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MONTHLY PROGRESS REPORT NO. 13

on

QRC-139A AEROSPACE GROUND EQUIPMENT (AGE)

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Contract AF33(604)39443

LMED Requisition 32636

Period Covered: 14 March 1963 to 8 April 1963

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Prepared for

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SECTION I

INTRODUCTION

A. PROGRAM DESCRIPTION.

This report describes the work accomplished from 14 March 1963 to 8 April 1963 on the design and development of a Broadband Spectrum Analyzer (G-E Drawing No. 7633108G1), 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.

Additional work is being accomplished on Converter-Measuring, Frequency "X" (G-E Drawing No. 7633658G1) under contract AF33(657)9311, LMED Requisition 32065.

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 $\pm 5\%$, 380-420 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.

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.

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 reporting period was devoted to relocating the A14 unit and to continuing the qualification testing of the analyzer and converters as reported in Monthly Progress Report No. 12. The tests performed and their results are reported in the following paragraphs of this section.

B. HUMIDITY TEST (RERUN).

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

The L-band and S-band converters were subjected to a rerun of the humidity test on 23 March 1963 as a follow up to the results reported in Monthly Progress Report No. 11. The L-band converter and analyzer were tested first; then the S-band converter was tested separately. It was found that the vertical linearity power readings were out-of-specification as much as 0.8 db in 50% of the cases. Since this happened in testing both converters (the analyzer was subjected to the rerun of the humidity test using only the L-band converter), it was concluded that an assembly common to the system, namely the converters, were affected by the humidity test. The S-band mixer was removed from its converter and was placed in a 100°F drying oven for one hour. The vertical linearity readings, which were formerly out-of-specification by 10 to 12 db,

were now within 1 to 2 db of acceptable limits. This indicated that both mixers had probably absorbed moisture during the test. The L-band mixer was coated with G-E "Dri-Film 88" silicon compound, and will be retested.

C. TEMPERATURE TEST (RERUN).

This test was performed in accordance with paragraph 6.4 of G-E Drawing No. 32636-N.

This rerun of the temperature test took place 27 March 1963.

The L-band converter and analyzer were subjected to the temperature test. Prior to this test, the precision calibrators for linearity testing were recalibrated. The results of the test showed the following out-of-specification conditions.

- (1) The minimum frequency was 1000 mc, i. e., the converter tuning range had shifted upward by 50 to 100 mc from the 950 mc minimum limit.
- (2) The vertical linearity readings exhibited a change of 2.5 db over the temperature range of 0°C to 40°C.
- (3) The power calibrator level presentation on the CRT changed.

The above three items show that the circuitry is temperature-sensitive between the 120 mc i-f amplifier and the CRT tube. Sensitivity control adjustments are provided on the front panel of each converter but were not adjusted prior to linearity tests. This preliminary adjustment will be made on the S-band converter temperature retest to verify the functioning of these controls.

D. SHOCK TEST.

This test was performed in accordance with paragraph 6.7.5 of G-E Drawing No. 32636-N.

The test took place on 15 March 1963. Transit shock tests were performed on the analyzer and S-band converter, and the equipment successfully passed the test. There were some out-of-specification conditions before the test was started; however, the test did not aggravate these conditions. These conditions were three total power readings and the power calibrator reading on the CRT.

E. RELOCATION OF A14 UNIT.

The original location of the filament power supply (A14) with respect to the first local oscillator (Raytheon BWO) was unsatisfactory because this position resulted in lowered r-f power output. A positioning study based on four BWO tubes has resulted in a repositioning of A14 and the auxiliary marker-calibrator (A15) to allow a minimum of two inches clearance between the BWO and A14. This has resulted in approximately 3 db more of r-f power, and this change is being incorporated in all new units as well as in the analyzer undergoing qualification testing.

SECTION III

CONFERENCES

A series of conferences, 27 March through 30 March 1963, were held with W. Cundiff, the ASD Project Engineer, to discuss and review progress to date in First Article testing. The following tests were to be re-run for additional data:

1. After incorporating all changes to date less the converter-wave meter shield, the analyzer and converters are to be given a limited unit test with adjustments optimized for the environment to date.
2. A humidity test on the L-Band Converter with a sealed mixer.
3. A temperature test on the S-Band Converter
4. A radiated radio interference test in the band from 150 to 400 kc.
5. Post environment unit test originally scheduled.

SECTION IV
PROGRAM FOR NEXT INTERVAL

1. Complete the qualification testing and issue the report.
2. Perform the tasks enumerated in Section III of this report.