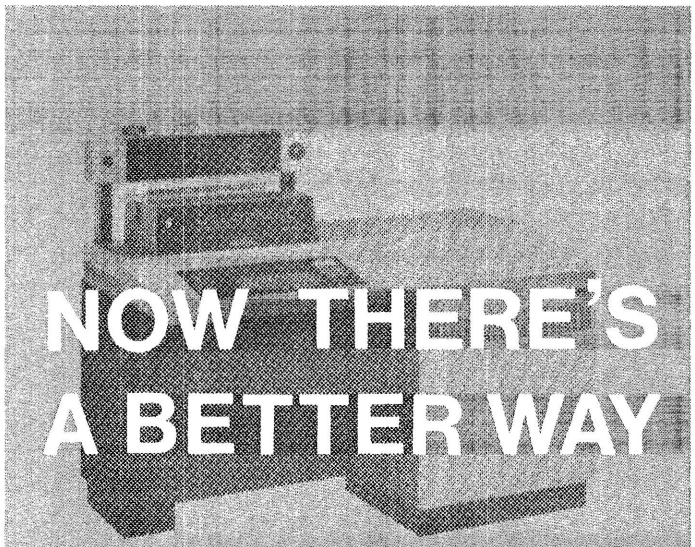
HP DOS-M vs IBM 1130

SALES AMPLIFIER 101A



NOW THERE'S A BETTER WAY

The HP DOS-M (Disc Operating System) has a significant price/performance advantage over the IBM 1130. Read on to find out why!

HP DOS-M

HEWLETT hp PACKARD

INTRODUCTION

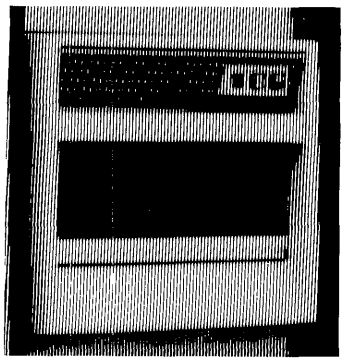
The IBM 1130 is a desk size, word-oriented computer intended primarily for small scale scientific applications. It can also serve as a low cost processor for certain business applications that do not require high I/O speeds. IBM announced the 1130 system in 1965, and the initial customer deliveries were made an November, 1965.

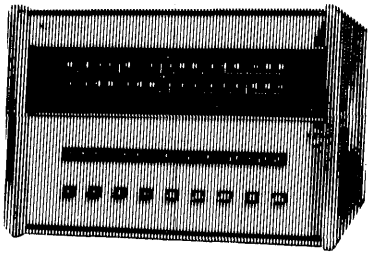
Since the initial introduction, a number of software and hardware announcements have followed (i.e., a 2.2 microsecond cycle time versus 3.6, more peripheral flexibility, commercial subroutine packages, etc.).

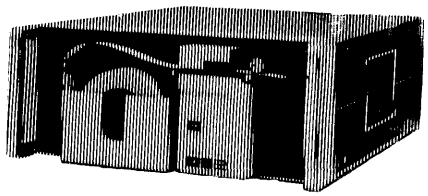
It is purported that IBM has between 6500 and 7500 units in the field.

HP DOS-M VS IBM 1130

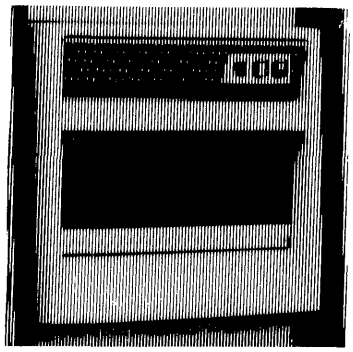
COMPARISON	DOS-M	IBM 1130
DISC STORAGE		
1. MAXIMUM ON LINE	4.8 million words	2.5 million words
2. AVERAGE RANDOM ACCESS TIME	90 milliseconds	790 milliseconds
CORE STORAGE		
1. CYCLE TIME	2 microseconds on the 2114B 1.6 microseconds on the 2116B	2.2 to 3.6 microseconds depending on the CPU model
2. MEMORY SIZE	8K in the 2114B Expandable to 32K in the 2116B	Expandable from 4K to 32K
IMPLICATIONS:	**DOS-M requires much less time than the 1130 to retrieve information from core or disc. This significantly decreases the amount of overhead involved in system and user program execution. The quantity of disc storage available on line may be expanded to 4.8 million words – (approximately twice the amount available on the 1130).**	
I/O DEVICE INTERFACING		
1. NUMBER OF DEVICES	A maximum of 24 peripherals may be interfaced to a DOS-M.	A maximum of 11 peripherals may be attached to an 1130.
2. KINDS OF DEVICES	Instrumentation devices may be easily interfaced to the system.	Non-IBM devices are *extremely difficult* to interface to this system.
3. DEVICES OF THE SAME TYPE	The user may attach several peripherals of the same type to the system. Note: 4 discs (max)	Normally only one peripheral of each type may be included in the system. Note: 5 discs (max) 2 printers (max)
IMPLICATIONS:	**The DOS-M system is capable of supporting a much more varied range of peripherals than the 1130. Each HP system may be custom configured to the peripheral needs of the user.**	

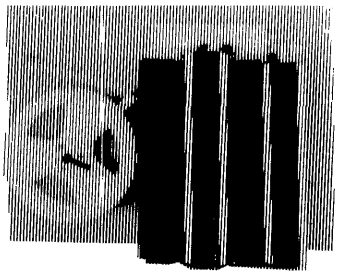


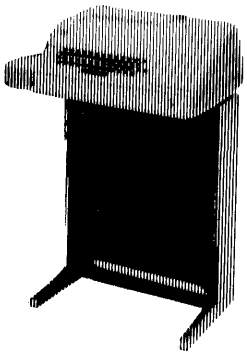




COMPARISON	DOS-M	IBM 1130
SYSTEM PROTECTION		
1. HARDWARE DISC PROTECT	Standard	None
2. SOFTWARE SYSTEM PROTECT	Yes	Yes
IMPLICATIONS:	**Hardware disc protect insures the integrity of DOS-M; the 1130 system, on the other hand, can be destroyed by user software. (Users have called the 1130 crash prone.)**	
SYSTEM BACK UP		
1. BACK UP CREATION **(minimum configuration)**	DOS-M system programs, user programs, and data files may be copied from the fixed portion of the disc to the disc cartridge. This back up cartridge may then be removed, stored off line, and replaced with a scratch cartridge.	IBM supplies 1130 users with a card copy of the 1130 operating system. Back up for user programs or data files, however, must be obtained by copying them from disc to punched cards. (IBM 1130s may use paper tape I/O instead of card I/O, but such systems are rare.)
2. RESTORATION FROM BACK UP **(minimum configuration)**	System restoration may be accomplished by copying the contents of the back up cartridge onto the fixed portion of the disc. The back up cartridge may then be removed and replaced with a scratch cartridge.	In a minimum 1130 system, the user must restore system software, user programs, and user files by copying information from punched cards to disc.
IMPLICATIONS:	**On a minimum 1130 system, back up for user programs and data files may only be created on punched cards. DOS-M, on the other hand, *does not require card punch hardware* but is capable of creating a spare copy of disc resident information quickly, efficiently, and in an easily storable form – a cartridge disc pack.** **If a one disc 1130 system fails, the software must be copied from card to disc – at least a 30 minute process. A DOS-M system, however, may be restored by copying software from disc to disc.** **Each user at a DOS-M installation may keep an off line copy (disc pack) of a system custom configured to his needs – system programs, user programs, source files, and data files.**	







COMPARISON	DOS-M	IBM 1130

+ SYSTEMS FEATURES

1. SOURCE FILE CAPABILITY	User may store copies of source programs in named disc files on line.	none
2. SOURCE FILE EDITING	User may insert, delete, or replace disc file source statements on line.	none

IMPLICATIONS:

The ability of DOS-M to store and edit disc source programs on line makes the system extremely useful for software development work. Once source statements have been stored on disc, they may be edited and recompiled directly from disc. All source program editing on the 1130 however, must be done off line; recompilation requires the user to reload his card deck or source tape.

3. DATA FILE ADDRESSING	DOS-M allows the user to read or write data on disc by file name and relative sector or by actual track and sector address. Both addressing methods may be used in Fortran or Assembly language.	The 1130 system allows Fortran users to address data files by number in READ or WRITE statements. Assembly language disc I/O subroutines require actual track and sector addresses and therefore cannot make use of symbolic file addressing.

IMPLICATIONS:

The ability of DOS-M to address information on disc by file name makes file handling more mnemonic and simpler to use.

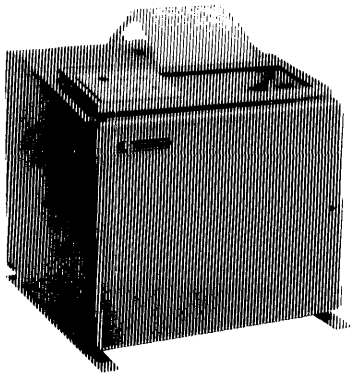
4. USER PROGRAM SEGMENTATION AND OVERLAY	The user must segment his program and code segment overlay requests.	Fortran *subprograms* may behave as automatically called overlay segments if the original program size exceeds available core. This "Automatic Segmentation" is not available if the main program is written in Assembly language. User controlled segmentation is also available.

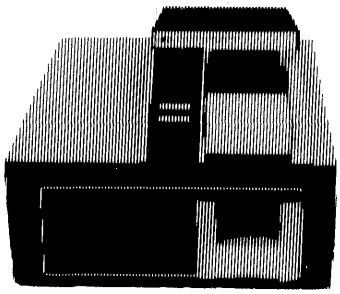
IMPLICATIONS:

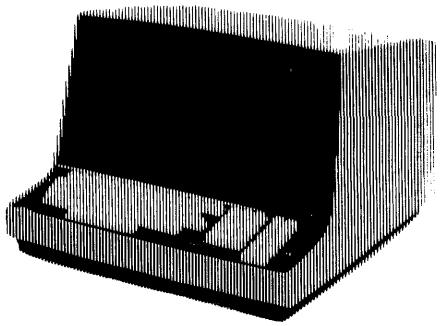
"Automatic Segmentation" is a strong feature of the 1130. It should be noted, however, that it will not segment main programs but treats subroutines as segments. If the main program and overlay area are larger than available core, the user must segment his program.

The use of the "Automatic Segmentation" feature may increase a program's execution time very substantially – (in direct proportion to the number of time consuming overlay requests) due to the slow (790 millisecond access time) disc.

Assembly language system development work may not use the "Automatic Segmentation" feature.







COMPARISON	DOS-M	IBM 1130
5. RESIDENT MONITOR (size)	3500_{10} locations	From 480_{10} to 930_{10} locations.
IMPLICATIONS:	**The limited size of the 1130 monitor leaves more core available for user program execution but requires that the bulk of the system be kept on disc. By making only a small portion of the system core resident, the 1130 incurs greater disc transfer overhead during system program execution.**	
	Since program segmentation may be used with the 1130 and DOS-M, the amount of user available core is seldom critical. Indeed, the whole purpose of a disc operating system is to use mass storage to extend limited core storage.	
6. PROGRAM DEBUGGING FACILITIES	The DOS-M system permits the user to dump an octal core image of his program. Dumps may be taken whether the program terminates normally or aborts execution. An additional debug package allows the user to monitor his program's execution on line.	There are several core dump routines available for the 1130. Some of these programs must be called by the user during the execution of his program, while others must be loaded off line and executed.
IMPLICATIONS:	**The core dump on abnormal program termination and the debug package of DOS-M make it very useful in a software development environment. All core dumps and debug facilities do not require any modification of the user's in line code. All on line 1130 core dumps, however, require that the user either place calls to dump routines *into his program code,* or use an *off line* dump routine.**	
7. I/O DEVICE REFERENCE TECHNIQUES	I/O devices are referenced using logical unit numbers. These numbers correspond to various I/O *functions* — system input, list, punch, etc.	The 1130 references peripherals with a set of numbers assigned to each type of I/O device which may be attached to the system.
	Logical unit assignments may be changed on line to associate any appropriate system device with a given logical unit number.	Unit reference number assignments are permanently determined. In a Fortran program, however, the user may substitute a variable unit reference number which will be determined at execution time.
IMPLICATIONS:	**DOS-M programs coded with logical unit numbers may be executed on any other DOS-M system regardless of hardware configuration. If 1130 programs use constant logical unit numbers, they may not be compatible with other 1130 hardware configurations. (Devices associated with fixed logical unit numbers cannot be changed on line in the 1130 system.)**	

COMPARISON	DOS-M	IBM 1130
SUPPORTING SOFTWARE		
1. TRANSLATORS	Assembly language FORTRAN II or IV ALGOL	Assembly language FORTRAN IV subset RPG COBOL (available Feb. 1971) APL
2. USER APPLICATION PACKAGES	under development	petroleum exploration and engineering type composition civil engineering coordinate geometry math pack - 20 Fortran subroutines electric field theory elasticity fluid flow etc. Statistical system numerical surface techniques countour map plotting commercial subroutine package (21 Fortran subroutines)
3. SOFTWARE COST	All presently available system software is furnished free of charge with a DOS-M system. The pricing structure on applications packages will be announced as they become available.	All IBM 1130 software developed prior to "unbundling" (June 23, 1969) is available without charge. Recently developed software, however, will be rented on a monthly basis. (The 1130 COBOL compiler will rent for $75/month.)
IMPLICATIONS:	**The quantity of applications software available is one of the strongest features of the IBM 1130. The majority of these programs are available free of charge. It should be noted, however, that OEMs will be primarily interested in the quality of the operating system itself and the ease with which the system may be used to develop specific user-oriented applications packages.**	
DATA COMMUNICATIONS	*At this time* no data communications software capability is available with the DOS-M. All hardware cards needed to implement this capability are presently available, however, and may be used by a customer to develop his own applications software.	The 1130 may act as a remote job entry work station for a larger IBM 360 operating system. In this capacity, the 1130 sends jobs via telephone lines to the larger system and outputs results sent back. If the 1130 has at least 16K of core, job output can be buffered on the disc and dumped after the remote job entry processing is terminated.
IMPLICATIONS:	**The 1130 system's ability to communicate with a larger computer is certainly a powerful feature. It should be noted, however, that all programs and job control language sent to a 360 system must be 360 operating system compatible. (If an 1130 user has an assembly language program which he wishes to run with remote job entry, the program must be in IBM 360 assembly language and must have the appropriate 360 job control language statements associated with it.)**	
PRICING STRUCTURE		
IMPLICATIONS	**Although the DOS-M system purchase price is significantly (15 to 65%) less than that of a comparable 1130 system, IBM offers a variety of attractive lease/rental plans including 30 and 90 day cancellation options. This can be a significant advantage in the educational market. IBM does *not*, however, offer an educational *discount* on the 1130 system.**	

HP DOS-M PRICE COMPARISON IBM 1130

MINIMUM SYSTEM (with paper tape)	PURCHASE
2114B (2.0 microsec)	$8,500
Option 4 (8K memory total)	4,500
12591A Memory Parity Check	1,000
12067A Direct Memory Access	1,500
2870A Cartridge Disc Drive	8,700
2871A Disc Controller	2,800
12557A Disc Interface	2,500
2882A Disc Cabinet	600
2881A Disc Power Supply	1,400
2752A Teleprinter ASR-33	1,250
12531B Teleprinter Interface	750
2748A Paper Tape Reader (500 characters /sec)	1,500
12597A P.T. Reader Interface	600
	$35,600

MINIMUM SYSTEM (with paper tape)	PURCHASE
1131-2A (3.6 microsec) TTY/Printer Console 4K core, 500K disc	$34,610
1134 Paper Tape Reader (60 characters/sec)	1,270
3623 P.T. Reader Attachment	450
1055 Paper Tape Punch (14.8 character/sec)	900
7923 P.T. Punch Attachment	900
	$38,130
(with card I/O)	
1131-2A as shown above	$34,610
1442 Card Reader/Punch (160 columns/sec)	12,750
4419 Card Reader/Punch Attachment	1,525
3630 1442 Interface	225
	$49,110

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TYPICAL SYSTEM	PURCHASE
2114B (2.0 microsec)	$8,500
Option 4 (8K memory total)	4,500
12591A Memory Parity Check	1,000
12067A Direct Memory Access	1,500
2870A Cartridge Disc Drive	8,700
2871A Disc Controller	2,800
12557A Disc Interface	2,500
2882A Disc Cabinet	600
2881A Disc Power Supply	1,400
2752A Teleprinter ASR-33	1,250
12531B Teleprinter Interface	750
2748A Paper Tape Reader (500 char/sec)	1,500
12597A P.T. Reader Interface	600
2753A Paper Tape Punch (120 char/sec)	3,300
12597A P.T. Punch Interface	600
2767A Line Printer (80 col. 356-1110 lpm)	10,000
12653A Line Printer Interface	2,500
	$52,000

TYPICAL SYSTEM	PURCHASE
1131-3B (2.2 microsec) TTY/Printer Console 8K core, 500K disc	$58,050
1134 Paper Tape Reader (60 char/sec)	1,270
3623 P.T. Reader Attachment	450
1055 Paper Tape Punch (14.8 char/sec)	900
7923 P.T. Punch Attachment	900
1132 Line Printer 82 LPM Alphameric 110 LPM Numeric	11,350
2310 Disc Drive 500K words	12,150
	$85,070

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