

**P1 CARRIER TELEPHONE SYSTEM**  
**INSTALLATION AND CONNECTIONS**  
**REMOTE TERMINAL**

**1. GENERAL**

**1.01** The procedure for the installation of remote terminals varies, depending upon the type of power supply and type of housings used.

**1.02** This section is reissued to include information on J98707M power supply and J98707T multihousing and to provide alternate installation procedures appropriate to the power supply and type housing being installed. This section also includes information to enable the craftsman to determine the proper 482-type network for insertion between the station and carrier line.

**1.03** The general procedure for the installation of remote terminals is as follows:

- For the J86463A or B power supply:

- (1) Verify that the power and terminal housings are mounted securely and are grounded properly.
- (2) Install and adjust the power supply.
- (3) Connect the power supply to the terminal housing.
- (4) Mount the 803A connector in the 386A apparatus case.
- (5) Verify the position of boards.
- (6) Connect local cable to line board.
- (7) Continue per section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office and Remote Terminal, General Information and Test Equipment.

- For the J98707M, List 2 power supply:

- (1) Verify that the combined power and terminal housing is mounted securely and is properly grounded.
- (2) Install and verify the connections to the power supply.
- (3) For use with 386C apparatus case:
  - (a) Mount the 803A connector in the 386C apparatus case.

*Note:* At coterminous installations the second, third, and fourth 803A connector will be installed in a 386A apparatus case.

- (b) For coterminous locations, connect the dc power from the 386C apparatus case terminal block to the 386A apparatus case terminal blocks.
  - (c) Verify the position of the boards.
  - (d) Connect local cable to line board.
  - (e) Continue per section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office and Remote Terminal, General Information and Test Equipment.
- (4) For use with the J98707T, List 1 multihousing:
    - (a) Verify that the combined power and terminal housing is grounded properly.
    - (b) Mount the 803A connectors in the J98707T multihousing.
    - (c) Verify the position of the boards.
    - (d) Connect the prestripped wire ends of the plug-in local cable to the 800A or 800B line board. Then insert the plug into the jack located to one side of the 803A connector.

**Note:** The local cable can be dressed to either side of the line connector board depending on the position of the terminal.

(e) Continue per section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office and Remote Terminal, General Information and Test Equipment.

**2. INSTALLATION**

**2.01** Before proceeding with the installation, verify that the 386A, 386C, and J98707T apparatus case is bonded and grounded properly and that the power company and telephone company ground rods are bonded together as covered in the 640 series of Bell System Practices under P1 carrier telephone systems.

**2.02** Install and adjust the power supply per the appropriate section: Station Systems, P1 Carrier, Power Plant—J86463A; Station Systems, P1 Carrier, Power Plant—J86463B; or Station Systems, P1 Carrier, Power Plant—J98707M.

**2.03** For the J86463A or B power supply, connect the power supply output to the terminal block on the 386A apparatus case. See Chart A for wiring details. For the J98707M, List

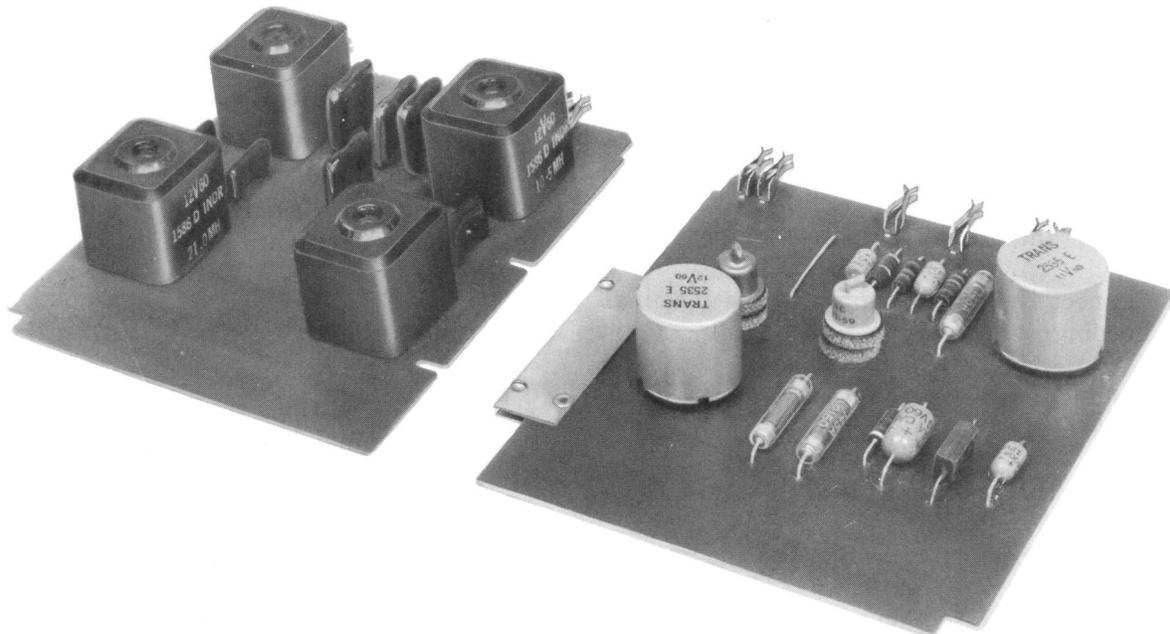
2 power supply or J98707T, List 1 multihousing, connections within the housings are made at the factory. At coterminous installations using 386C apparatus case, connect dc power to the terminal housings that do not contain the power supply. See Chart A for wiring details.



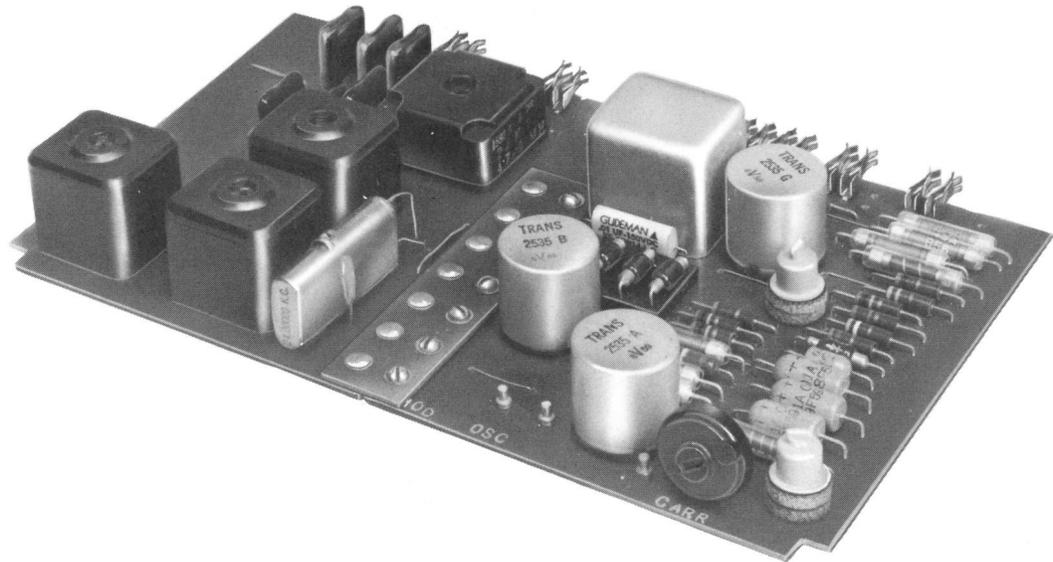
**C binding post caps must be installed on all battery and ground connections on the terminal block to avoid accidentally blowing fuses or damaging internal equipment.**

**2.04** Position the 803A connector on top of the line connector storage shelf. Be sure the stud on storage shelf is seated in the hole on the bottom of the connector. Fasten the top of the connector to the rear of the 386A or 386C apparatus case or to the mounting frame of the J98707T housing by two captive screws located in the right and left top corners of the 803A connector.

**2.05** Factory tested terminals are shipped with the network boards in proper position. To verify positions or to assemble terminals from re-used equipment, refer to Chart B.



**Fig. 1 — 801AA through 801P Network and 802A Network Join Together to Form a Full Board**



**Fig. 2 — 801AJ through 801BB Network and 802H Network Joined Together to Form a Full Board**

**2.06** The 801AJ through 801BB transmitting filters and the 802H oscillator modulator networks are half boards and must be put together by means of the phenolic strip provided on the 801AJ through 801BB filter network boards (see Fig. 1). These new networks when so connected can be used interchangeably with the present 800BC through 800BK and 800L through 800S oscillator-modulator-transmitting filter networks. The older networks are shown in Fig. 2.

**2.07** The 804B (A&M Only) or 804E (AT&TCO Std) network which provides remote terminal signaling, as furnished, may need one or two additional relays or, in the case of the 804B network, 404A shorting plugs to provide the proper ringing desired. See Chart C for this information. The 804E network directly replaces the 804D (Mfr Disc.) network.

**2.08** Place the board retainer in position G as shown in Fig. 3. This retainer is provided to keep the board in position G from becoming disconnected from the grid wires.

**2.09** The cable assembly is factory terminated on the underside of the terminal block on the 386A or 386C apparatus case and is fastened with a Tinnerman cord clamp. This local cable is

performed and ready to connect to the 800A or 800B line board. Chart D shows the connections to be made on the line board of the remote terminal.

**2.10** Multiwiring between local cable jack positions and the outside terminal block in the J98707T housing is prewired at the factory. Local cabling for the line board is preformed with a plug on one end and prestripped wire leads on the other end ready for connecting to the 800A or 800B line board. Chart E shows these connections.

**2.11** Pull the station drop wire and the carrier line (and carrier multiple, if a coterminal installation) through the grommets as shown in Chart A. Terminate the carrier pair as shown in Chart A. Do not connect the station drop at this time so that tests outlined in section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office and Remote Terminal, General Information and Test Equipment may be made.

**2.12** Make tests and adjustments covered in section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office and Remote Terminal, General Information and Test Equipment.

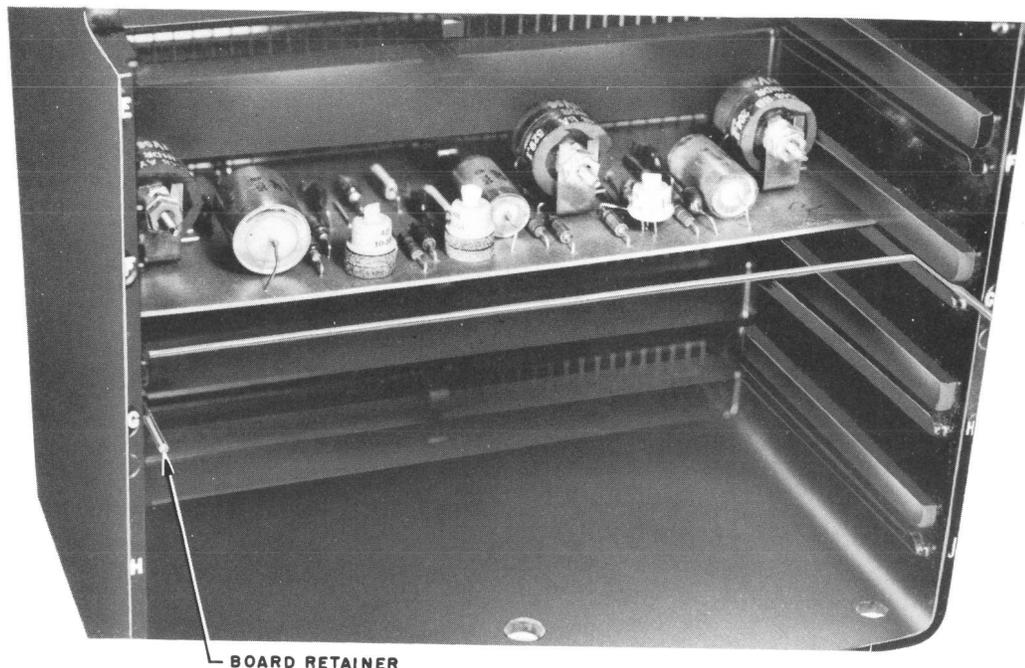


Fig. 3 — Board Retainer

**2.13** If system line-up (per section entitled P1 Carrier Telephone System, Adjustments and Maintenance, Central Office Terminal Tests, Transmitting) is not to be performed at this time, seal the terminal as follows:

- (1) Close and fasten the cover of the 803A connector.
- (2) Place a fresh bag of "C" dessicant per specification AT-7194 at the bottom of the 386A or 386C apparatus case under the line connector storage shelf, or, in the J98707T housing, place two bags of dessicant in any convenient out-of-the-way place.

**Note:** The "C" dessicant must be replaced with a fresh bag every time the terminal is opened.

- (3) Close and fasten the 386A or 386C apparatus case cover and terminal block cover with the special Allen wrench.
- (4) To close the J98707T multihousing, grip the two handles on the cover and lift it until it reaches the end of its travel. Then carefully let the cover slide down to the base plate. Place the "V" band around the flange joint being careful that it fits squarely over the joint. Connect and close the latch assembly.

**Caution:** Special care should be taken not to leave any tools or solid instruments lying across the edge of the base plate or else permanent damage may result to the hermetic sealing when the cover is let down.

### 3. 482-TYPE NETWORK SELECTION

**3.01** The 482-type networks are described in section entitled P1 Carrier Telephone System, Identification, General Description and Use. The 482A, B, and C networks separate the voice and carrier frequencies when the carrier line is used as part of the voice frequency circuit. This method of providing facilities for the customer is called filter distribution. Filter distribution can be used for the physical voice frequency circuit and for the derived voice frequency circuit. These networks are connected between the carrier line and the side lead (spur or station drop).

**3.02** The engineer will specify what network to use if he knows the length of the side lead (spur or drop). If he does not know or if the length and type of wire is not the same as shown on the construction print, the installer will have to choose the right network. Any time changes are made on a side lead (ie, adding or removing a

customer), the network should be verified for correct type; if not correct, install the proper network.

**3.03** The type and length of facility between the carrier line and the station equipment will determine which 482 network (A, B, or C) is required. Charts F and G show the capacity and length data for commonly used facilities. Chart H shows what network is required depending upon the capacity of the side lead and drop. If the side lead and drop exceed 1200 feet of C or E drop or 0.048 mf of capacity, a 482B and a 482D network are required. Connect the 482B between the carrier line and the side lead or drop. Connect the 482D at the pole nearest the customer equipment. Fig. 4 gives an example of how to use these Charts to select the correct network. Fig. 5 shows how to connect these networks. See Section 640-205-202 for connection of networks not shown in Fig. 5. See SD-97000-01 for network applications.

#### 4. STATION EQUIPMENT

**4.01** The physical voice frequency circuits served by filter distribution (482-type networks) from the carrier line are conventional circuits. The type of telephone set, loop requirements, and number of ringing bridges permitted are specified by the exchange transmission zoning practices.

**4.02** The derived voice frequency circuits are not conventional circuits. A 500C or D, or a 501C or D, telephone set must be used because the talking battery voltage supplied by the P1 carrier (as low as 17.5 volts before failure) requires the equalizing networks found in these sets.

A maximum loop resistance of 390 ohms and a minimum insulation resistance of 20,000 ohms is permitted between the remote terminal and each customer. The number of ringing bridges permitted depends upon the 804-type network used in the remote terminal. See Chart J for ringing bridge limitations.

**4.03** If the side lead and drop are a combination of facilities, add the loop resistance for the length of each facility to obtain the total resistance. See Chart K for length and resistance data; also see Fig. 6.

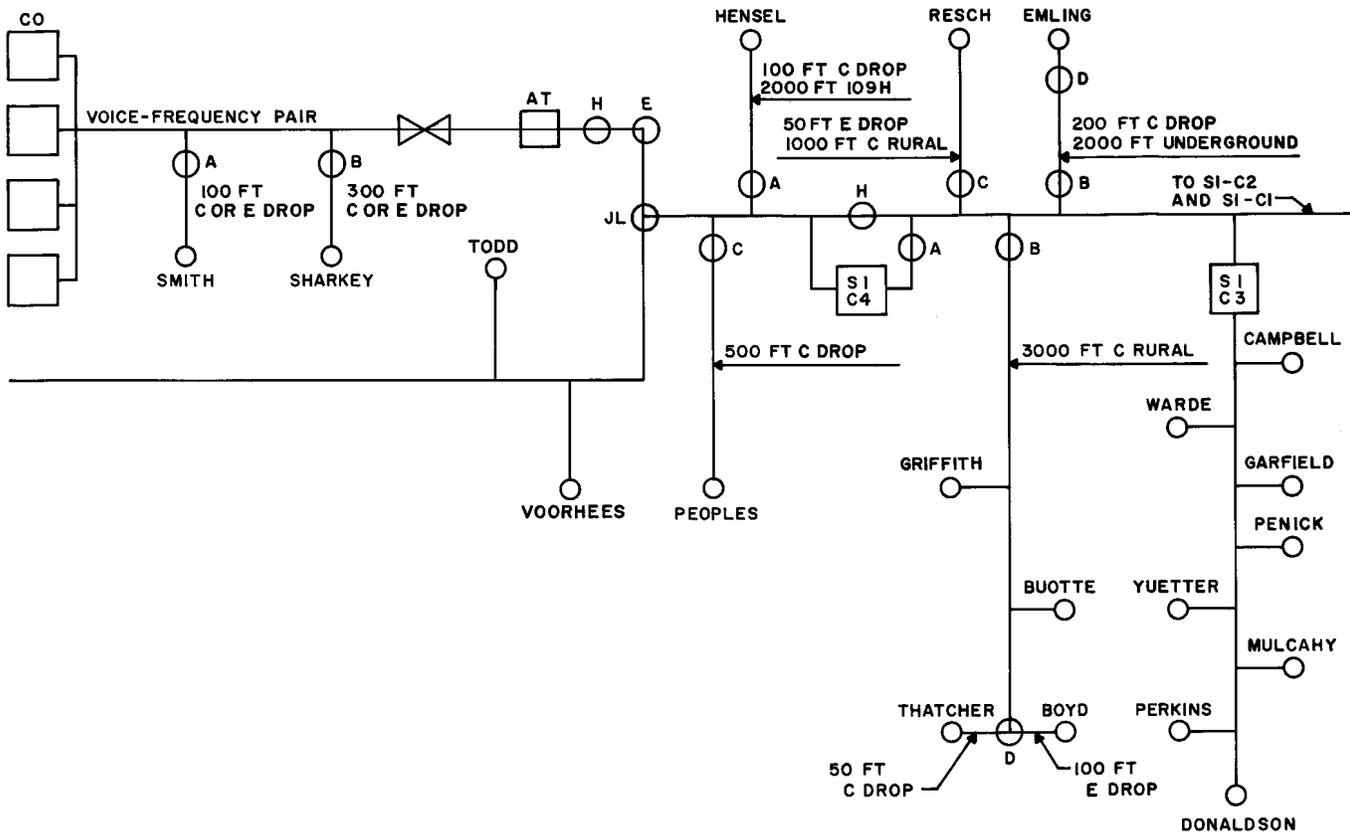
**4.04** If the 12-kc carrier is transmitted on the line (Chan 1 or Chan 1N), a 152A capacitor must be installed in all station sets served by filter distribution to filter out the 12-kc tone. This applies to the physical and to the derived voice frequency circuits. The only exception is the side lead and drop being long enough to require a 482B and 482D network. In this case the sets on this side lead (482B and D networks) do not need the 152A capacitor.

**4.05** Connect the 152A capacitor so that it is across the line when the set is off-hook. See Chart H and Fig. 7 and 8.

**4.06** The 152A capacitor is not needed in the station set when:

- Wire distribution is used.
- A 482D network is required on the side lead.
- Staggered systems are used.
- Chan 1 or Chan 1N is not used.

SECTION 363-100-102



Customer	Facility	Length	Capacity	482-Type Network	Remarks
		ft	uf		
Smith	C or E Drop	100		A	
Sharkey	C or E Drop	300		B	
Todd					None required; not on carrier line
Voorhees					None required; not on carrier line
Peoples	C Drop	500		C	
Hensel	109H C Drop	2,000 100	0.0035 0.0045 Total 0.0080	A	
Resch	C Rural E Drop	1,000 50	0.0230 0.0025 Total 0.0255	C	
Thatcher-Boyd	C Rural	3,000	More than 0.05	B and D	Use length to Boyd because his line is greatest length and greatest capacity
Emling	D — Underground C Drop	2,000 200	0.044 0.009 Total 0.053	B and D	

Fig. 4 — P1 Carrier System Application

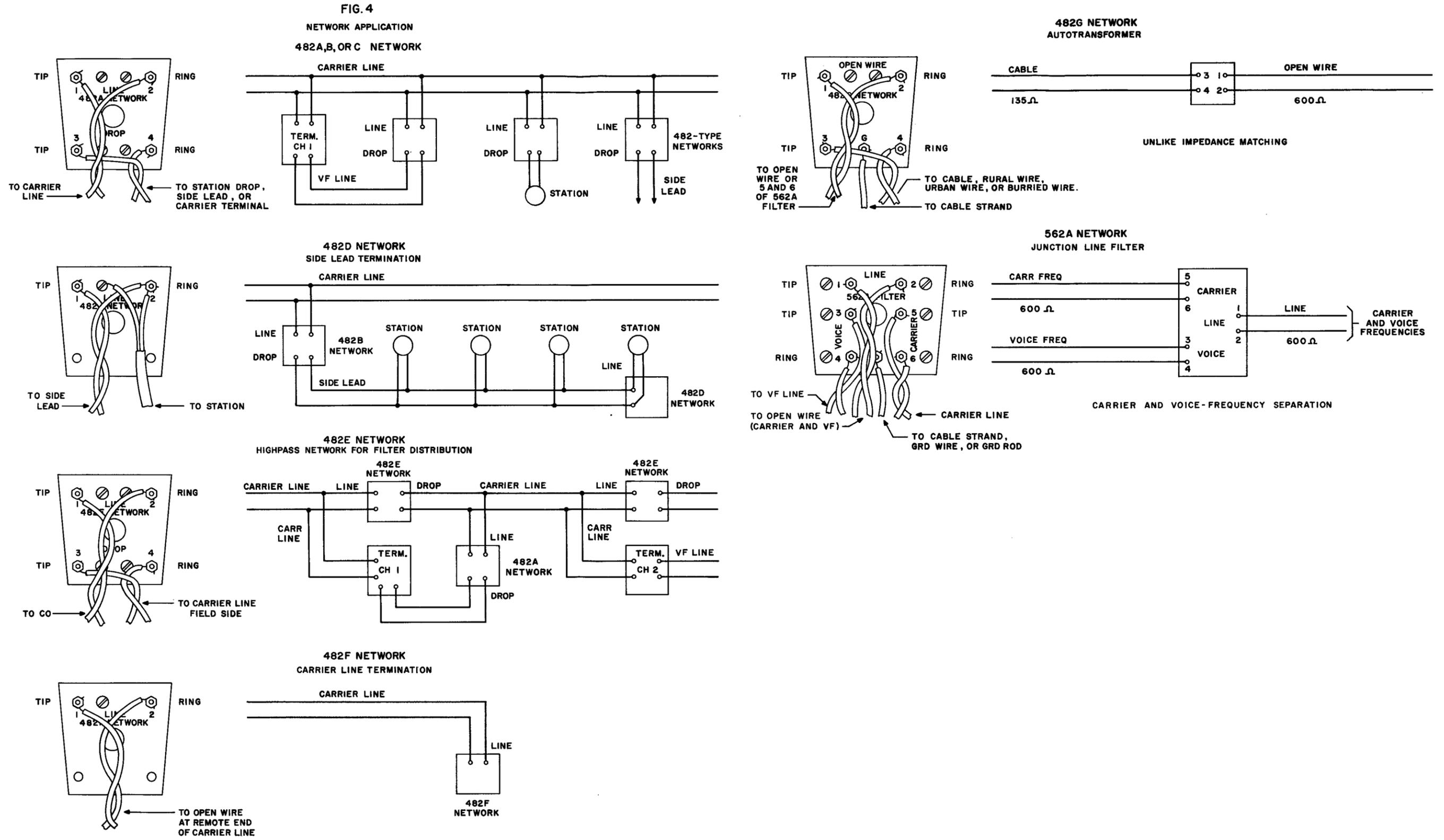
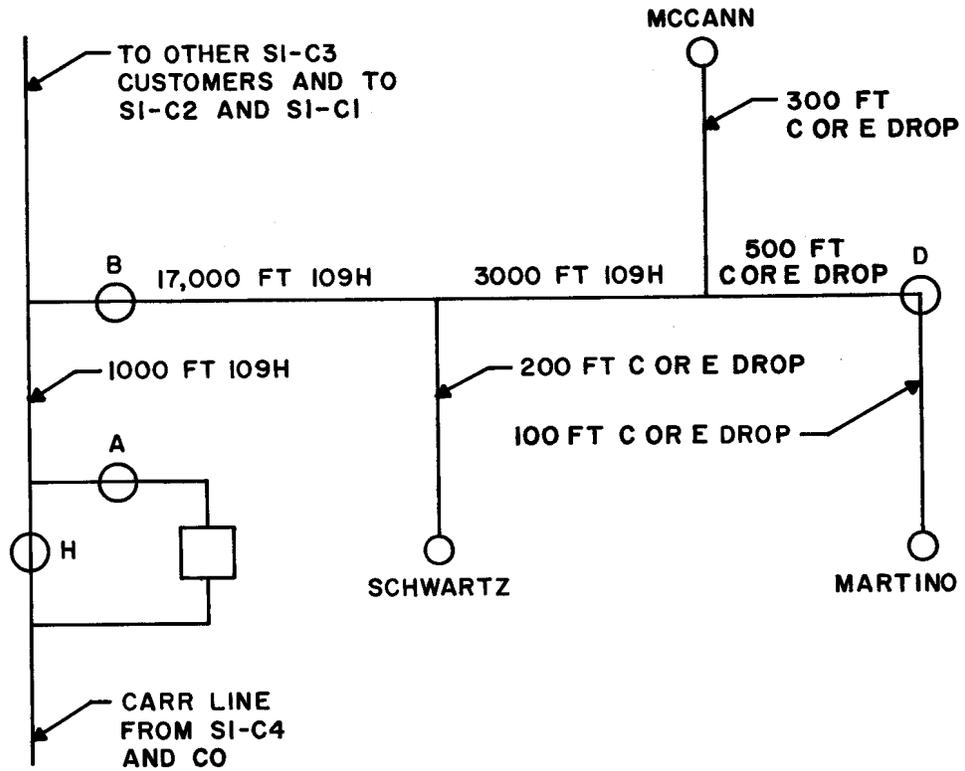


Fig. 5 - Network Application



Loop Resistance To:

Customer	Facility	Length	Loop Resistance
		ft	ohms
Martino	109 C or E Drop	$1 + 17 + 3 = 21,000$	305
		$500 + 100 = 600$	26 Total 331
McCann	109 C or E Drop	$1 + 17 + 3 = 21,000$	305
		300	13 Total 318
Schwartz	109 C or E Drop	$1 + 17 = 18,000$	261
		200	9 Total 270

Fig. 6 - Side Lead Application

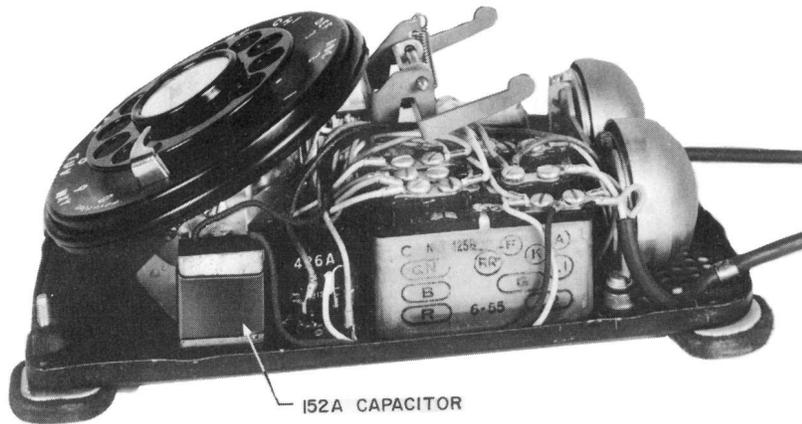


Fig. 7 — Installation of 152A Capacitor in 500-Type Telephone Set

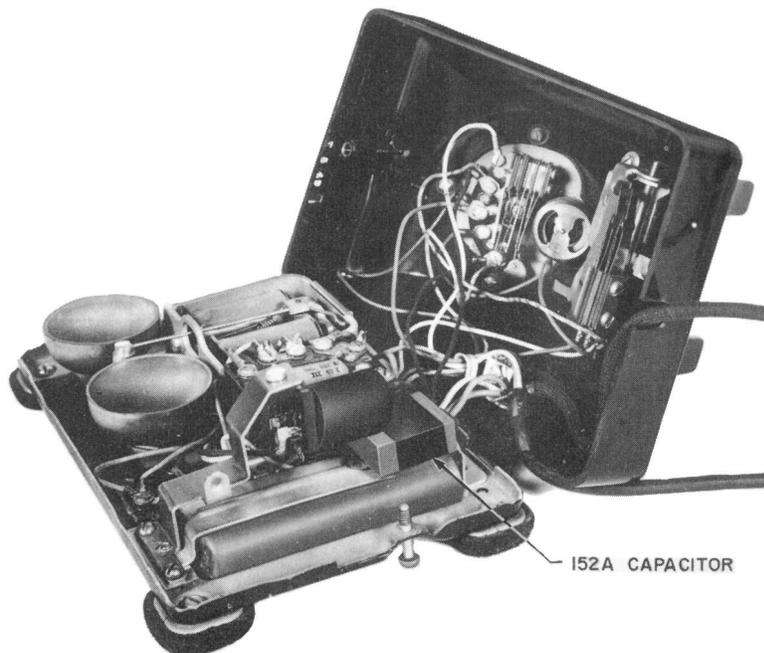
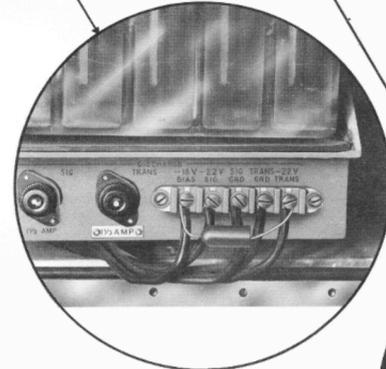
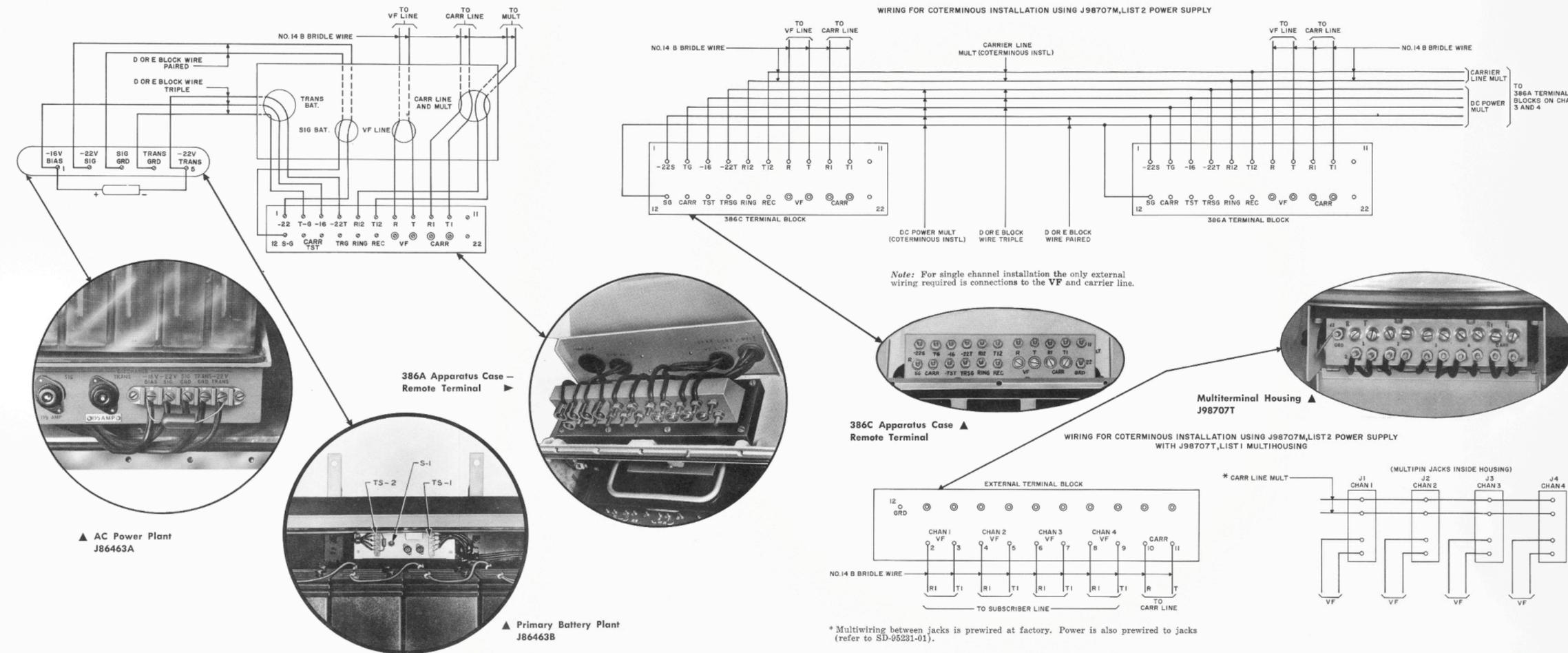
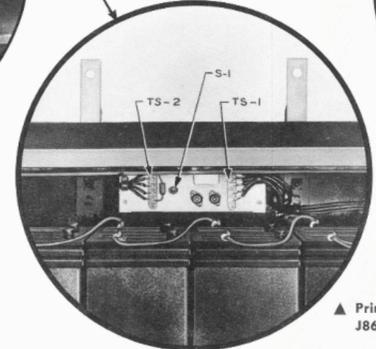


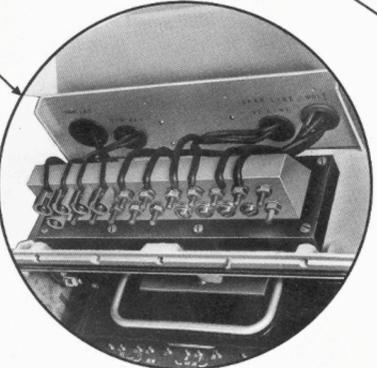
Fig. 8 — Installation of 152A Capacitor in 300-Type Telephone Set



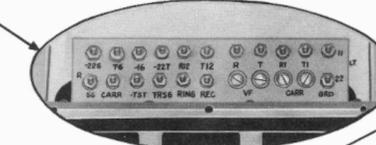
▲ AC Power Plant J86463A



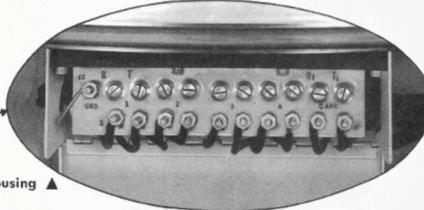
▲ Primary Battery Plant J86463B



386A Apparatus Case - Remote Terminal



386C Apparatus Case - Remote Terminal



Multiterminal Housing J98707T

CHART A

REMOTE TERMINAL - EXTERNAL WIRING

From	Lead Description	Lead Designation	Binding Post Number on Terminal Block on 386A or 386C Apparatus Case		Type and Size of Wire
			Channels Requiring 800A Networks	Succeeding Channels Requiring 800B Networks	
Central Office	Carrier Line	R T	9 10	5 6	No. 14B bridle
Station	Voice Freq Line	R1 T1	7 8	7 8	
Between Channel	Carrier Line Multiple Between Channels of Same System at a Coterminous Installation	R SH	See Note 1	See Note 1	No. 14B bridle
Power Plant		R Strap	13 and 14	13 and 14	Wire Block D or E Single
<b>DC Power Wiring Using Only 386A Apparatus Case (Applicable To All Installations Using J86463A or B)</b>					
J86463A (A&M) and J86463B	Transmitting Battery	-22v Trans	4	4	Wire Block D or E Triple
	Transmitting Bias	-16v Bias	3	3	
	Transmitting Ground	Trans Grd	2	2	Wire Block D or E Pair
	Signaling Battery	-22v Sig	1	1	
	Signaling Ground	Sig Grd	12	12	
<b>DC Power Wiring Using 386C and 386A Apparatus Case (Applicable To Coterminous Installations Using J98707M)</b>					
J98707M List 2 (Note 2)	Transmitting Battery	-22v Trans	From 386C Terminal Block: BP 4-1st Chan	To 386A Terminal Block: BP 4- Succeeding Channels	Wire Block D or E Triple
	Transmitting Bias	-16v Bias	BP 3-1st Chan	BP 3- Succeeding Channels	
	Transmitting Ground	Trans Grd	BP 2-1st Chan	BP 2- Succeeding Channels	
	Signaling Battery	-22v Sig	BP 1-1st Chan	BP 1- Succeeding Channels	Wire Block D or E Pair
	Signaling Ground	Sig Grd	BP 12-1st Chan	BP 12- Succeeding Channels	

CHART A (Continued)

Wiring Chart for Terminal Block on J98707T Multiterminal Housing				
From	Lead Description	Lead Designation	Binding Post Number on Terminal Block	Type and Size of Wire
Central Office	Carrier Line	(Carr) R T	10 11	No. 14B bridle
Station	Voice Frequency Line	Chan No. R1 T1	Channel 1 2 3 4 2 4 6 8 3 5 7 9	No. 14B bridle
Earth Ground	Ground*	Grd	12	No. 10 bare

\* Pole butt ground or driven ground rod.

Note 1: Multiple channels at a coterminous installation as follows:

From	To
Carrier Line from Co	BP 9 & 10 - 1st Ch
BP 5 & 6 - 1st Ch	BP 5 & 6 - 2nd Ch
BP 5 & 6 - 2nd Ch	BP 5 & 6 - 3rd Ch
BP 5 & 6 - 3rd Ch	BP 5 & 6 - 4th Ch

Note 2: DC power wiring for 386C is shop wired.

**CHART B**  
**NETWORK BOARD SELECTION FOR REMOTE TERMINAL**  
**HIGH GROUP TRANSMITTED FROM CENTRAL OFFICE**  
**(PREFERRED DIRECTION)**

Position in 803A Connector	Stackable Frequency System			Grouped Normal Frequency System				Grouped Staggered Frequency System		
	Channels			Channels				Channels		
Channel No.	1	2A	4	1N	2N	3N	4N	1S	2S	3S
Transmit	12	60	96	12	24	36	48	18	30	42
Receive	24	48	84	60	72	84	96	66	78	90
ED-97017-30 Group See Notes 1 and 2	T2, E1, N ( ) W ( )	T2, E2, N ( ) W ( )	T2, E4, N ( ) W ( )	T2, H1, N ( ) W ( )	T2, H2, N ( ) W ( )	T2, H3, N ( ) W ( )	T2, H4, N ( ) W ( )	T2, V1, N ( ) W ( )	T2, V2, N ( ) W ( )	T2, V3, N ( ) W ( )
A	See Note 1									
B1 See Note 3	801AJ	801AR	801AU	801AJ	801AK	801AL	801AP	801AV	801AW	801AY
B2 See Note 3	802H	802H	802H	802H	802H	802H	802H	802H	802H	802H
C1	801AB	801AD	801AG	801AE	801AF	801AG	801AH	801M	801N	801P
C2	802A	802A	802A	802A	802A	802A	802A	802A	802A	802A
D See Note 4	800BA	800BA	800BA	800BA	800BA	800BA	800BA	800BA	800BA	800BA
E	800U	800U	800U	800U	800U	800U	800U	800U	800U	800U
F	800W	800W	800W	800W	800W	800W	800W	800W	800W	800W
G	See Note 2			See Note 2				See Note 2		
J See Note 5	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B	804E or 804D or 804B

**Note 1:** Use 800A network (Group N1) in Position A, except at coterminal installations where only one channel requires the 800A. On other channels at a coterminal installation, use 800B network (Group N2) in Position A.

**Note 2:** Use network boards in Position G as follows:

If J Network is →	804D (AT&TCo Std)	804B (A&M Only)	Group
Divided Code Ringing	803AB or 803B	803B	W5
Semiselective Ringing	803AA or 803A	803A	W6
Private Line Ringing	803AB or 803B	803B	W4

**Note 3:** If position B is equipped with single network, use the following for network selection:

B	800BC	800BG	800BK	800BC	800BD	800BE	800BF	800L	800M	800N

**Note 4:** The 800T network may be used in position D of remote terminal only.

**Note 5:** See Chart C for relay selection.

**CHART C**  
**RELAY AND 404A SHORTING PLUGS**  
**SELECTION CHART**

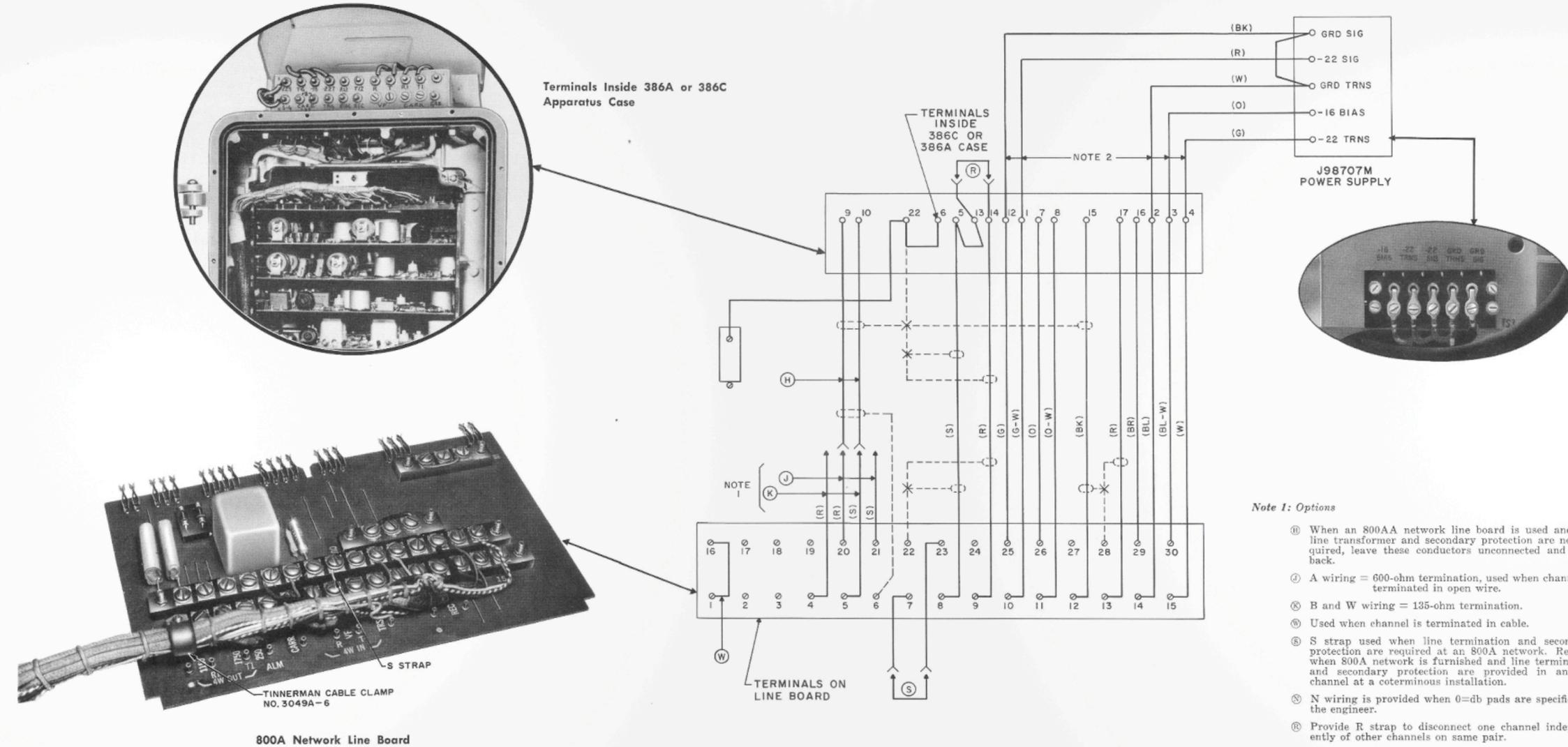
Type Ringing	Socket Position on 804B				Socket Position on 804D or 804E				
	RG* (K103)	T (K104)	N (K105)	A (K106)	RG†	T	N	PLS‡	A
Bridged	F-53245	404A	404A	303G	303F	—	—	303F	303G
2-Party selective, 4-Party semiselective, or divided code	F-53245	303F	404A	303G	303F	303F	—	303F	303G
4-Party selective or 8-Party semiselective	F-53245	303F	303F	303G	303F	303F	303F	303F	303G

\* The F-53245 relay should always be used with the 804B network.

† If the G position in the 803A connector contains an 803AA or 803AB network, use the 803F relay. If the 803A or 803B network is used, the RG position should have the F-53245 relay in order to obtain maximum ringing performance.

‡ The A relay, once used in this socket, should never be used in any other socket position because of contact arcing.

**Note:** The 303-type relay replaces the 291 type because of increased reliability.



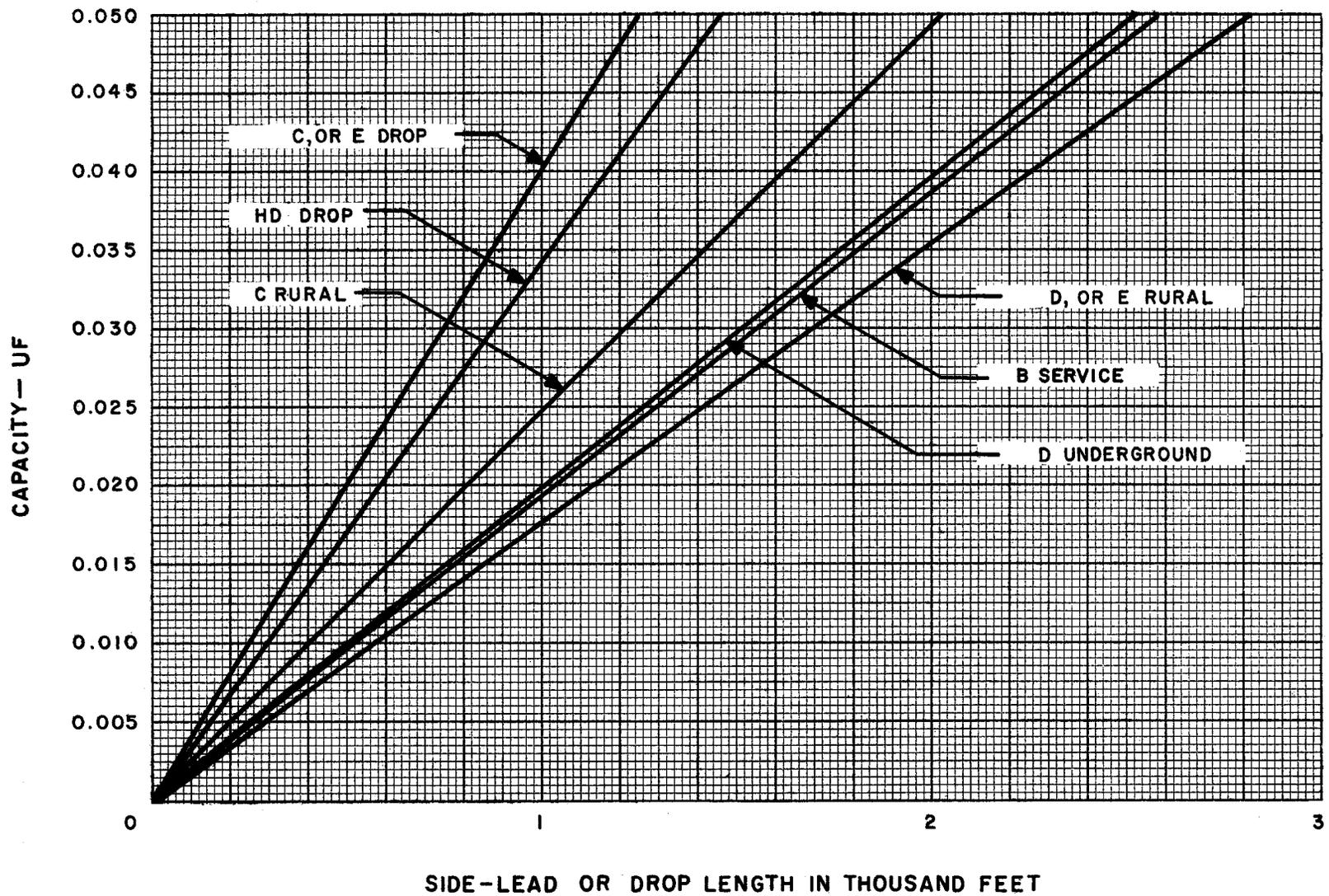
**CHART D**  
**REMOTE TERMINAL — INSIDE WIRING**

Wiring Chart for 800A or 800B Network Using 386C or 386A Case

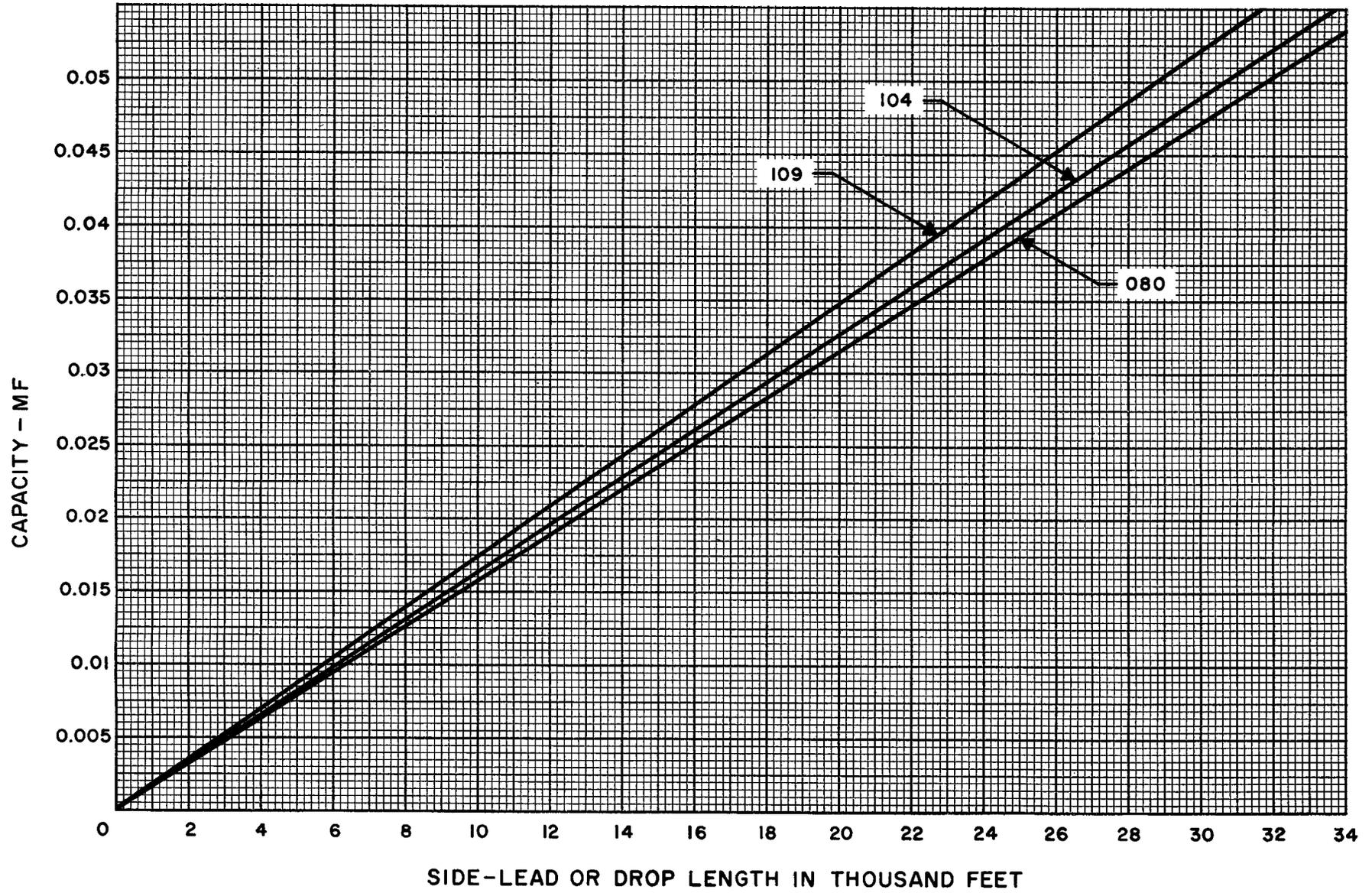
From	Lead Description	Lead Designation	From Terminal Block on 386A or 386C	Local Cable Assembly Color Code	Option	Terminal Strip Binding Post Number On	
						800A Net.	800B Net.
Central Office	Carrier Line	T	10	R	A	20 21	
		R	9	S	B	4 5	
						W S*	Strap 1 & 16 Strap 7 & 23 Input Strap 31 & 33
	Carrier Line Shield		6	Shield	N*	Output Strap 34 & 36	Output Strap 34 & 36
Between Channels	Multiple Carrier Line to Coterminous Remote Term.	T12	6	Shield		22	22
		R12	5	S		8	8
		R Strap	14	R	R	9	9
	Rec TST		17	R		13	13
	Ring TST		16	BR		29	29
Station	Voice Frequency Line	R1	7	O		26	26
		T1	8	O-W		11	11
		TRSG-TST	15 16	BK Shield (Sleeve)		12 28	12 28
Power Plant J86463 or J98707M See Note 2	Signaling Ground	GRD -SIG	12	G		25	25
	Signaling Battery	-22V SIG	1	G-W		10	10
	Transmitting Ground	GRD -TRNS	2	BL		14	14
	Transmitting Bias	-16V BIAS	3	BL-W		30	30
	Transmitting Battery	-22V TRNS	4	W		15	15



CHART F  
SIDE LEAD CAPACITY



### CHART G SIDE LEAD CAPACITY



**CHART H**  
**CARRIER BLOCKING NETWORK AND**  
**TELEPHONE SET MODIFICATION DATA**

482-Type Network Selection							Modification of Customer's Telephone Set (Filter Distribution Only)			
Side Lead Make-up (From Carrier Line to Customer)					482-Type Network at Junction of Carrier Line and Side Lead	482D Type Network Required	Derived Voice Frequency Circuit		Physical Voice Frequency Circuit	
Type of Facility	Length ft		Capacity uf				Type Set	Connect 152A Capacitor Across	Type Set	Connect 152A Capacitor Across
	From	To	From	To						
C or E Drop or Any Other Facility or Combination of Facilities	0	250	0	0.01	482A	No	500 C or D Dial or Manual	L2 and RR Terminals on Network	500 C or D Dial or Manual	L2 and RR Terminals on Network
C or E Drop or Any Other Facility or Combination of Facilities	250	500	0.01	0.02	482B	No			300 Dial	Y and R Terminals on the Dial
C or E Drop or Any Other Facility or Combination of Facilities	500	1200	0.02	0.048	482C	No			300* Manual	Y-BK and SR Terminals on Apparatus Blank
C or E Drop or Any Other Facility or Combination of Facilities	1200	—	0.048	—	482B	Yes At End of Side Lead	500 C or D	Not Required	500 C or D and 300	Not Required

\* For other type telephone sets, connect the 152A capacitor so it is across the line when receiver is off-hook.

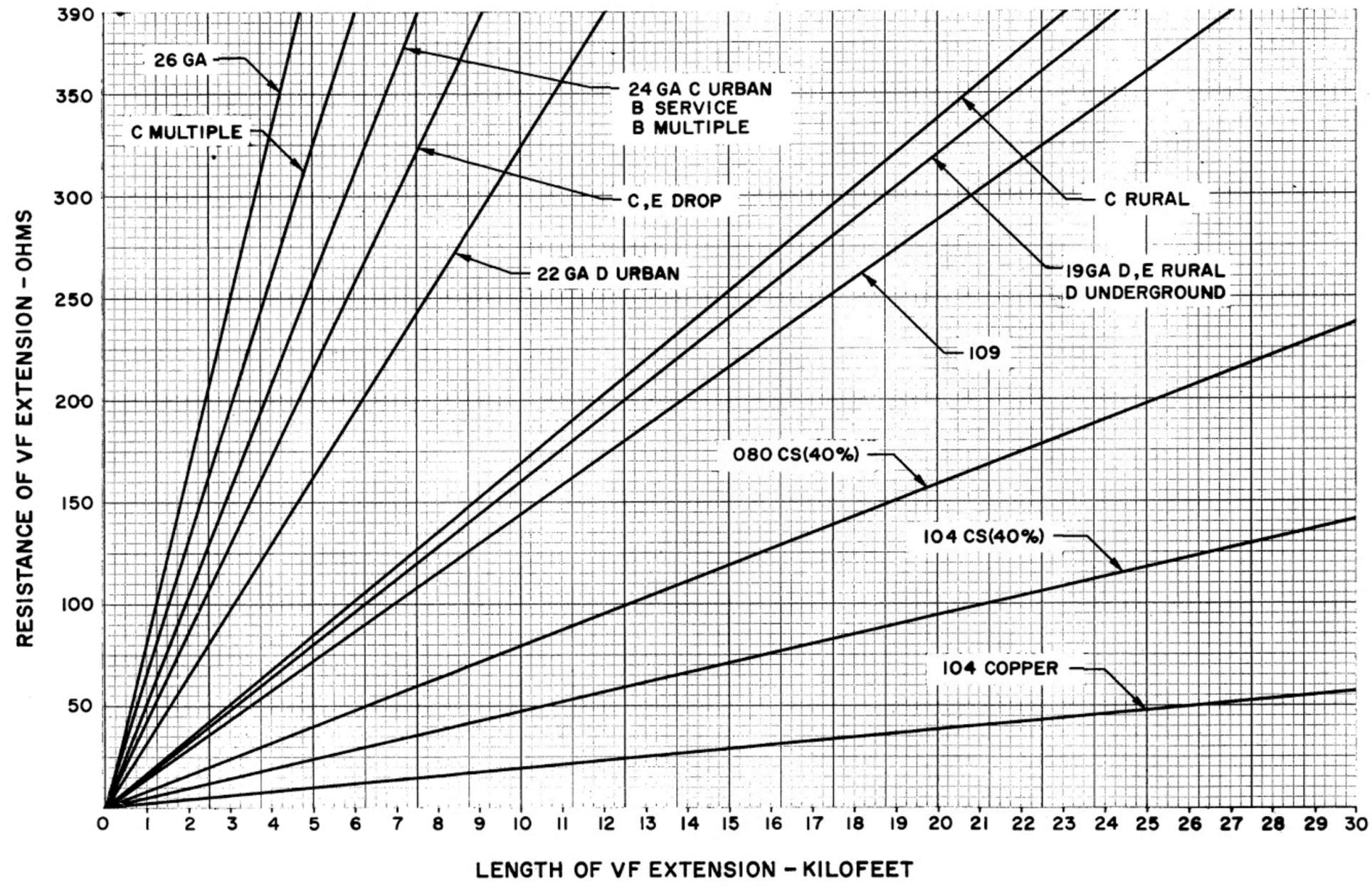
**CHART J**  
**RINGING BRIDGE LIMITATIONS**

Type of Service	Maximum Number of Ringer Connections to Line			
	804B Network*		804D Network†	
	Capacitor Ringers	Tube Ringers	Capacitor Ringers	Tube Ringers
1-Party Bridged	4	2	10	6
2-Party Full Selective	8	4	20	12
4-Party Semiselective	8	4	20	12
4-Party Full Selective		8		24
8-Party Semiselective		8		24
8-Party Divided Code	8	4	20	12

\* Arrange stations, main and extension, so that no more than four capacitor ringers or two tube ringers will be rung at any one time.

† Arrange stations, main and extension, so that no more than ten capacitor ringers or six tube ringers will be rung at any one time.

CHART K



RESISTANCE VALUES USED

Gauge	Ohms/Kilofeet
26	83.3
C MULTIPLE	65
24	51.9
C URBAN	
B SERVICE	
B MULTIPLE	
C DROP	43
E DROP	
22	32.4
D URBAN	
C RURAL	
19	16.1
D RURAL	
E RURAL	
D UNDERGROUND	
109	14.5
080	7.9
104CS	4.7
104C	1.9

Chart K