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RECEIVER AND REC[redacted] GAIN SETTING PROCEDURE

GENERAL

1. The gain controls of the receivers and recorders must be precisely pre-set to optimize the alerting system capability and to permit recording of the target signals at the widest possible range. Fortunately, the receiver gain settings for optimum loud speaker alerting coincides with settings appropriate to wide dynamic range recording.

2. After the receiver RF (or IF) and audio gain controls have been pre-set according to the following procedure, the physical position of the gain knobs must be clearly marked. Any perceptible variations from these settings must be corrected immediately.

3. Basically, the correct settings of RF (or IF) and audio gain are as follows:

a. RF (or IF) gain- so adjusted that a signal that is 30 decibels above receiver noise will begin to saturate the latter IF stages of the receiver.

b. AUDIO GAIN- so adjusted that the receiver noise (in the absence of any signal) is just perceptible from the loud speaker above the ambient noise in the operations room.

4. With the above combinations of level settings, any signal, with input level to the receiver significantly above receiver noise, will audibly add to the perceptible level of the loud speaker output. And, since the RF gain has been set so that the noise is some thirty decibels below receiver saturation level, the loud speaker will respond more or less proportionally to signals up to 30 decibels above the noise. (The signal-to-noise ratio of the missile borne signals are calculated to reach these levels for the period of time the missile is above the radio horizon).

5. The following procedures are prescribed for:

a. Initial set-up of project equipment.

b. Re-set-up after any repairs, to the receiver, that might affect predetection gain, such as replacing an RF or IF amplifier tube.

GAIN SETTING PROCEDURE

Step 1 Attach the video output of the receiver to the vertical amplifier input of the oscilloscope. (Assure that the receiver is in AM detection mode [redacted] anual gain).

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Step 2 — Connect the output of the signal generator to the RF input of the receiver, and using AM modulated output (30%), adjust the signal generator frequency to that of the receiver.

Step 3 — Turn the output of the signal generator to zero.

Step 4 — Set the receiver RF (or IF) to maximum gain (0 decibels if an attenuation type control is used).

Step 5 — Adjust the oscilloscope vertical gain until the receiver noise (in the absence of a signal) is of a convenient height (about 1") on the oscilloscope.

Step 6 — Increase the signal generator output until the modulated signal plus the receiver noise on the oscilloscope is approximately six db greater than the receiver noise alone, i. e., signal plus noise is exactly twice the height of noise alone.

Step 7 — Note and record this signal generator output level, S, to produce this two-to-one condition. (This value, S, is indicative of the basic sensitivity of this receiver. It should be reported in the initial report of operations and each two weeks subsequently).

Step 8 — Increase the signal generator output above the value S (obtained above) by 25 decibels. (If the signal generator is calibrated in microvolts, increase the microvolt reading by a factor of 18 above the value obtained in Step 6. For example, if a reading of two (2) microvolts is obtained in Step 6, increase the output to 18 x 2 or 36 microvolts for Step 8).

Step 9 — Lower the receiver RF (or IF) gain control until the signal, as observed on the test oscilloscope, is just below the point of saturating the receiver. Mark this knob setting as this is the setting to be used in both alert and during intercept.

Step 10 — Reconnect receiver to antenna and disconnect test oscilloscope.

Step 11 — With the RF gain control set, the audio gain is now increased until the receiver noise, in the absence of signals, is just perceptible from the loud speaker. If the total gain from the receiver audio amplifier

is not sufficient to make the receiver noise perceptible, the RF gain may be increased accordingly. However, if required, an auxiliary audio amplifier between the AUDIO OUTPUT and the loud speaker should be used rather than then disturbing the settings of Steps 8 and/or 9.

Step 12 Mark the settings.

6. The following are methods to optimize the recorder settings for maximum quality recordings:

a. With the receiver connected and set for optimum performance with no signal present as outlined in paragraph 5, adjust the recorder gain for a perceptible reading on the VU meter. It is advisable to disconnect the receiver to verify that this is receiver noise being measured.

This optimum recording setting can be suitably obtained by recording the receiver noise output as above, and adjusting the recorder gain for a perceptible aural recording. Again, it is advisable that the receiver be disconnected to verify that this is receiver noise being recorded.

b. Sample recordings should be made and studied to further insure that it is receiver Gaussian noise rather than hum or other extraneous interference being used to adjust the recorder. A simple test to verify the settings is to tune the receiver to one side of a signal, start the recorder, and tune through the signal, then check the resulting recording for quality.