GENERAL PURPOSE INTERFACE BUS (GPIB)

W.M.D.C.B.Piyasiri

Department of Electronics, Faculty of Applied Sciences, Wayamba University of Sri Lanka, Kuliyapitiya

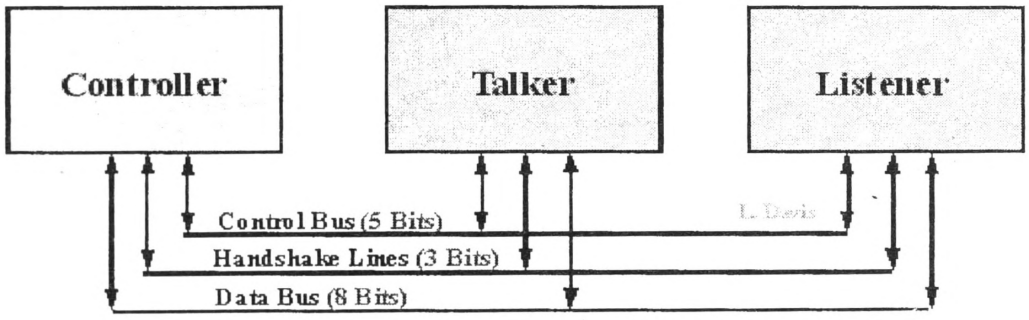
The GPIB (general purpose interface bus) was specifically designed to connect computers, peripherals and laboratory instruments so that data and control information could pass between them. It is also known as IEEE-488 or HPIB, and is electrically equivalent to IEC-625 bus. It is defined completely in the IEEE standard 488.1-1987 Standard Digital Interface for Programmable Instrumentation.

The General Purpose Interface Bus "GPIB" is an 8 bit wide byte serial, bit parallel interface system which incorporates:

- 5 control lines
- 3 handshake lines
- 8 bi-directional data lines.

The entire bus consists of 24 lines, with the remaining lines occupied by ground wires. Additional features include: TTL logic levels (negative true logic), the ability to communicate in a number of different language formats, and no minimum operational transfer limit. The maximum data transfer rate is determined by a number of factors, but is assumed to be 1Mb/s. Devices exist on the bus in any one of 3 general forms:

1. Controller
2. Talker
3. Listener



GPIB System

Figure 1

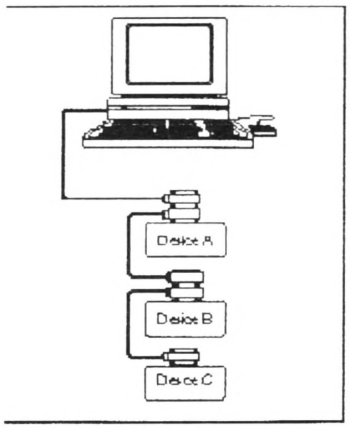
A single device may incorporate all three options, although only one option may be active at a time. The Controller makes the determination as to which device becomes active on the bus. The GPIB can handle only 1 'active' controller on the bus, although it may pass operation to another controller. Any number of active listeners can exist on the bus with an active talker as long as no more than 15 devices are connected to the bus.

The controller determines which devices become active by sending interface messages over the bus to a particular instrument. Each individual device is associated with a 5 bit BCD code which is unique to that device. By using this code, the controller can coordinate the activities on the bus and the individual devices can be made to talk, listen (un-talk, un-listen) as determined by the controller. A controller can only select a particular function of a device, if that function is incorporated within the device.

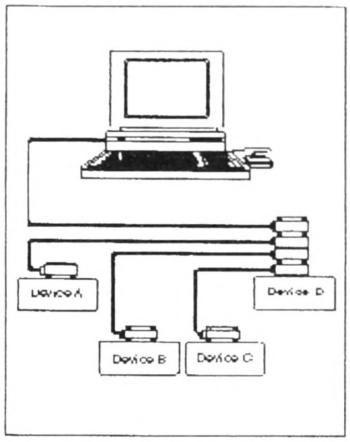
In addition to the 3 basic functions of the controller, talker, and listener the system also incorporates a number of operational features, such as; serial poll, parallel poll, secondary talk and listen addresses, remote/local capability, and a device clear (trigger).

Devices are connected together on the bus in a daisy chained fashion. Normally the GPIB connector (after being connected to the device with the male side) has an female interface so that another connector may be attached to

it. This allows the devices to be daisy chained. Devices are connected together in either a Linear or Star fashion. [1]



Linear Configuration



Star Configuration

Figure 2

IEEE-488

IEEE-488 uses 24-pin Amphenol-designed micro ribbon connectors. Most commonly in a stackable male/female combination that allows for easy daisy-chaining by stacking cables. Mechanical considerations limit the number of stacked connectors to four or less. They are held in place by screws, which come in UTS (now largely obsolete) or metric (M3.5×0.6) threads. By convention, metric screws are colored black, as the two threads do not mate. Total cable length is limited to 20 metres, although non-standard "bus extender" devices are available. [2]

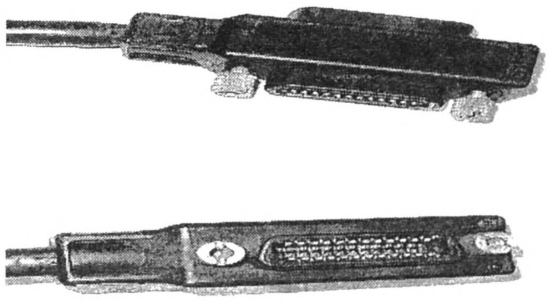


Figure 3

References

1). http://www.interfacebus.com/Design_Connector_GPIB.html
2). http://en.wikipedia.org/wiki/IEEE-488