

SPEAR 3 Kicker Timing Parameters

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This document lists the kicker timing parameters for the SPEAR 3 injection system. Combined together, the parameters should give a closed bump to the beam as it traverses the three elements.

1 Kicker Dimensions and Locations

The kickers come in two lengths; $K1$ and $K3$ are each 1.2 m in length while $K2$ is 0.6 m long. Their locations are taken from the Accelerator Toolbox deck, `sp3v81f.m`.

	K1	K2	K3
length (m)	1.2	0.6	1.2
location (m)	28.8251	40.2764	51.9727
center (m)	29.4251	40.5764	52.5727
time (ns)	98.2	135.3	175.4
$\Delta t_{electron}$ (ns)	0.0	37.2	77.2

Table 1: SPEAR 3 kicker mechanical dimensions

2 Pulse Current Monitoring

Each kicker has a Pearson current monitor, Model 101, mounted at the input of one cable of one of the kicker electrodes. These monitors are calibrated to output 5 V/kA into a 50 Ω termination. $K1$ and $K3$ have four cables, two in the positive electrode and two in the negative electrode. $K2$ has eight cables, four in each electrode. Assuming equal cable impedances, the effective calibration factors are 2.5 V/kA for the current in each electrode of $K1$ and $K3$, and 1.25 kA/V for the corresponding current in $K2$.

The cables from each current monitor to the kicker monitoring patch panel in rack B118-18 were measured for electrical length. At the rack, the timing of the SRS DG535 digital delay generators should be set such that the relative distances between the pulses are the sums of the electrical lengths of the monitoring cables and the time of flight differences between the kicker magnets.

	K1	K2	K3
$\Delta t_{electron}$ (ns)	0	37	77
cable delay (ns)	319	265	304
total delay (ns)	319	302	381
$\Delta t_{monitor}$ (ns)	0	-17	62

Table 2: Monitor signal timing differences for SPEAR 3 kickers