



Automate the Home

Phone Remote Control Unit

*Author: Mirkov Milos
Kikinda, Yugoslavia
email: mmki@sezampro.yu*

APPLICATION OPERATION:

This device is for a remote on and off switch for up to three home devices. It consists of two separate parts, a remote control and a main unit.

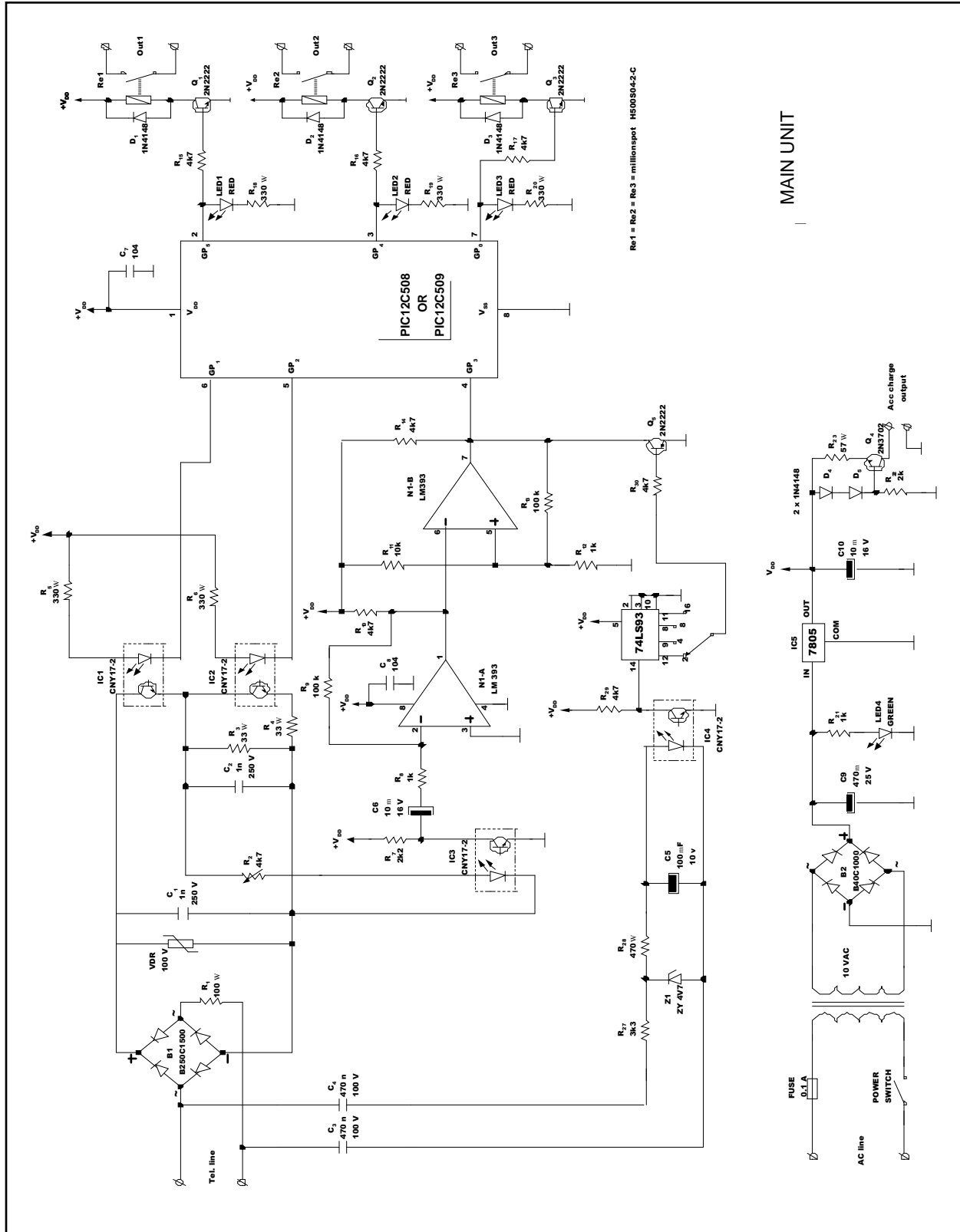
The main unit is connected to a phone line. It answers a phone call (after 2, 4, 8 or 16 ring signal), receives a message and controls the energetic outputs. LED1, LED2 and LED3 are for visual control of outputs. If a receiving error has occurred, the main unit will break the connection without changing any output states. Indication of a correctly received message is a 1.8 kHz tone. The power supply is from an AC network and there is a NiCd ac charging output.

The remote control unit has three buttons and four LEDs. By using the buttons UP and DOWN, we can select a device whose state needs to change. Three green LEDs are for indication of a currently active device, and the red LED is for indication of state. The ENTER button is for changing the state of the selected device. When all LEDs are off, pressing ENTER starts a transmit sequence. After the end of the transmit sequence, a main unit sends a beep tone which can be heard in a phone receiver. Next, pressing ENTER causes the microcontroller's SLEEP state. Waking up from the SLEEP state is done by pressing any button. The remote control has a NiCd charging input.

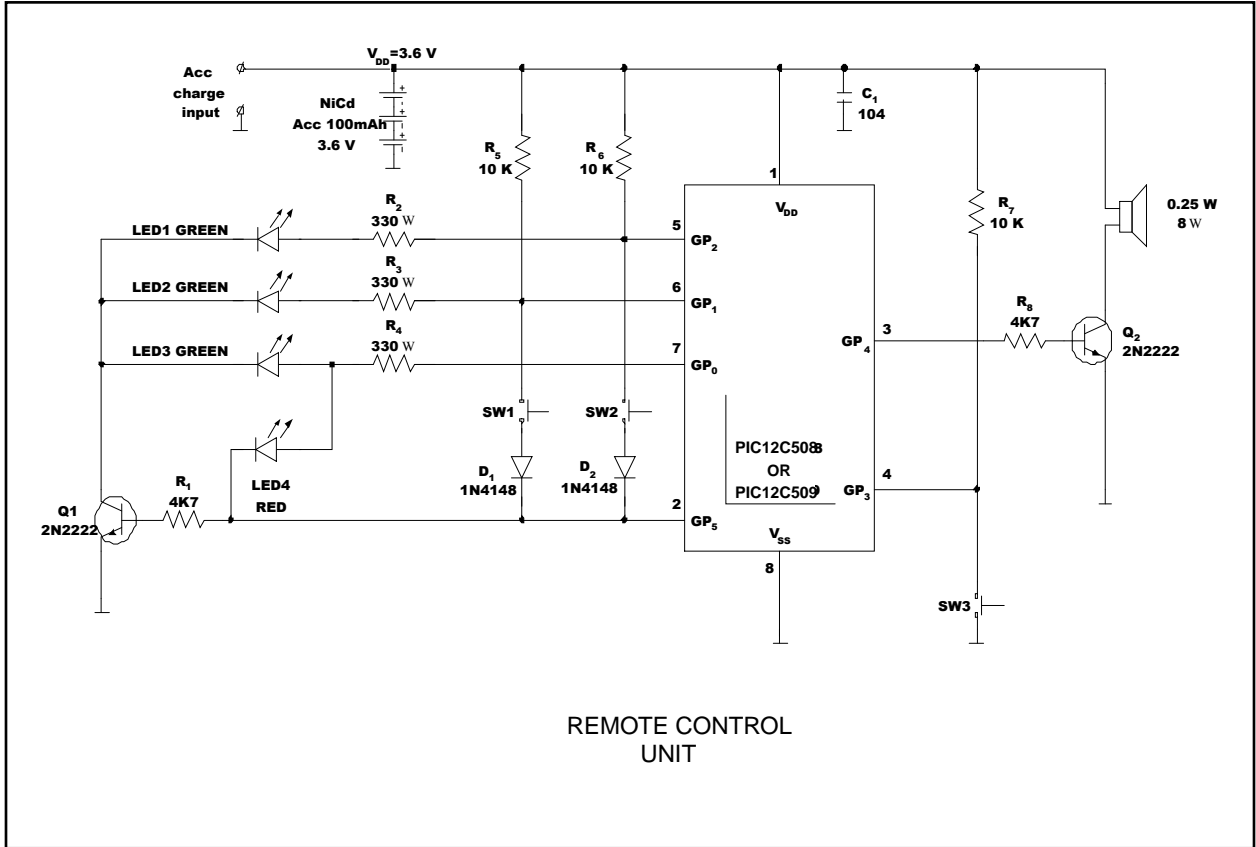
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Automate the Home

Graphical hardware representation:



Automate the Home



Automate the Home

APPENDIX A: SOURCE CODE

```
;*****  
;  
; THIS IS PROGRAM FOR MAIN UNIT  
;  
;*****  
W          equ          0  
TMR0      equ          0x01  
PCL       equ          0x02  
STATUS    equ          0X03  
GPIO      equ          0X06  
Gp0       equ          0  
Gp1       equ          1  
Gp2       equ          2  
Gp3       equ          3  
Gp4       equ          4  
Gp5       equ          5  
Flag      equ          0x07  
Rcvd      equ          0  
ByteCntr  equ          0x08  
BitCntr   equ          0x09  
BeepTime  equ          0x0A  
NoBeep    equ          0x0B  
Kode      equ          0x0C  
Output    equ          0x0D  
BTime     equ          0x0e  
          org          0  
          movlw        0x06  
          mowf         GPIO  
          movlw        0x08  
          tris         GPIO  
          clrf         TMR0  
;*****  
Start  
          btfsc        GPIO,Gp3  
          goto         Start  
          bcf         GPIO,Gp1  
Start1    btfss        GPIO,Gp3  
          goto         Start1  
          call         OutBeep  
          nop  
          nop  
Waiting   btfsc        GPIO,Gp3  
          goto         Waiting  
          call         RecByte1  
          call         RecByte2  
          call         OutBeep  
          call         Execute  
          goto         Start  
OutBeep  
          movlw        0x0F  
          movwf        NoBeep  
OutBeep0  movlw        0xFF  
          movwf        BeepTime  
OutBeep1  bcf         GPIO,Gp2  
          movlw        0xFC  
          movwf        TMR0  
BeepLoop  movf         TMR0,W  
          subwf        TMR0,W  
          btfsc        STATUS,0  
          goto         BeepLoop  
          bsf         GPIO,Gp2  
          movlw        0xFC  
          movwf        TMR0
```

Automate the Home

```
BeepLoop1 movf      TMR0,W
           subwf    TMR0,W
           btfsc    STATUS,0
           goto     BeepLoop1
           decfsz   BeepTime
           goto     OutBeep1
           decfsz   NoBeep
           goto     OutBeep0
           retlw    0

RecByte1  movlw     0x08
           movwf    BitCntr

BLoop1    call     RecBit
           btfss   Flag,Rcvd
           bcf     STATUS,0
           bsf     STATUS,0
           rlf     Kode
           decfsz  BitCntr
           goto   BLoop1
           movlw  0xAA
           xorwf  Kode,W
           btfss  STATUS,2
           goto   Error
           retlw  0

RecByte2  movlw     0x08
           movwf    BitCntr

BLoop2    call     RecBit
           btfss   Flag,Rcvd
           bcf     STATUS,0
           bsf     STATUS,0
           rlf     Output
           decfsz  BitCntr
           goto   BLoop2
           movlw  0xA0
           xorwf  Output,W
           andlw  0xF0
           btfss  STATUS,Z
           goto   Error
           retlw  0

RecBit    clrf     TMR0
           movf    TMR0,W

RB1       btfss   GPIO,Gp3
           goto   RB1
           subwf  TMR0,W
           movwf  BTime
           movlw  0x06
           subwf  BTime,W
           btfss  STATUS,0
           goto   BOR
           movlw  0x0A
           subwf  BTime,W
           btfss  STATUS,0
           goto   B1R

BOR       bcf     Flag,Rcvd

BOR1     movf    TMR0,W
           btfsc  STATUS,2
           goto   BOR1
           retlw  0

B1R      bsf     Flag,Rcvd

B1R1     movf    TMR0,W
           btfsc  TMR0,W
           btfsc  STATUS,2
           goto   B1R1
           retlw  0
```

Automate the Home

```
Error
    bsf      GPIO,Gp1
    goto    0
Execute
    btfss   Output,0
    bcf     GPIO,Gp5
    bsf     GPIO,Gp5
    btfss   Output,1
    bcf     GPIO,Gp4
    bsf     GPIO,Gp4
    btfss   Output,2

;*****
;
; THIS IS PROGRAM FOR REMOTE
; CONTROL UNIT
;
;     CONFIG = 0x0A
;     INTRC
;     WDT disabled
;     CP off
;     MCLR off
;*****
W      equ      0
TMR0   EQU      0X01
PCL    EQU      0X02
STATUS EQU      0X03
FSR    EQU      0X04
OSCCAL EQU      0X05
GPIO   EQU      0X06
Gp0    equ      0
Gp1    equ      1
Gp2    equ      2
Gp3    equ      3
Gp4    equ      4
Gp5    equ      5
Flag   EQU      0X07
Send   equ      0
KeyPres equ     1
dbnce  equ     2
ok     equ     3
Debounce equ    0x08
Gpio1  equ    0x09
Output equ    0x0A
AudOut equ    0x0B
MusCntr equ    0x0C
Temp   equ    0x0D
Delay  equ    0x0E
org    0
    clrw
    movwf GPIO
    movwf Flag
    movwf Gpio1
    movlw 0x07
    option
    movlw 0x16
    tris GPIO
    clrf TMR0
;*****
Loop   call     ServKeys
       call     UpdateLed
       btfss   Flag,Send
       goto    Loop
Audio  movlw    0x08
```

Automate the Home

```
    tris        GPIO
    movlw      0xAA
    movwf     AudOut
    call      Music
    movlw     0xA0
    movwf     AudOut
    movf      Output,W
    iorwf     AudOut
    bsf       AudOut,3
    call      Music
    bsf       Flag,ok
    goto      Loop
;*****
ServKeys
    movlw     0x16
    tris     GPIO
    bcf      GPIO,Gp5
    movf     Gpio1,W
    btfsc    STATUS,2
    bcf      GPIO,Gp0
    movlw   0x02
    subwf   Gpio1,W
    btfsc    STATUS,2
    goto    Show2
    btfss    STATUS,0
    goto    Show1
    btfss    Output,Gp2
    bcf      GPIO,Gp0
    bsf      GPIO,Gp0
Continue   btfss    GPIO,Gp2
    goto    Up
    btfss    GPIO,Gp1
    goto    Down
    btfss    GPIO,Gp3
    goto    Enter
    bcf      Flag,KeyPres
    retlw   0
Show2
    btfss    Output,Gp1
    bcf      GPIO,Gp0
    bsf      GPIO,Gp0
    goto    Continue
Show1
    btfss    Output,Gp0
    bcf      GPIO,Gp0
    bsf      GPIO,Gp0
    goto    Continue
Up
    btfsc    Flag,dbnce
    goto    DecDbnce
    btfsc    Flag,KeyPres
    retlw   0
    bsf      Flag,KeyPres
    movlw   0x04
    movwf   Debounce
    bsf      Flag,dbnce
    bcf      Flag,ok
    movlw   0x03
    subwf   Gpio1,W
    btfsc    STATUS,2
    goto    Up2
    incf    Gpio1
    retlw   0
Up2
    clrf    Gpio1
    retlw   0
```

Automate the Home

```
Down
    btfsc    Flag,dbnce
    goto    DecDbnce
    btfsc    Flag,KeyPres
    retlw   0
    bsf     Flag,KeyPres
    movlw   0x04
    movwf   Debounce
    bsf     Flag,dbnce
    bcf     Flag,ok
    movf    Gpio1,W
    btfsc   STATUS,2
    goto    Down2
    decf    Gpio1
    retlw   0
```

```
Down2
    movlw   0x03
    movwf   Gpio1
    retlw   0
```

```
Enter
    btfsc    Flag,dbnce
    goto    DecDbnce
    btfsc    Flag,KeyPres
    retlw   0
    bsf     Flag,KeyPres
    movlw   0x04
    movwf   Debounce
    bsf     Flag,dbnce
    btfsc    Flag,ok
    goto    TxEnd
    movf    Gpio1,W
    btfsc   STATUS,2
    goto    Ent0
    movlw   0x03
    subwf   Gpio1,W
    btfsc   STATUS,2
    goto    Ent3
    movlw   0x02
    subwf   Gpio1,W
    btfsc   STATUS,2
    goto    Ent2
    btfss   Output,Gp0
    bsf     Output,Gp0
    bcf     Output,Gp0
    retlw   0
```

```
Ent2
    btfss   Output,Gp1
    bsf     Output,Gp1
    bcf     Output,Gp1
    retlw   0
```

```
Ent3
    btfss   Output,Gp2
    bsf     Output,Gp2
    bcf     Output,Gp2
    retlw   0
```

```
Ent0
    bsf     Flag,Send
    retlw   0
```

```
DecDbnce
    decfsz  Debounce
    retlw   0
    bcf     Flag,dbnce
    retlw   0
```

```
TxEnd
    bsf     GPIO,Gp2
    bsf     GPIO,Gp1
```


Automate the Home

```
        bcf      GPIO,Gp0
        bcf      GPIO,Gp4
        bsf      GPIO,Gp3
        sleep
        retlw0
UpdateLed
        movlw   0x18
        tris    GPIO
        bsf      GPIO,Gp5
        movf    Gpio1,W
        btfss   STATUS,2
        goto    OffLed
        movlw   0x02
        subwf   Gpio1,W
        btfsc   STATUS,2
        goto    On2nd
        btfss   STATUS,0
        goto    On1st
        bcf      GPIO,Gp0
        bcf      GPIO,Gp1
        bsf      GPIO,Gp2
        retlw   0
On1st
        bsf      GPIO,Gp0
        bcf      GPIO,Gp1
        bcf      GPIO,Gp2
        retlw   0
On2nd
        bcf      GPIO,Gp0
        bsf      GPIO,Gp1
        bcf      GPIO,Gp2
        retlw   0
OffLed
        bcf      GPIO,Gp0
        bcf      GPIO,Gp1
        bcf      GPIO,Gp2
        retlw   0
MusLoop
        btfss   AudOut,7
        call    Out0
        call    Out1
        btfss   AudOut,6
        call    Out0
        call    Out1
        btfss   AudOut,5
        call    Out0
        call    Out1
        btfss   AudOut,4
        call    Out0
        call    Out1
        btfss   AudOut,3
        call    Out0
        call    Out1
        btfss   AudOut,2
        call    Out0
        call    Out1
        btfss   AudOut,1
        call    Out0
        call    Out1
        btfss   AudOut,0
        call    Out0
        call    Out1
        retlw   0
Out1
        movlw   .32
        movwf   Temp
```

Automate the Home

```
Loop1A  bsf      GPIO,Gp4
        movlw   .255
        movwf  Delay
Loop11  decfsz  Delay
        goto   Loop11
        bcf      GPIO,Gp4
        movlw   .254
Loop10  decfsz  Delay
        goto   Loop10
        decfsz  Temp
        goto   Loop1A
        retlw  0

Out0
        movlw   .16
        movwf  Temp
Loop0A  bsf      GPIO,Gp4
        movlw   .255
        movf   Delay
Loop01  nop
        nop
        decfsz  Delay
        goto   Loop01
        bcf      GPIO,Gp4
        movlw   .254
Lop00  nop
        nop
        decfsz  Delay
        goto   Loop00
        nop
        nop
        decfsz  Temp
        goto   Loop0A
        retlw  0
        end
```