CODE: Generator and Detector Synchronization Signal Generation

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#include "p33fxxxx.h"

#define MAX_CYCLES 40
#define COUNT_2_LSB 575
#define COUNT_1_LSB 615


#define COUNT_3 39
int  counter0, counter1, counter2, loop;
int counter;
char value[1300];

void init_hwd()
{
  PLLFBDbits.PLLDIV = 30;                   // pll feedback divider = 40;
  CLKDIVbits.PLLPRE = 2;                    // pll pre divider = 2
  CLKDIVbits.PLLPOST = 0;                   // pll post divider = 2

  //Timer 2 AND 3 -> 32 BIT TIMER MODE
  IFS0bits.T2IF = 0;
  IEC0bits.T2IE = 0;

  TMR2 = 0;                             //intial value 0
  PR2 = COUNT_1_LSB;                    //15.4us; period : 750ns = 300*50ns
  T2CONbits.TON = 0;
  T2CONbits.T32 = 0;
  T2CONbits.TSIDL = 0;
  T2CONbits.TGATE = 0;
  T2CONbits.TCKPS = 0;                  //prescalar 1:1
  T2CONbits.TCS = 0;                    //using internal clock
  //IPC1bits.T2IP = 7;                  //highest priority interrupt


  TMR4 = 0;                             //intial value 0
  PR4 = COUNT_2_LSB;                    //14.4us; period : 750ns = 300*50ns
  T4CONbits.TON = 0;
  T4CONbits.T32 = 0;
  T4CONbits.TSIDL = 0;
  T4CONbits.TGATE = 0;
  T4CONbits.TCKPS = 0;                  //prescalar 1:1
  T4CONbits.TCS = 0;                    //using internal clock
  TMR3 = 0;                             //intial value 0
  PR3 = COUNT_3;                         //1us; period : 750ns = 300*50ns
  T3CONbits.TON = 0;
  T3CONbits.TSIDL = 0;
  T3CONbits.TGATE = 0;
  T3CONbits.TCKPS = 0;                  //prescalar 1:1
  T3CONbits.TCS = 0;                    //using internal clock

  TMR5 = 0;                             //intial value 0
  PR5 = COUNT_2_LSB;                    //1us; period: 750ns = 300*50ns
  T5CONbits.TON = 0;
  T5CONbits.TSIDL = 0;
  T5CONbits.TGATE = 0;
  T5CONbits.TCKPS = 0;                  //prescalar 1:1
  T5CONbits.TCS = 0;                    //using internal clock

  //make the RE0 pin as an output pin and initially it's output is logic level 0
  TRISEbits.TRISE0 = 0;                 //1ms signal
  LATEbits.LATE0 = 0;
```

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  TRISEbits.TRISE1 = 0;                //750ns signal
  LATEbits.LATE1 = 0;

}


void __attribute__((__interrupt__, no_auto_psv)) _T5Interrupt(void)
{
  IFS1bits.T5IF = 0;
  LATEbits.LATE0 = 0;
  T5CONbits.TON = 0;
  IEC1bits.T5IE = 0;
}


void __attribute__((__interrupt__, no_auto_psv)) _T3Interrupt(void)
{

  IFS0bits.T3IF = 0;
  ++counter1;

  if(LATEbits.LATE1 == 1)
      LATEbits.LATE1 = 0;
  else
      LATEbits.LATE1 = 1;

  if(counter1 == value[loop]){
      T3CONbits.TON = 0;
      LATEbits.LATE1 = 0;
      IEC0bits.T3IE = 0;
      ++loop;
      counter1 = 0;
  }

  IFS0bits.T3IF = 0;
}

void __attribute__((__interrupt__, no_auto_psv)) _T4Interrupt(void)
{
  IFS1bits.T4IF = 0;
  T4CONbits.TON = 0;
  IFS1bits.T5IF = 0;
  T5CONbits.TON = 1;
  IEC1bits.T5IE = 1;

  IEC0bits.T2IE = 1;
  LATEbits.LATE1 = 1;
  T2CONbits.TON = 1;
  LATEbits.LATE0 = 1;
  T3CONbits.TON = 1;
  IEC0bits.T3IE = 1;

}


void __attribute__((__interrupt__, no_auto_psv)) _T2Interrupt(void)
{

  IFS0bits.T2IF = 0;
  ++counter0;
  if(counter0 == 64){
      T2CONbits.TON = 0;
      T3CONbits.TON = 0;
```

```
      T4CONbits.TON = 1;
      IEC1bits.T4IE = 1;
      IEC0bits.T2IE = 0;
      IEC0bits.T3IE = 0;
      LATEbits.LATE1 = 0;
      counter1 = 0;
      counter0 = 0;
      loop = 0;
  }
  else{
      LATEbits.LATE1 = 1;
      T3CONbits.TON = 1;
      IEC0bits.T3IE = 1;
  }
}

void assign_value(){

  int i;
  value[0] = 15;
  value[1] = 13;
  value[2] = 11;
  value[3] = 9;
  value[4] = 7;
  value[5] = 5;
  value[6] = 3;
  value[7] = 1;
  for(i = 8;i < 64; i++)
      value[i] = 1;

}



int main(){

  init_hwd();
  assign_value();
  counter1 = 0;
  counter2 = 0;
  loop = 0;
  IEC0bits.T3IE = 1;
  IEC0bits.T2IE = 1;
  IEC1bits.T5IE = 1;
  T2CONbits.TON = 1;
  T3CONbits.TON = 1;
  T5CONbits.TON = 1;
  LATEbits.LATE1 = 1;
  LATEbits.LATE0 = 1;
  while(1);

  return 0;
}
```