Application note : **Using the onboard digital outputs of the Z80-MBC3.**

LAMP (green LED)

The Z80-MBC3 has an onboard LED digital output labelled “LAMP” and a sounder (beeper) which can be used in an application program to signal events or exceptions to the user. The LAMP LED also lights up when the USER button is pressed.

The LAMP LED can be turn on and off with the following instructions :

OUT 1,0 : OUT 0,1 // turns the LAMP on.

OUT 1,0 : OUT 0,0 // turns the LAMP off.

It is a requirement that the two OUT instructions are executed immediatly after each other, or the command won’t work. The following BASIC example program will flash the LED for a few seconds when run.

```
40 OUT 1,0:OUT 0,1
50 FOR K=0 TO 9000
60 NEXT
70 OUT 1,0:OUT 0,0
```

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Sounder

The onboard sounder can produce short beeps of fixed duration, or a variable duration tone. The simplest method is to send a <BELL> character to the terminal. In BASIC this is done by executing:

```
PRINT CHR$(7)
```

or in Z80 assembly :

```
OUT 1,1         ; 1 = print one character
OUT 0,7         ; 7 = <BELL> character
```

But the sounder can also be turned on for a variable time from 1/16 second up to almost two seconds. The duration is a multiple of 1/16 second time slices, and this parameter can range from 1 to 31.
To trigger such a tone, the following commands are to be executed :

```
OUT 1,2             ; 2 = beeper command
OUT 0,26            ; 26 = duration multiplied by 16
```

This will produce a beeper tone of 1.625 second duration.

Written in BASIC the code looks like : `OUT 1,2: OUT 0,26`

To produce a continguous tone, the command can be repeated before the current one terminates.