur simultaneously,either call can be answered first and the station can be reconnected to the local call after being connected to the trunk.

FEATURES	755A PBX	750A PBX
10. Simultaneous local and trunk calls. (Cont'd)	trunk call can be answered in the normal manner, but the station cannot return to the local call after answering the trunk call.	

4. SALES AND MARKET CONSIDERATIONS

4.0 General

Business and residence dial private branch exchange service of both the 755A and 750A types is designed to meet the needs of medium sized business and large residences where P.B.X. attendants are not available. Due to cost of the service to the customer and the relatively heavy investment on the part of the Company, the sales representative is faced with added responsibility in analyzing customer requirements in order that he may fulfill his two-fold obligations of recommending the service which will BEST meet the customer's needs and prove beneficial to the Company. Other services such as, cord and cordless switchboards 15A and 23A Key Equipments, will often adequately meet the communication needs of the subscriber at less cost both to the customer and the Company. Therefore the sales representative who meets his full responsibility will recommend business dial P.B.X. service when the subscriber's needs can be met by no other type of service. He will further, by careful discussion and review with the customer, avoid the installation of one type of business dial P.B.X. service when the other is required. Careful forecasting of customer's future requirements will prove helpful in this connection.

Dial Intercommunicating Systems

750-A Type

Dimensions

Height	5-1/2″
Width	8-5/8″
Depth	6-3/4″

Finish

Black	Old Brass
Ivory	Statuary Bronze
Gray	Oxidized Silver

Fig. 1

Hand Telephone Set

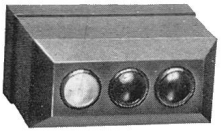


Fig. 2

Trunk Indicator

Dimensions

Height	3-15/16″
Width	1-15/16″
Depth	1-7/8″

Finish

Black	Old Brass
Ivory	Statuary Bronze
Gray	Oxidized Silver

Dimensions

	Wall Set	Key Box
Height	9-3/16″	6-3/16″
Width	9-5/16″	5-7/8″
Depth	6-1/2″	1-5/16″

Finish

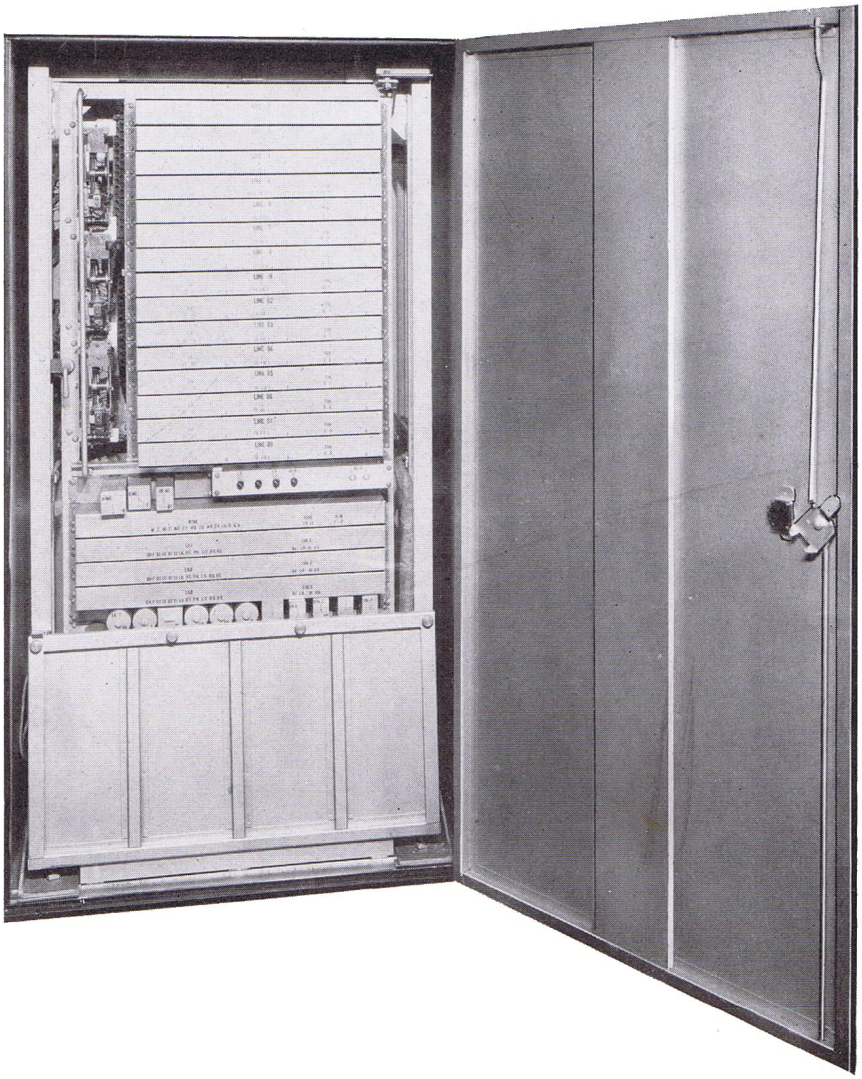
Wall Set—Black
Key Box—Black

Fig. 3

Wall Set With Key Box

Dial Intercommunicating Systems

750-A Type



Switch Frame

Dimensions

Height	5′
Width	2′ 7-1/4″
Depth	1′ 10-1/4″

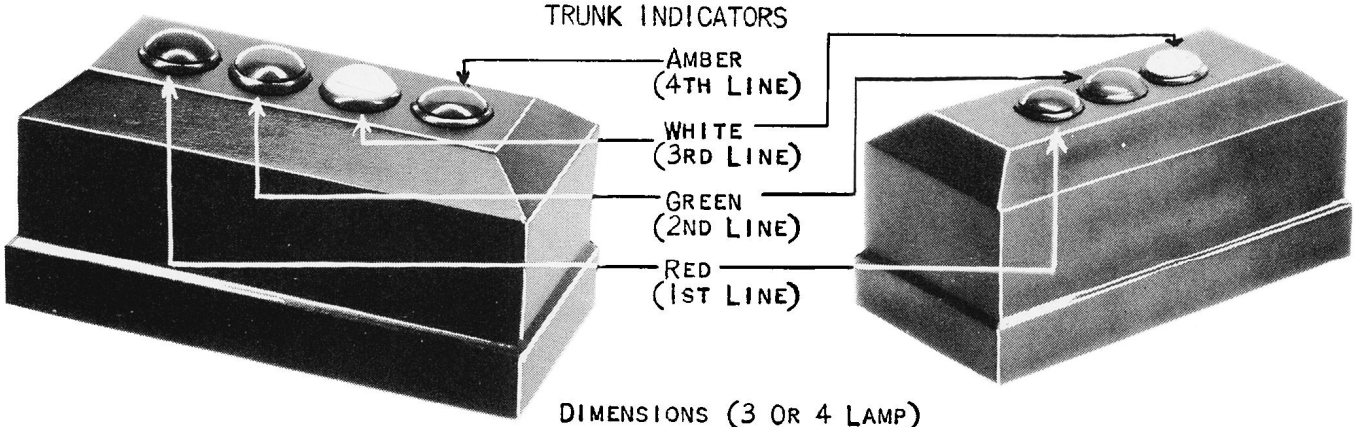
Capacity

Small Size	Large Size
8 lines	15 lines
2 trunks	3 trunks
2 intercommunicating paths	3 intercommunicating paths

Finish—Olive Green

SMALL DIAL SYSTEM

KEY TELEPHONE SET



DIMENSIONS (3 OR 4 LAMP)
HEIGHT 2-1/16 IN.
LENGTH 4 IN.
WIDTH 2 IN.

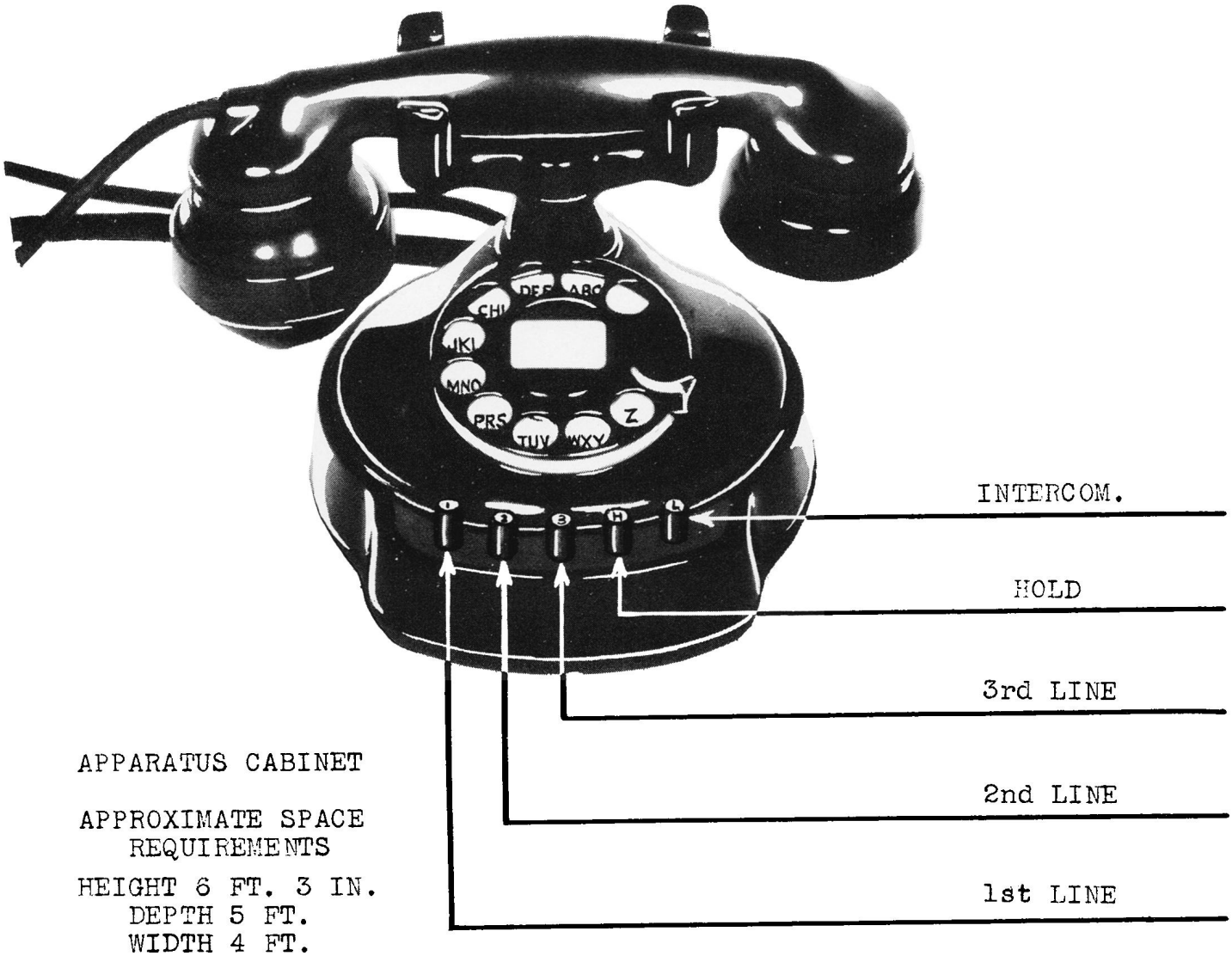
APPARATUS CABINET

APPROXIMATE SPACE REQUIREMENTS -

HEIGHT 6 FT. 3 IN.
DEPTH 5 FT.
WIDTH 4 FT.

SMALL DIAL SYSTEM

KEY TELEPHONE SET

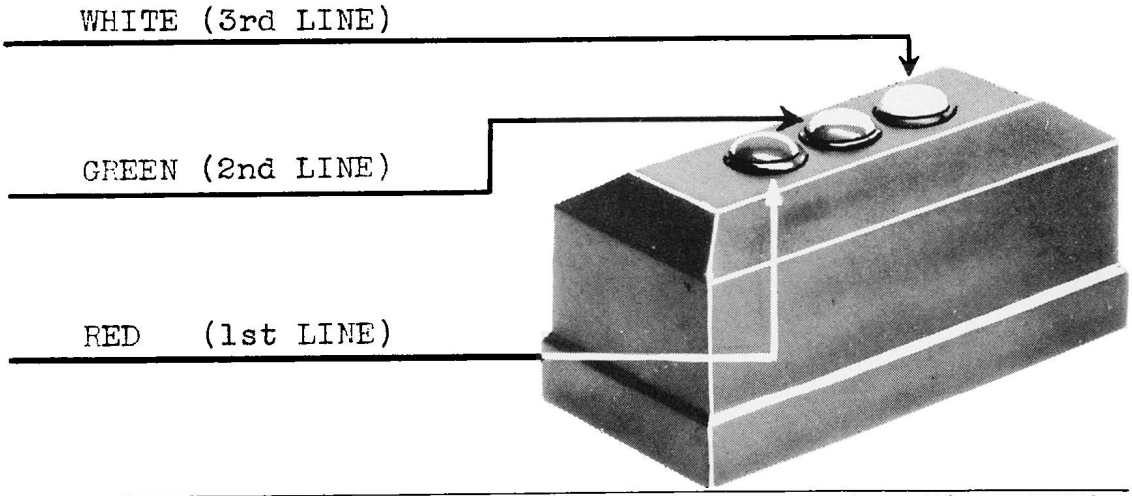


APPARATUS CABINET

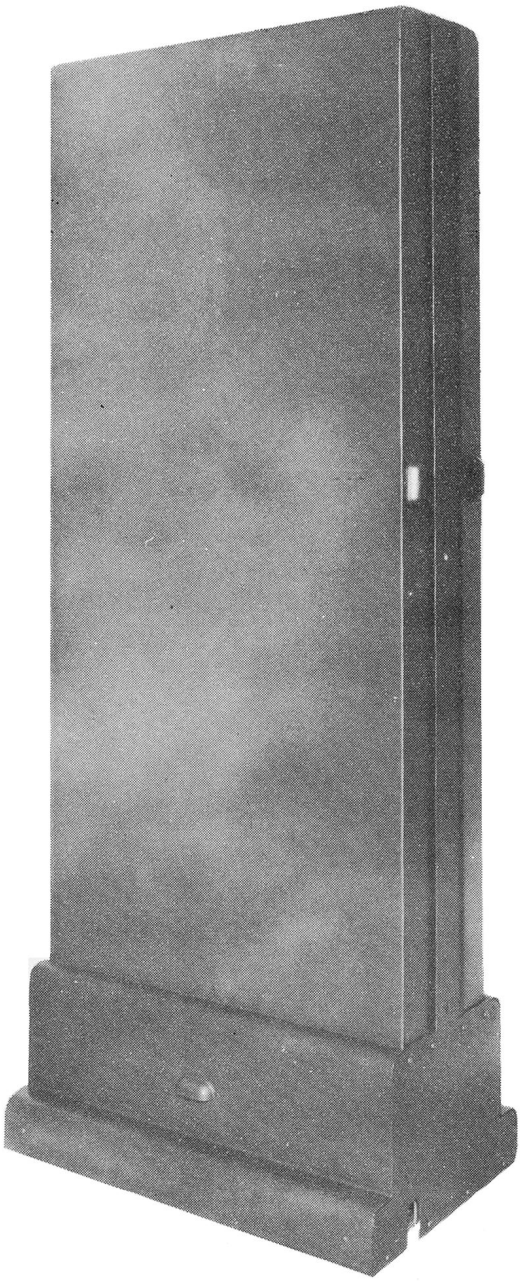
APPROXIMATE SPACE
REQUIREMENTS

HEIGHT 6 FT. 3 IN.
DEPTH 5 FT.
WIDTH 4 FT.

TRUNK INDICATOR



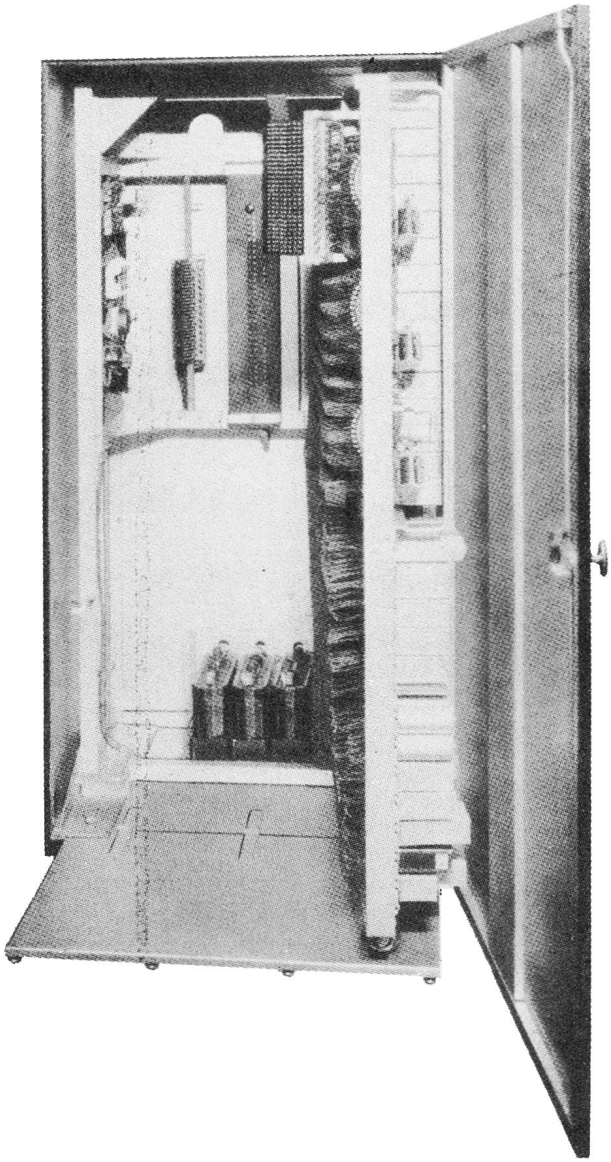
SMALL DIAL SYSTEM



755 A-PBX Apparatus Cabinet

Dimensions		Approximate Space Requirements	
Height	6'	Height	6' 3"
Depth	18"	Depth	5'
Width	28-1/2"	Width	4'

SMALL DIAL SYSTEM



750 A-PBX Apparatus Cabinet

Dimensions		Approximate Space Requirements	
Height	5'	Height	6' 3"
Depth	21"	Depth	5'
Width	31"	Width	4'

Dial Systems With Cordless Switchboard

740-C Type

General

The 740-C P. B. X. is a small dial private branch exchange with a maximum capacity of 4 central office trunks and 38 dial station lines designed to provide improved telephone facilities for serving the larger private residences and estates. It is suitable for use in manual and dial system common battery areas.

Application

Careful consideration has been given to design features which will contribute to the favorable appearance of the equipment and to the convenience of its installation and operation. The design of the attendant's cabinet which is one of the outstanding developments, is intended to harmonize with the high grade furnishings ordinarily found in the large residences for which this grade of service would be suitable. Other features desirable for residential service include secrecy on all calls, simple wiring arrangements, and compactness of the switching equipment and power plant which permits the installation of this apparatus in some out-of-the-way location.

Description of Equipment

Essentially the 740-C P. B. X. is the same in general equipment arrangements and method of operation as the 740-A or the 740-B P. B. X. except for differences occasioned by requirements for residential service. Generally speaking, the P. B. X. comprises three separate units of equipment; i. e., a frame for mounting step-by-step switching apparatus, one or two attendant's cabinets used primarily for receiving and completing incoming central office trunk calls, and a small local power plant. Each station line requires but two wires which terminate at the P. B. X. equipment and each station is equipped with a standard dial telephone set.

Dial Equipment—The dial equipment consists of switches of the step-by-step type, 50 point line finders and 50 point selector-connectors being employed. These switches are arranged to function on five levels only, levels 1 to 4 being available for station lines and level 5 being assigned to central office trunks. The switch frame is somewhat smaller in height than that used for the 740-A or B P. B. X. and occupies the same floor space. It accommodates equipment for 38 station lines, 7 line finders, 7 selector-connectors, and 4 central office trunks.

The switch framework is covered with a frame casing equipped with doors. The framework and switching apparatus are finished with aluminum colored paint. The frame casing is finished in an olive green.

Attendants' Cabinet—The attendants' cabinet, as previously mentioned, is designed with the view of being particularly advantageous for residence service. It is relatively small and requires no special mounting arrangements; the equipment normally housed in the cabinet, including the key and lamp panel is assembled as a

unit and can if desired be obtained without the cabinet and be mounted in a niche in the wall or in a piece of furniture designed for this purpose.

The cabinet normally will be furnished as follows:

(a) Mahogany woodwork with a two tone mahogany finish and having the key and lamp panel and associated keys finished in statuary bronze. The lamp caps are green.

(b) Walnut woodwork with an antique walnut finish and having the key and lamp panel and associated keys finished in old brass. The lamp caps are amber.

A hand telephone set will usually be desired for use with the attendant's cabinet. However, either a hand telephone set or a desk telephone set is suitable for this purpose and either may be obtained in a finish that will match the finish of the key and lamp panel. Special woodwork finishes as well as special metal finishes can, of course, be obtained although it is expected that the standard finishes will be satisfactory in most cases.

In some cases, it may be desirable to have the attendant answer calls at one location during certain hours of the day and at another location at other times. Arrangements have accordingly been made for providing two cabinets when required, one being equipped with a key for transferring the service to the other cabinet. Night connections may be established at either cabinet but it is preferable to establish them at the cabinet to be attended first.

Power Plant—The power equipment is arranged to be located adjacent to the switch frame and is completely enclosed in a sheet metal casing finished in olive green to match the switch frame casing. It is the same general type of power plant as that employed for the 740-A and B P. B. X.'s differing only in the improved appearance.

The switch frame and power plant are so arranged that they can be conveniently located in a small room, closet, or any other suitable location.

Operating Features

The method of operation of the 740-C P. B. X. is, in general, the same as for the 740-A and 740-B P. B. X.'s except that arrangements are provided for secrecy on central office calls as well as on intercommunication calls. The attendant has a standard dial telephone set with which, together with lamp and key equipment and an associated buzzer furnished in the cabinet, incoming or outgoing central office trunk calls can be completed in a manner very similar to that for a 740-A and B P. B. X. However, the calling and called parties are not connected until the keys used to establish the connection are restored to normal at the attendant's cabinet. The key equipment at the cabinet is then ineffective until the attendant is recalled by a flashing lamp signal. The attendant can at this time connect to either the calling or to the called party but cannot bridge in on the connection. It is necessary that the keys be restored to normal to reestablish the connection after which the keys are again ineffective unless the attendant is recalled.

The dial equipment is arranged for the completion directly by dialing of all inter-

communicating calls and calls outgoing to central office except from stations that are restricted from direct central office service, in which case, it is necessary for the attendant to complete a connection to the central office.

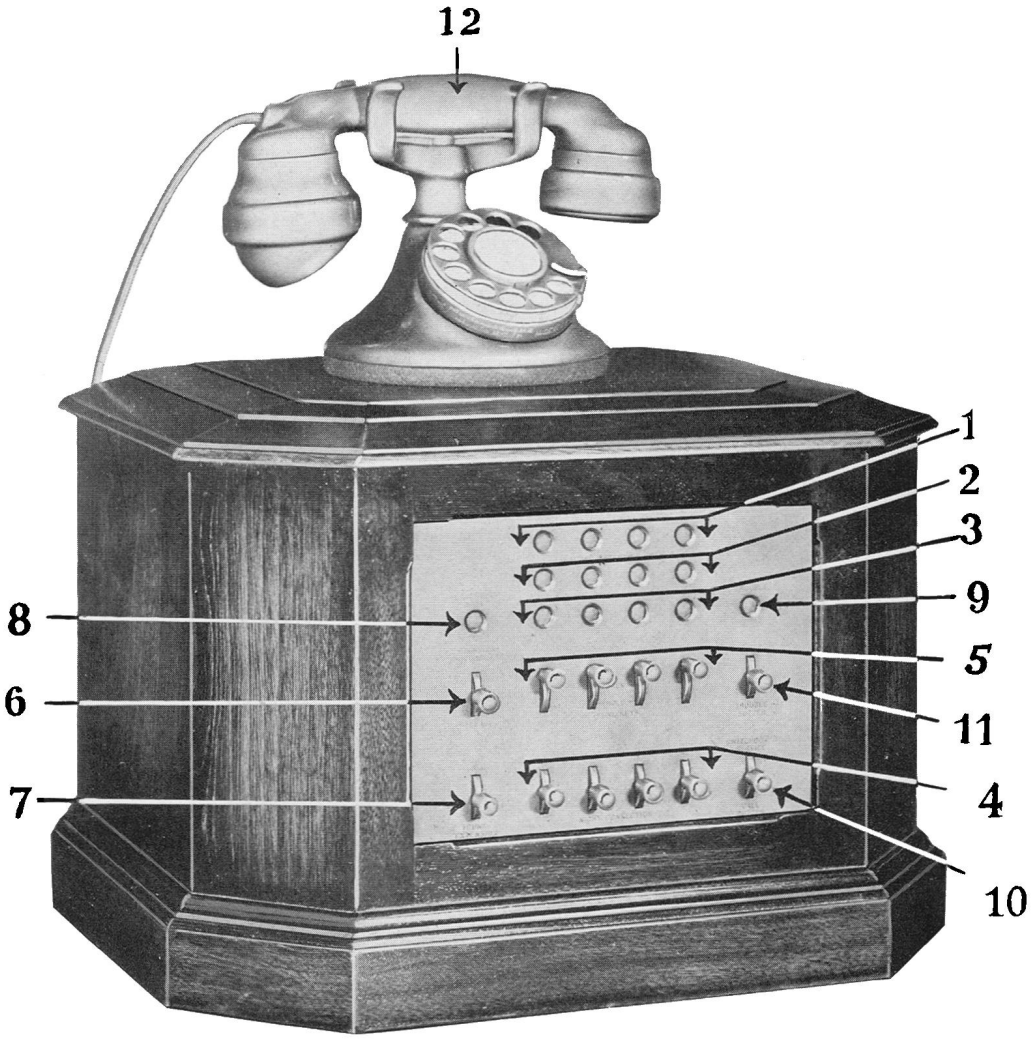
Each central office trunk is connected to lamp and key equipment mounted in the attendant's cabinet and is also assigned a line finder terminal in the dial switching equipment. An incoming call from a central office trunk is indicated at the attendant's cabinet by a lamp signal and is answered by operation of the key associated with the trunk. The operation of a common key in conjunction with the individual trunk key functions to connect the dial apparatus associated with the trunk so that the attendant is in position to extend the call by dialing the called station. The restoration of the keys completes the connection through to the station line. Facilities are provided for recalling the attendant so that an incoming call can be transferred by the attendant. The connection is automatically released when the connection at the central office is released and the called station hangs up the receiver.

The attendant may be reached from a dial station via a dial station line connected to lamp and key equipment in the attendant's cabinet. A call is indicated by this lamp signal and is answered by the operation of the associated key. The attendant's station line is not arranged for the extension of calls to other P. B. X. stations or to central office trunks. Outgoing central office trunk calls requiring assistance are placed with the attendant over this line; however, the station having given the necessary details of the call to the attendant, the receiver must be hung up. The attendant can place the call over a central office trunk and then complete the connection inward to the dial station in much the same manner as on an incoming trunk call. This method of operation can be reversed and the station called before the central office call is placed if desired.

Capacity

The 740-C P. B. X. is arranged for a maximum of four central office trunks and 38 dial station lines. The central office trunk capacity is 4 and the attendant's cabinet is designed to accommodate this number only. Since one selector-connector level is used for the central office trunks, four levels that can be used for 40 lines remain. One of these lines is assigned to the attendant and another is used for testing purposes so that the dial station line capacity is limited to a maximum of 38.

Dial Systems With Cordless Switchboard



740-C Attendant's Cabinet

Dimensions	
Height	10-3/16″
Width	1′-3″
Depth	10-3/16″

Finish—See Page 24

Capacity—Maximum: 4 Trunks, 38 Dial Station Lines

Operating Parts

1. Trunk lamp
2. Guard lamps (indicate awaiting station answer)
3. Busy lamps
4. Night keys (associated with trunks)
5. Operating keys (talk and hold, associated with trunks)
6. Attendant's extension and release key
7. Out call and extension dial key
8. Attendant's line lamp
9. Trouble alarm lamp
10. Combined battery and buzzer key
11. Trouble alarm cutoff key
12 Attendant's telephone set

Dial Systems With Cordless Switchboard

740-B Type

General

The 740-B P. B. X. is a small dial private branch exchange with a maximum of 38 station lines and a total of not more than 10 central office trunks and tie lines. The method of operation and the general equipment arrangements of this P. B. X. are the same as for the 740-A P. B. X. The switching equipment, however, has been redesigned to obtain economies made possible by a maximum of 38 station lines as compared with a maximum of 88 station lines provided with the 740-A P. B. X. The 740-B P. B. X. is designed for use in manual and dial system central office areas.

Application

In general the uses of the 740-B P. B. X. are the same as for the 740-A P. B. X.

Description of Equipment

Like the 740-A P. B. X. the equipment consists of three main units, the switching apparatus on a frame, a power plant, and an attendant's cabinet. The switch frame and power plant can be located in an office room if a more desirable space is not available. The attendant's cabinet is arranged to mount on an office desk or table leaving ample room for the performance of other duties by the attendant.

Dial Equipment—The dial equipment is mounted on a double sided frame accommodating 38 station lines, 12 line finders, 12 selector-connectors, 10 trunks and tie lines. A frame casing in olive green finish is provided to cover the switch frame when desired.

The switches are of the step-by-step type, 50 point line finders and 50 point selector-connectors being employed. These switches are arranged to function on five levels only. Two types of selector-connectors are standard for this P. B. X.; one for use where tie lines are not required and one for use where tie lines are required. In the case of the first type, the fifth level is used for central office trunks; in the other, the fifth level is used for both central office trunks and tie lines, a maximum of ten circuits, grouped as required, being possible. In both types of switches, levels 1 to 4 inclusive are arranged for local lines, these lines being reached by dialing two digits. In the case of the switch arranged for central office trunk lines only, the switch automatically hunts for an idle trunk when the digit 5 is dialed. In the case of the switch arranged for both trunks and tie lines on the fifth level, it is necessary to dial 5 followed by the code of the first terminal of the particular group of central office trunks or tie lines after which the switch automatically hunts over the group thus reached. The grouping of the central office trunks and tie lines on the same level prohibits local stations which are restricted from reaching central office trunks by direct dialing, from dialing tie lines also.

Attendant's Cabinet—The attendant's cabinet for the 740-B P. B. X. is the same

as that used for the 740-A P. B. X. In the case of the 740-B P. B. X., however, not more than one cabinet will ever be required since this P. B. X. is arranged for not more than a combined total of 10 trunks and tie lines.

Power Plant—The same power plant is employed for both the 740-A and B P. B. X.'s.

Operating Features

The operation of the 740-B P. B. X. is the same as that of the 740-A P. B. X. except that the digit 5 is dialed to reach the central office trunk and tie line level, and in the case where both central office trunks and tie lines are provided, it is necessary as previously described to dial a second digit to reach either the trunk or tie line groups.

Capacity

The 740-B P. B. X. is arranged for a maximum of 10 central office trunks and tie lines and 38 station lines, the fifth level of the selector-connector being used for central office trunks and tie lines. Four levels remain that can be used for station lines. One of these lines is assigned to the attendant and another is reserved for testing purposes so that the dial station line capacity is limited to a maximum of 38.

Dial Systems With Cordless Switchboards

740-A Type

General

The No. 740-A P. B. X. is a small two-digit dial system private branch exchange comprising an attendant's cabinet of the cordless type together with dial system and power plant equipment to serve installations up to a maximum capacity of 88 station lines. The 740-A P. B. X. is designed for use in manual or dial system central office areas.

Application

The uses to which the 740-A P. B. X. may be placed are in general similar to those of the No. 701-A system. A dial private branch exchange is especially desirable where there is a considerable proportion of intercommunicating or outward service and particularly where these service requirements extend over sixteen to twenty-four hours daily. Since with the No. 740-A system the attention of the attendant is required only on a portion of the calls, and since calls are automatically disconnected upon completion of the conversation, it is anticipated that the attendant will have considerable time for clerical duties which do not interfere with the efficient operation of the cabinet. The further fact that the cabinet is of such dimensions that it occupies but a small portion of the available space on a table or desk of standard size affords the attendant room for other work.

Description of Equipment

The 740-A P. B. X. consists essentially of step-by-step equipment employing 100 point line finders and selector-connectors, a small attendant's cabinet equipped with keys and signal lamps, and a simplified power plant.

Dial Equipment—The dial system equipment consisting of switches of the step-by-step type, is used for completion of intercommunicating calls, calls outgoing to the central office, and calls outgoing to distant P. B. X.'s over tie lines. These connections are established without the aid of the P. B. X. attendant by dialing directly from the station.

The dial equipment is mounted on a double sided frame accommodating 88 station lines, 20 line finders, 20 selector-connectors, and 19 trunks or tie lines. A sheet metal casing may be furnished if it is desirable to enclose the frame.

Attendant's Cabinet—The attendant's cabinet is a desk type turret similar in appearance to the manual cordless P. B. X. except that it is somewhat smaller and has different equipment arrangements to provide for the different operating requirements. It is designed to be mounted conveniently on an office desk or table and is arranged for the mounting of key and lamp equipment for 10 trunks or tie lines and the attendant's telephone set. Where more than 10 trunks or tie lines are required, two of these cabinets are furnished. A standard desk or hand telephone set is provided for the attendant's use in answering and extending incoming calls to the

stations by dialing, completing outgoing calls to the central office and to care for other services that may be required.

Power Plant—The power plant equipment comprises neat compact cabinets for enclosing the battery and miscellaneous alarm and control equipment. The charging equipment, usually tungar rectifiers, is mounted on top of the cabinet. Ringing current is ordinarily obtained over cable pairs from the central office but in some cases is furnished from a small ringing machine located at the P. B. X.

Operating Features

In general, the operating features of this private branch exchange are similar to those obtained with 701-A equipment. Intercommunicating calls are completed by direct dialing; outward central office calls either by dialing the central office code or by dialing the attendant's code and arranging for her to establish the connection. In the latter case, however, it is necessary for the station to hang up the receiver after placing the call over the attendant's line as this line is provided only for reaching the attendant and for the use of the attendant in originating calls to stations. The attendant can then establish connection to the central office and complete the call to the station by dialing in the same manner as on an incoming call from the central office.

The central office trunk furnished with the 740-A P. B. X. is of the combination type; that is, arranged for one-way outgoing service dialed directly from the station to the central office, and for two-way service between the attendant and the central office. All incoming calls are routed to the attendant's cabinet and the attendant completes the calls by dialing. Night service is also provided for.

The 740-A P. B. X. is arranged for tie lines service which is similar to that furnished with central office trunks except that the night service feature is not provided. Two types of tie line arrangements can be provided. One with operating features similar to a central office trunk connected to a manual central office is intended for use where the distant P. B. X. is another 740-A or a manual P. B. X. The other with operating features similar to a central office trunk connected to a dial system central office is for use where distant P. B. X. is of the 701-A type.

The zero level is definitely assigned to central office trunks and the ninth, eighth, and seventh levels can be used for either station lines, tie lines, or central office trunks.

Any station can be restricted from outward central office service.

Inward calls from the central office dialed by the attendant are disconnected automatically, i. e., after the connection has been established by the attendant all keys previously operated to set up the connection must be restored and the connection to the central office trunk at the P. B. X. is then under the joint control of the calling central office party and the called P. B. X. station. The attendant, however, is informed when the station answers and of the duration of the call by means of lamp signals associated with each trunk. Facilities are also provided for holding or transferring inward central office calls, and for releasing the central office trunk from the station line in case the called station is busy or does not answer or is busy and the calling party does not desire to wait.

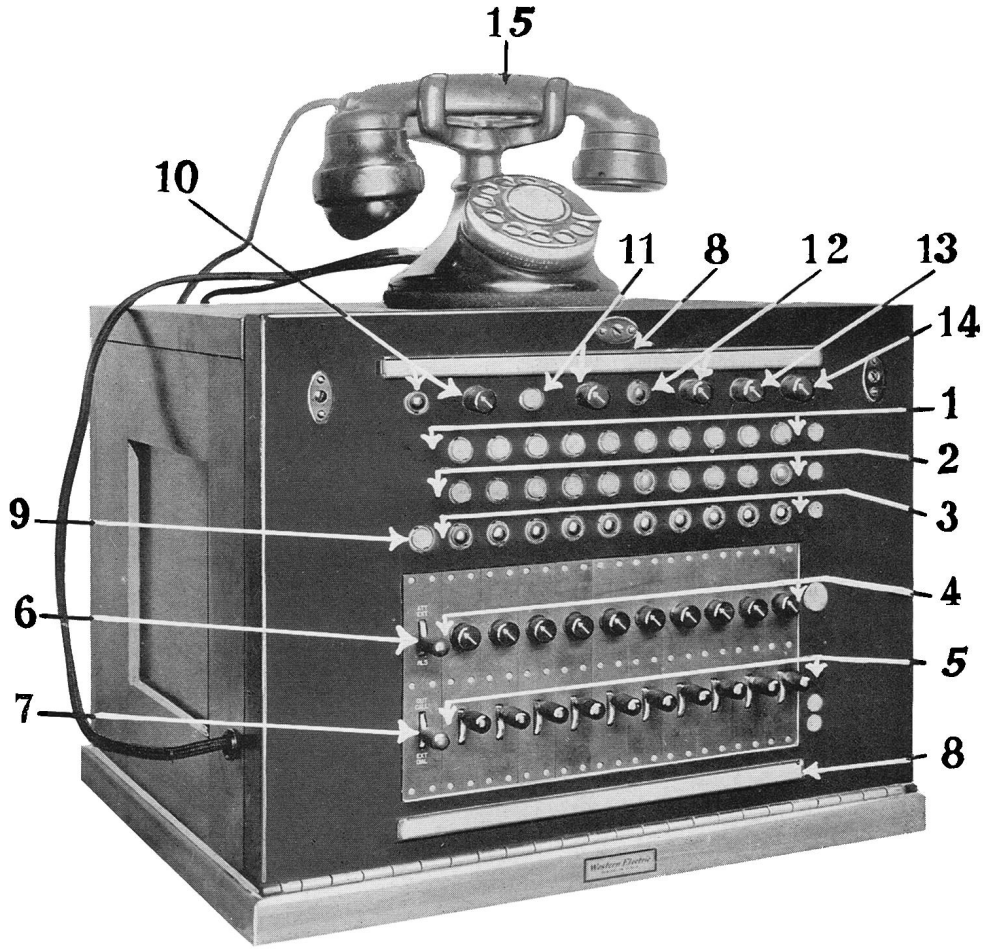
Capacity

A total of one hundred lines and trunks can be accommodated, one station line being used for the attendant's line and one for testing. The station line capacity is variable, depending on the number of trunks or tie lines required as follows:

Central Office Trunks	Tie Lines	Station Lines
1 to 10	None	88
*11 to 19	None	87 to 79
*1 to 18	One group of 10 or less	78
*1 to 17	Two groups	68

*The total number of trunks and tie lines is limited to 19 by the capacity of the switch frame.

Dial Systems With Cordless Switchboard



740-A and B Attendant's Cabinet

Dimensions	
Height	11-7/8″
Width	1′ 3-11/16″
Depth	1′ 9/16″

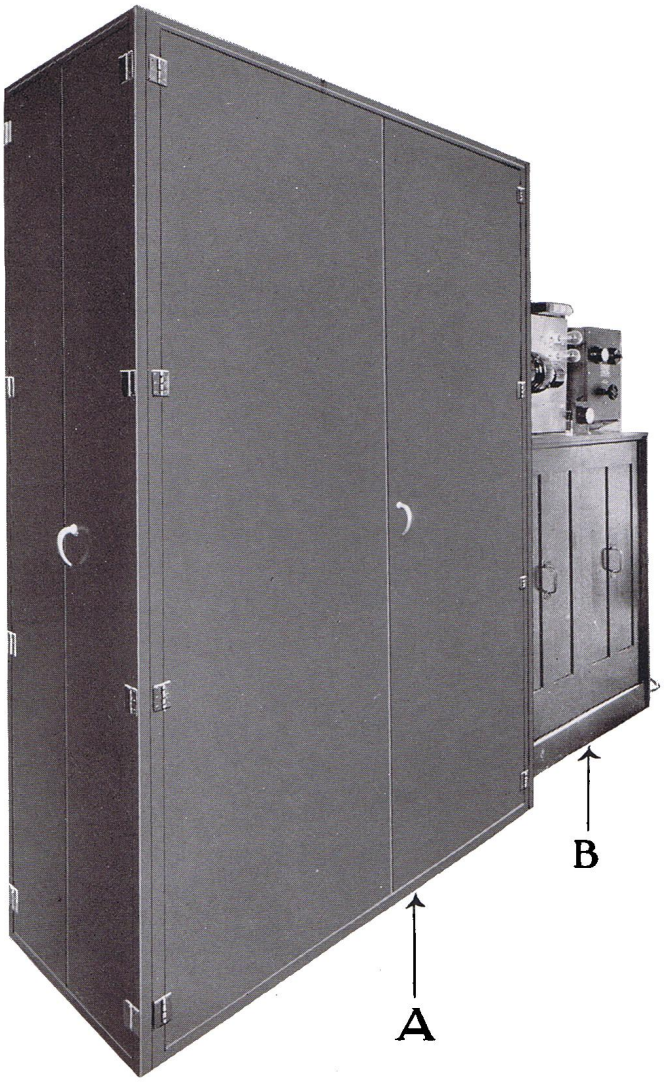
Finish—Mahogany

Capacity—See Page 18

Operating Parts

1. Trunk lamps
2. Guard lamps (indicate awaiting station answer)
3. Busy lamps
4. Night keys associated with trunks
5. Operating keys (talk and hold associated with trunks)
6. Attendant's extension and release key
7. Out call and extension dial key
8. Designation strip
9. Attendant's line lamp
10. Power alarm lamp and key
11. Permanent signal alarm lamp and key
12. Frame alarm lamp and key
13. Battery key
14. Auxiliary alarm key
15. Attendant's telephone set

Dial Systems With Cordless Switchboard



740-A and B Switch Frame and Power Plant

The 740-C switch frame and power plant cabinets are similar to the 740-A and B, except the height of the cabinets is less and all the power equipment is enclosed within the power cabinet. The floor space dimensions are the same.

Dimensions

	740-A and B Switch Frame	740-A and B Power Plant		740-C Switch Frame	740-C Power Plant
Height	7′	6′-3″	Height	5′	5′
Width	4′-8″	3′-7¼″	Width	3′-6¾″	3′-7¼″
Depth	2′	1′-8″	Depth	2′	2′

Finish—Olive Green

A—Switch Frame B—Power Plant

Dial Systems With Cord Type Switchboard

701-A Type

General

The 701-A P. B. X. system consists of dial equipment for switching intercommunicating and outgoing calls mechanically, and an associated switchboard for distributing incoming calls manually. The system may be connected to either a common battery manual or a dial central office.

Application

Dial private branch exchange service furnishes a faster means of establishing connection on intercommunicating and outgoing calls. Intercommunicating calls are established mechanically by calling direct from one station to another; thus the necessity of placing the call via an attendant is eliminated. During peak hours on a manual board the attendant may not be able to give the best grade of service and intercommunicating and outgoing calls may receive slow answers. When a dial P. B. X. is used the same high grade of service is maintained at all hours. Dial operation gives an immediate release of equipment when the calling party hangs up. This faster connection and disconnection cuts down the line and trunk holding time, and makes for more efficient use of the equipment.

Since the attendant handles only the incoming and special outgoing calls, such as toll calls, a saving in operating costs may be effected. With the same average proportion of outgoing and intercommunicating calls to total traffic and with a manual board installation requiring two or more attendants, the saving of one or more attendant's time may be effected by a dial P. B. X. This saving in operating costs increases as the number of stations increases; hence, this is an important factor in a growing business. In installations which can be handled by one attendant, a dial system will permit the attendant to give closer attention to incoming calls. This feature is particularly desirable in businesses such as banks, hospitals, department stores, railroad and steamship companies, public utilities, etc.

Under dial P. B. X. operation the customer obtains twenty-four hour outgoing and intercommunicating telephone service. This is of particular advantage in refineries, railroad shops, or other businesses which maintain a sixteen or twenty-four hour working force. In all lines of business it is of value to the night watchman and employees working after hours. The same incoming night service is established that can be established on manual P. B. X. systems.

Before definitely determining whether this is the service most suitable to the customers needs, it is essential that a comprehensive survey of his requirements for telephone service be made and that a decision be reached only after all factors have been given due consideration.

Description of Equipment

The 701-A P. B. X. consists of dial equipment of the step-by-step type mounted on seven foot switch frames, a manual switchboard of the cord type, station, trunk and

tie line apparatus mounted on relay racks, cross-connecting facilities usually in the form of a distributing frame, and a local power plant. A detailed description of each of these units of equipment follows:

A manual switchboard of either the multiple or non-multiple type is provided with the 701-A P. B. X. depending on the number of stations and the traffic load requirements.

The multiple switchboard is the same as the 605-A multiple manual switchboard with respect to the framework sections, cord circuits and miscellaneous equipment arrangements. Because of this similarity, it will be economical in many cases to install a 605-A board where manual service is desired initially and to add the dial switching equipment at a later date. It is essential that the Plant Department be advised if such a change is contemplated as it may be necessary to provide initially types and arrangements of station line equipment, distributing facilities and power plant apparatus which lend themselves readily to conversion to standard 701-A equipment.

The 701-A multiple switchboard is similar in appearance to the 605-A board in that the attendants' key shelf positions are equipped with cord pairs, supervisory lamps, keys, etc., while the face of the switchboard is equipped with jacks and lamps. The arrangements of the station and trunk multiple is on a four (4) panel basis. Station jacks, however, unless arranged for manual service on originating calls are not equipped with lamp signals as calls to the switchboard from stations are handled through the dial equipment over attendants' trunks which are terminated on jacks and lamp signals. (Attendants' trunks are listed in the tariffs as "dial trunks.") The switchboard lineup consists of a cable turning section, a head section, the required number of attendants' single position sections, and a foot section. Where it is necessary to change the direction of the board, 30 degree angle section may be employed. The sections are finished in walnut. Keyshelves are faced with black phenol fibre.

The non-multiple manual switchboard supplied with the 701-A P. B. X. is coded the 552-A switchboard. It has the same section framework as the 551-B manual non-multiple switchboard but is not suitable for use separately as a manual switchboard. Two sections can be lined up and bolted together. With this arrangement, a platform is required to permit the use of 6-foot cords. The keyshelf and face equipment are similar to that of the multiple switchboard except that the face equipment is provided on a non-multiple basis. The non-multiple switchboard is furnished either in oak or walnut finish. The keyshelf and face of the board are covered with black phenol fibre.

These switchboards must be so placed that access may be had to the rear of the sections where the equipment is housed. Sufficient clearance should be provided in front of the board to permit satisfactory operation and free passage behind the attendant's chairs.

A standard operators' chest transmitter with head receiver is provided for each position. Additional telephone sets for relief attendants will be furnished upon request at an additional charge. If the central office is of the dial system type, or if repeating tie lines are provided to a distant dial P. B. X., a dial is installed on each position. An alarm is furnished for audible signals.

Connections can be established between trunks and station lines for night service by means of the regular cord equipment and night jacks associated with the trunk.

Dial Equipment

The dial equipment is of the step-by-step type employing line finders, selectors and connectors (or selector-connectors) mounted on seven foot universal type frames. The station line, trunk, tie line and miscellaneous circuit apparatus is mounted on relay racks. The amount of dial equipment required varies with each installation, and this amount must be known before the plant engineers can determine exactly the amount of room and type of location needed. In general, basements are rarely suitable because they may be subject to flooding or dampness. A dirt and moisture proof room is desirable and for this reason an inside room which is not suitable for office space, is usually satisfactory. The dial and power equipment should be located, as near to the switchboard as possible in order to effect economies in cabling.

Line Finders—Two hundred point line finders are employed to connect the calling station line to a first selector. The dial station lines appear on banks below the line finders, each line finder having access to 200 lines. In each of the 100 positions of the switch, the line finder is in contact with two station lines, the mechanism determining which line will be connected. When the receiver is removed from the hook at a dial station, the dial station line functions to start a line finder and marks the line so that it will be selected when the line finder steps to it. A first selector or a selector-connector is directly associated with each line finder. After the line finder has found the calling station line, dial tone will be sent out from the selector or selector-connector.

Selectors—Selectors are 100 point step-by-step switches which when actuated by the dial pulses of a single digit, operate to select a path to an idle second selector or connector in the thousand or hundred dialed respectively.

The first selector sends the dial tone back to the calling station immediately upon being connected to the station by the line finder. This indicates to the calling party that the equipment is ready to receive the dial impulses.

A four digit system requires a first and second selector and a connector to establish connections; a three digit system, a first selector and a connector; a two digit system, a selector-connector.

Under a four digit system, the first selector when actuated by the dial impulses, operates to select a path to an idle second selector in the selected thousand dialed. Second selectors operate in like manner and select a path to an idle connector in the selected hundred dialed. The operation under a 2 or 3 digit system is identical except that the number of steps is reduced.

Connectors—The connector is controlled by the last two digits dialed and selects the particular station called. Upon receipt of the last dial impulse, if the called line is idle, the connector places a busy test on the called line and rings the called station. If the called line is busy, it connects the busy signal to the calling line.

Miscellaneous Equipment—Other equipment units include relay racks and a distributing frame. The relay racks are required to mount equipment associated with the station, trunk, and tie lines. The distributing frame is an iron frame work

upon which cables from the switchboard and lines from the central office and P. B. X. terminate. By means of cross-connecting wires, any station or trunk line may be associated with any station or trunk jack in the switchboard or line finder terminal in the dial equipment.

Power Plant—The power plant comprises a storage battery, ringing machine, battery charging equipment and a power board. The storage battery provides signalling and talking battery current for the switchboard and dial equipment. An outside source of electric power is required to operate the battery charging equipment. The ringing machine is the source of ringing current, dial tone, and the busy signal. It is driven by power derived from the storage battery. The power board carries the switching equipment and measuring instruments by which the power plant is controlled.

Operation

From the description of the switchboard, line finder and line circuit equipment, it will be evident that each station line has a terminal at each of these points of contact. The jack terminal at the switchboard enables the attendant to connect to the station an incoming call from the outside by plugging into the station jack and ringing. The line finder terminal gives the station access to the dial equipment for dialing other local stations or trunks to the central office or P. B. X. switchboard. The connector terminal makes the station available on calls from other local stations through the dial equipment.

Trunks to the central office are provided in separate groups for incoming and outgoing calls. The outgoing trunk group is not listed and is terminated in the dial equipment only, generally on the 9th level. P. B. X. stations by dialing "9" are thus able to obtain a trunk to the central office for outgoing calls without calling the P. B. X. attendant. The incoming or two-way trunk group is connected to the switchboard only. Attendants' trunks are also provided for one way service from the dial equipment to the P. B. X. switchboard for connections with the attendant from a station. They are of three different types as follows:

"Attendant" trunks are terminated on the "0" level and enable the station user to communicate with the P. B. X. attendant when necessary.

"Vacant" level trunks are connected to vacant selector levels so that in the event a number in one of them is dialed in error, a signal will appear before the P. B. X. attendant and she will dispose of the call.

"Intercepting" trunks are connected to the terminals of stations disconnected or changed in number. When such stations are dialed, the signal appears before the P. B. X. attendant and she disposes of the call as in the case of vacant level trunks.

Tie lines may be connected to the switchboard, to the dial equipment, or multipled to both. Tie lines connected to the dial equipment are usually reached from the stations by dialing a single digit code number. Tie line connections through the switchboard are made by dialing the attendant, who establishes the connection. Tie lines between dial P. B. X. systems can be arranged for direct dialing over them. No arrangements are made for dialing central office calls over these repeating tie lines.

Certain dial equipped stations may be restricted from dialing central office trunks or tie lines. If a central office trunk or tie line is dialed from a restricted station, the busy

signal is received. Arrangements are made for such stations to receive outward service through the switchboard, if desired, by dialing "0". Calls from manual stations and incoming calls to all stations may be restricted in the same general manner as in manual P. B. X.'s.

Connections may be established at the switchboard to distribute incoming calls when the attendant is not on duty, in the same general manner as in a manual P. B. X. system. Intercommunicating calls are made at night from stations not provided with an inward central office connection, in the usual manner. Intercommunicating calls cannot be made to stations set up on night connection except by dialing the central office night number of the trunk to which the desired station is connected. Those stations not connected for incoming night service may dial the central office in the usual manner.

Capacity

The dial equipment of the 701-A is designated 2 digit, 3 digit or combined 3 or 4 digit, depending upon the number of digits dialed on station to station calls. The station line capacities of this equipment on these bases are as follows:

701-A P. B. X.

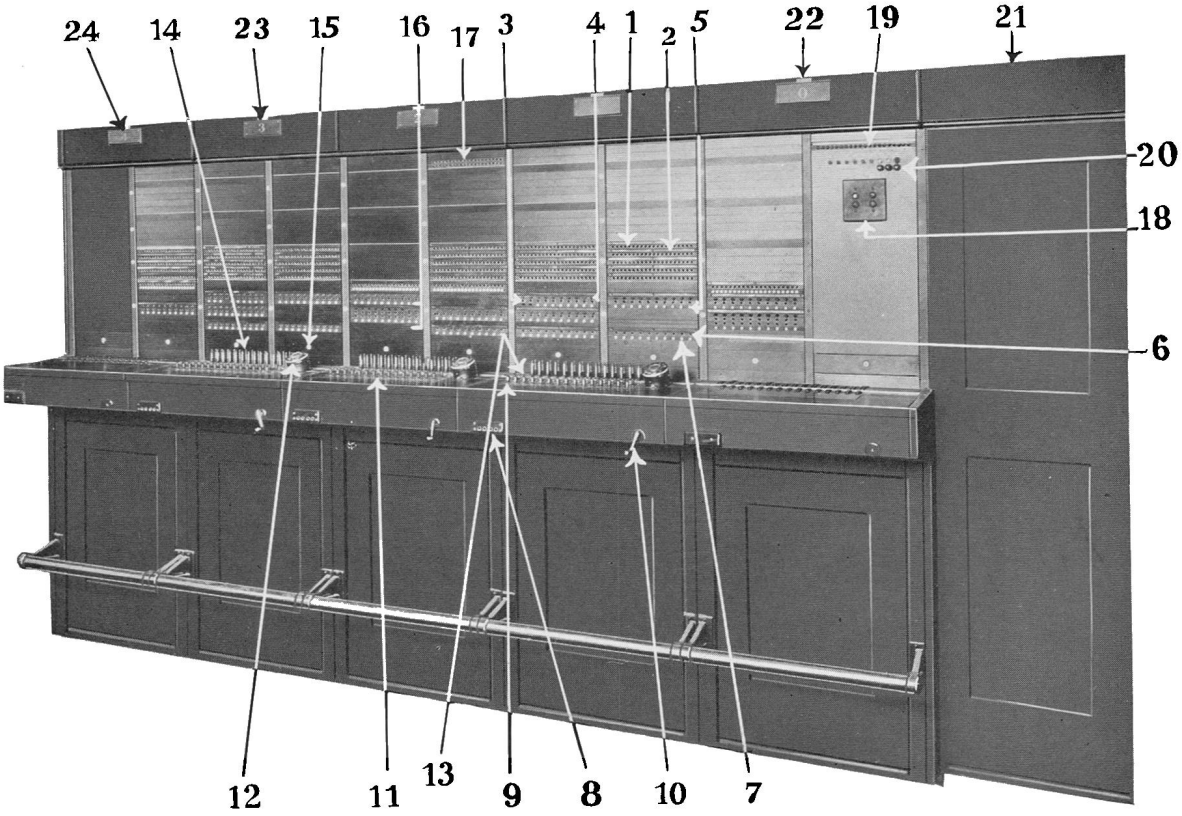
	Maximum Without Trunks or Tie Lines	Deduct for Each Level Assigned to Trunks or Tie Lines
2-digit basis	90	10
3-digit basis	900	100
3- and 4-digit	1200 or 2000*	

*Limited by capacity of manual switchboard.

The capacity of the 701-A non-multiple switchboard is approximately 300 dial station lines with designation strips and 80 trunks, tie lines or manual station lines. This capacity can be increased, however, by the use of two-non-multiple sections. The capacities of the multiple 701-A switchboard on a four-panel multiple basis with and without designation strips in the station multiple are as follows:

	With Designation Strips	Without Designation Strips
Station Lines	1200	2000
Trunks and/or tie lines (20 per strip)	400	480
Trunks and/or tie lines (10 per strip)	200	240

Dial Systems With Cord Type Switchboard



701-A Multiple Switchboard

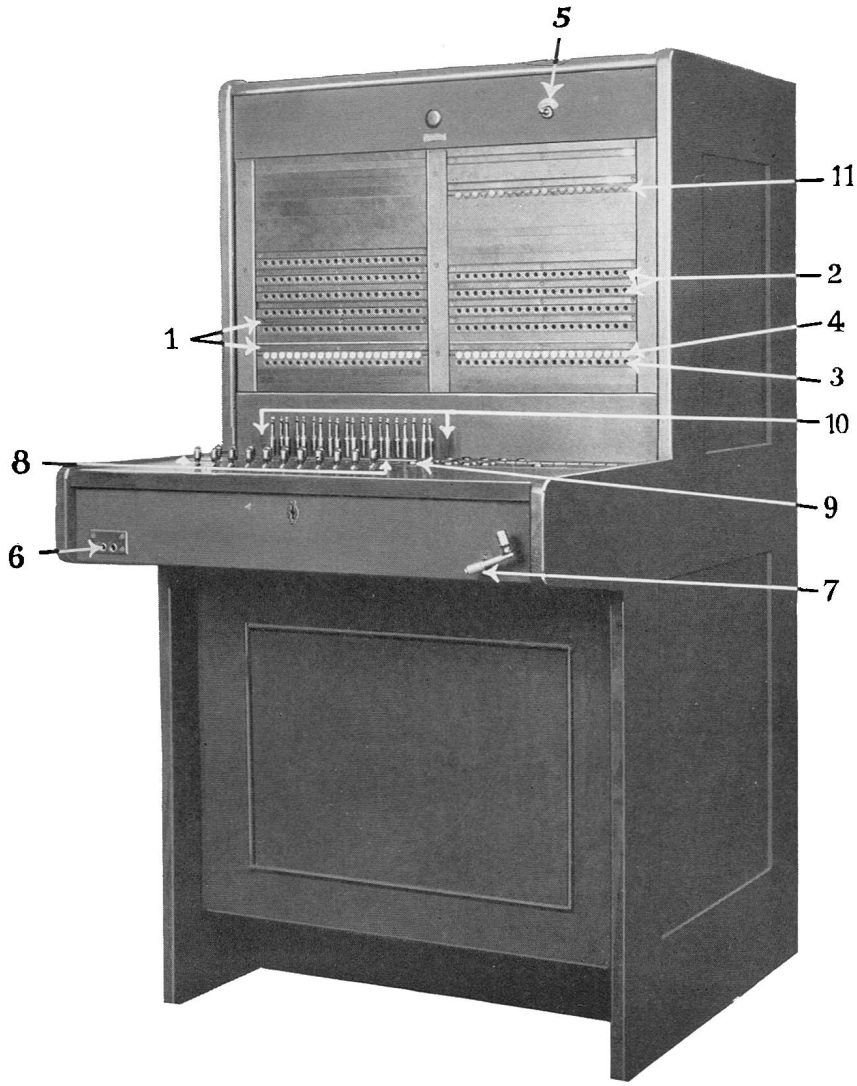
Dimensions
Vary with installation

Finish—Walnut
Capacity—See Page 40

Operating Parts

1. Station multiple jacks
2. Designation strips
3. Trunk jacks
4. Trunk busy lamps
5. Trunk line lamps
6. Attendants' trunk jacks
7. Attendants' trunk lamps
8. Attendant's telephone set jacks
9. Hand generator key
10. Hand generator
11. Operating keys
12. Attendant's dial
13. Supervisory lamps
14. Connecting cords
15. Pilot lamp
16. Tie line equipment
17. Trunk night jacks
18. Battery switch
19. Alarm lamps
20. Alarm cutoff keys
21. Cable turning section
22. Head section
23. Attendant's position section
24. Foot section

Dial Systems with Cord Type Switchboard



Non-Multiple Switchboard for 701-A P. B. X.
(552-A Type)

Dimensions

Height	4′ 3-3/16″
Width	2′ 2-7/8″
*Depth	2′ 10-1/2″

*Includes Key Shelf.

Finish—Oak or Walnut

Operating Parts

1. Designation strips
2. Station jacks
3. Trunk jacks (central office, attendant or intercepting trunks)
4. Trunk line lamps
5. Battery switch
6. Attendant's telephone jacks
7. Hand generator
8. Cord keys
9. Cord supervisory lamps
10. Connecting cords
11. Alarm lamps

Dial Systems With Cord Type Switchboard

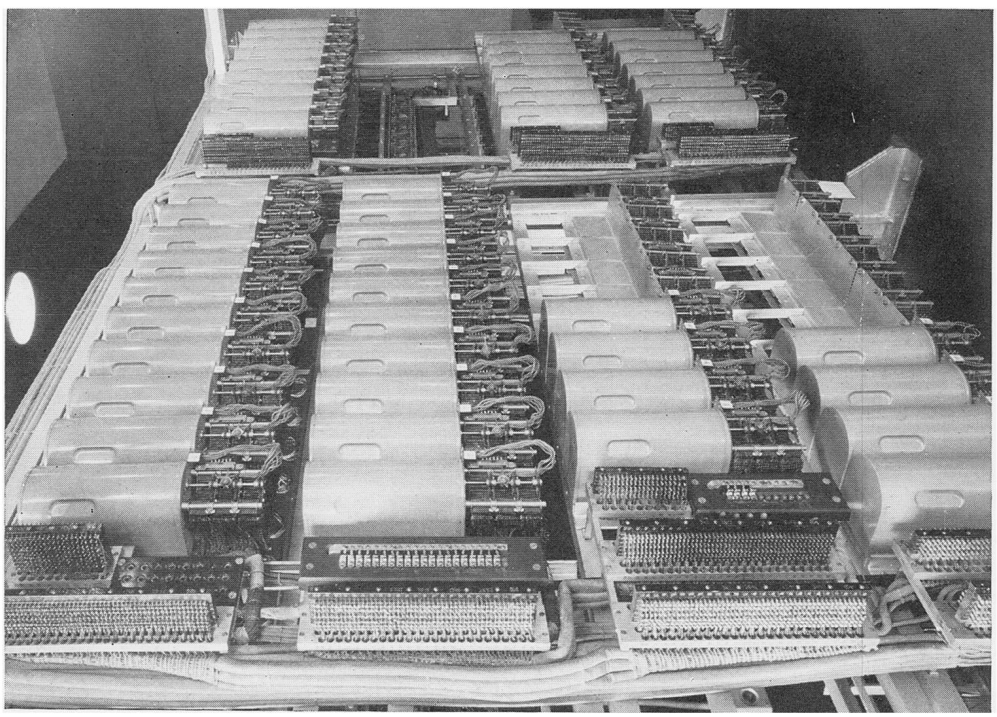


Fig. 1
701-A and 711-A Switch Frames

Dimensions
Vary with installation

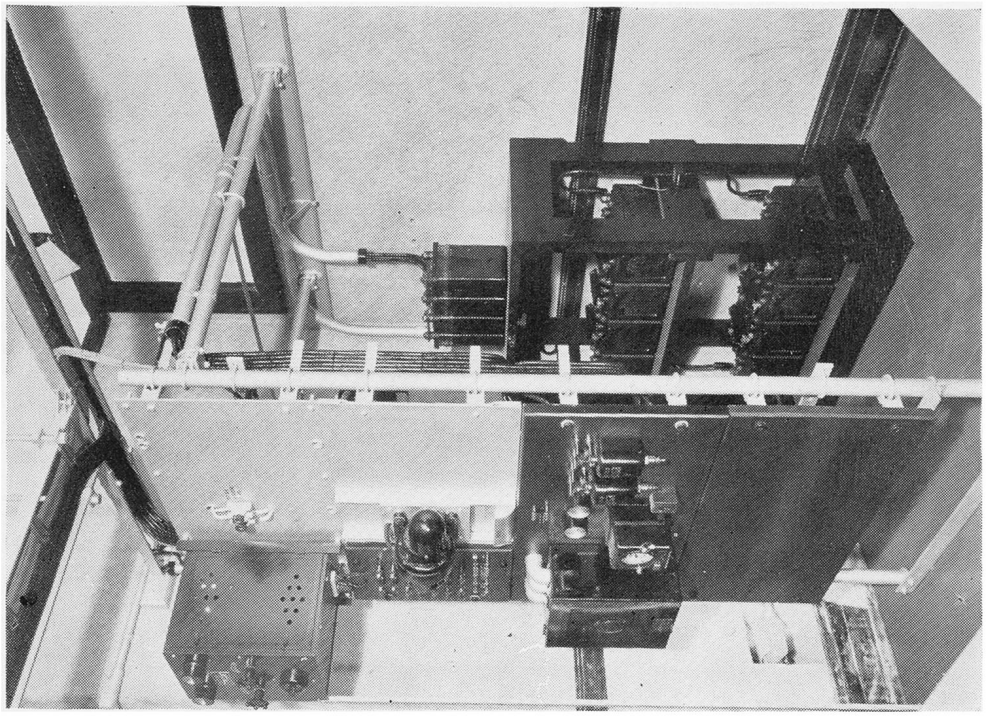
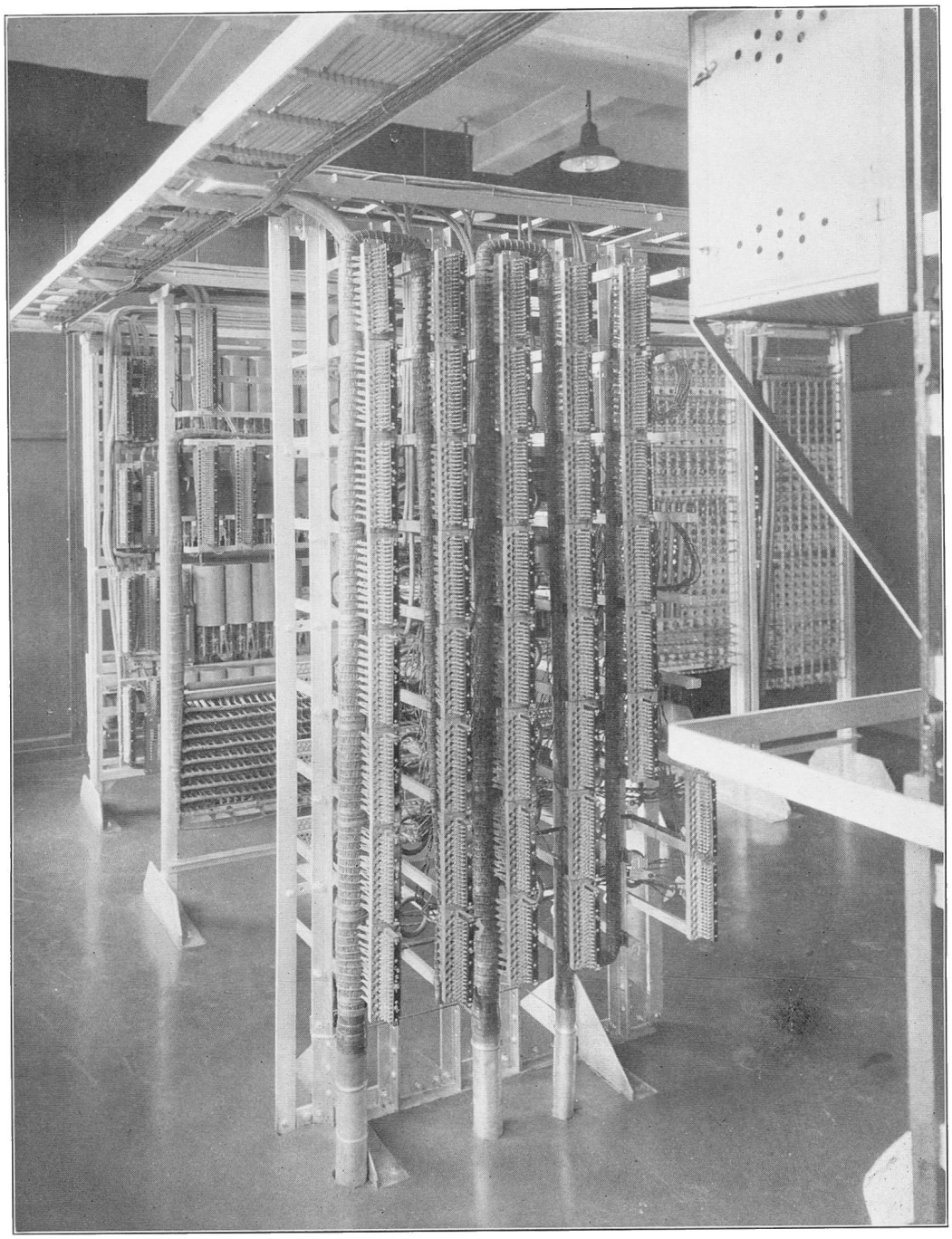


Fig. 2
701-A and 711-A Battery and Power Board

Dial Systems With Cord Type Switchboard



701-A and 711-A P. B. X. Distributing Frame and Dial Equipment
General View

Auxiliary Dial Type System

General

The 711-A P. B. X. provides dial equipment facilities for the mechanical handling of intercommunicating calls, and calls outgoing to and incoming from connecting P. B. X.'s. No provision is made for a manual switchboard and in order to handle incoming and outgoing central office calls, it will be necessary to furnish tie lines from an attended P. B. X.

Application

The 711-A P. B. X. is intended primarily for use as a subsidiary private branch exchange, incoming central office service being given through the attendant at the manual switchboard of the main private branch exchange and outgoing central office service in the same manner. The 711-A P. B. X. is suitable for companies maintaining two establishments (for example, offices and plant) relatively close together. By installing a 711-A system in one establishment and connecting it to the switchboard in the other, a saving is effected in operating costs, switchboard space, and P. B. X. attendant supervision. Such an arrangement provides rapid telephone connection between the two private branch exchanges by dialing. As dialing over tie lines can only be done in those cases in which the distance is not too great, each case should be passed on individually by the Plant Department to determine its feasibility.

Operating Features

Intercommunicating calls are completed through the dial equipment.

If the system is connected to another P. B. X. by tie lines, the other P. B. X. can be reached by dialing a single digit tie line code. If the other P. B. X. is of the dial system type, connections between stations in the two systems are established by dialing the tie line code and the station number. Incoming calls can be received at the switchboard of the associated main or attended P. B. X. and distributed to stations of the 711-A board by dialing over the tie lines. Outgoing calls to the central office are placed through the attendant at the associated P. B. X. by dialing the tie line code when the associated P. B. X. is of the manual operated type and the tie line code and then "Operator" when the associated P. B. X. is of the 701-A type.

Capacity

The dial equipment of the 711-A P. B. X. is designated 2 digit, 3 digit or combined 3 or 4 digit, depending upon the number of digits dialed on station to station calls. The station line capacities of this equipment on these bases are as follows:

	Maximum Without Trunks or Tie Lines	Deduct for Each Level Assigned to Trunks or Tie Lines
2-digit basis	100	10
3-digit basis	1000	100
3- and 4-digit	**	

**It is expected that P. B. X.'s which are too large to be handled on a 3 digit basis will require a manual switchboard.

INDEX TO SECTIONS

Section 1* -

Section 2* -

Section 3* -

Section 4* -

Section 5 - TYPE D (NO.4) ORDER TURRET

* These sections to be issued later.
Now included in present material.

Order Turrets

General

Order turrets have been made available to meet the requirements of customers such as newspaper offices, telegraph and taxicab companies, department stores, public service corporations, and similar organizations whose business requires prompt and expeditious handling of a large volume of incoming and outgoing calls in connection with order receiving and soliciting, telegram recording and delivery, requests for information and other situations where similar telephone requirements are involved. They are designed for use in either manual or dial central office areas and are arranged to be mounted on desks or tables furnished by the customer.

No. 1 Order Turret

Application

The No. 1 order turret is a small, one line non-multiple type arranged for two-way connection to a station line of a P. B. X. If desired, connection can also be provided to a central office or P. B. X. line for outgoing service only. It is most advantageous where orders are taken by employees spread about in separate locations or whose work is varied. It combines, in a small cabinet, facilities for selecting and holding either a two-way or a one-way line and placing a busy signal on the two-way line. It has a lamp signal for signaling incoming calls.

Description of Equipment

The equipment is housed in a black cubical cabinet 8 inches wide, 8 inches long and 9 inches high, and includes two combined talking and holding keys, a busy test key for diverting calls and a line lamp for indicating calls. With the "busy test" key is combined a battery cut-off feature. Although no audible signal is usually required, a bell can be provided if desirable. A desk set, a hand set, or an operator's set, can be furnished as the attendant's telephone set. When a dial is required with an operator's set, the dial is mounted on the table or desk where the turret is located. The two-way line is arranged for operation as a P. B. X. station line only. A supplementary one-way outgoing line to either the P. B. X. or central office may also be provided. This line will, in general, go to the P. B. X. for the purpose of obtaining a connection to another station while holding a call on the regular line. In some cases, however, where, for example, the attendants solicit business by telephone, the customer may wish to have this outgoing line connected to the central office in order that these out calls need not be handled at the P. B. X.

Since each No. 1 turret is provided with only one incoming line, all incoming calls for the turrets, received at the P. B. X. when the turret lines are all busy, must be held at the P. B. X. pending completion. This imposes some additional operating at the P. B. X. positions and this point should be considered before No. 1 turrets are recommended.

The No. 1 turret is more suitable for installations in which employees are assigned exclusively to receive incoming calls, or where they are at least able to give the turret close attention. As the incoming call signal is of the visual type, the call may be overlooked unless the employee is located where he can watch the turret. The 523-C sub set has a distinct advantage in this respect.

Operation

Each key has three positions; normal, talking, and holding. The left hand key is associated with the two-way line and the right hand key with the one-way line. The busy test and battery cut-off key when operated to the "busy" position puts a busy condition on the two-way line at the P. B. X. and cuts the battery off the line lamp.

No. 2 Order Turret

Application

Where the volume of incoming order traffic is large, the No. 2 order turret can be used to better advantage than the No. 1 turret. The No. 2 type permits the use of P. B. X. lines or direct central office lines and as incoming lines may be multipled, insures the most efficient handling of telephone traffic.

In general, the advantages of the No. 2 order turret are outlined as follows:

1. The No. 2 order turret facilitates rapid handling of calls. Incoming calls are indicated at several positions, and can be answered from any one of these positions, and for this reason the answering time on calls to the turret should be kept at the minimum number of seconds at all times. The saving effected through this turret by faster and more efficient handling of calls has been estimated in many installations as the equivalent to a 20% increase in personnel and merchandising equipment. Fast service has a direct and favorable effect on the attitude of the person calling.

2. The turret offers flexibility in handling variable traffic loads. Attendants used for handling peak loads can be delegated to other work, such as filling orders received, handling mail orders or similar activities during slack periods.

3. The turret enables the customer to centralize incoming calls. Incoming calls distributed to the various departments over the customer's premises may not receive proper attention because the employees in the particular department are busy with other responsibilities. This results frequently in delayed answers, during which the person calling may get impatient and hang up. If it is necessary for the person calling to deal with more than one department during the conversation, the calls must be transferred, which causes additional delay and longer trunk holding time.

4. Sufficient space may be provided on the table upon which the turret is mounted to give the attendant ample room to write orders, or refer to lists of customers and other working material.

Arrangements

1. A single group of central office lines with one listed number in the directory and for advertising purposes, is generally the most desirable, as the public becomes accustomed to calling one number to transact business regardless of its nature.

Under some circumstances, however, separate trunk groups for the customers' P. B. X. and order turret are advantageous, and the considerations involved should be carefully weighed, to determine what arrangement will be the best under the circumstances. For example, under the following conditions separate trunk groups to the turrets might be of advantage: (1) Where incoming calls to the other departments have peak periods which would block incoming orders, as for example, newspapers receiving information calls following public events, disasters, or similar occurrences; (2) In installations in which the calling public normally distinguishes between the various departments and will place the calls properly, as for example, police departments of municipal organizations; (3) Where the calling rate to the turret is heavy, and a substantial saving may be made in operating costs and time by the calls being directed straight to the turret, as for example, telegram receiving department of a telegraph company or business offices and repair departments of public utility organizations.

Generally, provision should be made so that, where there is a separate group of trunks to the turret, calls which are misrouted to the P. B. X. or the turret may be rerouted without requesting the customer to hang up and place another call. This can be done for calls misdirected to the P. B. X. by using tie lines to the turret; and for calls misdirected to either the turret or the P. B. X. by having the central office lines of each board multipled to the other, and using a tie line to the turret for a call circuit.

For answering calls to the turret at the P. B. X. at night or on holidays, the central office lines to the turret multipled at the P. B. X. can be equipped with line lamps.

2. A single trunk group multipled to both the P. B. X. and the turret and provided with line lamps at each is advantageous if most of the calls are for the turret; as is often the case with taxi companies, laundries, small telegraph offices, groceries and automobile service companies. Under this arrangement, the P. B. X. operator can assist the turret attendants in taking orders during peak hours as calls may be answered at both the P. B. X. and turret. If a call which is intended for the switchboard is picked up at the turret it may be referred back to the P. B. X. attendant by means of tie lines. Under such an arrangement, the P. B. X. operator may be able to handle all of the orders and calls during slack periods.

3. A single group of incoming central office trunks to the switchboard with tie lines to the turret, is suitable for all installations other than those discussed. Under this arrangement, non-listed central office lines may be provided to the turret for placing outgoing calls in order to eliminate duplicate handling of outgoing calls and to prevent tying up P. B. X. trunks used for incoming calls.

Description of Equipment

The No. 2 order turret is a cabinet 4 feet long, 1 foot 11 inches wide, by 1 foot, 3 inches high arranged to be mounted on a table furnished by the customer. The cabinet

is furnished in either oak or mahogany finish. The table should be of sufficient size to provide ample writing space on either side of the turret. It should not be so wide, however, as to cause the attendants any difficulty in reaching the cords or keys. In some cases, a table specially arranged for typewriters, such as is used in connection with telegram delivery and recording service may be used.

Each turret provides position equipment for four attendants. Each position is equipped with a standard operator's telephone set, two single ended cords and associated keys. A desk or hand telephone set can be provided for the attendant's telephone set if desired. The jacks associated with the attendants' telephone sets are mounted in the drawer rail of the table. In dial system central office areas, or where the turret is connected to a dial type private branch exchange, dials are mounted on the table.

The relays and other apparatus required for four telephone circuits and for ten trunks are housed in the two end sections of the cabinet. When the number of lines exceeds the space available in the turret or turrets, a separate apparatus cabinet may be provided to house the additional equipment. The jacks, lamps and keys are mounted in panels in the center of each side of the turret with the cords located directly in front of these panels.

Any number of lines up to forty can be terminated in each turret. The lines are multipled to each side of the turret and also to other turrets when more than one section is required. The multiple jacks, line lamps, and busy lamps are provided on a twenty per strip basis.

Lines terminating on No. 2 order turrets are of two general types: They may be either direct trunks from the central office, which may be extended, if desired, to terminate on a private branch exchange switchboard; or they may be station lines from a private branch exchange switchboard. Call circuit lines terminating on jack and lamp signals on the P. B. X. and keys on the order turret are necessary when the order turret trunks are multipled to a P. B. X.

One side of the turret (in group installations only the first turret) is arranged for terminating five station lines for order receiving during busy periods or for order solicitation. At the turret, these stations terminate on keys and single ended cords and can be connected to any jack ended line. These plug ended station lines must be on the same premises as the turret. Provision may be made, however, for off-premise station lines terminated on jacks in the trunk multiple, if required. Intercommunication between jack ended lines, or between plug ended station lines is not provided for. A holding feature is provided which enables the attendant to hold a call on one line while making or acknowledging a call on another line. An audible signal is provided for supervisory purposes.

A few cases may arise where the customer desires an arrangement to permit a three-way conversation between the calling party, the turret attendant and a private branch exchange station. This arrangement can be provided in connection with the No. 2 order turret but it introduces a possibility of transmission loss which might cause difficulties in some cases. In view of the above, it is desirable to limit the arrangement so far as practicable to cases where all considerations make its use advisable. All requests for this arrangement should be referred to the plant engineers before making any commitment to the customer.

Operating Features

Calls can be answered from any position. An incoming call is indicated by the lighting of the white line lamps in all multiples of the line. When the call is answered, the white lamps are extinguished and the associated green busy lamps light. These lamps are extinguished upon removal of the plug from the jack. A call on any line may be held by operating the associated cord circuit key to the hold position.

An outgoing call may be placed by inserting a plug into the jack of an idle line and operating the associated cord circuit key to the talking position. When the plug is inserted into the jack, the associated green busy lamps light in all multiples of the line.

The operator's telephone set is connected to cord circuits for answering or calling purposes by operating the associated cord circuit key to the talking position.

Capacity

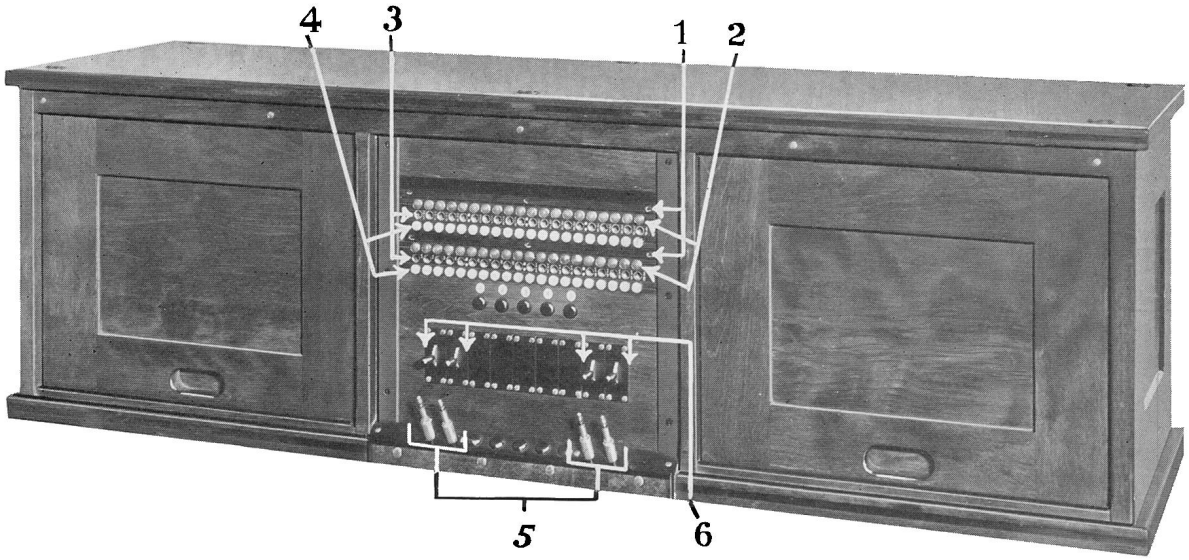
Each turret is arranged for a maximum capacity of forty lines. A P. B. X. or central office line may be multipled to as many as six turrets. Where the installation consists of more than six turrets and where there are not more than 40 lines, each line may be connected in all turrets but it will be necessary that enough line and busy lamps be omitted so that a maximum of 12 appearances will not be exceeded. Where more than forty lines are required, the trunks may be divided into groups in the most convenient answering arrangements to meet the customer's traffic requirements.

Order Turrets

No. 1 Type

Dimensions		*Finish*
Height	9-1/8″	Black
Width	8-1/2″	
Depth	8-1/2″	

Order Turrets



No. 2 Type

Dimensions

Height	1′ 3″
Width	4′
Depth	1′ 1″

Finish—Oak or Mahogany

Capacity—40 Lines

Operating Parts

1. Designation strips
2. Busy lamps
3. Multiple jacks
4. Line lamps
5. Answering cords
6. Cord keys

Busy Test Cabinet
(No. 523-C Sub Set)

General

The No. 523-C Subscriber's Set, known as a Busy Test Cabinet, is designed to facilitate answering incoming calls rapidly and efficiently by indicating to P. B. X. operators by means of a busy signal, those P. B. X. stations which are busy on another call, where employees are not at their desks, or where for some other reason the employee concerned cannot immediately answer the incoming call. It has a combined "busy signal" and a holding feature on a two-way line, and outgoing service and holding feature on a one-way line. The use of several of these sets, even though in different locations, assures that each call will be directed to some one ready to receive it. The set may be provided for use on station lines of manual or dial private branch exchange systems only as the one-way line over which all calls are normally made and received should always terminate in a P. B. X. The one-way line, however, may terminate either in a P. B. X. or a central office.

Application

The sales considerations for the busy test cabinet are practically identical with those of the No. 1 order receiving turret, except that a chest transmitter cannot be used in lieu of a desk or hand telephone set and that the 523-C set is intended primarily for incoming traffic, while the No. 1 order turret may also be used for order soliciting over the one-way line.

The set is adapted for businesses such as light, gas, and water companies, newspapers, laundries, cleaners, coal companies, dairies, lumber yards, and any other which receives order calls that can be handled by any one of several employees. With the use of the 523-C set, it is not necessary for the telephones receiving incoming calls to be placed together on one desk, or even located in the same room. The answering telephones can be placed on desks throughout the office or offices; and those employees who are away from their desks, or for some other reason not in a position to answer the call, can, by operating the set, indicate to the P. B. X. operator that they cannot handle incoming calls.

The use of the busy test feature permits directing the incoming calls to only those telephones at which there is someone to answer. This speeds up the answering time on all calls (answering time should be under five seconds), which effects the equivalent of a substantial increase to the customer in personnel and central office trunks. This is in addition to the recognized value of rendering to the person calling a prompt and satisfactory service.

The use of the set prevents confusion in the office caused by employees moving around to answer unattended telephones. Employees who are busy at their desks with other work can avoid being interrupted by incoming calls.

The visual busy signal on the top of the cabinet permits supervision of the employees who should be answering incoming calls, to assure that their incoming lines are open for receiving calls.

If the employee is going to be away from his desk for a considerable period he

should notify the P. B. X. attendant accordingly instead of operating the visual busy signal to prevent burning the busy signal lamps unnecessarily.

The line holding feature permits the employee to hold the two-way line and call out on the one-way line for information, etc., and return to the two-way line to complete the call. Both lines can be held and conversations can be carried on over them alternately. Calls cannot, however, be placed over the one-way line when a call is not being held on the two-way line, as this would cause a permanent signal on the two-way line.

The buzzer, which is within the cabinet, is low tuned and the direction of the sound is controlled by means of a small sounding box. This makes for much quieter office operation than does the use of ordinary buzzers or bells.

The cabinet must be fastened to the desk to prevent its being knocked off. Usually a hole is drilled in the center of the desk and the set is both wired and fastened from underneath. If the customer objects to this, it can be fastened to a board which is secured to the right-hand edge of the desk.

Description of Equipment

The equipment is housed in a small black cubical cabinet arranged to mount on an office desk or table.

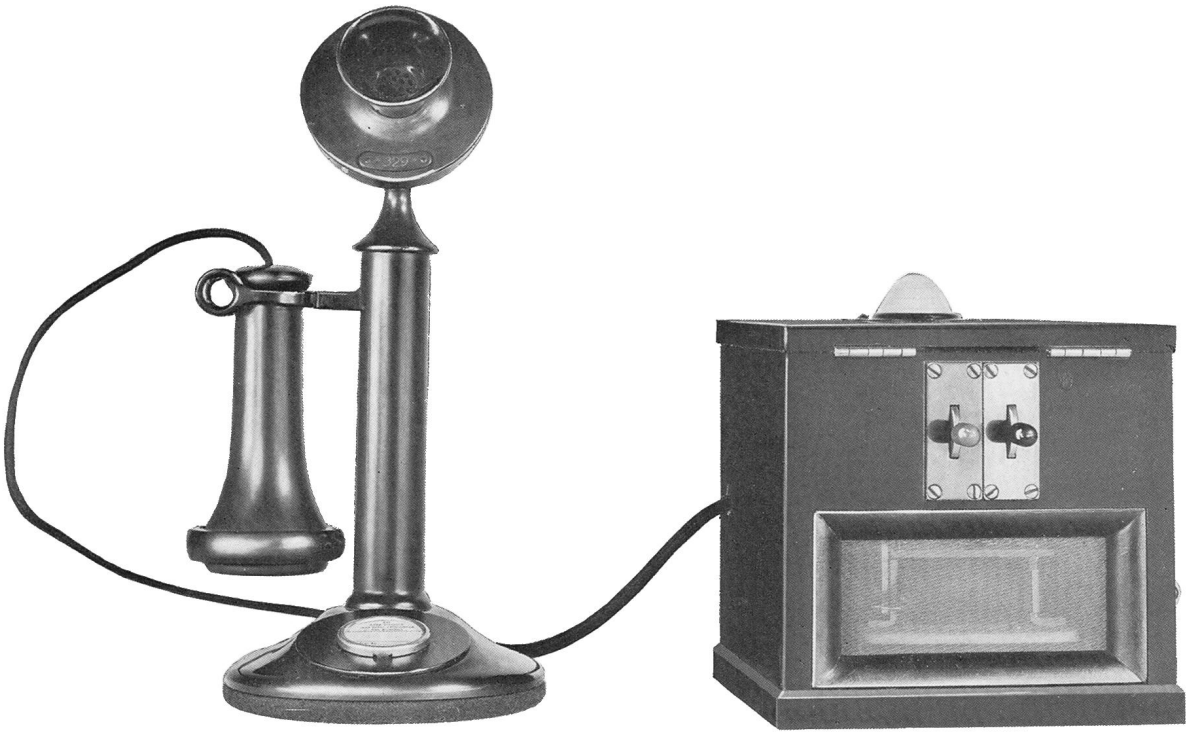
Each set is equipped with (1) Two keys by means of which either the two-way or the one-way line may be talked on or held, and by which when the telephone is unattended, a "busy" signal may be indicated to the P. B. X. attendant; (2) A supervisory lamp on top of the cabinet to indicate when the key has been set to give a busy signal on the two-way line; (3) A buzzer for announcing incoming calls; (4) A telephone instrument, which may be a desk stand or a hand set. The attendants' telephone may be equipped with a dial if the set is connected to a dial P. B. X. or a manual P. B. X. connected to a dial central office.

Operation

With the black key in the normal straight out position it is only necessary to lift the receiver to place or receive a call over the two-way line. The downward position of this key holds a call on the two-way line and is the talking position of the one-way line, when such a line is provided. The upward position of the black key places a busy test on the two-way line at the switchboard and lights the supervisory (bee-hive) signal on the top of the cabinet. Calls will not be distributed to the cabinet when the black key is in this position. Restoring the key to normal removes the busy test and extinguishes the visual signal.

If, in connection with a call originated over the one-way line, it is desired to return to the two-way line (the line on which the calling party is being held) without disconnecting the one-way line, this may be done by operating the red (non-locking) key to the downward position. By releasing this key (removing the pressure of the finger) connection is again made to the one-way line while the two-way line is held. When the conversation over the one-way line is finished, the black key is restored to the normal position, disconnecting the one-way line and again connecting the telephone set to the two-way line.

Busy Test Cabinet



523-C Busy Test Cabinet

Dimensions		*Finish*
Height	7-1/4″	Black
Width	6-5/8″	
Depth	7-5/8″	

Order Table

General

The order table provides facilities for the prompt handling of a large number of incoming calls. Its functions are similar to those of the No. 2 order turret, the principal differences being:

(1) The equipment is of the cordless type and is mounted flush with the surface of a specially designed table furnished by the Company.

(2) No provision is made for multipling central office trunks to both an order table and a P. B. X.

(3) The service is somewhat more expensive to the customer.

Application

The order table serves the same general purposes as does the No. 2 order turret. Some customers prefer the order table as they consider that it presents a neater appearance than the turret, but due to the limited capacity of 10 lines per table and the floor space required, consideration should first be given to the No. 2 order turret.

The table is suitable for both order taking and soliciting in manual areas, but in dial areas certain operating difficulties are encountered in holding outgoing calls and, accordingly, an effort should be made to limit its use in dial areas to the handling of order receiving service.

Description of Equipment

The equipment consists of a special table furnished by the Company, arranged for two attendants' positions. The tables are designed to line up together for multiple installations. The necessary key and lamp equipment is mounted in the center flush with the table top. The attendants' telephone set equipment may be a desk telephone, a hand telephone or an operator's telephone set.

The order table is designed to operate in either manual or dial system central office areas and may be connected either to the station lines of a P. B. X. or to direct central office lines.

Monitoring equipment is available when requested by the customer. A buzzer is provided as an audible signal.

The order table is furnished in either an oak or mahogany finish.

Operating Features

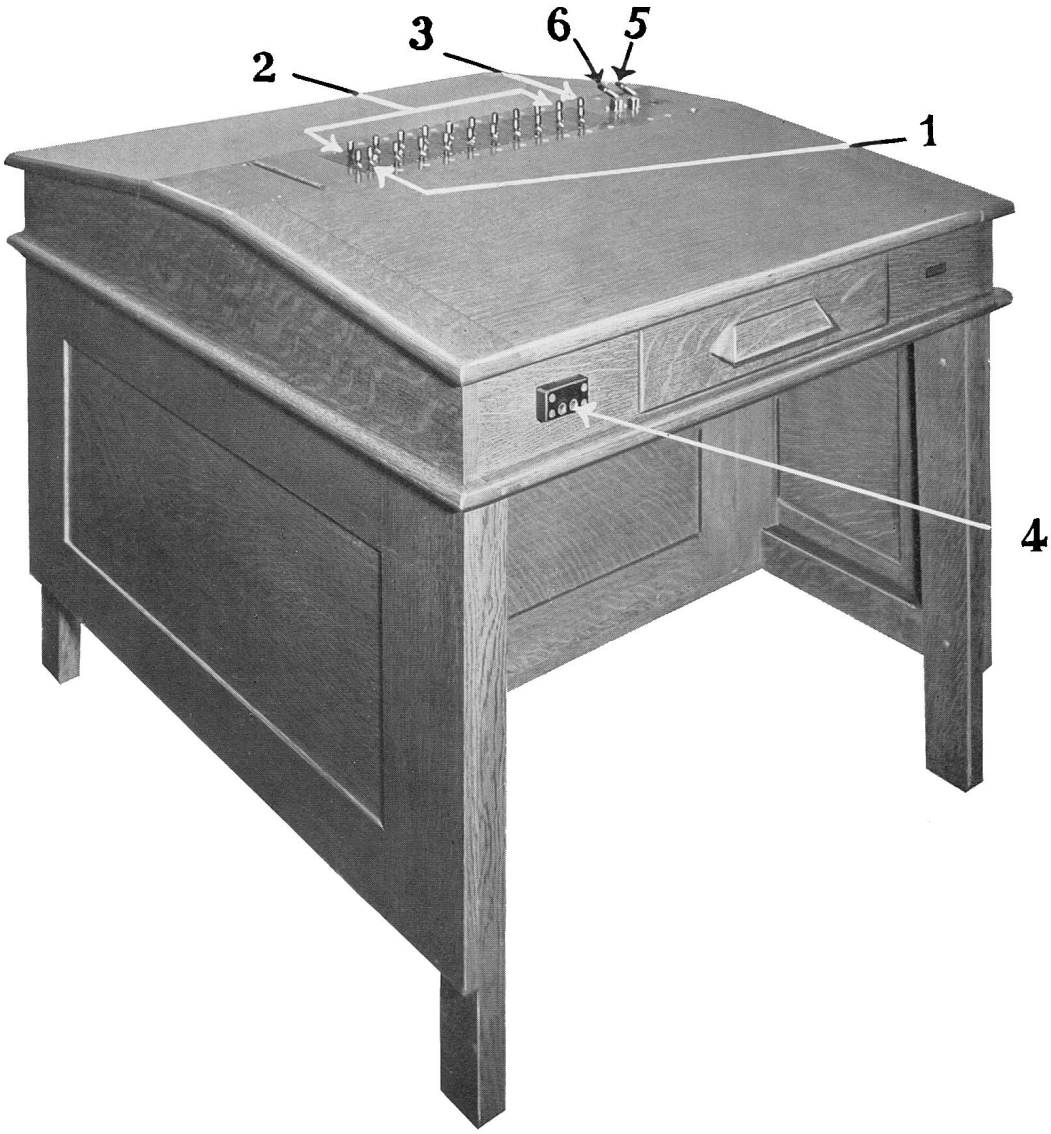
The operation is by means of keys: Each key has three positions; talking, normal and holding. An incoming call lights the line lamp associated with each multiple of the line. The call is answered at any table by operating the associated key to the talking position, which extinguishes the line lamps. A line can be held by operating the key to the holding position. The held line can be picked up by operating the key again to the talking position. At the termination of the conversation, the key is restored to normal.

An outgoing connection is established by operating the key of an idle trunk to the talking position. If the table is connected either directly or through a P. B. X. from a dial central office or connected to the station lines of a dial P. B. X., the attendant's telephone can be equipped with a dial. If an operator's telephone set is used, the dial will be mounted on the table.

Capacity

Each table is arranged for two operating positions and for terminating ten lines. Several tables may be installed for multiple operation when more than ten lines are required. When more than ten trunks are required, the trunks may be arranged in separate groups of ten or less each.

Order Table



Dimensions

Height	2′ 9-1/16″
Width	2′ 11-1/4″
Depth	3′ 5-3/4″

Finish—Oak or Mahogany

Capacity—10 Lines, 2 Positions

Operating Parts

1. Trunk lamps (located between rows of keys)
2. Trunk keys
3. Call circuit key
4. Attendant's telephone set jacks
5. Battery key
6. Buzzer key

Private Line Turrets

General

Private line turrets have been designed to meet the requirements of customers such as brokerage houses, banks, stock exchanges, and other firms which require an appreciable number of private lines in connection with their business. The turrets were designed primarily to provide facilities for conveniently terminating a considerable number of common battery private lines at one location. Two types are available however; one arranged for private lines only, the other to accommodate a limited number of central office or P. B. X. lines terminated in the same manner as the private lines. Interconnection of central office or P. B. X. lines or of private lines and central office or P. B. X. lines is not permissible and such connections are restricted by this equipment.

Description of Equipment

The private line turret consists of a wooden cabinet finished in dull ebony and equipped with lamp signals and keys arranged for answering and placing calls over any one of a group of private lines or of a group of central office or P. B. X. lines. The cabinet is designed to mount on a desk or table, but is so arranged that it may be mounted semi-flush if the customer so desires. The desk or table is not considered as part of the equipment and is furnished by the customer.

The lamp signals and keys are located in the top of the cabinet and arranged for two attendant's positions. One or both attendants' positions may be equipped for operation as desired. The twenty line turret is arranged for multiple operation so that by adding turrets, attendants' positions may be provided to meet the traffic requirements. The attendants' telephone usually consists of a standard desk or hand telephone set, but an operator's telephone set and jack may be furnished if desired. A dial can be provided if lines to a dial central office or P. B. X. or lines of a manual P. B. X. connected to a dial central office are required. An apparatus cabinet designed to be located on the floor is necessary for each installation and should be placed in some convenient accessible location as close to the private line turret as practicable. The apparatus cabinet is stocked in black finish only, but cabinets finished in oak or mahogany can be made up if specifically requested by the customer.

Private line stations are equipped with standard manual common battery telephones and are operated the same as regular exchange telephones. Some private lines may terminate on private line turrets of other customers, and such lines are arranged as two-way tie lines with automatic signaling. Associated with each private line terminating on the cabinet are two lamps and two keys. The line lamp is equipped with a white lamp cap and the busy lamp with a red lamp cap. Each key has three positions; normal, talking and holding. A common key for each attendant is provided for use in ringing on lines terminated on private line stations only.

Operating Features

Calls can be answered or placed from either position. An incoming call is indicated

by the lighting of the white line lamp. When the call is answered, the line lamp is extinguished, and the busy lamp is lighted. A line is held by operating the associated key to the hold position. The busy lamp is extinguished when the key is restored to normal at the end of the conversation.

An outgoing call to a private line station is placed by operating the key associated with the desired station to the talking position, causing the busy lamp to light. The station is then rung by operating the common ringing key. The busy lamp remains lighted during conversation. Holding and disconnect features are the same as for incoming calls.

On an outgoing call to another private line turret, the key associated with the tie line is operated to the talking position. This operation causes the busy lamp at the calling private line turret and the line lamp at the distant turret to light, thereby signaling the called attendant. The same method of operation applies to outgoing calls placed to the central office or P. B. X.

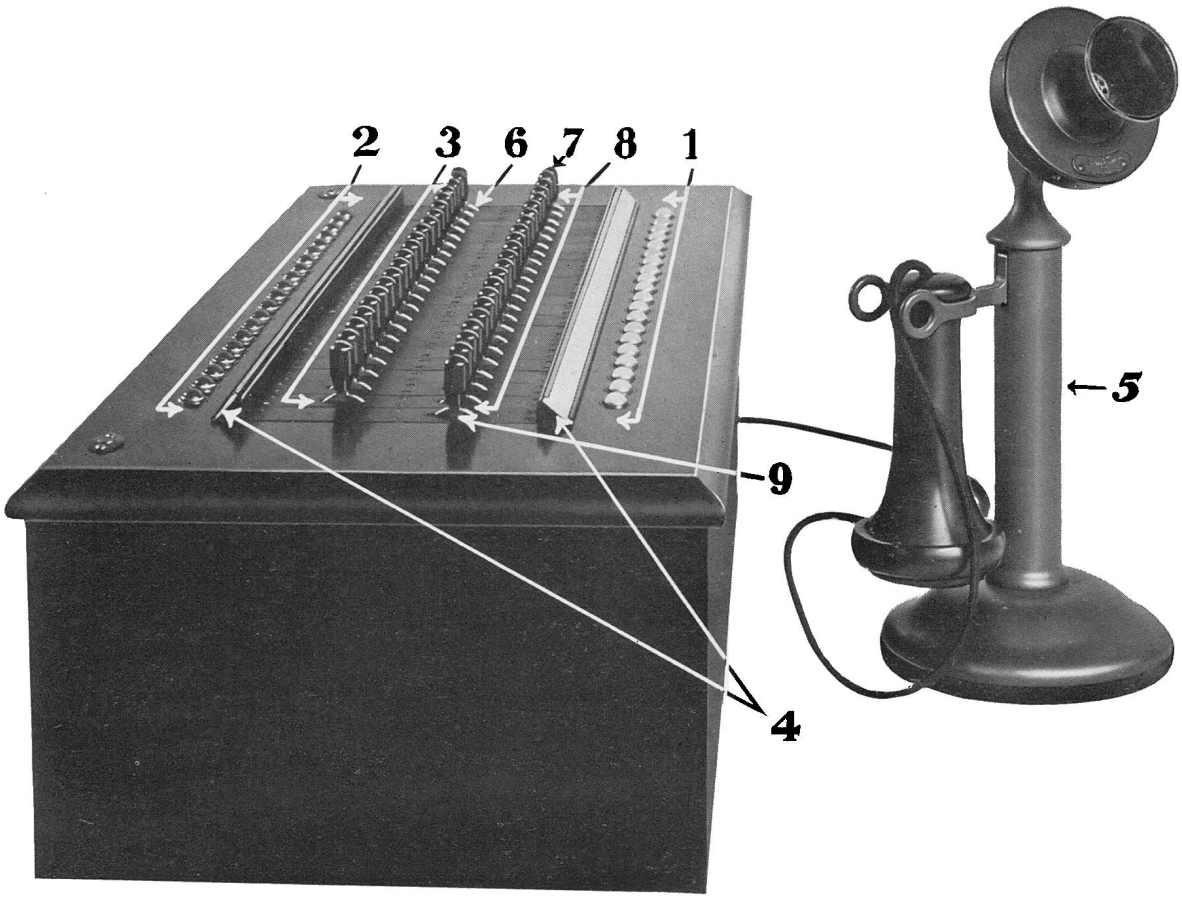
A buzzer is provided as an audible signal for incoming calls.

Capacity

Four sizes of private line turrets are available as follows:

1. A ten (10) line turret arranged for ten (10) private lines only.
2. A ten (10) line turret arranged for seven (7) private lines and three (3) central office or private branch exchange lines.
3. A twenty (20) line turret arranged for twenty (20) private lines only.
4. A twenty (20) line turret arranged for fifteen (15) private lines and five (5) central office or private branch exchange lines.

Private Line Turret



20 Line Type

Dimensions

	10 Line	20 Line
Height	6-5/16″	6-5/16″
Width	16-1/2″	25-1/4″
Depth	10″	10″

Finish—Black

Capacity—See Page 15

Operating Parts

1. Line lamps
2. Busy lamps
3. Talking and holding keys Position No. 1
4. Designation strips
5. Attendant's telephone set
6. Ringing key Position No. 1
7. Buzzer key
8. Talking and holding keys Position No. 2
9. Ringing key Position No. 2

TYPE D (NO. 4) ORDER TURRET AVAILABLE IN COMMON BATTERY EXCHANGES ONLY

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TYPE D (NO. 4) ORDER TURRET AVAILABLE IN COMMON BATTERY EXCHANGES ONLY

0. INTRODUCTION

The Type D Order Receiving Turret has been developed to provide certain service features which are not available in other types of order receiving equipment, and is designed primarily for telephone order departments in large department stores. The service is available in common battery exchanges only and is designed for operation in connection with Cord Type P.B.X. service.

1. SERVICE FEATURES

1.0 General

The service features offered by the Type D Order Turret comprise pick-up, holding, conference connections, a function which permits an order turret attendant to "busy" her position on the PBX, and an overflow arrangement whereby the PBX attendant may distribute calls to assemblies of order turrets by means of "overflow" lines. Each of these features is described in the following:

1.1 Pickup

The pickup feature enables positions of an assembly to answer and originate calls on PBX station lines.

1.2 Holding

This feature permits a turret to hold a call on one line while answering or originating a call on a second line. The held call is neither disconnected nor interfered with and neither of the calls can be overheard by the party on the other line.

1.3 Conference Connections

Conference connections may be established at the turret to include the order turret attendant and two parties connected simultaneously to 2 of the lines terminating on the order turret. For transmission reasons it is not anticipated that more than one off-premises station (either PBX stations, direct central office stations, or a combination of both) will be connected in such a conference.

1.4 Position Busy Arrangement

Through "busy" key operation an order turret attendant may operate the station line lamp on the PBX to notify the PBX attendant that the particular

TYPE (NO. 4) ORDER TURRET AVAILABLE IN
COMMON BATTERY EXCHANGES ONLY - (Cont'd)

order turret involved is not available to take incoming calls. This operation is also possible by unplugging the order turret attendant's telephone set.

1.5 Overflow Arrangement

This feature enables the PBX attendant to connect a call on an overflow line which is multipled to from 2 to 5 order turrets which, through operation of an overflow light on each turret, informs those turrets involved that a call is awaiting to be taken.

2. LINES

2.0 General

PBX station lines only may be terminated on Type D Order Turrets.

3. ORDER TURRET EQUIPMENT

3.0 General

The equipment at each telephone order clerk's position includes a small turret (see Exhibit), an apparatus box, and a chest type telephone set. The dimensions of the turret, including a base that protrudes 3/16" on each side, are: width, 6-3/8", height, 4-11/16", depth, 5". The dimensions of the apparatus box are 1'7-1/4" x 7" x 2-1/4". The turret may be mounted with the key face flush with the top of a table or with the turret on top of the table. The apparatus box is usually located beneath the table. Each turret is provided with a chest type telephone set equipped with cord and plug, with dial where required, and a double jack which may be mounted on the side of the table to permit plugging in the operator's set and, if desirable, a set for the use of a supervisor, observer, etc.

The turret contains 3 line keys, a busy key and 2 lamp signals.

4. METHOD OF OPERATION

4.1 Turret Operation

The functions of the 3 keys and lamps are as follows:

Key No. 1 - This key gives access to a PBX station line which is called the inward line. This line is individual to the telephone order clerk's position and permits holding on that

TYPE D (NO. 4) ORDER TURRET AVAILABLE IN
COMMON BATTERY EXCHANGES ONLY - (Cont'd)

line. An incoming call is indicated by a tone in the attendant's receiver. There is no other audible or visual signal. The line can be used, if desired, for outgoing calls, in which case the PBX attendant is flashed by repeatedly operating the 4th key in the turret (described subsequently).

Key No. 2 - This key gives access to a PBX station line known as an outward line, which is designed for outgoing calls only and is used primarily for making calls to the selling and other departments of the store during negotiations with the customer over the inward or overflow line. When a conference connection is desired between the customer on the inward line, the telephone order clerk and a clerk in the selling or other departments, it is established by operating keys 1 and 2 to the "talk" position simultaneously.

Key No. 3 - This key gives access to the overflow line, which must be common to from 2 to a maximum of 5 order turrets. An incoming call on this line is indicated by the lighting of the upper lamp on the right side of each of the several turrets at which the line is connected (see Exhibit Page E). The call is answered by the first attendant in the group who is free to answer it.

Calls on the overflow line are handled in the same manner as those received on the inward line; that is, they may be held and conference connections may be established with the outward line.

Busy Key - This key, when operated, prevents the lighting of the availbility lamp at the PBX on the regular incoming line and is used to prevent the telephone order clerk being interrupted by a call before all work has been completed on a previous call. The repeated operation of this key with the No. 1 key in the "talk" position causes the availability lamp at the PBX to flash and thus serves as a line lamp for outgoing service on the first line. Unplugging the telephone order clerk's telephone set extinguishes the availability lamp so that this key need not be operated when the telephone order clerk's position is unoccupied.

Upper Lamp - This lamp is lighted when a call is connected to the overflow line.

TYPE D (NO. 4) ORDER TURRET AVAILABLE IN
COMMON BATTERY EXCHANGES ONLY - (Cont'd)

Lower Lamp - This lamp is lighted when the busy key is operated to the "busy" position, and is intended both as a reminder to the telephone order clerk and as an indication to the supervisor that incoming calls cannot be connected to that turret.

4.2 PBX Switchboard Operation

The inward line to each Type D Order Turret terminates on the PBX in a jack which is associated with an availability lamp. The lamp, when lighted, indicates that the order turret position is ready to receive a call. The lamp is extinguished when connection is established to the line and it remains extinguished until the order turret position is again ready to receive a call. It is also extinguished when the telephone order clerk "busies" her position or removes the telephone set plug from the jack. Each overflow line is terminated at the PBX switchboard in the same manner as the inward line and the operation of the availability lamp associated with the overflow line is similar, except that it does not indicate that a telephone order clerk is ready to handle the call, but only that one or more positions at which the overflow line appears are attended. (See Exhibit for schematic.)

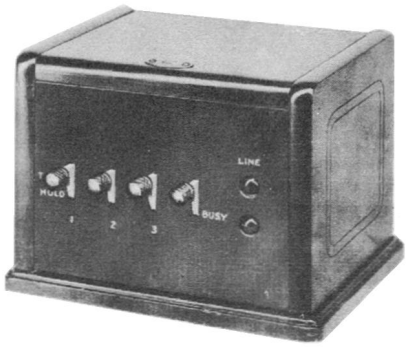
5. SALES AND MARKET CONSIDERATIONS

The Type D Order Turret service provides a combination of service features which enables a group of telephone order clerks to operate effectively, render a satisfactory grade of customer service, and take full advantage of the many profitable sales opportunities offered in connection with the handling of incoming telephone calls from customers, and is ideally suited for telephone order departments in large department stores. In addition, it may be used effectively for handling complaints and questions regarding credit or delivery service. There may be communication requirements in other types of businesses which can best be met by the use of this service, such as mail order houses, small retail stores, public utility business offices, bus and air line information and reservation offices, etc.

TYPE D ORDER TURRET

Dimensions

Height – 4-11/16"
Depth – 5"
Width – 6-3/8"

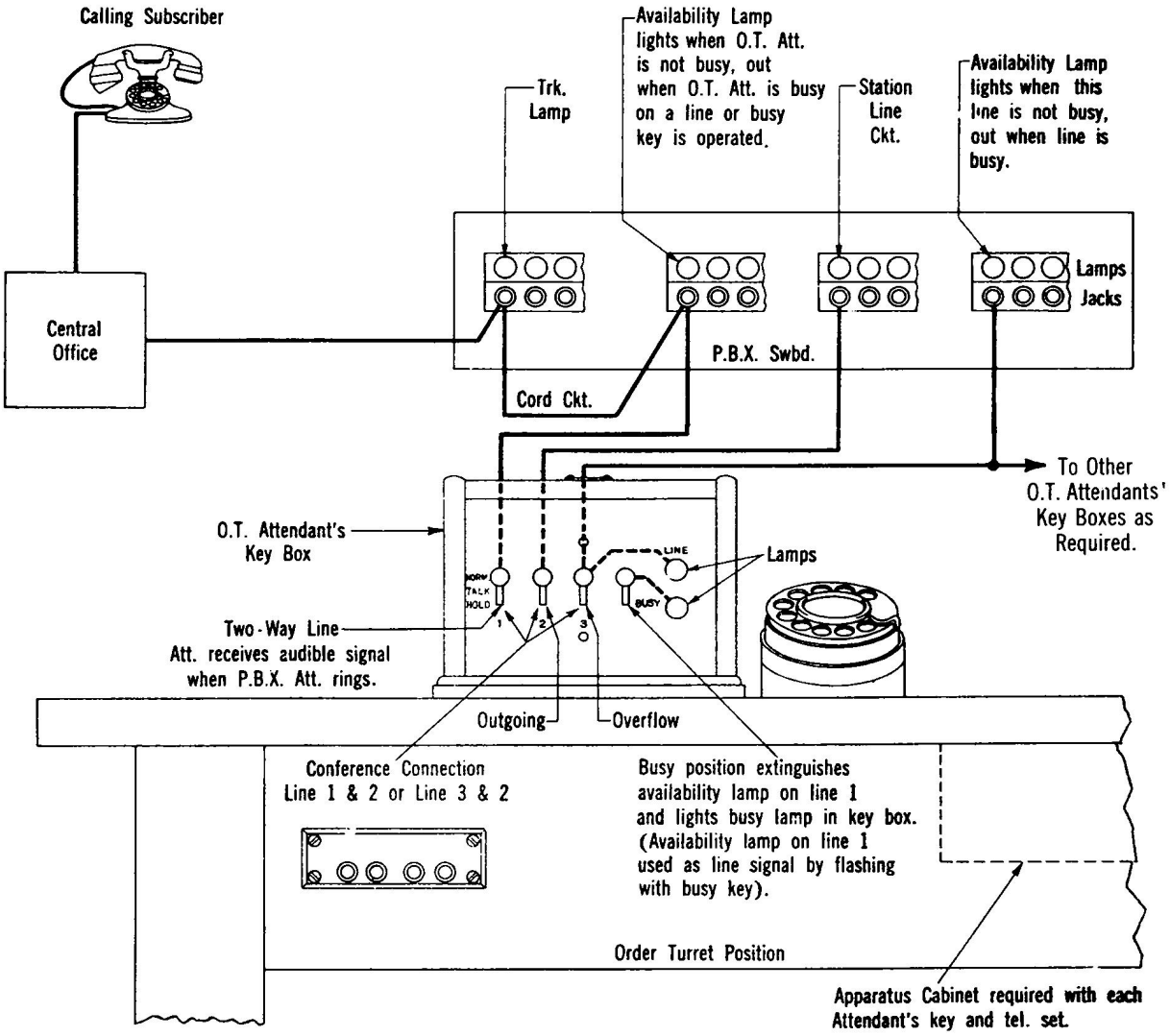


Attendant's Key Box

Dimensions for Counter Sinking

Depth – 4-3/4"
Width – 6-7/16"

PLAN OF OPERATION



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BOOTHS AND RELATED EQUIPMENT

0. INTRODUCTION

Telephone booths are primarily used at public and semi-public telephone installations to afford privacy and minimize the effect of room noises. They may also be furnished in connection with other services. Two general types of booths, open and closed, are furnished, the latter type also being available for outdoor use. As the installation of a booth substantially increases the cost, each case should be carefully reviewed to determine whether or not a booth is required and that the estimated revenue from the station warrants the provision of a booth. Related equipment, directory hangers, shelves, tables, etc., are available to assist in making the directories at public telephone locations readily accessible.

Booths and related equipment are illustrated on E pages accompanying this section.

1. INDOOR BOOTHS - CLOSED TYPE

1.01 General

Closed booths are intended for use at noisy locations or where greater privacy than is afforded by an open booth is necessary. Nos. 5 and 6 indoor booths superseded Nos. 1 and 2 types for general use in this area. However, there are many locations where Nos. 1 or 2 types are in keeping with other fixtures on the premises and should be installed when stock conditions permit. Nos. 1 and 2 types are no longer manufactured but when returned to Western Electric Company are repaired, refinished and equipped with the same ceiling and lamp fixture as used in Nos. 5 and 6 booths. It is necessary that currently available stocks of these booths be used and employees responsible for booth installations should keep in close touch with the supply situation.

To economically secure the most satisfactory booth installations it is important that consideration be given to several items of booth equipment, e.g., hard or soft wood backs, booth lighting, etc.

1.02 Nos. 5 and 6 Indoor Booths

(a) Description

These booths are constructed of wood in units with unfinished sides for single or multiple installation. For general use the back is constructed of soft wood. Hard wood backs are available (specify on order) when the back of a booth is to be exposes. When placed as a single installation two end panels are required. For multiple installations, in addition to two

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

end panels, separating panels totaling one less than the number of booths are required. Booth floor is heavy sheet metal practically flush covered with a rubber mat which extends up sides and back as a baseboard. The interior sides, ceiling and lower door panels are suitably lined with panelled sheet metal. A booth having a better interior appearance than the standard Nos. 5 and 6 types booths may be ordered equipped with "smooth lining". This is a smooth flat lining with golden brown mottled finish applied over the regular lining. Requests for booths with this special lining shall be forwarded through regular lines of organization for approval of the Division Commercial Manager. The electric light fixture is practically flush with the ceiling and the light when provided is controlled by a switch associated with the folding door. The folding door is equipped with plate glass in the upper panels. When open it is practically flush with the front of the booth.

Note: See other paragraphs regarding closed type booths in Government buildings.

The coin box is mounted diagonally in the right rear corner. A shelf (15A) which serves as a writing shelf and elbow rest is mounted directly beneath the coin box. A package shelf (16A) constructed of metal with bronze lacquer finish is available for installation in the right rear corner above the coin box and advertising card frame.

Louvers are provided in the ceiling light fixture to permit natural circulation of air. When additional ventilation is required ventilators, as described in other paragraphs, may be ordered.

Nos. 5 and 6 booths are identical, except in the No. 6 type a seat is standard equipment. When booth seat is provided, the coin box, 15A shelf and advertising card frame are mounted nine inches closer to the floor. A No. 5 booth may be converted to No. 6 type in the field by installation of a seat and relocating the coin box and other fittings.

Orders for Nos. 5 and 6 booths should usually include a No. 10 sign over the door (see Part VI, Section 2). The writing shelf and advertising card frame (see other paragraphs) are included by the Plant Department without being specified on the service order.

(b) Dimensions

Single installations Nos. 5 and 6 booths (including end panels)

Overall Width	Depth	Height
2 feet 6-5/8 inches	2 feet 6 1/2 inches	6 feet 11-9/16 inches

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

Multiple installations Nos. 5 and 6 booths (including end panels and required separators)

Number of Units	Overall Width
2	5 feet 1/4 inches
3	7 feet 5-7/8 inches
4	9 feet 11-1/2 inches
5	12 feet 5-1/8 inches
6	14 feet 10-3/4 inches

(c) Finish

Two standard finishes are available:

Booth No.	Finish	Material of Back
5D or 6D	Oak (102AG)	Soft Wood
5H or 6H	Walnut (105T)	Soft Wood

Booths with hard wood backs are available on order from factory:

Booth No.	Finish	Material of Back
5C or 6C	Oak (102AG)	Oak Wood
5G or 6G	Walnut (105T)	Mahogany Wood

Occasionally the owner of the premises or lessee desires to finish our booths to harmonize with interior trim or carry out some design. Unfinished booths to be finished by the owner of the premises or lessee are available on order from the factory:

Booth No.	Finish	Material of Back
5M or 6M	Unfinished Mahogany Wood	Soft Wood
5N or 6N	Unfinished Oak Wood	Oak Wood
5L or 6L	Unfinished Mahogany Wood	Mahogany Wood

When time will not permit obtaining unfinished booths from factory, booths with standard finish may be furnished over which the owner of premises or lessee may apply the special finish required. For the information of the Supply Department, orders should state that such will be done.

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

The metal interior lining is painted Forest Drab, the ceiling white. Door handle and other hardware is bronze.

(d) Use

For general use at telephone locations where indoor booths are to be furnished.

1.03 Special Backs for Nos. 5 and 6 Booths

Occasionally a desirable booth location would obstruct access to show windows, plumbing fixtures, etc., or obstruct light. To permit these installations when alternate desirable locations are not available, special backs may be ordered from the factory. These special backs designed to minimize the obstructions are substituted for the backs which are regularly a part of the booths. Installation of these special backs on the customers premises is impracticable and where required booths, so equipped, should be ordered. Three types finished the same as the booths with which they are to be used, are available.

(a) No. 52 Type (for use only on No. 5 booth) is a back panel equipped with a door with all wood panels which swings into the booth. The door is 5' 9-1/4" high, 1' 4-5/8" wide and hinges in the left rear corner of the booth with the lower edge of the door 6-3/4" above the floor. Door is equipped with lock and key.

(b) No. 53 Type (for use only on No. 5 booth) is the same as No. 52 type, except the upper panel in the door is glass.

(c) No. 54 Type (for use of Nos. 5 or 6 booths) is a back equipped with a glass panel in the upper part. The lower edge of the glass panel is 3' 8-1/2" above the floor.

1.04 Nos. 1 and 2 Indoor Booths

(a) Description

Although superseded for general use by Nos. 5 and 6 booths, Nos. 1 and 2 types are satisfactory in appearance and should be installed subject to current stock on hand whenever they are in keeping with other fixtures and furniture on owner's or lessee's premises. No. 2 booths are for use in single installations and constructed as a unit, the end panels not being detachable. No. 1 booths intended for multiple installation consist essentially of two main parts, body and end panels or separators.

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

Because of the difference in height No. 1 booths shall not be installed in the same bank with Nos. 5 and 6 booths. Nos. 1 and 2 booths are constructed of wood and have the floor raised four inches. They are equipped with a writing shelf in the right rear corner which also serves as an arm rest. The coin box is mounted on the right wall. When these booths are repaired for reuse a ceiling unit with flush light fixture the same as used in Nos. 5 and 6 booths is installed. The light, when provided, is controlled by a switch which is operated by the folding door. Interior walls and lower inside door panels are appropriately finished in sheet metal. The folding type door with plate glass in the upper panels extends when open approximately three inches beyond the front of the booth. The panel over the door is suitable for the installation of a No. 10 sign. (See Part VI, Section 2).

The writing shelf and advertising card frame (see other paragraphs) are ordered by the Plant Department without being specified on Commercial Department orders.

(b) Dimensions

No. 2 booth (single installations only)

Overall Width	Depth	Height
2 feet 5 inches	2 feet 6-1/2 inches	7 feet 4-3/8 inches

No. 1 booth (multiple installations including end panels and required number of separators)

Number of Units	Overall Width
2	5 feet 5/8 inches
3	7 feet 6-1/2 inches
4	10 feet 3/8 inches
5	12 feet 6-1/4 inches
6	15 feet 1/8 inches

(c) Finish

Two standard finishes are available

2G Oak
2H Mahogany (dark)

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

Should owner of the premises or lesee desire to finish our booths to harmonize with interior trim or special design a standard finish booth should be furnished over which the owner of the premises or lessee may apply the required finish. When booths are furnished for this purpose, order should state, for information of Supply Department, that such will be done.

The metal lining is painted Forest Drab, ceiling white.

(d) Use

Preference should be given to these booths at indoor locations when they are in keeping with owner's or lessee's premises.

1.05 No. 7 Booth

This booth of considerably more elaborate design than Nos. 5 and 6 booths is intended for use only when conditions and surroundings require this elaborate design and finish. As installations are to be made only on special order with the approval of the General Commercial Manager, a description is not included here. Any further information required may be obtained through lines of organization.

1.06 Booths Recessed in Walls

Frequently arrangements are made to recess booths with the front flush with the wall. When the backs of recessed booths are not exposed soft wood backs shall be used and end panels omitted. It is necessary that adequate space be provided above recessed booths and some form of entrance to the space to permit access to lighting equipment and other fixtures on top of booths. Plant Department representatives should usually be requested to furnish owners of premises or lessees with measurements for space in which booths are to be recessed.

1.07 Closed Booths for Government Buildings

There has been a ruling to the effect that only open booths could be used for housing public telephones in Federal buildings under supervision of the Treasury and Post Office Departments. This ruling has been modified to the extent that favorable consideration will be given to the use of Nos. 5 and 6 booths, provided they are equipped with full length glass door panels and they may be recommended to local Government representatives for future installations and replacements in Federal buildings. They are available on special order and the service order should specify "Equipped with full length glass door panels". These booths with plate glass panels in doors may also be used at locations

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

other than Government buildings when requested by the owner or lessee and it appears desirable to furnish them.

2. INDOOR BOOTHS - OPEN TYPE

2.01 General

Open booths afford a degree of privacy, which while not equal to that of a closed booth is adequate to meet the needs at many locations. The floor space required for an open booth is considerably less than for a closed type.

2.02 Open Booth (KS 7250)

(a) Description

This booth is constructed of metal and designed for either single or multiple installations. The single installation consists of one back and two sides and a shelf. The multiple installation consists of as many backs, sides and shelves as there are booths plus one additional side. The sides and back extend to within nine inches of the floor so as to facilitate sweeping or mopping. Bronze feet resistant to corrosive action of cleaning fluids are provided. The feet are arranged with lugs to permit fastening the booths to the floor.

(b) Dimensions

Open booth KS 7250 Single Installation

Overall Width	Depth	Height
2 feet 4-1/8 inches (including foot flanges) 2 feet 2-3/4 inches (excluding foot flanges) Inside width 2 feet 1 inch	23 inches	6 feet

Open booth KS 7250 Multiple Installation

Number of Units	Overall Width
2	4 feet 4-5/8 inches
3	6 feet 6-1/2 inches
4	8 feet 8-3/8 inches
5	10 feet 10-1/4 inches

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

(c) Finish

One standard finish, dark mahogany, is available. Should oak or walnut finish be required the booths may be ordered on a special basis.

(d) Use

The height and depth of this booth are sufficient to afford a degree of privacy which while not equal to that of the closed booth makes it satisfactory for general use except in excessively noisy locations.

NOTIFICATION OF SPECIAL SALES AND MARKET CONSIDERATIONS

Approximately 75 No. 2 Outdoor Booths are in use at the Golden Gate International Exposition on Treasure Island. This type booth was selected specially for use at the Exposition and has since been standardized for general use in this area. It will not be listed in the catalog, however, nor will it be available for general application until the booths in use at the Exposition have been returned to the Western Electric Company and refinished. In the meantime should it appear that only a No. 2 type outdoor booth will meet a particular requirement and the installation can not be delayed until after the close of the Exposition, full particulars should be forwarded through lines of organization to the General Commercial Manager and if approved the booth may be ordered on special requisition.

It is the consensus that this type outdoor booth will cover a general need in the area and in view of this fact it is suggested that pending availability of the booths removed from the Exposition a canvass be made of proposed locations and that locations decided upon for subsequent installation of these booths be cataloged. When the booths are available from the Exposition they may be ordered at once for installation at these selected points. Successfully carried out, this plan will probably enable us to satisfactorily reuse at once a large portion of the 75 booths now on the Island. This will avoid the necessity for special storeroom facilities to carry this large stock.

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

2.03 Open Booths Other Than Standard

Occasionally it has been necessary to furnish open booths other than standard, e.g., aluminum and glass wall compartments for post office lobbies and specially constructed wooden wall compartments for larger department stores. These booths (compartments) have been constructed on a special basis and to each has been assigned an identifying number by the Plant Department. Their use in lieu of standard booths is not desirable and the current trend should be toward standard booths. As mentioned in other paragraphs, closed booths with full length glass panels in the doors are satisfactory in Government buildings where only open booths heretofore were permitted. It is recognized, however, that special conditions may arise when after careful study it is determined that standard equipment cannot be satisfactorily adapted to the requirement. Full details should be forwarded through lines of organization for consideration.

3. OUTDOOR BOOTHS

3.01 General

Locations chosen by the Company in meeting the demand for public telephone service may involve placing booths in outdoor locations such as arcades, porches, parking lots, tourist camps, auto-
*mobile service stations, parks, etc. Three types of outdoor booths are available for this purpose. When deciding upon a location, consideration should be given to the likelihood of damage to or theft of our equipment.

*The Western Electric Company has discontinued manufacture
*of the Nos. 1 and 2 outdoor booths and in their stead is providing
*the No. 9A outdoor booth. The existing number of the two former
*types is such that they will continue to be covered in this manual
*and should be installed where stock and other conditions permit.

3.02 No. 2 Outdoor Booth

(a) Description

This booth is solidly constructed of tongue and groove cypress. Upper and lower panels of door and sides are fitted with heavy plate glass. Should wired plate glass be required due to expected breakage hazard, the booth so equipped may be obtained on special order. Back of booth is solid wood. The peaked roof is constructed with metal corners fitted with triangularly shaped pieces of wired glass which serve as a source of light. Roof is a separate unit and may be replaced on special order by a plain flat board top when the booth is to be installed under a marquee or canopy where

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

insufficient room is provided to accommodate a peaked roof. The door is a swinging type controlled by a door check arranged to open to a 90 degree angle. The floor which slants slightly to the front is constructed of wood covered with a rubber mat which extends up the back and sides to form a base board.

NOTE: See other paragraphs regarding special installation requirements.

A space between the lower edge of the door and the door tread and louvres in the roof unit permit natural circulation of air.

A writing shelf extending the full width of the booth is provided directly beneath the coin box which is mounted on the rear wall. When electric illumination is required a No. 2 light fixture (same as used over directory shelf on No. 5 and No. 6 booths) may be specified for installation directly above the coin box. The light is controlled by means of a pull chain. These booths may be installed individually or in groups of two or more. When installed in groups a space of at least eight inches between booths should be allowed for cleaning. Orders for these booths should usually include a No. 10 sign (see Part VI, Section 2) to be installed at the top of the door. An advertising card frame (see other paragraphs) is included by the Plant Department without being specified on the service order.

(b) Dimensions

No. 2 outdoor booth

Overall Width	Depth	Height
2 feet 6-3/8 inches (at base)	Same as width	7 feet 11-5/16 inches
2 feet 7-3/16 inches (at roof)		7 feet 0-3/16 inches (excluding roof)

(c) Finish

Wood work and metal frame throughout are finished in Forest Drab (an olive drab which harmonizes well with general surroundings). When owner of a premises or lessee desires a finish in some other color, these booths may be ordered unfinished from the factory and finished by the owner of the

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

premises or lessee in the desired color. If there is insufficient time to permit obtaining unfinished booths, they may be furnished in standard finish and the special finish may be applied by the owner or lessee over the standard finish. For information of Supply Department service orders should state that such will be done.

The door handle, hinges and door check are bronze.

(d) Use

For use at outdoor telephone locations where booths are to be provided. There is a field of use for both the No. 1 and No. 2 outdoor booths. Each should be considered and used appropriately.

3.03 No. 1 Outdoor Booth

(a) Description

Construction is tongue and groove cypress wood lined with zinc. The flat roof is covered with metal. The upper panels of the folding type door are fitted with wired glass. A writing shelf (15A) is located directly beneath the coin box which is mounted in the right rear corner. The booth is not equipped with a floor but is provided with four heavy foot castings for holding the booth to concrete paving or a concrete or wooden floor constructed locally specially for the booth.

NOTE: See other paragraphs regarding special installation requirements.

No provision is made for standard lighting equipment in this booth. However, arrangements can be made on special order to install a No. 2 fixture, controlled by pull chain, on the rear wall or a ceiling fixture to be controlled by a switch operated by the folding door. These booths may be installed individually or in groups.

(b) Dimensions

No. 1 outdoor booth

Overall Width	Depth	Height
2 feet 5-3/4 inches (at base)	2 feet 7-3/8 inches (at base)	6 feet 11 inches
2 feet 10-3/8 inches (at top)	2 feet 11-3/4 inches (at top)	

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

(c) Finish

Exterior and interior are painted Forest Drab.

(d) Use

For use where booths are to be installed at outdoor telephone locations provided this type of booth is in keeping with the owner's or lessee's premises. When either a No. 1 or No. 2 outdoor booth can be used and stock conditions permit, the No. 1 type should be ordered.

*3.04 No. 9A Outdoor Booth

*(a) Description

*This booth, which is of the folding door type, is *constructed of cypress with wire glass door panels. It may be *equipped with either wire glass or plywood panels in the sides, *the former being preferable from the standpoint of appearance. *However, the plywood side panels may be required in some cases *such as where the booth is exposed to the direct rays of the *sun. The panels for the sides are retained by interior wood *mouldings furnished with the booths.

*The service order should specify the type of side *paneling desired.

*NO. 56A PANEL - Consists of upper glass panel for booth side
*NO. 57A PANEL - Consists of lower glass panel for booth side
*NO. 58A PANEL - Consists of upper plywood panel for booth side
*NO. 59A PANEL - Consists of lower plywood panel for booth side

*A combination of wire glass and plywood panels will be pro- *vided if specified.

*Linoleum is used as the floor covering and for base *plates. The peaked roof, which is made of galvanized sheet *iron, may be replaced on special order by a plain flat board *top when the booth is to be installed under a marquee or simi- *lar locations where there is insufficient room to permit the *use of the peaked roof. The ceiling and peaked roof are de- *signed so as to ventilate the interior of the booth.

*A corner backboard and shelf are provided. When di- *rectories are to be furnished, the KS-7302 directory hanger is *recommended. If electric illumination is required and the *service order so specifies, the ceiling is equipped with the

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

*standard booth lighting fixture. The light is controlled by a *switch operated by the folding door.

*These booths may be installed individually or in *groups of two or more. When installed in groups, a space of *at least eight inches between booths should be allowed for *cleaning. An advertising card frame will be installed by the *Plant Department when required as a card holder for special *instruction cards. This information should be specified on *the service order.

*(b) Dimensions

*The booth is 30 inches square with a height of *approximately 8 feet with peaked roof and approximately 7 feet *without peaked roof. The latter is for use when the booth is *to be installed under a marquee or canopy where insufficient *room is available to accommodate the peaked roof.

*(c) Finish

*The booth is finished both inside and outside in *Forest Drab. When owner of premises or lessee desires a *finish in some other color, the standard 9A booth should be *ordered. The customer may then have the booth repainted as *desired.

3.05 Special Installation Requirements - Outdoor Booths

When locating Nos. 2 and 1 outdoor booths the approach to the booth shall be free from hazards such as stairways, driveways, etc. The No. 2 type booth should be far enough removed from sidewalks or other passageways to avoid hazard of the swinging door striking passersby. Outdoor booths should be installed on a level surface preferably concrete, brick or other permanent paving material. When No. 2 booth is installed directly on earth, the earth should be well packed and level. Location shall be such that drainage is away from the booths. To avoid subsequent delays and misunderstandings the commercial representative will usually find it helpful to check proposed outdoor booth locations with a Plant representative from an installation standpoint.

4. OTHER THAN STANDARD BOOTHS

All standard booths approved for installation are described in this section. It is expected that they will cover general requirements for booths. Occasions may develop, however, wherein consideration should be given to non-standard booths or special adaption of standard booths. In such instances full particulars should

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

be forwarded through lines of organization to the General Commercial Manager for consideration. Also suggestions regarding improvements in design or arrangement of public telephone booths and related accessories should be similarly forwarded.

5. USE OF CUSTOMER OWNED BOOTHS

Occasionally the owner of a premises or lessee is of the opinion that our standard booths do not harmonize with his interior finish or design and requests a booth to meet this special requirement. Commercial representative should encourage the owner or lessee to furnish a booth meeting these special requirements and render whatever assistance is necessary in developing specifications suitable to the Telephone Company's installation. If necessary for completion of such an arrangement and with approval of the Division Commercial Manager the owner or lessee furnishing a specially constructed booth satisfactory to us may be paid a rental of $.50 a month during the time the booth is used furnishing public telephone service.

6. LOCATING BOOTHS

It is helpful that Commercial Department representative arranging for booth installations shall have general knowledge of rules observed by Plant Department representatives in locating booths. Compliance with such knowledge will avoid misunderstandings and delays. In general, it will be found desirable to make a preliminary survey of the owner's or lessee's premises in order to

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

select the location for booths and to negotiate with the agent for clearing of the space selected, provision of lighting receptacle, location of accessories, if any, prior to the delivery of the booths. Rules for locating booths are as follows:

6.01 Each booth shall be easily accessible to the public and shall be located so that its door is not obstructed by a counter or other fixture. In this connection see that:

(a) Where booth is located so that the end of a counter or other fixture is in front of it, the distance between front of booth and counter or other fixture is at least 18 inches.

(b) Where booth is located so that the public side of a sales counter or other fixture is parallel to the front of it, the distance between front of booth and counter or other fixture is at least 36 inches.

6.02 Where practicable, booth shall be located so as to get the greatest amount of light in the booth at all times.

6.03 The approach to each booth shall be free from hazards, such as nearby staircase leading down, a trapdoor, etc.

6.04 The floor shall be in good condition. If the floor is not in good condition, the owner of premises or lessee should be requested to have the floor repaired before booth is installed.

6.05 The location of each booth shall be such as will permit easy access to adjacent wall equipment, such as a fuse box or switch box. Furthermore, the location shall be sufficiently remote from radiators, steam pipes, registers, flushing traps, etc., to prevent probable damage to booth or apparatus from either excessive heat or water. In addition, sufficient space should be left over top of booth if practicable, to permit access for maintenance of booth lighting equipment. If this is not practicable arrangements should be made with the owner of premises or lessee to provide removable panel or similar facility which will permit access to booth lighting equipment.

7. BOOTH LIGHTING

7.01 General

Adequate lighting contributes to convenience and greater use of public telephone service and should be considered in selecting each location. Where

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

necessary for satisfactory lighting, booths shall be ordered with lighting equipment. At locations where public telephones are now dial operated or assigned to conversion for dial operation all booths shall be equipped with electric lights. When booths are to be equipped with lights service orders shall so specify.

7.02 Electric Circuits and Current for Booth Lighting

At the time arrangements are made for booth installations satisfactory understanding should be had regarding the responsibility of the owner of the premises or lessee for provision of plug receptacle or other connections to electric circuits. It is therefore important that Commercial Representatives understand what is involved. Temporary connection of booth lighting equipment to electric circuits shall not be made in any instances.

The provision of plug ended cords associated with lighting equipment on booths is standard. (See exception below regarding other type of connection). The owner of the premises or lessee is requested to install a plug receptacle of proper type, Hubbell No. 7189 or approved equivalent, at a location 7 feet 7 inches above the floor at the approximate center of the booth.

Note A: In connection with multiple installations the receptacle should be located at end booth. In large multiple installations it is desirable to install two receptacles connected to different circuits to avoid the possibility of all booths being dark in the event of temporary failure of one circuit.

Note B: Occasionally a receptacle may be already in place. Such a receptacle may be used provided it is behind the booth or immediately adjacent to the booth.

All that is necessary to make the booth lighting operative when the booth is in place is for the Plant Department representative to "plug in" the cord connection to the booth.

Circumstances may arise or local regulations under certain conditions require that booth lighting equipment be connected to lighting circuits in a permanent manner in which event the owner of the premises or lessee should be requested to have such connection made coincident with booth installation. In these circumstances Plant Department representatives should furnish the owner or lessee with specifications as to what is required.

All the work in connection with the installation of electric service

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

wires should be provided for by the owner of the premises or lessee. The electric current consumed by booth lighting equipment shall be furnished by the owner or lessee.

Note: When provisions in operating agreements pertaining to public telephones do not conform with these provisions the agreements shall of course prevail.

There may be occasions when the owner of a premises or lessee is not willing to stand the expense of the installation of plug receptacles or other connection to electric service wires. In these cases when it is considered essential to satisfactory service to proceed with the installation, the case should be referred to the Sales Supervisor for approval to have the Telephone Company arrange for the installation at its expense.

8. BOOTH VENTILATION

8.01 General

Provision is made in practically all booths for natural circulation of air. In certain instances additional ventilation may be required and orders should include the provision of a booth ventilator.

8.02 Telephone Booth Ventilator KS 8164

(a) Description

This ventilator consists of a rubber bladed fan and motor mounted on a corner bracket. A switch is located in the bracket which permits the customer to turn the fan on or off at will. The fan is also under control of the booth door switch so it will not run when the door is open.

(b) Use

Ventilator is available for use in Nos. 1, 2, 5 and 6 indoor booths at locations where forced ventilation is required.

9. ADVERTISING CARD FRAME KS 6486

An oxidized bronze finish frame for holding printed matter is available and should be installed in all booths. The frame which holds cards 7"x 10-1/2" is mounted on the right inside wall (on rear wall in No. 2 outdoor booths and open booths) with the lower edge on a level with the top of the

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

coin collector. Card frames are ordered for all booth installations by the Plant Department without notation on the service order.

10. DIRECTORY SHELVES

10.01 General

Directory shelves facilitate the use of directories thereby improving the convenience of public telephone service, also their use generally improves the appearance of directory facilities at the booth. In considering the provision of a directory shelf the controlling factor is whether or not the expected usage warrants the added cost of the shelf. Three types are for standard use in this area.

10.02 No. 11 Directory Shelf

A wooden shelf length 30 inches equipped with brackets for installation on the side of Nos. 1, 2, 5 and 6 indoor booths or on walls. Finish is oak (No. 11-C) or walnut (No. 11-G) to match booths.

10.03 No. 12 Directory Shelf

A wooden shelf length 50 inches equipped with brackets for installation on walls only. Finish in oak (No. 12C) or walnut (No. 12G).

10.04 Metal Directory Shelf

A metal shelf, length 25 inches, arranged for installation on either side of open booth KS 7250 only. Finish is dark mahogany to match booth.

11. DIRECTORY LIGHTS

11.01 General

Directory lights are intended for use over directory shelves installed on booths or walls and directory tables where there is insufficient illumination from other sources. When lights are to be installed they should be included on orders for booths and shelves to avoid added cost of subsequent installation. Directory lights are controlled by a pull chain.

11.02 No. 7 Light

Used over directory shelves installed on Nos. 1 and 2 indoor booths or on a wall; also, when a light is required over a directory table or rack. See Part VI, Section 2 for description.

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

11.03 No. 2 Light

A bronze finish metal shade length 12 inches, height 2-3/4 inches, depth 3-3/4 inches. This light is intended primarily for use over directory shelves installed on Nos. 5 and 6 booths.

12. DIRECTORY TABLES

12.01 General

Directory tables are available for holding directories when directory shelves cannot be used. Generally the same factors which are controlling in furnishing directory shelves also apply to directory tables.

12.02 Nos. 51, 52 and 53 Directory Tables

Wooden tables with slanted top. Suitable corner braces are provided for fastening the table to the floor. Sizes and finish are as follows:

Table No.	Length	Finish
53	21 inches	53C Oak; 53G Walnut
51	32 inches	51C Oak; 51G Walnut
52	52 inches	52C Oak; 52G Walnut

13. DIRECTORY CABINETS

13.01 General

Occasionally at attended pay stations, commercial offices and other locations where a number of directories are to be maintained a directory cabinet would better meet the requirement than a table or shelf. Two standard cabinets are available on special order.

13.02 Directory Cabinet, Floor Type D-97538

(a) Description

A wooden cabinet designed to house several directories. Several separators for the directories are provided, but the spacing may be varied. All of the separators need not be used. The separators are cut back to provide ready access to the directory. Holes are provided in the back of the cabinets for securing them to ends of booths or other wall surfaces. When the floor type cabinet is mounted away from a wall angle

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

irons are available for fastening it to the floor. A metal strip is located on the front top of the cabinet to hold name plates to designate the various directories. The directory is raised by the user taking hold of it at the point where the separators are cut back and the directory is held by the hand while it is being used. When released the directory falls back into place and the general arrangement is such as to give maximum protection to the directories.

(b) Dimensions and Finish

Height 43", width 18", depth 11". Finish is oak or walnut to harmonize with booths.

13.03 Directory Cabinet Wall Type D97537

Same as floor type cabinet but without legs.

14. DIRECTORY HANGERS

14.01 General

Directory hangers are available for securing directories on booth walls in a manner which makes them readily usable but minimizes unauthorized removal. For installation on wall surfaces other than wood a back board (164A) 3"x4-1/2" is available to which the directory hanger is fastened. Ordinarily when exterior space is available directory hangers are not installed inside of indoor booths. Hangers are installed so that the top of the directory is approximately 50" from the floor.

14.02 No. 1 Hanger

A metal hanger finish in oxidized bronze arranged for hanging one thick directory.

14.03 No. 4 Hanger

A metal hanger finish in oxidized bronze arranged for hanging one thick and one thin directory.

14.04 No. KS 7302 Hanger

A metal hanger finish in oxidized bronze arranged for hanging directories with detachable binders. Also for hanging thin directories not provided with detachable binders.

BOOTHS AND RELATED EQUIPMENT - (Cont'd)

15. DIRECTORY FASTENERS

15.01 General

Directory fasteners are available for fastening directories on directory shelves and tables. They hold the directory at a fixed location and minimize unauthorized removal.

15.02 No. 1 Fastener

A metal fastener finished in oxidized bronze for fastening a directory one inch or more in thickness.

15.03 No. 2 Fastener

A metal fastener finished in oxidized bronze for fastening a directory one-half inch to one inch in thickness.

15.04 No. 4 Fastener

A metal fastener finished in oxidized bronze to be used where three or four directories have to be held in one fastener. Two of the looped rods will take directories one inch or more in thickness, the third rod will hold a directory one-half inch to one inch in thickness. A clevis and bolt are furnished to accommodate a thin local directory.

16. SALES AND MARKET CONSIDERATIONS

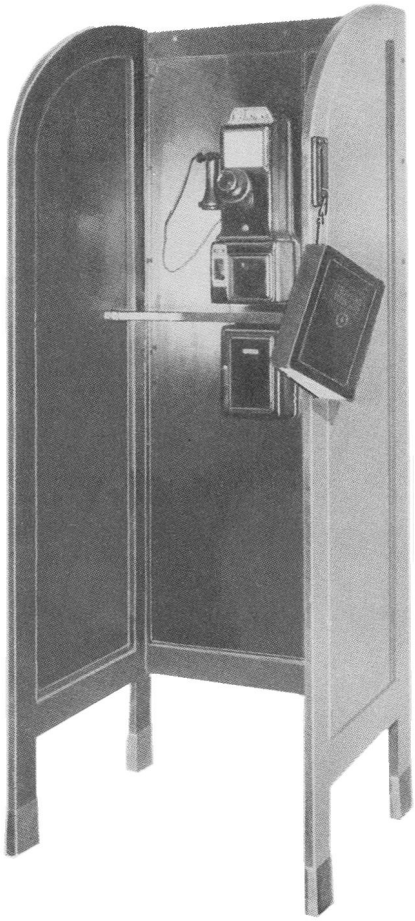
16.01 General

Public telephone service is furnished for the use of the general public. Anything that will add to the convenience of this use, such as booths and related equipment will encourage use, make the service more pleasing to the public and increase revenues. Accordingly booths and related equipment should be installed where these benefits will be realized.

Each installation should be planned throughout so that initial orders will include all equipment items, including signs, planned for the installation thereby avoiding unnecessary subsequent trips to the premises which are costly and annoying to the owner or lessee.

Other sales and market considerations, such as furnishing unfinished booths, are covered in the paragraphs dealing with the particular equipment.

BOOTHS AND RELATED EQUIPMENT

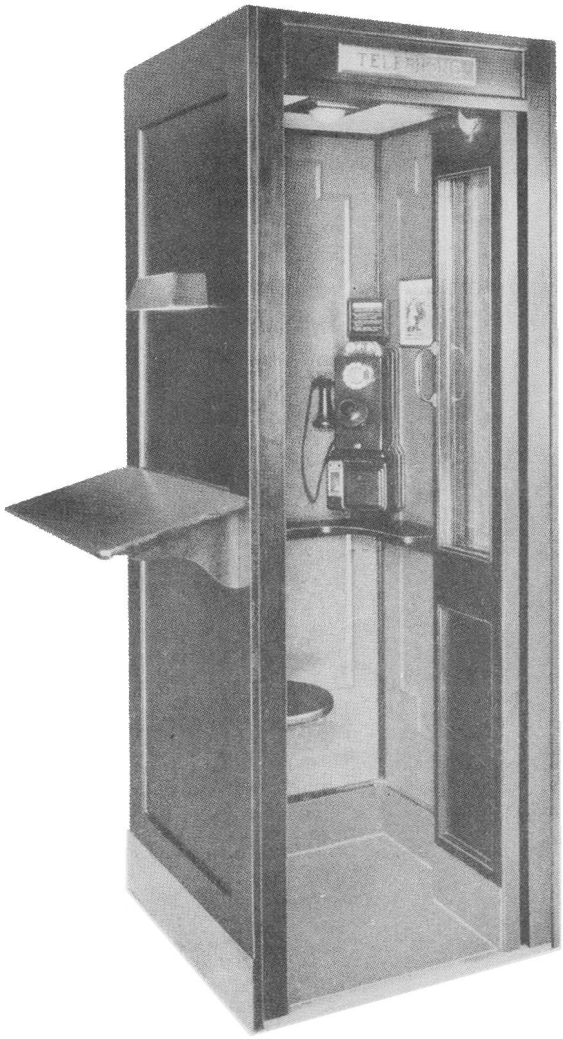


OPEN TYPE INDOOR BOOTH KS 7250

Finish Dark Mahogany

See text for dimensions
Single and multiple installations

Booth may be equipped with metal directory shelf - either end



NO. 6 INDOOR BOOTH

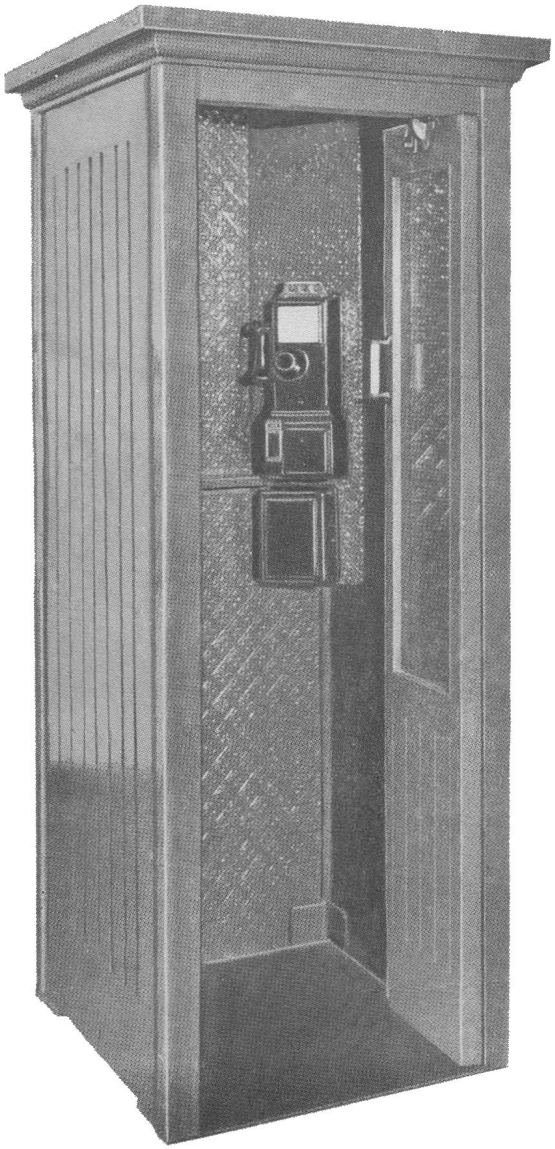
Equipped with

No. 11 Directory Shelf
No. 2 Directory Light
No. 10 Sign
Advertising Car Frame KS 6486

NO. 5 INDOOR BOOTH
Is identical but without seat

See text for dimensions and finishes - single and multiple installations

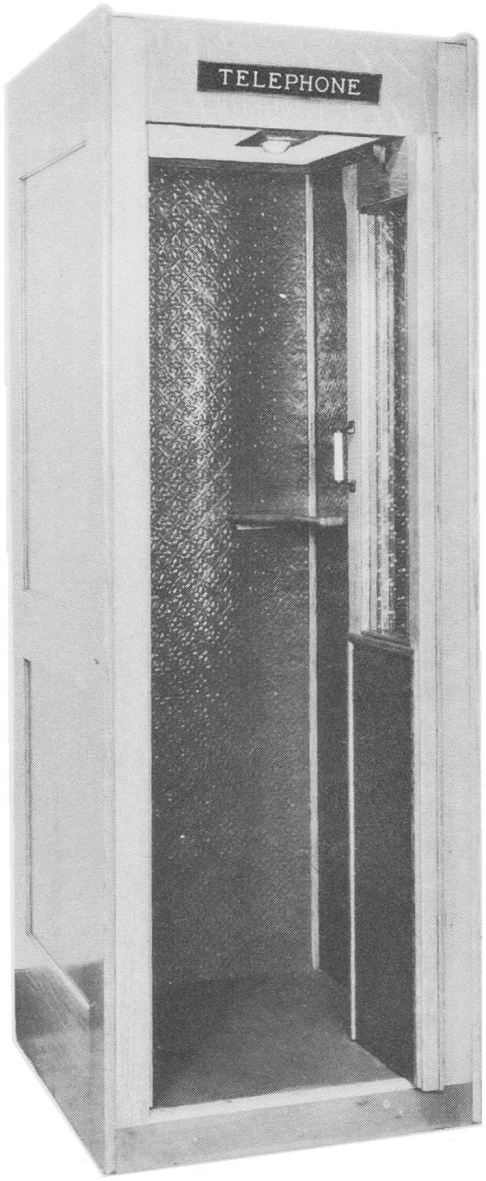
BOOTHS AND RELATED EQUIPMENT



NO. 1 OUTDOOR BOOTH

Width (at base) 2 feet 5-3/4 inches
Width (at top) 2 feet 10-3/8 inches
Depth (at base) 2 feet 7-3/8 inches
Depth (at top) 2 feet 11-3/4 inches
Height 6 feet - 11 inches

Finish - Forest Drab



NO. 2 INDOOR BOOTH

Equipped with No. 10 Sign
See Text for Directory Shelf

This Booth for Single Installations Only

Width - 2 feet 5 inches
Depth - 2 feet 6-1/2 inches
Height- 7 feet 4-3/8 inches

Finish - Oak or Dark Mahogany

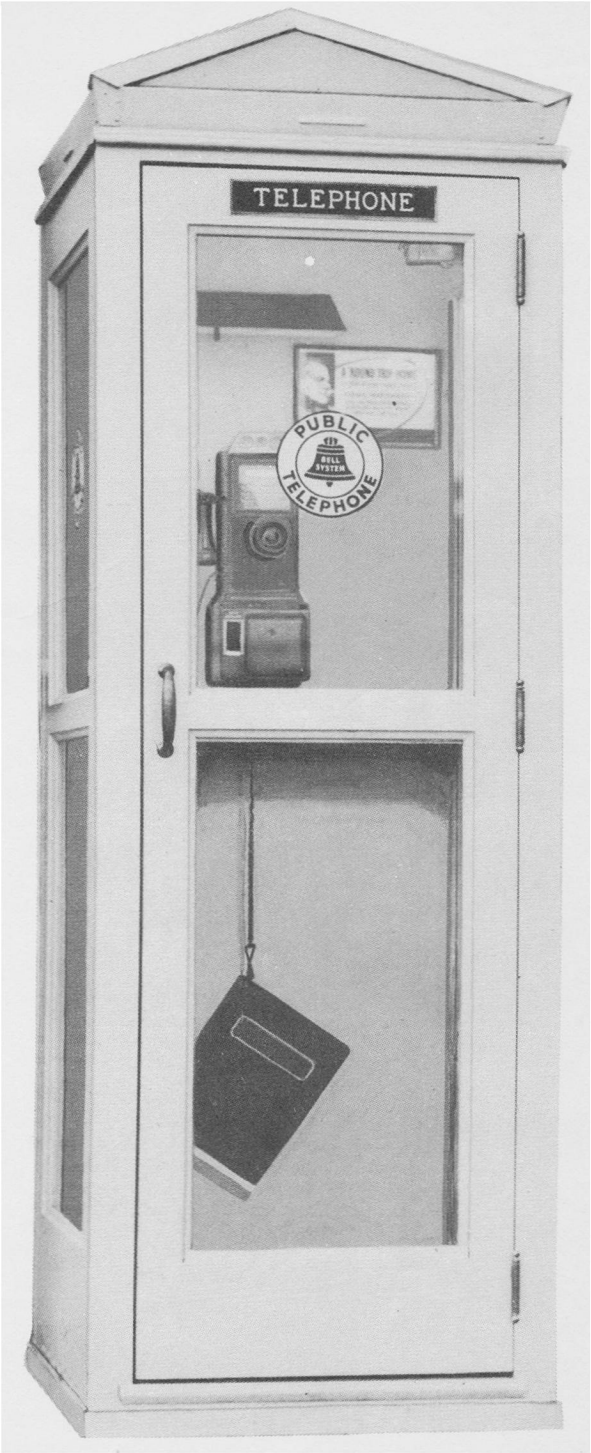
NO. 1 INDOOR BOOTH

Is same type designed for multiple installations. See text for dimensions and details

BOOTHS AND RELATED EQUIPMENT

NO. 2 OUTDOOR BOOTH - Shown With

Door Open

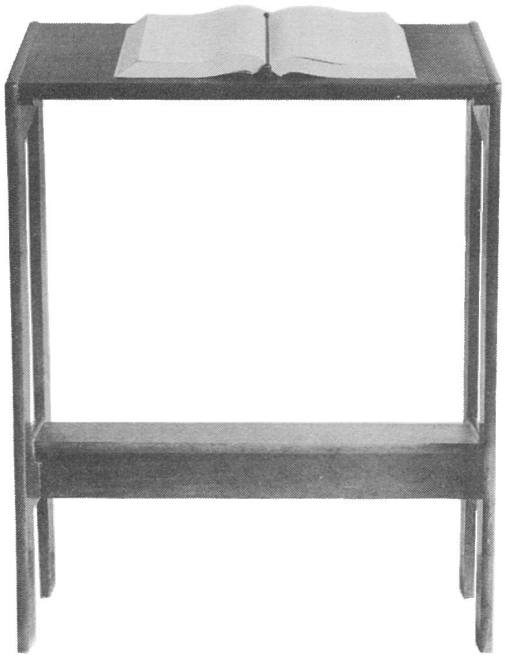


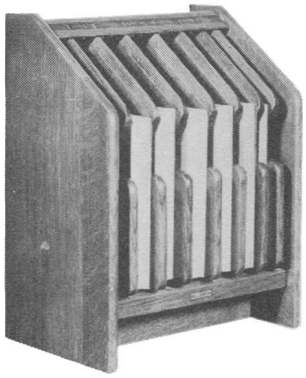
NO. 2 OUTDOOR BOOTH

Equipped With
No. 10 Sign
No. 2 Light
Advertising Card Frame KS 6486

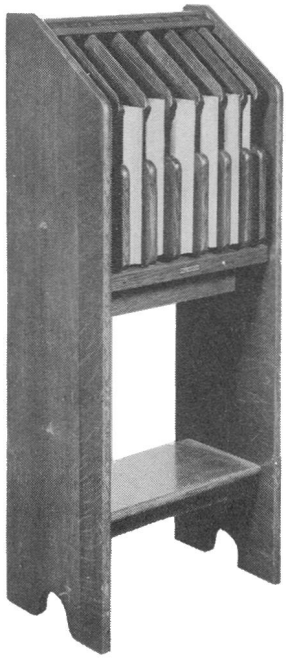
Width (at base) 2 feet 6 - 3/8 Inches
Width (at top) 2 feet 7- 3/16 Inches
Depth Same as Width
Height 7 Feet - 11-15/16 Inches
Finish- Forest Drab - See text for Details

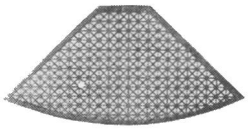
BOOTHS AND RELATED EQUIPMENT





Directory Cabinet D 97537
Wall Type
Same As D 97538 But Without Legs





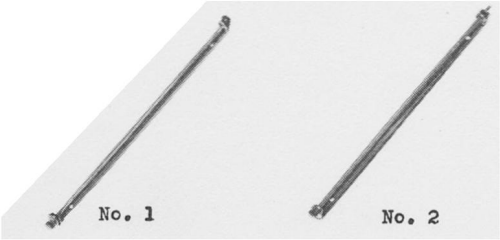
Package Shelf 16A

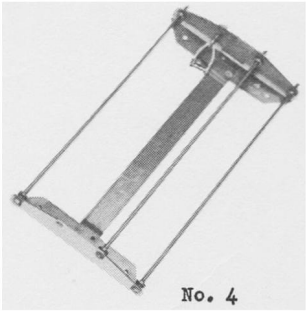
DIRECTORY TABLE

(Illustrated)	No.51	Length	32	Inches	Oak	(51C)	Walnut	(51G)
	No.52	"	52	"	"	(52C)	"	(52G)
	No.53	"	21	"	"	(53C)	"	(53G)

Also See Text for Directory Shelves

Directory Cabinet D 97538
Height 43 Inches
Width 18 Inches
Depth 11 Inches
Oak or Walnut Finish



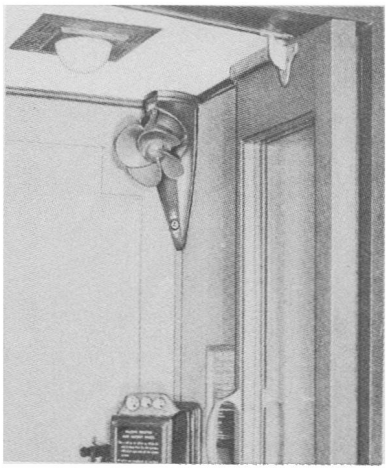


DIRECTORY FASTENERS

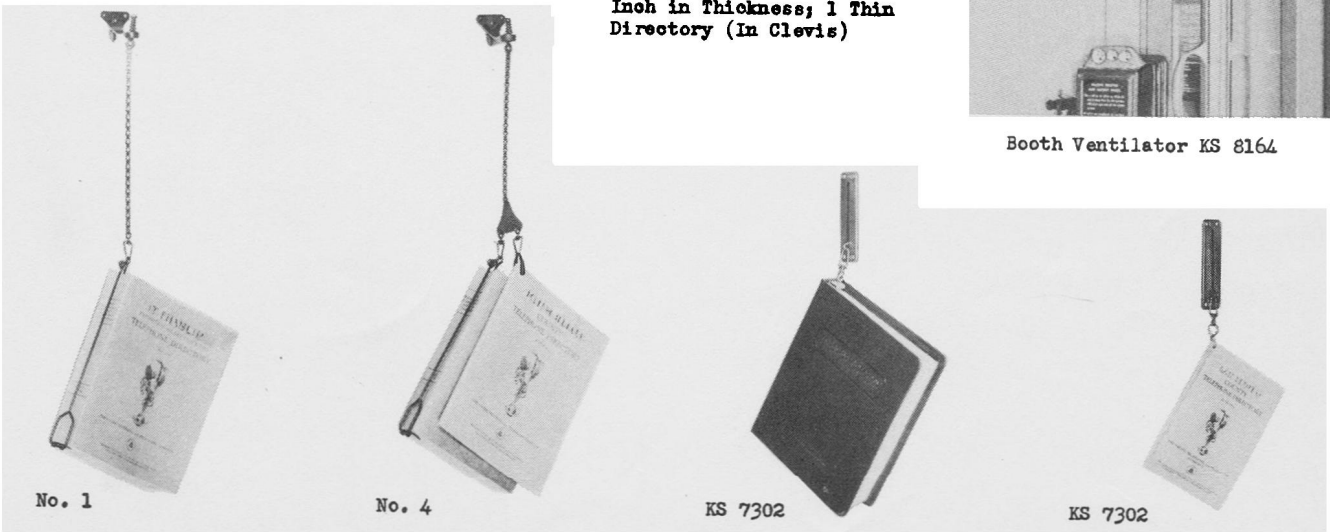
For Directory One Inch or More in Thickness

For Directory One-Half to to One Inch in Thickness

For 2 Directories One Inch or More in Thickness; 1 Directory One-Half to One Inch in Thickness; 1 Thin Directory (In Clevis)



Booth Ventilator KS 8164



DIRECTORY HANGERS

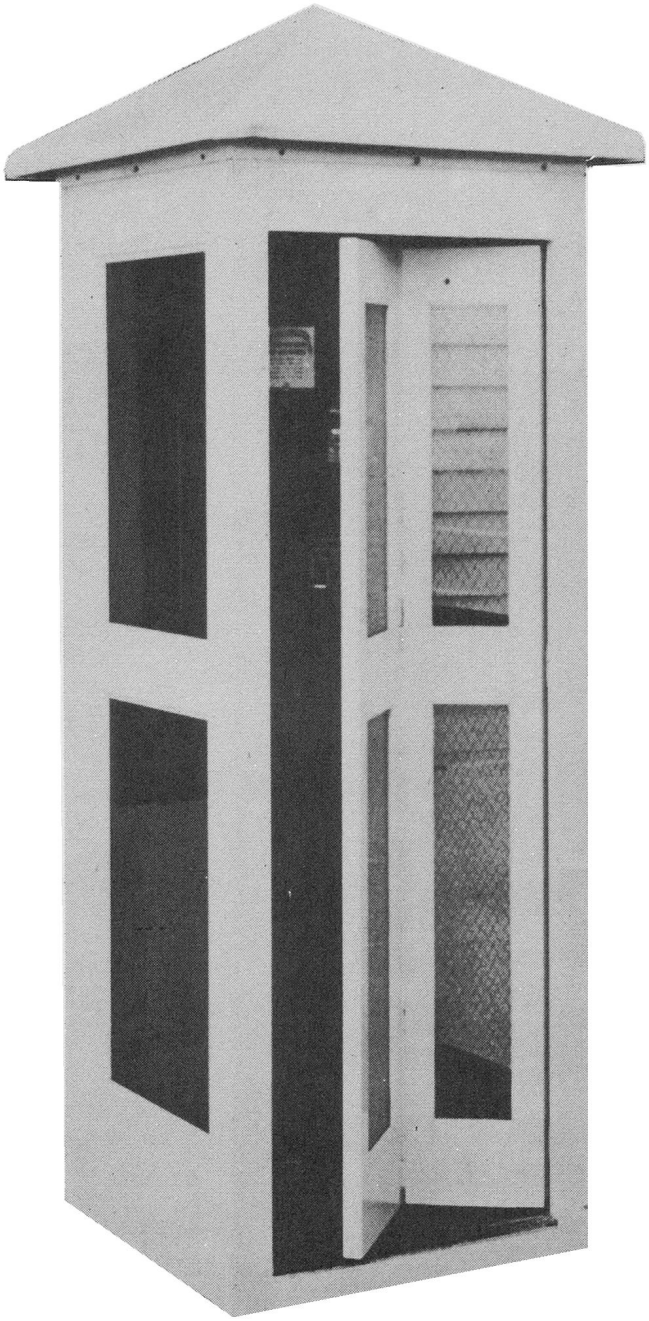
For One Thick Directory

For One Thick And One Thin Directory

For Directory With Detachable Binder

For One Thin Directory

BOOTHS AND RELATED EQUIPMENT



No. 9A OUTDOOR BOOTH

Dimensions;

Width	30 inches
Depth	30 inches
Height	8 feet (approximately).

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PUBLIC TELEPHONE SIGNS

0. INTRODUCTION

Adequate and appropriate signs should be considered as a part of all public and semi-public telephone installations. The type and quantity of signs will be determined by the Commercial Department.

It should also be recognized that our public telephone signs serve a double purpose. They indicate the location of public telephones as well as advertising our services by keeping the "Bell System" emblem continually before the public.

For these reasons it is to our advantage that each location be carefully studied for the purpose of selecting the signs which will most effectively meet the requirements at each location.

1. DESCRIPTION, USE AND MOUNTING

1.0 General

Signs available for use at public and semi-public telephone locations, together with the method of mounting where appropriate, are described in this section and illustrated on page E1. While the actual placing of a sign, including choice of brackets, fixtures, etc., is a Plant Department function, it is important that Commercial Department employees responsible for signing shall understand how the signs are mounted. This information will enable them to better select locations for signs.

Whenever possible, signs should be ordered at the same time and included with or related to orders for public and semi-public telephones and booths. Frequently special provisions must be made, and having information available regarding the complete installation enables Plant Department forces to better plan and execute the installation.

1.1 Sign No. 7

Description: A glass "blue bell" electric lamp shade, lettered "Bell System", 6-3/4" high x 7-3/4" in diameter.

Use. For advertising the location of public telephones. Also for illuminating directories mounted on directory shelves, especially in connection with installations of No. 1 and No. 2 type indoor booths. A different type light fixture - as described in the section of the Sales Manual pertaining to booths - is used to illuminate directories mounted on directory shelves associated with No. 5 and No. 6 type indoor booths.

PUBLIC TELEPHONE SIGNS - (Cont'd)

Mounting: A No. 7 wall fixture is used in mounting No. 7 sign on a wall or side of booth.

1.2 Sign No. 8

Description: A canteen shaped glass globe, 4-1/8" x 12-1/2", each face of which is covered by a glass disc with the "Bell System" emblem in the center and the words "Public Telephone" between two circles which surround the emblem. Both "bottom opening" and "top opening" signs are available. Design is blue, background white.

Use: For advertising the location of public telephones, generally where there are group installations of booths and where the display value of this electrically illuminated sign is desirable and its use is justified. For both indoor and outdoor locations.

Mounting: When a permanent fixture is not available, a No. 8 wall fixture is used for mounting either the "top opening" or "bottom opening" sign on walls. A No. 8 ceiling fixture is used for mounting the sign on ceiling when permanent fixture is not available; also when installed on top of booth.

1.3 Sign No. 9A

Description: A transparency type round paper sign 7" in diameter, printed and gummed on both faces. Has the Bell System emblem in the center and the words "Public Telephone" in the outer circles which surround the emblem. Design is blue, background white.

Use: Primarily on store windows (wherever practicable, inside, where a greater measure of protection is afforded the sign) at public telephone station locations not having closed type booths.

1.4 Sign No. 9B

Description: Same type and size as No. 9A but with the words "Telephone Booth" instead of "Public Telephone" in the outer circles surrounding the Bell System emblem.

PUBLIC TELEPHONE SIGNS - (Cont'd)

Use: Primarily on store show windows (wherever practicable, inside, where a greater measure of protection is afforded the sign) at public telephone station locations having one or more closed type booths.

1.5 Sign No. 10

Description: A bronze sign 2-7/16" x 13-1/2" displaying the word "Telephone".

Use: On No. 5 and No. 6 type booths on the panel over the booth door. Should be used where it is deemed necessary to so identify the booth or booths. In such cases where group installations are involved, a sign on one of the end booths or a center booth, depending on natural or outside lighting conditions, may be sufficient.

1.6 Sign No. 21 (and 21C)

Description: A round single-faced enameled iron sign, 7" in diameter, with the Bell System emblem in the center and the words "Public Telephone" in the outer circles surrounding the emblem. (Same as the No. 22 sign, without eyelets). Design is blue, background white.

The No. 21C sign is the same as No. 21 except that it has the word "Connections" under the Bell System emblem - for use at public telephone locations in Connecting Companies.

Use: To be cemented on glass, metal, marble or masonry surfaces that are not uneven or permanently wet, where the No. 23 or 22 signs are not suitable and the No. 9A or 9B signs are not used. For outside and inside display.

Mounting: Attached to a flat surface by means of a special cement.

1.7 Sign No. 22 (and 22C)

Description: A round single-faced enameled iron sign 7" diameter, with the Bell System emblem in the center and the words "Public Telephone" in the outer circles surrounding the emblem. Same as the No. 21 sign but equipped with 3/16" eyelets to accommodate wood screws for mounting on flat surfaces. Design is blue, background white.

PUBLIC TELEPHONE SIGNS - (Cont'd)

Sign No. 22C is the same as Sign No. 22 except that it has the word "Connections" under the Bell System emblem - for use at public telephone locations in Connecting Companies.

Use: At locations where a No. 23 or No. 21 sign is not suitable. For outside or inside display.

Mounting: Attached to a flat surface by means of wood screws or other fasteners.

1.8 Sign No. 23 (and 23C)

Description: A double-faced enameled iron sign, 11" x 11", with 1-1/2" flange for mounting. Has the Bell System emblem in the center with the words "Public Telephone" in the outer circle surrounding the emblem. Design and border are blue, background white.

Sign No. 23C is the same as Sign No. 23 except that it has the word "Connections" under the Bell System emblem - for use at public telephone locations in Connecting Companies.

Use: At public telephone station locations where a more prominent display is desired than with the No. 21 or No. 22 signs and where it is required that the sign be seen from more than one direction. For outside and inside display.

Mounting: Fastened to flat surfaces by means of screws or other fasteners. The No. 23 sign may also be mounted on posts or poles by means of sign brackets, types 170 and 188. An example of the use of these brackets is - on steel posts used at service stations.

1.9 Sign No. 25

Description: A directional double-faced sign, 5-1/2" x 12-1/8", with the words "Public Telephone" at the top and Bell System emblem with directional arrow below. Lettering, arrow and circle are white, bell and background blue.

Use: For use in corridors, etc., to indicate location of public telephone. For outside and inside display.

Mounting: To be used single-faced, the sign is mounted flat on wall with screws or other fastener. To be used double-faced,

PUBLIC TELEPHONE SIGNS - (Cont'd)

or diagonally across a corner brackets 25A and 25B are provided for attaching the sign to a wall at 90- and 45-degree angles respectively.

*1.10 Sign No. 50A

* Description: Same type, size and design as No. 9A except for the colors. The letters and striping are in gold, the bell and border in dark blue, while the translucent central field is cream.

* Use: Particularly desirable for use on the windows of better class shops where the blue and white transparency of the No. 9A type may not altogether meet the requirements from an appearance standpoint.

*1.11 Sign No. 62A

* Description: A single faced sign 3-3/4" x 20" in size and made from 1/8" Masonite Tempered Presswood or a similar material. The word "Telephone" in white against a blue background appears between a Bell System seal in a white circle near each end of the sign. The panel and the synthetic resin enamels used are highly water resistant.

* Use: The sign is designed for outdoor use but also may be used indoors.

* Mounting: Mounting holes are provided for No. 8 round head wooden screws. Galvanized screws are used when mounted outdoors.

*1.12 Sign No. 111

Description: A double-faced galvannealed steel arrow, 3 feet in length, containing the word "Telephone" in blue on a white enameled background.

Use: Used as an exterior directional sign to indicate location of public telephone, particularly along highways. May also be used to indicate location of public telephones in connecting companies.

PUBLIC TELEPHONE SIGNS - (Cont'd)

Mounting: A bracket coded as Drawing Y-4726 is provided for installing sign on walls and other vertical surfaces. The bracket may also be attached to small or large posts or poles by means of sign brackets types 170 and 188. The sign is attached to the bracket (Y-4726) by means of rigid supports. If desired, however, standard chains may be specified instead of rigid supports. The sign may also be attached directly to the under side of a horizontal surface by means of the rigid supports or chains. An example of this is the shed above a train platform or a marquee on a building. In these instances special consideration should be given to clearance.

When a suitable structure is not available for mounting the arrow sign, a pipe standard coded as Drawing Y-4469 may be provided. The arrow is fastened to the standard by means of rigid supports or chains as specified. Pipe standards are constructed only as ordered, and as special considerations - State or local signing regulations, requirement for a concrete base - are involved, they should be used only when no other practical way of mounting arrow signs is available.

2. RESTRICTIONS-SPECIAL REQUIREMENTS

The public telephone signs listed and described in this section of the Sales Manual are the only signs approved for installation in connection with public and semi-public telephones. Occasionally the management of a place of business or owner of a building finds our standard signs unsatisfactory and requires that the public telephone signs in his place of business harmonize with other specially designed signs used throughout the establishment or carry out some special motif. Signs of this type, which are usually designed specially for the particular place of business and become a part of the fixtures, shall be purchased and installed by the management of the business or owner of the building at their own expense. We shall, of course, offer where appropriate to supplement these special signs with our standard signs. Should any requirement with regard to public telephone signs develop which it is believed should be given special consideration, full particulars should be forwarded through lines of organization to the General Commercial Manager.

PUBLIC TELEPHONE SIGNS - (Cont'd)

3. LOCATING SIGNS

3.0 General

While the locations for public telephone signs will be determined by the Commercial Department, the actual placing of the signs is a Plant Department function. A knowledge of the following rules regarding the locating and placing of signs should assist Commercial representatives in selecting satisfactory locations.

3.1 Rules for Locating and Clearance

3.10 Comply with public regulations.

3.11 Locate so that signs will not be hidden by other signs, awnings or objects.

3.12 Locate flanged signs so as not to interfere with the lowering or raising of awnings. If the front of the building is not equipped with awnings but is likely to be in the near future, signs should be located so that they will not have to be shifted when awnings are placed.

3.13 Avoid locating flat signs on rounded or other surfaces where expensive blocking out would be required.

3.14 A sign should not be suspended from or attached to another sign.

3.15 Locate signs so that clearances specified in paragraphs 3.21, 3.22 and 3.23 below are obtained.

3.16 Signs should not be attached to telephone, electric light or power poles as this would constitute a hazard for workmen when climbing the poles.

3.17 The No. 21 sign, which requires cementing to install, should not be located above doorways, hatchways, cellar entrances or other places where

PUBLIC TELEPHONE SIGNS - (Cont'd)

people are likely to stand or walk under the sign, as such an arrangement is hazardous.

3.18 Projecting signs are a likely source of danger if installed where the public or occupants of a building can come in contact with them while going up or down steps, cleaning windows or leaving through windows or fire escapes in case of fire. These points should be considered when selecting sign locations.

3.19 Whenever possible, preference should be given to locations which will be illuminated at night by surrounding store or street lights.

3.20 Placing signs generally requires the making of screw or other holes. Therefore signs should not be located on granite columns, face brick walls, finely finished wood or metal trim, etc., unless consent of owner, authorized agent of building, or tenant who has authority to speak for owner, has been obtained.

3.21 Clearance and projection of flanged or bracket mounted signs:

Ordinarily a flanged sign should be placed so that the bottom of sign is not less than 10 feet above the sidewalk, platform, floor or stairs, unless local ordinances require a greater clearance. If a better display can be obtained and local ordinances permit, a flanged sign may be placed at a height less than 10 feet. In no case, however, should the sign be placed at a clearance height of less than 8 feet. Signs should not project more than local ordinances permit.

3.22 Building line:

Where ordinances restrict their maximum projection beyond the building line, signs should not project further than the allowable limit. In cities, the larger buildings are usually constructed with the face of the building (exclusive of columns and cornices) on the building line. In such cases, estimate the allowable limit as from the main wall of the building and, where signs are to be placed on columns or window frames, ascertain that they will not project beyond the limit.

3.23 Clearance of Flat Signs:

The No. 21, No. 22, No. 9A and No. 9B signs should be located not over 5 feet above the sidewalk or floor. The only exception to this would be in certain rare instances where it may be found desirable to use a No. 22 sign above the doors in the center of a bank of two booths. The No. 25 sign when mounted flat may be placed at any height giving the greatest display value. However,

PUBLIC TELEPHONE SIGNS - (Cont'd)

if the No. 25 sign is used with brackets, the same restrictions apply for clearance and projection as contained in preceding paragraphs 3.21 and 3.22.

4. ELECTRIC CIRCUITS AND CURRENT FOR ILLUMINATING SIGNS

4.0 When Attached to Booths

Illuminated signs attached to booths are associated with the booth lighting circuit, and current for lighting the signs is secured from the same source as that which lights the booth. It is important therefore that illuminated signs to be attached to booths are ordered with the booths so that any necessary advance wiring may be made at the time the booth is requisitioned. Special considerations with respect to electric circuits and current to booths are described in other sections of the Sales Manual.

With the exception of those cases wherein we have an agreement which specifies to the contrary, (for example the Southern Pacific Company) the electric current in all cases shall be furnished by the owner of the building or lessee.

4.1 When Not Attached to Booths

While each case is customarily handled in accordance with the circumstances pertaining thereto, the owner of the building or lessee is requested to furnish electric circuits when illuminated signs are being provided in connection with new buildings or coincident with alterations. These circuits are usually provided at the time other electric wiring is installed in the building.

When the installation of illuminated signs is not in connection with a new building or coincident with alterations, and it is necessary to install conduit and related fixtures to provide lighting from the ceiling or wall, the owner or lessee should be requested to arrange for the installation. If it is desirable, the telephone company will furnish its standard illuminating fixtures. Where the owner or lessee is not willing to stand the expense of such an installation and it is considered essential to satisfactory service, the case should be referred to the Sales Supervisor for approval to have the telephone company arrange for the installation at its expense.

With the exception of those cases wherein we have an agreement which specifies to the contrary (for example the Southern Pacific Company), the electric current in all cases shall be furnished by the management of the establishment or the building owner.

NO. 7

HEIGHT 6-3/4 INCHES
DIAMETER 7-3/4 INCHES

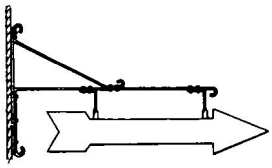
NO. 7 WALL FIXTURE USED TO INSTALL NO. 7 SIGN ON WALL OR SIDE OF BOOTH

NO. 62-A

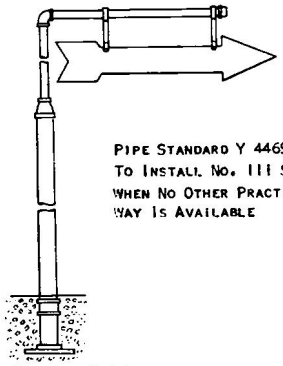
HEIGHT 3-3/4 INCHES - LENGTH 20 INCHES
(SINGLE FACED MASONITE TEMPERED PRESSWOOD)

NO. 111

LENGTH 3 FEET
(GALVANNEALED STEEL)



BRACKET Y 4726 USED TO INSTALL NO. 111 SIGN ON WALL OR OTHER VERTICAL SURFACE.

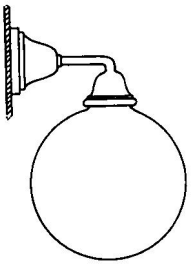


PIPE STANDARD Y 4469 USED TO INSTALL NO. 111 SIGN WHEN NO OTHER PRACTICAL WAY IS AVAILABLE

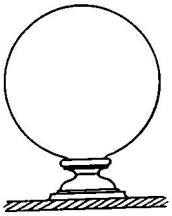
CONCRETE BASE

NO. 8

DEPTH 4-1/8 INCHES
DIAMETER 12-1/2 INCHES



NO. 8 WALL FIXTURE USED TO INSTALL NO. 8 SIGN (EITHER TOP OR BOTTOM OPENING) ON WALL



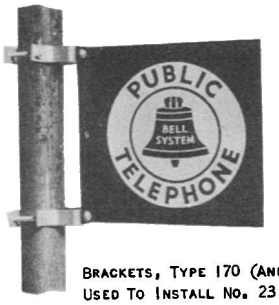
NO. 8 CEILING FIXTURE USED TO INSTALL NO. 8 SIGN (BOTTOM OPENING) ON TOP OF BOOTH OR OTHER FLAT SURFACE. USED IN REVERSE MANNER TO INSTALL SIGN (TOP OPENING) ON CEILING

NO. 10

HEIGHT 2-7/16 INCHES-LENGTH 13-1/2 INCHES
(BRONZE)

NO. 23

HEIGHT 11 INCHES- LENGTH 11 INCHES
(ENAMELED IRON)



BRACKETS, TYPE 170 (AND 188) USED TO INSTALL NO. 23 SIGN ON SMALL AND LARGE POSTS AND POLES

NO. 9-A (BLUE AND WHITE)
NO. 50-A (GOLD, BLUE AND YELLOW)
DIAMETER 7 INCHES
(TRANSPARENT GUMMED PAPER)

NO. 9-B

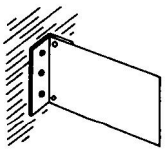
DIAMETER 7 INCHES
(TRANSPARENT GUMMED PAPER)

NO. 22

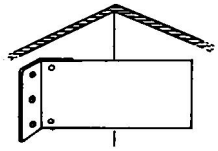
DIAMETER 7 INCHES
(ENAMELED IRON)

NO. 25

HEIGHT 5-1/2 INCHES- LENGTH 12-1/8 INCHES
(ENAMELED IRON)



BRACKET NO. 25A USED TO INSTALL NO. 25 SIGN AT 90° ANGLE TO WALL



BRACKET NO. 25B USED TO INSTALL NO. 25 SIGN AT 45° ANGLE TO WALL

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Section 3 - TELEPHONE CORDS

Section 4 - MISCELLANEOUS

Section 5 - CIVIL AIR RAID WARNING SYSTEMS

*Section 6 - SPEAKER-MICROPHONE SERVICE

*Addition

AUXILIARY HEAD RECEIVERS

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AUXILIARY HEAD RECEIVERS

0. INTRODUCTION

Auxiliary head receivers may be used in conjunction with the regular receiver to aid in hearing telephone conversations in noisy rooms, for occasions where there is continuous use for some time, where it is desirable to have both hands free while telephoning, as in order receiving or soliciting, or when it is desired to have a second person listen in as a means of instruction, or for the purpose of taking notes.

1. SINGLE AND DOUBLE HEAD RECEIVERS

1.0 General

Single and double head receivers with a head band may be used in addition to or in lieu of the regular hand receiver.

1.1 In Lieu of Regular Receiver

When it is desired to use the auxiliary receiver in lieu of the regular hand receiver at a desk set station, an instrument designed to hold the head receiver is furnished.

1.2 In Addition to Regular Receiver

There are three possible ways in which a single or double head receiver may be used in addition to the regular receiver, as follows:

(1) As an auxiliary receiver for use with the regular receiver at a wall, desk or hand set station.

(2) For alternate use with regular receiver at a wall or desk set station. (When so used, a key is required, and the complete arrangement is furnished under Wiring Plan 401-A.)

(3) For the purpose of listening in, primarily to take notes. A key and jack arrangement (Wiring Plan 400) is required for this purpose.

2. AUXILIARY WATCH CASE RECEIVER

This receiver is similar to the single head receiver except that it does not have a head band and may be used in conjunction with the receiver of the wall or desk telephone or the receiver in the hand telephone, except hand sets of the combined type. The user holds a receiver to each ear, operating a non-locking switch which is a part of the auxiliary receiver, to

2. AUXILIARY WATCH CASE RECEIVER (Cont'd)

connect it to the circuit. When not in use the auxiliary receiver is supported by a receiver holder that is attached to the telephone set.

3. CHEST TRANSMITTER SET (OPERATOR'S TELEPHONE SET)

The chest transmitter set, sometimes called operator's telephone set, consists of a chest transmitter and either a single or double head receiver with cord and plug. It is provided for use of attendants at cord type switchboards and order receiving equipment and when required in lieu of standard station equipment on primary or extension stations (through the medium of 4A key equipment).

4. 4A KEY EQUIPMENT

4.0 Introduction

When a chest transmitter is required in lieu of standard station equipment on primary or extension stations, 4A key equipment is utilized.

4.1 Description

The 4A key equipment consists of a key box containing a jack for the plug of the chest transmitter set, and a lever type key with either two or three positions.

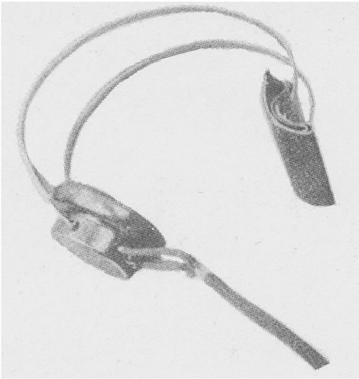
4.2 Operation

With the key normal the set is not connected to the line. With the key in the first down position, the set is connected to the line for talking. With the key in the lowest position the line is held and the plug of the chest transmitter set may be removed from the jack. This permits the user to hold a call and leave his desk to consult records, files, etc. The holding feature is optional, however, and when not used the key has only two positions.

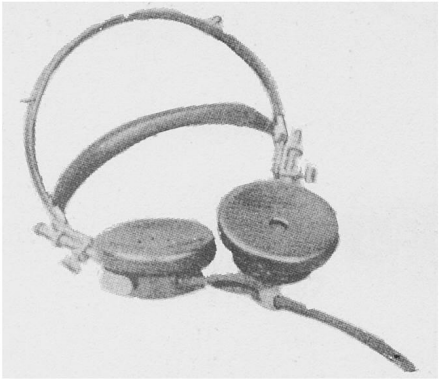
4.3 Holding Feature

The holding feature on 4A key equipment is optional. Holding is not necessary when the set is connected to a wiring plan having the holding feature. The operation of the holding button on the wiring plan permits the plug of the chest transmitter set to be removed from the jack without affecting the wiring plan line supervision.

AUXILIARY RECEIVERS



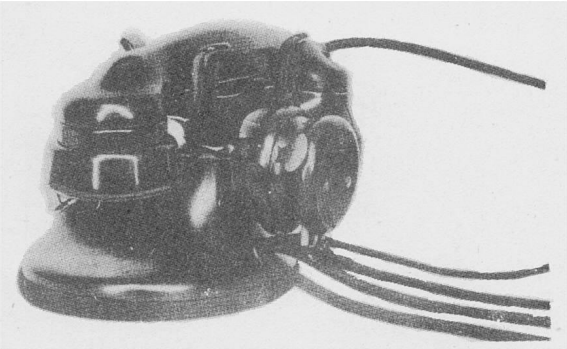
HEAD BAND AND SINGLE RECEIVER



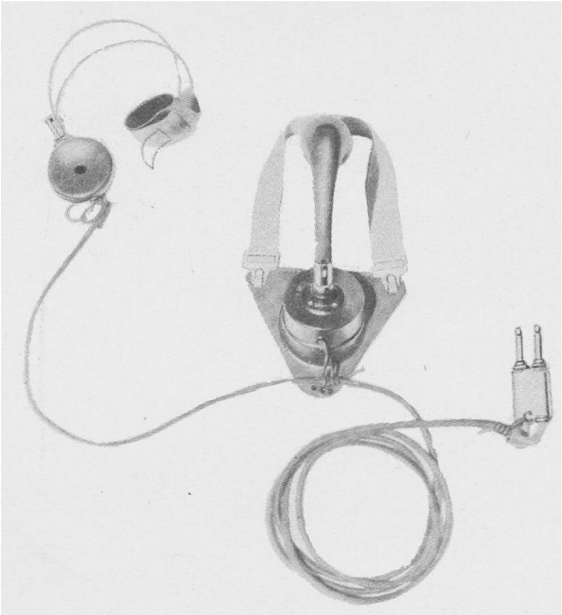
HEAD BAND AND DOUBLE RECEIVERS

DESK SET WITH SPECIAL SWITCHHOOK
FOR HEAD BAND AND RECEIVER

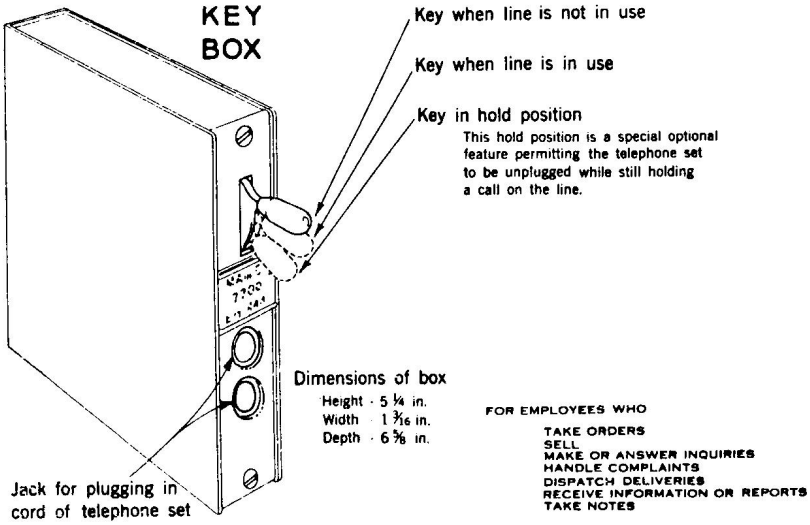
DESK SET WITH WATCH CASE
RECEIVER AND HOLDER

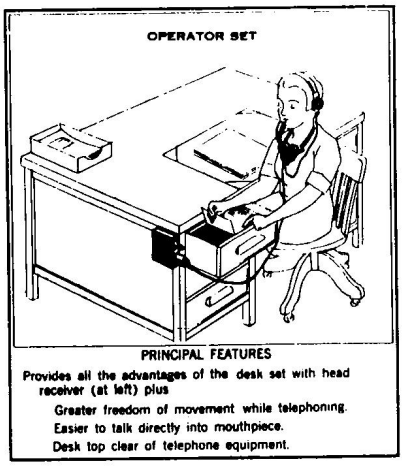


"CRADLE" HAND SET WITH WATCH CASE
RECEIVER AND HOLDER



CHEST TRANSMITTER SET





4-A KEY EQUIPMENT

AMPLIFIER EQUIPMENT FOR PERSONS WITH IMPAIRED HEARING

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EXHIBIT
   Amplifier Equipment..... E1

AMPLIFIER EQUIPMENT FOR PERSONS WITH IMPAIRED HEARING

0. INTRODUCTION

To assist subscribers with impaired hearing, amplifier equipment is available. This equipment may be furnished for amplification of telephone conversations only or for amplification of both telephone and direct conversations. The equipment is available in both Common Battery and Magneto Exchanges.

1. EQUIPMENT AND SERVICE FEATURES

1.0 Amplifier Set for Telephone Conversations

The equipment furnished for amplification of telephone conversations, in addition to the regular station equipment consists of an amplifier, a battery box and a volume control key.

1.01 Vacuum Tube Amplifier

The amplifier consists of a vacuum tube and associated equipment contained in a black metal box similar in appearance to a regular bell box. Its dimensions are:

Height	9-3/16 in.
Width	6-3/4 in.
Depth	3-39/64 in.

The amplifier must be mounted on the desk or wall near the associated instrument. At least 3-3/4 in. beyond the width of the amplifier must be free to the right to permit the cover to swing open for access to the amplifier.

1.02 Battery Box

The battery box of black finish, houses the batteries necessary for the operation of the vacuum tube. Its dimensions are:

Height	15-5/8 in.
Width	13-15/32 in.
Depth	5-1/2 in.

The battery box must also be mounted as near as possible to the associated telephone. Access to the batteries is obtained by means of the removable front cover.

AMPLIFIER EQUIPMENT FOR PERSONS
WITH IMPAIRED HEARING - (Cont'd)

1.03 Volume Control Key

The volume control key is finished in black and contains an "On-Off" switch and a rheostat for controlling five stages of amplification. Its dimensions are:

Height	8 1/2 in.
Width	3 15/16 in.
Depth	2 13/16 in.

The volume control key must be mounted on the desk or wall near the associated instrument. Access is obtained by means of a removable side cover.

1.04 Method of Operation

To operate the Amplifier Equipment the station user operates the "On-Off" switch to the "On" position, and then while listening with the telephone receiver operates the rheostat to the point of amplification giving the best results. When the telephone conversation is completed the switch should be operated to the "Off" position. The instrument may be used without the amplifier by merely leaving the switch in the "Off" position.

After brief experience the station user will know the stage of amplification desired and will leave the rheostat set to that point, changing it only to meet changing voice volumes.

1.1 Amplifier Equipment for Direct Conversations

Besides the equipment described for amplification of telephone conversations a transfer key and either a close-talking transmitter or a distant talking transmitter are also provided when amplification of direct conversations is desired.

1.11 Transfer Key

The transfer key is a black two-position key which in one position connects the associated telephone with either the close-talking or distant-talking transmitter. In the other position the associated telephone is connected to the Central Office or PBX line. Its dimensions are:

Height	3 3/16 in.
Width	7 1/2 in.
Depth	1 3/16 in.

AMPLIFIER EQUIPMENT FOR PERSONS
WITH IMPAIRED HEARING - (Cont'd)

The transfer key must be mounted on the desk or wall adjacent to the associated telephone. Access to the key is by means of a removable side cover.

1.12 Close Talking Transmitter

The close talking transmitter consists of a high efficiency transmitter on a desk type telephone stand. It is connected by means of a flexible cord to a connecting block which is in turn wired to the transfer and volume control keys.

1.13 Distant Talking Transmitter

The distant talking transmitter is a high efficiency transmitter housed in an attractive mounting of blue crinkle finish. It is connected by means of a flexible cord to a connecting block which in turn is wired to the transfer and volume control keys. Its dimensions are:

Height	3-1/4 in.
Width	3-1/2 in.
Depth	1-1/4 in.

1.14 Method of Operation

The station user desiring to use the direct conversation feature operates the transfer key to the position which connects either the close talking or distant talking transmitter (whichever is provided) to the station and at the same time disconnects the station from the Central Office or PBX station line. This operation does not disconnect the station bell. The person with whom the direct or face-to-face conversation is to be held then talks into the close talking transmitter as though talking over a desk telephone. If the distant talking transmitter is provided it should be located conveniently on the subscriber's desk facing the visitor. Satisfactory performance may be expected up to a distance of three feet. The subscriber places his regular telephone receiver to his ear and operates the volume control switch to the "On" position and if necessary regulates the rheostat to the desired stage of amplification. When the conversation is terminated the station user operates the volume control switch to the "Off" position and restores the transfer key to the position connecting his instrument to the Central Office or PBX station line.

AMPLIFIER EQUIPMENT FOR PERSONS
WITH IMPAIRED HEARING - (Cont'd)

2. RESTRICTIONS

2.1 Types of Instruments

Amplifier equipment for persons with impaired hearing is normally furnished only in connection with desk and oval base hand sets.

2.2 Associated Services

Amplifier equipment is not ordinarily furnished with the following services:

Key Equipment Intercommunicating Systems
Business and Residence Dial Private Branch Exchanges
Business and Residence Intercommunicating Systems.

Where required in connection with other types of instruments or the above services details of the case should be referred to the Chief Engineer who will advise if the installation can be made.

3. SALES AND MARKET CONSIDERATIONS

While this equipment is designed as an aid to subscribers with impaired hearing, there are various types and degrees of hearing difficulties, not all of which can be aided by the amplifier. Recognizing this, it is important that wherever possible the equipment should be demonstrated to the subscriber in order that he may determine if he will be aided by the installation of the equipment. Demonstration sets are installed in some business offices and there are available portable demonstration sets for connecting on the subscribers premises.

4. PORTABLE DEMONSTRATION SET

The portable demonstration set is housed in fumed oak cabinet. The cabinet contains all the necessary equipment to demonstrate the amplifier in connection with the telephone conversation. The cabinet's dimensions are:

Height	12 3/4 in.
Width	14 3/32 in.
Depth	7 21/32 in.

AMPLIFIER EQUIPMENT

Distant Talking Transmitter

Dimensions	Finish
Height 3-1/4"	Blue Crinkle
Width 3-1/2"	
Depth 1-1/4"	

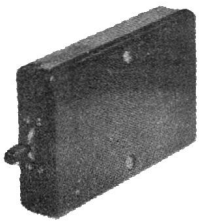
Close Talking Transmitter

Dimensions	Finish
Same As Desk Set	Gun Metal

Amplifier Assembly With Close Talking Transmitter

Volume Control Key

Dimensions	Finish
Height 8-1/2"	Black
Width 3-15/16"	
Depth 2-13/16"	



Transfer Key

Dimensions	Finish
Height 3-13/16"	Black
Width 7-1/2"	
Depth 1-1/8"	

TELEPHONE CORDS

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3. SALES AND MARKET CONSIDERATIONS..... 3

EXHIBIT
Retractile Cord..... E1

TELEPHONE CORDS

0. INTRODUCTION

In the use of telephone service a limited freedom of movement of the telephone is required. To permit this freedom of movement flexible cords are furnished with all station instrumentalities. Cords are normally furnished in regular lengths as detailed below. To meet unusual service requirements cords of extra length are available as itemized in the following paragraph of this section. Except when associated with colored telephone sets, all cords are covered with dark brown braid. For colors of cords associated with colored telephone sets, see instructions covering colored hand sets. For the number of conductors in the cords furnished with Key Equipment Intercommunicating Systems, Business and Residence Private Branch Exchanges, Business and Residence Intercommunicating Systems and Substation Vacuum Tube Amplifier Service see Sales Manual sections describing these services.

1. DESCRIPTION OF CORDS - NAMES AND LENGTHS

The following are the types of cords, a description of each, and both the regular and extra lengths in which they are furnished. Both the regular and extra lengths shown are the overall lengths. The usable length of eacn cord will be from 2 inches to 8 inches less than that shown.

Cord	Description	Regular Length	Extra Length
Receiver Cord	Cord connecting the receiver of the wall or desk set with instrument proper.	2 ft. 6 in.	None
Telephone Set Mounting Cord	Cord connecting the desk set or the hand set mounting of either the oval base or square base type with the subset or connecting block.	5 ft. 6 in.	9 ft. 13 ft. 25 ft.
Hand Set Cord (Hand Set Handle Cord)	Cord connecting the hand set proper with the mounting. Applies to all types of Hand Sets.	4 ft.	9 ft. (See Retractile Cord)

TELEPHONE CORDS - (Cont'd)

1. DESCRIPTION OF CORDS - NAMES AND LENGTHS (Cont'd)

Cord	Description	Regular Length	Extra Length
Retractile Cord	Self-coiling Hand Set cord. When not in use cord takes the form of a close helix. The helix extends with slight tension when instrument is in use.	None	Retracted Length 10 3/4 in. Diameter 3/4 in. Extended Length Normal 4 ft. Full 7 ft.
Miscellaneous Cords			
Head Receiver Cord	Cord furnished between the head receiver and instrument or Wiring Plan Assembly		
	Head. Rec. Cord to Instrument	3 ft. 6 in.	None
	Head. Rec. Cord to Wiring Plan Assembly	4 ft. 3 in.	None
Operator Set Cord	Plug-ended cord for connecting operator set to jack		
	Oper.Set Cord-1 Receiver	4 ft.	None
	Oper.Set Cord-2 Receivers	6 ft.	None
Lamp Cord	Cord connecting Station Auxiliary Signal Lamp of desk type mounting to connecting block or relay.	5 ft. 6 in.	None
Substation Vacuum Tube Amplifier Cords			
Telephone Set Mounting Cord	Cord connecting the desk set or oval base hand set with the volume control key.	5 ft. 6 in.	None
Close Talking Transmitter Cord	Cord connecting Close Talking Transmitter to the connecting block.	5 ft. 6 in.	None
Distant Talking Transmitter Cord	Cord connecting Distant Talking Transmitter to the connecting block.	6 ft.	None

TELEPHONE CORDS - (Cont'd)

1. DESCRIPTION OF CORDS - NAMES AND LENGTHS (Cont'd)

Cord	Description	Regular Length	Extra Length
Miscellaneous Cords (Cont'd)			
Plug Ended Cord	Telephone set mounting cord terminating on plug for use with portable instrument - Desk or Hand Sets, all types.	5 ft. 6 in.	9 ft. 13 ft. 25 ft.

2. RESTRICTIONS - EXTRA LENGTH CORDS

Besides those cords for which no extra lengths are shown above, cords exceeding regular length are not normally available for the following services:

Key Equipment Intercommunicating Systems
Business and Residence Dial Private Branch Exchange Systems
Business and Residence Intercommunicating Systems

3. SALES AND MARKET CONSIDERATIONS

Frequently subscribers request extra length cords to meet service problems that could better be disposed of by the installation of additional stations or by the relocation of stations. For this reason, plus the fact that cords exceeding regular length have a tendency to twist and become entangled with foreign objects, care should be exercised to recommend extra length cords only when the customer's service requirements can be met in no other way.

RETRACTILE CORD

DIMENSIONS

Contracted	- Length	-	10-3/4 in.
	Diameter		3/4 in.
Extended	- Normal	-	4 ft.
	- Full	-	7 ft.

MISCELLANEOUS

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3. FOOT SWITCH..... 2

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   Telephone Voice Silencer, Foot Switch... E2

MISCELLANEOUS

0. INTRODUCTION

Miscellaneous equipment refers to standard items of supplemental telephone equipment and services not already covered in the Manual, which are usually incidental to providing telephone service, but which are furnished to meet the requirements of some customers and for which a charge is made. The items described in this section are provided only in connection with or supplemental to other services furnished customers.

1. JACK AND PLUG EQUIPMENT

1.0 General

Jack and plug equipment for use with portable telephones is provided with two styles of jacks, flush and non-flush, having three or four contacts. Ordinarily the non-flush jack is used; on the other hand, when the customer has provided conduit and outlets, the flush type mounting is employed. The four contact jack and plug has been designed for anti-sidetone installations and is used by the Plant Department when necessary.

In order to permit portable telephone installations in connection with key stations of 750-A dial PBX's, an eight contact jack and plug is available. Inasmuch as key stations of 755-A dial PBX's, 15-A and 23-A key equipments, and most station arrangements of the 1-A key telephone system require more than 8 conductors, jack and plug equipment is not available for these stations. Keyless stations of 755-A PBX's and 15-A and 23-A key equipments and certain instruments of the 1-A key telephone system that do not require more than 8 conductors may be connected to jack and plug equipment.

Conditions under which jack and plug installations will be provided are contained in the Exchange Service Schedules.

1.1 Finishes

This equipment is available in the following finishes:

Flush jacks.....Ivory, brown, old brass, and brushed brass
Non-flush jacks.....Brown and ivory
Plugs.....Ivory, brown and old brass

2. TELEPHONE VOICE SILENCER

The telephone voice silencer is for use on desk sets only and permits the user to talk without being overheard.

2. TELEPHONE VOICE SILENCER (Cont'd)

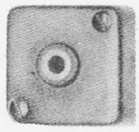
In order to secure satisfactory transmission with the use of this equipment, it is necessary to place the rim of the large mouthpiece opening against the face and around the mouth and talk in a low tone, causing as little air pressure as possible in the chamber of the silencer.

In the past, a common use for equipment of this type has been to eliminate objectionable room noise. This purpose is now largely accomplished by the use of anti-sidetone equipment. The voice silencer equipment will be provided when requested by customers or where its installation is advisable as a means of avoiding complications arising from the use of foreign attachments of a similar nature.

3. FOOT SWITCH

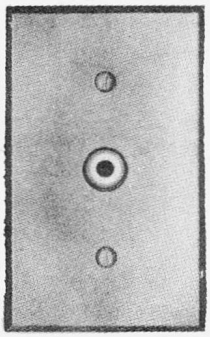
Standard type foot switches are provided at the customer's request to permit of silencing the buzzer on manual non-multiple PBX switchboards. The equipment may also be furnished as transmitter cutouts in connection with standard station sets in special instances where the sidetone cannot be reduced sufficiently by other means.

JACK AND PLUG EQUIPMENT

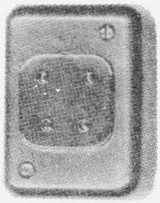


NON-FLUSH JACK
Dimensions:
Overall Length—1 11/16"
Depth—1 5/64"

THREE CONTACT PLUG
Dimensions:
Overall Length—1 7/8"
Protrusion from Face of Jack—7/8"

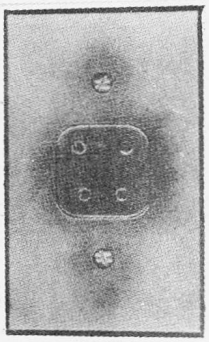


FLUSH TYPE JACK
Dimensions of Plate—4½" x 2¾"

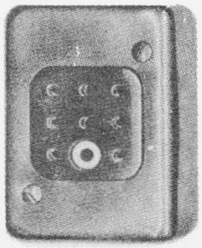


NON-FLUSH JACK
Dimensions:
Height—2 21/32" Width—1 29/32"
Depth—1 3/32"

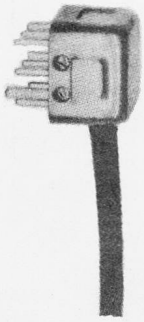
FOUR CONTACT PLUG
Dimensions:
Overall Length—1 3/8"
Protrusion from Face of Jack—57/64"



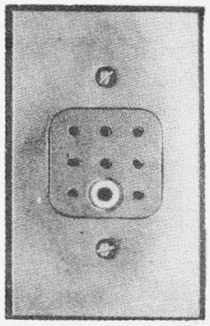
FLUSH TYPE JACK
Dimensions of Plate—4½" x 2¾"



NON-FLUSH JACK
Dimensions:
Height—3 5/16" Width—2 3/8"
Depth—1 7/16"



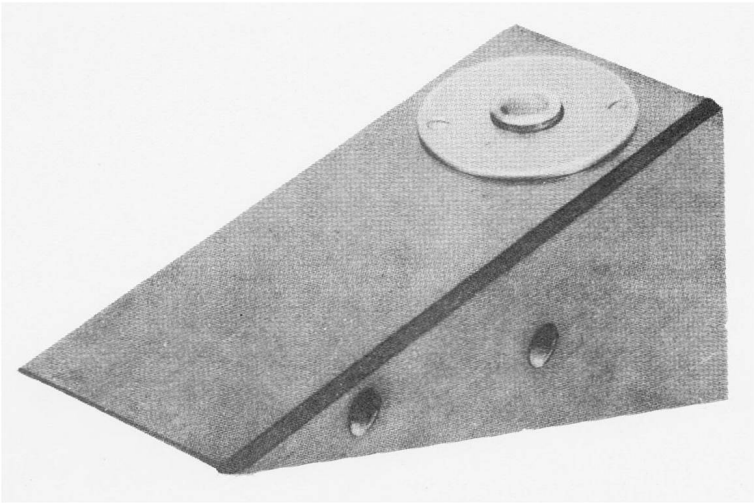
EIGHT CONTACT PLUG
Dimensions:
Overall Length—1 51/64"
Protrusion from Face of Jack—1 5/64"



FLUSH TYPE JACK
Dimensions of Plate—4½" x 2¾"

TELEPHONE VOICE SILENCER

Used on Desk Set Only



FOOT SWITCH

To Cut off Transmitter

TEMPORARY SECTION

CIVIL AIR RAID WARNING SYSTEMS

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TEMPORARY SECTION

CIVIL AIR RAID WARNING SYSTEMS

This Temporary Section was issued June 15, 1951, for the purpose of providing general information in the field regarding our thinking on this subject.

The memorandum, as prepared by the American Telephone and Telegraph Company, covered five methods of disseminating air raid warnings. Item 1, "Bell and Lights" had received the informal approval of the Federal Civil Defense people in Washington and was under development by Bell Laboratories. It had not at that time been adopted for use in our Area.

Pages 2, 3 and 4 of this memorandum have been revised to describe "Bell and Lights" as the arrangement has now been adopted in our Area, rates having been filed in Memorandum Schedule No. 15.

Pages 12 and 13, which pictured the equipment as it looked at that stage of development have also been revised to picture the equipment as it now appears.

TEMPORARY SECTION

CIVIL AIR RAID WARNING SYSTEMS

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Civil Air Raid Warning Systems.

April 11, 1951

MEMORANDUM:

This memorandum describes methods for disseminating air-raid warning (ARW) signals from keypoint warning stations. These methods were selected from a large number of proposals as being the most practicable and economical arrangements which meet the essential requirements for ARW arrangements. The methods described in this memorandum include:

1. Bell and Lights - A private line signaling circuit for city areas.

2. Bell (audible only) - " " " " " " "

3. One-way Dial Circuit to Outlying Cities - For use over a toll private wire signaling or telegraph channel.

4. Private Line Voice - Recommended where an acknowledgment is required.

5. Special Telephone Calling.

The keypoint warning stations receive ARW signals from the ADCC (Air Defense Control Center) and this is not considered within the scope of this memorandum. The public warning systems utilize sirens, broadcast radio announcements, television, etc., and are not within the scope of this memorandum.

The methods described in this memorandum will be applicable for the dissemination of the confidential Yellow ARW signal to points requiring it as well as for the speedy dissemination of the Red and White signals to those points which will make the public announcements, set off sirens, etc. Provision has been made in each of these methods for the dissemination of a fourth degree of alert ("Blue") although present requirements are only for the Yellow, Red and White alerts. This is to allow for the possible future reinstatement of a fourth degree of alert at which time the FCDA (Federal Civil Defense Administration) would have to define the Blue Alert.

The methods described in this memorandum should be integrated with existing communications facilities in so far as practicable, and this is discussed briefly in the latter part of the memorandum. This memorandum also considers briefly the advantages and disadvantages of providing for an acknowledgment of the receipt of air-raid warning signals and indicates the conditions under which provision should be made for an acknowledgment feature.

In the description of the following methods the "control point" may be considered either as a keypoint or as a subkeypoint.

Bell and Lights

The "Bell and Lights" Attack Warning System is used to send out attack warning alerts. The system consists of a special dial located at a control (or sending) point, connected by private one-way telephone circuits to any number of "Bell and Lights" receiving stations installed at Warning Points. It may also be arranged for automatic control of Public Alarm signals such as sirens, bells, horns, etc., which may be employed to warn the general public.

Application

This arrangement is recommended for use to disseminate AWS signals within a state, zone or city area, or in a localized area such as within an industrial plant. It may be used just as economically and efficiently for small networks as large ones.

Control Point Equipment and Operation

There will be a "sunflower-type" dial on which is designated the various degrees of alert rather than the conventional digits and letters. To send out a signal, the operator will simply dial once the degree of alert indicated. In each control point there will also be provided a receiving station set the same as that installed at each warning station so that the control point operator will receive a signal from the network as a verification of the fact that he has dialed the intended warning signal. To discontinue the sending of any signal, after, say three minutes, the operator will dial a STOP code which will release the circuit.

The dial is housed in a metal case having a hinged cover with a plastic window exposing the dial area. The cover is kept locked to prevent unauthorized operation of the dial. For routine tests, the operator will open the cover with a key, but in an emergency, if the key can not be quickly located, access to the dial can be had by breaking the plastic window.

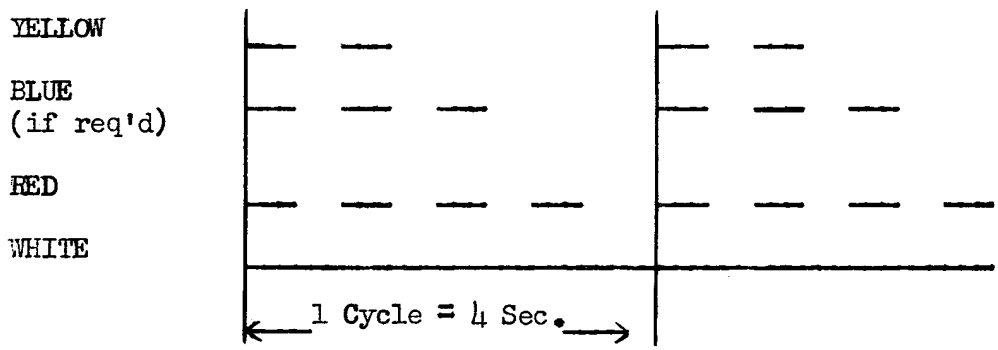
Station Equipment

The receiving station set located at each important warning station has one bell and four lamps, mounted in a metal box. The lamps are mounted behind a ground glass screen on which is indicated four degrees of alert - Yellow, Blue, Red and White. No local power is required. As an optional arrangement, it usually will be practicable to provide an additional regular or loud-ringing extension bell equipped with a key at those locations requiring it. Such bell and key are furnished at regular filed rates.

When a signal is received, the bell will ring and the appropriate lamp will light. A steady ringing is applicable for a network of one to

five stations. In individual exchanges having networks of over five receiving stations, code ringing will be utilized and it will be possible for an observer to determine the degree of alert from the audible coded ring. The lamps serve as a visual supplement to the audible code ringing and minimize the possibility of misinterpretation, which would otherwise exist in times of stress, especially with people who are not experienced in recognizing the audible codes.

The following codes have been chosen because they are different from conventional telephone ringing, because they are simple, easy to remember, and because they are readily distinguishable codes. Furthermore, the Red and White codes are an approximation of the public (siren) warning signals.



Control Circuit

The circuit from the control point to our nearest serving central office will be on a d-c pulse basis and will probably require not more than two cable pairs. This central office circuit and the entire control network is so arranged that these pairs are under continual test; any circuit troubles, such as grounds, opens or unbalances, will immediately register an alarm in a central office but will not cause false operation of the bells in the warning stations. The chances of a false alert will be further minimized by arranging the control equipment so that it will operate the warning system only if the proper number of correctly timed pulses are received. The use of distinctive ringing codes on the individual subscriber lines is another safeguard against false alerts.

The control circuit may be extended to adjacent central offices. This permits one control point to have control over an unlimited number of bells located at warning points. The circuit may also be activated from an alternate control point. As a result, it is possible to have centralized control of a large number of bells within a big city or intercity area and to operate the circuit from one or more alternate locations in the event of destruction of the primary control center.

As a safety factor, the alternate control points should be located a considerable distance from the primary control center. Civil Defense opera-

ting procedures will stipulate the conditions under which a primary or an alternate control point operates the network.

The control circuit is arranged so that any subscribers who are not authorized to receive the confidential Yellow signal, which is a confidential warning only given to a limited number of people, can be so connected that they receive only those signals which they are authorized to receive. Under present Civil Defense plans, the Blue alert is not used. The Red is a warning of imminent attack and the White is "all clear".

Public Alarm Signals

Since dialing the Yellow (Confidential) signal does not operate public alarm signals, the equipment is so arranged that a White (all clear) signal dialed following the Yellow signal will not sound the public alarm signals. However, when the White (all clear) is dialed first (such as for testing) or is dialed following the Red (attack warning) it will actuate public alarm signals. The Red (attack warning) signal actuates public alarm signals whether dialed first or following the Yellow (confidential) signal. Receiving stations and public signals (where connected) will continue to sound the signal dialed until the STOP code is dialed.

Bell - Audible Only Signals

This arrangement is almost identical to the foregoing except that the station set consists of a bell only, without the lights, and the various degrees of alert are determined by identifying the audible ringing codes. The ringing codes will be the same as previously described. The control point and central office equipment will be as described in the foregoing except that, rather than coded four-party selective ringing currents, simply coded ringing currents will be utilized between the central office and subscriber stations. Standard high impedance ringers, equipped with distinctive gongs, will be utilized as station sets.

This arrangement will be slightly less expensive than the bell and lights arrangement in that no superimposing battery will be required in the central office and the station set will not include the four lamps. With only the present three degrees of alert (Yellow, Red and White), there

is less likelihood that the codes will be misinterpreted than with four degrees of alert. However, it would be uneconomical to provide initially for bells only and then to add the lights at a later date.

It is expected that within any given city area, only the one type of service (bells only, or bells and lights) will be offered. The savings in cost which can be realized by using bells only must be weighed against the chances of their misinterpretation. The FCDA recommends the bell and lights arrangement in preference to the bell only arrangement.

One-Way Dial Circuit to Outlying City

This arrangement will utilize a dial (as previously described) located at the control center and connected via private wire facilities to the outlying cities. At an outlying city, the circuit will terminate in either (1) a special station set located at a subkeypoint control station to ring one bell and light one of four lamps or (2) control equipment in the outlying central office that will operate the previously described bell and lights arrangement at all of the important warning points in that city.

Application

This arrangement will be utilized to disseminate ARW signals from the keypoint warning station to outlying cities, towns, etc., in those cases where there are no suitable existing facilities.

Control Point Equipment and Operation

The control point equipment for intercity dissemination will consist of another dial similar to the one previously described for local dissemination. Operation will be the same. There will be one dial for each intercity network. Any number of outlying cities may be connected together on one network, the number being controlled by operating considerations. For example, certain cities may be designated to receive all signals and associated together on one intercity network. Whereas another group of cities may be designated to receive only the Blue, Red and White signals and these would be associated together on a second intercity network.

The control point equipment will also include a bell and lights to serve as a check of the circuit operation and to provide the operator with an indication of the signals being sent.

Equipment at Outlying City

Equipment may be located either in the subkeypoint station, to ring a bell and light a lamp at this one station, or this equipment may be located in a central office and utilized to control the dissemination locally of signals as previously described. With the latter arrangement, the operator at the keypoint could have control of the code ringing bells and lights at all of the important warning points within the territory of the keypoint.

Control Circuit

The facilities required between a control point and the outlying cities will consist of a single telegraph channel or CX signal channel. The telegraph channel may be either d-c or carrier. Several cities may be connected in tandem, thus conserving facilities. The CX signaling channel could be obtained either from spare, or by construction, or by converting an existing CX dial circuit to ringdown (or single-frequency dial) operation thereby releasing an existing CX channel for ARW use.

The control circuit facilities will be arranged so as to be under continual self-test. Any open circuit conditions will be indicated as an alarm to the central office.

Private Line Voice

This two-way voice system would be similar to the system now employed for disseminating air-raid warning signals from ADCC to keypoint warning stations. This is the system which is recommended for warning those points from which an acknowledgment is required.

A voice system is the most flexible type in that it can be used to disseminate alerts of any degree, or announcements of any character. No local power is required except for the speaker, if provided. Even where the speaker is provided, this is strictly a supplement to the telephone hand set and bell so that use of the circuit does not depend on local power. Where the two-way voice system is used, no set sequence is necessary for acknowledgments and if any station fails to acknowledge, this will be known only to the control point.

Application

This system may be utilized within a city area to disseminate ARW signals from the keypoint to subkeypoint warning stations from which the signals would be further disseminated by means of the bell and lights arrangement previously described. This system also may be used for intercity dissemination from keypoints to subkeypoints as it is from the ADCC to keypoint cities.

Control Point Equipment and Operation

Each control point will have a "push-to-talk" telephone hand set, or an operator's head set, together with a non-locking ringing key and, if desired, a 100F speaker. When the control point operator lifts the hand set (or plugs in the head set) and operates the key, this will cause a distinctive bell to ring in each warning station. Ringing will continue on each line until the control point operator releases the "ringing" key. After ringing, the control point operator will announce the indicated degree of alert. Individual warning stations will not be able to talk to each other but only to the control point. The control point operator will call the roll to receive acknowledgments.

Station Equipment

For two-way speech, each station will be provided with a distinctively colored or marked telephone set equipped with distinctive gongs. In some cases, it will be desirable to use a push-to-talk hand set. A speaker, 100F or equivalent, would be optional.

Control Circuit

Private line telephone facilities will be used for the backbone circuit connecting the central offices. Subscriber loops will radiate to the warning stations from the nearest central office. For two-way speech, separate paths will be used for the two directions of transmission, that is, four-wire operation will be employed throughout. Networks within a city area, involving up to 20 warning stations, may utilize the existing multi-station private line circuit employed for ARW dissemination in World War II. Larger versions of the same circuit could be made available. However, operating considerations might indicate, for example, that two 20-station networks are preferable to a single 40-station network. Networks involving toll intercity facilities will utilize circuits developed for the existing ADCC - keypoint networks.

Special Telephone Calling

Telephone calling will make use of existing message telephone facilities to the greatest extent practicable. Special arrangements are available for use in certain cases where the required degree of speed in disseminating alerts can not be obtained with normal arrangements.

Application

Sequence calling will be satisfactory and will be desirable, because it is economical, where the number of important warning stations which must be notified within about three minutes does not exceed about six. This method can be used for ARW dissemination both locally and to outlying cities, towns, etc. Chain telephone calling, using only existing facilities, will probably be adequate for notifying those points which are of very little military significance and which are not in likely target areas.

Control Point Equipment and Operation

A toll terminal (LD trunk) should be provided for each important out-of-town point to be alerted by telephone calling. The toll terminals save time in by-passing the local operator and in permitting the toll operators, upon receipt of a signal and without a verbal order, to establish connections to previously designated telephones at the distant points. Suitable instructions are necessary for the toll center operators.

The transmittal of the warning signals can be greatly speeded by providing 100-type key cabinets, (modified per the Plant Engineer's Letter of August 1, 1941) for every three (or six) toll terminals. When a warning is to be sent the caller throws all the line keys to the "HOLD" position thus signaling the operator who completes the calls as above. With the "HOLD" keys operated, the caller can monitor for all of the called telephones waiting for them to be answered. As each of the distant telephones is answered the caller throws the proper key from "HOLD" to "TALK", passes the warning, and obtains an acknowledgment.

Use of the modified 100 key cabinets permits the person doing the warning to handle at one time and over one telephone, calls to three (or six) outlying communities or local warning stations. Some tests indicate that one person can handle up to six lines. This arrangement permits adjacent toll operators to work simultaneously on calls to the several distant points involved. To obtain comparable speed without key cabinets would require more telephones and more people in the control point.

Station Equipment

Each important warning station should be provided with a one-way non-list telephone. This telephone should be used for no other purpose than receiving air-raid warning signals. This is important to insure that the ARW alerts are not delayed by a "busy" line. For any cases where the facility situation makes it impracticable to provide an additional telephone for ARW use exclusively, there are special circuits available which can be applied to insure that the ARW signals are not delayed by a busy line.

Development Work and Time to Provide

With the bell and lights arrangement, the bell only arrangement and the one-way dial circuit to outlying cities, the Bell Telephone Laboratories is now doing development work. To shorten the normal time intervals, it is proposed to have the Laboratories prepare only "pencil sketches" (ES - drawings) on the basis that the Telephone Companies each will do their own engineering locally. It is proposed that the station sets will be assembled by the Western Electric Company's Branch Houses. It is expected that the ES - drawings can be made available on a "rush" basis in two or three months.

With the two-way voice and sequence telephone calling arrangements, no development work is required. These types of service can be furnished on relatively short intervals because the Telephone Companies have had considerable experience with these services.

Choice of Methods

The most essential requirement for any ARW arrangement is that it be capable of speedily notifying a comparatively large number of important points almost simultaneously. Each of the private line methods meets this requirement well. It is this requirement, based on the high speeds of modern aircraft, which dictates somewhat better ARW arrangements than were employed in World War II.

It is essential that any ARW system shall not be dependent on local, 110-volt commercial power unless adequate standby power equipment is available. It may be assumed that after the first attack, the commercial power will fail and that restoration will be slow and incomplete for a long period. None of the five methods described in this memorandum requires any local power at the control point or the warning stations. The only power sources used are located in the telephone central offices where storage batteries and standby engine generators can be relied upon for continual service. (There is one minor exception to the foregoing and that is with the voice system; the 100F speakers, if used, do require local power, but where they are used, they are

strictly a supplement to the head receiver and the essential operation of the system is not dependent on their functioning.)

Another essential requirement is that the authenticity of the ARW signals received at any point shall be virtually unquestionable. The cir-suits should be secure in that false alerts can not be originated by un-authorized persons. Fundamentally, each of the foregoing private line arrangements meets this requirement well. Furthermore, each of these methods is considered to be as reliable and immune to failure as can reasonably be expected.

The choice of the method used in any particular instance will depend upon:

1. The number of minutes in which the warning must be completed. This is based upon the strategic importance of the places to be warned.

2. The availability of existing communications facilities. (See below.)

3. Economic considerations.

4. The number of places to be warned from a given control point.

5. The availability of personnel to operate the alarm.

   For example, if there are 10 people always available at a keypoint to pass the air-raid warning signals to 50 places, this could probably be done in less than five minutes by telephone calling. However, if there is only one man continuously on duty at the keypoint and if he has other duties in addition to ARW dissemination to 50 places, an automatic arrangement must be utilized which will require the operator to do nothing more than push a button, or operate a dial, or make a broadcast announcement.

6. Whether an acknowledgment is required. (See below.)

Acknowledgments

In disseminating ARW signals from the military at the ADCC to civilians at keypoints, considerable emphasis has been placed on the necessity of providing for an acknowledgment from each keypoint to indicate to the ADCC that the signal has been received. This is the first step in ARW dissemination and in this case an acknowledgment requirement is un-questionably justified because of the importance of this step. However, in the further dissemination from keypoints, in most instances an acknowledgment feature can not be justified and, in some respects would result in definite disadvantages.

An acknowledgment may indicate to the sender either one or both of the following depending upon the circuit arrangement.

1. The signal has been indicated at the receiving point; that is, there has been no circuit failure. (A circuit which incorporates a con-tinual self-testing feature accomplishes practically the same result.)

2. The signal has been observed by a person at the receiving point. An arrangement to accomplish this must require the recipient to push a button or take some other positive action to acknowledge the signal. This further is proof of the discharge of responsibility by the sender.

In actual practice, where an acknowledgment arrangement has been provided, if no acknowledgment is received for a given transmission, the sender should immediately initiate steps to send the warning by an alternate facility or to an alternate recipient. There is no advantage in providing for an acknowledgment unless alternate facilities are available and unless sufficient personnel are available at the sending point to handle the dissemination over the alternate facilities to all of the warning points failing to acknowledge any given transmission.

The principal disadvantage of including an acknowledgment feature is that it increases circuit costs and requires appreciably greater operating time. Routine testing and reporting are a substitute for acknowledgments and can reasonably assure the performance of a warning system. The reporting aspects serves as a check, not only on the circuit performance, but also on the operating arrangements.

Summarizing, an acknowledgment feature is practicable where the number of points to be notified is reasonably small and is desirable from those points (and only those points - such as keypoints) which are of prime importance in the further dissemination of ARW signals. However, an acknowledgment feature is impracticable, both from an economic and from an operating standpoint, where the number of points to be notified is large. For example, in Chicago approximately 2,000 important warning stations must be notified from the keypoint and it would be utterly impracticable to provide for an acknowledgment from these points. The important thing is to get the warnings to all these points and do it quickly; the bell and lights arrangement would be most applicable.

Use of Existing Facilities

The following types of existing facilities where available will be suitable for the speedy dissemination of air-raid warning signals.

1. Police teletypewriter networks

   The larger State Police teletypewriter networks are located in the States of New Hampshire, Massachusetts, Connecticut, Rhode Island, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, Ohio and California. In addition, the principal cities have municipal teletypewriter police systems many of which are connected with the State systems.

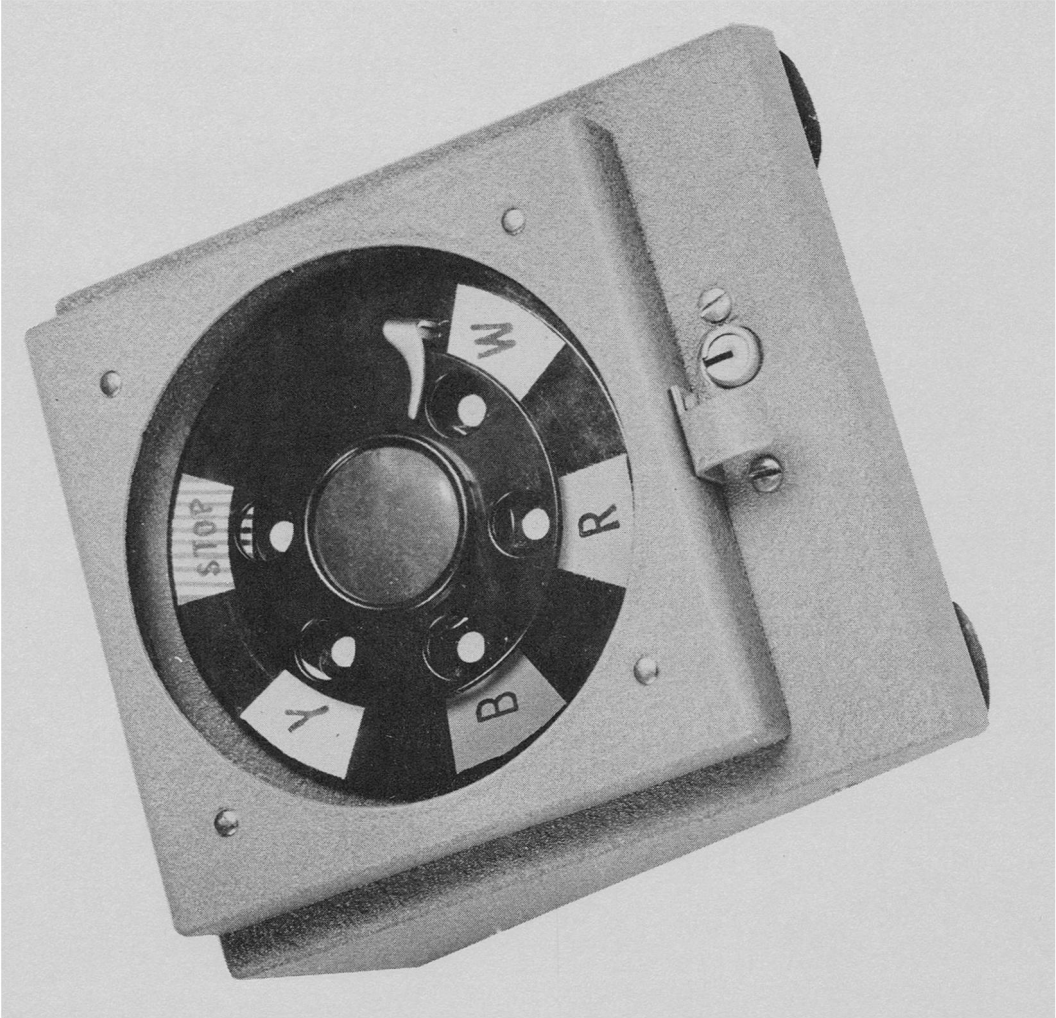
2. Police radio

   Both state and municipal radio systems will be most suitable as an alternate means of disseminating ARW signals. In many instances the state systems do not terminate in communications centers and, therefore, will be less easily integrated into an overall system.

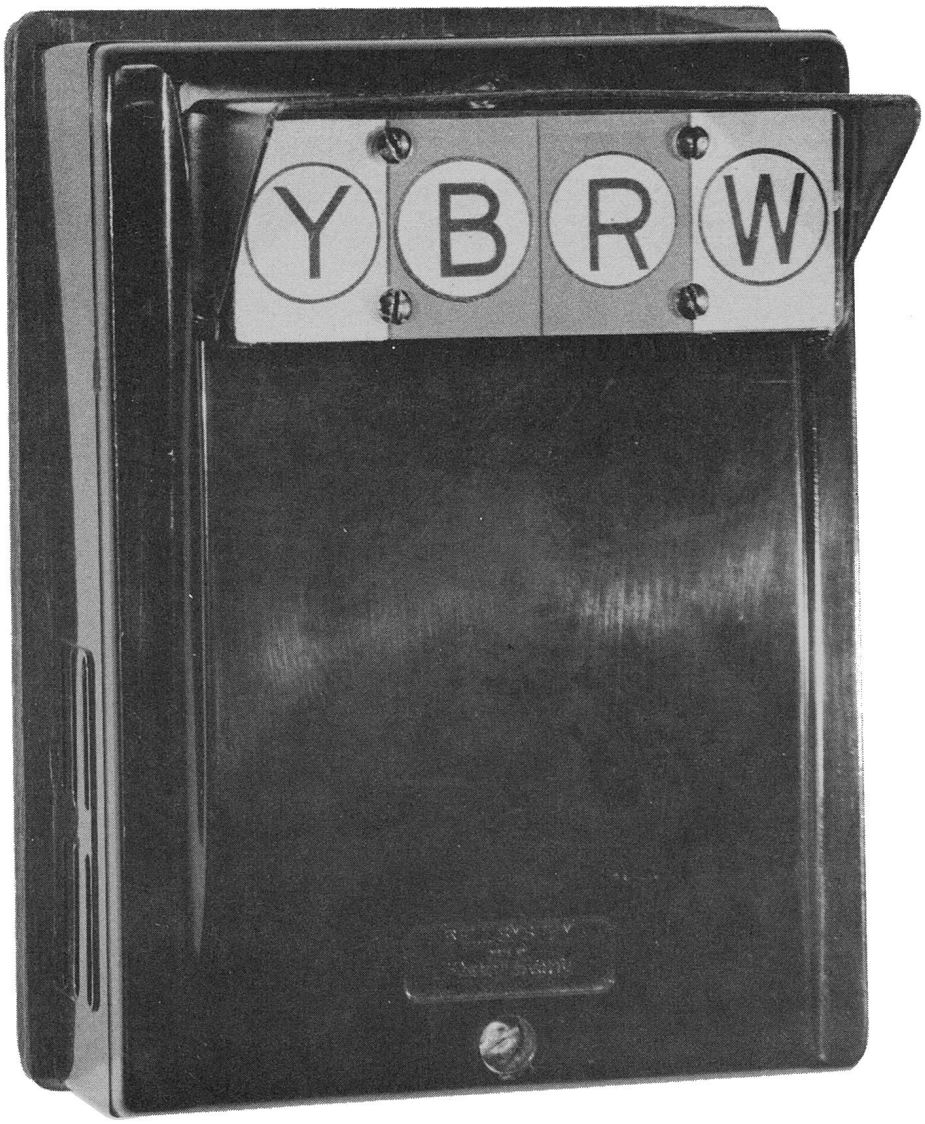
3. Municipal fire alarm systems.

   Air-raid warning signals will probably be sent over most fire alarm systems in any event, the principal question here is whether a fire station should be responsible for the further dissemination of the signals.

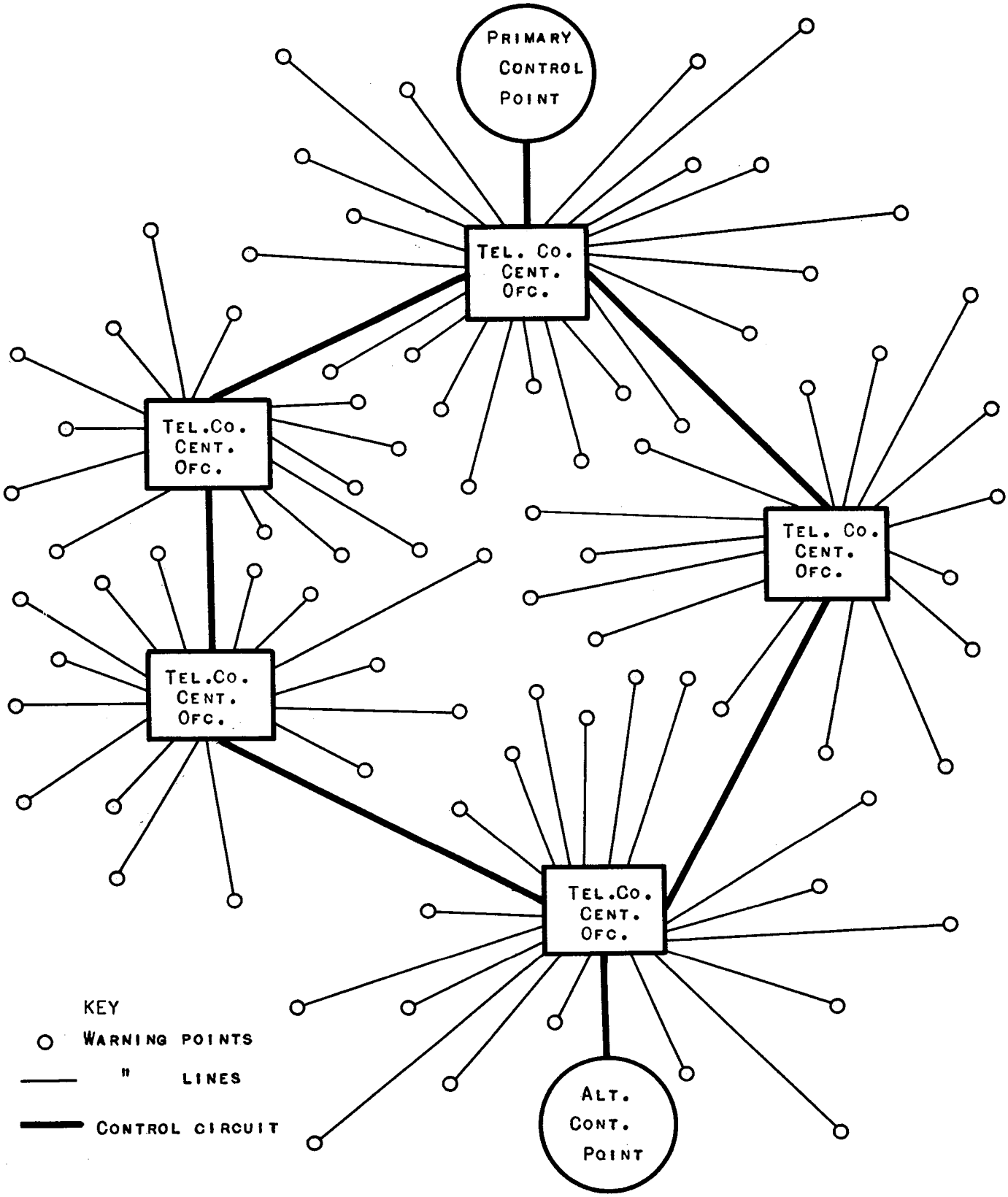
Existing facilities, where available and suitable, should be used whenever practicable to avoid the cost of providing special facilities. The above types of facilities, when available, will be most applicable for dissemination from keypoints to subkeypoints both where the subkeypoints are within the same city as the keypoint station and also where the subkeypoints are scattered throughout a state area. In either case, if there are many important warning points to be notified from a subkeypoint, a bell and lights arrangement will probably be indicated to complete the dissemination from the subkeypoint to the important warning stations.



BELL AND LIGHTS - CONTROL STATION



BELL AND LIGHTS - RECEIVING STATION



TYPICAL INTRACITY NETWORK

Printed in U.S.A.

*SPEAKER MICROPHONE SERVICE

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SPEAKER-MICROPHONE SERVICE

0. INTRODUCTION

Speaker-microphone service is designed to provide two-way voice communication between home and school as an adjunct to the training of handicapped students who cannot attend classes in person. This service may be utilized for other purposes where it is found to meet a requirement.

Loudspeaker-microphone station equipment is employed at each end of a private line circuit. The private line may be either local or interexchange.

The service is offered in California under Tariff Cal. P.U.C. 87-T. Should a requirement be encountered for installation of this service in Nevada, a request for establishment of tariffs should be made through lines of organization to the General Commercial Engineer.

1. STATION EQUIPMENT

1.0 Master Station

This is commonly called the "Home Station" since it is the one used by the home-bound student where the equipment is installed for school-to-home use. It is a bronze finished metal cabinet approximately 8 3/8" wide, 11 3/4" deep and with a sloping top 3 1/4" high at the front and 7 7/8" at the back. A speaker-microphone is mounted behind slits in the sloping top which mounts a non-locking sliding bar type "listen-talk" switch. A rotary type combination "on-off" and volume control knob is mounted in the center of the perpendicular face immediately above a small red pilot lamp. The set is equipped with an 8' power cord for connection to a 105-120 volt A-C or D-C power outlet provided by the user. The station may be installed as a fixed station if the student is to require the set at only one location. However, if the student desires to use the set at more than one location in his home, a portable set may be provided equipped with a plug ended cord, in which case a jack must be provided at each location where the station is to be used and a commercial power outlet must be available at each such location.

1.1 Controlled Station

This is the station referred to as the "Classroom Unit" when the service is installed for school-to-home use. This unit is a bronze finished metal cabinet, approximately 6 3/8" high, 6 1/8" wide and 3 5/8" in depth, housing a speaker-microphone. A sliding type volume control switch located in the top of the unit permits adjustment of the speaker to either "high" or "low" volume. If the controlled station is to be used in one classroom only, it may be installed as a fixed station permanently connected to an amplifier and the private line circuit. However, the station will usually be of the portable type equipped with a 9' cord and plug. A jack must then be provided in each of the classrooms where the station is to be used.

The fixed controlled station, or the various jacks to which the portable controlled station may be connected, are wired to an amplifier installed on the same premises and commercial power is not required at locations where the station set is to be used. Shielded wiring is usually required between the amplifier and the controlled station (or jacks). Refer to Tariff Schedule Cal. P.U.C. 87-T for limit on shielded wiring provided for filed rates.

2. AMPLIFIER

An amplifier located on the premises of the controlled station is required for each system. This unit provides amplification at the controlled station of incoming speech from the master station. It also controls the output volume received from the controlled station speaker and transmitted over the private line circuit.

The amplifier is contained in a dark brown wrinkle finish metal box, 7 1/2"high, 9" wide and 6 1/2" deep. An "off-on" toggle switch is located on the left side of the cabinet. Operation of this switch to the "on" position lights a pilot lamp on the cover of the cabinet to indicate that the unit is in operating condition. An 8' power cord is provided for connection to a power outlet, 105-120 volt A-C, provided by the subscriber.

The amplifier may be installed in any suitable room, provided that it is accessible at all times during classroom hours for turning the unit on and off. To avoid wiring and transmission problems, and to not exceed maximum lengths of shielded wiring between amplifier and the controlled station set (or jacks), the amplifier should, of course, be located in close proximity to the classroom or classrooms in which the controlled station is to be employed.

3. OPERATION

In its approved form each single installation of this equipment is designed to permit one home-bound student to participate, by means of speaker-microphone equipment, in the classroom discussions and recitations of his various school classes conducted in one or more classrooms of the same school.

Normal operation of the equipment is for the home-bound student at class time to turn on the master station (home station) by rotating the combination "off-on" and volume control knob in a clockwise direction. The pilot lamp in the master station then lights to indicate that the set is in operating condition.

At the school, the teacher sees that a designated class member or school employee turns the "off-on" switch on the amplifier to the "on" position making sure that the pilot lamp lights to indicate that the equipment is ready for operation. Then, if the controlled station (classroom unit) is permanently connected or has been plugged into its jack, the home-bound student can hear conversations in the school room. He (or she) adjusts the master station to proper volume by rotating the volume control knob.

When the home-bound student is called upon for recitation or comment, or by personal election desires to speak to the class, he (or she) operates the non-locking sliding bar "talk-listen" switch to the "talk" position and holds it in that position while talking. This operation reverses the direction of speech flow, causing the combination speaker-microphone in his (or her) station to become a microphone and the speaker-microphone in the classroom unit to become a speaker amplifying his (or her) voice to the classroom. His (or her) voice as released from the classroom unit may be adjusted to "high" or "low" volume by operation of the sliding type "high-low" volume control switch at the top of the classroom unit.

When, during the school day, the class shifts from one classroom to another, the portable controlled station (classroom unit) is taken along and plugged into a jack in the room to be used.

Both the amplifier at the school and the home station should be turned off at the close of the day's final class session.

4. APPLICABILITY

It is expected that some use may be found for employment of this equipment by business concerns and we should keep alert to its possible application. However, the equipment will probably be in greater demand for school-to-home use.

When used as an adjunct to the training of home-bound students, certain modifications in teaching techniques may be found necessary in the school. Accordingly, it is not expected that the equipment will be generally used except in those cases where a student is to be confined to his home for extended periods, usually one full semester. Installations for shorter periods would be costly.

5. LIMITATIONS OF THE SERVICE

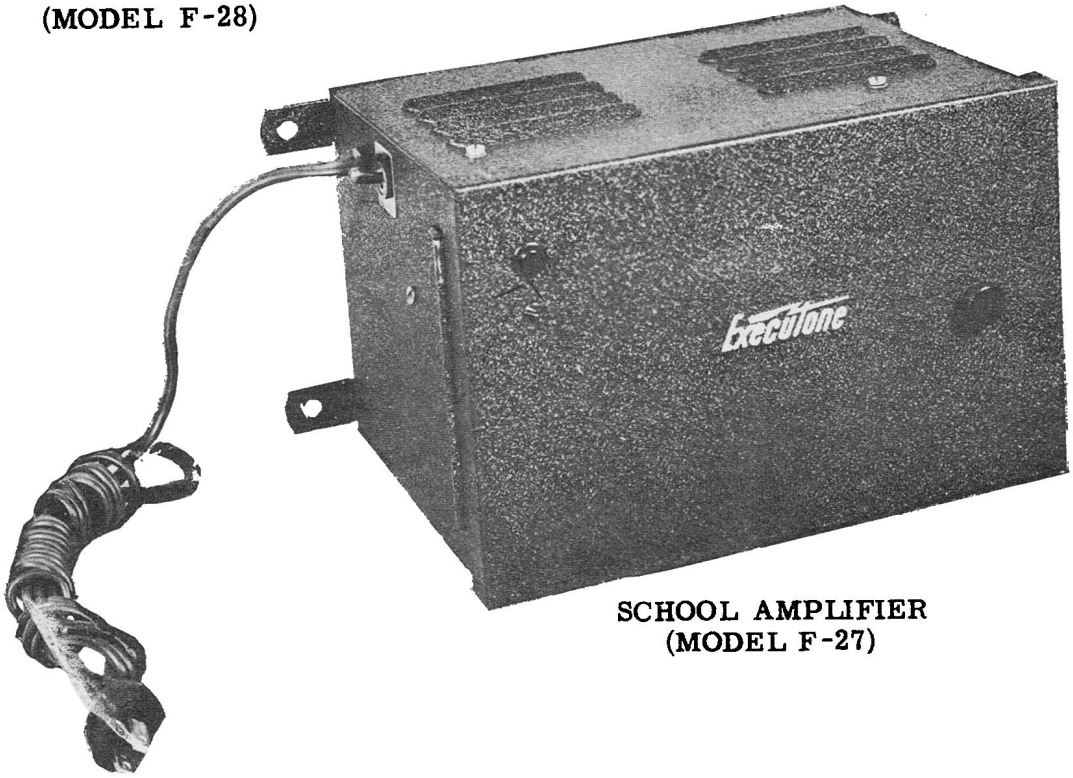
Acoustics of the room has considerable effect upon the quality of both reception in, and transmission from, the school room. Some experimentation may be necessary to determine the best location for the classroom unit. A usual location would be near the teacher's desk or table in front of the room and on a 6' high stand so that there is no obstruction between the students and the classroom unit. This location has the further advantage that students speak in the direction of the speaker when addressing the teacher.

Under ordinary classroom conditions, satisfactory transmission has been experienced from distances up to 30 feet or more from the classroom unit. However, radio broadcast quality transmission should not be expected from this equipment.

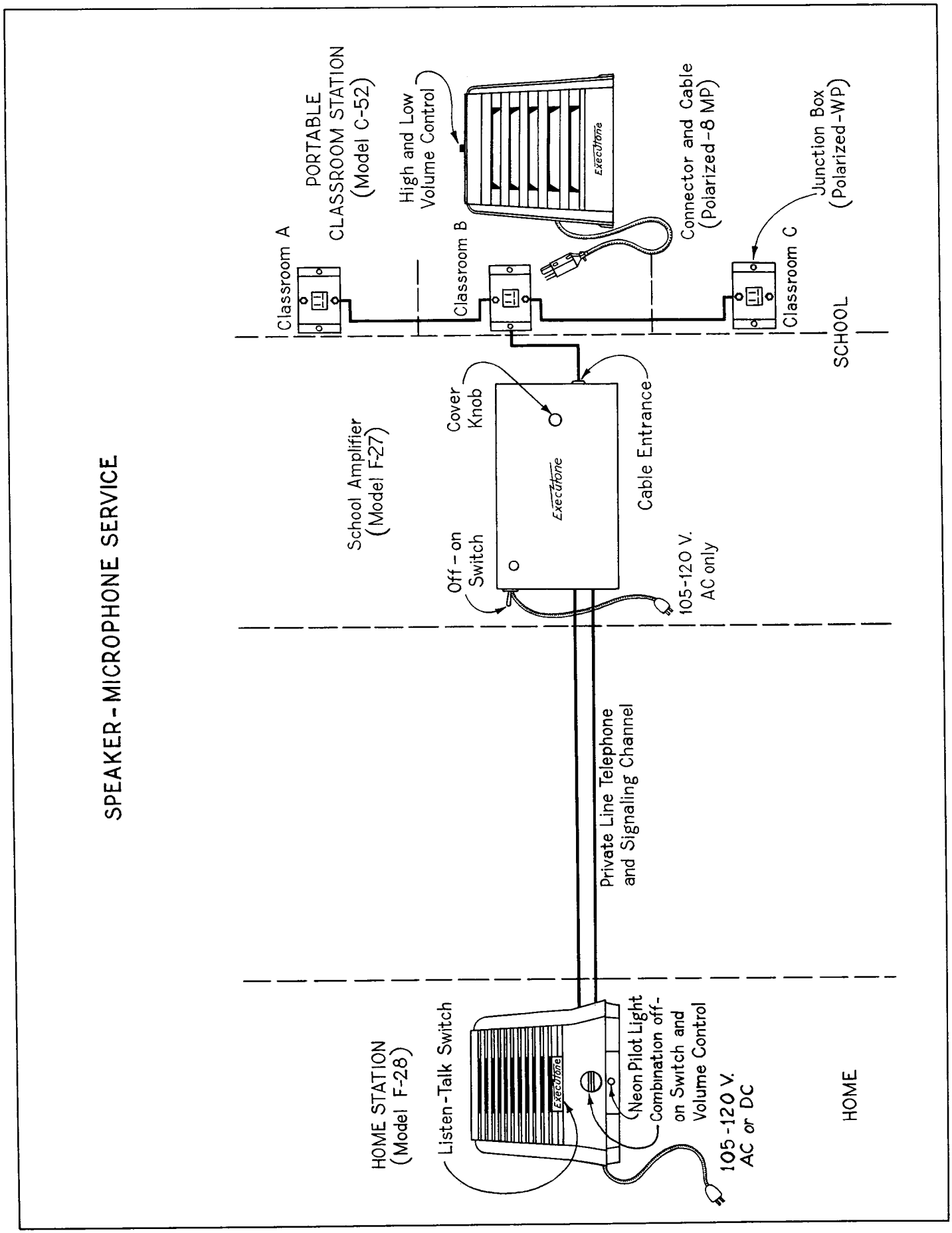
SPEAKER-MICROPHONE SERVICE

CLASSROOM UNIT
(MODEL C-52)

HOME STATION
(MODEL F-28)



SCHOOL AMPLIFIER
(MODEL F-27)


SPEAKER-MICROPHONE SERVICE
PORTABLE CLASSROOM STATION (Model C-52)
High and Low Volume Control
Classroom A
Classroom B
Classroom C
Connector and Cable (Polarized-8 MP)
Junction Box (Polarized-WP)
SCHOOL
School Amplifier (Model F-27)
Cover Knob
Cable Entrance
Off-on Switch
105-120 V. AC only
Private Line Telephone and Signaling Channel
HOME STATION (Model F-28)
Listen-Talk Switch
Neon Pilot Light
Combination off-on Switch and Volume Control
105-120 V. AC or DC
HOME

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TELETYPEWRITER EXCHANGE SERVICE

0. DESCRIPTION OF SERVICE

0.01 General

For the purpose of brevity, Teletypewriter Exchange Service is referred to hereafter as TWX service.

TWX subscribers are furnished a complete sending and receiving teletypewriter set. The sending is done from a keyboard very similar to a typewriter, and messages are usually received on a continuous paper or on a letter size form. If the customer prefers, machines for sending or receiving on a continuous tape are available.

In appearance and operation the teletypewriter machine is like an ordinary typewriter, except that the teletypewriter keyboard differs from that of the ordinary typewriter in the following major respects:

1. The typewriter keyboard has four banks of keys; the teletypewriter keyboard has three. The space between keys is wider on the typewriter.

2. The teletypewriter prints only capitals.

3. In the teletypewriter the lower case characters are the capital letters while the upper case are figures, fractions, punctuation marks, etc.

4. In the teletypewriter keyboard, keys are provided for the automatic operation of "line feed" and "carriage return," which are performed manually in the case of the teletypewriter.

5. There is no "back space" on the teletypewriter keyboard.

Anything typed on one teletypewriter machine is instantly and accurately reproduced on any other teletypewriter to which it is connected. Operation of the teletypewriter machine is electrical and machines are connected with each other by electrical circuits. Depressing a key on the teletypewriter keyboard causes certain electrical impulses to be transmitted over the connecting circuit which causes the corresponding key to operate at the distant machine, thus each word is transmitted letter by letter.

The nation-wide TWX service offered by the Bell System permits any subscriber to the service to request a connection to be established between his station, and one or more other stations in the network in much the same manner as with the telephone service.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

The speed with which connections are established is comparable with that of telephone service. Direct connections are established between the sender and receiver and only customers or their employees take part in the transmission of the communication.

TWX service is furnished only on the basis of 60 speed. This is a theoretical speed based on the total number of possible characters or operations per minute, and the assumption that the average word is equivalent to 6 characters (5 letters and 1 space). On this basis the 60-speed service is equivalent to a maximum of 360 characters per minute.

0.02 Network

The subscriber's station is permanently connected to a TWX switchboard, and terminates on a station jack and lamp as in the case of telephone service, with the exception of stations operated by CLX (See Paragraph 8.03(L)).

For operating efficiency the country has been divided into a number of regions with one teletypewriter center in each region designated as a "region al center." These centers are interconnected by direct trunks, which form the backbone of the complete network. In each region there are a number of smaller centers known as "routing centers" which generally have direct trunks to the regional center. In a large number of cases the "routing centers" in each region are also interconnected. Still other centers in each region, which because of their geographical location are not required to handle through connections, have direct trunks to only one routing center or to the regional center. These centers are known as "single outlet offices".

At each center a switchboard is provided, which contains the necessary line and cord equipment, including teletypewriters, to permit various connections to be established and supervised.

1. STATION EQUIPMENT

1.01 General

(a) Types of Machines

Any one of the following types of station equipment may be furnished to customers subscribing to TWX service:

1. No. 15 Page Type Keyboard Sending and Receiving Machine

2. No. 19 Page Type Keyboard Sending and Receiving Machine which

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

includes a keyboard perforator transmitter, a No. 15 teletypewriter unit and an automatic transmitter.

3. No. 26 Page Type Keyboard Sending and Receiving Machine

4. No. 14 Tape Type Keyboard Sending and Receiving Machine

Comparison of Page and Tape Type Equipment

The features of the page type machine are:

1. Types on a full width page, that is, 8-1/2 inches wide.

2. It is possible to make as many as seven copies of the communication at each machine (Nos. 15 and 19 only.)

3. It is possible to use the customer's own forms.

4. Suitable for both stenciling and hectographing work. (Nos. 15 and 19 only.)

The features of the tape machine are:

1. It is possible to transmit a few more characters per minute from one tape machine to another because it is not necessary to operate the "CARRIAGE RETURN" or "LINE FEED" keys.

2. Some customers prefer to have their communications received on a tape because of precedent, convenience in filing of short messages, economy due to the slightly greater efficiency of the tape type machine or some other reason.

(b) Finish

Equipment is regularly finished in walnut, plain black, or in the case of the No. 26 machine, a black "wrinkled" finish.

(c) Tables

Teletypewriter machines are mounted on tables designed for the service and carrying the necessary power equipment and signalling apparatus. The table and equipment are furnished without charge.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(d) Automatic Equipment

Equipment for automatic transmission will be furnished in connection with TWX service at No. 15 page, or No. 14 tape stations when desired.

(e) Copyholders

Two types of copyholders are available; one type is mounted on the front of the machine and is designed to accommodate short message blanks; the other type is located on the side and will accommodate sheets of copy up to eleven inches without obscuring the view of the typing.

(f) Keyboards

Since machines must be equipped to operate with any other machine, the universal keyboard is furnished as standard equipment. (See Exhibits)

(g) Margin Signals

Each page type machine is equipped with a single stroke margin bell which rings automatically when the end of the line is approached. The bell is normally adjusted to ring six characters before the actual end of the line.

When a tape printing machine is used on the same circuit with page printing machines such as the No. 15 and No. 26 teletypewriters, it is usually equipped with an "end of line indicator" to warn the operator of the approach of the end of the line in the page machines, so that suitable signals may be sent for starting a new line.

(h) Subscriber Sets

Each machine is equipped with a subscriber set which houses equipment which enables the attendant to turn the power on and off, and signal the operator.

(i) Station Bells

Each machine is equipped with a station bell which enables the TWX operator to signal the station.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(j) Placing of Equipment

Teletypewriter equipment should be so arranged that there will be at least a three-foot space in front of the machine for the operator's chair and at least a one and one-half foot space at the back of the machine to allow adequate room for maintenance.

1.02 Page Equipment - No. 15 Page Teletypewriter

(a) Description

The No. 15 Teletypewriter, for keyboard sending and receiving, uses type bars and a stationary carriage and is designed to handle wire communications, typing the message in page form. (See Exhibits)

(b) Dimensions

The over-all dimensions of the teletypewriter are 17 inches wide, 21 inches deep, and 15 inches high.

(c) Covers

Two covers are available for the No. 15 type equipment, one finished in walnut and the other in black. Except for the finish, these covers are identical. Each is equipped with a hinged door at the rear which may be raised to renew the paper roll. There is also a hinged lid at the front which is equipped with a tearing edge and a glass window through which the copy may be read.

(d) Keyboard

The No. 15 teletypewriter is equipped with the Universal keyboard. A feature of this equipment is that the machine will continue to space as long as the space bar is held down in the operating position.

(e) Copyholders

Two types of copyholders are available. The 14 type is designed to accommodate short message blanks; the 15 type is larger and will accommodate sheets of copy up to eleven inches. (See Exhibits)

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(f) Send - Receive - Break Control

This control is located in the front left-hand corner of all No. 15 sending and receiving teletypewriters. With the lever in the "Send" position, the equipment may be used for either transmission or reception.

With the lever in the "Receive" position, the keyboard contacts are short-circuited, thus preventing transmission due to the accidental depression of the keys while receiving.

When the lever is placed in the "Break" position, the line is opened and the levers at all stations are automatically moved to the "Receive" position, thus stopping all transmission instantly. To resume sending, an operator must manually restore the lever at his station to the "Send" position.

(g) Margin Bell

A single stroke margin bell is provided which rings automatically when the type carriage approaches the right-hand limit of its travel.

The bell is normally adjusted to ring six characters before the actual end of the line.

(h) Line Feed

No. 15 type apparatus is normally equipped for both single and double line spacing controlled by a small lever at the left-hand end of the platen. Single line spacing provides six lines per inch, double line spacing provides three lines per inch. When a number of fractions are being transmitted double line spacing must be employed, since the fractions are too large to permit single line spacing without overlapping fractions on adjacent lines.

(i) Characters Per Line

Page teletypewriters print ten characters per inch and are adjusted to print seventy-two characters per line with a left-hand margin of about three-quarters of an inch. This leaves approximately one-half inch margin on the right-hand side of the page.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

Printing may be carried to about one inch from the bottom of the page when individual message blanks are used.

(j) Paper Requirements

To print a single copy on blank paper, the usual paper in roll form is recommended. These rolls may be as large as five inches in diameter and eight and one-half inches wide.

(k) Carbon Copies

One or two carbon copies can be made on the usual friction feed platen using multiple wound roll paper with either carbon backing or inter-leaf carbon paper. Generally speaking, however, it will be found more satisfactory to use sprocket feed when carbon copies are desired, or when printed forms must be filled in on 15 type equipment. Sprocket feed is covered in detail in paragraph 2.03.

(l) Ribbons

No. 15 teletypewriters can use any good grade of medium inked typewriter ribbon, one-half inch wide, if wound on spools which will fit the machine. (Underwood typewriter ribbon spools will fit.) The ribbon feed is automatically reversed when one spool becomes nearly empty.

(m) Tables

Two types of tables suitable for mounting No. 15 teletypewriters are available. However, the No. 15-A table has been superseded by the No. 15-N table and will be supplied only when in stock. (See Exhibits). For dimensions of 15-A and 15-N tables see Paragraph 5.

1.03 Page Equipment - No. 19 Page Teletypewriter

(a) Description

The No. 19 teletypewriter set is a page teletypewriter which uses type bars and a stationary paper carriage and provides, in addition to the regular receiving and direct keyboard sending, a means of transmitting automatically. This is accomplished by preparing, ahead of actual transmission, a paper tape in which the operator punches holes coded to correspond with the characters to be

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

sent. The tape is then fed through an automatic transmitter and so insures uniform transmission at the maximum rate of speed. (See Exhibits).

The set consists of a typing unit which is the same as that on the No. 15 teletypewriter, a keyboard unit which can be used either for direct keyboard sending or to perforate tape or both at the same time; and an automatic transmitter.

(b) Dimensions

The overall dimensions of the set are 36 inches long and 23 inches deep. Since the set always includes the 19-A table, the height of the set on this table is 41-1/2 inches. The table alone is 26-1/2 inches high.

(c) Cover

The only cover available for the No. 19 set, is finished in walnut. A real is mounted on the left hand side to accommodate the perforator tape. A hinged door in the top of the section over the punch block permits the insertion of the tape in position over the punching pins. A glass window in this door permits the operator to read the punched tape. Other provisions, such as the door for replacing paper, and the window to permit seeing the printing, are the same as for the regular No. 15 teletypewriter.

(d) Keyboard

The No. 19 teletypewriter is equipped with the Universal keyboard. A feature of this equipment is that the machine will continue to space as long as the space bar is held down in the operating position.

(e) Copyholders

Two types of copyholders are available. The 14 type is designed to accommodate short message blanks; the 15 type is larger and will accommodate sheets of copy up to eleven inches. (See Exhibits.)

(f) Position Indicator

A special feature of the No. 19 teletypewriter set is an

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

indicator, mounted on the right hand side of the set which shows the position in the line. (See Exhibits.) A pointer indicates the number of characters which have been punched in the tape, when key is in "tape" position. The carriage return key resets the indicator pointer to zero. This indicator registers only on characters which cause the teletypewriter to space but not on functions (such as shifting and line feeding). In addition to the pointer, a red lamp is provided underneath the indicator to warn the operator that the end of the line is approaching. The lamp is normally lighted after the 65th character and remains lighted until the carriage return key is depressed. The position indicator does not operate with the back-space lever on the punch block.

(g) Perforator Transmitter

The single keyboard on the No. 19 set can be used for direct keyboard sending, perforating tape, or combined perforating and keyboard sending. A three-position key in the front right hand side of the unit controls selection of any one of these 3 possibilities:

1. When the key is set for direct keyboard transmission, (keyboard), no tape is perforated.

2. When the key is set for tape perforating, (tape), the typing unit is not connected to the keyboard and no local copy is obtained while the tape is prepared. This permits somewhat faster preparation of the tape than would otherwise be the case since the speed is not limited to the speed at which the service is set. Also, perforated tape can be prepared while the printing unit is receiving copy from another station.

3. When the key is set for combined keyboard transmission and tape perforation, (keyboard and tape), a copy is prepared on the machine while the tape is being perforated. If the teletypewriter is on "local test" (controlled by a switch inside the door just above the keyboard,) no signals are sent out on the line. The automatic transmitter must be turned off when the key is in this position.

   A back-space lever is located over the punch magnet for use in backspacing the perforated tape to correct errors.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(h) Automatic Transmitter

This is described in detail in Paragraph 2.02(c). In the No. 19 set it is mounted on the extreme left of the table so that the tape from the perforator feeds directly from the punch block to the transmitter pins.

(i) Send - Receive - Break Control

This control is located in the front left hand corner of the typing unit of No. 19 sets. With the lever in the "Send" position, the equipment may be used for either transmission (direct keyboard or automatic) or reception.

With the lever in the "Receive" position, the keyboard is short-circuited, thus preventing transmission due to the accidental depression of the keys while receiving. This also blocks the automatic transmitter, but does not affect the perforator so that tape can be prepared when the key is in this position.

When the lever is placed in the "Break" position, the line is opened and the keys at all stations are automatically moved to the "Receive" position, thus stopping all transmission instantly. To resume sending, an operator must manually restore the key at his station to the "Send" position.

(j) Margin Bell

A single stroke margin bell is provided which rings automatically when the type carriage approaches the right-hand limit of its travel. The bell is normally adjusted to ring six characters before the actual end of the line.

(k) Line Feed

No. 19 apparatus is normally equipped for both single and double line spacing which is controlled by a small lever at the left-hand end of the platen. Single line spacing provides six lines per inch, double line spacing provides three lines per inch. When a number of fractions are being transmitted, double line spacing must be employed since the fractions are too large to permit single line spacing without overlapping fractions on adjacent lines.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(l) Characters Per Line

Page teletypewriter print ten characters per inch and are adjusted to print seventy-two characters per line with a left-hand margin of about three-quarters of an inch. This leaves approximately one-half inch margin on the right-hand side of the page.

(m) Paper Requirements

To print a single copy on blank paper, the usual paper in roll form is recommended. These rolls may be as large as five inches in diameter and eight and one-half inches wide.

Paper tape for the perforator is approximately eleven-sixteenths of an inch wide and is sold in rolls about 1,000 feet long. This is normally enough tape for 18,000 to 20,000 words.

(n) Carbon Copies

One or two carbon copies can be made on the usual friction feed platen using multiple wound roll paper with either carbon backing or inter-leaf carbon paper. It will be found most satisfactory to use sprocket feed with continuous superfold paper when carbon copies are desired or when there is a requirement to fill in printed forms on No. 19 equipment. Sprocket feed is covered in detail in Paragraph 2.03.

(o) Ribbons

These teletypewriters can use any good grade of medium inked typewriter ribbon, one-half inch wide, if wound on spools which will fit the machine. (Underwood typewriter ribbon spools fit the machine.) The ribbon feed is automatically reversed when one spool becomes nearly empty.

(p) Tables

The 19-A table is the only table available for this type apparatus and is included as part of the set, since much of the apparatus associated with the No. 19 is installed in the rear compartment of the table. The table has recessed felt pads in the top to reduce the noise from the automatic transmitter and the teletypewriter. A chad box is mounted underneath the table top to catch the punchings from the perforator. (See Exhibits.)

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(q) Features

1. Direct keyboard transmission without perforation as with any other sending and receiving teletypewriter.

2. Automatic transmission which permits tape perforation and operation at maximum speed, with approximately 15% greater efficiency of operation.

3. A typed copy of the message may be obtained during either the perforating operation or as the message is being transmitted to the line. An important advantage of the feature providing a typed copy during perforation is that it allows the copy to be checked for errors and corrections in the perforations to be made before transmission.

4. The tape can be transmitted and typed as a continuous and practically simultaneous operation (there is a slight drag due to the physical arrangement of equipment) or the tape may be perforated and stored up for later transmission.

1.04 Page Equipment - No. 26 Page Teletypewriter

(a) Description

The No. 26 machine has a moving carriage, uses ribbon inking, and a type-wheel arrangement which is a cross between conventional type-bar and type-wheel design. This type wheel is an assembly which has a small individual type pallet for each separate character. In printing, a striking arm, somewhat like the shank of a type-bar, comes forward and forces the individual type pallet against the ribbon to make an impression on the paper. The type wheel is rotated to different positions to select the different characters. In this way a clear-cut impression is obtained, which compares favorably with the record of a type-bar or typewriter. (See Exhibits.)

(b) Dimensions

The overall dimensions of the set are 14-1/2 inches high, 16-7/8 inches deep including the keyboard, 14-5/8 inches wide at the base and 17-1/2 inches wide at the top of the cover not including the platen crank. This crank projects 1-7/16 inches from the side of the cover. The offset copy holder when used extends

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

about 11-1/2 inches to the right from the base or about 10 inches to the right from the top of the cover.

(c) Cover

The only cover available for the No. 26 set is of sheet metal with a black, wrinkled finish. The top section has two hinged portions, one opening toward the front and the other toward the rear. These are to provide easy access for inserting paper or ribbons and for cleaning type. The front portion forms a tearing edge for the paper and has a window to make the typed record visible.

There is sufficient sound absorbing padding inside of the cover to provide as much silencing of noise as is practicable by this means. Holes are provided in the back of the cover for mounting a paper roll bracket and for access to the manual carriage return latch. There is also a slot in the back to carry in paper from a roll or other supply outside the machine.

The slot through which the paper issues from the cover is adjustable in width by two screws in the front hinged portion of the cover. A wider slot is required for the feeding of super-fold paper than for the feeding of roll paper.

(d) Keyboards

The No. 26 machine is equipped with the Universal keyboard. A feature of this equipment is that the machine will continue to space as long as the space bar is held down in the operating position.

(e) Copyholders

Two types of copyholders are available. The front sloping panel of the cover carries a narrow shelf to support copy and near the top of this panel there is a spring clip for holding the copy against the panel. The clip may be released by pressure on a button at its right-hand end. Unless otherwise requested, this copyholder will be furnished with the No. 26 machine. (See Exhibits.)

A No. 26-A offset copyholder is available for attachment to the right-hand side of the cover for use where the copyholder normally provided on the front of the cover is inadequate. Sheets

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

9-1/2 inches or more in height, if used on the front copyholder without folding, will obscure clear view of the typing and the offset copyholder is provided to accommodate such sheets of copy. It has a black wrinkled finish and is provided with a movable message line guide for holding the copy.

(f) Break Control

At the front of the machine to the left of the keyboard is a key labeled "Break". This is used to open the line circuit when a station which has been receiving wants to take control of the circuit. Opening the line by operating the "Break" key interrupts the sending from the distant machine. The sending operator, noting this, ceases sending so that the distant station takes control.

(g) Margin Bell

As the paper carriage approaches the left-hand limit of its travel, a lug on the carriage engages a part attached to a bell clapper and rings the bell a single stroke.

(h) Line Feed

Provision is made for single line spacing (six lines per inch), or double line spacing (tnree lines per inch), and the change from one to the other may be made by means of a small lever mounted to the right side of the paper carriage. Due to the sweep of the moving paper carriage, when paper is fed from a supply external to the machine the problem of securing reliable feeding in all positions of the carriage is difficult and consequently feeding with the carriage in its normal returned position has been somewhat favored in the design. When repeated line feeds are transmitted, the operator snould be instructed to have the carriage in its returned position, since with the carriage in its other extreme position, reliable repeat feeding cannot always be obtained.

(i) Characters Per Line

The machine is normally arranged to type seventy-two characters per line. If a seventy-third character is typed, it will type over seventy-second character. The margin provided between the left-hand edge of the paper and the first character typed is approximately three-quarters inch. The characters are typed with a spacing of ten per inch, the same as in the No. 15 teletypewriter.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(j) Paper Requirements

The following types of paper supply may be used with the No. 26 teletypewriter, all paper being normally 8-1/2 inches wide:

1. A single sheet paper roll supported by a paper roll bracket mounted in the 26-A table or on the rear of the cover, the roll not to exceed 5 inches in diameter.

2. A small roll to be used in a rack, mounted on the paper carriage of the machine, inside of the cover. Using paper of the proper grade, this small roll will be about 50 feet in length.

3. Single sheet, superfold paper as normally furnished in container about 8-3/4 inches x 19-1/2 inches x 9-1/4 inches high, the container being placed either on the floor or supported just above the floor level with its long dimension extending from front to rear with respect to the machine.

4. Multiple wound rolls of paper including "one time" carbon sheets and providing for an original and one carbon copy. This multiple wound roll is to be carried on the paper roll bracket mounted on the rear of the cover or in the 26-A table.

(k) Carbon Copies

One carbon copy can be made on the usual friction feed platen using multiple wound rolls with "one time" carbon sheets. Sprocket feed arrangements for typing on forms and making carbon copies are not available with the No. 26 teletypewriter.

(l) Ribbons

Standard typewriter ribbons of the same type used with No. 15 teletypewriters are suitable for use in No. 26 teletypewriters. Hectograph ribbons can be used if desired, but may require rewinding. The direction of ribbon feeding is automatically reversed each time the ribbon becomes nearly exhausted from either spool.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(m) Tables

Two types of tables are available for use with the No. 26 teletypewriter:

1. The 26-A table is 22-1/2 inches wide, 20-1/2 inches deep, and 26-1/2 inches high, and the table top overhangs the front legs by about 4-1/2 inches. It has a walnut finish and the top surface is a wood fibre composition, of a color to match the walnut finish of the table. Since the teletypewriter is provided with rubber cushion mountings, no felt pad is required on the table top. Just to the rear of the machine there is a long slot in the table top through which it is possible to feed paper to the machine from a roll which may be accommodated inside the table. The table may be used either with or without the paper handling mechanism depending on what paper accommodations are desired.

   The paper roll mechanism in the 26-A table is mounted on an inclined front door which attaches to the table below the top. The paper roll becomes accessible when the door, which is hinged at the lower edge, is swung down. A clip arrangement is provided to hold the end of the paper so that when the door is closed after inserting a new roll, the end of the paper can be easily grasped and pulled through the paper slot at the rear of the table and then fed into the teletypewriter. Under the teletypewriter when it is mounted on the table there is space for an instruction card 6" x 8". (See Exhibits).

2. The 26-B teletypewriter table is similar in design to the 26-A table with the exception that it is somewhat larger so that it will accommodate the larger subscriber sets in addition to the teletypewriter and the paper handling device on the front panel or door. The table measures 24-1/2 inches wide, 30 inches deep, and 26-1/2 inches high. The finish is walnut and the top is made of a wood fibre composition to match the walnut finish of the table. The mounting arrangements for the teletypewriter as well as the paper handling arrangements are the same as provided in the 26-A table.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

There are two compartments under the table top, a front compartment for the paper roll arrangement and a rear compartment for the subscriber sets and rectifier if used. Space is provided for an instruction card in the same manner as on the No. 26-A table.

(n) Power Supply

No provision has yet been made for a governed AC motor for the No. 26 teletypewriter. This limits the use of the machine to areas in which 115 volt direct current or 115 volt 60 cycle regulated AC current is available and prevents its use in those few AC areas where other than 60 cycle regulated current is to be used. The AC motor requires about 60 watts and the DC motor about 50 watts.

(o) Difference Between the No. 26 and the No. 15 Teletypewriters

1. Carbon Copies - The No. 26 teletypewriter is satisfactory only for a limited number of carbon copies and not more than one carbon copy can be obtained when using continuous roll or superfold paper. This limitation is due to the paper feeding arrangements.

2. Carriage - The No. 26 teletypewriter has a moving carriage, as contrasted with the stationary carriage of the No. 15 teletypewriter.

3. Noise - The No. 26 teletypewriter is slightly quieter in operation than the No. 15.

4. Paper Feed - The No. 26 teletypewriter is designed only for friction-feed operation and cannot be used where form work or the need for a large number of carbon copies requires sprocket feed operation.

5. Unattended Teletypewriter Service - No provision has as yet been made for using the No. 26 teletypewriter at TWX stations where unattended service is desired.

6. Tabulation Indicator - The tabulation indicator developed for the No. 15 teletypewriter is not suitable for the No. 26, but on the latter machine the ribbon guide between the typewheel and the paper is provided with a raised portion to the right of the printing point to assist in lining up tabular material.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

1.05 Tape Equipment - No. 14 Tape Teletypewriter

(a) Description

The No. 14 teletypewriter for keyboard sending and receiving is type bar operated and designed to handle wire communications, typing the messages on a continuous narrow tape. (See Exhibits).

(b) Dimensions

The overall dimensions of the teletypewriter are 15-1/2 inches wide, 16-1/2 inches deep, and 12-1/2 inches high.

(c) Covers

There are two types of covers available for tape teletypewriters - "Regular" and "Cut-away" (See Exhibits). These covers may be obtained in either walnut or black enamel finish.

The Regular cover provides complete enclosure of the printer mechanism giving rather effective silencing. A window in the front permits a view of the typing.

The Cut-away cover provides greater accessibility to the tape but less effective silencing than the regular cover.

Both covers are hinged at the rear so that they may be raised to insert tape, clean type, and change ribbons. A hole in the front provides access to a knob by means of which the tape may be fed through manually. A covered single tape reel is also supplied.

(d) Keyboard

The No. 14 teletypewriter is equipped with the Universal keyboard. A feature of the 14-type equipment is that the machine will continue to space as long as the space bar is held down in the operated position.

(e) Copyholder

The copyholder usually provided for No. 14 sending and receiving teletypewriters mounts on the front oblique surface of the cover. (Exhibits). It is about 12-1/2 inches wide and 6 inches high and is finished in either walnut or black to match the cover. (See Exhibits).

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(f) Break Control

To "break" (i.e. interrupt another station's transmission) a button is provided on the left of the keyboard which, when depressed, opens the line, rings a single stroke bell, and stops all transmission by causing the lever mentioned above to drop to its "Down" position. Sending can be resumed at any station when the operator at that station manually restores his lever to the "Up" position.

There may also be provided when demanded by subscribers, a small two-position lever inside the opening in the front of the cover just above the keyboard (See Exhibits). In its "Up" position, the teletypewriter can be used for both sending and receiving.

In its "Down" position the keyboard is short-circuited and is therefore inoperative and the teletypewriter can be used for receiving only. This prevents transmission due to accidental depression of the keys while receiving.

(g) Size of Characters

Tape teletypewriters print 8 characters to the inch, each character being approximately 1/8 inch high.

(h) Paper Requirements

Tape for use in these teletypewriters is approximately 3/8 of an inch wide and normally is used in rolls of approximately 900 feet. This is enough tape for about 13,000 to 15,000 words. Two different forms are in common use; gummed tape for subsequent pasting on paper or forms, and ungummed or plain tape if the records are only of a temporary interest.

A tape-out signal is provided on the machine so that a bell rings when a roll of tape becomes nearly exhausted. Where a bell is not desired, the last few feet of tape over the roll are usually colored red to give similar warning.

(i) Carbon Copies

While the ordinary requirement on tape machines is for a single copy only, carbons can be made. This is best accomplished through the use of "Auxiliary Tape Reels" (See Exhibits).

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(j) Ribbons

No 14 machines can use any good grade of medium inked teletypewriter ribbon, 1/2 inch wide, if wound on spools which will fit the machine. The ribbon feed is automatically reversed when one spool becomes nearly empty.

(k) Table

The 14-B table is suitable for mounting the No. 14 teletypewriter and has a recessed section in the top to hold a felt pad to silence the operation of the machine. (See Exhibits).

(l) End of Line Indicator

When tape teletypewriters are connectable to page teletypewriters, it is necessary to provide a signal on the tape machine to indicate when the page machine is nearing the end of the line so that the operator may then transmit the Carriage Return and Line Feed signals and avoid "piling up" the page machine at the end of the line. To accomplish this purpose, a small red lamp is installed on the right hand side of the tape machine keyboard. This lamp normally lights when the 65th character has been typed and remains lighted until the Carriage Return signal has been transmitted. (See Exhibits).

2. ACCESSORIES AND SUPPLEMENTAL EQUIPMENT

2.01 Extension Stations

A second teletypewriter may be provided as an extension of a primary station. The extension may be arranged for both sending and receiving operation or for receiving only.

2.02 Extension Bells

When the regular teletypewriter station bell is not loud enough to be heard at all times by the subscriber's personnel, extension bells are furnished on the same premises as the teletypewriter station with which they are associated. The number of extension bells is limited to three per line. There are 2 sizes of bells available; the small gong which is the same size as the regular station bell, and the 6-inch loud ringing gong. The extension bell or gong should in all cases be near enough to the teletypewriter to permit answering the call before it is abandoned. These signals are both operated by central office ringing power.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

A key may be installed with an extension bell or gong where it is not always desirable to have it connected permanently to the line.

2.03 Equipment for Automatic Transmission

(a) General

Equipment for automatic transmission is in addition to the equipment for direct keyboard transmission regularly furnished. Items of automatic transmission may be furnished either separately or in combination.

(b) No. 14 Perforator

General - This machine is a manually operated punching device similar in operation to the perforating unit associated with the No. 19 machine. Since the perforator is not connected to the line, its speed of operation is only limited by that of the operator.

(c) Automatic Transmitter

General - An Automatic Transmitter transmits teletypewriter signals from a previously prepared paper tape in which holes have been punched corresponding to the characters to be transmitted. (See Exhibits).

Dimensions - The transmitter is 8 inches wide, 15 inches deep and 9 inches high.

Finish - The apparatus is available in both walnut and glossy black enamel to match associated equipment.

Automatic Stop - A stiff wire arm projects from the side of the transmitter over the tape feeding into the machine. This is arranged in such a way that when the tape becomes taut it raises the arm and stops the transmitter thus preventing tearing the center line feed holes.

Mounting - A special mounting plate is provided for each Automatic Transmitter which can be affixed to a table. While no standard table is specified, the company will provide, from standard equipment, whatever arrangement suits the circumstances.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(d) No. 14 Reperforator

General - A reperforator is a machine designed to reproduce incoming teletypewriter signals in the form of perforated tape which can then be used to send the same message over another teletypewriter circuit. The Reperforator makes no printed copy but is usually used in conjunction with a tape or page teletypewriter. (See Exhibits).

Dimensions - The No. 14 Reperforator is 12 inches wide, 11-1/2 inches deep and 13-1/4 inches high.

Finish - The No. 14 Reperforator is available in walnut only.

Paper Requirements - Tape for use in the Reperforator is 11/16 of an inch wide and is usually supplied in rolls of 1,000 feet. This is normally enough for about 18,000 to 20,000 words.

Table - The 14-B table is suitable for mounting the No. 14 Reperforator. (See Exhibits).

2.04 Sprocket Feed

General - This is a method of maintaining exact alignment of multi-copy forms and may be installed on No. 15 and No. 19 page teletypewriters (See Exhibits). The apparatus consists of a ring of knobs or "sprockets" installed at each end of the platen. They engage holes punched in the margins of the paper and thus provide a positive drive action in feeding the paper through the teletypewriter. In installing sprockets, the usual friction rolls underneath the platen are removed so that the same machine cannot be used for both friction feed and sprocket feed.

Cover - To facilitate smooth feeding of continuous multi-copy forms into the teletypewriter, a paper guide is added to the back of the cover (See Exhibits).

Margins - The holes punched in the margins of the forms limit the length of line to seventy-two characters, and the width of margins to one-half inch from the edge of the paper, minimum. The normal adjustments in teletypewriters having sprocket feed give a left-hand margin of approximately three-quarters of an inch.

Platens - Two platens are in general use on sprocket feed teletypewriters. The normal rubber platen is used in all cases when the number

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

of copies is not more than three and it may be used for four or five copy work if light weight paper is used.

When more copies than this are required, a steel jacketed platen will be found desirable to insure legibility on the last copy. This platen is effective for work requiring as many as seven copies.

Paper - See Paragraph 6.

2.05 Paper Box

This is a steel box, finished in dark green enamel, designed to fasten to the back of the 15-N table to hold continuous superfold forms for sprocket feed teletypewriters. The box is 10 inches wide and 10 inches deep and projects out from the table approximately 12 inches (See Exhibits).

2.06 Tabulation Indicator

This attachment is also known as a Visible Position Indicator and is used on the No. 15 and No. 19 page teletypewriters to show the operator how far along a line she has already typed and to assist her in filling out forms. It consists of a scale graduated in tenths of an inch (page machines type ten characters per inch) which is mounted underneath the lower edge of the glass window, and a pointer attached to the type basket. As the type basket moves across the line, the pointer will indicate the position of the next character to be typed. (See Exhibits).

2.07 End of Line Indicator

When tape teletypewriters are connectable to page teletypewriters, it is necessary to provide a signal on the tape machine to indicate when the page machine is nearing the end of a line so that the operator may then transmit the Carriage Return and Line Feed signals and avoid "piling up" the page machine at the end of the line. To accomplish this purpose, a small red lamp (See Exhibits) is installed on the right-hand side of the tape machine keyboard. This lamp normally lights when the sixty-fifth character has been typed and remains lighted until the Carriage Return signal has been transmitted.

2.08 Auxiliary Tape Reels

Where carbon copies are desired on tape teletypewriters, it is

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

necessary to add additional tape reels, since multiple wound tape generally will not feed smoothly. These additional reels are identical with the original reel provided on all tape machines except they are fitted to the nearest reel, not to the cover of the machine. When changing tape, the outer reel is lifted off to give access to the tape on the inner reel. (See Exhibits).

As many as four auxiliary reels may be added, each reel adding approximately an inch to the overall width of the machine.

2.09 Tape Winder

This is a spring-driven winder for rewinding the printed tape into a roll. It is provided with a manual stop and start control as well as an automatic control to stop the winding when the tape between the winder and the printer becomes taut. It is not attached to the No. 14 teletypewriter but placed in a convenient location to the left of the machine. The tape must feed in a straight line from the teletypewriter to the winding reel. (See Exhibits).

2.10 Tape Illuminator

For locations where it is difficult to see the printed tape, a Tape Illuminator can be added to the No. 14 teletypewriter. This consists of a small electric light and reflector shield mounted just over the exit tape guide, thus providing adequate illumination for reading the tape as it comes off the platen. The subscriber furnishes and maintains the necessary power wiring and power outlet at the location of the illuminator and also provides the electrical energy for its operation.

2.11 Gumming Equipment

To assist in handling gummed tape and pasting it on message blanks or forms, the following devices are available:

(a) Hand Moistener or Gummer - This consists of a barrel or water reservoir convenient to hold in the hand. A metal tape guide along the top of this leads the tape over a wick. A spring clip operated by the thumb permits holding the tape firmly while pasting. (See Exhibits).

(b) Trimble Cutter - This consists of a short cutting edge soldered to a thimble. It is convenient to use with the moistener described above. The thimble is available in sizes 5 through 12. (See Exhibits).

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(c) Table Moistener or Gummer - This is a glass container 5-3/4" by 3-3/4" by 1-3/4", over the top of which there is a blotter covered with cheesecloth. The ends of the blotter and cloth hang down into the water in the container. Tape is moistened by drawing it across the damp cheesecloth. (See Exhibits).

(d) Tape Cutting Scissors - These are short bladed scissors having a roller attached to one of the handles. The blades are normally held apart by a spring. These are convenient to use with the table moistener described above. (See Exhibits).

(e) Gumming Table - In locations where space for pasting is not conveniently available, a 14-C table may be used as a gumming table. Its dimensions are 16 inches wide, 19 inches deep and 26-1/2 inches long, and it is constructed of wood. The table is finished in walnut and has a solid linoleum top. (See Exhibits).

3. OTHER SERVICES

3.01 Sequence Service

Sequence service is offered on the same basis as telephone toll calls.

3.02 Service to Unattended Stations

Where equipment arrangements permit, a subscriber may arrange to establish connections to his stations to receive communications which calling parties desire to leave when such stations are unattended. In this case the TWX switchboard operator starts the subscriber's machine for the reception of a message and stops it when the transmission is completed. No provision has as yet been made for using the No. 26 machine at stations where unattended service is desired.

3.03 Conference (Multipoint) Connections

In order to permit subscribers to transmit information simultaneously to a number of stations in the same or different cities, or to permit the exchange of information between a group of stations, conference connections, i.e., simultaneous connections between more than 2 stations specified by the customer are provided when requested. When a conference call for the same group of stations is likely to be repeated from time to time, it may be designated by a code number. The call then may be placed simply by typing CONF followed by the code.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

3.04 Auxiliary Lines

Where a subscriber contracts for more than one central office line at the same premises, such lines may bear consecutive call numbers. In case additional lines are operated as auxiliary lines, only one call number for the entire service appears in the directory.

3.05 Joint User Service

Service permitting the use of a subscriber's service by and in the conduct of the business of other persons, firms, or corporations jointly occupying the same premises, etc., may be furnished upon request of the subscriber. The number of joint users, in addition to the subscriber, is limited to two per service.

4. DIRECTORY ARRANGEMENTS

4.01 General

Teletypewriter stations are assigned a number and listed in a national directory, known as the "Teletypewriter Directory".

4.02 Primary Listings

Each subscriber is furnished without charge, one primary listing consisting of the firm's name, business designation, address, city name (or code prefix, in the case of the larger or better known cities), and call number, which are arranged alphabetically under city headings, which are also arranged alphabetically. The primary listing may be included in the classified section of the directory under a suitable heading without additional charge. When unattended service is available, it is indicated by a symbol at the left of the firm's listing.

4.03 Joint User Service Listings

One directory listing in the alphabetical section of the TWX Directory is included with each joint user service. Listing of the joint user in the Classified Section may be arranged for on subscriber's request.

4.04 Additional Listings

Additional listings are available under conditions comparable to those for listings for telephone service.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

4.05 Distribution

The directory is published at frequent intervals as accumulated changes warrant. Customers are furnished with a sufficient number of directories to meet their requirements.

5. STANDARD TABLES

5.01 General

Apparatus	Table Code	Material	Dimensions Width	Deptn	Height	Remarks
No. 14 Tape Teletypewriter	14-B	Wood	16"	19"	26-1/2"	Walnut Finish Felt Top
	14-C	Wood	16"	19"	26-1/2"	Walnut Finish Linoleum Top For Pasting Only
No. 14 Perforator	14-B	Wood	16"	19"	26-1/2"	Walnut Finish Felt Top
No. 14 Automatic Transmitter		Special Mounting				
No. 14 Reperforator	14-B	Wood	16"	19"	26-1/2"	Walnut Finish Felt Top
No. 15 Page Teletypewriter	*15-A	Wood	18"	22"	26-1/2"	Walnut Finish Felt Top
No. 15 Page Teletypewriter	15-N	Wood	25"	22"	26-1/2"	Walnut Finish Felt Top
No. 19 Page Automatic	19-A	Wood	36"	23"	26-1/2"	Walnut Finish Felt Top
No. 26 Page Teletypewriter	26-A	Wood	22-1/2"	20-1/2"	26-1/2"	Walnut Finish Wood Fibre Composition Top
No. 26 Page Teletypewriter	26-B	Wood	24-1/2"	30"	26-1/2"	Walnut Finish Wood Fibre Composition Top

* 15-A Table has been superseded by the 15-N Table and will be supplied only as the existing supply warrants.

6. STATIONERY AND RIBBONS

6.01 General

Each teletypewriter is initially equipped with one roll of paper or tape and a teletypewriter ribbon, at the time the machine is installed. The customer furnishes all subsequent stationery supplies necessary

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

for the operation of this service and is also responsible for such routine maintenance as keeping the type clean and insuring that stationery is in place at teletypewriter stations.

6.02 Single-copy, Paper.

(a) Description

Teletypewriter paper is intended for use with record typewriter ribbons (black or other colors) and hectograph copying ribbons. The material usually required is a loaded wood pulp paper, and the colors are usually white or canary.

(b) Dimensions

Paper for use with machines in TWX service should always have a width of 8-1/2 inches. The diameter of the roll when roll paper is used should not exceed 5 inches. (See Paragraph 1.04(J) for special requirements for paper to be used with No.26 machines).

6.03 Continuous Superfold Forms.

(a) General

Superfold forms may be used with either the No. 15 or No. 19 teletypewriters when equipped with sprocket feed (See Exhibit), but no provision has been made for the use of forms with the No. 26 teletypewriter.

(b) Width

Paper for use with machines in TWX service should always have a width of 8-1/2 inches.

(c) Length Between Scored Lines

For single-spaced forms in which the length of form is evenly divisible by 1/2 inch, or double-spaced forms in which the length of form is evenly divisible by 1 inch, as is usually the case, the scored lines should be midway between 2 sprocket holes. It is undesirable for the sprocket holes to overlap the scored line due to the possibility of the forms prematurely tearing at such a point and catching or folding under in the course of feeding through the machine.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

For forms of other lengths, the distance between scored lines should be evenly divisible by 1/3 inch for double-spaced lines, and evenly divisible by 1/6 inch for single-spaced lines.

(d) Sprocket Holes

The sprocket holes should be 5/32 inch in diameter, spaced 1/2 inch between centers without cumulative error. The location of the holes with respect to the edges of the forms should be such that the vertical center lines through them are parallel and 1/4 inch from the edges of the paper.

(e) Relation Between Sprocket Holes and Typing Lines

Sprocket feed teletypewriters are adjusted so that the lower edges of the characters typed by the teletypewriter will be 1/32 inch above the horizontal line drawn even with or a multiple of 1/6 inch from the bottom of any sprocket hole. If horizontal ruled lines are provided on which typing is to be done, these should be even with or a multiple of 1/6 inch from the bottom of any sprocket hole. This enables the forms to be interchangeable on different machines without requiring adjustment of the machine.

(f) Width of Column

In order to provide adequate space for typing in each of the columns provided on a form, the width of each column should be at least 1/10 inch greater than the space required for typing the maximum number of characters to be used in the column. (Characters are typed 10 to the inch).

(g) Position of First Line of Typing

The distance from the top edge of the form to the first line on which typing is to be done should not be less than 5/8 inch. This limit should be observed to permit removal of the last form typed from the machine without disturbing the following form.

(h) Left-Hand Margin of Typing

The normal adjustment of the machine, types the left edge of the first character approximately 7/16 inch from the center of the left-hand sprocket holes.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(i) Right-Hand Margin of Typing

The right-hand margin, from the right-hand edge of the extreme right-hand character to the center of the right-hand sprocket holes is 1/4 inch.

(j) Number of Characters Typed Per Line

The teletypewriter types 10 characters per inch and 72 characters per line on a form 8-1/2 inch wide.

(k) Carbon Paper

One-time carbon paper is ordinarily used with forms for use on sprocket feed teletypewriters, although if desired, the forms may be carbon-backed.

(l) Continuous Paper and Serial Numbering

The paper in any individual package should be continuous. If forms are used bearing serial numbers, the packages of forms should be broken at the same place so that the machines will require reloading at all stations at the same time.

(m) General Design

In stationery where the carbon paper does not extend to the edge of the forms the carbon paper should be approximately 5/32 inch less in width than the distance between the inner edges of the sprocket holes. It should be securely stapled, spot-gummed or satisfactorily restrained from shifting by some other method at intervals not greater than about 22 inches.

(n) Stapling

If wire staples are used, they should be located at the top of the form not less than 1/16 inch from the scoring between forms or otherwise securely fastened to either paper or carbon so there is no possibility of their falling into the machine when the forms are separated. The staple should be located at least 3/8 inch above the first line on which typing is to be done.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

(o) Feeding of the Stationery

Stationery employing one-time carbons in which the carbons are secured by stapling or spot-gumming, may be fed into the machine from a box or container located on the floor at the back of the machine, or where the 15-N teletypewriter table is used the 15-A teletypewriter paper box may be mounted on the back of the table. The forms are brought up through the cover paper guide and if of satisfactory design, will feed smoothly through the machine provided the container on the floor is centered with respect to the back of the machine.

(p) Preparation of Forms

In instances where it is desired to use any type of forms, the subscriber should consult his stationer or a reliable firm which specializes in producing forms, and take advantage of their experience, before ordering a supply of forms.

6.04 Teletypewriter Ribbons

(a) The best results are obtained from ribbons with medium inking, and they should be supplied in a length of 12 yards and a width of 1/2 inch. All ribbons must be furnished wound on spools to fit machines for which they are ordered.

No. 14, No. 15, No. 19, and No. 26 teletypewriters use the same type of ribbon. Ribbons may be used of any color to suit the customer's requirements.

Ribbons inked with hectograph copying ink are usually inked on one side only (the side next to the paper) in order to prevent clogging of the type by the hectograph ink. Because of the construction of the No. 15 and No. 26 teletypewriters, hectograph ribbons for use with these machines should be wound in the reverse direction to that employed for typewriter ribbons, in order to bring the inked side of the ribbon next to the paper.

7. POWER

7.01 General

Teletypewriter equipment is designed to operate on 110 volts d.c., or 110 volts 50 or 60 cycle a.c. with the exception of the No. 26 machine which may be operated only on 110 volt d.c., or 110 volt a.c. 60 cycle.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

Where the power supply is of a special character other than that specified above, it may be necessary to install motor-generator sets or similar devices, which are furnished without additional charge. The customer provides the necessary power, the power outlet and power wiring from the source of power to the location of the equipment.

Care should be exercised in selecting the source of power in order to avoid, in so far as possible, delays due to failures from this source. The power wiring should also conform with the local fire underwriter's requirements.

7.02 Outlet

The subscriber furnishes and installs the power outlet, which should be located within 6 feet of the location of the teletypewriter. There are 2 types of receptacles available; the No. 7189 Hubbell receptacle or approved equivalent, which is a single 3-way outlet for one TWX machine; or the No. 7053-G Hubbell receptacle or approved equivalent, which is a double 3-way and 2-way outlet for a TWX machine and a calculating machine or other electrical appliance. The 3-contact receptacle provides 2 contacts for power, and a 3rd contact which is grounded.

8. OPERATIONS

8.01 General

The operation of TWX service, in general, parallels the usual practice followed in telephone service, except that all communications between the TWX attendant and the operator are by teletypewriter. The subscriber's teletypewriter is permanently connected by a circuit to the teletypewriter switchboard, with the exception of stations served by CLX (See Paragraph 8.03 (1)). The operator switches teletypewriter connections in a manner similar to the switching of telephone calls.

8.02 By Customer's Personnel

(a) Training Subscriber's Personnel

In order that the TWX equipment on a subscriber's premises may provide the service intended, it is necessary that the subscriber's personnel who will be responsible for the operation of the equipment be familiar with the manner in which it should be operated. The Traffic Department will provide the necessary

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

instructions at the Telephone Company office or on the subscriber's premises, as necessary.

The visiting instructors visit each attendant periodically to review the operation of the machine. In addition there is placed on each TWX machine a card containing instructions as to operation of the equipment.

(b) Signalling Operator

The teletypewriter attendant signals the TWX central office operator by the operation of a key at the machine. There are several different methods of signalling, depending on type of machine and its location, so each subscriber is provided with the proper instruction card (See Exhibits).

8.03 By Telephone Company

(a) General

Operation of TWX service, in general, follows the practice used in handling telephone calls, except that both local and toll connections are handled at the same switchboard and by the same operators.

(b) Hours of Service

Service is regularly available during all ordinary business hours and may be arranged for outside of these hours subject to reasonable advance notice.

(c) Speed of Connection

The speed of connection between stations of teletypewriter subscribers is about as fast as that provided in the case of telephone service.

(d) Completion of Calls

On both local and interexchange calls, completion is attempted while the attendant remains at her teletypewriter and is released only in case a delay is encountered. Calls not completed on the first attempt are followed up at intervals in accordance with a schedule of subsequent attempts, designed to render as fast and

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

reliable a service as possible without annoyance to the calling or called parties.

(e) Recording Calls

As in the case of telephone toll calls, the TWX central office operator enters the call details on a ticket as the subscriber types his order. It is not necessary to ask the calling party's number since the operator can obtain this information from the jack or designation strip.

(f) Handling Local Calls

If the call is for a station served from her switchboard, the central office operator connects the calling line with the called line and rings on the called line. The operator remains in on the connection until the called station answers, or repeats the rings at suitable intervals, if there is no answer.

(g) Handling Interexchange Calls

The TWX toll operating procedure is the same as that outlined for local calls, except that the connection is built up through one or more other teletypewriter switchboards (See Exhibits).

(h) Timing Calls

When satisfactory communication begins between subscribers, the operator will enter the starting time on the ticket, cut her machine out of the circuit and proceed with other work. When the disconnect signal, indicating the end of conversation, appears, the operator will challenge, if necessary, take down the connection, and time the call.

The tickets are always prepared by the operator at the originating point, regardless of whether the call is prepaid or sent collect.

(i) Unattended Service

If a station, which does not answer, is arranged for unattended service, the operator will ask the calling party if he wishes to send his communication with no one in attendance at the called station, and will proceed in accordance with her instructions. Each

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

TWX switchboard has the necessary equipment to enable her to turn the power off and on at any unattended station served by her switchboard.

(j) Inward and Through Operation

When the outward operator rings on a TWX toll line, a signal appears at the terminating end of the circuit. The operator, on answering the signal, proceeds in accordance with the request of the calling operator. If the request is for a connection to a teletypewriter station served by her switchboard, she establishes connection with the called line and rings the called station. If the calling operator requests connection to another office, the operator completes the connection to a TWX toll line to or in the direction of the called place.

(k) Conference Connections

The operator will first secure a connection to all of the desired stations by establishing connection in the local multiple or over a TWX toll line or TWX toll lines. The called stations are then signalled in turn, advised that a conference connection is to be established, and requested to hold the line. When all of the desired stations have been reached, the operator will signal the calling station and advise them to proceed with the call.

(l) Methods of Circuit Operation

The TWX central offices now established are quite far apart in many cases, and as a result some of the subscribers served by any one office may be at a considerable distance from it, while others will be very close. Such a situation is not ordinarily encountered in telephone practice, and to provide for it different methods of circuit operation have been provided. (See Exhibits).

1. Local Operation - This includes all services in the same city as the central office.

2. SL Operation - Served by a TWX switchboard in another exchange area than the area in which the station is located. Service is furnished by unloaded channel operation the same as local service. The subscriber is listed in the TWX directory under the town in which he is located.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

3. SLX Operation - Served by a TWX switchboard in another telephone exchange area than the area in which the station is located. Service is furnished by loaded channel operation and is used where the distance is too great to permit unloaded channel operation. These services are listed in the TWX directory under the town in which located.

4. TLX Operation - Served by a TWX switchboard in another telephone exchange area than the area in which the station is located. Is ground return operation either duplex repeatered or neutral. Is used where the type of line facilities or the distance will not permit unloaded or loaded channel operation. The subscriber is listed in the TWX directory under the town in which he is located.

5. CLX Operation - Occasionally there are no standard telegraph facilities anywhere near the subscriber, and to provide for such conditions, a method has been worked out for handling the subscriber's calls over a single carrier channel on regular telephone lines. This is known as CLX operation, and further differs from the other 4 methods in that the TWX station is not permanently connected to a TWX switchboard, but to the nearest local or toll telephone switchboard.

   When the CLX subscriber calls, a lamp signal appears on the switchboard; an operator there establishes connection by telephone methods, with the nearest teletypewriter board; and the operator there completes the teletypewriter connection.

(m) Building Up a TWX Connection

As an illustration of how a connection is built up for a TWX call, consider that a subscriber in San Francisco is calling for a subscriber in Cairo, Illinois. The San Francisco attendant turns on her machine. -- The San Francisco operator plugs into the loop and types "OPR" -- The attendant types "CAIRO ILL 1" -- The S.F. operator determines from her rate and route book that the route is through Chicago and St. Louis and that a repeater is required at Chicago -- She plugs in and rings on a Chicago trunk -- The Chicago operator answers and then the S.F. operator types "ST L REP" -- The Chicago operator inserts the repeater, plugs in and rings on a St.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

Louis circuit. -- When St. Louis answers, the CAIRO number is passed by the S.F. operator and St. Louis rings the subscriber which is served by that switchboard. The S.F. operator waits until the Cairo subscriber answers and then retires from the circuit, and does not return until she receives a disconnect or recall signal.

9. SALES AND MARKET CONSIDERATIONS

9.01 General

TWX service is designed to meet the need in the field of communication for two-way written customer to customer connection on an exchange service basis.

TWX service should be recommended only when it will enable a subscriber to handle his communications in a manner more effectively and satisfactorily than by other methods of communication.

TWX service is available in practically all exchanges. Application for establishment of service in smaller exchanges, at outlying points and in connecting company territory should be cleared for facilities and policy consideration before acceptance of application.

9.02 Types of Machines

(a) No. 14 Tape Teletypewriter

The No. 14 tape teletypewriter should only be installed for use in TWX service after a complete review shows that it best fits the customer's needs, and the customer understands clearly the limitations of the tape as against the page teletypewriter.

(b) No. 15 Page Teletypewriter

Generally the No. 15 page type machine has many advantages over the No. 14 tape machine from the customer's viewpoint, which are:

1. Types on full page width - that is, 8-1/2" wide.

2. It is possible to make as many as 7 copies of the communications at each machine.

3. It is possible to use the customer's own forms with the page type machine.

TELETYPEWRITER EXCHANGE SERVICE - (Cont'd)

4. The No. 15 page type machine is suitable for both stenciling and hectographing work.

Because of these advantages, salesmen will generally find it desirable to recommend the installation of page type equipment.

(c) The No. 19 Page Teletypewriter

The No. 19 teletypewriter has the same features as the No. 15 machine, with the addition of automatic equipment and should be recommended under the following conditions:

1. When the customer will be able to make sufficient savings in circuit time by taking advantage of the maximum speed of the service, to compensate for the additional cost.

2. When customer desires to prepare tape before setting up connection.

3. When customer wishes to transmit same message to two or more points, but does not wish to use Conference Service, it eliminates retyping message manually.

4. When a customer wishes to secure a typed copy during perforation so that the copy may be checked for errors and correction made in the perforations, before transmission of the tape, so as to send errorless copy.

5. When the customer has sufficient volume of one-way outgoing communications, so that the tape message may be transmitted without interruptions, resulting in greater efficiency.

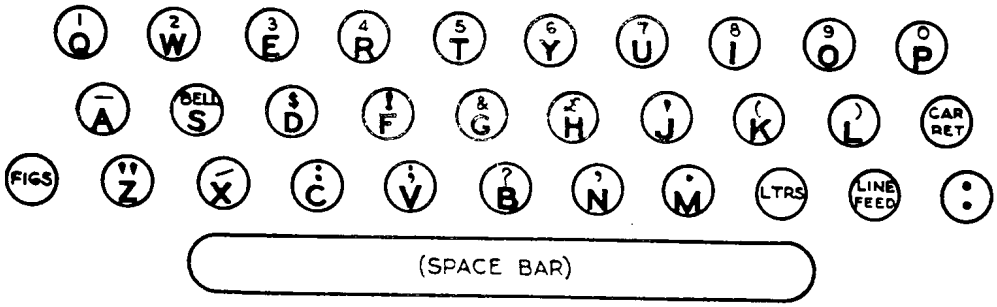
6. Permits preparation of tape during receipt of incoming message so that answer may be transmitted immediately and at maximum speed upon the completion of the incoming message.

(d) No. 26 Page Teletypewriter

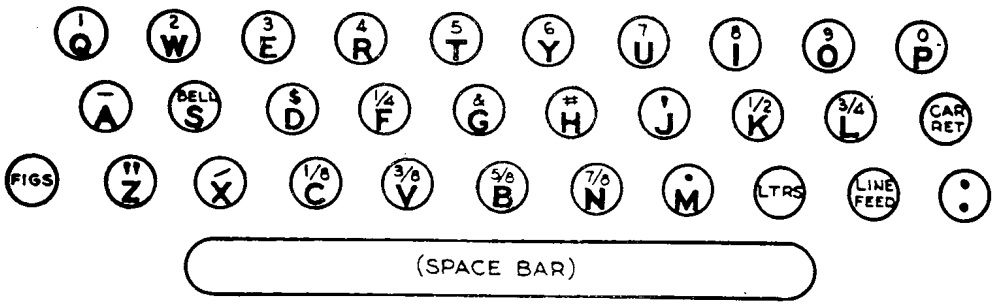
The No. 26 machine has been developed to provide a smaller page typing machine than the No. 15 teletypewriter, for customers who do not require all of the features provided on the No. 15 machine.

TELETYPEWRITER KEY BOARD

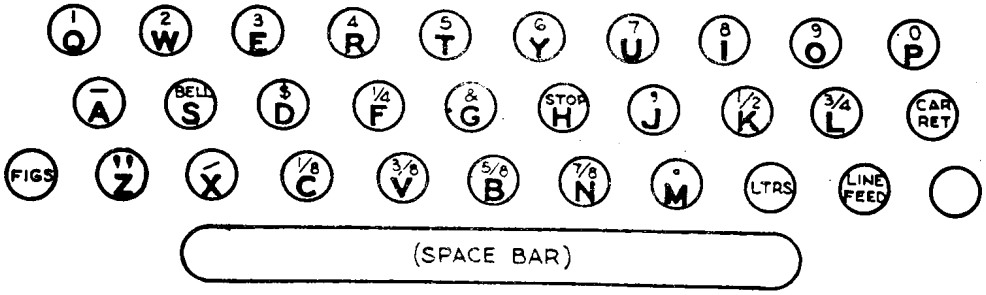
PAGE EQUIPMENT – STANDARD TYPE



PAGE EQUIPMENT – FRACTION TYPE



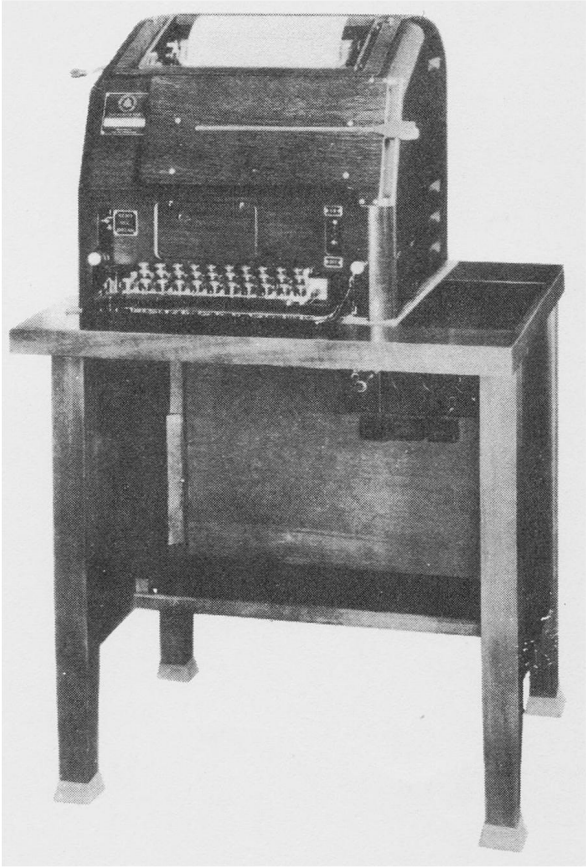
PAGE EQUIPMENT – UNIVERSAL TYPE



(TWX STATIONS ARE NORMALLY EQUIPPED WITH UNIVERSAL TYPE KEY BOARDS)

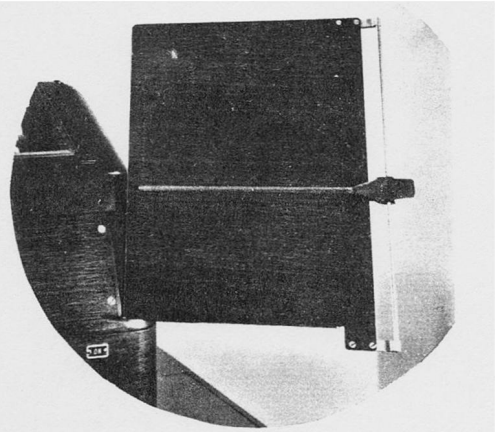
NO. 15 PAGE TELETYPEWRITER

With No. 14 Copy Holder



DIMENSIONS

	Machine Only	Table and Machine
Height	15 in.	41-1/2 in.
Width	17 "	25 "
Depth	21 "	22 "
Weight	110 lbs.	150 lbs.



NO. 15 COPY HOLDER

NO. 19 TELETYPEWRITER

AND

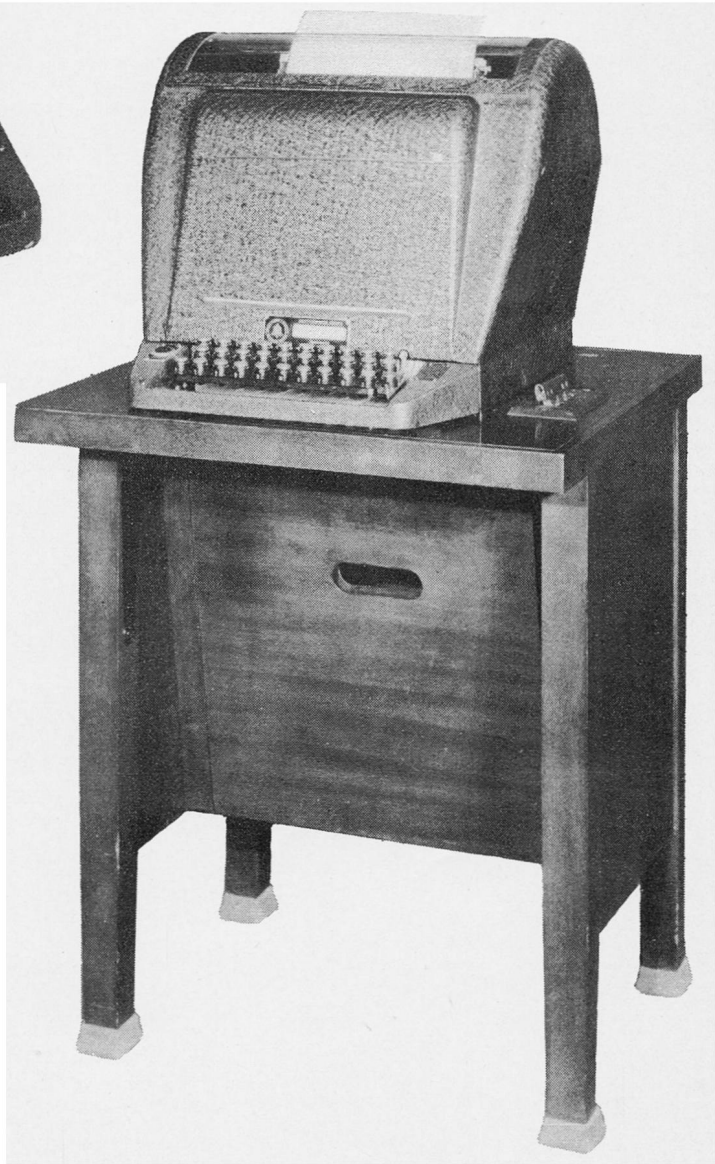
NO. 19A TABLE

NO. 19 TELETYPEWRITER
PERFORATOR AND AUTOMATIC TRANSMITTER

PAGE TYPE TELETYPEWRITER NO. 26

Dimensions of Teletypewriter

Height	14-1/2"
Depth	16-7/8"
Width	17-1/2"
Crank Projection	1-7/16"

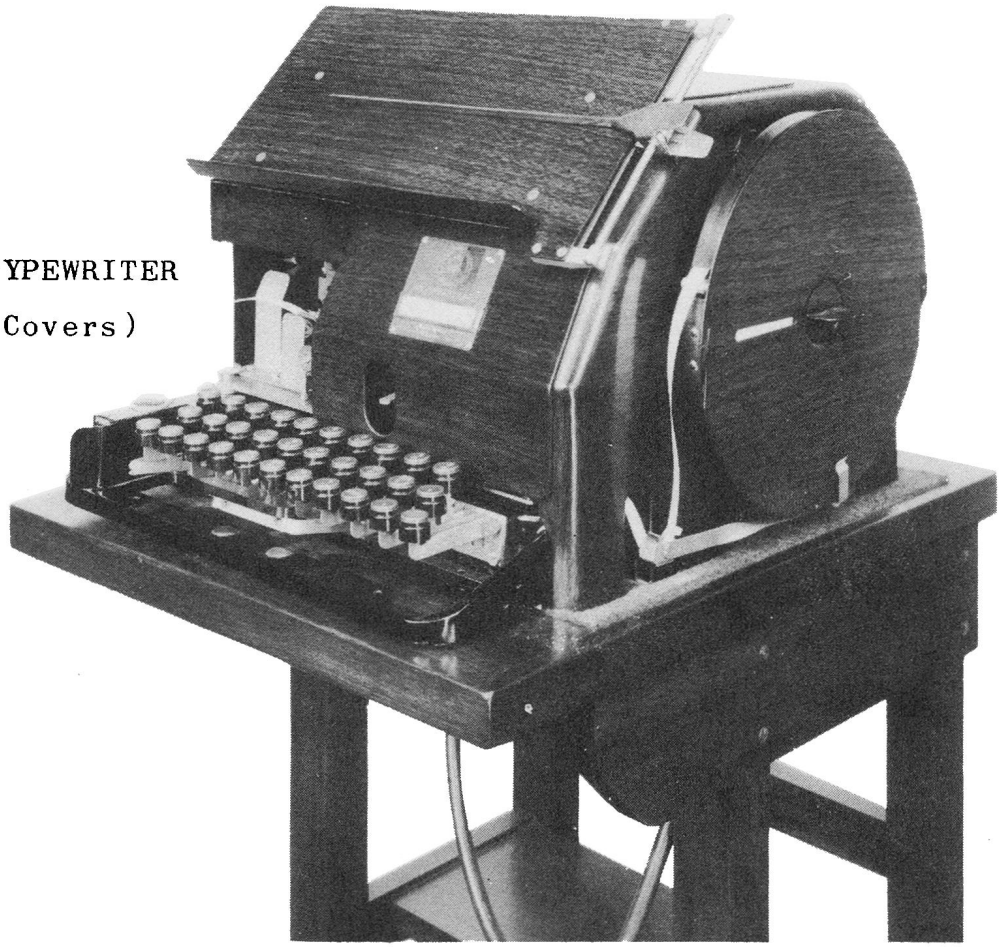


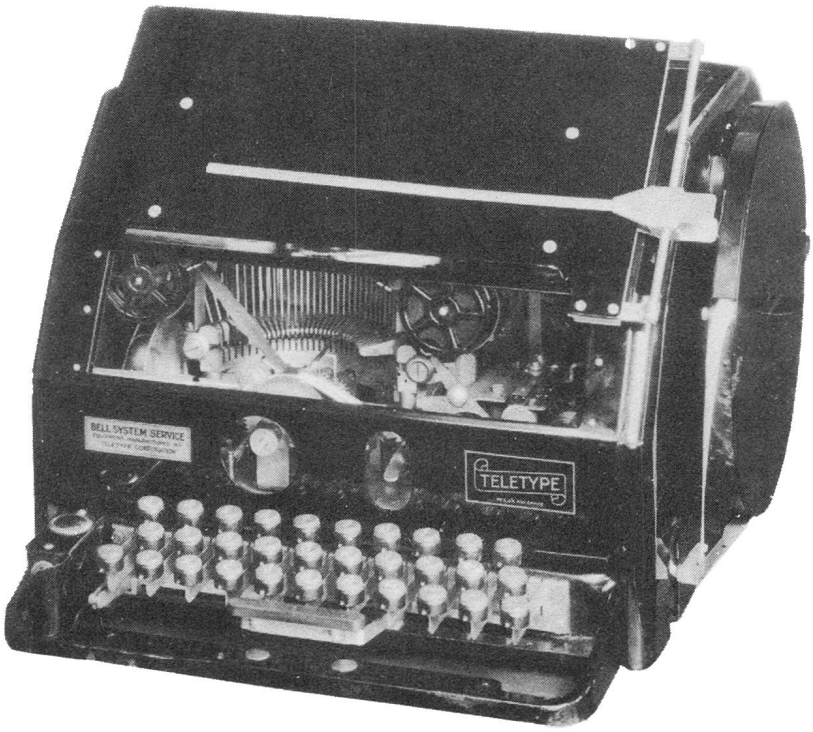
Dimensions of Table

Height	26-1/2"
Depth	20-1/2"
Width	22-1/2"
Table Overhang	4-1/2"

NO. 14 TAPE TELETYPEWRITER

(Two Types Of Covers)

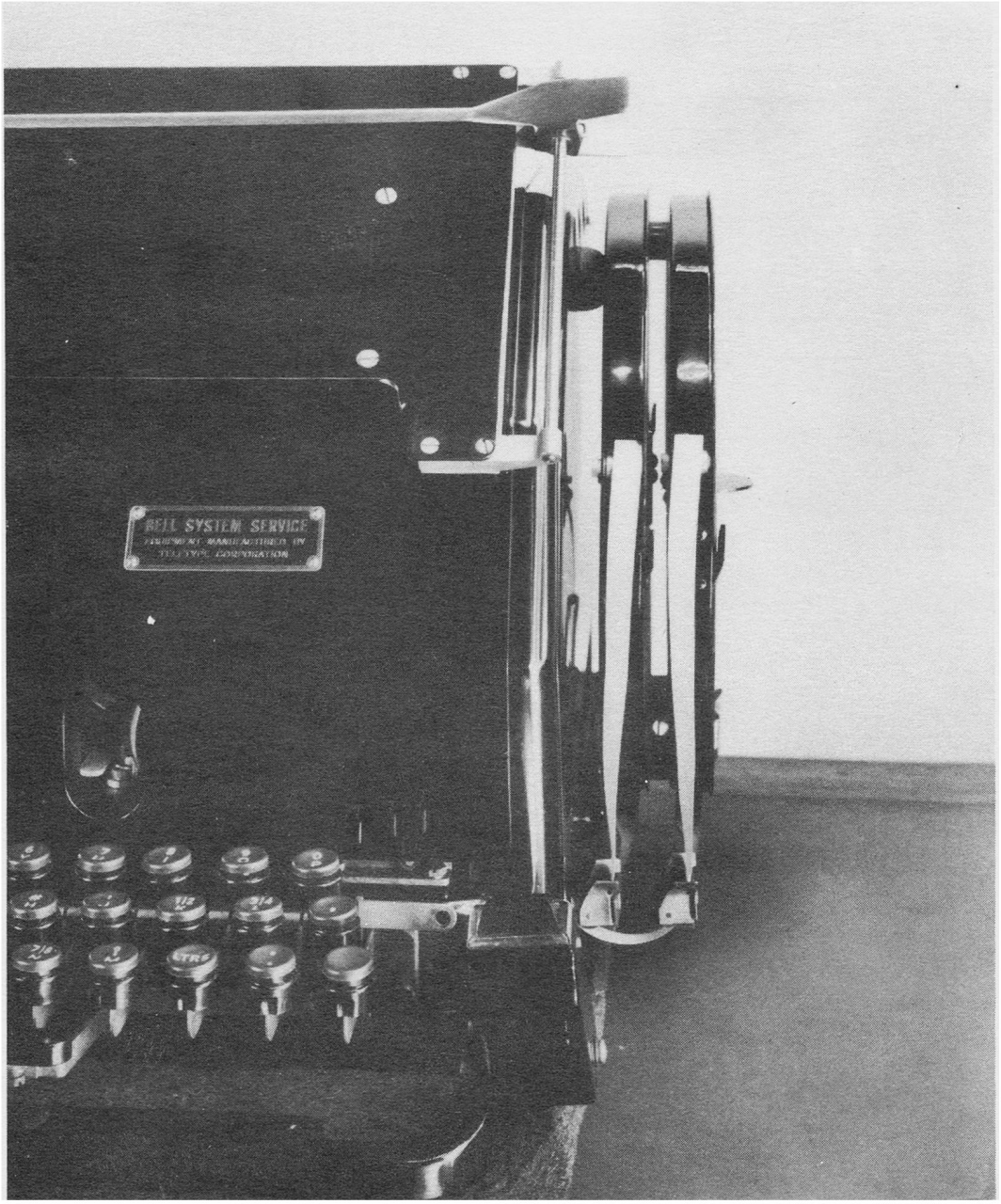




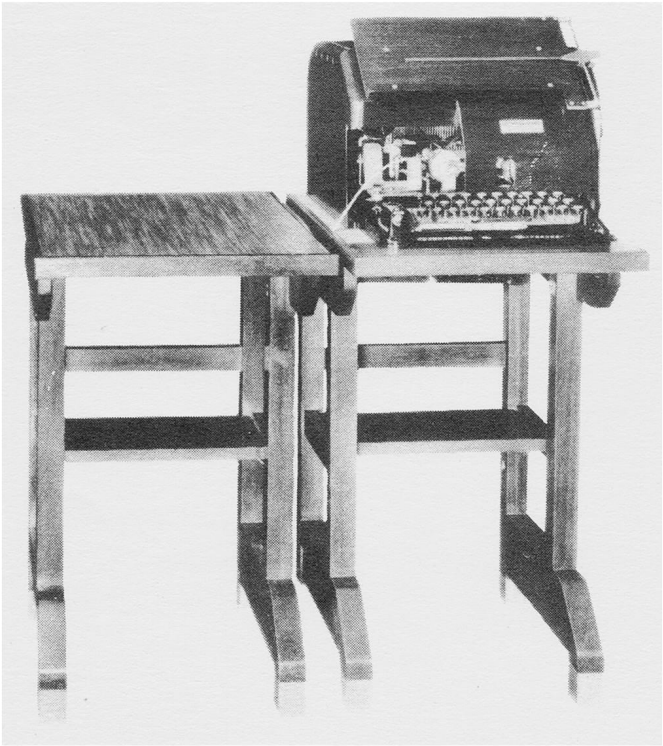
AUXILIARY TAPE REELS

AND

END OF LINE INDICATOR



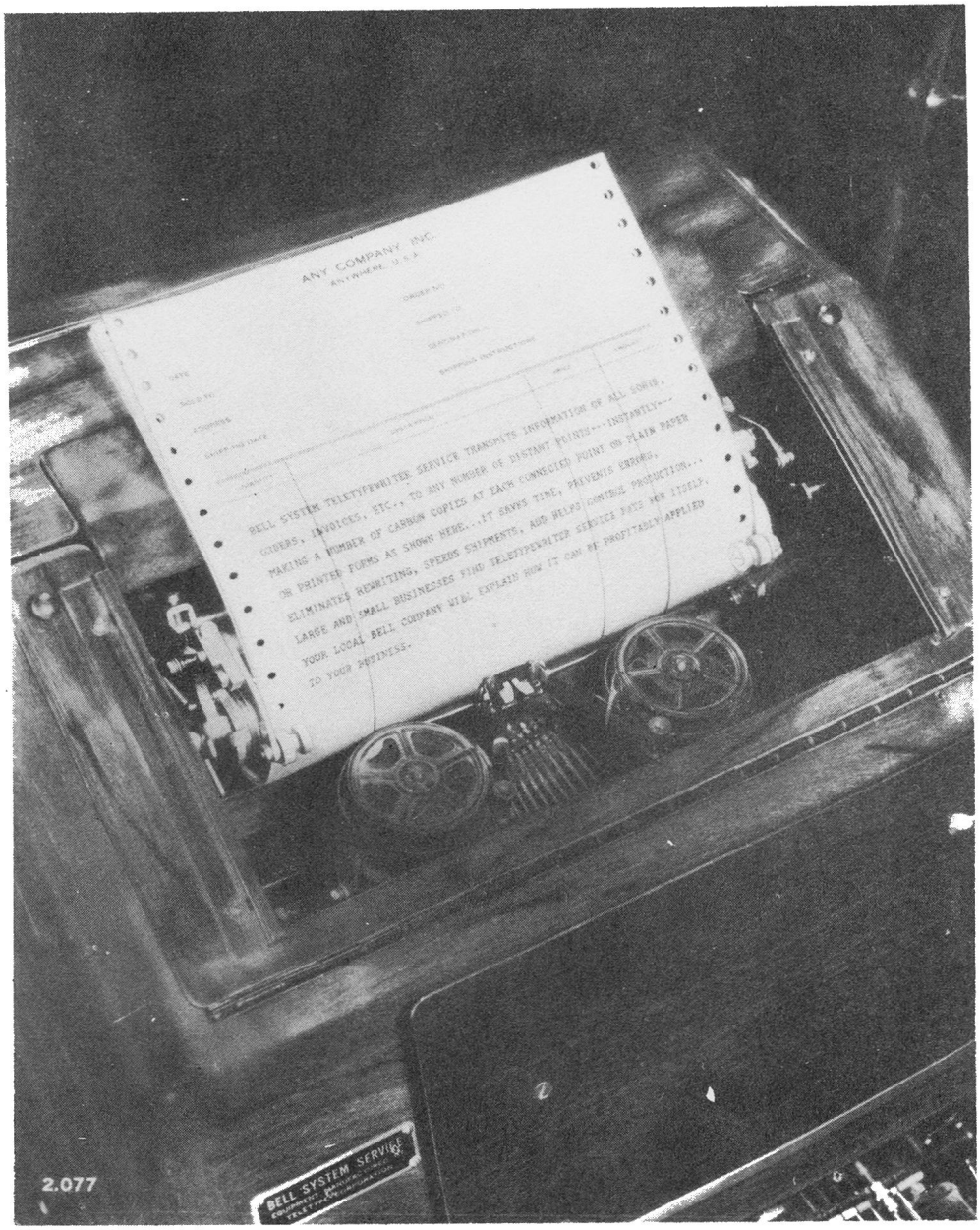
NO. 14 TAPE TELETYPEWRITER
WITH
NO. 14 TABLE AND NO.14C GUMMING TABLE



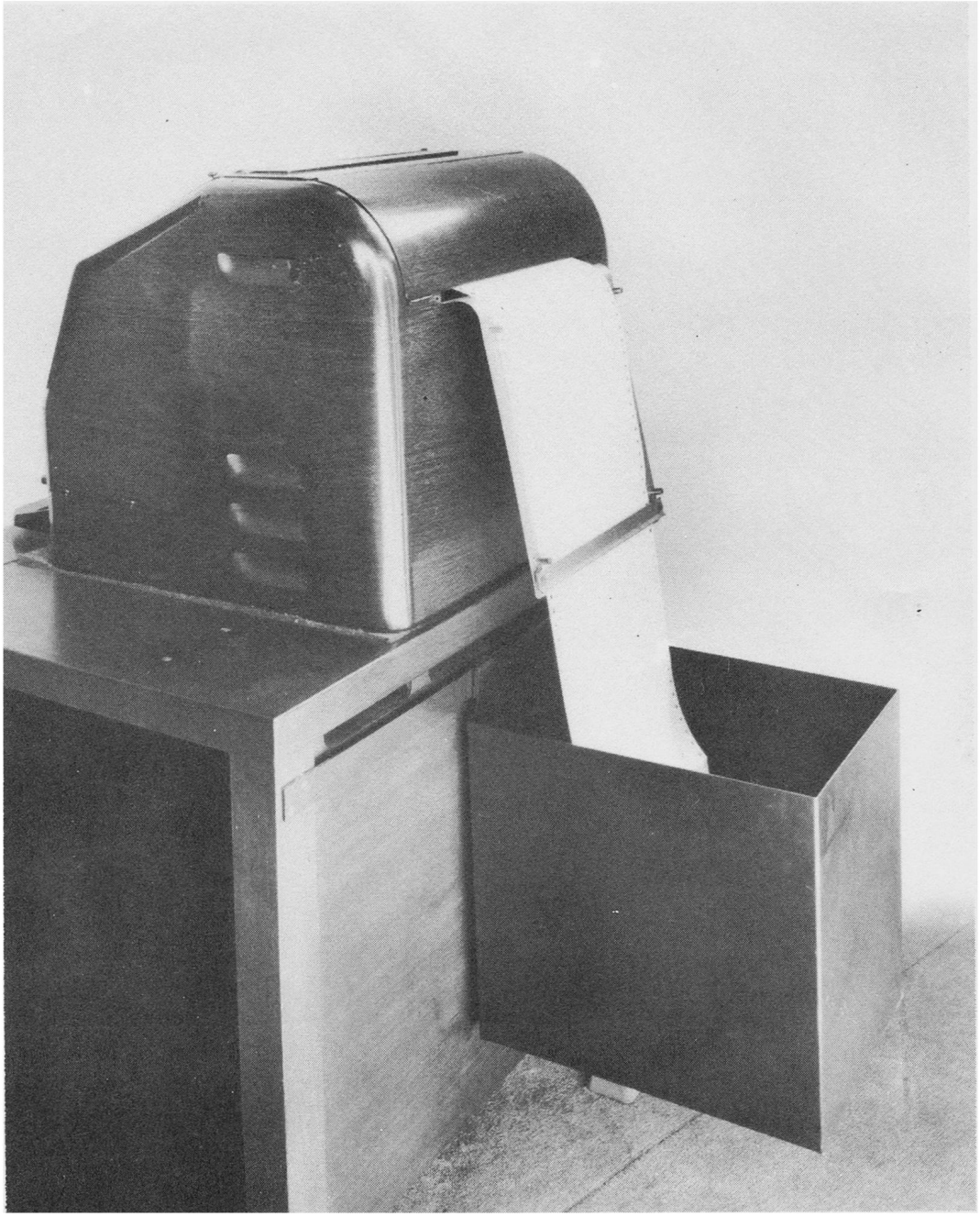
DIMENSIONS	MACHINE ONLY	MACHINE ON TABLE
Height	12-1/2 in.	39 in.
Width	15-1/2 "	16 "
Depth	16-1/2 "	19 "
Weight	63 lbs.	90 lbs.

REPERFORATOR AND AUTOMATIC TRANSMITTER

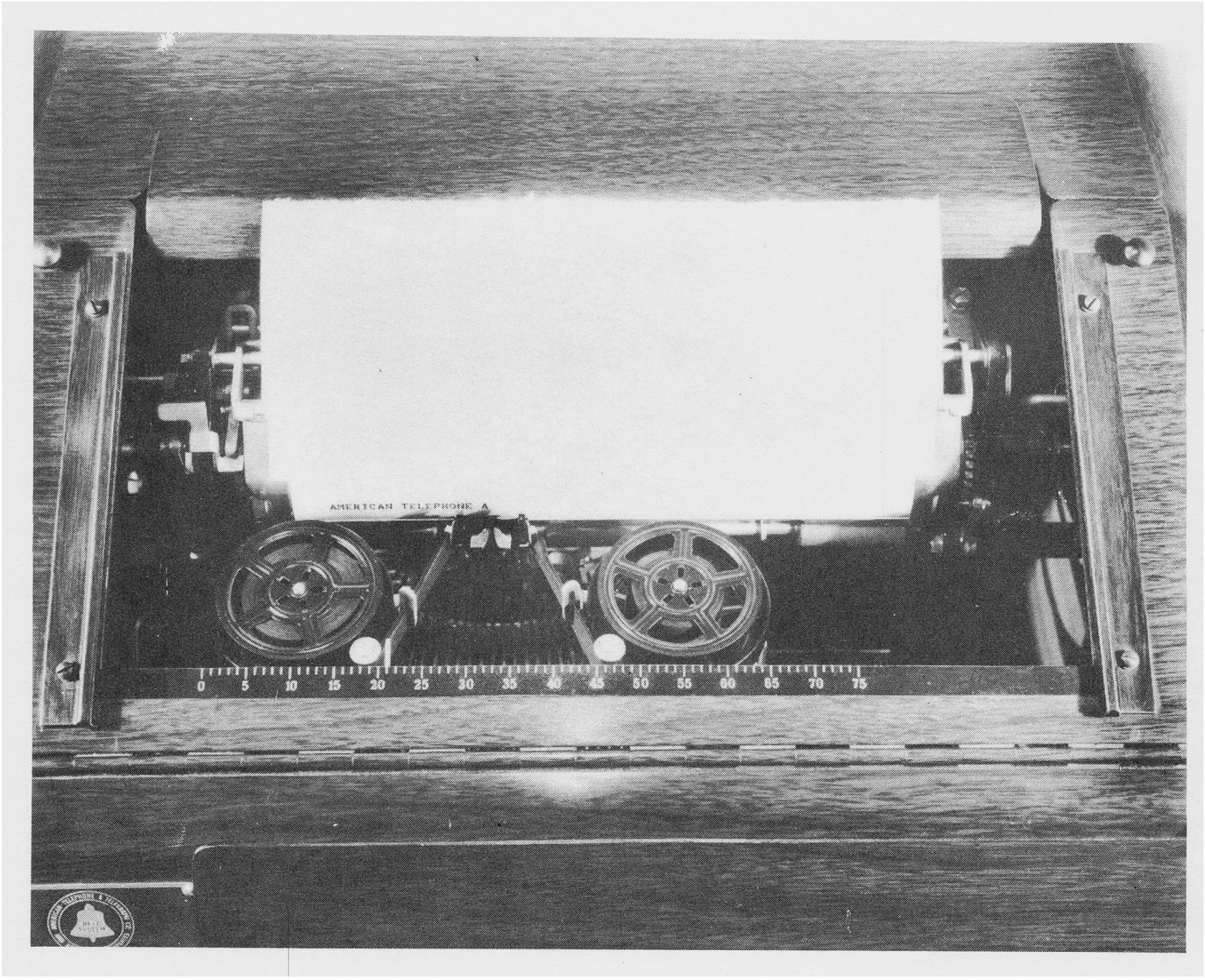
SPROCKET FEED



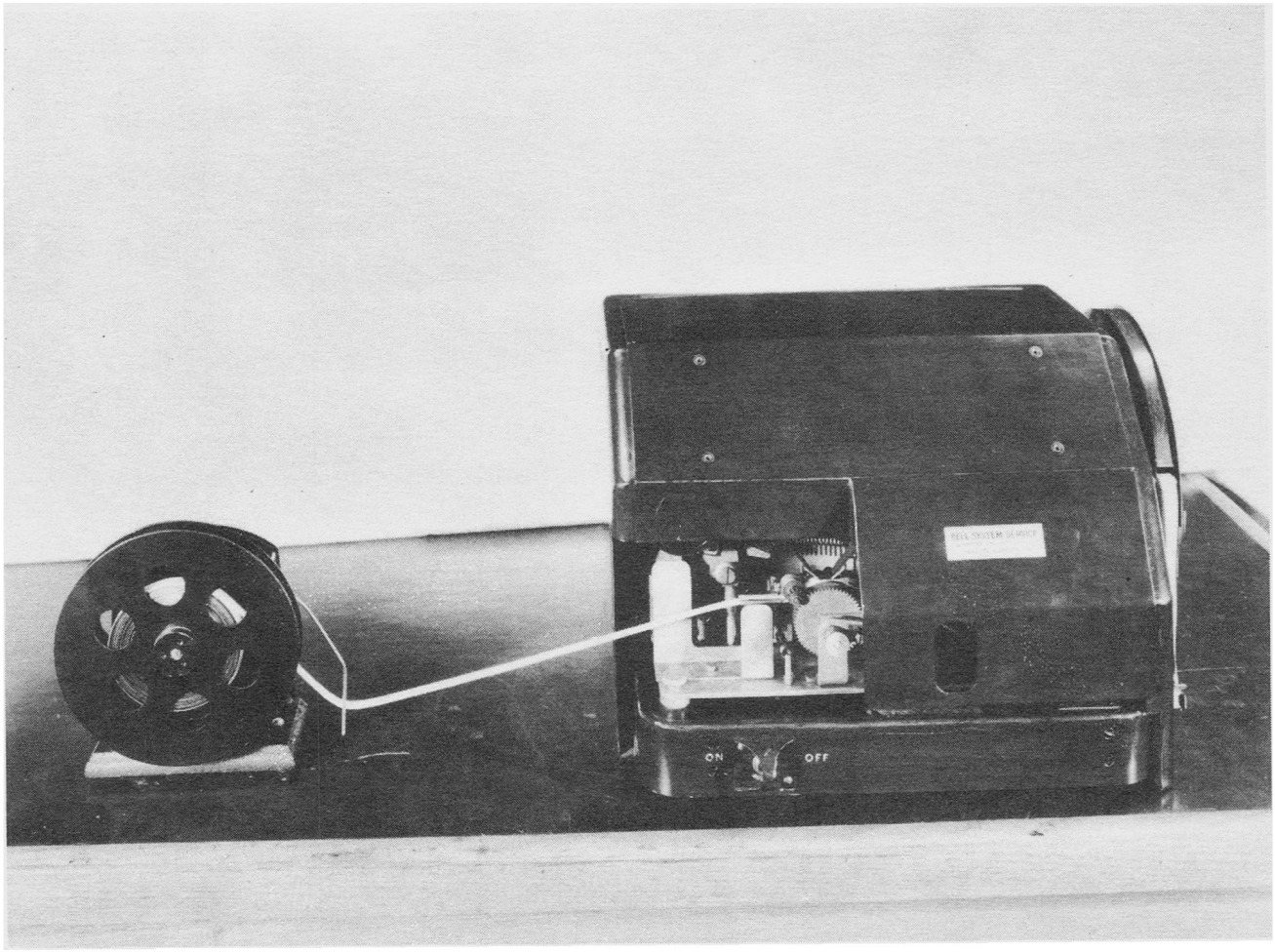
PAPER GUIDE AND PAPER BOX



TABULATION INDICATOR

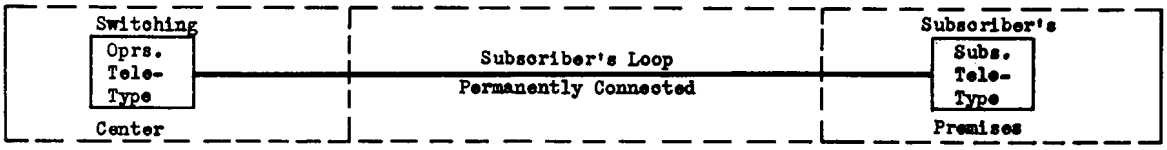


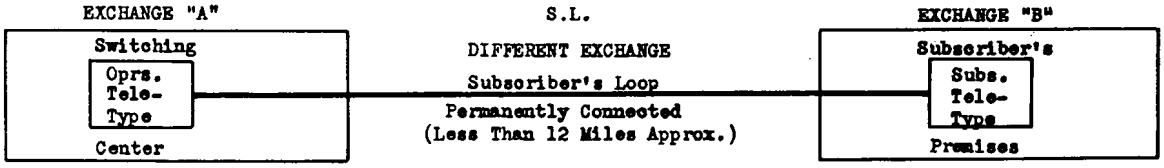
TAPE WINDER



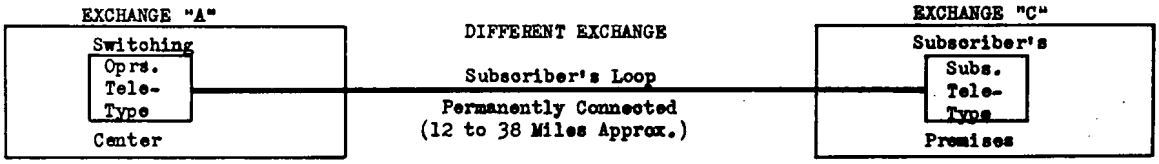
GUMMING EQUIPMENT

METHOD OF CONNECTION
SAME EXCHANGE

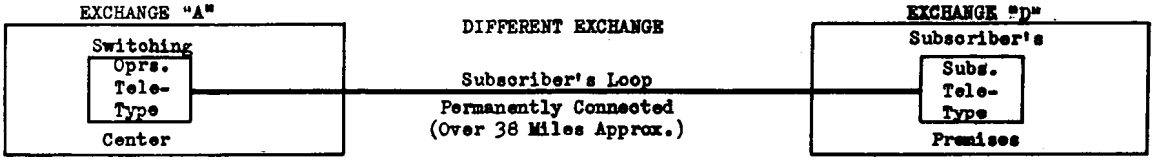




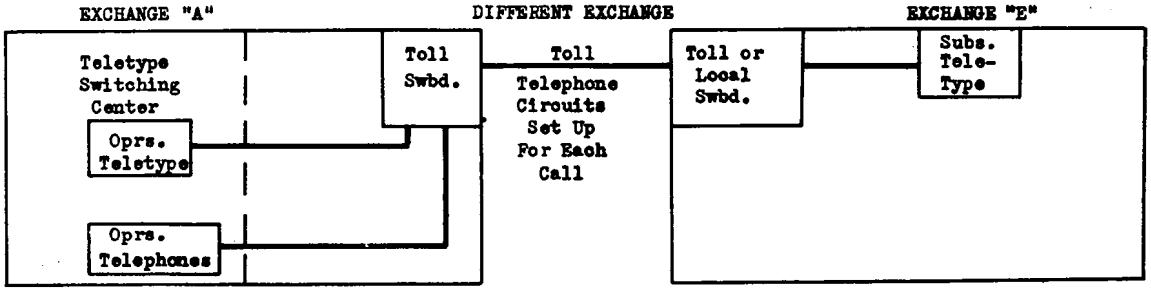
S.L.X.



T.L.X.



C.L.X.



Leased Circuit Services

General

In addition to furnishing telephone service to the public, the Company furnishes, when facilities may be available therefore, certain other services to meet the specific requirements of various patrons. Some of the services so furnished are:

Leased telephone service.
Teletypewriter service.
Telegraph service.
Signal facilities for miscellaneous services.

These services, known as leased circuit services, consist of the necessary facilities and equipment to provide communication service between designated points for designated periods of time for the exclusive use of the persons, firms or corporations named in the contract under which the service is furnished.

Contract

Leased circuit services are furnished under contract for a minimum term of one month. In some cases where special construction costs or other large expenditures are involved, a longer minimum term may be required. Temporary service may also be furnished for periods of less than one month.

Charges

Charges for leased circuit services generally are based upon the circuit mileage, hours and days of service, station equipment, the number of loops, and the number of intermediate drops. Each service must be computed separately. For these reasons, inquiries and requests for leased circuit service should be handled as prescribed in current instructions.

Leased Telephone Service

General

Leased telephone service provides direct and private telephone communication for use 24 hours daily, seven days per week, between two or more designated locations in separate exchanges or zones.

Application

This service meets the requirements of patrons having a large volume of inter-city communication traffic, between specific offices or units of the patron's organization, which can be more satisfactorily handled by speech and which does not require a written record of the communication.

Description of Service

The service consists of providing the necessary telephone line facilities and station equipment, consisting of a telephone instrument or a termination in a P. B. X. switch-

board located on the patron's premises, at each point. The service provides communication only between the terminals of the leased circuit, and connection with exchange and toll lines is not permitted.

Teletypewriter Service

General

Teletypewriter service provides a typewritten communication service between two or more designated locations. Both intra-exchange and inter-city teletypewriter services are furnished.

This service possesses the speed of the telephone, the flexibility of conversation, the accuracy of the typewriter, and the authority and permanence of the printed word.

Application

The teletypewriter typewrites by wire. Teletypewriter service carries typed messages instantly between offices and far-off plants, from editorial headquarters to newspapers hundreds of miles away, and from financial and industrial centers to distant offices. It is extensively used by banks, brokers, transportation companies, steel manufacturers, steamship companies, press associations, and, in fact, is useful to any industry having a considerable volume of correspondence, orders, and reports between two or more points.

It is valuable to operators of hotels, credit bureaus, mail order houses, department and chain stores.

Police departments find the service advantageous for the rapid dissemination of police information and the instantaneous communication of orders and reports. The teletypewriter has become a valuable aid to law enforcement agencies.

Railroads use the service between freight office and yards for spotting and dispatching freight cars. Teletypewriter service fulfills the requirements of aviation companies and of the United States Government for weather reporting and ship dispatching service.

Manufacturers employ teletypewriters for the simultaneous transmission of orders to the warehouse, to the credit departments for rating, and to the auditor for billing purposes. Orders may be assembled in the warehouse while the credit department inspects the customer's rating, and subsequently advises the warehouse before shipment is released.

A considerable proportion of correspondence normally transmitted by mail and by messenger service can be sent instantaneously by teletypewriter resulting in time saved and reduction of operating expenses.

Operation

The teletypewriter resembles an ordinary typewriter and in operation is quite similar to the ordinary typewriter. Any typist can operate the teletypewriter. A little training of typists assigned to teletypewriter operation will contribute, however, to effecting satisfactory results. The Telephone Company maintains experts in teletypewriter operation and traffic dispatching, and is glad to train the patron's operators and furnish advice as to the best methods of handling traffic.

Description of Equipment

General

There are two types of teletypewriter equipment. One prints on a page, by lines and paragraphs in letter form and readily lends itself to the transmission of tabular matter. The other prints the communication in a single line on a narrow continuous tape.

Either type may be furnished in the following combinations depending upon the patron's requirements:

1. Automatic sending and receiving.
2. Keyboard sending and receiving.
3. Receiving only.

The automatic equipment consists of a teletypewriter keyboard connected to a perforator. The message is perforated in the transmitting tape, permitting the advance preparation of message copy. The transmitting tape may then be fed into the automatic transmitter at any time and the message is transmitted simultaneously to all receiving machines connected to the circuit. Automatic transmission conserves wire time because of its greater efficiency than keyboard transmission. Automatic transmission is, therefore, recommended wherever the patron's volume of traffic approaches the maximum capacity of the circuit. When a patron has more than one service, the same tape may also be used for automatic transmission on the other services, thus avoiding duplication of typing.

Keyboard sending and receiving equipment is used wherever it is desirable to transmit messages direct from the keyboard into the line. No transmitting tape is used for this service. Experienced operators attain a high degree of efficiency with keyboard operation, and it is particularly applicable where circuit time is not pressed to the limit of its capacity.

Receiving only equipment is employed at stations where transmission is not desired.

Either of two keyboards may be provided, namely, non-fraction and fraction type.

The non-fraction type comprises the usual characters, figures and punctuation marks. The fraction type comprises the usual characters and, in addition, the fractions $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{8}$ and $\frac{7}{8}$ in place of certain other symbols.

Page Equipment

Page equipment is designed to print on a page eight and one-half inches wide. Either roll paper or message blanks may be used. Multiple copies may be made by employing either carbon backed paper or inter-leaved carbon sheets.

Receiving only equipment is similar to that shown in the accompanying cuts in so far as appearance is concerned, with the exception that the keyboard is eliminated.

The dimensions of the keyboard sending and receiving machine are as follows:

17″ wide, 21″ deep, 15″ high.

The receiving machine is 17″ wide, 17″ deep and 15″ high. The table is not included in the measurement of height.

Tape Equipment

The tape equipment is designed to print on a tape ⅜″ wide. Tape, either with or without a gummed back, may be used. The former can be pasted on suitable forms where a permanent record of the communication is desired. The equipment may be provided for keyboard sending and receiving service or receiving only service, and it may be equipped with either the non-fraction or the fraction type. Receiving only tape equipment resembles the equipment displayed in the cut with the exception that the keyboard is eliminated.

The dimensions of the tape keyboard sending and receiving machine are as follows:

15½″ wide, 16½″ deep, 12½″ high.

The receiving only machine is 15½″ wide, 13½″ deep and 10¾″ high.

Certain auxiliary equipment is furnished for use in connection with teletypewriter service where required by the patron.

Service Conditions

Teletypewriter service is furnished on the basis of a complete service including the provision and installation of the necessary equipment in the patron's office, the maintenance of the equipment, and the connecting line facilities. Provision is also made for the training of the patron's personnel in order that the patron may obtain maximum benefits from the service.

Service and spare teletypewriters are generally recommended for each station in connection with inter-city service. Where spare equipment is used, spare loops between the patron's office and the central office should also be provided. The loops and equipment are terminated in a loop switchboard or key switching arrangement in the patron's office to enable the patron to attain maximum flexibility.

Service may be furnished from one to twenty-four hours per day, six or seven days per week. Inter-city teletypewriter service may be operated either on a single or a duplex basis. Single service provides for the transmission of messages one at a time either in one direction only or in both directions but not in both directions simultaneously. Duplex service provides for the transmission of messages two at a time, one in each direction simultaneously.

Teletypewriter service is furnished at two speeds, namely, 240 operations per minute or 360 operations per minute. These speeds are theoretically equivalent to 40 and 60 words per minute, respectively, assuming that the average word is equivalent to six characters. It should be understood that the practical speed in words per minute is dependent not only upon operating efficiency, but also upon the type of traffic transmitted and the type of equipment used for the purpose.

Teletypewriters are motor driven and the patron is required to provide a source of power at an outlet near the location of the machines. An outlet similar to that required for an electric fan or adding machine is satisfactory.

The patron provides the stationery supplies and personnel for the operation of the service.

For the convenience of teletypewriter patrons, arrangements have been made to stock stationery supplies which are most frequently used, and the patron may obtain

these from the company at prevailing prices. There is no objection to a patron procuring these or other special supplies direct from the manufacturer, but the patron should assure himself that such supplies conform to the requirements of our equipment.

Teletypewriter Service

No. 14 Tape Type

Dimensions	*Finish*
Height 39″	Black
Width 22″	
Depth 19½″	

Teletypewriter Service

No. 15 Page Type

Leased Telegraph Service

General

Leased telegraph service provides all the facilities for manual telegraphic communication by the Morse code between two or more designated locations.

Application

This service is rapidly giving way to the more modern and efficient teletypewriter service. There are some patrons who, for various reasons, use telegraph service and either inter-city or intra-exchange telegraph service may be furnished.

Operation

Leased telegraph service requires personnel trained in the interpretation of the characters of the Morse code into the characters of the alphabet and the numerals. The speed of the service is governed by the type of traffic and the ability of the operators. Transmission is accomplished by the use of the ordinary telegraph key. Some operators prefer to use their own semi-automatic transmitters.

Description of Equipment

General

Station equipment consists of one set of telegraph instruments comprising one telegraph key and one sounder. In certain cases, the electrical conditions are such that a relay is also required.

Service Conditions

Leased telegraph service is furnished on the basis of a complete service, including the provision and installation of the telegraph equipment in the patron's office, the maintenance of the equipment, and the connecting line facilities.

The patron provides the personnel for the operation of the service.

Inter-city leased telegraph service may be furnished either on a single or a duplex basis. Single service provides for the transmission of messages one at a time either in one direction or in both directions, but not in both directions simultaneously. Duplex service provides for the transmission of messages two at a time, or in each direction simultaneously.

Facilities For Radio Program Transmission

Radio program transmission circuits consist of high quality facilities on which equipment especially suited to the frequency range for radio broadcasting has been installed. They are suitable for transmission in one direction only. Such facilities are furnished if and when available for the purpose. In some cases the Company may be requested to furnish and operate speech input equipment in connection with radio program transmission circuits.

Radio program transmission circuits are furnished only to radio broadcasting companies and owners or operators of radio broadcasting stations. They are not furnished to individual advertisers or sponsors who may desire to utilize a radio broadcasting station, and if inquiries are received from such third parties, the applicant should be told to communicate with the radio station or the broadcasting company whose facilities he expects to use. Each request for such facilities should be handled as prescribed in current instructions.

Signal Facilities For Miscellaneous Services

This service contemplates the furnishing of miscellaneous signal services, including alarm services, test services, and dispatch services. There are also many other uses for signal facilities. Owing to the various requirements of facilities for these purposes, it is not possible to treat them in detail in this Manual. Each request for such facilities should be handled as prescribed in current instructions.