

# HP-HIL

## General Description

Hewlett-Packard Human Interface Link (HP-HIL) is an HP standard for interfacing Series 300 computers and other workstations to human input devices. A list of all devices is shown in Table 3-2.

Asynchronous serial communications protocol enables you to select a set of input devices, connect them to your computer, and work with any application program.

HP-HIL circuits exist on the following assemblies used in Series 300 computers:

- 98561-66511 Processor Board.
- 98561-66512 Processor Board.
- 98561-66513 Processor Board.
- 98561-66531 Human Interface Card

A link controller exists on these assemblies to control the HP-HIL. Each HP-HIL device has a circuit to interface information to and from the device. Limitations for the HP-HIL are:

- Up to seven devices can be on the link.
- Maximum distance between devices is 2.4 metres, total link maximum length is 16.8 metres. This does not include the 15 or 30 metre extensions.
- Series 300 Maximum link current is 1 A.

## Link Controller

A block diagram of a typical link controller is shown in Figure 3-5.

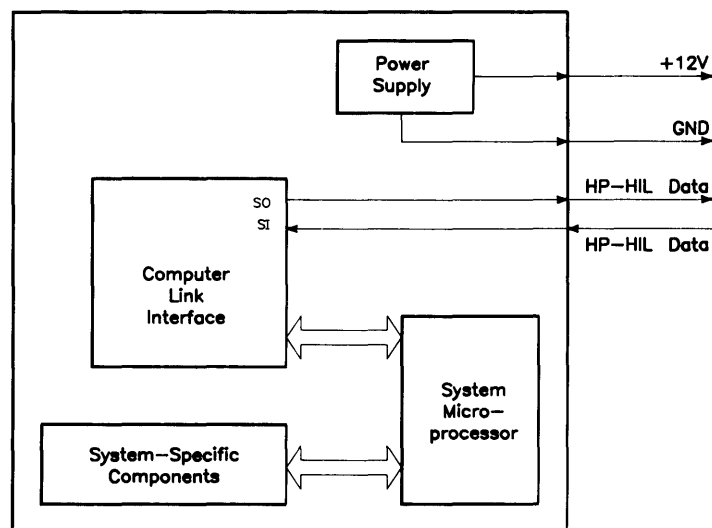


Figure 3-5. HP-HIL Link Controller

## Power Supply

One voltage, +12 Vdc is taken from the host computer and output as a regulated power supply to external devices on the link. Up to 1 A can be supplied to devices. When configuring HP-HIL devices with Series 300 computers, care must be used to ensure the total power drawn by all devices does not exceed 1 A. In Table 3-2, devices are listed with their power requirements.

**Table 3-2. HP-HIL Devices and Power Requirements**

Product No.	Device Name	Milliamps	Watts
HP 35723A	Touchscreen Bezel	250	3.0
HP 46020A	ITF Keyboard	100	1.2
HP 46021A	ITF Keyboard	145	1.74
HP 46060A	HP Mouse	200	2.4
HP 46080A	Extension Module	25	0.3
HP 46081A	3 Metre Ext.	25	0.3
HP 46082A/B	15/30 Metre Extension <sup>1</sup>	50	0.6
HP 46083A	Rotary Control Knob	110	1.32
HP 46084A	ID Module	60	0.72
HP 46085A	Control Dials	350	4.2
HP 46086A	Button Box	80	0.96
HP 46087A <sup>2</sup>	“A”-Size Digitizer <sup>2</sup>	200	2.4
HP 46088A <sup>2</sup>	“B”-Size Digitizer <sup>2</sup>	200	2.4
HP 46094A	Quadrature Port Device <sup>3</sup>	80	1.2
HP 46095A	Three-Button Mouse	80	0.96
HP 92916A	Barcode Reader	100	1.2

Notes: <sup>1</sup> Extension cables have two boxes, each draws 25 mA.

<sup>2</sup> Includes HP 46089A 4-Button Cursor.

<sup>3</sup> Port Device requires 80 mA and the device attached to it cannot exceed 120 mA.

## Computer-Link Interface

Series 300 computer DIO bus architecture is interfaced to the HP-HIL microprocessor in these circuits. They allow device input data to be used by the host computer.

## Microprocessor

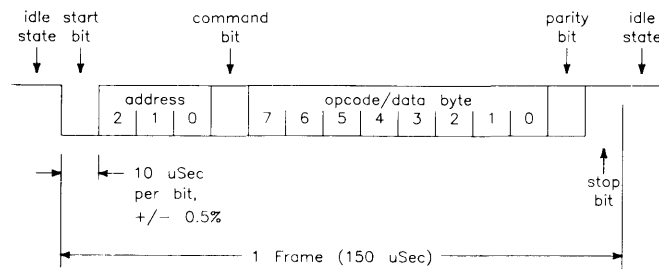
The HP-HIL microprocessor on the computer's assembly provides support for link protocol and is responsible for:

- Configuring the link.
- Processing input device data.
- Error recovery.
- Initiating commands onto the link through the Link Interface.

## Link Interface

Data is exchanged between the device and the host computer through the link interface. It accepts commands from the microprocessor for transmitting and receiving messages in an HP-HIL frame format.

Each frame is a 150  $\mu$ sec long, 15-bit fixed format. A frame is shown in Figure 3-6.



**Figure 3-6. HP-HIL Frame Structure**

Frames may be sent up to once each 154 sec allowing data transfer rates of up to 6500 bytes/second. HP-HIL protocol performs automatic configuration, identification, and polling of up to seven devices. Error recovery, device and system reset, and simple output commands provide a simple device integration.

When the computer is turned on, the link is polled for devices. Each device on the link has its own ID which is sent to the computer and stored in memory. The link is polled 60 times per second. Should a device have data to input to the computer, it sends its data frame to the computer for processing. As each device's frames has its own address in a 3-bit word, no more than 7 devices can be used on the link at one time.

## Interface Cables

A four-wire cable connects HP-HIL devices to each other and to the computer. AMP Shielded Data Link (SDL) connectors are used and are easily installed and removed from the computer or device. Keyboard cable connectors are keyed and are marked with dots to indicate where they are connected. Figure 3-7 shows the connector pinouts.

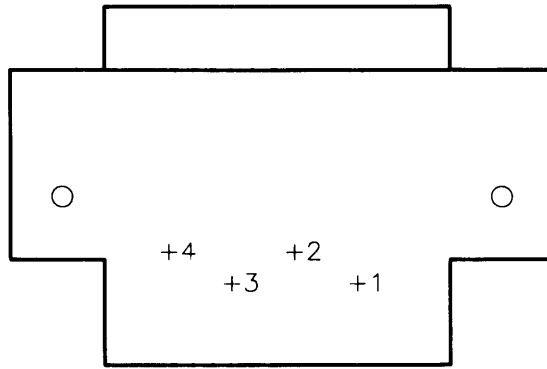


Figure 3-7. HP-HIL Cable Connector

## Device Controller

A block diagram of a typical device controller is shown in Figure 3-8.

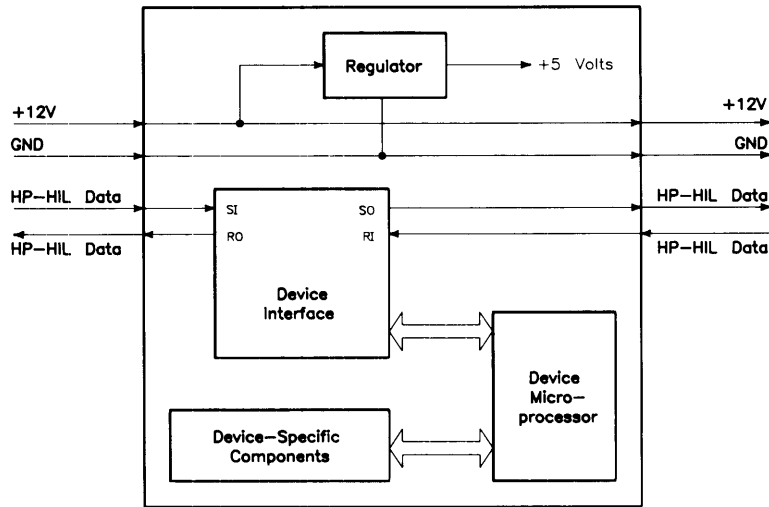


Figure 3-8. HP-HIL Device Controller

### Regulator

From the HP-HIL cable, +12 Vdc is regulated down to +5Vdc for use by device components. The +12 Vdc input is also sent to components needing that supply.

### Device Interface

The device interface serves as the communication link between the device and system HP-HIL microprocessor. In addition to transmitting and receiving data, it also interrupts the device microprocessor when a correctly addressed data frame or improper format is received. It also provides device hardware reset, lowers the NMI line at power-up and at device hard reset command.

**Device Microprocessor**

Tasks performed by the device microprocessor include maintaining the interface, data sending and receiving tasks. It also converts device information to data for the device microprocessor to send to the computer as human input information.

**Device-Specific Components**

Various components are used depending on the device. Digitizers, keyboards, knobs, and a host of other human input functions are converted to data for the device microprocessor. Each device will have its own specific components, depending on the input task details.