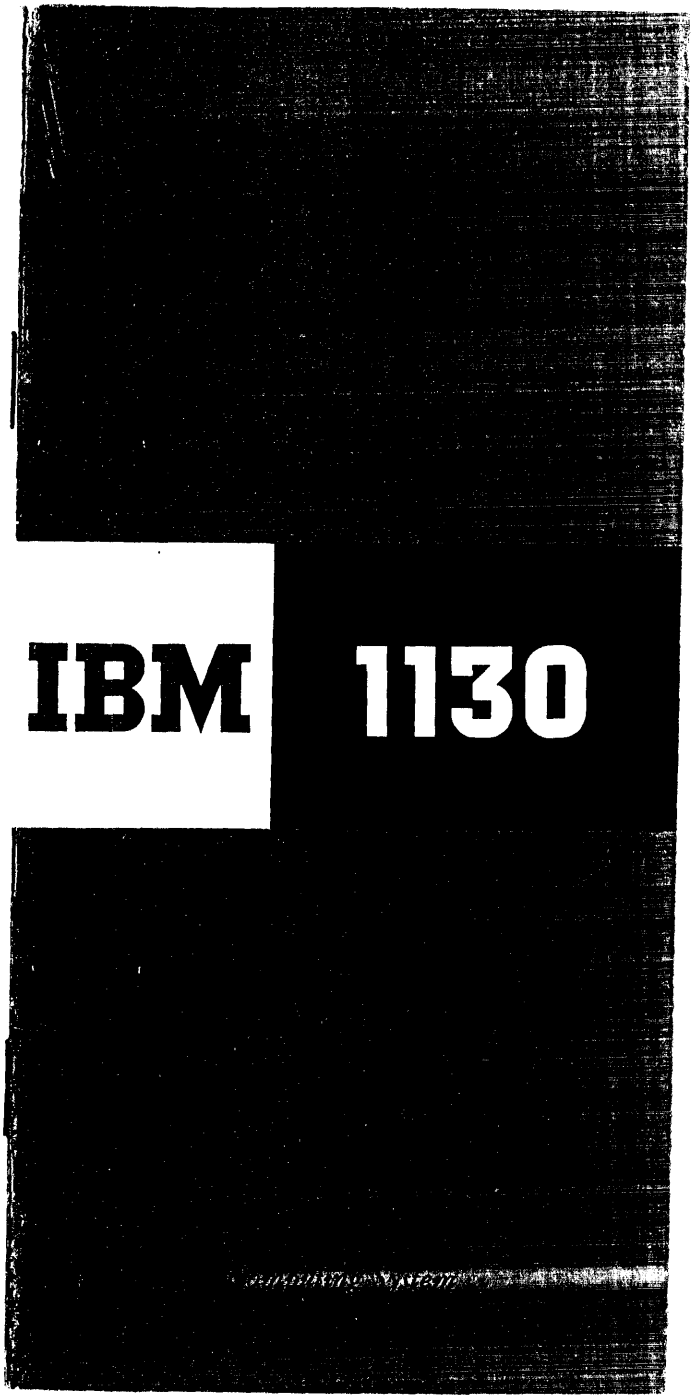

IBM
®
International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, New York 10601

520-1106

Printed in U.S.A.

General Information

An advanced stored-program computing system designed for use in engineering, research, management science, and business applications through a wide range of system configurations.

New solid-logic technology design techniques provide powerful processing capabilities in a compact, low-cost system.

Stored-program control by a flexible, comprehensive instruction set—35 discrete instructions including Boolean logic capabilities and double-precision arithmetic.

Fast access core storage of either 4096 or 8192 words of 16 bits.

High-speed parallel binary internal logic with 3.6-microsecond access cycle.

Model II processor contains direct access disk storage with capacity for storing up to 512,000 sixteen-bit words online. Removable and interchangeable 2315 Disk Cartridges provide unlimited random access storage of programs and data.

Automatic hardware interrupt system provides program-controlled monitoring of overlapping input/output functions.

Indirect addressing coupled with automatic indexing ability provides complete flexibility of programming.

Overlapped high-speed data transfer to core storage from direct access disk storage at 35,000 words per second accomplished on cycle-stealing basis concurrently with computing operation.

Flexible, high-speed card reading and punching.

High-quality printing through the online 1132 Printer.

Low-cost paper tape input/output capabilities.

Built-in console with modified SELECTRIC* typewriter output and flexible input keyboard for operator control.

Online X-Y plotter for direct graphic output recording.

Comprehensive library of programs and programming systems.

*Trademark

Built-in checking features assure accuracy of internal functions and input/output operations.

FORTRAN compatibility with IBM System/360 Special Support FORTRAN.

Machine language compatible with the IBM 1800 Data Acquisition and Control System.

Components

IBM 1131 Processor, Model I

Core storage capability of 4096 or 8192 addressable binary words of 16 bits.

3.6-microsecond access cycle.

Internal binary data representation—16-bit words consisting of 15 data bits plus sign.

Automatic sign control.

Extensive instruction set of 35 discrete instructions including load and store, arithmetic, shift, branch, and input/output commands. Automatic multiply and divide instructions are standard.

Single- and double-precision arithmetic functions for powerful computing capability.

Automatic interrupt system with six levels of priority makes possible simultaneous operation of serial input/output devices.

Direct and indirect addressing method plus indexing capability through three standard index registers.

Arithmetic operations plus control of internal logical functions accomplished through ten basic machine registers.

Odd-bit parity check on internal data transmission plus overflow check on add, subtract, and divide arithmetic operations.

Processor-mounted console with visual indicators and switches plus flexible keyboard for manual entry and operator control.

Console output by means of a modified SELECTRIC typewriter with automatic typing rate of 15.5 characters per second, 13⅛" pin-feed platen assembly, and a maximum printing line of 126 characters at 10 characters per inch. Selectable vertical spacing of 6 or 8 lines per inch.

Direct attachment of card and paper tape input/output devices through the Card/Paper Tape Adapter.

IBM 1131 Processor, Model II

Contains all of the features of Model I plus processor-contained direct access disk storage feature, which utilizes the IBM 2315 Disk Cartridge. Removable and interchangeable disk cartridges are mounted directly into the front panel of the 1131 Processor.

Access to information stored on a 2315 Disk Cartridge is via a high-speed data channel with a transfer rate of 35,000 words per second. Data transfer is independent of Processor operation on a cycle-stealing basis under control of four channel registers.

Processor communication with direct disk storage by means of the automatic interrupt system.

Disk cartridges contain a single disk with two recording surfaces accessible by a single read-write mechanism. Each disk cartridge has a storage capacity of 512,000 sixteen-bit words.

Up to 2560 words are available at each cylinder (track) position with no access motion. Access time for one or two tracks is 15 ms with average access time for an entire 2315 at 520 ms.

Built-in and programmable checking features ensure accuracy of data read or recorded onto direct access disk storage.

IBM 1054 Paper Tape Reader

Reads 8-channel punched paper tape directly into 1131 Processor at 14.8 characters per second.

Translation of punched image into any code by stored program.

Control of reading through the automatic interrupt system, thus allowing overlap with other input/output operations.

Optional reels, center roll feed and takeup for feeding and reading punched tape in roll form.

Capability for automatic program-loading operations in paper-tape-only system configurations through the Paper Tape Reader Loader feature.

Direct connection to 1131 Processor by means of 1054 Paper Tape Reader Adapter.

IBM 1055 Paper Tape Punch

Direct punched paper tape output from the 1131 Processor at 14.8 characters per second.

Capability for punching output data in any code format through program control.

Control of punching by means of the automatic interrupt system, thus allowing overlap with other input/output operations.

Optional takeup reel for automatically winding output tape into roll form.

Connection with 1131 Processor through 1055 Paper Tape Punch Adapter.

IBM 1442 Card Read Punch

Serial card feeding for flexible input/output operations.

- Model 6 reads 300 cards per minute and punches 80 columns per second, maximum.
- Model 7 reads 400 cards per minute and punches 160 columns per second, maximum.

Independent control of each function by stored program.

Automatic checking of reading and punching.

Large-capacity hopper for continuously feeding 1200 cards.

Two radial, nonstop stackers with capacity for 1300 cards each.

Stored-program-controlled stacker selection.

Binary image of cards is read or punched in 12-bit column image format.

Translation of column image to or from any code by stored program.

Control of reading or punching operations through 1131 Processor automatic interrupt system.

Direct connection to 1131 Processor through 1442 Adapter.

IBM 1132 Printer

Efficient typewheel printing concept.

Standard 48-character-set typewheels includes FORTRAN special character set.

High-speed online printing, up to 80 alphameric or 110 numeric lines per minute.

Standard 120 print-line positions spaced 10 characters per inch.

Operator selection of vertical line spacing, 6 or 8 lines per inch.

Forms skipping under program control through automatic, paper-tape-controlled carriage.

Printer operation under stored-program control through the automatic interrupt system.

Direct connection to the 1131 Processor by means of the 1132 Printer Adapter and an Expansion Adapter.

IBM 1627 Plotter

Model 1: Three hundred 1/100-inch increments per second and a 12-inch-wide chart allow plots on 11-inch Y axis and up to 120-foot X axis.

Model 2: Two hundred 1/100-inch increments per second and a 30-inch-wide chart allow plots on 29½-inch Y axis and up to 120-foot X axis.

Provides online, plotted graphic output for 1130 Computing Systems.

Plotting in single-increment character mode overlapped with computing by means of the 1131 automatic interrupt system.

Ball-point pens standard with liquid-ink pens available in two models.

Pen-up and pen-down commands allow up to 10 pen status changes per second.

Receives direct numerical data from the 1131 Processor for +X, —X, +Y, —Y, +Z, or —Z plot movements.

Communication with 1627 from the 1131 Processor under control of the automatic interrupt system.

Circuitry and controls interface for attachment to 1130 Computing Systems through the 1627 Plotter Adapter.

Programming Systems

Monitor System

Utilizing the 1131 Processor, Model II, with direct access disk storage, the Monitor System provides a stacked-job monitoring capability through a group of five distinct but interdependent programs:

- Supervisor Program
- Disk Utility Program
- Assembly Program
- FORTRAN Compiler
- Subroutine Library

FORTRAN Language

A programming language which permits the user to write his program in statements closely resembling those of mathematics. A source program written in the FORTRAN language is processed by the 1130 FORTRAN compiler to produce an 1130 object program. 1130 FORTRAN language provides upward compatibility with IBM System/360 Special Support FORTRAN.

Assembler Language

A programming language which allows the programmer to refer to instructions and data in the program by name or other meaningful designation without regard to core storage locations, to facilitate relocating program sections, incorporating subroutines, and inserting or deleting instructions. Programming is further simplified through the use of macro instructions which generate linkages and incorporate subroutines into the object program.

Subroutine Library

- Input/Output Subroutines.
- Conversion Subroutines.
- Arithmetic and Functional Subroutines (Fixed and Floating Point).
- Selective Dump Subroutines.

Utility Routines

- Input/Output Routine.
- Dump Routines.
- Console Routine.
- Loading Routines.

IBM Application Programs

An extensive library of programs developed and maintained by IBM for specific applications:

- Civil Engineering Coordinate Geometry (COGO).
- Mathematical Subroutines.
  - Compute Bessel Function of the First Kind.
  - Compute Bessel Function of the Second Kind.
  - Compute Modified Bessel Function of the First Kind.
  - Compute Modified Bessel Function of the Second Kind.
  - Fourier Coefficients of a Periodic Tabulated Function.
  - Fourier Coefficients of a Given Function.
  - Integration of a First Order Differential Equation up to a Specified Final Value.
  - Integration of a First Order Differential Equation Producing a Table of Integrated Values.
  - Integration of Six First Order Differential Equations Producing a Table of Integrated Values.
  - Numerical Integration of a Tabulated Function.
  - Numerical Integration of a Given Function.
  - Matrix Inversion.
  - Solution of Simultaneous Equations.
  - Eigenvalues of a Real Symmetric Matrix.
  - Eigenvectors of a Real Symmetric Matrix.
  - Calculation of a Gamma Function.
  - Calculation of LeGendre Polynomial.
  - Real Roots of a Real Polynomial.
  - Real and Complex Roots of a Real Polynomial.
  - Generate Uniformly Distributed Random Numbers.
  - Generate Normally Distributed Random Numbers.
- Numerical Surface Techniques and Contour Map Plotting.
  - Numerical Approximation over a Uniform Grid.
  - Smoothing.
  - Surface Fitting with Orthogonal Polynomials.
  - Equation Evaluation over a Uniform Grid.
  - Interpolation to a Finer Grid.
  - Grid-to-Grid Operations.
  - Numerical Integration.
  - Contouring.
  - Map Annotation.
- Petroleum Production Engineering Programs.
  - Economic Evaluation of Petroleum Projects.
  - Casing Design.
  - Decline Curve Analysis.
  - Material Balance.
  - Two-Dimensional Water Flooding.
  - Gas Deliverability.

Flash Calculation.

Petroleum Exploration Programs.

Velocity Functions from Time-Depth Data.

Wave-Front Ray-Path Determination.

Synthetic Seismogram.

Gravity or Magnetic Continuations, Derivations and Residuals.

Theoretical Gravity of a Three-Dimensional Mass.

Quantitative Log Analysis.

Dipmeter Calculation.

Statistical System.

Stepwise Linear Regression.

Analysis of Variance.

Factor Analysis.

Polynomial Curve Fitting.

Type Composition Program.

IBM Services

Executive and programming schools.

Systems engineering representatives in local IBM offices.

Special representatives in specific industries.

Tested programming systems and application programs.

Provision for extensive interchange and library of customer-contributed programs.

Extensive library of technical publications.

Complete line of data processing machines and systems.

Prompt, efficient equipment maintenance and service.

Over 200 branch offices to serve customer needs.