OAA Technical Memorandum NOS NGS-9

NATIONAL GEODETIC SURVEY PUBLICATIONS ON SURVEYING AND GEODESY 1976

Rockville, Md.
September 1977

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / National Ocean Survey

NOAA Technical Publications

National Ocean Survey-National Geodetic Survey Subseries

The National Geodetic Survey (NGS) of the National Ocean Survey establishes and maintains the basic National horizontal and vertical networks of the geodetic control and provides governmentwide leadership in the improvement of geodetic surveying methods and instrumentation, coordinates operations to assure network development, and provides specifications and criteria for survey operations by Federal, State, and other agencies.

NGS engages in research and development for the improvement of knowledge of the figure of the Earth and its gravity field, and has the responsibility to procure geodetic data from all sources, to process these data, and to make them generally available to users through a central data base.

NOAA Technical Reports and Technical Memorandums of the NOS NGS subseries facilitate rapid distribution of material that may be published formally elsewhere at a later date.

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NOAA Technical Memorandums are available as both paper copy and microfiche from NTIS.

NOAA Technical Memorandums

NOS NGS-1 Use of Climatological and Meteorological Data in the Planning and Execution of National Geodetic Survey Field Operations. Robert J. Leffler, December 1975, 30 pp.

NOS NGS-2 Final Report on Responses to Geodetic Data Questionnaire. John F. Spencer, Jr., March 1976, 39 pp. (PB-254641)

NOS NGS-3 Adjustment of Geodetic Field Data Using a Sequential Method. Marvin C. Whiting and Allen J. Pope, March 1976, 11 pp. (PB-253967)

NOS NGS-4 Reducing the Profile of Sparse Symmetric Matrices. Richard A. Snay, June 1976, 24 pp. (PB-258476)

NOS NGS-5 National Geodetic Survey Data: Availability, Explanation, and Application. Joseph F. Dracup, June 1976, 45 pp. (PB-258475)

(Continued on inside back cover)

NOAA Technical Memorandum NOS NGS-9

NATIONAL GEODETIC SURVEY PUBLICATIONS ON SURVEYING AND GEODESY 1976

National Geodetic Survey
Rockville, Md.
September 1977

UNITED STATES
DEPARTMENT OF COMMERCE
Juanita M. Kreps, Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
Richard A. Frank, Administrator

National Ocean
Survey
Allen L. Powell, Director

PREFACE

This memorandum is the first of a series containing current lists of publications and information published by the National Geodetic Survey (NGS) of the National Ocean Survey (NOS), a component of the National Oceanic and Atmospheric Administration (NOAA).

Many entries are followed by an identification code enclosed in parentheses. Use of these numbers will facilitate ordering copies of a report from a cited source. NOAA Technical Memorandums are available from the National Technical Information Service (NTIS) (see inside front cover for address). Microfiche copies of NOAA Technical Reports are also immediately available from NTIS. Paper copy of NOAA Technical Reports is usually obtainable from the Superintendent of Documents, Government Printing Office (GPO) (see inside front cover for address). When the GPO supply is exhausted, paper copy is then available from NTIS.

Inquiries on articles listed in the section, Publications and Presentations by Staff Members, NGS, should be directed to the author or to the National Geodetic Survey Information Center (NGSIC), C18, National Ocean Survey, Rockville, Maryland 20852. Inquiries on items listed in the section, Geodetic Documents Reprinted by NGS in 1976, should be directed to NGSIC.

Specific publications of NOS's predecessor agency, the Coast and Geodetic Survey (C&GS), are cited in this memorandum if they were reprinted by NOS in 1976 or if their source of availability changed from NOAA or GPO to NTIS. A complete list of all NOS publications, including C&GS, is given in NOS Education Pamphlet 7, Summary of National Ocean Survey Technical Publications and Charts. This periodically updated publication is available upon request from NOS, Rockville, Maryland 20852.

Inquiries on availability of C&GS publications not listed in this memorandum should be directed to GPO or to a GPO book store, listed in appendix I. NGS will continue to reprint and distribute the C&GS publications of plane coordinate projection tables and intersection tables for the 50 States, Puerto Rico, Virgin Islands, and American Samoa where no other authorized source exists.

Where C&GS publications are not available for purchase from any source, a National depository library may be consulted. These libraries perform an invaluable service by keeping such publications permanently available. Not all Government documents can be consulted at all of these libraries because selection is based on interest of their particular clientele. Designated Regional Depositories (appendix II) are required to receive and retain one copy of all Government publications. Requests may be made through your local library.

CONTENTS

PUBLICATIONS AND PRESENTATIONS BY STAFF MEMBERS, NGS 1976

Alger, David E., 1976: The new adjustment of the North American horizontal datum--data base management system. American Congress on Surveying and Mapping Bulletin, No. 54, 15.

Berry, Ralph M., 1976: History of geodetic leveling in the United States. Surveying and Mapping, 36 (2), 137-153.

Bossler, John D., 1976: Changing views on control networks. Presented to the International Symposium: The Changing World of Geodetic Science, The Ohio State University, Columbus, Ohio, October 6-8. Proceedings of the International Symposium: The Changing World of Geodetic Science, The Ohio State University, Columbus, 13 pp. (in press).

Bossler, John D., 1976: The new adjustment of the North American horizontal datum. E⊕S, Transactions of the American Geophysical Union, 57 (8), 557-562.

Chovitz, Bernard, 1976: Monitoring geodetic networks by space techniques. Presented to the Third International Symposium on Geodesy and Physics of the Earth, Weimar, Germany, October 25-31. Proceedings of the Third International Symposium on Geodesy and Physics of the Earth, 16 pp. (in press).

Dillinger, W. H., and Hanson, R. H., 1976: Status of the computer system for the new adjustment of the North American Datum. Presented to the American Geophysical Union, Annual Fall Meeting, San Francisco, December 6-10, 24 pp (preprint).

Douglas, Bruce C., and Goad, Clyde C., 1976: The role of orbit determination in satellite altimeter data analysis. Presented to IUCRM Colloquium on Radio Oceanography, Hamburg, Germany, October 1976, 11 pp. Boundary-Layer Meteorology (in press).

Doyle, F. J. (U.S. Geological Survey), Elassal, A. A. (U.S. Geological Survey), and Lucas, J. R., 1976: Experiment S-312, Selenocentric Geodetic Reference System. National Aeronautics and Space Administration Contract T-1168B, Houston, Texas, 53 pp. Reprinted, Selenocentric geodetic reference system, NOAA Technical Report NOS 70 NGS 5, 1977. (NTIS PB266046).

Dracup, Joseph F., 1976: National Geodetic Survey data: availability, explanation, and application. NOAA Technical Memorandum NOS NGS-5, 39 pp. (NTIS PB258475).

Dracup, Joseph F., 1976: The United States horizontal control network 1816-1976. Proceedings of the American Congress on Surveying and Mapping, 36th Annual Meeting, Washington, D. C., February 22-28, 252-261.

Dracup, Joseph F., 1976: Tests for evaluating trilateration surveys. Proceedings of the American Congress on Surveying and Mapping, Annual Fall Convention, Seattle, Washington, September 28 - October 1, 96-131.

Dracup, Joseph F., 1976: Updating survey networks - A practical application of satellite Doppler positioning. Proceedings of the International Geodetic Symposium on Satellite Doppler Positioning, New Mexico State University, Las Cruces, N. M., October 12-14, 657-674.

Goad, Clyde C., and Douglas, Bruce C., 1977: Determination of M_2 ocean tide parameters from satellite orbit perturbations. Journal of Geophysical Research, 82 (5), 898-900.

Hanson, Robert H., 1976: The new adjustment of the North American horizontal datum--the network adjustment. American Congress on Surveying and Mapping Bulletin, No. 55, 21-22.

Henriksen, Soren W., 1976: The role of extremely accurate surveying techniques in existing geodetic networks. Proceedings of the Scientific Applications of Lunar Laser Ranging Conference, University of Texas, Austin, June 9-11, 149-156.

Holdahl, S. R., 1976: Recent elevation change in Southern California. Proceedings of the 2nd International Symposium on Land Subsidence, International Association of Hydrological Sciences, Anaheim, California, December 13-17 (in press). Reprinted, NOAA Technical Memorandum NOS NGS-7, 1977, 19 pp. (NTIS PB265940).

Holdahl, Sandford R., 1976: Comments on 'New Vertical Geodesy' by J. H. Whitcomb. Journal of Geophysical Research, 81 (26), 4945-4946.

Hothem, L. D., and Strange, W. E., 1976: The use of Doppler satellite positioning for extension of offshore geodetic control. Preprint 2820, American Society of Civil Engineers Annual Convention and Exposition, Philadelphia, Pennsylvania, September 27 - October 1, 1976, 31 pp. Reprint, Proceedings of American Congress on Surveying and Mapping, Annual Fall Convention, Seattle, Washington, September 28 - October 1, 295-317.

Hothem, L. D., and Strange, W. E., 1977: Doppler satellite positioning of offshore structures. International Hydrographic Review, LIV (1), 39-58.

Kelley, Carl F. , and Holdahl, Jeannie H., 1976: NGSIC and the user. Presented to the American Society of Photogrammetry Rocky Mountain Region, American Congress on Surveying and Mapping Colorado Section, 11th Annual Symposium, Denver, Colorado, January 8-9, 11 pp. (preprint).

Marsh, J. G. (Goddard Space Flight Center, NASA), Douglas, B. C., Vincent, S. (Wolf R&D Corp.), and Walls, D. M. (Wolf R&D Corp), 1976: Tests and comparisons of satellite-derived geoids with Skylab altimeter data. Journal of Geophysical Research, 81 (20), 3594-3598.

Meade, B. K., 1976: The Mason-Dixon mile. Surveying and Mapping, 36 (4) 329-335.

Meade, B. K., 1976: Errors of Doppler positions obtained from results of transcontinental traverse surveys. Proceedings of the International Geodetic Symposium on Satellite Doppler Positioning, New Mexico State University, Las Cruces, N. M., October 12-14, 813-830.

Moose, Robert E., and Henriksen, Soren W., 1976: Effect of Geoceiver observations upon the classical triangulation network. NOAA Technical Report NOS 66 NGS 2, 65 pp. (NTIS PB260921). Reprinted, Proceedings of the International Geodetic Symposium on Satellite Doppler Positioning, New Mexico State University, Las Cruces, N. M., October 12-14, 591-656.

Morrison, Foster, 1976: Algorithms for computing the geopotential using a simple density layer. Journal of Geophysical Research, 81 (26), 4933-4936.

Morrison, Foster, 1977: Algorithms for computing the geopotential using a simple-layer density model. NOAA Technical Report NOS 67 NGS 3, 41 pp. (NTIS PB265421).

Morrison, Foster, 1976: A correction to an equation of Szebehely. Celestial Mechanics (in press).

Pope, Allen J., 1976: The statistics of residuals and the detection of outliers. NOAA Technical Report NOS 65 NGS 1, 133 pp. (NTIS PB258428).

Safford, Robert W., and Whiting, Marvin C., 1976: New trends at National Geodetic Survey. Presented to American Congress on Surveying and Mapping, 36th Annual Meeting, Washington, D. C. February 22-28, 7 pp. (preprint).

Snay, Richard A., 1976: Reducing the profile of sparse symmetric matrices. NOAA Technical Memorandum NOS NGS-4, 24 pp. (NTIS PB258476). Reprinted, Bulletin Géodésique, 50 (4), 341-352.

Spencer, John F., Jr., 1976: Final report on responses to geodetic data questionnaire. NOAA Technical Memorandum NOS NGS-2, 39 pp. (NTIS PB254641). Reprinted, Proceedings of the American Congress on Surveying and Mapping, Annual Fall Convention, Seattle, Washington, September 28 - October 1, 141-205.

Stem, James E., 1976: NGS data base as a central depository of geodetic control data. Proceedings of the American Congress on Surveying and Mapping, 36th Annual Meeting, Washington, D. C., February 22-28, 49-57.

Strange, William E., and Hothem, Larry D., 1976: The National Geodetic Survey Doppler satellite positioning program. Proceedings of the International Geodetic Symposium on Satellite Doppler Positioning, New Mexico State University, Las Cruces, N. M., October 12-14, 207-227.

Vincenty, T., 1976: Determination of North American Datum 1983 coordinates of map corners. NOAA Technical Memorandum NOS NGS-6, 8 pp. (NTIS PB262442). Reprinted, Proceedings of the International Geodetic Symposium on Satellite Doppler Positioning, New Mexico State University, Las Cruces, N. M., October 12-14, 831-838.

Vincenty, T., 1976: A method for determination of the geodetic height of a point. Allgemeine Vermessungs-Nachrichten, 5, Karlsruhe, p. 179.

Whalen, C. T., and Balazs, E., 1976: Test results of first-order class III leveling. NOAA Technical Report NOS 68 NGS 4, 30 pp. (NTIS PB265421). Reprinted, Surveying and Mapping, 37 (5), 1977.

Whiting, Marvin C., and Pope, Allen J., 1976: Adjustment of geodetic field data using a sequential method. NOAA Technical Memorandum NOS NGS-3, 11 pp. (NTIS PB253967).

Young, Gary M., 1976: The new adjustment of the North American horizontal datum--data capture and validation. American Congress on Surveying and Mapping Bulletin, No. 52, p. 19.

GEODETIC DOCUMENTS REPRINTED BY NGS IN 1976

Baker, L. S., 1968, reprinted 1976: Specifications for horizontal control marks. Coast and Geodetic Survey Technical Memorandum C&GSTM-4, 14 pp.

Bossler, John D. (The Ohio State University, Columbus) 1972, reprinted 1976: Bayesian inference in geodesy. Ph. D. Dissertation, 79 pp.

Claire, Charles N., revised 1973, reprinted 1976: State plane coordinates by automatic data processing. Publication 62-4, 68 pp.

*Federal Geodetic Control Committee, Phillips, John O. (Chairman), 1974, reprinted 1975/1976: Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys. National Oceanic and Atmospheric Administration, National Ocean Survey, 12 pp. (NTIS PB265442).
(To be used jointly with next publication cited, Specifications to Support ...)

*Federal Geodetic Control Committee, Phillips, John O. (Chairman), 1975, reprinted 1976: Specifications to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys. National Oceanic and Atmospheric Administration, National Ocean Survey, 30 pp. (NTIS PB261037).

Holdahl, J. H., and Dubester, D. E., 1971, reprinted 1976: A computer program for traverse adjustments using plane coordinates. Proceedings of the American Congress on Surveying and Mapping, 31st Annual Spring Meeting, Washington, D. C., 562-572. (Accompanying documentation for program is cited next.)

Holdahl, J. H., and Dubester, D. E., 1972, reprinted 1976: A computer program to adjust a State plane coordinate traverse by the method of least squares. Preprint, National Ocean Survey, NGS, 234 pp. (A traverse update, dated December 1, 1972, 7 pp., is included.)

Johnson, Philip C. (Cornell University, Ithaca, N. Y.) 1972, reprinted 1976: A measure of the economic impact of urban horizontal geodetic control surveys. M. S. Dissertation, 113 pp.

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*Reprinted by NOAA. Single copies are distributed free to requesters by NGSIC.

PUBLICATIONS OF THE U.S. COAST AND GEODETIC SURVEY DEPOSITED WITH THE NATIONAL TECHNICAL INFORMATION SERVICE

Many of the old publications of the U.S. Coast and Geodetic Survey (U.S. C&GS) are still relevant, while others continue to be a source of historical reference. Because of rising printing costs, NGS has deposited the following documents with NTIS for sale to the public (see inside front cover for address).

*C&GS Special Publication No. 5, 6th edition, 1935: Tables for a polyconic projection of maps and lengths of terrestrial arcs of meridian and parallels based upon Clarke's Reference Spheroid of 1866, 189 pp. (NTIS PB267481).

**C&GS Special Publication No. 8, 7th edition, 1952: Formulas and tables for the computation of geodetic positions, 101 pp. (NTIS PB267459).

#C&GS Special Publication No. 28, 1915: Application of the theory of least squares to the adjustment of triangulation, 220 pp. (NTIS PB267535).

#C&GS Special Publication No. 68, 5th edition, revised 1944: Elements of map projection with applications to map and chart construction, 210 pp. (NTIS PB267470).

**C&GS Special Publication No. 82, 1909: The figure of the Earth and isostasy from measurements in the United States, 183 pp. (NTIS PB257349).

**C&GS Special Publication No. 82 Supplement, 1910: Supplementary investigation in 1909 of the figure of the Earth and isostasy, 84 pp. (NTIS PB257350).

**C&GS Special Publication No. 137, 1927: Manual of first-order traverse, 133 pp. (NTIS PB267466).

#C&GS Special Publication No. 138, 1934: Manual of triangulation computation and adjustment, 242 pp. (NTIS PB267458).

*C&GS Special Publication No. 145, revised 1935: Manual of second and third-order triangulation and traverse, 226 pp. (NTIS PB267456).

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*Computations are relevant. Other sections are considered obsolete.

**Text is primarily of historical interest.

#Text is basic or relevant.

*C&GS Special Publication No. 193, 1935: Manual of plane coordinate computation, 271 pp. (NTIS COM-71-50368).

#C&GS Special Publication No. 225, 1941: Manual of reconnaissance for triangulation, 100 pp. (NTIS PB267457).

**C&GS Special Publication No. 235, 1945, revised 1974: The State coordinate system, 62 pp. (NTIS COM-71-50367).

**C&GS Special Publication No. 237, 1952: Manual of geodetic astronomy, determination of longitude, latitude and azimuth, 205 pp. (NTIS PB267465).

#C&GS Special Publication No. 238, 1947: Air-line distances between cities in the United States, 246 pp. (NTIS PB267497).

**C&GS Special Publication No. 239, 1948: Manual of geodetic leveling, 94 pp. (NTIS COM-72-50049).

**C&GS Special Publication No. 240, 1948: Manual of leveling computation and adjustment, 178 pp. (NTIS COM-72-50181).

#C&GS Special Publication No. 246, 1949: Sines, cosines, and tangents, ten decimal places with ten-second interval, 0°-6°, 36 pp. (NTIS COM-71-50369).

#C&GS Special Publication No. 247, 1950: Manual of geodetic triangulation, 344 pp. (NTIS COM-71-50406).

#C&GS Special Publication No. 251, 1952: Conformal projections in geodesy and cartography, 142 pp. (NTIS PB267467).

##C&GS Special Publication No. 266, 1952: Connecticut Plane Coordinate Projection Tables, 12 pp. (NTIS COM-71-50602).

##C&GS Special Publication No. 270, 1952: Oregon Plane Coordinate Projection Tables, 31 pp. (NTIS COM-71-50370).

##C&GS Special Publication No. 271, 1952: Washington Plane Coordinate Projection Tables, 28 pp. (NTIS COM-71-50371).

##C&GS Special Publication No. 285, 1952: Kansas Plane Coordinate Projection Tables, 27 pp. (NTIS COM-71-50372).

##C&GS Special Publication No. 288, 1952: Wisconsin Plane Coordinate Projection Tables, 32 pp. (NTIS COM-72-50353).

##C&GS Special Publication No. 306, 1953: Idaho Plane Coordinate Projection Tables, 32 pp. (NTIS COM-72-50358).

##Many States have enacted legislation legalizing these coordinate systems for property surveys.

##C&GS Special Publication No. 319, 1954: Missouri Plane Coordinate Projection Tables, 28 pp. (NTIS COM-71-50388).

##C&GS Special Publication No. 327, 1954: California Plane Coordinate Intersection Tables, 281 pp. (NTIS COM-75-10736).

##C&GS Special Publication No. 335, 1955: Texas Plane Coordinate Intersection Tables, 398 pp. (NTIS COM-71-50381).

**Publication No. G-58, 1947: Natural function tables for computing geographic positions on the International Ellipsoid, 95 pp. (NTIS PB267469).

##Publication 65-1, Part 1, 1957: Alabama Plane Coordinate Intersection Tables, 95 pp. (NTIS COM-71-50382).

##Publication 65-1, Part 11, 1960: Illinois Plane Coordinate Intersection Tables, 124 pp. (NTIS COM-72-50356).

##Publication 65-1, Part 35, 1960: Oregon Plane Coordinate Intersection Tables, 166 pp. (NTIS COM-71-50390).

GEODETIC CONTROL DATA

Availability and Prices

General Information

NGS issues horizontal and vertical control data for National network surveys. An automatic mailing service of up-to-date data and diagrams is available.

The National network publications of geodetic control data are primarily represented by standard quadrangles of 30' of latitude by 30' of longitude. However, in congested areas, standard quads are 15' of latitude by 15' of longitude. In Alaska, because of sparity of control, quadrangle units are 1° of latitude by 1° of longitude. Data are available in these formats for 75% of the United States. The remaining 25% are in the old formats, i.e., State level lines, plane coordinate sheets, geodetic position sheets, description booklets, etc. Until the old format data are converted to the standard quadrangle formats, vertical and horizontal control data will be available only by complete county coverage. Unadjusted data are available upon request.

National network data or supplemental control data, established by or in cooperation with NGS, that have been adjusted to the North American 1927 Datum or the National Vertical Datum of 1929 are printed on white paper. Preliminary, unadjusted, or field data are printed on yellow paper.

Data from Surveys Performed by Other Organizations

When field observations are performed to NGS standards, and data are evaluated and adjusted by NGS, the results are included in the NGS National network publications. NGS also publishes and distributes supplementary data for control surveys by other organizations that have not been evaluated or adjusted by NGS.

Horizontal Control Data

Data may be requested by areas of latitude and longitudes, by counties, or for an entire State. Graphic control diagrams depicting locations of control are published at various scales. Horizontal data not yet converted to the quad format are printed in three parts: (1) latitudes, longitudes, geodetic azimuchs, and distances, assembled by arc of triangulation; (2) State plane coordinates, available by State plane coordinate zones; and (3) descriptions of stations, assembled by triangulation arc or project areas, e.g., Defense Mapping Agency's domestic geodetic data.

Vertical Control Data

Data may be obtained by areas of latitudes and longitudes, by counties, or for an entire State. Graphic control diagrams depicting locations of control are published at various scales. Data not yet converted to the quad format, consisting of elevation lists and bench mark descriptions, are available and assembled by numbered level lines with the State.

Combined Horizontal and Vertical Data

Certain supplementary surveys by other Governmental agencies, listing both horizontal and vertical data, are combined on the same data sheets and are published and distributed by NGS. For simplicity, these data are listed and priced under Horizontal Data.

Unpublished Geodetic Data

Observations are adjusted and processed for publication in standard format as soon as practicable upon completion of a project. However, unavoidable delays may be caused in processing data for surveys that are incomplete. Information and available preliminary data for new projects, incomplete, or unadjusted projects are furnished upon request. Information regarding re-established triangulation stations (i.e., no. 2 marks, new azimuth) or resetting vertical stations is available.

Additional Data

As an additional service, NGS furnishes other related geodetic data, i.e., gravity values, astronomic positions, preliminary adjusted horizontal positions, horizontal and vertical control crustal movement data, UTM coordinate data, etc. Usually these data are available on magnetic tape and/or paper. New micropublishing techniques are being introduced in the form of computer generated microform. As geodetic data become available in this form, the user will be notified by "flier."

Control Diagrams

Status maps on 1:5,000,000 scale of horizontal and vertical control networks are published annually. Separate triangulation and leveling diagrams by States show the National network control surveys and supplementary surveys.

A new series of control diagrams for the 48 conterminous States is available on 1:250,000 scale topographic map bases covering primarily 1° of latitude by 2° of longitude. NOS and the U.S. Geological Survey with some participation by other Federal agencies compiled this information. These diagrams show the order of survey accuracy, locations and names of triangulation stations, and routes of traverse and level lines. When necessary, supplemental diagrams on large-scale maps and coastal charts are issued for clarity. An index map identifies the 1:250,000 geodetic control diagrams available for the 48 conterminous States and the triangulation disgrams available for Alaska, Hawaii, and Puerto Rico.

Contract and Fee Schedule

The automatic mailing service for geodetic control data enables users who maintain active files to automatically receive newly published data for a specific area. To facilitate an order, the desired area must be requested by complete quadrangle units.

A subscription may be obtained by completing NOAA Form 29-3, "Geodetic Control Data Automatic Mailing List Agreement," included at the end of this publication. The completed form should be mailed to:

Director, National Geodetic Survey
NGS Information Center, C18
National Ocean Survey, NOAA
Rockville, MD 20852

Telephone orders are accepted: 301-443-8631.

The prices for initial data furnished through the automatic mailing service are the same as for individual orders. Revised or additional published data for the requested area are automatically furnished thereafter for an annual fee of $2.00. A copy of the billing statement must accompany payment to ensure proper credit to the user's account.

Except as specified under the automatic mailing service contract, a minimum charge of $2.00 will be made for all orders. Prepayment is required for all orders that exceed $25.00. The following are standard charges for geodetic control data:

1. Published quadrangle booklets
   - Horizontal control data ..... $2.00 ea.
   - Vertical control data ..... $2.00 ea.

2. Complete county coverage--control data not available in published quadrangle booklets
   - Horizontal control data ..... $4.00 ea.
   - Vertical control data ..... $4.00 ea.

3. Unadjusted project data ..... $2.00 ea.

4. Control diagrams ..... $2.00 ea.

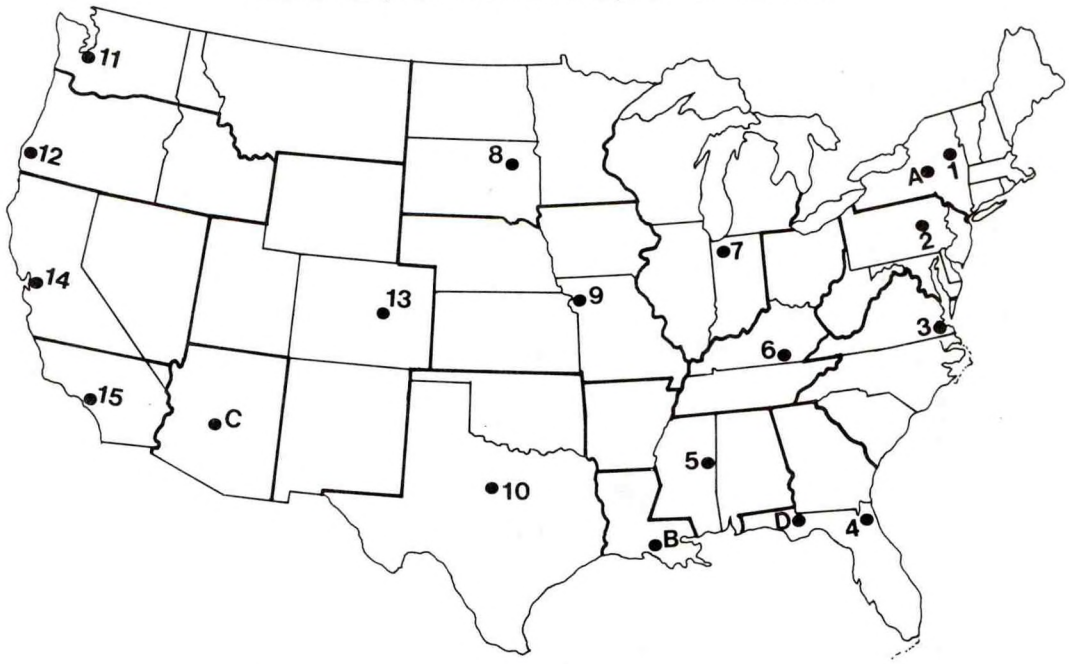
The above prices include postage. Any special handling or mailing request requires additional expense and will be added to the bill.

Network Maintenance

For more than 170 years, NOS has been responsible for establishing and maintaining the Nation's horizontal and vertical control networks. These networks now consist of more than three-quarters of a million marked control points in the United States. Their maintenance is the responsibility of 15 full-time engineers who regularly recover, repair, or reset markers in danger of being disturbed. A list of the personnel and the geographical areas they service is given below. Persons assigned to areas A, B, C, and D are on a cooperative program with the State as a geodetic advisor, in addition to contributing to the National program. Alaska, Hawaii, and the U.S. Territories are assisted on an individual basis. Anyone having information on markers that are in need of repair, in danger of being destroyed, or which have been inadvertently destroyed is requested to notify the following:

Director, National Geodetic Survey, C172, NOS, Rockville, Maryland 20852

Collect telephone calls are accepted: 301-443-8319



Network Maintenance Personnel, Listed by Geographical Areas.

1. Maine, New Hampshire, Rhode Island, Connecticut, Vermont, Massachusetts, New York

   Rolland D. Sveum
   1485 Bame Road
   Castleton-On-Hudson,NY 12033

2. Pennsylvania, New Jersey, Maryland, West Virginia, Delaware, District of Columbia

   Ralph G. Poust
   Route 1, Box 194
   Newport, PA 17074

3. Virginia, North Carolina, South Carolina

   Martin E. Zimmer
   439 West York Street
   Norfolk, VA 23510

4. Georgia, Florida

   Robert P. Konrady
   844 San Juan Avenue
   Lake City, FL 32055

5. Alabama, Mississippi, Arkansas

   Donald D. Rexrode
   P. O. Box 6366
   Pearl Branch
   Jackson, MS 39208

6. Ohio, Tennessee, Kentucky

   Floyd K. Stuart
   P. O. Box 851
   Middlesboro, KY 40965

7. Indiana, Illinois, Wisconsin, Michigan

   John D. Rigney
   Rural route 3
   Deer Trail
   Plymouth, IN 46563

8. Minnesota, North Dakota, South Dakota

   John S. Rindal
   P. O. Box 693
   Watertown, SD 57201

9. Missouri, Iowa, Kansas, Nebraska

   James E. Fuchs
   103 Fine Street
   Excelsior Springs, MO 64024

10. Texas, Oklahoma

    Percy E. Chamley
    P. O. Box 10266
    Oaks Branch Station
    Fort Worth, TX 76114

11. Washington, Montana, Idaho (north of latitude 46°)

    James T. Stapleton
    1801 Fairview Avenue, East
    Seattle, WA 98102

12. Idaho (south of latitude 46°), Oregon

    Floyd A. Martin
    P. O. Box 340
    Lake Oswego, OR 97034

13. Colorado, New Mexico, Utah, Wyoming

    Norman E. Matlock
    P. O. Box 466
    Brighton, CO 80601

14. California and Nevada (north of latitude 37°)

    Leo A. Critchlow
    260 Reichling Avenue
    Pacifica, CA 94044

15. California and Nevada (south of latitude 37°)

    Jay A. Gummow
    P. O. Drawer 3279
    West Riverside, CA 92519

A. New York - vacant

B. Louisiana

   A. K. Hansen
   Louisiana State Highway Dept.
   Location and Survey Division
   P. O. Box 44245
   Baton Rouge, LA 70804

C. Arizona

   Larry W. Wakefield
   P. O. Box 49
   Black Canyon City, AR 85324

D. Florida

   Harry Romine
   Bureau of Coastal & Land Boundaries
   Pennington Building, room 110
   Tallahassee, FL 32304

APPENDIX I.--GOVERNMENT PRINTING OFFICE BOOK STORES

Birmingham Bookstore
Room 102A, 2121 Building
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Birmingham, AL 35203
Telephone: area code 205-325-6056

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300 N. Los Angeles St.
Los Angeles, CA 90012
Telephone: area code 213-688-5841

San Francisco Bookstore
Room 1023, Federal Office Building
450 Golden Gate Ave.
San Francisco, CA 94102
Telephone: area code 415-556-6657

Denver Bookstore
Federal Building--U.S. Courthouse
1961 Stout St.
Denver, CO 80202
Telephone: area code 303-837-3965

Philadelphia Bookstore
U.S. Post Office and Courthouse
Ninth and Chestnut St.
Philadelphia, PA 19107
Telephone: area code 215-597-0677

Dallas Bookstore
Federal Building--U.S. Courthouse
1100 Commerce St.
Dallas, TX 75202
Telephone: area code 214-749-1541

Seattle Bookstore
Room 1056, Federal Building
901 First Ave.
Seattle, WA 98104
Telephone: area code 206-442-4270

Atlanta Bookstore
Room 100, Federal Building
275 Peachtree St., N.E.
Atlanta, GA 30303
Telephone: area code 404-526-6947

Chicago Bookstore
Everett McKinley Dirksen Building
219 South Dearborn St.
Chicago, IL 60604
Telephone: area code 312-353-5133

Boston Bookstore
Room G25, Kennedy Federal Building
Sudbury St.
Boston, MA 02203
Telephone: area code 617-223-6071

Detroit Bookstore
Room 229, Federal Building
231 W. Lafayette Blvd.
Detroit, MI 48226
Telephone: area code 313-226-7816

Kansas City Bookstore
Room 135, Federal Office Building
601 East 12th St.
Kansas City, MO 64106
Telephone: area code 816-374-2160

New York Bookstore
Room 110
26 Federal Plaza
New York, NY 10007
Telephone: area code 212-264-3826

Canton, Ohio, Bookstore
Federal Office Building
201 Cleveland Ave., S.W.
Canton, OH 44702
Telephone: area code 216-455-8971

APPENDIX II.--LIST OF REGIONAL DEPOSITORY LIBRARIES AS OF SEPTEMBER 1, 1976

Auburn University at Montgomery Library (1971)*
Montgomery, Ala.

University of Alabama Library (1860)
University, Ala.

Department of Library and Archives (unknown)
Phoenix, Ar.

University of Arizona Library (1907)
Tucson, Ar.

California State Library (1895)
Sacramento, Calif.

University of Colorado Libraries (1879)
Boulder, Colo.

Denver Public Library (1884)
Denver, Colo.

Connecticut State Library (unknown)
Hartford, Conn.

University of Florida Libraries (1907)
Gainesville, Fla.

University of Idaho Library (1907)
Moscow, Idaho

Illinois State Library (unknown)
Springfield, Ill.

Indiana State Library (unknown)
Indianapolis, Ind.

University of Iowa Library (1884)
Iowa City, Iowa

University of Kansas
Watson Library (1869)
Lawrence, Kans.

University of Kentucky, Margaret I. King Library (1907)
Lexington, Kent.

Louisiana State University Library (1907)
Baton Rouge, La.

Louisiana Technical University Library (1896)
Ruston, La.

University of Maine, Raymond H. Fogler Library (1907)
Orono, Ma.

University of Maryland, McKendin Library (1925)
College Park, Md.

Boston Public Library (1859)
Boston, Mass.

Detroit Public Library (1868)
Detroit, Mich.

Michigan State Library (unknown)
Lansing, Mich.

University of Minnesota, Wilson Library (1907)
Minneapolis, Minn.

University of Mississippi Library (1833)
University, Miss.

University of Montana Library (1909)
Missoula, Mont.

Nebraska Publications Clearinghouse, Nebraska Library Commission (1972)
Lincoln, Nebr.

University of Nevada Library
Reno, Nev.

Newark Public Library (1906)
Newark, N.J.

University of New Mexico, Zimmerman Library (1896)
Albuquerque, N.M.

New Mexico State Library (1960)
Sante Fe, N.M.

New York State Library (unknown)
Albany, N.Y.

North Dakota State University Library (1907)
Fargo, N.D.

Ohio State Library (unknown)
Columbus, Ohio

Oklahoma Department of Libraries (1893)
Oklahoma City, Ok.

Portland State University Library (1963)
Portland, Oregon

State Library of Pennsylvania (unknown)
Harrisburg, Pa.

*Date of founding. Documents are retained from this date.

Texas State Library (unknown)
Austin, Tex.

Texas Tech University Library (1935)
Lubbock, Tex.

Utah State University, Merrill Library Center (1907)
Logan, Utah

University of Virginia, Alderman Library (1910)
Charlottesville, Va.

Washington State Library (unknown)
Olympia, Wash.

West Virginia University Library (1907)
Morgantown, Va.

State Historical Society Library (1870)
Madison, Wis.

Milwaukee Public Library (1861)
Milwaukee, Wis.

Wyoming State Library (unknown)
Cheyenne, Wy.

NOAA FORM 29-3 (5-77)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMIN.

GEODETIC CONTROL DATA AUTOMATIC MAILING LIST AGREEMENT

1. REQUISITION OR ORDER NO.

2. NOAA AGREEMENT NO.

INSTRUCTIONS – (See reverse side). Return original to the National Geodetic Survey Information Center, C18, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.

3. DATE

4. APPLICANT

5. DELIVERY INSTRUCTIONS

6. ☐ New subscribers are requested to complete all applicable items.

7. **IMPORTANT NOTICE**

☐ A renewal of free subscriptions is required annually by the Congressional Joint Committee on Printing. Your signature below indicates that you wish to continue receiving this service. Your name will be removed from the mailing list if these forms are not returned within 21 days. **EXPIRATION DATE**

8. ☐ User charge subscriber – Review your requirements and confirm your subscription agreement by signing item 13.

9. DESCRIPTION OF MATERIAL DESIRED, INCLUDING AREA. Horizontal and vertical data may be ordered separately.

☐ NUMBER OF COPIES ☐ VERTICAL CONTROL ☐ HORIZONTAL CONTROL ☐ DIAGRAMS

LATITUDE °

LONGITUDE °

10. ☐ Check here if the applicant desires an initial shipment of all available material described above. The purpose of this shipment is to establish initial file.

11. The applicant agrees to accept all material sent under the agreement and to pay for the same upon receipt. Prices will be based on the current price list

12. This organization is qualified to receive free data and diagrams as:
☐ Federal Government ☐ Educational Institution ☐ Library

13. AUTHORIZED OFFICIAL *(Applicant)*	NAME	TITLE	
	SIGNATURE		DATE
14. ACCEPTED FOR NATIONAL GEODETIC SURVEY	NAME	TITLE Director, National Geodetic Survey Information Center National Geodetic Survey, NOS, NOAA	
	SIGNATURE		DATE

SUPERSEDES PREVIOUS EDITION.

GEODETIC DATA
AUTOMATIC MAILING SERVICE

The automatic mailing service for geodetic control data provides the mechanism through which users maintaining active files receive newly published data automatically for a specific area. To facilitate this service, it is necessary that the desired area be composed of complete quadrangle units.

The standard quadrangles of geodetic control data are 30' of latitude by 30' of longitude. However, in congested control areas, standard quads are 15' of latitude by 15' of longitude, and in Alaska, due to the sparsity of control, quadrangle units are 1° of latitude by 1° of longitude. Data are now available in these formats for approximately 75 percent of the U.S. with the remaining 25 percent being in a different format and available by county. In the latter areas, it will be necessary to furnish complete county coverage for all counties falling in your defined area until the data has been converted to the quadrangle format. Unadjusted data are also available through the automatic mailing service, but only on special request.

The prices for initial data furnished through the automatic mailing service are the same as for individual orders. Revised or additional published data for the requested area will be furnished thereafter for an annual charge of $2.00 and no additional charge for the data. Prices include postage; data for unadjusted projects and special handling charges are additional.

A bill for the initial shipment will accompany the data. A bill for the $2.00 annual charge will be forwarded annually thereafter. It is necessary that a copy of each bill accompany your payment to insure proper credit.

Federal Government organizations may be furnished limited quantities of these data free for their jurisdiction. In addition, tax supported educational institutions and libraries which are designated depositories for government publications may be furnished free one copy of all data within their area or State. Such organizations should complete this form, check the appropriate blocks in Item 12, and certify by the signature of a responsible official.

INSTRUCTIONS FOR COMPLETION OF FORM

Items 1, 2, and 3 For bureau use only.

Item 4 Correct if necessary. It is preferred that the mailing address be an office or position rather than an individual. Please include your zip code.

Item 5 Any special instructions for mailing data, if other than shown in Item 4.

Items 6 - 8 Self-explanatory.

Item 9 Area requirements may be described by a detailed written description or by filling in the appropriate boxes and outlining the geographic area on the printed grid. A small attached map outlining the area of interest is also acceptable. Data will be furnished to meet your requirements within the limitations described previously.

Item 10 If an initial set of data for the area described in Item 6 is required, check this block.

Items 11 - 14 Self-explanatory.

NOAA Technical Reports National Ocean Survey
National Geodetic Survey Subseries

NOS 65 NGS 1 The statistics of residuals and the detection of outliers. Allen J. Pope, May 1976, 133 pp. (NTIS PB258428).

NOS 66 NGS 2 Effect of Geoceiver observations upon the classical triangulation network. Robert E. Moose and Soren W. Henriksen, June 1976, 65 pp. (NTIS PB260921).

NOS 67 NGS 3 Algorithms for computing the geopotential using a simple-layer density model. Foster Morrison, March 1977, 41 pp. (NTIS PB265421).

NOS 68 NGS 4 Test results of first-order class III leveling. Charles T. Whalen and Emery Balazs, November 1976, 30 pp. (NTIS PB265421).

NOS 70 NGS 5 Selenocentric geodetic reference system. Frederick J. Doyle, Atef A. Elassal, and James R. Lucas, February 1977, 53 pp. (NTIS PB266046).

NOS 71 NGS 6 Application of digital filtering to satellite geodesy. Clyde C. Goad, May 1977, 73 pp.

NOS 72 NGS 7 Systems for the determination of polar motion. Soren W. Henriksen, May 1977, 55 pp.

(Continued from inside front cover)

NOS NGS-6 Determination of North American Datum 1983 Coordinates of Map Covers. T. Vincenty, October 1976. (PB262442/AS)

NOS NGS-7 Recent Elevation Change in Southern California. S.R. Holdahl, February 1977.

NOS NGS-8 Establishment of Calibration Base Lines. Joseph F. Dracup, Charles J. Fronczek, and Raymond W. Tomlinson, August 1977.

NOAA SCIENTIFIC AND TECHNICAL PUBLICATIONS

NOAA, the *National Oceanic and Atmospheric Administration*, was established as part of the Department of Commerce on October 3, 1970. The mission responsibilities of NOAA are to monitor and predict the state of the solid Earth, the oceans and their living resources, the atmosphere, and the space environment of the Earth, and to assess the socioeconomic impact of natural and technological changes in the environment.

The six Major Line Components of NOAA regularly produce various types of scientific and technical information in the following kinds of publications:

PROFESSIONAL PAPERS — Important definitive research results, major techniques, and special investigations.

TECHNICAL REPORTS—Journal quality with extensive details, mathematical developments, or data listings.

TECHNICAL MEMORANDUMS — Reports of preliminary, partial, or negative research or technology results, interim instructions, and the like.

CONTRACT AND GRANT REPORTS—Reports prepared by contractors or grantees under NOAA sponsorship.

TECHNICAL SERVICE PUBLICATIONS—These are publications containing data, observations, instructions, etc. A partial listing: data serials; prediction and outlook periodicals; technical manuals, training papers, planning reports, and information serials; and miscellaneous technical publications.

ATLAS—Analysed data generally presented in the form of maps showing distribution of rainfall, chemical and physical conditions of oceans and atmosphere, distribution of fishes and marine mammals, ionospheric conditions, etc.

Information on availability of NOAA publications can be obtained from:

ENVIRONMENTAL SCIENCE INFORMATION CENTER
ENVIRONMENTAL DATA SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

3300 Whitehaven Street, N W
Washington, D C 20235

NOAA--S/T 77-2818