

STATION RINGING APPARATUS SELECTION AND LIMITATIONS

1. GENERAL

1.01 This section contains information on the maximum number of ringers and also on the selection and capabilities of ringer coupling devices with recommendations as to their applications.

1.02 This section is reissued to:

- Delete all specific connection information which may be found in the appropriate section in Division 501
- Add information on 603A ringing extender
- Revise Fig. 1
- Add Fig. 2, 3, and 4
- Add new Table A

Since this reissue covers a general revision arrows ordinarily used to indicate changes have been omitted.

2. RINGERS

2.01 All ringers are provided with a mechanical bias spring. Ringers with the bias spring in the weak notch will ring on less voltage than if placed in the stiff notch. On two, four, and eight party lines, the bias spring may have to be placed in the stiff notch, as noted in Table A, to prevent cross ringing.

3. RINGER COUPLING DEVICES

3.01 Ringer coupling devices isolate the ringer(s) from ground, except during the ringing interval, thus preserving line balance and minimizing the effects of inductive noise.

3.02 The following is a list of ringer coupling devices and some of the advantages and/or disadvantages of each:

(a) 603A Ringing Extender (Section 501-380-102):

- Mounts near station protector
- Individual line only
- Provides extended ringing range for sets wired for bridged ringers

(b) *28A Ringer Isolator (Section 501-375-101):*

- Mounts near station protector
- Provides party line selectivity

• Provides extended ringing range

• Provides high isolation from effects of inductive noise

• Uses either three- or four-conductor station wiring (four required with Automatic Number Identification)

(c) *Ringer Isolator, D-180036 Kit of Parts (Section 501-375-100):*

• Mounts inside set (except AD1 telephone base or 2702-type sets when used with the D-180489 Kit of Parts for identification)

• Provides high isolation from effects of inductive noise

• No party line selectivity

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

(d) **426N Diode in series with ringer coil (Section 501-320-100):**

- Mounts inside set
- Provides party line selectivity
- Provides limited isolation from effects of inductive noise

(e) **425A or 426A gas-filled cold-cathode electron tube (Section 501-320-100):**

- Mounts inside most sets
- Provides party line selectivity
- Provides limited isolation from effects of inductive noise

(f) **687B Subscriber Set:**

- Mounts inside subscriber's premises
- Provides party line selectivity
- Provides relay activation to control a signal or other apparatus energized from a local low voltage source.

(g) **11A/B Extender (MD) (Section 501-322-101)**

- Mounts near protector
- Provides party line selectivity
- Provides moderate isolation from effects of inductive noise
- Provides extended ringing range
- Requires four-conductor station wiring.

4. RINGING CLASS OF SERVICE

4.01 Individual line ringing is accomplished by connecting the ringer across the line in series with the capacitor, (Fig. 1A). In the past, ringers of individual lines have been wired directly to ground for extended ringing range or wired through coupling devices to provide isolation from inductive noise. The 603A ringing extender (Section

501-380-102) extends the ringing range of bridged ringers by grounding the tip of the line at the station protector during ringing (Fig. 1B).

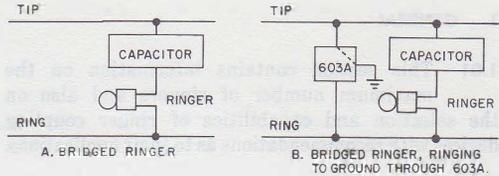


Fig. 1—Individual Line Ringing

4.02 Two-party full selective ringing is accomplished by connecting the ringers of one party from the ring side of line to ground, and the ringers of the other party from the tip side of the line to ground either directly, or through a coupling device (Fig. 2).

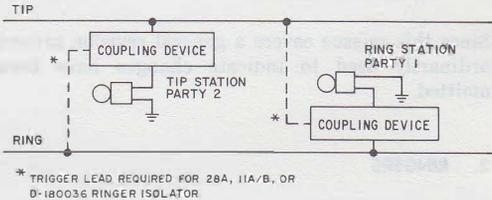


Fig. 2—Two-Party Full Selective Grounded Ringing

4.03 Four party semiselective ringing is accomplished by connecting the ringers of two parties from the ring side of the line to ground and the ringers of two other parties from the tip side of the line to ground either directly, or through a coupling device (Fig. 3). Coded ringing is used to differentiate between stations on the same side of the line.

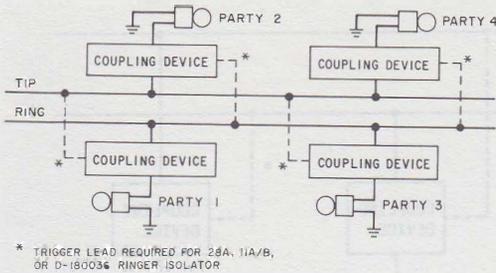


Fig. 3—Four-Party Semiselective Grounded Ringing

4.04 Four-party full selective ringing (Fig. 4) is accomplished by using telephones along with a polarity sensitive coupling device.

4.05 Eight-party semiselective ringing (Fig. 4) is also accomplished by using sets with a polarity sensitive coupling device in the ringing circuit. Coded ringing is used to differentiate between stations of the same polarity on the same side of the line.

4.06 Multiparty divided code ringing is accomplished the same as four-party semiselective ringing except extended to more than two parties on the same side of the line. On a full line, half of the parties have their ringers connected from the ring side of the line to ground and half from the tip side of the line to ground. All of the parties connected from one side of the line to ground will ring simultaneously and code ringing is used to differentiate between parties.

5. RINGING CAPABILITIES AND RECOMMENDATIONS

5.01 The resistance of long subscriber loops limits the number of ringers that can be connected to the loop. Range Extenders with Gain (REGs) are normally specified for such loops, however, they extend dialing and supervisory ranges and add gain, but do not aid ringing nor reduce the effects of inductive noise on lines with grounded ringers. In many applications it becomes necessary to add ringer coupling devices to reduce noise or to permit the proper numbers of ringers to operate. Table A provides recommendations on the maximum number of ringers permitted per party in each resistance zone. These numbers represent the

“worse case” loop and ringer conditions for each ringer coupling device.

5.02 In order to provide a practical means of administrating ringers, a system of resistance zoning is employed. This system aids in defining what equipment is required at the central office and the station location in order to provide satisfactory telephone service.

5.03 For subscriber Long Route Design, the zones are identified as follows:

RZ 13—up to 1300 ohms from central office

RZ 16—1301 to 1600 ohms from central office

RZ 18—1601 to 2000 ohms from central office

RZ 28—2001 to 2800 ohms from central office

RZ 36—2801 to 3600 ohms from central office

5.04 Uniguage zoning is based on a different concept of cable plant and is primarily designed to be used with No. 5 Cross-bar and No. 2 ESS offices. It is divided into:

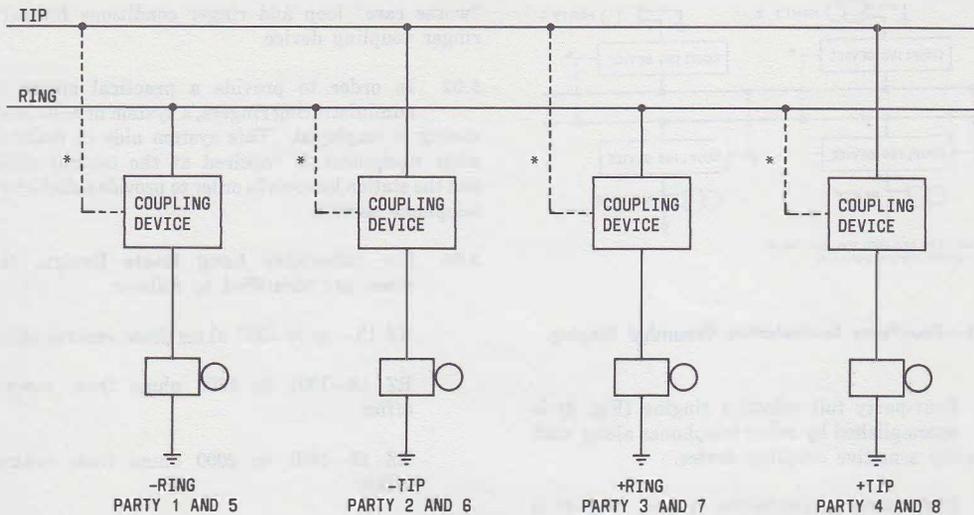
(a) **Short Loop**—up to 1300 ohm loop.

(b) **Uniguage or Loaded Uniguage Loop**—from 1301 to 2500 ohm loop.

5.05 Information as to the zone involved should appear on the service order. An absence of any zone information indicates that the order is in RZ 13, or short loop uniguage.

6. RINGING LIMITATIONS

6.01 The maximum number of capacitor-coupled ringers which can be connected to a line is determined by dialing considerations and/or the resistance zone. Dialing considerations limit the number of capacitor-coupled ringers used on any one line to five if bridged or to ten on each side of the line if connected to ground. Some dial long line circuits, however, impose additional limitations on the number of ringers because of dialing.



* TRIGGER LEAD REQUIRED FOR 28A, 425A/426A GAS TUBES, OR 11A/B

Fig. 4—Four-Party Full Selective and Eight-Party Semiselective Type Ringing

6.02 The maximum number of tube or diode-coupled ringers is not limited by dialing, but by the resistance zone and central office pretripping considerations. When using these devices, pretripping limits the maximum number of ringers of the same polarity on the same side of line to three. In addition, with tube or diode connected ringers the minimum loop must not be less than 300 ohms to prevent pretripping.

6.03 Ringer isolators or 11A/B extenders affect neither dialing nor tripping and the number of ringers is determined by the resistance zone.

7. SPECIAL RINGING BRIDGE LIMITATIONS

7.01 For each intercept line, neon lamp, or bell (3-, 4-, or 6-inch) used with other audible or visual line signals, deduct one ringer from the number of ringers shown in Table A.

7.02 For each automatic answering set used on individual or 2-party lines, deduct two ringers from the number allowed shown in Table A.

7.03 Each audible signal R relay associated with a 1A or 1A1 KTS is equivalent to two ringers. (With a 1A2 KTS, a signal R relay is equal to one ringer.)

7.04 Not more than three ringers may be connected in any combination across the line ahead of or behind the line circuit KTU in the 1A1 or 1A2 KTS.

8. COMPATIBILITY OF MIXED RINGER COUPLING DEVICES

8.01 On four and eight party semiselective and multiparty divided code ringing, two or more parties on the same side of the line ring simultaneously. It is important to remember that certain coupling devices may cause an appreciable loss in ringing voltage. Therefore, parties which ring simultaneously should be equipped with similar ringer coupling devices to assure proper triggering of each device.

8.02 For party line service, the 28A ringer isolator, the D-180036 ringer isolator, and capacitor couplers can be mixed without concern.

The 11A/B extenders can be mixed with any of the above if the ringer capability of the 11A/B in Table A is reduced by one. The 425A, 426A gas tubes, 426N diode, and the 687B subscriber set (when used to repeat ringing as recommended) may be intermixed but should not be combined with

any device in the first group above. In general, any combination of devices can be used on opposite sides of the line or at stations of opposite polarity. Administration may be a problem especially if field substitution is permitted.

GROUP 1		GROUP 2		GROUP 3		GROUP 4	
Device	Rating	Device	Rating	Device	Rating	Device	Rating
425A	1	426A	1	426N	1	687B	1
11A	1	11B	1	11C	1	11D	1
11E	1	11F	1	11G	1	11H	1
11I	1	11J	1	11K	1	11L	1
11M	1	11N	1	11O	1	11P	1
11Q	1	11R	1	11S	1	11T	1
11U	1	11V	1	11W	1	11X	1
11Y	1	11Z	1	11AA	1	11AB	1
11AC	1	11AD	1	11AE	1	11AF	1
11AG	1	11AH	1	11AI	1	11AJ	1
11AK	1	11AL	1	11AM	1	11AN	1
11AO	1	11AP	1	11AQ	1	11AR	1
11AS	1	11AT	1	11AU	1	11AV	1
11AW	1	11AX	1	11AY	1	11AZ	1
11BA	1	11BB	1	11BC	1	11BD	1
11BE	1	11BF	1	11BG	1	11BH	1
11BI	1	11BJ	1	11BK	1	11BL	1
11BM	1	11BN	1	11BO	1	11BP	1
11BQ	1	11BR	1	11BS	1	11BT	1
11BU	1	11BV	1	11BW	1	11BX	1
11BY	1	11BZ	1	11CA	1	11CB	1
11CC	1	11CD	1	11CE	1	11CF	1
11CG	1	11CH	1	11CI	1	11CJ	1
11CK	1	11CL	1	11CM	1	11CN	1
11CO	1	11CP	1	11CQ	1	11CR	1
11CS	1	11CT	1	11CU	1	11CV	1
11CW	1	11CX	1	11CY	1	11CZ	1
11DA	1	11DB	1	11DC	1	11DD	1
11DE	1	11DF	1	11DG	1	11DH	1
11DI	1	11DJ	1	11DK	1	11DL	1
11DM	1	11DN	1	11DO	1	11DP	1
11DQ	1	11DR	1	11DS	1	11DT	1
11DU	1	11DV	1	11DW	1	11DX	1
11DY	1	11DZ	1	11EA	1	11EB	1
11EC	1	11ED	1	11EE	1	11EF	1
11EG	1	11EH	1	11EI	1	11EJ	1
11EK	1	11EL	1	11EM	1	11EN	1
11EO	1	11EP	1	11EQ	1	11ER	1
11ES	1	11ET	1	11EU	1	11EV	1
11EW	1	11EX	1	11EY	1	11EZ	1
11FA	1	11FB	1	11FC	1	11FD	1
11FE	1	11FF	1	11FG	1	11FH	1
11FI	1	11FJ	1	11FK	1	11FL	1
11FM	1	11FN	1	11FO	1	11FP	1
11FQ	1	11FR	1	11FS	1	11FT	1
11FU	1	11FV	1	11FW	1	11FX	1
11FY	1	11FZ	1	11GA	1	11GB	1
11GC	1	11GD	1	11GE	1	11GF	1
11GG	1	11GH	1	11GI	1	11GJ	1
11GK	1	11GL	1	11GM	1	11GN	1
11GO	1	11GP	1	11GQ	1	11GR	1
11GS	1	11GT	1	11GU	1	11GV	1
11GW	1	11GX	1	11GY	1	11GZ	1
11HA	1	11HB	1	11HC	1	11HD	1
11HE	1	11HF	1	11HG	1	11HH	1
11HI	1	11HJ	1	11HK	1	11HL	1
11HM	1	11HN	1	11HO	1	11HP	1
11HQ	1	11HR	1	11HS	1	11HT	1
11HU	1	11HV	1	11HW	1	11HX	1
11HY	1	11HZ	1	11IA	1	11IB	1
11IC	1	11ID	1	11IE	1	11IF	1
11IG	1	11IH	1	11II	1	11IJ	1
11IK	1	11IL	1	11IM	1	11IN	1
11IO	1	11IP	1	11IQ	1	11IR	1
11IS	1	11IT	1	11IU	1	11IV	1
11IW	1	11IX	1	11IY	1	11IZ	1
11JA	1	11JB	1	11JC	1	11JD	1
11JE	1	11JF	1	11JG	1	11JH	1
11JI	1	11JJ	1	11JK	1	11JL	1
11JM	1	11JN	1	11JO	1	11JP	1
11JQ	1	11JR	1	11JS	1	11JT	1
11JU	1	11JV	1	11JW	1	11JX	1
11JY	1	11JZ	1	11KA	1	11KB	1
11KC	1	11KD	1	11KE	1	11KF	1
11KG	1	11KH	1	11KI	1	11KJ	1
11KK	1	11KL	1	11KM	1	11KN	1
11KO	1	11KP	1	11KQ	1	11KR	1
11KS	1	11KT	1	11KU	1	11KV	1
11KW	1	11KX	1	11KY	1	11KZ	1
11LA	1	11LB	1	11LC	1	11LD	1
11LE	1	11LF	1	11LG	1	11LH	1
11LI	1	11LJ	1	11LK	1	11LL	1
11LM	1	11LN	1	11LO	1	11LP	1
11LQ	1	11LR	1	11LS	1	11LT	1
11LU	1	11LV	1	11LW	1	11LX	1
11LY	1	11LZ	1	11MA	1	11MB	1
11MC	1	11MD	1	11ME	1	11MF	1
11MG	1	11MH	1	11MI	1	11MJ	1
11MK	1	11ML	1	11MM	1	11MN	1
11MO	1	11MP	1	11MQ	1	11MR	1
11MS	1	11MT	1	11MU	1	11MV	1
11MW	1	11MX	1	11MY	1	11MZ	1
11NA	1	11NB	1	11NC	1	11ND	1
11NE	1	11NF	1	11NG	1	11NH	1
11NI	1	11NJ	1	11NK	1	11NL	1
11NM	1	11NN	1	11NO	1	11NP	1
11NQ	1	11NR	1	11NS	1	11NT	1
11NU	1	11NV	1	11NW	1	11NX	1
11NY	1	11NZ	1	11OA	1	11OB	1
11OC	1	11OD	1	11OE	1	11OF	1
11OG	1	11OH	1	11OI	1	11OJ	1
11OK	1	11OL	1	11OM	1	11ON	1
11OO	1	11OP	1	11OQ	1	11OR	1
11OS	1	11OT	1	11OU	1	11OV	1
11OW	1	11OX	1	11OY	1	11OZ	1
11PA	1	11PB	1	11PC	1	11PD	1
11PE	1	11PF	1	11PG	1	11PH	1
11PI	1	11PJ	1	11PK	1	11PL	1
11PM	1	11PN	1	11PO	1	11PP	1
11PQ	1	11PR	1	11PS	1	11PT	1
11PU	1	11PV	1	11PW	1	11PX	1
11PY	1	11PZ	1	11QA	1	11QB	1
11QC	1	11QD	1	11QE	1	11QF	1
11QG	1	11QH	1	11QI	1	11QJ	1
11QK	1	11QL	1	11QM	1	11QN	1
11QO	1	11QP	1	11QQ	1	11QR	1
11QS	1	11QT	1	11QU	1	11QV	1
11QW	1	11QX	1	11QY	1	11QZ	1
11RA	1	11RB	1	11RC	1	11RD	1
11RE	1	11RF	1	11RG	1	11RH	1
11RI	1	11RJ	1	11RK	1	11RL	1
11RM	1	11RN	1	11RO	1	11RP	1
11RQ	1	11RR	1	11RS	1	11RT	1
11RU	1	11RV	1	11RW	1	11RX	1
11RY	1	11RZ	1	11SA	1	11SB	1
11SC	1	11SD	1	11SE	1	11SF	1
11SG	1	11SH	1	11SI	1	11SJ	1
11SK	1	11SL	1	11SM	1	11SN	1
11SO	1	11SP	1	11SQ	1	11SR	1
11SS	1	11ST	1	11SU	1	11SV	1
11SW	1	11SX	1	11SY	1	11SZ	1
11TA	1	11TB	1	11TC	1	11TD	1
11TE	1	11TF	1	11TG	1	11TH	1
11TI	1	11TJ	1	11TK	1	11TL	1
11TM	1	11TN	1	11TO	1	11TP	1
11TQ	1	11TR	1	11TS	1	11TT	1
11TU	1	11TV	1	11TW	1	11TX	1
11TY	1	11TZ	1	11UA	1	11UB	1
11UC	1	11UD	1	11UE	1	11UF	1
11UG	1	11UH	1	11UI	1	11UJ	1
11UK	1	11UL	1	11UM	1	11UN	1
11UO	1	11UP	1	11UQ	1	11UR	1
11US	1	11UT	1	11UU	1	11UV	1
11UW	1	11UX	1	11UY	1	11UZ	1
11VA	1	11VB	1	11VC	1	11VD	1
11VE	1	11VF	1	11VG	1	11VH	1
11VI	1	11VJ	1	11VK	1	11VL	1
11VM	1	11VN	1	11VO	1	11VP	1
11VQ	1	11VR	1	11VS	1	11VT	1
11VU	1	11VV	1	11VW	1	11VX	1
11VY	1	11VZ	1	11WA	1	11WB	1
11WC	1	11WD	1	11WE	1	11WF	1
11WG	1	11WH	1	11WI	1	11WJ	1
11WK	1	11WL	1	11WM	1	11WN	1
11WO	1	11WP	1	11WQ	1	11WR	1
11WS	1	11WT	1	11WU	1	11WV	1
11WW	1	11WX	1	11WY	1	11WZ	1
11XA	1	11XB	1	11XC	1	11XD	1
11XE	1	11XF	1	11XG	1	11XH	1
11XI	1	11XJ	1	11XK	1	11XL	1
11XM	1	11XN	1	11XO	1	11XP	1
11XQ	1	11XR	1	11XS	1	11XT	1
11XU	1	11XV	1	11XW	1	11XZ	1
11YA	1	11YB	1	11YC	1	11YD	1
11YE	1	11YF	1	11YG	1	11YH	1
11YI	1	11YJ	1	11YK	1	11YL	1
11YM	1	11YN	1	11YO	1	11YP	1
11YQ</							

TABLE A

MAXIMUM NUMBER OF RINGERS PER PARTY FOR EACH
RESISTANCE ZONE AND COUPLING DEVICE (NOTE 1)

COUPLING DEVICE (NOTE 3)	CLASS OF SERVICE						
	INDIVIDUAL (SINGLE-PARTY)		TWO PARTY	FOUR PARTY		EIGHT PARTY	
	BRIDGED	GROUNDING (NOTE 2)		SEMI- SELECTIVE	FULL SELECTIVE	SEMI- SELECTIVE	DIVIDED CODE
RZ 13							
None	5	8	4*	2*	—	—	1*
28A Ringer Isolator	—	8	8	4	4*	2*	2
D-180036 Ringer Isolator	—	7	4*	2*	—	—	1*
425A/426A Tube or 426N Diode	—	—	—	—	3	1	—
11-Type Extender	—	7	7	3	3*	1*	2
RZ 16							
None	4	7	3*	1*	—	—	—
603A Ringing Extender	5	—	—	—	—	—	—
28A Ringer Isolator	—	7	7	3	3*	1*	2
D-180036 Ringer Isolator	—	6	3*	1*	—	—	—
425A/426A Tube or 426N Diode	—	—	—	—	2	1	—
11-Type Extender	—	6	6	3	3*	1*	1
RZ 18							
None	3†	6	3*	1*	—	—	—
603A Ringing Extender	5	—	—	—	—	—	—
28A Ringer Isolator	—	6	6	3	3*	1*	1
D-180036 Ringer Isolator	—	5	3*	1*	—	—	—
425A/426A Tube or 426N Diode	—	—	—	—	2	1	—
11-Type Extender	—	5	5	2	2*	1*	1
RZ 28							
None	2†	5	2*	1*	—	—	—
603A Ringing Extender	5	—	—	—	—	—	—
28A Ringer Isolator	—	5	5	2	2*	1*	1
D-180036 Ringer Isolator	—	4	2*	1*	—	—	—
425A/426A Tube or 426N Diode	—	—	—	—	1	—	—
11-Type Extender	—	4	4	2	2*	1*	1
RZ 36							
None	2†	4	2*	1*	—	—	—
603A Ringing Extender	4	—	—	—	—	—	—
28A Ringer Isolator	—	4	4	2	2*	1*	1
D-180036 Ringer Isolator	—	4	2*	1*	—	—	—
11-Type Extender	—	3	3	1	1*	—	—
Unigauge (Loaded or Unloaded)							
None	3	5	2*	1*	—	—	—
603A Ringing Extender	5	—	—	—	—	—	—
28A Ringer Isolator	—	5	5	2	2*	1*	1
D-180036 Ringer Isolator	—	4	2*	1*	—	—	—
11-Type Extender	—	4	4	2	2*	1*	1

* Denotes cases when ringer biasing springs must be placed in high or stiff notch. All others are in weak notch.

† To avoid bell tap, ringers may have to be set in the stiff notch if 96 or 100 volt range extenders are used in the C O

Notes:

1. Number of ringers listed in table are for worse case loop and ringer conditions.
2. This application is not to be used with registered sets.
3. Another device, the 10A extender was rated MD in 1975 and is not recommended because it may cause pre-trip.