

# Mikroişlemci Sistemleri

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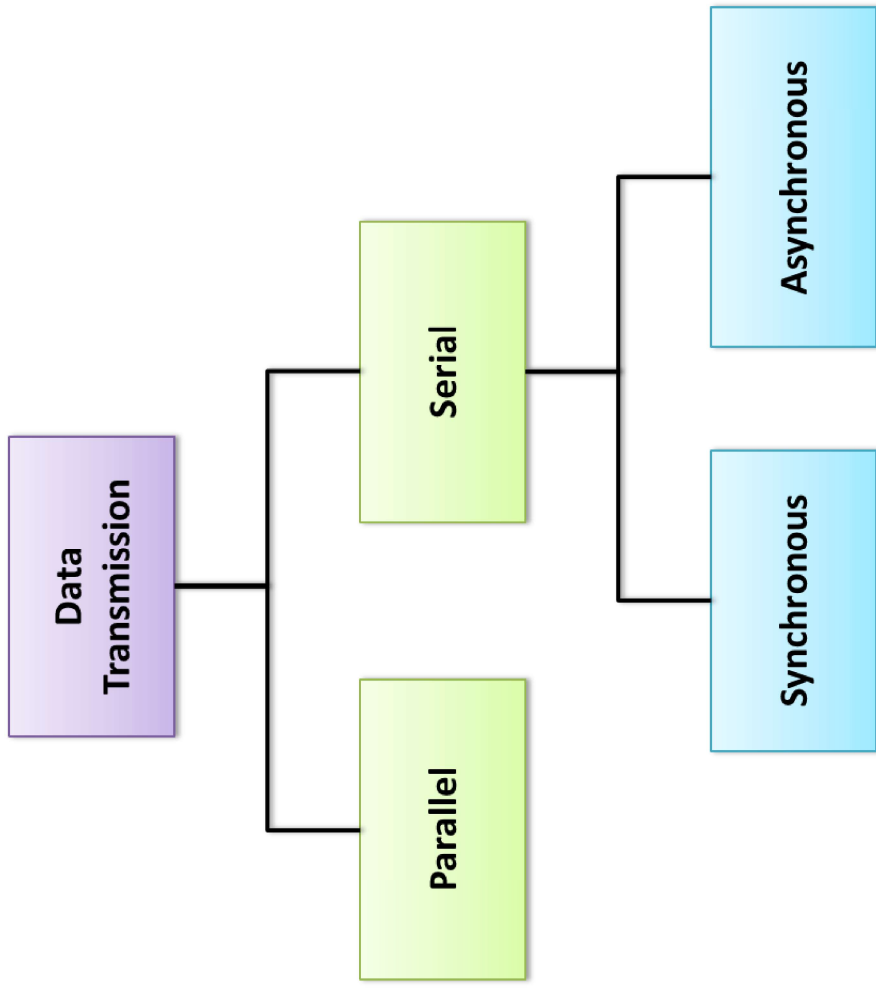
YTÜ-CE

# Ders-5 Konular

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

# Veri İletişimi: Seri-Paralel

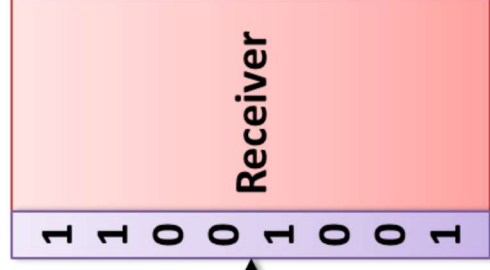
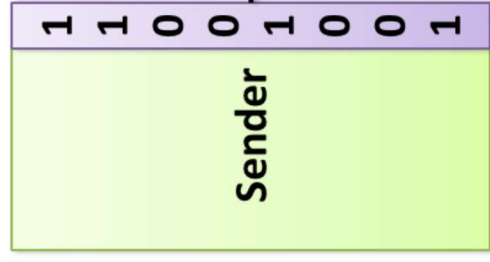
- Seri
  - Daha az maliyet
  - Daha yavaş
- Paralel
  - Daha hızlı
  - Kısa mesafeler için



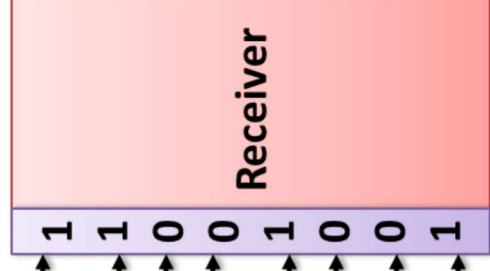
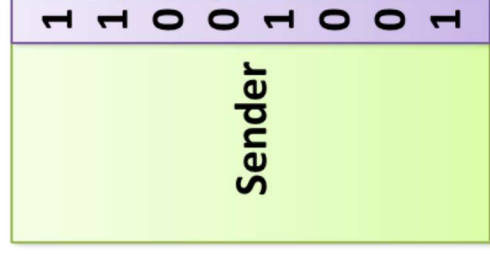
# Veri iletişimi: Seri-Paralel

Parallel to serial  
Conversion

Serial to parallel  
Conversion



Serial Transmission

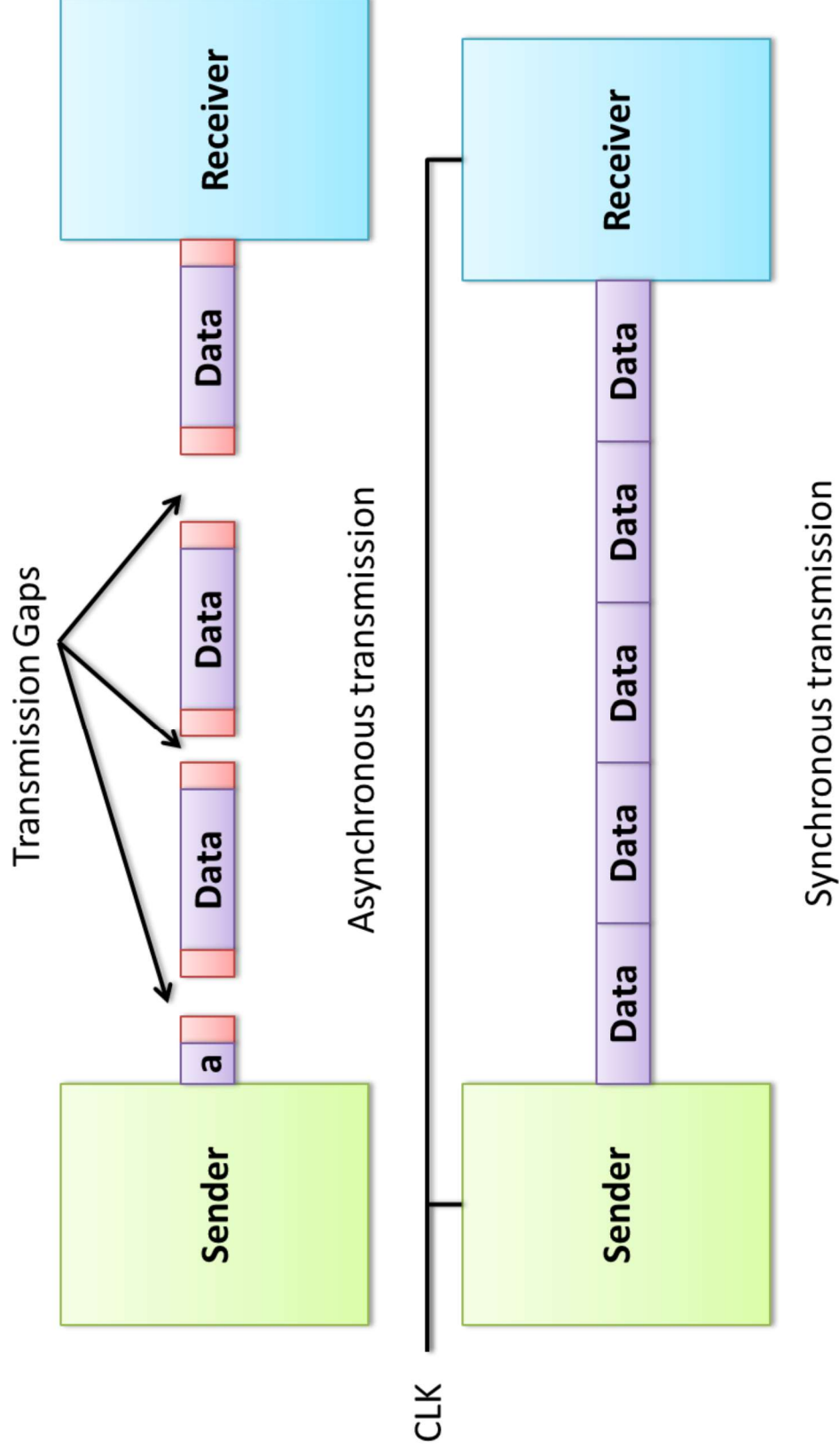


Parallel Transmission

# Seri İletişim

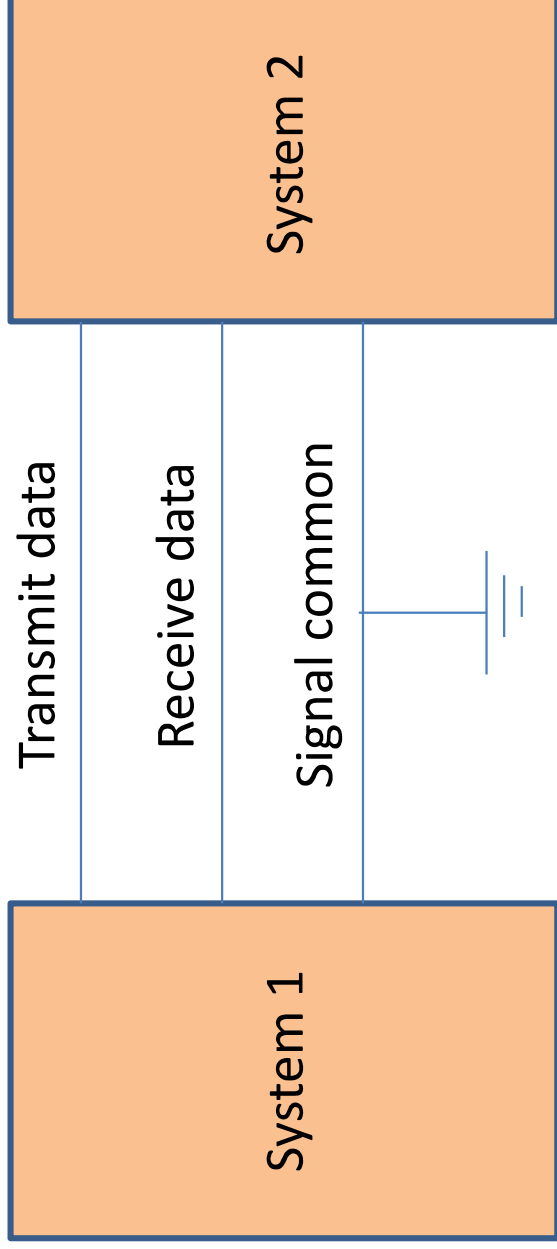
- Synchronous (Senkron)
  - Sender and receiver must synchronize
    - Done in hardware using phase locked loops (PLLs)
  - Block of data can be sent
  - More efficient : Less overhead than asynchronous transmission
  - Expensive
- Asynchronous (Asenkron)
  - Each byte is encoded for transmission
  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

# Seri İletişim



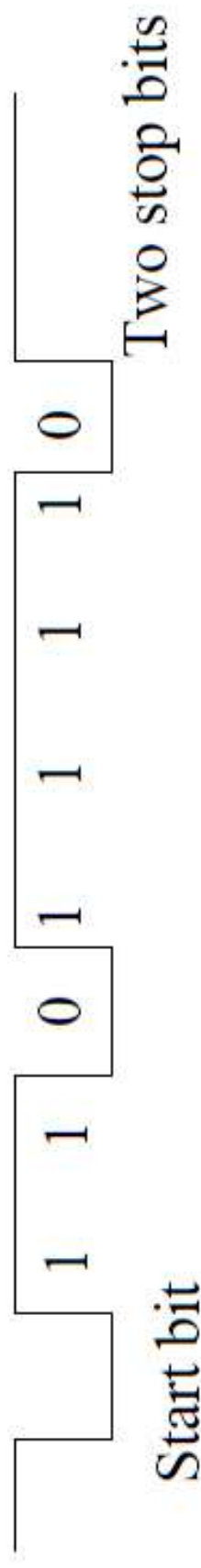
# Asynchronous Comm.

- Ortak bir CLK veya senkron işaretine ihtiyaç duymaz



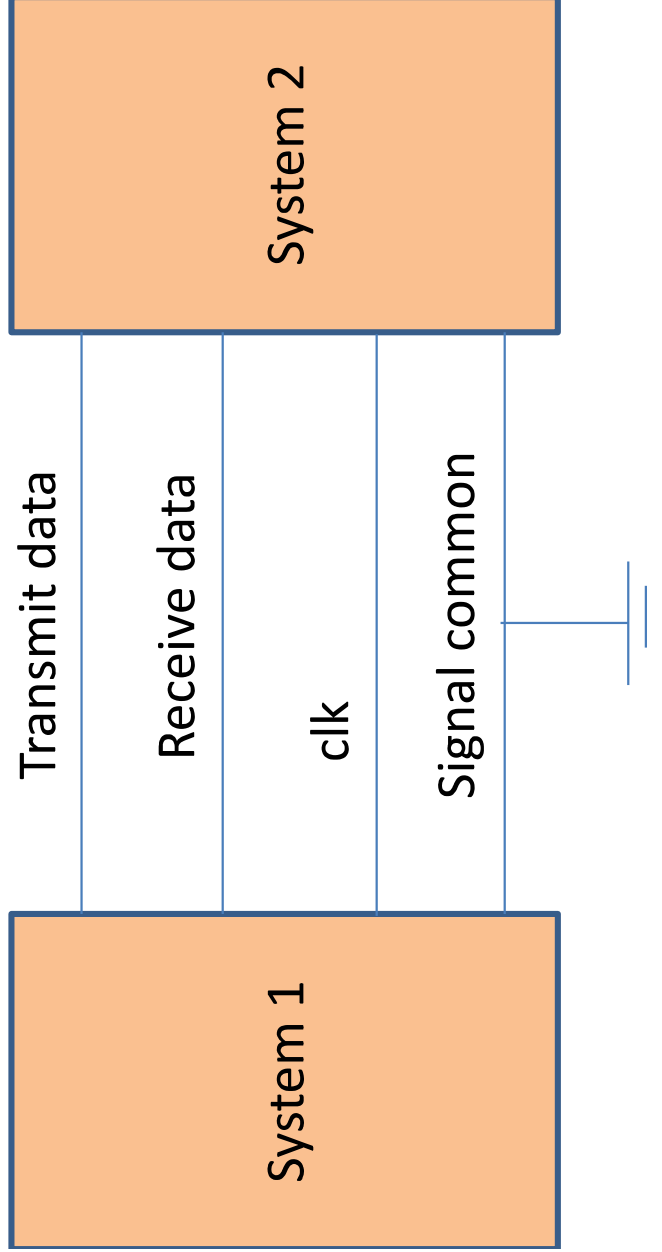
# Asynchronous Comm.

- 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.

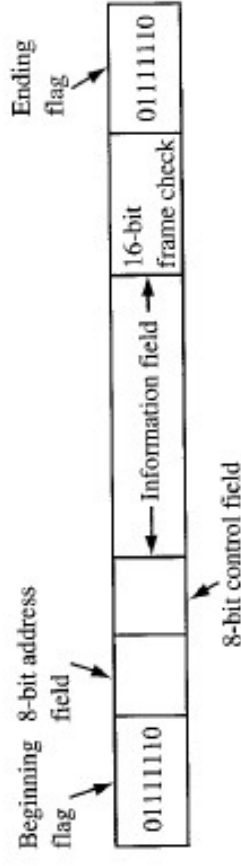




# Synchronous Comm.



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

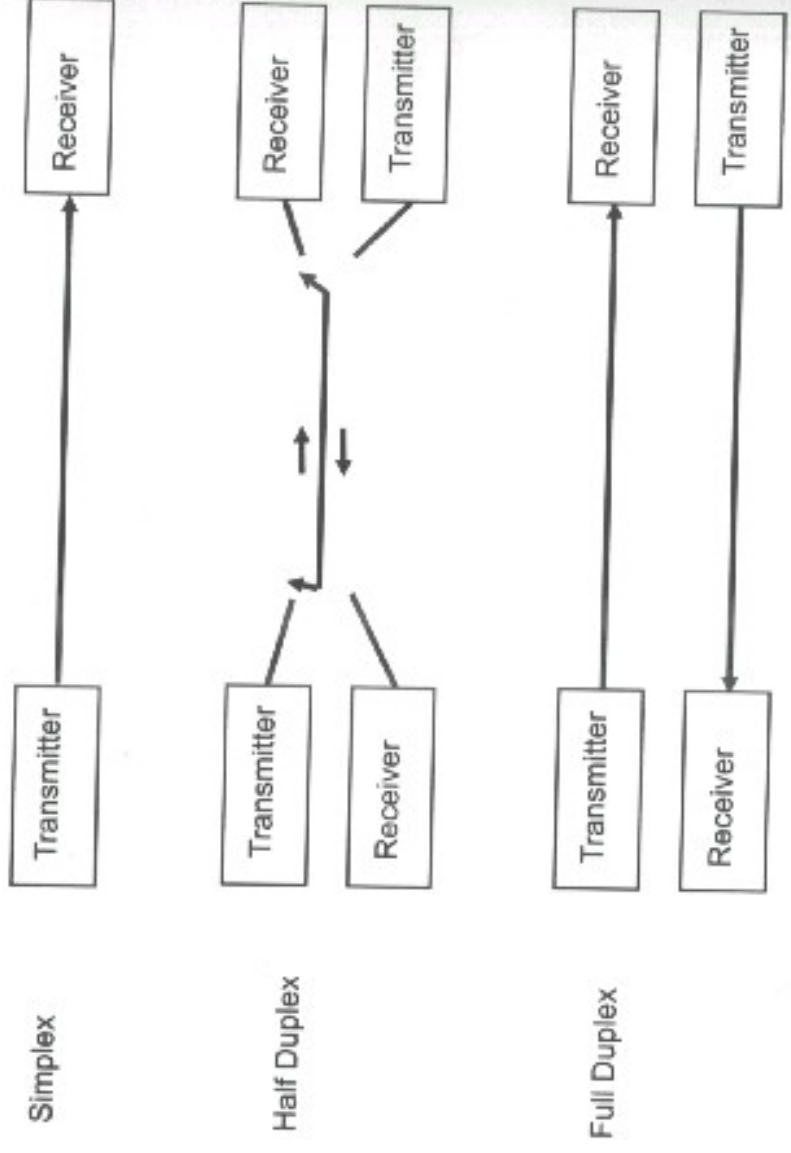


**Serial Data Link Control:** Developed by IBM used for computer networking (Token Ring). After Flag byte the network address is sent. Control Byte stores information about sequence of data etc. Data is thousands of bits. 16 bit field is used for error checking.

# 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



# 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  $1/1200=0.83\text{ms}$

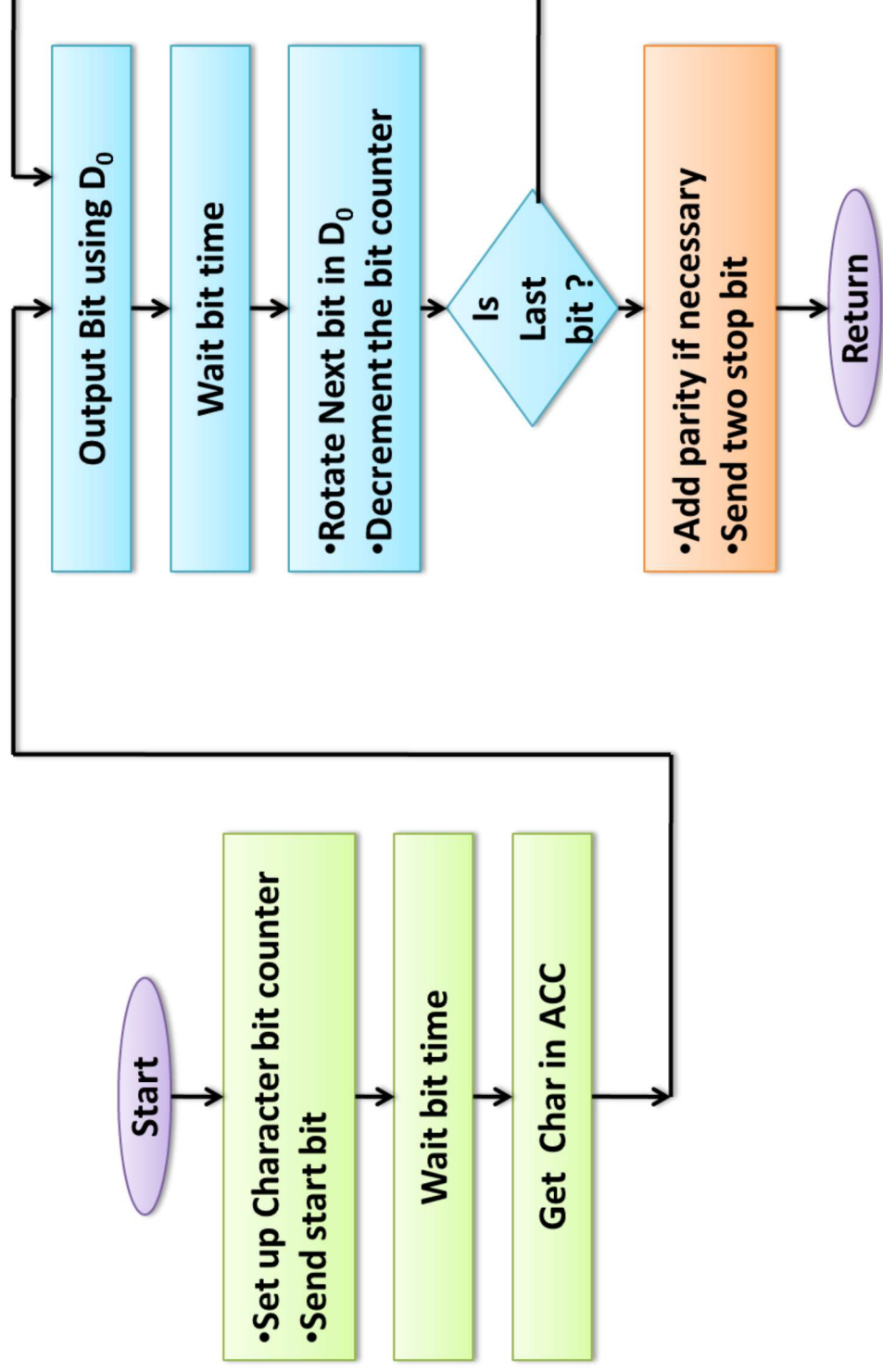
# Örnek

- 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**
  - Remainder 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.

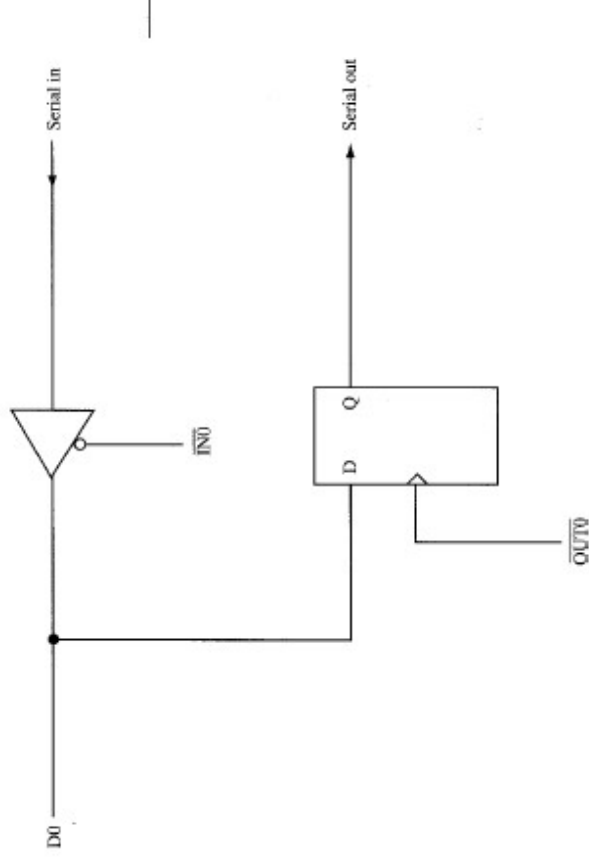
;Destroys: AL,CX,flags.

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

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

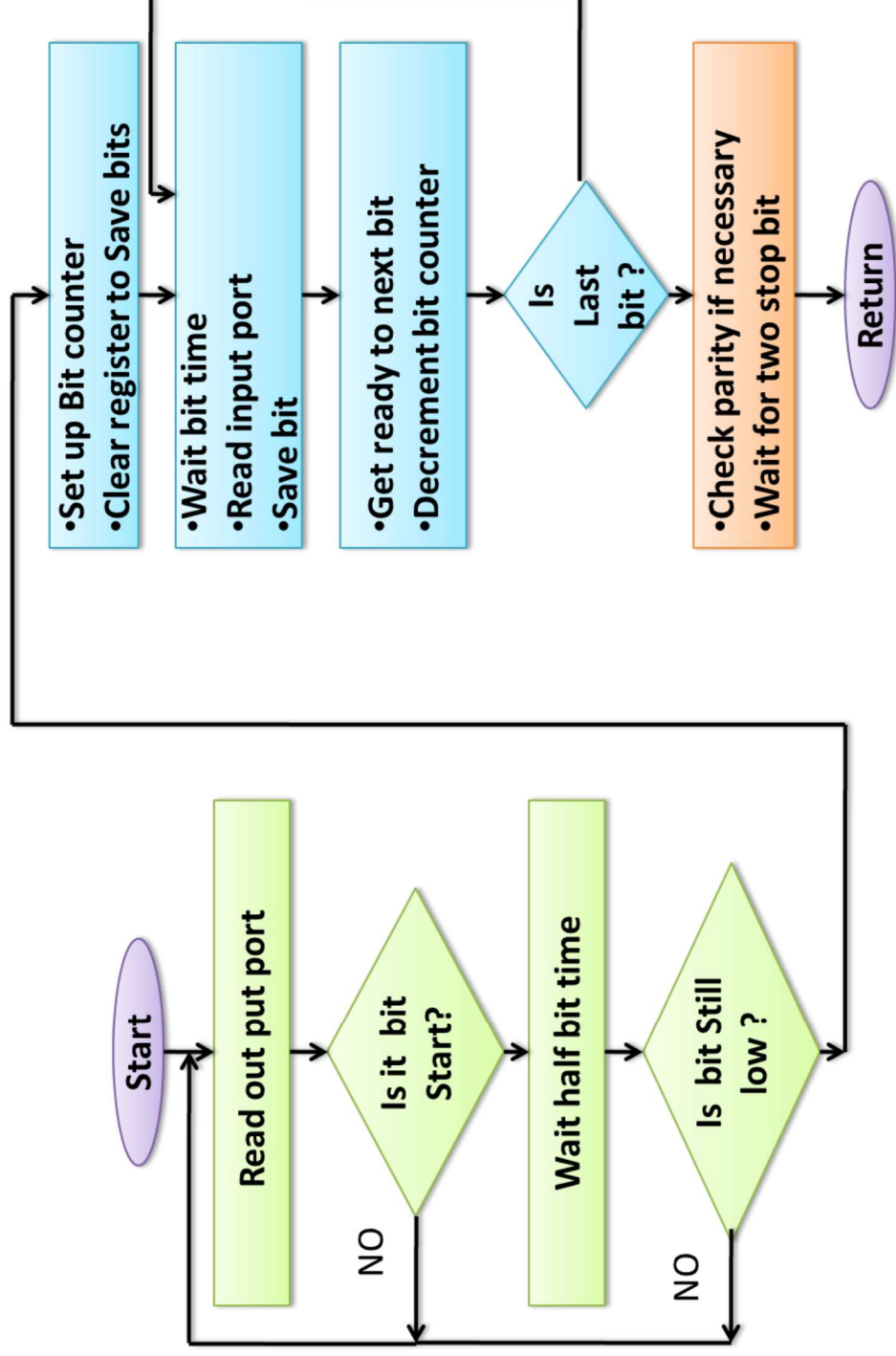
```
FIG10_3  PROC          NEAR
      MOV     CX,10      ;10 bits/char
      CLC
      RCL     AL,1        ;Start bit
      OUT     DPORT,AL    ;Move to position 0
      CALL    DELAY       ;Transmit bit
      RCR     AL,1        ;Wait
      STC
      LOOP    TRANS       ;Next bit
      RET         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

```
FIG10_3  ENDP
CODE     ENDS
END
```





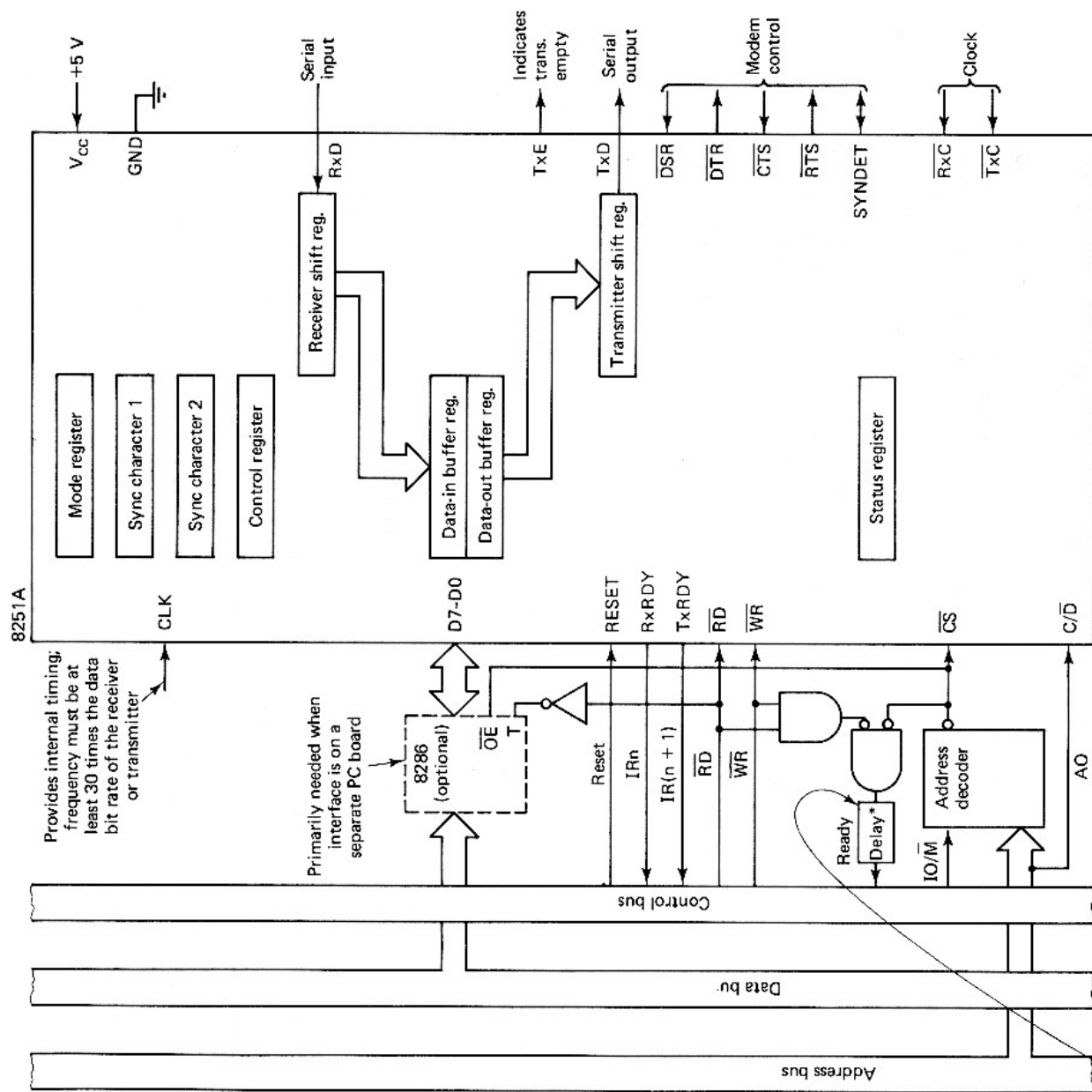
# Yazılımsal Seri İletişim - Receive



# 8251 USART

- USART: universal Synchronous/Asynchronous Receiver/Transmitter

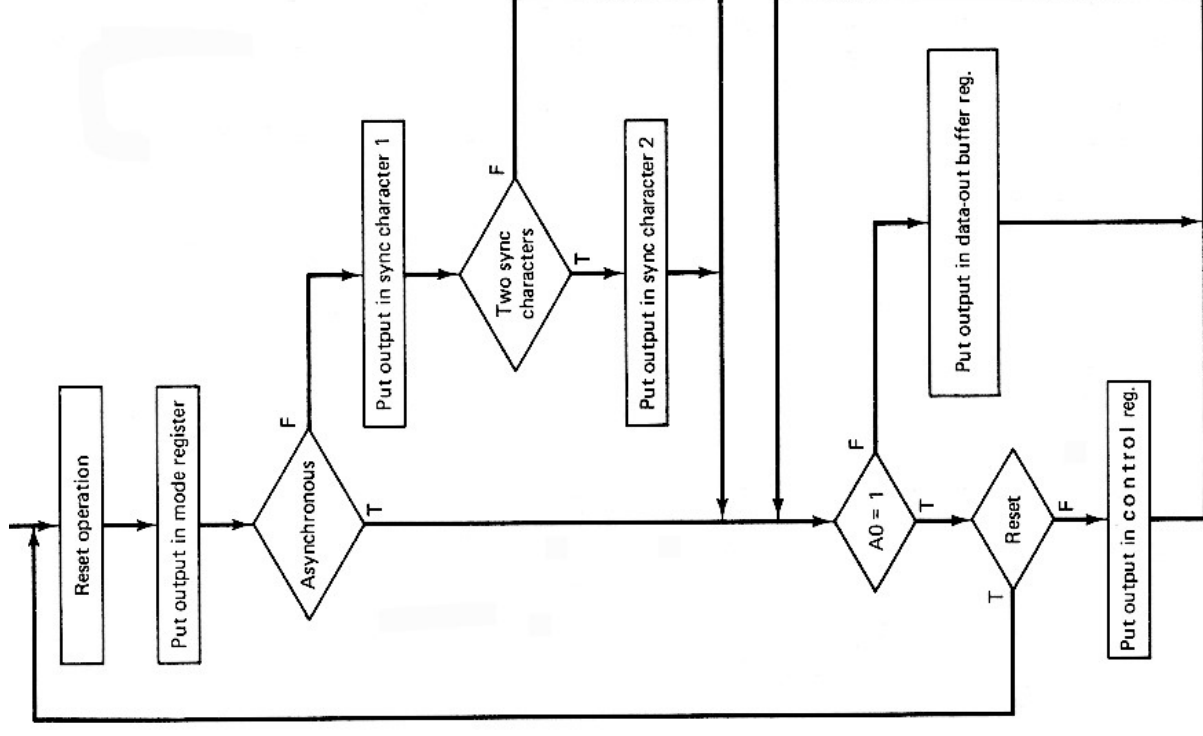
# 8251



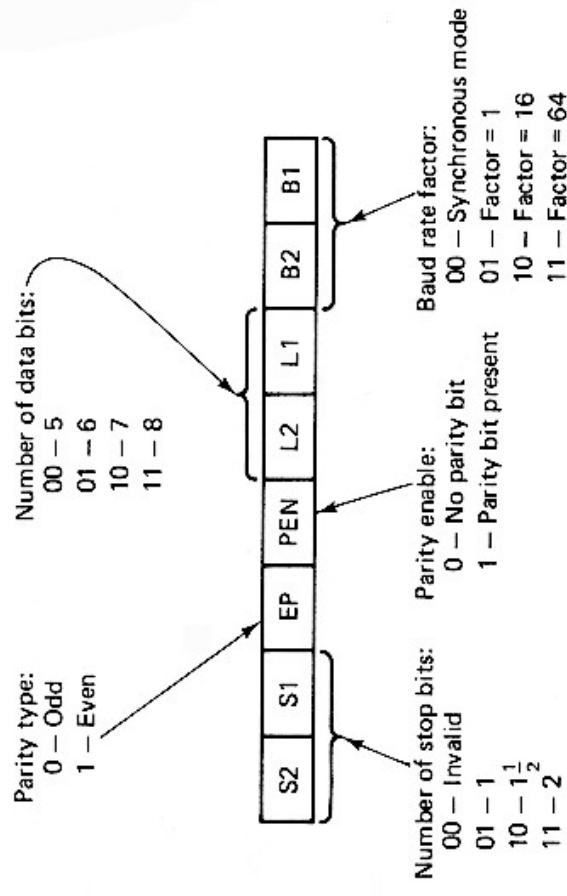
# 8251 Yazmaçlar

$\overline{CS}$	$C/\overline{D}$	$\overline{RD}$	$\overline{WR}$	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

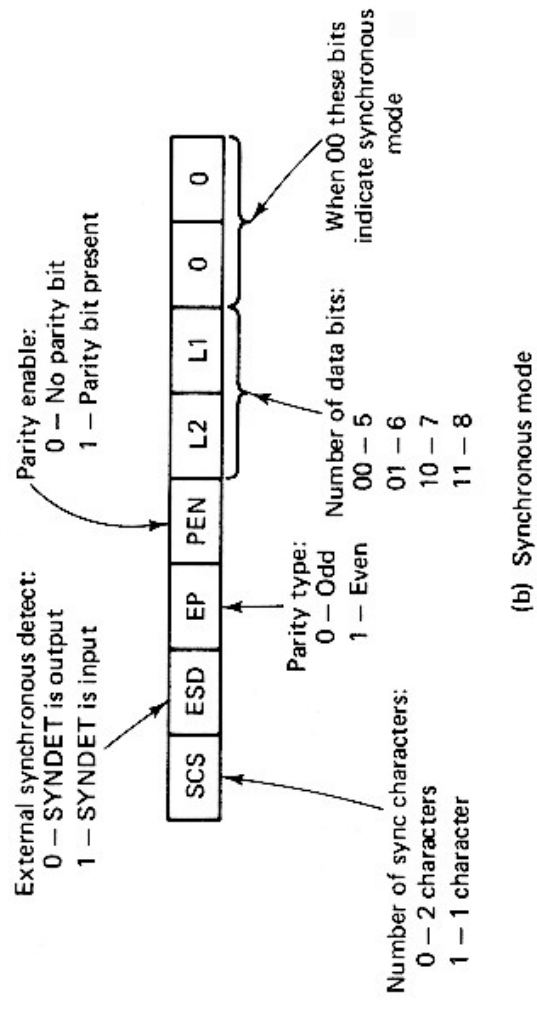
# 8251 ilk Ayarlama



# Mod Yazmacı

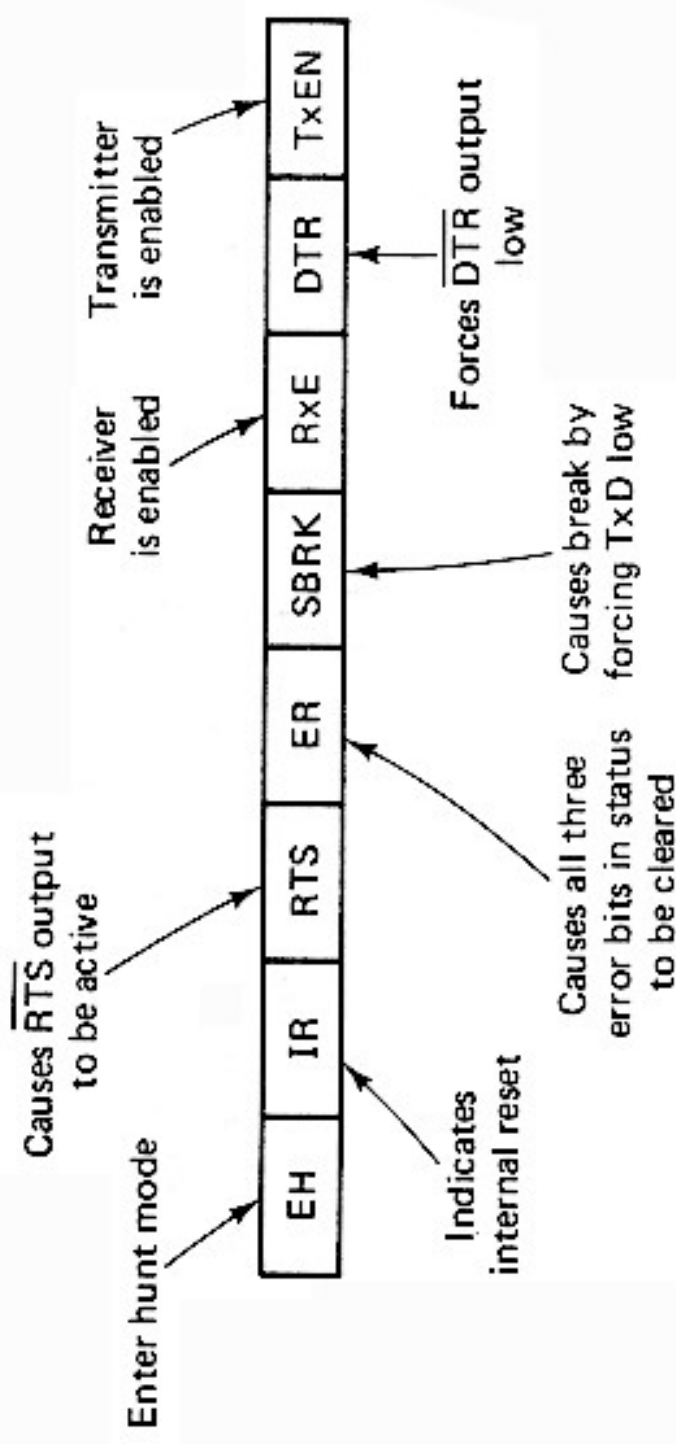


(a) Asynchronous mode



(b) Synchronous mode

# Kontrol Yazmacı



# Durum Yazmacı

