CLASSIFICATION STANDARD

COMPUTER SYSTEM ADMINISTRATION

ADMINISTRATIVE AND FOREIGN SERVICE CATEGORY

Canada

CONTENTS

INTRODUCTION

This standard describes the point rating plan to be used to evaluate jobs allocated to the Computer Systems Administration Group. It consists of an introduction, general definitions of the Administrative and Foreign Service Category and the occupational group, point rating scales and bench-mark position descriptions.

Point rating is an analytical, quantitative method of determining the relative value of jobs. It is particularly suited to heterogeneous occupational groups in which jobs consist of varied combinations of tasks. Essentially, point rating plans define characteristics or factors common to the jobs being evaluated. They define degrees of each factor and allocate point values to each degree. The total value determined for each job is the sum of the point values assigned by the raters.

All methods of job evaluation require the exercise of judgment and the orderly collection and analysis of information in order that consistent judgments can be made. The point rating method facilitates rational discussion and resolution of differences in determining the relative worth of jobs.

Factors

The combined factors do not describe all aspects of jobs. They deal only with those characteristics that can be defined and distinguished and that are useful in determining the relative value of jobs.

Four factors are used in this plan. Most factors have more than one dimension and have been defined in terms of two or three related elements. The factors and elements are

Knowledge	- Education
	- Experience
	- Continuing Study
Decision Making	- Scope for Decisions
	- Impact of Decisions
Responsibility for Contacts	
Supervision	- Level of Employees Supervised
	- Numbers Supervised

Point Values

Maximum point value assigned to each factor reflects its relative importance. Similarly, point values have been assigned to the degrees of the factors.

Point values increase arithmetically as the degrees of the factor increase. The minimum point value for each factor, with the exception of supervision, is one-fifth of the maximum value. The ranges of point values are

	Minimum	Maximum
Knowledge		
Education and Experience	60	300
Continuing Study	20	100
Decision Making	70	350
Responsibility for Contacts	20	100
Supervision	-	150
	170	1,000

Bench-mark Positions

Bench-Mark position descriptions are used to exemplify degrees of each factor or element. Each description consists of a brief summary, a list of the principal duties, with the percentage of time devoted to each, and a specification describing duties, with the percentage of time devoted to each, and a specification describing each of the point rating factors and elements as it appears in the job. The bench-mark positions have been evaluated, and the degree and point values assigned to each factor are shown in the specifications.

The rating scales identify the bench-mark position descriptions that exemplify each degree. These descriptions are an integral part of the point rating plan and are used to ensure consistency in application of the rating scales.

Use of the Standard

There are six steps in the application of this classification standard.

1. Allocation of the position to the category and the group is confirmed by reference to the definitions and the descriptions of inclusions and exclusions.
2. The position description is studied to ensure understanding of the position as a whole and of each factor. The relation of the position being rated to positions above and below it in the organization is also studied.

3. Tentative degrees of each factor in the job being rated are determined by comparison with degree definitions in the rating scales. Uniform application of degree definitions requires frequent reference to the descriptions of factors and the notes to raters.
4. The description of the factor in each of the bench-mark positions exemplifying the degree tentatively established is compared with the description of the factor in the position being rated. Comparisons are also made with descriptions of the factor in bench-mark positions for the degrees above and below the one tentatively established.
5. The point values for all factors are added to determine the tentative total point rating.
6. The position being rated is compared as a whole to positions to which similar total point values have been assigned, as a check on the validity of the total rating.

Determination of Levels

The ultimate objective of job evaluation is to determine the relative value of jobs in each occupational group in order that employees carrying out the jobs may be paid at rates consistent with the relationship indicated. Jobs that fall within a designated range of point values will be regarded as of equal difficulty and value and will be allocated to the same level.

Minimum Qualifications

Each of the group definitions in the category includes a statement of "Minimum Qualifications". These requirements are to apply without modification to all new entrants to the labor force, that is, students who have just completed their full-time studies and young people commencing full-time employment. With respect to experienced workers who may not possess the formal education prescribed in the definitions, the statements are intended to indicate the norms against which the qualifications of the individual may be assessed, in order to judge whether or not the combination of his education, training and experience provides, for the particular job being filled, qualifications equal to or higher than those prescribed in the "Minimum Qualifications" of the relevant occupational group.

CATEGORY DEFINITION

Occupational categories were repealed by the Public Service Reform Act (PSRA), effective April 1, 1993. Therefore, the occupational category definitions have been deleted from the classification standards.

GROUP DEFINITION

For occupational group allocation, it is recommended that you use the Occupational Group Definition Maps, which provide the 1999 group definition and their corresponding inclusion and exclusion statements. The maps explicitly link the relevant parts of the overall 1999 occupational group definition to each classification standard.

RATING SCALES

COMPUTER SYSTEMS ADMINISTRATION GROUP

FACTOR	POINTS
Knowledge	
- Education and Experience	300
- Continuing Study	100
Decision Making	350
Responsibility for Contacts	100
Supervision	150
	1,000

POINT BOUNDARIES

LEVELS	POINTS
CS 1	170 to 300
CS 2	301 to 450
CS 3	451 to 600
CS 4	601 to 750
CS 5	751 to 900
CS 6 (EX)	901 to 1000

GLOSSARY OF TERMS

Various terms, definitions and abbreviations used in the discipline are provided below. The selection aims primarily at assisting personnel people in using this standard. Some of the terms and definitions are peculiar to the need of this standard. However, and as much as possible, the terms and their definitions have been aligned with the more comprehensive series of terms and definitions appearing in the "Electronic Data Processing Glossary" (GES/NGI-12/G02) prepared, published and issued by the Government EDP Standards Committee. (The Glossary can be obtained from the Canadian Government Publishing Center, Supply and Services Canada.)

Note: Information pertaining to the Government's information policy, management, security and standards are contained in the Treasury Board Administrative Policy Manual - Chapter 440: Electronic Data Processing.

Acceptance testing: The running of a complete system against a predetermined series of specified information to arrive at a predictable result for the purpose of establishing acceptability.

Address: A character or group of characters that identifies a register, a particular part of storage, or some other information source or destination.

ADP: Abbreviation for: automatic data processing.

Algorithm: A finite set of well-defined rules for the solution of a problem in a finite number of steps.

Analog Computer: A computer capable of performing operations on physical entities represented in analog form. (Analog: Pertaining to representation of physical quantities by means of signals that vary continuously.)

Analysis: The methodical investigation of a problem, and the separation of the problem into smaller related units for further detailed study.

Analyst: A person who defines problems and develops algorithms and procedures for their solution.

Application: Any user problem to which information processing techniques are applied.

Array: An arrangement of elements in one or more dimensions.

Artificial intelligence: The capability of a device to perform functions that are normally associated with human intelligence.

Artificial language: A language whose rules are explicitly established prior to its use.

Assemble: To prepare a machine language program from a symbolic language program by substituting absolute operation codes for symbolic operation codes and absolute or relocatable addresses for symbolic addresses.

Assembler: A computer program used to assemble.

Assembly language: A computer-oriented language which must go through an assembly in order to be converted into the machine code required for operation on a computer and whose instructions are usually in one-to-one correspondence with computer instructions.

Assembly program: Synonym for: assembler.

Audit: To conduct a review and examination of the records and activities of an operational information processing system in order to test the adequacy and effectiveness of procedures for data security and data integrity. See also: computer systems audit.

Audit trail: A manual or computerized means for tracing the transactions affecting the contents of a record.

Automation: (1) The carrying out of processes by automatic means.
(2) The conversion of a procedure, process or equipment to automatic operation.

Automatic data processing: Information processing predominately performed by automatic means. Abbreviation: ADP.

Batch processing: The processing of information or the accomplishment of jobs, accumulated in advance, in such a manner that the user cannot further influence its processing while it is in progress.

Benchmarking: Synonym for: benchmark testing.

Benchmark problem: A problem used to evaluate the performance of hardware or software or both.

Benchmark testing: A procedure using a standard problem designed to evaluate the performance of computer systems relative to one another.

Bit: (1) The abbreviation of binary digit.
(2) A single pulse in a group of pulses.

Block: A string of records, a string of words or a character string formed for technical or logic reasons to be treated as an entity.

Block diagram: A diagram of a system, of an instrument, or of a computer, in which the principal parts are represented by suitably annotated geometrical figures to show both the basic functions of the parts and the functional relationships between them.

Bootstrap: A procedure in which simple preset computer operations are used to load instructions which in turn cause further instructions to be loaded until the complete computer program is in storage.

Buffer: A synchronizing element between two different forms of storage normally used to compensate for differences in the rate of flow of data. Same as: buffer storage.

Byte: A binary character string operated upon as a unit and usually shorter than a computer word.

Central Processing Unit: A unit of a computer that includes circuits controlling the interpretation and execution of instructions. Abbreviation: CPU
Same as: central processor.

Channel: In data transmission, a means of simplex transmission in a pre-assigned direction. In communication theory, that part of a communication system that connects the message source with the message sink.

Character: A member of a set of elements upon which agreement has been reached and that is used for the organization, control or representation of information (data).

Character set: A finite set of different characters upon which agreement has been reached and that is considered complete for some purpose.

Character subset: A selection of characters from a character set, comprising all characters that have a specified common feature.

Checking program: A computer program that examines other computer programs or sets of data for mistakes of syntax.

Checkpoint: A place in a computer program at which a check is made or at which a recording of data is made for restart purposes.

Checksum: The sum of a group of data items, computed when the data are recorded and appended to the group for checking purposes. Same as: control data.

Code: A set of unambiguous rules specifying the manner in which information may be represented in a discrete form. Same as: coding scheme.

Code: To represent data or a computer program in a symbolic form that can be accepted by an information processor. NOTE: Sometimes used interchangeably with "encode".

Coded representation: The representation of an item of information established by a code or the representation of a character established by a character set. Same as: code element; code value.

Coder: A person mainly involved in writing but not defining computer, programs.

Code Set: The complete set of coded representations defined by a code or by a coded character set.

Command language: A set of procedural operators, with a related syntax, used to indicate the functions to be performed by an operating system. Same as. control language.

Communication: Synonym for: data communications.

Communication theory: The branch of leaning dealing with the mathematical probabilities of the transmission of messages in the presence of noise and any other disturbances.

Compile: To translate a computer program expressed in a problem-oriented language (i.e. symbolic or high level) into a computer-oriented language (i.e. a machine language).

Compiler: A computer program used to compile. Same as: compiling program.

Compiler generator: A translator or an interpreter used to construct compilers.

Computer: A device capable of accepting information, applying prescribed processes to the information and supplying the results of these processes with minimal human intervention during a run.

Computer graphics: Methods and techniques for converting information to or
     from graphic display via computers.

Computer instruction: An instruction that can be recognized by the central
     processing unit of the computer for which it is designed. Same as:
     machine instruction.

Computer language: Synonym for: machine language.

Computer network: A system consisting of interconnected computers.

Computer-oriented language: A language that has mnemonics that directly
     correspond to machine language instructions. Same as: low-level
     language.

Computer program: A program expressed in a form suitable for execution by a
     computer.

Computer system audit: An audit of the controls in a computer system to evaluate
     their relative effectiveness and to recommend improvements.

Concentrator: In data transmission, a functional unit that permits a common
     transmission medium to serve more data sources than there are channels
     currently available.

Configuration: The arrangement of a computer system as determined by the nature, number
                and chief characteristics of its functional units.

Consistency check: A check to detect that specific items of information are
     compatible.

Contingency procedure: A procedure that is entered as an alternative to the
     normal path of a process in the event of an unusual but anticipated situation
     during the process.

Control data: Synonym for: checksum.

Control function: An action that affects the recording, processing, transmission or
     interpretation of information.
      Same as: control operation.

Control language: Synonym for: command language.

Control objectives: A statement of the factors relating to an acceptable level of
     integrity required of an information processing system.

Control program: A computer program designed to schedule and to supervise the
    execution of programs in a computer system.

Control specifications: A description of the rules and regulations to e applied
    within a computer system in order to ensure the required level of integrity.

Control standards: Control specifications accepted as a basis for preventing,
    detecting and correcting errors or omissions.

Convert: To change the representation of data from one form to another,
    without changing the information they convey, e.g., code conversion;
    analog to digit conversion.

Control techniques: Procedures, in a given information processing installation,
    which maintain integrity.

CPU: Abbreviation for: central processing unit.

Data: The representation of facts, concepts or instructions in a formalized
    manner suitable for communications, interpretation or processing by human or
    automatic means.

Data acquisition: In scientific/technological applications, the gathering of raw
    source process data by means of a data acquisition and control system
    designed to gather, from multiple remote locations at a certain computing
    facility, raw source data of either a primary numerical nature relating to
    scientific problems, observations or phenomena, or technological or process
    control variable raw source data such as signals, often in analog form, from
    sensing and/or measuring devices or instrumentation systems. System includes a
    large family of real-time process I/0 devices.

Data bank: A set of libraries of data.

Database: A set of data, part or the whole of another set of data and consisting of
    at least one file, that is sufficient for a given purpose or for a given information
    processing system. A repository of organized data managed using direct access.

Database control system: Software required by a computer program written in a
    computer language to direct the processing of a database. Abbreviation:
    DBMS.

Data capture: The process of transcribing information from source documents to
    a computer readable medium.

Data code: A set of rules and conventions according to which the signals
    representing data should be formed, transmitted, received and processed.

Data communication: Data transfer between data source and data link via one or
    more data links according to a link protocol. Same as: communication.

Data contamination: A deliberate or accidental process or act that destroys the
    data integrity.
    Same as: data corruption.

Data degradation: A reduction of the quality of information.

Data element: A unique collection of data items grouped together on the basis of a
        single shared or common functional attribute.

Data flow: A pipeline along which information of known composition is passed.

Data flowchart: A flowchart that represents the path of data in the solving of a
    problem and that defines the major phases of the processing as well as the
    various data media used.

Data flow diagram: A graphic representation of the flow of data through a system
    showing the external entities which are sources or destinations of data, the
    processes which transform data, and the places where data are stored. Also:
    Schematics.

Data independence: The concept that the definition of data should be independent of
    computer programs which write and/or read that data.

Data integrity: The quality of data that exists as long as accidental or
    malicious destruction, alteration or loss of data are prevented. The
    concept that a method is available to prevent the storage of invalid
    data.

Data network: The assembly of functional units that establishes data circuits
    between terminals.

Data processing: The systematic execution of operations upon information,
     e.g. handling, merging, sorting, computing.

Data processor: A device capable of performing information processing, such as a
    desk calculator, a punched card machine or a computer.

Data protection: The concept that a method is available to restrict access to stored data.

Data reduction: The transformation of raw data into a more useful form.

Data terminal equipment: Abbreviation: DTE. Synonym for: terminal.

Data transmission: The conveying of data from one place for reception elsewhere by signals transmitted over a channel. Same as: transmission.

Data transmission interface: A shared boundary defined by common physical interconnection characteristics, signal characteristics, and functional characteristics of the interchange circuits.
Same as: interface.

DBCS: Abbreviation for: database control system. DBMS:

Abbreviation for: database management system.

Debug: To detect, to trace and to eliminate mistakes in computer programs or in other software.
NOTE: In the English language, "trouble shoot" and "trouble shooting" may be used in lieu of "debug" and "debugging".

Decision content: A logarithmic measure of the number of decisions needed to select a given event among a finite number of mutually exclusive events.

Decision instruction: An instruction of the class of instructions that comprises branch instructions and conditional jump instructions. Same as: discrimination instruction.

Descriptor: In information retrieval, a key used to categorize or index information.
Same as: keyword.

Decision table: A table of all contingencies that are to .be considered in the description of a problem together with the action to be taken.

Diagnostic program: A computer program that recognizes, locates and explains either a fault in equipment or a mistake in a computer program.

Diagnostic routine: A routine used to detect and isolate a malfunction or mistake.

Diagnostic program: A computer program that recognizes, locates and explains either a fault in equipment or a mistake in a computer program.

Digit: A symbol that represents one of the non-negative integers smaller than the radix. In decimal notation, a digit is one of the characters 0 to 9. Same as: numeric character.

Digital computer: A computer capable of performing operations on information presented in the digital form.

Directory: A table of identifiers and references to the corresponding items of information.

Disk drive: A mechanism for moving a disk pack or a magnetic disk and controlling its movement.

Documentation: A collection of documents on a given subject.

Dump: The operation of writing the contents of a storage, or of part of a storage, usually from an internal storage into an external medium, for a specific purpose such as to allow other use of the storage, as a safeguard against faults or errors, or in connection with debugging. Data that have been dumped.

Dump routine: A utility routine that dumps.

Dynamic parameter: Synonym for: program-generated parameter.

Edit: To prepare data for a later operation.
    NOTE: Editing may include the re-arrangement or the addition of data, the deletion of unwanted data, format control, code conversion, and the application of standard processes such as zero-suppression.

EDP: Abbreviation for: electronic data processing.

Direct access: The facility to obtain data from a storage device or to enter data into a storage device in such a way that the process depends only on the location of that data and not on a reference to data previously accessed.

Direct access storage: A storage device that provides direct access to data. Same as: random access storage.

Electronic data processing: Automatic data processing performed predominately by electronic devices.

Emulate: To imitate one system with another so that the imitating system accepts the same data, executes the same computer programs, and achieves the same results as the imitated system.

Encode: To convert data by the use of code or a coded character set in such a manner that re-conversion to the original form is possible. Sometimes used interchangeably with "code".

Entry: Synonym for: entry point. See also: remote job entry.

Entry point: The address or the label of the first instruction executed upon entering a computer program, a routine or a sub-routine.

Error: A discrepancy between a computed, observed or measured value or condition and the true, specified or theoretically correct value or condition.

Error control: In data communication, that part of the link protocol controlling detection, and possibly the correction, of transmission errors.

Execution: The process of carrying out an instruction or the instructions of a computer program by a computer.

Executive program: Synonym for: supervisory program.

External program parameter: In a computer program, a parameter that must be bound during the calling of the computer program.

Failure: An event which leads to the termination of the ability of a functional unit to perform its required function.

Fault: An accidental condition that causes a functional unit to fail to perform its required function or that causes it to perform at reduced efficiency.

Field: In a record, a specified area used for a particular category of data. Example: A group of card columns in which a wage rate is recorded.

File: A set of related records treated as a unit. Example: In stock control, a file could consist of a set of invoices; also: audit review file; backup file; job-recovery file; job-recovery control file; main file; master file; transaction file.

File layout: The arrangement and structure of data or words in a file, including the order and size of the components of the file.

File maintenance: The activity of keeping a file up to date by adding, changing or deleting data.

Firmware: Set of micro programs loaded in a control storage, unmodifiable during execution, that allows a system to operate in a given mode.

Flowchart: A graphical representation of the definition, analysis or method of solution of a problem in which symbols are used to represent operations, data, flow, equipment, etc. Also: Schematics.

Format: The arrangement or layout of data on a data medium.

Functional design: The specification of the working relationships among the part of an information processing system.

General purpose computer: A computer that is designed to operate upon a wide variety of problems.

Generation: In information processing, hardware, software or files having many similarities or developed from a previous model. See also: system generation.

Hardware: Physical equipment used in information processing systems, as opposed to computer programs, procedures, rules and associated documentation.

Heuristic method: Any exploratory method of solving problems in which an evaluation is made of the progress towards an acceptable final result using a series of approximate results, for example by a process of guided trial and error.

High-level language: A language in which each program instruction or statement corresponds to one or more machine-executable instructions. Example: COBOL, FORTRAN.

Housekeeping operation: An operation that facilitates the execution of a computer program without making a direct contribution.
Examples: The initialization of storage areas; the execution of a calling sequence.

Hybrid computer: A computer capable of performing operations on both analog and digital representations of data through the intermixing of analog and digital devices.

Image graphics: A technique that involves the projection and positioning of selectable fixed images.

Information: The meaning that a human being assigns to data by means of the conventions used in their representation.

Information measure: A suitable function of the probability of occurrence of an event or of a sequence of events from a set of possible events. In information theory, the term "event" is to be understood as used in the theory of probability.

Information processing: processing of information performed predominately by electronic devices.

Information retrieval: The action of recovering information on a given matter from stored data. Methods and procedures for recovering information on a given matter from stored data.

Information theory: The branch of learning concerned with the study of information measures and their properties.

Input: Pertaining to a device, process or channel involved in an input process, or to the data or states involved in an input process. The word "input" may be used in place of "input data", input signal", input terminal", etc. Synonym for: input process.

Input data: Data being received or to be received into an information processing system or into any part of it.

Input-output: Pertaining to a device, process or channel involved in an input process and in an output process, concurrently or not. The phrase "input-output" may be used in place of "input-output data", "input-output signals", "input-output terminal", etc.
Abbreviation: I/0.

Input-output device: Synonym for: input-output unit.

Input-output unit: A device in an information processing system by which data may be entered into the system, received from the system or both. Same as: input-output device.

Input process: The process that consists of the reception of data into an information processing system or into any part of it. Same as: input.

Input program: A utility program that organizes the input process of a computer.

Input routine: A device in an information processing system by which data can be entered into the system.
Same as: input device.

Input validation: An input control technique used to detect input data which are inaccurate incomplete or unreasonable. Same as: input data validation.

Instruction: A meaningful expression that specifies one computer operation and identifies its operands, if any.

Instruction code: A code used to represent the instructions in an instruction set. Same as: machine code.

Instruction format: The part of the basic machine code of the computer that specifies the way in which the digits or characters are allocated to represent the functional codes of the computer's instructions repertoire.

Instruction set: The set of the instructions of a computer, of a programming language or of the programming languages in a programming system.

Integrated data processing: Information processing in which the coordination of all data acquisition and other stages of information processing within an organization are combined in a coherent information processing system. Abbreviation: IDP.

Interactive mode: Synonyme for: conversational mode.

Interface: The place at which independent systems meet and act upon or communicate with each other - The mean by which interaction or communication is effected at an interface - A common boundary between information processing systems or the parts of a single system - The boundary between two systems or two devices.

Interpreter: A computer program used to interpret. Same as: interpretive program.

Item: An element of a set of data. Example: A file may consist of a number of items such as records which in turn may consist of other items.

Iterative operation: The repetition of the algorithm for the solution of a set of equations with successive combinations of initial conditions or other parameters; each successive combination is selected by a subsidiary computation based on a predetermined set of iteration rules. Same as: automatic sequential operation.

Job: (Computing Service) A unit of work that is defined by a user and that is to be accomplished by a computer. Loosely, the term "job" is sometimes used to refer to a representation of job. This representation may include a set of computer programs, files, and control statements to the operating system.

Job-recovery control file: A file that contains all data pertaining to jobs being run on a computer system which can be used to restart jobs in the event of a system failure during the run.

Job stream: The sequence of jobs or parts of jobs submitted to an operating system.
 Same as: input stream; run stream.

Keyword: Synonym for: descriptor.

Language: A set of characters, conventions and rules that is used for conveying information, e.g., algorithmic language, artificial language, assembly language; command language; computer language; computer-oriented language; control language; language; problem-oriented language; procedural language; procedure-oriented language; programming language; source language; stratified language; target language; unstratified language.

Language processor: A computer program that performs such functions as translating, interpreting and other tasks required for processing a specified programming language.
 Examples: A FORTRAN processor; a COBOL processor.

Library of data: A set of related files.
 Example: In stock control, a set of inventory control files may form a library of data.

Library program: A computer program in or from a program library.

Link: In computer programming, a part of a computer program, in some cases a single instruction or an address,. that passes control and parameters between separate portions of the computer program. Same as: linkage. To provide a link.

Link protocol: A set of rules for data communication over a data link specified in terms of a transmission code, a transmission mode, and control and recovery procedures.

Load module: A program unit that is suitable for loading into main storage for execution; it is usually the output of a linkage editor.

Logic design: A functional design that uses formal methods of description, such as symbolic logic.

Logic diagram: A graphic representation of a logic design.

Logic element: A device that performs an elementary logic operation. Same as: switching element.

Logic function: Synonym for: switching function.

Logic instruction: An instruction in which the operation part specifies a logic operation.

Logic operation: (1) An operation that follows the rules of symbolic logic.
                  (2) An operation in which each character of the result depends only on the corresponding character of each operand.

Logic unit: A part of a computer that performs logic operations and related operations. Arithmetic and logic unit,

Loop: A set of instructions that may be executed repeatedly while a certain condition prevails.

Low-level language: Synonym for: computer-oriented language.

Machine code: Synonym for: instruction code.

Machine instruction: Synonym for: computer instruction.

Machine language: A language that is used directly by a machine. Instructions written in machine code which can be obeyed by a computer without conversion. Same as: computer language.

Macrodefinition: A declaration that provides the skeletal code which a macrogenerator uses in replacing a macroinstruction. Same as: macrodeclaration.

Macrogenerator: A computer program that replaces macroinstructions in the source language with the defined sequence of instructions in the source language. Same as: macro-generating program.

Macroinstruction: An instruction in a source language that is to be replaced by a defined sequence of instructions in the same source language.

Magnetic core storage: A magnetic storage in which data are stored by the selective polarization of magnetic cores.

Magnetic disk storage: A magnetic storage in which data are stored by magnetic recording on the flat surfaces of one or more disks that rotate in use.

Magnetic drum storage: A magnetic storage in which data are stored by magnetic recording on the curved surface of a cylinder that rotates in use.

Magnetic ink character recognition: Character recognition of characters printed with ink that contains particles of magnetic material. Abbreviation: MICR.

Magnetic tape drive: A mechanism for moving magnetic tape and controlling its movement. Same as: magnetic tape transport mechanism; drive; tape drive; tape transport.

Magnetic tape storage: A magnetic storage in which data are stored by magnetic recording on the surface of a tape that moves longitudinally in use.

Magnetic tape unit: A device containing a tape drive, magnetic heads and associated controls. Same as: tape deck.

Maintenance: (Hardware/equipment) Any activity intended to retain a functional unit in, or to restore it to, a state in which it can perform its required function. Includes keeping a functional unit in a specified state by performing activities such as tests, measurements, replacements, adjustments and repairs. See also: File maintenance, maintenance project.

Mask: To use a pattern of characters to control the retention or elimination of portions of another pattern of characters.

Mass storage: Storage having very large storage capacity.

Master file: A file that is used as an authority in a given job and that is relatively permanent, even though its contents may change. Same as: main file.

Matching: The technique of comparing the keys of two records to select items for a particular stage of processing or to reject invalid records.

Mathematical logic: Synonym for: symbolic logic.

Matrix: An array of elements, arranged in rows and columns, that may be manipulated according to the rules of matrix algebra.

Memory: Synonym for: internal storage.
      Also: read-only memory; virtual memory.

Memory device: Synonym for: storage device.

Merge: To combine the items of two or more sets that are each in the same
      given order into one set in that order.

Message: (1) In information theory and communication theory, an ordered
      series of characters intended to convey information. (2) In data communi-
      cation, a group of characters and control sequences transferred as an entity,
      from a data source to a data sink, whose arrangement of characters is
      determined by the data source-.

Message mode: A manner of operating a data network by means of message
      switching.

Message sink: That part of a communication system in which messages are
      considered to be received.

Message source: That part of a communication system from which messages are
      considered to originate.
       Same as: information source.

Message switching: The process of routing messages by receiving, storing, and
      transmitting complete messages within a data network.

Metalanguage: A language that is used to specify a language or languages.

Microform: A medium that contains microimages.

Micrographics: That branch of science and technology concerned with methods
       and techniques for converting any form of information to or from microform.

Microprogram: A sequence of elementary instructions that corresponds to a specific
      computer operation, that is maintained in special storage, and whose execution
      is initiated by the introduction of a computer instruction into an instruction
      register of a computer.

Microprogramming: The preparation or use of microprograms.

Minimum delay programming: A method of programming in which storage locations for
      instructions and data are chosen so that access time is reduced and minimized.

Mirror: To reflect all or part of a display image; the image is rotated 180
    degrees about a line in the place of the display image.

Mnemonic symbol: A symbol chosen to assist the human memory.
    Example: The abbreviation "myp" for "multiply".

Modem: A functional unit that modulates and demodulates signals.

Monitor: A functional unit that observes and records selected activities
    within an information processing system for analysis. See also: system
    monitor.

Monitor program: A computer program that observes, regulates, controls or
    verifies the operations of an information processing system. Same as:
    monitoring program.

Multiplexer: In data transmission, a functional unit that permits two or more
    data sources to share a common transmission medium such that each data source
    has its own independent channel.

Multiprocessing: A mode of operation that provides for parallel processing by two
    or more processors of a multiprocessor.

Multiprocessor: A computer including two or more central processing units
    that have access to a common main storage.

Multiprogramming: A mode of operation that provides for the interleaved
    execution of two or more computer programs by a single processor.

Multitasking: A mode of operation that provides for the concurrent performance, or
    interleaved execution of two or more tasks.

Natural language: A language whose rules are based on current usage without
    being explicitly prescribed.

Node: In a data network, a point where one or more functional units interconnect
    data transmission lines.

Notation: A set of symbols, and the rules for their use, for the representation of
    data.

Object language: The intended and desired output from the conversion of one
    language to another.
    Same as: target language.

Object module: A program unit that is the output of an assembler or a compiler and that is suitable for input to a linkage editor.

Object program: A computer program that is the output of a conversion from one language to another. Same as: target program.

Offline: Pertaining to the operation of a functional unit when not under the direct control of the computer.

Online: Pertaining to the operation of a functional unit when under the direct control of the computer.

Operand: An entity on which an operation is performed.

Operational analysis: Synonym for: operation research.

Operating system: Software for controlling the execution of computer programs and that may provide scheduling, debugging, input/output control, accounting, compilation, storage allocation, data management and related services. Abbreviation: OS.

Operation: A well-defined action that, when applied to any permissible combination of known entities, produces a new entity.

Operation analysis: Synonym for: operation research.

Operations research: The design of mathematical models for complex problems concerning the optimal allocation of available resources, and the design or application of mathematical methods for solving those problems. Abbreviation: OR. Same as: operational research; operation analysis.

Operation table: A table that defines an operation by listing all appropriate combinations of values of the operands and indicating the result for each of these combinations.

Output: Synonym for: output data; output process. Pertaining to a device, process or channel involved in an output process, or to the data or states involved in an output process. The word "output" may be used in place of "output data", "output signal", "output terminal", etc.

Output data: Data being delivered or to be delivered from an information processing system or from any part of it.

Output device: Same as output unit.

Output process: The process that consists of the delivery of data from an
     information processing system or from any part of it.

Output program: A utility routine that organizes the output process of a
     computer.

Output routine: A utility routine that organizes the output process of a
     computer.

Output unit: A device in an information processing system by which data can be
     received from the system.
     Same as: output device.

Overlay: In the execution of a computer program, to load a segment of the
     computer program in a storage area hitherto occupied by parts of the
     computer program that are not currently needed.

Packet: Data and a sequence of control bits arranged in a specified format and
     transferred as an entity that is determined by the process of transmission.

Packet mode: A manner of operating a data network by means of packet switching.

Packet sequencing: A process of ensuring that packets are delivered to the
     receiving data station in the same sequence as they were received by the data
     network from the sending data station.

Packet switching: The process of routing and transferring data by means of
     addressed packets so that a channel is occupied during the transmission of
     the packet only and, upon completion of the transmission, the channel is made
     available for the transfer of other packets.

Parallel operation: A processing mode in which operations are performed either
     concurrently in a single device, or concurrently or simultaneously in two or
     more devices.

Parameter: A variable that is given a constant value for a specified application and
     that may denote the application. Example: dynamic parameter; external program
     parameter; preset parameter; program generated parameter.

Parity check: A check which ensures that any one group of binary digits conforms
     to the parity (either odd or even) required by that particular computer or
     computer system.

Password: A protected code or signal that identifies a user.

Patch: To make an improvised modification.

Pattern recognition: The identification of shapes, forms, or configurations by automatic means.

Peripheral control unit: Synonym for: input-output controller.

Peripheral equipment: In an electronic data processing system, any equipment, distinct from the central processing unit, which may provide the system with outside communication or additional facilities.

Port: A functional unit of a node through which data can enter or leave a data network.

Postmortem dump: Dumping that is performed at the end of a run, usually for purposes of debugging, auditing or documentation.

Postprocessor: A computer program that effects some final computation or organization.

Precision: A measure of the ability to distinguish between nearly equal value. Examples: Four-place numerals are less precise than six-place numerals; nevertheless a properly computed four-place numeral may be more accurate than an improperly computed six-place numeral.

Preset parameter: A parameter that is bound when the computer program is constructed, for example, when it is flowcharted, coded or compiled.

Preventive maintenance: Maintenance performed specifically to reduce the incidence of faults. Also: routine maintenance; periodical maintenance.

Privacy: The right of individuals and organizations to control the collection, storage and dissemination of their data or data about themselves.

Privacy protection: The establishment of appropriate administrative, technical and physical safeguards to ensure the security and confidentiality of data against any anticipated threats or hazards to privacy.

Problem description: A statement of a problem, perhaps including a description of the method of solving it, the procedures and algorithms, etc.

Problem-oriented language: A programming language that is especially suitable for a given class of problems. Examples: Procedure-oriented language such as FORTRAN, ALGOL; simulation languages such as GPSS, SIMSCRIPT; list processing languages such as LISP, IPL-V; information retrieval languages.

Procedural language: Synonym for: procedure-oriented language.

Procedure: A description of a course of action taken for a specific purpose. See also: contingency procedure; recovery procedure.

Procedure-oriented language: A program-oriented language that facilitates the expression of a procedure as an explicit algorithm. Examples: FORTRAN, ALGOL, COBOL, PL/1.
 Same as: procedural language.

Process: A course of events occurring according to an intended purpose or effect. To perform operations on data according to an intended purpose or effect.

Processor: Software, hardware or firmware which is capable of performing processing.

Program: A schedule or plan that specifies actions which may or may not be taken.
 Variant: program.
 Also: assembly program; checking program; compiling program; computer program; control program; diagnostic program; executive program; input program; interpretive program; library program; macro generating program; monitoring program; monitor program; object program; output program; reenterable program; relocatable program; resident control program; reusable program; self-adapting program; self-organizing program; service program; snapshot program; snapshot trace program; source program; supervisory program; target program; trace program; translating program; utility program.

 Program: To design and/or to write (code) and test/debug computer programs.

Program-generated parameter: A parameter that is bound during the execution of a computer program. Same as: dynamic parameter.

 Program library: An organized collection of computer programs.

Programmatics: The branch of learning that is concerned with the study and development of computer programming methods and languages.

Programmed check: A check that is carried out by a series of instructions in a program.

Programming: The designing, writing and testing and documenting of computer programs.

 Programming flowchart: A flowchart representing the sequence of operations in a program.

Programming language: An artificial language established for expressing
    computer programs.

Programming science: Synonym for: programmatics.

Programming system: One or more programming languages and the necessary software
    for using these languages with particular information processing equipment.

Program testing: The running of a program against a predetermined series of users
    specified data to arrive at a predictable result for the purpose of
    establishing program acceptability.

Protection: An arrangement for restricting access to the use of all or part of
    a computer system.
        See also: privacy protection; storage protection.

Pseudocode: A code that requires translation prior to execution. Pseudocode can
    be used as an aid in program development by using English-like terms to describe
    program structures.

Rate: The number of bits, bytes or characters per unit of time which pass a
    given point in a given channel or which a device can accept (input) or deliver
    (output).

Read: To obtain data from a storage device, from a data medium, or from
    another source.

Reading: The obtaining of data from a storage device, from a data medium, or from
    another source.

Real time: Pertaining to the processing of information by a computer in
    connection with another process outside the computer according to time
    requirements imposed by the outside process. The term "real time" is also
    used to describe systems operating in conversational mode and processes that can
    be influenced by human intervention while they are in progress.

Real-time operation: In analog computing, an operation or other response in
    which programmed responses to an event are simultaneous with the event itself.

Reconfiguration: A change to the configuration of a computer system, effected
    manually and/or automatically, that can be used to maintain system integrity.

Record: A set of related data or words treated as a unit. Example: In stock
control, each invoice could constitute one record.

Record layout: The arrangement and structure of data or words in a record,
including the order and size of the components of the record.

Redundancy: In information theory, the amount by which the decision content
exceed the entropy.

Redundancy check: Any checking operation which depends on extra characters or bits
that are attached to data to permit the automatic detection of errors. The extra
characters or bits do not themselves contribute to the significant content of the
data.

RJE: Abbreviation for remote job entry.

Reliability: The ability of a functional unit to perform a required function
under stated conditions for a stated period of time.

Remote batch entry: Submission of batches of data through an input unit that has
access to a computer through a data link.

Remote batch processing: Batch processing in which input-output units have
access to a computer through a data link.

Remote job entry: Submission of one or more jobs through an input unit that has
access to a computer through a data link. Abbreviation: RJE.

Restart: The resumption of the execution of a computer program using the data
recorded at a checkpoint.
Result: An entity produced by the performance of an operation.

ROM: Abbreviation for: read only memory.

Routine: A computer program, or part thereof, that may have some general or
frequent use.

Run: A performance of one or more jobs or programs.

Segment: A self-contained portion of a computer program that may be executed
without the entire computer program necessarily being maintained in the
internal storage at any one time. To divide a computer program into
segments.
Same as: partition, section.

Self-organizing program: A program that has the ability to make re-arrangements in its internal structure.

Sequential: Pertaining to the occurrence of events in time sequence, with no simultaneity or overlap.

Service program: Synonym for: utility program.

Service routine: Synonym for: utility program.

Setup: In a computer which consists of an assembly of individual computing units, the arrangement of interconnections between the units and the adjustments needed for the computer to operate upon a given problem.

Signal: A value attached to an event that conveys information.

Simulation: The representation of features of the behavior of a physical or abstract system by the behavior of another system. Examples: (1) The representation of a physical phenomenon by means of operations performed by a computer. (2) The representation of operations of a computer by those of another computer.

Simulator: A device, information processing system or computer program for representing features of the behavior of a physical or abstract system.

Software: Computer programs, procedures, rules and any associated documentation concerned with the operation of an information processing system.

Sort: To segregate items into groups according to specified criteria. NOTE: Sorting involves ordering, but need not involve sequencing, for the groups may be arranged in an arbitrary order.

Source language: A language in which a problem is programd for a computer which requires conversion before processing.

Source program: A computer program expressed in a source language.

Snapshot program: (Synonym: snapshot trace program) A trace program that produces output data only for selected instructions or for selected conditions.

Statement: In a programming language, a meaningful expression that may describe or specify operations and is usually complete in the context of this language.

Storage: The action of placing data into a storage device. The retention of data in a storage device.

Storage capacity: The amount of data that can be contained in a storage device measured in binary digits, bytes, characters, words or other units of data.

Storage device: A functional unit into which data can be placed, in which they can be retained, and from which they can be retrieved. Same as: storage unit; memory unit; memory device.

Storage protection: Limitation of access to a storage device, or to one or more storage locations, by preventing writing or reading or both.

Statified language: A language that cannot be used as its own metalanguage. Example: FORTRAN.

Subroutine: A sequenced set of statements that may be used in one or more computer programs and at one or more points in a computer program.

Supervisory program: A computer program, usually part of an operating system, that controls the execution of other computer programs and regulates the flow of work in information processing systems. Same as: executive program; supervisor.

Swapping: A process that interchange the content of an area of main storage with the content of an area in auxiliary storage.

Symbol: A conventional representation of an idea or a representation of a concept upon which agreement has been reached.

Symbolic logic: The discipline in which valid arguments and operations are dealt with using an artificial language designated to avoid the ambiguities and logical inadequacies of natural languages.
Same as: mathematical logic.

Syntax: The relationships among characters or group of characters, independent of their meanings or the manner of their interpretation and use.

System: An independent collection of persons, machines, methods and procedures organized to accomplish a specific set of functions.

System generation: The process of selecting optional parts of an operating system and of creating a particular operating system tailored to the requirements of an information processing installation.
Abbreviation: sysgen.

System monitor: One or more computer programs that monitor the activities of a computer system.

System resilience: That quality of a computer system that enables it to continue to function correctly despite the existence of a fault or faults in one or more of its component parts.

System security (EDP): Technological and managerial safeguards designed to protect computer hardware, software and data from unauthorized or accidental modification, destruction or disclosure.

System testing: The running of a system against a predetermined series of users specified data to arrive at a predictable result for the purpose of establishing system acceptability.

Table: An array of data each item of which may be unambiguously identified by means of one or more arguments.

Tape deck: Synonym for: magnetic tape unit.

Tape drive: Synonym for magnetic tape drive.

Target program: Synonym for: object program.

Task: In a multiprogramming or multiprocessing environment, one or more sequences of instructions treated by a control program as an element of work to be accomplished by a computer.

Telecommunications: Data transmission between a computing system and remotely located devices via a unit that performs the necessary format conversion and controls the rate of a transmission. (Also: communications; data communication).

Terminal: An input-output unit by which a user communicates with an information processing system. The functional unit of a data station that serves as a data source or a data link and ensures that the data communication control function is performed in accordance with link protocol.

Throughput: A measure of the amount of work performed by a computer system over a given period of time.
Example: Number of jobs per day.

Time sharing: An operating technique of a computer system that provides for the interleaving in time of two or more processors in one processor.

Trace program: A computer program that performs a check on another computer
     program by exhibiting the sequence in which the instructions are executed and
     usually the results of executing them.

Trace routine: A routine designed to check or demonstrate the operation of a
     program. The output of such a routine usually includes some or all of
     the instructions in the program being checked, and their immediate results,
     arranged in the sequence in which they are executed.

Translate: In computer graphics, to more a display element, display group, or
     display image on the display space from one location to another location
     without rotating the image.

Translate: To transform from one language to another language.

Translator: A computer program that translates from one language into another
     language and in particular from one programming language into another
     programming language.
     Same as: translating program.

Utility program: A computer program in general support of the processes of a
      computer.
      Examples: An input routine; a diagnostic program; a trace program; a
      sort program.
      Same as: service program.

Utility routine: A routine in general support of the processes of a computer.
     Examples: An input routine; a diagnostic program; a trace program; a sort
     program.
      Same as: service routine.

Variable: (1) In computer programming, a character or group of characters that
     refers to a value and, in the execution of a computer program, corresponds to
     an address. (2) A character or group of characters that can assume any of
     a given set of values.

Virtual memory: Synonym for: virtual storage.

Virtual storage: The storage space that may be regarded as addressable main
     storage by the user of a computer system in which virtual addresses are mapped
     into real addresses.

<u>KNOWLEDGE</u>

This factor is used to measure the amount of education and experience required to undertake the duties of the position, and the requirement for continuing study.

<u>Definitions</u>

"Education" refers to the level of academic or other formal training required to provide the basis for the development of the skill and knowledge needed in the position.

"Experience" refers to the minimum length of time an employee requires, under optimum conditions, to acquire the administrative knowledge and skill needed to carry out the duties of the position.

"Continuing study" refers to the requirement for maintaining a knowledge of trends and developments in one or more fields related to the duties of the position.

<u>Notes to Raters</u>

For purposes of this standard the time needed to acquire clerical and other skills, to gain working knowledge of the regulations and directives, and to determine the capacity to perform administrative work is not to be considered in the evaluation of the Experience element of the Knowledge factor.

In tentatively selecting the degree of the Experience element, consideration is to be given to the length of time needed to develop the specialized knowledge and general administrative knowledge required to carry out the duties of the position. General administrative knowledge is gained through experience in such responsibilities as

    1.   formulating ideas and expressing them orally or in written form;
    2.   carrying out studies and preparing reports on specific aspects of existing or proposed activities;
    3.   making critical analyses of methods and procedures with a view to recommending improvements;
    4.   performing advisory duties that require a knowledge of the program objectives of the organization served and plans of action developed to achieve them;
    5.   planning programs of work to meet the requirements of the organization served; and
    6.   supervising and directing staff.

The degrees of the Experience element assigned to the bench-mark positions have been established by ranking on the basis of such considerations as those mentioned above. The degree of the Experience element tentatively selected is to be confirmed by direct comparison of the position being rated with the duties and specifications of the bench-mark positions.

The second degree of the Education element is to be assigned when the duties of the position

    1.   require university graduation in a specialized field,

or

    2. require understanding and appreciation of the principles and concepts of two or more specialized fields for which the knowledge is normally acquired through university training and which are directly associated with the duties performed,

or

    3.   require systematic study and analysis of complicated general problems and their solution by the application of specialized knowledge acquired through extensive post-secondary school study or training rather than through experience.

In positions with duties that meet conditions 2 and 3, the incumbents will not necessarily be university graduates.

KNOWLEDGE

RATING SCALE – EDUCATION AND EXPERIENCE

Experience Requirement and Degree	Education and Degree	
	Completion of Secondary School Education A	University Graduation B
	60 Page	135 Page
Up to and including 2 years 1	Computer Systems Programmer 75	
Up to and including 4 years 2	87	162 Analyst/Designer/Programmer, Technological Applications Systems 49 Computer Systems Programmer, Computer Science Division 78
Up to and including 6 years 3	114 Programmer-Analyst, Information Processing Applications Section 116 Systems Analyst 143	189 Head, Computer and Communications Center 94 Project Leader 119 Supervisor, Information Processing Applications Section 140
Up to and including 8 years 4	141	216 Head, Information Processing Hardware Service 101 Head, Systems Analysis and Programming Section, Central Computer Division 108
Up to and including 10 years 5	169	244 Chief, Central Computer Division, Central Ser. Br. 53 Chief, Customer Service 57 Chief, Information Processing Service 62
Up to and including 12 years 6	197	272 Director, Information Processing Service, Materiel Command H.Q. 90
More than 12 years 7	225	300

KNOWLEDGE

RATING SCALE-CONTINUING STUDY

Nature of Continuing Study, and Degree		Points	Bench-mark Position Descriptions	
				Page

The work requires knowledge of
 	
    (a) trends and developments in computer systems programming techniques and practices,
                OR
    (b) the capabilities, requirements and capacities of departmental and contractor information processing facilities, and the regulations and procedures governing their use,
 	
gained by continuing study of directives, manuals, texts, journals and periodicals, and by attendance at government and industry sponsored training courses.
	1	20	Computer Systems Programmer
			Computer Systems Programmer, Computer
			 Science Division
				75
				
				78

The work requires knowledge of
 	
    (a) trends and developments in computer systems analysis techniques and practices,
                OR
    (b) trends and developments in information processing technology and in the direction, planning and co-ordination of information processing operations,
 	
gained by continuing study of texts, journals and periodicals, consultations with officials of other information processing services, suppliers and manufacturers, and attendance at seminars, conferences and training courses.
	2	60	Head, Information Processing Hardware
			 Service
			Head, Systems Analysis and Programming
			 Section, Central Computer Division
			Project Leader
				101
				
				108
				119

The work requires knowledge of trends and developments in the administration and operation of information processing services and of the interrelationships of information processing and general management requirements, gained by continuing study of texts, journals and periodicals, consultations with officials of suppliers and manufacturers, and attendance at seminars, conferences and training courses. It also requires continuing study to develop and maintain knowledge of the objectives, operations and long-range information processing requirements of users.	3	100	Chief, Central Computer Division, Central Services Branch Chief, Information Processing Service Director, Information Processing Service, Materiel Command Headquarters	53 362 90

<center>DECISION MAKING</center>

This factor is used to measure the difficulty of the duties of the position as indicated by the scope for decision making and by the impact of the decisions.

Definitions

"Decisions" refers to decisions to take particular courses of action within the authority delegated to the position, to recommendations to superiors and users, and to shared decisions and recommendations in which the incumbent is an effective participant.

"Scope for decision making" refers to the freedom to make decisions. It is measured in terms of the judgment, initiative and discretion required to identify and resolve problems, the availability of direction, and the difficulty of determining the implications of possible courses of action.

"Impact of decisions and recommendations" refers to the importance of the decisions and recommendations in terms of their effect on the utilization and development of information processing services, staff and facilities, and on the programs of the organizations serviced.

Notes to Raters

The four degrees of the Impact of Decisions element are illustrated by the bench-mark position descriptions. The following characteristics of the work are to be considered in determining a tentative degree for this element:

1. The complexity and size of the user programs affected by information processing services.

2. The extent to which user operations are dependent upon information processing services.

3. The influence of the position on the economy and efficiency achieved in providing information processing services.

4. The extent to which the incumbent is the effective recommending authority, which is usually related to the level of the position in the organization.

5. The consequences of an error of judgment in making a decision or recommendation.

Any one characteristic is only an indication of the impact of the decisions and recommendations, and the whole context within which the work is performed is to be considered. The job as a whole is then to be compared to the descriptions of the bench-mark positions exemplifying the degree of decision making that has been tentatively established.

RATING SCALE - DECISION MAKING

Impact of Decisions, and Degree	Scope for Decision Making, and Degree			
	Some judgment, initiative and discretion is required in the identification of problems, in the application of information processing practices and techniques, and in the selection of alternative courses of action. The implications of possible courses of action are usually apparent from precedents. Unusual problems are referred to superiors. A	A moderate degree of judgment, initiative and discretion is required in the identification of problems, in the modification and application of information processing techniques, and in the selection of alternative courses of action to meet information requirements of users. The implications of possible courses of action may not be readily apparent. Direction is sought when the apparent solutions to problems are not within the intent of established practiced B	A significant degree of judgment, initiative and discretion is required in the identification of problems, in the negotiation of revisions to information requirements of users, and in the development and recommendation of alternative solutions to information processing problems. Recommendations are made to effect changes in, or establish limits to, the information processing services provided. The implications of possible courses of action are often difficult to determine. C	A high degree of judgement, initiative and discretion is required in the development of solutions to diverse and interrelated problems. Substantial contributions are made to the planning and developing of information processing services. Recommendations and decisions affect the acquisition, allocation and utilization of information processing resources, and must anticipate changes in technology and demands for information processing services. Implications of actions taken or proposed are complex and often cannot be determined with certainty. D
Limited 1	70 Computer Systems Programmer Page 75	116 Analyst/Designer/ Programmer, Technological Applications Systems Page 49	162 Page	208 Page
Moderate 2	117 Computer Systems Programmer, Computer Science Division 78	163 Head, Computer and Communications Centre 94 Senior Technical Consultant 131	209 Chief, Production Software 66 Chief, Technical Services Section 71	255
Significant 3	164	210 Supervisor, Information Processing Applications Section 140	256 Chief, Customer Service 57 Head, Systems Analysis and Programming Section, Central Computer Division 108	302
Major 4	211	257	303 Chief, Central Computer Division, Central Services Branch 53 Chief, Information Processing Service 62	350 Director, Information Processing Service, Materiel Command H.Q. 90

RESPONSIBILITY FOR CONTACTS

This factor is used to measure the difficulty and importance of contacts that occur as an integral part of the work and the requirements imposed by these contacts to work and communicate with others in person, by telephone or in writing.

Notes to Raters

Only those contacts that are an integral part of the work and that result from the duties assigned or sanctioned by management are to be considered.

Points are to be assigned for written contacts only if the duties of the position being rated include responsibility for signing letters or memoranda.

RATING SCALE - RESPONSIBILITY FOR CONTACTS

Nature of Contacts, and Degree		Points	Bench-mark Position Descriptions	
				Page
To give, obtain and exchange information requiring discussion, explanation and co-operation.	1	20	Computer Systems Programmer	75
			Computer Systems Programmer, Computer Science Division	78
To persuade and obtain assistance or agreement requiring action by others.	2	46	Project Leader	119
			Systems Analyst	143
			Telecommunications Advisor	146
To represent a central agency or a departmental information processing service at formal meetings when differences of interest may be expected, with authority to discuss problems of some significance and seek common ground on which to base solutions.	3	73	Head, Systems Analysis and Programming Section, Central Computer Division	108
			Supervisor, Information Processing Applications Section	140
To represent a central agency or a departmental information processing service at formal meetings, with authority to participate in the formulation of information processing policies and to undertake commitments to provide information processing services.	4	100	Chief, Information Processing Service	62
			Director, Information Processing Service, Materiel Command H.Q.	90

SUPERVISION

This factor is used to measure the continuing responsibility that the incumbent of the position assumes for the work and guidance of other employees. The two elements of the factor are the level of employees supervised and the numbers supervised.

Definitions

"Level of employees supervised" refers to the highest level supervised.

"Numbers supervised" refers to the total number of employees for whom the incumbent of the position exercises supervisory responsibility directly or through subordinate supervisors.

Notes to Raters

A position whose incumbent does not have a continuing and substantive responsibility for the supervision of the work of others is not to be assigned points under this factor. Characteristically, "substantive responsibility" includes allocating staff to various work projects, proposing disciplinary action, informing staff of their strengths and weaknesses, proposing changes in the numbers and classification of positions, and ensuring that work standards are maintained.

Occasional supervision, such as that performed during absences of the supervisor on annual or sick leave, is not to be rated.

For the purpose of the standard, "numbers supervised" includes the total of the following:

1. The number of employees in the department or agency for whom the incumbent has continuous supervisory responsibility.

2. The number of man-years of work performed by casual, part-time and seasonal employees who are supervised by the incumbent.

3. The number of employees in the department or agency for whom the incumbent has responsibility for functional supervision.

4. The maximum number of employees usually supervised by the incumbent where the work is organized on a project basis and where the number supervised varies according to the requirements of each project.

The term "functional supervision" applies to staff of units for which the incumbent of the position being evaluated

    1.   has authority to prescribe objectives or programs and the methods and procedures to be followed in carrying out a specialized function,

<div align="center">and</div>

    2.   has responsibility for ensuring adherence to established programs, methods and procedures,

<div align="center">and</div>

    3.   has authority to make effective recommendations on employment, promotions or transfers.

In 3 above, the term "has authority" refers to established practices that require senior officials to exercise significant influence on the employment, promotion or transfer of employees who are not under their direct supervision. It does not imply, however, authority to impose their views on line officers.

Employees at all levels are to be included in the numbers subject to functional supervision, although the third criterion may not apply to those at junior levels to the same degree as to more senior employees.

RATING SCALE - SUPERVISION

Level of Employees Supervised, and Degree	Numbers Supervised and Degree						
	1 - 3	4 - 10	11 - 25	26 - 50	51 - 100	101 - 175	176 or over
	A	B	C	D	E	F	G
1	15	32	49	67	85	103	121
2	29	46	63	81	99	117	135
3	44	61	78	96	114	132	150

Level of Employees Supervised, and Degree		Bench-mark Position Descriptions	
			Page
Supervises employees in the administrative support category or junior employees in other categories.	1		
Supervises intermediate employees in the administrative and foreign service, or other categories.	2	Project Leader Senior Analyst, Systems Software Supervisor, Information Processing Applications Section	119 122 140
Supervises senior employees in the administrative and foreign service, or other categories.	3	Chief, Central Computer Division, Central Services Branch Chief, Information Processing Service Director, Information Processing Service, Materiel Command H.Q.	 53 62 90

Bench-mark Position Description Index

In Bench-mark Numerical Order

Bench-mark Position Description Index In Ascending Order of Point Values

Descriptive Title	Bench-mark Position No.	Total Points	Page
Computer Systems Programmer	7	170	75
Computer Systems Programmer, Computer Science Division	8	319	78
Systems Analyst	23	383	143
Programmer-Analyst, Information Processing Applications Section	16	383	116
Analyst/Designer/Programmer, Technological Applications Systems	1	384	49
Information Processing Facilities Planner	15	458	112
Data Base Designer	10	458	86
Telecommunications Advisor	24	458	146
Senior Technical Consultant	20	458	131
Data Base Administrator	9	504	82
Senior Training Officer, Information Processing	21	504	136
Head, Computer and Communications Center	12	521	94
Senior Analyst, Systems Software	18	534	122
Project Leader	17	551	119
Supervisor, Information Processing Applications Section	22	578	140
Chief, Technical Services Section	6	604	71
Chief, Production Software	5	604	66
Head, Information Processing Hardware Service	13	605	101
Senior Planning Officer	19	605	126
Head, Systems Analysis and Programming Section, Central Computer Division	14	686	108
Chief, Customer Service	3	814	57
Chief, Central Computer Division, Central Services Branch	2	879	53
Chief, Information Processing Service	4	879	62
Director, Information Processing Service, Materiel Command Headquarters	11	972	90

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 1   Level: 2

Descriptive Title: Analyst/Designer/Programmer,   Point Rating: 384
                   Technological Applications Systems

Summary

Under the direction of the Head, Perception Group, determines the feasibility
of designs of proposed system software on a mini-microcomputer facility, of
new or modifications to generalized system software; evaluates mini-microcomputer
system software and of generalized application oriented system software; determines
extent of modifications identified; provides technical advice on acquisition of
specialized hardware processors, and on hardware and software packages to be
developed; and performs other significant duties.

Duties	% of Time
Determines the feasibility of, designs, implements and installs, on a mini-microcomputer facility, new or modifications to generalized system software, custom made application software and technological information processing applications systems to produce general design specifications and make decisions on future status of proposed software	25

-      by identifying, defining and reviewing actual and
       projected requirements of. proposed system software or
       for specific application software,
-      by determining the functional characteristics of
       systems,
-      by researching vendor-supplied software to determine
       suitability,
-      by determining hardware/software requirements and
       relevant costs,
-      by assessing impact of new software on overall resources
       of the facility, and
-      by recommending appropriate action.

Reviews general design specifications and packages functional specifications into computer system modules by inputs, outputs and processes of each module to produce design specifications	20

-      by clarifying general design specifications,

% of Time

- by packaging functional specifications into computer
  system modules,
- by preparing detailed computer program specifications,
- by preparing test and conversion plans,
- by estimating costs, and
- by recommending modifications to general design specifications.

Evaluates, installs and modifies vendor-supplied mini-   20
microcomputer system software and generalized application
oriented system software to decide on selection of system
software

- by determining software characteristics through analysis
  of hardware interfaces, communication network and
  special peripherals requirements,
- by determining characteristics of system software under
  evaluation and comparing these to identified requirements,
- by assessing the impact of the proposed system software
  on the capacity of computing facilities, and
- by recommending acquisition of system software.

Determines extent of modifications identified in the selection   20
process or in the sponsor's requests to provide the system
software required for the efficient and effective use of
the hardware facility

- by identifying locations of modifications within the
  vendor-supplied system software,
- by generating the code to replace existing code or to
  create new modules,
- by generating the system software incorporating vendor
  supplied options, modified code and new modules into a
  single package, and
- by assessing performance of package and conducting
  acceptance tests of software.

Provides technical advice on acquisition of specialized   10
hardware processors to implement special algorithms, and on
hardware and software packages to be developed through
industrial research contracts to support research projects
and to ensure compatibility with mini-microcomputer facility

- by reviewing and discussing requirements with project
  scientists and engineers,

% of Time

- by explaining current and potential capabilities of
  the existing facility,
- by defining the interfacing requirements to be met to
  be compatible with existing facility, and
- by generating technical inputs for development or
  contract specifications.

Performs other significant duties   5

- by acting as technical authority on the software
  aspects of industrial research contracts.

Specifications	Degree	Points
Knowledge - Education and Experience	B2	162

The work requires an in-depth knowledge of the design
principles and programming techniques used in computer
operating systems, the logical functioning of computer
hardware mainframe and peripheral equipment and the external
specifications of language processors and utilities, for
all sizes of computers. Familiarity with manufacturer's
procedures for maintaining their operating systems is
required, as is the ability to communicate effectively,
both orally and in writing, on technical subjects. A
knowledge of departmental operations and aims **is** required
to better anticipate user requirements and to forecast the
impact of proposed system changes on users. This is
necessary to ensure efficient implementation of the
computerized system. Extensive experience in working at
the highest level of technical competence in projects
requiring a sophisticated and complex operating system
design and programming techniques must be demonstrated.
This should include work in several areas of specialization,
e.g. input/output drivers, inter-computer communications,
and graphics. Furthermore, extensive experience with a
multiprogramming, real-time operating system of mini
computers is required. This knowledge and experience is
normally acquired through university graduation in science/
engineering/computer science or equivalent in a related
discipline and three year's experience in computer programming
in high level languages and assembly languages, systems
analysis and software design, at least half of which pertained
directly to multiprogramming real-time mini computer systems.

	Degree	Points
Knowledge - Continuing Study	2	60

This position requires a knowledge of trends and developments
in applications and programming of mini-computers and
technological advances in hardware and software systems.
Knowledge and study of the scientific objectives of each
project is essential. This knowledge is acquired through
i) personal contacts with peers, manufacturers, and user
groups. ii) study of manufacturer's literature, technical
and scientific journals and periodicals. iii) attendance
at seminars, conferences and training courses.

Decision Making	B1	116

The work requires sound judgment in proposing and selecting
alternative solutions to complex technical problems in
computer systems technology, including quick diagnosis and
solution of system software and hardware problems, and
decisions relating to performance and operational enhancements.
Any hardware failure must be countered by an appropriate
configuration change as quickly as possible. Recovery
action is nearly always required before the remedial manufacturer
support can arrive. Recommendations are made to
management pertaining to in-house, central computer
reconfiguration, auxiliary equipment selection, outside
communications facilities selection and software selection.

Contacts	2	46

The work requires daily contacts with systems analysts,
working level scientists, and technical staff in the computer
user community to resolve technical problems and provide
consultation. Frequent contacts are made with manufacturer's
sales and technical representatives to acquire technical
information and resolve problems in applying their products.
Contacts with staff and non-government agencies are made
periodically as are briefings to management in areas of the
incumbent's special competence.

Supervision	-	-

Supervision of the work of other staff is not a regular
requirement. Occasional guidance and work leadership may
be provided to junior programmers.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 2   Level: 5

Descriptive Title: Chief, Central Computer Division,   Point Rating: 879
                   Central Services Branch

Summary

Under general direction of the Director, Central Services Branch, plans, directs
and co-ordinates the activities of the Central Computer Division, which include
the provision of information processing services associated with cheque issuing,
processing of accounts payable and related accounting functions; advises user
officials on the use and requirements of information processing; and performs
other related duties.

Duties   % of Time

Plans, directs and co-ordinates the activities of the   60
Central Computer Division, with an establishment of
140 positions, large mainframe computers and extensive
peripheral and auxiliary equipment installations, and
engaged in computer systems analysis and programming,
planning of information processing systems, operation of
information processing equipment, and associated co-ordinating,
scheduling and administrative activities, to ensure the
economic and efficient satisfaction of user information
requirements and use of staff, equipment and contract
resources

-    by establishing information processing workload
     requirements through discussions with user officials
     in the department,
-    by developing forecasts of staff and equipment requirements,
-    by establishing priorities, in co-operation with user
     officials, to facilitate detailed scheduling of
     information processing operations,
-    by reviewing proposed applications to establish their
     overall technical and economic feasibility,
-    by negotiating major revisions to information requirements of
     users, to expedite processing operations or
     to improve the technical or economic feasibility of
     applications,
-     by developing and establishing production and quality
     control procedures,

% of Time

-    by assigning staff and equipment resources to the
     conduct of feasibility studies and the development and
     implementation of information processing systems, and
-    by reviewing production, operating and administrative
     reports to ensure the maintenance of production and
     quality standards and to assess supervisory staff
     performance.

Advises user officials and the Director, Central Services   30
Branch, of the capabilities, capacities, availability,
costs, benefits and requirements of information processing
services and of the policy and resource requirements of the
division, to assist users in obtaining maximum benefit from
information processing services and to facilitate the
development of the facilities and services of the division

-    by informing user officials of priorities, availability
     of staff and equipment, and costs and benefits of
     alternative processing arrangements,
-    by planning alternative methods of meeting information
     requirements of users to accommodate changing priorities
     or specifications of users,
-    by developing and recommending the implementation of
     policies and procedures relating to the administration
     and operation of information processing services,
-    by reviewing technological and administrative trends,
     developments and innovations in information processing
     for possible utilization in operations of the division,
     and
-    by preparing reports, including annual estimates and
     establishment presentations to Treasury Board, on the
     identification and substantiation of own staff and
     equipment requirements.

Performs other related duties, such as participating in the   10
selection, assessment and training of computer systems programming
and analysis staff and preparing memoranda, correspondence and
reports associated with administrative and
advisory responsibilities.

Degree   Points

Specifications

Knowledge - Education and Experience   B5   244

The work requires a thorough knowledge of the capabilities
and capacities of information processing equipment and of
computer systems analysis and programming practices and
techniques. A good knowledge of the regulations and practices
governing the payment of salary, pension, supplier and
other accounts, and maintenance of related records is also
required. Skill in planning, co-ordinating and scheduling
information processing operations and in the supervision
and training of staff is required. This knowledge and
skill are normally acquired through university graduation
and 10 years of progressively responsible experience in
administration, computer systems analysis, and information
processing.

Knowledge - Continuing Study   3   100

The work requires knowledge of trends and developments in
computer systems analysis and programming, information
processing technology and the administration of information
processing services, gained through continuing study of
texts, journals and periodicals and by attendance at courses
and seminars. Continuing study of regulations and procedures
contained in departmental directives and manuals is also
required.

Decision Making   C4   303

Judgment and discretion are required in the assignment of
information processing resources and choice of optimum
methods of meeting information requirements of users.
Decisions are made on priorities, information processing
techniques and the allocation of staff and equipment to
information processing applications. Recommendations are
made on the acquisition and use of staff and equipment.
Errors in judgment may adversely affect the economy and
efficiency of applications involving the use of large scale
information processing systems which control the accuracy
and promptness of salary and other payments to government
employees and outside suppliers. Problems arising from
revised or conflicting priorities are referred to the
Director, Central Services Branch.

	Degree	Points
Contacts	4	100

The work requires contacts with user officials within the
Central Services Branch to make commitments for the provision
of information processing services. Contacts are made to
provide advice, determine requirements and recommend alternative
methods of meeting information requirements of users,
and may involve persuading users to modify their requirements
or operating and administrative procedures. Contacts are
also made with officials of government and industry to
obtain and provide information on technological and administrative
innovations in information processing and assistance in the
resolution of technical and administrative
problems.

	Degree	Points
Supervision	F3	132

The work requires supervision of 120 full-time and 20 casual
employees, including section heads and unit supervisors, at
the senior, intermediate and junior levels of the administrative and
foreign service and administration support categories.
Supervisory duties include participation in assessment,
selection, promotion, and discipline of staff.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 3   Level: 5

Descriptive Title: Chief, Customer Service   Point Rating: 814

Summary

Under the direction of the Director, Computer Science Center, plans and manages the
services provided by the Center on its computer; continually monitors the quality of
these services and their relevance; refines those services to meet changing needs;
ensures good communication between the Center and its clients; plans and implements all
new services provided by the Center; assists the Director in the overall management of
the Center.

Duties	% of Time
Plans and manages the activities of the Customer Service Division of the Computer Science Centre. The Division is responsible for the implementation and support of all general purpose application software and for the development of the operating system used on the Centre's computer system. The Division currently provides remote batch entry and interactive (timesharing) services on two large scale multiprogramd computers. These services are currently made available to the Department and to other Government Departments.	40

- by managing the Computation Bureau which operates the
  Centre's computer and remote batch terminals, production
  control and transcription services. The Centre's
  computer currently provides service on a 24 hour day,
  6 day a week basis,
- by managing the Software Development Section which
  maintains and develops the operating system and its
  product set for the computers,
- by managing the Customer Support Section which provides
  consultant, technical support and training on application
  software services to well over 600 users,

Plans and supervises the implementation of all new software   20
and hardware

- by ensuring that sufficient resources are available to
  support the package or equipment,

% of Time

-    by ensuring that both software and hardware meet their
     acceptance tests,
-    by ensuring that training is provided to those who
     need it,
-    by studying new developments in software, hardware and
     operational techniques with a view to their potential
     usefulness and installation.

Ensures that users are aware of the Centre's services and   20
that the Centre is aware of user's requirements

-    by establishing and maintaining user working groups in
     the various areas of Centre expertise,
-    by ensuring that the Centre's publications are accurate
     and timely,
-    by publicizing and otherwise promoting the availability
     of various software and hardware services,
-    by maintaining personal contacts with senior representatives
     in a number of Government Departments.

Monitors and refines the services supplied by the Centre   5

-    by reviewing the services provided in the light of the
     Centre's and user's objectives,
-    by refining the services to overcome problems and
     shortcomings,
-    by analysis of revenues and system performance.

Ensures that security requirements for information processed   5
via EDP facilities either within or outside the department
are identified and that appropriate safeguards are applied
as outlined in the RCMP's Security Standards and Practices
manual.

Assists the Director in establishing objectives for the   5
Centre and participates in the development of long range
plans and the formulation of policy decisions.

Assists in recruitment, selection, training, appraisal and   5
career development of the staff of the Centre and of
information processing staff in the rest of the Department.

Degree Points

SPECIFICATIONS

Knowledge - Education and Experience: B5   244

The work requires a thorough knowledge of computing as
applied in the processing of scientific information in a
number of government departments. A sound knowledge is
required of the organization of the major customer
Departments, their administration and research programs and
the government policies and regulations covering the
administration of computing organizations. It also requires skill
in administration and in communicating on technical matters
with staff throughout a number of Departments. Knowledge
of the impact to user's projects of changes to software and
hardware is absolutely essential. The work requires skill
in the planning and co-ordinating of complex technical
operations the forecasting of staff and equipment requirements,
and the direction of staff. The required knowledge
and skills are normally acquired through University
graduation, followed by ten years of relevant experience in
administration and computing with at least four years in a
senior supervisory position.

Knowledge - Continuing Study   3   100

The work requires continuing study of developments and
trends in computing hardware and software, operation of
computer services, application software and general
administration with particular attention being given to
their relationship to the scientific and engineering
community in a number of different Government departments.
As well, the incumbent must relate his knowledge of
specialized trends within scientific computing to changes
in government policies and practice. This knowledge is
maintained by study of government directives and guidelines,
technical texts and trade publications, and from attendance
at seminars and conferences. In addition, it is essential
that meetings are held with user representatives, commercial
suppliers and university centers to ensure that the Center's
Computing Services are up-to-date and are sufficient to
meet the users' objectives.

	Degree	Points
DECISION-MAKING	C3	256

The work requires the management of a centralized inter
departmental computer service which is operated on 24-hour
day, 6-day week, and which provides both batch and interactive
processing capabilities to in excess of 600 users. The
services are used for processing large volumes of data and
for general problem solving in the fields of scientific
research, regulatory, administrative and operational programs
of several Departments. These programs often involve
contracts with the private sector and provincial governments
and failures to meet deadlines for computer produced output
can have a serious impact on the reputation of the Departments.
Although not in direct competition with the private sector,
it is essential that the services provided by the Division
are of equal standard to those available in the private
sector. The work involves the exercise of judgment,
initiative and, in particular, tact and discretion. Almost
all problems encountered are unique and decisions have to be
made on the spot without reference to existing directives.
The Division operates on a cost recovery basis with a total
recovery of $4,000,000 per annum. Decisions and commitments
are made which can have a significant impact on these
revenues and on the efficiency of the Center and its clients.
The incumbent will be expected to do the short and medium
term planning, up to one year, of the development of all
the computing services offered by the Center to ensure that
they meet the needs of its clients. He will be called upon
for the evaluation of all hardware and system software
acquisitions and for their acceptance. Errors in judgment
at this time will adversely affect the quality of the
services offered by the Center and can greatly affect its
comparative position with relation to other service organizations.
In addition, the incumbent must plan the development
of system software and performance, to this end he must
commit his limited staff to projects of many person-months
in implementing new features. The demand for these features
is always well in excess of the resources available and a
significant degree of insight into the probable return from
new developments in hardware and software is essential.

	Degree	Points

CONTACTS   4   100

The work requires frequent contacts with Division Chiefs,
Branch Directors and scientists throughout several Departments
and also with computer manufacturers and software suppliers.
At most meetings the incumbent will act as a representative
of the Center with authority to make a commitment on behalf
of the Center with regard to its computing services.

SUPERVISION   E3   114

The incumbent is responsible for the supervision of a staff
of 54 permanent staff and 3 casuals. These staff are at
senior, intermediate and junior levels of the Administrative
and Administrative Support categories. Supervisory duties
include participation in the selection, assignment, assessment,
training and discipline of staff.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 4

Level: 5

Descriptive Title: Chief, Information Processing Service

Point Rating: 879

Summary

Under the general direction of the Director General, Administration, plans and directs the activities of the departmental Information Processing Service, which include the planning, development and processing of mass data and problem-solving applications using departmental and outside contract facilities; advises user and departmental management officials on the use and development of information processing services; and performs other related duties.

Duties	% of Time
Plans and directs the activities of the Information Processing Service of the Department, with an establishment of 141 positions, a large computer, peripheral equipment and an auxiliary equipment installation, to ensure the satisfaction of departmental requirements for mass data and problem-solving applications and the efficient and economical use of depart mental information processing staff, equipment and contract resources	75

-    by determining workload requirements and available
     service and contract resources through liaison with
     departmental officials, subordinates and service
     contractors,
-    by developing forecasts of requirements for staff,
     equipment and contract resources,
-    by developing administrative and operational procedures
     governing the provision of departmental information
     processing services,
-    by assigning analysts and programmers to the planning
     and development of computer applications,
-    by authorizing and co-ordinating the use of contract
     facilities,
-    by scheduling and co-ordinating departmental information
     processing operations, and
-    by reviewing completed information processing systems
     and production, progress and administrative reports to
     ensure that quality and production standards are
     maintained and to assess staff performance.

% of Time

Advises user and departmental management officials on the   15
use and development of departmental information processing
resources, to assist users in obtaining the maximum benefit
from information processing and to ensure consideration of
information processing in the development of departmental
administrative practices

-      by informing users of the costs, capabilities and
       requirements of departmental and outside contract
       information processing services,
-      by recommending alternative information processing
       arrangements or revisions to information requirements
       of users, to improve the technical or economic feasibility of
       approved applications or to accommodate
       changes in processing or deadline specifications of
       users,
-      by developing and recommending implementation of
       departmental policies governing the use of information
       processing resources, and
-      by assessing administrative and technological innovations
       in information processing, and the capabilities of
       outside contract services, with a view to recommending
       the adoption of procedures, the acquisition of equipment,
       or the use of contract facilities of potential value
       in the provision or development of departmental information
       processing services.

Performs other related duties, such as participating in the   10
selection, assessment and discipline of information processing
staff, representing the Director General at departmental
and interdepartmental meetings on information processing
administration and preparing reports, memoranda and correspondence,
including estimates and submissions to Treasury
Board, associated with the administration and development
of the departmental Information Processing Service.

Specifications   Degree Points

Knowledge - Education and Experience   B5   244

The work requires a thorough knowledge of information
processing techniques and practices and the capacities and
capabilities of departmental and contractor information
processing facilities. It also requires a good knowledge
of the content, objectives and information processing

Degree   Points

requirements of departmental research, administrative and
operational programs and a good knowledge of departmental
and government policies and regulations governing the
administration of information processing services. An
appreciation of the scientific and technological disciplines
involved in the conduct of departmental research and operational
programs is a further requirement. The work requires
skill in the planning and co-ordinating of complex technical
operations, the forecasting of staff, equipment and financial
requirements, the development and presentation of advice,
and the direction of staff. This knowledge is normally
acquired through completion of university education and
10 years of progressively responsible administrative and
information processing experience.

Knowledge - Continuing Stud   3   100

The work requires continuing study of trends and developments
in the administration and operation of information processing
services, including the interrelationships of information
processing, general management and scientific research
requirements of the Department, through reading of texts,
journals and periodicals, consultations with manufacturers
and attendance at various seminars, conferences and training
courses.

Decision Making   C4   303

The work requires the direction and administration of a
centralized departmental information processing service
engaged in the development and processing of mass data and
problem-solving applications associated with scientific
research, regulatory, administrative and operational programs
of the Department. The work also requires the provision of
advice to departmental user and management officials on
information processing matters. The departmental computer
is mainly used in problem-solving applications related to
scientific research programs. Most computer mass data
applications are referred to service contractors, and
information processing applications are usually undertaken
by the departmental Information Processing Service. Field
research stations usually contract locally for required
information processing services. Decisions affect the
amount and nature of departmental and contract information
processing services available to departmental users in

Degree Points

Ottawa. Recommendations influence departmental management
decisions on the use of departmental and outside contract
information processing services.

Recommendations also influence the acquisition and development
of headquarters information processing staff and facilities
and the development and implementation of departmental
information processing policies. Errors in judgment can
adversely affect the efficiency and economy of departmental
information processing services. Recommendations are made
to the Director General, Administration.

Contacts   4   100

The work requires contacts with senior departmental officials
to plan and co-ordinate the provision of information processing
services, to establish information processing priorities
and to advise on the development of departmental information
processing policies. Contacts are also initiated with
central agencies and service contractors to arrange for
outside contract services, and with government and industry
officials to obtain information on technological and administrative
developments in information processing.

Supervision   F3   132

The work requires the supervision of 141 employees at the
senior, intermediate and junior levels of the administrative
and foreign service and administrative support categories,
including four section chiefs. Supervisory duties include
participation in the selection, assignment, assessment, and
discipline of staff.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 5

Level: 4

Descriptive Title: Chief, Production Software

Point Rating: 604

Summary

Under the general direction of the Director, Computer Operations, ensures that the department's computer systems make efficient use of hardware and software facilities; conducts production acceptance testing of systems software, applications systems, and telecommunications systems; controls the release and implementations of new software, and ensures the integrity of the production software environment.

Duties   % of Time

Advises the Director, Computer Operations and other senior   30
staff of the department's Systems and Services and Regional
Computer Centres on the efficient and effective use of
equipment, communications facilities, system software and
application programs to meet the Department's program
objectives

-    by developing and applying a comprehensive computer
     systems performance measurement program, using both
     system, analysis and programming, hardware and software
     monitor facilities to identify the resources consumed
     by the various software elements,
-    by directing the preparation using both systems analysis
     and programming, execution and analysis of representative
     benchmark programs,
-    by analyzing the results of monitor runs and benchmark
     programs to develop the requirements for further
     measurement experiment and ultimately to develop
     specific recommended changes in the software which
     will improve the efficiency of the systems,
-    by analyzing results of monitor runs to identify the
     impact on resources of new hardware, communications
     facilities, and new releases of system software and
     application programs to ensure that the headquarters'
     and Regional Computer Centres are not adversely impacted
     by the introduction of the change,
-    by approving operating standards and guidelines to be
     applied and propagated for the release of production
     applications, system software and equipment for
     implementation at all departmental computer centres, and

% of Time

- by writing evaluation reports and making recommendations
  to senior management (e.g. - new equipment requirements
  to optimize processing, and new software requirement
  to increase efficiency).

Conducts production acceptance testing of operating systems   20
software, telecommunications software and applications
systems

- by acquiring and maintaining a thorough knowledge of
  EDP standards, and system specifications,
- by directing and participating in the design and
  construction and programming of benchmarks and tests
  to measure performance characteristics of operating
  systems, telecommunications, software and applications
  systems,
- by reviewing the evaluation of the operational viability
  of the new software to ensure that it does not place
  undue involvement or responsibility on the operators,
  that the exception handling and recovery procedures
  and facilities work, and that the performance and
  turn-around standards are not jeopardized by the
  introduction of the new software,
- by recommending to senior management the acceptance or
  rejection of the system as a production system,
- by recommending specific software changes or improvements
  to the operations system software which the developer
  should consider prior to re-submission for production
  acceptance testing. These changes pertain in the
  internals of the systems and involve specific analyses
  of the programs submitted for acceptance testing, and
- by representing the directorate at formal meetings
  with senior management and technical staff with
  authority to discuss and resolve problems relating to
  the acceptability of application software.

                                                                     15
Controls the release for implementation of new software

- by the review of specifications and documentation, to
  ensure that the software meets the specifications and
  is properly documented,
- by confirming that the software passes production
  acceptance,
- by ensuring that each Computer Centre has adequate
  resources to run the new release,

% of Time

-       by developing in concert with Regional Computer Centre
        managers, system developers and client management, a
        schedule for the implementation of the new release,
-       by developing and managing control systems involving
        software maintenance and distribution procedures,
-       by providing operational training on new releases, to
        Operational Software Support in the field and to
        operations personnel in the field and headquarters, and
-       by liaison with Systems Directorate on implementation
        schedules.

Ensures the ongoing integrity of the production software   15
environment

-       by directing the development, documentation and
        implementation of manual and computerized diagnostic
        procedures,
-       by directing the development and auditing of control
        procedures to safeguard production program libraries,
        production data libraries and production network
        control tables, which are key elements of the production
        software environment,
-       by directing the analysis of production software
        trouble reports from the field,
-       by recommending to software suppliers, and Systems
        Directorate staff specific programs and changes to
        ensure the integrity of the production software,
-       by ensuring the promulgation of reports to the field
        on the current status of software problems,
-       by directing the development of procedures for network
        restart and recovery, degradation diagnostics, problem
        isolation and network control for both headquarters
        and Regional networks,
-       by directing the development of network security-related
        facilities and procedures, and network operating
        procedures, and
-       by directing the development of standards of operations
        of terminals, network-related facilities and system
        availability.

Specifies and implements computer programs and systems to   10
support the operation of the Computer Centres in areas such
as, resource accounting systems, diagnostic aids, scheduling
efficiency aids, monitoring and control aids, utilization
and effectiveness reporting, service level reporting, etc

% of Time

- by analyzing and documenting requirements raised by
  management and line operating personnel of the
  Directorate,
- by directing the design, programmation, implementation
  and documentation of the required programs, and
- by evaluating results of the systems and programs and
  refining them to continue to support operation functions
  in an optimal fashion.

Manages a staff of 8 employees   10

- by evaluating training needs and developing training
  programs,
- by evaluating staff performance,
- by providing advice, guidance and instruction to
  staff, and
- by recommending disciplinary action, as necessary.

SPECIFICATIONS   Degree Points

Knowledge - Education and Experience   B4   216

The position requires knowledge and expertise sufficient to
identify the data required and the method of obtaining and
analyzing the data to determine the actual performance of a
hardware/software/communication system and make recommendations
for changes to either the hardware configuration, the
systems software or the applications design. A thorough
knowledge of computer systems analysis, programming techniques
and practices and of the capabilities and limitations of
electronic data processing equipment in general and of
departmental equipment in particular, coupled with a sound
understanding of the organization, objectives and practices
of the Department. A well-developed ability in analysis
and evaluation of existing and proposed systems and in the
design of new systems through the supervision of a small,
highly skilled staff. A sound knowledge of the relationship
between the constantly developing E.D.P. systems and existing
manual systems and also of present and future staff and
equipment requirements. This knowledge and skill is normally
acquired and the ability developed through university
graduation and eight years of progressively responsible
experience in administration, data processing and systems
analysis.

	Degree	Points

Knowledge - Continuing Study   2   60

There is a requirement for a knowledge of trends and developments
in computer systems' methods, techniques and equipment,
and also for an awareness of accounting developments and
Departmental organization objectives and requirements which
can only be acquired through the continuing study of texts
and periodicals, Departmental reports and directives,
participation in training courses and seminars and by
discussion with the staff of equipment suppliers and
manufacturers.

Decision Making   C2   209

The position has the authority to commit resources to
special hardware/software acquisition process and evaluations
of specific EDP applications systems and to approve the
conclusions of these performance measurement evaluations.
The findings of the Section and the consequent recommendations
to the Director relate directly to the efficiency of the
operations with a consequent requirement for a considerable
degree of judgment and initiative, particularly in the
performance of assigned feasibility studies and in the
assignment of study areas to project teams in the development
of alternative information processing systems. These
recommendations influence the decisions made in the allocation
of staff and in the acquisition and directly affect the
utilization of the major equipment operated by the Department.
The contribution of this section to the development and
improvement of Departmental systems is significant.

Contacts   3   73

Contacts are with senior Departmental staff to obtain
assistance in conducting feasibility studies and in the
design or modification of computer or manual systems and in
order to persuade them to adopt progressive concepts. In
addition there are regular contacts with the equivalent
counterpart in other government departments with information
processing activities have an interdepartmental implication,
and in some instances contacts with the counterparts in the
governments of other nations. There are also contacts with
suppliers and manufacturers.

Supervision   B2   46

Four to ten staff are supervised, including staff at the
intermediate level.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: Level: 4

Descriptive Title: Chief, Technical Services Section   Point Rating: 604

Summary

Under the general direction of the Assistant Director, Information Processing
Division, plans, directs and administers the work of the Technical Services
Section which is responsible for providing technical support to users of the
Information Processing Division's computer services; manages the department's
telecommunications network; plans, implements and maintains the department's in-
house time-sharing computing facilities; evaluates, implements and maintains
department owned software packages; and performs other related duties.

Duties   % of Time

Plans and manages the Technical Services Section, which   40
provides department-wide technical support services to
information processing operations

-   by developing administrative procedures and the
    associated reporting structure for effective and
    efficient use of resources,
-   by developing and implementing software packages and
    procedures,
-   by developing standards and associated documentation
    on usage of various software facilities and programming
    aides,
-   by reviewing reports on equipment capacity and capability
    produced from software packages and hardware monitors
    to determine when expansion/ deletion to the installation is
    required,
-   by making firm recommendations on short-term and
    long-term equipment proposals to the Assistant Director,
-   by maintaining and updating various software packages
    utilized in the operating systems of the various
    mini-system configurations,
-   by initiating and conducting meetings with central
    site communications and remote terminal suppliers to
    form and maintain integrated trouble isolation and
    support structure organizations,
-   by participating in the negotiation of contracts for
    terminals, communications and central site equipment,
    and

% of Time

-   by standardizing problem determination procedures at
    central and remote sites.

Provides a specialist and consulting service to the users   30
of the Information Processing Division facilities in the
areas of hardware, software and telecommunications, as well
as up-grading the technical education service for both
Division personnel and Departmental users

-   by defining objectives and establishing priorities and
    completion target dates for various projects and by
    coordinating their execution,
-   by assigning tasks to project teams and determining
    their degree of participation in studies related to
    computing equipment, software packages, programming
    languages and new system concepts,
-   by ensuring that selected features and modules are
    properly generated into operating systems, that they
    are properly documented and back-up provided, that the
    currently utilized operating systems are maintained
    through necessary modifications and new versions
    generated and implemented as required,
-   by issuing publications, amendments and memoranda
    advising Division personnel and Departmental users of
    technical problems and their resolutions,
-   by liaising with technical personnel of manufacturers
    and service bureaus for the purpose of obtaining
    clarification, operational instructions and performance
    specifications on their software and hardware
    products used by the Division, and
-   by ensuring the continuing technical quality of staff
    in this group through training plans, contacts with
    colleagues in other installations, provision of pertinent
    literature and attendance at conferences on relevant
    subjects.

Maintains a satisfactory knowledge of trends in computer   15
technology and of developments in other government installations

-   by reviewing appropriate publications and periodicals,
-   by attending demonstrations of equipment and programming
    packages,
-   by participating in the activities of professional
    societies and seminars, workshops and conferences, and
-   by maintaining contact and exchanging views with
    colleagues in other departments.

% of Time

Performs other related duties such as selection, discipline   15
and appraisal of staff, preparation of supporting documents
for submissions to Treasury Board, handling of employee
complaints and acting as a level in the grievance procedure,
writing job descriptions and acting as a member of classification
and personnel evaluation boards.

Specifications	Degree	Points
Knowledge - Education and Experience	B4	216

The work requires a thorough knowledge of information
processing techniques and practices and the capacities and
capabilities of departmental and contractor information
processing facilities. A thorough knowledge of the practices,
capacities and performance of mini-computers and
telecommunications networks is a necessity. It also requires a
good knowledge of the content, objectives and information
processing requirements of departmental research, administrative
and operational programs, and a good knowledge of departmental
and government policies and regulations governing the
administration of information processing services. The
work requires skill in the planning and co-ordinating of
complex technical operations, the forecasting of equipment
and financial requirements, and the development and presentation of
advice. This knowledge is normally acquired through completion of
university education and eight years of progressively responsible
administrative and information
processing experience.

Knowledge - Continuing Study	2	60

The work requires continuing study of trends and developments
in the administration and operation of information processing
services, including the inter-relationships of information
processing, general management and research requirements of
the Department, through reading of texts, journals and
periodicals, consultations with manufacturers and attendance
at various seminars, conferences and training courses.

Decision Making	C2	209

The work requires the planning and co-ordinating of information
processing activities of centralized computer systems with
a large number of remote terminals located in Research
Stations, the Department Data Centre and Headquarters.

Degree   Points

Systems equipment configurations are contracted to multiple
computer, peripheral, and communications suppliers and
determination of accountability necessitates the use of
good judgment. The frequent resolution of conflicts
between multiple computer suppliers, software and common
carriers of telecommunications networks is an important
function of the work. Decisions affect the effectiveness
and efficiency of services provided to users and development
personnel. Because the on-line systems are meant to provide
an improved information service to users at regional offices
across Canada, the credibility of the Department will be
measured to some extent by the efficiency of the system and
decisions taken in co-ordinating the role of its different
components. Recommendations influence the acquisition and
usage of computer equipment and facilities and the implementation
of departmental information processing policies.
Errors in judgment can adversely affect the efficiency and
economy of departmental information processing services.
Recommendations are made to the Assistant Director, Information
Processing Division.

Contacts   3   73

The work requires contacts with senior departmental officials
in headquarters and regional Research Stations to plan and
co-ordinate the provision of information processing services,
to establish priorities and to advise on the development of
departmental information processing policies. Contacts are
also initiated with officials of computer equipment suppliers
during negotiation of contracts and when resolving problems
encountered during the term of contracts. Contacts with
other government and industry officials are maintained to
obtain information on technological and administrative
developments in information processing.

Supervision   B2   46

The work requires the supervision of nine positions at the
intermediate level of the administrative and foreign service
category. The incumbent is responsible for selection,
training, promotion and disciplinary action with regard to
this staff. From time to time a staff of management
consultants also requires supervision.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 7   Level: 1

Descriptive Title: Computer Systems Programmer   Point Rating: 170

Summary

Under the supervision of a programming team leader (programmer-analyst), develops
and writes programs and machine operating instructions for a computer installation;
collects and documents information required for future reference to completed
computer systems programs; modifies continuing computer systems programs; and
performs other related duties.

Duties   % of Time

Develops programs, machine operating instructions and   85
associated documentation for applications processed on
large mainframe computers and peripheral equipment, to
control the automatic performance of machine processing
actions in required sequences

-    by examining computer systems analysts' flow charts
     and program logic diagrams to determine the combination
     and sequence of machines to be used, the format of
     input and output records, the type and extent of
     information to be transferred from storage units, the
     variety of items to be processed, the steps required
     in machine processing and their sequence, the requirements
     for testing and assembling programs, and the
     procedures for phasing program segments into a system,
-    by designing detailed program block diagrams to indicate
     the machine processing actions required to provide for
     all possible conditions arising out of the data to be
     processed,
-    by writing instructions in symbolic language, using
     standard techniques, to indicate required machine
     processing operations,
-    by selecting and arranging utility programs and routines
     developed by machine manufacturers, to carry out
     segments of the program and to maintain continuity
     between segments,
-    by writing instructions in standard format for key
     punching and machine set-up operations, to ensure
     compatibility of these operations with the program
     specifications, and

% of Time

-       by constructing limited and volume tests of programs,
        arranging for test processing on the computer system,
        and correcting programming errors to ensure valid processing
        of the real data.

Collects such documents as specifications, flow charts,   5
diagrams, coding and operating instructions required for
future reference to programs.

Modifies the form and content of programs for established   5
applications, as directed.

Performs other related duties, such as overseeing the   5
phasing into production of specified systems, demonstrating
solutions of programming problems for trainee programmers,
and attending training sessions to receive instruction in
new programming methods, the characteristics of new computing
devices and the use of packaged programs.

Specifications	Degree	Points

Knowledge - Education and Experience   Al   60

The work requires knowledge of the techniques and practices
of computer systems programming. It also requires knowledge
of the capabilities, limitations and range of alternative
operations for which the machines in the installation may
be combined. Familiarity with available utility programs
and the administrative procedures for requisitioning testing
and key punching services and establishing work priorities
is required. This knowledge is normally acquired through
completion of secondary school education and two years of
related experience.

Knowledge - Continuing Study   1   20

The work requires continuing study of manuals, periodicals
and technical directives and attendance at computer
programming courses and study groups to keep abreast of
programming techniques for new machines and of new utility
programs written by manufacturers.

Decision Making   Al   70

Decisions are made to select the best ways to use computing
devices to meet prescribed system requirements, to design
or select the most suitable series of computer instructions,

Degree   Points

and to select the coding language necessary to convey
programming instructions. Guidance and supervision are
provided by senior programmers and computer systems analysts;
problems are solved in accordance with established
guide-lines, directives and precedents. Programs are
tested by trial runs on computing devices before they are
adopted for use. Decisions affect the efficiency of segments
of the computer operation. Errors in designing or selecting
machine instructions may result in delay during the testing
phase of operations.

Contacts   1   20

The work requires contacts with user officials to clarify
details of specifications and with supervisors of machine
operators to arrange tests of programs.

Supervision   -   -

Supervision of the work of others is not a regular requirement.
There may be a requirement to assist in the training of
programmers by demonstrating programming techniques and
assisting trainees to solve programming problems.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 8   Level: 2

Descriptive Title: Computer Systems Programmer,   Point Rating: 319
                   Computer Science Division

Summary

Under the supervision of a section chief, Computer Science Division, prepares
electronic computer programs and machine operating instructions for problem-solving
and mass data applications for processing in the division or on outside
contractors' computers; adapts or revises computer programs written for various
computer installations; and performs other related duties.

Duties   % of Time

Under the supervision of a section chief, Computer Science   60
Division, writes computer programs, machine operating
instructions and associated documentation for problem-solving
and mass data applications relating to departmental survey,
scientific research and administrative programs, to be
processed on the department's large mainframe computer or
on outside contractors' computers

-     by examining specifications and logic diagrams prepared
      by computer systems analysts and research scientists,
      to determine the combinations and sequences of machine
      processes, the format of input and output records, and
      the testing, assembling and program phasing procedures
      required,
-     by establishing the capacities, capabilities and
      programming requirements of the computer to which the
      application has been assigned,
-     by designing detailed block diagrams to indicate the
      required machine processing actions,
-     by writing procedural instructions for the operation
      of the assigned computing device, in symbolic language
      and using standard techniques,
-     by adapting utility routines to carry out segments of
      the program and maintain continuity between segments,
-     by writing instructions in standard format for key
      punching and machine set-up operations, in accordance
      with program specifications and the requirements of
      the assigned computing devices, and

% of Time

-    by developing program testing procedures, arranging
        for test runs, and correcting errors or deficiencies
     in the computer program.

Adapts and revises computer programs written for earlier   30
applications and a variety of computers, to meet the requirements
of the computer by which the application will be
processed and to assist departmental users to obtain processing
efficiency or reduce processing costs

-    by reviewing program documentation and processing
     specifications to establish the objectives, processing
     requirements and programming techniques of the application,
-    by identifying the capabilities and requirements for
     programming documentation of the assigned computer
     including requirements for symbolic language, utility
     routines and machine operating instructions,
-    by conferring with departmental user officials to
     clarify objectives and processing requirements, which
     are frequently stated in problem-solving applications
     in terms of complex mathematical expressions,
-    by developing, and recommending to user officials
     alternative programming techniques, and
-    by re-writing computer programs, test procedures and
     associated documentation.

Performs other related duties, such as advising scientists   10
and computer systems analysts in other departmental units
on programming techniques, available processing services
and requirements of contract computer services, evaluating
and adapting utility routines, revising computer programs
to meet changing information requirements of users, and
advising junior programmers on technical problems.

Specifications   Degree   Points

Knowledge - Education and Experience   B2   162

The work requires a thorough knowledge of computer systems
programming techniques and practices and a good knowledge
of the capacities, capabilities and requirements of a
variety of computers and peripheral equipment. It also
requires a good knowledge of departmental information
processing resources and the procedures associated with the

Degree   Points

provision of information processing services to departmental
users. Knowledge of advanced mathematical techniques, such
as those involved in the solution of simultaneous and
differential equations, and skill in developing and presenting
advice to user officials engaged in scientific research
activities are further requirements. This knowledge and
skill are normally acquired through university graduation
and three years of varied and progressively responsible
experience in computer systems programming.

Knowledge - Continuing Study   1   20

The work requires knowledge of trends and developments in
programming techniques and practices and of the capabilities,
requirements and capacities of information processing
facilities of the department and of contractors. This
knowledge is gained by continuing study of departmental
directives, equipment manuals, texts and periodicals and by
attendance at government and industry-sponsored training
courses.

Decision Making   A2   117

The work requires the exercise of judgement, initiative and
discretion in the development and adaptation of computer
programs for problem-solving and mass data applications
assigned to various government and outside computer instal
lations for processing. Advice and assistance provided to
departmental research scientists in the development of
computer programs affect the processing time, costs and
efficiency of problem-solving applications. Recommendations
are made on the use of programming techniques and the
specification of machine operating and machine processing
requirements. Errors in judgement can adversely affect the
efficiency and quality of programming services of the
Computer Science Division. Advice and assistance on technical
problems are available from colleagues and superiors in the
Computer Science Division and from departmental user personnel
who are familiar with information processing techniques and
information requirements of users. Recommendations and
unusual problems are referred to a section chief in the
Computer Science Division.

	Degree	Points
Contacts	1	20

The work requires contacts with computer systems analysts
and departmental research scientists, to obtain and provide
information and assistance in the development and writing
of computer programs.

Supervision	-	-

Supervision of the work of others is not a continuing
requirement. Occasional guidance and work leadership may
be provided to junior programmers.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 9   Level: 3

Descriptive Title: Data Base Administrator   Point Rating: 504

Summary

Under the direction of the Assistant Director, Technical Support (Data
Administrator), plans and directs the work of four computer systems analysts and
two administrative support positions, providing internal support services to
design, develop, implement and enhance the effective use of the portfolio
databases; maintains the databases interface system; develops procedures for the
maintenance of the integrity of the databases; prepares and maintains a
comprehensive data dictionary; provides specialist database and data analysis
support to portfolio managers and development projects; administers access to all
databases; performs other related duties.

Duties   % of Time

Plans, directs, controls and supervises the work of computer   40
systems personnel in developing, monitoring and implementing
both database and data management systems and procedures
for increased efficiency and economical use of departmental
databases

-    by analyzing, designing, testing and implementing new
     data structures,
-    by providing internal support services to ensure the
     effective and efficient use of the Database Management
     System,
-    by developing, maintaining and documenting the database
     interface system,
-    by preparing, documenting and enforcing procedures for
     the maintenance of the integrity of the database,
-    by providing guidelines, standards and general assistance
     in support of all data conversions from current
     to future systems,
-    by selecting, implementing, developing and maintaining
     a comprehensive data dictionary of all data elements
     and values used in systems supported by the department,
     and
-    by controlling and monitoring access to all databases.

Supervises the work of four computer system analysts and   20
two administrative support staff

% of Time

- by participating in the selection, assessment, training,
  assignment and discipline of staff,
- by investigating and resolving data base related
  anomalies,
- by providing guidance to application system design and
  application system programming personnel, and
- by answering questions on the facilities of the DBMS,
  on the meaning of certain standards or techniques.

Provides information and advice to senior officials, and   30
assistance to systems development and support staff, in the
utilization, understanding and appreciation of the corporate
databases

- by providing technical and generalized training in the
  Database Management System and techniques,
- by reporting statistics relative to the use and content
  of the database,
- by providing detailed instructions and explanations
  related to database systems additions or modifications,
- by coordinating all automated data management activities
  within the department,
- by conferring with client representatives to establish
  current and long term data requirements, and
- by providing technical specialist support to the
  requirements for data management and database systems
  as they relate to the department.

Performs other duties such as liaison with suppliers;   10
representing the Technical Support Section on ad-hoc depart
mental committees; participating in the EDP Standards
Committee; and by representing the Department at conferences
and seminars.

SPECIFICATIONS	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a good knowledge of the capacities and
capabilities of computers, information processing, database
technologies (DBMS), and the organization, functions and
database requirements of a complex organization. A general
knowledge of data communications is required. It also
requires a good knowledge of the policies and practices
of the Department and related Agencies and the Government

Degree   Points

which effect the administration of automated data services,
and a general knowledge of the technical and social aspects
of the departmental programs. Skill in the planning,
direction and coordination of large, complex database
systems, the provision of advice, and the supervision and
development of staff are required. This knowledge and
skill is normally acquired through university graduation in
one of the sciences, mathematics, business administration,
computer science or a related field and six years of progressively
responsible experience in the field of automated
information processing, with at least one year involvement
in database systems.

Continuing Study   2   60

Continuing study of government, departmental and related
agencies publications, policy directives, and data processing
texts, journals and periodicals is required, as well as
consultations with manufacturers and attendance at various
conferences, seminars and training courses, to maintain an
awareness of trends and developments in information processing
administration and technology.

Decision Making   B2   163

The work involves the planning and coordinating of database
systems development and coordination of automated data
usage supporting Portfolio programs. The work also requires
the provision of advice and information to senior departmental
and government officials on matters relating to the development
of automated data systems. Decisions and recommendations
may affect the commitment and use of extensive information
processing and data communications equipment installations,
the use and development of staff, and the amount and nature
of information processing services available to users.
This includes the initiation, negotiation and liaison for
procurement of specific external information processing
services. Recommendations and advice influence management
decisions on the use and development of automated data
services and the implementation of information processing
policies and procedures in the Portfolio. Recommendations
also influence the acquisition, leasing and use of equipment
and the assignment and training of staff. Recommendations
are made to colleagues and superiors at the senior and
intermediate level. Problems are referred to the Assistant
Director, Technical Support.

	Degree	Points
Contacts	2	46

The work requires contacts with users and systems development
staff to undertake, plan, coordinate and implement database
oriented applications, and with superiors and colleagues to
resolve administrative and technical problems, and plan the
development of information processing systems. Contacts
are also maintained with suppliers and officials of other
information processing organizations such as the Department
of Supply and Services, to obtain and provide information
on technological and administrative developments.

	Degree	Points
Supervision	B2	46

The work requires direct supervision of four computer
system analysts and two administrative support staff.
Supervisory duties include participation in the selection,
assessment, training, assignment and discipline of staff.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 10   Level: 3

Descriptive Title: Data Base Designer   Point Rating: 458

Summary

Under the direction of the Manager, Software Maintenance & Development, co-ordinates the design, development, testing, documenting and implementing of data bases in support of various information processing systems; co-ordinates the development, maintenance and documentation of back-up and recovery procedures for the production data bases; contributes to and implements standards; assists in developing data base management policies and plans, and implements security and privacy procedures for computer-stored information; and performs other related duties.

Duties
                                                                of Time

Co-ordinates the design, development, testing, documenting   50
and implementing of data bases

-     by analyzing detailed user requirements to design the
       different types of records required to make up the
       data base, and to determine the inter-relationship of
       records, their quantity, system overhead and system
       frequency,
-     by documenting, testing and creating newly designed or
      modified data bases,
-     by developing programs to be used in the analysis of
      data base requirements to determine desirable record
       structure, record priority and inter-relationships,
-     by designing data conversion routines and initial data
      base load routines,
-     by developing standards and parameters to be used for
      the selection of record sizes, their makeup and the
       considerations for decisions to carry data redundantly, and
-     by collaborating with the application program development
       staffs in the communication of data base standards to
       all user agencies.

Co-ordinates the development, maintenance and documentation   20
of back-up and recovery procedures for the production data
bases

% of Time

- by developing programs to be used in the scanning of
  data bases to determine data base integrity,
- by reviewing system performance reports and plans and
  reorganizing data bases to increase system performance,
- by collaborating with the application program development
  staff in the communication of data base standards to
  all users,
- by using judgment based on an understanding of data
  base systems and detailed knowledge of system applications
  to effect back-up and recovery of the production
  data bases, and
- by documenting, testing and implementing newly designed
  or modified data bases to meet production schedules.

Contributes to and implements standards, assists in developing   15
data base management policies, and plans and implements
security and privacy procedures for computer stored information

- by interpreting departmental data management policies
  and procedures,
- by developing and submitting for approval new policies
  and procedures for effective data administration of
  the system,
- by developing security, control and audit procedures
  to prevent and detect unauthorized access to computer
  stored data and to provide for recovery procedures to
  ensure system integrity,
- by developing and enforcing standards,
- by developing and maintaining a data dictionary, and
- by conducting analysis of data base performance and
  implementing efficiency and security improvement
  measures.

Instructs data base personnel and provides data base technical   10
advice to other staffs

- by planning activities in accordance with overall
  programs and objectives to ensure an effective work
  flow,
- by advising juniors and associates on approaches to
  problems and techniques to employ in their solution,
- by reviewing activities regularly in order to exercise
  effective control, and
- by directing training of personnel within the section.

% of Time

Performs other related duties such as designing courses and   5
instructing section personnel in the concepts of data base
management systems; contributing to the development of
statements of requirement for systems; and representing the
section on data base matters at meetings with industry and
other government agencies.

SPECIFICATIONS	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a thorough knowledge of information
processing practices and techniques, and a thorough, detailed
knowledge of data base management systems such as "MULTICS"
and data base design techniques. It also requires a good
knowledge of department and government policies and practices
that affect the administration of information processing
services and a general knowledge of the technical aspects
of manufacturing, cost accounting, forecasting and personnel
management systems. The work also requires the capability
to train the staff in data base management techniques.
This skill and knowledge is usually acquired through completion of
a university degree or equivalent training and
employment at the operational and managerial level, specialized
training through courses and five years of progressively
responsible experience in automatic data processing.

Knowledge - Continuing Study   60

The work requires continuing study of industry journals,
reports, texts and periodicals, attendance at seminars,
conferences and courses to develop and maintain knowledge
of data base applications and techniques; and a continual
awareness of changes in department and government policies.
The assessment of the impact of these changes on the data
base and the initiation of modifications necessitated by
these changes is required.

Decision-making	B2	163

The data base analyst is the technical expert in all matters
relating to data bases. The incumbent will be required to
design, develop, create, test and implement data bases to
support various information processing systems. The decisions
will affect the design and composition of the data bases
which in turn will affect the following: the upward compatibility
of the data base with those other data bases under

	Degree	Points

concurrent development, the processing time and techniques
required to obtain information from the data bases, the
flexibility of the data bases to meet new management require
ments, the quality and amount of information available to
management, and the ability of the data bases to function
as required by management. Errors can seriously degrade
system performance to a point where user requirements are
not satisfied.

Contacts   2   46

The work requires contacts with data base customers and, in
collaboration with supervisors and colleagues, the recommen-
dation for the commitment of resources and the planning and
coordination of data processing services. In addition, it
is necessary to contact other Government departments,
equipment manufacturers and software companies to exchange
or obtain data base management information. The incumbent
represents the Section at meetings within and outside the
Section in the areas of data base characteristics to resolve
problems where conflicting views of the Section and these
other agencies exist.

Supervision   -   -

The work requires the supervision of a contracted data base
designer. There is also a requirement for co-ordinating
and approving the work of other assigned members of a
project team.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 11

Level: 6 (EX)

Descriptive Title: Director, Data Processing Service,
                   Materiel Command Headquarters

Point Rating: 972

Summary

Under general direction, plans and directs the activities of the Information Processing Service of Materiel Command, which include the planning, development and processing of information processing applications associated with inventory cataloguing, maintenance, reprovisioning and control programs covering Canadian Armed Forces establishments and military supply depots in Canada and foreign countries; advises senior military and government officials on matters relating to information processing; and performs other related duties.

Duties	% of Time
Plans and directs the activities of the Information Processing Service, with an establishment of over 200 military and civilian employees engaged in computer systems analysis and programming, information processing operations, data communications operations and administrative support services, and using large mainframe computers and extensive. peripheral, auxiliary and data communications equipment installations, to ensure the efficient and economical use of staff and equipment of the Information Processing Service	50

- by determining workload requirements and available information processing resources through liaison with military and departmental user officials, and discussions with subordinate supervisors,
- by developing forecasts of staff and equipment requirements,
- by developing administrative and operational procedures for the provision of information processing services,
- by undertaking, or authorizing commitments to provide information processing services,
- by authorizing the development and implementation of information processing systems and establishing priori ties and completion deadlines for major applications,

of Time

- 	by developing and implementing procedures for the
	recording and review of proven techniques, completed
	programs, and utility routines to facilitate their
	identification, assessment and use in the development
	of new applications,
- 	by assessing administrative and technological innovations
	in information processing and authorizing the adaptation
	of new procedures or recommending the acquisition or
	rental of new equipment,
- 	by participating in the training of programmers and
	analysts, and
- 	by reviewing production, progress and administrative
	reports to ensure that production and quality standards
	are maintained and to assess the performance of supervisory
	staff.

Advises user officials, colleagues and senior officials in   30
the armed services, the Department and other government
departments on the use and development of information
processing resources, to assist users of information process
ing services in obtaining maximum benefits from information
processing

- 	by developing and recommending changes to information
	requirements of users to improve the technical or
	economic feasibility of applications,
- 	by reviewing administrative and operating procedures
	and practices to determine methods of improving efficiency
	or economy in the provision of information processing
	services,
- 	by providing information on costs, capabilities,
	requirements and benefits of information processing
	services, and
- 	by participating in discussions of military, departmental
	and interdepartmental committees concerned with the
	planning of information processing services.

Performs other related duties, such as participating in the   20
selection, assessment and discipline of staff, preparing

memoranda, correspondence and reports, and participating in
departmental management meetings, briefings and committees.

	Degree	Points

Specifications

Knowledge - Education and Experience

| | B6 | 272 |

The work requires a good knowledge of the capacities and
capabilities of information processing and data communications
equipment, of the organization, functions and information
processing requirements of the Materiel Command, and of the
organization and operations of the Canadian Armed Forces
and the Department of National Defence. It also requires a
good knowledge of military, departmental and government
policies and practices that affect the administration of
information processing services and a general knowledge of
the technical aspects of military logistics and operations
research. Skill in the planning, direction and co-ordination
of large, complex information processing and data communications
operations, the development and provision of advice,
and the supervision and development of staff are required.
This knowledge and skill are normally acquired through
university graduation and 11 years of progressively responsible
administrative experience, including experience in information
processing.

Knowledge - Continuing Study

| | 3 | 100 |

Continuing study of military and departmental publications,
policy directives, and military and information processing
texts, journals and periodicals **is** required, as well as
consultations with manufacturers and attendance at various
conferences, seminars and training courses, to maintain an
awareness of trends and developments in Canadian military
operations, military logistics and administration, and
implementation processing administration and technology.

Decision Making

| | D4 | 350 |

The work involves the planning, administration and co-ordination
of the information processing services supporting
armed forces materiel supply programs in Canada and foreign
countries. The work also requires the provision of advice
and information to senior military and government officials
on matters relating to the administration and development
of information processing services. Decisions affect the
commitment and use of extensive information processing and
data communications equipment installations, the use and

	Degree	Points

development of staff, and the amount and nature of information
processing services available to users. Recommendations
and advice influence management decisions on the use and
development of information processing services and the
implementation of information processing policies in Materiel
Command Headquarters and outside departments. Recommendations
within Materiel Command also influence the acquisition,
leasing and use of equipment and the assignment and training
of staff. Errors in judgment can adversely affect the
efficiency and economy of information processing operations
servicing military supply and inventory management programs.
Recommendations are made to military and civilian colleagues
and superiors at the senior administrative level.

Contacts   4   100

The work requires contacts with users to undertake, plan
and co-ordinate information processing applications and
with superiors and colleagues to resolve administrative and
technical problems and to plan the development of information
processing services. Contacts are also maintained with
manufacturers and officials of other information processing
organizations to obtain and provide information on techno
logical and administrative developments.

Supervision   G3   150

The work requires supervision and direction of 226 military
and civilian employees engaged in the development of information
processing systems and the operation of information
processing and data communications equipment, through three
subordinate supervisors. Employees supervised are at the
senior, intermediate and junior levels of the administrative
and foreign service and administrative support categories
and at equivalent levels in the military service. Supervisory
duties include participation in the selection, training,
assessment and discipline of staff.

Computer Systems Administration
B.M.P.D. No. 1.2

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 12   Level: 3

Descriptive Title: Head, Computer and   Point Rating: 521
                   Communications Centre

Summary

Under the general supervision of the Chief Regional Forecasts, performs the
following duties:

Manages the operation of the Edmonton computer and communication centre; maintenance
of manufacturer supplied multiprogramming, real-time operating system software; design
and implementation of modifications and enhancements to the hardware and software
components of the system to meet new requirements for computer service and access and
to improve the general operating efficiency of the in-house facility; technical
consultation to programmers, scientists, technical specialists and regional management
on all aspects of computer operating system software design, and implementation,
machine assembler and systems level languages, and the application of computer
systems technology to research projects; participates as project leader on systems
development projects undertaken in the Region; evaluation of computers and peripheral
equipment as part of existing and proposed configurations; liaison with suppliers of
computer systems, communication products and outside government and non-government
agencies; evaluation of equipment and system malfunctions requiring remedial action
and/or notification of the appropriate service personnel; and training for users in
command languages and procedures for batch and real-time access.

Duties	% of Time
Manages the operation of the Edmonton computer and communication center - by planning, directing and controlling, all systems and operational activities in the units, - by supervising systems analysts and the senior communicator, - by establishing local standards for efficient utilization of computer facility, - by establishing directives and procedures for effective day to day operation of the computer and communication facilities, - by preparing specifications and monitoring contracts for computer maintenance, hardware and software acquisitions, communications and supplies,	30

% of Time

- by participating in budget preparation and control
  related to computer systems and all operations, of the
  unit,
- by preparing annual information processing reports,
  quarterly information processing activity status
  reports, budget and operational plans related to
  computer and communication activities,
- by monitoring and tuning system performance to maximize
  system efficiency and user convenience in response to
  varying work configurations and loads,
- by ensuring that automatic procedures for system
  re-initialization after system crashes or shutdown
  function well and that operators are properly trained
  to effect successful re-initialization,
- by doing appraisals and participating on review committee
   for the subordinate staff, participating on rating
  boards, and
- by participating in Forecast management meetings.

Maintains manufacturer-supplied multiprogramming, real-time   15
operating system software

- by configuring software systems to requirements of
   installed hardware and operations procedures, using
  modules supplied by the manufacturer and other depart
   mental sources,
- by verifying that performance is consistent with
   specifications,
- by updating the operating system by incorporating
   corrective code supplied by the manufacturer and other
   departmental sources, and
- by diagnosing faults in software and designing,
   implementing and testing corrective code, or advising
   manufacturer of same and suggesting corrective code
   through manufacturers' technical support channels.

Designs and implements modifications and enhancements to   10
the hardware and software components of the system to meet
new requirements for computer service and access, imposed
by changing functional requirements and to improve the
general operating efficiency of the in-house facility

- by recognizing deficiencies in respect to new operational
   requirements and to existing operating procedures,
- by evaluating alternative solutions,
- by designing and coding new software modules, using
   assembly and higher level languages,

% of Time

-    by specifying and implementing new hardware and configurations,
-    by testing these modifications and enhancements in a
     complex 24 hour per day concurrent operations environment,
     and
-    by assigning specific design, coding and debugging
     tasks to a systems programmer.

Provides technical consultation to programmers, scientists,   10
technical specialists and regional management on all aspects
of computer operating system software design, and implementation,
machine, assembler and systems level languages, and
the application of computer systems technology to research
projects

-    by maintaining an up-to-date knowledge of the design
     concepts, implementation, and performance of all
     systems in use,
-    by maintaining an up-to-date knowledge of information
     being communicated, so that all relevant information
     can be made available to the professional and technical
     staff,
-    by understanding and providing optimizations for local
     system,
-    by suggesting new applications of computer technology
     in users' research projects,
-    by providing advice to users in program design and
     debugging, and
-    by ensuring that a systems programmer is conversant
     with the commonly used systems, and that users have
     access to the incumbent for consulting purposes.

Participates as project leader on local systems development   10
projects

-    by carrying out, as leader or member of systems project
     group, design, development and documentation of systems
     software related to the computerized production system,
-    by developing and implementing enhancements to the
     system software,
-    by producing and refining documentation of the
     implementation requirements and procedures for approved
     systems projects,
-    by distributing and assisting in implementation of
     systems project results in other regional offices,
-    by evaluating suggestions for modifications and implementing
     if desirable,

% of Time

- by testing system project results,
- by maintaining up-to-date knowledge of remote systems
  software to ensure effectiveness of distributed system
  and other systems projects, and
- by evaluating manufacturers enhancements to their
  distributed system software to ensure that there is an
  advantage in maintaining our own software.

Evaluates computers and peripheral equipment as part of   10
existing and proposed configurations

- by studying technical literature to obtain equipment
  performance specifications,
- by conducting studies of relative performance of
  different equipment configurations, for whole machines,
  complete subsystems and incremental changes,
- by obtaining opinions of users at other installations
  who have experience with the same or similar equipment
  to that proposed,
- by participating in benchmark studies on a variety of
  alternative equipment,
- by recommending to management the optimal configuration
  to enhance system performance and user acceptability,
- by providing specifications for the acquisition of
  equipment,
- by assigning specific evaluation and information
  gathering tasks to a systems programmer, and
- by considering long-range goals of the Service and
  relevant departmental policy.

Liaises with suppliers of computer systems, communication   5
products, computer related products, and outside government
and non-government agencies to acquire technical information
on state-of-the-art hardware and software

- by written, personal and telephone communication with
  manufacturers' marketing and technical representatives,
  as well as other personnel with related interests,
- by membership in and communication with manufacturers'
  users groups,
- by technical liaison visits to manufacturers and
  outside agencies, and
- by attendance at conferences and seminars.

Evaluates equipment and system malfunctions requiring   5
remedial action and/or notification of the appropriate
service personnel

of Time

- by responding to operating system error messages, operator or user queries,
- by adjusting hardware configuration in emergencies in order to support the 24 hour operational needs,
- by performing diagnostic tests where and when appropriate, and
- by notifying service personnel, if necessary, and monitoring their progress in fault isolation and solution.

Provides training for users in command languages and procedures   5
for batch and real-time access

- by giving informal seminars on existing, modified, or enhanced system features,
- by demonstrating the use of remote batch terminals, time-sharing terminals and other remote communications equipment,
- by assisting users with specific problems relating to computer system access and procedures, and
- by preparing documentation for existing, modified, or enhanced system features as nearly coincident as possible with the release of the associated system features.

Specifications	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires an in-depth knowledge of the design
principles and programming techniques used in computer
operating systems, the logical functioning of computer
hardware mainframe and peripheral equipment and the external
specifications of language processors and utilities, for
all sizes of computers. Familiarity with manufacturers'
procedures for maintaining their operating systems is
required, as is the ability to communicate effectively,
both orally and in writing, in technical subjects. Good
knowledge of management and supervising techniques is
essential. A knowledge of the organization's functional
aims is required to better anticipate user requirements and
to forecast the impact of proposed system changes on users.
This is necessary to ensure efficient implementation of
systems. Extensive experience in working at the highest
level of technical competence in projects requiring sophisticated
and complex operating system design and programming
techniques must be demonstrated. This should include work

Degree   Points

in several areas of specialization, e.g. input/output
drivers, inter-computer communications, and graphics.
Furthermore, extensive experience with a multiprogramming,
real-time operating system on mini computers is required.
Experience in communications protocols and local specialized
equipment as well as information format and content is
essential. This knowledge and experience is normally
acquired through university graduation in science/engineering/
computer science or equivalent in a related discipline and
six years' experience in computer programming in high level
languages and assembly languages, systems analysis and
software design, at least half of which pertained directly
to multiprogramming real-time mini computer systems.

Knowledge - Continuing Study   2   60

This position requires a knowledge of trends and developments
in applications and programming of mini-computers and
technological advances in hardware and software systems.
Knowledge of the physical sciences and familiarity with the
operational requirements to support regional functions is
required to ensure that the unit continues to meet the
real-time operational needs. Knowledge and study of the
scientific objectives of each project is essential. This
knowledge is acquired through personal contacts with peers,
manufacturers, and users groups, study of manufacturers'
literature, technical and scientific journals and periodicals,
and attendance at seminars, conferences and training courses.

Decision Making   B2   163

The work requires sound judgment in proposing and selecting
alternative solutions to complex technical problems in
computer systems technology, including quick diagnosis and
solution of system software and hardware problems, and
decisions relating to performance and operational enhancements.
Computer downtime or degraded user access must be
minimized because of the 24 hour operation. The computer
system is an integral part of critical regional operations.
Any hardware failure must be countered by an appropriate
action as quickly as possible. Recovery action is nearly
always required before the remedial manufacturer support
can arrive. Regional numerical models and other aids run
on the computer are a high priority in regional operations.
Recommendations are made to management pertaining to in-house,
central computer reconfiguration, auxiliary equipment

	Degree	Points

selection, outside communications facilities selection and
software selection. These recommendations strongly influence
the cost effectiveness of the use of unit hardware resources
valued at over $750,000. Participation in financial management,
planning and reporting is essential to ensure effective
and efficient operations.

Contacts

| | 2 | 46 |

The work requires daily contacts with programmers, working
level scientists, and technical staff in the computer user
community to resolve technical problems and provide consultation.
Frequent contacts are made with manufacturers' sales
and technical representatives to acquire technical information
and resolve problems in applying their products. Contacts
with staff of other departmental computing and communications
centers and non-government agencies are made periodically
as are briefings to management in areas of the incumbent's
special competence.

Supervision

| | C2 | 63 |

The work requires the direct supervision of five systems
analysts/programmers as well as eight staff members involved
in computer/communication operation through a subordinate
supervisor. The latter is a 24 hour operation. The
responsibilities include assignment of work, performance
evaluation, training and recommendation of advancement or
disciplinary
action.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 13   Level: 4

Descriptive Title: Head, Information Processing   Point Rating: 605
                   Hardware Service

Summary

Under the general direction of the Chief, Software/Hardware Division, plans,
controls and directs the activities of the Hardware Services Section; directs the
planning, configuration, evaluation, selection, acquisition and monitoring of
Computer Systems Hardware; directs the evaluation, selection and acquisition of
data conversion/data entry and information processing related equipment; directs the
acquisition of Data Communications Network facilities, to meet the needs of the
Department; provides an advisory service' to senior management on hardware and
network components; manages a staff of up to five analysts and five consultants in a
matrix organization; and performs other duties.

Duties   % of Time

Plans, controls and directs the activities of the Hardware   20
Services Section engaged in the planning, configuration,
evaluation, selection, acquisition and monitoring of Computer
Systems Hardware, Data Conversion/Data Entry and other
information processing related equipment, the acquisition
of Data Communications Network facilities, and provides
information processing advisory and training services, to
meet the needs of the Department in an efficient and
effective manner:

(Computer Systems Hardware encompasses ALL Information
Processing (EDP) equipment from computer mainframes to
terminals, including items such as: disk drives, tape
drives, printer systems, data communications hardware, and
other peripherals.)

-     by participating in the planning, with the Division
      Chief and other officers, the long range information
      processing needs of the Department,
-     by developing work plans and priorities (up to) four
      senior hardware/planning analysts, and one hardware/
      planning analyst.
-     by selecting and managing (up to) five senior consultants
      on a project management basis,

% of Time

- by setting objectives for senior analysts and consultants
  in the planning, configuration, evaluation,
  selection, acquisition and monitoring of computer
  systems hardware, data conversion/data entry and other
  information processing related equipment,
- by setting objectives for senior analysts in the
  research, development, preparation and submission of
  information processing hardware reports to the Department
  and Central Agencies, (i.e.: Treasury Board and
  Supply and Services Canada),
- by allocation of tasks to senior analysts and consultants
  and ensuring timely completion,
- by establishing terms of reference and developing and
  enforcing appropriate procedures for the orderly
  provision of services by the Section, and
- by conducting the activities of the Section in accordance
  with and within the directives and guidelines contained
  in the Treasury Board Administrative Policy Manual
  Chapter 440 regarding Information Processing.

Directs the planning, configuration, evaluation, selection,   20
acquisition and monitoring of Computer Systems Hardware to
ensure that the Department's needs are met in an efficient
and effective manner:

- by establishing and maintaining an up-to-date knowledge
  of the computer systems hardware industry,
- by developing and maintaining long-range procurement
  plans for the acquisition of information processing
  systems hardware, and effective equipment maintenance/
  repair services,
- by reviewing requests affecting computer systems
  hardware configurations and acquisitions and recommending
  appropriate courses of action,
- by planning and directing the conduct of tenders,
  Request for Proposal, and contract terms and conditions
  for the acquisition of computer systems hardware and
  maintenance/repair services,
- by co-ordinating the preparation and development of
  requirement specifications for information processing
  systems hardware required, for manufacturers and
  suppliers,
- by directing the preparation and execution of benchmark
  methodologies and procedures in order to assess the
  technical and economic effectiveness of manufacturer/
  supplier proposals, and actual hardware attributes,
  r1aim-, and performance.

% of Time

- by analyzing the results of evaluations, benchmark and
  performance reviews and recommending to senior management,
  the acquisition/modification/termination of
  hardware and maintenance/repair services,
- by initiating the approved acquisition/modification/
  termination process, and ensuring that the required
  activities are performed, and documentation prepared
  in accordance with acceptable and established Department
  /DSS/Treasury Board guidelines, directives and procedures,
- by constantly monitoring performance reports, both
  technical and financial, of manufacturer/supplier
  hardware, and maintenance/repair services, to ensure
  compliance with contractual agreements,
- by establishing and maintaining an up-to-date knowledge
  of current information processing policies and directives
  affecting the acquisition and application of computer
  systems hardware and equipment maintenance, and
- by serving as an information processing advisor in the
  selection and use of computer systems hardware and
  equipment maintenance/ repair services.

Directs the evaluation, selection and acquisition of data   15
conversion/data entry and other information processing
related equipment. (i.e. CADE 1900 and Key Edit System):

- by meeting with officials from the various manufacturers/
  suppliers to explain Department requirements and to
  ascertain what the manufacturers/suppliers can provide,
- by setting standards for senior analysts to follow in
  evaluating and monitoring the manufacturers/suppliers'
  equipment,
- by ensuring the preparation and running of comprehensive
  benchmarks on proposed/selected equipment,
- by overseeing the analysis of benchmark results, and
  the maintenance of records of various equipment
  capabilities and costs,
- by discussing equipment selection with senior analysts
  in Software/Hardware Division and Information Systems
  Directorate,
- by endorsing recommendations for the selection of
  equipment and confirming/clarifying the terms and
   conditions of Purchase/Rental/Maintenance and other
  services, and
- by establishing equipment monitoring procedures and
  activities to ensure that equipment systems continue
   to meet Department needs, and that timely compatible

% of Time

data conversion/data entry media are available for the
ever changing field of computer systems hardware and
other information processing related equipment.

Directs the acquisition of Data Communications Network   15
facilities:

-    by interpreting requirements and discussing needs with
     the Head, Data Communications Software Section,
-    determining availabilities of lines and services from
     common carriers (i.e.: CN/CP, Bell),
-    establishing effective deliveries and hook-up for
     hardware. (i.e.: modems, switches, cables, adapters),
     and
-    ensuring acquisition, contracting, and approval documentation
     is properly effected.

Provides an advisory service to senior management on information   10
processing hardware and network components:

-    by participating in meetings with suppliers and management
     to determine requirements and offerings,
-    by analyzing requests for facilities and services and
     recommending appropriate courses of action,
-    by liaising with senior management at NHQ and the
     Regions in the development of plans and acquisitions,
-    by participating in Software/Hardware Division and
     Information Systems Directorate meetings to determine
     problems with hardware and network components presently
     in use, and to explain new equipment and services that
     will be available,
-    by evaluating hardware and data communications services
     to advise management on their effectiveness,
-    by preparing plans for the introduction or integration
     of new/proposed/upgraded/existing information processing
     Hardware, equipment and/or components,
-    by participating in information processing Hardware
     Review committees to recommend courses of action in
      information processing Hardware matters,
-    by recommending improvements in policies, procedures
     and standards, and
-    by participating on Steering Committees involved in
     Systems and information processing Hardware matters.

Provides for and may participate in technical training on   5
Hardware and Network components to systems users.

% of Time

Acquires and maintains an up-to-date knowledge of new
developments in information processing equipment by attendance at
Computer Conferences, presentations by vendors, and
suppliers' demonstrations, and continuing study of texts,
journals and periodicals.

Manages a staff of up to five analysts and five consultants   5
in a matrix organization:

-    by assigning projects and reviewing work performance,
     recommending where necessary and applicable, re-assignment, or
     dismissal, and
-    by participating in appraisal and staffing Boards.

Performs other duties such as: 5

-    preparing memoranda, correspondence and reports associated with
     all aspects of information processing Hardware
     services and administration,
-    participating in the negotiations of external contract
     services for consultants,
-     acting as the Hardware Services Section liaison with
     other branch members in matters of mutual liaison,
-     representing Department on inter-governmental committees
     such as: Government EDP Standards, and
-     investigates information processing plans, policies,
     programs and trends of other organizations and
     levels of government at national and international
     levels in the area of information processing systems
     and Hardware technology to determine their significance
     and applicability within the Department.

Specifications   Degree Points

Knowledge - Education and Experience   B 4   216

Knowledge is required of governmental and departmental
policies and regulations related to information processing
installations. More specifically, the work requires a
thorough understanding of departmental programs and organization,
projected workload volumes, and types of work to be
handled, in order to recommend the most suitable information
processing hardware and communications systems. The position
incumbent must be knowledgeable in the areas of budgeting
and fiscal planning, to recognize monetary restraints and
to balance equipment performance against potential cost to
plan for maximum cost economy. The work requires a detailed

Degree   Points

knowledge of practices and techniques related to information
processing hardware, communications, environment, and
security. It also requires a thorough knowledge of the
basic technical aspects of computer systems, including
necessary interrelationships between hardware, software,
and applications. Experience is required in the procurement,
installation and implementation, and the evaluation of
equipment and systems in the areas of hardware, communications
and environment. The position incumbent is required to
lead a section of up to 11 highly technical personnel in
three specialty groups, assigning and critiquing the work
of the Section, as well as providing technical advice and
guidance. The position incumbent must coordinate the work
of the Section with that of applications and software
specialists: therefore, an appreciation of the requirements
and priorities of these areas is a pre-requisite. This
skill and knowledge is normally acquired through university
graduation in computer systems and eight years experience
in a range of information processing Specialty areas (hardware,
software, communications, security, environment).

Knowledge - Continuing Study   2   60

Continuing study is required of texts, journals, periodicals
and manufacturers' literature to maintain an awareness of
trends and developments in information processing. The
position's research is particularly concentrated in the
areas of hardware, communications and environmental support
equipment and techniques, but an appreciation of developments
in software is a pre-requisite to planning for information
processing hardware. Consultations with suppliers and
manufacturers and with colleagues at similar installations
in government and industry is essential, as is attendance
at industry-sponsored demonstrations and conferences. The
position must continually review departmental objectives
and policies e.g. increased emphasis on security of data in
information processing files generates study into specialized
security equipment and techniques.

Decision Making   B3   210

The position is effectively the departmental expert on
information processing hardware, communications, and environ
mental support. Recommendations are made to the Chief,
System Hardware/Software Service in the areas of procurement
and contract administration, planning for site and equipment

Degree   Points

configurations, and security for a Head Office information
processing installation. Similar recommendations are made
to management in the regions as computer installations are
established in each. Finally, the position participates as
hardware specialist on inter-divisional committees with
applications and software specialists to plan major procurement
and long-range development of equipment and systems,
for approval by the Systems Directorate and senior Operations
Management. Decisions made on a daily basis affect the
timely maintenance of hardware and environmental equipment
and, subsequently, the loss of computer time to problem
solving and testing exercises. Errors in judgment can
quickly cost many thousands of dollars in lost computer
time, damaged equipment, and the salaries of operators and
system users. Security of information is a major departmental
priority and recommendations as to physical security are
made by this position. Finally, the position is responsible
for the fire and emergency measures which affect the lives
of operators and the preservation of valuable equipment.

Contacts   3   73

The work requires representing the department at formal
meetings with suppliers to enforce contractually stipulated
levels of service, with authority to terminate the contract.
Particularly sensitive negotiations are required to ensure
satisfactory security measures are employed by common
carriers. Further negotiations involve planned, non-tendered
procurement and participation as a team member in major
negotiations. The work also requires frequent contact with
senior officials of industry to obtain information on
technological or administrative developments. Contacts are
made with other government departments, private industry
and educational institutions for lectures and other
presentations.

Supervision   B2   46

The work requires the direct supervision of the Supervisor,
Hardware Administration, Supervisor, Communications
Administration, Supervisor, Environment Administration and
the 2 assistants, Hardware Administration.

Computer Systems Administration
B.M.P.D. No. 14

<u>BENCH-MARK POSITION DESCRIPTION</u>

Bench-mark Position Number: 14   Level:

Descriptive Title: Head, Systems Analysis and   Point Rating: 686
                   Programming Section, Central
                   Computer Division

<u>Summary</u>

Under the direction of the Chief, Central Computer Division, directs the activities
of a Computer Systems Analysis and Programming Section, in which 30 computer systems
analysts, programmers and clerks are employed in the development and maintenance of
applications for processing data of public service pay and annuities and accounts
payable, and the preparation of financial statements, using large mainframe computers;
provides information and advice to senior officials of the Central Services Branch and
user departments; and performs other related duties.

Duties   % of Time

Directs the activities of the Computer Systems Analysis and   75
Programming Section engaged in developing and revising
information processing systems and computer programs for
mass data applications such as the issue of public service
pay, superannuation and accounts payable cheques, the
accounting for such payments, and the preparation of financial
statements for departmental users

-    by reviewing information requirements with officials
     of the department and user departments, and negotiating
     changes required to achieve economies and to conform
     to directives defining the responsibilities and the
     limitations on the activities of the Central Computer
     Division,
-    by allocating assignments to and co-ordinating the
     work of systems analysts and programmers in four
     project teams, to meet changing workloads and to
     ensure the full use and development of staff,
-    by establishing and implementing guide-lines and
     documentation standards to be followed in planning
     applications, and by advising project leaders on
     methods of resolving technical problems in analysis
     and programming,
-    by developing work measurement standards and implementing
     follow-up procedures to assure that priorities and
     deadlines are met,

% of Time

- by reviewing the reports and recommendations of systems
  analysts to determine the technical and economic
  feasibility of proposed applications and to authorize
  development and programming activities, and
- by establishing and implementing procedures to ensure
  the validity and accuracy of input data and the conformity
  of processing operations and output to user
  specifications.

Provides information and advice to senior officials of the
Central Services Branch and user departments to assist in   20
the development of long- and short-range plans for the use
of information processing services

- by explaining the capabilities, limitations and costs
  of the systems analysis and programming services
  available in the Section and of the information processing
  facilities within and outside the Central Services
  Branch,
- by participating in reviews of the use of the facilities
  of the Central Computer Division and of the adequacy
  of staff and equipment resources in relation to forecast
  requirements for information processing services,
- by recommending changes in numbers, classifications
  and assignments of systems analysis and programming
  staff, and
- by compiling information on and assessing developments
  in systems analysis and programming techniques and
  information processing equipment.

Performs other related duties, such as directing the development and
maintenance of utility routines and directing the
training and development of computer systems analysts and
programmers.

Specifications	Degree	Points
Knowledge - Education and Experience	B4	216

The work requires a thorough knowledge of computer systems
analysis and programming techniques and practices and of
the capabilities and capacities of information processing
equipment. It also requires a good knowledge of the
organization, methods and procedures, and requirements of the
divisions of the Central Services Branch, the department
and departments served. Skill is required in supervising
staff, planning and co-ordinating the activities of project

	Degree	Points

teams, and participating in the determination of staff and
equipment requirements. This knowledge and skill are
normally gained through university graduation and eight
years of progressively responsible experience in computer
systems analysis, programming and administration.

Knowledge - Continuing Study

2   6 0

The work requires knowledge of trends and developments in
computer systems planning and programming techniques and in
computing devices and services, gained through continuing
study of texts, manuals and periodicals and attendance at
courses and seminars. It also requires continuing study of
departmental reports and directives to ensure understanding
of the objectives and the accounting and other requirements
of user units.

Decision Making

C3   256

The work requires the exercise of judgment, initiative and
discretion in recommending that the section undertake the
development of applications and in evaluating alternative
systems and methods. Decisions made on the assignment of
work to project teams and priorities affect the ability of
the section to meet requirements of users. Standards
governing work methods, documentation and production affect
the efficiency and economy with which extensive information
processing facilities are used on three shifts. Errors in
judgement may adversely affect the efficiency and economy
of computer applications controlling the preparation of
cheques issued to large numbers of employees and suppliers,
and the financial information required by the department
and a number of departments for budgeting, cash forecast
and fiscal accounting purposes.

Contacts

3   73

The work requires contacts with user officials in the
Central Services Branch,. the department, and departments to
determine computer systems analysis and programming requirements
and to identify priorities and deadlines. Contacts
may require persuading user officials to modify information
requirements and the form and content of input data.

Degree Points

Supervision   D2   81

The work requires the supervision of 30 computer systems
analysts, programmers and clerks at the intermediate and
junior levels of the administrative and foreign service
and administrative support categories. Supervisory duties
include selection, training, assignment and assessment of
staff.

Computer Systems Administration
B.M.P.D. No. 15

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 15   Level: 3

Descriptive Title: Information Processing   Point Rating: 458
                   Facilities Planner

Summary

Under the direction of the Section Chief, Systems Planning and Research Division, co-
ordinates studies of the current and projected use of the departmental information
processing facilities; assists in the testing of new computer systems; provides
technical support to department user organizations and technical advice to senior
department management; periodically supervises a project team of assigned systems
analysts and performs other duties.

Duties   % of Time

Co-ordinates studies to determine the current and future   20
use of departmental information processing facilities
either individually or as the head of a project team

-    by measuring the existing system parameters through
     the use of hardware and/or software monitors, system
     logs, test drivers, and other performance measurement
     tools,
-    by projecting the results of measurement studies to
     determine the effects of new systems and/or changes to
     existing systems,
-    by identifying ways of improving the systems and
     equipment used by the department,
-    by developing and using computer simulation models of
     automated and manual systems,
-    by preparing project team work plans and forecasts,
-    by assigning project responsibilities,
-    by coordinating the activities of a project team, and
-    by reviewing assigned work and activities.

                                                                       15
Devises new methods and techniques for assessing the performance of
systems and equipment

-    by studying and reviewing technical publications,
-    by meeting with users both within and outside of the
      government, and
-    by attending seminars and training courses.

% of Time

Researches methods and techniques for use in the information   15
processing measurement, performance and simulation activities

-       by examining and reviewing new projects and services
        as they become available,
-       by preparing and disseminating reports on results of
         studies to other departmental groups concerned with
        information processing acquisitions and systems development,
-       by maintaining contact with suppliers and consultants
        who are active in this area, and
-       by maintaining membership in technical and user groups.

Assists in the testing of new computer programs   15

-       by designing drivers, bench-marks and other test
        vehicles,
-       by preparing test files, in co-operation with users,
        for operation with such test vehicles, and
-       by researching test vehicles prepared by others.

Provides technical support to department user organizations   15

-       by responding to requests for simulation modeling of
        automated and manual systems, computer load forecasting,
        and systems/application sizing, and
-       by co-operating with other sections in studies that
        require such services.

Provides technical advice to senior department management   10
on their current systems capacity and on the possibility or
desirability of systems additions or modifications

-       by participating in meetings and discussions concerning
        the departmental use of information processing facilities
        and the planning of new projects.

Performs other duties such as   10

-       monitoring current departmental operations and requirements,
-       maintaining a broad knowledge of the information
        processing field through study and training,
-       participating in equipment evaluation studies, and

% of Time

-    allocating work assignments to project teams to ensure
     the timely completion of studies and the development
     of staff, and making recommendations to the Section
     Chief, in the areas of performance, training, leave,
     and discipline.

SPECIFICATIONS	Degree	Points

Knowledge - Education and Experience   B3   189

The work requires a thorough knowledge of information
processing technology, hardware and software, systems
measurement and modelling techniques, knowledge of real
time computer capabilities, and experience in the analysis
or measurement of information processing systems, computer
systems design, equipment evaluation, systems implementation,
and report writing. This knowledge is normally acquired
through university graduation and six years of experience
in the management of computer applications, or through
secondary school graduation and extensive experience in
systems analysis and software fabrication.

Knowledge - Continuing Study   2   6 0

The work requires continuing study of departmental directives
and manuals, texts, journals and periodicals, and attendance
at government and industrially sponsored training courses,
to maintain an awareness of departmental information processing
requirements, and of trends and developments in analysis
and computer technology.

Decision Making   B2   163

The exercise of tact, judgment, initiative and discretion
is required in the conduct of simulation and measurement
studies, the dissemination of system measurement and modeling
data, the testing of new systems and the provision of
advice to user officials. Decisions are made on the scope
and depth of studies to be undertaken and on the methods,
procedures, and tools to be used in the performance measurement and
simulation activities. Recommendations are made
on the feasibility and desirability of proposed system
changes or additions, hardware selections, and machine
configurations, and on methods for optimizing current and
projected future systems performance and utilization.

	Degree	Points

Errors in judgment can result in inefficient or uneconomic
use of departmental information processing resources, and
can adversely affect the completion of computer applications
relating to administrative functions. Recommendations are
made to the Section Chief and to user officials.

Contacts   2   46

The work requires contacts with analysts, programmers,
superiors, and officials of departmental user units in the
planning and development of computer systems and the conduct
of measurement and performance studies of proposed computer
applications. It also requires contacts with manufacturers,
other researchers, colleagues, and other officials in
outside organizations to provide and obtain information
relating to computer systems measurement and information
processing techniques and practices.

Supervision   -   -

The work requires periodic supervision of a project team of
assigned systems analysts, including the scheduling and
allocation of work assignments, to meet deadlines and
provide for the development of staff. The incumbent makes
recommendations to the Section Chief in the areas of work
performance, training leave, and disciplinary action.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 16   Level: 2

Descriptive Title: Programmer-Analyst,   Point Rating: 383
                   Information Processing
                   Applications Section

Summary

Under supervision, develops systems proposals, estimates the cost of analysis,
programming and processing services and designs information processing systems for
departments and agencies requesting service; programs, tests and documents
applications; and performs other related duties.

Duties   % of Time

Develops systems proposals, estimates the cost of analysis,   40
programming and processing services, and designs specific
systems where exhaustive analysis is not required, for a
wide variety of applications using large mainframe computers
and peripheral equipment, for departments and agencies
requesting services

-    by discussing the objectives and requirements of the
     programs, the availability of data, and existing
     methods of processing with officials of the client
     departments,
-    by determining, through experimental flow charting and
     consideration of the capabilities of various computer
     facilities, the most efficient and economical methods
     of meeting information requirements of clients,
-    by estimating the person-hours required for computer
     systems development, programming and processing, and
     calculating the application costs at established
     rates,
-    by submitting the systems proposals and cost estimates
     for approval of the Chief of Departmental Applications,
-    by examining in detail input data and output requirements
     for assigned projects to clarify specifications and
     identify required revisions to clients' input forms,
     and
-    by designing flow charts and general block diagrams to
     depict and specify required equipment configurations,
     processing operations and required input and output
     formats.

% of Time

Develops programs for processing on departmental or commercial installations 55

- by designing detailed diagrams to indicate the logical steps and decisions that provide for all conditions likely to arise in processing information,
- by writing instructions in symbolic and higher languages, utilizing standard instructions to call for the use of utility routines,
- by selecting and incorporating available software programs to save programming time and reduce the possibility of error,
- by writing instructions, usually in standard format, for key punching and machine set-up operations to ensure that they conform with the systems design,
- by testing instructions, using simulated data and constructing volume tests of real data, to identify and correct errors in programs, and
- by assembling specifications, flow charts, diagrams, layouts, and programming and operating instructions to document applications for later modification or reference.

Performs other related duties, such as maintaining job-time records to relate progress of jobs to time and cost budgets and collecting, discussing and exchanging information to solve analysis and programming problems. 5

Specifications	Degree	Points
Knowledge - Education and Experience	A3	114

The work requires a good knowledge of the components and capabilities of various electronic computer systems,, a good knowledge of systems analysis techniques and a thorough knowledge of programming. It also requires skill in the planning and conduct of detailed studies on a variety of subject matter, often in co-operation with departmental officials unfamiliar with computer operations. The work requires skill in communicating and establishing effective working relations with officials of departments and agencies. This knowledge and skill are normally acquired through the completion of secondary school education and five years of progressively responsible experience in computer systems programming and analysis.

	Degree	Points

Knowledge - Continuing Study — Degree 2, Points 60

The work requires a knowledge of trends and developments in
computer systems programming and analysis for a variety of
computer systems, gained by reading equipment manuals,
texts, journals and periodicals and attending government
and industry-sponsored training courses.

Decision Making — Degree B2, Points 163

The work requires the identification of information processing
problems and development of the most economical and effective
ways of solving them. Solutions must take into account the
requirements of the client department and the capabilities
and costs of alternative information processing systems.
The work requires selection and modification of established
analysis and programming techniques. Recommendations and
cost estimates are subject to supervisory approval. Decisions
affect the satisfaction of information requirements of
clients, and errors in estimating the time required and the
costs quoted to departments may result in operating losses
to the department.

Contacts — Degree 2, Points 46

The work requires frequent contacts with senior officials
of client departments to discuss information processing
objectives and requirements, to advise on computer methods
and capabilities and to obtain the information needed to
develop and implement computer systems.

Supervision — -, -

The work does not require the supervision of staff.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 17   Level: 3

Descriptive Title: Project Leader   Point Rating: 551

Summary

Under the direction of the Chief, Systems Analysis Group, plans and directs
the work of a team of four computer systems analysts engaged in the conduct of
feasibility studies of proposed computer applications and the planning and
development of computer systems for departmental mass data applications; advises
departmental user officials on information processing matters; conducts feasibility
studies and carries out computer systems analysis assignments; and performs other
related duties.

Duties   % of Time

Supervises the work of a team of four computer systems   50
analysts engaged in carrying out studies to determine the
feasibility of proposed applications and planning computer
systems for large mainframe computers and extensive peripheral
equipment, to ensure the efficient completion of team
assignments, the economical satisfaction of information
requirements of users and the effective **use** and development
of subordinate analysts

-    by defining objectives, priorities and deadlines,
-    by assigning project responsibilities in keeping with
     the abilities and experience requirements of subordinates,
-    by co-ordinating the work of team members to ensure
     continuity of systems components and avoid duplication
     of effort,
-    by co-ordinating the development of computer systems
     with concurrent projects of other teams and programming
     activities, and the adaptation of established techniques
     and methods by subordinate analysts,
-    by advising project team members on problems, and
-    by reviewing completed work assignments to ensure
      conformity to technical and procedural standards and
     to assess staff performance.

Conducts feasibility studies of proposed computer applications   25
and carries out computer systems planning and development
assignments, as the senior analyst on a project team or
working independently on ad hoc assignments.

                                                              % of Time

Advises departmental user officials on available information   15
processing services, required input formats, and procedures
for the integration and co-ordination of manual and automated
information processing operations, on the basis of own
experience and information obtained from colleagues, superiors
and subordinate analysts, to assist users in obtaining the
maximum benefits from departmental information processing
services.

Performs other related duties, such as writing reports and   10
memoranda on the terms of reference, scope, progress and
results of project team assignments and on assessments of
subordinate staff performance, and participating in the
selection of programming and analysis staff.

Specifications	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a thorough knowledge of computer systems
analysis practices and techniques, a good knowledge of the
capabilities and capacities of departmental information
processing facilities, and a general knowledge of the
operations and information processing requirements of
departmental user units. It also requires experience in
the analysis of information processing systems, the planning
and development of computer systems, the writing of reports
and the supervision of staff. This knowledge is normally
acquired through university graduation and six years of
progressively responsible computer systems analysis and
administration experience.

Knowledge - Continuing Study	2	60

The work requires continuing study of departmental directives
and manuals, texts, journals and periodicals and attendance
at government and industry-sponsored training courses, to
maintain an awareness of departmental information processing
policies and procedures and of trends and developments in
computer systems programming and analysis.

Decision Making	B3	210

The exercise of judgement, initiative and discretion is
required in the conduct of feasibility studies of proposed
computer applications, the development of computer systems,
and the provision of advice to user officials. Decisions

Degree   Points

are made on the selection of alternative information processing
methods and on the specification of machine configurations
and processes to accomplish information processing requirements.
Recommendations are made to undertake the development of
computer systems to meet information requirements of users
and to modify processes or requirements of users to improve
the feasibility of applications. Errors in judgment can
result in inefficient or uneconomical use of departmental
information processing resources and can adversely affect
the completion of computer applications. Recommendations
are made to the Chief of the Systems Analysis Group and to
user officials.

Contacts

        2   46

The work requires contacts with analysts, programmers,
superiors and officials of departmental user units to
obtain assistance in the planning and development of computer
systems and the conduct of feasibility studies of proposed
computer applications. It also requires occasional contacts
with colleagues and officials in outside organizations to
provide and obtain information relating to computer systems
analysis and information processing techniques and practices.

Supervision

      B2   46

The work requires supervision of four computer systems
analysts, including the scheduling and allocation of work
assignments to meet deadlines and provide for the development
of staff, and the review and assessment of staff performance.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 18   Level: 3

Descriptive Title: Senior Analyst, Systems Software   Point Rating: 534

Summary

Under the direction of the Chief, Systems Software, develops, implements and
maintains software control programs and operating systems; carries out special
projects on software and hardware systems; supervises the activities of a staff of
subordinate software analysts; maintains an up-to-date knowledge of the computer
field with emphasis on software development; and performs other duties.

Duties	% of Time
Develops, implements and maintains software control programs and operating systems to ensure maximum effective and efficient utilization of computer facilities and provision of service to meet user requirements	45

- by establishing and maintaining contacts with software
  suppliers,
- by analyzing software packages supplied by computer
  manufacturers or other suppliers and tailoring the
  package to meet departmental needs,
- by identifying and assessing errors or inadequacies in
  control programs and designing modifications to overcome
  the problem,
- by studying, developing and evaluating methods of
  improving the efficiency of operating systems,
- by designing, testing and implementing new software or
  modifying existing software to meet particular requirements,
  such as interface programs to assess information
  produced by another computer, accounting routines, and
  the control of entry of programs to the system,
- by identifying and resolving, or assigning staff to
  solve on-line problems in the operating system,
- by recommending improvements in operating procedures
  to ensure optimum utilization of software and hardware,
  and
- by establishing and maintaining a reporting system
  that will produce statistics on the efficiency of the
  operating system.

                                                              % of Time

Carries out special projects on hardware and software   25
systems

-    by conducting studies into new systems that may improve
     the operating system, determining feasibility and
     cost/benefit and making recommendations,
-    by designing, testing and installing control programs
     to facilitate operations such as communications,
     magnetic tape handling and direct access usage of the
     computer, and discussing installation problems with
     application programmers,
-    by conducting bench-mark tests of equipment that is
     being considered for procurement,
-    by carrying out research and analytical tests to
     establish which features of software control systems
     offered by manufacturers best meet the requirements of
     the department and which features must be avoided to
     prevent problems in the operating system,
-    by participating in meetings with manufacturers to
     resolve contractual problems, evaluate contractor's
     proposals and conducting tests on software delivered
     on contract, and
-    by studying, developing and recommending improvements
     in communications between remote terminals and the
     computer.

Supervises the activities of a small group of software   15
analysts to ensure timely completion of projects and the
effective development of staff

-    by assigning work projects and checking the resulting
     reports for technical content,
-    by providing advice and guidance on work assignments,
-    by establishing and maintaining standards of quality
     and quantity, and
-    by assessing training needs, evaluating performance
     and making recommendations to the Chief, Systems
     Software.

Maintains an up-to-date knowledge of the computer field,   10
specifically languages, architecture, and software development by
reading texts, periodicals, journals and manufacturer's literature, by
visiting manufacturer's plants and attending industry sponsored
courses, and by attending meetings, seminars, workshops and formal
training courses.

	% of Time
Performs other duties such as giving lectures on computer software, maintaining liaison with application programmers, computer operations and various users, and providing technical advice to consultants.	5

Specifications	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a sound knowledge of computer hardware
and a thorough knowledge of software systems. The work
also requires a thorough knowledge of all the basic technical
aspects of computer systems including machine languages,
compilers, and input/output systems. Experience is required
in analyzing software packages, in tailoring these packages
to meet departmental requirements, in designing software
control programs, modifying control programs and in maintaining
the operating system at peak efficiency. Experience
is also required in evaluating. both hardware and software,
in establishing and maintaining professional working relations
within the department and with outside industry. This
education and experience is obtained either through secondary
school or university completion, formal training courses
and several years experience on various computers, involving
various machine languages and operations requiring extensive
tape and direct access manipulation.

Knowledge - Continuing Study	2	60

The work requires the continuing study of texts, journals,
periodicals and manufacturer's literature and of the objectives,
specifications and systems of various information
processing installations to maintain an up-to-date knowledge
of trends in software development and of the analysis and
comparison of systems of both software and hardware. The
work also requires attending seminars, workshops, training
courses and visiting manufacturers.

Decision Making	B3	210

The work requires judgment and initiative in evaluating
software packages provided by suppliers, in designing
software control programs, in seeking the most effective
and efficient methods of improving the operating system and
in carrying out research and analysis of software systems.
Initiative and judgment are also required in evaluating
proposals made by suppliers in carrying out bench-mark

Degree   Points

programs on new equipment and in identifying and solving
critical on-line problems. Recommendations are made
regarding additions to the system, changes in operating
methods and procedures and the most suitable equipment and
control programs to meet departmental requirements. Errors
in judgment may result in modifications to the operating
system that result in increased costs and reduced efficiency,
the procurement of control programs that require extensive
modifications to meet user's needs and the acquisition of
equipment and software facilities that are unsatisfactory
on a cost/benefit basis. Errors in judgment can also
result in the introduction of procedures that result in
delays in projects and ineffective and inefficient utilization
of manpower resources.

Responsibility for Contacts   2   46

The work requires contacts with senior staff of departmental
organizations to obtain agreement with modifications to, or
changes in, the operating system and to advise on computer
capabilities and utilization. The work also requires
contacts with manufacturers to obtain information, to
outline departmental requirements and to resolve software
problems.

Supervision   A2   29

The work requires the supervision of up to three systems
software analysts, involves assigning work, giving advice
and guidance, checking completed work and making recommendations
on promotion and disciplinary action.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 19

Descriptive Title: Senior Planning Officer

Level: 4

Point Rating: 605

Summary

Under the general direction of the Director of the Planning Division; develops short range objectives and plans related to the use of information processing resources; conducts feasibility studies involving major systems development; plans and directs the acquisition or modification of information processing equipment; advises senior departmental and other government officers on implications of planned information processing applications.

Duties	% of Time

Develops short range objectives and plans to ensure efficient use of information processing resources

20

- by defining in conjunction with other specialists standards of performance for hardware and personnel,
- by projecting current equipment utilization and personnel resources against known or anticipated future requirements,
- by preparing annual budgets of equipment expenditures, and
- by collating estimates of information processing personnel requirements as prepared by other divisions and commenting of the appropriateness of these estimates.

Conducts feasibility studies for such major systems development as telecommunications network design, Public Service pay, Canada Pension Plan, Socio-Economic payments and the like

20

- by conducting feasibility studies and cost benefit analysis of particular projects,
- by developing general systems specifications, and
- by preparing reports and making presentations and recommendations to clients.

Plans and directs the acquisition or modification of information processing equipment

20

- by maintaining up-to-date knowledge of the state of development in the entire range of computing equipment and the software associated with the equipment, in

% of Time

      data communication equipment and facilities in special
       conversions devices such as microfilm readers, optical
       character readers and magnetic tape converters,
-      by preparing specifications for equipment acquisition,
        such as Treasury Board submissions, invitations to
       tender and benchmark programs, in accordance with
       the Treasury Board's guidelines,
-      by evaluating the competing suppliers' performance
       against specifications, usually on the basis of benchmark
       tests, and recommending, in the form of a Treasury
       Board submission, a choice between alternatives, and
-      by preparing plans, and subsequently monitoring these
       plans to ensure the successful installation of varied
        size computer systems.

Advises senior government officers on implications of   15
planned information processing applications

-      by maintaining a knowledge of contemporary management
       techniques such as mathematical models, simulation,
       PERT/CPM, file organization and file management, etc.,
       and counseling senior officers, both of this and other
       departments, as to its use, and
-      by keeping abreast of the development in the ancillary
       equipment field, such as envelopers, microfilming
       equipment, bursters, etc., and making recommendations
       as to their use.

Advises senior management on the matters relating to   10
information processing security

-      by being the Branch representative on the Sector
       Information Processing Security Committee
-      by participating in the appraisal of the RCMP SEIT
       reports, and

-      by being responsible for the implementation of the
       recommendations of the SEIT reports which affect the
       Branch.

Is the Branch representative on matters dealing with   10
contingency Planning. Is responsible for the coordination
of audit report replies. Is the Branch representative on
the Services Official Languages Committee

-      by being responsible for the preparation of the annual
       O/L plan for the Branch, and

% of Time

- by co-ordinating the implementation of the O/L plan
   within the Branch.

Participates in other related duties such as

5

- the Public Service 'Commission's appraisal and selection
   boards for computer systems administrators up to the
   level of CSA-3, and
- presenting papers, participating in panel discussion
   or otherwise contributing to national or international
   technical organizations including the Federal Institute
   of Management, the Canadian Information Processing
   Society, the Association of Computing Machinery, the
   Institute of Electrical Engineers, the Data Processing
   Management Association and others.

Specifications	Degree	Points
Knowledge - Education and Experience	B4	216

The work requires a good knowledge of all aspects of informa-
tion processing including systems analysis and programming
practices and techniques, equipment capabilities, etc., and
a thorough knowledge of at least one of the following
subjects: computing equipment, programming and operating
systems, data file organization for storage and retrieval,
telecommunications, operations research disciplines. This
technical knowledge must be combined with a good knowledge
of management techniques, of departmental policies and
plans and resulting information processing requirements, of
branch objectives and of such subject matter areas as
accounting, pay and personnel, inventory control and socio
economic payments. The work requires the ability to develop
short range plans and objectives, to plan and conduct
studies for major systems development and to work effectively
with client and departmental officials. This knowledge is
normally acquired through university graduation, and eight
years of closely related and progressively more responsible
experience.

	2	60
Knowledge - Continuing Study		

The planning officer is required to continually study new
developments in his particular field of specialization and
relate his knowledge to the needs of the branch and the
department and to contemporary management techniques. So
rapid is the rate of change in some of these disciplines

Degree   Points

that without continuous updating, and individual's value to
the department diminishes rapidly. In developing plans and
objectives to ensure efficient use of information processing
resources, an up-to-date knowledge of all aspects of informa-
tion processing, how they interrelate and how they relate
to management practices is required. The planning officer's
knowledge is kept current by reading technical publications
(which are totally unintelligible to a non-specialist), by
attending and participating in professional seminars and
conferences and by attending university courses.

Decision Making

C3   256

Judgment and discretion are required in developing short
range plans and objectives to ensure effective use of
information processing resources, in planning and conducting
feasibility studies for major systems development such as
telecommunications network design, in planning the acquisition
or modification of information processing equipment and in
advising senior government officers on the implications of
planned information processing applications. Initial
direction is very general and it is largely up to the
planning officer to apply judgment and initiative to carry
out his assignment in the most appropriate and effective
manner. Two typical assignments are the design of a tele-
communications network and the evaluation of competing
supplier's bids to supply a large computer system. In both
instances, the initial direction would be very general -
"What is involved in setting up a telecommunications network
to service the department?" or "Which of the competing bids
is superior?" The planning officer is then required to
plan and organize his work, in order to answer these rather
fundamental questions. The work is often innovative and
the planning officer has very little to guide him save his
knowledge and initiative. As a result of feasibility
studies, recommendations are made to develop comprehensive
computer systems. Decisions and recommendations affect the
department's overall plans for the provision of information
processing services, particularly as these plans and services
relate to the area of specialization of the planning officer.
Errors in judgment could seriously impair the department's
ability to meet its responsibilities. For example, a
poorly designed telecommunications network or a computer
system with serious faults which had not been detected
would have serious repercussions on the department's oper-
ations. Because the work is so technical and the knowledge
so specialized, recommendations by a recognized expert in a
field are seldom questioned.

	Degree	Points

Contacts

Degree 3, Points 73

A planning officer participates in all major systems develop-
ment in the department, either as head of the task force,
as in the cases of telecommunications network design and
computer evaluation, or as a senior member, as in the
development of the Old Age Security Automation team. The
work brings him in contact with senior officers of the
department to determine system requirements, to reach
agreement on resources required and priorities, and to
co-ordinate diverse work requirements. Often he is required
to persuade user officials as to the proper or most effective
use of hardware or personnel resources. The work also
requires a constant liaison with equipment supplier personnel,
especially at the technical level.

Supervision

Degree -, Points -

The duties of a planning officer do not call for direct
supervision. However, for particular projects, personnel
are seconded from other divisions and assigned to the
planning officer for the duration of that project.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 20   Level: 3

Descriptive Title: Senior Technical Consultant   Point Rating: 458

Summary

Under the direction of the Chief, Technical Consulting Services, provides a
consulting service to the engineers, scientists and technicians of client
departments on all aspects of their use of computers. Provides leadership,
advice, training and a problem solving service to the department and to other
departments in the application of advanced mathematical, statistical and
operational research methods which require the use of computers to a wide variety
of complex scientific research, development and operational problems in any number
of diverse fields such as; the geological sciences, metallurgy, mining and mineral
economics, seismology, mineral processing, fuels technology, geodesy,
photogrammetry, geography and energy resources. May be called upon
to use any one of a number of different computers using FORTRAN and occasionally
assembler programming languages.

Duties   % of Time

Analyzes requirements and designs and implements systems on   55
request from the users of client departments or acts as a
consultant giving advice and assistance to those scientists
who wish to undertake their own system design and implementation

-    by detailed discussions with the scientists, economists
     and engineers involved, determines system requirements,
-    by conducting a feasibility study of the various
     possible solutions,
-    by proposing both verbally and in writing to the
     clients the best way of solving their problem,
-    by reviewing with the client details of the costs
     involved and recommending either implementation or
     rejection as a result of the cost benefit analysis,
-    by doing a detailed analysis of each part of the
     system,
-    by specifying the objectives of each program within
     the system,
-    by determining which components of the applications
     software library (mathematical and statistical
      subroutines or major modeling and simulation packages)
     are appropriate to the problem and applying them,

% of Time

-    by reviewing the program designs suggested by assigned
     staff,
-    by designing system test data,
-    by ensuring that all of the system objectives are
     accomplished,
-    by ensuring that all parts of the system are documented,
-    by ensuring that the client is fully aware of how to
     use system,
-    by writing specifications for the tendering of systems
     design and programming for outside contract, evaluating
     responses and making recommendations with regard to
     the selection of a successful bidder, and
-    by consulting with and advising and assisting the
     scientists who wish to implement their own solutions.

Manages the projects and staff under assigned control   20
including Technical Consultants

-    by estimating requirements for financial and manpower
     resources,
-    by ensuring that work is carried out in a timely
     manner and in adherence with estimated manpower and
     financial costs,
-    by ensuring that project staff designs, codes and
     documents according to the standards of the department,
-    by performing regular appraisals of assigned staff, and
-    by recommending to superior the training needs of the
     staff assigned.

Studies the research, development and operational activities   10
of the client departments and keeps abreast of the latest
developments, techniques and tools available in mathematics,
statistics, operational research and computer methods,

-    by visiting and discussing with scientists and engineers
     in the Department,
-    by study of departmental publications,
-    by study of the relevant technical and professional
     literature,
-    by attendance at conferences and symposia,
-    by reading the relevant technical literature,
-    by attendance at seminars and conferences, and
-    by personal contact with people active in the various
     fields.

% of Time

Performs research into the application of new techniques   13
and knowledge that he has determined merit investigation,

-      by obtaining the cooperation of scientists, engineers
       and their managers to support the investigation of new
       techniques,
-      by implementing the new techniques on a limited scale,
-      by comparing and reporting the advantages and
       disadvantages of new methods over old ones,
-      by recommending the adoption or rejection of new
       techniques,
-      by searching for and evaluating new mathematical and
       statistical subroutines,
-      by developing new applications library routines and by
       modifying or converting existing routines, and
-      by searching for, evaluating and participating in the
       selection and acceptance testing of large scale modeling
       or simulation software packages.

Performs other related duties, such as giving seminars on
subjects in areas of expertise, and recommending to superior
on the need for qualified staff. Attends selections boards
organized by the Public Service Commission and other
Departments for the promotion and recruitment of staff.

SPECIFICATIONS   Degree   Points

Knowledge - Education and Experience   B3   189

The work, requires an in-depth knowledge of computer systems
analysis, programming techniques and practices and a thorough
knowledge of the capabilities and capacities of a variety
of computers and peripheral equipment. It also requires a
good knowledge of information processing resources and
procedures associated with the provision of information
processing services to users.

A thorough knowledge of advanced mathematical techniques,
such as those involved in the solution of simultaneous and
differential equations, matrix algebra and statistics is
necessary, together with the ability to learn new methods
from research papers and texts. It is essential to
communicate clearly both verbally and in writing. It is
also desirable to have an in-depth knowledge of at least
one of the specialized areas of client departments in
addition to his computing knowledge. This knowledge and
skill is usually only acquired through University graduation

Degree   Points

in one of the physical or mathematical sciences and five
years of various and progressively responsible experiences
in computer systems programming. Finally, a general knowledge
of research methods would be considered to be useful.

Knowledge - Continuing Study   60

The work requires knowledge of trends and developments in
mathematical procedures, numerical analysis, systems analysis
and programming techniques and changes to practices and
capacities of available information processing equipment
and to be aware of trends in research. This knowledge is
normally gained by a continuing study of scientific journals,
reports, directives, texts and equipment manuals, by
attendance at Government and Industry sponsored training
courses and seminars and by direct contact with research
personnel.

Decision Making   B2   163

The work requires the exercise of judgment, initiative and
discretion in the analysis, design, development and imple-
mentation of scientific applications which are poorly
defined. Suggestions are made to users on changes to their
specifications which can result in better performance.
Decisions are made on which of a number of alternate mathema-
tical techniques is best suited to specific problems.
Recommendations are made to user officials on the feasibility
of new computer systems. Errors of judgment affect two
different areas. Firstly, a poor choice can adversely
affect the quality and efficiency of the services provided
by the department thereby causing significant losses in
revenue. Secondly, errors can cause undue delays and
excessive costs to research projects and more important can
lead to scientists and engineers publishing incorrect
reports in scientific journals. Finally, with a number of
problems, it is necessary for the incumbent to carry out
research since there is no known solution to the problem.

Contacts   2   46

The work requires frequent contacts with research scientists
of client departments to investigate their computing require-
ments. This usually requires a considerable amount of
discussion to clarify the real objectives of the client or
clients. The incumbent is required to obtain agreement on
the objectives of a specific project and then to persuade

Degree   Points

the clients to accept the results of his feasibility studies
and analysis. Finally contacts occur with scientists and
engineers throughout government and in Industry to obtain
and provide information on new mathematical and numerical
techniques.

Supervision   -   -

The incumbent is responsible for assigning work to and
maintaining performance of assigned staff in accordance
with the requirements of projects.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 21   Level: 3

Descriptive Title: Senior Training Officer,   Point Rating: 504
                   Information Processing

Summary

Under the general supervision of the Chief, Systems Training, participates in the
development of new Information Processing and management courses and the
modifications of existing courses to meet departmental requirements; supervises the
activity of four subordinate training officers; carries out instructional duties
for advanced Information Processing and management courses; maintains an up-to-date
knowledge of the trends and developments in computer technology; and performs other
duties.

Duties	% of Time
Participates in the planning and development of new Information Processing and management courses and in modifying existing courses to meet departmental requirements in the training of line management, analysts, programmers and operators	35

-     by studying trends and developments in the Computer
      Systems field and identifying and assessing departmental
      training needs,
-     by carrying out in-depth studies of courses offered
      outside the Public Service and of courses available
      from suppliers,
-     by making recommendations on courses that should be
      conducted in the department and training needs that
      can best be achieved by using facilities offered by
      private industry,
-     by designing course outlines, preparing syllabi,
      determining the manpower and financial requirements,
      determining and obtaining course material and training
      aids, and establishing course timetables,
-     by designing practical exercises to test the student's
      ability to solve problems in the operating environment,
-     by making modifications to programmed courses provided
      by suppliers and existing courses to meet departmental
      training needs and career path development,
-     by arranging training facilities for the training of
      staff from other departments,
-     by evaluating course results and making recommendations
      for improvements,

% of Time

- by providing advice to departmental management on all
  aspects of the training facilities, and
- by making suitable arrangements to meet varying require-
  ments for accommodation of facilities and students.

Supervises the activities of a staff of four Instructors to   35
ensure that courses are conducted in accordance with depart
mental objectives and that training needs are being satisfied

- by assigning specific segments of the training program
  to each instructor and providing the appropriate
  guidelines,
- by ensuring that each instructor has prepared adequate
  lesson plans and has arranged for hand-out material
  and training aids,
- by providing advice and guidance to instructors in
  instructional techniques, course content and the
  effective use of training aids,
- by monitoring training sessions to ensure that established
  standards are being met,
- by assessing student progress, evaluating course
  results and writing reports, and
- by appraising the performance of instructors and
  making recommendations for promotion or disciplinary
  action.

Carries out instructional duties for advanced Information   15
Processing and management courses

- by studying the relevant material and making up a
  course outline and lesson plans,
- by obtaining or preparing hand-out material and arranging
  for suitable training aids,
- by presenting course material through lectures, workshops,
  syndicates, and practical exercises, and
- by preparing, invigilating and marking examinations
  and case studies and assessing student performance.

Maintains an up-to-date knowledge of trends and developments   10
in computer technology and instructional techniques and new
training courses by studying texts, periodicals,. journals
and other literature and by attending conferences, seminars
and formal and informal courses.

Performs other duties such as assisting in the selection of
trainees, recommending placement of newly trained personnel
and acting as the chief of the training group when required.   5

Specifications	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a thorough knowledge of computer science
particularly languages, utilities and computer operations
together with a broad knowledge of at least one current
generation operating system and hardware. The work also
requires a sound knowledge of the training needs of the
department, of training methodology of the effective use of
training aids and the development of course outlines,
syllabi and examinations. Experience is required in the
computer operations, the application of computers, the use
of various machine languages and in software applications.
Experience is also required in supervising a staff, in
evaluating the results of courses and in appraising student
performance. This knowledge is normally acquired through
university graduation and several years of experience in
the design and implementation of complex computer projects
utilizing a variety of languages, compilers and utilities
or through secondary school graduation and extensive
experience in systems analyses and application programming
or software work.

	Degree	Points
Knowledge - Continuing Study	2	60

The work requires the continuing study of texts, periodicals,
journals and a variety of instruction material, the operating
system, and new departmental hardware and software acquisitions in
order to plan, develop and update training programs
for analysts, operators and programmers. Also required is
continuing studying of advances in training methodology.

	Degree	Points
Decision Making	B2	163

The work requires the identification of training requirements
in a variety of subject-matter areas, the evaluation of
alternate methods of meeting the training needs, the
assessment of the most efficient and economical solution
and the planning and development of training programs that
will fulfill all departmental requirements. Recommendations
commit departmental manpower and financial resources.
Errors in judgment in determining training requirements
result in inadequately trained personnel, limitations in
career development and affect the utilization and efficiency
of the Information Processing system.

	Degree	Points
Responsibility for Contacts	2	46

The work requires frequent contacts with suppliers of
training material, with commercial training organizations
to arrange for courses outside the department and with
management to explain and gain acceptance of proposed
training programs. There are also frequent contacts with
training organizations in other departments and officials
in private industry to discuss common training problems.

	Degree	Points
Supervision	B2	46

The work requires the supervision of four instructors which
requires assigning work, assessing performance, providing
technical advice and guidance and making recommendations on
promotion and disciplinary action.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 22   Level: 3

Descriptive Title: Supervisor, Information Processing   Point Rating: 578
                   Applications Section

Summary

Under direction of the Chief, Departmental Applications Division, plans and directs
the work of staff providing a computer systems analysis and programming service for
mass data applications in government departments and agencies; prepares preliminary
systems proposals and cost estimates; advises on the installation and maintenance of
information processing systems. .

Duties	% of Time
Plans and directs the work of a group of eight programmer-analysts providing a computer systems analysis and programming service for government departments and agencies contracting with the bureau for the development or modification of mass data applications to be processed on large mainframe computers	50

- by interpreting the policy and directives of the
  bureau for user officials,
- by discussing information requirements with client
  officials to determine the objectives and requirements
  of applications and to plan subordinate staff assignments,
- by establishing objectives, priorities, deadlines and
  schedules for projects and co-ordinating subordinate
  staff activities,
- by advising and instructing staff on technical problems
  encountered in analyzing and programming a variety of
  applications to ensure that the most efficient and
  economical methods and techniques are used, and
- by reviewing assignments to ensure conformity to
  production standards and satisfaction of clients'
  information requirements.

Prepares preliminary systems proposals and cost estimates for major applications to establish objectives, requirements and terms of reference for the section's services	40

- by consulting with senior officials or subject-matter
  specialists of client departments on information
  processing objectives and requirements,

% of Time

-   by undertaking preliminary analyses of existing informa-
    tion processing methods and procedures to determine
    the most efficient and economical approach to the
    satisfaction of information requirements of clients,
-   by recommending to client officials modifications of
    procedures associated with the proposed applications
    and assisting in their implementation,
-   by preparing for the approval of the Chief, Departmental
    Applications Division, outlines of proposed systems
    and estimates of costs of analyzing, programming, key
    punching, and processing operations, and
-   by negotiating terms of contracts with client departments
    and approving modifications within delegated authority.

Advises on and assists in the maintenance of automated   10
systems under contract by reviewing clients' requests or
reports, evaluating results, identifying problem areas and
modifying the system.

Specifications   Degree   Points

Knowledge - Education and Experience   B3   189

The work requires a thorough knowledge of computer systems
analysis and programming methods, procedures and techniques
and a good knowledge of the characteristics and capabilities
of a variety of computing devices. It also requires experience
in the planning and development of information processing
systems for a wide variety of applications and computing
devices. Skill is required in establishing effective
communications and good working relations with officials of
client organizations. This knowledge is normally acquired
through university graduation and six years of varied and
progressively responsible experience in administration,
computer systems analysis and programming.

Knowledge - Continuing Study   2   60

The work requires continuing study of the manuals and
information bulletins for a variety of computer systems,
reading of texts, journals and periodicals, and attendance
at courses and seminars to keep abreast of trends and
developments in systems analysis and programming techniques
and machine capabilities.

	Degree	Points
Decision Making	B3	210

The work requires identification of information processing
problems in a wide variety of subject-matter areas and
bureau operations, the evaluation of alternative information
processing systems and methods, the identification of the
most efficient and economical solutions, and the development
of systems that will meet the requirements of client departments
and available facilities. Recommendations commit the
information processing and manpower resources of the bureau.
Errors in judgment may affect the economy and efficiency
of computer applications developed for a variety of clients
normally having little, if any, information processing
resources or experience. Recommendations are made to the
Chief, Departmental Applications Division, and to client
officials.

	Degree	Points
Contacts	3	73

The work requires frequent contacts with senior officials
of departments and agencies to discuss and define the
objectives and requirements of proposed computer applications,
and to obtain the information needed to recommend specific
systems and estimate the cost of the services to be provided.
Contacts may involve persuading clients to modify their
requirements or input preparation procedures in order to
meet the needs or reduce the costs of the computer application.
Contacts involve negotiating, as a representative of the
department, the terms of contracts for information processing
services provided by the department.

	Degree	Points
Supervision	B2	46

The work requires the supervision of eight computer systems
analysts and programmer-analysts; supervisory responsibilities
include assignment of work, performance evaluation, training,
and recommendation of advancement and disciplinary action.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 23   Level: 2

Descriptive Title: Systems Analyst   Point Rating: 383

Summary

Under the supervision of a project leader, Systems Analysis Section, participates in
studies to establish the technical and economic feasibility of proposed computer
applications; plans and develops information processing systems for mass data
applications; and performs other related duties.

Duties	% of Time
Participates in the conduct of studies to establish the technical and economic feasibility of proposed computer applications, as a member of a team of computer systems analysts under the supervision of a project leader	25

-      by reviewing user policies and procedures relating to
       activities affected by the proposed applications,
-      by discussing requirements, resources, operations and
       objectives of users with their officials in headquarters
       and field locations,
-      by evaluating input forms, output requirements and
       operations of users to identify required changes in
       their procedures,
-      by consulting with colleagues and departmental special
       ists and reviewing previous departmental information
       processing applications, to identify alternative
       methods of meeting information requirements of users,
       and
-      by preparing reports, recommending the type and extent
       of information processing services appropriate, and
       estimating the development and processing requirements
       and associated costs of the recommended services.

Plans and develops information processing systems for mass data applications under supervision of a project leader, to ensure the co-ordination and integration of computer systems within applications, the economical satisfaction of information requirements of users, and the efficient use of depart mental equipment and programming facilities	65

-      by identifying and analyzing information processing
        requirements and objectives,

% of Time

- by developing general solutions to computer systems
   requirements,
- by evaluating alternative solutions in terms of costs,
   time and processing requirements, requirements of
      users, and available programming and processing resources,
- by conferring with the project leader and project team
   colleagues to ensure the co-ordination of systems and
   avoid duplication of efforts,
- by developing and recommending new user procedures to
   facilitate the provision of information processing
   services,
- by developing program specifications and test procedures
   for approved systems, and
- by directing programmers in the preparation of computer
   systems programs, operating instructions and program
   tests and in the correction or modification of completed
   programs.

Performs other related duties, such as instructing user   10
staffs in new procedures necessitated by information
processing, evaluating utility routines for potential use
in the development of computer systems, and assisting in
the training of junior computer systems analysis and programming

Specifications	Degree	Points
Knowledge - Education and Experience	A3	114

The work requires a good knowledge of computer systems
analysis and programming techniques and practices and the
capabilities and capacities of information processing
equipment. It also requires a general knowledge of legisla-
tive and administrative policy requirements affecting
information processing operations of users. This knowledge
is normally acquired through completion of secondary school
education and five years of progressively responsible
experience in computer systems analysis and programming.

Knowledge - Continuing Study	2	60

The work requires knowledge of trends and developments in
computer systems analysis and programming techniques and
practices, gained by reading texts, journals and periodicals
and attending government and industry-sponsored training
courses. It also requires familiarity with departmental
policies, procedures and practices, gained by reading
departmental manuals and directives.

	Degree	Points
Decision Making	B2	163

The work requires the exercise of judgment, initiative and
discretion in evaluating the feasibility of proposed computer
applications and in planning and developing information
processing systems to meet information requirements of
users within the limitations of costs, machine capacities,
priorities and deadlines assigned to applications.
Recommendations are made on the extent and type of information
processing services appropriate to applications, the
use of information processing facilities, and the revision
of procedures in accordance with information processing
requirements. Problems in identification of requirements
of users are resolved by consultation with their officials;
technical or procedural problems are referred to the project
leader. Completed systems are submitted to the project
leader for approval and are tested by trial runs before
implementation. Decisions affect the quality, efficiency
and economy of information processing systems used.
Recommendations are made to the project leader.

Contacts	2	46

The work requires contacts with user officials and colleagues
to obtain and provide information and assistance required
for the evaluation of the feasibility of proposed applications, the
planning and development of computer systems,
and the implementation of new or revised procedures
necessitated by information processing requirements.
Contacts with user officials may require consultations in
headquarters and field locations and may result in extensive
revisions to operating procedures of users.

Supervision	-	-

Supervision of the work of others **is** not a continuing
requirement. Work leadership and guidance are occasionally
provided to programmers and junior analysts, and assessments
of junior staff may be provided to the project leader on
request.

BENCH-MARK POSITION DESCRIPTION

Bench-mark Position Number: 24   Level: 3

Descriptive Title: Telecommunications Advisor   Point Rating: 458

Summary

Under the direction of the Chief, Technical Services, is responsible for the
functional management and efficient operation of all departmental Telecommuni-
cation hardware related to systems which include online terminals and telecom-
munications equipment in Systems and Consulting Directorate, Head Office,
remote research centres and regional offices. At the present time the configuration
is comprised of 16 Mini-Computers with 4 located centrally and the remainder located
at regional sites across the country. Approximately 300 terminals access the central
configurations. This network is expected to continue to grow both in terms of
terminals and computers. The incumbent will also advise user and departmental
management officials on the use and development of departmental telecommunications
resources, such as interactive information processing, electronic office automation,
local area networking and digital switching; evaluate and plan the implementation of
intelligent communication controllers; and perform other related duties.

Duties   % of Time

Plans and supervises the operation and maintenance of the   50
communications networks of the Department. Duties include
those related to the functional responsibility exercised by
the Information Processing Division over all central and
remote equipment on-line to the department's Time-Sharing
System and outside service bureau. Ensures the effective
use of facilities and services to users

-    by developing administrative and operational procedures,
-    by reviewing production, progress and administrative
     reports to ensure that quality and production standards
     are maintained,
-    by initiating and conducting meetings with central
     site, communications and remote terminal suppliers to
     form and maintain integrated trouble isolation and
     support structure organizations,
-    by participating in the negotiation of contracts for
     terminal, communications and central site equipment,
-    by evaluating the effectiveness of support contracts
     and the manner in which they are carried out,
-    by participating in the testing of computer equipment
     to ensure its satisfactory performance prior to contract
     finalization,

% of Time

-    by acting as a focal point for the receipt and dissemination
     of information related to the operational
     equipment related to real time computer systems,
-    by standardizing problem determination procedures at
     central and remote sites,
-    by carrying out on line terminal tests and other tests
     to ensure that continued effective security standards
     are maintained by all suppliers and users,
-     by developing and supervising an effective method of
      monitoring the performance and degradation of system
      components,
-     by supervising the preparation of both central and
      remote sites for the installation of computer communications-
      equipment,
-     by supervising the installation of computer communications
      equipment at central and remote sites,
-     by negotiating with suppliers schedules for the preventive
      maintenance of computer communications,
-     by conducting on-site investigations of headquarters
      and field operations and discussions with departmental
      management officials and computer systems analysts, to
      identify possible problems related to information
      processing,
-     by participating in the evaluation of new equipment
      either purchased or rental,
-     by acting as consultant to the site manager on problems
      related to the interface of the central site computer
      and the telecommunications and remote site subsystems,
      and
-     by ensuring and maintaining the integrity of the
      network.

Advises users, installation management, and departmental   40
management officials on the use and development of depart
mental telecommunication resources, such as interactive
information processing, electronic office automation and
local area networking supported by digital switching, to
assist users in obtaining the maximum benefit from information
technology and to ensure that the commitment to users is
not degraded due to lack of understanding of departmental
resources, capabilities and priorities

-     by informing users at regional offices and Head Offices
      of the capabilities and requirements of departmental
      services as outlined above,

% of Time

- by assisting in the recommendation of alternative
  information processing arrangements or revisions to
  information requirements of users, to improve the
  technical or economic feasibility of approved applica-
  tions or to accommodate changes in processing,
- by assessing administrative and technological innovations
  in information processing with a view to recommending
  the adoption of procedures, the acquisition of equipment,
  and the provision or development of departmental
  information systems services, and
- by advising and instructing staff on technical problems
  encountered in the various related activities and to
  ensure that the most efficient and economical methods
  and techniques are used.

Performs other related duties, such as participation in the   10
selection and assessment of staff, represents the Chief at
departmental meetings on information processing administration,
prepares reports, memoranda and correspondence associated with the
administration of the departmental Information
Processing Service.

Specifications	Degree	Points
Knowledge - Education and Experience	B3	189

The work requires a thorough knowledge of data processing
communications and networking techniques and practices and
the capacities and capabilities of department and contractor
information processing facilities. A thorough knowledge of
the practices, capacities and performance of mini computers
and telecommunications networks is a necessity. It also
requires a thorough knowledge of the content, objectives
and information processing requirements of research, adminis-
trative and operational programs and a good knowledge of
departmental and government policies and regulations governing
the administration of information processing and telecommuni-
cations services. Because users of the systems at the
remote terminals are not information processing oriented,
the work requires skill in dealing with users to ensure
that they accept the system as a means of carrying out
their responsibilities in an improved manner. An apprecia-
tion of the scientific and technological disciplines involved
in the conduct of departmental research and operational
programs is a further requirement. The work requires
skill in the planning and coordinating of complex technical
operations, the forecasting of staff, equipment and financial

Degree   Points

requirements, and the development and presentation of
advice. This knowledge is normally acquired through completion
of university education and six years of progressively
responsible administrative and information processing
experience.

Knowledge - Continuing Study   2   60

The work requires continuing study of trends and development
in the administration and operation of information processing
and telecommunications including the interrelationships of
information processing, general management and research
requirements of the Department, through reading of texts,
journals and periodicals, consultations with manufacturers
and attendance at various seminars, conferences and training
courses.

Decision Making   B2   163

The work requires the planning and coordinating of information
processing activities of telecommunications systems
supporting a large number of remote terminals located in
Research Stations, the Department's Data Centre and Head-
quarters and other regional sites. Systems equipment
configurations are contracted to multiple computer, peripheral,
and communications suppliers and determination of account
ability necessitates the use of good judgment. The frequent
resolution of conflicts between multiple computer suppliers,
software and common carriers of telecommunications networks
is an important function of the work. Decisions affect the
effectiveness and efficiency of services provided to users
and development personnel. Because the on line systems are
meant to provide an improved information service to users
at regional offices across Canada, the creditability of the
Department will be measured to some extent by the efficiency
of the system and decisions taken in coordinating the role
of its different components plays an important part.
Recommendations influence the acquisition and usage of
computer and telecommunications equipment and facilities
and the implementation of departmental information processing
policies. Errors in judgment can adversely affect the
efficiency and economy of departmental information processing
services. Recommendations are made to the Chief, Technical
Services Division.

	Degree	Points
Contacts	2	46

The work requires contacts with senior departmental officials
in headquarters and regional offices to plan and coordinate
the provision of information processing services, to establish
priorities and to advise on the development of departmental
information processing policies. Contacts are also initiated
during negotiation of contracts and when resolving problems
encountered during the term of contracts. Contacts with
other government and industry officials including common
carriers are maintained to obtain information on technological
and administrative development in information processing.

Supervision	-	-

The work requires supervision of programmer/analyst personnel
on a project basis as required as well as occasional utilization of
outside consulting resources.