SIDETONE AND ANTI-SIDETONE
EXTENSION STATION AND EXTENSION RINGER CONNECTIONS

1. GENERAL

1.01 This section covers the extension station and extension ringer connections (including loud ringing bells) for sidetone and anti-sidetone subscriber sets when such sets are used at manual or dial common battery stations or at local battery talking, common battery signaling stations (L.B.T., C.B.S.). It is reissued to include sidetone connections.

1.02 **Extension Ringers and Extension Stations With Ringers** are in the majority of the cases shown on the same diagrams in this section. The dash lines (– – –) in the diagrams indicate the part of the extension station connections which is not needed when extension ringers only are installed. When alternate terminal markings, depending upon the set used, are required both markings are shown. The markings "R" and "B" generally apply to the extension ringer. When an "E" terminal is shown in a diagram, it must be added to the set if not already provided.

1.03 **Subscriber Sets:** In the case of anti-sidetone main or extension stations, with or without ringers, it is necessary to install a set with an induction coil at each station.

1.04 **Loud Ringing Bells:** The diagrams show typical examples of how one loud ringing bell is connected. In general, additional loud ringing bells can be connected in the same manner as the first one subject, however, to the limitations given in Tables 1, 2 and 3 and their associated notes.

1.05 **A Ringing Bridge** may consist of a condenser in series with (a) one or more ringers, (b) a relay for polarized ringing lines (together with its associated ringer or loud ringing bell), (c) an auxiliary signaling relay, or (d) a loud ringing bell. The following Tables 1, 2 and 3 show the equivalent ringing bridges generally used at subscriber stations and the maxi-

mum number of ringing bridges permitted per main station. In cases of dialing, ringing or tripping difficulties and in cases of station rearrangements it may be desirable to replace or rewire stations that have ringing bridges that are not recommended herein.

TABLE 1

EQUIVALENT RINGING BRIDGES USED ON NON-POLARIZED RINGING LINES

Ringing Bridges	Condenser	Ringer	L. R. Bell	Aux. Sig. Relay
Equivalent **High Impedance.** Using .5 or .65 mf condenser. (See Note 1)	.5 mf	3500ω	—	—
	.5 mf	4300ω	—	—
	.65 mf	2500ω	—	—
	.65 mf	—	2500ω (See Note 4)	—
	.5 mf	—	—	2040ω (85 N)
	.5 mf	—	—	3300ω (AT 77B Type)
	.5 mf	—	—	5700ω (85 P)
Equivalent **Low Impedance.** Using 1 mf condenser. (See Note 2.)	1 mf	1000ω	—	—
	1 mf	1400ω	—	—
	1 mf	1500ω	—	—
	1 mf	3500ω	—	—
	1 mf	—	1000ω (See Notes 4 and 5)	—
Equivalent **Low Impedance.** Using 2 mf condenser (or 1 mf condenser with auxiliary signaling sets). (See Notes 3 and 6.)	2 mf	1000ω	—	—
	2 mf	1400ω	—	—
	2 mf	1500ω	—	—
	2 mf	—	1000ω (See Notes 4 and 5)	—
	1 mf	—	—	1700ω (AT 77)

Note 1: High impedance ringers should never be wired in series with another ringer, a loud ringing bell or an auxiliary signaling relay.

Note 2: Not more than two low impedance ringers should ever be wired in series with a 1 mf condenser. Unless series wiring of ringers is specified in this section, it is preferable to use a parallel connection of the ringers with a separate 1 mf condenser in series with each ringer.

Note 3: The use of two low impedance ringers in series with a 2 mf condenser is not recommended.

Note 4: Loud ringing bells or auxiliary signaling relays should never be wired in series with another loud ringing bell, ringer or relay.

Note 5: Low impedance loud ringing bells are recommended for use only where conditions are favorable and permit satisfactory results. Under severe conditions use high impedance equipment except for two party dial message rate main stations. See Note 3 following Table 3 for information regarding these stations.

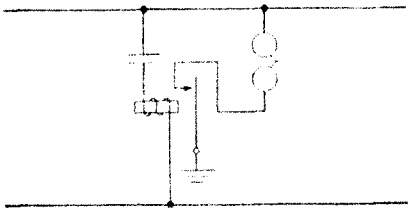
Note 6: Low impedance ringing bridges using a 2 mf condenser or equivalent ringing bridges are not recommended for use at the same station with a low impedance ringing bridge using a 1 mf condenser.

TABLE 2
EQUIVALENT RINGING BRIDGES USED ON POLARIZED RINGING LINES

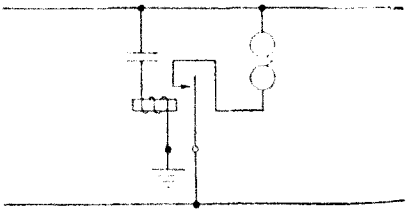
Ringing Bridges	Condenser	Relay	Ringer	L. R. Bell (See Note 2)
Equivalent **High Impedance.** Using .5 mf condenser. (See Note 1.)	.5 mf .5 mf .5 mf	5700ω 5700ω 2040ω (85P or 85N)	6000ω — —	— 4500ω 4500ω
Equivalent **Low Impedance.** Using .5 mf condenser. (See Notes 1 and 3.)	.5 mf .5 mf	2040ω 2040ω (85N)	1000-3000ω 1000-3000ω in series with 1000ω, 1400ω or 1500ω Ringer	— —
Equivalent **Low Impedance.** Using 1 mf condenser. (See Notes 1 and 3.)	1 mf 1 mf	2040ω 2040ω (85N)	1000-3000ω 1000-3000ω in series with 1000ω, 1400ω or 1500ω Ringer	— —

Note 1: The ringing bridges used on polarized ringing lines are of two types which differ as regards the circuit used in the subscriber set. See the following sketches:

Regular Circuit



Inverted Circuit



On four-party selective lines low impedance equipment with the regular circuit is ordinarily used unless d.c. ground potential is experienced, in which case the inverted circuit is used. High impedance equipment

with the inverted circuit is used on eight-party semi-selective lines and should also be used on four-party selective lines in cases of inductive interference.

Note 2: Only high impedance loud ringing bells should be used on polarized ringing lines and should never be wired in series with another loud ringing bell or a ringer.

Note 3: In manual areas the condenser used in series with the relay (2040ω) may be either .5 or 1 mf but in dial areas only .5 mf condensers can be used. This requirement applies to both of the station circuits illustrated above in Note 1.

Note 4: The low impedance ringing bridges listed below are not recommended for use at either manual or dial stations, as these ringing bridges may limit tripping and have an adverse effect upon the performance of other stations on the same line:

(1) 1 or 2 mf condenser, 2040ω relay and 2500ω loud ringing bell (392B Subscriber Set).

(2) 2 mf condenser, 2040ω relay and 1000-3000ω ringer.

(3) 1 or 2 mf condenser, 2040ω relay and 2500ω ringer (8B ringer).

TABLE 3
MAXIMUM NUMBER OF RINGING BRIDGES PER MAIN STATION

Class of Service (Includes L.B.T., C.B.S.)	Maximum Number of Ringing Bridges Per Main Station
Individual Line Stations, all P.B.X. Stations except as covered below, Two-Party Selective Flat Rate Stations and Two-Party Selective Message Rate Manual Stations. (See Note 2.)	**High Impedance** / **Low Impedance 1 mf** / **2 mf** 4 and 0 and 0 or 2 and 1 and 0 or 1 and 0 and 1 or 0 and 2 or 1
P.B.X. Stations for night or through dial connections when there is an a.c. bridge in the P.B.X. circuit.	2 and 0 and 0 or 0 and 1 and 0
Two-Party Selective Message Rate Dial Stations. (See Note 1.)	(4 and 0 and 0)* or 2 and 1 and 0 or 1 and 0 and 1 or 0 and 2 and 0
Four-Party Semi-Selective Stations. (See Note 2.)	2 and 0 and 0 or 0 and 1 and 0
Divided Code Ringing Stations and Manual Non-Selective Party Line Stations. (See Notes 2 and 4.)	1 and 0 and 0
Four-Party Selective Stations. (See Note 2 and Notes associated with Table 2.)	**High Impedance** / **Low Impedance .5 mf** / **1 mf**** 2 and 0 and 0 or 0 and 1 or 1
Eight-Party Semi-Selective Stations. (See Notes 2, 3 and 4.)	1 and 0 and 0

*Ring Party Stations only.
**Use permissible in manual areas only.

Note 1: The tip party on a two-party selective message rate dial line requires a 1000 ohm signal for a party identification test which is made automatically by the dial central office equipment. High impedance ringers

or loud ringing bells cannot, therefore, be used in the station circuit employed for the party identification test. If not used for party identification test purposes (as extension ringer only) two high impedance ringers or loud ringing bells may be provided in addition to the normal 1000 ohm ringer. A low impedance 1000 ohm loud ringing bell can, of course, be substituted for the normal ringer if required.

Note 2: On grounded ringing lines, where high impedance equipment is used to limit inductive noise, it is necessary from a noise standpoint to limit the unbalance between the two sides of the line. The following arbitrary figures may be applied to the ringing equipment continually connected to ground to determine the unbalance between the two sides of a line.

Ringing Equipment Continually Connected to Ground	Units of Unbalance
Ringer (High Impedance)	1
5700ω Relay (85P)	1
Loud Ringing Bell (High Impedance)	2
2040ω Relay (85N)	2
Auxiliary Signaling Relay (AT77B Type)	0.5

The unbalance between the two sides of a line shall ordinarily not be more than 3 units.

For example, a four-party semi-selective line has the following ringing equipment continually connected to ground:

	Tip Side	Ring Side
First Station	1 Ringer—1 unit	2 ringers—2 units
Second Station	1 Ringer—1 unit	1 ringer and 1 L.R. Bell—3 units
Total	2 units	5 units

Thus the unbalance between the tip and ring sides is 3 units, which is the maximum permissible.

Note 3: On eight-party semi-selective lines, the maximum number of ringing bridges on a given side of the line must be reduced by one if more than one loud ringing bell is installed on that side of the line.

Note 4: On eight-party semi-selective, divided code ringing and manual non-selective party lines extension stations with ringers and extension ringers can be added only by reducing the permissible number of main stations one for each extension station with ringer or extension ringer.

2. MAIN STATION AND ONE EXTENSION STATION WITH RINGER
MAIN STATION AND ONE EXTENSION RINGER
MAIN STATION AND ONE LOUD RINGING BELL

2.01 Individual Line Stations (Including L.B.T., C.B.S.) Manual and Dial
All P.B.X. Stations (Including L.B.T., C.B.S.) Manual and Dial Except the Stations Covered in 2.02 and 2.03

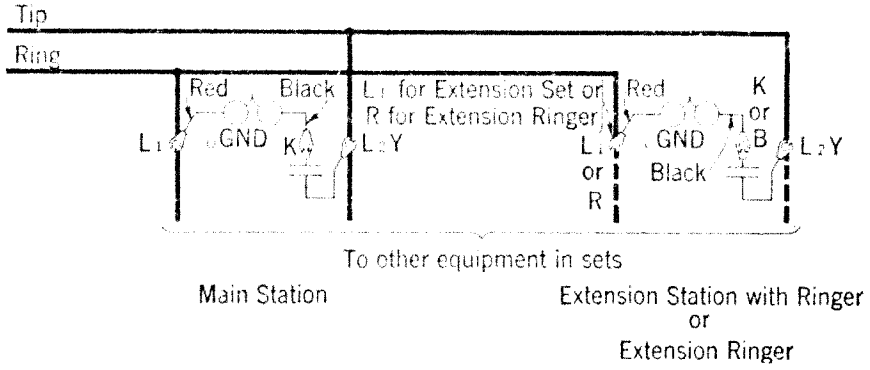


Fig. 1—High Impedance Ringers.

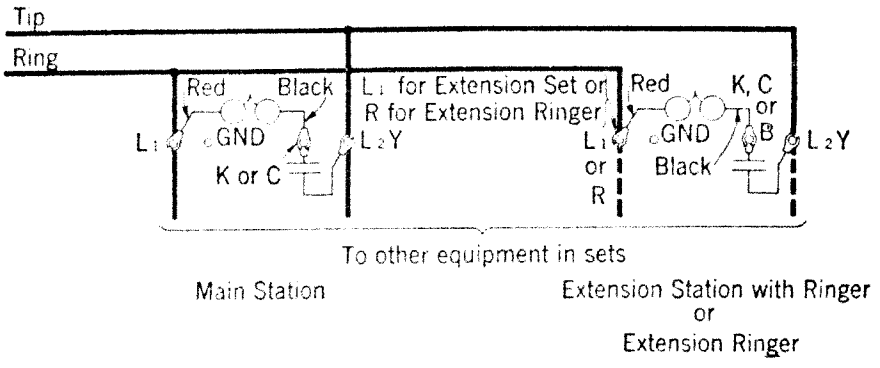


Fig. 2—Low Impedance Ringers.

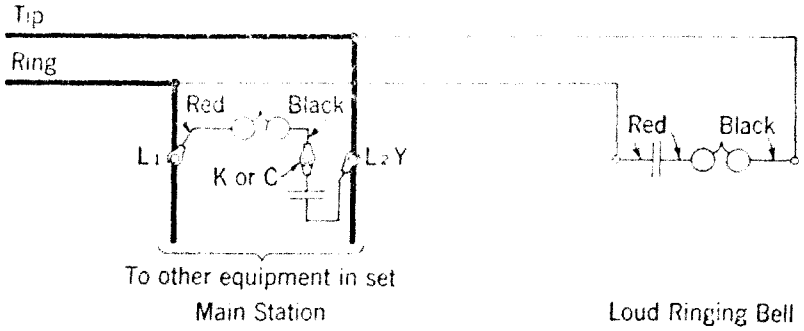


Fig. 3—High or Low Impedance Loud Ringing Bell.

2.02 **P.B.X. Stations for Night or Through Dial Connections when there is an a.c. Bridge in the P.B.X. Circuit—Manual and Dial.**

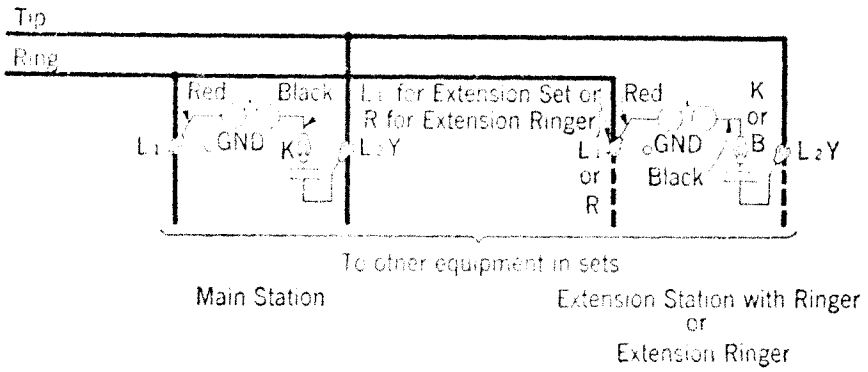


Fig. 4—High Impedance Ringers.

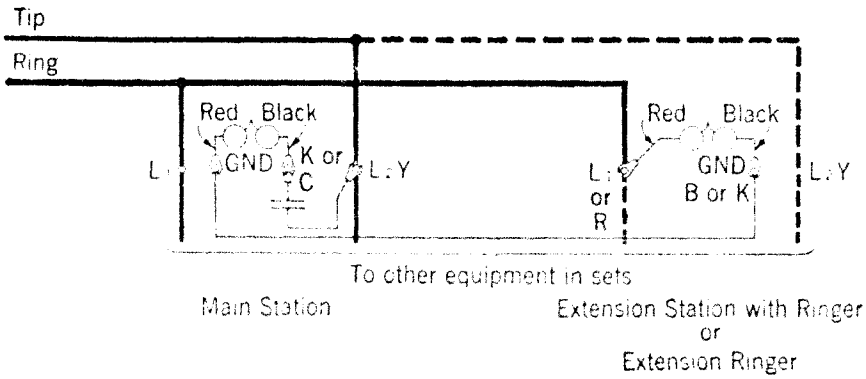


Fig. 5—Low Impedance Ringers.

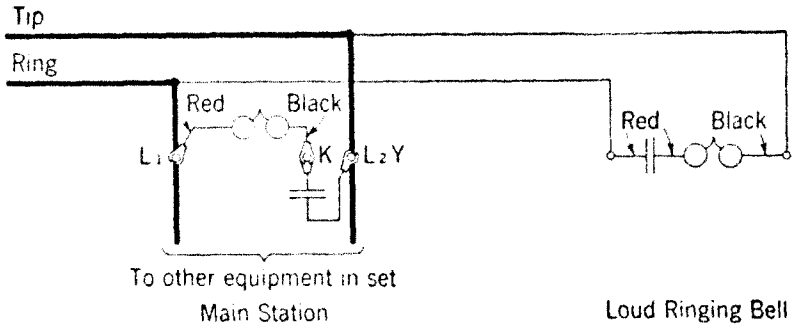


Fig. 6—High Impedance Ringer and Loud Ringing Bell.

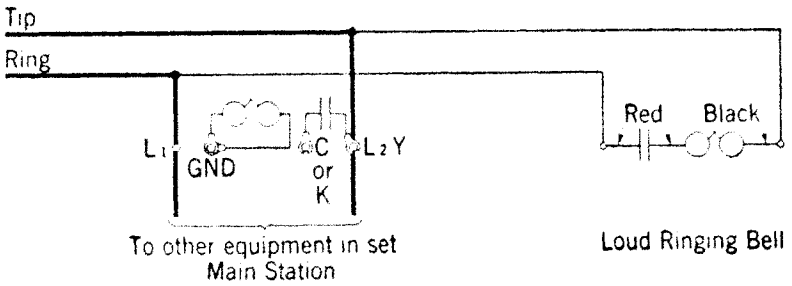


Fig. 7—High or Low Impedance Loud Ringing Bell Substituted for the Normal Low Impedance Ringer.

2.03 No. 750A P.B.X. Stations

One series extension ringer can be connected to Key Control stations as shown in Fig. 8. Extension stations and extension ringers can be connected to Keyless stations on the same basis as at any other P.B.X. station. See 2.01 for connections.

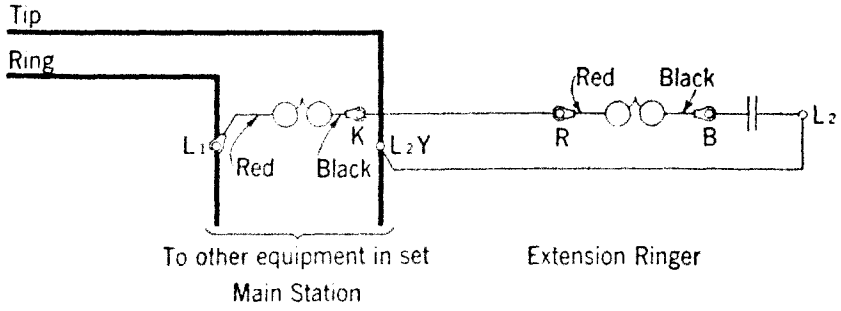


Fig. 8—Low Impedance Ringers—No. 750A P.B.X. Key Control Station.

2.04 **Two-Party Selective Flat Rate Stations (Including L.B.T., C.B.S.)—Manual and Dial**

Two-Party Selective Message Rate Stations (Including L.B.T., C.B.S.)—Manual Only

PARTY ON RING

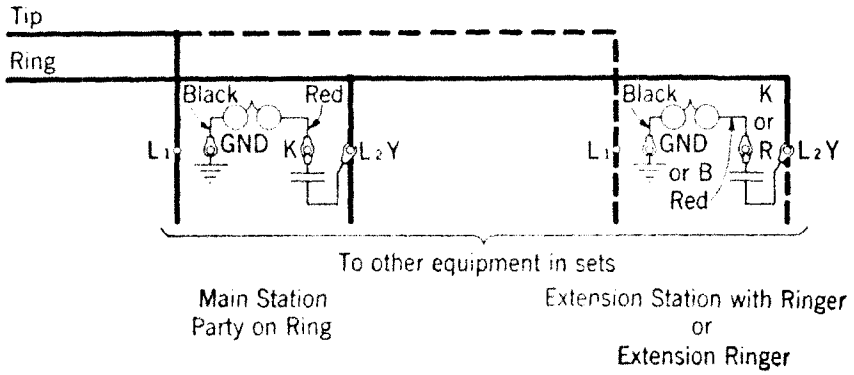


Fig. 9—High Impedance Ringers.

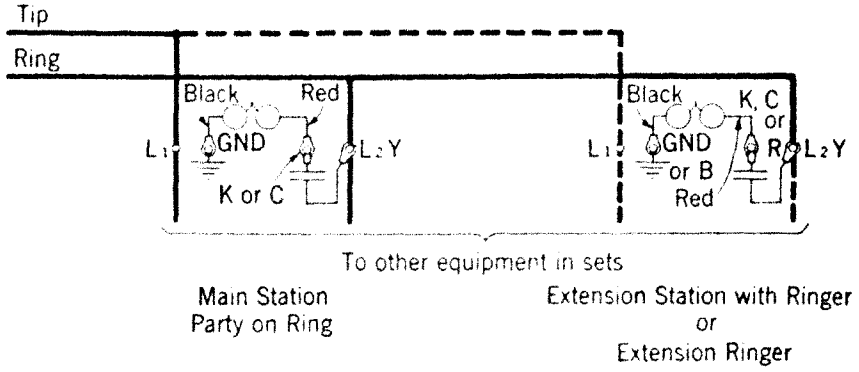


Fig. 10—Low Impedance Ringers.

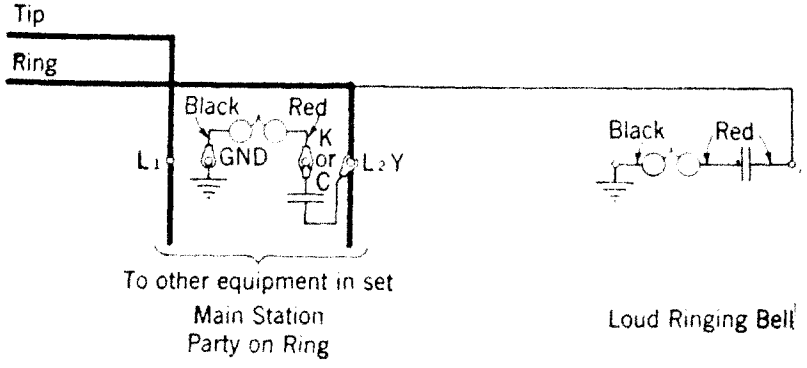


Fig. 11—High or Low Impedance Loud Ringing Bell.

PARTY ON TIP

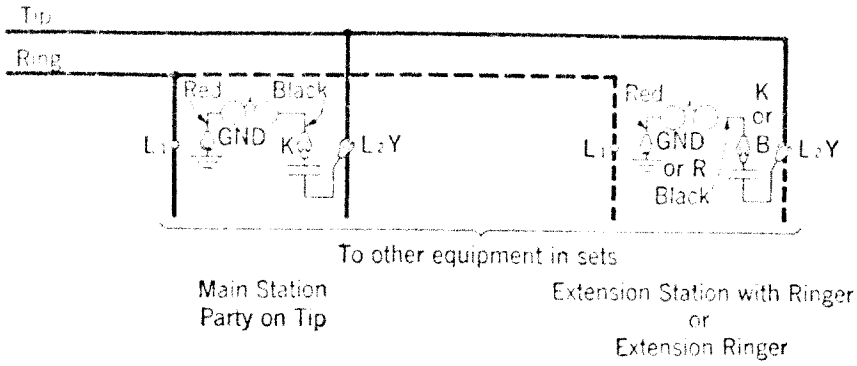


Fig. 12—High Impedance Ringers.

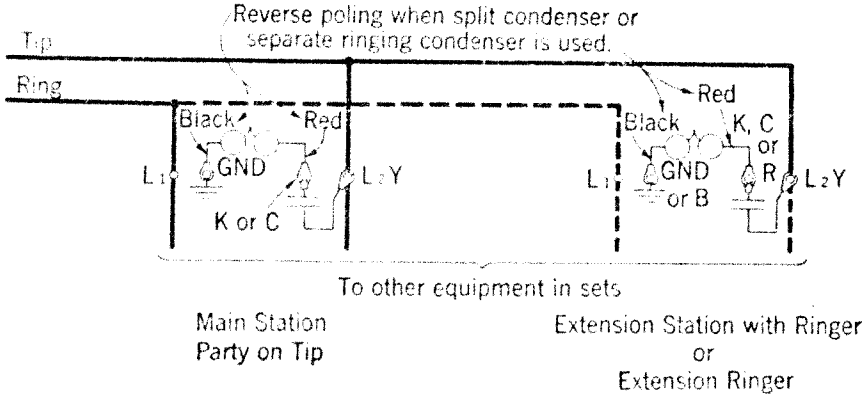


Fig. 13—Low Impedance Ringers.

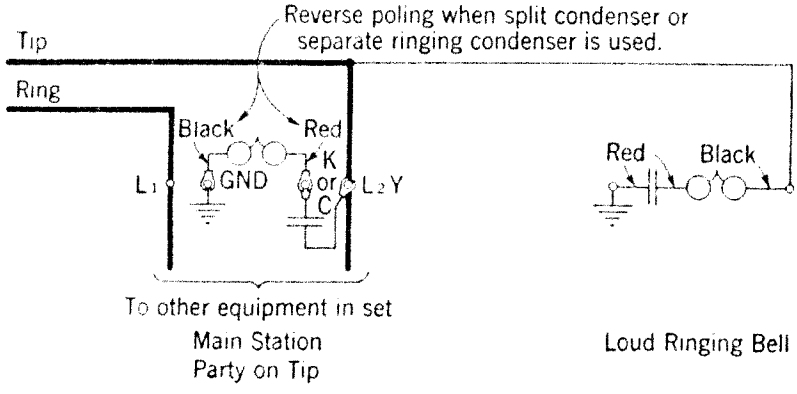


Fig. 14—High or Low Impedance Loud Ringing Bell.

2.05 Two-Party Selective Message Rate Stations—Dial.

PARTY ON RING

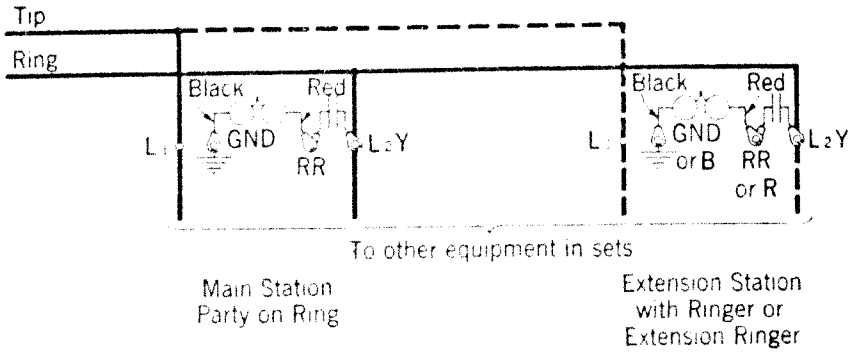


Fig. 15—Low Impedance Ringers.

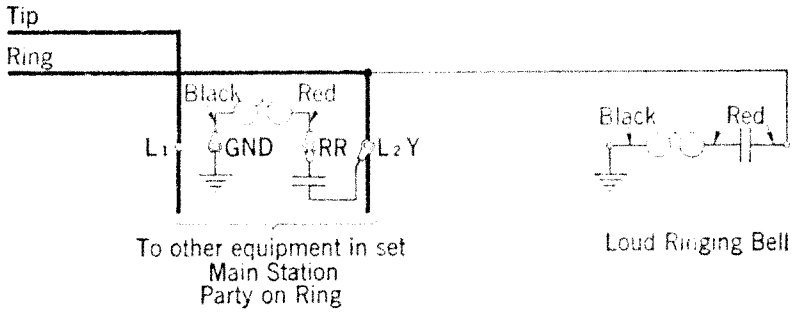


Fig. 16—High or Low Impedance Loud Ringing Bell.

PARTY ON TIP

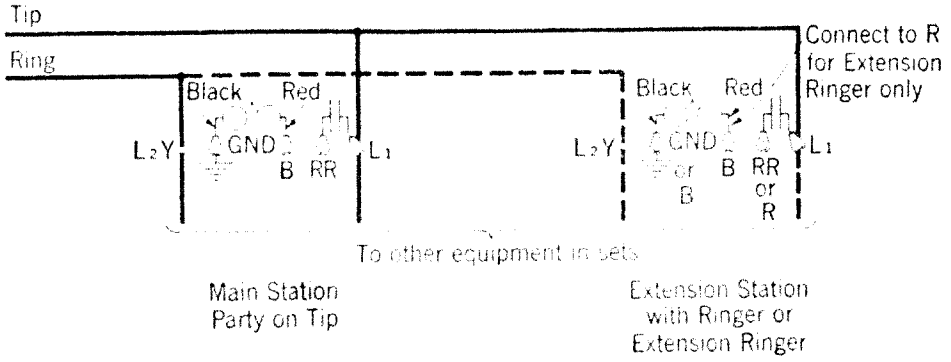


Fig. 17—Low Impedance Ringers—Sidetone Station.

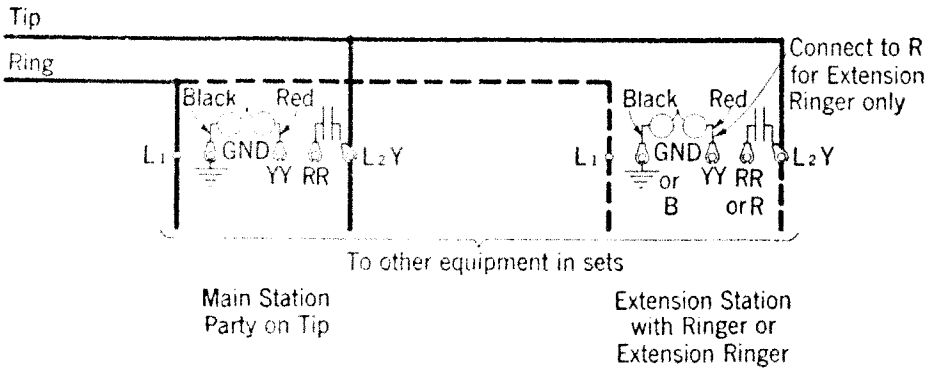


Fig. 18—Low Impedance Ringers—Anti-Sidetone Station.

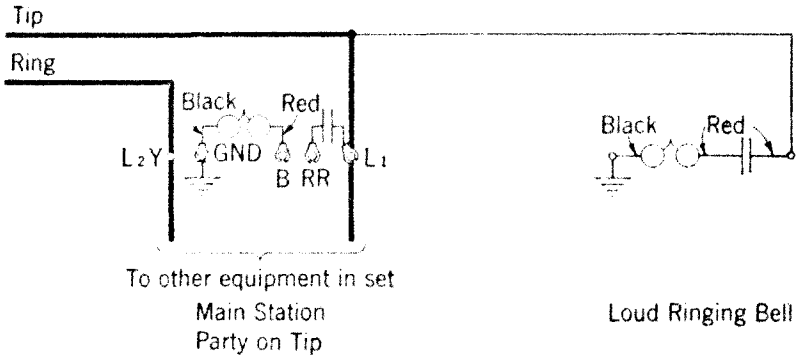


Fig. 19—High or Low Impedance Loud Ringing Bell—Sidetone Station.

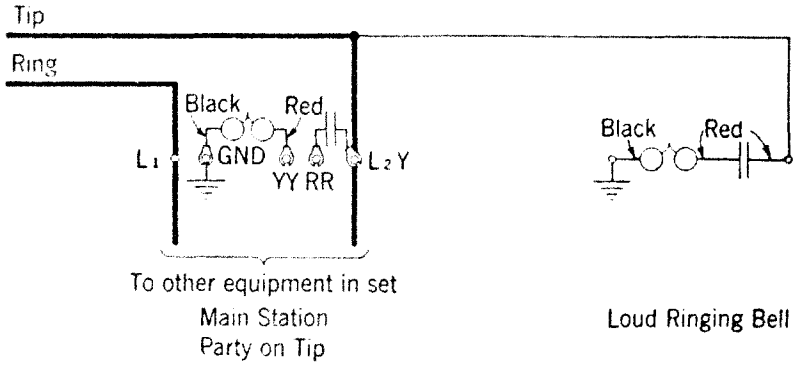


Fig. 20—High or Low Impedance Loud Ringing Bell—Anti-Sidetone Station.

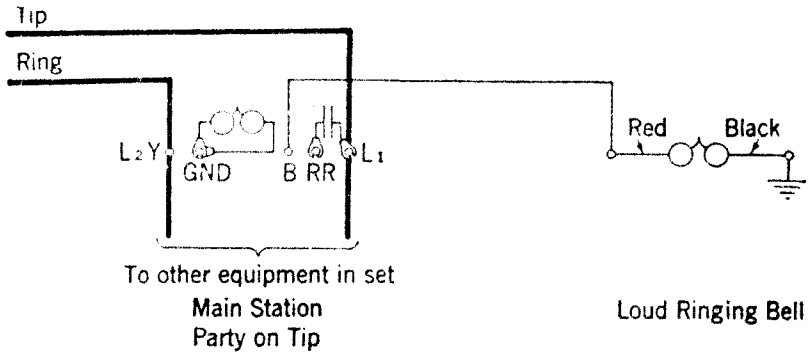


Fig. 21—Low Impedance Loud Ringing Bell Substituted for the Normal Ringer—Sidetone Station.

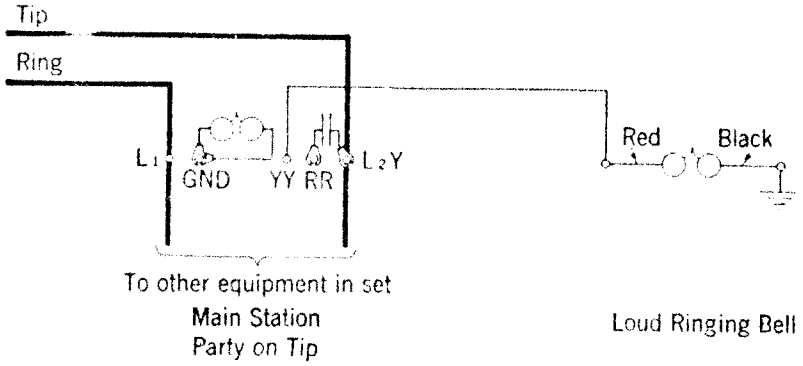


Fig. 22—Low Impedance Loud Ringing Bell Substituted for the Normal Ringer—Anti-Sidetone Station.

2.06 Four-Party Semi-Selective Stations (Including L.B.T., C.B.S.)—Manual and Dial.

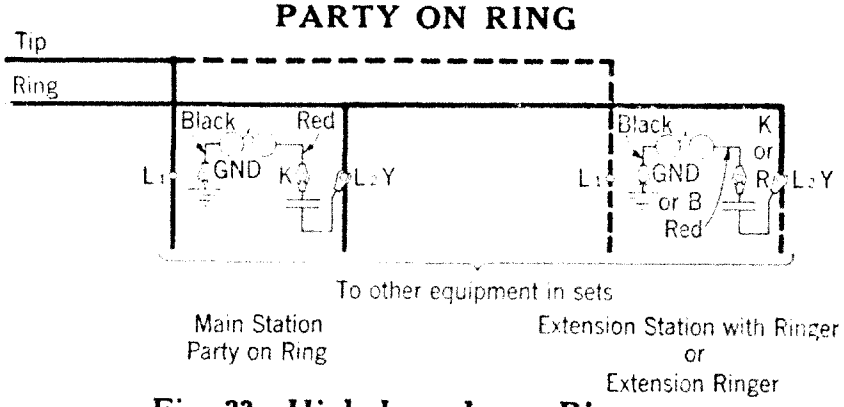


Fig. 23—High Impedance Ringers.

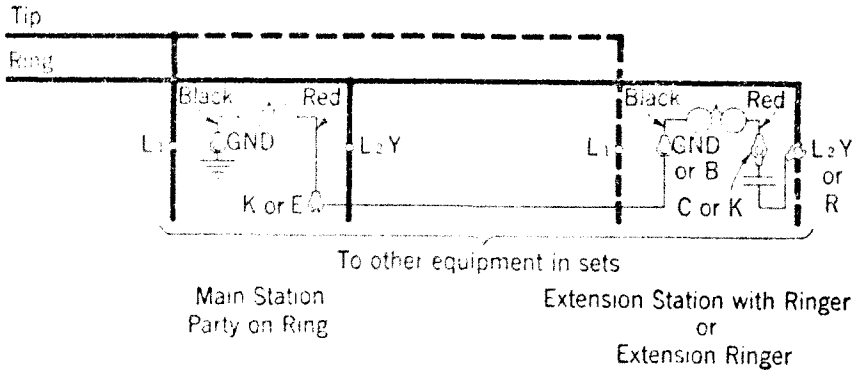


Fig. 24—Low Impedance Ringers.

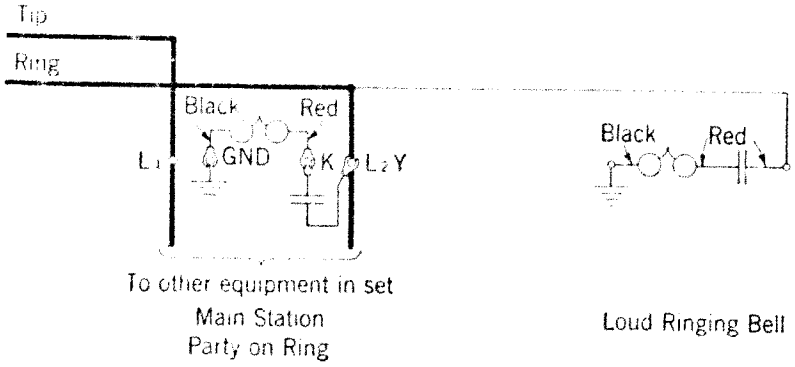


Fig. 25—High Impedance Ringer and Loud Ringing Bell.

Note: If the normal ringer is low impedance the loud ringing bell must be substituted for the normal ringer.

PARTY ON TIP

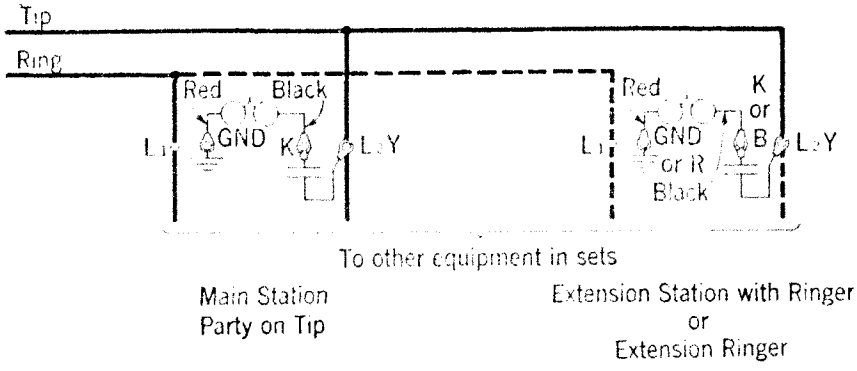


Fig. 26—High Impedance Ringers.

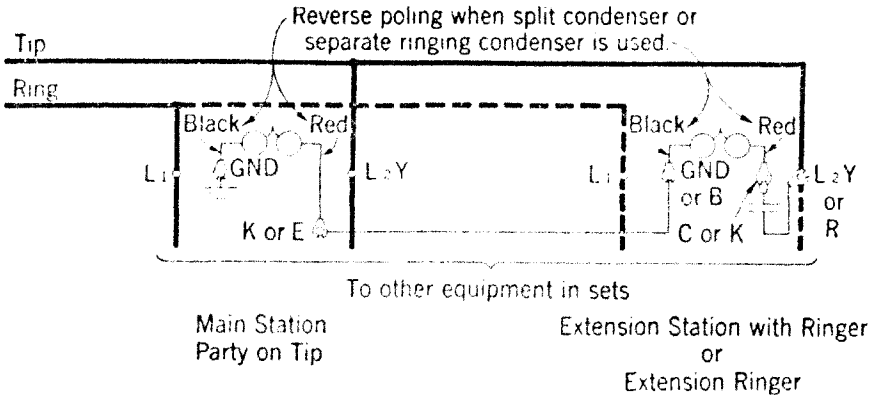


Fig. 27—Low Impedance Ringers.

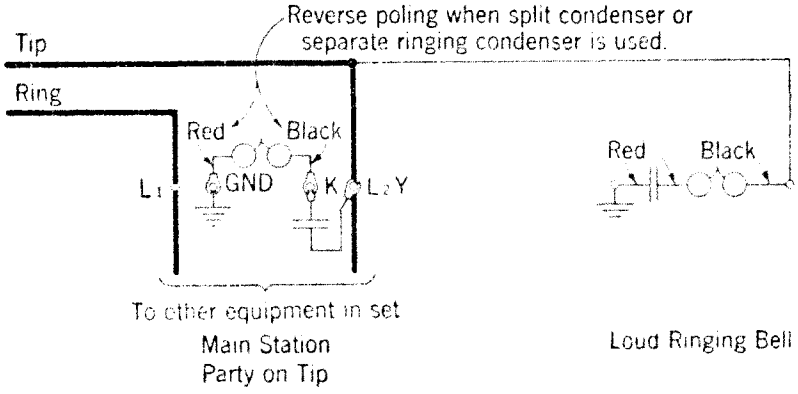


Fig. 28—High Impedance Loud Ringing Bell.

Note: If the normal ringer is low impedance the loud ringing bell must be substituted for the normal ringer.

2.07 Four-Party Selective Stations—Manual and Dial.

— PARTY ON RING

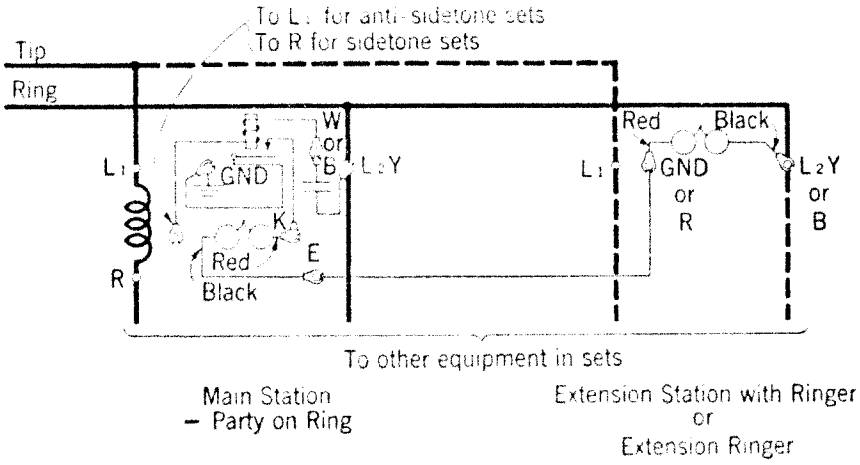


Fig. 29—Low Impedance Ringers.

— PARTY ON TIP

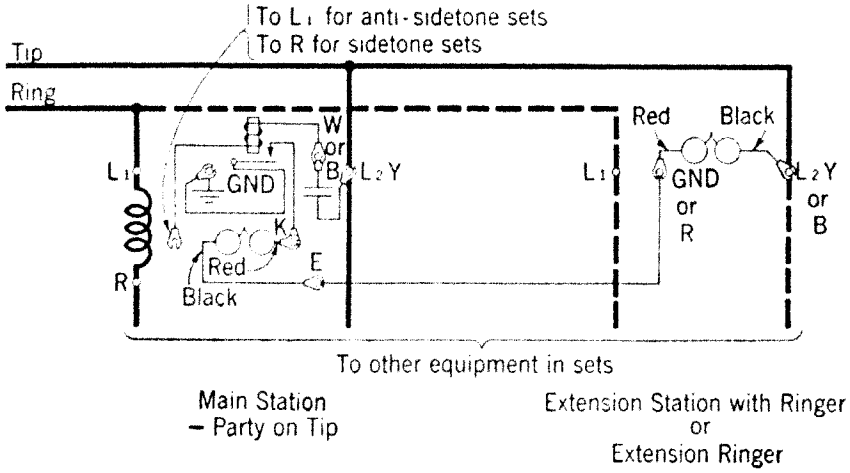


Fig. 30—Low Impedance Ringers.

+ PARTY ON RING

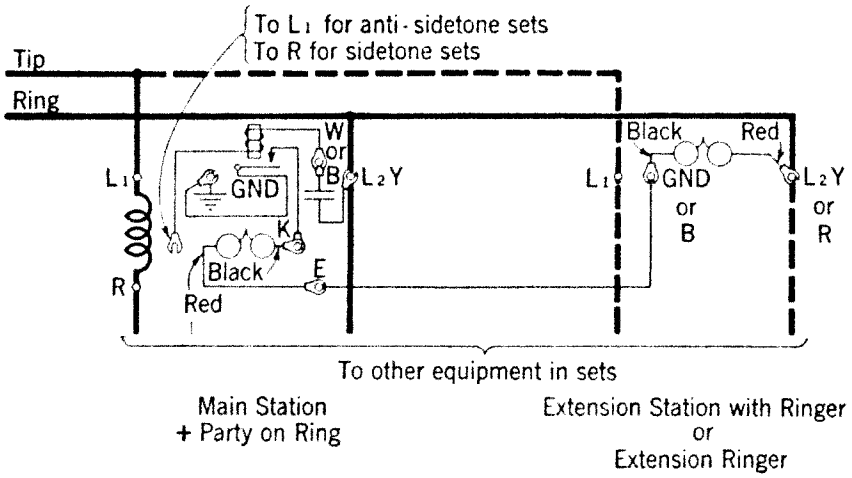


Fig. 31—Low Impedance Ringers.

+ PARTY ON TIP

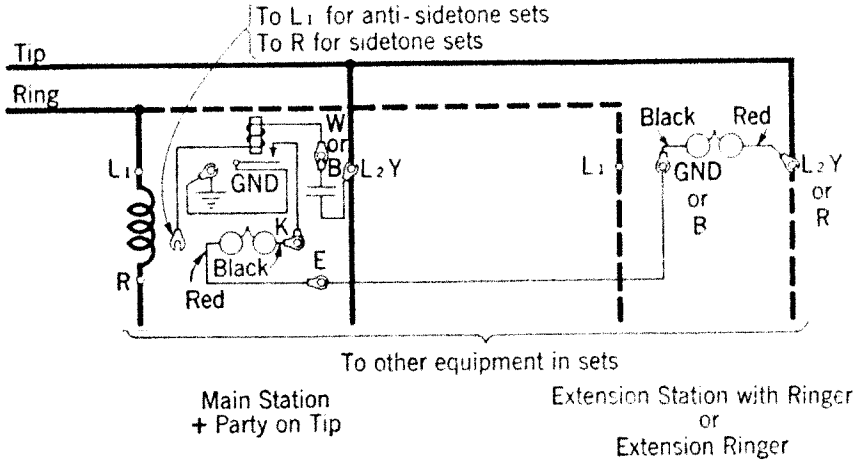


Fig. 32—Low Impedance Ringers.

Note: If a loud ringing bell is required, use high impedance loud ringing bell and substitute it for the normal ringer. See Tables 2 and 3 and their associated notes for further information.

2.08 Eight-Party Semi-Selective Stations (Including L.B.T., C.B.S.)—Manual and Dial.

No extension stations with ringers or extension ringers are permitted without reducing the number of main stations permissible on the line. If a loud ringing bell is required use high

impedance and substitute it for the normal ringer. See Tables 2 and 3 and their associated notes for further information.

2.09 **Divided Code Ringing Stations**
Manual Non-Selective Party Line Stations.

No extension stations with ringers or extension ringers are permitted without reducing the number of main stations permissible on the line. If a loud ringing bell is required, use high impedance and substitute it for the normal ringer. See Tables 2 and 3 and their associated notes for further information.

3. MAIN STATION AND 2 OR 3 EXTENSION STATIONS WITH RINGERS
MAIN STATION AND 2 OR 3 EXTENSION RINGERS
MAIN STATION AND EXTENSION STATIONS WITH EXTENSION RINGERS

3.01 **Individual Line Stations (Including L.B.T., C.B.S.) Manual and Dial.**

All P.B.X. Stations (Including L.B.T., C.B.S.) Manual and Dial Except as Covered in 3.02.

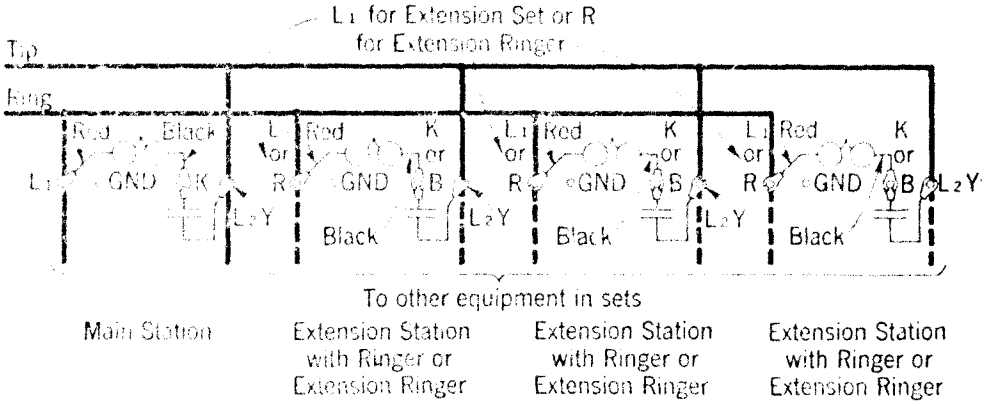


Fig. 33—High Impedance Ringers.

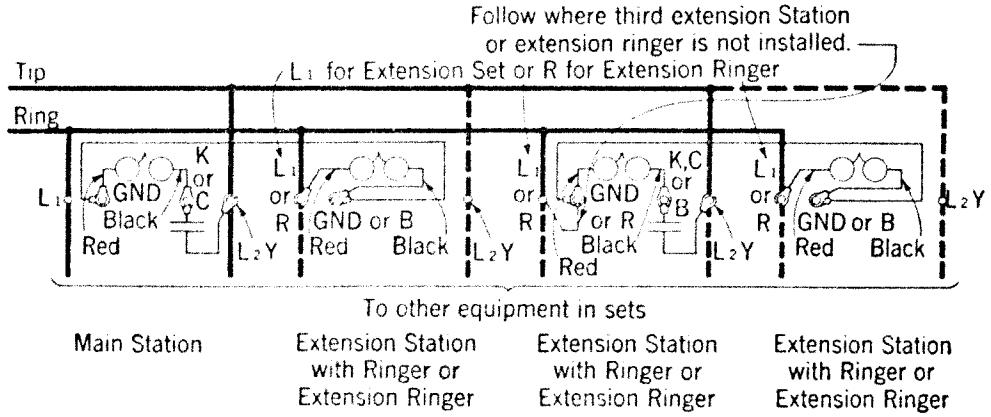


Fig. 34—Low Impedance Ringers.

Note: Do not use Fig. 33 or Fig. 34 for P.B.X. stations arranged for night or through dial connections when there is an a.c. bridge in the P.B.X. circuit, as only one low impedance or two high impedance ringing bridges are permitted at these stations. See Table 3.

3.02 **No. 750A P.B.X. Key Control Stations:** No extension stations and not more than one extension ringer should be provided.

3.03 **Two-Party Selective Flat Rate Stations (Including L.B.T., C.B.S.)—Manual and Dial.**

Two-Party Selective Message Rate Stations (Including L.B.T., C.B.S.)—Manual Only.

PARTY ON RING

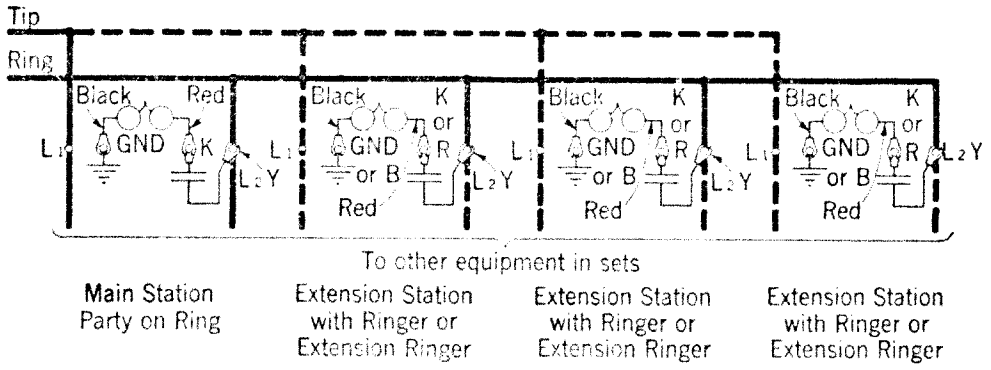


Fig. 35—High Impedance Ringers.

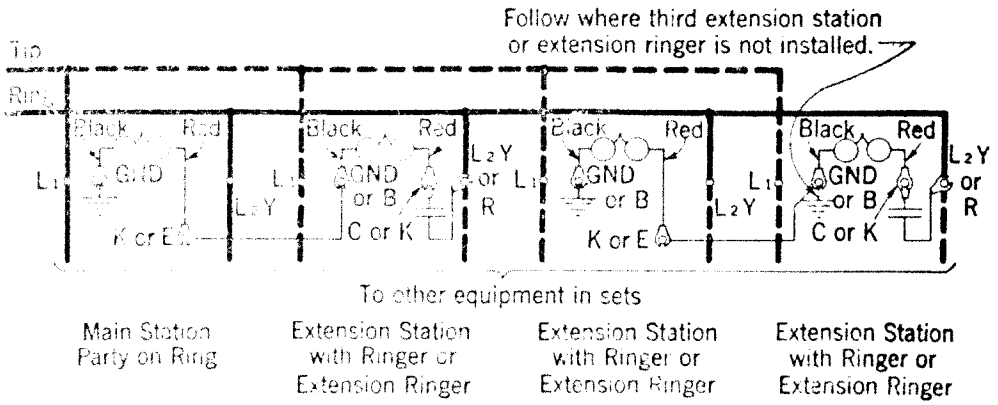


Fig. 36—Low Impedance Ringers.

PARTY ON TIP

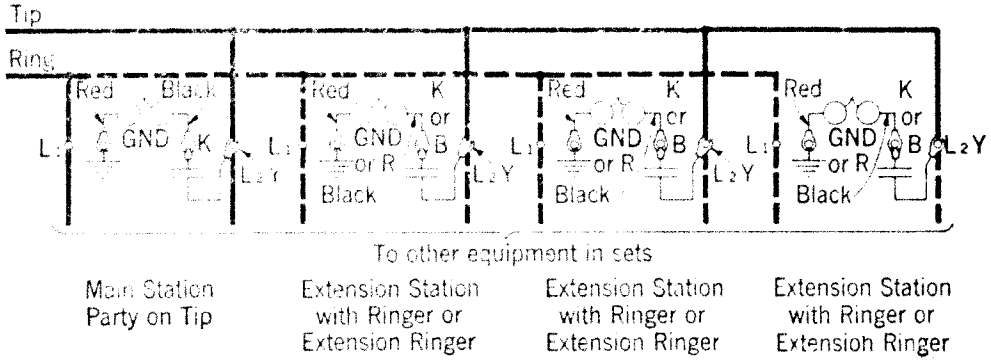


Fig. 37—High Impedance Ringers.

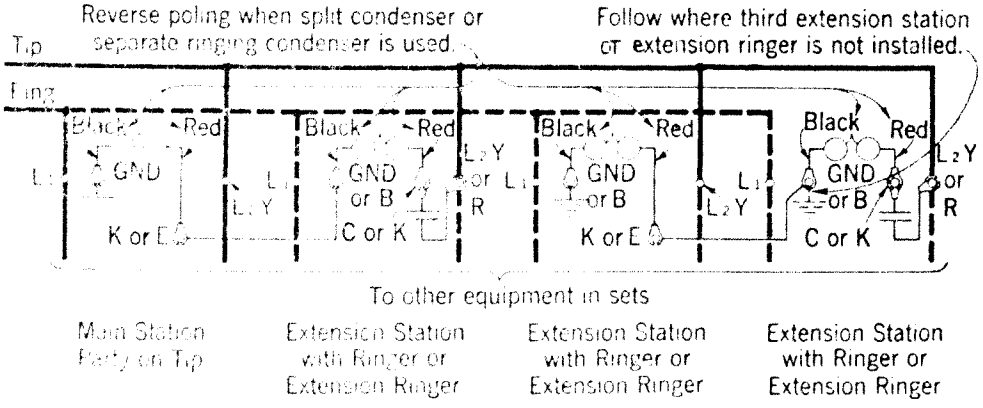


Fig. 38—Low Impedance Ringers.

3.03 Two-Party Selective Message Rate Stations—Dial Only.

PARTY ON RING

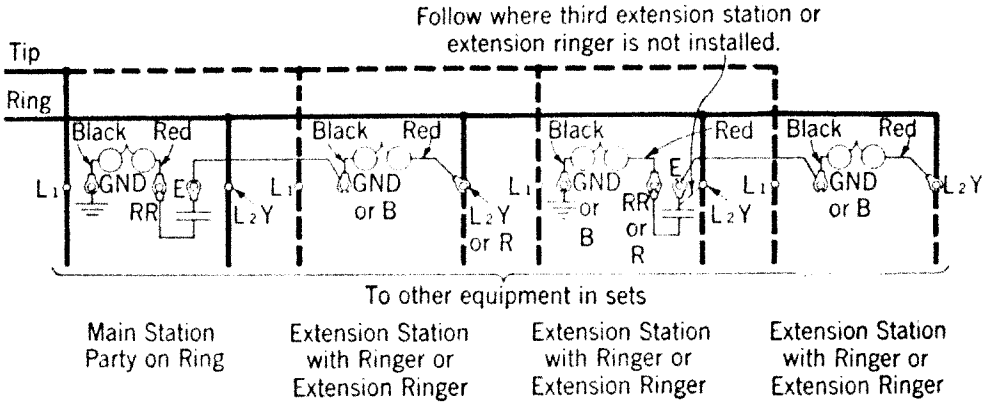


Fig. 39—Low Impedance Ringers.

PARTY ON TIP

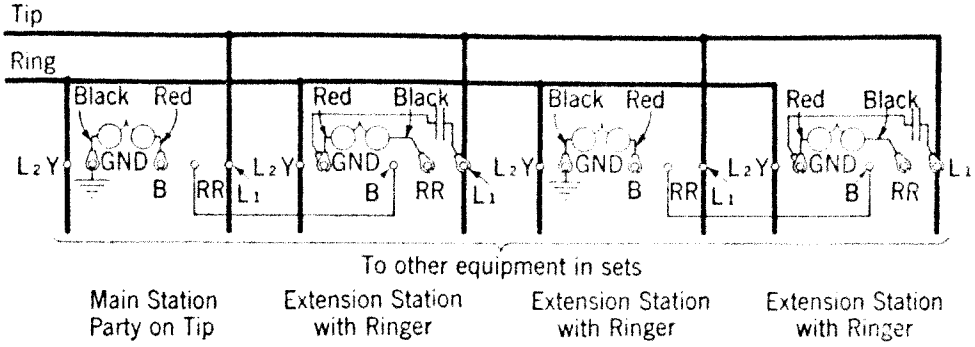


Fig. 40—Low Impedance Ringers—Sidetone Station.

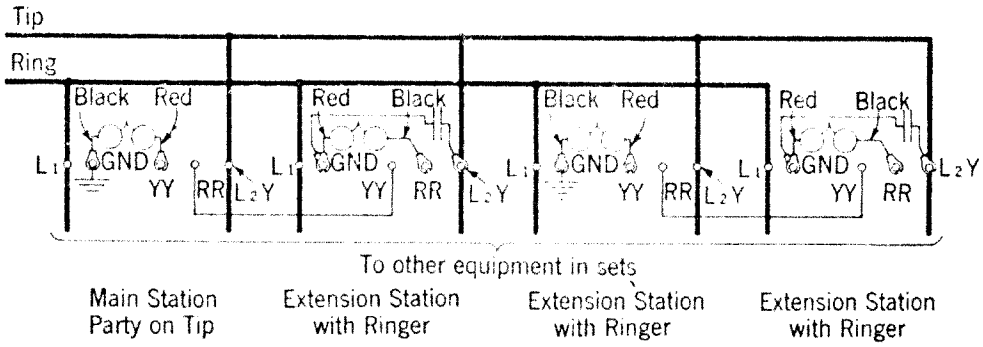


Fig. 41—Low Impedance Ringers—Anti-Sidetone Station.

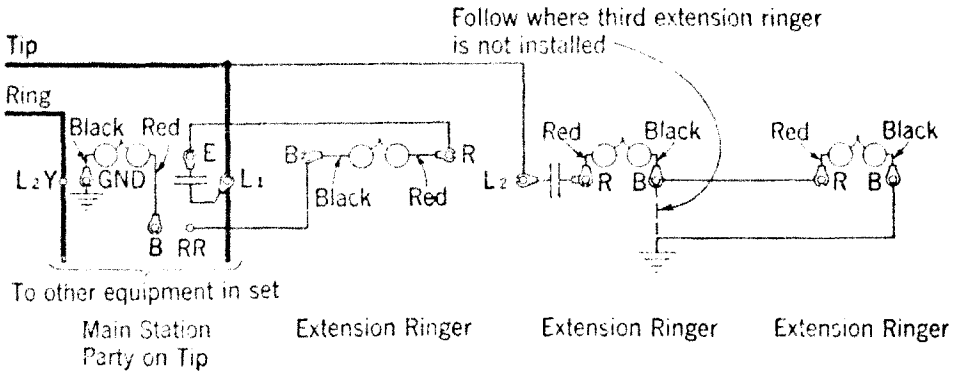


Fig. 42—Low Impedance Ringers—Sidetone Station.

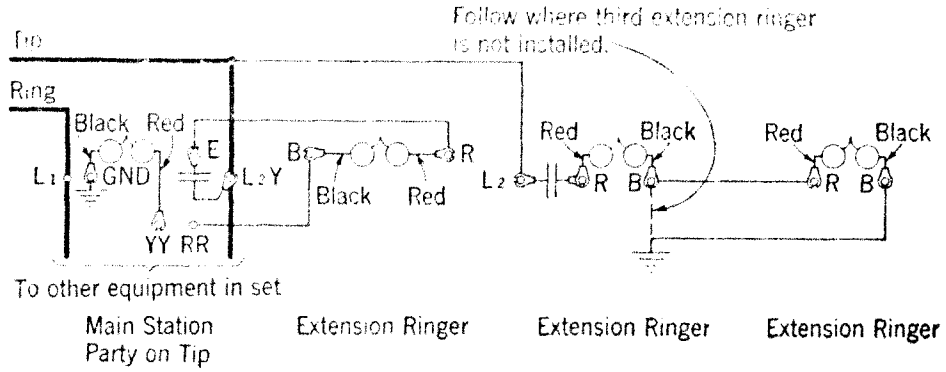


Fig. 43—Low Impedance Ringers—Anti-Sidetone Station.

Note: See Table 3 and Associated Note 1 for information regarding the use of high impedance ringers and loud ringing bells.

4. MAIN STATION AND 1, 2, 3 OR 4 EXTENSION STATIONS WITHOUT RINGERS

4.01 **All Stations Except as Covered by 4.02 and 4.03 and by Note Following Fig. 44.**

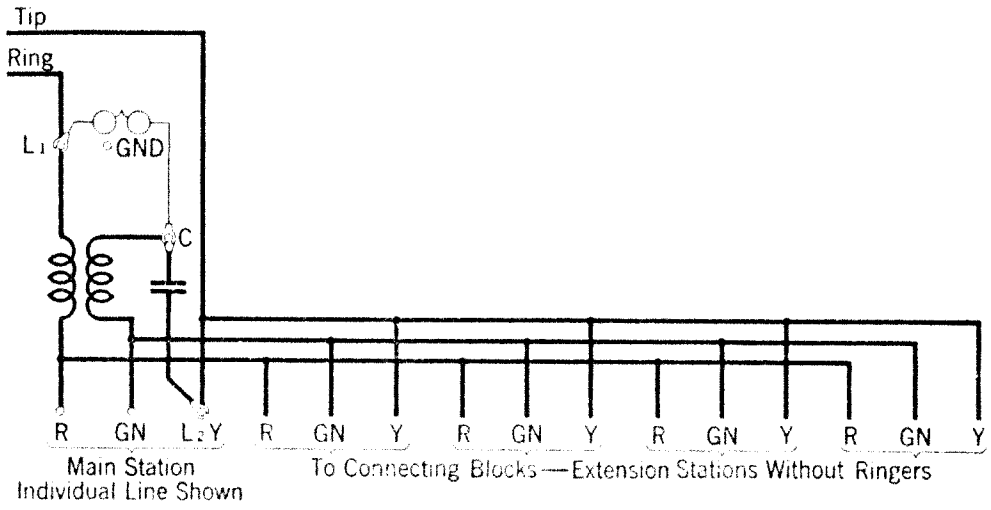


Fig. 44—Sidetone Sets.

Note: In the case of the following **sidetone stations** use sets without ringers or with the ringers disconnected and bridge set across the line the same as the main station set:

(1) When Main Station set is a wood type wall set.

(2) When Extension Station is a wall set.

(3) Where wire run between main station and extension station is more than 250 ft. (25 ft. for L.B.T., C.B.S. stations).

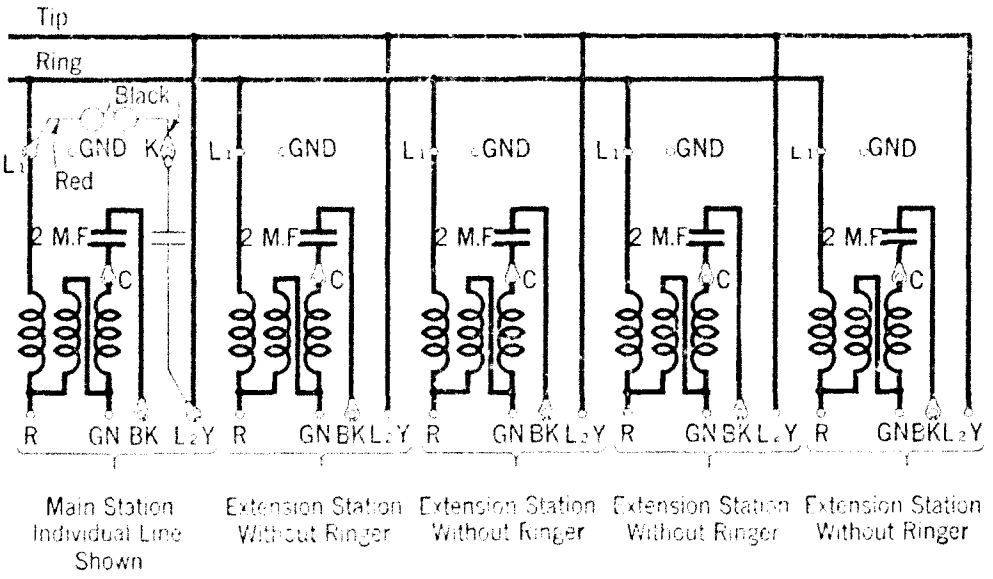


Fig. 45—Anti-Sidetone Sets.

Note: Fig. 44 and Fig. 45 show the main station connections for an individual line but the extension stations without ringers are connected in a similar manner at all stations.

4.02 Two-Party Selective Message Rate Stations—Dial Only.

PARTY ON RING

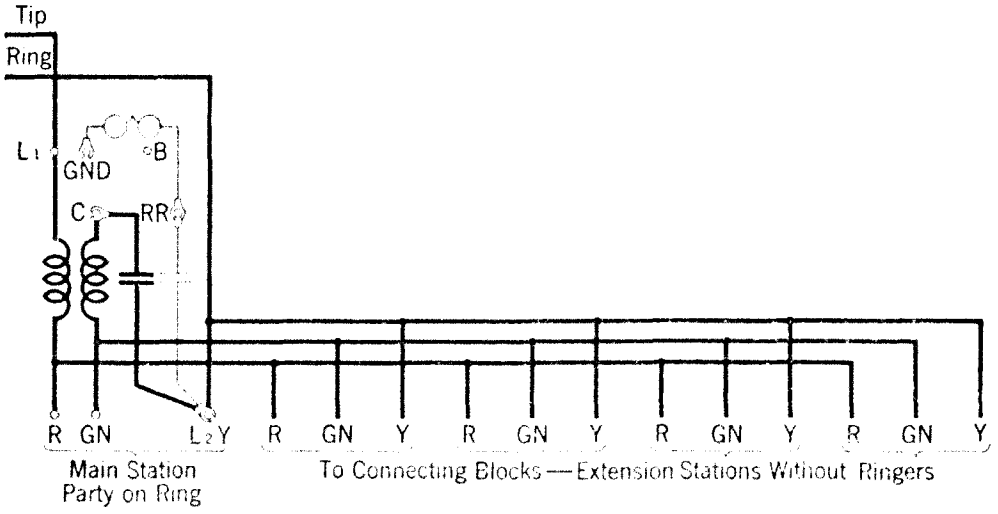


Fig. 46—Sidetone Sets.

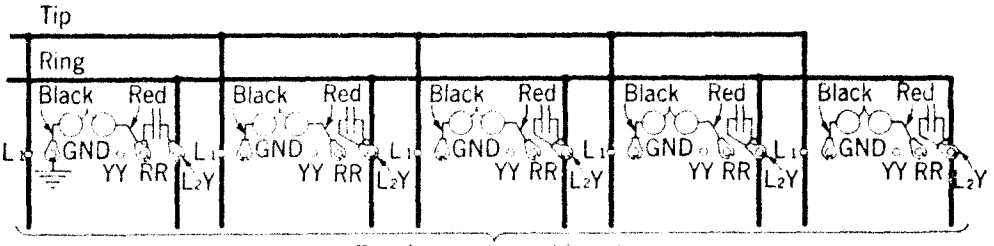


Fig. 47—Anti-Sidetone Sets.

PARTY ON TIP

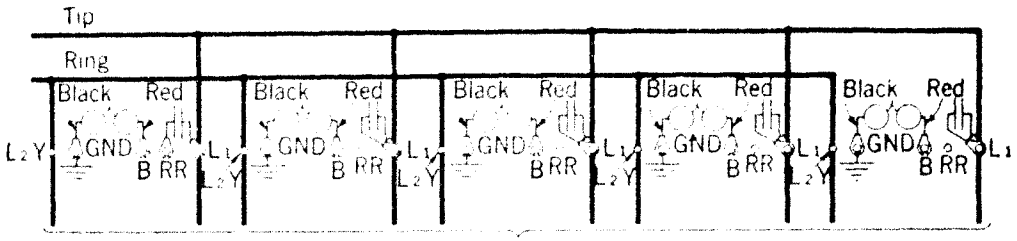


Fig. 48—Sidetone Sets.

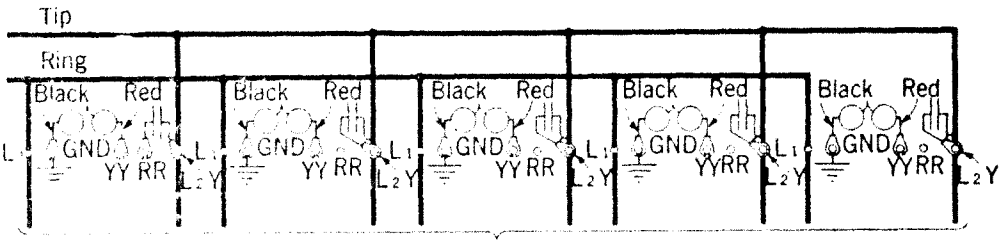


Fig. 49—Anti-Sidetone Sets.

4.03 **No. 750A P.B.X. Key and Control Stations—Dial:** No extension stations should be provided.