HEADQUARTERS
UNITED STATES ARMY NUCLEAR MEDICINE RESEARCH DETACHMENT, EUROPE
APO 180, US Forces

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MEMORANDUM FOR: Lt Col Brennan

SUBJECT: Use of T-6 during 7th Army's "Downwind" Medical FTX

I. The Simulated Action.

The T-6 was used to generate and detect a simulated build-up to 100 r/hr and the subsequent decrease of the residual fallout radiation level at a fixed location.

II. General Physical Layout and Preliminary Adjustments of T-6.

This FTX encompassed an area approximately 400 yds. by 200 yds. The T-6 transmitter antenna was fully extented and located approximately 300 to 400 yds. from the receivers. This relative location between the receivers and the antenna resulted in a fairly uniform field strength throughout the bivouac area. Three receivers were played. One was used in the unprotected area to detect the arrival of a one to one hundred r/hr simulated protection factor of 10 in order to obtain monitored readings during the "under cover" phase of the simulated fallout. These latter two receivers had the "AGC" and antenna adjusted so they would read 1/10 of the unprotected receiver reading.

In making the adjustment to satisfy the above requirements, the following were the main considerations. Because the transmitter antenna was relatively close to the area to be covered, the receiver "antenna tune" adjustment was greatly detuned to allow the minimum ambient field strength signal to cause a 2 r/hr receiver output. This adjustment permitted better tracking of several receivers at this range. The AGC and antenna of the "unprotected" receiver were adjusted to give 100 r/hr for maximum transmitter output. The AGC and antenna of the "protected" receivers were adjusted to give 10 r/hr for maximum transmitter output. The transmitter power (hence the fallout field strength) was varied by the transmitter "tune" adjustment with power output adjustment fixed at 1.0. In order for the transmitter operator to correlate the transmitter output ADJ with the receiver reading it was necessary to provide telephone communication between the transmitter antenna and a monitor receiver near the receivers being used in the problem. If care was not exercised the telephone line re-radiated via the monitor telephone to the monitor receiver.

III. Performance of T-6.

Unreliability of the receivers manifested itself by different drift rates of the receiver output values for a fixed transmitter output and the failure of several receivers to retain their ability to track each other when the transmitter output was varied throughout its range. The necessity of frequent adjustment and continuous checking to insure that receivers responded to transmitter level changes detracted from intended realism.

Because of the directional characteristic which could not be surmounted without sacrificing necessary transmitter control of receiver readings, it was necessary to instruct monitors to rotate the receivers for maximum output. Even when so instructed, reading errors resulted from the monitor's lack of complete understanding of the limitations of the receiver.

The response of the receivers varied greatly near telephone and power lines in the tents.

To insure stability of transmitter output it was necessary to maintain a steady output voltage from the battery supplying power to the transmitter. This was accomplished by running a 50 foot cable from a 12 volt vehicle battery and keeping the vehicle running.

IV. Conclusions.

As pointed out in the above discussion, the drawbacks of this device for training troops in the field are as follows:

1. Too much time is consumed prior to the field problem setting up the device to play the specified exercise fallout. This time is used mainly in causing several meters to track together when large build up and decay are played. The tracking difficulty is the result of the fact that the quiescent operating point of the receiver 1st RF is dependent upon the AGC setting, which is unstable, and the antenna adjustments.

2. The programming of the exercise fallout play from the transmitter is unreliable and extremely awkward because of the electrical instability of the receivers and the lack of the Vernier adjustment of the transmitter output. The electrical instability is caused by the receiver battery deterioration being directly transmitted to the bias of the 1st RF via the AGC potentiometer setting. The awkwardness of programming the transmitter comes from the necessity of using the transmitter "detune adjustment" to vary the output over such a large power output change.

V. Recommendations.

To avoid having this training device cause the users to lose confidence in this means of simulating fallout conditions and the subsequent placing of this device on the useless shelf, it is recommended that an effort be made to redesign of modify it to gain the following features:

1. Good electrical stability of the receiver and transmitter for battery changes, particularly the receiver.

2. Fairly smooth control of transmitter output over a quite large power output change.

3. A simplified receiver adjustment. Possibly a reduction in receiver antenna adjustments to one and making the non-directional characteristic of the receiver independent of antenna adjustments. Likewise, better tracking may result from having a fixed AGC and obtaining a sensitivity control outside the AGC loop.

VI. Summary.

The device worked fairly well in FTX Downwind but to get this performance required the constant attention of several specially trained people of a type not always available on manouvers (including an electrical engineer who had three months previous experience with this particular device).

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