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SUPPLEMENT TO DEPARTMENT OF DEFENSE WORLD GEODETIC SYSTEM 1984 TECHNICAL REPORT

PART II

PARAMETERS, FORMULAS, AND GRAPHICS FOR THE PRACTICAL APPLICATION OF WGS 84

UNCLASSIFIED

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This technical report, Part II of a three-part supplement to the Department of Defense (DoD) World Geodetic System 1984 (WGS 84) Technical Report, DMA TR 8350.2, presents the parameters, formulas, and graphics for the practical application of WGS 84. The development of WGS 84 was initiated for the purpose of providing the more accurate geodetic and gravitational data required by DoD navigation and weapon systems. The new system represents the Defense Mapping Agency's modeling of the earth from a geometric, geodetic, and gravitational standpoint using data, techniques, and technology available through early 1984.

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18. SUBJECT TERMS

Angular Velocity of the Earth, Astronomic Nutation, Average Value of Theoretical Gravity, Besselian Epoch, Celestial Ephemeris Pole, Conventional Inertial System, Conventional Terrestrial Pole, Conventional Terrestrial System, Coordinates, Coordinate Accuracy, Coordinate Systems, Datums, Datum Shifts, Datum Transformations, Datum Transformation Multiple Regression Equations, Degree Variances, Dynamical Ellipticity, Earth Gravitational Constant, Earth Gravitational Model, Earth's Mass, Earth's Moments of Inertia, Earth's Rotation, Ellipsoid Constants, Ellipsoid Flattening, Ellipsoidal Gravity Formula, Ellipsoid Parameters, Ellipsoid Semimajor Axis, Equatorial Gravity, Flattening, General Precession, Geodesy, Geodetic, Geodetic Heights, Geoids, Geoid Heights, Geoid Undulations, Gravitation, Gravitational Coefficients, Gravitational Model, Gravitational Potential, Gravity, Gravity Anomaly Degree Variances, Gravity Formula, Gravity Potential, Instantaneous Terrestrial System, Julian Epoch, Local Datums, Local Geodetic Datums, Local Geodetic Systems, Local Geodetic System-to-WGS 84 Datum Shifts, Local Geodetic System-to-WGS 84 Datum Transformations, Lumped Gravitational Coefficients, Mass of the Earth's Atmosphere, Mean Datum Shifts, Molodensky Datum Transformation Formulas, Multiple Regression Equations, NAVSTAR GPS-Derived WGS 84 Coordinates, NSWC 9Z-2 to WGS 84 Transformation, Normal Gravity, Normal Gravity Formula, Normal Gravity Potential, Nutation, Polar Motion, Precession, Reference Frames, Reference Systems, Seven Parameter Datum Transformation, Theoretical Gravity, Theoretical Gravity Formula, Theoretical Gravity Potential, World Geodetic System, World Geodetic System 1972, WGS 72, WGS 72-to-WGS 84 Transformation, World Geodetic System 1984, WGS 84, WGS 84 Coordinates, WGS 84 Coordinate Accuracy, WGS 84 Coordinate System, WGS 84 Ellipsoid, WGS 84 Ellipsoidal Gravity Formula, WGS 84 Earth Gravitational Model, WGS 84 Geoid, WGS 84-to-Local Geodetic System Datum Transformations, WGS 84 Reference Frame, WGS 84 Reference System.

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DMA maintains close liaison with civilian agencies of the United States Government engaged in MC&G activities and works closely with various national and international scientific and operational organizations in the MC&G field.

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DEFENSE MAPPING AGENCY TECHNICAL REPORT 8350.2-B

Supplement to Department of Defense
World Geodetic System 1984 Technical Report:

Part II - Parameters, Formulas, and Graphics
for the Practical Application of WGS 84

FOREWORD

1. This technical report, Part II of a three-part supplement to the Department of Defense (DoD) World Geodetic System 1984 (WGS 84) Technical Report, DMA TR 8350.2, presents the parameters, formulas, and graphics for the practical application of WGS 84. WGS 84 was initiated to provide more accurate geodetic and gravitational data required by DoD navigation and weapon systems. The new system represents the Defense Mapping Agency's (DMA) geometric, geodetic, and gravitational modeling of the Earth using data, techniques, and technology available through early 1984.

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MARCUS J. BOYLE
Colonel, USAF
Chief of Staff

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PREFACE

This technical report is Part II of a three-part supplement to the Department of Defense (DoD) World Geodetic System 1984 (WGS 84) Technical Report, DMA TR 8350.2. The latter provides a brief discussion of WGS 84 and its relationships with local geodetic systems. Part I of the supplement discusses WGS 84 and the methods, techniques, and data used in developing the parameters and products that define it. Considerable space is devoted in Part I to the discussion of the WGS 84 Reference Frame, Ellipsoid, Ellipsoidal Gravity Formula, Earth Gravitational Model, Geoid, and methods and procedures for obtaining WGS 84 coordinates. This report (Part II of the supplement) contains final values for the WGS 84 defining parameters and products, their accuracies, and formulas relevant to the implementation. Most of Part II consists of graphical and tabular materials for converting 83 local geodetic systems to WGS 84. Part II is largely self-contained in that the contents, with a few exceptions, completely define WGS 84. Although WGS 84 is essentially an unclassified system, the associated Earth Gravitational Model (and its corresponding geoid) above degree (n) and order (m) 18 are CLASSIFIED. These materials comprise Part III of the supplement, which treats the CLASSIFIED portion of WGS 84.

Requesters requiring additional information, data, or Part III of the supplement should forward their request to:

Director
Defense Mapping Agency
ATTN: PR
Building 56
United States Naval Observatory
Washington, DC 20305-3000

Similarly, requesters requiring the positioning of sites of interest directly in WGS 84 via Satellite Point Positioning utilizing ground-based receivers should transmit their requirements to the above address. Other WGS 84-related requests or questions may also be referred there.

Since WGS 84 is comprised of a consistent set of parameters, organizations involved in a DoD application should not make a substitution for any of the WGS 84-related parameters in an attempt to improve the accuracy. Such a substitution may lead to less accurate WGS 84 products.