
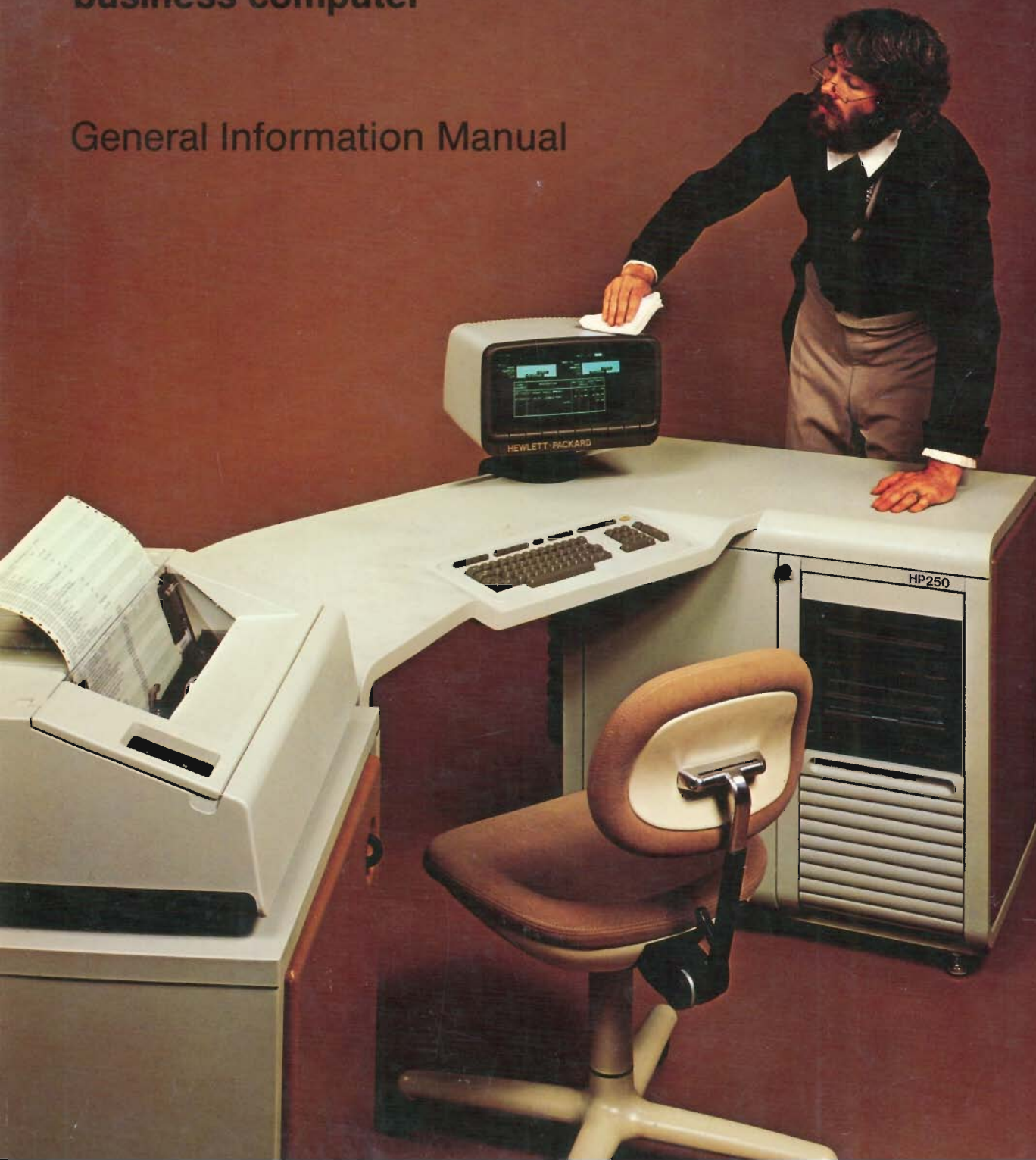


HP 250
The easy-to-use,
high-performance
business computer

 **HEWLETT
PACKARD**

General Information Manual



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HP 250
The easy-to-use,
high-performance
business computer



General Information Manual



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HP 250

PREFACE

This manual contains general information about the HP 250 Computer System and its capabilities. It is divided into two parts. Part I presents an overview of the system and its key features and concepts. Part II provides more detailed technical data.

Other HP 250 manuals and applications guides provide complete information on all aspects of system operation and programming. A list of the available HP 250 documentation can be found herein.



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The HP 250

Good for business no matter how much the user knows (or doesn't know) about computers.

When we say the HP 250 is powerful, we're talking about a potent and versatile programming language, including development tools, built around a true data base manager. Translation: It's cheaper to match the HP 250 to the user's needs.

When we say the HP 250 is simple, we mean that running it is often just a matter of pushing a button called a softkey and typing in the information the computer requests. Translation: The user can get more work done faster.

And when we say the HP 250 is human engineered, we mean it's pleasing to the eye and easy on the body. Translation: It looks great in any office and users don't get as tired.

We're confident that when you understand the HP 250, as this manual can help you do, you'll see that there's really only one choice when it comes to small business computers. The HP 250 speaks for itself.



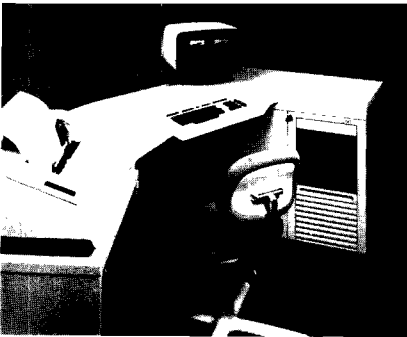


CHAPTER ONE: THE SYSTEM

A beautiful blend of power and simplicity.

From the beginning, Hewlett-Packard had the needs of the small businessman and departmental user in mind as we created the HP 250. It was designed to be HP's first powerful business system that's inexpensive and easy to use.

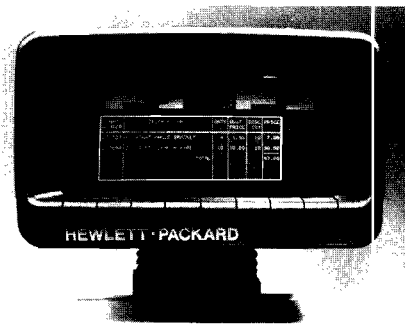
Special attention was given to developing an attractive system that operates on 110- or



220-volt current and requires no special environment.

Designed around a true data base manager—a sophisticated, electronic filing system—the HP 250 offers many capabilities previously found only on more expensive computers.

Data base management, which we will discuss at greater depth later, allows more flexibility when designing applications software and makes data modification easier as a business evolves. Moreover, it features a simple-to-use inquiry language for calling up stored data without writing a program.



A forms capability makes creating, modifying and using displayed forms easier and quicker. Commands to create input/output fields, protected fields and video enhancements are all part of this time-saving utility. There is also a report writer function that simplifies the task of programming report formats. It allows full or summary reports, automatic paging, headers and trailers, and report groupings.

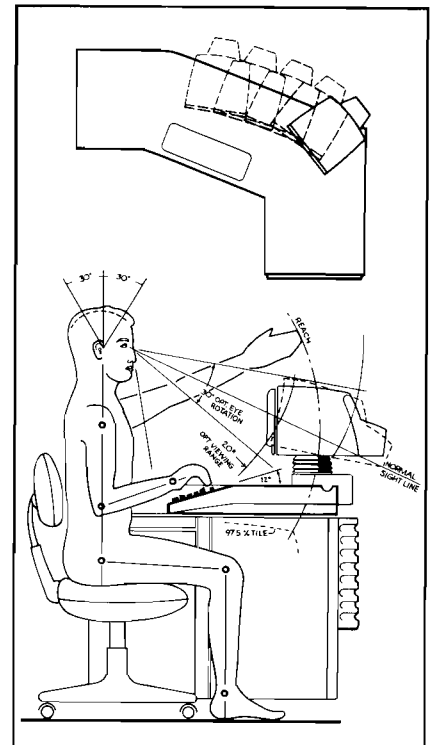
These powerful capabilities are reinforced by the system's programming language, HP Business BASIC. This conversational language offers enhancements like multicharacter variable names, subprograms, and error trapping.

The operating system software, which is memory resident, drives hardware made to exacting demands. The HP 250 system console houses the keyboard, display screen, 1.2-Mbyte flexible and 12-Mbyte fixed disc, processor and memory. Options include remote terminals (five

maximum), a choice of printers, and hard disc storage and synchronous data communications.

The System Console.

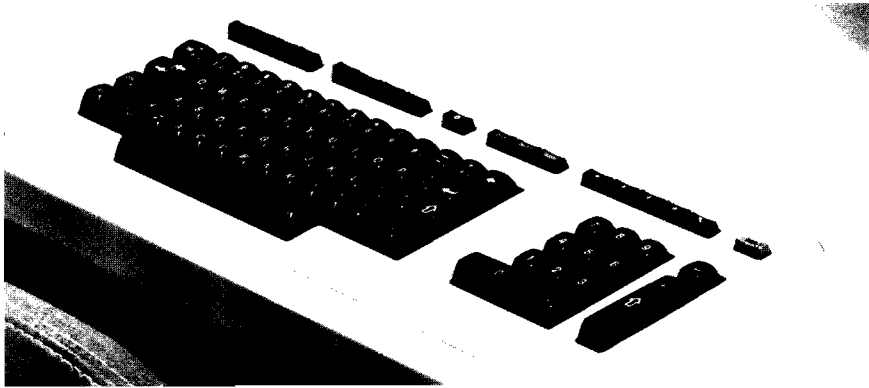
Form complements function with the HP 250. The computer is slim and its lines clean, yet it is designed to meet the practical needs of the operator. The display screen, keyboard and disc storage units are within easy reach. And the desktop is large enough for files, folders and other necessary items.



Keyboard.



The HP 250's typewriter-like keyboard insures fast, accurate information entry three ways: by maintaining a layout familiar to employees, by providing a feel

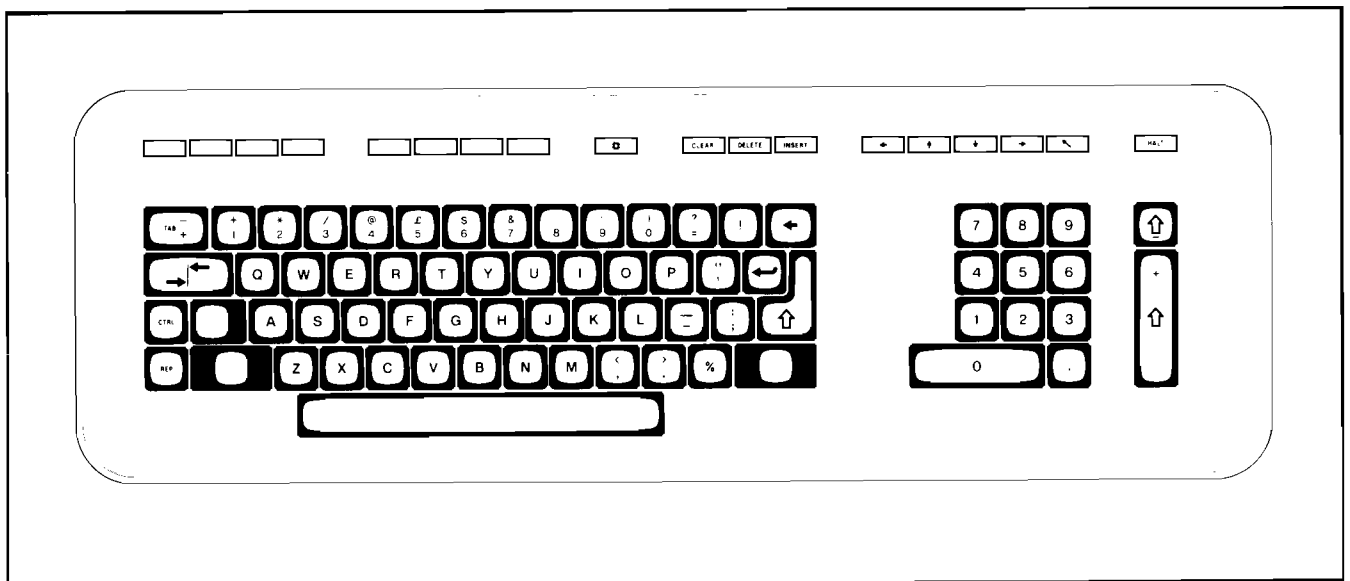
that encourages touch-typing, and by its positioning at a comfortable height. The keyboard consists of a typewriter block, numeric entry pad, display editing keys, special function keys, HALT key and an EXECUTE key.




Typewriter Block.

The typewriter block functions much like an office typewriter's—the alphabetical keys enter lowercase characters until changed to uppercase by the shift key. With the caps-lock key pressed, only the alphabetical keys are shifted. In addition, special control keys expand the capabilities as follows:




-  The ENTER key enters data into memory and can execute commands.
-  The TAB key moves the cursor to the tabbed position







or to the first character position of the next input field.

If (SHIFT)  is pressed, reverse tab results.

Data Entry Pad.

This block of keys, resembling an adding machine's pad, helps speed the input of numeric data. The pad has its own ENTER key  which works the same as  on the type-writer block. The MINUS  displays the negative sign. All numeric keys also have a shifted value.

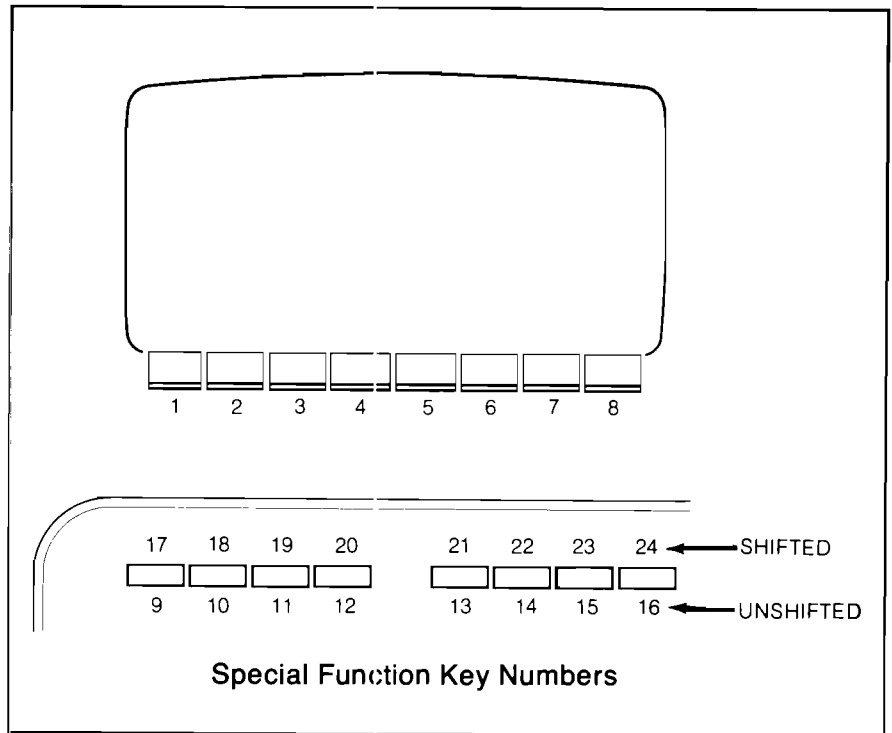
Execute and Halt Keys.

Two important elements of the keyboard are its  (EXECUTE) and  (HALT) keys. The  key executes the current line or expression displayed on the screen. The  key does what its name implies, halts a program at the end of the current operation.

Special Function Keys.

The eight softkeys are considered special function keys. There are also eight special function keys on the keyboard (shifting provides eight more) for a total of 24.

These special function keys are often used in applications software. Pressing a special function key initiates the predefined



program or routine, stored in the computer's memory, as assigned to that key. Those keys located on the keyboard can be labeled using plastic overlays. The eight softkeys, of course, have their own dynamic video labels.

Moreover, you can use these keys as typing aids, because often repeated sequences of keystrokes can be stored for recall by a single special function key.

Finally, these keys can be used to interrupt a running program.

Memory.

Memory on the HP 250 is allocated to satisfy operating system (system memory) and application program (user memory) requirements. The operating system is loaded into the system memory when the computer is turned on. You can then remove that flexible disc, freeing the drive for other uses. Having a memory-resident operating system also improves system response time.

Memory dedicated to the operating system can vary

MEMORY MATRIX: Single-user configurations

	System	User	Total
Required	128	32	160
Optional	32	32	64
Possible	160	64	224

between 128 (standard) and 192 Kbytes (with trigonometric, matrix and multitask functions). User memory expands from 32 (single task) to 384 Kbytes (multitask applications).

This dynamic read/write memory is available in 32-Kbyte blocks using a combination of 32-Kbyte, 64-Kbyte and 128-Kbyte memory boards. The larger memory boards are necessary to attain the maximum memory configurations (a given number of slots are available for memory boards).

Single-task Configurations.

A single-task system is defined as an HP 250 computer servicing the needs of one appli-

cation at a time. This definition stands whether the application runs on the main console only, or on a combination of the main console and standard (RS 232C) terminals.

The standard single-task system comes with 160 Kbytes of memory. One hundred twenty-eight Kbytes are required for operating system storage, five Kbytes for fixed console overhead (display screen, memory buffers, etc.). The remaining 27 Kbytes of memory are allotted for user programs.

The dynamic buffer area (fixed console overhead) varies with the running of programs and entering of data. Available user memory is assigned to the display buffer, with a minimum display capacity of

1000 characters.

Maximum user memory for single-task configurations is 64 Kbytes. System memory can expand to either 160 or 192 Kbytes, although only the standard 128 Kbytes are required.

Reconfiguring of memory resources to meet individual needs is handled using a utility program called CONFIG (configuration). It allows you to change the number of read/write memory blocks assigned to system or user.

Multitask Configurations.

A multitask system is defined as an HP 250 configured to service multiple users doing a variety of tasks using the REMOTE/250 capability. Multitasking is achieved using "block switching", a technique where the processor switches between individual blocks of user memory dedicated to each console. (A description of REMOTE/250 is found on page 14.)

Adding the REMOTE/250 capability affects memory requirements. In these configurations, the operating system requirement is 160 Kbytes (32 Kbytes more than in a single-task system). User memory is optional at 32 Kbytes per console, including the main-system console.

The consoles each require their own user memory partition (block) so that operators can run different applications programs

from each location. A block-switch capability allows the system processor to access the memory for a particular console at any given time. The memory blocks for all consoles (REMOTES included) reside in the HP 250 desk. Maximum memory for each console is 64 Kbytes.

The maximum possible memory in a multitask configuration is 576 Kbytes. To attain the maximum configuration, memory must be expanded using 128-

Kbyte boards: A limit on memory-board slots in the components drawer makes this necessary. The memory configurator for multitask systems (see table) highlights memory alternatives.

Flexible Disc Storage.

Flexible disc drives, located below the drawer of the console, provide convenient and economical mass storage for the system. The basic HP 250 system

contains a single 1.2-megabyte disc drive, with second and third drives optional. (A console-mounted, 12-Mbyte winchester disc drive and a stand-alone, 19.6-Mbyte cartridge disc drive offer very attractive mass storage alternatives.)

The flexible disc drives use double-sided media, recording in double-density format to attain the 1.2 Mbytes of data storage.

MEMORY MATRIX: Multitask configurations

	SYSTEM	USER						
		Main Console	1	2	3	4	5	
Required	160K	32K	32K	32K	32K	32K	32K	352K
Optional (maximum per console)	32K	32K (64K)	32K (64K)	32K (64K)	32K (64K)	32K (64K)	32K (64K)	224K
Possible	192K	384K						576K

NOTE: Older HP 250s will support only a maximum 512 Kbytes of memory whenever an INP/250 board is also installed. Local sales offices can supply details.

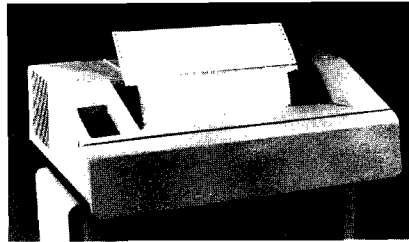
HP 250 Peripherals and Options.

When tailoring the HP 250 to application needs, you have a choice of printers, mass storage devices, and remote consoles or RS232C/V24 terminals.

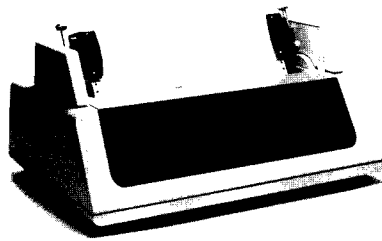
Printers.

Two printers per main console may be attached to the HP 250. A REMOTE/250 console can handle no more than one printer. There are three printers to choose from.

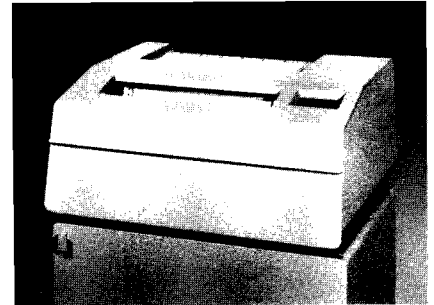
The HP 2631A. This dot matrix character printer can provide high-quality, multiple-copy output at 180 characters per second. The 2631A prints bidirectionally up to 136 characters per line, with six or eight lines per inch. A full 128-character, upper- and lowercase character set is standard, and various international character sets are obtainable. Multi-part business forms (up to six copies, in various lengths and widths) can be accommodated.



The 9871A. This is a full-character, serial-impact printer, which provides typewriter-like print at 30 characters per second. There are 132 characters per line at 10 characters per inch. Character and line spacing can be increased or decreased under program control. Bidirectional motions of the platen-print mechanism provide limited plotting capabilities for charts and graphs.



The HP 2608A. A dot matrix line printer, it provides good quality output at 400 lines per minute. Its 5 x 7 dot-matrix characters can be expanded under program control to allow either a standard 132 or an enlarged 66 characters per line. It offers up to 13 character sets (any two usable simultaneously) and a standard 16-channel electronic vertical format control or optional 12-inch form vertical format control.

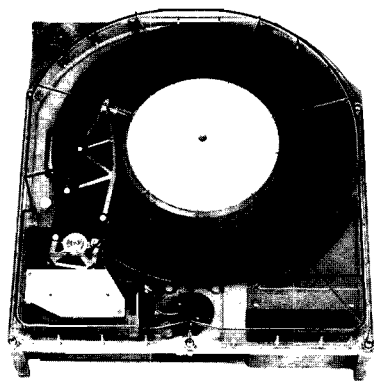


Additional Mass Storage.

The HP 250 system offers substantial room for growth in the area of mass storage. Although additional flexible disc drives may be installed, a 12.1-Mbyte fixed disc or 19.6-Mbyte cartridge disc offer a great deal more power and flexibility, making them a more cost effective solution in many cases.

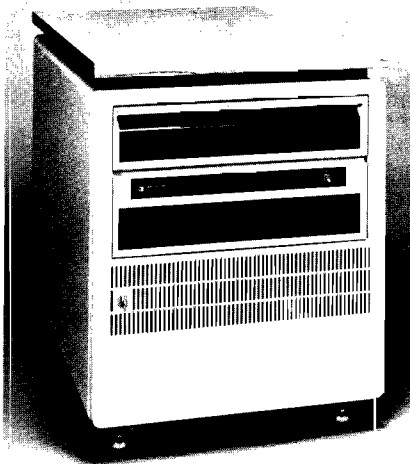
The 12-Mbyte Disc. This drive features winchester-technology heads and medium (with completely closed air flow). A moderately priced, high-density, high-reliability disc unit, it resides in the main-system console just below the flexible disc compartment. Back-up is on flexible disc.

The winchester technology eliminates the need for preventive maintenance. The drive undergoes an automatic self-test when the system is turned on: The self-test is also pushbutton invocable.



The 19.6 Mbyte Disc. Designated the HP 7906 and packaged in its own handsome lowboy cabinet, this drive combines a 9.8 Mbyte fixed disc and a 9.8 Mbyte front-loading, removable cartridge disc in one high-performance unit. The HP 250 will support one or two of these drives making nearly 40 Mbytes of add-on disc storage available.

The HP 7906 provides excellent data reliability for storage of programs and data. The fixed disc, cartridge disc combination allows for excellent backup of stored data within the one drive.



Asynchronous Serial Interface.

An asynchronous serial interface (ASI) provides an intelligent interface that controls the flow of data between the HP 250 and any of the following: REMOTE/250 consoles, RS232C/V24 terminals and printers, or HP 3000 computers. Besides handling the transfer of data, this interface monitors the data link to make sure the channel is operational.

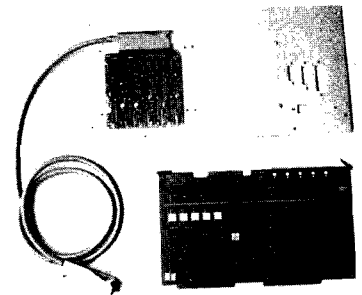
The asynchronous serial interface provides five ports, each independently configurable (for REMOTE/250s, RS232C/V24

devices, etc.). Each port can run at any one of ten speeds between 110 and 9600 bits per second, can handle even, odd or no parity, and can provide the necessary RS232C control signals to talk to remote devices connected either directly or through full-duplex modems. For transmissions over long distances (up to one km at 9600 bits per second), using direct connections, a 20-mA current-loop option which is compatible with HP 264X terminals, comes with the

standard ASI hardware.

Multi-user Processing.

REMOTE/250 consoles (product number 2649D) extend the power of the HP 250 to wherever users need it most. Each console—five maximum—has its own assigned block of memory (32-or-64 Kbytes) and can access all system commands and system software (FORMS, QUERY, REPORT WRITER and SORT).



Up to six different operations, such as program development and running applications programs, can be performed concurrently using five REMOTE/250s and the main computer. Programs developed on any REMOTE/250 can be run on the main system or other REMOTE/250 consoles without alteration.

General RS232C Devices.

The HP 250 can accommodate up to five remote printers when an application demands more than one output station. Standard terminals can also be interfaced.

A single program controls the entire configuration. Such configurations do not support programming functions or multiple, concurrent jobs.

HP-supported RS 232 terminals and printers are:

- HP 264x series terminals



- HP 2621 terminal
- HP 2635 printer/keyboard terminal
- HP 2631 printer

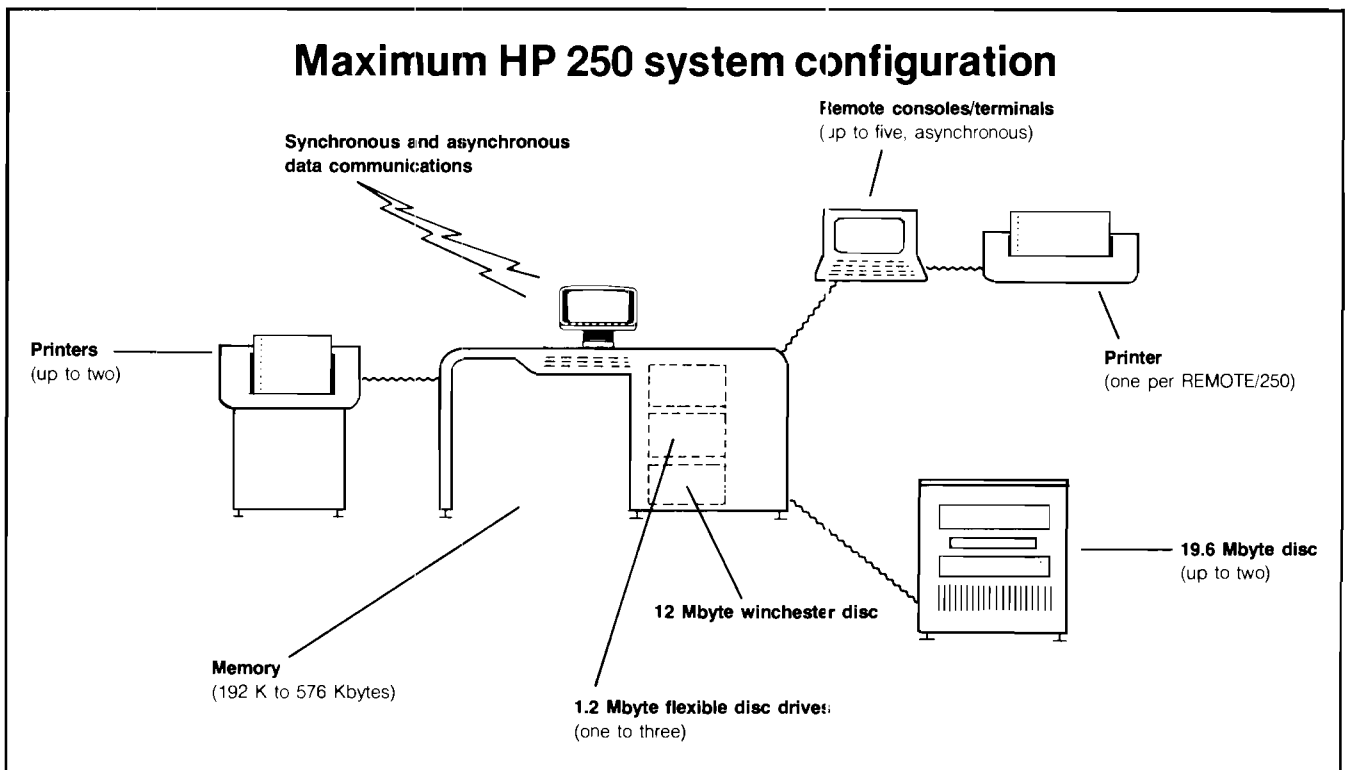
HP 250 to HP 3000 Communications.

The HP 3000 asynchronous link is provided as part of the HP 250's asynchronous serial interface capability. The link between the two computers is implemented via the LK3000 utility. It allows:

- The HP 250 to act as a remote terminal to an HP 3000 for interactive operations.
- The transfer of ASCII data files between the systems.

computer to computer communications.

The LK3000 utility is used to implement an HP 250-HP 3000 communication link with the asynchronous data communication capability. Chapter 4, pages 26-29, provides a closer look at the expanded interfacing possibilities available using synchronous data communications in networking and



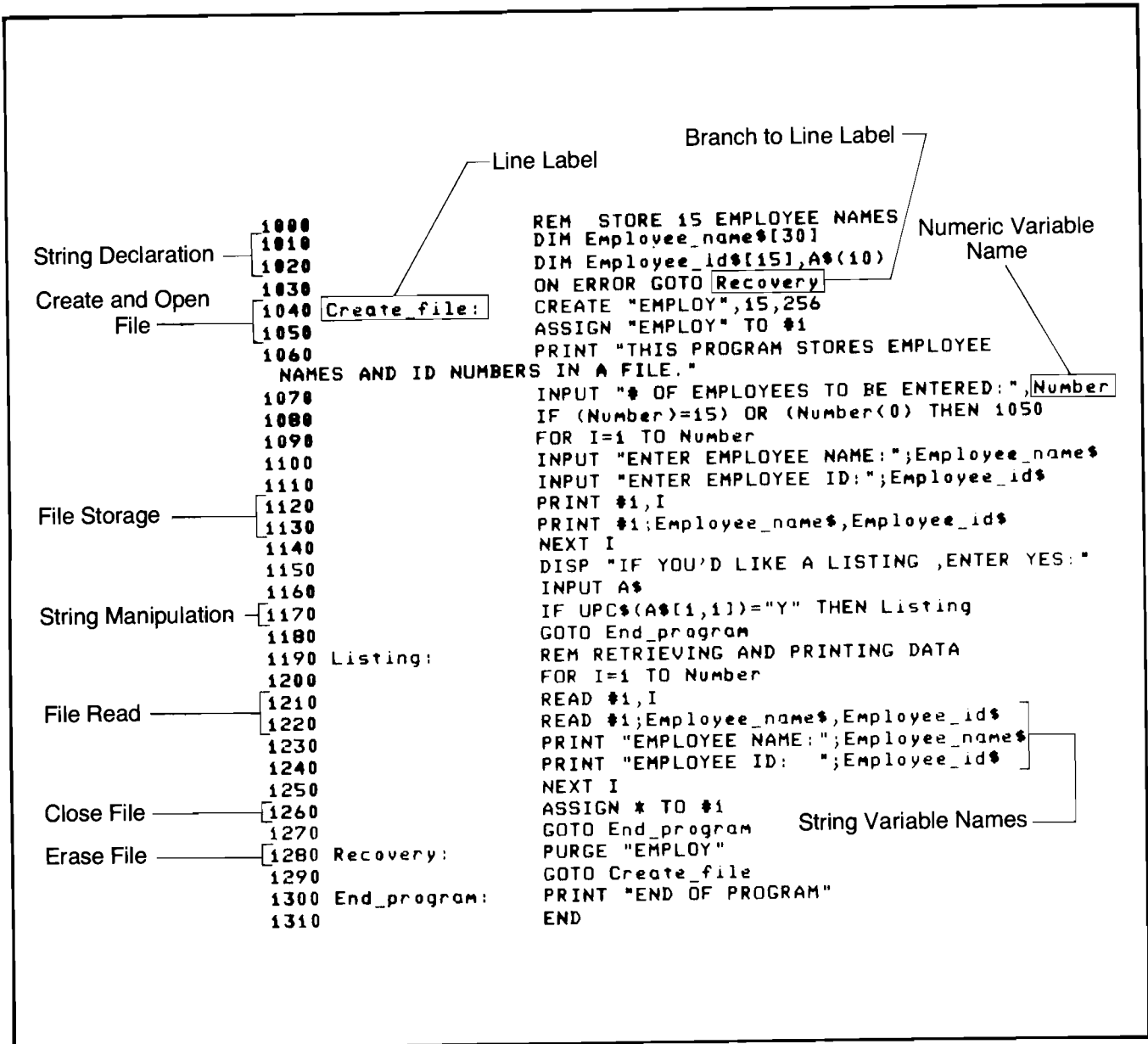
CHAPTER TWO: THE LANGUAGE BASIC/250. A language for business applications.

The programming language for the HP 250 is a version of HP Business BASIC. It's an easy-to-use, interpretive language consisting of statements, functions, operators and commands. Operators and functions used with variables and numbers create numeric and string expressions. BASIC permits program development, and its flexible input-output capabilities make it well-suited to complex business applications. These capabilities include:

Capabilities.

- **COMMERCIAL DATA TYPES:** BASIC supports character strings in addition to integers, floating point and fixed point numerics represented internally in Binary Coded Decimal.
- **POWERFUL, COMPACT STRING HANDLING:** Language constructs provide concatenation, substringing, character string manipulations and substringing searches.
- **FORMATTED OUTPUT:** The PRINT USING statement allows easy construction of printed reports and formatted displays.
- **FILE HANDLING CAPABILITIES:** Serial, direct and direct-word file access. Also, programmable file creation and purging are possible.
- **MEANINGFUL VARIABLE NAMES:** Alphanumeric variable names and statement labels up to 15 characters long make programs more descriptive and understandable.

```
LIST
1040 OPTION BASE 1
1050 COM Date$(8),INTEGER Time,Freerun,Ben
1060 !
1070 ! LOCAL VARIABLES
1080 !
1090 INTEGER Entryflag,Next_feat,Last_feat,I,J,K,Wflag
1100 DIM Prog$(6)[6],Key$(6)
1110 !
1120 Start:SCRATCH KEY #1,2,3,4,5,6,7,8
1130     ON MALT CALL Halt
1140     ON ERROR CALL Error
1150     CALL Setup_crt(Date$)
1160     READ Prog$(*),Key$(*)
1170     DATA D OPER,DDEPEN,DHRDWR,DTOOLS,SALES,REMOTE
1180     DATA OPERATOR FEATURES,DPENDABLE PRODUCT,HARDWARE CONFIG,PROGRAM TOOL
S,APPLI- CATION,REMOTE/ 250
1190 !
1200     IF Entryflag THEN Demo
1210     CALL Message("System busy.",1,1,0)
1220     IF FNVol_check("DEMO",1) THEN Exit
1230     WAIT 2000_
```



- **SUBPROGRAMS AND COMMON STORAGE:** Independently defined subprograms allow a more modular, structured approach to BASIC programming. Subprograms can have their own dynamic storage of local variables and passed parameters, in addition to sharing data through common storage.
- **CRT CURSOR CONTROL:** The programmable use of the cursor and display enhancements such as blinking, inverse video, half bright and underline aid in displaying reports and customizing forms.
- **PROGRAM DEBUGGING:** A convenient method of debugging program operation is to trace the logic flow and variable assignments by using the TRACE commands.
- **TRIGONOMETRIC FUNCTIONS:** Trig operations are a part of this BASIC language, configured on a separate system file (sometimes called a DROM).
- **MATRIX OPERATIONS:** Programming features are further enhanced by matrix operations (that is, add, multiply and inverse) which can be performed on entire arrays.
- **MASS STORAGE BACKUP:** The DUPL (duplicate) program allows rapid copying of the entire contents of one flexible

disc onto another compatible medium.

- **SYSTEM SERVICES:** The programmer has full access to both the HP 250 file system and IMAGE/250 data base management system.
- **CONVENIENT DATA PACKING:** PACK/250 allows packing and transferring of string and numeric data to and from a string variable.
Expressions can be included in

statements and/or executed from the keyboard. Each statement can also be preceded by a line number and stored as a program line.

The program excerpt on page 18 illustrates many of these HP Business BASIC features.

COBOL, APL and FORTRAN features found in BASIC/250.			
	COBOL	APL	FORTRAN
BASIC/250	<ul style="list-style-type: none"> • File-by-name • Easy mass storage access • GOTO label • Multi-character variable names • Business oriented formatting ability with PRINT USING/IMAGE • Report writer/250 	<ul style="list-style-type: none"> • Recursion • Function subprograms • Sophisticated matrix operations • Matrix redimensioning • Scalar operations on matrices • Local variables • Multi-character variable names • Line labels • Default output formatting • Logical expressions 	<ul style="list-style-type: none"> • Function subprograms • Subroutine subprograms with: <ul style="list-style-type: none"> — parameters passed by reference or value — dynamic memory allocation of local variables • COMMON • Ability to read and write from files — • Direct access files • Multi-character variable names • Character data type including substring capability • Statement labels • Assignment statement without "LET" • Two precisions of real variables • Computed GOTO/GOSUB statement • Formatted output • Ability to read or write an entire array with one statement (Implied DO) • Arithmetic statement functions



CHAPTER THREE: DEVELOPMENT TOOLS

For easy generation of applications software.

The HP 250's various hardware configurations allow for a company's future expansion, while the several programming tools incorporated in the system make tailoring solutions simpler and less costly. These tools include:

- IMAGE/250, a true data base management system.
- SORT/250, the ability to find and sort information across data sets faster than many larger systems can.
- QUERY/250, a simple method for accessing an IMAGE/250 data base without additional programming.
- FORMS/250, a set of utilities for customizing forms.
- REPORT WRITER, a combination of statements and functions which aid the programmer when formatting reports.

IMAGE/250 Data Base Management.

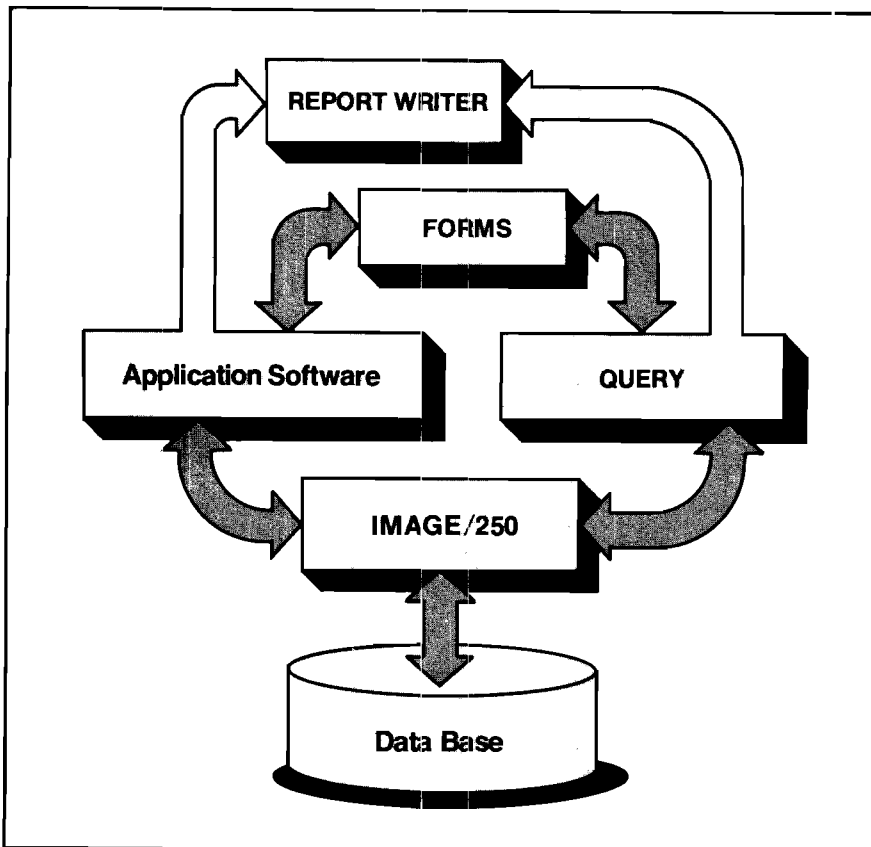
The HP 250 is the first computer in its price range that provides true data base management capabilities, IMAGE/250. It consists of a set of statements and programs that operate on a data base.

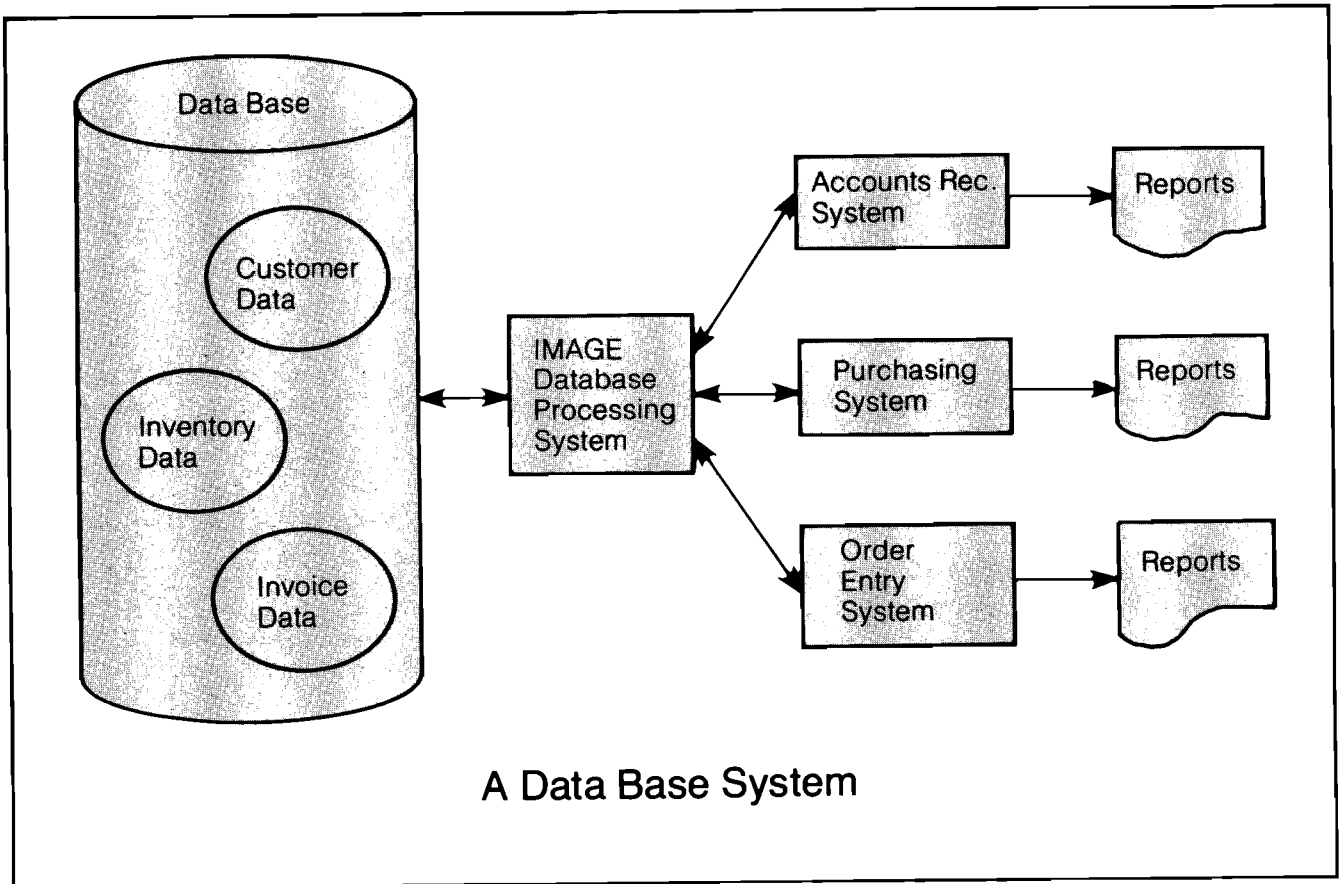
Generally speaking, a data base is a merging of logically related files that contain all data necessary to satisfy a user's needs. It further contains structural information that describes how the various data files are related. In the IMAGE/250 schema, data sets are used as indexes within the data base to allow access to data across the files.

IMAGE/250 can:

- Link together data.
- Reduce repeated data.
- Facilitate the sharing of data by several users for different purposes.
- Centralize the control of data.
- Decrease the dependence between programs and data.
- Document the logic, structure and organization of the data.

A data base system performs many of the same tasks





as standard file-processing systems. However, its files have been integrated into a single pool—the data base—that can be used by many application programs.

As shown here, accounts receivable, order entry and purchasing call upon IMAGE/250 to access the data base. IMAGE/250 processes the data as an inte-

grated whole. Because the files have been created by the same system, all of the data is compatible. This permits integrated processing, or the ability to index across the various files to extract information. For example, inventory data can be logically tied to several sales orders to represent the relationship between items in the inventory file and the "sale"

of those items in the invoice file. This relationship provides management with such information as sales by salesperson, region, customer and product class.

Data Base Structure.

IMAGE/250 has three components: data base definition, data base manipulation and data base maintenance.



Data base definition is accomplished using the EDITOR and SCHEMA programs. These programs are used in conjunction with the data base definition language (DBDL) to define the structure, size and security of the data base.

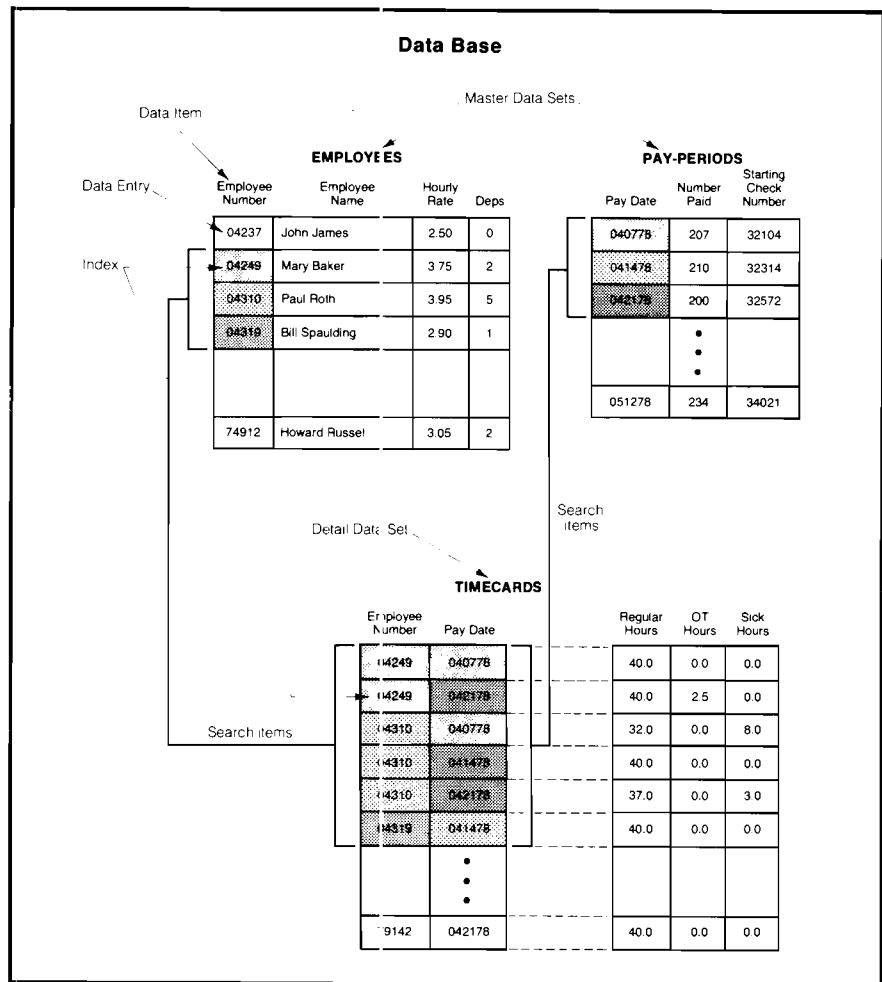
Data base manipulation is performed using statements invoked from BASIC language programs. They serve as an interface between data bases and application programs.

Data base maintenance operations employ data base utilities. These provide the capability to create and erase data sets; moreover, they allow the restructuring, restoring and backing up of data bases.

An IMAGE data base consists of data items, data entries and data sets.

- A data item is a single piece of information such as an employee's name.
- A data entry is an ordered set of related data items, such as all information about a particular employee.
- A data set is a named collection of data entries, such as all information about all employees.
- A data base is a named collection of related data sets, such as all the data sets that relate to payroll.

This example shows how data items, data entries and data sets relate to one another using a



payroll application.

Data entries in the data base are grouped and then related to each other in the IMAGE/250 data sets. The two types of data sets are:

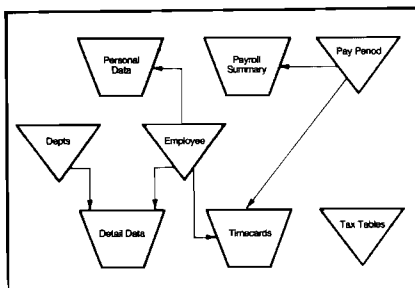
Master Data Sets. These data sets store data entries that

represent uniquely identifiable entities. One of the data items in each data entry is designated a search item and serves as the primary identification for that entry. The search item relates the master data set to detail data sets that contain the same search

item. In the previous example, EMPLOYEE and PAY PERIOD are master data sets with EMPLOYEE NUMBER and PAY DATE their respective search items.

Detail Data Sets. These data sets store entries that represent related events. Detail data sets are related to master data sets through the search items they share with the master set. In this way a detail data set may be indexed by one or more master data sets. In the previous example, TIMECARDS is a detail data set that is indexed by the EMPLOYEE AND PAY PERIOD data set.

To represent data relationships, master and detail data sets are combined in a network of data sets that form an entire data base. This network not only stores data, it represents relationships among data. The data can then be retrieved based on their relationships. The next figure expands the simple payroll example to show a typical network of data sets.



QUERY/250 Data Base Access.

QUERY/250 provides a simple method of instantly accessing an IMAGE/250 data base without much programming effort. It offers a convenient way to retrieve, update or modify data, and thus serves as an excellent design and debugging aid.

QUERY/250 can:

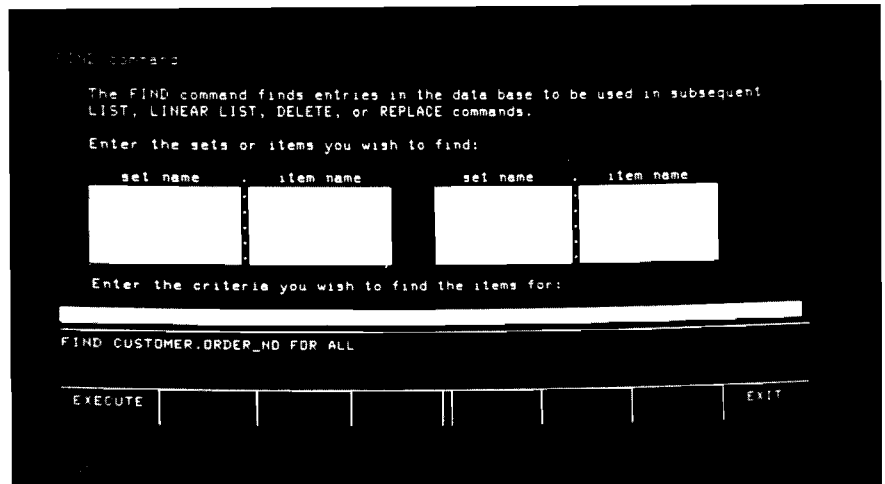
- Retrieve data which meets specified selection criteria.
- Report on the data retrieved.
- Add or delete data entries.
- Modify data entries.

Although QUERY/250, with its many aids for specifying the operation you wish to perform, is oriented to the everyday user, programmers will appreciate it as

an efficient way to access and edit an IMAGE/250 data base. QUERY/250 can utilize created files, written subprograms and program segments.

SORT/250.

SORT/250 is a specialized utility that gives the HP 250 fast sorting speeds. It consists of BASIC statements and functions that facilitate retrieving information from the data base. Statements within this utility allow accessing data in sorted order and selecting subsets of sorted information. SORT/250 also sorts numeric or alphanumeric data by ASCII value. The FIND and SORT operations may be performed across different data sets. Moreover, different sort fields may be selected.



FORMS/250.

As considered here a form is a version of a business form which is depicted on the HP 250's display screen. FORMS/250 makes it easy to show your unique business forms or to modify them to the changing needs of your business. In fact, it can alleviate changes to software that might be required to modify and display forms.

FORMS 250 provides a means of:

- Drawing a form on the display screen.
- Modifying a form on the display screen independent of the application.
- Specifying input and output fields on the form.
- Specifying the order in which the operator or program accesses input/output fields.
- Customizing display screen forms with the aid of inverse video, blinking, half-bright and underline commands.
- Formatting the data for output to a customized form loaded into the printer.

REPORT WRITER/250.

Writing programs for report generation usually is a cumbersome task. Until now. REPORT WRITER/250, a combination of statements and functions which expedite formatting reports to

ORDER ENTRY
ENTER ORDERS

Page: 2
Date: 06/22/79

Order No 1292 Customer No 124 Customer Class D2 Part Ship Y B/O Y

Item Number	Description	Qty	Unit	Prc	ExtdPrc
1 0004DRG	DOUBLE RIB GASKET	25	GR	92.160	2304.00
		0.00		115.20	115.20
				72.00	0.00

Is all information correct for this item? (Y/N) (Extdpr + Addl = 2419.20)

Qty Ordered: 25 GR. Allocated: 25 (Mhse: 1, Bin: 141). R/Q: 0.

users' needs, streamlines this chore by providing:

- Automatic paging controls.
- Built-in restart and pause capability for controlling the display screen or printout rate.
- A logical hierarchy for reporting groups.
- Automatic printing of headings for each page or grouping.
- Automatic averages for each grouping.
- The capability to suppress portions of a report when doing summary reports.
- The capability to begin printing a report on any page, not just the first one.



Name: Steve
125-0000000000
Date: 1/25/88
Time: 10:00 AM
Location: 1000
Phone: 1-800-555-1234
Fax: 1-800-555-1234
E-mail: steve@company.com
Address: 1234 Main St, New York, NY 10001
Company: ABC Corp., 1234 Main St, New York, NY 10001
Job Title: Software Engineer
Phone: 1-800-555-1234
Fax: 1-800-555-1234
E-mail: steve@company.com
Address: 1234 Main St, New York, NY 10001
Company: ABC Corp., 1234 Main St, New York, NY 10001
Job Title: Software Engineer



CHAPTER FOUR: SYNCHRONOUS COMMUNICATIONS

For local processing, centralized data consolidation.

A powerful, optional feature of the HP 250 is the ability to communicate with other computers using synchronous data communications. A plug-in circuit board, the Intelligent Network Processor (INP/250), provides this capability. It allows the HP 250 to interface with properly equipped, remote computers using standard transmission equipment and the telephone network.

INP/250 gives you the best of two worlds: A small, easy-to-use computer powerful enough for local data collection, processing and reporting; and access to a larger, centralized computer for purposes of data consolidation, large scale processing and central control or dispersion. Whether the central computer is across the country or in the next room, data can be easily transferred — immediately. Synchronous data communication eliminates the cost of producing cards, tapes or discs and, more importantly, the time required for preparation and transportation of the data.

INP/250

INP/250 lets the HP 250 communicate mainly with IBM-compatible mainframes using RJE capabilities. With it, you can include the HP 250 in a network of computers, tying together geographically separated activities — e.g., service bureau to customers

or branch sales offices to a headquarters facility. Each office collects, analyzes and controls its own data making the desired information available to the central computer on an as needed basis. Centrally processed/stored information can be transmitted back on a scheduled basis or upon request from the local HP 250.

The heart of the INP/250 is a sophisticated microprocessor with its own control and memory circuits. It amounts to a second computer working along-side the main HP 250 processor (handling only data communication activities). This design allows the main processor to devote almost full attention to other jobs running on the system.

The INP/250 capability provides:

- Synchronous RS232C (CCITT V.24/V.28) interface
- Error detection and retransmission (under bisync protocol)
- Modem connection, full or half duplex
 - Switched lines at 1200 to 4800 bits/second
 - Private or leased lines at 2400 to 19200 bits/second

RJE/250

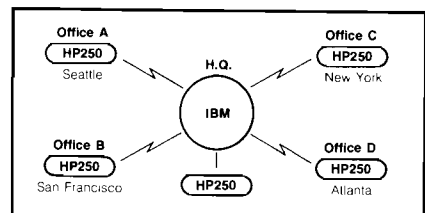
The program tailoring the INP board for communication with the IBM-compatible computers is called RJE/250. Remote job entry

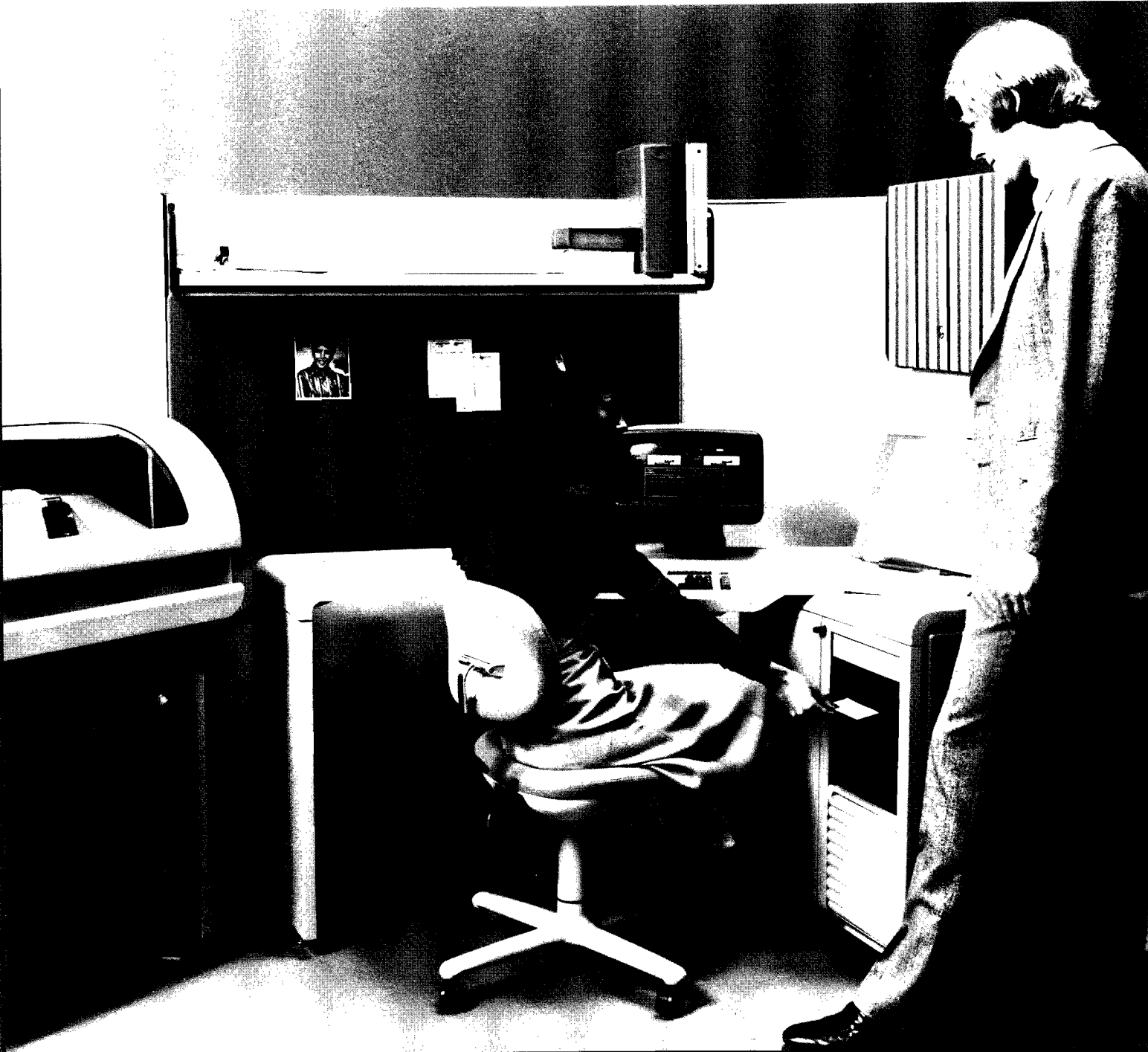
permits HP 250 connection to any computer that supports the IBM 2780/3780 batch terminal. Thus, the HP 250 emulates a batch terminal to the host computer, making it capable of sending jobs, receiving output files and entering host commands. In addition, RJE/250 allows communication with other 2780/3780-compatible batch terminals for transfer of files.

The synchronous capability offers excellent flexibility for applications demanding intercomputer communications because of the greater variety of input/output devices (i.e., keyboard, disc, etc.). The HP 250 can support a multitasking (multiuser) environment when operating in the synchronous communication mode. Using the RJE program has been simplified using the HP 250's softkey feature: also, the commands can be actuated from the keyboard or a command file.

Other features of the RJE/250 capability include:

- Auto answer/auto call
- Background processing
- Diagnostic and trace utilities (including loop-back testing)
- File concatenation for transmission





CHAPTER FIVE: OWNING AN HP 250

Elements contributing to low cost ownership.

The HP 250 system is designed to provide lasting value as it serves data processing needs. In addition to operational features, factors such as lifetime ownership costs, ease of expansion, and dependability in daily operation were carefully considered in its design.

The HP 250's low initial purchase price plays a major part in reducing its lifetime cost of ownership. As a company grows, the HP 250 can be expanded to meet growing needs at a reasonable cost. System expansion through a choice of peripherals (e.g., the fixed/cartridge disc, additional flexible discs and remote consoles) provides an economical way to expand without buying a new system.

At a glance, some of the key elements that play a part in keeping the HP 250's cost of ownership low are:

- Application development aids (IMAGE, QUERY, REPORT WRITER, etc.) included in system purchase.
- People can learn to use the system with ease.
- Minimal facilities requirements.
- Reliability.
- Easy maintenance and servicing.
- Comprehensive support programs and highly qualified support personnel.

Physical Requirements.

The HP 250 makes modest demands on facilities. A basic

system occupies about the same space as a desk. It needs no "computer room" environment, uses 110 or 220 volt power (may require its own line) and doesn't need air-conditioning or raised flooring. Quiet operation means that the HP 250 can fit into most offices without disturbing workers.

Installation Support.



The HP 250 Site Preparation Manual itemizes installation procedures. Upon delivery of the HP 250 an HP Customer Engineer will handle the installation. He will assure the system operates to specification. His duties include:

- Supervising unpacking the system and helping inventory contents.
- Installing the system.
- Running system verification and diagnostic programs.
- Loading and verifying system software.
- Showing the operator(s) how to turn the system on—not opera-

tor training (courses on programming the HP 250 are available).

- Explaining daily maintenance and emergency procedures.

Personnel Requirements.

The HP 250 is easy to operate. The person unfamiliar with computers can usually learn the basics of system operation with a few hours of study and training. He can then assume responsibility as a "key operator" for the system and help train and support others using the system. Users do not necessarily need to understand system commands or control procedures to interact directly with an application.

Programming Aids.

As mentioned, the HP 250 design should help reduce the costs of applications software development and maintenance. The HP 250's BASIC language, along with the DATA BASE MANAGER, REPORT WRITER, and FORMS capabilities, help make programming more efficient.

System Dependability.

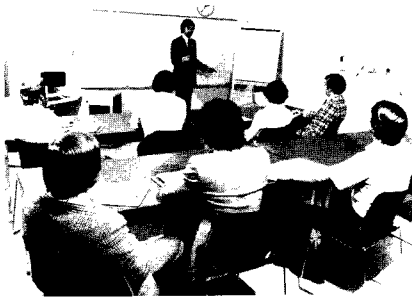
As a business relies more and more on data processing, the dependability of its computer system becomes increasingly important.

The HP 250 system itself requires minimum preventive

maintenance, and the HP 250 peripherals need only infrequent inspection or adjustment by an HP Customer Engineer. In addition, several HP 250 hardware features are included to help detect errors or problems and help quickly correct them:

- Automatic self-test (hardware diagnostics), each time an HP 250 is turned on to help locate hardware failures.
- Roll-out card cage for easy access.
- Interactive operating system diagnostics to help further isolate hardware and system software problems.
- Modularity in design for quick part replacement.

HP Support Services.

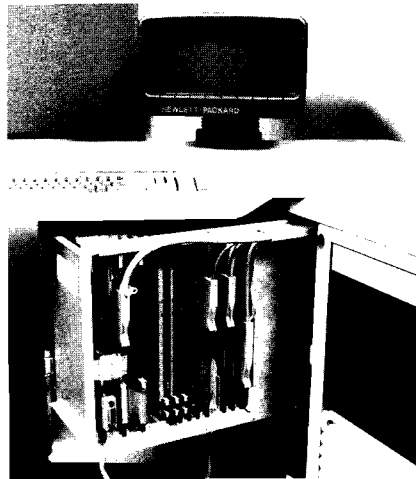


The HP 250 system is backed by a comprehensive set of support services from Hewlett-Packard. A worldwide team of HP sales, service and support personnel, dedicated to assuring a customer's success with an HP 250, provides training, consulting

and system maintenance.

Hewlett-Packard offers a five-day comprehensive introduction to the HP 250 SYSTEM SOFTWARE for computer professionals. Training is available on a tuition basis and may be ordered through the local HP Sales Offices.

System Maintenance.



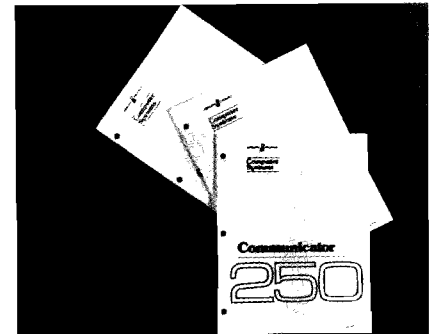
For the first 90 days after installation, HP's on-site warranty program provides for parts, labor and other basic services. After the warranty period, this service can be continued under the optional Customer Maintenance Agreement. This HP 250 maintenance program will ensure that the system runs smoothly and reliably. The services provided under the Customer Maintenance Agreement include a preventive

maintenance visit and emergency repairs.

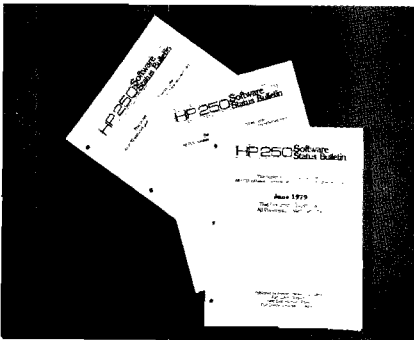
SOFTWARE SERVICES

Software Notification Service.

Under this service any HP 250 customer can order and receive the following publications (on an annual basis) to help remain current about system software:



- Periodically published issues of the "HP 250 Communicator" containing useful application data, current revision codes of various software products and the latest schedules of training courses.
- Periodically published issues of "Software Status Bulletin" that discuss reported discrepancies in the system software



manuals. This publication also gives any temporary corrections.

Software Subscription Service.

Computer professionals working with the HP 250 can order the Software Subscription Service. It provides automatic updates of system software and manuals whenever the factory releases design changes.

Customer Support Service.

To keep HP 250 system software up-to-date and to answer any software-related questions, HP 250 Customer Support Services includes the features of the Software Subscription Service with phone-in consulting added. However, it is not available for application products.

Software Consulting Service.

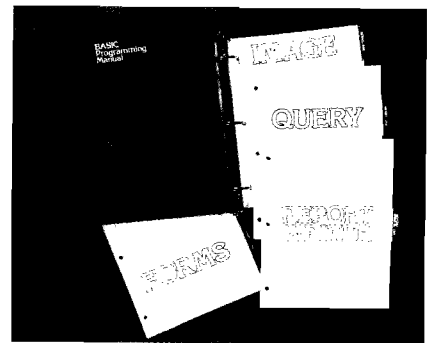
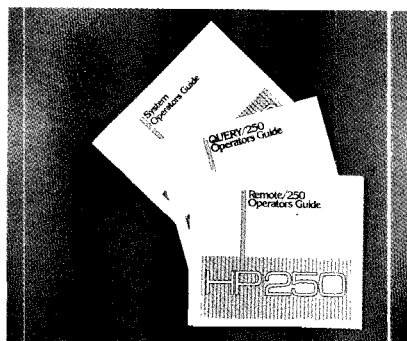
If you require help applying HP system software to a specific problem, on-site HP Systems Engineering and consultation time can be requested. This service for which a fee is charged, must be scheduled through your HP Sales Representative.

Documentation.

A complete set of manuals and a pocket reference support the HP 250 computer system. They make it easier to locate information about programming and operating.

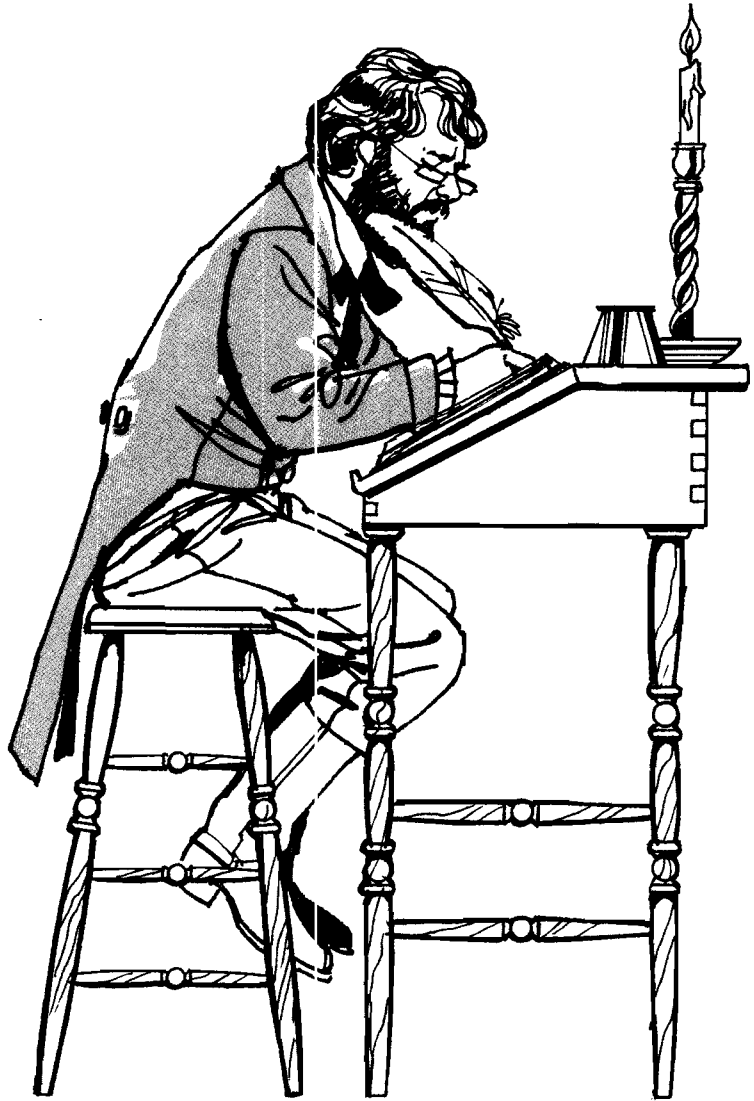
Available documents include:

Operating Manuals	Part Number
• System Operator's Guide	45251-90000
• QUERY Operator's Guide	45251-90005
• REMOTE Operator's Guide	45120-90010

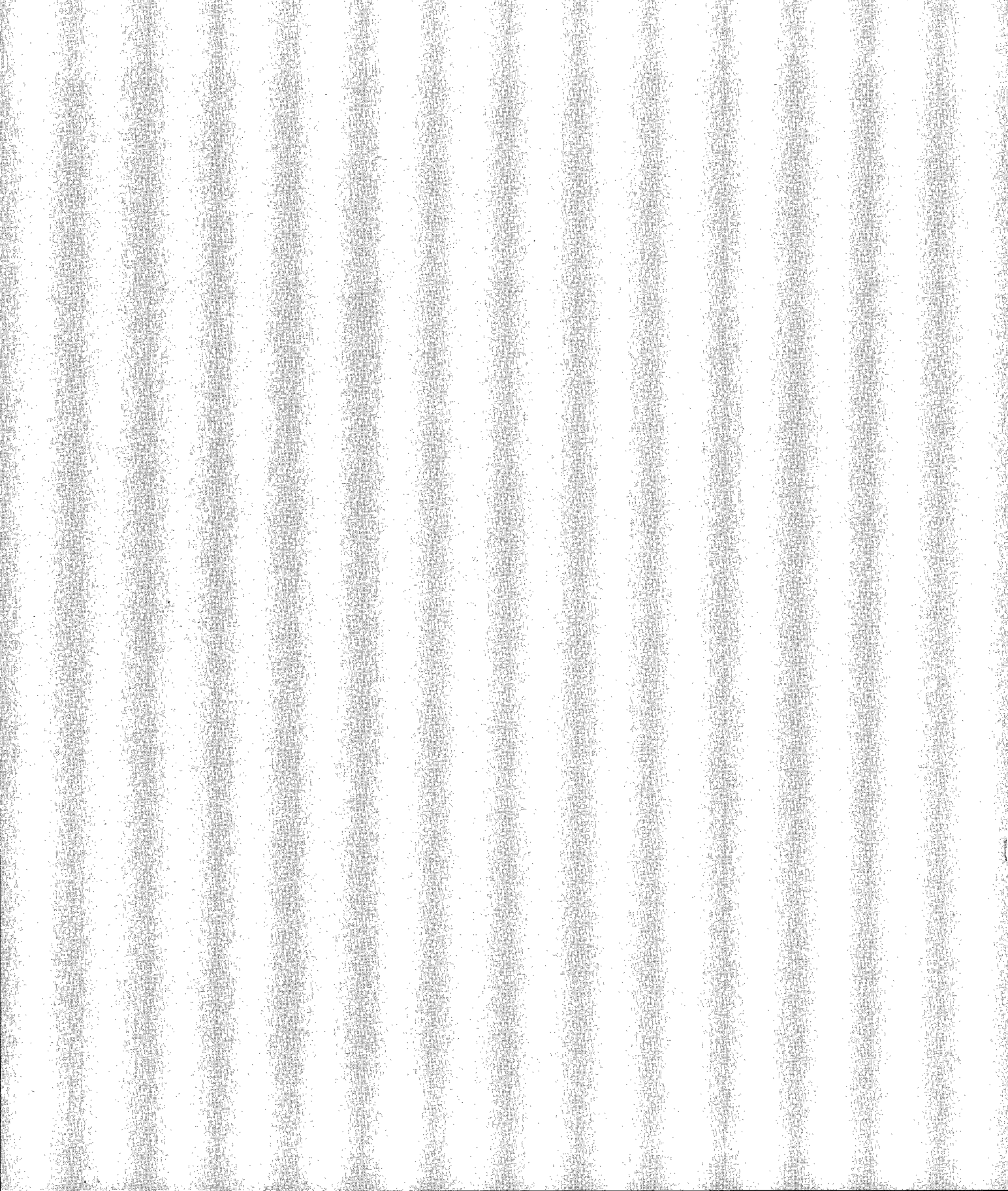


Programming Manuals

	Part Number
• BASIC	45251-90015
• IMAGE	45251-90020
• QUERY	45251-90021
• REPORT WRITER	45251-90022
• FORMS	45251-90023
• SORT	45251-90024
• REMOTE	45120-90020
• TIO	45120-90001
• MEDIA	45251-90025
• RJE	45122-90000



SECTION TWO



CHAPTER ONE: HARDWARE

Introduction

Section 2 contains sizes, capacities, rates, and more about the HP 250. If you're excited about our small business computer after perusing Section 1, you'll find the hard facts that follow just what you need to judge better the HP 250 and its capabilities.

We'll first discuss HP 250 hardware in detail, then systems software, peripherals, and available HP 250 documentation. The following is a summary of HP 250 hardware:

Convenience.

- 24 user-defined keys, including eight softkeys
- Automatic start-up of programs when system is turned on
- Typewriter-like keyboard
- Standard numeric pad
- Calculator mode for evaluating functions
- Work space on both sides of keyboard, built-in drawer
- Flexible disc drives within arm's reach

Performance.

- Memory-resident operating system (128 to 192 Kbytes)
- 16-bit, 833-nanosecond microprocessor
- 1.2-megabyte capacity flexible disc
- 173 milli-second average access time for flexible disc

- Intelligent network processor for powerful, synchronous data communication

Growth

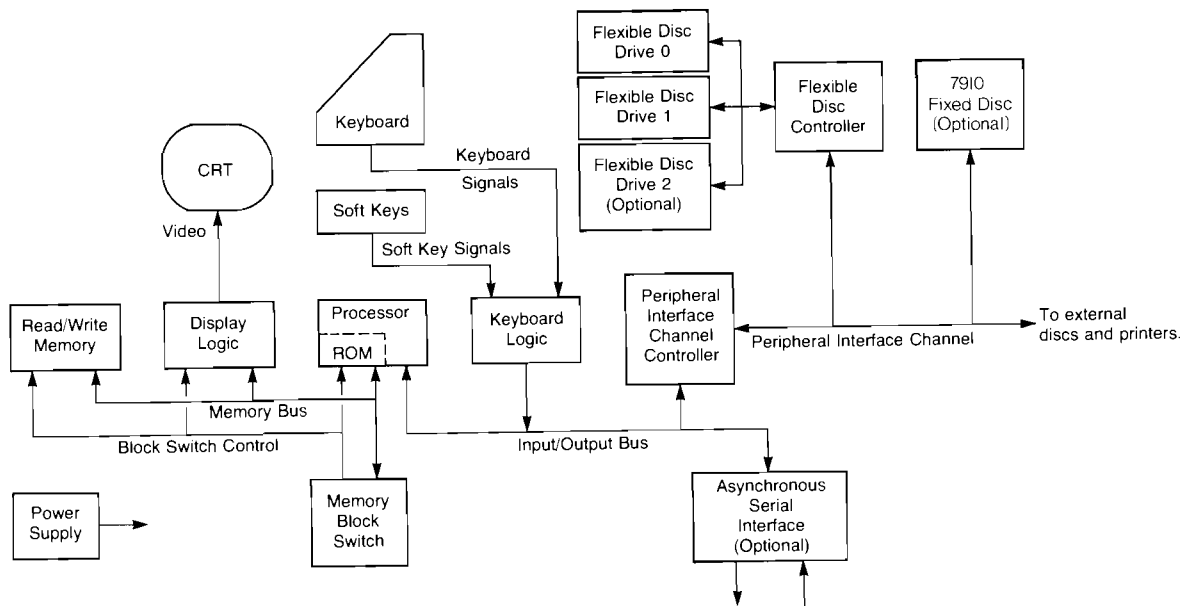
- One, two, or three flexible discs (1.2-megabyte)
- One 12.1-megabyte winchester disc drive
- One or two 20-megabyte cartridge disc drives
- Up to five additional CRT-keyboard consoles
- Up to 192-Kbytes of system memory
- Expandable *user* memory: possible 64-Kbytes single-task system configuration, 384-Kbytes multitask system configuration.
- Choice of three printers
- RS232C interface for connecting other peripherals

Safety and Security.

- Single On-Off key switch
- Ability to trap HALT key to prevent untimely program interruption
- Flexible disc drive door that locks under program control
- UL Listed — USA
Office Equipment
EDP Equipment
- CSA certified under EDP category — Canada
- VDE RFI certified — West Germany



Block diagram of the HP250 components and their interconnection



The System Unit

The system unit houses the central processor and the memory for both the main console and any remote devices. Further, it contains the peripheral interface channel,

the system keyboard, CRT display, up to three flexible disc drives, and the data communications hardware — both synchronous and asynchronous interfaces.

Processor.

The processor controls and buffers signals to and from an LSI NMOS-II micro-processor. It is a hybrid chip consisting of a Binary Processor Chip, an Extended Math Chip, Input Output Controller and four Bidirectional Interface Buffers.

Processor Specifications.

- Data Types:
 - Integer — 16 bits
 - Real — full precision floating point; 12 digits stored on Binary Coded Decimal (BCD) format
 - Short — half precision floating point; 6 digits (BCD)
 - Strings — alphanumeric data up to 32,767 bytes
- Default numeric internal representation is full precision
- Cycle time is 833 nanoseconds
- 16 peripheral addresses (select codes), four of which are used for standard peripherals (CRT, keyboard, flexible discs and printers)
- One level of indirect addressing
- One megabyte per second transfer rate on the interface channel
- 380,000 instructions per second (average)

Memory Specifications.

- Choice of three memory boards

containing 32,768, 65,536 or 131,072 bytes of random access memory (RAM)

- Memory technology is 16K-bit MOS RAMs
- Minimum memory is 160 Kbytes (128K system, 32K user)
- Maximum memory is 576 Kbytes (192K system memory, 384K user memory allotted in 64K blocks to six consoles)

Block Switch

To extend the addressing capabilities of the processor, block switch is used to select desired memory blocks. It can address 16 memory blocks of 64 Kbytes each. (However, in actual operation the total addressing capability is not used due to the limited number of memory board slots, as well as power supply limitations.) The switch also contains its own instruction decoder to route information to the proper memory block.

In addition to allowing system expansion beyond 64 Kbytes, the block switch permits the HP 250 to support up to five additional consoles in a straightforward, time-shared manner. It provides the memory block of each remote user a "time slice" of the processor, system disc and system printer.

CRT/Display Specifications

Display Screen.

- Dimensions: 24 lines of 80 characters
- Characters: 2.46 x 3.18mm (.097 x .125 in.); 7 x 9 enhanced dot matrix with half dot spacing
- Intensity: operator-controlled
- Character sets: 128-character ASCII, European and Katakana
- Line drawing set as secondary character set

Enhancements.

- Half-bright
- Blinking
- Inverse video (black on white)
- Underlining

Key-Controlled Functions.

- Display enhancements
- Character Set selection
- Set/Clear tab
- Display of control functions
- Print Screen

Peripheral Interface Channel (PIC)

This block connects peripherals, typically the printer and flexible

disc drives, to the processor. It uses standard HP-IB protocol, but is only intended to connect HP-specified printers and discs. The PIC converts 16-bit words from the processor into bytes, and in turn converts bytes from peripherals into words for processing. The channel is hard-wired such that the HP 250 is always the controller during HP-IB operations.

Flexible Disc Controller

Using the PIC, this controller transfers information between the drive(s) and processor. It is able to read, write, format, etc. Extensive self-test features monitor the controller and drive(s), either at power on or when initiated from the CPU board. The controller can read and write either HP- or IBM-formatted (3741) discs.

Flexible Disc Drive

The HP 250 uses flexible discs for on-line data and program storage, backup, and software data exchanges. These discs are read and written by the flexible disc drive(s) in the system unit. The drives are electro-mechanical assemblies that spin the discs, position heads, and provide the control circuitry. They further direct

the electrical currents that affect the read/write and erase functions. A verification capability carries out a "read after write" action. This read is performed with reduced sensitivity to assure data integrity during normal operations.

Flexible Disc Features.

- Double density, two-sided HP flexible disc formatted for 1.15 megabyte storage capacity per disc

- Ability to read and write HP Standard Interchange Format (Media DROM: applies to HP flexible, fixed and cartridge disc media)
- Ability to read and write IBM-3741 formatted diskettes (Media DROM)
- Automatic self-test initiated at power-on; also invocable by pushbutton on the processor board.

Flexible Disc Specifications

	HP 250 Format (Double Density)	IBM Format (1.4 Mbyte)
• Capacity		
Unformatted	1600 Kilobytes	400 Kilobytes
Formatted	1182 Kilobytes	256 Kilobytes
Surfaces	2	1
Track surface	77	77
Sectors track	30	26
Bytes sector	256	128
• Logical Formats		
Data tracks	148	73
Index tracks	4	1
Spare	4 cylinders	2 tracks
Single sector sparing	No	No
Track sparing	Yes	Yes
• Maximum recording density	6560 flux reversals/inch	6560 flux reversals inch
• Rotational speed	360 RPM	360 RPM
• Maximum data rate	62.5 Kbytes/s (500 Kbits/s)	31.25 Kbytes/s (250 Kbits/s)
• Access time		
Track	3 ms	3 ms
Average (including setting)	91 ms	91 ms
Settling time	15 ms	15 ms
Head load time	35 ms	35 ms

Asynchronous Serial Interface

The Asynchronous Serial Interface (ASI) is a microprocessor-controlled interface that directs the input and output data between the HP 250 and any of three types of external devices including:

- REMOTE/250 consoles
- HP 3000 Asynchronous Terminal Controller (ATC)
- RS232C/V.24 terminals or printers

REMOTE/250 consoles provide remote CRT/keyboard workstations functionally identical to the HP 250 system console. The user has access to all system commands and system software. See page 54 for a further discussion of REMOTE/250.

RS232C/V.24 terminals and printers can also be used in multi-terminal applications where a single application requires more than one CRT/keyboard. Programming the HP 250 or running multiple, concurrent jobs is not possible as with the REMOTE/250 capability. Printers and terminals supported by the HP 250 are:

- HP 264X series of terminals
- HP 2621 terminal
- HP 2635 printer/keyboard terminal
- HP 2631 printer

Specifications.

All of the HP 250 multi-user capabilities named above use Asynchronous Serial Interface hardware and can be configured with the HP 250. The ASI consists of hardware with the following specifications:

- Five RS232C/V.24 interface connections (ports)
- Nine data rates, each port independently switchable from 110 to 9600 bits/seconds
- Eight bits per character (seven bits plus odd, even or no parity with one stopbit; or, for teletype, one or two stopbits)
- Asynchronous bit serial RS232C (CCITT V.24)
- Connections:
 - Direct connection using 20-mA current loop to HP 264X terminals at distances up to one km (26-AWG, twisted-pair wire)
- Direct connection using RS232C to HP 264X terminals up to 5m (50 ft.)
- Modem connection, leased or private lines (full duplex), Bell 202T and limited distance connections that meet Bell 43401 specifications such as Gandalf LDS120 and Prentice ALD; speeds up to 9600 bits/second
- Switched-line modem connection (full duplex), including Bell 103 and European 200 baud modems

The LK3000 Utility.

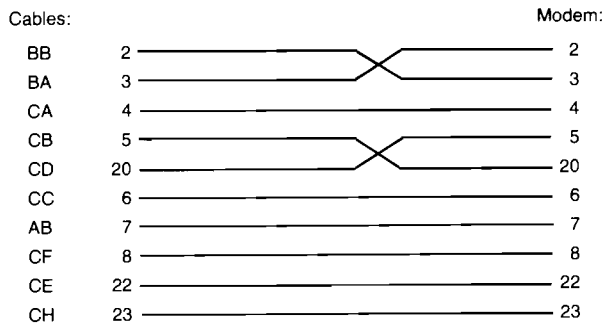
LK3000 is a run-only BASIC language program which allows:

- The HP 250 configured with an Asynchronous Serial Interface to act as a remote terminal to an HP 3000 computer system
- Transfer of ASCII data to or from the HP 3000
- Transfer of programs (as ASCII data) to or from the HP 3000

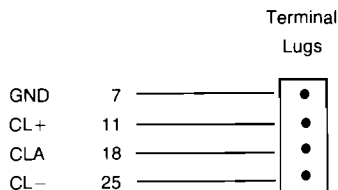
Features.

- The LK3000 turns a stand-alone HP 250 system into a powerful asynchronous terminal.
- Softkeys used in file-to-file transfers for operator convenience and efficiency
- The HP 250 and HP 3000 may be connected using either a full-duplex modem (Bell 103 or equivalent) or direct connection.

Figure 5: Asynchronous Data Communication Cable Configurations



HP250-to-modem Cable
(male RS-232C connector to male RS-232C connector)



Current-loop Cable
(male RS-232C connector to 4-lug connector)



Direct Connect (RS-232C) Cable
(male RS-232C connector to female RS-232C connector)

Synchronous Data Communications

The intelligent network processor (INP/250) is a micro-processor controlled interface for synchronous data communication on the HP 250. A special program, RJE/250, for the intelligent network processor makes the HP 250 appear as an IBM 2780/3780 batch-transmission terminal to the host computer (or any device supporting or emulating that capability).

Hardware Specifications.

- Silicon-on-sapphire microprocessor
- Synchronous RS232C (CCITT V.24/V.28) interface
- 32 Kbytes of random access memory
- 4 Kbytes of read-only memory
- CRC16 error detection capability
- Modem connection, full or half duplex
 - Switched lines, 1200 to 4800 bits/second
 - Private or leased lines, 2400 to 19200 bits/second
- Self-test at power-on

Acceptable Connections.

- Any computer supporting the IBM-2780/3780 batch terminal
- An IBM-2780/3780 terminal
- Other Hewlett-Packard computers able to emulate the IBM-2780/3780

Supported 2780/3780 Features.

- Remote job entry using bisync protocol
- Auto-answer (3780 only)
- Space compression (3780) and space truncation
- Vertical carriage control and horizontal tabbing
- Printer widths up to 132 characters
- Choice of ASCII or EBCDIC codes with automatic conversion
- Choice of transparent or non-transparent modes
- Output device selection

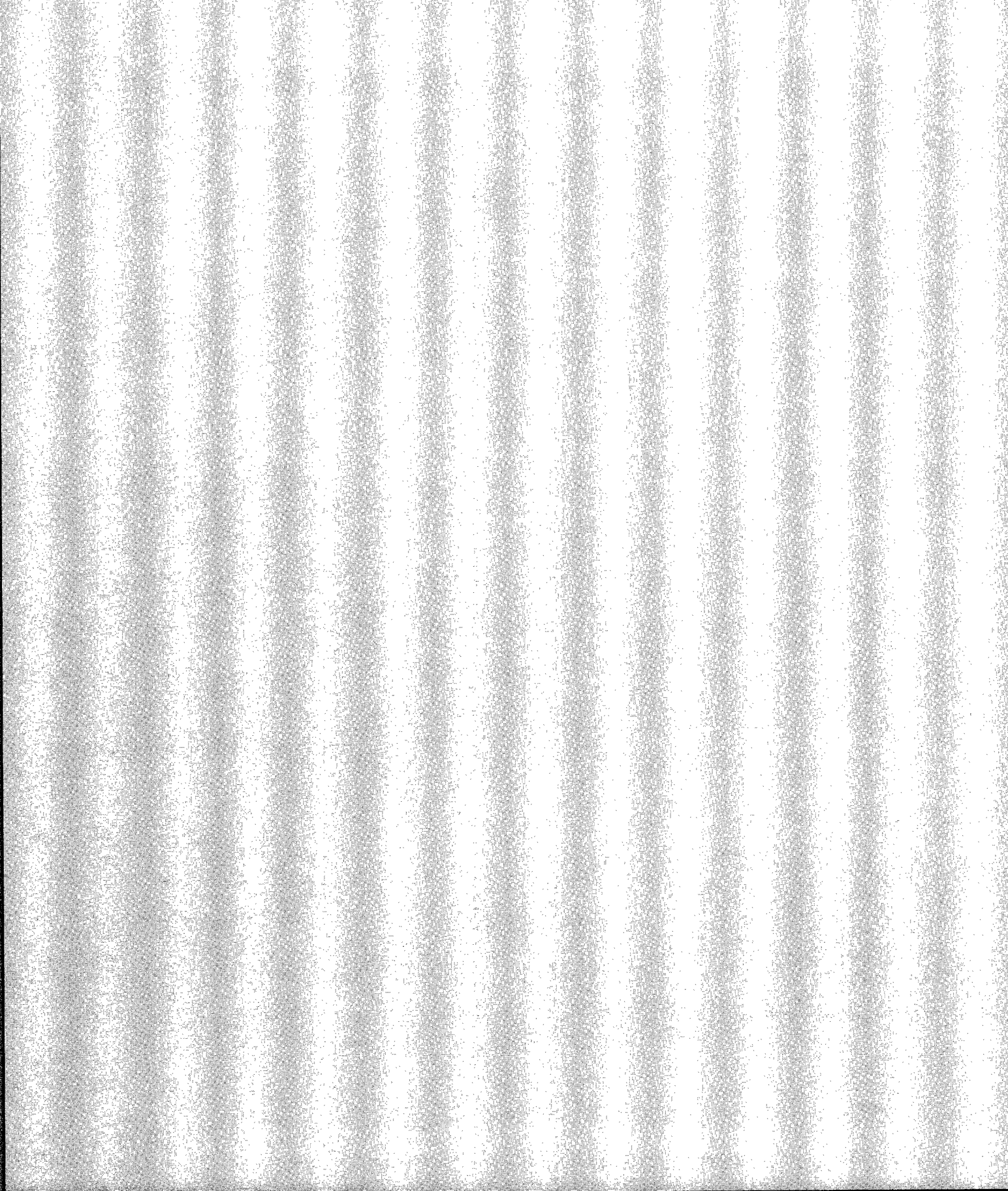
Unsupported 2780/3780 Features.

- IBM 2780 six-bit transcode
- Card reader and card punch
- Short record truncation (2780) performed without user-supplied EM control characters in the data

Additional RJE/250 Features.

- Default configuration file for communication parameters

- (modem attributes, time-out values, telephone numbers, buffers, etc.)
- The HP 250 can still operate as a multitask configuration
 - Ease of use: softkey control or commands actuated from keyboard or command files; auto-call capability
 - Data origination from either the keyboard or a disc file
 - Display mode: routes all data sent or received to the display screen
 - Trace mode: displays all data and control characters
 - Can operate as a detached task in a background partition
 - File concatenation for transmission
 - Diagnostic utilities, including loop-back testing



CHAPTER TWO: SYSTEM SOFTWARE

Introduction

The HP 250 is a BASIC language machine. Statements in BASIC and system commands are executed on the same level, either directly from the keyboard or in a program. Moreover, HP 250 BASIC is implemented by an interpreter, so a program can be listed at any time in essentially the same form in which it was entered. However, the internal form of a program is unlike that of most other interpreters that retain the character form of the user's program (and subsequently check syntax each time a statement is executed). Rather, with the HP 250, the program is stored as pointers to the proper execution micro-code for each operation (such as LET, PRINT, or READ), as pointers to a symbol table for variables and constants, and as pointers to a scratchpad location for temporary results. Execution speed is thereby increased by operating on the internal form (pointers), instead of the character form of a BASIC program.

The HP 250 system software consists of the BASIC interpreter and extensions to the language called "DROMs". A DROM (Dynamic ROM) is simply a convenient vehicle for grouping the assembly language routines that enhance the HP 250's BASIC language capability. For example, DROMs on the HP 250 typically contain:

- The data base management system

- Mass storage device drivers
- Printer and other peripheral drivers
- Additional BASIC statements, functions and operators
- Other miscellaneous control functions

Included in the operating software is a system self-test. When power is turned on, a small portion of ROM initiates a test of the processor, block switch, I/O channel and memory. The results of this five-second test are displayed on the CRT screen.

Having successfully passed all ten tests, the HP 250 initializes its I/O and loads the system software into the main memory area (128 to 192 Kbytes) reserved for it.

The system software includes:

- HP business BASIC
- IMAGE/250 (run-time modules)
- FORMS/250 (run-time modules)
- REPORT WRITER/250
- Display Screen and Keyboard Control
- Peripheral Control
- Optional DROMs (as configured)

HP Business BASIC

HP Business BASIC on the HP 250 is a greatly enhanced implementation of the ANSI X3.60 Standard for Minimum BASIC. It provides advanced features to make developing commercial data processing applications more efficient. BASIC/250 takes several of

its features from other commercial languages; for example, multi-character variable and label names, true subprograms with local variables, and structured programming constructs.

Programs that are too large to fit entirely in memory may be broken down into segments which are loaded and run by several mass-storage statements. Program code, subprograms or independent forms may overlay or add to program in memory.

Features.

- Interactive program development
- On-screen editing of source program
- Online syntax checking as each statement is entered
- Debug and TRACE facility for program debugging
- Ability to single step through a program
- Four data types, including two-byte Integer, four-byte Real (six-digit accuracy), eight-byte Real (12-digit accuracy), and String (one to 32,767 bytes)
- Alphanumeric variable names (up to 15 characters)
- Alphanumeric statement labels (up to 15 characters)
- Formatted Output (PRINT USING statement)
- Arrays of up to six dimensions for integers, real numbers and character strings

- Powerful string handling facilities, including concatenation, string searching, substring extraction and substring replacement
- Common (global) data storage for sharing data between subprograms and the main program
- Multi-line, user-definable functions
- Full matrix package
- Parameterized subprograms
- Structured programming constructs such as IF . . . THEN . . . ELSE; DO . . . WHILE; and others
- Command statement for dynamic execution of run-time-constructed BASIC language statements
- BASIC language statements to handle special function key interrupts
- Programmable enhancements for CRT output
- Mass-memory volume labels

IMAGE/250 Data Base Management

IMAGE/250 is the HP 250's version of the HP IMAGE Data Base management system, which is also available on the HP 3000, HP 1000 and HP 300 systems. IMAGE/250 allows logically related data to be placed in an integrated data base that expresses the

structural relationships among data items. The data can then be accessed according to the defined structure, without regard to its physical placement.

IMAGE/250 Components.

- SCHEMA PROCESSOR UTILITIES used to enter, edit and compile data-base schemas. Schemas are written, using IMAGE/250 data-base definition language, to define the structure and capacity of a data base.
- DATA BASE ACCESS PROCEDURES which are system statements called by application programs to access and maintain data bases.
- DATA BASE UTILITY COMMANDS used to create, erase, store and restore data bases. The utilities also can be used for data base restructuring.
- DATA BASE QUERY FACILITY, QUERY/250, used to interactively retrieve and update data base contents. It provides an ad hoc query facility, which can answer simple inquiries without program development. QUERY/250 is a valuable tool for both users and applications developers because it can be an effective data base testing and debugging aid.

IMAGE/250 Features.

- Integrated Structure. Logically related files can be handled as a single data base
- Network structuring. Master/detail data sets allow for complex relationships among data
- Data security through password-protected read and write access levels at the data base and set level
- Flexible data access from BASIC programs through direct, serial, chained or calculated access methods
- Concurrent access to a single data base from multiple, remote consoles
- Locking at the data base, data set and record levels for multi-console systems
- Distribution of a single data base across multiple disc volumes
- Compatibility of data base access procedures with IMAGE/3000
- Data base backup on flexible discs via data base utilities
- SORT or FIND capabilities in data-base language extensions which locate IMAGE/250 data items and sort them in correct order
- Modifications to corrupt data base prohibited

IMAGE/250 Limits.

- 255 items per data base
- 50 data sets per data base
- 127 data items per data set

- 65,534 records per data set
- Eight paths (keys) from master to detail
- 15 characters in data-set item name
- 31 passwords
- Maximum size (in bytes) of data entry:

Master	1018
Detail	1022

SORT/250

A frequently performed operation in commercial data processing is sorting. With the HP 250, the sort is designed to process information in an IMAGE/250 data base. Such sorts can be performed not only on entries in a single data set, but also on a subset of those entries. More importantly, SORT/250 is capable of extracting information that might be scattered across several data sets.

SORT/250 operations supply information that allows the programmer to access the desired portions of the data base in sorted order. This information is in the form of pointers to the appropriate data base entries. Subsets of the data set information are selected by the FIND statement.

When a FIND statement is executed, pointers corresponding to the selected records are put into a special file called a workfile. The pointer values may be read from the file using the BASIC READ#

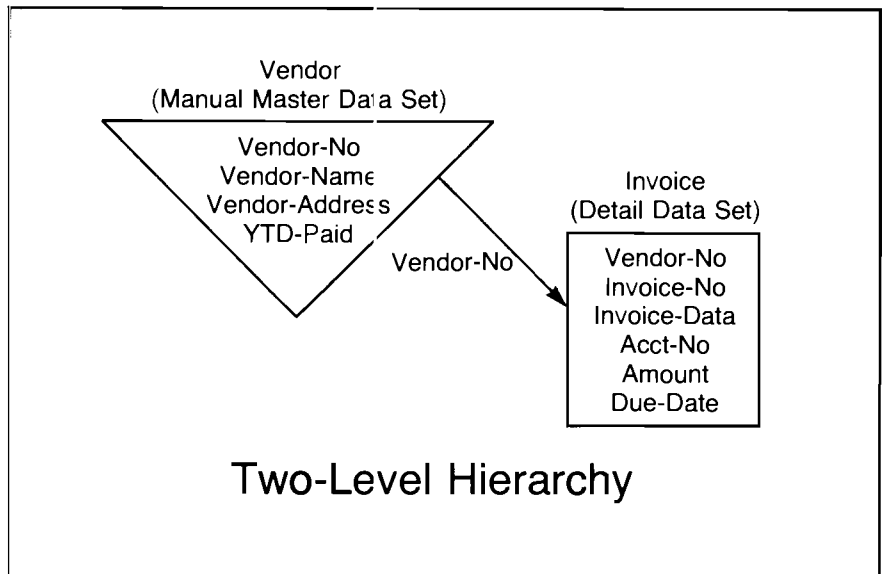
statement. Direct-mode DBGETs may then be used to extract the actual data base information.

Similarly, the SORT statement is used to sort information in the data base. Records in a data set can be sorted on any field in the set. If a FIND has previously been executed, only the records with associated pointers in the workfile that meet the selection criteria ("found" records) will be sorted. If a FIND has not been executed, all records will be sorted. In either case, the result of the sort is a series of data-base record pointers stored in a workfile.

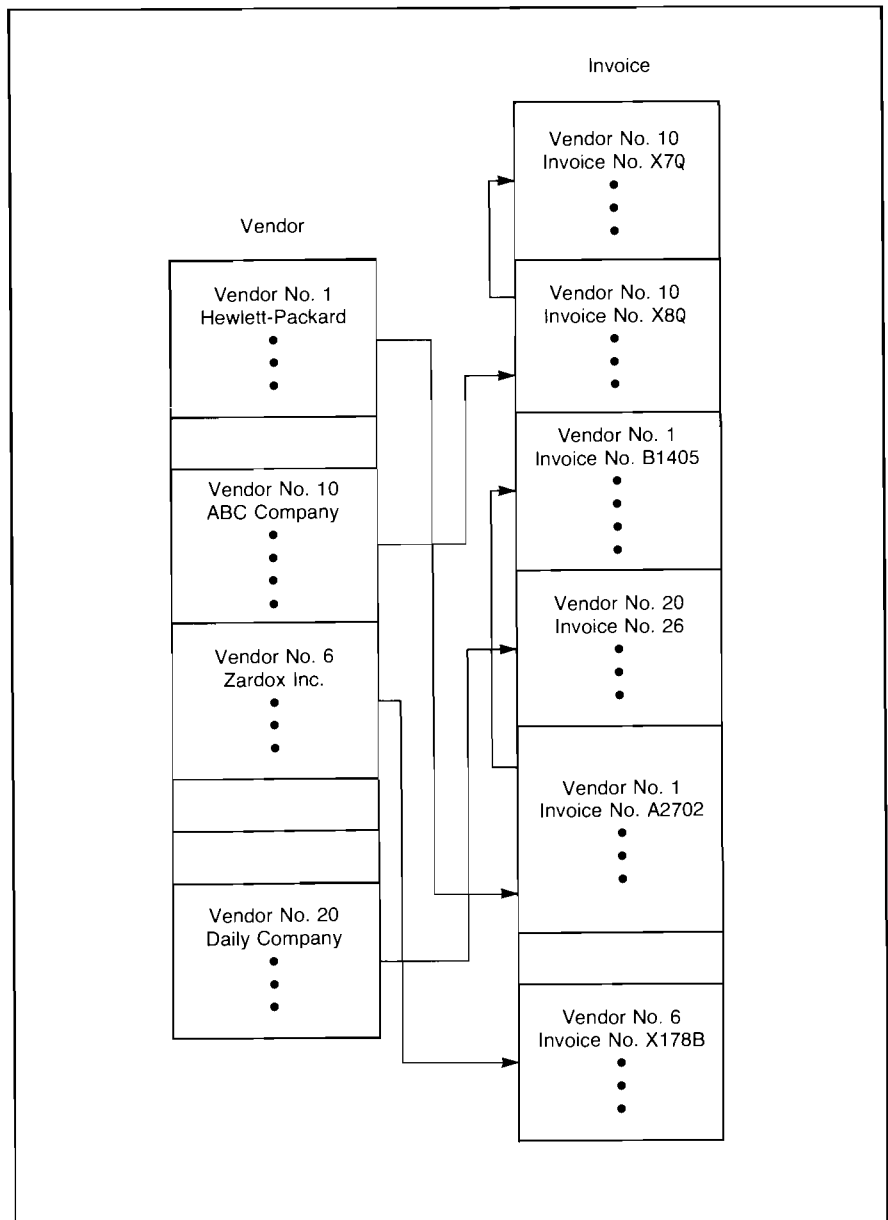
Sorting Across Multiple Data Sets.

SORT/250 provides facilities for dealing with structures that are more complex than simple data sets. Hierarchical structures consisting of up to ten sets can be described. To accomplish this a logical path called a thread is required. It consists of a list of sets involved in the hierarchy, along with information describing how they are interrelated.

A two-level hierarchy for a simple accounts payable system is shown. It consists of a single manual, master data set containing the vendor information, and a detail data set that contains the invoices associated with each vendor.



Also shown is sample information that might be contained in the data sets. If the master set were sorted by vendor name, the pointers in the workfile after the sort would be 3, 7, 1, 4. By retrieving these pointers sequentially and using them in direct-mode DBGETs, it is possible to produce a list of all vendors sorted by name.

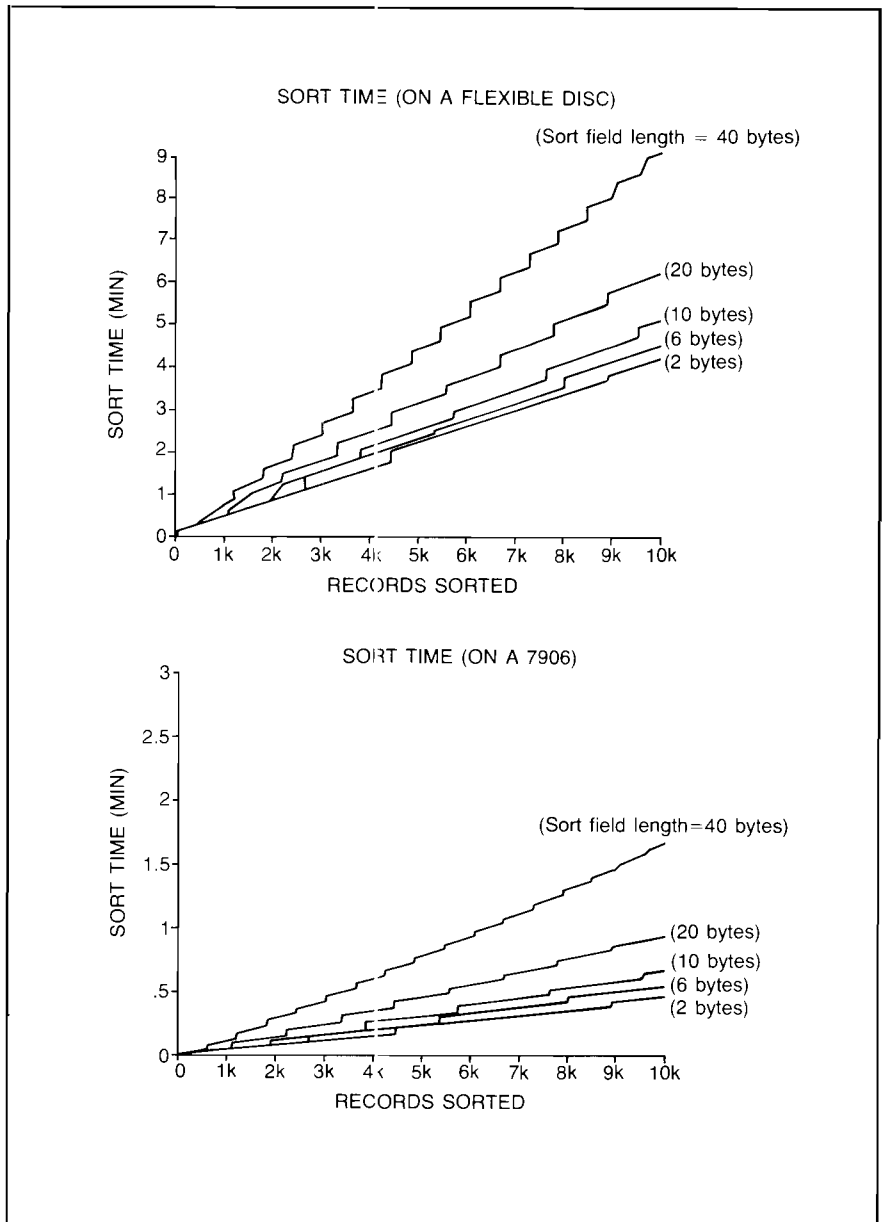


SORT/250 Features.

- Performs search and sort operations across data sets
- Allows selection of sort fields from different data sets
- Sorts numeric or alphanumeric data by ASCII value or Lexical value

SORT/250 Performance.

These graphs compare number of records sorted versus sort time. The lines on each graph correspond to different sort-field lengths.



QUERY/250

Commands.

QUERY/250 is an inquiry facility for IMAGE/250 data bases. It is written in BASIC and uses the data base management functions of IMAGE/250 and SORT/250 to access the data base. There are 17 QUERY/250 commands, which may be divided into the following four groups:

The selection commands are used for data modification and data reporting.

A two-level command input structure permits the expert user to type in and execute command lines directly. For the more casual user, QUERY/250 labels each softkey with commands that invoke input forms, thereby leading him through the proper command sequence.

In the interest of a simple command set, the "list" commands contain no provision for user-specified formatting of reports. However, reports may be formatted by calling a user's report writer program from QUERY/250.

Four commands make QUERY/250 attractive when developing or customizing programs:

- The ADD command, which allows QUERY/250 user to input data via a CRT form.
- The DO command, which executes a previously defined sequence of QUERY/250 commands written with the HP 250 text editor and stored in a data file.
- The RUN command, which loads and executes a BASIC subprogram. This feature permits the user to format output with REPORT WRITER/250, while taking advantage of the QUERY/250 data selection commands.
- The THREAD command, which permits a search path (defined in the schema) to be specified for multiple set access.

Selection	Reporting	Modification	Utility
THREAD FIND	SORT BREAK . . . TOTAL OUTPUT TO LIST LINEAR LIST	ADD DELETE REPLACE	DATA BASE PASSWORD INFO WORKFILE DO RUN EXIT

Features.

- An ad hoc inquiry facility with no programming required
- Utility to add, modify, delete or find based on certain criteria; sort on one or more keys; or list data
- Forms-driven command input for the first-time or casual user

PACK/250

PACK/250 contains three statements that provide a convenient and efficient way of transferring string and numeric data to and from a string variable. UNPACK is particularly useful when data base information is returned in a string variable as a combination of ASCII characters and numeric integers.

PACK/250 Statements.

- PACKFMT defines a list of variables to be used in conjunction with a source or destination string reference in an UNPACK USING or a PACK USING statement.
- PACK USING transfers data from each variable of the appropriate pack list to the string destination.
- UNPACK USING transfers data from the source string to the variables appearing in the pack list.

FORMS/250

FORMS/250 simplifies data entry and display, and is a convenient user interface when working with the CRT screen. The software consists of the FORMS DROM, which contains the system language extensions, plus run-on BASIC language utility programs for the creation, modification and printing of forms.

A form exists on the disc as a special form-type file, accessible only through the FORMS DROM or utility programs. The CRT image that makes up half of the form file is a direct copy of a section of the HP 250's display buffer. The advantage of storing the form in an internal CRT format is a high-speed display capability. The file is placed into the CRT display buffer by direct memory access, eliminating character-by-character display processing when the form is retrieved from the disc.

FORMS/250 does include a few new key words for the activation and termination of forms. However, data entry from a form and display to form are done with the standard INPUT, ENTER, and DISP statements.

CFORM and MFORM are special RUN ONLY BASIC utility programs for creating and modifying form files. They contain facilities for defining and moving input and output fields, specifying video enhancements and ordering fields.

CFORM provides total control over form development, while MFORM is a means of changing a form's appearance without affecting how the form is used by an application program.

Statements.

- GET FORM displays a form on the screen
- CLEAR FORM erases data in the input and output fields and resets field pointers
- CURSOR sets a value for the input and/or output field pointers.

Features.

- Forms are designed easily and saved as separate files independent of application programs
- Forms may be called in one line from a program and instantly displayed on the CRT
- Video enhancements, field locations, labels, etc., may be modified without modification of the application program
- Three field types may be defined; input only, output only or input/output
- Line drawing characters are available.

REPORT WRITER/250

REPORT WRITER/250 is a set of BASIC language commands which aids in efficiently writing programs to produce reports. It is designed to alleviate many of the programming burdens inherent in producing reports, by providing facilities for page and line counting, headers and trailers, break recognition and branching, page size determination, report formatting and printer independence.

Among its capabilities are:

- SOPHISTICATED BREAK WHEN statement to handle the problem of break recognition. A TRIGGER BREAK statement is also provided to deal with situations in which the break condition is too complex to be described by BREAK WHEN.
- A LEVELS capability used to describe the hierarchy of breaks and subtotals involved in a report.
- LINE and PAGE COUNTING capabilities independent of the printer being used. Specifying page size (in number of lines) allows REPORT WRITER/250 to perform all page and line counting.

- STRAIGHTFORWARD defining of reports which forces the production of self-documented, easily maintained reports.
- OTHER CAPABILITIES which include restart, summary reporting, exception reporting, automatic totaling and averaging, and a moveable left margin.

Features.

- Header and trailer block definition
- Page and line counting
- Built-in restart
- Print suppression of detail lines for summary reports
- Pause capability
- Automatic totals and averages

Additional Utilities.

A utility is a program written in BASIC language that permits the user to perform several "house-keeping" functions necessary for daily system operation or setup. For instance, an HP 250 utility allows for disc duplication (DUPL), while another permits the loading and unloading of a data base (DBLOAD, DBUNLOAD). Some other important utilities are:

- CONFIG, which allows the user to configure DROMs, peripherals and keyboards, establish auto-start and remote I/O connections; and define memory configurations.

- ROUTIL, which allows the user to copy or purge run-only programs; make a program run-only; or copy or purge DROM and system files.
- XREF, a cross reference program which allows the user to sort by variables, constants, line labels, functions or subprograms; or sort by name or group.
- TEST, which enables the user to perform a series of tests on the keyboard, display screen, printer, mass memory media and other hardware components.
- INIT, which permits the initialization of mass storage discs and cartridges to the HP 250's format.

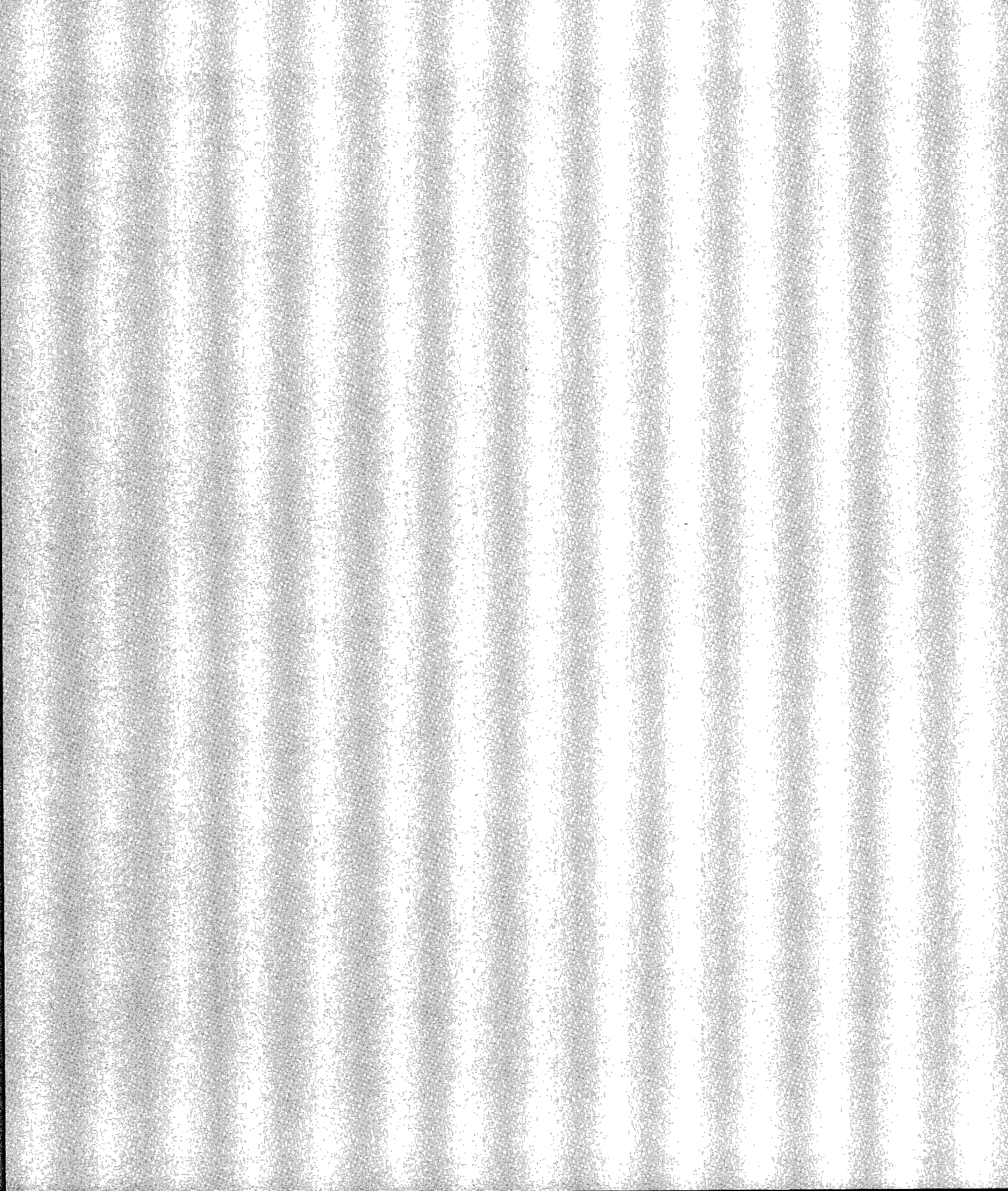
Optional DROMs.

Some important DROMs, which may be optionally configured on the system by the user are:

- Remote I/O (RIO), which allows operation of multiple REMOTE/250 consoles by time-sharing the HP 250's operating system, CPU and system peripherals.
- Terminal I/O (TIO), which enables the connection of RS-232C devices to the HP 250 via the Asynchronous Serial Interface board. Devices connected in this way are selected for output by the PRINTER IS statement and interrupt the HP 250 for input. These may be standard teletype-compatible terminals or additional printers.

With the LK3000 Program, the TIO DROM allows the connection of the HP 250 to an HP 3000 (as a 264X-type terminal).

- MEDIA, which allows the HP 250 to read and write IBM 3741 formatted diskettes and flexible discs written in HP standard format.
- SPOOL, which allows a disc file to be specified as a printer device for later output to a printer.



CHAPTER THREE: PERIPHERALS

Printers

HP 2631A Serial Printer.

- 7 x 9 dot matrix, impact
- Printer speed: 180 cps (bidirectional)
- Line length:
 - Standard (10 cpi)
136 characters
 - Expanded (5 cpi)
68 characters
 - Compressed (16.7 cpi)
277 characters
- Character Sets
 - 128-character ASCII
 - European subset characters (optional)
- Forms handling
 - Forms tractors standard
 - Eight-channel fixed vertical forms control for 11-inch forms
 - Horizontal tabbing
 - Variable horizontal and vertical pitch

HP 2608A Line Printer.

- Printing — 5 x 7 dot matrix (programmably expandable to 10 x 14)
- Print speed: 400 lpm
- Line length:
 - Standard 132 characters
 - Expanded 66 characters
 - Graphics Mode: 924 dot positions per line
- Character sets: up to 13 (any two may be used simultaneously)

- Forms handling
 - Eight-pin tractors standard
 - Accommodates up to six-part forms
- Forms control
 - Standard — 16-channel electronic vertical format control
 - Optional — 12-inch vertical format control

HP 9871A Character Impact Printer.

- Printing — 96-character, interchangeable, full character print disc; impact
- Print speed: 30 cps (bidirectional)
- Line length: 132 characters at 10 cpi
- Forms handling
 - Accommodates paper up to 15 inches in width, multiple copies (up to six) with maximum .018 mil pack thickness
 - Bidirectional operation for limited plotting capabilities
 - Programmable tabulation, both horizontal and vertical

Winchester Disc Drive

Features.

- Moderate price, high density

- Reliability based on Winchester design and fixed media concept
- Self-test diagnostics internal to the drive
- Compact size: allows the drive to fit into the HP 250 desk console
- Data access:
 - 70-msec average random seek time
 - 11-msec incremental (adjacent) track seek time

Specifications.

- 12.09-Mbytes formatted storage
- Average latency: 10 msec
- Data transfer rate: 526.5 Kbytes/sec (burst)
- Surfaces: 2
- Tracks/surface: 735
- Sectors/track: 32
- Bytes/sector: 256

The 7906 Disc Drive

The 7906 has approximately 19.6 Mbytes of storage capacity and includes both removable and fixed cartridge discs. Either the 7906M (and 7906S) or the 7906H with integrated controller can be added to the HP 250. In any case, the HP 250 will support a maximum of two drives (i.e., a 7906M with one 7906S or two 7906H drives).

Features.

- Microprocessor-based disc controller

- Fast data access:
 - 25 msec average random seek time
 - 5 msec incremental (adjacent) track seek time
- Removable cartridge/fixed disc configuration for disc-to-disc backup
- Constant spindle speed, independent of line frequency
- Temperature compensation circuitry to minimize start-up time
- Exceptional reliability over a wide range of environmental conditions
- Self-contained fault indicators for rapid, accurate servicing

Specifications.

- 19.6-Mbytes (9.8-Mbytes cartridge, 9.8-Mbytes fixed)
- Average latency: 8.3 msec
- Data transfer rate: 937.5 Kbytes/sec (burst)
- Surfaces: 3
- Tracks/surface: 400 (two surfaces at 400 tracks/surface on cartridge, 800 tracks on fixed disc)
- Sectors/track: 48
- Bytes/sector: 256

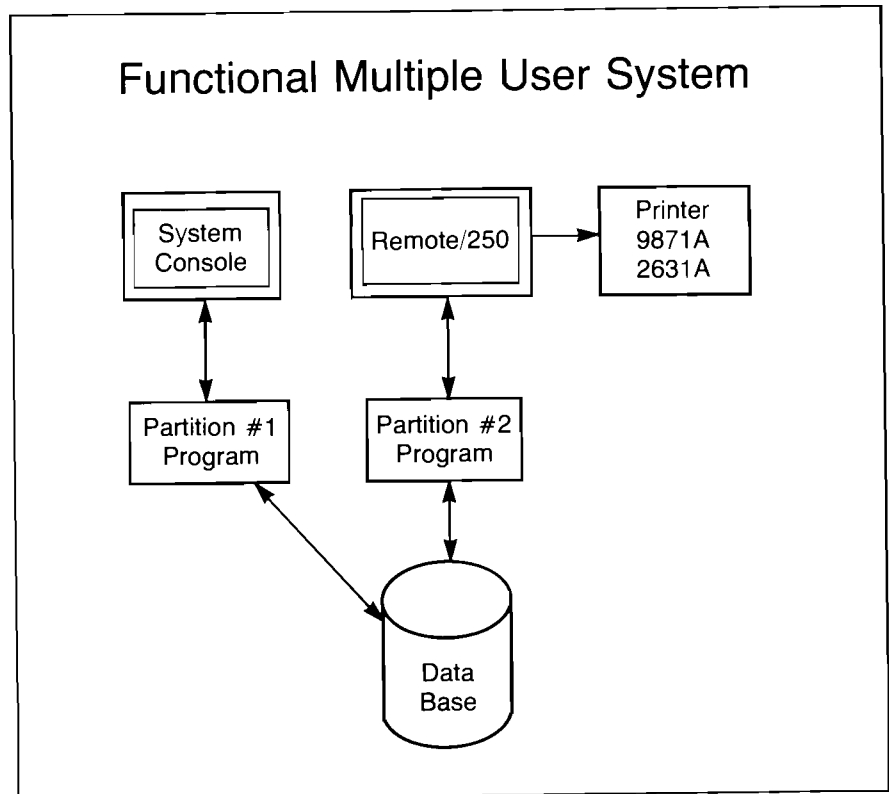
REMOTE/250 Consoles

REMOTE/250 consoles bring the capabilities of the HP 250 to locations apart from the HP 250. Each console has its own assigned

memory block located in the HP 250 card cage (32 or 64 Kbytes) and can access all system commands and software (FORMS, REPORT WRITER, QUERY and SORT). REMOTE/250 allows concurrent, independent execution of programs from each console. The 7910 or 7906 disc is recommended for multi-console configuration because it increases on-line storage and processing speed.

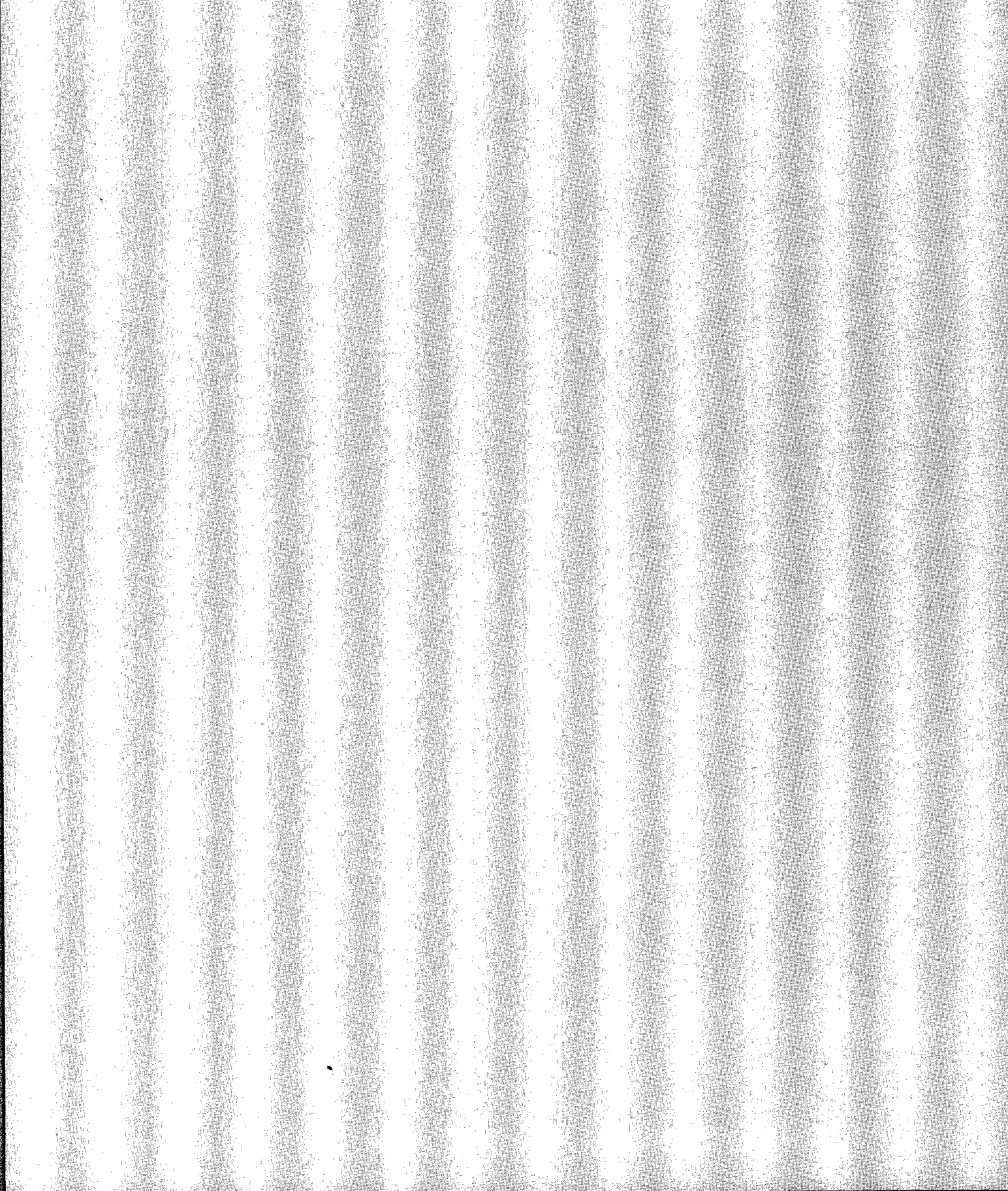
Existing tailored or packaged software designed for the HP 250 usually needs no modification to operate from a REMOTE/250 console. However, when several REMOTE/250's are used in the same application where resource management is required, some program modifications may be necessary.

This is a depiction of REMOTE/250's hardware configuration.



Features.

- Program compatibility between system console and REMOTE/250
- All HP 250 system software accessible from remote consoles
- Programming possible from each workstation (up to six)
- Programmable data base, data set and data locking
- Concurrent program execution
- Shared/independent data bases
- Full display enhancements (128 ASCII, European and Katakana characters, line drawing characters and HP 250 control characters)
- Special hardware features:
 - Fixed-size, independent user memory (32 and 64 Kbytes) per console
 - RS232 direct, current loop, modem connections
 - Program auto-start with system power on
 - Local printer interface (HP 2631 or 9871)



CHAPTER FOUR: DOCUMENTATION

Installation Manuals

- Site Selection Workbook (45251-87903). Contains the Site Selection Guide (45251-90040) and a folder of materials to aid in selecting the location for the HP 250. Electrical and physical specifications are listed.
- Asynchronous Serial Interface Installation and Reference (45120-90060). Covers installing and testing both the HP 45120A interface and REMOTE/250 consoles (HP 2649D terminals).

Operating Manuals

- System Operator's Guide (45251-90000). Introduces the HP 250 system to the operator in a friendly, non-technical style. The manual covers system components, keyboard operations, system commands, handling printers and discs, etc. The standard error messages also are described.
- QUERY/250 Operator's Guide (45251-90005). Explains how to use the QUERY/250 software to gain access to, or list and modify, information in a data base.

The guide assumes the reader is not a programmer and has little knowledge of data base structures and format.

- REMOTE/250 Operator's Guide (45120-90010). Introduces the REMOTE/250 to the operator in a friendly, non-technical style. The manual explains remote components, keyboard operations, system commands, handling printers and discs, self-test features and lists all error messages.
- Quick Reference Guide (45251-62500). A summary in tabulated form of the HP 250 system, including system loading, the keyboard, system commands and printers. Fits into desk drawer of system unit.

Programming Manuals

- BASIC/250 Programming Manual (45251-90015). This is the programmer's reference to each statement, function operator and command in the BASIC/250 language. Memory configurations, flexible disc structure, and system utility programs are covered. These optional software modules (DROMs) are also described: COPY, SPOOL, TRACE, TRIG

and MATRIX.

- Syntax Reference (45251-90050). A condensed list of HP 250 language syntax and error codes in a pocket-sized booklet. The complete BASIC/250 language and all enhancements are listed.
- IMAGE/250 Programming Manual (45251-90020). Describes how to define, maintain, and use an IMAGE/250 data base. The PACK DROM and many data-base utilities are included.
- QUERY/250 Programming Manual (45251-90021). Covers the programming operations needed to implement QUERY/250 features. A summary of QUERY/250 commands is included.
- REPORT WRITER/250 Programming Manual (45251-90022). Describes how to define and generate reports using REPORT WRITER/250 software.
- FORMS/250 Programming Manual (45251-90023). Shows how to create and use customized display forms using the FORMS/250 software.
- SORT/250 Programming Manual (45251-90024). Explains how to establish and implement sorts on data-base information using the SORT/250 software.

- TIO/250 Programming Manual* (45120-90001). Describes using the TIO/250 software to control remote printers and terminals. Communication with the HP 3000 computer is also covered in the section about the LK3000 utility.
- REMOTE/250 Programming Manual* (45120-90020). Describes the REMOTE/250's interactions with the HP 250. Discusses resource management and performance considerations for multi-user systems.
- MEDIA/250 Programming Manual (45251-90025). How to use the MEDIA DROM for reading information from flexible discs created on systems other than HP 250.
- RJE/250 Programming Manual (45122-90000). How to use the 2780/3780 emulator for Remote Job Entry to large mainframe computers.

*Supplied with the HP 45120A
Serial Data Communication
Interface.



**HEWLETT
PACKARD**