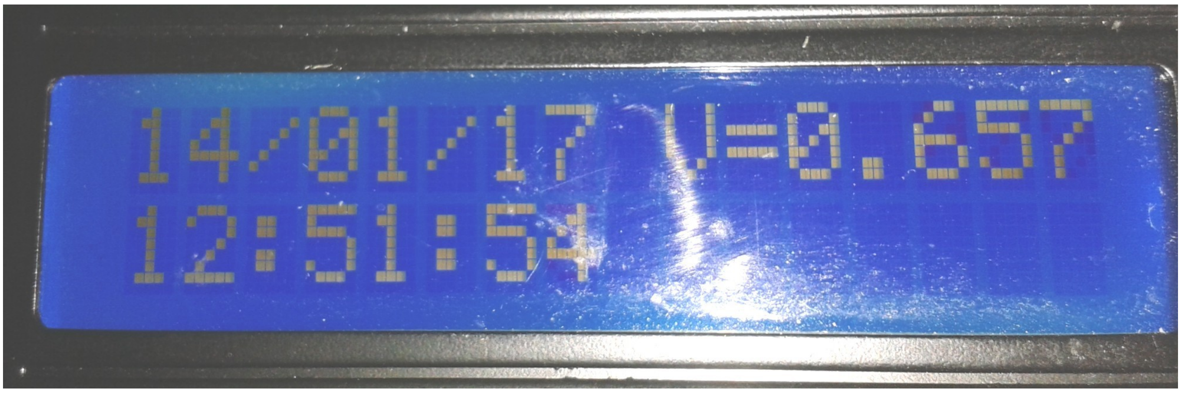
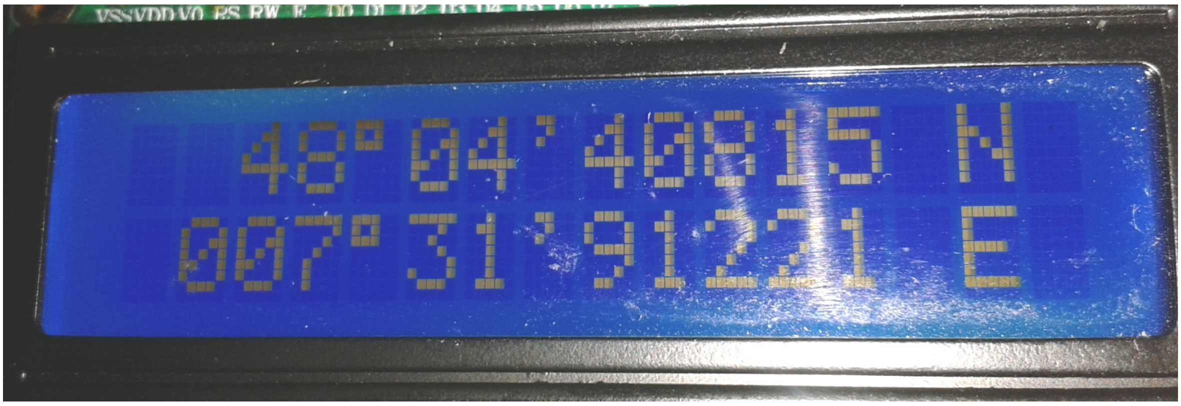
Projet réception GPS

Objectif :

Acquérir les trames GPS
Filtrer sur la trame GPRMC
Contrôler le checksum pour valider la trame reçue
Afficher sur LCD la date, l'heure et la vitesse :

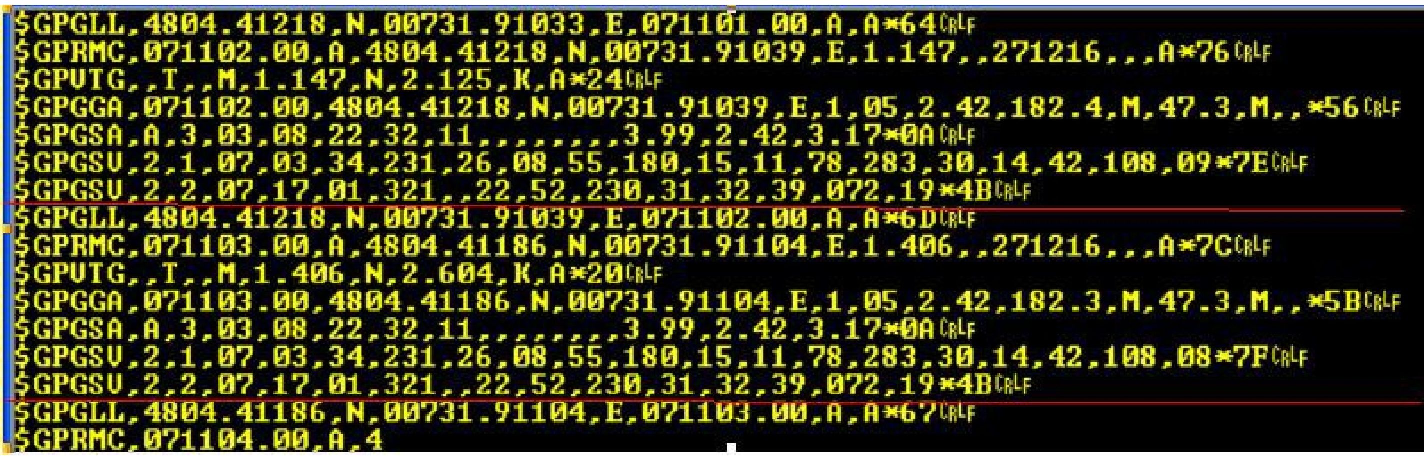


Afficher la latitude et la longitude :



Ces données sont prélevées sur la trame GPRMC

Trames reçues toutes les secondes (entre deux traits rouges):



```
$GPGLL,4804.41218,N,00731.91033,E,071101.00,A,A*64CRLF
$GPRMC,071102.00,A,4804.41218,N,00731.91039,E,1.147,,271216,,,A*76CRLF
$GPVTG,,T,,M,1.147,N,2.125,K,A*24CRLF
$GPGGA,071102.00,4804.41218,N,00731.91039,E,1,05,2.42,182.4,M,47.3,M,,*56CRLF
$GPGSA,A,3,03,08,22,32,11,,,,,,,,3.99,2.42,3.17*0ACRLF
$GPGSV,2,1,07,03,34,231,26,08,55,180,15,11,78,283,30,14,42,108,09*7ECRLF
$GPGSV,2,2,07,17,01,321,,22,52,230,31,32,39,072,19*4BCRLF
$GPGLL,4804.41218,N,00731.91039,E,071102.00,A,A*6DCRLF
$GPRMC,071103.00,A,4804.41186,N,00731.91104,E,1.406,,271216,,,A*7CCRLF
$GPVTG,,T,,M,1.406,N,2.604,K,A*20CRLF
$GPGGA,071103.00,4804.41186,N,00731.91104,E,1,05,2.42,182.3,M,47.3,M,,*5BCRLF
$GPGSA,A,3,03,08,22,32,11,,,,,,,,3.99,2.42,3.17*0ACRLF
$GPGSV,2,1,07,03,34,231,26,08,55,180,15,11,78,283,30,14,42,108,08*7FCRLF
$GPGSV,2,2,07,17,01,321,,22,52,230,31,32,39,072,19*4BCRLF
$GPGLL,4804.41186,N,00731.91104,E,071103.00,A,A*67CRLF
$GPRMC,071104.00,A,4
```

Chaque trame commence avec le caractère $
A la fin de la trame après le caractère étoile se trouve le checksum puis CR et LF
Le calcul du checksum se fait sur les caractères compris entre $ et * (voir le détail du calcul dans le programme.

Trame GPRMC :

```
$GPRMC,094227.00,A,4804.40790,N,00731.91207,E,0.102,,261216,,,D*76
$GPRMC,094228.00,A,4804.40797,N,00731.91201,E,0.039,,261216,,,D*71
$GPRMC,094229.00,A,4804.40800,N,00731.91204,E,0.045,,261216,,,D*7F
```

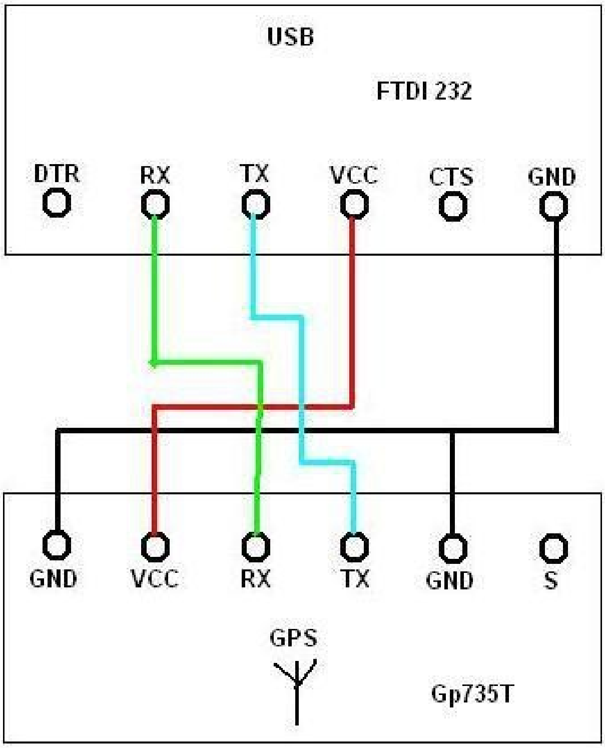
```
GPRMC,094230.00,A,4804.40806,N,00731.91203,E,0.070,,261216,,,D*70
0123456789012345678901234567890123456789012345678901234567890123
```

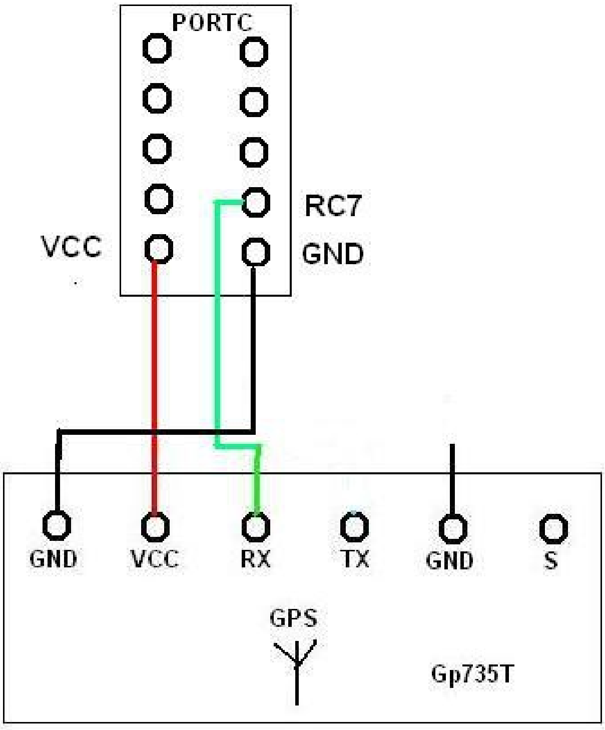
Matériel :

1 Récepteur GPS réf. GP-735-T (Chipset U-BLOX-7)
http://www.lextronic.fr/P27906-recepteur-gps-oem-gp-735t.html

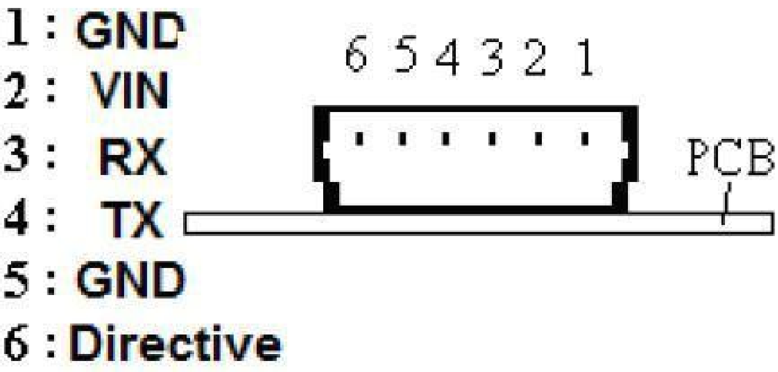
1 PIC18F2420 + afficheur LCD 2x16.

Branchement sur PC ou sur carte de développement EasyPic 5:





Branchement EasyPic 5



Programme PIC en Microbasic:

```
program TraceGps
'Ce programme reçoit les trames GPS, filtre la trame GPRMC et affiche les champs
'Heure, date, Latitude et Longitude.
'PIC 18F2420 Q=8MHz, récepteur GP735T SW7.RC7 = 1, SW8.RC6=1, Sw1.RA0=1,
'SW3.RC7=1 le 26/12/2016
'RCA.0 = 1 then affiche Date Heure Vitesse else affche coordonées Gps
'RCA.1 = 1 then Heure d'hiver else Heure d'été.
dim
  LCD_RS as sbit at RB4_bit
  LCD_EN as sbit at RB5_bit
  LCD_D7 as sbit at RB3_bit
  LCD_D6 as sbit at RB2_bit
  LCD_D5 as sbit at RB1_bit
  LCD_D4 as sbit at RB0_bit
dim
  LCD_RS_Direction as sbit at TRISB4_bit
  LCD_EN_Direction as sbit at TRISB5_bit
  LCD_D7_Direction as sbit at TRISB3_bit
  LCD_D6_Direction as sbit at TRISB2_bit
  LCD_D5_Direction as sbit at TRISB1_bit
  LCD_D4_Direction as sbit at TRISB0_bit

Dim Rec, Rec1 as string[74]
He as string[2]     'Extraction heure
HcW as word         'Heure corrigée en word
HcS as string[5]    'Heure corrigée en string
ScTime as string[8] 'HH:MM:SS
ScLat as string[11] 'Champs latitude
ScLon as string[12] 'Champ longitude
ScVit as string[5]  'Champ vitesse
ScDat as string[8]  'Champ date JJ/MM/AA
bc, i as integer
Tr as byte          'comptage trames
L1, L2 as string[16] 'Lignes LCD
ChS as string[2]    'cheksum lu en string
VitKmh as string[5]  'vitesse en kmh en string

'Procedure Interrupt RCI uart
  Sub procedure Interrupt
  if PIR1.RCIF = 1 then  end if
  PIR1.RCIF = 0
  PIE1.RCIE = 0
 end sub
'Fonction lecture RX Uart________________________________________________________
 sub function ReadChr as byte
  do
  loop until UART1_Data_Ready = 1
  result=UART1_Read
 end sub
'Fonction qui calcule le cheksum entre "$" et "*" et renvoi 0 si ok_____________
 sub function CtrlCs(dim byref Rec1 as string[64], dim byref ChS as string[4] ) as integer
  dim ChSum as word
      Bc as integer
      ChSumTxt as string[4]
```

```
   ChSum = 0    'word
  for bc = 0 to 61
   ChSum = ChSum xor ord(Rec1[Bc]+"") 'calcul
  next bc
    ChSumTxt = ""
    wordtohex(ChSum,ChSumTxt)
    result = StrCmp(ChSumTxt,ChS) 'compare cheksum calculé avec cheksum reçu
 end sub
'Fonction conversion vitesse de noeud en kmh_________________________________________
 sub function ConvVit(dim byref ScVit as string[5]) as string[5]
 dim PosP as word          'Position du point décimal
 'dim PospS as string[5]
 dim Ve, Vd as string[5]   'Valeur entier et décimale en string
 dim VeW, VdW as word      'Valeur entier et décimale en word
 dim VF as float           'Vitesse en kmh en float
 dim VFS as string[20]     'Vitesse en kmh en string
 PosP = StrStr(ScVit,".")  'Recherche position point décimal
  if PosP = 1 then         'Si point en 1 (origine 0)
   Ve = ScVit[0]+""
   Vd = ScVit[2] + ScVit[3] + ScVit[4]
  end if
    if PosP = 2 then       'Si point en 2
    Ve = ScVit[0] + ScVit[1]
    Vd = ScVit[3] + ScVit[4]
    end if
      if PosP = 3 then     'Si point en 3
      Ve = ScVit[0] + ScVit[1] + ScVit[2]
      Vd = ScVit[4]+""
      end if
    VeW = strtoword(Ve)     'Conversion valeur entiere en word
    VdW = strtoword(Vd)     'Conversion valeur décimale en word
      if PosP = 1 then VF = (float(VeW) + (float(VdW) /1000))*1.852 end if
      if PosP = 2 then VF = (float(VeW) + (float(VdW) /100))*1.852 end if
      if PosP = 3 then VF = (float(VeW) + (float(VdW) /10))*1.852 end if
    floattostr(VF,VFS)
    result = VFS[0]+VFS[1]+VFS[2]+VFS[3]+VFS[4]  '5 premiers caractère
 end sub

main:
UART1_INIT(9600)
ADCON1 = $0F        '
CMCON = 7
INTCON.IPEN  = 1    'Comparateur off
PIE1.RCIE = 0
INTCON.PEIE = 1
INTCON.GIE = 1
PORTA = $0
PORTB = $0
PORTC = $0
TRISA = %00000011
TRISB = %00000000
TRISC = %10000000
 LCD_Init()
 Lcd_Cmd(_LCD_CLEAR)            ' Clear display
 Lcd_Cmd(_LCD_CURSOR_OFF)       ' Cursor off
 LCD_Out(1,1," RECEPTION GPS  ")
 Delay_ms(2500)
 While true
'Lecture des trames
   Rec = ""
   Rec1 = ""
   Tr = 0
   do
    do
     i=ReadChr              ' fontion lecture uart byte à byte
    loop until i=36          ' detection début de trame si "$" reçu
    i=0
  do
    Rec[i]=ReadChr           ' fontion lecture uart byte à byte
    if Rec[i]= chr(10) then   ' init compteur de caracteres
       i=0
      else
       i=i+1
      end if
  loop until (i=0)           ' detection début de trame avec "$"
     if ((Rec[2]="R") and (Rec[3]="M") and (Rec[4]="C")) then ' Fitre sur RMC (GPRMC)
        i=0
       do
        Rec1=Rec1 + char(Rec[i])  'Création trame GPRMC
        i=i+1
       loop until (i=0) or Rec[i]=chr(10) ' detection fin de trame
    end if
  inc(Tr)
  loop until Tr =7  ' laisser passer 7 trames
  'uart1_write_text(Rec2)

'Heure
       ScTime = ""
       He=Rec1[6]+Rec1[7]
       HcW=strtoword(He)
        if HcW<23 then
        if TestBit(PORTA,1) = 1 then HcW=HcW+1 else HcW=HcW+2 end if
        else
         HcW=0
        end if
       wordtostr(HcW,HcS)
       Ltrim(HcS)
        if HcW<10 then HcS="0"+HcS end if     'correction UTC
        ScTime = HcS+":"+Rec1[8]+Rec1[9]+":"+Rec1[10]+Rec1[11]
'Latitude
       ScLat=""
       for Bc = 18 to 27
       ScLat = ScLat+Rec1[Bc]
       next Bc
       ScLat=ScLat+Rec1[29]
'Longitude
       ScLon=""
        for Bc = 31 to 41
        ScLon = ScLon+Rec1[Bc]
        next Bc
        ScLon=ScLon+Rec1[43]
'Vitesse______________________________________________________________
        ScVit=""
        for Bc = 45 to 49
        ScVit = ScVit+Rec1[Bc]
        next Bc
        VitKmh = ConvVit(ScVit)   'Conversion vitesse de noeud en kmh
'Date_________________________________________________________________
         ScDat=""
         ScDat=Rec1[52]+ Rec1[53]+"/"+ Rec1[54]+Rec1[55]+"/"+Rec1[56]+Rec1[57]
'Cheksum lu___________________________________________________________
         ChS = "00"+Rec1[63]+ Rec1[64]   'chekssum reçu
'Affichage LCD________________________________________________________
 if Rec1[16] = "A" then
  if  CtrlCs(Rec1,ChS) = 0 then  'si cheksum (Rec1[0] à Rec1[61]) = 1
    if TestBit(PORTA,0)=1 then
     Lcd_Out(1,1, ScDat +" V=" + VitKmh)
     Lcd_Out(2,1,ScTime +"        ")
    else
     L1 = "  "+ScLat[0]+ScLat[1]+Chr($DF) +ScLat[2]+ScLat[3]+"'"+
ScLat[5]+ScLat[6]+ScLat[7]+ScLat[8]+ScLat[9]+" "+ScLat[10]
     Lcd_Out(1,1,L1 + "  ")
     L2 = " "+ScLon[0]+ScLon[1]+ScLon[2]+Chr($DF) +ScLon[3]+ScLon[4]+"'"+
ScLon[6]+ScLon[7]+ScLon[8]+ScLon[9]+ScLon[10]+" "+ScLon[11]
     Lcd_Out(2,1,L2 + "  ")
    end if
  end if
  else
    Lcd_Out(1,1,"   Recherche    ")
    Lcd_Out(2,1,"   Satelites    ")
 end if
wend
end.
```