

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY
 WESTFORD, MASSACHUSETTS 01886

Telephone: 978-692-4764
 Fax: 781-981-0590

27 April 2006

TO: Mark 5 group
 FROM: Alan R. Whitney
 SUBJECT: Mark 5A+ design notes – Revision 3

The Mark 5A+ is a ‘compatibility’ extension of the Mark 5A DOM to be able to play back certain modes of recordings made with Mark 5B. The output of the Mark 5A+ will be in standard VLBA-format output ‘tracks’ that can be correlated on a Mark 4 or VLBA correlators with Mark 5A+ playback units. Playback modes of Mark 5A disks will be unaffected.

Operating modes

Table 1 shows the ‘compatibility’ modes to be supported by Mark 5A+:

#Active Mk5B DIM input bit-streams	Fanout ratio to VLBA-format tracks	#output VLBA tracks	#Mark5B disk frames per VLBA track frame
32	2	64	16
16	4	64	16
32	1	32	8
16	2	32	8
8	4	32	8
16	1	16	4
8	2	16	4
4	4	16	4
8	1	8	2
4	2	8	2
2	4	8	2

Table 1: ‘Compatibility’ modes to be implemented in Mark 5A+.

Figures 1 through 4 show the mapping of bit-streams to output tracks in each of the proposed modes of operation.

When operating in 'compatibility' mode, the only parameter that needs to be specified to the Mark 5A+ is the number of output tracks or, alternatively, the number of Mark 5B disk frames per VLBA tape frame (see Table 1).

Synchronization of VLBA tape frames

Generation of VLBA tape frames must always be such that a second tick (defined as Disk Frame Header number zero) is coincident with the beginning of a tape frame. The Mark 5A+ can do this at startup either by waiting for disk frame 0 or any disk frame number zero modulo 16, 8, 4 or 2, depending on the number of VLBA output tracks (as indicated in Table 1).

Data invalidation

The Mark 5A+ should keep a continuous eye open for the Mark 5B fill pattern and mark the output track invalid by inverting the data parity bit in exactly the same manner that Mark 5A manages invalid data.

VLBA tape frame header and auxiliary data

Each Disk Frame Header contains VLBA-format time that can be directly used in the corresponding VLBA tape track frame headers. The auxiliary-data field in all VLBA tape frame headers for all tracks should be all zeroes.

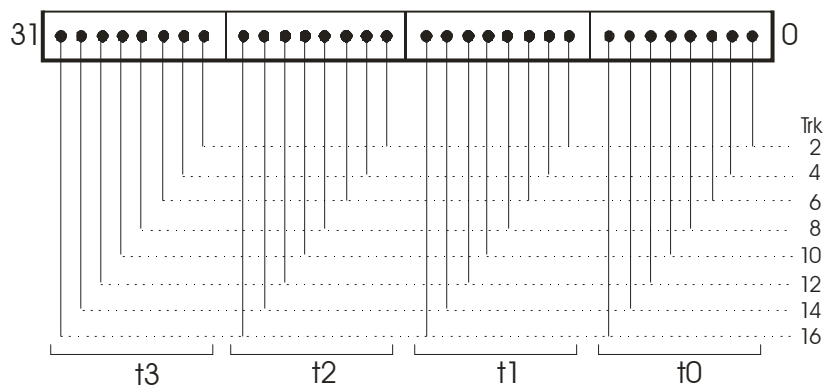


Figure 1: Mapping of bits in FPDP word to tracks for all cases of 8 output tracks. Output track groups will be duplicated in the same manner as Mark 5A. t_0 – t_3 refer to output-track clock cycles.

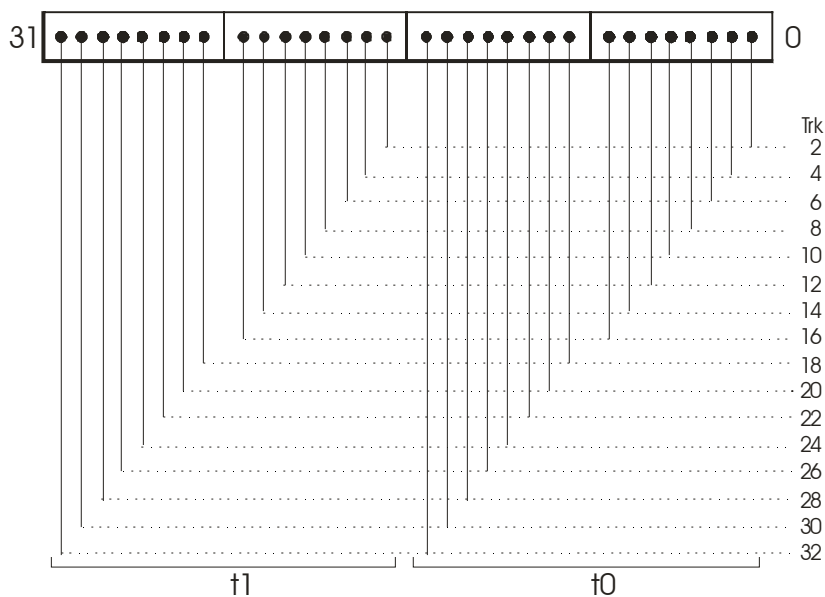


Figure 2: Mapping of bits in FPDP word to tracks for all cases of 16 output tracks. Output track groups will be duplicated in the same manner as Mark 5A. t_0 – t_1 refer to output-track clock cycles.

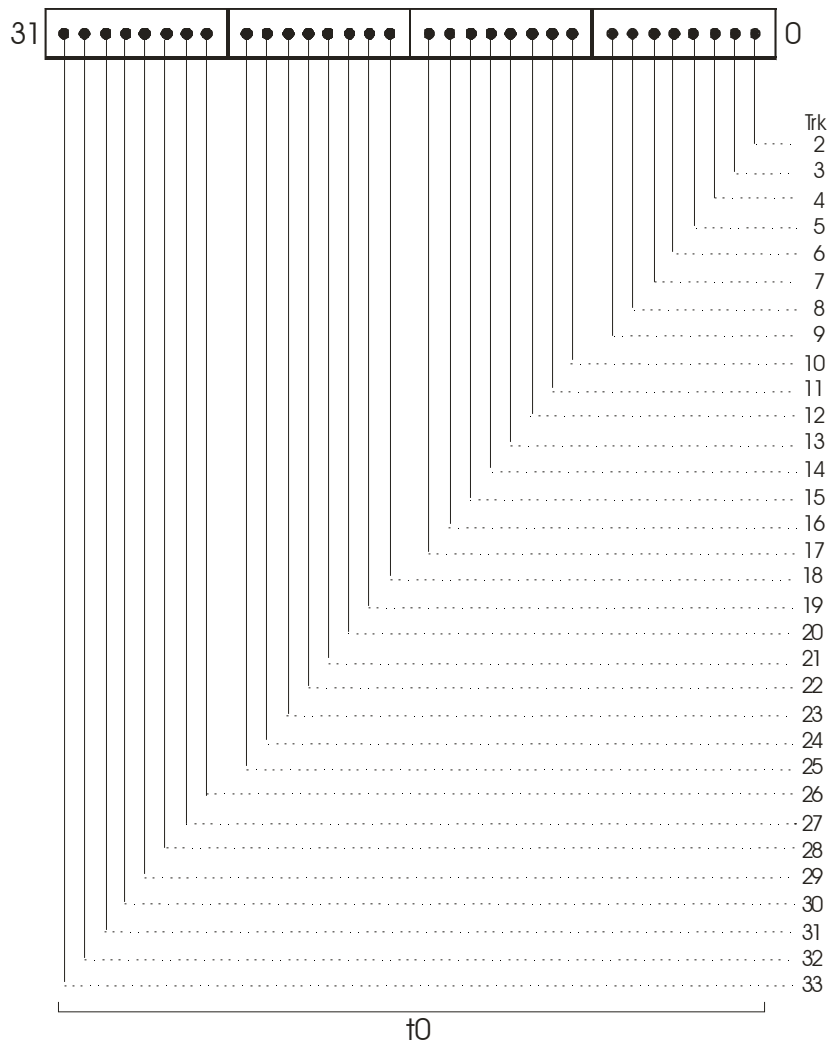


Figure 3: Mapping of bits in FPDP word to tracks for all cases of 32 output tracks. Headstack 1 output is duplicated to Headstack 2 (as in Mark 5A). t_0 refers to a single output-track clock cycle.

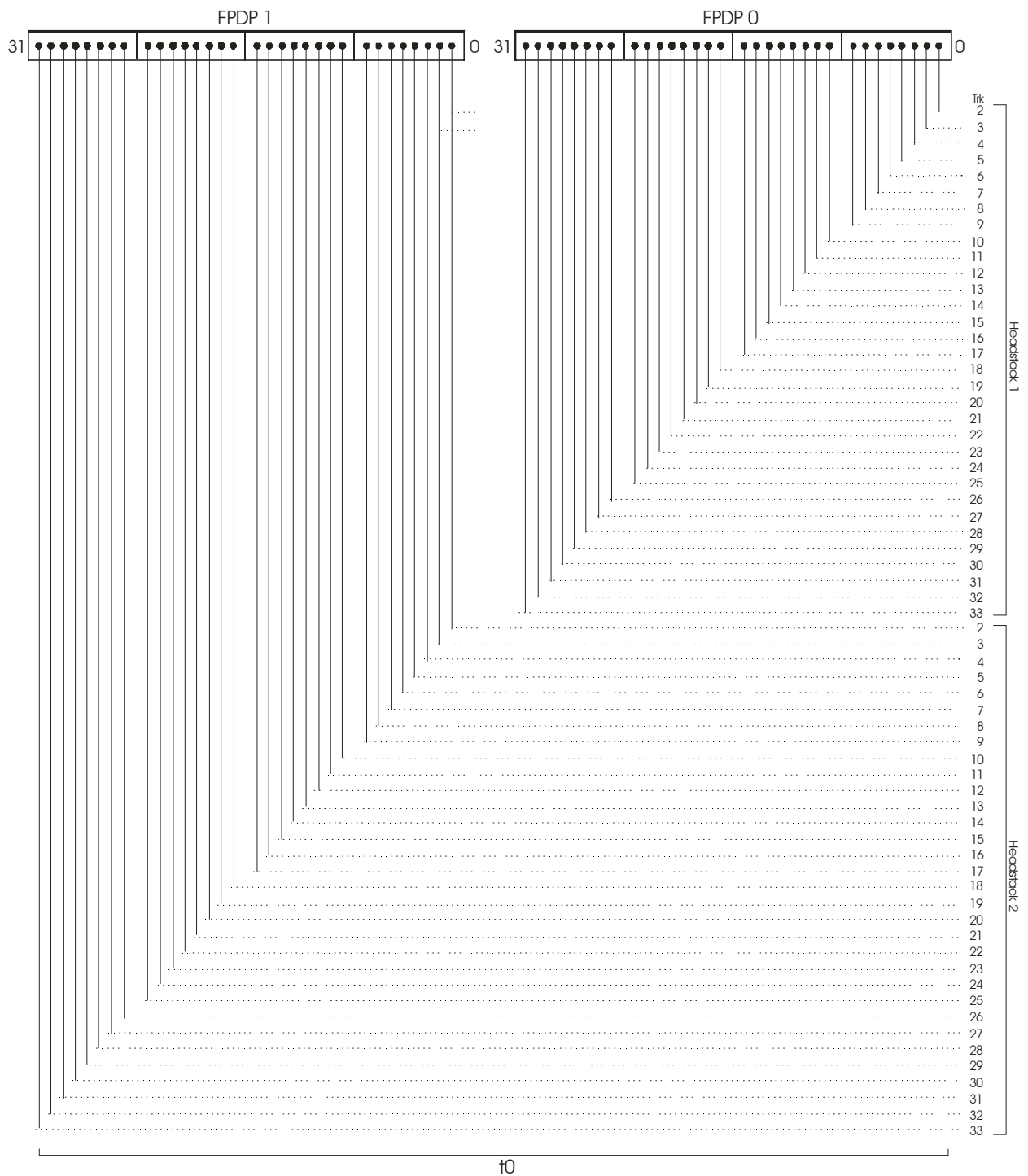


Figure 4: Mapping of bits in two consecutive FPDP words to output tracks for all cases of 64 output tracks. t_0 refers to a single output-track clock cycle.