

**REPORT OF THE WAR PREPAREDNESS COMMITTEE OF
THE AMERICAN MATHEMATICAL SOCIETY AND
MATHEMATICAL ASSOCIATION OF AMERICA
AT THE HANOVER MEETING**

In fulfilling its mission to prepare the Society and Association to serve the country in time of war the Committee recognizes three objectives

(1) The solution of mathematical problems essential for military or naval science, or rearmament.

(2) The preparation of mathematicians for research essential for objective (1).

(3) The strengthening of undergraduate mathematical education in our colleges to the point where it affords adequate preparation in mathematics for military and naval services of any nature. A study by a large group of mathematicians of the current routine military texts and sources wherever mathematics is involved in order that mathematicians may exert their proper influence on the teaching of military and naval science in time of war.

Organization. It is recommended that the present Subcommittee on Education be replaced by two new subcommittees corresponding to objectives (2) and (3) respectively and that the present Subcommittee on Research remain unchanged. So reorganized there would be three subcommittees designated as follows:

I. Committee on Research

II. Committee on Preparation for Research

III. Committee on Education for Service.

It is recognized that Committee III corresponds very closely to the special interests and aims of the Association. It is recommended that chairmen of Committees II and III be appointed at Hanover but that the completion of these committees be left until the new chairmen have had time to make recommendations as to the personnel of their committees.

Consultants. Having particular regard to the solution of problems, we recommend the appointment of Chief Consultants in each of the following fields: Ballistics, Aeronautics, Computation (numerical, mechanical, electrical), Cryptanalysis, Industry, Probability and Statistics. Other fields may well be added. The Chief Consultants would be responsible in research matters to the Research Committee without themselves taking on any of the executive duties of that committee. These consultants should also help the Committee on Preparation for Research when called upon. The three central committees should remain small so that they can act quickly. It is also recommended that there be *ordinary consultants* in each of the above fields. These ordinary consultants would be recommended for appointment so as to obtain some sort of correspondence with the subfields. Thus able young mathematicians so appointed might prepare themselves in advance to help in a given field. These consultants should also be appointed so as to meet the needs of particular sections of the country for help in its industries. It is suggested that any mathematician who feels competent in a field might ask to be made a consultant, and might be accepted as such if that seemed desirable. A flexible group is indicated.

DUTIES

1. *Committee on Research.* Problems would be received and assigned to consultants when available, otherwise assigned to members of the Research Committee. Recommendations as to educational needs would be made to the Committee on Education for Research. Suitable contacts would be made by this committee. The proper assignment and orientation of young consultants should be the duty of this committee.

2. *Education for Research.* This committee would continue work already done on bibliographies, texts, seminars, publications, etc. Professor A. W. Tucker, representing the Annals of Mathematics Studies, has stated that there will be no difficulty in publishing suitable texts concerning applications of mathematics in war or industry. New texts in practically all of the above fields are needed and competent mathematicians have already been invited to write such texts. A small loan fund may be necessary to pay the initial cost of such Studies since these texts are published on a cash basis without profit.

3. *Education for Routine Service.* The War Department intends in general to use sections of existing texts for instruction in the military schools. Those few texts which involve mathematics in an essential way should be carefully read by members of this committee, with two objects in view.

- (1) *What elementary mathematics must be taught in order that these books be readily understood?*
- (2) *In what way could the material in these books of a mathematical nature be better written to save time and achieve the desired results?*

The following three resolutions are recommended for adoption by the Council of the A.M.S. and Board of Governors of the M.A.A.:

1. That all competent students in the secondary schools take the maximum amount of mathematics available in their institutions. In the case of many schools, additions to the present curriculum will be necessary in order to furnish an adequate background for the military needs of the country.

2. That the colleges and universities at once make such revisions of their undergraduate courses in mathematics and add such courses to the curriculum as are necessary to prepare students in the elements of mechanics, probability, surveying, navigation and other essentials of military science.

3. That the graduate schools extend their courses in applied mathematics, such as dynamics, hydrodynamics, elasticity, aeronautics, ballistics, statistics, and that advanced students be urged to become highly qualified in one or more fields of applied mathematics.

These resolutions should be given immediate publicity in order that the changes recommended may be undertaken at once. In connection with resolutions 2 and 3 Committees II and III will be able to give a certain amount of advice at once and in a few months will undoubtedly be able to help considerably more.

We are appending two bibliographies corresponding respectively to the needs of those primarily interested in research and those primarily interested in education for service. These bibliographies are selective rather than exhaustive because it is felt that such bibliographies will best serve immediate needs. More extensive bibliographies are available and will be mailed to those interested upon request. The report of the War Preparedness Committee in extenso containing letters from various authorities and other important source material may be had upon writing to Secretary Richardson. Needless to say the Committee will help those who are working on war preparedness problems in any way in which it can.

Prepared for the Committee by

MARSTON MORSE
General Chairman

The above three resolutions were adopted by the Council of the American Mathematical Society and the Board of Governors of the Mathematical Association of America at a joint meeting at Hanover, N. H.

Professor M. H. Stone has been appointed Chairman of the Subcommittee on Preparation for Research and Professor W. L. Hart has been appointed Chairman of the Subcommittee on Education for Service. Chief Consultants have been appointed as follows:

- Ballistics—Professor John von Neumann, Institute for Advanced Study
- Aeronautics—Professor Harry Bateman, California Institute of Technology.
- Computation—Professor Norbert Wiener, Massachusetts Institute of Technology.
- Industry—Dr. T. C. Fry, Bell Telephone Laboratories
- Probability and Statistics—Professor S. S. Wilks, Princeton University
- Cryptanalysis—Professor H. T. Engstrom, Yale University.

SERVICE BIBLIOGRAPHY

- Seacoast Artillery Gunnery*, F. M. 4-10. U. S. Government Printing Office. Price 25 cents.
- Seacoast Artillery*, F. M. 4-15 and 4-10. U. S. Government Printing Office. To be published.
- Gunnery, Fire Control and Position Finding for Anti-Aircraft Artillery*. Special text No. 26, U. S. Government Printing Office. (*Restricted*)
- Field Artillery*, F. M. 6-40. 1939, U. S. Government Printing Office, Washington, D. C. Price 25 cents.
- Field Artillery*. Gunnery, 1936, Book 161. Printed: Field Artillery School, Fort Sill, Oklahoma.
- Signal Communications*, F. M. 24-5. U. S. Government Printing Office, Washington, D. C. Price 45 cents.
- Practical Air Navigation*. Special Publication No. 197, U. S. Department of Commerce, Coast and Geodetic Survey (temporarily out of print)
- The Use of the Airway Radio Range and Other Radio Aids*. Free publication of Civil Aeronautics Authority, Washington, D. C.
- Aerodynamics*. Bulletin No. 21, Civil Aeronautics Authority, Washington, D. C.
- Anti-Aircraft Artillery*. Gunner's Instruction, IX Expert Gunners, Coast Artillery Journal, 1115 17th Street, N.W., Washington, D. C.
- Sound Ranging*. F. M. 6-120, U. S. Government Printing Office, Washington, D. C.
- Meteorology*. Army Extension Courses, Special Text No. 193, U. S. Government Printing Office, Washington, D. C. Price 20 cents.
- Coast Artillery Journal*. \$4 a year. 1115 17th St. N.W., Washington D. C.

Ordnance

- T. J. Hayes. *Elements of Ordnance*, John Wiley and Sons, 1938. Chapters X, XI, XII, Exterior Ballistics, Probability of Hitting, Bombing from Airplanes, written by Kent, Dederick, Zornig, of Aberdeen Proving Ground.

Aerodynamics

- B. Jones. *Elements of Practical Aerodynamics*, Wiley and Sons.
- C. C. Carter. *Simple Aerodynamics*, Ronald Press.

Navigation

- Dutton. *Navigation and Nautical Astronomy*, U. S. Naval Institute.
- P. V. H. Weems. *Air-Navigation*, McGraw-Hill.

Optics

- McKinley. *Applied Aerial Photography*, Wiley.
 Reeves. *Aerial Photographs, Characteristics and Military Applications*, Ronald.
 Hotine. *Surveying from Air Photographs*, Constable.
 Gruber. *Photogrammetry*, Chapman.

Meteorology

- McAdie. *Principles of Aerography*, Rand.
 D. S. Piston. *Meteorology*, P. Blakiston and Son.

RESEARCH BIBLIOGRAPHY

Ballistics

- T. J. Hayes. *Elements of Ordnance*, John Wiley and Sons. 1938. Chapters X, XI, XII, Exterior Ballistics, Probability of Hitting, Bombing from Airplanes, written by Kent, Dederick, Zornig, of Aberdeen Proving Ground.
 F. R. Moulton. *New Methods in Exterior Ballistics*, University of Chicago Press, 1926.
 R. H. Fowler and others. *The Aerodynamics of a Spinning Shell*, Philosophical Transactions of the Royal Society of London, series A, vol. 221 (1921), pp. 295–387, and vol. 222 (1922), pp. 227–247.
 A. E. H. Love and F. B. Pidduck. *Lagrange's Ballistic Problem*, Phil. Trans., vol. 222 (1922), pp. 167–226.

Computation

- A. A. Bennett, W. E. Milne and H. Bateman. *Numerical Integration of Differential Equations*, Bulletin 92, National Research Council, Washington, 1933.

Probability and Statistics

- H. L. Rietz, *Mathematical Statistics*. Chicago, Open Court, 1927.
 G. Udny Yale and M. G. Kendall. *An Introduction to the Theory of Statistics*, London, Griffin, 1937.
 R. A. Fisher. *Statistical Methods for Research Workers*, London, Oliver and Boyd, various editions.
 J. Neyman. *Lectures and Conferences on Mathematical Statistics*, Washington, Graduate School of the U. S. Department of Agriculture, about 1938.
 S. S. Wilks. *Statistical Inference*, Ann Arbor, Edwards Bros., 1937.
 T. C. Fry. *Probability and Its Engineering Uses*, New York, Van Nostrand, 1928.
 W. A. Shewhart. *Economic Control of Quality of Manufactured Products*, New York, Van Nostrand, 1931.

Cryptography

- L. Sacco. *Manuale di Crittografia*, Rome, 1936.
 L. S. Hill. *Concerning Certain Linear Transformation Apparatus of Cryptography*, American Mathematical Monthly, vol. 38 (1931), pp. 135–154.

References in other fields will be suggested later.