

### PS FIGURE OF 8 POLAR LOOPS

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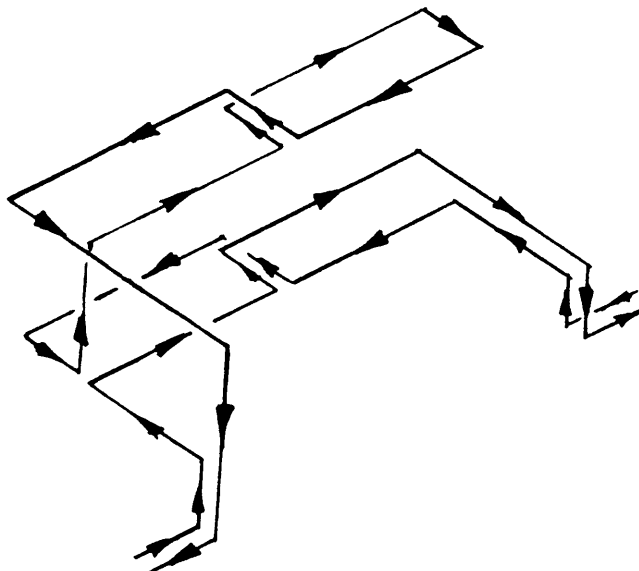
This note is a functional specification for the design of special polar loops.

1. The purpose of the loops is to correct, together with the pole face windings, the magnetic field of the PS main magnets (MU).

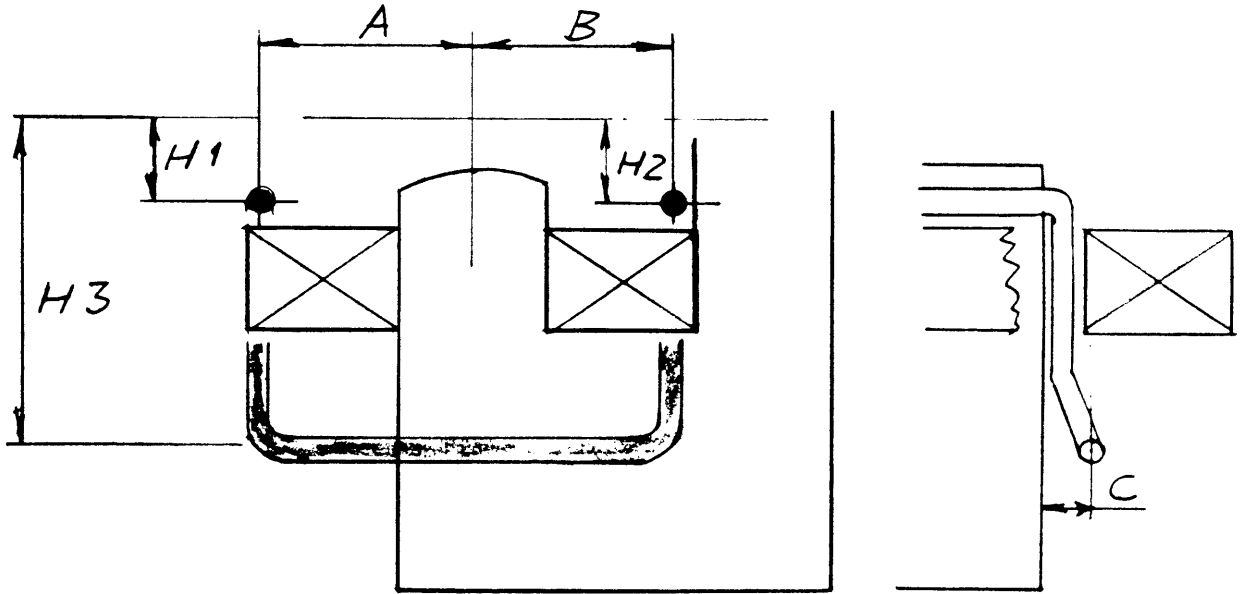
The existing figure of 8 loops around the magnet yokes will be removed.

All polar loops (PL) are electrically connected in series.

2. The geometry of the PL



3. The position of the PL conductors



Distances	Max.	Nomin.	Min.	Remarks
H 1	7.5	5.5	1.0	
H 2	7.5	2.75	1.0	Limited by MU coil
H 3	30.0	6.2	4.5	As far from orbit as possible
A	37.0	25.5	19.0	As close to the pole as possible
B	37.0	36.95	19.0	
C	20	7.0	7.0	

All dimensions are given in centimetres.

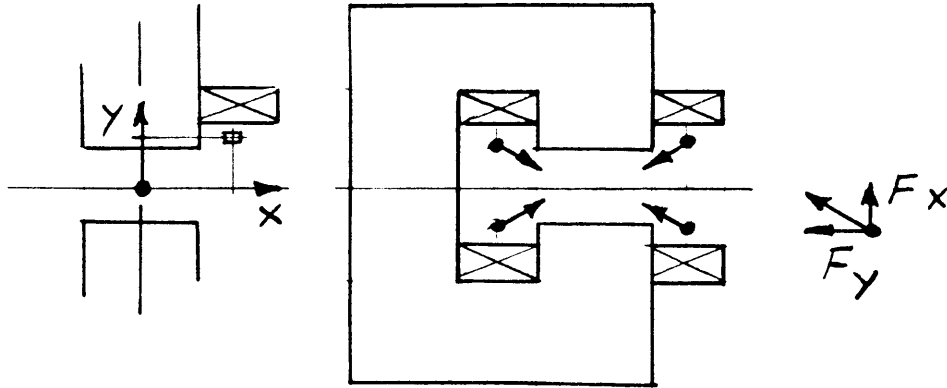
The distances H1, H2, H3, A, B, C are from the beam orbit to the centre of the conductors.

4. Electrical parameters

The loops are powered (in series) by a pulse generator.

Repetition rate (minimum)	1,2 s
Excitation current, rms value	600 A
Test voltage to earth	4 kv
Nominal resistance of the PL for one MU	0,002 Ω

5. Magnetic forces for longitudinal conductors



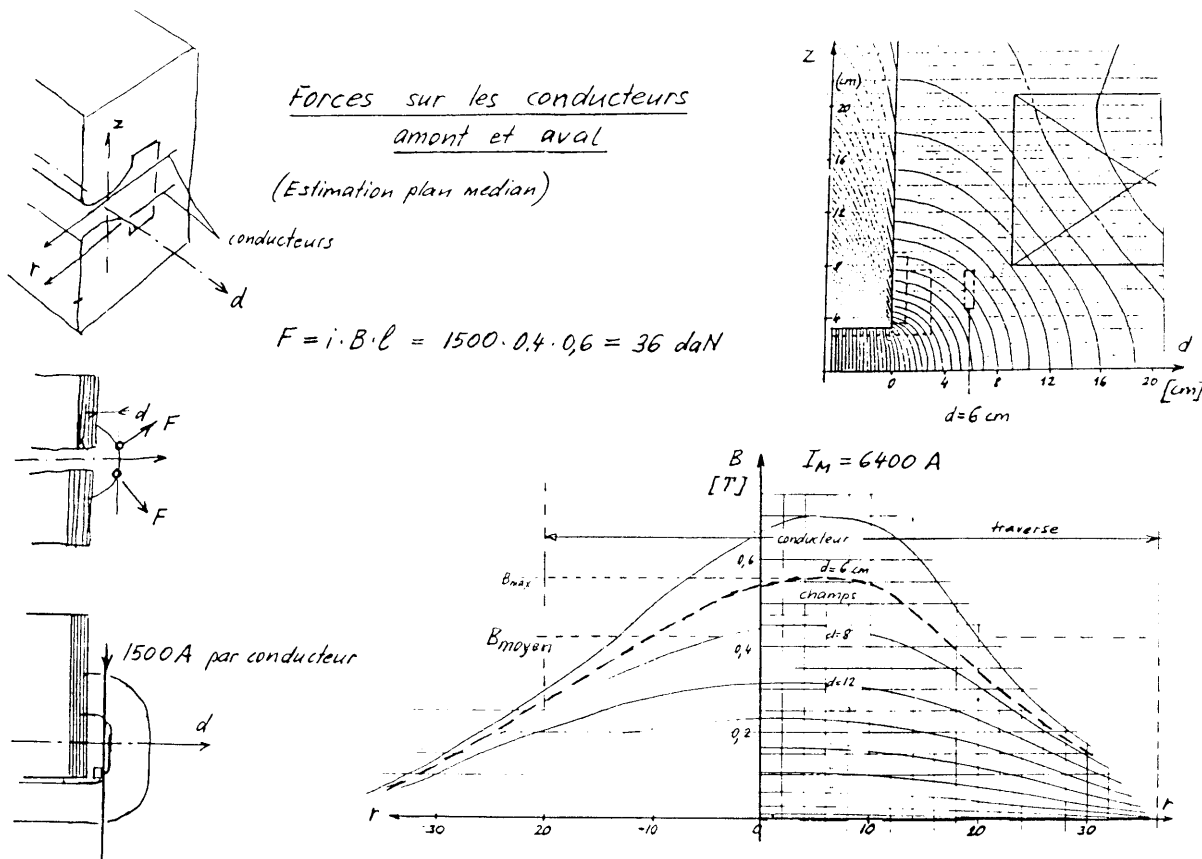
The direction of the force vector acting on the conductors is as shown on the sketch for all focusing magnet sections. For defocusing sections all forces are pointing in the opposite direction.

The following table gives the components of the force vector for various conductor positions (x, y coordinates with the beam orbit as origin) for  $I_{main} = 5500$  A and  $I_{loop} = 1500$  A.

point			closed profile		open profile	
	x	y	$F_x$	$F_y$	$F_x$	$F_y$
1	200	70	64	80	52	27
2	220	"	55	58	46	25
3	240	"	48	46	39	22
4	260	"	37	36	33	21
5	280	"	30	30	27	20
6	300	"	24	22	22	18
7	200	50	87	64	55	19
8	220	"	70	48	48	18
9	240	"	58	36	40	16
10	260	"	45	28	34	15
11	280	"	37	22	30	13
12	300	"	28	18	24	12
mm			daN/m		daN/m	

The forces are given in daN per meter, the distances (in cm) as well as the forces are indicated in the sketch.

6. Magnet forces for conductor at the MU ends



The above diagrams are from "EXPOSE" prepared by F. Rohner for discussion on the 13.06.1985.