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Mixing layer running incubator (MIRI): an instrument for incubating samples while moving vertically in the mixing layer

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Web Appendix 1

```
; MIRI

PROCESSOR 16F84A
RADIX DEC
INCLUDE "P16F84A.INC"
ERRORLEVEL -302
;Setup of PIC configuration flags
;XT oscillator
;Disable watch dog timer
;Enable power up timer
;Disable code protect
_ _ CONFIG 0×3FF1

UMP EQU 0
DMP EQU 1

;UMP = Upward Moving Pump (pin 6
;RB0)
;DMP = Downward Moving Pump (pin
;7 RB1)

DMPS EQU 2
UMPS EQU 3

;DMPS = Switch Downward Moving
;Pump (pin 8 RB2)
;UMPS = Switch Upward Moving Pump
(pin 9 RB3)

ORG 0×0C
Count RES 2

;Reset Vector
;Start point at CPU reset

ORG 0×00

bsf STATUS,RP0
;Swap to register Bank 1
movlw B'00011111'
movwf TRISA
;set pin RA
movlw B'11111100'
movwf TRISB
;set pin RB

bcf STATUS,RP0
;Swap to register Bank 0

bcf PORTB,DMP
;SwitchOFF Downward
;Moving Pump

bcf PORTB,UMP
;SwitchOFF Upward
;Moving Pump

CALL Delay5s
CALL Delay5s
;Generate 10s delay line

CheckDMPS

bcf PORTB,DMP
;SwitchOFF Downward
;Moving Pump

bsf PORTB,UMP
;SwitchON Upward
;Moving Pump

CALL Delay5s
CALL Delay5s
;Generate 10s delay line

btfss PORTB, DMPS
;If bit switch DMPS is 0
;the next instruction is
;executed

goto Swap
goto CheckDMPS

Swap

bcf PORTB,UMP
;SwitchOFF Upward
;Moving Pump

bsf PORTB,DMP
;SwitchON Downward
;Moving Pump

CheckUMPS
CALL Delay5s
CALL Delay5s
;Generate 10s delay line

btfss PORTB,UMPS
;If bit UMPS is 0 the next
;instruction is executed

goto CheckDMPS
goto CheckUMPS

;Subroutine
;Software delay

Delay
;This subroutine generate
;250ms delay software
clrf Count
clrf Count + 1

DelayLoop
decfsz Count,1
goto DelayLoop
decfsz Count + 1,1
goto DelayLoop

return

Delay5s
;This subroutine generate
;5s delay software
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
call Delay
return
END
```