Serial Data Logger HF-10

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Overview

The HF-10 logger is designed as a voltage monitor with serial output for a typical connection to a PC running serial communication software. It will measure the voltage on each of four analogue channels and send the corresponding measurements to the host in real time.   A precision 4.096 Volt reference and a 10 bit D/A converter ensures accurate measurements   to a resolution of 4mV.

The module communicates with the host either through a standard COM port (RS232) interface, or via USB.   For the latter, a virtual COM port is established with a USB-serial converter chip on the PCB.   In each case the module derives its power from whichever interface it is configured for so no external power supply is required.

The interval between measurements can be configured by link selection to be in the range 80ms to 5 minutes.   The data sent to the PC appears as ASCII text containing an interval time stamp in seconds followed by the voltage on each of the four channels in millivolts. The format has been optimised so that it can be directly read into an Excel spreadsheet for curve plotting and data analysis. An example is shown in the table below

Another user selectable link provides the option for a shorter output data string containing just a single value from analogue channel 1

```
Serial Port Data Logger   G4JNT  Ver 1.0 Sept
2011
000000      *    0000  0000  0000  0000
000020      *    1848  0384  0024  0000
000040      *    2580  1000  0152  0004
000060      *    2928  1500  0348  0024
000080      *    3136  1868  0576  0060
000100      *    3276  2144  0808  0112
000120      *    3380  2360  1028  0176
000140      *    3456  2532  1232  0252
```

An example of the data output from the HFH-10 Logger. Each field starts with a time stamp in seconds (rolls over after approximately 194 days) then an asterisk separator followed by the voltage on each of the four channels in millivolts in the range 0 – 4092. Each column is separated by a [tab] character. A user link on the PCB allows the format to be shortened to just show the Channel 1 data..

Uses

Voltage monitoring, and drift

Battery health and charge discharge characteristics

Signal strength from a receiver S-Meter

Remote monitoring, beacons, repeaters, remote stations

Antenna measurements, pattern plotting

Temperature monitoring and plotting

Magnetometer

Logging light levels

Ground resistance changes

Long term power consumption

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Hardware Options

Two variants of the module will be available, both making use of the same PCB.   The full module includes a PIC making up the for the logger plus an FT232R USB Serial port chip which makes the module appear as a COM port to the host PC.   Drivers for the FTDI chip for most operating systems can be downloaded from the manufacturers web site and full step-by-step installation instructions are available there.   Module power is derived from the USB interface

A lower cost, cut down version of the logger – The HF-10/COM without the USB serial interface chip is aimed at standard COM ports and other serial interface connection types such as Bluetooth module or optical-fibre interface. The additional components needed to derive the power from a standard COM port will be included.   The polarity of the serial data coming from the module can be selected to match the interface type by removal or addition of a 0Ω resistor

Pads for components on the analogue input channels allow each channel to be configured for RC filtering or as a potential divider for voltages to be measured outside the standard 0 – 4.092V range.

Purchasing / Kit availability

It is intended to supply the full and cut-down versions of the HF-10 logger in two ways::

Fully made up and tested for a ready-to-go solution

Part kit with PCB , programmed PIC and crystal with perhaps a few other "less available" components. For the full version, the FT232 chip and a USB socket are included.   You supply resistors and capacitors

The same PIC code is used for both USB and COM-port versions and the PCB can be converted from one to the other with a minimum of component changes.

Future Enhancements

The PCB has been designed for In Circuit programming, so future upgrade or new applications can be installed on the standard PCB using a PIC programmer and interface lead.
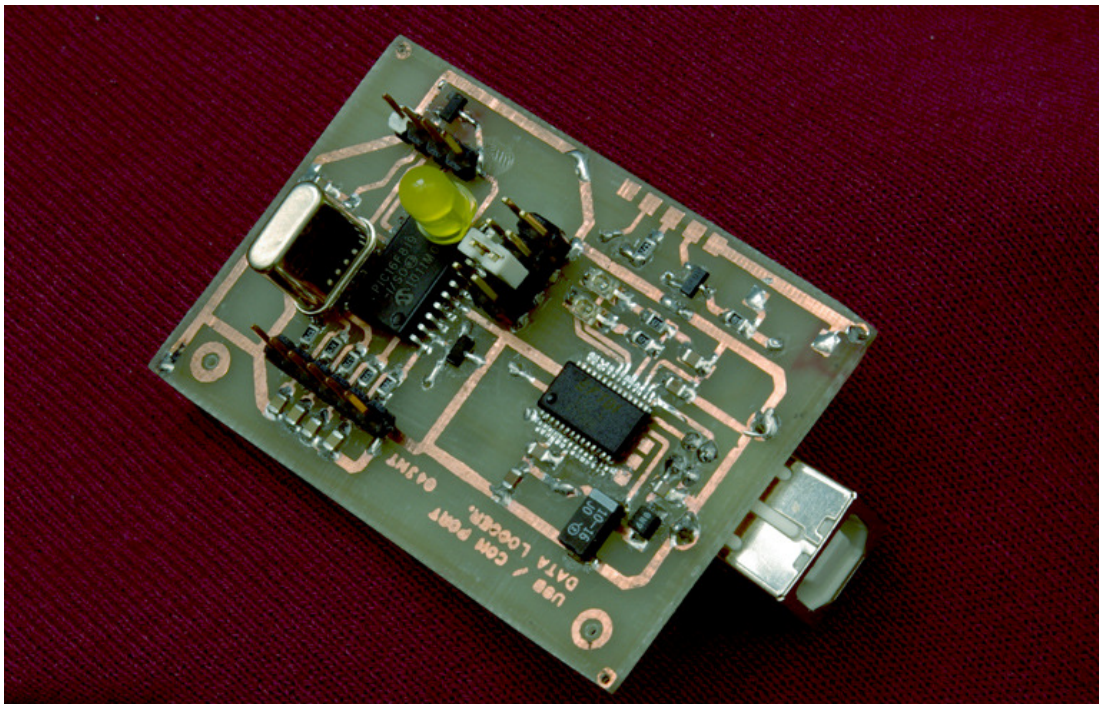
Prototype homebrew version of the 60 x 40mm PCB, showing the full USB enabled HF 10 data Logger.   Analogue connections are made to the header on the bottom left of the photo. Measurement interval and output format by selecting the links on the dual header in the middle of the board.   Top left is the in-circuit programming interface.   For the COM-port only version, a 9 pin D socket can be mounted on the edge of the board, using the pads on both sides of the PCB, shown top centre.
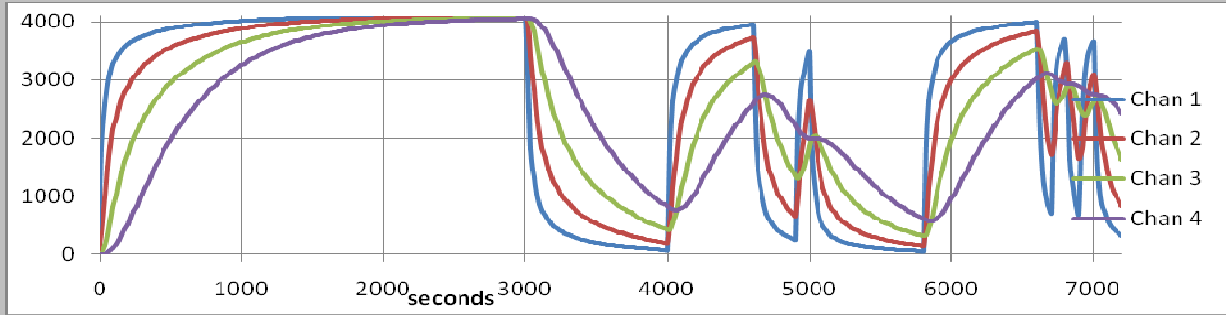
An example of the sort of plot that can be generated by the HF-10 Data Logger.   All four input channels read the voltages on each capacitor of the circuit below as the switch was repeatedly changed over.   The ouptut data was saved to a file using *Hyperterm* on a host PC; the file then read directly into an Excel spreadsheet to generate the plot.