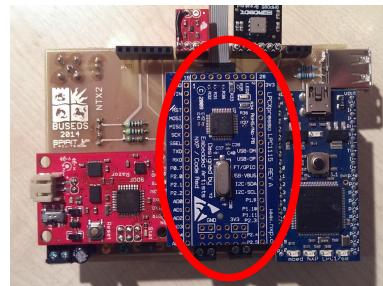
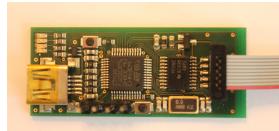
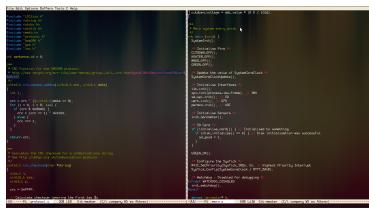


Microcontroller 1: Low Power, High Reliability

The first microcontroller used in the flight computer is active throughout the entire mission, and is responsible for the main radio link. It has a low power consumption of about 10mA.



The program for this microcontroller was written in the C programming language and amounts to about 3000 lines of code.



The C source code was written and checked against test data on a laptop. Testing the source with reliable hardware first helped to isolate problems early and ensure success. This is known as "cross-compiling" and "unit testing".

A "blackmagic" debug probe was used to debug the source code on the microcontroller. More details about this open source device can be found at:
github.com/gsmcmullin/blackmagic

Throughout development the "git" source code management system was used to keep track of changes. The code was then hosted online at:
github.com/richardeoin/buseds-hab

High Altitude Balloon Launch

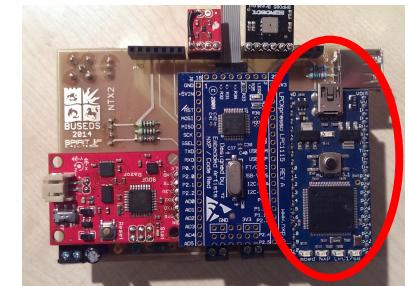
Flight Computer

The main purpose of the flight computer is to transmit data from the onboard sensors during the mission. It also stores this data for later analysis.

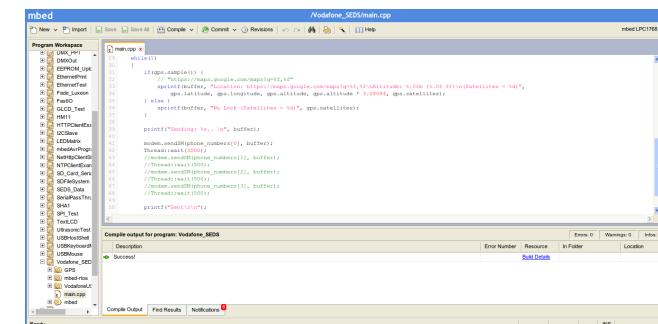
Each of the microcontrollers used in the flight computer has the same major components as a desktop computer but in miniature on a single silicon chip.

Microcontroller 2: High Power GSM Link

This microcontroller manages the GSM link, better known as a connection to the mobile phone network. It is active at an altitude of 1 km or less, where it can send its location using a standard text message.



This microcontroller was developed using the ARM "mbed" platform. The libraries already available for GSM and GPS communications greatly simplified development but required much more computing power and complexity than available on Microcontroller 1.



The code was written in the C++ language on the "mbed" online compiler. The libraries already available on the "mbed" platform meant the source code for this microcontroller was only about 50 lines in length.