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LABORATORY STAND FOR STUDY OF THE DIGITAL INTERFACE

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ABSTRACT:
This work presents a digital interface board with 2 input ports and 2 output ports. The board has been connected to the ISA bus of the computer and it contains 2 output ports and 2 input ports. This board was built and its functioning was tested by means of a program that represents a matriceal keyboard with 24 multiplexated buttons 8x3.

Key words:
bus, ports, digital interface

1. INTRODUCTION

The digital interface must be assuring the prelevation from the process some periodical signal (TTL or other levels) or contact signal and transmitions to the process some logical signals like an impulse, logical value or contacts.

This board that will be connected to the ISA bus of the computer and it is a digital interface board with 4 ports contains:

- 2 output ports (PA si PB) ;
- 2 input ports (PC si PD).

The input ports are connected with adaquated resistance (5,6kΩ) at +5V, so the inactivated inputs are 1 logic. The two input ports are implemented by two 74241 circuits (8-byte Bus Driver with HZ capability- high inpedance).

2. THE BLOCK DIAGRAM AND THE CONNECTION SCHEME OF THE BOARD

The board LIO contain 4 ports with 8 byte (2 output ports and 2 input ports). The 4 ports can be addressable anywhere in the address space of the port by using the 3 jumpers.

The block diagram of the board is described in Fig. 1 and contains the selector block implemented by 4 BCD decimal decoders, as well as the input/output circuits block that has 2 output circuits and 2 input circuits.

These two blocks are connected to the address, data and control buses, as follows:

a. The input circuits block to the data buses (SD_0- SD_7)
b. The port selection block to the address buses (SA_0- SA_9) and to the control buses (AEN, IORC, IOWC).

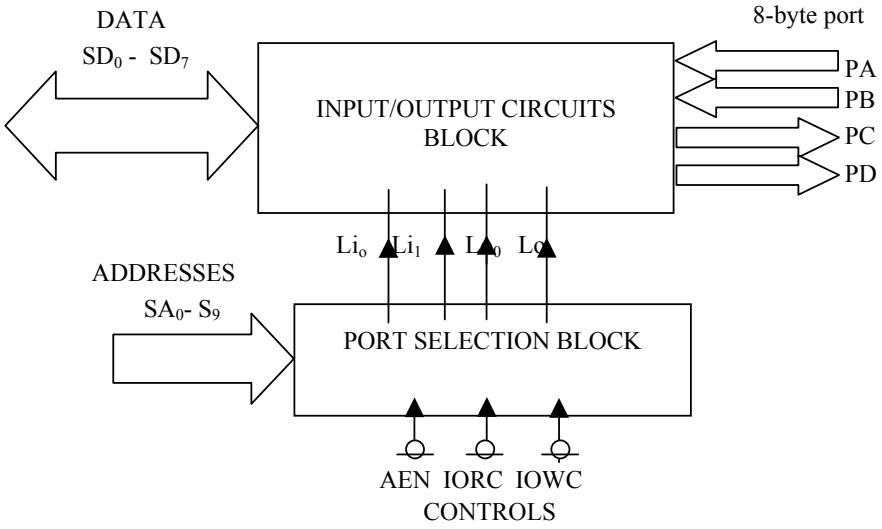

Fig. 1. The block diagram

In figure 2a it is presented the connection scheme and in fig.2b it is presented the part connection scheme.

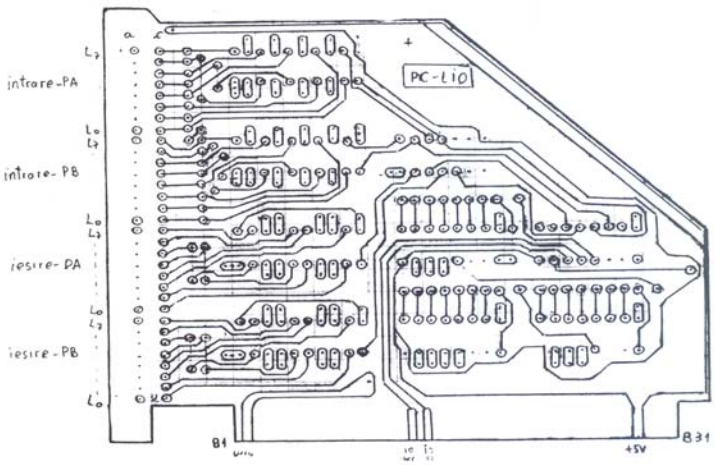

Fig. 2a The front connection scheme

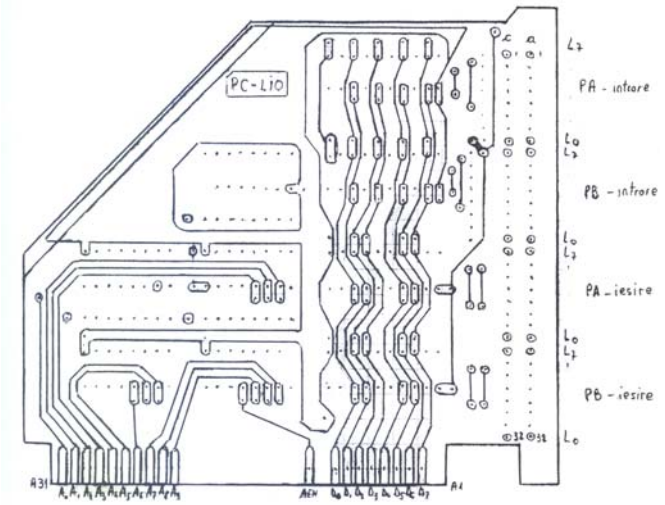

Fig. 2b The part connection scheme

3. THE TEST PROGRAM OF THE BOARD

To check the working of the bord, a program has been drawn-up in C++ language, which uses a matriceal keyboard with 24 multiplexated buttons 8x3.

```
#include <stdio.h>
#include <conio.h>
#include <dos.h>
const unsigned char s[24] = {
0x03,0x9f,0x25,0x0d,0x99,0x49,0x41,0x1f,0x01,0x09,0x11,0xc1,0x63,0x85,0x61,0x71,0x91,0xe3,0x31,0xc5,0x8
3,0xd5,0xed,0xfd};
                                        // 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, b, C, d, E, F, H, L, P, o, U, n, =, -
int i;

int c(int col,int i)
{
 int  k;
  k=0;
  while ((i && 0x01)!=0) // check if the active bitis on the 1st position (on the right)
      {
            k++; i=i >> 1;  // add "k" and switch the bit to the right
           }
  return (8*(col-1) + k); // return the number of the pressed button
}
void main()
{
  clrscr();
  printf("\n Program testing for a matrix keyboard of 8x3  ");
  do {
    outportb(0x341,0); // it doesn`t  activated any key column
    do {   // put in I the pressed button in the column
             i=inportb(0x340);
      // as long as any button or key isn`t pressed
          } while ((i!=0xff) && !kbhit());

    outportb(0x341,0xfe); // activate the 1st column of keyboard
    i=inportb(0x340);  // write on the screen the number of the pressed button


     if (i!=0xff)  // if is a pressed key in the column
       {
            outportb(0x340,s[c(1,i)]);  // write on the cell the number of the pressed button
            printf("\n %d",c(1,i));  // write on the screen the number of the pressed button
          }

    outportb(0x341,0xfd); // the second key column is activated
    i=inportb(0x340);   //put in i the pressed button in the column
     if (i!=0xff)  // if is pressed button in column 2
       {
            outportb(0x340,s[c(2,i)]);   // write on the cell the number of the pressed button
 printf("\n %d",c(2,i));      // write on the screen the number of the pressed button
           }
    outportb(0x341,0xfb);  // the 3rd column is activated
    i=inportb(0x340); // put in i the pressed button in the column

     if (i!=0xff)  // if is a pressed button in column 3
       {
            outportb(0x340,s[c(3,i)]);  // write on the cell the number of the pressed button
            printf("\n %d",c(3,i));     // write on the screen the number of the pressed button
            }
    delay(300);
  } while (!kbhit());  // as long as the computer key is not pressed.
}
```

4. CONCLUSIONS

This work carried out the study of the board that will be connected to the ISA bus of the computer and it contains 2 output ports and 2 input ports. This board was built and its functioning was tested by means of a program that represents a matriceal keyboard with 24 multiplexated buttons 8x3.

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