Fermilab

TS-SSC-91-254 *
December 26, 1991
Masayoshi Wake

Pressure-Size Diagram Update with DCA Series Long Magnet Data

Collaring pressure of DCA series long dipole magnet became available on VAX. Attached are the pressure v.s. size diagram updated with these data. The random noise still looks large but a pattern of the relationship can be seen using imagination. The target area for the size control remain the same.

The pressure used in the diagram is the pressure after the collaring. Actually the coil pressure changes as a function of time due to the creeping. This is one of the cause of the large noise. Change in the coil pressures during assembly now show a standard pattern as indicated in the attached figures.

Statistics in the pressure change may be useful for the quality control monitor of the production process. The spring back pressure loss due to the release of the press is summarized as the following table.

Spring Back Loss		
Magnet Number	inner coil (psi)	outer coil (psi)
DCA310	3864.5	7709.5
DCA311	3681.5	5752.0
DCA312	3325.5	4093.5
DCA313	4180.0	4382.0
DCA314	3872.0	4161.0
DCA316	2960.5	3375.0
DCA317	3703.5	4625.5
DCA318	3219.0	3614.5
DCA319	3966.5	4470.5
average	3277.3	4218.3

The coil pressure looses furthermore pressure after the keying while waiting for yoking due to the creeping. The amount of pressure losses are:

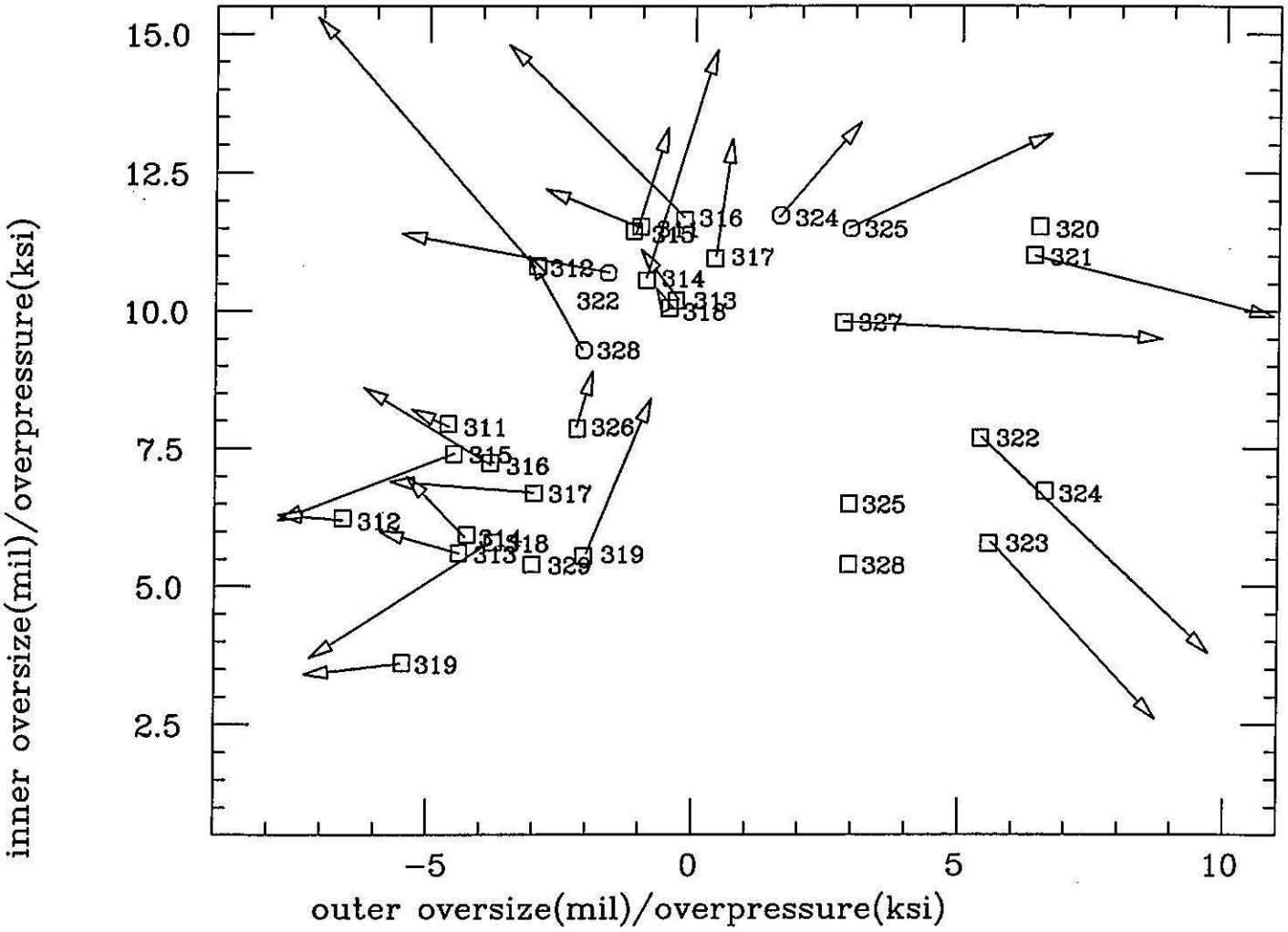
*Distribution: R.Bossert, J.Carson, S.Delchamps, T.Jaffery, W.Koska, M.Kuchnir, M.Lamm, G.Pewitt, R.Sims, J.Strait, M.Winters

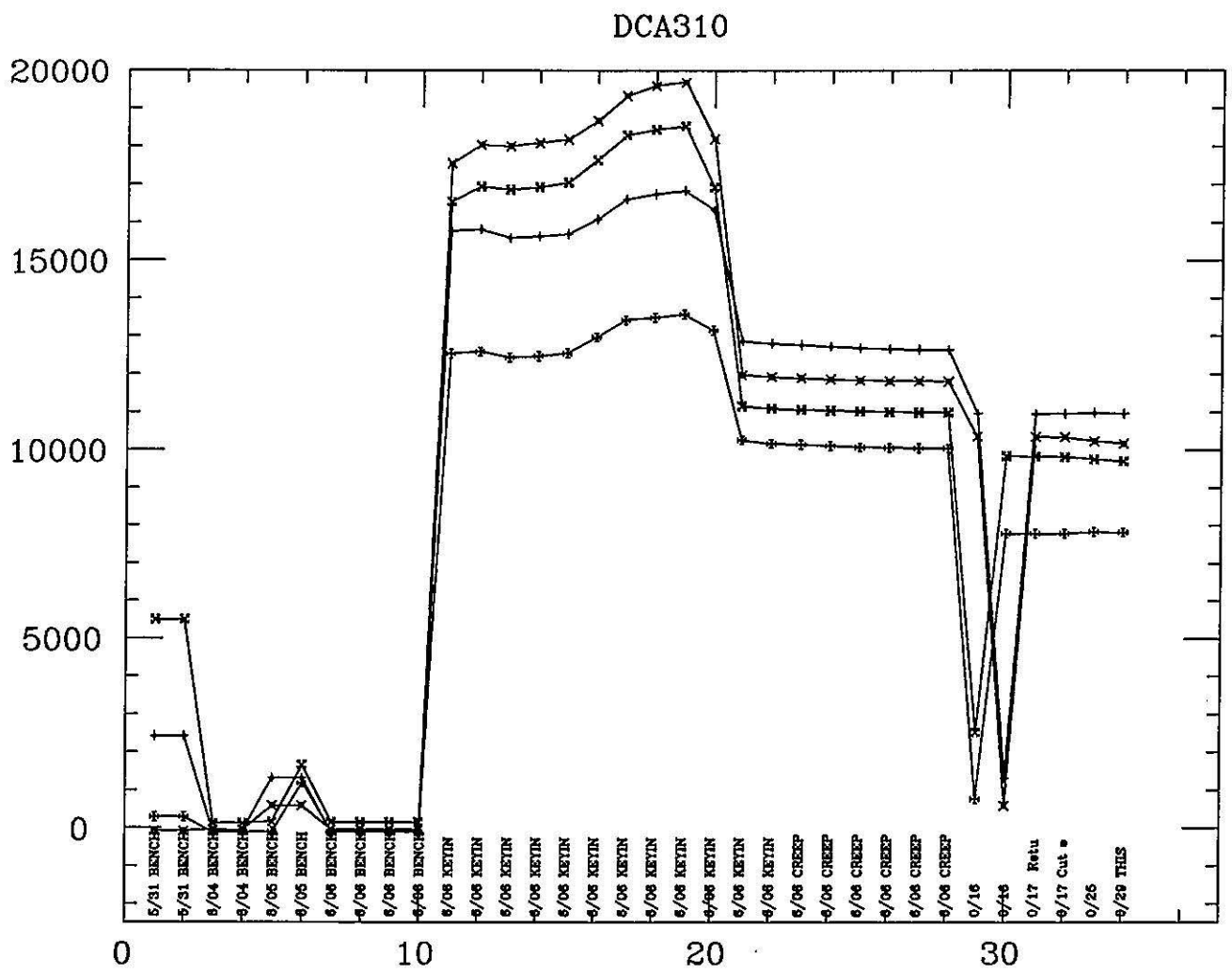
Creeping Loss		
Magnet Number	inner coil (psi)	outer coil (psi)
DCA311	2252.0	855.5
DCA312	2707.0	112.0
DCA313	3271.0	538.5
DCA314	3984.5	767.0
DCA315	2985.5	933.5
average	3040.0	641.3

The preloading is recovered by the yoking to some extent. The amount of recovery is shown as follows.

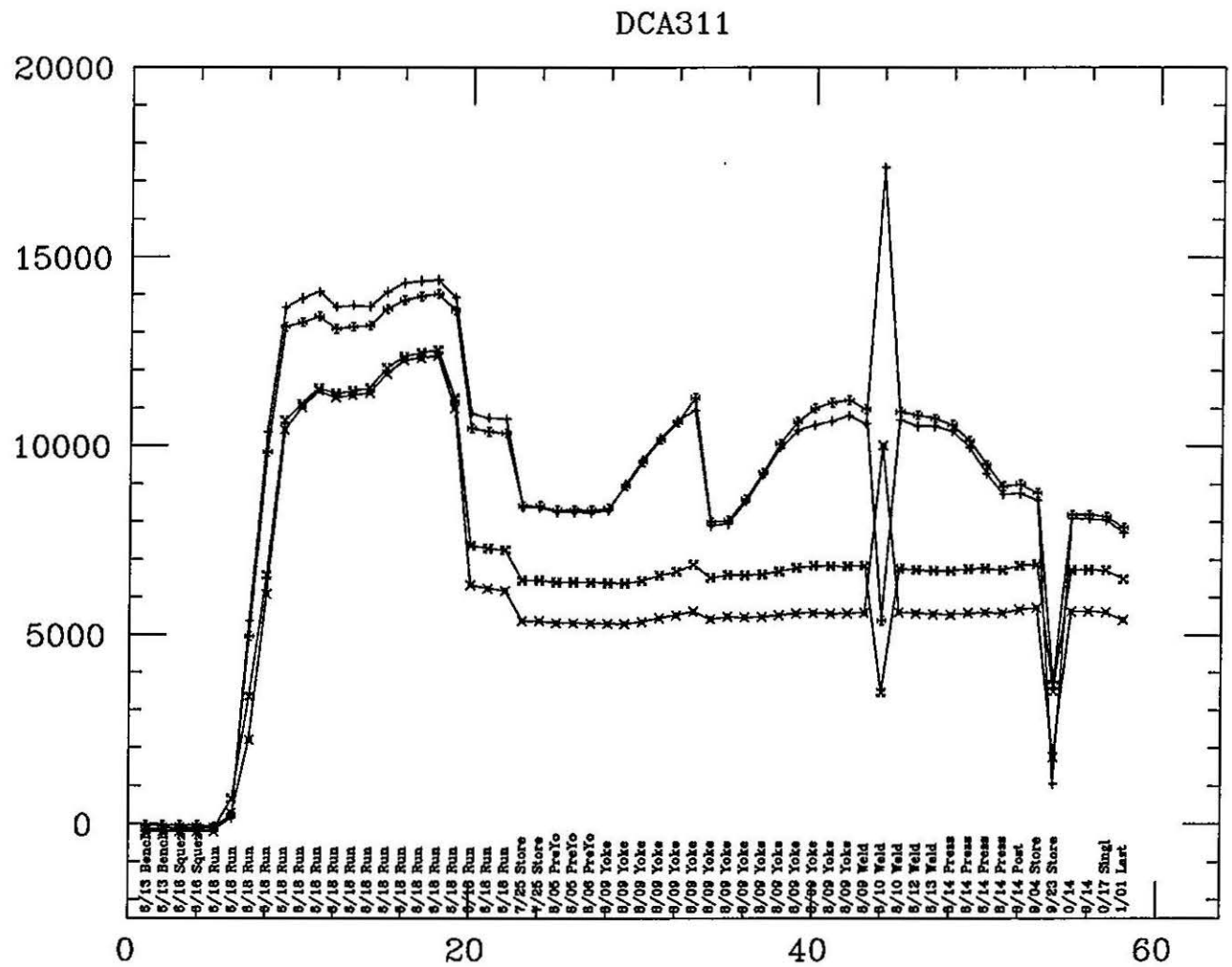
Yoking Gain		
Magnet Number	inner coil (psi)	outer coil (psi)
DCA311	-492.00	95.5
DCA312	1453.0	865.5
DCA313	2220.5	617.0
DCA314	2645.0	148.5
DCA315	2432.0	95.0
average	2187.6	431.5

The negative number in DCA311 is an unusual behavior probably due to the of the yoke. DCA311 data is excluded from the averaging.

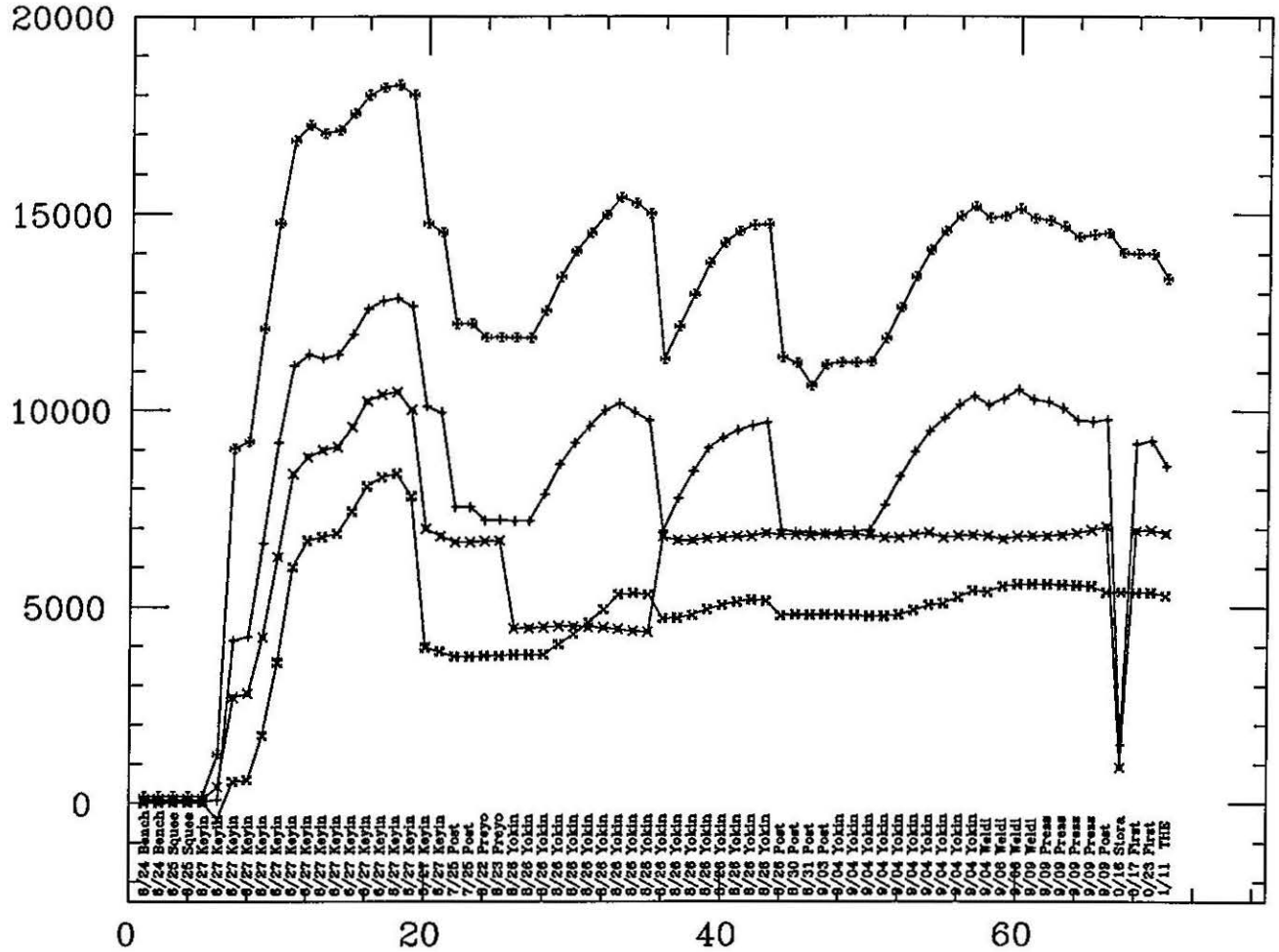

15.0
12.5
10.0
7.5
5.0
2.5
-5
0
5
10
inner oversize(mil)/overpressure(ksi)
outer oversize(mil)/overpressure(ksi)
316
324
325
320
321
317
312
322
314
313
318
327
328
311
326
322
315
316
324
317
325
312
314
318
323
313
329
319
328
319

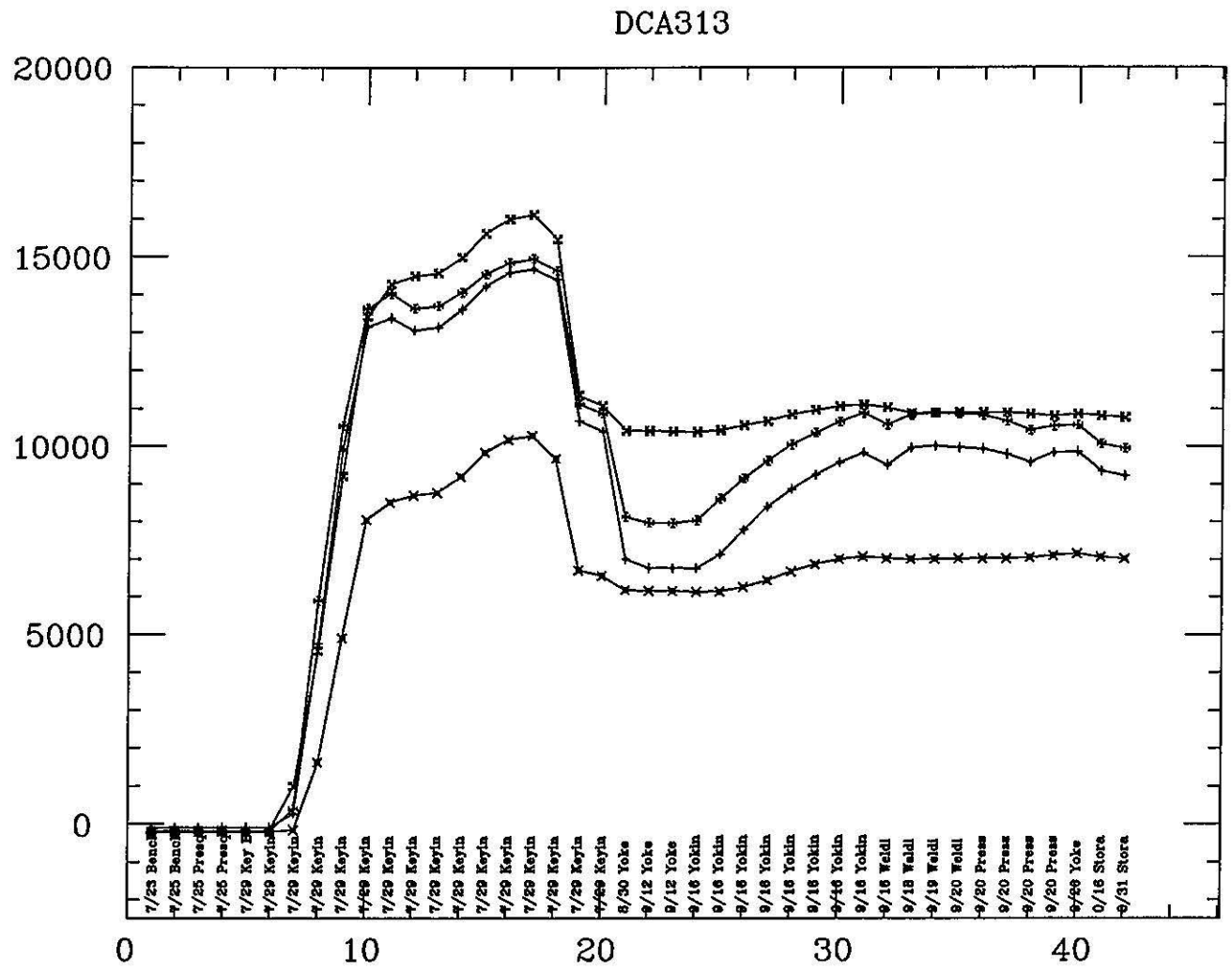

DCA310
20000
15000
10000
5000
0
0
10
20
30
5/31 BENCH
5/31 BENCH
6/04 BENCH
6/04 BENCH
6/05 BENCH
6/05 BENCH
6/06 BENCH
6/06 BENCH
6/06 BENCH
6/06 BENCH
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 KEYIN
6/06 CREEP
6/06 CREEP
6/06 CREEP
6/06 CREEP
6/06 CREEP
6/06 CREEP
0/16
0/16
0/17 Retu
0/17 Cut e
0/25
0/29 THIS

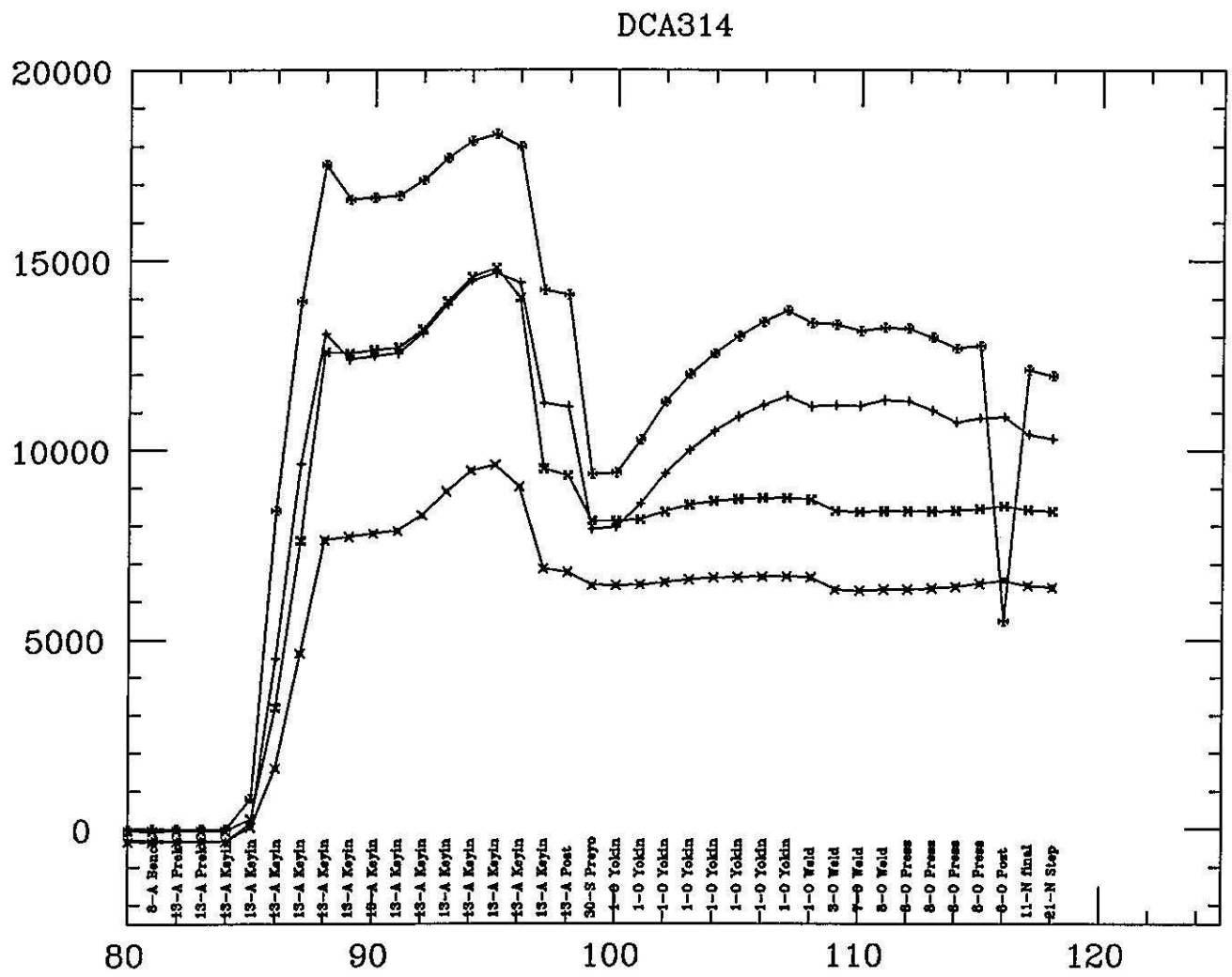
4

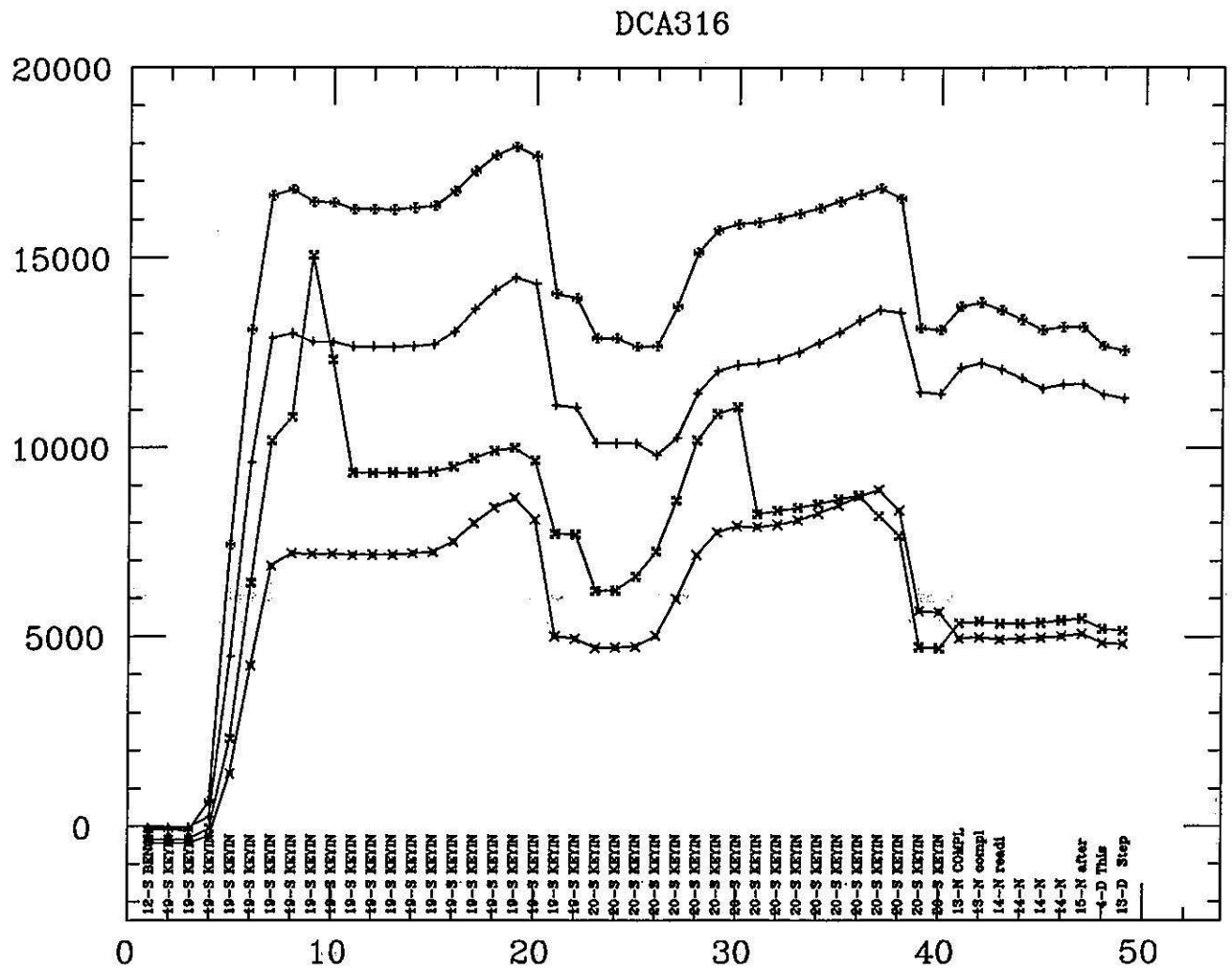

DCA311
20000
15000
10000
5000
0
0
20
40
60
5/13 Bench
5/13 Bench
5/18 Squeez
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
5/18 Run
7/25 Store
8/05 PreYo
8/06 PreYo
8/09 Yoke
8/09 Yoke
8/09 Yoke

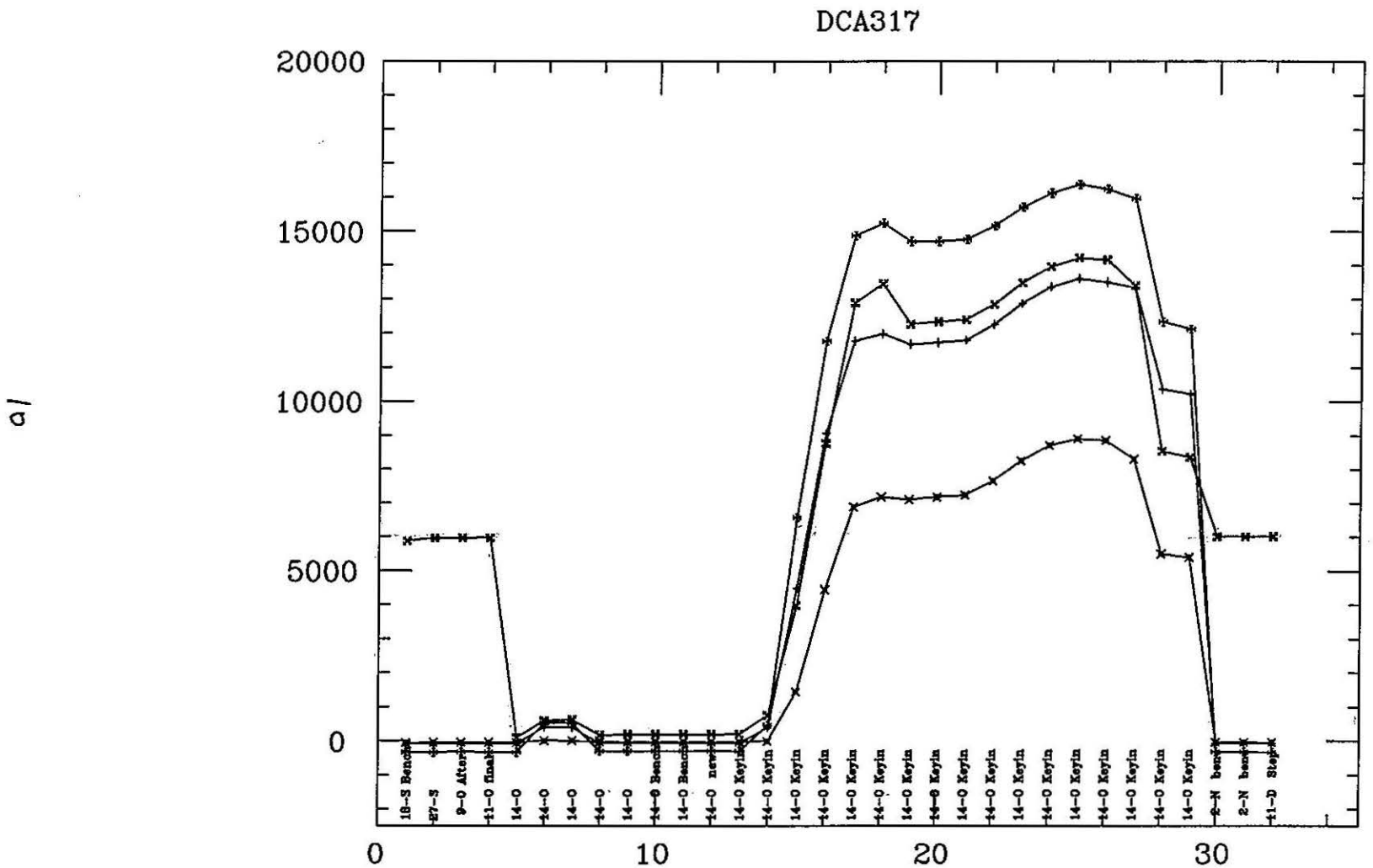
DCA312

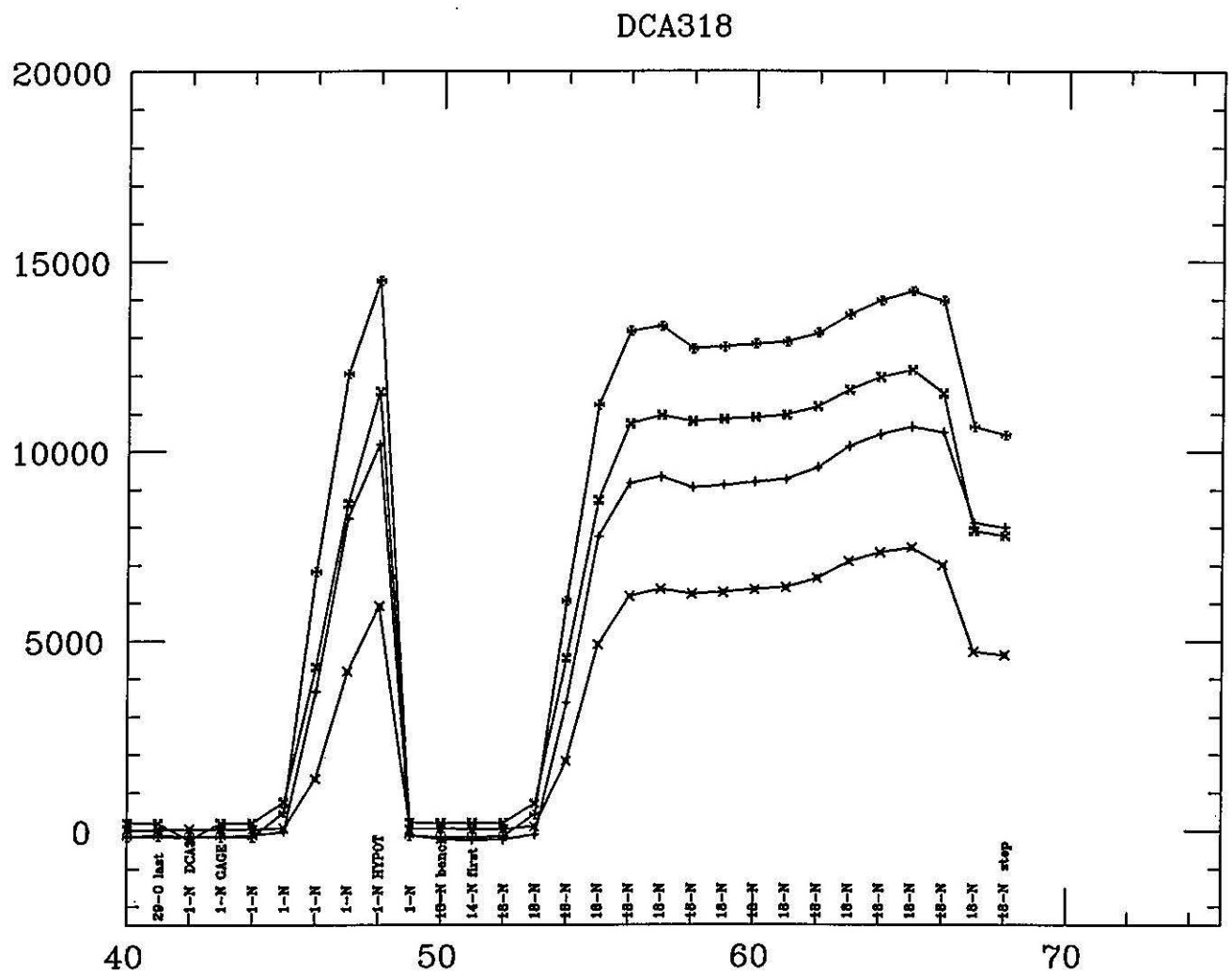


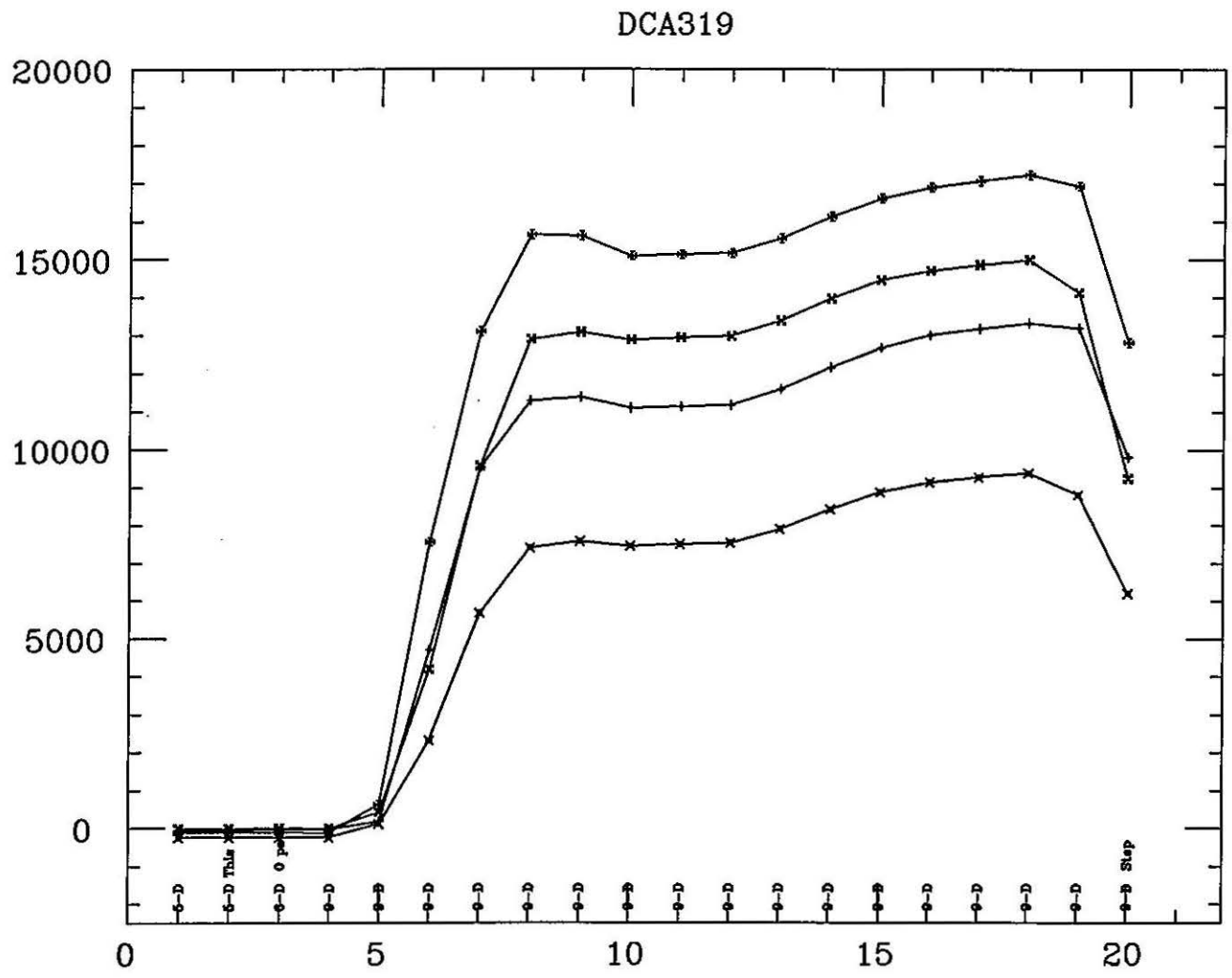

DCA313
20000
15000
10000
5000
0
0
10
20
30
40


DCA314
20000
15000
10000
5000
0
80
90
100
110
120
8-A Bend
13-A Preh
13-A Preh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Keyh
13-A Post
30-S Preyo
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Yokin
1-0 Weld
2-0 Weld
7-0 Weld
8-0 Weld
8-0 Press
8-0 Press
8-0 Press
8-0 Press
8-0 Post
11-N final
21-N Step


DCA316
20000
15000
10000
5000
0
0
10
20
30
40
50


DCA317
20000
15000
10000
5000
0
0
10
20
30


DCA318
20000
15000
10000
5000
0
40
50
60
70
29-O last
1-N DCA
1-N CAGE
1-N
1-N
1-N
1-N
1-N HYPOT
1-N
18-N
14-N first
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N
18-N step


DCA319
20000
15000
10000
5000
0
0
5
10
15
20