

Course on BASCOM 8051 - (7)

Theoretic/Practical course on BASCOM 8051 Programming.

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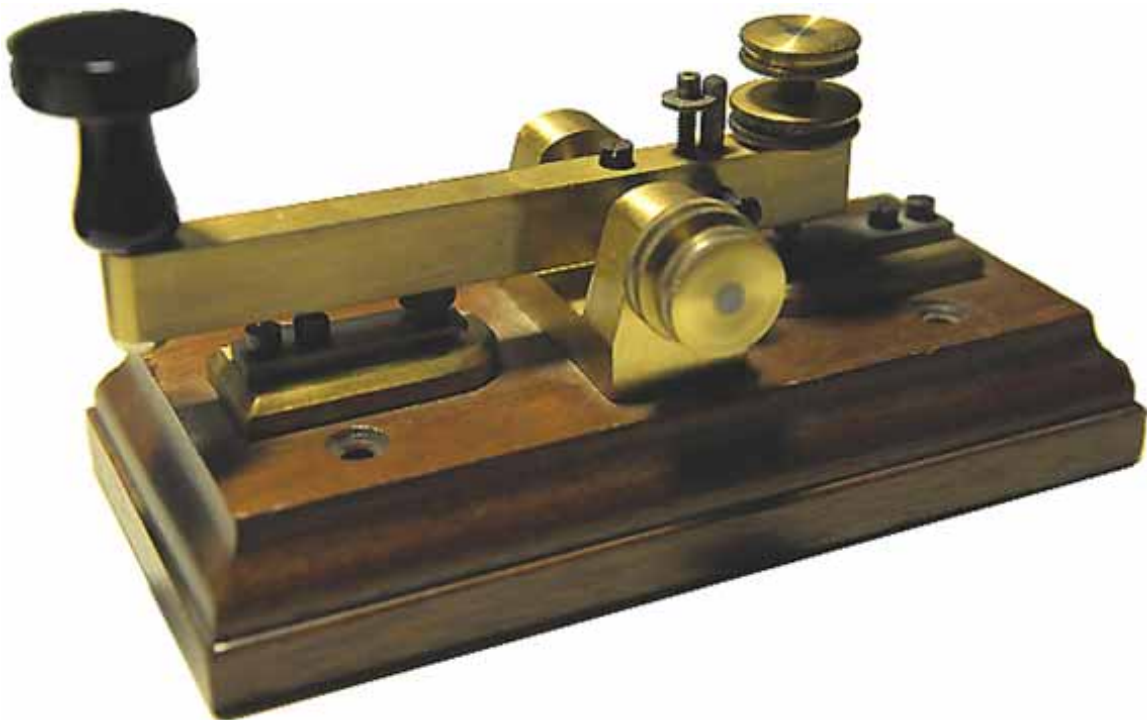
MORSE CODE (1)

This chapter will use all the knowledge acquired up to this moments in order to develop a new program that is conceptually simple, even if it executes many operations.

About hardware resources it uses the **GMM TST3** on board **Buzzer**, that generates the proper sound for **Morse** code.

Each time an alphabetic letter is typed on the keyboard, it is processed by the program that generates the sound of lines and points of the associated Morse code.

The execution speed of sound produced by **Buzzer** has been selected with a constant value that actually is quite slow for the demo version of the program. The user can change this constant speed as he prefer.



Typical for Morse Code Telegraph Key.

MORSE CODE

You can find other documentation directly at the following link or read those reported in next pages:

http://en.wikipedia.org/wiki/Morse_code

THE MORSE CODE

Morse code was invented by Samuel Finley Breese Morse in 1836. It is composed by a combination of long and brief signals (“**Line**” and “**Point**”) that represent all the numbers and letters of alphabet. Points and lines can be produced also with voice by using the syllable **TI** for the points and the syllable **TA** for the lines.

At the beginning it was used for wireless telegraphy and then the Morse has been used for radiotelegraphy. Normally used since few decades ago for communication, today it survives only in the hobby field.

The most famous abbreviation in Morse code is certainly the SOS (TI-TI-TI TA-TA-TA TI-TI-TI).

NOTE: *The use of points and lines is the classic representation. When the codes are read is probably more useful to think at the sonorous format and read the letter A not as “point line” but as TI-TA.*

BASIC MORSE CODES

A . -	J . - - -	S . . .	1 . - - - -
B -	K - . -	T -	2 . . - - -
C - . - . .	L . - . . .	U . . -	3 . . . - -
D - . . .	M - -	V -	4 -
E .	N - .	W . - - -	5
F	O - - -	X -	6 -
G - - . .	P . - - . .	Y - . - - -	7 - -
H	Q - - - - -	Z - - . . .	8 - - - . . .
I . . .	R		9 - - - . . .
			0 - - - - -

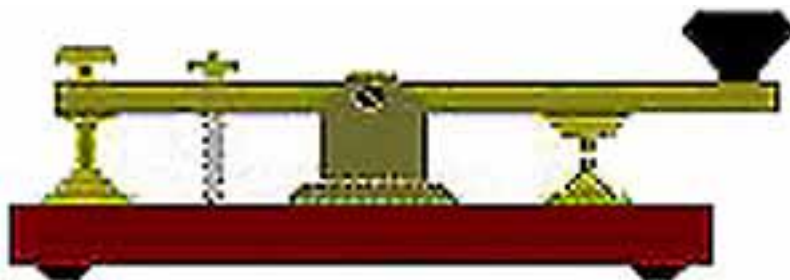
OTHER MORSE CODES

.	Point -
,	Comma	- - - . . . - -
/	Slash (1)	-
+	Plus
=	Equal	- -
?	Question mark	. . . - . . .
(Open round bracket	-
)	Close round bracket	- -
-	Minus	- -
"	Double quotation mark
_	Underline	. . . - . -
'	Single quotation mark	. . . - . . .
:	Two points (1)	- - -
;	Point and comma	-
\$	Dollar - -
@	AT (2)	. . . - . . .
	Attention	. - . . . -
	Error
	Repeat (ii ii)

Note:

(1) It means also “divided for”.

(2) The character @ used in **E-mail** address has been officially coded the **3 May 2004** and it is the first addition of a new Morse symbol, after seventy years. It is composed by the union of **A** and **C** letters.



Telegraph Key.

IMPLEMENTATIONFEATURES

- One **Line** is conventionally long three times the **Point**.
- The spaces between point and lines that codes the singol character are long as one point.
- The spaces between the characters are long as four points.
- The spaces between any word are long as seven points.

In order to become familiar with **Morse** code, you can write and read sentences by using the tones "**Ti**" for the point and "**Ta**" for the line, as in the following example:

- - - / -
TaTiTiTi TiTaTiTi TiTiTa / TiTiTi Ti TiTa
B **L** **U** / **S** **E** **A**

The **Morse** code in fact is memorized by hearing the typical sound of each character, as if any group of sound is a letter, and not by associating the point or the line at the sound.

Naturally the **Morse Code** is all based on time. Each element has a duration time that maintains proportions when the generation speed change.

For commodities we define **Time Unit** the base time of the code procedure that is the **Point** duration.



Telegraph Key.

METHODS TO LEARN THE MORSE CODE

It doesn't exist a unique method that works fine with everybody. Below are listed some methods: choose the one that function in the best way for you.

Visual. You read on the monitor what you hear.

Hearing. You recognize immediately one character or a whole word. Less time elapses between the hearing start and the recognition, the learning is better.

Inverted hearing. You study the opposite characters: A and then N, K and then R, etc.

Tones hearing. You associate the sound with alphabet, either letter or ICAO tone, that is, for example, when you hear TI-TA and you pronounce A or ALPHA. After some time and exercise when you hear TI-TA you'll immediately remind the A or ALPHA..

Sketch. In the letters of Morse codes there are some sketches. For example the letter A is similar to letter W, but it has an additional line. You can study the characters A, W, J, 1 in order and then mix them. It is extremely efficient if you have difficulties in recognition J and 1, etc.

Typing. Some people trend to type the right character on a keyboard immediately after they hear it.

Transmission. Someone learn better by telegraphing; it is normally joined with an hearing method.

Normal text in opposition to random characters. When Morse is studied with normal texts you have the advantage to anticipate what is coming, while with random characters you are carried to learn all them.

Computer program. There are many program available (Morse programs). Choose one and remind that the right one for your friend could not be the best one for you.

Conclusion: There isn't a secure method. You can test all them and adopt those that give the best results with you.

Example.013. Morse Letter Generator

Added Definitions:

None

Added Declarations:

None

Added Instructions:

AND ; RESTORE ; READ ; DATA ; SHIFT

Added Operators:

None

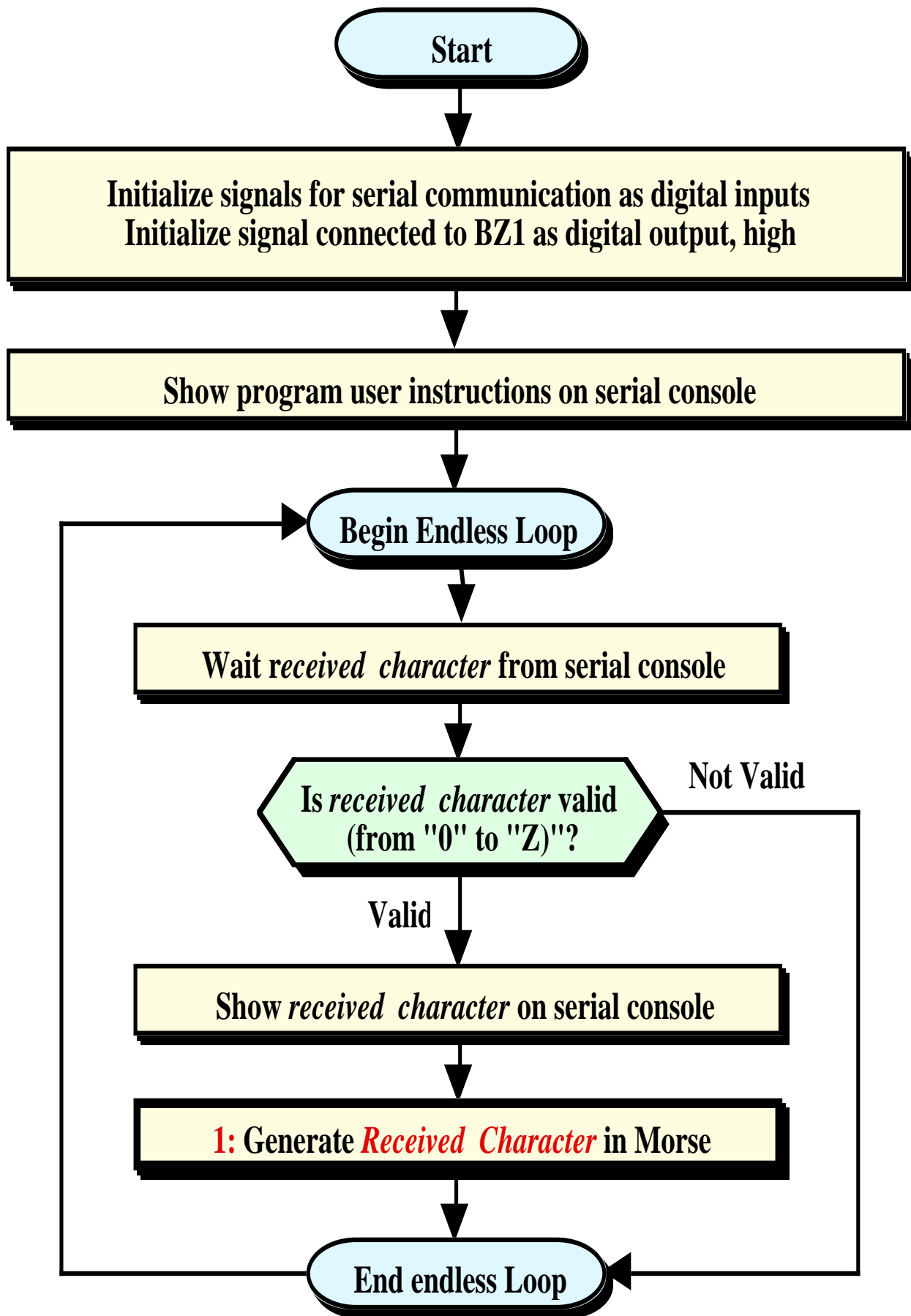
Program **Example.013** of **BASCOM 8051** course.

It manages a **Morse** characters generator with **GMM TST3** on board buzzer. The program waits the reception of letters or digits from serial line and it generates them on **Buzzer** with **Morse** code.

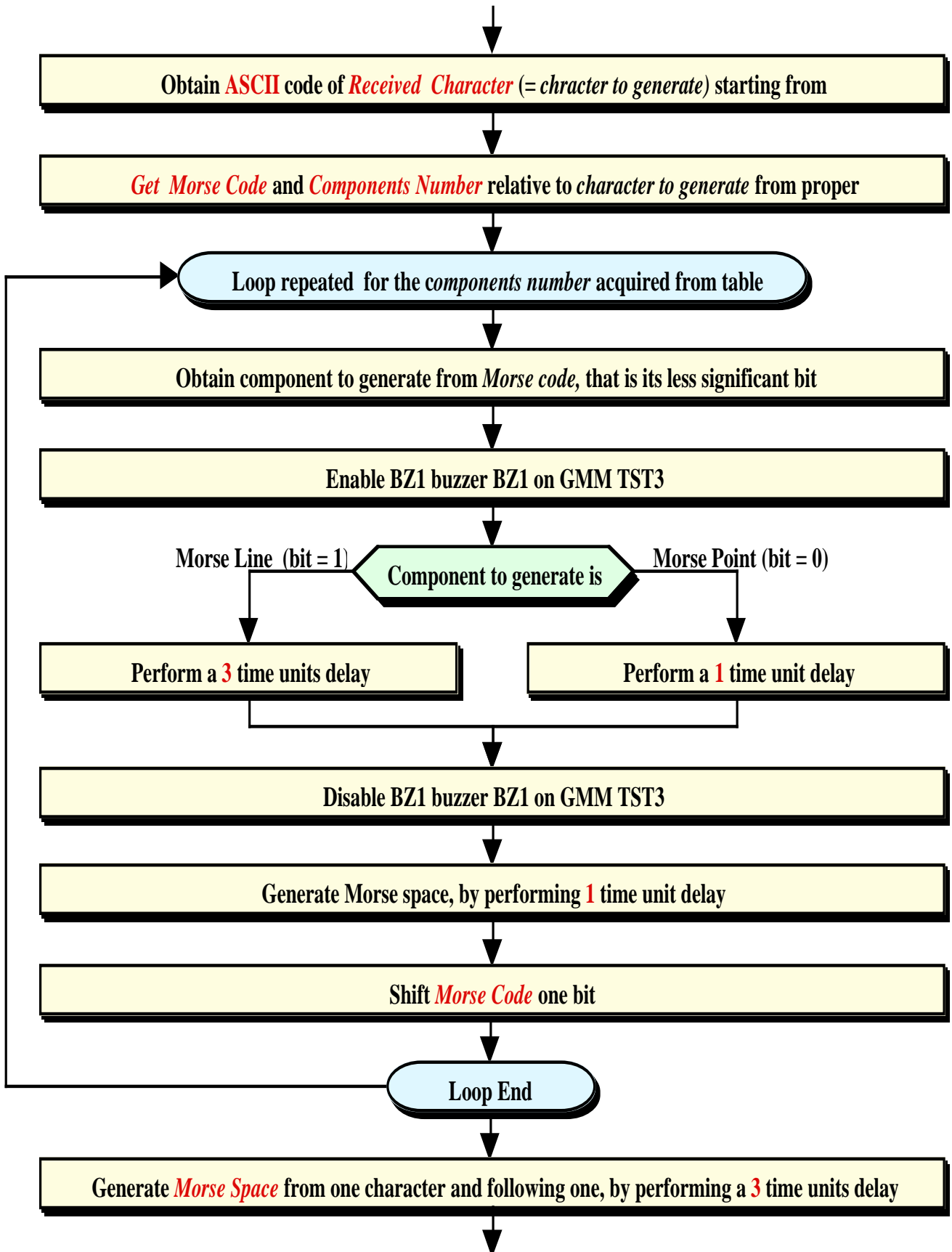
The **Morse** codes generation speed is slow in order to allow the right recognition even from users with no experience; the time unit used by example is fixed and equal to about **200 msec**.

The reception of characters is performed through a serial console provided of keyboard and monitor and it must communicate 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 8051** (see **IDE** Configuration).



Flow Chart Diagram of the Program



Exploded Flow Chart of Subroutine "Generates Received Character With Morse Code"