

ISR RUNNING-IN

Run 81/82, 5.7.1971, 14.30 - 16.00, 4 bunches;
17.00 - 19.45, 20 bunches, 22 GeV, working line "22 FA".

Experiments on intra-beam scattering, and "mysterious" losses

1. Setting up a working line with the $3Q_H = 26$ resonance in the stack was done by changing the Q values by $\Delta Q_H = +.03$ and $\Delta Q_V = -.02$. The aperture scan is shown in Fig. 1. There is enough space between the two third order resonances to stack a few amperes.
2. A stack of 1.4 A was made with 4 bunches. Its initial decay rate (measured over 3 minutes) was $1.4 \times 10^{-4} \text{ min}^{-1}$. It was moved inwards by 5 mm and back, the RF scan no. 1 shows a depleted region in the middle, the decay rate after this operation (measured over 19 minutes) was $6.6 \times 10^{-5} \text{ min}^{-1}$. What I forgot to do was to move the beam outwards so that it cleared also the other side of the resonance. This would have turned this experiment into a real experiment on intra-beam scattering.
3. 3 stacks were made with 20 bunches and the Q shifts given above, and 2 stacks with no Q shifts, all to about 2 A. Typical RF scans are no. 2 and no. 3. All stacks with the resonance in the stack suffered "mysterious semi-periodic" losses which made significant lifetime measurements impossible and spoiled the original purpose of the experiment. Recordings are shown in Figs. 2 and 3. The two stacks without resonance, made for comparison, did not show these losses. Decay rates : $3.1 \times 10^{-5} \text{ min}^{-1}$ and $2.5 \times 10^{-5} \text{ min}^{-1}$. This seems a clear indication that the "mysterious semi-periodic" losses are caused by small changes of an unknown parameter. The sensitivity of the beam to these changes is different for different working conditions. Stacks with a resonance in them (or nearby) are more sensitive.

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CM-P00072572

4. On some occasions the stack was moved outwards by 5 mm and back, as fast as possible with the ramp generator. On one traversal of the resonance the losses are about 10 % of the current swept through the resonance. This also explains why several traversals in succession give losses. The outwards motion always gives higher losses.

E. Keil

Distribution

ISR Group Leaders
Running In Committee
Engineers in charge
E. Brouzet MPS
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Run 81 5/2/71

FA 22

$\Delta R_H = 0.03$

$\Delta R_V = -0.02$

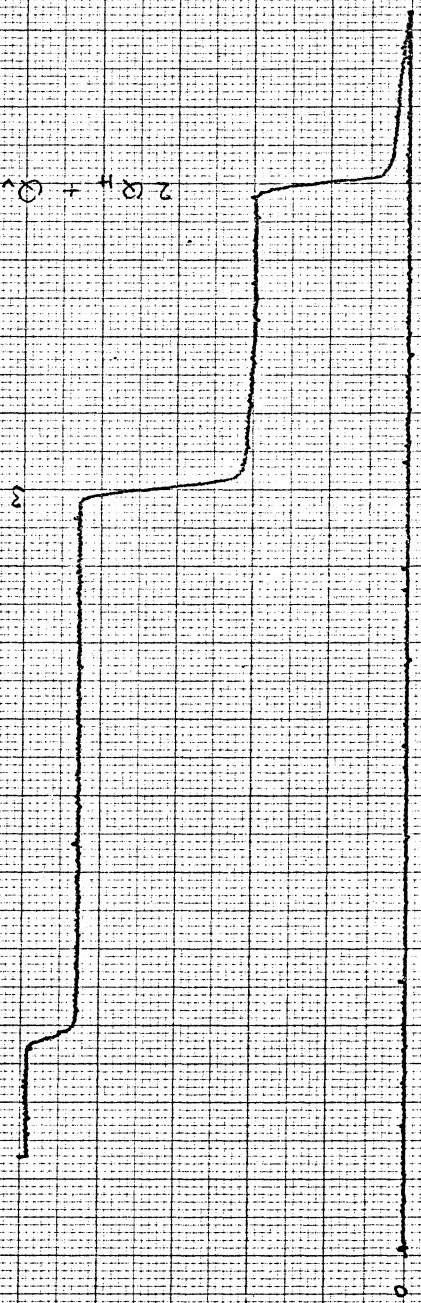
Display print

$f = 22.45 \text{ kHz}$

H	V
8.617	8.573
1.96	.85

$2 R_H = 26$

$2 R_V + Q_V = 26$



0
10
20
30
40
50
60
70
80

injection

Figure 2

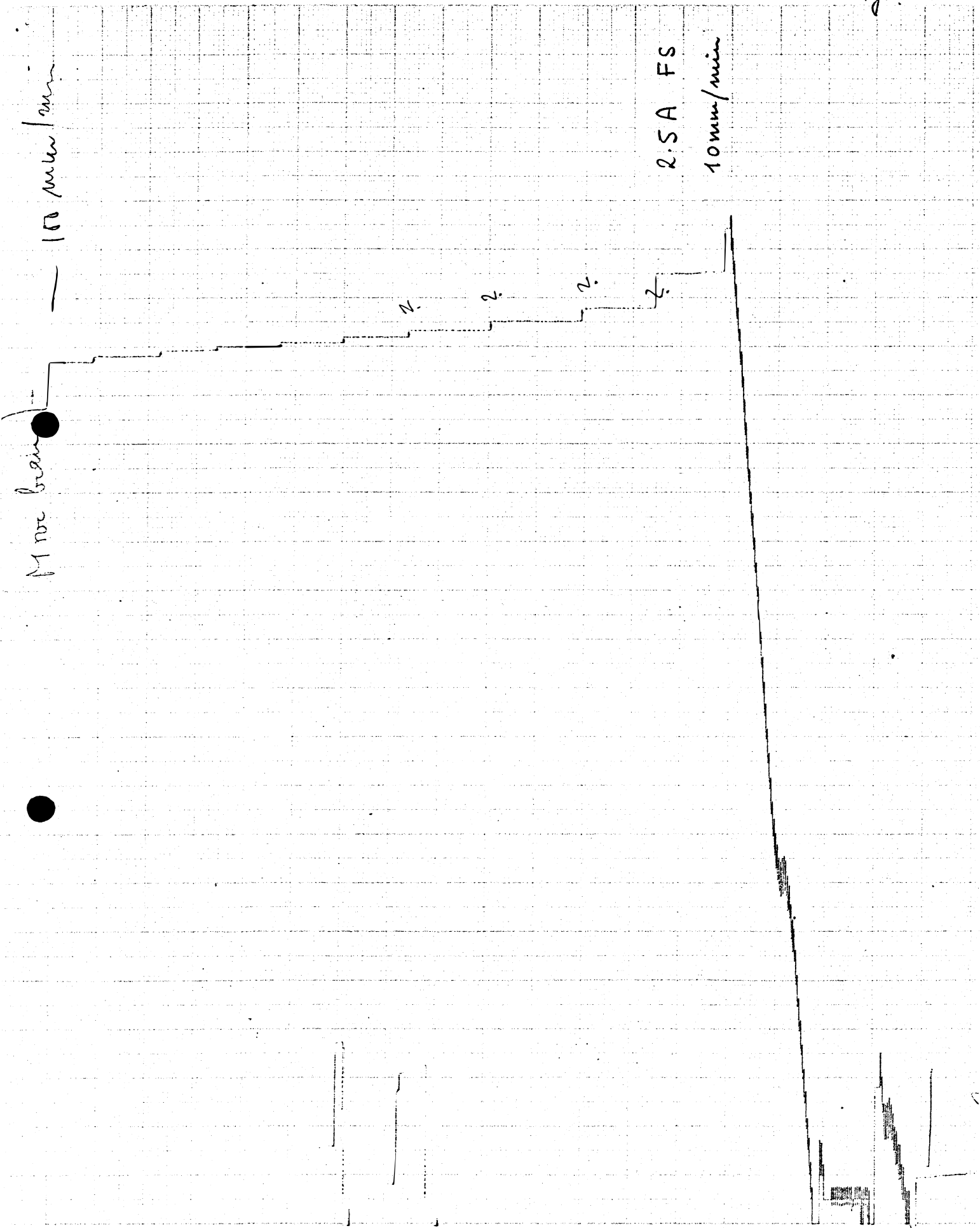
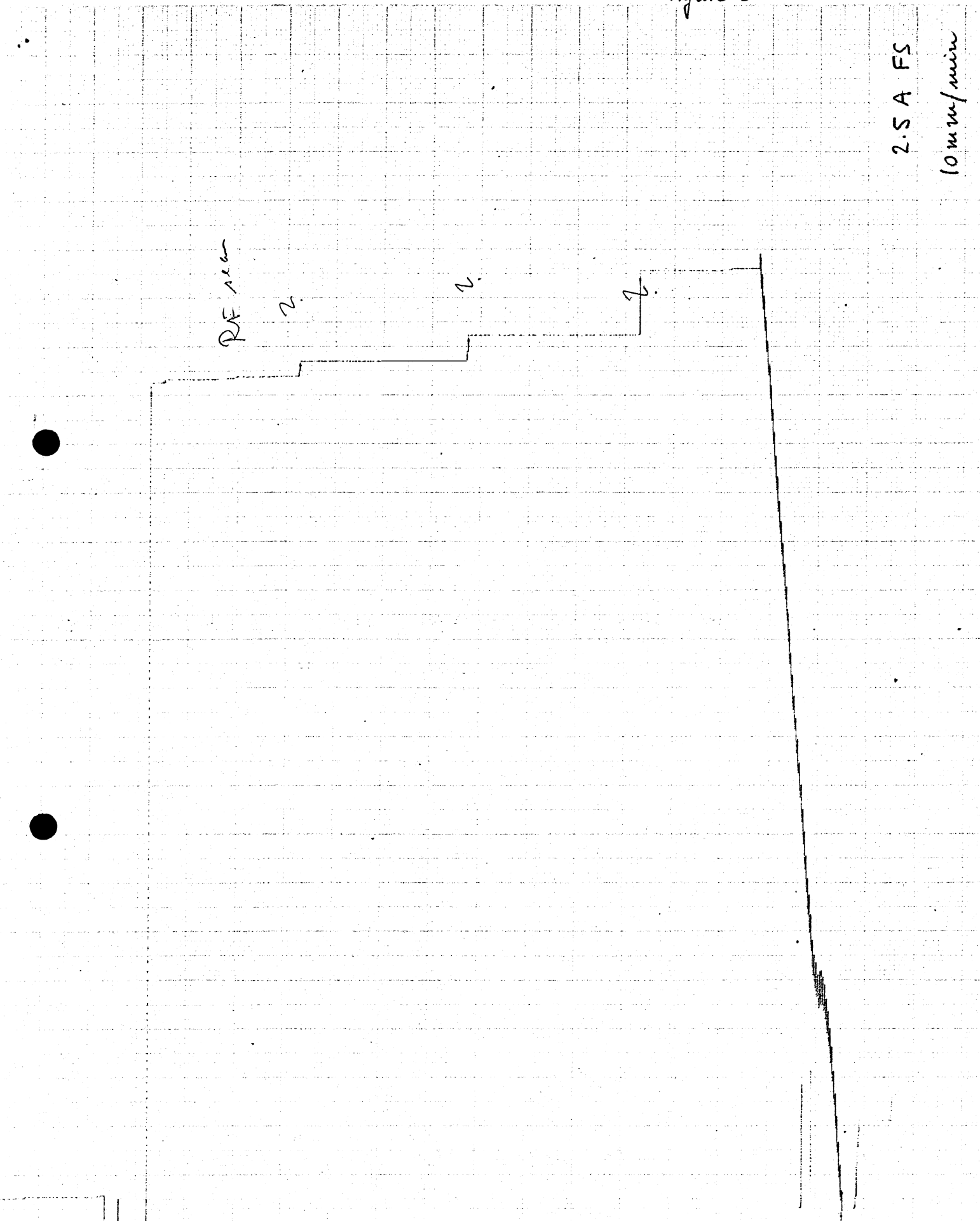
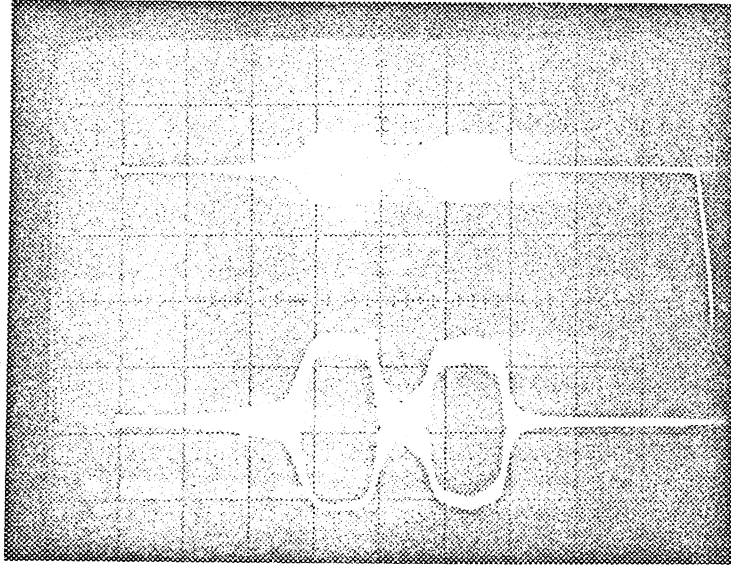


Figure 3

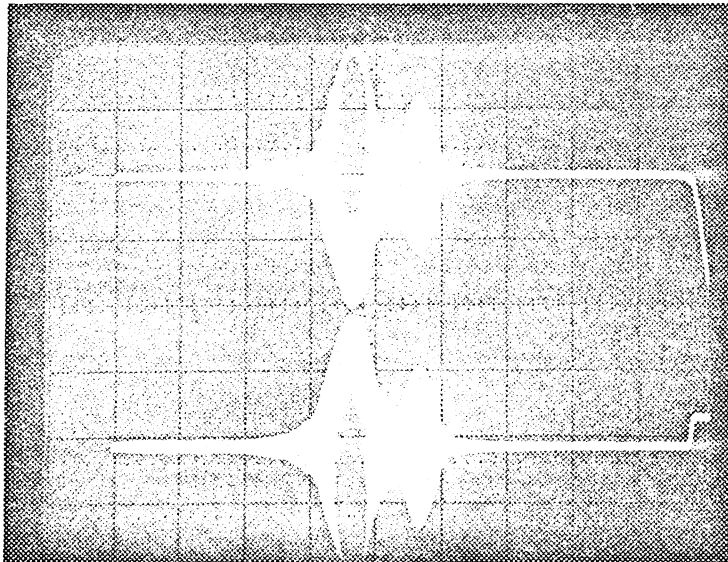


2.5 A FS

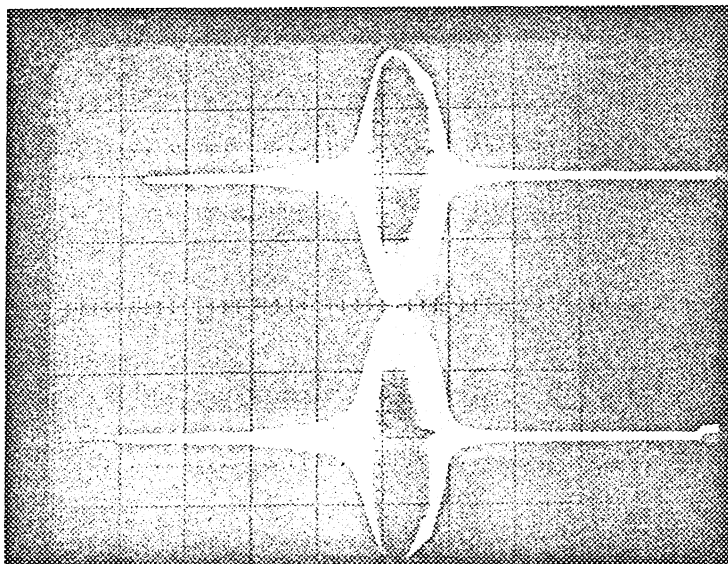
10 mm/min



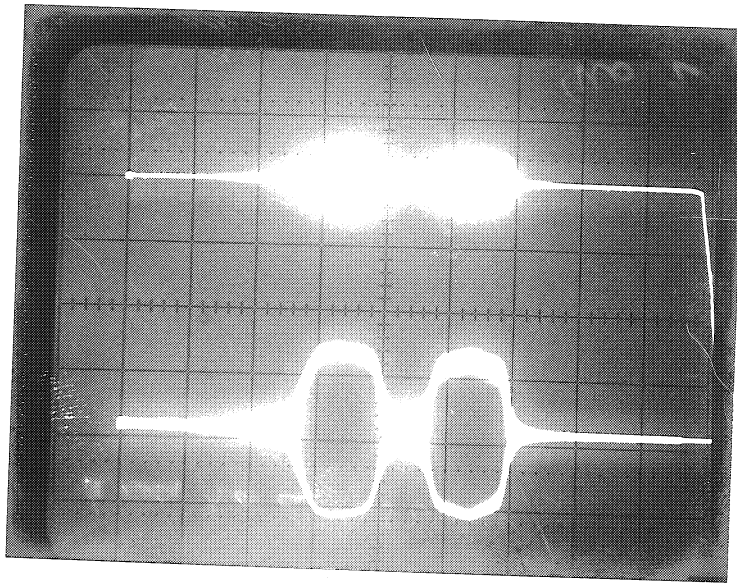
RF scan no. 1



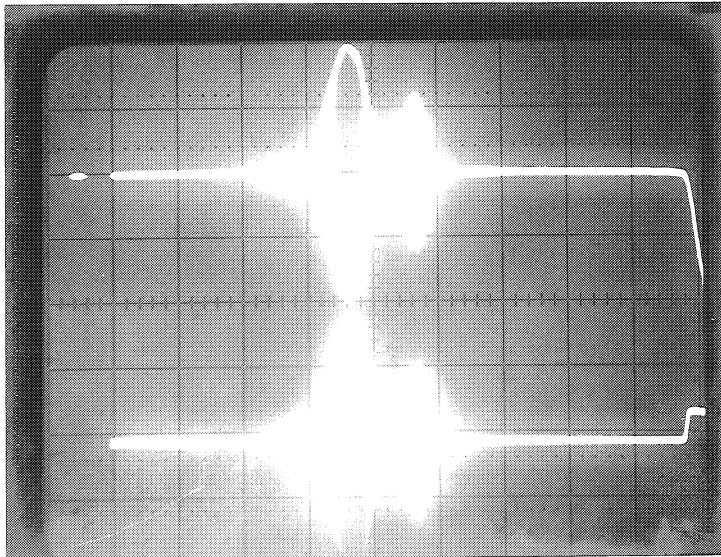
RF scan no. 2



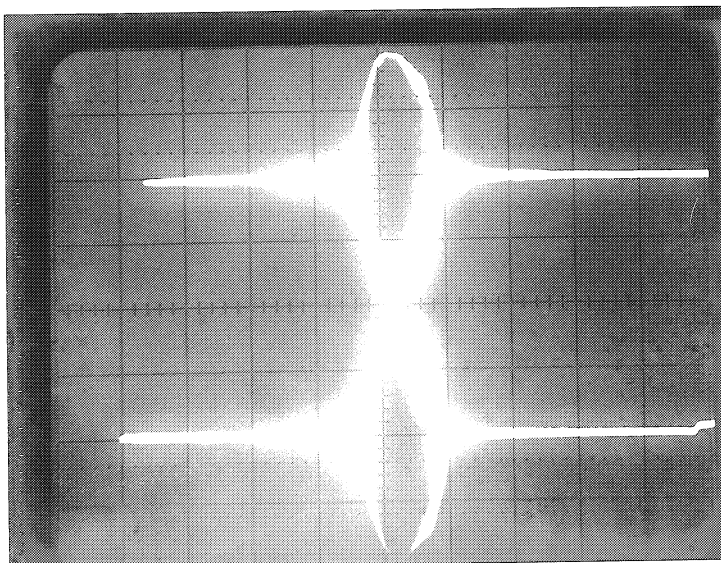
RF scan no. 3



RF scan no. 1



RF scan no. 2



RF scan no. 3

Figure 1.

Run 81 5/7/74

FA 22

$\Delta Q_H = 0.03$

$\Delta Q_V = -0.02$

Display pr. 3

$p = 22.455 \text{ bar}$

H	Q	V
0.617	0.196	0.573
		0.85

$3 Q_H = 2.6$

$2 Q_H + Q_V = 2.6$

