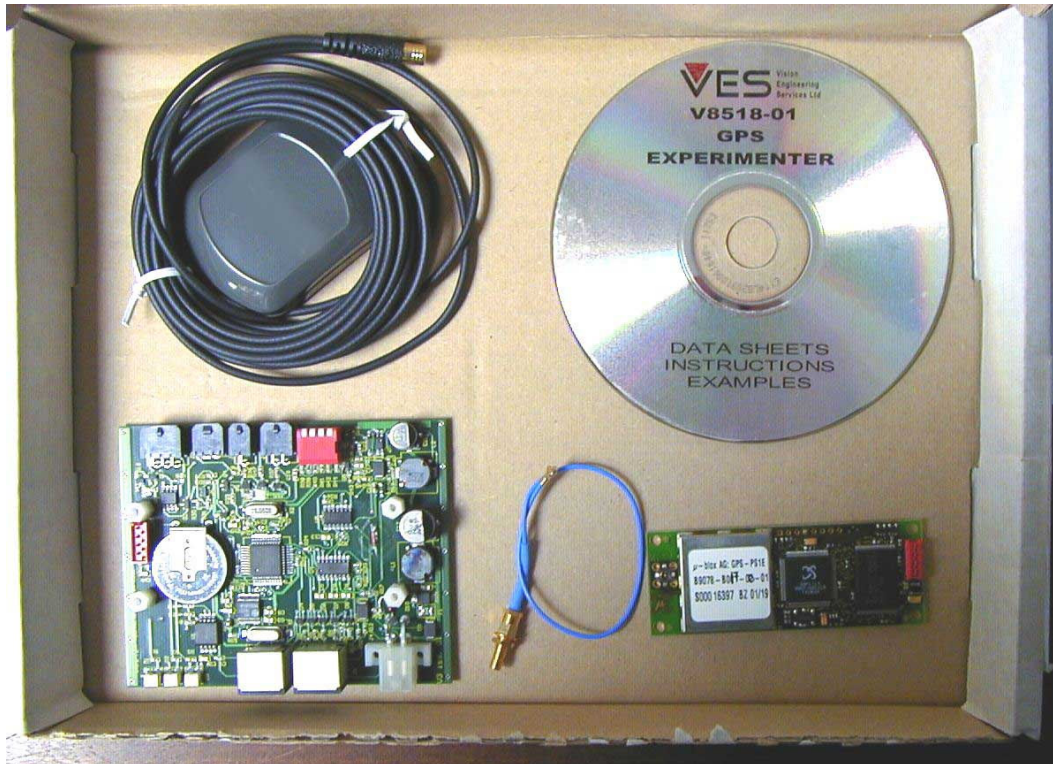


GPS EXPLORER KIT V8518



The GPS Explorer kit provides a unique collection of modules which can be built up as needed to provide a whole host of applications ranging from:

- GPS data logger – (vehicle or person tracking)
- Vehicle navigation in conjunction with any navigation software using NMEA input, including Autoroute and TomTom software running on your laptop or PDA
- Remote control over the mobile or landline network
- Vehicle tracking using GSM/GPRS with external GSM module

The GPS Explorer unit has the following functionality:

- PIC16F877 Flash processor running at 20MHz
- SirfStar 1/LP GPS engine with external GPS antenna
- Serial I/O for GPS engine and compass or laptop/PDA output
- DTMF data receiver and DTMF generator devices onboard
- Multipurpose Analog switches for speaker and microphone
- Approved Automotive 12V interface
- In-circuit programming using mini-din connector
- Suite of utility routines in C for
 - GPS engine control,

the Experimenter serial output at 19200,n,8,1, you should see continuous NMEA data strings from the unit, and a map of satellite locations as they are tracked.

Hints and Tips

The software has been compiled in CCS C for PIC micros. If you are using other compilers, some routines may need to be rewritten to suit your particular compiler.

It is suggested that you have a look through all the routines and refer to the supplied circuit diagrams to familiarise yourself with the hardware and software arrangements. If you are familiar with the PIC micro then most of the code should be fairly straightforward. Others may need to gain a little more experience with the PIC before attempting to modify the code significantly.

For gaining familiarity with GPS technology, refer to the excellent UBLOX introductory files under \GPS subdirectory. This explains the technology, the sentence structure and how it can be utilised effectively.

The detection of valid GPS fixes for simplicity is based on detecting the "A" character in the GPRMC NMEA data string. Normally, for vehicle telematics applications, not all NMEA sentences are required, but for this experimenter package, all available sentences have been enabled. This make the valid fix detection more problematic as the character "A" appears in other strings also. As your first project why not modify the valid fix routine to only look at the GPRMC string?

PIC flashing

Next, you will want to program your new code into the flash micro. All required programming connections for in-circuit flashing are available at J3. You will need to adapt your existing programmer to this connector. Otherwise flashing is standard PIC practice. Refer to the microchip website for more details.

GPS Engine flashing.

Source code exists among the examples supplied to send commands to the UBLOX GPS engine. This allows you to modify the GPS settings programmatically whenever your application starts. It is useful to refer to the available NMEA commands from the u-center utility to confirm the format of each command, and the required checksum.

It is also possible to reprogram the UBLOX engine directly so that the changes become permanent. This is normally done by using a GPS development kit, but can easily be done by modifying the main pcb RS232

converter to send commands to port B of the engine. Refer to the UBLOX documentation for complete information.

Remote Server

This hardware design has been used to perform realtime vehicle navigation using a mobile phone dialup connection to a remote server containing navigation software. If you are interested in sending realtime position information to your own PC via a mobile link, you can make use of the DTMF input and output functions. While a full description of the process is outside the scope of this document, here are a few hints:

With a 2nd unit located at the end of your phone at the "base station" a decode of incoming DTMF data can be sent to your PC and collected in a logfile. Similarly, using the RS232 port on this unit, you can send commands to the vehicle based unit to initiate, terminate or change navigation settings.

The vehicle based unit will receive audio from the headset connector connected to the mobile phone and decode and parse the DTMF detected by the MT8870 receiver as commands. The unit includes an audio input section including a set of dipswitches to change input sensitivity. In response to those commands, the unit will send DTMF over the audio channel using the PCD3312 generator.

For a more integrated solution, there are a number of oem GSM modules available which will allow you to initiate, answer and terminate either voice or data calls using an RS232 based command set. We have included some examples in the \GSM subdirectory. The existing example code set consumes no more than 20% of the available code space, so there is plenty of room to add in the necessary commands to automate the process. Please bear in mind that while GPRS is appropriate for data transmission, availability and data rate can be highly variable depending on many factors, and a fallback to DTMF over the audio channel can actually improve matters.

We hope you will enjoy experimenting with GPS as we have enjoyed developing navigation systems using this technology.

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