

Dept. of Computer Science and Engineering

EECS3215 – Embedded Systems

Timers

Lab 8

Objectives:

To learn how to use the timer interrupt (the systick timer) capabilities of the KL43Z.

Brief description

In this lab, you will implement a seat belt control version. This is a slightly more complicated version of what we did in the lecture.

Input

- Seat_occupied signal
- Seat bels not buckled signal
- Engine On signal

Output

- Buzzer signal
- Seat not buckled indication light

Detailed description

When the ignition is ON, someone is seated, and the seat is not buckled, the buzzer is ON for 5 seconds, then it goes off, the seat not buckled indication is ON. If the seat is buckled then the buzzer is OFF and the indicator is OFF. This is the normal operation of the car; you get in, turn ignition ON and buckle the seatbelt.

If after that, the seatbelt is unbuckled, the light indicator goes ON and stays ON until the ignition is OFF, even if the person leaves the car.

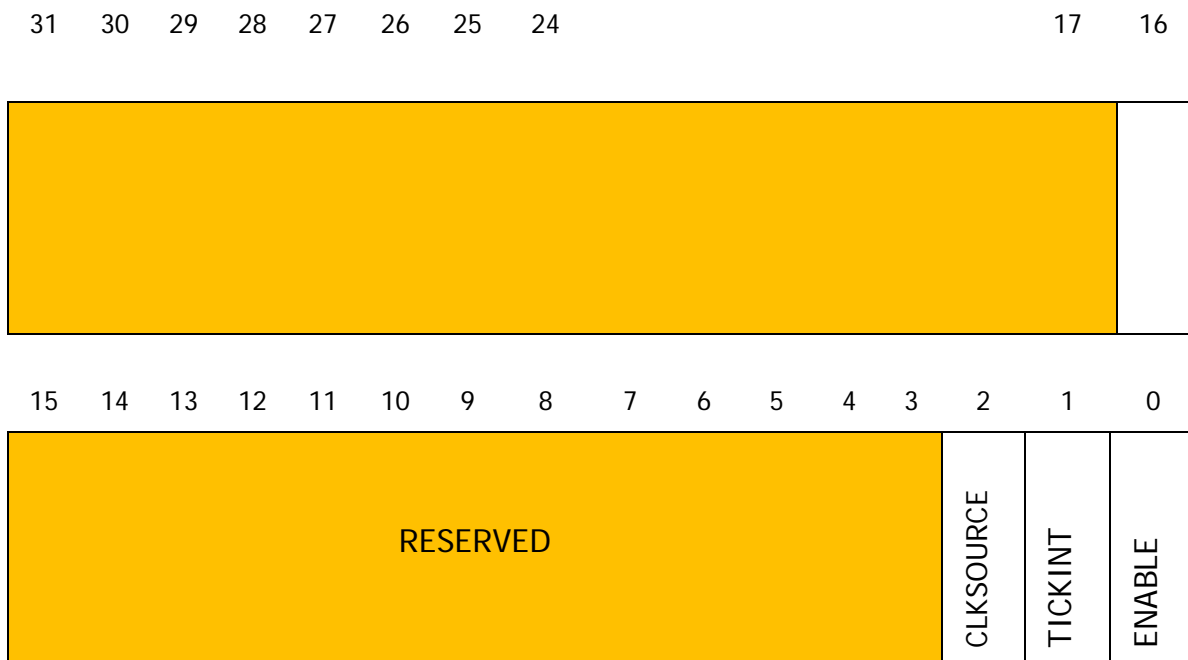
If the ignition is OFF, buzzer and indicator are OFF.

If someone is seated, and leaves the car without unbuckling the seat, then both buzzer and indicator are ON (something shouldn't have happened unless you are cheating and the belt is buckled from behind your back).

Systick timer

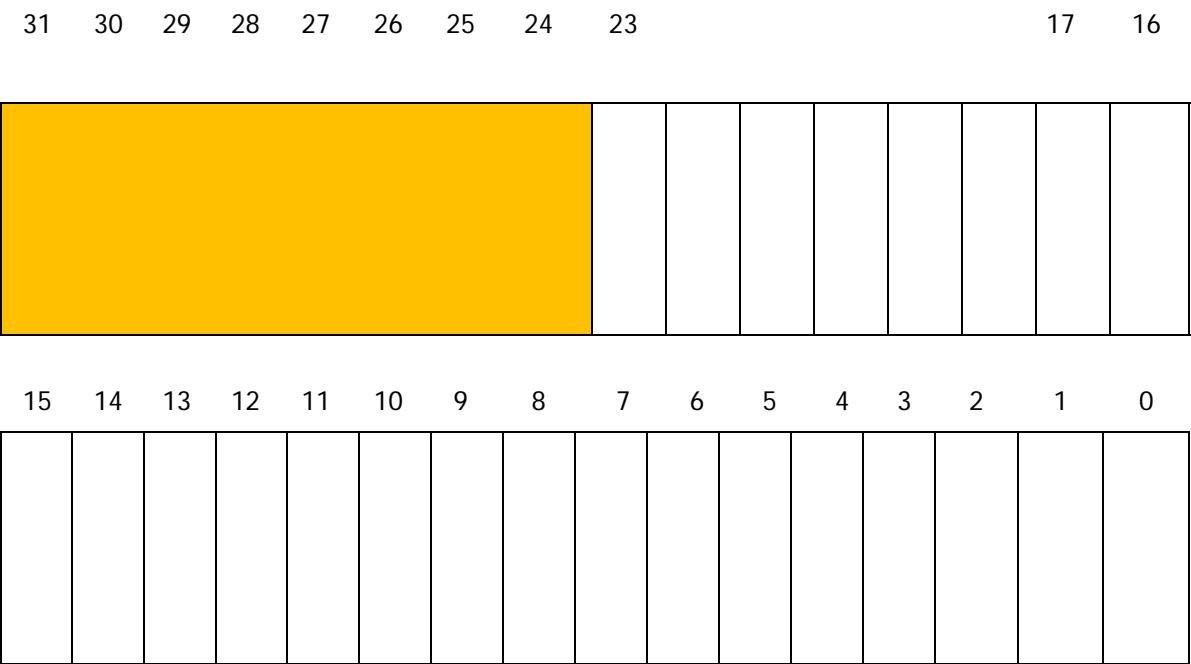
Systick is controlled by 4 registers, three of these we will use in this lab (the fourth is for calibration).

Systick Control and Status Register systick->CTRL



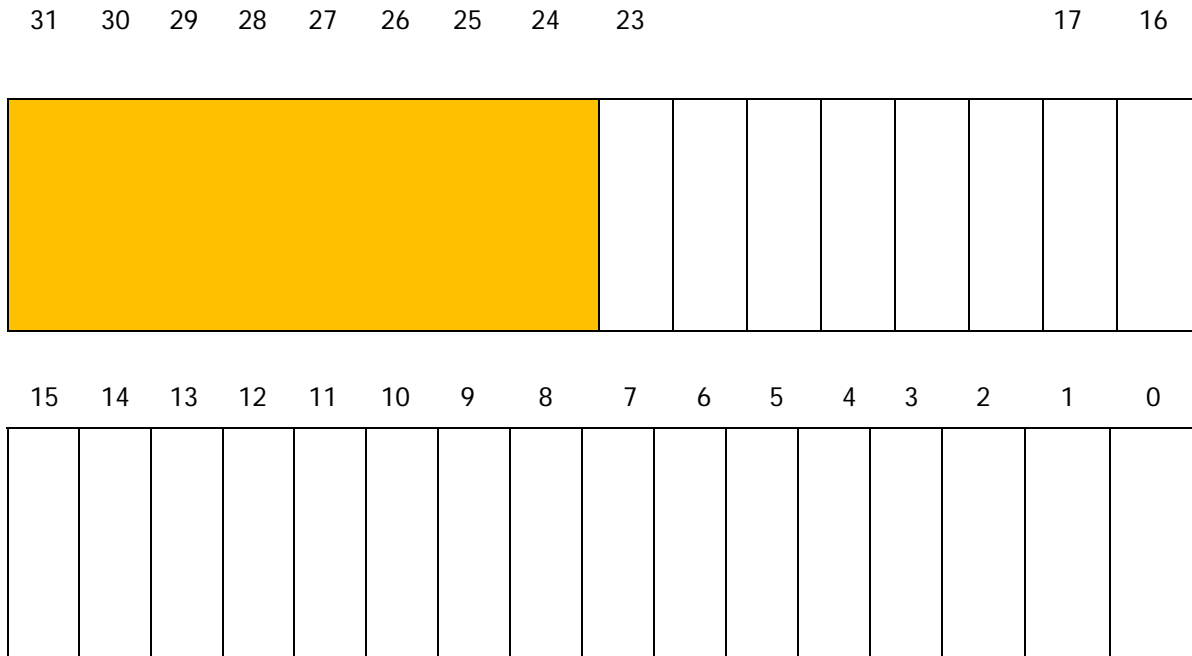
| | |
|--------------|--|
| 0 ENABLE | 1 to enable, 0 to disable |
| 1 TICKINT | if enabled, systick interrupt is generated when count=0 |
| 2 CLKSOURCE | 1 means the core clock is selected, otherwise depends on design |
| 3:15 | Reserved |
| 16 COUNTFLAG | Set to 1 when the timer reaches 0, clears by reading this register |
| 17:31 | Reserved |

Systick Reload register systick->LOAD



0:23 Reload value (when the timer reaches 0)
23:31 Reserved

Systick Current Value Register `systick->VAL`



| | |
|-------|--|
| 0:23 | The current value of the timer (you can read it). Writing any value to this register causes the register to clear and the COUNTFLAG to reset |
| 23:31 | Reserved |