



STANDARD PARALLEL PROGRAMMING PORT

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ABSTRACT:

This article propose to realize:

- Explain how to program the standard parallel port;
- how to conect a keyboard to the PC, useing the parallel port and make a software for her in C language;

KEYWORDS:

Parallel Port, keyboard, programming

1. INTRODUCTION

The Parallel Port is the most commonly used I/O port for connecting the own circuits to PC. This port is very easy to use when it first understand some basic tricks, but can be damaged quite easily if make mistakes in the circuits you connect to it. This port will allow the input of 5 bits or the output of 12 bits.

The port is composed of 4 control lines, 5 status lines and 8 data lines. It's found commonly on the back of the PC as a D-Type 25 Pin female connector. There may also be a D-Type 25 pin male connector. This will be a serial RS-232 port and thus, is a totally incompatible port.

2. STANDARD PARALLEL PORT PROGRAMING

PC parallel port was never designed to provide any output power to devices connected to it. Was only designed for connecting printer to the PC, but in time everything changes, parallel port have become a port where we can connect a external aplication.

When the computer is first turned on, BIOS (Basic Input/Output System) will determine the number of ports you have and assign device labels LPT1, LPT2 & LPT3 to them. BIOS first looks at address 3BCh. If a Parallel Port is found here, it is assigned as LPT1, then it searches at location 378h. If a Parallel card is found there, it is assigned the next free device label.

Are three possible base addresses for the parallel port are listed below:

Parallel Port					
Base Addresses - Hex - 0378 or 0278 or 03BC					
Decimal - 888 or 632 or 956					
Base Address		Base Address +2		Base Address +1	
Pin	Output	Pin	Output	Pin	Input
2	D0	1	-C0	15	S3
3	D1	14	-C1	13	S4
4	D2	16	C2	12	S5
5	D3	17	-C3	10	S6
6	D4			11	-S7
7	D5				
8	D6				
9	D7				

Notes: C0, C1, C3, S7 are inverted. Pins 18 - 25 are ground. C0, C1, C2, C3 may be open collector outputs.

The Control Port (base address + 2) was intended as a write only port. When a printer is attached to the Parallel Port, four "controls" are used. These are Strobe, Auto Linefeed, Initialize and Select Printer, all of which are inverted except Initialize.

The Status Port (base address + 1) is a read only port. Any data written to this port will be ignored.

The base address, usually called the Data Port or Data Register is simply used for outputting data on the Parallel Port's data lines (Pins 2-9). This register is normally a write only port.

Those pins are TTL level pins. This means that they put out ideally 0V when they are in low logic level (0) and +5V when they are in high logic level (1). The output current capacity of the parallel port is limited to only few milliamperes.

3. PARALLEL PORT APLICATION

In figure 1 is present the scheme of the mini keyboard with 12 keys (1-9, 0,*,#) connet to the parallel port.

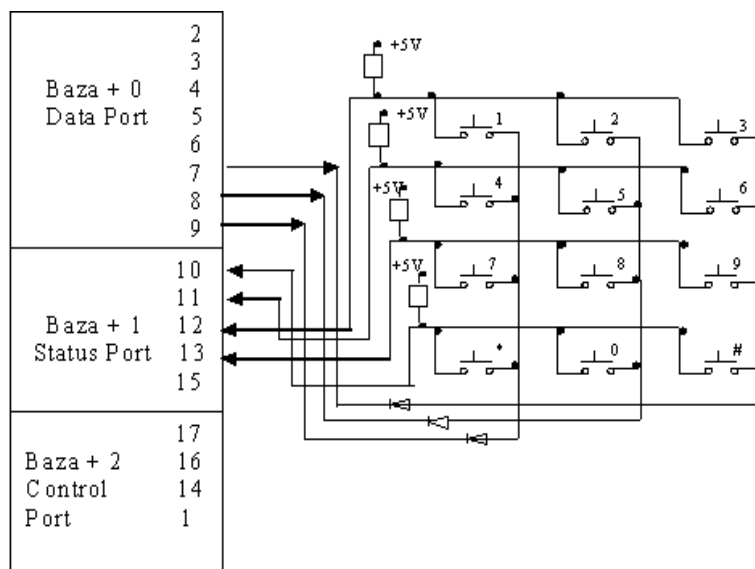


Figure 1. Scheme of a mini keyboard with 12 keys

For reading the dates from the keyboard it use the 4 pini: 10, 11, 12, 13 of the status port, whu it input. To send dates to the keyboard it use the pini: 7, 8, 9 of the data port, whu it output.

The 10 K resistor it connect to the +5V, to the input line 10, 11, 12, 13 we have all the time when a key it not press the logical 1 value. For example if to data port it send logical 0 value to the 9 pin and in rest logical 1 value (0111 1111b) it select the

column with the keys 1, 4, 7, *. If a key from this column it press, in status port we read the logical 0 value to the proper pin. This it the whey we know what key it pressed.

We have to send succesive to the data port the next values, to select the columns:

0111 1111b = 127

1011 1111b = 191

1101 1111b = 223

Sow, to read if the key 1 it press, we send to the data port, who have the base adres (if we have only 1 parallel port this adres is 378h) value 127 and then we read the status port, base + 1, pin 12. If read hier the logical 0 value then this key it is press and if we read logical 1 value then this key it is release.

In the figure 2 it present a picture with the practical aplication, of the keyboard. This it use in laboratory, for basic learning of the programing of standard parallel port.



Figure 2 The practical aplication of the keyboard

In figure 3 it present a print screen, in time when the keyboard it tested with the software, build in C language.

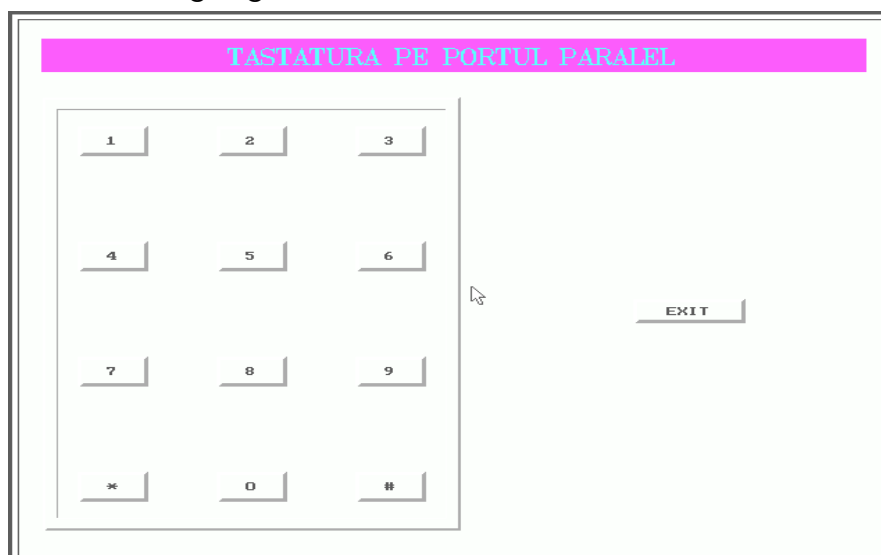


Figure 3 Print screen with the keyboard software

To build this software was use the principe of the keyboard, describe hereinbefore. To have the mouse cursor we use the mouse software interrupt 33h.

INT 33,0 Inițialize mouse

In ax register have to put the value 00h, and next, with the function int86 to call the 33h interrupt.

```
void minit(void)
{
    inreg.x.ax=0x00;
    int86(0x33,&inreg,&outreg);
}
```

INT 33,1 show tje mouse cursor

In ax register have to put the value 01h, and next, with the function int86 to call the 33h interrupt.

```
void mafist(void)
{
    inreg.x.ax=0x01;
    int86(0x33,&inreg,&outreg);
}
```

INT 33,3 Return the position of vertical, horisontal and the key status

In ax register have to put the value 01h, and next, with the function int86 to call the 33h interrupt. Return:

cx ← horisontal position, x (0-639);

dx ← vertical position, y (0-199);

bx ← status key.

In C language the function use to send data to Parallel port is:

```
Outport(port, value);
```

To receive data is inport function and is use:

```
unsigned x;
unsigned=inport(port);
```

4. CONCLUSIONS

With this easy aplication we can understand the basic knowledge of the parallel port programing and to control a external aplication. We use the keyboard example because in this way can see how to send and how to receive data to/from PC.

BIBLIOGRAPHY

- [1.] M. Popa, M. Marcu, „Porturile paralel și serie ale calculatorului PC” , Editura Orizonturi Universitare Timișoara , 2001;
- [2.] H.P. Messmer, „The Indispensable PC Hardware Book”. Fourt Edition Addison Wesley, 2000;
- [3.] Microsoft Comparison: Extended Capabilities Port: Specifications, 1993;