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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The AN/PSC-3 Program is progressing with small deviations from the proposed tech approach. Interfacing and interoperability with other equipments are reported.

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TABLE OF CONTENTS

## I. INTRODUCTION

This report describes the technical efforts during the sixth quarter of the AN/PSC-3 and AN/VSC-7 Production Program. The lead in engineering to production is progressing with no further deviations from the proposed approach beyond those already discussed in previous quarterly reports.

## 2. TECHNICAL DETAILS

### 2.1 Hardware Status

Four RT-1402( )/G's have been constructed and used for testing and demonstration purposes. The first two RT's are "engineering models", used primarily for verification of module interfacing and proof-of-concept for new techniques utilized in the system. These models also serve as a test-bed for modifications and corrections found necessary during lab testing.

Two additional RT's have been constructed as "marketing models." For a small number of components, limited-temperature range parts were utilized, due to the lack of qualified parts; and those few PWB modifications required were not necessarily accomplished in accordance with established rework procedures. But for the above exceptions, the marketing model RT's are fully representative of the First Articles.

One C-11119( )/VSC-7 "engineering model" has been assembled and is used as a test-bed for various RT's and as a part of several demonstrations, as well as testing the concept and implementation of the Control-Converter design and as a construction guide for First Articles.

### 2.2 Interfacing and Interoperability

Various equipments have been interfaced to and interoperated with the AN/PSC-3 and the AN/VSC-7 to determine preliminary compatibility in accordance with the specification requirements.

2.2.1 Digital Message Device Group, OA-8990( )/P: extensive use of the DMDG has never shown an interfacing problem. Operation of the equipments has been faultless in all respects.

2.2.2 Tactical Speech Security Equipment, TSEC/KY-57: After correcting a polarity error within the RT, 16 Kbps operation of the system produced excellent results.

2.2.3 Tactical Speech Security Equipment, TSEC/KY-65: Excellent performance.

2.2.4 Power Supply PP-6148( )/U: Electrical compatibility with the RT is problem-free.

2.2.5 Radio Set AN/PRC-77: After adding an overlooked wire and changing the DC impedance of the bias network in the RT's push-to-talk circuit, the AN/PSC-3 and AN/PRC-77 appeared to retransmit without problems in the laboratory area. Field-testing with two pairs of radios in a complete retransmit environment has not been attempted.

2.2.6 Radio Sets AN/PRC-70 and AN/VRC-12: Have not been tested with either the AN/PSC-3 or AN/VSC-7, due to the unavailibity of either Radio Set during the reporting period. Efforts are currently underway to obtain the units and complete the retransmission testing.

2.2.7 Digital Communications Terminal AN/PSC-2: Performed flawlessly in a 25 kHz channel using the AFSK mode of the AN/PSC-2 and Voice mode of the AN/PSC-3 (connection to the RT was made via the RXMT connector; to use the Voice/Data connector, the volume control must be set at one-quarter rotation for proper operation.)

In the BPSK mode of the DCT, however, several problems arose due to the DCT's use of separate key and data outputs to an RT. Data-mode keying of the RT-1402( )/G requires a high level input to the PTT line. The AN/PSC-2, however, provides a ground-closure on this line, which is the normal handset keying method for most current RT's. In the AN/PSC-3's data modes, a ground-closure is not recognized as either a valid keying signal nor as a data input. Further, data input to the AN/PSC-3 must appear on the PTT line to key the RT and be modulated; the DCT uses a sixth pin to provide the data. . . to a location not used on the AN/PSC-3's Voce/Data connector. An adaptor box was consturcted to interconnect the DCT's signals to the correct pins on the AN/PSC-3, and to invert the data from the DCT, since the resting state of the data output was a logic-one, which will key the AN/PSC-3 in data modes.

A more serious problem was subsequently discovered: failure of the transmitting DCT to receive an "acknowledge" from the receiving unit, when the reply was, indeed, transmitted! The problem was shared by both the DCT and the AN/PSC-3: the receiving DCT transmits an acknowledge in less than one second after it receives a message. The AN/PSC-3 continues to transmit, in accordance with its specification requirement, for one second after data into the RT ceases. This incompatibility was corrected by reprogramming the DCT, from its keyboard, to delay transmission of the message acknowledge for two seconds. When this change was accomplished, the AN/PSC-2 and AN/PSC-3 performed flawlessly in 1200 and 2400 bps data modes. In 300 bps data mode, data was effectively transmitted and received, but the message acknowledge was not received by the transmitting unit due to the time required for the transmitting units' Carrier Recovery Loop to recover from the transmit condition and be ready to receive a 300 bps signal. This condition is currently unresolved.

2.2.8 Radio Set AN/WSC-3: Excellent interoperability in 300, 1200, and 2400 bps BPSK data modes and in FM voice.

2.2.9 Radio Set PRT-250: Excellent in FM mode; no other modes tested due to limited capability of the PRT-250 as GFE'd.

2.3 Deviations

Various areas of anticipated deviation from specification requirements have been identified and are presented here.

2.3.1 Squelch hysteresis: at "good" signal levels, the drop in signal level required to close the squelch exceeds the 6 dB specification limit, due to the DC output characteristic of the noise detector. This should not effect the operational usefulness of the squelch feature.

2.3.2 Data 300 reacquisition: May exceed the four second limit, due to the hysteresis used to maintain carrier lock.

2.3.3 Transmitted spurious outputs: will not meet the 80 dB requirement of MIL-STD-461. Discrete mixing products in the vicinity of 226 MHz and 377 MHz will be the largest of the non-compliant output signals, enhanced when the RT's dial frequency approaches these signals. At their worst, however, these spurii should be 15 dB or more below the level allowed for harmonics.

2.3.4 RF Power Output: Under worst-case conditions of low DC supply voltage (< 22 volts, from a battery or the C-11119( )/VSC-7 Control Converter), antenna impedance, harmonic filter and T/R relay insertion loss and VSWR, ambient temperature, and output frequency, the RF power output of the AN/PSC-3 can degrade down to approximately 15 watts. (This power level represents only a ≅ .5 dB loss of EIRP from satellite, if the transmit path is not obstructed.)