

Simple solution for program switching

Gunther Zielosko

1. The starting situation

Maybe that some of the Basic-Tiger™ user have wondered that the Plug & Play Lab has such a complete keyboard. The keyboard is nearly like a computer keyboard. It seems the designer of the Plug & Play Lab was a little bit in competition with the PC, but nevertheless you can't type in a long text so good. The display can show some graphic elements and special symbols like a PC.

But the main task of a microcontroller is not to be like a PC, its strong point is to solve a singular problem in a special way. Mostly such a problem needs only some keys or a selector switch. As a sample for economical hardware using we discuss a minimal keyboard with a program selector switch.

2. The problem

As an electronic engineer we have many small tasks which can be smartly solved with a microcomputer like the BASIC-Tiger™ (Measure voltages or pulse lengths, make a clock, produce a pattern, send data to PC etc.). All these tasks need a own program to solve the single problem. In the following chapters we'll show how to bring various programs into the module and select them via a program selector switch. We can add programs like sub programs to this program collection.

3. Hardware

The basic device is a binary selector switch with up to 16 positions (Fig. 1) and matching numbers at the front side.

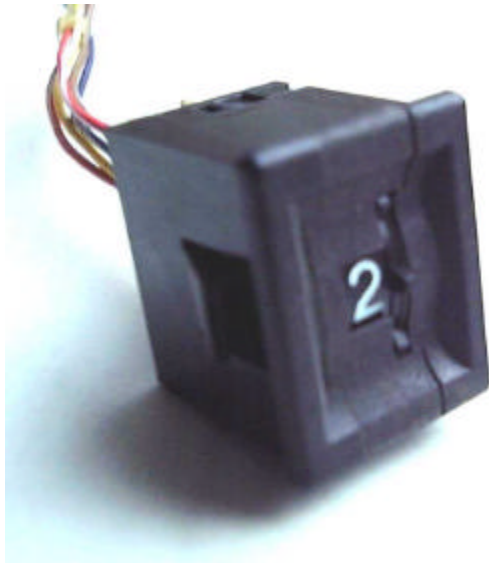


Fig. 1 Binary selector switch

At the output the selector switch has 5 solder points called for instance:

Com	common
1	bit 2^0
2	bit 2^1
4	bit 2^2
8	bit 2^3

The electronic engineer with experience knows what this means. Connected “common” with Vcc, the 4 outputs show the binary code of the number at the front side of the selector switch. A half port of the BASIC-Tiger™ could read this number at once. Unfortunately the Tiger port pins read an “1” (high level) not only if the bits are connected with Vcc but if the pins are open too (this should be a “0” in case of our switch). TTL logic ICs, by the way, have the same characteristic. One way to solve this problem is to connect the “common” to GND, this changes the binary word to “negative logic” and:

Decimal	binary	bitwise negated
0	0000	1111
1	0001	1110
:	:	:
7	0111	1000
8	1000	0111

and so on.

If we have a rotary switch with 10 positions, we can realize 10 different settings with a halve port (here L80 till L83).

Two other port pins (here L70 and L71) will be used as a key input, connecting over the key to ground too. In a suitable manner the software is reading both the position of the selector switch and the position of the two keys. The complete circuit is shown at figure 2.

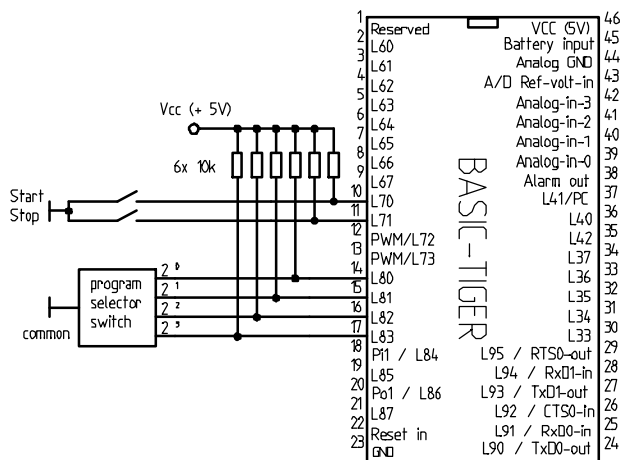


Fig. 2 BASIC-Tiger™ with 2 keys and program selector switch

4. Software

Supposing our keys are named “start” and “stop” and the program select switch can select one of 10 programs, then the BASIC-Tiger™ program will do following:

- scanning the two keys
- if key 1 pressed, then scanning the program select switch
- print “program x” (this is used only in the test phase)
- jump to the sub program x (now yet without function)
- if it finished (END reached) or key 2 pressed then
- back to main program, print “end”
- new key scanning etc.

The program PRO_SWI.TIG does exactly this. With simple hardware you can put 10 and more applications in one “program” into the flash memory of the BASIC-Tiger™. In some cases you don’t need a display because the program select switch has its own (the number !). So you can realize a function generator, each function correspond with a number. The function will be selected and started with start button. With the stop button the function will be finished an you can start a new one. Have fun during experiments!