

The Revised Handbook for Analyzing Jobs



U.S. Department of Labor
Lynn Martin, Secretary

Employment and Training Administration
Roberts T. Jones
Assistant Secretary for Employment Training
1991



This digital version of *The Revised Handbook for Analyzing Jobs* is a reprint of the original text printed by the U.S. Department of Labor (1991). It includes pages that were missing in the original printing (Chapter 9) by:

U.S. Government Printing Office
Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328
ISBN 0-16-035877-9
STOCK NO. 029-013 00095-1

A print version of this entire publication is available from www.elliottfitzpatrick.com/pcr.html as Item B128

CONTENTS

Chapter	Page
Introduction	i
1. Job Analysis: What It Is and Its Uses	1-1
2. Concepts and Principles of Job Analysis	2-1
Determining Job Limits	2-1
Dimensions of a Job: The Job Analysis Components	2-2
Sentence Analysis	2-3
Machines, Tools, Equipment, and Work Aids	2-3
3. Worker Functions	3-1
Structure of Worker Functions	3-1
Procedure for Rating Worker Functions	3-2
Definitions and Examples of Worker Functions	3-2
4. Work Fields	4-1
Combination Work Fields	4-1
Procedure for Assigning Work Fields	4-1
Alphabetical Listing of Work Fields	4-3
Work Fields Organization	4-4
List of Combination Work Fields	4-7
Work Fields Descriptions	4-8
5. Materials, Products, Subject Matter, and Services	5-1
Organization of MPSMS	5-1
Procedure for Assigning MPSMS	5-2
MPSMS Groups	5-3
Classifications, Definitions, and Examples of MPSMS	5-5
Alphabetical Listing of MPSMS	5-25
6. Sentence Analysis Technique	6-1
7. General Educational Development	7-1
Divisions of GED Scale	7-1
Rationale for GED Scale Definitions	7-1
Scale of General Educational Development	7-2
Definitions and Examples of GED Levels	7-4
Procedure for Evaluating and Recording GED Requirements	7-13
8. Specific Vocational Preparation	8-1
Scale of Specific Vocational Preparation	8-1
Definitions and Examples of SVP Levels	8-2
Procedure for Evaluating and Recording SVP Requirements	8-10
9. Aptitudes	9-1
Levels of Aptitudes	9-2
Procedure for Rating Aptitudes	9-2
Definitions, Interpretive Information, and Examples of Aptitudes	9-3
10. Temperaments	10-1
Definitions and Examples of the Temperament Factors	10-1
Procedure for Rating Temperaments	10-5
11. Guide for Occupational Exploration	11-1
Procedure for Assigning GOE Code and Title	11-1
Definitions and Work Groups of GOE Interest Areas	11-1

12. Physical Demands and Environmental Conditions	12-1
Physical Demands Factors, Definitions, and Examples	12-1
Environmental Conditions Factors, Definitions, and Examples	12-1
Procedure for Preparing the Physical Demands and Environmental Conditions Section of the JAR	12-14
Physical Demand and Environmental Condition Symbols	12-14
Limits of Weights Lifted/Carried or Force Exerted	12-15
Sample Physical Demands Form	12-17
Sample Environmental Conditions Form	12-18
13. Writing Job Summaries and Descriptions of Tasks	13-1
Preparing Job Summaries	13-1
Preparing Descriptions of Tasks	13-3
Writing Descriptions of Tasks	13-4
Style Conventions for Recording Descriptions of Tasks	13-10
Determining Detail Needed in Job and Task Descriptions	13-12
List of Frequently Used and Misspelled Words	13-13
14. The Job Analysis Report	14-1
Procedure for Preparing the JAR	14-1
Procedure for Recording Establishment Job Titles and DOT Titles	14-6
Sample Job Analysis Report Form	14-7
15. Procedure for Preparing for and Conducting a Job Analysis Study	15-1
Industry Study Planning Report	15-1
Sample ISPR Face Sheet	15-4
Sample ISPR Segment Analysis Sheet	15-7
Procedure for Conducting a Job Analysis Study	15-9
16. Plant Control Card and Staffing Table	16-1
Plant Control Card	16-1
Procedure for Preparing A Plant Control Card	16-1
Sample Plant Control Card	16-3
Staffing Table	16-4
Procedure for Preparing The Staffing Table	16-4
Sample Staffing Table Form	16-7
Alphabetical List of DOT Industries and Codes	16-9
17. Organization and Workflow Charts	17-1
Organization Charts	17-1
Sample Organization Chart	17-3
Workflow Charts	17-4
Sample Workflow Chart, Manufacturing Establishment	17-5
Sample Workflow Chart, Service Organization	17-6
18. The Narrative Report	18-1
Compiling Data	18-1
Organizing Materials	18-1
Writing the Report	18-2
Sample Narrative Report	18-5
Appendix A: Breaking A Job Down Into Tasks	A-1
Appendix B: Determining Detail Needed In Job And Task Descriptions	B-1
Appendix C: Machines, Tools, Equipment, And Work Aids	C-1
Appendix D: Bibliography	D-1
Appendix E: Agency Identification Numbers For Occupational Analysis	E-1

CHAPTER 9

APTITUDES

Aptitudes, a component of Worker Characteristics, are the capacities or specific abilities which an individual must have in order to learn to perform a given work activity. There are 11 Aptitudes used by USES for job analysis. Nine Aptitudes are measured by the United States Employment Service's General Aptitude Test Battery (GATB). Two others, Eye-Hand-Foot Coordination and Color Discrimination, have been added to these for job analysis because they are considered to be occupationally significant. Measurements for these Aptitudes have not been developed for the GATB. The 11 Aptitudes are:

G - General Learning Ability

V - Verbal Aptitude

N - Numerical Aptitude

S - Spatial Aptitude

P - Form Perception

Q - Clerical Perception

K - Motor Coordination

F - Finger Dexterity

M - Manual Dexterity

E - Eye-Hand-Foot Coordination

C - Color Discrimination

Decades of research have established the validity of the GATB in measuring the aptitudes of individuals. The USES job analysis technique of estimating the aptitude requirements of jobs has its basis not only in the GATB Aptitude definitions but in USES test development standards as well. In test validation procedures using the GATB, Test Research Analysts apply precise statistical and other quantitative as well as qualitative standards to determine validated test requirements for use as job selection criteria and counseling).

LEVELS OF APTITUDES

In job analysis, aptitude estimates are useful as analytical and descriptive tools and can be expressed in terms of the following levels which reflect the amount of the aptitudes possessed by segments of the working population:

1. The top 10 percent of the population. This segment of the population possesses an extremely high degree of the aptitude.
2. The highest third exclusive of the top 10 percent of the population. This segment of the population possesses an above average or high degree of the aptitude.
3. The middle third of the population. This segment of the population possesses a medium degree of the aptitude ranging from slightly below to slightly above average.
4. The lowest third exclusive of the bottom 10 percent of the population. This segment of the population possesses a below average or low degree of the aptitude.
5. The lowest 10 percent of the population. This segment of the population possesses a negligible degree of the aptitude.

Aptitude Levels				
1	2	3	4	5
Extremely High Aptitude Ability	High Degree of Aptitude Ability	Medium Degree of Aptitude Ability	Lower Degree of Aptitude Ability	Markedly Low Aptitude Ability
Top 10%	Highest Third Excluding Top 10%	Middle Third	Lowest Third Excluding Top 10%	Bottom 10%
Percent of Working Population				

PROCEDURE FOR RATING APTITUDES

Every aptitude factor must be considered independently in the rating process for each job. The analyst estimates the level of each aptitude required of the worker for average, satisfactory performance based on a careful evaluation of the work activities of the job and the specific worker abilities which can be identified in terms of the aptitudes. Then the appropriate aptitude level number is assigned. Certain of the aptitudes can be identified through study of the physical actions which the worker performs, such as Motor Coordination, Finger Dexterity, and Eye-Hand-Foot Coordination; other Aptitudes, such as Spatial, Numerical, and General Learning Ability, are identified by considering worker judgments and other mental processes involved in performing the job satisfactorily. Aptitude levels are determined by comparing the tasks of the job with the aptitude definitions, interpretive information, and the examples of work activities shown for each level which appear in the next section of this chapter.

Note that for each of the eleven aptitudes there are not any examples of job duties for level 5. Level 5 is used to indicate that for the job under study the amount of aptitude required is negligible or the aptitude is not required at all. Since level 5 represents an aptitude level that is not required or is required only in negligible amounts and which, according to the table above, represents job duties which 90 to 100 percent of the working population could perform satisfactorily, examples of job duties for this level are not provided. If there is a doubt as to which of two levels should be assigned, select the lower level. Enter in the box immediately below each Aptitude letter in Item 9 of the JAR a number, one through five, to indicate the estimated Aptitude level required in the job.

DEFINITIONS, INTERPRETIVE INFORMATION, AND EXAMPLES OF APTITUDES

The definition of each Aptitude is followed by interpretive information for analysts which provides supplementary information relating the definition to specific work activities and examples of job or task summaries illustrating each of the five levels of the Aptitude. The definitions reflect the Aptitudes as seen in people. The interpretive information reflects the Aptitudes as observed in jobs. Most of the examples are based on qualitative analyses contained in the technical reports of the SATB's. Although there are no illustrations for Aptitude factors K and M at level 1, this does not preclude assignment of level 1 when the analysis of a job warrants it.

G — GENERAL LEARNING ABILITY: The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

Interpretive Information for Analysts: Consider such factors as: work requiring the ability to define problems, collect information, establish facts, and draw valid conclusions; work requiring the use of logic or scientific thinking to solve a variety of problems; work requiring the use of measurable and verifiable information for making decisions or judgments; understanding detailed work procedures; planning, organizing, coordinating, and directing own work and that of others; coping with a variety of duties; following written or oral instructions; or selecting appropriate work aids and materials to perform a set of tasks.

LEVEL 1

G-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields and solves or directs solutions to problems in various fields by mathematical methods:

General learning ability is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to assimilate background information required to understand problems from various fields; to develop or apply appropriate methods and procedures for solving problems; and to present solutions or methodologies for solutions in logical and systematic forms and sequences.

G-1:2 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

General learning ability is required to understand and apply principles of dental anatomy, bacteriology, and physiology for diagnosis and treatment and to use techniques of dental restoration and prosthetics. Must understand the operation and function of dental tools and equipment and the uses of dental metals, alloys, and amalgams.

G-1:3 Converts symbolic statements of administrative data or business problems to detailed logical flow charts for coding into computer language:

General learning ability is required to understand and apply work statement instructions, recommended procedural routines, and related informational data; to identify and organize elements of a problem into logical sequence for computer operation by means of preparing block diagrams and flow charts; to make analytical and logical analyses in planning procedural routines; to have a working knowledge of the company business organization and management and with modern office methods and procedures; and to have a complete familiarity with programming principles and techniques in order to discuss programming methods, requirements, and approaches with line and staff personnel.

G-1:4 Writes original plays, such as tragedies, comedies, or dramas, or adapts themes from fictional, historical, or narrative sources for dramatic presentation:

General learning ability is required to utilize basic principles of play writing, including basic research of characters, dress, and furnishings of the time-setting of the play, and to show depth of understanding in the development of situations and roles.

G-1:5 Receives individual applications for insurance to evaluate degree of risk involved and accepts applications following company's underwriting policies:

General learning ability is required to understand and apply principles of insurance, finance, and economics. Must be able to understand application of information, such as medical reports, occupational hazards, financial reports, fire inspection reports, and insurance maps. Must work with actuarial formulas, study and relate all phases of an insurance risk problem, and come to a decision beneficial to the needs of the applicant and to the interests of the company.

G-1:6 Studies origin, relationship, development, anatomy, functions, and basic principles of plant and animal life:

General learning ability is required to study scientific facts and concepts which are needed for an understanding of the structure, function, development, and relationship of living organisms and to draw conclusions or generalizations from accumulated facts.

G-1:7 Coordinates activities of radio and television studio and control-room personnel to ensure technical quality of pictures and sound for programs originating in studio or from remote pickup points:

General learning ability is required to plan and arrange for all audio, visual, and special effects equipment and technical personnel needed for programs; to use judgment to determine number of cameras, etc., necessary to achieve specified effects; and to give work assignments to technicians who control and maintain lights, audio and visual controlling equipment, microphones, and cameras. Must understand functions and capabilities of equipment to give directions.

LEVEL 2

G-2:1 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution (Registered Nurses):

General learning ability is required to learn and apply principles of anatomy, physiology, microbiology, nutrition, psychology, and patient care used in nursing; to recognize and interpret symptoms and reactions; to make independent judgments in the absence of doctor; and to determine methods and treatments to use when caring for patients with varying illnesses or injuries.

G-2:2 Applies principles of accounting to devise and implement system for general accounting:

General learning ability is required to learn, understand, and apply accounting principles and procedures; to evaluate accounting and record-keeping systems; to analyze current and regulatory problems and develop system which provides needed records for internal operation and to meet requirements of government agencies; and to prepare analyses and interpretation of data for company officials.

G-2:3 Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment:

General learning ability is required to learn and understand principles of electricity; to read and interpret blueprints and specifications; to plan new or modified installations; and to diagnose problems and select the most feasible methods of repair.

G-2:4 Rents, buys, and sells property for clients on commission basis:

General learning ability is required to learn and make proper interpretation and application of law, legislation, and qualification requirements; and to keep informed of marketing conditions and property values.

- G-2:5 Analyzes a variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gauges, and machinists' handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

General learning ability is required to understand blueprints and other specifications; to plan sequence of operations and layout and setup procedures; to determine type of machine and tools to use and machine settings based on type of operations to be performed, type of material being processed, and dimensions and other specifications to be achieved.

- G-2:6 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

General learning ability is required to learn and apply drafting principles, procedures, and symbols and the geometry and mathematics peculiar to topography and to translate aerial photographs and other data into accurate maps.

- G-2:7 Prepares bodies for interment, in conformity with legal requirements:

General learning ability is required to learn and apply basic principles and techniques related to mortuary science including chemistry, anatomy, physiology, principles of preservation, disinfection, circulatory embalming, cavity treatment, hygiene, microbiology, restoration, and cosmetics; and to learn the laws and regulations relating to embalming.

LEVEL 3

- G-3:1 Takes dictation, in shorthand, of correspondence, reports, and other matters and transcribes dictated material, using typewriter:

General learning ability is required to learn meaning and usage of shorthand symbols; to learn typewriter operation and memorize keyboard; to learn rules for format of business letters and reports and rules of spelling, punctuation, and grammar.

- G-3:2 Repairs, maintains, and installs electrical systems and equipment, such as motors, transformers, wiring, switches, and alarm systems:

General learning ability is required to learn basic electrical theory and circuitry, blueprint reading, local building codes, and safety practices; and to use reason and judgment in diagnosing faults and choosing most feasible method of repair.

- G-3:3 Prepares and compiles records in hospital nursing unit, such as obstetrics, pediatrics, or surgery:

General learning ability is required to make independent judgments regarding task priorities; to integrate and interpret informational and situational data; and to respond quickly to data input.

- G-3:4 Drives truck over established route to deliver, sell, and display products or render services:

General learning ability is required to acquire and use knowledge of company products or services, unit cost, and policies; to discuss customer's needs and promote sales; to apply company policies and own judgment regarding delivery procedures, credit extension, discounts, etc., in a manner to maintain good customer relations; to maintain accounts and records; and to determine best driving routes to reach customers.

- G-3:5 Assembles and loads a variety of solid-propellant rocket motors:

General learning ability is required to learn the various steps in preparing and loading solid-propellant fuels for rockets; to understand specifications and follow them explicitly when mixing liquid and dry ingredients to form propellant; to use judgment when handling and processing propellant to avoid explosions; to determine when chemicals are properly mixed and cured from instrument readings on control panel, and using charts and direct observation via TV monitors.

G-3:6 Cares for ill, injured, convalescent, and handicapped persons in hospitals, clinics, private homes, sanitariums, and similar institutions (Licensed Practical Nurse):

General learning ability is required to learn and apply principles and techniques of basic nursing skills, body structure and functions, personal hygiene, nutrition, and first aid; and to use judgment in patient care, moving patients, and giving prescribed medicines and injections.

G-3:7 Provides beauty service for customers:

General learning ability is required to learn the various phases of cosmetology including hair cutting, styling, setting, and facial treatment, and the various methods used; to use reason and judgment to suggest various treatments to customers and assist them in deciding on hair style according to their individual features and taste.

LEVEL 4

G-4:1 Assists in care of hospital patients, under direction of nursing and medical staff:

General learning ability is required to learn patient care and handling and hospital routine; to understand and carry out orders correctly; to use reason and judgment in handling patients, noting patient's condition and reporting symptoms or reactions which may indicate a change in condition.

G-4:2 Makes women's garments, such as dresses, coats, and suits, according to customer specifications and measurements:

General learning ability is required to understand basic principles of garment construction and pattern alteration; to understand instructions from customers and patterns; and to reason when altering patterns to customers' measurements.

G-4:3 Sorts agricultural produce, such as bulbs, fruits, nuts, and vegetables, according to grade, color, and size, discards cull items and foreign matter, and places produce in containers:

Recognizes indications of defects, such as spots or softness, and learns grading characteristics for a variety of produce. Uses judgment in sorting out partially defective produce.

G-4:4 Feeds or removes metal stock from automatic fabricating machines:

Learns work routine, acceptable tolerances, and difference between acceptable imperfections and those to be rejected. Uses judgment to determine, from observing parts processed or machine operation, when machine should be stopped because of some malfunction.

G-4:5 Operates alphabetic and numeric keypunch machine, similar in operation to electric typewriter, to transcribe data from source material onto punchcards, paper or magnetic tape, or magnetic cards, and to record accounting or statistical data for subsequent processing by automatic or electronic data processing equipment:

General learning ability is required to follow instructions to ensure that correct format is followed in preparing program cards and reading the data.

G-4:6 Assists workers engaged in preparing foods for hotels, restaurants, or institutions, by washing, peeling, cutting or grinding meats, vegetables, or fruits, preparing salads, mixing ingredients for desserts, portioning foods on plates or serving trays, loading serving trays on delivery carts, carrying pans and kettles to and from work station, and cleaning work area, equipment, and utensils:

General learning ability is required to learn routine of kitchen, location of materials, equipment, and utensils, and various tasks to be performed. Must understand instructions pertaining to mixing of ingredients for salads, gelatin, and pudding-mix desserts; and for portioning food.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

V — VERBAL APTITUDE: The ability to understand the meaning of words and to use them effectively. Ability to comprehend language, to understand relationships between words, and to understand the meanings of whole sentences and paragraphs.

Interpretive Information for Analysts: Consider reading comprehension required to use or understand oral or written instructions or specifications, texts used in training, and reference materials used in work or mastery of required technical terminology.

LEVEL 1

V-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Verbal aptitude is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to develop methods and procedures of problem solving through reasoning; to understand terminology from such fields as engineering, data processing, or management in order to discuss problems with others whose background is in such fields and explain to them how mathematical concepts can be adapted to the solution of their problems; and to present solutions in logical and systematic forms and sequences.

V-1:2 Attends to variety of medical cases in general practice, diagnosing, prescribing medicine for, and otherwise treating diseases and disorders of the human body, and performing surgery:

Verbal aptitude is required for reading comprehension of complex technical materials in such areas as anatomy, biochemistry, physiology, pharmacology, pathology, bacteriology, and radiology; and for facility of expression to explain illness, treatment, or preventive measures to patients, or to discuss diagnosis and symptoms with colleagues.

V-1:3 Designs chemical plant equipment and devises processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergent, cement, and paper and pulp, applying principles and technology of chemistry, physics, mechanical and electrical engineering, and related areas:

Verbal aptitude is required to acquire the technical vocabulary of chemistry and engineering; to read and understand reference materials; and to write technical reports and design or production specifications.

V-1:4 Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads as owner's representative:

Verbal aptitude is required to write lead or policy editorials explaining complex political, social, or other issues in language which will be understood by most readers; to interpret the editorial policy of the firm on specific issues to other editorial writers; and to speak at professional and community functions as a representative of the publisher.

V-1:5 Conducts criminal and civil lawsuits, draws up legal documents, advises clients as to legal rights, and practices other phases of law; and represents client in court, and before quasi-judicial or administrative agencies of government:

Verbal aptitude is required to comprehend and interpret legal terminology for use in preparing legal documents, and in presenting oral or written arguments.

V-1:6 Selects, catalogs, and maintains library collection of books, periodicals, documents, films, recordings, and other materials, and assists groups and individuals to locate and obtain materials:

Verbal aptitude is required to review materials preparatory to purchase to see that they do not duplicate others and are consistent with the subject matter collection policy of the library; to accurately determine subject matter of books in order to properly code them and prepare cross-references; and to prepare and give talks to groups of patrons.

V-1:7 Collects, analyzes, and develops occupational data concerning jobs, job qualifications, and worker characteristics to facilitate personnel, administrative, or information functions in private or public organizations:

Verbal aptitude is required to read, understand, and interpret various kinds of technical data; to write reports, letters, and job descriptions concisely and clearly; and to conduct information gathering interviews.

V-1:8 Draws cartoons for publication to illustrate highlights of news topics in satirical or humorous manner:

Verbal aptitude is required to read news items to obtain subject for cartoons; discuss policy and method of presentation with editor; translate ideas from verbal to pictorial form; and to select most significant wording for caption to bring out meaning of cartoon.

LEVEL 2

V-2:1 Converts symbolic statement of business problem to detailed logical flow charts for coding into computer language and solution by means of automatic data processing equipment:

Verbal aptitude is required to read and understand statements of operations and procedural routines from various departments; to discuss program objectives and output requirements with supervisor and department heads; to explain programming techniques and principles while attending briefings, meetings, and interviews; and to write a documentation of each program's development.

V-2:2 Instructs students in one or more subjects, such as English, mathematics, or social studies, in private, religious, or public secondary school (high school):

Verbal aptitude is required to read and understand textbooks or other literature related to the subject matter taught; to lecture on, discuss, and explain subject matter to convey information to the students; to write lesson plans and outlines; and to read students' papers and write critiques.

V-2:3 Edits motion picture film and sound track:

Verbal aptitude is required to listen critically to the dialogue and to determine if it is understandable and maintains the story continuity.

V-2:4 Interviews job applicants in employment agency and refers them to prospective employers for consideration:

Verbal aptitude is required to speak and understand the applicants' language in order to learn their background, qualifications, and goals and to explain the employment service to employers and obtain requirements data for job orders.

V-2:5 Reads books or scripts of radio and television programs to detect and recommend deletion of vulgar, immoral, libelous, or misleading statements:

Verbal aptitude is required to understand the expressed and implied meanings and possible connotations of words in script and statements in the context used.

V-2:6 Schedules and assigns motor vehicles and drivers for the conveyance of freight according to company and government regulations and policies:

Verbal aptitude is required to read and understand the rules, laws, regulations, and policies of the company, union, and Interstate Commerce Commission; to effectively communicate instructions to drivers; and to write reports.

V-2:7 Sells automotive parts and equipment and advises customers on substitution or modification of parts when replacement is not available:

Verbal aptitude is required to ask pertinent questions to determine merchandise desired by customer; to answer technical questions and explain use of parts; and to provide other information requested.

V-2:8 Takes dictation, in shorthand, of correspondence, reports, and other matters, and transcribes material, using typewriter:

Verbal aptitude is required to comprehend meaning of words to record and transcribe dictation accurately.

LEVEL 3

V-3:1 Operates switchboard to provide answering service for clients:

Verbal aptitude is required to greet caller and announce name and phone number of client; to record and deliver messages; to furnish information; to accept orders; and to relay calls.

V-3:2 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Verbal aptitude is required to understand the meaning of words, sentences, and whole paragraphs well enough so that, in copying from a rough draft, insertions which are out of context or incorrectly placed can be noted.

V-3:3 Supervises and coordinates activities of workers engaged in assembly of electronic equipment such as radar and sonar units, missile control systems, computers, cables and harnesses, and test equipment:

Explains wiring and soldering procedures to new employees. Reads test reports to determine cause of equipment failures and explains procedures to workers to correct practices that result in defects. Explains company policies and discusses grievances with workers or their representative.

V-3:4 Questions patients to obtain their medical history, personal data, and to determine if they are allergic to dental drugs or have any complicating illnesses:

Converses with patient in reassuring manner; explains post-operative care, oral hygiene, and importance of preventive dentistry to patients. Greets patients, answers telephone, and schedules appointments.

V-3:5 Sells variety of commodities in sales establishment:

Describes salient features to customer and advises customer in making selection by explaining use of particular article or suggesting other articles.

V-3:6 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of machines, shop mathematics, metal properties, and layout machining procedures:

Verbal aptitude is required to read text materials while attending classes during training or apprenticeship; and to understand language in shop orders, specifications, and other written or oral instructions.

V-3:7 Provides beauty service for customers; suggests coiffure according to physical features of patron and current styles, or determines coiffure from instructions of patron; suggests cosmetics for conditions, such as dry or oily skin:

Verbal aptitude is required to greet patrons, ascertain services desired, and explain beauty treatments, hair styles, and other services.

V-3:8 Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles:

Reads and interprets technical manuals, charts, and parts manuals to plan work procedures and select replacement parts; discusses nature and extent of damage and repairs needed with customer and service manager.

V-3:9 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:

Verbal aptitude is required to read blueprints for information pertaining to materials and dimensions; and to understand building codes and company safety practice rules.

LEVEL 4

V-4:1 Records brand marks used to identify cattle, produce, or other commodities to facilitate identification:

Reads applications for new brands and official brand record; records assignment or reassignment of brands; reads to file reports of field inspectors.

V-4:2 Mixes and bakes ingredients according to recipes and production order to produce breads, pastries, and other baked goods:

Must read recipes and production orders to determine number and kind of bakery products to make, ingredients to use, and mixing and baking instructions.

V-4:3 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces a shield of inert or noncombustible gas around the electric arc to prevent oxidation:

Verbal aptitude is required to read work order or receive oral instructions indicating type of material and number of units to be welded, type and size of electrode material to use, type of gas shield to use, settings for gas pressure, electric current amperage, and speed of electrode wire feed.

V-4:4 Tends any of a variety of machine tools, such as lathes, drill presses, milling machines, grinders, and special purpose machines, to machine metal workpieces to specifications on a production basis:

Reads written instructions or work orders to determine number and kind of parts to be machined and kind of metal stock or castings to use. Requests stock and cutting tools from stock room, specifying sizes, types, and amounts.

V-4:5 Cares for children in private home:

Must read directions for preparation of formulas, and possess sufficient vocabulary to understand instructions regarding care of children.

V-4:6 Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories as requested by customer:

Verbal aptitude is required to understand specific instructions from station manager and to communicate with customers.

V-4:7 Assembles metal toys on assembly line, changing tasks as directed according to work load of department; tends drill press or punch press; fits parts together; and joins parts using resistance welder, fold-over tabs, or nuts and bolts:

Verbal aptitude is required to understand oral instructions specifying parts to assemble, position of parts, sequence of assembly, and methods of fastening parts for several types and models of toys and stages of assembly.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

N — NUMERICAL APTITUDE: The ability to perform arithmetic operations quickly and accurately.

Interpretive Information for Analysts: Consider activities, such as making change from currency of one denomination to another, keeping time or production records, using math or geometry to lay out geometric patterns, making accurate numerical measurements, and making or checking numerical entries. Consider the complexity of numerical operations as well as speed required and volume of arithmetic activity.

LEVEL 1

N-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Numerical aptitude is required to understand mathematical symbols, formulas, and concepts; to develop methods and procedures of problem solving; and to test hypotheses and alternate theories.

N-1:2 Performs variety of engineering work in designing, planning, or overseeing the manufacture, construction, installation, or maintenance of electric or electronic systems, equipment, or machinery used in the generation, transmission, or utilization of electrical energy for domestic, commercial, or industrial consumption:

Numerical aptitude is required for the understanding and application of algebra, trigonometry, analytical geometry, calculus, and differential equations to engineering problems.

N-1:3 Converts engineering, scientific, and other technical problem formulations into format processible by computer:

Numerical aptitude is required to identify mathematical formulas, equations, and assumptions presented in support of problem; to analyze problem using mathematical formulas, tables, and reference materials; and to make computations involving the use of linear algebra, vector analysis, differential equations, and calculus to identify each mathematical element in the solution of the problem.

N-1:4 Collects, analyzes, and interprets data on problems of public finance:

Computes or formulates problems for solution by others to determine government income and expenditures by source and function, using such data as tax tables and rates, income and population projections, and proposed budget and expenditure projections. Determines impact of tax and fiscal policies on level of income and business activities. Computes initial and final distribution of tax burden and its effects from analysis of shifting and incidence patterns for various types of taxes. Computes probable revenues and effects of new taxes or tax rates. Computations and formulation of problems require the use of statistical methods, algebra, and some calculus.

N-1:5 Researches market conditions in local, regional, or national area to determine potential sales of a product or service:

Computes and analyzes statistical data on past sales of firm and general wholesale and retail sales trends to forecast future sales trends. Makes statistical projections based on population, income, sales data, and consumer surveys.

N-1:6 Reviews applications for casualty insurance to evaluate degree of risk involved, following company's underwriting policies:

Determines amount of risk company will insure, based on value of property and risks involved, and the premium thereon. Determines the value of each factor affecting the degree of risk and applies the applicable premium to each using rate tables or computes the weighted value of each factor to arrive at a final composite weight used to compute the premium; computes amount of insurance in force in the particular class of risk or in the same area to assure that the company is spreading its risks sufficiently according to probability tables.

N-1:7 Prepares cost and work completion estimates for engineering contract bids:

Numerical aptitude is required to compute and list total quantity of each type of material needed from blueprints and specifications; to compute quantity of standard sizes or lots needed for each segment of structure or part; to estimate cost of raw materials, purchased equipment, or subcontracted work, and labor, using price lists, standard or estimated time/cost figures, and materials lists; and to set delivery or completion dates.

LEVEL 2

N-2:1 Applies principles of accounting to install and maintain accounting system:

Applies numerical reasoning to design or modify systems to provide records of assets, liabilities, and financial transactions; applying arithmetic principles to prepare accounts, records, and reports based on them; auditing contracts, orders, and vouchers; and preparing tax returns and other reports to government agencies.

N-2:2 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

Numerical aptitude is required to make arithmetic computations to lay out scale representations of mountains, cities, and other geographic features so that correct proportions and distances are achieved.

N-2:3 Applies electronic theory, principles of electrical circuits, electrical testing procedures, mathematics, physics, and related subjects to lay out, build, test, troubleshoot, repair, and modify developmental and production electronic equipment, such as computers, missile-control instrumentation, and machine tool numerical controls:

Numerical aptitude is required to calculate value and sizes of circuitry components needed, when not specified; to compute output values or potential of units; and to prepare graphs showing operating characteristics of system, using mathematical tables and formulas.

N-2:4 Develops resistance welding and brazing machine setup data for work orders to ensure that parts conform to blueprints and engineering specifications, applying knowledge of machine function, electronics, properties of metals, effects of heat, and shop mathematics:

Computes combination of pressure, current, holding time, and impact required to obtain specified weld, interpolating from tables and charts, and multiplying and dividing fractions and decimals to arrive at machine settings. Measures and makes arithmetic computations to determine dimensional setup for workpiece and electrodes and size of jigs or fixtures needed.

N-2:5 Schedules and assigns motor vehicles and drivers for availability, length of trip, freight requirements, vehicle capacities and licenses, and user preferences:

Numerical aptitude is required to compute truck capacities for various products; to estimate delivery time; to compute delivery charges; and to prepare statistical reports and studies on operations, equipment, and personnel.

N-2:6 Repairs electronic equipment, such as computers, industrial controls, radar systems, telemetering and missile control systems, following blueprints and manufacturers' specifications using handtools and test instruments:

Numerical aptitude is required to calculate dimensions; to determine output measurements of components; to compute ratios when calibrating instruments; and to apply principles of geometry and trigonometry to compute angles and coordinates.

N-2:7 Directs operation of retail, self-service food store according to overall organizational policies:

Numerical aptitude is necessary to determine amounts of merchandise needed based on stock and past sales; to prepare requisitions or orders; to adjust prices based on amount, condition and salability of item; and to prepare financial reports, such as sales reports, time and payroll reports, bank deposits, or inventories.

LEVEL 3

- N-3:1** Supervises and coordinates activities of workers engaged in extracting alumina from bauxite:
Numerical aptitude is required to calculate feed rates of raw materials, using standard formulas and chemical analysis reports to compute rate of inputs; to study production schedules and estimate staff hour requirements for completion of job assignment; and to adjust work schedules or staffing to meet production requirements, using knowledge of capacities of machines and equipment; and to maintain time and production records.
- N-3:2** Sells tickets for transportation agencies, such as airlines, bus companies, railroads, and steamship lines:
Numerical aptitude is required to compute ticket cost and taxes, using schedules and rate books; to check and weigh baggage; to compute travel time and fares for different types of accommodations; to prepare daily sales record showing number and class of tickets sold and amount of fare and taxes; and to count and balance cash with sales record.
- N-3:3** Grows shrubs, rootstocks, cut flowers, or flowering bulbs:
Computes acreage to be planted according to estimated demand for species, availability and cost of seed, bulbs, or scion stock and space requirements for each variety. Maintains record of wages and hours of workers.
- N-3:4** Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools:
Measures and computes unspecified dimensions to prepare layouts, mark cutting and assembly lines on materials, shape materials to prescribed measurements, and fit and install window and door frames, trim cabinet work, and hardware.
- N-3:5** Acts as intermediary between importers, steamship companies, or airlines and Bureau of Customs by preparing and compiling documents required by Federal Government for a ship or airplane of foreign origin to discharge its cargo at a domestic port:
Computes and quotes duty rates and amounts of commodities, using excise and tariff rate tables applicable to commodity.
- N-3:6** Designs and prepares decorated foods and artistic food arrangements for buffets in formal restaurants:
Reviews advance menus to determine amount and type of food to be served; prepares food according to recipe; computes amount of food needed, based on number of persons to be served and standard amounts per person; and adjusts standard recipes to obtain required quantities. Measures and weighs ingredients.
- N-3:7** Receives cash from customers or from other employees in payment for goods or services in retail or service establishment, and records amount received:
Computes bill and itemizes list or ticket showing amount due, using adding machine or cash register; makes change, cashes checks, and issues receipts; records amount received and prepares reports of transactions; and reads and records totals on cash register verifying against cash on hand.

LEVEL 4

- N-4:1** Makes women's garments, such as dresses, coats, and suits, according to customer specifications and measurements:
Measures customer to determine dimensions of garment; and adds and subtracts to adjust pattern to customer's dimensions.
- N-4:2** Inspects loaded freight cars:
Measures height and width of loads to ensure that they will pass over bridges and through tunnels on scheduled route.

- N-4:3 Coordinates and expedites flow of material, parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisors' priorities:
- Numerical aptitude is required to determine quantities of material, adding and subtracting to determine items of total order which are in various stages of manufacturing sequence.
- N-4:4 Sets up knitting machines to knit hose, garments, and cloth according to specifications and adjusts and repairs machines, using knowledge of machine function:
- Must measure, add, and subtract to determine number and size of cams and links for setup, to synchronize machine, and to make repairs.
- N-4:5 Mixes and bakes ingredients according to recipes to produce bread, pastries, and other baked goods:
- Numerical aptitude is required to calculate quantities and proportions of ingredients based on master recipes and for the measurement of temperatures, time, and weights.
- N-4:6 Records business transactions in journals, ledgers, and on special forms and transfers entries from one accounting record to another:
- Adds totals of entries after posting and compares totals with original records to detect errors.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

S — SPATIAL APTITUDE: The ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

Interpretive Information for Analysts: Frequently described as the ability to "visualize" objects of two- or three-dimensions or to think visually of geometric forms. Work examples are such activities as laying out, positioning, and aligning objects; observing movements of objects, such as vehicles in traffic or machines in operation, and comprehending how the movements affect their spatial position concurrently; achieving balanced design; and understanding and anticipating the effects of physical stresses in structural situations.

LEVEL 1

- S-1:1 Diagnoses and treats disease, injuries, and malformations of teeth, gum, and related oral structures:
- Spatial aptitude is required to read x rays; to comprehend relation between teeth, tooth functions, tooth forms, stresses, and all phases of occlusion.
- S-1:2 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems by mathematical methods:
- Spatial aptitude is required to visualize and understand the special relationships of objects and forces involved in a situation and their resultant effects on each other.
- S-1:3 Plans and designs private residences, office buildings, theatres, public buildings, factories, and other structures; and organizes services necessary for their construction:
- Plans layout of project, using visual imagination to integrate structural, mechanical, and ornamental elements into a unified design. Prepares sketches and elevation view of project for client. Prepares scale and full-size drawings for use by building contractors and craft workers.

- S-1:4 Performs variety of engineering work in designing, planning, and overseeing manufacture, construction, installation, and operation of electric or electronic equipment, and systems, used in generation and utilization of electrical energy for industrial and domestic consumption:
Spatial aptitude is required in the design and construction of electrical systems and equipment to visualize the spatial relationships of static and dynamic components and the spatial characteristics of energy flow.
- S-1:5 Draws and paints illustrations for advertisements, books, magazines, posters, billboards, and catalogs:
Renders details from memory, live models, manufactured products, or reference materials to execute design.

LEVEL 2

- S-2:1 Prepares working plans and detail drawings from rough or detailed sketches or notes, for engineering or manufacturing purposes according to specified dimensions:
Spatial aptitude is required in interpreting blueprints, sketches, and specifications, and in preparing detailed, scale drawings of three-dimensional parts or mechanisms from sketches, layout, and oral instructions.
- S-2:2 Performs dances alone, with partner, or in groups to entertain audience:
Spatial aptitude is required to interpret diagrams and instructions for proposed choreography; to visualize relative position of self with others; and to imagine how dance routines will appear to public.
- S-2:3 Repairs and adjusts radios and television receivers, using handtools and electronic testing instruments:
Spatial aptitude is required to read circuit diagrams in order to assemble and repair radio and television set components; to visualize power flow and spatial relationship of components and circuits as they relate to various functions, to isolate them for testing, and to test each circuit serially; and to visualize the source of trouble from observation of picture or from sound.
- S-2:4 Creates designs and prepares patterns for new types and styles of men's, women's, and children's wearing apparel or knitted garments:
Spatial aptitude is required to visualize the garment to be created and to sketch designs of it; to construct original patterns; and to use patterns to make garments.
- S-2:5 Controls air traffic on and within vicinity of airport according to established procedures and policies to prevent collisions and to minimize delays arising from traffic congestion:
Spatial aptitude is required to observe the spatial relationships of aircraft within the immediate vicinity of the airport; and to visualize the relative positions of other aircraft from radar, time, distance, speed, and altitude information.
- S-2:6 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures:
Spatial aptitude is required to interpret blueprints and sketches, make layouts, set up workpiece in chuck or on face plate, and to inspect completed work for compliance with shop orders and drawings.
- S-2:7 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:
Spatial aptitude is required to interpret blueprints and visualize the three dimensional form of the structure from prints; to lay out workpieces from blueprints; to shape and fit parts; and to construct forms for pouring concrete.

S-2:8 Assists driller in operating machinery to drill oil or gas wells, using handtools or power tongs and wrenches:

Spatial aptitude is required to visualize spatial relationships rapidly while placing tools and guiding lower end of drill-pipe sections to rack and unrack them; and to constantly be aware of the location of other workers, tools, and materials as they move about work area in order to prevent accidents.

LEVEL 3

S-3:1 Operates bridge or gantry crane, consisting of hoist and operator's cab mounted on bridge which runs along track to lift, move, and load machinery, equipment, and variety of loose materials:

Spatial aptitude is required to observe the relationship between the moving load and fixed items, such as machines, trucks, posts, etc., in order to avoid bumping load, and to position load in trucks or on stacks, or dump it into machines or equipment.

S-3:2 Installs, adjusts, and maintains electrical wiring, switches, and fixtures in airplanes according to blueprints and wiring diagrams:

Spatial aptitude is required to determine sizes and types of control boxes, relays, instruments, and accessories to install, and the location from blueprints and wiring diagrams.

S-3:3 Forms sand molds for the production of metal castings, using handtools, power tools, patterns, and flasks, and applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Spatial aptitude is required to visualize mold shape from part print or pattern; to visualize flow of metal during pouring process and gas formation to determine location and size of runner and sprue holes; to visualize points of stress on mold during pouring; and to determine location for reinforcing material.

S-3:4 Constructs and repairs dental appliances according to prescription:

Spatial aptitude is required to visualize and sketch outline of prosthetic dental appliance on stone model of upper and lower jaws, using impressions as guides; and to check movement and fit of upper and lower jaw models to determine proper alignment, and to approximate position and function of appliance being made.

S-3:5 Supervises and coordinates activities of workers engaged in loading and unloading of ships' cargoes:

Visualizes available cargo space, spatial dimensions of individual shipments and how they can be rearranged, and order of removal at various ports to determine the sequence and arrangement of the load.

S-3:6 Makes women's garments, such as dresses, coats, and suits, according to customer's specifications and measurements:

Spatial aptitude is required to use patterns visualizing the relationship between pattern pieces and finished garment and following pattern instructions; and to alter basic patterns proportionally to adapt them to customer's measurements.

S-3:7 Sets up and operates machines that measure, print, cut, fold, glue, or seal plain or waxed papers, polyethylene film, or cellophane to form bags:

Spatial aptitude is required to adjust cutters, feeders, printing rollers, and other mechanisms according to specifications for type and size of bag being produced.

LEVEL 4

- S-4:1 Inspects electronic units and subassemblies, such as radio transmitters, computer circuits, and cables, for conformance to specifications:
Spatial aptitude is required to examine completed assemblies relating them to configuration sheet to determine that components are in specified positions.
- S-4:2 Tends film cutter and mounting press to mount color-film transparencies:
Aligns cutting blade of film-cutting machine with frame separating line between transparencies on film strips.
- S-4:3 Smooths and finishes surfaces of poured concrete floors, walls, sidewalks, or curbs to specified textures, using handtools, including floats, trowels, and screeds:
Determines grade and contours from construction drawings and selects screeds needed to form or guide forming of work to specified shape.
- S-4:4 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch, to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:
Observes changing position of fork in relation to objects or materials to maneuver fork under load; observes position of load relative to other objects to move load about and to position or stack load.
- S-4:5 Tends units of fresh-work cigar machine that cuts wrapper leaf and wraps leaf around bunch:
Spreads wrapper leaf over die of machine in such a manner as to obtain maximum cuts per leaf.
- S-4:6 Joins and reinforces parts of articles, such as garments, curtains, parachutes, stuffed toys, hats, and caps; sews buttonholes and attaches fasteners, such as buttons, snaps, and hooks, to articles; or sews decorative trimmings to articles, using needle and thread:
Aligns parts, fasteners, or trimming, working with two dimensions in a single plane, to obtain desired appearance when item is in use.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

P — FORM PERCEPTION: The ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Interpretive Information for Analysts: Consider such activities as inspecting surfaces for consistency in coloring, scratches, flaws, grain, texture, and the like; observing lint, dust, etc., on surfaces; determining if patterns are correct or match; and recognizing small parts.

NOTE: Spatial deals with visualization of the shape of objects as well as comprehension of forms in space. Form perception, on the other hand, pertains to the perception of surface details.

LEVEL 1

- P-1:1 Conducts studies of all nonmetallic minerals used in horological industry:
Is able to perceive detail of grain size, pattern, and crystalline orientation in diamonds and abrasives and see differences in the features and size of grain angles using optical, x-ray, and other precision instruments.
- P-1:2 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:
Form perception is required to perceive pertinent details of shape, shade, and other characteristics when examining or comparing specimens or cultures under microscope.

LEVEL 2

- P-2:1 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:
Is able to perceive details of tooth and tissue structure and condition, tooth form, shadings of teeth (when preparing dentures), shape and shading of teeth when examining x rays, and parallelism and fit of dentures and inlays.
- P-2:2 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:
Is able to perceive details of land contours or other physical features in stereoscopic aerial photographs and other topographical maps; draw different widths and types of lines, each with specific meanings in topography; and assure that scale is maintained throughout drawing.
- P-2:3 Develops specifications for and blows and shapes glass laboratory apparatus, such as test tubes, retorts, and flasks, and glass components for such apparatus as condensers, vacuum pumps, barometer, and thermometers:
Form perception is required to see details in customer's sketches and work plans; to observe when specified shape and angles are obtained in glass; to inspect glass visually for flaws and pin holes; and to read measuring instruments such as micrometers and calipers.
- P-2:4 Changes undesirable details of illustrations which are to be reproduced by lithographic process:
Observes differences in shading (contrast) when comparing positives and negatives with original copy of illustration layout, and when applying dyes and etching solution. Must perceive details of object or fixture to apply opaque solution and halftone dots by hand; to pencil in highlights and retouch flaws; and to scrape areas to reduce density.
- P-2:5 Analyzes variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gauges, and machinists' handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:
Form perception is required to read dial indicators and machine settings; to observe cut as it is made by tool to be sure surface of part is not scored; to inspect workpiece visually and with precision gauges to detect surface and dimensional defects; and to check fit of dies and parts.
- P-2:6 Repairs radio receivers, phonographs, recorders, and other electronic-audio equipment, using circuit diagrams and test meters:
Form perception is required to inspect visually all circuits and connections for breaks or looseness; to detect defects in components by visual examinations; and to recognize components by their size, shape, and position.
- P-2:7 Reads typescript or galley proof to detect and mark for correction any grammatical, typographical, or compositional errors:
Is able to perceive pertinent detail in proof, such as blurs, misshapen letters, margin alignment, and spacing.

LEVEL 3

- P-3:1 Grades cured tobacco leaves preparatory to marketing or processing into tobacco products:
Visually inspects and feels leaves to determine their grade according to size and texture, and to detect damage to leaf.

P-3:2 Forms sand molds for production of metal castings, using handtools, power tools, patterns, and flasks, applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Form perception is required to determine appropriate length, width, and position of runners and sprue holes to be cut in mold; and to detect and repair damage to interior surfaces of mold.

P-3:3 Repairs and services office machines, such as adding, accounting, and calculating machines, and typewriters, using handtools, power tools, micrometers, and welding equipment:

Form perception is required to identify machine parts, and to detect defects in parts by their shape and alignment with other parts, when determining type and extent of repairs or service needed.

P-3:4 Inspects and assembles machined bomb-fuse parts, using handtools and power tools:

Examines machined parts prior to assembly for burrs and excess metal, using magnifying glass for small parts, and files and grinds off burrs and excess metal.

P-3:5 Cuts and trims meat to size for display or as ordered by customer, using handtools and power equipment, such as grinder, cubing machine, and power saw:

Form perception is required to align carcass with blade of saw in order to break down large sections into smaller standard cuts; to examine shape, marbling, fat, and bone to determine most economical means of preparing cuts; to trim fat, and bone and to examine shape and grain to determine cutting line to follow to make standard cuts, such as loin roasts, steaks, etc.

P-3:6 Prepares wire-wound coils for assembly in electronic or electrical equipment:

Inspects materials and coils for defects; locates tap wires in wound coils and pulls them out with tweezers and picks; bends wires to specified shape; and solders minute wires together or to terminal lugs.

P-3:7 Inspects glass bottles and glass containers from bottlemaking machine, rejects defective ware, and packs selected ware into cartons:

Form perception is required to inspect bottles and detect flaws in glass, such as cracks, checks, and splits, and irregularities of shape and size.

P-3:8 Operates battery of looms to weave yarn into cloth:

Form perception is required to make visual inspections of looms prior to and during operation to be sure shuttles are in position and no yarn strands are broken; and to detect mispicks, imperfections in weave, and breaks in warp fibers.

LEVEL 4

P-4:1 Operates cylinder press to score and cut paperboard sheets into box or container blanks:

Observes alignment of paperboard to adjust feeding and stacking mechanism. Inspects cutting and scoring lines to detect defects.

P-4:2 Performs one or more repetitive bench or line assembly operations to mass produce products, such as automobile or tractor radiators, blower wheels, refrigerators, or gas stoves:

Form perception is required when buffing parts to see when burrs are buffed from ends of tubing and taper with specified angle is attained; and to see small bubbles rise to surface of test tank denoting leak in coil, and to locate their source.

P-4:3 Receives, stores, and issues equipment, materials, supplies, merchandise, foodstuffs, or tools, and compiles stock records in stockroom, warehouse, or storage yard:

Examines stock to identify item according to size, shape or other characteristics in order to verify conformance to requisitions or invoice specifications.

- P-4:4 Packs agricultural produce, such as bulbs, fruit, nuts, eggs, and vegetables, for storage or shipment:
Form perception is required to recognize differences in size, shape, and condition of produce; to pack produce in prescribed pattern according to sizes and shapes; to inspect produce visually for imperfections; and to identify and remove foreign matter.
- P-4:5 Installs control cables to door, window, engine, and flight-control surfaces of airplanes according to specifications, using wrenches, screwdrivers, pliers, and drills:
Form perception is required to measure and locate positions for pulleys, guides, and brackets; to thread cable from control levers, through pulleys and guides to mechanism according to specified pattern; and to observe during functional checks to determine necessary adjustments.
- P-4:6 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose in manufacturing or dry cleaning establishments:
Form perception is required to position articles on press buck (padded table of machine) to ensure a smooth press; to shape articles when positioning; and to inspect garments for wrinkles and shape after pressing.
- P-4:7 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces shield of inert gas between electrode and workpiece to prevent oxidation:
Form perception is required to see details in work diagrams, to align workpiece according to layout markings; to follow line to be welded; to guide torch; and to inspect weld bead for consistent size, straightness, and complete fill of joint.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

Q — CLERICAL PERCEPTION: The ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception is required in many industrial jobs even when the job does not have verbal or numerical content.

Interpretive Information for Analysts: In trade and craft jobs consider the work orders, specifications, dials, gauges, and measuring devices which must be read. Consider whether perceptual errors in reading words and numbers or in rapidly comparing similar forms or shapes would result in defective work.

LEVEL 1

- Q-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields; and solves or directs solutions to problems in various fields by mathematical methods:
Accurately perceives numbers when performing computations, applying methods of numerical analysis, and operating calculators, plotters, or other electrical computation machines in solving problems in support of mathematical, scientific, or industrial research activity, and in analyzing tabular material produced as part of such research.
- Q-1:2 Reads and corrects proof while original copy is read aloud:
Clerical perception is required to see details in proof pages such as the way words are spelled, capitalized, hyphenated, and abbreviated; and to detect typographical errors, such as misspelling, wrong punctuation, skips, or repeats.

Q-1:3 Converts symbolic statement of business problems to detailed logical flow charts for coding into computer language and solution by means of automatic data processing equipment:

Clerical perception is required to perceive pertinent detail in program documentation, assembled data, and recommended program routines; to prepare input, output, and nomenclature lists; to translate step-by-step instructions from flow charts for console operator; to recognize and detect errors in program instructions; to correct errors by altering sequence of steps; and to avoid computation errors.

LEVEL 2

Q-2:1 Performs variety of clerical duties, such as filing correspondence, records, and reports; typing letters and reports; preparing bills; computing payrolls; compiling reports; addressing, sorting, and distributing mail; taking dictation; tabulating and posting data in record books; keeping inventory records; and giving information:

Clerical perception is required to read, record, and type numbers and names quickly and accurately, to file letters, prepare records and reports, and to post data.

Q-2:2 Reviews individual applications for insurance, evaluates the degree of risk involved, and accepts applications, following company's underwriting policies:

Clerical perception is required to compute accurately the value of property and risk involved; to figure premiums using tables and weighted values for risk factors; to note pertinent details in insurance applications and investigation reports; and to read accurately tables and insurance maps, indicating amount and type of insurance used in specific areas.

Q-2:3 Operates machine to perforate paper tape used to control casting type:

Clerical perception is required to read copy and strike keys accurately on keyboard to punch tape; to read tables to determine number of justification keys to punch to justify lines of type; and to read tables to avoid perceptual errors in arithmetic when converting line measures from one unit of measure to another.

Q-2:4 Answers inquiries regarding schedules; describes routes, services, and accommodations available; reserves space; and sells tickets for transportation agencies, such as airlines, bus companies, railroads, and steamship lines:

Clerical perception is required to read accurately schedules and manuals with route and accommodation information; to make out tickets and passenger lists and to record reservation information; to avoid perceptual errors when reading rate schedules, and computing fares and baggage charges; and to keep records of tickets sold, type of accommodations, fares, taxes, and payment.

Q-2:5 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Clerical perception is required to read laboratory test request slips, to determine patient for whom tests are to be made, type of test, quantities and types of specimens to be taken, and special test instructions; to read words and chemical symbols on laboratory supplies for selection of exact chemical to use in tests; to read reference materials determining type and quantities of reagents to use in analysis; to perceive numbers accurately when performing arithmetic computations for quantitative analyses; and to perceive words and numbers accurately when filing test reports, specimens, and other records according to alphabetical and numerical systems.

Q-2:6 Determines conformance of cloth to weight standards by computing weight per yard of cloth and comparing computations with information on style card:

Clerical perception is required to read identification tag on bolt of cloth, to determine style number, weight, and length; to perceive accurately numbers and markings on slide rule in order to compute weight per yard; to compare computation with standard listed on style card; and to record accurately weight, yardage, weight per yard, and style number for each bolt on production sheet.

- Q-2:7 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution:
Notes pertinent detail in written instructions, especially amounts and strengths of medications to administer; accurately perceives numbers when reading instruments, preparing medications, and filling syringes for injections; accurately records data on patients' charts, such as temperature, respiration, pulse count, blood pressure, medications, and dosage administered.

LEVEL 3

- Q-3:1 Prepares and compiles records in hospital nursing unit, such as obstetrics, pediatrics, or surgery:
Clerical perception is required to post information to patients' charts from doctors' and nurses' notes and laboratory reports; to file charts in chart racks; to make up daily diet sheet for unit; and to maintain inventory of drugs and supplies.
- Q-3:2 Drives truck over established route to deliver, sell, and display products or render services:
Clerical perception is required to fill out requisitions for merchandise and to check amounts received against requisition; to prepare sales slips for amounts sold, entering proper amount beside item listed on sales slip; and to avoid perceptual errors when computing total of sales and preparing reports of daily sales and collections.
- Q-3:3 Marks or affixes trademark or other identifying information, such as size, color, grade, or process code on merchandise, material, or product:
Clerical perception is required to check specification to determine label and other information to be stamped on product; to select appropriate type and other symbols and place them in type box in order; and to compare sample to specification.
- Q-3:4 Operates cash register to compute and record total sale and wraps merchandise for customers in department, variety, and specialty stores:
Clerical perception is required to record accurately amount of sale on cash register; to compare sales slip with price tickets on merchandise; and to copy cash register totals onto daily sales and receipt records.
- Q-3:5 Assists in care of hospital patients, under direction of nursing and medical staff:
Clerical perception is required to read and record such data as temperature, pulse rate, and respiration rate; to record patient's food and fluid intake and output; and to read charts and instructions accurately.
- Q-3:6 Performs combination of duties involved in binding books, magazines, pamphlets, directories, and catalogs:
Clerical perception is required to lay signatures on gathering table in correct page order for assembly; to gather up signatures in numerical order to form complete book body; and to inspect bound book bodies for proper pagination.

LEVEL 4

- Q-4:1 Coordinates and expedites flow of materials, parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisors' priorities:
Clerical perception is required to compare identification number of parts, materials, or assemblies to identical numbers on shop order when locating items; and to take physical inventories of stock, tool, or equipment storage rooms, comparing inventory number or other identifying number to inventory list.
- Q-4:2 Inspects finished glassware or flat glass for conformance to quality standards:
Clerical perception is required to read micrometers and gauges accurately to determine if dimensions are within specified tolerances; and to record number and type of defects.

Q-4:3 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:

Accurately perceives identification numbers and weights marked on materials, packing cases, or tote boxes to identify materials to be moved and to assure that weight of items lifted does not exceed vehicle capacity.

Q-4:4 Marks, sorts, and records number and type of soiled garments, linens, and other articles received for cleaning and laundering:

Clerical perception is required to enter number of each type of garment or article on laundry list; to write or stamp identification number or code on article or tag; and to accurately record identification number on laundry slip.

Q-4:5 Assists workers in business office by sorting, distributing, and collecting mail and interoffice correspondence and delivering office supplies to workers:

Avoids perceptual errors in reading names and addresses on mail in order to deliver it to proper destination.

Q-4:6 Sets up and operates coil winding machine to wind coils used in manufacture of electrical and electronic components, such as transformers, solenoids, chokes, and filters:

Clerical perception is required to observe counter and to stop machine after specified number of turns; and to read ohmmeter attached to resistance coil, winding or unwinding wire until specified resistance reading is obtained.

Q-4:7 Sells furniture, beds, and mattresses in department store or furniture store:

Clerical perception is required to avoid perceptual errors when making up bills of sales; when reading and recording identification numbers to make up inventory of stock; and when requisitioning stock from warehouse or checking on its availability.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

K — MOTOR COORDINATION: The ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

Interpretive Information for Analysts: Motor coordination involves hand movements guided by concentrated visual attention. It is present when objects are guided into position or parts are assembled. Typing and operating adding machines, calculators, and similar keyboards are examples of motor coordination in clerical occupations.

LEVEL 1 NO ILLUSTRATIONS

LEVEL 2

K-2:1 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Eye-finger coordination is required to type by "touch" with fingers striking the appropriate keys as the eyes follow the copy.

K-2:2 Itemizes and totals cost of customer's purchases of groceries, meat, and produce on a combination adding machine-cash register:

Motor coordination is required to coordinate finger, eye, and hand with speed.

K-2:3 Diagnoses and treats diseases, injuries, and malformations of the teeth, gums, and related oral structures:

Motor coordination is essential in using drills and other dental tools to extract, fill, or cap teeth; in positioning novocaine needle in gums; and in fitting artificial teeth, plates, and bridges.

K-2:4 Operates pantograph machine to transfer design in reduced form from zinc plate to varnished printing rollers:

Coordination between eyes and fingers is required in guiding needle point through line of design cut on plate to trace pattern on printing roll; and for moving stylet to follow colored lines in etched pattern.

K-2:5 Measures heel to toe length of stocking, using measuring lines on pairing table, and stacks stockings of comparable length, color, and grade for matching into pairs:

Motor coordination is required to coordinate eyes, hands, and fingers during measuring, color matching, and sorting, working at production pace.

K-2:6 Installs, repairs, adjusts, and calibrates pneumatic, electrical, and electronic instruments:

Motor coordination is required in using handtools to adjust or repair component parts of electronic instruments; to test and calibrate reassembled equipment with electrical testing devices; and to rewire and modify equipment in accordance to blueprints and schematics.

K-2:7 Works at discharge end of conveyor belt to inspect and box bakery products:

Motor coordination is required to remove products quickly from belt and place them in cartons according to specified arrangement.

LEVEL 3

K-3:1 Operates telephone switchboard to establish or assist customer in establishing local or long distance telephone connections:

Motor coordination is required to press proper keys or plug jacks into holes or slots on switchboard quickly in response to visual stimuli or lights on board, and often with several calls coming in and going out simultaneously.

K-3:2 Assembles electrical equipment, such as ammeters, galvanometers, and voltage meters:

Close correspondence is required between eyes and hands in using tools to position, adjust and tighten parts, such as screws, indicator arms, springs, and lugs.

K-3:3 Performs beauty services for patrons of beauty shop:

Coordination of eyes, hands, and fingers is required to cut, style, and tint hair, give facials, arch eyebrows, and manicure nails.

K-3:4 Drives gasoline-powered forklift truck to haul or stock materials and objects in or about establishment:

Coordinates eyes and hands or fingers in making precise movements with speed (pushing and pulling hand levers, gear shifts, and hand brakes) to drive truck and to raise, lower, or otherwise position forklift under objects to be moved.

K-3:5 Removes defective nuts and foreign matter from bulk nut meats:

Coordinates eye, hand, and finger movements to pick up and discard defective nut meats and foreign matter from conveyor belt, working at production rate.

K-3:6 Cuts, trims, and bones meats to prepare them for cooking, using knives, saw, and cleaver:

Motor coordination is required in adjusting saw blades; in cutting, boning, and trimming meats into desired portions with knives; and placing meats in grinders and cubing machines.

K-3:7 Assembles metal products, such as vacuum cleaners, valves, or hydraulic cylinders, working at bench or on shop floor:

Motor coordination is required in operating drill presses, punch presses, riveting machines, and various handtools in assembly operations; and in positioning, placing, and fitting of parts in each sub-assembly and main assembly.

K-3:8 Applies coats of plaster to interior walls, ceilings, and partitions of buildings to produce finished surface:

Motor coordination is essential in erecting scaffolding, mixing plaster to desired consistency, spreading plaster to attain uniform thickness, and creating decorative textures in finished coat by marking with brush or trowel.

K-3:9 Forms wire grids used in electron tubes, using winding, shaping, and cutting machines:

Motor coordination is required to coordinate eyes and fingers or hands to insert grid into chucks, to trim grids, and to thread wires through lathe.

LEVEL 4

K-4:1 Repairs defects, such as tears and holes in garments, linens, curtains, and draperies, and rebinds cleaned blankets by hand or by operating a sewing machine:

Eye and finger coordination is required in sewing, darning, or reweaving holes or tears in garments, curtains, or linens.

K-4:2 Performs tasks to finish and press household linens:

Motor coordination is required in placing garments into machine, making sure garments are properly aligned so that no wrinkles will be ironed into garments.

K-4:3 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines:

Motor coordination is required to align workpiece and cutting tool in relation to one another; to move levers when operating machines; and in using handtools to perform such functions as chipping, filing, and scraping.

K-4:4 Assembles various aluminum or steel components of trailers:

Motor coordination is required to align and position trailer components to fit rivets, bolts, and screws into position, using riveting gun and handtools, and to fit trailer parts in prescribed position for correct assembly.

K-4:5 Receives, stores, and issues equipment, material, supplies, merchandise, foodstuff, or tools, and compiles records in stockroom, warehouse, or storage yard:

Coordinates eye, hand, and finger movements to wrap or box items and label packaged parts.

K-4:6 Harvests fruit, working as crewmember:

Coordinates hands and eyes to make necessary movements in selecting, picking, and depositing fruit into picking sack.

K-4:7 Operates traveling and stationary tables to feed steel blooms, billets, and slabs to rolls for successive passes through roll stands:

Eye-hand coordination is required to position tables and align rollers preparatory to feeding steel into rollers.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

F — FINGER DEXTERITY: The ability to move the fingers and manipulate small objects with the fingers rapidly or accurately.

Interpretive Information for Analysts: Finger dexterity is present when bolts and screws are handled; small tools, machine controls, and the like are manipulated; musical instruments are played; and fine adjustments and alignments are made to instruments and machines. It may or may not be accompanied by visual stimuli.

LEVEL 1

- F-1:1** Plays organ in recital, as accompanist, or as member of orchestra, band, or other musical group:
All ten fingers must be positioned in rapid integrated movements to depress specified keys at varying tempos on one or more keyboards of organ.
- F-1:2** Performs surgical operations upon human body:
Finger movements of one hand are required to locate broken or cut blood vessel, to position vessel and place ligature about it, and to tie one of several types of knots in ligature to stem flow of blood from vessel.

LEVEL 2

- F-2:1** Sets up and operates coil-winding machine to wind multiple coils used in manufacture of electrical and electronic components:
Positions and moves very small parts and thin wires with fingers and fits coil forms on winding arbor of machine; threads wire through guide mechanism of machine; and tapes wire to coil forms.
- F-2:2** Adjusts watch movements to comply with mechanical and timing specifications:
Controls placement and movement of watchmaker tools and watch components with fingers in disassembling and cleaning watch movements; in adjusting lock, drop, and slide of escapement; in truing wheel and hairspring assembly; and in reassembling watch movements.
- F-2:3** Installs optical elements, such as lenses, prisms, and mirrors in mechanical portion of such instruments as telescopes, cameras, and gunsights:
Finger dexterity is required to guide and move tools and to position component parts in performing such tasks as scraping, filing, and lapping instrument mounts to align optical elements; adjusting optical elements to calibrations; and inserting retaining rings into housings and securing them to posts or threads.
- F-2:4** Assembles modules (units) of microelectronic equipment, such as satellite communications devices and hearing aids, using handtools, magnifying lens, and spotwelder:
Finger dexterity is required to insert lead wires of components, such as microdiodes, resistors, capacitors, and microtransistors, into mounting holes of plastic plate; and to attach color-coded wires between specified component leads to make circuit connections.
- F-2:5** Engraves lettering and ornamental designs on silverware, trophies, eyeglass frames, and jewelry, using engraving tools:
Finger dexterity is required to position and control movements of engraving tools in cutting complicated designs on objects, such as pins, rings, and bracelets.
- F-2:6** Packages pharmaceutical products by hand, working at production pace:
Finger dexterity is required in performing such tasks as inserting cotton in mouths of bottles, placing caps on bottles, pasting labels on bottles, inserting bottles into nested cartons, placing printed material in filled cartons, and packing individual cartons into larger cartons.
- F-2:7** Makes women's garments, such as dresses, coats, and suits, according to customer specifications and measurements:
Finger dexterity is required in performing such tasks as positioning and pinning pattern sections and fabric; pinning or basting together fabric parts in preparation for sewing; and threading needle and sewing parts together by hand.

F-2:8 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Finger dexterity is required to position and guide dental picks and mirrors; position x-ray film in patient's mouth; suture extraction wounds; and trim and carve bite blocks with spatulas and carving instruments.

LEVEL 3

F-3:1 Feeds tungsten filament wire coils into machine that mounts them to stems in electric light bulb:

Finger dexterity is required to grasp coils with tweezers and insert them into slotted plate of mounting machine; and to pick up and examine finished mounts as they emerge from machine.

F-3:2 Takes dictation in shorthand and transcribes dictated materials, using typewriter:

Finger dexterity is required in forming shorthand symbols with pencil or pen and in depressing keys of typewriter.

F-3:3 Installs, maintains, and services sound and communication systems:

Finger movements are required in performing such tasks as picking up and installing tubes, transistors, and component parts; wiring units of system together; and turning dials to obtain required performance level.

F-3:4 Cuts and styles hair, using clippers, comb, and scissors, and performs other personal services for patrons of barber shop:

Controlled movement of fingers is required to use clippers, scissors, and other barber tools when cutting and shaping hair.

F-3:5 Operates battery of looms to weave yarn into cloth:

Finger dexterity is required to repair breaks in warp fiber by tying piece of yarn to broken end of warp and threading yarn through drop wires, needle eyes, and reed dents, using reed hooks.

F-3:6 Constructs and repairs dental appliances:

Finger dexterity is required in performing such tasks as sketching outline of appliance on stone model, aligning model on articulator and securing it to frame with plaster, and building wax impressions of metal frames, crowns, partials, and full dentures.

F-3:7 Packs agricultural produce, such as bulbs, fruits, nuts, eggs, and vegetables, for storage or shipment:

Finger dexterity is required in performing such tasks as lining containers with padding, inserting separators in containers, sorting produce according to size and color, wrapping material around produce, and placing produce in containers.

F-3:8 Welds metal parts together, using electric and oxyacetylene welding equipment:

Finger movements are required to connect pressure regulators to nozzles of oxygen and acetylene supply tanks; connect hoses to regulators and welding torch to hose; screw welding tip into torch; and to open regulator valves and light torch.

LEVEL 4

F-4:1 Mixes and bakes ingredients according to recipes to produce breads, pastries, and other baked goods:

Finger dexterity is required to work with ingredients and utensils and to perform such tasks as arranging strips of dough across tops of pies, and placing cut or formed dough in pans or on baking boards or trays.

- F-4:2** Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in medical institutions:
- Finger dexterity is required in using knives, brushes, scrapers, and other tools to clean, trim, slice, and dice vegetables, fruits, and meats; in portioning foods; in turning dials and valves on kitchen equipment; in removing dishes, napkins, and waste materials from food carts; in sorting and stacking dishes; and in lining pans and shelves with paper.
- F-4:3** Sews fasteners and decorative trimmings to articles, sews buttonholes, and joins articles, using needle and thread:
- Finger dexterity is required to thread needle, align articles, and hold articles in place while sewing.
- F-4:4** Controls continuous operations of petroleum refining and processing units:
- Finger dexterity is required to move knobs, buttons, and switches on control panels; to place charts, tapes, and graphs in recording part of instruments; and to set control arms and needle points in proper recording positions.
- F-4:5** Repairs and maintains physical structures of commercial and industrial establishments, using handtools and power tools:
- Finger dexterity is required to perform such tasks as making electrical repairs that involve splicing broken lines; installing switches, receptacles, and junction boxes; and replacing fuses.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

M — MANUAL DEXTERITY: The ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions.

Interpretive Information for Analysts: Manual dexterity involves working with the arms and hands. It is present when objects are moved or stacked by hand or in other situations in which wrists and hands are used in turning and placing movements.

NOTE: Finger movements (Finger Dexterity) may or may not accompany the exercise of manual dexterity.

LEVEL 1 NO ILLUSTRATIONS

LEVEL 2

- M-2:1** Entertains audience by juggling and balancing objects:
- Manual dexterity is required to throw, catch, handle, and balance three to five objects, such as balls, knives, tenpins, and chinaware.
- M-2:2** Installs, repairs, maintains, and adjusts indicating, recording, telemetering, and controlling instruments used to measure and control variables, such as pressure, flow, temperature, motion, force, and chemical composition, using handtools and precision instruments:
- Assembly, disassembly, and calibration of instruments require placing and turning movements of the hands. Works with handtools, such as screwdrivers, wrenches, and pliers, and bench tools, such as jeweler's lathe, pin vises, small buffer grinders, and ultrasonic cleaners, in repairing instruments.
- M-2:3** Inspects eggs to ascertain quality and fitness for consumption or incubation according to prescribed standards:
- Manual dexterity is required to pick up eggs from cardboard cases, roll and shift eggs within palm while inspecting them, and place acceptable eggs on shuffler rack while working at production-line pace.

M-2:4 Fabricates, assembles, installs, and repairs sheet metal products and equipment, such as control boxes, drainpipes, ventilators, and furnace castings, according to work orders or blueprints:

Manual dexterity is required to manipulate such tools as outline cutting torches, power hacksaw, slitting shear, and various hand drills to accomplish general work processes as cutting, forming, folding, grooving, bending, punching, and drilling holes; and to place workpiece in holding fixture, operate tool, and remove workpiece from machine.

M-2:5 Constructs and repairs metal-forming tools, dies, jigs, fixtures, and gauges, shaping parts with various metalworking machines and fitting them together, using handtools:

Manual dexterity is required in setting up machines; in building tool-holding devices; in fitting and assembling tools, gauges, and other mechanical equipment; and in performing such tasks as chipping, filing, scraping, and polishing surfaces of mechanical parts.

M-2:6 Sets up and operates drum-type machine to build pneumatic automobile tires according to specifications:

Manual dexterity is required in handling, placing, and guiding product components and tools in the process of tire building; in applying cement stick to drum; in tearing the measured length of ply stock from roll and wrapping ply around drum; in guiding stock while drum is rotated; in lapping ends of ply; and in smoothing tight splice.

M-2:7 Diagnoses and treats disease, injuries, and malformations of teeth, gums, and related oral structures:

Accurate and flexible wrist movements are required when using drills and other dental tools to extract, fill, or cap teeth; positioning novocaine needle in gums; and fitting artificial teeth, plates, and bridges.

M-2:8 Works at conveyor belt to package previously filled bottles, tubes, and boxes of pharmaceuticals by hand in individual or nested cardboard boxes:

Uses placing and turning hand movements in putting empty containers on conveyor belt; removing filled packages from conveyor; and packaging smaller containers in larger packages while maintaining a continuous production pace in all operations.

LEVEL 3

M-3:1 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Manual dexterity is required in using handtools; in handling and assembling spring units; in building up and securing padding; and in handling, positioning, and securing covered material.

M-3:2 Sets up, inspects, and repairs looms to weave cloth:

A variety of hand and wrist movements are required to adjust screws and levers, install gears, tighten bolts, and to repair and replace various mechanical parts of machine.

M-3:3 Drives gasoline- or electric-powered industrial truck, equipped with forklift, to push, pull, lift, stack, or tier material in warehouse, storage yard, or factory:

Manual dexterity is required to push and pull levers on truck, turn steering wheel, and stack materials on truck.

M-3:4 Tends machine that coats continuous rolls of wire, strips, or sheets with wax, paint, rubber, asphalt, or other coating material:

Manual dexterity is required in handling control levers; guiding strips into machine and onto rewind coils; repairing broken splices by hand; and in using small handtools to change degreasing pads and squeeze rollers.

- M-3:5** Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in the field, following blueprints and using handtools and power tools:
- Uses placing and turning hand movements in aligning and fitting structures or plate sections in assembling boiler frames; in handling plumb bobs, levels, wedges, dogs, and turn buckles; and in riveting, welding, and caulking.
- M-3:6** Sorts and segregates fruit, working as a crewmember:
- Manual dexterity is required to place liners in boxes; grasp fruit and paper, and wrap fruit; and pack wrapped fruit in proper position in container.
- M-3:7** Lays building materials to construct or repair walls, partitions, arches, sewers, and other structures:
- Manual dexterity is required to manipulate equipment and tools; place and stack material; erect scaffold; mix and spread mortar, cut bricks; and embed iron rods in mortar.
- M-3:8** Operates machine to press face of composed type and plates into wood fiber mats to form stereotype casting mold for printing:
- Manual dexterity is required to manipulate tools to trim, plane, level, saw, and shave plates for printing.

LEVEL 4

- M-4:1** Harvests fruit, working as crewmember:
- Manual dexterity is required to position sizing loop around lemons; to clip lemons from stem; and to deposit lemons in boxes.
- M-4:2** Repairs and maintains physical structures of commercial and industrial establishments, using handtools and power tools:
- Manual dexterity is required in repairing and maintaining woodwork and furniture; making electrical repairs; patching and repairing cement, and making minor plumbing and pipe repairs.
- M-4:3** Removes stems from tobacco leaves to prepare tobacco for use as filler, binder, or wrapper for cigars, plugs, or twist chewing tobacco:
- Manual dexterity is required in the hand operation of picking up handful of tobacco, selecting single leaf, spreading it open and holding leaf with one hand while pulling out stem with other hand.
- M-4:4** Finishes household linens, such as sheets, pillowcases, tablecloths, and napkins:
- Manual dexterity is required to shake, sort, fold, and stack laundry; to tie bundles of laundry together; and to feed and guide material into ironer.
- M-4:5** Controls the operation of battery of stills to distill crude oil:
- Manual dexterity is required to turn knobs and switches on control panel; to position charts, tapes, and graphs in recording part of instruments; and to turn wheels and valves on the still and auxiliary equipment.
- M-4:6** Tends circular knitting machine with automatic pattern controls that knits seamless hose:
- Manual dexterity is required to pull hose over hands during operation; separate hose; stack yarns; thread yarn through proper channels when thread breaks; and to clean grease, lint, oil, etc., from machine.
- M-4:7** Sorts rags and old clothing:
- Manual dexterity is required to rip off buttons, pockets, hooks and eyes, snaps, and other foreign matter.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

E — EYE-HAND-FOOT COORDINATION: The ability to move the hand and foot coordinately with each other in accordance with visual stimuli.

Interpretive Information for Analysts: This factor involves using eyes, hands, and feet coordinately. Unless there is definite coordination of hand and foot movements with what the eye sees, this factor is not present.

LEVEL 1

- E-1:1** Performs gymnastic feats of skill and balance while swinging on a trapeze, turning somersaults, or executing flying stunts alone or as member of team:
Coordinates hand and foot motions with visual stimuli, in order to reach for and grasp approaching bar or other aerialist while standing on or hanging from another swinging bar.
- E-1:2** Performs ballet dances alone, with partner, or in group to entertain audience:
Coordinates feet and hands with vision in order to interpret dance role and to move in specified relationship with other members of cast; in positioning arms and hands in coordination with other movements to achieve desired interpretive effect or expression, to maintain balance, or to lift, carry, or support other dancer.
- E-1:3** Plays professional baseball:
Coordinates movements of hands and feet with what eye sees when catching, hitting, and throwing ball.
- E-1:4** Instructs groups at playgrounds and schools in fundamentals and rules of competitive sports:
Coordination of hand and foot movements with visual stimuli is required to demonstrate, by example, techniques of play for various sports and movements and body positions which result in best execution of a particular "play" or maneuver.
- E-1:5** Creates or interprets music on drum, as member of orchestra, band, or other musical group, to entertain audiences:
Eye-hand-foot coordination is required to hit or stroke drum heads with drum sticks or brushes and depresses pedals to activate other drums and cymbals simultaneously, while following musical score and conductor's baton.

LEVEL 2

- E-2:1** Pilots airplane to transport passengers, mail, freight, or for other commercial purposes:
Coordinated movements of hand and foot controls in accordance with observed conditions of aircraft or external factors or conditions indicated by instrument readings is required to take over control of airplane in emergency or override programmed control in case of malfunction to taxi, take off, land, and control aircraft in flight.
- E-2:2** Operates several types of powered construction equipment, such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or graders, to excavate and grade earth, erect structural and reinforcing steel, and pour concrete:
Moves hand and foot controls in coordination with vision and each other to drive and steer machines and move materials into position.
- E-2:3** Prunes and treats ornamental and shade trees and shrubs in yards and parks to improve their appearance, health, and value:
Eye-hand-foot coordination is required to climb trees or ladders and balance self while topping trees to control growth, sawing off dead, diseased, or undesirable limbs; scraping and filling cavities in trees with cement; and painting cut surfaces to seal them against insects and disease.

E-2:4 Raises, positions, and joins girders, columns, and other structural steel members to form completed structures or frameworks, working as member of crew:

Eye-hand-foot coordination is required to work above ground level while balancing on ladders, scaffolding, or structural members while raising, positioning, fitting, and joining structural pieces.

LEVEL 3

E-3:1 Attends to beef cattle on stock ranch:

Coordinates arm-hand and leg-foot motions with vision when riding horse to round up strays or to rope cattle; and to pin and tie down calves for branding.

E-3:2 Drives gasoline- or diesel-powered tractor-trailer truck combination, usually over long distances on highways, to transport and deliver goods, livestock, or materials in liquid, loose, or packaged form:

Eye-hand-foot coordination is required to operate clutch, brake, and accelerator pedals, gear-shift lever, and steering wheel to guide tractor-trailer on highways and streets, turn corners, negotiate narrow passageways, and backing up to warehouse, terminal, or other loading docks.

E-3:3 Maintains and repairs mercury-vapor, electric-arc, fluorescent, or incandescent street lights or traffic signals:

Coordinates hand and foot movements with vision to climb ladder to reach lamp, or stand in tower-truck bucket moving levers to position bucket near lamp; to maintain balance while using hands and vision to test circuits, locate broken wires, and replace fuses, bulbs, and transformers.

E-3:4 Renders variety of personal services conducive to safety and comfort of airline passengers during flight:

Coordinates hand and foot movements with vision to serve food and beverages without spilling them; and to walk in aisle, when airplane encounters rough weather, carrying trays or other items.

E-3:5 Loads and unloads ships' cargoes:

Coordinates hand and foot motions with vision when guiding slings used to lift cargo to avoid tripping and to keep load from swinging and bumping into other objects; when standing on ladders, platforms, or other objects to stack and arrange cargo high in hold; and to store cargo in ship's hold to prevent shifting during voyage.

LEVEL 4

E-4:1 Tends machine that crimps eyelets, grommets, snaps, buttons, or similar fasteners to materials such as cloth, canvas, paper, plastic, leather, or rubber to reinforce holes and attach fasteners or parts:

Coordinates hand and foot motions with vision when positioning material, fasteners, and ram of machine, while depressing foot pedal to activate ram which crimps fastener to material.

E-4:2 Parachutes from airplane into forests to suppress forest fires:

Coordinates hand and leg movements with vision to pull shroud lines and collapse chute while landing in manner to reduce impact and to prevent being dragged by chute.

E-4:3 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose, in manufacturing or dry cleaning establishment:

Simultaneous eye-hand-foot coordination is required to step on foot pedal, pull down on pressing head while observing garment to see that it does not slip out of position on press buck; to hold pedal down with foot to keep press head against garment; to press lever with fingers to emit steam from press head; and to keep pressure on press head handle to raise counterbalanced head gently, while stepping on second pedal to exhaust steam to cool and dry garment.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)

C — COLOR DISCRIMINATION: The ability to match or discriminate between colors in terms of hue, saturation, and brilliance. Ability to identify a particular color or color combination from memory and to perceive contrasting color combinations.

Saturation: Refers to the purity of color. Some colors have greater purity or amount of a certain color than others; that is, they have a more pronounced hue. For example, deep red is more "reddish" than light red.

Hue: Refers to the color itself and the various tints, shades, and attributes of a color which permit classification as reds, yellows, greens, or blues.

Brilliance: Refers to the brightness of a color. It is the amount of light reflected from a surface and can range from high to low, as when comparing a white snowflake with a mark made by a lead pencil.

Color Matching: Varying the components of a color mixture until it does not differ visually from a given sample.

Color Memory: The ability to retain an accurate visual image of a color and to be able to use it as a basis for matching and discriminating.

Interpretive Information for Analysts: Color discrimination may rely on one or a combination of the following: Identification of differences and similarities in colors from memory; using a visual standard against which colors can be matched or identified; or reproduction of colors using knowledge of color combinations.

LEVEL 1

C-1:1 Develops color formulas for printing textile and plastic materials and plans and directs activities of color shop:

Color discrimination is required to select and combine appropriate dyestuffs and pigments to achieve desired colors, distinguish minute differences in shades, and visualize the hue and brilliance which will result from mixing the primary colors in various proportions.

C-1:2 Paints portrait of person, usually in oil, on canvas, using living subject:

Color discrimination is required to combine paints and oils to develop colors which accurately reproduce coloring of subject; and to apply these colors on canvas in combinations of light and shade which give lifelike effect.

C-1:3 Studies production requirements, such as character, period, setting, and situation, and applies makeup to performers to alter their appearances in accordance with their roles:

Examines sketches, photographs, and plaster molds to form color image of characters to be depicted, selecting prostheses, cosmetics, and makeup materials, such as wigs, beards, rouge, powder, and grease paint, and applies these to change such physical characteristics of performers as facial features, skin texture, and coloring to produce effect appropriate to depict character and situation.

C-1:4 Reweaves damaged areas of oriental or other expensive rugs, following color, pattern, and weave of rug:

Color discrimination is required to perceive color scheme of rug so that proper alterations can be made which are consonant with rug's total color configuration, and to select yarn which is equivalent in color to that in rug.

LEVEL 2

C-2:1 Mixes stains, paints, and other coatings for use in painting according to formulas:

Color discrimination is required to detect any differences in color between mixture and sample and to rectify the color differences by adding pigment until exact shade is produced.

- C-2:2** Investigates properties and treatment of metals to develop new alloys, new uses for metal and alloys, and methods of producing them commercially:
Spectroscopic study of metals and alloys requires ability to discriminate between various colors and shades of same color as they are refracted onto screen, and to judge dispersion of alloy particles and their relative purity by means of color emission.
- C-2:3** Plans and designs artistic interiors for homes, hotels, ships, commercial and institutional structures, and other establishments:
Is well informed on outcome of blending various colors in interior decorating and capable of choosing color schemes which are harmonious with each other and particular setting.
- C-2:4** Changes undesirable details of illustration copy which is to be reproduced by lithographic process:
Compares negative or positive with original copy to determine color correction, silhouetting, or opaquing requirements; prepares dye or other chemicals; and intensifies or reduces unsatisfactory tone values in film or glass by adding color to lithographic plates to achieve required hue.
- C-2:5** Studies effects of drugs, gases, dusts, and other materials on tissues and physiological processes of animals and human beings:
Color shades and hues are used as basis for drawing valid conclusions about effect of drug or stain; and color matching is required when preparing two solutions of equal concentration or proportion.
- C-2:6** Prepares, stuffs, and mounts skins of birds or animals in lifelike form:
Color memory is required in painting eyes, teeth, claws, and feathers to enhance lifelike appearance of specimen, and in dressing-out, embalming, or otherwise preparing animal carcasses.
- C-2:7** Molds pulverized marble, metallic oxides or pigment, cement, and water in specific pattern to form terrazzo tile:
Color discrimination is essential in apprehending color values of pattern to be depicted; and color matching is required in mixing pigment, cement, and water, so that finished tile is equivalent in terms of color to that of standard.

LEVEL 3

- C-3:1** Examines and grades pieces of leather to make articles, such as garments, gloves, and mittens, according to specifications:
Color discrimination is required to match color of leather in each grade so that it is equal in terms of hue, saturation, and brilliance.
- C-3:2** Examines pearl buttons and sorts them according to grade:
Color discrimination is required to observe buttons on conveyor belt or worktable, at production-line pace; and to sort them into containers according to shade and purity of color and degree of iridescence.
- C-3:3** Tests temperature of glass melting furnaces and regulates gas and air supply to maintain specified temperature:
Observes color of flame through opening of optical pyrometer and turns dial on pyrometer until color of wire filament matches luminosity of flame. This color matching technique requires the worker to be able to make discrimination in color between the flame and wire filament.

C-3:4 Tests milk to determine bacterial count, percentage of butterfat, and amount of acid in milk of each cow in herd:

Measures out specified amount of ethylene blue and observes time required for blue color to disappear in determining bacterial count; and discriminates between various shades of red and blue when using pH indicator.

C-3:5 Displays and sells cotton, linen, rayon, silk, and wool yard goods:

Color discrimination is necessary to distinguish between different shades and colors of fabrics in filling customers' orders; and to match fabrics for color.

LEVEL 4

C-4:1 Performs various tasks in a fish hatchery:

Uses color discrimination and matching to sort fish according to size, coloring, and species in transferring them to proper tanks.

C-4:2 Arranges tiles into designs for such use as floor or sink tops and pastes paper on tile to preserve arrangement of design:

Is able to discriminate between colors in order to insert individually colored tiles in slots following sample design.

C-4:3 Inspects furniture and parts for defects:

Color matching is required in verifying color of furniture against work ticket specifications; and in detecting differences in shade of same color so that defective work can be discovered.

C-4:4 Cuts and trims meat to size for display or as ordered by customer, using handtools and power equipment:

Is able to distinguish different shades and colors in selecting meats according to customer's specifications and in inspecting meats for quality.

C-4:5 Inspects sample lots of varnish for acids, color, clearness, cracks, crystallization, sediment, and drying qualities, to ascertain whether varnish conforms with specifications before packing process:

Uses color discrimination and matching to compare sample varnish with standard varnish for any discrepancies in color.

LEVEL 5 NO ILLUSTRATIONS (see page 9-2)