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MONTHLY PROGRESS REPORT NO. 1

on

COUNTERMEASURES TRANSMITTING SET AN/ALT-22(V)

and

BARRAGE JAMMER QRC-139A-(T)

Modifications to

AN/ALT-6B COUNTERMEASURES TRANSMITTING SET

and

QRC-139A-(T) AGE EQUIPMENT

Contract AF 33(604)38334
LMED Requisition 32634

Contract AF 09(603)41935
LMED Requisition 32551

Period Covered: 1 September to 31 October 1962
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Prepared for

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SECTION I

INTRODUCTION

This report describes the work accomplished from 1 September 1962 to 31 October 1962 on the manufacture of 30 L-Band Oscillators for the QRC-139A-(T) and AN/ALT-22(V) jamming systems; the manufacture of two Broadband Spectrum Analyzers, with Converter-Measuring, "L" Frequency; one Servo Noise Amplifier modification kit; and one Noise Response modification kit. This effort is being performed in accordance with letter contract AF 09(603)41935.

The report also includes a description of the work accomplished during the same period under letter contract AF 33(604)38334.

SECTION II

AN/ALT-22(V) AND QRC-139A(T) MODIFICATIONS TO AN/ALT-6B COUNTERMEASURES TRANSMITTING SET

A. EQUIPMENT DESCRIPTION.

The equipment being procured under Contract AF 33(604)38334 consists of 60 government-furnished AN/ALT-6B equipments modified to the QRC-139A-(T) and AN/ALT-22(V) configurations. Fifty-seven QRC-139A-(T) equipments complete with L-band QRC-139A-1-(T) oscillator groups are to be supplied with deliveries starting in August 1962. Three first article AN/ALT-22(V) equipments complete with L-band oscillator groups are scheduled to be submitted for first article tests during September and October 1962, and the first article systems are to be delivered to the Air Force by 31 October 1962.

The QRC-139A-(T) equipment being procured under contract AF 09(603)41935 consists of 30 government-furnished AN/ALT-6B equipments modified to the QRC-139A-(T) barrage jammer configuration. These equipments, complete with QRC-139A-1-(T) oscillator groups, are to be supplied with deliveries starting in January 1963, and are to be completed in February 1963.

The control indicator and magnetron frequency control units which will be delivered on the two referenced contracts will be the three mode-type units. These units are designed to provide the capability to preset three

different sets of operating parameters, namely, Modes A, B, and C, for the modified system. When a remote control box is used in conjunction with the QRC-139A-(T) system, Mode A, B, or C can be selected as needed by an operator in the co-pilot's compartment.

B. PROGRAM STATUS.

1. Contract AF 33(604)38334.

The status of the QRC-139A-(T) equipment modification is summarized in the following table:

QRC-139A Unit	Total Units Shipped to Date	At Test	Remarks
Power Supply	24	30	
Transmitter	24	27	
Control Indicator	24	27	
Control, Magnetron Frequency	24	30	
Oscillator	24	6	45 Barratrons received 16 Barratrons returned to vendor
Video Board, Part of Transmitter	24	29	
Spare Isolators	20		
Spare Barrage Magnetrons	11		

Completion of the modification program has been delayed due to the slow delivery of the barrage magnetrons. The problems associated with this tube are described in paragraph C of this section of the report. Completion of the delivery of the QRC-139A-(T) systems on this contract is now scheduled for December 1962.

Three first article L-band AN/ALT-22(V) systems have been constructed and subjected to the qualification tests called for in the contract work statement. The qualification tests were started early in September and completed on 23 October 1962. Temperature-altitude and explosion proof tests were conducted on Sample No. 1. Service condition tests and a resonance vibration survey were conducted on Sample No. 2. A 250-hour Life Test and a 24-hour Stability Test were conducted on Sample No. 3. The performance of the first article systems has been completely satisfactory during the qualification tests. The first article test report will be submitted to the Air Force on 2 November 1962. The first article systems have been cleaned up and re-tested, and are ready for acceptance by the Aeronautical Systems Division of the Air Force.

The rough draft of the combined S- and L-band QRC-139A-(T) Maintenance and Operating Manual is ready for review by the ASD Project Engineer at the contractor's plant.

The vibration survey program which was authorized by the Air Force on 13 September 1962 was completed on 26 October 1962. Survey test data has been included in the qualification report. A complete report on the vibration study program will be included in the final engineering report submitted under this contract. It can be briefly stated here that the AN/ALT-22(V) equipment withstood the resonance survey better than was anticipated. The resonance survey was run at the following maximum vibration levels in addition to six lower levels:

Vibration Level	Frequency Range
0.200 inch DA	5 to 10 cps
0.060 inch DA	10 to 57 cps
10 G	57 to 1500 cps

2. Contract AF 09(603)41935.

The following work has been accomplished on this contract. Thirty government-furnished AN/ALT-6B systems have been received and inspected. All the transmitters and power supplies have been tested prior to modification to determine their serviceability. All the power supplies and 2 transmitters have been disassembled in preparation for installation of new QRC-139A parts and wiring. The control indicators have been dismantled and the chassis has been sent to the fabrication area for rework and assembly of new material. The hydraulic tuners which are part of the r-f oscillator have all been flushed out and tested. Several of these tuners are defective and will have to be replaced.

All new materials required for the modification of the AN/ALT-6B equipment have been ordered. Delivery of barrage magnetrons by Litton Industries for this contract will be delayed due to the slow delivery of these same tubes on contract AF 33(604)38334. Modification of the government-furnished equipment will begin early in December.

C. PROBLEM AREAS.

The unavailability of a sufficient number of good barrage magnetrons continues to limit the delivery of L-band QRC-139A-(T) systems to the Air Force. Litton Industries is having two problems with these tubes, namely, (1) low yield due to low mode boundary current, and (2) high tuning pressure.

During the past two months, Litton has built at least ten different models of the L-3519 in an attempt to increase the mode boundary current and thereby improve the manufacturing yield. The last of these models, which was designed late in October and has been designated JAX, shows a great deal of promise. Litton reports that six samples of this model have been built and that five of them exhibit satisfactory performance. Based on these results, Litton is relatively confident that it has a solution to the problem of low yield due to low mode boundary current. During the next few weeks, Litton will continue to build RX models, and also build an increasing number of JAX models if the yield continues to be good. The yield from the RX model is still very low, namely, less than 20 per cent. The only reason that Litton continues to build this model is that they are able to deliver some tubes by doing this. A total of sixteen tubes were delivered in September, and nineteen were delivered in October, 1962. Twenty-one of these tubes have recently been returned to Litton because they exhibited tuning pressures in excess of 350 psi. Litton has been building 25 to 30 tubes per week during the months of September and October. It is obvious from the quantity of tubes delivered that the yield has been very low, in fact, much lower than anticipated when the original tube schedule was prepared by Litton.

The other problem, high tuning pressure, which Litton is having with the L-3519 tube, developed early in October. At that time there were indications that a fast width slough-off problem existed because a number of r-f oscillators sloughed-off at the high frequency sweep rate when tested in the oscillator unit test position. It was first thought that the servo valve was

at fault. Subsequent tests showed that the servo valves were satisfactory and that 21 L-3519 tubes had tuning pressures in excess of 350 pounds per square inch, which is the maximum tuning pressure allowed by the purchase specification for this tube. The tuning pressure on one of these tubes was 500 psi. The average tuning pressure on the tubes rejected was 400 to 440 psi. Litton has investigated the problem and it is their opinion that these tubes have become misaligned in their manufacturing process. They have taken steps to thoroughly check all future tubes for proper alignment of parts. The effectiveness of this check is not yet known. They have also instituted some new static pressure test procedures for checking the tuning pressure after the tube is completely assembled. This is being done because the pressure test which Litton has made in the past is now considered to be inadequate. Litton is also accumulating parts for a hydraulic test bench which will permit Litton to test for tube tuning pressure under dynamic conditions. The General Electric Company has recommended to Litton that this test bench be built at San Carlos, California. A similar test bench is currently in use at the General Electric Company at Utica, New York. The 21 tubes which have been returned to Litton for high tuning pressure were tested on this test bench. The Litton test bench will not be available for at least six weeks due to the unavailability of certain of the parts needed for the hydraulic bench.

Litton is optimistic that some of the returned tubes can be saved by adjusting their part alignment on a special lathe. This remains to be demonstrated at this time. The adequacy of the new static pressure test also remains to be demonstrated by Litton. Until the tuning pressure problem is solved, all tubes will be tested under dynamic conditions at General Electric facilities.

D. PROGRAM FOR NEXT INTERVAL.

The program for the next interval will consist of working closely with Litton Industries to solve as soon as possible the problems associated with the L-3519 barrage magnetron. In connection with contract AF 33(604)38334, General Electric Company will resubmit the rough draft of the final engineering report and will strive to deliver at least sixteen QRC-139A-(T) equipments. The three first article systems will be delivered as soon as the Air Force has given them a preliminary inspection.

E. CONFERENCES.

1. Personnel from Litton Industries visited Utica on 30 and 31 October 1962 for purposes of discussing the L-3519 tube problems.

2. General Electric Company Quality Control personnel visited Litton Industries on 1 and 2 November 1962 to coordinate test procedures and to inspect Litton's test equipment.

SECTION III

QRC-139A-(T) AGE EQUIPMENT

A. 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 115V AC ±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 AC and DC 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.

B. PROGRAM STATUS.

All parts necessary for fabrication of the QRC-139A-(T) AGE equipment have been released to manufacturing, and the factory is proceeding to fabricate the equipment.

C. PROGRAM FOR NEXT INTERVAL.

There will be monitoring of all factory work on the equipment, and this factory follow-up will continue as long as the equipment is in process of manufacture.

D. CONFERENCES.

No conferences or meetings were held during this report period.

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