Discussion on 3kHz clock generation for new laser system for CTF2/AWAKE gun

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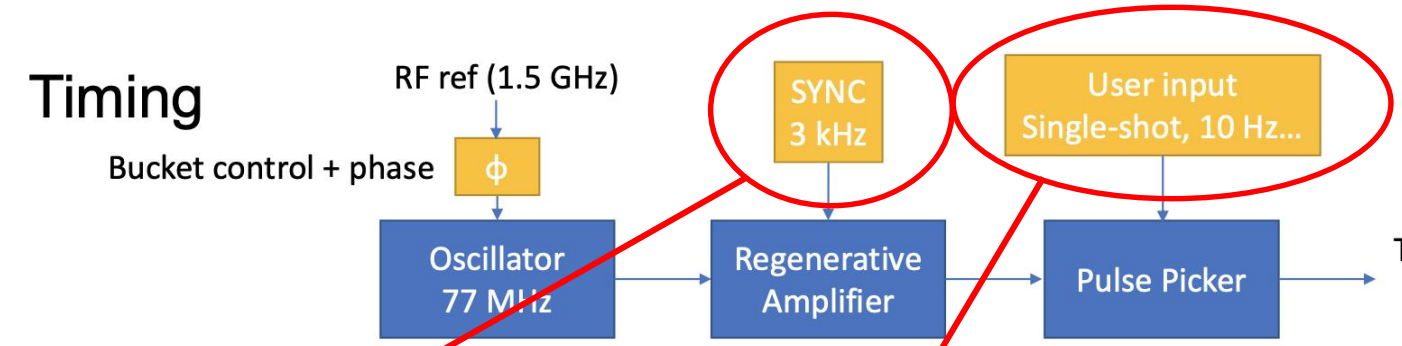
Request from the LASER system

Slide from Edu
See others on indico

Timing



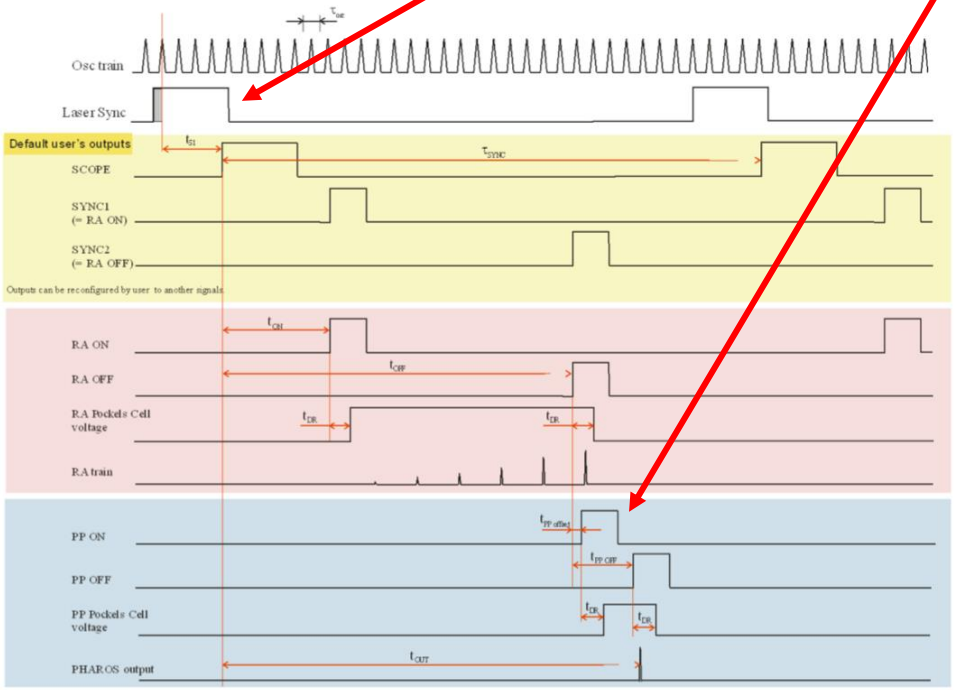
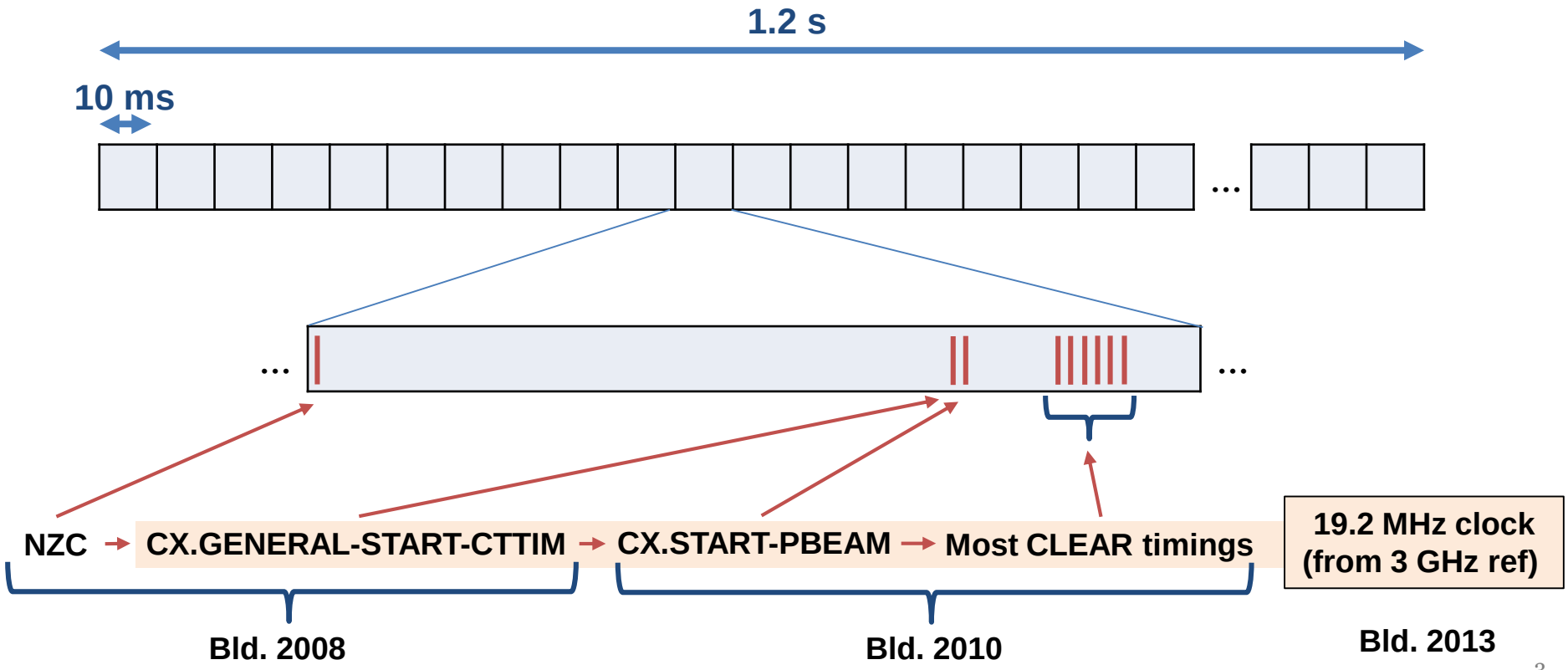


Figure 9. Laser timing diagram with reference to optical pulses of OSC and RA

Parameter		Min	Min	Max	Jitter	
Oscillator period	τ_{OSC}		13-14			ns
SYNC period	τ_{SYNC}	1-5*		1000	1 τ_{OSC}	µs
SCOPE to SYNC delay	τ_{S1}		6 τ_{OSC}		1 τ_{OSC}	ns
RA on delay	τ_{ON}	0		45		ns
RA off delay	τ_{OFF}	145		500	0.5 (typical)	ns
Cavity Dumping Time	τ_{CD}	145		500	0.5 (typical)	ns
HV driver delay	τ_{DR}		60			ns
Pulse picker offset	$\tau_{PP\ offset}$	-30		30		ns
PP OFF delay to PP ON	$\tau_{PP\ OFF}$				10	ns
SCOPE, SYNC1, SYNC2 delay to PHAROS output	τ_{OUT}				0.5 (peak to peak at 10^7 pulses)	ns
"Soft Start" time			5			s
Time between RA STOP and Run commands		3				s

Introduction about CTF/CLEAR timings

- At CTF/CLEAR we have:
  - a **slow telegram** (called SCT for Slow Clic Telegram); provided every 1.2 seconds
  - a **fast telegram** (FCT); transmitted every 10ms; synchronized with the zero crossing
  - The telegram is used (also) to "configure" the LTIMs
    - e.g. to enable/disable a particular trigger to come out in the following period
- Within each FCT period, in principle, we could fire a new beam (100 Hz)



Present solution: using three LTIMs

To actually fire the beam

To sync the clock to NZC and 19.2 MHz

The actual 3 kHz clock

LTIM	Event	Load	Start	Delay	Clock Str.
CX.LAS-USTART	true	CFX.SCY-CT	CX.SLASER-PP	11000	19.2 MHZ
CX.LAS-SYNC-S	true	CFX.SCY-CT	CX.GENERAL-...	4528	19.2 MHZ
CX.LAS-SYNC	true		CX.LAS-SYNC-S	6400	Failed to c...
CX.LAS-SYNC-N	true	CFX.SCY-CT	CX.GENERAL-...	4527	19.2 MHZ

Never "loaded"/"resetted", i.e. always start with previous and stop with next LTMs

Start/Stop at every FCT, i.e. make sure clock is sync every 10 ms

Count 6400 19.2 MHz ticks, and repeat… i.e. ~3 kHz

Re-synchronized SYNC signal every 100 ms

Jitter pulse-to-pulse and vs facility trigger