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PS/AR/ME Note 85
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AAC ME SUMMARY 19TH OCTOBER TO 22ND OCTOBER 1989

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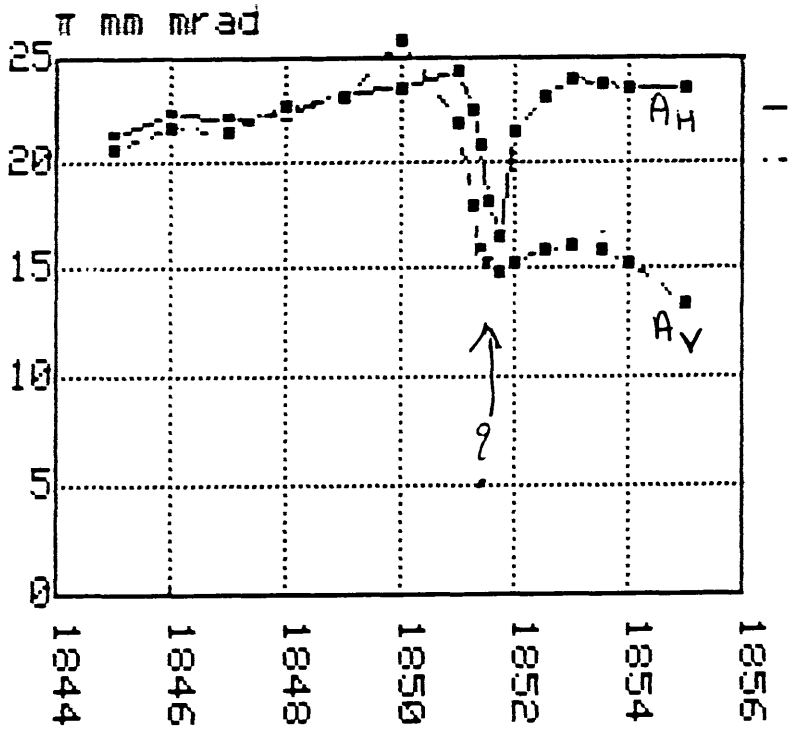
Introduction

After a 10 day long shutdown, 4 days were devoted to a ME before starting $\bar{p}$ accumulation and transfer to LEAR. Here is a short description of each ME and of what we did during this period.

ME1 : HORIZONTAL AA ACCEPTANCE

(X. Brunel, S. Maury, S. van der Meer)

The AA acceptance was measured at all frequencies.



The vertical acceptance is normnal and goes down at f=1851.5 kHz to 15 π mm.mrad due to the stack tail pick-up. The horizontal acceptance is greater than 22 π mm.mrad at all frequencies except at f=1851.7 kHz. There is a very sharp hole. It sems to be due to a coupling problem because when we changed the vertical tune by +2 10^{-3}, the hole disappeared. We intend to study this acceptance again in the next ME period.

ME2 : ANTIPROTON EMITTANCE MEASUREMENTS IN AC
(L. Soby)

These programs were modified to get an automatic version of emittance measurement in AC (with scrapers) and they now are included in the Performance check program.

ME3 : AA PRECOOLING
(G. Carron, L. Thorndahl)

Longitudinal and vertical precooling systems were checked with the 12 new preamplifiers in the pick-up. A slightly narrower distribution was obtained after 4.8 s cooling time. Furthermore, it was observed that the vertical pre-cooling causes a small widening in $\Delta p/p$. With BTF measurement on the vertical system, it was found that the phase curves for individual amplifiers were equal but amplifiers 129 and 133 were late by 2.6 cm - this improvement turned out to be mainly benefitial to Δp cooling because the amplitude of the loop gain was increased by 2 dB at the top of the band. But the Δp blow-up caused by the vertical system remained unchanged.

After further investigations, it was found that amplifiers 132 and 136 (band II amplifiers) had only a small effect on the beam. The error was traced to 2 faulty diplexers. After replacing them, we noticed that the vertical precooling did no blow-up the Δp distribution. The distribution itself was also slightly improved.

ME4: NEW VERTICAL STACK TAIL SYSTEM
(G. Carron, L. Thorndahl)

Due to lack of time, the new V stack tail system was just tried out and it was found that the betatron phase advance from pick-up to kicker caused an error of $\pm$ 40°. A large common mode was noticed from the pick-up which is not understod yet and which requires further investigation.

ME5: AUTOMATIC OPTIMISATION OF AA TRIM FOR MAXIMUM ACCEPTANCE
(S. van der Meer)

It is a new program which optimizes the AA trim to get the maximum of horizontal acceptance by:

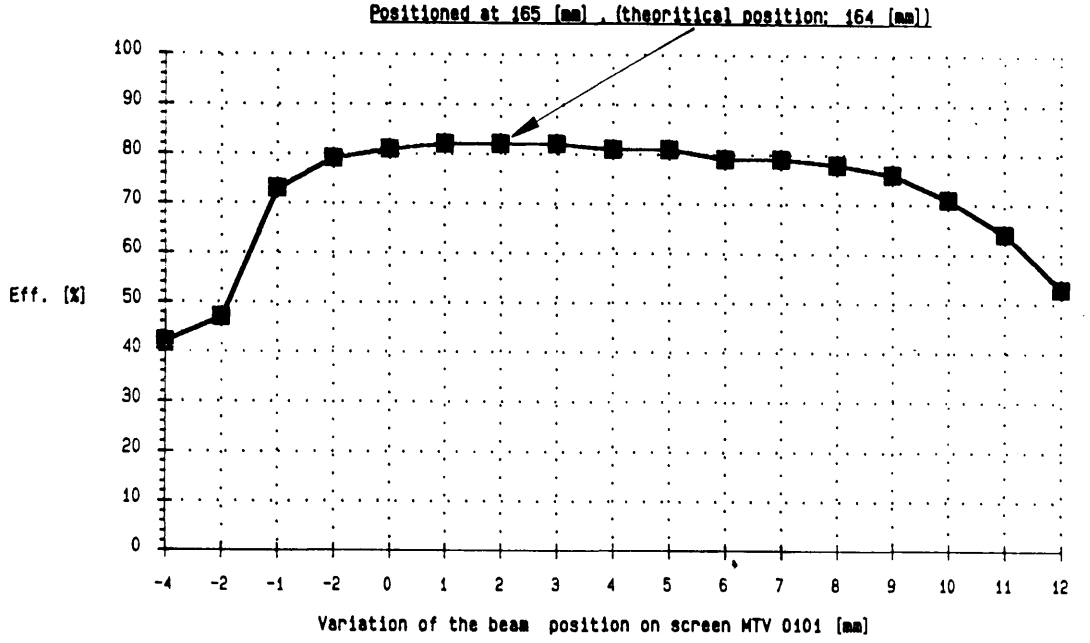
- injecting a pulse;
- blowing it up by one module of the injection kicker to get a sharp-edged amplitude distribution;
- depositing this beam on the central orbit;
- moving the trim by 0.3 mm steps back and forth, finding out where the beam gets lost on each side;
- putting the trim at the central value;
- repeating the whole exercise with smaller steps.

This program was tested and it is now operational.

ME6: AA EJECTION LINE STUDY ON SCREEN 0101

(G. Adrian, J. Kuczerowski, S. Maury)

To get the maximum space between the AA ejection kicker and septum, we varied the beam position on screen 101 and for each different position the coherent oscillations were reduced and finally the injection efficiency recorded. The final best position of the beam on screen 101 was found at 165 mm, compared to the theoretical position of 164 mm.



kicker

100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00

Position ecran 101 [mm]	Kicker [KV]	Septum [A]	Efficacite [%]
-4	67.00	3833.00	42
-2	65.10	3845.00	47
-1	64.90	3844.00	73
-2	64.80	3851.00	75
0	62.90	3863.19	81
1	62.33	3871.30	82
2	61.27	3878.40	82
3	60.39	3882.40	82
4	59.19	3886.50	81
5	58.28	3895.60	81
6	57.16	3901.70	79
7	56.41	3909.80	79
8	55.74	3913.80	78
9	55.38	3918.90	76
10	54.08	3927.00	71
11	53.60	3934.10	64
12	53.50	3938.20	53

ME7: INFLUENCE OF AA TUNE AND SKEW QUADRUPOLE ON TRANSFER EFFICIENCY

(G. Adrian, J. Kuczerowski, S. Maury, C. Metzger, J. Ottaviani, L. Soby)

To see the effect of the AA time or the coupling on the AA injection orbit versus transfer efficiency, we varied the $\bar{p}$ beam emittances in AC and we measured the AC/AA transfer efficiency for different AA tunes (ΔQ_V and ΔQ_H).

$$(\varepsilon_H, \varepsilon_V) = (5\ \pi, 5\pi), (5\ \pi, 15\ \pi)\ (15\ \pi, 5\pi), (15\ \pi, 15\ \pi)$$

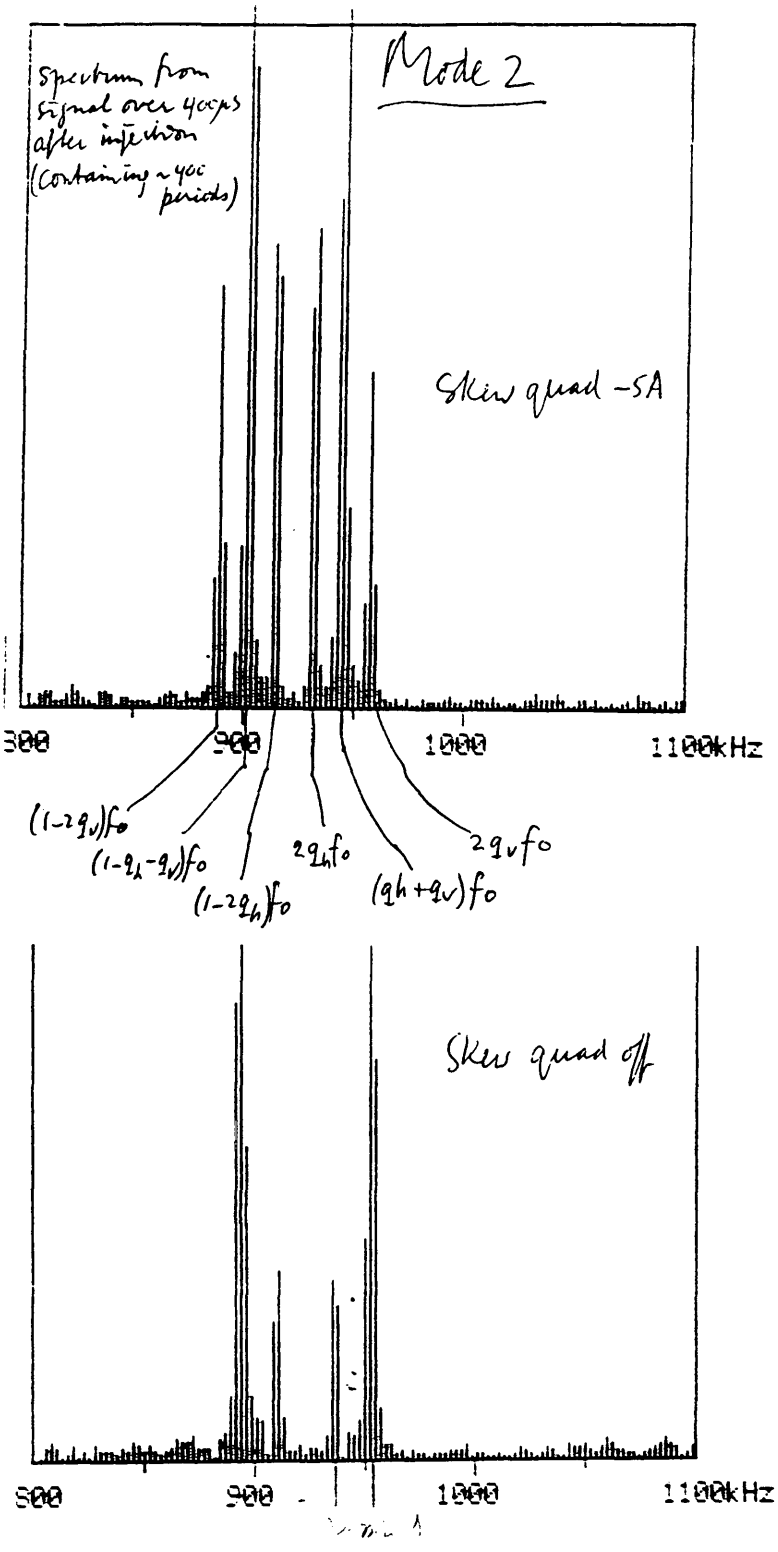
We did not find any new tune giving a higher AC/AA transfer efficiency.

ME8: QUADRUPOLAR COHERENT OSCILLATIONS

(S. van der Meer)

For beam transfer between two rings, good transverse matching is required to conserve low emittance. To check the AC/AA and AA/PS matching with proton beams, a quadrupole pick-up was installed in the AA. The $(n \pm 2q)\ f_0$ frequency can be measured.

First, it was observed for the normal AA setting, the usual quadrupole frequencies but also strong coupling lines between. Then, with the skew quadrupoles off, these lines disappeared. So, for quadrupole oscillation measurements, the skew quadrupoles should be off.



To achieve a good frequency measurement, it was necessary to reduce the ejection kicker voltage so as to get large horizontal lines. The measurements showed that in order to get any reproducibility, it was necessary to reduce the dipole oscillation amplitude in both planes to less than 0.3 mm. The program does it automatically but the reproducibility is not very good. After many successive adjustments, we obtained a better injection efficiency although the new quadrupole amplitudes did not seem to be very much better.

What was not done

AA vertical aperture in stack tail pick-up

This study was not carried out because we found 3 obstacles in section 5 with the Obstacle Search Program:

1°) at f=1855.0 kHZ on the bottom side,
2°) at f=1851.5 kHz on the bottom side,
3°) at f=1854.2 kHz on the top side

and with a bump, it was impossible to optimize the acceptance with obstacles on both sides.

Conclusion

It was a 4 day long ME session including a setting-up after a shutdown and a setting-up for $\bar{p}$ accumulation. For the first time 2 ME's were done by OP technicians. Such initiatives should be encouraged, provided the purpose of these ME's are carefully explained in advance. After a setting-up full of trouble, the antiprotons in AA were ready to be sent to LEAR on Monday morning, October 23.

S. Maury