ISR-MA/JPG/HL/rh 5th December 1972

ISR PERFORMANCE REPORT

Run 254 - 16 November 1972

Rings 1 and 2 - 22 GeV/c - 20 bunches

Working lines 3C22 and 4C22

1. Working line 3C22

Line 3C22 was established in both rings (Figure 1). There were no problems with injection (as have arisen at 26 GeV/c during run 250). However, when offsetting the variable RF frequency, it was possible to provoke the same kind of "rejection" as experienced at 26 GeV/c.

Crossing the $Q_H = Q_V$ diagonal and the 3rd order resonances $mQ_H + nQ_V = 26$ gives exchange of emittance (and vertical blow up?) - see Figure 2 a).

Shaving with the halo scraper indicates $\beta_V < f(\bar{x})$ (and tilt of the beam?), see Figure 2 b) and c).

2. Working line 4C22 (Ring 1)

The purpose was to test the possibility of using, for shaved stacks, a working line which crosses 3rd and 4th order resonances. Such a line would not cross the main diagonal and could have larger Q-spreads than 2C22.

Experiment

For each line, the vertical halo scraper was adjusted to scrape the beam at injection (RF off) from 80 mA to 30 mA, and was left in this position during acceleration, the RF parameters being those generally used for shaved stacks with 2C22.

Working line 1 (Fig. 3 a) and c))

This line crosses $3\,Q_V = 26$ giving rise to a 24 mA loss when a pulse of 30 mA is accelerated from injection to -20 mm. This loss is so strong that it results in some malfunctioning of the RF program.

Working line 2 (Fig. 3 b) and c)

Although this line does not cross any low order resonance, a continuous beam loss was noticed during acceleration. This loss (16 mA from a pulse of 30 mA accelerated to -27 mm) is of the same order of magnitude as the ones previously measured on $3\ Q_V = 26$. This loss appears to be too large to be explained simply by the variation of β_V across the aperture or the tilt of the beam with respect to the scraper. Was it, therefore, due to a maladjustment of the RF program which was not carefully checked?

3. Conclusion

The crossing of $3\ Q_V = 26$ gave a beam loss (24 mA from 30 mA) which is larger than those measured with 2C22 when crossing $Q_V = Q_H$. It can be concluded that this line is not suitable for shaved stacks. Unfortunately, this conclusion is somewhat confused by the fact that a similar loss of approximately 2/3 this amount, but of a complete different form, was measured with a line which did not cross any low order resonances.

J.P. Gourber
H. Laeger

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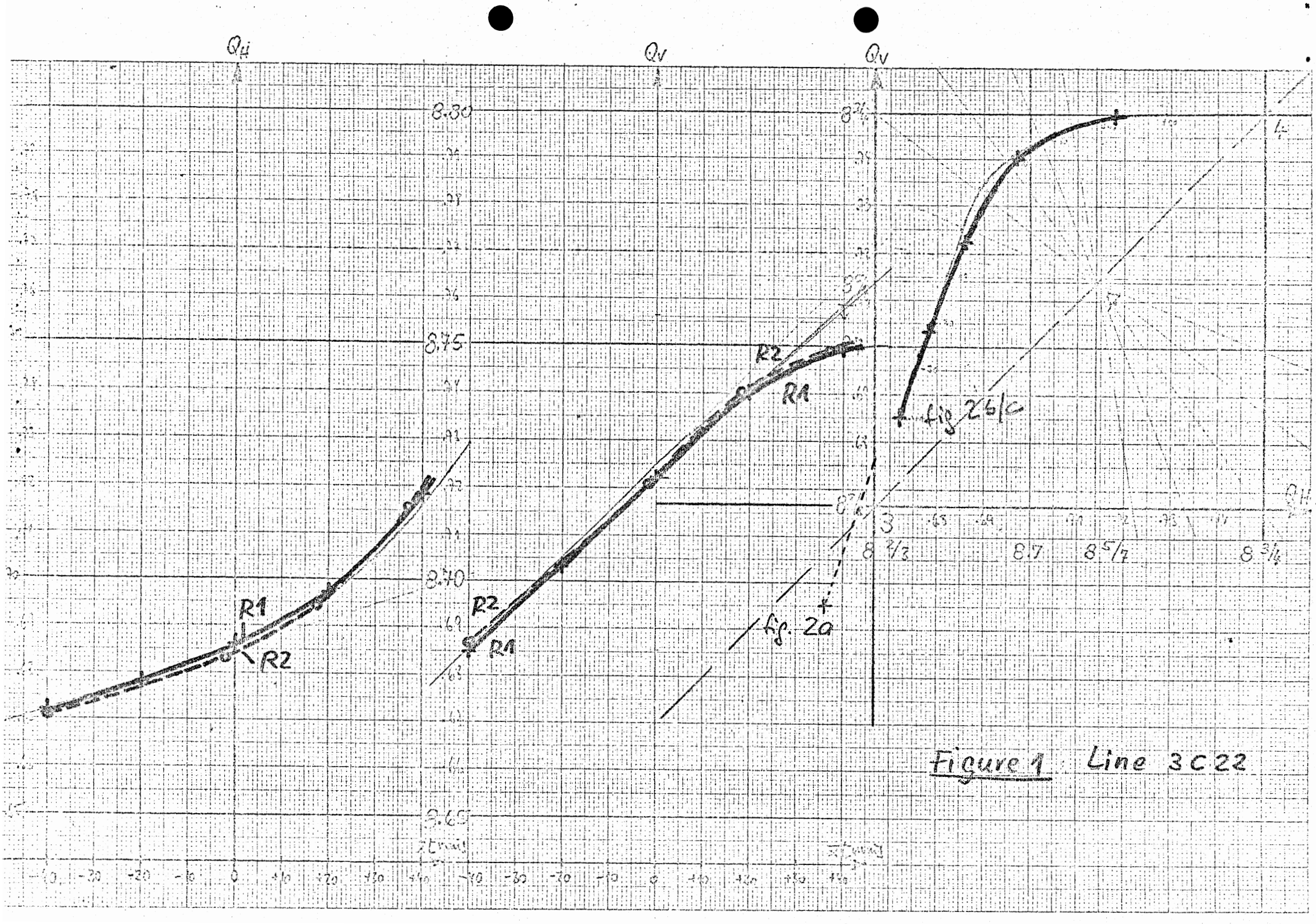
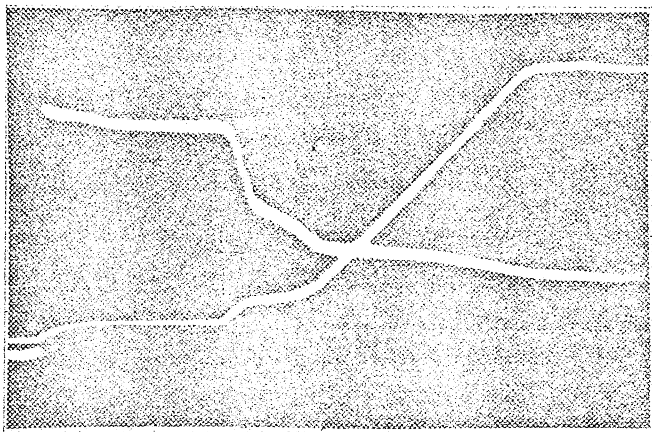


Figure 1 Line 3 C 22



U_{aH}

ΔI

2C22 displaced to injection

$Q_H = 8.656 \quad Q = 8.645$

at $x \approx -30$ mm $\Rightarrow$ diagonal

at $\approx -30 < x < 0 \Rightarrow 4 \times 3^{rd}$ order resonances

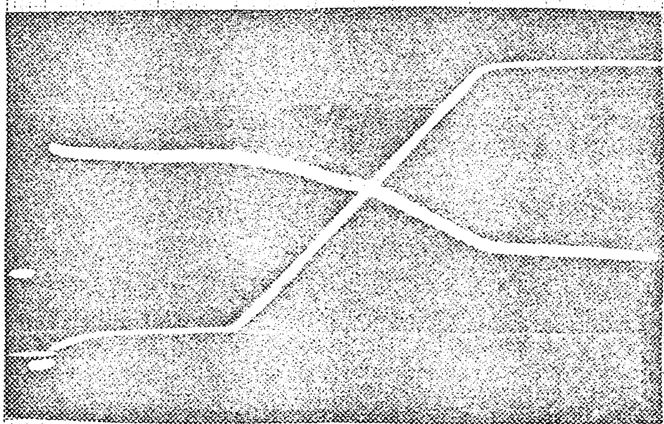
$U_V = Q_H \uparrow \rightarrow 4 \times 3^{rd}$ order res.

time : 0.1sec /Div

ΔI : 20mV/Div $\hat{=}$ 20mA/Div

U_{aH} : 2V/Div $\hat{=}$ 10mm/Div

Figure 2a: Effect of $Q_H = Q_V$ and $mQ_H + nQ_V = 26$



3C22

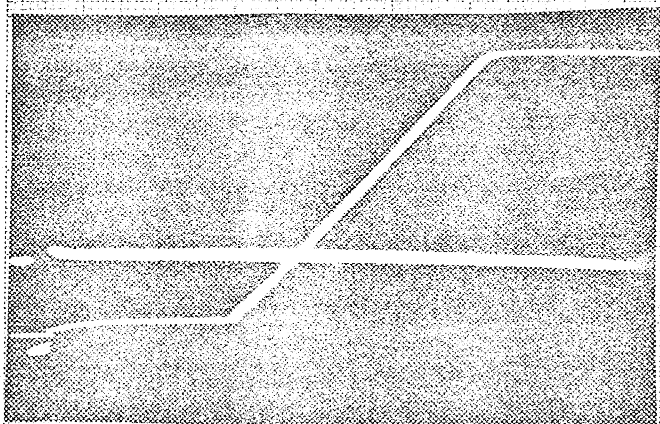
$Q_H = 8.672 \quad Q_V = 8.685$

– HALO - scraper shaving

80 to ~ 30 mA

Figure 2b: Effect of $\beta_V = f(\bar{x})$ (and tilt of beam?)

(and ??)



3C22

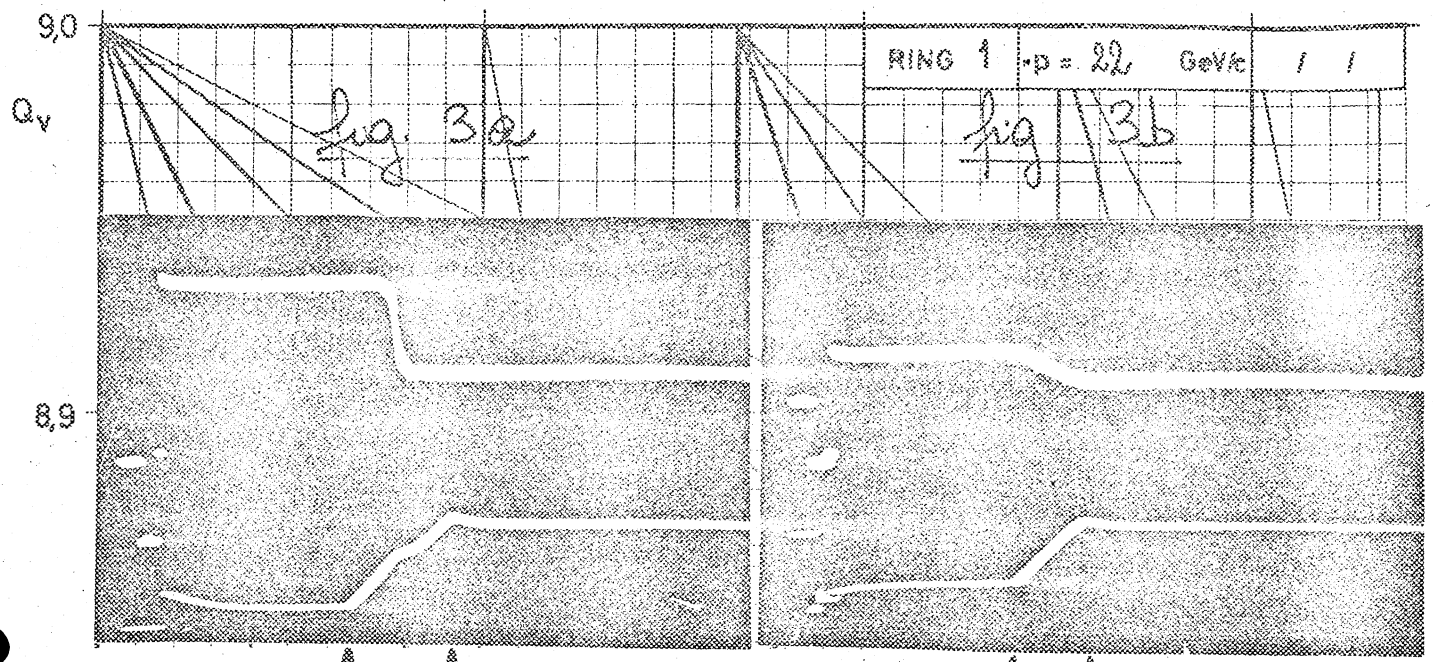
$Q_H = 8.672 \quad Q_V = 8.685$

– Montague - Scraper shaving

80 to ~ 30 mA

Figure 2c: Proper shaving with M-Scraper Target

Figure 2 : 3C22



Working line I

upper trace Ibeam 20mA/div

lower trace RF voltage 2V/div = 20mm/div

Working line II

upp. trace Ibeam 20mA/div

low. trace RF volt. 20mm/div.