**Course on BASCOM AVR - (23)**

***Theoretic/Practical course on BASCOM AVR Programming.***
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# T I M E R .

With the exercise of this chapter we'll start the knowledge and the use of **Timers** available on **Mini Module**.

It is strongly suggested to examine closely this topic by studying the microcontroller **Data Sheet**. The described example programs are widely remarked but, without a preventive study of technical features, the solutions adopted by the program will be obscure and hard to understand.

The **Example.037** generate a square wave signal with a frequency defined by the user through an interaction on the console connected to the **RS 232** serial communication line. The signal is obtained thanks to a periodic interrupt generated by **Timer2** of microcontroller.
The interrupt frequency starts from the clock frequency that is properly divided by a time constant inserted by the user.

The **Example.038** coincides with a program capable to measure the user reaction **Reflexes**.

When the program start it produces two audible advises, through the **Buzzer**. After a casual time it is enabled one of the two **LED**, **L2** or **L3**, available on **GMM TST3**.

The program start the reaction **time** measure by starting a **Timer** and the user must press the button placed near the turned on **LED**. When the program recognizes the pressure, it terminates the time measure by stopping the timer and then it display the measured time, in milliseconds, on console.

Whenever for **2** seconds no buttons are pressed, then the program advise and it restarts.

## Example.037. Timer Management (1). It Generates a signal with a Frequency Inserted by Console on GMM TST3 LED, through TIMER.

***Added Definitions:***
None

***Added Declarations:***
None

***Added Instructions:***
None

***Added Operators:***
None

**Example** program **37** of **BASCOM AVR** course.

The program generates a square wave with a frequency defined by console, through **Timer**, on the signal connected to **Red LED L2**. Of course, the **LED** activation doesn't change with inserted frequency in fact the generated signal is always a square wave with a **50%** duty cycle.

The program describe its functionalities and uses a serial console provided of monitor and keyboard with a fixed physical protocol at **19.200 Baud**, **8 Bit x chr**, **1 Stop bit**, **No Parity**.

This console can be another system capable to support a serial **RS 232** communication. In order to simplify the use it can be used a **PC** provided of one **COMx** line, that execute a terminal emulation program as **HYPERTERMINAL** or the homonym modality provided by **BASCOM AVR** (see **IDE** Configuration).

The program works only when the **GMM AM08** is mounted on **Z1** socket of **GMM TST3**!!

Inside the program the terms that identify the used signals refers to electric diagram and technical manual of **GMM TST3**!!

## Example.038. Timer Management (2). Reflexes Test. It Measures the time Passed Between the Casual turn on of a LED and the Pressure of near Button, Through TIMER.

***Added Definitions:***
None

***Added Declarations:***
None

***Added Instructions:***
RND ; FUSING

***Added Operators:***
None

**Example** program **38** of **BASCOM AVR** course.

The program pre-notice the user with two beeps, then it activates one of the two **LEDs** of **GMM TST3** (**L2**,**L3**) after a randomic delay time and it waits the pressure of corresponding button (**T1**,**T2**), by measuring the time elapsed between **LED** deactivation and button pressure, through **TIMER1**. A third audible **beep** indicates the button pressure or a **2** seconds maximum timeout. Finally it is shown the test result (measured time) on the console.

The program describe its functionalities and uses a serial console provided of monitor and keyboard with a fixed physical protocol at **19.200 Baud**, **8 Bit x chr**, **1 Stop bit**, **No Parity**.

This console can be another system capable to support a serial **RS 232** communication. In order to simplify the use it can be used a **PC** provided of one **COMx** line, that execute a terminal emulation program as **HYPERTERMINAL** or the homonym modality provided by **BASCOM AVR** (see **IDE** Configuration).

The program works only when the **GMM AM08** is mounted on **Z1** socket of **GMM TST3**!!

Inside the program the terms that identify the used signals refers to electric diagram and technical manual of **GMM TST3**!!