GE-115 System Software









Benefits

GE-115 System Software offers you many important benefits. It is:

Comprehensive — GE-115 System Software covers the entire range of computer software usually offered only on medium and large scale systems. It includes, for example, programming langages, input/output systems, operating systems, sort/merge generators, utility programs, and application packages.

User Oriented — GE-115 System Software allows you to minimize your concern about the peripheral hardware on which individual programs are executed and concentrate on the solution to the information processing problem itself.

Easy-To-Learn — GE-115 System Software offers you a range of programming languages . . . permitting you to choose a language that allows you to code in terms familiar to you, terms that are commonly used in your business or commercial field.

Easy-To-Use — GE-115 System Software has been planned to provide you with predetermined organizations that are both logical and highly efficient, thereby relieving you of the tedious and time consuming task of program organization. It is carefully constructed to allow you to describe each phase of your programs in simple, logical terms.

Highly Efficient — GE-115 System Software is organized so that your programs need include only those instructions and subroutines necessary to solve a given problem; use a minimal amount of core; and execute at high speeds.

Quality Controlled — GE-115 System Software had been thoroughly checked and rechecked by experienced quality control personnel. They also ensure that associated documentation accurately explains how you use the program.

Thoroughly Documented — GE-115 System Software has been thoroughly documented by professional technical writers in clear, concise manuals that describe what each program is, what it is capable of doing, and how you make use of it.



Components

GE-115 System Software includes:

Assembly Programming Systems, available in two versions: one for use with 4K CPU's; one with macro and program segmentation capabilities for use with CPU memories of 8K and larger.

Logic Generating Languages (LOGEL), available in three versions: two for card-oriented systems; one for tape and disc-oriented systems. The first card version is for use with 4K CPU's and handles 1 input and 1 output file (plus printout); the second is for use with 8K CPU's and handles 2 input and 3 output files (plus print-out). The tape/disc version operates under Tape/Disc Operating System supervision and requires an 8K CPU.

Common Business-Oriented Languages (COBOL) is available in two forms: one for tapeoriented systems; one for disc-oriented systems. Both versions operate under operating system supervision and require a 12K CPU.

Input/Output Systems are available in two versions: one basic, one extended. The basic system has been developed for use with cardoriented systems. The extended system, for use with tape- and disc-oriented systems.

Operating Systems are available in two forms: one for tape-oriented systems; one for discoriented systems. Both versions are capable of loading, processing, terminating, and linking stacked jobs with a minimum of operator intervention.

Sort/Merge Generators — One version: Covers both tape- and disc-oriented systems. Capable of generating compact, efficient sort/merge programs tailored to your particular requirements. Generation is controlled by means of powerful, descriptive macro-statements.

General Routines offer a wide range of service, data manipulation, math, and input/output routines.

Application Packages — Manufacturing Control System, MANCON (Management Control System), SIMTAB, Critical Path Method (Card and Tape versions), and Matrix Inversion are all available.

Utility Programs include the List and Summarize Report Generator, the Reproduce and Gang Punch Program, a wide range of card, tape and disc service routines and Media Conversion programs.

Data Communications Software is available in four areas: GERTS (General Remote Terminal Supervisor)/115, 115-to-115, 115-to-360 Communications Packages and a group of generalized transmission subroutines that manage a DATANET® 10 transmission controller.



Assembly Programming Systems

General Electric Assembly Programming Systems:

retain the capabilities and flexibility inherent in coding programs in machine language.

significantly reduce the individual programmer's coding burden by permitting instructions, memory, and constants to be defined mnemonically, and referred to by means of symbolic names.

expand the capabilities of the basic machine language by making available supplementary mnemonic operation codes that encompass a wide range of conditional jump instructions.

considerably ease the task of program debugging by producing source and corresponding object program listings that include source program error diagnostics.

provide for the formatting and the inclusion of descriptive comments in program listings, thereby facilitating their use as basic program documentation.

greatly facilitate detailed coding by allowing users to represent constants in decimal, alphanumeric, hexadecimal, and instruction-address format.

reduce highly repetitive, detailed coding by providing the linkage necessary to call and insert in your programs, routines, and subroutines that perform common utility, service, and input/output operations.

Basic APS

Basic APS is a one-for-one assembly program that provides for the inclusion of Basic Input/ Output (BIOS), arithmetic and general purpose subroutines in the object program.

Minimum Hardware

- 4K CPU
- Card Reader
- Printer

Extended APS

Extended APS is an expansion of Basic APS that is designed to be run under the supervision of the Tape Operating System (TOS) or the Disc Operating System (DOS). The additional features included in extended APS are:

a complete set of macro-instructions for signed arithmetic.

■ a large set of input/output macro-instructions, which make use of the various subroutines that make up the Extended Input/Output System (EIOS).

file management and file description macros that set up file tables and other control data used by the input/output macro-instructions.

the ability to subdivide programs into logical segments and to overlay these segments in memory.

- 8K CPU
- Printer
- 3 Tape Handlers or 2 Disc Drives



Logic Generating Languages

LOGEL LOgic GEnerating Language) is a compiler that includes assembler-level options. LOGEL:

saves programming man hours by generating, from one source statement, many detailed assembler statements . . . thereby providing a larger computer system feature in the inexpensive GE-115.

reduces problem solution time by providing a logical program organization keyed to file management specifications and record-processing requirements. The program is divided into five divisions: General, Input, Data, Procedure, and Format.

permits description of data files by associating a data name with each logical record field or group of fields and then handles these fields as units.

allows APS mnemonic instructions to be freely intermixed with the available macro-instructions and specification statements.

simplifies the coding and program documentation by providing statements that are equivalent to a flow-chart function block.

provides diagnostic listings that record program errors detected during compilation.

Logel 1

Capable of processing one card or tape input file, and producing one card or tape output file and a printed report.

Minimum Hardware

- 4K CPU
- Card Reader
- Card Punch
- Printer

Logel 2

Capable of processing up to two card or tape input files and of producing up to three card or tape output files and a printed report.

Minimum Hardware

- 8K CPU
- Card Reader
- Card Punch
- Printer
- 8K CPU
- Card Reader/Punch
- Printer

or

- or
- 8K CPU
- Card Reader
- Card Reader/Punch
- Printer

Logel 3

Run under the supervision of the tape or disc operating system. Capable of processing a variable combination of up to 11 input/output files, plus a printed report. Additional features include: four consultation tables, and the ability to establish hierarchical relationships between files.

- 8K CPU
- Card Reader
- Printer
- 3 Tape Handlers or 2 Disc Units



Common Business Oriented Language

General Electric's 115 System Software also includes tape/disc COBOL (COmmon Business Oriented Language) which:

eliminates a great deal of detailed coding, thereby minimizing application programming time.

provides an efficient method for clearly expressing the solution to commercial data processing problems.

provides excellent documentation of the problem solution . . . thereby permitting work begun by one programmer to be continued or maintained by another programmer.

allows source programs written for one computer to be run with little or no alteration on another computer.

decreases re-training costs because once a programmer is trained in COBOL programming techniques, he can use those techniques on any computer.

Further benefits are provided by these features:

 program, computer, user data file and data record description statements

 Input/Output statements such as READ, WRITE, OPEN, CLOSE, ACCEPT, DISPLAY

- arithmetic statements such as ADD, SUB-TRACT, MULTIPLY, DIVIDE, COMPUTE
- procedure branching statements such as GO, ALTER, PERFORM
- data movement statement MOVE
- program termination statement STOP
- report writer
- full editing capabilities
- compiler directing statements EXIT, ENTER, NOTE
- automatic program segmentation
- condition names such as IF, UNTIL, NOT, GREATER, UNEQUAL, EQUALS
- Logical connectives AND and OR

Minimum Tape Hardware

- 12K CPU
- Card Reader (not necessary when source programs are on tape)
- Printer (can be replaced by additional tape handlers)
- 4 Tape Handlers

Minimum Disc Hardware

12K CPU

- Card Reader
- Printer
- 2 Disc Units



Input/Output Control Systems

General Electric's basic and extended input/ output systems:

provide a set of routines that performs all major input/output functions.

save programming time because the routines are pre-written, tested, and debugged.

decrease programmer training costs by doing away with the necessity of teaching programmers how to handle the detailed coding involved in input/output operations.

reduce assembly time by providing the routines in assembled form.

provide a significant measure of standardization on programs in the area of input/output operations by ensuring that the same routines will be used to perform input/output operations in many programs.

increase program efficiency by making use of the concurrent peripheral operation feature of the hardware whenever possible.

allow the inexperienced programmer to code complex programs that would otherwise be beyond his capabilities.

Basic IOS

Basic Input/Output System is a set of routines that execute physical record read/write operations on card reader, printer, and tape units. Basic IOS routines perform the following functions:

- read a tape block
- write a tape block
- erase tape
- rewind a tape
- read a card
- print a line
- read a card and print a line
- paper skipping

Minimum Hardware

- 8K CPU
- Card Reader
- Card Punch
- Printer
- Magnetic Tape Handlers (as required)

Extended IOS

Extended Input/Output System is a set of powerful macro-instructions inserted in the source program that describe and manage logical record input/output operations on tape and disc files. The Extended IOS Macro-Instructions are:

- GET read a logical tape or disc record
- PUT write a logical tape or disc record
- SEEK seek a disc location
- PUTX update a logical disc record
- DEL delete a logical disc record
- RLS skip the current block of logical records
- CHKP write a checkpoint on tape
- DCKP write a checkpoint on disc
- OPEN open a tape or disc file
- CLOSE close a tape or disc file
- NEXT change a tape or disc volume

Note: The Basic IOS routines may be intermixed in Extended APS programs with Extended IOS macros.

- 8K CPU
- Card Reader
- Printer
- 3 Tape Handlers or 2 Disc Drives



Operating Systems

Advantages

The tape and disc operating systems:

reduce the amount of idle time between jobs by keeping the computer in continuous operation during the processing of groups of independent jobs, commonly called stacked jobs.

increase the ratio of useful computer time to total available computer time by reducing job set-up time.

minimize the number of manual operations and interventions required of the computer operator, thereby minimizing the chance of introducing operator errors.

facilitate storage, access, maintenance, and loading of your programs by providing an organization of system, library, and master tapes on which your programs can be stored and referenced.

get programs on the air faster by providing efficient debugging aids in an operating system environment.

Functions

The tape and disc operating systems perform the following functions:

- loading of individual jobs
- processing of individual jobs
- terminating of individual jobs
- linking of groups of unrelated jobs
- executing store dumps
- executing tape/disc dumps
- generating sample data on tape or disc
- debugging program generation
- stripping the system tape of obsolete programs
- printing and duplicating the system tape
- updating the system tape
- generating the master and the library tape and discs
- supervising assemblies, compilations
- supervising and executing input/output operations required by individual jobs
- media conversion jobs

- 8K CPU
- Card Reader
- Printer
- 3 Tape Handlers or 2 Disc Drives



Sort/Merge Generator

General Electric's tape and disc sort/merge generator provides:

and machine configuration at generation time . . . according to the descriptive macros provided by the programmer.

message printed at generation time noting the optimum blocking factors and record sizes that should be used to obtain the most efficient sort/merge.

generated programs that make use of the optimum sort/merge technique for specific configurations . . . thereby considerably reducing the times required to sort and merge large files.

fast, efficient object programs with a minimum of programming effort.

options for inserting user-coded routines for manipulation of records prior to, and following the sort.

programming that makes use of the concurrent operation of peripherals feature built into the hardware and the read backward feature of the magnetic tape units.

Minimum Hardware

- 8K CPU
- Card Reader
- Printer
- 3 Magnetic Tape Handlers or 2 Disc Units

General Routines and **Subroutines**

General routines and subroutines provide prewritten, tested, and debugged coding that performs a wide variety of common, essential data processing functions. Some of the most important are:

Card Systems

- Card Loader
- Memory Dump
- Memory Punch
- Low Store Dump
 Read Cards
 Compare Cards
 Read Cards and Print
- to Store
- Pre-load Store APS/LOGEL Resequencer

High Speed Card Lister

Program CondenserInsert Character

Minimum Hardware

- 4K CPU
- Card Reader
- Card Punch
- Printer

Card Systems with

Tape Handlers

- Tape Label Write
- Tape File Open
- Tape Dump
- File Sample Generator Write Physical Blocks
- Tape Duplicate
- GE-400 Tape to Printer Write Logical Records

Minimum Hardware

- 8K CPU
- Card Reader
- Printer
- 1 Tape Handler

Disc Systems*

- Cards/Tape to Disc
- Disc to Card
- Card to Disc
- Disc Dump
- **Minimum Hardware**
- 8K CPU
- Card Reader
- Printer
- 2 Disc Drives

*For use in conjunction with the Disc Operating System (DOS)

- Disc to Disc
- Disc to Tape
- Tape to Disc
- File Indexing

Read/Write

GE-400 Files

Read Physical Blocks

Read Logical Records

Card Punch

rer



Utility Programs

Utility programs reduce the time, cost, and personnel necessary to write, test, and debug the detailed coding necessary to perform repetitive data processing tasks common to all installations.

List and Summarize

Developed for card-oriented systems, this program processes input card files in order to produce:

a selective listing of input cards that includes totals, headings, and page numbers

- a deck of summary cards
- an object program card deck

Reproduce and Gangpunch

Developed for card-oriented systems, this program processes an input card file to:

- reproduce a card deck
- reproduce a deck with transfer and suppression of selected fields
- calculate and punch products or percentages
- gangpunch a serial number into some or all cards
- gangpunch a constant into some or all cards
- punch 1 to 9 copies of each card

Applications Packages

Applications packages take advantage of General Electric's programming experience to code programs designed to perform specific user dataprocessing applications.

Manufacturing and Inventory Control System

A package supplied in both card and tape versions that gives manufacturing companies' production planning and control people all the data they need to plan and control production and inventory in an efficient, profitable manner.

MANCON

(Management Control System)

Developed for card-oriented steel service center users, this package produces a wide range of daily and monthly management reports that provide management with a complete, comprehensive picture of the operation of a steel service center.

SIMTAB

A package developed for card-oriented users that is capable of processing most of your present 407 jobs faster and more efficiently on the GE-115.

Critical Path Method

Developed for card- or tape-oriented systems, this package provides a powerful management tool for planning, scheduling, and controlling of business, scientific, and industrial projects. This tool is based on a critical path network of each such project.

Matrix Inversion

Developed for card-oriented systems, this package allows the user to invert square matrices of nth order, in which each operand is expressed in floating point format. The technique used is the Gauss-Jordan method.

Data Communication Packages

Data communications packages offer business, industry, education, and government agencies the capability of remote data processing.

Over private or switched telephone or telegraph lines, marketing, financial, manufacturing, scientific, personnel, and customer service data is received from a remote computer. The data is processed by the central computer and the results re-transmitted to the originating (remote) computer. Data Communication Packages include:

- GERTS/115
- 115-to-360
- 115-to-115
- Transmission Subroutines

CHAR OR 161 .

8 BIF 6.5 pis 4K-

\$55,000 126 K Birs

