

HP-IL Compendium

HP-IL Interface & Peripherals Compendium

Sylvain Côté - September 20, 2018

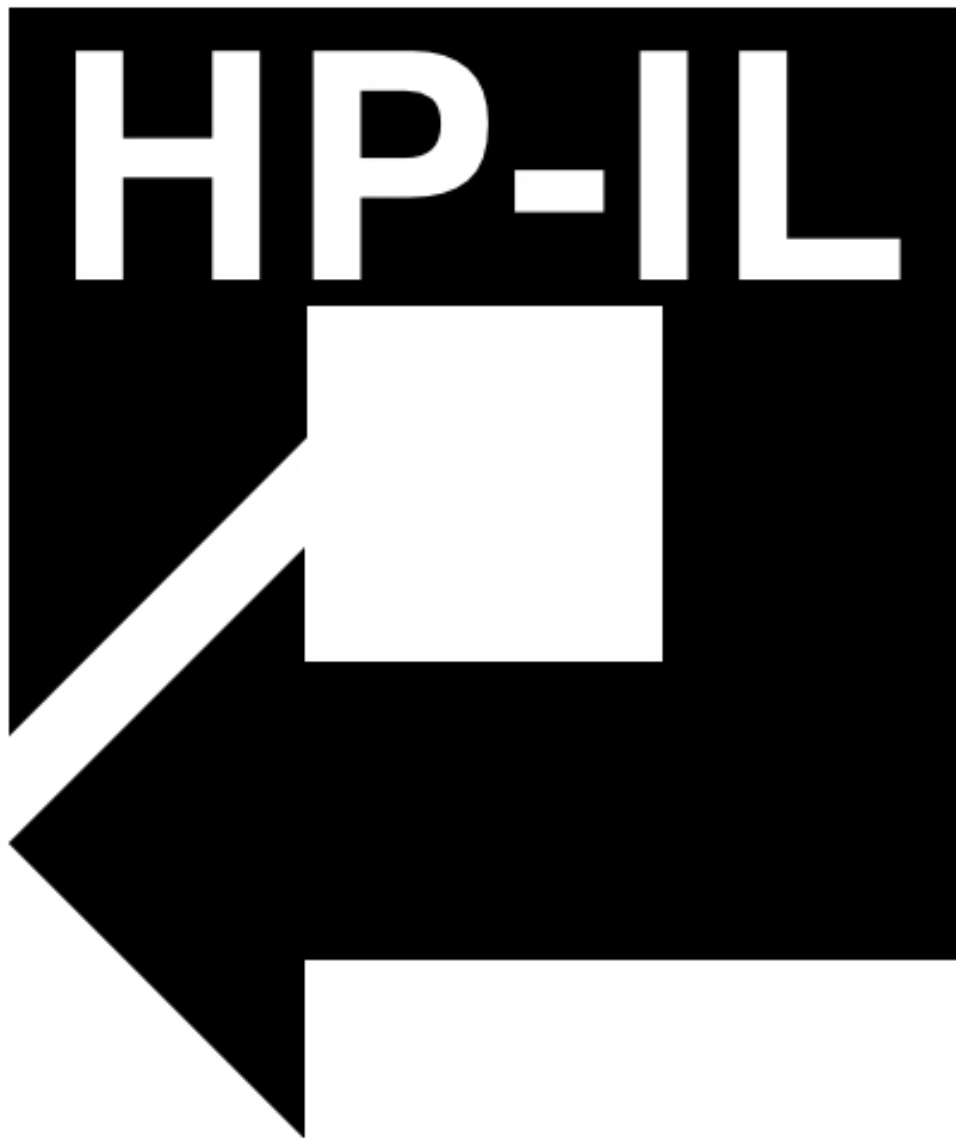


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Preface

Introduction

The goal of this document, is to gather all the information related to the Hewlett-Packard Interface Loop in one place.

Disclaimer

It is my understanding that due to their age, the documents, softwares, ROM images, etc. referenced in this document may be shared for personal and non-commercial use, however, please contact me immediately if you are a copyright holder and my understanding is incorrect.

Acknowledgments

- To Hewlett-Packard for having created HP-IB and HP-IL technology.
- To companies and individuals who has created HP-IL peripherals and accessories.
- To individuals who has created virtual HP-IL peripherals.
- To all unnamed peoples who contribute in keeping HP-IL alive.

Contributors

- Robert Prosperi : Compendium Reviewer, SB10160 Manuals, CMT-DISPLAY pictures, HP-IL Fact Sheet & many other documents.
- Jean-François Garnier : PIL-Box & PIL-IO Products Informations.

Notes

- All contributors are welcome.
- If you have directly contributed to this document and you are not listed, please contact me and I will gladly add your name to it.
- If you find errors in any part of the document, please contact me and I will correct it and if the correction is incorrect do not hesitate to contact me as long as it need be, with some reserve of course.
- Original price is rounded to the nearest Euro or US dollar.

- Italic entries are educated guess.
- Underline entries are web links to external documents or web sites.

Updates

Revisions

Released	Updates
2018-09-20	Version 1.0, HHC-2018
2018-09-14	Version beta.1, distributed to compendium reviewer(s)
2018-08-26	Version alpha.3, distributed to compendium reviewer(s)
2018-08-18	Version alpha.2, distributed to compendium reviewer(s)
2018-08-17	Version alpha.1, distributed to compendium reviewer(s)

Upcoming

Upcoming
HP / 3421A / Data Acquisition & Control Unit + Accessories
HP / 2671A / Impact Printer, 8½", Text Only
HP / 2671G / Impact Printer, 8½", Text & Graphic
HP / 1630A / Logic Analyzer, 35 Channels
HP / 1630D / Logic Analyzer, 43 Channels
HP / 1630G / Logic Analyzer, 65 Channels
FSI / Modem1200 / 1200 Bauds Modem
HP / 4945A / Transmission Impairment & Measuring Set
HP / 5006A opt. 030 / Signature Analyser
HP / 5384A opt. 003 / Frequency Counter 225 MHz [JFG]
HP / 5385A opt. 003 / Frequency Counter 1 GHz
II / ADC71A / A/D Interface
Ocean Scientific / - / A/D Interface, 8 in/8 out
Ocean Scientific / - / A/D Interface, 0..20V

Upcoming

HP / Integral PC / HP-IL Interface Card [JFG]

HP / 82973A / HP-IL Interface Card for the IBM-PC/XT

Christoph Klug / HP-IL Interface Card [JFG]

CMT / MC-II / Handheld Computer + HP-41 Emulator + HP-IL Pod

Pac Hardware / Advanced Pac Screen / Video Interface with Centronics Interface

HP / 82477A / HP-IL Link Software

LIETZ / IL71 / HP-71 IL & Theodolite Interface

HP / Series 80 / HP-IL Controllers (83/85/86/87)

HHP / RS-232 Interface

FSI / FSI164A / Multi-Channel RS-232 Interface

FSI / Modem300+ / 300 baud Modem

Many others not yet listed here ...

References

Acronyms

Acronym	Description
A/D	Analog to/from Digital
B	Byte(s)
CAD	Canadian Dollar (\$)
EU	European or European Union
EUR	Euro (€)
FF	French Franc
IB	Interface Bus (HP-IB, IEEE-488 or GPIB)
IL	Interface Loop (HP-IL)
I/O	Input and/or Output
ISA	Industry Standard Architecture
KB	Kilobyte(s) [1000 Bytes]
KiB	Kibibyte(s) [1024 Bytes]
MB	Megabyte(s) [1000000 Bytes or 1000 KB]
MiB	Mebibyte(s) [1048576 Bytes or 1024 KiB]
NA	North-American
n/a	Not available
PC	Personal Computer
PDF	Portable Document File/Format
RAM	Random Access Memory
ROM	Read Only Memory
tbd	To be defined
USD	United States Dollar (\$)

Acronym	Description
ZIP	Zip formatted & compressed file

Units & Conversions

Unit	Description
'	Foot, US: 1/3 of a yard (SI: 304.8 mm)
"	Inch, US: 1/12 of a foot (SI: 25,4 mm)
ANSI A	Letter size paper, US: 8½" × 11" (SI: 216 mm × 279 mm)
ISO A4	Letter size paper, SI: 210 mm × 297 mm (US: 8.27" × 11.7")

Creators, Manufacturers & Distributors

Creators, Manufacturers & Distributors	Link
CG : Christoph Gießelink (Germany) Products : Windows HP-IL emulators	Website
CMT : Corvallis MicroTechnology Inc. (Corvallis, OR, USA) Origin : founded in 1984 by David Lin (ex HP) & others Products : 41/71/75/IL add-ons and peripherals	
EduCALC (South Laguna, CA, USA) Origin : founded by Jim Carter, operated from 1980 to 1997 Store : calculators, peripherals, accessories, books, etc.	
Epson formerly named Daiwa Kogyo and now Seiko Epson Corporation (Japan) Origin : founded in 1942 by Hisao Yamazaki Products : printers, etc.	Website
FSI : Firmware Specialists Inc. (Corvallis, OR, USA) Origin : founded in 198? by David R. Conklin (ex HP) & Steve Chou (ex HP) Products : 41/IL add-ons and peripherals	
HHP : Hand Held Products Inc. (Charlotte, NC, USA) Origin : founded in 1982 by Mike Weaver Products : 41/71/IL add-ons and peripherals	

Creators, Manufacturers & Distributors	Link
HP : Hewlett-Packard (Palo Alto, CA, USA) Origin : founded in 1939 by William Redington Hewlett & Dave Packard Products : most of the products in this compendium	Website
Interface Instruments (Corvallis, OR, USA) Products: data acquisition & analog to digital converter	
JFG : Jean-François Garnier (France) Products : HP-IL interfaces (PIL-Box & PIL-IO) & DOS HP-IL emulators	Website
JS : Joachim Siebold (Germany) Products : Python HP-IL Emulator (pyILPER)	Website
MH : Martin Hepperle (Germany) Products : 3D parts, Articles, German Books, etc.	Website Store
MC : Mountain Computer (Scotts Valley, CA, USA) Products : HP-IL peripherals (Video & EPROM Programmer), etc.	
NCR : National Cash Register (since 1884, USA) Origin : acquired by John Henry Patterson and Frank Jefferson Patterson in 1884 Products : thermal paper, etc	Website
NEC : Nippon Electric Company (Japan) Origin : founded in 1898 by Kunihiko Iwadare and Takeshiro Maeda Products : monitors, etc.	Website
NM : Nate Martin (USA) Products : 3D parts	Store
Ocean Scientific (USA)	
S&B : Steinmetz & Brown (USA) Products : HP-IL disk drives	
SC : Sylvain Côté (Canada) Products : HP-71 Compendium & HP-IL Compendium	71 : Website / Compendium IL : Compendium

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Interfaces Technology

Hewlett-Packard Interface Bus



Overview

Introduction

The Hewlett Packard Interface Bus (HP-IB) is a carefully designed and defined general purpose digital interface system and associated support which simplifies the design and integration of instruments and computers into systems. It minimizes electrical/mechanical hardware and functional compatibility problems between devices and has sufficient flexibility to accommodate a wide and growing range of future products. As such, HP-IB is an interfacing concept, and a design technique which you can take advantage of to define, design, build, and use your own measurement system for maximum cost-effectiveness.

HP-IB evolved from an internal Hewlett Packard need for a standardized instrumentation interface system. The chronology of the HP-IB evolution is summarized here:

- Sept. '65 — HP began to look at how to standardize "the interfacing of all HP future instruments."
- March '72 — U.S. Advisory Committee (IEC) formed. The committee takes HP proposal as starting point.
- Sept. '74 — IEC approves for ballot draft document (U.S. Proposal).
- April '75 — IEEE Publishes IEEE-488.
- Jan. '76 — ANSI Publishes MC1.1.
- Nov. '78 — IEEE Revises IEEE-488.

- June '80 — IEC 625-1 published.
- Dec. '81 — IEEE 728 published. (Recommended Codes & Formats)
- June '87 — IEEE revises 488 to become 488.1.
- June '87 — IEEE 488.2 published. (Codes, Formats, Protocols & Commands)

The IEEE-488 is widely used internationally and is implemented in several brand versions: HP-IB, GPIB, IEEE BUS, ASCII BUS, PLUS BUS & IEC BUS

The IEEE-488 standard has been published in 9 languages and has been used by more than 250 manufacturers in more than 14 countries to design more than 1000 products. It is one of the most carefully defined, consistent, and highly used interface systems in the world.

HP-IB: Going beyond the standards

The Hewlett Packard Interface Bus (HP-IB) begins by being totally consistent with all Electrical, Mechanical, and Functional specifications of the IEEE 488/ ANSI MC1.1 standards. It also is totally consistent with the Electrical and Functional specifications of the IEC 625-1 standard. Hewlett Packard's experience designing HP-IB system components leads to additional "Designed for Systems" benefits in the operational area of HP-IB products/systems and in the programmer/user conveniences engineered into them.

Technical overview of IEEE 488

The key specifications of IEEE 488 are summarized here:

- INTERCONNECTED DEVICES — Up to 15 maximum on one contiguous bus.
- INTERCONNECTION PATH — Star or linear bus network up to 20 meters total transmission path lengths.
- SIGNAL LINES — Sixteen active total; 8 data lines and 8 lines for interface and communication management.
- MESSAGE TRANSFER SCHEME — Byte-serial, bit-parallel, asynchronous data transfer using interlocking three-wire handshake technique.
- MAXIMUM DATA RATE — One megabyte per second over limited distances; 250 to 500 kilobytes per second typical maximum over a full transmission path. The actual data rate is determined by the devices in communication at the time.
- ADDRESS CAPABILITY — Primary addresses, 31 Talk and 31 Listen; secondary (2 byte) addresses, 961 Talk and 961 Listen. There can be a maximum of 1 Talker and up to 14 Listeners at a time.
- PASS CONTROL — In systems with more than one controller, only one can be active at a time. The currently active controller can pass control to one of the others. Only the controller designated as system controller can assume control.

- INTERFACE CIRCUITS — Driver and Receiver circuits TTL and Schottky compatible.

What comprises an interface system?

An interface system can be totally characterized in terms of the Functional, Electrical, Mechanical, and Operational specifications of the interface.

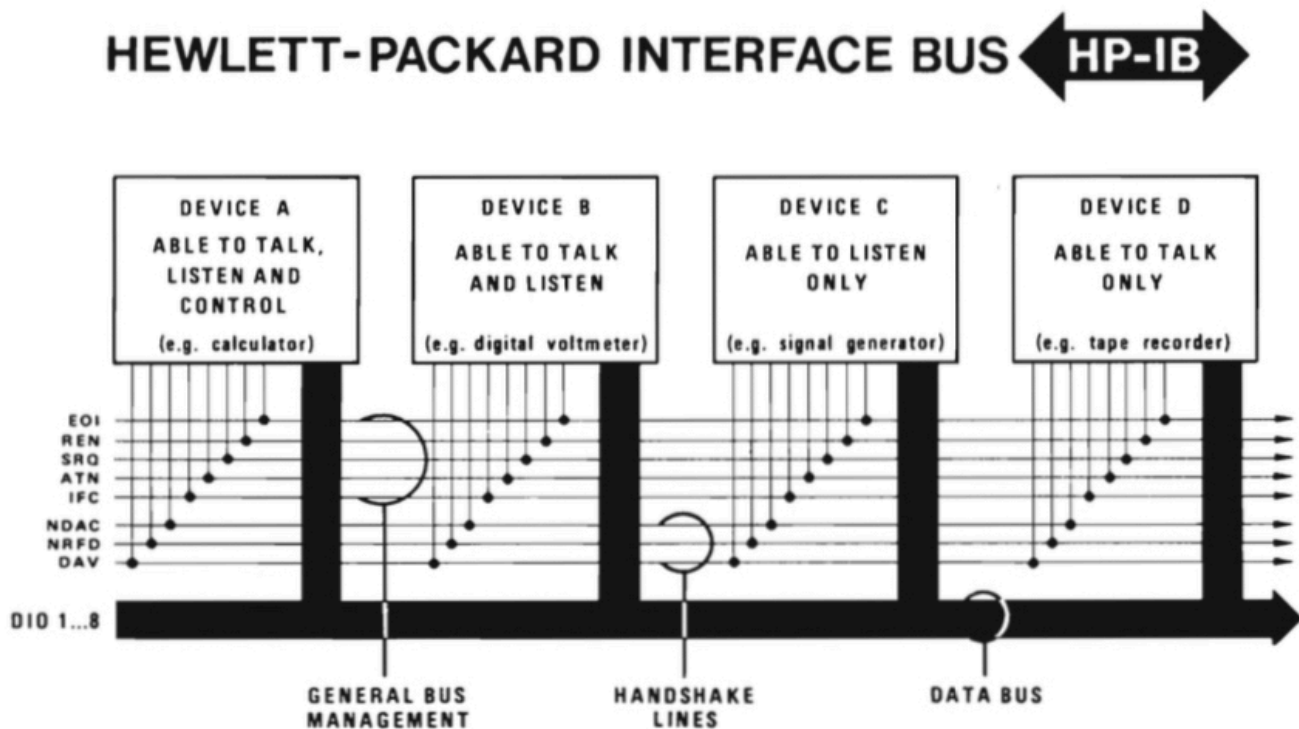
- FUNCTIONAL — Total set of allowable interface functions and their logic descriptions (Application independent)
- ELECTRICAL — Logic levels, protocol, timing, termination, etc. (Application independent)
- MECHANICAL — Connector, Mounting, Cable assembly, etc. (Application independent)
- OPERATIONAL — Total set of allowable device functions and their logic descriptions (Applications dependent)

The IEEE-488, ANSI MC1.1, and IEC 625-1 standards address three of these areas but not the Operational area. This gives instrument and computer designers the flexibility to optimize their products to the intended applications. This includes which functions they choose and to some degree how they choose to implement them.

Functional aspects

The HP-IB interface system utilizes a party-line bus structure (devices share signal lines) to which a maximum of 15 devices may be connected in one contiguous bus. Sixteen signal lines and 8 ground lines are used to interconnect devices in a parallel arrangement and maintain an orderly flow of device and interface related information.





Hewlett-Packard Interface Bus Structure

Every HP-IB device must be capable of performing one or more of the following interface functions (roles):

- **LISTENER** — A device capable of receiving data over the interface when addressed. Examples of this type of devices are: printers, display devices, programmable power supplies, programmable signal sources and the like. There can be up to 14 active listeners simultaneously on the interface.
- **TALKER** — A device capable of transmitting data over the interface when addressed. Examples of this type of devices are: tape readers, voltmeters that are outputting data, counters that are outputting data, and so on. There can be only one active talker on the interface at a time.
- **CONTROLLER** — A device capable of this includes specifying the talker and listeners for an information transfer (including itself). A computer with an appropriate I/O card is an example of this type of device. There can be only one active controller on the interface at a time. In multiple controller systems only one can be a **SYSTEM CONTROLLER (MASTER)**.

Interface Functions

Interface functions are predefined capabilities which could be designed into an HP-IB device. The designer is free to choose which are implemented in a device depending on the particular device's intended application. The total available set is summarized here:

- Talker : must be able to transmit data and commands.
- Listener : must be able to receive data and commands.
- Source Handshake : must be able to send remote multiline messages.
- Acceptor Handshake : must be able to receive remote multiline messages.
- Remote/Local : must be able to select between two sources of input information.
- Service Request : must be able to asynchronously request service from the controller.
- Parallel Poll : must be able to return a status bit upon controller request.
- Device Clear : must be able to return to a pre-defined state upon reception.
- Device Trigger : must be able to execute a device function upon talker request.
- Controller : must be able to control the bus.
- Driver : must be able to report driver type implemented: open-collector or tri-state.

Data Lines

An 8-bit bidirectional bus is used to transfer information from device to device on the interface. Normally, a 7-bit ASCII (American Standard Code for Information Interchange) code is used with the eighth bit available for parity (if desired). The international equivalent to this is the 7-bit ISO (International Standards Organization) code. However, other encoding techniques may be utilized to compress information on these 8 lines. Information transferred includes interface commands, addresses, and device dependent data (discussed later with the ATN management line).

Handshake Lines

Three lines used to coordinate the transfer of data over the data bus from a source (an addressed talker or a controller) to an acceptor (an addressed listener or all devices receiving interface commands) to ensure data transfer integrity. This technique has the following characteristics:

- Data transfer is asynchronous and the transfer rate automatically adjusts to the speed of the sender and receiver(s) and runs at the rate of the slowest active device.
- More than one device can accept data at the same time.
- Every byte transferred undergoes the handshake.

These handshake lines are:

- Data Valid : this line is controlled by the source (active talker or controller).

- Not Ready For Data : this line is controlled by the acceptors (active listeners) or all devices receiving interface commands.
- Not Data Accepted : this line is controlled by the acceptors (active listeners) or all devices receiving interface commands.

General Interface Management Lines

Five lines are used to manage an orderly flow of information across the interface; These general interface management lines are:

- Attention : causes all devices to interpret data on the bus as a controller command and activate their acceptor handshake function (command mode) or data (data mode) between addressed devices.
- Interface Clear : initializes the HP-IB system to an idle state (no activity on the bus).
- Service Request : alert the controller to a need for communication.
- Remote Enable : enables devices to respond to remote program control when addressed.
- End Or Identify : indicates last data byte of a multibyte sequence; also used with attention management line to parallel poll devices for their status bit.

(ref: 59300-90007 1980/11 Tutorial Description of the Hewlett-Packard Interface Bus)

Availability

Introduced in 1972 and still available today.

Articles

Articles	Link
Hewlett-Packard Journal, October 1972 • HP-IB : A Practical Interface System for Electronic Instruments by Gerald E. Nelson and David W. Ricci • A Common Digital Interface for Programmable Instruments: The Evolution of a System by Donald C. Loughry	<u>Journal</u>
Hewlett-Packard Journal, January 1975 • The Hewlett-Packard Interface Bus : Current Perspectives by Donald C. Loughry • Putting Together Instrumentation Systems at Minimum Cost by David W. Ricci and Peter S. Stone	<u>Journal</u>
Hewlett-Packard Journal, December 1979 • Don Loughry on ANSI/IEEE Standard 488 and the HP Interface Bus.	<u>Journal</u>

Articles	Link
Tutorial Description of the Hewlett-Packard Interface Bus, November 1980	Manual
Tutorial Description of the Hewlett-Packard Interface Bus, November 1987	Manual

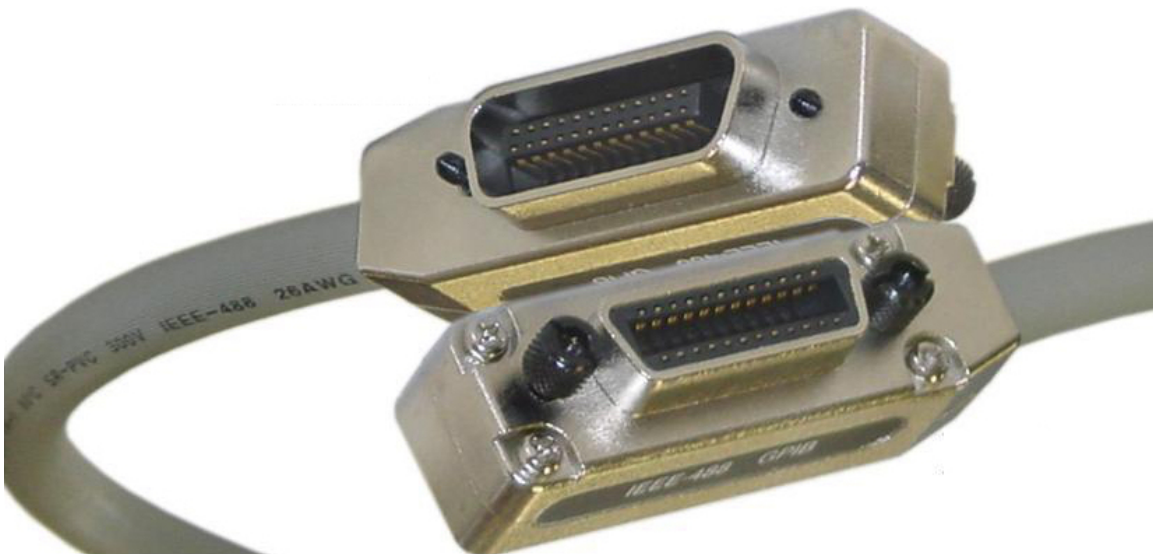
Price List

Product #	Description (Cables)	Price € / \$ US
10631D	HP-IL Cable, 0.5 meter	60.00 \$: 1979
10631A	HP-IB Cable, 1 meter	60.00 \$: 1979
10631B	HP-IL Cable, 2 meters	65.00 \$: 1979
10631C	HP-IL Cable, 4 meters	75.00 \$: 1979

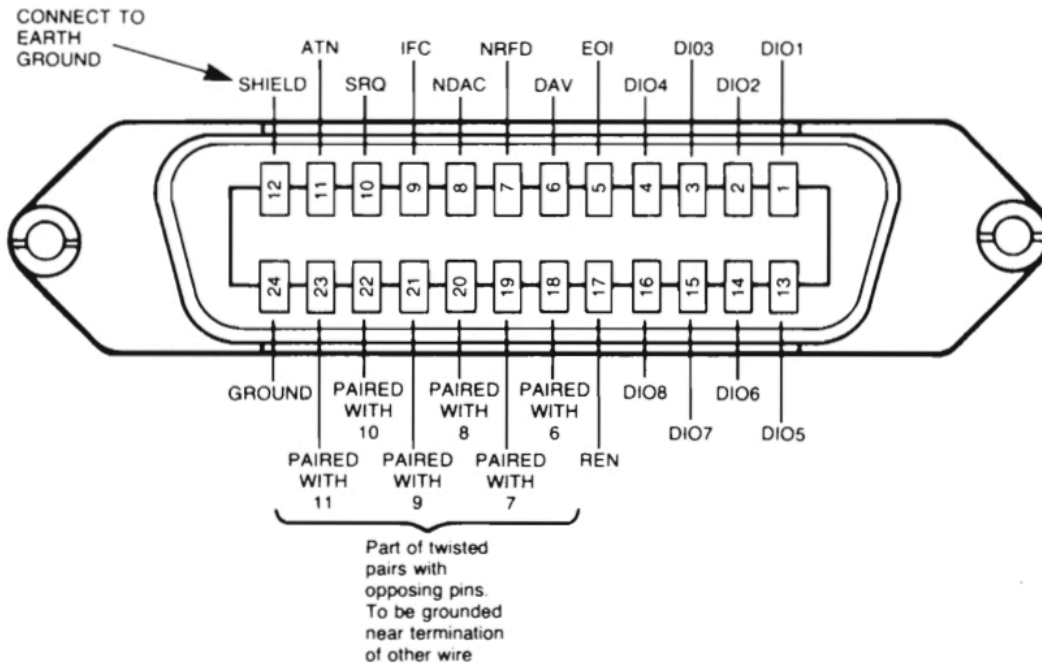
Pictures



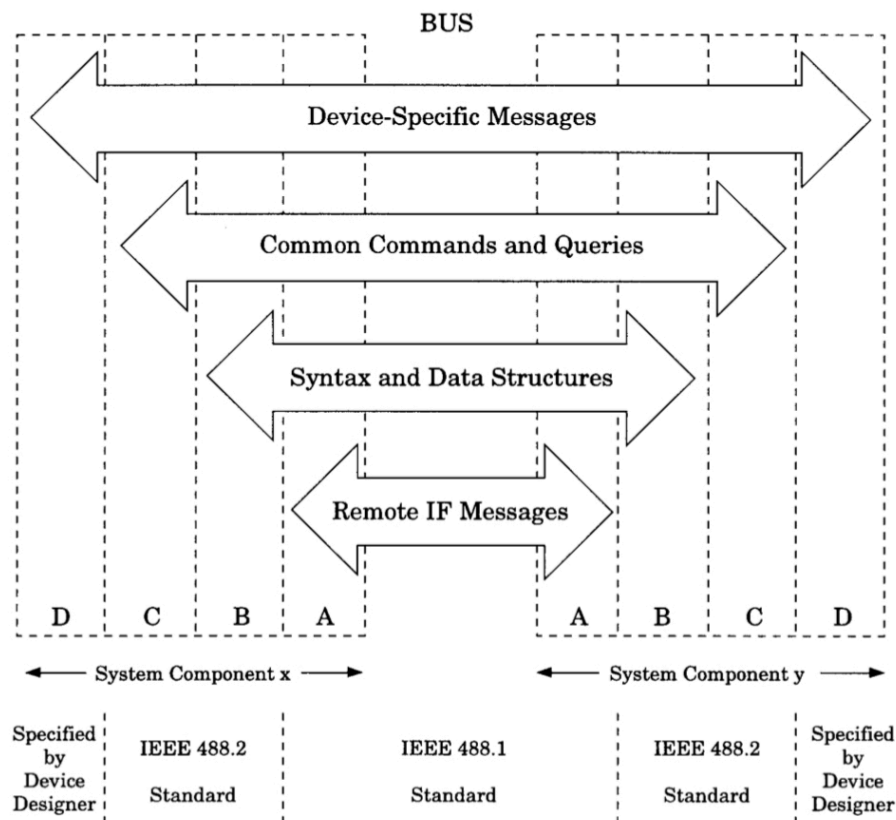
HP-IB Device Connector



HP-IB Cable

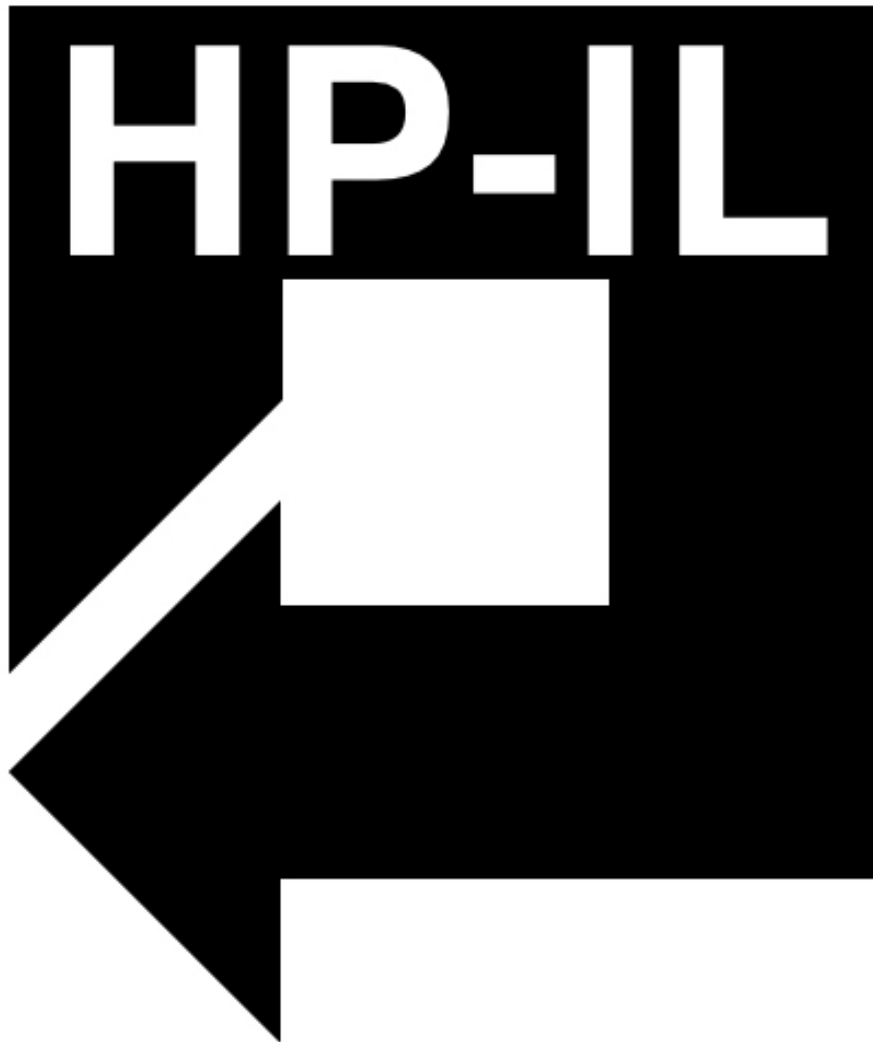


HP-IB Connector Lines



IEEE 488 Standardization

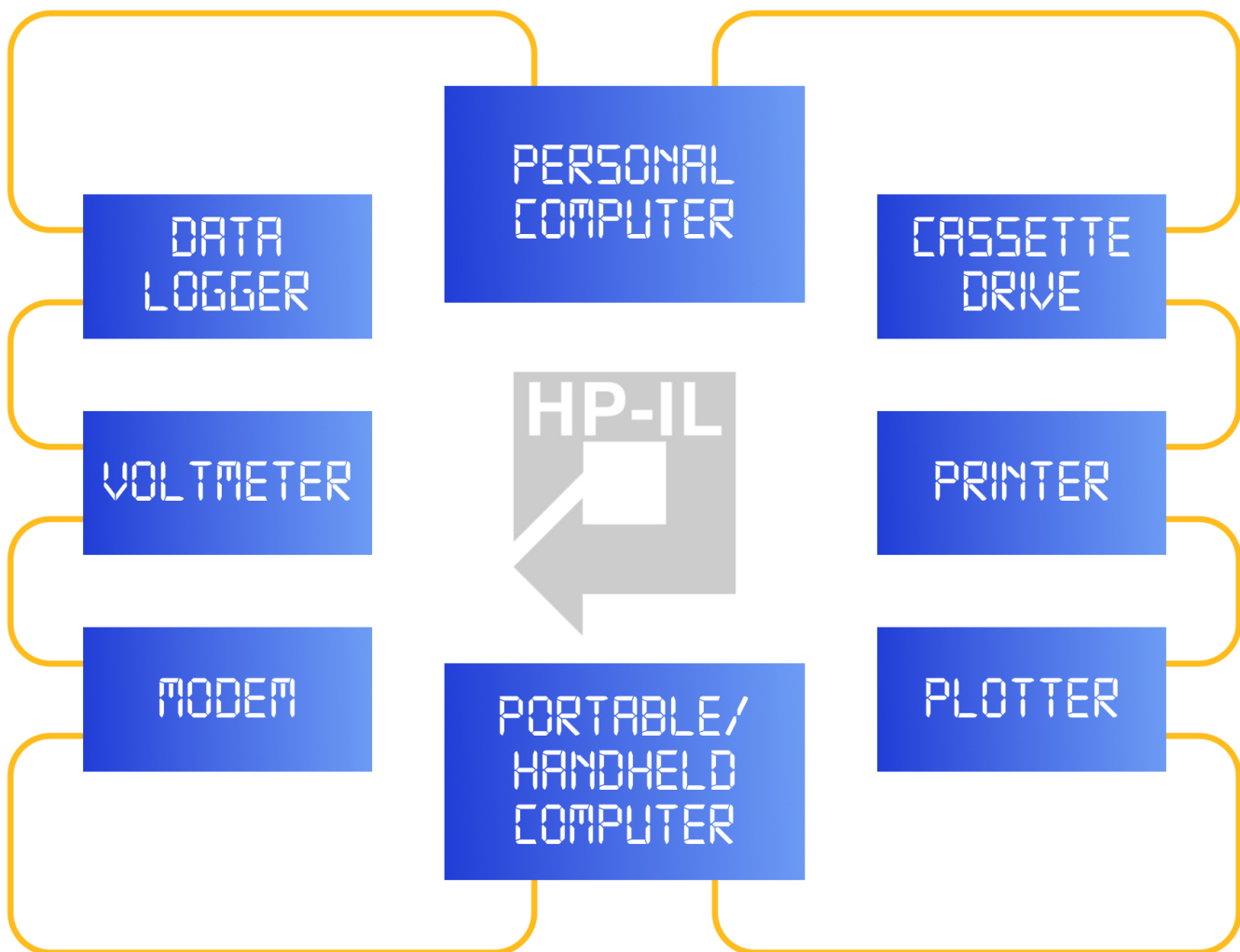
Hewlett-Packard Interface Loop



Overview

The Hewlett-Packard Interface Loop (HP-IL) is a bit-serial interface designed for low cost, battery operable systems. HP-IL lets you use your calculator or your computer as system controller, capable of transmitting and receiving data, and performing a wide variety of information management and instrument control functions. In this system, devices are connected by two-wire cables leading from the output port of one device to the input port of the next, until all devices form a closed loop. This loop structure provides a unique capability through auto address assignment, device capability identification, power ON/OFF control and error checking.

(ref: 5953-5579 1983/10 Series 40 Adv. Prog. Calc.)



Hewlett-Packard Interface Loop

The Loop:

The Hewlett-Packard Interface Loop is easy to use and understand. The computer and all devices included in the interface loop are connected together in series, forming a communications circuit. Any information that is transferred among HP-IL devices is passed from one device to the next around the circuit. If the information is not intended for a particular device, the device passes the information on to the next device in the loop. When the information reaches the proper device, that device responds as directed. In this way, the computer can send information to and receive information from each device in the loop, according to the devices capability.

Talker & Listeners:

The transfer of information on the loop is analogous to communication among people. Obviously, in any transfer of information between two people, one person must send

information while the other receives it. If the information is transferred orally, then the sender is a talker, and the receiving person is a listener. Similarly, a device sending data on HP-IL is called a talker, and the receiving device functions as a listener. Some devices in the loop can talk and listen (although not simultaneously). A mass storage device such as a disc drive is a talker when it is being read from. It can also function as a listener when being written to. Some devices are able to function in only one mode, that is, either as talker or listener. A printer, for example, functions solely as a listener.

The Controller:

In a group of two or more people, confusion will result if more than one person talks at once. A moderator prevents confusion in a group by designating one and only one person to talk at a time. In HP-IL the active controller maintains order by assigning a device as the active talker. Other functions of the active controller include passing the loop control to another device and designating which devices are active listeners. Your HP Series 80 Personal Computer is a device that can function as active controller. The computer also has the capability to be a talker or a listener. It is permissible for several devices to be active listeners simultaneously, but there can only be one active controller and one active talker at any time.

Addressing:

In order to distinguish among devices in the loop, each device must have an address, a number from 0 to 30. The system controller assumes the 0 address at power on, and then assigns addresses starting with 1 for the device next in order after the controller in the direction of information transfer. Each device in the loop stores its unique address internally.

(ref: 82938-90001 1982/07 Series 80 HP-IL Interface Owner's Manual)

Availability

Introduced in 1982 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
Hewlett-Packard Interface Loop Fact Sheet, 5953-1980, Nov 1981	<u>Sheet</u>
The HP-IL System, G. Kane, S. Harper & D. Ushijima, ISBN: 0-931988-77-2, 1982	<u>Book</u>
Boucle d'interface Hewlett-Packard, Pamphlet, Jan. 1982, French	<u>Pamphlet</u>
HP Measurement & Computation News, Cover Page, Jan.-Feb. 1982	<u>News</u>
HP Bench Brief, New HP Interface Called HP-IL , Mar.-Apr. 1982	<u>Brief</u>

Documents & Web Sites	Link
HP 82166A HP-IL Converter Technical Manual, 82166-90002, Nov. 1981	Manual
HP 82166A Manual Supplement, 82165-90012, Oct. 1982	Manual
HP 82166C The HP-IL Interface Kit Technical Guide, 82166-90020, Dec. 1982	Manual
The HP-IL Interface Specification, 82166-90017, Nov. 1982	Manual
The HP-IL Integrated Circuit User's Manual, 82166-90016, Nov. 1982	Manual
Hewlett-Packard Journal, Jan. 1983	Journal
<ul style="list-style-type: none"> • HP-IL and Low-Cost Digital Interface by Roger Quick & Steven Harper. • HP-IL Interconnect System by James Fleming. • The Electronics Interface for the Hewlett-Packard Interface Loop by Carl Landsness. • A CMOS Integrated Circuit for the HP-IL Interface by Steven Harper 	
Autour de la Boucle, Janick Taillandier, ISBN: 2-86811-000-2, Sept. 1983, French	Book
Control the World with HP-IL, Gary Friedman, ISBN: 0-9612174-9-9, 1987	Book
HP-IL 2009, Egan Ford, HHC Presentation, Sep. 2009	Presentation
Virtual Loops, PILs and LIF, Robert Prosperi, HHC Presentation, Sep. 2014	Presentation
How to Make Your Own HP-IL Cables, Martin Hepperle, Jan. 2015	Website
How fast is HP-IL ?, Jean-François Garnier, Allschwil Presentation, Oct. 2016	Presentation
HP-IL @ Google Search	Googling
HP-IL @ Wikipedia	Website
HP-IL @ hp41.org, Warren Furlow Web Site	Website
HP-IL @ hpmuseum.org, Dave Hicks Web Site	Googling
HP-IL @ hpmuseum.net, Jon Johnston Web Site	Googling
HP-IL @ jeffcalc.hp41.eu, Jean-François Garnier Web Site	Website
HP-IL @ giesselink.com, Christoph Gießelink Web Site	Website
HP-IL @ hp-collection.org, Matthias Wehrli Web Site	Website

Price List

Description (Books)	Price € / \$ US
The HP-IL System: An Introduction to the HP Interface Loop by Gerry Kane, Steve Harper & David Ushijima 1982, McGraw-Hill, Berkeley, CA, USA, ISBN: 0-931988-77-2	16.95 \$: 1984
HP-41 / HP-IL System Dictionary by Cary Reinstein 1982, Corvallis Software, Corvallis, OR, USA, ISBN: 0-942358-01-5 1983, PPC, Santa Ana, CA, USA, ISBN: 0-942358-01-5	10.95 \$: 1982 10.95 \$: 1984
Autour de la Boucle : Tome 1, Janick Taillandier 1983, Editions du Cagire, Toulouse, France, ISBN: 2-86811-000-2	100 FF : 1984 28.22 € : 1984
Control The World With HP-IL by Gary Friedman 1987, SYNTHETIX, Berkeley, CA, USA, ISBN: 0-9612174-9-9	20.95 \$: 1987
IL 2000 Interface System & HP-41 Input/Output Board, Christoph Klug 2008, Thraxus, Hildesheim, Germany, ISBN: 978-3-88120-853-6	40.00 € : 2012

Product #	Description (Cables)	Price € / \$ US
82167A	HP-IL Cable, ½ Meter (x2)	6.00 \$: 1985
82167B	HP-IL Cable, 1 Meter (x2)	8.00 \$: 1985
82167D	HP-IL Cable, 5 Meters (x2)	10.00 \$: 1985
11340A	HP-IL Cable, 10 Meters (x2)	40.00 \$: 1985
11340B	HP-IL Cable, 50 Meters (x2)	100.00 \$: 1985
11340C	HP-IL Cable, 100 Meters (x2)	200.00 \$: 1985

Product #	Description (Adapters)	Price € / \$ US
82059D	110 VAC AC Adapter/Recharger, NA	20.00 \$: 1986
82066B	220 VAC AC Adapter/Recharger, EU	25.00 \$: 1986
82067B	220 VAC AC Adapter/Recharger, UK	
82067B opt. 1	220 VAC AC Adapter/Recharger, South-African	
82068B	220 VAC AC Adapter/Recharger, Australian	

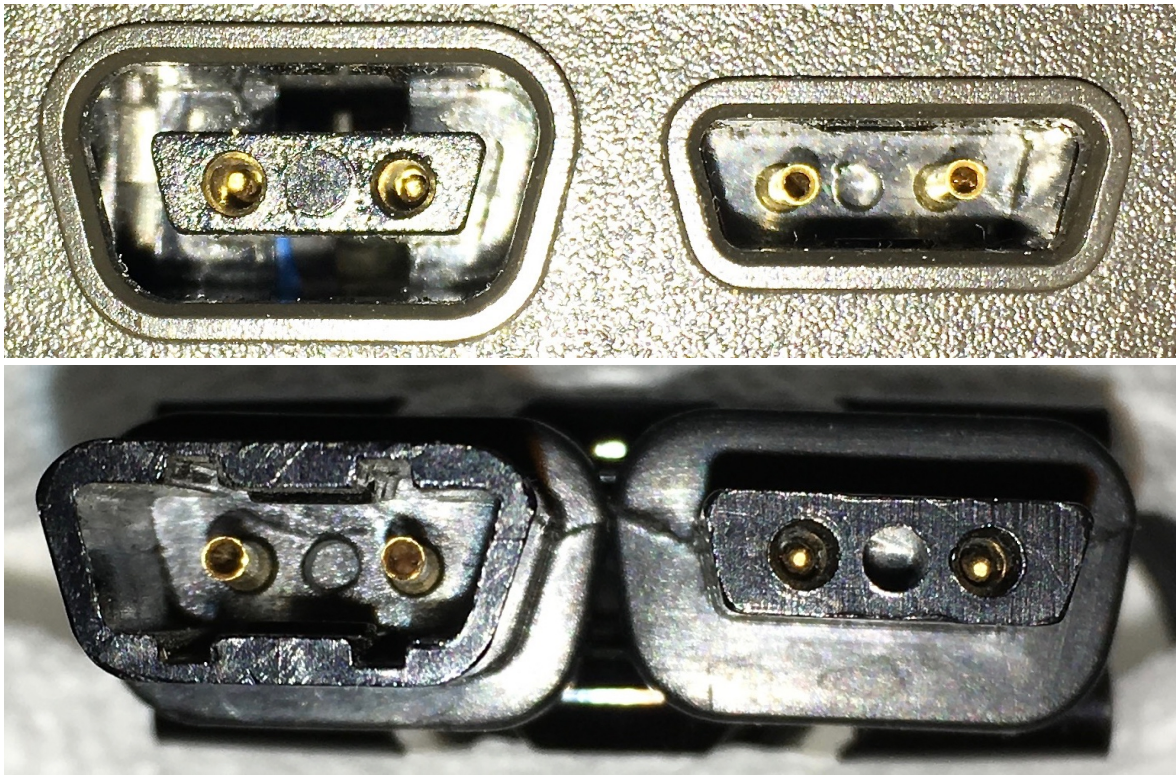
Product #	Description (Adapters)	Price € / \$ US	
82069B	110 VAC AC Adapter / Recharger, EU		

Product #	Description (3D Printed Parts)	Price € / \$ US	
hp-il-housings	HP-IL Cable Housings by Martin Hepperle	Store	8.74 \$: 2018
pil-clip	HP-IL Cable Clip by Nate Martin	Store	2.16 \$: 2018
pil-clip-2x	HP-IL Cable Clip (x2) by Nate Martin	Store	4.31 \$: 2018
pil-clip-r2	HP-IL Cable Clip, v2 by Nate Martin	Store	2.41 \$: 2018

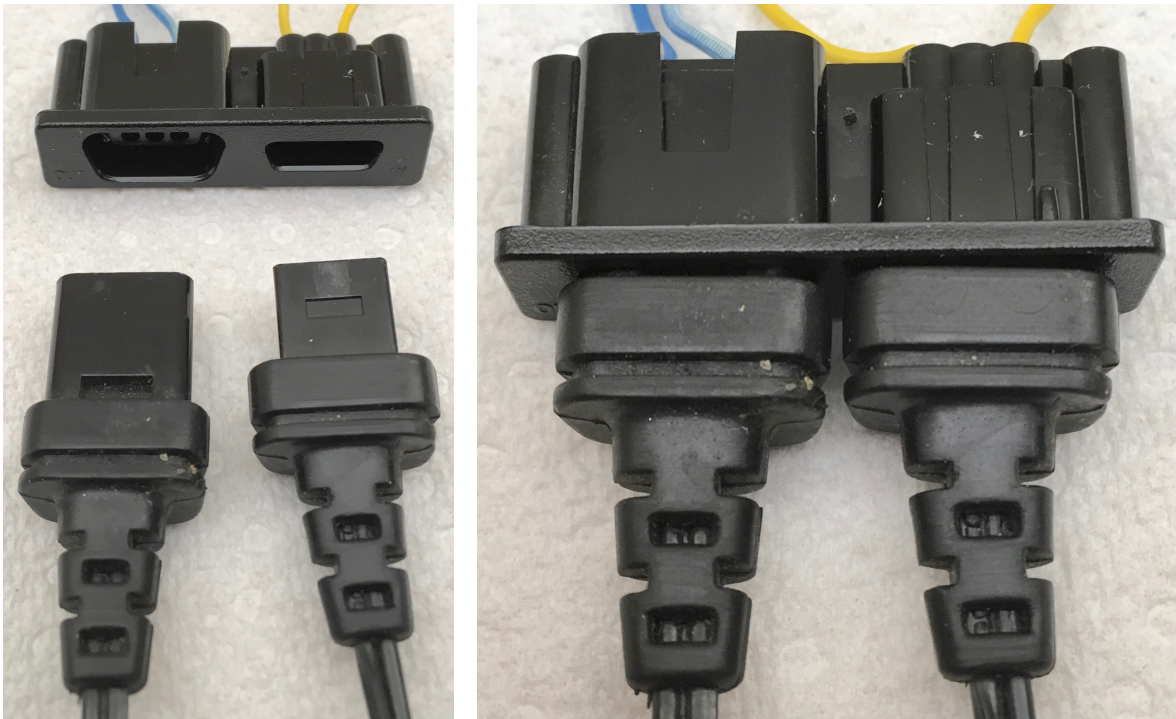
Pictures



HP-41 / HP-IL Demo Setup



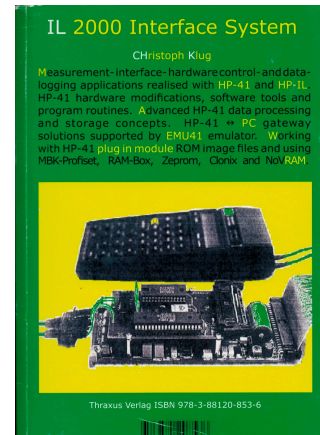
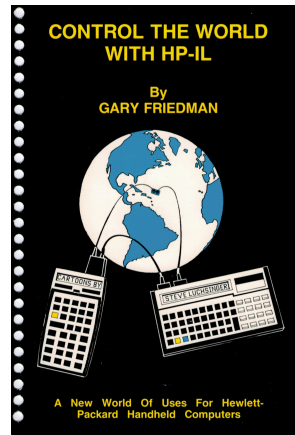
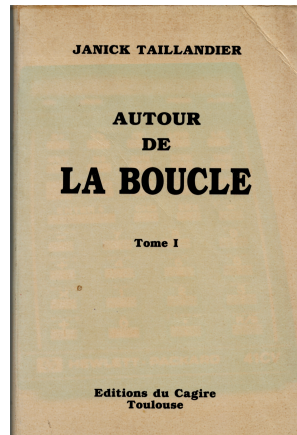
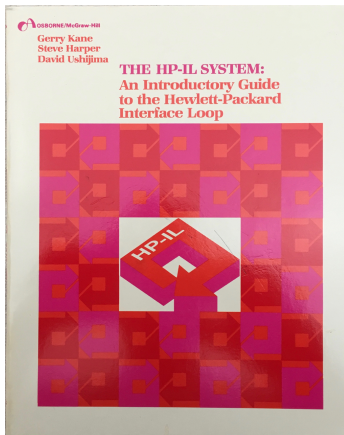
Top: Device Connector & Bottom: Cable Connector



Left: Unplugged Cable & Right: Plugged Cable



HP-75 / HP-IL Demo Setup



HP-IL Books

HP-IL Controller Devices

HP 41C Handheld Calculator
HP 41CV Handheld Calculator
HP 41CX Handheld Calculator



Overview

The HP-41 is the most versatile, powerful and easy-to-use calculator Hewlett-Packard has ever designed. And although it is simple to operate, it offers the advanced problem solving power your professional world demands.

A Calculator

The HP-41 by itself could easily be all the calculator you'll ever need. While it is our most powerful ever personal calculator, it is remarkably uncomplicated. Communicating in familiar words so operation is simple even for the novice. Status annunciators keep everything error-free by reminding you of operating modes and battery life. You can name a program, then call it up by name for execution.

Choose between three HP-41 models: the HP-41C with 445 bytes of main memory, expandable to 2,237 bytes, the HP-41CV with 2,237 bytes of main memory, or the HP-41CX with 3,105 bytes of main and extended memory. In addition to all the built-in functions of the HP-41C/41CV, the HP-41CX features built-in Time and Extended Functions/Memory modules, a text-file editing function, and 19 other functions not available as HP-41C/41CV options.

The HP-41 is straightforward and logical. It uses the time-proven RPN logic system and no-nonsense keystroke programming, guaranteed to help you easily solve the most difficult problems.

The HP-41 is versatile, able to switch from a predefined calculator to a user-customized instrument, tailored to your personal needs, matched to your professional demands.

A System

Alone, the HP-41 is an extraordinary calculating instrument. Yet it also constitutes the heart of an exceptional personal calculating system which is adaptable to your computational needs. When combined with peripherals and modules designed specifically for the HP-41, you can develop an expanded, growing system matched to virtually any requirement.

The Application Modules provide preprogrammed answers to hundreds of complex problems, many of them related to your particular discipline or field.

The Card Reader stores and retrieves your personal program and data library on magnetic cards. These cards can be used with your own or any other HP-41 Card Reader.

The Wand lets you quickly load long programs by reading bar codes printed on paper.

The Printer/Plotter has a complete alphanumeric character set and can document your calculations and program listings in three operational modes. It can also plot graphs and even print user definable "special characters."

Plug-ins

Interface Loop

The HP-IL Interface Module plugs into any one of the four ports in the HP-41, connecting your handheld computer with an ever-growing family of HP-IL peripherals, like battery-operated cassette drive, battery-operated printer, instrumentation/controls units, video monitors, graphics plotters, impact printers, larger systems, modems and other kind of devices. The module gives your HP-41 simultaneous control of up to 30 devices on the loop. There are three function sets supplied by the HP-IL Module: printer, mass storage, and general input/output (I/O).

Time Module

The Time Module expands your HP-41 computing system with time information and time-controlled operations. Using the quartz-crystal controlled Time Module, your HP-41 can become the heart of a time-based system controller, an alarm clock, an appointment reminder, a calendar, a timer, even an advanced stopwatch.

Plotter Module

The 8K-byte Plotter Module fits easily into one of the HP-41's four ports to give you bar code generation and plotting capabilities. The Plotter Module enables you to use your Series 40 computer with the HP 7470A Graphics Plotter. It also enables your HP-41 to print Series 40 bar code using the HP 82162A Thermal Printer/Plotter or the HP 7470A Graphics Plotter. Take advantage of ready-to-go bar code generation programs or write your own. The Plotter Module also helps you produce high-quality plots on HP's low cost HP 7470A Graphics Plotter. This module contains 52 plotter functions to help you design your own programs. There is also a utility plotting program that enables you to produce framed, labeled plots, such as line and bar charts, without having to learn specific plotter functions.

Automatic Start and Cassette Duplication Module

The automatic start feature provides a means of writing "fool-proof" HP-41 programs. With the automatic start module installed, the HP-41 goes through a special sequence when it is turned on. This sequence lets you write programs that automatically set status, configure memory, access peripherals, or prompt the user. The mass copy feature provides an easy-to-use means of duplicating programs and data. The information on one HP 82161A Digital Cassette Drive can be copied on to as many as 29 other cassette.

Extended I/O Module

The HP 82183A provides easy-to-use I/O functions that enhance the HP-41's control of the HP-IL loop. This 4K-byte module provides 59 functions that extend the I/O capabilities beyond those provided by the HP 82160A HP-IL Module. These functions enhance mass storage, character manipulation, HP-IL control and advanced control of the HP-41 and devices on the loop.

HP-41 Development Module

Adding a second HP-41 to the HP-IL loop becomes a possibility with the aid of the HP-41 Development Module. In Scope mode, a second HP-41 can be used for displaying the mnemonics of HP-IL messages as they travel around the loop. Giving direct access to the HP-IL integrated circuit, the Development Module allows you to change the contents of any control register and poll certain status bits. Characters can be inserted at, or removed from, any position in the Alpha register.

3421A Data/Acquisition Pac

The 44468A Data Acquisition Pac provides special software routines to control the 3421A using the 41CV hand-held calculator and 82182A Time Module. With the key overlays that are provided, the 41CV can act as a dedicated 3421A system controller, performing

complete transducer measurements and linearizations with just a few key strokes. You can combine the 3421A and 44468A with the 82161A Digital Cassette Drive and the 82162A Thermal Printer for a very low cost automated HP-IL data acquisition system complete with measurement, computation, data storage, and printout.

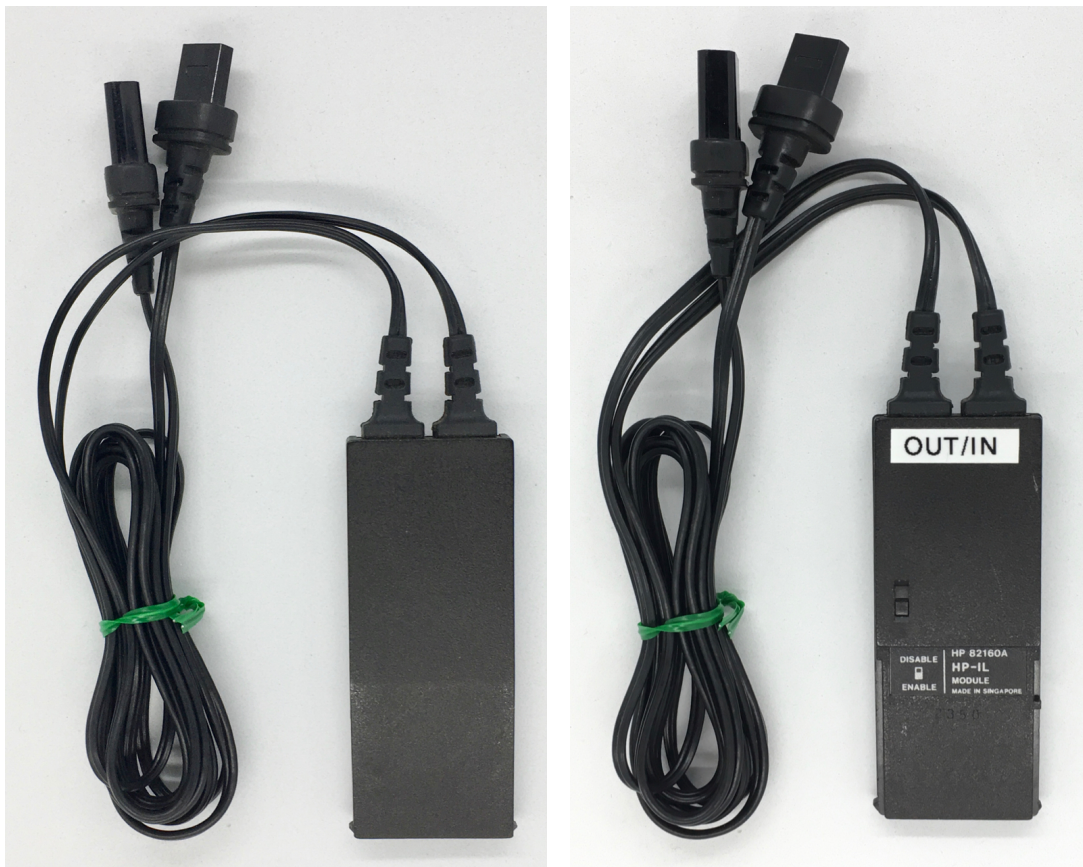
(ref: 5953-1958-B 1981-01 HP-41C/CV & 5953-5557 1983-05 Series 40 Handheld Computers)

Availability

Introduced in 1979 and discontinued in 1990.

HP-IL Focused Price List

Product #	Description	Price € / \$ US
41C	Handheld Calculator	195.00 \$: 1984
41CV	Handheld Calculator (41C+Quad)	275.00 \$: 1984
41CX	Handheld Calculator (41CV+Time+XFM+CXT+CXF)	325.00 \$: 1984
82160A	HP-IL Module	125.00 \$: 1986
82180A	Extended Functions & Memory Module (41C/41CV)	75.00 \$: 1986
82181A	Extended Memory Module	75.00 \$: 1986
82182A	Time Module (41C/41CV)	75.00 \$: 1986
82183A	Extended I/O Module	75.00 \$: 1986
82184A	Plotter Module	75.00 \$: 1986
44468A	Data Acquisition/Control Module	100.00 \$: 1983
00041-15042	Auto/Start Duplication Module	35.00 \$: 1986
00041-15043	HP-IL Development Module	75.00 \$: 1986

Pictures*HP-41 Versions & Boxes**HP-IL Module*



HP-41CX Half-Nut with HP-IL Module Inserted



HP-IL & System Modules

HP 75C Handheld Computer HP 75D Handheld Computer



Overview

The HP-75 is the portable computer for professionals on the move. As powerful as a personal computer, as small as a book, the HP-75 gives you the answers you need wherever and whenever you need them.

Enjoy Fast and Easy Solutions.

Prepare a 30-day income projection on the 7 a.m. to Chicago? Type a letter-perfect trip report on the 6:05 home? That's right. With an HP-75 and our ready-to-go software, you can perform spreadsheet analysis and create text on a plane or in a hotel room, at home, or in the office. To evaluate alternative courses of action, to ask "what if?" questions, and to get your answers almost instantaneously, simply plug in an HP-75 VisiCalc module. To write memos, letters, reports, and other short documents quickly and easily, choose Text Formatter software. You can generate hard-copy output of your formatted text or program an HP graphics plotter to create high-quality color slides.

To get up-to-date information for your applications, you can use our acoustic coupler. Working with Data Communications software, the coupler lets the HP-75 communicate with other computers over telephone lines. Dial up stock market data and educational and message services such as THE SOURCE, the Dow Jones News/Retrieval Service, and CompuServe. Tap your office or lab computer from the field. If electronic mail figures in your

future, our coupler or an HP-IL/RS-232C interface with any standard modem, may be the right solution.

If you frequently work away from your desk, you'll appreciate the HP-75's file structure. It lets you store multiple VisiCalc worksheets and other files simultaneously. You can load program, data, and appointment files at the office, then call them up once you're out in the field.

You'll also like the way the HP-75's typewriter-like keyboard lets you touch type to enter data fast, even with it resting on your lap. And the way you can redefine almost every key to become another character, expression, command, or to execute a program.

Make Every Minute Count.

You can rely on the HP-75's appointment and time modes to keep you on schedule. When each of your appointments comes due, the computer turns itself on, emits one of nine alarms, and displays the reminder message you entered. You don't have to worry about turning the computer off. The HP-75 automatically puts itself into deep sleep when the job's done. And you don't have to worry about losing your programs or data. Continuous Memory saves your information even when the HP-75 is turned off.

Set Yourself Free.

With the HP-75, you can leave the office and still have immediate access to personal computer power. There are 16K bytes of user memory (RAM) built in, and you can expand it to 24K bytes with an optional 8K-byte plug-in module. With 24K bytes of RAM and a 48K byte built-in ROM operating system, you have plenty of memory for problem solving. You also have the option of using as many as three plug-in ROM modules with up to 32K bytes each. The HP-75 uses convenient battery power. Three rechargeable nickel-cadmium batteries run for two to three weeks of normal use or 20 to 30 hours of continuous use.

You can even carry around your own personal computing system in a briefcase. Or, you can create a desktop system for the office or lab. You get this flexibility because the HP-75's built-in HP-IL (Hewlett-Packard Interface Loop) lets you access a variety of portable, battery-powered devices for mass storage, printing, plotting, and measurement.

In the Laboratory.

Whether you're crunching numbers, creating sophisticated programs, or performing real-time data logging, the HP-75 backs you up with the power, accuracy, and versatility you need.

Solve It With Software.

You've got two software media to choose from. You can take advantage of ready-recorded software solutions with plug-in modules, such as HP-75 Application Pacs (VisiCalc, Text Formatter, Math, Surveying, and Data Communications). Or you can load ready-written solutions from magnetic cards in disciplines such as math, engineering, and finance from HP-75 Solutions Books.

Take Control.

With built-in HP-IL, the HP-75 can talk to and work with devices such as battery-powered mass storage drives and printers. It can control instruments such as digital multimeters and data acquisition and control devices. And using a variety of interface converters it can communicate with desktops such as HP Series 80, 100, and 200 computers and large mainframes such as the HP 1000 and the HP 3000.

(ref: 5953-5549 1983-05 Series 70 Portable Computers)

*Plug-ins***HP 82718A Expansion Pod**

Attach the HP 82718A Expansion Pod to your HP-75D and reap the rewards of a single integrated data communications package!

Data communications capability in the form of a 300-baud, direct-connect modem and 32K or 64K bytes of electronic disc is built into the pod.

Modem and electronic disc commands are built into the pod's 16K byte ROM software. The direct-connect, serial, asynchronous, full-duplex modem is compatible with Bell 103/113 modems. Low-level modem commands allow user control of dialings, changing operating modes, and setting handshake protocol and parity. High-level commands are used to turn the modem on and off, transmit strings to and from the modem, and check the status of the modem.

Electronic disc uses RAM to emulate a flexible disc as a high-speed disc drive. Since there's no mechanical hard or floppy disc to slow you down, you get fast data transfer, and data file access. Electronic disc commands provide the ability to create, access and modify files, establish a hierarchical directory structure, and copy files into and out of the electronic disc. It's non-volatile, so your information is retained, even when the computer is turned off.

And to top it off, the pod has two industrial bar code decoders built in — 3 of 9 Code and Code 11. For five more decoders, simply slip the HP 82725A Bar Code Reader Module into one of the ports on the HP-75D.

HP 00075-15001 I/O ROM

The Hewlett-Packard I/O ROM (read-only memory) enhances the BASIC language capability of the HP-75 with HP-IL controller and advanced programming commands. It can be used with any HP-IL talker or listener device. The major I/O statements provided by the ROM are OUTPUT, ENTER, SENDIO, ENTIO\$, and SEND. Using these, and other I/O statements in BASIC programs, you can perform a wide variety of input/output tasks. For example:

- Interface your HP-75 with another computer using the built-in HP-IL interface, and send data from one computer to the other.
- Send data to another computer over telephone lines using a modem.
- Program the HP-75 to enter readings from an HP-IL digital voltmeter, then output the readings to an HP-IL printer.
- Write a program that remotely controls several HP-IL devices and triggers them to take readings. Then, the program can record the readings in program variables.

The I/O ROM replaces and extend what was offered in 00075-15013 I/O Utilities and in 00075-15014 RIOWIO Utility solutions books.

(ref: 5954-1078 1984-04 HP-75D Technical Product Guide)

*Softwares***HP 00075-15013 I/O Utilities Solutions Book**

The I/O Utility gives the HP-75 the capability to communicate with any Hewlett-Packard Interface Loop (HP-IL) talker or listener device. With the utility, the HP-75 can be programmed to send low-level HP-IL commands to any device and receive data from any device. This solutions book is for programmers who are experienced with the HP-75 and with HP-IL. Familiarity with HP-75 and HP-IL commands is assumed. Information on specific HP-IL command scan be found in the owner's manuals for HP-IL devices, and also in THE HP-IL SYSTEM: An Introductory Guide to the Hewlett-Packard Interface Loop, by Gerry Kane, Steve Harper, and Dave Ushima, published by OSBORNE/ McGraw-Hill, Berkeley, California, 1982.

(ref: 00075-15013 I/O Utilities Solutions Book)

HP 00075-15014 RIOWIO Utility

The RIOWIO Utility allows you to directly read and write to the HP-IL IC of the HP-75. By directly reading and writing to the registers of the HP-IL IC, you can have greater control

of the HP-IL operations, you can simulate an arbitrary device, or you can practice writing the assembler code to the HP-IL IC without worrying about all the details of driving a processor.

(ref: 00075-15014 RIOWIO Utility Card)

Availability

Introduced in 1982 and discontinued in 1986.

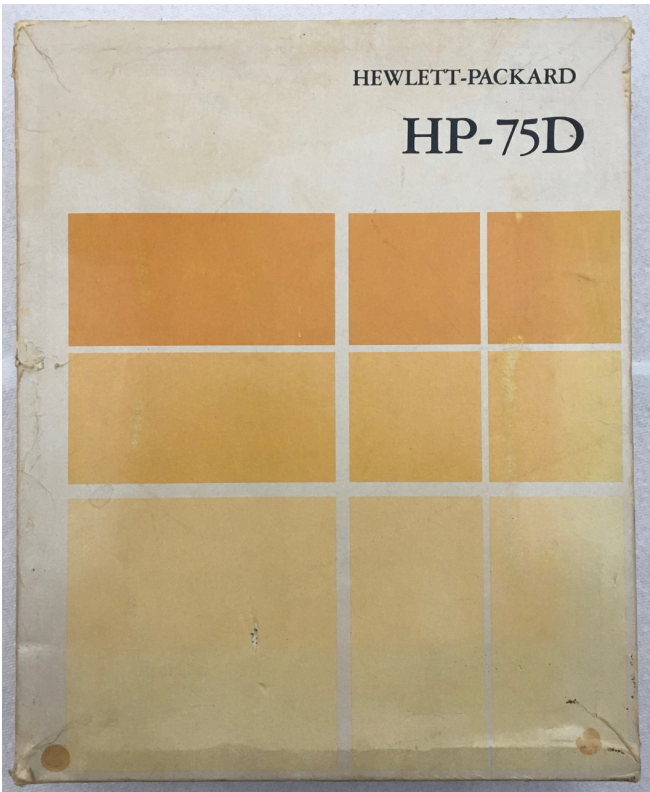
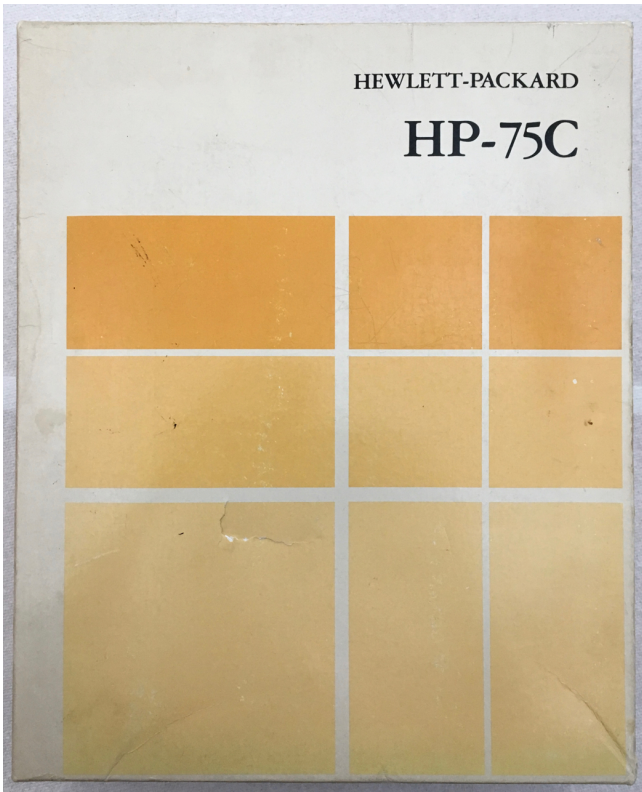
HP-IL Focused Price List

Product #	Description	Price € / \$ US
75C	Handheld Computer (16KB RAM & HP-IL)	995.00 \$: 1982
75D	Handheld Computer (16KB RAM, HP-IL & Wand Port)	1095.00 \$: 1984
82700A	8KB RAM Module	195.00 \$: 1983
82718A opt. 032	Expansion Pod (300 Baud Modem & 32KB E.Disk)	875.00 \$: 1985
82718A opt. 064	Expansion Pod (300 Baud Modem & 64KB E.Disk)	1175.00 \$: 1985
00075-15001	I/O ROM Module	95.00 \$: 1984
00075-15035	Data Communication Module	175.00 \$: 1984
00075-13013	I/O Utilities Solutions Book	45.00 \$: 1984
00075-13014	RIOWIO Utility and Instruction Card	
00075-13015	Mass Media Duplication/Privacy Solutions Book	45.00 \$: 1984
00075-13016	Graphics Solutions Book	45.00 \$: 1984

Pictures



HP-75C/D Front Side View



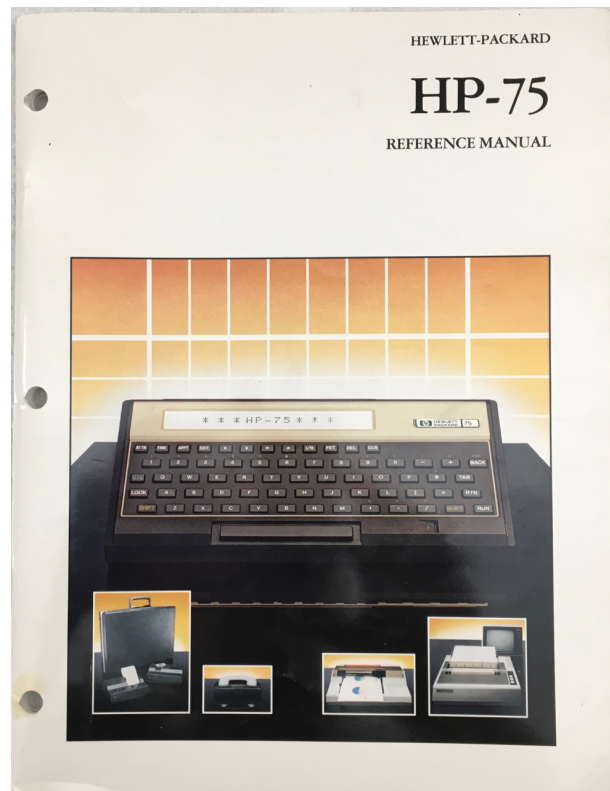
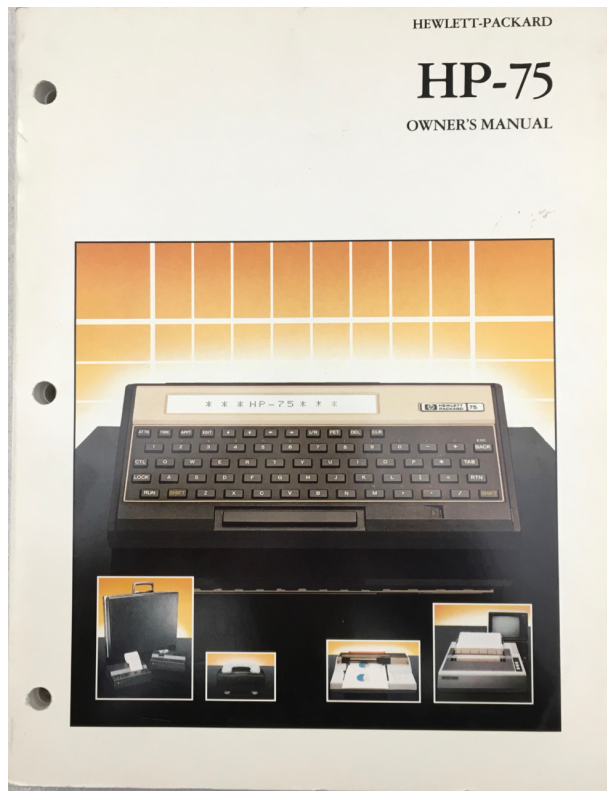
HP-75C/D Boxes



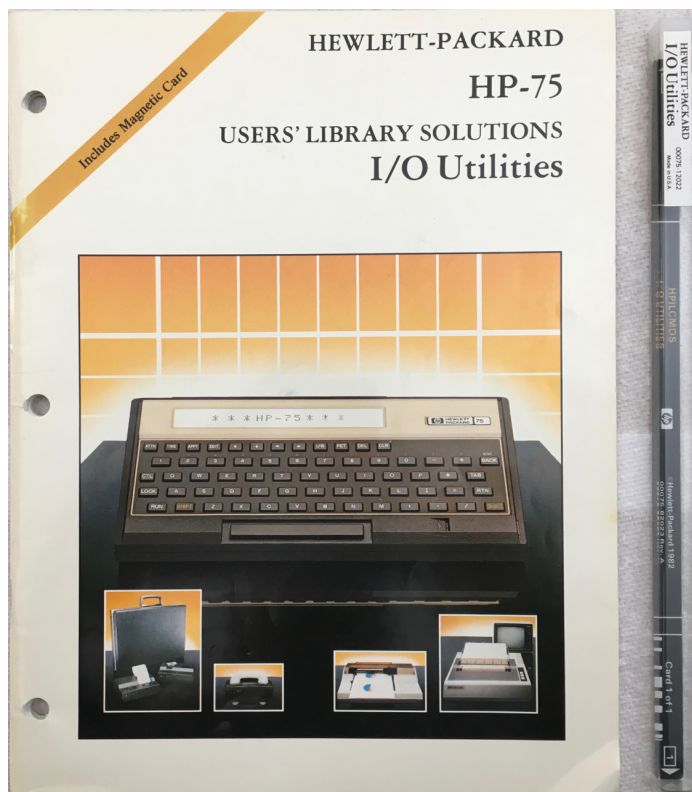
HP-75C/D Connectors



HP-82718A Expansion Pod



HP-75C/D Manuals



HP-75 I/O Extension Softwares

HP 71B Handheld Computer



Overview

The HP-71 Handheld Computer, a portable, 12-ounce package that puts a powerful calculation mode, BASIC language, and expansion potential right at your fingertips. The HP-71 offers a built-in operating system larger than many desktop computers. Use it alone or configured as part of an HP-IL (Hewlett-Packard Interface Loop) system for expanded, personalized calculating. HP-71 Features ...

CALC mode.

A powerful, nonprogrammable operating mode, CALC is easy to learn and simple to use. It is optimized for calculations to handle your most complex computations. Expressions are easy to key in — work from left to right in true algebraic format, and watch your intermediate results develop as you go along. Twelve decimal digits of accuracy assure you of precise results. And, CALC mode interacts with BASIC; a variable assigned a value in BASIC retains that value in CALC mode, and vice versa. Any numeric expression that can be keyed in and evaluated in BASIC can also be evaluated in CALC mode. You can use all of the built-in HP-71 numeric functions and operators, as well as your own single-line functions. Statistics functions are built-in, allowing you to perform computations on up to 15

independent variables. And a complete set of trig functions lets you evaluate complex equations with no extra effort.

BASIC programming language.

Develop your programs in a friendly, familiar language. Over 240 functions, statements, and operators complement a language powerful enough to handle almost all of your programming needs. To help increase your programming versatility and flexibility, create subprograms. Parameters can be passed from main programs to the subprograms. The enhanced HP-71 BASIC supports the IEEE Radix Independent Floating-Point Math Standard to give you more control and accuracy in your computations.

Built-in operating system.

The powerful, calculation-oriented 64K-byte operating system allows for high-level programming in addition to repetitive calculations.

Five-level command stack.

Your last five commands are stored in HP-71 memory so that you can recall any of them to modify and reuse. That's a real time saver when you're executing a series of commands, or when you need the combined results of several equations.

Expandable.

The HP-IL interfacing option opens the door to a broad array of accessories, peripherals, instruments, and other computers. Print, store, retrieve, and display information, as well as communicate with larger computers.

Four RAM/ROM ports.

Choose your memory requirements, to a maximum of 33.5K bytes of user-accessible memory. Plug in up to four 4K-byte RAM modules to increase your memory and storage capacity by 16K bytes. The HP-71 is capable of directly addressing 512K bytes. And, you can add ROM software modules for speedy execution of specific solutions. Customize your applications with plug-in Custom ROM Modules to add unique problem-solving capabilities and a means of permanent, private storage. Any of the internal or external RAM can be set aside for program or data storage so you can locate files quickly and protect them from some memory reset conditions. You can also remove memory modules without disturbing files in the rest of RAM.

Typing aids.

Often-used keywords or instructions can be displayed simply by pressing a shifted key. Reduce your program and data entry time by using these built-in typing aids.

Redefinable keyboard.

Each key on the keyboard can be redefined (except the blue and gold shift keys) to increase your calculating efficiency. Redefine the shifted key functions, too, and further expand the number of functions available to you. Assign your own typing aids to any convenient key, execute a particular statement or program from the keyboard, and simplify data entry while you're running a program.

Multiple file structure.

The number of files in HP-71 memory is limited only by the amount of available RAM. Seven different file types are supported: BASIC, BIN, LEX, DATA, TEXT, KEY, and SDATA.

Clock/calendar.

A built-in quartz crystal clock can be set with an accuracy of 1 second per month or better. It runs even when your HP-71 is turned off. Create and use clock/calendar dependent programs that must begin and run when you can't be there to control the process. Three independent timers are available for your use.

Software.

HP-written software in a variety of applications is available to give you ready-to-go solutions. Each application pac comes with a convenient plug-in module and complete documentation.

(ref.: 5954-1059 1984-04 HP-41 Adv. Prog. Calculators & HP-71 Handheld Computers)

*Plug-ins***HP 82401A HP-IL Interface.**

The HP-71 HP-IL Interface plugs into a specially designed port at the upper left corner of your HP-71, establishing a link to the world of instruments and peripherals. Connect directly to any HP-IL product, and to HP-IB, RS-232C and GPIO interfaces using converters.

The HP-IL Interface gives your HP-71 simultaneous control of up to 30 devices on the loop, and through secondary addressing, up to 930 devices. The 16K bytes of ROM in the Interface provide for printer, display, mass storage and general input/output (I/O) operations. Multiple HP-71s can be connected on the interface loop.

(ref.: 5954-1059 1984-04 HP-41 Adv. Prog. Calculators & HP-71 Handheld Computers)

HP 82479A Data Acquisition Pac

The HP 82479A Data Acquisition Pac, together with the HP-71B Handheld Computer and the HP 3421A Data Acquisition/Control Unit, provide a powerful, low-cost data acquisition system. These devices may be used in the laboratory, the field, or on the

production line to gather data, control devices or report on equipment status. When combined with devices such as the ThinkJet printer or an 80 column video interface, the data acquisition system provides system capabilities equivalent to larger, more expensive systems at a fraction of the cost. Also, in space-critical environments the °HP-71 takes less space than the keyboard of a standard personal computer, leaving room for production or test equipment.

(ref.: HP 82479A Data Acquisition Pac Owner's Manual)

HP 82488A Data Communications Pac

The Data Communications Pac provides a versatile terminal emulator software package, the DATACOMM program, for the HP-71 Portable Computer. With this program you can communicate with other computer systems over a phone line to access a variety of information. You can connect to systems such as The Source, Dow Jones News/Retrieval, and other host computer systems via a modem. It is quite easy to obtain stock quotes, send or receive electronic mail, or make airplane reservations using one of these data base services.

(ref.: HP 82488A Data Communications Pac Owner's Manual)

Availability

Introduced in 1984 and discontinued in 1988.

HP-IL Focused Price List

Product #	Description	Price € / \$ US
71B	Handheld Computer	525.00 \$: 1986
82401A	HP-IL Module	125.00 \$: 1986
82401-90023	HP-IL Internal Design Specifications	60.00 \$: 1986
82402A	Dual HP-IL Adaptor Module	99.00 \$: 1985
82479A	Data Acquisition Module	195.00 \$: 1985
82488A	Data Communication Module	150.00 \$: 1985

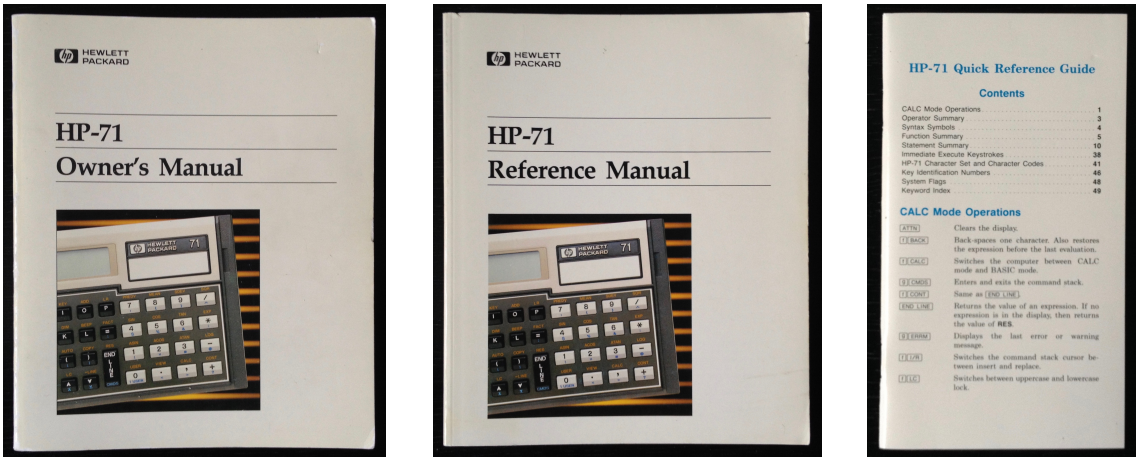
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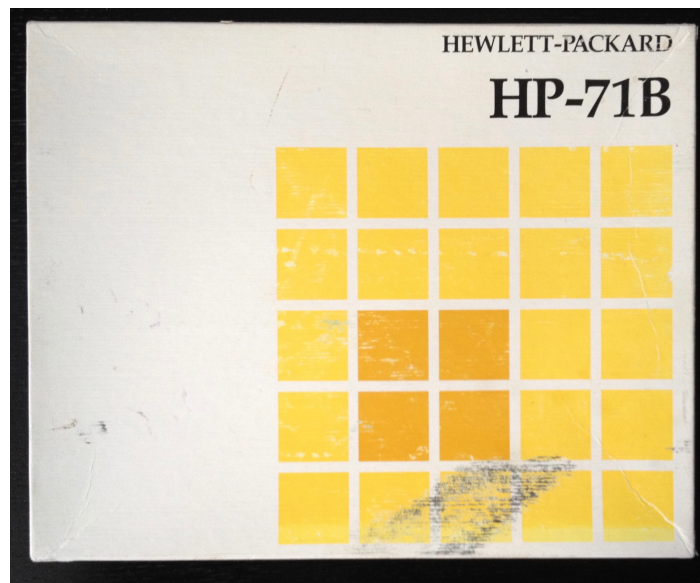
HP-71B HP-IL Module



HP-71B with HP-IL Module



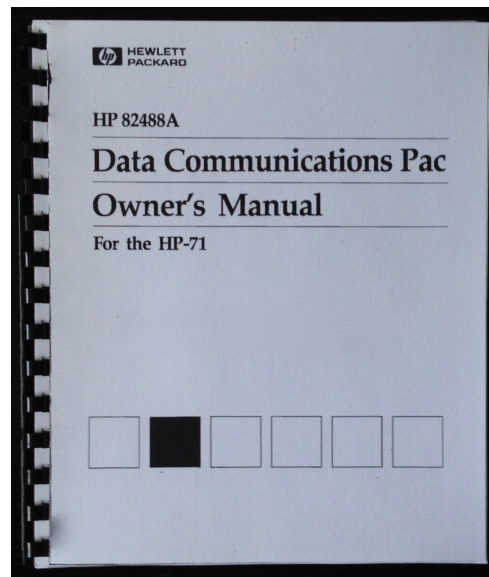
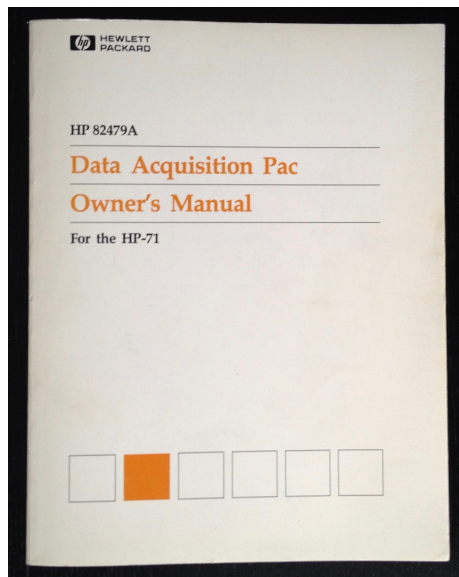
HP-71B Manuals



HP-71B Box



82479A Data Acquisition & 82488A Data Communications Modules



82479A Data Acquisition & 82488A Data Communications Manual

HP 110 Portable Computer HP 110+ Portable Computer



HP 110 Portable & HP 110+ Portable Plus

Overview

With the Portable PLUS from Hewlett-Packard, you can have it all—the power of a desktop computer and the convenience of a portable specifically designed to fit your mobile work style. And, along with power and convenience, the system gives you full computer flexibility in a durable package that takes the abuse portables must endure.

Managers and professionals in marketing, finance, administration, data processing, sales, and others whose schedules keep them on the move, will discover this new computer is a hardworking traveling companion. Take it with you to meetings, on a plane, or anyplace you need to work away from your desk. On out-of-town trips it helps you keep up with your workload. And for finishing that urgent report, the Portable PLUS easily goes home with you.

Indicative of the system's power is the fact that it runs top-selling applications software faster than many desktops, supports a sophisticated built-in electronic disc, and accommodates your special applications in its large, expandable memory (up to 896K RAM or 3Mb ROM). In addition, the Portable PLUS can be customized with the ROM-based programs you need and use daily.

The system extends the usefulness and productivity of your office personal and mainframe computers via convenient communication and data exchange capabilities. And like your personal computer, it features a full-size keyboard and 25-line by 80-character

display. Still, with all this power, it's only about the size of a three-ring binder and weighs less than 10 pounds.

Convenience PLUS

To enhance its convenience, the Portable PLUS features a ROM software offering that allows you to tailor the machine to specific needs. ROM-based software permits instant accessibility to applications and ensures that you always have the right software installed. You can't lose it or accidentally erase it. In a typical configuration, the Portable PLUS accommodates six to eight of your favorite programs in ROM (12 128K byte ROMs per software drawer).

Disc on a chip

One of the system's advanced features is its electronic disc, or "disc on a chip". This expandable memory provides enough continuous, built-in storage for numerous memos, worksheets, data bases, and applications—in short, anything you would typically store on a floppy. It gives you convenient, reliable mass storage that is always available. And it also makes the system highly portable by eliminating the need to carry mechanical discs when you travel.

Instant access

Like the electronic disc, the system's plug-in ROM software lets you access programs up to 10 times faster than with a mechanical disc. You will be able to select, load, make minor changes, and restore a program like 1-2-3 from Lotus in less than 30 seconds.

Another aspect of the Portable PLUS's instant access feature is continuous memory. With this you can suspend a job at any point, then later resume exactly where you left off. If you stop in the middle of a project, the computer saves your work in continuous memory and is ready to pick up again at that point whenever you are. There is no time-consuming program reloading or scrolling through files.

PAM

An additional convenience feature is PAM, the Personal Applications Manager, which eliminates the need to learn complicated DOS commands. Its easy-to-use menu displays the installed software programs and helps you switch tasks quickly—from word processing to data bases to spreadsheets and back.

Small, lightweight

The Portable PLUS complements the mobile professional's work style. Its small size and weight mean you can slip it into a briefcase and carry it wherever you go. It also means you

can use the system unobtrusively in almost any situation— while waiting for a plane, traveling, or on a sales call.

Battery-powered

Since the Portable PLUS is battery-powered, you're not tied to an electrical outlet. You work wherever it's convenient. A built-in, rechargeable lead/acid gel-cell battery pack powers the system for up to 20 hours. This long-lasting battery has even dissipation so you get a constant power flow. The system continuously displays the percentage of battery life remaining. When power is low, you can plug in the recharger and continue operation. You're always confident that your data is secure. The system alerts you when power drops to 20%, then automatically enters a protect mode at 5% and directs the remaining power to the electronic disc to preserve your data for up to a week. To further conserve battery power, the system turns itself off automatically after a user-specified period of inactivity of from 30 seconds to 30 minutes.

Flexibility PLUS

The Portable PLUS offers you extensive flexibility in-terms of ROM-based applications, memory expansion, peripherals, and communications. This means you can customize the system to your exact requirements.

Application software

Numerous software packages are available for the Portable PLUS in the form of both Disc-based and ROM-based media. You can choose from ROM-based applications such as Microsoft Word, 123 from Lotus, MemoMaker/Time Management, and communications to personalize your computer. Available disc-based software includes computer languages, data base management, entertainment, financial applications, and others.

Communications

The Portable PLUS makes it fast and easy to tie into your office computer system to access information, run remote applications, and download data for off-line analysis. The following communications options are available.

Battery-powered peripherals

To enhance the Portable PLUS's versatility, the battery-powered ThinkJet printer and the HP 9114A disc drive are available. These components, along with the computer, fit into a carrying case and weigh less than 20 pounds total. Yet they give you the full function of a desktop system with complete portability.

The HP 9114A disc is especially useful when you need additional memory or access to disc-based applications. This is a double-sided 3.5-inch microfloppy with 710K byte capacity.

(ref.: 5954-2485D 1985-06 *The Portable PLUS Personal Computer*)

Availability

Introduced in 1984 and discontinued in 1989.

Price List

Product #	Description	Price € / \$ US
110	Portable Computer (with HP-IL built-in)	2995.00 \$: 1984
110+	Portable Computer Plus (with HP-IL built-in)	2295.00 \$: 1985
9114A	3½" Single Floppy Drive	795.00 \$: 1985
9114B	3½" Single Floppy Drive	795.00 \$: 1987
2225B	Thinkjet Printer with HP-IL & Battery	495.00 \$: 1986

Pictures



HP Portable Plus connected to a HP 9114B Floppy Drive and a HP 2225B ThinkJet Printer

Computer Interface Cards



Price List

Product #	Description	OEM	Price € / \$ US
82938A	HP-IL Interface Card for HP-85A/B		295.00 \$: 1982
45643A	HP-IL Interface Card for HP-150/150II		175.00 \$: 1984
82924A	HP-IL Interface Card for Integral PC		295.00 \$: 1985
82973A	HP-IL Interface Card for Vectra PC & IBM PC (ISA)		165.00 \$: 1986
T1000/HPIL	HP-IL Interface Card for Toshiba T1000	Interloop	250.00 \$: 1991
PC/HPIL	HP-IL Interface Card for IBM PC (ISA)	Interloop	200.00 \$: 1991

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HP-IL Storage Devices

HP 82161A Digital Cassette Drive



Overview

The HP 82161A Digital Cassette Drive is a battery-operable, mass memory device meeting the standards of quality and performance formerly reserved for peripherals to large installed computers.

The Digital Cassette Drive uses a high-quality digitally-certified mini-cassette for storing data. Each cassette can hold up to 131,000 bytes of information. This translates to 50 times the total capacity of an HP-41CV or 18,000 registers. Imagine. enough capacity on one cassette to store all 26 of the current HP-41 Solutions Books programs, with room to spare. The Digital Cassette Drive even has a storage compartment for two spare cassettes, typical of HP's attention to detail.

The Digital Cassette Drive provides exceptional performance for a battery-operable device. Rewind time is under thirty seconds and read/write operations are done at nine inches per second. All tape movement is under microprocessor control and buffer space is

provided in the drive for temporary storage of directory information to help minimize access time and tape motion.

Standby Mode is provided to allow HP-IL controllers to turn the drive on or off remotely. This feature, unique to the HP-IL Interface, allows systems to be developed for remote applications. System battery life can be extended dramatically, because the HP-41 can turn devices on and off when necessary.

The Digital Cassette Drive uses a two-motor system to move the tape past a two-track, magnetic head. The motors have precision, iron-less core rotors for high performance and low tape tension and wear. The magnetic head is specially designed to resist data alteration due to externally generated magnetic fields. Precise control of tape speed allows reliable, high-density recording.

(ref: 5953-7206 1982/01 Hewlett-Packard HP-41C/CV Pamphlet)

Availability

Introduced in 1982 and discontinued in 1990.

Documents & Web Sites

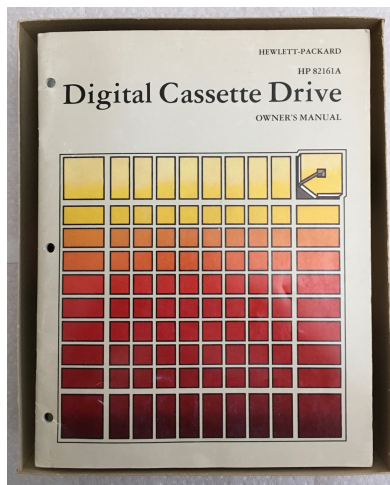
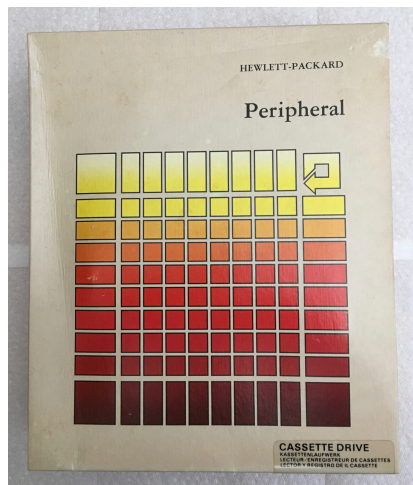
Documents & Web Sites	Link
Digital Cassette Drive, Owner's Manual, 82161-90002, Feb. 1981	Manual
Digital Cassette Drive, Owner's Manual Addendum, 82161-90016, May 1982	Sheet
Digital Cassette Drive, Owner's Manual, 82161-90002 Rev. C, Jan. 1987	Manual
Digital Cassette Drive, Service Manual, 82161-90014, Nov. 1981	Manual
Hewlett-Packard Journal, May 1983 • Compact Digital Cassette Drive for Low-Cost Mass Storage by William Buskirk, Charles Gilson, and David Shelley	Journal
Mini Data Cassette, Blank Labels Sheet, 82177A	Sheet
Repairing HP-82176A tape cassettes by Tony Duell	Article

Price List

Product #	Description	OEM	Price € / \$ US
82161A	Digital Cassette Drive (1x 128KB)		550.00 \$: 1986
82161-90002	Digital Cassette Drive Owner's Handbook		10.00 \$: 1986

Product #	Description	OEM	Price € / \$ US
82161-90014	Digital Cassette Drive Service Manual		
82176A	Mini Data Cassette (80 foot tape, 128KB, x10)	Verbatim	95.00 \$: 1986
MI-80	Mini Data Cassette (80 foot tape, 128KB)	Verbatim	
MI-50	Mini Data Cassette (50 foot tape, 80KB)	Verbatim	
82177A	Mini Data Cassette, Blank Labels (x420)		12.50 \$: 1986
82033A	Rechargeable Battery Pack		25.00 \$: 1986
82037A	Reserve Power Pack		60.00 \$: 1986
82044A	Security Cable		20.00 \$: 1986
82059D	AC Adapter/Recharger		20.00 \$: 1986
8206?B	AC Adapter/Recharger		2?.00 \$: 1986

Pictures



Unboxing



Media



Drive with Opened Doors



Drive Front View



Drive Top View



Drive Rear View

*Drive Side View**Battery Pack & AC Adapter*

SB10161A Single 5¼ Floppy Drive SB10162A Dual 5¼ Floppy Drive



Overview

Steinmetz & Brown, Ltd., a St. Paul Minnesota company, announces the availability of the SB10160A 5 1/4 inch disk drive series.

The two models are:

- SB10161A : has one double-sided disk drive, capable of storing 368,000 byte.
- SB10162A : has two double-sided disk drive, capable of storing 736,000 byte.

Both models uses the same physical package allowing the SB10161A to be converted to a SB10162A later on.

Designed for use with the HP-41, HP-71 & HP-75 handheld computers, the drives provide mass storage features not previously found on HP-IL devices:

- High speed data storage and retrieval
- Long media life
- Inter-drive copying (SB10162 only)
- Standard 5 1/4 inch media
- IBM PC (40 track/side, 9 sector / track) format
- Physical write protection on disks
- Large storage capacity

Availability

Introduced in 1984 and discontinued in 1987.

Documents & Web Sites

Documents & Web Sites	Link
Series 10160, HP-IL Disk Drives, Preliminary Features List, Mai 1984	<u>Pamphlet</u>
SB10161/SB10162 Technical Description, 1984	<u>Manual</u>
HP-9114B Supplemental Manual, 09914-90013, Aug. 1986	<u>Manual</u>

Price List

Product #	Description	Price € / \$ US
SB10161A	5¼" Single Floppy Drive	595.00 \$: 1984
SB10162A	5¼" Dual Floppy Drive	895.00 \$: 1984

Notes

- SB10160A series are build around Shugart SA455-3AA 5¼ DSDD 500KB half-height floppy drive.
- FAT12 formatted disks has 360KB of available data space.
- LIF formatted disks has 131KB or 368KB of available data space.
- HP-71 & HP-75 can access 368KB of data space natively.
- HP-41 can access up to 131K natively, but can access the full 368KB of data space by using the Extended-IL module or the combination of the 82183A Extended-I/O module with the HP-41 small program contained in the 09914-90013 Supplement Manual.

Pictures



Drive Front View



Drive Rear View



Media

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HP 9114A 3½ Floppy Drive HP 9114B 3½ Floppy Drive



Overview

If you've been looking for a more powerful storage device for your portable computer or calculator, look no further...

Hewlett-Packard's 9114 gives you up to 710,000 characters of formatted data in a battery-powered, portable package.

- **Flexibility**

Add flexibility to your handheld or portable computer! With the HP 9114, you are now able to complement your ROM-based software with a wide selection of disc-based software. The 9114 gives you extra data storage capability. Valuable data can be stored on disc and carried with you.

- **Portability**

The HP 9114 3 1/2 inch microfloppy disc drive is powered by a dry cell battery. Just pick it up and carry it with you...no power cord to tie you down. And it's lightweight...only 5.4 pounds... making it a perfect travel companion. Team it up with the stackable HP ThinkJet Printer for the complete portable solution!

- **Battery Charge Indicator**

The LED "Fuel Gauge" on the front panel indicates the state of battery charge. This feature allows you to easily track battery life. Then when you're back in your office simply plug your HP 9114 recharger into an AC outlet... and you'll be ready for your next field visit or business trip.

- **Capacity**

Each 3 1/2" disc holds the equivalent of a 400 page, double-spaced report. If you're a

professional on-the-move, you need all your information at your fingertips... Carry your client information with you and update it right on the spot...without relying on the central office.

- **IBM Compatibility**

You can easily share data via discs between your HP Touchscreen II, PORTABLE, or Portable PLUS, and IBM's PC and PC/XT. Simply plug your HP 9114 into the back of the IBM using the HP 82973A Portable-Desktop Link.

- **Extensive System Support**

HP PORTABLE, HP Portable PLUS, IBM PC, IBM PC/XT, HP Series 40 & HP Series 70.

(ref: 5953-6862 1985/12 HP 9114B Portable Data Storage Technical Note)

Availability

Introduced in 1984 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
HP-9114A Portable Mass Storage Pamphlet, 5953-6836, Aug. 1984	<u>Pamphlet</u>
HP-9114A Service Manual, 5957-6557, June 1984	<u>Manual</u>
HP-9114A Schematics by Tony Duell	<u>Diagram</u>
HP-9114B Portable Data Storage Pamphlet, 5953-6862, Dec. 1985	<u>Pamphlet</u>
HP-9114B Operator's Manual, 09914-90005, Aug. 1986	<u>Manual</u>
HP-9114B Supplemental Manual, 09914-90013, Aug. 1986	<u>Manual</u>
HP-9114B Schematics by Tony Duell	<u>Diagram</u>

Price List

Product #	Description	Price € / \$ US
9114A	3½" Single Floppy Drive	795.00 \$: 1985
9114B	3½" Single Floppy Drive	795.00 \$: 1987
09114-90005	Operator's Manual	
09114-90013	Supplement Manual	
5957-6557	Service Manual	

Product #	Description	Price € / \$ US
88014A	Rechargeable Battery Pack	55.00 \$: 1985
88014B	Rechargeable Battery Pack	55.00 \$: 1985
92192A	3½ DSDD 1MB Floppy Disks (Box of 10)	69.00 \$: 1985
82059D	AC Adapters/Rechargers	20.00 \$: 1986
8206?B	AC Adapters/Rechargers	2?.00 \$: 1986

Notes

- 9114A is build around Sony OA-D32W-10 3½ DSDD 1MB full-height floppy drive.
- 9114B is build around Sony MP-F52W-50 3½ DSDD 1MB half-height floppy drive.
- 82199A is build around Panasonic LCR-226P (6V, 2.4Ah) lead-acid battery.
- FAT12 formatted disks has 710KB of available data space.
- LIF formatted disks has 131KB or 630KB of available data space.
- HP-71 & HP-75 can access 630KB of data space natively.
- HP-41 can access up to 131K natively, but can access the full 630KB of data space when using the Extended-IL module or the combination of the 82183A Extended-I/O module with the HP-41 small program contained in the 09914-90013 Supplement Manual.

Pictures



Media & Battery Pack



9114A Drive Front View



9114B Drive Front View



9114 Drives Rear View

CMT-RD RAM Drive



Overview

The CMT HPIL RAM Disc is an electronic mass-storage device which emulates the HP 82161A Digital Cassette Drive. Being a solid state device, there is a marked improvement in data access time over the Cassette Drive. The main benefit of the RAM Disc, however, is its portability. The unit is powered by an internal Alkaline battery or an internal rechargeable NiCad battery.

(ref: CMT 1987/08 Hand-Held Solutions Vol. I)

Availability

Introduced in 1987 and discontinued in 1990.

Documents & Web Sites

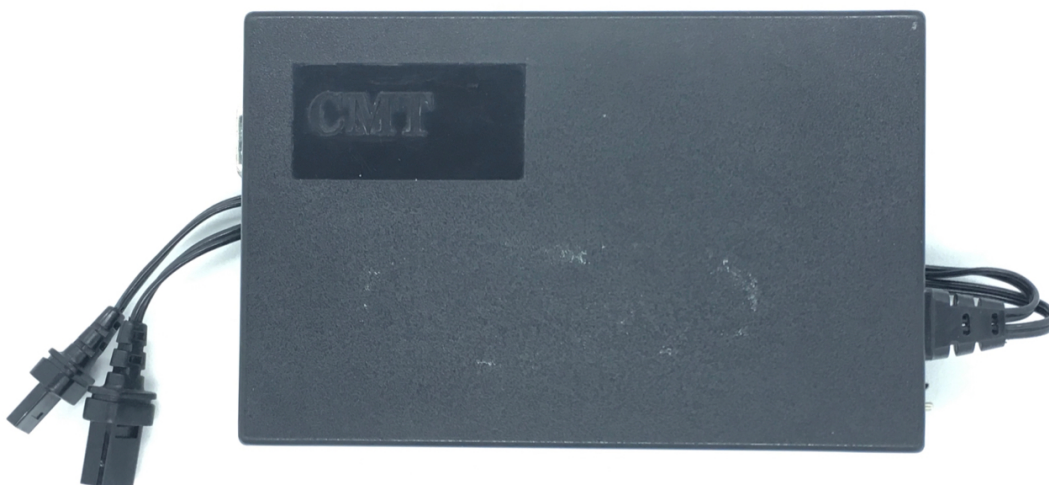
Documents & Web Sites	Link
CMT HPIL RAM Disk & IL/RS Interface Owners Manuals, CMT100, Feb. 1988	Manual
CMT Hand-Held Solutions, Vol. I, Aug. 1987	Magazine

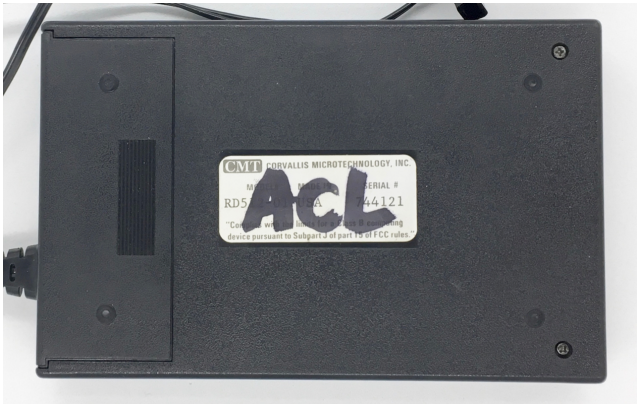
Price List

Product #	Description	Price € / \$ US
CMT-RD-128	128KB RAM Drive	345.00 \$: 1987
CMT-RD-256	256KB RAM Drive	495.00 \$: 1987
CMT-RD-512	512KB RAM Drive	795.00 \$: 1987
CMT-9VA	9V Alkaline Battery	
CMT-9VR	9V NiCad Rechargeable Battery	
CMT-3VL	3V Lithium Battery	
CMT-RE2	120VAC - 9VDC 300mA Adapter	
CMT-RE3	120VAC - 9VDC 300mA Adapter	

Notes

- Support Extended Filbert Protocol.
- Can be configured as one big drive or as multiple 128KB drives.
- E-block 9v battery used for mobile operation.
- DC Adapter 9v 300mA model RE-3 (SPA-4190, + center) used for fixed operation.
- BR2325 3v 165mAh lithium coin cell battery used for backup.
- RS-232C connector is a DB-9 male.

Pictures*Drive Top View*



Drive Bottom View



Drive Rear View

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HP-IL Printer Devices

HP 82162A Thermal Printer



Overview

This whisper-quiet, thermal, 24-character Printer/Plotter gives you numeric, upper- and lower-case alpha, double-wide characters, plotting capability, intensity control for optimum contrast and readability. It even allows you to define your own "special" characters.

Portable and lightweight, it operates on batteries or ordinary house current, working when and where you need it. The printer/plotter is a valuable aid in editing programs or checking long calculations. You see everything at once, clearly on tape.

The HP-IL Interface ensures that the HP82162A will be compatible with future HP-IL devices. Thus, its utility will extend far into the future. Like the Digital Cassette Drive, this Printer supports Standby Mode so the loop controller can manage its power consumption.

(ref: 5953-7206 1982/01 HP-41C/CV Pamphlet)

Availability

Introduced in 1982 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
Hewlett-Packard Journal, March 1980 • Evolutionary Printer Provides Significantly Better Performance (82143A) by Roger Quick and Donald Morris	<u>Journal</u>
Thermal Printer, Owner's Manual, 82162-90001, Apr. 1981	<u>Manual</u>
Thermal Printer, Owner's Manual Addendum, 82161-90016, May 1982	<u>Sheet</u>
Thermal Printer, Owner's Manual, 82162-90001 Rev. B, Aug. 1983	<u>Manual</u>

Price List

Product #	Description	OEM	Price € / \$ US
82162A	Thermal Printer, 2¼" wide, 24 columns		450.00 \$: 1985
82162-90001	Thermal Printer Owner's Handbook		10.00 \$: 1986
82162-90011	Thermal Printer Service Manual		
82045A	Blue Thermal Paper (x6)		10.00 \$: 1986
82175A	Black Thermal Paper (x6)		10.00 \$: 1986
998523	Black Thermal Paper (x9)	NCR	13.99 \$: 2018
82033A	Rechargeable Battery Pack		25.00 \$: 1986
82037A	Reserve Power Pack		60.00 \$: 1986
82044A	Security Cable		20.00 \$: 1986
82059D	AC Adapters/Rechargers		20.00 \$: 1986
8206?B	AC Adapters/Rechargers		2?.00 \$: 1986

Pictures*Printer With Paper Door Opened**Printer Front View*



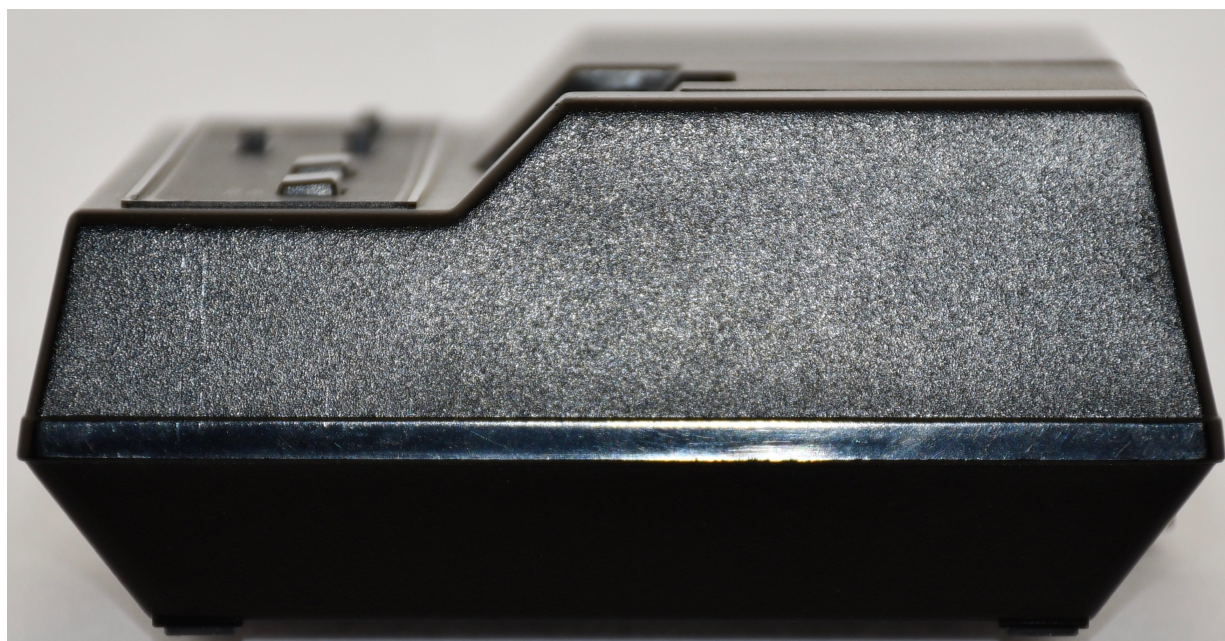
Printer Top View



Printer Rear View



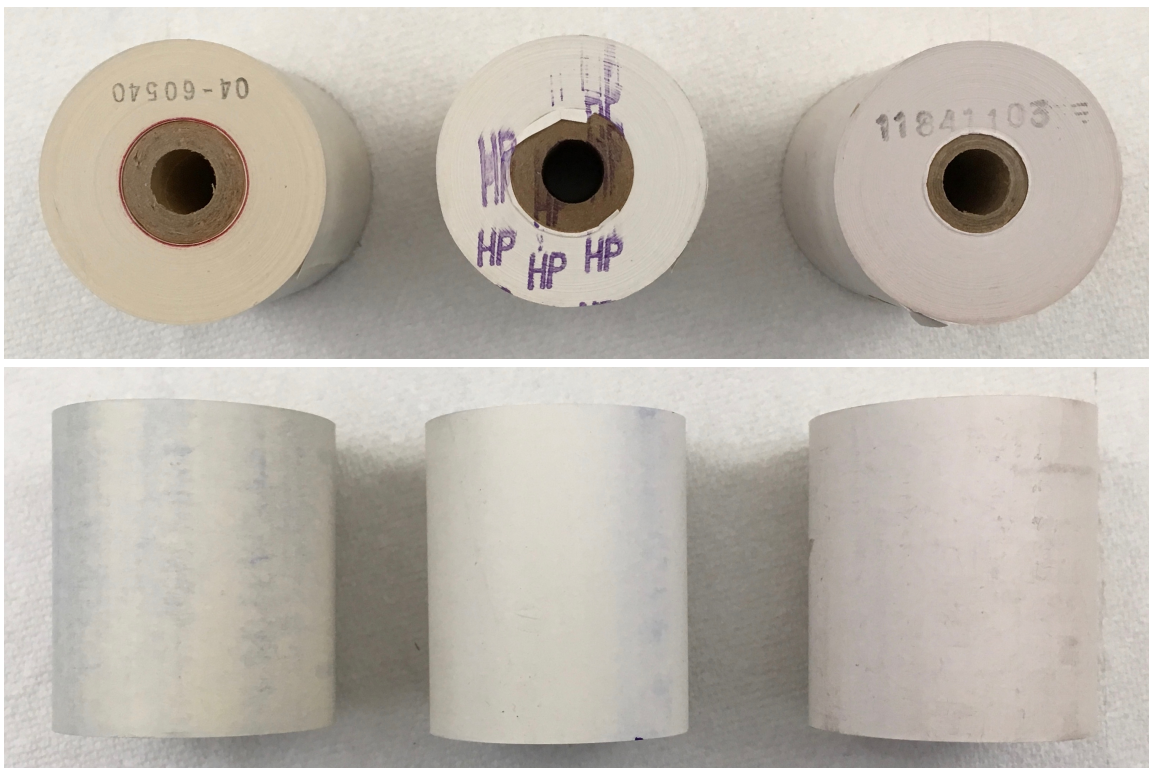
Printer Bottom View



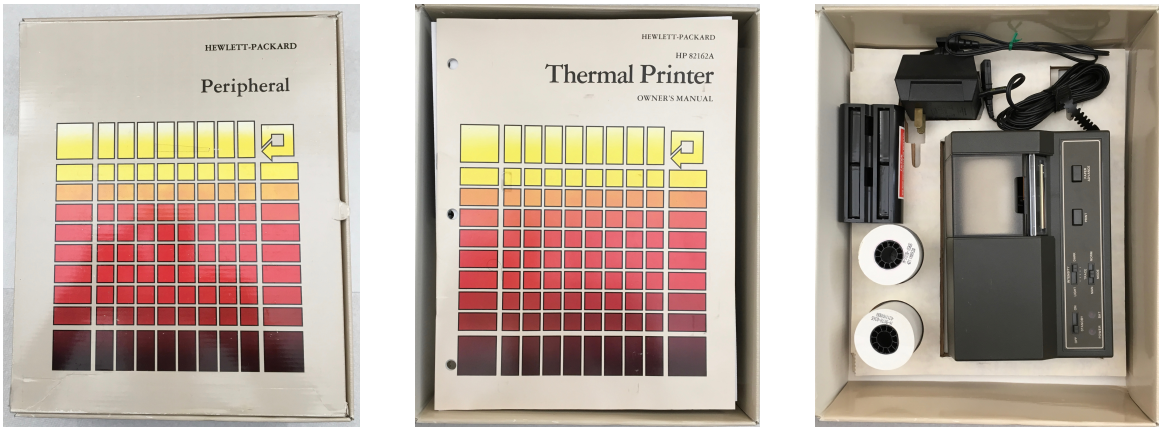
Printer Side View



HP 82045A (Blue) & 82175A (Black) Thermal Papers



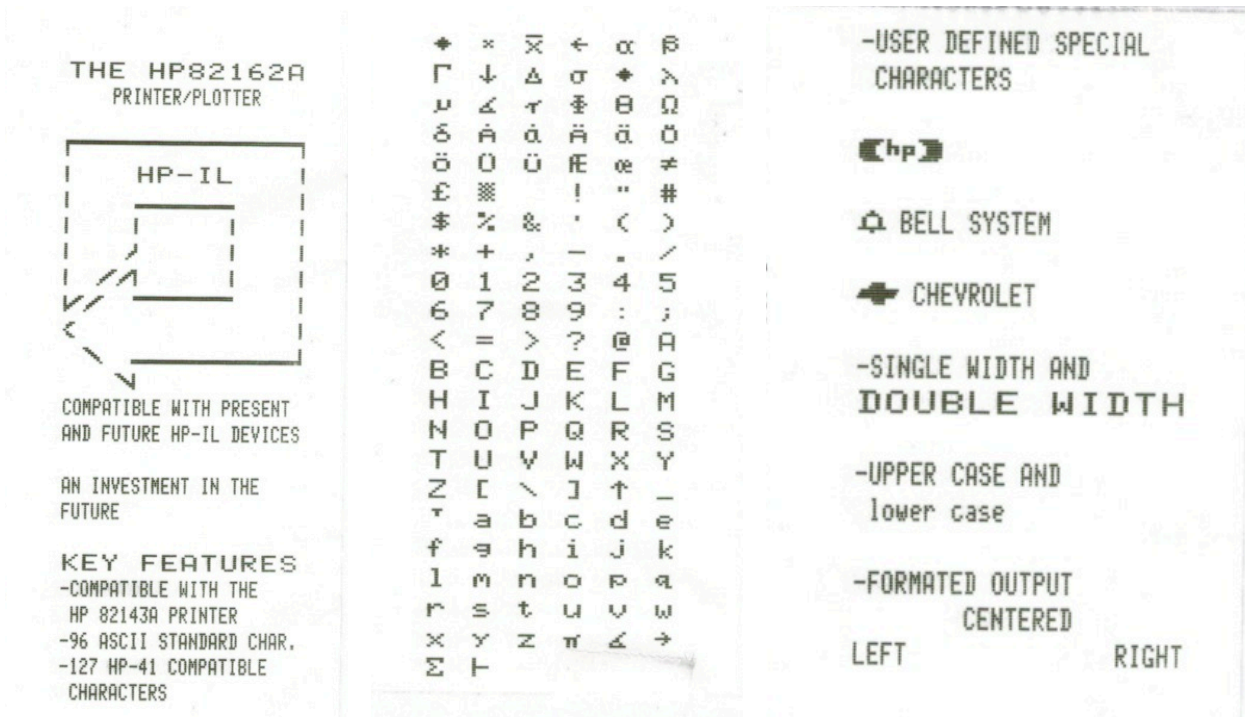
HP Blue (left & center) & Black (right) Thermal Papers



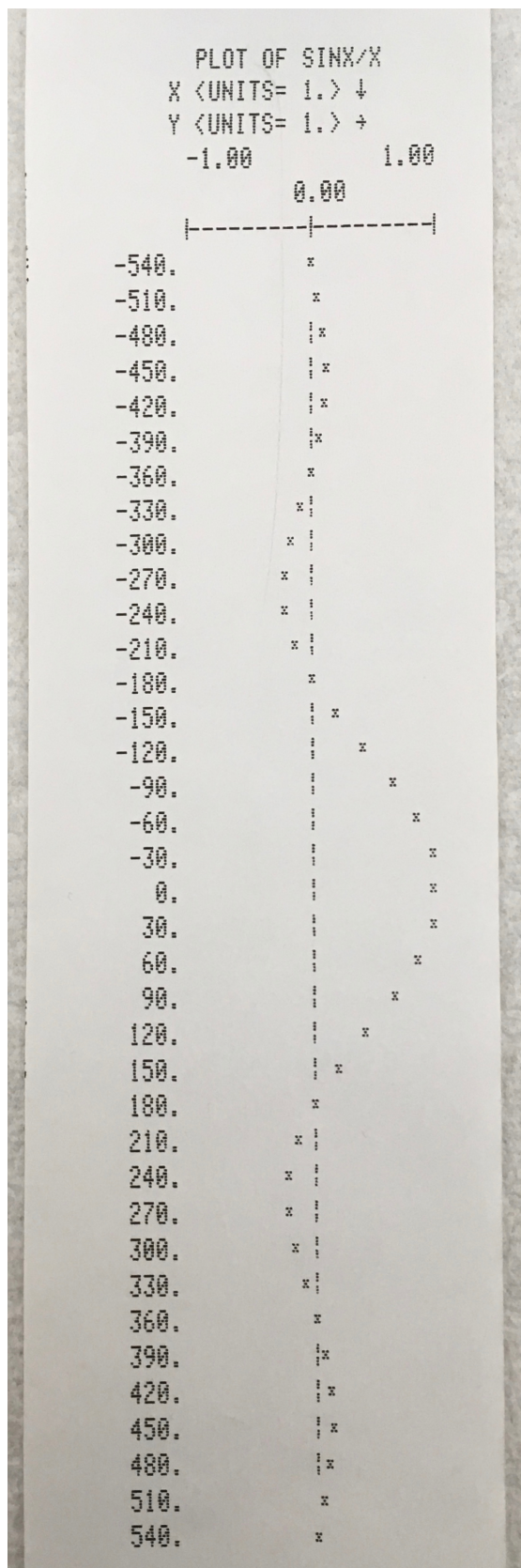
Unboxing



Battery Pack & AC Adapter

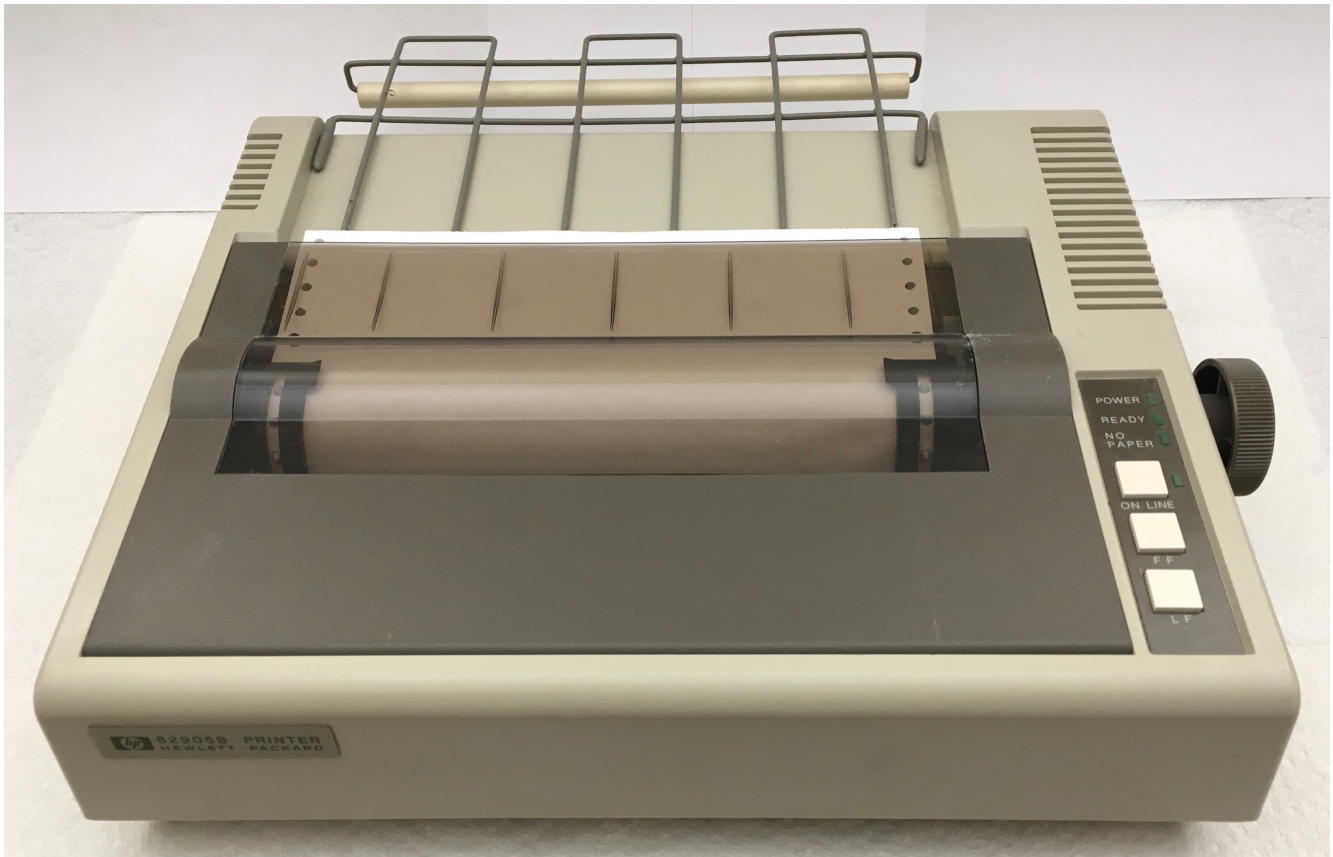


Printer Output from HP-41 System Demo Program



Left: Plotting Example / Right: Bar Code Example

HP 82905B Impact Printer



Overview

Introduction

The HP 82905B Printer is a general purpose printer featuring 80 character per second bi-directional printing. The printer utilizes a 9 X 9 dot matrix character format. It prints in 40, 66, 80, or 132 columns. You can choose among normal, expanded, compressed, or compressed expanded characters. Normal size characters may also be emphasized.

The printer has a graphics mode which gives you the ability to print illustrations, charts, graphs, block letters, etc. using patterns of dots under software control. You can also specify functions such as line spacing, form length, and skip over perforation under software control.

Interface Options

The HP 82905B Printer is available with the following interface options:

Interface	120V	220V	240V
IEEE Standard 488-1978 (HP-IB)	option 002	option 003	option 004
HP-IL	option 248	option 348	option 448
Serial (RS-232C)	option 240	option 340	option 440
Parallel (Centronics)	option 242	option 342	option 442

Caution

Each of the HP 82905B Printers has been configured for compatibility with a single type of interface. Do not attempt to use the connector located on the back of the printer in the lower right corner unless your printer has been configured with the parallel interface option (options 242, 342, or 442).

Operation Modes

The HP 82905B Printer has two modes of operation when used on line with a computer: text and graphics. Text mode is the normal operating mode for the printer and will probably be the one you use most often. When the printer is first turned on, it operates in text mode until instructed to change to the graphics mode.

Text Mode

In text mode, all of the printer functions can be controlled by ASCII (American Standard Code for Information Interchange) codes transmitted as data to the printer. These codes can be transmitted separately to initialize the printer for a given print job, embedded in the data to be printed, or as a combination of both methods. Control codes are not printed by the printer.

Graphics Mode

The HP 82905B Printer has two graphics modes that give you the ability to produce virtually any graphic display using patterns of printed data under software control. When graphics mode is enabled, the entire page becomes a matrix of dot positions that the print head can access. There are 480 dot positions on a line in the standard graphics mode and 960 dot positions in the dual-density graphics mode.

The printer utilizes a raster scan technique of producing graphics which prints vertical columns of eight dots across the page during each pass of the print head. Dot patterns are the "image" of the binary equivalent of the ASCII characters transmitted to the printer.

(ref: 82905-90014 1982-11 HP 82905B Printer Owner's Manual)

Availability

Introduced in 1982 and discontinued at an unknown date.

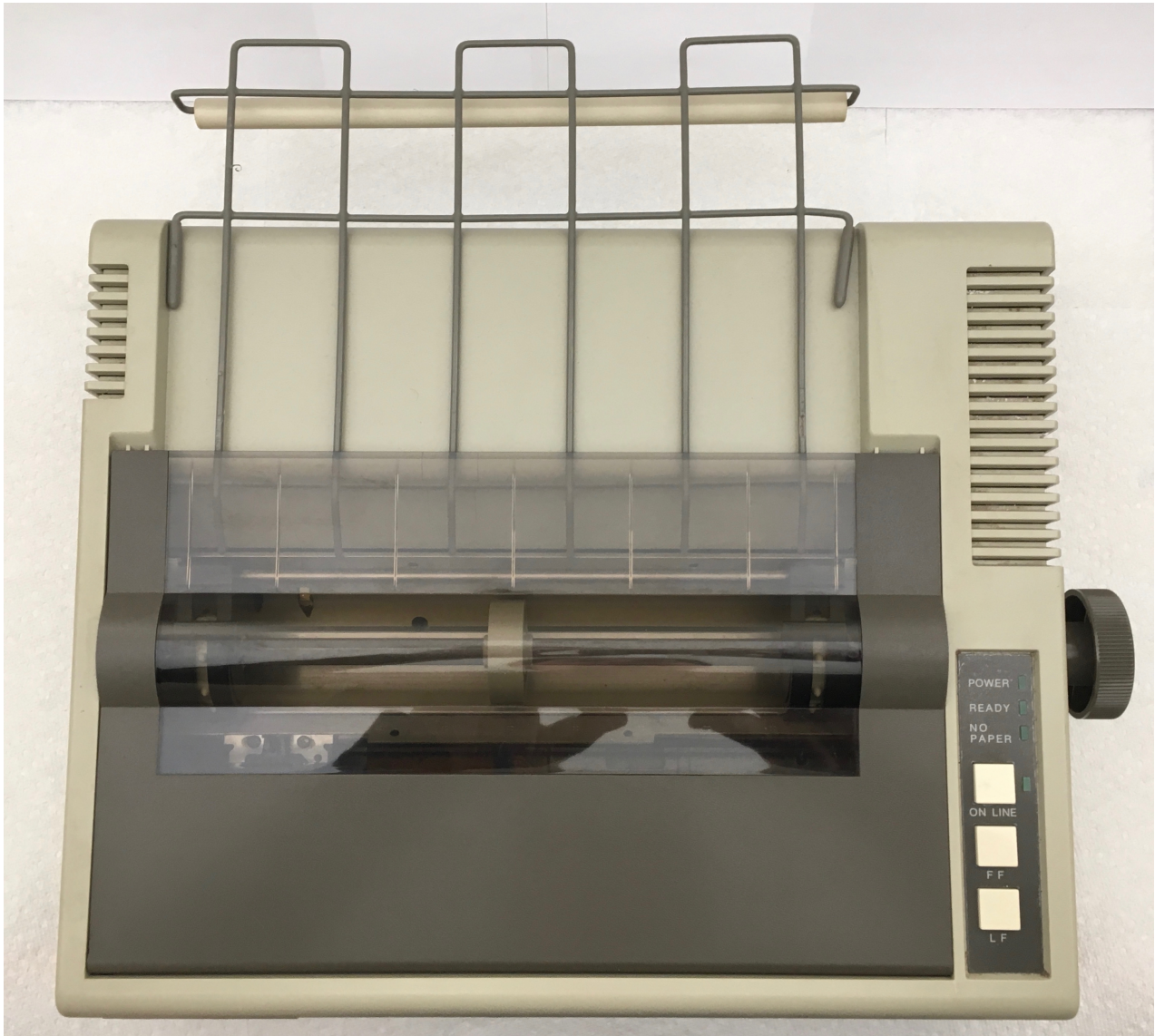
Documents & Web Sites

Documents & Web Sites	Link
HP 82905B Impact Printer, Owner's Manual, 82905-90014, Nov. 1982	Manual

Price List

Product #	Description	OEM	Price € / \$ US
82905B opt. 248	Impact Printer, 8½"	RX-80 / Epson	795.00 \$: 1985

Pictures



Top View



Front View



Side View



HP-IB - Rear View



HP-IL - Rear View

HP 2225B ThinkJet Printer



Overview

The ThinkJet prints bidirectionally at 150 characters per second to produce 80-column pages quickly in the office or in the field. With sound pressure under 50 decibels, printer noise need never interrupt your train of thought again.

An inexpensive, disposable cartridge holds the print head and ink reservoir, and is capable of printing approximately 500 full pages before replacement. Ink is delivered to the paper on demand, and dries immediately.

The 11 x 12 dot-matrix format text mode has a logic-seeking feature to find the fastest print route. Add a bold mode that won't slow printing speed to handle most of your letter-quality needs. A ROMAN8 character set provides 216 printable characters to meet your multilingual printing needs. Print on single sheets or fanfold paper.

(ref.: 5954-1059 1984-04 HP-41 Adv. Prog. Calculators & HP-71 Handheld Computers)

Availability

Introduced in 1984 and discontinued in 1993.

Documents & Web Sites

Documents & Web Sites	Link
Thinkjet Printer, Reference Manual, 02225-90002, Mar. 1984	Manual

Documents & Web Sites	Link
Thinkjet Printer, Owner's Manual, 02225-90032, Oct. 1984	<u>Manual</u>
Hewlett-Packard Journal, May 1985	<u>Journal</u>
<ul style="list-style-type: none"> • History of ThinkJet Printhead Development by Niels Nielsen • An Inexpensive, Portable Ink-Jet Printer Family by Cheryl Katen and Thomas Braun • Alignment of Bidirectional Text by Dave Lowe and Robert Callaway • Printhead Interconnect by Roy Buck • Custom VLSI Microprocessor System by Ray Pickup • Home Switch Design by Andrew Sleeper • Thermodynamics and Hydrodynamics of Thermal Ink Jets by Ross Allen, John Meyer, and William Knight • Development of the Thin-Film Structure for the ThinkJet Printhead by Eldurkar Bhaskar and Stephen Aden • Where the Ink Hits the Paper by David Hackleman • The ThinkJet Orifice Plate: A Part With Many Functions by Gary Siewell, William Boucher, and Paul McClelland • Managing the Development of a New Technology by Frank Cloutier 	

Price List

Product #	Description	Price € / \$ US
2225A	Thinkjet Printer with HP-IB	495.00 \$: 1986
2225B	Thinkjet Printer with HP-IL & Battery	495.00 \$: 1986
2225C	Thinkjet Printer with Centronics	495.00 \$: 1986
2225D	Thinkjet Printer with RS-232	495.00 \$: 1986
2225P	Thinkjet Printer with Centronics & Battery	495.00 \$: 1986
82199A	Rechargeable Battery Pack for 2225B & 2225P	45.00 \$: 1985
13269TT	Carrying Case	49.00 \$: 1985
92250V	Dust Cover	15.00 \$: 1985
92261A	Black Printhead Cartridge	9.95 \$: 1985
92261L	ANSI A / US Letter Ink-jet Paper (1000 Fanfold Sheets)	29.00 \$: 1985
92261M	ANSI A / US Letter Ink-jet Paper (2000 Single Sheets)	48.00 \$: 1985
92261N	ANSI A / US Letter Ink-jet Paper (2500 Fanfold Sheets)	50.00 \$: 1985

Product #	Description	Price € / \$ US
92261S	Printer Stand	49.00 \$: 1985
82059D	AC Adapters/Rechargers	20.00 \$: 1986
8206?B	AC Adapters/Rechargers	2?.00 \$: 1986

Notes

- HP 82199A Battery Pack is uses six type C NiCad batteries

Pictures



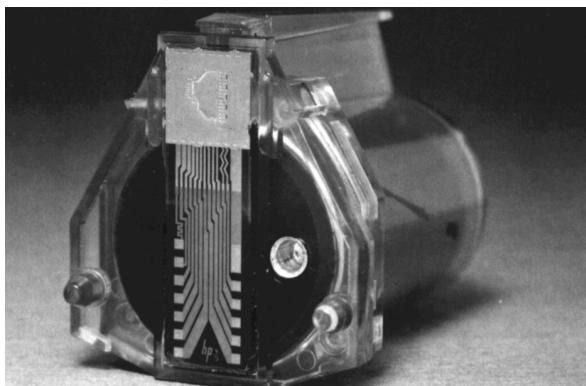
Printer Top View



Printer Front View



Printer Rear View



Printer Printhead & Battery Pack

HP-IL Plotter Devices

HP 7470A Desktop Plotter



Overview

It's portable ... and affordable.

The 7470A plotter is designed for the rigors of daily use. Take it traveling, plug it in, and make last-minute updates for your presentations. Or, create plots in your lab or office. Combined with a hand-held computer such as the HP-41, the 7470A provides you with a complete, reliable graphics system at a remarkably low price.

Plotting is easy with the HP 82184A Plotter Module.

The HP 82184A Plotter Module for the HP-41 makes plotting simple. Just enter your data to make line graphs using the module's utility program. Everything else — grids, axes, labels, and line types — can be added automatically. The module's plotting functions help you create other graphs and charts. Plus, you can plot bar code for storing programs and data, or for use in inventory control.

Let graphics speak for you.

Graphics help you interpret and communicate information. With the 7470A, you can make plots for documents or for presentations. And, you can use a variety of vivid pen colors in two line widths.

What is HP-IL?

The Hewlett-Packard Interface Loop (HP-IL) is a new standard in interfacing. Designed for portable computing and measurement systems, HP-IL uses standard two-wire cables that form an expandable closed loop system. HP-IL features simplicity, low cost, and portability.

Thanks to HP-IL, you can now gather data in the field, lab, or office. Then analyze your data or make presentations with the help of the HP 7470A Graphics Plotter.

What will an HP-IL graphics plotter do for you?

HP-IL brings the versatility and power of graphics to portable computing systems. You can save time and money by plotting instead of hand-drawing . . . use graphics to analyze your data . . . make corrections quickly and easily.

HP-IL lets you use all of the standard features of the 7470A plotter: automatic pen changing and capping, five character sets, the HP Graphics Language (HP-GL), and more.

Put HP-IL into your future.

The 7470A plotter is just one of many HP-IL products. Expand your system with powerful devices such as: the HP-41C/CV or HP-75C handheld computers, the HP3421A data acquisition/control unit, the HP 3468A multimeter, and a variety of peripherals. With each HP-IL product, you can depend on the superior quality and reliability you've come to expect from Hewlett-Packard.

(Ref.: 5953-4153 1982-12 Hardcopy color graphics for your handheld computer)

Availability

Introduced in 1982 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
HP-7470A Interfacing and Programming Manual, 07470-90001, 1982	<u>Manual</u>
HP-7470A Operator's Manual, 07470-90002, 1982	<u>Manual</u>
HP-7470A Interconnection Guide, 07470-90003, 1982	<u>Manual</u>
HP-7470A Reference Card, 07470-9004, 1982	<u>Ref.Card</u>

Documents & Web Sites	Link
Hewlett-Packard Journal, Dec. 1982	<u>Journal</u>
<ul style="list-style-type: none"> • Development of a Low-Cost, High-Quality Graphics Plotter by Majid Azmoon • Controlling a Graphics Plotter with a Handheld Programmable Calculator by Robert Miller and Randy Coverstone • Low-Cost Ma Electronics Design by Neal Martini, David Element, and Peter Ma • Plotter Drive Motor Encoder Design by Arthur Wilson and Daniel Johnson • Graphics Plotter Mechanical Design for Performance and Reliability at Low Cost by Richard Kemplin, David Petersen, Chuong Ta, David Tribolet and Robert Force 	
HP-7470A Graphics Plotter, 5953-4151, Oct.1982	<u>Pamphlet</u>
Announcing the HP-7470A Graphics Plotter, 5953-4153, Dec.1982	<u>Pamphlet</u>
HP-7470A Schematics, by Tony Duell	<u>Diagram</u>
41CX tracing a sinus graph on a 7470A	<u>Video</u>
41CL tracing a sinus graph on a 7470A	<u>Video</u>

Price List

Product #	Description (Plotters)	Price € / \$ US
7470A opt. 001	Desktop Plotter, ANSI A/ISO A4, 2 pens, RS-232	1550.00 \$: 1983
7470A opt. 002	Desktop Plotter, ANSI A/ISO A4, 2 pens, HP-IB	1550.00 \$: 1983
7470A opt. 003	Desktop Plotter, ANSI A/ISO A4, 2 pens, HP-IL	1550.00 \$: 1983
Product #	Description (Manuals)	Price € / \$ US
07470-90001	Interfacing and Programming Manual, 1982	
07470-90002	Operator's Manual, 1982	
07470-90003	Interconnection Guide, 1982	
07470-90004	Reference Card, 1982	
Product #	Description (Accessories)	Price € / \$ US
17057A	Overhead Transparency Kit	
09872-60066	Digitizing Sight	
9211-3901	Transit Case	

Product #	Description (Accessories)	Price € / \$ US
1540-0560	Carrying Case	

Product #	Description (Papers)	Price € / \$ US
17800P	Non-Glossy Paper, ANSI A / US Letter (x50)	
17801P	Non-Glossy Paper, ANSI A / US Letter (x250)	
17802P	Non-Glossy Paper, ISO A4 (x50)	
17803P	Non-Glossy Paper, ISO A4 (x250)	
17900G	Glossy Paper, ANSI A / US Letter (x100)	
17901G	Glossy Paper, ISO A4 (x100)	
17702T	Transparency Film, ANSI A / US Letter (x50)	
17703T	Transparency Film, ISO A4 (x50)	
9280-0601	Vellum, ANSI A / US Letter (x150)	
9280-0603	Vellum, ISO A4 (x150)	
9280-0605	Polyester Film, ANSI A / US Letter (x50)	
9280-0606	Polyester Film, ISO A4 (x50)	

Product #	Description (Paper Pen, Fiber-Tip, 0.3 mm)	Link	Price € / \$ US
17825P	Paper Pen, Fiber Tip, 0.3 mm, Black (x5)		
50006	Paper Pen, Fiber Tip, 0.3 mm, Black (x5)	Store	27.10 \$: 2018
17827P	Paper Pen, Fiber Tip, 0.3 mm, Green (x5)		
17829P	Paper Pen, Fiber Tip, 0.3 mm, Aqua (x5)		
17831P	Paper Pen, Fiber Tip, 0.3 mm, Blue (x5)		
17831P	Paper Pen, Fiber Tip, 0.3 mm, Blue (x5)		
17833P	Paper Pen, Fiber Tip, 0.3 mm, Violet (x5)		
17835P	Paper Pen, Fiber Tip, 0.3 mm, Brown (x5)		
17837P	Paper Pen, Fiber Tip, 0.3 mm, Yellow (x5)		
17839P	Paper Pen, Fiber Tip, 0.3 mm, Orange (x5)		

Product #	Description (Paper Pen, Fiber-Tip, 0.3 mm)	Link	Price € / \$ US
17841P	Paper Pen, Fiber Tip, 0.3 mm, Red (x5)		
17843P	Paper Pen, Fiber Tip, 0.3 mm, Red-Violet (x5)		
17845P	Paper Pen, Fiber Tip, 0.3 mm Primary Colors: Black, Blue, Red, Green, Yellow		
50005	Paper Pen, Fiber Tip, 0.3 mm Cool Colors: Black, Green, Aqua, Blue, Violet	Store	27.10 \$: 2018
17847P	Paper Pen, Fiber Tip, 0.3 mm Cool Colors: Black, Green, Aqua, Blue, Violet		
50004	Paper Pen, Fiber Tip, 0.3 mm Cool Colors: Black, Green, Aqua, Blue, Violet	Store	27.10 \$: 2018
17849P	Paper Pen, Fiber Tip, 0.3 mm Warm Colors: Brown, Yellow, Orange, Red, Red-Violet		

Product #	Description (Paper Pen, Fiber-Tip, 0.7 mm)	Link	Price € / \$ US
17826P	Paper Pen, Fiber-Tip, 0.7 mm, Black (x5)		
50014	Paper Pen, Fiber Tip, 0.7 mm, Black (x5)	Store	27.10 \$: 2018
17828P	Paper Pen, Fiber-Tip, 0.7 mm, Green (x5)		
17832P	Paper Pen, Fiber-Tip, 0.7 mm, Blue (x5)		
17842P	Paper Pen, Fiber-Tip, 0.7 mm, Red (x5)		
17846P	Paper Pen, Fiber-Tip, 0.7 mm, Primary Colors: Black, Blue, Red, Green, Yellow		
17848P	Paper Pen, Fiber-Tip, 0.7 mm, Cool Colors: Black, Green, Aqua, Blue, Violet		
17850P	Paper Pen, Fiber Tip, 0.7 mm, Warm Colors: Brown, Yellow, Orange, Red, Red-Violet		

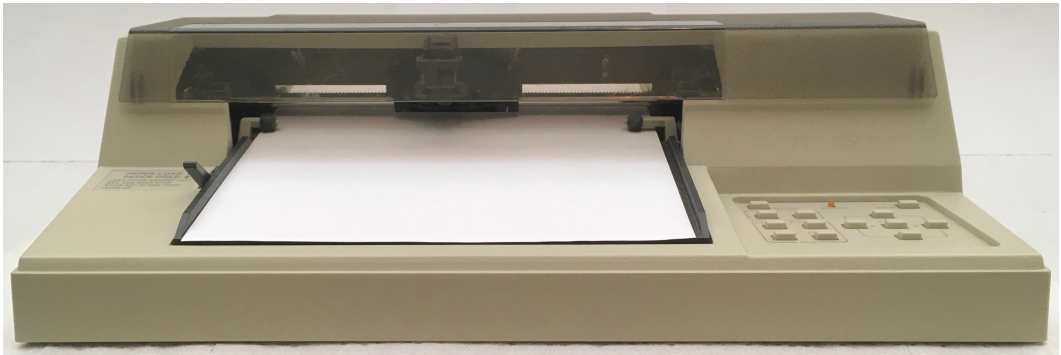
Product #	Description (Transparency Pen, Fiber-Tip, 0.3 mm)	Price € / \$ US
17725T	Transparency Pen, Fiber Tip, 0.3 mm, Black (x5)	

Product #	Description (Transparency Pen, Fiber-Tip, 0.3 mm)	Price € / \$ US
17727T	Transparency Pen, Fiber Tip, 0.3 mm, Green (x5)	
17729T	Transparency Pen, Fiber Tip, 0.3 mm, Aqua (x5)	
17731T	Transparency Pen, Fiber Tip, 0.3 mm, Blue (x5)	
17731T	Transparency Pen, Fiber Tip, 0.3 mm, Blue (x5)	
17733T	Transparency Pen, Fiber Tip, 0.3 mm, Violet (x5)	
17735T	Transparency Pen, Fiber Tip, 0.3 mm, Brown (x5)	
17737T	Transparency Pen, Fiber Tip, 0.3 mm, Yellow (x5)	
17739T	Transparency Pen, Fiber Tip, 0.3 mm, Orange (x5)	
17741T	Transparency Pen, Fiber Tip, 0.3 mm, Red (x5)	
17743T	Transparency Pen, Fiber Tip, 0.3 mm, Red-Violet (x5)	
17745T	Transparency Pen, Fiber Tip, 0.3 mm, Primary Colors: Black, Blue, Red, Green, Yellow	
17747T	Transparency Pen, Fiber Tip, 0.3 mm, Cool Colors: Black, Green, Aqua, Blue, Violet	
17749T	Transparency Pen, Fiber Tip, 0.3 mm, Warm Colors: Brown, Yellow, Orange, Red, Red-Violet	

Product #	Description (Transparency Pen, Fiber-Tip, 0.7 mm)	Price € / \$ US
17726T	Transparency Pen, Fiber-Tip, 0.7 mm, Black (x5)	
17728T	Transparency Pen, Fiber-Tip, 0.7 mm, Green (x5)	
17732T	Transparency Pen, Fiber-Tip, 0.7 mm, Blue (x5)	
17742T	Transparency Pen, Fiber-Tip, 0.7 mm, Red (x5)	
17746T	Transparency Pen, Fiber-Tip, 0.7 mm, Primary Colors: Black, Blue, Red, Green, Yellow	
17748T	Transparency Pen, Fiber-Tip, 0.7 mm, Cool Colors: Black, Green, Aqua, Blue, Violet	

Product #	Description (Transparency Pen, Fiber-Tip, 0.7 mm)	Price € / \$ US
17750T	Transparency Pen, Fiber Tip, 0.7 mm, Warm Colors: Brown, Yellow, Orange, Red, Red-Violet	

Pictures



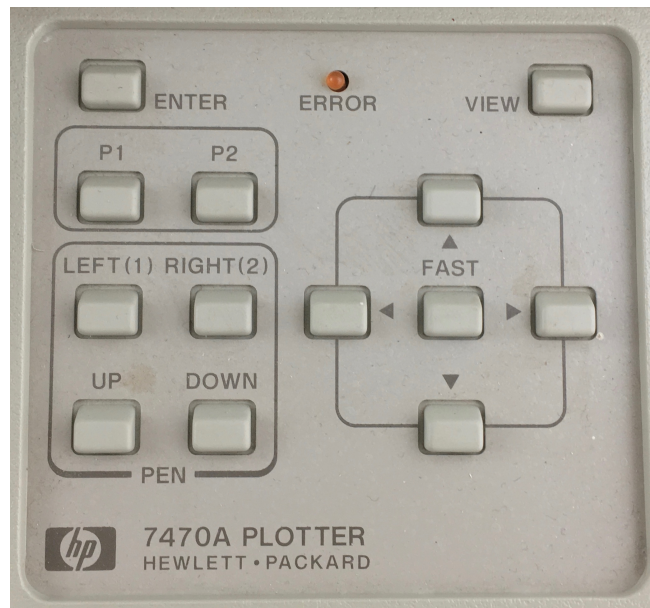
Plotter Front View



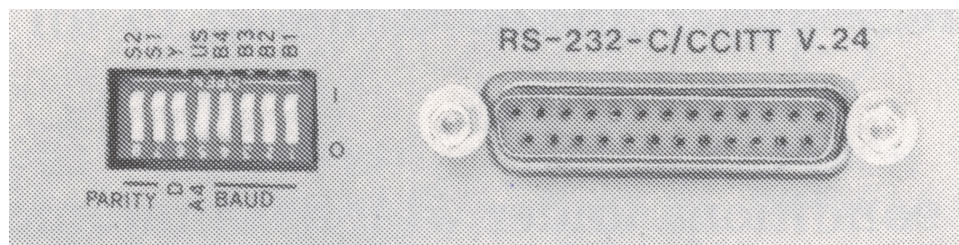
Plotter Side View



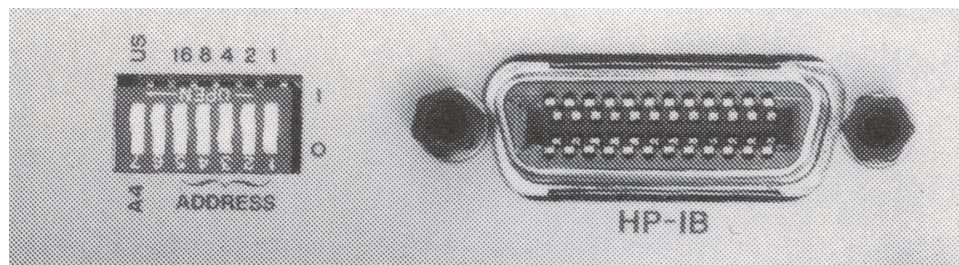
Plotter Rear View



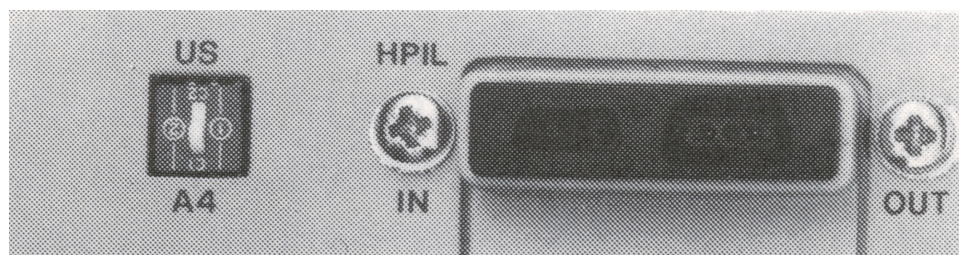
Plotter Control Panel



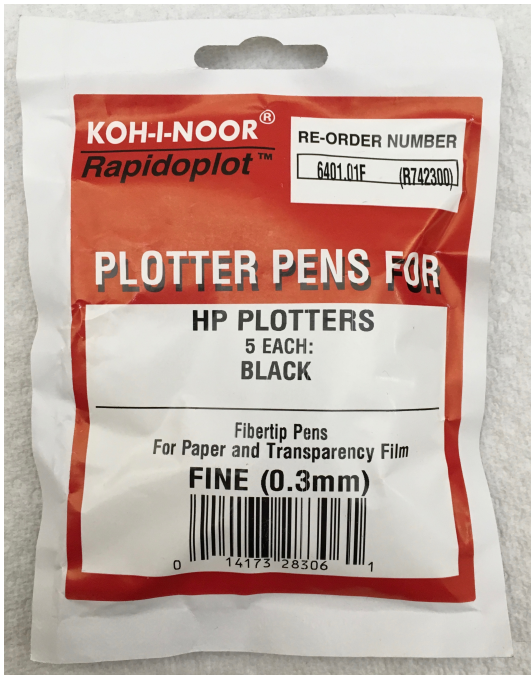
HP-7470A opt. 001 : RS-232C Interface



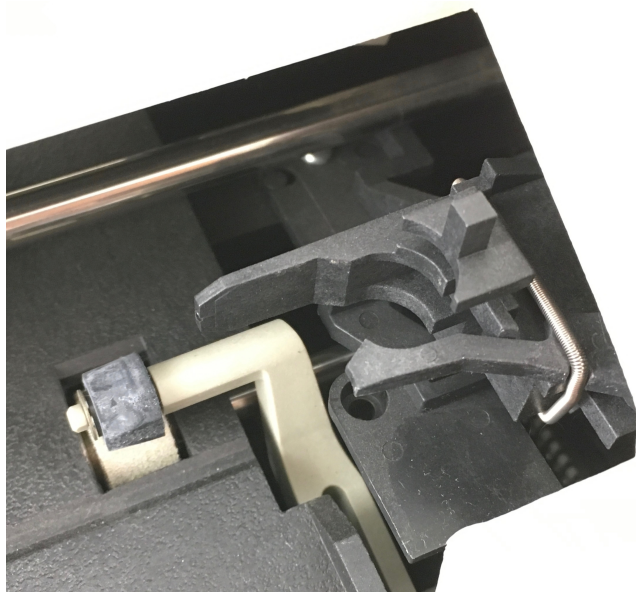
HP-7470A opt. 002 : HP-IB Interface



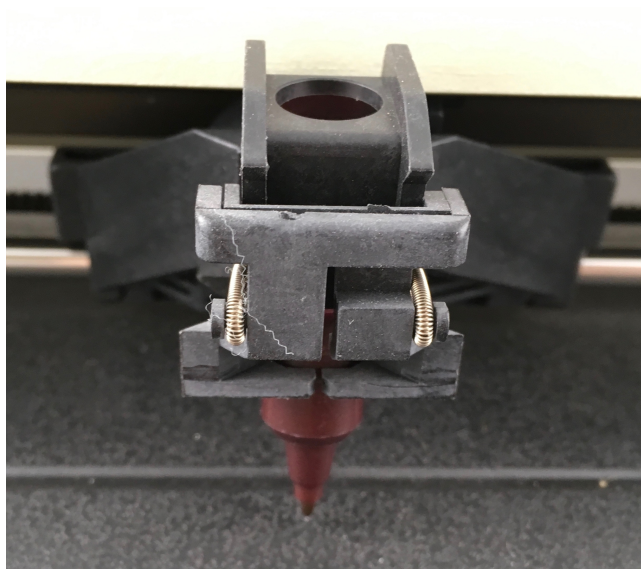
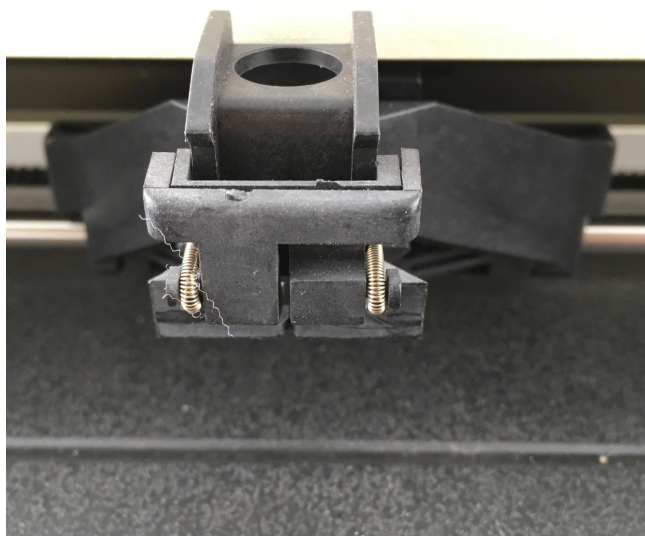
HP-7470A opt. 003 : HP-IL Interface



Plotter Pens



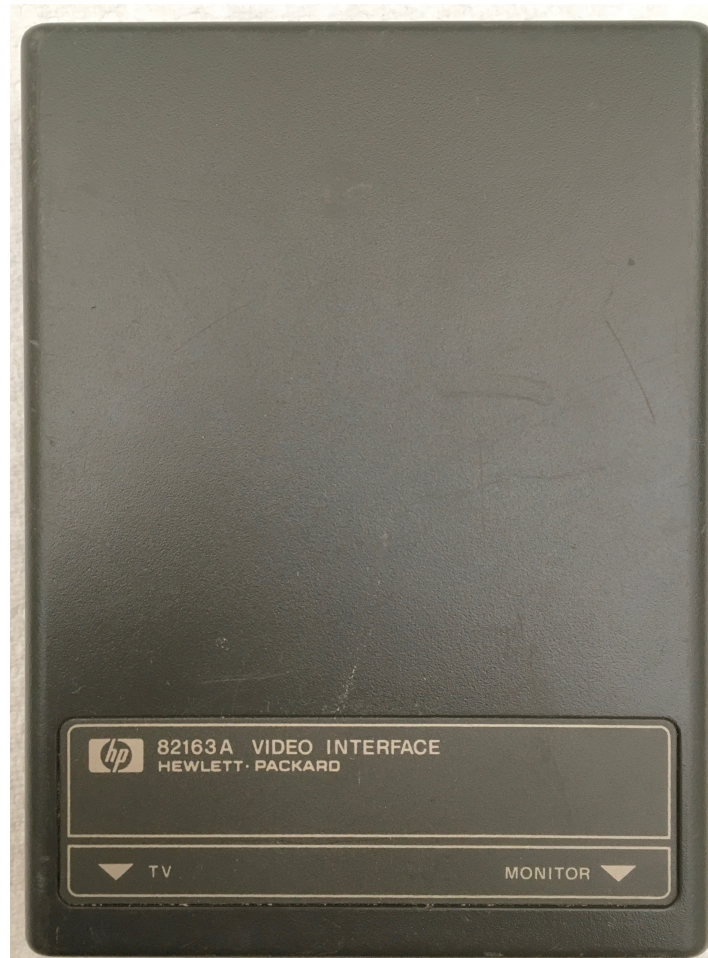
Plotter Pen Storage Without and With a Pen



Plotter Pen Holder Without and With a Pen

HP-IL Display Devices

HP 82163A Video Interface
HP 82163B Video Interface



Overview

Introduction

The HP 82163 Video Interface provides video display capabilities for your calculator or computer system through the Hewlett-Packard Interface Loop (HP-IL).

The video interface is typically controlled by your calculator or computer through its HP-IL capabilities or HP-IL extensions. Therefore, you should refer to the owner's manual for your computer, calculator, or HP-IL extension for operating information.

Operation

The video interface is ready to use when it has been connected to a power source, connected to a TV or monitor, and connected to a Hewlett-Packard Interface Loop. It will

then accept HP-IL messages and respond to many of the print commands issued by your calculator or computer through its HP-IL capabilities or extensions. More specifically, it displays data bytes sent to it, except for those contained in recognized escape sequences.

Character set

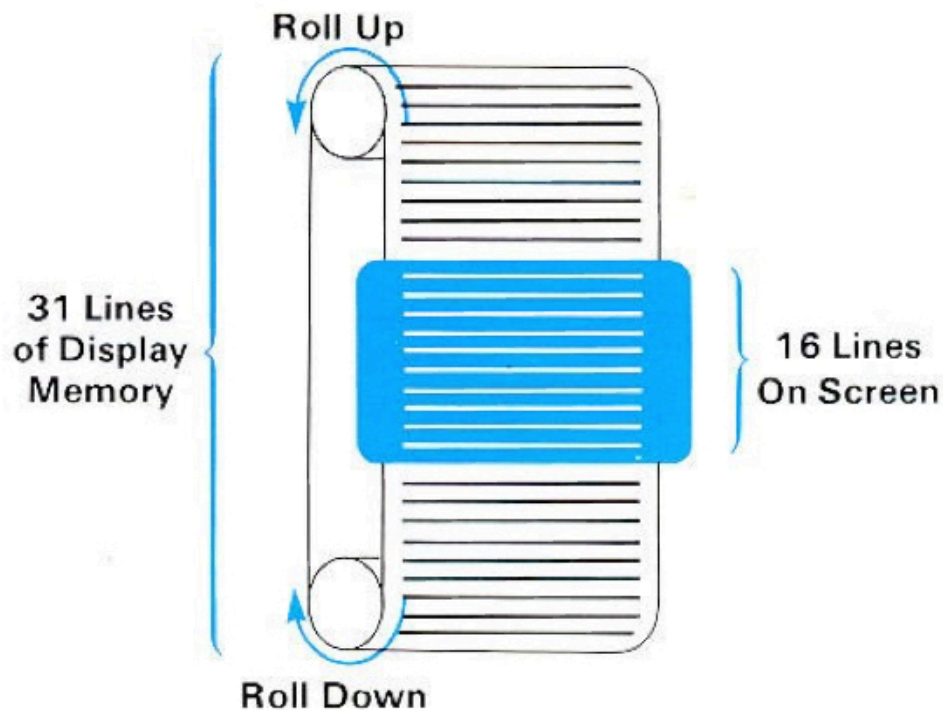
The HP 82163 Video Interface features 95 displayable characters and 4 non displayable control characters, each with a corresponding code number shown in the table below.

HP 82163 Video Interface Character Set

CODE NUMBER	CHARACTER	CODE NUMBER	CHARACTER	CODE NUMBER	CHARACTER	CODE NUMBER	CHARACTER
0		32	(Space)	64	@	96	\
1		33	!	65	A	97	a
2		34	"	66	B	98	b
3		35	#	67	C	99	c
4		36	\$	68	D	100	d
5		37	%	69	E	101	e
6		38	&	70	F	102	f
7		39	'	71	G	103	g
8	(BS)	40	(	72	H	104	h
9		41	)	73	I	105	i
10	(LF)	42	*	74	J	106	j
11		43	+	75	K	107	k
12		44	,	76	L	108	l
13	(CR)	45	-	77	M	109	m
14		46	.	78	N	110	n
15		47	/	79	O	111	o
16		48	0	80	P	112	p
17		49	1	81	Q	113	q
18		50	2	82	R	114	r
19		51	3	83	S	115	s
20		52	4	84	T	116	t
21		53	5	85	U	117	u
22		54	6	86	V	118	v
23		55	7	87	W	119	w
24		56	8	88	X	120	x
25		57	9	89	Y	121	y
26		58	:	90	Z	122	z
27	(^E c)	59	;	91	[	123	{
28		60	<	92	\	124	|
29		61	=	93	]	125	}
30		62	>	94	^	126	~
31		63	?	95	_	127	

Display Memory

The display memory, consisting of 992 bytes, will hold 31 lines of up to 32 characters. However, at any one time the video interface displays up to 16 of these lines. The remaining lines may be displayed by scrolling them onto the screen.



Escape Sequences

The HP 82163 Video Interface responds to 14 escape sequences. An escape sequence is a string of characters that is sent out on the loop as a series of Data Bytes and interpreted as a special instruction by the device receiving it. An escape sequence always starts with the escape code (27), followed by one or more characters that define the instruction. Escape sequences are used by the video interface to position the cursor, scroll through display memory, and clear the display.

Many different escape sequences can be passed through HP-IL; however, the video interface responds to only a few of these. When the interface receives an escape sequence that it does not recognize, it displays all but the first two characters in the sequence. Escape sequences recognized by the interface are shown in the following table.

Escape Sequence Instructions

Escape Sequence	Description
ESC >	Cursor displayed.
ESC <	Cursor not displayed.
ESC A	Cursor up.
ESC B	Cursor down.

Escape Sequence	Description
ESC C	Cursor right.
ESC D	Cursor left.
ESC E	Soft reset.
ESC H	Cursor home.
ESC J	Clear display from cursor.
ESC Q	Insert cursor.
ESC R	Replace cursor.
ESC S	Roll up.
ESC T	Roll down.
ESC % c r	Cursor relative address column and line; c and r are one byte binary numbers that represent the cursor position on the display screen.

(Ref.: 82163-90001 1982-01 Video Interface Owner's Manual)

Availability

Introduced in 1982 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
HP 82163A Video Interface, Owner's Manual, 82163-90001, Jan. 1982	Manual
HP 82163A Video Interface, Owner's Manual, 82163-90001 Rev. B, May. 1982	Manual

Price List

Product #	Description	Price € / \$ US
82163A	32 Col. Video Interface, NA	225.00 \$: 1983
82163B	32 Col. Video Interface, EU	225.00 \$: 1983

Pictures*Unboxing**Side View**TV & Monitor Connectors**HP-IL & Power Supply Connectors*



*HP 75C displaying a VisiCalc spreadsheet on a
HP 82163A video interface connected to a
HP 82912A monitor*

MC00701A Video Interface HP 92198 Video Interface



Overview

Introduction

The MC00701A HP-IL 80-Column Video Interface provides the user with a full screen video display capability for any of the HP-IL family of portable or handheld calculators or computers. A computing device, such as the HP-41C or the HP-75C, may control the MC00701A by means of the Hewlett-Packard Interface Loop (HP-IL). The MC00701A provides a high quality (80 columns by 24 lines) video output which may be displayed on a wide variety of low cost video monitors.

Two Character Sets

The MC00701A displays up to 80 columns by 24 lines of characters. Two complete character sets are included:

1. Standard 96-character upper and lower case ASCII character set which can be displayed in normal or inverse video, and
2. Roman-8 character set (ASCII with Roman extension and no inverse video).

Screen Editing Features

The MC00701A provides useful features for cursor-oriented screen editing. The MC00701A provides 48 lines of screen memory. The 24-line display area may be scrolled line by line to view the entire screen buffer. Simple escape codes issued over the HP-IL allow the cursor to be moved anywhere on the screen. Insert line, insert character, delete line and delete character escape codes permit simplified editing of the displayed text. Two types of cursors are provided to visually prompt the user. The replace cursor is a flashing block. The insert cursor is displayed whenever the MC00701A is in the insert character mode and appears as a flashing under bar.

Software Features

The MC00701A incorporates a number of software selectable options to provide the user increased versatility. The character set may be switched between ASCII and Roman 8. The display format may be switched from 80 columns by 24 lines to 40 columns by 20 lines to enable the display device to be a television set rather than a video monitor. In this mode, the user must supply an external modulator to convert the MC00701A video output to RE. The video standard may be switched between NTSC (United States, Canada, Japan) and PAL (European) standards.

Escape Sequences

The HP-IL 80-Column Video Interface responds to 30 escape sequences. An escape sequence is a string of characters that is sent out on the loop as a series of data bytes and interpreted as a special instruction by the device receiving it. An escape sequence always starts with ESC (Escape) - code number 27 - and is followed by one or more characters that define the instruction. Escape sequences are used by the video interface to position the cursor, scroll through display memory, clear the display, etc.

Escape Sequence Instructions

Escape Sequence	Description
ESC >	Cursor displayed. (Default.)
ESC <	Cursor not displayed.
ESC A	Cursor up.
ESC B	Cursor down.
ESC C	Cursor right.

Escape Sequence	Description
ESC D	Cursor left.
ESC E	Soft reset.
ESC H	Home cursor (current page).
ESC J	Clear screen memory from cursor to end of page.
ESC K	Clear screen memory from cursor to end of line.
ESC L	Insert line.
ESC M	Delete line.
ESC N	Enable insert character mode.
ESC O	Delete character.
ESC Q	Switch to the insert cursor, but do not enable insert mode.
ESC R	Disable insert character mode. (Default.)
ESC S	Scroll up (move window down).
ESC T	Scroll down (move window up).
ESC Y	Enable Monitor Mode.
ESC Z	Disable Monitor Mode.
ESC [	Display 80 columns by 24 lines. (Default.)
ESC]	Display 40 columns by 20 lines.
ESC /	Switch to NTSC mode.
ESC =	Switch to PAL mode.
ESC e	Hard reset.
ESC h	Home cursor (screen memory).
ESC j	Use Roman-8 character set.
ESC k	Use standard character set. (Default.)
ESC z	Performs an extensive self-test on the internal screen RAM

Escape Sequence	Description
ESC % c r	Cursor relative address column and line; c and r are one byte binary numbers that represent the cursor position on the display screen.

(Ref.: 11-MC00701A-02 1983-06 HP-IL 80-Column Video Interface Owner's Manual)

Availability

Introduced in 1983 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
HP-IL 80-Column Video Interface, Owner's Manual, 11-MC00701A-02, Jun. 1983	Manual
HP-IL 80-Column Video Interface, Owner's Manual, 5957-8408, Jan. 1984	Manual

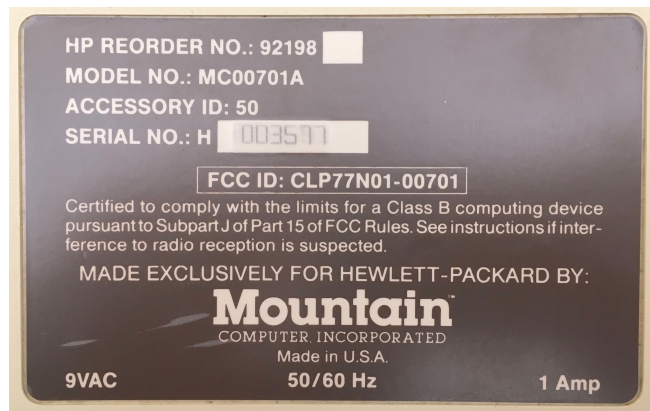
Price List

Product #	Description	OEM	Price € / \$ US
92198	80 Col. Video Interface, NA	MC00701A/MC	295.00 \$: 1985

Pictures



Front Labels

*Back Labels**Monitor Connector**HP-IL & Power Supply Connectors*



*HP 75C displaying a VisiCalc spreadsheet on a
HP 92198 video interface connected to a
HP 82912A monitor*

HP 82912A Composite Monitor HP 82913A Composite Monitor



Overview

Introduction

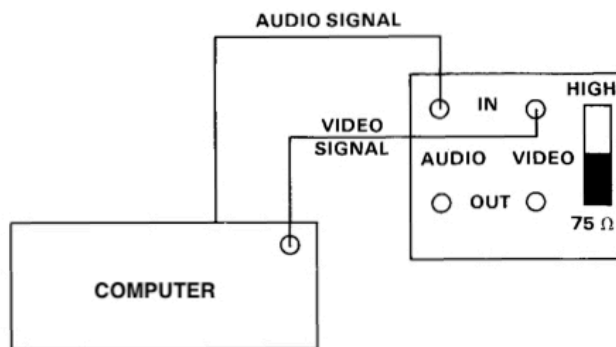
The video monitor is a high-resolution, monochrome display available with a 9-inch (HP 82912A) or 12-inch (HP 82913A) CRT.

Features include a screen to reduce glare and reflections, a video bandwidth wide enough to display 24 lines of 80 characters each without distortion, and a 1-watt audio amplifier.

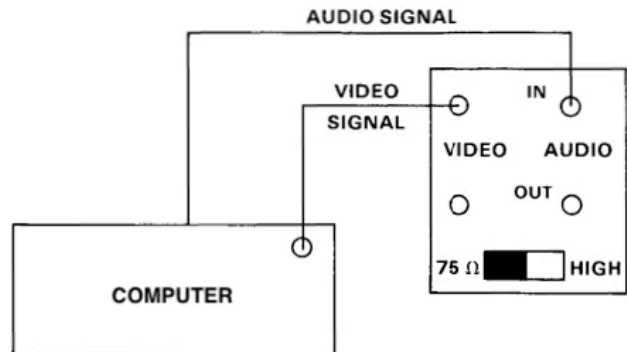
Installation

To connect one video monitor to your computer, feed the video signal from the computer to the VIDEO-IN connector. The termination switch on the back panel should be set to 75 Ohm. (Maximum video cable length is 150 meters.)

With an HP 82912A Video Monitor:

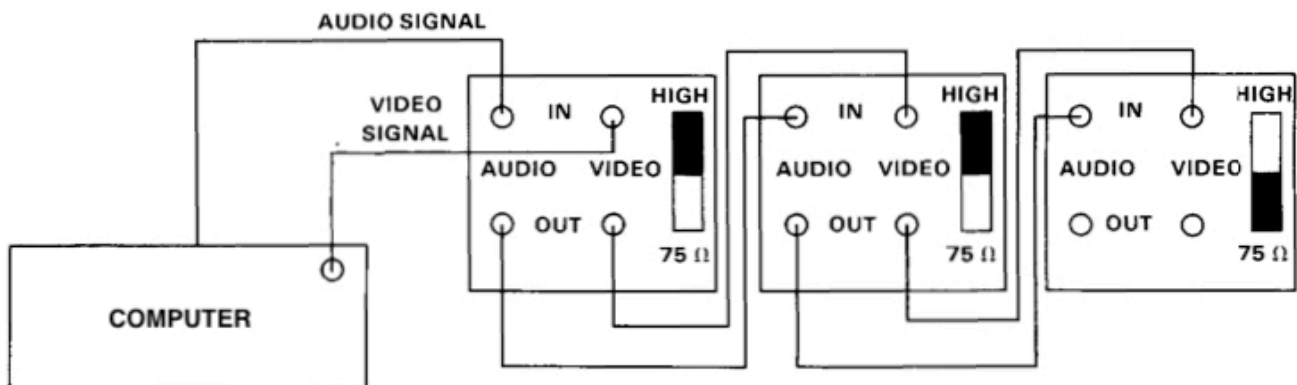


With an HP 82913A Video Monitor:

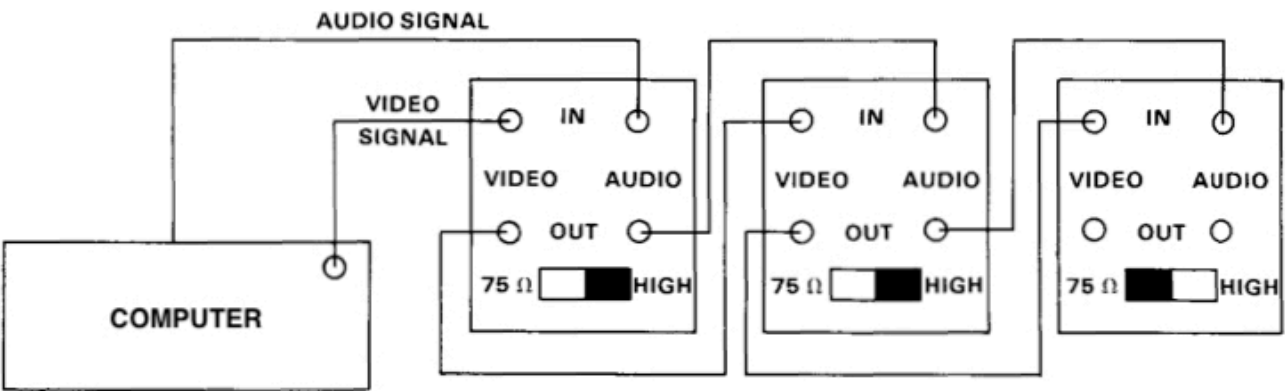


For more than one display, the termination switch should be set to HIGH on all video monitors except the last one. The switch on this last monitor should be set to 75 Ohm. Up to four displays can be connected.

With an HP 82912A Video Monitor:



With an HP 82913A Video Monitor:



When connecting multiple displays, observe the following guidelines for total video cable length. To determine this total for your system, add together the lengths of any video cables attached to active VIDEO-IN or VIDEO-OUT connectors.

Maximum Video Cable Length	Number of Monitors
50 meters	2
30 meters	3
10 meters	4

(Ref.: 5957-3331 1983-01 Video Monitor Instruction Sheet)

Availability

Introduced in 1983 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
HP 82912A / HP 82913A Video Monitor Instruction Sheet, 5957-3331, Jan. 1983	Sheet

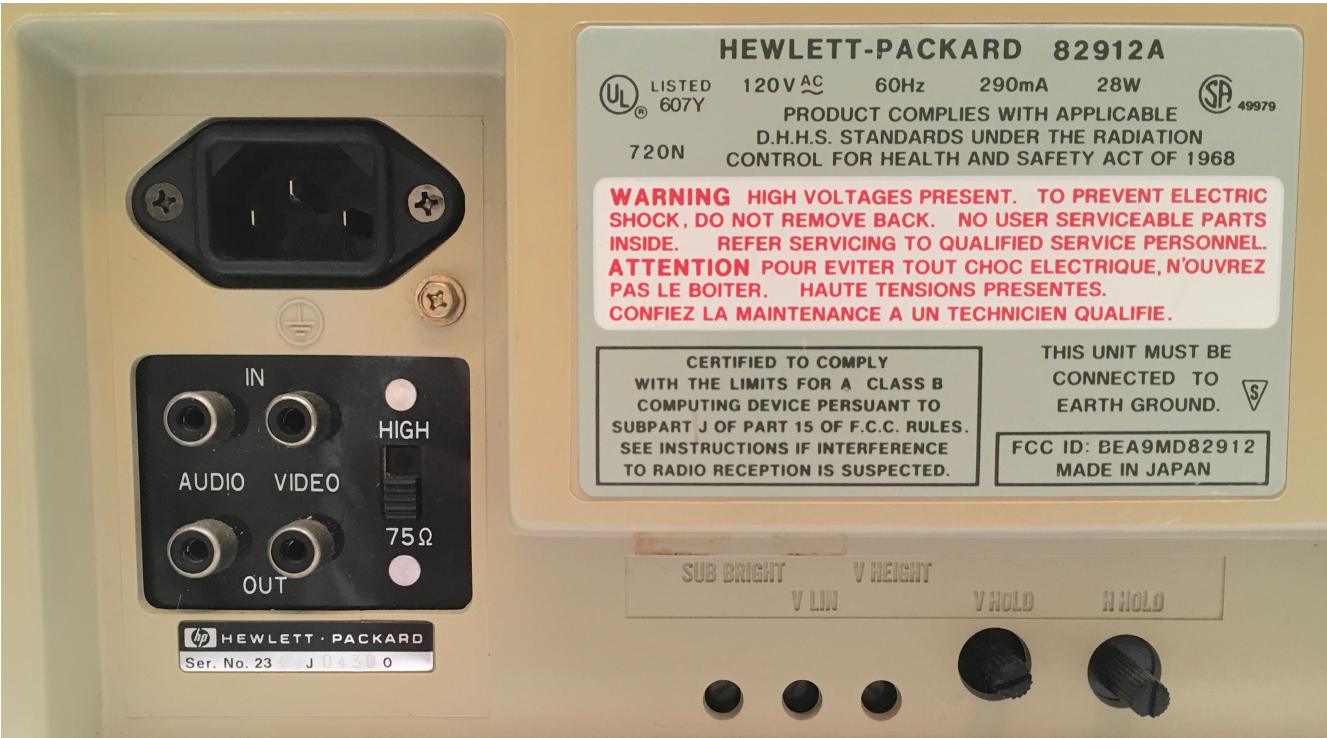
Price List

Product #	Description	OEM	Price € / \$ US
82912A	9" Video Monitor, Composite	JB-902M/NEC	295.00 \$: 1985
82913A	12" Video Monitor, Composite	JB-1201M/NEC	325.00 \$: 1985

Pictures

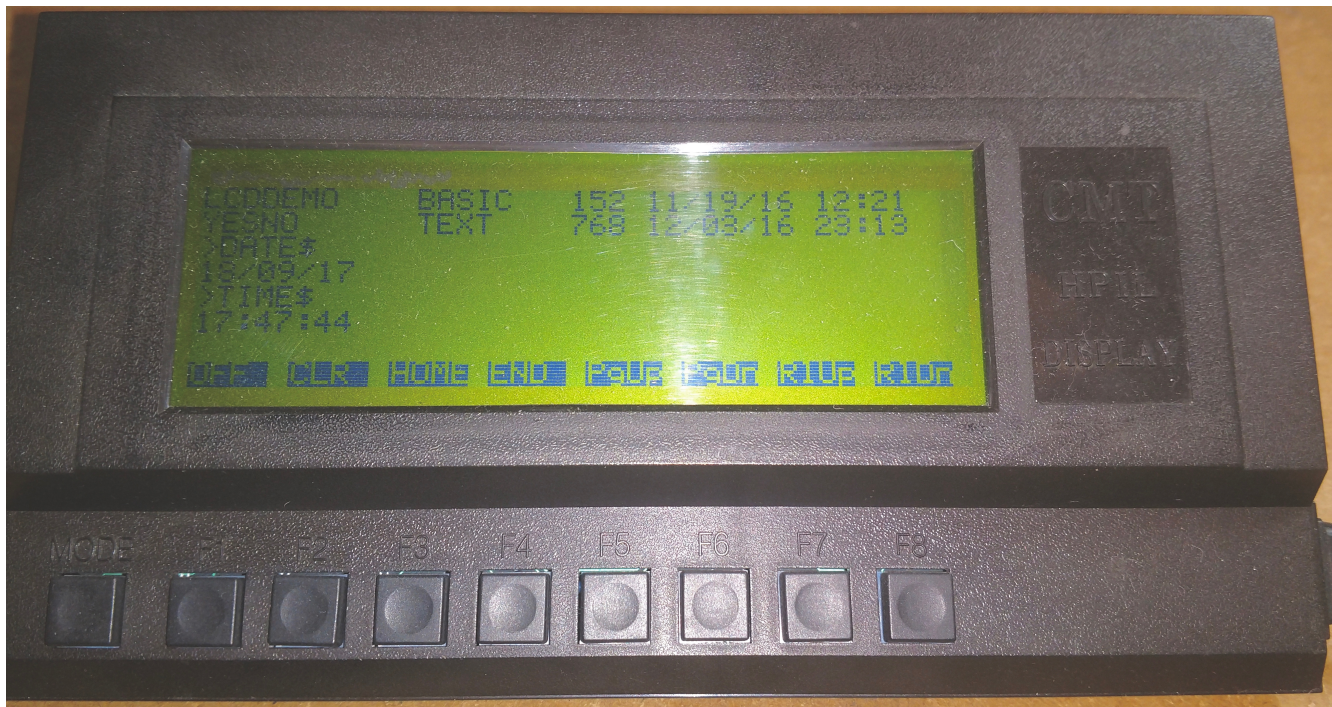


Front, Side & Rear View



Connectors & Adjustments

CMT Liquid Crystal Display



Overview

The CMT LCD display interface provides an 8 line by 40 character "super-twist" display for your HPIL controller through the HP-IL interface loop. It has 50 lines of display memory so you can view previous "pages" of work.

Eight soft keys enable you to view the display memory with functions like Page-Up, Page-Down, Home, End, Row-Up, Row-Down, and Clear. Additionally, you may define the eight function keys and display your custom labels on the screen.

The display requires no additional programming. This feature lets you run existing programs and also use the larger display. Escape sequences give you full cursor control, power to redefine the character fonts and soft keys, and raster graphics.

The unit size is 4" X 7.5" X 1.25" and weighs just 12 oz.

(ref.: CMT 1988-05 *Hand-Held Solutions Vol. III*)

Availability

Introduced in 1988 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
CMT HP-IL LCD Display Manual, 1988	Manual

Price List

Product #	Description	Price € / \$ US
IL-DISP	8 Lines x 40 Columns Battery Powered LCD	295.00 \$: 1988

Pictures



Rear View



Side View

HP-IL Bridge Devices

HP 82164A RS-232 Interface



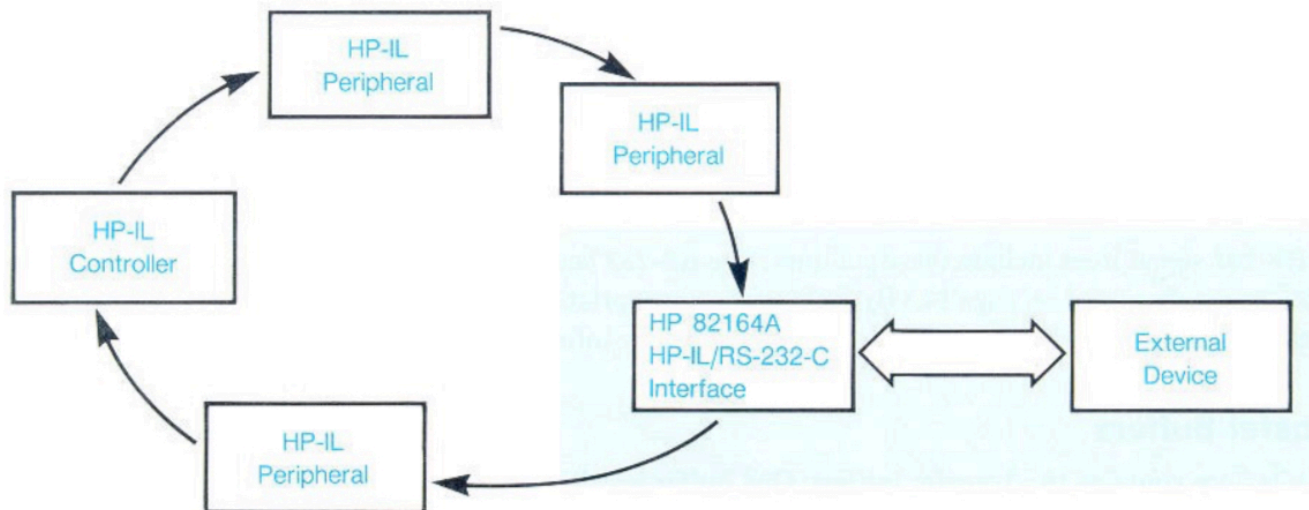
Overview

Introduction

The HP 82164A HP-IL/RS-232-C Interface provides the capability to interface an external device having serial input/output (RS-232-C) capabilities with the Hewlett-Packard Interface Loop (HP-IL).

An Overview of the Interface's Operation

Consider the HP-IL system shown below. The interface loop contains an HP-IL controller (such as a computer), perhaps one or more additional HP-IL devices, and the HP-IL/RS-232-C interface. The interface connects to an external device (such as an RS-232 serial printer), allowing the controller to interact indirectly with the external device. In this way, the external device becomes an HP-IL controlled peripheral.



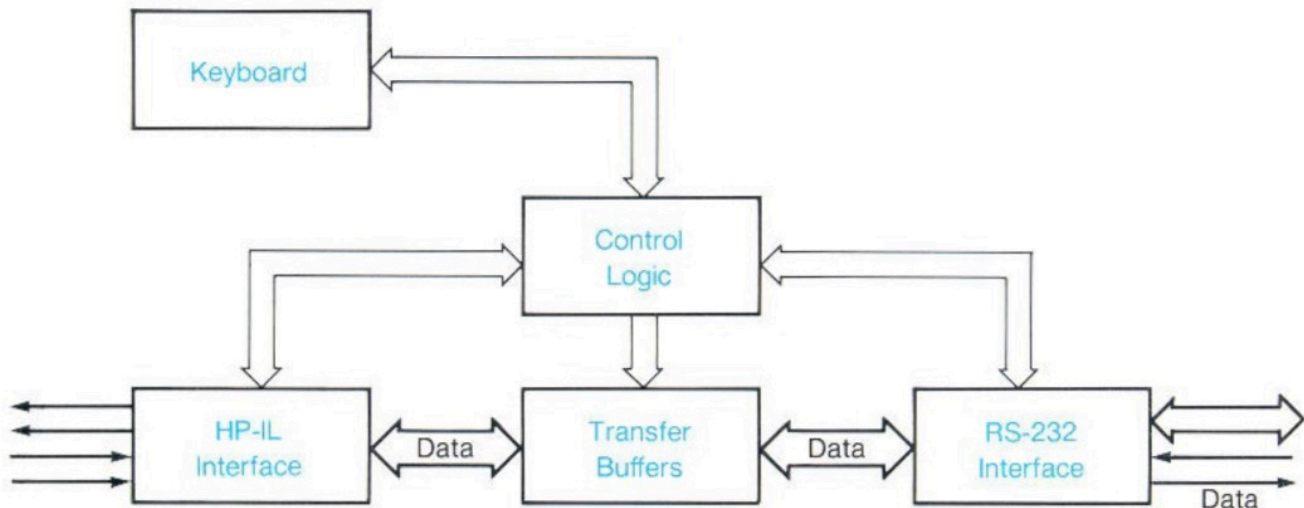
If the controller needs to send data to the external device, the controller first makes the interface a listener, which means that the interface is set to accept data from HP-IL and pass it to the external device. The controller then initiates the transfer of data around the interface loop, one character (or byte) at a time. As characters are received by the interface, it stores them internally. Meanwhile, the interface sends the data to the external device one character at a time.

If the controller needs the external device to send data to listeners on HP-IL, the controller first makes the interface a talker, which means that the interface is set to accept data from the external device and send it on HP-IL. The controller then directs the interface to start sending data.

This example illustrates one way that the interface can be used. However, it can be set up to operate in several different ways. Using the interface with HP-IL and an external device requires an understanding of these options.

Internal Design

The HP-IL/RS-232 interface has five primary features that are important for understanding the interface's operation: the HP-IL interface, the RS-232 interface, the transfer buffers, the control logic, and the keyboard.



HP-IL Interface

The HP-IL interface portion of the interface performs standard operations required by the interface loop, such as maintaining the interface's talker or listener status, and accepting and passing HP-IL messages around the loop. The physical connection to HP-IL consists of standard HP-IL receptacles—one for incoming messages and one for outgoing messages.

RS-232 Interface

The RS-232 interface portion of the interface provides the connection to the external device. The physical connection consists of a male 25-pin D -subminiature RS-232 receptacle. An internal configuration selector enables you to select one of two possible pin configurations for the RS-232 receptacle.

The RS-232 signal lines include two data lines, five RS-232 handshake lines, and a ground line. By making the appropriate connections, you enable the external device and the interface to use the signal lines to send and receive information.

Transfer Buffers

The interface contains two transfer buffers. One buffer is called the transmit buffer and contains the data being transmitted to the RS-232 device. The other buffer is called the receive buffer and contains the data received from the RS-232 device.

The transmit buffer is capable of holding 84 bytes, and the receive buffer is capable of holding 109 bytes. (Each byte consists of eight bits.) The buffers pass data in the order it is received—first in, first out.

Control Logic

The control logic stores operating information, implements various operating modes that can be selected, and controls the flow and interpretation of data within the interface. It

includes registers that store operating information: the control registers, the character registers, and the status registers. This operating information can come from the HP-IL controller or the interface's keyboard.

Keyboard

The keyboard contains the RESET key, the MSRQ key, the PWR indicator light, and the T/R indicator light. The RESET key and the MSRQ key allow you to interact with the interface and set certain states. When the PWR indicator light is lit, there is power to the interface. The T/R light is lit during the transfer of data and during other activity.

(Ref.: 82164-90002 1983-03 HP 82164A HP-IL/RS-232-C Interface Owner's Manual)

Availability

Introduced in 1983 and discontinued at an unknown date.

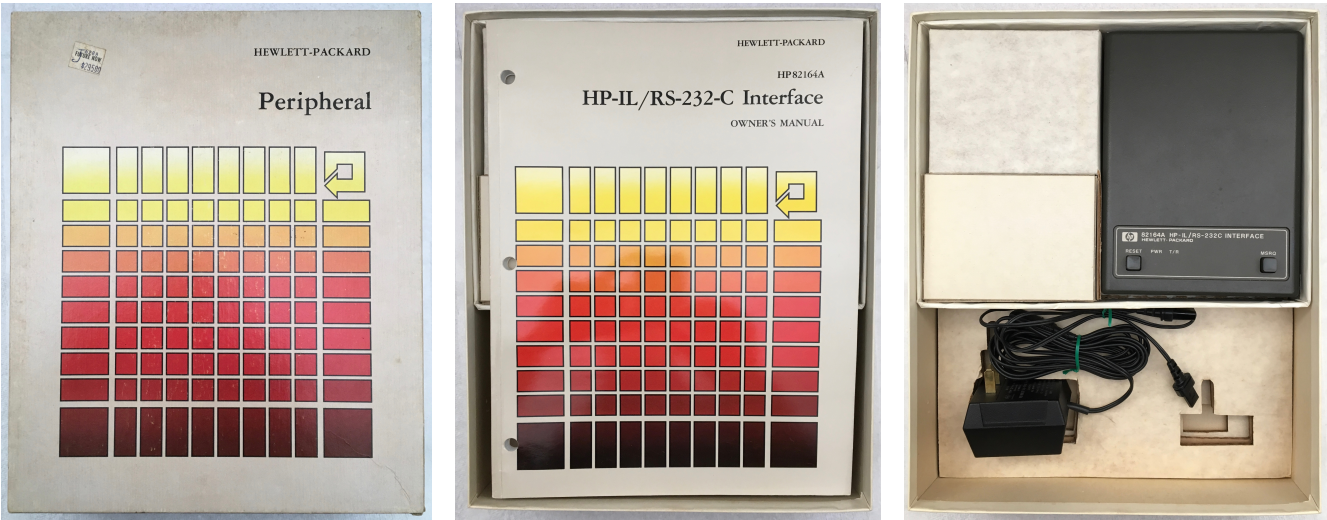
Documents & Web Sites

Documents & Web Sites	Link
HP 82164A HP-IL / RS-232-C Interface, Owner's Manual, 82164-90002, Mar. 1983	Manual

Price List

Product #	Description	Price € / \$ US
82164A	HP-IL / RS-232-C Interface	295.00 \$: 1985

Pictures



Unboxing



Connectors

DTE CONFIGURATION	
1	13
14	25
1 —	14 —
2 TXD	15 —
3 RXD	16 —
4 RTS	17 —
5 CTS	18 —
6 DSR	19 —
7 GND	20 DTR
8 DCD	21 —
9 —	22 —
10 —	23 —
11 —	24 —
12 —	25 —
13 —	

DTE Configuration Available Pins

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CMT-IL/RS RS-232 Interface



Overview

The CMT-IL/RS enables a HP-IL device to communicate with personal computers, printers, plotters, modems, etc. through an RS-232 interface.

The CMT-IL/RS interface is a battery powered unit that is compatible with the HP 82164A HP-IL/RS-232 Interface. The product has been engineered for long battery life.

Some model also includes a RAM disk. For more information on the RAM disk part, please refer to the CMT-RD pages in this document.

(ref: CMT 1988/02 CMT HPIL RAM Disc and IL/RS Interface Owner's Manual)

Availability

Introduced in 1987 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
CMT HPIL RAM Disk & IL/RS Interface Owners Manuals, CMT100, Feb. 1988	Manual
CMT Hand-Held Solutions, Vol. I, Aug. 1987	Magazine

Price List

Product #	Description	Price € / \$ US
CMT-IL/RS	RS-232 Interface	295.00 \$: 1987
CMT-RD-128-01	RS-232 Interface + 128KB RAM Drive	445.00 \$: 1987
CMT-RD-256-01	RS-232 Interface + 256KB RAM Drive	595.00 \$: 1987
CMT-RD-512-01	RS-232 Interface + 512KB RAM Drive	895.00 \$: 1987
CMT-9VA	9V Alkaline Battery	
CMT-9VR	9V NiCad Rechargeable Battery	
CMT-3VL	3V Lithium Battery	
CMT-RE2	120VAC - 9VDC 300mA Adapter	
CMT-RE3	120VAC - 9VDC 300mA Adapter	
CMT-DTE	RS-232 9 pins to 25 pins DTE cable	
CMT-DCE	RS-232 9 pins to 25 pins DCE cable	
CMT-1010	LIF to text file conversion software for MS-DOS	

Notes

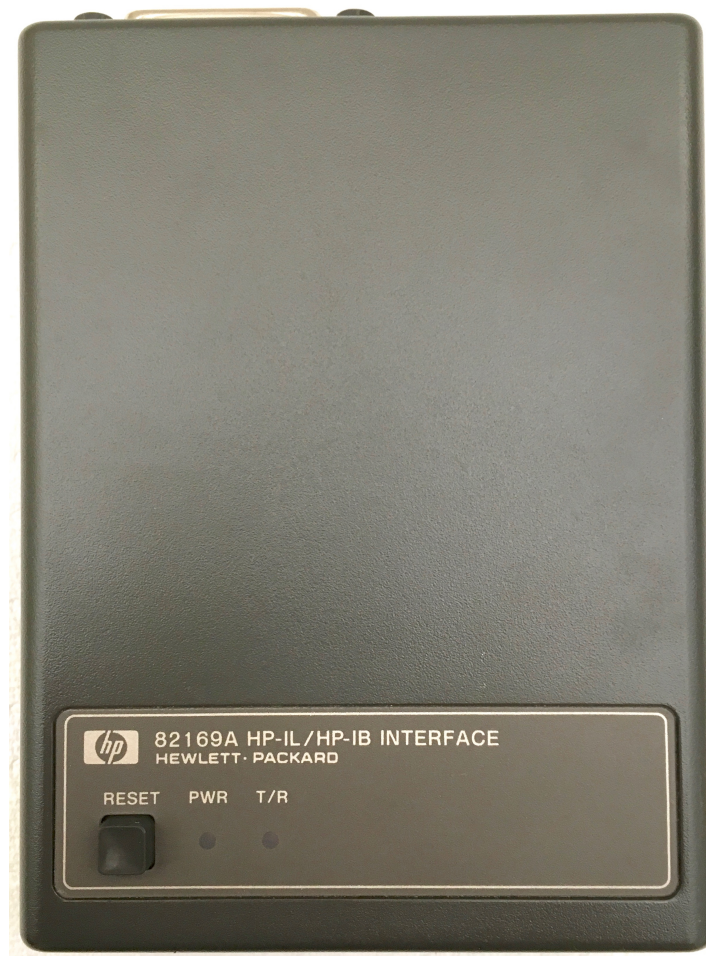
- E-block 9v battery used for mobile operation.
- BR2325 3v 165mAh lithium coin cell battery used for backup.
- DC Adapter 9v 300mA model RE-3 (SPA-4190, + center) used for fixed operation.
- Unit behave like a Data Terminal Equipment (DTE).
- The RS-232 DB-9 male connector support the following signals:
 - Pin 1 : Data Carrier Detect (CD or DCD)
 - Pin 2 : Received Data (RD)
 - Pin 3 : Transmitted Data (TD)
 - Pin 4 : Data Terminal Ready (DTR)
 - Pin 5 : Signal Ground (GND)
 - Pin 6 : Data Set Ready (DSR)
 - Pin 7 : Request To Send (RTS)
 - Pin 8 : Clear To Send (CTS)
 - Pin 9 : Unspecified in the manual, DTE spec. define this line as Ring Indicator (RI)

Pictures*Interface Top View**Interface Rear View*



Interface Bottom View

HP 82169A HP-IL/HP-IB Interface

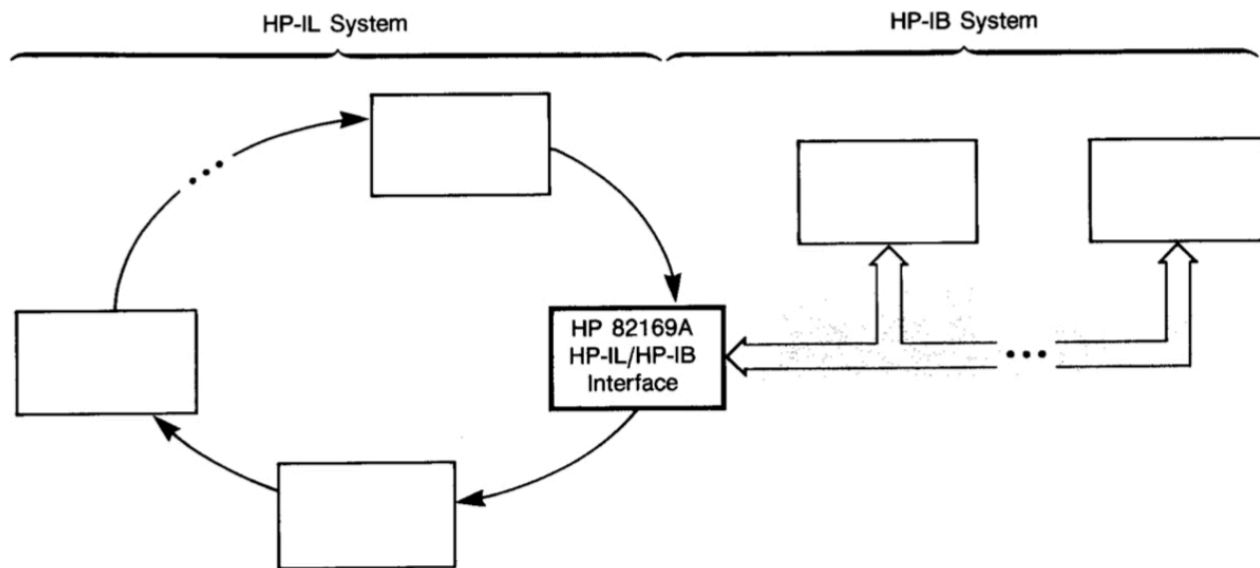


Overview

The HP 82169A HP-IL / HP-IB Interface provides the capability to interconnect Hewlett-Packard Interface Loop (HP-IL) and Hewlett-Packard Interface Bus (HP-IB) systems.

The interface makes the interconnection of the two systems easy. Once the addressing schemes of the systems are understood, you can usually run existing programs with little or no modification.

Consider the system shown below. The HP-IL system can contain a controller (such as a computer), perhaps one or more additional HP-IL devices, and the HP-IL / HP-IB interface. The HP-IB system can contain a controller, perhaps one or more additional HP-IB devices, and the HP-IL / HP-IB interface. The interface essentially links the two systems. The nature of this link is determined by the interface's operating mode.

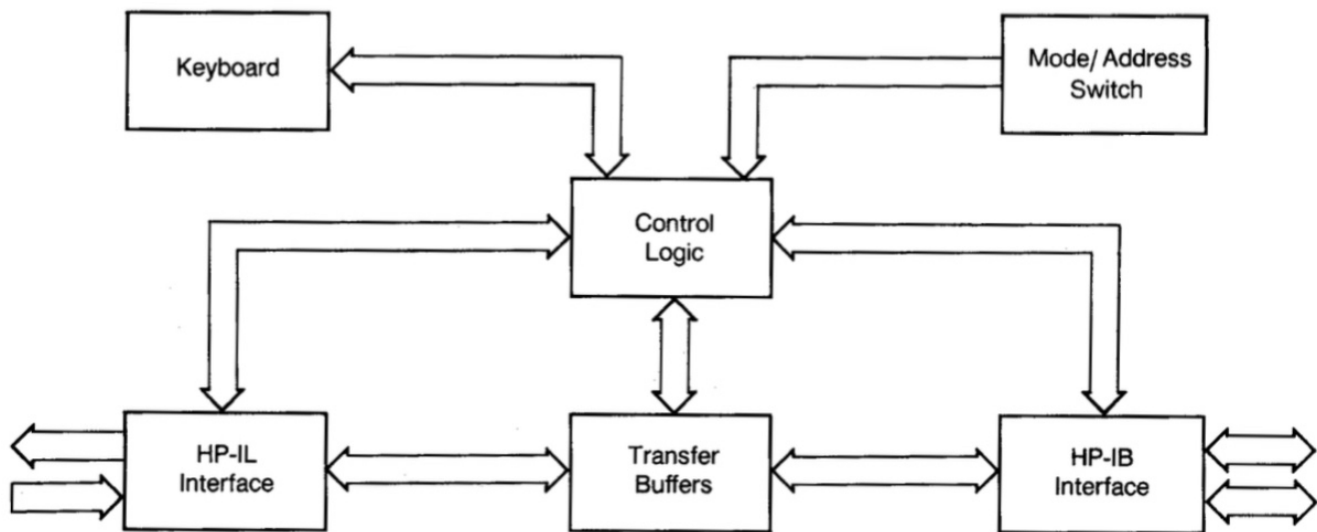


When the interface is acting as a "translator", a controller essentially works "through" the interface to interact with a device on the other side. In this mode, the controller essentially controls all devices-HP-IL devices and HP-IB devices. The interface ensures that instructions and data from each system are transferred to the other system according to the other system's standards. There can be a device on each side capable of being a controller, but there can be only one active controller at a time. These controllers can pass control between themselves-the interface will keep track of where the system controller and active controller are located.

When the interface is acting as a data "mailbox", a controller essentially interacts with the interface itself-not with devices on the other side. In this mode, the HP-IL and HP-IB systems are joined by the interface, but neither system controls the other system. There must be active controllers on both the HP-IL side and the HP-IB side. The HP-IL controller can place data in one of the interface's buffers; the HP-IB controller can retrieve that data when needed. Similarly, the HP-IB controller can make data available to the HP-IL side.

Internal Design

The HP-IL/HP-IB interface has six primary features that are important for understanding the interface's operation: the HP-IL interface, the HP-IB interface, the transfer buffers, the control logic, the keyboard, and the mode/address switch. In Translator mode, the interface doesn't use the transfer buffers; they are used in Mailbox mode only.



HP-IL Interface

The HP-IL interface portion of the interface performs standard operations required by the interface loop, such as maintaining the interface's talker or listener status, and accepting and passing HP-IL messages around the loop. The physical connection to HP-IL consists of standard HP-IL receptacles—one for in-coming messages and one for outgoing messages.

HP-IB Interface

The HP-IB interface portion of the interface performs standard operations required by the interface bus, similar to that of the HP-IL interface portion. The physical connection to HP-IB consists of the standard IEEE-488 connector.

Control Logic

The control logic stores operation information, implements various operating modes that can be selected, and controls the flow and interpretation of data and commands within the interface. It ensures that the protocol of each interfacing system is preserved.

The control logic includes registers that store operating information: the option registers, the HP-IB device address registers, and the status registers. This operating information comes from the HP-IL controller, the HP-IB controller, the interface's keyboard, and the interface's mode/address switch.

Transfer Buffers

The interface contains two transfer buffers that are used to store data while in Mailbox mode. One buffer is called the HP-IL to HP-IB buffer and contains the data being transmitted to the HP-IB system. The other buffer is called the HP-IL from HP-IB buffer and contains the data received from the HP-IB system.

Each buffer is capable of holding 110 bytes. The buffers pass data in the order it was received-first in, first out.

Mode/Address Switch

The mode / address switch provides operating information to the control logic. It lets you define the interface's operating mode and HP-IB address.

(ref: 82169-90001 HP 82169A HP-IL/HP-IB Interface Owner's Manual)

Availability

Introduced in 1982 and discontinued at an unknown date.

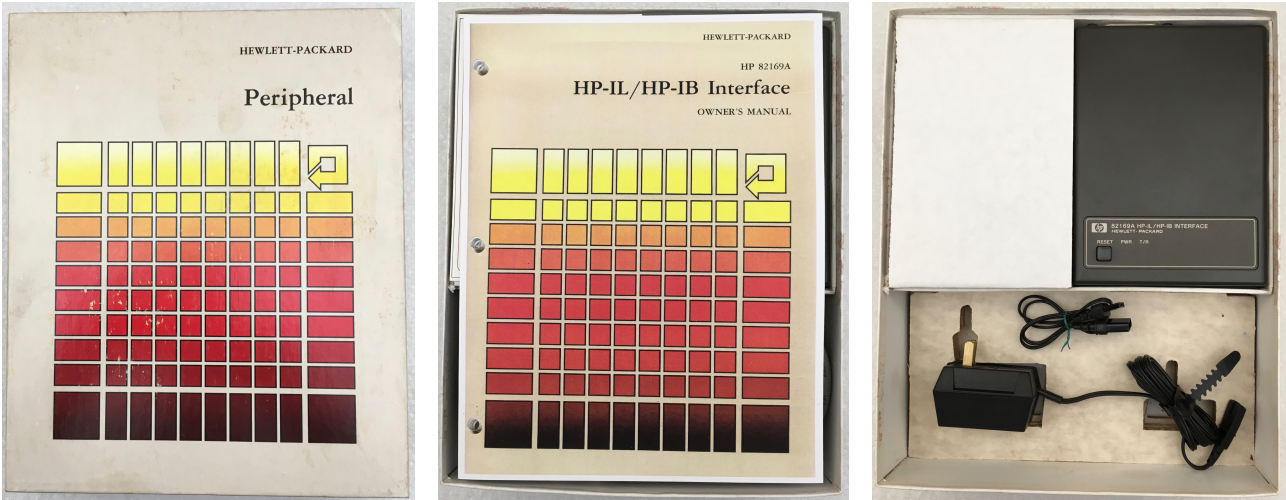
Documents & Web Sites

Documents & Web Sites	Link
HP-IL / HP-IB Interface Owner's Manual, 82169-90001 Rev. B, Aug. 1983	Manual

Price List

Product #	Description	Price € / \$ US
82169A	HP-IL / HP-IB Interface	395.00 \$: 1985

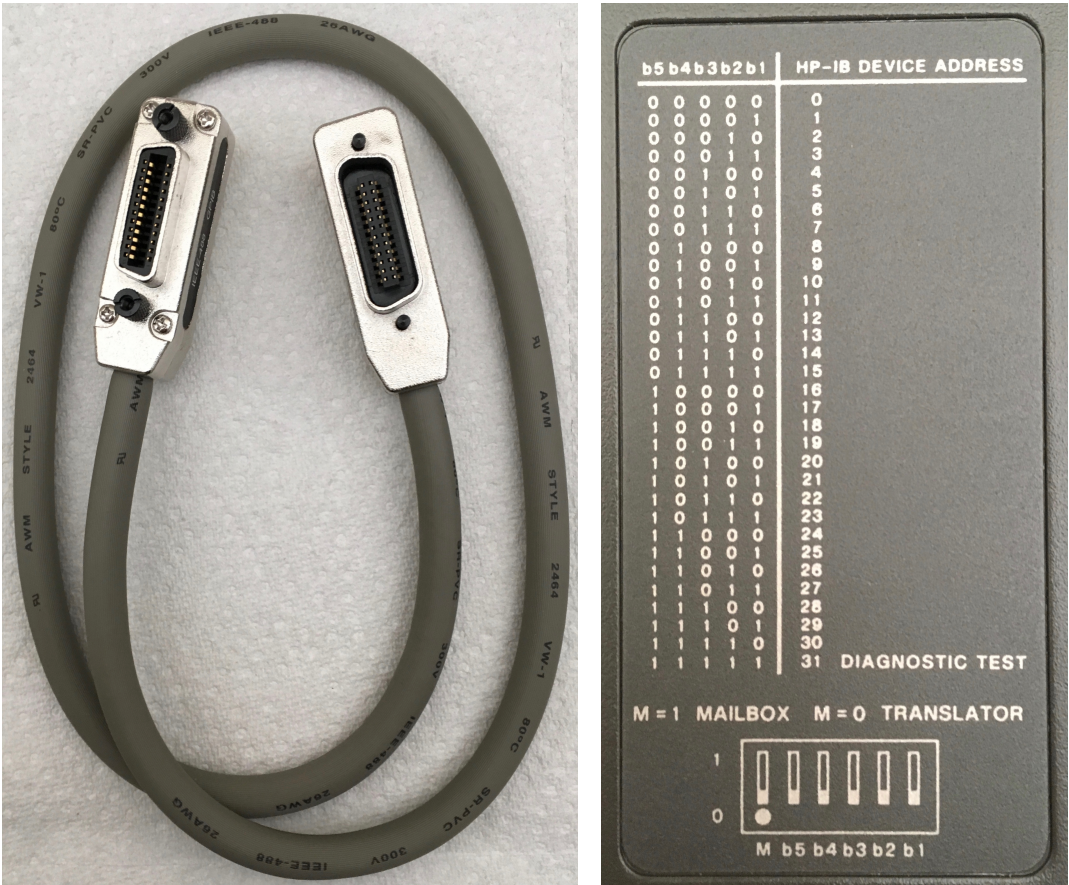
Pictures



Unboxing



Connectors



HP-IB Cable & DIP Switches Definition

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JFG PIL-Box USB Interface



Overview

The PIL-Box, a HP-IL <-> PC link Solution.

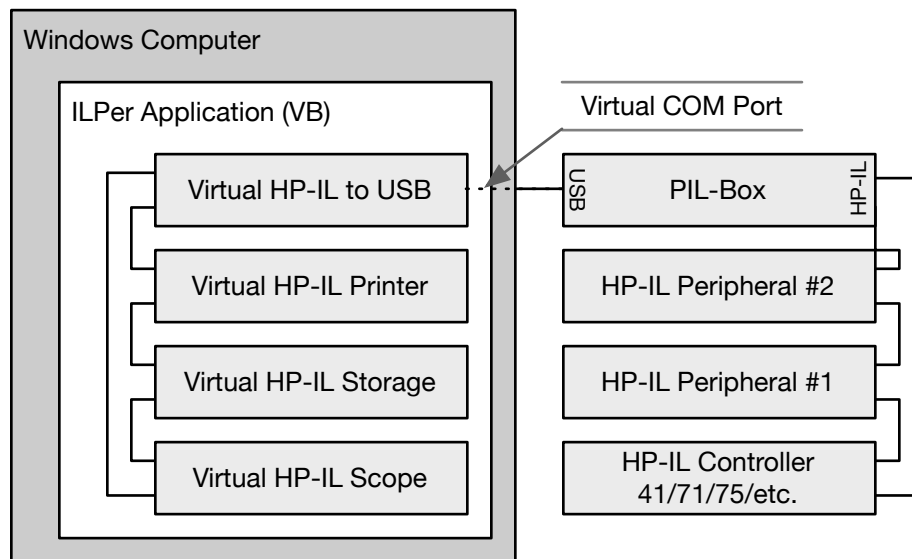
The PIL-Box is a HP-IL /USB translator. It uses NO OBSOLETE HP PARTS such as the HP-IL chip or the custom HP-IL pulse transformer. It aims to be an alternative to the old ISA HP-IL board (HP82973A) and to be compatible with most computers/OS that support USB.

PIL-Box Latest Firmware (v2.1)

This firmware update for the PIL-Box provides a support for a faster communication speed at 230 kbps, for use with ILPer 2.2 or higher. The 9600 baud speed is no more supported by the PIL-Box. Users of PIL-Box with firmware 1.x can upgrade to 2.1 by changing the micro-controller, no modification of the board is needed. The performance gain at 230 kbps vs firmware 1.5 is about 40% using the HP-71B.

ILPer introduction from Jean-François Garnier

ILPer is a HP-IL peripheral emulator using the PIL-Box. It provides an emulation of a mass storage unit and a generic alphanumeric non-graphic printer. It also provides a HP-IL scope that was very useful to test the PIL-Box and identify some tricky problems.

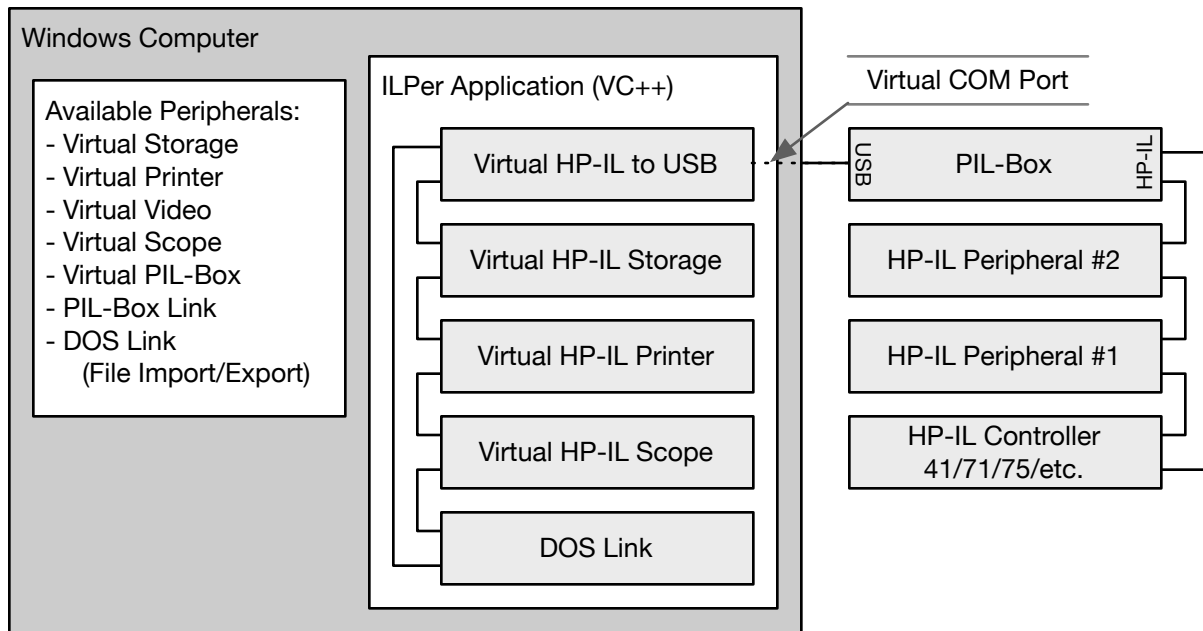


Virtual and physical HP-IL devices connected to a PIL-Box (loop controller on HP-IL side)

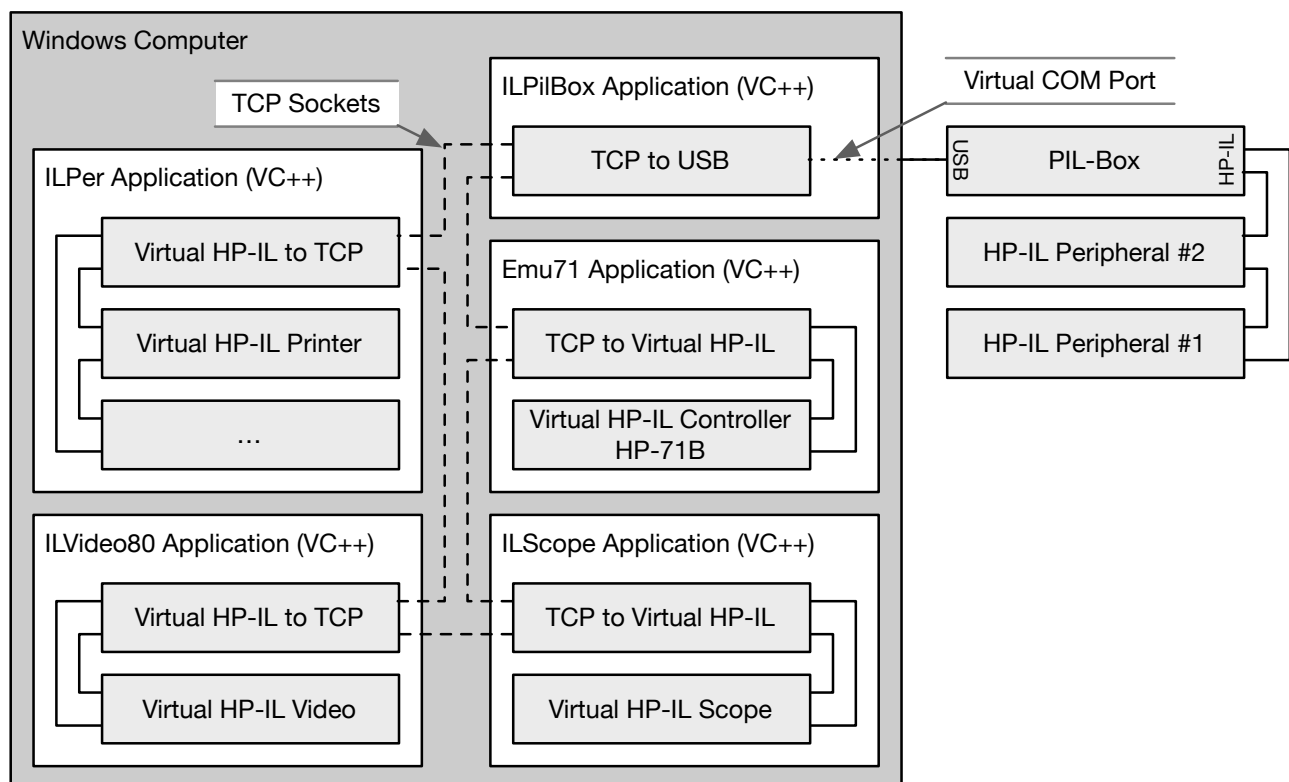
Virtual HP-IL introduction from Christoph Gießelink

In summer 2009 Jean-François Garnier published his PIL-Box project to link real HP-IL hardware with virtual devices on a PC. The PIL-Box itself is a piece of hardware connecting the HP-IL system with a PC via USB bus. On the PC a program called "HP-IL Peripheral emulator" (short ILPer) is simulating a generic printer and a mass storage device.

Jean-François Garnier wrote ILPer originally in Visual Basic. In 2010 I ported his sources with some improvements to Visual C. ILPer up to V1.35 was designed to work only in conjunction with the PIL-Box resulting in an isolated HP-IL solution which could not be used as an universal peripheral simulator. ILPer since V1.4 got also an additional TPC/IP interface, allowing to link many different simulated devices in one virtual HP-IL loop.



Virtual and physical HP-IL devices connected to a PIL-Box (loop controller on HP-IL side)



Virtual and physical HP-IL devices connected to a PIL-Box (loop controller on computer side)

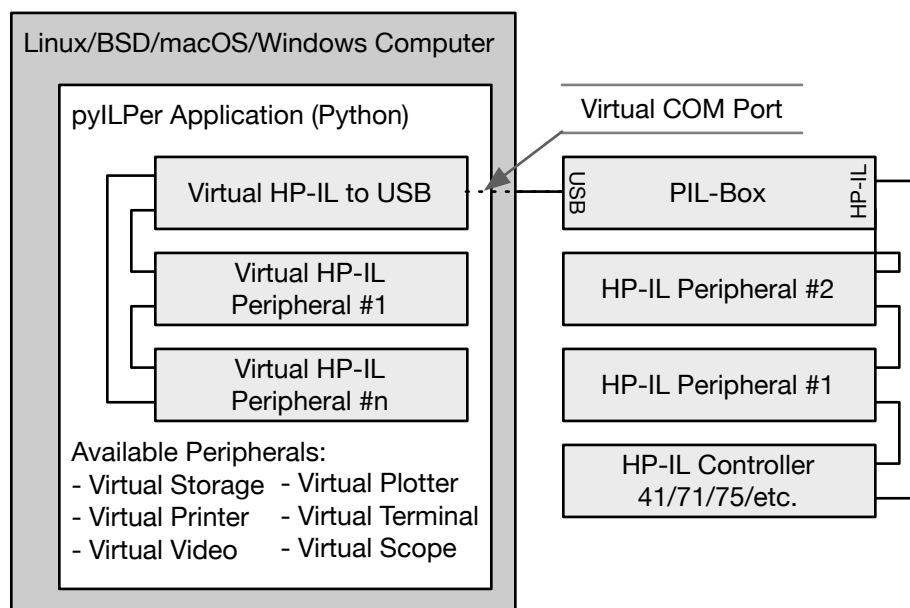
pyILPer introduction from Joachim Siebold

HP-IL (Hewlett Packard Interface Loop) is a serial interconnection bus introduced by Hewlett-Packard in the early 1980s. It enabled the communication between peripheral devices such as printers, floppy disk drives etc. with programmable calculators such as the HP-41C, HP71B and HP-75C/D.

The connection to PCs was realized by either an generic ISA bus card or a serial interface controller. As these devices are not available any more, Jean-Francois Garnier published his PIL-Box project in 2009 to link a PC via USB to the HP-IL system.

The PC operating system communicates with the PIL-Box as a virtual serial device over USB. The PIL-Box is connected to the HP-IL Loop.

pyILPER is a program that reads incoming HP-IL frames from the PIL-Box, processes them by emulating some virtual HP-IL devices, like a printer, a disk drive or a terminal and sends the processed frames back to the loop.



Virtual and physical HP-IL devices connected to a PIL-Box (loop controller on HP-IL side)

Availability

PIL-Box was introduced in 2009 and still available.

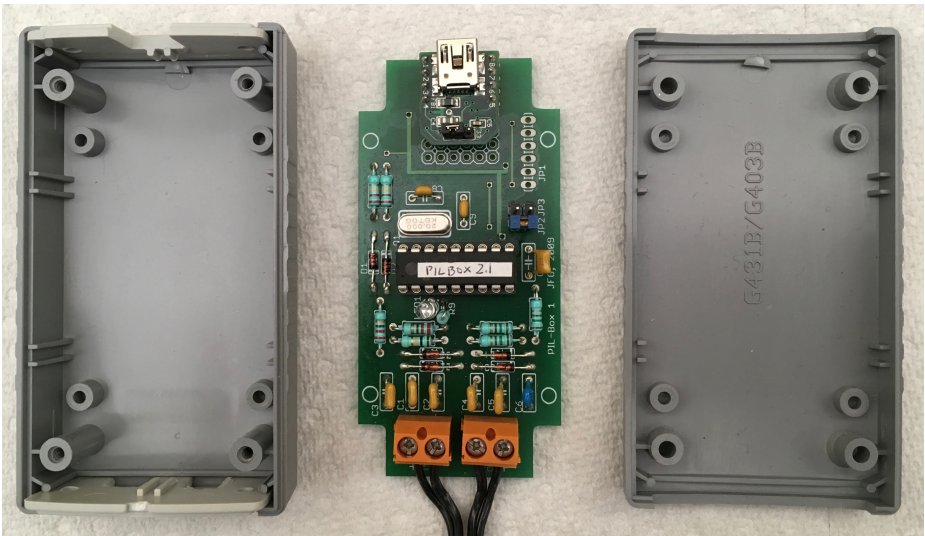
Documents & Web Sites

Documents & Web Sites	Link
PIL-Box kit notes, updated for firmware 2.x, February 2016	<u>Notes</u>
PIL-Box setup notes, September 2009	<u>Notes</u>
PIL-Box by Jean-François Garnier	<u>Website</u>
ILPer for Windows by Jean-François Garnier	<u>Website</u>
Virtual HP-IL for Windows by Christoph Gießelink	<u>Website</u>
pyILPer for Windows, macOS & Linux by Joachim Siebold	<u>Website</u>

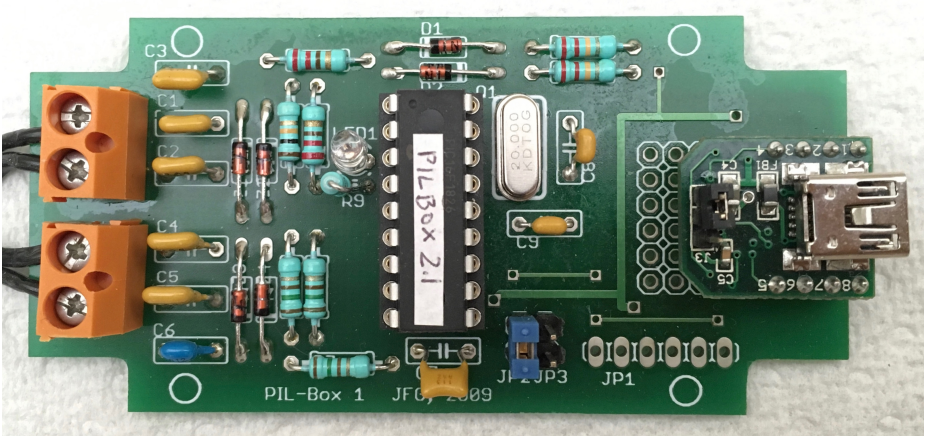
Price List

Product #	Description	Contact	Price € / \$ US
PIL-Box	USB Interface (in parts)	<u>JFG</u>	Available : 2018
PIL-Box	USB Interface (assembled)	<u>JFG</u>	Available : 2018

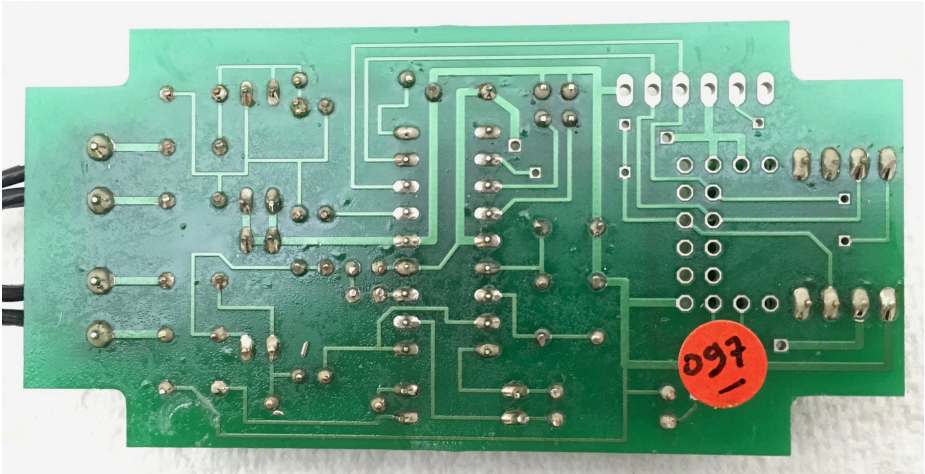
Pictures*HP-IL & USB mini-B Connectors*



PIL-Box Inside View



PCB Top View



PCB Bottom View

HP-IL Modem Devices

HP 82168A Acoustic Coupler



Overview

Introduction

The HP 82168A Acoustic Coupler is a telephone interface device that provides remote communications capabilities for your computer through the Hewlett-Packard Interface Loop (HP-IL).

Operation

As soon as the HP 82168A Acoustic Coupler has power and is connected on the loop, you can begin using its capabilities.

Front Panel Indicators

The front panel of the coupler contains two indicators that let you know when the coupler is operating properly.



POWER Indicator.

The POWER indicator shows whether or not the coupler is powered up. When the coupler is powered up, the POWER indicator will become dark red. When it is powered down, the POWER indicator will become pale red.

The coupler will power up whenever it receives any HP-IL message. Therefore, you can power up the coupler by simply operating the loop with your controller. (However, the first message will be lost, and a "transmit" error may result.)

Using your controller, you can power down the coupler by sending a Loop Power Down message. Additionally, the coupler will automatically power down if no HP-IL activity occurs and no carrier tone is detected for 10 minutes. This "activity time-out" can be disabled with Remote mode instructions sent using your controller. After an activity time-out, if the coupler is sent an HP-IL message, that message will be lost and a "transmit" error will result. Therefore, you should ensure that your controller can accommodate this type of error.

The coupler will also power down when battery power becomes insufficient. When battery power first becomes low, the POWER indicator will start flashing, indicating that there is about 3 minutes of sufficient power remaining. You should connect the ac adapter/recharger to continue operations.

CARRIER Indicator.

The CARRIER indicator shows when the coupler detects a carrier tone of the proper frequency from the telephone line. The carrier indicator is dark green when a carrier tone is detected and pale green when one is not detected.

Establishing a Communications Link

Before establishing a communications link with a computer over the telephone line, the following settings must be determined:

- Control protocol.
- Parity.

These settings are based in part on the settings of the computer system your coupler will be communicating with. You should make sure the dial-up computer system transmits and receives data at 300 baud.

Control Protocol.

The coupler can interact with a computer over the telephone line using a choice of protocols (procedures) that govern how devices send and receive information. The following control protocols are available:

- XON/XOFF (default).

- ENQ/ACK.
- no protocol.

Before establishing a link, the coupler should be set to the same protocol as the dial-up system. The coupler's protocol can be selected by the controller using Remote mode instructions.

Parity.

Many computer systems encode transmitted data with a "parity bit" for use in error-checking procedures. The coupler should be set to use the same parity as the dial-up computer. This can be done with your controller using Remote mode instructions. The following parities are available:

- Even parity (default).
- Odd parity.
- Zero parity.
- One parity.
- No parity.

Establishing a Telephone Link.

To establish a communications link with another computer, dial the number for the computer and listen for the carrier tone. When you hear the tone, insert the telephone handset into the acoustic cups of the coupler. Be sure the cord to the handset is at the end of the coupler marked CORD. Push firmly on the handset to ensure that the rubber collars form a tight seal. When the coupler detects the carrier tone, the CARRIER indicator will become dark green.

If you dial up a system which requires that a person on the other end establish the link, be sure you have a good telephone connection, then insert the handset into the coupler. When the person on the other end has established a link to the computer and your coupler detects a carrier tone, the CARRIER indicator will become dark green. You can then use the coupler to communicate with the computer.

Terminating a Telephone Link.

After ending communications with the other computer, you can terminate the telephone link by removing the handset from the coupler. The telephone handset can be removed by rolling it to one side and pulling it out of the coupler.

Telephone Link Interruptions.

There are times when, to recover from errors, it is desirable to suspend communications between the coupler and the computer on the telephone line. The coupler can be instructed to

break communications with the computer by sending it a BI (break on) instruction followed immediately by a BO (break off) instructions. This operation sends the computer a short "break" signal, interrupting its operation. A computer that recognizes a break will suspend operations until you send it instructions.

There may occasionally be unintentional interruptions because of a poor telephone connection or acoustical interference. If your carrier tone is lost or the connection is faulty (in which case data transmission errors might be detected), you should hang up, redial the computer, and reestablish the link. Should you encounter further problems with the connection, you should contact the computer operator or the telephone company and request service.

(ref: 82168-90001 HP 82168A Acoustic Coupler Owner's Manual)

Availability

Introduced in 1983 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
Acoustic Coupler, Owner's Manual, 82168-90001, Apr. 1983	upcoming
System Configurations & Documentation, 82168-90002, Apr. 1983	Sheet
Acoustic Coupler, Owner's Manual, 82168-90001 Rev. B, Nov. 1983	Manual

Price List

Product #	Description	Price € / \$ US
82168A	300 Bauds Modem, Acoustic Coupler	495.00 \$: 1985

Pictures



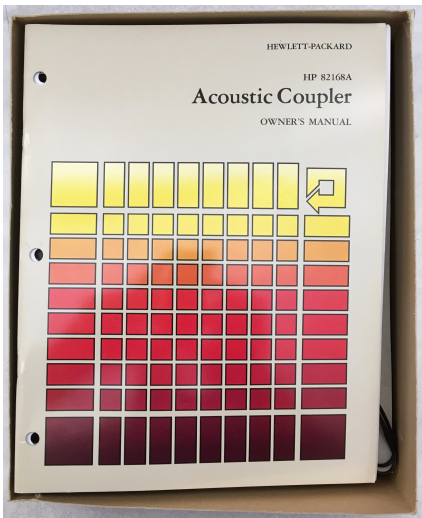
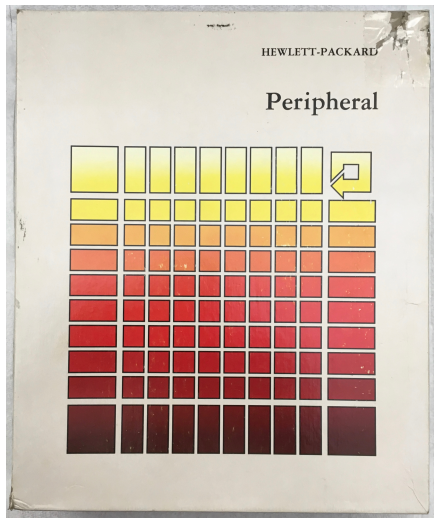
Side View



Top View



Connectors View



Unboxing



Acoustic Coupler Without and With a Telephone Handset

HP-IL Instrumentation Devices

HP 3468A Digital Multimeter
HP 3468B Digital Multimeter



Overview

Description

The 3468A/B is an auto ranging 5 $\frac{1}{2}$ to 3 $\frac{1}{2}$ digit DMM with the five functions of DC volts, true RMS AC volts, 2 and 4-wire ohms, DC current and true RMS AC current. It interfaces with HP-IL (Hewlett- Packard Interface Loop) providing complete programmability of functions, ranges and modifiers. The 3468A/B can also be completely calibrated electronically without any adjustments either from the front panel or remotely in an automatic calibration system. It is available with a rechargeable battery and battery charging circuitry for portable measurement

HP-IL

The 3468A/B is fully programmable with HP-IL, a new two-wire serial interface, and the HP 41C/CV handheld calculators or the more powerful HP series 80 computers. HP-IL provides automatic measurements and adds computational power to a bench DMM. For example, to measure temperature, the HP 41 can linearize a transducer device and display the results in degrees C or degrees F right on the display of the 3468A/B. For audio and

telecommunication applications, the 3468A/B can measure AC voltage and the HP 41 can convert to dBm referenced to any impedance. Or the HP 41 can be programmed to get data from the 3468A/B and perform a % error calculation, then display the results in percent on the 3468A/B display.

High Performance

The 3468A/B has 5 functions with selectable $5\frac{1}{2}$, $4\frac{1}{2}$ or $3\frac{1}{2}$ digit resolution. DC and true RMS AC voltage measurements are provided from 0.3 volt full scale range with $1\text{ }\mu\text{V}$ sensitivity up to 300 volts. The bandwidth of the true RMS AC converter is from 20 Hz to 100 kHz on all ranges and up to 300 kHz on the 30 V range. Either 2 or 4-wire ohms measurements can be selected with a maximum range of 30 megaohm. Both DC and true RMS AC current capability is provided up to 3 A. All functions on the 3468A/B incorporate a fast auto-ranging. The 3468A/B uses an integrating analog to digital conversion technique for high noise rejection. The selectable $3\frac{1}{2}$, $4\frac{1}{2}$ or $5\frac{1}{2}$ digits of resolution allows flexibility for choosing speed or noise rejection.

Electronic Calibration

Complete calibration of the 3468A/B is done electronically, either manually from the front panel or remotely in an automatic calibration system. There are no internal adjustments. Complete calibration of all functions is done without removal of the instrument's covers, thus saving valuable time and reducing cost. The calibration procedure for the 3468A/B involves connecting a calibration standard to the input, then pressing three keystrokes to store one calibration constant in CMOS RAM for each range and function. When the 3468A/B makes a measurement, each reading is corrected according to the calibration constants that have been stored. The internal CMOS RAM used in the 3468A/B is powered by a lithium battery to create a non-volatile memory capable of holding the calibration constants for more than ten years.

Battery

The optional battery pack includes a rechargeable battery and the battery charger circuitry for up to five hours of continuous measurements.

Availability

Introduced in 1982 and discontinued at an unknown date.

Documents & Web Sites

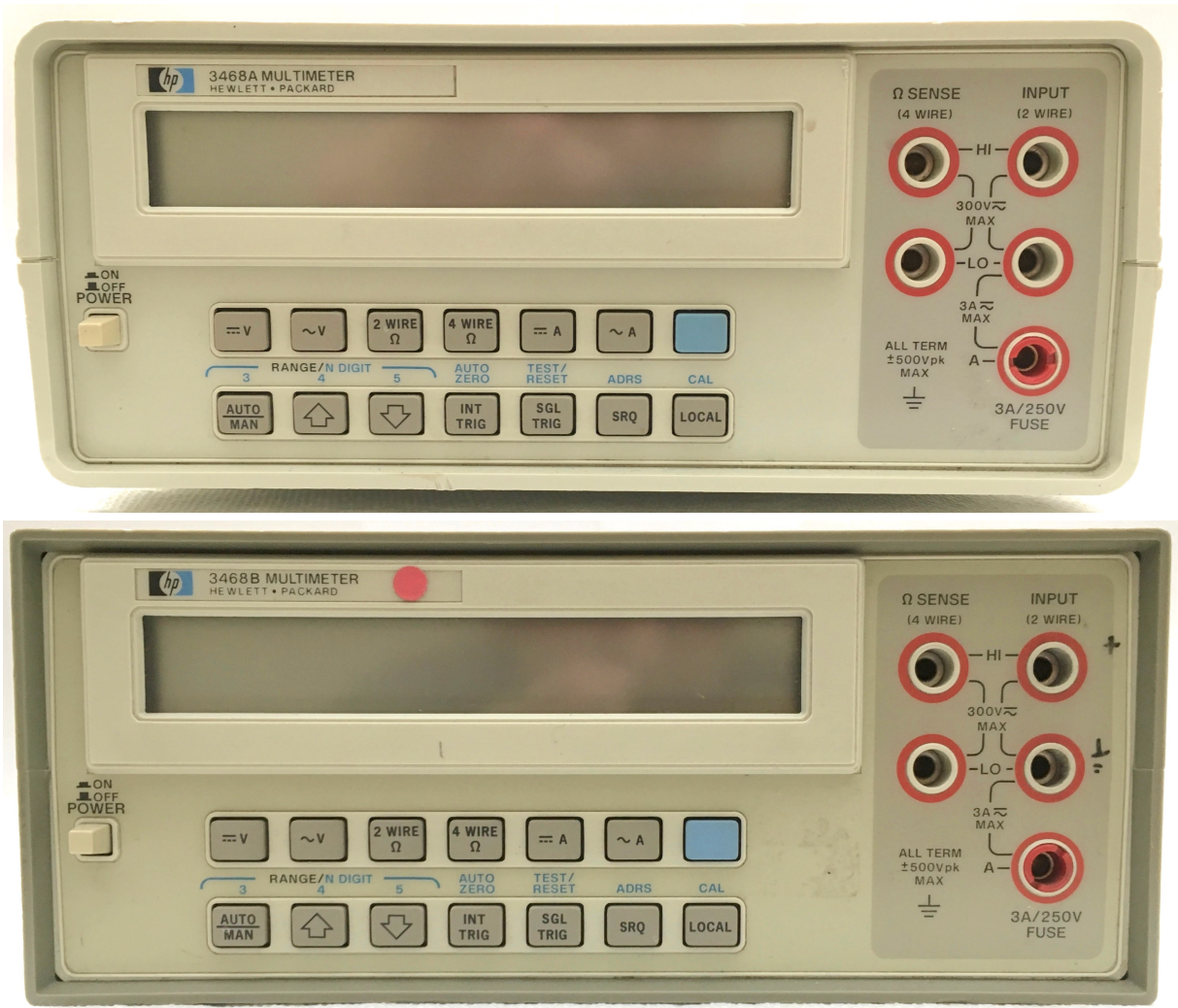
Documents & Web Sites	Link
3468A/B Multimeter, Operator's Manual, 03468-90055, Jan. 1983	upcoming

Documents & Web Sites	Link
3468A/B Multimeter, Service Manual, 03468-90007, Feb. 1984	upcoming

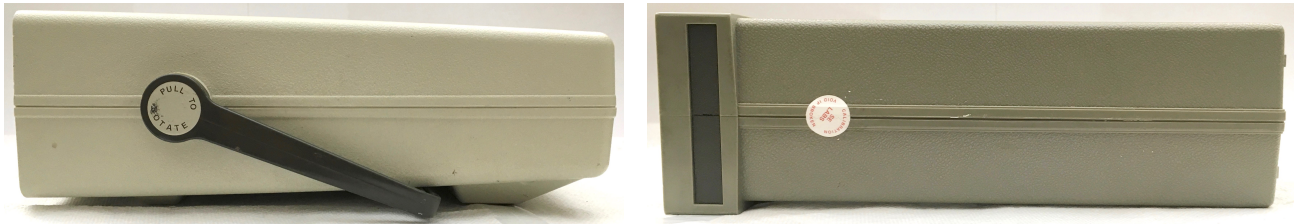
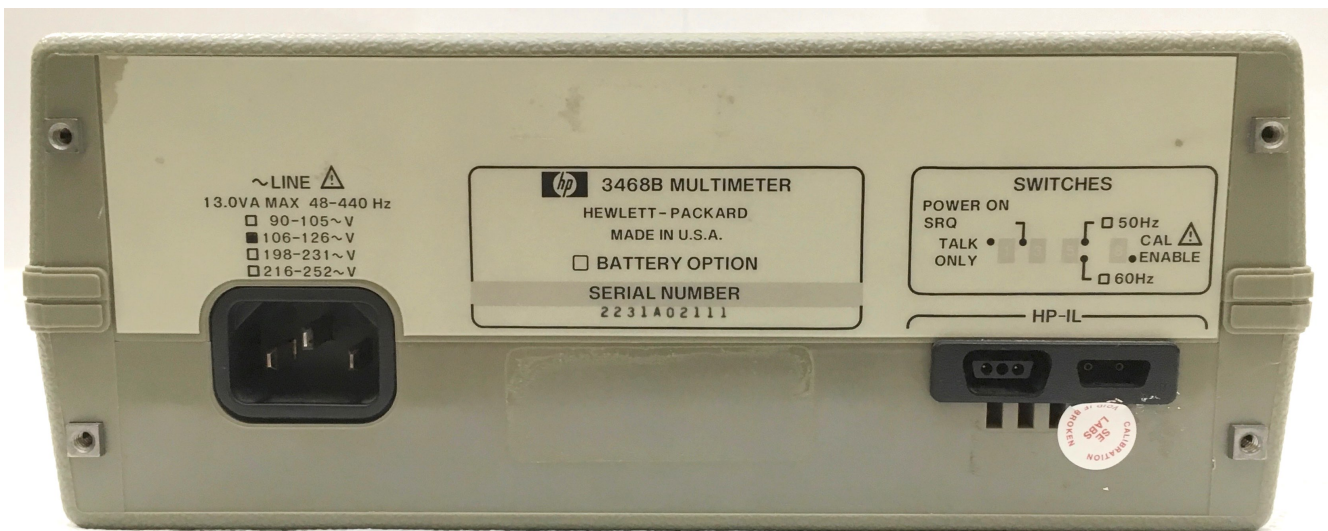
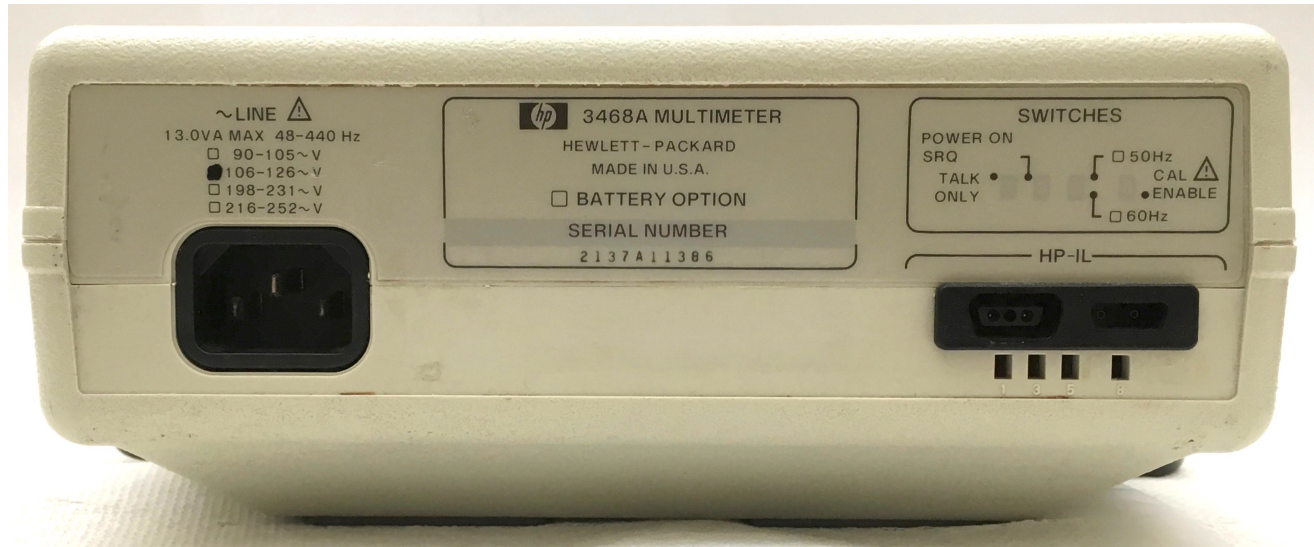
Price List

Product #	Description	Price € / \$ US
3468A	Digital Multimeter	695.00 \$: 1984
3468A opt. 001	Digital Multimeter with Battery Pack	820.00 \$: 1984
03468-90055	3468A/B Multimeter, Operator's Manual, Jan. 1983	
03468-90007	3468A/B Multimeter, Service Manual, Feb. 1984	

Pictures



3468A & 3468B Front View

*3468A & 3468B Side View**3468A & 3468B Rear View*

hp 3468A MULTIMETER **WARNING: NO USER SERVICEABLE PARTS INSIDE.**

PROGRAM COMMANDS

FUNCTION	RA	R1	R2	R3	R4	R5	R6
F1 = V	AUTO	.3V	3V	30V	300V		
F2 ~ V	AUTO	.3V	3V	30V	300V		
F3 2WΩ	AUTO	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
F4 4WΩ	AUTO	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
F5 = A	AUTO	3A					
F6 ~ A	AUTO	.3A	3A				
F7 2WΩ	AUTO	10MΩ	100MΩ				

B1	BINARY STATUS	N3	3 DIG OF RES
B2	BINARY CAL CONSTANT OUT	N4	4 DIG OF RES
B3	BINARY CAL CONSTANT IN	N5	5 DIG OF RES
C	CALIBRATE	T1	INTERNAL TRIG
D1	NORMAL DISPLAY	T2	SINGLE TRIG
D2	REMOTE DISPLAY	Z0	AUTO ZERO OFF
Mbb	OCTAL SRQ MASK	Z1	AUTO ZERO ON

OUTPUT FORMATS

DEVICE ID HP3468A CR LF
 READING ±d.dddde±d CR LF
 OVERLOAD +9.99999E+9 CR LF
 STATUS BYTE

BIT	DESCRIPTION
D7	MSB, 1=POWER ON RESET
D6	1=REQUIRE SERVICE
D5	1=CALIBRATION ERROR
D4	1=KEYBOARD SRQ
D3	1=HARDWARE ERROR
D2	1=INVALID SYNTAX
D1	1=INVALID RANGE
D0	LSB, 1=READING READY

MEASUREMENT CHARACTERISTICS

DC V 1μV-300V
 RIN: >10¹⁰Ω, 0.3V, 3V
 10MΩ, 30V, 300V
 AC V 1μV-300V TRUE RMS, ≥10% F.S.
 CREST FACTOR 4:1 @ F.S.
 BW 20Hz-100kHz EXCEPT TO
 300kHz ON 30V RANGE
 ZIN: 1MΩ, SHUNT BY < 60pF
 A 10μA-3A
 MAX SHUNT R: 0.3Ω
 BW ~A: 20Hz-20kHz
 CAL ⚠ CAUTION: ENABLING CALIBRATION SWITCH MAY CAUSE LOSS OF CALIBRATION IF PROPER PROCEDURE IS NOT FOLLOWED.

Ω 1mΩ-30MΩ
 OPEN CIRCUIT V < 6.3V
 CURRENT THRU UNKNOWN:
 300Ω, 3kΩ 1mA
 30kΩ 100μA
 300kΩ 10μA
 3MΩ 1μA
 30MΩ 100nA
 DIODE TEST: IN 3kΩ RANGE,
 DIODE VOLTAGE DISPLAYED
 IN VOLTS.

FUSES

FUNCTION	RATING	LOCATION
~ LINE	100mA/250V	MAIN BOARD
CURRENT	3A/250V	A INPUT
BATTERY	2A/250V	BATT BOARD

MADE IN U.S.A.

ERROR MESSAGES

ERROR #	ERROR DESCRIPTION
1	CALIBRATION RAM
2	MICROPROCESSOR RAM
4	ROM
8	A/D CONVERTER

BATTERY

CHARGE TIME	PWR ON	PWR OFF	RUN TIME @23°C
6 HR	2 HR	1 HR	
36 HR	16 HR	5 HR	

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hp 3468B MULTIMETER **WARNING: NO USER SERVICEABLE PARTS INSIDE.**

PROGRAM COMMANDS

FUNCTION	RA	R1	R2	R3	R4	R5	R6
F1 = V	AUTO	.3V	3V	30V	300V		
F2 ~ V	AUTO	.3V	3V	30V	300V		
F3 2WΩ	AUTO	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
F4 4WΩ	AUTO	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
F5 = A	AUTO	3A					
F6 ~ A	AUTO	.3A	3A				
F7 2WΩ	AUTO	10MΩ	100MΩ				

B1	BINARY STATUS	N3	3 DIG OF RES
B2	BINARY CAL CONSTANT OUT	N4	4 DIG OF RES
B3	BINARY CAL CONSTANT IN	N5	5 DIG OF RES
C	CALIBRATE	T1	INTERNAL TRIG
D1	NORMAL DISPLAY	T2	SINGLE TRIG
D2	REMOTE DISPLAY	Z0	AUTO ZERO OFF
Mbb	OCTAL SRQ MASK	Z1	AUTO ZERO ON

OUTPUT FORMATS

DEVICE ID HP3468B CR LF
 READING ±d.dddde±d CR LF
 OVERLOAD +9.99999E+9 CR LF
 STATUS BYTE

BIT	DESCRIPTION
D7	MSB, 1=POWER ON RESET
D6	1=REQUIRE SERVICE
D5	1=CALIBRATION ERROR
D4	1=KEYBOARD SRQ
D3	1=HARDWARE ERROR
D2	1=INVALID SYNTAX
D1	1=INVALID RANGE
D0	LSB, 1=READING READY

MEASUREMENT CHARACTERISTICS

DC V 1μV-300V
 RIN: >10¹⁰Ω, 0.3V, 3V
 10MΩ, 30V, 300V
 AC V 1μV-300V TRUE RMS, ≥10% F.S.
 CREST FACTOR 4:1 @ F.S.
 BW 20Hz-100kHz EXCEPT TO
 300kHz ON 30V RANGE
 ZIN: 1MΩ SHUNT BY < 60pF
 A 10μA-3A
 MAX SHUNT R: 0.3Ω
 BW ~A: 20Hz-20kHz
 CAL ⚠ CAUTION: ENABLING CALIBRATION SWITCH MAY CAUSE LOSS OF CALIBRATION IF PROPER PROCEDURE IS NOT FOLLOWED.

Ω 1mΩ-30MΩ
 OPEN CIRCUIT V < 6.5V
 CURRENT THRU UNKNOWN:
 300Ω, 3kΩ 1mA
 30kΩ 100μA
 300kΩ 10μA
 3MΩ 1μA
 30MΩ 100nA
 DIODE TEST: IN 3kΩ RANGE,
 DIODE VOLTAGE DISPLAYED
 IN VOLTS.

FUSES

FUNCTION	RATING	LOCATION
~ LINE	100mA/250V	MAIN BOARD
CURRENT	3A/250V	A INPUT
BATTERY	2A/250V	BATT BOARD

MADE IN U.S.A.

ERROR MESSAGES

ERROR #	ERROR DESCRIPTION
1	CALIBRATION RAM
2	MICROPROCESSOR RAM
4	ROM
8	A/D CONVERTER

BATTERY

CHARGE TIME	PWR ON	PWR OFF	RUN TIME @23°C
6 HR	2 HR	1 HR	
36 HR	16 HR	5 HR	

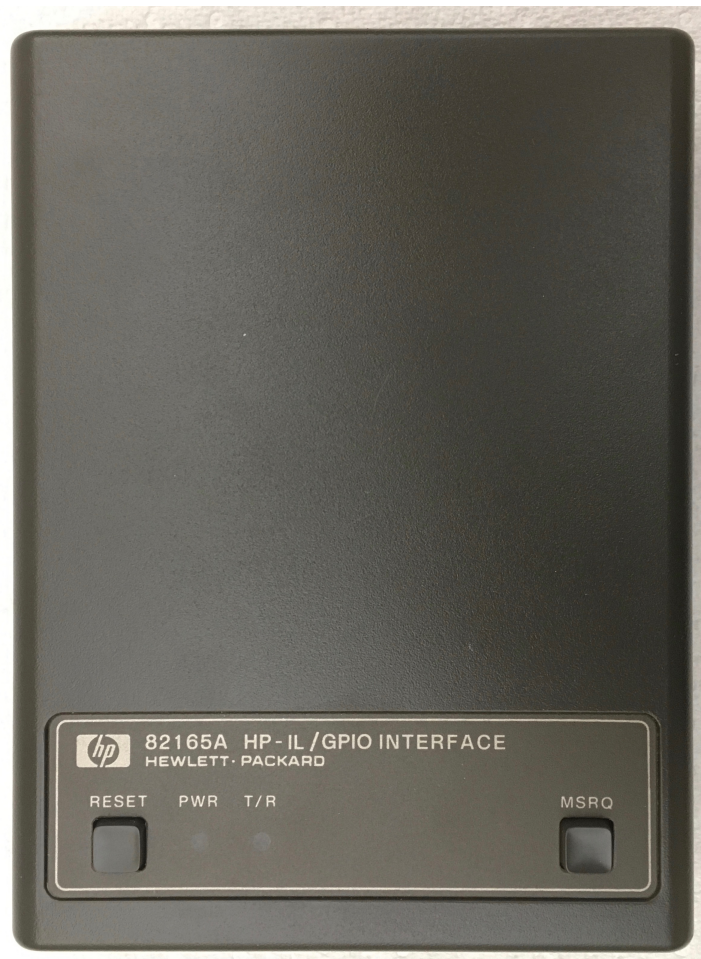
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3468A & 3468B Back Label

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HP-IL Input/Output Devices

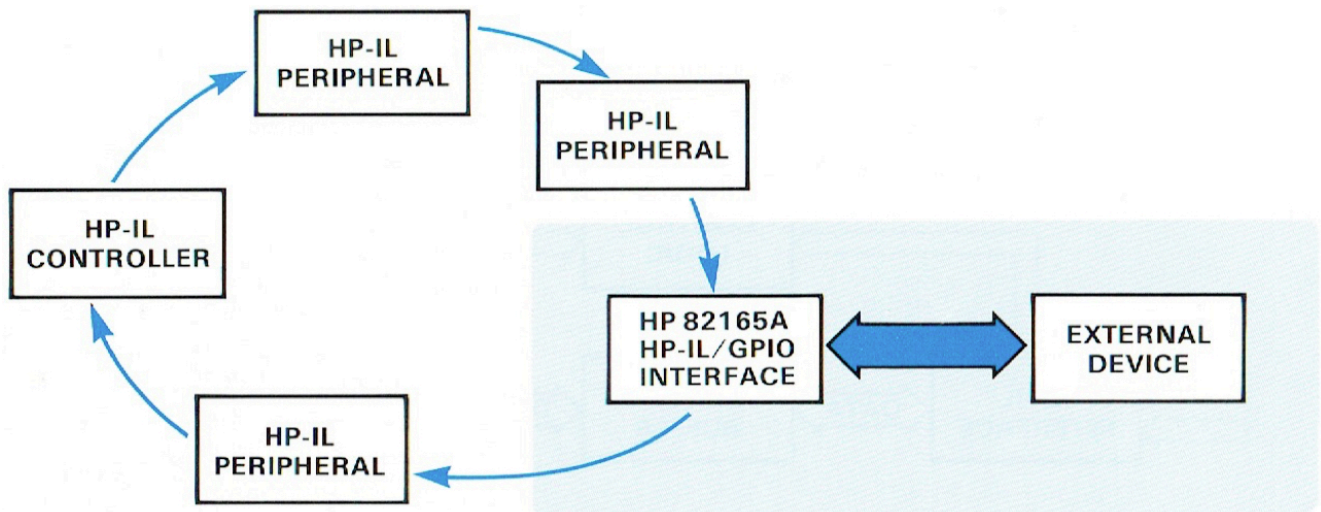
HP 82165A HP-IL/GPIO Interface



Overview

The HP 82165A HP-IL /GPIO Interface provides the capability to interface an external device having general-purpose input/output (GPIO) capabilities with the Hewlett-Packard Interface Loop (HP-IL).

Consider the HP-IL system shown below. The interface loop contains an HP-IL controller (such as a calculator), perhaps one or more additional HP-IL devices, and the HP-IL /GPIO interface. The interface connects to an external device (such as a GPIO printer), allowing the controller to interact indirectly with the external device. In this way, the external device becomes an HP-IL controlled peripheral.



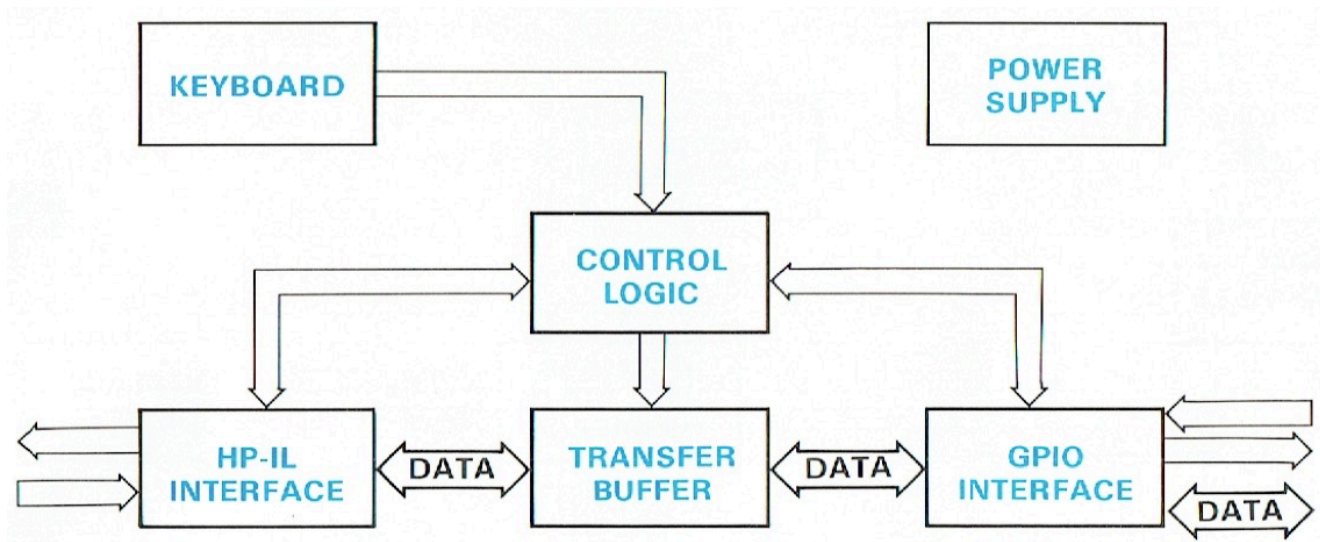
If the controller needs to send data to the external device, the controller first makes the interface a listener, which means that the interface is set to accept data from HP-IL and pass it to the external device. The controller then initiates the transfer of data around the interface loop, one character (or byte) at a time. As characters are received by the interface, it stores them internally. Meanwhile, the interface sends the data to the external device, one character at a time. The interface uses its three GPIO output "handshake" lines (RDYI, DAVO, and DACI) to control the flow of data on the data lines. When the external device sets RDYI (ready) true, the interface places one byte (character) on the data lines and sets DAVO (data valid) true. The external device sets DACI (data accepted) true after it has accepted the data byte, and then sets RDYI true when it is ready for the next byte. In this way, each character received by the interface is transferred to the external device. This is called an HP-IL ♦ GPIO ("HP-IL to GPIO") operation.

If the controller needs the external device to send data to listeners on HP-IL, the controller first makes the interface a talker, which means that the interface is set to accept data from the external device and send it on HP-IL. The controller then directs the interface to start sending data. The interface uses its three GPIO input "handshake" lines (RDYO, DAVI, and DACO) to control the flow of data on the data lines. The interface sets the RDYO line true. When the external device places one byte on the data lines, it sets DAVI true. The interface sets the DACO line true when it has accepted the data byte and has stored it internally. The interface accepts and stores additional bytes in the same manner. Meanwhile, the interface sends each byte on HP-IL, where it is received by all HP-IL listeners. This is called an HP-IL ♦ GPIO ("HP-IL from GPIO") operation.

This example illustrates one way that the interface can be used. However, the interface is a general-purpose interfacing device. It can be set up to operate in several different ways. Using the interface with HP-IL and an external device requires an understanding of these options.

Internal Design

The HP-IL / GPIO interface has six primary features that are important for understanding the interface's operation: the HP-IL interface, the GPIO interface, the transfer buffer, the control logic, the keyboard, and the power supply.



HP-IL Interface

The HP-IL interface portion of the interface performs standard operations required by the interface loop, such as maintaining the interface's talker or listener status, and accepting and passing HP-IL messages around the loop. The physical connection to HP-IL consists of standard HP-IL receptacles—one for incoming messages and one for outgoing messages.

Transfer Buffer

The transfer buffer consists of 32 registers, each capable of holding one byte of information. (Each byte consists of eight bits.) This buffer stores information being transferred from HP-IL to GPIO or from GPIO to HP-IL. It gives the interface the capability of holding up to 32 bytes waiting to be sent. The buffer passes data in the order it was received—first in, first out.

GPIO Interface

The GPIO interface portion of the interface provides the connection to the external device. The physical connection consists of a 25-pin D-subminiature GPIO connector. By

making the appropriate connections, the external device and the interface use signal lines to send and receive information. The signal lines include two 8-line GPIO data buses, six GPIO handshake lines, two HP-IL interfacing lines, and a ground line.

Control Logic

The control logic stores operating information, implements various operating modes that can be selected, and controls the flow and interpretation of data within the interface. It includes registers that store operating information: the control registers and the status register. This operating information can come from either the HP-IL controller or the interface's keyboard.

Keyboard

The keyboard contains the RESET key, the MSRQ (manual service request) key, the PWR (power) indicator light, and the T/R (transmit/receive) indicator light. The RESET key and the MSRQ key allow you to interact with the interface and set certain states. When the PWR indicator light is lit, there is power to the interface. The T/R light is lit during the transfer of data across the GPIO bus.

Power Supply

The HP-IL / GPIO interface contains no internal power source; therefore, the interface must be connected to the ac adapter. The power supply provides a regulated voltage to the interface.

(ref: 82165-90002 HP 82165A HP-IL/GPIO Interface Owner's Manual)

Availability

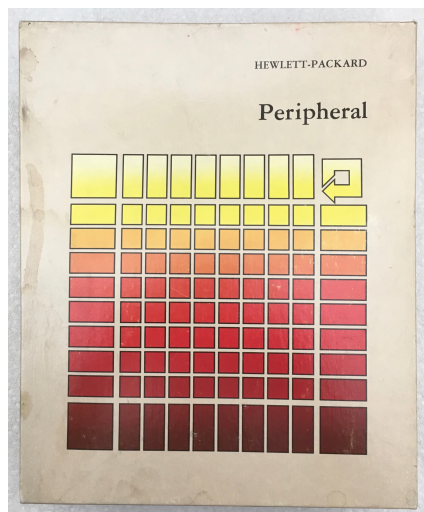
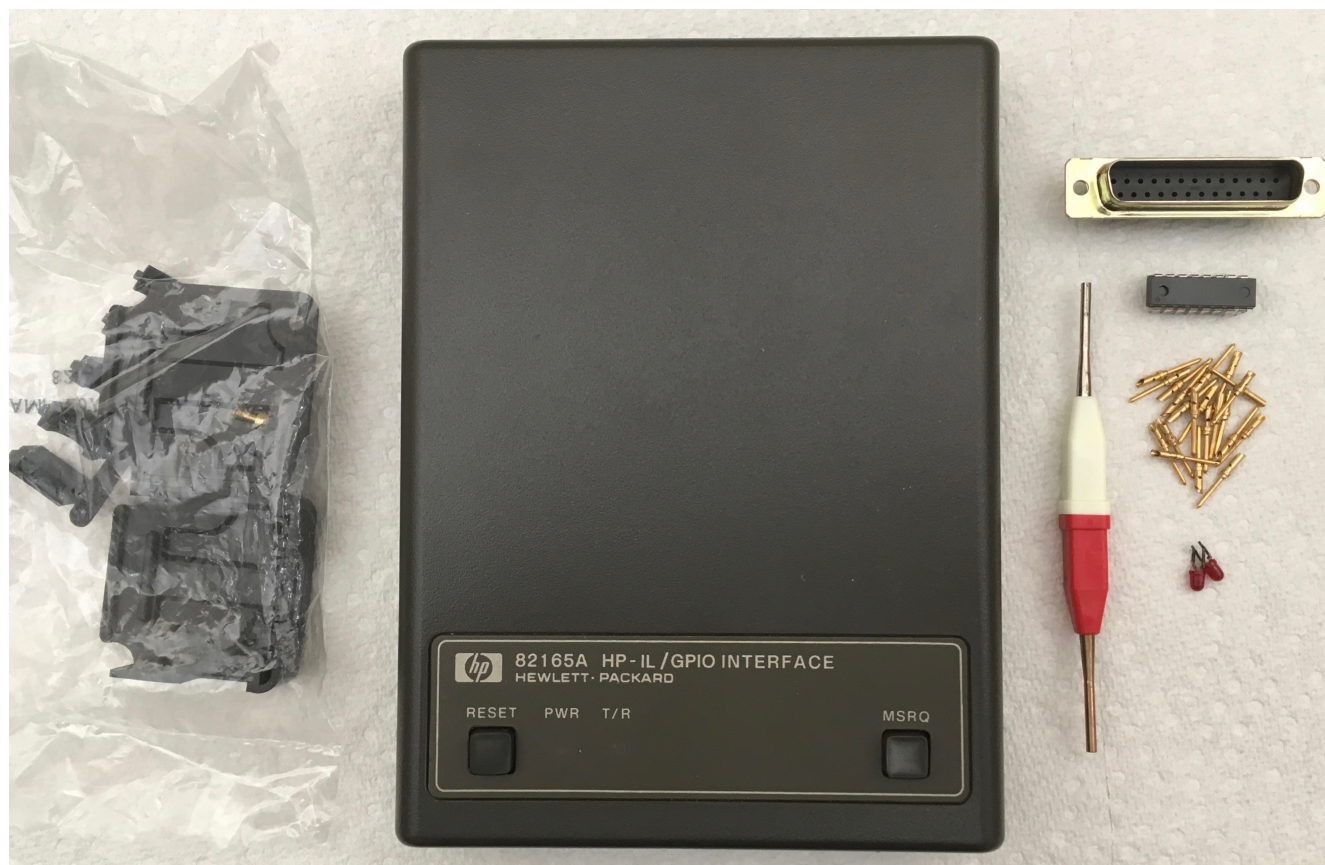
Introduced in 1982 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
HP 82165A HP-IL / GPIO Interface Owner's Manual, 82165-90002, Feb. 1982	Manual
HP 82165A HP-IL / GPIO Interface Manual Supplement, 82165-90012, Oct. 1982	Manual

Price List

Product #	Description	Price € / \$ US
82165A	HP-IL / GPIO Interface	295.00 \$: 1985

Pictures*Unboxing**Interface Parts*

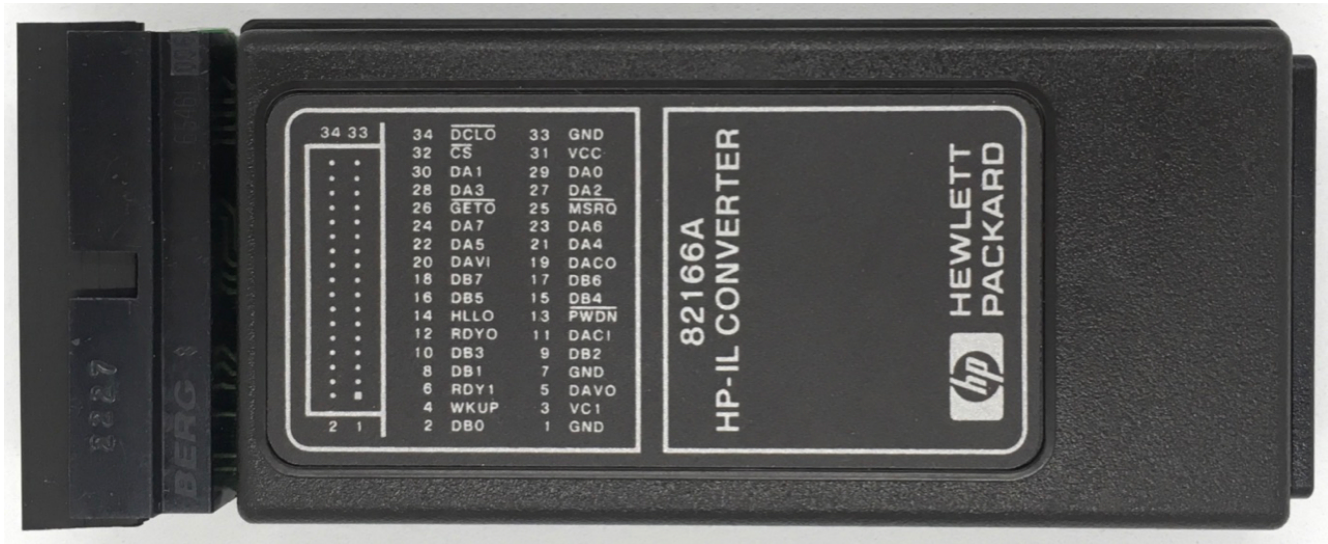


Connectors

Name	Description	Direction
DACI	Data Accepted Input	Interface ← Device
DACO	Data Accepted Output	Interface → Device
DAVI	Data Valid Input	Interface ← Device
DAVO	Data Valid Output	Interface → Device
DA0 – DA7	Data Bus A	Interface ↔ Device
DB0 – DB7	Data Bus B	Interface ↔ Device
GETO	Group Execute Trigger Output	Interface → Device
GND	Ground	Interface ↔ Device
MSRQ	Manual Service Request	Interface ← Device
RDYI	Ready Input	Interface ← Device
RDYO	Ready Output	Interface → Device

Signal Descriptions

HP 82166A HP IL Converter Kit HP 82166B HP IL Converter Pack



Overview

The HP 82166A HP-IL Converter provides the capability to convert an external device with general-purpose input/output (GPIO) capabilities into a device compatible with the Hewlett-Packard Interface Loop (HP-IL).

The converter package includes the following:

- Two HP 82166A HP-IL Converters
- Two HP-IL cables.
- Two GPIO connectors.
- An evaluation board.

Internal Design

The HP-IL converter has four primary features that are important for understanding the converter's operation: the HP-IL interface, the GPIO interface, the transfer buffer, and the control logic.

HP-IL Interface

The HP-IL interface portion of the converter performs standard operations required by the interface loop, such as maintaining the converter's talker or listener status, and accepting and passing HP-IL messages around the loop. The physical connection to HP-IL consists of standard HP-IL receptacles—one for incoming messages and one for outgoing messages.

GPIO Interface

The GPIO interface portion of the converter provides the connection to the external device. The physical connection consists of a 34-pin connector on the printed-circuit assembly. By making the appropriate connections, the external device provides power to the converter and uses signal lines to send and receive information from the converter. The signal lines include two GPIO data buses, GPIO handshake lines, HP-IL interfacing lines, and indicator lines. (Signal descriptions are discussed on page 7.)

Transfer Buffer

The transfer buffer consists of 32 registers, each capable of holding one byte of information. (Each byte consists of eight bits.) This buffer stores information being transferred from HP-IL to GPIO or from GPIO to HP-IL. It gives the converter the capability of holding up to 32 bytes waiting to be sent. The buffer passes data in the order it was received-first in, first out.

Control Logic

The control logic stores operating information, implements various operating modes that can be selected, and controls the flow and interpretation of data within the converter. It includes registers that store operating information: the control registers and the status register.

(ref: 82166-90002 HP 82166A HP-IL Converter Technical Manual)

Availability

Introduced in 1982 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
HP 82166A HP-IL Converter Technical Manual, 82166-90002, Nov. 1981	Manual
HP 82166A HP-IL Converter Manual Supplement, 82165-90012, Oct. 1982	Manual

Price List

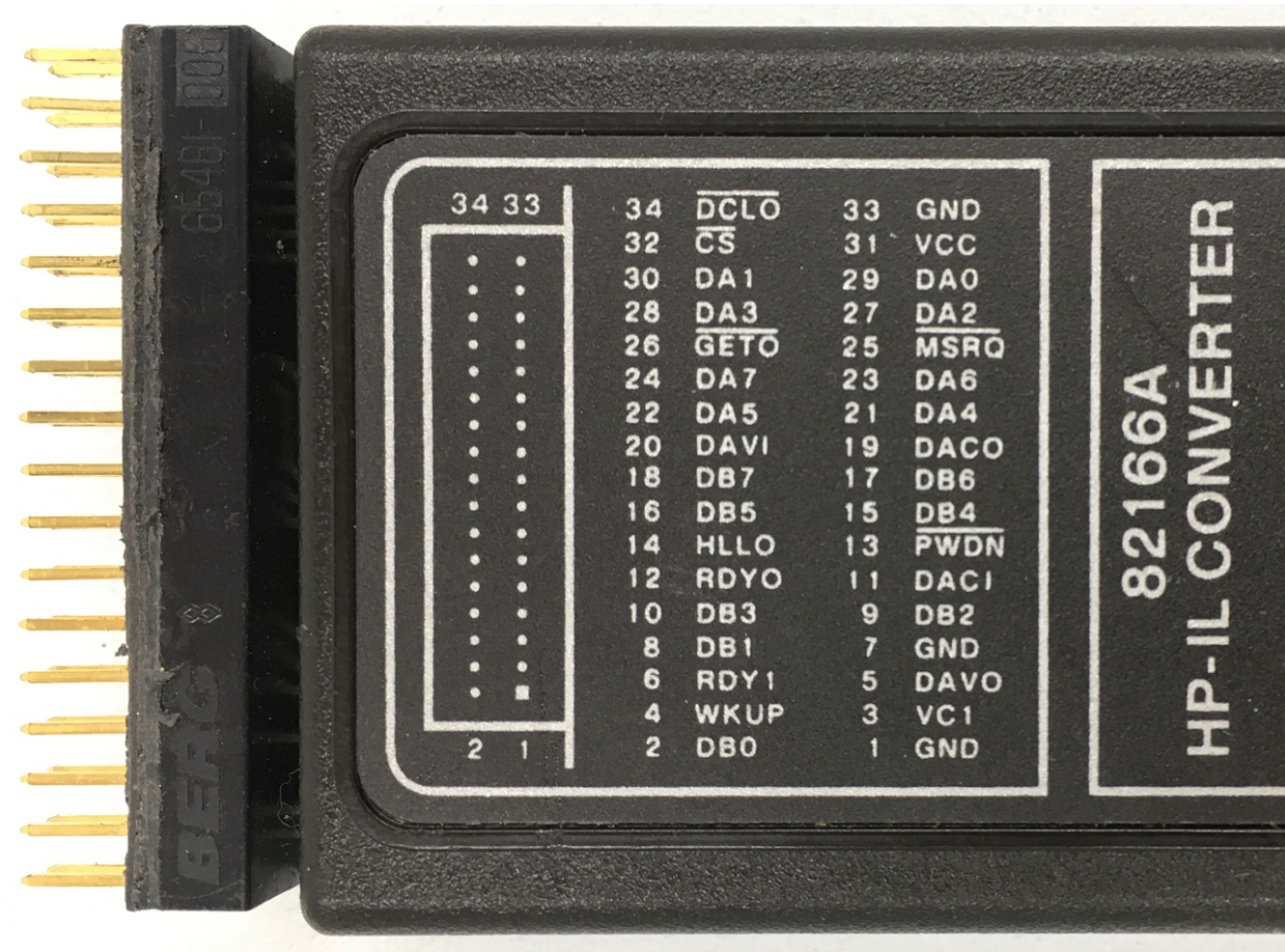
Product #	Description (Components & Parts)	Price € / \$ US
82166A	HP-IL Converter Kit	395.00 \$: 1982
82166B	HP-IL Converter Pack (10 units, no manuals)	1250.00 \$: 1982
82166-90002	HP-IL Converter Technical Manual	10.00 \$: 1986

Product #	Description (Components & Parts)	Price € / \$ US
82166-90012	HP-IL Converter Manual Supplement	8.00 \$: 1986

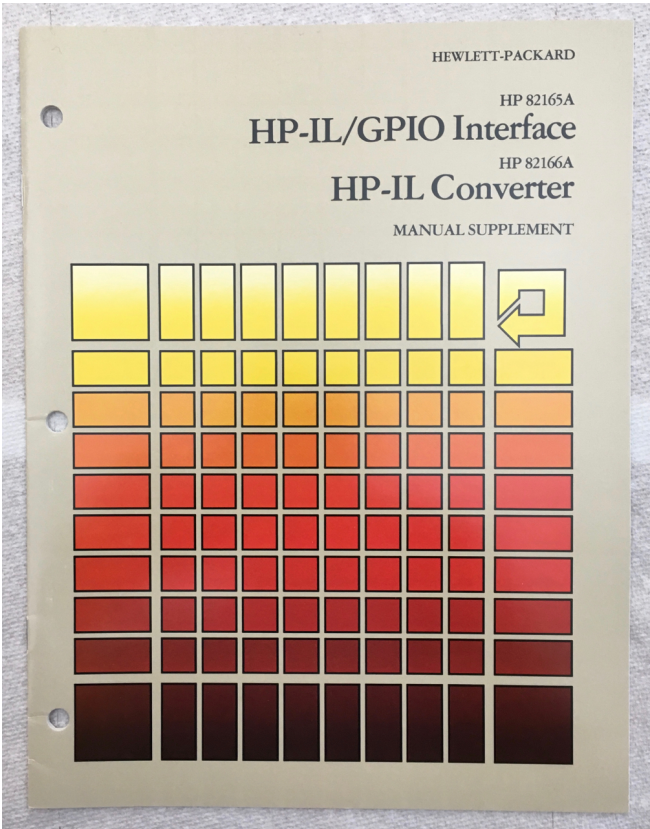
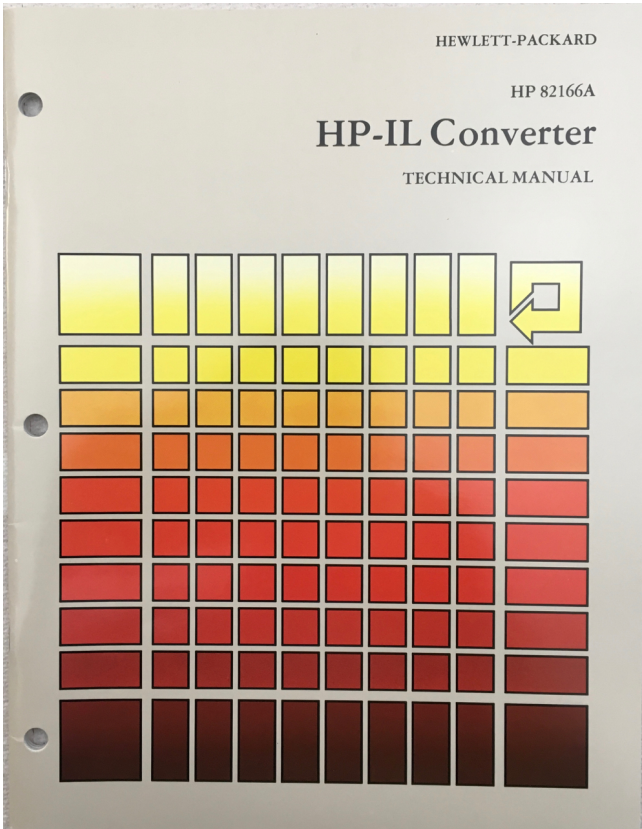
Notes

- An external 5VDC (4.75V to 5.25V) power must be supplied for the unit to works
- Power line (+5V) should be connected to both VCC and VC1
- Reference ground(pin 1) must be connected to signal ground (pin 7 and/or pin 33)

Pictures

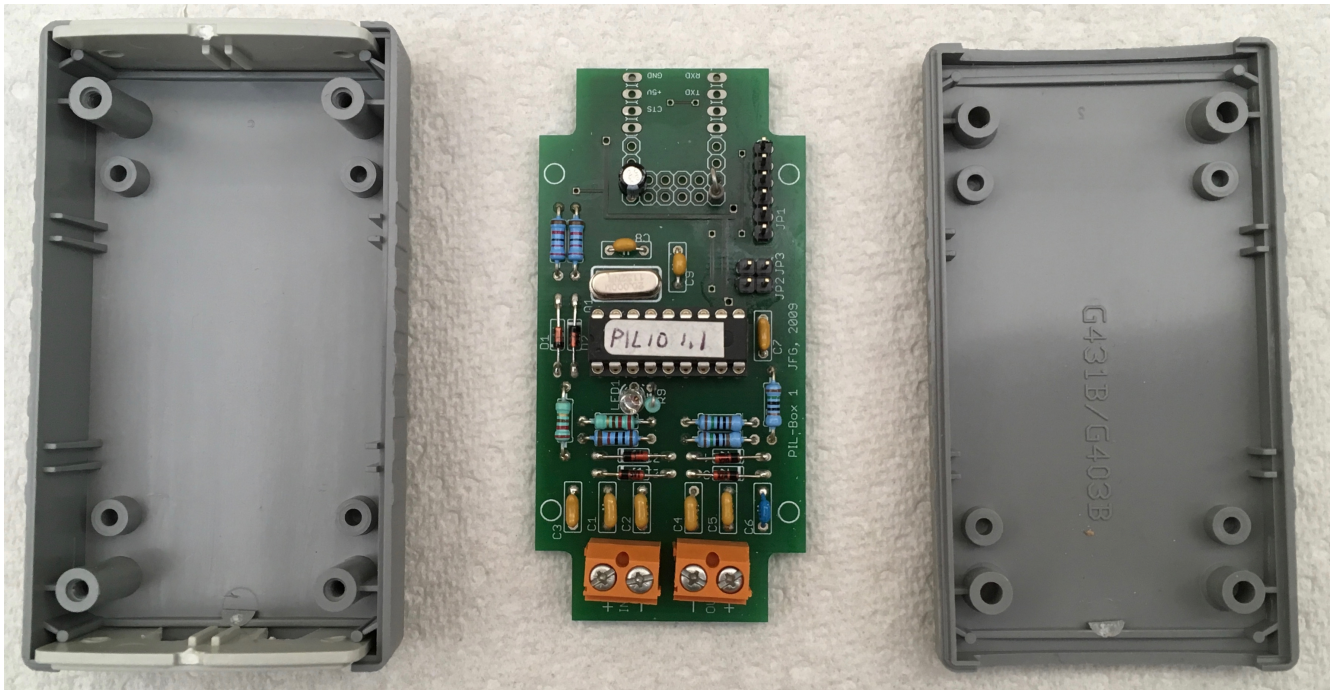


Pins Definition



Manuals

JFG PIL-IO Digital IO Interface



Overview

The PIL-IO board provides 4 digital input/output lines and a serial link (UART type, logic level) to the HP-IL loop. It can be driven by any HP-IL controller such as the HP-41C or the HP-71B.

The PIL-IO board is intended to be used by electronic hobbyists and aims to be a substitute to the old HP82166A converter to interface the HP-IL loop to electronic circuitry.

PIL-IO Board

The PIL-IO board provides 2 HP-IL devices:

- “PILPIO1”: a mini HP-IL / GPIO interface with 4 I/O lines,
- “PILSER1”: a mini HP-IL / serial interface with logic level Rx and Tx lines.

Power requirements:

- Supply: 5V or 3 AA batteries,
- 3mA (active), 0.2mA in power-down (e.g. with HP-41C: PWRDN).

(ref: Jean-François Garnier, PIL-IO Board Presentation, Allschwil Meeting, Nov. 2014)

Availability

Introduced in 2010 and still available.

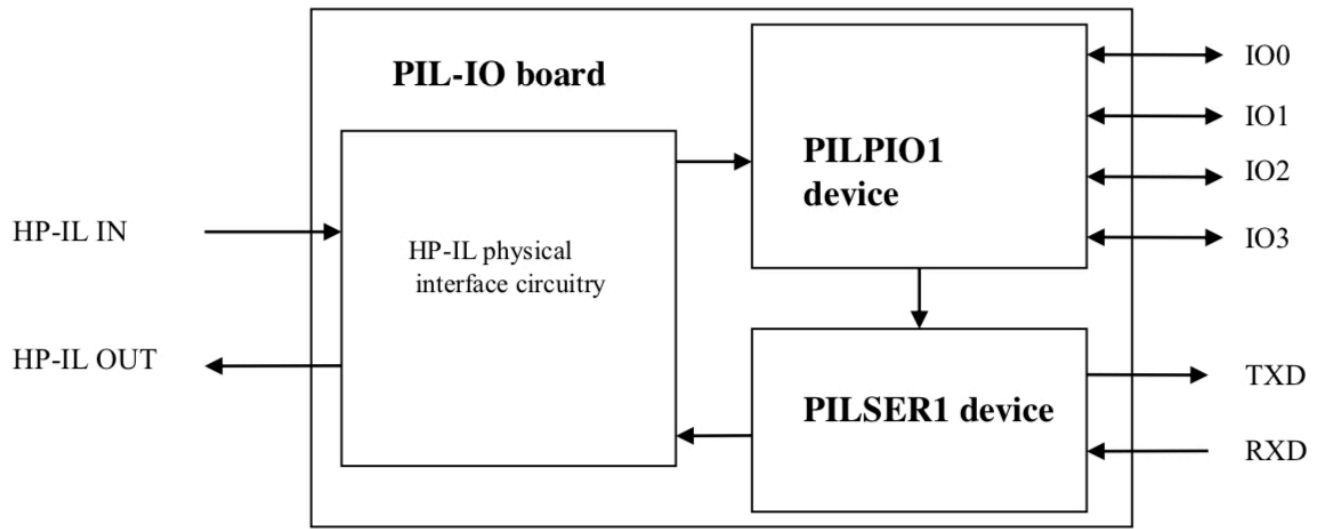
Documents & Web Sites

Documents & Web Sites	Link
PIL-IO board notes for firmware 2.x, February 2016	Manual
The PIL-IO Board Presentation, November 2014	Manual
PIL-IO by Jean-François Garnier	Website

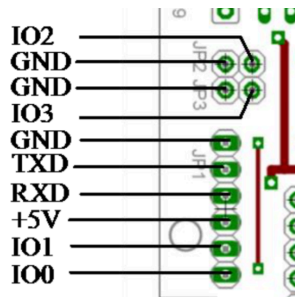
Price List

Product #	Description	Contact	Price € / \$ US
PIL-IO	Digital I/O x 4 + TTL Rx/Tx (in parts)	JFG	Available : 2018
PIL-IO	Digital I/O x 4 + TTL Rx/Tx (assembled)	JFG	Available : 2018

Pictures



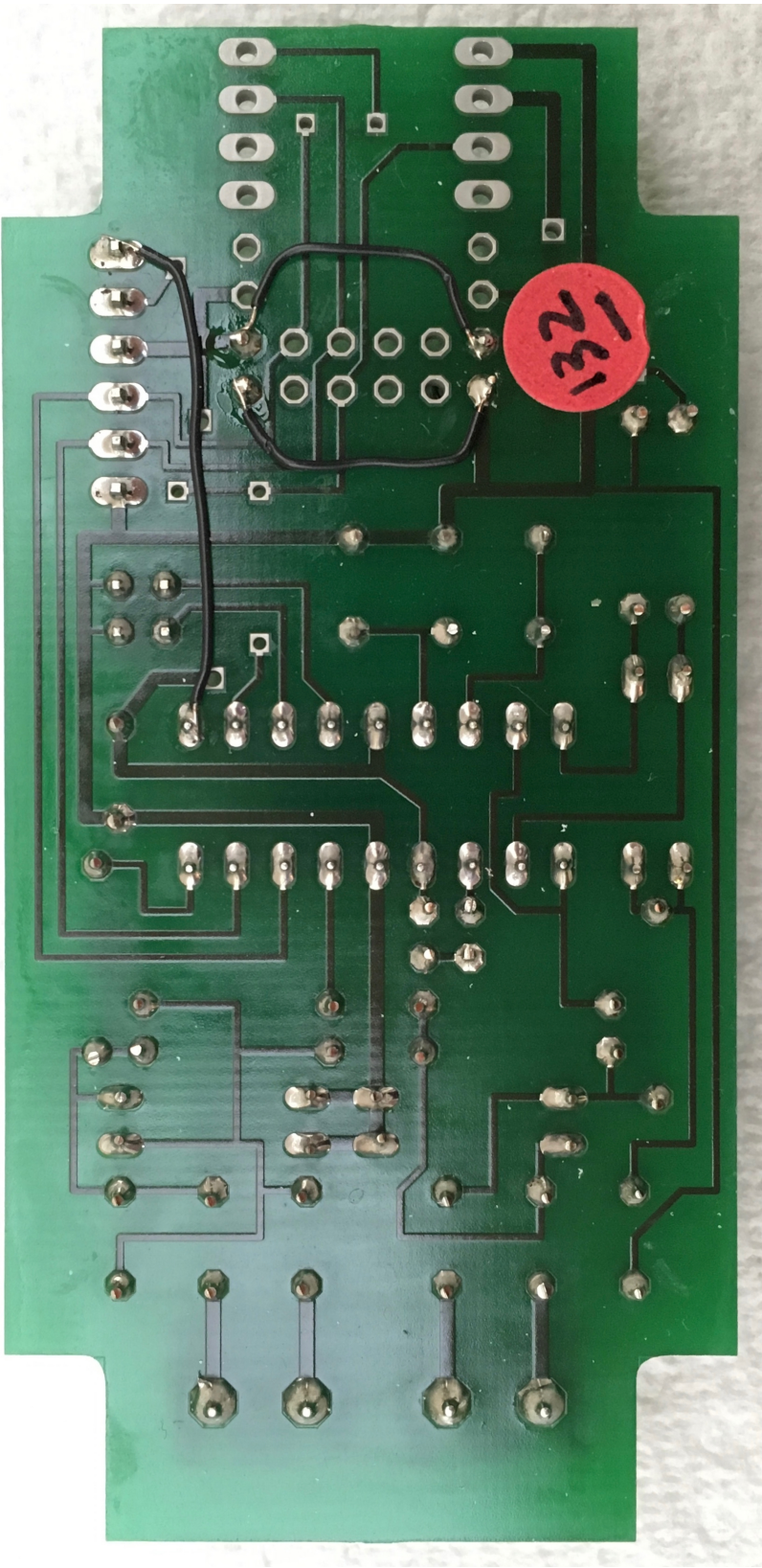
PIL-IO Board Logic Modules



PIL-IO Board Logic Modules



PCB Top View



PCB Bottom View

HP-IL Control Devices

ATC 0010 Relay Activator



Overview

The ATC-0010 from Air Therm Corporation is a relay actuator that can control 8 channels. Each channel is wired to a relay that can be closed or opened with a simple HP-IL command. Equipment connected to a channel can choose to be normally closed or normally opened.

Availability

Availability dates are unknown for this product.

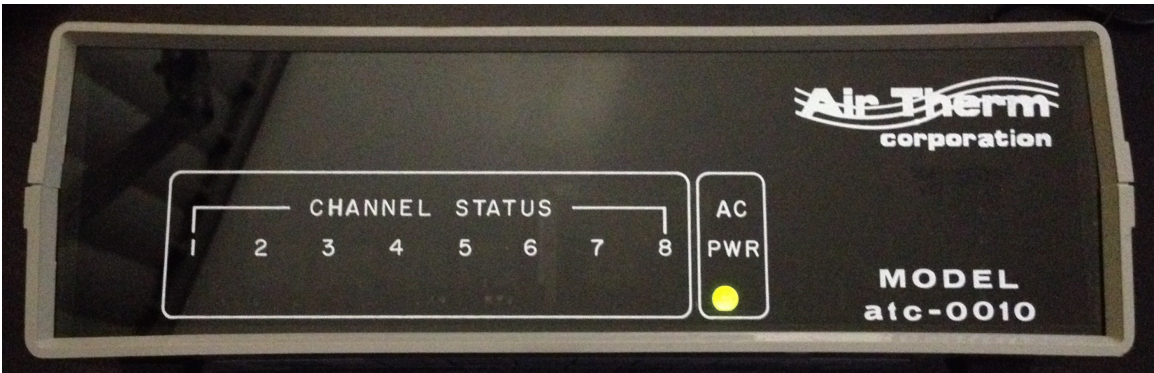
Price List

Product #	Description	Price € / \$ US
ATC-0010	Relay Activator (8 output)	

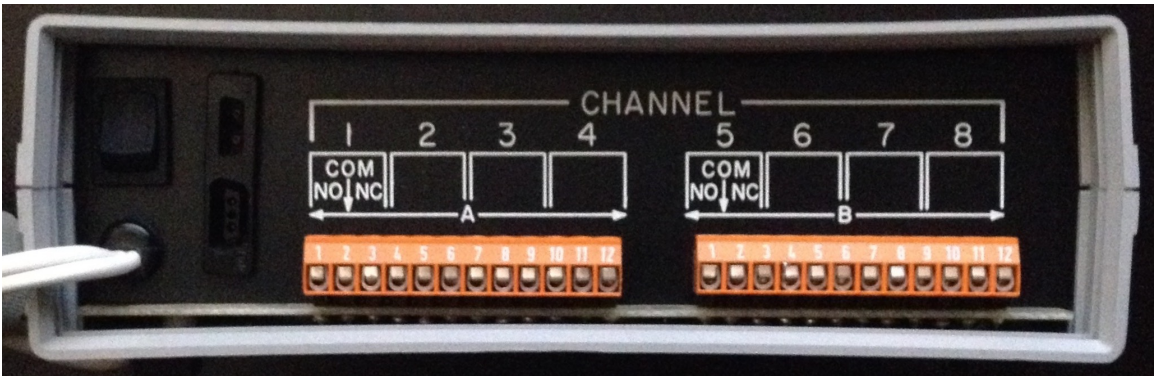
Notes

- The device closes or opens channels (relays) based on the data byte received
- Relay used is a MIDTEX, 296-11B200, 12V DC, 5A
- Device ID = 'HP82166A'
- Accessory ID = 64

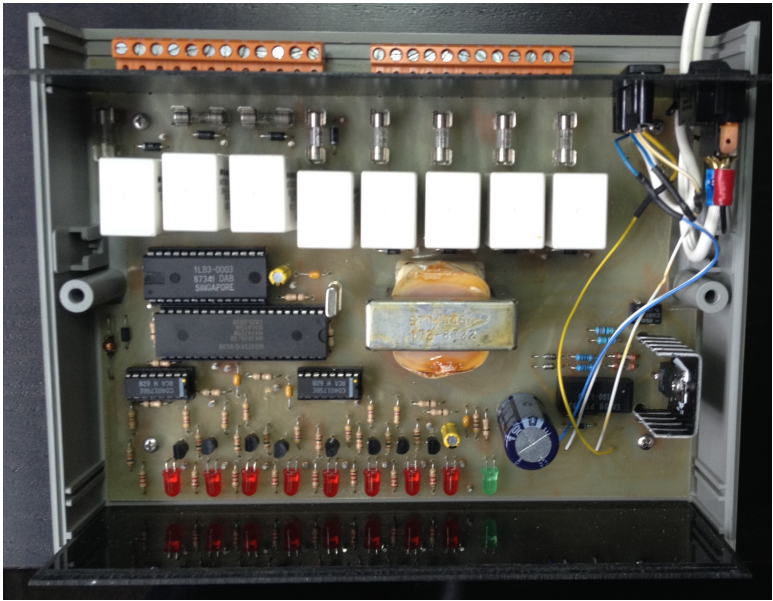
Pictures



Front View



Rear View



Internal



Example

X	Command	Description & HP-IL Trace
		IFC/RFC/AAU/RFC/AAD 01/TAD 01/RFC/SAI/DAB 40/UNT/RFC HP-41C power on loop enumeration
1	SELECT	AAU/RFC/AAD 01/TAD 01/RFC/SAI/DAB 40/UNT/RFC Select first device in the loop, ATC-0010 report an Accessory ID of 64
1	OUTXB	AAU/RFC/AAD 01/LAD 01/RFC/DAB 01/UNL/RFC 0x01 Activates channel #1 on the left
128	OUTXB	AAU/RFC/AAD 01/LAD 01/RFC/DAB 80/UNL/RFC 0x80 Activates channel #8 on the right
255	OUTXB	AAU/RFC/AAD 01/LAD 01/RFC/DAB FF/UNL/RFC 0xFF Activate all channels
0	OUTXB	AAU/RFC/AAD 01/LAD 01/RFC/DAB 00/UNL/RFC 0x00 Deactivate all channels

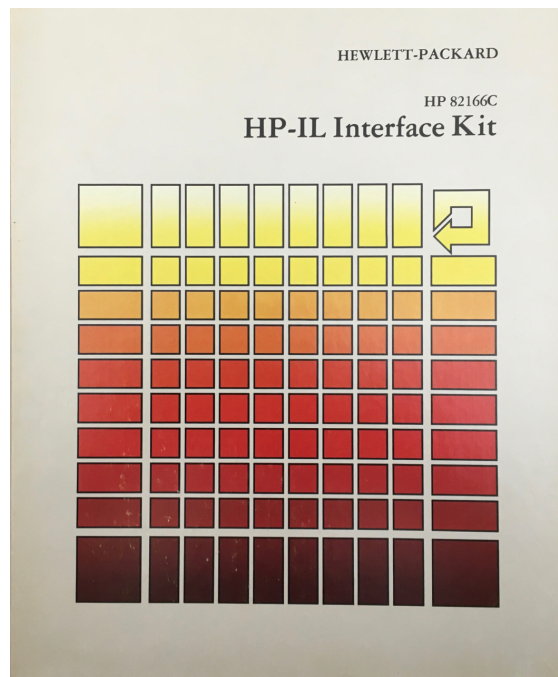


The above example uses an HP-41C with an HP-IL module and an Extended-I/O module

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HP-IL Specialty Devices

HP 82166C HP IL Interface Kit



Overview

Introduction

HP-IL, the Hewlett-Packard Interface Loop, is a digital communication system designed primarily for portable devices. It combines in one interface the attributes of low power, small size, and low cost. In terms of data rate, distance, and number of devices, HP-IL has several advantages over the common serial interface. The HP-IL protocol is based on and is very similar to that used in HP-IB (Hewlett-Packard Company's implementation of IEEE std 488). While its design center is portable devices, the HP-IL interface is quite general in capability and will provide efficient communication for a broad range of devices in diverse applications.

The HP 82166C HP-IL Interface Kit provides the necessary hardware, documentation, and support to allow you to design and build a prototype HP-IL interface as an integral part of your special device. This will permit your device to send and receive data from other HP-IL devices as well as allowing it to be controlled by HP-IL controller devices. Furthermore, you can even design the controller capability into your device using the component parts in this kit.

Part List

Many of the components used in the HP-IL interface are standard parts which are widely available. Some are specially designed for HP-IL such as the HP-IL integrated circuit. This section will provide you with the information you need to specify those standard parts in your interface as well as to assure yourself that the interface kit has no missing parts. The quantity of each part included in the interface kit and the Hewlett-Packard part number are given in each case for reference purposes.

(ref: 82166-90020 HP 82166C The HP-IL Interface Kit Technical Manual)

Availability

Introduced in 1982 and discontinued in 1990.

Documents & Web Sites

Documents & Web Sites	Link
The HP-IL System, G. Kane, S. Harper & D. Ushijima, 5955-9425, 1982	Manual
HP 82166A HP-IL Converter Technical Manual, 82166-90002, Nov. 1981	Manual
HP 82165A / HP 82166A Manual Supplement, 82165-90012, Oct. 1982	Manual
The HP-IL Integrated Circuit User's Manual, 82166-90016, Nov. 1982	Manual
The HP-IL Interface Specification, 82166-90017, Nov. 1982	Manual
HP 82166C The HP-IL Interface Kit Technical Guide, 82166-90020, Dec. 1982	Manual

HP-IL Interface Kit Standard Parts

Product #	Qty	Description
0683-1535	8	Resistor, 15 kilo-ohms, 5%, .25 watt
0698-3446	8	Resistor, 383 ohms, 1%, .125 watt
0160-4800	4	Capacitor, 120 picofarad, 5%
0160-4292	8	Capacitor, 330 picofarad
0160-0576	4	Capacitor, .1 microfarad
0180-3135	4	Capacitor, 10 microfarad
9100-1631	4	Inductor, 56 microhenry, 5%
1902-0953	8	Zener diode, 6.2 volt, 1N753A

Product #	Qty	Description
1902-0970	8	Zener diode, 33 volt, 1N973B
0410-1305	2	Crystal, 4 megahertz
3050-0626	8	Washer, flat
0624-0302	8	Screw, 2-28 self-tapping

HP-IL Interface Kit Custom Parts

Product #	Qty	Description
1820-2810	2	Microprocessor integrated circuit
1LB3-0003	4	HP-IL integrated circuit
9100-4226	4	HP-IL pulse transformer
1810-0651	4	HP-IL hybrid network
0950-0852	4	HP-IL panel receptacle

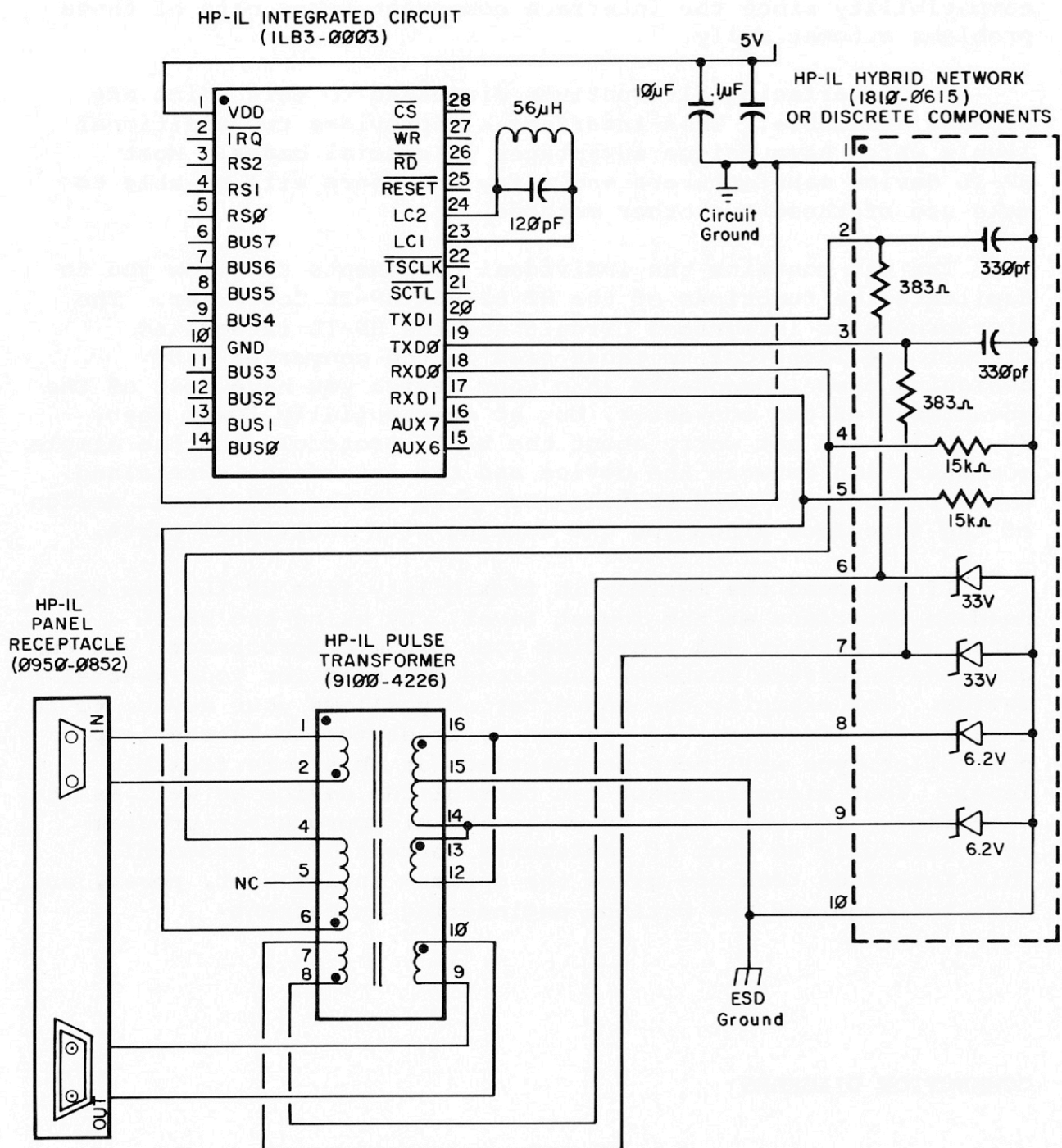
HP-IL Interface Kit Books & Softwares

Product #	Qty	Description
5955-9425	1	The HP-IL System: An Introductory Guide to the Hewlett-Packard Interface Loop
82166-90002	1	HP 82166A HP-IL Converter Technical Manual
82165-90012	1	HP 82165A / HP 82166A Manual Supplement
82166-90016	1	The HP-IL Integrated Circuit User's Manual
82166-90017	1	The HP-IL Interface Specification
82166-90020	1	HP 82166C The HP-IL Interface Kit Technical Guide
00041-15043	1	HP-41 HP-IL Development Owner's Manual
00041-15043	2	HP-41 HP-IL Development Module
00075-13013	1	HP-75 I/O Utilities and Solution Book
00075-13014	1	HP-75 RIOWIO Utility and Instruction Card

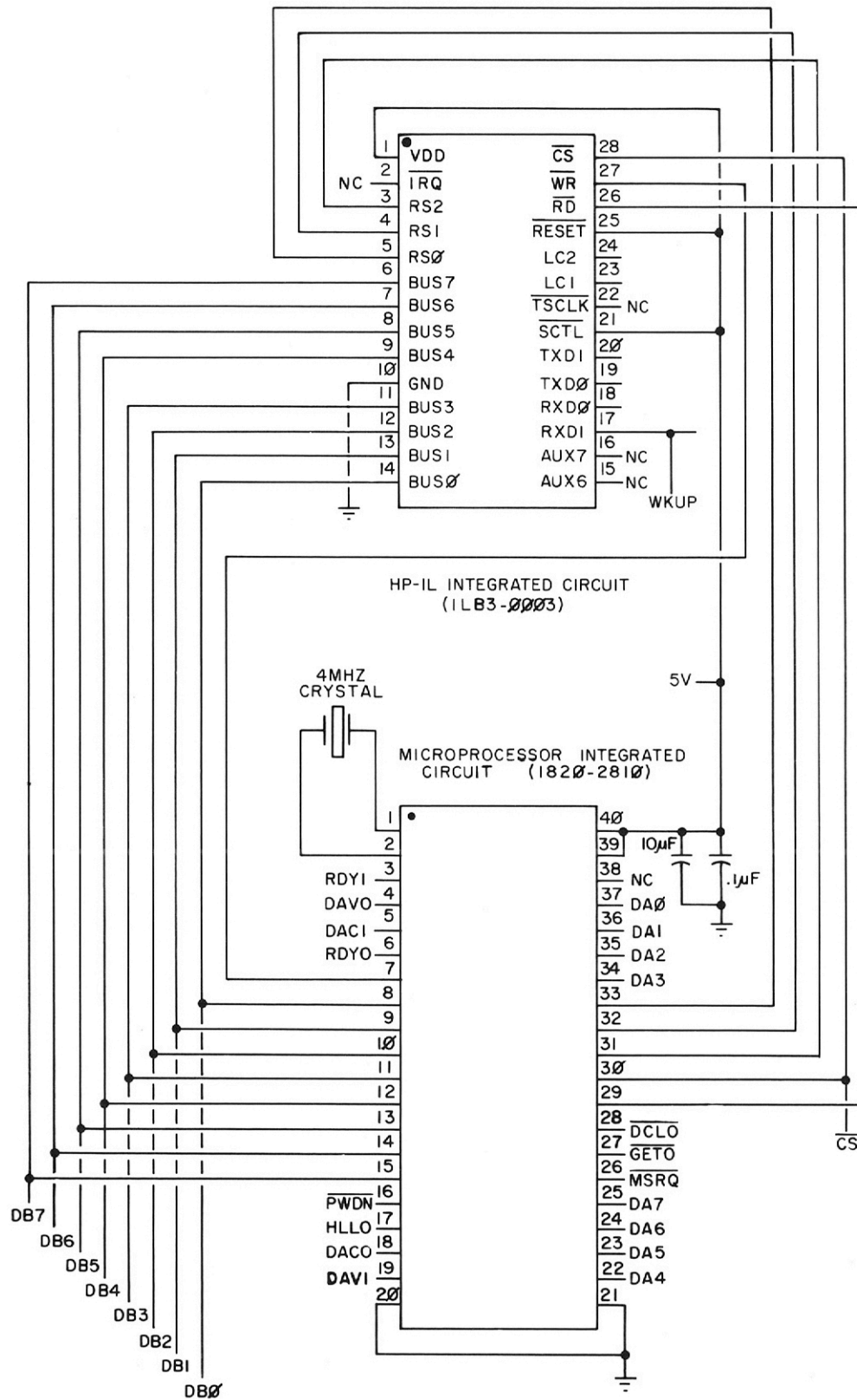
Price List

Product #	Description	Price € / \$ US
82166C	HP-IL Converter Kit	395.00 \$: 1985
9100-1631	Inductor, 56mh	1.25 \$: 1984
0410-1305	Crystal, 4 MHz	4.00 \$: 1984
5061-4306	Panel Receptacle	7.60 \$: 1984
9100-4226	HP-IL Transformer	12.00 \$: 1984
1820-2810	Microprocessor	22.20 \$: 1984
ILB3-003	HP-IL Integrated Circuit	24.00 \$: 1984
5955-9425	The HP-IL System: An Introductory Guide ...	16.95 \$: 1984
82166-90016	The HP-IL Integrated Circuit User's Manual	15.00 \$: 1986
82166-90017	The HP-IL Interface Specification	20.00 \$: 1986
82166-90020	The HP-IL Interface Kit Technical Guide	15.00 \$: 1986

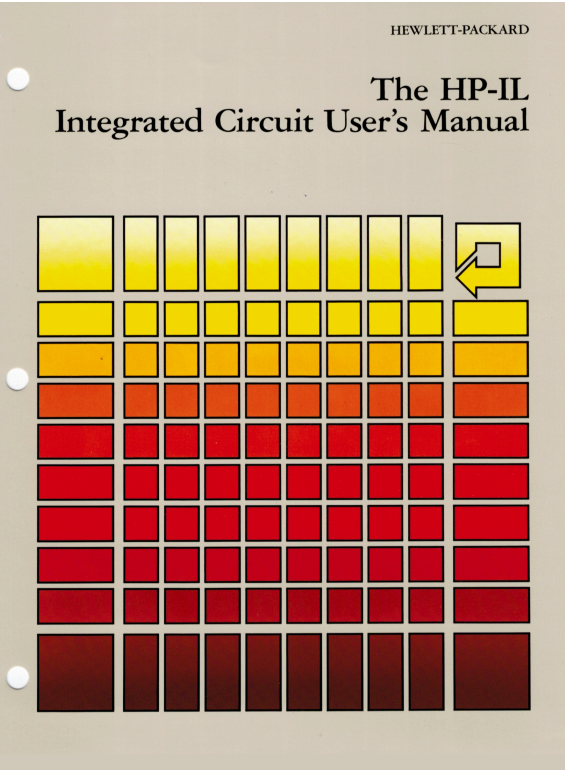
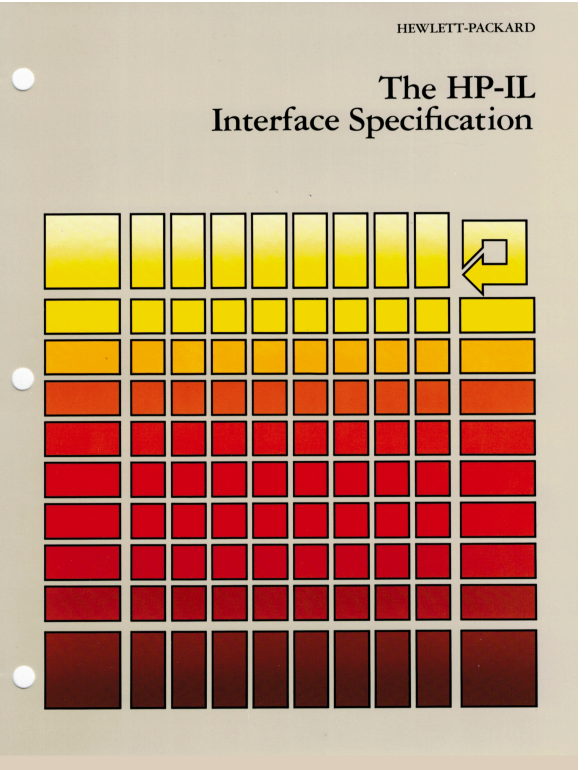
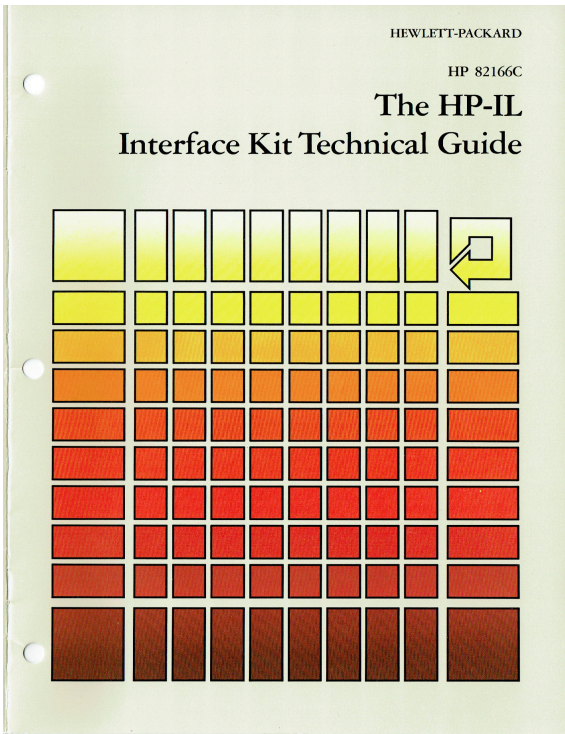
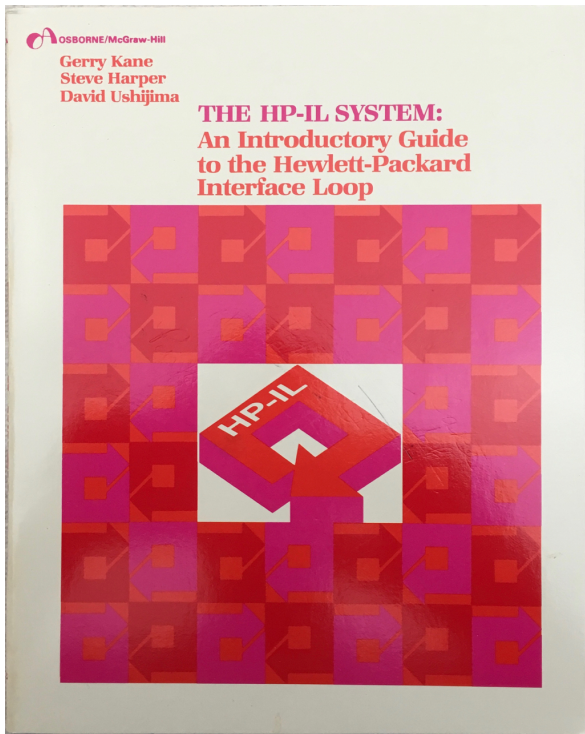
Pictures*HP-IL Interface Kit Components*



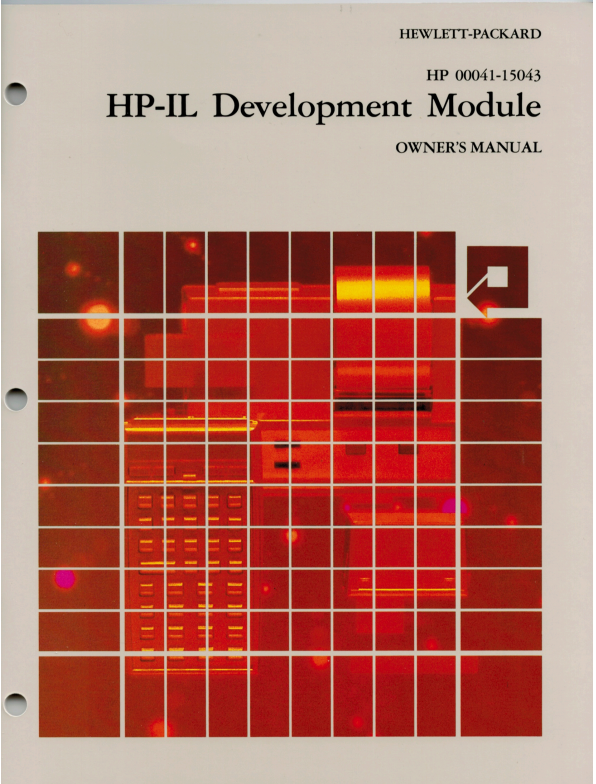
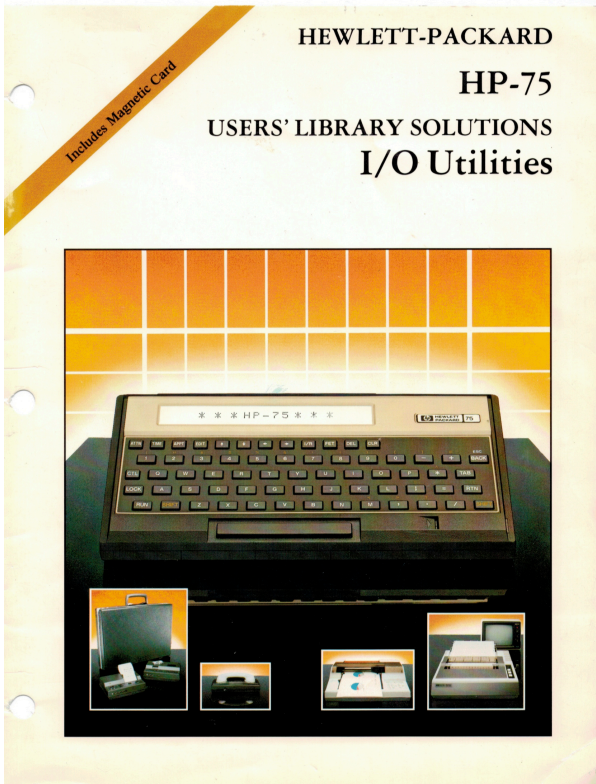
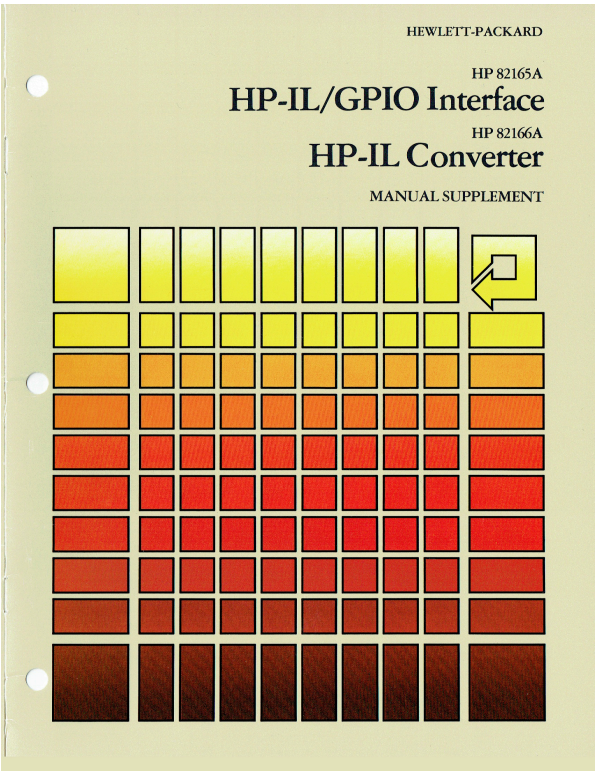
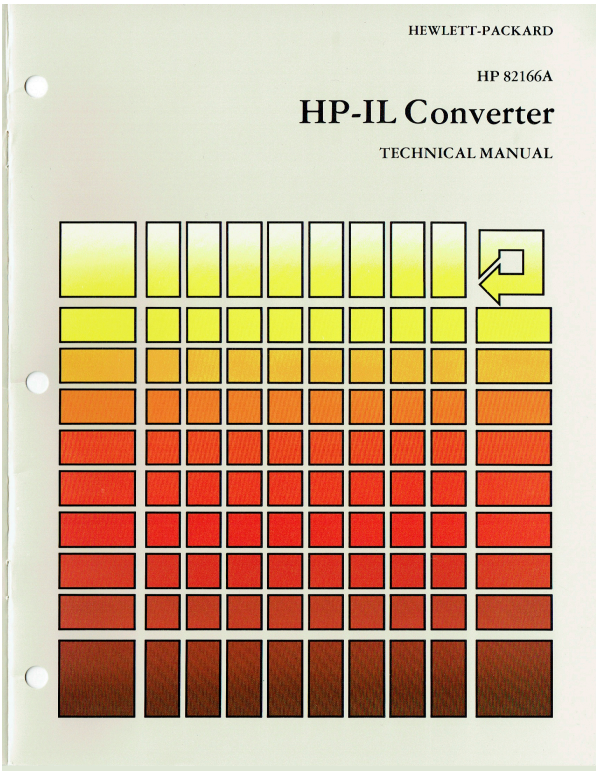
HP-IL Interface Connection Diagram



HP-IL Converter Microprocessor Connection Diagram



HP-IL Interface Kit Manuals



HP-IL Interface Kit Manuals & Softwares

MC00506A HP-IL EPROM Programmer



Overview

Introduction

The MC00506A HP-IL EPROM Programmer provides the user with the hardware and software tools needed to program EPROMs. It uses the Hewlett Packard Interface Loop (HP-IL) and a HP-IL controller. The HP-IL EPROM Programmer's operation is controlled via HP-IL commands. The controller may be a computer or a calculator including the HP series 80, series 70, and HP41C.

The MC00506A will program most of the EPROMs that are currently available. Personality modules are used to configure the unit for reading and programming a specific type of EPROM. Four of the personality modules included with the unit will program the following EPROMs: 2716, 27C16, 2732, 27C32, 2732A, 2758, 2764, 6716, and 27128. In addition a blank personality module is included. It can be wired for other types of EPROMs including: 2532, 2564 or additional EPROMs as they become available.

Installation

Your HP-IL EPROM Programmer is packaged with the following accessories:

- One HP-IL cable
- One DC power module
- Four personality modules PM 2716, PM 2732, PM 2732A, and PM 2764
- One blank personality module
- EPROM Program Diskette for Series 80 Computers

The MC00506A HP-IL EPROM Programmer is ready to use with your system after a personality module, power, and the HP-IL interface are installed.

Power

Power for the HP-IL EPROM Programmer is provided by either the DC power module (included with the unit) or an HP 82059B AC adapter. For portable operations a 9 Vdc battery may be attached to the unit (eliminates the AC power requirement).

Software Requirements

The MC00506A EPROM Programmer is controlled by the commands and data it receives via the HP-IL loop. The unit is typically initialized at the beginning of a program to set the format for incoming and outgoing data. Next, commands are sent to the unit to establish an EPROM address to be written to, or read from. Commands are usually sent to the unit when it has been placed in the HP-IL remote mode. Address information and data to be burned are generally sent while the unit is in the HP-IL local mode.

A typical burn program should meet most of the following requirements:

1. Initialize the EPROM Programmer. Initialization sets the unit's operating parameters (format, Carriage Return and Line Feed enabled etc.).
2. If there is doubt that the EPROM is erased, verify that it is erased for the address range that is to be burned.
3. Set the starting address. Since the EPROM Programmer burns one byte at a time, only a starting address is required. Writing (or reading) a byte of data will cause the EPROM Programmer address pointer to be incremented by 1; so that the next byte of data will be placed at the next contiguous address.
4. Place the unit in the HP-IL local mode. Send one byte of data. DO NOT SEND A CARRIAGE RETURN OR A LINE FEED AFTER DATA. The unit will try to interpret the previous data as commands.
5. Send a trigger command to burn the data byte.

6. Check the device status; if OK repeat steps 4, 5 and 6 until the entire address range has been filled. Each new byte will be placed at the next contiguous address (a starting address is not required each time). If an ending address was sent and data exceeds the reserved memory area, then the unit will ignore the ending address and continue to burn data. Ending addresses play a more important role during a read operation (see step 7).

7. Place the unit in the HP-IL Talk mode and read the programmed EPROM area to check the results. Reading the entire programmed area requires that a starting address and an ending address be set. If the ending address is not sent, then only one byte of data will be sent to the controller and the EPROM Programmer internal address pointer will point to the next location. If the starting address is not set, the read will contain a data byte from the address following the last burn address.

(ref: MC00506A HP-IL EPROM Programmer Owner's Manual)

Availability

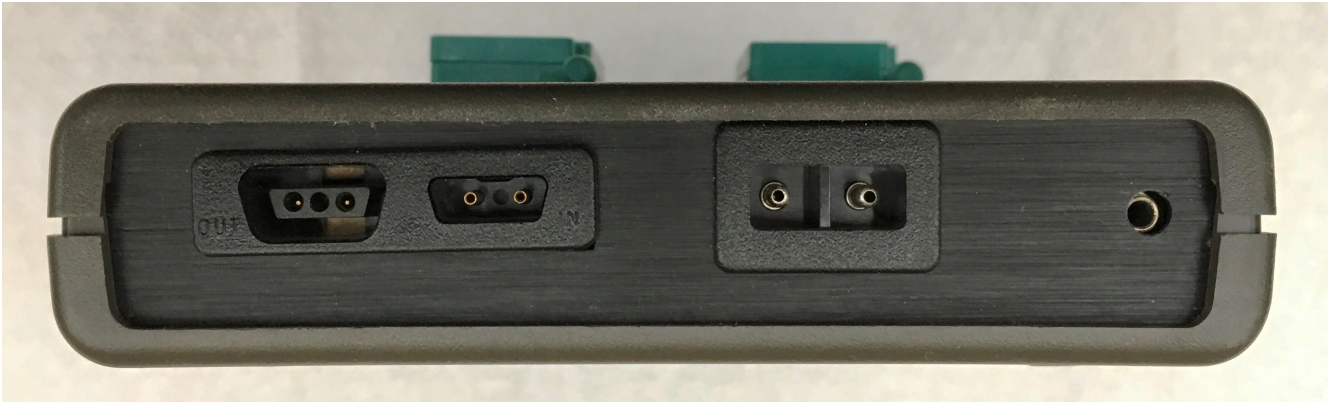
Introduced in 1983 and discontinued at an unknown date.

Documents & Web Sites

Documents & Web Sites	Link
MC00506A HP-IL EPROM Programmer Pamphlet, Jan. 1983	<u>Pamphlet</u>
MC00506A HP-IL EPROM Programmer Owner's Manual, May 1983	<u>Manual</u>
PPC HP-41 MC EPROM Set for MC00506A, July 1983	<u>Manual</u>
MC00506A Order Form, Jan. 1983	<u>Sheet</u>

Price List

Product #	Description	Price € / \$ US
MC00506A	EPROM Programmer	450.00 \$: 1983

Pictures*HP-IL & Power Connectors**EPROM Personality Modules*

