

```

1  =====
2  '
3  '  VERSATILE ENGINE SOUND UNIT
4  '
5  '  PROGRAM 1 OF 4 - SPEED DEMAND PROCESSING
6  '
7  =====
8  '  VERSION 2.0 14th October 2008          © A.F.Bond 2008
9  '
10 '  (ONLY FOR USE IN CONJUNCTION WITH v2.0 SOUND GENERATION MODULES)
11 =====
12 '
13 ' This module manipulates and scales the input signal from a radio control
14 ' receiver prior to generating a 4Khz PWM signal whose duty cycle varies
15 ' in a quasi logarithmic manner with the throttle position. A 25 element lookup
16 ' table defines the control law to take account of the logarithmic nature of
17 ' sound plus the sound generation PIC's fixed processing time overheads which
18 ' occupy an increasingly disproportionate amount of the silent period as the
19 ' engine speed increases. Overall this yields a linear sounding throttle
20 ' response. A bi-directional throttle channel is assumed with neutral/stop based
21 ' on receiving a 1.5mSec pulsewidth. Full ahead therefore relates to a 1mSec
22 ' pulse and full astern to a 2mSec pulse.
23 '
24 ' The code assumes a negative going pulse as the receiver signal has been
25 ' inverted by an input buffer stage - included for compatibility with 2.4GHz
26 ' sets which have insufficient output voltage swing to drive the PICAXE direct.
27 '
28 ' The PWM signal from this module is low pass filtered and the dc level that
29 ' results is used as the control voltage for the sound generation module.
30 '
31 ' NOTE: In the description below be aware that PIN1, PIN2 etc are virtual
32 ' pins and not to be confused with the device's physical pins, which in PICAXE
33 ' parlance are referred to as 'legs'
34 '
35 =====
36
37 'VARIABLE DEFINITIONS
38 symbol speed=w0          'assign variable to speed demand
39
40 'INITIALISATION
41 setfreq m8              'set 8 Mhz operation to yield 5uSec resolution
42
43
44
45 'MAIN LOOP
46 main:
47 'get throttle demand from receiver at "PIN3" and assign it to the variable 'speed'
48 pulsln 3,0,speed
49 'note: 1 to 2 mSec will equate to values for 'speed' in the range 200 to 400
50
51 'now scale speed 0 to 100 in fwd and reverse
52 if speed>300 then
53     speed=speed-300
54 else
55     speed=300-speed
56 end if
57
58 'guard against over-range

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```
59  if speed>100 then
60      speed=100
61  end if
62
63  'quantise speed into 25 values for lookup table
64  speed=speed/4
65
66  'scale logarithmically for use by PWM command (duty cycle 0 to 100% = 0 to 800)
67  lookup
speed,(0,0,126,217,296,365,425,478,524,564,599,629,655,678,698,715,730,743,755,765,774,782,789,795,800)
,w1
68
69
70  'assert PWM train on "PIN2"
71  pwmout 2,199,w1
72
73  goto main
74
75
76
77
78  '=====
79  ' VERSION HISTORY
80  '=====
81
82  'v1.0 1st October 2008
83  'first release
84
85
86  'v2.0 14th October 2008
87  'Logarithmic lookup table function moved from sound generation modules into
88  'this module.This yielded spare program space in the sound generation modules
89  'and allowed a longer lookup table to be used without code execution time
90  'problems as this code only has to run at the transmitter frame rate rather
91  'than the engine revolution rate. The resulting throttle response of the
92  'overall system is thereby much smoother.
93  '=====
```