

show a transmit function that handles 9-bit characters. For the assembly code, the data to be sent is assumed to be stored in registers R17:R16.

Assembly Code Example⁽¹⁾⁽²⁾

```

USART_Transmit:
    ; Wait for empty transmit buffer
    sbis UCSRnA, UDREn
    rjmp USART_Transmit
    ; Copy 9th bit from r17 to TXB8
    cbi UCSRnB, TXB8
    sbrc r17, 0
    sbi UCSRnB, TXB8
    ; Put LSB data (r16) into buffer, sends the data
    out UDRn, r16
    ret

```

C Code Example⁽¹⁾⁽²⁾

```

void USART_Transmit( unsigned int data )
{
    /* Wait for empty transmit buffer */
    while ( !( UCSRnA & (1<<UDREn)) )
        ;
    /* Copy 9th bit to TXB8 */
    UCSRnB &= ~(1<<TXB8);
    if ( data & 0x0100 )
        UCSRnB |= (1<<TXB8);
    /* Put data into buffer, sends the data */
    UDRn = data;
}

```

- Notes:
1. These transmit functions are written to be general functions. They can be optimized if the contents of the UCSRnB is static. For example, only the TXB8 bit of the UCSRnB Register is used after initialization.
 2. See "Code Examples" on page 7.

The ninth bit can be used for indicating an address frame when using multi processor communication mode or for other protocol handling as for example synchronization.

17.6.3 Transmitter Flags and Interrupts

The USART Transmitter has two flags that indicate its state: USART Data Register Empty (UDREn) and Transmit Complete (TXCn). Both flags can be used for generating interrupts.

The Data Register Empty (UDREn) Flag indicates whether the transmit buffer is ready to receive new data. This bit is set when the transmit buffer is empty, and cleared when the transmit buffer contains data to be transmitted that has not yet been moved into the Shift Register. For compatibility with future devices, always write this bit to zero when writing the UCSRnA Register.

When the Data Register Empty Interrupt Enable (UDRIEn) bit in UCSRnB is written to one, the USART Data Register Empty Interrupt will be executed as long as UDREn is set (provided that global interrupts are enabled). UDREn is cleared by writing UDRn. When interrupt-driven data transmission is used, the Data Register Empty interrupt routine must either write new data to