

## Chapter No. 6 INTERFACES (12 Marks)

### SCSI:-

- **Small computer systems interface** abbreviated SCSI & pronounced “Skuzzy”.
- Its high speed standard for physically connecting & transferring data between computers & peripheral devices.
- It is very high speed parallel/serial interface, which is used to connect up to 7 devices to the computer system using only one interface card.
- SCSI is basically a bus into which different peripherals are connected in a daisy chain.

### SCSI Standard:-

There are 3 different SCSI standards,

1. SCSI-1
2. SCSI-2
3. SCSI-3

#### **1. List Features SCSI-1:-**

1. 8 bit parallel bus.
2. 5MHz asynchronous & synchronous operation.
3. 4MBPS (asynchronous) 5MBPS (synchronous) throughput.
4. 50 pin cable.
5. Passive termination.
6. Optional bus parity.

#### **2. List Features SCSI-2:-(improved version of SCSI-1)**

1. Fast SCSI (10MHz)
2. Wide SCSI(16 bit transfers)
3. New Commands.
4. High density, 50 pin cable connectors.
5. Active termination for improved single ended transmission.

#### **3. List Features SCSI-3:-**

1. Ultra2 (fast-40) SCSI.
2. Ultra 3 (fast -80DT) SCSI.
3. Ultra 4 (fast-160DT) SCSI.
4. Ultra 5 (fast-320DT) SCSI.
5. New low voltage differential signaling.
6. Elimination of high voltage differential signaling.

### SCSI Cables:-

- It refers to a complete cable, including the wire, connectors & possibly a terminator as well.
- SCSI cables come in two distinct varieties:
  1. External
  2. Internal

**Q. What is SCSI connector?****SCSI Connectors:-**

- Connectors are the physical devices that are used to attach a SCSI cable to SCSI device.
- External & Internal devices use different connectors. Each has 4 different alternatives.

**Q. Explain following external SCSI connectors.****External connector types:-**

1. D-Shell
2. Centronics
3. High Density(HD)
4. Very high density cable interconnect(VHDCI)

**Q. Explain the following external SCSI connectors D- Shell.****1. D Shell (D-sub, DD)**

- SCSI 1 defined a 50 pin D-Shell connector for narrow SCSI implementation.
- It has a D Shaped metal shell which goes around the pins of the male half connector, hence the name.
- The disadvantage of this connector is its size & bulkiness.
- It was very large & not widely used.



Fig. D Shell 25Pin &amp; 50 Pin

**Q. Explain the following external SCSI connectors Centronics.****2. Centronics:-**

- Another external type, SCSI 1 which is a 50 pin connector called the centronics connector.
- It uses two rows of flat contacts instead of thin pins.
- Two latches are present on either side of the connector to hold it at appropriate place.
- It is still used in printer interfaces (cables), at the end which attaches to the printer.
- These 50 pin connectors are still present in the current SCSI specifications & are called as “Alternative - 2” external connectors.

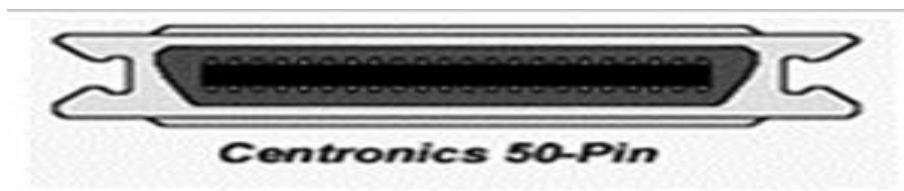


Fig. Centronics

**Q. Explain the following external SCSI connectors High Density.****3. High Density:-**

- The D Shell connectors defined in the SCSI-1 standard are replaced by High Density shielded connectors in SCSI-2.
- The space between pins are reduced, making the older connectors smaller, cheaper to make & easier to use.
- It uses a “squeeze to release” latching mechanism instead of centronics style latches.
- A narrow 50 pin connector is called “Alternative 1”, & the wide 68 pin version “Alternative -3”

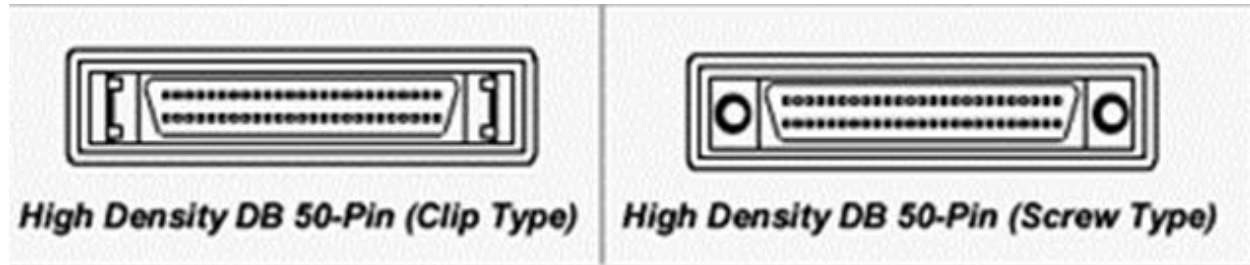


Fig. High Density

**Q. Explain the following external SCSI connectors Very High Density Cable Interconnect (VHDCI).****4. Very High Density Cable Interconnect (VHDCI):-**

- It is a wide only (68 pin) & also called as “micro centronics”, because it uses the same design as the Centronics interface. The contacts are much smaller & close to each other.
- Because of its small size it is being used widely, also known as “Alternative - 4”

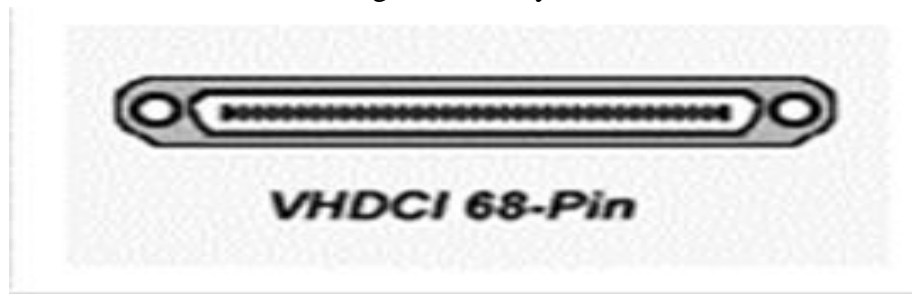


Fig. Very High Density Cable Interconnect (VHDCI)

**Internal SCSI Connectors (Unshielded):-****1. Regular Density**

- It is used for narrow (8 bit) devices.
- It is a rectangular connector with two rows of 25 pins.
- This connector is very similar to IDE/ATA connector. (Except 5 extra pins on each row.)
- It is widely used in older devices (Slower.).
- In the current standard it is called as “Alternative 2”.

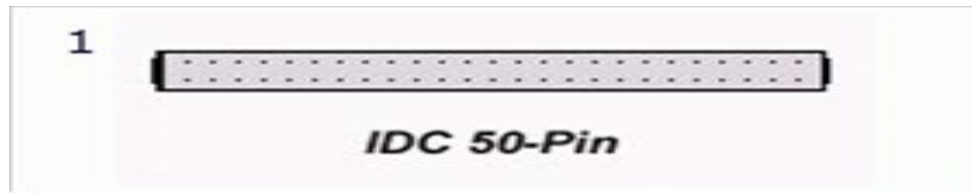


Fig. Regular Density

## 2. High Density

- The pin spacing in high density is half of the older SCSI-1 connector, making them much smaller.
- It is the most common connector used in today systems.
- The narrow 50 pin versions is unshielded connector “Alternative 1” & the 68-pin version is “Alternative 3”.

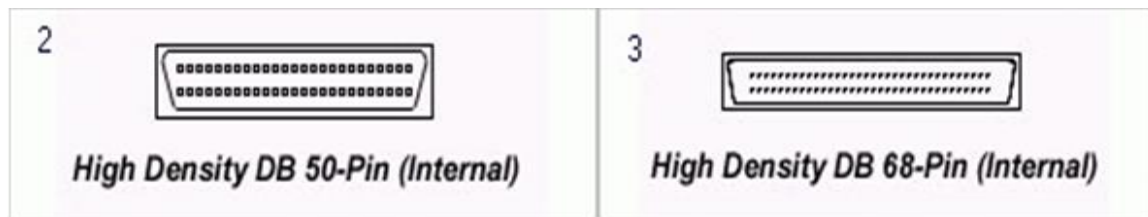


Fig. High Density

## 3. Single Connector Attachment (SCA)

- “Alternative 4” in the SCSI standards for unshielded connectors.
- The connector used for the single connector attachment system for backplane-connecting of SCSI drives.

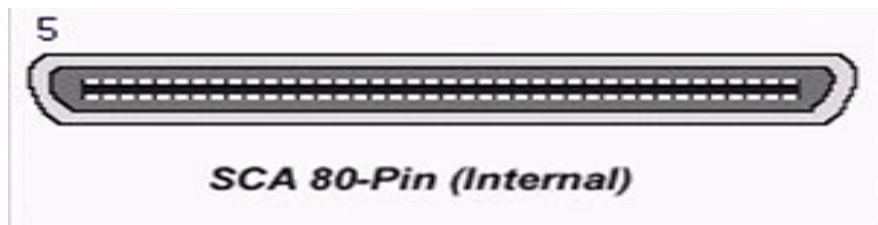


Fig. Single Connector Attachment

## Q. Explain SCSI drive Configuration.

### SCSI Drive Configuration:-

- Configuring the SCSI drive is a bit critical than configuring the IDE.
- Following parameters must be set before configuring the SCSI drive.

#### 1. SCSI Device ID:

- For narrow SCSI 3 jumpers are used.
- For wide SCSI 4 jumpers are used.

#### 2. Termination Activate:

- End device on SCSI chain must be terminated for the bus to function properly.
- If HDD is the last device then the jumper settings will cause it to terminate the bus.

#### 3. Disable Auto Start

**4. Delay Auto Start****5. Stagger spin:**

- Enhanced version of “Delay Auto Start”.
- When a system with many HDD has this option set for each unit, the drives stagger their start up time by multiplying a user defined constant times their SCSI ID.

**6. Narrow/ Wide:**

- The drive to function in narrow or wide mode.

**7. Force SE (single ended):**

- Allows newer drives [Ultra2 or more] to be forced to use single ended operation.

**8. Disable Parity: -** Turns off parity checking on the SCSI bus.**USB (Universal Serial Bus):-**

- It is a serial bus standard to connect devices or interface devices.
- Improves plug & play facilities.
- Allows Hot Swapping :( No need to reboot the system.)
- Consumes low power, does not require external power supply.
- USB can connect computer peripherals such as mouse, devices, keyboards, PDAs, game pads, scanners, digital cameras, Printers etc.
- The design of USB is standardized by the USB Implementers forum (USB-IF). It is an industry standards body incorporating leading companies from Computer & electronics industries.

**How USB is better than RS 232**

- 1 .Easy Installation.
- 2 .Faster Transfer Rate.
3. Simple Cabling.
4. Multiple device connections.

**Data Rates Supported By USB**

- USB 1.0 : 1.5 Mbps Low Speed
- USB 1.1 : 2 Mbps Full Speed
- USB 2.0 : 480 Mbps Hi Speed
- USB 3.0 : 4.8 Gbps Super Speed.

**Q. State & explain the features of USB.****USB Features:-**

1. **Host: -** The computer acts as a host machine.
2. **Multiple Device support: -**Up to 127 devices can connect to host.
3. **USB Cable Length: -** as long as 5 meters.
4. **Transfer rate:-**USB1.0 supported 12mbps, USB2.0 supported 480 Mbps.
5. **Ease of Installation:-**USB cable has two wires for power (+5V & GND).
6. **Power Allocation:-**computer can supply up to 500 milliamps of power at 5V.

7. **Hot Swappable:** - USB device can directly plug & unplug any time.
8. **Hot Pluggability:** - No need to reboot the system.
9. **Hub Architecture:** - No use of daisy chain manner.
10. **Power saving:**-Many USB devices can be put to sleep by the host computer when computer enters a power saving mode.
11. **Support for Wide Range of Peripherals:**-keyboard, mouse, joystick, game pad, printer, scanner etc.

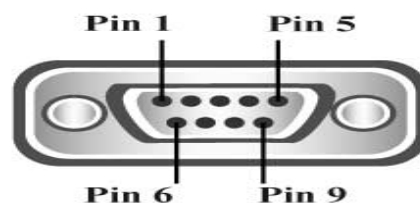
### **RS232 (Recommended standard):-**

- It is standard interface developed by the electronics industries association (EIA).
- Communication as defined in the RS232 standard is an asynchronous serial communication method.
- Serial: - means that the information is sent one bit at a time.
- Asynchronous: - information is not sent in predefined time slots.
- RS232 is a standard for serial binary data signals connecting between a DTE (data terminal equipment) & DCE (data circuit terminating equipment).
- It is commonly used in computer serial ports.
- The RS232 interface expects a modem to be connected to both the receiving& the transmitting end.

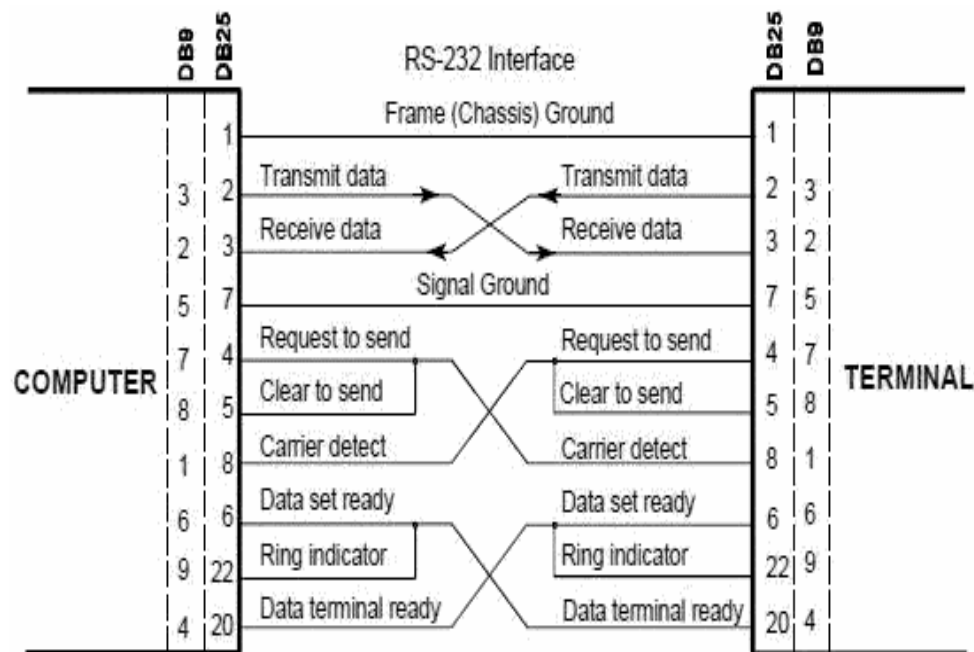
## Powered RS232

<b>Pin 1</b>	<b>DCD/12V/GND</b>
<b>Pin 2</b>	<b>RXD</b>
<b>Pin 3</b>	<b>TXD</b>
<b>Pin 4</b>	<b>DTR</b>
<b>Pin 5</b>	<b>GND</b>
<b>Pin 6</b>	<b>DSR</b>
<b>Pin 7</b>	<b>RTS</b>
<b>Pin 8</b>	<b>CTS</b>
<b>Pin 9</b>	<b>RI/12V/5V</b>

**Powered RS232  
Pinout (9 Pin Male)**



**Q. Draw the block diagram of RS232 connector & give the function of the signals.**

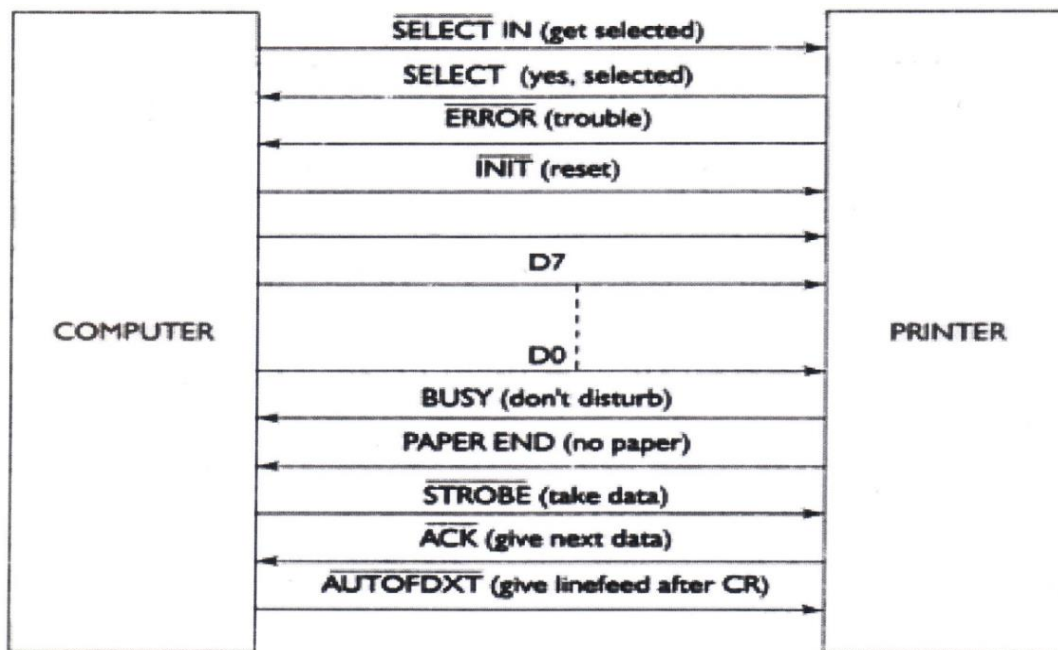
**RS232 Signal Description:-**

- **CD (carrier Detect or Data carrier detect):-** it is used by computer to know that the modem connected to the serial port has made a proper connection with the modem on the other side.
- **RxD (Receive Data):-** device connected to the serial port to send data to the computer. Data sent from DCE to DTE.
- **TxD (Transmit Data):-** computer to send data to a device connected to the serial port or data sent from DTE to DCE.
- **DTR (data terminal ready):-** To inform that computer is ready for communication.
- **GND (ground):-** this wire provides return path for both signals.
- **DSR (data set ready):-** device connected to the computer to inform that the device is ready for communication.
- **RTS (request to send):-** the computer send request to send (RTS) signal to the device connected to inform that computer is also ready to start the data transmission.
- **CTS (clear to send):-** CTS signal is used by the device connected to inform to the computer that the computer can start the data transmission.
- **RI (ring indicator):-** it is used by the device connected to the serial port to inform to the computer that it has detected a ringing voltage on the telephone line.



**Centronics:-**

- It is an old I/O interface standard used for connecting printers.
- It is also called parallel interface & it was used for connecting old printers.
- It uses 36 pin male & female connector cable to connect the printer or other device.
- The original centronics parallel interface for dot matrix printers.

**Centronics Interface Signals:-**

**Q. Draw diagram of centronic interface & explain function of any four signals.**

**Signals from PC to Printer:-**

- There are 12 signals from PC to printer. Out of these 8 signals are data bits & 4 signals are control signals.
1. **STROBE**: - this becomes low. Whenever the PC sends a byte of data to printer. This low voltage tells the printer that data is being sent.
  2. **INIT**: - when it is low, the printer resets its electronics logic & clears the printer buffer.
  3. **SELECT IN**: - it is an interface enable signal, when this signal is low, the printer responds to signals from the controller.
  4. **AUTOFEEDXT**: - after printing every line, the printer will provide one line feed automatically if signal is low.



**Q. Explain the signals from printer to PC in centronics interface.****Signals from printer to PC:-**

1. **ACK**:-when this low indicate that the character has been accepted & the printer is ready for the next character.
2. **BUSY**:- when this signal is high if for some reason such as being out of paper, the printer is not ready.
3. **PE (Paper End)**:- if this signal is high means no paper in the printer.
4. **SELECT**:- this signal is indicates that the printer is selected & logically connected to the computer.
5. **ERROR**:-this signal goes low for various an error condition of the printer.

**Firewire (IEEE 1394):-**

- It is brand name for the IEEE 1394 high speed serial bus interface.
- The 1394 interface is also known by the brand I. Link (Sony)
- It was developed in the late 1980s and early 1990s by Apple, who called it FireWire.
- IEEE 1394 is a serial bus architecture for high-speed data transfer. FireWire is a serial bus, meaning that information is transferred one bit at a time.
- IEEE 1394 fully supports both isochronous and asynchronous applications.
- It is used in modern PCs.

**IEEE 1394(AKA Firewire, I-Link)****6-pin****4-pin**

**USB 2.0 vs. FireWire (IEEE 1394)**

Sr. No.	USB 2.0	FireWire (IEEE 1394)
1.	1.5 Mbps, 12Mbps, 480 Mbps supported.	100 Mbps, 200Mbps, 400 Mbps supported.
2.	USB controller is required to control the bus and data transfer.	Works without control, devices communicate peer-to-peer.
3.	Cable up to 5m.	Cable up to 4.5m.
4.	Up to 127 devices supported.	Up to 63 devices supported.
5.	Power supply to external devices is 500 mA/5V (max).	Power supply to external devices is 1.25A/12V (max).
6.	Full compatibility with USB 1.1 devices.	The only computer bus used in digital video cameras.
7.	<b>Application:</b>  USB is a small and medium bandwidth connection for telephony products, digital cameras, monitors, keyboards, mice, and other similar I/O devices.	<b>Application:</b>  IEEE 1394 is a high-speed bus designed for digital video cameras, DVD players, mass storage devices, and other peripherals that require greater bandwidth.