

Jonathan W. Valvano October 5, 2005, 1 to 1:50pm

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(20) Question 1. 32=256/8
void Convert(void){ // convert Ic to If
    If = (Ic*9)/5 + 256;
}
```

(15) Question 2.

Part a) See view03.pdf CPHA=1, CPOL=1

Part b) The 6812 be a master so it creates the clock

Part c) Enable=PM3(SS), Clock=PM5(Sclk), and Data=PM4 (MOSI)?

(10) Question 3.  $TC5=TC5+1500$  is more accurate because interrupts will be requested exactly every 1ms. If one sample is delayed then the next sample will still be requested at the correct time. The other method,  $TC5=TCNT+1500$ , will drift ahead in time, so that on average the interrupts will be requested at a rate slower than 1000 Hz. In this bad method, if one sample is delayed then all the subsequent samples will be delayed too.

(20) Question 4.

Part a) Aliasing is prevented using an analog 500 Hz LPF, the cutoff is selected at  $\frac{1}{2} f_s$ .

Part b) Put the zeros at 125-Hz and poles near it (but inside).

(5) Question 5. The solid state disk in Lab 25 has internal fragmentation, because there is wasted space used for the links and counters. For example, 2 bytes of every 32-byte block is used by the operating system.

(30) Question 6.  $V_{AD} = 10V_t - 5$

Part a) Step one, rewrite with reference chip voltage shown as a third input.

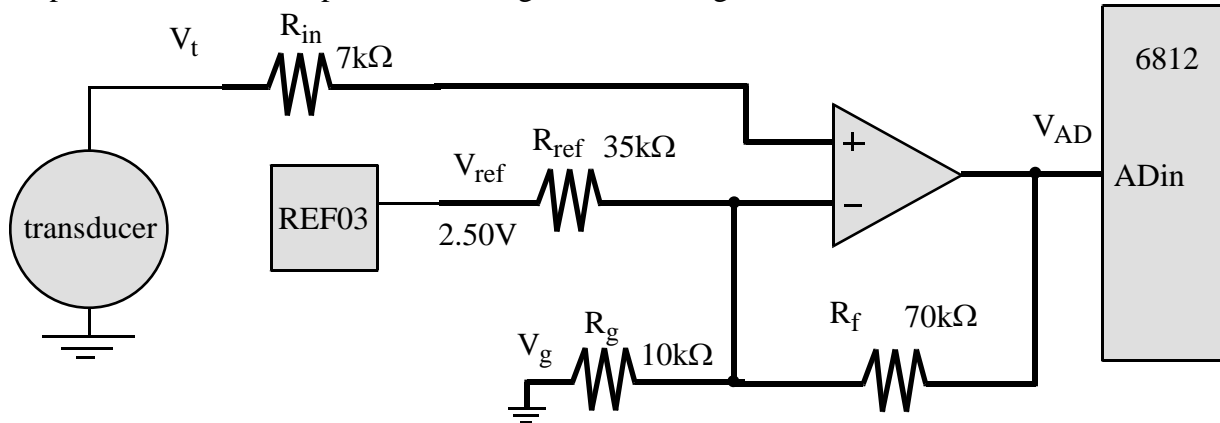
$$V_{AD} = 10 V_t - 2V_{ref}$$

Step two, add a ground as a third input, with a gain such that the sum of the gains is 1.

$$V_{AD} = 10 V_t - 2V_{ref} - 7 V_g$$

Step three, choose a feedback resistor which is a common multiple of 2,7,10.  $R_f = 70k\Omega$ .

Step four, select three input resistors to get the desired gains.



Part b) The voltage resolution, calculated as range/precision, is  $0.5V/1024 = 0.5mV$ ?

