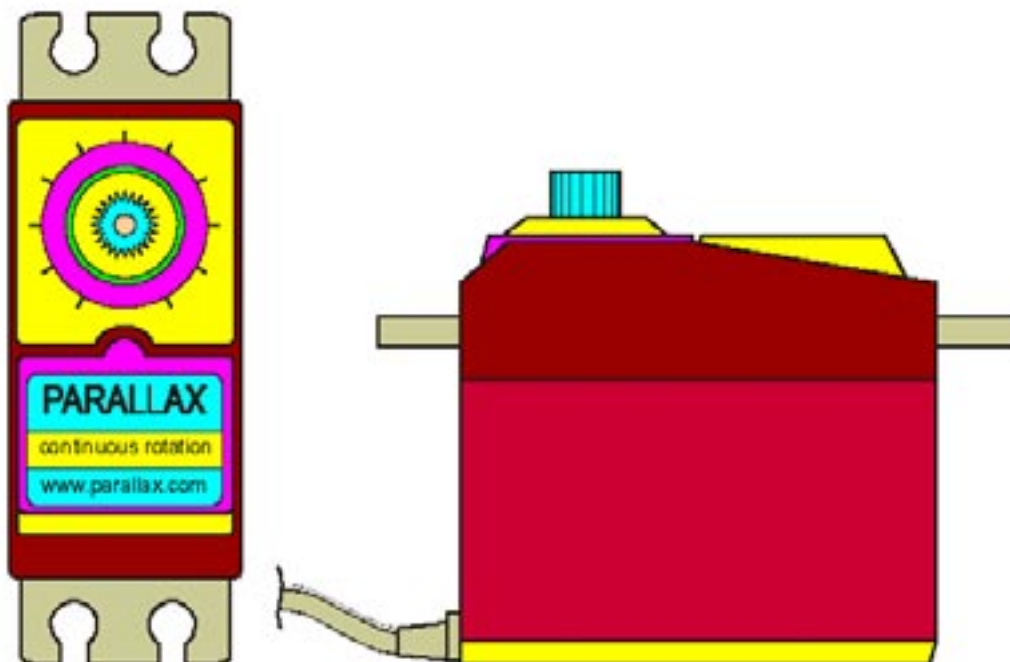


## CONTINUOUS ROTATION SERVOMOTORS ( 3 )

A really interesting model of **Servomotor** is those capable to rotate continuously, as the **Parallax** one, illustrated below.



*Continuous Rotation Servomotor Capable to Rotate over the 360°.*



*Continuous Rotation Servomotor.*

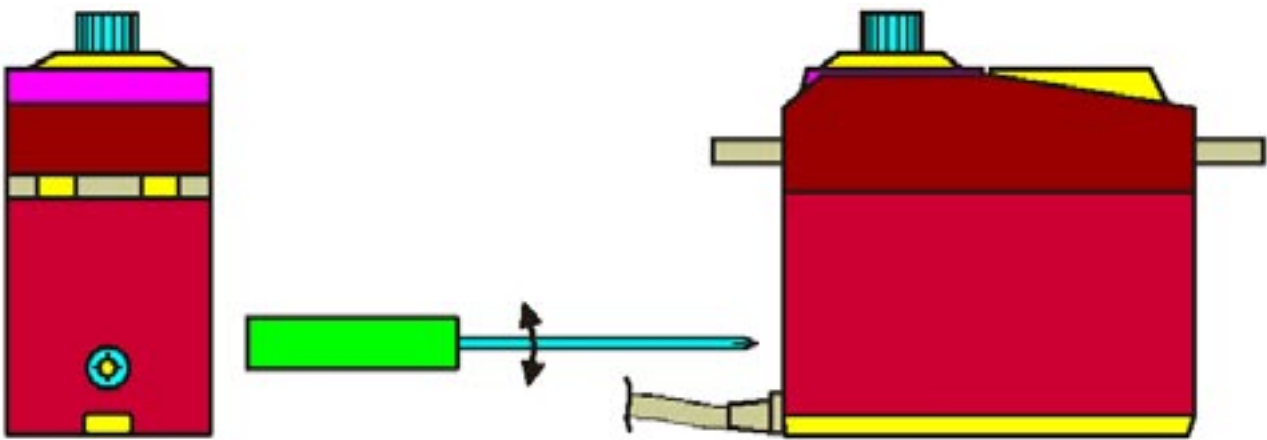
The main features of this model, identified by **PN 900-0008** order number, are briefly described in following lines.

- **Bidirectional** Continuous Rotation
- **Linear Response** between **0** and **50 RPM**.
- Possibility to use a **PWM** signal to generate movement ramps in a short time.
- Simple and easy management of the resources.

## COMMUNICATION PROTOCOL

In order to compensate the little production differences, and the small variations of driving pulse, the **Servo** has a **Trimmer** that must be slowly rotated until the shaft is completely stopped.

This regulation must be performed only when the driving pulse has a waveform equal to those reported in following figure, that is a wide duration of **1,5 ms**.

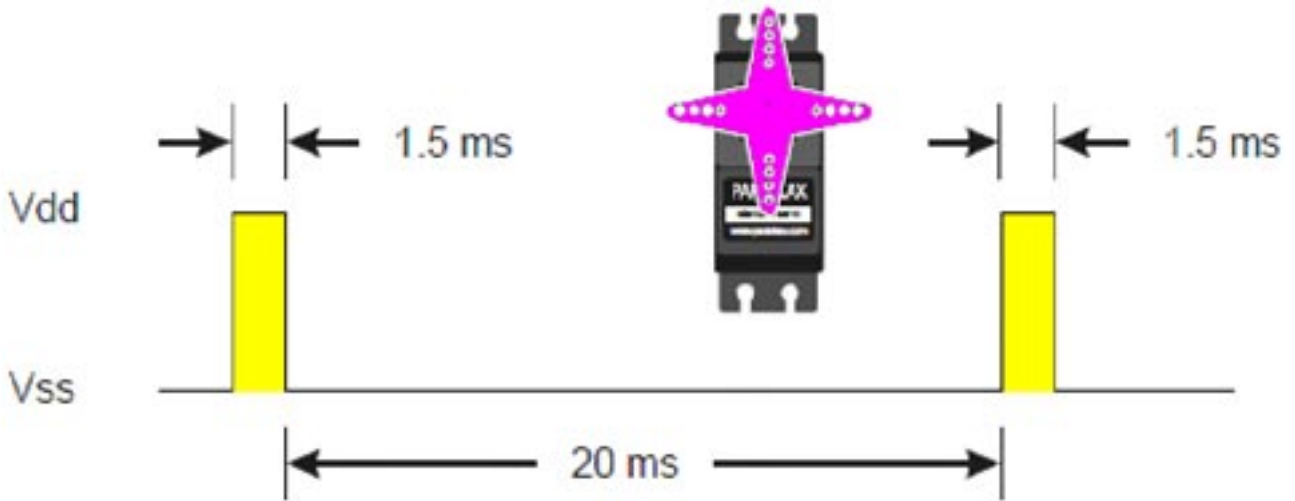


### *Regulation of Continuous Rotation Servomotor.*

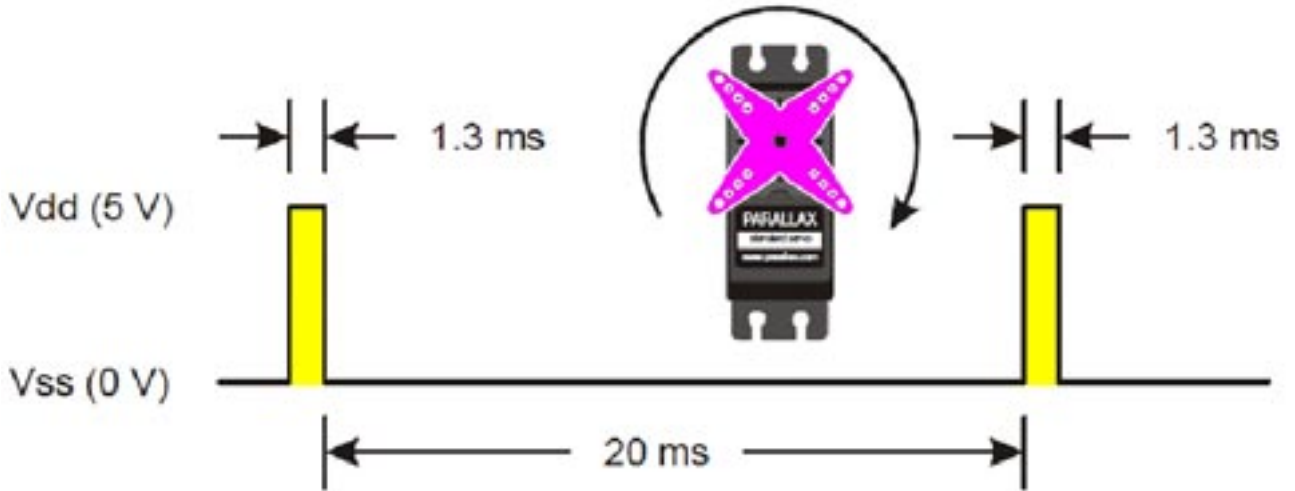
The **Continuous Rotation Servo** produced by **Parallax** is controlled by a pulse, with variable time duration, that defines either the sense and speed of rotation.

In order to obtain regular rotation, the **Servo**, requires a **20 ms** pause between the pulses. Below there is an example time diagram that maintain the **Servo** stopped and balanced.

When the pulse duration decrease from **1,5 ms** the **Servo** will immediately rotate, in **Clockwise** direction, with a speed directly proporzionale to time reduction, as described in following figure.

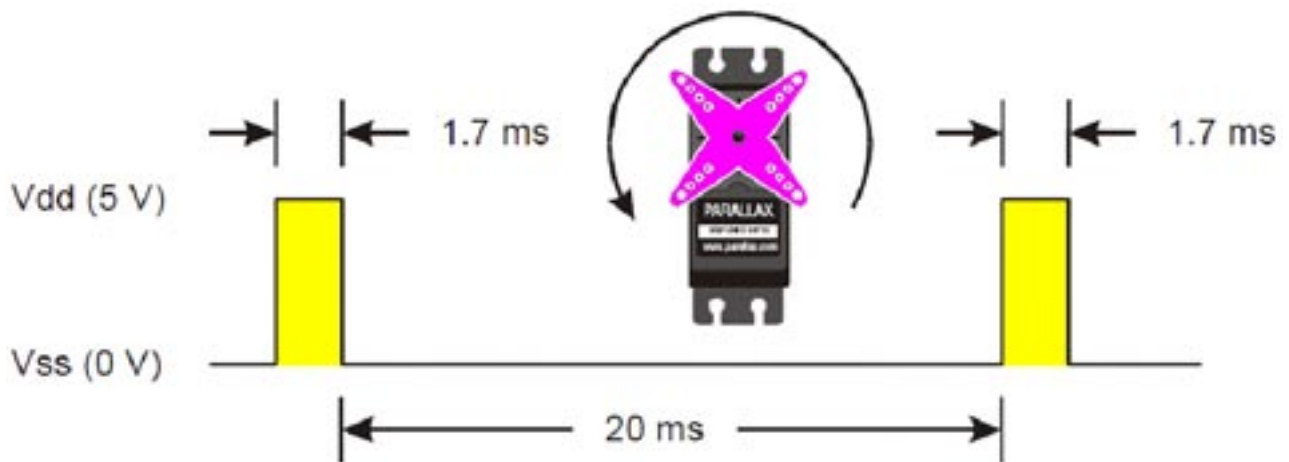


*Continuous Rotation Servomotor Stopped and Balanced.*



*Continuous Rotation Servomotor in Clockwise Direction.*

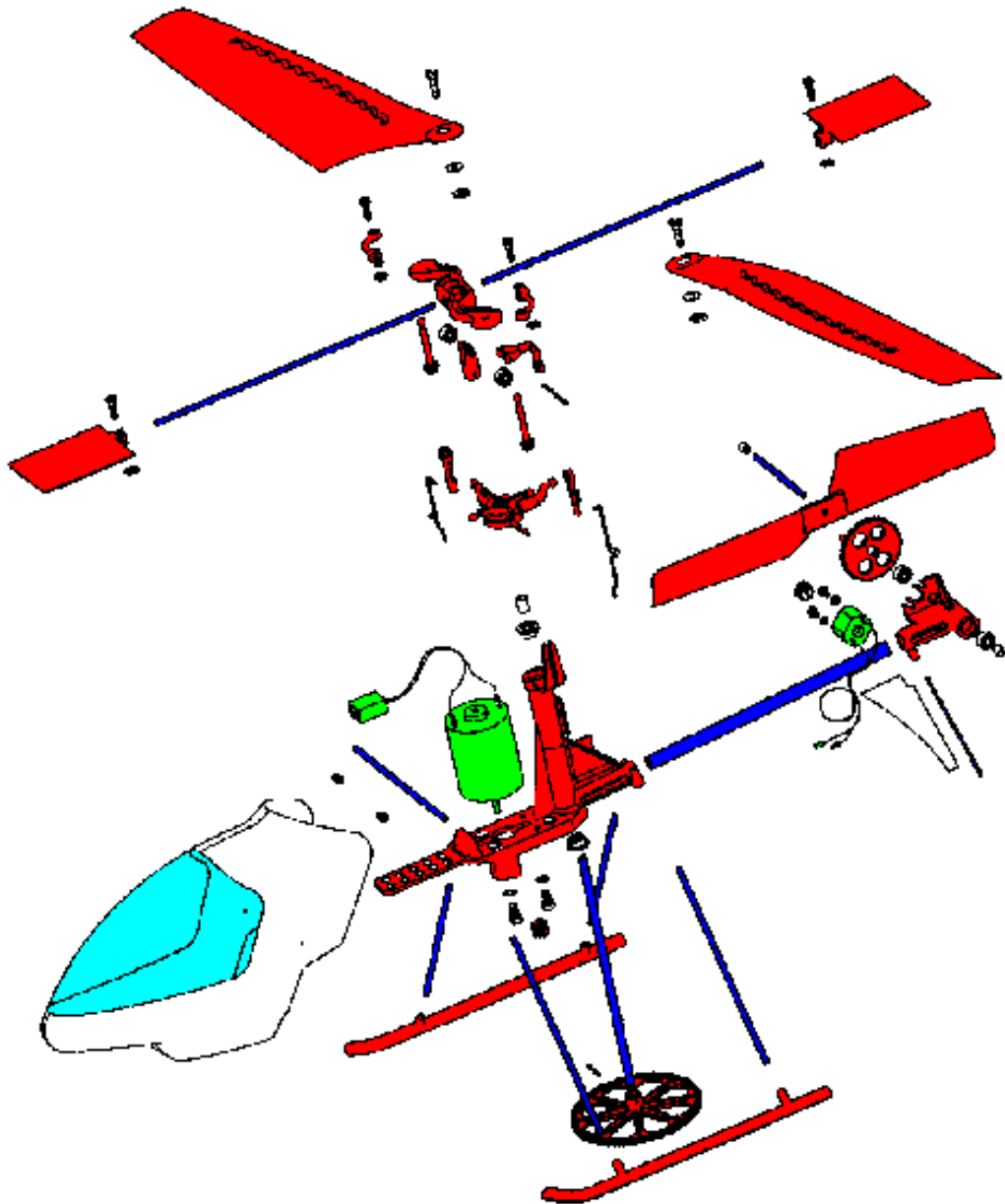
In the same manner, when the pulse duration increase from **1,5 ms** the **Servo** will rotate, in **Reversed Clockwise** direction, with a speed directly proporzionale to time increase, as described in following figure.



*Continuous Rotation Servomotor in Reversed Clockwise Direction.*



*Helicopter.*



*Detailed Components Diagram of Helicopter.*



*Radio Command Airplane Model.*



*Widely used Radio Comands.*



## USE EXAMPLES

The **Example.045** show how to use the **BASCOM AVR** instructions to manage the **Continuous Rotation Servo**.

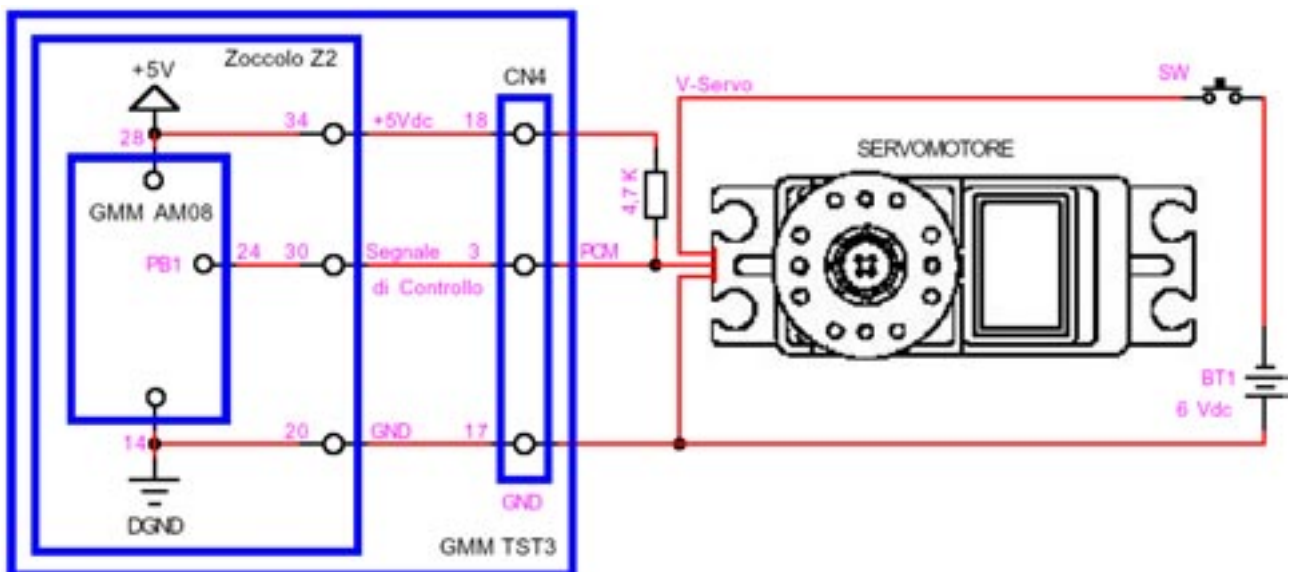
Please mount **Mini Module** on **Z2** of **GMM TST3** and connect **PCM** signal of **Servo** to **CN4.3**.

The **Servomotor** management is performed with the high level instructions of **BASCOM**. These generate a signal that doesn't exactly match the timing specifications of the **PCM** control signal of continuous rotation **Servos**, and so only few speeds can be set.

The **BASCOM** instructions use a periodic **Interrupt** generated by **TIMER0**, that can't be used for other functions!!!

The **Timing Resolution (=duration)** is defined by **Reload** value used in **Config Servo...** instruction and by speed selected with **Servo...** instruction, as illustrated in **BASCOM** on line help.

This **Demo** define a minimum reload time, equal to **10 usec**, in order to avoid vibrations and to obtain the higher speed resolution. Anyway these speeds are reduced to few different values.



**Application Diagram for Servo Connection on Example.045.**

The **Example.046** is an evolution of **Example.044**, suitable for continuous rotation **Servomotor** that uses **Low Level Instructions** in **Assembly** language, in order to obtain a really higher resolution and precision.

The operating features are the same of the mentioned example, but the performances reach very high levels. In fact, it can be set up to **100** different speeds.

If you want to check the obtained enhancements you can directly execute the program and then examine and understand the adopted strategies that carry out these results.

In the program source there are the detailed explanations of all the reason why of the performed choices. For this purpose are reported even the mathematical descriptions required by the process.

By studying this program the user will have optimum ideas and solutions to afford and solve the possible future applications.



***Robot Model of 6 Feet Insect.***

**Example.045. Continuous rotation Servomotor with BASCOM high level instructions. From console it can be selected the rotation direction and speed (over 360°).**

**Added Definitions:**

None

**Added Declarations:**

None

**Added Instructions:**

None

**Added Operators:**

None

**Example** program 45 of **BASCOM AVR** course.

The program allows to define direction and speed of a **Servomotor** with **Continuous Rotations** through proper values inserted by console. The signal selected to drive the **Servomotor** is the **PB1** of **Mini Module**, reported on **CN4.3** connector of **GMM TST3**. This signal is generated by the high level instructions of **BASCOM**, dedicated to **Servos**.

The program has been tested with the **Continuous Rotation** model **Servo** standard **900-00008** produced by **Parallax**.

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!!**



**Example.046. Continuous rotation Servomotor with low level instructions. From console it can be selected the rotation direction and speed (over 360°).**

**Added Definitions:**

None

**Added Declarations:**

None

**Added Instructions:**

None

**Added Operators:**

None

**Example** program 46 of **BASCOM AVR** course.

The program allows to define direction and speed of a **Servomotor** with **Continuous Rotations** through proper values inserted by console. The signal selected to drive the **Servomotor** is the **PB1** of **Mini Module**, reported on **CN4.3** connector of **GMM TST3**. This signal is not generated by the high level instructions of **BASCOM**, dedicated to **Servos** but by **Low Level Instructions**.

In order to obtain the maximum **resolution** on the motor speeds, it has been necessary to obtain the highest resolution on timings; this condition has been satisfied only with parts of programs coded in **Assembly**.

The program has been tested with the **continuous rotation** model **Servo** standard **900-00008** produced by **Parallax**.

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!!**