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(U) Applied Research Laboratories, The University of Texas at Austin (ARL:UT), was awarded Contract NO0140-76-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.		

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. TRF, AN/FQM-10(V), AND AN/WQM-5 FIELD SUPPORT	3
A. Pressure Vessel Stuffing Tubes	3
B. AN/FQM-10(V) Field Support	3
C. Jib Crane/Hoist Systems for YFNX 1250	5
D. Fixed Positioners	5
E. AN/UQN-1/4 Repair Fixtures	5
III. SPECIAL PURPOSE PASSIVE SONAR SYSTEMS SUPPORT	7
IV. SONAR INSTRUMENTATION TEST AND EVALUATION	9
A. Introduction	9
B. AN/GQM-() Immittance Test Set	9
C. AN/UQM-() Sonar Test Set	9
D. SACS Support	10
1. Hardware Documentation	10
2. Software Documentation	10
3. Sonar Controller Installation	10
4. AN/SQS-35/38 Study	11
5. Results of USE HULL (DD 945) Transducer and Dome Testing	11
V. ASSISTANCE WITH EXPANSION OF THE TRF CAPABILITIES TO INCLUDE NEW TRANSDUCERS	13
VI. DOCUMENTATION SUPPORT	15
VII. AN/WQM-5() PROCUREMENT AND FIELD CHANGE PROGRAM	17
VIII. AN/BQQ-6 TEST INSTRUMENTATION PROGRAM	19
IX. PIERSIDE CALIBRATION OF AN/WLR-12	21

I. INTRODUCTION

Applied Research Laboratories, The University of Texas at Austin (ARL:UT), was awarded Contract NO0140-76-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 NO0140-74-C-6316.

The work under Contract NO0140-76-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 N00123-79-C-0459)
- XI. AN/BQQ-6 Test Instrumentation (P00035)
- XII. AN/WLR-12 Calibration (P00033)

This report is Quarterly Progress Report No. 10 under
Contract N00140-76-C-6487, for the period 1 September -
30 November 1978.

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

A. Pressure Vessel Stuffing Tubes

ARL:UT has completed fabrication of the majority of the stuffing tubes required to complete the hydrostatic pressure vessel facilities at the Transducer Repair Facilities (TRFs). The remaining items have been delayed by material problems, but are scheduled for delivery in December 1978. The units for NAVSHIPYD MARE and NAVSHIPYD PEARL will be shipped as soon as they can be packaged and GBLs obtained. The NAVSHIPYD PTSMH units will be retained at ARL:UT with the PTSMH pressure vessels.

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

1. Upon request ARL:UT sent five Grigsby-Barton relays (model GB 821A-27) to NAVSHIPYD MARE for the sampling digital voltmeter, unit 74.

2. NAVSHIPYD PEARL's sampling digital voltmeter, unit 74, was repaired and calibrated at ARL:UT. The unit was then returned to NAVSHIPYD PEARL.

3. On 22 November ARL:UT received from NAVSHIPYD PTSMH eight spare units to be repaired and calibrated. A list of the units follows.

- (1) pulse timing generator model 1118, unit 7
- (2) power supply model 1116-2A1, unit 6
- (3) differential preamplifier model 1116-20, unit 6
- (4) frequency tracking servo model 1114A, unit 4
- (5) EI normalizer model 1153, unit 13
- (6) sampling digital voltmeter model 1166, unit 74
- (7) PVIM sampling unit model 1171-3-0, unit 30
- (8) ARL:UT dummy load, unit 74

ARL:UT also shipped to NAVSHIPYD PTSMH 25 quick-disconnects for the junction box, unit 61.

4. Travel to NAVSHIPYD PTSMH, 5-21 October 1978

Gary Warren, Manuel Vargas, and Richard Marshall of ARL:UT traveled to NAVSHIPYD PTSMH in response to a request from the TRF for technical aid in the repair of several units of the AN/FQM-10(V) Sonar Test Set. Ed Comeau and Sam Bellucci of NAVSHIPYD PTSMH gave the ARL:UT representatives a list of equipment to be repaired.

Units of test set Ser 6 in need of attention were:

- (1) pulse timing generator, unit 7,
- (2) sampling digital voltmeter, unit 74,
- (3) pulse vector immittance meter, unit 27,
- (4) frequency tracking servo, unit 4, and
- (5) differential preamplifier, unit 6.

Units of test set Ser 5 needing repair were:

- (1) pulse timing generator, unit 7,
- (2) pulse vector immittance meter, unit 27,
- (3) EI normalizer, unit 13,
- (4) differential preamplifier, unit 6, and
- (5) three CML amplifiers, unit 65.

Each instrument was repaired and returned to service, except two of the CML power amplifiers aboard the test barge. These amplifiers needed repair parts, which were not immediately available. Two CML amplifiers from the AN/FQM-10(V) test set Ser 6 were transferred to the test barge and installed. These two amplifiers and the one remaining CML amplifier of test set Ser 5 were aligned for their maximum efficiency.

The controlled rectifier unit, unit 63, which had been repaired at ARL, was received and installed. After installation, the unit was tested and found to be operating properly in all modes.

C. Jib Crane/Hoist Systems for YFNX 1250

During October 1978, it was discovered that the project (P-2261) to convert the YFN 1250 to a sonar test barge at NAVSHIPYD PTSMH did not include the procurement and installation of the two 900 kg (2000 lb) capacity jib crane/hoist systems on the YFN 1250. ARL:UT was tasked to procure the jib crane/hoist systems and deliver them, ready to install, to NAVSHIPYD PTSMH as soon as possible. During the month of November 1978, a specification for the jib crane/hoist system was written. On 30 November 1978, an ARL:UT purchase request, with the specification attached, was initiated.

D. Fixed Positioners

ARL:UT previously worked on the design and fabrication of a fixed transducer positioner for the test tank at NAVSHIPYD PTSMH. In October 1978, ARL:UT was tasked to fabricate several similar units for the test tank at PEARL and the new YFN 1250 barge at PTSMH. Although no significant work has been done on this project during this report period, work is expected to be accelerated during the next report period.

E. AN/UQN-1/4 Repair Fixtures

Some time ago, the TRFs expressed interest in a repair fixture for use in handling AN/UQN-1/4 transducers during repair work. ARL:UT designed and built a prototype and delivered it to MARE on a trial basis. Subsequent comments led to a revised design. The decision to deliver two of these fixtures to each TRF was made in April 1978. ARL:UT has since been tasked to do this work. No significant progress was made during this report period, but work will begin in the next. Delivery is tentatively scheduled for April 1979.

III. SPECIAL PURPOSE PASSIVE SONAR SYSTEMS SUPPORT

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 has been postponed until instructions are received from NLONLAB NUSC.

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.

B. AN/GQM-() Immittance Test Set

ARL:UT received funds on 6 July 1978 for three units of the AN/GQM-() Immittance Test Set. Purchase orders initiated in July for the various instruments required to configure the system have been delayed in the purchasing cycle. By 30 November the Tektronix enclosures and current probes had been received; they are currently undergoing modifications necessary to assemble the test units. The other instruments are on order, but delivery dates are not firm.

As of 30 November 1978, the official nomenclature for the test set had not been received.

C. AN/UQM-() Sonar Test Set

High manpower demands on various other development efforts occurring parallel with the AN/UQM-() have temporarily restricted further progress on this task. Within the next few months more engineering help will have become available, and a more concentrated effort can then be made on the AN/UQM-() task.

The effort on the development of the AN/SQM-() prototype has increased. A new small graphic plotter will be evaluated in the near future to determine its applicability to the AN/SQM-() design. This new plotter could result in a reduction of both cost and size of the test set.

D. SACS Support

1. Hardware Documentation

Work on the AN/SQS-26CX/53A sonar controller hardware documentation is proceeding on a low priority basis. The rough draft is being reorganized and its content modified. A second draft in the required format is expected to be completed during the next quarter.

2. Software Documentation

The documentation for the SPEDE program has been an unexpectedly complex task. The program was written by Mr. Jim Rea (presently of Sperry Univac and formerly at Tracor). He was hired as a consultant to clarify some of the fine points of the program, and to explain the idiosyncrasies of the Varian 620L on site at SACS.

Many of the 85 subroutines presently on file at SACS are called by SPEDE. These called subroutines must also be documented. It is estimated that the final software documentation will be several hundred pages long.

3. Sonar Controller Installation

Little work was accomplished on the installation plan due to work on SPEDE documentation and the SACS line calibration study under another contract.

4. AN/SQS-35/38 Study

A request for OMNI transmission data for the AN/SQS-35/38 from Edo Corp., College Pt., New York, was routed through NLONLAB NUSC but was lost in transit from NUSC to Edo or, at Edo. ARL:UT became aware of this in early November and reforwarded the request to NLONLAB NUSC, with follow-up telephone alerts to both NLONLAB NUSC and Edo. At this time Edo informed ARL:UT that some of the information requested had not yet been found in-plant. None of the data requested by ARL:UT had been received by the end of the report period.

5. Results of USS HULL (DD 945) Transducer and Dome Testing

In 1976, ARL:UT was funded under Contracts N00024-75-C-6035 and N00140-76-C-6487 to test the transducer and dome of USS HULL (DD 945). Progress on this task was reported under Contract N00024-75-C-6070. The final test report "Technical Assessment of Transducer TR-208A Ser B36, and Dome CW-559/808 Ser E10, From USS HULL (DD 945)" (U), ARL-TR-73-42, was issued under Contract N00140-76-C-6487 during September 1978.

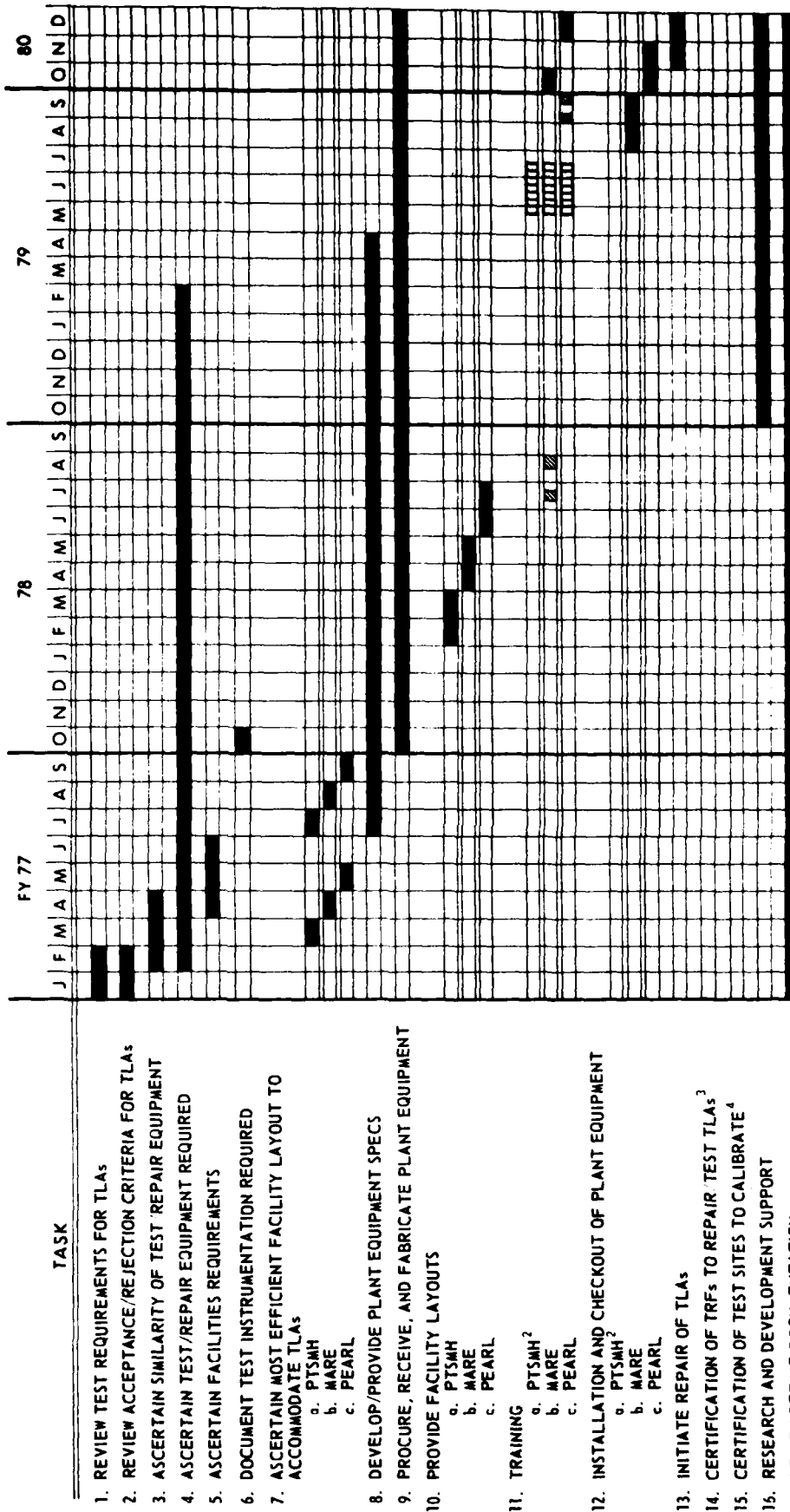
V. ASSISTANCE WITH EXPANSION OF THE TRF CAPABILITIES
TO INCLUDE NEW TRANSDUCERS

ARL:UT is tasked under Contract N00024-77-C-6035 to specify and deliver to the TRFs the plant equipment items needed for work on sonar towed line arrays (TLAs). Early background work on this project was conducted under Contract N00140-76-C-6487. However, because the major portion of this effort is under Contract N00024-77-C-6035, progress for this period will be reported under that contract.

Figure 1 is an updated milestone chart for this task.



MILESTONES FOR NAVSEA TOWED LINE ARRAY (TLA) REPAIR AND TEST CAPABILITY FOR TRFs



¹ MILESTONES DEPEND ON PROMPT DELIVERY OF EQUIPMENT BY MANUFACTURERS
² PTSMH MILESTONES DEPEND UPON COMPLETION OF MILCON P-157 AUTHORIZED IN FY 79
³ SIX MONTHS AFTER TASK 13 IS INITIATED
⁴ CERTIFICATION DEPENDS ON THE SUCCESSFUL COMPLETION OF THE ACOUSTICAL CALIBRATION DEVELOPMENT PROGRAM

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VI. DOCUMENTATION SUPPORT

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

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

By 30 November 1978, ARL:UT had received from C-Tech, Inc., the following AN/WQM-5() Field Change Kits:

AN/WQM-5 -- 7

AN/WQM-5B/C -- 8

The remaining kits are scheduled to be delivered well in advance of the time that they are needed for installation. The remaining items necessary to configure the AN/WQM-5() units have been received and are on hand at ARL:UT. 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, five AN/WQM-5() sets have been retrofitted and redelivered to user activities.

VIII. AN/BQQ-6 TEST INSTRUMENTATION PROGRAM

During the previous report period ARL:UT had informally proposed several technical approaches to the design of a second generation portable spherical array test set (PSATS). During this report period, ARL:UT further developed these technical concepts and designed a unit similar to the original PSATS, but with the following improvements.

1. Upgraded the target bearing resolution from 6° to 0.1° .
2. Made provisions to move or sweep the targets at different angular speeds in azimuth and D/E.
3. Diminished or eliminated an effect known as the "striping problem".
4. Used hybrid construction techniques to reduce physical size.
5. Provided four separate channels, each of which could be allocated either for a target or for background noise.
6. Moved all targets (up to four) automatically at arbitrary rates, with 0.1° resolution.
7. Assigned the targets and noise arbitrary spectral and amplitude characteristics within the bandwidth and dynamic range limitations of the system.
8. Generated the targets and noise internally by the microprocessor or provided by an external source in either digital or analog form.
9. Used PSATS II to test sonar systems other than those used with the spherical array, given that the impedance, drive, and spectral characteristics of the array to be imitated are similar to those of the spherical array.

ARL:UT is describing this new version of the PSATS in a preliminary technical letter (TL-EA-78-9), which is scheduled to be issued in December 1978. In this document, ARL:UT plans to recommend that funding be provided for the following efforts.

1. Further PSATS II design development
2. Technical consultation and design review
3. Construction of breadboard apparatus to evaluate the feasibility of the PSATS II design
4. Technical review of breadboard

Upon successful completion of the technical review of the breadboard, ARL:UT would request funding for the following actions.

1. Full prototype design
2. Prototype construction
3. Prototype evaluation

IX. PIERSIDE CALIBRATION OF AN/WLR-12

The preliminary report on AN/WLR-12 pierside calibration was forwarded to NLONLAB NUSC Code 326 (W. Jucksch) by ARL:UT ltr Ser E-370 of 13 November 1978. ARL:UT had not received review comments on the report as of the end of this report period.

29 March 1979

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