A new software-defined radio receiver for the BRAMS network

Replacement of the analogue ICOM receiver by a software-defined radio

Michel Anciaux

Royal Belgian Institute for Space Aeronomy

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Introduction

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A first candidate based on a software-defined radio has been evaluated and its suitability will be presented here.

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- This can only get worse !

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- The market trend is that analogue receivers are being replaced by software defined radios

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- to replace the ICOM
- to improve upon its performance

while keeping the cost low

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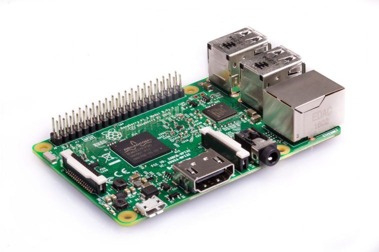
- Dedicated electronic interface to feed the NMEA frames and the 1-PPS signal to the RPi

Raspberry Pi 3B and Funcube Pro+



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- ntpd configured to synchronise the system clock to the GPS signal

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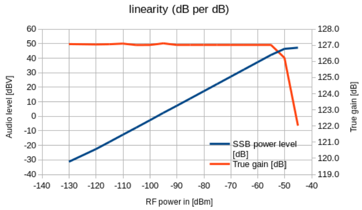

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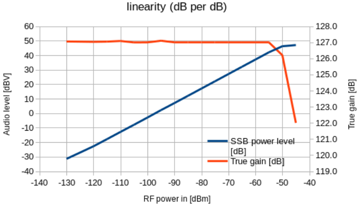

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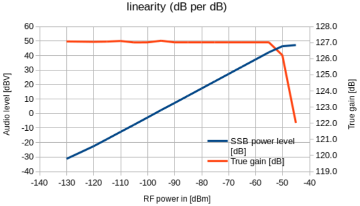

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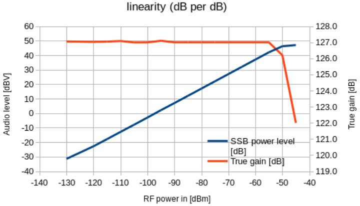

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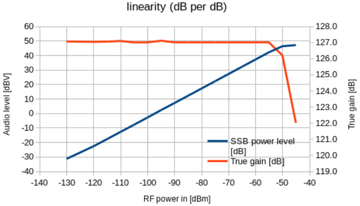

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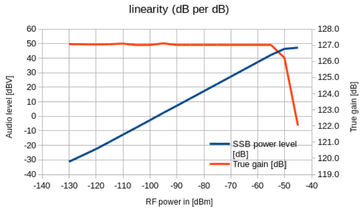

- SSB noise temperature: $\approx$430 K
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This is much better than the ICOM !

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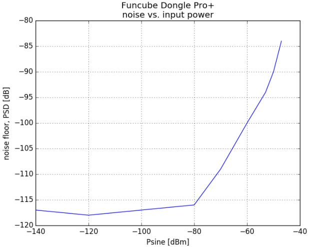

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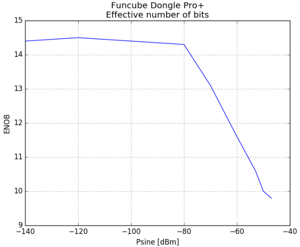

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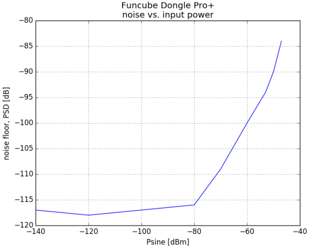

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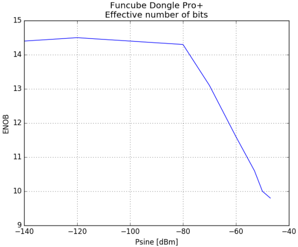

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To mitigate this effect, the Funcube should have its temperature stabilised (not a major hurdle thanks to its very low mass).

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- A new method is needed.

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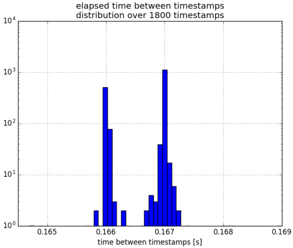

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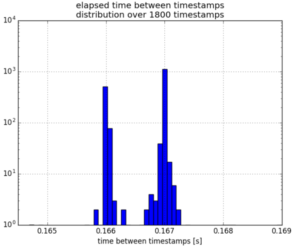

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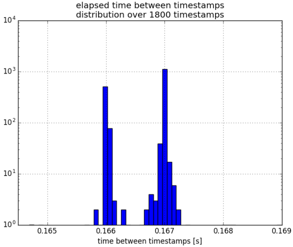

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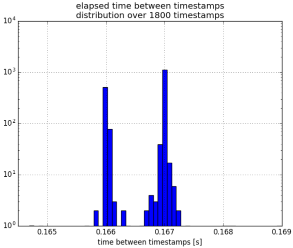

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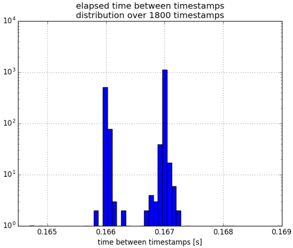

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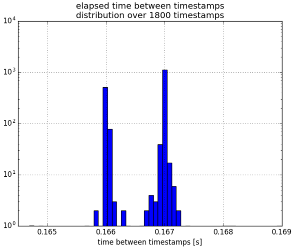

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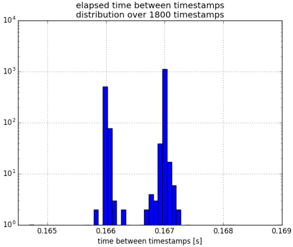

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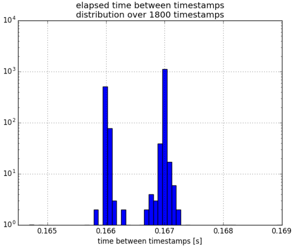

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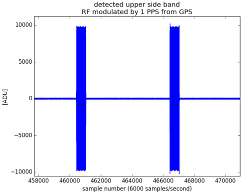

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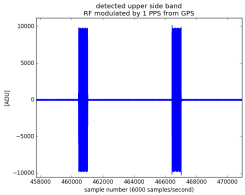

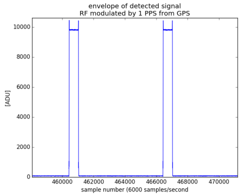

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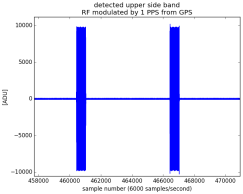

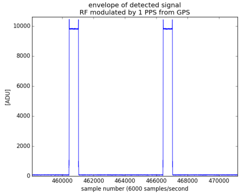

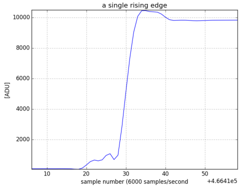

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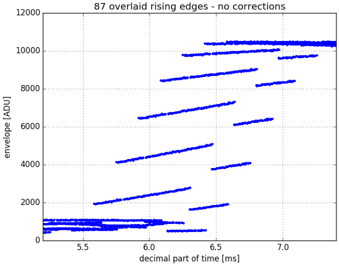

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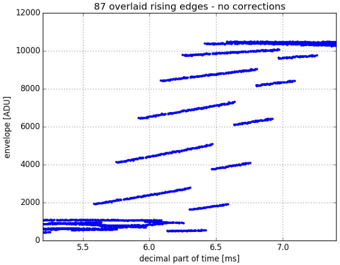

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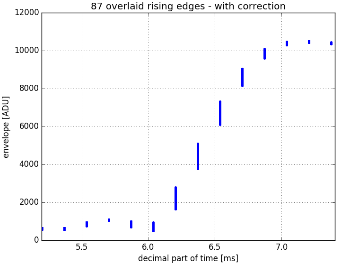

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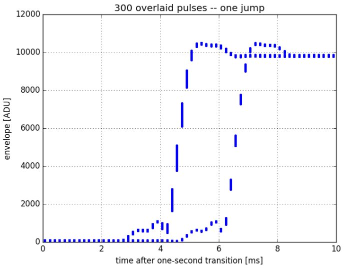

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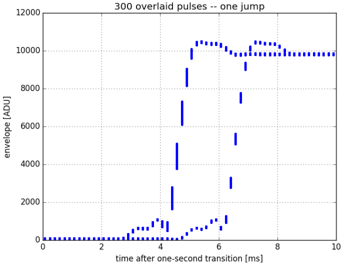

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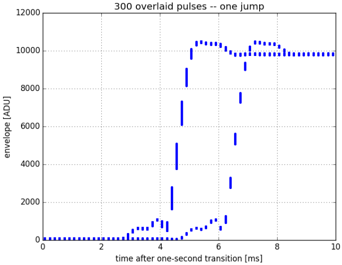

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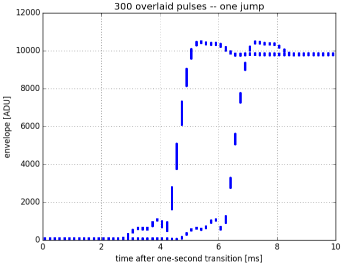

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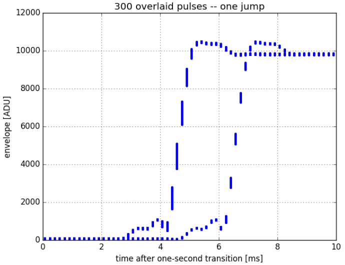

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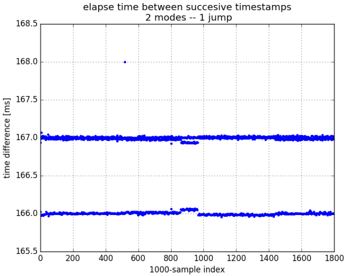

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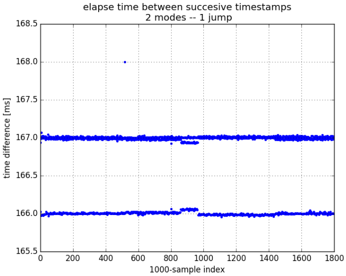

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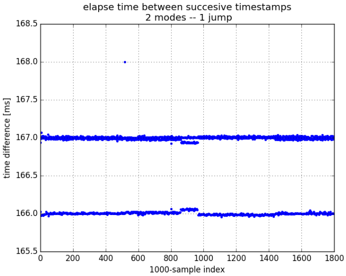

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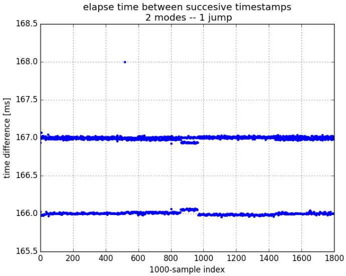

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- 1 jump at index $\approx$510: dropped samples ==> increased time between timestamps

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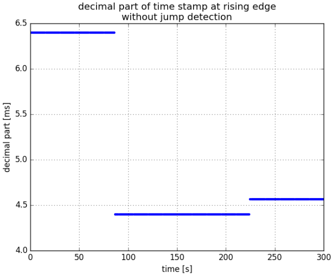

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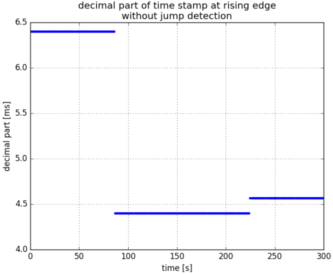

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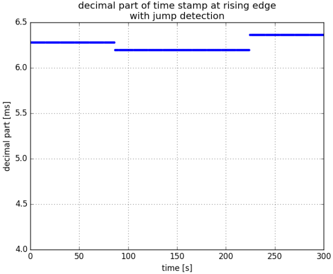

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- for the 323 seconds where the time stamp was declared dubious, the time error was bounded by the measured discontinuity of a few ms

Simultaneous observation with BEUCCL

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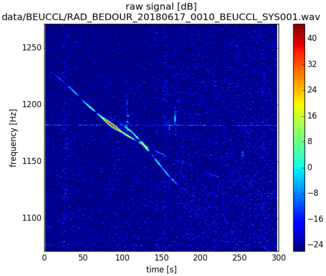

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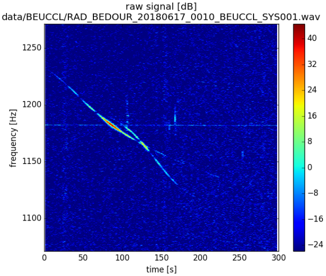

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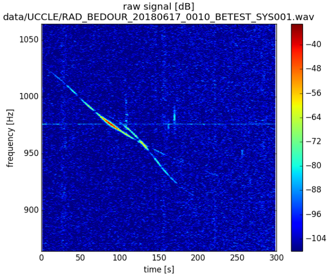

Funcube

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The evaluation of the other front-end alternatives should continue (in particular with respect to the timing issue).

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This is a very serious contender. If it does not exhibit the sample loss of the Funcube, it may be the better option.

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- For these two applications, however, the LO must be phase-locked to a common reference. This rules out the Funcube of course.

The end