Theoretic/Practical course on BASCOM AVR Programming.
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C O U N T E R

With the exercises of this chapter we'll start the knowledge and the use of **Counters** 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.039** shows how to use one of the **Counter** available inside the microcontroller of **Mini Module**. For this operation it is used the **TIMER1**. It has a **16** bits resolution, equal to **65.536** points or different values.
The program count the **Transitions** occurred on **T12** push button of **TIO 16**, that acts as a pseudo generator of the input signal.
Obviously, a so made program counts also the typical electric rebounds of key (or push button) commutations. If You try different keys models You will test and recognize really different values in transitions counting, during pressure and release of the same key.

The **Example.040** shows how to realize a classic measures instruments as a **Frequency Meter**. This program measures the frequency of **T1** input signal of **TIMER1**. When the program starts it obtains and shows on console, the features of performed measure, that is the used resolution and maximum allowed frequency.
The frequency measure is performed by counting the variations number of the signal occurred in a time unit, related to one second. When, for example, the time unit is **1/4=0,25** seconds and in this time the timer counts **100** variations, then the frequency will be **100/0,25=400 Hz**.

It is advantageous select a low time unit, in order to increase the maximum measurable frequency; this coincides with the **65.535** maximum variations of **16** bits counter in the same time unit. The first instructions of the program calculate and visualize either the resolution and maximum frequency, just obtained from the selected time unit, defined by a program constant.
The time unit is performed with a delay that take into account even the processing time required to calculate the frequency, experimentally calibrated.

Added Definitions:
None

Added Declarations:
None

Added Instructions:
COUNTER1 ; START COUNTER1 ; STOP COUNTER1.

Added Operators:
None

Example program **39** of **BASCOM AVR** course.

Transitions   Counter.
The program counts the **transitions**   occurred on input signal of **TIMER1** used as **16** bits counter.   The transitions number is continuously displayed on serial console. By pressing the **T12** button of a **TIO 16** connected to **CN4** connector of **GMM TST3**, the signal **T1** is changed and, as it coincides with the counter input signal, the displayed value changes consequently.

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 **Z2** socket of **GMM TST3**!!

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

Added Definitions:
None

Added Declarations:
None

Added Instructions:
None

Added Operators:
None

Example program **3 8** of **BASCOM AVR** course.

Frequency Meter.
The program measures the frequency of the input signal of **TIMER1** used as **1 6** bits counter. The frequency is calculated as number of occurred transitions in a time unit equal to **0.25** seconds, and it is continuously displayed on serial console. By pressing **T12** button of a **TIO 1 6**, connected to **CN4** connector of **GMM TST3**, it is changed the measured signal.

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).

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