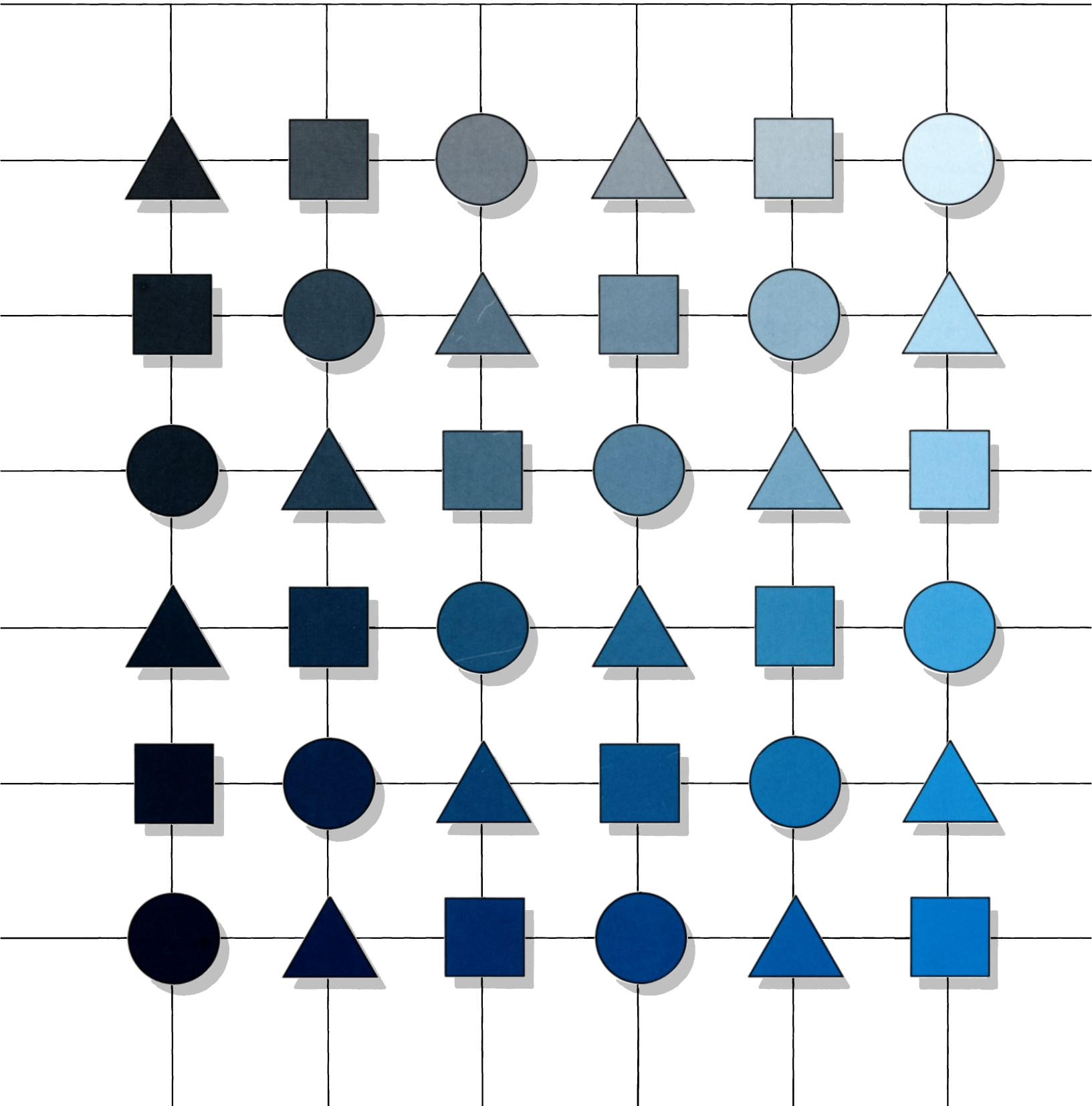


HP 1000/9000 Interface Products Specification Guide

August 1985



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HP AdvanceNet

Interface Products
for
HP 1000 and HP 9000 Computer Systems

Specification Guide



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Product Number 12005B

The HP 12005B Asynchronous Serial Interface provides an asynchronous serial communications link between the HP 1000 A-Series or L-Series Computer and RS-449, RS-422, or RS-232 compatible devices. The connection can be made through a fiber optic or hardwire cable. Modem control signals through the hardwired cables are also available.

Features

- * Includes fiber optic interface and 15 meter cable to minimize electrical interference
- * EIA RS-232-C, RS-422, RS-423, and a subset of RS-449 compatibility
- * Complies with European standard CCITT V.28
- * Sixteen data transfer rates from 50 to 19.2K baud
- * 56K baud data rate with external clock
- * Choice of half-duplex, full-duplex, or echoplex operation
- * Built-in DMA capability for optimum I/O efficiency
- * Selectable special character recognition capability for termination of indeterminate length DMA transfers by an End of Transmission character
- * Virtual control panel support
- * Built-in framing error, overrun error, and parity error checking
- * Hardware break detection
- * Voltage level and current loop outputs
- * I/O driver support with RTE-L/XL and RTE-A operating systems

Functional Specifications**FORMATS, PARITY, AND FORMAT CONTROL**

Data Codes: 7-bit ASCII or 8-bit binary.

Serial Data Transfer Format: Each 7-bit or 8-bit data code is preceded by a start bit, accompanied by an odd or even parity bit, and followed by one or two stop bits.

Parity Selection: Odd, even, or no parity.

Stop Bit Selection: One or two stop bits.

INTERFACE LEVEL

Complies with EIA Standard RS-232-C, RS-422, RS-423, and a subset of RS-449.

Complies with CCITT Recommendation V.28.

TRANSFER RATES

Interface-clocked Rates: 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, and 19200 baud.

Externally-clocked Rate: Up to 56,000 baud, with external clock signal (requires fabrication of an interface cable).

CHARACTER BUFFERING

Two characters.

TELEPRINTER INTERFACE

A 20mA current loop interface is provided for interfacing to teleprinters; connection to this interface requires that a cable be fabricated for the device used.

VIRTUAL CONTROL PANEL SUPPORT

The 12005B interface can be set to support a terminal which will function as the Virtual Control Panel of HP 1000 A/L-Series computers.

DIRECT MEMORY ACCESS (DMA) OPERATION

DMA Accessibility: The 12005B can transfer data directly to or from computer memory. DMA control is performed on the card, reducing the overhead of handling DMA operations.

Termination of Indeterminate Length Transfers: Special hardware on the 12005B has the

capability of monitoring the incoming serial data stream for the occurrence of a specific 7 or 8-bit pattern. This pattern can be used to terminate a DMA block data transfer of indefinite length.

BREAK DETECTION

Hardware on the 12005B monitors the incoming serial data stream for BREAK characters, which are defined as SPACES occurring over 12 successive bit times. When the line returns to a MARK condition, the computer is informed of receipt of the BREAK.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12005B Asynchronous Serial Interface is compatible with all HP 1000 A/L-Series Computers and Systems.

Software Support: The 12005B interface uses RTE-A interface drivers ID.00 and ID.01. RTE-A device drivers DD.00 (keyboard-display I/O) and DD.20 (minicartridge I/O) which will operate with ID.00 to support Hewlett-Packard Terminals.

Modem Capability: The 12005B interface with RTE-A driver ID.00 and ID.01 is designed to be compatible with Bell Type 103 and 212 Data Sets and equivalent modems.

Diagnostic Support: A diagnostic test and test connector for the 12005B interface can be obtained by purchasing the HP 24612A A/L Systems Diagnostic Package.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements: 1.6A (+5V), 0.145A (+12V), 0.11A (-12V).

Switch-Selectable Options:

- Operation as a Virtual Control Panel
- Baud Rate Selection
- Select Code Setting
- Stop Bit Selection (1 or 2)
- Parity Sense (Even or Odd)

PHYSICAL CHARACTERISTICS

Dimensions: 289mm (11.38in) long by 172mm (6.75in) wide by 1.6mm (0.063in) board thickness, with 10.2mm (0.4in) top-of-board parts clearance and 5.1mm (0.2in) beneath-board clearance.

Weight: 795 grams (28oz)

Ordering Information

The 12005B Asynchronous Serial Interface includes:

- 12005-60012 Asynchronous serial interface assembly
- 12005-90002 Installation and Reference manual
- 5061-5798 15 meter Fiber Optic Cable

12005B Options

- 001:** Substitutes a 5 meter 5061-6604 filtered cable for 5061-5798 for interfacing to HP terminals using a 50-pin connector.
- 002:** Substitutes a 5 meter 5061-6605 filtered cable for 5061-5798 for interfacing to terminals which require a 25-pin DB25P male RS-232-C DTE connector.
- 003:** Substitutes a 5 meter 12005-60004 RS-232-C cable for 5061-5798 for interfacing to modems which require a 25-pin male connector.
- 004:** Substitutes a 5 meter 12005-60005 cable for 5061-5798 for interfacing to HP terminals requiring a hooded connector.
- 005:** Adds a fiber-optic interface, 5061-5800, for interfacing via fiber optic cable to HP terminals having 50-pin connectors.
- 006:** Substitutes a 48 pin edge connector kit (5061-3426) for user fabricated cables.

NOTE: If the intended terminal does not include a built-in fiber-optic interface, ONE of options 1-6 MUST be ordered.

Table 1. 12005B Signals

(PCA) J1-	SIGNAL NAME	SIGNAL DEFINITION	RS- 232C	RS- 449	SIGNAL SOURCE
A	GND				
1	GND				
B	IC(A)*	Incoming Call (A)	CE	IC	Device
2	RS(B)*	Request to Send (B)	CA	RS	Interface
C	RIC	Used by Diagnostics Only			
3	RS(A)*	Request to Send (A)	CA	RS	Interface
D	TTYI	Teleprinter Input			
4	TTYI	Teleprinter Input			
E	RS(U)**	Request to Send (U)	CA	***	Interface
5	DRST	Reset Line Used by Diagnostics Only			
F	IC(B)*	Incoming Call (B)	CE	IC	Device
6	RDM	Used in Diagnostics Only			
H	RCS	Used in Diagnostics Only			
7	EXTCLK	Clock from External Device (if any) (16X)			
J	+5V	+5 to Terminal			
8	ECHOM	Used by Diagnostics Only			
K	SPC2	Used by Diagnostics Only			
9	SD(B)*	Send Data (B)	BA	SD	Interface
L	RRR	Used by Diagnostics Only			
10	SD(A)*	Send Data (A)	BA	SD	Interface
M	TR	Terminal Ready	CD	TR	Interface
11	SBS	Stop Bit Select			
N	TTY+12	+12 to Teleprinter			
12	TTY+12	+12 to Teleprinter			
P	RDRCNTL	Reader Control (GND)			
13	RDRCNTL	Reader Control (GND)			
R	TTY-12	-12 to Teleprinter			
14	TTY-12	-12 to Teleprinter			
S	RD(B)*	Receive Data (B)	BB	RD	Device
15	SRD(A)*	Secondary Receive Data (A)	SBB	SRD	Device
T	TTYO	Output to Teleprinter			
16	TTYO	Output to Teleprinter			
U	RD(A)*	Receive Data (A)	BB	RD	Device
17	SRD(B)*	Secondary Receive Data (B)	SBB	SRD	Device
V	RR(A)*	Receiver Ready (A)	CF	RR	Device
18	RR(B)	Receiver Ready (B)	CF	RR	Device
W	SD(U)**	Send Data (U)	BA	***	Interface
19	MSB-	Most Significant Bit of Baud Rate Select			
X	CS(A)*	Clear to Send (A)	CB	CS	Device
20	NMSB-	Next to Most Significant Bit of Baud Rate Select			
Y	CS(B)*	Clear to Send (B)	CB	CS	Device
21	NLSB+	Next to Least Significant Bit of Baud Rate Select			
Z	DM(A)*	Data Mode (A)	CC	DM	Device
22	LSB+	Least Significant Bit of Baud Rate Select			
AA	DM(B)*	Data Mode (B)	CC	DM	Device
23	SSD	Secondary Send Data	SBA	SSD	Interface
BB	O/E	Optical/Electrical Select			
24	GND				

NOTES: * Indicates Differential Driver or Receiver used on this signal.
 ** Indicates Single-ended Driver used on this signal.
 *** RS-449 recommends the use of Differential Drivers.

Product Number 12006A

The HP 12006A is a multi-purpose interface for 8 or 16 bit bidirectional data transfers between external devices and HP 1000 A-Series Computers and Systems.

Features

- * TTL (+5V) and +12V interface compatibility
- * Separate 16-bit input and output storage registers
- * Built-in DMA capability offering maximum data rates to 850K words per second on inputs and 730K words per second on outputs
- * Wide choice of programmable operating modes for easy use with instrumentation
- * 8 or 16-bit operation with hardware packing of bytes into or from words
- * Pin compatibility with 12566B/C interface used in other HP 1000 Computers and Systems

Functional Specifications

DATA TRANSFER

Protocol: Transfers either 8 or 16 parallel bits at a time.

Maximum Rate: The following transfer rates can be attained in a quiescent RTE-A environment with the 12006A interface in the highest priority position.

	<u>Input</u>	<u>Output</u>
A600+	850K words/s	730K words/s
A700	790K words/s	650K words/s
A900	740K words/s	500K words/s

Typical CPU to CPU transfer rates will be less than 50% of the output rate.

High Logic Level Choices: TTL (+5V) is standard; removal of six resistor packages converts the interface to +12V level.

Logic Levels and Circuits:

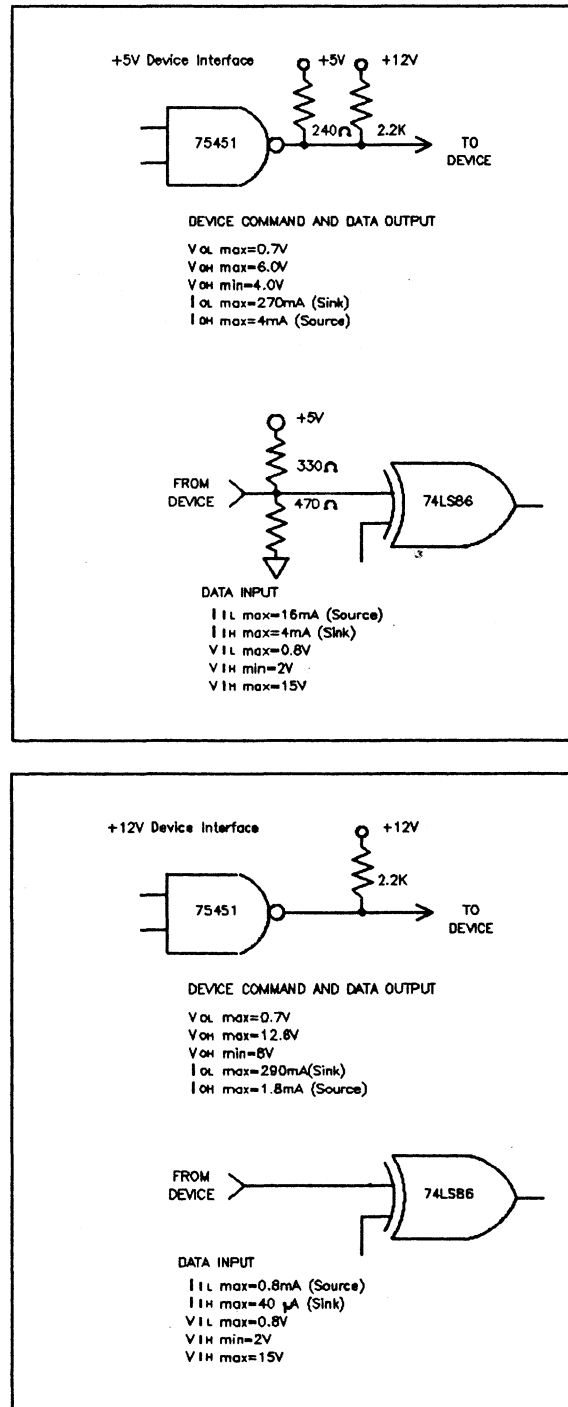


Figure 1. 12006A Logic Levels and Circuits

Byte Packing: For use with 8-bit devices, such as tape readers, tape punches, and some line printers, the interface may be programmed to automatically pack/unpack bytes into/from 16-bit computer words.

Device Command Sense Selection: The interface can be set to respond to either high-true or low-true device command from the interfaced device for card/device synchronization.

Clocked Mode: The parallel interface supports a clocked mode in which data transfers to/from external devices are synchronized by a flag-to-device handshake that is clocked by the external device.

Transparent (asynchronous) Mode: The parallel interface can also be used to send data to or receive data from one or several devices, such as indicators or switches, that do not provide or use any type of clocking signal. Information is output to the destination device(s) exclusively under program control and input information may be read at any time.

CONTROL AND STATUS BIT COMMUNICATION

Control Output: Four control bits may be sent to the interfaced device via an output control word for use as control, command, or address bits. For instance, they can be decoded to address any of 16 device registers or actions, or to address any of 16 devices connected to the same parallel interface.

Status Input: Four status bits may be received from the interfaced device via an input control word.

DIRECT MEMORY ACCESS (DMA) OPERATION

DMA Accessibility: The 12006A can access memory under control of its I/O master processor, regardless of how many other interfaces in the system are also accessing memory via DMA.

Self Configured, Chained DMA Mode: The I/O master processor on the 12006A interface sup-

ports a self configuring mode of operation. In this mode, instead of interrupting the central processor after a block transfer, the I/O processor fetches a new set of control words for the next transfer. This process continues as long as additional sets of control words are available. Chained DMA transfer is particularly useful for storing several sequential scans of measurement channels from an instrumentation subsystem into memory, which can be accomplished without interrupting computations or other processing by the central processor.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12006A Parallel Interface is compatible with all HP 1000 A-Series Computers and Systems.

Connector Compatibility: The 12006A interface printed circuit cable connector is pin-compatible with the 12566B/C Microcircuit Interface, permitting direct substitution of an HP 1000 A-Series Computer or System with the 12006A interface for an HP 1000 M/E/F-Series with 12566B/C interface.

Software Support: The 12006A interface is supported by RTE-A interface driver ID.50.

Diagnostic Support: A diagnostic and a test hood for the 12006A interface are provided in the 24612A Diagnostic Package.

Installation: Set device command sense switch to appropriate level; set the interface's I/O address on the select code switches; turn off power to the computer and interfaced device; plug the interface into the computer backplane; connect an appropriate cable from the interface to the device; and integrate the interface driver into the operating system if that has not been accomplished previously.

NOTE: The I/O address setting of the interface select code switches is independent of the interface card's position in the computer backplane.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements:

Configured as a +5V Device interface:

+5V at 1.94A

+12V at 179mA

Configured as a +12V Device interface:

+5V at 1.61A

+12V at 175mA

PHYSICAL CHARACTERISTICS

Dimensions: 289mm (11.38 in) long by 172mm (6.75in) wide by 1.6mm (0.063in) board thickness, with 10.2 mm(0.4in) top-of-board parts clearance and 5.1mm (0.2in) beneath-board clearance.

Weight: 370 grams (13oz) with mating connector.

Ordering Information

The 12006A includes:

12006-60003 Parallel Interface Card

5061-3426 48-pin Connector Kit

12006-90001 Reference Manual

HP 1000 A-Series and M/E/F-Series HDLC Network Interfaces for DS/1000-IV Communication between HP 1000 Systems

Product Numbers 12007B, 12044A, 12794B, and 12825A

The HP 12007B, 12044A, 12794B and 12825A are interfaces for communication between DS/1000-IV network nodes based on both HP 1000 A-Series and M/E/F-Series Computers. Series applicability of these interfaces is summarized in Table 1, below. All of these microprocessor-based interfaces use the widely-accepted, full-duplex High Level Data Link Control (HDLC) protocol to maximize communications efficiency and reliability. The interface handles all HDLC protocol generation, including CRC-CCITT error checking, on-board buffer management, and all modem control tasks (12007B and 12794B interfaces only). In conjunction with 91750A DS/1000-IV software, the HDLC interfaces support high-level user access between HP 1000 computers.

*Table 1. Series Applicability of HDLC
Network Interfaces*

Type of Interface	For HP 1000 A-Series	For HP 1000 M/E/F-Series
Modem	12007B	12794B
Direct Connect	12044A	12825A

Features

- * Availability of both modem and direct connect interfaces to maximize network planning flexibility
- * On-board microprocessor off-loads the computer, making possible larger networks and leaving more CPU capacity for processing user's applications
- * 16K bytes of RAM memory for extensive on-board message buffering
- * Firmware-controlled automatic power-up self-test to help assure interface integrity
- * Supports remote Forced Cold Load (FCL) over DS/1000-IV links
- * Supports remote Virtual Control Panel access to A-Series DS/1000-IV network nodes
- * Long term communication line statistics and message logs are available through user request via DS/1000-IV software to facilitate checks of line quality and assist link troubleshooting
- * HDLC interface for DS/1000-IV to DS/1000-IV communication links with microprocessor management of HDLC protocol, CRC-CCITT error checking, buffer management, DMA transfers, and modem control tasks
- * Data rates to 257K bps
- * 12007B and 12794B support synchronous full duplex modems
- * 12044A and 12825A interfaces support hardwired links up to 2.2km (1.36mi)
- * 12044A/12825A optically isolated input breaks ground loops, maximizing noise immunity for direct connect links

Functional Description

ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER

A powerful microprocessor on the HDLC network interface manages routine communications processing, freeing the host computer for applications oriented tasks. Under control of on-board firmware, the microprocessor converts command words into actions, such as establishing the communications link and loading/unloading data between the on-board buffers and the host CPU. The microprocessor also performs the protocol generation and interpretation, error checking, and error recovery by retransmission, all without the attention of the host computer.

Numerous user-programmable parameters are available to tailor the interface to specific applications and configurations, which are also managed by the microprocessor. For example, the number of retransmissions of frames in error can be set by the user, or a default of 10 may be used. Frame size is accessible, as are controllable communication line timeouts to promote

maximum use and efficiency of the communication links.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for Direct Memory Access transfers to the host CPU and unpacking words into bytes for transmission.

Finally, on the 12007B/12794B interface, the microprocessor handles the synchronous modem control signals and is capable of setting additional modem control lines, such as Rate Select.

FIRMWARE CONTROLLED SELF-TESTS

On-board, firmware-controlled self-tests, performed at power-up, help to assure reliable operation of the HDLC network interface and minimize troubleshooting time. These tests check out the RAM and ROM memories, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface.

COMMUNICATION LINE STATISTICS

Eleven long-term statistics are accumulated automatically and buffered on the interface. These statistics can be easily read by the user to help determine the quality of the communication line and to aid link troubleshooting. All statistics are cleared when read, facilitating use, since they are 16-bit unsigned integers (0-65535) that will roll over if not cleared or reset. The eleven long-term statistics are:

1. Information frames correctly received.
2. Receiver Ready frames received.
3. Receiver Not Ready frames received.
4. Reject frames received.
5. Receive process overruns.
6. CRC errors.
7. Abort sequences received.
8. Receive buffer overflows.
9. SIO chip receiver overruns.
10. Frames with incorrect address field.
11. CMDR frames received.

REMOTE FORCED COLD LOAD CAPABILITY

The HDLC network interfaces support Remote Forced Cold Load (FCL) in which a remote HP 1000 A/L/E/F-Series Computer is forced to accept and run a new program load regardless of its current state. In this way, the HDLC interfaces and the 91750A software provide a capability

that supports completely unattended remote DS/1000 nodes.

REMOTE A-SERIES VIRTUAL CONTROL PANEL CAPABILITY

The 12007B and 12044A interfaces can be set to support Virtual Control Panel (VCP) access to an HP 1000 A-Series System from the system console at any remote but adjacent HP 1000 A/L/M/E/F-Series System in the same network. With VCP capability, an operator at the remote console can examine and change the contents of registers and memory locations, control execution of diagnostics and other programs, and select a bootstrap loader and initiate the boot-up of the A-Series System. By making possible a considerable degree of remote fault diagnosis and maintenance, this VCP capability greatly augments the support for completely unattended DS/1000 A-Series nodes.

Functional Specifications

COMMUNICATIONS

Interface Level: EIA RS-232-C and EIA RS-449, CCITT V.28, V.10, V.11.

Internally-clocked Data Rates: 300, 1200, 2400, 4800, 9600, 19200, 57600, and 230000 bits/second.

Externally-clocked Data Rates: To 257,000 bits/second.

Transmission Mode: Full-duplex, bit-serial synchronous.

Message Buffering: Seven frames in either direction (14 frames total, with up to 1024 bytes per frame) may be buffered using the 16k byte on-board RAM memory.

Error Detection and Correction: Errors are detected using CRC-CCITT cyclic redundancy checking on all frames sent or received. The interface retransmits, or requests retransmission of all frames with errors to attain error-free data transfer. The maximum number of retransmissions may be user specified. If not user specified, the maximum number of retransmissions initiated by the interface defaults to 10.

12007B/12794B Interface signals:

CCITT	EIA	EIA RS-449			
<u>V.24</u>	<u>RS-232-C</u>	<u>Signal</u>	<u>Source</u>	<u>Default</u>	<u>Function</u>
104	BB	RD	DCE	None	Receive data
103	BA	SD	DTE	None	Send data
106	CB	CS	DCE	DCE dep	Clear to send
105	CA	RS	DTE	F/W	Request to send
108.2	CD	TR	DTE	F/W	Data terminal ready
109	CF	RR	DCE	DCE dep	Receiver ready (Data carrier detect)
114	DB	ST	DCE	None	Send timing (Transmit clock)
115	DD	RT	DCE	None	Receive timing (Receive clock)
113	DA	TT	DTE	None	Terminal timing
125	CE	IC	DCE	DCE dep	Incoming call (Ring indicator)
107	CC	DM	DCE	DCE dep	Data set ready
142	--	TM	DTE	DCE dep	Test mode
141	--	LL	DTE	F/W	Local loop-back
140	--	RL	DTE	F/W	Remote loopback
110	CG	SQ	DCE	DCE dep	Signal quality
111	CH	SF/SR	DTE	F/W	Select frequency/select rate
--	--	IS	DTE	F/W	In Service
--	--	NS	DTE	F/W	New signal
119	SBB	SRD	DCE	None	Secondary receive data
118	SBA	SSD	DTE	None	Secondary send data
120	SCA	SRS	DTE	F/W	Secondary request to send
121	SCB	SCS	DCE	DCE dep	Secondary clear to send
122	SCF	SRR	DCE	DCE dep	Secondary receiver ready

Where: DCE dep = Depends on external DCE device and connection
 F/W = Set by interface firmware

Usable 12044A/12825A Data Rates and Direct Connect Cable Length: Usable direct connect data rate depends on the length of the cable used for data transfer, as shown below:

<u>Data Rate to</u>	<u>Cable Length</u>
257,000 bps	1km (0.621mi/3279ft)
57,600 bps	2.2km (1.367mi/7218ft)

Line Protocol: The HDLC network interfaces implement a superset of the High Level Data Link Control (HDLC) communications protocol, which is not suitable for general-purpose HDLC communications and should not be used for other than HP 1000-to-HP 1000 communications links in the DS/1000-IV environment.

EUROPEAN LICENSING OF HDLC MODEM INTERFACES

Hewlett-Packard has applied for FTZ licensing of the 12007B and 12794B interfaces in Germany and GPO licensing in the United Kingdom. Consult your Hewlett-Packard sales

representative on the status of FTZ or GPO licensing of these interfaces if such licensing is important to you.

CONFIGURATION INFORMATION

System Compatibility:

Table 2. HDLC Network Interface System Compatibility

Interface Product Numbers	Compatible Computers	Compatible Computer Systems	Compatible Operating Systems
12007B & 12044A	2137A 2139A 2156B 2436A/E 2437A 2439A	2196C/D 2197C/D 2199C/D 2486A 2487A 2489A	RTE-A
12794B & 12825A	2109E 2113E 2117F	2176C/E 2177C/F 2178A/C 2179A/C	RTE-6/VM RTE-IVB RTE-IVE

Computer I/O Channels Required: One per HDLC network interface.

Compatible U.S. Modems and Communication Lines: The 12007B/12794B interface is compatible with modems listed in Table 3. Strapping requirements and recommendations for U.S. modems used with the 12007B/12794B are given in the HDLC Firmware Installation Manual (5955-7626).

Table 3. Connections, Modems, and Data Rates

Connection via	Model Type	Maximum Synchronous Data Rate
Private Lines	Bell 201C	to 2400 bits/s
	Bell 208A	to 4800 bits/s
	Bell 209A	to 9600 bits/s
	HP 37220T	to 9600 bits/s
	HP 37230A	to 19200 bits/s
Dial Up	Bell 212A	to 1200 bits/s
	GDC 212A	to 1200 bits/s

European Modems: Contact local European HP sales office for information. European modems and interfaces should have approval of PTT in each country.

Interface Current Required from Computer Power Supplies:

Interface Product No.	+5V Supply	+12V Supply	-12V Supply
12007B	2.6A	0.35A	0.18A
12044A	2.4A	0.31A	0.04A
12794B	1.93A	0.32A	0.18A
12825A	1.81A	0.27A	0.04A

Counterpart Interfaces in Other HP 1000 Systems: See Table 1.

Software Support: Operation of HDLC network interfaces is supported by 91750A DS/1000-IV software as described in the 91750A data sheet.

12007B/12794B Installation: Set the interface configuration switch for baud rate, 128 or 1024 byte maximum buffer size, and forced cold load enable/disable. On the 12007B interface, set I/O address on the select code switches and VCP enable/disable. With power off, plug the interface into the computer I/O backplane, connect the supplied cable to the compatible customer-furnished modem, and integrate the

interface card and 91750A software into the RTE-L/XL/A/RTE-IVB/RTE-IVE/RTE-6 operating system.

12044A/12825A Installation: Set the interface configuration switch for baud rate, 128 or 1024 maximum buffer size, and forced cold load enable/disable. On the 12044A interface, set I/O address on the select code switches and VCP enable/disable. With power off, plug the interface into the computer I/O backplane, fabricate any necessary direct connect extension cables, connect cables between the local and remote 12044A/12825A interfaces, and integrate the interface card and 91750A software into the RTE-L/XL/A/RTE-IVB/RTE-IVE/RTE-6 operating system.

Ordering Information

Note: The 12007B, 12044A, 12794B, and 12825A interfaces are for use only in the 91750A DS/1000-IV environment for HP 1000-to-HP 1000 communication links. They are not general-purpose HDLC interfaces.

12007B HDLC NETWORK MODEM INTERFACE (for A-Series)

The 12007B Interface includes:

- 5061-4940 A-Series Programmable Serial Modem Interface
- 91750-80008 Network Firmware ROM
- 91750-80009 Network Firmware ROM
- 5061-4914 5 meter (17ft) RS-232-C Modem Interface Cable
- 5061-3425 RS-232-C Loop-Back Verifier Hood
- 5955-7626 HDLC Firmware Installation Manual
- 12042-91001 PSI Modem Connection from L/A-Series Computers Installation and Service Manual

12794B HDLC NETWORK MODEM INTERFACE (for M/E/F-Series)

The 12794B Interface includes:

- 5061-4913 M/E/F-Series Programmable Serial Modem Interface
- 91750-80008 Network Firmware ROM
- 91750-80009 Network Firmware ROM
- 5061-4914 5 meter (17ft) RS-232-C Modem Interface Cable
- 5061-3425 RS-232-C Loop-Back Verifier Hood

- 5955-7626 HDLC Firmware Installation Manual
- 12826-91001 PSI Modem Connection from M/E/F-Series Computers Installation and Service Manual

12007B/12794B Options

- 001:** Provides one set of updated firmware ROMs.
- 002:** Substitutes 5061-4923 5 meter (17ft) RS-449 Modem Interface Cable and 5061-4915 RS-449 Loop-Back Verifier Hood for 12007B/12794B Cables (5061-4914 and 5061-3425) listed above.

12044A HDLC DIRECT CONNECT INTERFACE (for A-Series)

The 12044A Interface includes:

- 5061-4938 A-Series Programmable Serial Direct Connect Interface
- 91750-80008 Network Firmware ROMs
- 91750-80009 Network Firmware ROM
- 5061-3422 5 meter (17ft) direct connect interface cables with a male connector. Together, the 5061-3422 and the 5061-4908 provide a complete link between local and remote HDLC direct connect interfaces, although extension cables (91712A/13A/14A may be required.
- 5061-4908 A 5 meter (17ft) direct connect interface cable with a female connector.
- 5061-3421 Direct Connect Loop-Back Verifier Hood
- 5955-7626 HDLC Firmware Installation Manual
- 12042-91002 PSI Direct Connection from L/A-Series Computers Installation and Service Manual

12825A HDLC DIRECT CONNECT INTERFACE (M/E/F-Series)

The 12825A Interface includes:

- 5061-3432 M/E/F-Series Programmable Serial Direct Connect Interface.
- 91750-80008 Network Firmware ROM
- 91650-80009 Network Firmware ROM

- 5061-3422 5 meter (17ft) direct connect interface cable with a male connector. Together, the 5601-3422 and the 5061-4908 provide a complete link between local and remote HDLC direct connect interfaces
- 5061-4908 A 5 meter (17ft) direct connect I/F cable with a female connector
- 5061-3421 Two Direct Connect Loop-Back Verifier Hoods
- 5955-7626 HDLC Firmware Installation Manual
- 12826-91002 PSI Direct Connection from M/E/F-Series Computers Installation and Service Manual

12044A/12825A Options

- 001:** Provides one set of updated firmware ROMs.
- 002:** Deletes cables and loop-back verifier hoods (items 3 and 4) from the 12044A/12825A (for second HDLC direct connect interface in a DS/1000-IV link).

ACCESSORIES

- 91712A** Assembled 75 meter (255ft) extension cable with 24-pin connectors for DS/1000 direct connections
- 91713A** Pair of 24-pin female cable connectors for user fabricated card-to-card direct connect extension cable (cable part number 8120-3096 not supplied)
- Opt 001:** Pair of edge connectors for user fabricated direct connect cable (cable part number 8120-3096 not supplied)
- 91714A** 300 meters of 8120-3096 direct connect cable with 24-pin cable connectors and a connector kit for user fabricated direct connect extension cable

NOTE: HP Cable is equivalent to Belden YR19169. No other cable is supported or has been tested.

Product Number 12008A

The HP 12008A PROM Storage Module provides mounting for up to 64K bytes of off-line PROM storage for HP 1000 A/L-Series Computers and Systems. For applications in which operating system and user software can be stored in PROMs, the use of the 12008A PROM Storage Module offers the following advantages:

1. Non-volatile storage, unaffected by loss of power regardless of duration.
2. Rugged storage medium that is usable in environments too harsh for flexible or hard disc or other mechanical storage devices.
3. For minimal storage requirements, the PROM module is more compact and less costly than disc storage.

I/O Master Processor and PROM interface logic on the PROM module can load software into main memory at up to 1.7M bytes/second in blocks that can range in size from 2 bytes up to 64K bytes. This can include automatic bootup of PROM-resident programs at power on. The size and destination of the transfer into main memory is dynamically determined under software control. Multiple PROM modules can be used to keep several different software systems resident inside the A/L-Series Computer. Any of these systems can be loaded extremely quickly under program control or under Direct Memory Access. Note: Programs may not be executed directly from PROM, but must be loaded into main memory for execution.

Features

- * Capacity for 64K bytes of PROM storage
- * Automatic program load on power-up capability
- * Multi-system storage with multiple PROM modules
- * Dynamic control of transfer size and destination
- * 1.7M byte/second transfer rate into main memory
- * Direct memory access capability

Functional Specifications**ORGANIZATION**

Capacity: 32 sockets for 16K PROMs; 64K bytes, maximum.

Minimum Block Size: 2.

PROM SELECTION AND PROGRAMMING

Recommended PROMs: Intel 2716 or equivalent UV-erasable 16K PROMs.

PROM Burners: PROMs may be programmed using any commercial PROM burner.

TRANSFER CHARACTERISTICS

Minimum Transfer: 2 bytes under program control, 10 bytes under DMA control.

Maximum Transfer: 64K bytes under DMA or program control.

Maximum Transfer Rate: 1.7M bytes/second under DMA control.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12008A PROM Storage Module is compatible with all HP 1000 A/L-Series Computers and Systems.

Software Support: Formatting of the data to burn onto PROMs is supported by a PFORM DATA included in the RTE-L and RTE-XL operating systems. *Please note there is no software support included in the RTE-A operating system.*

Card Cage Slots Required: One per 12008A PROM Module.

Installation: Set the select code switches on the PROM module to the appropriate select code I/O address and plug the PROM module into an I/O slot in the A/L-Series Computer or System card cage.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements: 2.18A (+5V) and 0.06A (+12V)

PHYSICAL CHARACTERISTICS

Dimensions: 289mm (11.38in) long; 172mm (6.75in) wide

Weight: 340 grams (12oz)

Ordering Information

The 12008A Prom Storage Module includes:

12008-60002 PROM Storage Module
12008-90001 PROM Storage Module
Reference Manual

Product Number 12009A

The HP 12009A HP-IB* Interface provides for connection of up to 14 Hewlett-Packard Interface Bus compatible devices to HP 1000 A-Series Computers or Systems. HP-IB interfaceable devices include flexible and hard disc drives, printers, magnetic tape drives, plotters, graphics digitizers, and an extensive list of measurement instruments.

The HP-IB functions of the 12009A interface are largely embodied in a CMOS/SOS LSI integrated circuit chip that works with the I/O master processor LSI chip and circuits to manage HP-IB control and communications.

Features

- * Interface to low cost peripherals
- * Capacity of up to 14 instruments
- * Simple software control of HP-IB based instrumentation systems
- * Built-in DMA capability for optimum I/O efficiency
- * Burst transfer rates to 940K bytes/second
- * Concurrent operation of multiple HP-IB buses under control of the RTE-L/A operating system
- * I/O driver support with RTE-XL, RTE-A, RTE-L operating system

HP-IB Capabilities

The 12009A HP-IB Interface connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel-byte-serial to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners". Data is exchanged asynchronously using interface messages to set up, maintain, and terminate an orderly flow of device-dependent messages. Three data byte transfer control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB.

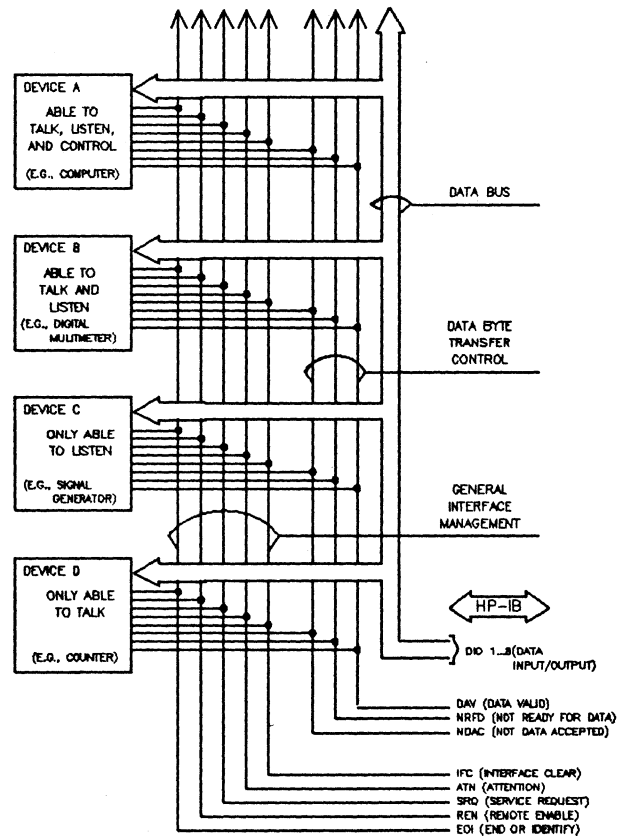


Figure 1. HP Interface Bus Concept

*The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MC1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

Functional Specifications

CAPACITY

7906H/7910HR Discs per 12009A Interface: Up to two, maximum, in addition to single or dual flexible disc.

Other HP-IB Devices/Interface: Up to 14.

SWITCH-SELECTABLE OPERATING MODES

High Speed Mode: Selects operation at data rates to 940K bytes/second, maximum. Only 7 high speed devices plus the 12009A allowed on bus.

Normal Mode: Selects operation at data rates to 500K bytes/second, maximum. 14 normal speed devices may be on the bus.

Matching Requirement: All devices connected to the same bus must be compatible with the selected mode. For that reason, separate 12009A interfaces will be required to interface both high speed mode and normal mode devices to the same A-Series Computer or System.

System Controller Mode: A two position switch enables 12009A operation as system controller (supported by RTE-L/XL/A) or disables such operation (not supported by RTE-L).

BUS CHARACTERISTICS

Bus Signal Lines:

DIO	1-8	Data I/O Lines 1 Through 8
DAV		Data Valid
NRF		Not Ready For Data
NDAC		Not Data Accepted
IFC		Interface Clear
ATN		Attention
SRQ		Service Request
REN		Remote Enable
EOI		End or Identify

Logic Levels, Line Terminations, Line Drivers, and Line Receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum Cable Length for Normal Mode Operation: 2 meters (6.5 ft) per device connected, with a 20 meter (65 ft) total length. The maximum number of devices is accommodated by interconnection using shorter than maximum cable length.

Maximum Cable Length for High Speed Operation: 2 meters (6.5 ft) per device connected, with a 15 meter (48.75 ft) total length. Additional load resistors, provided with the interface, are required.

DIRECT MEMORY ACCESS (DMA) OPERATION

The 12009A can directly access computer memory under control of its I/O master processor regardless of how many other interfaces in the system are also accessing memory via DMA.

TRANSFER RATES

High Speed Mode: Up to 940K bytes per second via Direct Memory Access when HP-IB interface is plugged into the highest priority I/O slot (next to the central processor board) in the card cage.

Normal Mode: Up to 500K bytes per second via Direct Memory Access.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12009A HP-IB Interface is compatible with all HP 1000 A-Series Computers and Systems.

Software Support: The 12009A interface is supported by RTE-L/XL/A interface driver ID.37. Use of Hewlett-Packard disc memories and printers with the 12009A interface is supported by RTE-L device drivers DD.30 and DD.12 respectively, which work with interface driver ID.37.

Diagnostic Support: A diagnostic for the 12009A interface is provided in the 24612A Diagnostic Package.

Installation: Set interface card switches to select (or unselect) operation as bus controller, normal or fast settling time, appropriate HP-IB bus address and control functions, and appropriate I/O address select code; turn off power to the computer; plug the interface into the computer backplane*; connect the bus cable from the interface to HP-IB devices; and integrate the interface driver into the operating system if that has not been accomplished previously.

**NOTE: To achieve maximum data rate in high speed mode, the HP-IB interface must be plugged into the card cage slot next to the central processor; I/O address setting of the interface*

select code switches is independent of the interface card's position in the computer backplane.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements: 2.1A (+5V),
0.084A (+12V).

PHYSICAL CHARACTERISTICS

Dimensions: 289 mm (11.38 in) long by 172 mm (6.75 in) wide by 1.6 mm (0.063 in) board thickness, with 10.2 mm (0.4 in) top-of-board parts clearance and 5.1 mm (0.2 in) beneath-board clearance.

Weight: 710 grams (25 oz) with HP-IB cable.

Ordering Information

The 12009 Interface includes:

12009-60020 HP-IB Interface Card
12009-60014 HP-IB 2 meter RFI Filter Cable
12009-90001 Reference Manual

12009A Option

001: Replaces 12009-60014 2 meter cable with 12009-60015 4 meter RFI Filter Cable.

Product Number 12010A

The HP 12010A Breadboard Interface provides the standard A-Series I/O master circuit along with space for sixty 16-pin wire wrap sockets for user-designed custom interfaces. The printed circuit layout is based on a 2.5mm (0.1in) by 7.6mm (0.3in) matrix, which accommodates any mix of dual or single in-line integrated circuits. All signals needed by the user are brought along with dc power supply voltages to convenient, labelled connection pads along the edge of the I/O master circuit area.

Features

- * Standard A-Series I/O master interface to computer or system backplane
- * Built-in DMA capability for optimum I/O efficiency
- * 60-socket space for user's circuits
- * TTL-compatible signals

Functional Specifications

I/O MASTER

Purpose: To assure compatibility of user-designed interfaces with the high performance I/O design of A-Series Computers and Systems, the Breadboard Interface includes the same I/O master circuit as other A-Series interfaces. This includes the CMOS LSI I/O Processor chip, which executes I/O instructions, and other circuits that make high speed transfers possible.

Determination of I/O Address: I/O address select code is set by select code switches and is independent of interface card position along the A-Series backplane bus.

I/O Addressing: The Breadboard Interface may be pre-addressed by presetting the select code into its Global Register (GR), which leaves the six select code bits of I/O instructions available for addressing registers or other functions on the interface. Alternatively, the GR can be turned off and the select code bits in each instruction can be used to address the user-designed custom interface.

I/O Device Interrupt Priority: Depends upon I/O interface position in the card cage with respect to the processor board.

Interrupt Masking: Under program control an interrupt mask register provides selective inhibition of interrupts from specific under program control. This capability can be programmed in interfaces to temporarily cut off undesirable interrupts from any combination of interfaces when they could interfere with crucial transfers.

Direct Memory Access (DMA): The I/O master supports DMA capability for user's circuits on the Breadboard Interface. This feature reduces the number of interrupts from one per data item (byte or word) to one per complete DMA block transfer, greatly reducing overhead and increasing throughput.

Self-Configured, Chained DMA: A self-configuring mode of DMA operation is available for when groups of DMA transfers must be performed. In this mode, instead of interrupting after a block transfer, the I/O master fetches a new set of DMA control words for the next transfer, reconfigures itself, and initiates another block transfer. This chained process continues as long as additional control word sets are available.

Data Packing under DMA: When byte mode is specified in control word instructions, the I/O master automatically manages byte packing or unpacking.

Maximum Achievable DMA Rate: 700,000 words/second (1.4M bytes/second).

Virtual Control Panel Support: The I/O master supports the provision of virtual control panel interface capability on user-designed custom interfaces based on the Breadboard Interface.

I/O Master Signals and Timing: Refer to the HP 1000 A/L-Series I/O Interfacing Guide (02103-90005).

USER'S CIRCUIT SPACE

Area: 133mm (5.25in) by 146mm (5.75in).

Organization: The user's circuit area is organized into ten column pairs of 53 circuit pads each for mounting up to 60 16-pin wire wrap integrated circuit sockets or any other combination of dual in-line integrated circuit sockets with different numbers of pins.

Maximum Component Height above board surface: 10mm (0.4in) for an interface capable of being installed in any circuit card position in the 12030A or 2103L 10-slot card cage, 12032A 5-slot card cage, or 2145B 16-slot card cage. Height can be up to 18mm (0.7in) for an interface to be used only in 10-slot card cage slot XA6 or 16-slot card cage slot XA9.

Maximum Permissible Depth below board for leads or attaching hardware: 5mm (0.2in).

POWER DISSIPATION

Maximum per A-Series Interface Card: 17W, determined by air flow provided through the card cages in 2103L Computers and 2145B System Core.

I/O Master Dissipation: 5.29W

Power Dissipation Capacity available for user's circuits: 11.7W.

CONFIGURATION INFORMATION

Computer and System Compatibility: The I/O master on the 12010A Breadboard Interface is compatible with all HP 1000 A-Series Computers and Systems.

Software Support: User's custom-designed interfaces based on the 12010A Breadboard Interface will require user-written RTE-A/L driver software, which can be modeled on the general purpose RTE-A/L driver ID.50

Diagnostic Support: Diagnostic support for user's custom-designed interfaces must be user-written. A kernel diagnostic, supplemented by a BASIC-like interactive diagnostic test and design language is provided in the 24612A Diagnostic Package to assist the user's diagnostic development efforts.

Installation: Build user's custom interface on the Breadboard Interface; establish control settings as required for the user's custom application; set select code switches to the appropriate I/O address; turn off power to the computer and the interfaced device; plug the custom interface into the computer backplane; connect an appropriate cable from the interface to the external device; and integrate the interface and its user-written driver into the RTE-A/L operating system if that has not been accomplished previously.

NOTE: The I/O address setting of the interface select code switches is independent of the interface card's position in the computer backplane.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements: The I/O master requires 0.912A (+5V), and 0.061A (+12V).

Power Sources Available:

<u>DC/AC Voltage</u>	<u>Interface Card</u>
	<u>P2 Pin(s)</u>
+ 5V dc	35-37
+12V dc	41, 42
-12V dc	43, 44
19.5V ms, 25kHz*	47, 48
Common	2, 15, 17, 21, 27, 34
19.5V ms, 25kHz*	49, 50

* *The 19.5V ms, 25kHz power is available for meeting unique power supply requirements. For more information, see Hewlett-Packard Application Note 404-3, which is available from your Hewlett-Packard representative.*

PHYSICAL CHARACTERISTICS

Dimensions: 289mm (11.38 in) long by 172mm (6.75in) wide by 1.6mm (0.063in) board thickness with 10.2mm (0.4in) top-of-board parts clearance and 5.1mm (0.2in) beneath board clearance.

Weight: 313 grams (11oz) with mating connector.

Ordering Information

The 12010A Breadboard Interface includes:
12010-60003 Breadboard Interface Card
5061-3426 48-pin Connector Kit
02103-90005 A-Series I/O Interfacing Guide

Extender and Priority Jumper Cards

Product Number 12011A and 12012A

The HP 12011A and 12012A are, respectively, the Extender Card for out-of-card cage access to system-connected A-Series plug-in cards and the Priority Jumper Card for continuation of the HP 1000 A-Series hardware priority chain through an otherwise unoccupied card cage slot.

Functional Specifications**COMPUTER AND SYSTEM COMPATIBILITY**

The 12011A Extender Card and the 12012A Priority Jumper Card are compatible with all HP 1000 A-Series computers, systems, and card cages.

INSTALLATION

The 12011A Extender Card: Remove the plug-in card to be accessed, plug the extender card into the card cage in its place, and plug the card into the extender board.

Priority Jumper Card: Plug the priority jumper card into the vacant card cage slot through which the priority chain is to be continued.

PHYSICAL CHARACTERISTICS**Weight:**

Extender Card: 426 grams (15oz).

Priority Jumper Card: 170 grams (6oz).

Ordering Information**The 12011A includes:**

12011-60001 Extender Card

The 12012A includes:

12012-60001 Priority Jumper Card

Product Number 12040C

The HP 12040C is an Asynchronous Multiplexer Interface that can connect up to eight asynchronous teleprinter-like terminal devices to an HP 1000 A-Series Computer System using a single I/O slot.

Features

- * EIA RS-423-A and RS-232-C/CCITT V.24 compatibility
- * On-board microprocessor off-loads computer
- * On-board buffering with DMA capability
- * Programmable data rates using two baud rate generators to eliminate hardware speed strapping
- * Programmable character size, parity checking, and number of stop bits for flexible control of transmission format
- * Parity, overrun, and framing error detection
- * X-on, X-off control during multiplexer data output transmission
- * Two of eight baud rate groups may be simultaneously selected
- * Supports HP 37214A Systems Modem, which can provide up to 7 ports having full modem control capabilities
- * Supports a Virtual Control Panel (VCP) in RTE-A Systems
- * Full Duplex or Echoplex transmission
- * Capability to edit data prior to passing it to computer memory
- * Includes an 8-port Distribution Panel for mounting RS-232 connections

Functional Description

The 12040C Asynchronous Multiplexer Interface provides multiplexed terminal support for up to eight asynchronous RS-232-C compatible devices connected directly, or through full-duplex asynchronous modems,* to the multiplexer. The multiplexer interface can operate at programmable data rates up to 19,200 bits/second on a given channel with a maximum

throughput capability of 69,000 bits per second. This aggregate throughput rate is attainable for short bursts. For continuous throughput, either the baud rate or the number of channels must be reduced to avoid data loss on input. There will be no data loss on output, but the full data rate may not be achieved.

The 12040C includes an eight-port Multiplexer panel to provide for convenient connection via EIA 25-pin connectors.

Functional Specifications**CAPACITY**

Channels: Eight full-duplex (transmit and receive) communications channels.

Buffering: Two 254 byte transmit buffers and two 254 byte receive buffers for each channel.

COMMUNICATIONS

Interface Level: RS-423-A/RS-232-C or CCITT V.24.

Program-selectable Data Rates: 50, 75, 110, 134.5, 150, 300, 1200, 1800, 2400, 4800, 9600, and 19200 bits/second.

Program-selectable Baud Rate Groups: (50); (75, 150); (110); (134.5); (300, 1200); (1800); (2400, 4800, 9600); (19200).

Aggregate Throughput Capacity: 69,000 bits per second per interface. The aggregate throughput rate is attainable for short bursts. For continuous throughput, either the baud rate or the number of channels must be reduced to avoid data loss on input. There will be no data loss on output, but the full data rate may not be achieved.

Communication Mode: Asynchronous, bit serial.

*Modem control lines are passed through to the multiplexer panel to allow passive full-duplex modem support. Active modem control may be achieved by adding the HP 37214A System Modem.

Programmable Communications Parameters:
Character length from 5 to 8 bits; 1, 1-1/2, or 2 stop bits; and odd, even, or no parity.

CONFIGURATION INFORMATION

System Compatibility: The 12040C Interface is compatible with HP 1000 A-Series Computer Systems operating under the RTE-L, RTE-XL, and RTE-A real-time executive systems.

Computer I/O Slots Required: 1

Software Support: RTE Driver: IDM00

Supports the following HP Terminals:

2392A	2628A	2645A Opt 007
2621A/P	2631A/B	2647A
2622A	2635A/B	2648A Opt 007
2623A	2640B	2649B Opt 007
2624A/B	2645A	2649C Opt 007
2625A	2648A	2649G
2626A	2649B/C	7310A
2627A	2647F	

Current Required from Computer Power Supply:
2.5A (+5V), 0.10A (+12V), 0.05A (-12V).

Approximate Memory Requirements: See Table 1.

PHYSICAL CHARACTERISTICS

Dimensions: 269mm (11.38in) long, by 172mm (6.75in) wide, by 1.6mm (0.063in) deep; top clearance, 10.2mm (0.4in); bottom clearance, 5.1mm (0.2in)

Weight: 481 grams (17oz) with mating connector.

RS-232 PANEL EXTENSION

The 1252-0508 MUX Cable Extender Kit includes 1 set of male and female connector components which are used with up to 300 ft. of HP cable (part number 8120-4510) to remotely position the 28658-60005 RS-232-C panel. The raw cable can be purchased from the Corporate Parts Center.

Ordering Information

The 12040C Interface includes:

12040-60004	8-channel	Multiplexer Interface Assembly
12040-90022	Interface Reference Manual	
5001-5278	Mounting Bracket	
28658-60005	8-channel RS-232-C Panel	
28658-63005	3 Meter EIA RS-232 Cable	
1252-0508	MUX Cable Extender Kit	

12040C Options

002: Cable option for use with 37214A System Modem.

Deletes: (28658-60005) RS-232-C panel
(28658-63005) Cable
(1252-0508) Extender kit
(5001-5278) Mounting Bracket

Adds: (12828-60002) Cable

003: Custom Connection Option

Deletes: (28658-60005) RS-232-C panel
(28658-63005) Cable
(1252-0508) Extender kit
(5001-5278) Mounting Bracket

Adds: (5061-3467) Edge Connector kit

Table 1. HP 12040C Approximate Memory Requirements

File Name	Description	Memory Required
IDM00	Basic interface driver, including device driver for basic CRT display terminals	2,100 bytes
	Additional per 12040C interface	48 bytes
	Additional per device	48 bytes
DD.00	Device driver for 26XX terminal or RS-232-C compatible printing devices (IDM00) is also required)	1,500 bytes
	Additional per terminal or printer	44 bytes
DD.20	Mincartridge driver for 264X terminal (IDM00 and DD.00 are also required)	1,100 bytes
	Additional per mincartridge tape unit	44 bytes

Product Number 12041B

Features

- * EIA RS-423-A and RS-232-C/CCITT V.24 compatibility
- * On-board microprocessor off-loads computer
- * On-board buffering with DMA capability
- * Programmable character size, parity checking, and number of stop bits for flexible control of transmission format
- * Programmable data rates using two baud rate generators to eliminate hardware speed strapping
- * Parity, overrun, and framing error detection
- * Full Duplex or Echoplex transmission
- * Includes an 8-port Distribution Panel for mounting RS-232 connections
- * On-board self-test

Functional Description

The HP 12041B is a microprogrammable interface for HP 1000 A-Series computers. These cards are intended to be purchased by customers who will use them with HP software downloading the characterizing protocol into 16K bytes of on-card RAM memory. By designing firmware unique to a particular application, an HP division has almost unlimited scope in the variety of different specialized interfaces available to support application oriented software products. Because the interface program is downloaded from software into RAM memory on the card, the interface never needs to be modified by the addition of EPROMs. This means the 12041B is used and supported as shipped from Roseville Networks Division. An 8K EPROM on each interface contains programs for self-test, loading and executing code.

DIRECT MEMORY ACCESS TRANSFERS

Each interface card has its own DMA intelligence to control transfers of data between card buffer and the host CPU backplane. DMA reduces the time and overhead required to move messages between interface and host CPU memory.

ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER

A powerful microprocessor on the interfaces manages routine communications processing, freeing the host computer for applications oriented tasks. Under control of downloaded firmware, the microprocessor converts command words into actions, such as establishing a communications link, loading or unloading data from the on-board buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general purpose I/O interfacing, all without the attention of the host computer.

16K BYTES OF RAM MEMORY

On-board memory allows messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications.

EPROM-BASED SELF TESTS

A go/no-go self-test, performed at power-up or reset of card, helps to assure reliable operation of the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-tests results via the LED indicator. The self test can also be run with the supplied diagnostic hood which allows for the test of the electrical drivers and receivers.

COMMUNICATIONS

Interface Level: RS-423-A/RS-232-C or CCITT V.24

Communication Mode: Asynchronous, bit serial.

Programmable Communications Parameters:
Character length from 5 to 8 bits; 1, 1-1/2, or 2 stop bits; and odd, even, or no parity.

CONFIGURATION INFORMATION

System Compatibility: The 12041B Interface is compatible with HP 1000 A-Series Computer Systems operating under RTE-A real-time executive systems.

Computer I/O Slots Required: 1

Software Support: RTE Driver: IDM00

Current Required from Computer Power Supply: 2.5A (+5V), 0.10A (+12V), 0.05A (-12V).

PHYSICAL CHARACTERISTICS

Dimensions: 269mm (11.38in) long, by 172mm (6.75in) wide, by 1.6mm (0.063in) deep; top clearance, 10.2mm (0.4in); bottom clearance, 5.1mm (0.2in)

Weight: 481 grams (17oz) with mating connector.

RS-232 PANEL EXTENSION

The 1252-0508 MUX Cable Extender Kit includes 1 set of male and female connector components which are used with up to 300 feet of HP cable (part number 8120-4510) to remotely position the 28658-60005 RS-232-C panel. The raw cable can be purchased from the Corporate Parts Center.

Ordering Information

The 12041B Interface includes:

12041-60002	8-channel Multiplexer Interface Assembly
12040-90001	Interface Reference Manual
5180-1968	Download Monitor EPROM
5001-5278	Mounting Bracket
28658-60005	8-channel RS-232-C Panel
28658-63005	3 Meter EIA RS-232 Cable
1252-0508	MUX Cable Extender Kit
5061-4901	MUX Diagnostic Hood

12041B Option

003: Customer Connector Option:

Deletes: (28658-60005) RS-232-C panel
(28658-63005) Cable
(1252-0508) Extender kit
(5001-5278) Mounting bracket
Adds: (5061-3467) Edge connector kit

Product Numbers 12042B and 12826B

The HP 12042B and 12826B are microprogram-
mable interfaces for A-Series and M/E/F-Series
HP 1000's, respectively. These cards are intended
to be used by sophisticated OEM's or End-Users
as a foundation for designing their own applica-
tion oriented communications products.

The 12042B and 12826B consist of Z-80A based
intelligent interfaces with two available
EPROM/ROM sockets. User developed firmware
modules are required for use. By designing
firmware unique to a particular application, the
user has almost unlimited scope in the number of
customized products that are feasible. The
24602A PSI Firmware Development Package
provides reference material to guide users in the
task of creating their own firmware. In conjunc-
tion with the 24602A, the 12042B and 12826B
create a flexible solution to complex data com-
munication problems.

Features

- * **Z-80A CPU microprocessor control**
- * **One Z-80A SIO/2 dual channel serial I/O
"USART" controller**
 - Full or half duplex mode
 - Synchronous or asynchronous features
 - CRC-16 or CCITT block frame check for
synchronous operation
 - Two modem control inputs and two modem
control outputs per channel
 - Optional vectored interrupts per channel
 - Capability for two independent RS-232-C
primary channels
- * **Two Z-80A DMA direct memory access
controllers**
- * **16K bytes of Dynamic RAM for tables, buf-
fers, and/or firmware**
- * **Capability for EIA RS-449, EIA RS-232-C
(on one channel)**
- * **Internal loop-back of clocks and transmitted
data under firmware control for self-test**
- * **Two EPROM/ROM sockets capable of using
any combination of 2716's, 2732's, 2764's,
2516's, 2532's, and similar devices up to a
maximum of 8K bytes per socket**

- * **One Z-80A CTC Counter Timer Chip provid-
ing one system timer, an independent,
programmable baud rate for each SIO chan-
nel, and a programmable DMA backplane
transfer rate**
- * **Multidrop capability**
- * **Forced Cold Load capability**
- * **Four programmable indicator lights (LEDs)**
- * **Eight switches, accessible as a single byte**

Functional Description

ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER

A powerful microprocessor on the interfaces
manages routine communications processing,
relieving the host computer for applications
oriented tasks. Under control of customer sup-
plied firmware, the microprocessor converts
command words into actions, such as establishing
a communications link or loading/unloading data
from the on-board buffers to the host CPU. The
microprocessor can also perform protocol genera-
tion and interpretation, error checking, error
recovery by retransmission, or general purpose
I/O interfacing, all without the attention of the
host computer.

16K BYTES OF RAM MEMORY

On-board memory allows messages and as-
sociated information to be buffered on the card
either for transmission, reception, or temporary
program storage. Thus, interrupts to the host
processor can be kept at a minimum so the host
CPU can be put to better use processing applica-
tions.

DIRECT MEMORY ACCESS TRANSFERS

Each interface card has its own DMA intel-
ligence to control transfers of data between card
buffer and the host CPU backplane. DMA
reduces the time and overhead required to move
messages between interface and host CPU
memory.

EPROM-BASED SELF TESTS

A go/no-go self test (which can be optionally deleted), performed at power-up or reset of card, helps to assure reliable operation of the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-test results via LED indicators. The self test can also be run with the supplied diagnostic hood. The diagnostic hood fits on the edge of the PSI card and tests more of the card than is possible with self test alone.

Functional Specifications

TRANSMISSION MODE

Full or half duplex, bit-serial, synchronous or asynchronous.

Z-80A SIO/2 CHARACTERISTICS

Data Buffering: Received data quadruple buffered; transmitted data double buffered.

Synchronous Features for Character Oriented Protocol:

- One or two Sync characters
- Automatic Sync character insertion
- Cyclic Redundancy Check generation and checking
- Received data overrun detection

Synchronous Features for Bit Oriented Protocol:

- Abort sequence generation and checking
- Automatic Zero insertion and detection
- Automatic Flag insertion between messages
- Address field recognition
- Supports one to eight bits per character
- Cyclic Redundancy Check generation and checking
- Valid receive message overrun detection

Asynchronous Features:

- 5, 6, 7, or 8 bits per character
- 1, 1-1/2, or 2 stop bits
- Even, odd, or no parity
- X1, X16, X32, or X64 clock modes
- Break generation and detection
- Parity, overrun, and framing error detection

Optional Generation of a Vectored Interrupt per Channel when:

- the state of an SIO modem control input changes
- the transmit buffer is empty
- a receive character is available
- a special receive condition occurs for: parity error, Rx overrun error, CRC/Framing error, End of Frame

Z-80A DMA CHARACTERISTICS

Three Classes of Operation: Transfer only, Search only, Search and Transfer.

Three Modes of Operation: Byte-at-a-Time, Burst (continuous as long as both sides are ready), Continuous (locks out CPU until done). Read and write port addresses can independently increment, decrement, or stay fixed.

Interrupts: On Match Found, End of Block, or Port Ready (each can be its own interrupt vector).

Address and Block Length Register Loading: Registers may be loaded for the next operation without disturbing current operation.

Operation Restart: Last operation can be restarted automatically or on command.

DMA Signalling: DMA can signal when a specified number of bytes have been transferred without disturbing the current system.

DMA Status: CPU can read the current channel status, Read or Write address registers or the length register.

Z-80A COUNTER TIMER CHIP CHARACTERISTICS

Channels: Four independently programmed channels used for dynamic RAM timing, Zilog chip main system clock and baud rate generator for each SIO channel. Baud rate limits are:

Asynchronous: max 57.6K, min 50

Synchronous: max 460.8K, min 50

Synchronous

External: max 810K

Note that the speed of transmission depends on and may be limited by the type of firmware protocol implemented. The best practical board rates that can be expected with sophisticated protocols are 230K baud synchronous and 57.6K baud asynchronous.

Modes: Operates in Counter or Timer mode.

Interrupt: On the zero count condition (each channel has its own interrupt vector).

Restart: Automatically restarts the last operation in either mode.

Output: Gives the Z-80A CPU the number of counts to go until a zero count condition.

COMMUNICATIONS INTERFACE CHARACTERISTICS

Number of Input Lines: Six input lines with balanced receivers and eight input lines with unbalanced receivers.

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers, eight output lines with unbalanced line drivers.

CONFIGURATION INFORMATION

Computer I/O Channels Required: One per interface.

Interface Current Required from Computer Power Supplies:

<u>Product Number</u>	<u>+5V Supply</u>	<u>+12V Supply</u>	<u>-12V Supply</u>
12042B	2.60A	0.35A	0.18A
12826B	1.93A	0.32A	0.18A

Compatible Modems: The 12042B/12826B interface is compatible with the modems listed in Table 1 and may be useful with other modems that are compatible with both the PSI card hardware and user-developed firmware. Note that compatibility with any modem is highly dependent on the firmware implemented on the PSI card. Further information on the modems listed below are given in the 12042B/12826B PSI Card Hardware Manual (12042-90001 or 12826-90001).

Table 1. Connections and Compatible Modems

<u>Connection via</u>	<u>Model Type</u>
Private Lines	Bell 201C
	Bell 208A
	Bell 208B
	Bell 209A

System Compatibility:

Table 2. PSI Card System Compatibility

<u>Product Number</u>	<u>Compatible Computer</u>	<u>Compatible Computer System</u>
12042B	2137A	2196C/D
	2139A	2197C/D
	2156B	2199C/D
	2436A/E	2486A
	2437A	2487A
	2439A	2489A
12826B	2109E	2176C/E
	2113E	2177C/F
	2117F	2178A/C
		2179A/C

Support Policy

Because the PSI card is a customizable system, the customer must assume responsibility for its support. Consequently, there is no Service Contract applicable to the PSI product. Hewlett-Packard Computer Engineers will accept contracts for HP 1000 systems containing PSI cards upon verification of the system by the responsible HP field office. However, the PSI card itself will not be diagnosed, repaired or examined at the customer's site. If the PSI product develops problems, it will be the responsibility of the customer to diagnose and replace both its hardware and firmware. The Self Test EPROM is provided as a tool to be used at the discretion of the customer.

Customers must be prepared to develop their own support strategy for the PSI cards. It is suggested the customer maintain spare cards which can be swapped by the customer if a problem arises in the field. Board Repair and Exchange programs are available for the PSI to assist customers in their support. Contact the responsible Hewlett-Packard Field Engineer for further information.

Ordering Information

Note: It is strongly recommended that purchase of either the 12042B or 12826B for program development be done jointly with the purchase of the HP 24602A PSI Firmware Development Package.

12042B A-SERIES PROGRAMMABLE SERIAL INTERFACE CARD

The 12042B Interface includes:

- 5061-4940 A/L-Series Programmable
Serial Interface with Self-Test
PROM (5180-1951)
- 5061-4914 5m (17ft) RS-232-C Modem
Interface Cable
- 5061-4916 Diagnostic Test Hood
- 5180-1951 Self Test EPROM
- 5955-7628 OEM/PSI Manual

12826B M/E/F-SERIES PROGRAMMABLE SERIAL INTERFACE CARD

The 12826B Interface includes:

- 5061-4913 M/E/F-Series Programmable
Serial Interface
- 5061-4914 5m (17ft) RS-232-C Modem
Interface Cable
- 5061-4916 Diagnostic Test Hood
- 5180-1951 Self Test EPROM
- 5955-7628 OEM/PSI Manual

12042B/12826B OPTIONS

- 001:** Substitutes 5061-4923 5m (17ft) RS-449
Modem Interface Cable for 12042B/
12826B (5061-4914)
- 002:** Substitutes 5061-3440 custom cable kit
(edge connector only) for 12042B/12826B
(5061-4914)
- 003:** Delete Self-Test PROM and Diagnostic
Hood

Product Numbers 12043A and 12260A**Features**

- * **Z-80A CPU microprocessor control**
- * **One Z-80A SIO/2 dual channel serial I/O "USART" controller**
 - Full or half duplex mode
 - Synchronous or asynchronous features
 - CRC-16 or CCITT block frame check for synchronous operation
 - Two modem control inputs and two modem control outputs per channel
 - Optional vectored interrupts per channel
 - Capability for two independent RS-232-C primary channels
- * **Two Z-80A DMA direct memory access controllers**
- * **16K bytes of Dynamic RAM for tables, buffers, and/or firmware**
- * **One Z-80A CTC Counter Timer Chip providing one system timer, an independent, programmable baud rate for each SIO channel, and a programmable DMA backplane transfer rate.**
- * **Capability for EIA RS-449, EIA RS-232-C**
- * **Multidrop capability**
- * **Internal loop-back of clocks and transmitted data under firmware control for self-test**
- * **Four programmable indicator lights (LEDs)**
- * **Eight switches, accessible as a single byte**
- * **EPROM-based developmental debug monitor**
- * **EPROM-based self test**
- * **Off-line RAM dump to host**
- * **EPROM-based program for loading and executing downloaded code**
- * **Fully supported by HP**

Functional Description

The HP 12043A and 12260A are micro-programmable interfaces for A/L-Series and M/E/F-Series HP 1000s, respectively. These cards are intended to be purchased by customers who will use them with HP software downloading the characterizing protocol into 16K bytes of on-card RAM memory. The 12043A and 12260A executes Multileaving Remote Job Entry) protocol. Because the interface program is downloaded from software into RAM memory

on the card, the interface never needs to be modified by the addition of EPROMs. This means the 12043A and 12260A are used and supported as shipped from Roseville Networks Division. An 8K EPROM on each interface contains programs for self-test, loading and executing code, and a development and debug monitor. The cards are configurable through software.

ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER

A powerful microprocessor on the interfaces manages routine communications processing, relieving the host computer for applications oriented tasks. Under control of downloaded firmware, the microprocessor converts command words into actions, such as establishing a communications link or loading/unloading data from the on-board buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general purpose I/O interfacing, all without the attention of the host computer.

16K BYTES OF RAM MEMORY

On-board memory allows messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications.

DIRECT MEMORY ACCESS TRANSFERS

Each interface card has its own DMA intelligence to control transfers of data between card buffer and the host CPU backplane. DMA reduces the time and overhead required to move messages between interface and host CPU memory.

EPROM-BASED SELF TESTS

A go/no-go self-test, performed at power-up or reset of card, helps to assure reliable operation of

the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-tests results via LED indicators. The self test can also be run with the supplied diagnostic hood. The diagnostic hood fits on the edge of the PSI card and tests more of the card than is possible with self test alone.

EPROM-BASED DEVELOPMENTAL DEBUG MONITOR (DDM)

The DDM program serves as a monitor to aid in the development of user firmware. Once a firmware program is cross-assembled on a mini-cartridge tape, the DDM can load that program into the PSI card's RAM through an HP 2645 or 2648 terminal and a terminal-to-card-to-link cable supplied with the DDM. The DDM can then support these functions:

- * Display and/or modification of memory locations
- * Display and/or modification of registers
- * Control of program flow by:
 - Transferring control to firmware entry points
 - Setting and removing break points
 - Single-step simulation with trace
- * Reading and writing through all I/O ports
- * Creating ("punching") modified code into 264X minicartridge tape
- * Help facility providing information about the command set

Functional Specifications

TRANSMISSION MODE

Full or half duplex, bit-serial, synchronous or asynchronous.

Z-80A SIO/2 CHARACTERISTICS

Data Buffering: Received data quadruple buffered; transmitted data double buffered.

Synchronous Features for Character Oriented Protocol:

- 1 or 2 Sync characters
- Automatic Sync character insertion
- Cyclic Redundancy Check generation and checking
- Received data overrun detection

Synchronous Features for Bit Oriented Protocol:

- Abort sequence generation and checking
- Automatic Zero insertion and detection
- Automatic Flag insertion between messages
- Address field recognition
- Supports 1 to 8 bits per channel
- Cyclic Redundancy Check generation and checking
- Valid receive message overrun detection

Asynchronous Features:

- 5, 6, 7 or 8 bits per character
- 1, 1-1/2, or 2 stop bits
- Even, odd, or no parity
- X1, X16, X32, or X64 clock modes
- Break generation and detection
- Parity, overrun and framing error detection

Optional Generation of a Vectored Interrupt per Channel when:

- the state of an SIO modem control input changes
- the transmit buffer is empty
- a receive character is available
- a special receive condition occurs for: parity error, Rx overrun error, CRC/Framing error, End of Frame

Z-80A DMA CHARACTERISTICS

Three Classes of Operation: Transfer only, Search only, Search and Transfer.

Three Modes of Operation: Byte-at-a-Time, Burst (continuous as long as both sides are ready), Continuous (locks out CPU until done). Read and write port addresses can independently increment, decrement, or stay fixed.

Interrupts: On Match Found, End of Block, or Port Ready (each can be its own interrupt vector).

Address and Block Length Register Loading: Registers may be loaded for the next operation without disturbing current operation.

Operation Restart: Last operation can be restarted automatically or on command.

DMA Signalling: DMA can signal when a specified number of bytes have been transferred without disturbing the current system.

DMA Status: CPU can read the current channel status, Read or Write address registers or the length register.

Z-80A COUNTER TIMER CHIP CHARACTERISTICS

Channels: Four independently programmed channels, used for dynamic RAM timing, Zilog chip main system clock and baud rate generator for each SIO channel. Baud rate limits are:

Asynchronous: max 57.6K, min 50
Synchronous: max 460.8K, min 50
Synchronous
External: max 810K

Note that the speed of transmission depends on and may be limited by the type of firmware protocol implemented. The best practical board rates that can be expected with sophisticated protocols are 230K baud synchronous and 57.6K baud asynchronous.

Modes: Operates in Counter or Timer mode.

Interrupt: On the zero count condition (each channel has its own interrupt vector).

Restart: Automatically restarts the last operation in either mode.

Output: Gives the Z-80A CPU the number of counts to go until a zero count condition.

COMMUNICATIONS INTERFACE CHARACTERISTICS

Number of Input Lines: Six input lines with balanced receivers and eight input lines with unbalanced receivers.

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers, eight output lines with unbalanced line drivers.

CONFIGURATION INFORMATION

Computer I/O Channels Required: One per interface.

Interface Current Required from Computer Power Supplies:

Product Number	+5V Supply	+12V Supply	-12V Supply
12043A	2.60A	0.35A	0.18A
12260A	1.93A	0.32A	0.18A

Compatible Modems: The 12043A/12260A interface is compatible with the modems listed in Table 1 and may be useful with other modems

that are compatible with both the PSI card hardware and user-developed firmware. Note that compatibility with any modem is highly dependent on the firmware implemented on the PSI card.

Table 1. Connections and Compatible Modems

Connection via	Model Type
Private Lines	Bell 201C
	Bell 208A
	Bell 208B
	Bell 209A

System Compatibility:

Table 2. PSI Card System Compatibility

Product Number	Compatible Computer	Compatible Computer System
12043A	2137A	2196C/D
	2139A	2197C/D
	2156B	2199C/D
	2436A/E	2486A
	2437A	2487A
12260A	2439A	2489A
	2109E	2176C/E
	2113E	2177C/F
	2117F	2178A/C
		2179A/C

Ordering Information

12043A MULTIUSE MODEM PSI FOR HP 1000 A-SERIES

The 12043A includes:

5061-4940	A Modem Programmable Serial Interface Assembly
5061-4914	5 meter (18 ft) RS-232-C Modem Interface Cable
5180-1966	Self-Test/Download EPROM (installed)
5955-7630	Multi-use PSI Installation Manual
5061-4916	Self Test Hood
12042-91001	PSI Installation and Service Manual for Modem Connection from A/L-Series Computers

12043A Option 001:

5061-4923	5 meter (18 ft) RS-449 Modem Interface Cable (delete 5061-4914)
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**12260A MULTIUSE MODEM PSI FOR
HP 1000 M/E/F-SERIES**

The 12260A includes:

- 5061-4913 M/E/F Modem Programmable
Serial Interface Assembly
- 5061-4914 5 meter (18 ft) RS-232-C
Modem Interface Cable
- 5180-1966 Self-Test/Download EPROM
(installed)
- 5955-7630 Multi-use PSI Installation
Manual
- 5061-4916 Self Test Hood
- 12826-91001 PSI Installation and Service
Manual for Modem Connection
from M/E/F-Series Computers

12260A Option 001:

- 5061-4923 5 meter (18 ft) RS-449 Modem
Interface Cable (delete 5061-
4914)

Product Numbers 12060B & 12060BC, 12061A & 12061AC**Features**

- * 8 Differential inputs, expandable to 40 channels
- * Up to 55kHz throughput to memory
- * Auto scanning or single-channel sampling
- * 12-bit resolution including sign
- * 4 programmable input ranges: ± 1.28 to $\pm 10.24V$ full scale
- * Input overvoltage protection
- * External pacing/triggering
- * Separate zero reference for error correction
- * Easy connection via pre-wired cables and optional screw termination

Description

The HP 12060B and HP 12061A are plug-in cards for HP 1000 A-Series computers for low-cost, high-performance analog input capability in small distributed measurement and control applications. The A-Series product in which these cards are used must have a 25kHz power supply. The 12060B High Level Analog Input Card provides the capability of converting 8 differential analog voltage inputs to digital form. The 12061A Expansion Multiplexer Card provides an additional 32 channels of differential input for a total capability of 40 channels. All inputs are protected against accidental overvoltage to 42V peak.

12060B CARD

The 12060B is capable of acquiring up to 55,000 readings per second with 12-bit resolution. Auto scanning or single-channel sampling is possible to 55kHz. Provisions for external pacing/triggering of sampling and scanning is provided. The 12060B includes four programmable full scale ranges from plus or minus 1.28V to plus or minus 10.24V. Maximum resolution is 0.625mV on the 1.28V range to 5mV on the 10.24V range. A separate "zero reference" on the card allows the user to measure actual offset due to temperature drift, and correct readings on all 40 channels for higher accuracy.

12061A CARD

The 12061A provides 32 additional differential inputs for the 12060B card. The 12061A card fastens directly onto the 12060B card, creating a two-board unit that occupies two I/O slots in an HP 1000 A-Series computer. Programming information is passed from the 12060B directly to the 12061A; analog signals on the additional 32 channels are in turn passed back to the 12060B for digitizing. The 12061A includes removable plug-in headers so the user can add current sense resistors for current loop measurements. These headers allow the board to be adapted to the specific application without soldering components directly on the board and are easily removable for repair.

12060BC and 12061AC CABLES

The 12060BC 8-Channel Analog Input Cable and the 12061AC 32-channel Analog Input Cable provide for easy connection of your application to the 12060B and 12061A respectively. Both cables provide a 3-meter cable pre-wired to the appropriate card compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for optional analog performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation displacement 12064A Termination Accessory providing electrician compatible heavy-duty screw terminals and built-in wiring tray (see 12064A data sheet).

USER PROGRAMMING

User programming of both cards is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System. A simple RTE EXEC call is all that is needed for full control of both cards. The format is as follows:

```
CALL EXEC (1,LU#, Data Buffer,  
          #readings, control word)
```


The control word specifies:

1. **Gain (1, 2, 4, or 8)**
2. **Start Channel:** Scanning always begins at the specified "Start Channel" on up to the highest channel available (8 for the 12060B only and 40 with the 12061A). If more than one scan worth of readings has been requested, the next scan and all subsequent scans will also begin at the "Start Channel".
3. **Auto Scan:** The user specifies the starting channel (1-40) and the number of readings to be taken. The card will automatically begin at the starting channel, increment to the next and so forth, returning to the starting channel when reaching channel 8 (12060B only) or channel 40 (12061A), continuing until the specified number of readings have been taken.

Single Channel: The user specifies the number of readings on a specific channel. The card then takes the readings requested.
4. **Internal Pacing:** The card begins taking readings on commands and takes all readings at the maximum rate (18µs per reading), either scanning or on channel.

External Pacing: The card begins taking readings when the external pace input goes high and stops when it goes low. This allows for pacing on channel by supplying a pace pulse less than a conversion time wide (nominally >15µs) for a specified number of readings. In auto scan mode, it allows pacing the start of scan by holding the input high for "n" readings per scan times one conversion time. Alternately, readings in autoscan mode may be taken at any rate by applying a pulse train with a pulse width <15µs).

With a single call you can cause multiple scans and/or set up and wait for an external trigger.

NOTE: See related products information concerning MAC/1000 high level call subroutines for A-Series M&C interfaces.

CALIBRATION

The 12060B is calibrated at the factory and may require recalibration by the customer on arrival by using a voltage source and optional calibration software.

Functional Specifications

12060B/12061A ANALOG INPUT SYSTEM

Gain Dependent:

SPEC	GAIN			
	1	2	3	4
Full Scale Range	±10.24V	±5.12V	±2.56V	±1.28V
Resolution (12 bits)	5mV	2.5mV	1.25mV	0.625mV
Accuracy (25°C, RTI)	±5mV	±2.5mV	±1.25mV	±0.625mV
Temperature Coefficient	±0.38mV/°C	±0.38mV/°C	±0.095mV/°C	±0.048mV/°C
Inputs at:				
12060B	±16.4mV	±8.2mV	±4.1mV	±2.1mV
12061A	±24.6mV	±12.3mV	±6.1mV	±3.1mV

Overall Accuracy* [0° to 55° C, referred to input (RTI), Worst Case]

* May be improved to 25°C Accuracy Specification levels by correcting for the offset error due to temperature by measuring and subtracting the on-board zero reference voltage.

Gain Independent:

Maximum input voltage: $\pm 10.24\text{V}$ to ground
Common mode rejection: $>70\text{dB}$ dc to 100Hz with $1\text{k}\Omega$ source impedance and $1\text{k}\Omega$ source imbalance. Example: 20Vp-p common mode voltage produces $<6\text{mVp-p}$ noise RTI.
Crosstalk: $<80\text{dB}$ dc to 100Hz . Example: 20Vp-p adjacent channel input produces $<2\text{mVp-p}$ noise RTI.
Throughput to memory: 55,000 samples per second.
Sample and hold aperture time: <20 nanoseconds

Input Overload Protection:

Steady state: Up to ± 25 volts on any one input line to ground or to another input
Transient: ± 42 volts for 500 ms without damage

Effective Input Impedance:

Power off: $1.2\text{k}\Omega$ ($\pm 10\%$) to ground, $2.4\text{k}\Omega$ ($\pm 10\%$) to any other channel.
Power on: $>5\text{M}\Omega$
Source impedance: Up to $1\text{k}\Omega$
Source imbalance: Up to $1\text{k}\Omega$
Common mode return: Up to $10\text{k}\Omega$

External Trigger: TTL compatible handshake, not protected (operates at up to full 55kHz rate, jumper selectable pull-up, pull-down, or TTL)

12060B Physical Characteristics:

PC board: 28.89cm (11.375in) length, 17.15cm (6.750in) width, 1.91cm (0.750in) height
Net weight: 0.40kg (14oz)

12060B Power Requirements: 5.5W at 5V dc, 7.25W at 25kHz ac (normally provided by 12035A Power Module)

12061A Physical Characteristics:

PC board: 28.89cm (11.375in) length, 17.15cm (6.750in) width, 2.79cm (1.100in) height
Net weight: 0.27kg (9.3oz)

12061A Power Requirements: 0.05W at 5V dc, 2.0W at 25kHz ac

12060BC AND 12061AC CABLES**Physical Characteristics:**

Cable length: 3 meters (9.84 feet)
Wire gauge: 26
Overall diameter: $<1.31\text{cm}$ ($.515\text{inches}$)

Electrical Characteristics:

Configuration:
 12060BC -- 8 shielded twisted pairs plus one drain common to all shields
 12061AC -- 32 shielded twisted pairs plus one drain common to all shields
Voltage rating: 300 volts peak

ENVIRONMENTAL CHARACTERISTICS (both products)

Operating Temperature: 0° to 55°C (32° to 131°F)

Storage Temperature: -40°C to 75°C (-40°F to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) without condensation

Altitude: Up to 4.6km ($15,000\text{ft}$) operating. Up to 15.3km ($50,000\text{ft}$) non-operating

System Requirement: HP 1000 A-Series computers with 25kHz power options. See the HP 1000 Ordering Information.

Ordering Information

12060B HIGH LEVEL INPUT CARD

The 12060B includes:

12060-60101 A-Series Analog Input Interface
12060-90004 Hardware Reference Manual
12060-90003 Programming Manual

12060B Options

- 001:** Adds edge connector kit and extra edge connector
- 020:** Calibration software on phase encoded minicartridges (12060-13301)
- 041:** Calibration software on 8" flexible disc (12060-13401)
- 044:** Calibration software on 3.5" microfloppy disc (12060-13402)

The 12060BC includes:

3 meter Unterminated Cable with 8 individually shielded twisted pairs

12061A EXPANSION MULTIPLEXER CARD

The 12061A includes:

12061-60001 A-Series Analog Input Expansion Interface

12061A Option

- 001:** Adds edge connector kit and extra edge connector.

The 12061AC includes:

3 meter unterminated cable with 32 individually shielded twisted pairs

DIAGNOSTICS

Diagnostics software is supplied with the 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the 12060B, 12061A, 12062A, and 12063A. Must order one of the following media options: #020, #022, #041, #042, #044, or #051.

Related Products Information

MAC/1000 SOFTWARE LIBRARY

This third party software product provides a set of high level call subroutines for the A-Series M&C family. These calls make upgrades to higher point count applications via Control 1000, straight forward. For more information contact:

Demand Systems, Inc.
6279 Variel Ave. Suite D
Woodland Hills, CA 91367
Attn: Frank Zuhde
(213) 710-8851

Product Number 12062A and 12062AC

Features

- * 4 channels of voltage output/card
- * Output range of ± 10.24 volts
- * 12 bit resolution including sign
- * Short circuit and overvoltage protection
- * One undedicated digital output per channel
- * 90kHz output from memory
- * Programmable data rates

Description

12062A CARD

The HP 12062A is a plug-in card for the HP 1000 A-Series computers for low cost, high-performance analog output capability in small distributed measurement and control applications.

The 12062A Analog Output Card provides 4 independent bipolar voltage outputs. Remote sensing per channel provides accurate output voltages compensating for long distances of field wiring. Undedicated digital outputs may be used in pen up/down control, CRT display, or X-Y plotters. DMA compatibility provides fast analog updates on a per channel basis or between channels. Programmable time delay between DMA updates provides signal reconstruction capability with a full power bandwidth of 20kHz.

12062AC CABLE

The 12062AC 4-Channel Analog Output Cable provides for easy connection of your application to the 12062A. The 12062AC provides a 3 meter cable pre-wired to the appropriate card compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for optimal analog performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation displacement 12064A Termination Accessory providing electrician compatible heavy-duty screw terminals and built-in wiring tray (see 12064A data sheet).

USER PROGRAMMING

User programming of the 12062A card is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System. A simple RTE EXEC call in the following format is used:

```
CALL EXEC (2,LU#,Data Buffer,  
#readings,control word)
```

The control word specifies a time delay between successive DMA word transfers. Each increment (up to 255) in the control word adds a 1.085 microsecond time delay to the 10.85 microsecond base rate.

CALIBRATION

12062A is calibrated at the factory and may require recalibration by the customer upon arrival by using a voltmeter and optional calibration software.

Functional Specifications

12062A CARD

Number of Channels: 4 bipolar

Resolution: 12 bits, LSB = 5mV

Voltage Output Range: -10.24 to +10.235V at 20mA

Short Circuit and Overvoltage Protection: Protected against short to common or overvoltage up to ± 15 V dc

Accuracy:

- Linearity error (0° to 70°C):** ± 2.5 mV max
- Monotonicity temperature range:** 0° to 70°C
- Gain error:** Adjustable to zero
- Offset error:** Adjustable to zero

Drift:

- Offset drift:** 0.0015% of FSR per °C, max
- Gain drift:** 0.0015% of FSR per °C, max

Total error (0° to 70°C): 0.15% of FSR max

Output Characteristics:

Slew rate: 10V per microsecond, resistive load
Settling time for FSR change: 5 microsecond typical with resistive load
Full power bandwidth: 20kHz with resistive load
Ripple and output noise: 2.5mV p-p max (dc to 500kHz, no load)
Fastest Update Time: 10.85 microseconds
Programmable Times: 10.85 μs to 288.61 μs in increments of 1.085 μs

Digital Outputs:

TTL Level per channel: One
Load per channel: Ten standard TTL loads

Physical Characteristics

Dimensions: 28.89 cm (11.375in) length, 17.15cm (6.750in) width, 1.91cm (0.75in) height

Net Weight: 0.36kg (12.75oz)

Power Requirements: 6.0W at 5V dc, 7.6W at 25kHz ac

12062AC CABLE

Physical Characteristics

Cable length: 3 meters (9.84 feet)
Wire Gauge: 22
Overall Diameter: <1.31 cm (.515 inches)

Electrical:

Configuration: 9 shielded twisted pairs plus one drain per pair
Voltage rating: 300V Peak

ENVIRONMENTAL CHARACTERISTICS (both products)

Operating Temperature: 0 to 55°C (32 to 131°F)

Storage Temperature: -40 to 75°C (-40 to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) without condensation

Operating Altitude: to 4.6km (15,000ft)

Non-Operating Altitude: to 15.3km (50,000ft)

System Compatibility: All HP 1000 A-Series computers with 25kHz power option. See HP 1000 Ordering Information (part number 5953-8730).

Ordering Information

The 12062A includes:

12062-60011 4 channel DAC card
12060-90003 Programmers Manual
12062-90001 Operating & Service Manual

Options:

001: Adds edge connector kit and extra edge connector
020: Adds Calibration program on mini-cartridge (12062-13301)
041: Adds Calibration program on 8" flexible disc (12062-13401)
044: Adds Calibration program on 3.5" micro-floppy disc (12062-13403)

NOTE: Calibration requires A-Series card extender (12011-60001) and HP 3455A multi-meter (or equivalent).

The 12062AC includes:

3 meter unterminated cable with 9 individually shielded twisted pairs.

Diagnostics: Diagnostics software is supplied with the 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the 12060B, 12061A, 12062A, and the 12063A. Must order one of the following media options: #020, #022, #041, #042, #044, or #051.

Related Product Information

MAC/1000 SOFTWARE LIBRARY

This product provides a set of high level call sub-routines for the A-Series M&C family. These calls make upgrades to higher point count applications, via Control 1000, straight forward. For more information contact:

Demand Systems, Inc.
6279 Variel Ave. Suite D
Woodland Hills, CA 91367
Attn: Frank Zuhde
(213) 710-8851

Product Numbers 12063A and 12063AC**Features**

- * 16 optically isolated digital inputs
- * 16 isolated Form-C relay outputs
- * Resistor selectable input voltage levels: 5 to 42V dc, 6 to 29V ac
- * Programmable event detection and debounce delay
- * Provision for relay arc suppression
- * On-card isolated power supply for relay coil power

Description**12063A CARD**

The HP 12063A Isolated Digital Card is a plug-in I/O card for HP 1000 A-Series computers. It features flexible digital I/O capability for sensing and activating of devices in measurement and control applications.

Input Characteristics:

The 12063A provides 16 fully isolated digital inputs via voltage threshold opto-couplers. Input voltage levels are selectable by the user for each channel by installing the appropriately valued resistors on plug-in headers (8 resistors per header = 8 channels). These headers allow the board to be adapted to the specific application without soldering components directly on the board, and are easily removed for repair purposes. Plug-in opto-couplers (supplied) allow user selection of ac or dc coupling for each channel by merely installing the opto-coupler in the ac position or dc position. For ac coupling, a plug-on jumper is provided for each channel to select 60Hz ac filtering of the rectified input if desired.

Event Detection:

In addition to status, any input may be user programmed to function as an interrupt input by use of the mask, sense, sense override registers on the card. These registers allow the interrupt to be generated on the rising edge or falling edge of the input or both (whichever occurs first). This capability is easily activated by the user via

loading the appropriate pattern into the three registers. The on-card microprocessor takes over to cause the interrupt to be generated when that event occurs. User programming is required to service the interrupt.

Debounce Delay:

The same microprocessor also provides for user programmable debounce delay up to 246 milliseconds on inputs when monitoring contact closures, and may be used in both status mode and event sense mode. The selected delay will apply to all inputs.

Output Characteristics:

Sixteen Form-C (SPDT) relay outputs are provided on the same card. Both the normally open (NO) and normally closed (NC) contacts are available to users. Two removable headers allow for arc suppression devices to be added by the user for each channel without soldering directly to the board. The use of arc suppression reduces coupled noise and extends relay life. Each header handles 8 output channels. Plug-on jumpers select the arc suppression across the NO or NC contacts. An on-card isolated power supply derived from the 25kHz ac supply in the A-Series processor provides coil power for the relays. This technique minimizes any coupling of relay contact noise into the computer itself. For ease of servicing, plug-in relays are used.

12063AC CABLE

The 12063AC 32-Channel Digital Input/Output Cable provides for easy connection of your application to the 12062A. The 12062AC provides a 3 meter cable pre-wired to the appropriate card compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for quite reliable performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation-displacement 12064A Termination Accessory which provides electrician-compatible heavy-duty screw terminals and built-in wiring tray (see 12064A data sheet).

USER PROGRAMMING

User programming of the 12063A card is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System.

A simple RTE-EXEC call in the following format is used:

```
CALL EXEC (R/W, LU#, Data Buffer,  
          # Data Words, Control Word)
```

Control Words provide for:

- Open/Close Relays or read present state
- Set debounce delay
- Read status of inputs
- Write to Mask Register (enable/disable interrupt)
- Write to Sense Register (select rising or falling edge)
- Write to Sense Override Register (respond to whichever edge occurs first)
- Read from Mask, Sense, or Sense Override registers
- Read for Interrupt Status Register

NOTE: See related products information concerning MAC/1000 high level call subroutines for A-Series M&C interfaces.

Functional Specifications

12063A CARD

Input Specifications:

16 Optically Isolated Inputs

Input voltage levels: 5 to 42V dc, 6 to 29Vrms ac. User selectable on removable headers, level determined by resistor value.

Example level selection:

Level	Resistor Value	Threshold Turn-Off	Voltage Turn-On
5 Vdc	None	2.0V min 2.8V max	3.4V min 4.0V max
12 Vdc	909 ohms	4.3V min 5.6V max	6.5V min 8.2V max
16 Vrms ac	3.48k ohms	8.1V min 11.4V max	8.1V min 11.4V max

Debounce timer (user programmable): 0 to 246 ms, 960 μ s resolution.

Isolation voltage between any two input channels: 250V dc, 110V ac.

Input signal riming (without firmware debounce): Minimum detectable pulse width during the ON state; 1 ms with or without filter capacitor; Minimum detectable pulse

width during the OFF state; 1 ms without filter capacitor, 53 ms with filter capacitor.

Output Specifications:

16 Relay Isolated Outputs

Contact form: 1 Form-C (SPDT)

Maximum contact rating (UL rating 42V peak): 1.0A at 28V dc, 1.0A at 120V ac

Approximate contact switching:

Operate time: 2ms

Release time: 3ms

Contact resistance: less than 50m Ω initial contact resistance (relay only)

Insulation resistance: 10⁷ Ω @ 250V dc

Contact lifetime: 10⁵ operations minimum at 1 amp, resistive load

Arc suppression voltage levels: User selectable on removable headers. Transient voltage suppressors are separately available from 5V and up. Arc suppression should be used with inductive cards (including long cables).

Physical Characteristics:

PC board: 28.89cm (11.375in) length, 17.15cm (6.750in) width, 1.91cm (0.750in) component height

Net weight: 0.54kg (1.2lbs)

Power Requirements: 5W at 5V dc, 11.4W at 25kHz ac (Normally provided by 12035A Power Module)

12063AC CABLE

Physical Characteristics:

Cable length: 3 meters (9.84 feet)

Wire gauge: 26

Overall diameter: <1.31 cm (.515 inches)

Electrical:

Configuration: 32 shielded twisted pairs plus one drain common to all shields

Voltage rating: 300V Peak

ENVIRONMENTAL CHARACTERISTICS

(both products)

Temperature:

Operating: 0° to 55°C (32° to 131°F)

Storage: -40° to 75°C (-40° to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) without condensation

Altitude:

Operating: to 4.6km (15,000ft)

Non-operating: to 15.3km (50,000ft)

System Compatibility: All HP 1000 A-Series computers with 25kHz power options available. See HP 1000 Ordering Information (part number 5953-8730).

Ordering Information

The 12063A includes:

12063-60010 A-Series Digital Multifunction Interface
12063-90001 Hardware Reference Manual
12060-90003 Programming Manual

12063A Option

001: Adds edge connector kit and extra edge connector

The 12063AC includes:

3 meter unterminated cable with 32 individually shielded twisted pairs.

Diagnostics: Diagnostics software is supplied with the 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the 12060B, 12061A, 12062A, and the 12063A. Must order one of the following media options: #020, #022, #041, #042, #044, or #051.

Related Products Information

MAC/1000 SOFTWARE LIBRARY

This third party software product provides a set of high level call subroutines for the A-Series M&C family. These calls make upgrades to higher point count application straight forward. For more information contact:

Demand Systems, Inc.
6279 Variel Ave., Suite D
Woodland Hills, CA 91367
Attn: Frank Zuhde
(213) 710-8851

68 Circuit Termination Accessory for HP 1000 A-Series Measurement and Control Cards

Product Number 12064A

Features

- * 68 Circuits
- * Insulation displacement on computer side
- * Heavy-duty screw terminals on field wiring side
- * Built-in wiring tray for field wiring
- * Safety door with labeling surface
- * 19 inch EIA rack mounting
- * Compatible with 12060BC, 12061AC, 12062AC, and 12063AC cables

Description

The HP 12064A Termination Accessory provides an easy way for users of the A-Series measurement and control interfaces and cables to get electrician-compatible screw terminations. Each 12064A has 68 circuit lines which can be used in any configuration the application demands. Easy-to-use insulation displacement connection to the computer side of each circuit allow for quick connection of the 12060BC, 12061AC, 12062AC, and 12063AC cables to the 12064A. Many combinations of 12064As and cables are possible and entirely up to the user.

On the field wiring side, heavy-duty screw terminals provide a reliable, strip-insert-tighten, gas tight (non-corrosive) connection suitable for electrical installers. Included in the assembly is a convenient wiring tray to keep the installation neat and serviceable. A removable hinged door closes off the wiring compartment giving the final installation a safe, professional finish. The 12064A mounts easily in any 19 inch EIA rack.

Functional Specifications

PHYSICAL CHARACTERISTICS

Computer Side Terminations: insulation displacement; 26 to 22 gauge wire

Field Wiring Terminations: 22 to 10 gauge wire

Dimensions: 48.26 cm (19.0 in) wide by 12.06 cm (4.75 in) deep by 8.89 cm (3.5 in) high

Weight: 1.08 kg (2 lbs 6 oz)

ELECTRICAL CHARACTERISTICS

Circuits: 68 user configurable

Voltage Rating: 300V Peak

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0°C to 50°C (32°F to 131°F)

Storage Temperature: -40°C to 75°C (-40°F to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) without condensation

Altitude: Up to 4.6 km (15,000 feet) operating; up to 15.3 km (50,000 feet) non-operating

Ordering Information

The 12064A includes:

12064-00001 68 Circuit Termination
Accessory

12064-90001 Termination Accessory Manual

Product Number 12065A

The HP 12065A is a plug-in interface card providing full color video output capability for the HP 1000 A-Series family of real time computers.

Features

- * Graphics/1000-II Version 2.0 compatible
- * Red-Green-Blue (RGB) RS-343 compatible video output
- * 512 x 512 pixel resolution for 1:1 aspect ratio displays
- * 576 x 455 pixel resolution for 4:3 aspect ratio displays
- * 16 colors selected from a palette of 4096
- * Alphanumeric text overlay
- * On card, independent blink control of each color
- * Polygon area fill
- * Scrolling capability
- * Two RS-232-C ports for keyboards, touch screens, and mice

Functional Description

The 12065A Video Output Interface provides full color video output capability to color displays for the HP 1000 A-Series family of computer products. The 12065A has been designed to specifically address the needs of the computer aided manufacturing marketplace. This video interface offers medium resolution as well as some unique display features that will dramatically increase your productivity.

The card utilizes a Motorola 68008 16 bit microprocessor for system control and backplane communications. It also provides supervisory control over a specialized graphics processor, pixel memory and video circuits. Four pixel memory planes provide for two combinations of color and character capability. In one mode, three pixel memory planes are used to produce 8 colors from a palette of 4096 leaving the fourth plane for overlay of characters, cursors and prompts. In the second color mode, all four planes are used to produce 16 colors from a

palette of 4096. In both modes, independent blink control of each color is possible on-card. A standard character set is provided in ROM with user specified size and orientation for maximum flexibility. In addition, the card will support user defined characters, for example, foreign languages which can be downloaded to local RAM from the A-Series CPU.

Benefits of the on-card intelligence and the DMA per I/O card A-Series architecture result in flexible drawing capabilities. In an *Update* mode, an existing screen is added to, either with characters or vectors, with immediate display of results. This is the mode you would use to change data or to perform limited animation, such as increasing or decreasing tank levels in a process control flow application. Using the *Frame Buffer Read/Write* capability, entire screens can be downloaded via DMA to pixel display memory (frame buffer) and then to the screen. The whole screen image is displayed within seconds. This feature is particularly useful in applications where several displays are used frequently as operators execute sequences of control or trackdown process problems tagged with alarms. Frame Buffer Reads/Writes automatically takes advantage of *flash-fill*, where data is written to display memory while the screen is continuously blanked. The screen is then unblanked to display the image. Update mode can also be configured for flash-fill to take advantage of the higher performance realized.

In general, display images used frequently will be initially created in Update mode. Once in frame buffer memory, the image will be stored in A-Series memory, or on disc, via Frame Buffer Reads. Later, the A-Series can redisplay the image using Frame Buffer Writes; additional modifications can be made in Update mode.

Finally, the 12065A also supports two RS-232-C serial ports to allow for the direct attachment of graphics input accessories. This allows devices like custom keyboards and keypads, touch screens, trackballs, joy sticks or mice to be interfaced through one graphics sub-system. This saves money and I/O slots.

Functional Specifications

Video Output: Compatible with RGB RS-343. Three BNC connectors for RED, GREEN, and BLUE.

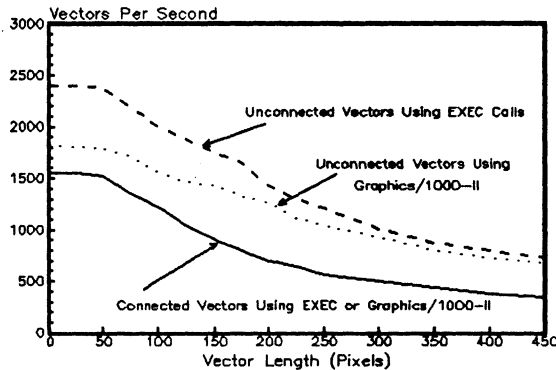
Resolution:
576x455 (4:3 aspect ratio) or
512x512 (1:1 aspect ratio).

Polygon Area Fill: 8 unique styles.

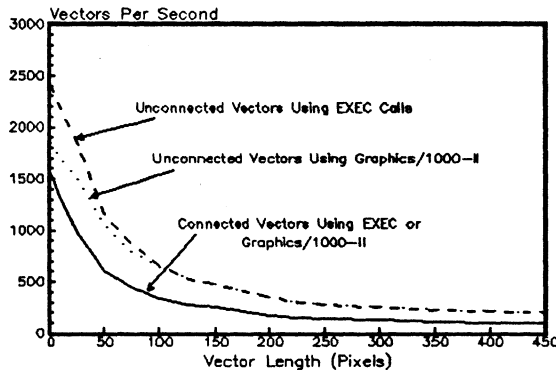
Write Modes:
Flash fill: blanking the screen, then writing vectors, pixels, and characters, then displaying the screen.
Update: single character or vector writes to existing display.

Hardware Vector Generator:

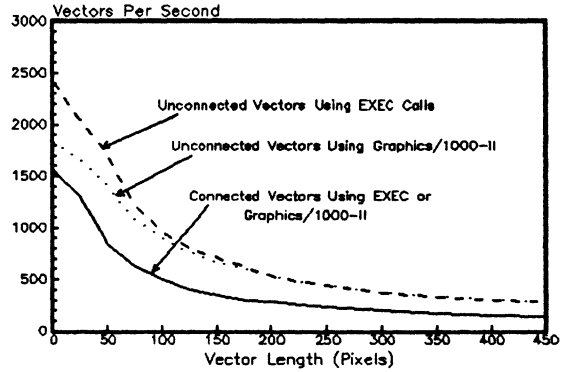
**Graph 1: Vector Performance
Screen Blanked**



**Graph 2: Vector Performance
60 Hertz Refresh Rate**



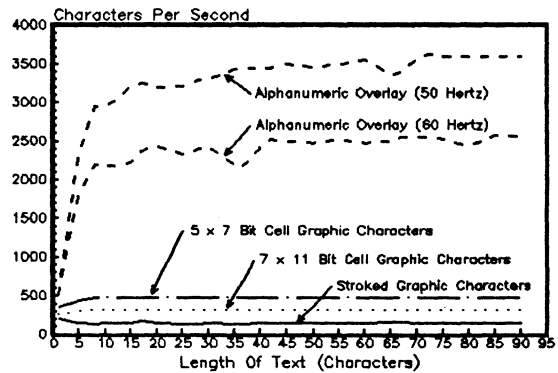
**Graph 3: Vector Performance
50 Hertz Refresh Rate**



Character Display:
Variable size and orientation (90 degree increments),
On-board ROM storage of standard character set,
On-board RAM for user downloadable character sets,
On-board character field blinking.
Characters per sec to overlay plane (one color):

Graph 4: Character Performance

Alphanumeric Overlay and Graphic Characters



Memory Maps: 4 planes partitioned as:
3 planes producing 8 colors from a palette of 4096 and 1 overlay plane for alphanumeric text
or
4 planes producing 16 colors from a palette of 4096
plus
On-board blink control of all memory planes.

Scrolling Capability

Direct Pixel Memory Frame Buffer Reads and Writes: Yes.

Accessory Data Comm:

Two RS-232-C ports, three wire
User programmable baud rate to 9600 baud,
non-continuous for interfacing Graphics
Accessories.

ELECTRICAL SPECIFICATIONS:

<u>DC Supply</u>	<u>Maximum Current</u>	<u>Maximum Power Used</u>
+12 Volts	0.062 amps	0.7 watts
-12 Volts	0.018 amps	0.2 watts
+ 5 volts	3.760 amps	19.8 watts

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C

Maximum Total Cable Distance from 3 Meter

12065A Cable to Monitor:

Total Distance for RG 59/U (Belden #9259)

Cable is: 250 feet

Total Distance for RG 11/U (Belden #9212)

Cable is: 500 feet

Maximum Numbers of Monitors per Card: 5

HP Supported Monitor: 13279B

Please note that the HP 13279B is currently the only 19" monitor tested for FCC RFI compliance. The responsibility of non-HP monitor FCC RFI compliance is with the user.

Ordering Information

The 12065A Interface includes:

- 12065-60001 Video Output Interface Assembly
- 12065-63001 3.0 Meter BNC Video Output Cables
- 12065-90001 Video Output Interface Reference Manual
- 12065-90003 Color Video Device Handlers Manual

12065A Option

001: Adds an additional 3.0 meter RS-232-C input cable with an edge connector to a female 25-pin connector, part number 12065-63002.

A self-test loop back connector for optional use with the on-card self-test is available. Order HP Part Number 12065-67001.

Product Numbers 12072A and 12830A**FOR HP 1000 A-SERIES AND M/E/F-SERIES MULTIDROP DS/1000-IV COMMUNICATION**

The HP 12072A and 12830A are slave interfaces connecting HP 1000 A-Series and M/E/F-Series computers, respectively, to the Data Link. These microprocessor based interfaces, together with 91750A DS/1000-IV software allow high-level user access between slave computers and an HP 1000 M/E/F-Series master computer (controlled by a 12790A interface) or A-Series master computer (controlled by a 12092A interface) on the Data Link. The full set of DS/1000-IV features, except remote front panel access to an A-Series computer, are supported by these interfaces. The 12072A interface is compatible with A-Series computers running RTE-L, RTE-XL, RTE-A. The 12830A Interface is supported on M/E/F-Series computers operating with RTE-6/VM, RTE-IV B, or RTE-IV E.

Features

- * Allows multiple computer access to low cost Data Link
- * Supports full DS/1000-IV software features except for remote front panel access to the HP 1000 A-Series
- * Z-80 based intelligent interface
- * Microprocessor management of Bisync protocol and on-board data buffer, leaving more CPU capacity for processing user applications
- * 1K byte of data memory and 4K bytes of program memroy
- * Firmware-controlled automatic power-up self test to help assure interface integrity
- * Asynchronous communication at rates up to 19,200 bits/second
- * Optically isolated interface for noise immunity
- * Two 8-bit switch-packs to program device address, baud rate, and datacomm operating mode

Functional Specifications**MULTIPLE COMPUTER ACCESS TO
FACTORY DATA LINK**

A number of HP 1000 computers can now be connected to the Data Link, allowing multidropped computer connection in the DS/1000-IV network environment. Data Link is an extremely cost effective, local area network for industrial automation, control, and data collection. The link provides flexible configurability and growth potential for distributed networking needs over distances up to 4km (2.5 miles).

**ON-BOARD MICROPROCESSOR OFF-LOADS
HOST COMPUTER**

A powerful microprocessor on the Data Link slave interfaces manages routine communications processing, freeing the host computer for application-oriented tasks. The protocol used throughout the link is Multipoint Bisync, which is similar to IBM Bisync. Under the control of on-board firmware, the microprocessor converts command words into actions, such as loading/unloading data from the on-board buffers to the host CPU. The microprocessor also performs the protocol generation and interpretation, error checking, and error recovery by retransmission, all without the attention of the host computer.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for direct memory access transfers to the host CPU, and unpacking words into bytes for transmission. The basic Data Link slave interface uses 4K bytes of program space and 1K byte of buffer memory, of which two 192 byte buffers are for data transmission and two 250 byte buffers are for data reception.

FIRMWARE CONTROLLED SELF-TESTS

On-board, firmware controlled self-tests, performed at power-up, help to assure reliable operation of the Data Link slave interface and minimize troubleshooting time. These tests check out most of the LSI components including the ROM, RAM, SIO, and CTC.

ERROR DETECTION CORRECTION

Errors are detected using CRC-16 cyclical redundancy error checking on blocks received or sent. The interface retransmits, or requests retransmission of the block with error, to attain error free data transfer.

DS/1000-IV COMPATIBILITY

Operation of the 12072A and 12830A slave interfaces is supported by 91750A DS/1000-IV software as described in the 91750A data sheet. All DS/1000-IV networking features are supported by the Data Link slave interfaces except remote Virtual Control Panel access to an A-Series computer.

INTERFACE LEVEL

Data Link Driver Specifications:

- Output voltage high:** 4.0 volt minimum
- Output voltage low:** 0.4 volt maximum
- Differential voltage:** 7.2V peak-to-peak min
- Drive Current:** 100mA minimum

Internally Clocked, Programmable Data Rates:
300, 600, 1200, 2400, 4800, 9600, 19200 bits/second

NOTE: Since the speed of Data Link is limited by the speed of the slowest device on the link, 12072A and 12830A speeds must be set in conjunction with those of all other devices on the Data Link.

Transmission Mode: Bit serial, asynchronous, half-duplex

Performance: See DS/1000-IV Performance Brief. Supplement available pub. 8/81 part no. 5953-2881

CONFIGURATION INFORMATION

Computer and System Compatibility:

Interface Product Numbers	Compatible Computers	Compatible Computer Systems	Compatible Operating Systems
12072A	2137A 2139A 2156B 2436A/E 2437A 2439A	2196C/D 2197C/D 2199C/D 2486A 2487A 2489A	RTE-A
12830A	2109E 2113E 2117F	2176C/E 2177C/F 2178A/C 2179A/C	RTE-6/VM RTE-IVB RTE-IVE

Computer I/O Channels Required: One per interface

Interface Current Required from Computer Power Supply:

	<u>+5V</u>	<u>+12V</u>	<u>-12V</u>
12072A	1.5A	.16A	.07A
12830A	1.3A	.16A	.07A

Software Support: Operation of each 12072A or 12830A is supported by slave driver software located in the 91750A DS/1000-IV software product.

Installation: To install, set the interface configuration switches for baud rate, device ID and group ID. Turn slave computer power off, plug the interface into the computer I/O backplane, and connect the supplied cable. Configure the master and the slave. Plug the slave computer cable into the link connector box and power-up the slave computer.

Ordering Information

12072A DATA LINK SLAVE INTERFACE

The 12072A Interface includes:

- 5061-4942 A-Series Data Link Slave Interface
- 5061-4903 Twin 5 meter cable; terminated with an HP 1000 hood connector and a 6-contact male connector.
- 12072-90001 Data Link Slave Interface Reference Manual
- 5180-1974 Data Link ROM

12072A Option

001: Provides one updated ROM.

12830A DATA LINK SLAVE INTERFACE

The 12830A interface includes:

- 5061-4902 M/E/F Data Link Slave Interface
- 5061-4903 5 meter twin HP Data Link cable terminated with an HP 1000 hood connector and a six-contact male data link connector.
- 12830-90001 Data Link Slave Interface Reference Manual
- 12830-13301 Diagnostics Software
- 5180-1974 Data Link ROM
- 5061-4909 Diagnostic Hood

12830A Option

001: Provides one updated ROM.

ADDITIONAL EQUIPMENT REQUIRED FOR OPERATION

Data Link Slave Computer with 91750A DS/1000-IV software package.

Data Link Master Computer, 3074A, Data Link cable, connector boxes, 12790A Multipoint Master or 12092A Factory Data Link Master, 91730A Multipoint Software Package.

Diagnostic software is provided on the 12830A as part of the product. The 12072A Diagnostic Software is obtained from the 24612A Diagnostic Package.

HP 1000 A-Series and M/E/F-Series Binary Synchronous Modem and Direct Connect Interfaces for DS/1000-IV Communication between HP 1000 and 3000 Systems

Product Numbers 12073A, 12082A, 12793B, and 12834A

The HP 12073A, 12082A, 12793B and 12834A are interfaces for modem or direct connect communication between HP 1000 network nodes based on both A-Series and M/E/F-Series Computers and the HP 3000. Series applicability of these interfaces is summarized in Table 1, below. All of these microprocessor-based interfaces use the Binary Synchronous protocol. The interface handles all BSC protocol generation, including CRC-16 error checking, on-board buffer management, and all modem control tasks (12073A and 12793B interfaces only). In conjunction with 91750A DS/1000-IV software, the BSC interfaces support high-level user access between HP 1000 computers and HP 3000 computers.

- facilitate checks of line quality and assist link troubleshooting
- * Binary Synchronous interface for DS/1000-IV to DS/3000 communication links with microprocessor management of BSC protocol, CRC-16 error checking, buffer management, DMA transfers, and modem control tasks
- * Data rates to 57.6K bps
- * 12073A and 12793B support synchronous full duplex modems
- * 12082A and 12834A interfaces support hardwired links up to 1km/0.62mi
- * 12082A/12834A optically isolated input breaks ground loops, maximizing noise immunity for direct connect links

Table 1. Series Applicability of BSC Network Interfaces

Type of Interface	For HP 1000 A-Series	For HP 1000 M/E/F-Series
Modem	12073A	12793B
Direct Connect	12082A	12834A

Features

- * Availability of both modem and direct connect interfaces to maximize network planning flexibility
- * On-board microprocessor off-loads the computer, making possible larger networks and leaving more CPU capacity for processing user's applications
- * 16K bytes of RAM memory for extensive on-board message buffering
- * Firmware-controlled automatic power-up self test to help assure interface integrity
- * Long term communication line statistics and message logs are available through user request via DS/1000-IV software to

Functional Description

ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER

A powerful microprocessor on the BSC network interface manages routine communications processing, freeing the host computer for applications oriented tasks. Under control of on-board firmware, the microprocessor converts command words into actions, such as establishing the communications link and loading/unloading data from the on-board buffers to the host CPU. The microprocessor also performs the protocol generation and interpretation, error checking, and error recovery by retransmission, all without the attention of the host computer.

Numerous user-programmable parameters are available to tailor the interface to specific applications and configurations, which are also managed by the microprocessor. For example, from 0 to 255 retransmissions of blocks in error can be set by the user, or a default of 7 may be used. The transmission block size can also be specified.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for Direct Memory Access transfers to the host CPU and unpacking words into bytes for transmission.

Finally, on the 12073A/12793B interface, the microprocessor handles the synchronous modem control signals.

FIRMWARE CONTROLLED SELF TESTS

On-board, firmware-controlled self tests, performed at power-up, help to assure reliable operation of the BSC network interface and minimize troubleshooting time. These tests check out the RAM and ROM memories, the Direct Memory Access operations, baud rate generators, and the I/O channel control.

COMMUNICATION LINE STATISTICS

Eleven long-term statistics are accumulated automatically and buffered on the interface. These statistics can be easily read by the user to help determine the quality of the communication line and to aid link troubleshooting. They are:

1. Good blocks sent.
2. Good blocks received.
3. Bad blocks received.
4. NAKs received.
5. WACKs sent.
6. WACKs received.
7. TTDs sent.
8. TTDs received.
9. Response errors.
10. Three-second timeouts.
11. Line errors.

Functional Specifications

COMMUNICATIONS

Interface Level: EIA RS-422, Direct Connect. RS-232, RS-449, V.28, Modem Connect.

Internally-clocked Programmable Data Rates: 300, 1200, 2400, 4800, 9600, 19200, and 57600 bits/second.

Transmission Mode: Half-duplex, bit-serial synchronous.

Message Buffering: A maximum of 6432 bytes in each direction (12864 bytes total) may be buffered using the 16K byte on-board RAM memory.

Error Detection and Correction: Errors are detected using CRC-16 cyclic redundancy checking on all blocks sent or received. The interface retransmits, or request retransmission of all blocks with errors to attain error-free data transfer. The user can specify 0 to 255 retransmissions. If a number is not user specified, the maximum number of retransmissions initiated by the interface defaults to 7.

Line Protocol: The card family implements an extended subset of the IBM Binary Synchronous Communications Line protocol and NOT in a general-purpose Binary Synchronous interface. It should be used only for HP 1000-to-HP 3000 communications links in the HP-DSN environment. (It is also possible to connect HP 1000s to 9835/45 desktop computers with the appropriate simulator software.)

EUROPEAN LICENSING OF BSC MODEM INTERFACES

Hewlett-Packard has secured FTZ licensing of the 12073A and 12793B interfaces in Germany and GPO licensing in the United Kingdom.

CONFIGURATION INFORMATION

System Compatibility:

Table 1. Modem & Direct Connect Interfaces

<u>Product Number</u>	<u>Compatible Computers</u>	<u>Compatible Systems</u>
12073A & 12082A	2137A 2139A 2436A/E 2437A 2439A	2196C/C 2197C/D 2486A 2487A 2489A
12793B & 12834A	2109E 2113E 2117F	2176C/E 2177C/F 2178A/C 2179A/C

Interface Current Required from Computer Power Supplies:

<u>Product Number</u>	<u>+5V Supply</u>	<u>+12V Supply</u>	<u>-12V Supply</u>
12073A	2.6A	0.35A	0.18A
12082A	2.4A	0.31A	0.04A
12793B	1.93A	0.32A	0.18A
12834A	1.81A	0.27A	0.04A

Computer I/O Channels Required: One per BSC network interface (uses two EQT's and two LU's in an RTE System).

DIRECT CONNECT

Counterpart Interfaces in HP 3000 Systems: HP 30010A interface and 30222F cable for HP 3000 Series II/III, HP 30020A/B interface and 30221F cable for HP 3000 Series 30/33/34.

Modem Connect Interfaces in HP 3000 Systems: Same as above but use 30222A and 30221A cables respectively.

Software Support: Operation of any number of HP 1000-3000 communications link (which can use the 12834A interface) is supported by 91750A DS/1000/IV software.

Compatible U.S. Modems and Communication Lines: The 12073A/12793B interface is compatible with modems below:

Table 1. Connections, Modems, and Data Rates

Connection via	Modem Type	Maximum Synchronous Data Rate (bits/s)
Private Lines	Bell 2096	To 9600
Dial Up	Bell 212A	To 1200
	Bell 208B	To 4800

European Modems: Contact local European HP sales office for information. European modems and interfaces should have approval of PTT in each country.

Ordering Information

Note: The 12073A, 12082A, 12793B, and 12834A interfaces are for use only in the 91750A DS/1000-IV environment for HP 1000-to-HP 3000 communication links. They are not general-purpose BSC interfaces.

12073A BSC NETWORK MODEM INTERFACE (for A-Series)

The 12073A Interface includes:

- 5061-4940 A-Series Programmable Serial Modem Interface
- 91750-80016 Network Firmware ROM
- 91750-80017 Network Firmware ROM
- 5061-4914 5 meter (16 ft) RS-232-C Modem Interface Cable

- 5061-4916 RS-232-C Diagnostic Hood
- 12042-91001 A-Series Programmable Serial Reference Manual (Modem)
- 5955-7627 Bisync Protocol Firmware Manual

12793B DS-1000-IV MODEM INTERFACE TO HP 3000 (for M/E/F-Series)

The 12793B Interface includes:

- 5061-4913 M/E/F-Series Programmable Serial Modem Interface
- 91750-80016 Network Firmware ROM
- 91750-80017 Network Firmware ROM
- 5061-4914 5 meter (16 ft) RS-232-C Modem Interface Cable
- 5061-4916 RS-232-C Diagnostic Hood
- 5955-7627 Bisync Protocol Firmware Manual
- 12826-91001 M/E/F Programmable Serial Interface Hardware Reference Manual

12073A/12793B Options

- 001:** Provides one set of updated firmware ROMs (deletes other parts of the interface).
- 002:** Deletes 5061-4914 RS-232-C Cable and adds 5061-4923 RS-449 Cable

12082A DS-1000-IV DIRECT CONNECT INTERFACE TO HP 3000 (for A-Series)

The 12082A Interface includes:

- 5061-4938 A-Series Programmable Serial Direct Connect Interface
- 91750-80016 Network Firmware ROM
- 91750-80017 Network Firmware ROM
- 5061-3422 5 meter (16 ft) direct connect interface cable to a male connector. Extension cables may be necessary. See direct connect extension accessory 91712A through 91714A
- 5061-3460 Diagnostic Test Hood
- 12042-91002 A-Series Programmable Serial Interface Hardware Reference Manual (Direct Connect)
- 5955-7627 Bisync Protocol Firmware Manual

12082A Options:

- 001:** Set of latest firmware ROMs (deletes other parts of the interface)

**12834A DS-1000-IV DIRECT CONNECT
INTERFACE TO HP 3000 (for M/E/F-Series)**

The 12834A Interface includes:

- 5061-3432 M/E/F-Series Programmable
Serial Direct Connect Interface
- 91750-80016 Network Firmware ROM
- 91750-80017 Network Firmware ROM
- 5061-3422 5 meter (16 ft) direct connect
interface cables to a male con-
nector. Extension cables may
be necessary. See direct connect
extension accessory 91712A
through 91714A
- 5061-3460 Diagnostic Test Hood
- 12826-91002 MEF Programmable Serial
Interface Hardware Reference
Manual (Direct Connect)
- 5955-7627 Bisync Protocol Firmware
Manual

12834A Options

- 001:** Set of latest firmware ROMs (deletes
other parts of the interface)

**DIRECT CONNECT EXTENSION
ACCESSORIES**

- 91712A** Assembled 75 meter (255ft) extension
cable with 24-pin connectors for
direct connect HP 1000- to-HP 3000
connections
- 91713A** Pair of 24-pin cable connectors for
user fabricated card-to-card direct
connect extension cable (cable part
number 8120-3096 not supplied)
 - Opt 001:** Pair of edge connectors for user
fabricated direct connect cable (cable
part number 8120-3096 not supplied)
- 91714A** 300 meters of 8120-3096 direct con-
nect cable with 24-pin cable connec-
tors and a connector kit for user
fabricated direct connect extension
cable

*NOTE: HP cable is equivalent to Belden
YR19169. No other cable is supported or has
been tested.*

Product Numbers 12075A and 12250A

The HP 12075A and HP 12250A are interfaces for modem communication which implement the CCITT X.25 recommendation for physical interface (X.21 bis) and frame interface (LAP-B) levels. These interfaces provide access to packet switching wide-area networks which use the X.25 interface standards.

The 12075A is used with HP 1000 A-Series and the 12250A is used with the HP 1000 M/E/F-Series minicomputers. They provide support for the internationally adopted full-duplex Link Access Protocol-Balanced (LAP-B) and handle all LAP-B protocol generation (including CCITT compatible CRC error checking), on-board buffer management, and all modem control tasks. These interfaces operate in conjunction with HP 91751A DSN/X.25 and HP 91750A DS/1000 IV Software to allow higher-level user communication through a packet-switching network.

Features

- * Meets international recommendations for physical and frame level CCITT X.25 Packet Switching Networks
- * Compatible with DSN/X.25 (HP 91751A)
- * On-board microprocessor off-loads the computer, making possible larger networks and leaving more CPU capacity for processing user's applications
- * On-board message buffering
- * Firmware-controlled automatic power-up self-test
- * Supports synchronous full-duplex modems
- * LAP-B interface for communication link with microprocessor management of LAP-B protocol, CCITT compatible CRC error checking, buffer management, DMA transfers, and modem control tasks

Functional Description

ON-BOARD MICROPROCESSOR OFF-LOADS COMPUTER

A powerful microprocessor on the LAP-B network interface manages routine communications processing, freeing the host computer for applications-oriented tasks. Under control of on-board firmware the microprocessor converts command words into actions, such as establishing the communications link and loading/unloading data from the on-board buffers to the host CPU. The microprocessor also performs the protocol generation and interpretation, error checking and error recovery, all without the attention of the host computer.

Numerous user-programmable parameters are available to tailor the interface to specific network applications and configurations, which are also managed by the microprocessor. For example, the number of retransmissions of a frame before error recovery can be set by the user through 91750A network software. Maximum frame size and communication line timeouts, are accessible for optimizing efficiency of each communications link.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for Direct Memory Access transfers to the host CPU and unpacking words into bytes for transmission. The microprocessor handles the synchronous modem control signals and is capable of setting or sensing additional modem control lines by software request.

FIRMWARE CONTROLLED SELF-TEST

An on-board, firmware-controlled self-test is performed at power-up to assure reliable operation of the LAP-B network interface and minimize troubleshooting time. RAM and ROM memories, Direct Memory Access operations, baud rate generators, and the I/O drivers and receivers are tested.

COMMUNICATIONS LINE STATISTICS

Long-term statistics are accumulated automatically and buffered on the interface to assist in verifying the quality of the communication line and to aid troubleshooting. Statistics are:

1. Information frames received.
2. Receiver Ready frames received
3. Receiver Not Ready frames received.
4. Reject frames received.
5. Receive process overflows.
6. CRC errors.
7. Abort sequences received.
8. SIO chip receive overruns.
9. Receive buffer overruns.
10. Frames with incorrect address field.
11. FRMR frames received.

Functional Specifications

COMMUNICATIONS

Interface Level: EIA RS-232, EIA RS-449, CCITT X.21 bis compatibility.

Transmission Mode: Full-duplex, bit-serial synchronous.

12075A/12250A Interface Signals:

<u>Signal</u>	<u>Source</u>	<u>Default</u>	<u>Function</u>
RD	DCE	None	Receive Data
SD	DTE	None	Send Data
CS	DCE	DCE dep	Clear to Send
RS	DTE	F/W	Request to Send
TR	DTE	F/W	Data Terminal Ready
RR	DCE	DCE dep	Receiver Ready (Data Carrier Detect)
ST	DCE	None	Send Timing (Transmit Clock)
RT	DCE	None	Receive Timing (Receive Clock)
TT	DTE	None	Terminal Timing
IC	DCE	DCE dep	Incoming Call (Ring Indicator)
DM	DCE	DCE dep	Data Set Ready
TM	DCE	DCE dep	Test Mode
LL	DTE	F/W	Local Loopback
RL	DTE	F/W	Remote Loopback
SQ	DCE	DCE dep	Signal Quality
SF/SR	DTE	F/W	Select Frequency/Select Rate
IS	DTE	F/W	In Service
NS	DTE	F/W	New Signal
SRD	DCE	None	Secondary Receive Data
SSD	DTE	None	Secondary Send Data
SRS	DTE	F/W	Secondary Request to Send
SCS	DCE	DCE dep	Secondary Clear to Send
SRR	DCE	DCE dep	Secondary Receiver Ready

*Where DCE dep = Depends on external DCE device and connection
F/W = Set by interface firmware*

Internally-clocked, Programmable Data Rates:
300, 1200, 2400, 4800, 9600, 19200, 38400, 48000 and 57600 bits/second.

Externally-clocked: To 57.6K bits/second.

Message Buffering: 14K bytes available for data buffering.

Error Detection and Correction: Errors are detected using CCITT compatible CRC cyclic redundancy checking on all frames sent or received. The interface transmits, or requests retransmission of all frames with errors to attain error-free data transfer. The maximum number of retransmissions specified by the user.

EUROPEAN LICENSING OF LAP-B MODEM INTERFACES

Hewlett-Packard has applied for FTZ licensing of the 12075A and 12250A interfaces in Germany and GPO licensing in the United Kingdom. Current status of licensing is available from local HP representatives.

CONFIGURATION INFORMATION

System Compatibility:

Table 1. Lap-B Network Interface

Product Number	Compatible Computers	Compatible Systems
12075A	2137A	2196C/D
	2139A	2197C/D
	2156B	2199C/D
	2436A/E	2486A
	2437A	2487A
	2439A	2489A
12250A	2109E	2176C/E
	2113E	2177C/F
	2117F	2178A/C
		2179A/C

Computer I/O Channels Required: 1

Interface Current Required from Computer Power Supplies:

Product Number	+5V Supply	+12 Supply	-12V Supply
12075A	2.6A	0.35A	0.18A
12250A	1.93A	0.32A	0.18A

Software Support: Operation of the LAP-B network interfaces is supported by 91751A DSN/X.25 and can be used with the 91751A and 91750A DS/1000 IV software.

Compatible U.S. Modems and Communications Lines: The 12075A/12250A interface is compatible with the modems listed in Table 2. The LAP-B card supports standard RS-232C compatible modems supplied by Transpac and Telenet at speeds up to 19200 bits/seconds. Strapping requirements and recommendations for U.S. modems used with the 12075A/12250A are given in the LAP-B Firmware Manual.

Table 2. Connections, Modems, and Data Rates

Connection via	Modem Type	Maximum Synchronous Data Rate (bits/s)
Switched Telephone Lines	Bell 212A	To 1200
	Bell 201C	To 2400
Private Lines	Bell 208A	To 4800
	Bell 209A	To 9600
	HP 37220T	To 9600

European Modems: Contact local European HP sales office for information. European modems and interfaces should have approval of PTT in each country.

12075A/12250A Installation: Set the interface configuration switch for baud rate. On the 12075A interface, set I/O address on the select code switches. With power off, plug the interface into the computer I/O backplane, connect the supplied cable to the compatible customer-furnished modem, and integrate the interface card and operating system.

Ordering Information

12075A LAP-B NETWORK MODEM INTERFACE (for A-Series)

The 12075A Interface includes:

5061-4940	A/L-Series Modem Programmable Serial Interface Assembly
5180-7220 and 5180-7221	LAP-B Network Firmware ROMs
5061-4914	5 meter (17 ft) RS-232-C Modem Interface Cable
5061-3425	RS-232-C Loop-Back Verifier Hood
5955-7625	LAP-B Firmware Reference Manual
12042-91001	PSI Installation Manual

12250A LAP-B NETWORK MODEM INTERFACE (for M/E/F-Series)

The 12250A Interface includes:

5061-4913	M/E/F-Series Modem Programmable Serial I/F Assembly
5180-7220 and 5180-7221	LAP-B Network Firmware ROMs
5061-4914	5 meter (17 ft) RS-232-C Modem Interface Cable
5061-3425	RS-232-C Loop-Back Verifier Hood
5955-7625	LAP-B Firmware Reference Manual
12826-91001	PSI Modem Interface Hardware Reference Manual

12075A/12250A Options

001: Deletes all but one set of updated firmware ROMs (5180-7220 and 5180-7221) and the LAP-B Interface Firmware Reference Manual (5955-7625)

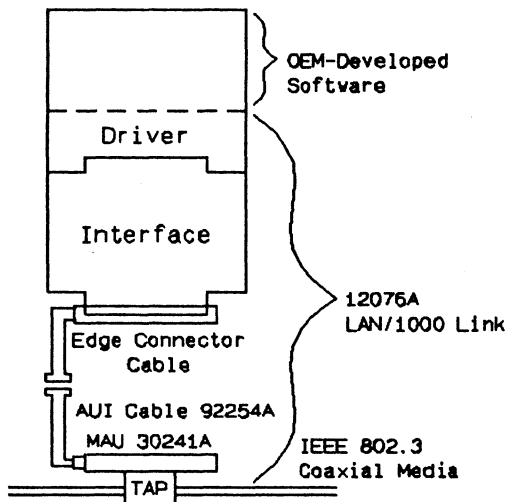
002: Substitutes 5061-4923 5 meter (17 ft) RS-449 Modem Interface Cable and 5061-4915 RS-449 Loop-Back Verifier Hood for 5061-4914 and 5061-3425

Local Area Network Interface Controller

Product Number 12076A and 12079A

The HP 12076A LAN/1000 Link and HP 12079A Direct Driver Access (DDA) products provide the hardware, software and documentation for customers to connect an HP 1000 A-Series computer to a Local Area Network.

The LAN/1000 Link product provides the interface between an A-Series computer and an IEEE 802.3 Local Area Network. The 12076A enables an A-Series computer to communicate with other A-Series computers at a 10 Mbits/second transfer rate along the network. The product consists of a printed circuit assembly, a card connector cable, an Attachment Unit Interface (AUI) cable, an installation guide, interface driver and node management software. The figure below shows the 12076A as it connects to an IEEE 802.3 type 10 Base 5 backbone ("thick") coaxial cable. The product can also be connected to an IEEE 802.3 Type 10 base 2 ThinLAN ("thin") coaxial cable via an HP 28641A ThinMAU.



The 12076A can connect to Ethernet Rev. 1 baseband local area networks using an optional card connector cable. The LAN/1000 Link transmits and receives both IEEE 802.3 and Ethernet Rev. 1 type packets.

The LAN/1000 Link product provides the signalling layer and the media access control sub-layer protocols as defined in the IEEE 802.3 and Ethernet Rev. 1 standards. This capability allows the interface to prepare packets for transmission by adding preamble and Cyclic Redundancy Check (CRC), transmit packets according to link access protocol, receive incoming packets addressed to the node, and check them for correctness before transmitting them to the host CPU. The LAN/1000 Link also provides diagnostic and link management functions such as self test, loopback, promiscuous mode addressing, and statistics gathering. Higher level protocols are handled by the host system.

The Direct Driver Access (DDA) product provides the necessary information to interface the user's customized networking software to the driver contained in the LAN/1000 Link product.

Features

- * Direct Driver Access
- * 10 Mbits/s Burst Transfer Rate
- * Single Card Interface
- * Frame size of 1500 bytes
- * Operational compatibility with IEEE 802.3 and Ethernet Rev. 1
- * Provides power (0.5A @ 12V) for MAU
- * Provides physical signalling layer and media access control sublayer
- * Interface adds preamble, Source Address, and CRC to transmit packets; strips preamble and CRC from receive packets
- * 32K bytes of on-board RAM allowing buffering for both transmit and receive packets
- * Capable of receiving multiple back-to-back packets
- * Provides for Multicast, Broadcast, and Individual Addressing
- * Collection of Link Statistics (Collided Packets, Bad Packets, etc.)
- * On-board loopback of transmit packets addressed to self

- * Card configuration stored in non-volatile memory
- * Generates response packets for TEST and XID packets for specific DSAP
- * Power-on self test
- * Environment: Class B
- * EMC: will pass FCC, VDE level A

COMMUNICATION LINE STATISTICS

As packets are transmitted and received from the link, the interface firmware tabulates occurrences of particular events and returns these counts as statistics when requested. When reading the statistics, a user has the capability of resetting them all. Good received packets, good transmitted packets, good bytes transmitted, and good bytes received, are all 32-bit unsigned integers. All other statistics are 16-bit unsigned integers.

The following statistics are collected:

1. Interface firmware revision code (not resettable)
2. Total number of good bytes transmitted
3. Total number of good bytes received
4. Total number of good packets transmitted
5. Total number of good packets received
6. Total number of errors on transmit
7. Total number of bad frames received
8. Total number of times no heartbeat was indicated after a transmission
9. Total number of times a packet was missed due to a lack of resources
10. Total number of memory errors
11. Total number of receive framing errors
12. Number of packets discarded by driver (on card)
13. The number of packets received with a CRC error
14. 802.3 length field errors
15. Total number of times the transmission of a packet was completed after 2 to 15 retries
16. Number of times exactly one retry was needed to transmit
17. Number of times any packet was deferred while trying to transmit
18. Total number of underflow errors on transmit
19. Number of times the interface detected a late collision on transmit
20. Number of times the carrier was lost when transmitting a frame
21. Number of times the transmission of a frame failed after 16 retries
22. TDR information from last valid TDR

USER CONFIGURABLE ADDRESS

Each interface is shipped with a unique link level (node) address. In order to allow the user the most flexibility, the nodal address may be changed from the factory set address. This is an important feature for OEMs who may want their devices to have specific addresses or may not have software which can be easily updated as nodes are moved around in the network.

REMOTE FORCED COLD LOAD CAPABILITY

The A-Series LAN interface supports Virtual Control Panel/Remote Forced Cold Load modes of operation. Hence, the host may be downloaded and booted from a remote mode over the LAN.

Functional Specifications

GENERAL CHARACTERISTICS

Topology: Bus

Network Medium: Digital baseband IEEE 802.3 Type 10 base 5 backbone ("thick") coax

Maximum Distance Between Nodes per Segment: 500m (excluding AUI cables)

Minimum Distance Between Nodes: 2.5 meters

Maximum Number of Nodes: 100

Maximum AUI Length: 42 meters

TRANSMISSION CHARACTERISTICS

Transmission Mode: Baseband Digital

Access Methods: Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Impedance: 50 Ω

ENVIRONMENTAL CHARACTERISTICS

Temperature:

Non-operating: -40°C to +75°C

Operating: 0°C to +70°C

Humidity: 5% to 95% relative humidity

ELECTRICAL SPECIFICATIONS

Maximum Power Consumption:

(+5V) 3A, 15 Watts

(+12V) 0.5A, 6 Watts (with MAU attached)

Ordering Information

12076A LAN/1000 LINK

The 12076A Standard Product includes:

12076-60001	PCA A-Series LAN Unit
12076-63001	802.3 Card Connector Cable
12076-90001	Installation Manual
12076-90002	Node Manager User's Guide
30241-60101	Medium Attachment Unit
0362-0819	Coaxial Cable Tap Kit
92254A	6 meter FEP AUI

12076A Option 001:

Option 001 substitutes an Ethernet Rev. 1 Card Connector Cable for the standard IEEE 802.3 compatible cable. The option also deletes the AUI and MAU. Since there are grounding differences between the two types of hardware, it is **important** to distinguish the type of media hardware being used at a node. If the media access hardware conforms to Ethernet Rev. 1 then Option 001 should be ordered. Option 001 substitutes an Ethernet Edge Connector cable for the standard 802.3 compatible cable.

12076A Option 002:

Option 002 is a firmware update option which will delete everything except the latest firmware stored on EPROMs. Customers on support subscriptions will receive updates automatically.

12076A Option 241:

Option 241 deletes the 6m FEP AUI cable and the Medium Attachment Unit.

12076A Software Media Options *

One of the following options should be ordered in order to get the Node Management interface and driver software. The user does have the right to make multiple copies of the software at no cost.

022: Linus Cartridge

044: Micro Floppies

051: 1600 BPI Magnetic Tape

12079A DIRECT DRIVER ACCESS

The 12079A LAN/1000 DDA includes:

12079-90001 Driver Reference Manual

ORDERING RELATED PRODUCTS

30241A Medium Access Unit can be ordered separately through HP Direct Marketing Division. This product is for attachment to 802.3 backbone "thick" coax cable only.

28641A ThinMAU with integral 1m AUI cable is available through Direct Marketing Division. This product enables the LAN interface to attach to an IEEE 802.3 Type 10 Base 2 ThinLAN coaxial cable.

Attachment Unit Interface (AUI) Cables are available through Direct Marketing Division only. They come in various sizes up to a maximum length of 48m. There are PVC and Teflon cables available. PVC should be used when the cable will be installed in a conduit. Teflon (FEP) cable should be used when installing into ceilings and walls. Due to local and municipal codes, it is the customer's responsibility to determine proper cable selection. These AUI cables cannot be used with the 28641A ThinMAU.

IEEE 802.3 Coaxial Cable and Installation Kits are available through Direct Marketing Division for both "thin" and "thick" coaxial cable environments. The lengths of the coaxial cable were determined to be the best to minimize impedance problems when connecting multiple cables.

*Valid until 1st Quarter FY'86, at which time the software will be incorporated into the RTE-A operating system.

LAN/1000 Link Performance Brief

The following results are preliminary. For the final performance testing results, please contact the Sales Center or order a Performance Brief (PN 5953-5016) from the Literature Distribution Center after October 1, 1985.

TEST ENVIRONMENT

The test results are based on program communication between two HP 1000 series A700 systems. The programs, one writer and one reader, utilize the Direct Driver Access methods to write a data buffer to the LAN/1000 Link driver, and read the buffer from the Link, respectively, monitoring the transfer rates simultaneously. A third program, running on both systems, measured the system overhead involved in the communication process. During the testing, there were no other tasks running on the systems, and there was no other activity on the network. (Note: the programs did no buffer manipulation; they only read data in from the buffer and wrote data out to the LAN.)

A few assumptions can be made which may help in forecasting one's actual performance against the performance achieved through the test environment. First, one can expect better Link performance (and therefore better overall network performance) with A900 systems, versus A600/A700 systems. Second, using non-class I/O for reads will provide improved results over using class I/O, as in the test procedures. (The supplied Read program uses class I/O). Conversely, a decrease in performance can be expected for systems running many tasks, and overall network speeds will be slower when many nodes are communication on the LAN.

ABOUT THE GRAPHS

Each graph plots some quantity as a function of buffer size. "Buffer size" refers to the length of the data buffer being written to (or read from) the LAN/1000 card buffer. It includes the user's data (e.g., file, program data), plus packet information such as frame delimiters, length field, destination address, control information, and an error-detecting code, as well as space for a source address, which the card itself supplies.

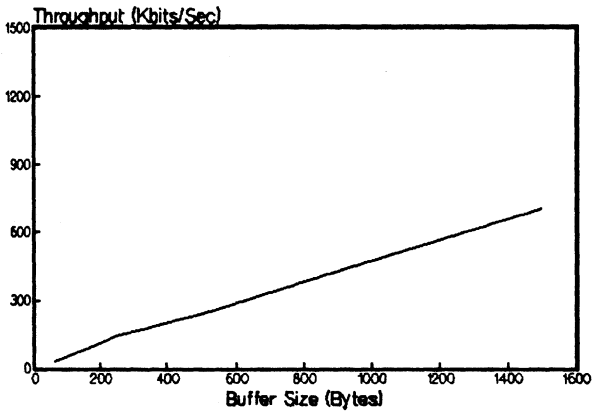
The performance data is broken up into transmit and receive, as there is a significant variation between the data rate associated with each. Complete node-to-node communication throughput is necessarily bottlenecked by the slower read process, but because of the 32 Kbytes of RAM buffering available on the card, the writing node need not be slowed by the reading node, which can buffer the data being sent. Transmit data rates are affected when messages exceeding 32 Kbytes are sent.

THROUGHPUT versus BUFFER SIZE

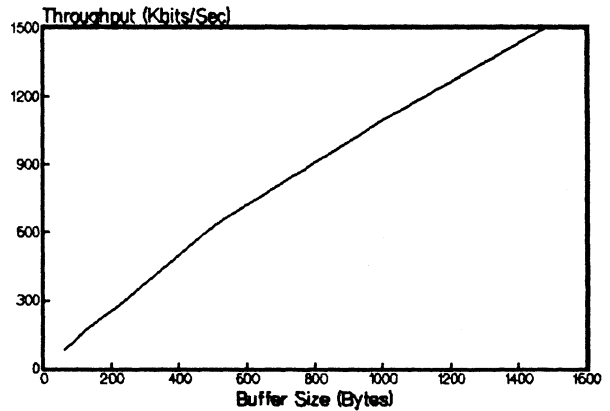
The following two graphs measure throughput as a function of buffer size. "Throughput" refers to the data rate (Kbits/Sec) for the transfer of the data buffer through the LAN Link. On a write, this includes transferring data from user memory to the card buffer, and finally onto the network. For a read, data is transferred from the network to the card buffer, and then a system program is invoked to transfer the data

to user memory. The graph for the receive operation illustrates the slowing of throughput incurred by the longer data path. The throughput increases with the buffer size, since the card and driver must perform a fixed amount of overhead (not to be confused with system overhead) for each packet, regardless of size, therefore overall throughput over the link gets higher for larger packets.

Throughput vs. Buffer Size
(Receive Data - Overhead Constant)



Throughput Vs. Buffer Size
(Transmit Data - Overhead Constant)

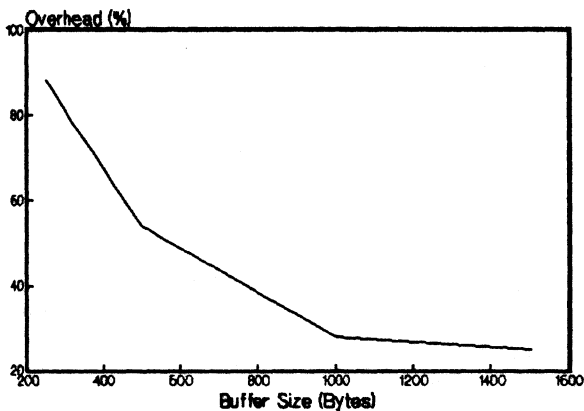


OVERHEAD versus BUFFER SIZE

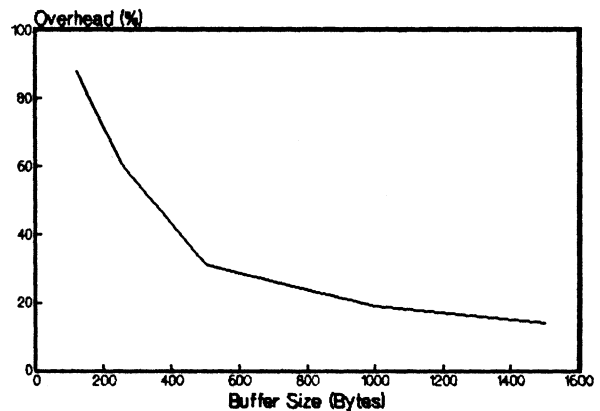
"Overhead" refers to the system CPU time that is dedicated to a data transfer/receive, and occurs at the LAN/1000 Link driver level. For a write command, this involves configuring buffers for data transfers to the card, while on a read command, a system reader program must be scheduled to transfer the data to system buffers.

The amount of overhead is expressed as a percentage of the total available CPU capability. Again, the overhead decreases with the buffer size, since the system must be configured regardless of the amount of data to be transferred, and therefore less CPU time per byte is required.

Overhead Vs. Buffer Size
(Receive Data - Data Rate Constant)



Overhead Vs. Buffer Size
(Transmit Data - Data Rate Constant)



Product Number 12092A

The HP 12092A Data Link/Multipoint Master is a controller for the HP Data Link (HPDL) communications network, and for HP terminals connected in Multipoint configurations. It provides a low-speed, low-cost communications alternative for a large number of HP devices. The Data Link/Multipoint Master provides the controller capability for the HP 91732A Data Link/Multipoint Subsystem and enables an HP 1000 A-Series Computer to act as a network controller. Refer to the HP 1000 Communications Data Book Supplement (5953-8727) for a description of the Data Link and Multipoint system configurations.

Features

- * Multipoint protocol (similar to Bisync)
- * Allows up to 64 terminals to be linked in a Multipoint configuration
- * Compatibility with EIA RS-232-C and CCITT V.28 interfaces
- * Supports RS-232-C compatible asynchronous modems
- * Automatic polling of up to 64 devices
- * Selectable data rates to 19.2K bits/second
- * Independent block sizes for each device up to 2032 bytes
- * Special character handling capabilities, including optional removal of ASCII Rs, Gs control characters from character strings
- * CRC-16 error checking of incoming data
- * Backplane command protocol compatible with HP A-Series Computers
- * Configurable protocol timeouts
- * Built-in firmware self test
- * Long-term statistics
- * Diagnostic mode with loopback hood
- * Asynchronous modem support

Functional Description**ON-BOARD MICROPROCESSOR OFFLOADS
HOST COMPUTER**

A microprocessor on the interface manages routine communications processing, freeing the host computer for applications-oriented tasks. Firmware residing on the board manages the character-oriented Bisync protocol which controls all communications activity.

AUTOMATIC POLLING

The interface polls all devices on its polling list, determines which has a message to be sent, and initiates transfer. When a device is selected to transfer data, detection of an error will automatically initiate a retry. When the maximum number of retries is reached, the request is aborted. Then the firmware will notify the driver that the request is aborted.

Normal polling operation involves continuously scanning a list of all devices until one requests a data transfer, and then initiating the transfer. If a device is taken out of service, the list is modified to exclude it, and the device is polled at a slower rate by a separate "background" list. When it is brought back into service, the device is returned to the main list. This technique enables devices to be disconnected from the network without degrading overall performance.

CHARACTER BUFFERING

A unique character block size can be selected for each device on the link, allowing optimum data transfer rates for each. The card contains two 2032 byte buffers for reading characters and three 2032 byte buffers for writing characters.

STATISTICS

Major events, including successful transmission of data, NAK retries, WACK retries, successful receipt of data, TX overruns, RX overruns, TTD's received, and RVI's transmitted and received.

SELF-TEST

The HP 12092A has a built-in self test initiated by power turn-on which indicates whether the card is operating properly. Test results are displayed by an array of light emitting diodes that indicate successful operation of the test, or provide a code referencing error messages found in the installation manual. If the test hood supplied is connected to the edge connector during a selftest, the test includes serial input-output circuits and line drivers and receivers.

Functional Specifications

5601-4912 CARD ASSEMBLY

Physical Interface: EIA RS-449, RS-232-C, and CCITT V.28

Voltage Level: 5V differential

Ground Isolation: 120 VDC

Inputs and Outputs: See Table 1 for standard RS-232-C lines. Front edge connectors meet RS-422 and RS-423 electrical standards, which allows compatibility with RS-232-C.

FIRMWARE

Message Protocol: Asynchronous, HP Multipoint (similar to Bisync).

Number of Devices: 64

Data Rates, switch selectable: 19.2K, 9600, 4800, 2400, 1800, 1200, 600, 300 bits/second.

Note: Multipoint configuration does not offer 19.2K bits/second

Message Block Sizes: 16 to 2032 message characters.

Statistics Measured: Successful transmission, NAK retries, WACK retries, successful receipt of data, CRC errors on input.

Table 1. Standard RS-232-C Lines

<u>Pin* No.</u>	<u>Signal Name</u>	<u>Description</u>	<u>Board Edge Pin</u>
1	AA	Protective Ground	38A
7	AB	Signal Ground	25A
2	BA	Transmitted Data	8A
3	BB	Receive Data	23A
4	CA	Request to Send	9A
5	CB	Clear to Send	17A
6	CC	Data Set Ready	27A
20	CD	Data Terminal Ready	11B
22	CE	Ring Indicator	24B
8	CF	Received Line	26A
21	CG	Signal Quality Detector	18A
23	CH	Data Signal Rate	28A
24	DA	Transmitter Signal Element Timing (DTE)	9B
15	DB	Transmitter Signal Element Timing (DCE)	20B
17	DD	Receive Timing Element Timing (DCE)	30B
14	SBA	Secondary Transmitted Data	3A
16	SBB	Secondary Received Data	32A
19	SCA	Secondary Request to Send	7A
13	SCB	Secondary Clear to Send	31A
12	SCF	Secondary Received Line Signal Detector	22A

* On DCE Connector

HOST COMPUTER HARDWARE

Backplane Specifications: HP 1000 A-Series computers

HOST COMPUTER SOFTWARE

Operating System: RTE-A

Software Driver (Included with 91732A): IDS00

System Software: HP 91732A Data Link/Multipoint Subsystem

CONFIGURATION

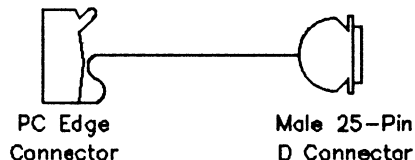
Computer and System Compatibility:

Table 2. Data Link/Multipoint Master Compatibility

Interface Product Numbers	Compatible Computers	Compatible Computer Systems	Compatible Operating Systems
12092A	2137A 2139A 2156B 2436A/E 2437A 2439A	2196C/D 2197C/D 2199C/D 2486A 2487A 2489A	RTE-A

CABLING INFORMATION

One cable, part number 5061-4914, RS-232-C Data Communications Interface Cable is used with the HP 12092A card. Its description is



Ordering Information

HP 12092A Data Link/Multipoint Master includes:

- 5061-4940 Programmable Serial Interface Assembly
- 5061-4914 Data Communications Interface Cable
- 12092-80003 ROM
- 12092-80004 ROM
- 5955-7632 12092A Firmware Manual
- 12042-91001 Programmable Serial Interface Operating and Service Manual
- 5061-4914 RS-232-C Interface
- 5061-4916 Test Connector

HP 12092A Option

001: Deletes all above items except ROM and the 12092A Firmware Manual.

Product Numbers 12531C and 12531D

The HP 12531C and 12531D interfaces provide for local or modem connection of printing or non-cartridge tape CRT terminals of HP M/E/F-Series Computer Systems.

Features

- * EIA RS-232-C and CCITT V.24 compatibility
- * Simplex, half duplex, or echoplex operation
- * Jumper-selectable data transfer rates to 9600 bits/second with 2 stop bits

Functional Specifications**APPLICATION**

12531C: The 12531C is for interfacing HP 2752A/2754B or equivalent ASR 33/35 type Teleprinters to HP 1000 computers. Optionally, the 12531C can also interface Bell type 103 or equivalent data sets, operated in manual mode only.

12531D: The 12531D is for interfacing a variety of terminal devices to an HP 1000 computer or system, either locally or via Bell type 103A data set or equivalent modem operating in manual mode.

INTERFACE LEVEL

12531C or 12531D: 20mA or EIA/CCITT

JUMPER-SELECTABLE BAUD RATES WITH INTERNAL CLOCK

12531C: 110, 220, 440, 880, and 1760 bits/second

12531D: 150, 300, 600, 1200, and 2400, 4800, 9600 bits/second

MAXIMUM BAUD RATE WITH EXTERNAL CLOCK FROM TERMINAL

12531C: 2400 bits/second

12531D: 9600 bits/second

CHARACTER SIZE, STOP BITS, AND BUFFERING

8-bit character with one or two stop bits. Each interface buffers a single character at a time for transfer to/from the computer.

MODEM INTERFACE CAPABILITY

12531C and 12531D: Bell type 103 or equivalent, manual only.

CONFIGURATION INFORMATION

Compatibility: The 12531C and 12531D terminal interfaces and supporting software are compatible with 2105, 2108, 2109, 2111, 2112, 2113, and 2117 computers with BCS, RTE-B, RTE-C, RTE-II, RTE-III, RTE-IV/IVB operating system. No other operating system environment is supported.

Computer I/O Channels Required: One

Approximate Memory Required: 710 bytes for each terminal interface in BCS system; 1220 bytes for all terminal interfaces in RTE-B/C/M/II/III/IV/IVB system, which also serves the punched tape reader and tape punch subsystems.

Software Support: RTE driver DVR00, which is included in the 92001B RTE-II, 92067A RTE-IV, 92068A RTE-IVB, and 92064A RTE-M operating systems, is used by the 12531C and 12531D terminal interface.

Diagnostic Support: Diagnostics for the 12531C, 12531D, and 12880A interfaces are provided in the 24396A-F Diagnostic Library.

Installation: To install, plug the terminal interface into the computer I/O backplane, connect the interface cable to the terminal or modem, and integrate the interface into the operating system.

Current Required from Computer Power Supply:

	<u>+ 5V</u>	<u>- 2V</u>	<u>+12V</u>	<u>-12V</u>
12531C	0.76A	0.05A	0.08A	0.10A
12531D	0.76A	0.05A	0.24A	0.01A

Ordering Information

12531C TELEPRINTER INTERFACE

The 12531C Teleprinter Interface includes:

- 12531-60032 Teleprinter interface card
- 12531-90033 Interface manual

12531D TERMINAL INTERFACE

The 12531D Terminal Interface includes:

- 12531-60033 Terminal interface card
- 12531-90038 Interface manual

12531D Options

- 001:** Adds 12531-60026 7.6 meters (25ft) EIA terminal cable
- 002:** Adds 12531-60024 7.6 meters (25ft) Data Set cable

Product Number 12539C

The HP 12539C Time Base Generator provides a system software clock for interfacing time-dependent equipment. All time base generator functions are contained on a single, plug-in card that has its own select code. The card provides command and interrupt logic, a 100KHz oscillator, eight decade frequency dividers, and output selection logic.

Features

- * Multiple time bases
- * Built-in error detection
- * Easy assembly-language programming
- * Operates with interrupt or skip routines
- * Accurate to 1/2 second/day
- * Plugs into the I/O slot of the M/E/F-Series HP 1000 computer

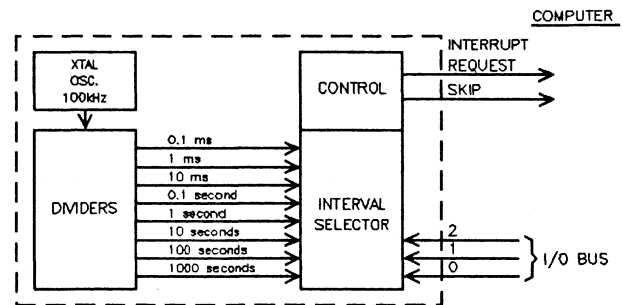
Functional Description

The time intervals are generated in decade steps from 100 microseconds to 1000 seconds (16.67 minutes) and are derived from the crystal oscillator. Any interval (in 100-microsecond increments) may be selected by use of a simple, assembly-language bit to the computer when a time interval is acknowledged.

A signal from the computer enables the generator. The 100KHz oscillator signal is formed into eight time base intervals by the divider circuit. The appropriate time base is selected by using one of the following interval codes:

Binary code	000	001	010	011
Interval (ms)	0.1	1.0	10	100
Binary code	100	101	110	111
Interval (s)	1.0	10	100	1000

When the selected interval is elapsed, the control logic requests an interrupt or enables a skip signal to the counter.



Functional Specifications

BASE INTERVALS

0.1, 1, 10, and 100 milliseconds and 1, 10, 100, and 1000 seconds.

ACCURACY

Stability: 2 parts in 10⁶/week

Temperature Effects: 20 parts in 10⁶ over temperature range of 15° to 35°C (59° to 95°F)

Total Stability: 1/2 second/24-hour day

ELECTRICAL SPECIFICATIONS

Current Required from Computer Power Supply:
0.76A (+5V), 0.016A (-2V)

Ordering Information

The 12539C Time Base Generator includes:
12539-60005 Time Base Generator
12539-90008 Operating and Service Manual

Product Number 12551B

Features

- * 16-bit output used for HP 1000 M/E/F-Series computers separately or in combination to control from 1 to 16 devices
- * Floating contact closures for flexible use of output bit states
- * Power-on initialization predetermines initial states of all relays
- * Command-interrupt logic provides two-way communication

Functional Description

The Relay Register provides 16 floating contact closures which can be used for controlling one device, or be subdivided in any combination to control several devices. The voltages switched through the Relay contacts can differ from each other, and from computer ground, by as much as 100V peak. Contacts can be connected in series, parallel, or in series-parallel, with or without diode isolation.

POWER ON PRESET

Turn-on of computer power automatically presets register flip-flops that store the output bit states for the various flip-flops for bits 15 through 8 and those for bits 7 through 0. Hardwired jumper connections to each group of eight flip-flops determine whether all the flip-flops in a group will be set, closing the respective Relay contacts, or cleared, allowing the Relay contacts to open. *Initialization assures that the states of all relays are known immediately after power turn-on*, which is particularly desirable when power supplies are being programmed. This feature also saves initialization instructions that might otherwise be required in computer programs.

OUTPUT OPERATIONS

An Output instruction (OTA or OTB) transfers 16 data bits from the computer A or B register to the storage register flip-flops, in turn energizing the corresponding relays through

transistor driver circuits, closing the Relay contacts.

The relays retain their states unless changed by the next OTA or OTB instruction. Relay contacts close or open within 1 millisecond following transfer of new bit states to the storage register on the card.

READ-BACK OPERATIONS (with Option 001)

The bit states applied to the relays can be read back into the computer A or B register by an Input instruction (LIA or LIB). The read-back capability also permits any part of a program to determine the state of the relays at any given time.

COMMAND-INTERRUPT CAPABILITY

In addition to the 16-bit Relay output, the Relay Register is equipped with command and interrupt logic that makes possible a two-way exchange of control and status or request information between the computer and controlled equipment. Typically, the computer will use the command logic to "tell" a controlled equipment that new data has been entered in the Relay Register. The controlled equipment will normally use the interrupt logic to "ask" the computer for the next data word to be transferred via the Relay Register. The command output is generated in response to a Set Control (STC) instruction in the program. This instruction sets the Control and Command flip-flops, enabling the interrupt request logic in addition to activating the command output. There is a choice of two command outputs, which can be used individually or simultaneously. One of the outputs comes from a ground-referenced driver transistor and the other is an isolated (floating) contact closure that can be used as flexibly as any of the 16 sets of Relay contacts that make up the output data.

An interrupt request is generated in response to a flag signal from the controlled equipment. This signal sets the Response flip-flop, which clears the Command flip-flop and activates the

interrupt request logic when it has been enabled by the set output of the Control flip-flop. The Relay Register provides an isolated flag input to a Relay coil as well as a ground-referenced input to a driver transistor. (The +12V input to the Relay coil need not be referenced to computer ground.) Energizing the Relay coil grounds the input line to the driver transistor, which sets the Response and Flag flip-flops. Where the isolation provided by the Relay coil input is not needed, an external circuit closure to ground has the same effect.

Functional Specifications

RELAY CONTACTS

States: All contacts are normally open when power is off; contacts close individually in response to "1" bit states from the computer.

Maximum Power: 10W peak or continuous, per contact.

Maximum Voltage: 100V peak or continuous across open contacts, between output connector pins, and with respect to computer ground on the register card.

Maximum Current: 500mA per contact, peak or continuous.

Life: 10 million operations under rated load.

Resistance: 0.1 Ω at 100mA (higher at lower current).

Protection: Mounting positions are provided for connecting contact protection resistors in series with the contacts for all the relays.

Settling Time: 1 millisecond, maximum, for Relay pull-in or drop-out.

DATA OUTPUT

(16 floating Relay contacts, with ratings as specified above)

"1" Level: Contact closed.

"0" Level: Contact open.

Power-on Preset: Register is normally wired to preset all data relays open. Upon request at time of ordering, register will be wired to preset bits 15 through 8 or bits 7 through 0 open, or all bits closed when power is turned on.

COMMAND OUTPUT, GROUND-REFERENCED

"1" Level: 0V, 12mA current sink.

"0" Level: +12V through 10K Ω

COMMAND OUTPUT, ISOLATED

(Floating Relay contact, with ratings as specified above)

"1" Level: Contact closed.

"0" Level: Contact open.

Delay: 3 milliseconds nominal.

RESPONSE (FLAG) INPUT, ISOLATED

Normal: 12V, 15mA to Relay coil.

Set Flag: No input to Relay coil.

Response Delay: 15 milliseconds, nominal.

RESPONSE (FLAG) INPUT, GROUND REFERENCED

Normal: 0V, 12mA current sink from NPN transistor.

Set Flag: Open Circuit.

Response Delay: 15 milliseconds, nominal.

INTERFACE CURRENT SUPPLIED BY THE COMPUTER

Interface Kit 12551B: 0.24A (+12V), 0.39A (-2V), 0.6A (+5V)

Interface Kit 12551B-001: 0.24A (+12V), 0.59A (-2V), 1.1A (+5V)

WEIGHT

Net: 482g (17oz)

CONFIGURATION INFORMATION

Computer Compatibility: The 12551B Relay Register interface is compatible with the HP 1000 M/E/F-Series computers.

I/O Channels Required: One per interface.

Software Support: Software support for the 12551B is limited to a diagnostic, which is available in the 24398-F diagnostic library. A user-written driver, programmed in assembly language to work with the software operating system used in the computer, will be required to control the interface from user's programs.

Ordering Information

The Interface Kit 12551B includes:

12551-6001	Relay Output Register (without read-back option)
5060-8339	48-pin Connector Kit
12551-9002	Operating and Service Manual

The Interface Kit 12551B-001 includes:

12551-6002	Relay Output Register (without read-back option) replaces 12551-6001
5060-8339	48-pin Connector Kit
12551-9002	Operating and Service Manual

INSTALLATION

Installation of the 12551B is the responsibility of the customer. HP installation assistance is provided on request, at prevailing rates.

Product Numbers 12554A and 12597A

The HP 12554A and 12597A Duplex Register Cards provide an easy way to interface HP 1000 computers with a wide range of external devices used for on-line production test, lab design, or measurement applications. Model 12554A offers 16-bit input and output storage registers plus control and interrupt logic. Model 12597A offers 8-bit registers plus control and interrupt logic.

Both models are general-purpose interfaces designed to provide wide flexibility when used with conventional-output digital devices.

Features

- * Dual 8 or 16-bit data registers
- * Choice of positive or negative transistor interface
- * Includes control and interrupt logic

Functional Description**OUTPUT OPERATIONS**

An output instruction and an accompanying I/O OUT signal from the computer transfers 8 or 16-bits from the computer's A or B-register to the output data register on the card. These bits are then applied to the external device without further intervention by the computer. Next, the computer issues a Device Command which "tells" the device that the data is ready to be acted upon.

When the external device is ready for the next data word, it returns a flag signal to the Duplex Register Card.

INPUT OPERATIONS

When the external device is ready to supply data to the computer, it must issue a flag signal to the duplex register card. This signal enters data into the card's input register and sets up a request for service to the computer. The computer responds

with an input instruction which enters data into its A or B-register.

Functional Specifications**CAPACITY**

12554A: 16-bit input and 16-bit output

12597A: 8-bit input and 8-bit output

**DATA INPUT/OUTPUT
(standard 12554A/ 12597A)**

Logic sense: Positive in/positive out

Input "1": 0 to +0.5V, 12mA maximum sink

Input "0": +8V through 700 Ω

Output "1": 0 to +0.5V, 12mA maximum sink

Output "0": +12V, 10K Ω source

**DATA INPUT/OUTPUT
(12554A/12597A Option 001)**

Logic Sense: Negative in/negative out

Input "1": -8V through 700 Ω

Input "0": 0 to -0.5V, 12mA maximum sink

Output "1": -12V, 10K Ω source

Output "0": 0 to -0.5V, 12mA maximum sink

DEVICE COMMAND OUTPUT

Device Command signal "tells" the device that it may accept data (or latch data) at its input lines.

DEVICE FLAG INPUT

External Device Command to a interface card strobes data to a input storage register and sets interface card flag flip-flop.

CONFIGURATION INFORMATION

Computer compatibility: The 12554A and 12597A Duplex Register Interfaces are compatible with the M/E/F-Series HP 1000 computers.

I/O channels required: One per interface.

Software support: Except for punched tape subsystems using the 12597A interface, software support for the 12554A and 12597A interfaces is limited to the diagnostic in the 24396A-F diagnostic library. A user-written driver programmed in assembly language will be required for general-purpose use of these interfaces in a computer operating system.

Installation: To install, plug the interface into the computer I/O backplane, connect the optional (or a user-fabricated) cable to external equipment, and integrate the interface and driver into the computer's operating system.

ELECTRICAL SPECIFICATIONS

Current required from computer power supply:

<u>Product Number</u>	<u>+ 5V</u>	<u>- 2V</u>	<u>-12V</u>	<u>+12V</u>
12554A	1.11A	.06A	.03A	.023A
12554A & 001	1.11A	.06A	.25A	.025A
12597A	.75A	.05A	.02A	.05 A
12597A & 001	.75A	.05A	.05A	.02 A

Ordering Information

HP 12554A 16-BIT DUPLEX REGISTER CARD

The 12554A includes:

12554-60023 Positive in/positive out 16-bit Duplex Register Interface Card.
5060-8339 48-pin Connector Kit
12554-90021 Interface Manual

12554A Option

001: Replaces the 12554-60023 positive in/positive out interface card with the 12554-60024 negative in/negative out interface card and the 12554-90021 interface manual with the 12554-90022 interface manual.

HP 12597A 8-BIT DUPLEX REGISTER CARD

The 12597A includes:

12597-6001 Positive in/positive out 8-bit Duplex Register Interface Card
5060-8339 48-pin Connector Kit
1251-0332 Test Connector
12597-9002 Interface Manual

Product Number 12556B**Features**

- * 40 bit (10 BCD digit) capacity
- * Choice of ASCII or binary assembly modes
- * Includes recorder command hold-off interface

Functional Description

The HP 12556B is an output interface with 40-bit capacity for driving program input lines of non-HP-IB stimulus or measuring instruments, control panel indicators or control lines, of HP model 5055A or 5050B Digital Recorders connected to HP 96MX or HP 1000 Model 31 or Model 81 Computer Systems.

ASSEMBLY OF OUTPUT

The 40-bit register offers a choice of ASCII and binary output modes. In ASCII mode, the register assembles the BCD portion of ASCII characters from six words (12 bytes) in computer memory, to form a 41-bit output (10 BCD digits plus control bit). In binary mode, the register output is assembled from three words (six bytes) or memory.

Functional Specifications**DATA OUTPUT**

No. of Bits: 40 data bits and one control bit.

"1" Level: +12V/+5V, jumper-selectable, through 10 Ω

"0" Level: 0V, 10mA maximum current sink

REFERENCE VOLTAGES

Positive: +9V/+3.33V, jumper-selectable, 110 Ω impedance

Negative: +1V/+0.33V, jumper-selectable, 44 Ω impedance

COMMAND OUTPUT

Standard: 50 μ s pulse from <+1V to +7.8V

Option 002 Negative Command: 50 μ s pulse from >+5V/+7.8, jumper-selectable, to <+1V. May be changed to positive command by changing jumper.

FLAG (POSITIVE HOLD-OFF) INPUT FROM EXTERNAL DEVICE

Standard: +7V to +125V, 2.3mA, minimum, from -0.7V or open circuit state. Return to ground or open circuit state sets flag.

Option 002: +4.5V to +15V, 2.2mA, minimum, from -0.7V sets flag. Return to ground or open circuit state.

STATUS (NEGATIVE HOLD-OFF) INPUT FROM EXTERNAL DEVICE

-3V to -30V, 0.61mA, minimum, from +5V open circuit state. (This input from 5050A/B recorder remains in hold-off state when recorder is out of paper.)

OUTPUT PRESETTING

Power On: Turn-on of computer power presets all output bits to "0" state.

Programmed: All output bits can be program-preset to either "1" or "0".

OVERRIDE TIMER

Timing: Sets flag after 300 milliseconds if external device has not returned flag.

Status: Bit 3 to input bits is set if override timer has set flag.

OUTPUT ASSEMBLY MODES

ASCII Mode: Bits 11-8 and 3-0 from 16-bit computer words are assembled to form the output.

Binary Mode: All bits of 16-bit computer words from the output, most significant bit first.

Mode Selection: By jumpers and programming.

COMPUTER I/O CHANNELS USED

One.

INTERFACE CURRENT REQUIRED

0.01A (-12V), 0.08A (-2V), 0.9A (+5V), 0.15A (+12V)

MEMORY REQUIRED FOR RTE DRIVER

500 bytes; 640 bytes when called from Multiuser Real-Time BASIC.

SOFTWARE USED

The 40-bit register uses driver DVR54, included with the 92066A RTE Measurement and Control Driver Package.

PREREQUISITE

The performance test routines must be read into the system via the 12925A Punched Tape Reader Subsystem; therefore the HP 1000 Model 31 or Model 81 Computer System must have the punched tape reader before it can use the 12556B 40-Bit Register.

Ordering Information

The 12556B includes:

12556-6002	40-Bit Register, positive true
5060-8339	Mating connector kit
12556-9002	Interface Manual

12556B Options

002: Replaces standard positive true 40-Bit Register, Interface manual, and test routine with:

12556-60022	40-bit register, ground true
12556-60023	Test connector
12556-60024	Test cable
12556-90028	Interface Manual

INSTALLATION

Installation of the 12556B is the responsibility of the customer. HP installation assistance is provided on request, at prevailing rates.

The microcircuit interface card for HP 1000 M/E/F-Series Computers permits interfacing to an external device with the popular DTL/TTL family of integrated circuits, at data speeds much greater than can be achieved with discrete components. Typical devices are those used for on-line production testing, lab design work, and those applications that involve measuring instrumentation. The interface card permits input and output information flow between the computer and an external device. It features a separate 16-bit input and output storage register, plus control and interrupt logic. These features offer a wide latitude in configuring your instrument measurements for computer analysis.

Features

- * Plug-in jumper selection of options
- * DTL/TTL compatible
- * Dual 16-bit storage registers
- * Input and output operation (one for input, one for output)
- * Interrupt logic for ease of use with instrumentation
- * Combined negative true and positive true data operation in one interface

Functional Description

The HP 12566C Microcircuit Interface card enables HP 1000 M/E/F-Series Computers to exchange input and output information with most digital measurement devices with DTL/TTL output voltage levels. Although the 12566C is designed as a general-purpose microcircuit interface, it has many features found in specific peripheral device interfaces. Included are 16-bit input and output storage registers which provide temporary storage during data transfer, plus control and interrupt logic.

Also provided is a device command (action) line to the external device and a flag (action completed) response line from external device. You can choose from a combination of device command and flag signal logic levels and timing

to fit your particular needs: jumpers permit positive-true, positive-false, or positive-false pulse-mode, encode signal levels; jumpers also permit a positive-going or negative-going signal as the flag signal to initiate an interrupt and/or to turn off the device command signal. Also, it is possible to remove a jumper and obtain ungated inputs to the input register of the card; data can be input without receipt of a flag signal from the device. Combined input/output operations are possible between the computer and external device when interfaced through the microcircuit interface card.

COMBINED INPUT/OUTPUT OPERATIONS

The microcircuit interface card includes two independent registers which allow a two-way flow of information between the computer and an external device. A typical combined input/output operation would be output of control information to a measuring device that measures data from several input channels. The output register would provide control information to the external device and the input register would accept the results of the measurements. If the external device is a printer, for example, data is transferred through the output register and status information may be read back into the input register.

DIRECT MEMORY ACCESS OPERATIONS

This interface card is also fully compatible with direct memory access and dual channel port controller in (DCPC) HP 1000 M/E/F-Series Computers. It is easily programmed to accept or send high speed 16-bit transfers to instrumentation or other computers. Transfer speed up to 1.14 megabytes/second can be achieved on HP 1000 M/E/F-Series Computers, up to 615 kilobytes/second on HP 1000 M-Series Computers.

PULSE MODE OPERATION

The pulse mode of operation permits use of the microcircuit interface card for those applications where data lines are shared and data can appear

at the output of the interface card for a certain period of time only. By changing jumpers on the card, both the encode signal and the output data can be 'pulsed' out simultaneously.

INTERCONNECTING CABLE

Due to the fast rising times and low voltage level outputs from this interface card, it is recommended that twisted-pair cable be used to connect the computer interface card to the external device.

Functional Specifications

CAPACITY

16-bit input and 16-bit output.

DATA AND FLAG INPUTS (Standard)

Logic Sense: Ground-true, positive-false or positive-true, ground-false.

"1" State: 0 to +0.5V, 16 mA current sink.

"0" State: +2.4V to +5V.

Bias and Impedance: +3.37V, 222Ω

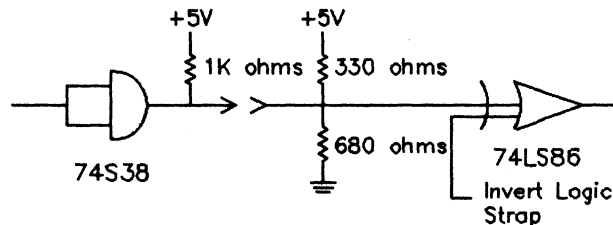
DATA AND COMMAND OUTPUTS (Standard)

Logic Sense: Ground-true, positive-false or positive-true, ground-false.

"1" State: 0 to 0.5V, 55 mA current sink.

"0" State: +2.4V to +5V, 1KΩ impedance.

LOGIC CIRCUITS (Outputs can be wire OR ed)



CONFIGURATION INFORMATION

Computer Compatibility: The 12566C Microcircuit interface is compatible with all HP 1000 M/E/F-Series Computers.

I/O Channels Required: One per interface.

Software Support: Software support for the 12566C Microcircuit interface includes RTE driver DVM72 in the drivers supplied with RTE-M, RTE-IVB, and RTE-VI operating systems and the diagnostic in the 24396A-F diagnostic library.

Installation: To install, plug the interface into the computer I/O backplane, connect the interface to external equipment with user-fabricated, twisted pair cable, and integrate the interface and driver DVM72 or user-written driver into the computer's operating system.

ELECTRICAL SPECIFICATIONS

Current Required from Computer Power Supply: 0.7A (+5V), 0.09A (-2V)

Ordering Information

12566C Microcircuit Interface includes:

12566-60032	Microcircuit Interface Card
5060-8339	48-pin Connector Kit
8120-1846	4.6 meter (15ft) cable with 36 twisted pair lead wires
1251-0332	24-pin Test Connector
12566-90032	Interface Manual

12566C Option

001: Replaces 5060-8339 48-pin connector kit with 5060-8340 24-pin connector kit for connection to a single bidirectional data bus. Use on a bidirectional data bus requires the microcircuit card to be operated in pulse mode.

Synchronous Communications Interface

Product Number 12618A

The HP 12618A interface provides for connection of Bell type 201, 203, 208, or 209 data sets or equivalent modems to HP 1000 M/E/F-Series Computers, offering a choice of half duplex only, or half and full duplex operations to the the user.

Features

- * EIA RS-232-C and CCITT V.24 compatibility
- * Compatibility with Bell type 201, 203, 208, and 209 data sets or equivalent and IBM bisynchronous protocol
- * Compatibility with Paradyne MP-14.4, MP-9.6, and T-9.6 modems
- * Full duplex operation with secondary data channel
- * Data transfer at rates to 9600 bits/second, under program of dual channel port controller (direct memory access) control
- * Double character buffering
- * Special character recognition

Functional Description

The 12618A is a two-card interface that can operate in either full or half duplex mode with Bell type 201, 203, 208, or 209 and Paradyne MP-14.4, MP-9.6, or T-9.6 or equivalent data sets that provide timing. It communicates at rates to 9600 bits/second with fully-independent send and receive channels. Parity generation and checking (none, odd, or even), sync character, and character size are program-selectable, and the 12618A provides special character recognition/interrupt capability.

Functional Specifications

Interface level: EIA, RS-232-C or CCITT V.28

Operational mode: Half or full duplex

Maximum data rate: Up to 9600 bits/second

Character size: Programmable, 1 to 8 bits

Character buffering: Two characters

Parity generation and checking: Programmable, none, odd, or even.

Special character recognition: Program selectable

Modem interface capability: Interfaces with Bell type 201, 203, 208, and 209 data sets and Paradyne MP-14.4, MP-9.6, and T-9.6 or equivalent data sets and provides secondary data channel.

DATA SET SIGNALS PROVIDED

EIA Designation	12618A		CCITT Numbers
	Receive	Transmit	
Protective Ground	(AA)	(AA)	101
Transmitted data		(BA)	103
Received data	(BA)		104
Request to send		(CA)	105
Clear to send		(CB)	106
Data set ready	(CC)	(CC)	107
Signal ground	(AB)	(AB)	102
Received line signal detector	(CF)		109
Secondary transmitted data	(SBA)		118
Transmitter signal element timing		(DB)	114
Secondary received data		(SBB)	119
Receiver signal element timing	(DD)		115
Data terminal ready	(CD)	(CD)	108.2
Ring indicator	(CE)	(CE)	125

CONFIGURATION INFORMATION

Computer compatibility: Hardware compatible with HP 1000 M/E/F-Series Computers.

Computer I/O channels required: Two.

Software support: The 12618A is supported by and included in the 91780A RJE/1000 communications hardware-software package. The RJE/1000 software also includes a bi-synchronous driver and an IBM 2780 Emulator for remote job entry to suitably equipped IBM 360/370 systems.

Diagnostic support: The 12618A is supported by a diagnostic in the 26396A-F diagnostic library.

ELECTRICAL SPECIFICATIONS

Current required from computer power supply:

	+ 5V	- 2V	+12V	-12V
12618A	2.8A	0.23A	0.1A	0.07A

Ordering Information

The 12618A includes:

12621-60001	Receive interface card
12622-60001	Send interface card
12621-60005	Receive test connector assembly
12622-60005	Send test connector assembly
12618-60001	15.2 meter (50ft) branched data set cable
12618-90001	Interface Users Manual
12621-90001	Interface Manual
12622-90001	Interface Manual

91780A RJE/1000 SOFTWARE (FOR 12618A)

For listing of items included, see the 91780A RJE/1000 data sheet.

Product Number 12620A

The HP 12620A Interface Breadboard is a standard interface card for HP 1000 M/E/F-Series computers with the standard flag and interrupt logic pretested on the board. This logic occupies 11 of the 60 microcircuit positions, leaving 49 available receptacles. In addition to its use as a breadboard, it can also serve as privileged interrupt fence card in RTE systems.

A printed circuit pad adjacent to each microcircuit pin provides easy solder connections on either side of the card. The pin structure will also accommodate commercially-available sockets or wire wrap pin sockets. +5V power and ground sources run along the board with convenient jumper points to pins on TTL packages. A frontplane connector is available that will accept a 48-pin PC edge connector for connection to the "outside world".

Features

- * Works with any HP 1000 M/E/F-Series computer
- * Standard flag, interrupt logic pretested on the board
- * Easy scope probe connection

Functional Specifications

SCOPE TIE POINTS ON THE BREADBOARD INTERFACE

The functions of the tie points include:

- TP1:** (Flag) Input signal is ground-true. A ground sets the Flag Buffer flip-flop. Must remain true for at least 200 nanoseconds.
- TP2:** (ENF Signal) Signal is + during T2 of computer timing. ENF gates Flag Buffer into Flag flip-flop.

- TP3:** (SIR Signal) Signal is + during T5. SIR enables inputs into Interrupt flip-flop.
- TP4:** (STC Command) Goes to ground (true) during a Set Control (STC) instruction at this address.
- TP5:** (CLC Command) Goes to ground (true) during a Clear Control (CLC) instruction at this address.
- TP6:** (CRS Signal) Ground-true signal, occurs at power turn-on, when PRESET button is pressed, or a CLC 00 instruction is executed.
- TP7:** (Flag FF output, set side) + True.
- TP8:** (Flag FF output, clear side) + True.
- TP9:** (Decoded address) Contains most significant and least significant address digits, and IOG (I/O Group) instruction. + True. Goes + when I/O instruction selects this card.
- TP10,11,12:** (Ground) For scope probe ground.

ELECTRICAL SPECIFICATIONS

Current Required from Computer Power Supply: 0.32A (+5V) for flag and interrupt circuits on card. Total current will depend upon additional requirements of circuits added by the user.

Ordering Information

The 12620A Interface Breadboard includes:

- | | |
|-------------|----------------------|
| 5060-6282 | TTL Breadboard |
| 5060-8339 | 48-pin Connector Kit |
| 12620-90001 | Interface Manual |

Product Numbers 12771A, 91720A, 91721A

The HP 12771A Computer Serial Interface is a two card interface with male and female cables that forms a complete direct connect hardware communications link between two HP 1000 M/E/F-Series computer systems equipped with 91740A/B DS/1000 network software-firmware and managed by HP's RTE-M, RTE-III, RTE-IV/IVB, or RTE-VI operating system. The 12771A interface can also be used with 91750A DS/1000-IV network software if 91740A/B/P/R firmware is also provided in each node using the 12771A. For convenient interconnection between interface cards supplied with the 12771A over lengths greater than 7.3 meters (24ft), Hewlett-Packard offers 91720A and 91721A communications cables in various lengths.

Features

- * Data rates up to 62,500 bytes/second at distances to 183 meters (600ft)
- * Transmission distances to 3.048km (10,000ft) at rates to 3,220 bytes/second
- * Simple, individually shielded dual twisted pair cable connection
- * Optically isolated input breaks ground loops, maximizes noise immunity
- * Complete two-card link between two computers

Functional Specifications

CAPACITY

One complete, bit-serial duplex channel per interface, with two cards, one for each computer at either end of the communications channel.

ERROR CONTROL

Errors detected in hardware word parity check on the 12771A board and in the longitudinal or diagonal parity checks on the blocks received (which are computed in 91740A/B firmware) are corrected by retransmission.

HARDWARE CABLE LENGTHS AND MAXIMUM HARDWARE TRANSMISSION SPEEDS

Cable Lengths		Maximum Transmission Speeds
<u>meters</u>	<u>feet</u>	<u>bytes/second*</u>
7- 180	24- 600	62,500
181- 360	601- 1200	39,200
361-1200	1201- 4000	22,400
1201-1600	4001- 5400	12,100
1601-2200	5401- 7300	6,300
2201-3000	7301-10000	3,220

*Transmission speeds are user-selected by jumper on each interface card to correspond with the cable length used. These are maximum hardware speeds; network throughput rates will be lower because of software overhead.

CONFIGURATION INFORMATION

Computer and system compatibility: The 12771A interface is compatible with 2108, 2109, 2111, 2112, 2113, and 2117 computers and HP 1000 Model 20, 25, 41, and 46 Computer Systems.

Computer I/O channels required: One for each computer interconnection.

Limitations: The 12771A has optical isolation for intrabuilding communication. *It is not recommended or warranted for interbuilding communication.*

Software and firmware required: 91740A/B DS/1000 network software/firmware or 91750A DS/1000-IV software and 91740A/B/P/R DS/1000 firmware.

Additional equipment required for installation: For cable lengths greater than 7.3 meters (24 ft), HP communications cables, model 91720A (with unassembled connectors) or 91721A (with assembled connectors), or user-fabricated cables will be required to complete interconnection of the two cards furnished in the 12771A interface.

Installation: Set jumper W1 to select correct data rate and jumper W2 to position A on both interface cards. Then plug the interface cards into the I/O backplanes of their respective computers, interconnect them with the two 3.65 meters (12 ft) cables furnished, plus communications cables as required, and integrate the interfaces and the 91740A/B DS/1000 network software and firmware into the computer operating system.

CURRENT REQUIRED FROM COMPUTER POWER SUPPLY

1.6A (+5V), 0.07A (-2V), 0.09A (+12V), 0.095 (-12V)

Ordering Information

HP 12771A COMPUTER SERIAL INTERFACE

The 12771A includes:

- 12665-60001 Two Hardwire Serial Data Interface Cards
- 12665-60002 3.65 meter (12ft) Interface cable with male connector
- 12665-60003 3.65 meter (12ft) Interface cable with female connector
- 12665-60004 Two Diagnostic Hoods
- 12665-90001 Two Interface Manuals

91720A/91721A Cables:

- 91720A 76 meters (250ft) Communications Cable (with unassembled connectors)
- 91721A 76 meters (250ft) Communications Cable (with assembled connectors)

91720A and 91721A Options

- 001:** Adds 76 meters (250ft) to cable length for total of 152 meters (500 ft)
- 002:** Adds 221 meters (725ft) to cable length for total of 297 meters (975ft)

Product Number 12773A

The HP 12773A Computer Modem Interface provides for interconnection of HP 1000 M/E/F-Series computer systems in the DS/1000 network using full-duplex modems as specified below. The 12773A interface is supported by the 91740A/B network software-firmware package, which operates in computer systems managed by HP's RTE-M, RTE-III, RTE-IV/IVB, or RTE-VI operating system. The 12773A interface can also be used with the 91750A DS/1000-IV network software if 91740A/B/P/R firmware is also provided in each node using the 12773A.

Features

- * EIA RS-232-C compatibility
- * Full duplex operation
- * Compatibility with either synchronous or asynchronous modems
- * Built-in error detection

Functional Specifications**INTERFACE COMPATIBILITY**

EIA RS-232-C and CCITT V.24 with full duplex operation.

TRANSMISSION MODE

Bit-serial, synchronous or asynchronous adaptable to modem used.

TRANSMISSION LINK

Full duplex over switched (direct distance dial) or private (leased) common carrier telephone line. Modems may have automatic answering capability.

DATA TRANSFER RATES

Asynchronous: Approximately 300, 600, or 1200 bits/second

Synchronous: Depends upon modem selected.

ERROR CONTROL

Errors detected in hardware word parity check on the 12773A board and in the longitudinal and diagonal parity checks on the blocks received (which are computed in 91740A/B firmware) are corrected by retransmission under firmware controls.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12773A interface is compatible with 2108, 2109, 2111, 2112, 2113, and 2117 computers and HP 1000 Model 20, 25, 41, and 46 Computer Systems.

I/O Channels Required: One for 12620A interface used as privileged interrupt fence and one for each DS/1000 modem communications channel.

Software and Firmware Required: 91740A/B DS/1000 network software/firmware or 91750A DS/1000-IV software and 91740A/B/P/R DS/1000 firmware.

Additional Equipment Required for Installation: 12620A interface used as privileged interrupt fence and user-furnished modem. Operation requires similarly-equipped system at other end of DS/1000 communications channel.

Installation: Set switches on the interface to select synchronous or asynchronous operation and (for asynchronous operation) set jumper to select appropriate data rate to match modems used at both ends of common carrier communications line. Then plug interface into the computer I/O backplane, connect interface cable to modem, and integrate the interface and DS/1000 software and firmware into the computer operating system.

**CURRENT REQUIRED FROM COMPUTER
POWER SUPPLY**

1.6A (+5V), 0.07A (-2V), 0.04A (+12V), 0.04A (-12V).

COMPATIBLE MODEMS AND COMMUNICATION LINES

Table 1. Connections, Modems, and Data Rates

<u>Connection via</u>	<u>Modem Type</u>	<u>Maximum Data Rate (bits/s)</u>
Switched Telephone (Direct Distance Dialing) Network	Bell 103A2	To 300
	Bell 201C	To 2000
	Bell 202T	To 2400
	HP 37210T	To 4800
	Vadic VA3400	To 1200
Private Lines	Bell 103A3	To 300
	Bell 201A3	To 2000
	Bell 201C	To 2400
	Bell 202T	To 2000
	Bell 208A	To 4800
	Bell 209A	To 9600
	HP 37210T	To 4800
	HP 37220T	To 9600
	HP 37230A	To 19200

Ordering Information

**The HP 12773A DS/1000 Modem Interface
includes:**

- 12773-60001 Modem Interface Card
- 12773-60002 3.65 meter (12ft) Interface
Cable
- 12773-60003 Diagnostic Hood
- 12773-90001 Interface Manual

Product Number 12777A

The HP 12777A provides a means of completing the I/O priority chain when blank I/O slots are configured into a system. This card passes the interrupt priority chain through to I/O cards which follow the blank space, thus making it possible for them to cause an interrupt.

Features

- * Completes HP 1000 M/E/F-Series computer I/O priority chain
- * Allows blanks to be configured into I/O backplane
- * Saves moving I/O cards and reconfiguration to complete interrupt priority chain

Functional Specifications**APPLICATION**

This card provides a direct short between PRL (Pin 3) and PRH (Pin 23). It may also be used to tie +5V to PRL (Pin 3).

INSTALLATION

To install, plug into HP 1000 computer I/O slot which is desirable to leave blank while passing I/O priority chain.

Ordering Information

The 12777A includes:
02116-6110 Priority Jumper Interface Card

Multipoint Terminal Subsystem Interface

Product Number 12790A

The HP 12790A Multipoint Terminal Subsystem Interface is designed to operate with the 91730A Multipoint software which enables up to 32 devices to be linked in a daisy chain. Devices can be display terminals or data-capture terminals, and operate on the same line via polling performed by the 12790A interface. The 12790A can be configured with the 3074A Data Link adapter, which converts signals to those of a multiprotocol data link, enabling terminals and other devices to communicate under its control. For information on data link connections, refer to the HP 1000 System Designer's Guide. When configured with the 91750A DS/1000-IV software and the 91730A Multipoint Software, the 12790A and 3074A support most Distributed System features.

Other 1000 series computers are connected to data link via the 12830A M/E/F-Series Data Link Slave or the 12072A A-Series Data Link Slave interfaces.

Series 200 desktop computers are connected to a data link network via the HP 98628A Communications Interface and the HP 13624A Data Link Adapter.

Hardware and Firmware Features

- * **Microprocessor management of HP 2645A Multipoint Protocol, line/modem control signals, and on-board data buffer**
- * **Nominally, up to 32 terminals per multipoint line**
- * **Hardwired or modem-linked communications**
- * **Full-duplex or half-duplex modem compatibility**
- * **Asynchronous or synchronous communication when operating in a multipoint configuration up to 9600 baud**
- * **Asynchronous communication when operating as a Data Link, with Data Link Slave interfaces, up to 19.2k baud**
- * **CRC-16 error checking**
- * **1024 byte RAM memory for I/O operations**

- * **Firmware-controlled self-tests**
- * **Compatibility with HP 1000 M/E/F-Series Computers**

Functional Description

BUILT-IN MICROPROCESSOR OFF-LOADS THE COMPUTER

The multipoint protocol implemented on the interface is 2645A Multipoint Protocol, which is similar to IBM Bisync. CRC-16 Cyclical Redundancy Error Checking is performed on the interface for all text blocks received or sent. The microprocessor automatically requests up to 8 retransmissions upon detection of an error, but can be programmed for 1 to 16 retransmissions.

The microprocessor also manages synchronous or asynchronous modem control signals and is capable of setting additional modem control lines. A controllable watchdog timer indicates communications line outages.

Finally, under programmatic initiation, the interface can perform several optional text editing functions automatically. On writes to a terminal, these include "homing" the terminal's cursor, clearing the display screen, and/or appending a carriage return/line feed after the last character of text. On reads from a terminal, the interface strips "group separators", which are ASCII symbols that define the end of a data stream or block that contains information from a "screen" of data transmitted from the terminal. It can also optionally strip one or more "record separators" characters which define protected fields in screens. ASCII characters which can be stripped are "RS"--record separator, "CR"--carriage return, and "LF"--line feed.

BISYNC MULTIPOINT PROTOCOL

The 12790A interface supports a character-oriented Bisync Multipoint Protocol that selects the terminal to be written to or read from.

BUILT-IN TEXT BUFFERING FOR EFFICIENT OPERATION

The 12790A interface incorporates a 1024 byte RAM which allows data transfers in blocks containing up to 998 bytes each. Data is transferred to the computer backplane via the Dual Channel Port Controller, which enables DMA transfer rates.

FIRMWARE-CONTROLLED SELF-TESTS

The 12790A has a built-in self test initiated by the PRESET button on the CPU. The test checks the microprocessor, memory, baud rate select, interrupt circuits, the oscillator, and ancillary circuits. A light-emitting diode on the board reports the status of the self test.

Functional Specifications

INTERFACE LEVEL

EIA RS-232-C and CCITT V.24.

TRANSMISSION MODE

Bit serial, asynchronous or synchronous via hardwired cables or half or full duplex modems and telephone lines.

NUMBER OF TERMINALS PER MULTIPOINT LINE

Up to 32 terminals can be connected to the 12790A interface via a multipoint line, subject to the distance and speed limitations given in the paragraph on line lengths. A multipoint communications line is intended for transaction processing applications, in which terminals are operated in block mode, and blocks are randomly transmitted. Continuous usage of a large number of terminals will cause a decrease in system throughput.

LINE LENGTHS (for a Multipoint Daisy Chain)

Interface to Nearest Terminal or Modem: 15.2 meters (50 feet), maximum.

Maximum Length between any Two Terminals: 609 meters (2000 feet).

Maximum Total Line Length: 4876 meters (16,000 feet), not including distance between modems.

ADDITIONAL LIMIT ON SYNCHRONOUS LINES

Table 1. Average line lengths between multipoint terminals on a synchronous line

Terminals Per Line	Average Line Length Versus Line Speeds Of:		
	2400 bps	4800 bps	9600 bps
4	609m (2000ft)	609m (2000ft)	609m (2000ft)
8	609m (2000ft)	609m (2000ft)	365m (1200ft)
16	609m (2000ft)	365m (1200ft)	146m (480ft)
32	365m (1200ft)	146m (480ft)	36.5m (120ft)

CONFIGURATION INFORMATION

Computer Compatibility: The 12790A Multipoint Interface is compatible with 2108, 2109, 2111, 2112, 2113, and 2117 Computers operating under Real Time Executive System.

Table 2. 12790A Computer Compatibility

Interface Product Numbers	Compatible Computers	Compatible Computer Systems	Compatible Operating Systems
12790A	2109E 2113E 2117F	2176C/E 2177C/F 2178A/C 2179A/C	RTE-6/VM RTE-IVB RTE-IVE

Computer I/O Channels Required: One per interface.

Compatible CRT Display Terminals: 2645A, 2648A, 2649B, and 2649C terminals, which also require 13234A 4k byte terminal memory module, and 264X Option 033 (asynchronous) or 264X Option 034 (synchronous) multipoint communications with monitor mode capability. Also 2624 and 2626 terminals, HP 85, and HP 2673A.

Compatible Data Capture Terminals: 3075A, 3076A, and 3077A.

Compatible Modems: See Table 3.

Table 3. Connections, Modems, and Data Rates

Connection via	Modem Type	Maximum Data Rate (bits/s)
Switched Telephone (Direct Distance Dialing) Network	Bell 201A3	To 2000
	Bell 202T	To 1200
	Bell 208B	To 4800
	Bell 212A	To 1200
	Vadic VA3400	To 1200
Private Lines	Bell 201A3	To 2000
	Bell 202T	To 1800
	Bell 208A	To 4800
	Bell 209A	To 9600
	HP 37230A	*To 19200

* Limited by maximum speed of 2645A Multipoint lines.

Current required from computer power supply: 2.5A (+5V), 0.1A (+12V), 0.05A (-12V), 0.06A (-2V).

ERROR DETECTION AND CORRECTION

Errors are detected using CRC-16 cyclical redundancy error checking on blocks received or sent. Interface retransmits, or requests retransmission of block with error, to attain error-free data transfer. User can program-specify any number of retransmissions up to 16; if not user-specified, the number of retransmissions is defaulted to 8.

Ordering Information

HP 12790A MULTIPOINT TERMINAL SUBSYSTEM INTERFACE

The 12790A Interface includes:

5061-1389	Multipoint Interface Card
12790-80036	Control ROM
12790-80037	Control ROM
12790-80038	Control ROM
12790-80039	Control ROM
5061-1393	10.6 meter (35 ft) interface cable for hardwire connection to first 13232P cable on multipoint terminal
12790-90001	Multipoint Terminal Interface Subsystem Reference Manual

12790A Option

001: Substitutes a 7.6 meter (25ft) interface-to-modem cable (5061-1391) for the 5061-1393 hardwire cable.

ADDITIONAL EQUIPMENT REQUIRED FOR OPERATION

Refer to HP 1000 System Designer's Guide (92007-90001).

Product Number 12792C

The HP 12792C is an Asynchronous Multiplexer Interface that can connect up to eight asynchronous teleprinter-like terminal devices to an HP 1000 M/E/F-Series Computer System using a single I/O slot.

Features

- * EIA RS-423-A and RS-232-C/CCITT V.24 compatibility
- * On-board microprocessor off-loads computer
- * On-board buffering with DMA capability
- * Programmable data rates using two baud rate generators to eliminate hardware speed strapping
- * Programmable character size, parity checking, and number of stop bits for flexible control of transmission format
- * Parity, overrun, and framing error detection
- * X-ON, X-OFF control during multiplexer data output transmission
- * Two of eight baud rate groups may be simultaneously selected
- * Supports HP 37214A Systems Modem, which can provide up to 7 ports having full modem control capabilities
- * Full duplex or Echoplex transmission
- * On-board self-test
- * Capability to edit data prior to passing it to computer memory
- * Includes an 8-port distribution Panel for mounting RS-232-C connections

Functional Description

The 12792C Asynchronous Multiplexer Interface provides multiplexed terminal support for up to eight asynchronous RS-232-C compatible devices connected directly, or through full-duplex asynchronous modems,* to the multiplexer. The multiplexer interface can operate at programmable data rates up to 19,200 bits/second on a given channel with a maximum

throughput capability of 69,000 bits per second. The aggregate throughput rate is attainable for short bursts. For continuous throughput, either the baud rate or the number of channels must be reduced to avoid data loss on input. (There will be no data loss on output, but the full data rate may not be achieved.)

The 12792C includes an 8-port Multiplexer panel, to provide for convenient connection via EIA 25-pin connectors.

Functional Specifications

CAPACITY

Channels: Eight full-duplex (transmit and receive) communications channels.

Buffering: Two 254 byte transmit buffers and two 254 byte receive buffers for each channel.

COMMUNICATIONS

Interface Level: RS-423-A/RS-232-C or CCITT V.24

Program-selectable Data Rates: 50, 75, 110, 134.5, 150, 300, 1200, 1800, 2400, 4800, 9600, and 19200 bits/second.

Program-selectable Baud Rate Groups: (50); (75, 150); (110); (134.5); (300, 1200); (1800); (2400, 4800, 9600); (19200)

Aggregate Throughput Capacity: 69,000 bits per second per interface. The aggregate throughput rate is attainable for short bursts. For continuous throughput, either the baud rate or the number of channels must be reduced to avoid data loss on input. (There will be no data loss on output, but the full data rate may not be achieved.)

*Modem control lines are passed through to the multiplexer panel to allow passive full-duplex modem support. Active modem control may be achieved by adding the HP 37214A System Modem.

Communication Mode: Asynchronous, bit serial.

Programmable Communications Parameters:
Character length from 5 to 8 bits; 1, 1 1/2, or 2 stop bits; and odd, even, or no parity.

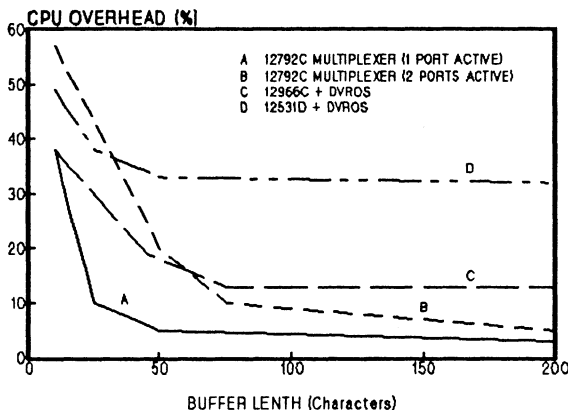


Figure 1. 12792C Computer Overhead compared with HP 1000 E/F-Series point-to-point interfaces, 9600 baud transfers.

CONFIGURATION INFORMATION

System Compatibility: The 12792C Interface is compatible with HP 1000 M/E/F Series Computer Systems operating under the RTE-IVB, and RTE VI Real-Time Executive systems.

Computer I/O Slots Required: 1

Software Support: RTE Driver: DVM00

Supports the following Hewlett-Packard terminals:

2392A	2628A	2645A Opt 007
2621A/P	2631A/B	2647A
2621B	2635A/B	2648A Opt 007
2622A/D	2640B	2649B Opt 007
2623A	2645A	2649C Opt 007
2624A/B	2648A	2649G
2625A	2649B/C	
2626A/W	2647F	
2627A	7310A	

Current Required from Computer Power Supply:
2.0A (+5V), 0.30A (+12V), 0.04A (-12V).

Approximate Memory Requirements:

Table 1. 12792C Memory Requirements

File Name	Description	Memory Required
PVM00	Pre-driver (this is a small subroutine that resides in the Table II area in RTE-IVB or the subroutine area in RTE-MIII)	260 bytes
DVM00	Basic interface driver (supports all teleprinter like devices) (subroutine PVM00 is also required) a. Driver memory requirement b. Table space for each terminal	2640 bytes 64 bytes
DDV05	Device driver for full screen mode and status reporting support of 262X, 263X, and 264X terminals (does not include support of cartridge tape units or auxiliary printer with 264X terminals) (DVM00 and its table space for each terminal is also required) a. Driver memory requirement b. Table space for each terminal	440 bytes 8 bytes*
DDV12	Device driver for support of HP 7310A or 2631/B Printers or 2635A/B Printing Terminals used as printer only (DVM00 and its table space for each terminal is also required) a. Driver memory requirement b. Table space for each printer	320 bytes 6 bytes*

*NOTE: If either of two different devices may be connected to a particular multiplexer port, the table space allocated to that port should be the maximum table space required for either device.

PHYSICAL CHARACTERISTICS

Dimensions: 269mm (11.38 in) long by 172mm (6.75 in) wide by 1.6mm (0.063in) deep. Top clearance 10.2 mm (0.4 in); bottom clearance 5.1mm (0.2 in)

Weight: 481 grams (17oz) with mating connector.

Ordering Information

The 12792C Interface includes:

12792-60002	8-channel Multiplexer Interface assembly
12792-90021	Installation Reference Manual
5001-5278	Mounting Bracket
28658-60005	8-channel RS-232C Panel
28658-63002	Cable, Multiplexer card to RS-232C Panel
1252-0508	Multiplexer Extender Kit

12792C Options

002: For use with HP 37214A System Modem.

Deletes: 5001-5278, 28658-60005,
28658-63002, 1252-0508

Adds: 12828-60002 cable

003: For use with custom cable assemblies.

Deletes: 5001-5278, 28658-60005,
28658-63002, 1252-0508

Adds: 5061-3467 80-pin edge
connector kit

RS-232C PANEL EXTENSION

The 1252-0508, Mux Cable Extender Kit, includes 1 set of male and female connector components which are used with up to 300 ft of cable (Part Number 8120-4510) to remotely position the 28658-60005 RS-232C panel. The raw cable can be purchased from the Corporate Parts Center.

Product Number 12821A

The HP 12821A is an HP-IB disc interface that is supported for use with CS/80 discs in RTE-VI/VM operating systems and for use with ICD discs in RTE-IV/B or RTE-VI/VM operating systems.

Features

- * Supports of 7906H/HR, 7920H, 7908P/R, 7911P/R, 7912P/R, 7925H, and 7933H discs
- * Transfers rates to 937.5 kilobytes per second
- * RTE-IVB, RTE-VI/VM software support
- * Up to two 12821A interfaces per system for lowest cost support of high throughput applications
- * One 12821A ICD interface and one 13175B MAC disc interface can be used in the same system to provide high throughput via two disc I/O facilities, one of which is expandable to 960M bytes

Functional Specifications**CAPACITY**

CS/80 memories per interface: Up to four.

ICD memories per interface: Up to two.

12821A interfaces per HP 1000 Computer System: Up to two.

MAXIMUM TRANSFER RATE

937.5 kilobytes per second.

CONFIGURATION INFORMATION

Computer and Operating system compatibility:
The 12821A interface is compatible with HP 1000 M/E/F-series Computers operating under the RTE-IVB and the RTE-VI/VM real time executive system.

Compatible ECD discs: 7906H/HR+020, 7920H, and 7925H maximum of 2 discs per interface.

Compatible CS/80 discs: 7908 P/R, 7911P/R, 7912 P/R, and 7933H up to four discs per interface.

Software support: The 12821A and the ICD drives it interfaces are supported by RTE driver DVA32, which is included in RTE-IVB, RTE-VI/VM operating systems with revision code 2001 or later.

Diagnostic support: An on-line verification routine and a stand-alone diagnostic for 12821A-ICD and CS/80 subsystems are provided in the 91711B On-line Verification Package. A separate diagnostic is also provided in the 24396A-F Diagnostic Library.

Approximate memory required: 2300 bytes for RTE driver DVA32 plus 10 bytes per disc sub-channel for track map table (maximum of 32 subchannels per 12821A).

Requirements for a second 12821A interface:
The second 12821A interface in a system requires an additional copy of the driver and its own track map table, approximately doubling memory requirements. See the RTE-IVB drivers DVR32 and DVA32 Reference Manual, part number 92068-90012, for additional information.

Cabling Considerations: The 12821A interface is supplied with a 3.69 meter (12 foot) cable that connects the interface to the first ICD drive. Hewlett-Packard ICD drives are shipped with 2 meter (6.5 foot) cables. The maximum cable length to the first disc is 3.69 meters (12 feet), from the first disc to a second disc is 2 meters (6.5 feet).

Use in same system with 13175B MAC interface: One 12821A ICD interface can be used in the same RTE-IVB and RTE-VI/VM based on HP 1000 Computer Systems as one 13175B MAC disc interface.

NON-DISC HP-IB DEVICES

Non-disc HP-IB devices are not supported by the 12821A interface.

ELECTRICAL SPECIFICATIONS

Current required from computer power supply:
3.34A(+5V), 0.1A(-2V).

Ordering Information

The 12821A interface includes:

12821-60003 Disc Interface
59310-60008 Cable Assembly, 3.69 meters (12 feet)
12992-80004 12992H Disc Loader ROM for ICD drives
12821-90006 Interface and Service Manual
12992-90001 HP 12992 Loader ROMs Installation Manual

12821A Option

001: Interface for CS/80 Discs; deletes the 12992-80004. Must order 12992J CS/80 Disc Loader ROM from HP Data Systems Division (22).

Product Number 12889A

The HP 12889A Hardwired Serial Interface provides for high speed, asynchronous, long-distance, point-to-point data transfer between two HP 1000 M/E/F-Series Computers. The 12889A can be plugged into each computer with separate coaxial cables for sending and receiving to achieve immediate line turnaround. It is also used for communication between a local HP 1000 M/E/F-Series Computer System and an HP 3000 Series II/III System with 30360A Hardwired Serial Interface via an appropriate length of 30220A cabling.

Features

- * Transfer rates to 250K bytes/second
- * Transmission distances to 609 meters (2000 feet)
- * Programmable error detection
- * Optically isolated receiver circuit

Functional Specifications**DATA TRANSFER**

Maximum Cable Length: 304.8 meters (1000 ft) standard; 609.6 meters (2000 ft) with Option 001.

Maximum Data Rate: 250K bytes/second standard; 125K bytes/second with Option 001. This is a hardware rate; software overhead will result in slower system throughput.

Transmission Mode: Bit-serial, asynchronous, using separate cables to send and receive for immediate line turnaround.

Error Detection: Uses a Cyclic Redundancy Code (CRC) technique with a 16-bit feedback shift register that implements a 15th degree polynomial.

CONFIGURATION INFORMATION

Computer and System Compatibility: The 12889A is hardware-compatible with HP 1000 M/E/F-Series Computers and with HP 1000 Model 20, 25, 40, and 45 Computer Systems.

Computer I/O Channels Required: One.

Software Support: HP 1000-to-HP 3000 communication is supported in the HP 1000 M/E/F-Series System by 91750A DS/1000-IV software or by 91740A/B DS/1000 software-firmware and 91741A software.

Prerequisite: Appropriate length of 30220A cable for connection to 30360A interface in HP 3000 system. User can provide his own 75-ohm coaxial cabling, type RG-59/U, Belden No. 9259, or equivalent, (two cables per connection).

Current Required from Computer Power Supply: 2.25A (+5V), 0.01A (-2V), 0.125A (+12V), 0.05A (-12V).

Installation: To install, plug the 12889A interface into the computer I/O backplane, connect the cable from the interface in the local computer and to the counterpart interface in the remote computer. Then integrate the interfaces and recommended software into the operating systems of both computers. *The 12889A is recommended and warranted for intra-building communication only.*

Ordering Information

12889A Hardwired Serial Interface Includes:

- 12889-60005 Hardwired serial interface card that has a 15MHz clock oscillator
- 12889-60004 3.048 meters (10ft) Hood and coaxial signal cable assembly.
- 12889-90001 Interface manual

12889A Options

- 001:** Replaces the 12889-60005 serial interface with the 12889-60006 serial interface that has a 7.5MHz clock oscillator.

Product Number 12930A

The HP 12930A Dual-Channel Universal Interface Card is designed to interface HP 1000 M/E/F-Series computers with a wide variety of external input/output devices. The card's versatility is achieved by employing a set of programmable switches which may be positioned to accommodate most external device interface requirements. The card's dual-channel design provides for rapid transfer of large data blocks (up to 616,000 16-bit words/second) over relatively long distances (up to 152 meters or 500 feet) as well as the exchange of control and status information. The universal interface card offers a choice of differential or TTL logic (ground true/positive true). Operationally, in HP 1000 M-Series computers only, it provides for successive cycle stealing under DCPC control, separately addressable and independently programmed data and control/status channels, and a power status monitor.

Features

- * Differential line drivers and receivers
- * Separate data and control channels
- * Dual 16-bit data registers
- * 6-bit command and status registers

Functional Description

The universal interface card provides two interface duplex data channel transfers 16-bit data words between the computer and the input/output device. This channel includes data transfer control circuits and two storage registers which allow the interface card to accept and send data when convenient for the I/O device. The lower priority (higher select code) control/status channel transfers up to six bits of command and status information. This channel is equipped with 6-bit control and command registers. Status information is strobed directly between the computer and external device without intermediate storage so that device/computer status is continuously available.

Each interface channel has a set of independently programmable switches which accommodate diverse interface requirements. A set of general-purpose switches is also provided.

The universal interface card may be programmed for input-only, output-only, or combined input-output operation using data-channel, control-status, or dual-channel modes. Three logic types are available: differential driver (standard), ground-true TTL (Options 001 and 003), and positive-true TTL (Option 002).

Functional Specifications**CAPACITY**

Duplex Data Input/Output Channel: 16 bit input and 16 bit output.

Command-Status Channel: 6 bit command output and 6 bit status input.

TYPES OF LOGIC

Standard: Differential.

Options 001 and 003: Ground-true, positive false TTL.

Option 002: Positive-true, ground false TTL.

DIFFERENTIAL INPUT LEVELS

"1" State: Voltage differential greater than or equal to +1V, 2.5 Ω input impedance.

"0" State: Voltage differential less than or equal to -1V, 2.5K Ω input impedance.

TTL INPUT LEVELS

Positive State: +2.4V to 5.0V, 330Ω to +5V.

Ground State: 0 to 0.5V, 15mA.

MAXIMUM DCPC TRANSFER RATES

In HP 1000 M-Series Computer: 616,000 words/second.

In HP 1000 E/F-Series Computer: 552,000 words/second.

MAXIMUM INTERFACE CABLE LENGTH

Standard: 152 meters (500 feet)*

Options 001 and 002: 7.6 meters (25 feet)

Option 003: 15.2 meters (50 feet)

**Cable longer than 7.6 meters (25ft) must be special ordered.*

CONFIGURATION INFORMATION

Computer Compatibility: The 12930A Universal Interface is compatible with all HP 1000 M/E/F-Series computers.

I/O Channels Required: One, if only the duplex data channel on the interface is used; two, with the second physically filled by the priority jumper card included with the 12930A, when both the duplex data channel and the control-status channel are used.

Software Support: Software support for the 12930A interface is limited to the diagnostic furnished with it. A user-written driver, programmed in Assembly language, will be required to run this interface in a computer operating system.

Installation: To install, set the select code switches on the card for the select codes to be used by the duplex data channel (and the command-status channel if used). Then plug the interface into the computer I/O backplane, plug

the priority jumper card into the adjacent channel whose code is being used by the second channel on the 12930A interface. Connect the interface to external equipment with user-fabricated (or Option 003 preassembled) cable and integrate the interface and user-written driver into the computer's operating system.

ELECTRICAL SPECIFICATIONS

Current Required from Computer Power Supply:

	<u>+5V</u>	<u>-2V</u>
12930A	1.8A	0.1A
12930A & 001 or 002	2.2A	0.1A

Ordering Information

HP 12930A Dual Channel Universal Interface includes:

12930-60001	Dual channel universal interface card with differential logic
8120-1895	7.6 meter (25 ft) cable
12930-60013	Test connector
02116-6110	Priority jumper card
12930-90001	Interface manual

12930A Options

- 001:** Replaces 12930-60001 differential logic interface with 12930-60016 TTL ground-true logic interface and the 12930-60013 test connector with the 12930-60014 test connector.
- 002:** Replaces 12930-60001 differential logic interface with 12930-60017 TTL positive-true logic interface and the 12930-60013 test connector with with 12930-60015 test connector.
- 003:** Replaces 12930-60001 differential logic interface with 12930-60016 TTL ground-true logic interface. Replaces the 8120-1895 cable with the 12930-60012 15.2 meters (50ft) interface cable assembly for connection to the 2894A Card Reader/Punch, and the 12930-60013 Test Connector with the 12930-60014 Test Connector.

Product Number 12966A

The HP 12966A Buffered Asynchronous Communications Interface provides for connection of Bell type 103 or type 202 data sets or equivalent modems to HP 1000 M/E/F-Series computers, offering three levels of capability and sophistication to the user. The 12966A is HP's most powerful point-to-point terminal interface and is supported under RTE-M/II/III/IV/IVB/VI-VM for local or modem interfacing of 2635A Printing Terminals, 2621A/P, 2640B, 2644A, 2645A, 2647A, 2648A, 2649C, or 2649G Display Terminals with or without minicartridge I/O and/or auxiliary printers, or 7221A Graphics Plotter to HP 1000 computers and systems.

Features

- * EIA RS-232-C and CCITT V.24 compatibility
- * Compatibility with Bell 103 and 202 data sets or equivalent
- * Data set control implemented through software
- * Simplex, half duplex, or echoplex operations with secondary data channel
- * Selectable data rates to 9600 bits/second
- * Multiple character buffering
- * Special character recognition/interrupt capability with 256 byte special character memory
- * Selectable character size, parity checking, and number of stop bits
- * Hardware break detection

Function Description

The 12966A is the recommended point-to-point interface for 2621A/P, 2640B, 2644A, 2645A, 2647A, 2648A, 2649C, and 2649G Display Terminals, with or without minicartridge tape units or auxiliary printers, 2631A/B and 2635A/B Printing Terminals, and 7221A/B/S Graphics Plotter on HP 1000 Computer Systems. Its buffering offers high performance when used with software driver DVR05 or DVA05 in RTE-M/II/IV/IVB/VI-VM based systems. The

12966A contains a 128 character buffer which supports block-mode data transfers for efficient use of computer time. Interface flags indicate buffer status, improving computer utilization by reducing the number of times an interrupt must be serviced. The 12966A also contains a special character recognition/interrupt capability with a 256 byte RAM special character memory. The special character memory gives the user the ability to specify up to 256 different special characters and cause an interrupt flag to be set whenever one of them is received. The interface operates at speeds to 9600 bps.

Functional Specifications

Interface Level: EIA RS-232-C or CCITT V.24.

Jumper-Selectable Baud Rates with Internal Clock: 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600 bits/second.

Program-Selectable Baud Rates with Internal Clock: Same as Jumper-selectable baud rates, listed above.

Maximum Baud Rate with External Clock: 9600 bits/second.

Programmable Character Size: 5, 6, 7, or 8 bits.

Stop Bit Selection: 1, 1-1/2, or 2, program selectable.

Programmable Parity Generation and Checking: No parity, odd, or even.

Character Buffering: 128 characters.

Special Character Memory: 256 characters.

Modem Interface Capability: Interface and supporting DVA05 software driver are compatible with Bell type Data Sets and Vadic VA3400 1200 bps modem.

Break Detection: Hardware break detection.

Data Set Signals Provided:

<u>EIA Designation</u>	<u>12966A</u>
Protection ground	
Transmitted data	(BA)
Received data	(BB)
Request to send	(CA)
Clear to send	(CB)
Data set ready	(CC)
Signal ground	(AB)
Received line signal detector	(CF)
Secondary received line	(SCF)*
Secondary received data	(SBB)*
Secondary request to send	(SCA)*
Data terminal ready	(CD)
Ring indicator	(CE)

**The 12966A user may choose any one of the pairs SBA, SBB; SBA, SCF; SCA, SBB; or SCA, SCF. Wiring details are given in the Reference and Application Manual.*

CONFIGURATION INFORMATION

Computer Compatibility: Hardware compatible with all HP 1000 M/E/F-Series Computers.

System Compatibility: The 12966A used with RTE driver DVR05 or DVA05 is compatible with all HP 1000 M/E/F-Series Computer Systems.

Computer I/O Channels Required: One per interface.

Software Support: The 12966A interface is supported by RTE drivers DVR05 and DVA05 which are included in the RTE-II, RTE-M, RTE-IV, RTE-IVB, and RTE-VI-VM operating systems.

Diagnostic Support: Diagnostics for the 12966A interface is provided in the 24396A-F Diagnostics Library.

Installation: To install, plug the interface into the computer I/O backplane, connect the interface cable to the modem, and integrate the interface into the operating system.

Current required from Computer Power Supply:

<u>+5V</u>	<u>-2V</u>	<u>+12V</u>	<u>-12V</u>
1.95A	0.07A	0.02A	0.06A

Ordering Information**12966A Buffered Async Communications Interface, including:**

12966-60013	Asynchronous communication interface card
12966-60003	Test connector assembly cables
12966-60004	15.2 meter (50ft) cable terminated with EIA RS-232-C 25-pin male connector.
12966-90001	Interface reference and application manual

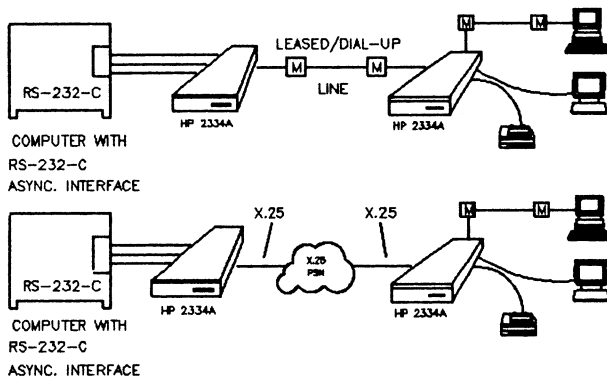
12966A Options:

- 001:** Replaces 12966-60004 standard EIA terminal cable with 15.2 meter (50ft) 12966-60008 hooded connector for 264X, 2631A, or 2635A terminals.
- 002:** Replaces 12966-60004 with 12966-60006 15.2 meter (50ft) cable terminated with EIA RS-232-C 25-pin male connector for modem connections.
- 005:** Replaces the 12966-60004 cable with a 12966-60010 15.2 meter (50ft) cable for HP terminals requiring a 50-pin connector.
- 006:** Deletes 12966-60004 Cable.
- 105:** Replaces 12966-60004 with 12966-60014 EMI compatible cable for HP terminals requiring a 50-pin connector.
- 106:** Replaces 12966-60004 with 12966-60015 EMI compatible cable having 25-pin male RS-232-C connector. It is used with the 2392A terminal and terminals not providing baud rate timing.

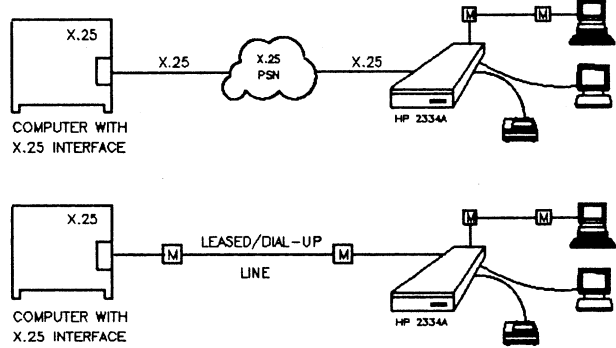
NOTE: Options 105 and 106 contain jumpers which force the interface to operate at 9600 baud; they are required when used with HP systems to meet EMI compatibility requirements.

Product Number 2334A

1 - STAT MUX



2 - CLUSTER CONTROLLER



The HP 2334A MULTIMUX is designed to connect up to 16 remote workstations (terminals, personal computers, printers, plotters) to a host computer. It can be used over analog or digital leased line, dial-up line, or X.25 Packet Switching Network (PSN).

Two types of configuration are supported for each 2334A port: stat mux and cluster controller.

Features

- * Remote connection of up to 16 RS-232-C workstations
- * Expandable from 4 to 16 terminals in groups of 4
- * Support analog/digital leased line, dial-up line and X.25 PSN
- * Support of HP 3000 and HP 1000 computers
- * Remote connection of spooled printers with the HP 3000 computer
- * Most HP 3000 application subsystems supported with stat mux configuration
- * Implementation of X.25/X.3/X.28/X.29/X.121 November CCITT recommendations
- * Certification with most X.25 public PSNs
- * Connection to non-HP computers
- * Computer switching and port contention
- * Menu driven configuration accessible remotely
- * Comprehensive diagnostic and self-tests

Functional Description and Specifications

ASYNCHRONOUS PORTS CONNECTION

The HP 2334A uses a four-port interface that supports full-duplex, asynchronous RS-232-C, CCITT V.24/V.28 point-to-point connection at 110, 150 300, 600, 1200, 2400, 4800 or 9600 bps. Two different RS-232-C four port interfaces are available: 4 port direct connect interface and 4 port modem control interface. The 4 port direct connect interface supports 7 signals (TX, RX, ground, RTS, CTS, DCD and DTR) allowing asynchronous modem or PBX/Dat Switch and other devices connection requiring modem control signals.

The HP 35016A and RACAL-MILGO MPS 1222 are the recommended asynchronous full-duplex modems for connections over dial-up line at 1200 baud.

Up to four interfaces (direct connect and/or modem control) can be installed in the same HP 2334A, allowing up to 16 connections. These connections can be between the HP 2334A and workstations, or HP 2334A and host computer ports. Each port of the HP 2334A port interface can be used for a workstation connection or a computer port connection.

Workstations can be connected using either one of the two interfaces, but the 4 port modem control interface is recommended for its performance and its possible remote configuration access.

The HP 2334A used in stat mux configuration and connected to HP 3000 computer ports using "switching connection methods" (see details further) is only supported by HP with 4 port modem control interfaces.

Auto-parity (odd, even) and auto-speed (up to 9600 bps) are available on each HP 2334A port. ASCII code is fully supported. X-ON/X-OFF or HP ENQ/ACK flow control methods can be chosen. Binary transfer with no flow control should be done in blocks of maximum 128 bytes.

SYNCHRONOUS COMPOSITE INTERFACE

HP 2334A has one RS-232-C, CCITT V.24/V.28 synchronous full duplex composite interface to connect the HP 2334A to a modem via analog leased line, digital leased line (DDS), dial-up line or X.25 PSN access. Change from one transmission media to another one does not require any hardware or firmware modification in the HP 2334A. This interface is supported at any speed between 1200 bps and 19200 bps with external clocking. Speed of 4800, 9600 or 19200 bps can be selected with internal clocking.

RACAL-MILGO ALPHA 96 is the recommended synchronous full-duplex modem to be connected over leased line at 9600 bps. HP 35016A and RACAL-MILGO MPS 1222 are the recommended synchronous full-duplex modems to be connected over dial-up line at 1200 bps. Hardwired connection for the synchronous composite link is not supported, synchronous full-duplex short-haul modems or modem eliminator should be used.

HP 2334A is using X.25 protocols, which provide excellent error detection and correction and a choice of flow control parameters.

X.25 Packet Switching Network

PARAMETERS

The HP 2334A has an X.25 interface which is fully compatible with the November 1980

version of the CCITT X.25 recommendation for levels 1, 2, and 3.

Level 1 : Physical Interface

- X.21 bis (RS-232-C, CCITT V.24/V.28) at any speed from 1200 to 19200 bits/second for PSN connection
- Operate as DTE

Level 2 : Data Link Protocol

- LAP-B protocol
- Modulo 8 sequence number
- Window size: 1-7
- Operate as DCE or as DTE

Level 3 : Packet Level

- Switched Virtual Circuit (SVCs)
- Permanent Virtual Circuits (PVCs)
- Up to 17 Virtual Circuits simultaneously
- Window size: 1-7
- Maximum packet size: 128 bytes
- Support of D, M and Q bits

X.25 Facilities

"Facility" is the name that the PSN administrations give to some network features.

Facility Name	CCITT X.25 Reference	2334A Support
Extended Sequence Numbers	7.1.1	No
Non-Standard Default Window Sizes	7.1	Yes
Default Throughput Class	7.1.3	Yes
Packet Retransmission (REJ)	7.1.4	No
Incoming Calls Barred	7.1.5	Yes
Outgoing Calls Barred	7.1.6	Yes
One-Way Outgoing	7.1.7	Yes
One-Way Incoming	7.1.8	Yes
Closed User Group	7.1.9	Yes
Closed User Group Outgoing	7.1.10	Yes
Closed User Group Incoming	7.1.11	Yes
Closed Group Incoming Barred	7.1.12	Yes
Closed Group Outgoing Barred	7.1.13	Yes
Bilateral Closed User Group	7.1.14	Yes
Bilateral Closed Outgoing	7.1.15	Yes
Reverse Charging Request	7.1.16	Yes
Reverse Charging Acceptance	7.1.17	Yes
RPOA Selection	7.1.18	No
Default Packet Sizes	7.2.1	Yes (1)
Flow Control Negotiation	7.2.2	Yes
Throughput Class Negotiation	7.2.3	Yes
Fast Select	7.2.4	No
Fast Select Acceptance	7.2.5	No
D-Bit Modification	7.2.6	No
Abbreviated Address	7.2.7	No
Datagram Facilities	7.3	No

(1) Only 128 bytes.

X.3/X.28/X.29 IMPLEMENTATION

The HP 2334A supports the November 1980 version of CCITT X.3/X.28/X.29 recommendations which allow the controller to act as a private Packet Assembler/Disassembler (PAD). The standard 18 parameters defined in the X.3 recommendation are supported, plus additional HP defined local parameters are available for enhanced functionality with HP devices. These programmable parameters are used to configure the operational characteristics for each port to the device or the application.

Basic defined set of parameters (or profiles) are stored permanently in the HP 2334A configuration, retained in non-volatile memory and automatically loaded at power-up.

Supported Public Packet Switching Networks

The table below lists the public Packet Switching Networks (PSN) which have been, or are in the process of being certified, as of December 1984. Consult your Hewlett-Packard Representative for the most recent list of certified Packet Switching Networks:

Country	PSN	2334A
Australia	Austpac	In Progress
Austria	Datex-P	In Progress
Belgium	DCS	Certified
Canada	Datapac	In Progress
France	Transpac	Certified
Germany	Datex-P	Certified
Ireland	Eirpac	In Progress
Italy	Itapac	In Progress
Japan	Venus-P	Certified
Netherlands	DN-1	Certified
Norway	Datapak	Certified
South Africa	Saponet	Certified
Spain	Iberpac	Certified
Sweden	Datapak	Certified
Switzerland	Telepac	Certified
UK	PSS	Certified
US	Telenet	Certified
US	Tymnet	Certified
US	Uninet	Certified

2334A Additional Capabilities

The following capabilities are available with the HP 2334A.

- * The HP 2334A in stat mux configuration supports the following "switching connection methods":
 - Host computer switching from the same remote terminal over leased/dial-up line or X.25 PSN
 - Host computer port contention, allowing connection of more remote terminals than computer ports (connected to HP 2334A)
 - Host computer access via X.25 PSN using Switched Virtual Circuits

The "switching connection methods" used with HP 3000 computers are only supported by HP if modem ATP/ADCC cards and HP 2334A 4 port modem control interfaces are used. PBX, Data Switch, or X.25 Node Switch may also require that the HP 2334A 4 port modem control interfaces be used.

The following features are offered:

- * Incoming call support (for remote printer) with HP 3000 computer
- * Automatic dial of PAD selection command
- * Port disabling for call barring
- * Symbolic host computer addressing (up to 16 names)
- * Callable port-pool for sharable connections
- * Local user group (saving the cost of public PSN closed user group facility service) via 16 filters with don't care value place holders
- * User definable 2334A port profile, retained in non-volatile memory
- * Test port (password protected) accessible by any connected terminal, for remote on-line configuration, tests and statistics
- * Indexed sub-addressing compatible with X.25 Node Switch connection
- * User defined welcome message (20 characters)
- * User defined PAD message header (10 characters)

Configuration and Tests

LOCAL OPERATIONS

- * The HP 2334A configuration can be set and modified off-line from a terminal connected to the 2334A by using the HP 2334A menus.

- * The following tests can be performed off-line by using the HP 2334A switches:
 - Internal power-on automatic self-test
 - Switches test
 - Closed loop self diagnostic test
 - Terminal loop-back test
 - Modem loop-back test (when authorized by the network administration and available on the modem)
- * The following status can be seen on-line by using some of the 21 LEDs of the HP 2334A:
 - X.25 levels 1 and 2 status
 - HP 2334A internal memory buffer use
 - Asynchronous port ready
 - Virtual Circuit status
 - X.25 level 2 activity
- * Also 2334A manual reset and 2334A port disabling are available

REMOTE OPERATION

- * The HP 2334A configuration can be modified remotely in two ways:
 - On-line via the HP 2334A synchronous interface over the communication line or X.25 PSN using the test port.
Warning: Care must be exercised when some X.25 parameters are modified on-line.
 - Off-line via a HP 2334A modem control asynchronous port over a dial-up line at 1200 bits/second.
- * The 2334A displays the following information on line via the test port:
 - X.25 level 2 statistics on communication line quality
 - HP 2334A identification
 - 128 bytes of HP 2334 memory for status of connected ports
 - HP 2334A ROM part numbers for verification of HP 2334A firmware revision
- * The 2334A performs on-line the following operations via the test port:
 - HP 2334A reset
 - HP 2334 port disabling
 - Communication test

Computer Support

HP 3000 COMPUTER SUPPORT

* HP 2334A In Stat Mux Configuration

The HP 2334A in stat mux configuration is supported when connected to HP 3000 computer used with MPE-VE and ATP/ADCC interface cards. Modem ATP/ADCC cards are required when the HP 2334A is used with "switching connection methods" described previously.

This configuration supports the following workstations:

- Terminals: HP 2321B, 2622A, 2623A, 2624B, 2625A, 2626A, 2627A, 2628A, 2382A, 2392A.
- Personal computers: HP 150, HP 110.
- Spooled printers: HP 2932A, 2933A, 2934A, 2563A, 2686A, 2687A, 2631B
- Plotters: HP 7470A, 7475A, 7550A.
- Graphics tablet: HP 17623A connected to HP 2627A.

All workstations should be used as TERMTYPE 10, except remote printers which should be used as TERMTYPES 18, TTPCL18N, or 22.

This configuration supports the following HP 3000 applications subsystems with the indicated release number (or later release): HPDRAW (A.03.00), HPEASYCHART (A.03.00), DSG/3000 (a.04.00) HPMENU (A.01.00), HPLIST (A.00.02), ADVANCELINK (A.01.02), DSNLINK (A.01.01), VPLUS (B.03.25), IMF/3000 (A.51.90), HPMESSAGE 150 (A.00.00), HPMESSAGE/IBM (A.00.00), HPTELEX (A.02.00), HPDESK (A.03.00), HPSLATE and TDP.

Warning: HPDESK imposes some restrictions to HPSLATE used within HPDESK (see HPDESK Data Sheet for more details).

The HP 2334A, like any other stat mux, is causing performance degradation to the use of HPSLATE and TDP.

Tests on the following products are in progress and results will be obtainable from your local Hewlett-Packard Representative: PM, MM, VISICALC/3000, IDS, IFS, RAPID. HPWORD and HPTELEX interface unit are not supported with the HP 2334A.

* HP 2334A In Cluster Controller Configuration

The HP 2334A in cluster controller configuration is supported when connected to HP 3000 computer used with MPE-VE or MPE-VP and X.25 NETWORK LINK (HP 32187A).

This configuration supports:

- Limited VPLUS/3000 application subsystem (version B.03.25 or later) using only the following workstations with their indicated date code: HP 2622A (2313), 2623A ((2335), 2624B (2249), 2625A, 2627A, 2628A, 2392A, and HP 150.
- DSNLINK (A.01.01) and ADVANCELINK (A.01.02) with HP 150.
- Character mode applications with any HP terminal or HP 150/110.
- Spooled printers: HP 2932A, 2933A, 2934A, 2563A, 2686A, 2687A, 2631B, with MPE-VE T-MIT or later release.

HP 1000 COMPUTER SUPPORT

The HP 2334A in stat mux configuration is supported when connected to HP 1000 computer used with RTE-A (A-Series) or RTE-6/VM (E/F Series) and HP 12040B or HP 12792B interface cards.

The HP 2334A in cluster controller configuration is supported when connected to HP 1000 computer used with RTE-A (A-Series) or RTE-6/VM (E/F Series), LAP-B interface card (HP 12075A/12250A) and HP 9175A X.25 software.

These two configurations support exclusively character mode applications with all HP terminals or personal computers.

Remote printers are not supported in cluster controller configuration.

HP PERSONAL COMPUTER SUPPORT

The HP 150 is supported with the HP 2334A as a terminal or as personal computer (PC). In PC mode, the HP 150 can transfer files to the HP 3000 computer or to another HP 150 PC connected to a different HP 2334A by using DSNLINK (A.01.01) or ADVANCELINK (A.01.02) software.

The HP 110 is only supported as a terminal.

Customer Installation Configuration

The customer is responsible for installation of the HP 2334A. The HP 2334 reference and service

manual (02334-90001) provides the information needed to install and configure the HP 2334A.

The initial configuration can be set by a Hewlett-Packard System Engineer by ordering HP 2334A Option 100. Later modifications to the configuration are not included but may be purchased as consulting time.

Before installing HP 2334A, the customer should obtain, install and verify the correct operation of any communication line, X.25 PSN access or any other equipment and facilities necessary to interface to the HP 2334A.

Hewlett-Packard is liable only for correct execution of the loop-back and self diagnostic tests (i.e. HP 2334A functionality). All hardware and software connections to the communication line or X.25 PSN and non-HP computers are the customer's responsibility. The four port interfaces (option 122 or 123) are factory installed only when ordered with the HP 2334A. Add-on HP 40260A and HP 40261A four port interfaces may be installed by the customer or by a Hewlett-Packard Customer Engineer on a time and material basis.

ENVIRONMENTAL CHARACTERISTICS

Temperature Free Space Ambient

Operating: 0° to 55°C

Non-Operating: -40° to +75°C

Relative Humidity (non-condensing)

Operating: 5% to 95% at 40°C

Non-operating: 90% at 65 to 95% @ 40°C

Altitude

Operating: 4,600 meters (14,700ft)

Non-operating: 15,300 meters (49,000ft)

Vibration

Up to 0.38 mm p-p, 5-55-5 Hz,

3 axis for 15 minutes

Dwell 10 minutes

Shock

Bench handling: 102 mm bench drop

Transport handling: 762 mm drop

30 g for 11 ms

PHYSICAL CHARACTERISTICS

Dimensions: 135 mm H (140 mm with feet)
x 425 mm W x 540 mm L [5.25 in H (5.45in)
x 16.75 in W x 21.25 in L]

Net Weight: 13 kg (29 lbs)
Shipping Weight: 17 kg (38 lbs)

POWER REQUIREMENTS

Input Voltage: 86 to 127 volts
With Option 015: 195 to 253 volts

Input Frequency: 47.5 to 66 Hz

Power Consumption: typical 115 watts

Approvals

The HP 2334A has passed the following approvals: RFI (Radio Frequency Interference)

- VDE 0871 level A
- FCC class A

Configurations including peripherals with high RFI levels may not be supported or may require on site verification in some countries.

SAFETY APPROVALS

- UL 478, UL 114 for EDP and Office Equipment.
- CSA C22.2-154 for EDP Equipment.
- VDE 0730 part 2P for EDP and Office Equipment.
- Complies with IEC standards for EDP and Office Equipment.

DATA COMMUNICATION APPROVALS

- Complies with CCITT requirements.
- Australian, Belgian, British, German, Japan and Scandinavian datacomm certification pending.
- Some datacomm regulations may restrict the use of all possible HP 2334A connections. Check with your local datacomm regulation agency.

Ordering Information

HP 2334A HP MULTIMUX. *1 to 4 each of options 122 or 123 must be ordered. Network modem cable supplied (5m). Customer installed.*

2334A Option

- 115:** 220 Volts AC unit.
100: HP 2334A initial configuration done by HP AEO. Includes labor and travel.
122: 4 port direct connect interface. Factory

installed. Cannot be used for asynchronous modem or computer port connection requiring modem control signals (e.g. "switching connection methods"), use instead option 123.

123: 4 port modem control interface. Factory installed.

X25: X.25 manual for each 2334A connected to an X.25 PSN.

40260A Additional 4 port direct connect interface for an installed HP 2334A. Customer installed. Cannot be used for asynchronous modem or computer port connection requiring modem control signals.

40261A Additional 4 port modem control interface for an installed HP 2334A. Customer installed.

001: HP 2334A 4 port modem control adapter. To upgrade an installed HP 2334A MULTIMUX 4 port direct connect interface to an HP 2334A MULTIMUX 4 port modem control interface. Customer installed.

Direct connection of workstations to HP 2334A must be done by using standard terminal modem cables.

An asynchronous modem or computer port must be connected to the HP 2334A by using HP 40220A (5m) modem cable for each HP 2334A port. HP 31391A (+5m) or HP 31391B (+10m) extension cables can be used with HP 40220A.

ATP direct connect needs HP 30152 cable in addition to HP 40220A cable.

Rack Mounting Accessories:

- 5061-0089 Front handles kit
- 5061-0077 Rack mounting kit without front handles
- 5061-0083 Rack mounting kit with front handles

Documentation

For further information refer to: HP 2334A Reference and Service Manual (02334-90001).

Product Number 24602A

The HP 24602A is a package of tools necessary to aid in the programming of firmware on 12042B (A/L-Series) and 12826B (M/E/F-Series) PSI cards. This package is intended for sophisticated OEM's or End Users as a foundation for designing applications-oriented communications products. Instructions and information presented presuppose the ability of the user to understand and program assembly level language and Z-80 processor code. Also required are certain user supplied developmental devices.

The HP 24602A contains a manual providing detailed descriptions of PSI cards and how their features can be capitalized upon in the design of firmware. A Developmental Debug Monitor (DDM) EPROM and accessory cable allow cost effective program test and edit capabilities. Used with either the 12042B or 12826B, the 24602A creates a flexible solution to complex data communication problems.

Features

- * **Firmware Programming Guide, containing:**
 - Extensive listing of related reference material
 - PSI card block level feature description
 - Principles of PSI operation; including a description of the Zilog Z-80A smart chip set, modem/control lines and communication interface
 - Detailed instructions on integrating firmware into PSI backplane and communications specifications
 - Programming considerations for Z-80A microprocessor characteristics
 - Firmware programming example
 - Reference guide to the DDM
- * **Friendly Development Debug Monitor (DDM), an alternative to purchasing a microprogramming development workstation.**

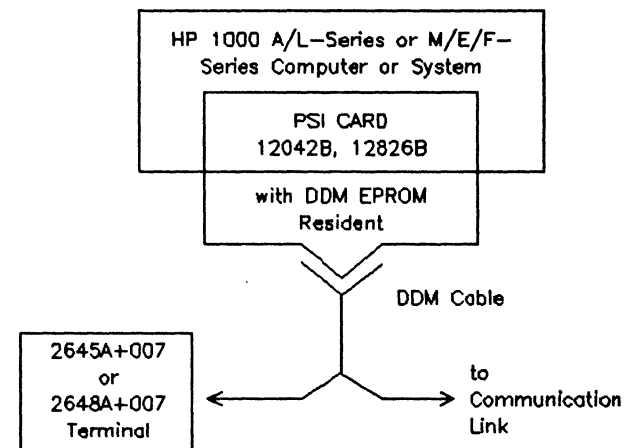
Functional Description

ONE DETAILED MANUAL FOR FIRMWARE DEVELOPMENT

The Firmware Programming Guide is a complete reference on firmware development of PSI cards. Concisely written with a programmer's perspective in mind, the Guide leads the reader from a general overview of the hardware and firmware capabilities to detailed specifics of the cards. A full index and footnotes make it easy to locate and cross-reference information.

FRIENDLY AND COST-EFFECTIVE DEVELOPMENTAL DEBUG MONITOR (DDM)

The DDM is an optional EPROM based program which plugs into an EPROM/ROM socket in the PSI card. It serves as a monitor to aid in the development of user firmware. Once a firmware program is cross-assembled on a minicartridge tape, the DDM can load that program into the PSI card's RAM through an HP 2645 or 2648 terminal and a terminal-to-card-to-link cable supplied with the DDM (Figure 1).



For multiple programming and more sophisticated development functions, a microprogramming workstation, such as the HP 64000, is recommended.

Figure 1. DDM Hardware Configuration

The DDM can then support these functions:

1. Display and/or modification of memory locations.
2. Display and/or modification of registers
3. Control of program flow by:
 - a. Transferring control to firmware entry points.
 - b. Setting and removing break points.
 - c. Single-step simulation with trace.
4. Reading and writing through all I/O ports.
5. Creating ("punching") modified code into 264X minicartridge tape.
6. Help facility providing information about the command set.

**Note that the self-test EPROM offered with the 12042B and 12826B PSI cards is required to run DDM. When the card is reset with both the self-test and DDM plugged in, self-test is executed before DDM is activated.*

CONFIGURATION PREREQUISITES

Hardware: An HP 1000 computer and a 12042B (for HP 1000 A/L-Series) or 12826B (for HP 1000 M/E/F-Series) PSI card, plus either:

- a. a microprogramming workstation, such as the HP 64000, or
- b. Self-Test for either the 12042B or 12826B, a cross-assembler program to translate HP assembly or higher level language code to Z-80A code (contact HP for list of available cross assemblers), and one or more 2645 or 2648 terminals with minicartridge support.

Expertise: User must be able to write, test, and debug Z-80A firmware as well as HP 1000 resident drivers and applications software. This requires substantial expertise in Z-80A and HP 1000 assembly programming, the RTE operating system at the driver and backplane level, and communication protocols.

Ordering Information

The 24602A Package includes:

24602-90001	Firmware Programming Manual
24602-80001	Developmental Debug Monitor EPROM
24602-60001	DDM Accessory Cable
12042-91001	PSI for Modem Connection from A/L-series computers Installation and Service Manual
12826-91001	PSI for Modem Connection from M/E/F-series computers Installation and Service Manual

24602A Option

001: Deletes 24602-80001 Developmental Debug Monitor EPROM and 24602-60001 DDM Accessory cable.

Product Number 27110B

The HP 27110B HP-IB* Interface allows connection of up to 14 Hewlett-Packard Interface Bus compatible devices to HP Computers using the CHANNEL I/O architecture. HP-IB compatible devices include flexible and hard discs, printers, plotters, magnetic tape devices, graphics digitizers and an extensive list of instruments.

terminate an orderly flow of device-dependent messages. Three data byte transfer control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB.

Features

- * Allows simple implementation of computer-controlled instrumentation and peripheral systems
- * Fully IEEE-488-1978 compatible
- * 980 kilobytes per second high speed, 500 kilobytes per second standard speed
- * On-board intelligence off-loads the host computer, leaving more CPU resources for application oriented tasks
- * Support of up to 14 standard devices, 8 high speed devices (standard speed devices cannot be mixed on the high speed bus)
- * Support of Command Set 80 protocol for CS/80-based discs and tapes
- * Selectable HP-IB controller or slave capabilities
- * Parity check and Cyclic Redundancy Check-16 for error detection
- * Parallel poll mode can be programmatically enabled or disabled
- * Firmware-based self-test to help assure interface integrity

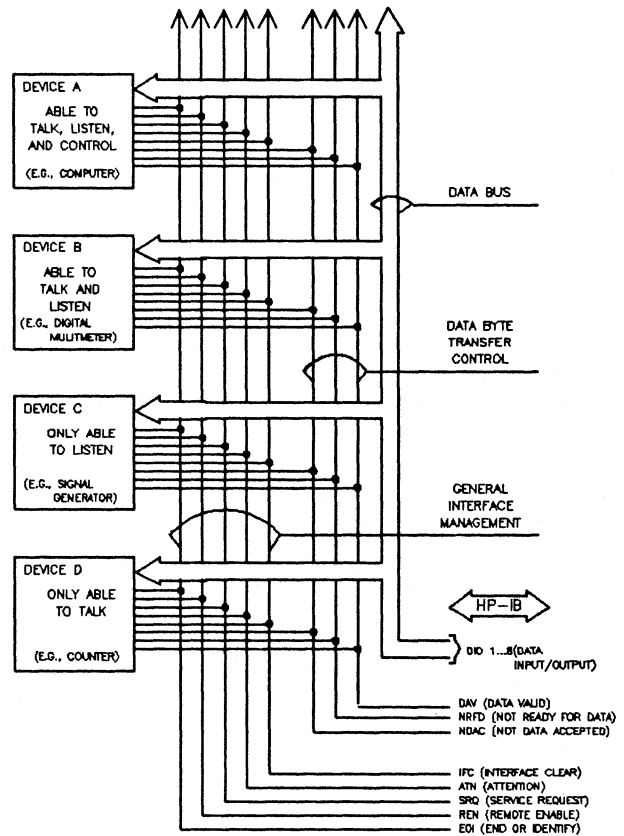


Figure 1. HP Interface Bus Concept

HP-IB Capabilities

The 27110B HP-IB Interface connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel, byte-serial form to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners". Data is exchanged asynchronously using interface messages to set up, maintain, and

*The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MC1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

Functional Specifications

CAPACITY

High speed devices per 27110B interface: Up to eight with load resistors installed. Up to 14 without.

Standard speed HP-IB devices per interface: Up to 14.

NOTE: Standard speed devices cannot be mixed on a high speed bus. High speed devices can be mixed on a standard speed bus if high speed cabling rules are observed.

OPERATING MODES

High speed mode: Operation at data rates to 980 kilobytes per second.

Standard speed mode: Operation at data rates to 500 kilobytes per second.

NOTE: Realizable speed for a particular system is dependent on such factors as cabling length, type of external device, system level software and number of devices. Higher transfer rates can be achieved when using less than maximum cable lengths and devices. Consult system documentation for further information.

System controller mode: A two position switch enables 27110B operation as system controller or disables such operation.

BUS CHARACTERISTICS

HP-IB Bus Signal lines:

DI01	Data Input/Output 1
DI02	" "
DI03	" "
DI04	" "
DI05	" "
DI06	" "
DI07	" "
DI08	Data Input/Output 8
DAV	Data Valid
NRFD	Not Ready For Data
NDAC	Not Data Accepted
IFC	Interface Clear
ATN	Attention
SRQ	Service Request
REN	Remote Enable
EOI	End or Identify

Logic Levels: High > 2.4V
Low > 0.5V
All signals are low true

Supported HP-IB functions: C1-C5, SR1, RL2, PP1, DC1, SH1, AH1, T1, TE1, L1, LE1, DT1, E2. TE1 and LE1 require host system support.

Logic Levels, line terminations, line drivers, and line receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum cable length for standard operation: 2 meters (6.5 ft) per device connected, with a 20 meter (65 ft) total length. The maximum number of devices is accommodated by interconnections using shorter than maximum cable length.

Maximum cable length for high speed operation: Interconnecting cable links should be as short as possible, with a maximum of 15 meters total length per system, and should have at least one equivalent resistive load per meter of cable (the high-speed resistor pack adds seven equivalent resistive loads).

Number of Devices	Maximum Total Cable Length (meters)
1	8
2	9
3	10
4	11
5	12
6	13
7	14
8 (maximum)	15

No more than eight devices are allowed in the system. A maximum system would be composed of the System Controller, with its high-speed resistor pack, and eight peripherals. Load resistors may need to be repositioned on the interface card for high speed operation. Refer to the installation manual.

NOTE: For high and low speed cable length operation, refer to the installation manual (27110-90003) for a complete explanation.

ERROR DETECTION

Data errors can be detected using Cyclic Redundancy Check-16 on all data messages sent or received. CRC-16 can be used if the other participating device supports CRC-16. CRC-16 is invoked by the system for each transaction. See system documentation for details. Interface message errors are detected using odd byte parity.

DIAGNOSTIC SUPPORT

An interface resident self-test, initiated on reset, is provided in the firmware of the 27110B.

ELECTRICAL SPECIFICATIONS

		Power
<u>Voltage</u>	<u>Current</u>	<u>Dissipation</u>
+5V	1.8 A	9.0 watts
+12V	35 mA	0.42 watts

PHYSICAL CHARACTERISTICS

Size: 172.7 mm (6.80 in) long by 172 mm (6.75 in) wide.

Weight: 234 grams (8.2 ounces); 679 grams (23.8 ounces) with HP-IB cable.

I/O Channel Interconnects: 80-pin connector, J1.

Device Interconnects: 26-pin connector, J2.

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C.

Operating Humidity: 5% to 95% RH @ 40°C.

Operating Altitude: 4600 meters (15,000 feet maximum).

Ordering Information

The 27110B includes:

27110-60101 HP-IB Interface Card
27110-63001 2 meter HP-IB Cable
27110-90003 Installation Manual

NOTE: Detailed technical information (schematics, cabling, etc.) for the HP-IB interface can be obtained from the HP 27132A CHANNEL I/O Technical Reference Package.

Product Number 27112A

The HP 27112A General Purpose I/O Interface is designed to provide multipurpose 8 or 16-bit parallel communication capabilities between external devices and HP Computers using the CHANNEL I/O architecture.

Features

- * Wide choice of programmable operating modes for ease of use with instrumentation
- * TTL (+5V) and +12V output level capability
- * Clocked mode for data transfers with handshake, transparent mode for transfers without handshake
- * Selectable data-in clock source
- * Positive true or negative true logic
- * 8 or 16-bit operation
- * Independent 16-bit input and output lines and storage registers
- * Data handshake control and flag lines
- * Two control and two status lines

Functional Specifications
DATA TRANSFER

Protocol: Transfers either 8 or 16 parallel bits at a time, without byte packing on 8-bit transfers

Maximum Data Rate: Rate depends on host processor.

In HP 9000 Series 500:

<u>Transfer Mode</u>	<u>Operating System</u>	<u>Transfer Rate</u>
Word Mode	Basic	600K bytes/s
Byte Mode	Basic;UNIX	300K bytes/s

These transfer rates assume that the card is in a quiescent backplane i.e. that no other card in the backplane requires service and that if the transfer is a read transfer, that transfer is terminated on count.

Maximum Length of Data Transfer from Interface to Backplane: 2 bytes per transfer

LINE CHARACTERISTICS

High Logic Level Choices: TTL (+5V) is standard; repositioning a jumper converts the interface to +12V level on outputs only. Inputs are TTL only.

Signal Lines:

PDIR		Peripheral Data Direction
DIN	0-15	Data Input Bus
DOUT	0-15	Data Output Bus
STS	0-1	Status Input Bus
CTL	0-1	Control Output Bus
PFLAG		Peripheral Flag
PCNTL		Peripheral Control
PEND		Peripheral End
PRESET		Peripheral Reset

Clocked Mode: The 27112A supports a clocked mode in which data transfers to/from external devices are synchronized by a command-flag handshake. Input data may be clocked on rising or falling edge, or on a Read command.

Internal Handshake Mode: The 27112A can also be used to send data to, or receive data from one or several devices, such as indicators or switches, that do not provide or use any type of handshaking (PFLAG) signal. Information is output to the destination device(s) exclusively under program control and input information may be read at any time.

Device Logic Sense Selection: The logic sense of DIN, DOUT, PCNTL, PFLAG, CTL, STS, PEND, and PRESET can be switch selectable independently. Switch open-high is positive true; switch closed-low is negative true.

CONTROL AND STATUS BIT COMMUNICATION

Control Output: Two control output bits may be sent to the interface device via an output control byte for use as control, command, or address bits.

Status Input: Two status bits may be received from the interfaced device via an input control byte. Both status bits can be programmed to cause an asynchronous request interrupt (ARQ).

ELECTRICAL SPECIFICATIONS

Direct Current Requirements:

<u>Voltage</u>	<u>Typical Current</u>	<u>Two Standard Deviation Current</u>
+5V	2.06A	2.20A
+12V	0.12A	0.15A

PHYSICAL SPECIFICATIONS

Dimensions: 172.7mm (6.8in) long by 172mm (6.75in) wide.

Weight: Interface Card, 245 grams (8.6oz);
Unterminated Cable, 990 grams (34.7oz).

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C.

Operating Humidity: 5% to 95% RH @ 40°C.

Operating Altitude: 4600 meters (15,000 feet) maximum.

Ordering Information

The 27112A includes:

27112-60001 GPIO interface card
27112-63002 5 meter unterminated cable
27112-90001 Installation Manual

27112A Option

001: Replaces unterminated cable with 2.5 meter 9885 Disc interface cable (27112-63003)

NOTE: Detailed technical information (cabling, schematics, etc.) for the GPIO interface can be obtained from the HP 27132A CHANNEL I/O Technical Reference Package.

A self-test loop back connector for optional use with the on card self-test is available. Order HP Part Number 1251-8003.

Product Number 27116A

The HP 27116A is an Extender Card for out-of-card-cage access to I/O cards connected with HP Computers using the CHANNEL I/O architecture.

Features

- * Solid mechanical support for board under diagnosis
- * Crosstalk isolation of all data and control lines
- * Decoupled ground and voltage planes

Physical Specifications

Dimensions: Overall 391.16mm (15.4in) long by 181.61mm (7.15in) wide.

Weight: 182 grams (9.4oz)

Ordering Information

The 27116A includes:

27116-60001 Extender Card

Product Number 27122A

The HP 27122A RJE interface is used to allow a CHANNEL I/O compatible host computer system to simulate an IBM 2780 or 3780 workstation. This permits the host HP computer to be used as a Remote Job Entry (RJE) station for batched-job communication with IBM 360/370 (or compatible) computers using IBM Bisync protocol.

The interface features a plug-in card incorporating microprocessor intelligence that offloads ALL communications overhead from the host. This means the interface card performs all protocol generation and interpretation, as well as modem control tasks and pre-processing functions such as character conversion, blocking and deblocking.

The specific needs of many different applications are met by selecting programmable configuration parameters. Complete verification of the interface is provided by full trace log, communications status and statistics, as well as hardware self-test.

Features

- * CHANNEL I/O RJE provides communications for allowing a host computer with complementary software to simulate an IBM 2780 or 3780 Remote Job Entry workstation
- * Is compatible with computers that utilize the CHANNEL I/O architecture
- * Makes it possible to communicate with other standard IBM 2780/3780 emulators.
- * Offloads all RJE communications overhead from the host computer
- * Operates at data rates up to 19.2k bits/second
- * Meets EIA RS-232C specifications and is compatible with CCITT V.24
- * Supports Bell type 208B, 209A, and 212 data sets or equivalent
- * Works with full or half duplex modems and supports auto answer and originate
- * Provides link control functions: line bid, normal and transparent data modes, all responses, and link termination

- * Meets specific application needs with configurable parameters and special character handling
- * Assures data integrity with CRC error checking on all data blocks
- * Accumulates long-term communication statistics and collects all link control and data characters in continuous trace log
- * EBCDIC character set recognized
- * Has built-in hardware self-test

Functional Description

CHANNEL I/O RJE provides a communication link used by a host HP computer to transmit batch jobs and receive output from a processor that can support standard IBM 2780/3780 devices. Additionally, one can use the CHANNEL I/O RJE link to exchange files between a host HP computer and other processors that simulate standard IBM 2780/3780 devices.

CHANNEL I/O RJE works with modems over switched and non-switched lines. The maximum data rate supported by the interface is 19.2k bits/second, but the interface also operates at slower rates to accommodate different modems (Bell Type 208B, 209A, and 212).

Link control is managed entirely by the on-card microprocessor. All functions including line bid, normal and transparent data modes, as well as all responses (ACK/NAK/WACK/TTD/RVI) and link termination are implemented by the card upon request by software in the host computer.

Card parameters and special character handling may be configured from the host computer or allowed to retain their default values. Configurable parameters include: Record and block sizes, timeouts, retry counts, conversion tables, record separators, formatting functions, and others. Special character handling include: Character code translation, automatic record terminations, adding and stripping, record and block separator sequences, blank truncating and padding, and repeated character compression and expansion.

To assist in line quality and link troubleshooting, the CHANNEL I/O RJE interface card accumulates communication statistics. A continuous trace log can collect all sent or received link control characters and independently collect all sent or received data characters. One may review the link control characters trace log without having access to the data characters trace log, thus permitting link troubleshooting without violating data security. A trace log also collects all internal firmware state changes.

An interface resident self-test, initiated upon reset, is provided with the CHANNEL I/O RJE interface.

Functional Specifications

CHANNEL I/O RJE meets all requirements for communication allowing simulation of the 2780/3780 systems.

CHANNEL I/O RJE does not recognize horizontal tabulation and vertical forms control codes. This capability, when it exists, must be host resident.

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0°C to 55°C.

Operating Humidity: 5% to 95% RH @ 40°C.

Operating Altitude: 4600 meters (15,000 feet) maximum.

PHYSICAL CHARACTERISTICS

Dimensions: 172.7mm (6.800in) long by 172.0mm (6.75in) wide.

Weight: Interface Card 235 grams (8.3 oz); Modem Cable 560 grams (19.7 oz).

ELECTRICAL SPECIFICATIONS

Maximum Direct Current Requirements: 1.62A (+5V), 0.087A (+12V), 0.108A (-12V).

Ordering Information

The 27122A includes:

5061-4920 PSI Card
27122-63001 5 meter RS-232-C Modem Cable with a 25-pin DTE modem male connector
27122-90001 Installation Manual
27122-80001 and -80002 RJE Firmware ROMs

NOTE: Detailed technical information (cabling, schematics, etc.) for the RJE interface can be obtained from the HP 27132A CHANNEL I/O Technical Reference Package.

A self-test loopback connector for optional use with the on card self-test is available. Order HP part number 1258-0207.

Shared Resource Manager Interface

Product Number 27123A

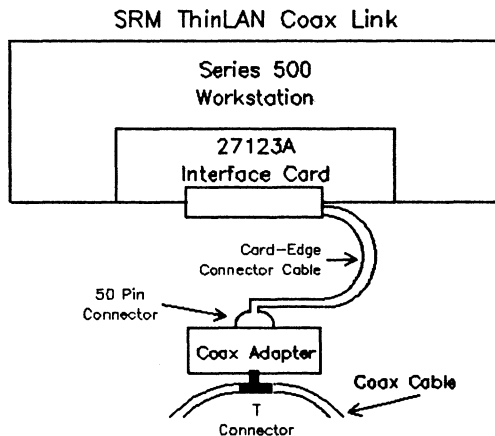
The Shared Resource Management (SRM) system is a dedicated file and printer/plotter server for the HP 9000 and HP 9835/45 engineering workstations. It provides the capability to share resources including discs, printers, and plotters, among workstations in a local cluster. SRM combines the distributed processing advantages of personal workstations with the centralized resources of multi-user systems.

The HP 27123A interface card is used in the HP 9000 Series 500 computers with BASIC or HP-UX operating systems.

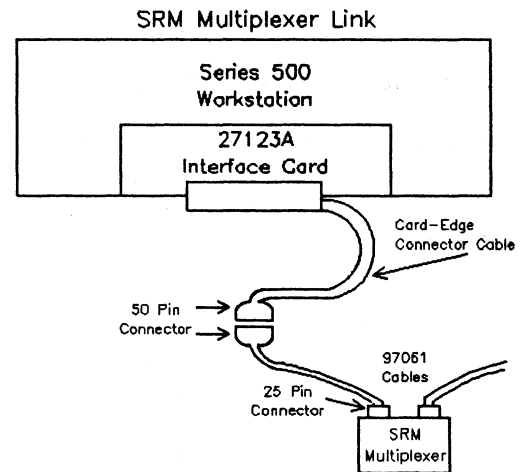
Functional Specifications

PHYSICAL ARRANGEMENT OF EQUIPMENT

Two cabling schemes are available for connecting workstations to the SRM Server (controller): the SRM Coax Link and the SRM Multiplexer Link. In the Coax Link, workstations and servers connect to a thin coaxial cable in a bus arrangement. The SRM interface card in each computer connects to the coaxial cable through an HP 50961 Coax Adapter. The coax adapter mounts directly on the interface card and connects to the cable with a BNC "tee" connector. The coaxial cable can be up to 1000 meters long, and up to 25 nodes (servers and workstations) can connect to it. All HP 9000 workstations are supported on the SRM Coax Link.



The SRM Multiplexer Link uses an HP 98028A SRM Multiplexer and HP 97061 SRM cables in a star configuration. Each cable segment can be up to 60 meters long and the Multiplexer can accommodate up to four workstations. All HP 9000 workstations as well as the HP 9835/45 desktop computers are supported on this link.



For existing SRM systems with unused Multiplexer ports available, additional workstations can be added using the HP 27123A interface cards and 97061X cables. Otherwise, it is recommended to use the new coax cables and coax adapters. An SRM Server can serve both types of links simultaneously and can support up to 63 workstations.

ELECTRICAL SPECIFICATIONS

The table below lists the power consumed by the 27123A card when it powers a 98028A Multiplexer, powers a 50961 Coax Adapter, and when it is connected to a Multiplexer but does not power it:

	+5V	+12V	-12V	TOTAL
27123A/98028A	10.6	6.96	1.3	18.86
27123A/50961	10.6	0.96	1.3	12.86
27123A	8.1	0.96	1.3	10.36

Ordering Information

To add a workstation to a Multiplexer port:

27123A Resource Management Interface and one of the following cables:

97061A	10 Meters *
97061B	25 Meters *
97061C	60 Meters *
97061D	60 Meters **

* connector on both ends

** connector attached on one end only; the second connector (included) to be attached by user after pulling cable through cable trays.

To Add a Workstation to a Coax Link:

50961A Option 500 SRM Coax Adapter and Interface. Includes both the 27123A interface card and the Coax Adapter and one of the following Coax cables:

92227A	1 Meter *
92227B	2 Meters *
92227C	4 Meters *
92227D	8 Meters *
92227E	6 Meters *
92227F	32 Meters *
92227G	64 Meters *
92227H	28 Meters *
92227A	PVC jacket **
92227A	FEP jacket **

* connectors on both ends; PVC jacket

** cut to specified length; no connectors included

To Upgrade an Existing 27123A Interface Card for use with the Coax Link:

50961U Option 500 SRM Coax Adapter Upgrade Kit. Also order 92227X cables listed above.

Prerequisites

SRM Server: 50960A/S, or a 9826A/9920A computer configured as 9826A Option 500 or 9920A Option 500.

Workstation: Series 500 with one of the following operating systems or subsequent revisions:

BASIC 4.0

HP-UX 4.0 (plus 98694A SRM Access Utilities for HP-UX)

Additional Information

5953-9535 HP 9000 Data Communications Technical Supplement

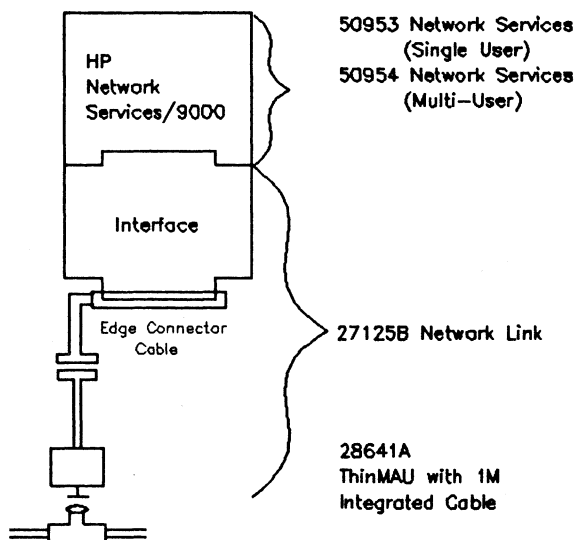
5953-9550 SRM System Planning Guide

98619-90021 SRM Hardware Installation Manual Manual (included with the 50961A products)

Fuse for Replacement/Spares: 2110-0712

Local Area Network Interface Controller
Product Number 27125B

The HP 27125B LAN/500 product provides all of the necessary hardware to interface between a 9000 Series 500 computer on HP-UX 5.0 and an IEEE 802.3 Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Local Area Network. The product consists of a printed circuit assembly, an edge connector cable, ThinLAN Medium Attachment Unit (ThinMAU) with 1m integrated cable and BNC Tee and Tee insulator installation manual. Figure 1 shows the 27125B as it connects to an IEEE 802.3 type 10 base 2 workstation ("thin") coaxial cable. The product can also be connected to an IEEE 802.3 Type 10 Base 5 backbone ("thick") network via a 30241A MAU.



The HP 50953A and 50954A Network Services/9000 software provides single user or multi-user systems, respectively, the ability to send packets of data via the 27125B. Together, the LAN/500 Link and NS/9000 enable a 9000 Series 500 computer to communicate not only with other 9000 computers on HP-UX but also with computers from the 3000, 9000 Series 200 and 300 families on a 10 Mbits/s data rate along the network.

For those users needing to access the Link directly in order to implement network protocols for special purposes, such as multivendor networking, the system intrinsic and network I/O commands are available in the NS/9000 documentation.

For existing networks that use Ethernet hardware and need to transfer Ethernet type packets instead of 802.3, both the NS/9000 and the LAN/500 can be configured to operate accordingly. For new installations, HP strongly recommends the use of 802.3 cable and packet types. Only the Network Services operating on the Series 500, Series 200 and Series 300 are capable of communicating with each other via Ethernet. In order to communicate with the 3000 computer, the Services must be configured for 802.3.

The interface provides the signalling layer and the media access control sublayer protocols as defined in the IEEE 802.3 and Ethernet Rev. 1 standards. This capability allows the interface to prepare frames for transmission by adding preamble and Cyclic Redundancy Check (CRC), transmit frames according to link access protocol, receive frames addressed to the node, and check them for correctness before transmitting them to the host CPU. The interface also provides diagnostic and link management functions such as self-test, loopback, promiscuous mode addressing, and statistics gathering.

The interface includes 32K bytes of RAM. Both receive and transmit packets are buffered in the RAM allowing the interface to receive back-to-back packets.

Features

- * 10 Mbits/s burst transfer rate
- * Single card interface
- * Frame size of 1500 bytes
- * Operational compatibility with IEEE 802.3 and Ethernet Rev. 1

- * Provides power (0.5A @ 12V) for MAU
- * Provides physical signalling layer and media control sublayer
- * Interface adds preamble, source address, and CRC to transmit packets; strips preamble and CRC from receive packets
- * 32K bytes of on board RAM allowing buffering for both transmit and receive packets.
- * Capable of receiving multiple back-to-back packets
- * Provides for Multicast, Broadcast, and Individual Addressing
- * Collection of Link Statistics (collided packets, bad packets, etc.)
- * Card configuration stored in non-volatile memory (except multicast addresses)
- * On-board loopback of transmit packets addressed to self
- * Power-on self-test
- * Environmental: Class B
- * EMC: will pass FCC, VDE Level A

COMMUNICATION LINE STATISTICS

As packets are transmitted and received, the interface firmware and NS/9000 software tabulates occurrences of particular events and returns these counts as statistics when requested. When reading the statistics, a user has the capability of either resetting each individually or all at once.

The following statistics are collected:

1. Total number of packets received
2. Total number of packets transmitted
3. The number of bad packets received
4. Total number of packets that were not transmitted due to an error
5. Total number of packets that were received with a bad CRC code
6. Total number of packets that the interface had to defer to other network traffic
7. Total number of times one retry was needed to transmit
8. Total number of times the transmission of a frame was completed after 2 to 15 retries
9. Number of times the transmission of a frame failed after 16 retries
10. The number of times the interface detected a late collision or transmission
11. The number of times the carrier was lost

- when transmitting a packet
12. The number of times no heartbeat was indicated after a transmission
13. The number of packets received with both CRC error(s) and alignment error(s)
14. The number of times a packet was missed due to a lack of resources
15. The number of packets received with no associated protocol
16. The number of IEEE 802.3 packets received with an illegal control field
17. The number of XID request packets received
18. The number of TEST request packets received
19. The number of XID and TEST request packets received but not responded to due to a lack of resources
20. The total number of packets received that had an error
21. The number of times that the card had no transmit buffer space
22. The value of the last TDR test
23. The number of packets received with an illegal frame size

Functional Specifications

GENERAL CHARACTERISTICS*

Topology: Bus

Network Medium: Digital baseband IEEE 802.3 Type 10 base 2 ("thin") coax

Maximum Distance Between Nodes per Segment: 185m

Minimum Distance Between Nodes: 0.5m

Maximum Number of Nodes: 30

TRANSMISSION CHARACTERISTICS

Transmission Mode: Baseband Digital

Access Methods: Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Impedance: 50 Ω

*HP recommends the use of the "thin" 802.3 coax media when distance and maximum number of nodes is not a limitation.

ENVIRONMENTAL CHARACTERISTICS

Temperature:

Non-operating: -40°C to +75°C

Operating: 0°C to +70°C

Humidity: 5% to 95% relative humidity

ELECTRICAL SPECIFICATIONS

The Maximum Power Consumption for the interface is: 5 Volt: 15 Watts

The interface also powers the ThinMAU which requires 12 Volts: 4.3 Watts Typical

Ordering Information

The 27125B Standard Product includes:

27125-60001 PCA Series 200 LAN Unit

27125-63001 IEEE 802.3 Card
Connector Cable

27125-90001 Installation Manual

28641A ThinMAU BNC Tee
and Insulator

27125B Option 001:

Option 001 substitutes Ethernet Rev. 1 based Card Connector Cable for standard cable. The 28641A ThinMAU is also deleted. Due to grounding difference between the two types of hardware, it is important to distinguish the type of media access hardware being used at a node. If it is the 30241A MAU, or compatible 802.3 MAU then the 802.3 Edge Connector will be necessary and therefore the standard product should be ordered. If the media access hardware conforms to Ethernet Rev. 1 then Option 001 substitutes an Ethernet Edge Connector Cable.

27125B Option 241:

Option 241 deletes the Workstation MAU from the standard product. The customer may then purchase related products such as the "thick" cable MAU from Direct Marketing Division.

ORDERING RELATED PRODUCTS

30241A Media Access Unit and TAP can be ordered through standard channels including Direct Marketing Division. This product is to attach to an 802.3 "thick" coax cable only.

Access Unit Interface (AUI) Cables are available through Computer Supplies Operations only. They come in various sizes up to a maximum allowable length of 48m. There are PVC and Teflon cables available. PVC should be used when the cable will be installed in conduit. Teflon(FEP) cable should be used when installing into ceilings and walls. Due to local and municipal codes, it is the customer's responsibility to determine proper cable selection. These AUI cables should only be used in a thick cable environment and not with the 28641A ThinMAU included in the 27125B

IEEE 802.3 Coaxial Cable and Installation Kits are available through Direct Marketing Division for both "thin" and "thick" cable environments. The lengths of the coax cable were determined to be the best to minimize impedance problems when connecting multiple cables.

HP Network Services/9000

In order to make the 27125B product as easy to use as possible, HP has developed a set of user level services which will provide all of the functionality required for interactive and programmatic access to other HP 9000 systems on a local area network. The 50953A and 50954A Network Services/9000 have been implemented in accordance with HP's AdvanceNet architecture and will provide Network File Transfer and Network InterProcess Communication (program-to-program communication) between HP 9000's with HP-UX, and HP 3000's. The 50953A is for the single user computer and the 50954 is for the multi-user computer.

Asynchronous Serial Interface**Product Number 27128A**

The HP 27128A is a single channel Asynchronous Serial Interface (ASI) for use in the CHANNEL I/O compatible computers or systems. Consisting of a single plug-in card and cable, this interface operates in terminal emulation mode or as a standard interface to such RS-232-C devices as terminals and line printers. This very versatile interface uses an on-board microprocessor and buffering to allow user programming of a wide range of features while off-loading the host computer of communications overhead.

Features

- * Switch selectable and software programmable baud rate up to 19.2K bits per second
- * EIA RS-232-C, RS-423-A, CCITT V.10, V.24, and V.28 compatibility
- * Asynchronous transmission in simplex, half duplex, full duplex, or echoplex modes
- * Programmable format control and built-in framing error, data overrun error, and parity error checking
- * Edit mode operation
- * On-card modem control supporting auto answer and originate
- * Programmable special characters such as edit characters, single and double text terminators, and prompt sequence dictation
- * Break detection, support of X-ON/X-OFF, and terminal emulation mode
- * Built-in Self-Test

Functional Specifications

The CHANNEL I/O ASI interface consists of a plug-in card and cable. The card uses a Z-80 microprocessor with 8K of ROM and 2K of RAM allowing maximum versatility while off-loading communications overhead from the host computer.

Baud rate is switch-selectable (sets power-on value) or program selectable to 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 19200 bits per second

(continuous 19200 baud operation requires that special features be disabled).

The CHANNEL I/O ASI provides a single channel asynchronous interface. Transmission modes may be simplex, half duplex, full duplex, or echoplex. Operation as a terminal emulator or as a standard interface for terminal or line printer type devices is available. This interface is compatible with EIA RS-232-C, RS-423, and CCITT V.10, V.24, and V.28.

Modem control is provided by the interface or may be passed through to the host. Auto answer and originate are supported by the interface.

Format Parity and Format Control are Programmable as follows:

Number of data bits/character: 5, 6, 7 or 8 plus parity

Number of stop bits: 1, 1.5, or 2

Parity: None, odd, even, "0", or "1"

Edit Mode Operation Uses On-card Intelligence to Support Programmable Characters for: Backspace and line delete.

Other Programmable Functions Available Include:

- * Text terminators (single and double)
- * Prompt sequence detection
- * Programmable host controlled ENQ/ACK handshaking to devices with programmable timeout and pacing counter
- * Programmable device controlled ENQ/ACK handshaking
- * Programmable host controlled X-ON/X-OFF handshaking
- * Programmable device controlled X-ON/X-OFF handshaking
- * Type ahead mode
- * Programmable automatic output separator(s) appendage for transmitted text
- * In echoplex the card may be enabled to echo a CR-LF for a programmable single text terminator
- * internal and external loopback diagnostic
- * Modem support

- * Timer for various functions
- * Character stripping on incoming message
- * Conditional output separators
- * "Give me all you got" read (Alert 1 mode)
- * Do not terminate the text record on errors
- * Edit character quoting mode
- * Signal character checking

ELECTRICAL SPECIFICATIONS

Maximum Direct Current Requirements: 1.29A (+5V), 54mA (+12V), 73mA (-12V).

PHYSICAL CHARACTERISTICS

Dimensions: 172.7mm (6.800in) long by 172mm (6.75in) wide.

Weight: Interface Card 214 grams (7.6oz); Cable 547 grams (19.3oz).

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C.

Operating Humidity: 5% to 95% RH @ 40°C.

Operating Altitude: 4600 meters (15,000 feet) maximum.

Ordering Information

The 27128A includes:

27128-60101 Asynchronous Interface Card
 27128-63002 5 meter RS-232-C DCE Cable with Female Connector for Modem Handling
 27128-90001 Installation Manual

27128A Option

001: Replaces the 27128-63002 5 meter RS-232-C DCE cable with female connector for terminal handling with 27122-63001 5 meter RS-232-C cable with male connector for terminal emulation.

NOTE: Detailed technical information (cabling, schematics, etc.) for the Asynchronous Serial Interface can be obtained from the HP 27132A CHANNEL I/O Technical Reference Package.

A self-test loop back connector for optional use with the card self-test is available. Order HP Part Number 1258-0207.

Asynchronous 8-Channel Multiplexer

Product Number 27130B

The HP 27130B Multiplexer connects up to 8 devices having RS-232-C or RS-423-A interfaces to HP computers using the CHANNEL I/O architecture. A wide range of configurable transmission modes and formats permits hardwired connection of various CRT terminals, printing terminals, printers, plotters, and other asynchronous devices.

Features

- * Eight full-duplex asynchronous serial I/O ports
- * EIA RS-232-C, RS-423-A, RS-422-A, CCITT V.10 and V.28 compatibility
- * Simplex, echoplex, half duplex, or full duplex mode operation
- * Speed sensing or programmable data rates independent by each channel
- * On-board intelligence handles edit functions, special character recognition, handshaking, and other communications tasks
- * Programmable character size 7 or 8 bits
- * Programmable parity odd, even, or none
- * Programmable number of stop bits 1, 2
- * Parity, overrun, framing error check detects transmission faults
- * Firmware based self test helps assure interface integrity
- * Programmable device XON/XOFF handshaking to pace MUX input and output data transmission
- * Optional ENQ/ACK handshaking

Functional Description

Incoming characters on any channel pass through the UART to the Z-80 processor on an interrupt basis. If the character is an edit, handshake, break, text terminator, or other special character, the Z-80 performs the indicated function. If the character is data, it is passed to the appropriate one of eight buffers for incoming characters. The buffer is sent to the host when a set number of characters has been received or when an end of record character is detected.

Output characters from the host go briefly to the appropriate output buffer and then to the Z-80. The Z-80 outputs the character through the UART after checking to see if special characters should be appended. In this manner the interface can perform such functions as adding a line feed upon detecting a carriage return.

Configuration of the card for character size, parity, edit characters, and other special characters, is done through software by issuing configuration commands to the card. Each channel may be independently configured.

Modems cannot be controlled using this interface card as there are no modem control lines for any of the eight channels.

Functional Specifications

CAPACITY

Channels: Eight channels -- simplex, echoplex, half duplex, or full duplex.

Buffering: Up to 504 bytes of transmit buffer per port; Up to 499 bytes of receive buffer per port.

COMMUNICATIONS

Interface Level: RS-232-C, RS-423-A, RS-422-A; CCITT V.10, V.28 (cable not available for RS-422-A operation).

Data Rates: Speed sense or program control for each channel: 19200, 9600, 4800, 2400, 1200, 600, 300, 150, 134.5, 110.

Throughput: Aggregate throughput for this interface is results from two factors.

1. The transfer rate of blocks (records) across the backplane between the host and the interface card is limited by the host computer (refer to system documentation). This effect dominates when small block sizes are used.

- The eight channel aggregate rate of character transfers across the frontplane between the interface and connected devices is 76,800 bits per second. This effect tends to dominate when several channels are operating at a high baud rate. This limit will not be exceeded with 8 channels operating half duplex at 9600 bits per second.

Communication Mode: Asynchronous, bit serial.

Programmable Communications Parameters:
The following communication parameters are programmed independently for each channel by sending configuration words to the interface card. Each parameter has a default value on power up as indicated.

- Character length:** 7 or 8* Bits
 - Parity:** odd, even, none*, force '0', force '1'
 - Number of stop bits:** 1*, 2
- (* indicates default value)

Break Detection: Break condition is recognized by the interface and result in sending an interrupt to the host.

Optional Device Handshakes: The following handshake protocols are available and may be programmed by the user. The protocol characters are also programmable.

- Host Controlled XON/XOFF
- Device Controlled XON/XOFF
- Host Controlled ENQ/ACK

EDIT FUNCTIONS

Edit functions such as backspace, character delete, and line delete are managed on the multiplexer interface using the Z-80 microprocessor. The edit characters and end of record detection characters may be programmed by the user or the default values used as follows:

- back space/delete control-h (08 HEX)
- delete line DEL (7F HEX)
- end of record CR (0D HEX)

ELECTRICAL SPECIFICATIONS

Direct Current Requirements:

Voltage	Typical	Two Standard
	Current	Deviation Current
+5	1.672 A	1.890 A
+12	0.052 A	0.062 A
-12	0.075 A	0.085 A

PHYSICAL SPECIFICATIONS

Dimensions: 172.7 mm (6.8 in) long, by 172 mm (6.75 in) wide.

Weight: Interface Card, 187 grams (9.7oz); Cable and J-Box, 487 grams (25.3oz).

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C

Operating Humidity: 5% to 95% RH @ 40°C.

Operating Altitude: 4600 m (15,000 ft max).

Ordering Information

The 27130B includes:

- 5061-4929 8-channel Multiplexer Interface Card
- 28658-63001 1 Meter EIA RS-232-C Cable
- 28658-60005 RS-232 Connector Panel
- 1252-0508 MUX Cable Extender Kit
- 27130-90003 Installation Manual

27130B Options

- 019:** Adds Mounting Bracket Kit - Two Panel Capacity (5061-4962).
- 540:** Adds Mounting Bracket Kit for 9030A and 9040A/AT Systems (5061-4963). Only one mounting bracket kit may be used with a 9030/40 computer.
- 550:** Adds Mounting Bracket Kit for 92211R Cabinet (5001-5280). Up to four mounting brackets may be used with 92211R.

A self-test hood connector for optional use with the on-card self-test is available. Order HP Part Number 0950-1659.

RS-232 Panel Extension:

The 1252-0508 MUX Cable Extender Kit includes 1 set of male and female connector components which are used with up to 300 ft of HP cable (Part Number 8120-4510) to remotely position the 28658-60005 RS-232-C panel. The raw cable can be purchased from the Corporate Parts Center.

NOTE: Detailed technical information (cabling, schematics, etc.) for the 8-channel Multiplexer can be obtained from the 27132A CHANNEL I/O Technical Reference Package.

Product Number 27132A

The HP 27132A CHANNEL I/O Technical Reference Package provides detailed information for the CHANNEL I/O interface card product line. CHANNEL I/O interface cards are used to connect those Hewlett-Packard computers using the CHANNEL I/O architecture with other devices.

Features

- * **General Information** (description, identification, specifications, supported functions)
- * **Configuration and Start-Up**
- * **Principles of Operation**
- * **Programming**
- * **Maintenance**
- * **Replaceable Parts**
- * **Schematic Diagram**

This package is not required for the installation and configuration of CHANNEL I/O interface cards, since a brief manual provided with the card serves this purpose. The 27132A does provide a greater level of information for sophisticated control, diagnosis or modification of the card.*

Ordering Information

The 27132A includes:

CHANNEL I/O Technical Reference Package Binder and Dividers:

HP-IB Interface Technical Reference Section (27110B)

GP-IO Interface Technical Reference Section (27112A)

Remote Job Entry Interface Reference Section (27122A)

Asynchronous Serial Interface Technical Reference Section (27128A)

Eight Channel Multiplexer Technical Reference Section (27130B)

Programmable Serial Interface Hardware Reference Manual

*Hardware modification is not supported by Hewlett-Packard and invalidates any Service Contract applicable to a specific Hewlett-Packard product.

Asynchronous 6-Channel Multiplexer

Product Number 27140A

The HP 27140A Multiplexer provides 6 asynchronous RS-232-C compatible ports with full duplex modem control capability. It connects up to 6 devices having RS-232-C interfaces to HP computers using the CHANNEL I/O architecture. A wide range of configurable transmission modes and formats permits hardwired and remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

- * Six full-duplex asynchronous serial I/O ports with 10 wire modem control capability satisfying European license requirements.
- * EIA RS-232-C and V.28 compatibility
- * Full duplex modem operation only
- * Support for use as a local system console on port 0
- * Programmable data rates for each channel
- * Programmable character size: 5,6,7 or 8 data bits
- * Programmable parity: odd, even, or none
- * Programmable number of stop bits: 1, 1.5 or 2
- * Parity, overrun, framing error check detects transmission faults
- * Firmware based self-test helps assure interface integrity
- * Programmable device XON/XOFF handshaking to pace MUX input and output data transmission
- * On-board buffering with DMA capability to send/receive data to/from host for multiple ports in a single transfer

Functional Description

The HP 27140A Asynchronous 6-Channel multiplexer is used for interfacing up to six EIA RS-232-C compatible devices to the HP channel I/O backplane. As a Z80B microprocessor based interface, the HP 27140A MUX accesses a

16K byte EPROM which contains default port handling code for port zero and a power up self-test. Moreover, it monitors the download process and verifies the integrity of the code. The downloaded application software has been optimized for character-at-a-time I/O.

Functional Specifications**CAPACITY**

Channels: Six channels -- full duplex

Buffering: On card buffering with DMA capability to send/receive data for multiple ports in a single transfer to increase throughput and reduce host CPU interrupts.

Transmit Buffer Size: 255 bytes per port.
Receive buffering of up to 1K byte data buffering dynamically allocated over all 6 ports.

Software: HP 9000 Series 500 HP-UX revision 5.0 or later.

COMMUNICATIONS

Interface Level: RS-232-C; CCITT V.28

Data Rates: Baud rate defaults to 9600 and is software programmable to any of the following 15 rates: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 19200.

Modem Support Includes:

- originate mode
- auto answer mode
- modem connection timer
- lost receiver-ready timer
- no-activity timer
- host control of every interface output modem line

Supported Signal Lines:

<u>RS-232-C</u>	<u>V.24</u>	<u>Common Abbreviation</u>	<u>Description</u>	<u>Input Output</u>
AB	102	SG	Signal Ground	
BA	103	SD	Transmitted Data	O
BB	104	RD	Received Data	I
CA	105	RS	Request to Send	O
CB	106	CS	Clear to Send	I
CC	107	DM	Data Set Ready	I
CD	108.2	TR	Data Terminal Ready	O
CF	109	RR	Received Line Signal Detector	I
CH	111	SR	Signal Rate Selector	O
CE	125	IC	Ring Indicator	I

Throughput: The 27140A 6-channel MUX will support 6 interactive terminal users running character mode at 19.2K baud. Other RS-232 applications which may simultaneously send and receive data over all six ports should be run at 9600 baud or slower.

Communication Mode: Asynchronous, bit serial.

Break Detection and Transmission: Break condition is recognized by the interface and result in sending an interrupt to the host. Break condition can also be generated by the MUX at the request of the host.

Optional Device Handshakes: The MUX is capable of pacing both inbound and outbound data via an "XON/XOFF" type of protocol. The "XON/XOFF" characters are programmable. Outbound MUX transmission or device controlled "XON/XOFF" is performed at the interface level. Host controlled "XON/XOFF" is available to pace the flow of incoming data from a peripheral. This is not done at the interface level but on host demand.

EDIT FUNCTIONS

Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements:

<u>Voltage</u>	<u>Typical Current</u>	<u>Two Standard Deviation Current</u>
+5	1.380 A	2.298 A
+12	0.084 A	0.159 A
-12	0.135 A	0.150 A

PHYSICAL SPECIFICATIONS

Dimensions: 172.7 mm (6.8 in) long, by 172 mm (6.75 in) wide.

Weight: Interface Card 270 grams (9.5oz); Cable and RS-232 panel 723 gram (26 oz)

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C

Operating Humidity: 5% to 95% RH @ 40°C.

Ordering Information

The 27140A includes:

- 27140-60001 6-Channel Multiplexer Printed Circuit Assembly
- 27140-90001 Installation Manual
- 28659-60005 RS-232C Panel
- 28659-63002 Cable, PCA to Panel, 1 meter

27140A Options:

- 001:** Extension Cable, 10 meters (28659-63004) used with 28659-63002 to remotely position the RS-232 panel
- 019:** 19 inch Rack Mounting Bracket Kit (5061-4962)
- 540:** Mounting Bracket Kit for 9040A Systems (5061-4963)
- 550:** Mounting Bracket Kit for 92211R Cabinet (5001-5280)

A self-test hood connector for optional use with the on card self-test is available. Order HP Part Number 27140-60002. This hood is also included in the CIO Service Kit 27132-67801.

RECOMMENDED PERIPHERAL CABLES

For direct connection to RS-232 terminals, printers, plotters, etc. minimum wiring requires pins 1, 2, 3, 7 to be wired end to end.

- 13242M 5 meter 25 pin M - 25 pin M
pins 1-8, 12, 15, 17, 20, 22, 24
wired end to end
- 13242N 5 meter 25 pin M - 25 pin M
pins 1-8, 12, 15, 17, 20, 22, 23, 24
wired end to end
11 & 19 are switched
- 13242Y 5 meter 25 pin M - 25 pin M
1-3, 7 wired end to end
- 92219G 3.8 meter 25 pin M - 25 pin M
1-8, 11, 12, 19, 20, 22, 23, 25
wired end to end

Connection to RS-232 Modems

- 92219Q 5 meter 25 pin M - 25 pin M

<u>Computer End Pin</u>	<u>Data Set End Pin</u>
1	1
2	3
3	2
4	8
6	20
7	7
8	4
9	22
20	6
22	5
23	23

For UUCP direct connect applications from 27140A to 27140A, the following cables could be used:

- 92219Q
- 30062B

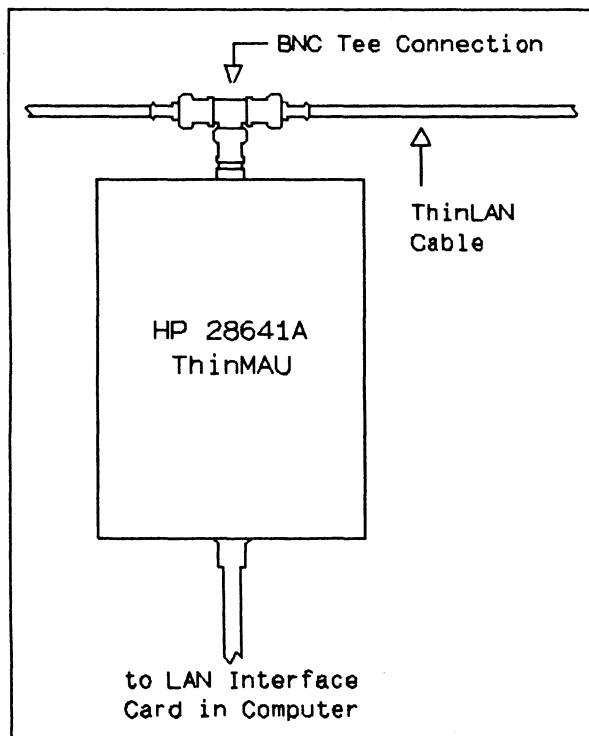
The cables listed above are available from the Direct Marketing Division (DMK).

RECOMMENDED MODEMS:

- Bell 212A
- HP 37212A Stand Alone Modem
- 92205A Hayes Smart Modem 1200

Product Number 28641A

The ThinMAU is specifically designed for connection to the 10 Mbps IEEE 802.3 Type 10BASE2 "ThinLAN" coaxial cable. It includes an integrated, 1M Attachment Unit Interface (AUI) cable for connection to the computer's LAN interface controller card. Access to the coaxial cable is through a BNC Tee Connector. Like the HP 30241A MAU for "thick" coax, the ThinMAU sends and receives data, detects collisions on the network, and protects the network's reliability by monitoring malfunctions between itself and the computer. The figure below illustrates the ThinMAU and Tee Connector.



Features

- * Operationally compatible with IEEE 802.3 Type 10BASE2 standard protocol
- * Compact, convenient design
- * Integrated 1M AUI cable
- * Jabber and Heartbeat functions minimize the impact of controller, AUI, and ThinMAU malfunctions on the rest of the network
- * User installable

Functional Description

The HP 28641A ThinMAU provides a physical and electrically isolated connection between HP LAN interface products and the ThinLAN coax. For connection to IEEE 802.3 Type 10BASE5 "thick" coax, refer to the 30241A MAU. Using the ThinMAU with non-HP equipment and with extension AUI cables are unsupported configurations.

COLLISION DETECTION, JABBER, AND HEARTBEAT

Collisions occur when two or more nodes transmit simultaneously on the LAN. The ThinMAU provides collision detection by detecting signals on the coax other than those provided by its transmitter, and signaling the LAN controller.

The Jabber circuitry simply turns off the transmitter if the computer tries to send data for an abnormal amount of time, preventing a faulty LAN node from tying up the network indefinitely.

The Heartbeat function is a signal sent from the MAU to the LAN interface following each successful transmission. The signal exercises most of the collision detection circuitry when generated and functions to inform the controller that the collision detection path is operating correctly.

COMPATIBILITY

The ThinMAU can be used with the following LAN interfaces:

- 98643A - I/F for HP 9000/Series 200,300
- 27125B - I/F for HP 9000/Series 500
- 12076A - I/F for HP 1000 A-Series
- 30242A - I/F for HP 3000 Computers

Note:

- 98643A/27125B includes ThinMAU
- 98643A/27125B #241 deletes ThinMAU for separate ordering
- 12076A/30242A #241 deletes 30241A MAU for separate ordering of ThinMAU

- 27125B/12076A #001, which replaces IEEE 802.3 card cable with Ethernet card cable is not support with use of ThinMAU
- 98643A does not have a card edge cable

Functional Specifications

ENVIRONMENTAL CHARACTERISTICS

Meets Environmental Class B Specifications

Operating temperature: 0° to 55° C

Humidity: 5% to 95% relative at 40° C noncondensing

PHYSICAL CHARACTERISTICS

Dimensions: 100mm (4.5in) by 152mm (6in) by 25mm (1in)

Approximate Weight: 454 grams (16oz)

ELECTRICAL CHARACTERISTICS

Power Requirement: 8.0 - 13.5 V

Power Consumption: 4.3 Watts (typical)
5.1 Watts (maximum)

Electrical Isolation: 500 AC RMS from coax to AUI cable

Ordering Information

The 28641A ThinMAU includes:

28641-60001	ThinMAU Assembly
28641-90001	Installation Manual
1250-0781	BNC Tee Connector
1252-1154	Plastic Boot

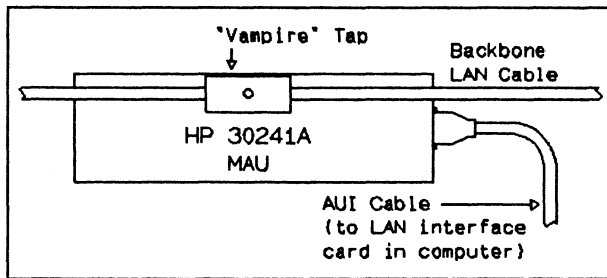
The ThinMAU, LAN cabling, and installation tools are available through Direct Marketing Division. The following documentation on hardware and installation for the entire network, including the ThinMAU, is also available through Direct Marketing Division:

5955-7680	Cable and Accessories Installation Manual
5955-7681	LAN Link Troubleshooting Manual

Please refer to the HP Computer User's Catalog for ordering information.

Product Number 30241A

The Medium Attachment Unit (MAU) and the included coaxial cable tap together provide a physical and electrical connection to a 10 Mbps IEEE 802.3 Type 10BASE5 "thick" Local Area Network coaxial cable. The MAU transmits and receives data, detects collisions on the network, and improves the network's reliability by monitoring malfunctions between itself and the computer. The figure below illustrates the MAU and tap.



Features

- * Operationally compatible with IEEE 802.3 Type 10BASE5 standard protocol
- * Easy tap installation and removal without disturbing network uptime
- * Jabber and Heartbeat functions minimize the impact of controller, AUI, and MAU malfunctions on the rest of the network

Functional Description

The HP 30241A MAU provides HP computer system LAN interface products with an electrically isolated connection to the thick "backbone" coaxial cable specified in the 802.3 Type 10BASE5 standard. For connection to the RG/58 "ThinLAN" cable, refer to the HP 28641A ThinMAU. Using the MAU with non-HP LAN interfaces is an unsupported configuration.

TRANSMIT AND RECEIVE FUNCTIONS

A few special functions are performed by the transmitter and receiver. The receiver amplifies

and reshapes the signal before passing it to the Attachment Unit Interface (AUI) cable driver. Both perform a "squellch" function, which turns the cable drivers off when no data is being sent over the coax or from the computer. Finally, the receiver monitors data sent by the transmitter, performing a local loop-back function.

COLLISION DETECTION, HEARTBEAT, AND JABBER

When two or more nodes on the LAN transmit simultaneously, a collision occurs. The MAU detects collisions by measuring a rise in the DC voltage on the coax cable, and signaling the LAN controller.

The Jabber circuitry turns the MAU transmitter off if the computer attempts to transmit for an abnormal amount of time. This ensures that a faulty LAN node will not tie up the network indefinitely.

The Heartbeat function is a signal sent from the MAU to the LAN interface following each successful transmission. The signal exercises most of the collision detect circuitry when generated and functions to inform the controller that the collision detection path is operating correctly.

COMPATIBILITY

The MAU can be used with the following LAN interfaces:

- 12076A - I/F for HP 1000 A-Series
- 30242A - I/F for HP 3000 Computers
- 27125B - I/F for HP 9000/Series 500
- 98643A - I/F for HP 9000/Series 200, 300

Note:

- 12076A/30242A includes MAU
- 12076A/30242A #241 deletes MAU for separate ordering
- 27125B/98643A #241 deletes 28641A ThinMAU for separate ordering of MAU
- 27125B/12076A #001, which replaces IEEE 802.3 card cable with Ethernet card cable is not supported with use of MAU

Functional Specifications

ENVIRONMENTAL CHARACTERISTICS

Meets Environmental Class B Specifications

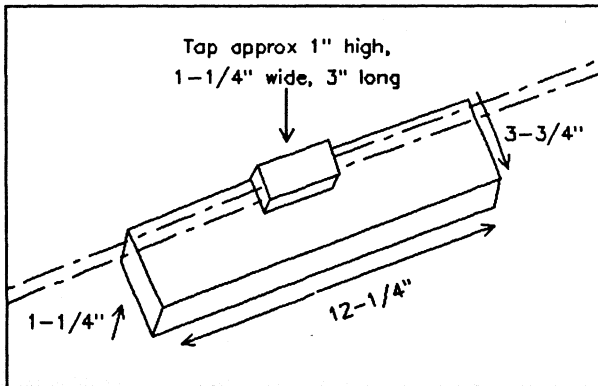
Storage Temperature: -10° to 65° C

Operating Temperature: 0° to 55° C

Humidity: 5% to 95% relative at 40° C noncondensing

Note: Not suitable for installation in ducts, plenums, or other environmental air spaces according to the National Electrical Code Article 300-22 b&c or equivalent.

PHYSICAL CHARACTERISTICS



MAU Dimensions: 310mm (12.25in) long by 95mm (3.75in) wide by 30mm (1.25in) deep

Top Dimensions: 75mm (3in) X 30mm (1.25in) by 25mm (1in)

ELECTRICAL CHARACTERISTICS

Power Requirement: 9.0 - 15.75 V

Power Consumption: 4.6 Watts (typical)
6 Watts (absolute max)

Electrical Isolation: 500 V AC RMS from coax to AUI cable

Ordering Information

The HP 30241A includes:

30241-60101 MAU Assembly
0362-0819 Coax Cable Tap

The MAU, LAN cabling, and installation tools are available through HP's Direct Marketing Division. The following documentation on hardware and installation for the entire network, including the MAU, is also available through Direct Marketing Division:

5955-7680 Cable and Accessories Installation Manual
5955-7681 LAN Link Troubleshooting Manual

Please refer to the HP Computer User's Catalog for ordering information.

Product Number 59310B

The HP 59310B is a duplex interface card for connecting up to 14 Hewlett-Packard Interface Bus (HP-IB)* graphics I/O devices, measurement and stimulus instruments, and other HP-IB digital devices to HP 1000 Computers or Systems.

Features

- * Simple implementation of computer-controlled instrumentation systems
- * IEEE Standard 488-1978 instrumentation interface
- * Simple, passive cable interconnections
- * Concurrent operation of multiple buses and multiple instrument clusters by one computer using multiple HP-IB interface cards in RTE-M/IVB/6 environment
- * On-line addition of instruments with RTE-M/IVB/6 operating system

HP-IB Capabilities

The 59310B HP-IB interface card connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel-byte-serial form to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners". Data is exchanged asynchronously using interface messages to set up, maintain, and terminate an orderly flow of device-dependent messages. Three data byte transfer control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB.

RELATION OF IEEE STANDARD 488-1978

The 59310B interface with RTE software meets the specifications for controller subset C26 of IEEE Standard 488-1978.

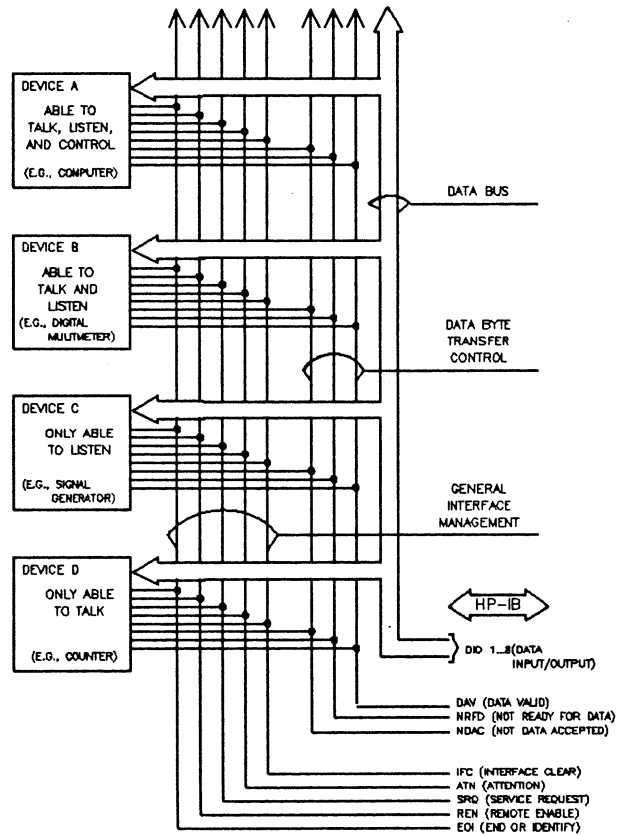


Figure 1. HP Interface Bus Concept

Functional Specifications

CAPACITY

HP-IB Devices/Interface: Up to 14.

HP-IB Interfaces/RTE Computer System: Up to 4, if not constrained by available interface current from the computer, available logical unit numbers in the operating system, or response requirements.

*The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MC1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

BUS CHARACTERISTICS

Bus Signal Lines:

DIO 1-8	Data I/O lines 1-8
DAV	Data valid
NRFD	Ready for data
NDAC	Data accepted
IFC	Interface clear
ATN	Attention
EOI	End or identify
SRQ	Service request
REN	Remote enable

Logic Levels, Line Terminations, Line Drivers, and Line Receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum Cable Length: 2 meters (6.5 ft) per device connected to the bus; 20 meters (65 ft) total, connected to each 59310B interface card.

DATA TRANSFER MODES IN RTE SYSTEMS

Dual-Channel Port Controller (DCPC) Mode:

Provides for data transfer directly between memory and the 59310B interface. It is intended primarily for fast HP-IB devices, but can also be used for slower devices that communicate relatively long messages (over 10 bytes) to minimize system overhead when a DCPC channel is available for such use.

Non-DCPC Mode: Provides for data transfers via the normal I/O structure of the computer, for slower HP-IB devices. It can achieve transfer rates up to 15.6K bytes/second in an HP 1000 E/F-Series Computer with standard performance memory when used with HP-IB devices capable of that rate or a faster rate. With slower devices, each byte sent or received requires its own I/O processing. Because this greatly increases system overhead, it may be desirable to use DCPC transfers for such devices.

MAXIMUM SOFTWARE DATA RATES (non-DCPC)

The maximum estimated data rate for a tight, user-written dedicated FORTRAN routine to move data from the instrument bus to the computer memory is over 100 kilobytes/second without using DCPC. The maximum data rates achieved by the 59310B and its RTE driver range from 11.1K bytes/second in HP 1000 M-Series Computers to 15.6K bytes/second in

HP 1000 E/F-Series Computers with 595 nanosecond memory.

MAXIMUM BUS DATA RATES VIA DCPC

HP 1000 COMPUTER SERIES	Data rate Transmit	Data rate Receive
M	411K bytes/s	411K bytes/s
E/F w/595 ns memory	575K bytes/s	470K bytes/s
E/F w/350 ns memory	760K bytes/s	570K bytes/s

BUS MESSAGE TRANSFER TIMES IN RTE SYSTEMS

The effective time for message transfer between programs in the computer and HP-IB instruments bus-connected to the 59310B interface is given by:

$$M = S + T(B) + C$$

Where:

M = message transfer time in milliseconds

S = setup time in milliseconds

T = transfer time per byte in milliseconds

B = number of bytes in the message

C = ASCII to floating point format conversion time in milliseconds (may not be needed with some HP-IB device messages).

Average Setup Times†:

	INPUT	OUTPUT
For DCPC transfers:	5.975ms	6.148ms
For non-DCPC transfers:	2.714ms	2.952ms
For non-DCPC (slow) transfers:	5.736ms	7.617ms

Average Transfer Times/byte†:

	INPUT	OUTPUT
For DCPC Transfers (max):	0.0027ms*	0.0017ms*
For non-DCPC transfers:	0.6 ms	0.024 ms
For non-DCPC (slow) transfers:	1.109 ms	0.561 ms

Conversion Time†: 1.14 ms + 0.48 ms/byte

† These times apply to operation in HP 1000 E/F-Series computers with 595 ns memory; they will be briefer with 350 ns memory, longer in HP 1000 M-Series computer.

*DCPC transfers are useful for four or more bytes. The odd byte of a buffer is always transferred via the interrupt system, incurring non-DCPC setup and transfer times for that byte in addition to DCPC setup and transfer times; for that reason, it is desirable to send an even number of bytes when operating in DCPC mode. The transfer time per byte given here applies to HP-IB devices capable of sending or receiving data at rates at or above 470K bytes per second; for slower devices, the transfer time per byte will closely approximate that of the HP-IB device.

SOFTWARE SUPPORTED CAPABILITIES

The multiprogramming design of the RTE-M and RTE-IV/IVB systems makes possible concurrent control and data transfers via multiple 59310B HP-IB interface cards. Thus, multiple automatic test or lab data acquisition setups can be controlled by a single computer system.

On-line Program Development: Multi-programming also makes it possible to be developing new programs while existing programs are actively controlling and communicating with bus-interfaced devices.

On-line Addition of Bus Devices: The RTE software package for the 59310B supports addition, deletion, or exchanging of HP-IB devices without stopping or regenerating the executive software system.

Automatic Addressing: The RTE software may be operated in a mode wherein the driver automatically performs all necessary addressing prior to an input or output operation.

Direct I/O: The RTE software can also be used in a mode that gives the user direct access to the HP-IB for special bus manipulation and device access.

Vectored Response to Service Requests: Two versions of RTE driver DVR37 offer a choice of vectored response to service request (SRQ) from a particular device on the bus or operation without that capability for approximately 20% savings in memory usage. When enabled for an HP-IB device, the SRQ from that device causes the scheduling of an associated service program (or BASIC subroutine via TRAP interrupt link), thereby providing quick, flexible response to alarm or normal service request conditions.

ELECTRICAL SPECIFICATIONS

Current Required from Computer Power Supply: 3A(+5V), 0.1A(-2V)

CONFIGURATION INFORMATION

I/O Channels Required: One I/O channel serves up to 14 HP-IB devices.

Approximate Memory Required:

RTE driver (non-SRQ):	11	2030 bytes
RTE driver (SRQ):		2510 bytes
RTE Utility Library:		500 bytes
SRQ/TRAP service utility for RTE BASIC/1000M or BASIC/1000D:		80 bytes

Software Recommended: Multi-bus operation requires RTE driver DVR37 which is included with a programming manual in the 92064A RTE-M, 92067A RTE-IV, and 92068A RTE-IVB operating systems.

Installation: Plug in 59310B interface into the computer I/O backplane, connect the HP-IB cable from the interface to HP-IB cable from the interface to HP-IB devices, and integrate the 59310B and recommended software into the operating system.

OVERALL SYSTEM RESPONSIBILITY

Instrument or device-dependent operational characteristics have been excluded from the IEEE Standard 488-1978 definition. This opens up a tremendous diversity of possible instrument combinations that might be connected to the 59310B HP-IB interface. Because of that diversity, Hewlett-Packard cannot, as a practical matter, be responsible for the performance of HP-IB instrument systems connected to the HP 1000 via the 59310B interface. That responsibility remains with the customer. We assist the customer by furnishing RTE software and a 59310B User's Guide as part of the 92064A RTE-M, 92067A RTE-IV, or 92068A RTE-IVB operating system package.

Ordering Information

The 59310B Interface includes:

59310-60101	Interface Card
59310-60008	3.69 meter (12 ft) Bus Cable
59310-90068	Operating and Service Manual

59310B Option

001: Replaces 59310-60008 3.69 meter cable with 59310-60006 2 meter cable.

Model 91000A**Features**

- * Complete subsystem on a computer interface card
- * 8 differential/16 single-ended input channels
- * Software compatible with larger (2313B) Analog I/O Subsystem

Description

The HP 91000A is a complete, $\pm 10.24\text{V}$ full scale analog input subsystem for HP 1000 Model 81 Computer Systems, HP 96MX System Controllers, HP 21MX, or HP 2100S Computers. It includes interface and control logic, sample-and-hold amplifier, ADC, and input multiplexer with capacity for 16 single-ended or 8 differential inputs.

Functional Specifications

Resolution: 12 bits, including sign; LSB = 5mV.

Full Scale Input: +10.235V to -10.24V.

Number of Inputs: 8 differential or 16 single-ended.

Maximum Sample Rate: To 20,000 channels per second. (*This is a hardware rate subject to response degradation that depends on other activity in the system; actual rates achieved will vary accordingly.*)

Sample-and-Hold: "Hold" strobe is delayed 150 ns from trailing edge of page pulse; aperture (total jitter with respect to pace pulse) is less than 250 ns.

External Pace Pulse Input: +4.5V \pm 0.5V, 1.5 μ s \pm 0.5 μ s pulse referenced to 0 \pm 0.5V baseline, 100 Ω source.

Overall Accuracy: $\pm 0.1\%fs \pm 1/2$ LSB at 25 $^{\circ}$ \pm 5 $^{\circ}$ C, $\pm 0.004\%fs/^{\circ}$ C over 0 $^{\circ}$ to 55 $^{\circ}$ C range of ambient temperatures outside of the computer. These absolute accuracy specifications include 3 sigma noise; linearity, offset, gain, dynamic response errors; and $\pm 10\%$ line voltage variation effects on the entire subsystem (multiplexer, sample-and-hold amplifier, and analog-to-digital converter).

<u>Gain</u>	<u>Accuracy</u>	<u>Drift</u>
1	$\pm 10\text{mV}$	4m V/C $^{\circ}$

Input Impedance: >5m Ω (power on), 1K Ω \pm 10% (power off).

Maximum Input: $\pm 10.5\text{V}$ differential + common mode, or high-to-computer chassis (S.E. inputs); $\pm 10.24\text{V}$ high-to-common (S.E. inputs) for rated accuracy; up to $\pm 15\text{V}$, any input line to computer chassis without damage.

Source Resistance: To 1K Ω , balanced or unbalanced.

Crosstalk and Common Mode Rejection: >80dB, dc to 100 Hz, using differential input.

Computer I/O Channels Required: One.

Interface Current Required: -2V (0.065A); +4.5V (2.4A).

Memory Required For RTE Driver and Device Interface Routines: 900 bytes for driver, plus 760 bytes for FORTRAN/ALGOL device interface, or 1250 bytes for BASIC device interface.

Weight: 4 lb (1.8 kg)

Ordering Information

HP91000A INTERFACE CARD

The 91000A includes:

91000-60001 A-to-D Interface
02313-60010 Mating Connector Kit
1250-1223 Coaxial Connector
91000-93001 Interface Service Manual
91000-93003 Operating and Programming
Manual

91000A Options

005: 91000-60005 Single-Ended Input Cable
006: 91000-60004 Differential Cable

Software Used: The 91000A A-to-D Interface uses DVR62 and device interface routine R2313, included with the 92066A RTE Measurement and Control Drivers Package.

Installation: Installation of the 91000A is the responsibility of the customer. HP installation assistance is provided on request, at prevailing rates.

Product Number 91200B

The HP 91200B TV interface provides the capability to connect real-time outputs from any HP 1000 M/E/F-Series Computer or System to black and white, color, or gray-scale displays on up to five low-cost standard TV monitors at once, via cables up to 500 meters (1640 feet) long.

Features

- * Large-screen graphics control
- * Compatibility with low-cost commercial TV monitors
- * Multi-monitor drive from one TV interface
- * Display remoted via cable up to 500 meters (1640 feet) long
- * American and European standard scan modes
- * Color with 3 cards
- * Gray scale with multiple cards
- * Industry-standard sync for external mixing of interface video with other video
- * RAM memory storage for low overhead and continuous refresh
- * Fast update via direct memory access
- * Graphics and alphanumeric software library with...
 - multiple character sizes
 - vectors

Functional Specifications**SCAN MODES AND RESOLUTION**

<u>Scan Modes</u>	<u>Addressable Points</u>	<u>Scan Method</u>
American TV standard	256x240 (61,440)	525 lines/screen; 2 fields at 262.5 lines/screen, 60 fields per second; 2:1 interlace.
Industrial monitor	256x256 (65,536)	288 lines/screen; 60 fields per second; no interlace.
European TV standard	256x256 (65,536)	625 lines/screen; 2 fields at 312.5 lines/screen, 50 fields per second; 2:1 interlace. The bottom 256 lines of the visible unblanked display are where we can place the data.

POINT UPDATE RATE

>300 kHz (<3.3 μ s/point) via DMA.

CHARACTER UPDATE RATE

>100 characters/second using library software with no other RTE activity.

CHARACTER SIZE

5 x 7 dot matrix/character (size 1) and larger-size multiples of size 1.

DRIVE CAPABILITY

Up to five TV monitors can be driven by one 91200B kit.

MAXIMUM CABLE LENGTH

500 meters (1640 ft) from card to the farthest monitor.

VIDEO POLARITY

Programmable, white on black, black on white, or color inversion from normal to complementaries with multiple cards driving color monitor.

OUTPUT AND INPUT SIGNALS

Video: One output for black and white, three outputs for color, composite video with sync, EIA RS-170 compatible into 75 Ω load.

White level: 0.V

Blank level: -0.7V to -1.0V

Sync level: -1.4V

Sync: Sync signal separate from composite video, 4 volts negative-going pulse, EIA RS-170 compatible.

Edge connector signals:

- * Master oscillator output (TTL with $1k\Omega$ pull-up resistor) from card used as "master" and external oscillator input (TTL gate) for cards used as "slaves" for sync of color or multilevel gray on multiple cards.
- * Raw video output and two raw video inputs to summation amplifiers are available for control of black and white gray scale using multiple cards. 3 cards maximum are available for 8 levels (6 shades of gray; 2 for black & white).
- * Frame sync output from card used as "master" and frame sync input for cards used as "slaves" in color or multilevel gray applications.
- * Card address output from card used as "master" and card address input for cards used as "slaves" in multicard applications.

CONFIGURATION INFORMATION

The 91200B TV interface kit requires one computer I/O channel for B&W operation up to three cards in three adjacent computer I/O slots for color or gray scale operation. The 91200B uses RTE driver DVA13 and the related graphics library (furnished with the RTE-M, RTE-II, RTE-IV, and RTE-IVB operating systems). Diagnostics are supplied with all HP 1000 Computer Systems.

CUSTOMER-FURNISHED EQUIPMENT REQUIRED FOR OPERATION

For B&W or gray-scale use:

1. Customer must provide suitable TV Monitor designed for EIA RS-170 composite video signals.
2. Customer-furnished chaining cables for multiple monitors or additional cable with BNC-compatible connectors for distances beyond 25 feet (RG-59/U or RG-59B/U coaxial cable).

For color use:

1. Customer must provide an RGB TV Monitor, or an NTSC TV monitor with sync generator and color encoder.
2. Customer-furnished chaining cable for multiple monitors or additional cable with BNC-compatible connectors for distances beyond 25 feet (RG-59/U or RG-59B/U coaxial cable).

COMPUTER INTERFACE CURRENT REQUIRED

1.2 (+5V), 0.32A (+12V), 0.05A (-12V), 0.05A (-2V)

Ordering information

The 91200B TV Interface Kit includes:

91200-60007	TV Interface Card
02313-60010	48-pin Connector Kit
0410-0592	American Standard Scan Mode Crystal (10.8 MHz)
0410-0591	Industrial Monitor Scan Mode Crystal (11.6 MHz)
0410-0035	European Standard Scan Mode Crystal (10 MHz)
91200-90001	Installation and Service Manual

Options

- 001:** Replaces 02313-60010 Connector kit with 7.6 meter (25 ft) cable (91200-60006) and two BNC-to-UHF coaxial cable adapters (1250-0071).
- 003:** Replaces 02313-60010 Connector kit with 7.6 meter (25 ft) cable (91200-60008) and four BNC-to-UHF coaxial cable adapters (1250-0071) for color displays.

Product Number 98622A

The HP 98622A General Purpose I/O (GPIO) Interface is a flexible parallel interface that will send and receive up to 16 bits of data to a variety of compatible devices. Several handshake modes are also available to permit interfacing to a variety of equipment. Extended control and status lines are available for applications that require transferring control and status information outside the data path.

Features

- * 16 Latched Input Lines
- * 16 Latched Output Lines
- * 10 Handshake, Control and Status I/O Lines
- * Selectable Handshake Modes
- * DMA Compatibility for fast transfers
- * Connections for Flexible Disc Drive, Multiprogrammer or Thermal Printer
- * Interrupt Capability
- * Configurable Data-in Clock Source

Functional Specifications
MAXIMUM TRANSFER RATES

The sample of transfer rates quoted below are the maximum rates that can be attained with the type of data transfer specified. Any delay generated by the peripheral or by additional program statements or options will cause the actual data transfer rate to be lower.

	INPUT (bytes/s)	OUTPUT (bytes/s)
BASIC 2.0		
Handshake	63K	65K
BASIC Advanced Program Binary Capability		
Interrupt, burst	65K	75K
Fast handshake	115K	115K
DMA, regular	540K	480K
DMA, burst	770K	670K
HPL 2.0		
Interrupt	8K	8K
Fast read/write	87K	100K
DMA, regular	540K	480K
DMA, burst	770K	670K

DATA, STATUS, AND CONTROL LINES

The 16 output lines provide high current/voltage drivers using open-collector buffers. Either positive- or negative-true logic is selectable. The 16 input lines are terminated by a resistive divider of 3k Ω to +5V and 6.2k Ω to ground accepting standard TTL signal levels. Ten lines provide control, status, and handshake information between the peripheral and the GPIO Interface.

STATUS AND CONTROL LINE DEFINITIONS

PCTL Peripheral Control: Handshake Output, driven by interface; indicates that the computer is ready for input data or new output data is available on output lines; PCTL is reset by a ready-to-busy transition on PFLG or by an interface reset.

PFLG Peripheral Flag: Handshake Input, driven by peripheral; indicates that the peripheral has completed the data transfer; also used to request peripheral interrupt when enabled.

PSTS Peripheral Status: Status Input, driven by peripheral; indicates to the computer the readiness of the peripheral; PSTS is sampled by the computer whenever communication with the peripheral is requested.

ST10, ST11 Extended Status: Status Input, driven by peripheral; sensed by computer; may be used for any purpose; examined by reading the 98622A peripheral status register.

CTL0, CTL1 Extended Control: Control Output, driven by computer; sensed by the peripheral; may be used for any suitable purpose by the user; asserted by writing to the 98622A peripheral control register.

I/O Direction: Handshake Output, driven by card; indicates to the peripheral the direction of the current data transfer.

PRESET Peripheral Reset: Control Output, driven by card; used to initialize a peripheral when the computer is turned on, when the RESET key or CLEAR I/O key is pressed, or when the 98622A peripheral reset register is written to.

EIR External Interrupt Request: Control output, driven by peripheral; used to generate an interrupt request based on some external event or termination of a DMA buffer transfer; the current state can be examined by reading the 98622A peripheral status register. The interrupt is level detected, not edge sensitive. EIR should be held low until the interrupt is serviced.

ELECTRICAL CHARACTERISTICS

Data Output and Control Output Lines

	Minimum	Maximum
Output Low Voltage @ 16 mA		0.4 V
Output Low Voltage @ 40 mA		0.7 V
Output High Voltage (open collector)		30.0 V
Output Low Current		40.0 mA
Output High Current @ Output High Voltage		0.25mA

Data Input Lines

Input Low Voltage		0.7 V
Input High Voltage	3.0 V	
Input Current @ Input Low Voltage = 0.4V		-2.3 mA

Control Input Lines

Input Low Voltage		0.5 V
Input High Voltage	3.0 V	
Hysteresis	0.4 V	
Input Low Current @ Input Low Voltage = 0.4V		-3.3 mA

DMA CAPABILITY

The 98622A is capable of carrying out DMA transfers via the optional two channel 98620A DMA Controller card. Word or Byte Mode as well as Regular or Burst DMA Transfers are supported by the 98622A. The burst feature allows a higher data transfer rate and a shorter latency time.

INTERRUPT CAPABILITY

Proper interrupt level settings allow a higher level request to interrupt a lower level data transfer. The 98622A is capable of generating interrupts to the computer under the following conditions:

- PCTL clear
- PCTL clear & PFLG ready
- EIR asserted

SWITCH CONFIGURATION

Select Code: The factory select code setting is 12; valid select codes are:

- HPL 1-6, 8-15
- PASCAL & BASIC 8-31

Interrupt Level: The factory setting is 3; a valid interrupt level setting is from 3 to 6.

Output Data Line Sense: A 1-bit switch allows the input data lines to use either positive-true or negative-true logic even with fast read/write and DMA transfers.

PFLG Line Sense: A 1-bit switch allows the peripheral flag line to use either positive-true or negative-true logic.

PCTL Line Sense: A 1-bit switch allows the peripheral control line to use either positive-true or negative-true logic.

PSTS Line Sense: A 1-bit switch allows the peripheral status line to use either positive-true or negative-true logic.

Handshake Mode: A 1-bit switch allows selection of full or pulsed handshake mode.

Data In Clock Source: A 6-bit switch allows selection of 3 different clocking transitions for input data. The upper input byte (8 lines) and lower input byte (8 bits) can have separate clock sources. The input bytes can be clocked (1) when the register is read, (2) on the ready-to-busy transition of PFLG, or (3) on the busy-to-ready transition of PFLG.

Ordering Information

*Earliest Language Version Required: BASIC 1.0,
HPL 1.0, PASCAL 1.0.*

The 98622A includes:

98622-66501 General Purpose I/O Card
98622-90000 Installation Manual

98622A Options:

- 001:** 4.6 meter (15ft) unterminated cable
(5061-4209)
- 002:** 0.8 meter (2.5ft) terminated cable for
9885M Flex Disc Drive
(5061-4211, 50-pin, female connector)
- 003:** 4.6 meter (15ft) terminated cable for
6940A/B Multiprogrammer
(5061-4210, 50-pin, male connector)
- 004:** 2.5 meter (8.3ft) terminated cable for
9866A/B Thermal Printer
(5061-4212, 19-pin, round male
connector)

Fuse for replacement/spare: 2110-0712

Product Number 98623A

The BCD Interface provides input to the Series 200 computer from bit-parallel, digit-parallel, binary-coded decimal devices such as digital voltmeters. Input format is selectable, allowing two independent instruments to be read from one 98623A Interface Card. Data can also be accepted as five input bytes of pure binary information. Eight data output lines are provided for use as general purpose control and/or data output.

Features

- * Up to 8 significant BCD digits
- * Selectable input format
- * Single or dual instrument input
- * 43 Data Input Lines
- * 8 Data Output Lines
- * 5 Control Lines

Functional Specifications

MAXIMUM INPUT TRANSFER RATES

BASIC Advance Programming Binary

Handshake (formatted) 5.2K bytes/s (325 readings/s)

Handshake (unformatted) 34K bytes/s (6.9K readings/s)

HPL 2.0

Interrupt 7.3K bytes/s (450 readings/s)

Fast read/write 21K bytes/s (1.3K readings/s)

ELECTRICAL SPECIFICATIONS

Data Input Lines:

	Min.	Max.
Input Low Voltage		0.8 V
Input High Voltage	2.0 V	
Input Low Current @		-0.4 mA
Input High Current @		20 μ A
Input High Voltage = 2.7V		

Data Output Lines:

Output Low Voltage @ 12mA	0.4 V
Output Low Voltage @ 24mA	0.5 V
Output High Voltage	2.4 V
Output Low Current	24 mA
Output High Current	-15 mA

Control Input Lines:

Input Low Voltage	0.5 V
Input High Voltage	1.9 V
Hysteresis	0.4 V
Input Low Current @	
Input Low Voltage = 0.4V	-0.4 mA
Input High Current @	
Input High Voltage = 2.7V	20 μ A

Control Output Lines:

Output Low Voltage @ 16 mA	0.4 V
Output Low Voltage @ 40 mA	0.7 V
Output High Voltage	
(open collector)	30 V
Output Low Current	40 mA
Output High Current @	0.25mA
Output High Voltage	

DATA LINES

The 98623A BCD interface provides 43 data input lines (eight BCD digits, mantissa sign, exponent sign, exponent digit, function code digit, and an overload bit) for BCD data entry or five bytes of bit-parallel data entry. Eight data output lines are also provided for general purpose data output or control. Data is latched and held until the next output operation. The data I/O lines have low-power Schottky TTL receivers and drivers.

CONTROL LINES

The following incoming and outgoing control lines use open collector drivers with pull-up resistors on the receiver inputs.

CTLA, CTLB Peripheral Control A and B: Indicate that the Series 200 is requesting input data or that data is ready for output; CTLA(B) can be reset by a ready-to-busy or busy-to-ready transition on FLGA(B) or by an interface reset.

FLGA, FLGB Peripheral Flag A and B: Indicates to the computer that the peripheral has completed the data transfer; also used to request peripheral interrupt when enabled.

PRESET Peripheral Reset: Used to initialize a peripheral when (1) the computer is turned on, (2) the RESET key or CLEAR I/O key are pressed or (3) when writing to the 98623A reset register.

DATA FORMATS

Two BCD data input formats are supported by the 98623A which are switch selectable on the interface card. This switch status can then be interrogated by the language system to insure that the incoming data is being formatted correctly.

Standard: A 4-bit function code digit, a sign bit, eight 4-bit BCD magnitude digits, an exponent sign bit, a 4-bit BCD exponent digit, and an overload bit that indicates whether or not the reading is valid.

Optional: Up to 4-BCD-digit signed mantissa from one device. Up to 5-BCD-digit signed mantissa with positive exponent from a second device.

Data Codes: 8421 binary-coded decimal weighting with codes 0-9 representing digits 0-9 and other codes as follows:

1010	(LF)	line feed
1011	(+)	plus
1100	(,)	comma
1101	(-)	minus
1110	(E)	exponent
1111	(.)	decimal point

ADDITIONAL INFORMATION

Exponent & Function Code: 8421 binary-coded decimal weighting (codes 0-9 only), Mantissa sign, Exponent sign.

Overload: 1 binary bit.

INTERRUPT CAPABILITY

The 98623A BCD Interface is capable of generating interrupts to the computer when FLGA and FLGB are both ready.

SWITCH CONFIGURATION

The following switches can be set:

Select code: The factory select code setting is 11; valid select codes are: 1-6,8-15

Interrupt Level: The factory interrupt priority setting is 3; valid settings are from 3 to 6.

Input Data Line Sense: A 1-bit switch allows the input data lines to use either positive-true or negative-true logic.

CTLA(B) Line Sense: A 1-bit (each) switch allows the peripheral control lines to use either positive-true or negative-true logic.

DFLGA(B) Line Sense: A 1-bit (each) switch allows the peripheral flag line to use either positive-true or negative-true logic.

CTLA(B)-2: A 1-bit (each) switch allows selection of full or pulsed mode handshake.

Option Format: A 1-bit switch selects standard (one device) or optional (two devices) data format.

SIGN1(2) Line Sense: A 1-bit (each) switch allows the mantissa and/or exponent sign lines to use either positive-true or negative-true logic.

OVL D Line Sense: A 1-bit switch allows the overload line to use either positive-true or negative-true logic.

Ordering Information

Earliest Language Version Required: BASIC 2.0 plus BASIC Extensions 2.1, and HPL 1.0.

The 98623A includes:
98623-66501 BCD Interface Card
98623-90000 BCD Service Manual

98623A Option

001: 4.6 meter (15 ft) unterminated cable (5061-4217)

Fuse for replacement/spare: 2110-0712

Product Number 98624A

The HP 98624A HP-IB* Interface Card implements the IEEE 488-1978 (and the supplement IEEE 488A-1980) Standard Digital Interface for Programmable Instrumentation. The interface can communicate with as many as 14 HP-IB compatible instruments, connected with a maximum of 20 meters (65.5 feet) of cable.

Functional Specifications

MAXIMUM TRANSFER RATES

For both the 98624A HP-IB interface and the internal HP-IB interface that is standard on the Series 200:

	INPUT (bytes/s)	OUTPUT (bytes/s)
BASIC 2.0		
Handshake	42K	60K
BASIC Advanced Program Binary		
Interrupt, burst	40K	55K
Fast handshake	110K	80K
DMA, regular	340K	270K
HPL 2.0		
Interrupt	6K	6K
Fast read/write	42K	70K
DMA, regular	330K	230K

INPUT/OUTPUT LINES

Eight bi-directional data lines provide data input/output; three lines are for control and five lines are used for Interface Management (see Figure 1).

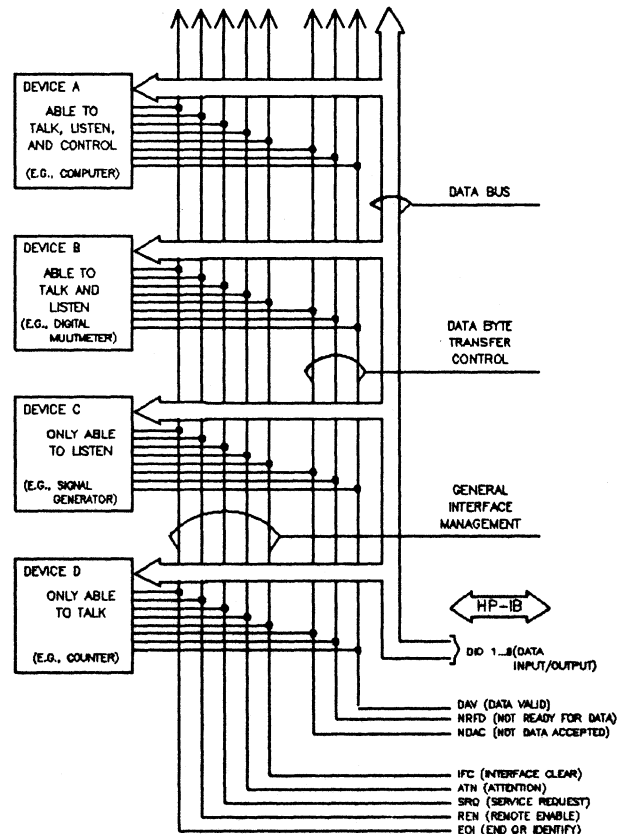


Figure 1. HP-IB Interface Bus Concept

DMA CAPABILITY

The internal and 98624A HP-IB interfaces are optionally capable of carrying out DMA transfers via the two-channel 98620A DMA Controller Card. Byte Mode DMA and Regular (not Burst) DMA transfers are supported.

*The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MC 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

INTERFACE FUNCTIONS

The chart below specifies the level of implementations in terms of IEEE 488-1978 mnemonics. The Device Trigger, Device Clear and Remote/Local state responses are achieved by programming the Series 200 computer for end-of-line interrupts on those conditions.

Source Handshake	SH1
Acceptor Handshake	AH1
Talker	T6
Listener	L4
Service Request	SR1
Remote/Local	RL1
Parallel Poll	PP1
Device Clear	DC1
Device Trigger	DT1
Controller	
System Control	C1
IFC & Take Charge	C2
REN	C3
Respond SRQ	C4
Miscellaneous control	C5
Drivers	E2

INTERRUPT CAPABILITY

The internal and 98624A HP-IB interface are capable of generating interrupts under the following conditions (PASCAL has no interrupt capabilities):

	HPL	BASIC
- Controller addressed	X	X
- Talker addressed	X	X
- Listener addressed	X	X
- Service Request (SRQ) detected	X	X
- Parallel Poll configuration change		X
- EOI received		X
- Serial Poll active		X
- Remote/Local configuration change		X
- MY Address mode change		X
- Group Execute Trigger received	X	X
- Source handshake error		X
- Unrecognized universal command		X
- Unrecognized addressed command		X
- Secondary command received		X
- Device Clear received	X	X
- Interface Clear detected	X	X

SWITCH CONFIGURATION

The following switches are configurable:

Select Code: The factory select code is 8 (select code seven for internal HP-IB); valid select code settings are:

BASIC & PASCAL	8-31
HPL	1-6, 8-15

Interrupt Level: The factory interrupt priority level setting is 3 (internal HP-IB level is 3); valid interrupt level settings for the 98624A are from 3 to 6.

Interface Bus Address: A 5-bit talker/listener address. The factory-set bus address for the 98624A is 21 decimal (21 for internal HP-IB; if the computer is not a system controller then its default bus address will be 20); the 98624A card can have a bus address setting from 0 to 30.

System Controller: A 1-bit switch allows the 98624A interface to act as a system controller or non-system controller. The factory setting is system controller.

Ordering Information

Earliest Language Version Required: BASIC 1.0, PASCAL 1.0, HPL 1.0, and HP-UX 2.0.

The 98624A Interface includes:
 98624-66501 HP-IB Interface
 98624-90000 Service Manual

Compatible Cables from Direct Marketing Division (DMK):

10833A	1 meter cable
10833B	2 meter cable
10833C	4 meter cable
10833D	0.5 meter cable

Fuse for Replacement/Spares: 2110-0712

High Speed Disc Interface**Product Number 98625B**

The HP 98625B High Speed Disc Interface is intended for connection of disc drives and other HP-IB devices to HP 9000 Series 200 or Series 300 computers. All data transfers may be handled through the use of DMA for increased speed.

The HP 98625B will be compatible with HP 98625A drivers and will also offer a mode for doing word-wide DMA transfers.

Features

- * Connection of DIO Computers to HP CS/80 Disc Drives and other HP-IB devices.
- * Up to 7 disc drives on one 98625B
- * Total cable length up to 15 meters
- * DMA Capability for fast transfers
- * HP 98625A compatibility
- * Allows status register access during DMA transfers
- * Switch selectable system controller/non-system controller
- * Switch selectable high speed/low speed HP-IB

Functional Specifications**TRANSFER RATES**

The 98625B will allow data to be transferred in bursts at a rate of 1 megatransfer/second (2Mbytes/sec in word mode). The average transfer rate will be equal to the transfer rate of the attached disc.

DMA CAPABILITY

The 98625B utilizes DMA (direct memory access) and is recommended for use with the HP 98620A/B DMA Controller card for operation.

SWITCH CONFIGURATION

Select Code: The factory setting is 14, but can be set to any non-conflicting value.

Interrupt Level: The factory setting is 6. Unlike the 98625A card, other cards may share the interrupt level of the 98625B card. This is recommended only with HP-UX 5.0 and later versions.

Ordering Information

Note: The 98625B is scheduled to be on the CPL October 1, 1985.

Earliest Language Version Supported: PASCAL 2.0, BASIC Extensions 2.1, HP-UX 2.0, and SRM environments.

The 98625B includes:

98625-66502 High Speed Disc Interface
98625-90001 Installation Manual

Compatible Cables (from Direct Marketing Division):

10833A 1 meter (3.3ft)
10833B 2 meters (6.6ft)
10833C 4 meters (13.2ft)
10833D 0.5 meters (1.6ft)

Fuse for replacement/spare: 2110-0712

Product Number 98626A

The HP 98626A Serial Interface is an RS-232-C* compatible interface used for simple asynchronous I/O applications such as driving line printers and terminals.

Features

- * EIA RS-232-C (CCITT V.28/V.24) compatibility
- * Data rates from 50 to 19200 baud (bits/second)
- * Series 200 Terminal Emulation Software compatibility
- * Software selectable character length and number of stop bits
- * Software selectable parity configuration
- * Software selectable baud rate
- * Interface to terminals, modems, and current loop pod

Functional Specifications**MAXIMUM TRANSFER RATES**

<u>BASIC 2.0 & HPL</u>	<u>Input</u>	<u>Output</u>
Handshake	19200 baud	19200 baud

DATA RATES

Standard switch selectable data rates (bits per second) available are:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

INTERRUPT CAPABILITY

The 98626A Serial Interface Card can be programmed to interrupt the computer on the following conditions:

under BASIC 2.0:

- Receiver buffer full
- Transmitter buffer empty
- Receiver buffer overrun error
- Received character parity error
- Received character framing error
- Received break indication
- Carrier detect line change
- Clear-to-send line change
- Data-set-ready line change
- Ring indicator change from on to off

under HPL:

- Input buffer full
- Output buffer empty

Interrupt buffer transfers are supported by the BASIC Advanced Programming Binary for the 98626A Serial Interface.

SWITCH CONFIGURATION

The following switches can be configured on the interface card:

Select Code: The factory select code setting is 9; valid select code settings are:

BASIC & PASCAL	8-31
HPL	1-6, 8-15

*RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 2001 Eye Street N.W., Washington D.C. 20006. Its equivalent for European applications is CCITT V.24.

Interrupt Level: The factory interrupt priority level setting is 3; valid interrupt level settings are from 3 to 6.

Parity: A 3-bit switch is available to enable or disable parity, select even or odd parity, or select fixed '1' or fixed '0' parity bit; the factory setting is disable, odd, and fixed '0' parity.

Character Length: A 2 bit switch selects between 5, 6, 7 or 8 bits per character length; the factory setting is 8 bits per character length.

Stop Bits: A 1-bit switch selects between 1 stop bit per character or 1.5 stop bits per character. If the number of bits per character is 6, 7 or 8, then the stop bits switch selects between 1 stop bit per character or 2 stop bits per character; the factory setting is 2 stop bits per character.

Modem Line Disconnect: A 4-bit switch allows the Ring Indicator, Data Set Ready, Clear To Send and/or Carrier Detect lines to be disconnected and tied high; the factory setting is disconnected.

Baud Rate Select: Allows power up/reset selection for the baud rate. Refer above to the baud rates available for switch selection; the factory setting is 2400 baud.

Ordering Information

Earliest Language Version Required: BASIC 1.0, PASCAL 2.0, HPL 1.0, and HP-UX 2.0.

The 98626A Interface includes:

98626-66501 Serial Interface Card
98626-90000 Service Manual

98626A Options

001: 4.9 meter (16 ft) cable with DTE male connector (5061-4215)
002: 4.9 meter (16 ft) cable with DCE female connector (5061-4216)

Supported Connection Products:

13265A 300 Baud Modem
13266A Current Loop Interface

Fuse for replacement/spare: 2110-0712

Data Communications Interface**Product Number 98628A**

The HP 98628A Data Communications Interface enables your desktop computer to communicate with any device that is compatible with standard asynchronous or HP Data Link data communication protocols. Devices can include various modems or link adapters, as well as equipment with standard RS-232-C* or current loop links.

Features

- * Asynchronous Serial Communications including RS-232-C (CCITT V.28/V.24), RS-449, RS-423, and RS-422
- * Distributed System Network/Data Link support for communication to HP 1000
- * Terminal Emulation software compatibility for communication with other computers
- * Data formats of 5, 6, 7, or 8 bits/character and 1, 1.5, or 2 stop bits
- * Selectable odd, even or no parity and fixing parity bit to 0 or 1

Functional Specifications**DATA RATES**

Standard data rates available with internal clocking:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

INTERRUPT CAPABILITY

The 98628A Serial Interface Card can be programmed to interrupt the computer on the following conditions:

Async:

- Data or control block available
- Prompt received
- Framing and/or parity error
- Modem line change (DSR, DCD, CTS, RI)
- No activity timeout
- Lost carrier or connection timeout
- End-of-line received
- Break received

Data Link:

- Data block available
- Space available for new transmission block
- Receive or transmit error
- Modem line change (DSR, DCD, DTS, RI)
- No activity timeout
- Lost carrier or connection timeout

BUFFER SIZE

The 98628A card contains the following buffer sizes:

Async:

- Tx control is 11 blocks of 50 bytes each
- Tx data is 549 bytes
- Rx control is 99 blocks of 7 bytes each
- Rx data is 699 bytes

FDL:

- Tx control is 11 blocks of 50 bytes each
- Tx data is 549 bytes
- Rx control is 11 blocks of 95 bytes each
- Rx data is 1049 bytes

SWITCH CONFIGURATION

The following switches are configurable:

Async/Data Link:

Select Code: The factory setting is 20; valid select codes are 8 to 31.

*RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 20001 Eye Street N.W., Washington D.C. 20006. Its equivalent for European applications is CCITT V.24.

Interrupt Level: The factory interrupt priority level setting is 3; valid settings are 3 to 6.

Async/Data Link: Selects between Async or Data Link personality; the factory setting is Asynchronous.

NOTE: The settings listed below are not all switch selectable. However, all values are selectable through the CONTROL statement. Values selected through the CONTROL statement override the switch settings.

Async:

These settings are active when the ASYNC/DATA LINK switch is set to its ASYNC position.

Parity-Bits/Character: A 2-bit switch selects between the following Parity-Bits/Character combinations: None/8, None/7, Odd/7, Even/7; the factory setting is Odd/7.

Hardware Handshake: A 2-bit switch selects (1) Handshake Off, Non-Modem Connection; (2) Full Duplex, Modem Connection; (3) Half Duplex, Modem Connection; and (4) Handshake On, Non-Modem connection; the factory setting is Full Duplex, Modem Connection.

Baud Rate: A 3-bit switch selects between the following combinations of baud rates/stops bit settings: 110/2, 150/2, 300/1, 600/1, 1200/1, 2400/1, 4800/1, 9600/1; the factory setting is 300/1.

Data Link:

These settings are active when the ASYNC/DATA LINK switch is set to its DATA LINK position.

DID: A 3-bit switch selects the following value for the 98628's device address: @, A, B, C, D, E, F, or G.

Baud Rate: A 2-bit switch selects the following baud rates: 300, 1200, 9600, or 19200.

Hardware Handshake: A 2-bit switch selects between:

- 1) Handshake Off, Non-Modem Connection;
- 2) Full Duplex, Modem Connection;
- 3) Half Duplex, Modem Connection; and
- 4) Handshake On, Non-Modem Connection.

ELECTRICAL SPECIFICATIONS

Card Power Consumption:

- +5V at 710mA typical
- +12V at 37mA typical
- 12V at 60mA typical

POD Power Consumption

(supplied by computer):

	+5V	+12V	-12V
	(typical)		
Current loop interface (13266A)	200mA	90mA	80mA
300 baud modem (13265A)	100mA	45mA	45mA
Data link adapter (13264A)	30mA	160mA	23mA

Ordering Information

Earliest Language Version Required: BASIC 2.0, PASCAL 1.0, HPL 2.0, AND HP-UX 2.0.

The 98628A includes:

- 98628-66503 Data Communications Card
- 98046-90005 Data Comm Manual
- 98628-90001 Installation Manual

98628A Options

- 001:** 4.9 meter (16 ft) RS-232-C DTE (male) cable (5061-4215) with test connector (1251-6625)
- 002:** 4.9 meter (16 ft) RS-232-C DCE (female) cable (5061-4216) with test connector (1251-6624)
- 003:** 4.9 meter (16 ft) RS-449/423 DTE (male) cable (5061-4250) with test connector (5061-4220)

Supported Connection Products:

HP 13264A Data Link Adapter for use in HP 1000 or HP 3000-based Data Link network applications

HP 13265A Modem for asynchronous connections up to 300 baud, including built-in autodial capability.

HP 13266A Current Loop Adapter for use with current loop links or devices.

Fuse for Replacement/Spare: 2110-0712

Shared Resource Management Interface

Product Number 98629A

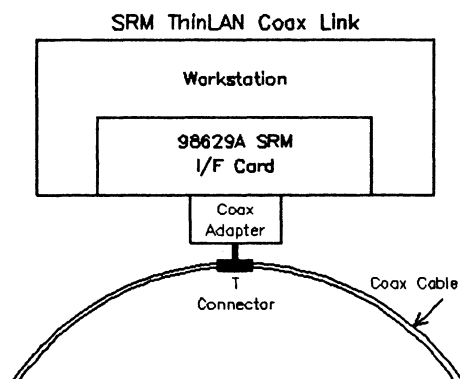
Shared Resource Management (SRM) is a dedicated file and printer/plotter server for the HP 9000 and HP 9835/45 engineering workstations. It provides the capability to share resources, including discs, printers, and plotters, among workstations in a local cluster. SRM combines the advantages of the distributed processing of personal workstations with the centralized resources of multi-user systems.

The HP 98629A interface card is used in the HP 9000 series 200/300 computers with BASIC, Pascal, or HP-UX operating systems. It is also used in the SRM Servers.

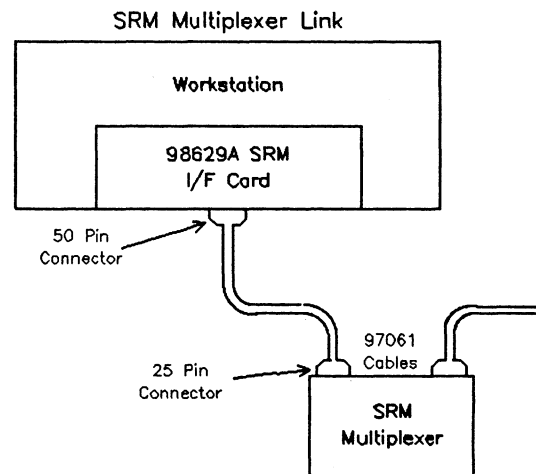
Functional Specifications

PHYSICAL ARRANGEMENT OF EQUIPMENT

Two cabling schemes are available for connecting workstations to the SRM Server (controller): the SRM Coax Link and the SRM Multiplexer Link. In the Coax Link, workstations and servers connect to a thin coaxial cable in a bus arrangement. The SRM interface card in each computer connects to the coaxial cable through an HP 50961 Coax Adapter. The coax adapter mounts directly on the interface card and connects to the cable with a BNC "tee" connector. The coaxial cable can be up to 1000 meters long and up to 25 nodes (servers and workstations) can connect to it. All HP 9000 workstations are supported on the SRM Coax Link.



The SRM Multiplexer Link uses an HP 98028A SRM Multiplexer and HP 97061 SRM cables in a star configuration. Each cable segment can be up to 60 meters long and the Multiplexer can accommodate up to four workstations. All HP 9000 workstations as well as the HP 9835/45 desktop computers are supported on this link.



For existing SRM systems with unused Multiplexer ports available, additional workstations can be added using the HP 98629A interface cards and 97061X cables. Otherwise, it is recommended to use the new coax cables and coax adapters. An SRM Server can serve both types of links simultaneously and can support up to 63 workstations.

ELECTRICAL SPECIFICATIONS

The table below lists the power consumed by the 98629A card when it powers a 98028A Multiplexer, powers a 50961 Coax Adapter, and when it is connected to a Multiplexer but does not power it:

	+5V	+12V	-12V	TOTAL
98629A/98028A	5.9	6.9	0.5	13.3
98629A/50961	5.2	0.5	0.5	6.2
98629A	3.7	0.5	0.5	4.7

Ordering Information

To Add a Workstation to a Multiplexer Port:

98629A Resource Management Interface and one of the following cables:

97061A	10 Meters *
97061B	25 Meters *
97061C	60 Meters *
97061D	60 Meters **

* connector on both ends

** connector attached on one end only; the second connector (included) to be attached by user after pulling cable through cable trays.

To add a Workstation to a Coax Link:

50961A Option 200 SRM Coax Adapter and Interface. Includes both the 98629A Interface Card and the Coax Adapter, and one of the following Coax Cables:

92227A	1 Meter *
92227B	2 Meters *
92227C	4 Meters *
92227D	8 Meters *
92227E	16 Meters *
92227F	32 Meters *
92227G	64 Meters *
92227H	128 Meters *
92227J	PVC jacket **
92227K	FEP jacket **

* connectors on both ends; PVC jacket

** cut to specified length; no connectors included

To Upgrade an Existing 98629A Interface Card for use with the Coax Link:

50961U Option 200 SRM Coax Adapter Upgrade Kit. Also order 92227X cables listed above.

Prerequisites

SRM Server: 50960A/S, or a 9826A/9920A computer configured as 9826A Option 500 or 9920A Option 500.

Workstation: Series 200 or 300 computer with one of the following operating systems or subsequent revisions:

BASIC Extensions 2.0
Pascal 2.1
HP-UX 2.0 (plus 98693A SRM Access Utilities for HP-UX)

Additional Information

5953-9535 HP 9000 Data Communications Technical Supplement

5953-9550 SRM System Planning Guide

98619-90021 SRM Hardware Installation Manual (included with the 98629A and 50961A products)

Fuse for Replacement/Spares: 2110-0712

Product Number 98640A

The HP 98640A Analog Input Interface is a plug-in analog to digital converter for Series 200 or Series 300 computers. It provides a low cost, easy to use data acquisition solution for low point count applications. Programmatically it looks like RAM to the Series 200/300 computer. Communication involves reading or writing to appropriate locations on the card or calling sub-routines in the HP 98645A Measurement Library from BASIC or Pascal environments.

The 98640A provides 8 differential unguarded inputs (or 7 inputs and one reference channel). A shunt circuit protects inputs from signals which exceed ± 10 volts. The overvoltage signal is routed to ground through a 1k ohm resistor. The 8 differential inputs are multiplexed to a single analog path containing a sample and hold and a 13 bit analog converter chip. Therefore conversions are made in a serial fashion and simultaneous readings on multiple channels are not possible.

Maximum conversion speed is 55,000 readings per second on one channel. Maximum conversion speed for readings taken across channels (scanning across channels) depends upon the gain settings. See Table 1. The limitations placed on across-channel readings are due to the slewing times of the input amplifiers.

Readings are taken by calling routines from the HP 98645A Measurement Library or by direct card access from BASIC or Pascal or assembly language. The user must supply a channel address to the card in order to invoke the conversion process. There is a one-word address buffer on the card providing the capability of back-to-back conversion cycles.

Because the card has no external adjustments, all calibration is done in software. A calibration routine (described in the manual) is provided for in the measurement library, and library reading calls are set to provide calibrated data.

Since a DMA request does not guarantee prompt access time, there is no DMA capability with this card.

Features

- * 7 differential input channels plus 1 channel for calibration
- * 55,000 samples per second to system memory
- * 13 bit resolution (includes sign bit)
- * 4 programmable input ranges
- * Overvoltage protection activated at 15V (maximum power dissipation of 150 watts)
- * 90dB common mode rejection at 60Hz.
- * Internal and external pacing/triggering
- * Easy connection via modular screw termination assembly
- * State of the art successive approximation analog-to-digital converter
- * On-board crystal-controlled clock
- * HP 98645A Measurement Library available
- * Multiple 98640As supported in one computer

Functional Specifications

(0° to 50° Centigrade)

External Trigger:

> 2 volts for at least 2.3 microseconds

External Trigger Delay (maximum):

1.45 microseconds \pm 300 nanoseconds

Resolution of Internal Clocked Pace Rate: 600 nano-seconds (*Externally paced readings could be off by +600 ns*)

Aperture Time of Sample and Hold:

25 nanoseconds

Temperature Coefficient for Voltage Offset:

10 microvolts per degree Celsius

Time from First Read to Hold at 55kHz:

7 microseconds

Input Resistance (on each channel): 100 M Ω

Power Consumption: 3.5 Watts

Table 1. Maximum Conversion Speed for Readings Taken Across Channels

GAIN*	1	8	64	512
Full Scale	±10V	±1.25V	±156mV	±19.5mV
LSB	2.44 mV	305µV	38.1V	4.77µV
RMS Noise** Standard Deviation	5mV	600µV	100µV	18µV
Offset after Software Calibration***	±7.3mV	±915µV	±152µV	±24µV
Accuracy after Software Calibration***	±18mV	±3mV	±250µV	±75µV
Maximum Sample Speed Across Channel	20K/s	20K/s	14K/s	1K/s
Maximum Sample Speed on Channel	55K/s	55K/s	55K/s	55K/s
Input Amplifier Slew Rate	.4V/µs	.05V/µs	4mV/µs	40µV/µs

* No autoranging capability.

** By using Digital Filtering techniques (averaging readings) noise can be reduced to <1 LSB.

*** Worst Case.

Ordering Information

The 98640A includes:

98640-66501 ADC Interface
 98640-66502 Screw Termination Assembly
 98640-67950 Test Hood Assembly
 98640-90001 Hardware Manual

98640A Options

Must order one of the following:

001: Deletes Test Hood (98640-67950)
630: 3.5" Diagnostic Software (98640-13301)
655: 5.25" Diagnostic Software (98640-13601)

The following is optional:

016: Shield kit required for proper operation in
 9816 (98640-60001)

Product Number 98641A

The HP 98641A RJE interface is used to allow a DIRECT I/O compatible host computer system to simulate an IBM 2780 or 3780 workstation. This permits the host HP computer to be used as a Remote Job Entry (RJE) station for batched-job communication with IBM 360/370 (or compatible) computers using IBM Bisync protocol.

The interface features a plug-in card incorporating microprocessor intelligence that offloads ALL communications overhead from the host. This means the interface card performs all protocol generation and interpretation, as well as modem control tasks and pre-processing functions such as character conversion, blocking and deblocking.

The specific needs of many different applications are met by selecting programmable configuration parameters.

Full trace log, communications status and statistics, as well as hardware self-test provides complete monitoring and check out of the interface.

Features

- * **DIRECT I/O RJE provides communications for allowing a host computer with complementary software to simulate an IBM 2780 or 3780 Remote Job Entry workstation**
- * **Is supported with computers that utilize the DIRECT I/O architecture running the HP-UX operating system**
- * **Makes it possible to communicate with other standard IBM 2780/3780 emulators.**
- * **Offloads all RJE communications overhead from the host computer**
- * **Operates over modems at data rates up to 38.4K bits/second**
- * **Meets EIA RS-232C specifications and is compatible with CCITT V.24**
- * **Supports Bell type 208B, 209A, and 212 data sets or equivalent**
- * **Works with full or half duplex modems and supports auto answer and originate**

- * **Provides link control functions: line bid, normal and transparent data modes, all responses, and link termination**
- * **Meets specific application needs with configurable parameters and special character handling**
- * **Assures data integrity with CRC error checking on all data blocks**
- * **Accumulates long-term communication statistics and collects all link control and data characters in continuous trace log**
- * **EBCDIC character set recognized**
- * **Has built-in hardware self-test**

Functional Description

DIRECT I/O RJE provides a communication link used by a host HP computer to transmit batch jobs and receive output from a processor that can support standard IBM 2780/3780 devices. Additionally, one can use the DIRECT I/O RJE link to exchange files between a host HP computer and other processors that simulate standard IBM 2780/3780 devices.

DIRECT I/O RJE works with modems over switched and non-switched lines. The maximum data rate supported by the interface is 38.4K bits/second, but the interface also operates at slower rates to accommodate different modems (Bell Type 208B, 209A, and 212).

Link control is managed entirely by the on-card microprocessor. All functions including line bid, normal and transparent data modes, as well as all responses (ACK/NAK/WACK/TTD/RVI) and link termination are implemented by the card upon request by software in the host computer.

Card parameters and special character handling may be configured from the host computer or allowed to retain their default values.

Configurable parameters include: Record and block sizes, timeouts, retry counts, conversion tables, record separators, formatting functions, and others.

Special character handling includes: Character code translation, automatic record terminations, adding and stripping of record and block separator sequences, blank truncating and padding, and repeated character compression and expansion.

To assist in line quality and link troubleshooting, the DIRECT I/O RJE interface card accumulates communication statistics. A continuous trace log can collect all sent or received link control characters and independently collect all sent or received data characters. One may collect the link control characters trace log without also collecting the data characters trace log, thus permitting link troubleshooting without violating data security. A trace log also collects all internal firmware state changes.

A resident interface self-test, initiated upon reset, is provided with the DIRECT I/O RJE interface.

Functional Specifications

DIRECT I/O RJE meets all requirements for communication allowing simulation of the 2780/3780 systems.

DIRECT I/O RJE does not recognize horizontal tabulation and vertical forms control codes. This capability, when it exists, must be host resident.

Ordering Information

The 98641A includes:

98641-66501	PSI Card
5061-4215	5 meter RS-232-C Modem Cable with a 25-pin DTE modem male connector
98641-90001	Installation Manual

A self-test loopback connector for optional use with the on card self-test is available. Order HP part number 1251-6625.

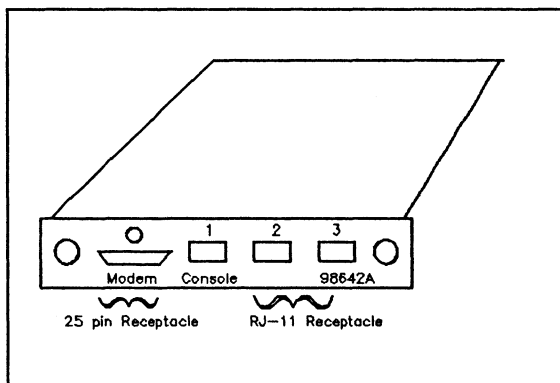
4-Channel Asynchronous Multiplexer

Product Number 98642A

The HP 98642A Multiplexer provides 4 asynchronous RS-232-C compatible ports on a single interface. Three ports are intended for local or direct connection. The fourth port can be used either locally or to interface to RS-232-C compatible modems. A wide range of configurable transmission modes and formats permits three hardwired and one remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

- * Four full duplex asynchronous serial I/O ports
- * One port with 10 wire full duplex modem control capability
- * EIA RS-232-C, CCITT V.28 compatibility
- * Programmable data rates for each port up to 19.2K baud
- * Programmable character size: 7 or 8 bits/character
- * Programmable parity: odd, even, none
- * Programmable number of stop bits: 1 or 2
- * Parity, overrun, framing error check detects transmission faults
- * Firmware based self test helps assure interface integrity
- * On-board buffering
- * Programmable interrupt interval
- * Special character recognition
- * System console support



Functional Description

The HP 98642A Asynchronous 4-Channel Multiplexer is used for interfacing up to four EIA RS-232-C compatible devices to the HP Direct I/O backplane. As a Z80A microprocessor based interface, the 98642A MUX accesses the 8K byte EPROM which contains a power-up self test and the code necessary to manage the on-board FIFO buffers.

Data will be passed between the card and the host in circular FIFO data buffers. This buffering scheme allows the host to receive multiple characters per interrupt, thus decreasing the interrupt servicing overhead of the host.

The 98642A includes three cables providing convenient local connection via the RJ-11/25 pin male connector/ adapters. The product also includes a 5 meter 25 pin male-to-25 pin male modem interface cable.

Functional Specifications

CAPACITY

Channels: Four full duplex channels (3 direct connect and 1 modem/direct connect). Full Duplex refers to the card's ability to simultaneously transmit and receive data. However, this may be limited by the half duplex nature of the Direct I/O backplane.

Buffering: There are a total of eight circular FIFO data buffers; four (128 character) receive buffers and four (16 character) transmit buffers (one for each port).

SOFTWARE

Multi-user HP-UX 5.0 or later.

COMMUNICATIONS

Interface Level: RS-232-C; CCITT V.28.

Supported Signal Lines:

<u>RS-232-C</u>	<u>V.24</u>	<u>Common Abbreviation</u>	<u>Description</u>	<u>Input Output</u>
AB	102	SG	Signal Ground	
BA	103	SD	Transmitted Data	O
BB	104	RD	Received Data	I
CA*	105	RS	Request to Send	O
CB*	106	CS	Clear to Send	I
CC*	107	DM	Data Set Ready	I
CD*	108.2	TR	Data Terminal Ready	O
CF*	109	RR	Received Line Signal Detector	I
CH*	111	SR	Signal Rate Selector	O
CE*	125	IC	Ring Indicator	I

* These signals are only supported on the modem port.

Data Rates: The default baud rate on all four ports is 9600 baud. However, each of the four ports are software programmable to any of the following baud rates: 110, 134.5, 150, 300, 600, 1200, 2400, 4800, 9600 or 19.2K.

Throughput: The 98642A 4-Channel MUX will support 4 interactive terminal users running character mode at 19.2K baud. Other RS-232 applications which may simultaneously send and receive data over all four ports should be run at 9600 baud or slower. Aggregate MUX throughput may be limited by the load present on the host processor.

Communication Mode: Asynchronous, bit serial.

Break Detection and Transmission: A break condition is recognized by the interface and results in sending an interrupt to the host. A break condition can also be generated by the MUX at the request of the host.

Interrupts:

Host-to-Card (non-specific):

- Modem Output Change
- Timer Off/On
- Self Test On

Host-to-Card (port-specific):

- Configuration Data Change
- Transmit Buffer not Empty
- Send Break

Card-to-Host (non-specific):

Timer--Interrupts host every 16 milliseconds. This signals the host to receive any characters that might be in the receive buffers.

Modem Input Change

Self Test Complete

Card-to-Host (port-specific):

Special Character Received--Received character matches host programmed bit map character.

Transmit Buffer Empty

Handshaking: All handshaking is deferred to host control.

EDIT FUNCTIONS

Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

ELECTRICAL SPECIFICATIONS

Direct Current Requirements:

<u>Voltage</u>	<u>Typical Current</u>	<u>Two Standard Deviation Current</u>
+5	0.950 A	1.142 A
+12	0.057 A	0.067 A
-12	0.005 A	0.007 A

PHYSICAL SPECIFICATIONS

Dimensions: 137.2mm (5.4in) long by 170.2mm (6.7in) wide

Weight: Interface card, 255 grams (9.0oz)

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: 0° to 55°C

Operating Humidity: 5% to 95% relative humidity at 40°C

Ordering Information

The 98642A includes:

98642-66501 4-Channel Multiplexer Printed Circuit Assembly
98642-66505 3 RJ-11 Cables, 15 meter
98642-66506 25 pin male modem cable, 5 meter
98642-66508 3 RJ-11/25 pin male connector/adapters
98642-90001 Installation Manual

98642 Option:

001: Deletes all cables and connectors

Recommended Cables:

The 92219R 25 pin M-to-25 pin M direct connect cable for the modem port is available from the Direct Marketing Division (DMK). The other cables and connectors are also available from DMK.

92219R (98642-66507) 15m 25 pin male-25 pin male direct connect cable
92219S (98642-66506) 5m 25 pin M-25 pin male modem cable
92219T (98642-66505) 15m RJ-11 cable
92219U (98642-66508) RJ-11-25 pin male connector/adapter

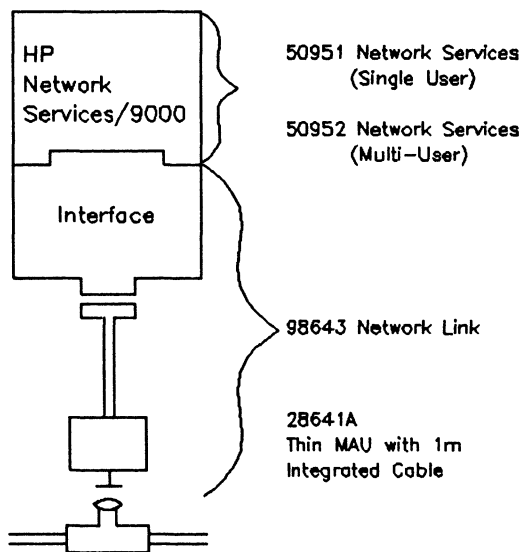
Self-test loop back connectors are available for optional use with the on-card self test. Order three RJ-11 Test Hoods (98642-67950) and one 98644-67950 EIA 25 pin Test Hood from the HP Corporate Parts Center.

Recommended Modems:

- Bell 212A
- HP37212A Stand-alone Modem
- 92205A Hayes Smart Modem 1200
- Bell 202T 4 wire leased line Modem

Product Number 98643A

The HP 98643A LAN/300 link product provides all of the necessary hardware to interface between a HP 9000 Series 200 or Series 300 computer on HP-UX 5.0 and an IEEE 802.3 10 Mb/s/sec Local Area Network. The product consists of a printed circuit assembly, a Thin Medium Attachment Unit (ThinMAU) with 1m integrated cable, and an installation manual. Figure 1 shows the 98643A as it connects to an IEEE 802.3 type 10 base 2 ThinLAN coaxial cable. The product can also be connected to an IEEE 802.3 Type 10 Base 5 backbone ("thick") network via a 30241A MAU.



The HP 50951A and 50952A Network Services/9000 for Series 300 software provides single user or multi-user systems, respectively, the ability to send packets of data via the 98643A. For HP 9000 Series 200 that have upgraded their hardware and software to run HP-UX 5.0, the 98643A can be used with the 50956A and 50957A Network Services/9000 software for single or multi-use systems respectively. Together, the LAN/300 Link and NS/9000 enables a 9000 Series 200 or Series 300 computer to communicate over the network with other 9000 computers on HP-UX, and with computers from the HP 3000 family.

For those users needing to access the Link directly in order to implement special network protocols, the system intrinsics and network I/O commands are available in the NS/9000 documentation.

For existing networks that use Ethernet hardware and need to transfer Ethernet type packets instead of 802.3, both the NS/9000 and the LAN/300 link can be configured to operate accordingly. For new installations, HP strongly recommends the use of 802.3 cable and packet types. LAN/300 and LAN/500 are capable of communicating with each other via Ethernet. In order to communicate with the 3000 computer, the 9000 LAN Link and Services must be configured for 802.3.

The interface provides the signalling layer and the media access control sublayer protocols as defined in the IEEE 802.3 and Ethernet Rev. 1 standards. This capability allows the interface to prepare frames for transmission by adding preamble and a Cyclic Redundancy Check (CRC), transmit frames according to link access protocol, receive incoming frames addressed to the node, and check them for correctness before transmitting them to the host CPU. Data packets are buffered on card in a 16K Byte dual port RAM that can be accessed by both the LAN interface and the Host CPU.

Features

- * 10 Mb/s/second Burst Transfer Rate
- * Single Card Interface
- * Variable frame size up to 1500 Bytes
- * Operational compatibility with IEEE 802.3 and Ethernet Rev. 1
- * Provides Power (0.5A @ 12V) for MAU
- * Provides physical signalling layer and media control sublayer
- * Interface adds preamble, and CRC to transmit packets; strips preamble and CRC from receive packets

- * **16K bytes of on board RAM allowing buffering for both transmit and receive packets. RAM accessible by both host CPU and LAN interface simultaneously for added performance**
- * **Provides for Multicast, Broadcast, and Individual Addressing**
- * **Collection of Link Statistics (Collided Packets, Bad Packets, etc.)**
- * **Node address stored in non-volatile memory**
- * **Environmental: Class B**
- * **EMC: will pass FCC, VDE level B**

COMMUNICATION LINE STATISTICS

As packets are transmitted and received from the link, the Network Services/9000 tabulates occurrences of particular events and returns these counts as statistics when requested.

The following statistics are collected:

1. Total number of packets received
2. Total number of packets transmitted
3. The number of bad packets received
4. Total number of packets that were not transmitted due to an error
5. Number of packets that were received with a bad CRC code
6. Total number of collisions detected
7. Number of times one retry was needed to transmit
8. Number of times the transmission of a packet was completed after 2 to 15 retries
9. Number of times the transmission of a packet failed after 16 retries
10. The number of times the network was busy when the interface attempted to transmit
11. The number of times the carrier was lost when transmitting a packet
12. The number of times that a heart beat was not detected after transmission
13. The number of packets received with both CRC error(s) and alignment error(s)
14. The number of transmissions aborted because a collision occurred after the allotted time

15. The number of packets lost by the hardware because of a buffer shortage
16. The number of packets received with no associated protocol
17. The number of IEEE 802.3 packets received with an illegal control field

Functional Specifications

GENERAL CHARACTERISTICS*

Topology: Bus

Network Medium: Digital baseband IEEE 802.3 Type 10 base 2 ("thin") coax

Maximum Total Length of Segment: 185m

Minimum Distance between Nodes: 0.5m

Maximum Number of Nodes per Segment: 30

TRANSMISSION CHARACTERISTICS

Transmission Mode: Baseband Digital

Access Methods: Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Maximum Burst Transfer Rate: 10 Mbits

Impedance: 50 Ω

ENVIRONMENTAL CHARACTERISTICS

Temperature:

Non-operating: -40°C to +75°C

Operating: 0°C to +70°C

Humidity: 5% to 95% relative humidity

ELECTRICAL SPECIFICATIONS

The Maximum Power Consumption for the interface is: 5 Volt: 4.89 Watts

The interface also powers the ThinMAU which requires 12 Volts: 4.3 Watts Typical

*HP recommends the use of the ThinLAN 802.3 coax media when distance and maximum number of nodes is not a limitation.

Ordering Information

The 98643A Standard Product includes:

98643-66501 PCA series 200 LAN Unit
98643-90001 Installation Manual
28641A ThinMAU with integrated cable

98643A Option 241:

Option 241 deletes the ThinMAU from the standard product. The customer may then purchase related products such as the "thick" MAU from Direct Marketing Division.

ORDERING RELATED PRODUCTS

30241A Media Access Unit and TAP can be ordered through standard channels including Direct Marketing Divisions. This product is to attach to an 802.3 backbone ("thick") coax cable only.

Attachment Unit Interface (AUI) Cables are available through Direct Marketing Divisions. They come in various sizes up to a maximum allowable length of 48m. There are PVC and Teflon cables available. PVC should be used when the cable will be installed in conduit. Teflon (FEP) cable should be used when installing into ceilings and walls. Due to local and

municipal codes, it is the customer's responsibility to determine proper cable selection. These AUI cables are only used in a backbone ("thick") cable environment and not with the Thin MAU included in the 98643A.

IEEE 802.3 Coaxial Cable and Installation Kits are available through Direct Marketing Divisions for both "thin" and "thick" environments. The lengths of the coax cable were determined to be the best to minimize impedance problems when connecting multiple cables.

HP Network Services/9000

In order to make the LAN/300 product as easy to use as possible, HP has developed a set of user level services which will provide all of the functionality required for interactive and programmatic access to other HP 9000 systems on a local area network. The 50951A and 50952A Network Services/9000 have been implemented in accordance with HP's AdvanceNet architecture and will provide Network File Transfer between HP 9000's with HP-UX and HP 3000's. The 50951A and the 50952A are for single user and multi-user systems, respectively. To purchase Network Services/9000, contact your Hewlett Packard Sales Representative.

Product Number 98644A

Features

- * Inexpensive serial interface
- * EIA RS-232-C (CCITT V.28/V.24) compatibility
- * Modem control
- * Data rates from 50 to 19,200 baud (bits per second)
- * Software selectable character length and number of stop bits
- * Software selectable parity configuration
- * Software selectable baud rate
- * Interface to Series 200/300 RS-232-C compatible peripherals--terminals, modems, printers, etc.
- * Support of remote keyboard enable
- * Interrupt capability through status or modem signal lines
- * Standard 25 pin connector compatibility

Functional Description

The HP 98644A Serial Interface is an RS-232-C* compatible interface used for simple asynchronous I/O applications with HP 9000 Series 200 or Series 300 systems. This includes driving terminals, line printers, and modems.

Functional Specifications

PHYSICAL SPECIFICATIONS

Length: 14.6 cm (5.75 inches)
Width: 19.2 cm (7.56 inches)
Thickness: 2.95 cm (1.16 inches)
Weight: 0.94 kg (0.43 pounds)
Shipping Weight: 2.29 kg (1.04 pounds)

ENVIRONMENTAL SPECIFICATIONS

Temperature: 0-55°C
Humidity: 40°C at 5-95%
Altitude: 4,572 meters (15,000 feet)

ELECTRICAL SPECIFICATIONS

<u>Supply</u>	<u>Power</u>
+12V	0.3 W
-12V	0.03W
+ 5V	2.03W

Total Power Consumption: 2.36 Watts RMS

This card does not have battery back-up capabilities.

DATA RATES

Standard software selectable data rates (bits/second) available:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

The 98644A interface is recommended for use in character mode applications only.

PIN & SIGNAL ASSIGNMENT

1	Frame Ground
2	Transmitted Data
3	Received Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Carrier Detect
20	Data Terminal Ready
22	Ring Indicator
23	Data Rate Select

*RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 2001 Eye Street N.W., Washington, D.C. 20006. Its equivalent for European applications is CCITT V.24.

COMPARISON WITH HP 98626A RS-232-C INTERFACE

- * The 98644A uses a standard 25-pin female DTE connector instead of the 50-pin connector used in the 98626A.
- * The 98644A will not support the following connection products:
 - 13265A 300 Baud Modem
 - 13266A Current Loop InterfaceThese products are supported with the 98626A serial interfaces. They take their power via the 50-pin interface connector. The 98644A does not provide power through its 25-pin connector.
- * The 98644A has no switches for setting the baud rate and the character format. These parameters are software programmable.

Ordering Information

Earliest Language Version Recommended:
BASIC 3.0, PASCAL 3.0, HP-UX 2.1.

The 98644A Interface includes:
98644-66502 Serial Interface Card
98644-90002 Installation & Reference Manual

Recommended Cables: *Cables must be ordered from the Direct Marketing Division (DMK)*

13222Y 5 meter cable for 262X Terminals
(25-pin male to 50-pin male)
13242G 5 meter cable for Terminals and
2601A printer (25-pin male to
25-pin male)
13242N 5 meter for Modems (25-pin male to
25-pin male)
13232Y 4.5 meter cable for 264X Terminals
(25-pin male to 264X)

The test connector (98644-67950) is available from the Corporate Parts Center (CPC).

Product Number 98645A

The HP 98645A Measurement Library provides a set of subroutines for use with the HP 98640A Analog Input Interface for the Series 200 or Series 300. The Measurement Library is written in Pascal and adapted to the BASIC language with the CSUB utility package so it can be used in either language environment.

Features

- * **Compatible with HP 98640A Analog Input Interface**
- * **Compatible with BASIC 2.1, BASIC 3.0, Pascal 2.0, Pascal 2.1, Pascal 3.0**
- * **Takes sequential or random readings**
- * **Sets up selected pacing rates**
- * **Sets hardware gain to one of four settings**
- * **Compensates for hardware offset errors**
- * **Fills array of data in memory at full 55,000 samples per second from a card**
- * **Multiple card support with separate commands (across card delay of >3.5 ms)**
- * **Supports card interrupt mode under BASIC**

Subroutine Descriptions

CONFIG_0 sets up an HP98640A for access by the Measurement Library subroutines.

INIT resets and disables interrupt mode on the card, and sets the calibration array to its default values.

INPUT or **READ_CHANNEL** takes one reading from a specified channel. Input is used from BASIC, Read_Channel is used from Pascal.

SEQUENTIAL_SCAN takes sequential readings from channels on a card.

RANDOM_SCAN takes readings from channels in any order specified with selected pace and gain values for each individual reading.

ENABLE INTERRUPT configures ADC for interrupt mode operation.

DISABLE INTERRUPT configures ADC for normal, non-interrupt mode operation.

SET GAIN sets the default hardware gain range to be used when taking readings.

CALIBRATE compensates for the various offsets in the HP 98640A. To do this, one channel on the card must be dedicated for reference readings. The offsets derived from the reference readings are used to adjust the readings taken on the remaining channels of the card.

SET_UNITS specifies the format of the readings returned by the Measurement Library to be:
BASE = binary integer returned from HP98640A
STANDARD = BASE adjusted for gain and calibration
USER = STANDARD * multiplier + offset
(multiplier and offset defined by user)

MEAS_LIB_INIT initializes the global variables in the Measurement Library.

SYSTEM_INIT initializes all configured cards. For each card it performs an INIT.

Ordering Information

Earliest Language Version Required: PASCAL 2.0, BASIC Extensions 2.1

The 98645A includes:
98645-90001 Programming Manual

98645A Options (one required)
630: 3.5" Disc Media (98645-13301)
655: 5.25" Disc Media (98645-13601)

Programmable Data Communications Package

Product Numbers 98690A and 98691A

The Programmable Datacomm Interface product provides a spectrum of capabilities that can be tailored to meet special datacomm and/or serial interfacing needs. The product consists of two pieces--the PDI Development Package (98690A) and the Programmable Datacomm Interface Card (98691A). The Development Package contains the essential information and tools required by a sophisticated user to do firmware programming of the Programmable Datacomm Interface (including source listing of self-test). The Programmable Interface Card is a micro-programmable serial interface which is intended to be a foundation for designing application-oriented communications products. It is based on the Z-80 CPU, Counter Timer Chip and Serial I/O chip.

Features

- * Z-80A CPU microprocessor control
- * One Z-80A SIO/2 dual channel serial I/O "USART" controller
 - Full or half duplex mode
 - Synchronous or asynchronous features
 - CRC-16 or CCITT block frame check for synchronous operation
 - Two modem control inputs and two modem control outputs per channel
 - Optional vectored interrupts
 - Capability for two independent RS-232-C primary channels
- * 4K bytes of Dynamic RAM (supports up to 16K)
- * One EPROM/ROM socket capable of using 2712's, 2732's, 2764's, and similar devices up to a maximum of 32K bytes
- * One Z-80A CTC Counter Timer Chip for timing and baud rate generation
- * Supports EIA RS-423, EIA RS-422, EIA RS-232-C
- * Internal loop-back of clocks and transmitted data under firmware control for self-test

Functional Description**ON-BOARD MICROPROCESSOR OFF-LOADS HOST COMPUTER**

A powerful microprocessor on the interfaces manages routine communications processing, freeing the host computer for applications oriented tasks. Under control of customer supplied firmware, the microprocessor converts command words into actions, such as establishing a communications link or loading/unloading data from the on-board buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general purpose I/O interfacing, all without the attention of the host computer.

RAM MEMORY

Two RAM sockets for on-board memory allow messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications. The card comes standard with 4K bytes of RAM and will accommodate up to 16K bytes.

Functional Specifications**TRANSMISSION MODE**

Full or half duplex, bit-serial, synchronous or asynchronous.

Z-80A SIO/2 CHARACTERISTICS

Data buffering: Received data quadruple buffered; transmitted data double buffered.

Synchronous features for character oriented protocol:

- One or two Sync characters
- Automatic Sync character insertion
- Cyclic Redundancy Check generation and checking
- Received data overrun detection

Synchronous features for bit oriented protocol:

- Abort sequence generation and checking
- Automatic Zero insertion and detection
- Automatic Flag insertion between messages
- Address field recognition
- Supports one to eight bits per character
- Cyclic Redundancy Check generation and checking
- Valid receive message overrun detection

Asynchronous features:

- 5, 6, 7, or 8 bits per character
- 1, 1-1/2, or 2 stop bits
- Even, odd, or no parity
- X1, X16, X32, or X64 clock modes
- Break generation and detection
- Parity, overrun, and framing error detection

Optional generation of a vectored interrupt:

- the state of an SIO modem control input changes
- the transmit buffer is empty
- a receive character is available
- a special receive condition occurs for: parity error, Rx overrun error, CRC/Framing error, End of Frame (HDLC)

Z-80A COUNTER TIMER CHIP CHARACTERISTICS

Channels: Four independently programmed channels used for programmable general-purpose system timer, and baud rate generator for SIO channel A. Baud rate limits are:

- Asynchronous: max 57.6K, min 50 baud
- Synchronous: max 460.8K, min 50 baud
- Synchronous External: max 736K baud

Note that the speed of transmission depends on and may be limited by the type of firmware protocol implemented.

Modes: Operates in Counter or Timer mode.

Interrupt: On the zero count condition (each channel has its own interrupt vector).

Restart: Automatically restarts the last operation in either mode.

Output: Gives the Z-80A CPU the number of counts to go until a zero count condition.

COMMUNICATIONS INTERFACE CHARACTERISTICS

Number of input lines: Eight input lines with balanced or unbalanced receivers.

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers.

ELECTRICAL CHARACTERISTICS

Card power consumption:	+5V	720mA typical
	+12V	37mA typical
	-12V	60mA typical

Accessory power consumption (supplied by Series 200 computer)

	+5V typical	+12V typical	-12V typical
HP 13264A Data Link Adapter	200mA	90mA	80mA
HP 13265A 300 Baud Modem	100mA	45mA	45mA
HP 13266A Current Loop Pod	30mA	160mA	23mA

If these pods are used, care must be taken not to exceed the power specifications of the Series 200 I/O backplane.

Support Policy

Because the PDI card is a customizable system, the customer must assume responsibility for its support. Consequently, there is no Service Contract applicable to the PDI product. If the PDI product develops problems, it will be the responsibility of the customer to diagnose and replace both its hardware and firmware. The self-test source listing in the PDI Development Package (98690A) is provided as a tool to be used at the discretion of the customer. Customers must be prepared to develop their own support strategy for the PDI card. It is suggested the customer maintain spare cards which can be swapped by the customer if a problem arises in the field.

Ordering Information

Note: It is strongly recommended that purchase of either the 98691A for program development be done jointly with the purchase of the 98690A PDI Firmware Development Package.

Earliest Language Versions Required: BASIC 2.0, PASCAL 1.0, or user-written driver.

HP 98690A DEVELOPMENT PACKAGE

The 98690A includes:

09826-66544 PC Extender
5061-4247 Test Connector
5061-4248 Test Connector
98628-90001 Installation Manual
98690-90001 Firmware Development Guide

98690A Options

630: PDI Document Package on 3-1/2" floppy
650: PDI Document Package on 5-1/4" floppy
for external drive
655: PDI Document Package on 5-1/4" floppy
for internal drive

HP 98691A PROGRAMMABLE SERIAL I/F CARD

The 98691A includes:

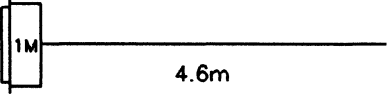
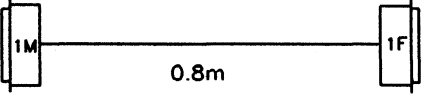
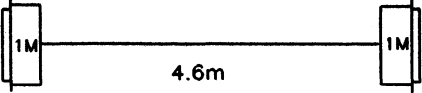
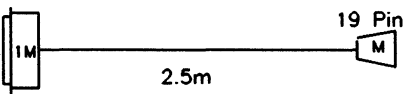
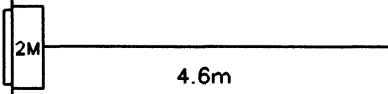
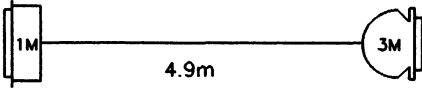
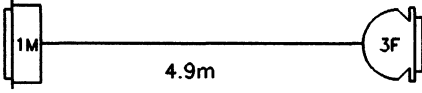
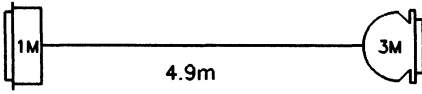
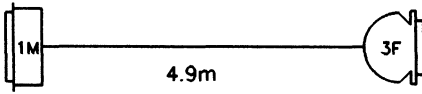
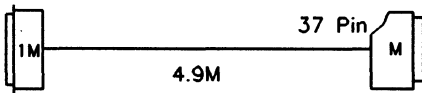
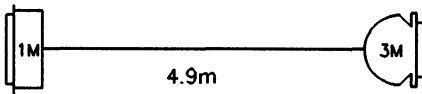
98691-66501 PDI Interface
98628-90001 Installation Manual

98691A Options

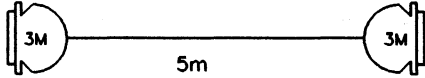
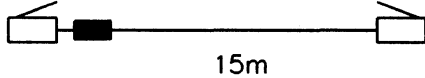
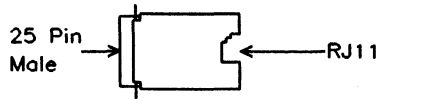
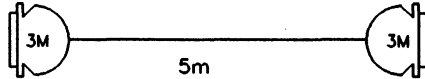
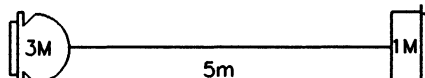
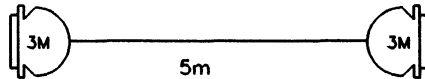
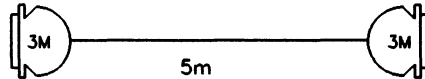
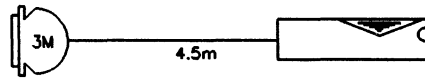
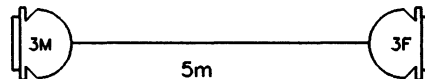
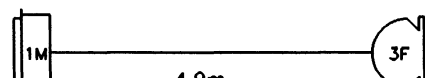
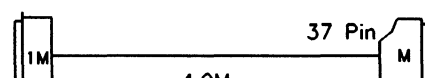
001: 4.9 meter (16 ft) RS-232-C DTE (male)
cable (5061-4215) with test connector
(1251-6625)
002: 4.9 meter (16 ft) RS-232-C DCE (female)
cable (5061-4216) with test connector
(1251-6624)
003: 4.9 meter (16 ft) RS-449/423 DTE (male)
cable (5061-4250) with test connector
(5061-4220)

Fuse for replacement/spare: 2110-0712

HP 9000 Series 200/300 Cable Matrix

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
98622A #001	5061-4209	Unterminated	
98622A #002	5061-4211	Terminated for 9885M Floppy Disc	
98622A #003	98622-66503	Terminated for 6940B Multiprogrammer	
98622A #004	5061-4212	Terminated for 9866B Printer	
98623A #001	5061-4217	Unterminated	
98626A #001	5061-4215	RS-232 Male DTE (Modem)	
98626A #002	5061-4216	RS-232 Female DCE (Direct Connect)	
98628A #001	5061-4215	RS-232 Male DTE (Modem)	
98628A #002	5061-4216	RS-232 Female DCE (Direct Connect)	
98628A #003	5061-4250	RS-449/423 Male DTE	
98641A	5061-4215	RS-232 Male DTE (Modem)	

HP 9000 Series 200/300 Cable Matrix (continued)

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
98642A	98642-66506 (*92219S)	RS-232 Modem Cable	
	98642-66505 (*92219T)	Direct Connect Cable (Phone Cable with RJ-11 Connectors)	
	98642-66508 (*92219U)	RJ-11/RS-232 25 Pin Male Connector Adapter	
	98642-66507 (*92219R)	RS-232 Direct Connect Cable	
98644A	*13222Y	RS-232 Direct Connect for 262X Terminals	
	*13242G	RS-232 Direct Connect for Terminals & Printers	
	*13242N	RS-232 Modem Cable	
	*13232Y	RS-232 Direct Connect for 264X Terminals	
	*13242H	RS-232 Direct Connect	
	98691A #001	5061-4215	RS-232 Male DTE (Modem)
5061-4216		RS-232 Female DCE (Direct Connect)	
5061-4250		RS-449/423 Male DTE	

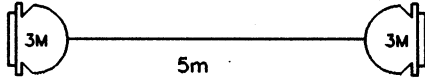
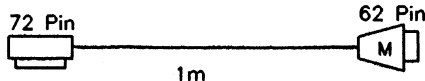
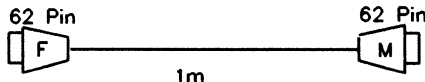
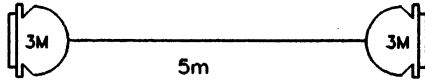
**Recommended Cables from Direct Marketing Division*

HP 9000 Series 500 Cable Matrix

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
27110B	27110-63001	HP-IB Cable	
27112A	27112-63002	Unterminated Cable	
27112A #001	27112-63003	Terminated for 9885M or 97060A	
27122A	27122-63001	RS-232 Male DTE (Modem)	
27123A	27123-63002	Cable for 98028A SRM Multiplexer via a 97061 - Series Cable	
27128A	27128-63002	RS-232 Female DCE (Direct Connect)	
27128A #001	27122-63001	RS-232 Male DTE (Modem)	
27130B	28658-63001	MUX to Panel Cable	
27140A	*13242M	Direct Connect to RS-232 Peripherals	
	*13242N	Direct Connect to RS-232 Peripherals	
	*13242Y	Direct Connect to RS-232 Peripherals	

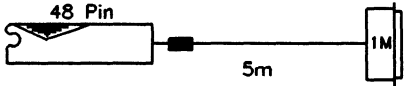
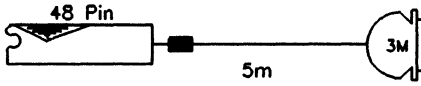
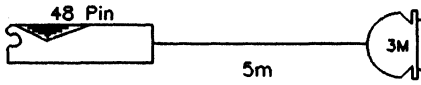
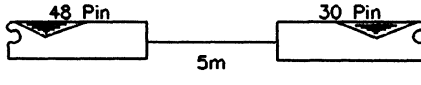
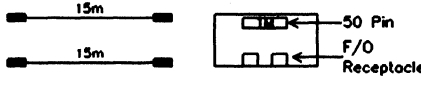
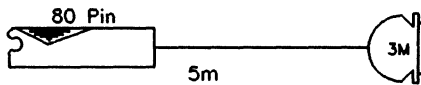
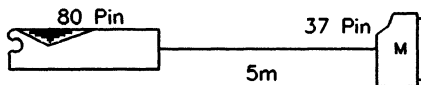


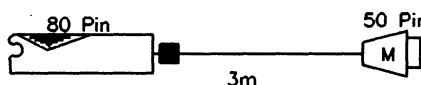
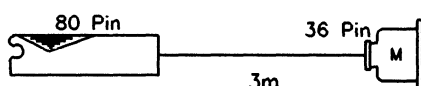
**Recommended Cables from Direct Marketing Division*

HP 9000 Series 500 Cable Matrix (continued)

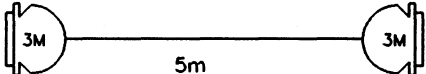
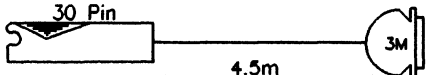
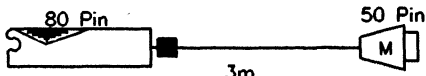
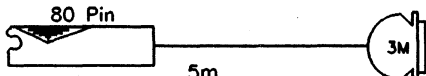
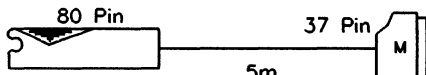
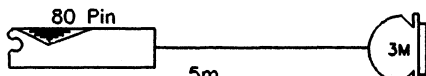
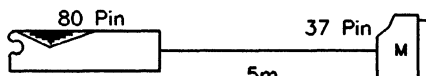
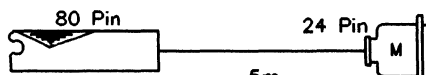
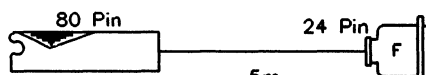
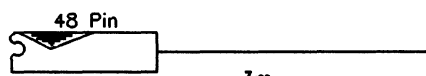

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
	*92219G	Direct Connect to RS-232 Peripherals	
27140A	28659-63002	MUX to Panel Cable	
27140A #001	28659-63004	Adds Extender Cable	
13242M/N/Y & 92219G recom- mended for Direct Connect	*92219Q	Connection to RS-232 Modems	

**Recommended Cables from Direct Marketing Division*

HP 1000 A-Series Cable Matrix

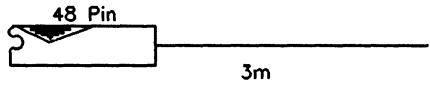
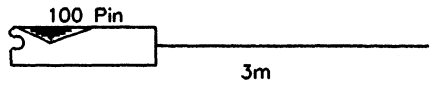
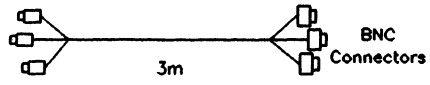
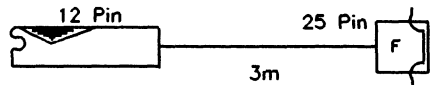
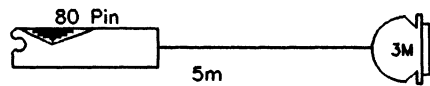
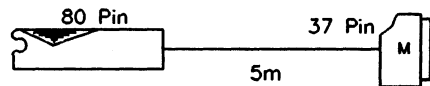
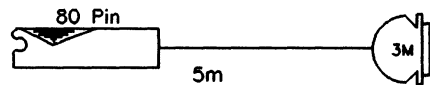
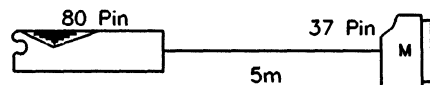
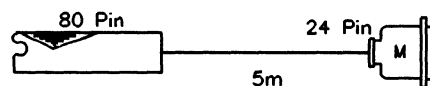
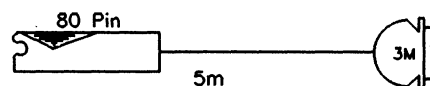
PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12005B #001	5061-6604	RS-232 Direct Connect for 262X Terminals	
12005B #002	5061-6605	RS-232 Direct Connect Cable	
12005B #003	12005-60004	RS-232 Modem Cable	
12005B #004	12005-60005	RS-232 Direct Connect for 264X Terminals	
12005B #005	5061-5798 5061-5800	Fiber Optic (F/O) Cable Fiber Optic/RS-232 Adapter	
12007B	5061-4914	RS-232 Modem Cable	
12007B #002	4061-4923	RS-449 Modem Cable	
12009A	12009-60014	HP-IB RFI Filter Cable	
12009A #001	12009-60015	HP-IB RFI Filter Cable	
12040C	28658-63005	MUX to Panel Cable	
12040C #002	12828-60002	37214A Modem Panel Cable	

HP 1000 A-Series Cable Matrix (continued)

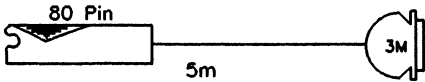
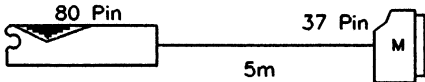
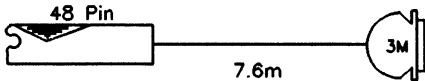
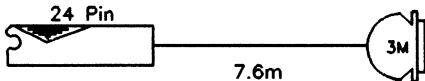
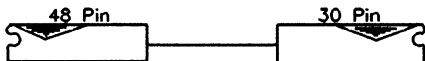
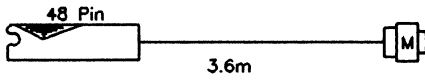
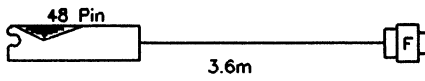
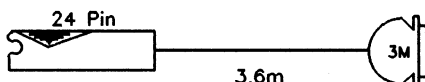
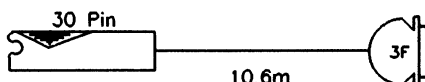

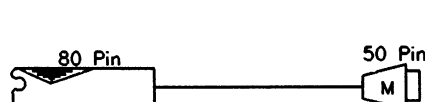
PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12040C	*13242N	RS-232 Direct Connect to Terminals	
	*13232Y	RS-232 Direct Connect for 264X Terminals	
12041B	28658-63005	MUX to Panel Cable	
12042B	5061-4914	RS-232 Modem Cable	
12042B #001	5061-4923	RS-449 Modem Cable	
12043A	5061-4914	RS-232 Modem Cable	
12043A #001	5061-4923	RS-449 Modem Cable	
12044A	5061-3422	RS-232 Direct Connect Cable	
	5061-4908	RS-232 Direct Connect Cable	
12060BC	---	Unterminated with 8 Individually Shielded Twisted Pair	
12061AC	---	Unterminated with 32 Individually Shielded Twisted Pair	

**Recommended Cables from Direct Marketing Division*

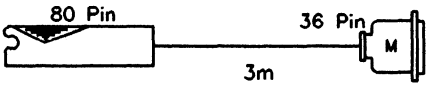
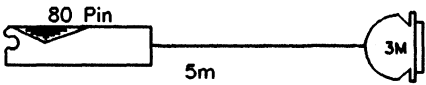
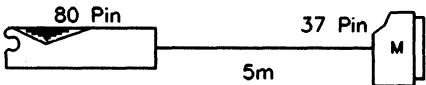
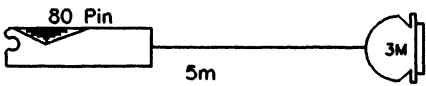
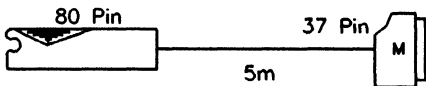
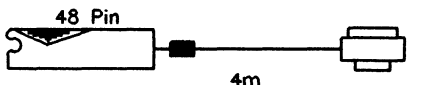
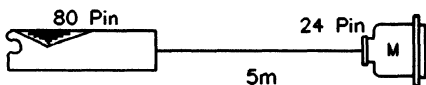
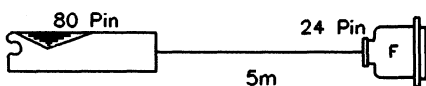
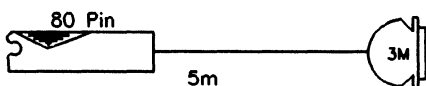
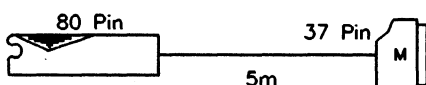
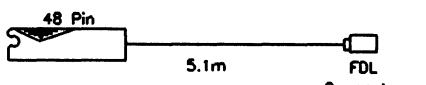
HP 1000 A-Series Cable Matrix (continued)

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12062AC	---	Unterminated with 9 Individually Shielded Twisted Pair	
12063AC	---	Unterminated with 32 Individually Shielded Twisted Pair	
12065A	12065-63001	BNC Video Output Cables	
12065A #001	12065-63002	Adds RS-232 Cable for Graphics Input	
12072A	5061-4914	RS-232 Modem Cable	
12072A #002	5061-4923	RS-449 Modem Cable	
12075A	5061-4914	RS-232 Modem Cable	
12075A #002	5061-4923	RS-449 Modem Cable	
12082A	5061-3422	RS-232 Direct Connect Cable	
12092A	5061-4914	RS-232 Modem Cable	

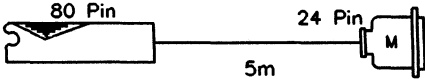
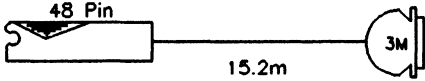
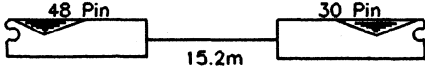
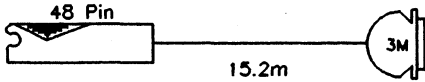
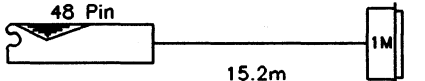
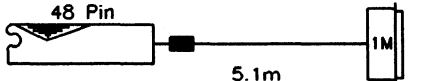
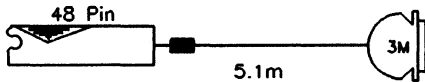
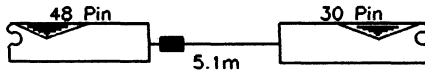
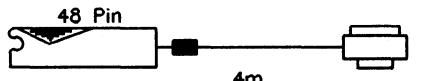
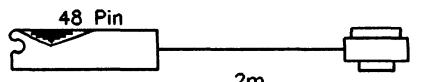
HP 1000 M/E/F-Series Cable Matrix

PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12250A	5061-4914	RS-232 Modem Cable	
12250A #002	5061-4923	RS-449 Modem Cable	
12531D #001	12531-60026	EIA Terminal Cable	
12531D #002	12531-60024	Data Set Cable	
12531D #004	13232B	264X Terminals	
12771A	12665-60002	Serial Interface	
	12665-60003	Serial Interface	
12773A	12773-60002	Modem Cable	
12790A	5061-1393	Hardwire Connection to first 13232P cable on Multi-point Terminal	
12790A #001	5061-1391	Modem Cable	
12792C	28658-63005	MUX to Panel Cable	

HP 1000 M/E/F-Series Cable Matrix (continued)


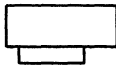

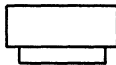

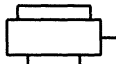

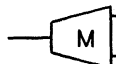

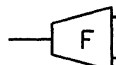



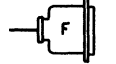

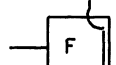

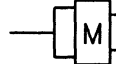


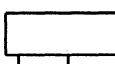
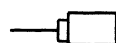
PRODUCT/ OPTION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12792C #002	12828-60002	37214A Modem Panel Cable	
12793B	5061-4914	RS-232 Modem Cable	
12793B #002	5061-4923	RS-449 Modem Cable	
12794B	5061-4914	RS-232 Modem Cable	
12794B #002	5061-4923	RS-449 Modem Cable	
12821A	59310-60008	RFI Filtered HP-IB Cable	
12825A	5061-3422	RS-232 Direct Connect Cable	
	5061-4908	RS-232 Direct Connect Cable	
12826B	5061-4914	RS-232 Modem Cable	
12826B #001	5061-4923	RS-449 Modem Cable	
12830A	5061-4903	Data Link Cable	

HP 1000 M/E/F-Series Cable Matrix (continued)

PRODUCT/ OPRION	HP PART NUMBER	DESCRIPTION	DIAGRAM
12834A	5061-3422	RS-232 Direct Connect Cable	
12966A	12966-60004	RS-232 Direct Connect Cable	
12966A #001	12966-60008	RS-232 Direct Connect for 264X Terminals	
12966A #002	12966-60006	RS-232 Modem Cable	
12966A #005	12966-60010	RS-232 Direct Connect for 264X Terminals	
12966A #105	12966-60014	RFI Filtered RS-232 Direct Connect for 262X Terminals	
12966A #106	12966-60015	RFI Filtered RS-232 Direct Connect Cable	
19666A #107	12966-60016	RFI Filtered RS-232 Direct Connect Cable	
59310B	59310-60008	RFI Filtered HP-IB Cable	
59310B #001	59310-60006	HP-IB Cable	

NOTE: 12966A Options 105, 106 and 107 contain jumpers which force the interface to operate at 9600 baud; they are required when used with HP systems to meet EMI compatibility requirements.

Connector Diagram Legend

DIAGRAM	DESCRIPTION	DIAGRAM	DESCRIPTION
	50-pin Male Connector		50-pin CIO Connector
	50-pin Female Connector		72-pin CIO Connector
	19-pin Male Connector		HP-IB Connector
	64-pin Male Connector		50-pin or 62-pin Male Connector
	25-pin Male Connector		62-pin Female Connector
	25-pin Female Connector		24-pin or 36-pin Male Connector
	37-pin Male Connector		24-pin Female Connector
	RJ-11 Connector		25-pin Female Connector
	RJ-11/RS-232 25-pin Male Connector Adapter		6-pin Male Connector
	PC Edge Connector		6-pin Female Connector
	26-pin CIO Connector		FDL connector

Reader Comment Sheet

HP 1000/9000 INTERFACE PRODUCTS Specification Guide

5954-6312 August 1985

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Is this specification guide technically accurate? Yes No

Are the concepts and wording easy to understand? Yes No

Is the format of this guide convenient in size, arrangement, and readability? Yes No

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