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SONAR TEST AND TEST INSTRUMENTATION SUPPORT. (U)
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④ SONAR TEST AND TEST INSTRUMENTATION

Quarterly Progress Report No. 11 under Contract No. N00014-70-C-0001

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⑪ 7 Dec 1970

⑬ 20

⑨ Quarterly Progress Report, vol. 11
1 Dec 1970 - 28 Feb 1971

Distribution limited to U.S. Government agencies only;
TEST AND EVALUATION: 30 Dec 1970
Other requests for information should be referred to
NLOWL/ASROC.

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Prepared for:

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A100 056	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SONAR TEST AND TEST INSTRUMENTATION SUPPORT		5. TYPE OF REPORT & PERIOD COVERED quarterly progress report 1 Dec 78 - 28 Feb 79
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Dudley D. Baker et al.		8. CONTRACT OR GRANT NUMBER(s) N00140-76-C-6487
9. PERFORMING ORGANIZATION NAME AND ADDRESS Applied Research Laboratories The University of Texas at Austin Austin, TX 78712		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New London Laboratory Naval Underwater Systems Center New London, CT 06320		12. REPORT DATE 7 December 1979
		13. NUMBER OF PAGES 25
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Applied Research Laboratories, The University of Texas at Austin (ARL:UT), was awarded Contract N00140-76-C-6487, sponsored by New London Laboratory, Naval Underwater Systems Center, effective 1 June 1976. Work under this contract involves technical support with sonar testing, test instrumentation, and documentation. This report describes progress made under the tasks that are still active under the subject contract.		

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I. INTRODUCTION

Applied Research Laboratories, The University of Texas at Austin (ARL:UT), was awarded Contract N00140-76-C-6487, sponsored by New London Laboratory, Naval Underwater Systems Center (NLONLAB NUSC), effective 1 June 1976. Some of the work under this contract represents a follow-on effort to previous work sponsored by NLONLAB NUSC under Contract N00140-74-C-6316.

The work under Contract N00140-76-C-6487 was originally divided into six task areas that focused on technical support in areas of sonar technology:

- I. AN/FQM-10(V) Sonar Test Set Field Support
- II. Transducer Repair Facility Test Site Field Support
- III. AN/WQM-5 Sonar Test Set Field Support
- IV. Special Purpose Passive Sonar Systems Support
- V. Sonar Instrumentation Test and Evaluation
- VI. Study of Towed Line Array Acoustical Testing at Transducer Repair Facilities

Additional tasks were added by contract modifications, as follows:

- VII. AN/SQM-() Sonar Noise Measuring Set Development (Mod P00019)
- VIII. AN/WQM-5() Sonar Test Set Development (P00019)
- IX. Sonar Dome Maintenance Documentation Support (P00019)
- X. AN/BQQ-5 Power Supply Development (P00019) (follow-on work under Contracts N00024-77-C-6035 and similar effort under N00123-79-C-0459)
- XI. AN/BQQ-6 Test Instrumentation (P00035)
- XII. AN/WLR-12 Calibration (P00033)

This report is Quarterly Progress Report No. 11 under
Contract N00140-76-C-6487, for the period 1 December 1978 -
28 February 1979.

II. TRF, AN/FQM-10(V) AND AN/WQM-5 FIELD SUPPORT

A. TRF Support

ARL:UT provides material and technical support for the Transducer Repair Facilities (TRFs) at three Naval shipyards: Portsmouth Naval Shipyard (NAVSHIPYD PTSMH), Mare Island Naval Shipyard (NAVSHIPYD MARE), and Pearl Harbor Naval Shipyard (NAVSHIPYD PEARL).

During this report period, ARL:UT provided support as described in the following subsections.

1. MX-9818/GQM-1 Adapter, Filling Fixture, Transducer

The last of three filling fixtures is nearing completion and is to be delivered to NAVSHIPYD PEARL in the near future.

2. Pressure Vessel Stuffing Tubes

All pressure vessel stuffing tubes required to complete the hydrostatic pressure vessel facilities at the TRFs have now been constructed and delivered as specified by NAVSEA.

B. AN/FQM-10(V) Sonar Test Set Field Support

ARL:UT provides material and technical support for six AN/FQM-10(V) sonar test sets located at the three TRFs at NAVSHIPYDs PTSMH, MARE, and PEARL. In addition, ARL:UT maintains a pilot AN/FQM-10(V) at Lake Travis Test Station (LTTS). During this report period, ARL:UT provided the following support.

Upon request, ARL:UT furnished NAVSHIPYD PTSMH with two fan motors for Krohn Hite amplifiers Model DCA-50, unit No. 41.

ARL:UT also repaired and returned the following units of the AN/FQM-10(V) to NAVSHIPYD PTSMH.

1. E-I normalizer Model 1153, unit 13
2. ARL:UT dummy load, unit 75
3. immittance sampling unit, Model 1170, unit 30

C. AN/WQM-5 Sonar Test Set Field Support

Naval Sea Systems Command (NAVSEA) assigned ARL:UT the responsibility of being the designated overhaul point (DOP) for repairing AN/WQM-5 components, under the support of SPCC. In addition to being the DOP, ARL:UT also provides field maintenance engineering support for the 27 AN/WQM-5 Sonar Test Sets located at various Naval laboratories and installation and support activities.

During this report period, ARL:UT provided support for AN/WQM-5 test sets, as described in the following subsections.

1. AN/WQM-5, Ser A11

ARL:UT loaned the 12th Coast Guard District a recorder, unit 5, while their recorder was being repaired. The Ser A11 recorder was repaired at ARL:UT and returned to the Coast Guard.

2. AN/WQM-5A, Ser A14

ARL:UT loaned NAVSHIPYD PTSMH a capacitor unit, unit 9, while ARL:UT repaired Ser A14 capacitor unit.

3. AN/WQM-5A, Ser A15

ARL:UT provided NAVSHIPYD PEARL with three 2N3872 and three 1N5384 components to be used in the repair of their power supply unit, unit 8.

D. Jib Crane/Hoist Systems for YFNX 1250

As previously reported, the ARL:UT purchase request for the jib crane/hoist systems for the YFNX 1250 was issued on 30 November 1978. The invitation to bid was issued on 6 December 1978 and the bids were opened on 4 January 1979. All the bids were technically deficient. During January 1979, ARL:UT received the required technical information from the bidders, and on 5 February 1979, the UT Austin Purchasing Office ordered the jib crane/hoist systems from Stewart Engineering and Equipment Company, Richardson, Texas, to be delivered to NAVSHIPYD PTSMH in the first two weeks of June 1979. Copies of the jib crane/hoist specification and the technical portion of the Stewart bid were forwarded to NAVSHIPYD PTSMH for review and comment by ARL:UT ltrs Ser E-15 of 11 January 1979 and Ser E-25 of 22 January 1979.

E. Repair Fixture for AN/UQN-1,4 Transducer

As previously reported, ARL:UT is producing six units of the repair fixture and will deliver two of them to each of the TRFs. The update of the shop drawings was completed early in December 1978 and most of the parts and materials needed for manufacture were ordered. Machine shop fabrication was begun in mid-January 1979 and was 95% complete by the end of this reporting period; all ordered parts had been received by the first week of February 1979. At the 12-16 February 1979 NAVSEA program review, it was agreed that nomenclature would not be obtained for the repair fixture and that some sort of informal nametag would be sufficient. Informal nametags were ordered the third week of February. Preassembly, sandblasting, painting, and final assembly should occur in March and delivery to the shipyards in April.

F. Fixed Positioners

1. Scope and Design Modifications

As indicated in Refs. 1 and 2, several changes have been made in the design, logistics, and scheduling for the fixed positioners. The fixed positioners are now to be rated uniformly at 280 kg (625 lb). Two positioners are to be delivered for use in the acoustical test tanks at NAVSHIPYDS PTSMH and PEARL. Of these, the positioner already installed at NAVSHIPYD PTSMH will be completely retrofitted to be identical to the positioner to be installed at NAVSHIPYD PEARL. Three positioners are to be delivered to the test barge at NAVSHIPYD PTSMH (YFNX 1250). Because of the strong river currents at the mooring site for YFNX 1250 (berth 3), the diameter of the shaft on the barge units will be larger. Thus, the barge and tank positioners will be approximately 85% identical.

The redesign of the fixed positioners has evolved over the past year. The changes were made in response to input from NAVSHIPYD PTSMH TRF personnel, the opportunities afforded by the AN/FQM-12(V) program, and ideas for general improvement generated at ARL:UT. These changes include an endless chain drive for vertical motion, rather than a wire rope winch, synchro repeaters from the AN/FQM-12(V) test sets for local bearing and depth readout, and the elimination of adjustable limits on bearing and depth. The prime mover for the depth function has been changed to a 2 hp motor, which requires the addition of a 2 hp dc motor controller with an interface to allow control from the Scientific-Atlanta controlled rectifier unit being used with the AN/FQM-12(V).

The positioners are to be installed at the same time as the associated AN/FQM-12(V)s. Thus, the first fixed positioner will be installed on the YFNX 1250 by 30 June 1979.

2. Action

Work on the fixed positioners resumed in earnest on 2 January 1979. By the end of this reporting period, work was about 20% complete. The design and bill of materials is about 95% complete and 95% of the equipment and material for constructing the four positioners and retrofitting the one positioner has been ordered. Also, as previously reported, many of the parts and assemblies for the second tank positioner had been fabricated and assembled in 1977.

In mid-December 1978, ARL:UT arranged for a 2 hp 3 ϕ motor speed/direction controller to be sent to NAVSHIPYD PTSMH TRF (on loan from the manufacturer) to be used with the existing fixed positioner, which was delivered without depth speed control. At the end of the loan period (2 March 1979) ARL:UT will, at the TRF's request, buy the controller (or a similar one) and loan it to the TRF until the positioner is retrofitted.

III. SPECIAL PURPOSE PASSIVE SONAR SYSTEMS SUPPORT

As reported in QPR No. 10, the specification for the frequency domain equalizer was completed by ARL:UT on 1 September 1978. Since that time ARL:UT has been asked to justify certain requirements of the specification, but any further action had been postponed until instructions are received from NLONLAB NUSC. No instructions to resume work on this project were received during the report period.

IV. SONAR INSTRUMENTATION TEST AND EVALUATION

A. Introduction

Work reported under this task includes conceptual design of a family of calculator based sonar test sets, and a task in support of the Sensor Alignment and Calibration Site (SACS), including a section on AN/SQS-35/38 testing. All funds under this contract for the latter task have been expended; this work is continuing under Contract N66001-78-C-0329.

B. AN/GQM-() Immittance Test Set

The HP 9825S calculators, HP 9872A plotters, and interfaces for the AN/GQM-() Immittance Test Set were received in January 1979. As of 28 February the HP 3330B automatic synthesizers and the HP 3570A network analyzers had not yet been received; delivery from Hewlett-Packard is scheduled in May.

The first V/I sampling unit was completed in January and will be tested with a fully assembled system before final assembly of the remaining units.

As of the end of this reporting period, the official nomenclature for the test set still had not been received.

C. AN/UQM-() Sonar Test Set

Manpower demands on other development efforts occurring parallel with the AN/UQM-() have temporarily restricted further progress on

this task and on the development of the AN/SQM-() prototype. Progress will be reported when work on either task is resumed.

V. ASSISTANCE WITH EXPANSION OF TRF CAPABILITIES TO INCLUDE NEW TRANSDUCERS

During this reporting period, the remaining funds in this task were expended to support monitoring of the fabrication of plant equipment to be delivered to the TRFs for repair/testing of sonar towed line arrays. This plant equipment is being delivered under Contract N00024-77-C-6035.

VI. DOCUMENTATION SUPPORT

No work was performed under this task during the report period.

VII. AN/WQM-5() PROCUREMENT AND FIELD CHANGE PROGRAM

By 28 February 1979, ARL:UT had received from C-Tech, Inc., the following AN/WQM-5() Field Change Kits.

AN/WQM-5A -- 10

AN/WQM-5B/C -- 8

These materials are being installed as a part of the retrofit/repair program begun under Contract N00024-77-C-6035 and being continued under Contract N00024-79-C-6358. Thus far, seven AN/WQM-5() sets have been retrofitted and redelivered to user activities.

VIII. AN/BQQ-6 TEST INSTRUMENTATION PROGRAM

During this report period ARL:UT developed several technical approaches to the design of a second generation portable spherical array test set (PSATS). This new version of the PSATS was described in a preliminary technical letter (TL-EA-78-9), which was forwarded to NLONLAB NUSC 326 (Ben Travisano) by ARL:UT ltr Ser E-401 of 11 December 1978. In this letter, ARL:UT also recommended that funding be provided for further PSATS development.

At the end of the reporting period, however, ARL:UT was notified that such funding is not available and the program has been suspended because current funds have been expended.

IX. PIERSIDE CALIBRATION OF AN/WLR-12

Comments on the AN/WLR-12 pierside calibration preliminary report (forwarded to NLONLAB NUSC during the last report period) were received at ARL:UT on 2 January 1979. These comments were forwarded by NLONLAB NUSC 326 ltr Ser 8326-62 of 20 December 1978. The final report is being modified in response to these comments and will be distributed during the next report period.

REFERENCES

1. "Meeting Report of Transducer Repair Facility (TRF) Working Group Meeting No. 4," Enclosure (1) to NAVSEA 06H4 ltr Ser 520-06H4D of 4 December 1978.
2. "Highlights of SEA 06H4D Program Review Under Contract N00024-77-C-6035/79-C-6358 at ARL:UT 12-16 February 1979," Enclosure (1) to ARL:UT ltr Ser E-102 of 1 March 1979.

7 December 1979

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QUARTERLY PROGRESS REPORT NO. 11
UNDER CONTRACT N00140-76-C-6487
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