

Project Apex II - Technical Design Document

Custom Data Format

We have the following data available to the flight computer via various sensors etc, that we will transmit via telemetry:

- Number of GPS satellites in view
- ADC channels (4)
- Temperature sensors (2+)
- Ionising Radiation Detector count (2)
- Photodiode/light (1)
- RSSI (1)
- Humidity (1)

We are using the standard UKHAS format for the main telemetry packets:

```
$$<CALL SIGN>,<COUNTER D>,<TIME HH:MM:SS>,<LATITUDE DD.DDDDDD>,<LONGITUDE DD.DDDDDD>,<ALTITUDE METRES MMMM>,<O SPEED KM/H DDDD.DD>,<O BEARING DDD.DD>,<O TEMPERATURE INTERNAL C D.DD>,<O TEMPERATURE EXTERNAL C D.DD>,<O TEMPERATURE CAMERA C D.DD>,<O BAROMETRIC PRESSURE hPa(millibars)>,<O CUSTOM DATA>*<CHECKSUM><NEWLINE>
```

Given this, we will use the following format for the Apex II telemetry:

```
$$APEX,<TICKS>,<TIME>,<LAT>,<LON>,<ALT>,<SPEED>,<BEARING>,<SATS>,<INT_TEMP>,<EXT_TEMP>,<ADDITIONAL_TEMP(S)>,<PRESSURE>,<BATT_VOLTS>,<ADDITIONAL_ADC(S)>,<IRD_1>,<IRD_2>,<PD_FREQ>,<PD_CONF>,<HUMIDITY>,<RSSI>
```

Formatting

- TEMP: Temperatures in degrees C. **Variable length** decimal floating points, **fixed at two decimal places** (xx.xx)
 - Internal
 - External
- ADC: Raw reads **only**, **12bit** words. Transmit as **fixed length hex** (0x0000 – 0xFFFF)
 - Pressure
 - Battery voltage
- IRD: **16bit** word. Transmit as **fixed length hex** (0x0000 – 0xFFFF)
- PD_FREQ: **16bit** word, transmit as **fixed length hex** (0x0000-0xFFFF)
- PD_CONF: **16bit** word, transmit as **fixed length hex** (0x0000-0xFFFF)
 - Each hex digit is 2bits GAIN, 2bits CHANNEL
 - One hex character is like ccgg, where c = channel and g = gain
- HUMIDITY: Time in seconds, **16bit** word, transmit as **fixed length hex** (0x0000 – 0xFFFF)
- RSSI: **8bit** ADC read. Transmit as **fixed length hex** (0x00 – 0xFF)