

```
Freq equ 4 ;Set to 4,10, or 20 for 4MHz, 10MHz, or 20MHz
SDA equ 4 ;I2C serial data bit of PORTC
SCL equ 3 ;I2C serial clock bit of PORTC
```

(a) Equates

```
cblock
.
.
.
DEVADD ;Device's I2C address x 2
INTADD ;Internal address
DATAOUT ;Data to be written into INTADD during a write
DATAIN ;Data to be read from INTADD during a read
TXBUFF ;Buffer for each byte sent by TX
RXBUFF ;Buffer for each byte received by RX
.
.
.
endc
```

(b) Variables

Figure 9-8 I²C equates and variables.

The I2Cin subroutine of Figure 9-9 is similar to the I2Cout subroutine. It calls the Start subroutine and then the TX subroutine twice to send DEVADD (plus R/W = 0) and INTADD. Then it calls the Start subroutine to restart, the TX subroutine to send DEVADD (plus R/W = 1), the RX subroutine to read back a byte (with NOACK), and finally the Stop subroutine.

9.4 DAC OUTPUT

Two digital-to-analog converter outputs are easily added to a PIC with the MAX518 eight-pin DIP or SO-8 surface-mount part shown in Figure 9-10. Each output channel produces an output voltage that ranges from 0 V up to 255/256^{ths} of the power supply voltage, giving roughly 20-mV output increments. An output of 2.50 V will appear on the OUT0 pin if the following three bytes are sent to the chip:

```
B'01011000' B'00000000' B'10000000'
```

An output of 1.25 V will appear on the OUT1 pin following

```
B'01011000' B'00000001' B'01000000'
```

The MAX518 chip includes a power-on reset circuit that drives the two outputs to 0 V initially. Because the MAX518 may come out of reset after the PIC chip comes out of reset, the MAX518 may ignore commands sent to it immediately after the PIC comes out of reset.

The two address inputs, AD1 and AD0, provide an adjustable part of the chip's I²C address. With 5 bits fixed at 01011 and two adjustable bits, it is possible to connect four MAX518 chips to a PIC. Each chip must have its AD1 and AD0 pins tied to a different combination of +5 V and GND. The four 7-bit addresses become B'0101100', B'0101101', B'0101110', and B'0101111'.

```
;;;;;;;; I2C su
;
; The I2Cout s

I2Cout
call
movf
call
movf
call
movf
call
movf
call
return

; The I2Cin su
; transfers ou

I2Cin
call
movf
call
movf
call
call
movf
iorlw
call
bsf
call
movwf
call
return

; The Start su
; condition on
; The ReStart

Start
movlw
movwf
bcf
bcf
movlw
movwf

ReStart
bsf
bsf
delay
bcf
delay
bcf
return

; The Stop sub

Stop
bcf
bsf
delay
bsf
return
```

Figure 9-9 I²C