

Display for GPS Module Data

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LATEST VERSION WITH 10 Character LOCator

This PIC based design reads NMEA data from a GPS module and displays several different parameters on an LCD module. Data shown includes :

GPS Status, Date, Time, 8 Digit Locator, Lat/Long, Speed in m/s, Speed in mph.

A push button switch is used to switch between three separate sets of information on a 16 character x 2 line display. The PIC code can be easily modified to use a larger display module and present all information simultaneously.

A Mark 2 version showing all data simultaneously on a 4 line x 20 char display is also available. See Annex 1

The circuit is shown in Figure 1. The data interface directly from the GPS receiver at logic level passes via a level shifting transistor so this design can be used directly from 3 Volt GPS receivers such as the Motorola M12 (The Oncore replacement). RS232 levels can be interfaced by bypassing this transistor and applying the RS232 data via a current limiting resistor directly to the PIC input pin. The LED flashes with initial acquisition, then stays on; it is really only there as an aid during software development

On switching on, the display will show the message GPS Loc Display briefly before looking for NMEA data. If the RMC sentence is present in the NMEA data, and the GPS not initially locked up the display will change to.

```
NO GPS NO GPS
NO GPS NO GPS
```

Which also shows whenever signal is lost.

When the module locks up, the initial display will change to (for example)

```
02 Aug IO90IV58
14:05:34 {g4jnt}
```

Pressing the push button will change this to :

```
02 Aug 0117.41W
14:05 5054.60N
```

(Lat / Long displayed as DDMM.MM)
Pressing it again:

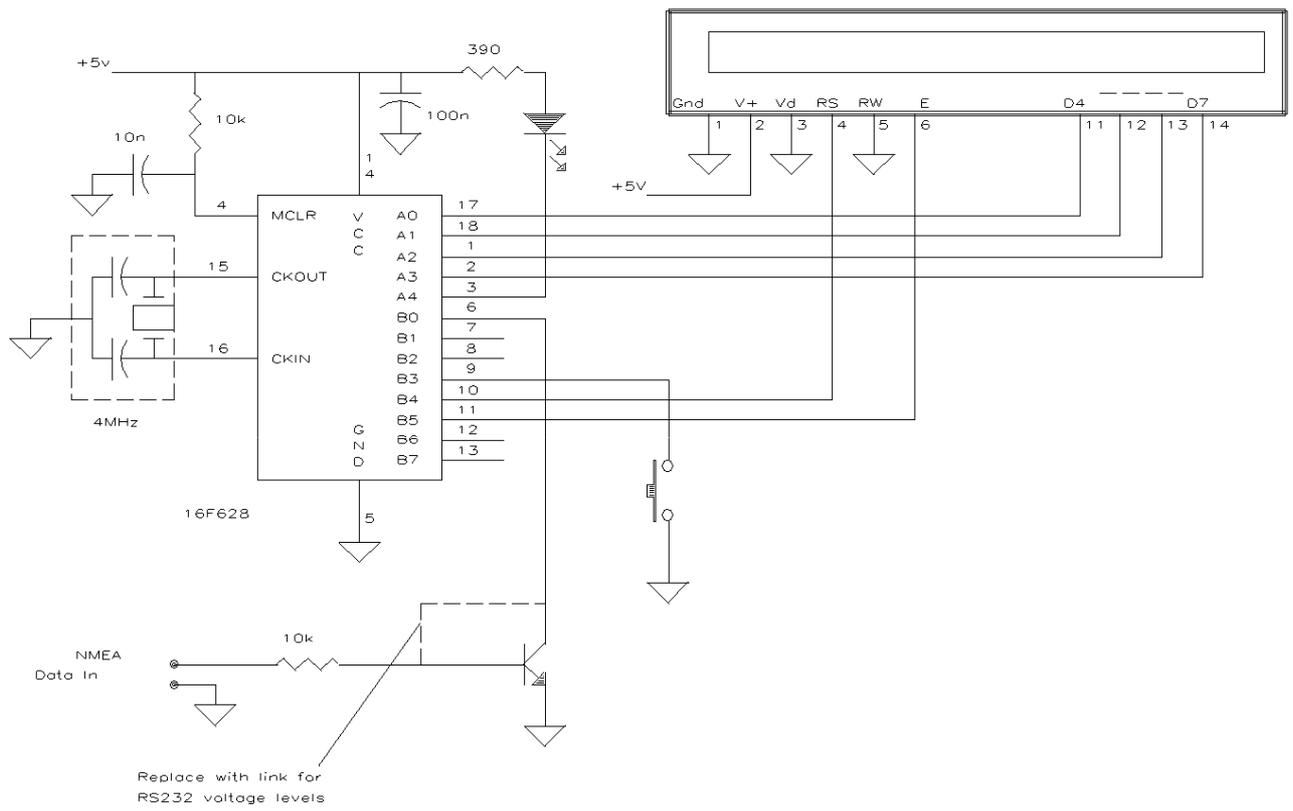
```
02 Aug 14:0534
003.4m/s 007mph
```

Then returning to the first display.

The circuit has been tested with several different makes and sizes of LCD module, including ones with more characters per line, and all worked immediately. For 40 character x 2 line displays, the PIC software could be modified to display all the data simultaneously and remove any need for the pushbutton switch. The software has been tested with simulated NMEA data for many different locations around the world to prove the universality of the locator conversion software.

The PIC code is in file GPLOCDIS.HEX and the source code in GPLOCDIS.ASM. The 16F628 device is just over half full, so there is scope for adding further calculations and display possibilities...

You may have to initialise the GPS module to ensure it supplies NMEA data at 4800 baud and the RMC sentence (beginning \$GPRMC,) once per second. Look at the GPS module data sheet to see how do do this for your particular unit.



Annex 1

Mark 2 Version, September 2010.

The latest version shows all data simultaneously on a 20 character 4 line LCD Module. In addition the Course Over Ground value is displayed, and miles per hour are now shown to higher precision

Use the circuit of Figure 1 substituting the larger display which has the same connections. The push button switch now serves no useful purpose and is no longer used.

Use PIC software **GPS_LOCDISP2**¹ for a 16F628 device running with a 4MHz crystal

The initial start screen will show

```
GPS NMEA DISPLAY
G4JNT Sep 2010
```

Which will briefly change to this display before the signal is acquired. (This will also appear when the GPS signal is lost)

```
NO GPS
```

Eventually a display similar to this should appear

```
15 Sep 2010 16:09:34
IO90IV58 000.0m/s
50°54.61'N 000.00mph
01°17.48'W 000.0°
```

Version 3 July 2016

Use PIC software **GPS_LOCDISP3**

This latest version makes use of the full resolution lat/long in the latest generation of GPS modules and uses a new calculation algorithm for the locator that gives the 10 character locator, showing position to an accuracy of about 18 metres at mid latitudes. The display also shows the lat/long to full resolution

Also introduced:

Conditional Compile time flags for NMEA polarity so RS232 or raw data from a GPS module can be used, and NMEA baud rate delay to cater for 4800 or 9600 baud NMEA

```
10 Jul 2016 15:13:34
IO90IV58AL 000.0m/s
50°54.6159N 000mph
01°17.4897W 000.0°
```

Alternative miles per hour or kilometres per hour display (there is no room on the LCD to show both)

The new display look like this :

The compile time flags have to be set within this block in the .ASM file

```
_____ User Defined setup _____
NMEAPol    =    0    ;1 = RS232 levels, 0 = TTL
RS232POL   =    1    ; ditto for any output (eg GPS initialisation)
BAUDCONST  =    d'14' ;Half bit delay, based on 6.N + 18 = 104 clocks (9600 bd with Fc = 1MHz)
USEKPH     =    1    ;0 = mph  1 = kph
_____
```

¹ Do not confuse with *GPLOCDIS2* which is just a minor upgrade on the original