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TO: Will Aldrich, Roger Cappallo  
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SUBJECT: Suggested algorithms for Mark 5A+

Suggested algorithms

After discussions with Will Aldrich and Roger Cappallo, the following algorithms are suggested for the "Mark 5A+ module" within the Mark 5A DOM

*Initial sync or re-sync:*

Search all FPDP words for Sync Word followed immediately by word with 4LSB =0 [i.e. modulo(DF#,0xf)=0]. Until sync is achieved, output fill pattern

*Dynamic sync check* (i.e. check made while believed to in sync):

Check every 16<sup>th</sup> DF for proper Sync Word; if fail, go to re-sync procedure.

*Fill pattern from FPDP:*

Pass fill pattern through during data part of VLBA tape frame; splice in fill-pattern header of proper length during header part of VLBA tape frame.

Comments

When the Mark 5A+ module is "synced", the ratio (#FPDP 32-bit input words)/(#output 32-bit words) is always 2504/2520 [i.e. on average: for every 2504 words into Mk5A+ module, 2520 must emerge], regardless of the number of target output tracks. What should the Mk5A+ module do during re-sync? Possible options:

1. Stop data flow from Mk5A+altogether.
2. Pass FPDP words through on 1-to-1 basis with no spliced data. In this case, based on output clock cycles along, the Mark 5B data rate will implicitly appear to be about 0.16% faster than the actual data rate.
3. Substitute fill pattern for FPDP words on a 1-to-1 basis with no spliced data.

4. Substitute fill pattern for FPDP words on a 1-to-1 basis, splice in 16 fill-pattern words for every 2504 FPDP words. This would fly-wheel at a rate perfectly matched to the Mark 5B data rate.

Recommendation: Since we don't expect a re-sync to happen very often, and recovery should be very fast, I would vote for option 3. If recovery takes place within 16 DFs, as it should, the time discontinuity seen by the correlator should be easily managed.