

## INSTALLATION

### RADIO FREQUENCY DEMODULATION SUPPRESSORS

#### 1. GENERAL

1.01 This section contains instructions for testing telephone circuits for Radio Frequency Interference (RFI) and installing devices which function as interference suppressors.

1.02 This section has been revised to broaden the application of the SE1542A induction coil.

#### 2. DESCRIPTION

2.01 RFI signals can be picked up or demodulated by various components of the telephone plant. This detection process results in noise or undesired audio signals appearing in the telephone receiver. Parts of the telephone plant which are most susceptible to RFI are telephone set transmitters; varistors; poor electrical connections associated with inside wire, open wire, drop wire, or aerial cable; and defective protector carbon blocks.

2.02 The telephone set is the component most susceptible to RF pickup. The next most troublesome element is found in connections and splices where corrosion has developed. This problem can be greatly reduced by making original connections clean and tight.

2.03 In some cases, high-frequency potentials of appreciable magnitude to ground may be present on cables or wires. It is possible for high-frequency induction to cause arcing to ground across open space protectors resulting in a sputtering or crackling noise in the receiver. Should it appear that an abnormal level of high-frequency energy is present on a customer's line, refer the matter to the Engineering Department.

#### 3. TEST PROCEDURE

3.01 A hand test telephone, with the transmitter shunted out, is required for the following test procedure. If the transmitter is not shunted out, it may demodulate the radio signal and render the test invalid. The following procedure is used to determine whether the source of RFI is within the telephone set, in a component or in a line connection external to the set. The same

procedure should also be used for interference testing on electronic equipment.

- (1) Place all telephone sets in the circuit to be tested on hook.
- (2) Bridge the modified (transmitter shunted out) hand test telephone across the line.
- (3) If radio interference is heard, it indicates that the source of RFI is external to the telephone sets. In this case, perform corrective action as described in Part 4, "RFI Corrective Measures - External".
- (4) If radio interference is not heard, it indicates that the source of RFI is internal to one or more telephone sets. In this case, perform corrective action as described in Part 5, "RFI Corrective Measures - Internal".

3.02 Because of the numerous possible sources of such interference and the unpredictable level of RFI energy which might prevail, it is impossible to prescribe a specific series of instructions which may be uniformly applied in correcting all RFI trouble. Each case of RFI trouble must be investigated and a solution determined based on those conditions which are peculiar to the location involved. Therefore, one or more of the following corrective measures may be required to correct a given case of RFI.

3.03 If the methods outlined in this section do not eliminate RFI, refer the problem to the Engineering Department.

#### 4. RFI CORRECTIVE MEASURES - EXTERNAL

4.01 In those instances where RFI is determined to be external to the telephone set, it will first be necessary to check all line connections between the cable terminal and the telephone set connecting block. This check should also include an inspection of station protector and protected cable terminal carbons where found. All corroded connections should be cleaned and defective carbon blocks should be replaced. If RFI problem is still evident, proceed as follows:

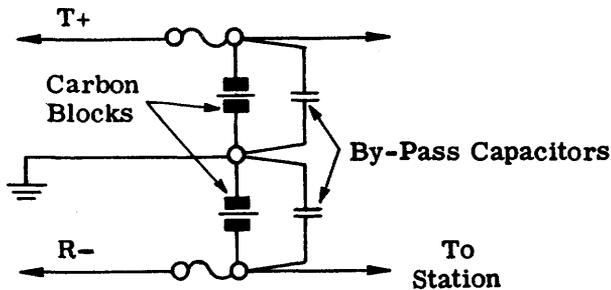


Figure 1. Capacitor Installation on Station Protector

4.02 Small ceramic disk-type capacitors of  $\pm 20$  percent tolerance and a 500 volt rating when installed at the station protector will alleviate RFI. Capacitors of the following values should be obtained for RFI applications:

0.01 MFD      0.02 MFD      0.03 MFD

4.03 Two capacitors are required for RFI suppression at the station protector (see Fig. 1). It may be necessary to substitute capacitors of various values until interference elimination is achieved. It is desirable to employ the minimum capacitance necessary to eliminate the trouble. Thus, 0.03 MFD units would not be used if 0.01 MFD capacitors would clear the line and in no event would 0.01 MFD and 0.02 MFD or similar unequal combinations be employed. Install capacitors as follows:

- (1) Insulate capacitor leads with standard tubing. Keep leads as short as possible.
- (2) Terminate one lead of the first capacitor on the tip and one lead of the second capacitor on the ring terminal on the station side of the protector.
- (3) Terminate the other lead of each capacitor on the ground post of the protector.

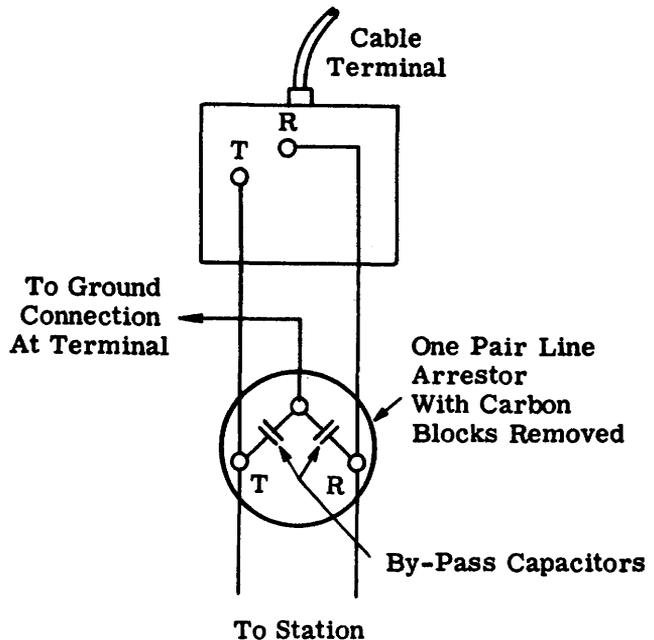


Figure 2. Capacitor Installation at Cable Terminal

4.04 In some severe cases of RFI, it may be necessary to place by-pass capacitors at the serving terminal in addition to those placed within the telephone set or protector. These additional capacitors shall be mounted outside the terminal in a one pair line arrester (either cable or open wire type is acceptable). Mount the arrester as close to the terminal as possible keeping in mind the need to avoid climbing area infractions while maintaining easy access to the cable terminal. Remove carbon blocks before installing capacitors. Carbon blocks are not to be used in this application of the line arrester. Refer to Fig. 2 and proceed as follows:

- (1) Insulate capacitor leads with standard tubing. Keep leads as short as possible.
- (2) Terminate one lead of the first capacitor on the tip and one lead of the second capacitor on the ring terminal of the arrester.
- (3) Terminate the other lead of each capacitor on the ground terminal of the line arrester.
- (4) Connect short lengths of drop wire between tip terminals and between ring terminals of cable terminal and line arrester.

- (5) Place a short length of wire between a dependable ground connection on the cable terminal and the ground terminal of the line arrester.

## 5. RFI CORRECTIVE MEASURES -- INTERNAL

5.01 In those instances where RFI is determined to be internal to the telephone sets, it will first be necessary to check for loose or corroded line connections. This check should also include an inspection for defective telephone set cords. (Sometimes replacement of the transmitter and receiver capsules will eliminate an RFI problem.) If the RFI problem is still evident after the above inspections and appropriate corrective measures, install either drainage capacitors or an inductor as follows. In some severe cases, a combination of both will be required.

### Capacitors

5.02 Install drainage capacitors within the telephone set according to the procedure outlined in the GSP (473 series) for that particular telephone set.

### Inductor

5.03 An SE1542A inductor can be effectively used as a radio frequency suppression coil. The inductor should be installed as close as possible to the telephone set. The mounting block is designed to be mounted on a wall in place of the usual telephone connecting block. Inductor mounting block installation procedures are similar to connecting block installation procedures (see Fig. 3). If the inductor is used with an instrument that does not require a connecting block, the inductor should be connected across the line as close as possible to the instrument's subset.

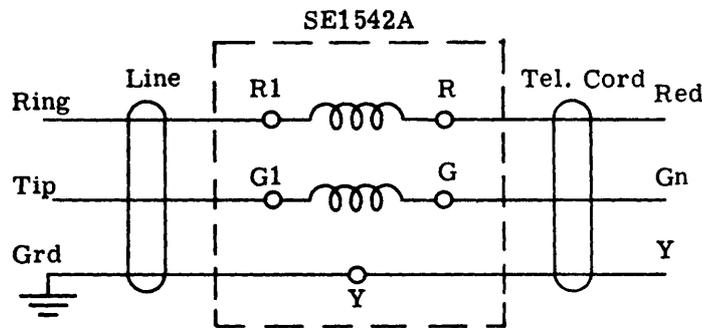


Figure 3. SE1542A Schematic