Figure 9-9 (continued)

: The TX subroutine sends out the byte passed to it in W.
: It returns with Z=1 if ACK occurs.
: It returns with Z=0 if NOACK occurs

TX
movwf TXBUFF ;Save parameter in TXBUFF
btfss STATUS,C
rff TXBUFF,F ;Rotate TXBUFF left, through Carry
btfss STATUS,Z
btfsc STATUS,2 ;Until Z=1
call BitOut ; send carry bit, then clear carry bit
btfsc STATUS,7
goto TX_1 ; then do it again
call BitIn ;Read acknowledge bit into bit 0 of RXBUFF
movlw B'00000001' ;Check acknowledge bit
andwf RXBUFF,W ;Z=1 if ACK, Z=0 if NOACK
return

: The RX subroutine receives a byte from the I2C bus into W, using RXBUFF buffer
: Call RX with bit 7 of RXBUFF clear for ACK.
: Call RX with bit 7 of TXBUFF set for NOACK.

RX
movlw B'00000001' ;Rotate a one through RXBUFF to the carry bit to count bits
movwf RXBUFF
RX_1
rff RXBUFF,F ;Shift previous bits left
call BitIn ;Read a bit from SDA into bit 0 of RXBUFF
btfsc STATUS,7 ;C=1 yet;
goto RX_1 ;No, do it again
rff TXBUFF,F ;Move bit 7 of TXBUFF to Carry bit
call BitOut ;And from there to SDA as acknowledgment
movwf RXBUFF,W ;Put received byte into W
return

: The BitOut subroutine transmits, then clears, the Carry bit

BitOut
bcf INDF, SDA ;Copy Carry bit to SDA
btfsc STATUS, C
btfsc INDF, SDA
bcf INDF, SCL ;Pulse clock line
delay 0.1, 2 ;T:HIGH
bcf INDF, SCL
bcf STATUS, C ;Clear Carry bit
return

: The BitIn subroutine receives one bit into bit 0 of RXBUFF

BitIn
bfs INDF, SDA ;Release SDA line
bfs INDF, SCL ;Drive clock line high
bcf RXBUFF,0 ;Copy SDA to bit 0 of RXBUFF
btfsc RSYNC, SDA
bcf RXBUFF,0
bcf INDF, SCL ;Drive clock line low again

:::::::: End of I2C subroutines :::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

9.5 TEMPERATURE SENSOR

The combination of an analog temperature transducer, an analog-to-digital converter, and an I²C bus interface all in a tiny SO-8 surface-mount package represents a significant contribution to designers.