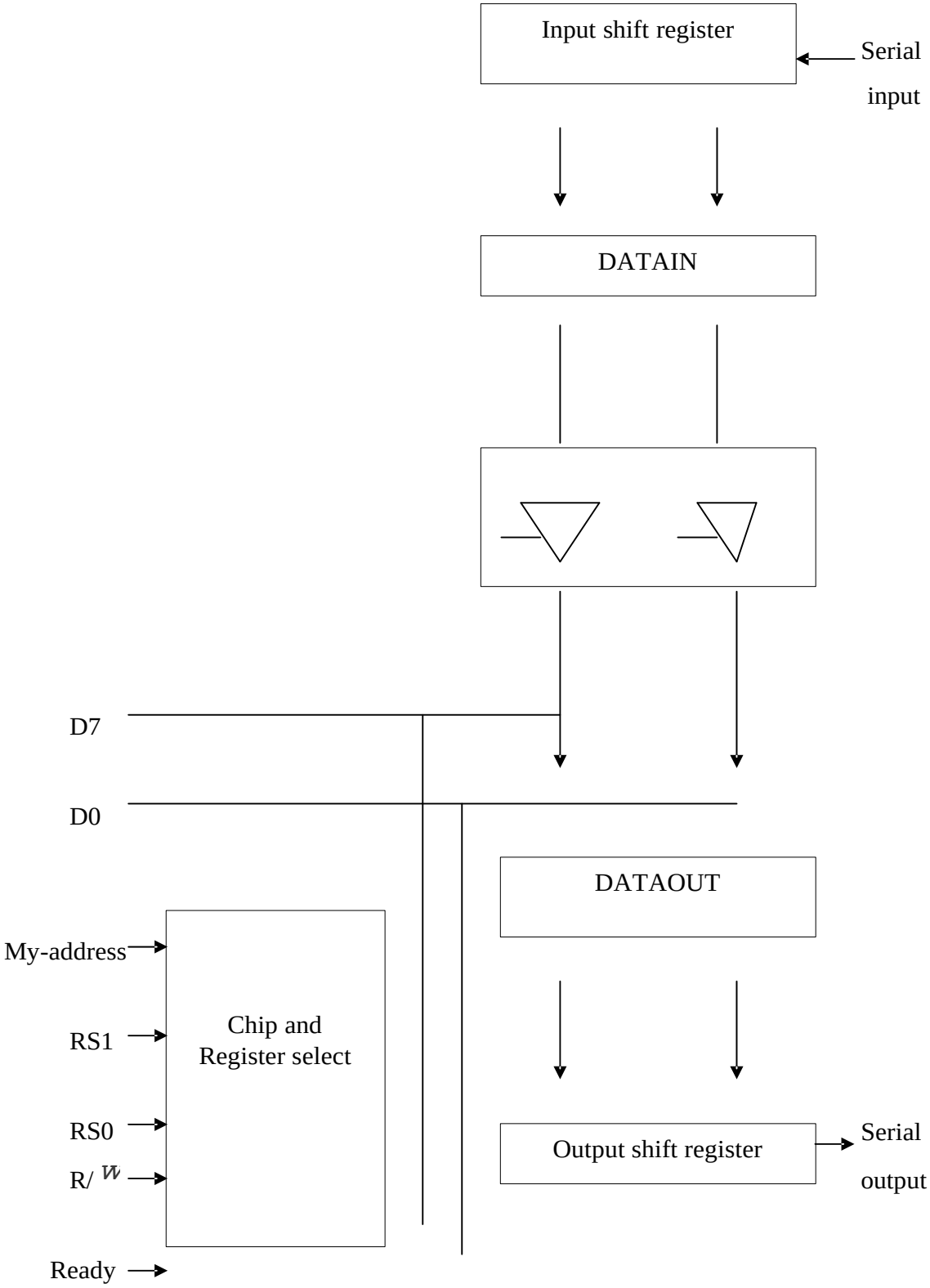
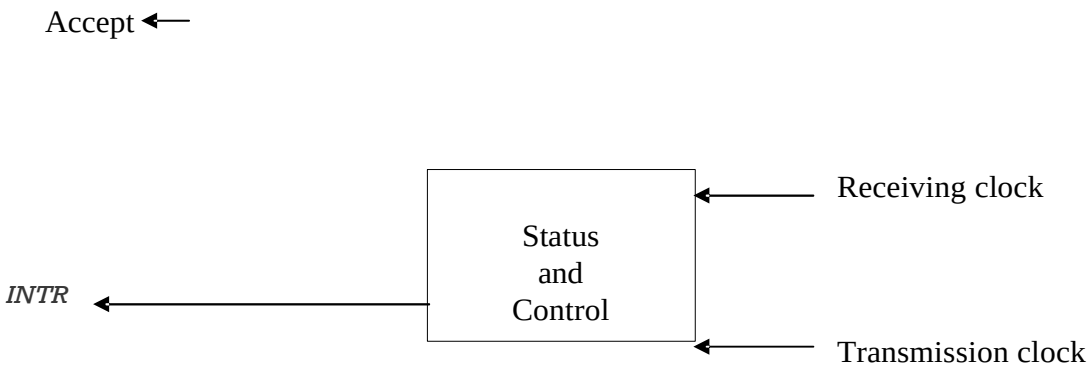
INTERFACE CIRCUITS - II

SERIAL PORT:-

A Serial port is used to connect the processor to I/O devices that require transmission of data one bit at a time. The key feature of an interface circuit for a serial port is that it is capable of communicating in a bit-serial fashion on the device side and in a bit-parallel fashion on the bus side. The transformation between the parallel and serial formats is achieved with shift registers that have parallel access capability. A block diagram of a typical serial interface is shown in figure 20. It includes the familiar DATAIN and DATAOUT registers. The input shift register accepts bit-serial input from the I/O device. When all 8 bits of data have been received, the contents of this shift register are loaded in parallel into the DATAIN register. Similarly, output data in the DATAOUT register are loaded into the output register, from which the bits are shifted out and sent to the I/O device.

Figure 20 A serial interface





The double buffering used in the input and output paths are important. A simpler interface could be implemented by turning DATAIN and DATAOUT into shift registers and eliminating the shift registers in figure 4.37. However, this would impose awkward restrictions on the operation of the I/O device; after receiving one character from the serial line, the device cannot start receiving the next character until the processor reads the contents of DATAIN. Thus, a pause would be needed between two characters to allow the processor to read the input data. With the double buffer, the transfer of the second character can begin as soon as the first character is loaded from the shift register into the DATAIN register. Thus, provided the processor reads the contents of DATAIN before the serial transfer of the second character is completed, the interface can receive a continuous stream of serial data. An analogous situation occurs in the output path of the interface.

Because serial interfaces play a vital role in connecting I/O devices, several widely used standards have been developed. A standard circuit that includes the features of our example in figure 20. is known as a Universal Asynchronous Receiver Transmitter (UART). It is intended for use with low-speed serial devices. Data transmission is performed using the asynchronous start-stop format. To facilitate connection to communication links, a popular standard known as RS-232-C was developed.

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