DUMONT

First with the Finest in Television

SERVICE NOTES

FOR

DU MONT TELESETS

ALLEN B. DU MONT LABORATORIES, INC.

Teleset Service Control Department

MARKET STREET **EAST PATERSON, N. J.**

Installation

INSTALLATION SECTION

This section is devoted to the solution of problems normally encountered in installations. Not only will this section cover the installation itself but will also pertain to interference and other adverse conditions that may be present at the point of installation.

We are interested in obtaining from the servicemen in the field, case histories of installations that are unusual and would be of interest and value to other servicemen.

We plan to include a bibliography of various references that may be read by the TV serviceman to further his knowledge of installations.

We intend to publish in the not too distant future, a manual devoted entirely to the proper installation of Du Mont Telesets. We hope to make this manual as practical and useful as possible and welcome all suggestions from you men in the field.

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INSTALLATION

All Du Mont Telesets are designed using 72 ohm unbalanced input. Therefore, for optimum performance it is desirable that coaxial cable be used for the transmission line.

In locations where the signal is strong RG-59/U cable is satisfactory. However, in fringe areas it is essential that the transmission line losses be kept to an absolute minimum. Therefore, the use of RG-59/U in these areas is not advisable.

A much lower loss coaxial cable that can be used in place of RG-59/U in fringe areas is identified as RG-11/U. The line losses in this cable are slightly lower than that in the 300 ohm twin lead cable as commonly used with 300 ohm receivers. It is recommended that whenever necessary RG-11/U transmission line be used.

It is possible to use the 300 ohm twin lead transmission line with Du Mont Telesets in fringe areas. However, some means for converting the balanced 300 ohm line to the unbalanced 72 ohm input will have to be used.

One commercial type of transformer that can be used for this purpose is known as the Workshop T72 transformer. However, it should be pointed out that if the Teleset is to be located in a weak signal area where considerable noise is present it is not advisable to use the 300 ohm twin lead since the noise pick up on this line is greater than that when using RG-11/U coaxial cable.

ELECTRICAL CHARACTERISTICS OF COAXIAL CABLES FOR USE WITH DU MONT TELESETS

JAN Type No.	Du Mont Part No.	Characteristic Impedance-Zo ohms	Nominal Attenuation -DB per 100' 30 Mc	100 Mc	300 Mc	400 Mc
RG-59/U	23-547	73 ± 3	2.0	3.8	7.0	8.9
RG-11/U	None	75 ± 3	---	2.1	3.8	5.3

RECEPTION AFFECTED BY TREE FOLIAGE

When making installations, it should be understood that any mass of foliage between receiving antenna and the transmitter location will seriously affect reception.

This is definitely noticeable in weak signal areas and causes the reception to vary with the condition of the foliage. Obviously the reception would be better in those months when there are no leaves on the trees.

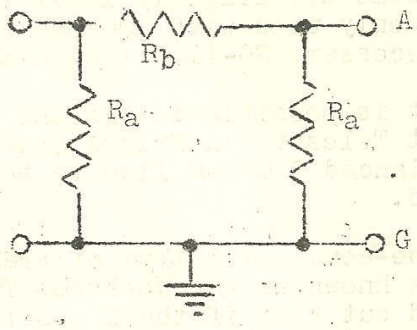
Thus, in weak signal areas, to obtain consistent reception, the antenna should be raised above the trees.

ATTENUATORS FOR REDUCING SIGNAL LEVEL AT INPUT TERMINALS OF DU MONT TELESETS

In certain areas where Telesets are installed, the signal level is too high to permit proper control of synchronization. One of the best methods in use to reduce signal strength to usable levels is the "Pi" type resistance attenuator.

For the convenience of servicemen, the following circuit diagram and table of values of a standard attentuator is published.

db Attenuation Desired	R_a (ohms)	R_b (ohms)
5	257	43.8
10	139	102.5
15	103	196
20	88	356
25	80.5	637
30	76.7	1140
35	74.6	2020
40	73.4	4600
45	72.8	6400
50	72.5	11380



REPORT OF INTERFERENCE ON TELEVISION CHANNELS

The Federal Communication Commission has advised us that a rather large number of complaints have recently been received from owners of Du Mont television sets regarding interference on television channels. The interference reported has included code transmissions, amateur code and telephone transmissions, and FM broadcasting transmissions.

In each case the complainant apparently was acting on advice received from servicemen. As a result of complaints received, the FCC has had to make investigation of conditions which, in many cases, should not have been reported in the first place to the Commission, as the interference was due to improper adjustment of the receiver or faulty installation.

It is desired that servicemen receiving complaints of such interference obtain full information concerning the source of the interference, frequency on which received, type of interference, etc., and submit such information to the Teleset Service Control Department for investigation. Individual customers should not be advised to complain directly to the Commission.

HIGH VOLTAGE WARNING!

New York daily papers for May 5, 1948 carried an item concerning the accidental death of two television installation men who were electrocuted while engaged in installing a television receiver at a Long Island residence. The death of these two men was caused by their aluminum ladder coming into contact with a 13,000 volt high tension line.

The untimely death of these two installation men is a regrettable occurrence and is mentioned here as a warning to all installation men against one of the several hazards which may be encountered in connection with their work. Many service organizations and dealers are now using aluminum ladders because of their light weight and handiness on the job. However, all workers should be warned that such metal ladders, being excellent conductors, should be handled with particular care to avoid letting them come into contact with high voltage wires.

INSTALLATION OF TELEVISION RECEIVER ANTENNA

A recent letter from the Radio Manufacturer's Association, addressed to all Television Receiver Manufacturers, pointed out that in many cases installations being made by dealers and service organizations are not in accordance with the National Electric Code.

Violations mentioned included the use of Telephone Company standoff insulators to hold antenna lead-in, and the lack of outside lightning arresters or grounded shielding.

Portions of Article 810 of the National Electric Code which apply to Television Receiver installations are quoted herewith for your information.

"8112. SUPPORTS. Outdoor antenna and counterpoise and lead-in conductors shall be securely supported. They shall not be attached to poles or similar structures carrying electric light or power wires or trolley wires of more than 250 volts. Insulators supporting the antenna or counter-poise conductors shall have sufficient mechanical strength to safely support the conductors. Lead-in conductors shall be securely attached to the antenna.

8113. AVOIDANCE OF CONTACTS WITH CONDUCTORS OF OTHER SYSTEMS. Outdoor antenna, counter-poise and lead-in conductors from an antenna to a building shall not cross over electric light or power circuits and shall be kept well away from all such circuits so as to avoid the possibility of accidental contact. Where proximity to electric light and power service conductors of less than 250 volts cannot be avoided, the installation shall be such as to provide a clearance of at least two feet. It is recommended that antenna and counter-poise conductors be so installed as not to cross under electric light or power conductors.

8115. INDOOR ANTENNA. There are no requirements for indoor antennas except that they shall have the same clearance from the conductors of electric light and power circuits and signaling circuits as is required for lead-in conductors.

8122. SIZE OF LEAD-IN. Lead-in conductors from outside antenna, and counter-poise for receiving stations, shall, for various maximum open span lengths, be of such size as to have a tensile strength at least as great as that of the conductors for antenna as specified in section 8121. When the lead-in consists of two or more conductors which are twisted together or are enclosed in the same covering or are concentric, the conductor size shall, for various maximum open span lengths, be such that the tensile strength of the combination will be at least as great as that of the conductors for antenna as specified in section 8121.

8123. ON BUILDINGS. Lead-in conductors attached to building shall be so installed that they cannot swing closer than two feet to the conductors of circuits of 250 volts or less or ten feet to the conductors of circuits of more than 250 volts, except in the case of circuits not exceeding 150 volts, if all conductors involved are supported so as to insure permanent separation, the clearance may be reduced but shall not be less than four inches. The clearance between lead-in conductors and any conductor forming a part of a lightning rod system shall be not less than six feet.

8141. LIGHTNING ARRESTERS-RECEIVING STATIONS. Each conductor of a lead-in from an outdoor antenna shall be provided with a lightning-arrester approved for the purpose, except where the lead-in conductors from antenna to entrance to building are protected by a continuous metallic shield which is permanently and effectively grounded. Lightning arresters shall be located outside the building, or inside the building between the point of entrance of the lead-in and the radio set or transformers, and as near as practicable to the entrance of the conductors to the building. The lightning arrester shall not be located near combustible material nor in a hazardous location.

8161. INSIDE OR OUTSIDE BUILDING. The grounding conductor may be run either inside or outside the building.

8162. SIZE OF PROTECTIVE GROUND. The protective grounding conductor for receiving stations shall be not smaller than No. 14 copper or No. 17 copperclad steel or bronze, provided that where wholly inside the building it shall not be smaller than No. 18.

8163. COMMON GROUND. A single grounding conductor may be used for both protective and operating purposes.

If a single conductor is so used, the ground terminal of the equipment should be connected to the ground terminal of the protective device.

8181. CLEARANCE FROM OTHER CONDUCTORS. Except as provided in Article 640, all conductors inside the building shall be separated at least 4 inches from the conductor of any other light or signal circuit unless separated therefrom, by conduit or some firmly fixed non-conductor such as porcelain tubes or flexible tubing.

8182. RADIO NOISE SUPPRESSORS. Radio interference eliminators, interference capacitors or radio noise suppressors connected to power supply leads shall be of a type approved for the purpose. They shall not be exposed to mechanical injury."

It will be noted that a lightning arrester is not required under paragraph 8141 when the lead-in conductors from antenna to entrance of building are protected by a continuous shield which is permanently and effectively grounded. Such requirement would, therefore, be met by proper grounding of the outer shield of the regular coax cable now recommended for use with all Du Mont receiver installations. Installation men should be particularly cautioned to comply with paragraph 8123 and 8181 and to refrain from the use of insulators or cable clips installed on or in buildings by Telephone or Lighting Companies.

It is suggested that all service organizations obtain a copy of the 1947 National Electrical Code and insure that all of their installation men are familiar not only with the requirements of Article 810 but with the general requirements for running cable, installing fittings and other requirements which should be compiled with in connection with any installation work.

Compliance with the National Electrical Code will insure the service organizations or dealers concerned against the possibility of complaint or civil action.

REPORT ON INTERFERENCE ELIMINATION IN CUSTOM INSTALLATION

Some time ago an RA-101 Custom installation was made on the first floor of a 17-story apartment building in the heart of New York. The installation, made by one of our better and well known service organizations, was apparently normal with the exception that WABD could not be received. However, as the customer was informed by the installation crew that his location was such that only WCBS and WNBT could be received, he accepted the job as satisfactory.

Several months later a tenant on the 9th floor purchased a new Magnavox radio receiver and immediately experienced trouble. After thorough investigation by various service men, dealers, representatives, and the superintendent of the building, the cause of the various squeals, howls, and general interference on the Magnavox and the other receivers throughout the building was thought to be the "antenna" of the television receiver in the first floor restaurant. The realty company managing the apartment house directed the immediate removal of the antenna, which had been installed without their permission, under dire threats of lawsuits and other unpleasant things.

At this point, the set owner, the dealer and the service organization were all very unhappy and requested the assistance of Du Mont. An engineer from Quality Control was detailed to the job with the following results.

The antenna itself was found to be not at fault so far as radiation was concerned, although the interference was very definitely caused by the installation as a whole.

Further check showed that a portion of the interference was originating in the leads from the sweep chassis to the deflection yoke. This condition was somewhat improved by shielding both the cable between the sweep chassis and the deflection yoke and the CRT grid lead between the sweep chassis and the base of the CRT.

The next step was to shield the deflection yoke, as well as all cables between the cathode ray tube and the sweep chassis.

In connection with the shielding operations, a jumper was found between the center conductor of the antenna coax and ground. This jumper was removed and caused such an increase in signal

level received that the Teleset would not sync. A 20DB attenuator was then provided and installed in the antenna line at the receiver.

Some interference was still experienced in various radio receivers about the building so the antenna lead was traced through. It was found that this lead had been run from the first floor to the roof through a 3-inch conduit which also contained the open antenna lines for all standard radio receivers in the building. The shield of the antenna lead had not been grounded at any point throughout this run. By grounding the antenna coax shield at approximately every alternate floor through the building and at the antenna, it was found that the last of the interference had been eliminated.

The removal of the jumper previously mentioned and the substitution of the attenuator had increased the horizontal resolution of the received picture from 250 lines to 300. However, WABD was still not receivable with a usable picture, so, being on the spot, the engineer determined to find out why. After considerable experimentation and relocation of the antenna, an optimum location was found. A combination H antenna and vertical whip was installed and found to give satisfactory performance on all three stations - WABD, WNBT and WCBS.

Details of the grounding of the antenna lead and the shielding of the set leads are as follows:

The antenna distribution system in the building consists of a 3" conduit from roof to basement. The conduit is interrupted at each floor by an outlet box which permits taking an antenna from the conduit at any floor desired. The grounding of the antenna coax lead was done by stripping 1" of insulation at various points and running a bond from the coax shield to the inside wall of the conduit box. This was done at the 2nd, 3rd, 5th, 7th, 9th, 11th, 14th, and 16th floors. The conduit itself was then grounded to the water tank on the roof and to a water pipe in the basement using shield braid.

The five leads between the sweep chassis and the deflection yoke were shielded by pulling same through a 1/4" shield braid, and the seven leads between the sweep chassis and the base of the C.R.T. were pulled through a second 1/4" shield braid. (Du Mont part number for this shield braid is 23-16).

The special shield for the deflection yoke was a copper cylindrical type as shown in Figure 1.

The attenuator used was a simple resistance 'L' type.

The particular points which should be stressed in installations of this type are:

1. Be sure that authority to install the antenna and installation is obtained in writing by the set owner from the realty company concerned.

2. Do not run long coax leads in proximity to other antenna leads or building wiring without adequate grounding of the shield.

3. When signal strength is too high, use proper attenuators rather than makeshift devices which affect the picture resolution.

4. Use special shielding on long leads when necessary. Remember, it is entirely possible to operate a standard AM receiver within 10 feet of a properly installed Teleset without interference.

5. Do not give up too easily on location and type determination of the antenna. The antenna is the most important part of the installation and many service calls about snow, ghosts, and poor reception of certain stations can be eliminated at the outset by experimentation. In many cases, it is necessary to use two antennas of different types to obtain proper results.

6. Get in touch with Du Mont for assistance when you run into troubles you can't lick singlehanded.

ELIMINATION OF ANTENNA WIND NOISE

In certain locations, high winds have caused the antenna array to "howl", whistle, or vibrate. In New Hampshire and certain parts of Massachusetts the procedure has been to fill the antenna elements with saw dust and to close the ends with putty. The mast is also filled with saw dust and is calked at both ends. Guy wires are loosened slightly if they tend to "sing" at an audible frequency. Inserting wooden dowels in the antenna rods and squeezing down the ends of the antenna will produce similar results.

INSTALLATION SECTION

FM INTERFERENCE

Interference from FM broadcasting stations has caused some difficulty in most locations throughout the country. The interference may be caused by reception of an FM station on the image frequency of the television channel being received. Channel 2 is most susceptible to interference from an image. This can readily be seen in the following chart:

Channel	Range	Video Carrier	Local Oscillator	Image Frequency
2	54-60 mc	55.25 mc	81.65 mc	103.25 - 108 mc

Since 26.4 mc is the video IF frequency that corresponds to the video carrier, the local oscillator is equal to the video carrier frequency plus 26.4 mc (81.65 mc). The local oscillator also beats with other signals that may be applied to the mixer. If the signal from a strong FM station (frequency between 103.25 mc and 108 mc) is applied to the mixer the local oscillator will beat with it to produce a signal between 22-26.4 mc. This can be passed by the IF amplifier and appear on the picture tube at the same time as the channel 2 signal, thus causing interference. The intensity of the interference of course depends on the strength of the image signal.

FM interference may also be caused by fundamental overloading of the RF and mixer stages by a strong FM station. This results in generation of harmonics of the FM station frequency. The second harmonic is the most annoying as it usually falls into and causes interference with, one of the higher TV channels.

The basic principle behind the elimination of FM interference of either type is to attenuate the FM signal at its fundamental frequency. This may be accomplished by the use of a trap in the antenna input to the receiver. A simple parallel resonant trap which is available from the Teleset Service Control Department may be inserted in series with the transmission line to accomplish the desired results.

This trap is designed to tune over the FM band (88-108 mc) and, therefore, attenuate the signal. This trap has been used in many locations and has been found to work satisfactorily. The normal method of installation is shown in Figure 1.

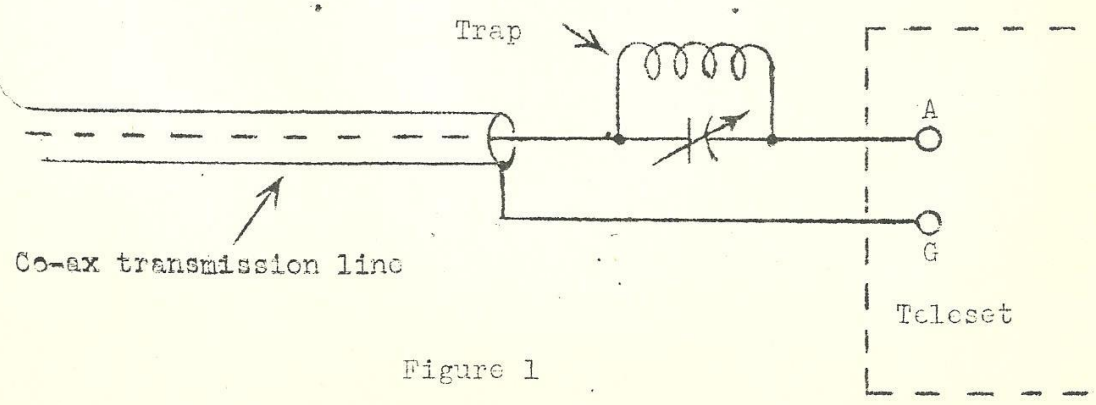


Figure 1

In some very extreme cases of interference, especially where the Teleset is located close to the FM station, it is necessary to insert one trap in the shield of the coax as well as one in the hot side of the line. This is shown in Figure 2.

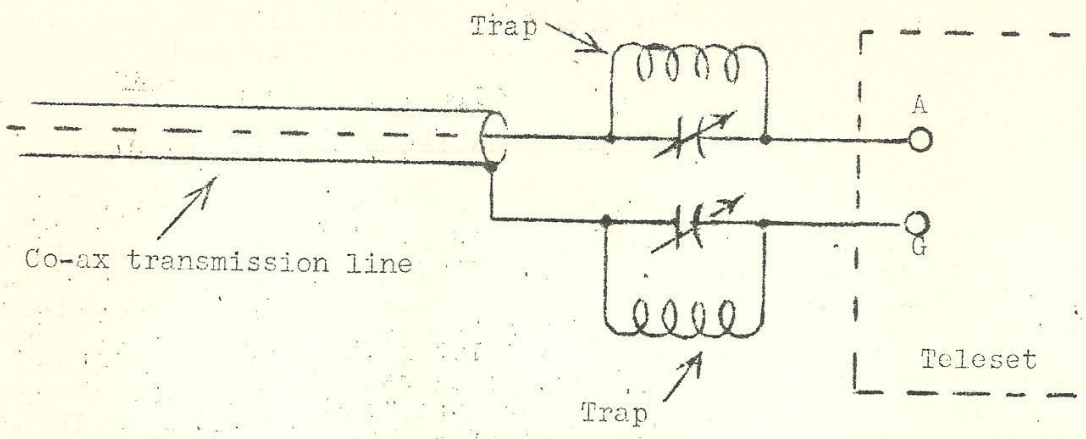


Figure 2

These traps may be purchased from the Teleset Service Control Department for $.50 each. Please contact this department if any difficulty is encountered in the elimination of FM interference.

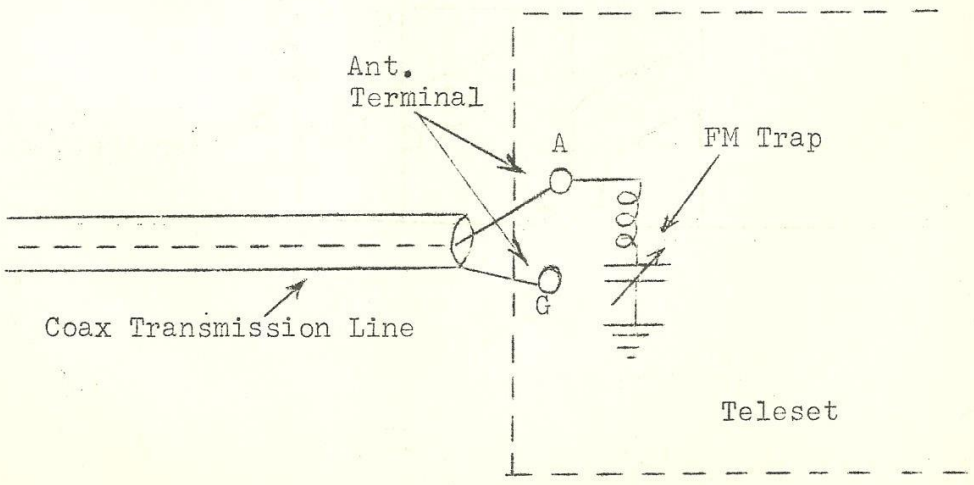
Series Resonant Traps for FM Interference

The parallel resonant trap has been found to be very inconvenient to install in the 72 ohm coax type of antenna lead used on Du Mont Telesets. A more convenient and equally effective method for eliminating FM interference in many locations is the insertion of a series resonant trap shunted across the transmission line at the antenna terminal of the receiver. This series trap is designed to tune over the FM band (88-108 mc) and can be easily adjusted for resonance at the frequency of the interfering station.

Series FM traps may be purchased from the Teleset Service Control Department for $.50 each. For convenience in mounting, two types of series traps are available:

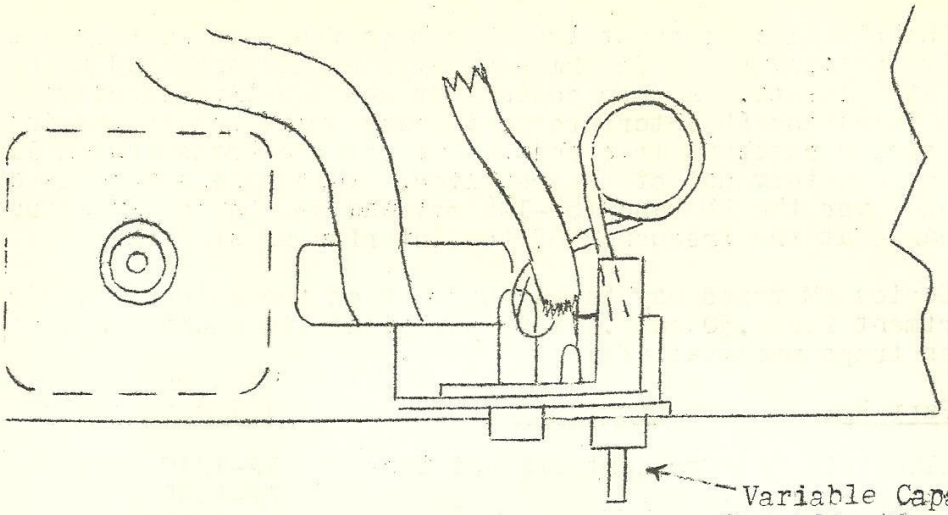
Part No.	Description	Used on Teleset Models
21005881	Straight Bracket Type	RA-103C RA-103D RA-104A RA-110A
21005891	"L" Bracket Type	RA-105A RA-105B RA-106 RA-108A

Because of the convenience in mounting the series trap, the parallel FM trap will no longer be available. For installation instruction, see the following sketches.

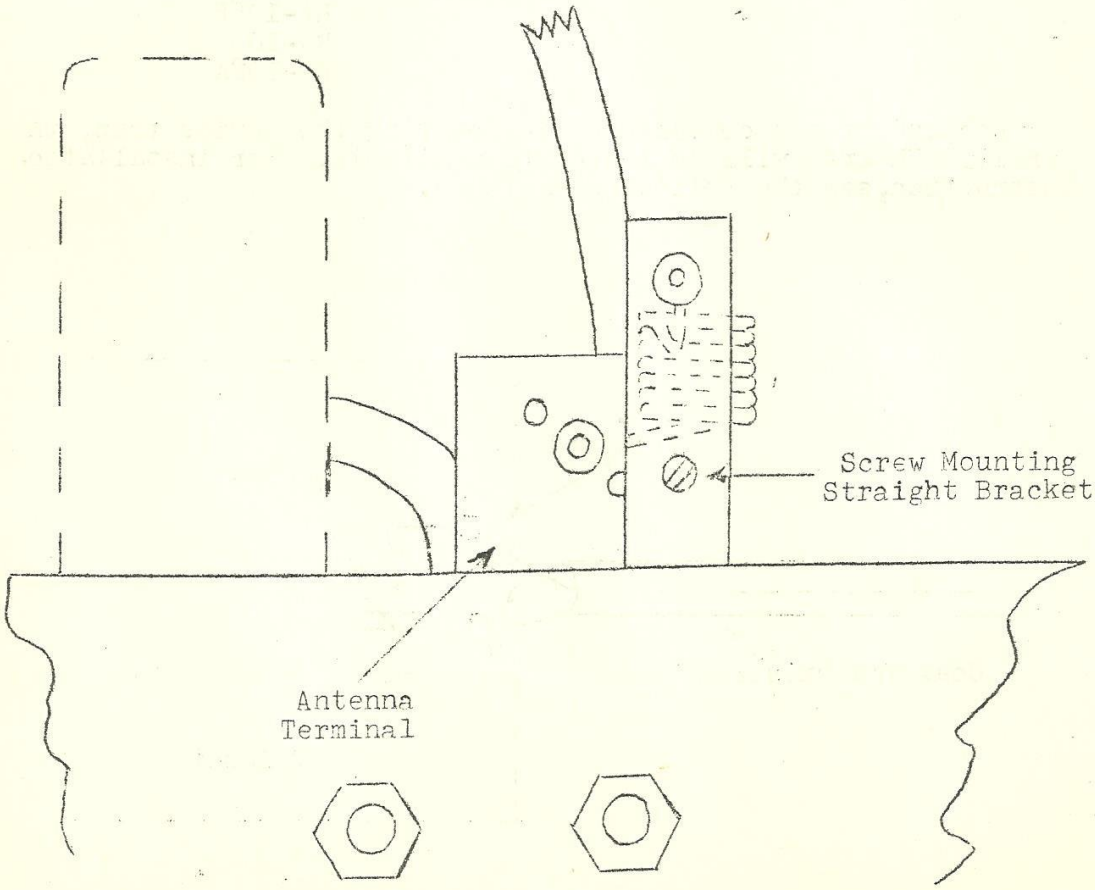


FM Series Trap - Straight Bracket Type

Used on RA-103C - RA-103D - RA-104A - RA-110A



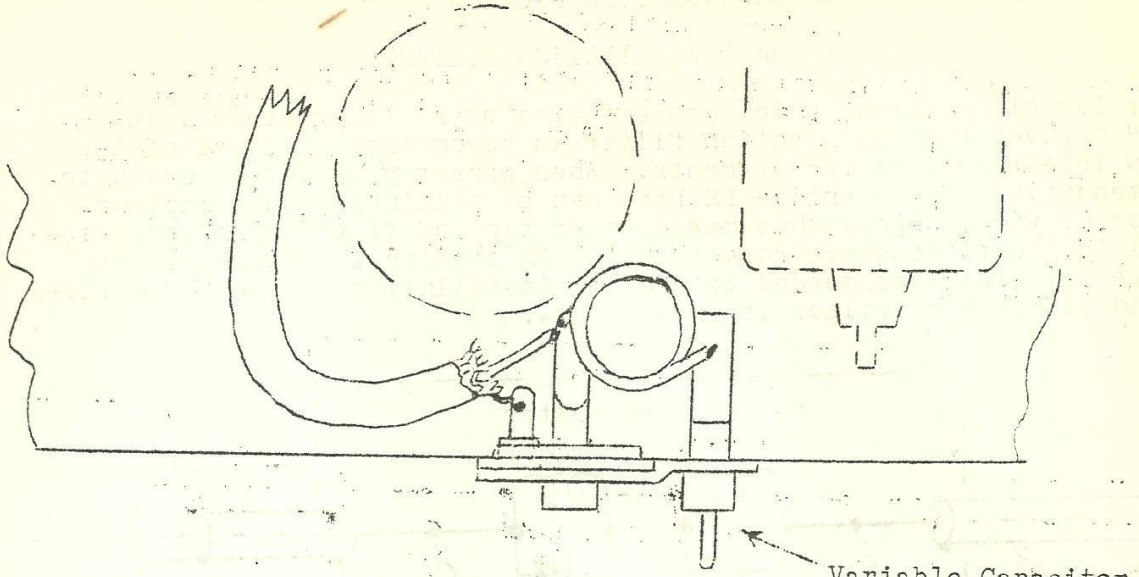
Top View of Chassis



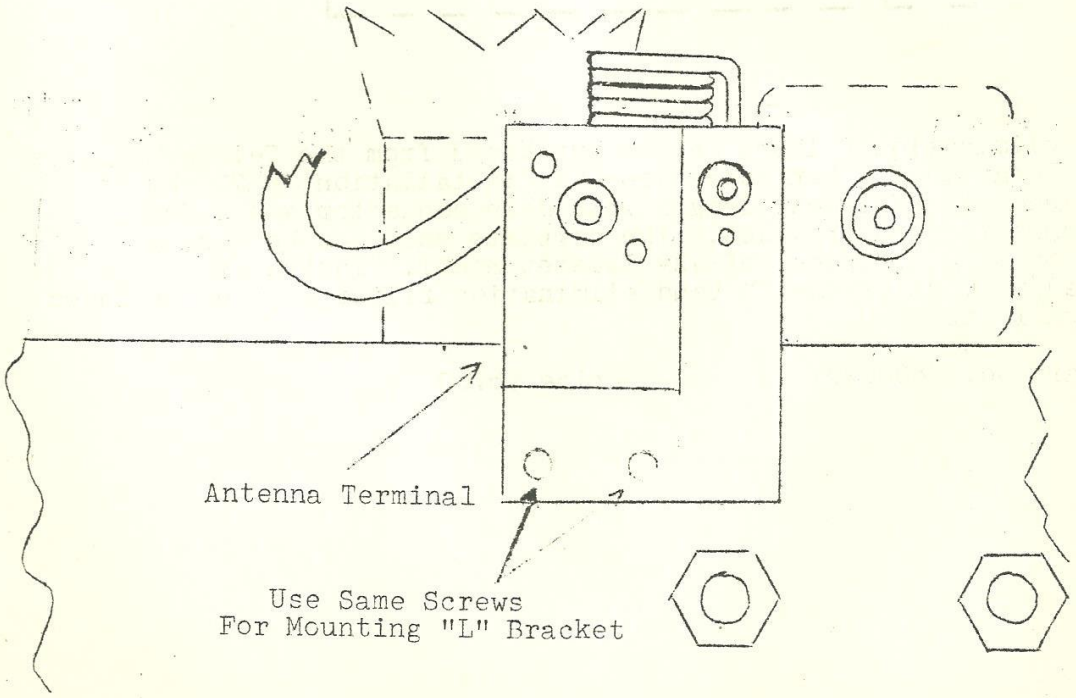
Rear View of Chassis

FM Series Trap - "L" Bracket Type

Used on RA-105A - RA-105B - RA-106 - RA-108A



Top View of Chassis

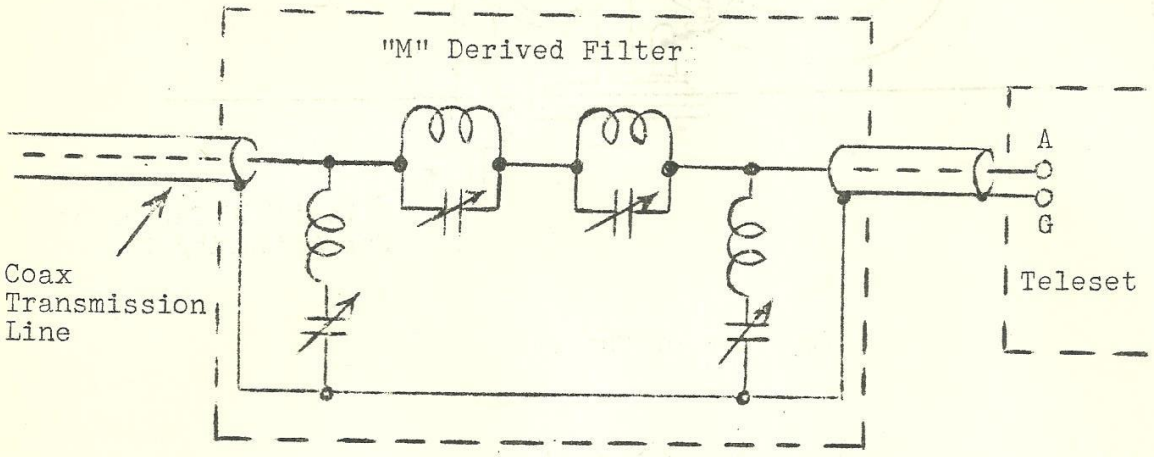


Rear View of Chassis

INSTALLATION SECTION

FM BAND ELIMINATION FILTER

For low signal areas which are affected by FM interference, an "M" derived band elimination filter is recommended because of the low insertion loss requirements. When properly adjusted, adequate attenuation of the entire FM band can be obtained with a minimum loss of video signal thus making this type of filter also very useful in locations where more than one FM station is causing interference. The recommended method for installation of the "M" derived band elimination filter is shown below.



FM band elimination filters may be purchased from the Teleset Service Control Department. For convenience in installation, a 72 ohm coax output lead of sufficient length with male connector and a female input connector are provided. The complete unit can be easily mounted on the back panel of any Teleset model. Instructions for proper adjustment of the FM band elimination filter will be included with each filter.

Part No. 88000301 Price $6.00 each

INSTALLATION SECTION

INTERFERENCE FROM RADIO AMATEUR STATIONS

Interference to Telesets from Radio Amateur stations can usually be completely eliminated. To accomplish this elimination, it is very important that the Television Serviceman and the Radio Amateur co-operate with each other as much as possible.

To protect the Teleset from interference caused by the Amateur station, the serviceman should install a high pass filter in the antenna input to the receiver. The design of this filter should be such that frequencies above 40 mc pass without attenuation whereas those frequencies below 40 mc are greatly attenuated.

A high pass filter, designed for use with 72 ohm coaxial cable is available from the Teleset Service Control Department direct, or through your distributor. The part number for this filter is #88000331. The list price is $4.00 each.

If the use of this high pass filter does not completely eliminate the interference, it will probably be necessary for the amateur to take whatever steps are necessary to reduce the harmonic output of his transmitter.

Most amateurs are well informed as to the procedure to follow in order to make their "rig" as interference free as possible. However, if any amateur has difficulty in cleaning up his transmitter, he should be referred to the following reference book:

T V I
Television Interference
Its Causes and Cures

published by:

Radio Magazines, Inc.
342 Madison Avenue
New York 17, New York

The price of this book is $.50. It is available at most stores which handle radio communication equipment.

DIATHERMY INTERFERENCE

The problem of interference from diathermy machines has been a headache to servicemen confronted with the situation.

In many cases, the complainants were told that "nothing could be done about it". Some of these complainants have been the doctors who own the diathermy equipment.

Many cases may be cured by the use of the high pass filter mentioned in the item on Amateur Interference. This trap would be effective for those Telesets located at some distance from the source of the interference.

If the Teleset is located very close to the diathermy machine, it will be necessary to shield the Teleset to prevent direct IF pickup from the machine.

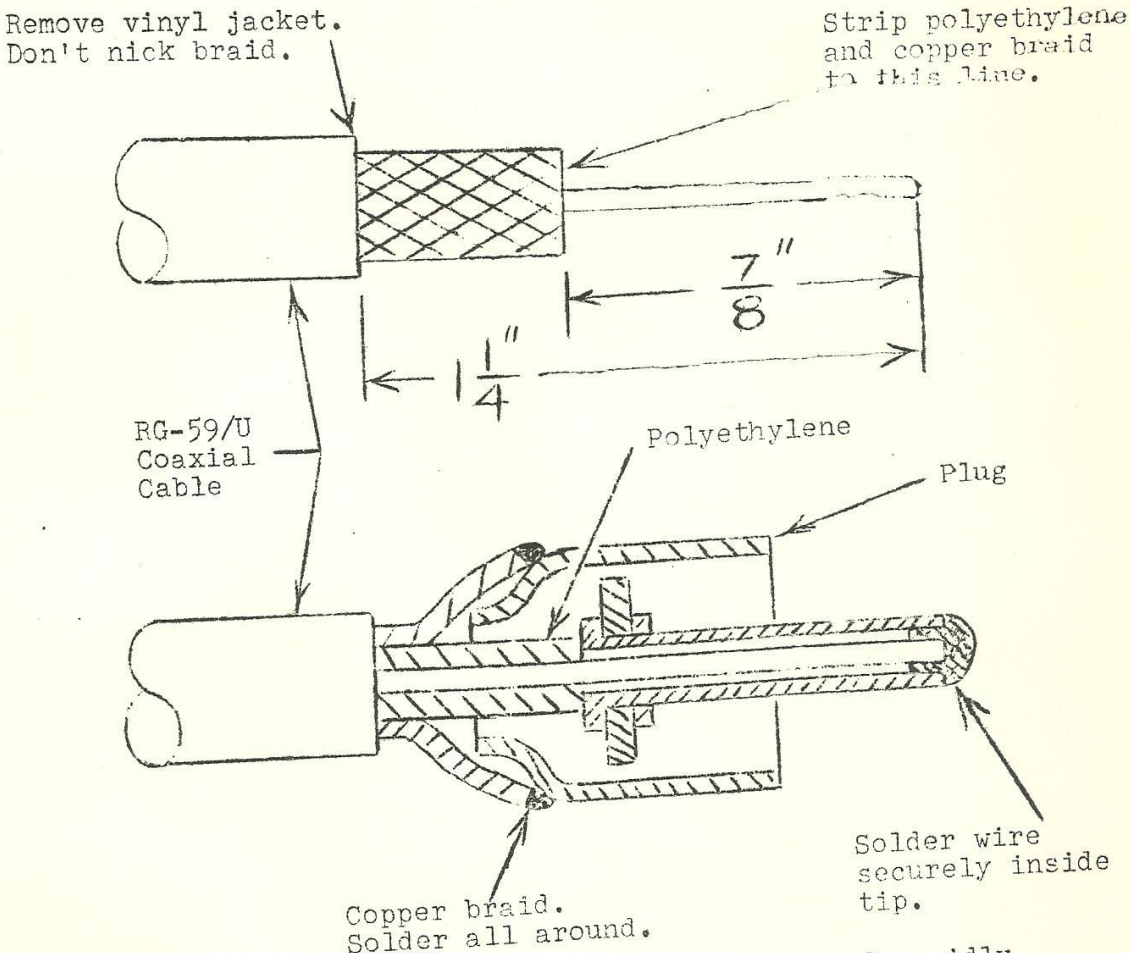
In the next issue of Service Notes, a procedure for elimination of strong diathermy interference will be described.

This procedure is currently being field tested.

ANTENNA PLUG SOLDERING INSTRUCTIONS

Observations made over a long period of time indicate that many servicemen either do not know how or do not take the time to solder the antenna plug to the coaxial cable lead-in properly. If care is exercised to solder the antenna plug carefully according to the instruction tag included with each Teleset, many call-backs may be eliminated. Extreme care should be taken to avoid application of excessive heat to the polyethylene insulation. This will damage the insulation and increase the possibility of leakage and short circuit from inner conductor to ground.

The proper procedure for soldering the antenna plug to the coaxial cable lead-in is shown below:



These connections must be soldered rapidly with hot iron to avoid damage to polyethylene insulation. Cable must be in line with body of antenna plug when soldering.

6/15/50