

# IBM 145

Announcing:  
IBM System/370  
Model 145

## Description

The Model 145 is a powerful new System/370 designed for use in both commercial and scientific applications. The internal performance is four times the System/360 Model 40 and eight times the System/36 Model 30. The System/370 Model 145 is a growth system that provides significant price/performance improvements plus increase in function for the larger Model 30, Model 40, 44 and smaller Model 50.

Both the customer's storage and the micro-control program are housed in the monolithic cards, hence no ferrite core arrays. Every Model 145 will have at least one console printer with keyboard; either a 3215, 3210 or combination of both can be attached.

An integrated file adapter feature is available in place of selector channels one and four.

New, more-powerful System/370 instructions are included in the standard package as well as an Interval Timer (3.3 milliseconds) and a Time-of-day Clock.

Most current System/360 I/O devices plus new and faster I/O devices can be attached.

## Compatibility

The Model 145 is program compatible to all current System/360 programs (exceptions—time and model dependent programs).

Emulation for 1401, 1440, 1460, 1410 and 7010 is available as a feature.

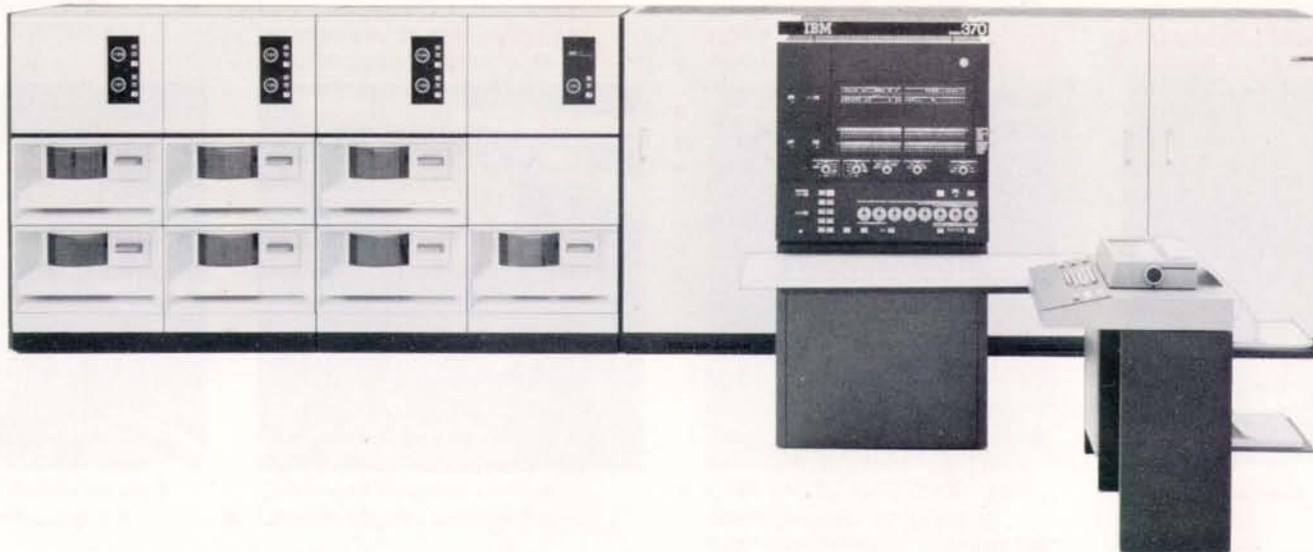
## Technology

Monolithic System Technology (MST-2) is used for all logic circuits. Circuitry operates in the 6-8 nanosecond range.

Increased internal speed is attained by using two local storage units containing identical information.

Each local storage unit is comprised of sixty-four 36 bit words (including four parity bits). This monolithic buffer is contained on two four-wide MST cards.

Power is supplied by a Motor Generator (MG) set. The MG converts 50/60 HZ input power to 208V 400 HZ three phase. High current memory power supplies are fed directly by the MG set. Remaining power is provided by the MG set feeding 400 HZ three phase transformer rectifier assemblies.



## Storage

Storage in the Model 145 is a monolithic non-destructive read-out storage. Storage cycle time ranges from about 202.5 to 315 nanoseconds depending on the type of operation being executed. A read cycle will access 72 bits from which the CPU will operate on 36 bits. Monolithic storage is used for both control and main storage.

- **Control Storage**—Reloadable control storage is expandable from 32K to 64K depending upon customer feature configuration. Control storage is loaded from the console file via a removable 7" mylar disk media.
- **Main Storage**—The Model 145 offers the following storage increments—Storage Sizes 112K, 160K, 208K, 256K, 384K and 512K.

## Main System Features

- **Console Printer Attachment**—The native attached console printer/keyboard (3210) can be used for alter/display operations and under program control as a message printer for operator and CE.
- **Console File**—This disk loading device is used for loading customer micro-program, as well as emulators, some macro and all micro-diagnostics.
- **Integrated File Adapter**—This feature permits attachment of a minimum of three and a maximum of eight drives. The basic 2319 Disk Storage configuration of three drive modules can be expanded to a maximum of eight drive modules by attachment of combinations of the 2312 (1 drive), 2313 (4 drives) or 2318 (2 drives).

With this feature only two additional selective channels are possible (channels 2 and 3).

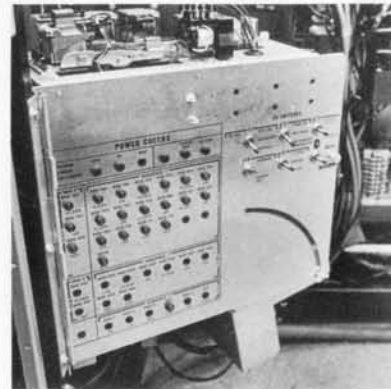
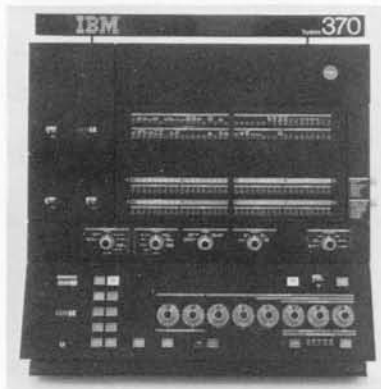
- **Extended Control Mode**—This extension of System/360 interrupt and system control architecture will provide additional information which will be used by the programming systems to isolate errors and will also provide additional status control capability.
  - Interval Timer (3.3 milliseconds)
  - Time-of-day Clock (TOD)
  - Byte Boundary Alignment
  - Block Multiplexer Feature
  - Channel Word Buffer
  - New Instructions
  - IBM 3345 additional 128K of storage
  - IBM 3046 additional Motor Generator
- For a complete list of standard and optional features, please refer to the DP announcement material.

- IBM 3346 additional 256K of storage

## Maintainability

Maintenance of the Model 145 is enhanced through the utilization of the following facilities:

- Extensive error checking and indicators
- CE power test panel
- CE panel for integrated file attachment
- Keyboard alter/display functions
- Internal micro-diagnostics
- Fault locating micro-diagnostics
- A console file using a magnetic disk cartridge to load diagnostics via the service adapter and a dedicated data path.
- Automatic system check-out-program (ASCP is self-configuring)
- Micro-program list system (MLS) provides documentation to utilize program listing format.





## Service Highlights

- **Channel Retry**—This feature will insure that all information required to retry a channel operation will be available to the operating system. Channel errors and CPU errors concerned with the channels will appear as channel checks to the software. This allows greater recovery for these type of errors.
- **Electrostatic Discharge (ESD) and Power Line Disturbance (PLD)**—Reduced electrical noise susceptibility techniques will be incorporated in the system design. Doors, covers and cables are designed to prevent transient electrical noise from causing intermittent errors. The Motor Generator will eliminate electrical interference usually experienced from line voltage variations, intermittent loss of power and conductive line noise.
- **Instruction Retry**—Whenever a CPU failure is detected during the execution of any instruction, the processor will automatically try to retry the operation. The Model 145 will have micro-program retry, implemented by micro-programs operating on information in back-up circuitry. This will reduce the effect of intermittent machine errors.
- **Error Correction Code (ECC)**—The Model 145 will automatically correct all single bit memory errors and detect all double bit errors. This facility is accomplished by means of "Hamming" code in place of byte parity. Double bit errors will be micro retired. ECC will reduce the effect of the majority of intermittent memory failures that cause machine check interrupts. It will allow maintenance to be deferred on solid single bit failures.
- **Logout**—A comprehensive logout for machine check and channel check error data will be logged out on the system residence device. Editing of log data is accomplished by use of EREP and SEREP programs. In addition, facilities are provided to retrieve the log data and output on the console typewriter in hard copy.
- **Micro-Diagnostics**—The Model 145 will be supported by extensive micro;diagnostics which will provide a high degree of fault location. They will include:
  - Resident Micro-diagnostics
  - Basic CPU Bring-up Tests
  - Extended CPU Micro-diagnostic FLT's
  - Micro-diagnostic Stand-alone Test
- **Alter/Display Micro-Routine**—This feature allows the customer and the CE to alter and display storage, general purpose registers, floating point registers and PSW's by a simple two-character command from the console keyboard.
- **Additional Console Functions**—In addition to the many conventional facilities historically provided, the Model 145 will incorporate the following:
  - **Data Compare Trap**  
When a match occurs and the hex valve of switches A and B match the data in main memory, a trap occurs. The resulting action depends on the micro-code at the trap location. The CE will have the ability to alter this code.
  - **Control Word Address Trap**  
This switch function is used to trap a 16 word area of control storage after an address match. The micro-code in this area can be modified by the CE to help diagnose an intermittent problem.

## System Diagnostic Support

- **OLTEP**—An "On-Line Test Executive Program" will be available as part of the Type I Operating System to enable running the "On-Line Test" concurrent with customer operations. It will run as a problem program to select, load and execute the OLT's.
- **OLTSEP**—The "On-Line Test Standalone Executive Program" is a standalone control program designed to select, load and execute on-line tests (OLT's) in an off-line environment. OLTSEP CE interface, OLT interface, and service functions are similar to those in the On-Line Test Executive Program (OLTEP) thereby maintaining the compatibility established in the on-line test (OLT's).
- **EREP**—"Environment Recording Edited Print" (EREP) program will run as a problem program under the Operating System. It will be part of the Type I release. The main function of the program is to take the system environment recording, format them and print results in English.
- **SOSP**—"Standalone On-Line Test Support Processor" (SOSP) will operate as a modular program called and loaded by the "On-Line Test Standalone Executive Program" (OLTSEP) to provide a means of generating and maintaining a configured and edited master IPL tape or disk file for OLTEP and on-line tests.
- **ASCP**—The major objective of the "Automatic System Checkout Program" (ASCP) is to insure that when all parts of a system are hocked together they work. It is very similar to the System Test available in the field today with some improvements.
- **SEREP**—"Standalone Environment Recording Edited Print" (SEREP) program is a tool used to capture, edit and print environment data in those cases where the system failed and was not capable of transmitting the failing environment to the SYS LOG recording set. This is a standalone program designed to be used primarily by the customer. The program can also be used by the CE.
- This is an CE Career Path "General Systems" product.

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