F. PUBLICATIONS
I. general

During the course of the Contract with NDRC and later with the Bureau of Ships, UCDWR prepared a variety of written material for distribution to other NDRC agencies and to many naval activities. This material ranged from typewritten memoranda, dealing with technical details of research and development and given very limited distribution, to official printed Navy pamphlets and manuals, widely disseminated throughout the Fleet. The work on official manuals has been described in Chapter Five. This section, therefore, deals chiefly with publications reporting the research, development, and training activities of UCDWR.

At the beginning of the Contract with NDRC, no procedure for reporting the results of research and development was established. The scientists and engineers responsible for individual projects prepared periodic memoranda on their work, either on their own initiative or at the request of the Director. These memoranda were then forwarded to the New York office of NDRC for further distribution if warranted.

The increasing research activities of UCDWR soon made this procedure inadequate. Some uniformity in reporting the results of research was established in January of 1942, and in October of that year a special group was formed to handle the editing and reproduction of memoranda and reports. The original Reports Group consisted of an editorial secretary and three typists, who also operated a mimeograph machine. The functions of the group were to edit all reports and memoranda for errors in grammar and style, reproduce reports by typing or mimeograph, maintain adequate records, and effect authorized distribution (the system of numbering reports was instituted at this time). The group also prepared and reproduced all Laboratory forms and circular letters. The Reports Group, being a service group for all divisions of the Laboratory, was not placed under any of the research or development divisions, but reported directly to the Director or to his Assistant. Photographs and photostats for reports were furnished by the Photographic Department, which was under the Engineering Division. When reproduction of some reports by the ozalid method was instituted, the Photographic Department also furnished this service.

As distribution increased, with wider dissemination to Navy activities, the need for more careful preparation of reports became evident. Many of the scientists and engineers concerned with research, development, and training had difficulty in presenting the results of their work in clear and easily understandable language. The staff of the Reports Group at that time had neither the time, writing ability, scientific background, nor the detailed knowledge of research and development projects needed for a complete rewriting of the drafts submitted by the scientific personnel. An increasing load therefore fell upon the administrative personnel—the Group Leaders, Assistant Directors, and the Director—for the writing or rewriting of reports. To relieve this load, scientists who showed particular aptitude for presenting the results of research were transferred from their scientific activities to the preparation of reports. Where such persons were not available or could not be spared from research, professional writers were obtained and assigned to the research divisions. Since these men were naturally not already familiar with the work, they had to extract the essential information from the scientists or engineers concerned and then prepare drafts for review by the Group Leader and Assistant Director.

A further difficulty was the lack of facilities for adequate presentation of the information. The Reports Group did not include artists or layout specialists, was not closely coordinated with the Photographic Department, and had no methods of duplication other than mimeograph and ozalid. The lack of these facilities was not particularly serious for brief technical reports designed for a limited audience of scientists or engineers, but when the information was distributed to a larger audience, many of whom were not intimately concerned with the details of research or development, experience showed that the degree to which the material was read, assimilated, and used depended largely upon the way it was presented.

In the case of manuals and training aids for the Fleet, this problem was partially solved by the establishment of the two special groups mentioned previously: one in New York for the preparation of sonar maintenance manuals, and one in San Diego for the production of manuals and visual aids explaining the use of the bathythermograph and the effects of water conditions on the performance and operational use of sonar gear. The New York group, of course, was in no position to assist
with publications prepared at San Diego. The group at San Diego included writers and artists capable of handling reports and similar publications, but during the period of hostilities their work on official manuals and training aids was considered of higher priority, and the group was not large enough to undertake more than a minor amount of work on UCDWR's reports. With the termination of hostilities, however, the need for training material for the Fleet became less pressing, while the number of reports increased markedly as the end of the Contract approached. This group was therefore consolidated with the Reports Group and the Photographic Department, and a Publications Department was established (see Figure 9.4). The number of personnel engaged in the handling of reports is indicated, on a quarterly basis, in Figure 9.5.

This enlarged department was able to handle the flood of reports written during the closing months of the Contract and to improve their general appearance; but time and personnel were still not sufficient to rewrite the texts in terms of audience level, and very little effort could be devoted to layout and illustration except on those reports scheduled for rather wide distribution.
II. procedures

The procedures finally adopted for the preparation and reproduction of reports and similar publications may be summarized as follows:

(1) First draft prepared by the engineer or scientist in charge of the project, or by a writer working with him.
(2) Review by the cognizant Assistant Director.
(3) Revision by author if needed.
(4) Approval by the Assistant Director.
(5) Editing by the Publications Department; editorial changes checked with the author or the Assistant Director to insure technical accuracy.
(6) Layout (if warranted by the distribution and importance of the report) and preparation of final illustrations (also checked for technical accuracy).
(7) Final approval by the Associate Director and Director.
(8) Duplication by ozalid, mimeograph, multilith, or offset lithography (determined by the importance of the report and the proposed distribution).
(9) Initial distribution to activities authorized to receive all reports.
(10) Final distribution, after Bureau of Ships' approval, to other activities interested in the specific report.

III. publications issued

A bibliography of all publications prepared by UCDWR is given in Appendix A. Figure 9.6 shows, by quarters, the number of individual publications prepared, while Figure 9.7 shows the total number of pages. Detailed data are lacking for the period prior to October 1942, but comparatively few reports were issued before that date.

IV. recommendations

Like many other UCDWR activities, the Publications Department grew at random. Even at the end of the Contract, the preparation of publications was not as well centralized as now appears desirable. The original plan of assigning writers, draftsmen, and artists to the scientific divisions was not efficient, and led to some duplication of effort. The results of the gradual centralization of this work indicate that the most effective organization is one in which the greater part of the publication activity is centralized in a single department, with a trained staff of writers and editors, illustrators, photographers, and personnel familiar with duplication processes. It is essential that the writers have sufficient scientific background to be able to comprehend readily the complex engineering and research projects and to discuss intelligently details of the work with the responsible scientists and engineers. At the same time, they must be able to interpret the results of such work to audiences which frequently may have little or no scientific training. The artists, similarly, must be able not only to produce accurate graphs, drawings, and diagrams, but also to adapt complex theoretical concepts to illustrations, cartoons, and sketches which will amplify and clarify the textual material. A publications group comprising from 30 to 40 persons would appear to be required to serve a laboratory of the size of UCDWR adequately.
APPENDIX A  technical bibliography

GENERAL
COMPARATIVE LISTING OF NAVY PROJECT AND NDRC FILE OUTLINE NUMBERS
COMPARATIVE LISTING OF BUSHIPS TASK PROBLEM AND NDRC FILE OUTLINE NUMBERS
BIBLIOGRAPHY (ANNOTATED)

APPENDIX B  patent bibliography

APPENDIX C  personnel roster
appendix a  TECHNICAL BIBLIOGRAPHY
During the course of UCDWR’s operations, a considerable number of reports were prepared and variously distributed. These differed widely not only in technical content and detail but in the manner of reproduction as well, as is described elsewhere (see Chapter Nine, Section F).

All the reports and memoranda included in the bibliography are available in UCDWR’s files, the custody of which was transferred to the U. S. Navy Electronics Laboratory, San Diego, toward the end of the contractual period. During the very early months of the Laboratory’s operation, distribution of UCDWR reports was very limited and only the major ones were forwarded to Section 6.1, NDRC, where they are presumably still available. As time went on, more and more reports (including all those with UCDWR numbers) were sent to Section 6.1, which forwarded certain of them to the Coordinator of Research and Development for Navy distribution. After 1 March 1945, copies of all reports prepared for external distribution were forwarded to the Chief of the Bureau of Ships, Code 940, who authorized distribution to other activities if this was considered desirable. The reports sent to Code 940 included all of those bearing UCDWR numbers published after the transfer date.

During the final months of the Contract, definitive completion reports were issued of programs and devices developed by UCDWR and not already fully reported. As most of these were published after 1 April 1946, the closing date of this report, they perforce are not included in the following bibliography; copies, however, will be available in the files of UCDWR-NEL and Code 940, BuShips. Beginning several months before the cessation of hostilities with Japan, when it began to appear that UCDWR could expect to terminate its activities in the not-too-remote future, increasing emphasis was put on the preparation of these completion reports. Between V-J Day and 30 June 1946, this became the principal task of UCDWR, and the groups engaged in writing the material were greatly augmented by hiring persons, such as writers, artists, and stenographers, and by assigning engineers to full-time report writing. With the relaxing of the forces of patriotism, the War Manpower Commission and, to some extent, the Selective Service, many staff members who had been intimately associated with the work left the Laboratory to accept other positions or to return to school. These departures had a crippling effect on the writing program, and several reports were abandoned because there was no one remaining on the staff with sufficient background to write them.

In considering the various ways in which the UCDWR reports could be compiled into a bibliography, primary emphasis was placed upon subject matter and the ease with which an individual item could be located. Because UCDWR adopted and used the File Outline of Work of Section 6.1, Division 6, NDRC (as subsequently modified by UCDWR for use while operating under Navy auspices), throughout the period of operation, and also because most of the material was filed in accordance with the subject index of that outline, the bibliography which follows is arranged in corresponding fashion. Reports which deal with miscellaneous types of equipment or test devices whose use was general are listed at the end of the bibliography under “Miscellaneous”.

However, the use of the outline without further aids would be somewhat clumsy. Therefore, in an attempt to supplement the primary bibliography based on the File Outline, two additional listings are included herein. The first is a comparative listing of NDRC File Outline numbers and the Navy Project numbers assigned by the Coordinator of Research and Development during the period of OSRD auspices. The second is a comparative listing of the NDRC File Outline numbers and the Task and Problem number assignments made by the Bureau of Ships after sponsorship of the Contract had been transferred to that activity.

The staff of UCDWR also made substantial contributions to the Summary Technical Reports published by NDRC, Division 6. The Summary Technical Reports include detailed descriptions of much of the work accomplished at UCDWR and should be consulted, in addition to the reports in the bibliography, for details.

In addition, since the use of the File Outline for a bibliography framework does not provide for the listing of various types of periodic progress reports, these are briefly described below.
progress reports

This group of reports includes those prepared in the early period of the Contract when no other formal progress reporting system had been established. Copies can be found in files of UCDWR-NEL and NDRC, Section 6.1.

BRIEF PROGRESS REPORT ON THE NDRC PROJECT AT POINT LOMA, V. O. Knudsen, 20 August 1941.

PROGRESS REPORT ON RESEARCH WORK AT UNIVERSITY OF CALIFORNIA, V. O. Knudsen, 1 December 1941.

REPORT ON THE FUNDAMENTAL RESEARCH PROGRAM AT THE UNIVERSITY OF CALIFORNIA, V. O. Knudsen, 8 December 1941.


REPORT ON THE DEVICES OR ENGINEERING DEVELOPMENT PROGRAM, K. S. Von Dyke, 31 December 1941.


REPORT ON WORK IN APRIL 1942, 1 June 1942.

REPORT ON WORK IN MAY 1942, 29 June 1942.

REPORT ON WORK IN JUNE 1942, 21 July 1942.

ANNUAL REPORT OF UCDWR, NDRC, 7/1/41/-6/30/42, J. M. Adams, 30 June 1942.

BI-WEEKLY

progress reports

UCDWR published a series of bi-weekly progress reports, covering all laboratory activities, for the period beginning 29 June 1942 and ending 3 February 1945. These were forwarded to NDRC, Section 6.1, for distribution to various Navy, NDRC, and other research activities. File copies are available in the files of UCDWR-NEL and NDRC, Section 6.1.

MONTHLY

progress reports

During the period of BuShips' auspices of the Contract, UCDWR published four series of Monthly Progress Reports (Series I, Sonar Data; Series II, Sonar Devices (Confidential); Series III, Sonar Devices (Secret); Series IV, Training Aids). These covered the period from 1 February 1945 to 1 March 1946 when NEL assumed cognizance of UCDWR's scientific program. The UCDWR numbers assigned to this series were prefaced by the letters MR and followed by a dash and the Roman numeral indicating the particular series, as MR 304-III. These were distributed to Navy and civilian activities approved by the Bureau of Ships, and copies may be obtained from the UCDWR-NEL files or from BuShips, Code 940.

SELECTION AND TRAINING

progress reports

The selection and training activities of the various laboratories associated with Division 6 of NDRC published three series of progress reports. Copies are maintained in the UCDWR-NEL and the NDRC, Section 6.1 files. These reports were compiled by UCDWR and issued as follows:

1. PSYCHOLOGICAL SELECTION AND TRAINING GROUP BI-WEEKLY REPORT. This series covered the period from 11 January 1943 to 4 October 1943 and the number assigned was preceded by the letters ST, as ST5.

2. TRAINING GROUP INFORMAL CIRCULAR LETTER. This series was issued monthly for the use of civilian personnel only, and its issuance was correlated with the Quadra-Weekly Progress reports described below so that an issue of one of the two series appeared every two weeks. This series covered the period from 3 October 1943 to 10 June 1944 and the number assigned was preceded by the letters CL, as CL9.

3. TRAINING GROUP QUADRA-WEEKLY PROGRESS REPORT. This series, in contradistinction to the Circular Letter series, was prepared for both civilian and naval personnel. It covered the period from 17 October 1943 to 24 June 1944 and the number assigned was preceded by the letters PR, as PR9.

OCEANOGRAPHIC SECTION

progress reports

In the early period of the Laboratory's existence, the Oceanographic Section published a series of monthly progress reports. These covered the period from July 1941 to June 1942, after which time the reporting was accomplished through the regular bi-weekly reports. Copies of these are available in the files of both UCDWR-NEL and NDRC, Section 6.1.
comparative listing of navy project
and ndrc file outline numbers

NS—97 SELECTION AND TRAINING OF SOUND
OPERATORS. Navy Liaison Officer Capt. R.
Bennett, Code 910, BuShips.
80.00, 91.00, 91.10, 91.11, 91.12, 91.13, 91.14,
91.20, 91.21, 91.211, 91.212, 91.212.1, 91.214,
91.215, 91.216, 91.22, 91.221, 91.222, 91.223,
91.23, 91.230.1, 91.231, 91.233, 91.237, 91.239,
91.248.1, 91.249, 91.26, 91.261, 91.262, 91.263,
91.40, 91.41, 91.411, 91.412, 91.43, 91.50, 91.60,
91.70.

NS—139 TESTING AND CALIBRATING FACILITIES
FOR UNDERWATER ACOUSTIC DEVICES.
Navy Liaison Officer, Capt. R. Bennett, Code 910,
BuShips.
01.10, 01.11, 01.12, 01.13.

NS—140 ACOUSTIC PROPERTIES OF THE SEA
BOTTOM, AND RANGE AS A FUNCTION
OF OCEANOGRAPHIC FACTORS. Navy
Liaison Officer, Comdr. R. Revelle, Code 940,
BuShips.
01.30, 01.31, 01.32, 01.33, 01.331, 01.332, 01.35,
01.40, 01.41, 01.42, 01.60, 01.70, 01.71, 01.72,
01.73, 01.74, 01.75, 01.76, 01.80, 01.90, 01.91,
01.911, 01.912, 01.913, 01.92, 01.921, 01.922,
01.93, 01.94, 01.95.

NS—141 ACOUSTIC PROPERTIES OF WAKES. Navy
Liaison Officer, Capt. R. Bennett, Code 910, BuShips.
01.50.

NS—142 BASIC IMPROVEMENT IN ECHO-RANG-
ING GEAR. Navy Liaison Officers, Capt. R. Ben-
ett, Code 910, BuShips; and Comdr. J. C. Myers,
Code 940, BuShips.
01.10, 01.22, 02.00, 02.10, 02.11, 02.12, 02.13,
02.14, 02.30, 02.31, 02.311, 02.311.1, 02.311.2,
02.311.3, 02.311.4, 02.312, 02.313, 02.314, 02.315,
02.316, 02.32, 02.33, 02.331, 02.332, 02.333, 02.40,
02.41, 02.411, 02.412, 02.413, 02.42, 02.43, 02.44,
02.45, 02.451, 02.452, 02.453, 02.454, 02.455,
02.456, 02.50, 03.50, 71.00.

NS—144 ECHO REPEATER TARGET. Navy Liaison
Officer, Capt. C. L. Engleman, Code 983, BuShips.
66.00, 91.235.

NS—152 SHIPBOARD ATTACK TEACHER (SASAT
A). Navy Liaison Officer, Capt. R. Bennett, Code
910, BuShips.
91.234.
NO-163 COOPERATION WITH THE NAVY IN SURVEYS OF AMBIENT UNDERWATER NOISE CONDITIONS IN VARIOUS AREAS. Navy Liaison Officer, Comdr. R. Revelle, Code 940, BuShips.
01.30, 01.31, 01.32, 01.33, 01.331, 01.35, 03.00, 03.30.

NO-164 SUBMARINE EVASION DEVICE—ELECTRONIC NOISEMAKER FOR SIMULATING SUBMARINE SOUNDS. Navy Liaison Officers, Comdrs. L. R. Daspit and G. W. Underwood of Code 5815, BuShips; Mr. F. M. Varney, Code 335, BuShips; Comdr. C. C. Smith, Cominch (Read.).
09.30, 09.40, 09.41, 09.411, 09.42, 09.421, 09.422, 09.43, 09.44.

NO-173 CONSULTING SERVICES ON SASAT MARK III EQUIPMENTS (SASAT A). Navy Liaison Officer, Capt. C. L. Engleman, Code 983, BuShips.
91.234.

NO-181 INVESTIGATION AND DEVELOPMENT OF NEW METHODS OF ECHO-RANGING CONTROL. Navy Liaison Officer, Comdr. M. J. Murphy, BuOrd.
01.22, 06.00.

NO-195 CONSULTING SERVICES ON MODEL OAS AND OAU PRACTICE TARGETS TO BUShIPS ON WESTERN ELECTRIC CONTRACTS. Navy Liaison Officer, Capt. R. Bennett, Code 910, BuShips.
91.236.

NO-195 DEPTH CHARGE PATTERN RECORDER. Navy Liaison Officer, Comdr. E. J. O'Connell, BuOrd.
91.232.

NO-221 SILENT ECHO-SOUNDING EQUIPMENT. Navy Liaison Officer, Capt. R. Bennett, Code 910, BuShips.
09.21, 09.22.

NO-226 SHIPBOARD SUBMARINE ATTACK TEACHER. Navy Liaison Officer, Lt. W. E. Jaor, Jr., BuOrd.
91.243.

NO-233 PRIMARY LISTENING TEACHER. Navy Liaison Officers, Capt. C. L. Engleman, Code 983, BuShips; and Comdr. C. C. Smith, Cominch (Read.).
91.241.

NO-240 CONSULTING SERVICE ON SHIPBOARD ANTI-SUBMARINE ATTACK TRAINER (SASAT B). Navy Liaison Officer, Capt. R. Bennett, Code 910, BuShips.
91.235.

NO-245 ADVANCED LISTENING TEACHER. Navy Liaison Officers, Capt. R. Bennett, Code 910, BuShips; and Comdr. C. C. Smith, Cominch (Read.).
91.242, 91.247.

NO-252 PREPARATION OF SUPPLEMENTS TO SONAR INSTRUCTION BOOKS. Navy Liaison Officer, Capt. C. L. Engleman, Code 983, BuShips.
91.00, 91.413.

09.45, 09.451, 09.452, 09.453, 09.454, 09.455.

NO-297 DETECTION OF SMALL OBJECTS BY MEANS OF UNDERWATER ACOUSTIC DEVICES. Navy Liaison Officer, Capt. R. Bennett, Code 910, BuShips.
02.13, 02.131, 02.132, 02.133.

NO-308 SONAR-SURFACE AND SUBMARINE BATHYTERMOMGRAPH INSTRUCTION PROGRAM. Navy Liaison Officer, Comdr. R. Revelle, Code 940, BuShips.
91.248, 91.80.
NS—316 CONSULTING SERVICES TO BUSHIPS ON MODEL NAC SOUND BEACONS AT THE SOUND EQUIPMENT CORPORATION, HOLLYWOOD, CALIFORNIA, UNDER NAVY CONTRACT NXsr-60065.

Navy Liaison Officers, Mr. L. D. Whitelock, Code 945, BuShips; and Mr. R. C. Carpenter, Code 945, BuShips.

09.412.

NS—324 SONAR GROUP OPERATOR TRAINER.

Navy Liaison Officer, Comdr. J. C. Myers, Code 940, BuShips.

91.213.

NS—329 DEVELOPMENT OF A DEVICE WHICH PROVIDES AUTOMATIC TARGET POSITIONING ON DEAD RECKONING TRACER FROM AN INPUT OF TARGET RANGE AND BEARING. Navy Liaison Officer, Capt. E. L. Schlief, Code 634, BuShips.

85.00.

NS—339 RECOGNITION RECORDER FOR USE IN TRAINING OPERATORS TO RECOGNIZE VARIOUS SHIP AND TORPEDO NOISES.

Navy Liaison Officer, Comdr. J. C. Myers, Code 940, BuShips.

91.246.

comparative listing of buships task-problem and ndrc file outline numbers

TASK NO. 1—SONAR COUNTERMEASURE DEVICES

PROBLEM NO. 1A—NAD SOUND BEACONS, 3", 6", 10"

09.40, 09.45, 09.451, 09.452, 09.453, 09.454, 09.455.

PROBLEM NO. 1B—NAD SOUND BEACON, 8"

09.454.

PROBLEM NO. 1C—

09.46.

PROBLEM NO. 1D—NAC SOUND BEACON

09.412, 09.44.

PROBLEM NO. 1E—X-NAG SOUND BEACON

09.423.

PROBLEM NO. 1F—X-NAH SOUND BEACON

(SEE PROBLEM NO. 7B)

09.413.

TASK NO. 2—PHYSICS OF UNDERWATER SOUND

PROBLEM NO. 2A—TRANSMISSION AND SCATTERING

01.40, 01.60, 01.70, 01.71, 01.72, 01.73, 01.74, 01.75, 01.76, 01.90, 01.95.
PROBLEM NO. 2B—PROPERTIES OF WAKES
01.50.

PROBLEM NO. 2C—REFLECTION OF SOUND FROM TARGETS
01.80.

PROBLEM NO. 2D—SMALL OBJECT DETECTION—PHYSICS
(SEE PROBLEM NO. 4A)
02.133.

PROBLEM NO. 2E—MASKING OF ECHOES BY REVERBERATION
01.41.

PROBLEM NO. 2F—MASKING OF ECHOES BY NOISE
01.42.

PROBLEM NO. 2G—UNDERWATER NOISE MEASUREMENTS
01.31, 01.33, 01.331.

PROBLEM NO. 2H—PROCESSING AND ANALYSIS OF BT DATA
01.913, 01.93.

PROBLEM NO. 2I—TRANSUDER DESIGN AND PERFORMANCE
01.10, 01.20, 01.22.

TASK NO. 3—QLA SONAR EQUIPMENT

PROBLEM NO. 3A—QLA SONAR—CONSULTATION
(SEE PROBLEM NO. 5I)
02.15, 02.454, 02.456.

PROBLEM NO. 3B—QLA SONAR—RESEARCH & DEVELOPMENT
02.454, 02.50.

PROBLEM NO. 3C—QLA SONAR—CENTER BEARING INDICATION
02.454, 02.455.

PROBLEM NO. 3M2—CONTOUR BOTTOM SCANNER
02.134.

PROBLEM NO. 3M3—SECURE ECHO SOUNDER
09.22.

TASK NO. 4—SMALL OBJECT DETECTION

PROBLEM NO. 4A—SMALL OBJECT DETECTION—RESEARCH & DEVELOPMENT (SEE PROBLEM NO. 2D)
02.131, 02.15.

PROBLEM NO. 4B—SMALL OBJECT DETECTION—EVALUATION
02.132.

TASK NO. 5—TRAINING AIDS

PROBLEM NO. 5A—GROUP LISTENING TEACHER
91.247.

PROBLEM NO. 5B—SASAT C
91.235.1.

PROBLEM NO. 5C—PRACTICE ATTACK TARGETS
91.236, 91.236.1.

PROBLEM NO. 5D—BATHYTERMGRAPH TRAINING
91.80.

PROBLEM NO. 5E—NAVY TRAINING ASSISTANCE
91.14, 91.230.1, 91.239, 91.248, 91.263, 91.50.

PROBLEM NO. 5F—ADVANCED LISTENING TEACHER
91.24.

PROBLEM NO. 5G—GROUP OPERATOR TRAINER
91.213.

PROBLEM NO. 5H—RECOGNITION GROUP TRAINER
91.216, 91.246.

PROBLEM NO. 5I—QLA SONAR TRAINER (SEE TASK NO. 3)
02.456.

PROBLEM NO. 5J—GROUP OPERATOR TRAINER (QDA—QKA)
91.213.

PROBLEM NO. 5M1—MAINTENANCE MANUALS
91.413.

TASK NO. 6—CIC TRAINING DEVICES

PROBLEM NO. 6A—AUTOMATIC TARGET POSITIONER FOR DRT
85.00.

PROBLEM NO. 6B—TACTICAL (CIC) TRAINER
91.262.

TASK NO. 7—SONAR AND RELATED DEVICES

PROBLEM NO. 7A—NAJ SOUND BEACON
09.70.

PROBLEM NO. 7B—DAVID TAYLOR MODEL BASIN ASSISTANCE
(SEE PROBLEM NO. 1F)
09.80, 09.81.

PROBLEM NO. 7C—EXPENDIBLE ECHO SOUNDER
02.135.

TASK NO. 8—COLLABORATION WITH USNEL
(FORMERLY USNRSRL)

PROBLEM NO. 8A—EXPENDIBLE WAVE BUOY
02.136.

TASK NO. 9—
bibliography
I. DETECTION

A. acoustic detection—00.00

1. sonar performance studies—01.00

1. THE EXTINCTION OF SOUND IN WATER, C. Eckart
   31 AUG 1941
2. SUMMARIZED RESULTS OF FLOW MEASUREMENTS ON VARIOUS MATERIALS, N. J. Holter
   8 SEPT 1941
3. TRANSMISSION OF SOUND THROUGH FLAT PLATES, E. M. McMillan
   15 OCT 1941
4. DEPTH OF CROSSING OF TWO LIMITING RAYS, L. R. Revelle
   10 Jan 1942
5. A METHOD OF MEASURING THE VELOCITY OF SOUND IN SOLIDS, B. G. Eaton
   1 Feb 1945

(a) testing and calibrating facilities—01.10

1. REPORT ON A PROPOSED METHOD OF INCREASING THE SENSITIVENESS OF UNDERWATER ACOUSTIC RECEIVERS, W. G. Cady
   22 OCT 1941
2. COMMENTS ON "UNDERWATER IMPEDANCE MEASUREMENTS" BY R. L. BROWN AND J. R. PELLAM, H. T. O'NEIL
   12 Aug 1942
3. MEASUREMENTS ON CRYSTAL TRANSDUCER CP1-1 NO. 770, C. J. Burbank, NO. C1
   4 Sept 1943
4. MEASUREMENTS ON CRYSTAL TRANSDUCER CS1-1 NO. 586, C. J. Burbank, NO. C2
   7 Sept 1943
5. MEASUREMENTS ON CRYSTAL TRANSDUCER CS2-1 NO. 593, C. J. Burbank, NO. C3
   9 Sept 1943
6. MEASUREMENTS ON CRYSTAL TRANSDUCER AX5A-A NO. 37, C. J. Burbank, NO. C4
   15 Sept 1943
7. MEASUREMENTS ON CRYSTAL TRANSDUCER AX5B-A NO. 38, C. J. Burbank, NO. C5
   15 Sept 1943
8. MEASUREMENTS ON CRYSTAL TRANSDUCER AX5B-A NO. 39, C. J. Burbank, NO. C6
   16 Sept 1943
9. MEASUREMENTS ON CRYSTAL TRANSDUCER GD1-1 NO. 595, C. J. Burbank, NO. C7
   24 Sept 1943
10. MEASUREMENTS ON CRYSTAL TRANSDUCER GD4-2 NO. 769, C. J. Burbank, NO. C8
   28 Sept 1943
11. MEASUREMENTS ON CRYSTAL TRANSDUCER CN7-1 NO. 591, C. J. Burbank, NO. C9
   29 Sept 1943
12. MEASUREMENTS ON CRYSTAL TRANSDUCER CW-78178, C. J. Burbank, NO. C10
   14 Oct 1943
13. MEASUREMENTS ON CRYSTAL TRANSDUCER CA1-1 NO. 218, C. J. Burbank, NO. C11
   16 Oct 1943
14. MEASUREMENTS ON CRYSTAL TRANSDUCER FC1-1 NO. 600, C. J. Burbank, NO. C12
   27 Oct 1943
15. MEASUREMENTS ON CRYSTAL TRANSDUCER CN6-1 NO. 581, C. J. Burbank, NO. C13
   1 Nov 1943
16. MEASUREMENTS ON CRYSTAL TRANSDUCER CN8-1 NO. 596, C. J. Burbank, NO. C14
   1 Nov 1943
17. MEASUREMENTS ON CRYSTAL TRANSDUCER CN8-2 NO. 597, C. J. Burbank, NO. C15
   2 Nov 1943
18. MEASUREMENTS ON CRYSTAL TRANSDUCER GB1-1 NO. 350, C. J. Burbank, NO. C16
   2 Nov 1943
19. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER, C. J. Burbank, NO. C17
   8 Nov 1943

(Report C17 presents the complex impedance of the COG-30152 transducer, and also directivity patterns for frequencies from 3 through 90 kc and field response charts both with and without accompanying fairing. The transducer is 3 feet long and 2 inches in diameter, with a sponge rubber fairing over one half and the end protruding about 4 inches from the unit.)

20. MEASUREMENTS ON CRYSTAL TRANSDUCER CR4-1 NO. 583, C. J. Burbank, NO. C18
    9 Nov 1943
21. MEASUREMENTS ON CRYSTAL TRANSDUCER GD6-1 NO. 766, C. J. Burbank, NO. C19
    10 Nov 1943
22. MEASUREMENTS ON CRYSTAL TRANSDUCER CR6-1 NO. 598, C. J. Burbank, NO. C20
    11 Nov 1943
23. MEASUREMENTS ON CRYSTAL TRANSDUCER CR8-1 NO. 599, C. J. Burbank, NO. C21
    11 Nov 1943
24. MEASUREMENTS ON CRYSTAL TRANSDUCER GC2-1 NO. 580, C. J. Burbank, NO. C22
    11 Nov 1943
25. MEASUREMENTS ON M. I. T. STREAMLINED CRYSTAL MICROPHONES NO. 1 AND NO. 2, C. J. Burbank, NO. C23
    12 Nov 1943
26. MEASUREMENTS ON CRYSTAL TRANSDUCER CR1-1 NO. 943, C. J. Burbank, NO. C28(S)
    17 Nov 1943
27. MEASUREMENTS ON CRYSTAL TRANSDUCER CD2-1 NO. 263, C. J. Burbank, NO. C25 18 NOV 1943
28. MEASUREMENTS ON CRYSTAL TRANSDUCER C52-3 NO. 1122, C. J. Burbank, NO. C24(S) 19 NOV 1943
29. MEASUREMENTS ON CRYSTAL TRANSDUCER CP4-1 NO. 942, C. J. Burbank, NO. C26 19 NOV 1943
30. MEASUREMENTS ON CRYSTAL TRANSDUCER CP6-1 NO. 1127, C. J. Burbank, NO. C27 20 NOV 1943
31. MEASUREMENTS ON CRYSTAL TRANSDUCER GD10-1 NO. 1121, C. J. Burbank, NO. C29(S) 4 DEC 1943
32. MEASUREMENTS ON MAGNETIC VIBRATOR TYPE TRANSDUCER MEF1-1 NO. 1136, C. J. Burbank, NO. C30(S) 6 DEC 1943
33. MEASUREMENTS ON CRYSTAL TRANSDUCER-TYPE JK NO. CBM733 J275, C. J. Burbank, NO. C31 15 DEC 1943
34. MEASUREMENTS ON QB TRANSDUCER CBM78115 NO. 41, C. J. Burbank, NO. C32 17 DEC 1943
35. MEASUREMENTS ON CRYSTAL TRANSDUCERS CW78205 NOS. 43, 72, 77, 80, C. J. Burbank, NO. C33 18 DEC 1943
36. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER TMS 85, C. J. Burbank, NO. C34 20 DEC 1943
37. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER H NO. 9, C. J. Burbank, NO. C35 21 DEC 1943
38. MEASUREMENTS ON CRYSTAL TRANSDUCER GD14-1 NO. 1137, C. J. Burbank, NO. C36(S) 30 DEC 1943
39. MEASUREMENTS ON CRYSTAL TRANSDUCERS CW78205 NOS. 112, 122, 124, 127, C. J. Burbank, NO. C37 6 JAN 1944
40. MEASUREMENTS ON CRYSTAL TRANSDUCERS JK4926 AND GD11-1 NO. 1143 IN JK HEAD, C. J. Burbank, NO. C38 11 JAN 1944
41. MEASUREMENTS ON THE SPIRAL MAGNETOSTRICTION TRANSDUCER, C. J. Burbank, NO. C39 12 JAN 1944
42. MEASUREMENTS ON CRYSTAL TRANSDUCERS CW78205 NOS. 12, 19, 26, 55, 111, 136, C. J. Burbank, NO. C40 15 FEB 1944
43. MEASUREMENTS ON CRYSTAL TRANSDUCER CT1-1 NO. 945, C. J. Burbank, NO. C41 16 FEB 1944
44. MEASUREMENTS ON CRYSTAL TRANSDUCER CN6-4 NO. 1187, C. J. Burbank, NO. C42 6 MAR 1944
45. MEASUREMENTS ON CRYSTAL TRANSDUCER C23 NO. 707, C. J. Burbank, NO. C43 7 MAR 1944
46. MEASUREMENTS ON CRYSTAL TRANSDUCER FG2-1 NO. 1130, C. J. Burbank, NO. C44(S) 18 MAR 1944
47. CALIBRATION OF EQUIPMENT USED IN THE USS SUMNER EXPEDITION, C. J. Burbank, T. F. Johnston, NO. C45 21 MAR 1944
48. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER A-6, C. J. Burbank, NO. C46 21 MAR 1944
49. TRANSMISSION OF SOUND THROUGH SCREENS OF LUCITE, POLYSTYRENE, PLEXIGLASS, AND NEOPRENE-COVERED WIRE MESH, C. J. Burbank, NO. C47 12 APR 1944
50. ACCURACY OF SWEETWATER MEASUREMENTS, J. H. Martin 15 APR 1944
51. MEASUREMENTS ON W E B MAGNETOSTRICTION TRANSDUCER CBM 78214 NO. 2, Calibration Group, NO. C48 20 APR 1944
52. MEASUREMENTS ON SOUND BEACON, Calibration Group, NO. C49 22 APR 1944
53. MEASUREMENTS ON B. T. L. CRYSTAL TRANSCIEVERS NO. 1 AND NO. 2 (4OKC) UCDWR NO. 1916 AND NO. 1917, Calibration Group, NO. C50 27 APR 1944
54. MEASUREMENTS ON CRYSTAL TRANSDUCERS CP10-1 NO. 1217 AND GA2-5 NO. 1692, Calibration Group, NO. C51 1 MAY 1944
55. MEASUREMENTS ON MAGNETOSTRICTION HYDROPHONE H-12, Calibration Group, NO. C52 17 MAY 1944
56. MEASUREMENTS ON TYPE 135 ASDIC MAGNETOSTRICTION TRANSDUCER, Calibration Group, NO. C53 18 MAY 1944
57. MEASUREMENTS ON CRYSTAL TRANSDUCERS-TYPE CY4 NOS. 1225, 1226, 1237, 1654, Calibration Group, NO. C54 18 MAY 1944
58. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER, ATM2-1 NO. 1703, NAVY PROJECT NS-159, Calibration Group, NO. C55 8 JUNE 1944
59. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER, CCEM-1 NO. 1707, Calibration Group, NO. C56 9 JUNE 1944
60. EFFECT OF NRL ANTI-FOULING PAINT NO. 364, USED ON DOMES, Calibration Group, NO. C57 22 JUNE 1944
61. MONITORING CBM78165A PROJECTORS INSIDE 54-INCH DOMES, Calibration Group, NO. C58 23 JUNE 1944
62. PRELIMINARY REPORT ON TEMPERATURE STRUCTURE OF SWEETWATER LAKE, JUNE 24, 1944, E. C. LaFond, G. H. Gould 27 JUNE 1944
63. MEASUREMENTS ON CRYSTAL TRANSDUCERS-TYPE CY4 NO. 1777 THROUGH NO. 1781, Calibration Group, NO. C59 8 AUG 1944
64. MINIMAL REQUIREMENTS FOR CLASS A CALIBRATION, J. H. Martin 14 AUG 1944
65. CALIBRATION OF SOME AX·SB AND AX·SBA HYDROPHONES SUPPLEMENT TO CALIBRATION OF EQUIPMENT USED IN THE USS SUMNER, Calibration Group, NO. C60

66. MEASUREMENTS ON CRYSTAL TRANSDUCERS CN8·7 NO. 1718, CN8·8 NO. 1717, CN8·9 NO. 1716, Calibration Group, NO. C61

67. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO) SAMPLE NO. 1 (CONTRACT NXsr-60065) NAVY PROJECT NS·316, Calibration Group, NO. C62

68. MEASUREMENTS ON CRYSTAL TRANSDUCER CQ4Z·3 NO. 1838 (B), Calibration Group, NO. C63

69. FLUCTUATIONS IN SOUND TRANSMISSION OBSERVED AT SWEETWATER LAKE, C. W. Ufford

70. MEASUREMENTS ON A C11·A1 HYDROPHONE WITH AN ELLIPSOIDAL AND A SPHERICAL REFLECTOR, Calibration Group, NO. C64

71. MEASUREMENTS ON QCN·4 MAGNETOSTRICTION TRANSDUCER (CM 78184 NO. 23 AND SPEP 6·12), Calibration Group, NO. C65

72. MEASUREMENTS ON CRYSTAL TRANSDUCER FGBZ·3 NO. 1760, Calibration Group, NO. C66

73. MEASUREMENTS ON CRYSTAL TRANSDUCER GE2Z·1 NO. 1892, Calibration Group, NO. C67

74. MEASUREMENTS ON CRYSTAL TRANSDUCER GE2Z·2 NO. 1893, Calibration Group, NO. C68

75. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO) SAMPLE NO. 2, Calibration Group, NO. C70

76. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER KDM1·3 NO. 2263, Calibration Group, NO. C69

77. MEASUREMENTS ON CRYSTAL TRANSDUCER, JB4Z·1 NO. 2191, Calibration Group, NO. C71

78. MEASUREMENTS ON CRYSTAL TRANSDUCERS CS3·1 NO. 2268 AND CS3·2 NO. 2275, Calibration Group, NO. C72

79. MEASUREMENTS ON 10·INCH NAD BEACON, Calibration Group, NO. C73

80. MEASUREMENTS ON CRYSTAL TRANSDUCERS GD16, Calibration Group, NO. C74

81. INVESTIGATIONS OF THE THERMAL STRUCTURE OF SWEETWATER LAKE, B. E. Holtsmark

82. MEASUREMENTS ON CRYSTAL TRANSDUCERS CS2Z·1 NO. 2283 AND CS2Z·3 NO. 2279, Calibration Group, NO. C75

83. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO)—SAMPLES NO. 3, 4, 5, (CONTRACT NXsr-60065), Calibration Group, NO. C76

84. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO)—SAMPLES NO. 3A, 4A, 5A (CONTRACT NXsr-60065), Calibration Group, NO. C77

85. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER XQHA, Calibration Group, NO. C78

86. MEASUREMENTS ON CRYSTAL TRANSDUCERS—TYPE BG2, Calibration Group, NO. C79

87. MEASUREMENTS ON CRYSTAL TRANSDUCERS—TYPE BF6, Calibration Group, NO. C80

88. EFFECT OF BAKER CASTOR OILS ON NEOPRENE, F. X. Byrnes

89. RECOMMENDED STANDARD PROCEDURES FOR THE PRESENTATION OF CRYSTAL TRANSDUCER CALIBRATION DATA, G. D. Camp

(1) reference laboratories—01.11

(2) standard hydrophones and projectors—01.12

1. BEAM PATTERNS FOR THE JK FACE OF A QC·JK COMBINATION PROJECTOR, G. Duwell, R. Corhart 20 OCT 1942

(3) calibration research—01.13

b. transducers (in general)—01.20

1. PROPERTIES OF ROCHELLE SALTS, W. G. Cadby AUG 1941

2. NOTES OF CONFERENCES ON THE "ST. CLAIR" SOUND GENERATOR, H. T. O'Neill 16 SEPT 1941

3. THE BEHAVIOR OF ROCHELLE SALTS IN TRANSDUCERS, K. S. Van Dyke 3 DEC 1941
4. PROGRESS REPORT NO. 2, UNDERWATER SOUND, 11-4-41 TO 12-10-41, M. C. Henderson

(Content: I. Bubbles as absorbers. II. Rochelle salt projectors as harmonic generators. III. (A) Reflections from sponge rubber, steel sheets, and Balsa wood at various angles and frequencies. (B) Transmission through steel sheets. IV. Calibration and properties of the W.U transducer. V. Output levels of various microphones: C13, C7, WE 630-A, and WU. The work reported is exploratory rather than quantitative.)

5. THE EFFECT OF VARIATIONS IN AMPLITUDE OVER THE FACE OF A TRANSDUCER, F. N. D. Kurie 13 DEC 1941

6. PRELIMINARY DRAFT: EQUIVALENT CIRCUITS FOR ELECTROMECHANICAL TRANSDUCERS, E. M. McMillan 10 JAN 1942

7. GYROSTABILIZER FOR TRANSDUCERS, F. N. D. Kurie, F. Pierce 14 JAN 1942

8. APPLICATIONS OF C-13 TRANSDUCERS; QUESTIONS REGARDING, J. N. A. Hawkins 22 JAN 1942

9. PRELIMINARY DRAFT: PIEZOELECTRIC TRANSDUCERS (PART I), E. M. McMillan 26 JAN 1942

10. SOME MEASUREMENTS OF THE IMPEDANCE OF A BRUSH C-13 MICROPHONE, A. M. Thorndike 17 FEB 1942

11. IMPEDANCE MEASUREMENTS ON ROCHELLE SALT RESONATORS, G. E. Duvall 26 FEB 1942

12. POWER FACTORS AND INPUT IMPEDANCE OF ELECTRICAL CIRCUITS EQUIVALENT TO CERTAIN CRYSTAL TRANSDUCERS, D. K. Froman 6 MAR 1942

13. OUTLINE OF RESEARCH PROGRAM AND PROGRESS REPORT, PIEZOELECTRIC STUDIES GROUP, D. K. Froman 9 APRIL 1942

14. SOME PROBLEMS CONCERNED WITH CAVITATION, A. M. Thorndike 6 MAY 1942

15. A MULTIDIRECTIONAL REFRACTION MICROPHONE, N. Most 23 JUNE 1942

16. DYNAMIC DISPLACEMENT METER, C. H. Keen 26 JUNE 1942

17. A HIGH INTENSITY UNDERWATER SOUND GENERATOR, S. C. Boden 24 JULY 1942

18. EXPERIMENTS ON CAVITATION IN THE RANGE 10 KC TO 50 KC, A. M. Thorndike 10 AUG 1942

19. VINYLITE-COVERED 6 CONDUCTOR SHIELDED CABLE, T. F. Burke, J. W. Sampsell 5 OCT 1942

1. EXPERIMENTAL STUDY OF ROCHELLE SALT; PRELIMINARY PROPOSALS, D. K. Froman 4 JAN 1942

2. OUTLINE OF THE PROPOSED MEASUREMENT ON ROCHELLE SALT, C. H. Keen 4 JAN 1942

3. NEED FOR MEASUREMENTS OF PIEZOELECTRIC PROPERTIES OF ROCHELLE SALT, A. M. Thorndike 4 JAN 1942

4. HEATING IN ROCHELLE SALT DRIVEN AT HIGH POWER, A. M. Thorndike 12 JUNE 1942

5. INVESTIGATION OF THE POWER HANDLING ABILITY OF 45° X-CUT AND Y-CUT ROCHELLE SALT CRYSTALS, F. X. Byrnes, NO. 175 30 NOV 1943


(a) 45° y-cut rochelle salt crystals—01.211

1. THE DIELECTRIC PROPERTIES OF X-CUT ROCHELLE SALT, A. M. Thorndike 6 MAR 1942

2. PROGRAM OF RESEARCH ON X-CUT ROCHELLE SALT CRYSTALS, D. K. Froman 19 MAR 1942

3. MEASUREMENTS ON THE DIELECTRIC PROPERTIES OF X-CUT ROCHELLE SALT, A. M. Thorndike 30 MAR 1942

4. IMPEDANCE OF ROCHELLE SALT, G. E. Duvall 23 JUNE 1942

5. DYNAMIC DISPLACEMENT METER, C. H. Keen 26 JUNE 1942

6. DISPLACEMENT DATA ON 45° X-CUT ROCHELLE SALT CRYSTALS, C. H. Keen 30 JUNE 1942


8. FUNDAMENTAL STUDIES ON X-CUT ROCHELLE SALT, D. K. Froman 15 JULY 1942


(b) x-cut rochelle salt crystals—01.212

1. THE DIELECTRIC PROPERTIES OF X-CUT ROCHELLE SALT, A. M. Thorndike 6 MAR 1942

2. PROGRAM OF RESEARCH ON X-CUT ROCHELLE SALT CRYSTALS, D. K. Froman 19 MAR 1942

3. MEASUREMENTS ON THE DIELECTRIC PROPERTIES OF X-CUT ROCHELLE SALT, A. M. Thorndike 30 MAR 1942

4. IMPEDANCE OF ROCHELLE SALT, G. E. Duvall 23 JUNE 1942

5. DYNAMIC DISPLACEMENT METER, C. H. Keen 26 JUNE 1942

6. DISPLACEMENT DATA ON 45° X-CUT ROCHELLE SALT CRYSTALS, C. H. Keen 30 JUNE 1942


8. FUNDAMENTAL STUDIES ON X-CUT ROCHELLE SALT, D. K. Froman 15 JULY 1942


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(c) magnetostriction units–01.213

(d) miscellaneous–01.214

1. INVENTION REPORT NO. PC-4 st-30 PAT 92—CEMENTING PIEZOELECTRIC CRYSTALS TO RUBBER, F. M. Uber

2. TRANSMISSION OF SOUND THROUGH FLAT PLATES, E. M. McMillan

3. INVENTION REPORT NO. PC-4 st-30 PAT 4B—CRYSTAL AND METHOD, G. A. Argabrite, T. F. Burke, OSRD Invention Disclosure No. 2055, Navy Case No. 4400, Application Serial No. 538,434 filed

4. INVENTION REPORT NO. PC-4 st-30 PAT 6S—ACOUSTIC IMPEDANCE ELEMENT (TRANS­­­­­­­­­­DUCER BACKING PLATE), T. F. Burke, OSRD Invention Disclosure No. 3902, Navy Case No. 5368, Application Serial No. 599,740 filed

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are suggested. This memo is interesting historically, since it is the forerunner of the variational treatment later developed. However, this subject is treated much more thoroughly in the STV.

17. EQUIVALENT CIRCUITS OF CRYSTAL TRANSDUCERS, MODIFIED TO INCLUDE THE INFLUENCE OF DISSIPATION AND ATTACHMENTS—PART II, G. D. Camp

(The equivalent circuits of attachments are given and these are combined with that for a dissipative single crystal as discussed in Part A, to obtain a complete equivalent circuit for a loaded single crystal. The much more complicated problem, of finding an equivalent circuit representation of an actual crystal transducer, is briefly discussed and an experimental program is suggested. Much of this experimental work has since been done and useful results obtained. However, much more still remains to be done.)

18. CRYSTAL TRANSDUCER RESEARCH PROGRAM, G. D. Camp

19. REPRESENTATION OF TRANSCENDENTAL IMPEDANCES WITH CONSTANT OR SLOWLY VARYING LCR ELEMENTS, G. D. Camp

(This is a brief memo developing results used in the memo on the LCR simulator (Representation of Transcendental Impedances with Constant, or Slowly Varying LCR Elements, Camp, 29 August 1944.) It shows that the individual terms, in the partial-fraction or "resonance denominator" series representations of certain transcendental functions, can be interpreted as the impedance of a parallel circuit composed of constant LCR elements.)

20. REPRESENTATION OF REAL TRANSDUCERS WITH ELECTRICAL NETWORKS COMPOSED OF CONSTANT OR SLOWLY VARYING LCR ELEMENTS (THE LCR SIMULATOR), G. D. Camp

(Continuous elastic systems, when represented by circuits with a finite number of loops, always have elements which are transcendental functions of frequency; this because an algebraic impedance cannot have an infinite spectrum of resonances. Computations are therefore very tedious, especially where dissipation is involved since in this case the arguments of the transcendental functions are complex. This memo proposes an electric circuit, the LCR simulator, for doing these computations rapidly, and develops the design formulas for this circuit. This circuit was built shortly afterward and has furnished very valuable results with a minimum of labor.)

21. EFFICIENCY AND IMPEDANCE OF CRYSTAL TRANSDUCERS, D. C. Kalbfell

22. DIRECTIVITY PATTERN COMPUTER, G. D. Camp

(Electrical circuits for computing directivity patterns are discussed. Time did not permit further work on this, and the rapid computation of directivity patterns from an assumed velocity distribution is still an unsolved problem.)

23. DIRECTIVITY PATTERNS CORRESPONDING TO NON-UNIFORM VELOCITY DISTRIBUTIONS, G. D. Camp

(Probe microphone measurements indicate that, at least, in air, the velocity pattern over the motor of actual transducers is far from uniform. This memo is a theoretical study of the influence of these non-uniformities on the directivity pattern.)

24. SERIES AND PARALLEL RESONANCE, T. F. Burke

(Written as the result of a conference in which it developed that there was common misunderstanding of simple circuits. Memo merely reviews elementary circuit theory available in many textbooks, and lists some useful formulas.)

25. DEPENDENCE OF FINITE-WIDTH PHASE ON FREQUENCY, G. D. Camp

(The total change in phase suffered by a wave in traveling once along a rod or crystal of fixed length, is the argument of the transcendental impedances appearing in its equivalent circuit. This quantity is proportional to frequency in thin rods, but increases more rapidly in rods or crystals of finite width. In this memo, the dependence of the total phase increment upon frequency and radius of gyration of the cross-section is calculated and displayed by a set of graphs.)

26. INVENTION REPORT NO. PC-4 31-30 PAT 66—ACOUSTIC IMPEDANCE ELEMENT (TRANSDUCER BACKING PLATE), T. F. Burke, OSRD Invention Disclosure NO. 3902, Navy Case NO. 5568, Application Serial NO. 599,740 filed

27. SEVERAL APPLICATIONS OF THE RECIPROCITY THEOREM, T. F. Burke

(Written as the result of research for the Research and Development Group of the Transducer Laboratory. Makes use of Reciprocity Theorem to develop several expressions not readily obtained by inspection. Two major results are given: (1) A relation for the diminution in radiated intensity caused by lobe-suppressing any plane radiator. (2) An algebraic expression for the directivity index of any radiator involving two unknown parameters; particularly useful for plane arrays.)

c. underwater sounds and noise (listening methods)—01.30

1. SONIC DETECTION OF AN AIRPLANE FROM A SUBMARINE, H. U. Sverdrup

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2. MEMORANDUM ON MEASUREMENTS NECESSARY TO THE DEVELOPMENT OF METHODS OF UNDERWATER LISTENING, F. A. Everest, W. V. Houston

3. BRIEF REPORT ON PROGRESS OF LISTENING WORK UP TO 4-23-42, F. A. Everest

4. TRANSMISSION MEASUREMENTS WITH SIGNAL/NOISE RATIO LESS THAN UNITY, F. A. Everest

5. METHODS SUITABLE FOR THE CALIBRATION AND USE OF AN OCTAVE-BAND SOUND LEVEL METER, R. W. Young, NO. M32

6. SURVEY OF UNDERWATER SOUND—REPORT NO. 1, INTRODUCTION, V. O. Knudsen, R. S. Alford, J. W. Emling

7. SURVEY OF UNDERWATER SOUND—REPORT NO. 2, SOUNDS FROM SUBMARINES, V. O. Knudsen, R. S. Alford, J. W. Emling

8. SURVEY OF UNDERWATER SOUND—REPORT NO. 3, AMBIENT NOISE, V. O. Knudsen, R. S. Alford, J. W. Emling


10. FURTHER UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS, Listening Section, NO. A3

11. UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS. Listening Section, NO. M212

12. UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS (MAY 24 AND JUNE 1, 1944), T. McMillion, H. J. Oorthuys, NO. A14

13. UNDERWATER SOUND OUTPUT OF CRUISER, DESTROYER, AND AIRCRAFT CARRIER, Listening Section, NO. SM268

14. CALIBRATION OF UNDERWATER SOUND LEVEL METER AND ANALYZER, H. J. Oorthuys, NO. A48

15. SUBMARINE SOUNDS RECORDED FOR MARE ISLAND NAVY YARD, Listening Section, NO. M277

16. SURFACE BOAT SOUNDS ON SHIPS OF THE AGC-5, Listening Section, NO. M356

(1) detectable sounds of ships and submarines—01.31

1. MEASUREMENTS OF THE SOUNDS OF SUBMARINES BY THREE INDEPENDENT MEASURING SYSTEMS (COLUMBIA, HARVARD, MIT), V. O. Knudsen, L. J. Sivian

2. UNDERWATER SOUND OUTPUT FROM SUBMARINE CHARGING BATTERIES, Listening Section, NO. M43

3. SOME UNDERWATER SOUND MEASUREMENTS ON TWO AIRCRAFT CARRIERS, Listening Section, NO. A1

4. FURTHER UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS, Listening Section, NO. A3

5. UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS, Listening Section, NO. M212

6. UNDERWATER SOUND MEASUREMENTS ON AIRCRAFT CARRIERS (MAY 24 AND JUNE 1, 1944), T. McMillion, H. J. Oorthuys, NO. A14

7. UNDERWATER SOUND OUTPUT OF CRUISER, DESTROYER, AND AIRCRAFT CARRIER, Listening Section, NO. SM268

8. CALIBRATION OF UNDERWATER SOUND LEVEL METER AND ANALYZER, H. J. Oorthuys, NO. A48

9. SUBMARINE SOUNDS RECORDED FOR MARE ISLAND NAVY YARD, Listening Section, NO. M277

10. SOUND CAVITATION TESTS ON USS SPRINGER (SS414), Listening Section, NO. M233

11. BACKGROUND NOISE IN THE SUPERSONIC RANGE, T. F. Johnston

12. UNDERWATER SOUND OUTPUT OF USS SPOT (SS413), Listening Section, NO. M296

13. UNDERWATER SOUND OUTPUT OF THE USS TINOSA (SS283), Listening Section, NO. M303

14. POINT LOMA SHIP-SOUND MONITORING STATION, Listening Section, NO. M321

15. AIRBORNE NOISE MEASUREMENTS ON THE AGC-5, Listening Section, NO. M356

16. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley

(2) detectable sound of underwater ordnance—01.32

(3) background noise—01.33

1. METHODS SUITABLE FOR THE CALIBRATION AND USE OF AN OCTAVE-BAND SOUND LEVEL METER, R. W. Young, NO. M32

2. UNDERWATER SOUNDS OF BIOLOGICAL ORIGIN, M. W. Johnson, NO. U28

(An early summary, amplified but not superseded by later reports.)
3. DATA FOR THE DESIGN OF INDUCTANCES WOUND ON MOLYBDENUM PERMALLOY CORES, R. S. Gaies, NO. M37
25 FEB 1943
4. BLANKING AND SCREENING BY SURFACE WAKES, Wake Studies Group, NO. M38
5 MAR 1943
5. AMBIENT NOISE MEASUREMENTS IN THE WESTERN PACIFIC—USS SUMNER EXPEDITION, R. H. Fleming, F. A. Everest
13 SEPT 1943
6. UNDERWATER SOUND OUTPUT OF THE USS TINOSA (SS283), Listening Section, NO. M303
5 MAR 1945
7. AIR-BORNE NOISE MEASUREMENTS ON THE AGC-5, Listening Section, NO. M356
28 AUG 1945

(a) ambient noise—0.331

1. SEASONAL AND DIURNAL WATER-NOISE VARIATIONS, SAN FRANCISCO HARBOR ENTRANCE—SUPPLEMENT TO WATER NOISE SURVEY, SAN FRANCISCO, F. A. Everest, R. W. Young
13 JUNE 1942
2. WATER BACKGROUND NOISE IN SAN DIEGO AREA, F. A. Everest, R. W. Young, G. P. Welch
22 AUG 1942
3. DEEP-SEA WATER BACKGROUND NOISE, Listening Section, NO. M34
8 FEB 1943
4. PRELIMINARY SURVEY OF CERTAIN BIOLOGICAL UNDERWATER SOUNDS ON THE EAST COAST OF NORTH AMERICA, M. W. Johnson, NO. U63
25 MAY 1943
5. UNDERWATER AMBIENT NOISE SURVEY—BAHAMAS AND EAST COAST OF FLORIDA, R. H. Fleming, D. A. Proudfoot, NO. M80
29 JUNE 1943
6. A SURVEY OF BIOLOGICAL UNDERWATER NOISES OFF THE COAST OF CALIFORNIA AND IN UPPER PUGET SOUND, M. W. Johnson, NO. U100
10 SEPT 1943
7. SOME AMBIENT WATER NOISE MEASUREMENTS IN THE 13TH NAVAL DISTRICT, Listening Section, NO. M120
15 OCT 1943
8. BACKGROUND NOISES OF BIOLOGICAL ORIGIN, M. W. Johnson
19 OCT 1943
9. SOME AMBIENT WATER NOISE MEASUREMENTS IN THE 14TH NAVAL DISTRICT, Listening Section, NO. M122
22 OCT 1943
10. UNDERWATER NOISE AND THE DISTRIBUTION OF SNAPPING SHRIMP WITH SPECIAL REFERENCE TO THE ASIATIC AND THE SOUTHWEST AND CENTRAL PACIFIC AREAS, M. W. Johnson, NO. U146
15 JAN 1944

(Definitive report on the areas in which snapping shrimp exist.)

11. SUPPLEMENT TO SOME AMBIENT WATER NOISE MEASUREMENTS IN THE 14TH NAVAL DISTRICT, Listening Section, NO. M122a
22 JAN 1944
12. THE PREDICTION OF AMBIENT NOISE LEVEL IN OR NEAR SHALLOW WATER, M. W. Johnson, F. P. Shepard, NO. M205
21 APRIL 1944
13. DISTRIBUTION OF AMBIENT NOISE LEVELS, Listening Section, NO. A9
20 MAY 1944
14. DIRECTIVITY OF SHRIMP NOISE, T. F. Johnston, NO. A27
11 AUG 1944
15. FOURIER ANALYSIS OF SNAPPING SHRIMP IMPULSES, T. F. Johnston, NO. A28
14 AUG 1944
16. NOISE PRODUCED BY SNAPPING SHRIMP, T. F. Johnston, NO. A36
14 SEPT 1944
17. THE EFFECT OF SHRIMP NOISE ON AUDIBILITY OF UNDERWATER SOUNDS, R. S. Gaies, NO. A46
9 NOV 1944

(Shrimp noise very effectively masks ship, submarine and torpedo sounds above 1.5 kc for sonic listening.)

18. AMBIENT WATER NOISE IN THE CENTRAL AND SOUTHWEST PACIFIC BASED ON OBSERVATIONS MADE BY W. E. LOOMIS, M. W. Johnson, T. F. Johnston, NO. M284
28 DEC 1944

(Final report on results of an expedition sponsored by BuOrd, BuShips and NDRC.)
19. UNDERWATER EVENING NOISE IN THE HAWAIIAN AREA, Listening Section, NO. M299
1 MAR 1945

(Report of noise made by an as yet unidentified marine animal.)
20. UNDERWATER NOISE CAUSED BY SNAPPING SHRIMP, Sonar Data Division, NO. U337
20 AUG 1945

(b) self noise—0.332

1. QC PROJECTOR WATER NOISE MEASUREMENTS (USS RATHBURN), F. A. Everest, D. J. Evans
24 FEB 1942
2. SELF-NOISE OF PC BOATS, T. F. Johnston, NO. A16
10 JUNE 1944
(4) masking of ship sounds by noise—01.35

1. A RECORDING CHANNEL FOR THE LABORATORY, J. N. A. Hawkins
   AUG 1941
2. PROPOSAL FOR STUDYING THE MASKING EFFECT OF WATER NOISE ON UNDER-
   WATER SHIP SOUNDS, F. A. Everest
   10 APRIL 1942
3. ALTERNATIVE METHOD OF MEASURING A SIGNAL-TO-NOISE RATIO LESS THAN
   UNITY, R. W. Young
   22 OCT 1942
4. OUTLINE OF PROPOSED LISTENING MASKING PROGRAM, F. A. Everest
   13 AUG 1943
5. NOTES BASED ON CONFERENCE OF 5 MAY 1944 ON PSYCHOPHYSICAL PROBLEMS
   OF ECHO RANGING AND LISTENING, C. Eckart
   16 MAY 1944
6. SOME CONSIDERATIONS PERTAINING TO SYSTEMATIC MASKING OF SHIP SOUNDS,
   R. S. Goles, NO. A11
   23 MAY 1944
7. PROPOSED METHODS FOR MONITORING SONIC OUTPUT OF SUBMARINES, L. W. Sep-
   meyer, R. S. Goles, NO. A13
   31 MAY 1944
8. MASKING EXPERIMENTS: REPORT NO. I, Listening Section, NO. U229
   (The first of a series on this subject, being devoted to apparatus, techniques and definitions.)
   28 JUNE 1944
9. MASKING EXPERIMENTS: REPORT NO. II, Listening Section, NO. U258
   (Quantitative evidence on the audibility of underwater ship sounds in the presence of selected
   background noises.)
   15 SEPT 1944
10. THE EFFECT OF SHRIMP NOISE ON AUDIBILITY OF UNDERWATER SOUNDS, R. S. Goles,
    NO. A46
    9 NOV 1944
11. AUDIBILITY WEIGHTING NETWORK, R. S. Goles, L. J. Goldberg
    9 MAR 1945
12. AN EXPERIMENTAL STUDY OF MASKING BY A LINE SPECTRUM, Sonar Data Division,
    NO. M314
    7 JUNE 1945

d. reverberation and scattering—01.40

1. THEORY OF REVERBERATION AND ECHO, C. Eckart
   JULY 1941
2. OBSERVATIONS MADE ON BOARD DESTROYERS USS TALBOT AND USS GILMER AND
   SUBMARINE S-28 DURING MANEUVERS OF JULY 16-17, N. J. Holter
   28 JULY 1941
3. ATTENUATION AND SCATTERING BY BUBBLES ACCORDING TO WILLIS, W. V. Houston
   18 AUG 1941
4. REVERBERATION SIMULATOR AND RANDOM NOISE PRODUCER, T. H. Schafer
   31 DEC 1941
5. REVERBERATION STUDIES, C. F. Eyring
   13 FEB 1942
6. CONFERENCE ON REVERBERATION IN SEA WATER HELD FEBRUARY 23, 1942, W. V.
   Houston
   23 FEB 1942
7. AMPLITUDE OF THE ECHO FROM A SUBMARINE AS A FUNCTION OF THE SIGNAL
   LENGTH, C. F. Eyring, R. J. Christensen
   18 APRIL 1942
8. MULTIPLE SCATTERING, C. F. Eyring, R. J. Christensen, C. Eckart
   18 APRIL 1942
9. OPTICAL ANALOGUE OF SONIC REFLECTION FROM THE SURFACE OF THE OCEAN,
   J. G. Teasdale
   21 APRIL 1942
10. REDUCTION OF REVERBERATION WITH PRESENT ECHO-RANGING EQUIPMENT, L. J.
    Sivian, C. F. Eyring
    2 MAY 1942
11. REVERBERATION IN SHALLOW WATER, C. F. Eyring, R. W. Raitt, R. J. Christensen
    15 MAY 1942
12. REVERBERATION IN ECHO RANGING—PART I, GENERAL PRINCIPLES, T. H. Osgood,
    W. V. Houston
    (A summary of the work which has been carried on principally by the UCDWR.)
    28 JULY 1942
13. EFFECT OF DOPPLER ON ECHO DETECTION (COMMENTS ON BRITISH INTERNAL REPORT
    NO. 31—V258), C. Eckart
    29 JULY 1942
14. MEASUREMENT OF RAPID DECAY RATES IN A REVERBERATION CHAMBER, D. C. Kalb-
    fell
    10 OCT 1942
15. REVERBERATION STUDIES AT 24 KC, Reverberation Group, NO. U7
    23 NOV 1942
16. SCATTERING OF UNDERWATER SOUND BY SOLID PARTICLES AND AIR BUBBLES, G. E. Duvall, NO. M40
   (Summary of theoretical formulae and graphs.)
17. VOLUME REVERBERATION SCATTERING AND ATTENUATION VS. FREQUENCY, Reverberation Group, NO. U50
   (Report of an extensive program of experiments designed to investigate the effect of frequency on the intensity of volume reverberation. Also see U79.)
18. REVERBERATION IN ECHO RANGING—PART II, REVERBERATION FOUND IN PRACTICE (NAVY PROJECT NO. NS-140), T. H. Osgood, CUDWR
   (A summary of the work which has been carried on principally by the UCDWR.)
19. THE DISCRIMINATION OF TRANSDUCERS AGAINST REVERBERATION, Reverberation Group, NO. U75
   (Definitive theoretical discussion of this subject; contains useful approximate formulae and comparison with experiment.)
20. BOTTOM REVERBERATION: DEPENDENCE ON FREQUENCY, Reverberation Group, NO. U79
   (Report on experiments designed to investigate the effect of frequency on the intensity of bottom reverberation. Supplements U50.)
21. A SYSTEM FOR RECORDING REVERBERATION AS IT OCCURS IN THE OCEAN, Reverberation Group, NO. M111
22. BOTTOM REVERBERATION, T. H. Schafer, NO. A5
23. BOTTOM REVERBERATION AT 24 KC—E. W. SCRIPPS DATA, R. R. Carhart, NO. A7
24. RANGE LIMITATION IN SHALLOW WATER AS CONTROLLED BY BOTTOM CHARACTER, STATE OF SEA, AND THERMAL STRUCTURE, P. P. Shepard, NO. A10
25. REFLECTION COEFFICIENT OF SURFACE AND BOTTOM, R. W. Raitt, NO. A8
26. LIMITATION OF RANGE BY REVERBERATION PRESENTATION OF DATA, R. W. Raitt
27. SOME EVIDENCE FOR SPECULAR BOTTOM REFLECTION OF 24 KC SOUND, R. R. Carhart, NO. A17
28. BOTTOM REVERBERATION IN VERY SHALLOW WATER, R. W. Raitt, NO. A18
29. APPENDIX TO INTERNAL REPORT A18—BOTTOM REVERBERATION IN VERY SHALLOW WATER, R. W. Raitt, NO. A19
30. BOTTOM REVERBERATION IN VERY SHALLOW WATER, Echo-Ranging Section, NO. SM249
31. SUMMARY OF THE CALIBRATION OF THE REVERBERATION EQUIPMENT NOVEMBER 24, 1943, TO FEBRUARY 23, 1945, T. H. Schafer
32. UCDWR AND BTL NO-DOPPLER RECOGNITION DIFFERENTIALS, A. M. Small
33. JOB BREAKDOWN OF REVERBERATION MEASUREMENT AND ANALYSIS TO FIRST SUMMARY SHEETS, T. H. Schafer
34. BOTTOM REVERBERATION WITH A HORIZONTAL BEAM, R. R. Carhart
35. LIMITATION OF ECHO RANGES BY REVERBERATION (DEEP WATER), Sonar Data Division, NO. M361
   (A statistical analysis based on transmission and reverberation measurements.)
36. SCATTERING FROM A HEAVY RIGID SPHERE, G. E. Duvall
37. A SUGGESTION FOR CONTROLLING THE ERRORS INVOLVED IN THE PROCESSING OF REVERBERATION DATA, G. E. Duvall
38. STRATIFICATION OF SOUND SCATTERERS IN THE OCEAN, Sonar Data Division, NO. M397

**e. echo masking by reverberation—01.41**

1. INVENTION REPORT NO. PC-4 sr-30 PAT 39—PERIOD METER, R. C. Fisher, W. M. Royton, OSRD Invention Disclosure NO. 2054
2. A RECORDING CHANNEL FOR THE LABORATORY, J. N. A. Hawkins
3. THE DETECTION OF AN ECHO IN THE PRESENCE OF REVERBERATION, C. Eckart
4. REPORT OF LABORATORY TESTS ON AURAL RECEPTION, ETC. BY R. S. ALFORD (COMMENTS ON NDRC DOCUMENT 115.3), C. Eckart, G. Camp

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5. THE MASKING OF ECHO BY REVERBERATION. C. Eckart, NO. M22
   (First report on the subject; not obsolete.)
6. TONE DURATION AS A FACTOR IN PITCH DISCRIMINATION, E. G. Wever, NO. M179
   8 JAN 1943
    10 MAR 1944
7. FREQUENCY CHARACTERISTICS OF ECHOES AND REVERBERATION, W. M. Rayton, R. C. Fisher, NO. U244
   (Final report on the periodmeter and results obtained with this device.)
8. ANALYSIS OF VARIANCE WITH THE APPLICATION OF THIS METHOD TO PSYCHO-AcouSTIC TESTS, G. W. Tyler
   8 MAR 1945
9. SONAR HUT NOISE MEASUREMENTS ON A FRIGATE, R. S. Gales, A. M. Small, NO. M324
   11 JUNE 1945
    (Experimental results of a study of errors in judgment of doppler as a function of frequency of the echo. The apparent pitch varies with loudness of the echo differently at different audio frequencies.)

f. echo masking by noise—01.42
1. MASKING EFFECT OF WATER NOISE ON SHORT PULSES, R. C. Fisher, NO. 5239
   25 JULY 1944

g. acoustic properties of wakes—01.50
1. DETECTION OF WAKE BY HYDROCARBON, H. M. Zenor
   AUG 1941
2. INFLUENCE OF AIR BUBBLES ON THE EXTINCTION OF SOUND IN WATER—REPORT NO. 1, P. S. Epstein
   8 AUG 1941
3. ON THE EXTINCTION OF SOUND IN WATER CAUSED BY AIR BUBBLES—REPORT NO. 2, P. S. Epstein
   11 AUG 1941
4. ATTENUATION AND SCATTERING BY BUBBLES ACCORDING TO WILLIS, W. V. Houston
   18 AUG 1941
5. ON THE DETECTION OF WAKES BY VERTICAL SUPERSONIC BEAM, W. R. Smythe
   13 SEPT 1941
6. CONFERENCE ON WAKES—JUNE 26, 1942, G. P. Hornwell
   26 JUNE 1942
7. STATUS OF AND PLANS FOR THE WAKE PROGRAM, C. Eckart
   24 AUG 1942
8. ECHOES FROM WAKES, Reverberation Group
   29 AUG 1942
9. CONFERENCE ON WAKES, C. Eckart
   16 NOV 1942
10. THE EFFECT OF TURBULENT MOTION ON THE RATE OF RISE OF BUBBLES IN A WAKE, J. S. McNown, NO. U25
    19 FEB 1943
11. THE ENTRAPMENT OF BUBBLES IN VORTICES, J. S. McNown, NO. M46
    3 MAR 1943
12. BLANKING AND SCREENING BY SURFACE WAKES, Wake Studies Group, NO. M38
    5 MAR 1943
13. ACOUSTIC MEASUREMENTS ON SURFACE WAKES IN SAN DIEGO HARBOR, R. R. Carhart, G. E. Duvall, NO. U62
    8 MAY 1943
14. ECHOES FROM WAKES, Reverberation Group, NO. M99
    24 AUG 1943
15. OSCILLOGRAMS OF 24 KC ECHOES FROM A DESTROYER AND ITS WAKE, Echo-Ranging Section, NO. M141
    3 JAN 1944
16. MEASUREMENTS OF 24 KC ECHOES FROM A DESTROYER AND ITS WAKE, G. Duvall, NO. M141a
    20 JAN 1944
17. PRELIMINARY REPORT ON ECHOES FROM A DIVING SUBMARINE AND ITS WAKE, Sonar Section, NO. M172
    22 JAN 1944
18. DATA AT 45 KC ON ECHOES FROM A DIVING SUBMARINE AND ITS WAKE, Sonar Section, NO. M172a
    3 MAR 1944
19. SOUND TRANSMISSION THROUGH DESTROYER WAKE, Listening Section, NO. M189
    8 MAR 1944
20. SCATTERING STRENGTH OF S/M WAKES AT 45 KC, G. E. Duvall
    8 APRIL 1944
21. OSCILLOGRAMS OF 24 KC NOISE PRODUCED BY A DESTROYER, G. E. Duvall, NO. A2
    1 MAY 1944
22. CHEMICAL RECORDER TRACES OF SUBMARINE WAKES, G. E. Duvall, NO. A23
    18 JULY 1944
23. WAKE OF A FLEET-TYPE SUBMARINE, G. E. Duvall, W. M. Rayton, NO. A34
    6 SEPT 1944
h. bottom investigations—01.60

1. BOTTOM SEDIMENT CHARTS NO. HO·0796·BS, HO·0797·BS, HO·1019·BS, HO·1593·BS, HO·1594·BS, HO·1595·BS, HO·BA1653a·BS, HO·2124·BS, HO·2187·BS, HO·2404·BS, HO·BA2414·BS, HO·2475·BS, HO·BA2637·BS, HO·2725·BS, HO·2726·BS, HO·2728·BS, HO·2732·BS, HO·2733·BS, HO·3112·BS, HO·3117·BS, HO·3149·BS, HO·3176·BS, HO·3240·BS, HO·3308·BS, HO·3747·BS, HO·3316·BS, HO·3517·BS, HO·5322·BS, HO·5323·BS, HO·5326·BS, HO·5466·BS, HO·5467·BS, HO·5492·BS, HO·5494·BS, HO·5495·BS, HO·5677·BS, HO·5679·BS, HO·6146·BS, HO·MISC. 10,010·30·BS, HO·UCDWR.

2. BOTTOM CHARACTER IN APPROACHES TO SAN FRANCISCO, Oceanographic Division 14 JULY 1942
3. BOTTOM CHARACTER OFF THE COLUMBIA RIVER ENTRANCE, Oceanographic Division 24 AUG 1942
4. REVISED BOTTOM CHARACTER CHART OFF SAN DIEGO, Oceanographic Division 25 AUG 1942
5. BOTTOM CHARACTER IN STRAIT OF JUAN DE FUCA, Oceanographic Division 27 AUG 1942
6. PROPOSED SOUND-RANGING EXPERIMENTS TO TEST EFFECTS OF BOTTOM CHARACTER AND SUBMARINE TOPOGRAPHY, Oceanographic Division 3 SEP 1942
7. CHARACTER OF THE BOTTOM OFF SAN FRANCISCO (CHART NO. 224), Oceanographic Division 10 NOV 1942
8. BOTTOM CHARACTER CHART OF TOKYO BAY AND APPROACHES (NO. 221, 1, 2), Oceanographic Division 16 NOV 1942
9. BOTTOM REVERBERATION: DEPENDENCE ON FREQUENCY, Reverberation Group, NO. U79 16 JUNE 1943
10. THE EFFECT OF THERMAL CONDITIONS ON THE INCIDENT ANGLE OF SOUND AT THE OCEAN BOTTOM, R. R. Carhart 20 NOV 1943
11. BOTTOM SCATTERING COEFFICIENT, R. W. Raitt 25 JAN 1944
12. STATUS OF BOTTOM REVERBERATION STUDIES, R. R. Carhart 17 MAY 1944
13. BOTTOM REVERBERATION AT 24 KC—E W SCRIPPS DATA, R. R. Carhart, NO. A7 18 MAY 1944
14. RANGE LIMITATION IN SHALLOW WATER AS CONTROLLED BY BOTTOM CHARACTER, STATE OF SEA AND THERMAL STRUCTURE, F. P. Shepard, NO. A10 22 MAY 1944
15. SOME EVIDENCE FOR SPECULAR BOTTOM REFLECTION OF 24 KC SOUND, R. R. Carhart, NO. A17 9 JUNE 1944
16. ECHO RANGING IN SHALLOW WATER AT 20 KC, F. P. Shepard 22 JUNE 1944
17. A NEW METHOD FOR MEASURING THE ACOUSTICAL CONSTANTS OF SEDIMENT SAMPLES, Sonar Data Division, NO. M340 2 AUG 1945

i. transmission of underwater sound—01.70

1. ALTERNATIVE METHOD OF MEASURING A SIGNAL-TO-NOISE RATIO LESS THAN UNITY, R. W. Young 22 OCT 1942
2. VARIATION OF THE SOUND FIELD NEAR THE SURFACE IN DEEP WATER, H. T. O’Neill, T. F. Johnston, NO. U49 16 MAR 1943
   (Graphs and formulae concerning interference of direct and surface-reflected sound, neglecting refraction. See M140.)
3. OUTLINE OF PROPOSED PROGRAM OF DEEP WATER SOUND PROPAGATION MEASUREMENTS, F. A. Everest 28 AUG 1943
4. SOME GENERAL IDEAS CONCERNING THE TRANSMISSION OF SOUND IN THE DEEP SEA, C. Eckart, NO. M108 28 SEPT 1943
5. MINUTES OF A CONFERENCE ON THE TRANSMISSION OF SOUND IN THE SEA, C. Eckart 11 OCT 1943
6. LLOYD MIRROR EFFECT IN A VARIABLE VELOCITY MEDIUM, R. R. Carhart, NO. M140 23 OCT 1943
   (An application of ray theory to the problem of interference between direct and surface reflected sound when there are temperature gradients.)
7. OUTLINE OF PROPOSED PROGRAM OF SOUND PROPAGATION MEASUREMENTS IN DEEP WATER, F. A. Everest, T. F. Johnston 9 NOV 1943
8. TRANSMISSION OF UNDERWATER SOUND OVER A SLOPING BOTTOM, R. R. Carhart, K. O. Emery, NO. A29 1 OCT 1944

(1) attenuation—01.71

1. ATTENUATION AND SCATTERING BY BUBBLES ACCORDING TO WILLIS, W. V. Houston 18 AUG 1941
2. MEMO ON THE ATTENUATION OF SOUND IN WATER (NOTES FROM SEMINAR CONDUCTED BY V. O. KNUDSEN), V. O. Knudsen 29 SEPT 1941
3. THE ATTENUATION OF SOUND IN WATER—NOTES BASED ON SEMINAR CONDUCTED BY DR. KNUDSEN, 29 SEPTEMBER 1941, V. O. Knudsen
4. A METHOD OF DETERMINING THE ATTENUATION OF SOUND IN SEA WATER, R. R. Thompson
5. SOUND ATTENUATION IN SAN DIEGO HARBOR, F. A. Everest, H. T. O'Neil
(Material incorporated in report of 30 July 1942.)
6. ATTENUATION OF UNDERWATER SOUND, F. A. Everest, H. T. O'Neil
(Later revised and issued 30 July 1943.)
7. MEASUREMENT OF ATTENUATION IN SEA WATER BY VERTICAL PULSING, H. T. O'Neil
(Refers principally to work plans.)
8. ATTENUATION OF UNDERWATER SOUND, F. A. Everest, H. T. O'Neil
(A revision of a report originally issued 16 February 1942 on attenuation as deduced from shallow water measurements.)
9. THE ATTENUATION OF SOUND IN THE SEA, C. Eckart, NO. U236
(Critical summary of measurements by various experimenters.)
10. ATTENUATION AND FLUCTUATION STUDIES BASED ON SUPersonic BOTTOM ECHOES, Sonar Data Division, NO. M384

(2) transmission of high frequency sound—01.72

1. INVENTION REPORT NO. PC-4 sr.30 PAT 102—CALCULATOR, C. Eckart
2. LLOYD MIRROR EFFECT, R. R. Corhart
3. INTERIM REPORT ON THE SOUND FIELD OF ECHO-RANGING GEAR, Sound Field Group, NO. U113
(A comprehensive survey of transmission phenomena; extended but not superseded by later reports.)
4. EFFECTS OF REFRACTION ON LLOYD MIRROR TENTATIVE RESULTS, R. R. Corhart,
5. LLOYD MIRROR EFFECT IN A VARIABLE VELOCITY MEDIUM, R. R. Corhart, NO. M140
(An application of ray theory to the problem of interference between direct and surface-reflected sound when there are temperature gradients.)
6. THE AUTOMATIC RECEIVER GAIN CHANGER, N. Most
7. TRANSMISSION OF 60 KC SOUND DATA OF MARCH AND APRIL 1944, M. J. Sheehy, NO. A6
8. SCATTERING OF SOUND BY THE SURFACE OF THE SEA, L. I. Schiff, NO. M217
10. TRANSMISSION OF THE 24 KC COMPONENT OF SIGNALS, M. J. Sheehy, NO. A15
11. PROCEDURE FOR CALCULATION AND PLOT OF RAY DIAGRAMS FROM BATHYthermograph DATA, H. R. Gould
12. AMPLITUDE FLUCTUATIONS OF TRANSMITTED AND REFLECTED SOUND SIGNALS IN THE OCEAN, M. J. Sheehy, NO. A29
13. TRANSMISSION OF 24 KC AND 60 KC SOUND IN VERY SHALLOW WATER, JUNE 1944, M. J. Sheehy, NO. A31
15. VARIABILITY OF DEEP WATER TRANSMISSION, M. J. Sheehy, NO. A40
16. TRANSMISSION OF 24 KC AND 60 KC SOUND IN VERY SHALLOW WATER, OCTOBER 1944, M. J. Sheehy, NO. A31a
17. CORRELATION OF SIMULTANEOUS TRANSMISSION IN DEEP WATER AT DIFFERENT FREQUENCIES, M. J. Sheehy, NO. A44
18. OPERATIONAL PROCEDURE AND EQUIPMENT USED IN SONAR SOUND FIELD STUDIES, Echo-Ranging Section, NO. U295
19. EFFECT OF ROLL ON SHORT RANGE AMPLITUDE FLUCTUATIONS, N. Most
20. THE INFLUENCE OF THERMAL CONDITIONS ON TRANSMISSION OF 24 KC SOUND, Sonar Data Division, NO. U307
(Critical survey of data available at the time. Extended but not superseded by later reports.)
21. A COMPARISON OF TRANSMISSION LOSS AT 15 KC AND 24 KC, Sonar Data Division, NO. M313

DEC 1941
16 DEC 1941
10 JAN 1942
16 FEB 1942
14 MAY 1942
30 JULY 1942
6 JULY 1944
13 DEC 1945
22 JUNE 1943
1 OCT 1943
16 OCT 1943
23 OCT 1943
29 MAR 1944
17 MAY 1944
25 MAY 1944
29 MAY 1944
9 JUNE 1944
28 JUNE 1944
17 AUG 1944
26 AUG 1944
9 SEPT 1944
5 OCT 1944
23 OCT 1944
28 OCT 1944
15 FEB 1945
12 MAR 1945
16 MAR 1945
3 MAY 1945

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(3) transmission of low frequency sound–01.73

1. A NOTE ON THE TRANSMISSION OF LOW FREQUENCY SOUND IN SEA WATER, L. D. Statham
2. CONCLUSIONS DERIVED FROM THE ANALYSIS OF TRANSMISSION DATA OBTAINED DURING HARBOR SURVEYS, Listening and Oceanographic Sections, NO. U110
3. SOME SHALLOW WATER SOUND PROPAGATION MEASUREMENTS IN THE 13TH NAVAL DISTRICT, Oceanographic and Listening Sections, NO. M126
4. OUTLINE OF PROPOSED PROGRAM OF SOUND PROPAGATION MEASUREMENTS IN DEEP WATER, F. A. Everest, T. F. Johnston
5. SOME EXPERIMENTS ON THE TRANSMISSION OF CONTINUOUS SOUND IN 100 FATHOM TO 600 FATHOM WATER, Listening Section, NO. M193
7. SOME SOUND PROPAGATION MEASUREMENTS IN THE FOURTEENTH NAVAL DISTRICT, Listening and Oceanographic Sections, NO. M228
8. FURTHER EXPERIMENTS ON THE TRANSMISSION OF CONTINUOUS SOUND, R. E. Chambers, NO. A42
9. SOUND MEASURING EQUIPMENT ON THE YAG-6 (Ex–ENCHARENTRESS), T. McMillian, NO. A47
10. SHALLOW WATER SOUND PROPAGATION NEAR SCRIPPS PIER, Listening Section
11. LOW FREQUENCY SOUND TRANSMISSION PROGRAM, F. A. Everest
12. LOW FREQUENCY UNDERWATER SOUND SOURCE, TYPE MEF, Listening Section, NO. M331
13. EFFECTIVENESS OF THE 01.73 PROGRAM, T. F. Johnston
14. TIME STUDY OF CURRENT PROCEDURES IN 01.73 DATA PROCESSING, T. F. Johnston
16. INTERIM REPORT ON TRANSMISSION OF UNDERWATER SOUND AT LOWER FREQUENCIES, Sonar Data Division, NO. U362
17. OVERLAYS USEFUL IN THE ANALYSIS OF SOUND TRANSMISSION DATA, Sonar Data Division, NO. M391

(4) transmission of explosive sound–01.74

1. BOUNDARY STUDIES IN THE OCEAN BY THE USE OF EXPLOSIVE SOUNDS, W. R. Smythe
2. DATA ON CATHODE RAY OSCILLOGRAPH RECORDS OF EXPLOSIVE SOUNDS, C. F. Eyring, R. J. Christensen
3. A METHOD OF DETERMINING THE ATTENUATION OF SOUND IN SEA WATER, R. R. Thompson
4. PROPOSED INVESTIGATION OF EXPLOSIVE PULSES AND POSSIBLE USES OF SONIC IMPULSES FOR THE DETECTION OF SUBMARINES, H. E. Hartig  
5. IMPULSE STUDIES—PROGRESS REPORT (MEMO IM-1), R. A. Peterson  
6. PROGRAM FOR IMPULSE STUDIES, R. A. Peterson  
7. PRELIMINARY REPORT ON COMPARISON BETWEEN COMPUTED SOUND INTENSITIES AND OBSERVATIONS OF INTENSITIES OF EXPLOSIVE SOUND, Oceanographic Division  
8. ATTENUATION OF EXPLOSIVE IMPULSES IN THE SEA, R. W. Raitt  
9. DEVELOPMENT OF SINGLE SWEEP EQUIPMENT FOR IMPULSE WORK, T. F. Johnston  
10. WESTERN INSTRUMENT COMPANY AMPLIFIERS,  
11. POWER  
12. A STUDY OF THE TRANSMISSION OF EXPLOSIVE IMPULSES IN SEA WATER, T. F. Johnston  
14. FOURIER ANALYSIS OF EXPLOSIVE IMPULSES—DRAFT (PART IV), B. G. Eaton  
15. EXPLOSIVE SOUND WAVES IN THE SEA—OBSERVATIONS WITH A 2500 MOVING-COIL OSCILLOGRAPH, T. F. Johnston, R. W. Raitt, NO. M10  
16. TRANSMISSION OF EXPLOSIVE IMPULSES IN THE SEA, T. F. Johnston, R. W. Raitt, NO. U8  

1. THE CALCULATION OF RAYS OF SOUND BY DIRECT AND VARIATIONAL METHODS, H. Bateman  
2. INFLUENCE OF AIR BUBBLES ON THE EXTINCTION OF SOUND IN WATER—REPORT NO. 1, P. S. Epstein  
3. ON THE EXTINCTION OF SOUND IN WATER CAUSED BY AIR BUBBLES—REPORT NO. 2, P. S. Epstein  
4. ATTENUATION AND SCATTERING BY BUBBLES ACCORDING TO WILLIS, W. V. Houston  
5. THE EXTINCTION OF SOUND IN WATER, C. Eckart  
6. THE STABILITY OF AIR BUBBLES IN THE SEA AND THE EFFECT OF BUBBLES AND PARTICLES ON THE EXTINCTION OF SOUND AND LIGHT IN SEA WATER, P. S. Epstein  
7. RANGE AND TRAVEL TIME OF A SOUND RAY IN A MEDIUM OF UNIFORMLY VARYING VELOCITY, R. R. Carhart  
8. SOME THEORETICAL STUDIES OF THE PROPAGATION OF SOUND IN SHALLOW WATER, G. D. Camp, C. Eckart, NO. U102  
9. NATURAL FREQUENCIES OF A FREE ANNULAR PLATE VIBRATING RADially, G. D. Camp  
10. POWER RADIATED BY A STEEL TUBE DRIVEN BY A MULTI-POLE MAGNET, G. D. Camp  
11. STEEL TUBE TRANSDUCER II, G. D. Camp  
12. PRELIMINARY DRAFT—THE SEA SURFACE AND ITS EFFECT ON THE REFLECTION OF SOUND AND LIGHT—I—REFLECTION OF RAYS, Sonar Data Division  

13. THE ISOLATION OF ADDITIVE EFFECTS, Sonar Data Division, NO. M327  
14. CONSIDERATIONS CONCERNING THE ELECTRICAL CALCULATION OF CORRELATIONS, C. Eckart  
15. ADDITIVE ANALYSIS WITH DISPROPORTIONATE WEIGHTING, Sonar Data Division, NO. M379  

16. ECHO RANGING WITH EXPLOSIVE SOUND, T. F. Johnston, T. McMillian, NO. U88  

(5) mathematical studies—01.75  

1. ADDITIVE ANALYSIS WITH DISPROPORTIONATE WEIGHTING, Sonar Data Division, NO. M379  
2. FLUCTUATION OF 24 KC SIGNALS AT SHORT RANGE AS A FUNCTION OF THE ROLL OF THE SENDING SHIP, Sonar Data Division, NO. M386  
3. ATTENUATION AND FLUCTUATION STUDIES BASED ON SUPERSOncIC BOTTOM ECHoES, Sonar Data Division, NO. M384  

(6) fluctuation—01.76  

1. ADDITIVE ANALYSIS WITH DISPROPORTIONATE WEIGHTING, Sonar Data Division, NO. M379  
2. FLUCTUATION OF 24 KC SIGNALS AT SHORT RANGE AS A FUNCTION OF THE ROLL OF THE SENDING SHIP, Sonar Data Division, NO. M386  
3. ATTENUATION AND FLUCTUATION STUDIES BASED ON SUPERSOncIC BOTTOM ECHoES, Sonar Data Division, NO. M384  

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j. reflectivity of sound from targets—01.80

1. INVENTION REPORT NO. PC-4 sr-30 PAT 101—MINE CONSTRUCTION, W. M. Rayton
   18 NOV 1941
2. SUBMERSIBLE SPHERE FOR SOUND MEASUREMENTS, F. Pierce
   19 JAN 1942
3. THE TARGET SPHERE, F. Pierce
   18 APR 1942
4. AMPLITUDE OF THE ECHO FROM A SUBMARINE AS A FUNCTION OF THE SIGNAL
   LENGTH, C. F. Eyering, R. J. Christensen
   16 SEPT 1942
5. EXPLOSIVE SOUND WAVES IN THE SEA—OBSERVATIONS WITH A 2500 MOVING-COIL
   OSCILLOGRAPH, T. F. Johnston, R. W. Raitt, NO. M10
   2 DEC 1942
6. TRANSMISSION OF EXPLOSIVE IMPULSES IN THE SEA, T. F. Johnston, R. W. Raitt, NO.
   US
7. REFLECTION OF LIGHT FROM A SUBMARINE MODEL, R. B. Tibby, NO. M61
   12 MAY 1943
8. TARGET STRENGTH OF A SUBMARINE AT 24 KC, G. E. Duvall, NO. A4
   10 MAY 1944
9. ACOUSTIC MEASUREMENTS WITH SUBMARINES, R. J. Christensen
   6 JULY 1944
10. PERSONAL OBSERVATIONS ON OPERATIONS WITH FLEET-TYPE SUBMARINES IN THE
    KEY WEST AREA, J. D. Frautschy
    6 JULY 1944
11. FREQUENCY CHARACTERISTICS OF ECHOES AND REVERBERATION, W. M. Rayton,
    R. C. Fisher, NO. U244
    9 AUG 1944
(Final report on the periodmeter and results obtained with this device.)
12. EFFECT OF PING LENGTH ON SUBMARINE TARGET STRENGTH, G. E. Duvall, W. M.
    Rayton
    14 AUG 1944
13. 24 KC ECHOES FROM A 3-FOOT SPHERE, G. E. Duvall, NO. A32
    26 AUG 1944
14. MEASUREMENTS ON THE INTENSITIES OF ECHOES FROM SUBMARINES, R. J. Christensen
    2 SEPT 1944
15. WAKE OF A FLEET-TYPE SUBMARINE, G. E. Duvall, W. M. Rayton, NO. A34
    6 SEPT 1944
16. TARGET STRENGTH, C. Eckart
    27 SEPT 1944
17. ECHOES FROM SWELLS, G. E. Duvall, NO. A43
    27 OCT 1944
18. ECHOES OF VERY SHORT PINGS FROM SUBMARINES, W. M. Rayton, NO. M301
    1 MAR 1945
19. SURFACE-REFLECTED SUBMARINE ECHOES, Echo-Ranging Section, NO. M306
    15 MAR 1945
20. SUMMARY AND CONCLUSIONS OF MEASUREMENTS OF THE REFLECTIONS FROM A
    SPHERE AND A TEN-INCH DISC, C. J. Burbank
    9 JULY 1945
21. TARGET STRENGTH OF A SIX-FOOT TRIPLANE, T. H. Schafer
    19 DEC 1945
22. STATUS REPORT ON ECHOES FROM SMALL OBJECTS, Sonar Data Division, NO. M388
    14 FEB 1946

k. prediction of sound ranges—01.90

1. OCEANOGRAPHIC PROGRAM FOR COLLECTION OF INFORMATION ON SOUND TRANS-
   MISSION CONDITIONS IN THE PACIFIC OCEAN, USNRSL, NDRC, BuShips
    20 AUG 1941
2. THE EFFECT OF DIURNAL VARIATION IN TEMPERATURE ON SOUND RANGES, Oceano-
   graphic Division
    SEPT 1941
3. THE STABILITY OF AIR BUBBLES IN THE SEA AND THE EFFECT OF BUBBLES AND
   PARTICLES ON THE EXTINCTION OF SOUND AND LIGHT IN SEA WATER, P. S. Epstein
    1 SEPT 1941
4. ACCURACY OF ECHO RANGES PREDICTED FROM BATHYTHERMOGRAPH OBSERVA-
   TIONS, Oceanographic Division
    11 DEC 1941
5. THE PROBABLE EFFECT ON SOUND RANGES OF VARYING DEPTH OF THE SOUND
   PROJECTOR, Oceanographic Division
    18 DEC 1941
6. REPORT ON EXAMINATION OF RANGES OBTAINED BY TWO SUBMARINES RANGING-
   AT EACH OTHER, Oceanographic Division
    30 DEC 1941
7. PREDICTION OF ECHO RANGES FROM BATHYTHERMOGRAPH OBSERVATIONS, A
   MANUAL ACCOMPANIED BY A SLIDE RULE, Oceanographic Division
    3 JAN 1942
8. CALCULATION OF SOUND RAY PATHS IN SEA WATER, R. H. Fleming, Lt. R. Revelle
    (Exposition of practical methods of computing sound rays when temperature or salinity gradients
    are present.)
    16 JAN 1942
9. GENERAL CONDITIONS FOR ECHO RANGING IN THE WESTERN NORTH PACIFIC OCEAN,
   Oceanographic Division
    30 JAN 1942
10. SOME CHARACTERISTICS OF THE SOUND FIELD IN THE SEA, Oceanographic Division
    (An early summary of the effects of oceanographic conditions on the transmission of sound in
    the sea.)
    13 MAR 1942
11. EFFECT OF THE THERMOCLINE ON THE PROPAGATION OF SOUND (NO. 5), P. S. Epstein
12. PRELIMINARY DRAFT OF MATERIAL TO APPEAR ON FACE OF SOUND RANGING CHARTS, Oceanographic Section
13. OCEANOGRAPHIC TEMPERATURE MEASUREMENT EQUIPMENT, D. C. Kalbfell
14. RELATIVE INTENSITIES IN THE SOUND FIELD, Oceanographic Division

(Exposition of the application of ray theory to the calculation of transmission loss caused by ray divergence.)

15. BEST DEPTH OF ESCAPE FOR SUBMARINES—RULES BASED ON TEMPERATURE STRUCTURE, Oceanographic Section
16. PROPOSED STUDY OF CERTAIN TYPES OF WAVE MOTIONS, Oceanographic Division
17. PREDICTION OF ECHO RANGES FROM SUBMARINE BATHYTERMOMOGRAPH OBSERVATIONS (Preliminary Draft), Instruction Manual for Submarine Bathythermograph Observers, Part II, NDRC, WHOI, BuShips
18. REFRACTION OF SOUND RAYS IN THE ATMOSPHERE, Oceanographic Division

19. RANGE AND TRAVEL TIME OF A SOUND RAY IN A MEDIUM OF UNIFORMLY VARYING VELOCITY, R. R. Carhart
20. SOUND-RANGING CONDITIONS IN THE JAPANESE AREA, WINTER SEASON, Oceanographic Section, NO. U20
21. SUPPLEMENT TO SOUND-RANGING CONDITIONS OF THE NORTH PACIFIC OCEAN, Oceanographic Section, NO. M24
22. SOUND-RANGING CONDITIONS IN THE JAPANESE AREA, SUMMER SEASON, Oceanographic Section, NO. U9

23. ECHO RANGES AS A FUNCTION OF OCEANOGRAPHIC FACTORS (REVISED), UCDWR
24. MAXIMUM ECHO RANGES—THEIR PREDICTION AND USE, WCSS, NDRC
25. LLOYD MIRROR EFFECT IN A VARIABLE VELOCITY MEDIUM, R. R. Carhart, NO. M140

(An application of ray theory to the problem of interference between direct and surface-reflected sound when there are temperature gradients.)

26. A SURVEY OF THE PROBLEM OF MAXIMUM ECHO RANGES (PRELIMINARY DRAFT), C. Eckart, NO. U130

(Exposition of the factors influencing maximum echo ranges. No final draft was prepared.)

27. A DEVICE FOR PLOTTING RAYS IN A MEDIUM OF VARIABLE VELOCITY, L. I. Schiff, NO. M125
28. DEFINITIONS AND RANGE TABLES FOR SONAR CHARTS BT DATA, E. C. LaFond
29. ANALYSIS OF BLOCK ISLAND TRANSMISSION DATA (TRANSMISSION MEMO No. 1), R. R. Carhart
30. FISHERS’ ISLAND DATA (TRANSMISSION MEMO No. 2), R. R. Carhart
31. PREDICTION OF MAXIMUM ECHO RANGES, R. D. Russell
32. ANALYSIS OF 14TH NAVAL DISTRICT TRANSMISSION DATA (TRANSMISSION MEMO No. 4), R. R. Carhart
33. TRANSMISSION DATA FROM 13TH NAVAL DISTRICT (TRANSMISSION MEMO No. 5), R. R. Carhart
34. CONCLUSIONS DERIVED FROM ANALYSIS OF TRANSMISSION DATA OBTAINED DURING HARBOR SURVEYS (TRANSMISSION MEMO No. 6), R. R. Carhart
35. PREDICTION OF SOUND RANGES FROM BT OBSERVATIONS—RULES FOR PREPARING SONAR MESSAGES (PRELIMINARY VERSION), UCDWR
36. SUGGESTED PLAN FOR DETERMINATION OF MAXIMUM ECHO RANGES, R. D. Russell
37. PRELIMINARY REPORT ON THE SONIC RAY PLOTTER, L. I. Schiff, NO. M207
38. THE SONIC RAY PLOTTER, L. I. Schiff, NO. U246

(Final report on a device which automatically plots sound rays from the bathythermogram.)

39. USE OF SONIC RAY PLOTTER FOR LARGE ANGLE RAYS, L. I. Schiff
40. A SUMMARY OF DATA USED IN THE PRELIMINARY SHALLOW WATER RANGE PREDICTION RULES, R. R. Carhart
41. AFTERNOON EFFECT, ITS APPLICATION TO THE SOUND-RANGING CHARTS, E. C. LaFond
42. SOUND-RANGING CONDITIONS OFF SOUTHERN CALIFORNIA, K. O. Emery, NO. A45
43. LIMITATION OF ECHO RANGES BY REVERBERATION (DEEP WATER), Sonar Data Division, NO. M361

(A statistical analysis based on transmission and reverberation measurements.)
(1) preparation of charts and manuals—01.91

1. SOUND-RANGING (SONAR) CHARTS OF THE INDIAN OCEAN—Summer Season, 4 editions (1942-1945); Winter Season, 3 editions (1942-1944), UCDWR, HO, HO NO. 2603-R

2. SOUND-RANGING (SONAR) CHARTS OF THE NORTH PACIFIC OCEAN—Summer Season, 4 editions (1942-1945); Winter Season, 3 editions (1942-1944), UCDWR, HO, HO NO. 1401-R

3. SOUND-RANGING (SONAR) CHARTS OF THE SOUTH PACIFIC OCEAN—Summer Season, 3 editions (1942-1944); Winter Season, 4 editions (1942-1945), UCDWR, HO, HO NO. 2601-R

4. SUPPLEMENT TO SOUND-RANGING CONDITIONS OF THE JAPANESE AREA, WINTER SEASON, Oceanographic Section, NO. U20

5. SUPPLEMENT TO SOUND-RANGING CONDITIONS OF THE NORTH PACIFIC SECTIONS, NO. M24

6. SOUND-RANGING CONDITIONS IN THE JAPANESE AREA, SUMMER SEASON, Oceanographic Section, No. U9

7. AFTERNOON EFFECT, ITS APPLICATION TO SOUND-RANGING CHARTS, E. C. LaFond, NO. A49

(a) charts of average echo-ranging conditions—01.911

1. PREDICTION OF ECHO RANGES FROM SUBMARINE BATHYTERMOMETER OBSERVATIONS (Preliminary Draft), Instruction Manual for Submarine Bathythermograph Observers, Part II; NDRC, WHOI, BuShips

2. PRELIMINARY CHARTS WITH HISTOGRAMS FOR THE FOURTH EDITION OF THE SOUND-RANGING (SONAR) CHARTS, UCDWR, WHOI, NO. M326

(b) charts of average listening conditions—01.912

(c) submarine supplements—01.913

1. SUBMARINE SUPPLEMENT TO HYDROGRAPHIC OFFICE PUBLICATION NO. 133, SAILING DIRECTIONS FOR THE BAY OF BISCAY, HO, WHOI, NDRC, BuShips


3. LATE SUMMER HYDROGRAPHIC CONDITIONS IN THE JAPANESE AREA, R. H. Fleming, NO. U85

4. SUMMER SUBARINE SUPPLEMENT TO HYDROGRAPHIC OFFICE PUBLICATIONS NO. 122, 123, 124—THE JAPANESE EMPIRE AREA, JUNE, JULY AND AUGUST. HO Supplement to HO NOS. 122, 123, 124, HO, SIO, UCDWR, WHOI, NDRC, BuShips

5. SUBMARINE SUPPLEMENT TO HYDROGRAPHIC OFFICE PUBLICATION NO. 165. Western Pacific Area July-September, HO, SIO, UCDWR, WHOI, NDRC, BuShips, HO Misc. 11,418

6. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: THE JAPANESE EMPIRE AREA SEPTEMBER-DECEMBER, HO, SIO, UCDWR, WHOI, NDRC, BuShips, HO Misc. 11,381-A

7. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: THE WESTERN PACIFIC AREA SEPTEMBER-DECEMBER, HO, SIO, UCDWR, WHOI, NDRC, BuShips, HO Misc. 11,413-2

8. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: SOUTH CHINA SEA AREA NOVEMBER-APRIL, HO, UCDWR, SIO, CUDWR, Geol. Sur. Dept. of Interior, BuShips, NDRC, WHOI, HO Misc. 11,530-1

9. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: JAPANESE EMPIRE AREA JANUARY-MARCH, HO, SIO, UCDWR, CUDWR, Geol. Sur. Dept. of Interior, BuShips, NDRC, WHOI, HO Misc. 11,381-B

10. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: WESTERN TROPICAL PACIFIC AREA JANUARY-MARCH, HO, UCDWR, SIO, CUDWR, Geol. Sur. Dept. of Interior, BuShips, NDRC, WHOI, HO Misc. 11,418-3

11. SUBMARINE SUPPLEMENT TO THE SAILING DIRECTIONS: JAPANESE EMPIRE AREA, HO, UCDWR, NDRC, SIO, BuShips, CUDWR, Geol. Sur. Dept. of Interior, WHOI, HO 231
(2) methods for range prediction—01.92

1. RANGE AND TRAVEL TIME OF A SOUND RAY IN A MEDIUM OF UNIFORMLY VARYING VELOCITY, R. R. Carhart
   2 NOV 1942
2. LLOYD MIRROR EFFECT IN A VARIABLE VELOCITY MEDIUM, R. R. Carhart, NO. M140
   23 OCT 1943
3. A SURVEY OF THE PROBLEM OF MAXIMUM ECHO RANGES (PRELIMINARY DRAFT), C. Eckart, NO. U130
   20 NOV 1943
4. A DEVICE FOR PLOTTING RAYS IN A MEDIUM OF VARIABLE VELOCITY, L. I. Schiff, NO. M125
   29 NOV 1943
5. PRELIMINARY REPORT ON THE SONIC RAY PLOTTER, L. I. Schiff, NO. M207
   21 APRIL 1944
6. A COMPARISON OF CALCULATED AND OBSERVED INTENSITIES FOR SOME SPLIT BEAM SOUND FIELD RANGES, R. R. Carhart, L. A. Thacker, NO. A26
   2 AUG 1944
7. THE SONIC RAY PLOTTER, L. I. Schiff, NO. U246
   8 AUG 1944
8. INVENTION REPORT NO. PC-4 sr-30 PAT 64—DIFFERENTIAL ANALYZER, L. I. Schiff, OSRD Invention Disclosure NO. 2560, Navy Case NO. 4457, Application Serial NO. 550,470, filed
   21 AUG 1944
9. OBSERVED RANGES ON A SUBMARINE AT 90 FEET KEEL DEPTH, REPORTED BY THE USS RATHBURN, R. R. Carhart, NO. A30
   24 AUG 1944
10. SUBMARINE ECHO RANGES OBSERVED AND PREDICTED—MIEKE PATTERN, BELOW LAYER, C. Eckart, NO. A33
    29 AUG 1944
11. AFTERNOON EFFECT, ITS APPLICATION TO SOUND-RANGING CHARTS, E. C. LaFond, NO. A49
    25 NOV 1944
12. PRELIMINARY CHARTS WITH HISTOGRAMS FOR THE FOURTH EDITION OF THE SOUND-RANGING (SONAR) CHARTS, UCDWR, WHOI, NO. M326
    8 JUNE 1945

(a) maximum echo ranges—01.921

(b) maximum listening ranges—01.922

(3) processing of bt slides—01.93

1. WOODS HOLE BATHYTERMOPHGRAPRO INSTRUCTION MANUAL—PRELIMINARY DRAFT, NDRC, WHOI, UCDWR, Bristol Company
   3 APRIL 1942
2. STATUS OF BATHYTERMOPHGRAPRO PROGRAM IN THE PACIFIC OCEAN OCTOBER 31, 1942, Oceanographic Division
   3 NOV 1942
3. ADJUSTMENT OF THE BATHYTERMOPHGRAM FOR ERRORS IN SURFACE TEMPERATURE AND PRESSURE, J. S. McNown, NO. M103
   2 SEPT 1943
4. SONAR—STATUS OF UNITED STATES NAVY BT PROGRAM IN THE PACIFIC, R. D. Russell
   20 JAN 1945
5. NEW MODEL EXPERIMENTAL BATHYTERMOPHGRAPROs, C. W. Ufford
   7 APRIL 1945
6. AFTERNOON EFFECT AND ITS APPLICATION TO SOUND-RANGING CHARTS, Sonar Data Division, NO. U357
   (Analysis of the bathytermograms gathered by the United States Navy during the war, with special reference to empirical rules for the prediction of afternoon effect.)
   15 SEPT 1945

(4) bathytermogram program for submarines—01.94

1. BEST DEPTH OF ESCAPE FOR SUBMARINES—RULES BASED ON TEMPERATURE STRUCTURE, Oceanographic Section
   29 APRIL 1942
2. PENETRATION OF SOUND INTO THE SHADOW ZONE, C. Eckart
   12 AUG 1942

(5) thermal investigations—01.95

1. INVENTION REPORT NO. PC-4 sr-30 PAT 2O—RESISTANCE THERMOMETER, G. W. Downs, Jr., OSRD Invention Disclosure NO. 1471, Navy Case NO. 4187

269
2. **INVENTION REPORT NO. PC-4 or 30 PAT 34—ADMITTANCE NEUTRALIZING CIRCUIT,**
   G. W. Downs, Jr., OSRO Invention Disclosure NO. 1024, Navy Case NO. 4887

3. THE EFFECT OF DIURNAL VARIATION IN TEMPERATURE ON SOUND RANGES—
   APPENDIX 1 TO REPORT ON WORK IN SEPTEMBER 1941, Oceanographic Division

4. TEMPERATURE OBSERVATIONS OFF THE SECTION BASE, SAN DIEGO HARBOR, JANUARY 26 TO FEBRUARY 2, 1942, Oceanographic Division

5. OCEANOGRAPHIC TEMPERATURE MEASUREMENT EQUIPMENT, D. C. Kalbfell

6. THE STUDY OF THE MICROSTRUCTURE OF THE SEA, Oceanographic Division

7. A NEW TYPE OF RESISTANCE THERMOMETER FOR USE IN MEASUREMENTS OF TEMPERATURE STRUCTURE OF THE OCEAN, G. W. Downs, Jr.

8. PROPOSED STUDY OF CERTAIN TYPES OF WAVE MOTIONS, Oceanographic Division

9. MEASUREMENTS OF HIGH VELOCITIES WITH A CURRENT METER, J. S. McNown

10. MOVEMENT IN THE OCEAN, Oceanographic Division

11. A LABORATORY STUDY OF SURFACE AND INTERNAL WAVE MOTION, Oceanographic Section, NO. U3

12. MICROSTRUCTURE INSTRUMENTATION, R. H. Fleming

13. MINUTES OF MEETING ON MICROSTRUCTURE INSTRUMENTATION, R. H. Fleming

14. REFLECTION OF SOUND IN THE OCEAN FROM TEMPERATURE CHANGES, R. R. Carhart, NO. U74

   (Application of theory to the problem of the reflection of sound in regions where its velocity changes gradually. Useful graphs.)

15. PRELIMINARY REPORT ON THE SOLUTION OF ACOUSTIC BOUNDARY PROBLEMS, L. I. Schiff

16. RAPID-RESPONSE THERMOMETER, D. C. Kalbfell, NO. M101

17. SOLUTION OF ACOUSTIC BOUNDARY PROBLEMS II, L. I. Schiff

18. SOLUTION OF ACOUSTIC BOUNDARY PROBLEMS III, L. I. Schiff

19. PRELIMINARY REPORT ON TEMPERATURE STRUCTURE OF SWEETWATER LAKE JUNE 24, 1944, E. C. LaFond, G. H. Gould

20. PRELIMINARY REPORT ON THE TEMPERATURE STRUCTURE OF EL CAPITAN LAKE, G. H. Gould

21. FLUCTUATIONS IN SOUND TRANSMISSION OBSERVED AT SWEETWATER LAKE, C. W. Ufford

22. INTERNAL WAVES, C. W. Ufford

   (Internal waves with less than tidal periods are shown to exist by measuring the variation of the layer depth with the time. The theory is extended to waves under a moving ship.)

23. INTERNAL WAVES OFF SAN DIEGO, CALIFORNIA, C. W. Ufford, NO. M290

24. INVESTIGATIONS OF THE THERMAL STRUCTURE OF SWEETWATER LAKE, B. E. Holtsmark

25. ATMOSPHERIC PRESSURE AND INTERNAL WAVES, C. W. Ufford

26. THE DETERMINATION OF DENSITY FROM TEMPERATURE, PRESSURE, AND THE VELOCITY OF SOUND, C. W. Ufford

27. INTERNAL WAVES MEASURED AT THREE STATIONS, C. W. Ufford, NO. M350

2. **sonar (echo-ranging) gear—02.00**

   1. PROPOSED METHOD FOR DETERMINING THE DEPTH OF A SUBMARINE, D. C. Kalbfell

   2. MEMORANDA ON RANGING EQUIPMENT, H. M. Zener

   3. THREE METHODS OF EMPLOYING A TWO-CHANNEL ECHO-RANGING PROJECTOR, F. Pierce

   4. PHYSICS OF SOUND AS APPLIED TO ECHO-RANGING DEVICES, UCDWR, Department of Physics, University of Pennsylvania

   5. TECHNIQUE OF ECHO RANGING, UCDWR, Department of Physics, University of Pennsylvania

   6. MECHANICAL RANGE INDICATOR, W. A. Myers, NO. M13

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a. fundamental studies—02.10

(1) high-intensity pulsing—02.11

(2) high-frequency echo-ranging—02.12

(3) shallow water sonar—02.13

(a) sod development—02.131

1. INVENTION REPORT NO. PC-4 sr-30 PAT 88—SMALL OBJECT DETECTOR, M. E. Chun, C. S. Mongan, Jr., W. H. Williams
2. INVENTION REPORT NO. PC-4 sr-30 PAT 106—ECHO-RANGING SYSTEM, D. C. Kalbfell
3. INVENTION REPORT NO. PC-4 sr-30 PAT 111—ECHO-RANGING SYSTEM, M. E. Chun
4. INVENTION REPORT NO. PC-4 sr-30 PAT 112—DIRECTIONAL SOUND APPARATUS, M. E. Chun

5. BRITISH ASDIC TYPE 135 TESTS, M. E. Chun, NO. SM221
6. BOTTOM REVERBERATION IN VERY SHALLOW WATER, Echo-Ranging Section, NO. SM249
7. MEASUREMENTS ON CRYSTAL TRANSDUCER, JB4Z-1 NO. 2191, Calibration Group, NO. C71
8. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie
9. PRELIMINARY INSTRUCTION MANUAL: SMALL OBJECT DETECTOR (SOD) MODEL I, NO. 1, NO. M317
10. PRELIMINARY REPORT ON SMALL OBJECT DETECTOR (SOD), M. E. Chun, C. E. Mongan, Jr., NO. M343
11. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley
12. CONFERENCE—PRO-SUBMARINE DEVELOPMENTS, 2 OCTOBER 1945, R. O. Burns

(b) sod evaluation—02.132

1. MEASUREMENTS ON TYPE 135 ASDIC MAGNETOSTRICTION TRANSDUCER, Calibration Group, NO. C53
2. MEASUREMENTS ON MAGNETOSTRICTION TRANSDUCER XQHA, Calibration Group, NO. C78
3. XQHA SONAR TESTS, W. H. Williams, NO. M339

(c) sod physics—02.133

1. EXPERIMENTS IN ECHO RANGING AT 90 KC, C. E. Mongan, Jr., R. Halley

(d) bottom scanning—02.134

1. INVENTION REPORT NO. PC-4 sr-30 PAT 87—BOTTOM SCANNER, W. H. Williams, D. A. Baldwin
2. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie
(e) expendable echo sounder—02.135

2. INVENTION REPORT NO. PC-4 sr-30 PAT 110—ELECTRONIC INDICATOR, R. A. Mueller
3. PROPOSED METHOD FOR AMPHIBIOUS OPERATIONS, F. N. D. Kurie
4. RADIO SOUNDER BUOY, D. H. Ransom, Jr.
5. EXPENDIBLE FATHOMETER TESTS, W. B. Beckley
6. TESTS OF EXPENDIBLE FATHOMETER, W. B. Beckley
7. EXPENDIBLE FATHOMETER, F. N. D. Kurie
8. REPORT ON INVESTIGATION OF USDAR PRINCIPLE AS APPLIED TO THE EXPENDIBLE BUOY ECHO-SOUNDING EQUIPMENT PROJECT, R. A. Mueller
10. RECONNAISSANCE PADDLEBOARDS: USE OF EXPENDIBLE ECHO-SOUNDING EQUIPMENT ON, R. H. Fleming
11. EXPENDIBLE FATHOMETER—TESTS CONDUCTED AT THE NAVAL COMBAT DEMOLITION TRAINING AND EXPERIMENTAL BASE, MAUl, 3 TO 9 AUGUST 1945, S. P. Shelton, L. P. Delasso

(4) low-frequency echo ranging—02.14

1. SONIC IMPULSE METHOD OF SUBMARINE DETECTION AND LOCATION, H. E. Hartig 2 OCT 1941
2. A NOTE ON THE TRANSMISSION OF LOW-FREQUENCY SOUND IN SEA WATER, L. D. Statham 21 JAN 1942
3. PROGRAM FOR THE STUDY OF LOWER FREQUENCIES FOR ECHO RANGING, F. N. D. Kurie 29 SEPT 1942
4. BEARING ACCURACY AT LOWER OPERATING FREQUENCIES, F. N. D. Kurie 30 OCT 1942
5. BEARING ACCURACY AT LOWER OPERATING FREQUENCIES, F. N. D. Kurie, NO. U2 12 NOV 1942
6. INTERIM REPORT ON ECHO RANGING AT LOWER FREQUENCIES, L. M. Langer, NO. U109 1 SEPT 1943

(5) targets—02.15

1. THE TRIPLANE, D. E. Ross, F. N. D. Kurie, NO. U4 23 NOV 1942
   (This report covers the design, construction, use, and a brief theory for three-foot and six-foot triplane acoustical targets using fabric-covered celotex panels.)
2. SUPPLEMENT TO THE TRIPLANE, D. E. Ross, F. N. D. Kurie, NO. U4a 29 JUNE 1943
   (This report covers mechanical design information on the original fabric covered panel type triplane and the replacement of the fabric covered panels by metal covered panels.)
3. MEMORANDUM ON TARGET STRENGTH OF THE TWO-FOOT TOWABLE TRIPLANE AT 60 KC, Sonar Section 16 FEB 1944
4. MEMORANDUM ON STREAMLINED TRIPLANE, D. G. Reed 31 AUG 1944
   (This report covers the design and construction of a two-foot triplane enclosed in a streamlined lucite case to facilitate towing the triplane as a moving target, also includes design and construction of a cable depressor required to hold the triplane submerged under towing conditions. This equipment was built for the Harvard Underwater Sound Laboratory.)
5. TRIPLANES, C. E. Mongan 6 FEB 1945
   (This report covers the design, construction and use of eight-inch foam glass triplanes and a brief theory and discussion of triplane target strength as a function of frequency.)
6. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie 23 APRIL 1945
b. possible improvements in standard gear–02.30

1. A CIRCUIT TO OSCILLATE AT A LOW FREQUENCY OR BE NON-OscILLATORY AS A FUNCTION OF AN APPLIED VOLTAGE, M. C. Henderson

2. A BEAT FREQUENCY GENERATOR FOR MEASURING VELOCITY BY THE DOPPLER PRINCIPLE, G. E. Duvall

3. ELIMINATION OF WATER NOISE IN SUPersonic Sound Ranging BY APPLICATION OF FREQUENCY MODULATION, L. D. Statham

4. A PROPOSAL TO INVESTIGATE THE EFFECT OF MINIMIZING REVERBERATION IN QC ECHO-RANGING EQUIPMENT, H. E. Hartig

5. GYROSTABILIZER FOR TRANSDUCERS, F. N. D. Kurie, F. Pierce

6. APPLICATION OF FM METHODS TO SOUND PULSE RECEPTION, E. M. McMillan

7. REDUCTION OF REVERBERATION WITH PRESENT ECHO-RANGING EQUIPMENT, L. J. Sivian, C. F. Eyring

8. CONSIDERATION OF CERTAIN FACTORS AFFECTING THE CHOICE OF SIGNAL FREQUENCIES FOR ECHO RANGING, V. O. Knudsen

9. A PROPOSED METHOD OF MINIMIZING REVERBERATION PICKUP IN THE QC ECHO-RANGING EQUIPMENT, C. A. Hisserich

This is a two-page paper accompanied by one illustration, covering a proposal which was intended to minimize the annoyance of high-intensity local reverberation. The discussion covers means for obtaining this effect and the illustration shows particular connection with regard to a QC Receiver. This type of system was adopted to many types of sound equipment and has been referred to as TVG (Time Varying Gain).

10. ECHO-RANGING SET–UCDWR NO. 483, M. E. Chun, W. A. Myers

11. REFLECTION OF LIGHT FROM A SUBMARINE MODEL, R. B. Tibby, NO. M61

12. MODIFICATION OF A TYPE CBM-55081 RANGE INDICATOR, D. E. Ross, NO. M104

13. THE EFFECT OF THE SHIP’S ROLL ON ECHO RANGING, J. S. McNown, C. Eckart, NO. M114


(1) basic improvement study–02.31

(a) doppler devices–02.311

1. ENHANCEMENT OF DOPPLER EFFECT, K. S. Van Dyke

2. DOPPLER RECOGNITION, C. A. Hisserich

3. PROPOSAL FOR A CATHODE RAY INDICATOR FOR ECHO-RANGING EQUIPMENT, G. W. Downes, Jr.

4. A METHOD OF FINDING THE VELOCITY OF A SUBMARINE BY USE OF THE DOPPLER EFFECT AND A NEW ATTACK DOCTRINE BASED ON KNOWLEDGE OF THE VELOCITY, T. H. Schafer

5. EFFECT OF DOPPLER ON ECHO DETECTION (COMMENTS ON BRITISH INTERNAL REPORT NO. 81–V258), C. Eckart

6. THE DOPPLER DOUBLER AND SQUARE-LAW AMPLIFICATION, W. A. Myers, NO. M48

7. DOPPLER DOUBLER AND SQUARE-LAW AMPLIFIER, W. A. Myers, V. G. McKenney, NO. U67

8. OPERATION, INSTALLATION AND ALIGNMENT INSTRUCTIONS FOR THE DOPPLER DOUBLER (AS APPLIED TO THE SUBMARINE SIGNAL COMPANY 755 RECEIVER AMPLIFIER), W. A. Myers, Lt. Comdr. J. C. Myers, V. G. McKenney, NO. U86

9. INVENTION REPORT NO. PC.4 sr-30 PAT 35–SIGNAL ENHANCER (DOPPLER DOUBLER), Comdr. J. C. Myers, BuShips, Navy Case NO. 3846, Application Serial NO. 500,781 filed

27 AUG 1941

22 SEPT 1941

24 OCT 1941

12 DEC 1941

14 JAN 1942

13 FEB 1942

2 MAY 1942

23 OCT 1942

8 DEC 1942

15 APRIL 1943

12 MAY 1943

4 SEPT 1943

8 OCT 1943

13 NOV 1943

14 NOV 1941

28 FEB 1942

31 MARCH 1942

23 MAY 1942

29 JULY 1942

1 APRIL 1943

20 MAY 1943

4 AUG 1943

1 SEPT 1943
(i) doppler enhancers—02.311.1

(ii) visual doppler indicator—02.311.2

(iii) own-doppler nullifier—02.311.3

(iv) reverberation suppression filter—02.311.4

(b) gain control systems—02.312

(c) maintenance of true bearing (mtb)—02.313

(d) bearing deviation indicator (bdi, formerly slc)—02.314


2. SPLIT BEAM DETECTION, F. N. D. Kurie 27 OCT 1941

3. THREE-CHANNEL BEARING AND RANGE DETERMINATION, F. N. D. Kurie 3 DEC. 1941

4. REPORT ON SPLIT BEAM WORK AT SAN DIEGO, F. N. D. Kurie 10 SEPT 1942

(e) console racks—02.315

(f) reverberation equalizer—02.316

1. A PROPOSED METHOD OF MINIMIZING REVERBERATION PICKUP IN THE QC ECHO-RANGING EQUIPMENT, C. A. Hisserich 8 DEC 1941

2. PROPOSAL FOR A CATHODE RAY INDICATOR FOR ECHO RANGING, G. W. Downs, Jr. 31 MAR 1942

3. SYSTEM FOR PROVIDING SELECTIVE RECEPTION OF VARIABLE FREQUENCY SIGNALS, G. W. Downs, Jr. 28 MAY 1942

4. A SUGGESTION FOR THE IMPROVEMENT OF THE RATIO OF ECHO SIGNAL TO REVERBERATION BY USING TWO FREQUENCIES, R. C. Fisher. 25 JUNE 1942

5. OBSERVATIONS OF ECHO SIGNALS OBTAINED USING VARIABLE FREQUENCY TRANSMISSIONS, E. M. McMillan 4 JULY 1942

6. PRELIMINARY REPORT ON REVERBERATION EQUALIZER, G. W. Downs, Jr. 4 JULY 1942

7. FREQUENCY MODULATION IN ECHO RANGING, C. Eckart 21 JULY 1942

8. REVERBERATION EQUALIZER, G. W. Downs, Jr. 3 DEC 1942

(This is a two-page report accompanied by one illustration, stating the particular plan of investigation of a proposed method of minimizing or equalizing reverberation. The report indicates the general type and form of equipment being constructed for use in the above mentioned investigation. This report is supplemented by two other reports on the same subject dated 27 February 1943 and July 1943. Issued as a Laboratory Report U97 on 18 September 1943.)

9. THE REVERBERATION EQUALIZER, G. W. Downs, Jr. 27 FEB 1943

(This is a two-page report supplementing a similar report of the same title dated December 3, 1942. It covers in a little more detail the actual techniques used and parameters chosen for the investigation made at San Diego. This report is still further supplemented by the report of the same name dated July 1943. Issued as a Laboratory Report U97 September 18, 1943.)

10. APPLICATION OF THE PRINCIPLES OF THE REVERBERATION EQUALIZER TO THE SLC, QC STACK, G. W. Downs, Jr. 25 MAR 1943
11. THE REVERBERATION EQUALIZER, G. W. Downs, Jr., NO. U97
   (This report supplements the preliminary material contained in the reports of the same name
dated December 3, 1942 and 27 February 1943. It is an eight-page report and contains eight
pages of illustrations. The text covers the tests made with this device and is in the form of a
final report.)

12. INVENTION REPORT NO. PC-4 Sr-30 PAT 24—ECHO-RANGING SYSTEM AND METHOD
    (REVERBERATION EQUALIZER), C. Eckart, G. W. Downs, Jr., OSRD Invention Dis-
closure NO. 636, Navy Case NO. 3912, Application Serial NO. 532,652 filed

(2) automatic target training—02.32

1. TWO POSSIBLE "BEARING KEEPERS" FOR DISCRETE SIGNAL PULSES OR "ECHOES."
   M. C. Henderson
   (An automatic hunting device including a scheme for holding contact with a target. Uses relays
and bow and stern cut-ons, range-gate and other devices. Never reduced to practice.)

(3) echo-ranging test equipment—02.33

1. MONITOR MICROPHONE AMPLIFIER, D. C. Kalbfell, NO. M77
   (a) sound gear monitor—02.331
   (b) split projector test unit—02.332
   (c) portable directional pattern tracer—02.333
   c. devices alert in all directions—02.40

1. NOTES ON FREQUENCY SCANNING I, W. V. Houston
2. SONIC IMPULSE METHOD OF SUBMARINE DETECTION LOCATOR, H. E. Hartig
3. A LONG-RANGE SUBMARINE DETECTION SCHEME, C. A. Hiserich
4. THE EFFECT OF SWEEPING THE FREQUENCY PAST A FILTER, C. Eckart
   19 SEPT 1941
   2 OCT 1941
   16 OCT 1941
   25 JULY 1942

(1) fm systems (non-scanning)—02.41

1. SUPERSONIC ECHOSCOPE DEVELOPMENT, K. S. Van Dyke
   (First memo; intended use, Brush tests.)
2. MODIFIED ECHOSCOPE TO DETERMINE THE DEPTH OF A SUBMARINE, D. C. Kalbfell
   (Path difference between direct ray and surface-reflected ray utilized.)
3. A POSSIBLE MODIFICATION OF THE ECHOSCOPE, H. M. Zanor
   (Multiple projectors and receivers, rotatable with angular lag.)
4. SOME BASIC CALCULATIONS ON ECHOSCOPE, K. S. Van Dyke
5. DOPPLER EFFECT AND ECHOSCOPE, A. M. Thorndike
   (First discussion of subject.)
6. ELIMINATION OF WATER NOISE IN SUPERSONIC SOUND RANGING BY APPLICATION
   OF FREQUENCY MODULATION, L. D. Statham
   (Makes point that "FM radio" differs from present Echoscope in its use of FM.)

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7. ECHOSCOPE PROGRESS REPORT, J. N. A. Hawkins
   (Progress, plans, equipment on hand, etc.)
   28 OCT 1941
8. THE ECHOSCOPE DEVELOPMENT, K. S. Van Dyke
   (Account of Brush demonstration of July 1941, and NDRC's own development to date.)
   5 NOV 1941
9. THE CHARACTERISTICS OF CERTAIN ECHOSCOPE SYSTEMS, D. C. Kalbfell
   (General discussion. Suggests sum as well as difference be used.)
   30 DEC 1941
10. ECHOSCOPE RANGING, F. C. Jones
    13 JAN 1942
11. ECHOSCOPE SCANNING, F. C. Jones
    14 JAN 1942
12. SAWTOOTH SWEPT OSCILLATOR TESTING BY MEANS OF MECHANICAL ECHO SIMULATION, C. A. Hisserich
    (Uses frequency division, followed by recording at 2700 ± cycles, and beating the frequency being recorded against the frequency one or two grooves behind. The beat frequency is constant if the oscillator is linear.)
    22 JAN 1942
13. A NEW ECHOSCOPE RECEIVING SYSTEM, F. C. Jones
    (Suggests fixed sawtooth and a frequency measuring device.)
    28 JAN 1942
14. SOME CONSIDERATIONS WHICH CONCERN THE CHOICE OF OPTIMUM VALUES OF THE ECHOSCOPE DESIGN CONSTANTS, H. P. Yockey
    29 JAN 1942
15. A DISCUSSION OF WHY THE ECHOSCOPE IS A DETECTION DEVICE ONLY, H. P. Yockey
    10 FEB 1942
16. THE DOPPLER EFFECT ON THE ECHOSCOPE, D. K. Froman
    (Mathematical treatment of time relations between echo, signal, and beat note.)
    24 MAR 1942
17. PROGRESS REPORT ON THE ECHOSCOPE, K. S. Van Dyke
    (Experimental. Results to date, plans and problems.)
    4 APRIL 1942
18. THE ECHOSCOPE—BI-MONTHLY REPORT, K. S. Van Dyke
    (Full description of the Echoscope and the Mason Prism.)
    24 APRIL 1942
19. PROGRESS REPORT ON MEASUREMENTS WITH THE ECHOSCOPE, M. C. Henderson
    (Use of device for measuring target and reverberation levels.)
    30 MAY 1942
20. STUDY OF TWO METHODS FOR IMPROVING THE CONSTANCY OF BEAT FREQUENCY IN THE ECHOSCOPE, R. C. Fisher
    (Applies to Bell Laboratory oscillator.)
    11 JUNE 1942
21. A PROPOSAL FOR IMPROVING THE RATIO OF SIGNAL TO "REVERBERATION" IN THE ECHOSCOPE, R. C. Fisher
    (A balance method: Reverberation at A vs. reverberation at B. Signal at A disturbs balance.)
    12 JUNE 1942
22. COBAR—MARK VII, C. G. McProud
    (Includes the Cobar or Echoscope, Principles and Practice, by M. C. Henderson. Full description of Cobar principles and complete circuit diagrams. Some experimental results.)
    15 SEPT 1942
23. THE COBAR OR ECHOSCOPE—PRINCIPLES AND PRACTICE, M. C. Henderson
    (Includes Cobar—Mark VII)
    15 SEPT 1942
24. FREQUENCY MODULATION GROUP, J. N. A. Hawkins
    (Report on personnel and problems.)
    7 OCT 1942
25. AN ANALYSIS OF SINGLE-FREQUENCY, MULTI-FREQUENCY, AND SAWTOOTH-FREQUENCY ECHO-RANGING SYSTEMS, C. A. Hisserich
    (Extensive discussion of properties of such system, sawtooth relations "lost time," scanning in azimuth and range, etc.)
    21 OCT 1942
26. NOTES ON OPERATING REQUIREMENTS OF FM ECHO-RANGING DETECTION SYSTEMS, J. N. A. Hawkins
    (A glossary of terms and short discussion of them.)
    25 NOV 1942
27. FREQUENCY MODULATION ECHO-RANGING SYSTEMS—COBAR, PRIBAR, SUBSIGHT, M. C. Henderson, NO. U12
    (This report deals with FM systems in general. It evaluates the properties (covering advantages as well as disadvantages) of this particular method of echo ranging. Theory underlying Cobar, Pribar and Subsight is presented with some indication of performance and expected results being made in the text, as well as by illustration. The report concludes with a brief treatment of Doppler effect on range accuracy. Treatment of this subject is only lightly mathematical.)
    30 DEC 1942
28. CURRENT DEVICES, INSTALLATIONS, PROGRAM OF MODIFICATION AND INVESTIGATION, M. C. Henderson

29. OUTLINE OF THE PROPOSED FAMPAS SYSTEM, C. A. Hisserich, NO. M30
   (This report presents a complete discussion of the Fampas system mentioned in the title. It
   associates the Fampas proposal as a modification of existing Cobor equipment and supports the
   discussion with photographs of the initial equipment used, and indications obtained by use
   of the equipment. This discussion is especially of interest in that it presents the first successful
   attempt at developing a PPI presentation of targets with an FM echo ranging system.)

30. A MULTI-CHANNEL ELECTRONIC SWITCH, S. Bertram, NO. U29
   (This report contains a discussion of an essentially new form of electronic switch. It is
   proposed that the form of switch under discussion is for more simple in design, as well as more
   versatile, than previous units. The discussion covers complete theory and design details and
   is supplemented with proposed circuit diagrams and a general mathematical treatment of the
   problem, of spectrum analysis as well as phase shift network design. This report was supple­
   mented by U29a, dated May 1, 1943.)

31. SUPPLEMENTARY NOTES ON A MULTI-CHANNEL ELECTRONIC SWITCH, S. Bertram,
   NO. U29a
   (Used in QIA (FM) Sonar.)

32. COHERENCE AND FLUCTUATION OF FM REVERBERATION, M. J. Sheehy, NO. A37

33. COHERENCE AND FLUCTUATION OF FM REVERBERATION, Sonar Data Division,
   NO. M395

1. SUPersonic Echoscope Development, K. S. Van Dyke
   (First memo: intended use, test results.)

2. MODIFIED ECHOSCOPE TO DETERMINE THE DEPTH OF A SUBMARINE, D. C. Kalbfell
   (Path difference between direct ray and surface-reflected ray utilized.)

3. DESCRIPTION OF THE ECHOSCOPE, D. C. Kalbfell
   (Circuit operation is described. The "Point Lorna" Model.)

4. NOTES ON FREQUENCY SCANNING, W. V. Houston
   (Response of a filter to a "sweep frequency.")

5. A POSSIBLE MODIFICATION OF THE ECHOSCOPE, H. M. Zenor
   (Multiple projectors and receivers, rotatable with angular lag.)

6. SOME BASIC CALCULATIONS ON ECHOSCOPE, K. S. Van Dyke
   1 OCT 1941

7. DOPPLER EFFECT AND ECHOSCOPE, A. M. Thorndike
   (First discussion of subject.)

8. ECHOSCOPE PROGRESS REPORT, J. N. A. Hawkins
   (Progress, plans, equipment on hand, etc.)

9. THE ECHOSCOPE DEVELOPMENT, K. S. Van Dyke
   (Account of Brush demonstration of July 1941, and NDRC's own development to date.)

10. ECHOSCOPE, J. N. A. Hawkins
    (Report of progress to date and comments.)

11. THE CHARACTERISTICS OF CERTAIN ECHOSCOPE SYSTEMS, D. C. Kalbfell
    (General discussion. Suggests sum as well as difference be used.)

12. ECHOSCOPE RANGING, F. C. Jones
    13 JAN 1942

13. ECHOSCOPE SCANNING, F. C. Jones
    14 JAN 1942

14. SOME NOTES ON THE PECULIAR BEHAVIOR OF FREQUENCY-MODULATED CONTINUOUS-TRANSMISSION ECHO-RANGING SYSTEMS, K. S. Van Dyke
    (Analyzes Kalbfell's suggestions.)

15. A NEW ECHOSCOPE RECEIVING SYSTEM, F. C. Jones
    (Suggests fixed sawtooth and a frequency measuring device.)

(a) cobar-02.411

18 AUG 1941

20 SEP 1941

1 OCT 1941

17 OCT 1941

28 OCT 1941

5 NOV 1941

2 DEC 1941

30 DEC 1941

13 JAN 1942

15 JAN 1942

28 JAN 1942
16. SOME CONSIDERATIONS WHICH CONCERN THE CHOICE OF OPTIMUM VALUES OF THE ECHOSCOPE DESIGN CONSTANTS, H. P. Yockey 29 JAN 1942
17. A DISCUSSION OF WHY THE ECHOSCOPE IS A DETECTION DEVICE ONLY, H. P. Yockey 10 FEB 1942
19. THE DOPPLER EFFECT ON THE ECHOSCOPE, D. K. Froman 24 MAR 1942
(Mathematical treatment of time relations between echo, signal, and beat note.)
20. PROGRESS REPORT ON THE ECHOSCOPE, K. S. Van Dyke 4 APRIL 1942
(Experimental; results to date, plans and problems.)
21. THE ECHOSCOPE—BI-MONTHLY REPORT, K. S. Van Dyke 24 APRIL 1942
(Full description of the Echoscope and the Mason Prism.)
22. PROGRESS REPORT ON MEASUREMENTS WITH THE ECHOSCOPE, M. C. Henderson 30 MAY 1942
(Use of device for measuring target and reverberation levels.)
23. STUDY OF TWO METHODS FOR IMPROVING THE CONSTANCY OF BEAT FREQUENCY IN THE ECHOSCOPE, R. C. Fisher 11 JUNE 1942
(Appplies to Bell Laboratory oscillator.)
24. COBAR—MARK VII, C. G. McProud 15 SEP 1942
(Includes the Cobar or Echoscope—Principles and Practice, by M. C. Henderson. Full description of Cobar principles and complete circuit diagrams. Some experimental results.)
25. STATEMENT RE COBAR, K. S. Van Dyke 15 SEP 1942
26. THE COBAR OR ECHOSCOPE—PRINCIPLES AND PRACTICE, M. C. Henderson 15 SEP 1942
(Includes Cobar—Mark VII, by C. G. McProud.)
27. MEASUREMENT PROGRAM OF COBAR GROUP, J. N. A. Hawkins 6 OCT 1942
28. FREQUENCY MODULATION GROUP, J. N. A. Hawkins 7 OCT 1942
(Report on personnel and problems.)
29. SEA TESTS OF COBAR WITH SUBMARINE FRIDAY, 9 OCTOBER 1942, M. C. Henderson 14 OCT 1942
30. USE OF FREQUENCY MODULATION IN ECHOSCOPE, A. M. Thorndike 25 OCT 1942
(Echoscope is not a true “FM” system.)
31. COBAR—MARK VIII, C. G. McProud 17 NOV 1942
(Circuit diagrams and details of operation.)
32. NOTES ON OPERATING REQUIREMENTS OF FM ECHO-RANGING DETECTION SYSTEMS, J. N. A. Hawkins 25 NOV 1942
(Largely definitions.)
33. AN ANALYSIS OF THE SINE SWEEP ECHOSCOPE, L. D. Statham 5 DEC 1942
(Properties of the sinusoid and sawtooth sweeps.)
34. CONFERENCE ON THE FM SYSTEMS PROGRAM AT SAN DIEGO JANUARY 13, 1943, G. P. Hornwell 13 JAN 1943
35. CURRENT DEVICES, INSTALLATIONS, PROGRAM OF MODIFICATION AND INVESTIGATION, M. C. Henderson 13 JAN 1943
36. FREQUENCY MODULATION SYSTEMS GROUP (CHARTS ON COBAR, SUBSIGHT), J. N. A. Hawkins 11 FEB 1943
(Chart showing characteristics (frequency, sweep rate, etc.) of various experimental systems.)
37. MINE DETECTION WITH COBAR DEVICES, M. C. Henderson, A. H. Roslon, NO. M115 2 AUG 1943
(First use of Cobar and Subsight to detect mines.)
38. MEASUREMENTS ON CRYSTAL TRANSDUCER GC2-1 NO. 590, C. J. Burbank, NO. C22 11 NOV 1943
39. INVENTION REPORT NO. PC-4 sr-30 PAT 21—SERVO MECHANISM (FOR COBAR), S. Bertram, OSRD Invention Disclosure NO. 403, Navy Case NO. 4650, Application Serial NO. 556,989 filed 3 OCT 1944

(b) pribar-02.412

1. THE DOPPLER EFFECT ON THE ‘MASON PRISM’ ECHOSCOPE, D. K. Froman 16 JUNE 1942
2. SUBMARINE DETECTION AS A PROBLEM IN SCANNING, A. M. Thorndike 22 OCT 1942

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1. EQUIPMENT SPECIFICATIONS, AUTO-TRAIN GEAR, J. N. A. Hawkins
2. SUBSIGHT, M. C. Henderson, NO. U12a
   (First description of range-rate compensation by Cobor devices.)
3. PLANE SPOTTING WITH SUBSIGHT, C. G. McProud
   (Report on finding a sunken airplane in Lake Mead.)
4. AIRPLANE LOCATION WITH SUBSIGHT, C. G. McProud, NO. M65
   (Report on finding a sunken airplane in Lake Mead.)
5. MINE DETECTION WITH COBAR DEVICES, M. C. Henderson, A. H. Rosson, NO. M115
   (First report of mine detection by FM systems.)
6. MEASUREMENTS ON CRYSTAL TRANSDUCER GB5-1 NO. 350, C. J. Burbank, NO. C16

(c) subsight–02.413

1. INVENTION REPORT NO. PC-4 sr-30 PAT 16–TIME VARYING GAIN DEVICE (FOR POLYSCOPE), E. M. McMillan, OSRD Invention Disclosure NO. 1058, Navy Case NO. 4060
2. INVENTION REPORT NO. PC-4 sr-30 PAT 17–MULTIPLE UNIT ECHO-RANGING SYSTEM (POLYSCOPE), E. M. McMillan, OSRD Invention Disclosure NO. 1056, Navy Case NO. 4049
3. PROPOSED INDICATING DEVICES TO BE USED ON THE MULTIPLE PROJECTOR, "POLYSCOPE," OR POLYJECTOR, OR DRAGON'S EYE, OR POLYPHONE, E. M. McMillan, M. C. Henderson
4. SPECIFICATIONS FOR POLYSCOPE EQUIPMENT, E. M. McMillan
5. POLYSCOPE REPORT, E. M. McMillan
6. EVALUATION OF POLYSCOPE AND SUGGESTED MODIFICATIONS, E. M. McMillan
7. THE POLYSCOPE ELECTRONIC SWITCH, E. M. McMillan

(2) polyscope–02.42

1. MEASUREMENTS ON CRYSTAL TRANSDUCER CP1-1 NO. 770, C. J. Burbank, NO. C1
20 SEP 1943
3. supersonic prism–02.43
4. magnetic tape compensator–02.44
5. scanning sonar systems–02.45
   (a) rotoscope (mr sonar)–02.451
   (b) cr sonar (capacity rotated)–02.452
   (c) er sonar (electronically rotated)–02.453
(d) qla equipment (fm sonar)—02.454

1. INVENTION REPORT NO. PC-4 sr-30 PAT 23—ECHO-RANGING STROBOSCOPE, R. C. Fisher, OSRD Invention Disclosure NO. 1060

2. INVENTION REPORT NO. PC-4 sr-30 PAT 89—FREQUENCY ANALYSIS SYSTEM (FOR QLA SONAR), S. Bertram

3. INVENTION REPORT NO. PC-4 sr-30 PAT 100—ACOUSTICALLY DIRECTED AND DETONATED ECHO REPEATER (ADDER), G. P. Hornwell, M. O. Kappler

4. INVENTION REPORT NO. PC-4 sr-30 PAT 114—ELECTRIC CONTROLLER, K. W. Wyckoff

5. FREQUENCY MODULATION ECHO-RANGING SYSTEMS—COBAR, PRIBAR, SUBSIGHT, M. C. Henderson, NO. U12

   (This report deals with FM systems in general. It evaluates the properties (covering advantages as well as disadvantages) of this particular method of echo ranging. Theory underlying Cobar, Pribar and Subsight is presented with some indication of performance and expected results being made in the text, as well as by illustration. The report concludes with a brief treatment of Doppler effect on range accuracy. Treatment of this subject is only lightly mathematical.)

6. INVENTION REPORT NO. PC-4 sr-30 PAT 80 (DEVELOPED UNDER SUBCONTRACT NO. 5)—RELAXATION OSCILLATOR (FOR FM SONAR), O. D. Engstrom—Western Electric Company, OSRD Invention Disclosure NO. 3903, Application Serial NO. 471,661 filed


8. OUTLINE OF THE PROPOSED FAMPAS SYSTEM, C. A. Hisserich, NO. M30

   (Finding a sunken plane in Lake Mead.)

9. SUBSIGHT, M. C. Henderson, NO. U12a

   (This report covers a particular adaptation of Cobar or FM equipment, known as Subsight. Subsight was proposed and constructed to serve as a fire control device for forward thrown projectors. The device was capable of automatically providing "velocity compensation" to the fire control problem without knowledge of the speed of the submarine target. The report deals with fundamental considerations of FM systems in general and covers theory of velocity Compensation. Treatment of the subject is only lightly mathematical.)

10. MECHANICAL TUNED ELEMENTS FOR FILTERING AND RANGE INDICATION IN A MULTI-CHANNEL COBAR, R. C. Fisher

   (This report consists of four pages of general discussion of the problem of spectrum analysis, bringing forth in a general discussion the amount of resolution possible when analyzing a particular spectrum within a specified time. The discussion associates the spectrum analysis problem with the particular application in mind at that time, which was Fampas (FM Sonar) range resolution and indication. Suggestion is made in the conclusion of this report as to proposed methods of Doppler multiplication of a given spectrum so that greater percentage accuracy or resolution could be obtained by ultimate analysis of that spectrum.)


12. AIRPLANE LOCATION WITH SUBSIGHT, C. G. McProud, NO. M65

   (Finding a sunken plane in Lake Mead.)

13. PROPOSED SYSTEM FOR THE RAPID FREQUENCY ANALYSIS OF AN AUDIO SPECTRUM, S. Bertram, NO. M54

   (This report covers a discussion of FM Sonar (Fampas-QLA) as a new form of echo-ranging gear and compares it briefly with QC echo-ranging equipment. It presents in a general manner, the fundamental FM concept as it is associated with a system to provide Plan Position Indication. Mentioned in the report are various tests which had been conducted, and photographs taken during some of these tests are included. Block diagram and schematic diagrams of FM Sonar Model 1, No. 3 are included in the report.)

14. FM SONAR, M. C. Henderson, C. A. Hisserich, NO. U95

   (This report discusses the influence of the Doppler effect upon the range indications of FM Sonar device and proposes methods for reducing these effects to the extent where advantages can be derived from them. The report contains discussion of a system known as Subsight, which eliminates own Doppler and which takes advantage of target Doppler to obtain fire control information. The discussion is only lightly mathematical.)

15. Doppler Effect in FM Sonar, M. C. Henderson, NO. U107

   (This is a one-page report briefly discussing the general arrangement and ability of FM Sonar (QLA). Attached to the report, there are ten photographs from an FM Sonar PPI screen. Also attached, is an artist's conception of an FM Sonar submarine installation.)

16. FM SONAR, F. N. D. Kurle

   (This report consists of four pages of general discussion of the problem of spectrum analysis, bringing forth in a general discussion the amount of resolution possible when analyzing a particular spectrum within a specified time. The discussion associates the spectrum analysis problem with the particular application in mind at that time, which was Fampas (FM Sonar) range resolution and indication. Suggestion is made in the conclusion of this report as to proposed methods of Doppler multiplication of a given spectrum so that greater percentage accuracy or resolution could be obtained by ultimate analysis of that spectrum.)
17. SPECIFICATIONS FOR AUXILIARY EQUIPMENT FOR MULTI-STRING LIGHT VALVE, F. N. D. Kurie

18. MEASUREMENTS ON CRYSTAL TRANSDUCER CP-1 NO. 942, C. J. Burbank, NO. C26

19. MEASUREMENTS ON CRYSTAL TRANSDUCER CP-1 NO. 1127, C. J. Burbank, NO. C27

20. PRELIMINARY MANUAL FM SONAR MODEL I INSTALLATION AND OPERATION (EXPERIMENTAL), M. C. Henderson, NO. R134


22. DOPPLER EFFECT IN FM SONAR, M. C. Henderson, NO. M184
   (This report supplements the UCDWR report No. U107 and contains an elaborate mathematical treatment of the subject of Doppler effect in FM Sonar.)

23. PRO-SUBMARINE CONFERENCE, 8 MARCH 1944, D. J. Evans

24. DEMONSTRATION OF FM SONAR AT NEW LONDON, C. A. Hisserich

25. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NO. 3, INSTALLATION, OPERATION AND MAINTENANCE, UCDWR, NO. R208

26. PRELIMINARY REPORT ON THE USE OF FM SONAR IN HARBOR NET PROTECTION, Sonar Devices Group, NO. SM201

27. PRESENT STATUS ON FM SONAR FOR SUBMARINES, F. N. D. Kurie

28. INVENTION REPORT NO. PC-4 sr-30 PAT 12—MULTI-CHANNEL ELECTRONIC SWITCH (FOR QLA SONAR), S. Bertram, OSRD Invention Disclosure No. 144, Navy Case NO. 3489, Application Serial NO. 532,915 filed

29. MEASUREMENTS ON CRYSTAL TRANSDUCERS CP10-1 NO. 1217 AND GA2-5 NO. 1692, Calibration Group, NO. C51

30. INVENTION REPORT NO. PC-4 sr-30 PAT 28—SAWTOOTH VOLTAGE GENERATOR, G. W. Downs, Jr., OSRD Invention Disclosure NO. 351, Navy Case NO. 3798, Application Serial NO. 516,967 filed

31. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NO. 5, M. C. Henderson, NO. R223

32. FM SONAR, INSTALLATION AND TRIALS OF, F. N. D. Kurie

33. INVENTION REPORT NO. PC-4 sr-30 PAT 27—LIGHT VALVE (FOR QLA SONAR INDICATOR), C. A. Hisserich, M. C. Henderson, K. K. Wyckoff, OSRD Invention Disclosure NO. 2156, Navy Case NO. 4444, Application Serial NO. 547,780 filed

34. REPORT ON MEDITERRANEAN FIELD SERVICE EXPEDITION OF J. W. Sampsell AND A. H. Roshon, A. H. Roshon

35. FM SONAR TRIP TO MEDITERRANEAN, A. H. Roshon

36. INVENTION REPORT NO. PC-4 sr-30 PAT 45—RADIAL SWEEP CIRCUIT (FOR QLA SONAR), S. Bertram, OSRD Invention Disclosure NO. 1250, Navy Case NO. 4563, Application Serial NO. 549,876 filed

37. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NO. S, UCDWR, NO. R223.1

38. INVENTION REPORT NO. PC-4 sr-30 PAT 46—MULTI-CHANNEL ELECTRONIC SWITCH (FOR QLA SONAR), S. Bertram, OSRD Invention Disclosure NO. 1249, Navy Case NO. 4444, Application Serial NO. 535,351 filed

39. FM SONAR, INSTALLATION AND TRIALS CF, M. C. Henderson

40. MEASUREMENTS ON CRYSTAL TRANSDUCER CQ4Z-2 NO. 1838 (B), Calibration Group, NO. C63

41. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NOS. 6-10, UCDWR, NO. R223.2

42. OBSERVATIONS MADE DURING 10 DAYS AT SEA WITH FM SONAR ON THE USS TINOSA (SS283), M. O. Kappler, NO. SM250

43. MULTI-STRING LIGHT VALVE, ELECTRICAL RESEARCH PRODUCTS DIVISION OF WESTERN ELECTRIC COMPANY, INC., UCDWR, NO. U276
   This report contains a reasonably complete discussion of the 100-string, light valve, analyzer. The report briefly covers the principles of FM Sonar (QLA) operation and associates the multi-string light valve with the problem of FM Sonar spectrum analysis. 23 illustrations are provided showing details of the mechanical and electrical design as well as graphs showing operating characteristics.

44. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NOS. 6-10, UCDWR, NO. R223.3

45. NOTES ON SHOOTING LIVE ACTION PORTION OF FM SONAR FILM, W. Hutton

46. PRODUCTION STATUS OF QLA TRAINING FILM, W. Hutton

47. MINER DETONATOR, M. O. Kappler
   (This is a single-page memorandum covering in brief discussion, the possibilities of a mine countermeasure device.)

48. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie

2 NOV 1943

19 NOV 1943

20 NOV 1943

1 DEC 1943

1 FEB 1944

8 FEB 1944

10 MAR 1944

11 MAR 1944

APRIL 1944

14 APRIL 1944

20 APRIL 1944

26 APRIL 1944

1 MAY 1944

23 MAY 1944

12 JUNE 1944

17 JULY 1944

2 AUG 1944

11 AUG 1944

12 AUG 1944

17 AUG 1944

15 SEPT 1944

22 SEPT 1944

19 OCT 1944

21 OCT 1944

1 NOV 1944

11 NOV 1944

25 NOV 1944

1 JAN 1945

19 FEB 1945

15 MAR 1945

10 APRIL 1945

23 APRIL 1945
49. CRITIQUE OF FM SONAR, T. F. Burke

(Written at the request of F. N. D. Kurie as the result of observations and tests of FM sonar, particularly aboard FLYING FISH. Contains opinions shared by most other observers and concludes: (1) Present FM Sonar is range-limited by reverberation in most conditions. (2) Increased output power would improve performance very little. (3) Improved crosstalk isolation might improve the character of the echoes, but would not increase limiting range very much. (4) Present range limitations can be overcome by increasing the number of channels and by decreasing the range depth scanned on each scale.)

50. PRELIMINARY INSTRUCTION BOOK FOR FM SONAR MODEL I NOS. 11-15, UCDWR, NO. R223.4

51. INVENTION REPORT NO. PC-4 sr-30 PAT 76—RECORDER (QLA INDICATOR), F. A. Jeswine, M. C. Henderson, K. K. Wyckoff, OSRD Invention Disclosure NO. 2681, Navy Case NO. 5208, Application Serial NO. 559,110 filed

52. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley

53. CONFERENCE—PRO-SUBMARINE DEVELOPMENTS, 2 OCTOBER 1945, R. O. Burns

54. STUDY OF REFRACTION EFFECT ON QLA RANGES, H. R. Gould, F. Boltzly, Jr.

(i) center bearing indication—02.455

1. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie

(ii) qla trainer—02.456


2. INVENTION REPORT NO. PC-4 sr-30 PAT 113—SIMULATOR FOR ECHO RANGING, S. Bertram

3. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie

4. PRELIMINARY INSTRUCTION MANUAL FM SONAR SIMULATOR AND OPERATOR TRAINER EXPERIMENTAL MODEL I, NO. 1, UCDWR, NO. M318

5. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley

6. QLA TRAINER; STATUS OF, W. W. Isenberg

d. depth determining echo-ranging gear—02.50

3. harbor defense systems (in general)—03.00

a. cable-connected hydrophones—03.10

b. harbor defense surveys—03.30

1. SEASONAL AND DIURNAL WATER-NOISE VARIATIONS, SAN FRANCISCO HARBOR ENTRANCE—SUPPLEMENT TO WATER-NOISE SURVEY, SAN FRANCISCO, F. A. Everest, R. W. Young

2. WATER BACKGROUND NOISE IN SAN DIEGO AREA, F. A. Everest, R. W. Young, G. P. Walch

3. METHOD FOR CALCULATING THE NUMBER OF HYDROPHONES NEEDED FOR LISTENING POSTS FOR HARBOR PROTECTION, R. W. Young

4. PROPOSALS FOR SAN FRANCISCO WATER-NOISE SURVEY, F. A. Everest

5. MEASUREMENTS OF HIGH VELOCITIES WITH A CURRENT METER, J. S. McNown

13 JUNE 1942

22 AUG 1942

22 OCT 1942

30 OCT 1942

4 NOV 1942

16 DEC 1941

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NOTES ON HARBOR SURVEY TECHNIQUE AS SUGGESTED BY THE EXPERIENCE GAINED AT SAN FRANCISCO DURING NOVEMBER 1942, F. A. Everest

SOUND SURVEY—SAN FRANCISCO HARBOR (NOVEMBER 1942), Listening Section, NO. S27

COMPREHENSIVE OUTLINE FOR HARBOR SURVEY REPORTS, UCDWR, NO. M36

SUPPLEMENT TO SOUND SURVEY—SAN FRANCISCO HARBOR (NOVEMBER 1942), Listening Section, NO. S27a

SOME AMBIENT WATER-NOISE MEASUREMENTS IN THE 13TH NAVAL DISTRICT, Listening Section, NO. M120

SOME AMBIENT WATER-NOISE MEASUREMENTS IN THE 14TH NAVAL DISTRICT, Listening Section, NO. M122

SOME SHALLOW-WATER SOUND-PROPAGATION MEASUREMENTS IN THE 13TH NAVAL DISTRICT, Oceanographic and Listening Sections, NO. M126

SUPPLEMENT TO SOME AMBIENT WATER-NOISE MEASUREMENTS IN THE 14TH NAVAL DISTRICT, Listening Section, NO. M122a

SOME SOUND-PROPAGATION MEASUREMENTS IN THE 14TH NAVAL DISTRICT, Listening and Oceanographic Sections, NO. M128

Phase-actuated locator—03.40

Applications of FM systems to harbor defense—03.50

Reduction of interference on magnetic detection loops—03.60

Listening techniques—04.00

Listening apparatus for patrol craft—04.10

Listening apparatus for submarines—04.20
5. radio-sonic buoys—05.00

a. expendable aircraft-launched type—05.30

(1) air sea rescue (raser)—05.32

1. USING THE EXPENDIBLE RADIO SONO BUOY IN AIRCRAFT RESCUE OPERATIONS BY SUBMARINES, J. M. Snodgrass 31 JAN 1945
2. PROGRESS REPORT ON THE EMPLOYMENT OF EXPENDIBLE RADIO SONO BUOYS IN AIR/SEA AND SURFACE RESCUE OPERATIONS, J. M. Snodgrass 4 OCT 1945
3. RASER INSTALLATION—TECHNICAL AND OPERATIONAL INSTRUCTIONS, ComDesPac 15 OCT 1945
4. PRELIMINARY INSTRUCTION BOOK FOR RASER (NAVSHIPS 900,614), J. M. Snodgrass, NO. M387 JAN 1946

6. miscellaneous acoustic devices—09.00

a. acoustic marine speedometer—09.10

b. echo-sounding equipment—09.20

(1) regenerative type—09.21

1. SILENT FATHOMETER, G. W. Downs, Jr., NO. SM98 28 AUG 1943
2. SILENT FATHOMETER, D. H. Ransom 20 DEC 1943
3. MASKING EFFECT OF WATER NOISE ON SHORT PULSES, R. C. Fisher, NO. S239 25 JULY 1944

(2) secure echo-sounding equipment (sese)—09.22

1. MINUTES ON CONFERENCE ON PRO-SUBMARINE DEVICES, F. N. D. Kurie 9 AUG 1943
2. FEEDBACK DEPTH SOUNDING SYSTEM, G. W. Downs, Jr. 9 NOV 1943
3. MEASUREMENTS ON CRYSTAL TRANSDUCER GD14-1 NO. 1137, C. J. Burbank, NO. C36(5) 30 DEC 1943
4. MEASUREMENTS ON THE SPIRAL MAGNETOSTRICTION TRANSDUCER, C. J. Burbank, NO. C39 12 JAN 1944
5. PRO-SUBMARINE CONFERENCE, 8 March 1944, D. J. Evans 10 MAR 1944
6. THE SECURE ECHO SOUNDER, F. N. D. Kurie 20 APRIL 1944
7. MASKING EFFECT OF WATER NOISE UPON SHORT PULSES, R. C. Fisher 5 JUNE 1944
8. PRELIMINARY INSTRUCTION BOOK FOR THE SECURE ECHO-SOUNDING EQUIPMENT, MODEL 2, INSTALLATION, OPERATION AND MAINTENANCE, D. H. Ransom, Jr., NO. S222 13 JUNE 1944
9. SECURE ECHO-SOUNDING EQUIPMENT, D. H. Ransom, Jr., NO. SM231 14 JUNE 1944
10. THE DESIGN AND ADJUSTMENT OF A REMOTE INDICATOR FOR SESE, R. C. Fisher 26 JUNE 1944
12. SECURE ECHO-SOUNDING EQUIPMENT, D. H. Ransom, Jr., NO. S257 15 SEPT 1944
15. PRELIMINARY INSTRUCTION BOOK FOR THE SECURE ECHO-SOUNDING EQUIPMENT, MODEL 2, INSTALLATION, OPERATION AND MAINTENANCE, L. A. Cartwright, Jr., NO. S222.1 11 OCT 1944
16. MEASUREMENTS ON CRYSTAL TRANSDUCERS GD16, Calibration Group, NO. C74 12 FEB 1945
17. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie 23 APRIL 1945
18. SECURE ECHO-SOUNDING EQUIPMENT (SESE), L. A. Cartwright, Jr., NO. S222.2 1 JUNE 1945
19. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley 28 SEPT 1945
20. CONFERENCE—PRO-SUBMARINE DEVELOPMENTS, 2 OCTOBER 1945, R. O. Burns 2 OCT 1945

C. Fiducial Signal Generator—09.30

1. FIDUCIAL SIGNAL GENERATOR OPERATING AND GENERAL INSTRUCTIONS, W. A. Myers 1 JAN 1943
2. PRELIMINARY REPORT ON DISPLACED FREQUENCY ECHO SIGNAL REPEATER, W. A. Myers 8 MAR 1943

D. Evasion Devices and Decoys—09.40

1. INVENTION REPORT NO. PC-4 sr-30 PAT 100, G. P. Harnwell, M. O. Kappler 22 JUNE 1942
2. TACTICAL USES FOR BEEPING TOM, D. K. Froman, A. M. Thorndike 17 SEPT 1942
3. USE OF ECHO REPEATERS AS DECOYS, E. M. McMillan 22 JULY 1943
4. ANTI-ECHO-RANGING AND ANTI-LISTENING PROGRAM, W. A. Myers 9 AUG 1943
5. MINUTES ON CONFERENCE ON PRO-SUBMARINE DEVICES, F. N. D. Kurie 6 DEC 1943
6. MEASUREMENTS ON MAGNETIC VIBRATOR TYPE TRANSDUCER MEF1-1 NO. 1136, C. J. Burbank, NO. C30(S) 15 JAN 1944
7. PRO-SUBMARINE DEVICES TO DATE, D. J. Evans 20 JAN 1944
8. BURGESS SEA CELL OPERATIONAL DATA, W. A. Myers, NO. M148 16 FEB 1944
9. MEASUREMENTS ON CRYSTAL TRANSDUCER CT1-1 NO. 945, C. J. Burbank, NO. C41 10 MAR 1944
10. PRO-SUBMARINE CONFERENCE, 8 MARCH 1944, D. J. Evans 17 MAR 1944
11. PRELIMINARY REPORT ON THE FACTORS INVOLVED IN THE DESIGN OF AN ECHO REPEATER TO SIMULATE A SUBMARINE, F. X. Byrnes 19 JUNE 1944
12. SOUND OUTPUT OF SIX-INCH NAD, T. McMillian, NO. A20 27 JUNE 1944
13. SPECTRAL ANALYSES OF 3- AND 10-INCH NAD, Listening Section, NO. A22 12 JULY 1944
15. STATUS OF PRO-SUBMARINE DEVELOPMENT WORK AT UCDWR, F. N. D. Kurie 28 SEPT 1945
16. PRO-SUBMARINE PROGRAM AT UCDWR, W. B. Beckley 2 OCT 1945
17. CONFERENCE—PRO-SUBMARINE DEVELOPMENTS, 2 OCTOBER 1945, R. O. Burns 2 OCT 1945
18. THE STATIONARY ECHO-REPEATER DECOY FOR SUBMARINE USE, F. X. Byrnes, C. W. Chattin, NO. SM396 28 FEB 1946
(1) anti-echo ranging-09.41

1. GAS PRODUCTION WITH MAGNESIUM AMALGAM, M. Silverman, NO. M106 25 SEPT 1943

(a) ejected echo-repeater type-09.411

1. EXPERIMENTAL SURFACE MODEL ECHO REPEATER, W. A. Myers, E. M. McKillan 20 JUNE 1942
3. THE STATIONARY ECHO-REPEATER DECOY FOR SUBMARINE USE, F. X. Byrnes, C. W. Chattin, NO. SM396 28 FEB 1946

(b) nac beacon-09.412

1. MEASUREMENTS ON SOUND BEACON, Calibration Group, NO. C49 22 APRIL 1944
(Report C49 gives the sound spectrum both in graphic and tabular form, as measured by a band pass filter 50 cycles wide. This beacon consists of a CY4 type transducer powered by a model 16B amplifier modified for fixed frequencies. The total unit is approximately 30 inches long and 3 inches in diameter.)
2. INVENTION REPORT NO. PC-4 sr-30 PAT 42-BUOYANCE CONTROL DEVICE, R. D. Atchley, OSRD Invention Disclosure NO. 1726, Navy Case NO. 4158, Application Serial NO. 533,895 filed
3. REPORT ON CONSTRUCTION OF A LOW FREQUENCY SOUND BEACON, B. F. Howell, Jr. 13 MAY 1944
4. MEASUREMENTS ON CRYSTAL TRANSDUCERS—TYPE CY4 NOS. 1225, 1226, 1237, 1654, Calibration Group, NO. C54 18 MAY 1944
5. NAC BEACON TESTS, D. J. Evans, V. G. McKenney, NO. SM215 19 MAY 1944
6. NAC BEACON TESTS IN THE 14TH NAVAL DISTRICT, V. G. McKenney, W. B. Beckley, NO. SM240 30 JUNE 1944
7. MEASUREMENTS ON CRYSTAL TRANSDUCERS—TYPE CY4 NO. 1777 THROUGH NO. 1781, Calibration Group, NO. C59 8 AUG 1944
8. INVENTION REPORT NO. PC-4 sr-30 PAT 60—UNDERWATER SOUND TRANSMITTER, V. G. McKenney 9 AUG 1944
9. CONTROLLED-FREQUENCY ECHO MASKER, V. G. McKenney 15 MAY 1945
10. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO) SAMPLE NO. 1 (CONTRACT Nxsr-60065) NAVY PROJECT HS-316, Calibration Group, NO. C62 4 OCT 1944
11. MEASUREMENTS ON CRYSTAL TRANSDUCER, TYPE CY4 (SECO) SAMPLE NO. 2, Calibration Group, NO. C70 28 DEC 1944
12. MANUFACTURING SPECIFICATIONS FOR MODEL NAC SOUND BEACON, UCDWR 1 MAR 1945
13. TEST ON WATER-ACTIVATED BATTERY BURGESS-TYPE 4-CC-167 SAMPLES NOS. 1 AND 2 (CONTRACT Nxsr-60065), W. L. Bryant, NO. M309 9 APRIL 1945
14. MEASUREMENTS ON CRYSTAL TRANSDUCER TYPE CY4 (SECO)—SAMPLES NOS. 3, 4, 5 (CONTRACT Nxsr-60065), Calibration Group, NO. C76 3 MAY 1945
15. MEASUREMENTS ON CRYSTAL TRANSDUCER TYPE CY4 (SECO)—SAMPLES NOS. 3A, 4A, 5A (CONTRACT Nxsr-60065), Calibration Group, NO. C77 10 MAY 1945
16. DESCRIPTION OF NAC BEACON, R. H. Bolt 21 MAY 1945
17. NAC BEACON, F. N. D. Kurie 6 JUNE 1945
18. ASDEVANT EVALUATION TESTS AT FORT LAUDERDALE, FLORIDA, JUNE 9, 1945 TO JUNE 16, 1945, K. E. Geren 29 JUNE 1945

(c) nah beacon-09.413

1. INVENTION REPORT NO. PC-4 sr-30 PAT 94—UNDERWATER SOUND TRANSMITTER, V. G. McKenney 19 MAY 1945
2. CONTROLLED-FREQUENCY ECHO MASKER, V. G. McKenney
(2) anti-listening—09.42

(a) mechanical noise makers—09.421

(b) electronic noise makers—09.422

(c) x-nag beacon—09.423

(3) towed fish—09.43

1. SONIC INTENSITY AT SOURCE DEPTH IN DEEP WATER, G. D. Camp 30 OCT 1943

(4) buoyancy control—09.44

1. GAS PRODUCTION WITH MAGNESIUM AMALGAM, M. Silverman, NO. M106 25 SEPT 1943
2. GAS PRODUCTION WITH MIXTURES OF MAGNESIUM AMALGAM AND CRYSTALLINE ACIDS ("BUBBLITE"), M. Silverman, W. B. Beckley, M. Kyle, NO. M133 12 NOV 1943
3. BUOYANCY CONTROL, R. D. Atchley, NO. M135 3 DEC 1943

(5) nad beacons—09.45

1. DIRECTIONAL CONTROL DEVICES, L. N. Schwien Engineering Company, UCDWR, NO. U266 24 OCT 1944
2. SUMMARY STATUS REPORT OF SELF-PROPELLED DECOYS, F. N. D. Kurie 13 NOV 1944
3. INSPECTION OF CRYSTAL TRANSDUCERS (10" BEACON), F. X. Byrnes 9 AUG 1945

(a) nad 3" beacons—09.451

1. INVENTION REPORT NO. PC-4, PAT 72—SUBMARINE DEVICE (NAD-3 SOUND BEACON), D. G. Reed, OSRD Invention Disclosure NO. 3389 2 NOV 1944
2. 3" NAD SONIC SIMULATOR DESCRIPTION AND OPERATION INSTRUCTIONS, F. N. D. Kurie

(b) nad 6" beacons—09.452

1. INVENTION REPORT NO. PC-4, PAT 36—NAD-6 SOUND BEACON, G. W. Downs, R. D. Atchley 23 JUNE 1945
2. NAD-6A SOUND BEACON, F. N. D. Kurie
3. PRELIMINARY INSTRUCTION MANUAL NAD-6A SOUND BEACON, Sonar Devices Group, NO. SM332 24 JULY 1945

(c) nad 10" beacons—09.453

1. INVENTION REPORT NO. PC-4, PAT 71—ARTIFICIAL UNDERWATER TARGET (NAD-10 SOUND BEACON), D. J. Evans, C. F. Bradley
2. MEASUREMENTS ON 10-INCH NAD BEACON, Calibration Group, NO. C73
   29 JAN 1945
3. NAD-10A SOUND BEACON, F. N. D. Kurie
   23 JUNE 1945
4. MEASUREMENTS ON CRYSTAL TRANSDUCERS-TYPE BG2, Calibration Group, NO. C79
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5. MEASUREMENTS ON CRYSTAL TRANSDUCERS-TYPE BF6, Calibration Group, NO. C80
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(d) nad 8" beacons--09.454

1. PROPOSED DESIGN FEATURES FOR THE NEW NAD-8 BEACONS, R. D. Atchley, NO. SM355
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(e) electronics--09.455

1. COMPLETION MEMO FOR THE BEACON ELECTRONIC DIVISION, C. F. Bradley
   30 OCT 1945

(6) 09.46

e. project "merchant"--09.50

f. depth charge direction indicator--09.60

g. naj beacon (pet)--09.70

h. nah beacon (model cxkk)--09.80

1. CONFERENCE—PRO-SUBMARINE DEVELOPMENTS, 2 OCTOBER 1945, R. O. Burns
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i. dtmb transducers--09.81

B. magnetic detection—10.00

1. detection from aircraft (mad)--11.00

1. COMMENTS ON TEMPORARY REPORT NO. 8 CONCERNING MAD EQUIPMENT MARK IV-B2, R. C. Fisher
   3 AUG 1942

C. visual detection accessory devices—20.00

1. optical transmission in sea water—21.00

1. OPTICAL ASPECTS OF SUBMARINE DETECTION, F. A. Jenkins
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2. VISIBILITY IN OCEAN WATER, F. A. Jenkins, I. S. Bowen, F. T. Rogers 18 OCT 1941
3. OPTICAL INVESTIGATIONS COMPLETED TO DECEMBER 10, 1941, F. A. Jenkins 10 DEC 1941

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2. flares—22.00

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2. UNDERWATER FLARE EXPERIMENTS, A. H. Rack 16 JULY 1942
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3. underwater photography—23.00

1. UNDERWATER PHOTOGRAPHY OF SHIP'S HULLS, F. A. Jenkins, B. T. Wright 5 OCT 1941
2. REPORT OF ACTIVITIES OF NDRC GROUP ON UNDERWATER PHOTOGRAPHY, DECEMBER 13, 1941—JANUARY 5, 1942, F. A. Jenkins 7 JAN 1942
3. PROGRESS REPORT ON UNDERWATER PHOTOGRAPHY, A. B. Wyse 26 JAN 1942
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4. underwater television—24.00

1. THE POSSIBILITY OF UNDERWATER TELEVISION AS A SUPPLEMENT TO UNDERWATER PHOTOGRAPHY, I. H. Tilles, A. B. Wyse 2 APRIL 1942

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A. large depth charges—40.00

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1. sinking rates—41.00

1. FREE FALL OF STREAMLINED BODIES IN WATER, R. G. Folsom, M. P. O'Brien 22 OCT 1941
2. studies of underwater explosions—42.00

3. fuzes—43.00

1. APPENDIX TO MEMO OF FEBRUARY 11, 1942, BY L. STATHAM, "AN ELECTRICAL PROXIMITY FUZE FOR ANTI-SUBMARINE BOMBS," W. R. Smythe

2. PRELIMINARY REPORT ON THE ELECTRICAL ANTI-SUBMARINE BOMB FUZE, L. D. Statham

3. AN ELECTRICAL PROXIMITY FUZE FOR ANTI-SUBMARINE BOMBS, L. D. Statham

4. ELECTRIC AND MAGNETIC PROXIMITY FUZES, C. Eckart

5. AN IMPROVED DESIGN OF AN ELECTRIC PROXIMITY FUZE, L. Statham, C. Eckart

6. PROGRESS REPORT ON ELECTRICAL CONTACT FUZES, L. D. Statham, C. Eckart, D. Baldwin

7. APPLICATION OF THE HISSERich FUZE, E. M. McMillan

8. A SUGGESTION FOR THE CONSTRUCTION OF A PROXIMITY FUZE BY MEANS OF ELECTRIC FIELDS, H. P. Yockey

9. HYDRAULIC MINE FUZE, R. D. Atchley, NO. M41

a. underwater acoustic proximity fuze (echo-ranging type)—43.10

1. A SOUND-OPERATED PROXIMITY FUZE, H. P. Yockey

23 FEB 1942

b. underwater acoustic proximity fuze (feedback type)—43.20

1. INVENTION REPORT NO. PC-4 0r-30 PAT 5—ACOUSTIC DETECTOR, C. A. Hisserich, D. G. Reed, OSRD Invention Disclosure NO. 83

2. AN UNDERWATER ACOUSTIC FEEDBACK PROXIMITY FUZE, C. A. Hisserich

3. PRELIMINARY EXPERIMENTS ON THE FEEDBACK PROXIMITY FUZE, A. M. Thorndike


5. THE FEEDBACK PROXIMITY FUZE, E. M. McMillan, D. G. Reed, D. W. Mathews

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1. PROXIMITY FUZES MAKING USE OF OPTICAL METHODS, I. S. Bowen, W. R. Smythe

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3. OPTICAL CONDITIONS RELATING TO OPTICAL PROXIMITY FUZE FOR DEPTH CHARGES, A. B. Wyse, B. T. Wright, F. T. Rogers, Jr.

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B. small streamlined charges—50.00

1. bombs—aircraft and side launched—51.00

a. contact fuzes—51.10

1. CONTACT FUZE FOR MARK 24 MINE, S. C. Boden

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2. AN INERTIA CONTACT BOMB FUZE FOR USE ON TARGETS ABOVE OR BELOW THE SURFACE OF THE WATER, R. D. Atchley, NO. M58

3 MAY 1943
b. magnetic fuzes—51.20

1. INVENTION REPORT NO. PC-4 sr-30 PAT 25—EXPLOSIVE BOMB FUZE, R. D. Atchley, OSRD Invention Disclosure NO. 337

2. ELECTRIC AND MAGNETIC PROXIMITY FUZES, C. Eckart

3. A MAGNETIC ANTI-SUBMARINE BOMB FUZE, L. D. Statham

4. A NEW TYPE OF BOMB FUZE, R. D. Atchley

5. MAGNETIC FUZE, L. D. Statham

6. REMARKS ON MEMORANDUM BY R. D. ATCHLEY, "A NEW TYPE OF BOMB FUZE," L. D. Statham

7. MAGNETIC FUZE, C. Eckart

8. THE MAGNETIC FLUX-CHANGE FUZE, L. D. Statham

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2. SONIC MINE USING DIFFERENTIAL DETECTION, J. N. A. Hawkins

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2. MEASUREMENTS ON CRYSTAL TRANSDUCER CS1-1 NO. 586, C. J. Burbank, NO. C2

3. MEASUREMENTS ON CRYSTAL TRANSDUCER CS2-1 NO. 593, C. J. Burbank, NO. C3

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1. EVASION OF ANTI-SUBMARINE ATTACK, A. M. Thorndike 10 DEC 1941
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3. REVISED SELECTION PROCEDURE FOR SONAR OPERATORS; A REPORT ON VALIDATING RESEARCH, A. Ford, S. W. Osgood, W. J. Giese, W. R. Thurlow, L. J. Cronbach, NO. U197  
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2. MEMORANDUM FOR THE NDRC C-4 COMMITTEE ON SELECTION AND TRAINING OF SOUND PERSONNEL REGARDING THE AUDITORY PROGRAM INSTITUTED BY LT. COMDR. C. W. SHILLING (MC) USN AT THE SUBMARINE BASE, NEW LONDON, CONNECTICUT, G. P. Harnwell  
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<td>MEMORANDUM ON THE SELECTION AND TRAINING OF SOUND OPERATORS, W. D. Neff</td>
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### 16. Memorandum on Selection of Elementary Sound Materiel Students; Some Problems and Some Results, R. L. French

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### 17. Interim Report by the UCDWR Psychological Group Working on the Selection and Training of Sound Operators, Selection and Training Group

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5. MEANS FOR ADDING QDA DEPTH-DETERMINING EQUIPMENT TO THE GROUP OPERATOR TRAINER, R. G. Hye
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(Preliminary report.)

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b. attack teacher azimuth grid (true bearing projector)—91.231

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appendix b  PATENT BIBLIOGRAPHY
As described in the body of this report (see Chapter Nine, Section D), UCDWR submitted Invention Reports from time to time. These reports, over 100 in number, included many types of ideas and suggestions, although the great majority were obviously concerned with the assigned work.

These reports, as of 1 April 1946, are listed below, together with information concerning the inventors, the project or file numbers with which they were associated, and the pertinent OSRD, Navy, and Patent Office designations, where these are known to UCDWR. For convenience, these same numbered reports are also listed in the bibliography of Appendix A, under their appropriate file numbers.

The sequence of numbers in the following list is complete except for Nos. 26, 32, 49, 61, 62, and 97, on which the files were closed by UCDWR, and Nos. 103, 108, and 115, relating to work still in progress at UCDWR on 1 April 1946.

### INVENTION REPORT NO. PC-4 sr-30 PAT 1
NON-INVERTING AMPLIFIER (TRAINING DEVICES)
GEORGE A. BRETTELL, JR.
FILE NOS. 91.20, 91.211
OSRD INVENTION DISCLOSURE NO. 80
NAVY CASE NO. 3433
APPLICATION, SERIAL NO. 511,626, FILED 24 NOVEMBER 1943

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MAGNETIC BOMB FUSE
LOUIS D. STATHAM
FILE NO. 51.20
OSRD INVENTION DISCLOSURE NO. 81
NAVY CASE NO. 4078
APPLICATION, SERIAL NO. 512,384, FILED 30 NOVEMBER 1943

### INVENTION REPORT NO. PC-4 sr-30 PAT 3
PRIMARY BEARING TEACHER
FIRTH PIERCE, GEORGE A. BRETTELL, JR.
FILE NO. 91.211
OSRD INVENTION DISCLOSURE NO. 82
NAVY CASE NO. 3427
APPLICATION, SERIAL NO. 555,144, FILED 21 SEPTEMBER 1944
(COMBINED WITH PAT 33)

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FLUXION METER
CHARLES A. HISSEIRICH
FILE NO. 02.30
OSRD INVENTION DISCLOSURE NO. 89
NAVY CASE NO. 3407
APPLICATION, SERIAL NO. 510,243, FILED 13 NOVEMBER 1943

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ACOUSTIC DETECTOR
CHARLES A. HISSEIRICH, DONALD G. REED
FILE NO. 45.20
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TRANSUDER SUSPENSION SYSTEM
GEORGE W. DOWNS, JR., LUDWIG W. SEPMEYER
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NAVY CASE NO. 3468
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ADVANCED BEARING TEACHER
HENRY E. HARTIG, FIRTH PIERCE, GEORGE A. BRETTELL, JR.
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INVENTION REPORT NO. PC-4 sr-30 PAT 8
ELECTRONIC SWITCH (FOR POLYSCOPE)
EDWIN M. McMILLAN
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APPLICATION, SERIAL NO. 519,317,
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TRANSDUCER CONSTRUCTION AND METHOD
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ECHO REPEATER (PRACTICE TARGET)
EDWIN M. McMILLAN, WILLIAM A. MYERS
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DIFFERENTIALLY SENSITIVE SONIC DETECTOR
(MINE FUZE)
JOHN N. A. HAWKINS
FILE NO. 40.00
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MULTI-CHANNEL ELECTRONIC SWITCH
(FOR QLA SONAR)
SIDNEY BERTRAM
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AGC FOR ECHO REPEATER
JOHN N. A. HAWKINS, WILLIAM A. MYERS
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FM ECHO-RANGING SYSTEM (COBAR)
KARL VAN DYKE
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UNDERWATER TRANSDUCER
DONALD E. ROSS
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TIME-VARYING GAIN DEVICE (FOR POLYSCOPE)
EDWIN M. McMILLAN
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MULTIPLE UNIT ECHO-RANGING SYSTEM (POLYSCOPE)
EDWIN M. McMILLAN
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RADIAL BEAM SWITCHING TUBE
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ALBERT R. CHAMPION
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OSRD INVENTION DISCLOSURE NO. 1057
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RESISTANCE THERMOMETER
GEORGE W. DOWNS, JR.
FILE NOS. 01.95, (E)
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SERVO MECHANISM (FOR COBAR)
SIDNEY BERTRAM
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APPLICATION, SERIAL NO. 556989, FILED 3 OCTOBER 1944

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DYNAMIC DISPLACEMENT METER
CLARE H. KEAN
FILE NOS. 01.21, (E)
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RAYMOND C. FISHER
FILE NO. 02.454
OSRD INVENTION DISCLOSURE NO. 1060
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ECHO-RANGING SYSTEM AND METHOD
(REVERBERATION EQUALIZER)
CARL H. ECKART, GEORGE W. DOWNS, JR.
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EXPLOSIVE BOMB FUZE
RAYMOND D. ATCHLEY
FILE NO. 51.20
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ATTACK TRAINING DEVICE (SASAT A)
FIRTH PIERCE, GEORGE A. BRETTELL, JR.,
MELVIN O. KAPPLER, CLARK F. BRADLEY
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SAWTOOTH VOLTAGE GENERATOR
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LIGHT VALVE (FOR QLA SONAR INDICATOR)
CHARLES A. HISSEIRICH, MALCOLM C. HENDERSON,
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OSRD INVENTION DISCLOSURE NO. 2136
NAVY CASE NO. 4444
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CALCULATOR (BEARING SPLITTER)
HENRY E. HARTIG
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NAVY CASE NO. 3835
APPLICATION, SERIAL NO. 501573, FILED 8 SEPTEMBER 1943

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SHIPBOARD TRAINING DEVICE (SASAT B)
FIRTH PIERCE, GEORGE A. BRETTELL, JR.
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OSRD INVENTION DISCLOSURE NO. 2479
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PRIMARY LISTENING TEACHER
FIRTH PIERCE, GEORGE A. BRETTELL, JR.
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ADMITTANCE NEUTRALIZING CIRCUIT
GEORGE W. DOWNS, JR.
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OSRD INVENTION DISCLOSURE NO. 1024
NAVY CASE NO. 4887
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SIGNAL ENHANCER (DOPPLER DOUBLER)
COMDR. J. C. MYERS, BUSHIPS
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APPLICATION, SERIAL NO. 500,781,
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NAD-6 SOUND BEACON
GEORGE W. DOWNS, JR., RAYMOND D. ATCHLEY
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BEARING DEVIATION INDICATOR
EDWIN M. Mc MILLAN, FRANZ N. D. KURIE,
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FILE NO. 02.314
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RADIUS OF CURVATURE METER
LUDWIG W. SEPMEYER
FILE NO. (E)
OSRD INVENTION DISCLOSURE NO. 927
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INVENTION REPORT NO. PC-4 sr-30 PAT 39

PERIOD METER
RAYMOND C. FISHER, WILLIS M. RAYTON
FILE NO. 01.41
OSRD INVENTION DISCLOSURE NO. 2054
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SLIDE RULE (FOR SASAT A)
GAYLORD P. HARNWELL
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ECHO-RANGING AND SOUNDING SYSTEM (SESE)
DAVID H. RANSOM, JR.
FILE NO. 09.22
OSRD INVENTION DISCLOSURE NO. 2939
NAVY CASE NO. 4633
APPLICATION, SERIAL NO. 536,451,
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BUOYANCY-CONTROL DEVICE
RAYMOND D. ATCHLEY
FILE NOS. 09.44, 09.412
OSRD INVENTION DISCLOSURE NO. 1726
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TORPEDO-CONTROL MEANS
CHARLES A. HISserICH
FILE NO. 60.00
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PRIMARY CONNING TEACHER
GAYLORD P. HARNWELL, WILLIAM E. STEPHENS
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OSRD INVENTION DISCLOSURE NO. 1070
NAVY CASE NO. 4052
APPLICATION, SERIAL NO. 511,130,
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RADIAL SWEEP CIRCUIT (FOR QLA SONAR)
SIDNEY BERTRAM
FILE NO. 02.454
OSRD INVENTION DISCLOSURE NO. 1250
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APPLICATION, SERIAL NO. 549,876,
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MULTI-CHANNEL ELECTRONIC SWITCH
(FOR QLA SONAR)
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ECHO-RANGING SYSTEM (QLA SONAR)
CHARLES A. HISserICH
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NAVY CASE NO. 4043
APPLICATION, SERIAL NO. 520,667,
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CRYSTAL AND METHOD
GEORGE A. ARGABRITE, T. FINLEY BURKE
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CABLE SPLICE
DONALD G. REED
FILE NO. 91.236, (E)
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NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 51

SOUND TARGET (PRACTICE TARGET-SRS)
DONALD G. REED
FILE NO. 91.236
OSRD INVENTION DISCLOSURE NO. 2094
NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 52

LISTENING TRAINING DEVICE (ADVANCED
LISTENING TEACHER)
GEORGE A. BRETTELL, JR., WALTER W. CARRUTHERS
FILE NO. 91.242

INVENTION REPORT NO. PC-4 sr-30 PAT 53

PATTERN RECORDER (FOR DEPTH-CHARGE TRAINING)
SIEGFRIED C. BADEN
FILE NO. 91.232
OSRD INVENTION DISCLOSURE NO. 1840
NOT TO BE FILED

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DECADE POTENTIOMETER
SIDNEY BERTRAM
FILE NO. (E)
OSRD INVENTION DISCLOSURE NO. 1985
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INVENTION REPORT NO. PC-4 sr-30 PAT 55

BALL COMPUTER CONSTRUCTION
DUNDRED D. EVERS
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SIMULATOR FOR BATTLE MANEUVERS
(CIC TACTICAL TRAINER)
FIRTH PIERCE, GEORGE A. BRETTELL, JR.
FILE NO. 91.262
OSRD INVENTION DISCLOSURE NO. 3927
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PERISCOPE TRAINING DEVICE
GAYLORD P. HARNWELL
FILE NO. 91.243
OSRD INVENTION DISCLOSURE NO. 2961

INVENTION REPORT NO. PC-4 sr-30 PAT 58

TRANSDUCER (FOR NAC SOUND BEACON)
RAYMOND D. ATCHLEY
FILE NO. 91.412
OSRD INVENTION DISCLOSURE NO. 2137
NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 59

PRESSURE-PROOF REPRODUCER (FOR SUBMARINE
BRIDGE)
WILLIAM A. MYERS
FILE NO. (E)
OSRD INVENTION DISCLOSURE NO. 2550
NAVY CASE NO. 4455
APPLICATION, SERIAL NO. 543,149,
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INVENTION REPORT NO. PC-4 sr-30 PAT 60

SOUND BEACON (NAC)
WILLIAM A. MYERS, VAUGHN G. MCKENNEY
FILE NO. 09.412
OSRD INVENTION DISCLOSURE NO. 2337
NAVY CASE NO. 4333
APPLICATION, SERIAL NO. 548,738,
FILED 9 AUGUST 1944

INVENTION REPORT NO. PC-4 sr-30 PAT 63

SOUND TARGET (10' HOLLOW SPHERE)
FRANZ N. D. KURIE, FIRTH PIERCE
FILE NO. 91.20
OSRD INVENTION DISCLOSURE NO. 2466

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INVENTION REPORT NO. PC-4 sr-30 PAT 64
DIFFERENTIAL ANALYZER
LEONARD I. SCHIFF
FILE NO. 01.92
OSRD INVENTION DISCLOSURE NO. 2560
NAVY CASE NO. 4457
APPLICATION, SERIAL NO. 550,470,
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ELECTRONIC CONTROLLER
JOHN L. LEONARD
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OSRD INVENTION DISCLOSURE NO. 3224
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INVENTION REPORT NO. PC-4 sr-30 PAT 66
ACOUSTIC IMPEDANCE ELEMENT (TRANSDUCER BACKING PLATE)
T. FINLEY BURKE
FILE NOS. 01.214, 01.22
OSRD INVENTION DISCLOSURE NO. 3902
NAVY CASE NO. 5368
APPLICATION, SERIAL NO. 599,740,
FILED 15 JUNE 1945

INVENTION REPORT NO. PC-4 sr-30 PAT 67
RECORDER (SOUND AND ECHO RECOGNITION GROUP TRAINERS)
FREDERICK W. CARTLAND
FILE NOS. 91.216, 91.246
OSRD INVENTION DISCLOSURE NO. 3907
NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 68
TOWED SOUND TARGET (PLASTIC COVERED TRIPLANE)
FRANZ N. D. KURIE
FILE NO. 66.00
OSRD INVENTION DISCLOSURE NO. 3307
NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 69
ELECTRONIC DEVIATION INDICATOR (BDI TRAINER)
GEORGE A. BRETTELL, JR., CLARK F. BRADLEY
FILE NO. 91.212.1
OSRD INVENTION DISCLOSURE NO. 3186
NAVY CASE NO. 4836
APPLICATION, SERIAL NO. 582,352,
FILED 12 MARCH 1945

INVENTION REPORT NO. PC-4 sr-30 PAT 70
PLOTTER (AUTOMATIC TARGET POSITIONER FOR DRT)
FIRTH PIERCE, GEORGE A. BRETTELL, JR.
FILE NOS. 85.00, 91.220.1
OSRD INVENTION DISCLOSURE NO. 3724
NAVY CASE NO. 5253
APPLICATION, SERIAL NO. 599,502,
FILED 14 JUNE 1945

INVENTION REPORT NO. PC-4 sr-30 PAT 71
ARTIFICIAL UNDERWATER TARGET (NAD-10 SOUND BEACON)
DAVID J. EVANS, CLARK F. BRADLEY
FILE NO. 09.453

INVENTION REPORT NO. PC-4 sr-30 PAT 72
SUBMARINE DEVICE (NAD-3 SOUND BEACON)
DONALD G. REED
FILE NO. 09.451
OSRD INVENTION DISCLOSURE NO. 3389

INVENTION REPORT NO. PC-4 sr-30 PAT 73
GROUP TRAINER FOR OPERATORS OF ER EQUIPMENT
R. GLENN NYE, GEORGE A. BRETTELL, JR., LAUREL T. APPLE
FILE NO. 91.213

INVENTION REPORT NO. PC-4 sr-30 PAT 74
TRAINING APPARATUS AND CONTROL DEVICE THEREFOR (BATHYTERMOMETER SIMULATOR)
HENRY E. HARTIG, GEORGE A. BRETTELL, JR.
FILE NO. 91.248
OSRD INVENTION DISCLOSURE NO. 3891
NAVY CASE NO. 5513
APPLICATION, SERIAL NO. 608,698,
FILED 3 AUGUST 1945

INVENTION REPORT NO. PC-4 sr-30 PAT 75
ELECTROMECHANICAL TRANSDUCER
GEORGE A. ARGABRITE
FILE NO. 01.22

INVENTION REPORT NO. PC-4 sr-30 PAT 76
RECORDER (GADS INDICATOR)
FRED A. JESWINE, MALCOLM C. HENDERSON, KENNETH K. WYCOFF
FILE NO. 02.454
OSRD INVENTION DISCLOSURE NO. 2681
NAVY CASE NO. 5208
APPLICATION, SERIAL NO. 559,110,
FILED 12 JUNE 1945
INVENTION REPORT NO. PC-4 sr-30 PAT 77
EXPENDIBLE SOUNDER
FRANZ N. D. KURIE, LOUIS A. CARTWRIGHT, JR.
FILE NO. 02.135

INVENTION REPORT NO. PC-4 sr-30 PAT 78
SUBMARINE BAROMETER SIMULATOR (ADJUNCT FOR ASKANIA TRAINER)
CHARLES A. HISSE RICH
FILE NO. 91.249
OSRD INVENTION DISCLOSURE NO. 3378
NOT TO BE FILED

INVENTION REPORT NO. PC-4 sr-30 PAT 79
RADAR SIMULATOR (FOR CIC TACTICAL TRAINER)
CHARLES A. HISSE RICH, GEORGE A. BRE TTELL, JR.
FILE NO. 91.262

INVENTION REPORT NO. PC-4 sr-30 PAT 80
DEVELOPED UNDER SUBCONTRACT NO. 8
RELAXATION OSCILLATOR (FOR FM SONAR)
O. D. ENGSTROM—WESTERN ELECTRIC COMPANY
FILE NO. 02.454
OSRD INVENTION DISCLOSURE NO. 3903
APPLICATION, SERIAL NO. 471,661,
FILED 8 JANUARY 1943

INVENTION REPORT NO. PC-4 sr-30 PAT 81
DEVELOPED UNDER SUBCONTRACT NO. 8
MULTIVIBRATOR (FOR FM SONAR)
O. D. ENGSTROM—WESTERN ELECTRIC COMPANY
FILE NO. 02.454
OSRD INVENTION DISCLOSURE NO. 3916
APPLICATION, SERIAL NO. 473,189,
FILED 22 JANUARY 1943

INVENTION REPORT NO. PC-4 sr-30 PAT 82
GROUP LISTENING TEACHER
WALTER W. CARRUTHERS
FILE NO. 91.247

INVENTION REPORT NO. PC-4 sr-30 PAT 83
SIMULATOR FOR SHIP MovEMENTS
ROBERT M. OLIVER
FILE NO. 91.239

INVENTION REPORT NO. PC-4 sr-30 PAT 84
RECOGNITION TRAINER (SOUND RECOGNITION GROUP TRAINER)
R. GLENN NYE, LAUREL T. APPLE
FILE NO. 91.246

INVENTION REPORT NO. PC-4 sr-30 PAT 85
HARMONIC COMPUTING MECHANISM
(BALL COMPUTER)
FIRTH PIERCE
FILE NO. 91.262

INVENTION REPORT NO. PC-4 sr-30 PAT 86
ELECTRIC SERVO SYSTEM (FOR AUTOMATIC TARGET POSITIONER)
GEORGE A. BRE TTELL, JR.
FILE NO. 85.00, 91.230.1

INVENTION REPORT NO. PC-4 sr-30 PAT 87
BOTTOM SCANNER
WILLIAM H. WILLIAMS, DAVID A. BALDWIN
FILE NO. 02.134

INVENTION REPORT NO. PC-4 sr-30 PAT 88
SMALL OBJECT DETECTOR
MELVIN E. CHUN, CHARLES E. MONGAN, JR.,
WILLIAM H. WILLIAMS
FILE NO. 02.131

INVENTION REPORT NO. PC-4 sr-30 PAT 89
FREQUENCY ANALYSIS SYSTEM (FOR QLA SONAR)
SIDNEY BERTRAM
FILE NO. 02.454

INVENTION REPORT NO. PC-4 sr-30 PAT 90
MINE ECHO REPEATER
LT. T. L. SCANLAND, USN
FILE NO. 91.236

INVENTION REPORT NO. PC-4 sr-30 PAT 91
RANGE-BEARING PLOTTER
HENRY E. HARTIG, COMDR. J. C. MYERS, USN
FILE NO. 80.00

INVENTION REPORT NO. PC-4 sr-30 PAT 92
CEMENTING PIEZOELECTRIC CRYSTALS TO RUBBER
FRED M. UBER
FILE NO. 01.214

INVENTION REPORT NO. PC-4 sr-30 PAT 93
TRANSDUCER CASE
DONALD E. ROSS
FILE NO. 01.22
INVENTION REPORT NO. PC-4 sr-30 PAT 94
UNDERWATER SOUND TRANSMITTER
VAUGHN G. McKENNEY
FILE NO. 09.413

INVENTION REPORT NO. PC-4 sr-30 PAT 95
SIMULATION OF UNDERWATER ECHO RANGING
SIDNEY BERTRAM, JOHN W. SAMPSELL,
ARTHUR H. ROHON, FREDERICK BALTZLY, JR.
FILE NO. 02.456

INVENTION REPORT NO. PC-4 sr-30 PAT 96
RANGE INDICATOR
CARLTON M. BEYER, ERNEST M. BOLZE
FILE NO. 91.246

INVENTION REPORT NO. PC-4 sr-30 PAT 98
LAMINATED ACOUSTIC WINDOW
EDWIN M. McMILLAN
FILE NO. 01.22

INVENTION REPORT NO. PC-4 sr-30 PAT 99
REINFORCED ACOUSTIC WINDOW
FRED M. UBER
FILE NO. 01.22

INVENTION REPORT NO. PC-4 sr-30 PAT 100
GAYLORD P. HARNWELL, MELVIN O. KAPPLER
FILE NO. 02.454, 09.40

INVENTION REPORT NO. PC-4 sr-30 PAT 101
MINE CONSTRUCTION
WILLIS M. RAYTON
FILE NO. 01.80

INVENTION REPORT NO. PC-4 sr-30 PAT 102
CALCULATOR
CARL ECKART
FILE NO. 01.72

INVENTION REPORT NO. PC-4 sr-30 PAT 104
BALL TYPE DIFFERENTIAL
FIRTH PIERCE
FILE NO. 91.235

INVENTION REPORT NO. PC-4 sr-30 PAT 105
IMPROVEMENTS IN POLAR DRIVES AND TAKE-OFFS FOR
HARMONIC BALL COMPUTERS
FIRTH PIERCE
FILE NO. 91.20

INVENTION REPORT NO. PC-4 sr-30 PAT 106
ECHO-RANGING SYSTEM
DAVID C. KALBFELL
FILE NO. 02.131

INVENTION REPORT NO. PC-4 sr-30 PAT 107
CAM SHIFTING CONTROL
EDWIN H. BIRDSALL
FILE NO. 91.247

INVENTION REPORT NO. PC-4 sr-30 PAT 109
ACOUSTISONDE
DAVID C. KALBFELL
FILE NO. (E)

INVENTION REPORT NO. PC-4 sr-30 PAT 110
ELECTRONIC INDICATOR
RICHARD A. MUELLER
FILE NO. 02.135

INVENTION REPORT NO. PC-4 sr-30 PAT 111
ECHO-RANGING SYSTEM
MELVIN E. CHUN
FILE NO. 02.131

INVENTION REPORT NO. PC-4 sr-30 PAT 112
DIRECTIONAL SOUND APPARATUS
MELVIN E. CHUN
FILE NO. 02.131

INVENTION REPORT NO. PC-4 sr-30 PAT 113
SIMULATOR FOR ECHO RANGING
SIDNEY BERTRAM
FILE NO. 02.456

INVENTION REPORT NO. PC-4 sr-30 PAT 114
ELECTRIC CONTROLLER
KENNETH K. WYCKOFF
FILE NO. 02.454