

HEWLETT • PACKARD 9825A

Everything you Always Wanted TO Know About The 9825*

***But Never Dared To Ask**

HP PRIVATE

HEWLETT  PACKARD

HP 9825A

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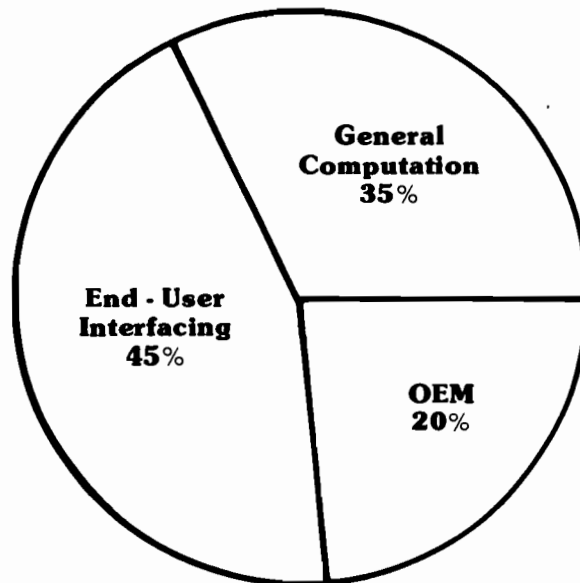
SALES AMPLIFIER
CALCULATOR PRODUCTS DIVISION
JULY 1977

HISTORY AND MAJOR MARKET AREAS

- 9825A was introduced on January 19, 1976.
- During fiscal '76 the 9825A was the second best product for all divisions of Hewlett-Packard!
- Did you know. . .

. . . . that 88% of the 9825A's sold contain the String/AP ROM?
. . . . that 33% of the 9825A's sold contain the Matrix ROM?
. . . . that 76% of the 9825A's sold contain Extended I/O capability?
. . . . that the average memory size for 9825A's sold is 15,330 bytes or equivalent to Option 001?

- The 9825A is being sold in two major market areas - Interfacing and Engineering/Scientific
- Interfacing (plus data acquisition, instrument test, and lab/research which include interfacing) accounts for 45% of 9825A sales.
- Statistics/General Computation and Engineering accounts for 35% of the 9825A sales.



GENERAL COMPUTATION

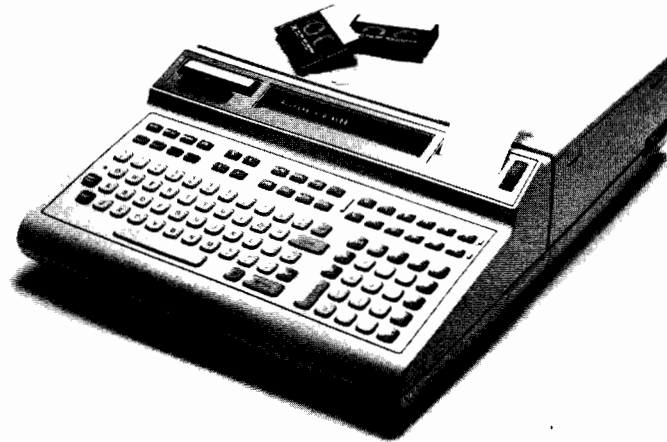
Here's What Customers Like About The 9825

- Portable computing systems (9825) allow chemists to get on-line quickly, and solve problems -- without the waiting, as is the case with single large systems. Non-technical people, too, can run programs and acquire meaningful data.
- Programming the same problem on the 9825 is 3 to 4 times faster than programming a microprocessor.

Benefits of the 9825 to these customers...

- With dynamic array allocation found in the HPL language, you can use the same program for larger memory sizes and therefore solve large problems by letting you specify the memory size.
- You can use the display to prompt a user so that other people can run your programs and get meaningful results without knowing how to program.
- With a two-track cartridge, you can store programs on one track and data on the other for faster program and data access.

- The error messages allow you to debug programs syntactically while you are writing them and not while they are running. You can quickly locate where the error occurs by means of the flashing cursor.
- You can start from the beginning or end of a program line to find the place where you want to edit - this saves keystrokes especially if your error is in the beginning of a program line.



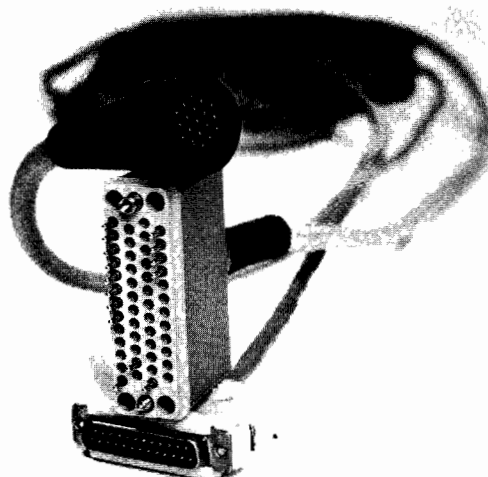
INTERFACING

Here's What Customers Like About the 9825

- The time to test heart pacemakers was reduced by 30% and accuracy plus the repeatability of the tests was far superior to a manual system.
- The size, power requirements, and sheer power of the 9825 are better than a minicomputer in our use for a mobile van system.

Benefits of the 9825 to these customers. . .

- The speed of the 9825 allows you to process incoming data and do something (e.g. store or print) with that data before the next reading or output is required.
- With HPL language, you can write programs and debug them faster than you could in working with assembly language.



HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

- You can use the cartridge to store data brought in from an external device for later analysis without missing other information being sent to the 9825.
- You have four different interface cards available for use with the 9825, allowing you to interface with most any device.
- You can easily transport the 9825 due to its size to areas where you may need to interface to some equipment and take readings at some particular interval (weekly, monthly). The 9825 has everything in one box which makes it ideal for systems on boats, mobile vans, submarines, and offshore oil rigs.

OEM

Here's What Customers Like About The 9825

- The 9825 has been substituted for the PDP-11 in some of our systems - due to language, size and HP-IB interfacing.
- The 9825 provides maximum accuracy and economy and at the same time is improving the performance of the NC machine which it is controlling.

Benefits of the 9825 to these customers. . .

- The speed of the 9825 allows you a far superior alternative to the manual system which you may now be offering.
- By using the cartridge for storage and the internal printer, you can reduce the cost of a system by the price of external memory storage device and an external printer.
- You can easily interface the 9825 by use of our four interface cards, the 16 bit parallel, the BCD, the serial I/O and the HP-IB.
- With the Special Function keys, you can allow a user to perform required operations without using the typing keyboard, making program operation easier for the user and less prone to error.
- The size of the 9825 makes it easy for you to incorporate it into your system, plus you have everything (keyboard, display, printer, and storage device) in one box which means reduced cost and less volume.

INTERFACE CARDS

Here's What They All Like About The I/O Cards

98032A 16 Bit Parallel Card

- You can interface to CPD peripherals or many non-HP instruments by use of this general purpose interface card.
- You have latched input and output which means that it is not the peripheral's responsibility to hold data on the I/O lines. The card will take care of this.
- If your device requires more than one signal from the 9825, you can use the extended control and status lines to provide those signals.

98033A BCD Input Card

- Using this interface card, you can interface to instruments such as a frequency counter, digital voltmeter, digital multimeter, or capacitance bridge.
- By selecting input formats, you can handle two instruments with one interface when each controlled instrument outputs a limited number of digits (4 or 5) and lower the cost of system by the price of an interface card.

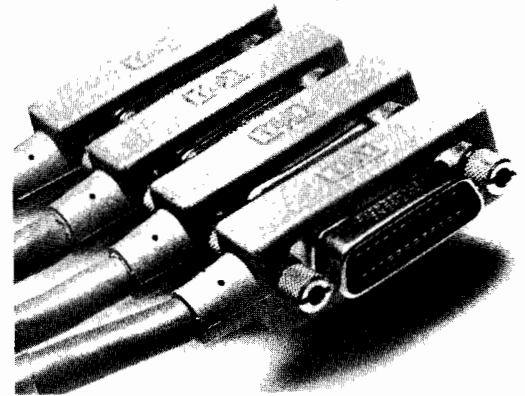
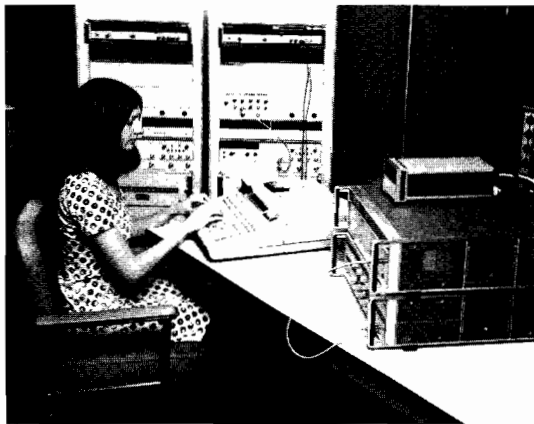
98034A HP-IB Card

- With only one interface card, you can communicate with 14 HP-IB compatible devices, saving the other two I/O slots for other types of devices and lowering the cost of the system by the price of the interface cards.

- You don't have to worry about the HP-IB protocol since it's automatically taken care of by the controlling processor. This also decreases the amount of programming required.
- Since the card incorporates the IEEE 488-1975 Standard, you don't have to solder connectors. You can tailor your instruments to HP-IB; you can use many HP peripherals and have a total system from one company; and you will be able to use future HP peripherals since they will be HP-IB compatible.

98036A Serial I/O Card

- With this interface card, you can interface the 9825 to a modem to provide communication of data to large computer systems after gathering it from interfaced instruments or keyboard entry. You can also use it to interface the 9825 to a terminal.
- You can set data rates with an external switch so you don't have to take the interface apart when you use the 9825 with several computer systems.
- By selecting data format and with the other formatting capability, you have a great deal of flexibility to work with a variety of communication systems. Refer to the "Selecting an HP Computing Controller and Interface" brochure, 5953-0266, for more information on all these interface cards and how they are used.



ROMs

Here's What They All Like About Our ROMs

98210A String/AP ROM

- You can easily access alphanumeric characters which may be related (like product names, description and part number for an inventory system) by means of string arrays.
- You can use parameter passing functions to easily access a function which is used frequently in your program, rather than setting variable values with → and using gsb.
- By using subroutines with local variables, you can write universal subroutines so that all a user needs to know is what parameters and how many to supply. There is no need to know what the variable names are.
- You can have some of the capability of BASIC or FORTRAN in using for... next loops to conserve programming space in working with arrays or in operations which must be repeated a number of times.

98211A Matrix ROM

- You can easily manipulate matrices without a lot of program statements, and you get faster execution than you would with HPL language implementation.

98212A or 98214A 9862A Plotter ROM 98215A or 98216A 9872A Plotter ROM

- You can easily control the plotter with just a few program statements.
- You can label plots to make them more meaningful to the person who is using them.



- 9872A: You can represent sections or groupings within a graph by the same color, e.g., plot the actual sales of a product vs. the forecasted sales of a product in bar graph format.
- 9872A: You can define a window in a plot to distinguish, enhance, or enlarge a section of a plot.

98212A, 98213A, 98214A, 98215A General I/O ROM

- By using read and write with format statements, you can make columns and headings and you can print a certain number of digits on an external printer like the 9866B or 9871A.
- You can perform a status test on a device for things such as “printer busy,” “out of paper,” “protected tape” which might allow you to display a message that the tape is protected rather than just giving an error message.

98213A, 98214A, 98216A Extended I/O ROM

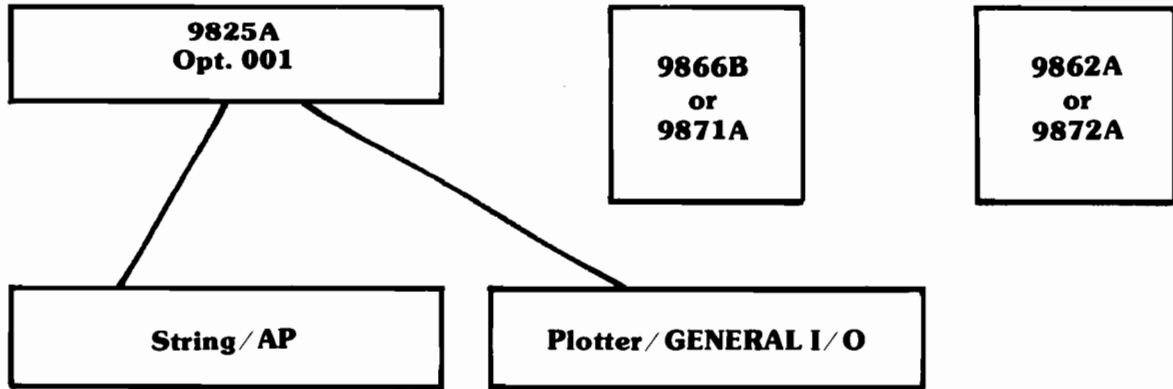
- By using interrupt, you can communicate with a device only when it needs service, otherwise the program can run to perform other functions or communicate with other devices. It is especially useful with slow devices where you don't want a program to stop and wait for a peripheral to input some information.
- You can specify the data collection method (buffered I/O, fast read/write, DMA) based on the speed of the device you are communicating with.
- In unattended systems, you can do error trapping to branch to a labeled routine when an error occurs rather than having the program stop and display an error message. You can specify an alternative action with time out if a peripheral does not respond in a certain amount of time, e.g., the printer goes down and yet you still want to continue collecting data, You can automatically load and run file 0 with auto restart if the power goes off, thereby getting the system running again.

DEMOS

Suggestions

Suggestions On Demo Equipment

Most field engineers demonstrate the 9825A in conjunction with some peripheral device, typically the 9866B or 9871A printer or 9862A or 9872A plotter, in order to show what other options are available with a 9825A and to give some idea of the interfacing capable with HP peripherals. You can also use live keyboard to demonstrate the interrupt capability. A typical demo system might consist of the following:



Be sure to clock the select codes so that they correspond to the ones used in the programs you are going to demo. Remember that the 9872A requires a three-digit HP-IB code as may the 9871A if it has the HP-IB options. Also, check that you have the necessary ROMs.

This equipment will differ, of course, depending upon the customer's application and your own particular choice of demo equipment.

Software available for demonstration

- 9825A Demonstration Library 11141-10010
- 9885M Demonstration Programs 11141-10040
- Electrical Construction Estimating Demo Kit 11141-10060
- 9825A/9872A Plotter Demo 11141-10070

Points to remember

- Power of the 9825A vs. Minicomputers.
See the COMPETITION section. More than one sales call may be required in order to close a sale when your competition is a minicomputer. The size of the 9825A may prove deceiving to a potential customer.
- Features and benefits of the 9825A.
Remember these as they apply to different types of customers.
- HP Image.
The majority of 9825A customers, both present and potential, are located in the scientific community where HP had its start and where the Hewlett-Packard name is known and respected. You won't have to spend time selling HP to these people, but can concentrate on selling the 9825.
- Reliability and service.
The reliability of our products is very important to customers designing systems for use unattended or in remote locations. The fact that HP has worldwide service is a deciding factor for many large companies and OEMs.

QUESTIONS TO EXPECT

Answering Objections

- Q.** What other languages are available?
- A.** HPL is the only language available for the 9825, but it is very similar to BASIC and FORTRAN (contact your sales support engineer for the HPL vs. BASIC white paper), but it is more flexible than either of these languages due to the HPL syntax. Many users have come to like HPL better, due to features like multiple statement lines, multi-dimensional arrays, and dynamic dimensioning of arrays.
- Q.** Can I program in assembly language?
- A.** The 9825 can be programmed only in HPL and was designed to be programmed in a language that is higher level as compared to assembly language. We want to give our users ease of editing and ease of learning the

language which are not features of assembly language. The speed of the 9825 may be fast enough so that you do not need assembly language programming. If you really find that you need this capability, Hewlett-Packard offers a wide range of computer systems which can be programmed in assembly language.

Q. What software is available?

A. Software packages are offered in several market areas. See the SUPPORT section, page 9, for more details.

The HPL language is very easy to learn. You can write programs to your specifications and for your own needs. Most of our customers find that they can write more useful software since they know their system and needs better than anyone else.

There are also third-party consultants, outside HP, who do specialized programs for customers.

Q. What training is available?

A. A training tape in cartridge form is provided with each 9825 shipped from our factory. The tape acquaints the user with the 9825 and allows use of the 9825 without first reading many manuals. A customer training class is also available to potential or present customers.

Q. What peripheral devices do you offer?

A. Hewlett-Packard manufactures and sells a wide variety of peripheral devices compatible with the 9825A. These peripherals range from printers, plotters, flexible disks and digitizers to digital voltmeters, counters, function generators, and multi-programmers.

Q. Do you have a large storage device?

A. The cartridge (in the 9825A and as a peripheral device in the 9877A) and the flexible disk (9885M) meet the needs of most customers in areas where we sell the 9825A. If large storage device is absolutely necessary, the 9830A and 9880B would provide a solution to the customer.

Q. Do you have a CRT for the 9825A?

A. First, determine why the customer wants a CRT. If the customer wants a CRT for:

1. a listing device, then this can be done with 9866B.
2. editing, then the editing keys of the 9825A make it fast and easy to scroll through and correct a program.
3. graphics, then a plotter can be used, especially the 9872A.

Second, you can interface the 9825A to a CRT by means of the serial I/O card (98036A). See the application summary on the 98036A for information on using the 9825A with the 2645 CRT.

Q. Can I use the 9825 as a terminal?

A. The serial interface card (98036A) provides an interface to a modem or terminal for use in communicating with large computer systems or to a CRT. This communication is only asynchronous.

Q. How fast can I transfer data to and from the 9825A?

A. The data sheets on the interface cards specify the maximum data rates. Remember that time is required for the handshake and therefore reduces the transfer rate. The specifications should probably be given in terms of low, typical and high data transfer rates. More detailed information on these I/O speed will be given in the I/O Guide. For now, the best solution is to put the system together and try it.

Q. How does the 9825A compare to minicomputers?

A. The 9825A can contain up to 64K bytes of internal memory. 24K bytes are reserved for the system, 8K TO 32K bytes are available for R/W memory and up to 16K bytes are available for ROMs. The size of the 9825 is somewhat deceptive in comparison to a minicomputer, but with its speed and I/O functions of interrupt and DMA, it approaches much of the capability of minicomputers. The 9825 has everything in one box - keyboard, display, printer, and storage - whereas these must be added as peripherals on a minicomputer system.

Q. Do you install the system?

A. We have found that the system is so easy to put together that no installation or installation fee is necessary. The 9825A can be removed from its box, plugged in and is ready to start solving your problems. The peripherals are easily connected to the 9825A with an appropriate interface card.

COMPETITION

Who Is It?

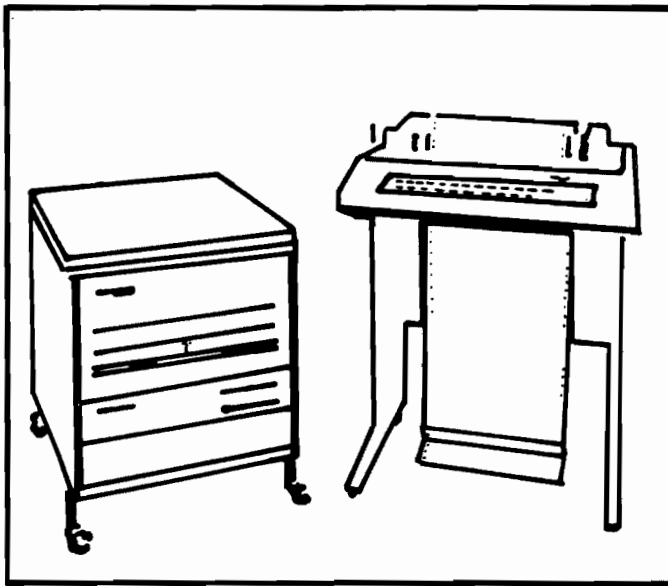
Competition for the 9825A is in two different categories - desktop computers (programmable calculators) and minicomputers. In the area of desktop computers, the major competitors are IBM, Wang, Tektronix and Olivetti. The IBM 5100 is a competitor due to the two languages (APL and BASIC) offered, the large memory (64K bytes) capacity and the CRT. The 9825A is faster (execution speed and the cartridge), offers more peripheral devices and provides easy editing of programs.

The Wang PCSII is a competitor due to the CRT, the modularity and expandability of the system, the large peripheral base and the mini-floppy which provides faster access but less storage than our cartridge. The 9825A is faster (execution speed), is portable, has a 250K byte cartridge (vs. Wang's 80K byte disk), and has I/O capability of DMA and interrupt.

The Tektronix 4051 is a competitor due to its graphics capability and the CRT. The 9825A is faster (execution speed and the cartridge), has powerful I/O operations, has a large peripheral base, has more efficient program storage, has matrix commands and is portable.

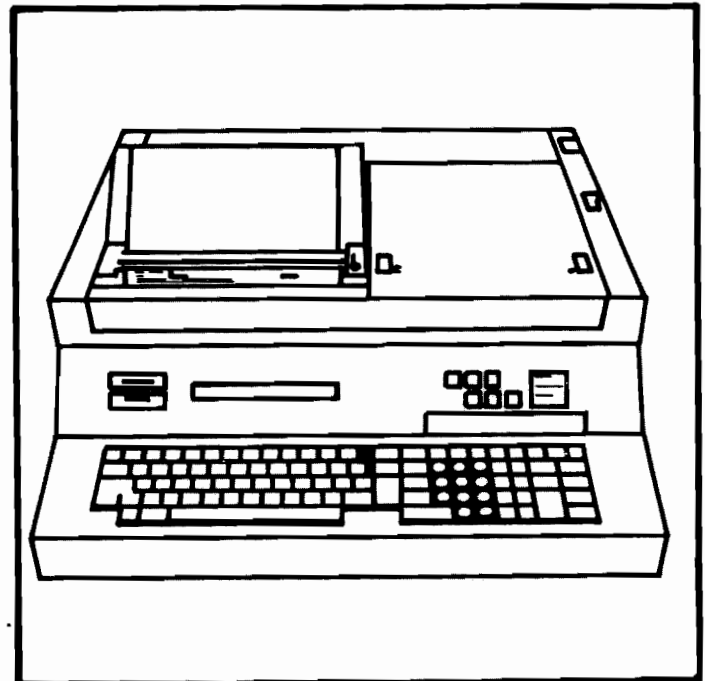
The Olivetti P6060 is a competitor due to the built-in floppy and printer which plots at a price less than the equivalent 9825A system and to the 48K byte memory. The 9825 is faster (execution speed), has a large peripheral base, is portable and has extensive I/O capability and speed.

Minicomputer competition occurs from companies like DEC, Data General, HP, and others. The minicomputer is a competitor due to multiple language capability, memory expandability, large disk memory, faster memory access and general flexibility and versatility. The 9825 can compare with minis in the areas of fast execution speed, DMA, interrupt capability and system controller capability. Compared to minis, the 9825A is more portable, has easier program editing, has a wide variety of interfacing and is lower priced.



DEC LAB

OLIVETTI



COMPETITION*

How Do They Stack Up Against The 9825?

	DESK-TOP COMPUTERS					MINICOMPUTERS		
	HP 9825A	IBM 5100	Wang PCS II	Tek 4051	Olivetti P6060	DEC PDP 8/A	DEC 11/03	HP 21 MX
Language	HPL	BASIC APL	BASIC	BASIC	BASIC	BASIC DIBOL ALGOL FOCAL	FORTRAN IV BASIC	BASIC FORTRAN IV ALGOL IMAGE 2000 FORTRAN II
Memory: Max. Size (bytes)	31,420	64,000	32,000	32,000	48,000	32,000	64,000	524,288
Instruction Length (bits)	16	16	8	8, 16, 24		12	16	16, 32
Type	MOS	MOS	MOS	MOS		Core, MOS	Core. MOS	MOS
Language ROM (bytes)	31,000		14,000	36,864	32,000 (compiler)	N/A	N/A	N/A
I/O: DMA (words/sec)	400,000	500,000	None	Optional	None	333,000	1.7M	616,000
Interrupt Levels	2	3	None	1	None	1-64	Variable	60
Interfaces: HP-IB (GPIB)	X	No	No	X	No	No	X	X
Bit Parallel (G I/O)	16 bit	No	8 bit	No	X	12 bit	16 bit	16 bit
RS-232-C	X	X	X	X	X	X	X	X
BCD	X	X	X	No	No	No	No	No
Price: Base (U.S.)	\$5,900	\$8,975	\$6,200	\$6,995	\$8,900	\$8,295	\$17,750	\$5,560
Weight (lbs)	26	50	62	64	88	N/A	N/A	N/A
Speed ¹	1	14.5	3.2	5.4	6.3			

¹(Competitor's Execution Speed)
9825 Execution Speed

*Best information available from data sheets etc. use with caution.



SUPPORT

Software And Users Club

SOFTWARE - WHAT'S AVAILABLE

Engineering

- AC Circuit Analysis 09825-12500
- Electrical Construction Estimating 09825-12750
- 6800 Microprocessor Assembler 09825-12510

Mathematics

- General Utility Routines 09825-10000
- 9825 Linear Programming Package 09825-13750

Statistics

- General Stat Vol. 1 09825-15000
- Stat Vol. 2 Analysis of Variance and Regression Analysis 09825-15010
- Stat Vol. 3 Nonparametrics 09825-15020
- Statistical Library 1 (contains Volumes 1, 2, and 3) 09825-15030

- Stepwise Regression 09825-15040

Miscellaneous

- Binary Cartridge (binary versions of String, Advanced Programming, and Extended I/O ROMs) 09825-10010
- Documentation Package 09825-10020

Over 1000 Programs in the Calculator Users' Club



USERS CLUB

A number of years ago, HP in Germany formed the Calculator Users Club to encourage users of the 9820A Calculator to share their programs with other users. New calculators with 9820A-type language introduced by HP have been included in the club, i.e., the 9821A and 9825A. Membership to the club is free - there is no admission or yearly fee for subscription. In order to join, a user submits a program written for the 9820A, 9821A, or 9825A and in return can choose any five programs from the library. Every subsequent submittal entitles the user to choose five more programs. Programs exist in the areas of engineering (chemical, civil, electrical, mechanical, optics), business, finance, education, statistics, and more. For further information, a user should write to:

Calculator Users Club
D-703 Boeblingen
Herrenberger Strasse 110
Federal Republic GERMANY

MANUALS

Titles And Part Numbers For Ordering

SYSTEM MANUALS

9825A Operating and Programming Manual	09825-90000
9825A Quick Reference Guide	09825-90011
9825A Error Messages Booklet	09825-90015
9825A System Test Booklet	09825-90031

OPERATING NOTES FOR PERIPHERALS

98032A Opt. 030 9825-9830/9821/9820/9810

Interfacing Operating Note
09825-90053

98032A Opt. 040 6940 Multiprogrammer

Operating Note
09825-90049

98032A Opt. 062 9862A Plotter Operating Note

09825-90040

98032A Opt. 063 9863A Tape Reader Operating

Note
09825-90041

98032A Opt. 064 9864A Digitizer Operating

Note
09825-90042

98032A Opt. 066 9866A/B Printer Operating

Note
09825-90043

98032A Opt. 069 9869A Card Reader Operating

Note
09825-90044

98032A Opt. 071 9871A Printer Operating Note

09825-90045

98032A Opt. 083 9883A Tape Reader Operating

Note
09825-90046

98032A Opt. 084 9884A Tape Punch Operating

Note
09825-90047

9871A Opt. 001 Printer Operating and Service

09871-90001

PERIPHERAL INSTALLATION MANUALS

9862A Plotter Peripheral Manual	09862-90012
9863A Tape Reader Operating Manual	09863-90000
9864A Digitizer Peripheral Manual	09864-90000
9866A/B Printer Peripheral Manual	09866-90001
9869A Card Reader Operating and Service	09869-90002
9871A Printer Operating and Service	09871-90000
9872A Plotter Operating and Service	09872-90000
9883A Tape Reader Operating and Service	02748-90032
9884A Tape Punch Operating and Service	09884-90000
98226A Computer Cradle Installation Note	09825-90066
9878A I/O Expander	09878-90000

ROM PROGRAMMING MANUALS

String Variables Programming	09825-90020
Advanced Programming	09825-90021
Matrix Programming	09825-90022
9862A Plotter Programming	09825-90023
General I/O Programming	09825-90024
Extended I/O Programming	09825-90025
9872A Plotter Programming	09825-90026
Disk Programming	09885-90005

9825A CALCULATOR INTERFACE MANUALS

98032A 16-Bit Interface Installation and Service	98032-90000
98033A BCD Interface Installation and Service	98033-90000
98034A HP-IB Interface Installation and Service	98034-90000
98036A Serial I/O Interface Installation and Service	98036-90000

NOTES

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