



DATAFILE BULLETIN

25-250 MC QUARTER-WAVE STUB FILTER

FILE UNDER: Servicing

Interference

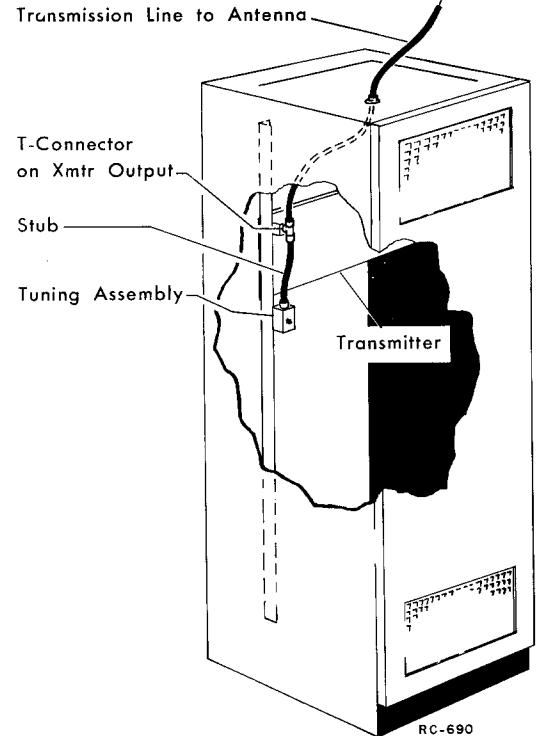
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Even though General Electric Two-Way Radio transmitters well exceed FCC requirements for spurious radiation, the 60 to 80-db spurious attenuation provided may, in a few situations, be insufficient to prevent interference.

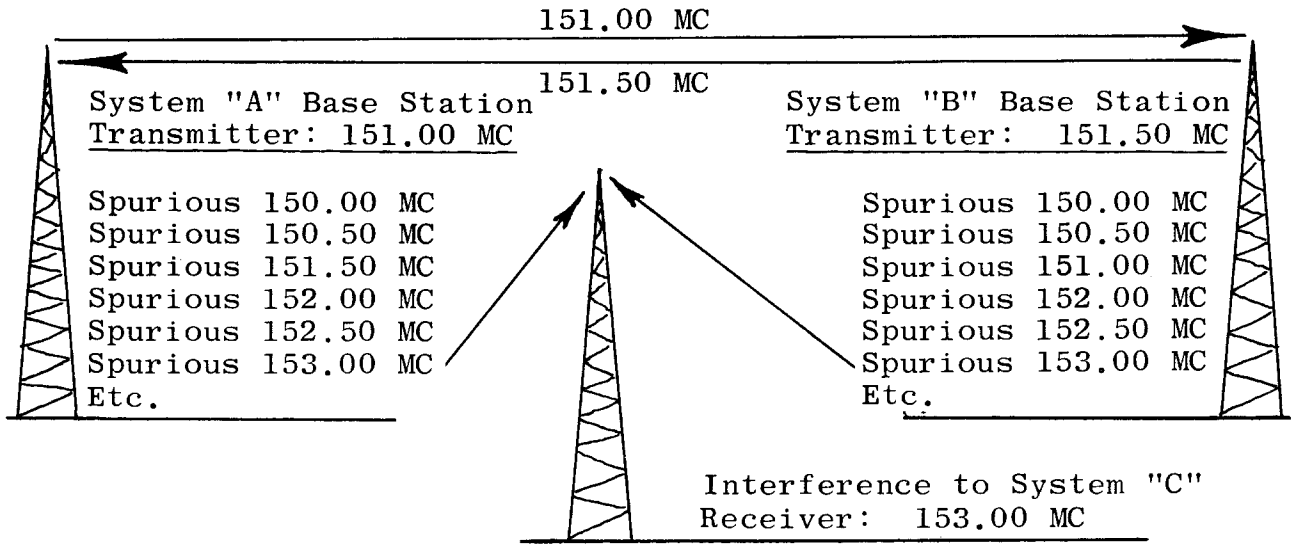
This Bulletin describes the construction of a filter, useful for suppressing spurious radiation at one specific frequency. When properly tuned, the filter should reduce the spurious by at least 35 db. The filter consists of a short section of RG-8/U coaxial cable, cut to length for the frequency to be suppressed (Figure 2). A small air capacitor provides a means of accurately adjusting the electrical length of the stub to a quarter-wavelength at the spurious frequency. To the spurious, the stub looks like a short (due to the 180° out-of-phase voltage reflected from the end of the stub), while to other frequencies it looks like a high impedance.

Figure 1 - INSTALLATION OF FILTER



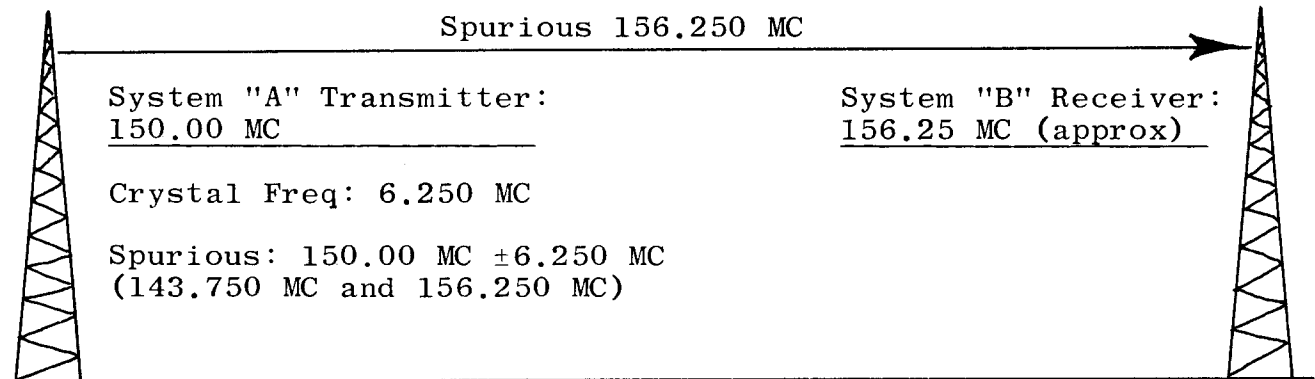
APPLICATION OF THE FILTER

Example 1 - This is an example of the signal from one transmitter mixing in the power amplifier of another transmitter to produce an interfering spurious. Of course, this interference will only be present while both transmitters are on the air. Suppose that base stations "A" and "B", located adjacently, were on the air simultaneously on 151.00 MC and 151.50 MC, respectively. It would be possible, if their antennas were sufficiently close together, for the signal from Transmitter "A" to be received by the base station "B" antenna and to be coupled into the PA of Transmitter "B". By mixing (adding and multiplying) in the PA with the transmitter "B" signal, several spurious frequencies at intervals of 0.50 MC could be generated and transmitted, causing interference to any nearby receiver on one of those frequencies.



Installing the filter described in this Bulletin in the antenna circuit of Base Stations "A" and/or "B" and tuning it to the frequency of the other transmitter should reduce the interference to a negligible level.

Example 2 - This is an example of a spurious from transmitter "A" (resulting from the addition of the operating frequency and the crystal frequency) causing interference in System "B" in the same city. Although it might be possible to change the crystal frequency and multiplication in the transmitter and refile it with the FCC, it would probably be much easier to add a filter to each of the System "A" transmitters.



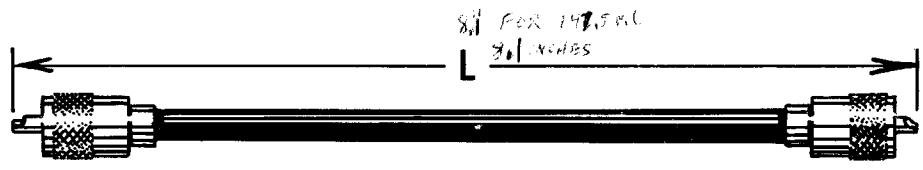
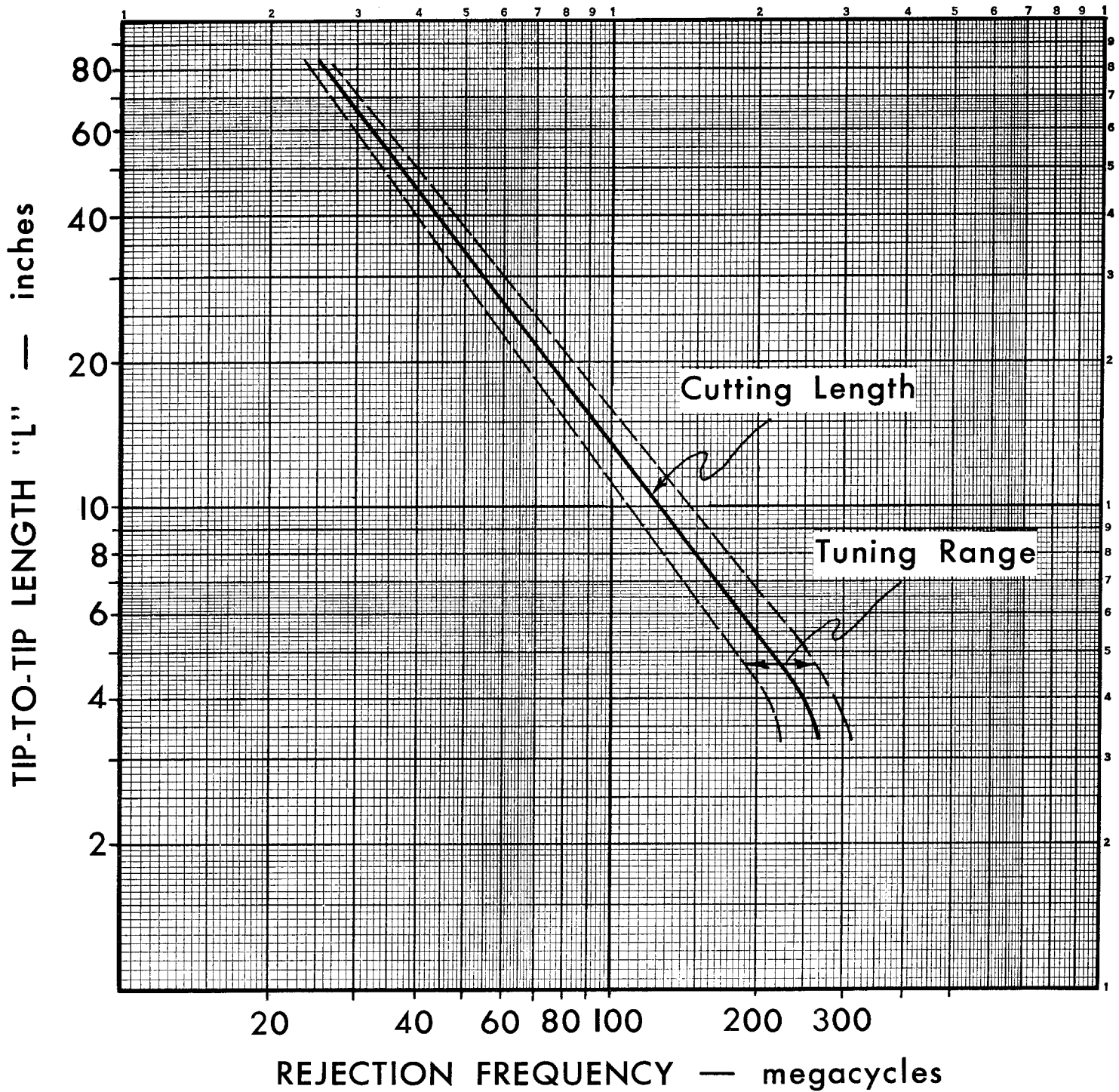


Figure 2 - LENGTH OF RG-8/U CABLE REQUIRED FOR FILTER

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MATERIAL REQUIRED

<u>Quantity</u>	<u>Description</u>	<u>G-E Part Number</u>
1 piece	RG-8/U Coaxial Cable (determine length from Figure 2).	
1	Capacitor, Variable: miniature, air, 3 to 10 MMFD, such as E.F. Johnson Part No. 160-107-43.	M-7481115-P3 or B-7491398-P1
2	PL-259 Coaxial Cable Plug (Amphenol No. 83-1SP).	M-2R22-P1
1	SO-239 Coaxial Panel Receptacle (Amphenol No. 83-1R).	M-2R22-P3
1	M-358 Coaxial T-Adapter (Amphenol No. 83-1T).	M-2R22-P5
1	Metal Box, such as Bud Metal Products Minibox Number CU-3000A.	
Asst'd	Hardware for mounting capacitor, panel receptacle and metal box.	

ASSEMBLY OF THE FILTER

1. Cut the RG-8/U coaxial cable to the exact length indicated in Figure 2 for the frequency of the spurious to be attenuated.
2. Assemble a PL-259 coaxial cable plug on each end of the cable, as shown in Figure 3. Be sure that the center conductor of the cable extends out even with the tip of the plug before soldering. The length of the stub from plug-tip to plug-tip will then be the same length as the cut cable.

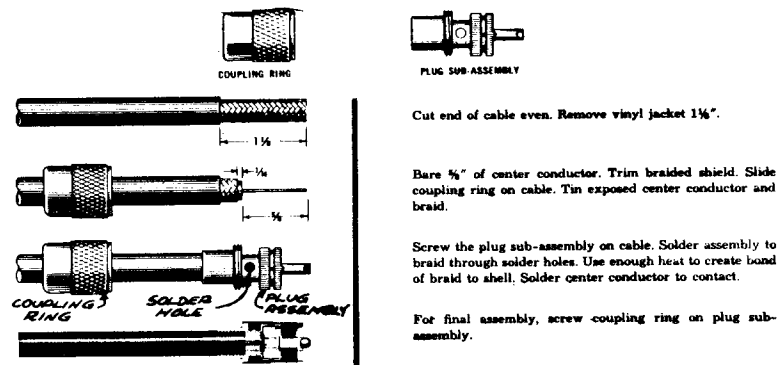


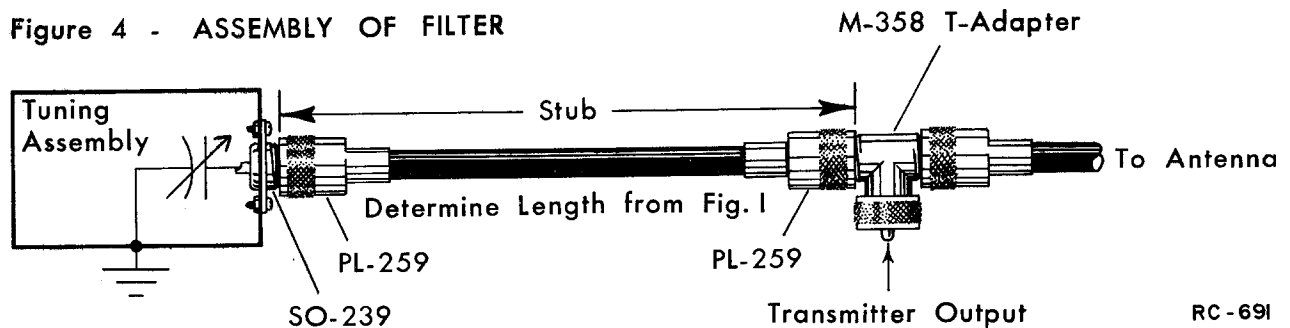
Figure 3-Assembly of RG-8/U Cable to PL-259 (83-1SP) Plug (A-7135401:Sh.1)

3. Mount the SO-239 panel receptacle and the variable capacitor on the metal box.

ASSEMBLY (Cont'd)

4. Inside the box, ground one side of the capacitor and connect the other terminal to the receptacle. See Figure 4.

Figure 4 - ASSEMBLY OF FILTER



INSTALLATION

Connect the coaxial T-adapter to the transmitter's output jack. Mount the filter and make the connections shown in Figure 1. The tuning assembly must be mounted within reach of the quarter-wave stub from the T-adapter.

ADJUSTMENT

Accurate adjustment of the filter requires the use of a field-strength meter or an FM receiver whose limiter voltage can be read. The filter is tuned for maximum attenuation of the spurious radiation by means of the variable capacitor.

1. With the filter disconnected, key the transmitter and tune the field-strength meter (or receiver) to the frequency to be suppressed. A location must be found for the monitor where radiation from the antenna, and not direct radiation from the transmitter, will be monitored.
2. Turn the transmitter off and connect the filter.
3. With the transmitter keyed, tune the variable capacitor in the filter for maximum rejection of the spurious frequency, as indicated on the field-strength meter (or the first limiter reading of the receiver).
4. If necessary, retune the output of the transmitter for proper loading and matching. Some loss of RF power to the antenna may be noted, particularly if the transmitter frequency is near the filter frequency.

END OF DOCUMENT