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MONTHLY PROGRESS REPORT NO. 14

on

QRC-139A AEROSPACE GROUND EQUIPMENT (AGE)

and

QRC-139A-(T) AGE EQUIPMENT

Contract AF33(604)39443
Contract AF09(603)41935

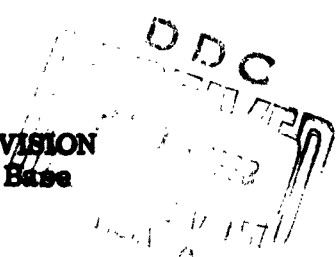
LMED Requisition 32636
LMED Requisition 32551

Period Covered: 9 April 1963 to 9 May 1963

Date of Report: 13 May 1963

Prepared for

AERONAUTICAL SYSTEMS DIVISION
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SECTION I
INTRODUCTION

A. PROGRAM DESCRIPTION.

This report describes the work accomplished from 9 April 1963 to 9 May 1963 on the design, development and First Article (qualification) testing of a Broadband Spectrum Analyzer (G-E Drawing No. 7633109G1), Converter-Measuring, Frequency "S" (G-E Drawing No. 7633120G1), and Converter-Measuring, Frequency "L" (G-E Drawing No. 7633119G1).

Work on these equipments and modification kits (G-E Drawing No. 7520905G1 and 7520906G1) was performed in accordance with letter contract AF33(604)39443, LMED Requisition 32636.

B. EQUIPMENT DESCRIPTION.

The spectrum analyzer contains ten wired boards and ten subchassis assemblies and is packaged in a combination case 19 inches wide, 19 inches high, and 27 inches deep. All wired boards slide into frames in various positions around a five-inch cathode ray tube. Cooling of the analyzer is accomplished by two fans, one of which has access to outside air. Primary power input is 115 volts a-c $\pm 5\%$, 380 to 420 cps, single phase. The weight of the unit in transit condition, less the converter, is 111 pounds.

Converter-Measuring, Frequency "S" and Converter-Measuring, Frequency "L" have separate transit cases and plug into the analyzer to provide specific r-f band coverage. All a-c and d-c power for the converters is provided by the analyzer. The weight of the converter in the transit case is 29 pounds.

The modification kit (G-E Drawing No. 7520905G1) for the Servo-Noise Amplifier Test Set (G-E Drawing No. 7631547G1) contains input and output loads for the noise amplifier board, a replacement power transformer, a power relay, decals, miscellaneous wire and hardware, and installation instructions.

The modification kit (G-E Drawing No. 7520906G1) for the Noise Response Test Set (G-E Drawing No. 7732849G1) contains a dummy load for r-f inputs to the noise amplifier board, a coupling capacitor, a high power r-f load resistor, miscellaneous wire and hardware, decals, and installation instructions. Both kits were shipped in May, 1962.

SECTION II

BROADBAND SPECTRUM ANALYZER AND FREQUENCY-MEASURING CONVERTERS (S- AND L-BAND), PROGRAM STATUS

A. INTRODUCTION.

The effort during this report period was devoted to the following tasks:

1. Completion of the limited unit test mentioned in Section III of Monthly Progress Report No. 13.
2. Continuation of the qualification testing of the analyzers and converters as follows:
 - a. Completion of humidity test on L-Band Converter.
 - b. Completion of the radio interference testing of the L- and S-Band Converters in the 150 to 400 kc band.
 - c. Running of a humidity test on the S-Band Converter.
 - d. Engineering temperature evaluation of the S-Band Converter.
 - e. Drip-proofing test of analyzer combination case.

B. QUALIFICATION TESTING OF THE ANALYZER AND CONVERTERS.

1. L-Band Converter Humidity Test.

This test was performed in accordance with paragraph 6.3 of G-E Drawing No. 32636-N1.

The L-Band Converter, after its mixer had been treated with G-E "Dri-Film 88" silicon compound, was resubjected to the humidity test on 4 May 1963. The converter passed the test 100% successfully.

2. S-Band Converter Humidity Test.

The S-Band Converter's mixer was also treated with G-E "Dri-Film 88" compound, and then the converter was resubjected to a humidity test on 4 May 1963, in accordance with paragraph 6.3 of G-E Drawing No. 32636-N1. The converter failed the test, the sensitivity being down 10 db. The mixer was removed, dried out, tested, and given a one-day humidity test, which conclusively proved that it was the mixer which had been the cause of the loss of sensitivity. The mixer was disassembled, and it was found that moisture had been seeping in through its top-side laminations, and that this moisture had corroded portions of the printed circuit. The mixer was cleaned up and re-treated with the silicon compound. Special attention was given to the top side. The mixer was then given another one-day humidity test and still did not pass. Additional design effort will be concentrated on sealing the top edge.

3. Radiated Radio Interference Testing of Converters in 150 to 400 KC Band.

This test was conducted on 16 April 1963 in accordance with paragraph 6.2 of G-E Drawing Nos. 32636-N and 32636-N1.

The readings were out of specification a maximum of 7 to 8 db. It was determined that the neoprene rubber anode hood on the CRT was causing the interference. The hood was temporarily removed, leaving an air-insulated metal cap. Using this, the readings were less than 3 db out of specification. A new silicon rubber hood was then installed in the cap, and a new test was run using this fix. The readings were again less than 3 db out of specification, and the caps will henceforth have this type of hood incorporated. It was

determined that the remaining 3 db out-of-specification reading was caused by inherent characteristics of the power meter. Since the prime equipment which the analyzer will be used with operates only in the range above 50 mc, it is felt that this condition is not serious. Filter chokes in the total power meter circuits eliminated the out-of-specification readings, but they rendered the power meter inoperative.

4. Engineering Temperature Evaluation of Analyzer and S-Band Converter.

It was determined that the BWO power supply shifted approximately 100 volts when the equipment was subjected to a 50°C temperature change. The subassembly responsible for the voltage change was the BWO sweep board, 1A1A5. Voltages were measured in all circuits, and as a result of the tests, the constant-current generator bias circuit was redesigned to improve its stability. These changes will be incorporated in the equipment presently undergoing First Article testing, which will then be resubjected to the temperature test.

5. Drip-Proofing Test on Analyzer Combination Case.

This test was performed in accordance with paragraph 6.6 of G-E Drawing Nos. 32636-N and 32636-N1, on 3 May 1963.

Previously, this case had failed the test because of leakage around the air-vent door on the rear. This door was redesigned to stiffen it, and the sponge rubber gasket was replaced with a more dense material. The test was then rerun, and the case passed the test successfully.

SECTION III
PROGRAM FOR NEXT INTERVAL

Complete the first article testing of the equipment as follows:

- 1. S-Band Converter Humidity Test**
- 2. S-Band Converter Temperature Test**
- 3. L-Band Converter Temperature Test**
- 4. Post-environmental Performance Test**
- 5. Complete and submit the First Article test report.**

SECTION IV

CONTRACT AF09(603)41935

A. GENERAL.

The information in this section is supplied as a supplement to the QRC-139A-(T) AGE portion of Monthly Progress Report No. 6, submitted under Contract AF09(603)41935.

B. PROGRAM STATUS.

The work listed in Section III. C. of Monthly Progress Report No. 6 has been completed; two analyzers and two L-Band Converters were tested, accepted by local USAF Quality Control personnel, and shipped on 6 May 1963. This will be the final AGE report issued on Contract AF09(603)41935.