

Serial I/O Interface Option

For HP 3075A And HP 3076A Terminals



3075A, 3076A Option 013



Features

- EIA RS232C and CCITT V24/V28 compatible
- Transmission speed: 110 to 9600 baud
- Input and output buffers 180 characters
- Parity: even, odd or none
- Echo to serial device selectable
- Handshake mode or no handshake
- ASCII or binary transmission
- Choice of any ASCII character as input terminator
- Termination of binary input according to length
- Input data displayed on terminal
- Full duplex mode
- Internal or external clock
- Multifield operation (multiple entries)
- Internal clock available on serial connector
- Serial baud rate independent from computer to terminal transfer rate
- Device enabled/disabled under program control

General

Peripheral data processing equipment commonly use serial data transmissions, and a wide range of peripherals (generally at low cost) is available for connections to computers and terminals (such as the 3075A or 3076A).

The Serial I/O interface option available on the 3075A and 3076A Data Capture Terminals enables them to communicate with one user serial device, using point-to-point full duplex serial communication. The interface signals comply with EIA RS232C specifications and CCITT recommendations V24/V28.

Note: The Serial I/O Interface is not used with the 3077A Time Reporting Terminal.

This option features a printed circuit Serial I/O Interface mounted in the terminal, which is wired to a male RS232C connector on the terminal rear panel. The RS232C connector may be connected via a point-to-point Serial I/O cable to one user serial device; for example a digital weigh scale, large serial printer or cassette recorder, etc. The Serial I/O Interface communicates with the computer via the terminal's point-to-point or multiterminal connector, this enables a serial user device (i.e. a device not offered as a terminal option) to be connected to the terminal and program controlled in a like manner to the terminal standard options.

Note:

- 1) *The communication between the Serial I/O and the serial device is hardwired, i.e. no modems can be used.*
- 2) *The Serial I/O Interface CANNOT be used to connect the terminal to the computer.*

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Serial I/O Interface Control

The functions are controlled by the system application programs using control sequences starting with the ESCape character. The available control sequences are as follows:

- Serial I/O Interface selection: ESC-cNs

Where: N = 0 disable interface
N = 1 enable interface

- Enable/disable input data: ESC-sNi

Where: N = 0 input data inhibited
N = 1 input data enabled

- Enable/disable output data: ESC-sNo

Where: N = 0 output data inhibited
N = 1 output data enabled

- Data transfer rate: ESC-sNb

Where: N = 0 9600 bd
N = 1 4800 bd
N = 2 2400 bd
N = 3 1200 bd
N = 4 600 bd
N = 5 300 bd
N = 6 110 bd
N = 7 selects an external clock to determine the speed.

- Parity bit: ESC-sNp

Where: N = 0 for no parity
N = 1 for odd parity
N = 2 for even parity

Parity is not checked by the Serial I/O Interface.

- Display input data: ESC-sNd

Where: N = 0 to inhibit display
N = 1 enables all ASCII data received from the serial device (for transfer to the computer) to be echoed to the terminal display and, when fitted, to the printer.

- Echo to serial device: ESC-sNe

Where: N = 0 to inhibit echo
N = 1 ASCII or binary data received from the serial device (for transfer to the computer) are echoed back to the device.

- Multifield operation: ESC-sNm

Where: N = 0 inhibits multifield operation
N = 1 enables multifield operation

Multifield operation allows multiple entries in the same transaction. It prevents the Serial I/O Interface from generating a terminator character at the end of the serial data.

- Enable/disable handshake: ESC-sNh

Where: N = 0 handshake disabled (acts as a three wire connection)
N = 1 handshake enabled (all data transfers are monitored by the RS232C control lines)
See next section.

- ASCII terminator character: ESC-sNt

Where $000 \leq N \leq 177$ = octal ASCII code for terminator.

- Send binary data: ESC-bNW Binary data

Where: N = number of bytes (0 to 170)
W = specifies write binary

- Binary reading: ESC-sNw

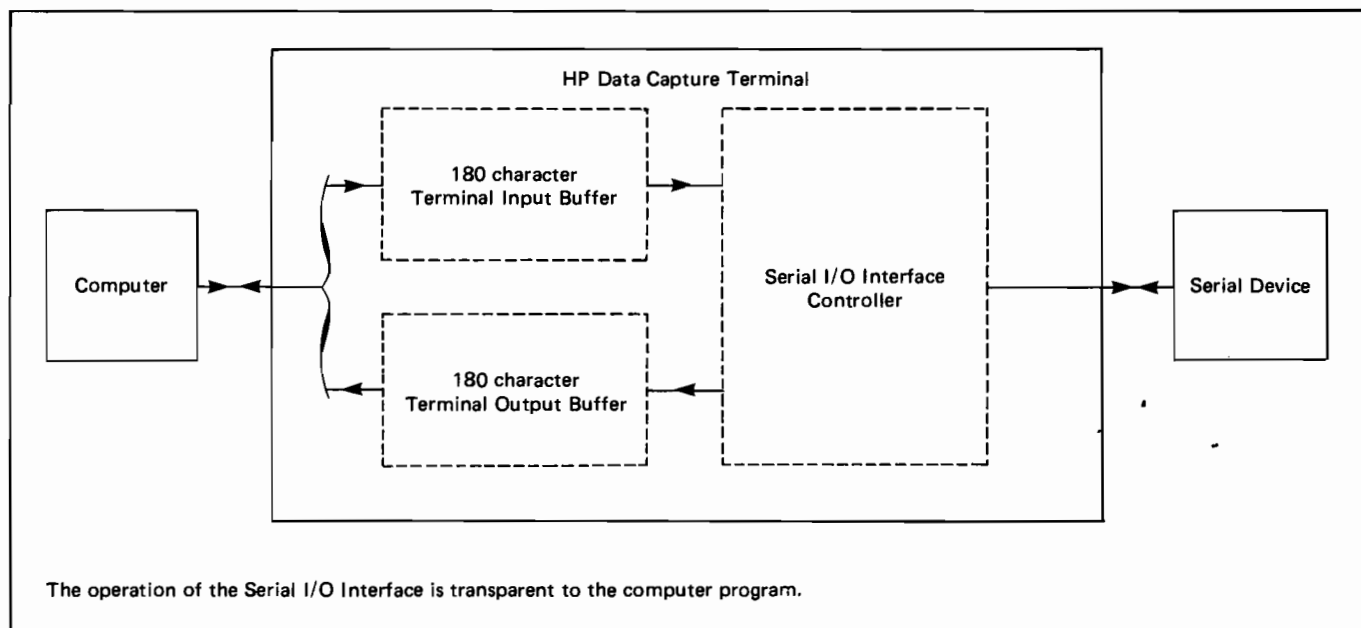
Where: N = number of bytes (0 to 99) to be read from the serial device and transferred to the computer.

- Backspace: BS (octal 010)

When generated by the serial device, it allows the terminal to delete the last character stored in the buffer before it is entered to the computer.

- Delete last entry: CAN (octal 030)

Completely erases from the buffer all the data after the last end of transmission (terminator) character.



Handshake connections

Escape sequence ESC-sNh determines which RS232C signals will be used to control the data transfers between the Serial I/O Interface and the device.

No handshake. When no handshake is selected, the Serial I/O Interface transmits data (to the device) immediately it is received from the computer. Similarly, the serial device transmits data (to the Serial I/O Interface) immediately it is available. i.e. the serial cable acts like a three wire connection (data in, data out and ground).

Terminal RS232C connector	Serial device RS232C connector
BA (transmitted data)	BB (received data)
BB (received data)	BA (transmitted data)
AB (ground)	AB (ground)

Handshake connection. When the handshake is selected, the connection between the Serial I/O Interface and the serial device uses the following lines.

Terminal RS232C connector	Connection	Serial device RS232C connector
AB (logic ground)	← Ground →	AB (logic ground)
BA (Transmitted data) BB (Received data)	— Tx data → ← Rx data —	BB (Received data) BA (Transmitted data)
CB (Clear To Send) SCA (Secondary Request To Send) CF (Received Line Signal Detector)	← Tx data — handshake — Rx data → handshake ←	SCA (Secondary Request To Send) CB (Clear To Send) CA (Request To Send)

Ready lines. The "ready" lines are independent of the handshake and use the following signals:

Terminal RS232C connector	Connection	Serial device RS232C connector
CA (Request To Send)	→	CF (Received Line Signal Detector)
CC (Data Set Ready)	←	CD (Data Terminal Ready)
CD (Data Terminal Ready)	→	CC (Data Set Ready)

Serial I/O cable

The serial cable which connects the serial device to the terminal must conform to the following wiring (for full handshake connections). The serial device connector may be male or female.

To Terminal female RS232C connector		Connection	To Serial device RS232C connector	
Signal	Pin		Pin	Signal
GND	1	↔	1	GND
BA	2	→	3	BB
BB	3	←	2	BA
CA	4	→	8	CF
CB	5	←	11	SCA
CC	6	←	20	CD
AB	7	← Ground →	7	AB
CF	8	←	4	CA
SCA	11	→	5	CB
CD	20	→	6	CC
External Clock In	24	←	25	Clock Out
Clock Out	25	→	24	Clock In

Note: The maximum length of these cables is 15.2 m (50 feet) when working at 9600 baud.

External clock

When escape sequence ESC-sNb selects a data transfer rate, the Serial I/O Interface clock output (i.e. terminal RS232C connector pin 25) provides the relevant clock signal to the serial device.

If an external clock is used, it must be connected to pin 24 of the terminal RS232C connector. When the clock is enabled by escape sequence ESC-s7b, the Serial I/O Interface clock output (terminal RS232C connector pin 25) automatically assumes the same frequency as the external clock input.

Note:

- 1) The external clock may be the clock output from the serial device.
- 2) The external clock frequency must be 16 times the baud rate.

Data buffering

For point-to-point (terminal to computer) connections, data received from the computer is immediately transferred (via the terminal input buffer and Serial I/O Interface) to the device. The data is NOT stored in the terminal buffer. If more than 180 characters are received before a terminator character, the extra characters may be lost. For multi-terminal (terminal to computer) connections, data received from the computer is stored in the terminal input buffer until the complete block is received. The data is then sent (via the Serial I/O Interface) to the serial device. For both point-to-point and multiterminal connections, serial device originated data is stored in the terminal output buffer (until either a terminator character or the specified number of binary bytes have been received) before being sent to the computer. If more than 180 characters are received, the terminal waits until a terminator character is received before transmitting the characters to the computer. The characters in excess of 180 are lost.



Data transfers

Data may be transferred between the computer and the serial device (via the Serial I/O Interface) using either ASCII or binary format. If the data is in ASCII format (i.e. seven data bits plus one parity bit), any of the 95 displayable ASCII characters from space (octal 040) to tilde (~ octal 176) may be transmitted to and received from the serial device.

Note: ASCII characters NUL (octal 000) to US (octal 037) and DEL (octal 177) are non-displayable ASCII control characters. Certain of these characters initiate local control actions on the terminal. Therefore, if these characters are to be successfully transferred to and from the device as data they must be sent in binary format.

The end of transmission of the ASCII data generated by the serial device is indicated by a terminator character. At power-on or after a full reset by default the terminal's terminator character is CR (Carriage Return = octal 015), but this may be modified by escape sequence ESC-sNt in order to comply with the serial device's terminator character.

Enabling/disabling input data. The transfer of data from the serial device to the computer is controlled by escape sequence ESC-sNi. This sequence may be used to inhibit data inputs from the serial device.

Enabling/disabling output data. The transfer of data from the computer to the serial device is controlled by escape sequence ESC-sNo. This sequence may be used to inhibit data outputs to the serial device.

Serial I/O Interface characteristics

Data transfer rate: 110, 300, 600, 1200, 2400, 4800, 9600 baud - variable.

Input buffer: 180 characters

Output buffer: 180 characters

Environmental conditions

Temperature:

- Operating: 0°C to 55°C (32°F to 131°F)
- Non operating: -40°C to 75°C (-40°F to 167°F)

Humidity: 5% to 95% (non condensing)

Vibration: 0.38 mm point-to-point (0.015 ins.) at 5-55 Hz

Altitude:

- Operating: 4 600 m (14 400 ft)
- Non operating: 15 000 m (48 000 ft)

Physical description

The serial interface is composed of a printed circuit board, totally housed in the terminal. The only visible part is the 25 pins RS232C male connector situated on the rear panel of the terminal.

Safety approvals

UL, CSA and VDE.

Supplied with option

Serial I/O test connector (HP part no. 03075-60211)

Documentation available

3075A/3076A/3077A Reference Manual
(HP part no. 03075-90011)

Ordering information

Product Number	Description
3075A/3076A option 013	Serial I/O Interface

Data subject to change.



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