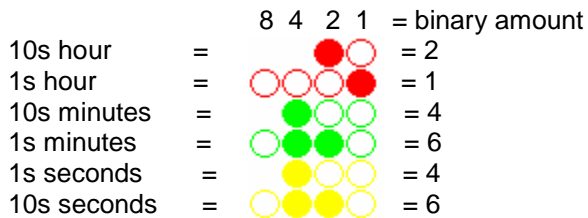


## Theory of Operation

This setup uses the Ds1302 to keep the time and the BS2p40 to control the LEDs. The LED control can also be done with a shift register but to keep the parts down, I just used the BS2p40. If you are not familiar with a Binary Clock, it is simple a way of displaying time in a binary format. Below is the way it is read.

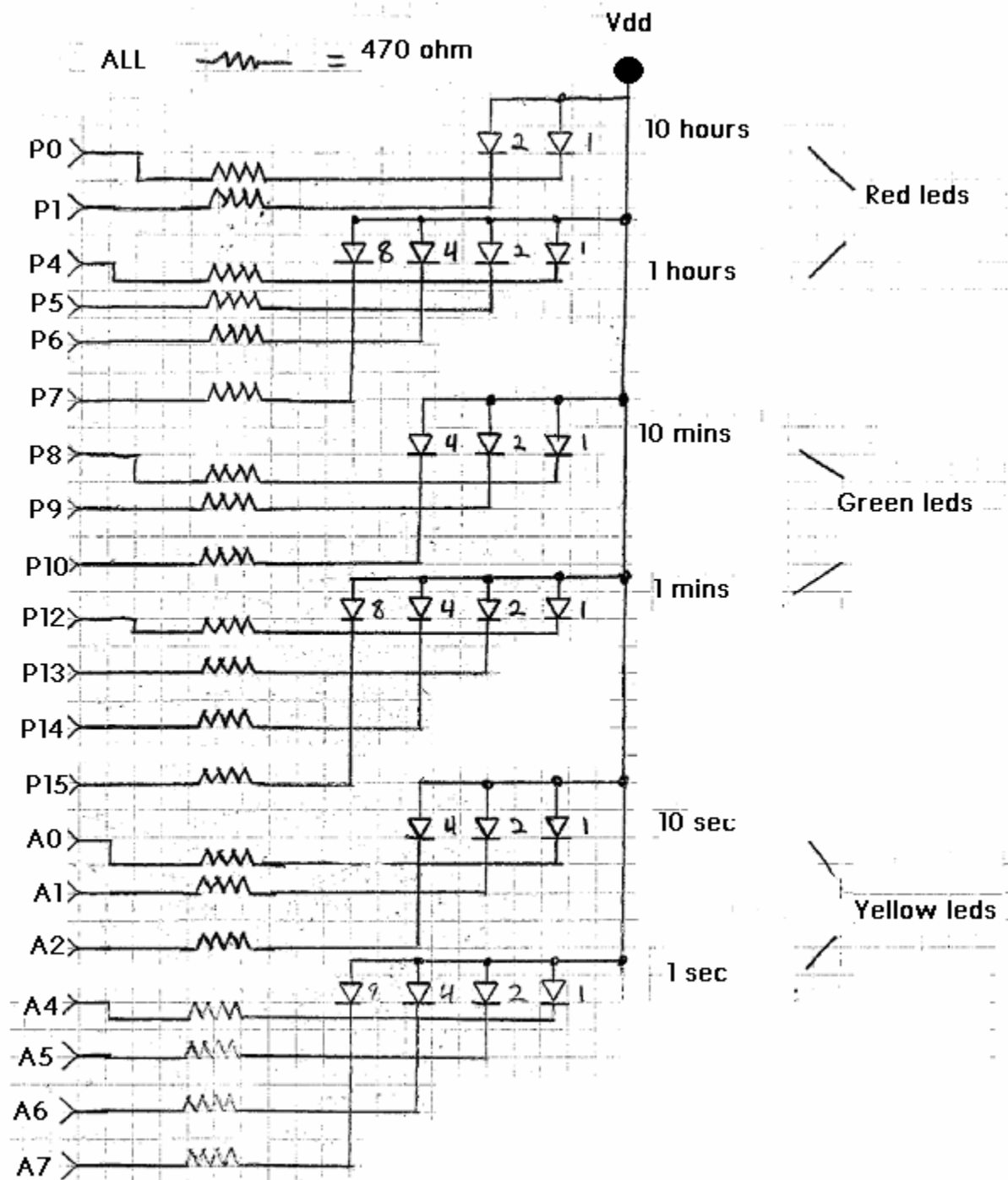


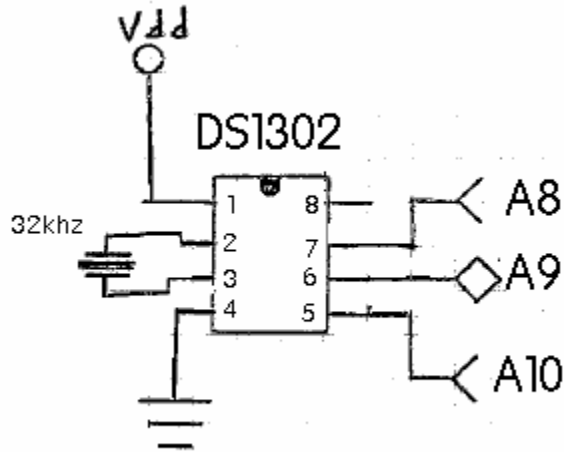
The time would = 21:46:46 or 9:46:46 PM

## Parts list:

Description:	Part number	Quantity
BS2p40	BS2p40-ic	1
Ds1302	604-00005	1
32.khz crystal	251-03230	1
Red LED	350-00006	6
Green LED	350-00001	7
Yellow LED	350-00007	7
470ohm resister	150-04710	20

# Circuit Connections





Test code:

This code will set the time and display the time after about two minutes the unit will go to a sleep mode until the reset button is pushed. Then it will wake up a then display the time for two minutes. On the top of the code there is a handy reset detector. This will allow the stamp to only set the time after a reprogramming and not after reset or power down.

```
' {$STAMP BS2p}
' {$PBASIC 2.5}

'This code will set the time and display the time. After about two minutes
'the unit will go to a sleep mode until the reset button is pushed. Then it
'will wake up and display the time for two minutes and go back to sleep
'again. In the code there is a handy reset detector. This will
'allow the stamp to only set the time after a reprogramming and not after
'reset or power down.

' -----[ Initialization ]-----

MAINIO
'Ds1302 registers
SecReg      CON      %00000
MinReg      CON      %00001
HrsReg      CON      %00010
DateReg     CON      %00011
MonReg      CON      %00100
YrReg       CON      %00110
CtrlReg     CON      %00111
BrstReg     CON      %11111
Tric        CON      %10010000
'Trickle time charger settings
OFF         CON      %11110000 'turns off trickle charge
D1R1       CON      %10100101 '1 diode 1 resistor
D1R2       CON      %10100110 '1 diode 2 resistor
D1R3       CON      %10100111 '1 diode 3 resistor
D2R1       CON      %10101001 '2 diode 1 resistor
D2R2       CON      %10101010 '2 diode 2 resistor
D2R3       CON      %10101011 '2 diode 3 resistor

Sleep_timer VAR      Word
```

IO	VAR	Byte
Temp	VAR	Byte
RTCCmd	VAR	Byte
Seconds	VAR	Byte
Minutes	VAR	Byte
Hours	VAR	Byte
Clk	CON	8
Dta	CON	9
RTCReset	CON	10

Reset\_detect:

MAINIO

DIRS = %1111111111111111

AUXIO

DIRS = %0000000011111111

DATA 123

READ 0,temp

IF temp = 123 THEN GOSUB settime

WRITE 0,111

MAINIO

Read\_time:

FOR sleep\_timer = 1 TO 10000

  ReadRTCBurst:

AUXIO

  HIGH RTCReset

  SHIFTOUT DTA, Clk, LSBFIRST, [%1\1,BrstReg\5,%10\2]

  SHIFTIN DTA, Clk, LSBPRE, [Seconds,Minutes,Hours]

  LOW RTCReset

MAINIO

  OUTA = %1111 ^ hours.HIGHNIB

  OUTB = %1111 ^ hours.LOWNIB

  OUTC = %1111 ^ minutes.HIGHNIB

  OUTD = %1111 ^ minutes.LOWNIB

AUXIO

  OUTA = %1111 ^ seconds.HIGHNIB

  OUTB = %1111 ^ seconds.LOWNIB

MAINIO

  NEXT

MAINIO

DIRS = %0000000000000000

AUXIO

DIRS = %0000000000000000

DO

  SLEEP 60000

LOOP

STOP

```

settime:
' Clear Write Protect bit in control register
Temp = $10
RTCCmd = CtrlReg
GOSUB WriteRTC

Temp = $15
RTCCmd = HrsReg
GOSUB WriteRTC

Temp = $05
RTCCmd = MinReg
GOSUB WriteRTC

Temp = $19
RTCCmd = SecReg
GOSUB WriteRTC

Temp = $80
RTCCmd = CtrlReg
GOSUB WriteRTC

' trickle timer settings
Temp = OFF 'changes this variable to off or the setting that you want the ds1302
to charge at see data sheet
RTCCmd = TRIC
GOSUB trick

Temp = $80
RTCCmd = CtrlReg
GOSUB WriteRTC
RETURN

WriteRTC:
'Write to DS1202 RTC
HIGH RTCReset
SHIFTOUT Dta, Clk, LSBFIRST, [%0\1,RTCCmd\5,%10\2,Temp]
LOW RTCReset
RETURN

Trick:
HIGH rtreset
SHIFTOUT Dta, Clk, LSBFIRST, [RTCCmd,Temp]
LOW RTCReset
RETURN

```