



**U. S. NAVAL SUBMARINE
MEDICAL CENTER**

Submarine Base, Groton, Conn.

SPECIAL REPORT NO. 67-4

S U M M A R I E S O F R E S E A R C H
R E P O R T E D O N D U R I N G

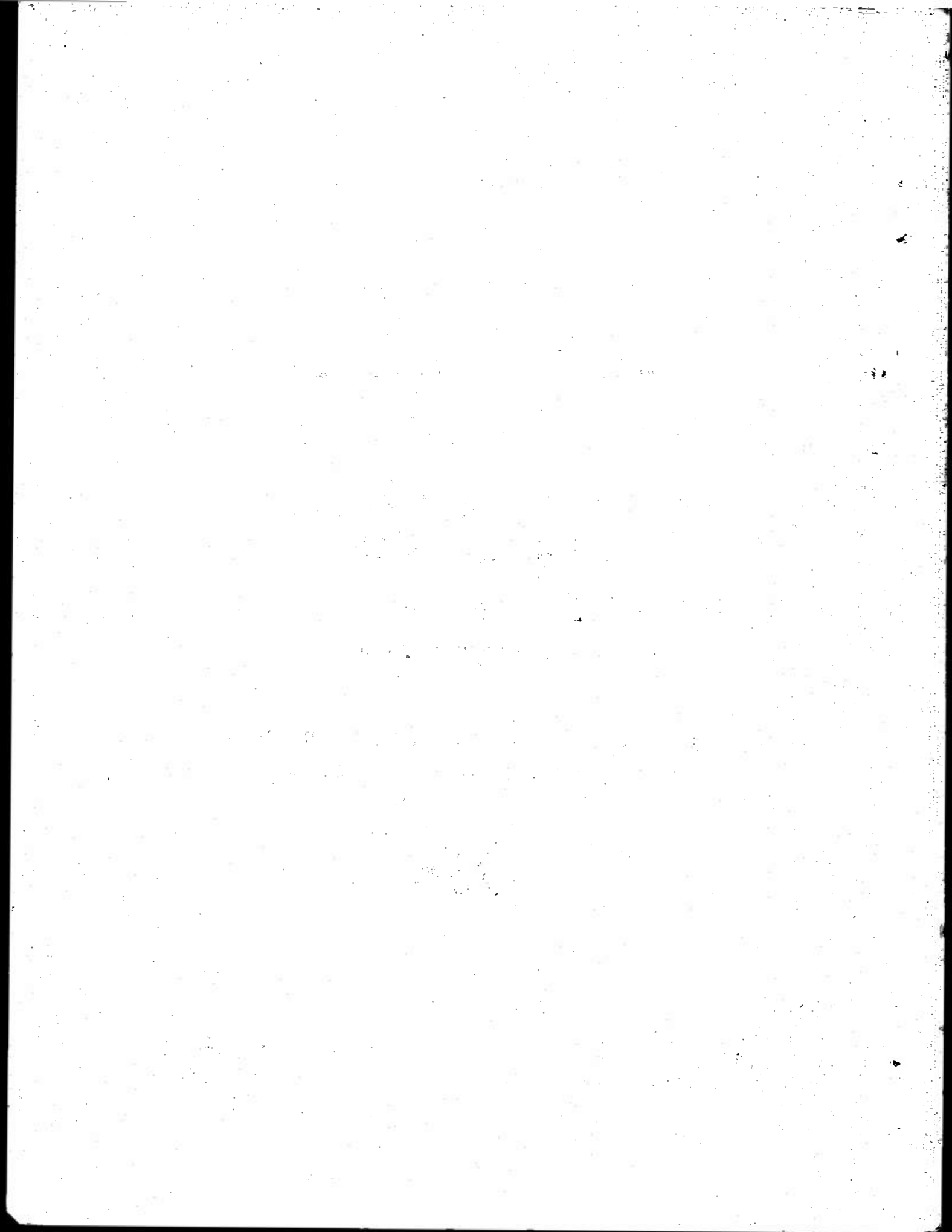
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15 February 1967





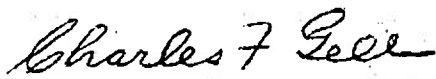
SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR

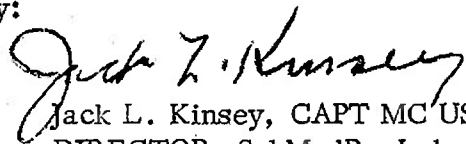
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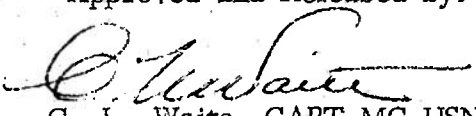
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15 February 1967

This publication presents a summary of each of the research reports published during the calendar year 1966 by the Submarine Medical Research Laboratory at the Submarine Medical Center, in that Laboratory's regular chronological series, and lists the title of the reports issued in the memorandum and special report series. Also included is a list of articles published by members of the Submarine Medical Research Laboratory's staff in scientific journals, books, and in the proceedings of scientific societies, during the same period. There follows a list of items which were "in press" at the end of the year.

Reprints are available for most of the material listed. Please address requests to: Commanding Officer, Naval Submarine Medical Center, Attn: Code 4, Box 600, Naval Submarine Base New London, Groton, Connecticut 06340.

ISSUED BY THE NAVAL SUBMARINE MEDICAL CENTER

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4	468	Blood Clotting Studies in a Submarine Crew, by LT Ganson Purcell, Jr., MC, USNR, MF022.03.03-9025.21, 21 January 1966 (Reprint from <u>Arch. Environ. Health</u> , Vol. 11, 804-809, December 1965).	3
5	469	Oxygen Breathing Effects Upon Night Vision Thresholds, by CDR Paul R. Kent, MSC USN, MF011.99-9002.03, 2 February 1966.	4
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7	471	Pure-Tone Acuity and the Intelligibility of Everyday Speech, by J. Donald Harris, MF022.03.03-9008.08, 8 February 1966 (Reprint from <u>J. Acoust. Soc. Am.</u> , Vol. 37, No. 5, 824-830, May 1965).	5

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9	473	Viral Disease Diagnosis Aboard Nuclear Submarines, by LT Robert N. Sawyer, MC USN, MF022.03.03-9025.24, 10 March 1966.	6
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11	475	Dissertation for Orientation of FBM Submarine Medical Officers, by CDR John Caruso, MC USN, MF022.03.03-9025.26, 14 March 1966.	8
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14	478	Adaptation to Breath-Hold Diving, by Karl E. Schaefer, MR005.14-3100-1.05, 20 May 1966 (Reprint from <u>Physiology of Breath-Hold Diving</u> , and the AMA of Japan, Publication 1341, 1965, NAS-NRC).	10
15	479	Effect of Wavelength and Bandwidth of Red Light on Recovery of Dark Adaptation, by Mary M. Connors, MF022.03.03-9019.10, 2 June 1966 (Reprint from <u>J. Opt. Soc. Am.</u> , Vol. <u>56</u> , No. 1, 111-115, January 1966).	10

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17	481	A Longitudinal Study of Acuity and Phoria Among Submariners, by Donald O. Weitzman, J.A.S. Kinney and A.P. Ryan, MF022.03.03-9019.11, 12 September 1966.	12
18	482	Periodontal Health of Submarine School Candidates: A Correlative Analysis, by CDR William R. Shiller, DC USN, MR005.19-6024.07, 30 September 1966 (Reprint from <u>J. Periodontology</u> , Vol. <u>37</u> , No.3, 224-229, May-June 1966).	12
19	483	Masked DL for Pitch Memory, by J. D. Harris, MF022.03.03-9007.21, 25 October 1966 (Reprint from <u>J. Acoust. Soc. Am.</u> , Vol. <u>40</u> , No. 1, 43-46, June 1966).	13
20	484	Signal Presentation Rate, Auditory Threshold, and Group Vigilance, by Richard L. Martz, MF022.03.03.9020.04, 26 October 1966 (Reprint from <u>Perceptual & Motor Skills</u> , <u>23</u> , 463-469, 1966).	13
21	485	Voice Communication Problems in Spacecraft and Underwater Operations, by Russell L. Sergeant, MF011.99-9001.09, 10 November 1966.	14
22	486	Variability of Respiratory Functions Based on Circadian Cycles, by Karl E. Schaefer and James H. Dougherty, Jr., MR005.04-0058.02, 22 November 1966 (NASA Order R-24).	15

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66-1	(U) Effects of Sonar Transmission on Underwater Divers: An Attempt to Establish Auditory Damage Risk Criteria for Exposure to AN/SQS-26, by Paul F. Smith and Paul G. Linaweaver, Jr., MF022.03.03-9015.07, 14 January 1966 (Contents <u>CONFIDENTIAL</u>).
66-2	Observations on the Use of Supra-Aural Muffs in Audiometry, by C. K. Myers, MF022.03.03-9008.07, 25 January 1966.
66-3	Bibliography of Biological and/or Biomedical Effects of LASER Radiation, by Grover A. Smithwick, LTJG MSC USNR, and Paul R. Kent, CDR MSC USN, MF005.08-5203-1.02, 26 January 1966.
66-4	Studies of Circadian Cycles in Human Subjects During Prolonged Isolation in a Constant Environment Using 8-Channel Telemetry Systems, MR005.14-3300-1.01, by Bruce R. Clegg and Karl E. Schaefer, 10 February 1966.
66-5	Cockroach Control on Submarines: Field Evaluation of Kepone Bait, MF022.03.03-9025.22, by Donald J. Maraist, LT MC USN, 4 February 1966.
66-6	Sound Survey Aboard YFNB-34, by Paul F. Smith, MF022.03.03-9015.08, 24 February 1966.
66-7	Human Factors Evaluation of the MK-66 Control Console (U), by George Moeller and Bernard L. Ryack, MF022.03.03-9014.03, 9 March 1966 (Contents <u>CONFIDENTIAL</u>).
66-8	Examination of Airborne Noise Levels from Prairie/Masker Installation on Board USS COBBLER (SS-344), by P. B. Hurley, MF022.03.03-9015.09, 14 March 1966.
66-9	SEALAB I: A Personal Documentary Account, by LCDR Robert E. Thompson, MC USN, MF011.99-9003.05, 29 March 1966.

* These are brief technical notes - titles are self-sufficient.

1966 SMRL MEMORANDUM REPORTS

SMRL No.	Title -- BuMed Work-Unit Number -- Author(s) -- Date
66-10	Oral Health of Operating Conventional Submarine Crews: Cross-Sectional Survey, by William R. Shiller, LCDR DC USN, MF022.03.03-9001.08, 7 April 1966.
66-11	Residual Nitrogen in Medical Officers Participating in Submarine Escape Training, by LT Lewis Terry, MC USNR, MR005.14-3100-1.07, 2 May 1966.
66-12	Exploratory Study of a Peer Nomination Technique with Officer Trainees in Basic Submarine School, by Rupert Hester and Joseph Auwood, MF022.03.03-9022.06, 27 May 1966.
66-13	Visual Requirement Failure by Candidates Reporting for Basic Submarine Training During 1965, by CDR Paul R. Kent, MSC USN, MF022.03.03-9018.06, 26 July 1966.
66-14	Management of Toothaches by a Medical Officer Aboard an FBM Submarine by LT Donald J. Jarzynski, MC USN, MF022.03.03-9001.06, 16 August 1966.
66-15	A Study of the Attrition Data for Basic Enlisted Submarine School in 1965, by LT Terence R. Collins, MC USN and LCDR Julio C. Rivera, MC USN, MF022.03.03-9021.15, 17 August 1966.
66-16	Frequency Shifts of a Whistle Blown in Different Gases, by Russell L. Sergeant, MF011.99-9001.07, 29 September 1966.
66-17	Underwater Hearing Threshold Measuring Set, by Paul F. Smith, MF011.99-9001.07, 2 November 1966.
66-18	Ten Point Weighting with the IBM-805 Test Scoring Machine, by James W. Parker and Joseph A. Auwood, MF022.03.03-9021.16, 8 December 1966.
66-19	Gingival Health and Oral Hygiene Aboard an FBM Submarine on Patrol, by LT William E. Powers, Jr., MC USNR, and CDR William R. Shiller, DC USN, MR005.19-6024.09, 21 December 1966.
66-20	Study of Progress of Enamel Caries in Teeth of Naval Personnel, by CDR William R. Shiller, DC USN and CAPT F.P. Scola, DC USN, MR005.19-6042.01, 23 December 1966.

SPECIAL REPORT SERIES (Not applicable to any one Work-Unit)

- SP-66-1 Operational Abstracts of Research Reports Published During the Period 1 July 1965 to 1 January 1966, Paul G. Linaweaver, Jr., CDR MC USN, 25 January 1966.
- SP-66-2 Vertigo Among Divers, by LT Lewis Terry, MC USN and LT Landon Dennison, 8 April 1966.
- SP-66-3 Operational Abstracts of Research Reports Published During the Period 1 January 1966 to 1 July 1966, CAPT Jack L. Kinsey, MC USN, 11 July 1966.
- SP-66-4 Fourth Quarter Progress Review for Submarine Medical Research Laboratory, by J. W. Kohl (ed.), 25 July 1966.
- SP-66-5 First Quarter Progress Review for Submarine Medical Research Laboratory, by J. W. Kohl (ed.), 25 October 1966.

SUBMARINE MEDICAL RESEARCH LABORATORY
SUBMARINE MEDICAL CENTER

SUMMARIES OF RESEARCH
1 9 6 6

<u>Work Unit No., SMRL No.</u>	<u>Title, Author(s), Branch of Origin and Date of Report</u>
MR005.14-3100-4 Report No. 1 (SMRL-465)	<u>STANDIVE, FORTRAN Solution of Decompression Tables</u> <u>George Moeller - Human Factors Branch - Jan 1966</u> <u>Abstract:</u> This report concerns a digital computer program for solution of decompression problems in stop-type dives. This computer program has been christened STANDIVE. It is capable of generating diving tables to meet the needs of practical diving situations. This system computes partial pressure for two components and total inert gas in each of nine tissues for each stop. The calculations may be completely specified by input to the computer, or the dive plan as well as the calculations may be generated by the computer. The reports describes the program through flow charts, sample outputs, a catalog of inputs, and description of program applications to date. A FORTRAN listing and program glossary are also provided.
MF022.03.03-9017 Report No. 1 (SMRL-466)	<u>Performance of the Farnsworth Lantern in the Field and at SMRL for the Period 1955-1965</u> <u>Helen M. Paulson - Human Factors Branch - Jan 1966</u> <u>Abstract:</u> The Farnsworth Lantern (FaLant) is a color vision test which was developed for Naval use by the late CDR Dean Farnsworth, USNR, when he was attached to the Medical Research Laboratory. The color vision test which was most commonly used by the Navy prior to the development of FaLant, a set of pseudo-isochromatic plates, was designed to pass normals and fail all color defectives, whereas the FaLant was designed to pass

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	normals and the mild color defectives and to fail the moderate, severe and dichromatic color defectives. Good color vision is required for acceptance to many Naval training schools, because upon completion of the training the man will be called upon to make critical color judgments as part of his Naval duties. When plates were used as the qualifying color vision test for acceptance to these schools, all color defectives - 10 per cent of the applicants - were rejected (when the plates were correctly administered). With the introduction of the FaLant as a qualifying test, 30 per cent of the color defective population is being salvaged. That is, the FaLant passes three of the ten men in 100 who are color defective, by rating them as safe for making accurate color judgments. The FaLant has been used at the Submarine Medical Research Laboratory for more than ten years, and also at various other Naval activities, such as hospitals, training schools, air stations, et cetera. This paper analyzes its performance at SMRL and in the field during this period. At SMRL the FaLant has rendered excellent service. Data are presented which show its test validity, its high test-retest reliability, the significant increase in error score with increase in degree of color defect, the correctness of its pass-fail cut-off point, et cetera. In the field, however, its performance has not been exemplary. The reasons for this are discussed, and six recommendations are made for improving its performance in the field.
MF022.03.03-9001 Report No. 4	<u>Aerodontalgia Under Hyperbaric Conditions (Oral Surgery, Oral Med., and Oral Path., Vol.20, No.5, 694-697, Nov 1965).</u>
(SMRL-467)	<u>William R. Shiller, CDR DC USN - Dental Research Br.</u> <u>Abstract:</u> This investigation was undertaken to determine to what extent aerodontalgia due to hyperbaric

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	conditions encountered as a part of routine requirement for entrance into the Basic Submarine School is a problem and whether experience gained in aviation dentistry would be applicable. Case histories of forty-five men who experienced aerodontalgia in these circumstances were analyzed. It was found highly probable that pressure involvement of the maxillary sinuses had a role in producing this pain in a large number of cases. Further studies are underway to clarify the role of other factors in producing this condition.
MF022.03.03-9025 Report No. 21 (SMRL-468)	<u>Blood Clotting Studies in a Submarine Crew (Arch. Environ. Health, Vol.II, 804-809, Dec 1965)</u> <u>Ganson Purcell, Jr., LT MC USNR - Jan 1966</u> <u>Abstract:</u> LT Purcell was the Medical Officer on the USS THEODORE ROOSEVELT (SSBN-600) at the time he made this study which concerns several phases of the mechanism of blood clotting. The investigation was carried out during a routine patrol cycle of this Polaris-type submarine. This situation provided a uniformity of environment, diet, and daily routine of work which gave the investigator a readily available and controllable population of healthy young subjects. A battery of five tests was employed to analyze the several phases of the blood clotting mechanism in ten normal volunteer subjects in serial fashion throughout the patrol. Results of all tests remained well within accepted normal limits throughout the pre-patrol and patrol segments of the testing period. Etiologies of acquired coagulation defects are discussed briefly; precautions to be taken to avoid such developments are presented, and reparative measures are outlined.

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	Proposal is made that a simple platelet screening test, the prothrombin time, and the partial thromboplastin time provide a means of anticipating the development of hemorrhagic diathesis postoperatively, should surgery aboard a nuclear submarine become a necessity.
MF011.99-9002 Report No. 3 (SMRL-469)	<u>Oxygen Breathing Effects Upon Night Vision Thresholds</u> <u>Paul R. Kent, CDR MSC USN - Vision Branch - Feb 1966</u> <u>Abstract:</u> A study was conducted to assess the effect of breathing oxygen (purity ranging 97.8-99%), at ambient (sea level), and at elevated pressures, upon both rod and night vision thresholds. Rod and cone night vision thresholds were measured while subjects were breathing oxygen at one atmosphere of pressure for periods of 140 minutes, and at 2.82 atmospheres for 20 minutes. The measuring device was a Hecht-Shlaer Adaptometer. One of five subjects showed elevated thresholds at one atmosphere, and two of four at 2.82 atmospheres. The previously reported sensitivity of rod and cone thresholds to blood sugar level was confirmed. The night vision thresholds of some subjects (6 of 8) were elevated by breathing through a mask-demand valve system, apart from the effect of the inhalant. Results are pertinent to diving and other operations where oxygen is used as an inhalant.
MF022.03.03-9014 Report No. 2 (SMRL-470)	<u>Human Factors Evaluation of MK-113 Fire Control System: I. System Description and Simulation (U)</u> <u>Bernard L. Ryack and Craig P. Chattin - Human Factors Branch - Feb 1966 - (CONTENTS CLASSIFIED)</u> <u>Abstract:</u> This report was prepared as part of a Weapon System Effectiveness Study. It is intended as an introduction to the facilities available for simulation of ASW exercises, the MK-113 Mod 2 Fire Control System, and

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the Weapons System Evaluation formula as developed by SubDevGroup TWO.

Its purpose is to provide the Human Factors Specialist with background information for a detailed systems analysis and for planning simulating exercises. Appended to this report is a section directing attention to the phases of the research program. (U)

MF022.03.03-9008
Report No. 8

Pure-Tone Acuity and the Intelligibility of Everyday Speech (J. Acoust. Soc. Am., Vol.37, No.5, 824-830, May 1965)

J. Donald Harris - Auditory Branch - February 1966

(SMRL-471)

Abstract: This study was conducted to determine the frequency region important for speech in military communication systems.

Discrimination scores were collected on 52 subjects, while speech was being distorted by having talkers wear nose clamps, by speeding up the speech, interrupting it, or using reverberations. When the mean scores from these distortions were averaged to create a condition assumed to represent everyday listening, the important acuities were found to be at 1,000, 2,000, and 3,000 cps. This is about an octave higher than the region usually used for computation, derived from studies of undistorted speech.

The results of this investigation point out: (1) The importance of computing hearing loss in decibels for speech averaging the pure-tone audiometric loss at 1, 2, and 3 kc/s; (2) The need for emphasizing the region 1-3 kc/s in assessing the frequency-response characteristics of a communications system; and (3) The importance of paying special attention to protecting hearing in this region in a hearing conservation program.

Work Unit No., SMRL No.	Title, Author(s), Branch of Origin and Date of Report
MF022.03.03-9025 Report No. 23 (SMRL-472)	<u>Near-Drowning: Its Pathophysiology and Treatment in Man, (Military Med., 131, No.1, 12-21, Jan 1966)</u> <u>George E. Griffin, LT MC USN - March 1966</u> <u>Abstract:</u> This study was conducted to evaluate existing reports on survivors of near-drowning and the clinical history and autopsy findings in individuals who died shortly after near-drowning, in order to develop a clear concept of the pathophysiology of near-drowning in humans and through these concepts to develop a rational basis for treatment. A distinct difference was found in the effects of submersion on humans from results observed with animals; the difference seems to be mostly quantitative rather than qualitative with respect to production of pulmonary, cardiac, volumetric, osmotic and electrolytic changes. The reaction of the human body to submersion is almost entirely on the basis of hypoxia, pulmonary edema, and aspiration. A course of treatment is outlined and attention is called to the necessity of keeping close watch over the near-drowning victim, especially during the first 24 hours of hospitalization. Sudden reversal of an apparently satisfactory clinical course is not uncommon. The information presented is valuable to all physicians, since anyone of them may be confronted at any time with a near-drowning emergency, --especially with the tremendous increase in water sports, pleasure boating, SCUBA diving, and the military uses of underwater swimmers, all of which can be expected to increase the number of potentially fatal drowning accidents.
MF022.03.03-9025 Report No. 24 (SMRL-473)	<u>Viral Disease Diagnosis Aboard Nuclear Submarines</u> <u>Robert N. Sawyer, LT MC USN - March 1966</u> <u>Abstract:</u> This report was prepared while Dr. Sawyer was Medical Officer of the Blue Crew of the USS SAM

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HOUSTON (SSBN-609). He discusses the need for, and the status of viral disease diagnosis aboard a nuclear-powered submarine.

Methods of diagnosis are briefly described, and the most practical method, serology, is described in detail.

The advantages and present state of development of another, faster diagnostic method, --the fluorescent antibody technique, are also described, and recommended for future use.

Nineteen pertinent references are presented, and an appendix outlines the collection of viral serology specimens, and lists methods, materials, and the address of a processing laboratory to which specimens may be shipped.

MF022.03.03-9025
Report No. 25

Viral Serology Antibody Survival Versus Storage
Temperatures Available Aboard Nuclear Submarines

Robert N. Sawyer, LT MC USN - March 1966

(SMRL-474)

Abstract: While serving as Medical Officer aboard a nuclear-powered submarine, Dr. Sawyer interested himself in the problem of viral disease diagnosis while on patrol. This report is closely related to SMRL Report No. 473, since it concerns the relative effects of three methods of storage upon viral serology titration values.

Three methods, --freezing, refrigeration, and storing at room temperature, are currently available aboard operational nuclear submarines.

Freezing and refrigeration were found to be equally effective in the storage of serology specimens, while storage at room temperature (even with the use of a preservative) was unsatisfactory.

The study proves that successful diagnostic viral studies are feasible under patrol conditions.

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MF022.03.03-9025 Report No. 26 (SMRL-475)	<u>Dissertation for Orientation of FBM Submarine Medical Officers</u> <u>John Caruso, CDR MC USN - March 1966</u> Abstract: This presentation of the environmental situation for a typical nuclear-powered submarine and its 144 man crew is intended to be of assistance to Naval medical officers newly assigned to such a submarine. It outlines and then treats in detail the responsibilities of the Medical Officer, --as advisor to the Captain in all medical matters, doctor to the crew, and Department Head and Administrator responsible for maintaining the health of the personnel of the ship, making appropriate inspections and making recommendations regarding health, hygiene and sanitation. The reports that are required of the medical officer are listed, and the medical officer's role in a medical training program is specified.
MF022.03.03-9019 Report No. 9 (SMRL-476)	<u>Visual Resolution Underwater</u> <u>Paul R. Kent, CDR MSC USN and Seymour Weissman</u> <u>Vision Branch - April 1966</u> Abstract: Visual efficiency in ordinary circumstances (in air) were compared with the ability to distinguish objects while underwater. These comparisons were made by using Landolt Ring targets and a self-luminous, water- and pressure-proof target mount. SCUBA diving masks were worn during the tests, both in water and in air. Comparisons were also made while viewing above and below surface targets through a periscope from a surface position. The subjects were divers. In both instances, visual resolution in clear water was better than in air at the same actual target distance, when apparent luminances were equated for the two conditions. In most cases the improvement while wearing the SCUBA mask fell below predictions based

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on the magnification of the target image underwater. This result was ascribed to fogging of the mask underwater, and the lack of sufficiently small targets for some observers.

The difference in resolution between air and underwater viewing through the periscope was less than predicted by theory.

The results are applicable to an evaluation of the visual standards for diving personnel. They should also be useful wherever it is necessary to know the range of object sizes, or parts thereof, that can be identified underwater.

MR005.14-3002.10
Report No. 2

A Light Scattering Technique for Measuring Protein Concentration (Analytical Biochemistry, Vol.14, No.2, February 1966)

Donald V. Tappan - Physiology Branch - April 1966

(SMRL-477)

Abstract: This report describes a precipitation process involving measurement of scattered light for determining concentrations of proteins in solution.

The process is especially useful where the samples to be studied are small, --not large enough for some of the standard processes usually employed. An example is described which uses a commercial fluorometer without modification for assay of individual samples, and with a very minor modification, for flowing samples.

The process described is suitable for measuring very low protein levels from any of a wide variety of biological materials. It can also be used in conjunction with gel filtration chromatography for estimation of molecular size.

The technique is simple, requiring a minimum number of easily obtainable reagents and uses instruments commonly available in most laboratories.

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MR005.14-3100-1 Report No. 5 (SMRL-478)	<u>Adaptation to Breath-Hold Diving (Physiol. of Breath-Hold Diving and the AMA of Japan, Pub.1341, 1965 NAS-NRC)</u> <u>Karl E. Schaefer - Physiology Branch - May 1966</u> <u>Abstract:</u> This report concerns long-range studies of instructors at the Submarine Escape Training Tank at the U.S. Naval Submarine Base, Groton, Connecticut, to determine the adaptation to breath-hold diving which might take place during their tour of duty at the Training Tank. It was found that (1) The total lung-capacity increased and the residual volume decreased, resulting in a larger ratio of total lung capacity to residual volume and anatomical dead space. Due to these changes in lung volumes, the instructors increased their maximal attainable depth from 87 feet to 112 feet; (2) The instructors also developed a larger tolerance to increased carbon dioxide and lowered oxygen (this form of adaptation is similar to that of diving animals); (3) Blood pressure response to mecholyl injections in divers as compared with laboratory personnel was found to be significantly smaller, suggesting an increased resistance to stress.
MF022.03.03-9019 Report No. 10 (SMRL-479)	<u>Effect of Wavelength and Bandwidth of Red Light on Recovery of Dark Adaptation (J. Opt. Soc. Am., Vol. 56, No.1, 111-115, January 1966)</u> <u>Mary M. Connors - Vision Branch - June 1966</u> <u>Abstract:</u> "Red" Lighting, or light that looks red to the eye may consist of widely different physical energy distributions. This study was a systematic determination of the effects of two variations in physical energy, the wavelength and the bandwidth, on the recovery of dark adaptation. Increasing the wavelength of the red light out to about 640 mμ increased the speed of subsequent dark adaptation;

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no further advantages were gained beyond that point. Recovery times following a red-orange light of 595 mμ are often double that of deep red light, 640 mμ and above.

The data show both the physical characteristics of the light energy that may be manipulated safely and those that may be detrimental to night vision. Ships whose "red" lighting tends to have an orange quality are losing the advantage that deep red light provides in dark adaptation.

MF011.99-9001
Report No. 6

The Effect of Frequency Passband Upon the Intelligibility of Helium Speech in Noise

Russell L. Sergeant - Auditory Branch - Aug 1966

(SMRL-480)

Abstract: This report concerns a study of the changes in the intelligibility of human speech caused by altering the frequency passband of speech spoken while breathing a mixture of helium and oxygen (80% He, 20% O₂), in an attempt to locate that passband most suited to the reception of helium-speech.

A variety of passband filters were investigated, using 16 groups of 20 listeners. Results indicate that while intelligibility did not suffer appreciably when frequencies of 300 cps and below were eliminated, the loss of frequencies in the area from 600 down to 300 cps caused a marked deterioration. However, 38 per cent intelligibility was possible, even with the severe filtering restrictions of a 600-1200 cps bandpass and a 1-db speech/noise ratio. Apparently, the intelligibility of speech in a helium mixture, as in air, is quite distortion-resistant. The estimated frequency at which high- and low-pass filtering would have equal effects on intelligibility was lower than 1000 cycles/second, in contrast to approximately 1600 cps for speech in air.

No condition of filtering increased intelligibility over the no-filter condition.

Work Unit No., SMRL No.	Title, Author(s), Branch of Origin and Date of Report
MF022.03.03-9019 Report No. 11 (SMRL-481)	<u>A Longitudinal Study of Acuity and Phoria Among Submariners</u> <u>Donald O. Weitzman, J.A.S. Kinney, and A.P. Ryan</u> <u>Vision Branch - September 1966</u> <u>Abstract:</u> In 1951 a group of 1,064 submariners were given a battery of visual tests in order to assess the visual characteristics of the population at that time. A sample (51) of the original group was recently re-tested on the same battery of tests in order to assess the long-term effects (if any) of submarine duty on vision. It was found that certain changes have taken place over the 15-year interval, most notably a loss of visual acuity, at both near and far distances and a tendency toward esophoria. While some decrement in vision is expected as a function of age, these changes are larger than that predicted for men of their age level. The suggestion has been made previously that the confining nature of the submarine with the constant requirement for accommodation and convergence might cause a visual impairment. This possibility, and other conceivable influences, will be evaluated in further longitudinal studies of submariners and non-submariners. Preventive measures will also be assessed.
MR005.19-6024 Report No. 8 (SMRL-482)	<u>Periodontal Health of Submarine School Candidates: A Correlative Analysis (Journal of Periodontology, Vol.37, No.3, 224-229, May-June 1966)</u> <u>William R. Shiller, DC USN - Dental Branch - Sept 1966</u> <u>Abstract:</u> A study was completed among candidates for the Submarine Service to evaluate the prevalence of and the factors associated with periodontal disease. The prospective submariner was found to be in a rather good state of oral health when compared with the average Naval recruit. However, much improvement is

Work Unit No., SMRL No.	Title, Author(s), Branch of Origin and Date of Report
	to be desired in the oral hygiene practices (i.e. tooth-brushing habits) of this group. The amount of debris on the teeth was found to be closely related to the presence of periodontal disease. Improvement of oral hygiene is felt to be particularly important to the submariner who spends relatively long periods away from professional dental care, --as for example, men on Polaris patrols. Hygiene practices were also found to be closely related to personality types. While this finding is considered to be of limited practical importance, it does demonstrate the importance of the psychological test in evaluating the whole man, and that dental conditions are not to be considered separately from the whole man.
MF022.03.03-9007 Report No. 21	<u>Masked DL for Pitch Memory (Journal of the Acoustical Society of America, Vol.40, No. 1, 43-46, July 1966</u>
(SMRL-483)	<u>J. Donald Harris - Auditory Branch - October 1966</u> <u>Abstract:</u> This paper concerns human sensitivity to frequency changes of pure tones in a noise background. Frequencies from 125 to 2000 cycles per second (cps) were placed from 45-60 decibels (db) over threshold in quiet, and the noise level fixed so that Recognition Differential equalled Zero with 45 db tones. It was found that the measure of differential sensitivity improved from 125 through 2000 cps, both in favorable and unfavorable signal-to-noise ratios, but noise is especially deleterious at the lower frequencies. The number of distinguishable pitches between 125 and 2000 cps is 548 for tones in quiet, but is reduced to 170 for tones 5 db above the Zero Recognition Differential.
MF022.03.03-9020 Report No. 4	<u>Signal Presentation Rate, Auditory Threshold, and Group Vigilance (Perceptual and Motor Skills, 23, 463-469, 1966)</u> <u>Richard L. Martz - Auditory Branch - October 1966</u>

Work Unit No.,

SMRL No.

Title, Author(s), Branch of Origin and Date of Report

(SMRL-484)

Abstract: In an effort to determine the effect of signal presentation rate on vigilance, auditory thresholds were obtained during the course of a single two-hour vigilance session from eight groups of rated and non-rated Navy enlisted men (11-14 in each group), when exposed to one of four signal rates: one per hour, 2.5 per hour, 7.5 per hour, or 15 per hour. Subjects in each group were tested at the same time, in a dark unlighted, noise-homogeneous room, in close physical (and possibly tactile and vibratory) proximity, but without visual or acoustic interaction. Each subject wore earphones and pressed a microswitch to report single tones in trains of 12 successive tones ranging in 2-db steps from roughly 14 db below to 10 db above the average subject's threshold.

Results showed: (1) A positively accelerated linear relation between auditory detection and log signal rate; (2) Decrements of one to ten db occurring early in the first half of the watch in all groups (and virtually all subjects) at all signal rates; and (3) Large individual differences permitting an arbitrary, significant separation of 'better' and 'poorer' performers.

MF011.99-9001

Report No. 9

Voice Communication Problems in Spacecraft and Underwater Operations

Russell L. Sergeant - Auditory Branch - Nov 1966

(SMRL-485)

Abstract: Various problems in voice communication systems found in operations underwater and in outer space are considered. Since the production of speech is basic to these problems, the major part of the article is devoted to factors affecting vocal production. Examples are given of special problems which arise when the voice communication situation involves highly restrictive environmental factors such as those encountered by deep sea divers, swimmers, and personnel within under-the-sea habitats or space capsules.

Work Unit No., SMRL No.	Title, Author(s), Branch of Origin and Date of Report
	In addition to the effects of speech on varying ambient pressures, changes to the voice caused by different gas mixtures are described. Several ways of making helium-speech more intelligible and natural-sounding are presented with their advantages and disadvantages. Problems associated with the electronic link between the talker and listener are discussed. In addition to revised calibration techniques, there are problems of waterproofing, size and weight restrictions, and pressure proofing of components which must be solved. The effectiveness of communication systems can be increased by proper circuit discipline, training to speak clearly, and the utilization of vocabularies specific to the immediate operation. The need for improved coordination among behavioral and engineering efforts to solve problems of communication in space and underwater environments is emphasized.
MR005.04-0058 Report No. 2	<u>Variability of Respiratory Functions Based on Circadian Cycles (Joint Report with NASA, Order R-24)</u> <u>Karl E. Schaefer and James H. Dougherty, Jr.</u> <u>Physiology Branch - November 1966</u>
(SMRL-486)	<u>Abstract:</u> No systematic study of circadian cycles of lung functions has been reported in the literature in which influences were rigidly controlled. Accordingly such a study was undertaken at this Laboratory. Vital capacity, inspiratory capacity, expiratory reserve volume, maximum expiratory flow rate and maximum inspiratory flow rate were measured four times daily at four-hour intervals in two subjects during a control period, during nine days of isolation in a constant environment, and during a three-day recovery period. Temperature was kept at $27^{\circ}\text{C} \pm .1$, barometric pressure $30.560 \pm .004$ inches.

Work Unit No.,

SMRL No.

Title, Author(s), Branch of Origin and Date of Report

All the lung functions measured showed circadian cycles which shifted during the isolation period in the same direction as the sleep-wakefulness cycles, but at a somewhat different rate. Periodicities were determined with a computer analysis, using a cross-correlation technique with a synthesized 24-hour sinusoid. Average daily variability of lung functions based on circadian cycles ranged from $5.6 \pm 1.7\%$ for vital capacity to $20.3 \pm 10.4\%$ for maximum inspiratory flow rate.

ARTICLES IN PRESS AS OF 31 DECEMBER 1966

- Hester, R. Come Mathematical and Methodological Implications
of Wilder's Law of Initial Values,
Psychophysiology
- Inman, E.E. Personality Assessment thru Utilization of Response
Set,
J. General Psychology
- Jacey, M. and Regulation of Plasma LDH in Chronic Respiratory
Schaefer, K.E. Acidosis,
Am. J. Physiology
- Johnson, J. A Step Test of Motivation to Excel,
Aerospace Medicine
- Kinney, J.A.S. Color Induction Using Asynchronous Flashes,
Vision Research
- Kinney, J.A.S.
et al Visibility of Colors Underwater
J. Optical Soc. of America
- Klagsbrun, S.C. In Search of an Identity
Arch. Neurol. Psychiat.
- Laxar, K. Performance of Farnsworth Lantern Test as Related
to Type and Degree of Color Vision Defect,
Military Medicine
- Linaweaver, P.G. Toxic Marine Life,
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- Luria, S.M. Color-Name as a Function of Stimulus Intensity
and Duration,
Am. J. Psychology
- Luria, S.M. and Relationship between Static and Dynamic Stereoscopic
Weissman, S. Acuity,
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ARTICLES IN PRESS AS OF 31 DECEMBER 1966 (Cont'd)

- Martz, R. Auditory Vigilance as Affected by Signal Rate and
Inter-Signal Interval Validity,
Perceptual & Motor Skills
- Mazzone, W.F. Saturation-Excursion Dives Breathing Air: Effect
et al on Lactic Dehydrogenase Activity,
Science
- Satloff, A. Psychiatry and the Nuclear Submarine,
Am. J. Psychiatry
- Rivera, J.C. History of Training in Submarine Medicine,
Military Medicine
- Schaefer, K. with Breathing Under High Ambient Pressure,
Lord & Bond J. Applied Physiology
- Scola, F.P. and Clinical Evaluation of SnF₂ in Naval Personnel,
Ostrom, C.A. J. Am. Dental Assoc.
- Sergeant, R.L. Phonemic Analysis of Consonants in Helium Speech,
Speech Monographs
- Shiller, W.R. Dental Caries Increments Evaluated by Use of Bite-
Wing Roentgenograms,
Military Medicine
- Smithwick, G.A. Use of Ferric Choline Citrate in the Prevention
et al of Iron-Deficiency Anemia in Baby Pigs,
Am. J. Vet. Research
- Tappan, D.V. Simple Method for Manipulation of and Repeated
Sampling from Dialysis Bags,
Analytical Biochemistry
- Terry, L. Atypical Case of Stevens-Johnson Sundrome,
New England J. Medicine

ARTICLES IN PRESS AS OF 31 DECEMBER 1966 (Cont'd)

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|------------------------------------|--|
| Waite, C.L.
et al | Cerebral Air Embolism,
<u>Proceedings of the Third Underwater
Physiol. Symposium</u> |
| Weitzman, D. and
Kinney, J.A.S. | Appearance of Color for Small, Brief Spectral Stimuli
in the Central Fovea,
<u>J. Optical Soc. Am.</u> |

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

- Dougherty, James H., Jr., "Pulmonary Function During Saturation-Excursion Dives Breathing Air", Fourth International Biometeorological Congress, 31 August 1966, Douglass College, Rutgers University, Brunswick, N. J.
- Greenwood, Michael, "SEALAB II", Charlotte Engineers' Club, Charlotte, N.C., 6 February 1966
- Greenwood, Michael, "SEALAB II", Reserve Training Group, Brookhaven, L.I., N.Y., 20 July 1966
- Greenwood, Michael, "SEALAB II", Westerly Rotary Club, Haversham Inn, Westerly, R.I.
- Greenwood, Michael, "Decompression and Underwater Diving", New London Lions Club, New London, Conn., 16 August 1966.
- Greenwood, Michael, "SEALAB Projects I and II", Eastern Connecticut Branch of Society of Technical Writers and Publishers, Holiday Inn, Groton, Conn., 20 October 1966.
- Greenwood, Michael, "Philosophy and Future of Saturation Diving, --with Special Emphasis on Saturation Diving as a Valuable Oceanographic Tool or Technique", Oceanography and Oceanology Symposium, New York City, 17 November 1966.
- Greenwood, Michael, "SEALAB II", Commerce Club of Norwich, Norwich, Connecticut, 24 October 1966
- Harris, J. Donald, "Activity of the Middle Ear Muscles", Narragansett Chapter, Acoustical Society of America, Narragansett, R.I., 30 March 1966.
- Harris, J. Donald, "Primary Auditory Abilities", University of Conn., Department of Speech, 9 December 1966.

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

Harris, J. Donald	"International Standards in Audiometry", Am. Speech and Hearing Association, Washington, D.C., 20 November 1966.
Inman, E.E., LCDR MSC USN	"Operation HIDEOUT", U.S.C.G. Academy, New London, Connecticut, 22 November 1966.
Johnson, Jimmie, LT MSC USN	"Relationships Between Human Factors Studies in Submarines and in Aviation", Aviation Psychology Conf., Aerospace Med. Inst., Pensacola, Florida, 13 January 1966.
Johnson, Jimmie, LT MSC USN	"A Step Test of Motivation to Excel", Aerospace Med. Association, Las Vegas, Nevada, 21 April 1966.
Kent, Paul R., CDR MSC USN	"A Rationale of Visual Standards for Military Personnel", Congress of American Optometric Association, Boston, Massachusetts, 21 June 1966.
Kent, Paul R., CDR MSC USN	Panelist, Laser Safety Conference, Orlando, Florida, 18-20 May 1966.
Kinney, Jo Ann S.	"Induced Colors Seen by Deuteranopes", The Psychonomic Society, St. Louis, Missouri, 29 October 1966.
Kinsey, Jack L., CAPT MC USN	"History of Submarine Medicine", University of Indiana Medical School, Indianapolis, Indiana, 21 December 1966.
Kinsey, Jack L., CAPT MC USN	"Undersea Research Program Management", Jet Propulsion Laboratory, Calif. Tech., Pasadena, California
Larsen, Reynold T. LT MC USN	"SEALAB Project", Central Illinois Chapter of Ill. Soc. of Professional Engineers, Decatur, Illinois, 22 February 1966.

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

Larsen, Reynold T. LT MC USN	"Medical Aspects of Deep Sea Diving and Living on The Continental Shelf", Third Symposium of Underwater Physiology, Washington, D.C., 23-25 March 1966.
Larsen, Reynold, T. LT MC USN	"The Man-in-the-Sea Program", Annual Meeting N.L. Subsect., Inst. of Elec. & Electronic Engineers, Connecticut Yankee Motor Inn, East Lyme, Connecticut, 27 May 1966.
Linaweaver, Paul G. CDR MC USN	"Toxic Marine Life", Military Surgeons Meeting, Washington, D.C., 8 November 1966.
Luria, Saul M.	"A Comparison of Visual Masking by Stationary and Moving Stimuli", Eastern Psychological Association, New York, N.Y., 14-16 April 1966.
Parker, James W.	"Problems in Measuring Performance in Unusual Environments", Fourth Annual Workshop in Biolog. Sciences, Naval Training Center, Great Lakes, Illinois, 4 October 1966.
Schaefer, Karl E.	"The Breaking Point of Breath-Holding During Dives to 90-Foot Depth", American Physiolog. Soc., Federation Meetings, Atlantic City, N.J., 12 April 1966.
Schaefer, Karl E.	"Circadian Cycles During Isolation: Effect of Physical Activity and Chronic Hypercapnia", Meeting of Aerospace Medical Association, Las Vegas, Nevada, 19 April 1966.
Schaefer, Karl E.	"Metabolic Effects During Prolonged Exposure to High Pressure Environments", Fourth International Biometeorological Congress, Rutgers University, New Jersey, 31 August 1966.

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

Scola, Francis P., CAPT DC USN	"Preventive Dentistry in Naval Personnel", Dental Society Meeting, Submarine Base, Groton, Connecticut, 24 February 1966.
Scola, Francis P., CAPT DC USN	"Clinical Evaluation of Stannous Fluoride in Naval Personnel", Preventive Dentistry Symposium, Hdq. Cruiser-Destroyer Force, U.S. Naval Base, Newport, Rhode Island, 18 May 1966.
Scola, Francis P., CAPT DC USN	"Stannous Fluoride Cariostasis in Naval Personnel", Combined Cecil and Hartford Counties Dental Society, Bainbridge, Maryland, 22 September 1966.
Scola, Francis P., CAPT DC USN	"Symposium on Current Dental Health Preventive Procedures, N.H. Dental Soc. and N.H. Bur. of Dental Public Health, Melvin Village, N.H., 18 October 1966.
Scola, Francis P., CAPT DC USN	"Clinical Evaluation of Stannous Fluoride Cariostasis in Naval Personnel", Greater N.Y. Dental Meeting, New York City, 5 December 1966.
Sergeant, Russell L.	"Voice Communication Problems in Spacecraft and Underwater Operations", Conf. on Sound Production in Man, N.Y. Academy of Sciences, New York City, 9 November 1966.
Shiller, William R. CDR DC USN	"Oral Health of Operating Submarine Crews: A Cross-Sectional Survey", International Assoc. for Dental Research, Miami, Florida, 27 March 1966.
Shiller, William R. CDR DC USN	"Treatment of Enamel Caries on Posterior Inter- proximal Surfaces", Naval Submarine Base Dental Clinic, Groton, Connecticut, 1 September 1966.
Shiller, William R. CDR DC USN	"Salivary Research", Society of New London County Dental Assistants, New London, Connecticut, 27 September 1966.

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

Shiller, William R. CDR DC USN	"Training Submarine Medical Officers to Treat Dental Problems", American Dental Association Meeting, Dallas, Texas, 16 November 1966.
Waite, Charles L. CAPT MC USN	"Man-in-the-Sea Program: Deep Submergence and Underwater Habitats", Society of Military Engineers, Newport, Rhode Island, 19 January 1966.
Waite, Charles L. CAPT MC USN	"Navy Medical Underwater Research", 68th Annual Meeting L.I. Physicians Association, Brooklyn, New York, 29 January 1966.
Waite, Charles L. CAPT MC USN	"Physiology of Diving", Bellevue Hospital Medical Group, Yale Club, New York City, 2 February 1966.
Waite, Charles L. CAPT MC USN	"Man-in-the-Sea, SEALAB, and Hyperbaric Medicine, Naval Medical School, Bethesda, Maryland, 18 March 1966.
Waite, Charles L. CAPT MC USN	"Cerebral Air Embolism", 3rd Underwater Physiology Symposium, Washington, D.C., 24 March 1966.
Waite, Charles L. CAPT MC USN	"Medical Aspects of SEALAB and the Role of the Submarine Medical Center and Its Personnel in This Project", Willimantic Rotary Club, Willimantic, Connecticut, 17 May 1966.
Waite, Charles L. CAPT MC USN	"Submarine and Diving Medicine", Staff of Charles Pfizer Co., Groton, Connecticut, 1 June 1966.
Waite, Charles L. CAPT MC USN	"Medical Aspects of Man-in-the-Sea", Nassau County Surgical Society, St. Albans, L.I., New York, 7 June 1966.
Waite, Charles L. CAPT MC USN	"Aspects of Navy Medicine", Commencement Address, Waterbury Hospital School of Nursing, Waterbury, Connecticut, 12 June 1966.

PAPERS READ BEFORE SCIENTIFIC SOCIETIES AND LECTURES GIVEN
TO VARIOUS GROUPS DURING 1966

Waite, Charles L. CAPT MC USN	"Medical Aspects of Ocean Engineering", Mass. Institute of Technology, Cambridge, Mass., 28 July 1966. Full day's Seminar.
Waite, Charles L. CAPT MC USN	"Underwater Medical Research in the Navy", L.I. North Shore Branch, Assoc. of Univ. Women, Manhasset, L.I., New York, 28 November 1966.
Weybrew, Benjamin B.	"Selection and Recruitment of Scientific Personnel", American Psychological Association, New York, September 1966.

PUBLICATIONS BY STAFF MEMBERS: (Other Than Those Designated
as Regular SMRL Reports) - During 1966

- | | |
|--|---|
| Earls, J.H.
and R. Hester | Tattooed Sailors: Some Sociophysiological Correlates, <u>Military Medicine</u> , 132, No. 1, December 1966. |
| Kent, Paul R.
CDR MSC USN | Vision Underwater, <u>Am. J. Optom. & Arch. Am. Acad. Optom.</u> , 43, 553-565, September 1966. |
| Luria, Saul M. | Color Vision, <u>Physics Today</u> , 19, 34-41, March 1966. |
| Ryack, B.L., Luria,
S.M., Inman, E.E.,
and Johnson, J.H. | Weapons Systems Effectiveness Committee Report No. 1, January 1966. - |
| Scola, Francis P.
CAPT DC USN | Clinical Evaluation of Stannous Fluoride When Used as a Constituent of a Compatible Prophylactic Paste, as a Topical Solution, and in a Dentifrice, in Naval Personnel: I. Report of Findings after First Year, <u>J.Am.Dental Assoc.</u> , 73, 1306-1311, Dec. 1966. |
| Weybrew, Benjamin B. | Patterns of Psychophysiological Response To Military Stress, in Appley, M.H. & Trumbull, R. (Eds) <u>Psychological Stress: Issues in Research</u> , Appleton-Century-Crofts, 1966. |
| Weybrew, Benjamin B. | The Effectiveness of Navy Incentive Programs: Some Methodological Considerations and Preliminary Findings, <u>Inst. of Naval Studies Research Report</u> , No. 15, March 1966. |
| Weybrew, Benjamin B. | An Analysis of Some Factors Affecting the Career Motivation of Naval Officers, <u>Inst. of Naval Studies Research Contribution No. 18</u> , June 1966. |

HONORS, ELECTIONS, AWARDS, CITATIONS

Harris, J. Donald	--	Appointed to S-3 Committee of U.S.A. Standards Inst.
	--	Appointed to Working Group 1-W-37, American Standards Inst.
	--	Appointed Consultant to VA in Hearing Aids, 9 June 1966.
	--	Appointed Board of Directors, American Board of Examiners Speech Pathology and Audiology
	--	Re-appointed Professor (Adjunct), Department of Speech, City University, New York.
Greenwood, Michael	--	Navy Meritorious Civilian Award, 29 April 1966.
Inman, Elmer E. LCDR MSC USN	--	Named Adjunct Professor of Psychology, University of Rhode Island
Kent, Paul R. CDR MSC USN	--	Re-appointed Member Armed Forces-NRC Committee on Vision
Kinney, Jo Ann S.	--	Chairman, E-1.4.1 Committee of U.S. National Committee of CIE (International Commission on Illumination).
	--	Chairman, American Psychological Association delegation to Inter-Society Color Council
	--	Fellow of Optical Society of America
	--	Re-appointed Member Armed Forces-NRC Committee on Vision
Kohl, Jessie W.	--	Re-appointed to Groton Public Library Board; re-elected Secretary of that Board
	--	Senior Member, Society Technical Writers and Publishers
	--	Hosted the Fall Meeting of Navy East Coast R&D Labs Interlaboratory Committed on Editing and Publishing, 19-21 October 1966.
	--	Charter Member, Quill & Brush Branch, Armed Forces Writers League.
Moeller, George	--	Invited to serve as Chairman of session entitled "Measurement of Performance Capacity" at the American Psychological Association Meeting, New York City, 6 September 1966.

HONORS, ELECTIONS AWARDS, CITATIONS

Price, Daniel D.	--	Voted "Service Man of the Month", July 1966.
Ryack, Bernard L.	--	Elected to membership in Human Factors Society.
Sergeant, Russell L.	--	Vice President, Thames Science Center.
	--	Program Chairman, Connecticut Speech and Hearing Association.
	--	Instructor, Naval Reserve Officers School (Civilian Manpower Management).
	--	Abstractor, Deafness Speech and Hearing Abstracts.
	--	Member, Committee, Narragansett Chapter, Acoustical Society of America
	--	Trustee/Elder, United Presbyterian Church of St. Andrew, Groton, Connecticut.
Shiller, William R. CDR DC USN	--	Appointed Abstractor Oral Research Abstractors by the American Dental Association
	--	Appointed to ONR Biology Review Panel, which reviews requests in the field of oral biology.
Smithwick, G.A.	--	Elected Member of Connecticut Health Physics Society.
Waite, Charles L.	--	Elected Member, Aerospace Medical Association and Space Medicine Branch.
	--	Elected Member, Industrial Medical Association.
Weybrew, Benjamin B.	--	Elected Fellow of Division 19 (Military Psychology), American Psychological Association.
	--	Received Inst. of Naval Studies of the Center for Naval Analyses Certificate in recognition of year-long participation in the Interdisciplinary Manpower Study, conducted for the Chief of Naval Operations, at Cambridge, Massachusetts.

SEMINARS AND SYMPOSIA

MEND SYMPOSIUM: 12-13 May 1966

A two-day symposium under the general title "Beneath the Sea" was held at the Submarine Medical Center for 147 medical educators, representing 88 medical schools and colleges under Medical Education for National Defense.

The first day of the symposium was spent in lecture presentations on various aspects of submarine medicine, closed atmospheric environment and underwater medicine. Indoctrination tours of the Escape Training Tank and the USS SEA OWL were conducted on 13 May. Medical Education for National Defense is a program jointly supported by the Army, Navy and Air Force, and the U.S. Public Health Service. The Program is administered through a National Coordinator and the purpose is to improve and extend the teaching of military medicine in undergraduate medical schools, and to give faculty members an opportunity to learn current work being conducted by the Federal Services.

Staff Members participated in Seminars and Symposia as follows:

- | | | |
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| Harris, J. Donald | -- | Chaired seminar with Dr. Winn, University of Rhode Island, Narragansett Marine Lab., on Sound Production and Hearing in Fish, 28 September 1966. |
| | -- | Chaired seminar with Dr. R. Plomp, Inst. of Perception, The Netherlands, on Psycho-Acoustics and Human Engineering, 14 September 1966. |
| | -- | Chaired seminar with Dr. Duffy, Brooklyn College, on Binaural Hearing, 6 September 1966. |
| | -- | Chaired seminar with Mr. Mendelson, USN Air Crew Equipment Lab., Philadelphia, Pa., on Middle Ear Muscles, 27 June 1966. |
| | -- | Chaired seminar with Professor Parvolesar, Columbia University, on Echo-Free Underwater Test Facility, 13 June 1966. |
| | -- | Chaired seminar with Dr. P. Van Houten, St. John's University, New York City, on Effect of Drugs on Hearing, 16 May 1966. |
| | -- | Chaired seminar with Dr. Auerbach of Bell Telephone Laboratory on Auditory Display in Sonar, Murray Hill, New Jersey, 9 February 1966. |

SEMINARS AND SYMPOSIA

- Moeller, George -- Participated by invitation in Conference on Assessment of Operator Performance Capability on Complex Tasks, 29-30 March 1966, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio.
- Invited to attend CNO-ONR Human Factors Meeting - Antisubmarine Warfare, at TRACOR, Inc., Washington, D.C., 13-14 April 1966.
- Schaefer, Karl E. -- Chairman session on Circadian Rhythms, Annual Meeting Aerospace Medical Association, Las Vegas, Nevada, 19 April 1966.
- Chairman Working Group on High Pressure and Artificial Atmospheres, Fourth International Congress of Biometeorology, Rutgers University, New Jersey, 31 April 1966.
- Sergeant, Russell L. -- Invited speaker, N.Y. Academy of Sciences Symposium "Sound Production in Man", New York City, 9 November 1966.
- Shiller, William R. -- Organized and coordinated training program for two Reserve Dental Companies, 1-1, and 1-2 from Boston, Massachusetts, performed ADT at SubMedCen, 18-19 April 1966.
- Weybrew, Benjamin B. -- Chairman - Symposium "Management of Scientific Personnel in Navy Research Settings, American Psychological Association Convention, New York City, September 1966.

EXHIBITS

Armed Forces Day - May 1966: Dealey Center, Submarine Base, Groton, Connecticut: SMC Exhibit demonstrated all aspects of the Center's activities:

The central exhibit consisted of a 24-foot swimming pool with a test vehicle, "The Penguin", in simulated operation. This was an audience-participation type of exhibit, inasmuch as continuous tapes of actual test runs of the vehicle were run through individual earphones placed around the pool area. The background showed actual runs of the vehicle in Long Island Sound.

A walk-through panel exhibit showed excerpts from all aspects of the program of the Submarine Medical Research Laboratory.

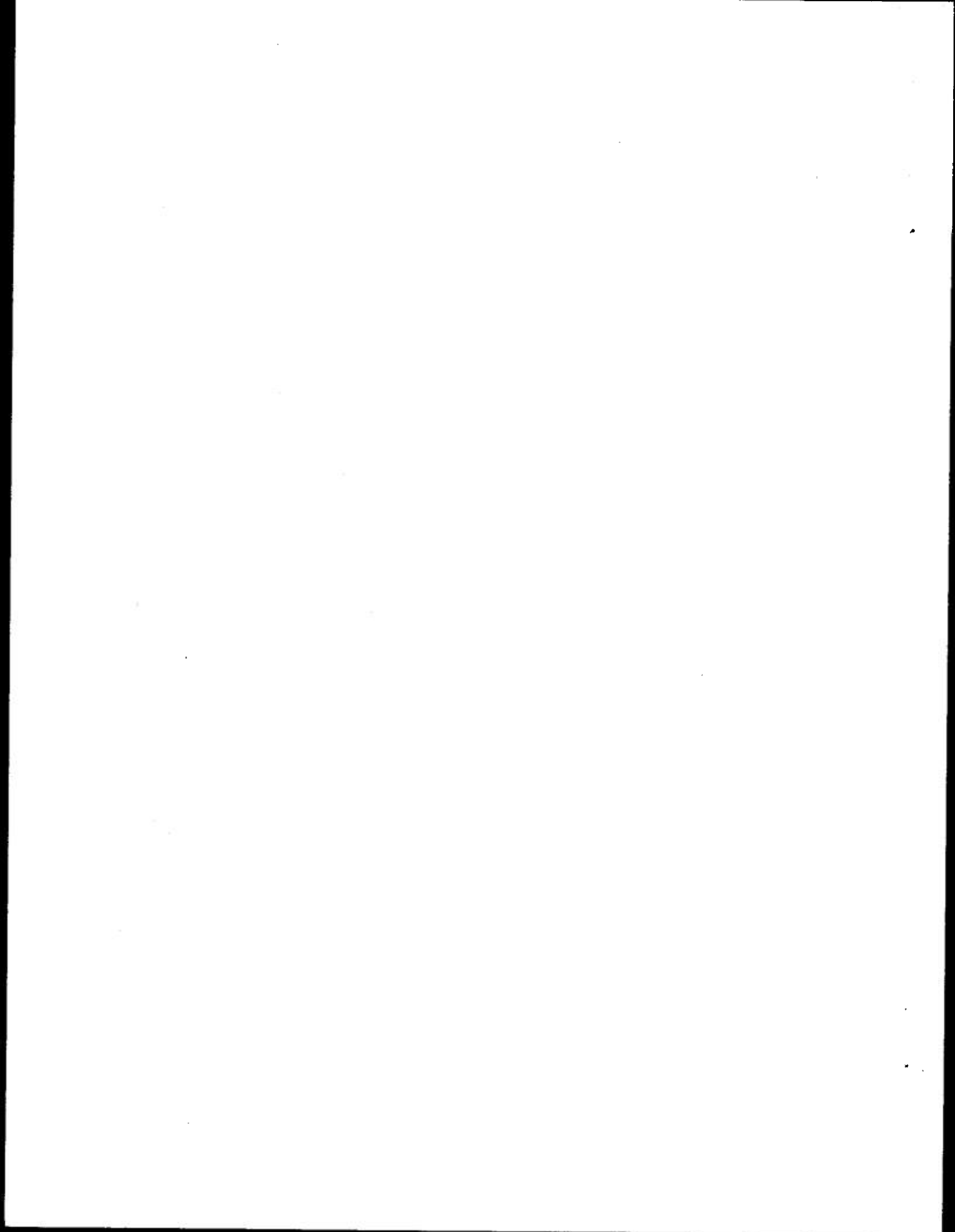
A continuous slide and sound show was held on OPERATION SEALAB II with a seating capacity for 50 persons.

A "Man-in-the-Sea" exhibit was set up in the area; this exhibit was made possible through courtesy of ONR.

The Station Hospital exhibit included the newest type of ambulance in service, and exhibited plans for the proposed new hospital building.

Brochures were available and monitors were continuously available, --these were individuals well versed in all units of the exhibits.

Space of the entire exhibit included approximately 3,500 sq. ft. Over 17,000 visitors passed through the exhibit, which drew much favorable comment.



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13. ABSTRACT This publication presents a summary of each of the research reports published during the calendar year 1966 by the Submarine Medical Research Laboratory at the Submarine Medical Center, in that Laboratory's regular chronological series. There follows a listing of the title of the reports issued in the Memorandum and Special Report series. Also included is a list of articles which were 'in press' with scientific journals at the end of the year; and a list of articles presented before scientific societies during the year, also publications (other than SMRL Reports) by staff members during the same period, and a notation of honors, elections, citations to staff members, as well as a listing of Seminars and Symposia conducted at SMRL and those held elsewhere in which staff members have played an important role.			

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