
HP-41

Sales Training Manual

Introduction

Hewlett-Packard, thanks to the HP-41, is already a major factor in the handheld computer market. Adding the Hewlett-Packard Interface Loop (HP-IL) creates the world's first battery-powered, portable, computer/interface system. Just as the HP-35 created the market for pocket scientific calculators, so does the HP-41 with HP-IL create the market for handheld interfacing computers dedicated to personal use. The low cost HP-41/HP-IL system, coupled with Hewlett-Packard's ability to customize the HP-41 to individual needs, ensures a rapidly growing market for personalized solutions.

In the coming months, Hewlett-Packard will be introducing devices with built-in HP-IL interfaces, further accelerating the use of the HP-41 as a system controller. Loveland Instrument Division has already introduced a battery-powered Digital Multimeter equipped with HP-IL (3468A Opt 001). As HP-IL becomes a more commonly used interface, other manufacturers will find it as desirable to add HP-IL to their products as they did when HP-IB was introduced.

Hewlett-Packard is not only first with the system, but it has all the pieces together:

- Quality hardware and software
- International sales and support
- A well-known, well-accepted product, the HP-41 Handheld Computer
- A unique, state-of-the-art interface—low cost, small size, battery powered
- Volume production

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1 Overview

HP-41 at a Glance

Product Hardware

HP-41 Handheld Computer (HHC)—Both the HP-41C and HP-41CV are pocket-sized and battery-powered, each with:

- four I/O ports
- full alphanumeric reassignable keyboard
- RPN logic
- 24-character, alphanumeric, scrolling display, 12 character window
- 128 functions
- Continuous Memory, which preserves all memory contents even when the HP-41 is turned off.

HP-41C—441 bytes of user programmable RAM, expandable to 2,233 bytes (expansion requires one port using Quad Memory Module, HP 82170A.)

HP-41CV—2,233 bytes of user programmable RAM built in.

HP-IL Interface Module—HP 82160A—powered by HP-41's batteries. Contains 65 functions for cassette drive, printer and interface control operations.

HP-IL Digital Cassette Drive—HP 82161A—battery powered. Uses 128K byte digital mini-cassettes.

HP-IL Thermal Printer/Plotter—HP 82162A—battery powered. Prints 24-character line.

HP-IL Impact Printer—HP 82905B Opt 248/348/448 (120V/220V/240V)—ac powered. Dot-matrix, 80-character/line printer with built-in HP-IL connectors.

Plug-in Card Reader—HP 82104A—powered by HP-41's batteries. Reads both HP-67/97 and HP-41 magnetic cards.

Plug-in Optical Wand—HP 82153A—powered by HP-41's batteries. Reads HP-41 bar code.

Plug-in Extended Functions/Memory Module—HP 82180A—powered by HP-41's batteries. Adds 47 functions to the HP-41, for a total of 175 functions. Also provides 889 bytes of solid-state mass storage.

Plug-in Extended Memory Module—HP 82181A—powered by HP-41's batteries. Used with the Extended Functions/Memory Module. Provides an additional 1666 bytes of solid-state mass memory. Up to two may be used, providing 4221 bytes of additional memory.

Time Module—HP 82182A—contains a quartz-crystal controlled clock which keeps accurate time whether the HP-41 is on or off. Alarms can be set which automatically turn on the HP-41 and start programs at particular times. Such programs could perform instrument control and data acquisition tasks, all unattended. The time module also features 12- and 24-hour formats, month/day/year and day/month/year formats, a calendar covering the years 1583 through 4319, and a stopwatch with splits.

HP-IL Video Interface—HP 82163A/B (U.S./Europe)—ac powered. Provides video display capabilities, monitor or TV.

HP-IL Converter Prototyping Kit—HP 82166A—The HP-IL Converter is an HP-IL/GPIO component that can be incorporated into an OEM product and that draws power from that product. This Prototyping Kit helps the engineer design the Converter into the OEM's device. It consists of two converters and one test board.

HP-IL Converter (10 pack)—HP 82166B—It consists of 10 converters only and is designed for purchase by OEMs as production inventory.

HP-IL/GPIO Interface—HP 82165A—ac powered. Allows the HP-41 to interface with devices operating with parallel bus structures. Includes port buffering and power supply.

HP-IL Interface for Series 80 computers—HP 82938A—plugs into a Series 80 port providing communication between the HP-41 and a Series 80 computer.

HP-IL Digital Multimeter—HP 3468A Opt 001—ac or battery powered, low-cost multimeter option. One of eight no-charge voltage/frequency options must also be chosen.

Product Software

HP-41 programming uses RPN logic, generally accepted as more efficient (fewer bytes/program), consistent, and forgiving than algebraic logic, which is often used by other manufacturers. Also, RPN programs are generally considered to be easier to write and interpret than algebraic logic programs. Compared to BASIC, tests have suggested that programming the same task using RPN takes about 1/3 the bytes required using BASIC. These tests suggest that the HP-41CV, with 2,233 bytes of programmable RAM, has the same programming capacity as a BASIC computer with about 6.5K bytes of usable RAM.

Application Pacs—00041-150xx—cover 17 technical and financial subjects, including Mathematics, Circuit Analysis, Statistics, Financial Decisions, and Petroleum Fluids. Each pac's programs are contained in a plug-in module (ROM).

Solutions Books—00041-90xxx—26 economical collections of bar coded programs covering a variety of technical and financial subjects. Both alphanumeric and bar code listings are included.

HP Plus—an aggressive program is underway to stimulate the development of independently sold software for the HP-41/HP-IL system meeting HP+ quality standards.

Over 6000 Users' Library Programs—available on magnetic cards, cassettes, or as bar codes.

Software Development Service—a key element of HP's Custom Products program. SDS supplies the system customers need to develop ROM-based HP-41 software for their unique requirements. Hewlett-Packard then produces custom plug-in modules containing this software for use in these customers' HP-41s.

Key Markets

Primary target customers are OEM and VEU project leaders and managers who require:

- Instrument control and data acquisition
- Portable, on-the-job computation
- Remote data entry and data processing

Major Competitors

Instrument Control and Data Acquisition:

- Burr-Brown Research Corp.
- G.R. Electronics, Ltd.
- Nu Data Corp.

Portable Computation:

- Texas Instruments Corp.
- Matsushita Electric Industrial Co., Ltd. (Panasonic, Quasar)
- Casio Computer Co., Ltd.
- Sharp Corp.
- Tandy Corp. (Radio Shack)

Remote Data Entry and Data Processing:

- MSI Data Corp.
- Norand Corp
- Azurdata Corp.
- Matsushita
- Sharp
- Casio

Prices start with the stand-alone HP-41C that retails at \$250, and continue to an HP-41CV/HP-IL/Series 80 system at about \$3500 and up. Since custom orders will normally be large volume, a typical custom order might be \$50,000 to \$100,000, with some ranging up to and over \$1,000,000.

Price Range

HP-41 Product Positioning

The HP-41 is designed as a powerful handheld computer (HHC). Combined with its peripherals, the Hewlett-Packard Interface Loop (HP-IL), and software, both standard and custom, the HP-41 becomes a low-cost, versatile, highly portable, problem-solving system without equal in today's handheld computer market. Users are typically technical or business professionals. The number of systems purchased at one time ranges from single units to thousands.

These large volume orders fall into three categories: Instrument control and data acquisition; portable or dedicated, on-the-job computation; and remote data entry/data processing.

Often, these volume orders depend on user-written customized software. HP provides OEM and VEU customers with four different media they may use to distribute their software:

- Cassettes
- Custom modules (plug-in ROM's)
- Magnetic cards
- Bar codes

The generation of custom software in volume quantities often depends on Corvallis Division's Custom Products, such as custom modules, custom keyboard overlays, etc. Custom Products offer your customers an important way to convert a standard product into a reliable, low cost product of their design, dedicated to solving their unique problems. These specialized handheld computers not only provide your customers with custom solutions to meet their needs, but they also offer all the power of the standard HP-41 handheld computer system.

Instrument Control and Data Acquisition

The combination of the HP-41 and the Hewlett-Packard Interface Loop offer your OEMs and VEU's powerful control over their HP-IL equipped instruments. You can provide your customers with the means to equip their instruments with HP-IL by using the HP 82166 Converter or HP 82165 HP-IL GPIO Interface. Through Custom Products, you can offer a custom software production service, so that your customers, in turn, can offer custom plug-in modules or magnetic cards to their users. Using a standard HP-41 system, your customers can duplicate their special software in volume onto cassettes, and there's a recommended vendor who can reproduce their custom software onto bar codes. In addition, your customers can enhance the power and friendliness of their custom software by offering their users HP-41's equipped with custom key labels, also available through Custom Products, allowing keys to show their standard or customer-defined functions.

By combining the HP-41 and HP-IL with the HP 82182A Time Module, your customers can write software which will guide their devices through a complicated sequence of unattended actions. These actions can include automatic data storage on the HP 82161A Cassette Drive as well as the printing or plotting of selected information on the HP 82162A or HP 82905B Printer. All these devices can be part of a single HP-IL connection to the HP-41.

Portable, On-the-Job Computation

There are many occasions where a small, battery-powered computer provides the only practical means for computation, analysis and design. Among those customers requiring these abilities are electrical and power engineers, mechanical engineers, civil engineers, surveyors, navigators (both air and sea), and petroleum engineers. Many others need low-cost, dedicated computer systems which are not shared with others.

As an example of an OEM who wishes to satisfy the portable computation needs of customers, let's consider a manufacturer of personal and business aircraft who wants to provide battery-operated computing power to the owners of its planes. The company wants a handheld computer designed to quickly calculate vital flight problems such as weight-and-balance distributions, climb/cruise/descend profiles, great-circle and rhumb-line navigation, true air speed, and best-economy and best time en route patterns.

Beech Aircraft Corp. wanted to offer such computing power to owners of their high-performance "Super Air King" aircraft. They satisfied this need by offering an HP-41C HHC equipped with their software in a Custom Products plug-in module. Beech's flight management system also includes an HP thermal printer/plotter, a Custom Products keyboard overlay, manuals and a carrying case.

Remote Data Entry and Data Processing

The HP-41 system can collect either keyboard or HP-code wand data, perform on-the-spot calculations, and then transfer that data to a Series 80 personal computer for further processing. From a Series 80 computer, this processed data can be forwarded to any larger HP or other central computer for general use. The bar code read by the HP 82153A Optical Wand has been specially developed to allow the Wand to read program and data code rapidly, accurately and reliably, while ensuring low data-collection cost. The code developed for our Optical Wand has not been developed to compete in the more mature food, drug and hardware distribution industries, where more condensed bar codes and more expensive terminals are normally used.

However, the wand market for inventory control within a single company, where bar code compatibility is not important, is just opening up. This is the data-entry market that offers great promise for the HP-41, using either keyboard or wand entry. The HP-41 system's low cost, coupled with your customers' freedom to customize their HP-41 systems over wide limits, opens the door to this new market.

The HP-41CV with its 2,233 bytes of RAM can be equipped with 4,221 bytes of plug-in, solid-state mass storage, giving 6,454 bytes of data processing and storage power in a battery operated, pocket-sized package. This 4K of solid-state mass storage is provided by the HP 82180A Extended Functions/Memory Module plus two HP 82181A Extended Memory Modules. This leaves one port available for a Custom Products plug-in module containing several specialized data gathering and processing programs. Another candidate for the fourth port is the HP-IL Interface Module, which could connect to the battery-powered Cassette Drive. Since each mini-cassette holds 128,000 bytes, this arrangement provides a very large data and program storage capacity available instantly at any remote location.

Features and Benefits

HP-41/HP-IL System

Features	Benefits
Field-portable, small size	Provides economical, full computer power available anywhere.
Battery powered	Offers maximum portability, plus convenient battery recharging during desk use.
Four software media	Cassette, plug-in module, magnetic card and bar code, each suitable for volume copies of user-written custom software.
Custom Products	HP can manufacture customer-written software as plug-in modules or magnetic cards, and can produce customer-chosen key labels. So HP can produce customer-defined, dedicated solutions.
Modular	Allows selection of best system for application.

HP-41 Handheld Computer

Features	Benefits
Computer power	Large memory and sophisticated computer instruction set make the HP-41 capable of solving complex problems on site quickly and easily.
Four I/O ports	Potential for plug-in ROM software, peripherals, interfaces, etc.—provides problem solving versatility. Potential for next generation plug-ins—ensures against technological obsolescence.
User-definable keyboard	A user may assign any program or function (HP or user-defined) to almost any key, thereby customizing the HP-41 to the user's unique needs. And any program can preserve these special key assignments.
User mode	A toggle selects either user or normal modes. In user mode, keys perform their reassigned duties. In normal mode, keys perform their original functions. So a user is never more than one keystroke away from either the HP-41's original power or the user's own customized computer.

Continuous memory	The entire contents of RAM, including key assignments, are preserved even when the HP-41 is turned off—programs and data do not have to be reloaded when the HP-41 is turned back on.
Alphanumeric keyboard	Prompting makes operation simple. Labeling of output makes interpreting results easy.

Features	Benefits
Battery powered	HP-IL systems are completely field portable, so a solution can be carried to its problem, no matter how remote.
Simple connector system	Keyed cables for easy, error-free connection.
Auto addressing	Unlike HP-IB, there's no need to configure the HP-IL loop in any particular way—just hook up devices in any order and the system works, automatically. If two devices of the same type are in the loop, auto addressing causes the first device receiving the signal to become the active device. HP-IL provides simple, fool-proof operation.
Manual addressing	A program can control which of two similar loop devices will accept a particular output. Control flexibility is there when you need it.
Adds 65 functions	Allows control of the HP-IL Printer/Plotter, HP-IL Cassette Drive, and the HP-IL loop.
Device-powered loop	Each device powers its section of loop, allowing 30 devices on one loop and up to 10 meters between devices.
Bit-serial, loop structure	Allows automatic error checking. The HP-41 checks its control signal after the signal completes a circuit of the loop.
5000 cps transfer rate	System can be upgraded with future controllers with higher transfer rates than the HP-41's 150 characters/sec.
Program controlled power up/power down	Controlling program can put loop devices recognizing these commands into standby mode until they're needed, thereby saving power.

HP-IL Interface— 82160A

**HP-IL
Converter
82166A/B
(as used with
the HP-41)**

Features

Converts HP-IL to 8-bit parallel products.

Six control lines

Benefits

Allows OEMs and VEU's to easily design HP-IL into their products.

Allows full HP-IB-like handshakes.

**HP-IL/GPIO
Interface
82165A**

Features

Adds ac-powered supply and 32-register buffer to HP-IL Converter.

Benefits

Permits straightforward connection to any GPIO device.

**Time Module
82182A**

Features

Multiple alarms

Includes over 2,700-year internal calendar

Provides stopwatch, including splits

Benefits

Allows accurately timed, unattended start of control and data acquisition programs.

Provides reminders for appointments, for data taking, etc.

Multiple alarms can be set for virtually any future time for initiation of instrument control/data acquisition activities or appointment reminders.

Facilitates timed lab experiments and other time sensitive events.

**Extended
Functions/
Memory
Module
82180A

Extended
Memory
Module
82181A**

Features

Provides HP-41 with 4,221 bytes of battery-powered, solid-state mass memory

Adds 47 functions

Benefits

Impressive entry and data processing power in one pocket-sized, portable package.

Allows programs to reassign different functions or programs to keys many times during program execution.

Provides file management for solid-state mass memory.

Allows bit-level manipulation for I/O.

And much more

**Optical
Wand
82153A**

Features	Benefits
Reads special HP-41 bar code	Unique HP-41 bar code makes possible the Wand's low cost and high reliability.
Plugs into and is powered by the HP-41	Provides economical data entry and data processing system featuring portability, high quality and small size.
Bar code very inexpensive	Minimizes software distribution expense.

**HP-IL Digital
Cassette
Drive
82161A**

Features	Benefits
Battery powered	Allows complete portability.
Uses digital mini-cassettes	Computer quality—far more reliable and faster than audio cassettes.
Cassette capacity: 128K	Over 58 times the capacity of HP-41CV's programmable RAM.
Entire HP-41 memory can be stored.	Entire status of computer can be saved and recovered, including special key assignments, thereby making rerun of program fast and easy.
Read/write speed: 9 IPS	40 seconds to store full HP-41CV programmable memory (2.2K)
File by name	Allows variable length, user defined file name for easy identification.
Standby mode	Helps conserve battery power.

**Automatic
Start and
Tape
Duplication
Module
00041-15042**

Features	Benefits
Auto start function	Program starts automatically when HP-41 is turned on. Provides simplest program operation of all.
Mass copy function	Allows copying the contents of one cassette tape onto 29 other tapes using an HP-IL loop connecting 30 Digital Cassette Drives. Provides customers the ability to reproduce in volume their custom software.

Plug-in Card Reader 82104A

Features

Reads both HP-67/97 and HP-41 magnetic cards

Entire HP-41 memory can be stored.

Powered by HP-41's batteries

Uses one HP-41 port

Uses 224 byte magnetic cards

Benefits

6000 program Users' Library available to HP-41.

The Card Reader shares this power with the Cassette Drive, including preserving key assignments. Makes program rerunning fast and easy.

Allows small size, total portability.

Can use HP-IL Module or Wand with Card Reader plugged in, leaving two ports available for plug-in ROM or RAM. Provides smallest HP-41 system combining flexible program and data storage with versatile problem-solving and data-collecting power.

Programs/data easily modified

Cards easily stored/carried

Easy to write contents on card's face.

HP-IL Thermal Printer/Plotter 82162A

Features

Battery powered

24-character print line size

Both single- and double-wide characters

Automatic right and left justification and centering

128-character set

Standby mode

Benefits

Allows complete portability.

Makes possible smaller printer.

Allows highlighting of output.

Provides formatting control.

Allows more precise communication.

Helps conserve battery power.

Line Voltage Operated HP-IL Devices

Features

HP-IL Video Interface 82163A/B

- ac-powered interface connects HP-41 to video monitor or TV.

Benefits

Provides a 16 line, 32 character/line display, with 16 additional lines made visible by scrolling. Turns a monitor or TV into a useful demonstration tool or programming aid for U.S. (82163A) or Europe (82163B).

Dot-matrix impact printer
82905B Opt 248/348/448

- Up to 132 characters/line
- 80 characters/sec bidirectional
- 9×9 dot-matrix characters
- Diagnostics self-test

Series 80 HP-IL Interface 82938A

Big computer printout available for HP-41.

Allows HP-41 to pass data to a Series 80 computer for manipulation. The Series 80 computer can then transfer the results to a larger computer via HP-IB or modem.

Custom Solutions

We realize that the key to many of your volume orders will be unique, personalized solutions. Therefore, Hewlett-Packard has made custom solutions a key element of our HP-41 program. Our role is not to design special computers or to write custom software. That would result in high development costs per unit, small production runs, and a heavy support burden; in short, a price too high for customer acceptance. Rather, our role is to make it easy for customers to write software (or to have it written for them by custom software companies), then to make it easy for them to obtain as many copies of their software as they wish on a variety of media.

The HP-41 system is designed to be personalized. The functions of most keys can be redefined by a customer. These new key assignments, together with the program using the new assignments, can be recorded on digital mini-cassette tape, in a plug-in ROM module, on magnetic cards, or in bar code. When such a program is read from tape, ROM, cards or bar code, the special functions are automatically assigned to the keys, making program operation easy.

It is even possible to write a program that redefines the functions of keys many times *during program execution*, if the program is written for a custom ROM using HP's Software Development Service, or if the HP-41s being used to write and read the program are equipped with the HP 82180A Extended Functions/Memory Module.

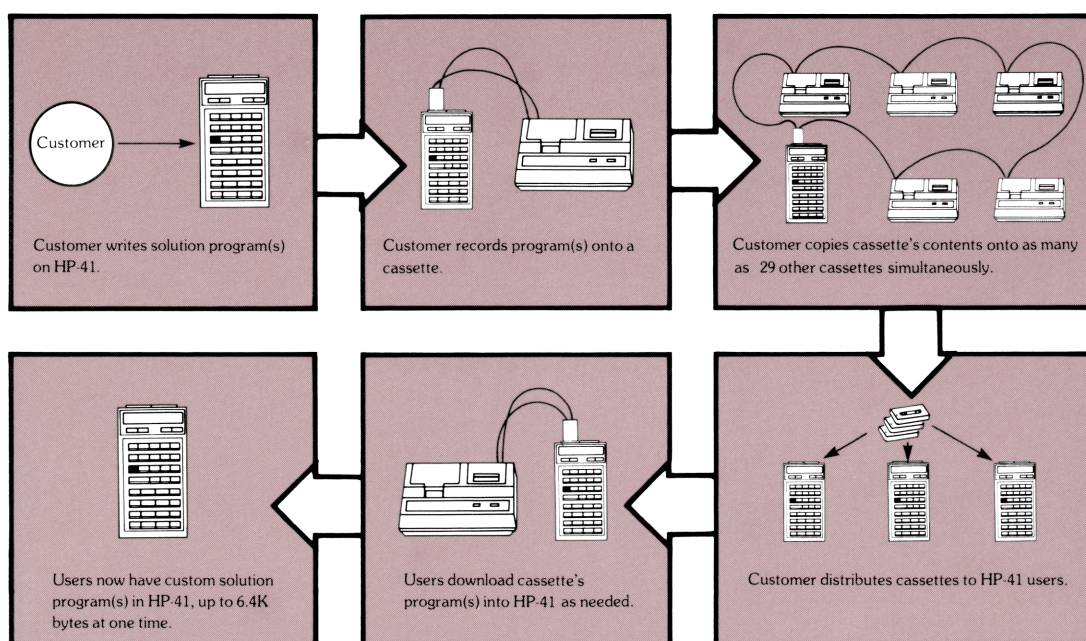
Keyboard overlays are a standard part of the HP-41 system. Users can write on blank overlays the names of the special functions they have assigned to the keys, further simplifying program operation.

Hewlett-Packard can manufacture special printed keyboard overlays showing customers' key label definitions. And, user written software can be reproduced in volume on any one of four media:

- Digital mini-cassettes
- Plug-in modules (ROM's)
- Magnetic cards
- Bar codes

Here are details on each medium, including how software can be reproduced in volume. Following that, you'll find information on the ways Hewlett-Packard can relabel HP-41 keys. Finally, comparisons of these software media will be given.

Digital Mini-Cassette Copy Routine at a Glance:



Digital Mini-Cassette Details: The HP-41/HP-IL system equipped with the HP 00041-15042 Automatic Start and Tape Duplication Module has the ability to copy the entire contents of one cassette onto as many as 29 cassettes at one time. Each duplicate cassette could then be sent to another location, where the cassette's program and data files could be downloaded to a number of HP-41s. Each of these HP-41s could be equipped with the HP 82180A Extended Functions/Memory Module and two HP 82181A Extended Memory Modules, giving each HP-41 4.2K of on-board mass memory plus 2.2K of RAM (HP-41CV) to store the downloaded cassette programs and data until needed. This method of duplicating user provided software onto a reliable, easily used medium requires no special production contract with Hewlett-Packard or other vendors. This ability to customize is built into the standard HP-41/HP-IL system.

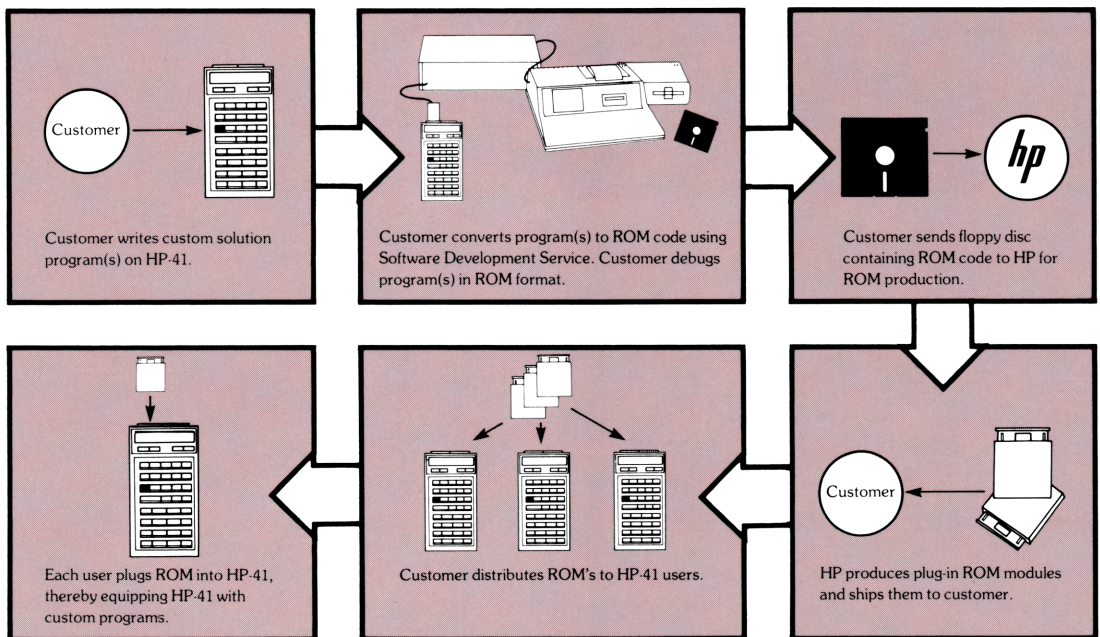
In addition, the Automatic Start and Tape Duplication Module allows a program to be written and run that starts automatically when the HP-41 is turned on. Of course, only one autostart program can be included among the programs and data held in an HP-41 at one time.

Special key assignments can be recorded on cassette tape along with the program using those assignments. When the program is read from tape, these key assignments are made

automatically. Since programs as well as functions can be assigned to keys, a program can be started by pressing a single key. Consequently, each of the several programs an HP-41 can hold may be started by pressing a unique key to which that program has been assigned.

If a program is written and run on HP-41s equipped with Extended Functions/Memory Modules, key assignments can be changed many times during program execution.

Custom Module Copy Routine at a Glance:



Custom Module Details: Corvallis Division's Custom Products group makes it easy for customers to convert their special programs into custom 4K or 8K plug-in modules. Such modules provide program permanence and security, additional ease of operation, and small size. The outside dimensions of an HP-41 are virtually unchanged with four such modules inserted. Custom Products can provide the Software Development Service (SDS), a hardware and software system which customers use to convert their HP-41 programs into the special bit patterns used for plug-in modules. This bit pattern is sent to CVD on a 5¼" floppy disc, then CVD manufactures the contracted quantity of custom modules.

This Software Development Service is offered in two ways:

HP 82505ST Software Development Service—Short Term
Priced at publication at \$275/week, U.S. It includes:

- HP 82505-69901 Custom Module Emulator
- HP-85A Personal Computer
- HP 82902M Flexible Disc Drive
- HP 82505-60004 Interface—to connect the customer's HP-41 and the Emulator
- HP 82505-60014 Port Extender—allows use of the Card Reader while exposing the three remaining HP-41 ports for the Emulator Interface and, if desired, the Wand and HP-IL Module.
- HP 82936A ROM Drawer for the HP-85
- HP 00085-15003 I/O ROM for the HP-85
- HP 82903A 16K Memory Module for the HP-85
- HP 00085-15001 Mass Storage ROM for the HP-85
- HP 82939A Opt 001 Serial Interface (RS-232-C) to connect the HP-85 and Emulator
- HP 82937A HP-IB Interface to connect the HP-85 and Disc Drive

HP 82505LT Software Development Service—Long Term

Priced at publication at \$3000 for 6 months, U.S. It omits from the short term service the HP-85A computer and the HP 82902M single disc drive. This long term service was developed for those writing custom software essentially full time.

In addition, each customer who rents or leases SDS should buy:

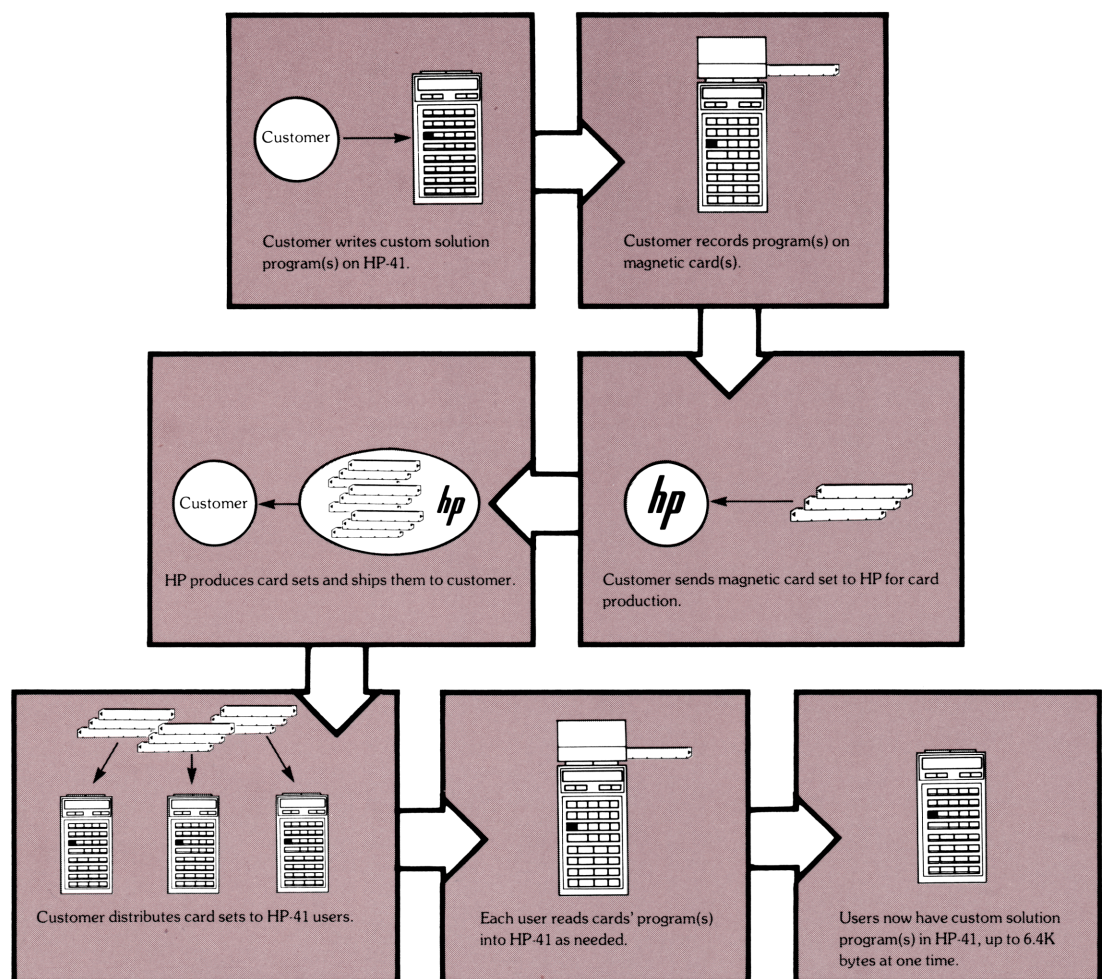
- HP 82505AC SDS Consumables Kit, consisting of the operating system on disc, 22 special microcode routines on disc, manuals and consumables.

The 22 microcode routines are available for customers' use as they program their custom modules. For example, one routine allows a custom module program to reassign functions and programs to most HP-41 keys many times during program execution. When a program is assigned to a key, that program can be started simply by pressing that one key.

The contract covering Hewlett-Packard's production of custom modules calls for customers to send their ROM codes to the Corvallis Division on floppy discs. HP then sends printed listings of these codes to the customers for their signatures, attesting to the correctness of the codes. HP is then responsible for duplicating those printed listings in ROM form.

Normally, ROM's are shipped 22 weeks after HP receives a customer's signature confirming that the printed listing is correct. If customers want faster response, a 13-week shipment is available (fast track). However, customers are asked to take financial responsibility for the increased chance for ROM bit error introduced by the short cuts faster shipment requires.

Magnetic Card Copy Routine at a Glance:

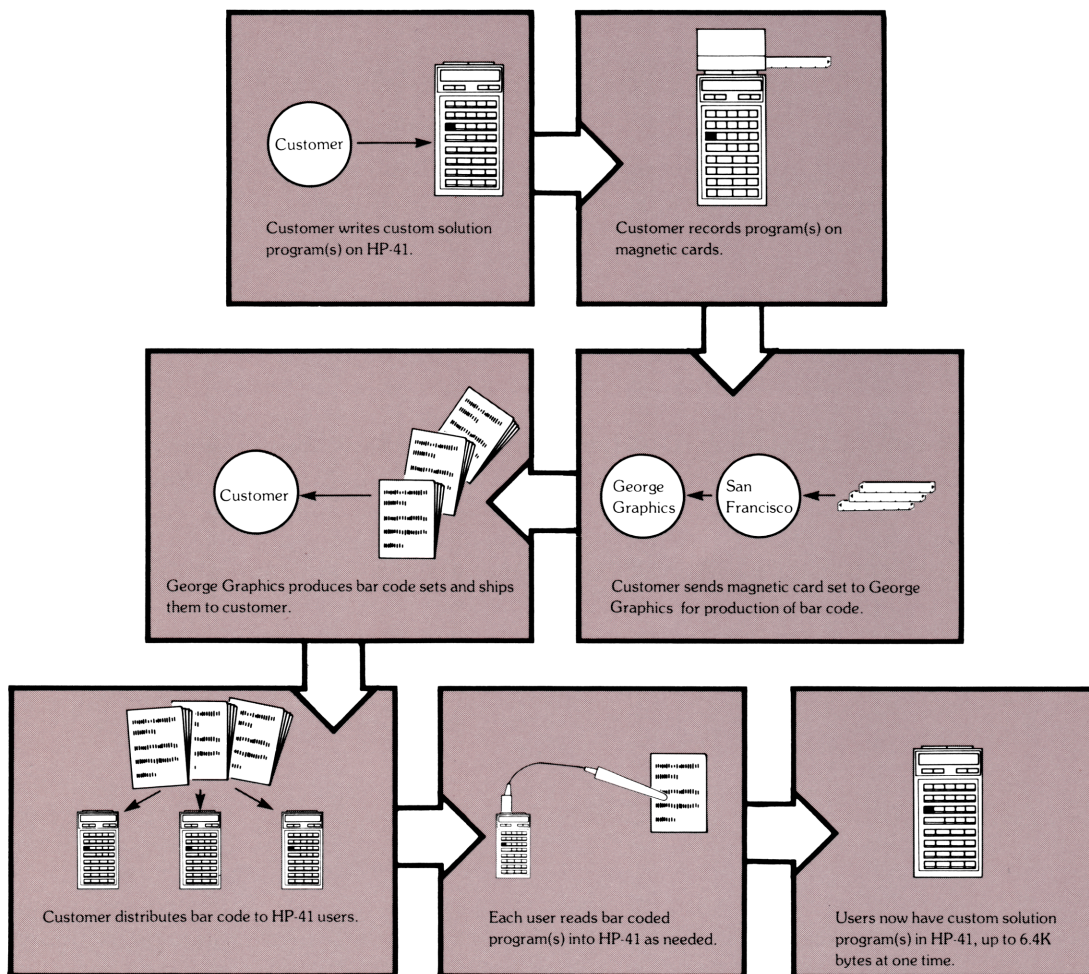


Magnetic Card Details: Custom Products also provide a magnetic card duplicating service, including printing customer's logos and other information on each card face. Magnetic cards are often favored by customers for volume duplication because they allow easy program and data modification, and they're inexpensive for program solutions comprising one or two thousand bytes or less.

In common with ROM's and cassette tapes, magnetic cards also allow the recording of special key assignments together with a program. So a magnetic card program can also be started by

pressing only one key. Magnetic card programs can also profit from the added power supplied by the Extended Functions/Memory Module. For example, a magnetic card program can reassign functions to keys many times during program execution.

Bar Code Copy Routine at a Glance:



Bar Code Details: Since there is a bar code segment corresponding to each of the 128 HP-41 functions, any operation, such as key assignment, that can be performed from the keyboard can also be represented by bar code. This means special key assignments as well as programs and data can be preserved by bar code just as they can by a mini-cassette, a custom module, or a magnetic card.

Two methods are available for creating and duplicating bar codes, which are perhaps the least expensive software media of all for large distributions:

- Customers may contact a vendor we have selected to provide a bar code creation service. They should write or call:

George Graphics
650 Second Street
San Francisco, CA 94107
(415) 397-2400

- Customers may follow the instructions in our \$12.95 manual “Creating Your Own HP-41 Bar Code” (82153-90019). A computer and printer are needed as described in the manual; for instance, the HP-85A plus the HP 82905B Printer.

Custom Key Labels

Custom Products offer one product and two services to help OEMs and VEU's obtain HP-41s in quantity with key labels corresponding to their custom software:

HP-41 Opt 001, a standard HP-41 omitting most key labels: A standard HP-41 necessarily shows several labels for each key. When using a custom program where many new functions are assigned to keys, these standard key labels can be confusing to the user. HP-41 Option 001 is a standard HP-41 in all respects except many key labels are removed or covered. The **USER** and **PRGM** keys with their labels are covered, and all other key labels are removed except **ON**, **ALPHA**, **R/S** and the following alphanumerics:

A-Z	Space
,	0-9
.	—
=	+
?	×
:	÷

The HP-41 Opt 001 is normally used with the custom keyboard overlay described below. The result is an HP-41 showing only key labels describing functions used in the custom program.

HP 82501-xxx Custom Overlay: The key labels corresponding to special functions assigned to HP-41 keys may be shown on a custom overlay. The overlay fits around the keys and may be imprinted with a customer's special labels and graphics. The labels on the keys of a standard HP-41 are still visible with the overlay in place, but the HP-41 Opt 001 removes those standard key labels that might prove confusing. Custom Overlays are supplied in minimum quantities of 250.

HP 82200A Touchpad: This special keyboard covering shows all standard key labels. It is designed for use with the HP-41 Opt 001. Since all keys on this special HP-41 perform their standard functions, the addition of the Touchpad makes it easy for a customized-HP-41 user to take full advantage of all the convenience and power of a standard HP-41. This keyboard covering is easily fixed to or removed from an HP-41, allowing quick, easy change between custom and standard use of HP-41 Opt 001. Due to the Touchpad's thin, flexible design, good key "feel" is retained as keys are pressed through the covering.

HP 82504A-xxx Custom Keyboard: Often OEMs or VEU's wish to relabel the entire HP-41 keyboard. The Custom Overlay described above can be used to rename labels above each key, but the labels on each key are still visible. These on-key labels can be renamed as well with the Custom Keyboard, a keyboard covering which is identical to the Touchpad described above, except the labels are chosen by the customer. Hewlett-Packard not only will print special labels on the Custom Keyboard as ordered by the customer, but also logos, trademarks and other special symbols. Minimum order quantity for the Custom Keyboard is 250.

Custom Solutions Software Media Comparisons

Assumptions:

1. A customer wants to distribute copies of an already programmed custom solution to HP-41 users.
2. Number of copies required: 250 copies.
3. Number of bytes in solution (programs, data): 8000 bytes.

Note: Prices are U.S. and are subject to change.

1.	2.	3.	4.	5.	6.
Software Medium	Bytes/Medium	Number of Medium Units/ Solution	Setup Charge = Cost to Place Solution on Single Medium	Cost/Blank Cassette or Cost/Each Add'l ROM, Mag Card, or Bar Code Sheet	Customer's Labor Cost to Produce 250 Copies of Medium
Cassette	128K	1	\$600*	\$9.50	\$335†
8K ROM	8K	1	20,000	22.00	0
4K ROM	4K	2	12,000	15.00	0
Magnetic Cards	224	36	495	.55	0
Bar Code	224‡	36	7.25	1.35§	0

1.	7.	8.	9.	10.	11.
Software Medium	Total Cost of 250 Copies of Solution, Including Setup = 3. × (4. + 6. + 5. × 250)	Ease of Update	Ease of Use	Degree of Program Security or Privacy	Cost Effectiveness for Short Programs (< 2000 Bytes)
		1: Easy, Inexpensive	1: Easy	1: Good Security	1: Well Suited
		2: OK	2: OK	2: OK	2: OK
		3: Not as Easy, More Expensive	3: Not as Easy	3: Not as Secure	3: Not as Well Suited
Cassette	\$3305	1	2	2	2
8K ROM	25,500	3	1	1	3
4K ROM	31,500	3	1	1	2
Magnetic Cards	22,770	1	3	3	1
Bar Code	12,411	2	3	3	1

* Costs shown are for a two-cassette-drive copying system. One cassette belongs to the customer's HP-41 system, and is not included in the setup charge. The cost of the other drive (\$550 U.S.) is part of the setup charge. The remaining \$50 of the \$600 setup charge is the estimated cost of HP 00041-15042 Automatic Start and Tape Duplication Module, soon to appear on HP's price list. If frequent cassette copying is planned, it would be more economical to invest in more Digital Cassette Drives and reduce the labor cost per copy session.

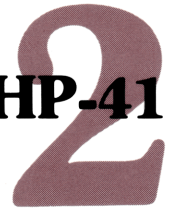
† Copy labor is estimated in this way:

To initialize a new cassette and to copy 8K onto this cassette takes about 8 minutes. Add one extra minute for each additional cassette drive in the HP-IL loop used for copying. A \$10 direct labor plus overhead figure is used. This charge is based on a one copy per session system (the two-cassette-drive copying system described in the preceeding footnote).

‡ About 224 bytes per 8½" sheet, both sides. Number of bytes per sheet varies depending on program code.

§ This is George Graphics' charge for extra copies. Printing costs for large quantities would be much lower.

Selling the HP-41



Primary Markets

VEUs are a good market for portable computation and remote data entry/data processing systems. The HP-41 system's unique combination of portability, versatility, power and low cost, coupled with a customer's ability to easily duplicate custom solutions, gives you a strong selling potential with VEUs.

Volume End Users

Including manufacturers of:

- Medical instruments
- Test and measurement instruments
- Scientific and laboratory instruments
- Fluid meters and counting devices

Hardware OEMs

Your biggest market may be hardware OEMs. The list above only suggests the variety of device manufacturers whose products might have need for low-cost, small-size, portable, battery-powered control systems that they can customize with their software and keyboard labels.

The impressive on-going success enjoyed by the HP-41 results primarily from its successful application by individuals to a wide variety of fields, from electrical engineering to finance. OEMs and VEUs are receptive to buying the HP-41 in quantity because of this extensive individual use, and because of the reliability and capability demonstrated for the HP-41 by these many owners.

Individual Customers

Secondary Markets

Systems Houses

Including:

- Energy management systems
- Inventory control systems

While these companies do not design and build hardware, they can influence their hardware suppliers to equip hardware with HP-IL. As more devices become HP-IL compatible, systems houses will turn to the HP-41 system to obtain the same outstanding advantages which will be sought by hardware OEMs.

Software OEMs

- Government—general
- Government—military

Governments around the world are prime targets for HP-41 systems. They can specify in their quote requests that the hardware they wish to buy be equipped with HP-IL, so that their software acting through HP-41s can perform their desired control functions.

Customer Close-Up

Potential customers of HP-41 systems typically require portable, low-power, custom solutions for their control, computational or information gathering needs. These customers may be unaware of:

1. HP's presence in this market.
2. HP's ability to customize a solution for their specific needs.
3. The HP-41's ability to interface upward to the Series 80 and beyond.
4. The HP-41's low cost and portability.
5. The power of the HP-41

Customer Needs	Required Product Features/Benefits
Ability to communicate with other instruments or computers, regardless of manufacturer.	HP-IL 82165 Interface 82166 Converter
Ability to customize to meet individual needs.	Custom Products Programmability
Ability to compute anywhere, quickly and accurately.	Extensive function set Portability
Ability to collect information "in the field or on the floor."	Portability Battery powered
A low cost, portable, powerful, interfactable, handheld computer.	The HP-41 system

Typical Sales Situations

Multi-Unit Purchase— Instrument Control/Data Acquisition

Customers:

- Project, program or production managers, such as:
 - Lab engineers
 - Production test engineers
 - Q/A engineers

Applications:

- Bench test
- Incoming inspection
- Assembly line product test
- Environmental test
- Field test

What the Manager is Looking for:

- Portability
- Customizable design
- Low cost
- Quality
- Ease of operation
- Automatic operation
- Programmability
- State-of-the-art, obsolescence-proof system
- Volume discounts
- After-sale support

HP Keys to Success:

- Custom solutions
- Time-controlled program execution
- Battery power
- Small size
- Modular system
- State-of-the-art, friendly user interface—HP-IL
- HP support

Watch Out For:

- Competitors having no ability to customize.
- Competitors lacking hardware and software support.
- Competitors offering terminals, not computers.

Customer:

- Individual manager

Applications:

- Incoming inspection
- Field engineer tool
- Military logistics support
- Aircraft flight planning
- Navigation
- Surveying
- Sales tool (quotes, special calculations)
- Computational projects
- Premiums for managers/sales reps (rewards, incentives)

What the Manager is Looking for:

- Solutions
- Portability
- Quality
- Ease of operation
- Low cost
- Programmability
- Customizable design
- Applications software
- Volume discounts
- State-of-the-art, obsolescence-proof system
- After-sale support

**Multi-Unit
Purchase—
Remote Data
Entry and
Data
Processing**

HP Keys to Success:

- Custom solutions
- Small size
- Battery power
- HP standard software
 - Application pacs
 - HP+
 - Solutions books
 - User Library programs
- RPN logic—quick, easy and efficient
- HP support

Watch Out for:

- Low price competitors lacking memory.
- Algebraic logic—not as easy to write or interpret.
- BASIC language—programs use about three times more memory.
- Competitors lacking hardware and software support.
- Competitors having no ability to customize.

Customers:

- Inventory managers
- Field test engineers
- Production line test engineers
- Quality assurance engineers

Applications:

- Inventory control
- Field station data acquisition
- Assembly line product testing
- Incoming inspection

What the Manager is Looking for:

- Communications capability
- Customizable design
- Portability
- Low cost
- Quality
- Ease of operation
- Volume discounts
- State-of-the-art, obsolescence-proof system
- After-sale support

HP Keys to Success:

- Low-cost system
- Portable mass memory
- Battery power
- Custom solutions
- State-of-the-art, friendly user interface—HP-IL
- Can interface with Series 80 and beyond
- HP support

Watch Out for:

- Competitors lacking hardware and software support.
- Competitors having no ability to customize.
- Competitors positioning terminals as computers.

Lead Generation

There will be an extensive schedule of full page and page dominating ads in selected major market newspapers and in the Wall Street Journal from mid-August through the end of October. A supplement to this schedule will be the extensive back to school campaign (universities and college newspapers) that will appear on 158 campuses. Beginning in November, the fall promotion theme will be continued in an extensive business and technical magazine schedule.

Competition³

Competitive Background

This is a relatively undeveloped market characterized by a number of products from a variety of companies. No product or company has a dominant market position. Products fall primarily into the following categories:

Handheld computers (HHC)

Handheld terminals:

- Dedicated, special-purpose models
- General-purpose models

Handheld Computers: Handheld computer manufacturers such as Matsushita (Panasonic), Sharp, etc. have recently introduced products with the potential for instrument control and data acquisition by adding communications capability to their HHCs. However, we know of no example of these companies' HHCs being used so far in this market. Another competitor that has the immediate potential of moving into this market aggressively is Texas Instruments. They have recently announced a new programmable calculator that is a direct competitor to the HP-41 system, and since TI is already in the dedicated handheld terminal market, they could move fast.

Handheld Terminals—Dedicated, Special-Purpose Models: These products have been developed for those times when it's necessary to go out into the plant and visit a particular computer-controlled device or a section of a computer-controlled process. These are the times when it's not practical to communicate with the controlling computer from a dedicated CRT desk terminal located in the control room. So the operator carries a miniaturized terminal to the device or process location of interest, and plugs it into a line leading to the controlling computer. Based on first-hand observation of the operation, the operator then sends instructions to the controlling computer through the portable terminal.

Such a handheld terminal is a dedicated accessory to the computer controlling the process, either because the connection to the computer is non-standard or because the specific software cannot be easily changed. Some examples: the Texas Instruments Model 510, the Fisher Controls PRoVOX, and the Bristol Babcock handheld controller. Because of the dedicated nature of these models, their applications will be necessarily limited.

Handheld Terminals—General-Purpose Models: These general-purpose models use easily modified software and industry standard interfaces, such as RS-232-C, RS-422, 20 mA current loop, or TTL level signals. Most general-purpose models draw their power from the control system, but some are battery powered. Note that these units are terminals, not computers. They only communicate with the computer that does the actual controlling. Companies producing general-purpose terminals include Burr-Brown Research Corp., G. R. Electronics, Ltd. and Nu Data Corp. These relatively small, privately-held companies constitute the most active current competition to Hewlett-Packard's entry into this budding market.

So far, OEMs designing devices to be controlled by computers necessarily design into their equipment the facility to use a large, ac powered interface. This design necessity resulted from

**Instrument
Control and
Data
Acquisition**

the absence (up until HP-IL) of a smaller, battery-powered interface system. The use of a larger, ac powered interface reduces portability, and puts constraints on size and cost reduction. The HP-41/HP-IL system will give OEMs new design freedoms that have been denied them up until now.

Portable Computation

Products in this market are direct descendants of the HP-35. Well established competitors exist against whom we have sold for some years. However, an important change has recently occurred to some of these handheld calculators. They now have I/O capability and have become compatible with standard interface systems; in short, they have become handheld computers. The presence of I/O ports makes it practical to use custom software as plug-in ROM's to solve specific problems. The company that takes best advantage of these and other new developments will dominate the portable computational market.

Our chief competitors are Matsushita (Panasonic, Quasar), Sharp (also sold by Tandy Radio Shack as the TRS-80 PC 2), Casio, and Texas Instruments. TI has traditionally been our strongest competitor, but during the last year or two they have not been as strong a presence as before, since they have not introduced a strong competitor to the HP-41 system. The new Model 88 Series recently announced could make them a more serious competitor again.

Remote Data Entry and Data Processing

This is a newer market than portable computation, but an important segment of this market is already somewhat mature. This mature segment is inventory control in the food, drug and hardware distribution industries using handheld bar code readers. Each product distributed by these industries may be held in inventory by a variety of wholesalers and retailers. For an inventory control system to work for all who handle the product, the bar code used to identify the product must be universally accepted by all. The bar code chosen is the Universal Product Code (UPC) familiar to consumers as supermarket bar code.

The dominant force in this market segment, with 61% of the business, is MSI Data Corp. You may have seen their data collector being used at your local supermarket. Other competitors are Norand Corp. and Azurdata Corp.

A rather undeveloped segment of the remote data entry/processing market that is expected to show rapid growth in the future is manufacturing inventory control. This segment includes not just manufacturers, but any company whose inventory of goods and assets is controlled within that company. For such a company, it is not critical that the bar code used be an accepted standard, since the code will be used for internal purposes only.

Where such a common bar code is not needed, the choice of a remote data entry/processing system may depend less on the use of a widely accepted bar code and more on the system's low cost, small size, portability, ease of programming, use of custom software, and ease of transferring data to a larger computer for data processing. It is in these areas, plus before- and after- sales support, that we believe Hewlett-Packard has the advantage.

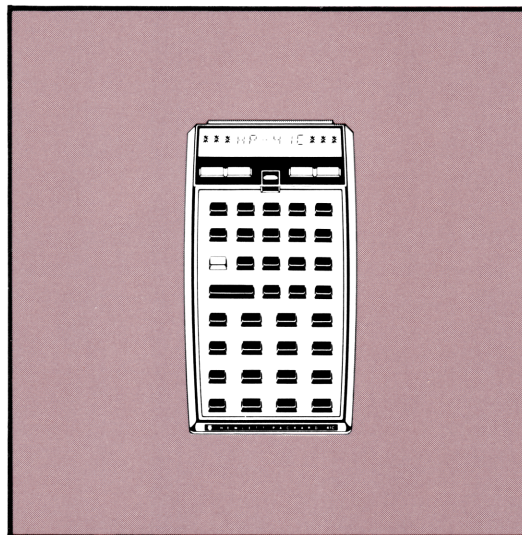
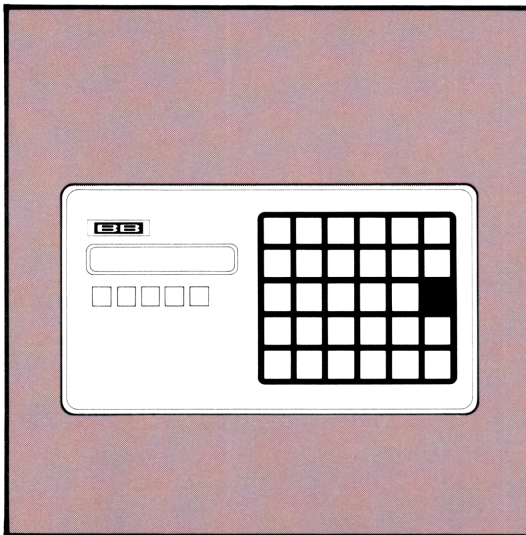
Winning Against Competition

Burr-Brown Research Corporation

The Company: Burr-Brown is fairly typical of competitors in this area. It is primarily a components manufacturer with estimated annual sales of 50 to 60 million dollars. Their products include A/D and D/A converters, hybrids, and op-amps. There are two manufacturing locations, both in Tucson, Arizona, employing about 1000 people. Although control and data acquisition is a minor part of Burr-Brown's business, it is considered innovative and aggressive in this area. Selling is done through distributors.

The Product: The battery-powered TM77 model sells for \$545, has a decimal keyboard (no alpha), and a 52-character, alphanumeric display. It's dimensions are 4.5" wide × 8.5" high × 0.6" thick. It includes 1K of RAM and 4K of PROM, and its keyboard includes 14 user programmed function keys. It's designed to interface with either RS-232-C, V.24 or a 20 mA current loop. Transmission rates may vary from 110 to 19200 baud. A wand is available as well as custom software.

Instrument Control and Data Acquisition



Burr-Brown Strengths

Standard interfaces (RS-232-C, V.24, 20 mA)
Fast transmission rates—up to 19200 baud
(but how useable is this maximum rate?)
Sealed, waterproof unit

Winning with the HP-41

Battery-powered, small-sized, low-cost interface (HP-IL)
Can control device directly (it's a computer, not a terminal).

Winning Against Burr-Brown

Burr-Brown Strengths

52 character scrolling display, 16 character window

Winning with the HP-41

HP-IL battery-powered Cassette Drive

HP-IL battery-powered Printer

HP-IL battery-powered DMM

Programmable

HP provides total solution.

Small size

Low-power liquid-crystal display visible in bright light.

HP support

Portable Computation

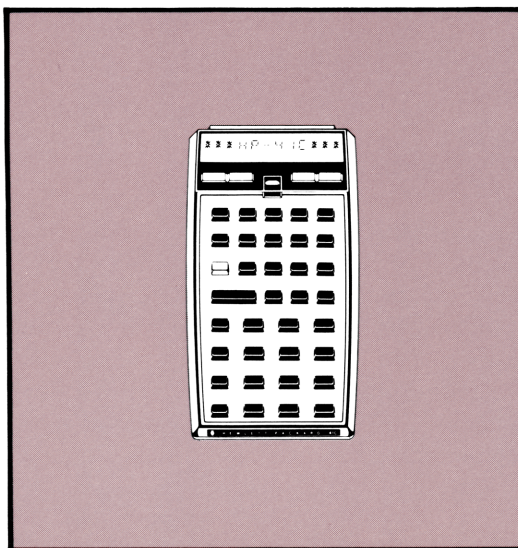
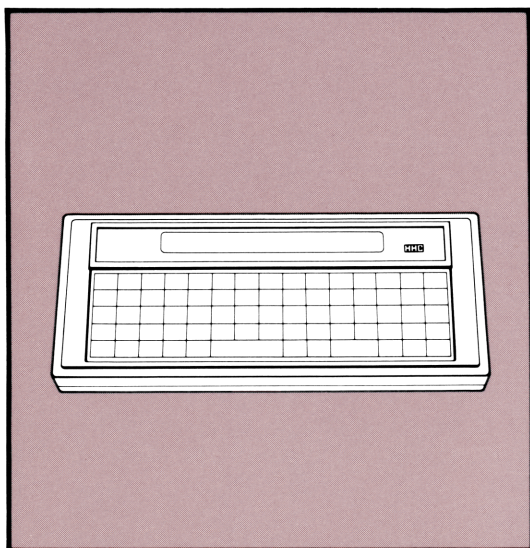
Matsushita Electric Industrial Co., Ltd. (Panasonic)

The Company: While handheld computers are a small part of Matsushita's business, they are an important competitor in our market. Based in Japan, Matsushita is one of the world's largest electrical and electronic manufacturers, with 1980 sales of \$13.7 billion. Panasonic is a Matsushita trade mark used exclusively in the United States. Panasonic products are sold in other countries under the trade name National.

The Product: The Panasonic HHC RL-H1000, also called Link, is based on the 6502 microprocessor. It is powered by a rechargeable battery, and is 8.94" wide × 3.75" high × 1.13" thick. The basic unit includes an internal clock and calendar. Base price (not including recharger) is \$418 (U.S.). The basic HHC has three sockets for ROM capsules (up to 16K each) or EPROM capsules (up to 4K each). The HHC also has one port for peripherals. An I/O adapter can be plugged into the HHC's peripheral slot to provide six additional slots for peripherals. Extra ROM's allow programming in Microsoft BASIC or SNAP, a proprietary language based on FORTH.

Programmable RAM in the basic unit is 3.3K, and up to six additional 4K or 8K RAM plug-in peripheral modules may be added, providing programmable memory of 51K. Panasonic recently announced a 16K programmable RAM plug-in module, but it is unclear at print time if the HHC can address six of these 16K modules. These RAM modules, when plugged into the HHC, are powered by the HHC's batteries. When removed, the RAM modules' memories are preserved by back-up batteries contained within each module.

An audio cassette is also offered, which requires a cassette adapter. Using this adapter, two cassette drives may be connected. Other available peripherals include a battery-powered RS-232-C interface, a battery-powered microprinter (15 characters per line), a battery-powered 40-character microprinter, a battery-powered, 80 character, four-color plotter, a battery-powered acoustic modem, and an ac powered TV adaptor.



Panasonic Strengths

Up to 51K of programmable RAM
 Phone modem—battery powered
 LCD, 26 character, 8 × 159 dot matrix
 BASIC and SNAP
 QWERTY keyboard
 RS-232-C—battery powered (but draws 650 mW at 5V from HHC's 5 AA batteries).
 Low cost peripherals
 80-character/line, four-color plotter, battery powered
 40-character/line dot-matrix printer, battery powered

Winning with the HP-41

Low cost mainframe
 HP-IL Digital Cassette Drive
 HP software
 HP-IL—up to 30 HP-IL devices on one loop
 Low cost wand
 Fast repair service
 HP support
 Established, respected product
 Strong customer base

**Winning
Against
Panasonic**

MSI Data Corporation

The Company: MSI, based in Costa Mesa, California, is the world leader in handheld, battery-powered data-entry terminals with over 200,000 units delivered to date. Most of MSI's revenues (FY 1981 sales: \$55 million) come from sales to retail/wholesale industries. Now MSI

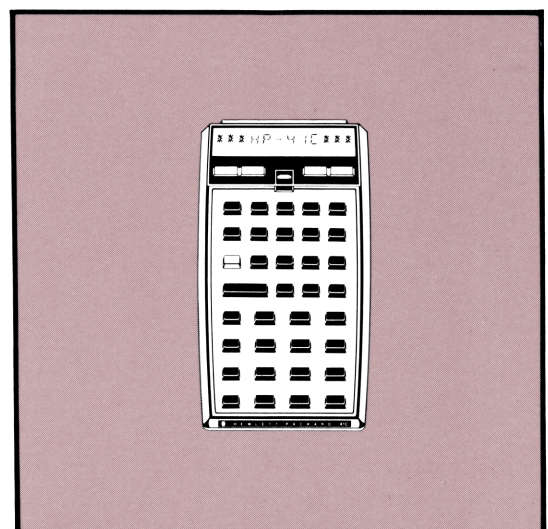
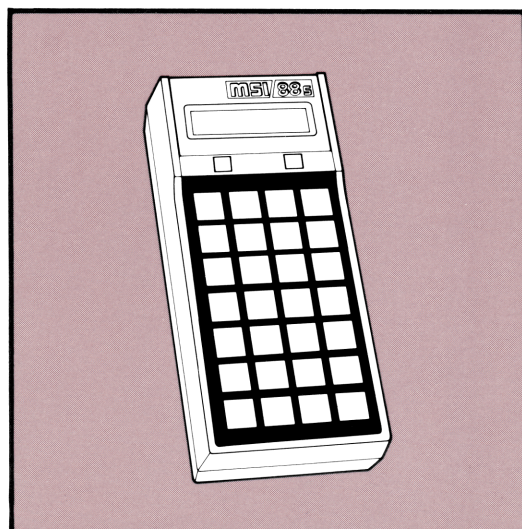
**Remote Data
Entry and
Data
Processing**

is developing software that will allow their products to move into the manufacturing and field service markets. New manufacturing applications include inventory control, quality assurance, material control and industrial engineering.

MSI sells directly to its end users through its own direct sales force in both the U.S. and Europe. Outside distributors are used in other countries. MSI has approximately 20 field service centers in the U.S. and Canada.

The Product: MSI produces a number of portable, battery-powered data-entry terminals, the most capable and expensive being the MSI/88S Alphanumeric Program-Loadable Portable Terminal. Its dimensions are 3.94" wide × 7.75" high × 2.25" thick. Equipped with the minimum available RAM memory, 16K, its price is at least \$1450. (The 88S is a new model somewhat more powerful than the 88F, previously the top-of-the-line model, which is priced at \$1450). Memory options allow up to 56K of RAM, providing program or data storage for 112K of four-bit numeric or 56K of eight-bit alpha characters. The 88S is equipped with a full alphanumeric keyboard of 28 shifted keys, and it has a two-line, 32 character LCD display. The wand is of rugged design, and can read several types of commonly used U.S. and European bar codes. Several interface options are available including an acoustic modem and RS-232-C.

The 88S is not programmable, but programs and data can be downloaded into RAM by plugging an MSI Program Load Module into the 88S's communication port. Customers may develop their own custom software by renting or buying MSI's software development system, which is used in a manner similar to Hewlett-Packard's Software Development Service. MSI's software development system (Omega Application Development System) is priced at \$25,290 and up. MSI maintains several Regional Development Centers to help customers develop their software.



MSI Strengths

Wand can read several common bar codes.
Rugged, high quality wand
Up to 56K internal RAM
Strong leader in data entry market
Regional Development Centers help custom programmers
Phone modem
RS-232-C interface

Winning with the HP-41

Low cost system
Programmable computer
Custom programs easily written onto cassette, easily copied from one to many cassettes, and easily down-loaded into HP-41s.
Digital tape drive provides 128K/cassette portable mass memory.
Low-cost, battery-powered interface
HP-IL peripherals
Small size

**Winning
Against MSI**

Remote Data Entry and Data Processing Competition

Remote Data Entry and Data Processing Competition

Company	MSI	Norand	Azurdata
Model	88s	101-XL	Scorepak
Wand	Yes	Yes	Yes
Bar Code	Modified-Plessey UPC Codabar Code 39 EAN Own Code	Modified-Plessey UPC Codabar Own Code	Modified-Plessey UPC Codabar EAN/JAN
Data Communication	RS-232-C MDAA ADAA	Own Bus	RS-232-C
Custom Products	Yes	Yes	No
Programmable Memory (Bytes)	16-56K	16-64K	4-64K
CPU	8-Bit Parallel	8-Bit Parallel	
Operating System	8K Terminal Operating System		
Display	32-Character LCD	12-Character LED	
Options: Thermal Printer 80 Col. Printer Tape Memory Phone modem TV/Monitor Time Capability	Yes No No Yes No Built-In	Yes Yes No Yes No Yes	Yes
List Price for Basic Mainframe		\$810	

Hewlett-Packard	Panasonic (Quasar)	Sharp (Radio Shack)	Casio
HP-41CV/HP-IL	RL-H1000 (HK2500)	PC 1500 (TRS-80 PC 2)	FX-702P
Yes	No	No	No
Own Code			
HP-IL GPIO **	Own Bus RS-232-C	Own Bus RS-232-C	Own Bus
Yes	Yes	Yes	No
2.2K-6.4K	1.3-51K	2.6-6.6K	1680 Steps
10-Bit Serial	8-Bit Serial	8-Bit Serial	8-Bit Serial
RPN	BASIC	BASIC	BASIC
12-Character LCD	26-Character LCD	26-Character LCD	20-Character LCD
Yes Yes Digital No Yes Yes	Yes No Audio Yes Yes Built-In	Yes No Audio Avail. Soon No Built-In	Yes No Audio No* No No
\$325	\$329	\$275	\$199

* Only Available in Japan.

** Call your CVD Field Support Group for Other Implementations (RS-232-C, HP-IB, etc.)

Portable, On-The-Job Computation Competition

Portable, On-The-Job Computation Competition

Company	Hewlett-Packard	Sharp (Radio Shack)
Model	HP-41CV/HP-IL	PC 1500 (TRS-80 PC 2)
Display	12-Character LCD	26-Character LCD
Keyboard	Alphanumeric	Qwerty
Operating System	RPN	BASIC
Custom Products	Yes	Yes
Programmable Memory (Bytes)	2.2-6.4K	2.2-6.6K
Options: Wand Thermal Printer 80 Col. Printer Tape Memory TV/Monitor Time Capability	Yes Yes Yes Digital Yes Yes	No Yes No Audio No Built-In
List Price for Basic Mainframe	\$325	\$275

Panasonic (Quasar)	Casio	Texas Instruments
RL-H1000 (HK2500)	FX-702P	88
26-Character LCD	20-Character LCD	16-Character LCD
Qwerty	Alphanumeric	Alphanumeric
BASIC	BASIC	Algebraic
Yes	No	Yes
1.3-51K	1680 Steps	.96-3.3K
No Yes No Audio Yes Built-In	No Yes No Audio No No	No Yes No Audio No Built-In
\$329	\$199	\$350

Instrument Control and Data Acquisition Competition

Instrument Control and Data Acquisition Competition

Company	Burr-Brown	G.R. Elec.	Nu Data
Model	TM77	Pocket Terminal	920A
Keyboard	Decimal	Alphanumeric	Alphanumeric
Display	16-Character LED	8-Character LED	16-Character LCD
Programmable Memory (Bytes)			2K
Operating System			
Interface	RS-232-C V.24 20mA	RS-232-C 20mA	RS-232-C 20mA
Transmission in Baud	110-19200	110 & 300	50-19200
Options: Wand Thermal Printer 80 Col. Printer Tape Memory Phone modem TV/Monitor Time Capability	Yes No		
Custom Products	Yes		Yes
List Price for Basic Mainframe	\$595	\$395	\$1595

Hewlett-Packard	Hewlett-Packard	Panasonic (Quasar)	Sharp (Radio Shack)
41CV/HP-IL	97S	RL-H1000 (HK2500)	PC 1500 (TRS-80 PC 2)
Alphanumeric	Numeric	Qwerty	Qwerty
12-Character LCD	10-Character LED	26-Character LCD	26-Character LCD
2.2-6.4K	.2K	1.3-51K	2.6-6.6K
RPN	RPN	BASIC	BASIC
HP-IL GPIO ***	BCD Input Only	RS-232-C Own Bus	RS-232-C* Own Bus
1500	110	110-9.6K	Not Avail. Yet
Yes Yes Yes Digital No Yes Yes	No Yes** No No No No No	No Yes No Audio Yes Yes Built-In	No Yes No Audio No No Built-In
Yes	No	Yes	Yes
\$325	\$1445	\$329	\$275

* Announced But Not Available Yet.

** Built-In.

*** Call your CVD Field Support Group for Other Implementations (RS-232-C, HP-IB, etc.)

Sales Aids 4

Sales aids are available to help you or your OEM sell HP-41 systems effectively. As time passes, the selection of available sales aids will change without notice.

A 4-color, 20-page booklet covering personal computation sales promotion aids, including all items listed below. Two pages of order forms, showing prices, are included for your use. For copies of this Sales Promotion Catalog, write to:

Hewlett-Packard
MARCOM
1010 NE Circle Blvd.
Corvallis, OR 97330

Personal Computation Sales Promotion Catalog

A 9-minute, 65-slide (35mm), audio cassette, self-presenting show (script included). Designed to provide a sales oriented tutorial overview of the HP-41, Extended Functions/Memory, Extended Memory, and Time Modules, as well as HP-IL. Excellent for introducing the HP-41/HP-IL system.

HP-41/HP-IL Tutorial Slide Show

A 10-minute, 73-slide (35mm) show including script. Designed to provide a sales-oriented tutorial overview of Custom Products. It covers the mechanics of getting customer-written software produced as bar codes, magnetic cards or plug-in ROM's. Descriptions of actual and potential custom software applications are also included. In addition, custom keyboards, custom keyboard overlays, and the HP-41 Opt 001 HHC are covered. (HP-41 Opt 001 is a functionally standard HP-41 with almost all function labels removed). Even though it does not include HP-IL, this slide show gives customers a good introduction to Custom Products.

Custom Products Tutorial Slide Show

A 4-color, 20-page brochure describing features and functions of the HP-41C, HP-41CV, peripherals and modules. The brochure also covers HP-IL and its peripherals. A complete list of the program names in all HP-41 application pacs and solutions books is included.

HP-41C/CV and HP-IL Brochure (5953-7206)

A 16-page, black and white brochure providing specifications and functions resident in the HP-41C/CV, HP-IL, and in the Extended Functions/Memory, Extended Memory, and Time Modules, plus dedicated peripherals. It includes an HP-41 configuration guide.

HP-41 Technical Product Guide (5953-5505)

**Custom
Products
Sales
Presentation
Pac**

An 8½" × 11" folder containing material including prices to help you sell Custom Products. Included are agreement forms and a configuration guide worksheet. Also included is a flowchart to help you describe the procedures HP and your customer would follow from the initial agreement to the receipt of the final custom product. Full color pictures of custom keyboards and keyboard overlays are included to show the combination of background and print colors available.

**HP-41
System
Demo
Cassette**

A digital mini-cassette containing demonstration programs for the HP-41 and its peripherals designed to be run by customers without assistance. It offers an excellent way to introduce a new customer to the HP-41/HP-IL system.

**HP-41 Space
Shuttle
Poster (7668)**

27" × 19", 4-color, showing the U.S. Space Shuttle landing. (The HP-41 system was used for flight-critical calculations on board the Space Shuttle).

**HP-IL
Selection
Guide (6072)**

A 13" × 15", laminated card enables you to easily determine what mainframe and peripherals will best meet the customer's needs.

**Hewlett-
Packard
Banner
(7065)**

28" × 60", satin finish with Hewlett-Packard logo in blue and black. This banner has been designed for use by all HP sales personnel. Three grommets are on the top edge and one on each lower corner. Great for road shows and seminars.

**Retail Price
List
(5953-7803)**

8½" × 11" price list, including mainframes, software, owner's manuals, accessories, and peripherals. This list does *not* include prices for Custom Products. See the Custom Products Sales Pac for these prices.

**HP-41
Statement
Stuffer (5074)**

A 3" × 4.88", 10-panel, 4-color presentation of the HP-41. One panel is left blank for imprint. Designed to be enclosed in mailings.

Bronze acrylic, 19"W × 11.5"D × 7"H. The HP-41 can be centered or positioned on the right side in a floating position, using a bronze acrylic security holder. A Card Reader can easily be installed. The Printer or Cassette Drive can be positioned to the right or centered on the display.

**HP-41C/CV
System
Display
(6032A)**

½" dia., showing the Space Shuttle landing. Sticks on windows and metal surfaces. Easily removed.

**HP-41 Static
Sticker
(6083)**

An HP-41 without internal components, excellent for display purposes.

**"Dummy"
HP-41CV
Computer
(6025)**

Ordering Information

5

HP-41 System Price List Summary

Note: These prices are in effect at print time. They are U.S. prices, and may change at any time.

Here are July 1982 list prices for the HP-41/HP-IL hardware and supply items which will be of most interest to you. Application pacs and solutions books are priced individually in the retail price list (5953-7803).

Item	Product Number	List Price
HP-41C Handheld Computer (441 bytes)	41C	\$195.00
HP-41CV Handheld Computer (2,333 bytes)	41CV	275.00
Note: The HP-41C and HP-41CV are each supplied with 4 non-rechargeable, 1.5v, size N, alkaline batteries. These are standard batteries available at retail stores. Hewlett-Packard does not offer spare or replacement batteries of this type.		
Rechargeable Battery Pack for HP-41 Batteries may be recharged whether mounted in or removed from the HP-41. <i>The 82059B or 82066B Recharger/AC Adapter is required.</i>	82120A	35.00
Recharger/AC Adapter—110 V Allows line voltage operation of Printer, Cassette Drive, or an HP-41 equipped with the Rechargeable Battery Pack. <i>The Printer and Cassette Drive each come equipped with either the 82059B or 82066B Recharger/AC Adapter.</i>	82059B	12.50
Recharger/AC Adapter—220 V Except for voltage, same as 82059B.	82066B	25.00
Plug-in Card Reader	82104A	215.00
Plug-in Optical Wand	82153A	125.00
Extended Functions/Memory Module	82180A	75.00
Extended Memory Module No more than two may be used. Use of one or two requires one Extended Functions/Memory Module.	82181A	75.00
Time Module	82182A	75.00
Automatic Start and Tape Duplication Module	00041-15042	To be established

Item	Product Number	List Price
Application Pacs—currently 17 subjects from Circuit Analysis to Petroleum Fluids. Each Pac includes a plug-in ROM and a manual. Some include keyboard overlays.	00041-150xx	From 30.00 to 75.00
HP-IL Interface Module	82160A	125.00
HP-IL Digital Cassette Drive, includes Recharger/AC Adapter, one cassette, and one 0.5 meter HP-IL Cable.	82161A	550.00
HP-IL Thermal Printer/Plotter, includes Recharger/AC Adapter, two rolls of blue paper, and one 0.5 meter HP-IL Cable.	82162A	495.00
Rechargeable Battery Pack for HP 82161A Cassette Drive and HP 82162A Printer	82033A	20.00
HP-IL Video Interface, U.S. version, 525/60 Hz refresh, 61.25 MHz (Ch. 3), includes TV/monitor selector switch, Recharger/AC Adapter and one 0.5 meter HP-IL Cable.	82163A	295.00
HP-IL Video Interface, European version, 625, 50 Hz refresh, 62.25 MHz (Ch. E.4), includes cable adapter, Recharger/AC Adapter and one 0.5 meter HP-IL Cable.	82163B	295.00
Impact Printer—HP-IL Includes one 0.5 meter HP-IL Cable. (Personal Computer Division)	82905B	
120V	Opt 248	795.00
220V	Opt 348	845.00
240V	Opt 448	845.00
HP-IL Converter Prototyping Kit Includes two converters, an evaluation board, a manual, two 0.5 meter HP-IL cables, and two GPIO connectors.	82166A	395.00
HP-IL Converter (10 pack) Includes 10 converters only.	82166B	1250.00
HP-IL/GPIO Interface Includes Recharger/AC Adapter and one 0.5 meter HP-IL Cable.	82165A	295.00
HP-IL Interface for Series 80 computers (Personal Computer Division) Includes one 0.5 meter HP-IL Cable.	82938A	295.00
Digital Multimeter (HP-IL) Includes rechargeable battery pack	3468A Opt 001	820.00

Item	Product Number	List Price
Includes one 0.5 meter HP-IL Cable. (Loveland Instrument Division) Must also choose one of eight no-charge voltage/frequency options:		
100V, 50 Hz	Opt 315	
110V, 60 Hz	Opt 316	
120V, 50 Hz	Opt 325	
120V, 60 Hz	Opt 326	
220V, 50 Hz	Opt 335	
220V, 60 Hz	Opt 336	
240V, 50 Hz	Opt 345	
240V, 60 Hz	Opt 346	
Digital Mini-Cassettes (10 pack)	82176A	95.00
0.5 meter HP-IL Cable	82167A	12.00
1 meter HP-IL Cable	82167B	15.00
5 meter HP-IL Cable	82167D	20.00
Reserve Power Pack for Printer and Cassette Drive (includes battery pack)—Allows recharging of spare batteries.	82037A	60.00
Blank Overlays for HP-41 (50 pack)	82172A	55.00
Blank Program Cards for Card Reader		
40 Card Pack with Holder	00097-13141	20.00
120 Card Pack with 3 Holders	00097-13143	50.00
1000 Card Pack (No Holders)	00097-13206	250.00
Holder for Program Cards (3 pack)	00097-13142	15.00
Each holds 40 cards, 5 cards per page, so that each card's label is visible.		
Black Thermal Printing Paper (6 rolls)	82175A	12.00
Blue Thermal Printing Paper (6 rolls)	82045A	10.00
Software Development Service—Short Term	82505ST	275.00/ week
Software Development Service—Long Term	82505LT	3000.00/ 6 months
SDS Consumables Kit	82505AC	235.00
"Creating Your Own Bar Code" Manual	82153-90019	12.50

Remember When ordering a Series 80 computer as part of an HP-IL system, be sure to include the HP-IL Interface (82938A), plus an I/O ROM and a ROM Drawer. The HP-IL Interface plugs into a Series 80 port and contains HP-IL cable connectors. One 0.5 meter HP-IL Cable is also included.

Note that an HP-85F mainframe ordered with Option 006 includes the Series 80 HP-IL Interface.

Also note that most HP-IL devices include one 0.5 meter HP-IL cable. Remember to consider this when determining how many HP-IL cables your customer should order.

No more than two HP 82181A Extended Memory Modules can be used in one HP-41.

One or two Extended Memory Modules requires one HP 82180A Extended Functions/Memory Module.

Typical Ordering Examples

This system allows the remote entry of data using the battery-powered HP-41 Handheld Computer, followed by the transmission of this data to an HP-85 for processing and storage.

Portable Data Entry System

HP-41 items:

Item	Product Number	List Price
HP-41CV Handheld Computer	41CV	275.00
Extended Functions/Memory Module	82180A	75.00
2 Extended Memory Modules	82181A	150.00
HP-IL Interface Module for the HP-41	82160A	125.00
SUB-TOTAL FOR HP-41 SYSTEM		625.00

Series 80 items:

Item	Product Number	List Price
HP-85F Computer including 82938A HP-IL Interface	85F Opt 006	3385.00
Optional: 16K Memory Module	82903A	195.00
Optional: 5¼" Dual Master Flexible Disc Drive	82901M	2200.00
Optional: Impact Printer (HP-IB)	82905B Opt 002	795.00
SUB-TOTAL, HP-85F OMITTING OPTIONAL ITEMS		3385.00
TOTAL OMITTING OPTIONAL ITEMS		4010.00
TOTAL INCLUDING OPTIONAL ITEMS		7200.00

This system is designed for customers who want to equip their personnel with HP-41s fitted with plug-in custom modules. This system would allow each customer to program the ROM bit pattern on a disc. Hewlett-Packard would etch this bit pattern into the quantity of modules covered by the customer's contract

Development System

Item	Product Number	List Price
HP-41CV Handheld Computer	41CV	275.00
HP-IL Interface Module	82160A	125.00
HP-IL Digital Cassette Drive	82161A	550.00
HP-IL Thermal Printer/Plotter	82162A	495.00
Digital Mini-Cassettes (10 pack)	82176A	95.00
Black Thermal Printing Paper (6 rolls)	82175A	12.00
Software Development—Short Term	82505ST	275.00 per week
TOTAL		1552.00 plus 275.00 per week

Development System

This system, or one similar, would satisfy your customers who wished to:

1. Develop HP-IL equipped devices to be controlled by HP-41s.
2. Write custom HP-41 software designed to perform this control function.
3. Provide this software on custom magnetic cards to ensure future software flexibility not provided by ROM's.

Item	Product Number	List Price
HP-41CV Handheld Computer	41CV	275.00
Rechargeable Battery Pack—recommended because of the Card Reader's frequent use in this application.	82120A	35.00
Recharger/AC Adapter	82059B	12.50
Plug-in Card Reader	82104A	215.00
Time Module	82182A	75.00
HP-IL Interface Module	82160A	125.00

Item	Product Number	List Price
Thermal Printer/Plotter	82162A	495.00
HP-IL Converter Prototyping Kit	82166A	395.00
HP-IL Converter (10 pack)	82166B	1250.00
Blank Overlays for HP-41 (50 pack)	82172A	55.00
Blank Program Cards for Card Reader 120 card pack with 3 holders.	00097-13143	45.00
Black Thermal Printing Paper (6 rolls)	82175A	12.00
TOTAL		2989.50

You might prepare a quote like this for VEUs who wish to equip their professionals with standard HP-41 systems.

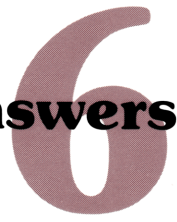
**Industrial
User System**

Item	Product Number	List Price
HP-41CV Handheld Computer	41CV	275.00
Extended Functions/Memory Module	82180A	75.00
Extended Memory Module	82181A	75.00
Time Module	82182A	75.00
HP-IL Interface Module	82160A	125.00
HP-IL Digital Cassette Drive—one Drive for every five HP-41s. Programs and data would be periodically downloaded from the Cassette Drive into each HP-41's mass memory (82180 + 82181). The Drive's price, \$550.00, is divided by five to derive a unit system price.	82161A	110.00
HP-IL Thermal Printer/Plotter	82162A	495.00
TOTAL		1,230.00
TOTAL FOR 50 SYSTEMS		61,500.00

In addition, the following optional items might be included:

Item	Product Number	List Price
10 Reserve Power Packs for Printer and Cassette (each includes battery pack.)	82037A	600.00
25 Digital Mini-Cassettes (10 pack) (total of 250 cassettes)	82176A	2375.00
25 Black Thermal Printing Paper (6 roll pack) (total of 150 rolls)	82175A	300.00
2 Blank Overlays for HP-41 (50 pack) (total of 100 overlays)	82172A	110.00
10 Optical Wands	82153A	1250.00
10 Plug-in Card Readers	82104A	2150.00
10 Recharger/AC Adapters	82059B	125.00
Blank Program Cards for Card Reader 1000 card pac (no holders)	00097-13206	195.00
4 Holders for Program Cards (3 pac) (total of 12 holders)	00097-13142	40.00
TOTAL PACKAGE PRICE		68,645.00

Questions and Answers



What Do We Call the HP-41?

The HP-41 Handheld Computer. Our current sales promotion campaign features this name. Note that we use “handheld” as one word. The common, industry wide standard acronym is HHC.

Is the HP-41 Truly a Computer?

Yes—it’s programmable, it computes, it interfaces, it handles files (ASCII, program, data), and it has an alphanumeric display. Except for size, portability, speed and memory size, it’s like all other HP computers.

Can the HP-41 Communicate in ASCII?

Yes—the HP-41 can communicate bi-directionally in ASCII with any appropriate device equipped with the HP 82166 Converter.

Where Should I Direct My Customer for Non-HP Software?

Direct your non-European customer to the Corvallis Division Users’ Library. European customers should contact the Users’ Program Library Europe in Geneva. See Appendix A, pages 63-64 for details.

What About Graphics?

There is activity in this area, but we can say nothing definite at this time.

What About an HP-IL Modem?

We are aware of the importance of an HP-IL modem, but at this time, we have nothing to report.

What Software is Available to Link the HP-41 to the Rest of the Asynchronous Computer World, Like the HP-3000?

We do have hardware links from the HP-41 to other computers, the HP 82160A HP-41/HP-IL Interface Module coupled to the HP 82938A Series 80/HP-IL Interface, and the HP 82165A HP-IL GPIO Interface coupled to any GPIO computer interface. However, no standard software exists yet to link the HP-41 to the rest of the computer world. Relatively simple HP-41 and Series 80 programs must be written to transfer data through HP-IL from one to the other. Examples of these programs can be found in the Owner’s Manual (82938-90001) for the HP 82938A Series 80/HP-IL Interface.

Can My Customer Rent the Software Development System Without the HP-85 and the Disc Drive?

Yes, the Software Development System is available without the HP-85 and disc drive as a long term (6 months) lease.

My Custom Products Customer Has a Full Stock Room of HP Consumables. Should I Recommend the Purchase of the SDS Consumables Kit?

Yes, the Consumables Kit is a requirement. It not only contains the vital SDS Operating System on disc and 22 very useful microcode routines on another disc, but it also includes unique SDS manuals, spare fuses specific to the SDS hardware, plus other consumables your customer might not have.

Does the Software Development System Include an HP-41 System?

No, your customers must supply their own HP-41 systems or buy them separately. Generally, OEMs who want Hewlett-Packard to produce custom HP-41 software will already own HP-41 systems.

Once My Custom Products Customer Has Sent to Hewlett-Packard a Disc Containing the Custom ROM Bit Pattern, How Soon Will the Finished ROM's Be Shipped?

Normally, ROM shipment occurs about 25 weeks after Corvallis receives the customer's disc. A week after the disc arrives, Hewlett-Packard mails to the customer a listing showing the program steps on the disc. The customer checks this listing, then signs and sends to HP a document stating that the listing is correct. Within 22 weeks after receiving this signed assurance, HP ships the finished ROM's. However, for customers who are willing to accept the resulting increased risk of ROM bit error, a fast track processing is available that reduces this 22 week period to 13 weeks.

Why Doesn't the HP-41 Wand Read Common Bar Codes?

The bar code which the HP-41 Optical Wand reads was optimized to provide a low cost method of reading and duplicating software compatible with the HP-41. Code 39, which is gaining some acceptance as an industry standard, could not have been implemented for the HP-41 without increasing wand costs to an unacceptable level.

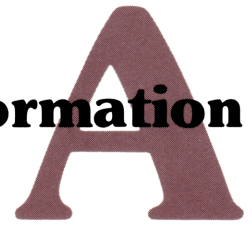
Is Corvallis Looking at Other Bar Codes?

Corvallis and other divisions are looking at other bar codes, *BUT* there are no plans to develop another HP-41 compatible wand at this time.

What Customer Training is Available on the HP-41 System?

There is no HP-41 customer training available at this time, except that which is available through dealers or private parties.

Sales Support Information



The HP-41 and its accessories (except software, the batteries, and damage caused by batteries) are warranted by Hewlett-Packard against defects in materials and workmanship for one year from the date of original purchase.

Warranty

Title	Part Number
HP-41C/CV Owner's Handbook and Programming Guide	00041-90313
HP-41C/CV Operating Manual—A Guide for the Experienced User	00041-90328
HP 82104A Card Reader Owner's Handbook	82104-90001
HP 82153A Wand Owner's Manual	82153-90001
HP 82180A Extended Functions/Memory Module Owner's Manual (This also covers HP 82181A Extended Memory Module).	82180-90001
HP 82182A Time Module Owner's Manual	82182-90001
HP 82160A HP-IL Module Owner's Manual	82160-90001
HP 82161A Digital Cassette Drive Owner's Manual	82161-90002
HP 82162A Thermal Printer Owner's Manual	82162-90001
HP 82163 Video Interface Owner's Manual	82163-90001
HP 82165A HP-IL/GPIO Interface Owner's Manual	82165-90002
HP 82166A HP-IL Converter Technical Manual	82166-90002

Documents

Hewlett-Packard's largest library of user and HP written software, serving all areas except Europe, is available to help you sell HP-41 systems. (European customers are served by the Users' Program Library Europe located in Geneva—see below). Here are some U.S. Users' Library highlights:

U.S. Users' Library

Over 6000 HP-41 and HP-67/97 program titles in the current catalog—the “smart” HP-41 Card Reader can read over 90% of HP-67/97 magnetic cards and translate their code into HP-41 code.

Three classes of software are included in the catalog:

- Software written by individual HP-41 users
- Software obtained through Hewlett-Packard's HP+ Program
- Software written especially for low cost Solutions Books, each covering a specific technical or financial area.

Quality of user-submitted software is ensured through strict standards and careful program review of all submittals.

Low cost is a benefit of large volume:

- Programs—\$6.00 or higher, depending on size
- Solutions Books—\$12.50 for about 10 programs.
- Library Subscriptions (U.S.)—\$20.00 for benefits totalling \$49.00.

The current *Users' Library Catalog of Contributed Programs* listing all three classes of software is available to you and your customers for \$10.00. For your copy, just send a COMSYS to Nancy Reddington, Division 3900, listing your name, mailing address, account number and location code, and your Catalog will be mailed to you within 48 hours. Your customers may obtain catalogs from their local dealers, whose locations can be found through our 800 number (see below). Customers may obtain catalog updates by subscribing to the Users' Library.

The U.S. Users' Library offers a one-year, renewable subscription whose price depends on the subscriber's location. For addresses in the U.S., Puerto Rico, Virgin Islands, and Canada, the price is \$20.00. For all other locations (except Europe), the price is \$35.00. All subscriptions should be paid in U.S. dollars.

To receive a U.S. Users' Library subscription, your customer should send name, address and check or money order to:

Hewlett-Packard
Users' Library
1000 NE Circle Blvd.
Corvallis, OR 97330

Users' Program Library Europe

Customers with European addresses should contact the following address for information:

Users' Program Library Europe
Hewlett-Packard S.A.
P.O. Box CH-1217 Meyrin 2
Geneva, Switzerland

800 Number

Any of your customers may obtain the following information toll free:

Availability and price of any Personal Computing Group product.

General non-technical product information.

Location of a customer's local dealer.

Product service information, such as:

- Repair prices
- Repair turn-around time
- Status of a repair order

The toll free number is 800-547-3400. In Alaska, Hawaii and Oregon, the number is (503) 758-1010. TTY users with hearing or speech impairments may dial (503) 758-5566.

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SEE ALSO CONTENTS, P. 3

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All part numbers beginning with letters (like HP xxxxxx) are listed alphabetically.

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 1.0 meter HP-IL Cable—see: HP 82167B
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 5704—see: HP-41 Statement Stuffer
 5953-5505—see: HP-41 Technical Product Guide
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