RTCA Special Committee 186, Working Group 3
EUROCAE WG-51, SG-1

ADS-B 1090ES MOPS Maintenance

WG-3 Meeting #26
SG-1 Meeting #3
Joint Session

RTCA Headquarters, Washington DC
31 March – 3 April 2009

Time Mark Extrapolation

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Summary
This Working Paper addresses encoding and decoding of position when Time Mark is used.

ACSS's Discussion of DO-260A Time Mark Extrapolation

PROBLEM:

If extrapolation of position when using the Time Mark is followed per DO-260A then there could be a condition when the Airborne Position ES is sent out at the incorrect time in relation to the 200ms epoch. An ADS-B IN system could then set Time of Applicability (TOA) of the position to the incorrect epoch, resulting in the TOA being in error by 400ms.

BACKGROUND:

From DO-260A Section 2.2.3.2.3.7.2.1:

"b. The Airborne latitude data registers and the encoded latitude subfield **shall** be updated every 200 milliseconds to the next 0.2 UTC Epoch using the velocity data provided for the position fix."

The ADS-B In requirements should be made clear on which UTC epoch to associate the received position data with. If the registers are encoded as instructed above the position squitter could be sent out either before or after the epoch, reference Figure 1 below. In the case where the transmitter sent the squitter out after the epoch, if the receiver sets the TOA to the next epoch, then the TOA could be off by 400ms.

Two solutions exist:

1). On the transmitter side, update the register to the previous epoch, reference Figure 2 below,
2). On the receiver side, set the TOA to the nearest epoch**.**

ADDITIONAL PROBLEM:

There are no requirements on how a ADS-B IN system that is not receiving a Time Mark should handle Position Messages that are encoded using a Time Mark.

Figure 1

ARINC 743A GPS - Synchronized with Time Mark

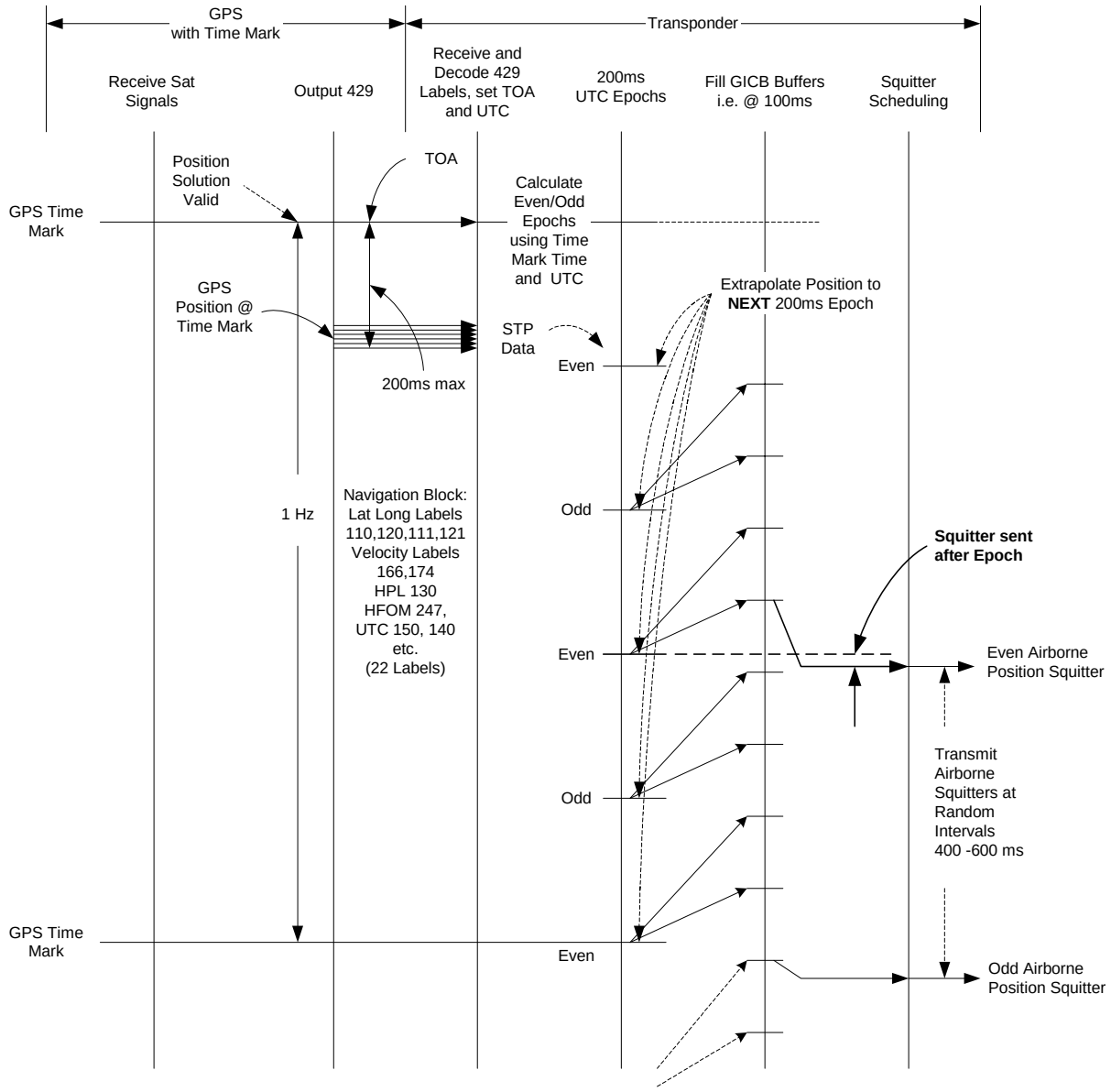
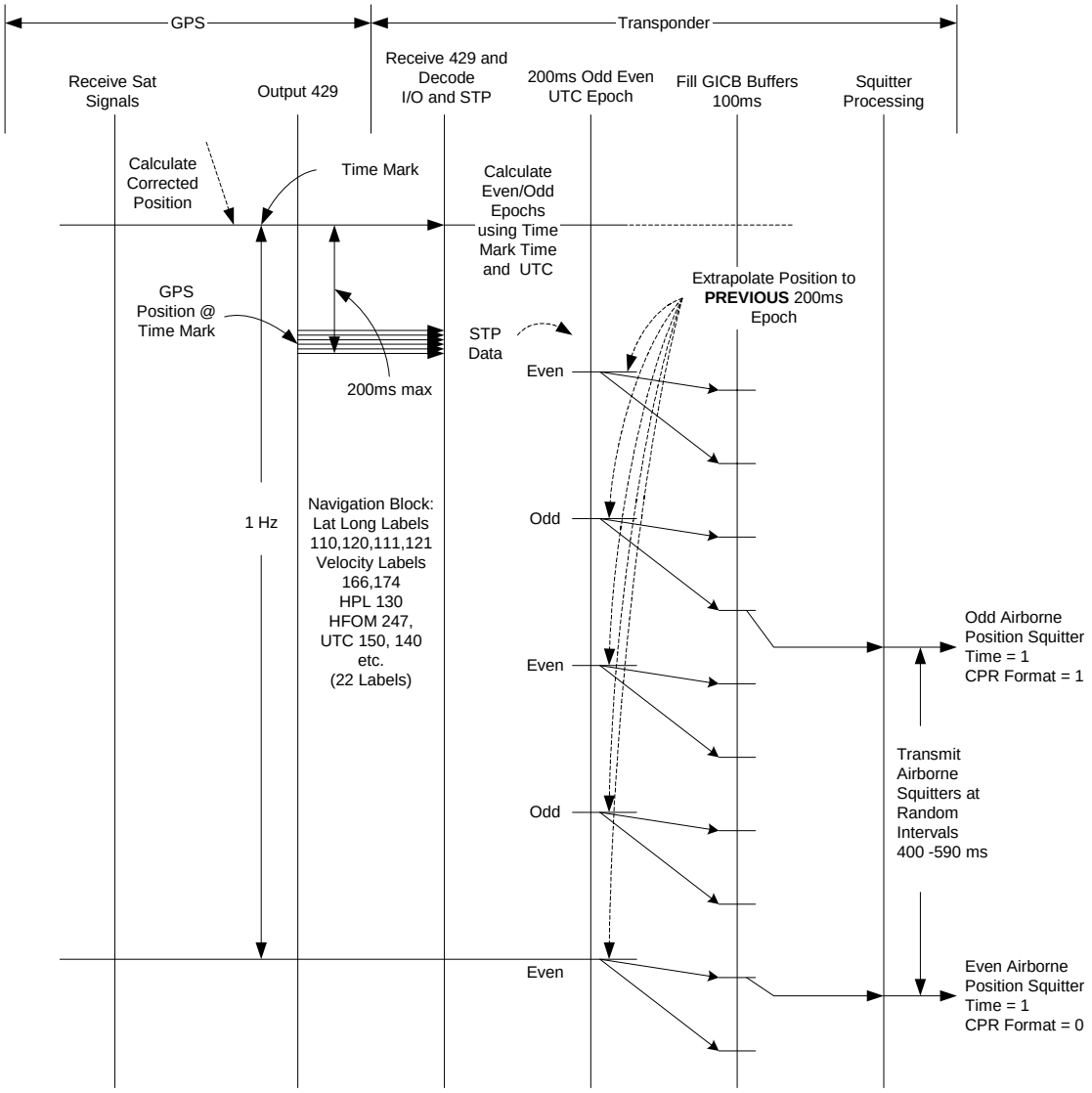


Figure 2

ARINC 743A GPS - Synchronized with Time Mark