

ENGINEERING TECHNICAL BULLETIN No. 107

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**Improving the Noise Level
of the
SP-600 Receiver
using a
Nuvistaplug**

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INTRODUCTION:

The Nuvistaplug, a new device made by Raytronics, has been found to significantly improve the noise figure of the SP-600 when substituted for the first RF amplifier. The purpose of this Technical Bulletin is to explain the advantages of the Nuvistaplug, and describe the substitution procedure.

TECHNICAL DISCUSSION:

Noise figure (the ratio of noise generated in a practical receiver compared to the noise generated in an "ideal" receiver and expressed in db) is an important consideration in determining the effectiveness of a receiver. It is generally true that the noise figure of a receiver is established in the first RF stage. This is because the signal and noise present at the first stage are amplified to such a level that the noise contributed by succeeding stages amounts to very little.

It is therefore desirable to keep the first stage as free from internally generated noise as possible. Pentode tubes have long been used instead of triode tubes as first RF amplifiers (in most receivers) because of their more desirable amplification characteristics. However, the pentode, because of its physical construction, is more noisy than the triode.

By combining the miniature, low noise, high amplification triodes (RCA Nuvistor Type 6DS4) in a cascade arrangement, the Nuvistaplug is able to take advantage of the triode's low noise while retaining, essentially, the desirable amplification characteristics of the pentode it replaces (See Schematic, Figure 1). No circuit changes are necessary when the Nuvistaplug is used, and only slight compensating adjustments are needed in most cases.

Tests show that the noise figure of the SP-600 can be improved 2 to 6 db or more at most frequencies. It should be pointed out that improving the noise figure by 3 db is equivalent to doubling the signal strength at the transmitting antenna, all other conditions remaining equal. The Nuvistaplug cannot, of course, improve conditions resulting from noise external to the receiver.

SUBSTITUTION PROCEDURE:

The procedure for substitution of the Nuvistaplug in the SP-600 is as follows:

1. Connect a resistor (approximately 600Ω) across the audio output of the SP-600 receiver and connect an audio voltmeter across the resistor.
2. Connect a variable amplitude CW source to the SP-600 antenna connector. The source frequency should be ~~at least~~ in the middle of the ~~most~~ frequently used range of frequencies -- in other words, if the receiver is used most of the time between 5 and 25 Mc., set the signal generator at about 15 Mc.
3. Replace the V1 tube 6BA6 in the first RF amplifier stage with the Nuvistaplug Model 675.
4. Set the MOD-CW switch to CW and the AVC-MANUAL switch to MANUAL; set the RF gain for best sensitivity. Tune the receiver until the CW source is heard.
5. Adjust the CW signal generator amplitude so that the audio tone output is in the noise level of the internally generated white noise of the receiver. The audio gain should be high enough for easy listening, but the tone should be audible, (the noise will be much stronger).
6. Adjust the trimmers for the antenna and the first RF stage while listening to the tone output (See Figure 2). Each time an improvement is made, decrease the amplitude of the CW generator output so that the audio tone is barely heard under the internally generated white noise of the receiver. In most cases the two trimmer capacitors marked "C" need to be readjusted, but the two trimmer inductors marked "L" do not need readjustment.
7. The substitution and realignment are now complete. The manufacturers of the Nuvistaplug point out that two effects may be immediately noticeable after installation of the Nuvistaplug. One is the lowering of the background noise normally heard through the speaker, and the other is a reduced S-meter reading. Both are due to the fact that the Nuvistaplug frequently has a lower amplification factor than the tube it replaces. However, the important fact remains that the noise is reduced in relation to the signal.

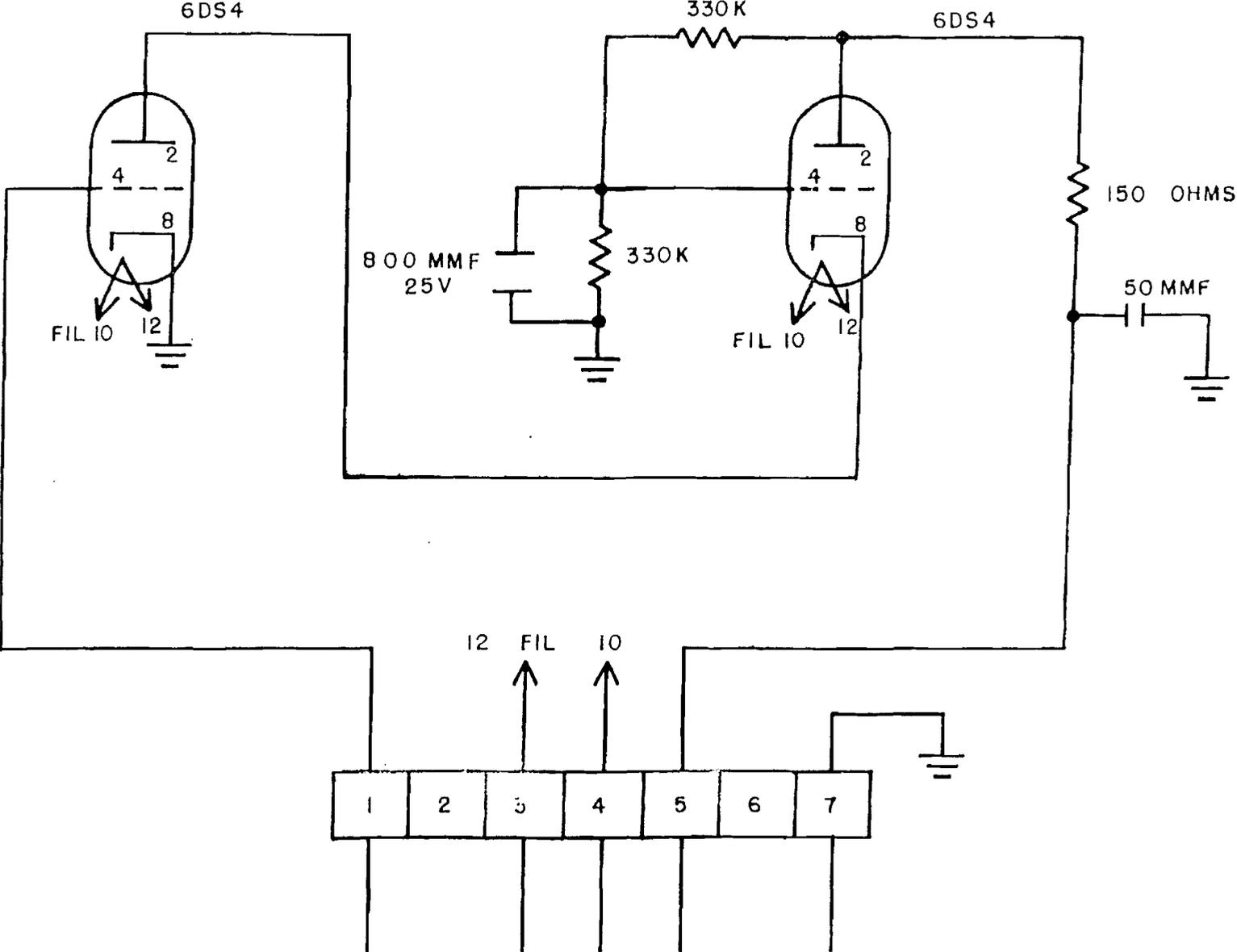


FIGURE :1- NUVISTA PLUG SCHEMATIC

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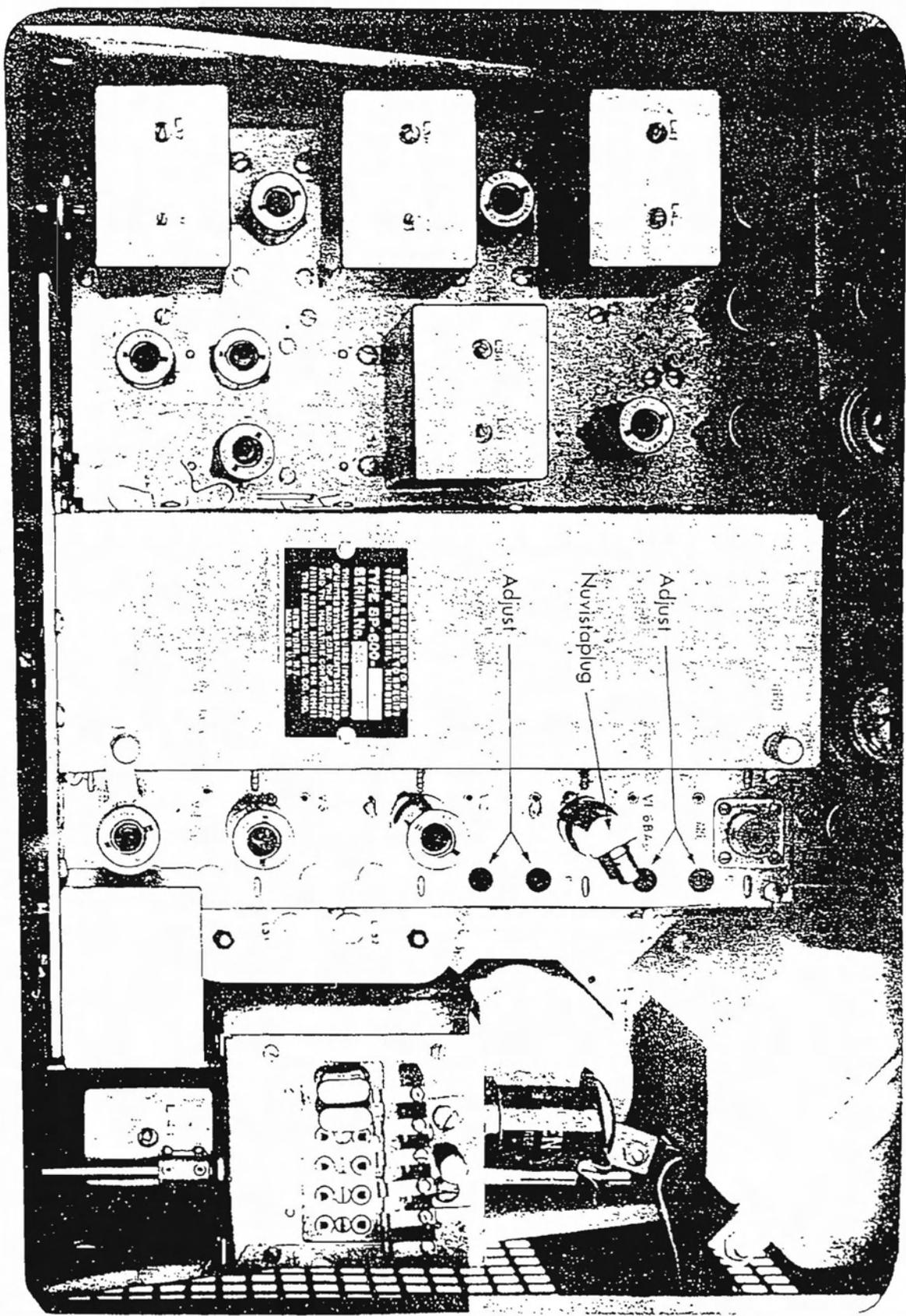


FIGURE : 2 NUVISTAPLUG IN SP-600

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