

RADIO SIGNAL SUPPRESSION FOR TELEPHONE SETS IDENTIFICATION, INSTALLATION, AND MAINTENANCE

1. GENERAL

1.01 This section contains information on the reduction of Radio Frequency Interference (RFI), also referred to as Electromagnetic Interference (EMI), in telephone sets.

1.02 This section is reissued to:

- Add information on D-180891 Kit of Parts
- Revise Fig. 6
- Update note in paragraph 2.02
- Add information on dial amplitude equalization leads.

1.03 The RFI frequently occurs where a radio station transmitter or citizens band (CB) radio equipment is located near telephone facilities. Generally the radio signal is picked up by the wire, which acts as an antenna, or the signal is radiated directly into the telephone set, and demodulated (changed to audio frequency) by nonlinear components, such as varistors, transistors, and diodes in the telephone set. **However demodulation can also result from other sources. Refer to paragraph 1.04.**

1.04 Before ordering a telephone set modified for radio signal suppression, check for the following and correct as needed:

- Corroded connections (inside and outside plant)
- Loose wire terminations (including set wiring)
- Abandoned drop wire still connected to line
- Inside wire connected but not used

- Foreign attachments.

Installing a modified telephone set on the customers premises will not be effective if demodulation is caused by any of the above conditions.

1.05 Telephone set components that may act as demodulators are:

- Transistors in amplifiers of some networks and handsets
- Varistors and transistors in TOUCH-TONE® dials
- Diodes in polarity guards
- Light emitting diodes in TRIMLINE® hand telephone sets
- Click suppression varistors across receiver units
- Carbon transmitters
- Speech equalization varistors in networks.

1.06 With the introduction of the 4228D and 4228J networks, the cause of radio signal demodulation in networks other than those in the TRIMLINE sets has effectively been minimized. In these networks the speech equalization varistors have been replaced by resistors and a strapping option which provides speech (transmission) equalization for various loop lengths.

1.07 All telephone sets, including TRIMLINE sets but excluding coin, (refer to paragraph 1.08) will be available from the local distributing house or service center modified for radio signal suppression. Modification will include changing to new network, where applicable, and placing bypass capacitors

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across all other components that may act as demodulators as listed in paragraph 1.05.



Before ordering a modified telephone set make sure that demodulation is not occurring external to the telephone set (see paragraph 1.04).

1.08 Single slot coin telephones are not modified at the service center, and where RFI is a problem, it is recommended that a 40BA capacitor be added at the protector and/or a 1542A (MD) or 1542AM inductor be substituted in place of the connecting block.

1.09 Where demodulation is attributed to components in a telephone set, or associated voice coupler, in addition to changing to a modified set it is recommended that a 40BA capacitor be placed at the protector and a 1542A or 1542AM inductor be substituted in place of the connecting block. Refer to section in Division 463 for voice coupler modifications. The capacitor will bypass, to ground, radio signals picked up by the drop wire while the inductor will tend to attenuate radio signals picked up by the inside wire. These capacitors and inductors are ineffective above 10 Megahertz (MHz) and thus will not eliminate interference from citizens band and certain short wave radios.

1.10 Where an adjacent (TOUCH-TONE phone) dial forms a part of the customers equipment and a modified telephone set is installed for RFI

reasons, the adjunct dial should also be replaced by one modified for RFI.

1.11 The MD telephone sets will not be modified for radio suppression. Where a telephone set rated MD is encountered, it should be replaced by an equivalent modular set in the current series, modified for radio suppression.

1.12 Arrange trouble visit during operation of the radio station in order that the effectiveness of corrective measures taken may be evaluated immediately.

2. IDENTIFICATION

A. Suppression Devices

2.01 Networks, 425J (MD) (Fig. 1), 4010E (MD) (Fig. 2), 4228D (Fig. 3), and 4228J (Fig. 4) have strapping options for loop equalization.

- Can be used on rotary or TOUCH-TONE dial applications.
- The 4228J network has leads terminated on a connector.
- Refer to Section 501-135-100 for additional information on networks.

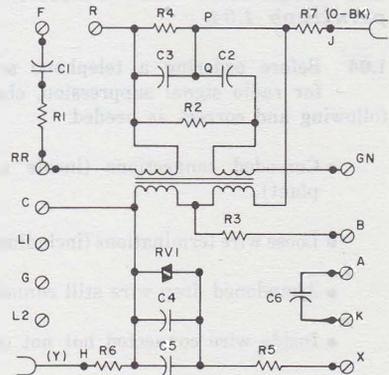
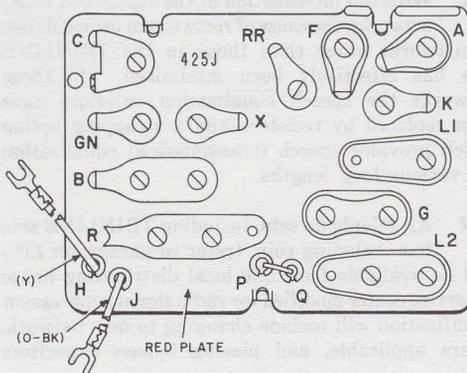


Fig. 1—425J (MD) Network, Terminal Layout, and Schematic

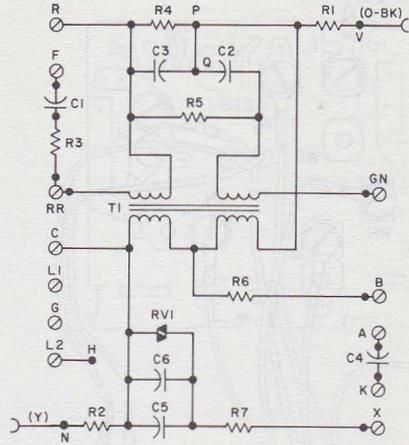
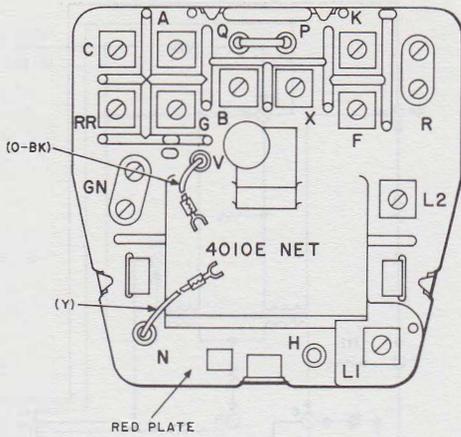


Fig. 2—4010E (MD) Network, Terminal Layout, and Schematic

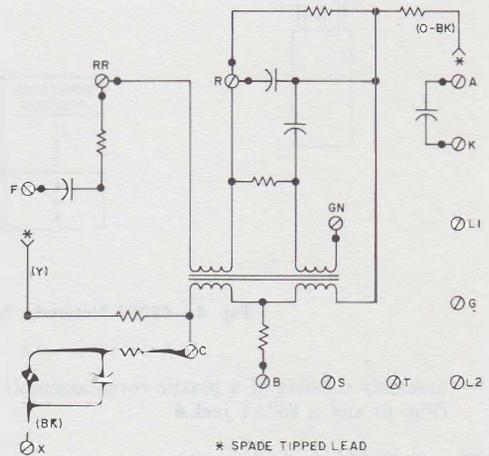
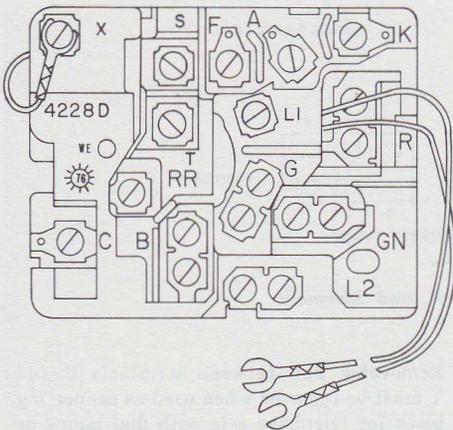


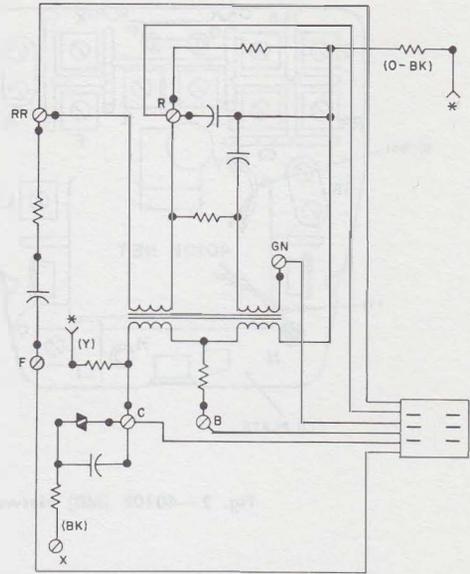
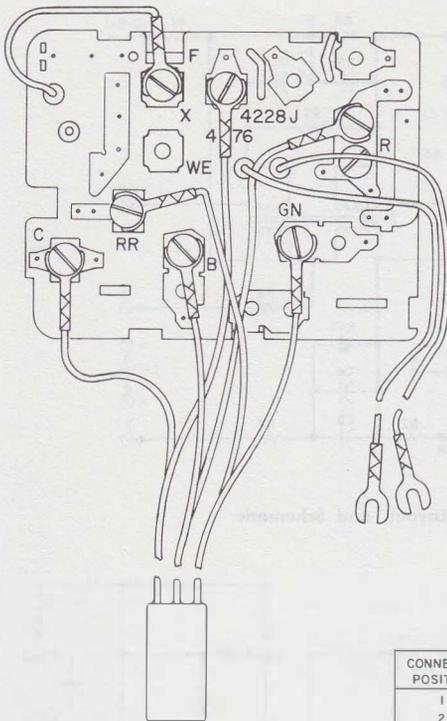
Fig. 3—4228D Network, Terminal Layout, and Schematic

2.02 1542A (MD) Inductor (Fig. 5).

- Used with nonmodular telephone sets.
- Attenuates RF line current for signals under 10 MHz.
- Can be substituted for the 42A connecting block.

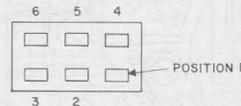
- Removable link between terminals B and Y must be removed when used as connecting block for telephone sets with dial lamps or with 30A voice coupler.

Note: A 157A cover assembly may be ordered separately to convert existing nonmodular 1542A inductors to modular. The 157A cover



* SPADE TIPPED LEAD

CONNECTOR POSITION	NETWORK TERMINAL
1	GN
2	B
3	F
4	RR
5	R
6	C



CONNECTOR PIN IDENTIFICATION

Fig. 4—4228J Network, Terminal Layout, and Schematic

assembly consists of a plastic cover assembly (Fig. 6) and a 652A4 jack. ♦

2.03 1542AM Inductor (Fig. 6).

- Used with modular telephone sets.
- Attenuates RF line current for signals under 10 MHz.
- Can be substituted for 625-type connecting block.
- Equipped with 157A cover assembly which includes a 652A4 (modular) jack. Jack mates with modular D4BU mounting cord (ordered separately).

- Removable link between terminals B and Y must be removed when used as connecting block for telephone sets with dial lamps or with 30A voice coupler.

2.04 40BA Capacitor (Fig. 7).

- Located at protector to bypass RF signals under 10 MHz to ground.

2.05 ♦D-180891 Kit of Parts:

- Used on 2220C and 2226A hand telephone sets (TRIMLINE sets) when on-hook RFI is encountered

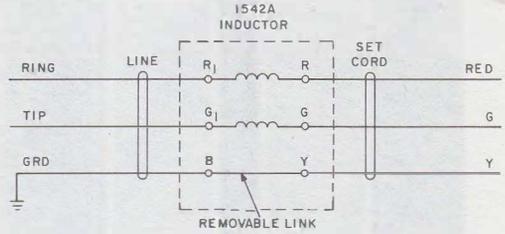
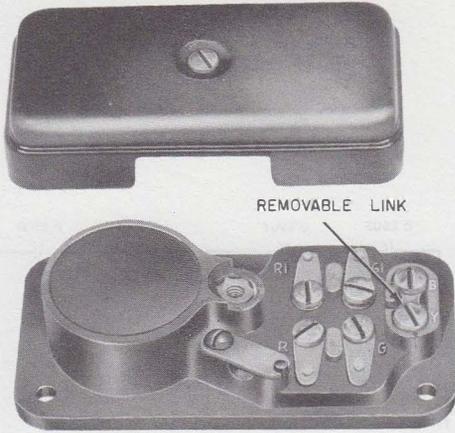
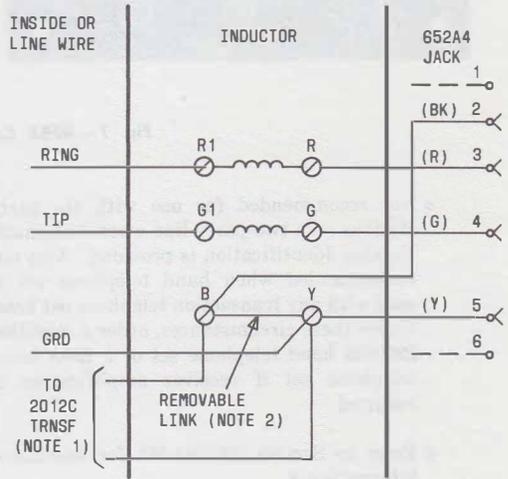
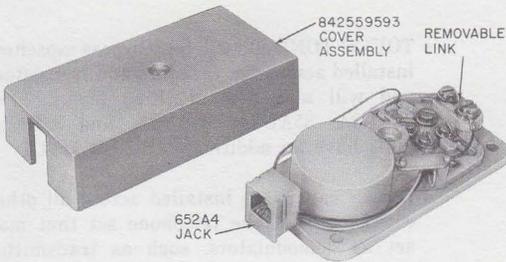


Fig. 5—1542A (MD) Inductor and Schematic



NOTES:

1. FOR TELEPHONE SETS WITH INCANDESCENT DIAL LIGHT.
2. DISCONNECT LINK WHEN INCANDESCENT DIAL LIGHT IS PROVIDED.

Fig. 6—1542AM Inductor and Schematic

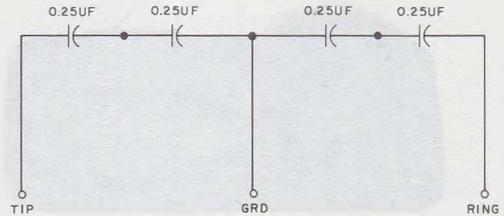
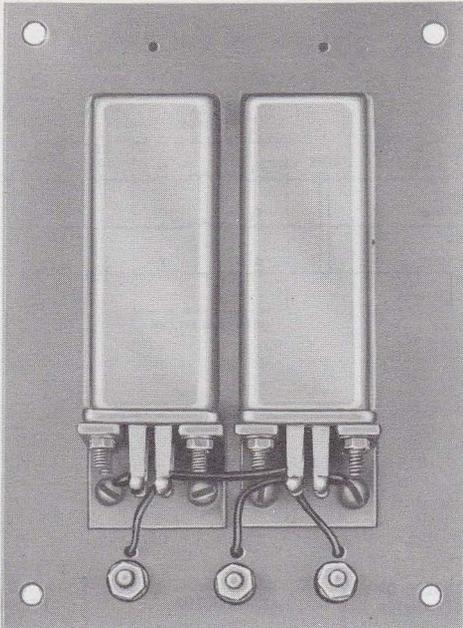


Fig. 7—40BA Capacitor and Schematic

- Not recommended for use with tip party stations on a two-party line when Automatic Number Identification is provided. Also not recommended when hand telephone set is used with any transaction telephone set base. Under these circumstances, order a modified 2220BM hand telephone set or a 226A hand telephone set if receiver amplification is required
- Refer to Section 502-303-101 for additional information.♦

B. Telephone Set Modification By Local Distributing House or Service Center

2.06 Telephone sets, except coin, currently using the 425-, 4010-, or 4228-type networks are modified as follows.

- Existing network replaced by a 4228D or 4228J network, whichever is applicable.

- TOUCH-TONE dial will have bypass capacitors installed across the varistors and transistors and will also have a (R-S) lead. ♦The 35AR3A, 35AU3A, 35AY3A, and 35BA3A dials have an additional (BR-W) lead.♦
- Bypass capacitors installed across all other components of the telephone set that may act as demodulators, such as transmitter unit, receiver unit, transistors in amplifiers, polarity guards, etc.

2.07 The TRIMLINE hand telephone sets will be modified by having bypass capacitors placed across all the components in the set that may act as demodulators.

2.08 Modified sets will not be recoded but will be identified in some manner by the local distributing house or service center.

C. Associate Apparatus Modification By Local Distributing House or Service Center

2.09 The TOUCH-TONE dials and all G-type handsets will be available from the local distributing house or service center modified for radio suppression. These will be used where an adjunct dial must be installed or where the dial or handset must be replaced for maintenance reasons.

2.10 Other modified telephone set components include 241B, 242B, and 277A amplifiers; D-180191 and D-180229 polarity guard assemblies; and 694A and 694B subsets. Modified versions of additional items will be made available in the future when they are needed.

3. ORDERING GUIDE

3.01 Associated Apparatus or Equipment (ordered separately):

- Capacitor, 40BA
- Inductor, 1542AM-49 Gray (only)
- Set, Telephone, (add code) - RF modified
- Set, Telephone, Hand, 220AM, AL, or C and 226A— RF Modified
- Set, Telephone, Hand, 2220BM or C and 2226A—RF Modified
- ♦D-180891 Kit of Parts.♦

3.02 Replaceable Components:

- Cover, 157A
- Dial - (TOUCH-TONE dial only) RF Modified
- Set, Hand, G - RF Modified.

4. INSTALLATION

4.01 Telephone Sets Equipped With 425J, 4010E, 4228D, or 4228J Networks.

- (a) Installed in usual manner.
- (b) For connections, see connection section of type set modified.

♦**Note:** The network terminal F of the 870-, 872-, 2870-, and 2872-type telephone sets is not to be used as a spare terminal or tie point.♦

(c) Sets are shipped with speech equalization option leads insulated and stored.

(1) For loops greater than 500 ohms leave insulated and stored.

(2) For loops 500 ohms or less connect (yellow) and (orange-black) leads to terminals RR and R, respectively, on the 425J, 4010E, 4228D, and 4228J network.

(d) ♦The (R-S) and (BR-W) dial leads.

(1) For sets with a 35AR3A, 35AU3A, 35AY3A, or 35BA3A dial, connect the (R-S) dial lead to network terminal X for loops greater than 500 ohms. For loops less than 500 ohms, connect the (BR-W) dial lead to network terminal X.

(2) For all other type dials, connect the (R-S) dial lead to network terminal X for all loops.♦

4.02 Modified TRIMLINE Telephones.

- (a) Install in usual manner.
- (b) Refer to connection section in Division 502.

4.03 1542A (MD) Inductor (Fig. 8).

- (a) Use as connecting block for nonmodular telephone set cord or install as near to telephone set as possible.
- (b) Locate as near as possible to wall-type sets.

4.04 1542AM Inductor (Fig. 6).

- (a) Use as connecting block to terminate inside or line wire. Modular mounting cord plugs into jack provided with inductor and the telephone set.
- (b) Install as near as possible to wall-type sets.

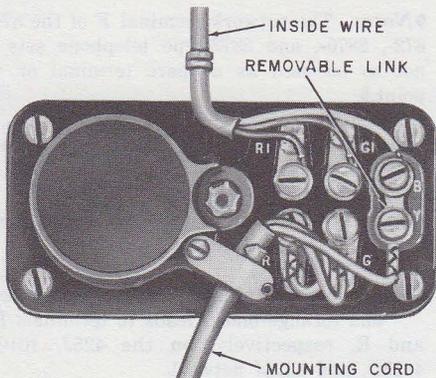


Fig. 8—Cording Diagram, 1542A (MD) Inductor

4.05 40BA Capacitor (Fig. 9).

- (a) Install near and connect to protector with as short as possible piece of inside wire.
- (b) Station wires must connect to the capacitor.
- (c) Mounted inside when outside protector is used.

- (d) **Protector ground must be upgraded to the best possible ground available.**

4.06 ♦D-180891 Kit of Parts.

Note: When this kit of parts is installed in the 2220C or 2226A hand telephone set, the base also must be modified per Table A, B, C, or D of this section.

- (a) Refer to Section 502-303-102 for connection information of kit of parts in the 2220C and 2226A hand telephone sets.
- (b) If the 73B control unit of the 50A1 portable conference telephone set is subjected to RFI, refer to Section 512-630-111 for suppression information.♦

5. MAINTENANCE

5.01 Normal maintenance can be performed on modified telephone sets. Modified TOUCH-TONE dials and G-type handsets are available from the local distributing house or service center for maintenance.

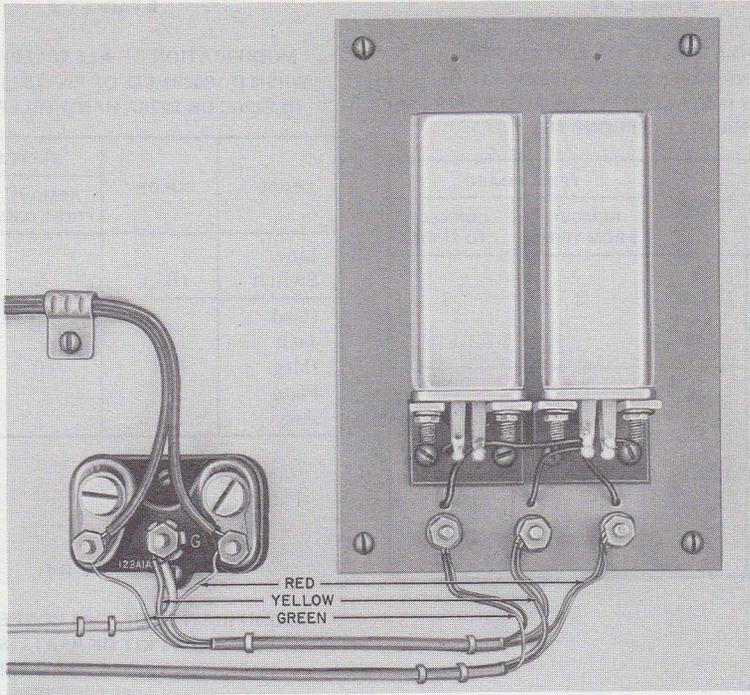


Fig. 9—123A1A Protector with 40BA Capacitor Installed

◆ TABLE A ◆

MODIFICATION OF AC- AND AD-TYPE
TELEPHONE BASES WHEN D-180891 KIT OF
PARTS IS INSTALLED IN 2220C OR 2226A
HAND TELEPHONE SET

LEADS	COLOR	TERM. BOARD	
		REMOVE FROM TERM.	CONNECT TO TERM.
Handset Cord Jack	(Y) or (W)	3	1
Inside Wire, 523-Type Plug, Mtg. Cord Jack, or 623T4 Jack	(BK)	1	3

◆ TABLE B ◆

MODIFICATION OF 2950A-TYPE TELEPHONE
SETS WHEN D-180891 KIT OF PARTS IS
INSTALLED IN ASSOCIATED HAND
TELEPHONE SET

LEADS	COLOR	TERM. BOARD	
		REMOVE FROM TERM.	CONNECT TO TERM.
Line Switch	(S)	L2	*
	(Y)	L2	4
	(BR)	L2	1

* Insulate and store.

◆ TABLE C ◆

MODIFICATION OF AL1 TELEPHONE BASE
WHEN D-180891 KIT OF PARTS IS INSTALLED
IN 2220C OR 2226A HAND TELEPHONE SET

LEADS	COLOR	TERM. BOARD ASSY.	
		REMOVE FROM TERM.	CONNECT TO TERM.
Line Switch	(BL)	2	10
Cord Jack (Mtg. Plate Assy.)	(Y)	10	2

◆ TABLE D ◆

MODIFICATION OF 50A1 CONFERENCE SET
WHEN D-180891 KIT OF PARTS IS INSTALLED
IN 2220C OR 2226A HAND TELEPHONE
SET (NOTE)

LEADS	COLOR	TERM. BOARD ASSY.	
		REMOVE FROM TERM.	CONNECT TO TERM.
Hand Tel Set	(W)	*	14
Cord Jack Leads	(BK)	*	15

* Insulated and stored.

Note: This modification applies to sets with
serial numbers 100,000 and higher
preceded by the letter prefix A, only.