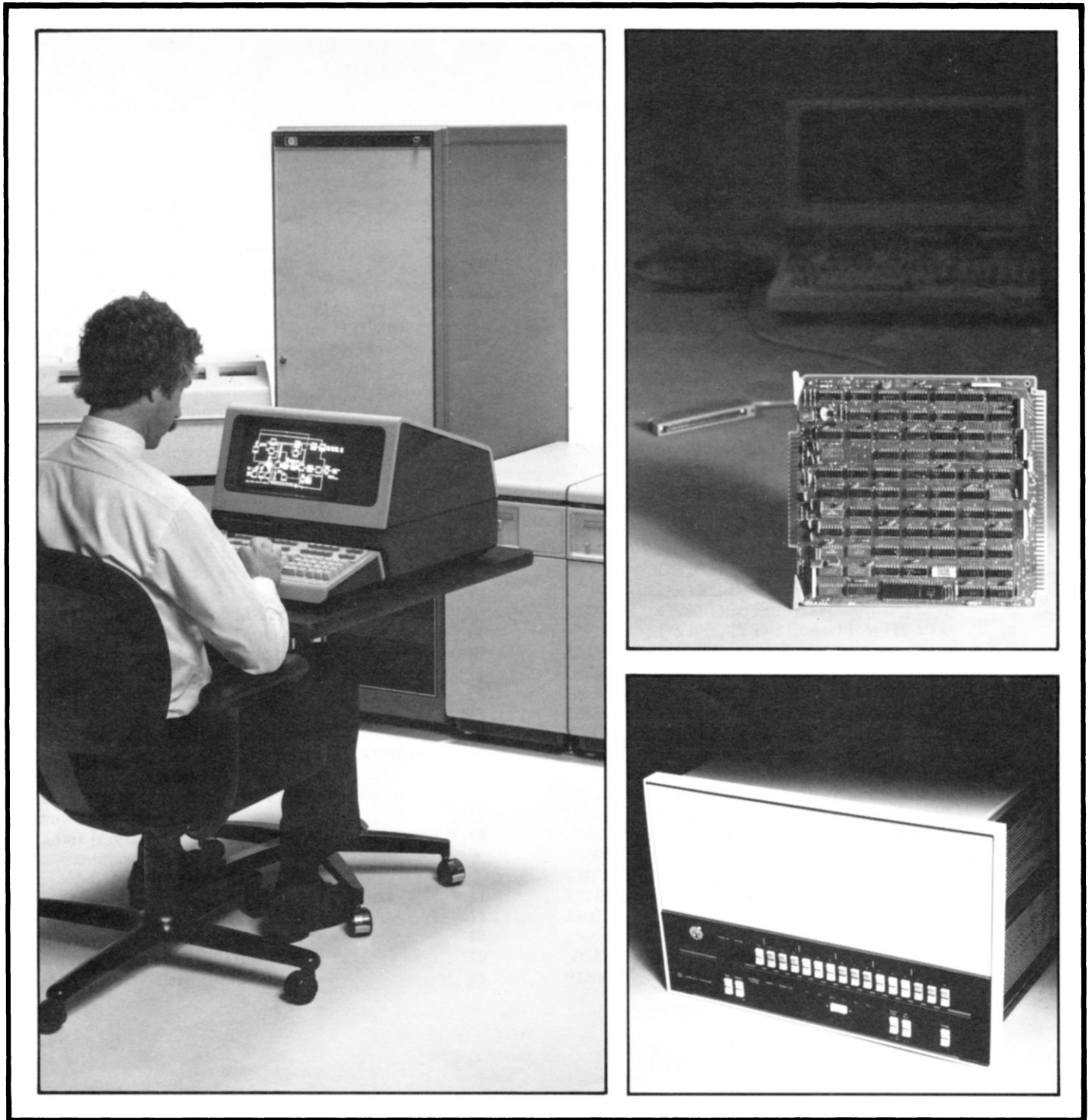


HP 1000 Computer Systems



HP 1000 M/E/F-Series Computer Interfaces Technical Data



HP 1000 M/E/F-Series Systems

This booklet provides data on the interfaces that are available for use in HP 1000 M/E/F-Series Computer Systems in compact tabular summary form. For convenience in locating needed data, separate summary tables are provided for communications interfaces (Table 1), peripheral and general-purpose interfaces (Table 2), and mature interfaces (Table 3), which continue to be offered

for the convenience of customers who are using them in current applications, but which are not recommended for new applications. For further convenience in locating needed data, Tables 1 and 2 are divided into several different bold-headlined subsections. In addition, the interfaces and related accessories can be located by the alphabetical and product number indexes below.

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Active Communications Interfaces

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
RECOMMENDED TERMINAL INTERFACES AND ACCESSORIES		
<p>12966A</p> <p>Buffered Async Communications Interface. Interface is software supported by RTE drivers DVR05 (direct connect only) and DVA05 (modem or direct connect) for use with 2382A and 26xx terminals. DVR05 and DVA05 are furnished in active RTE operating systems for M/E/F-Series computers. The 12966A product includes:</p> <ol style="list-style-type: none"> 1. 12966-60001 interface card. 2. 12966-60003 test connector. 3. 12966-60004 15.2m (50ft) standard EIA terminal cable. 4. 12966-90001 interface manual. <p>-001 12966-60008 15.2m (50ft) cable to 264x or 2635B+051 terminal instead of std cable.</p> <p>-002 12966-60006 15.2m (50ft) cable to data set instead of std cable.</p> <p>-003 12966-60007 7.6m (25ft) cable to teleprinter instead of std cable.</p> <p>-004 12966-60011 15.2m (50ft) cable to 7221x Graphic Plotter and 12966-60012 1.5m (5ft) cable from 7221x to 264x or 2635B+051 terminal instead of std cable.</p> <p>-005 12966-60010 15.2m (50ft) cable to 262x terminal* (port 1) instead of 12966-60004 cable.</p>		<p>Interface level: EIA RS-232-C or CCITT V.24.</p> <p>Jumper and program-selectable baud rates with internal clock: 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, and 9600 bits/sec.</p> <p>Maximum baud rate with external clock: 9600 bits/sec.</p> <p>Programmable character size: 5, 6, 7, or 8 bits.</p> <p>Programmable stop bit selection: 1, 1-1/2, or 2 stop bits.</p> <p>Programmable parity generation and checking: No parity, even, or odd.</p> <p>Character buffering: 128 characters.</p> <p>Special character memory: 256 characters for special character recognition/interrupt capability.</p> <p>Modem compatibility: Interface and supporting DVA05 driver are compatible with Bell type 103 data sets and Vadic VA3400 1200 bps modem.</p> <p>* 2621B (or 2629L OEM) Terminal requires 12966A Opt. 002 and 40242Z cables and restrapping in the 12966A Opt. 002 cable hood to select the baud rate. 2622A, 2623A, 2624B, or 2629E/F/G Terminal requires restrapping of 12966A Opt. 005 cable in the interface connector hood to set desired baud rate.</p>
<p>12792A</p>	<p>8-Channel Async Multiplexer. Interface is software supported by RTE drivers PVM00, DVM00, DDV05, and DDV12 for HP 2382A and 26xx terminals. The RTE drivers are furnished in active RTE operating systems for M/E/F-Series computers. The 12792A product includes:</p> <ol style="list-style-type: none"> 1. 5061-3415 interface card. 2. 12792-80002 multiplexer firmware ROM. 3. 5061-3467 80-pin connector kit. 4. 12792-90001 interface manual. 5. 12792-90002 multiplexer user's manual. 6. 12792-90003 multiplexer configuration guide. 	<p>Capacity: Eight full-duplex communications channels.</p> <p>Buffering: Two 254 byte transmit buffers and two 254 byte receive buffers for each channel.</p> <p>Interface level: EIA RS-423-A/RS-232-C and CCITT V.24.</p> <p>Program-selectable data rates: 50, 75, 110, 134.5, 150, 300, 1200, 1800, 2400, 3600, 9600, and 19200 bits/second.</p> <p>Aggregate throughput capacity: 7,680 char/sec per interface (8 channels at 960 char/second).</p> <p>Communication mode: Asynchronous, bit-serial.</p> <p>Other programmable communications parameters: character length from 5 to 8 bits, start, stop, and parity.</p> <p>Maximum multiplexer to terminal cable length: 91 metres (300ft) via user-fabricated cabling, HP Part No. 8120-3072 (Belden type NBR-9519) to individual terminals or via 12828-60003 Connector Kit and up to 91 metres (300ft) of user-fabricated cabling (same type as above) to 12828A Multiplexer Panel, thence via individual cables to terminals.</p> <p>Modem support: Modem connection via the 12792A Multiplexer is passive; the 12792A interface does not support modem control.</p> <p>Accessory connector panel: 12828A RS-232-C Multiplexer Panel is recommended for use with the 12792A interface.</p>

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)																																												
MULTIPOINT AND DS/1000-IV DATA LINK INTERFACES (continued)																																														
		<p>Compatible modems for multipoint daisy-chain lines:</p> <table border="1"> <thead> <tr> <th>Dial-up Line Modems</th> <th>Leased or Private Line Modems</th> <th>Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td>Bell 202T & 212A</td> <td></td> <td>1200 bits/sec</td> </tr> <tr> <td>Vadic V3400</td> <td></td> <td>1200 bits/sec</td> </tr> <tr> <td></td> <td>Bell 202T</td> <td>1800 bits/sec</td> </tr> <tr> <td>Bell 201A3</td> <td>Bell 201A3</td> <td>2000 bits/sec</td> </tr> <tr> <td>Bell 208B</td> <td>Bell 208A</td> <td>4800 bits/sec</td> </tr> <tr> <td></td> <td>Bell 209A</td> <td>9600 bits/sec</td> </tr> <tr> <td></td> <td>HP 37230A</td> <td>9600 bits/sec*</td> </tr> </tbody> </table> <p>* Limited by maximum speed of multipoint lines.</p> <p>Compatible modems for multidrop Data Link:</p> <table border="1"> <thead> <tr> <th>Modem</th> <th>Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td>Bell 202T, 212A</td> <td>1200 bits/sec</td> </tr> <tr> <td>Vadic VA3400</td> <td>1200 bits/sec</td> </tr> <tr> <td>Gandalf LDS 120</td> <td>9600 bits/sec</td> </tr> </tbody> </table> <p>Number of interfaces per RTE system: Depends upon computer and data rate, as follows:</p> <table border="1"> <thead> <tr> <th>Computer</th> <th>Data Rate</th> <th>Number of Interfaces</th> </tr> </thead> <tbody> <tr> <td>M/E/F-Series</td> <td>9600 bits/sec</td> <td>8</td> </tr> <tr> <td>E/F-Series</td> <td>19200 bits/sec (Data Link)</td> <td>4</td> </tr> <tr> <td>M-Series</td> <td>19200 bits/sec (Data Link)</td> <td>1</td> </tr> </tbody> </table> <p>Device connect cables:</p> <ul style="list-style-type: none"> 13232P 4.5m (15ft) multipoint cable to first 264x or 307x terminal 13232Q 4.5m (15ft) cable for continuation of multipoint line to additional 264x or 307x terminal 13232R 30.4m (100ft) multipoint extension cable 13232T 9m (30ft) power protect multipoint cable providing continuity around a "down" 264x terminal 13232U 1.5m (5ft) modem bypass cable for connection between 12790A+001 cable and 13232P cable or 13267A multipoint interface 13267A Async multipoint interface to first 262x terminal with 10m (32.8ft) cable 13268A Async multipoint interface to additional 262x terminal with 10m (32.8ft) cable -001 Sync multipoint interface instead of async 	Dial-up Line Modems	Leased or Private Line Modems	Max. Data Rate	Bell 202T & 212A		1200 bits/sec	Vadic V3400		1200 bits/sec		Bell 202T	1800 bits/sec	Bell 201A3	Bell 201A3	2000 bits/sec	Bell 208B	Bell 208A	4800 bits/sec		Bell 209A	9600 bits/sec		HP 37230A	9600 bits/sec*	Modem	Max. Data Rate	Bell 202T, 212A	1200 bits/sec	Vadic VA3400	1200 bits/sec	Gandalf LDS 120	9600 bits/sec	Computer	Data Rate	Number of Interfaces	M/E/F-Series	9600 bits/sec	8	E/F-Series	19200 bits/sec (Data Link)	4	M-Series	19200 bits/sec (Data Link)	1
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M-Series	19200 bits/sec (Data Link)	1																																												
<p>12830A</p> <p>-001</p>	<p>Data Link Slave Interface for DS/1000-IV network communication. Interface is software supported in RTE-6/VM and RTE-IVB/IVE systems by 91750A DS/1000-IV Network software. The product includes:</p> <ol style="list-style-type: none"> 1. 5060-4902 interface card. 2. 5061-1957 ROM and 1818-1114 RAM. 3. 5061-4903 5m (16.4ft) cable to Data Link connection box. 4. 5061-4909 diagnostic hood. 5. 12830-13301 diagnostic software on 264x Mini cartridges. 6. 12830-90001 interface manual. <p>Provides the latest Data Link ROM (deletes other parts of interface).</p>	<p>Counterpart master interface: 12790A Multipoint Interface, connected via 12790A option 001 cable and 3074A Data Link Adapter or via 12790A option 001 cable, modems, telephone line and 3074M Data Link Adapter.</p> <p>Internally-clocked, programmable data rates: 300, 600, 1200, 2400, 4800, 9600, and 19200 bits/sec.</p> <p>Externally-clocked data rates: Up to 2400 bits/sec.</p> <p>Transmission mode: Bit-serial, asynchronous, half-duplex.</p> <p>Error control: CRC-16 cyclic redundancy error checking of blocks sent and received, correction by retransmission of block with error to attain error-free data transfer.</p>																																												

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)																		
DS/1000-IV POINT-TO-POINT INTERFACES TO HP 1000 SYSTEMS																				
<p>12794B</p> <p>-001</p> <p>-002</p>	<p>DS/1000-IV Modem Interface to HP 1000 Systems. Interface is software supported for HP 1000 communications from RTE-6/VM or RTE-IVB/IVE based HP 1000 systems by 91750A Network software. The 12794B product includes:</p> <ol style="list-style-type: none"> 5061-4913 interface card. 91750-80008 and 80009 HDLC firmware ROMs. 5061-4914 5m (16ft) RS-232-C modem cable. 5061-3425 RS-232-C loop-back verifier hood. 12826-91001 interface manual. 5955-7626 HDLC firmware manual. <p>Set of latest firmware ROMs (deletes other parts of the interface).</p> <p>5061-4923 5m (16ft) RS-449 modem cable and 5061-3441 RS-449 loop-back verifier hood instead of 5061-4914 cable and 5061-3425 verifier hood.</p>	<p>Interface level: EIA RS-232-C and EIA RS-449.</p> <p>Transmission mode: Full-duplex, bit-serial synchronous via full-duplex modems and telephone lines.</p> <p>Internally-clocked, programmable data rates: 300, 1200, 2400, 4800, 9600, 19200, 57600, and 230000 bits/sec.</p> <p>Externally-clocked data rates: Up to 230000 bits/sec.</p> <p>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.</p> <p>Error detection: CRC-16 cyclic redundancy error checking of frames sent and received.</p> <p>Error correction: User-specified number of retransmissions to attain error-free data transfer (default is 10).</p> <p>Line protocol: The 12794B interface implements 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 under DS/1000-IV.</p> <p>Counterpart interfaces in remote HP 1000 Systems: 12007A/B in HP 1000 A/L-Series, 12794A/B in HP 1000 M/E/F-Series.</p> <p>Compatible modems:</p> <table border="1" data-bbox="812 1176 1429 1354"> <thead> <tr> <th>Dial-Up Line Modems</th> <th>Leased or Private Line Modems</th> <th>Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td>Bell 212A</td> <td></td> <td>1200 bits/sec</td> </tr> <tr> <td>GDC 212A</td> <td></td> <td>1200 bits/sec</td> </tr> <tr> <td></td> <td>Bell 201C</td> <td>2400 bits/sec</td> </tr> <tr> <td></td> <td>Bell 208A</td> <td>4800 bits/sec</td> </tr> <tr> <td></td> <td>Bell 209A</td> <td>9600 bits/sec</td> </tr> </tbody> </table>	Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate	Bell 212A		1200 bits/sec	GDC 212A		1200 bits/sec		Bell 201C	2400 bits/sec		Bell 208A	4800 bits/sec		Bell 209A	9600 bits/sec
Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate																		
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	Bell 208A	4800 bits/sec																		
	Bell 209A	9600 bits/sec																		
<p>12825A</p> <p>-001</p>	<p>DS/1000-IV Direct Connect Interface to HP 1000 Systems. Interface is software supported for HP 1000 communications from RTE-6/VM or RTE-IVB/IVE based HP 1000 Systems by 91750A DS/1000-IV Network software. The 12825A product includes:</p> <ol style="list-style-type: none"> 5061-3432 interface card. 91750-80008 and 80009 HDLC firmware ROMs. 5061-3422 and 4908. Two 5m (16ft) direct connect cables, one to a male connector, the other to a female connector. Together these two cables provide a complete link between local and remote HDLC direct connect interfaces. Extension cables (available through options 003 through 005) may also be required for longer distances. Two 5061-3421 loop-back verifier hoods. 12826-91002 interface manual. 5955-7626 HDLC firmware manual. <p>Set of latest firmware ROMs (deletes other parts of the interface).</p>	<p>Interface level: EIA RS-232-C and EIA RS-449.</p> <p>Transmission mode: Full-duplex, bit-serial synchronous.</p> <p>Usable data rates vs direct connect cable length:</p> <table border="1" data-bbox="812 1512 1299 1617"> <thead> <tr> <th>Data Rate To</th> <th>Cable Length To</th> </tr> </thead> <tbody> <tr> <td>230,000 bits/sec</td> <td>1km/0.6214mi/3281ft</td> </tr> <tr> <td>57,600 bits/sec</td> <td>2.2km/1.367mi/7218ft</td> </tr> </tbody> </table> <p>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.</p> <p>Error detection: CRC-16 cyclic redundancy checking of frames sent and received.</p> <p>Error correction: By retransmission of frames in error up to user-specified number of retransmissions (default is 10).</p>	Data Rate To	Cable Length To	230,000 bits/sec	1km/0.6214mi/3281ft	57,600 bits/sec	2.2km/1.367mi/7218ft												
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Active Communications Interfaces

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)															
DS/1000-IV POINT-TO-POINT INTERFACES TO HP 1000 SYSTEMS (continued)																	
<p>-002</p> <p>91712A</p> <p>91713A</p> <p>-001</p> <p>91714A</p>	<p>Deletes cables, verifier hoods, and manual from 12825A that will be second HP 1000 interface in a direct connect link.</p> <p>Direct connect extension accessories:</p> <p>Assembled 75m (255ft) ext cable.</p> <p>Pair of cable connectors for 12825A Direct connect cable.</p> <p>Pair of edge connectors for 12825A/12044A interface instead of 12825A cable connectors.</p> <p>300m (1020ft) cable kit with connectors for user-fabricated ext cable.</p>	<p>Line protocol: The 12825A interface implements 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 under DS/1000-IV.</p> <p>Counterpart interfaces in remote HP 1000 Systems: 12044A in HP 1000 A/L-Series, 12825A in HP 1000 M/E/F-Series.</p> <p>Direct connect limitations: The 12825A interface has optical and transformer isolation to maximize noise immunity for direct connect links. This isolation is usable only for intra-building communication. Because its isolation is not designed to survive a lightning strike, the 12825A interface is not recommended or warranted for connections between buildings.</p>															
DS/1000-IV POINT-TO-POINT INTERFACES TO HP 3000 SYSTEMS																	
<p>12793B</p> <p>-001</p> <p>-002</p>	<p>DS/1000-IV Modem Interface to HP 3000 Systems. Interface is software supported for HP 3000 communications from RTE-6/VM or RTE-IVB/IVE based HP 1000 Systems by 91750A DS/1000-IV Network software. The 12793B product includes:</p> <ol style="list-style-type: none"> 1. 5061-4913 interface card. 2. 91750-80010 and 80011 Bisync firmware ROMs. 3. 5061-4914 5m (16ft) RS-232-C modem cable. 4. 5061-3453 diagnostic test hood. 5. 12826-91001 interface manual. 6. 5955-7627 Bisync firmware manual. <p>Set of latest firmware ROMs (deletes other parts of the interface).</p> <p>5061-4923 5m (16ft) RS-449 modem cable instead of 5061-4914 RS-232-C modem cable.</p>	<p>Interface level: EIA RS-232-C and EIA RS-449.</p> <p>Transmission mode: Bit-serial synchronous half duplex, via half-duplex or full duplex modems and telephone lines.</p> <p>Internally-clocked, programmable data rates: 300, 1200, 2400, 4800, 9600, 19200, and 57600 bits/sec.</p> <p>Externally-clocked data rates: Up to 57600 bits/sec.</p> <p>Message buffering: A maximum of 6432 bytes in each direction (12864 bytes total) may be buffered using the 16k byte on-board RAM memory.</p> <p>Error control: CRC-16 cyclic redundancy error checking of blocks sent and received, correction by user-specified number of retransmissions up to 255 to attain error-free data transfer (default is 7).</p> <p>Line protocol: The 12793B interface implements an extended subset of the IBM Binary Synchronous Line protocol and is NOT a general-purpose Bisync interface. It should be used only for HP 1000-to-HP 3000 communications links in the HP-DSN environment.</p> <p>Counterpart interfaces in remote HP 3000 Systems: 30010A or 30055A in HP 3000 Series II/III, 30020B in HP 3000 Series 30/33/40/44/64.</p> <p>Compatible modems:</p> <table border="1" data-bbox="878 1612 1471 1759"> <thead> <tr> <th>Dial-Up Line Modems</th> <th>Leased or Private Line Modems</th> <th>Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td>Bell 201C</td> <td>Bell 201C</td> <td>2400 bits/sec</td> </tr> <tr> <td>Bell 208B</td> <td>Bell 208A</td> <td>4800 bits/sec</td> </tr> <tr> <td></td> <td>Bell 209A</td> <td>9600 bits/sec</td> </tr> <tr> <td></td> <td>HP 37230A</td> <td>19200 bits/sec</td> </tr> </tbody> </table>	Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate	Bell 201C	Bell 201C	2400 bits/sec	Bell 208B	Bell 208A	4800 bits/sec		Bell 209A	9600 bits/sec		HP 37230A	19200 bits/sec
Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate															
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Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
DS/1000-IV POINT-TO-POINT INTERFACES TO HP 3000 SYSTEMS (continued)		
<p>12834A</p> <p>-001</p> <p>91712A</p> <p>91713A</p> <p>-001</p> <p>91714A</p>	<p>DS/1000-IV Direct Connect Interface to HP 3000 Systems. Interface is software supported for HP 3000 communications from RTE-6/VM or RTE-IVB/IVE based HP 1000 Systems by 91750A DS/1000-IV Network software. The product includes:</p> <ol style="list-style-type: none"> 5061-3432 interface card. 91750-80010 and 80011 Bisync firmware ROMs. 5061-3422 5m (16ft) direct connect interface cable to a male connector. Extension cables (available through options 002 through 004) may be required. One 5061-3460 Programmable Serial Interface Diagnostic Test Hood. 12826-91002 interface manual. 5955-7627 Bisync firmware manual. <p>Set of latest firmware ROMs (deletes other parts of the interface).</p> <p>Direct connect extension accessories:</p> <p>Assembled 75m (255ft) ext cable.</p> <p>Pair of cable connectors for 12834A Direct connect cable.</p> <p>Pair of edge connectors for 12834A/12082A interface. instead of 12834A connectors.</p> <p>300m (1020ft) cable kit with connectors for user-fabricated ext cable.</p>	<p>Interface level: EIA RS-422.</p> <p>Transmission mode: bit-serial, synchronous, half-duplex.</p> <p>Internally-clocked, programmable data rates: 300, 1200, 2400, 4800, 9600, 19200, and 57600 bits/second.</p> <p>Message buffering: A maximum of 6432 bytes in each direction (12864 bytes total) may be buffered using the 16k byte on-board RAM memory.</p> <p>Error detection: CRC-16 cyclic redundancy checking of blocks sent and received.</p> <p>Error correction: User-specified number of retransmissions up to 255 to attain error free data transfer (default is 7).</p> <p>Line protocol: The 12834A interface implements an extended subset of the IBM Binary Synchronous Communications Line protocol and is NOT a general-purpose Binary Synchronous interface. It should not be used for other than HP 1000-to-HP 3000 communications in the HP-DSN environment.</p> <p>Counterpart interfaces in remote HP 3000 Systems: 30010A interface and 30222F cable in HP 3000 Series II/III, 30020B interface and 30222F cable in HP 3000 Series 30/33/40/44/64.</p> <p>Direct connect limitations: The 12834A interface has optical and transformer isolation to maximize noise immunity for direct connect links. This isolation is usable only for intra-building communication. Because its isolation is not designed to survive a lightning strike, the 12834A interface is not recommended or warranted for connections between buildings.</p>
X.25 COMMUNICATIONS INTERFACE		
<p>12250A</p> <p>-001</p> <p>-002</p>	<p>DSN/X.25 Network Interface. Provides Level-II, LAP-B Protocol. Software support for higher level user access in a packet switching network is provided by the 91751A DSN/X.25 Software Interface. High-level network communications are provided by 91750A DSN/DS software, which can operate with 91751A DSN/X.25 software. The 12250A (modem) interface includes:</p> <ol style="list-style-type: none"> 5061-4913 Interface Card. 5180-1958 and 1959 LAP-B Protocol Firmware ROMs. 5061-4914 5m (17ft) RS-232-C Modem cable. 5061-3425 RS-232-C loop-back verifier hood. 12826-91001 interface manual. 5955-7625 firmware manual. <p>Set of latest firmware ROMs (deletes other parts of the interface).</p> <p>5061-4923 5m (16ft) RS-449 modem cable instead of 5061-4914 RS-232-C modem cable.</p>	<p>Interface level: EIA RS-232-C, EIA RS-449, CCITT X.21 bis, V.24, V.28.</p> <p>Transmission mode: Bit-serial synchronous, via half-duplex or full-duplex modems and telephone lines.</p> <p>Internally-clocked, programmable data rates: 300, 1200, 2400, 4800, 9600, 19200, and 57600 bits/sec.</p> <p>Externally-clocked data rates: Up to 57600 bits/sec.</p> <p>Message buffering: 14k bytes is available for message buffering.</p> <p>Error detection: CCITT compatible CRC cycle redundancy checking of blocks sent and received.</p> <p>Error correction: Interface transmits or requests retransmission of all frames with errors to attain error-free data transfer. Maximum number of retransmission is user specified.</p> <p>Line protocol: The 12250A interface supports the internationally adopted full-duplex Link Access Protocol — Balanced (LAP-B) to maximize communications efficiency and reliability and provide access to X.25 Packet Switch Networks. The interface handles all LAP-B protocol generation, including CCITT compatible CRC error checking, on-board buffer management, and all modem control tasks.</p>

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)															
X.25 COMMUNICATIONS INTERFACE (continued)																	
		<p>Counterpart interfaces in remote HP Systems: 12075A in HP 1000 L-Series, 12250A in HP 1000 M/E/F-Series, 30010A in HP 3000 Series III, 30020A in HP 3000 Series 30/33/40/44, 30020B in HP 3000 Series 30/33/40/44/64. Note that all HP 3000 communications over X.25 packet switched networks use 32190A DSN/DS network software.</p> <p>Compatible modems: The 12250A interface is compatible with the modems listed below and with the standard RS-232-C compatible modems supplied by Transpac and Telenet at speeds to 19200 bits/sec.</p> <table border="1" data-bbox="922 743 1442 926"> <thead> <tr> <th>Dial-Up Line Modems</th> <th>Leased or Private Line Modems</th> <th>Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td>Bell 212A</td> <td></td> <td>1200 bits/sec</td> </tr> <tr> <td></td> <td>Bell 201C</td> <td>2400 bits/sec</td> </tr> <tr> <td></td> <td>Bell 208A</td> <td>4800 bits/sec</td> </tr> <tr> <td></td> <td>Bell 209A</td> <td>9600 bits/sec</td> </tr> </tbody> </table>	Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate	Bell 212A		1200 bits/sec		Bell 201C	2400 bits/sec		Bell 208A	4800 bits/sec		Bell 209A	9600 bits/sec
Dial-Up Line Modems	Leased or Private Line Modems	Max. Data Rate															
Bell 212A		1200 bits/sec															
	Bell 201C	2400 bits/sec															
	Bell 208A	4800 bits/sec															
	Bell 209A	9600 bits/sec															
PROGRAMMABLE SERIAL INTERFACE AND DEVELOPMENT PACKAGE																	
<p>12826B</p> <p>-001</p> <p>-002</p> <p>-003</p>	<p>Programmable Serial Interface. This is a user-customizable, microprocessor-based interface that sophisticated OEMs or End Users can use as a foundation for their own application oriented communications products. The 24602A Programmable Serial Interface Firmware Development Package (below) provides reference material to guide users in the task of creating their own firmware. The 12826B product includes:</p> <ol style="list-style-type: none"> 5061-4913 interface card. 5061-4914 5m (16ft) RS-232-C cable. 5061-3453 diagnostic test hood. 5180-1951 self-test PROM 12826-91001 interface manual. <p>5061-4923 5m (16ft) RS-449 cable instead of 5061-4914 RS-232-C cable.</p> <p>5061-3440 custom cable kit (edge connector only) instead of 5061-4914 cable.</p> <p>Delete self-test PROM and diagnostic hood.</p> <p>Support Policy: Because the 12826B interface is a customizable system, the customer must assume responsibility for its support. Consequently, there is no Service Contract applicable to the 12826B. Hewlett-Packard Customer Engineers will accept contracts for HP 1000 Systems containing the 12826B upon verification of the system by the responsible HP field office. However, the 12826B interface itself will not be diagnosed, repaired, or examined at the customer's site. If the 12826B product develops problems, it will be the customer's responsibility to diagnose and replace both its hardware and firmware.</p> <p>The self-test PROM is provided as a tool to be used at the discretion of the customer.</p>	<p>Transmission mode: Full or half duplex, bit-serial synchronous or asynchronous.</p> <p>Data buffering: Received data quadruple buffered, transmitted data double buffered.</p> <p>Synchronous features for character-oriented protocol:</p> <ul style="list-style-type: none"> One or two sync characters Automatic sync character insertion Cyclic Redundancy Check (CRC) generation and checking Received data overrun detection <p>Synchronous features for bit-oriented protocol:</p> <ul style="list-style-type: none"> 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 (CRC) generation and checking Valid receive message overrun detection <p>Asynchronous features:</p> <ul style="list-style-type: none"> 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 mode Break generation and detection Parity, overrun, and framing error detection <p>Optional generation of a vectored interrupt when:</p> <ul style="list-style-type: none"> 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 or framing error, or End of Frame <p>Classes of DMA operation: Transfer only, Search only, and Search and Transfer.</p>															

Table 1. HP 1000 M/EIF-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)								
PROGRAMMABLE SERIAL INTERFACE AND DEVELOPMENT PACKAGE (continued)										
	<p>Customers must be prepared to develop their own support strategy for the 12826B card. It is suggested that 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 12826B to assist customers in their support. Contact the responsible Hewlett-Packard Sales Representative for further information.</p>	<p>DMA operating modes: 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.</p> <p>DMA interrupts: On Match Found, End of Block, or Port Ready (each can be its own interrupt vector).</p> <p>DMA Address and Block Length Register Loading: Registers may be loaded for the next operation without disturbing current operation.</p> <p>DMA Operation Restart: Last operation can be restarted automatically on command.</p> <p>DMA Signalling: DMA can signal when a specified number of bytes have been transferred without disturbing the current system.</p> <p>DMA Status: CPU can read the current channel status, Read or Write address registers, or the Length register.</p> <p>Counter-Timer 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: 57.6k bits/sec, asynchronous; 460.8k bits/sec, internally clocked synchronous, and 810k bits/sec externally clocked synchronous.</p> <p>Counter-Timer Modes: Operates in counter or timer mode.</p> <p>Counter-Timer Interrupt: On zero count condition (each channel has its own interrupt vector).</p> <p>Counter-Timer Restart: Counter-timer automatically restarts the last operation in either mode.</p> <p>Counter-Timer Output: Gives the Z-80 CPU the number of counts to go until a zero count condition.</p> <p>Number of communications input lines: Six with balanced line receivers and eight with unbalanced receivers.</p> <p>Number of communications output lines: Four that can be driven by balanced or unbalanced line drivers, eight with unbalanced line drivers.</p> <p>Compatible Modems: The 12826B interface is compatible with the modems listed below and may be useful with other modems that are compatible with both the interface hardware and user-developed firmware. Compatibility with any modem is highly dependent on the firmware implemented on the interface.</p> <table data-bbox="906 1583 1390 1724"> <thead> <tr> <th data-bbox="906 1583 1081 1633">Leased or Private Line Modems</th> <th data-bbox="1230 1608 1390 1633">Max. Data Rate</th> </tr> </thead> <tbody> <tr> <td data-bbox="938 1646 1032 1671">Bell 201C</td> <td data-bbox="1247 1646 1373 1671">2400 bits/sec</td> </tr> <tr> <td data-bbox="938 1671 1049 1696">Bell 208A/B</td> <td data-bbox="1247 1671 1373 1696">4800 bits/sec</td> </tr> <tr> <td data-bbox="938 1696 1032 1722">Bell 209A</td> <td data-bbox="1247 1696 1373 1722">9600 bits/sec</td> </tr> </tbody> </table>	Leased or Private Line Modems	Max. Data Rate	Bell 201C	2400 bits/sec	Bell 208A/B	4800 bits/sec	Bell 209A	9600 bits/sec
Leased or Private Line Modems	Max. Data Rate									
Bell 201C	2400 bits/sec									
Bell 208A/B	4800 bits/sec									
Bell 209A	9600 bits/sec									

Active Communications Interfaces

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
PROGRAMMABLE SERIAL INTERFACE AND DEVELOPMENT PACKAGE (continued)		
<p>24602A</p> <p>-001</p>	<p>Programmable Serial Interface Firmware Development Package, consisting of:</p> <ol style="list-style-type: none"> 1. 24602-90001 firmware programming manual. 2. 24602-80001 Development Debug Monitor (DDM) EPROM. 3. 24602-60001 DDM accessory cable. <p>Deletes 24602-80001 DDM EPROM and 24602-60001 DDM Accessory Cable.</p>	<p>Purpose: Support of the development of firmware for the 12826B or 12042B Programmable Serial Interface (PSI) card.</p> <p>Development Debug Monitor capabilities:</p> <ol style="list-style-type: none"> 1. Loading of cross-assembled firmware program into the RAM memory of the PSI card. 2. Display and/or modification of memory locations. 3. Display and/or modification of registers. 4. Control of program flow by: <ol style="list-style-type: none"> a. Transferring control to firmware entry points. b. Setting and removing break points. c. Single-step simulation with trace. 5. Reading and writing through all I/O ports. 6. Creating ("punching") modified code into 264x Mini cartridge tape. 7. Help with information about the command set. <p>Prerequisite for DDM use: The self-test PROM normally provided with the PSI card.</p> <p>Hardware requirements for use of 24602A: HP 1000 computer and 12826B (for M/E/F-Series) or 12042B (for L-Series) PSI card, plus either:</p> <ol style="list-style-type: none"> 1. A microprogramming workstation, such as the HP 64000, or 2. Self Test for the 12826B or 12042B, a cross Assembler program to translate HP Assembly or higher level language code to Z-80 code (contact HP for list of available cross-assemblers), and one or more 264x terminals with Mini cartridge support. <p>User's expertise: User must be able to write, test, and debug Z-80 firmware as well as HP 1000 resident drivers and applications software. This requires substantial expertise in Z-80 and HP 1000 assembly programming, the RTE operating system at the driver and backplane level, and communication protocols.</p>
OTHER DATA COMMUNICATIONS INTERFACES		
<p>12531C</p> <p>-001</p> <p>-002</p>	<p>Teletypewriter Interface. Interface is software supported by RTE driver DVR00, which is furnished in active RTE operating systems for HP 1000 M/E/F-Series computers. The 12531C product includes:</p> <ol style="list-style-type: none"> 1. 12531-60022 interface card. 2. 12531-90033 interface manual. <p>Adds 12531-60021 7.6m (25ft) EIA terminal cable.</p> <p>Adds 12531-60024 7.6m (25ft) Data set cable.</p>	<p>Interface level: 20mA current loop or EIA RS-232-C and CCITT V.24.</p> <p>Jumper selectable baud rates with internal clock: 110, 220, 440, 880, and 1760 bits/sec.</p> <p>Character size, stop bits, and buffering: 8-bit character with one or two stop bits. The interface buffers one character at a time for transfer to/from the computer.</p> <p>Compatible modem: Bell type 103 or equiv. data set, manual only.</p>
<p>12531D</p> <p>-001</p> <p>-002</p> <p>-003</p>	<p>Terminal Interface. Interface is software supported by RTE driver DVR00, which is furnished in active RTE operating systems for M/E/F-Series computers. The 12531D product includes:</p> <ol style="list-style-type: none"> 1. 12531-60025 interface card. 2. 12531-90038 interface manual. <p>Adds 12531-60026 7.6m (25ft) EIA terminal cable.</p> <p>Adds 12531-60024 7.6m (25ft) Data set cable.</p> <p>Adds 0264-60058 15.2m (50ft) HP 2640 CRT terminal cable.</p>	<p>Interface level: 20mA current loop or EIA RS-232-C and CCITT V.24.</p> <p>Jumper selectable baud rates with internal clock: 150, 300, 600, 1200, and 2400 bits/sec.</p> <p>Maximum baud rate with external clock: 9600 bits/sec.</p> <p>Character size, stop bits, and buffering: 8-bit character with one or two stop bits. The interface buffers one character at a time for transfer to/from the computer.</p> <p>Compatible modem: Bell type 103 or equiv. data set, manual only.</p>

Table 1. HP 1000 M/E/F-Series Communications Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
OTHER DATA COMMUNICATIONS INTERFACES (continued)		
12618A	<p>Synchronous Communications Interface. This interface is included in and software supported by the 91780A RJE/1000 Remote Job Entry Package, which operates under the RTE-6/VM and RTE-IVB systems in a system that also includes the 12620A Interface Breadboard used as a Privileged Interrupt Fence. The 12618A product includes:</p> <ol style="list-style-type: none"> 1. 12621-60001 Receive interface card. 2. 12622-60001 Send interface card. 3. 12621-60005 Receive test connector. 4. 12622-60005 Send test connector. 5. 12618-60001 15.2m (50ft) branched data set cable. 6. 12618-90001 interface user's manual. 7. 12621-90001 Receive interface manual. 8. 12622-90001 Send interface manual. 	<p>Interface level: EIA RS-232-C and CCITT V.24.</p> <p>Operational mode: Half or full-duplex.</p> <p>Maximum data rate: 9600 bits/sec.</p> <p>Character size: Programmable, 1 to 8 bits.</p> <p>Character buffering: Two characters.</p> <p>Parity generation and checking: Programmable, odd, even, or none.</p> <p>Special character recognition: Program selectable.</p> <p>Compatible modems: Bell type 201, 203, 208, and 209 data sets or equivalent data sets. The 12618A provides a secondary data channel.</p>
12967A	<p>Synchronous Communications Interface, which includes:</p> <ol style="list-style-type: none"> 1. 12967-60001 interface card. 2. 12967-60003 test connector. 3. 12967-60005 15.2m (50ft) data set cable. 4. 12967-90003 interface manual. 	<p>Interface level: EIA RS-232-C and CCITT V.24.</p> <p>Operational mode: Half duplex.</p> <p>Maximum data rate: 19200 bits/sec.</p> <p>Character size: 8 bits, fixed.</p> <p>Character buffering: Two characters.</p> <p>Parity generation and checking: Programmable, odd, even, or none.</p> <p>Special character recognition: None.</p> <p>Compatible modems: Bell type 201, 203, 208, and 209 data sets or equivalent data sets. The 12967A provides a secondary data channel.</p>
12968A	<p>Asynchronous Communications Interface, which includes:</p> <ol style="list-style-type: none"> 1. 12968-60001 interface card. 2. 12966-60003 test connector. 3. 12966-60004 15.2m (50ft) standard EIA terminal cable. 4. 12968-90001 interface manual. <p>-001 12966-60008 15.2m (50ft) cable to 264x or 2635B+051 terminal instead of std cable.</p> <p>-002 12966-60006 15.2m (50ft) cable to data set instead of std cable.</p> <p>-003 12966-60007 7.6m (25ft) cable to teleprinter instead of std cable.</p>	<p>Interface level: EIA RS-232-C or CCITT V.24.</p> <p>Jumper and program-selectable baud rates with internal clock: 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, and 9600 bits/sec.</p> <p>Maximum baud rate with external clock: 9600 bits/sec.</p> <p>Programmable character size: 5, 6, 7, or 8 bits.</p> <p>Programmable stop bit selection: 1, 1-1/2, or 2 stop bits.</p> <p>Programmable parity generation and checking: No parity, even, or odd.</p> <p>Character buffering: Two characters.</p> <p>Modem compatibility: Interface is hardware compatible with Bell type 103 data sets and Vadic VA3400 1200 bps modem, and provides a secondary data channel.</p>

Active Peripheral and General-Purpose Interfaces

Table 2. HP 1000 M/E/F-Series Peripheral and General-Purpose Interfaces Summary

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
IEEE 488-1978 INTERFACE		
59310B	<p>HP-IB Interface for connection of up to 14 HP-IB instruments or other HP-IB devices to M/E/F-Series computer system via a single I/O channel. Software support includes RTE driver DVR 37, an RTE utility library, and an SRQ/TRAP service utility for BASIC/1000D, which are furnished in all active RTE operating systems for M/E/F-Series computrs.</p> <p>The 59318B product includes:</p> <ol style="list-style-type: none"> 1. 59310-60101 HP-IB Interface card. 2. 59310-60002 3.69m (12ft) HP-IB interface cable. 3. 59310-90068 interface manual. 	<p>Capacity: Up to 14 HP-IB bus-connected devices.</p> <p>Applicable standard: Logic levels, termination, line drivers, and receivers conform to IEEE Std 488-1978, identical ANSI Std MC.1, and IEC Recommendation 625-1. The 59310B interface with RTE software meets the specifications for controller subset C26 of IEEE Std 488-1978.</p> <p>Data rates via DCPC: To 570kb/sec (receive) or 760kb/sec (transmit) in E/F-Series computer with high performance memory, to 470kb/sec (receive) or 575kb/sec (transmit) in E-Series computer with standard performance memory, to 411kb/sec (receive or transmit) in M-Series computer.</p> <p>Non-DCPC data rates: To 15.6kb/sec in E/F-Series computer, to 11.1kb/sec in M-Series computer, using RTE driver DVR37.</p> <p>Maximum cable length: 2m (6.5ft) per device connected to the bus; 20m (65ft) total, connected to each 59310B interface card.</p> <p>Number of interfaces per RTE system; Up to four if not constrained by available interface current from the computer, logical unit number capacity of the RTE system, or response requirements.</p>
DISC INTERFACES		
12821A	<p>Disc Interface. Interface is software supported for use with CS/80 discs in RTE-6/VM operating system and for use with ICD discs in RTE-IVB or RTE-6/VM operating system. The 12821A product includes:</p> <ol style="list-style-type: none"> 1. 12821-60001 HP-IB Disc Interface Card. 2. 59310-60002 3.69m (12ft) cable. 3. 12821-90006 interface manual. 4. 12992-80004 ICD disc loader ROM. 5. 12992-90001 Loader ROMs installation manual. 	<p>Compatible CS/80 discs: 7908P/R, 7911P/R, 7912P/R, and 7933H, up to four discs per interface.</p> <p>Compatible ICD discs: 7906H/HR+020, 7920H, and 7925H, maximum of two discs per interface.</p> <p>Data rate: Up to 1 Megabyte/second.</p>
-001	Deletes 12992-80004 ICD Disc loader ROM and 12992-90001 Loader ROMs installation manual.	Loader ROM for CS/80 discs: Order 12992J.
13175B	<p>Multi-Access Controller (MAC) Disc Interface. Interface is software-supported in RTE-6/VM and RTE-IVB operating systems. The 13175B includes:</p> <ol style="list-style-type: none"> 1. 13037-60023 MAC Disc Interface. 2. 13037-60030 5.49m (18ft) cable. 3. 13037-90015 interface manual. 	<p>Capacity: One 7906M/MR+020, 7920M, or 7925M Multi-Access Controller Disc and up to seven 79xxS slave discs connected to the 79xxM Disc Controller.</p> <p>Data rate: To 937.5kb/sec.</p>
13178C	<p>Multi-CPU Interface to 79xxM MAC Disc. Interface is software-supported in RTE-6/VM and RTE-IVB operating systems. The 13178C product includes:</p> <ol style="list-style-type: none"> 1. 13037-60025 interface card. 2. 13037-60033 bracket-adaptor assembly. 3. 13037-60029 1.85m (6ft) interface cable. 4. 13178-60003 2.44m (8ft) multi-CPU cable. 5. 13037-90015 interface manual. 	<p>Purpose: Interfaces second to seventh M/E/F-Series computer connected to Disc Controller of 79xxM disc.</p> <p>Data rate: To 937.5kb/sec.</p>
-001	13178-60004 4.88m (16ft) multi-CPU cable instead of 13178-60003 cable.	<p>Disc access limitations: Multiple CPUs can access the same master and/or slave discs, but the file manager of the RTE operating system does not support multi-CPU access to the same file spaces on disc. Multi-CPU access to the same file spaces on the disc must be developed by the user.</p>

Active Peripheral and General-Purpose Interfaces

Table 2. HP 1000 M/E/F-Series Peripheral and General-Purpose Interfaces Summary, continued

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
DUPLEX REGISTERS, continued		
<p>12597A</p> <p>-001</p> <p>-002</p> <p>-005</p>	<p>8-Bit Duplex Register. The 12597A product includes:</p> <ol style="list-style-type: none"> 12597-6001 positive-in, positive-out 8-bit Duplex Register Interface 02116-6178 48-pin connector kit. 12597-90002 interface manual. <p>12597-6002 negative-in, negative-out interface instead of 12597-6001 positive-in, positive-out interface.</p> <p>Adds 12597-6004 3.6m (12ft) cable to 2748B Punched Tape Reader and 12597-90022 tape reader interface manual.</p> <p>Adds 12597-60061 4.5m (15ft) cable to 2895B Tape Punch and 12597-90025 tape punch interface manual.</p>	<p>Capacity: 8 bit input and 8 bit output.</p> <p>Input: "1" is 0 to +0.5V, 12mA current sink. "0" is +8V through 700 ohms.</p> <p>Output: "1" is 0 to +0.5V, 12mA current sink. "0" is +12V through 10k ohm source.</p> <p>Changes logic levels as follows:</p> <p>Input: "1" is -8V through 700 ohms. "0" is 0 to -0.5V, 12mA current sink.</p> <p>Output: "1" is -12V through 10k ohm source. "0" is 0 to -0.5V, 12mA sink.</p> <p>Same specifications as standard 12597A</p> <p>Same specifications as standard 12597A</p>
<p>12930A</p> <p>-001</p> <p>-002</p>	<p>Universal Interface. The 12930A product includes:</p> <ol style="list-style-type: none"> 12930-60001 differential-input Universal Interface card. 12930-60007 7.6m (25ft) interface connector plus cable kit. 12930-60006 test connector. 02116-6110 priority jumper card. 12930-90001 interface manual. <p>12930-60004 TTL ground-true interface instead of 12930-60001 differential interface and 12930-60014 test connector instead of 12930-60006 test connector.</p> <p>12930-60005 TTL positive-true interface instead of 12930-60001 differential interface and 12930-60015 test connector instead of 12930-60006 test connector.</p>	<p>Capacity: 16 bit data input and 16 bit data output plus 6 bit command output and 6 bit status input.</p> <p>Input: "1" is +1V or greater, 2.5k ohm impedance. "0" is -1V or more neg, 2.5k ohm impedance.</p> <p>Output: Pos. is +2.4V, 0.8mA (source). Gnd. is 0 to +0.4V, 32mA (sink).</p> <p>Data rate: To 1.14Mb/sec via DCPC in E/F-Series computer, to 1.23Mb/sec via DCPC in M-Series computer.</p> <p>Max. cable: 152m (500ft) long, which must be special ordered.</p> <p>Changes logic levels and max. cable as follows:</p> <p>Input: "1" is 0 to +0.5V, 15mA. "0" is +2.4V to +5V, 330 ohms to +5V.</p> <p>Max. cable: 7.6m (25ft) long.</p> <p>Changes logic levels and max.cable as follows:</p> <p>Input: "1" is +2.4V to +5V, 330 ohms to +5V. "0" is 0 to +0.5V, 15mA.</p> <p>Max. cable: 7.6m (25ft) long.</p>

Table 2. HP 1000 M/E/F-Series Peripheral and General-Purpose Interfaces Summary, continued

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
MISCELLANEOUS INTERFACES		
10278A	<p>Logic Analyzer Interface with two boards, one that plugs into the DCPC card slot of the M/E/F-Series computer, and another that plugs into either a memory card cage slot or an open I/O slot that would otherwise contain a priority jumper card. The 10278A product includes:</p> <ol style="list-style-type: none"> 10278-66502 DCPC probe card. 10278-66503 Memory or I/O slot probe card. 10278-92901 Operating Note. 	<p>Interface-derived clock: Circuits on the 10278A boards generate a clock signal from bus activity for strobing address and data information into the logic analyzer.</p> <p>Clock qualification: On-board switches provide qualification of bus activity for selective capture of reads, writes, I/O, or DMA for detailed analysis.</p> <p>Priority jumpering: The 10278A interface board includes a circuit for continuation of the HP 1000 M/E/F-Series priority chain so that it can be installed in an I/O slot without breaking the priority chain.</p> <p>Bus loading: < 1/4 standard TTL load.</p> <p>Compatible logic analyzers: The 10278A Logic Analyzer Interface is used with Hewlett-Packard Model 1600A, 1607A, 1610A/B, 1611A, and 1615A Logic Analyzers.</p> <p>Recommended accessories: 10277A, B, C, and D General Purpose Probe Interfaces for use with Logic Analyzer Models 1610A, 1610B or 1615A, 1600A or 1607A, and 1600A with option 001, respectively.</p>
12551B -001	<p>Relay Output Register, which includes:</p> <ol style="list-style-type: none"> 12551-6001 Relay Register card. 5060-8339 48-pin connector kit. 12551-90002 interface manual. <p>Adds bit state read-back to the 12551B.</p>	<p>Capacity: 16 isolated contact closures.</p> <p>States: All contacts are normally open with power off and close individually in response to "1" bit states from the computer.</p> <p>Maximum power: 10W, peak or continuous, per contact.</p> <p>Maximum voltage: 100V peak or continuous across open contacts, between connector pins, and with respect to computer ground on the interface.</p> <p>Maximum current: 500 mA per contact.</p> <p>Contact life: 10 million operations under rated load.</p> <p>Resistance: 0.1 ohm at 100 mA (higher at lower current).</p> <p>Protection: Mounting positions are provided for connecting contact protection resistors in series with relay contacts.</p> <p>Settling time: 1 millisecond, max., for pull-in or drop-out.</p> <p>Power-on preset: Register is normally wired to preset all data relays open. Upon request at time of ordering, the register will be wired to preset bits 15 through 8 or bits 7 through 0 closed or all bits closed by power on.</p> <p>Command outputs: Include a ground referenced output with "1" level of 0V, 12 mA current sink and "0" level of +12V through 10k ohms and an isolated relay contact closed for "1" state, open for "0" state.</p> <p>Response (flag) inputs: Include ground referenced input that is normally 0V, 12 mA current sink from NPN transistor; (set flag is open circuit) and an isolated input that is normally 12V, 15 mA to relay coil (set flag is no input to relay coil). Response delay is 15 milliseconds, nominal.</p>

Active Peripheral and General-Purpose Interfaces

Table 2. HP 1000 M/E/F-Series Peripheral and General-Purpose Interfaces Summary, continued

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
MISCELLANEOUS INTERFACES, continued		
12620A	<p>Interface Breadboard, which is also usable as a privileged interrupt fence card in RTE systems. The 12620A product includes:</p> <ol style="list-style-type: none"> 1. 5060-6282 Breadboard Interface card. 2. 5060-8339 48-pin connector kit. 3. 12620-90001 interface manual. 	<p>Capacity: 49 wire-wrap socket spaces for user's circuits.</p>
91200B	<p>Video Display Card for connection of B&W TV monitor to M/E/F-Series computer. Three 91200B cards can be used for interface to color TV monitor. The 91200B is software supported by RTE driver DVA13 and a graphics library, which are furnished in all active RTE operating systems for M/E/F-Series computers. The 91200B includes:</p> <ol style="list-style-type: none"> 1. 91200-60007 TV Interface card. 2. 02313-60010 48-pin connector kit. 3. 0410-0592 American standard scan mode crystal. 4. 0410-0591 Industrial monitor scan mode crystal. 5. 0410-0035 European standard scan mode crystal. 6. 91200-90001 interface manual. 7. 91200-90006 programming and operating manual. 	<p>Scan modes: 91200B includes crystals for operation in American TV standard, Industrial monitor, and European standard scan modes.</p> <p>Point update rate: 300 kpps (<3.3 μsec/point) via DMA.</p> <p>Character update rate: >100 char/sec using library software while there is no other RTE system activity.</p> <p>Character size: 5 x 7 dot-matrix character (size 1) and integer multiples of size 1.</p> <p>Drive capability: Up to five TV monitors can be driven by one 91200B interface.</p>
-001	<p>B&W cable connector kit w/7.6m (25ft) cable (91200-60006) and two BNC-to-UHF coaxial cable adapters (1250-0071).</p>	<p>Maximum cable length: 500m (1640ft) from card to farthest monitor.</p>
-003	<p>Three-card color cable connector kit, w/7.6m (25ft) cable (91200-60008) and four BNC-to-UHF coaxial cable adapters (1250-0071).</p>	<p>Video polarity: Programmable, white on black or black on white, or color inversion from normal to complementaries with multiple cards driving color monitor.</p> <p>Video output: One output for black and white, three outputs for color, composite video with sync, EIA RS-170 compatible into 70 ohm load. White level is 0V, black level is -0.7V to -1V, sync level is -1.4V.</p> <p>Sync signal: 4V negative-going pulse, EIA RS-170 compatible that is separate from the composite video.</p> <p>Edge connector signals: (1) Master oscillator output (TTL with 1k ohm pull-up resistor) from card used as "master", (2) External oscillator input (TTL gate) for cards used as "slaves" for sync of color or multi-level gray on multiple cards, (3) Raw video output and two raw video inputs to summation amplifiers for control of black and white and gray scale using multiple cards, (4) Frame sync output from card used as "master", (5) Frame sync input for cards used as "slaves" in color and multi-level gray applications, (6) Card address output from card used as "master", and (7) Card address input for cards used as "slaves" in multicard applications.</p>

Table 3. HP 1000 MIE/F-Series Mature Interfaces Summary

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)																								
MATURE COMMUNICATIONS INTERFACES																										
<p>12587B</p>	<p>Async Comm Interface for M-Series Computers which includes:</p> <ol style="list-style-type: none"> 1. 12587-60004 interface card. 2. 12587-60006 15.2m (50ft) standard data set cable. 3. 12587-90006 interface manual. 	<p>Interface level: EIA RS-232-C or CCITT V.24.</p> <p>Jumper-selectable baud rates with internal clock: 45, 50, 75, 110, 134.5, 150, 165, 200, 220, 300, 330, 440, 600, 880, 900, 1050, 1200, 1760, and 2400 bits/sec.</p> <p>Maximum baud rate with external clock: 9600 bits/sec.</p> <p>Programmable character size: Any size from 1-8 bits.</p> <p>Stop bit selection: 1 or 2 bits, jumper selectable.</p> <p>Programmable parity generation and checking: Odd, even, or no parity.</p> <p>Buffering: One character.</p> <p>Compatible modems: Bell type 103 and 202 Data sets are hardware compatible with the 12587B interface, which provides a secondary data channel.</p> <p>Break detection: 12587B supports software break detection when used with type 202 data set.</p>																								
<p>12589A</p>	<p>Automatic Calling Unit Interface for M-Series Computers, which includes:</p> <ol style="list-style-type: none"> 1. 12589-6001 interface card. 2. 12589-6004 interface cable. 3. 12589-6005 test connector. 4. 12589-90002 interface manual. 	<p>Interface level: EIA RS-366 and CCITT V.24.</p> <p>Compatible communications equipment: Bell 801A or 801C Automatic Calling Unit or equivalent.</p> <p>Device status lines: Power indicator (PWI), Present next digit (PND), Data line occupied (DLO), Call origination status (COS), and Abandon call and retry (ACR).</p> <p>Device control and dialing lines: Call request (CRQ), Digit present (DPR), and Four digit leads (NB1, NB2, NB4, NB8).</p>																								
<p>12771A</p>	<p>Computer Serial Interface. Interface is software supported in RTE-6/VM and RTE-IVB/IVE based HP 1000 Systems by the 91750A DS/1000-IV Network software when DS/1000 firmware (91740P in M-Series, 91740R in E/F-Series) is installed in the computer. The 12771A product includes:</p> <ol style="list-style-type: none"> 1. Two 12665-60001 interface cards, one for each end of the communications link. 2. 12665-60002 3.65m (12ft) cable with female connector. 3. 12665-60003 3.65m (12ft) cable with male connector. 4. Two 12665-60004 diagnostic hoods. 5. Two 12665-90001 interface manuals. 	<p>Capacity: One complete, bit-serial duplex channel per interface, with two cards, one for each computer at either end of the communications channel.</p> <p>Direct connect cable lengths and maximum hardware transmission speeds:</p> <table border="1" data-bbox="812 1417 1429 1617"> <thead> <tr> <th colspan="2">Cable Lengths</th> <th>Maximum transmission speeds</th> </tr> <tr> <th>metres</th> <th>feet</th> <th>bytes/second†</th> </tr> </thead> <tbody> <tr> <td>7 - 180</td> <td>24 - 600</td> <td>62,500</td> </tr> <tr> <td>181 - 360</td> <td>601 - 1200</td> <td>39,200</td> </tr> <tr> <td>361 - 1200</td> <td>1201 - 4000</td> <td>22,400</td> </tr> <tr> <td>1201 - 1600</td> <td>4001 - 5400</td> <td>12,100</td> </tr> <tr> <td>1601 - 2200</td> <td>5401 - 7300</td> <td>6,300</td> </tr> <tr> <td>2201 - 3000</td> <td>7301 - 10000</td> <td>3,220</td> </tr> </tbody> </table> <p>†Transmission speeds are user-selected by jumper on each interface card to correspond with cable length used. Network throughput rates will be lower because of software overhead.</p> <p>Error control: Errors detected in hardware word parity check on the board and in longitudinal or diagonal parity checks on blocks received (which are computed in DS/1000 firmware) are corrected by retransmission.</p>	Cable Lengths		Maximum transmission speeds	metres	feet	bytes/second†	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
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Table 3. HP 1000 MIE/F-Series Mature Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)																				
MATURE COMMUNICATIONS INTERFACES (continued)																						
<p>12920B</p> <p>-001</p>	<p>16-Channel Async Multiplexer (three-card interface). Software support in RTE-IVB/IVE is available as the 91731A Async Multiplexer Subsystem Software Package (not supported under RTE-6/VM). The 12920B/91731A combination also requires the 12620A Interface Breadboard used as a privileged interrupt fence. The 12920B product includes:</p> <ol style="list-style-type: none"> 1. 12920-60001 and 12920-60002 data interface cards. 2. 12921-60003 3.6m (12ft) data cable assembly. 3. 12922-60001 control interface card. 4. 12922-60003 3.6m (12ft) control cable. 5. 30062-60002 connector panel assembly. 6. 30062-60017 connector panel 7. 30062-60016 multiplexer test assembly. 8. 12920-90001 multiplexer manual. <p>Adds the following (not supported by 91731A software):</p> <ol style="list-style-type: none"> 1. 12922-60003 (second) control interface. 2. 12922-60003 (second) 3.6m (12ft) control cable. 	<p>Capacity: 16 full-duplex communication channels; auto calling units use two channels each.</p> <p>Programmable baud rate: 57 to 2400 bits/second.</p> <p>Programmable character length: 5 to 12 bits/char, including start, data, and stop bits.</p> <p>Communication mode: Asynchronous, bit-serial.</p> <p>Interrupt trigger: Leading, trailing, or both edges of the status line signal, program selectable.</p> <p>Data lines: Two per channel — Received Data (BB) and Transmitted Data (BA).</p> <p>Control lines from first control card: Two per channel — Data Terminal Ready (CD) and Request to Send (CA).</p> <p>Control lines from second control card (opt. 001): Two per channel — Supervisory transmit (SA) and Data Signal Rate Selector (CH/CI).</p> <p>Status lines from first control card: Two per channel — Data Set Ready (CC) and Received Line Signal Detector (CF).</p> <p>Status lines from second (opt. 001) control card: Two per channel — Supervisory Receive (SB) and Received Line Signal Detector (CF).</p> <p>Logic levels at data set connectors: EIA RS-232-C and CCITT V.24 compatible.</p> <p>Modem support: 12920B interface and supporting software are compatible with Bell type 103A2 or 212A Data Sets or Vadic VA3400 full-duplex modems. With 12920B option 001, the additional control and status lines allow operation with Bell half-duplex type 202 Data Sets, but such operation is not software supported by Hewlett-Packard.</p> <p>Device connect cables:</p> <table border="0"> <tr> <td>13232A, Y:</td> <td>4.6m (15ft) cable to 264x terminal.</td> </tr> <tr> <td>13222N, Y:</td> <td>5m (16ft) cable to 262x terminal.</td> </tr> <tr> <td>13242N, Y:</td> <td>4.6m (15ft) cable to 2382A terminal.</td> </tr> <tr> <td>263xB includes:</td> <td>3.6m (12ft) cable to 263xB terminal.</td> </tr> <tr> <td>30062B:</td> <td>7.6m (25ft) cable to modem.</td> </tr> <tr> <td>30062B+001:</td> <td>15.2m (50ft) cable to modem.</td> </tr> <tr> <td>30062C:</td> <td>7.6m (25ft) Extension cable.</td> </tr> <tr> <td>30062C+001:</td> <td>15.2m (50ft) Extension cable.</td> </tr> <tr> <td>30062-60005:</td> <td>7.6m (25ft) cable to auto calling unit.</td> </tr> <tr> <td>30062-60008:</td> <td>15.2m (50ft) cable to auto calling unit.</td> </tr> </table>	13232A, Y:	4.6m (15ft) cable to 264x terminal.	13222N, Y:	5m (16ft) cable to 262x terminal.	13242N, Y:	4.6m (15ft) cable to 2382A terminal.	263xB includes:	3.6m (12ft) cable to 263xB terminal.	30062B:	7.6m (25ft) cable to modem.	30062B+001:	15.2m (50ft) cable to modem.	30062C:	7.6m (25ft) Extension cable.	30062C+001:	15.2m (50ft) Extension cable.	30062-60005:	7.6m (25ft) cable to auto calling unit.	30062-60008:	15.2m (50ft) cable to auto calling unit.
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Mature Interfaces

Table 3. HP 1000 M/E/F-Series Mature Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
OTHER MATURE INTERFACES		
12555B	<p>D-A Converter provides two analog outputs, each with 8-bit resolution for connection from M-Series computer to oscilloscopes, analog X-Y plotters, or other analog devices. The 12555B product includes:</p> <ol style="list-style-type: none"> 12555-60001 Dual 8-bit D-A Converter. 50608340 24-pin connector kit. 12555-90063 interface manual. 	<p>Capacity: Two analog outputs.</p> <p>Output: 0 to +10V, nominal.</p> <p>Accuracy: ±100mV full scale.</p> <p>Offset: To ±40mV (one bit) with respect to zero.</p> <p>Linearity: To ±40mV within one machine cycle from the end of the output (OTA/B) instruction.</p> <p>Blanking pulses: High: +10V to -10V (nominal). Low: +1V to -1V (nominal). Pulse length: Two instruction times.</p> <p>Erase: Transistor closure to ground.</p>
<p>12556B</p> <p>-001</p> <p>-002</p>	<p>40-Bit Output Register, which assembles a 40-bit (10 BCD digit) output word and a 41st command bit from multiple computer words. It is software supported by RTE driver DVM72, which is furnished in all active RTE operating systems for M/E/F-Series computers. The 12556B product includes:</p> <ol style="list-style-type: none"> 12556-6002 40-Bit Output Register card. 5060-8339 48-pin connector kit. 12556-9002 interface manual. <p>02547-6040 2.4m (8ft) cable to 5055A Digital Recorder in place of 5060-8339 connector kit.</p> <p>Replaces standard interface, connector kit and interface manual with:</p> <ol style="list-style-type: none"> 12556-60022 ground-true 40-bit register. 12556-60023 test connector. 12556-60024 test cable. 12556-90028 interface manual. 	<p>Capacity: 40 data bits and 1 control bit.</p> <p>Data input: "1" level: +12V or +4.5V, jumper selectable, through 10k ohms. "0" level: 0V, 10mA current sink.</p> <p>Reference voltages: +9V or +3.3V, jumper selectable, through 100 ohms and +1V or +0.37V, jumper selectable, through 44 ohms.</p> <p>Flag input: +7V to +15V, 2.2mA min, from -0.7V or open circuit state (return to ground or open circuit sets flag).</p> <p>Status input from external device: -3V to -30V, 0.61mA min. from +5V open circuit state.</p> <p>Output presetting: Turn-on of computer presets all output bits to "0" state. All output bits can be program-preset to either "0" or "1" states.</p> <p>Override timer: Sets flag after 300 milliseconds if external device has not returned flag. Bit 3 to the computer input bus is set if override timer has set the flag.</p> <p>Output assembly modes: Jumper or programming can select ASCII mode, in which bits 11-8 and 3-0 from six computer words are assembled to form the output, or Binary mode, in which all bits of three computer words are assembled to form the output.</p> <p>Changes specifications as follows:</p> <p>Command output: 50 μsec pulse from >+5V or +7.8V, jumper-selectable, to <+1V (may be changed to positive command by changing jumper).</p> <p>Flag input: +4.5V to +15V, 2.2mA min, from -0.7V or open circuit state (return to ground or open circuit sets flag).</p>

Table 3. HP 1000 M/E/F-Series Mature Interfaces Summary (Continued)

Product and Opt Numbers	Interface Name and Description	Specifications (Capacity, Logic Levels, Data Rates, etc.)
OTHER MATURE INTERFACES (continued)		
<p>12604B</p> <p>-001</p> <p>-002</p> <p>-003</p> <p>-005</p>	<p>Data Source Interface for referenced capacitive coupling of up to 8 BCD digits from counters, DVMs, etc., to M-Series computers. It is software supported by RTE driver DVM72, which is furnished in all active RTE operating systems for M-Series computers. The 12604B product includes:</p> <ol style="list-style-type: none"> 1. 12604-60001 Data Source Interface card. 2. 5060-8339 48-pin connector kit. 3. 12604-90002 interface manual. <p>12604-60002 3.6m (12ft) cable to HP 2402A/2401C DVM in place of 5060-8339 conn. kit.</p> <p>02116-6153 3.6m (12ft) cable to older HP counters in place of 5060-8339 conn. kit.</p> <p>12604-60008 3.6m (12ft) cable with printed circuit edge connector to integrated circuit HP counters.</p> <p>12604-60004 3.6m (12ft) cable to HP 3450 DVM in place of 5060-8339 connector kit.</p>	<p>Capacity: Up to 8 BCD input digits.</p> <p>Range of data input levels: -100V to +100V.</p> <p>Threshold: "1" state must be more positive than "0" state by 5V (min) to 100V (max).</p> <p>Encode: Shift from -12V (through 10k ohms) to ground (pos.) or shift from +13.5V (through 9k ohms) to ground (neg.), jumper-selectable 60-80 μsec duration when pulsed.</p> <p>Positive hold: +17V through 1k ohms (10mA max.).</p> <p>Negative hold: -11V through 2.2k ohms (10mA max.).</p> <p>Record command: +4.5V to +24V (or -4.5V to -24V), 20 μsec minimum duration, ac-coupled pulse.</p> <p>External low set: +4.5V logic pulse to set for first 16 bits input (not required for normal operation).</p>



For more information call the HP Sales Office listed in the White Pages. Or write or phone Hewlett-Packard, Data Systems Division, 11000 Wolfe Rd., Cupertino, CA 95014, (408) 257-7000.

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