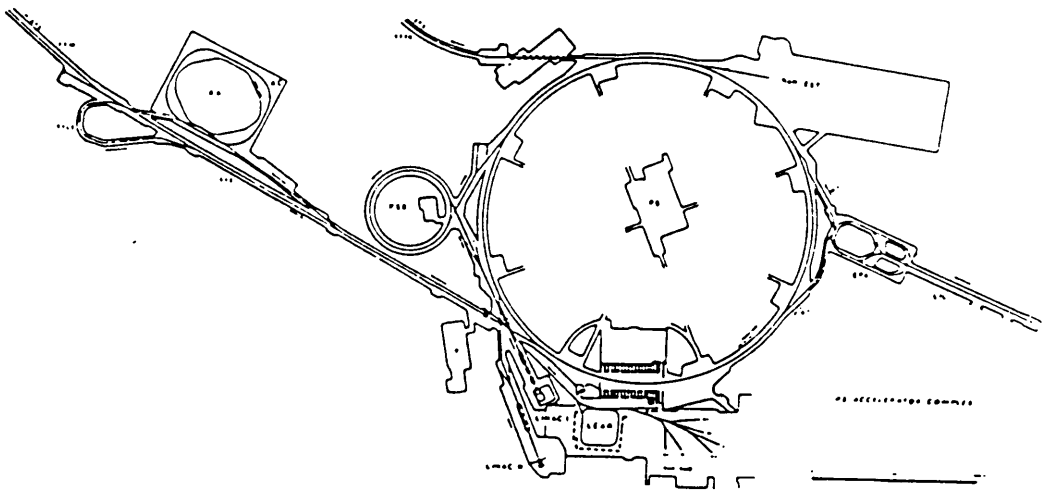
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN/PS 87-2 (OP)

STATISTICS OF PS OPERATION



1986

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CERN/PS 87-2 (OP)
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STATISTICS OF PS OPERATION

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Explanatory note

In order to clarify the figures quoted, it is necessary to give definitions of the headings for the various tables and to specify the time involved.

OVERALL PS SCHEDULES PERIOD is defined as the time which elapses between the end of one PS running period and the end of the next.

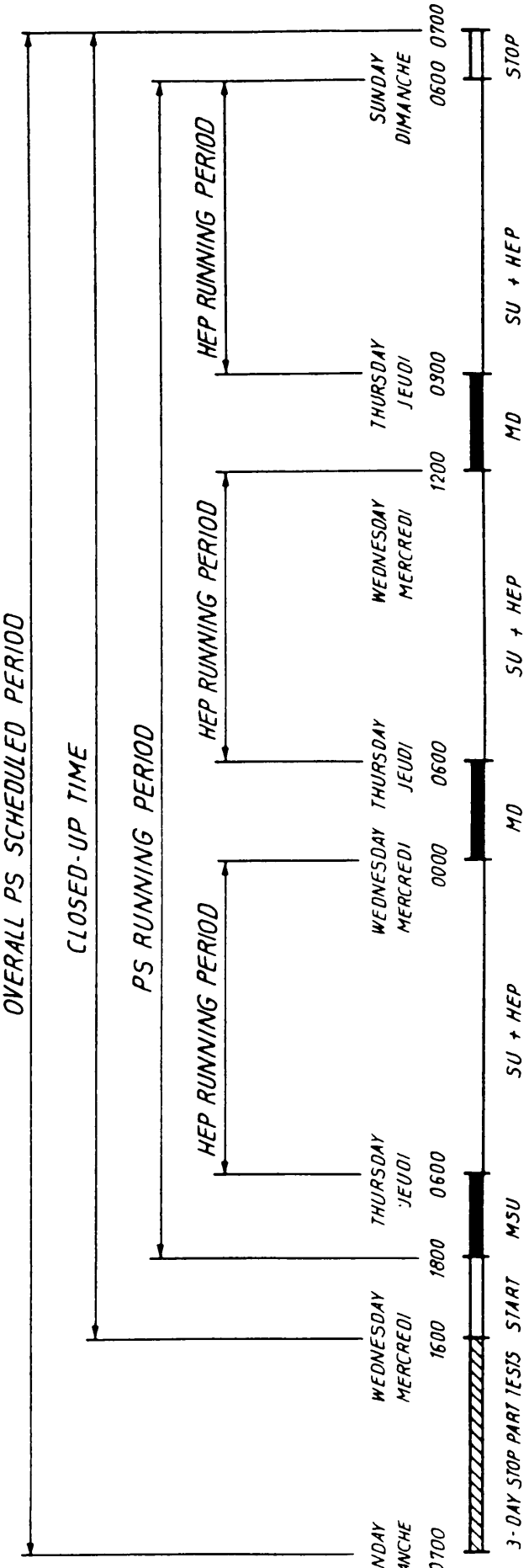
PS RUNNING PERIOD is defined as the time of continuous PS operation from the scheduled end of a PS start-up until the beginning of the next shutdown procedure and includes stops for breakdowns, etc.

HEP RUNNING PERIOD is a period of continuous PS operation for high energy physics. They are generally three such periods per PS running period, not necessarily of equal length and separated by a machine development period.

Changes since last year

- New table No. 1b : a view of PS Performance for 1986
- New table No. 28 : LPI statistics
- New annex 6 : explanation of PS Users

EXEMPLE OF A RUNNING PERIOD



MSU : Machine Setting-up
MD : PS and/or Booster Machine Development
SU : Setting-up
HEP : High Energy Physics (including SPS, AA and LEAR)

- TABLE 1 : A VIEW OF PS PERFORMANCE FOR 1986

- TABLE 1B: A VIEW OF PS PERFORMANCE FOR 1986

- TABLE 2 : STATISTICS OF PS OPERATION

For each "overall PS scheduled period", the following statistics are given:

Clock time : total number of hours in the "overall PS scheduled period".

Closed-up time is the total of the following:
- HEP : time used for high energy physics
- MD : time used for machine development
- MSU : time used for machine setting-up
- start/stop : time allocated to starting up and stopping the PS.

Partial tests (P.T.) : time taken for magnet, Linac and PSB testing, prior to PS start-up.

Cooling-down and miscellaneous : time allowed for PS cooling-down plus all the other time not included under the various headings of this chapter.

- TABLE 3 : DISTRIBUTION OF HEP TIME

Under this heading the time used for high energy physics is divided into four distinct categories (expressed as a percentage of total hours of HEP time), viz:

ON TIME	RUNNING %	: time during which the beam is actually used for high energy physics
	SETTING-UP %	: high energy operation setting-up time attributed to HEP
OFF TIME	FAULT %	: self-explanatory
	USER REQUEST %:	time during which PS is stopped at HEP users request

- TABLE 4 : HEP STATISTICS OF INTENSITY AND NUMBER OF PULSES

The total intensity, the total number of accelerated beam pulses and the average intensity are given. These are calculated for the entire HEP time in each "PS running period".

- TABLE 5 : TOTAL DISTRIBUTION OF BEAM INTENSITY (HEP)

  The distribution of the beam between the various targets* and ejection* systems is given for the HEP time of each "PS running period". Totals and percentages are quoted for the year 1986.

- TABLE 6 : HEP STATISTICS

  This gives the total number of hours of HEP time, the total number of accelerated beam pulses, the total intensity and the average intensity computed over the total time for the year 1986. The same figures are given for the period 1960-1985 inclusive and under "Grand Total" are given the overall totals and overall average for 1986.

- TABLE 7 : DISTRIBUTION OF MD TIME

  Under this heading the time used for machine development is divided into two distinct categories, viz:

  ON TIME RUNNING % : self-explanatory
  OFF TIME FAULTS % : self-explanatory.

- TABLE 8 : MD STATISTICS OF INTENSITY AND NUMBER OF PULSES

  The total intensity, the total number of accelerated beam pulses and the average intensity are given. These are calculated for the entire MD time in each "PS running period".

- TABLE 9 : TOTAL DISTRIBUTION OF BEAM INTENSITY (MD)

  The distribution of the beam between the various targets* and ejection* systems is given for the MD time of each "PS running period". Totals and percentages are quoted for the year 1986.

- TABLE 10: DISTRIBUTION OF MSU TIME

  Under this heading the time used for machine setting-up is divided into two distinct categories, viz:

  ON TIME % : self-explanatory.
  OFF TIME % : self-explanatory.

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* See annex 6 for the meaning of this heading.

- TABLE 11 : MSU STATISTICS OF INTENSITY AND NUMBER OF PULSES

The total intensity, the total number of accelerated beam pulses and the average intensity are given. These are calculated for the entire MSU time in each "PS running period".

- TABLE 12 : TOTAL DITRIBUTION OF BEAM INTENSITY (MSU)

The distribution of the beam between the various targets* and ejection* systems is given for the MSU time of each "PS running period". Totals and percentages are quoted for the year 1986.

- TABLE 13 : STATISTICS

This gives the total number of hours of HEP + MD + MSU time, the total number of accelerated beam pulses, the total intensity and the average intensity computed over the total time for the year 1986. Under "Grand Total" are given the overall totals and overall average for 1960-1986 inclusive.

- TABLE 14 : FAULT DISTRIBUTION BY SYSTEM

This gives the breakdown time per "PS running period" according to the various PS system**. Totals and percentages for 1986 are given.

- TABLE 15 : VARIATIONS OF AVERAGE INTENSITY (HEP)

The evolution of average intensity during HEP time of each "PS running period" is plotted on a graph.

- TABLE 16 : PERCENTAGE OF FAULTS

This graph shows the percentage of faults per "PS running period".

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* See Annex 6 for the meaning of this heading.

** See Annex 1 for the meaning of this heading.

- TABLE 17 : AVAILABILITY FOR THE SPS AND AA IN PERCENTAGE

This graph shows the availability for the SPS and AA in percentage. It is calculated for the HEP time of each "PS running period" according to the formulae:

$$\frac{\text{HEP time - (HEP faults + continuous transfer faults during HEP)}}{\text{HEP time}} \quad \text{for SPS}$$

and

$$\frac{\text{AA running-in time - Total PS faults (as seen by AA)}}{\text{AA running-in time}} \quad \text{for AA}$$

- TABLE 18 : FAULT DISTRIBUTION BY SYSTEM (Number of faults/Total time)

This table gives the breakdown time for the year 1986, according to the various PS systems*. The faults are further subdivided into particular time slices as follows :

0 to 10 minutes
10 to 20 minutes
20 min. to 1 hour
1 to 3 hours
3 to 6 hours
more than 6 hours

- TABLE 19 : FAULT DISTRIBUTION BY SYSTEM FOR THE BOOSTER (number of faults/total time)

This table gives the breakdown time for the Booster only, for the year 1986.

- TABLE 20 : FAULT DISTRIBUTION BY SYSTEM for AA (number of faults/total time)

This table gives the breakdown time for the AA only, for 1986.

- TABLE 21 : STATISTIQUES AA (Y. Renaud)

Récapitulatif pour l'année 1986. See also PS/OP/Note 86-4.

** See Annex 1 for the meaning of this heading.

- TABLE 22 : 1986 PS SCHEDULE

- TABLE 23 : LEAR STATISTICS (R. LEY)

  Statistics for 1986.

- TABLE 24 : ANNUAL STATISTICS FOR THE PS COMPLEX (MONTHLY)

- TABLE 25 : EVOLUTION OF FAULT DISTRIBUTION BY SYSTEM SINCE 1981

- TABLE 26 : TOTAL PSB INTENSITY PER RING AND NUMBER OF PULSES

  The distribution of the beam between the different transformers is given for each "PS running period". Total intensity and number of pulses are quoted for 1986.

- TABLE 27 : STATISTICS OF PS INTENSITY AND FAULTS SINCE 1981

- TABLE 28 : LPI STATISTICS (B. Frammery)

  LPI functioning in 1986.

Acknowledgements

We want to thank M. Bouthéon, B. Frammery, L. Henny, R. Ley and Y. Renaud for their help in the preparation of this document.

References

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M. Bouthéon, Monthly Management Reports, Technical parameters, for 1986, (January 1987)

Y. Renaud, Statistiques AA pour 1986, PS/OP/Note 87-4.

R. Ley, Statistiques LEAR - 1986, PS/LEA/Note 86-10.

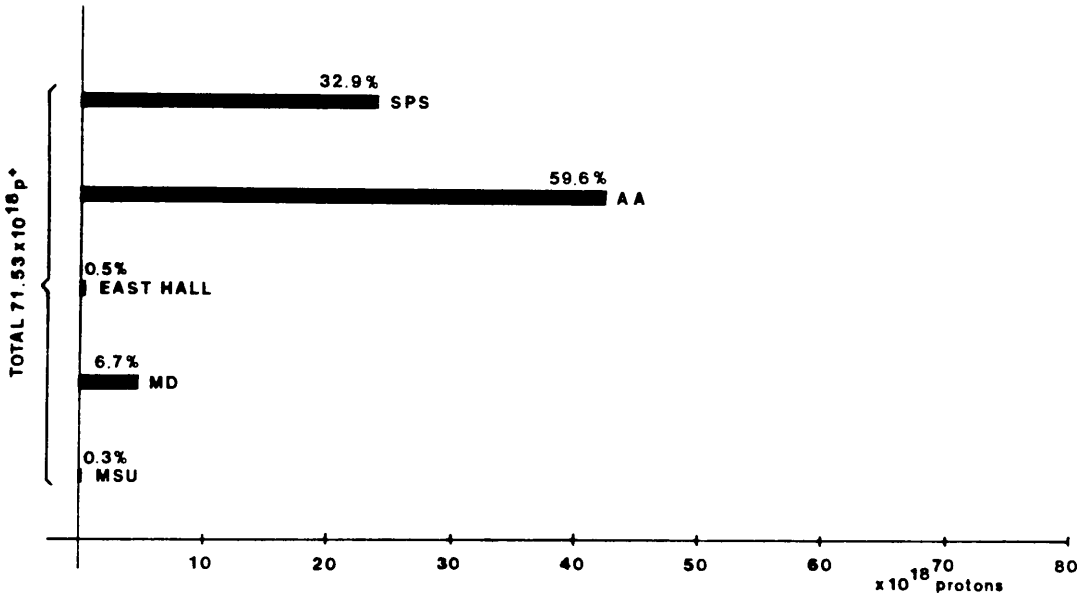


Fig.1 GENERAL DISTRIBUTION OF p ACCELERATED BY THE PS IN 1986

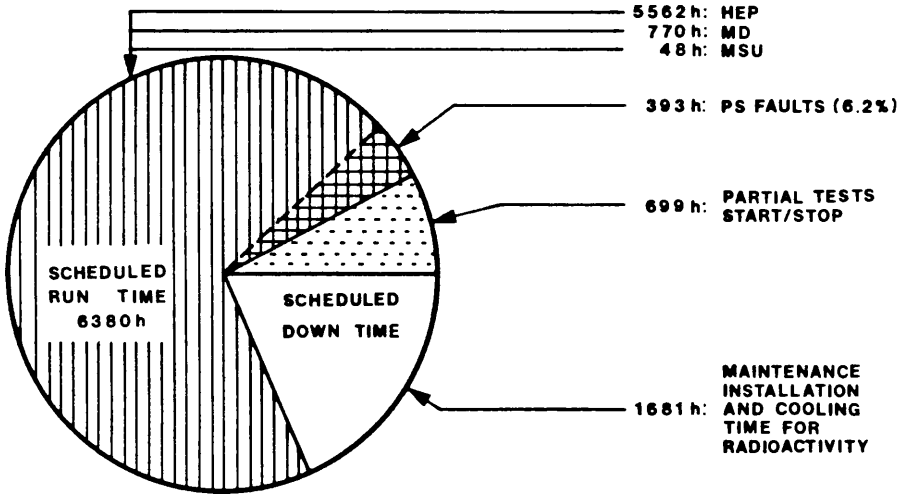


Fig.2 DIVISION OF PS CAKE FOR 1986

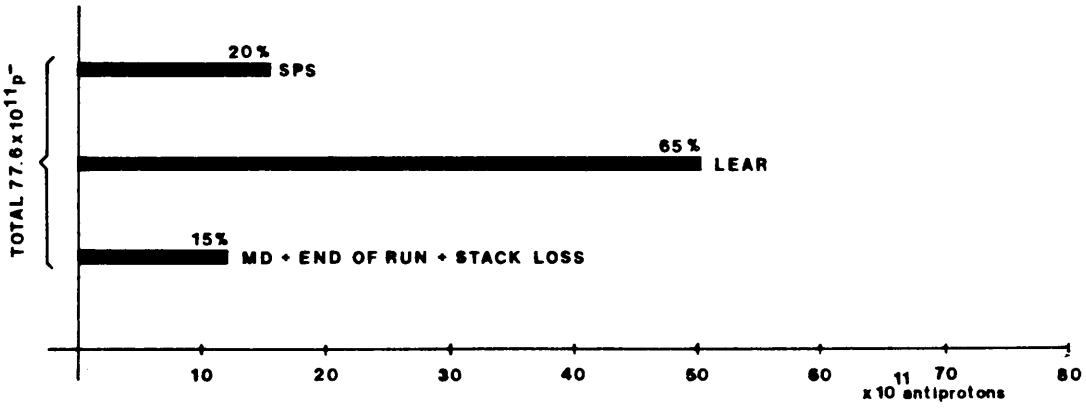


Fig.3 GENERAL DISTRIBUTION OF $\bar{p}$ BY AA IN 1986

TABLE 1b

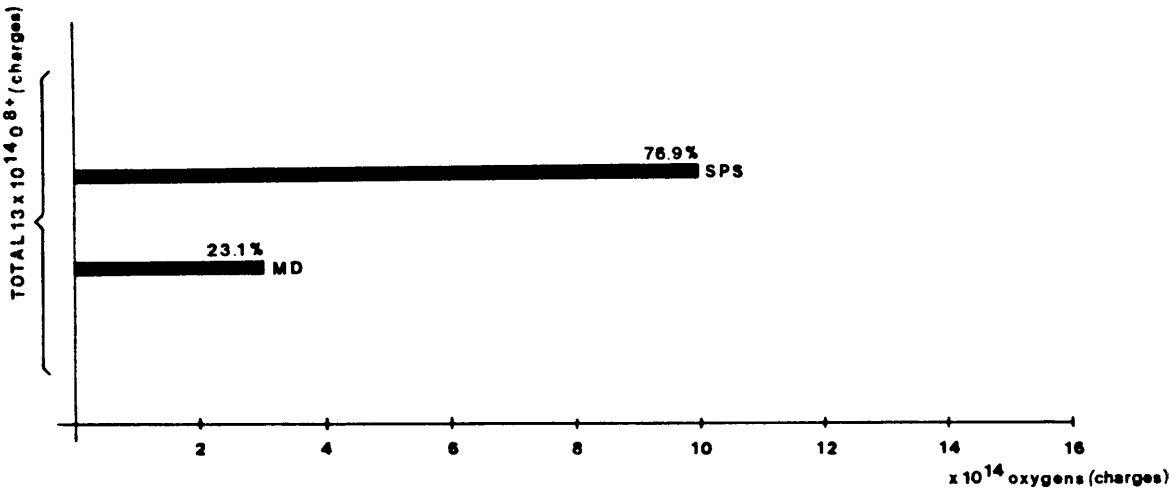


Fig.1 GENERAL DISTRIBUTION OF OXYGENS ACCELERATED BY THE PS IN 1986

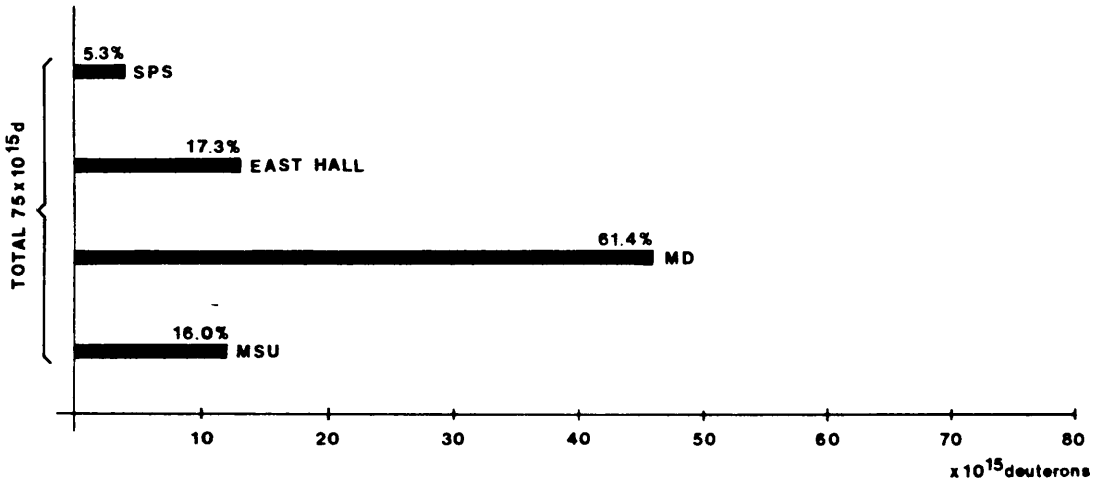


Fig.2 GENERAL DISTRIBUTION OF DEUTERONS ACCELERATED BY THE PS IN 1986

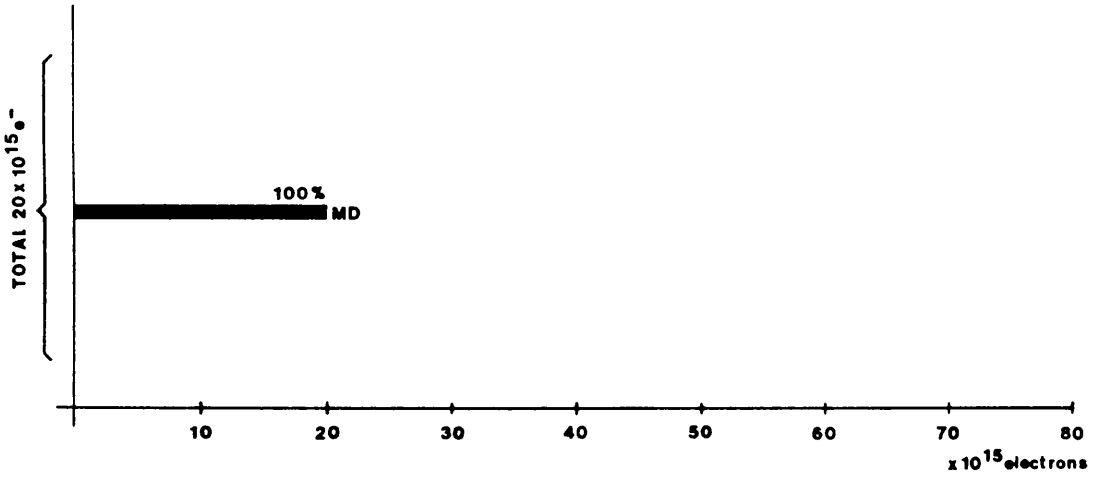


Fig.3 GENERAL DISTRIBUTION OF ELECTRONS ACCELERATED BY THE PS IN 1986

STATISTICS OF PS OPERATION

WEEK NO	CLOCK TIME	CLOSED–UP TIME							TOTAL		P.T.	MAINT. AND INSTAL.	COOLING DOWN AND MISCELLANEOUS
		HEP		M.D.		M.S.U.		START/ STOP					
	(HOURS)	SCHEDULED (HOURS)	WORKED (HOURS)	SCHEDULED (HOURS)	WORKED (HOURS)	SCHEDULED (HOURS)	WORKED (HOURS)	(HOURS)	SCHED (HOURS)	WORKED (HOURS)	(HOURS)	(HOURS)	(HOURS)
1-6	960										240	720	
7-13	1176	678	678	114	114			273	1065	1065	60	24	27
14-22	1512	1406	1406	28	28	12	12	3	1449	1449	34	24	5
23	168											60	108
24-34	1848	1656	1656	90	90	12	12	3	1761	1761	34	24	29
35	168											60	108
36-45	1680	1366	1366	208	208	12	12	3	1589	1589	34	24	33
46	168											60	108
47-51	840	456	456	330	330	12	12	3	801	801	12	12	15
52	240												240
TOTAL (HOURS)	8760	5562	5562	770	770	48	48	285	6665	6665	414	1008	673
PERCENT CLOCK TIME	100.0	63.5	63.5	8.8	8.8	0.5	0.5	3.3	76.1	76.1	4.7	11.5	7.7
PERCENT CLOSED UP TIME	—	83.4	83.4	11.6	11.6	0.7	0.7	4.3	—	100.0	—	—	—

TABLE 2

TABLE 3

DISTRIBUTION OF HEP TIME IN HOURS (IN %)

WEEK Nº	ON TIME		OFF TIME		TOTAL HOURS OF HEP WORKED
	RUNNING	SETTING-UP	FAULTS	USER REQUEST	
1		SCHEDULED	SHUT	DOWN	
2		"	"	"	
3		"	"	"	
4		"	"	"	
5		"	"	"	
6		"	"	"	
7 8 9 10 11 12 13	602.26 (88.9)		44.57 (6.6)	30.37 (4.5)	678.0
14 15 16 17 18 19 20 21 22	1335.52 (95.0)		58.32 (4.2)	11.36 (0.8)	1406.00
23		SCHEDULED	SHUT	DOWN	
24 25 26 27 28 29 30 31 32 33 34	1544.40 (93.3)		109.36 (6.6)	1.44 (0.1)	1656.00
35		SCHEDULED	SHUT	DOWN	
36 37 38 39 40 41 42 43 44 45	1307.00 (95.7)		59.00 (4.3)	—	1366.00
46		SCHEDULED	SHUT	DOWN	
47 48 49 50 51	438.24 (96.1)		17.36 (3.9)	—	456.00
52		SCHEDULED	SHUT	DOWN	
TOTAL %	94.0		5.2	0.8	100.00
TOTAL HOURS	5228.22		289.41	43.57	5562.00

HEP STATISTICS OF INTENSITY AND Nº OF PULSES

WEEK Nº	TOTAL INTENSITY [p^+]	AVERAGE INTENSITY [10^{12}]	NUMBER OF PULSES
1	SCHEDULED	SHUT	DOWN
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	"
6	"	"	"
7 8 9 10 11 12 13	420.3	4.52	928 859
14 15 16 17 18 19 20 21 22	2127.7	10.44	2 037 590
23	SCHEDULED	SHUT	DOWN
24 25 26 27 28 29 30 31 32 33 34	2950.8	9.37	3 150 557
35	SCHEDULED	SHUT	DOWN
36 37 38 39 40 41 42 43 44 45	1170.1	3.96	2 957 883
46	SCHEDULED	SHUT	DOWN
47 48 49 50 51	0.8 17.0 d 10.0 O^{8+}	0.01 0.10 0.003	61 518 169 000 310 000
52	SCHEDULED	SHUT	DOWN
TOTAL	6669.7	7.30	9 136 407

UNITS = p^+ (10^{16}) d (10^{15}) O^{8+} (10^{14}) e^+ (10^{15}) e^- (10^{15})
(charges)

TABLE 5

TOTAL DISTRIBUTION OF BEAM INTENSITY (HEP)

WEEK Nº	FAST EJECTIONS								SLOW EJECTION		DUMP TARGETS 47-48 D2-D3	TOTAL
			SPS									
	16							58	62			
	AA	TST	SPP		SFT			SPN	PHY.			
	p^+	p^+	p^+	e^+	p^+	d	O^{8+}	e^-	p^+	d	p^+	p^+
7-13	398.7	1.8	1.3		10.7				6.4		1.4	420.3
14-22	2094.1	1.1	9.7		17.4				3.1		2.3	2127.7
24-34	1757.8	2.6			1178.9				9.8		1.7	2950.8
36-45					1137.3				19.0		13.8	1170.1
47-51		0.3				4.0	10.0		0.5	13.0		0.8
TOTAL	4250.6	5.8	11.0		2344.3	4.0	10.0		38.8	13.0	19.2	6 669.7
PERCENT	63.7	0.1	0.2		35.1	—	—		0.6	—	0.3	100.0

UNITS = $p^+(10^{16})$ $d(10^{15})$ $O^{8+}(10^{14})$ $e^+(10^{15})$ $e^-(10^{15})$

HEP STATISTICS

YEAR	TOTAL HOURS OF N.P. WORKED	TOTAL NUMBER OF PULSES ACCELERATED	TOTAL NUMBER OF PROTONS [10^{16}]	AVERAGE [Tpp^{-1}]
TOTAL FOR 1986	5 562.0	9 136407	6 669.7	7.30
TOTAL FOR 1960...1985	131072.8	193 678 860	81651.4	4.22
GRAND TOTAL 1960...1986	136 634.8	202 815 267	88321.1	4.35

$1\,Tpp^{-1} = 10^{12}\,pp^{-1}$

TABLE 7

DISTRIBUTION OF MD TIME IN HOURS (IN %)

WEEK No	ON TIME		OFF TIME		TOTAL HOURS OF MD WORKED
	RUNNING	SETTING-UP	FAULTS	USER REQUEST	
1		SCHEDULED	SHUT	DOWN	
2		"	"	"	
3		"	"	"	
4		"	"	"	
5		"	"	"	
6		"	"	"	
7 8 9 10 11 12 13	102.59 (90.4)		11.01 (9.6)		114.00
14 15 16 17 18 19 20 21 22	26.01 (92.9)		1.59 (7.1)		28.00
23		SCHEDULED	SHUT	DOWN	
24 25 26 27 28 29 30 31 32 33 34	85.19 (94.8)		4.41 (5.2)		90.00
35		SCHEDULED	SHUT	DOWN	
36 37 38 39 40 41 42 43 44 45	188.04 (90.4)		19.56 (9.6)		208.00
46		SCHEDULED	SHUT	DOWN	
47 48 49 50 51	266.11 (80.7)		63.49 (19.3)		330.00
52		SCHEDULED	SHUT	DOWN	
TOTAL %	86.8		13.2		100.00
TOTAL HOURS	668.34		101.26		770.00

M. D. STATISTICS OF INTENSITY AND Nº OF PULSES

WEEK Nº	TOTAL INTENSITY [p^+]	AVERAGE INTENSITY [10^{12}]	NUMBER OF PULSES
1	SCHEDULED	SHUT	DOWN
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	"
6	"	"	"
7 8 9 10 11 12 13	79.7	1.74	459 141
14 15 16 17 18 19 20 21 22	138.2	7.56	182 707
23	SCHEDULED	SHUT	DOWN
24 25 26 27 28 29 30 31 32 33 34	151.6	3.83	394 853
35	SCHEDULED	SHUT	DOWN
36 37 38 39 40 41 42 43 44 45	37.3 37.0 d 3.0 O^{8+}	1.71 0.16 0.003	218 117 236 000 90 000
46	SCHEDULED	SHUT	DOWN
47 48 49 50 51	52.2 9.0 d 20.0 e^-	1.89 0.08 0.08	276 482 104 000 248 000
52	SCHEDULED	SHUT	DOWN
TOTAL	459.0	3.00	1 531 300

UNITS= $p^+(10^{16})$ $d(10^{15})$ $O^{8+}(10^{14})$ (charges) $e^+(10^{15})$ $e^-(10^{15})$

TABLE 9

TOTAL DISTRIBUTION OF BEAM INTENSITY (MD)

WEEK Nº	FAST EJECTIONS								SLOW EJECTION		DUMP TARGETS 47-48 D2-D3	TOTAL
			SPS									
	16							58	62			
	AA	TST	SPP		SFT			SPN	PHY.			
	p^+	p^+	p^+	$\bullet^+$	p^+	d	O^{8+}	$\bullet^-$	p^+	d	p^+	p^+
7-13	38.9		0.2		7.7				1.5		31.4	79.7
14-22	80.0										58.2	138.2
24-34	34.0	0.2			82.1				0.5		34.8	151.6
36-45	2.2				27.3	33.0	3.0		0.6	4.0	7.2	37.3
47-51	16.4	0.3			32.0	9.0		20.0			3.5	52.2
TOTAL	171.5	0.5	0.2		149.1	42.0	3.0	20.0	2.6	4.0	135.1	459.0
PERCENT	37.4	0.1	—		32.5	—	—	—	0.6	—	29.4	100.0

UNITS = $p^+(10^{16})$ $d(10^{15})$ $O^{8+}(10^{14})$ $\bullet^+(10^{15})$ $\bullet^-(10^{15})$

DISTRIBUTION OF MSU TIME IN HOURS (IN%)

WEEK Nº	ON TIME		OFF TIME		TOTAL HOURS OF MSU WORKED
	RUNNING	SETTING-UP	FAULTS	USER REQUEST	
1		SCHEDULED	SHUT	DOWN	
2		"	"	"	
3		"	"	"	
4		"	"	"	
5		"	"	"	
6		"	"	"	
7 8 9 10 11 12 13					—
14 15 16 17 18 19 20 21 22	12.00 (100.0)		—		12.00
23		SCHEDULED	SHUT	DOWN	
24 25 26 27 28 29 30 31 32 33 34	12.00 (100.0)				12.00
35		SCHEDULED	SHUT	DOWN	
36 37 38 39 40 41 42 43 44 45	11.30 (95.8)		0.30 (4.2)		12.00
46		SCHEDULED	SHUT	DOWN	
47 48 49 50 51	10.17 (85.8)		1.43 (14.2)		12.00
52		SCHEDULED	SHUT	DOWN	
TOTAL %	95.4		4.6		100.00
TOTAL HOURS	45.47		2.13		48.00

TABLE 11

M.S.U. STATISTICS OF INTENSITY AND Nº OF PULSES

WEEK Nº	TOTAL INTENSITY [p⁺]	AVERAGE INTENSITY [10¹²]	NUMBER OF PULSES
1	SCHEDULED	SHUT	DOWN
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	"
6	"	"	"
7 8 9 10 11 12 13	—	—	—
14 15 16 17 18 19 20 21 22	9.4	2.01	46 703
23	SCHEDULED	SHUT	DOWN
24 25 26 27 28 29 30 31 32 33 34	14.7	1.85	79 590
35	SCHEDULED	SHUT	DOWN
36 37 38 39 40 41 42 43 44 45	— 6.0 d	— 0.10	— 55 000
46	SCHEDULED	SHUT	DOWN
47 48 49 50 51	— 6.0 d	— 0.10	— 55 000
52	SCHEDULED	SHUT	DOWN
TOTAL	24.1	1.90	126 293

UNITS = $p^+(10^{16})$ $d(10^{15})$ $O^{8+}(10^{14})$ (charges) $e^+(10^{15})$ $e^-(10^{15})$

TOTAL DISTRIBUTION OF BEAM INTENSITY (MSU)

WEEK NO	FAST EJECTIONS								SLOW EJECTION		DUMP TARGETS 47-48 D2-D3	TOTAL
			SPS									
	16							58	62			
	AA	TST	SPP		SFT			SPN	PHY.			
	p^+	p^+	p^+	e^+	p^+	d	O^{8+}	e^-	p^+	d	p^+	p^+
7-13												—
14-22	8.4	0.1			0.6				0.3			9.4
24-34	4.3				10.4							14.7
36-45						6.0						—
47-51						6.0						—
TOTAL	12.7	0.1			11.0	12.0			0.3			24.1
PERCENT	52.7	0.4			45.7	—			1.2			100.0

UNITS = p^+ (10^{16}) d (10^{15}) O^{8+} (10^{14}) e^+ (10^{15}) e^- (10^{15})

TABLE 12

TABLE 13

PS STATISTICS

FOR HEP + MD + MSU

YEAR	TOTAL HOURS WORKED	TOTAL NUMBER OF PULSES ACCELERATED	TOTAL NUMBER OF PROTONS [10^{16}]	AVERAGE [Tpp^{-1}]
TOTAL FOR 1986	6 380.0	10 794 000	7 152.8	6.63
TOTAL FOR 1960...1985	135 264.3	199 613 841	83 529.0	4.18
GRAND TOTAL 1960... 1986	141 644.3	210 407 841	90 681.8	4.31

$1\ Tpp^{-1} = 10^{12} pp^{-1}$

YEAR 1986		1/1 9/2	10/2 30/3	31/3 1/6	2/6 8/6	9/6 24/8	25/8 31/8	1/9 9/11	10/11 16/11	17/11 21/12	22/12 31/12	TOTAL	
TIME WORKED HEP+MD +MSU (HOURS)		DOWN	792	1446	DOWN	1758	DOWN	1586	DOWN	798	DOWN	6380	
BREAK-DOWN TIME (HOURS)		SHUT	55.58	60.31	SHUT	114.17	SHUT	79.26	SHUT	83.08	SHUT	393.20	
BREAK-DOWN TIME %		SCHEDULED	7.1	4.2	SCHEDULED	6.5	SCHEDULED	5.0	SCHEDULED	10.4	SCHEDULED	6.16	
FAULT DISTRIBUTION BY SYSTEM (HOURS)													PERCENTAGE OF TOTAL TIME WORKED =6380h / OF TIME LOST =393h20
MACHINE	MAIN MAGNET & AUXIL.		1.45	9.18		1.52		1.35		1.30		16.00	0.25 / 4.1
	MAIN GENE-RATOR		0.12	-		-		2.27		0.06		2.45	0.04 / 0.7
	LINAC		10.36	8.55		14.39		6.34		7.37		48.21	0.76 / 12.3
	BOOSTER		6.51	4.52		24.00		11.27		3.12		50.22	0.79 / 12.8
	INJECT.	DOWN	0.03	1.28	DOWN	2.33	DOWN	5.43	DOWN	0.45	DOWN	10.32	0.16 / 2.7
	ACCEL.	SHUT	3.51	10.07	SHUT	3.18	SHUT	26.17	SHUT	11.37	SHUT	55.10	0.87 / 14.0
	VACUUM	SCHEDULED	-	-	SCHEDULED	-	SCHEDULED	-	SCHEDULED	0.02	SCHEDULED	0.02	- / -
	EJECT. & TARGETS		0.30	2.33		0.49		1.57		0.21		6.10	0.10 / 1.6
	CONTROL		24.08	8.48		20.12		14.08		19.50		87.06	1.37 / 22.1
	BEAM TRANS-PORT		1.19	4.49		4.44		6.24		0.08		17.24	0.27 / 4.4
	MISCELL.		0.20	0.27		0.06		-		0.42		1.35	0.02 / 0.4
	EXTER. FAULTS (LPI)		6.23	9.14		42.04		2.54		37.18 (31.40)		97.53 (31.40)	1.53 (0.50) / 24.9 (8.1)

TABLE 15

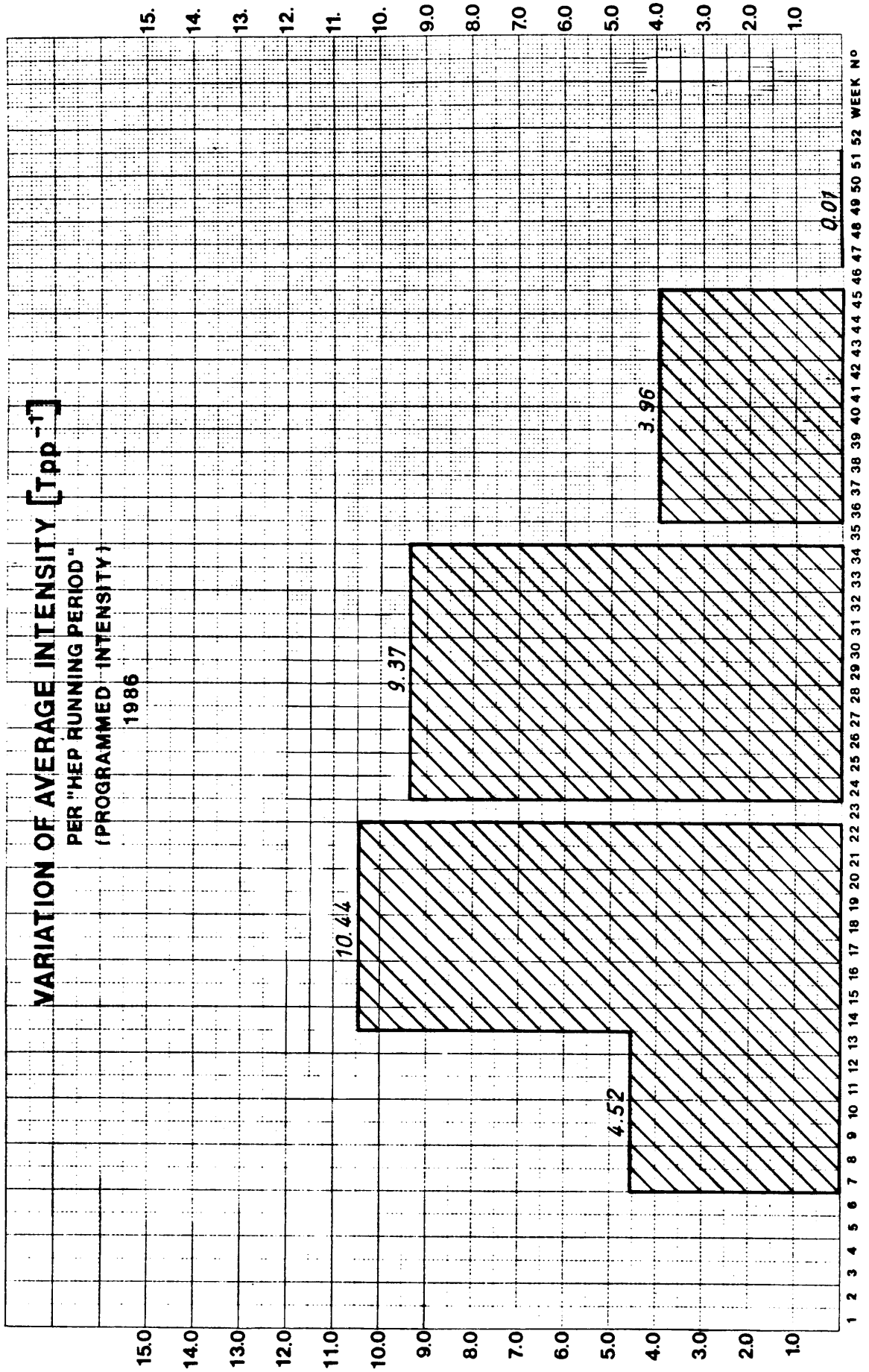

VARIATION OF AVERAGE INTENSITY [Tpp⁻¹]
PER "HEP RUNNING PERIOD"
(PROGRAMMED INTENSITY)
1986
10.44
4.52
9.37
3.96
0.01
WEEK Nº

TABLE 16

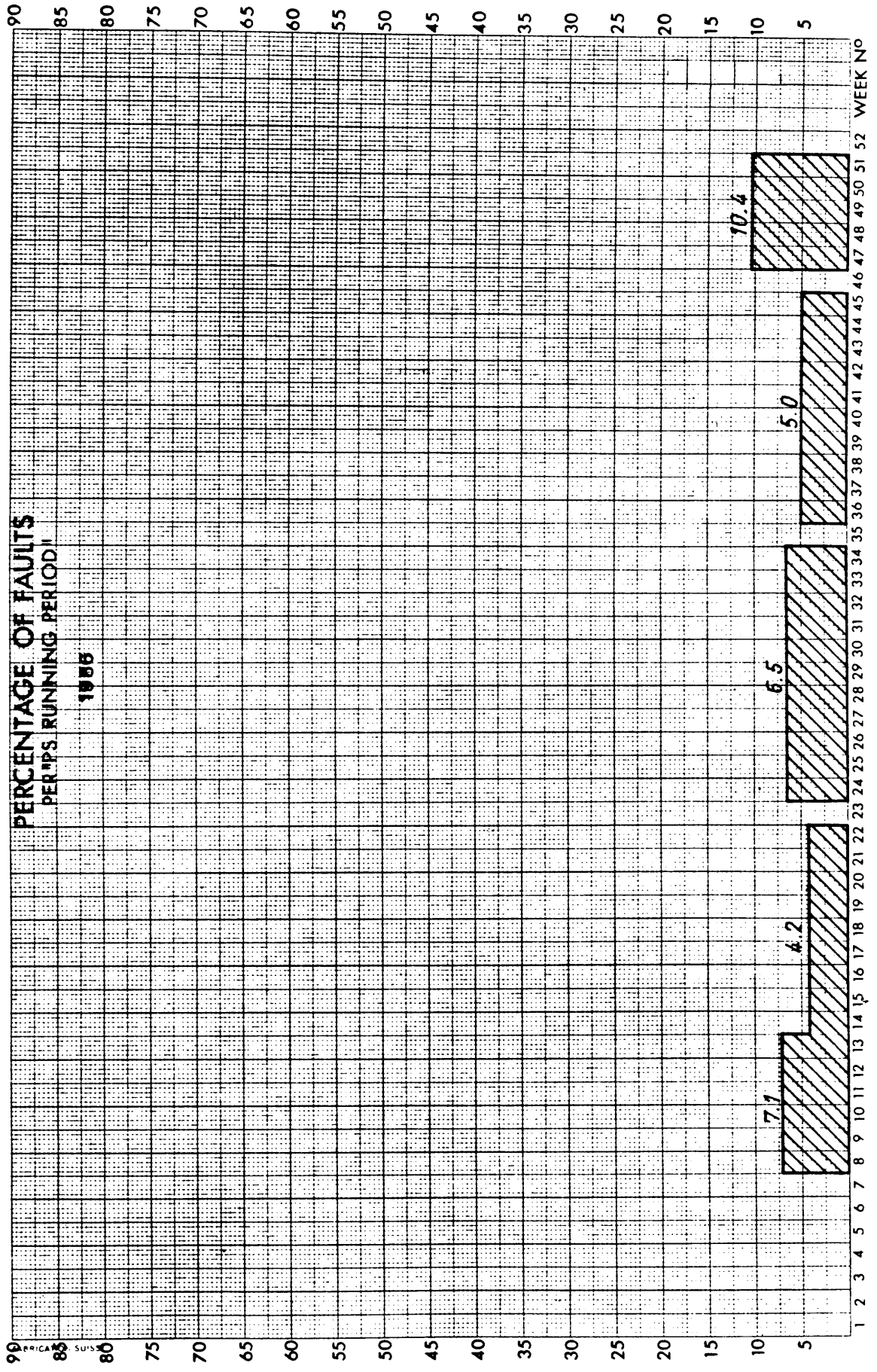
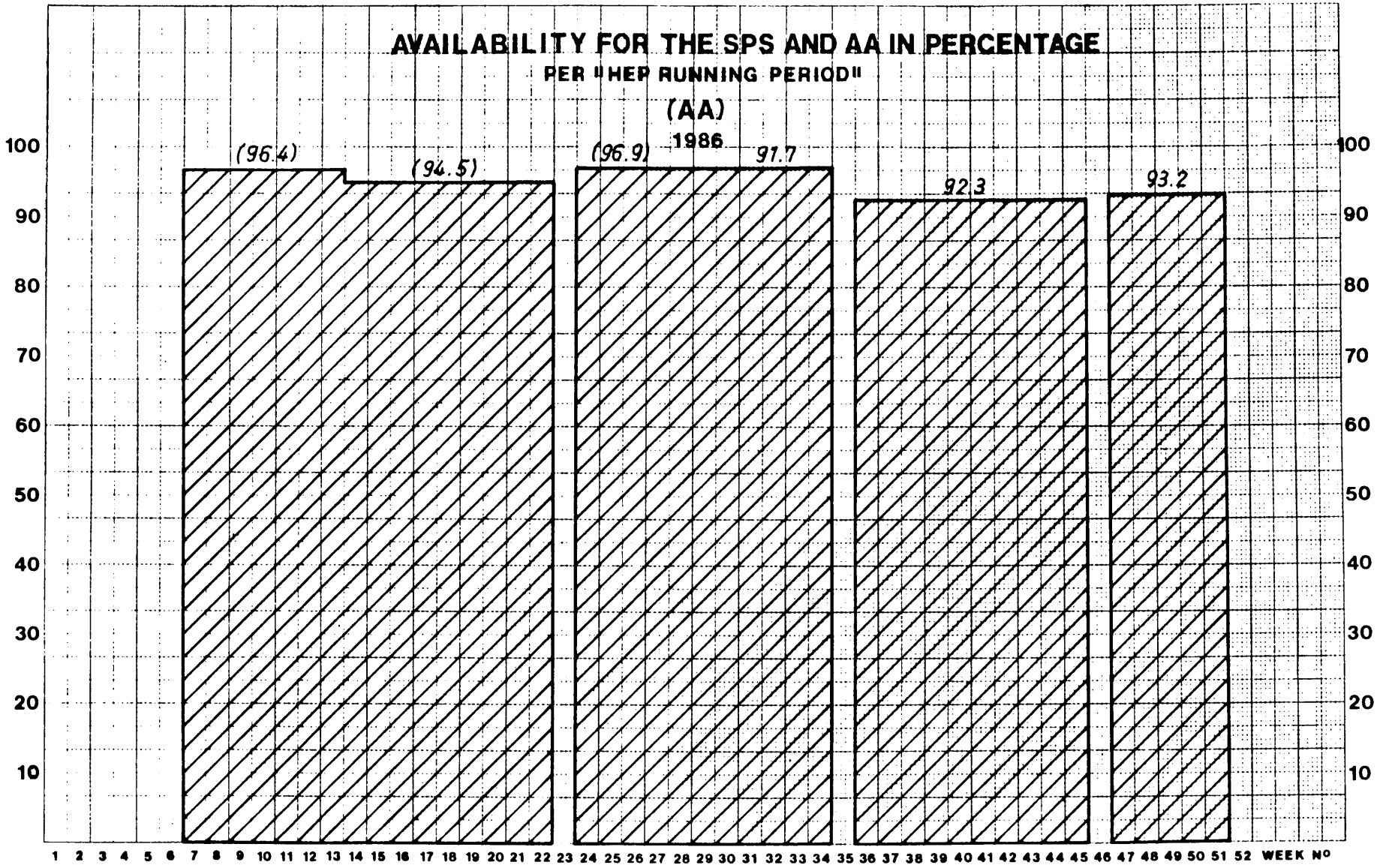

PERCENTAGE OF FAULTS
PER "PS RUNNING PERIOD"
1966
WEEK No
7.1
4.2
6.5
5.0
10.4

TABLE 17


AVAILABILITY FOR THE SPS AND AA IN PERCENTAGE
PER "HEP RUNNING PERIOD"
(AA)
1986
(96.4)
(94.5)
(96.9)
91.7
92.3
93.2
100
90
80
70
60
50
40
30
20
10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 WEEK Nº

FAULT DISTRIBUTION BY SYSTEM(Number of faults/ Total time)

YEAR 1986	0'- 10' 228/17^{h}.25	10'-20' 127/29^{h}.21	20'- 1H 134/73^{h}.23	1H - 3H 77/126^{h}.52	3H-6H 14/59^{h}.34	> 6H 9/86^{h}.45	TOTAL 589/393^{h}.20
MAIN MAGNET & AUXILIARIES	14/1.12	4/1.00	8/4.09	1/1.30	2/8.09		29/16.00
MAIN GENERATOR	5/0.29	2/0.20		1/1.56			8/2.45
LINAC	64/5.13	17/3.37	28/14.42	16/24.49			125/48.21
BOOSTER	26/1.42	14/3.11	18/10.28	11/21.37	3/13.24		72/50.22
INJECTION	22/1.17	4/0.56	7/4.47	3/3.32			36/10.32
ACCELERAT.	12/0.59	26/6.33	19/10.18	11/15.18		3/22.02	71/55.10
VACUUM	1/0.02						1/0.02
EJECTION & TARGETS	13/0.39	6/1.13	6/2.56	1/1.22			26/6.10
CONTROL	27/2.38	28/6.24	26/14.25	21/34.23	1/3.00	2/26.16	105/87.06
BEAM TRANSPORT	10/0.57	6/1.25	5/2.58	3/4.44	2/7.20		26/17.24
MISCELL.	4/0.18	1/0.15	2/1.02				7/1.35
EXT. FAULTS	6/0.22	4/0.57	5/3.03	6/12.41	4/17.08	3/32.02	28/66.13
LPI	24/1.37	15/3.30	10/4.35	3/5.00	2/10.33	1/6.25	55/31.40

TABLE 18

TABLE 19

FAULT DISTRIBUTION BY SYSTEM FOR THE BOOSTER (Number of faults/Total time)

YEAR 1986	0'-10' 26/1h.42	10'-20' 14/3h.11	20'-1H 18/10h.28	1H-3H 11/21h.37	3H-6H 3/13h.24	> 6H	TOTAL 72/50h.22
AIMANT		1/0.16	1/0.29		1/3.30		3/4.15
ALIMENTAT.	12/0.46	8/1.47	6/3.33	1/2.51	1/4.13		28/13.10
KICKERS			2/1.08		1/5.41		3/6.49
ACCELERAT.	3/0.09	1/0.16	3/1.24				7/1.49
VACUUM			1/0.46				1/0.46
CONTROL	2/0.08		2/1.13	2/4.53			6/6.14
MISCELL.	9/0.39	4/0.52	3/1.55	8/13.53			24/17.19
EXT.FAULTS							

FAULT DISTRIBUTION BY SYSTEM FOR AA
Number of faults/Total time

1986	0..10mn	10..20mn	20mn..1h	1h..3h	3h..6h	> 6h	Total
	94 5h31mn	34 5h22mn	65 30h04mn	12 18h12mn	11 41h52mn	2 41h11mn	218 142h12mn
INJECTION	5 0h19mn	1 0h10mn	7 3h25mn	2 3h24mn	3 12h38mn		18 19h56mn
EJECTION			1 0h35mn				1 0h35mn
RING	1 0h04mn		3 1h25mn				4 1h29mn
KICKERS	11 0h40mn	5 0h47mn	3 1h35mn				19 3h02mn
SHUTTERS	20 0h58mn	6 0h58mn	8 3h29mn	2 2h26mn		1 20h11mn	37 28h02mn
R.F.	3 0h12mn	1 0h10mn	1 0h45mn				5 1h07mn
COOLING	2 0h07mn	1 0h06mn	7 3h40mn		2 6h24mn		12 10h17mn
VACUUM			1 0h20mn		1 3h00mn	1 21h00mn	3 24h20mn
CONTROLS	11 0h45mn	5 0h48mn	14 6h35mn	4 6h57mn	2 7h45mn		36 22h50mn
TIMING	2 0h08mn		1 0h45mn	2 2h35mn			5 3h28mn
SECURITY			3 1h15mn				3 1h15mn
WATER			1 0h34mn		1 5h15mn		2 5h49mn
DIVERS	39 2h18mn	15 2h23mn	15 5h41mn	2 2h50mn	2 6h50mn		73 20h02mn

TABLE 20

TABLE 21

STATISTIQUES AA

ANNEE: 1986

1) FONCTIONNEMENT DU AA
- Heures prévues :3734h
- Heures réalisées :3690h

2) PANNES PS
- Total des pannes PS vues par le AA: 253h 08mn
- Disponibilité PS--->AA : 93.1 %

3) PANNES AA
- Total des pannes AA : 142h 12mn
- AA down time sans pertes de stack : 3.8 %
- AA down time avec pertes de stack : 9.2 %

REPARTITION DES DIFFERENTES PANNES

INJECTION	19h 56mn (18)		VACUUM	24h 20mn (3)	
EJECTION	0h 35mn (1)		CONTROLS	22h 50mn (36)	
RING	1h 29mn (4)		TIMING	3h 28mn (5)	
KICKERS	3h 02mn (19)		SECURITY	1h 15mn (3)	
SHUTTERS	28h 02mn (37)		WATER	5h 49mn (2)	
R.F.	1h 07mn (5)		DIVERS	20h 02mn (73)	
COOLING	10h 17mn (12)				

4) FONCTIONNEMENT EFFECTIF DU AA
- Sans les pertes de stack :3547h 48mn SOIT 96.1 %
- Avec les pertes de stack :3348h 39mn SOIT 90.7 %

5) PRODUCTION D'ANTIPROTONS : 7760.12 E9
- Temps de production :2143h 48mn
- Taux de production : 3.6 E9/h

6) PERTES DE STACK ACCIDENTELLES : 654.96 E9
- Temps de perte équivalent : 199h 09mn

7) STACK MAXIMUM DURANT LA PERIODE : 523.22 E9

8) STACK DETRUIT (ME + FIN DE RUN) : 317.38 E9

9) TRANSFERTS
- Pbars délivrés au SPS :1544.32 E9
- Pbars délivrés au LEAR :5031.89 E9

Y. Renaud

1986 ACCELERATOR SCHEDULE

MACHINE : PS Complex

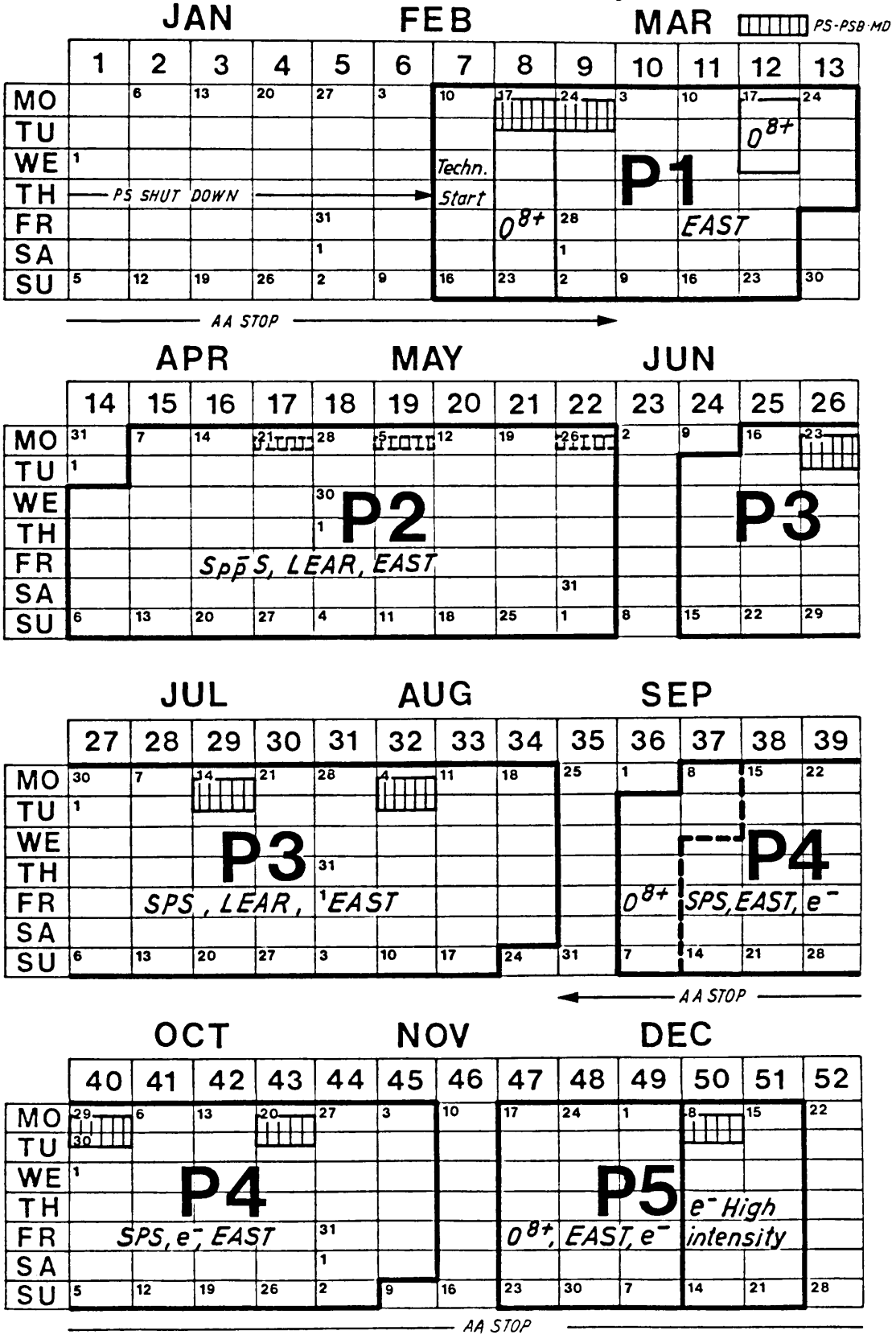


TABLE 23-1

PS/LEA/Note 86-10
23.9.1986

STATISTIQUES LEAR - 1986

Heures prévues pour MD + SU: $p + \bar{p} + H^-$	972 + 678 (*) = 1650
Heures utilisées pour MD + SU: $p + \bar{p} + H^-$	655 + 558 (*) = 1213
Heures prévues pour la physique en antiprotons	2154
Spills d'une heure réalisés pour la physique $\bar{p}$ (inclus 150 spills de 1/2 h)	1336
Heures de flux continu de $\bar{p}$ pour la physique	1280
Impulsions d'antiprotons utilisées pour la physique en extraction rapide	14
Total d'impulsions transférées AA-LEAR pour la physique	1480
Impulsions perdues	130
Total d'antiprotons extraits de LEAR pour la physique	$1,53 \times 10^{12}$
Total d'antiprotons extraits de AA pour LEAR	$5,03 \times 10^{12}$
Total d'antiprotons produits par AA pour toutes les machines	$7,76 \times 10^{12}$

* Mois de septembre-octobre-décembre (MD + MSU ONLY)

Comptage approximatif des antiprotons distribués vers les utilisateurs ($\times 10^9$)

PS179, Piragino	20
PS183, Smith	45
PS174, Davies	12
PS186, V. Egidy	9,3
PS170, Dalpiaz	650
PS182, Tauscher	43
Ps172, Bugg	260
PS173, Walcher	62
PS178, Bressani	21
PS175, Simons	25
PS196, Gabrielse	1,8
PS177, Polikanov	37
PS185, Kilian	287
PS194, Uggerhoy	8,4
PS171, Asterix	46,8
	1528,3 x 10^9 $\bar{p}$

Remarques

1. Intégration du flux moyen sur 3000/3600 sec (forme du spill)

2. Transmission moyenne AA/LEAR utilisateurs : 5 x 10^{12} → 1.53 x 10^{12} (inclus ≈ 25% de la physique à 105 MeV/c avec une efficacité de 12%).

R. Ley

TABLE 23-3

		SOUTH					CENTRE				NORTH					
		1		2			1		2		1					2
WEEKS	Extracted momenta in MeV/c	Piragino	Smith	Davies	Bressani	V. Egidy	Dalpiaz	Tauscher	Bugg/Bradamente	Walcher	Simons	Gabrielse	Polikanov	Kilian	Uggerhoy	Asterix
		PS 179	PS 183	PS 174	PS 178	PS 186	PS 170	PS 182	PS 172	PS 173	PS 175	PS 196	PS 177	PS 185	PS 194	PS 171
20.26.27.28	105	115		117									107		35	156
18.21.22.25	202	80				78				37	136	15				
19	250									18						
18	309									9						
29.30.31.32	352		98		95		113	53	36					44		
19	400									11						
17	420								28							
30	432		37						37							
17	530								14							
13.17.19	612						190		19							
33	800								21							
32	1100								37							
12.34	1300						14		15					14		
16	1360								13							
33	1369						16							16		
33	1407						15							15		
16	1425								17							
33	1426						16							16		
34	1435						18							18		
33	1444						14							14		
34	1453						17							17		
33	1472						15							15		
16	1475								7							
34	1491						12							12		
33	1506						10							10		
11.12	1512								44							
34	1568						12							12		
Total spills		195	135	117	95	78	462	53	288	75	136	15	107	203	35	156

Distribution of slow ejection spills (antiprotons) in 1986

6.1.1987

1986 TECHNICAL PARAMETERS

ACCELERATORS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
SC													
Hours scheduled for physics		208	500	s	s	660	s	164	688	688	540	478	3926
Hours given to physics		227	442	h	h	37	h	113	663	659	525	407	3073
Hours given/hours scheduled		109.1	88.4	u	u	5.6	u	68.9	96.4	95.8	97.2	85.1	78.3
Hours scheduled for MD + Setting-up		464	124	t	t	8	t	4	0	4	0	0	604
Hours given to machine development + SU		220	122	d	d	8	d	4	0	2	6	0	362
Total hours scheduled		672	624	o	o	668	o	168	688	692	540	478	4530
Total hours realised		447	564	w	w	45	w	117	663	661	531	407	3435
				n	n		n						
PS													
Hours scheduled for physics		84	594	658	724	444	714	522	462	712	474	174	5562
Hours given to physics		73	560	625	699	397	673	500	440	676	457	173	5273
Hours given/hours scheduled		86.9	94.3	95.0	96.5	89.4	94.3	95.8	95.2	94.9	96.4	99.4	94.8
Hours scheduled for MD + Setting-up	s	332	55	22	20	45	30	31	190	32	15	331++	1103
Hours given to machine development + SU	h	330	46	21	19	45	30	26	178	24	13	267	999
Total hours scheduled	u	416	649	680	744	489	744	553	652	744	489	505	6665
Total hours realized	t	403	606	646	718	442	703	526	618	700	470	440	6272
- LINAC 2													
Hours scheduled	d	416	649	680	744	489	744	553	652	744	489	288	6448
Hours realized	o	415	639	674	741	485	740	547	646	743	482	288	6400
Hours realized/hours scheduled	w	99.8	98.5	99.1	99.6	99.2	99.5	98.9	99.1	99.9	98.6	100	99.3
- PSB	n												
Hours scheduled		416	649	680	744	489	744	553	652	744	489	288	6448
Hours realized		415	643	679	740	472	738	552	646	739	486	288	6398
Hours realized/hours scheduled		99.8	99.1	99.9	99.5	96.5	99.2	99.8	99.1	99.3	99.4	100	99.2
- AA													
Hours scheduled[1]		-	560	631	744	441	744	552	shut	shut	shut	shut	3672
Hours realized		shut	497	577	726	395	626	505	down	down	down	down	3326
Hours realized/hours scheduled		down	88.8	91.4	97.6	89.6	84.1	91.5					90.6
- LINAC 1													
Hours scheduled		246	208	150		160	80	120	140	330	584+	400	2418
Hours realized		6	130	100	**	120	70	60	120	310	580	390	1886
Hours realized/hours scheduled		2.4	62.5	66.7		75.0	87.5	50	85.7	93.9	99.3	97.5	78.0
LEAR													
Hours scheduled for physics ($\bar{p}$)[2]		-	251	236	444	195	600	428	-	-	-	-	2154
Number of spills given to physics		-	141*	143	292	106	362	306	stop	stop	stop	stop	1350
Number of spills lost		-	12	14	23	9	49	23	-	-	-	-	130
Efficiency			92.2	91.1	92.7	92.2	88.1	93.0					91.2
Hours scheduled for MD + SU ($\bar{p}$p)		288	88	272	84	88	72	80	152	330	-	196	1650
Hours given " " " "		0	62	286	90	71	72	74	48	314	-	196	1213

1 Included $\bar{p}$ stack losses

2 1 h. $\bar{p}$ spill time

* 20' to 60' $\bar{p}$ spill time

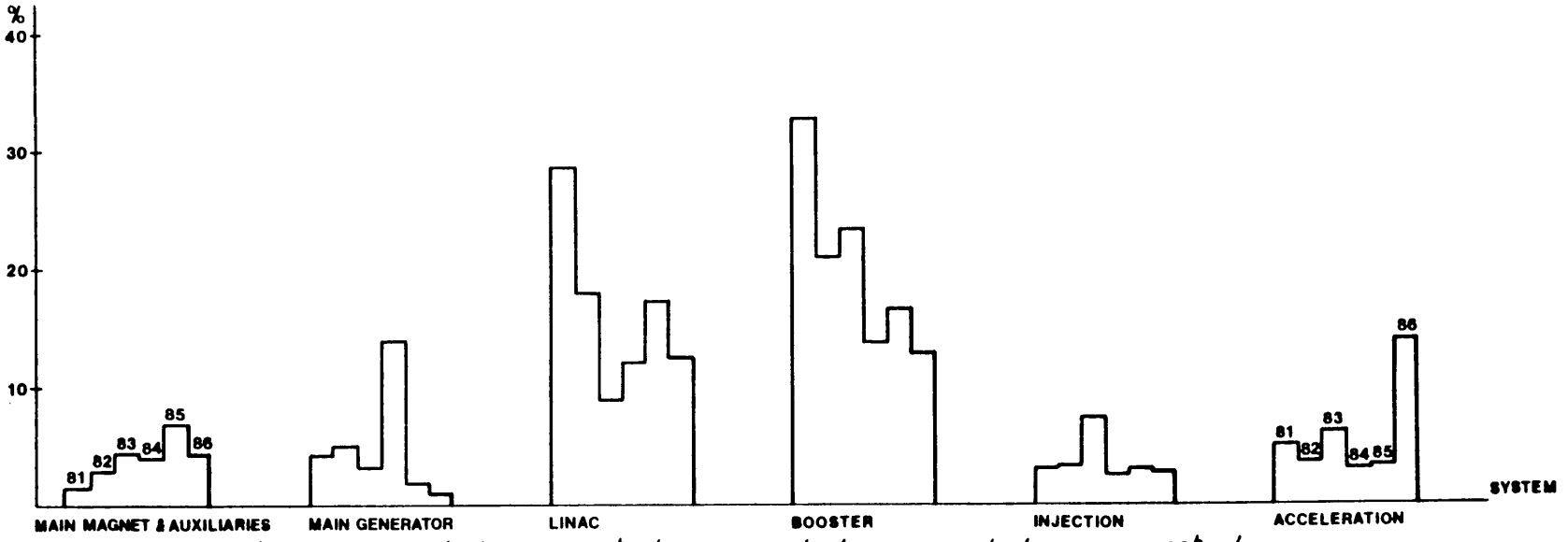
** Tests and adaptation for Oxygen acceleration

\+ Oxygen ions (56 hour MD time out of the total)

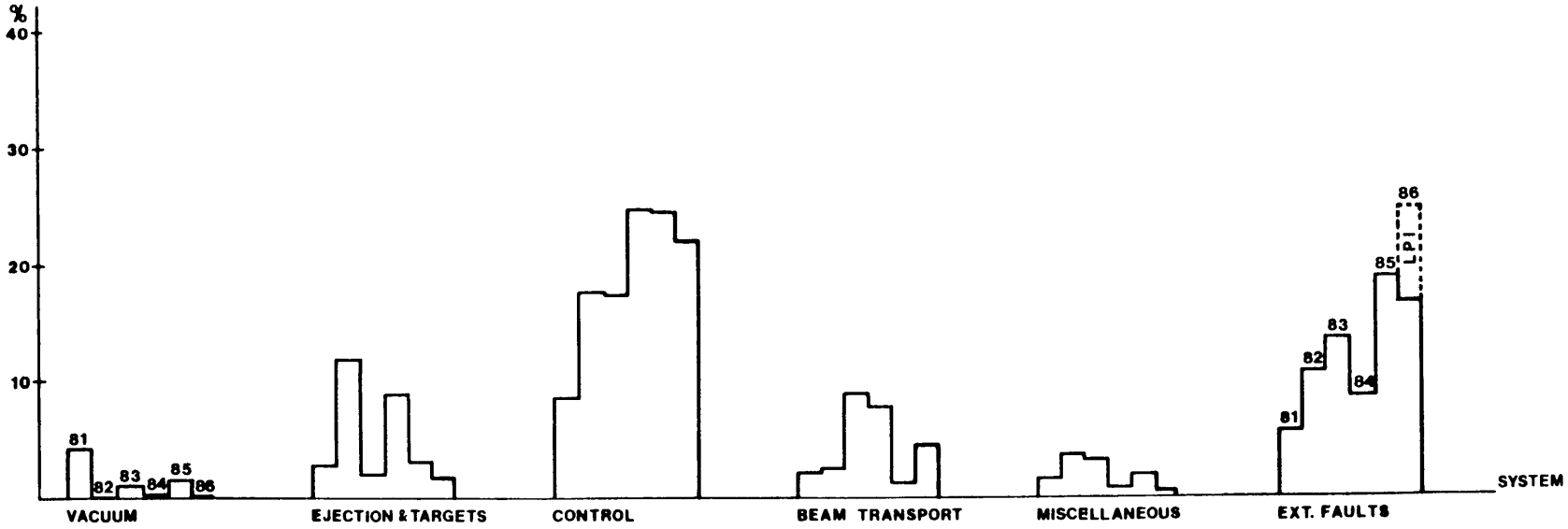
++ 300 hours with electrons from LIL + EPA machines

TABLE 24

TABLE 25



TOTAL: 1981 = 513h47' 1982 = 492h15' 1983 = 498h56' 1984 = 494h03' 1985 = 419h51' 1986 = 393h20'



EVOLUTION OF FAULT DISTRIBUTION BY SYSTEM SINCE 1981

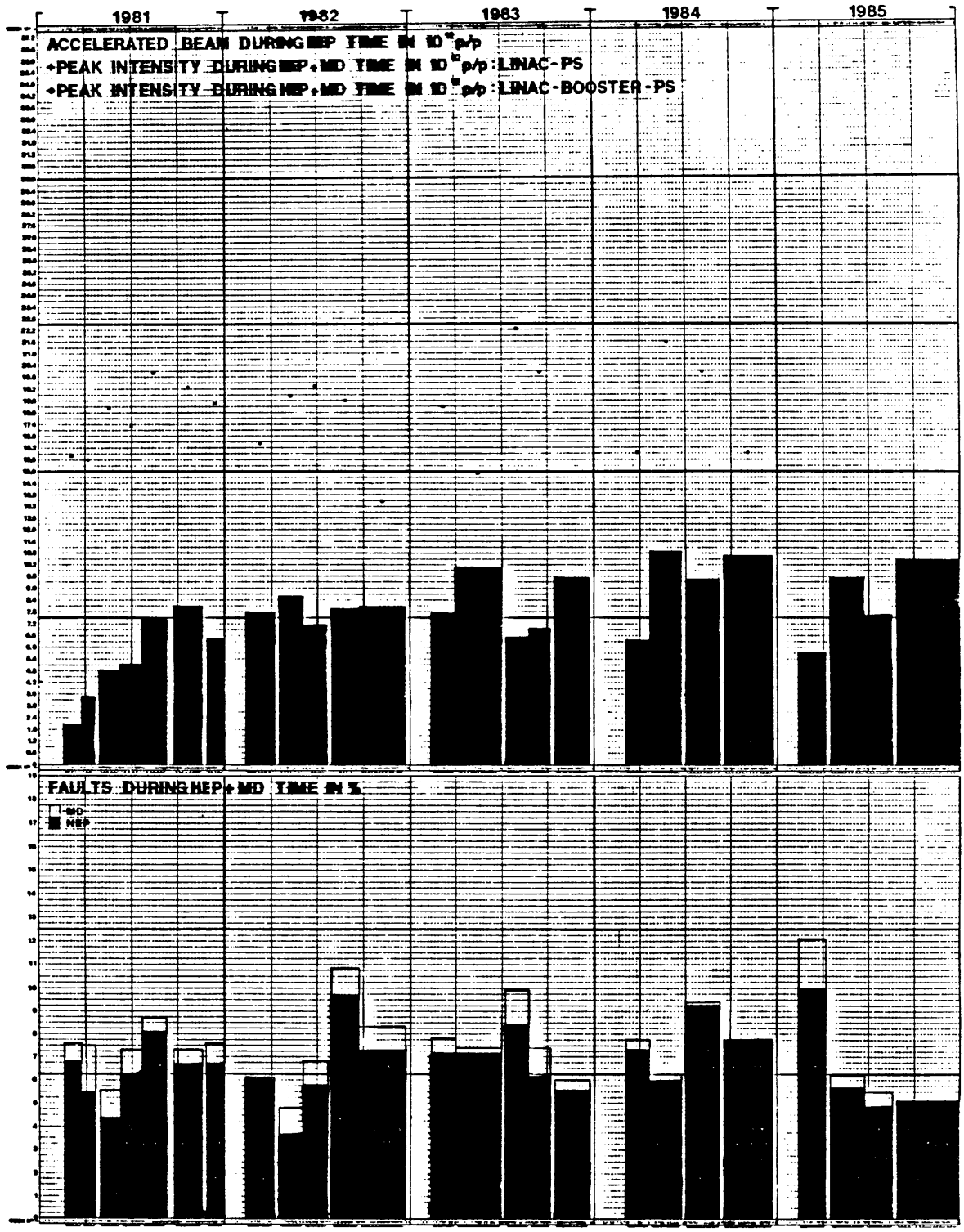
TOTAL PSB INTENSITY PER RING AND Nº OF PULSES

ALL VALUES ARE IN 10^{16} PROTONS

WEEK Nº		RING 4	RING 3	RING 2	RING 1	TOTAL
7-13	TRA 20	160	732	935	117	1944
	INJECTION	55	405	553	109	1122
	CAPTURE	30	397	499	60	986
	ACCELERATION	21	280	327	40	668
	OUT					586
	PULSES (10^3)					1825
14-22	TRA 20	128	2457	2720	153	5458
	INJECTION	29	1570	1639	90	3328
	CAPTURE	21	1311	1366	54	2752
	ACCELERATION	11	1194	1245	35	2485
	OUT					2280
	PULSES (10^3)					2335
24-34	TRA 20	939	2739	2846	850	7374
	INJECTION	503	1852	1938	567	4860
	CAPTURE	355	1521	1557	394	3827
	ACCELERATION	316	1350	1404	346	3416
	OUT					3236
	PULSES (10^3)					3707
36-45	TRA 20	850	887	1303	880	3920
	INJECTION	491	503	734	586	2314
	CAPTURE	378	428	603	454	1863
	ACCELERATION	319	373	404	385	1481
	OUT					1234
	PULSES (10^3)					2930
47-51	TRA 20	60	60	130	80	330
	INJECTION	60	60	130	70	320
	CAPTURE	60	60	120	60	300
	ACCELERATION	60	60	110	60	290
	OUT					58
	PULSES (10^3)					1072

TABLE 26

TABLE 27-1


1981
1982
1983
1984
1985
ACCELERATED BEAM DURING HEP TIME IN 10^12 p/p
PEAK INTENSITY DURING HEP+MD TIME IN 10^12 p/p : LINAC-PS
PEAK INTENSITY DURING HEP+MD TIME IN 10^12 p/p : LINAC-BOOSTER-PS
FAULTS DURING HEP+MD TIME IN %
MD
HEP

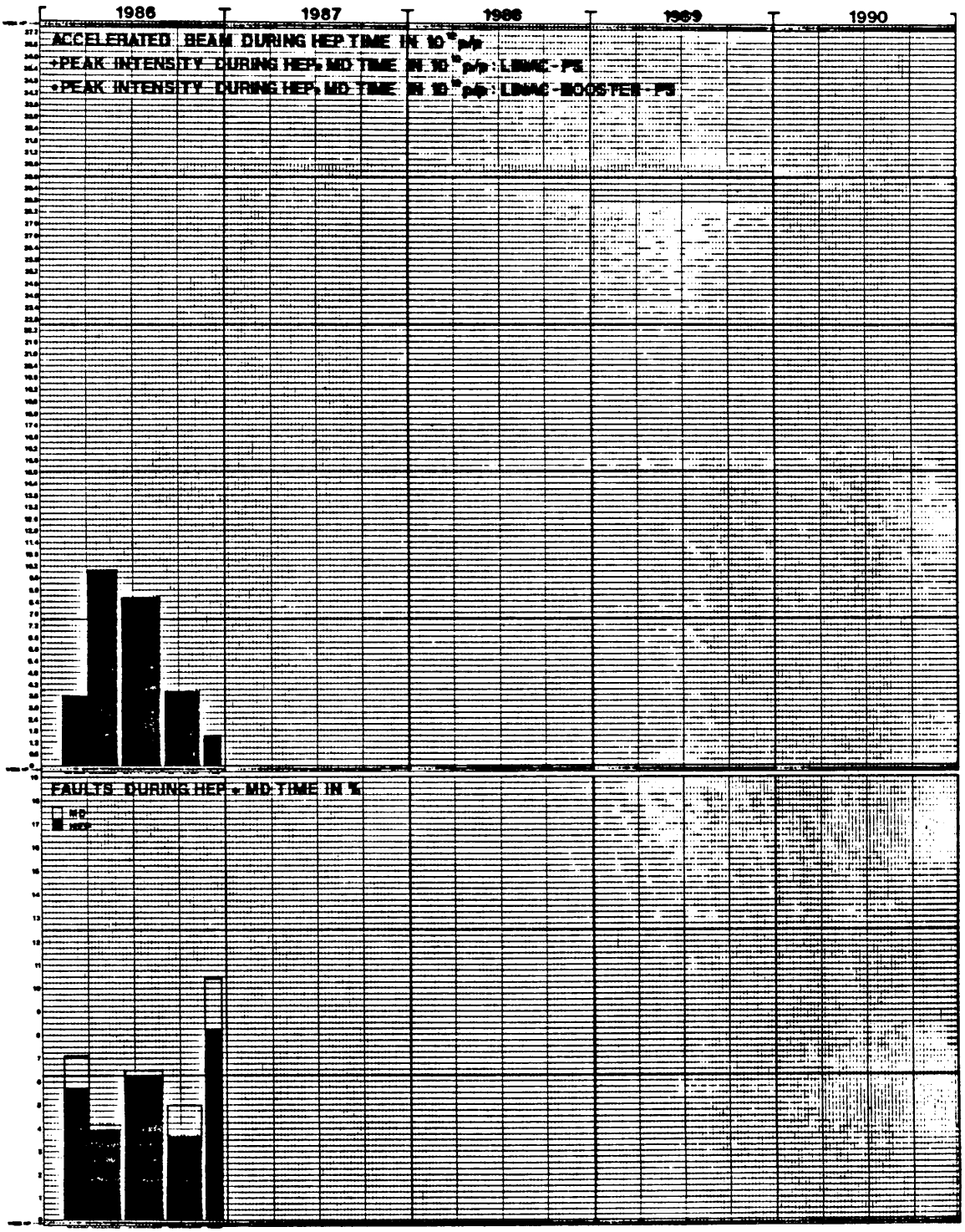

1986
1987
1988
1989
1990
ACCELERATED BEAM DURING HEP TIME IN 10^12 p/p
+PEAK INTENSITY DURING HEP, MD TIME IN 10^12 p/p : LINAC - PS
•PEAK INTENSITY DURING HEP, MD TIME IN 10^12 p/p : LINAC - BOOSTER - PS
FAULTS DURING HEP + MD TIME IN %
MD
HEP

TABLE 28

FONCTIONNEMENT DU LPI EN 1986

JANVIER A MAI : LIL W SEUL : 350 HEURES

A PARTIR DE JUIN: LIL W , EPA : 1720 HEURES
DONT 415 HEURES EN TANT QU'INJECTEUR PS

TAUX DE PANNES CALCULE SUR LE RUN DE DECEMBRE

DU 09.12 04H30

= 296 HEURES

AU 21.12 12H30

DONT 261 HEURES COMME INJECTEUR PS
ET 35 HEURES DE ME LPI

GLOBAL : 12,8%
DONT 8,7% RF LIL
3,6% ALIMENTATIONS

B. FRAMMERY

FAULT DISTRIBUTION BY SYSTEM

1. Main magnet and auxiliaries

Here are gathered all the faults of the PS magnets (PR.BHZ), the cooling system, the PFWs (PP.W), the "high energy" quadrupoles (PR.Q), the sextupoles (PR.X), the Tekelecs type power supplies (PP.T), the power supplies for type "D" (PP.D), the power supplies for type "M" (PP.M), the equipment for "B" and "BO.1" train generation (PX.TB), the shims, the octupoles (PR.O) and the dipoles (PR.D).

2. Main generator

All the faults concerning the main magnet power supply are classed in this section.

3. Linacs I and II

All the Linac faults (including controls) for the old (Linac I) and the new (Linac II) are found here, except for vacuum faults (see the vacuum diagram annexed).

4. Booster

All the Booster faults (vacuum, RF, controls, etc.) are classed here, beginning from I-VS2 (BI.VVS10) up to T-VS5 (BTP.VVS20) for the vacuum; the ejection line to the PS up to T-QO5 (BTP.QNO10) inclusive (transfer line) for the magnet units; the transfer line up to and including TIS (PI.SMH42) for the magnet power supplies and for demineralized water supply.

5. Injection

This section comprises all the faults related to 50 MeV and 800 MeV injection, viz.:
Inflector 26 (PI.SMH26), injection quadrupoles (PI.QNO), BLW (PI.DHZ), vertical dipoles (PI.DVT), KM28 (PI.KFA28), BD44 (PTE.DVT10), kicker 22 (PI.KSW22) and 30 (PI.KSW30), skewed quadrupoles (PI.QSK), injection sextupoles (PI.XNO et SK), the Booster injection line to the PS (transfer line), i.e. the magnet after T-QO5 (BTP.QNO10), ((T-QO6 .....10, BTP.QNO20 ...60), T-DHO3 ...5 (BTP.DHZ20 ...40), T-DVO5 ...9 (BTP.DVT10 ...50), BLM (PR.MBL), T-TRI (PI.TFA), T-TR2 (BTP.TRA , Sem Grids (PR.MSG), TV30-34-46 (PR.MTV30-34-46), TU2...5 (BTP.UESOO...30), TIK (PI.KFA45), TIS (PI.SMH42), SB40...44 (PI.BSM40...44)), beam dumper (PR.STP), and the new equipment : the fast kicker (PI.KFA28), horizontal dipoles (PTE.DHZ10), Sem Grid 26 (PI.MSGH26L, MSGH26P, MSGV26L), TV 26 (PR.MTV26).

6. Acceleration

All the faults related to the radio-frequency (beam control, cavities, etc.) which can be defined as active equipment are found here; plus all the faults concerning what can be called the passive part, I_p measuring system (PR.TRA72), the ACEM detectors (PR.MBL), the pick-up stations (PR.U). (See annex 2 for passive part).

7. Vacuum

All faults related to the PS, Linac I, Linac II, FA58, ligne FT16 and LEAR are found here, according to their position in the layout (see vacuum diagrams annexed).

8. Ejection - targets

Here are classed all the faults concerning the FAK (PR.KFA), fast bumpers (PE.BFA), the septa (PR.SMH), the internal targets (PR.TP, PR.TM), the dump targets (PR.TD), the ejected beam servo system, the minitoposcopes (PR.MTO), the "Cerenkovs", the TV's (PR.MTV), the septa and external targets lighting equipment, the measuring transformer for extracted beam, the SEC's and the BLM's (PR.MBL).

9. Control

All the faults of the various parts of the centralised PS computer system are found here, plus the security ((beam stoppers (BI.STP.BRi. STP-BTP.STP), fire detection equipment, barriers, etc.)), the timing (pulse distribution to linac, MCR, CB, etc.).

Note: 1) The faults due to security are put here.

2) As indicated in 3. and 4., the controls faults are included for the Linacs and the Booster as in the past.

10. Miscellaneous

All the faults found here will be dealt with in detail in Annex 3.

11. Beam transport

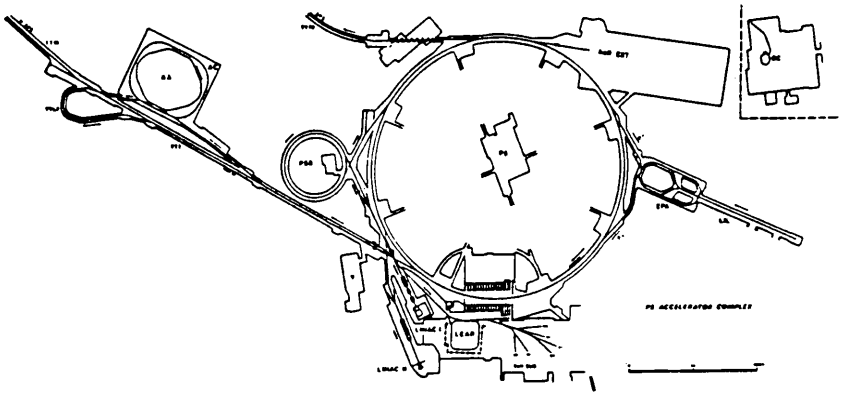
All the faults related to the separators, the magnets, the quadrupoles and their cooling system, the vacuum ejected beams, the septa (ex. MNP 35/1-2) and the hydrogen targets are to be found in this section; plus the ATP1, ATP2, FTD, TT2 and FA58 lines.

12. External faults

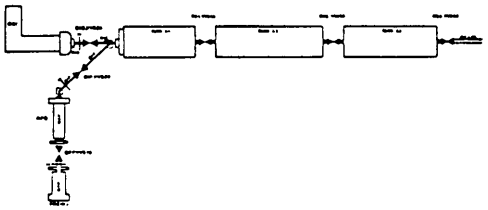
All the faults which are not attributed to an element found in or around the PS, i.e. thunderstorms, mains failures, stops due to SB causes (water supply, water pump below door 4, ventilation, etc.) are classed here. (Details in Annex 4).

PS/ML/VAC/ar
5.12.86

Vues Generales



LINAC I



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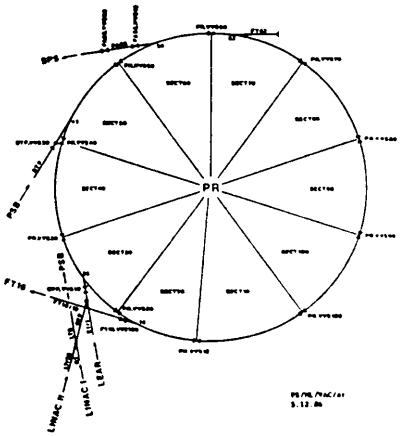
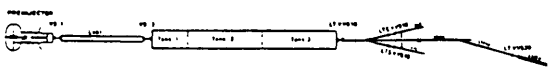
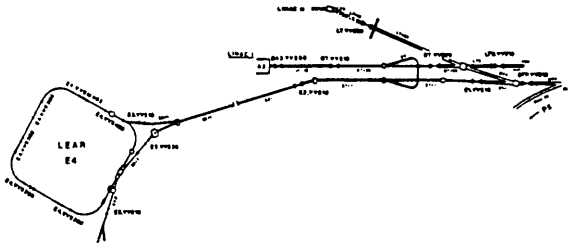


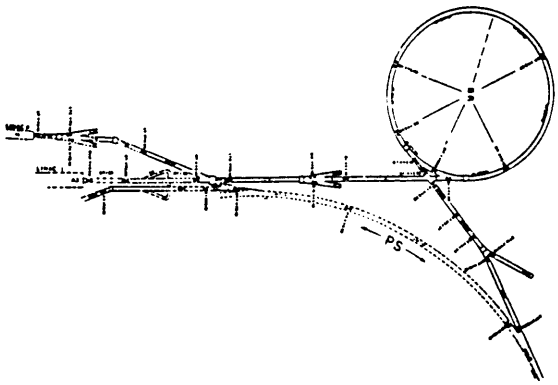
LINAC II



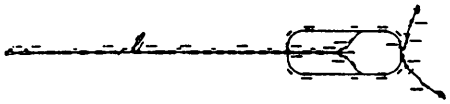
LEAR



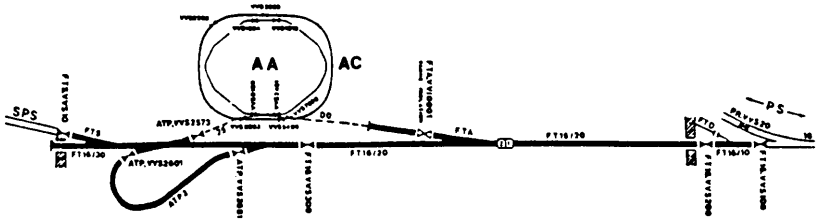
BOOSTER



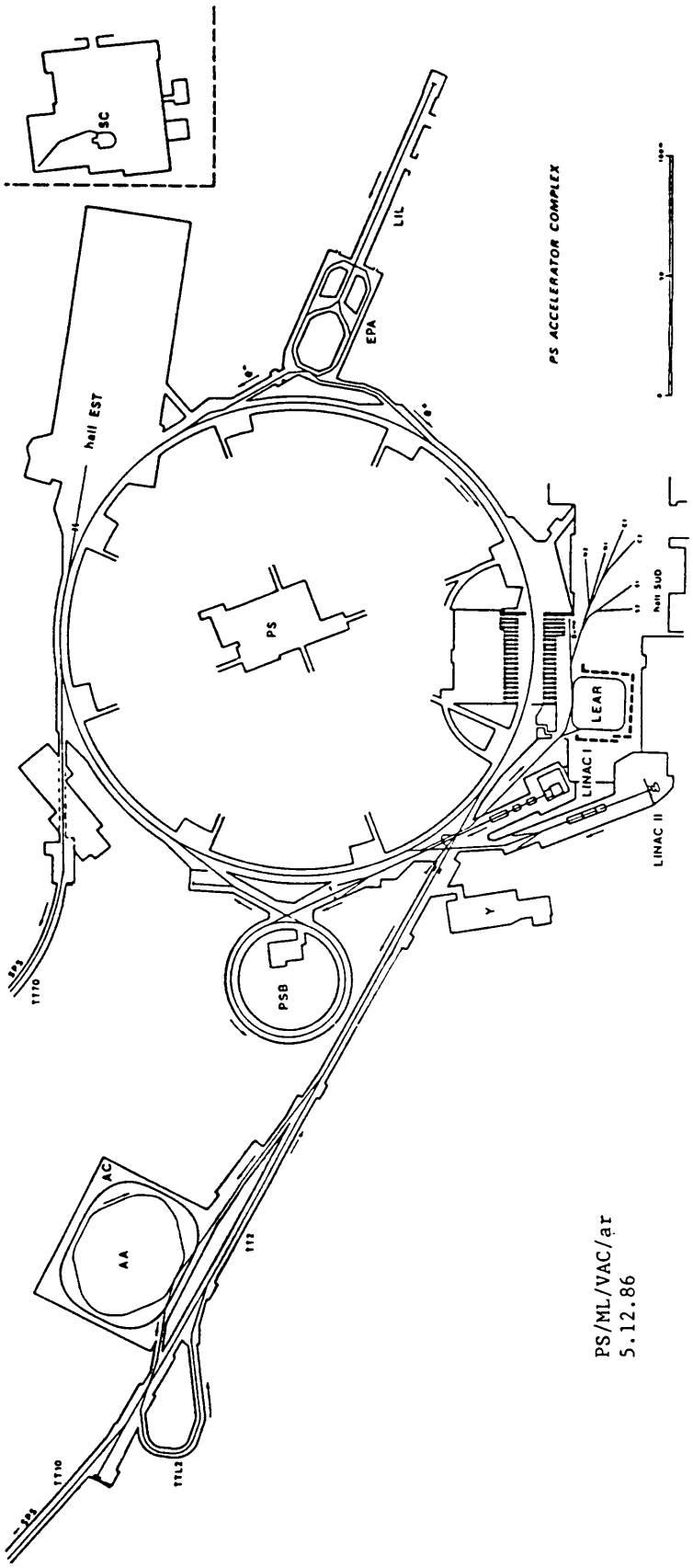
LIL-EPA



AA/ACOL/FT16



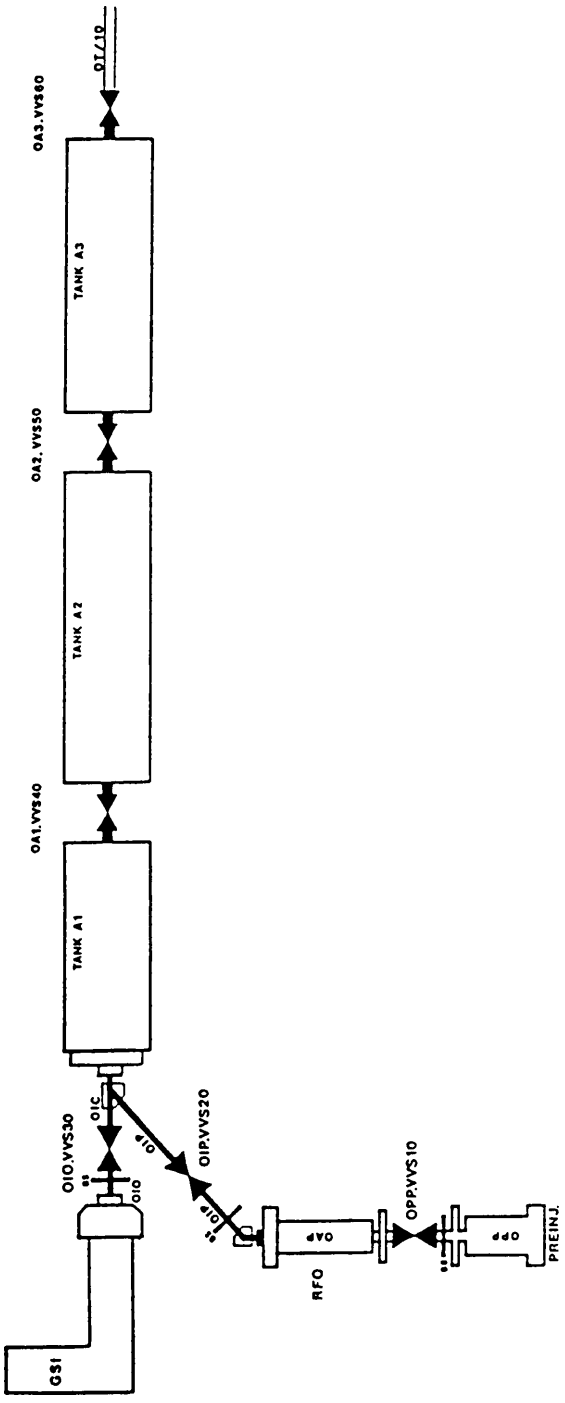
ANNEX 1-4



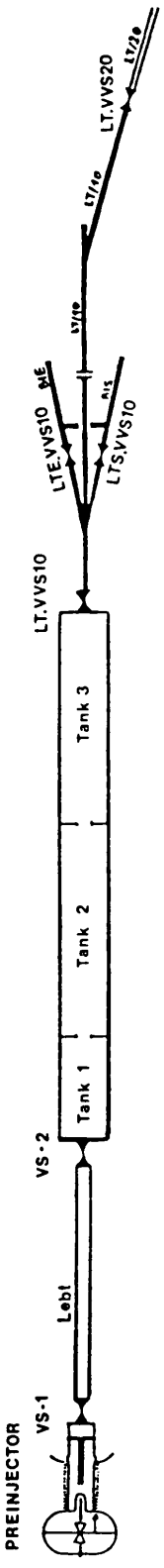
PS/ML/VAC/ar
5.12.86

PS/ML/VAC/ar
5.12.86

LINAC I
LINAC II



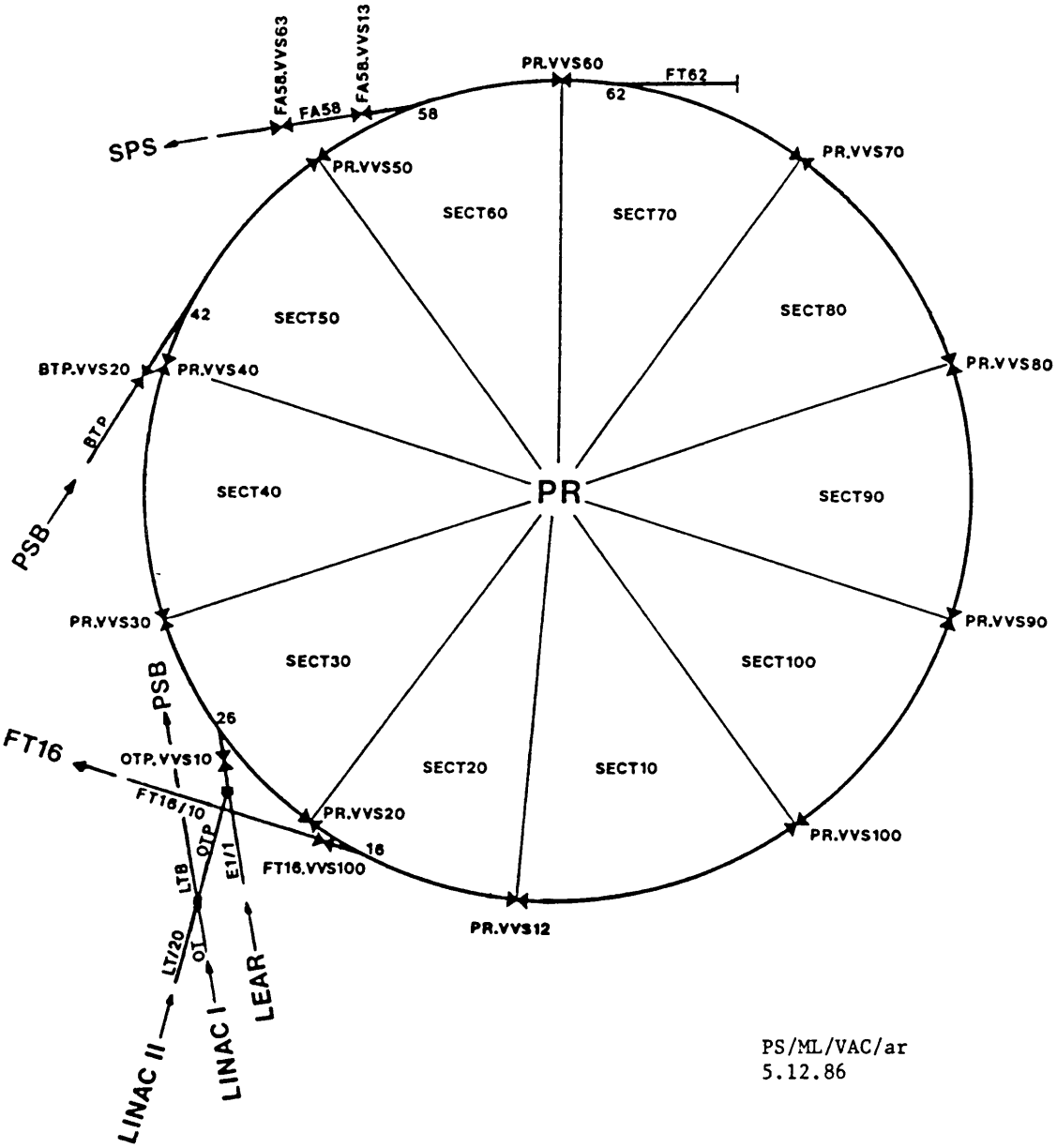
LINAC I



LINAC II

ANNEX 1-6

PS



PS/ML/VAC/ar
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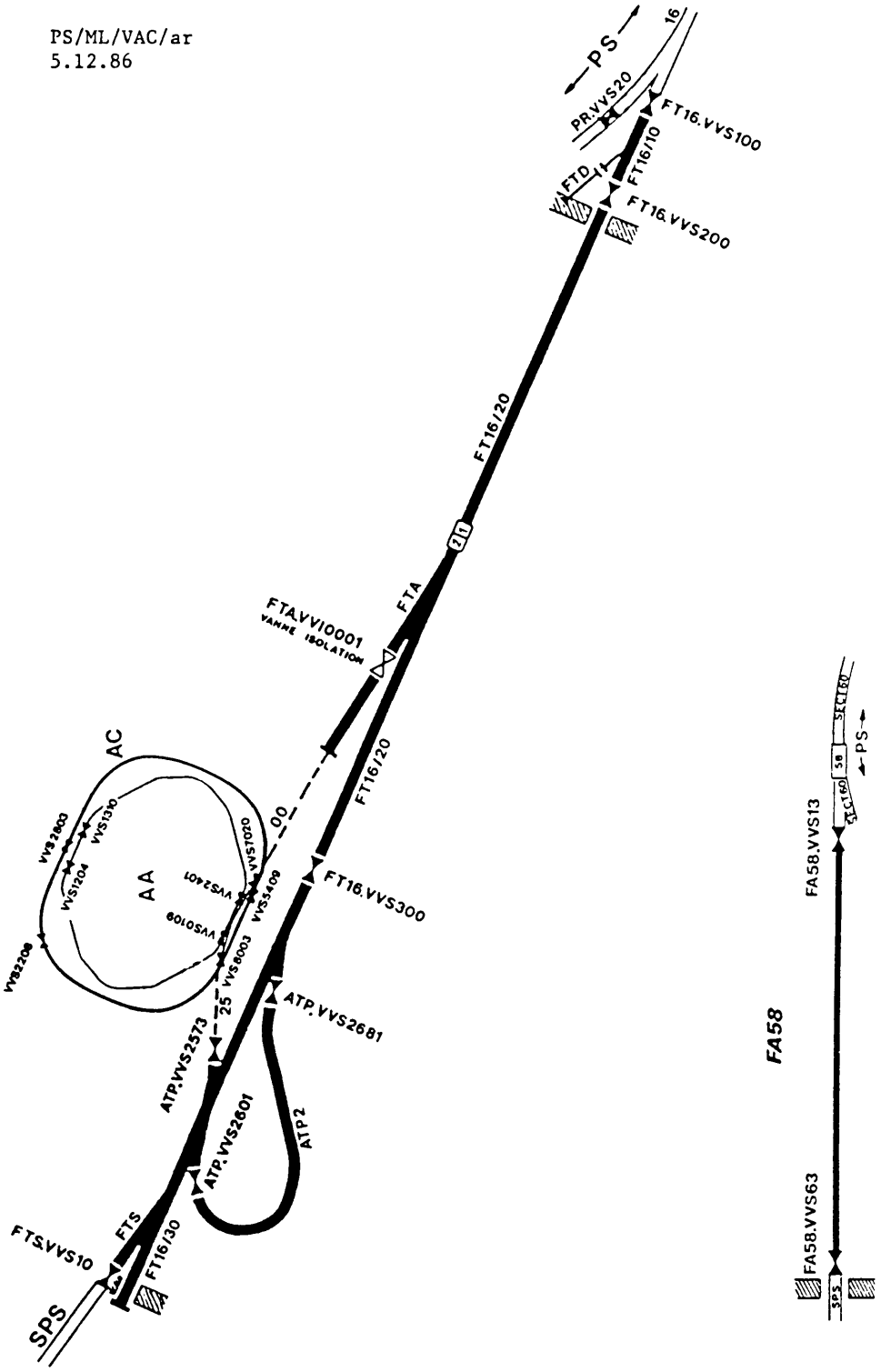
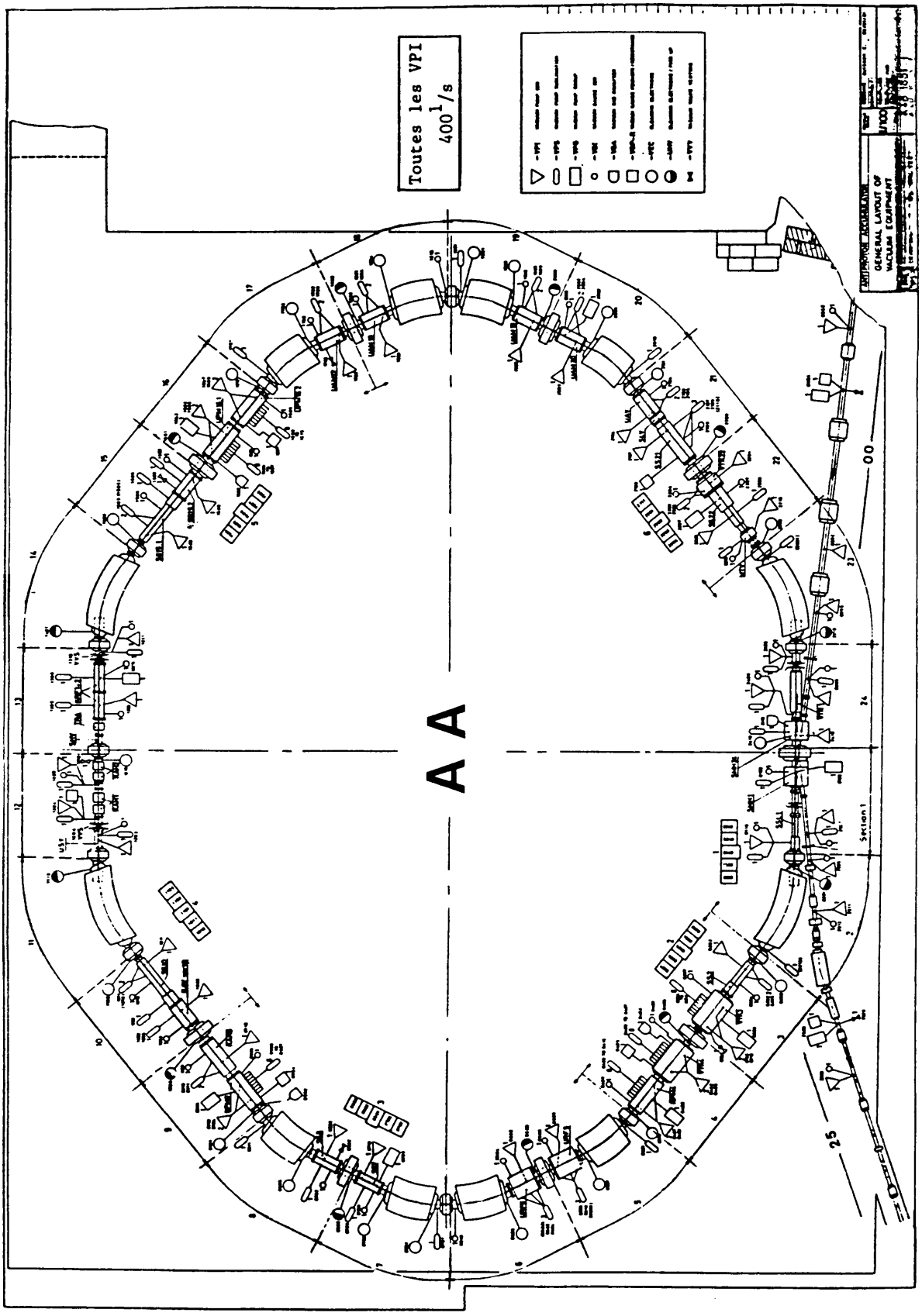
PS/ML/VAC/ar
5.12.86



ANNEX 1-8



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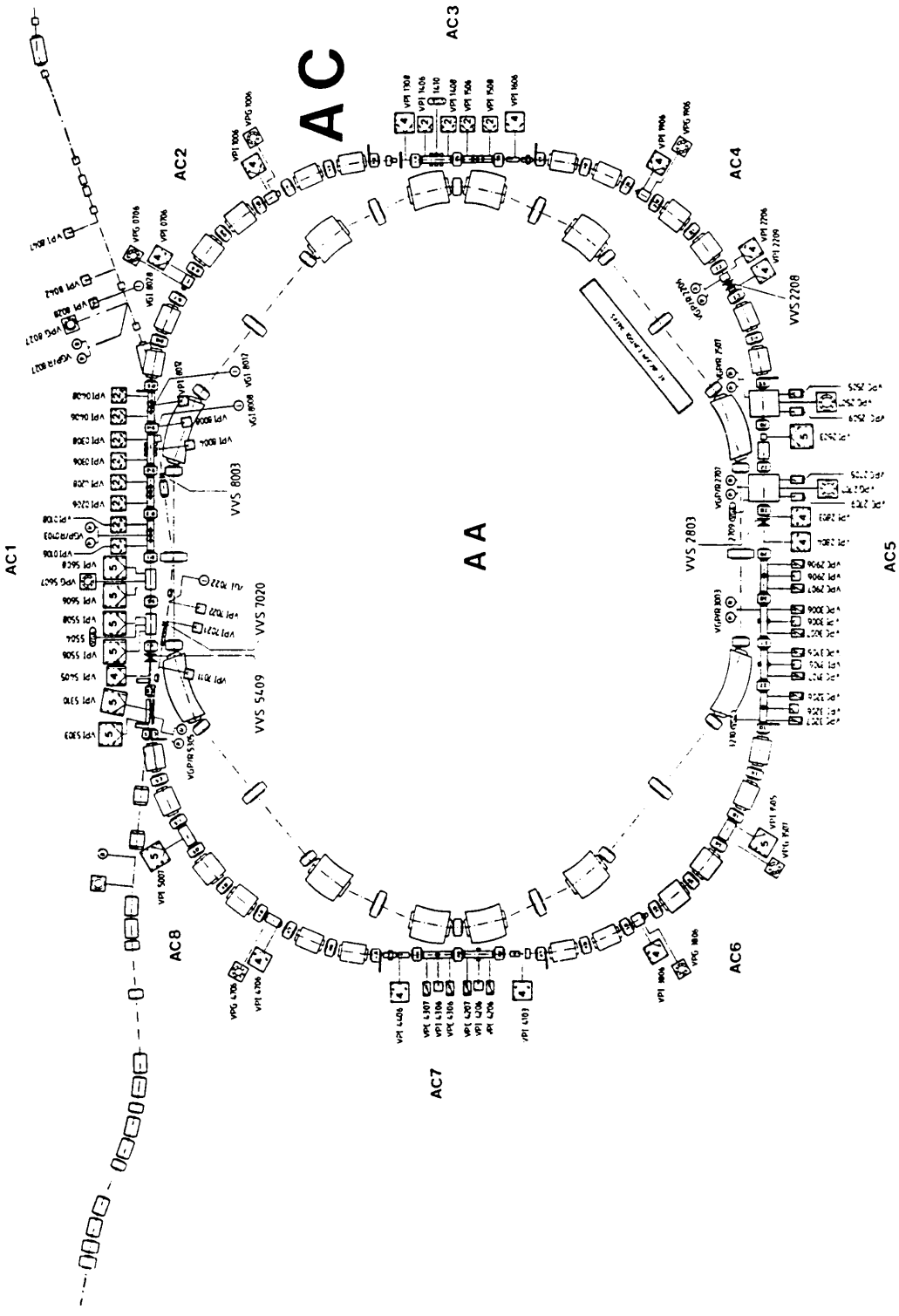
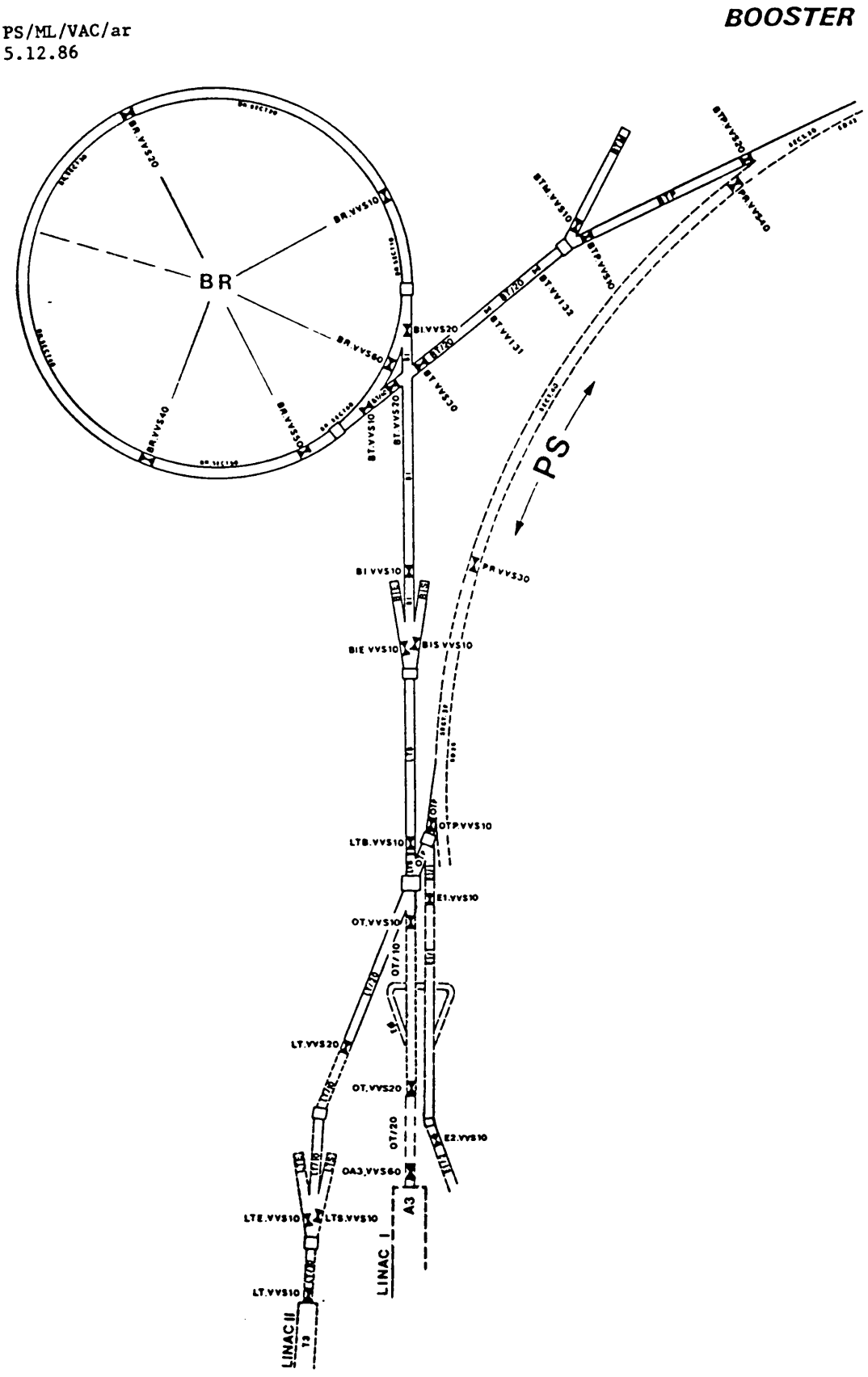
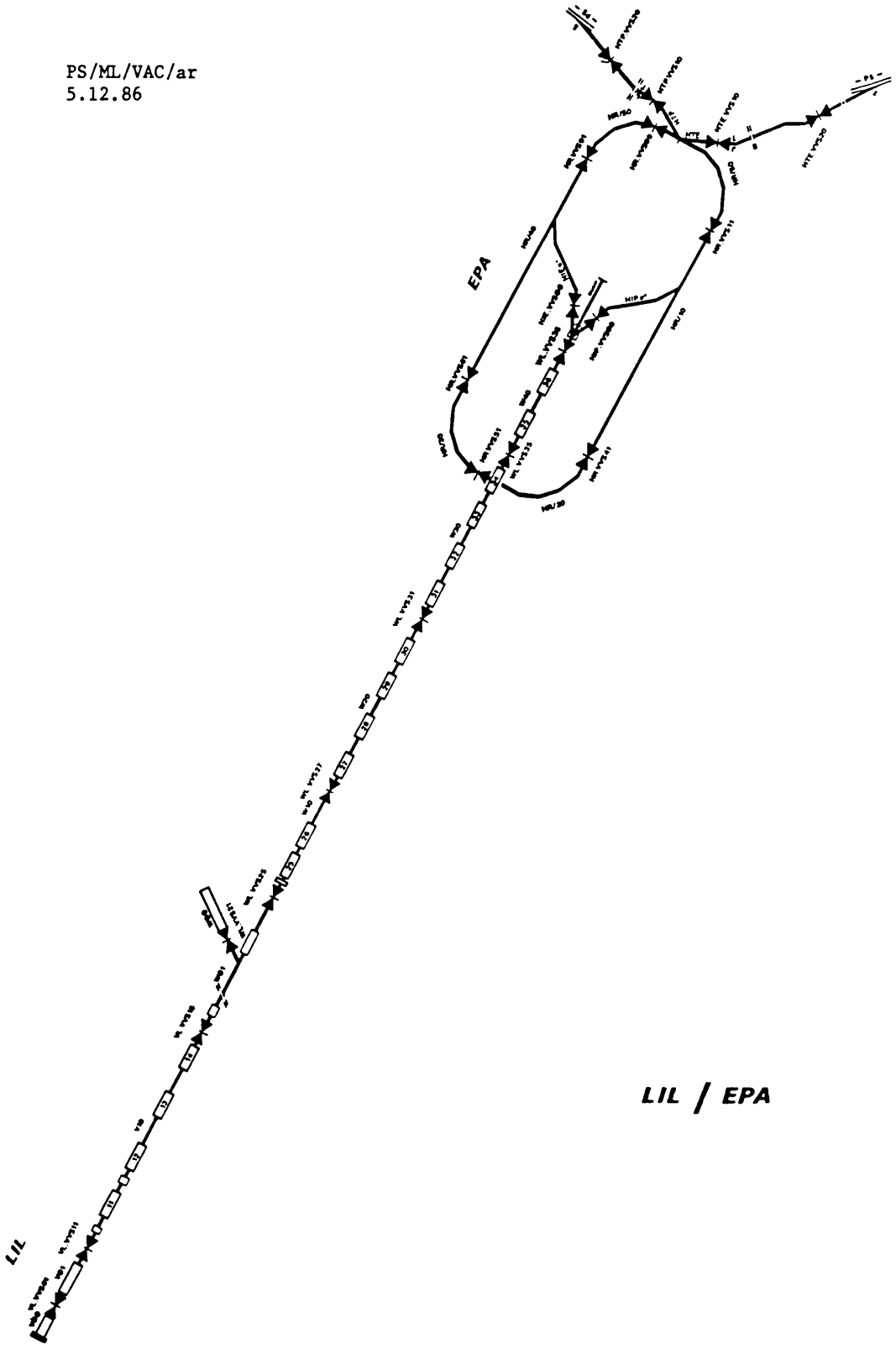

AC
AA
AC1
AC2
AC3
AC4
AC5
AC6
AC7
AC8
VVS 8003
VVS 7020
VVS 5409
VVS 7803
VVS 2208

ANNEX 1-10

PS/ML/VAC/ar
5.12.86



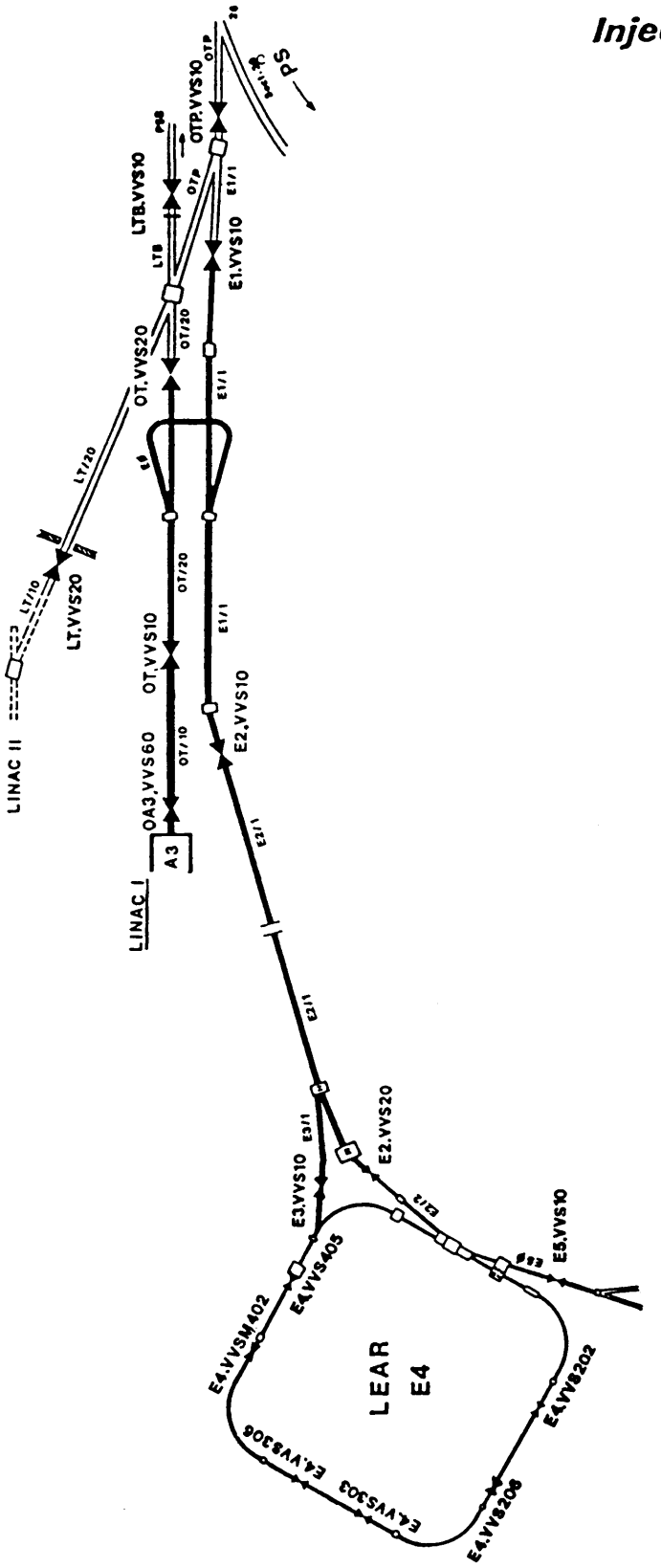
PS/ML/VAC/ar
5.12.86

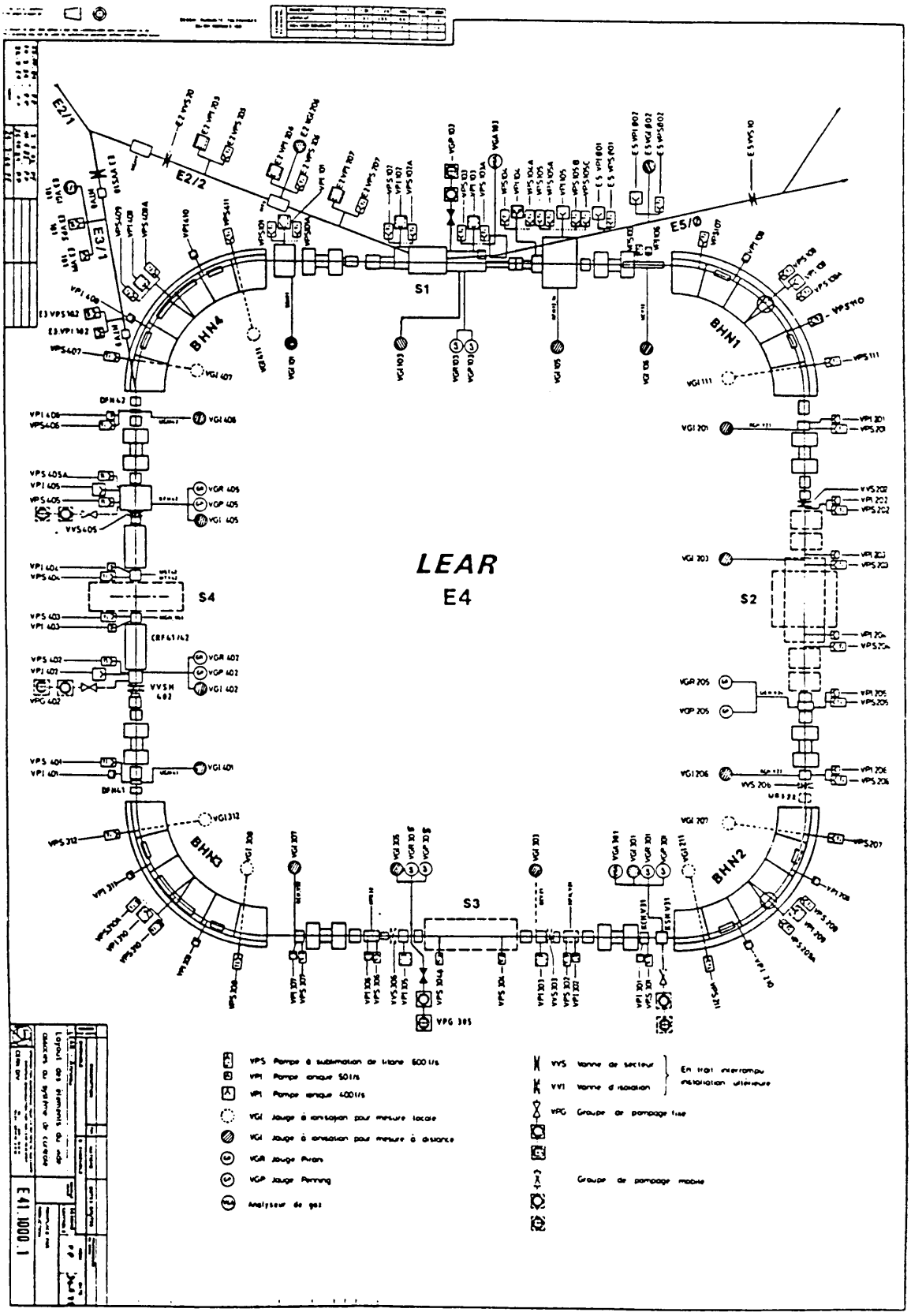


LIL / EPA

PS/ML/VAC/ar
5.12.86

LEAR &
Injection line




LEAR
E4
S1
S2
S3
S4
BHN1
BHN2
BHN3
BHN4
E2/1
E2/2
E3/1
E5/1
E41.1000.1

ANNEX 2

PASSIVE PART ACCELERATION FAULTS (number of hours) - 1986

NO FAULTS

MISCELLANEOUS FAULTS (Number of hours) - 1986

0h05	Inspection in the PS ring	(Period 1)
0h15	No reason found	"
0h05	No reason found	(Period 2)
0h02	ME	"
0h20	Inspection in the PS ring	"
0h06	No reason found	(Period 3)
0h42	Adjustments	(Period 5)

TOTAL = 1H35

ANNEX 4

EXTERNAL FAULTS (Number of hours) - 1986

2h34	Mains failure	(Period 1)
3h49	" "	"
0h04	Mains failure	(Period 2)
0h07	" "	"
0h03	" "	"
0h11	" "	"
0h55	" "	"
0h27	" "	"
7h14	" "	"
0h13	SB	"
0h03	Mains failure	(Period 3)
0h03	" "	"
0h18	" "	"
0h37	" "	"
1h56	" "	"
2h05	" "	"
1h48	" "	"
1h26	" "	"
4h32	" "	"
12h30	" "	"
3h53	" "	"
12h18	" "	"
0h35	Ejection 16 security (SPS fault)	"
2h52	Mains failure	(Period 4)
0h02	" "	
4h54	Mains failure	(Period 5)
0h29	" "	"
0h15	" "	"
31h40	LPI*	"

TOTAL = 97H53

* LPI faults were counted as "external faults" in order not to change the general layout of other statistics. A special entry will appear in the 1987 statistics report.

FAULT EXCEDING 6 HOURS (Number of hours) - 1986

15h05	CPS computer	(Period 1)
7h14	Mains failure	(Period 2)
12h30	Mains failure	(Period 3)
12h18	" "	"
8h12	114 MHz cavity	(Period 4)
7h10	" "	"
6h40	" "	"
11h11	PLS computer	(Period 5)
6h25	LPI*	"

TOTAL = 86H45

* LPI faults were counted as "external faults" in order not to change the general layout of other statistics. A special entry will appear in the 1987 statistics report.

ANNEX 6

EXPLANATION OF PS USERS

AA	proton beam production for AA	at 26 GeV/c
TST	proton beam tests for AA	at 3,5 GeV/c
SPP(p^+)	proton beam for collider	at 26 GeV/c
SPP(e^+)	positron beam for SPS	at 3,5 GeV/c
SFT(p^+)	proton beam for SPS fixed target	at 14 GeV/c
SFT(d)	deuteron beam for " " "	at 10 GeV/c/n
SFT(O^{8+})	oxygen ions for SPS fixed target	at 10 GeV/c/n
SPN(e^-)	electron beam for SPS	at 3,5 GeV/c
PHY(p^+)	proton beam for East Hall	at 24 GeV/c
PHY(d)	deuteron beam for East Hall	at 12 GeV/c/n

DUMP TARGETS : beam on the internal dump targets 47 ou 48 in the PS or in dump line D2 or D3 at different energies.

LEA(p^-)	antiproton beam for LEAR	at 0,6 GeV/c
SPN(p^-)	antiproton beam for SPS	at 26 GeV/c
SFT(α)	alpha beam for SPS	at 10 GeV/c/n

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