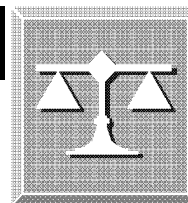


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General Schedule
Position Classification Standards



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POSITION CLASSIFICATION
STANDARD
FOR
GEODETIC TECHNICIAN
SERIES,
GS-1374



Workforce Compensation
and Performance Service



NOTE

This standard has been converted from the original paper format to electronic format without substantive change in series coverage or grading criteria. The standard was reviewed to correct errors that may have been introduced during the conversion process. In some standards minor corrections were made such as updating references to other documents that may have become obsolete, or correcting minor typographical errors in the original standard. Any errors that remain due to conversion to electronic format should be minor and are not intended to change the meaning of the original standard.

If you find page references near the right hand margin of this standard they indicate the pagination of the official, printed version of this standard. For example, a notation "PAGE 2, 4/88, TS-87" would mean that (1) page two of the printed version begins here, (2) the date of issuance was 4/88, and (3) the Transmittal Sheet number was TS-87.



Geodetic Technician Series

GS-1374

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SERIES DEFINITION¹

This series includes positions the duties of which are to supervise or perform technical work in the analysis, evaluation, processing, computation, and selection of geodetic survey data. These positions require a practical knowledge of theories and techniques of geodesy particularly as they relate to the identity, reliability, and usefulness of geodetic control data but not a full professional knowledge of geodesy as required in the execution and adjustment of geodetic surveys or the mathematical transformation of geodetic datum systems.

The work of this series centers around the function of treating data derived through the measurement of distances, elevations, areas, angles and related characteristics and phenomena of the earth's surface so that they can be used in the development of logical metrical descriptions of areas of the earth. Such metrical descriptions are essential to the accomplishment of many aspects of cartographic, engineering, and navigational work.

Since the work requires an understanding of how data are developed through survey processes and involves the use of mathematical methods as described in standards for other series (e.g., [Surveying Technician Series, GS-817-0](#), [Mathematics Technician Series, GS-1521-0](#), etc.) it is not always possible to differentiate between the work of this series and that of certain positions in related series solely on the basis of duties performed. Consequently, in distinguishing between the work of this and closely related series, it should be recognized that even though the duties and responsibilities of the technician position are of basic importance for classification purposes, the environment in which the position functions and other

¹ This standard is based on a draft prepared by the Army Map Service of the Corps of Engineers, Department of the Army.



factors may affect the qualification requirements and the classification of the position. *Thus, where an organization has a primary geodetic mission and the staff includes professional geodesists, the treatment of data derived through the measurement of distances, elevations, areas, angles and related characteristics and phenomena of the earth's derived through the measurement of distances, elevations, areas surface would normally be performed by geodetic technicians.*

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On the other hand, in an engineering organization the processing of such data might be performed by civil engineering technicians working under the supervision of civil engineers. Similarly, where reduction of data is accomplished in direct support of broad scientific studies, the work might be performed by mathematics technicians. Surveying technicians perform preliminary field work of this nature before, during, and after surveys. The essential point is that while geodetic technicians are in a sense specialists in geodetic data, the procedures established for adjusting data derived from geodetic surveys are not the exclusive domain of any one occupational series. *However, this kind of work is the essence of this series, whereas in the related series it is one of several functions.* Accordingly, in determining the series in which such work is most appropriately classified, it is necessary to take into account the kind of background qualifications required, and the normal line of promotion within the organization.

Relationship of this series to the Geodesy Series, GS-1372-0

Part VI of the introduction to the [Engineering and Architecture Group, GS-800-0](#), contains basic criteria for distinguishing between the work of professional occupations and technician occupations. The principles contained therein are equally applicable in distinguishing between the work of the Geodetic Technician Series, GS-1374-0, and that of the [Geodesy Series, GS-1372-0](#).

In order to understand how the work discussed in this standard relates to the broader professional field of geodesy it is useful to think of the field of geodesy as including four major areas of concern: (1) conducting theoretical investigations of the form and size of the earth; (2) establishing positions of points on the earth by a variety of precise measurement techniques; (3) applying mathematical methods in the computation and adjustment of observational data, and the transformation of datum systems; and (4) analyzing and evaluating for use, fundamental geodetic control data. Geodetic technicians are primarily concerned with technical office operations relating to the last two of these.

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DEFINITIONS

For the purpose of this standard the following terms are defined:

Adjustment. -- The overall process of determining and applying corrections corresponding to errors affecting the observations; making the observations consistent among themselves; and coordinating and correlating the derived data.

Analysis, descriptive. -- Examination of data and visual comparison with other control data on hand in order to identify, screen out duplicates, correct errors noted by examination, and integrate new with old geodetic control.

Analysis, graphic. -- Analysis of control positions appearing on maps, or control points that have been plotted at convenient scale on map overlays to give a visual representation of location, distribution, and density. The interest is in geodetic systems more than in individual control points. This form of analysis is useful in locating or verifying positions, determining common stations between overlapping or adjoining triangulation nets or traverse lines, revealing discrepancies between the coordinates or elevations of supposedly common stations, and pointing up errors in field work or computations.



Analysis, mathematical. -- Computation of data or testing of computations given, that may extend to recomputing the location of stations or portions of nets where discrepancies occur. Computations may relate to any method or order of survey, necessitating a grasp of all of the standard geodetic computation procedures, and sufficient knowledge of the literature of geodesy to locate and apply the correct procedure to nonstandard problems.

Datum. -- Any numerical or geometrical quantity or set of such quantities which may serve as a reference or base for other quantities.

Geodetic control. -- Any system of control stations established by geodetic methods.

Traverse survey. -- A sequence of lengths and directions of lines between points on the earth, obtained by or from field measurements, and used in determining positions of the points.

Triangulation arc. -- Any system of triangulation forming a band or belt on the surface of the earth or the corresponding system of positions, lines, and angles on the surface of the spheroid of reference.

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BACKGROUND INFORMATION

Geodetic control data are needed wherever there are requirements for precise positioning of points on or relative to the earth's surface. These uses are ever-increasing in number and variety by both Government agencies and private concerns. The need for geodetic data to support developments in space technology and other advanced civilian and military programs makes it increasingly important that the United States have control data of known accuracy and reliability for all areas of the world. Some of these worldwide control data are being obtained by geodetic surveys in foreign areas currently being executed under United States specifications and adjusted by United States methods but for vast



areas of the world the only available geodetic data are the results of surveys over which the United States had no control, with possibly obscure origins and questionable reliability.

This situation has resulted in a tremendous collection effort in which geodetic information in any form, and of every country, date of origin, description, and state of usefulness, is being gathered, researched, and identified, fitted systematically together, analyzed descriptively and mathematically, and converted to usable form.



NOTES ON USE OF THIS STANDARD

Most geodetic technicians are concerned with some aspect of the work necessary to derive useful geodetic control from available survey data. The demands imposed on the technician in accomplishing this conversion will vary with (1) the status of geodetic control which is an indicator of the degree of consistency and continuity characterizing the available data and (2) the definiteness of the criteria for judging the value of geodetic data in relation to their intended use. Accordingly, the characteristics identified with the grade levels emphasize the relationships between these two basic considerations.

The traditional classification factors have been used in determining the characteristics of the various grade levels but, with the exception of supervision received, have not been discussed as separate entities. It should be noted that in describing the characteristics of work at the various grade levels, certain work has been identified as being of the "full performance level." This is an abbreviated way of saying (a) that the work referred to is performed in accordance with normal work-flow procedures as opposed to being performed on a selective basis, and (b) that supervisory advice and assistance in connection with the work referred to is largely limited to that requested by the employee.

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Status of Geodetic Control. -- This standard uses the term "Status of Geodetic Control" as a means of applying to individual assignments the first of the basic considerations mentioned above, i.e., the degree of consistency and continuity characteristic of the available data.

The characteristics of the data to be used in deriving requisite geodetic control are identified below in terms of their relatedness to clear status control data on the one hand versus obscure status control data on the other. While it is improbable that any set of data will possess all the characteristics of either extreme, most data will



possess several elements in combination so that it is possible to decide that their essential nature places them in one of the two categories.

CLEAR-STATUS CONTROL DATA	OBSCURE-STATUS CONTROL DATA
Origin known.	Origin unknown or vague.
Identified as to position, order, datum, spheroid.	Unidentified or incorrectly identified; frequently old survey work or new work added onto old.
Relationship to geodetic system apparent.	Relationship to geodetic system unknown; frequently fragmentary or heterogeneous.
May be either raw or adjusted by acceptable standard methods.	Usually adjusted by nonstandard methods.
Field books available and clear as to work done and instruments used.	Field books may be available but may contain inconsistent or misleading entries, or inadequate descriptions and recovery notes; may be in a foreign language with semantic problems present.
US accuracy standards used.	Local accuracy standards may not be equivalent to those of the US.
Careful field work performed.	Careless field work performed, e.g., insufficient observations, incomplete recording, obsolete and inaccurate instruments used.

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It is essential that this judgment about the status of geodetic control data be made in terms of the character and variety of the *source data as assigned to a given position*. It cannot be assumed that all



positions connected with a project involving obscure-status data are thereby enhanced. A project involving massive amounts of obscure-status control data may require segmenting the work into small sets of repetitive operations in assembly-line fashion. This situation may result in a relatively large proportion of the low-level work assignments. Again, as obscure-status control passes through the chain of analytical operations, its status becomes more and more clarified, so that in final operations such as preparing for publication, this consideration may be of little relevance.

Definiteness of the criteria for judging the value of geodetic data in relation to their intended use.

As previously pointed out, the level of difficulty of the work involved in deriving useful geodetic control from available data is in large part a function of the relationship between the status of the available data and the definiteness of the criteria for judging the value of geodetic data for intended uses. The significance of the latter consideration (definiteness of evaluation criteria) can best be understood in terms of the effect it has on the character of the knowledges required of geodetic technicians.

The adjustment of geodetic data involves a variety of methods of quantitative reasoning (extrapolation, statistical inference, etc.) and the work of many geodetic technician positions permits primary reliance on mathematical techniques and procedures which though quite sophisticated are nevertheless well established. In other types of assignments the available data provide inadequate information to rely on quantitative reasoning exclusively, and competence in established data adjustment procedures must be supplemented by the use of methods which are not as well controlled procedurally. For example, if the source material available is too fragmentary to test mathematically, it may be necessary to make operational decisions with respect to its use on the basis of (1) an overall judgment of the capability of the originating geodetic activity and the methods it characteristically uses, and (2) a judgment as to the potential effects



of the limitations in the obtainable geodetic control on the uses which the control must serve.

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Accordingly, whether the evaluator of geodetic control works against the firm mathematical criteria or whether he must evaluate available data against broad nonquantitative criteria (e.g., whether obtainable geodetic control would support a large-scale map) is a significant indicator of the scope and character of geodetic knowledges required and hence of the level of difficulty of an assignment.

This series is designated as a one-grade interval series. The absence of grade-level criteria for any given grade in no way precludes classification in such a grade where warranted on the basis of relevant cross series comparisons and logical extension of the criteria is this standard. The title of *Geodetic Aid* is authorized for positions classified in grades below GS-5.

Supervisory positions are included in this series, but this standard does not provide criteria for classifying positions in which supervisory responsibilities are grade controlling. Positions requiring supervisory qualifications should be identified by prefixing the term "Supervisory" to class titles as established in this standard. Where the evaluation of supervisory responsibilities is essential for a grade determination, refer to the [General Schedule Supervisory Guide](#).

Grade-level criteria in this standard primarily depict technician positions in large-scale geodetic processing operations. While unique, atypical or small-scale operations are not treated as such, evaluation of positions in such operations can be made by comparison with the grade-level criteria in this standard.

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GEODETTIC TECHNICIAN, GS-1374-05

GS-5 technicians use a variety of established methods such as those required in the organization and preliminary processing of geodetic data. In using these methods, the technician is expected to evidence a general understanding of the scientific concepts represented by the geodetic terms and symbols involved, and to be familiar with basic sources of geodetic data and their characteristic limitations. Much of the work performed is in support of difficult and extensive data analysis projects, and in these instances the work results are supplied to employees of higher grade for incorporation into major work products.

Where the sources of data used are clearly identified and systematically organized the work is not closely supervised. Where work situations involve a wide variety of unorganized and incompatible primary and secondary sources, detailed instructions are furnished. In either case, the GS-5 level requires a full application of the knowledges described above, and the ability to acquire through training the knowledges and skills demanded at higher levels. Positions at GS-4 and lower levels, by contrast, require selected portions of these knowledges as applied to limited segments of the processing work.

GEODETTIC TECHNICIAN, GS-1374-07

This represents the full-performance level in work situations which involve the use of clear-status data and in which the evaluation of geodetic data for use can be based on established, well-defined criteria, e.g., determining whether a control station is within stated accuracy requirements permitting inclusion or demanding exclusion from a network of geodetic control. Normally, established procedures are pertinent to such assignments and detailed supervisory assistance is limited to unusual circumstances.



In work situations concerned with analysis and use of obscure status data, the GS-7 technician functions principally as a factfinder, carrying through complete analytical operations on blocks of data and arriving at tentative evaluations, recommendations, and selections. This involves concern with how the data may be converted to common terms and with the interrelationships between the data established. The techniques of descriptive and graphic analysis are independently adapted for use, but the mathematical analysis of obscure-status data is normally performed following selection of method and explanation of procedure by higher- grade employees

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GEODETIC TECHNICIAN, GS-1374-09

This is a full-performance level for technicians engaged in analysis of obscure-status data where there is responsibility for selecting and using all analysis techniques-descriptive, graphic, and mathematical-in combination as needed to establish the identity and improve the status of source data.

Data adjustment work characteristic of this level involves selecting the appropriate adjustment method for use in situations that are nonstandard. The nonstandard character of the work may derive from field data that are deficient in quantity or quality to make a satisfactory adjustment by direct standard methods, or it may derive from innovations in field instruments and procedures that introduce new conditions to the adjustment procedure. In all such cases the grade-determining factor of the work lies in the judgment necessary in selecting and adapting the method rather than in making the computations. An example of an innovation in field instruments is the use of airborne electronic distance measuring equipment in surveys. This introduces new problems in computation because it makes use of principles (e.g., time-for-signal-return) not covered by long-established procedures.



In assignments of this level there is frequently responsibility for much work which provides the technician with knowledge of the relationships between technical characteristics of geodetic data and the needs of the work situations in which the geodetic data are to be used, e.g., how map scale, coverage, and the method used in map construction affect the requirements for geodetic control. Such work may be present at lower levels and is not in and of itself of GS-9 level. Its significance is not that it identifies a particular level, but rather that it illustrates the increasing breadth of the bases on which judgments are made concerning the evaluation of data. As there is greater understanding of how different approaches to the solution of cartographic or engineering problems affect the minimal acceptable characteristics of geodetic control, there is increasing capability for evaluating the usefulness of available geodetic control in terms of essential needs of the using activity. In other words, there is a developing capability for evaluating the usefulness of available data against broad non-quantitative criteria.

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GEODETTIC TECHNICIAN, GS-1374-11

GS-11 technicians plan and accomplish complex projects² which require (1) an understanding of the full range of analytical techniques used in converting obscure-status data to usable form, and (2) an understanding of the considerations affecting the usefulness of geodetic data in the varied applications for which the data are required, i.e., capability of evaluating the usefulness of available data against broad non-quantitative criteria. Representative of such work is an assignment to provide complete geodetic servicing for a project to map a large geographic area, e.g., Eastern Europe, using cartographic source material. Geodetic servicing in such a case might entail performing descriptive, graphic and mathematical

² A "project" for these purposes may be generally defined as a block of work, usually designated by staff planning elements and identified by a title or number, requiring unified treatment of data and production of specified end products.



analysis of hundreds of map sheets in many map series and based on numerous spheroids, datums and grid systems, in order to evaluate the geodetic adequacy of cartographic sources as the basis for new maps. On the basis of this analysis the technician then presents various conclusions and instructions pertaining to the geodetic elements of the new maps, such as preferred maps to use as basic sources, instructions for positioning source maps, symbolizing control, and correctly designating horizontal and vertical datum of the proposed compilation; and estimated geodetic accuracy classification of resulting maps applying national map accuracy standards. The GS-11 technician may also advise on the procurement of additional geodetic information, e.g., obtaining additional aerial photography so that certain operations can be accomplished photogrammetrically to improve the status of geodetic control.

Assignments at this level are extensive in scope. The difficulty in planning, coordinating, and directing work of such scope is accentuated by: the flow of data into and out of the organization for translating, automatic data processing, computing, reproducing, or other servicing; the necessity to break large projects into workable segments and sequences; and the necessity for preparing contract specifications in such a way as to assure the necessary uniformity of treatment.

Assignments of this nature are typically found in organizations where the project management load is heavy and the technician shares with the supervisor the technical overseeing of the work of the organization in addition to being responsible for other special assignments.

