FINAL REPORT

ENGINEERING SUPPORT FOR ACOUSTIC AND ANALYSIS SYSTEM

Contract N00014-83-C-0769

SYSTEMS INTEGRATED

SD650-124-902

FINAL REPORT

ENGINEERING SUPPORT FOR ACOUSTIC AND ANALYSIS SYSTEM

Contract N00014-83-C-0769

by

Systems Integrated
7394 Trade Street
San Diego, CA 92121

I. INTRODUCTION

This final report is submitted in accordance with ELIN A002 of ONR Contract N00014-83-C-0769 and presents the work accomplished for the period 15 September 1983 through 14 September 1984 by Systems Integrated. Work done was in support of acoustic data acquisition and analysis systems for Dr. Robert R. Gardner, Naval Ocean Research and Development Activity (NORDA), Code 201.

This contract ~~tasked Systems Integrated to~~ perform a study of all current SEAS acoustic data acquisition and analysis systems to determine their limits, accuracies, and options for improvements based on equipment availability and cost. Also, ~~to make~~ recommendations and ~~provide~~ guidelines for field measurements based on system capabilities and mission objectives.

II. RESULTS

Systems Integrated examined the existing data systems operated and maintained by the SEAS program office. This study was limited to the collection and processing systems used primarily for acoustic research. (A similar study is being performed for the SPARS modeling system under a separate contract.)

The systems examined were the ones used during at-sea exercises such as OUTPOST CREOLE, WESTLANT 80, Mid-Frequency Acoustics, and the CHURCH STROKE exercises. These systems were:

1) Three Array Processor, ~~(TAP)~~

2) Mid-Frequency Array Beamformer, ~~(MFA)~~

3) Autonetics Digital Filters;

4) Non-acoustic Data Subsystem (NADS);

5) SEAS Array Processor, ~~(SAP)~~ and

6) Batch Processing System (BATCH).

First, the throughput of each system was analyzed. The system with the best throughput was the SAP system; 80% throughput was reached. The SAP system (as with the TAP system) was constructed with small capacity disc drives (5 and 20 megabytes), and 800 BPI tape units at 45 ips. Another common

piece of equipment was the AP120B, a floating point system. The AP120B was purchased prior to 1978 and has a limited capacity, and is difficult to maintain due to manufacturer upgrades.

Although all of the SEAS systems worked well, much of the equipment is bulky and is fast becoming obsolete. For example, the SAP system utilizes 2 racks for the computers, tape units and AP120B. The MFA system needs 2 racks as well as 2 racks for the BATCH system. The TAP system requires less space but its throughput is significantly less and the equipment nonsupportable.

The BATCH system is used almost exclusively for doing off-line processing. Neither the SAP nor the TAP system has the capability to perform complex real-time functions.

Based upon years of experience with computer hardware, Systems Integrated believes that the technology exists today to provide a compact "state-of-the-art" data collection system which can provide beamforming, spectral analysis, real-time displays, and on-line signal processing. The key to developing such a system is to buy off-the-shelf hardware that is flexible and supportable world-wide by the manufacturer. This would almost eliminate the problem of hiring several contractors just to maintain equipment/systems during at-sea tests. This, in turn, will allow more scientists to be aboard a research vessel rather than repairmen.

Systems Integrated also recommends using the latest disc technology. The 5 and 20 megabyte discs are not out of date yet. Winchester discs are available up to 132 megabytes; and even larger 404 megabyte discs can be used in the proper environment.

The HP 1000F computer systems can be upgraded to HP 1000 A-series computers. The A-series is roughly 10 times faster and occupies half the space.

The last consideration by SI in this task was the High Density Digital Recorders (HDDR). Typically, there are 2 HDDRs aboard a research vessel during an exercise. Each recorder uses 1 full rack. A study is recommended in video cassette recorder (VCR) technology to determine the possibility of replacing HDDRs with VCRs. This would save over a rack of space. Also, the cost of each VCR is negligible compared to the extreme cost of a HDDR.

In conclusion, Systems Integrated will take the results of this study and propose a "state-of-the-art" combination of VCRs, beamformers, spectrum analyzers, and processing systems for future at-sea exercises.

DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
875 NORTH RANDOLPH STREET
SUITE 1425
ARLINGTON VA 22203-1995

IN REPLY REFER TO:

5510/1
Ser 321OA/011/06
31 Jan 06

MEMORANDUM FOR DISTRIBUTION LIST

Subj: DECLASSIFICATION OF LONG RANGE ACOUSTIC PROPAGATION PROJECT (LRAPP) DOCUMENTS

Ref: (a) SECNAVINST 5510.36

Encl: (1) List of DECLASSIFIED LRAPP Documents

1. In accordance with reference (a), a declassification review has been conducted on a number of classified LRAPP documents.

2. The LRAPP documents listed in enclosure (1) have been downgraded to UNCLASSIFIED and have been approved for public release. These documents should be remarked as follows:

   Classification changed to UNCLASSIFIED by authority of the Chief of Naval Operations (N772) letter N772A/6U875630, 20 January 2006.

   DISTRIBUTION STATEMENT A: Approved for Public Release; Distribution is unlimited.

3. Questions may be directed to the undersigned on (703) 696-4619, DSN 426-4619.

BRIAN LINK
By direction

Subj: DECLASSIFICATION OF LONG RANGE ACOUSTIC PROPAGATION PROJECT (LRAPP) DOCUMENTS

DISTRIBUTION LIST:

NAVOCEANO (Code N121LC – Jaime Ratliff)
NRL Washington (Code 5596.3 – Mary Templeman)
PEO LMW Det San Diego (PMS 181)
DTIC-OCQ (Larry Downing)
ARL, U of Texas
Blue Sea Corporation (Dr.Roy Gaul)
ONR 32B (CAPT Paul Stewart)
ONR 321OA (Dr. Ellen Livingston)
APL, U of Washington
APL, Johns Hopkins University
ARL, Penn State University
MPL of Scripps Institution of Oceanography
WHOI
NAVSEA
NAVAIR
NUWC
SAIC

Declassified LRAPP Documents

Report Number	Personal Author	Title	Publication Source (Originator)	Pub. Date	Current Availability	Class.
NORDA35VOL.1BK 2OF3	Lauer, R.B.	THE ACOUSTIC MODEL EVALUATION COMMITTEE (AMEC) REPORTS, VOL. 2- APPENDICES A-D- EVALUATION OF THE FACT PL9D TRANSMISSION LOSS MODEL	Naval Ocean R&D Activity	810901	ND ADC034019	U
NORDA36VOL.3BK 2OF3	Lauer, R.B., et al.	THE ACOUSTIC MODEL EVALUATION COMMITTEE (AMEC) REPORTS, VOL. 3- APPENDICES A-D- EVALUATION OF THE RAYMODE X PROPAGATION LOSS MODEL (U)	Naval Ocean R&D Activity	810901	ND ADC034022	U
Unavailable	Hooper, M. W., et al.	MEASUREMENTS AND ANALYSIS OF ACOUSTIC BOTTOM INTERACTION IN THE NORTHWESTERN MEXICAN BASIN	University of Texas, Applied Research Laboratories	811005	ADA107551	U
Unavailable	Kirby, W. D.	FINAL REPORT FOR CONTRACT NUMBER N00014-78-C-0862	Science Applications Inc.	820201	ADA111000	U
Unavailable	Brunson, B. A., et al.	PHYSICAL SEDIMENT MODEL FOR THE PREDICTION OF SEAFLOOR GEOACOUSTIC PROPERTIES	Planning Systems Inc.	820701	ADA119445	U
Unavailable	Cavanagh, R. C., et al.	NORDA PARABOLIC EQUATION WORKSHOP, 31 MARCH - 3 APRIL 1981	Naval Ocean R&D Activity	820901	ADA121932	U
NORDA34VOL.1A	Martin, R. L., et al.	THE ACOUSTIC MODEL EVALUATION COMMITTEE (AMEC) REPORTS, VOL. 1A- SUMMARY OF RANGE INDEPENDENT ENVIRONMENT ACOUSTIC PROPAGATION DATA SETS	Naval Ocean R&D Activity	820901	ADC034017; ND	U
Unavailable	Bartberger, C. L., et al.	THE ACOUSTIC MODEL EVALUATION COMMITTEE (AMEC) REPORTS, VOLUME 2. THE EVALUATION OF	Naval Ocean R&D Activity	820901	ADC034019	U
Unavailable	Deavenport, R., et al.	THE ACOUSTIC MODEL EVALUATION COMMITTEE (AMEC) REPORTS, VOLUME 3. EVALUATION OF THE RAYMODE X PROPAGATION LOSS MODEL. BOOK 2. APPENDICES A-D	Naval Ocean R&D Activity	820901	ADC034022	U
Unavailable	Unavailable	1975-1982 SUMMARY REPORT	Analysis and Technology, Inc.	821217	ADA192591	U
Unavailable	DeChico, D.	ACOUSTIC EVALUATION OF SANDERS ASSOCIATES ACODAC SENSORS	Naval Air Development Center	830301	ADB073873	U
NRL-FR-8695; NRL-8695	Palmer, L. B., et al.	TRANSVERSE HORIZONTAL COHERENCE AND LOW-FREQUENCY ARRAY GAIN LIMITS IN THE DEEP OCEAN	Naval Research Laboratory	830809	ND ADA131916	U
Unavailable	Unavailable	ENGINEERING SUPPORT FOR ACOUSTIC AND ANALYSIS SYSTEM	Systems Integrated	840101	ADB091112	U
Unavailable	Unavailable	SEAS (SURVEILLANCE ENVIRONMENTAL ACOUSTIC SUPPORT PROGRAM) SUPPORT	Systems Integrated	840229	ADB091119	U