AK/iw

MPS/SR/MD 72-8
21.8.1972

MD NOTE

Continuous Transfer Tests on 4.8.1972 and 5.8.1972

4.8.1972

Persons present : J. Bleeker, C. Bovet, D. Grier, L. Henny, A. Krusche, H.S. Simpson.

The first part of the MD time was spent to check the kicker magnet 13 strength which was felt to be necessary after previous difficulties with a fast ejection setting-up.

Then, an emittance measurement of the fast ejected beam was tried out, using the SEM grids in the e_{10} beam line. The results were discouraging - the measured emittance showed varations between 0.4 to 2π mm mrad which were certainly wrong

The continuous transfer setting-up was not successful either. It was not possible to approach the beam without losses, near enough to the electrostatic septum in order to jump properly into it with the available fast kicker strength.

Afterwards we had a break-down of the stair function generator which was the end of this MD.

5.8.1972

Persons present : D. Boussard, C. Bovet, D. Grier, L. Henny, A. Krusche, H.S. Simpson, M. Thivent.

Machine Conditions :

The machine cycle was changed in order to get a magnetic flat top at 10 GeV/c; start of flat top at M 125; beam intensity ~ 130 · 10^{10} ppp. The continuous transfer was set up rather quickly with the following parameters :

Ejection timing at M 131.
Quadrupoles 73/89 : 166 A, start at M 106; Q 73 shunted with ~ 3.4 Ohms.
ES 83 : anode 63 mm, cathode 73 mm, angle 1.08 mrad, 120 kV.
TSM 85 : position 76 mm, angle 0.4 mrad.
Bump 16 : 324 A, start at M 123
Bump 83 : 214 A, start at M 115
Octupoles : + 40 A, start at M 88
Mean radial position $\bar{r}$ = - 4 mm, measured without bumps,
$\bar{r}$ = + 0.5 mm measured with bumps.

Measurements with a Bunched Beam :

Some measurements were done in order to study the influence of some parameters on the ejected beam intensity.

Figs. 1 and 3 show the variation of the ejected beam intensity due to changes of the current of bump 83, bump 16 and the mean radial position of the circulating beam. It must be mentioned here that the change of the parameters did not influence the losses on the septum 16.

Fig. 2 : shows the efficiency and the A.I.C. 83 loss indication as function of the electrostatic septum angle. The efficiency had to be derived from the external beam current transformer analog signal shown in Fig. 4 because of a break-down of the S.E.C. (DC 103).

Fig. 5 : shows the profile evolution of the peeled beam in s.s. 85. The peeled beam has to pass through the thin septum magnet (T.S.M.) in s.s. 85 before being ejected. The mini-scanner analog signal of T.S.M. 85 was used to look at the intensity evolution as function of the radial position (Fig. 6). From this, the beam profile of every slice of the peeled beam can be deduced. The same method was applied to s.s. 16 but the measurements suffered seriously from instabilities of the bump 16 power supply (G 1000).

Ejection of a Debunched Beam :

It was the first time we tried to eject a debunched beam. D. Boussard prepared for this purpose a debunching scheme which, in principle, should not alter the momentum spread (jump into unstable phase and rotation by 45 degrees).

This obviously changed the radial beam dimensions, so that with the available FK kick strength it was not possible to eject without losses (~ 8% of the particles were lost "slowly" on the ES). Besides this, no significant difference between ejection of a bunched or debunched beam could be observed. Fig. 7 shows the ejected beam intensity for both cases.

A. Krusche

Distribution :

Persons present

O. Barbalat
D. Bloess
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G. Plass
B. de Raad (Lab. II)
F. Rohner
F. Schäff
P.H. Standley
Ch. Steinbach

Fig.1 : Ejected Beam Intensity VS Parameter Variations

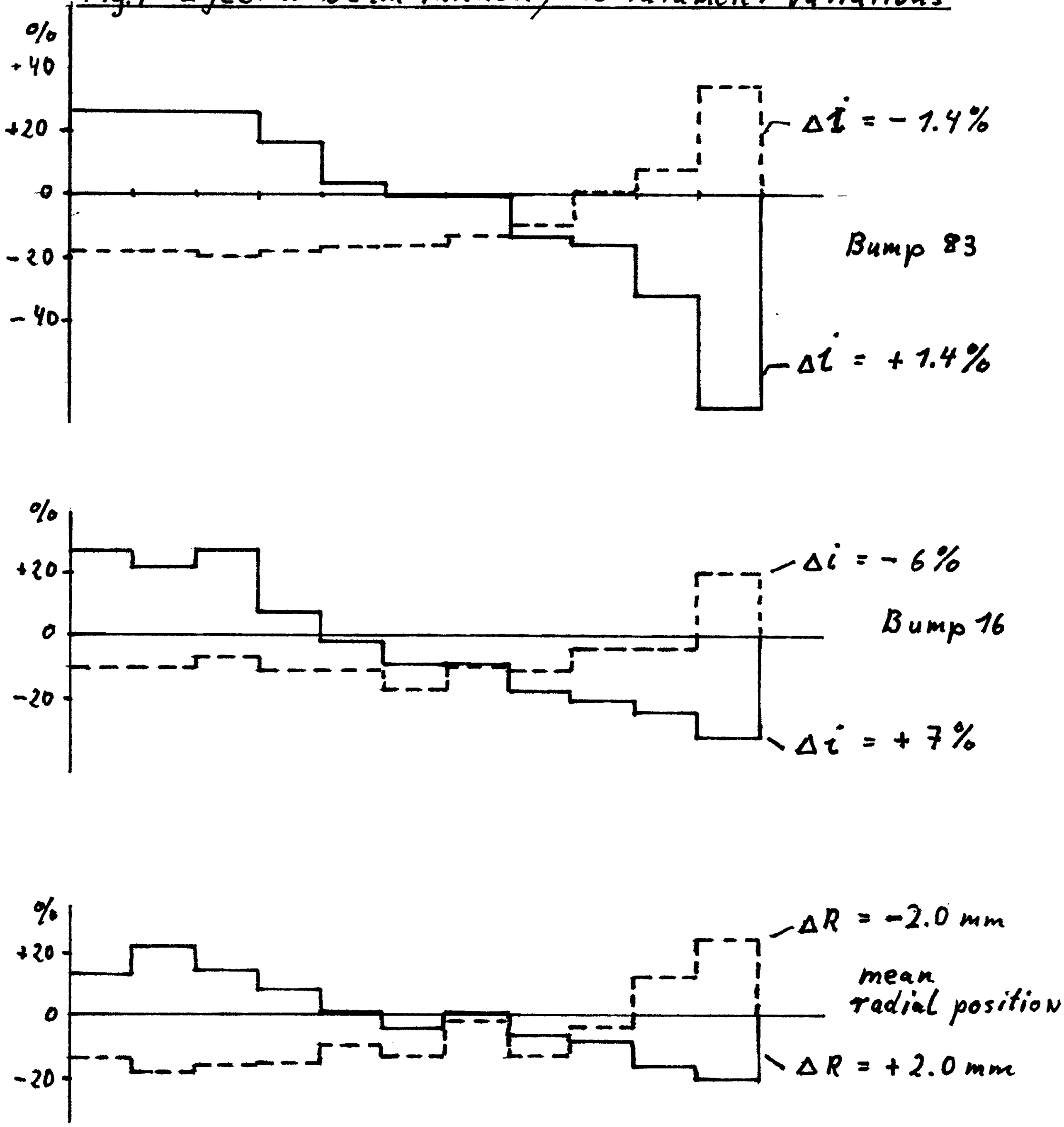
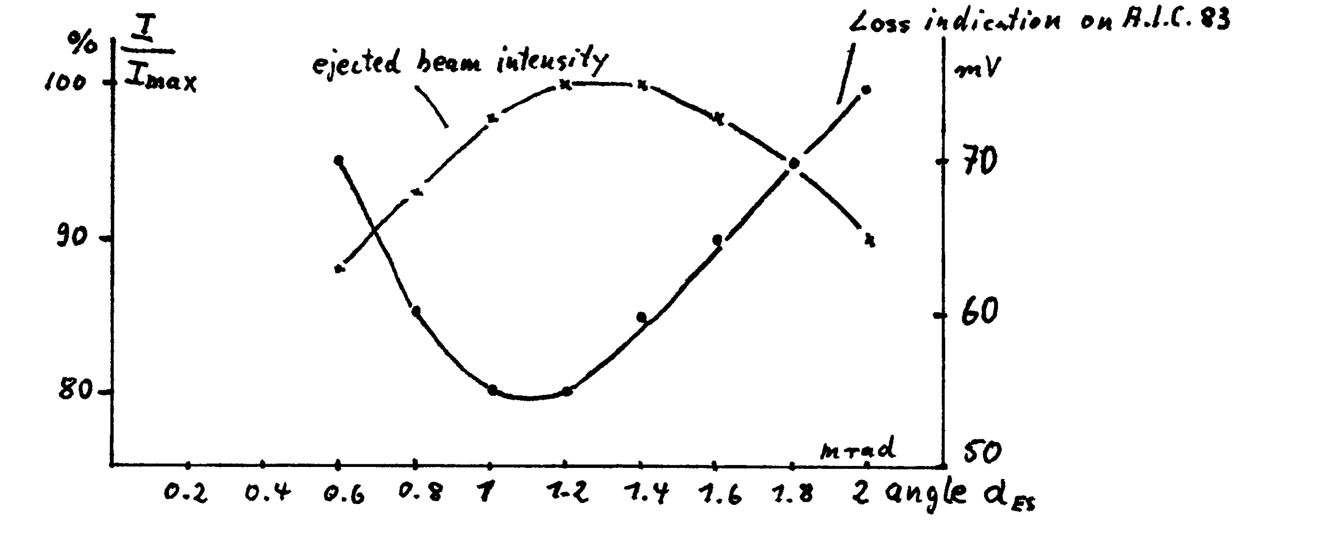
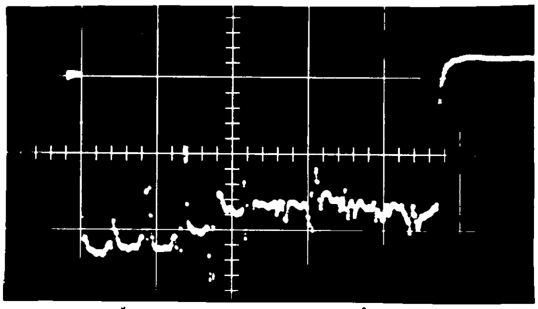
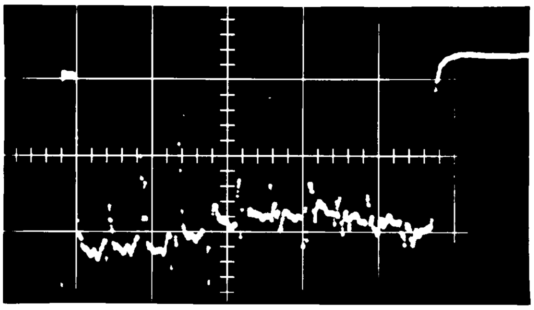


Fig.2 : Losses and Efficiency Dependance

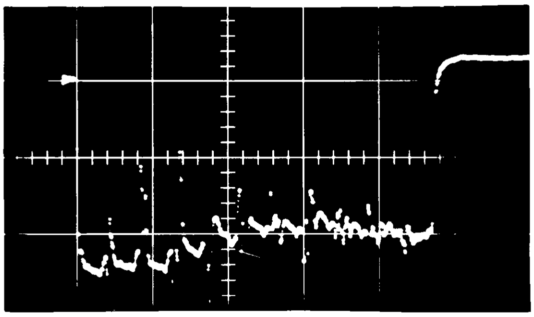




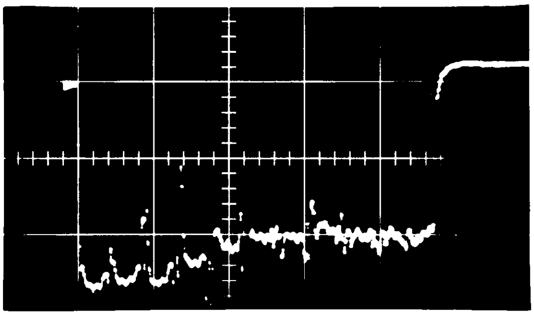
$\alpha_{ES} = 2.0$ mrad



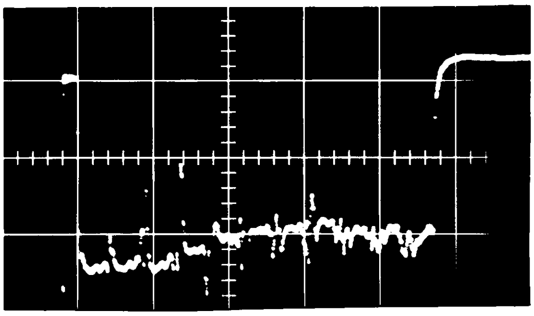
$\alpha_{ES} = 1.8$ mrad



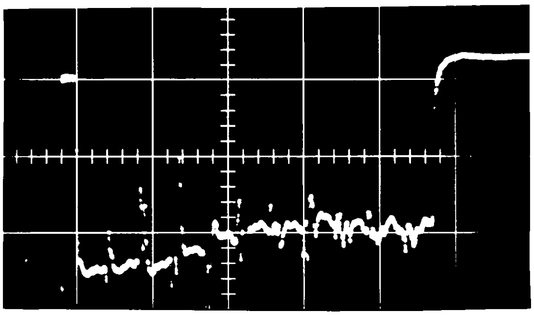
$\alpha_{ES} = 1.6$ mrad



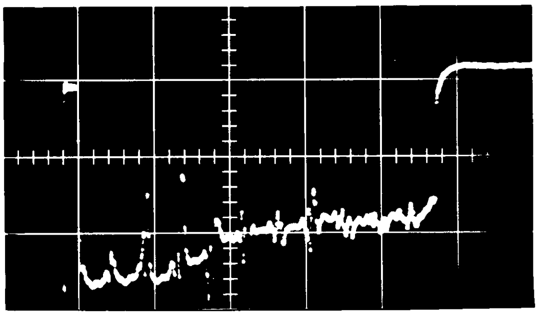
$\alpha_{ES} = 1.4$ mrad



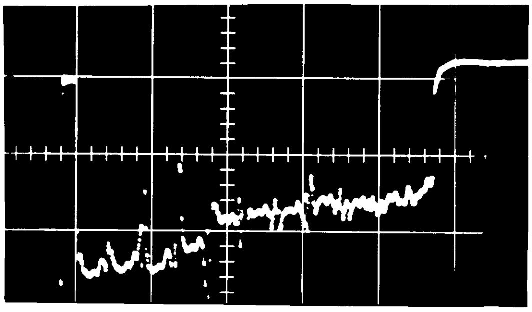
$\alpha_{ES} = 1.2$ mrad



$\alpha_{ES} = 1.0$ mrad



$\alpha_{ES} = 0.8$ mrad



$\alpha_{ES} = 0.6$ mrad

Fig. 4 : Ejected beam intensity for various electrostatic septum angles

ss 85

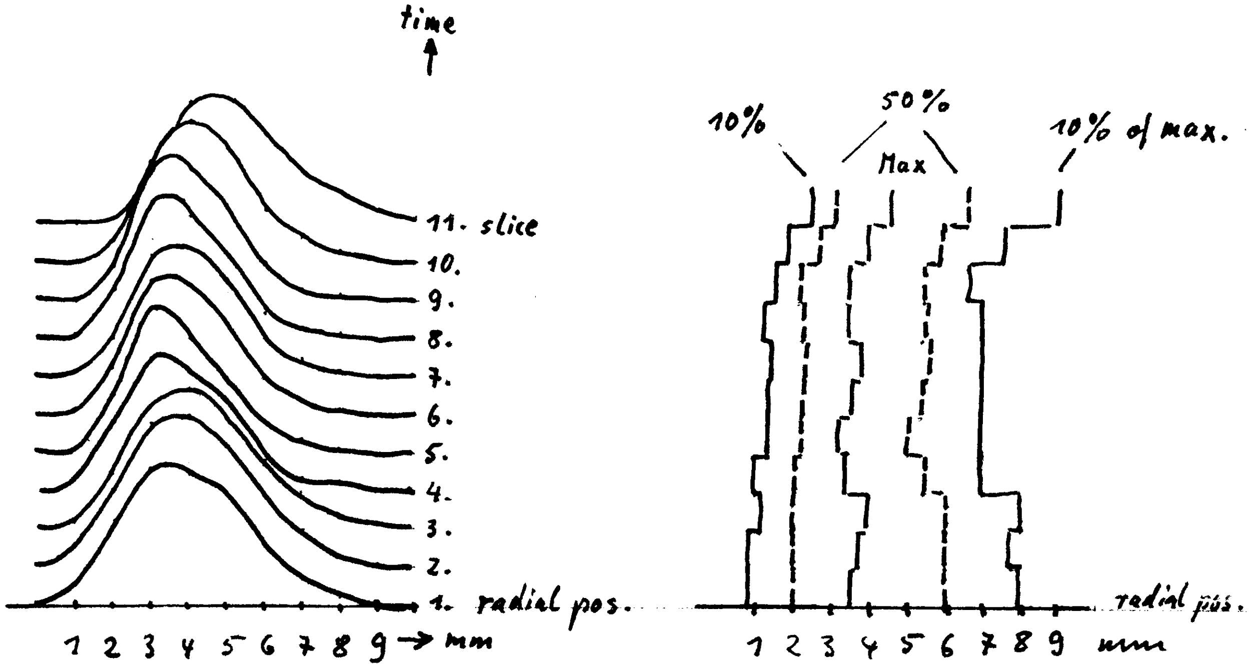


Fig. 5 : Profile evolution of peeled beam in ss 85

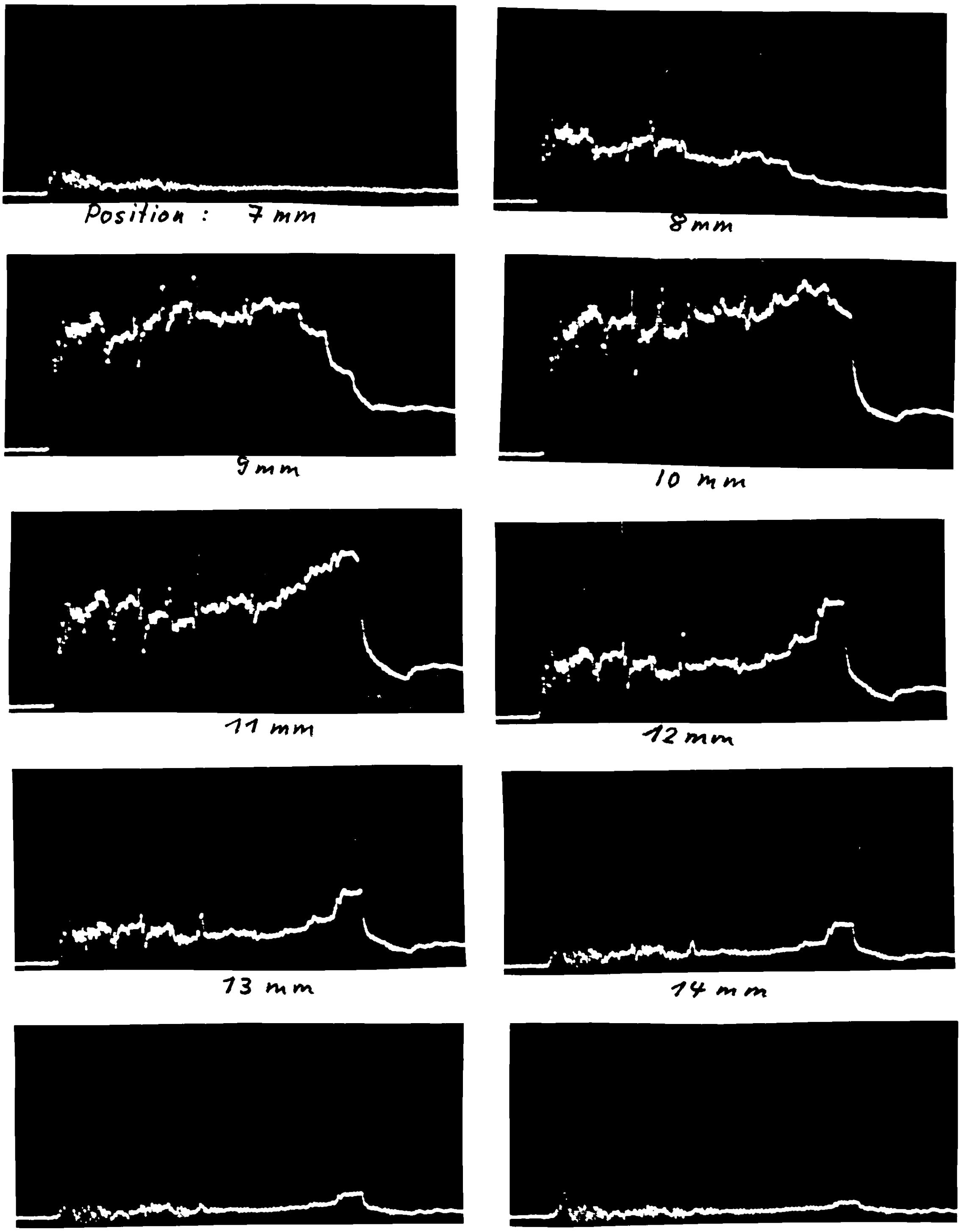
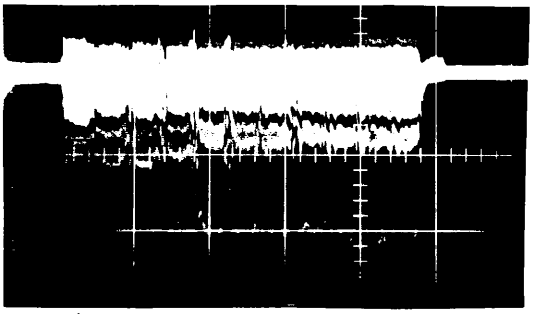
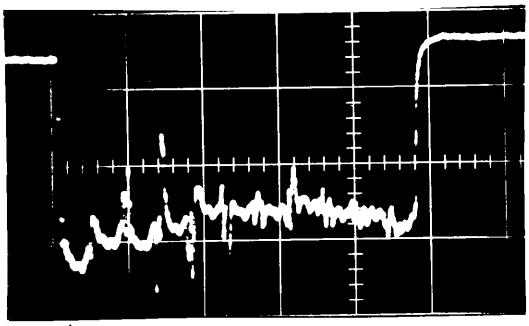


Fig. 6 : Analog signal of minniscanner TSM85 for shaved beam. 10 MHz structure is filtered out. 50 mV/div ; 5 µs /div.

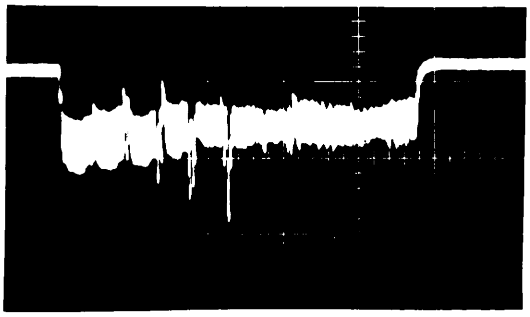
The baseline shift is due to a baseline restorer which normally is used for the droop compensation of a beam current transformer and was connected here by mistake



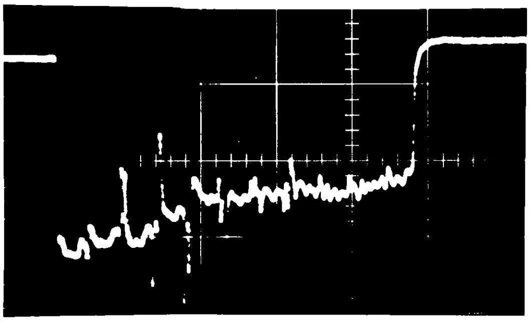
a) Ejected beam; 5 μs/cm
bunched



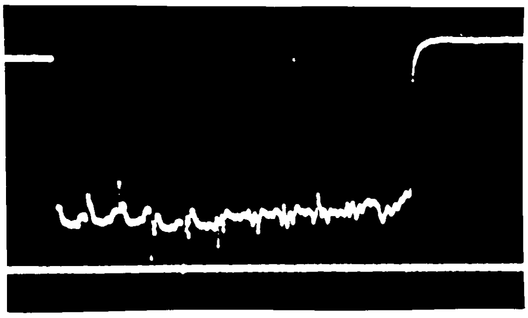
b) same as a) but
bunch structure filtered out



c) Ejected beam
debunched



d) same as c) but
10 MHz structure filtered out



e) Debunched ejected
beam, 10 MHz structure
filtered out; program
steps of fast Kickers
optimized

Fig. 7