

Mikroişlemci Sistemleri

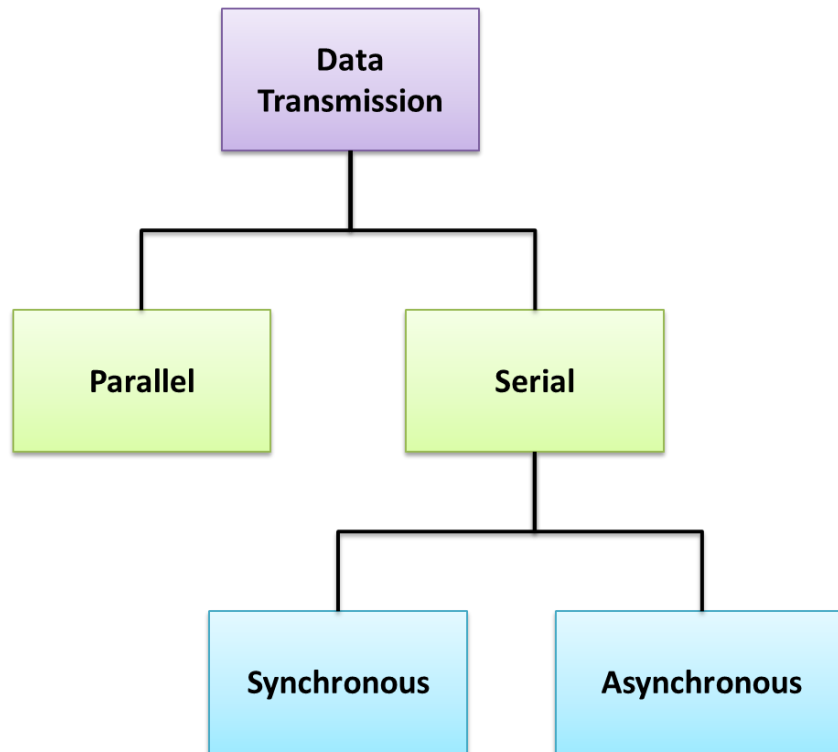
Dr. Öğr. Üyesi Hamza Osman İLHAN
2020/1-Ders 5

Ders-5 Konular

- Paralel Seri Haberleşme
- Seri Haberleşme
 - Synchronous/Asynchronous
 - Simplex/Duplex
 - Baud Rate
 - Error Correction
- Yazılımsal Seri Haberleşme
 - Transmit
 - Receive
- 8251 USART
 - 8251 Blok Diyagram
 - Yazmaçlar
 - Mode Word / Command Word
 - Status Word

Veri İletişimi: Seri-Paralel

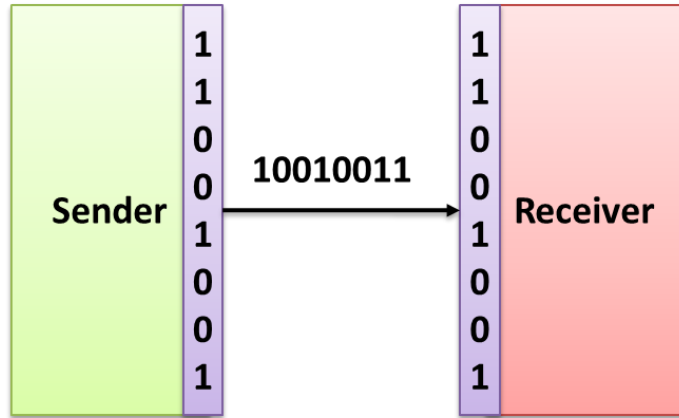
- Seri
 - Daha az maliyet
 - Daha yavaş
- Paralel
 - Daha hızlı
 - Kısa mesafeler için



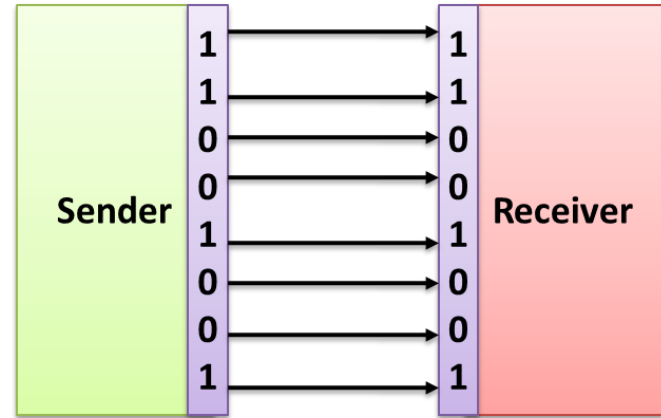
Veri İletişimi: Seri-Paralel

Parallel to serial
Conversion

Serial to parallel
Conversion



Serial Transmission

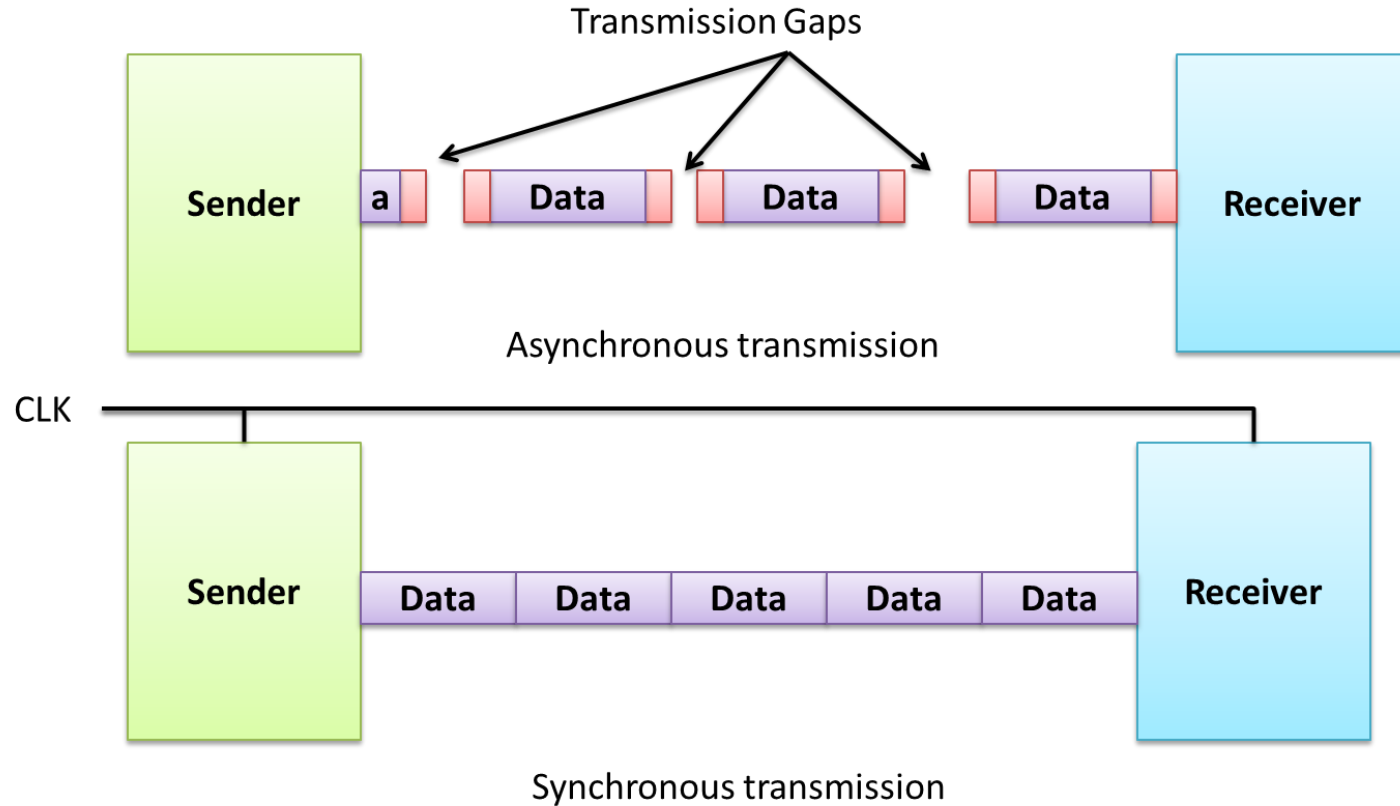


Parallel Transmission

Seri İletişim

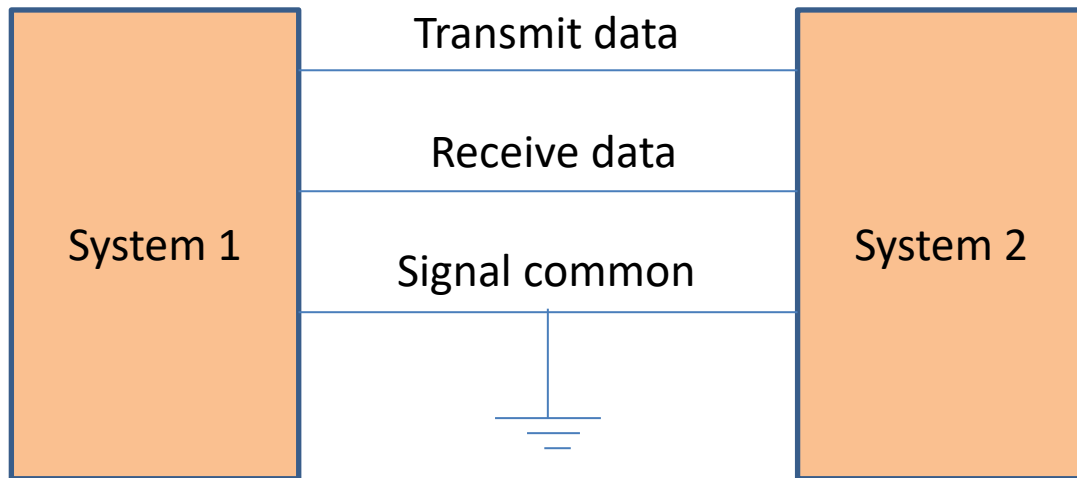
- Synchronous (Senkron)
 - Sender and receiver must synchronize
 - Done in hardware using phase locked loops (PLLs)
 - Block of data can be sent
 - More efficient : Less overhead than asynchronous transmission
 - Expensive
- Asynchronous (Asenkron)
 - Each byte is encoded for transmission
 - Start and stop bits
 - No need for sender and receiver synchronization

Seri İletişim



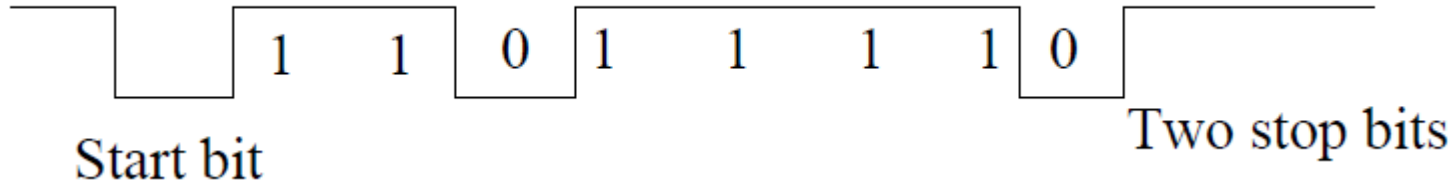
Asynchronous Comm.

- Ortak bir CLK veya senkron işaretime ihtiyaç duymaz

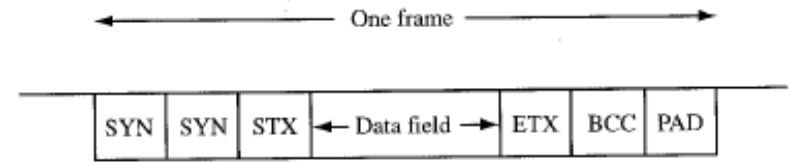
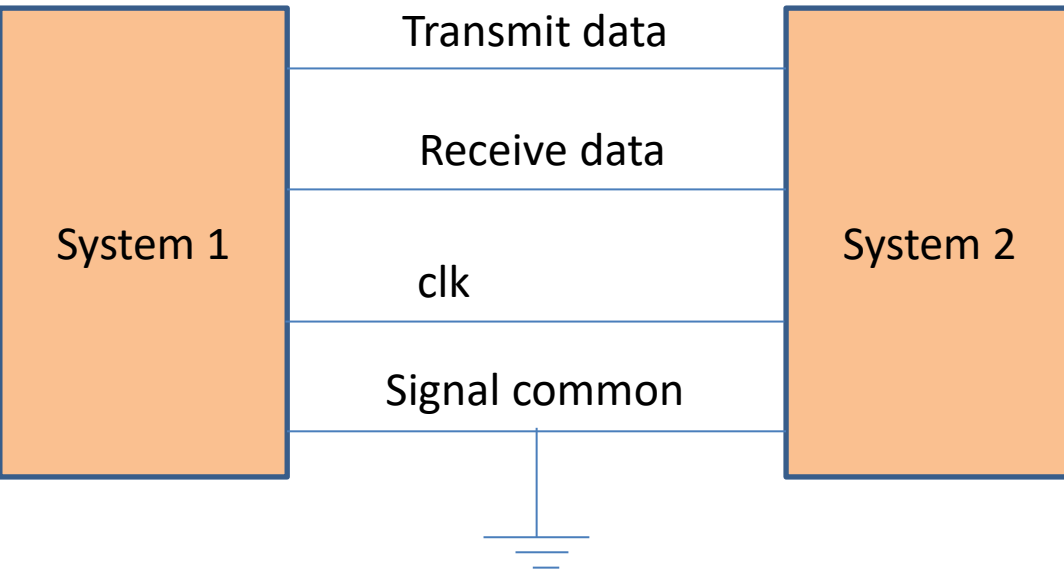


Asynchronous Comm.

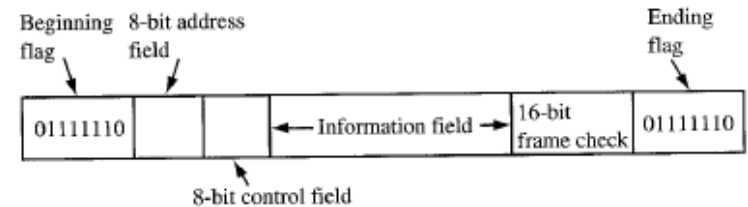
- Veri bitler halinde gönderilir.
- Alıcı taraf iletişimin başladığını/bittiğini başta ve sonda bulunan START ve STOP bitleri ile anlar.
- Hat boşta iken lojik 1 değerindedir.



Synchronous Comm.



BISYNC: Each block of data has synch characters. The size of block data can be 100 or more bytes. BCC checks for errors.



Serial Data Link Control: Developed by IBM used for computer networking (Token Ring). After Flag byte the network address is sent. Control Byte stores information about sequence of data etc. Data is thousands of bits. 16 bit field is used for error checking.

Simplex/Duplex

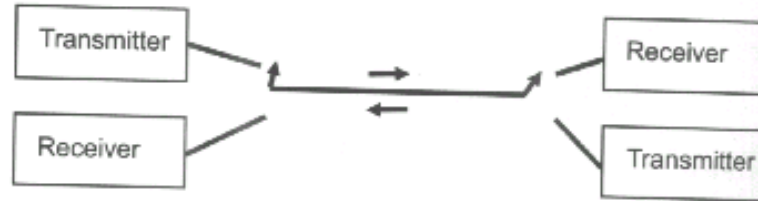
- Simplex
 - Data are transmitted in one directions
 - Example: CPU to printer
- Duplex
 - Data flow in both direction
 - Half Duplex (Transmission goes on way at a time)
 - Full Duplex (Both ways simultaneously)

Simplex/Duplex

Simplex



Half Duplex



Full Duplex



Transmission Rate

- Rate at which bits are transmitted (BAUD)
- Number of signal changes per second
- Bit time: how long the Bit stay On or Off
- Printer, Terminal Baud Adjustable (50-9600)
- 1200Baud means: Bit stay for $1/1200=0.83\text{ms}$

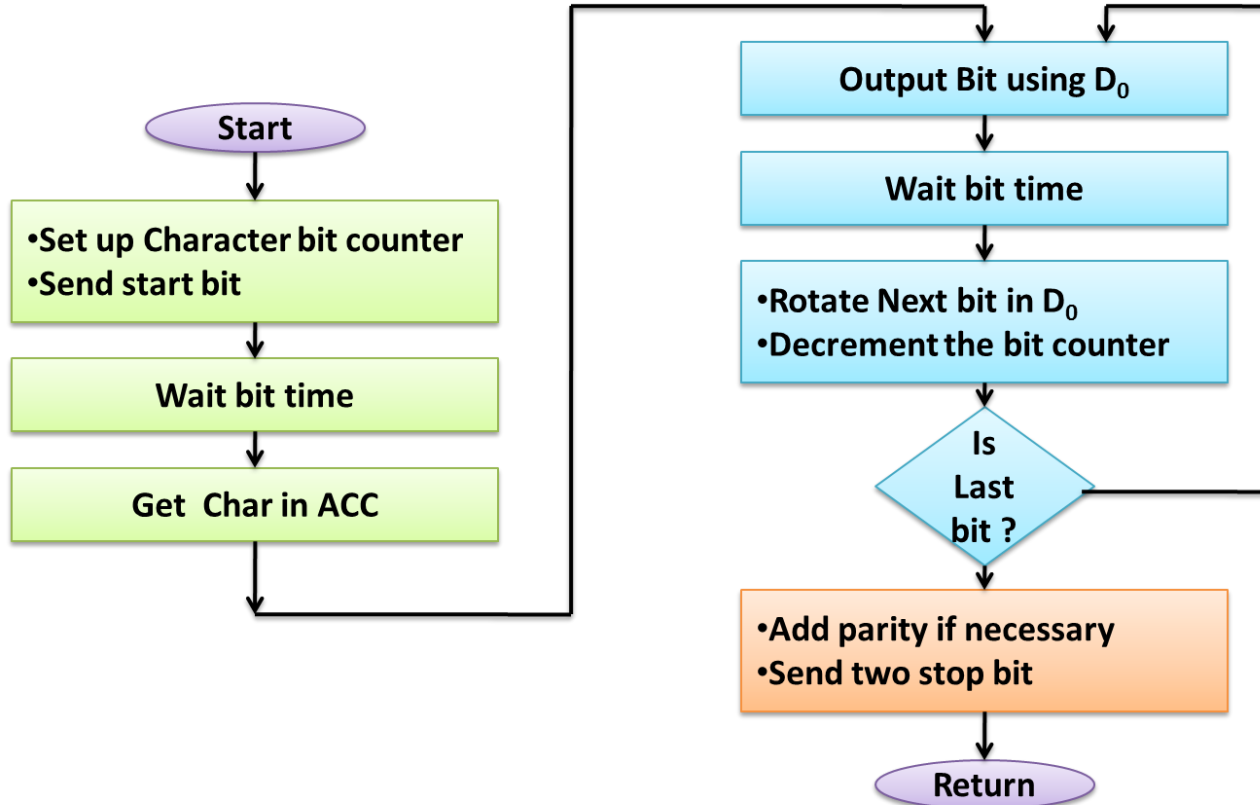
Örnek

- What is the data rate in bits/sec and character rate if the bit time is 3.33 ms (1 start, 8 data, 2 stop)
 - Bit rate = $1 / 3.33 \text{ ms} = 300 \text{ bits/sec}$
 - $11 \times 3.33 \text{ ms} = 36.63 \text{ ms}$ required to transmit a character so character rate = $1/36.63 \text{ ms} = 27.3 \text{ char/sec}$
- Modems typically transmit data over the telephone network at 9600, 14400, 28800 or 56K bps.
- If 1 MByte file is to be transmitted to another computer using a modem calculate the transmission time (1 start, 7 data, 1 parity, 1 stop)
 - 9600 bps: $1048576 \times 10 / 9600 \text{ bits/sec} = 1092 \text{ s} = 18 \text{ minutes and } 12 \text{ sec}$
 - 28800 bps: $364 \text{ s} = 6 \text{ minutes and } 4 \text{ sec}$

Error Check

- Parity Check
 - Even parity: When odd numbers of 1 make D7=1
 - Send Even number of 1
 - Odd parity: When even number of 1 make D7=1
 - Send Odd number of 1
- Check Sum
 - Used for block of data
 - Sum of all Bytes without carry and 2's complements
 - Total Sum Result should be Zero
- Cyclic Redundancy Code (CRC)
 - Synchronous Communication
 - Stream of Data can be represented by Cyclic polynomial that divided by a **constant polynomial**
 - Reminder to set **Bits** and Send out as check for error

Yazılımsal Seri İletişim - Transmit



Yazılımsal Seri İletişim - Transmit

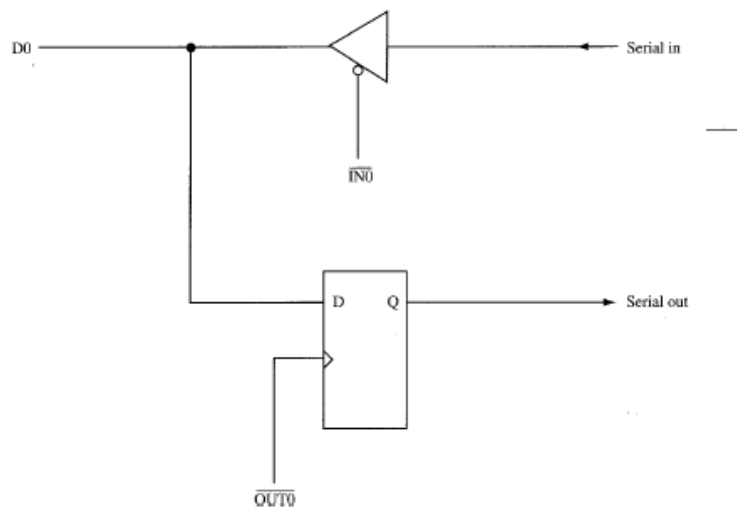
;Function: Serial data transmitter. DELAY
; procedure determines data rate.
;Inputs: Character to be transmitted assumed
; passed in AL.
;Outputs: Serial data on bit 0 of DPORT.

;Destroys: AL,CX,flags.

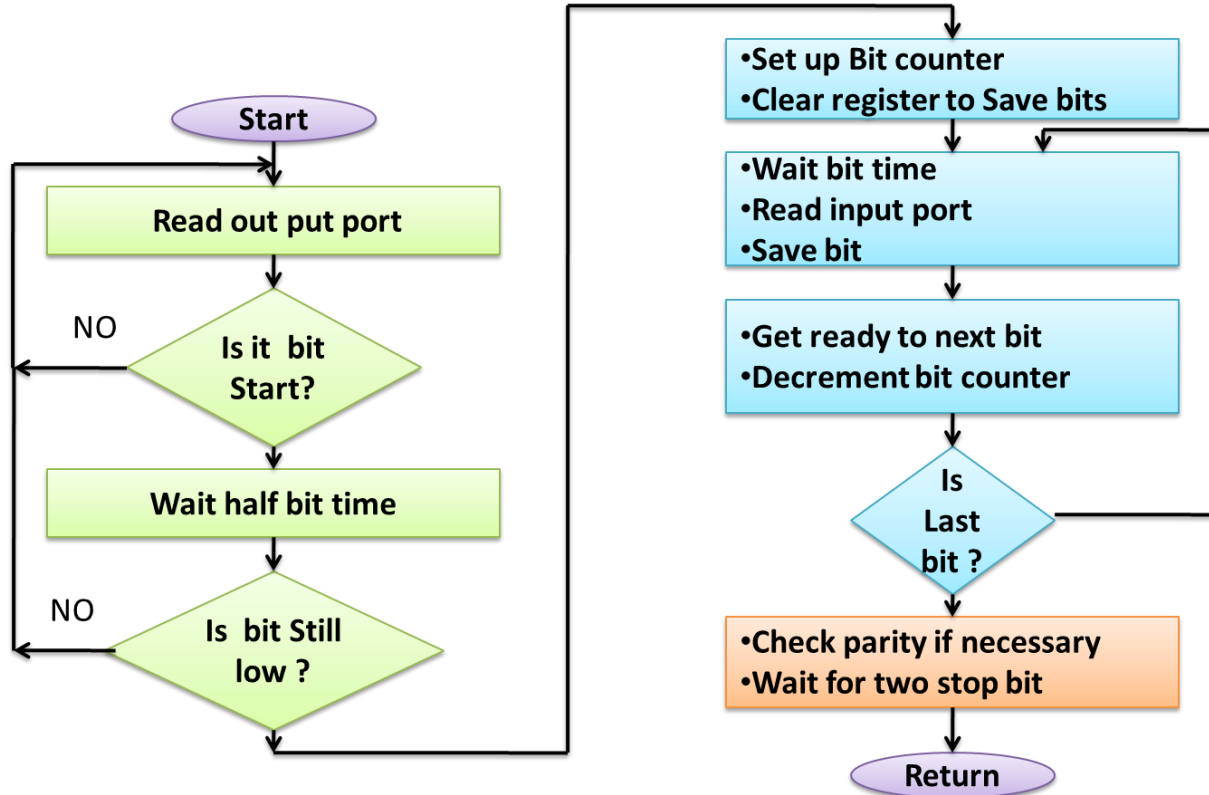
```
EXTRN    DELAY:NEAR  
DPORT    EQU    00H
```

```
CODE     SEGMENT  
ASSUME   CS:CODE
```

```
FIG10_3  PROC     NEAR  
          MOV      CX,10          ;10 bits/char  
          CLC       ;Start bit  
          RCL      AL,1          ;Move to position 0  
TRANS:    OUT      DPORT,AL      ;Transmit bit  
          CALL     DELAY         ;Wait  
          RCR      AL,1          ;Next bit  
          STC       ;Stop bit  
          LOOP     TRANS         ;Do 10 times  
          RET  
FIG10_3  ENDP  
CODE     ENDS  
END
```



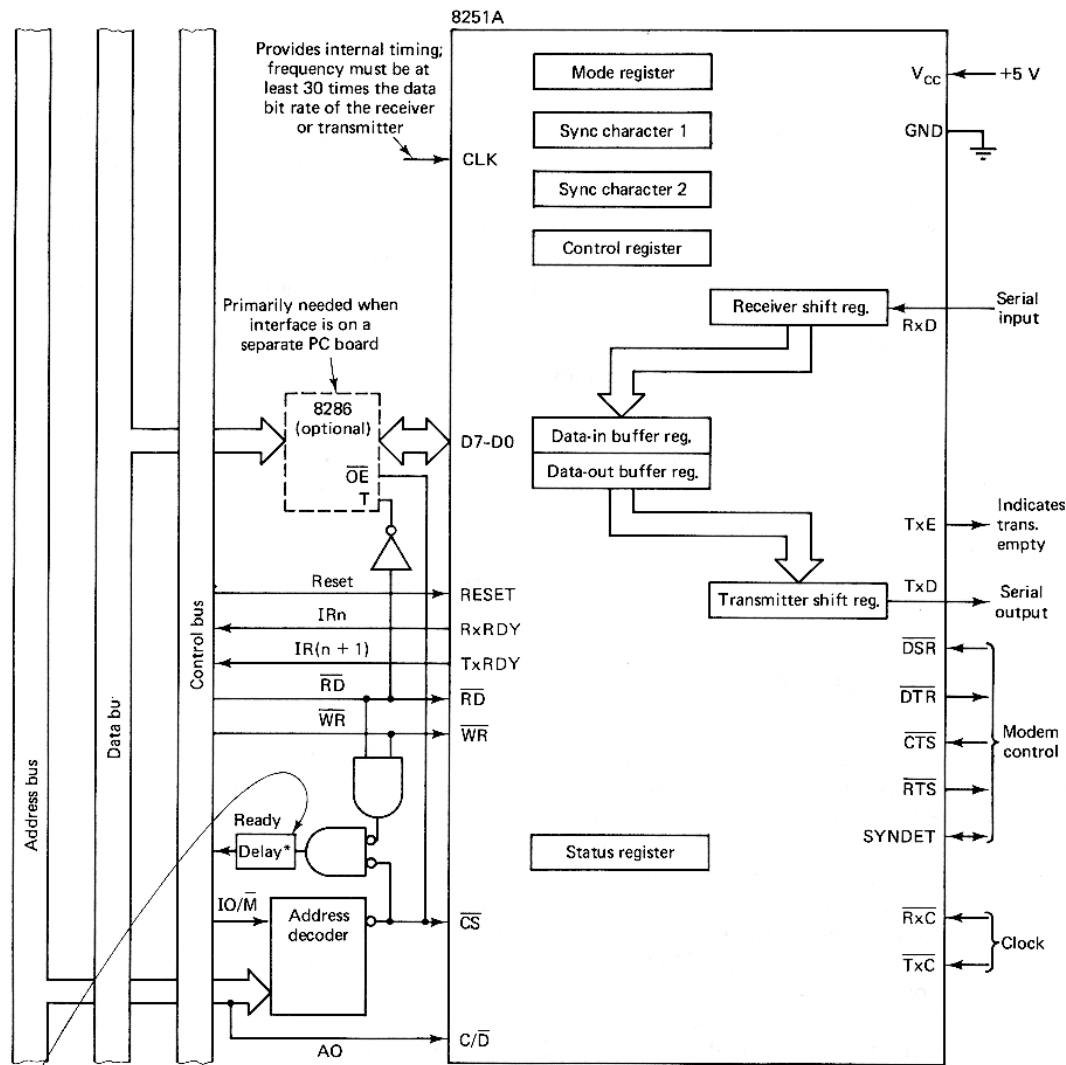
Yazılımsal Seri İletişim - Receive



8251 USART

- USART: universal Synchronous/Asynchronous Receiver/Transmitter

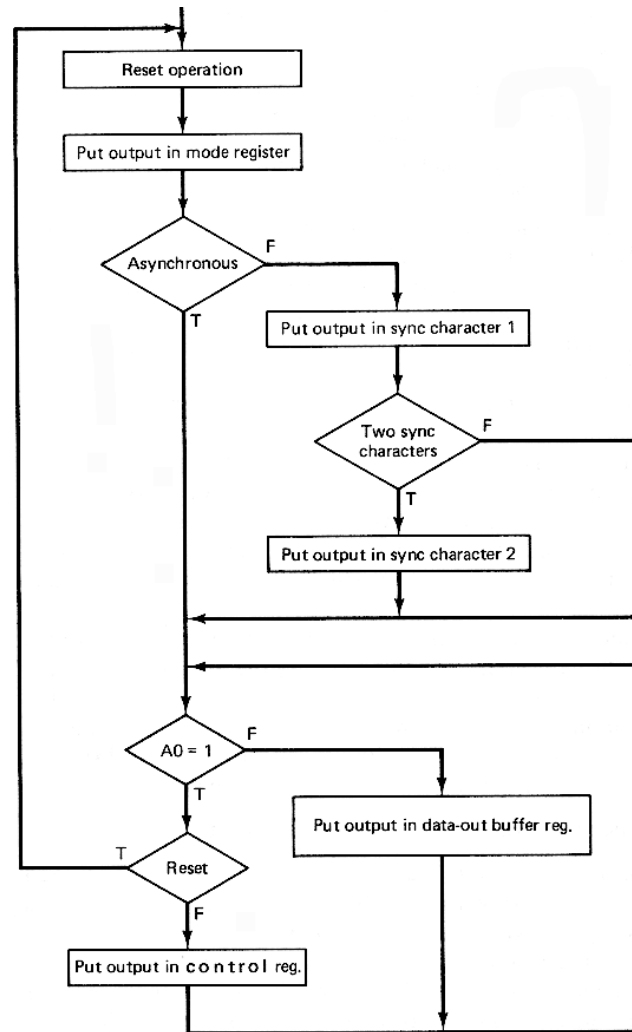
8251



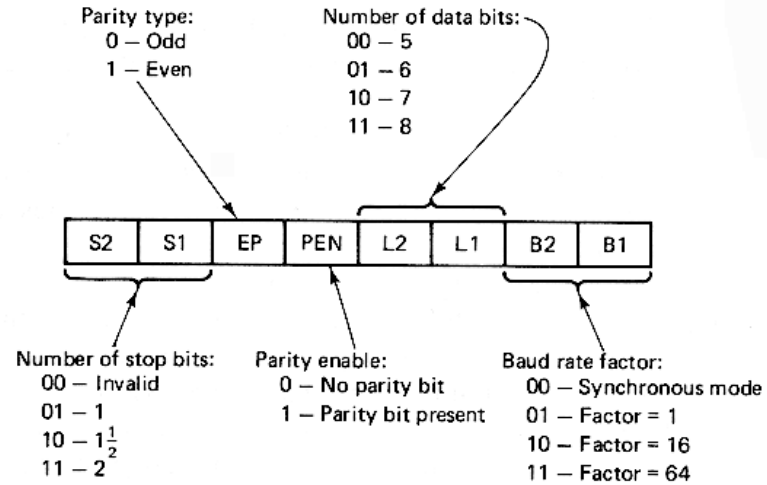
8251 Yazmaçlar

\overline{CS}	C/\overline{D}	\overline{RD}	\overline{WR}	Anlam
1	X	X	X	Data-bus tristate
0	X	1	1	Data-bus tristate
0	1	0	1	Status \rightarrow CPU
0	1	1	0	Mode, Control, Sync \leftarrow CPU
0	0	0	1	Data \rightarrow CPU
0	0	1	0	Data \leftarrow CPU

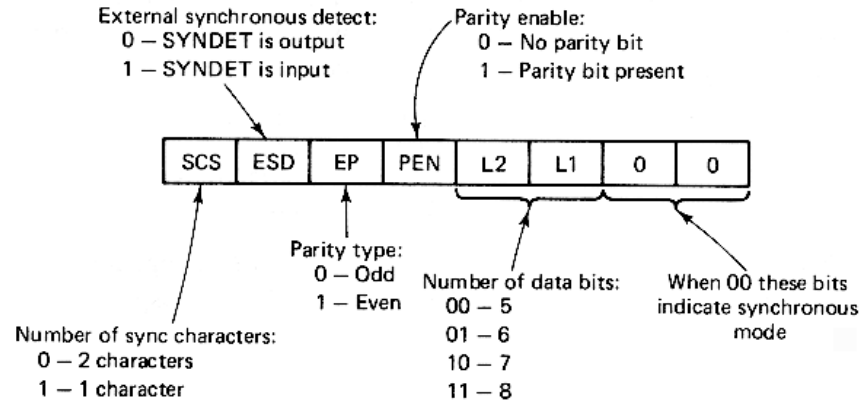
8251 ilk Ayarlama



Mod Yazmacı

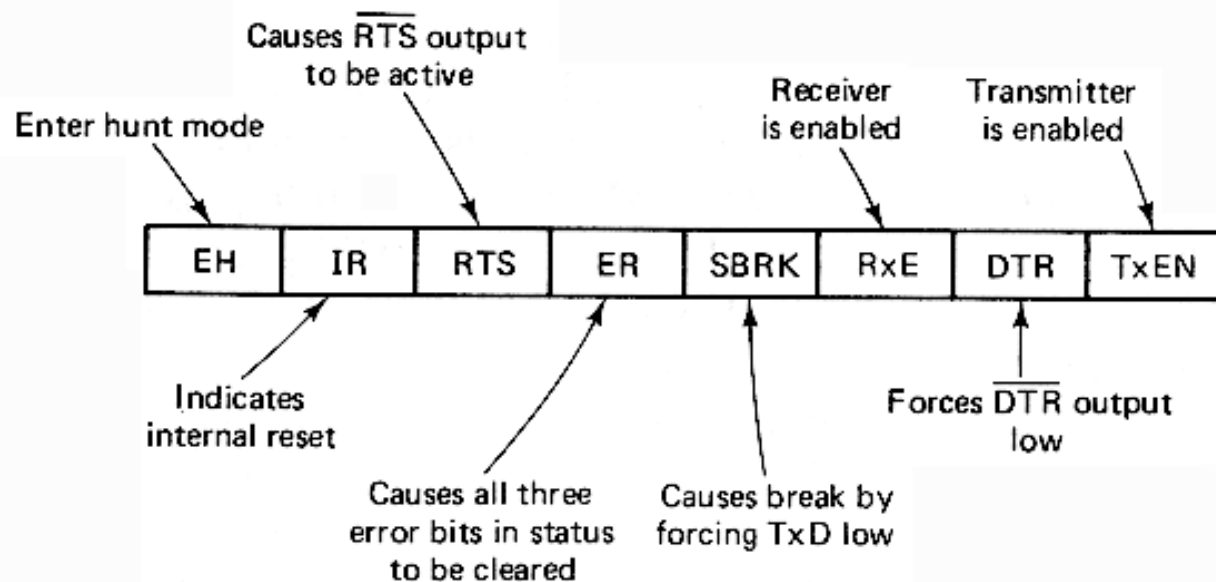


(a) Asynchronous mode



(b) Synchronous mode

Kontrol Yazmacı



Note: In all cases action is taken when the bit is set to 1.

Durum Yazmacı

