TS-61 April 1966

General Schedule
Position Classification Standards

WCPS-2 August 2002

POSITION CLASSIFICATION STANDARD FOR INDUSTRIAL ENGINEERING TECHNICIAN SERIES, GS-0895

Workforce Compensation and Performance Service

Theodore Roosevelt Building 1900 E Street, NW Washington, DC 20415-8330 Classification Programs Division

Industrial Engineering Technician Series

GS-0895

TABLE OF CONTENTS

SERIES DEFINITION[1]

This series includes nonprofessional technical positions engaged in industrial engineering work. Industrial engineering technician positions are concerned primarily with planning, designing, analyzing, improving, and installing integrated work systems comprised of men, materials, and equipment, for use in producing products, rendering services, repairing equipment, or moving and storing supplies and equipment. The work typically involves studies of engineered time standards, methods engineering, layout design of work centers, control systems, materials handling, or manpower utilization. It requires a knowledge of the principles and techniques of industrial engineering and practical knowledge of pertinent industrial and related work processes, facilities, methods, and equipment.

This series supersedes the Industrial specialization of the Engineering Technician Series, GS-0802.[2]

BACKGROUND

Industrial engineering technician positions are found in programs in the Federal service to provide advice to management in these areas: (1) *planning and organization* -- effective organization, standards, methods, systems, procedures, flow of work, materials handling, cost and control systems; (2) *facilities layout* -- the arrangement of machines, equipment, processes, and service areas into efficient and economical operating systems; (3) *plant design* -- the design of new buildings or alteration of existing buildings to provide for new or improved processes and functions; and (4) *industrial production planning* -- evaluating requirements for items to be produced, advising on production capability of contractors and Government-owned facilities, and production planning, which involves systems, machinery, equipment, products, work methods, procedures and standards.[3]

Industrial engineering programs are found primarily in industrial establishments such as shipyards, ordnance plants, arsenals, and aircraft overhaul and repair facilities. Programs of this type are also found in supply depots, research and development centers, and public works organizations.

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1 This standard is based in part on standards developed by the Department of the Navy and the Department of the Air Force

2 Reclassification of positions to this series from the former Industrial specialization of the Engineering Technician Series, GS-802, does not require re-examination of the experience and training of incumbents.

3 For more detailed discussion of these areas, see the classification standard for the Industrial Engineering Series, GS-0896, April 1960 and industrial engineering reference books.

Industrial engineering involves the application of scientific methods in systematic studies of the organization, accomplishment, and improvement of work effort. Studies typically involve planning, fact-finding, analyzing and evaluating data, reaching conclusions, preparing recommendations, gaining acceptance, and installing changes. The techniques applied are based largely on the mathematical, statistical, and engineering concepts of modern industrial management.

The purpose of these studies is to find a more economical and more efficient way to produce a product or render a service. Effective utilization of available resources is the primary objective.

Assignments to industrial engineering technicians may range from mere collection of data in a limited phase of a study, to responsibility for a major phase of an entire overall study, as in preproduction development of work methods for the manufacture of a prototype model. More typical are assignments in which the technician specializes in one or more phases of industrial engineering work, as in establishing engineered time standards, conducting methods improvement studies, or designing work center layouts.

A technician engaged in establishing *engineered time standards*, determines the time required by a qualified worker to accomplish a given task or operation in accordance with a specified method when working at a normal pace, using the allowed amount of personal time, without lost time. In undertaking such a study, the technician determines the techniques which will be used in gathering data and in setting the standard. The task is really one of determining essential elements in the work process and assigning time values.

Techniques available to the technician engaged in such work include: time study; performance rating; work sampling or ratio-delay, a random sampling technique; micromotion study, which utilizes slow-motion pictures; standard time data, which involves extraction of data from charts for specified job elements; measurement of machine interference involved in multiple machine operation; frequency studies, that is, recurrence of work steps; and predetermined motion times, using a system such as MTM (Methods-Time-Measurement), to analyze every manual motion and assign a predetermined time value which is determined by the nature of and conditions under which the motion is made. Other systems of this same type are work factor, basic motion time (BMT), and motion-time analysis.

A technician engaged in *methods improvement*, or methods engineering, analyzes each element of the work process to eliminate unnecessary motions, in determining the most efficient and economical method for accomplishing a given task or operation.

The technician engaged in such work studies current work processes and pertinent data and may use many of the techniques used in time studies. The technician reviews or prepares layout drawings and process charts, such as: sequence of operations; workflow; machine load, availability, and capability; multiple activity charts (also called man-and-machine charts, a graphic representation of the coordinated working and waiting time of two or any combination of men and machines); standard-data charts; manpower availability data; and cost data. The technician may also use micromotion (slow-motion photography) in charting current processes.

Technicians engaged in *layout studies* build the work center layout around standardized work methods and the operator who is to use those work methods. Operator comfort is important. Special thought is given to factors such as height of working surfaces, seating and footrest facilities, lighting, optional operation from a standing position, space for personal possessions, placement of tools, materials, fixtures, space requirements, and arrangement of machines for which the operator is responsible. Installation of new methods often requires alteration and redesign of equipment to facilitate easy movements and encourage use of correct methods.

Regardless of the functional activity, industrial engineering technicians characteristically prepare comprehensive written reports containing their recommendations and supporting data. They participate to a degree in selling their ideas for change to management. Even those who specialize in but one phase of industrial engineering are systems oriented; that is, they plan, design, improve, analyze, and install integrated systems of men, materials, and equipment. The various parts combine in creating an integrated work system. For example, standardized work methods are one of the prerequisites for establishing valid time standards. Working conditions and the work center layout are important, in that the flow of work must be uniform, equipment and materials must be standard.

Technicians normally acquire knowledge of the techniques and principles of industrial engineering through intensive classroom and on-the-job training. A partial listing of the subject matter covered gives a good indication of the areas of competence and the scope of the technician occupation. Subjects normally covered include: industrial management, work measurement, methods improvement, engineered time standards, methods-time measurement, layout design, materials handling, cost analysis, control systems, charting, human relations, and basic mathematical and statistical concepts.

The industrial knowledge and abilities needed by technicians to conduct industrial engineering studies include: a good knowledge of mechanical processes, some knowledge of materials, ability to read and interpret engineering drawings, ability to understand the significance of fine measurements and tolerances, ability to identify component parts and make sketches, and ability to understand shop language.

The industrial shops are an important source for recruitment of industrial engineering technicians. Shop experience aids the technician who has been trained in the principles and techniques of modern industrial management, to understand industrial work processes, to recognize nonstandard and waste motions, and to apply leveling factors. Such experience is also generally helpful in communicating with shop employees and supervisors.

OCCUPATIONAL BOUNDARIES AND DISTINGUISHING CHARACTERISTICS

The management techniques and principles which form the primary and essential knowledge requirement for industrial engineering technician positions are shared by several other occupations. Practical knowledge of the principles of mechanics and of industrial work processes which are also required of and applied by industrial engineering technicians is shared with additional technical occupations. The following paragraphs attempt to clarify occupational boundary lines and to indicate distinguishing characteristics.

1. *The professional Industrial Engineer, GS-0896*, performs duties which require application of professional knowledge of mathematics, physical and social science, and of the specialized subjects characteristic of industrial engineering. Normally, the professional industrial engineer acquires his knowledge through successful completion of a college curriculum, culminating in a bachelor's degree in industrial engineering. Professional positions, that is, those for which such knowledge is the paramount requirement, usually carry responsibility for planning, coordinating, and directing an entire industrial engineering program, or for a major phase of such a program, and are classifiable to the Industrial Engineering Series, GS-0896.

2. *Management Assistants, GS-0344,* and others may employ the same study techniques as do industrial engineering technicians. Management studies conducted by management technicians, industrial engineering technicians, and others may involve engineered time standards, methods improvement, and work center layouts

Industrial engineering technicians are typically associated with "blue-collar" activities in industrial organizations. The work performed requires knowledge of industrial management and technical knowledge of industrial practices. The work may involve studies of support and related activities such as production control, quality assurance, manpower utilization, and, at times, related office activities.

Management technicians are typically associated with "white-collar" activities requiring a knowledge of management techniques and practices in office, professional, administrative, and similar functional areas.

There is considerable intermingling of these positions; however, significant differences do exist, justifying recognition of different occupational groupings. In addition to the knowledge differences, the sources of recruitment differ. Industrial engineering technicians are usually recruited from technical institutes or shop areas; management technicians come largely from those with college-level training oriented to commerce and from office type occupations. Therefore, positions which require paramount knowledge of management practices and techniques, with little or no need for knowledge of engineering principles and techniques, are classifiable to the Management and Program Clerical and Assistance Series, GS-0344.

3. *Engineering Technician Series, GS-0802*. Positions the primary duties of which are to perform nonprofessional technical work in engineering functions such as research, development, design, evaluation, or test of equipment or structures, where the work requires primarily the application of some of the principles and techniques of a narrow or limited range of engineering, are classifiable to the Engineering Technician Series, GS-0802, or to other appropriate series within the Engineering and Architecture Group, GS-0800.

The determination of whether individual positions requiring knowledge as described above are classifiable to the Industrial Engineering Technician Series, GS-0895, the Engineering Technician Series, GS-0802, or other appropriate series requires inquiry into the purpose of the assignment and the knowledge required. For example, a technician position responsible for designing equipment, preparing specifications, and planning the installation of equipment may be classifiable to the Mechanical specialization of the Engineering Technician Series, GS-0802. A technician position responsible for reviewing the equipment designs, and recommending changes or responsible for preparing installation plans, *solely from the standpoint of optimum integration of the equipment into the industrial system in relation to men and materials*, is classifiable to the Industrial Engineering Technician Series, GS-0895.

The Industrial Engineering Technician Series, GS-0895, includes positions which are classified in the former Industrial specialization of the Engineering Technician Series, GS-0802. The GS-0895 series continues to be, in effect, the Industrial specialization of the Engineering Technician Series in that it is the technician counterpart of the professional Industrial Engineering Series, GS-0896. The GS-0895 Series has been established because of major differences between the two occupations in the kind of work, the purpose of the work, the knowledge and abilities required, and the qualifications examining techniques and considerations which are appropriate.

4. Positions which are responsible for planning, estimating, scheduling, and expediting the *use* of men, machines, and materials in specific manufacturing operations that employ mechanical production methods in the fabrication or repair of Government equipment and supplies are classifiable to the Production Control Series, GS-1152. The productive effort of production controllers is supported by industrial engineering technicians who design, install, and/or improve the individual work systems and operations involved.

5. Positions classifiable to the Industrial Specialist Series, GS-1150, employ an overall practical knowledge of the nature and operation of a specific industry or industries, including knowledge of materials, facilities, and work methods involved in the production of commodities, in fulfilling functions and activities such as: (a) developing and carrying out plans for the expansion, conversion, integration or utilization of industrial production facilities; (b) furnishing technical information, assistance, and advice concerning facilities, machinery, methods, materials, and standards for industrial production; (c) developing and/or administering provisions or regulations covering such matters as materials allocation, tariffs, export-import controls, etc; (d) conducting surveys of industrial plants to evaluate capacity and potential for production of specific commodities; and (e) planning, evaluating, and maintaining technical surveillance over Government-operated plants.

Industrial engineering technicians are also interested in the materials, facilities, and work methods involved in the production of commodities. The industrial engineering technician is, however, concerned primarily with details of design, installation, and/or improvement of work systems and operations.

6. Positions for which the paramount requirement is practical knowledge of industrial type equipment for these purposes: (a) collecting, analyzing, interpreting, and developing specialized information about equipment; (b) providing such information together with advisory service to those who design, test, produce, procure, supply, operate, repair, or dispose of equipment; and/or (c) developing, installing, inspecting, or revising equipment maintenance programs, are classifiable to the Equipment Specialist Series, GS-1670. Some industrial engineering technician positions are concerned with modification of equipment and the development of information on operational procedures and replacement programs; however, their concern with machinery and machine tools is only adjunct to studies (production operations, costs, methods and procedures, performance and time standards, etc.) involving the broader aspects of the integration of men, materials, and equipment.

SUPERVISORY POSITIONS

Criteria for classifying supervisory positions are not included in this standard. Positions requiring supervisory qualifications should be identified by the prefix "supervisory" and should be evaluated by reference to the General Schedule Supervisory Guide.

NOTES TO USERS

This is a one-grade interval series. This standard provides criteria for use in classifying positions in grades GS-4 through GS-11. The absence of criteria at grades GS-12 and above or below grade GS-4 does not preclude their use.

PLAN OF EVALUATION

Industrial engineering technician positions are evaluated by reference to three basic factors. These factors are: (a) the nature and scope of assignments; (b) judgment and initiative; and (c) level of responsibility. A brief discussion of each follows:

(a) *Nature and scope of assignments*

This factor measures the scope and complexity of the assignment. Involved here are: the type of studies assigned; the knowledge employed and the variety of industrial engineering techniques used in fact-finding and in the analysis of data; the range, complexity, and knowledge of the industrial processes, operations, systems, components, and/or products encompassed by the assignment; the number of variables which must be analyzed and considered in reaching valid conclusions; and the degree of prior planning and coordination required in executing assignments.

(b) *Judgment and initiative*

This factor measures the degree of judgment and initiative present and required in planning and executing industrial engineering studies.

Effective planning demands decisions: on approach, choice of methods, techniques to be used; area of coverage, timing, contacts, and fact-finding. The accomplishment of such studies and the reaching of valid recommendations demand the exercise of sound judgment based upon competent fact-finding and analysis as in: planning the flow of work for an industrial process; predetermining the essential steps in a manufacturing process to produce a new product; determining the best way to produce a product or render a service at lowest cost; and preparing and presenting recommendations for change in a manner which will facilitate acceptance and implementation.

Individual initiative is also required in executing industrial engineering studies. To probe continually and effectively, sometimes in the face of resistance, for new and less costly ways to accomplish work effort requires a high degree of individual initiative and stick-to-it-iveness.

Level of responsibility

The level of responsibility is based upon two criteria: controls exercised over the work of the industrial engineering technician by the supervisor; and the nature and purpose of contacts in executing studies. Included here, to a degree, is the kind of decisions and recommendations which go into the final product of the technician's work effort, and the review given these decisions and recommendations.

Controls: The nature and scope of the assignment and the stage of development of the technician have an effect on the kind of supervision exercised by the supervisor. Generally, technicians at the full operating level execute industrial engineering studies under general supervision. Gradations in difficulty occur as a result of variations in the type of instructions given, the degree of freedom granted to the technician in accomplishing his assignment, the extent to which completed staff work is expected of the technician, the review given to work during and upon completion, and the impact of recommendations for change. Typically, significant reports are subject to intensive review, since they may contain recommendations for far-reaching change.

Contacts: To execute an industrial engineering study normally requires considerable person-to-person contact. Although it is possible to apply some techniques in the relative isolation of one's desk, this is not typical operating procedure. Normally, fact-finding is a face-to-face experience in human exchange of ideas and information. The technician asks questions, listens, gathers opinions, records facts which are observed, and tests his ideas by "sounding them out" with shop employees and supervisors. The "selling" of recommendations for change to management is a crucial and significant aspect of industrial engineering work for it is the one way to assure implementation. In overall importance, the human aspects are secondary only to the technician's ability to prepare valid recommendations.

GRADE DESCRIPTION LEVELS

INDUSTRIAL ENGINEERING AID, GS-0895-04

This is a basic trainee level. Normally, trainees are given a period of intensive training in the principles and techniques of industrial engineering; a period of indoctrination to the industrial areas; and a period of on-the-job training in application of the principles and techniques of industrial engineering.

Tasks are selected to provide familiarization with industrial equipment, work processes, and shop language, plus experience in applying the principles and techniques of industrial engineering. Work is closely controlled, instructions are detailed and specific. The immediate supervisor is readily available, and work is checked in process and upon completion. Assignments permit little opportunity for decision making.

The scope and complexity of assignments is increased as the trainee gains competence. At this stage of development, work assignments are not unlike those found at the GS-5 level.

Personal contacts are with shop employees and supervisors in operating units, for purposes of gathering data.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-05

Nature and scope of assignments

This is a developmental level. Assignments involve continuing performance of the less difficult tasks involved in industrial engineering surveys and studies. Technicians usually assist higher grade technicians. Tasks assigned are selected to provide knowledge and experience in applying the principles and techniques of industrial engineering. Typical tasks may include: recording factual data in test and observation studies; performing calculations, applying standard formulas; searching reports to obtain information needed by higher level technicians.

Employees at this level are expected to demonstrate aptitude and increasing competence in applying these principles and techniques. The scope and difficulty of assignments is increased in helping employees to develop proficiency in this occupation.

Judgment and initiative

Written guides to the work are readily available, and are self-applying. The work assignments provide only limited opportunity to exercise judgment and display individual initiative.

Level of responsibility

Technicians work under the immediate supervision of a higher grade technician. Instructions are detailed and specify the scope of tasks, techniques to use, and contacts to be made. The supervisor is readily available to provide guidance and assistance.

Work is typically reviewed in detail for compliance with instructions, the adequacy with which basic principles and techniques are applied, and the appropriateness of tentative recommendations.

Personal contacts are with shop employees and supervisors in operating units, for purposes of gathering data.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-06

Nature and scope of assignments

Assignments are basically the same as those at GS-7. The kinds of studies assigned, the scope and level of difficulty of those studies, the guidelines, the principles and techniques to be applied, the required reports, and the kinds of recommendations made generally resemble GS-7 assignments.

Judgment and initiative

The GS-6 technician participates in development of study plans with the supervisor. Work sequence, methods, and techniques to be applied are predetermined or specified by the supervisor. The technician exercises judgment and initiative in gathering data, applying the principles and techniques of industrial engineering, and reporting, within the limits of the study plan, as the GS-7 technician does.

Level of responsibility

The GS-6 technician receives closer supervision than does the GS-7 technician. Reports and recommendations receive a more searching review. Operating freedom is diminished by the tighter supervisory controls.

Personal contacts are basically the same as at GS-7.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-07

Nature and scope of assignments

Assignments normally involve independent performance of studies of limited difficulty and scope in one function or phase of industrial engineering work, as in establishing engineered time standards for a specific shop, work center, work process, or work system. These studies may involve more than one work center or shop.

In a typical time standards study, the technician meets with the shop supervisor to arrange for fact-finding, selection of typical workers, units to be studied, and time scheduling. The technician then observes work operations, records data, breaks the work process down into individual elements, notes nonstandard and waste motions, discusses problem areas with the shop supervisor, evaluates the data, and sets the standard. The standard is contained in the study report prepared by the technician.

In a study to design the layout for a specific production work center or shop, the technician plans and draws layouts for assigned phases of the study, keeping in mind the objectives of efficiency and economy of time, effort, and materials. The technician studies equipment needs, recommends the type and quantity needed, and prepares drawings of electrical and plumbing systems. The technician discusses ideas, cost data, and recommendations with his supervisor and with plan service personnel and specialists. The technician revises drawings and plans as necessary. Recommendations are contained in the study report.

Industrial Engineering Technicians GS-7 select and apply pertinent industrial engineering principles and techniques, and general knowledge of shop processes and procedures.

Judgment and initiative

In executing assignments, technicians follow established policies, procedures, directives, manuals, and drawings which are largely self-applying. Technicians plan their work and determine the techniques which they wish to employ. For example, in a study to establish engineered time standards the technician determines whether to use time study, MTM, work factor, or standard data. The technician employs judgment in analyzing the data collected, applies established formulae, computes allowances for fatigue, personal time, and ungovernable conditions, and establishes the standard. The technician also uses judgment when visualizing alternate ways to perform work operations, when analyzing the advantages and disadvantages of similar equipment, and when determining the most efficient workflow pattern. The technician employs a degree of initiative in discussing problem areas with the shop supervisor and in bringing nonstandard and waste motions to his attention.

Level of responsibility

Technicians work under general supervision. The supervisor establishes the work schedule, may suggest approaches, and indicates special conditions which may affect the study. Recommendations which have a significant impact in terms of cost or work organization are

reviewed and discussed as part of the study. Completed work is reviewed by the supervisor through discussions and review of reports for adherence to instructions, application of established guidelines and techniques, and adequacy of recommendations. Disputed recommendations are given more searching review.

Person-to-person contacts are primarily internal, with shop employees, shop supervisors, plant service personnel, and equipment specialists. Personal contacts are important, for if the technician is to be successful in gaining information and support for recommendations there must be confidence and cooperation from those contacted.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-08

Nature and scope of assignments

Assignments are basically the same as those at GS-9. The kinds of studies assigned, the scope and level of difficulty of those studies, the guidelines, the principles and techniques applied, the reports required, and the kinds of recommendations made generally resemble GS-9 assignments.

Judgment and initiative

The GS-8 technician exercises judgment and initiative in the execution and reporting of projects like that at GS-9. However, the supervisor participates to a significant degree in planning the assignment and suggests approaches to be used. Guidance is provided in solution of difficult and unusual problems.

Level of responsibility

The GS-8 technician receives closer supervision than does the GS-9 technician. The work receives a more searching review. (Such situations may arise when Wage Board employees, such as Planners and Estimators, are reassigned to perform industrial engineering technician work.) The tighter supervisory controls are applied until the technician reaches the full operating level of competence expected at the GS-9 level.

Personal contacts are basically the same as at GS-9.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-09

Nature and scope of assignments

Assignments are characterized as being difficult projects, requiring independent action by the technician in executing the assignment. Considerable knowledge of and ability to apply a full range of the pertinent principles and techniques of industrial engineering in combination with knowledge of mechanics and industrial work processes is required. Many technicians specialize in one or more of the major phases of the occupation, such as methods and standards, systems and procedures, or layout and equipment. A technician may be responsible for a study limited to a rather narrow area of specialization in several work center(s) or shop(s); the technician may be

responsible for a comprehensive study involving several areas of specialization within an assigned work center or shop; or the technician may serve as a member of a team working on an assigned phase of a larger project. In smaller activities, the technician may be required to work on all phases of the occupation on a regular basis.

Assignments at this grade level differ from those at lower grade levels in terms of scope and level of difficulty. Studies at this level encompass larger areas of the shops, and/or encompass a broader range of industrial engineering activities. Work processes studied are characterized as difficult, and relatively complete within themselves. Machinery and equipment involved, while complex in itself, is considered standard. The work problems which face the industrial engineering technician at this level are difficult, but not novel or unique. Generally, problems are solved through the application of standard techniques and practices of the occupation.

In methods and standards work, the technician may be assigned responsibility for establishing and maintaining engineered performance standards for an assigned production shop or a group of shops in a major industrial activity. In discharging this responsibility, the technician independently conducts methods engineering studies of work processes which are relatively complete in themselves; or, the technician conducts segments of larger studies which are coordinated by a technician or engineer of higher grade. In either instance, the technician analyzes material flow, operational sequence, worker environment, facilities and equipment utilization, manual motions, and machine operations. The technician develops manual and machine procedures, working from processing specifications and engineering directives. The technician conducts work measurement studies utilizing techniques such as random sampling, time and motion study, and micromotion predetermined time-data analysis to determine bottlenecks in material flow, unnecessary activity or duplicated processes, and manpower and equipment utilization. The technician develops standard time data and prepares reports in support of his conclusions and recommendations.

The technician who specializes in facilities layout and equipment studies, develops plant layout drawings, equipment lists, and bills of material for assigned shop areas. In conducting such a study, the technician confers with work measurement and production control technicians to verify number of operations and units being scheduled; conducts surveys and prepares operational sheets listing work processes and sequences; compiles workflow diagrams and materials handling data to effect more economical use of space, equipment, and manpower; prepares an equipment list to accompany layout, identifying each item and the number of units required; and compiles bills of material required to install machines, convert work areas, and renovate buildings. The technician prepares and issues the movement plan and, following approval, sets target dates and designates actions to be taken. The technician follows through to assure compliance with target dates, monitors installation of equipment, and makes minor layout changes as necessary.

The technician may be responsible for developing preproduction work methods and processes, listing the essential steps, for the manufacture of a prototype model. The problems encountered in developing work methods are characterized as being difficult but neither novel nor unique. In conducting such a study, the technician also gathers data and computes manpower and material costs in terms of the amount of time and material needed to produce the item.

Judgment and initiative

Technicians plan and execute assignments independently. Established guidelines such as policies, procedures, engineering drawings, manuals, directives, oral and written instructions are not self-applying; many must be interpreted.

Judgment and initiative in planning and execution are important since they may affect subsequent phases of the study. Decisions at the GS-9 level on procedural matters such as selection of techniques (also found at GS-7) assume greater importance due to the differences in scope and complexity of assignments and degree of supervision exercised over the work. Personal initiative and judgment also play an important role in determining the degree to which problems are to be studied. Where shall we find data? How shall we collect data? Is it valid? How deeply shall we probe? All of these things affect subsequent recommendations.

Level of responsibility Technicians at the GS-9 level work under general supervision. The supervisor, generally an engineer or technician of higher grade, outlines the scope of the project, known and suspected problem areas, available sources of data, anticipated end product, and deadline date. The technician is expected to handle problems which can be resolved within the scope of his responsibility without referral. Nonroutine, unusual, and precedent-setting problems are generally referred to and discussed with the supervisor.

Study reports and recommendations are generally well documented. Recommendations which are controversial, or exceed study limits in their effects, are reviewed closely for adherence to instructions, accuracy, achievement of objectives, and adequacy and soundness of procedures and recommendations. Recommendations which meet project objectives, do not exceed study limits in their effects, and which are generally acceptable to shop management, are implemented after a less searching review.

Personal contacts are with all levels of shop personnel in the assigned area of responsibility, and frequently with supervisors and professional personnel of other departments of the activity. These contacts are to give and obtain information, cooperation, and support for the resulting recommendations. The technician is required to maintain good working relationships.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-10

Nature and scope of assignments

Assignments are basically the same as those at GS-11. The kinds of studies assigned, the scope, difficulty and complexity of those studies, the guidelines, the principles and techniques applied, the need for creativity, the requirement for preparing comprehensive reports and recommendations, and/or the need to consolidate and integrate reports and recommendations of team members, generally resemble GS-11 assignments.

Judgment and initiative

The judgment and initiative exercised by GS-10 technicians is less than that at GS-11 in that the supervisor participates in planning the assignment and in developing approaches.

Level of responsibility

The primary difference from GS-11 is that supervisory controls are applied more tightly at the GS-10 level, diminishing the operating freedom characteristic of the GS-11 level.

Personal contacts are generally the same as those at GS-11, except that the GS-10 technicians are not typically required to meet with plant management to explain and defend controversial recommendations.

INDUSTRIAL ENGINEERING TECHNICIAN, GS-0895-11

Nature and scope of assignments

Technicians at this level are responsible for independently planning and executing, or for serving as leader of a team conducting, studies or surveys, characterized by one or more of the following: comprehensive studies involving scheduling, coordinating and integrating several phases, each of which is a complete assignment of itself; complex studies which require deviation from standard methods, techniques, and established policies; and studies which have a significant impact on the workload, operations, and/or costs of related organizations.

Technicians are required to have extensive knowledge of industrial engineering and expert ability to apply the principles and techniques. In addition, most assignments require extensive knowledge of a specific industry, industrial work process, product, and/or equipment.

A GS-11 technician specializing in standards and methods work, plans, coordinates, and conducts industrial engineering studies, which are extensive in scope, encompassing all or most all production shops within a large industrial installation. Comprehensive studies of this type relate to methods of operations, production problems, work standardization and simplification, cost of operations, engineered standards, facilities and equipment, manpower utilization, etc. Such studies involve evaluation of an entire work system, as all work processes necessary in the

dry docking of a seagoing vessel, or all of the required routine repair and inspection operations to be performed while the vessel is in dry dock.

A GS-11 technician specializing in layout and equipment studies, plans, designs, and recommends *complete facilities,* new or improved, for the manufacture and repair of Government property. Such studies result from requirements for a new or modified workload, or by survey to rearrange, repair, modify, and/or improve existing production methods and facilities. In planning such a study, the technician participates in management discussions on program plans, production requirements, proposed moves, expansions, etc. Using industrial engineering techniques, the technician assembles and analyzes pertinent data on facilities, equipment, tools, production records, quotas, methods of operation, flow of work, quality control, inspection requirements, and manpower utilization. The technician prepares detailed recommendations, justification, and specifications for accomplishing changes including: layout drawings showing location of machines, benches, aisles, materials handling and holding areas, clean rooms, offices, restrooms, power outlets, etc.; equipment lists showing types, capacity, operational efficiency, number of units needed, etc.; input items such as power requirements, heating, plumbing, etc.; cost estimates; manpower requirements, etc. The technician discusses recommendations with shop officials, engineering personnel, and planning staff. The technician plans, schedules, coordinates, and monitors implementation and installation phases.

A GS-11 technician specializing in production planning, develops detailed preproduction work methods for the efficient and economical manufacture, assembly, and testing of complex prototype models which have been developed by the activity. Such an assignment involves responsibility for detailing the work methods for a complex instrument or component such as a telescope or a mount, in one of the major systems of a fire control device; that is, in the electronics, optical, or mechanical-optical systems. The technician must anticipate production problems and may recommend design changes to facilitate production. In addition to visualizing work methods, the technician specifies the tools and equipment needed to manufacture, assemble, and test the items to be produced. The technician develops cost estimates in terms of the amount of man hours, material, and test equipment needed. The technician may plan and coordinate pilot production runs, recommending changes as inadequacies are noted, and provide advice on production problems to contractor representatives.

GS-11 technicians prepare comprehensive reports of completed studies. As team leaders they consolidate and integrate reports and recommendations of team members into the overall study report.

Judgment and initiative

Assignments at the GS-11 level require exercise of a high degree of judgment and initiative. The complexity of work problems demands not only that established guidelines be interpreted, but also that they be modified, adjusted, and applied with ingenuity in finding new approaches to the work at hand.

A high degree of personal motivation is expected of technicians at this level, in keeping abreast of new developments and the changing technology of the industrial field with which they are

associated. For example, a technician developing work methods for production of a product which employs the laser beam must be informed about lasers and their applicability to the problems at hand. The technician is expected to question, to probe, and to stretch his imagination, knowledge, and, at times, existing engineering concepts, in seeking the most efficient and most economical way to accomplish the work objective.

The need for a high degree of ability to innovate, for creativity, and for personal initiative and determination in solving problems is characteristic of this level.

Level of responsibility

Technicians at the GS-11 level work under general direction, with rather wide latitude for action. General objectives of the study, known and suspected problem areas, and deadline date are covered in instructions from the supervisor. The incumbent proceeds independently to execute the assignment, and is expected to make decisions on the unusual and unique problems without referral, keeping his supervisor informed as necessary.

Study reports contain recommendations which may have far-reaching effects, requiring agreement or accommodation by other departments. Controversial recommendations may be contested by other departments. Work is reviewed for attainment of objectives, compliance with instructions, adherence to policy requirements, and soundness of engineering judgments.

Personal contacts are with all level of shop personnel and involve frequent contact with supervisors, professional personnel, and middle managers in many different departments of the activity. These contacts are for the purposes of giving and gaining information, cooperation, and support for study recommendations. Technicians at this level may be required to participate in meetings with plant management to explain and defend controversial recommendations.