

Fermilab

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TS-SSC 91-103

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From: Jim Strait
Subj: Criteria for full collar key insertion

In the short magnet program several collared coils have been keyed[1] in which data have been collected from the linear potentiometers (3 per side) connected to the side bars that insert the tapered keys. Several different amounts of press vertical closure were tried in this sequence requiring a wide range of side pressures to insert the keys. Full key insertion was defined in these tests by the derivative $dx/dPh = 0$, where x is the side bar position and Ph is the horizontal hydraulic pressure.

Figure 1 shows dx/dPh , averaged over the 6 linear pots, for four short magnets covering the full range of press vertical closures tried. For DSA322 and DSA325 considerable side force was required and data were taken every 500 psi (500 lbs/in). For DSA324 and DSA327 minimal size force was required and data were taken at smaller intervals of 200 psi. It is currently planned to collar the long magnets in a manner similar to DSA325[2]. Data for the six individual gauges are shown in Figure 2 for DSA325. For comparison DSA327 data are shown in Figure 3. Based on Figures 1 and 2 a reasonable set of conditions to indicate full key insertion would be

- 1) $|dx/dPh| < 5$ mils/kpsi averaged over all gauges
- 2) $|dx/dPh| < 10$ mils/kpsi for each gauge individually.

However, the random error in the derivative measurement grows as the step size in pressure decreases and it is clear that with the smaller step size in Figure 3 that the criteria above are too tight. Two approaches are possible if the data taking interval is smaller than 500 psi: 1) increase the limits by a factor inversely proportional to the pressure interval, or 2) require that the derivative be calculated over an interval of at least, say, 400 psi. The latter seems the more correct approach.

References

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- [1] J. Strait, Development of Collar Keying Procedures, TS-SSC 91-085, 5/14/91
 - [2] J. Strait, Collar Keying of DSA325, TS-SSC 91-062, 4/9/91

cc: R.Bossert, J.Carson, S.Delchamps, S.Gourlay, W.Koska, M.Lamm, D.Smith, M.Wake

Side Bar Travel: dx/dPh

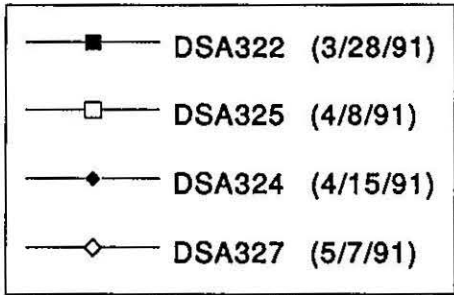
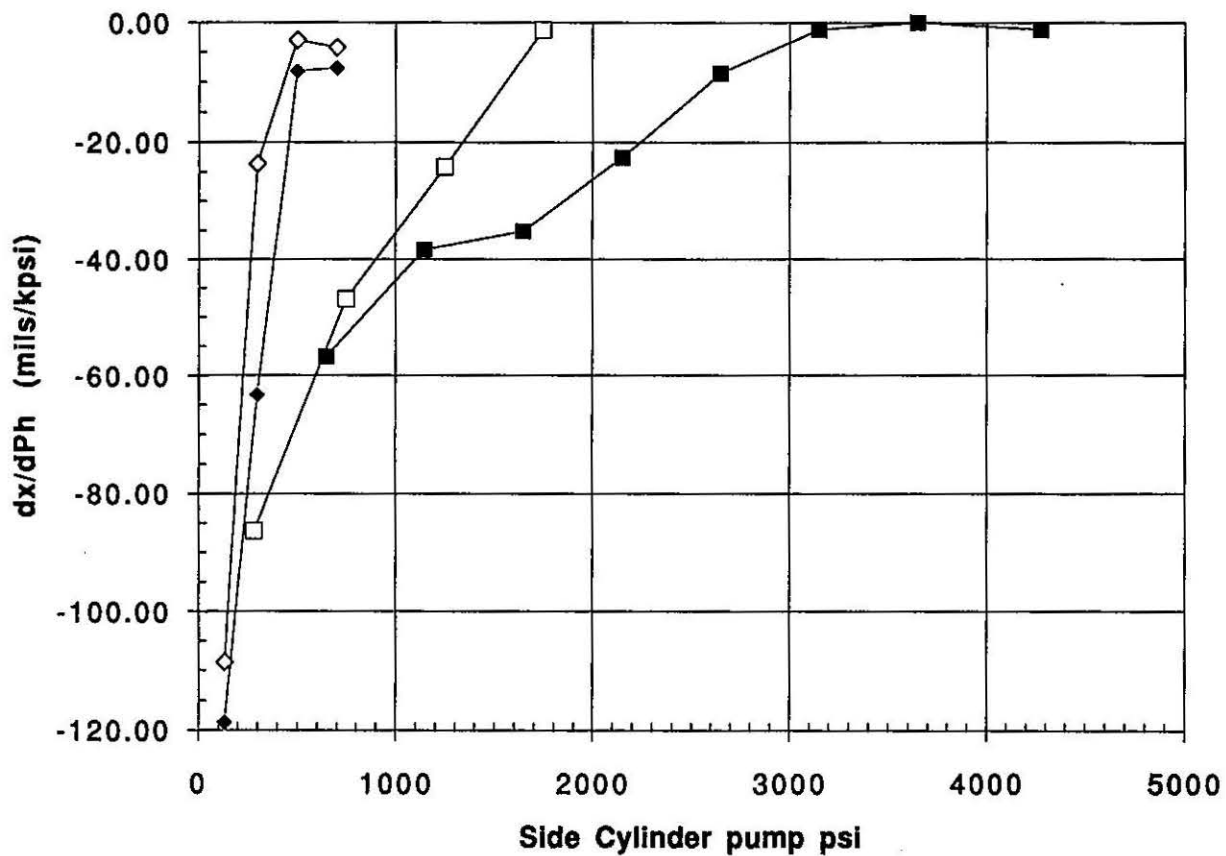


Figure 1

DSA325 Collaring: Side Bar Travel

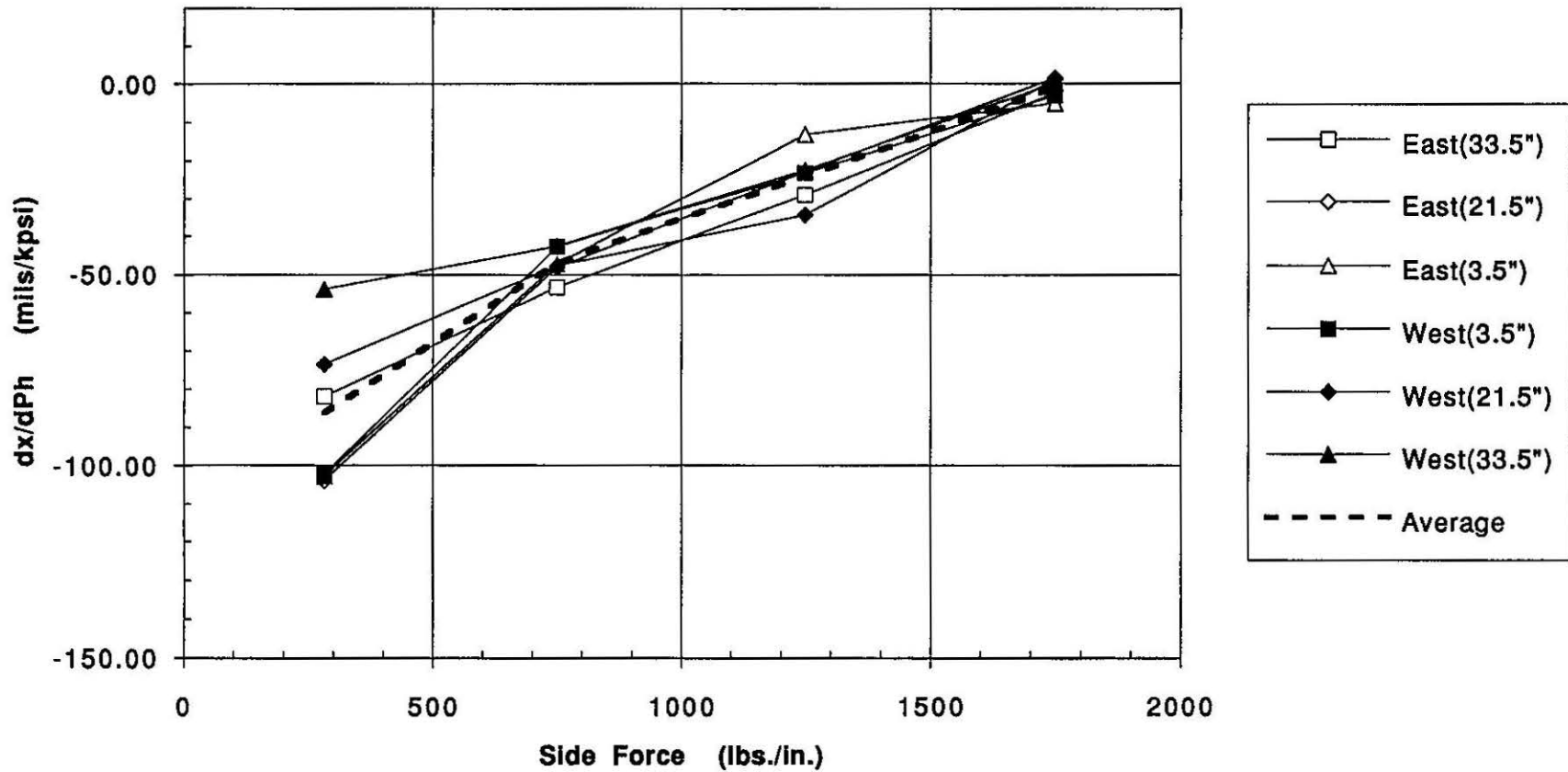


Figure 2

DSA327 Collaring: Side Bar Travel

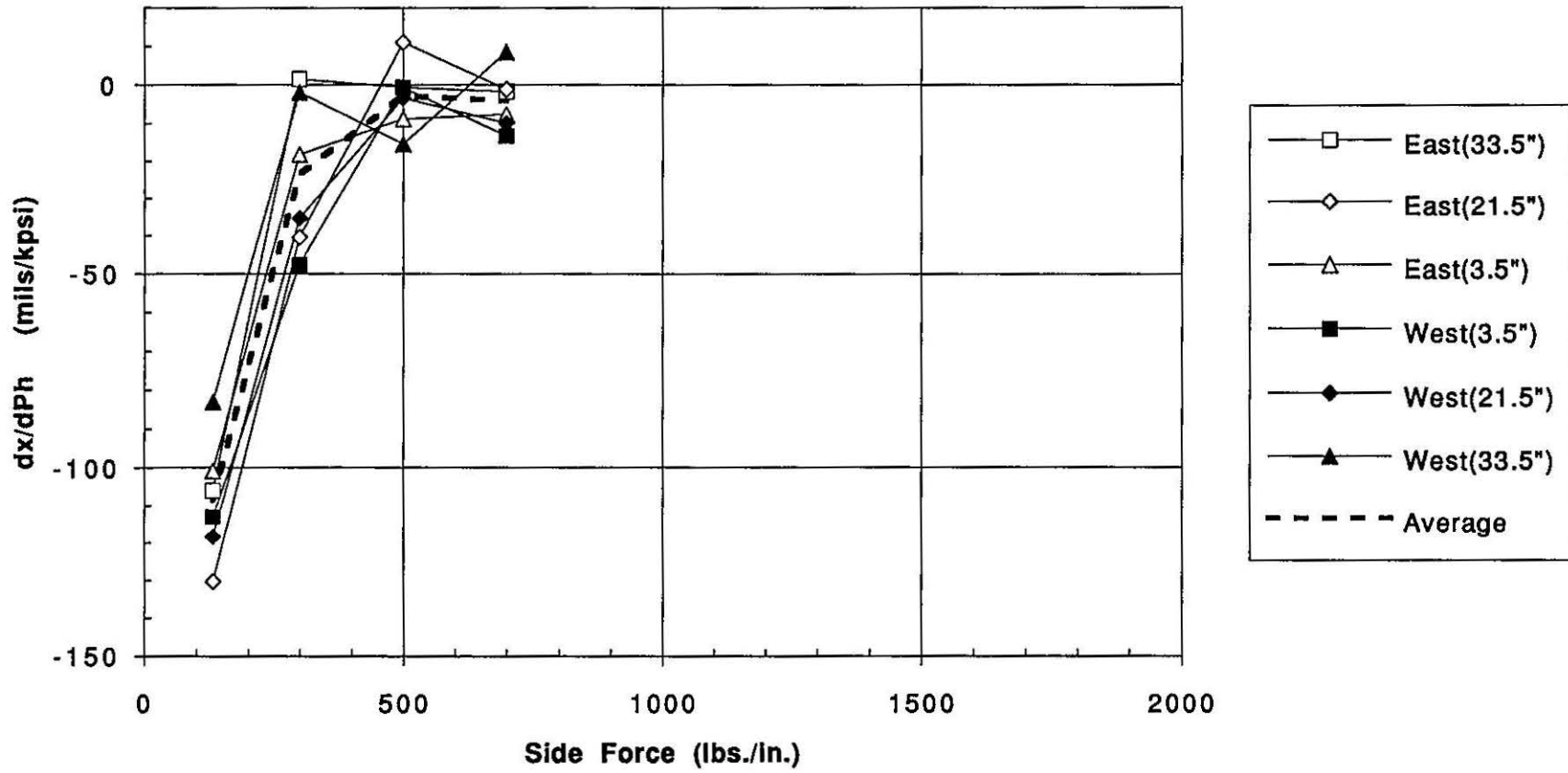


Figure 3