RINGING LIMITATIONS

1. GENERAL

1.01 This section contains data on the maximum number and different types of ringers used in various service arrangements. Connection information is also included.

1.02 This section is reissued to:

- Remove obsolete information from text, tables, and figures
- Add information on 10A and 11A extenders
- Add new Tables A, B, C and D and Fig. 5 and 6
- Show all low impedance ringers MD.

2. CLASSIFICATION

2.01 Ringers are classified in two groups:

(a) High impedance—having a total dc coil resistance of 2500 ohms or more in series with a capacitor of 0.4 to 0.65 microfarads.

Note: Current production ringers are all high impedence.

(b) Low impedance (MD)—having a total dc coil resistance of less than 2500 ohms in series with a capacitor of 1.0 or 2.0 microfarads.

2.02 Ringers are coupled to the line using the following devices.

(a) A capacitor in series with ringer.

(b) A 425A or 426A electron tube in series with ringer. (For more information see Section 501-320-100.)

(c) A 426N diode in series with ringer.

(d) A ringer isolator (D-180036 Kit of Parts). (For more information see Section 501-375-100.)

(e) Ringing range extenders—10A or 11A.

The 11A extender is a centralized unit that can be mounted near the protector block. One 11A is used per party regardless of number of extensions. All other coupling devices require one per telephone. For more information on 10A or 11A extenders, see Sections 501-322-100 and 501-322-101, respectively.

3. TYPES OF RINGING

3.01 Individual line ringing (Fig. 1) is accomplished by connecting the ringer, associated with a single party using a coupling device, Table A.

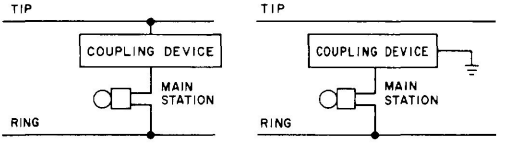


Fig. 1—Individual Line Ringing

3.02 Two-party full selective ringing, (Fig. 2) 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 tip side of the line to ground using a coupling device, Table A.

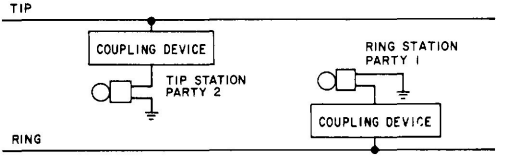


Fig. 2—Two-Party Full Selective Grounded Ringing

3.03 Four-party semiselective ringing (Fig. 3) is accomplished by connecting the ringers of two parties from the ring side of line to ground and the ringers of two other parties from the tip side of line to ground using a coupling device, Table A. Coded ringing is used to differentiate between stations on the same side of line.

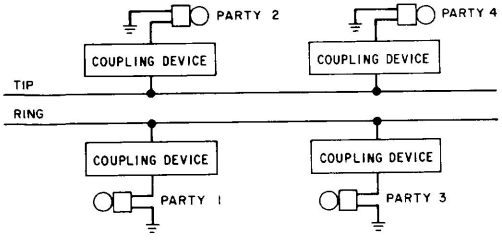


Fig. 3—Four-Party Semiselective Grounded Ringing

3.04 Four-party full selective ringing (Fig. 4, 5, or 6) is accomplished by using telephones employing an electron tube, diode, or extender in the ringing circuits as coupling devices, Table A.

3.05 Eight-party semiselective ringing (Fig. 4, 5, or 6) is also accomplished by using sets employing an electron tube, diode, or extender coupling device (Table A) in the ringing circuit. Coded ringing is used to differentiate between stations of the same polarity on the same side of the line.

3.06 Multiparty divided code ringing is accomplished same as four-party semiselective ringing except extended to more than four 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 are rung simultaneously and code ringing is used to differentiate between parties. Table A lists all of the coupling devices which can be used.

4. RINGING BRIDGE LIMITATIONS

4.01 The following information covers limitations on the number and type of ringing bridges used with:

- Individual lines
- 2-party full selective lines
- 4-party semiselective lines
- 4-party full selective
- 8-party semiselective.

4.02 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

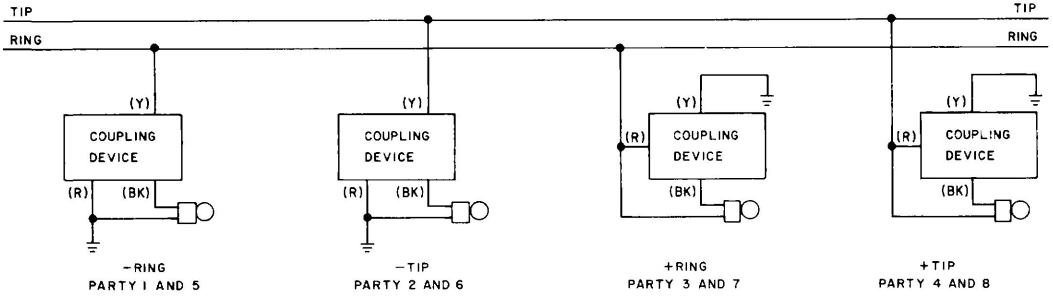


Fig. 4—Four-Party Full Selective and Eight-Party Semiselective Type Ringing using a Coupling Device

▶TABLE A◀

TYPES OF RINGING COUPLING TO SUBSCRIBER LINES

COUPLING DEVICE	INDIV	2-PARTY FULL SELECTIVE		4-PARTY SEMI-SELECTIVE	4-PARTY FULL-SELECTIVE	8-PARTY SEMI-SELECTIVE	MULTIPARTY DIVIDED CODE
		NO ANI	ANI				
Capacitor	•	•	•	•			•
425A or 426A Tube	•	•		•	•	•	•
426N Diode					•	•	
Ringer Isolator	•	•	•	•			•
10A Extender					•	•	
11A Extender	•	•	•	•	•	•	•

line circuits, however, impose additional limitations on the number of ringers because of dialing.

4.03 The maximum number of tube or diode-coupled ringers is not limited by dialing, but by the resistance zone and central office pretripping considerations. 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.

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

4.05 10A extender coupled ringers are not limited by dialing, but by resistance zone and pretripping considerations. This limits the maximum number of ringers of the same polarity on the same side of the line to three. In addition, the minimum loop resistance must be 1600 ohms to prevent pretripping.

Inductive noise considerations may determine the method of ringer coupling, which in turn may change the maximum number of ringers permissable.

4.06 Table A lists the coupling devices covered in this section and type party service each device can be used with. Tables B, C, and D list the maximum number of ringers that can be rung in the various resistance zones according to the type of ringing and coupling device provided.

4.07 Resistance zones are defined as follows:

ZONE	LOOP RESISTANCE
13	0-1300 ohms
16	1301-1600 ohms
18	1601-2000 ohms
28	2001-2800 ohms
36	2801-3600 ohms
U or LU	1300-2500 ohms

4.08 Tables B, C, and D are for 86-volt, 20 Hz ringing voltage superimposed with a minimum of 37 volts DC through a tripping relay.

4.09 Use of higher ringing voltages or ringing through resistance lamps or a resistor may

increase the allowable number of ringers over that shown in the tables.

4.10 Table B is for individual line bridged ringing or ringers connected to ground.

4.11 Table C is for two-party full selective, four-party semi-selective, and multiparty divided code ringing. The number listed in the table is the total number of ringers that ring simultaneously.

4.12 Table D is for four-party full selective and eight-party semi-selective ringing. The number listed in the table is the total number of ringers that ring simultaneously.

5. APPLICATION OF 687B SUBSCRIBER SET

5.01 If necessary, the 687B subscriber set may be used to increase the number of ringing bridges per polarity on each side of the line.

5.02 The 687B subscriber set may be employed to advantage if:

(a) It is necessary to accommodate a greater total number of ringers than is otherwise allowed.

(b) The minimum loop requirements to avoid pretripping cannot be met.

5.03 The 687B subscriber set has a cold-cathode tube and a relay in place of the ringer. When the relay is operated, the relay contacts may be used in any of the following combinations:

(a) To connect one or two high-impedance capacitor ringing bridges to the line.

(b) To control a signal or other apparatus energized from a local low voltage source.

(c) To connect one high-impedance capacitor ringing bridge as well as control locally energized apparatus.

5.04 For connection of 687B subscriber set, refer to section on subscriber sets, ringers, and relay type polarized ringing.

TABLE B

INDIVIDUAL LINE (LOOP RESISTANCE)
NUMBER OF RINGERS ALLOWED (SEE NOTE)

BRIDGED RINGING						
COUPLING DEVICE	ZONE 13 0-1300Ω	ZONE 16 1301-1600Ω	ZONE 18 1601-2000Ω	ZONE 28 2001-2800Ω	ZONE 36 2801-3600Ω	U, LU (UNIGAUGE) 1301-2500Ω
Capacitor	5	4	3	2*	1	3
RINGERS TO GROUND						
Capacitor, Ringer Isolator, or 11A Extender	8	7	6	4	3	5
425A or 426A Tube, 426N Diode	3	2	2	1	—	—

* For Unigage applications, three ringers are allowed at 2500 ohms.

Note: It may be necessary to put ringers in weak notch to obtain satisfactory ring.

TABLE C

TWO-PARTY FULL SELECTIVE, FOUR-PARTY SEMI-SELECTIVE, AND MULTIPARTY DIVIDED CODE RINGING – FIELD BRIDGED (SEE NOTE)

		MAXIMUM NUMBER OF RINGERS SIMULTANEOUSLY RUNG						
LINE	COUPLING DEVICE	ZONE 13 0-1300Ω	ZONE 16 1301-1600Ω	ZONE 18 1601-2000Ω	ZONE 28 2001-2800Ω	ZONE 36 2801-3600Ω	U, LU (UNIGAUGE) 1301-2500Ω	RINGER BIAS SPRING
1	Capacitor	5	4	4	3	2	3	Stiff Notch*
2	425A or 426A Tube, 426N Diode	3	2	2	1	—	—	May be in Weak Notch
3	Ringer Isolator	5	4	4	3	2	3	Stiff Notch*
4	11A Extender	8	7	6	4	3	5	May be in Weak Notch

* Loop approaching the maximum resistance in each zone may require ringer selection (or set selection) if the full number of ringers listed for the zone must be rung.

Note: If two-party lines are office bridged, ringers can be used in weak notch in all zones, except zone 13. If the weak notch is used, the number of ringers for lines 1 and 3 are the same as line 4

TABLE D

FOUR-PARTY FULL SELECTIVE AND EIGHT-PARTY SEMI-SELECTIVE RINGING (SEE NOTE)

	MAXIMUM NUMBER OF RINGERS SIMULTANEOUSLY RUNG					
COUPLING DEVICE	ZONE 13 0-1300Ω	ZONE 16 1301-1600Ω	ZONE 18 1601-2000Ω	ZONE 28 2001-2800Ω	ZONE 38 2801-3600Ω	U, LU (UNIGAUGE) 1301-2500Ω
425A or 426A Tube, 426N Diode	3*	2	2	1	—	1
10A Extender	†	†	2	3	2	†
11A Extender	8	7	6	4	3	5

* Minimum loop resistance is 300 ohms to prevent pretrip.

† Limited by pretrip considerations.

Note: Ringers may be in weak notch.

If a 687B subscriber set is used to connect one or two high impedance capacitor ringing bridges at one party on the line, a like connection is required when another party of the same polarity is added to the same side of the line.

5.05 Fig. 7 shows examples of 687B subscriber set application to an 8-party semiselective line with no inductive interference.

5.06 For example, to install ringer at party 5 (Fig. 7), use 687B subscriber set at party 5 ***and*** at party 1.

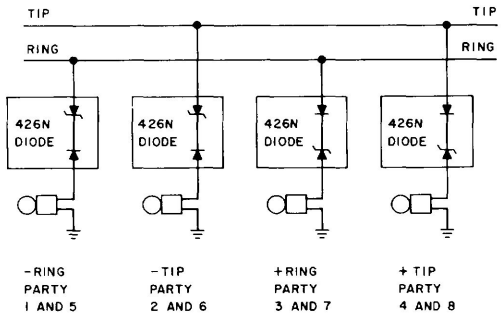


Fig. 5—Four-Party Full Selective and Eight-Party Semi-selective Type Ringing using 426N Diode

5.07 Fig. 7 shows four tube controlled, high-impedance capacitor ringing bridges connected for negative polarity on the ring side of the line.

5.08 To install an extension ringer connected for positive polarity at party 7 (Fig. 7), use 687B subscriber set at both party 7 ***and*** party 3.

5.09 These arrangements are necessary because the tube and relay of the 687B subscriber sets plus the high-impedance capacitor ringing bridges under their control present a lower impedance to the line than does a single tube type ringing bridge. This lower impedance would deprive the regular tube ringing bridge (of same polarity) of the necessary ringing current for proper operation.

5.10 If capacitor ringing bridges are not used it is not necessary to change other tube ringing bridges of the same polarity on the same side of line when ringers are added.

6. SPECIAL RINGING BRIDGE LIMITATIONS

6.01 For each intercept line, neon lamp, or gong (3-, 4-, or 6-inch) used with other audible or visual line signals, deduct one ringer from the allowable number.

6.02 For each automatic answering set used on individual or 2-party lines, deduct two ringers from the number allowed. For each automatic answering set used on 4-party lines, deduct one ringer bridge from the number allowed.

6.03 Each audible signal (R) relay associated with a 1A or 1A1 KTS is equivalent to two high-impedance ringers. (With a 1A2 KTS it is equal to one.)

6.04 Not more than three high-impedance ringers may be connected in any combination across the line ahead of or behind the line circuit KTU in the 1A1 or 1A2 Key Telephone System.

7. PARTY IDENTIFICATION

7.01 Depending upon the central office circuit, DC resistance values of 1000 ohms and 2650 ohms have been established for making party identification.

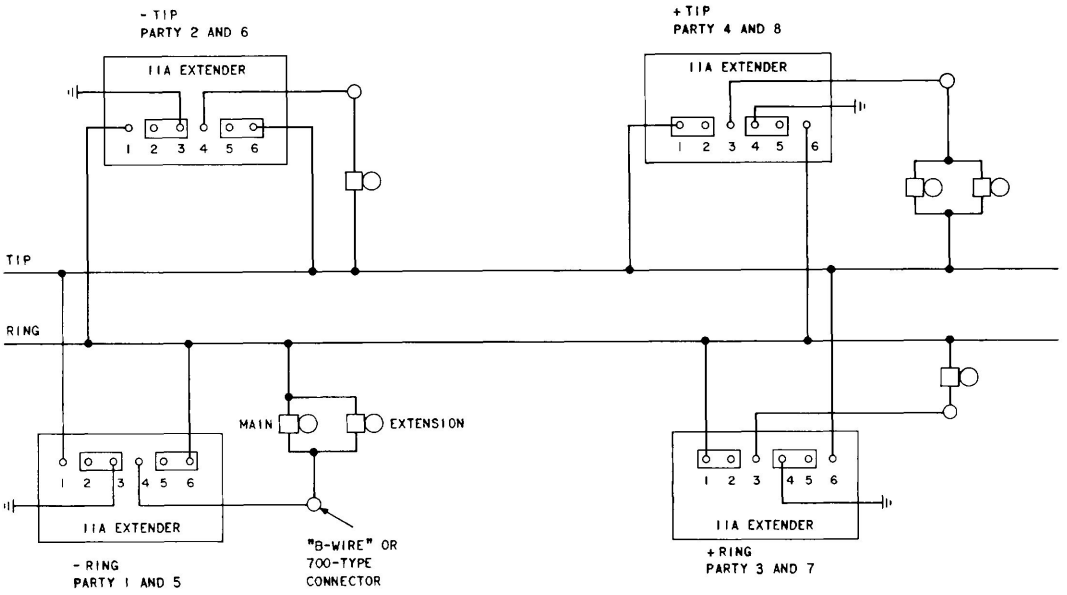
7.02 Some larger ringers have a split coil—made up of 1000 ohm and 2650 ohm sections (Fig. 8).

7.03 Smaller ringers (G1A, M1A, N1A, and P1A type) utilize a single coil of fine wire tapped at 1000 ohms and 2650 ohms (Fig. 9). The additional turns required for ringer operation are in a third segment of the coil and are connected to the slate-red and red leads.

7.04 The C4B, H1B, M1B, P1B, and T1A ringers can also be classified as small ringers having a single coil and only two leads. These ringers are not intended for use where tip party identification is required. Refer to the appropriate Reference section in Division 501 for connections when these ringers are required.

8. CONNECTIONS

8.01 Fig. 8 through 13 shown schematic diagrams and connection information for various ringers when adapted to available services.



NOTE:
FOR POSITIVE POLARITY PARTIES, STRAP TERMINALS 1 AND 2, 4 AND 5.
FOR NEGATIVE POLARITY PARTIES, STRAP TERMINALS 2 AND 3, 5 AND 6.

Fig. 6—Four-Party Full Selective and Eight-Party Semiselective Type Ringing using 11A Extender

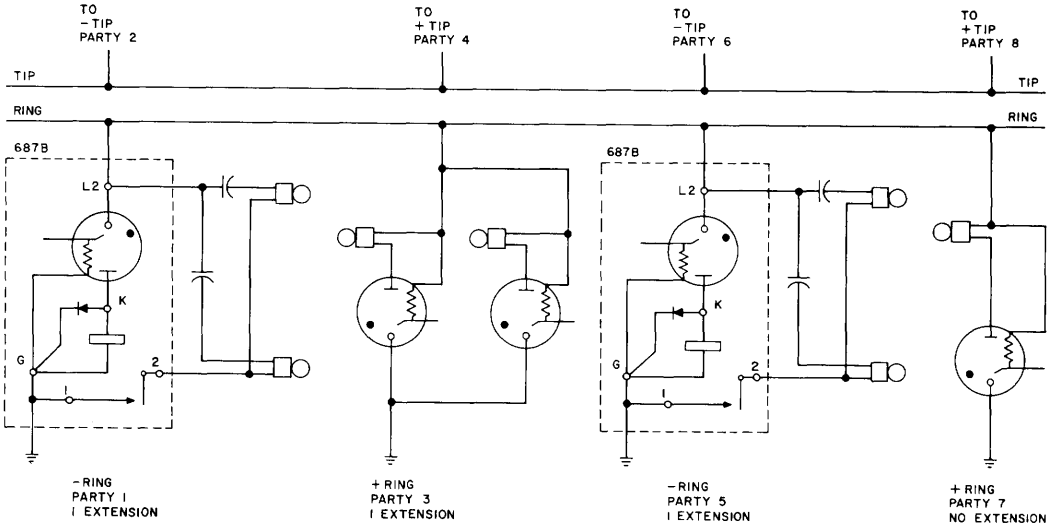


Fig. 7—Application of 687B Subscriber Set

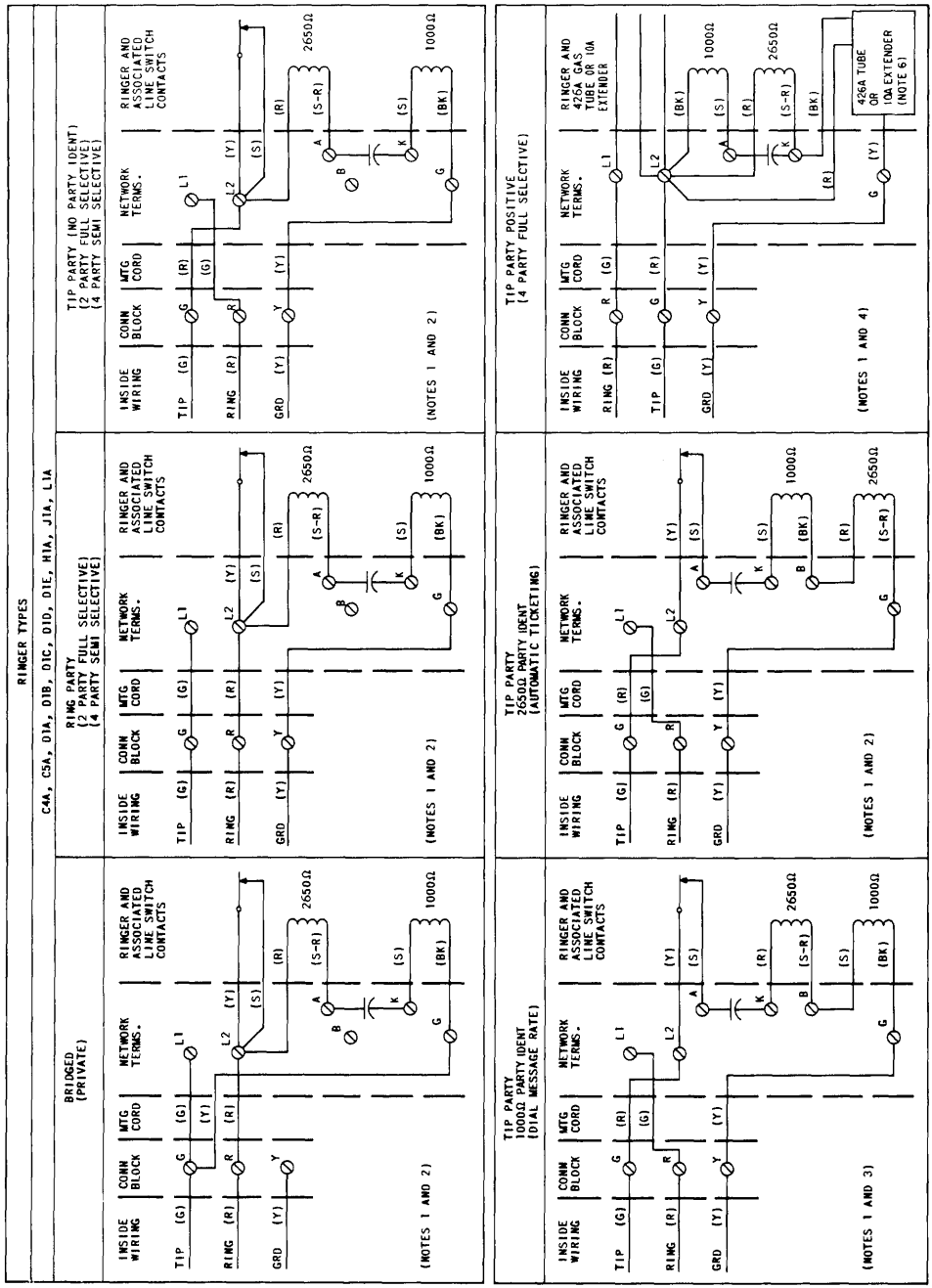
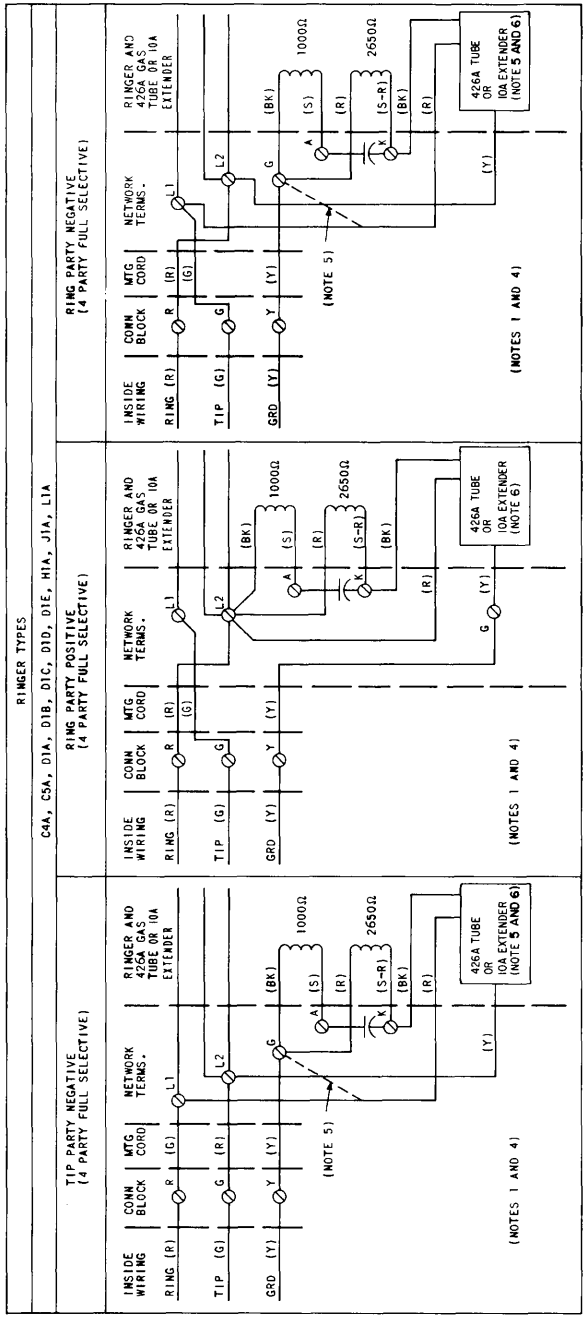


Fig. 8—Ringer Connection Information—C-, D-, H-, J-, and L-Types (Sheet 1 of 2)



NOTES:

1. WIRING SHOWN FOR C4A RINGER IN 500, 501, 544, 556 AND 2500 TYPE TELEPHONE SETS.
2. TO PERMANENTLY SILENCE RINGER - TRANSFER BLACK RINGER LEAD TO K TERMINAL ON NETWORK.
3. TO PERMANENTLY SILENCE RINGER - TRANSFER (S-R) RINGER LEAD TO K TERMINAL ON NETWORK.
4. TO PERMANENTLY SILENCE RINGER - AT CONNECTING BLOCK, TRANSFER YELLOW MOUNTING CORD CONDUCTOR TO SAME TERMINAL AS RED MOUNTING CORD.
5. FOR STATIONS IN OFFICES WITHOUT ANI, RED LEAD FROM 426A TUBE OR 10A EXTENDER MAY BE CONNECTED TO G TERMINAL IF RINGER OPERATION IS MARGINAL, RED LEAD FROM 426A TUBE OR 10A EXTENDER MUST BE CONNECTED TO G TERMINAL FOR 96 VOLTS LONG LINE SERVICE. WHEN 10A EXTENDER IS USED ON NEGATIVE PARTIES, RED LEAD MUST ALWAYS CONNECTED TO G.
6. THE 10A EXTENDER IS NOT A GENERAL REPLACEMENT FOR THE 426A TUBE, TO BE USED ONLY ON LONE LOOPS OVER 1600 OHMS.

Fig. 8—Ringer Connection Information—C-, D-, H-, J-, and L-Types (Sheet 2 of 2)

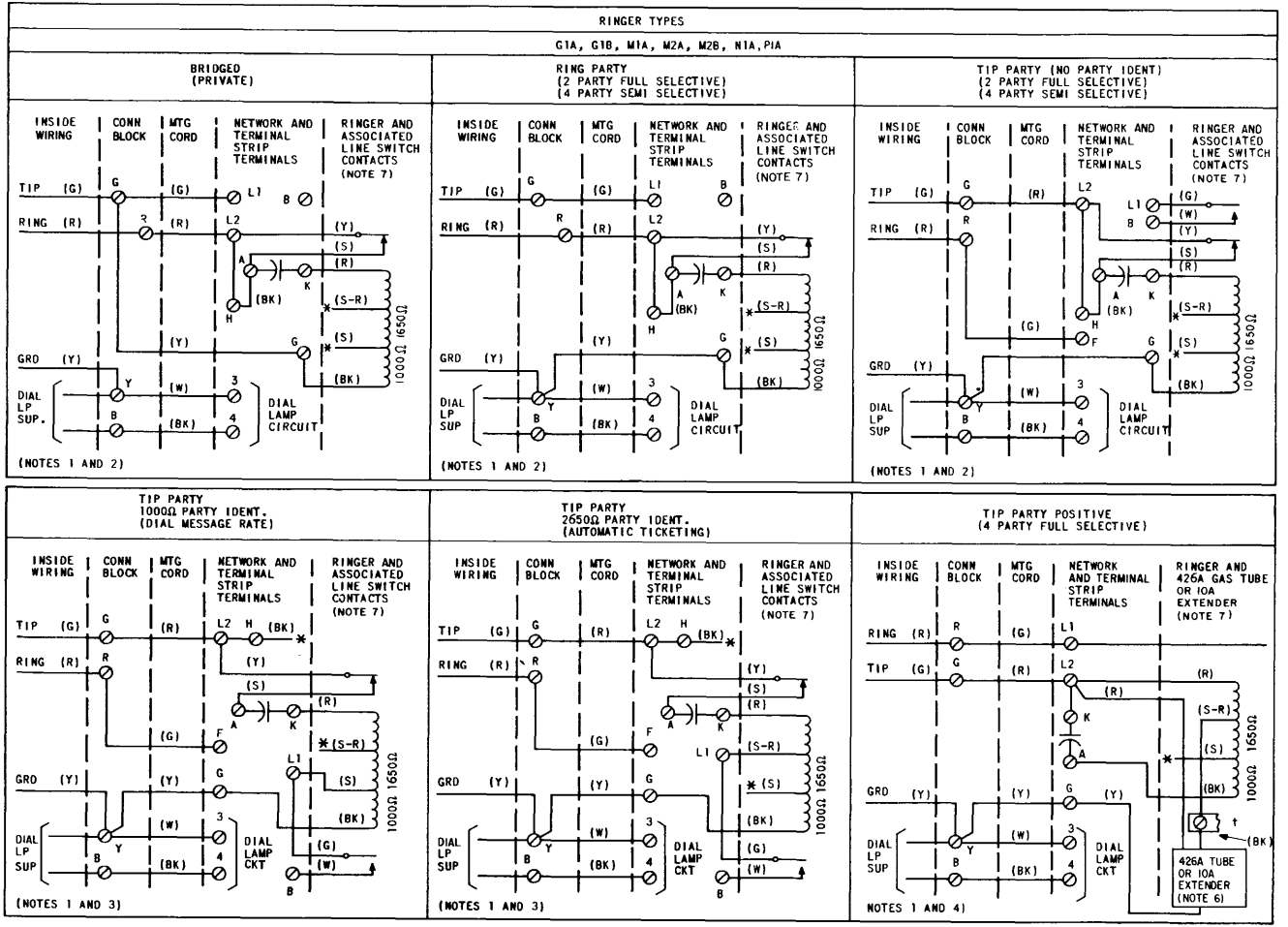
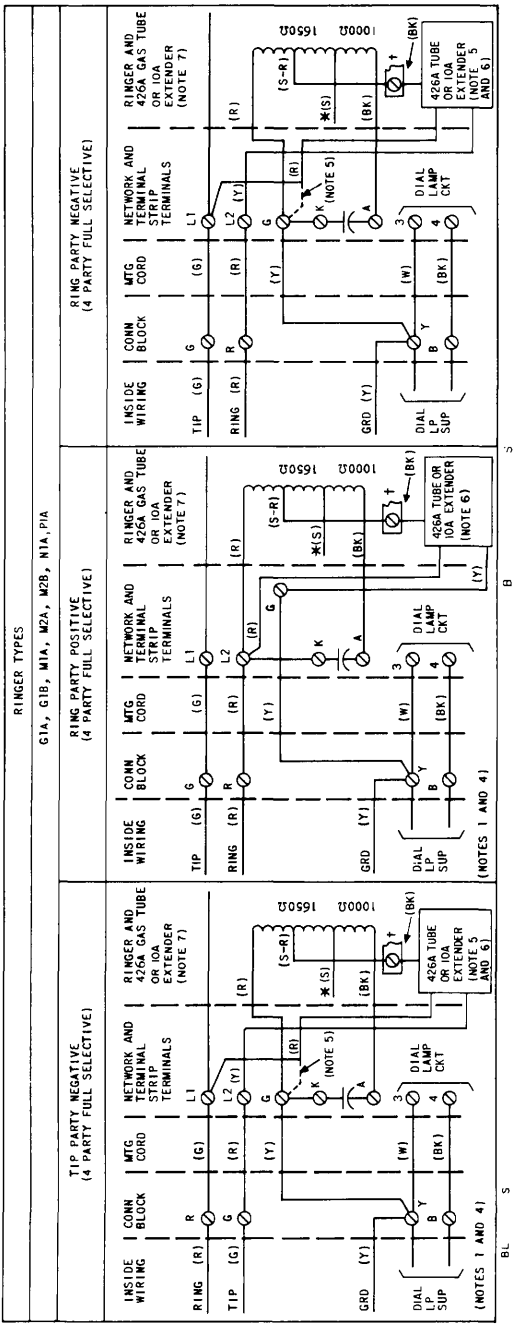


Fig. 9—Ringer Connection Information—G-, M-, N-, and P-Type (Sheet 1 of 2)



NOTES:

1. WIRING SHOWN FOR M1A RINGER IN 702 SERIES SET.
2. TO PERMANENTLY SILENCE RINGER – TRANSFER RED RINGER LEAD FROM (K) TO (G) TERMINAL ON NETWORK.
3. TO PERMANENTLY SILENCE RINGER – TRANSFER RED RINGER LEAD FROM (K) TO (B) TERMINAL ON NETWORK.
4. TO PERMANENTLY SILENCE RINGER – AT CONNECTING BLOCK, TRANSFER YELLOW MTG CORD CONDUCTOR TO SAME TERM. AS RED MTG CORD.
5. FOR STATIONS IN OFFICES WITHOUT AN1, RED LEAD FROM 426A TUBE OR 10A EXTENDER MAY BE CONNECTED TO G TERMINAL IF RINGER OPERATION IS MARGINAL. RED LEAD FROM 426A TUBE OR 10A EXTENDER MAY BE CONNECTED TO G TERMINAL FOR 96 VOLTS LONG LINE SERVICE. WHEN 10A EXTENDER IS USED ON NEGATIVE PARTIES, RED LEAD MUST BE CONNECTED TO G
6. THE 10A EXTENDER IS NOT A GENERAL REPLACEMENT FOR THE 426A TUBE, TO BE USED ONLY ON LONG LOOPS OVER 1600 OHMS.
7. (BL) LEAD MISSING FROM P1A RINGERS MANUFACTURED AFTER 10-1-72.

* INSULATE AND STORE INDIVIDUALLY.

† D-161488 CONNECTOR.

Fig. 9—Ringer Connection Information—G-, M-, N-, and P-Type (Sheet 2 of 2)

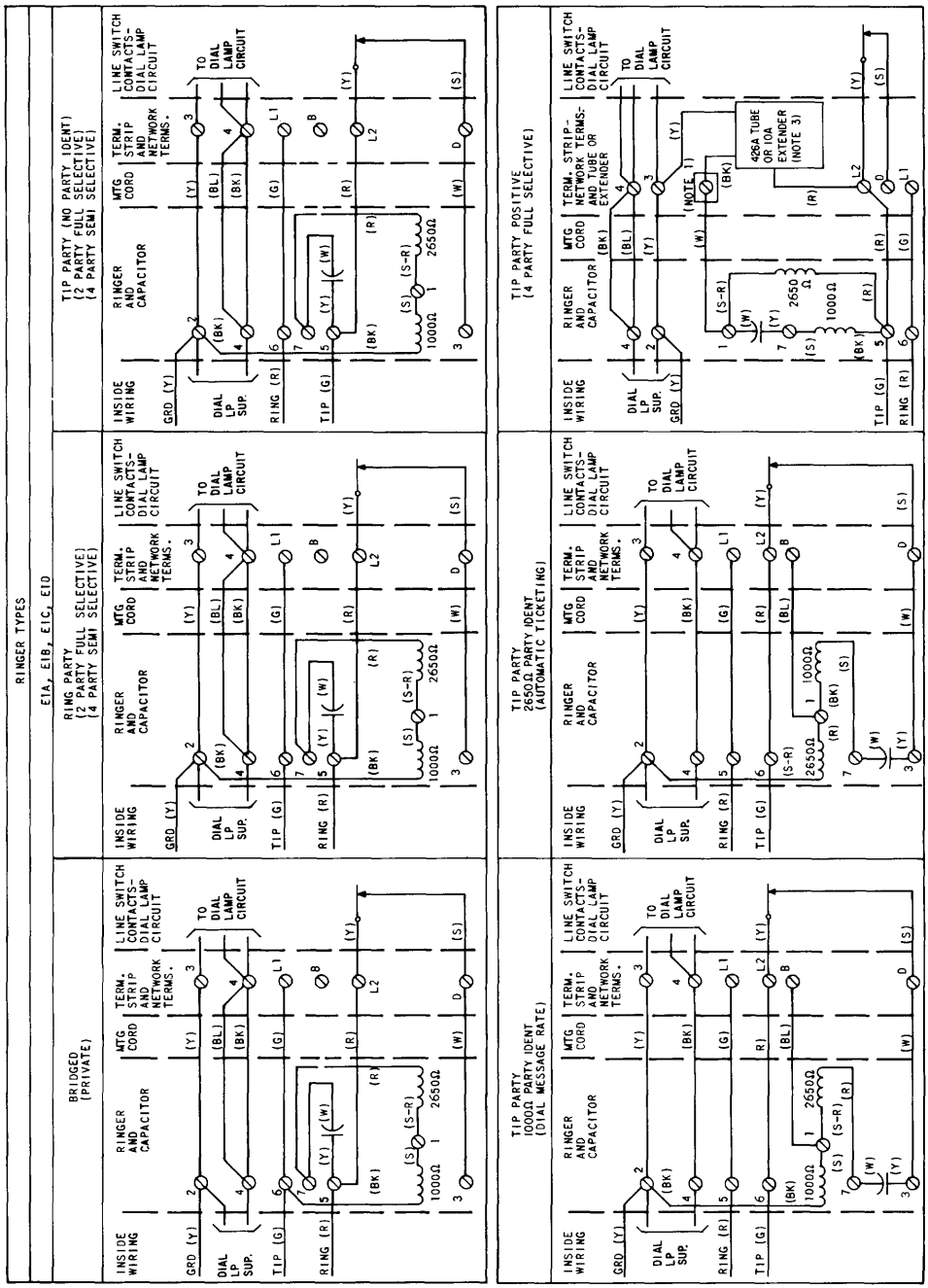
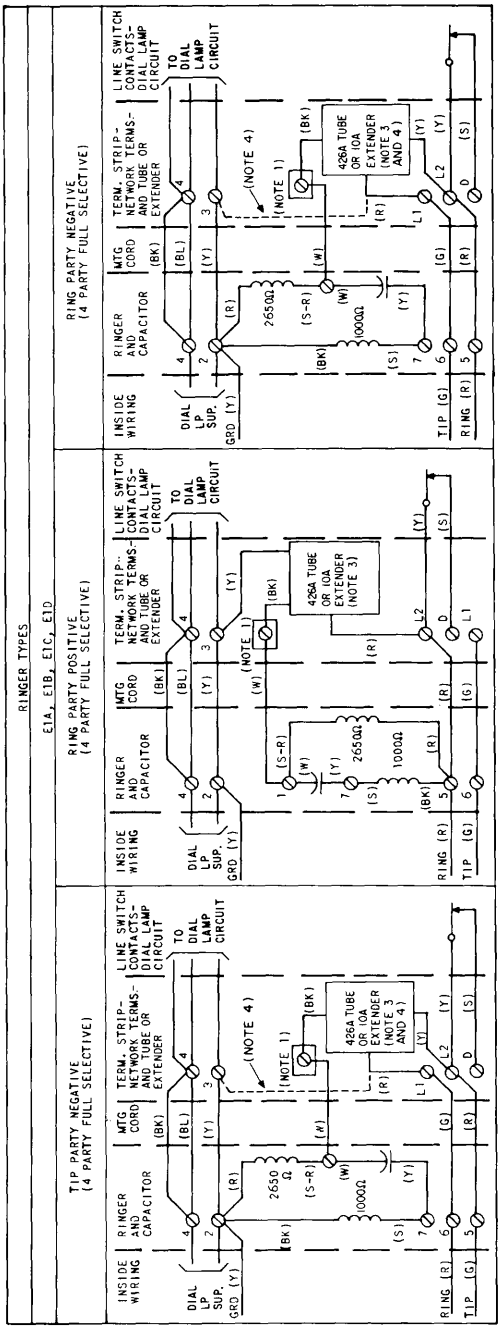


Fig. 10—Ringer Connection Information—E-Type (Sheet 1 of 2)



NOTES:

1. D-161488 CONNECTOR
2. WIRING SHOWN FOR E1A RINGER WITH 701 SERIES SET
3. THE 10A EXTENDER IS NOT A GENERAL REPLACEMENT FOR THE 426A TUBE, TO BE USED ONLY ON LONG LOOPS OVER 1600 OHMS.
4. WHEN 10A EXTENDER IS USED ON NEGATIVE PARTIES, THE RED LEAD MUST BE CONNECTED TO GROUND.

Fig. 10—Ringer Connection Information—E-Type (Sheet 2 of 2)

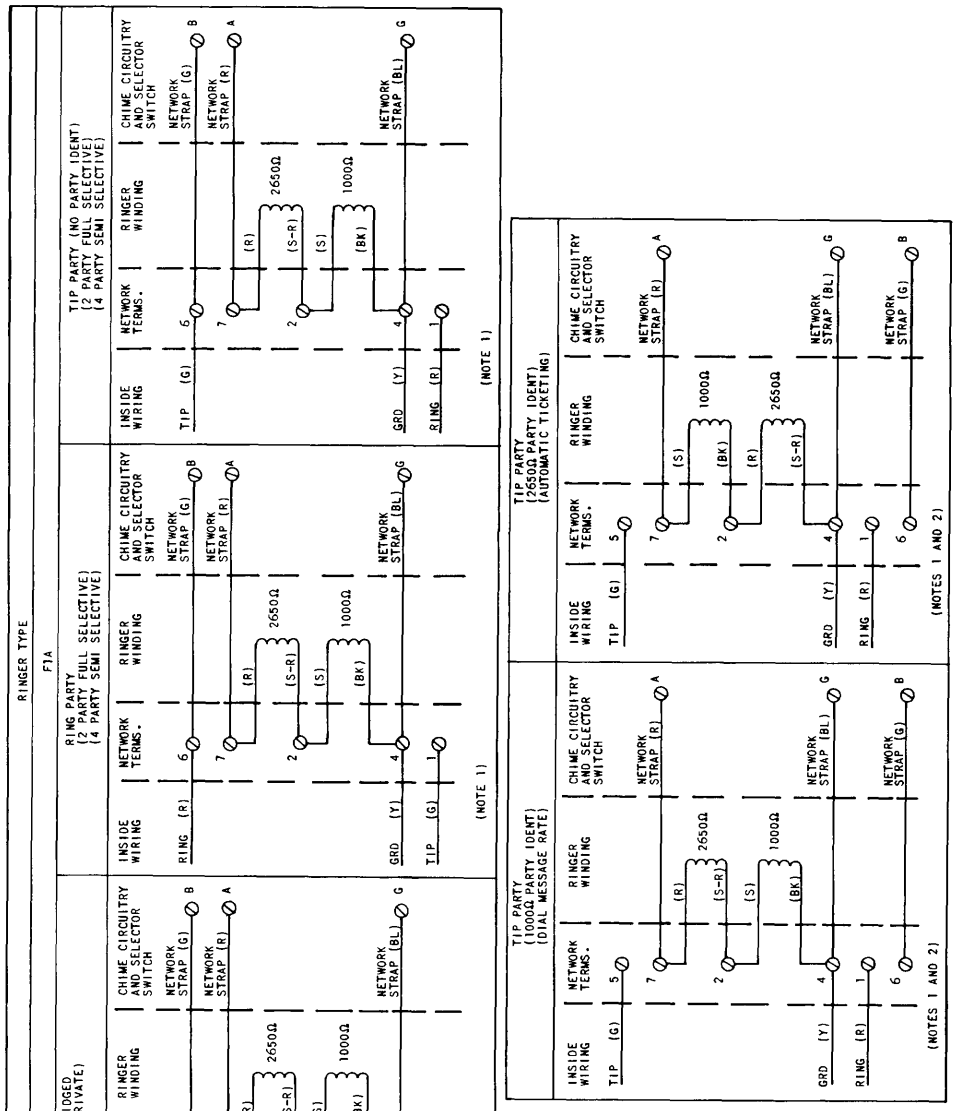
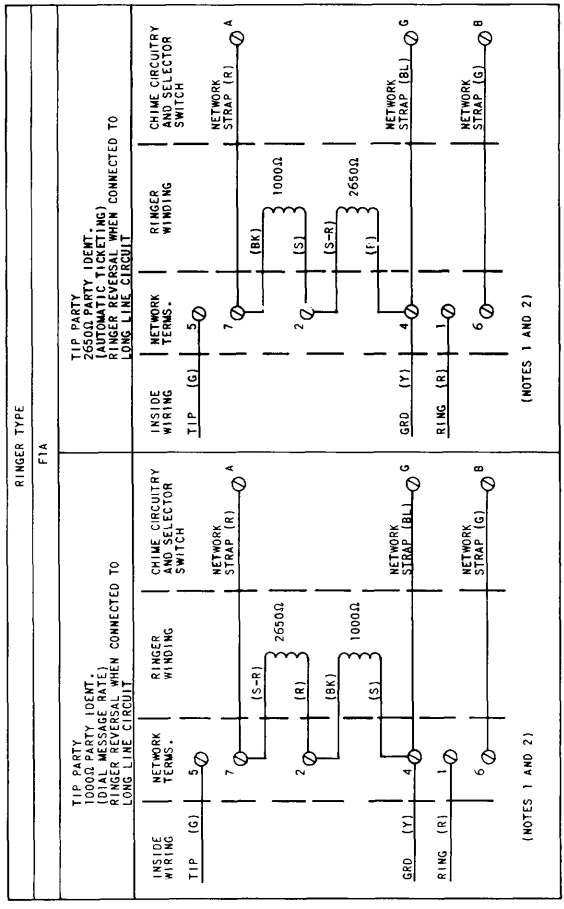


Fig. 11—Ringer Connection Information—F1A-Type (Sheet 1 of 2)



NOTES:

1. THE F1A RINGER IS NOT INTENDED FOR USE WHEN A GAS TUBE IS USED TO PROVIDE 4 PARTY FULL SELECTIVE RINGING.
2. WIRING SHOWN FOR 701B TELEPHONE SET WHERE F1A RINGER IS ONLY RINGER ASSOCIATED WITH SET. FOR USE WITH SETS WHICH HAVE AN INTEGRAL OR ASSOCIATED RINGER, THE F1A RINGER SHOULD BE CONNECTED AS NORMAL TIP PARTY RINGER, AND THE TELEPHONE SET SHOULD BE CONNECTED FOR TIP PARTY IDENTIFICATION WITH THE RINGER SILENCED AS DESCRIBED IN THE SECTION RELATED TO SET.

Fig. 11—Ringer Connection Information—F1A-Type (Sheet 2 of 2)

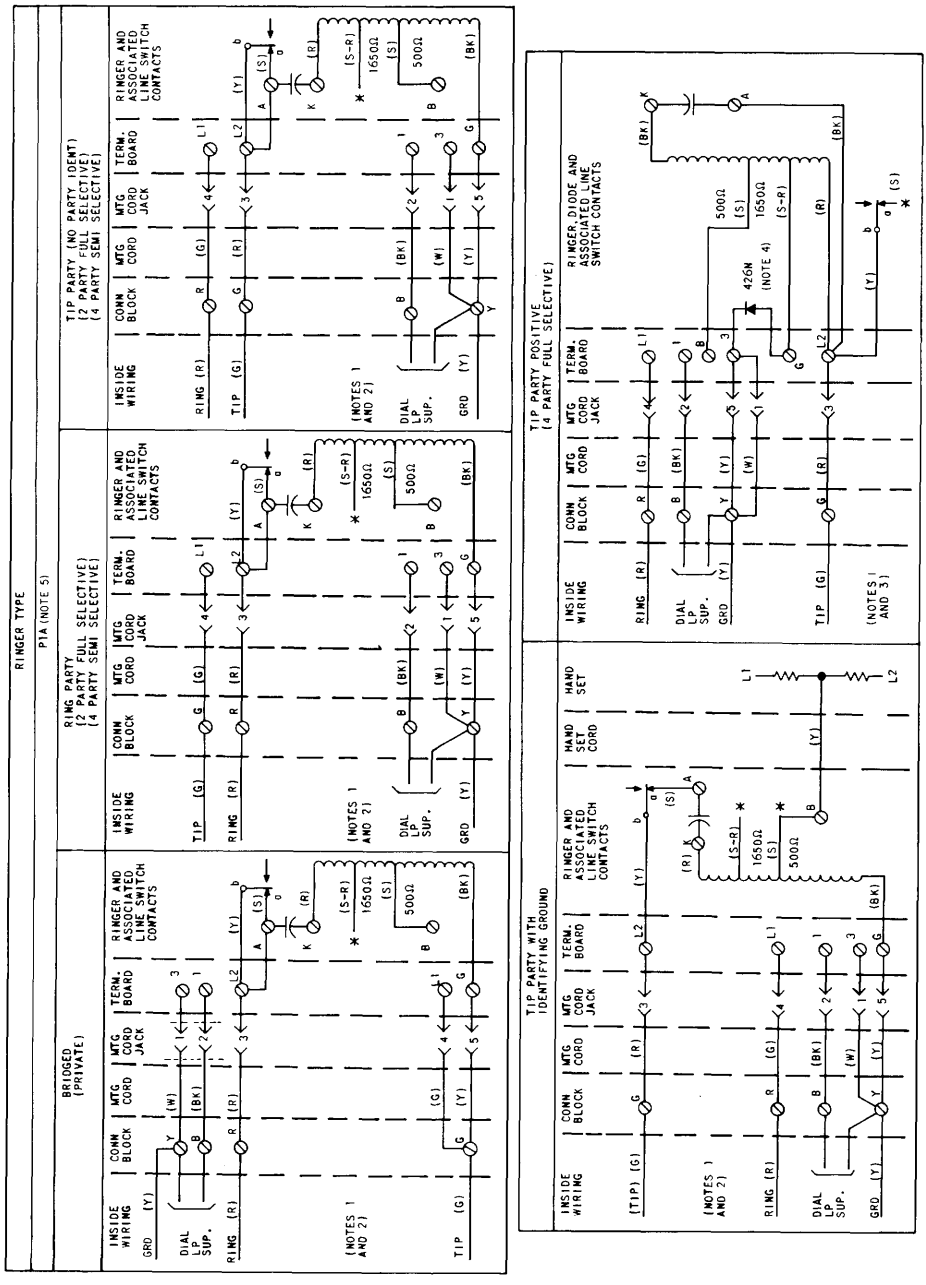


Fig. 12—Ringer Connection Information—P1A-Type (Sheet 1 of 2)

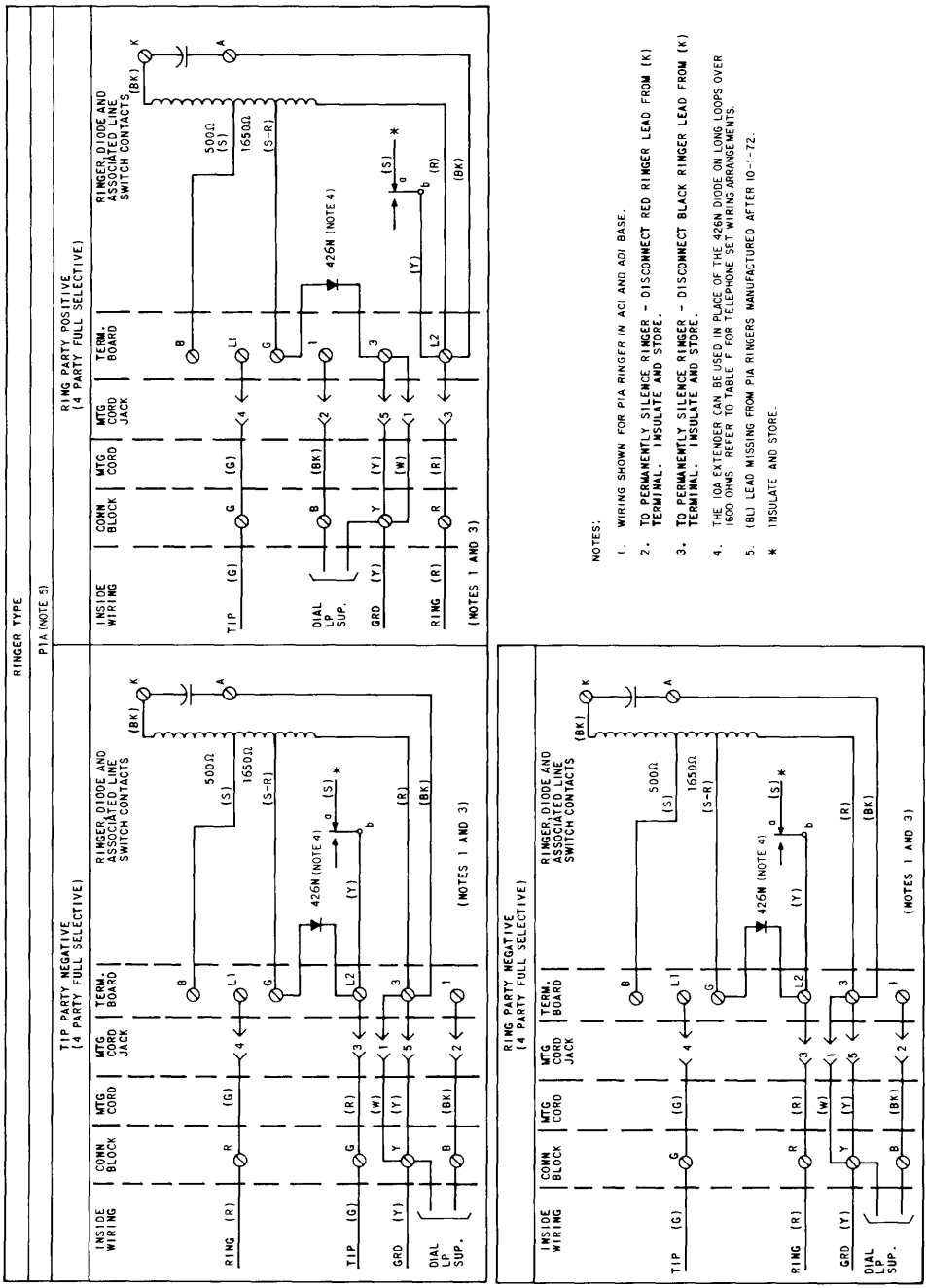


Fig. 12—Ringer Connection Information—P1A-Type (Sheet 2 of 2)

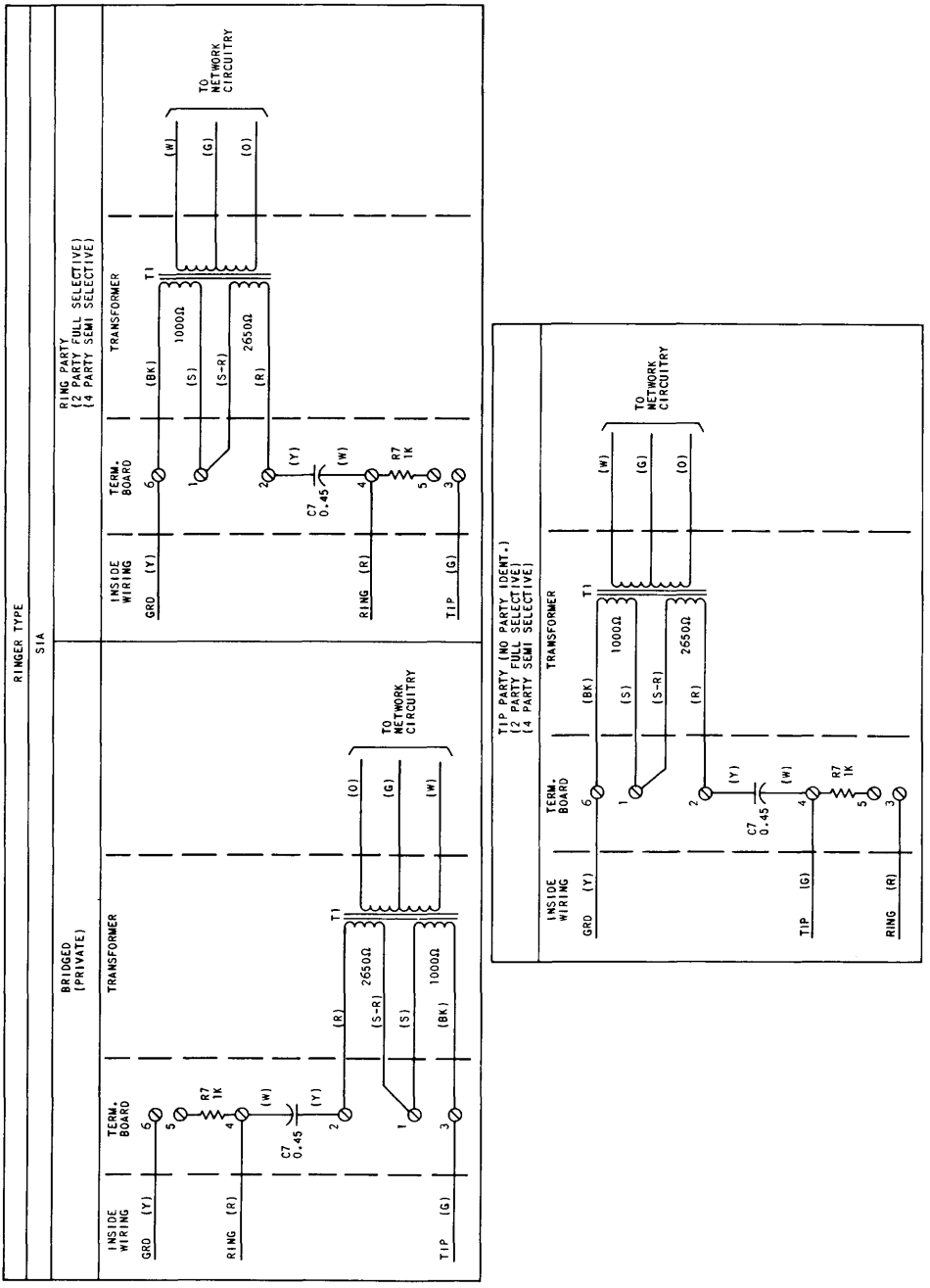


Fig. 13—Ringer Connection Information—S1A-Type

REPLACING PAGE ADDENDUM
Filing Instructions:

1. REMOVE FROM THE SECTION THE PAGES NUMBERED THE SAME AS THOSE ATTACHED TO THIS PINK SHEET.
2. INSERT THE ATTACHED PAGES INTO THE SECTION IN THEIR PLACE.
3. PLACE THIS PINK SHEET AHEAD OF PAGE 1 OF THE SECTION.

RINGING LIMITATIONS

1. GENERAL

1.001 This addendum supplements Section 500-114-100, Issue 5. The attached page must be inserted in the section in accordance with the filing instructions above.

1.002 This addendum is issued to revise wiring of 11A Extender, Fig. 6.

Attached:

Page 7/8 dated March 1974—Revised

8. CONNECTIONS

The following change applies to Part 8 of this section:

(a) Fig. 6—revised