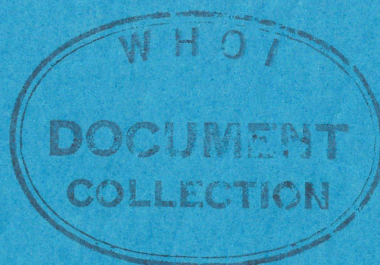


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# WOODS HOLE OCEANOGRAPHIC INSTITUTION

Reference No. 61-12

SONAR RESEARCH conducted during the period  
1 January - 31 March 1961

WOODS HOLE, MASSACHUSETTS



WOODS HOLE OCEANOGRAPHIC INSTITUTION  
Woods Hole, Massachusetts

Reference No. 61-12

SONAR RESEARCH conducted during the period  
1 January - 31 March 1961

Quarterly Progress Report  
Submitted to the Bureau of Ships  
Under Contract NObsr-72521

April 1961

APPROVED FOR DISTRIBUTION

  
\_\_\_\_\_  
Paul M. Fye, Director

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## INTRODUCTION

This is a report of activities supported under Contract NObsr-72521 for the period 1 January through 31 March 1961. It also contains mention of other reports, papers, and undertakings of the submarine geophysics group (listed under "Personnel") which are believed to be of interest to the Bureau of Ships. During this period no cruises have been supported directly under this contract. Eight members of the group under the leadership of Dr. Voorhis have participated in a cruise of CHAIN to the Romanche Trench. Their principal objective was to determine the sill depth which controls the exchange of deep, cold water between the western and eastern sides of the Atlantic Ocean. This sill was previously identified from hydrographic evidence to lie somewhat east of the Romanche Trench. A second objective was to continue the observations of temperature structure near the sea's surface with the thermistor chain. Another group, under Mr. Baxter's leadership, continued a sound transmission study in the Bermuda area in support of Project ARTEMIS. A third group, under Dr. Hays's direction, commenced a finely detailed bathymetric survey of an area of special interest to Project ARTEMIS. In all three of these studies we are making use of one or more experimental techniques in the use of sonobuoys, underwater acoustic navigation for submerged instruments, and sound coherence studies which are planned for use eventually in sound transmission and bottom reflection research under this contract.

We have been space-limited to one laboratory analysis study of bottom reverberation, and thus have no progress to report in analysis of sound transmission data from recent cruises. But new space has now become available which we are preparing as an analysis laboratory.

Plans are being formed for major cruises for the summer and fall in the Puerto Rico Trench, on the Blake Plateau, to the Caribbean (this cruise may have to be cancelled), and to the Mediterranean Sea. Bottom and sub-bottom reflection and sampling are planned for all cruises while the Puerto Rico Trench and Mediterranean cruises will include temperature, sound propagation, velocity, and sound transmission measurement programs. The work during these will be divided between contracts NObsr-72521 and None-1367. As in past years we have offered employment to a group of college and university students to participate in our research program during the summer season.

Our analysis of data from past cruises and our work on experimental instrumentation are detailed below.



## REPORTS

The following reports and papers, completed during this quarter are believed to be of interest to the Bureau of Ships. The supporting contracts are indicated with each paper.

WHOI Ref. No. 60-44. Narrative of CHAIN Cruise #7 April - August 1959, dated November 1959. (Previously distributed as Technical Memorandum #9-59). (Unclassified). Prepared under Contracts Nonr-1367(00) and NObsr-72521. ✓

WHOI Ref. No. 61-7. A Telemetering Hydrophone by Willard Dow. Prepared under Contract Nonr-1367(00).

## PAPERS

The following papers were submitted for publication:

Contribution No. 1122. Erratic Boulders from Great Meteor Seamount by Richard M. Pratt. Submitted to Deep-Sea Research. Prepared under Contract Nonr-1367(00).

Contribution No. 1178. Sound Scattering Spectra of Deep Scattering Layers in the Western North Atlantic Ocean by J. B. Hersey, R. H. Backus and Jessica Hellwig. Submitted to Deep-Sea Research. Prepared under NSF Grant G-9579.

Progress Report on Environmental Studies in the Mediterranean Sea. Edited by J. B. Hersey. Submitted to the Journal of Underwater Acoustics. Prepared under contracts Nonr-1367(00) and NObsr-72521.

During this period the following papers were published:

Theoretical Estimates of Submarine Echo to Surface Reverberation Ratio for a Deep Omni-Directional Source and Receiver by A. D. Voorhis. U. S. Navy Journal of Underwater Acoustics, Vol. 11, No. 1, January 1961. Prepared under Contract Nonr-1367(00).



A Comparison of Directly Measured Sound Velocities with Values Calculated from Hydrographic Data by E. Hays. Jour. Acous. Soc. of Am., Vol. 33, No. 1, pp. 85-88, January 1961.

## SOUND TRANSMISSION

### Instrumentation for Future Near-Surface Transmission Studies (Mr. Caulfield and others).

Mr. Caulfield has been investigating possibilities to increase both the peak pressure and the decay constant of the acoustic pulse radiated from a sparker. The relationships observed between acoustical radiation and electrical characteristics of the spark discharge circuit and its power supply suggest that charging voltage controls peak pressure and capacity of the storage condenser controls the decay constant of the pressure-time curve. The current work suggests that acoustic pulses of considerably higher pressure and total energy can be produced by straightforward increases in the voltage and capacity of the power supply. Further it seems probable that efficiency of the system can be increased greatly by improved design of high tension cabling. We are investigating ways of realizing these gains for bottom reflection and sound transmission studies planned later in 1961. This work is applicable to research under this contract and under Nonr-1367(00) and Nonr-2866(00). It is supported under Nonr-1367(00).

## ECHO, REVERBERATION AND SCATTERING STUDIES

### Project with DesDevGroup II (Mr. Knott).

One of our laboratory-constructed single channel PGR's has been loaned to DesDevGru II for a six month period. It is to be used in continuing tests based on our earlier work with DesDevGroup II.



Reverberation (Drs. Hays and Hersey).

Reflection of explosions and echo sounder pings from the ocean floor have been analyzed during the quarter. Explosion reflections analyzed are those from CHAIN Cruise #13 in the area northwest of Lofoten Islands. Intensities of the first and second bottom reflections, their ratio (in db), and a selection of relative intensities in the first bottom reflection as a function of time have been plotted. Peak amplitudes have been read from 'scope photographs of bottom echoes from the Edo UQN-1b echo sounder (12 kc pings of various ping lengths) photographed during CHAIN Cruise #13, 4 July to 17 September 1960. These are being corrected for spreading loss to a common depth with the intention of collating the results with geographic location, physiographic province (according to Heezen's analysis of the North Atlantic), and indications of local topography available from our echo soundings. Data from CHAIN Cruise #7 will be analyzed similarly.

SUBMARINE GEOLOGY AND GEOPHYSICS

Seismic Refraction Studies in the Mediterranean Sea (Mr. Fahlquist).

The interpretation of travel time plots for profiles 193, 194, 195, 198, 199 (1958) and profile 5 (1959) (Location given in WHOI Ref. No. 54-4, p. 6 and WHOI Ref. No. 60-44, Chart II) has been completed. The final computations of velocities and layer thicknesses for these profiles have also been completed. These travel time plots are now being drafted in a form suitable for publication. Analysis of the travel time plots of profiles 196, 197 (1958) and 2, 3, 4 (1959) is continuing.

Continuous Seismic Profiling in Narragansett Bay (Dr. Hersey and Mrs. Nalwalk).

During this period work was continued on the preparation of a report which is planned to serve as a scientific report under Contract NObsr-72521 and also as information to the U. S. Army Corps of Engineers concerning the study for proposed hurricane protection structures in southern Narragansett Bay. A rough draft of the final report was prepared and sent to the Corps of Engineers for comment. As soon as figures prepared for the report have been drafted and reproduced the report will be submitted for review by the Bureau of Ships and the Corps of Engineers.

*More BuShips First!*



The report includes discussions of the instrumentation used in both portions of the study (Seismic Profiler was used with a Sparker in May, 1958, and with an Edgerton Thumper in May, 1960), the procedure for acquiring and interpreting the data, detailed presentation of the geophysical data, the geology of the area, and the interpretation of the results.

## INSTRUMENTATION

### A New Use for Styrofoam (Mr. Sutcliffe).

Styrofoam can be used as a "breadboard" to make up or try out experimental electronic circuits. Resistors, diodes, transistors, rectifiers, capacitors, and other components may be fixed in a sheet of styrofoam by bending the leads to form legs which can then be inserted into the styrofoam (see fig. 1). Experimental circuits may be drawn on paper and pasted to the styrofoam, then components can be placed through the paper into the styrofoam in the places indicated. If desired, the styrofoam may also be used as a holder for circuits being built for encapsulation.

Sheets of styrofoam 3/4" by whatever length is convenient have been found most practical although the sheets may be almost any size desired. Since the styrofoam melts under heat, solder joints should be made quickly and as far away from the styrofoam as possible. The use of some other rigid, foamed material might eliminate this problem.

Styrofoam is white, clean, and easy to work with. The mockups are clearly seen and easy to check out. The open construction on the white background also photographs well for future reference.



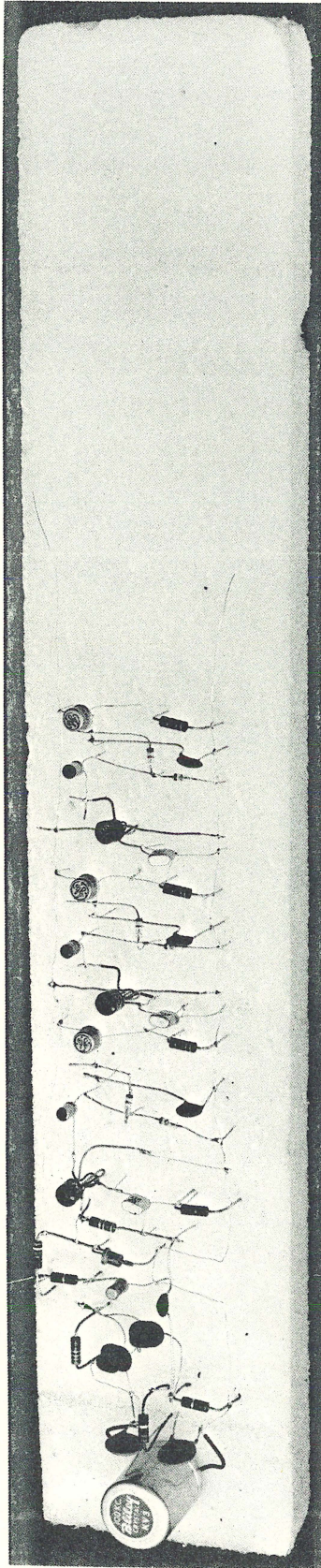


Figure 1 Styrofoam Breadboard

APPENDIX

Visitors's List

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Mr. E. W. Pratt	" " "
Mr. A. Dunn	Alden Products Company
Mr. D. S. Fearing	" " "
Mr. D. Nightingale	" " "
Mr. J. I. McLalland	National Academy of Sciences
Dr. J. W. Silver	Avco Corporation
Mr. F. A. Russo	Bell Telephone Laboratories
Mr. R. J. Wagner	" " "
Mr. K. A. Wright	" " "
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Mr. R. E. Gaber	" "
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Mr. R. E. Fisher	Concord Controls Inc.
Mr. J. Morin	" "
Mr. F. Gray	Cambridge Univ. - England
Mr. S. Raymond	Edgerton, Germeshausen & Grier
Mr. E. D. Van Reenan	" " "
Mr. M. P. Froache	French Navy
Dr. H. Mosby	Geofysisk Institute - Norway
Mr. W. Joyce	Grumman Aircraft Co.



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Mr. A. DeFillipo	" "
Mr. W. H. Dingle	" "
Mr. L. A. Gregory	" "
Mr. W. E. Mead	" "
Mr. F. E. Bupp	Hughes Aircraft Co.
Mr. D. A. Murphy	" "
Mr. R. W. Melville	International Business Machines Corp.
Mr. F. Rosentel	" " " "
Mr. W. Vanderkulk	" " " "
Mr. G. B. Tirey	Lamont Geological Observatory
Dr. A. J. Carsola	Lockheed Aircraft Co.
Mr. A. T. Jaques	U. S. Naval Ordnance Laboratory
Mr. J. G. Retallack	Naval Research Establishment - Canada
Mr. I. A. Engelsen	Norwegian Defence Research Establishment
Mr. H. A. O'Neal	Office of Naval Research - Washington, D. C.
Mr. J. W. Smith	" " "
Cdr. C. Winkler, Jr.	" " "
Mr. F. E. Bellas	Penn State University - ORL
Mr. D. L. Pastor	Raytheon Mfg. Company
Mr. Peter Lehner	Shell Oil Company
Mr. A. Salenius	Sperry Gyroscope Company
Mr. A. Saliano	" " "
Mr. C. W. B. Neal	Underwater Weapons Establishment
Mr. E. C. Durringer	U. S. Coast & Geodetic Survey

Cdr. D. L. Hignite	U. S. Naval Air Station
Chief J. J. Welby	U. S. Naval Base - Newport, R. I.
Lt. J. O. Wilner	" " " "
Lt. L. A. Shoemaker	U. S. Navy Electronics Laboratory
Mr. F. J. Keltonie	U. S. N. Underwater Sound Laboratory
Mr. A. L. Martin	" " " "
Mr. L. Hague	W. M. Hague Company
Mr. A. D. Foster	Westinghouse Electric Company
Mr. F. C. Ryder	" " " "

Personnel

Hersey, J. B.	Geophysicist
Foster, D. B.	Administrative Assistant
Vine, A. C.	Physical Oceanographer
Hays, E. E.	Physicist
Voorhis, A. D.	"
Dow, W.	Electronics Engineer
Schevill, W.	Associate in Oceanography
Roberts, Helen	Associate in Mathematics
Backus, R. H.	Marine Biologist
Baxter, L.	Research Assoc. in Physics
Bunce, Elizabeth T.	" " "
Graham, J. W.	Research Assoc. in Geology
Pratt, R. H.	" " "



Knott, S. T.	Research Assoc. in Engineering
Caulfield, D. D.	Research Assist. in Physics
Ducharme, J. L.	" " "
Graham, Helen-S.	" " "
Cain, H. A.	Research Assist. in Engineering
Carter, A. L.	" " "
Dimock, A. D.	" " "
Hess, F. R.	" " "
Hoadley, L. D.	" " "
Johnston, A. T.	" " "
Stillman, S. L.	" " "
Sullivan, J.	" " "
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Watkins, W. A.	" " "
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Fahlquist, D. A.	" " "
Arends, J. G.	Research Assist. in Geology
Nalwalk, A. J.	" " "
Stetson, T. R.	" " "
Bradshaw, A. L.	Research Assist. in Mathematics
Hellwig, Jessica	" " "
Kittridge, Sally	" " "
Bergstrom, S. W.	Research Assist. in Underwater Acoustics
Dunkle, W. M.	" " " "
Morehouse, C. B.	Electrical Technician

Broughton, Jane	Technician
Gallagher, Gloria	"
Grant, C.	"
Hays, Helen	"
Maddux, D. E.	"
Nalwalk, Ann H.	"

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