STM32 Timers

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CONTENTS

***Abstract*—This manual shows how to program timers in arm using STM32F103C8T6.**

1 COMPONENTS

Component	Value	Quantity
Breadboard		1
Resistor	220 Ω	1
STM32F103C8T6		1
Seven Segment Display	Common Anode	1
Jumper Wires		20

TABLE 1.0

Problem 1.1. List all available clocks in the STM32F103C8T6 blue pill.

Solution: See Table 1.1.

Clock	Location	Type	Frequency
HSI	Internal	RC	8Mhz
LSI	Internal	RC	32.768 kHz
HSE	Internal	Crystal	8Mhz

TABLE 1.1

2 SYSTICK TIMER

The Systick timer is the default timer available on all ARM chips.

Problem 2.1. Make connections as shown in Table 2.1.

STM32	Seven Segment Display
3.3V	COM (through resistor)
PA1	DOT

TABLE 2.1

Problem 2.2. Execute the program in

```
https://github.com/gadepall/
    STM32F103C8T6/blob/master/
    examples/blink_systick.c
```

Problem 2.3. The default clock is the HSI 8MHz RC. Find the number of clock cycles required for a 1 s delay.

Solution: The time period is

$$T = \frac{1}{8}\mu s = 1 \text{ cycle} \tag{2.3.1}$$

Thus, the number of cycles required for 1 s delay is

$$1 \text{ second} = 8000000 \text{ cycles} \tag{2.3.2}$$

Problem 2.4. List the SysTick registers.

Solution: See Table 2.4.

Register	Command	Purpose
SysTick Control and Status	SysTick->CTRL	Timer control
SysTick Reload Value	SysTick->LOAD	Timer Count
SysTick Current Value	SysTick->VAL	Timer Initialize
SysTick Calibration Value		

TABLE 2.4

Problem 2.5. What do the following instructions do?

```
SysTick->LOAD = 4000000;
SysTick->VAL = 0;
```

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Solution: See Table 2.4 for details. These two instructions ask the SysTick timer to count down from 4000000 to 0.

Problem 2.6. Explain the following instruction.

```
while(!(SysTick->CTRL & 0x00010000
    ));
```

Solution: Fig. 2.6 shows the SysTick CTRL register. 0x00010000 is used in the above command to mask all the bits except for bit 16, which is the COUNTFLAG. The **while** loop will stop once COUNTFLAG = 0. The while loop is used for the delay. will stop once

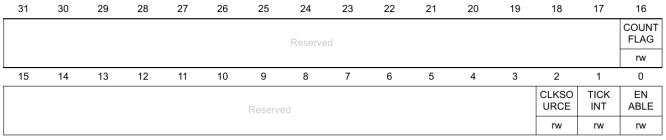

Fig. 2.6

Problem 2.7. What does the following instruciton do?

```
SysTick->CTRL = 0x00000005;      //
    8MHz clock
```

Solution: From Fig. 2.6, ENABLE = 1 enables the counter (for delay) and CLKSOURCE = 1 enables the 8 MHz internal RC clock.

Problem 2.8. Obtain a 1 MHz clock.

Solution: CLKSOURCE = 1 results in the $\frac{\text{Processor Clock}}{8}$ = 1 MHz clock.

```
SysTick->CTRL = 0x00000001;      //
    1MHz clock
```

Problem 2.9. Obtain a delay of 1 second using the 1 MHz clock.