INTRODUCTION:

There have been many insect repellers used over time, with very few giving good results.

Liquids have personal and environmental impacts and many of the electronic versions are either very bothersome or not very effective.

This extremely simple circuit and approach is actually based on scientific data having to do with the personal life of the common mosquito. The natural enemy of the mosquito is the very fast and effective dragon fly, which can pluck a mosquito from the air before it can hide. Over many generations this fact has been imprinted on these nasty little critters and any time they hear anything that sounds like their mortal enemy, they immediately hide, land, stop moving, freeze up and almost stop breathing to avoid detection.

This means that if we can realistically duplicate the sound of the dragon fly wings in motion, we can convince the ubiquitous mosquito, at least any within hearing distance, to go hide and to not bother us. This works very effectively, is environmentally friendly and in use, is almost unnoticeable, since the dragon fly wings we are simulating are not very noisy to begin with.

APPLICATION OPERATION:

This circuit is extremely simple and very low power. The crystal earphone used with those old crystal radio kits works perfectly in this application, since it draws essentially no power and makes perfect ticking sounds with very simple drive. Note that I am not speaking of the transistor radio earphone that can have impedances as low as 4 ohms, but the crystal earphone. If that is hard to find, any small piezo noise maker can also be used. The clock of the PIC12C508 in this circuit is a low frequency RC circuit since crystals would draw more power than necessary. The RC circuit can be set to a lower frequency than even the typical watch crystal frequency to reduce the total drain to a level that allows months or even years of operation from a lithium or alkaline battery, making the entire unit extremely compact and convenient.

The wing beat of the typical dragon fly appears as bursts of clicks at about 30 Hz as the dragon fly spurts around chasing its dinner. Tests have shown that even a continuous thirty Hz beat is very effective at convincing mosquitoes to hide, so this implementation that creates bursts of about thirty Hz approximately two thirds of a second in length, with about a third second between them, is more effective yet. However, for the more energetic, improvements would include a slight randomizing of both the frequency and the length of the bursts, with the frequency slightly higher at the end of each burst than at the beginning.

Note: The timers are left essentially separate to allow for easy changes to this code to randomize a bit on each number. Doing so makes the result even less bothersome to listen to, as not quite repetitious is less annoying then exactly repetitious. Normal noises will mask this under typical use.

This project can easily lead into discussions of various techniques to produce random or pseudo-random numbers within the framework of a fun and practical little project.
APPENDIX A: SOURCE CODE:

The wing beat portion of the code is shown here, since the setup is straightforward and repetitiously available.

Set up notes for the '508;

Set up for external RC, weak pullups off, internal MCLR, watch dog timer off, no wake up on change.
Set rest of lines as outputs.
Set registers (EQU) for:

GPIO
WINGTIME
BURSTCNT
PAUSECNT

;Wing beat code
movlw .10 ;loads for number in burst
movwf BURSTCNT ;
LOOP1ST
bsf GPIO,GP2 ;does a tic sound
movlw .9 ;preloads counter
movwf WINGTIME ;
LOOP2ND
decfsz WINGTIME,F ;runs loop
goto LOOP2ND ;
bcf GPIO,GP2 ;does next tic sound
movlw .9 ;preloads counter again
movwf WINGTIME ;
LOOP3RD
decfsz WINGTIME,F ;runs this loop
goto LOOP3RD ;
decfsz BURSTCNT,F ;counts number in burst
goto LOOP1ST
movlw .10 ;reloads this counter
movwf BURSTCNT ;

movlw .100 ;loads pause timer
movwf PAUSECNT ;

LOOP4TH
decfsz PAUSECNT,F ;runs quiet pause
goto LOOP4TH ;
goto LOOP1ST ;does it all again, and again