

WIRING PLANS  
FOR  
TWO-LINE MONOPHONES

BULLETIN 604  
MARCH 1937

**AUTOMATIC ELECTRIC COMPANY**

CHICAGO, U. S. A.

## "DOUBLE-TRACK" SERVICE

"Double-track" service associates the use of one Monophone with two telephone lines, thus making it unnecessary to provide two separate telephone instruments. The Monophone differs from ordinary telephones in that it is fitted with a sub-base upon which is mounted a key for switching the Monophone from one line to the other and vice versa. A push button is also mounted on the sub-base and serves as a release or flashing key under certain conditions.

The two lines associated with the Monophone may be connected to central-battery telephone exchanges in a variety of combinations. The principal arrangements are as follows:

- (a) Line #1 to a Public Exchange.  
Line #2 to a Public Exchange.
- (b) Line #1 to a P-A-B-X or P-B-X.  
Line #2 to a Public Exchange.
- (c) Line #1 to a P-A-B-X for Regular Service.  
Line #2 to a P-A-B-X for Executive Right-of-Way Service.

The service on either line may be automatic or manual: one-way or two-way: the ringing, harmonic or straight-line; and the ringing circuit metallic or grounded. In certain cases, the two ringers may be mounted in one box, and in other instances, two individual ringer boxes (one for each line) are required.

Another arrangement provides for one line being connected to a telephone exchange, and the other line to a private-line telephone instead of a telephone exchange.

Five double-track plans are included in this bulletin. These plans cover the majority of combinations likely to be encountered, and variations can be made to suit individual requirements. The five plans are designated as follows:

- Plan #1--Switching between two exchange lines and holding on both lines.
- Plan #2--Switching between two exchange lines and holding on one line.
- Plan #3--Switching only between two exchange lines.
- Plan #4--Switching between two lines (one a private line) and holding on the exchange line.
- Plan #5--Switching only between two lines (one a private line).

## "EXECUTIVE-SECRETARY" SERVICE

This telephone service is intended primarily for the executive or professional man who occupies a private office and has a secretary in an adjacent room. The plan provides for the answering of incoming calls by the secretary, and the extending of such calls to the executive, as required. The executive can make outgoing calls independent of the secretary or he can instruct the secretary to do the calling.

To accomplish this with a minimum of effort on the parts of the executive and secretary, a private line (local) circuit is provided, over which the executive and secretary signal and converse with each other, independent of the telephone exchange line. They may switch between the private line and the telephone exchange line at will and may hold a connection on the exchange line while talking over the private line.

Only one Monophone is required at each desk. The Monophone is fitted with a sub-base upon which is mounted a key for switching between the private line and the exchange line. A push button is also mounted on the sub-base and serves as a release or flashing key for the exchange line.

The exchange line may be connected to a central-battery automatic or a central-battery manual exchange. Ringing may be harmonic or straight-line, and the ringing circuit may be either metallic or grounded.

One secretary may also serve two executives, if the telephone requirements so warrant. In this case each executive is assigned an exchange line for his own service, and the number is so listed in the directory. The secretary can connect with each executive's telephone, and each executive can signal and converse with the secretary over the private line. In addition the executives can converse with each other provided that the calling executive instructs the secretary to buzz the other executive for him.

The two executive-secretary plans included in this bulletin cover the majority of cases likely to be encountered and variations of these plans can be made to suit individual requirements. The two plans are designated as follows:

- Plan #6--Executive-secretary service with one exchange line.
- Plan #7--Executive-secretary service with two exchange lines.

## PLAN #1--SWITCHING BETWEEN TWO EXCHANGE LINES AND HOLDING ON BOTH LINES

Three keys are mounted on the Monophone ----- one key for switching between the two lines, and one holding key for each line. The switching key always remains in the position last operated, and the Monophone will be connected to the line last used when the handset is lifted from the cradle. Operating the key to the opposite position switches the Monophone to the other line.

The holding keys are automatically restored each time the handset is returned to the cradle. With the handset off the cradle, however, the holding keys may be operated by hand. Both keys are independent of each other.

Holding key #1, when pressed down, places a bridge across line #1. The user can thus hold a connection on line #1 while calling or answering on line #2. Similarly holding key #2 places a bridge across line #2 for holding a connection on line #2 while using line #1.

It is unnecessary to restore a holding key to talk on the associated line as the holding bridge is of sufficiently high impedance not to affect the transmission. However, the bridge can be readily removed from the line by restoring the holding key.

A push button on the Monophone is used for releasing in case of an error in dialing or for recalling the operator in case of a manual-exchange line. The cradle switch is not used for these purposes as the pressing of the cradle plunger automatically restores the holding keys.

The upper diagram in Illustration "A" shows the plan in theory form, and the lower diagram shows where to connect the Monophone cord conductors and the two line circuits inside the ringer boxes. The code numbers are as follows:

### Monophone

AA-22-----When a dial is required (automatic exchange lines).  
AA-23-----When no dial is required (manual exchange lines).

### Ringer Boxes

For line #1 (Straight-line ringing) ----- AO-25.  
For line #2 (Straight-line ringing) ----- AO-26.  
For line #1 (Harmonic ringing) ----- AO-25 SPECIAL with \_\_\_\_\_ cycle ringer.  
For line #2 (Harmonic ringing) ----- AO-26 SPECIAL with \_\_\_\_\_ cycle ringer.

## PLAN #2--SWITCHING BETWEEN TWO EXCHANGE LINES AND HOLDING ON ONE LINE

One key is mounted on the Monophone. This key is automatically restored each time the handset is returned to the cradle. With the handset lifted from the cradle, however, the key may be operated to either position by hand.

The Monophone is switched to line #1 when the handset is lifted from the cradle. Operating the key (down) switches the Monophone to line #2. Restoring the key (by hand) switches the Monophone back to line #1 and also places a "short" across line #2. Re-operating the key (down) removes the short from line #2 and again switches the Monophone to line #2.

The user is thus able to switch between the two lines at will, and to hold a connection on line #2 while calling or answering on line #1. There is no holding bridge for line #1.

A push button on the Monophone is used for releasing in case of an error in dialing or for recalling the operator in case of a manual-exchange line. The cradle switch is not used for these purposes as the pressing of the cradle plunger automatically restores the switching key.

Illustration "B" shows one combined ringer box for straight-line ringing. Illustration "C" shows separate ringer boxes (one for each line) for either straight-line or harmonic ringing. In both illustrations, the upper diagram illustrates the plan in theory form; and the lower diagram shows where to connect the Monophone cord conductors and the two line circuits inside the ringer box or boxes. The code numbers are as follows:

### Monophone (Illustrations "B" and "C")

AA-24-----When a dial is required (automatic exchange lines).  
AA-25-----When no dial is required (manual exchange lines).

### One Combined Ringer Box (Illustration "B")

AO-27-----For straight-line ringing only. Contains two single-gong ringers.

### One Ringer Box for Each Line (Illustration "C")

For line #1 (Straight-line ringing) ----- AO-28.  
For line #2 (Straight-line ringing) ----- AO-29.  
For line #1 (Harmonic ringing) ----- AO-28 SPECIAL with \_\_\_\_\_ cycle ringer.  
For line #2 (Harmonic ringing) ----- AO-29 SPECIAL with \_\_\_\_\_ cycle ringer.

### PLAN #3--SWITCHING ONLY BETWEEN TWO EXCHANGE LINES

One key is mounted on the Monophone. This key always remains in the position last operated and the Monophone will be connected to the line last used when the handset is lifted from the cradle. Operating the key to the opposite position switches the Monophone to the other line. A connection cannot be held on either line.

Releasing a connection in case of an error in dialing or flashing the operator in case of a manual exchange line, is accomplished by pressing the cradle plunger. The push button on the Monophone is not required for this plan. It may, therefore, be used to operate an independent buzzer signal, if desired.

Illustration "B" shows one combined ringer box for straight-line ringing. Illustration "C" shows two ringer boxes (one for each line) for either straight-line or harmonic ringing. The code numbers are as follows:

#### Monophone (Illustrations "B" and "C")

AA-26-----When a dial is required (automatic exchange lines).  
AA-27-----When no dial is required (manual exchange lines).

Connect blue-green and blue-slate conductors of the cord to terminals 7B and 5B in the ringer box instead of the terminals shown on the label inside of the box. An independent buzzer signal may be wired to terminals 7B and 5B, and operated from the push button on the Monophone.

#### One Combined Ringer Box (Illustration "B")

A0-27-----For straight-line ringing only. Contains two single-gong ringers.

#### One Ringer Box for Each Line (Illustration "C")

For line #1 (Straight-line ringing) ----- A0-28.  
For line #2 (Straight-line ringing) ----- A0-29.  
For line #1 (Harmonic ringing) ----- A0-28 SPECIAL with \_\_\_\_\_cycle ringer.  
For line #2 (Harmonic ringing) ----- A0-29 SPECIAL with \_\_\_\_\_cycle ringer.

### PLAN #4--SWITCHING BETWEEN ONE EXCHANGE LINE AND ONE PRIVATE LINE, AND HOLDING ON THE EXCHANGE LINE.

One key is mounted on the Monophone. This key is automatically restored each time the handset is returned to the cradle. With the handset lifted from the cradle, however, the key may be operated to either position by hand.

The Monophone is switched to the private line when the handset is lifted from the cradle. Operating the key (down) switches the Monophone to the exchange line. Restoring the key (by hand) switches the Monophone back to the private line and also places a "short" across the exchange line. Re-operating the key (down) removes the "short" from the exchange line and again switches the Monophone to the exchange line.

The user is thus able to switch between the two lines at will, and to hold a connection on the exchange line while calling or answering on the private line. A connection may also be held on the private line since that line does not pass through a switchboard ----- all that is required is to request the person on the private line to wait on the line a few moments.

A push button on the Monophone is used for releasing in case of an error in dialing or for recalling the operator in case of a manual-exchange line. The cradle switch is not used for these purposes as the pressing of the cradle plunger automatically restores the switching key.

The upper diagram in Illustration "D" shows the plan in theory form, and the lower diagram shows where to connect the Monophone cord conductors and the line circuits inside the ringer box. The lower diagram also shows the detail wiring for the private-line buzzer circuit. The code numbers are as follows:

#### Monophone

AA-24-----When a dial is required (automatic exchange lines).  
AA-25-----When no dial is required (manual exchange lines).

#### Ringer Box (Exchange Line)

For straight-line ringing ----- A0-28.  
For harmonic ringing ----- A0-28 SPECIAL with \_\_\_\_\_cycle ringer.

Connect the ringer and condenser to terminals 3B and 4B in the ringer box instead of the terminals shown on the label inside of the ringer box.

#### Buzzers (Private Line)

One No. 210 iron-box buzzer (two ohms) is required at each end of the private line. The buzzers may be operated from a dry-cell battery or from a small bell-ringing transformer.

#### Push Buttons (Private Line)

One No. 10 push button is required at each end of the private line. The push buttons are 1-5/8" x 1-1/8" x 7/8", suitable for mounting on the side of the desk.

#### Transmission Bridge (Private Line)

One Z-1047-1 transmission bridge and a 6-volt dry-cell battery are required for supplying current for talking on the private line. The bridge consists of two 20-ohm windings, and is fitted with an angle mounting bracket.

#### PLAN #5--SWITCHING ONLY BETWEEN ONE EXCHANGE LINE AND ONE PRIVATE LINE

One key is mounted on the Monophone. This key always remains in the position last operated and the Monophone will be connected to the line last used when the handset is lifted from the cradle. Operating the key to the opposite position switches the Monophone to the other line.

A connection cannot be held on the exchange line while talking on the private line. A connection may be held on the private line since that line does not pass through a switchboard----all that is required is to request the person on the private line to wait on the line a few moments.

Releasing a connection in case of an error in dialing or flashing the operator in case of a manual exchange line is accomplished by pressing the cradle plunger. The push button on the Monophone may be used for operating the buzzer of the private-line telephone, thus making it unnecessary to provide a separate push button.

The upper diagram in Illustration "D" shows the plan in theory form, and the lower diagram shows where to connect the monophone cord conductors and the line circuits inside the ringer box. The lower diagram also shows the detail wiring for the private-line buzzer circuit. The code numbers are as follows:

#### Monophone

AA-26-----When a dial is required (automatic exchange lines).

AA-27-----When no dial is required (manual exchange lines).

Connect the blue-green and blue-slate conductors of the Monophone cord to terminals 7B and 5B in the ringer box instead of the terminals shown on the label inside of the box. Connect the buzzer circuit of the private line to terminals 7B and 5B in the ringer box as shown in Illustration D.

#### Ringer Box (Exchange Line)

For straight-line ringing ----- AO-28.

For harmonic ringing ----- AO-28 SPECIAL with \_\_\_\_\_ cycle ringer.

Connect the ringer and condenser to terminals 3B and 4B in the ringer box instead of the terminals shown on the label inside of the ringer box.

#### Buzzers (Private Line)

One No. 210 iron-box buzzer (two ohms) is required at each end of the private line. The buzzers may be operated from a dry-cell battery or from a small bell-ringing transformer.

#### Push Button (Private Line)

One No. 10 push button is required. The push button is 1-5/8" x 1-1/8" x 7/8" suitable for mounting on the side of a desk.

#### Transmission Bridge (Private Line)

One Z-1047-1 transmission bridge and a 6-volt dry-cell battery are required for supplying current for talking on the private line. The bridge consists of two 20-ohm windings, and is fitted with an angle mounting bracket.

#### PLAN #6--EXECUTIVE-SECRETARY SERVICE WITH ONE EXCHANGE LINE

The ringer box for the exchange line is located at the secretary's desk, and an extension box (no ringer) at the executive's desk. A ringer box may be substituted for the extension box in case it is desired to have incoming calls sound at both desks; and a key may be provided for cutting off the executive's ringer when the secretary is on duty.

The switching key on the Monophone is automatically restored each time the handset is returned to the cradle. With the handset off the cradle, the key may be operated to either position by hand.

Each Monophone is switched to the private line when the associated handset is lifted. Operating the key (down) switches the Monophone to the exchange line. Restoring the key (by hand) switches the Monophone back to the private line, and also places a "short" across the exchange line. Re-operating the key (down) removes the "short" from the exchange line and switches the Monophone to the exchange line.

The secretary answers incoming calls by lifting the handset and operating the switching key (down). If the call is to be held while the secretary talks to the executive, the key is restored by hand. This operation switches the Monophone to the private line and also places a "short" across the exchange line. The secretary then presses a push button (separate from the Monophone) to signal the executive.

The executive lifts his handset and talks to the secretary over the private line. He can accept the incoming call by operating his switching key down. The secretary then operates her key (down), thus removing the "short" from the exchange line; and after noting that the executive has answered the waiting person, the secretary replaces her handset.

Outgoing calls can be made from either Monophone by lifting the respective handset and operating the switching key down. A push button on the Monophone is used for releasing in case of an error in dialing, or for recalling the operator in case of a manual-exchange line. The cradle switch is not used for these purposes as the pressing of the cradle plunger automatically restores the switching key.

The executive may make a call on the exchange line and then wish to consult with his secretary. He restores his switching key (by hand), which action places a "short" across the exchange line and also switches his Monophone to the private line. He then signals the secretary by pressing a push button (separate from the Monophone). The return to the exchange line is made by re-operating the switching key (down).

The executive and secretary can signal each other and converse over the private line regardless of whether there is a call on the exchange line.

A series relay AP-17 may be wired in the exchange line for the purpose of lighting a busy lamp at the secretary's desk during the periods the executive is using the exchange line. Interference by the secretary is thus avoided.

The upper diagram in Illustration "E" shows the plan in theory form, and the lower diagram shows where to connect the Monophone cord conductors and the two line circuits inside of the ringer and extension boxes. The lower diagram shows the wiring for the private-line signals and the series relay circuit. The code numbers are as follows:

#### Monophone (Both Desks)

AA-24-----When a dial is required (automatic exchange lines).

AA-25-----When no dial is required (manual exchange lines).

#### Ringer Box (Secretary's Desk)

For straight-line ringing ----- A0-28.

For harmonic ringing ----- A0-28 SPECIAL with \_\_\_\_\_ cycle ringer.

Connect the ringer and condenser to terminals 3B and 4B in the ringer box instead of the terminals shown on the label inside of the ringer box.

#### Extension Box (Executive's Desk)

Code No. A0-24. No ringer is included as it is expected that the secretary will answer all calls.

#### Buzzers (Private Line)

One No. 210 iron-box buzzer (two ohms) is required at each end of the private line. The buzzers may be operated from a dry-cell battery or from a small bell-ringing transformer.

#### Push Buttons (Private Line)

One No. 10 push button is required at each end of the private line. The push buttons are 1-5/8" x 1-1/8" x 7/8", suitable for mounting on the side of the desk.

#### Transmission Bridge (Private Line)

One Z-1047-1 transmission bridge and a 6-volt dry-cell battery are required for supplying current for talking on the private line. The bridge consists of two 20-ohm windings, and is fitted with an angle mounting bracket.

#### Series Relay (Secretary's Desk)

AP-17-----Series Relay Box.

AS-55-----Desk lamp signal. Specify color (red, green or white) of the glass dome, and voltage (6, 12, 24 or 48) of the lamp.

Locate the series relay at the secretary's desk and connect as shown in Illustration E. The lamp signal may be operated from a dry-cell battery or from a small transformer.

PLAN #7--EXECUTIVE-SECRETARY SERVICE WITH TWO EXCHANGE LINES

This plan is similar to plan 6 except that the secretary serves two executives. Each executive is assigned an exchange line for his own service.

Ringer boxes for the two exchange lines are located at the secretary's desk, and an extension box (no ringer) at each executive's desk. A separately mounted two-position key enables the secretary to switch between the two exchange lines.

The secretary answers incoming calls by first operating the separate switching key to select the calling line, and then lifting the handset and operating the switching key on the monophone. The rest of the operation is similar to that described under plan #6.

Each executive can signal and talk with the secretary. In addition, the two executives can talk with each other over the private line provided that the calling executive instructs the secretary to signal the other executive for him.

A series relay AP-17 may be wired in each exchange line for the purpose of lighting a busy signal at the secretary's desk during the periods each executive is using his line. Interference by the secretary is thus avoided.

Illustration "F" shows the plan in theory form. Illustration "G" shows where to connect the Monophone cord conductors and the line circuits inside the ringer and extension boxes, and also shows the detail wiring for the private-line signals and the series relay circuits. The code numbers are as follows:

Monophone (Each Desk)

AA-24-----When a dial is required (automatic exchange lines).  
AA-25-----When no dial is required (manual exchange lines).

A nine-conductor cord is attached to each instrument. Connect the red and white conductors of the secretary's Monophone to terminals 6B and 7B in the A0-28 ringer box as shown in Illustration "G" instead of the terminals shown on the label inside of the ringer box.

Ringer Boxes (Secretary's Desk)

For line #1 (Straight-line ringing) ----- A0-28.  
For line #2 (Straight-line ringing) ----- A0-29.  
For line #1 (Harmonic ringing) ----- A0-28 SPECIAL with \_\_\_\_\_ cycle ringer.  
For line #2 (Harmonic ringing) ----- A0-29 SPECIAL with \_\_\_\_\_ cycle ringer.

Extension Boxes (Executives' Desks)

Code No. A0-24. No ringer is included as it is expected that the secretary will answer all calls.

Buzzers (Private Line)

One No. 210 iron-box buzzer (two ohms) is required at each desk for the private line. The buzzers may be operated from a dry-cell battery or from a small bell-ringing transformer.

Push Buttons (Private Line)

One No. 10 push button is required at each executive's desk and two at the secretary's desk. The push buttons are 1-5/8" x 1-1/8" x 7/8", suitable for mounting on the side of the desk.

Transmission Bridge (Private Line)

One Z-1047-1 transmission bridge and a 6-volt dry-cell battery are required for supplying current for talking on the private line. The bridge consists of two 20-ohm windings, and is fitted with an angle mounting bracket.

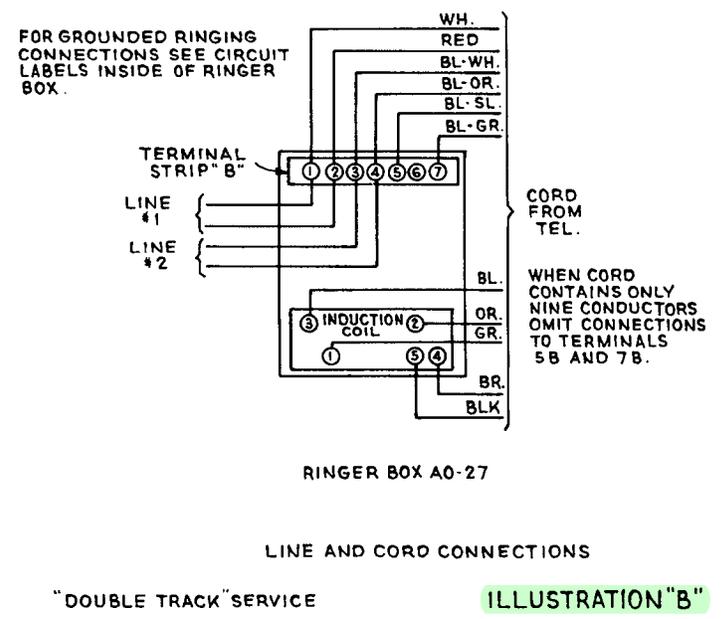
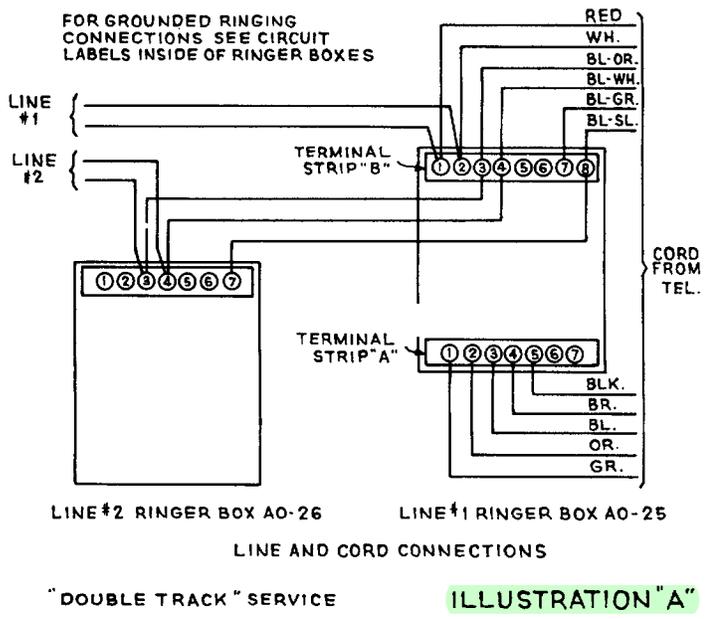
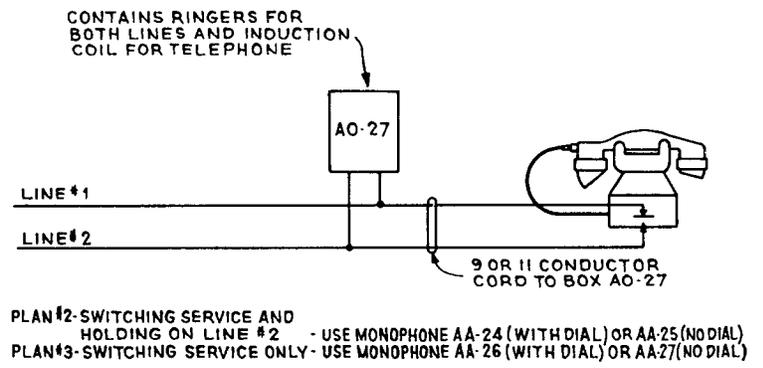
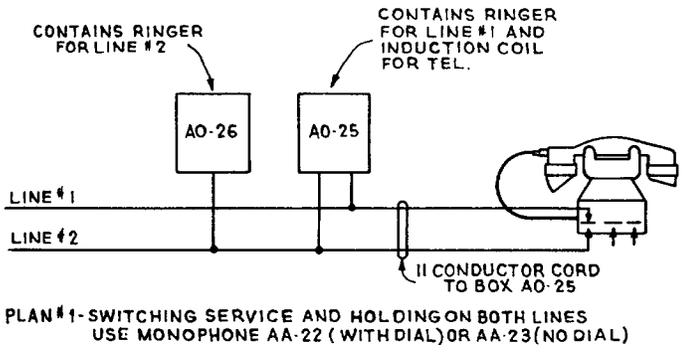
Series Relays (Secretary's Desk)

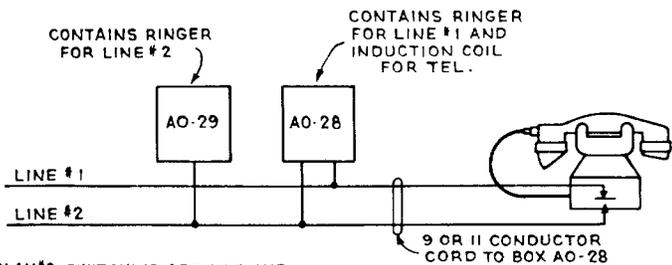
One AP-17 series relay box for each exchange line.  
One AS-55 desk lamp signal for each exchange line.  
Specify color (red, green or white) of the glass dome, and voltage (6, 12, 24 or 48) of the lamp.

Locate the series relays at the secretary's desk and connect as shown in Illustration "G". The lamp signals may be operated from a dry-cell battery or from a small transformer.

Switching Key (Secretary's Desk)

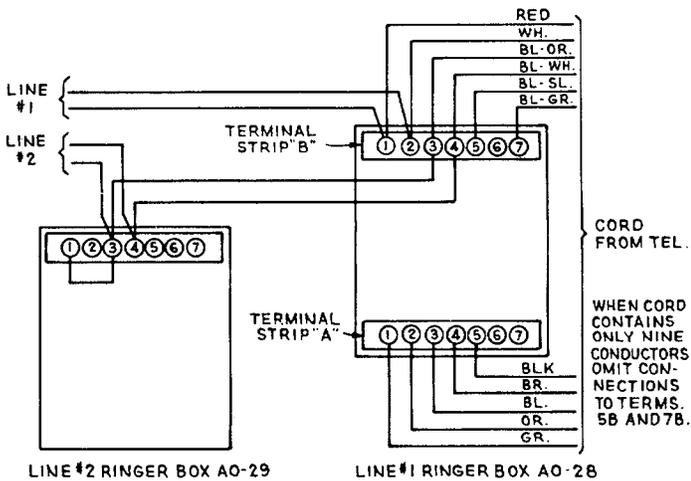
One AY-10 key is required at the secretary's desk for switching between the two exchange lines. This key is of the lever type, is encased in a metal cover, and is suitable for mounting on the side of the desk.





PLAN #2 - SWITCHING SERVICE AND HOLDING ON LINE #2 - USE MONOPHONE AA-24 (WITH DIAL) OR AA-25 (NO DIAL)  
 PLAN #3 - SWITCHING SERVICE ONLY - USE MONOPHONE AA-26 (WITH DIAL) OR AA-27 (NO DIAL)

FOR GROUNDED RINGING CONNECTIONS SEE CIRCUIT LABELS INSIDE OF RINGER BOXES.

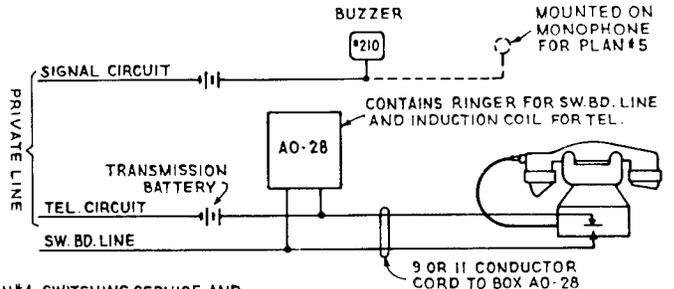


LINE #2 RINGER BOX AO-29      LINE #1 RINGER BOX AO-28

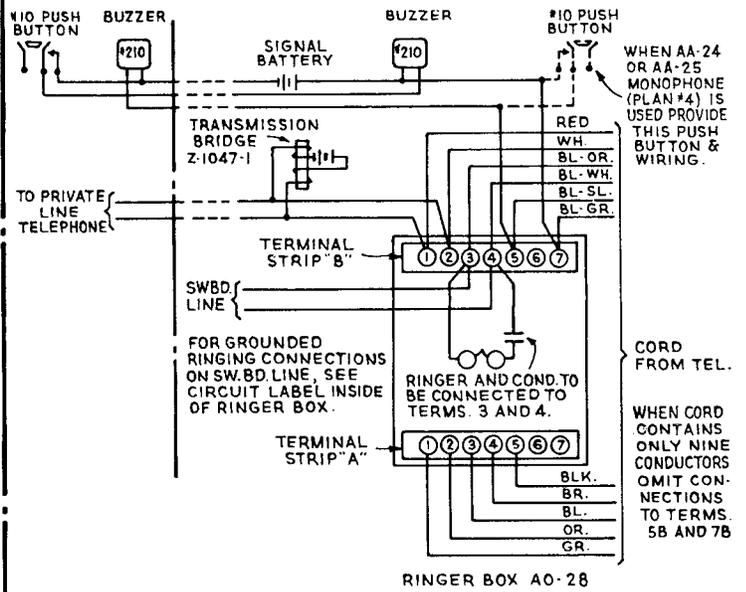
LINE AND CORD CONNECTIONS

"DOUBLE TRACK" SERVICE

ILLUSTRATION "C"



PLAN #4 - SWITCHING SERVICE AND HOLDING ON SW. BD. LINE - USE MONOPHONE AA-24 (WITH DIAL) OR AA-25 (NO DIAL)  
 PLAN #5 - SWITCHING SERVICE ONLY - USE MONOPHONE AA-26 (WITH DIAL) OR AA-27 (NO DIAL)



RINGER BOX AO-28

LINE AND CORD CONNECTIONS

"DOUBLE TRACK" SERVICE

ILLUSTRATION "D"

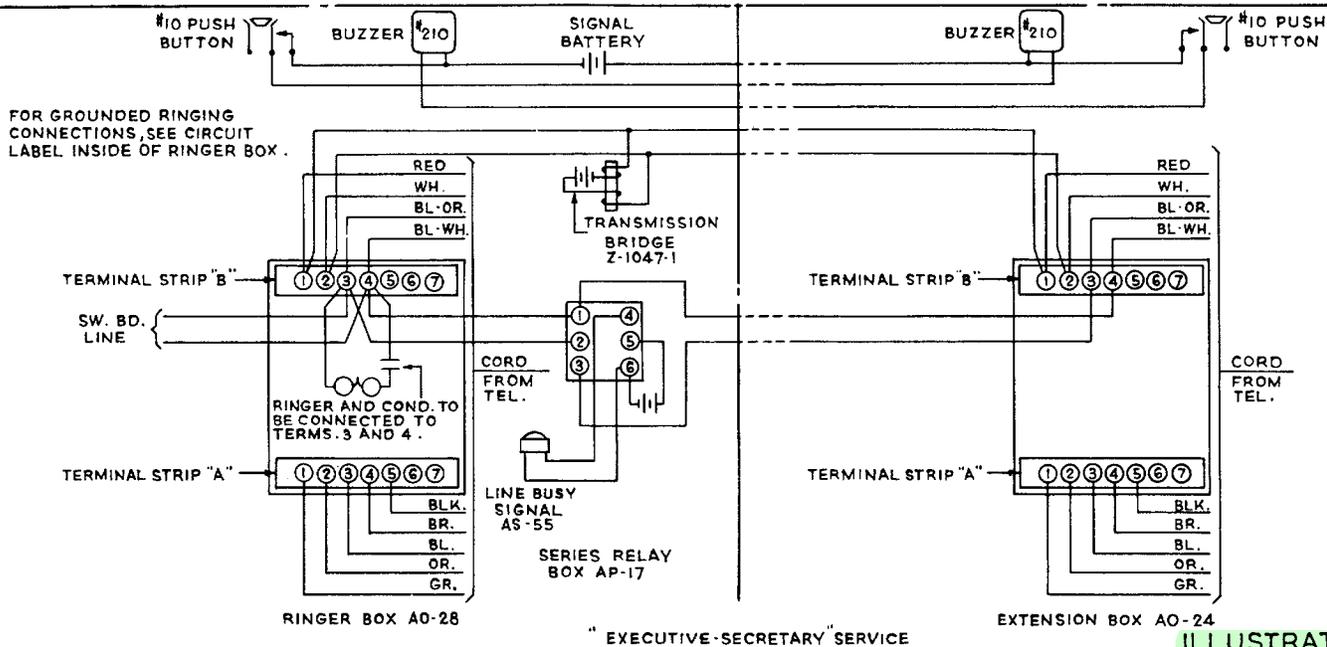
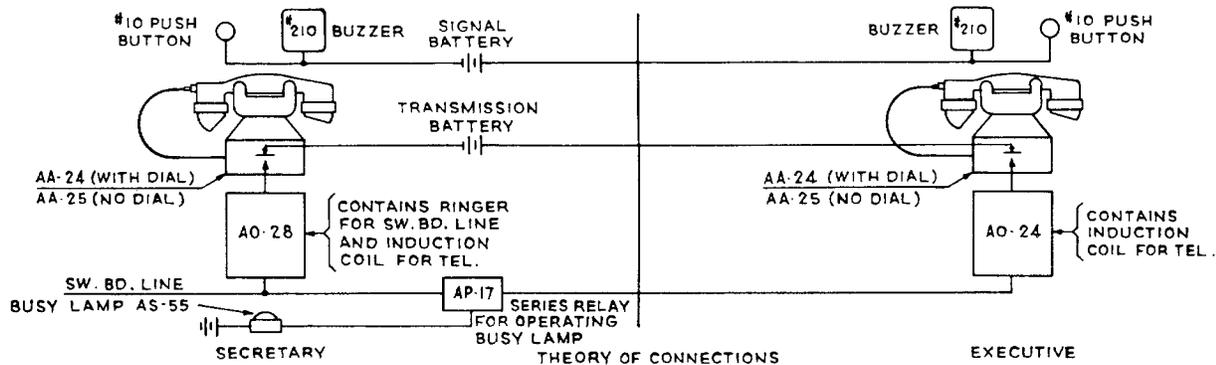
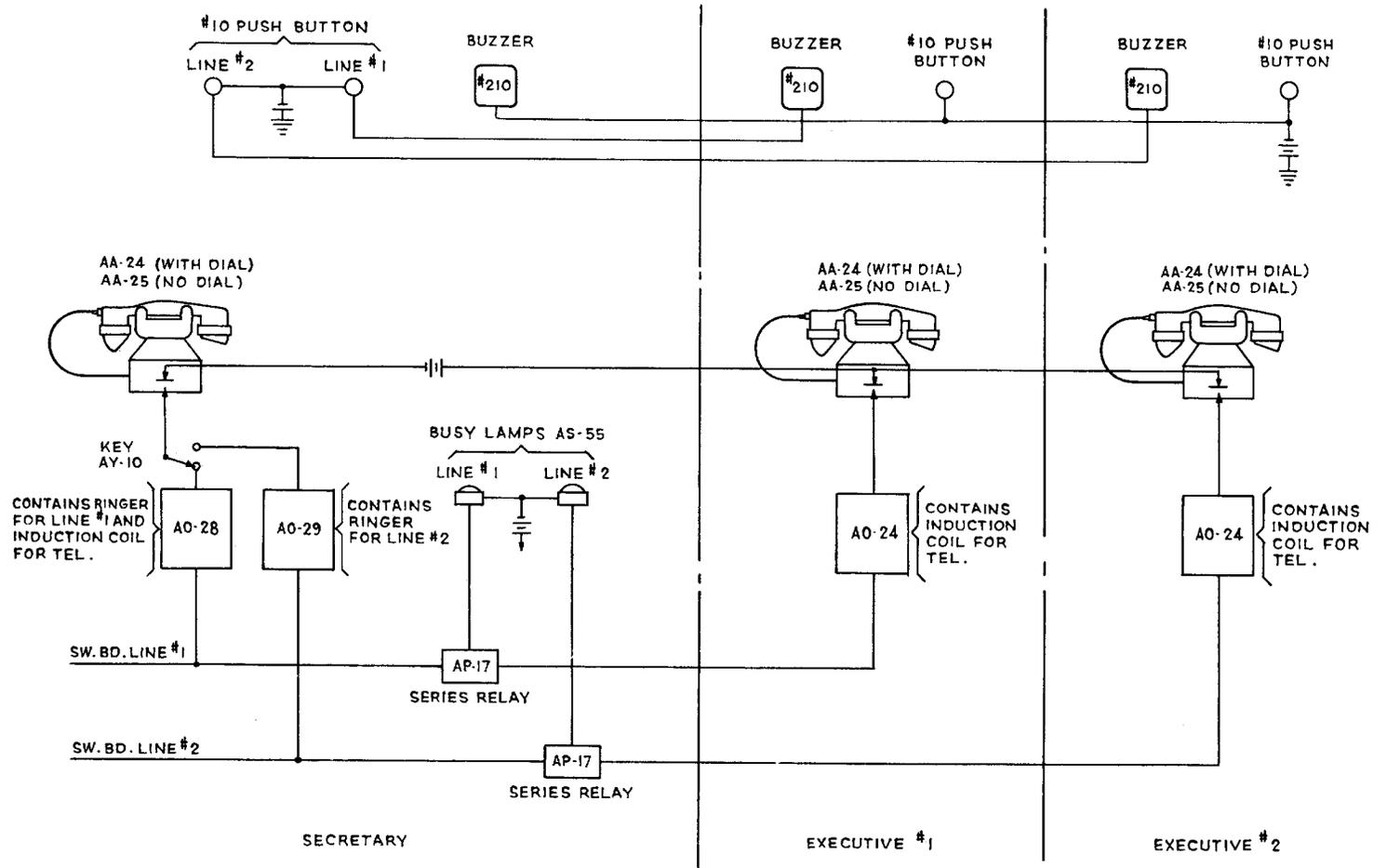
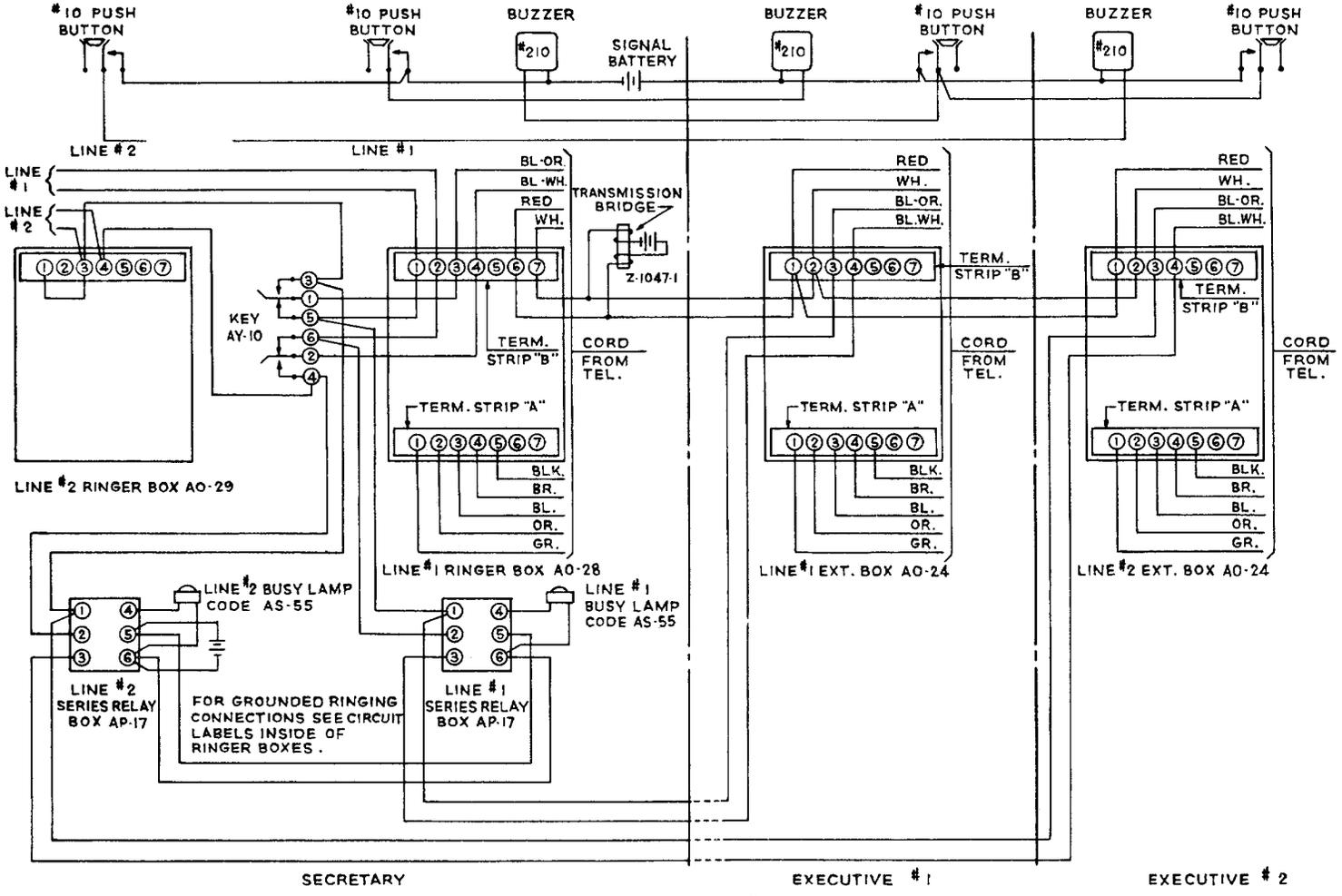


ILLUSTRATION "E"



"EXECUTIVE - SECRETARY" SERVICE

ILLUSTRATION "F"



"EXECUTIVE - SECRETARY" SERVICE

ILLUSTRATION "G"