APPLICATIONS ON THE INTERRUPT SYSTEM

1. THE BOARD AND THE APPLICATION

The application bellow is an example of how the interrupt system can be used. This example shows the major aspects, like the interrupt redirect, its solving and the development of a handler routine.

On IRQ7 input (the less prioritary input, destined for LPT, parallel port) of the 8259A controller (master) there are a three possibilities to generate an interrupt: with a switch, from channel 2 of a I8253 circuit with address 100h (see fig. 1) and from a telephone disc (see fig.2) The interrupt source selection is done with a jumper (JP2).

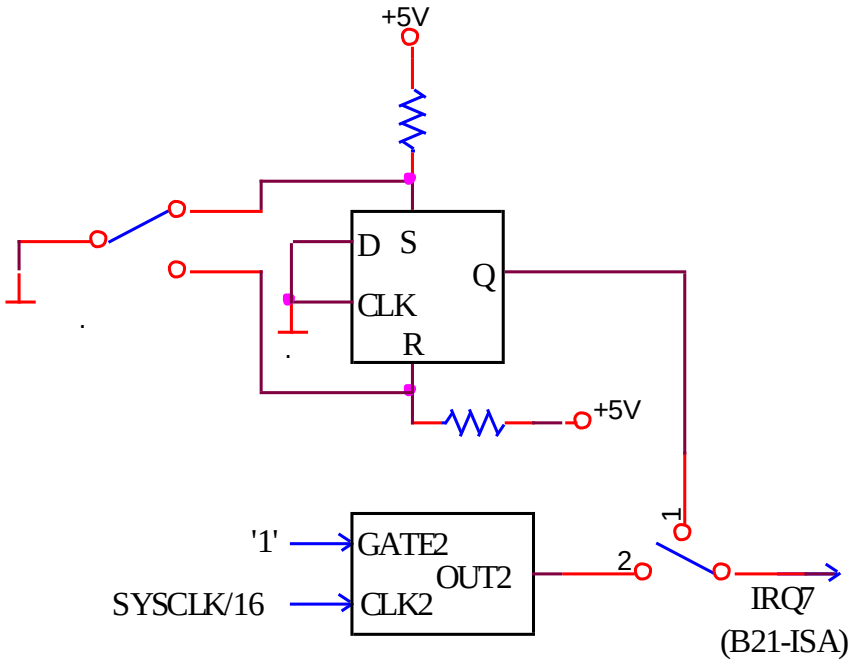

Fig. 1 Electric scheme of the circuit

For the interrupt source 1 the application INT7.ASM presented bellow was developed. The application counts the interrupts arrived on line ‘1’ from the pushbutton (and cleaned with a D bistable) and signals it on the screen.

```
;------------------------
PAGE 60,132
TITLE INT7
COMMENT * Generates interrupts from a pushbutton on IRQ7*
STIVA    SEGMENT          PARA  STACK 'STACK'
DW       512   DUP(?)
STIVA    ENDS
;-----------------------------------------
DATA     SEGMENT          PARA  PUBLIC     'DATA'
irq7_old   dw  2 DUP (?)     ; Old irq7 interrupt address
mes_in     db 0dh,0ah,"Push the key connected to IRQ7 ",0dh,0ah, "$"
mes_out    db 0dh,0ah,"Done",0dh,0ah, "$"
caracter   db 30h
DATA     ENDS
```

```
  ;-----------------
  CODE     SEGMENT   PARA   PUBLIC     'CODE'
  MAIN     PROC  FAR
  ASSUME CS:CODE, DS:DATA, SS:STIVA ,ES:NOTHING
  push ds
  xor ax,ax
  push ax                  ;for return
  mov ax,data
  mov ds,ax
  mov ah,9                 ; message display, string display function
  mov  dx,offset mes_in          ;message address offset
  int  21h                       ; DOS interrupt call
  cli
;-- Redirect intrerrupt IRQ7 to user's routine --------
  mov ax,350fh                   ;Read timer interrupt address in ES:BX
  int 21h                        ; DOS interrupt call
  mov irq7_old,bx                ;saveold interrupt offset address
  mov irq7_old+2,es              ;and segment addres
  push ds
  mov dx,offset irq7int          ;new routine offset address
  mov ax,seg irq7int
  mov ds,ax
  mov ax,250fh                   ;load address from DS:DX in TVI
  int 21h                        ; DOS interrupt call
  pop ds
  mov ax,0600h                   ;screen empty
  mov cx,0
  mov dx,164fh
  mov bh,7
  int 10h
  mov al,00111000b               ;masks settings
  out 21h,al
  sti
  stai:    mov ah,1              ;wait for a key press
           int 16h
           jz  stai
  cli                            ;--Old interrupt irq7---
  push ds                        ;saves  DS
  mov ax,250fh                   ;restores vector in TVI
  lds dx,dword ptr irq7_old      ;loads old address in   DS:DX
  int 21h                        ; DOS interrupt call
  pop ds                         ;restores DS
  mov al,10111000b               ;restores mask
  out 21h,al
  sti
  mov ah,9                 ;-- end message ---------
  mov dx,offset mes_out
  int 21h
  mov ah,02
  mov dl,07                ;sound at exit
  int 21h
  mov ax,4C00h             ;end program through
  int 21h                  ; a DOS function call
  MAIN ENDP

  IRQ7INT   PROC  NEAR     ;-- new interrupt routine---
  push ax
```

```
  push ds
  mov ax,data
  mov ds,ax
  mov ah,0eh
  mov al,caracter
  int 10h              ;character display
  inc caracter
  mov al,7             ; generates sound
  int 10h
  mov al,20h
  out 20h,al
  pop ds
  pop ax
  iret                 ;return

  IRQ7INT    ENDP
;== End ====================================
code ends          ; COD segment end
end main           ; program end
;*-------------------------------------------------------*;
```

2. WORK

a. Analyze INT7.ASM application and run it.
b. Rewrite the application:
   - using the controller in polling mode
   - using software cleaning instead of the bistable
c. Adapt the application for the second interrupt source (channel 2 - timer)
d. The third interrupt source is a telephone disc. Write an application that takes the impulses from it and displays the dialed number. Attention to cleaning!

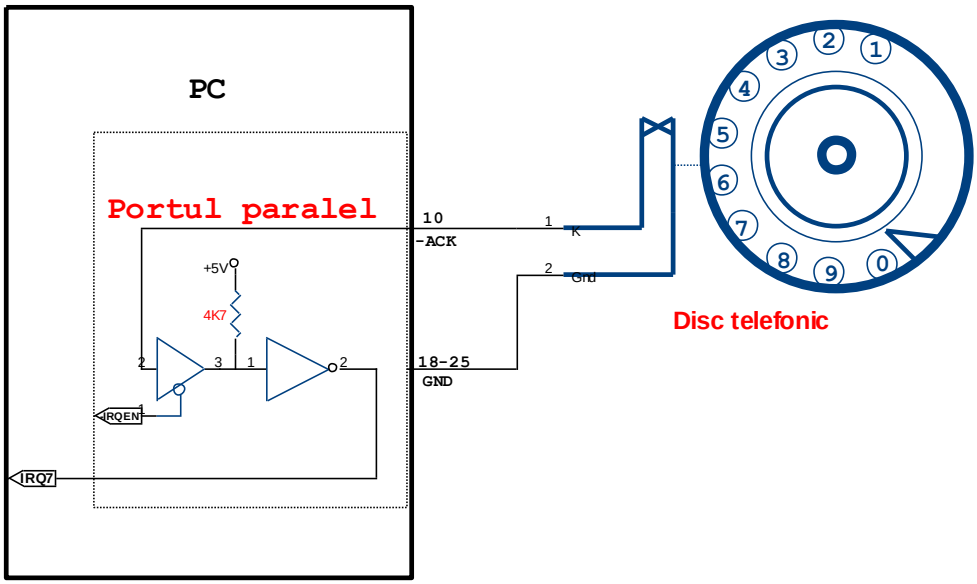

Fig. 2 The electric scheme of the telephone disc connection to IRQ7