AK/ab

MPS/SR/MD 70-2
9. 6. 1970

MD Note of 29. 5. 1970

I. Fast Ejection on 3. Turn

Introduction: The purpose of this M.D. was to study the possibility to eject 5 bunches during the 3. revolution after kicker excitation. The reason for this is to avoid changing the field in the kicker magnet when ejecting into 2 different channels.

Conditions of experiment:

$I_p \approx 70 \cdot 100 \cdot 10^{10}$ ppp
Momentum : 15 GeV/c
Number of ejected bunches : 5
Ejection area : 16
Septum magnet position : 54 mm, angle + 2 mrad
KM voltage : 45 kV on the lines

Radial beam dimensions : in ss 24 : 10 - 12 mm
in ss 47 : 19 mm

1. Mean radial position of the beam : 0
bumpers current I_b = 380 A
Q = 6.24

With kick OUT (ejection during 1. turn) an ejection efficiency of 90 - 95 % was reached.

Then, reversing the kick polarity (without changing other parameters) we observed a 4 % decrease in efficiency. The losses as seen on A.I.C. 16 remained the same, i.e. 50 - 70 mV.

2. Mean radial position : - 4.6 mm (see Fig. 6)
   Q = 6.256
   I_{bump} = 460 A

With kick OUT an ejection efficiency of 90 - 95 % was reached. Reversing the kick polarity the efficiency decreased almost to 0.

Losses on A.I.C. 16 were 100 - 150 m^V and we detected big losses on A.I.C. 19, which were higher than in 16. As shown on Fig. 6 the theoretical trajectory during the 2. turn touches the outer wall of the vacuum chamber in ss 19.

3. Without taking much data we tried to optimize the efficiency with a lower Q-value (mean radial beam position more to the outside) but we did not do as well as in 1).

Returning to case 1) it was easy to come back to the same conditions, that is: ejection efficiency ~ 88 - 92 %. Reducing the KM voltage from 45 kV to 42 kV the efficiency went up by approximately 2 %.

Conclusions:

Further M.D. sessions will be necessary to state whether such a scheme is operationally feasible ($I_p \approx 2 \times 10^{12}$ ppp, other operations before and after fast ejection, higher momenta). It is felt that for an operation the kicked bunches must have the smallest possible excursion.

II. Fast ejection with field inversion

A successful operation was made for

Momentum for F.E. 58 : 20.8 GeV/c

Momentum for F.E. 16 : 15 GeV/c

$I_p = 100 \cdot 10^{10}$ ppp

Time interval between the two ejections : 49 M-pulses, i.e. $\approx$ 160 ms.

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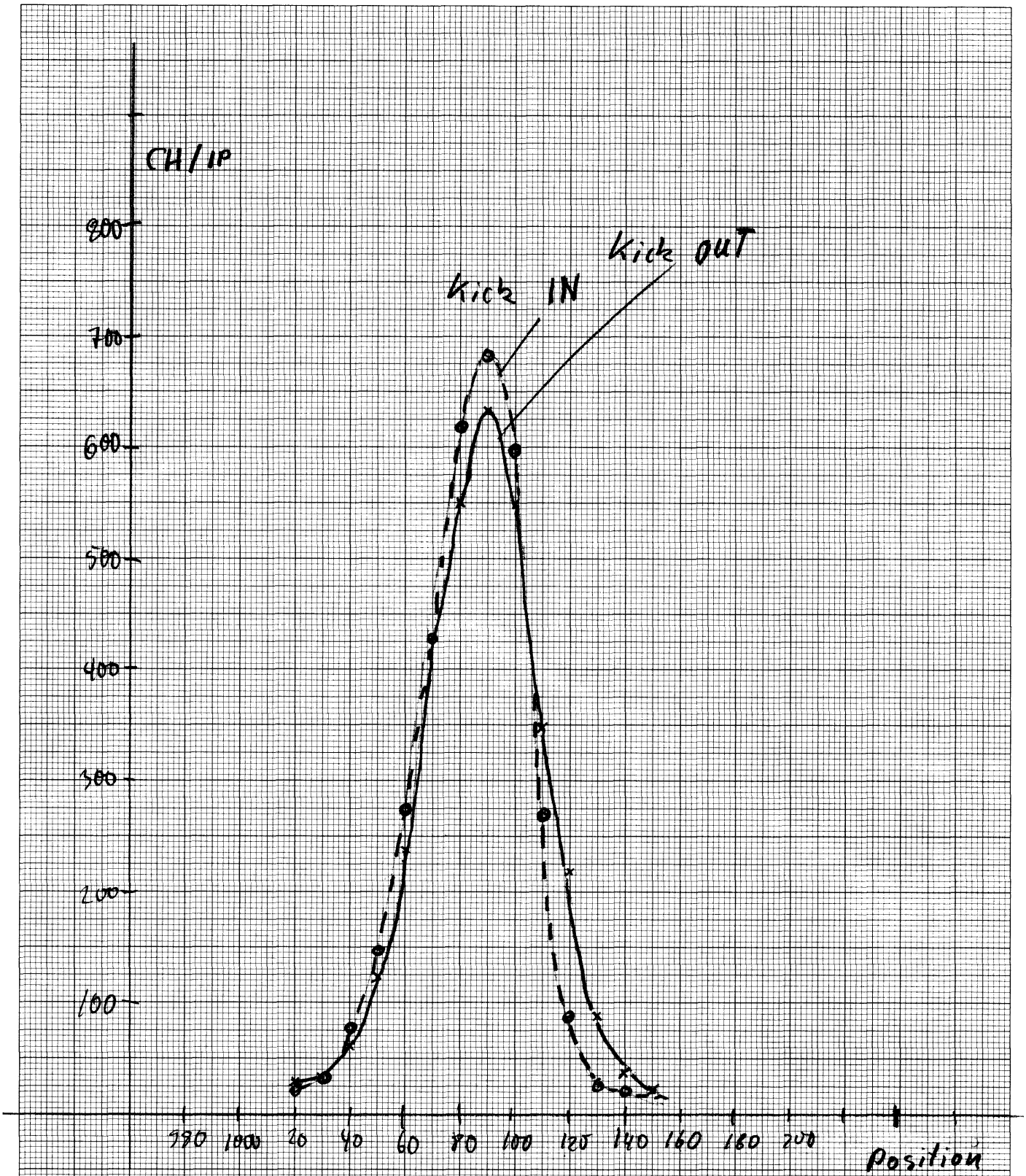
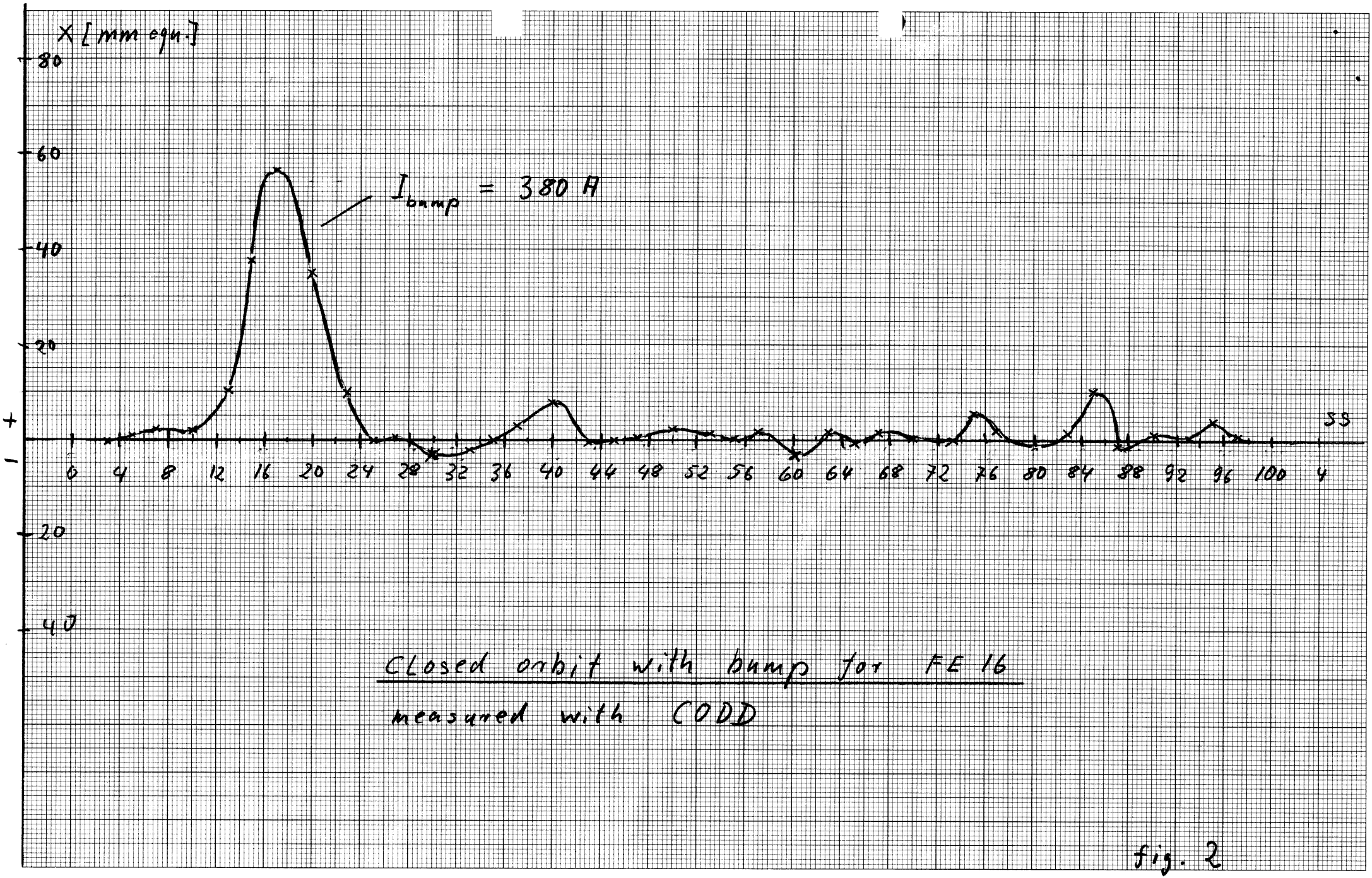


Beam width in Septum 16

measured with minniscanner 16

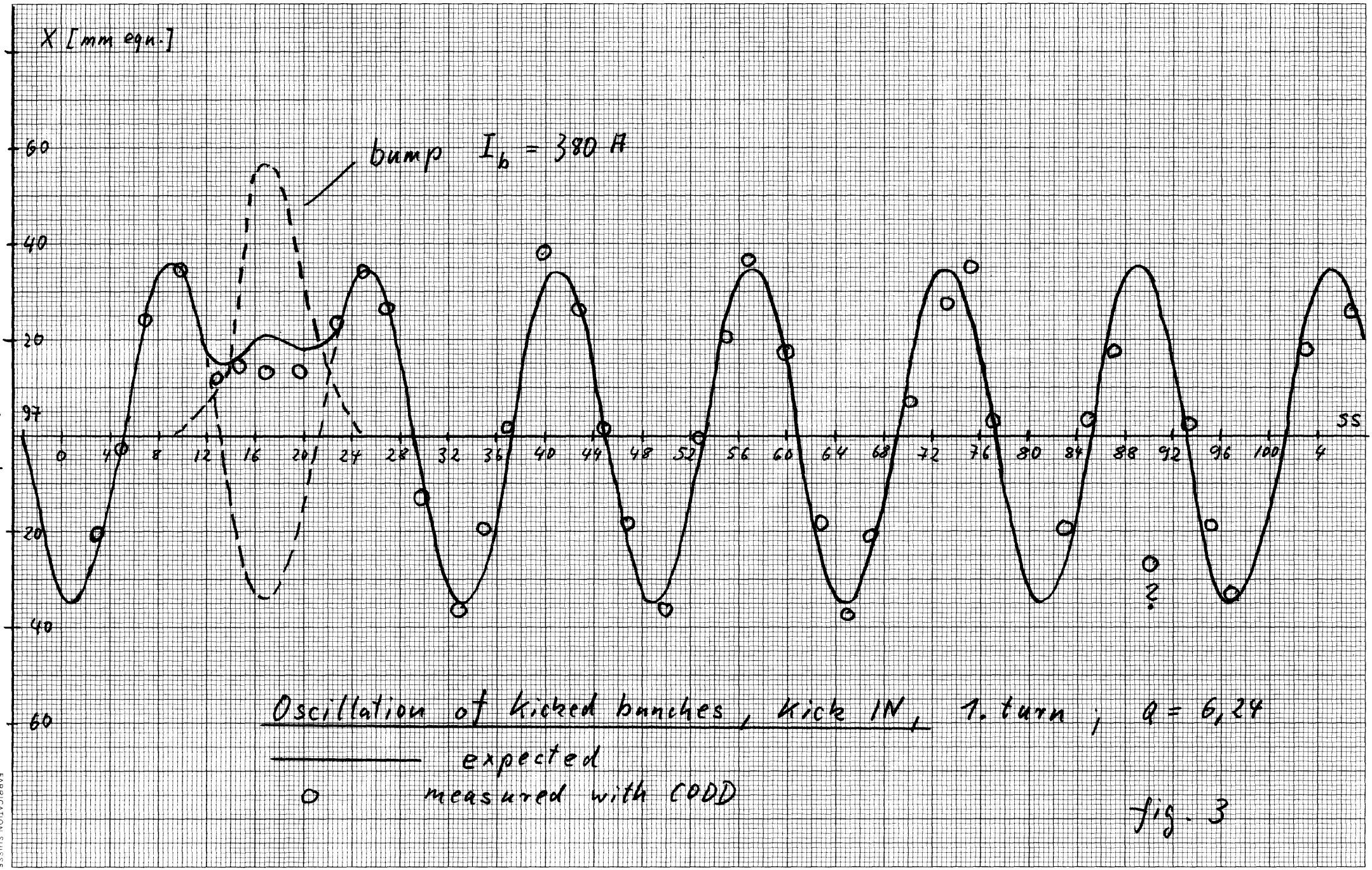
fig. 1



Closed orbit with bump for FE 16

measured with CODD

fig. 2

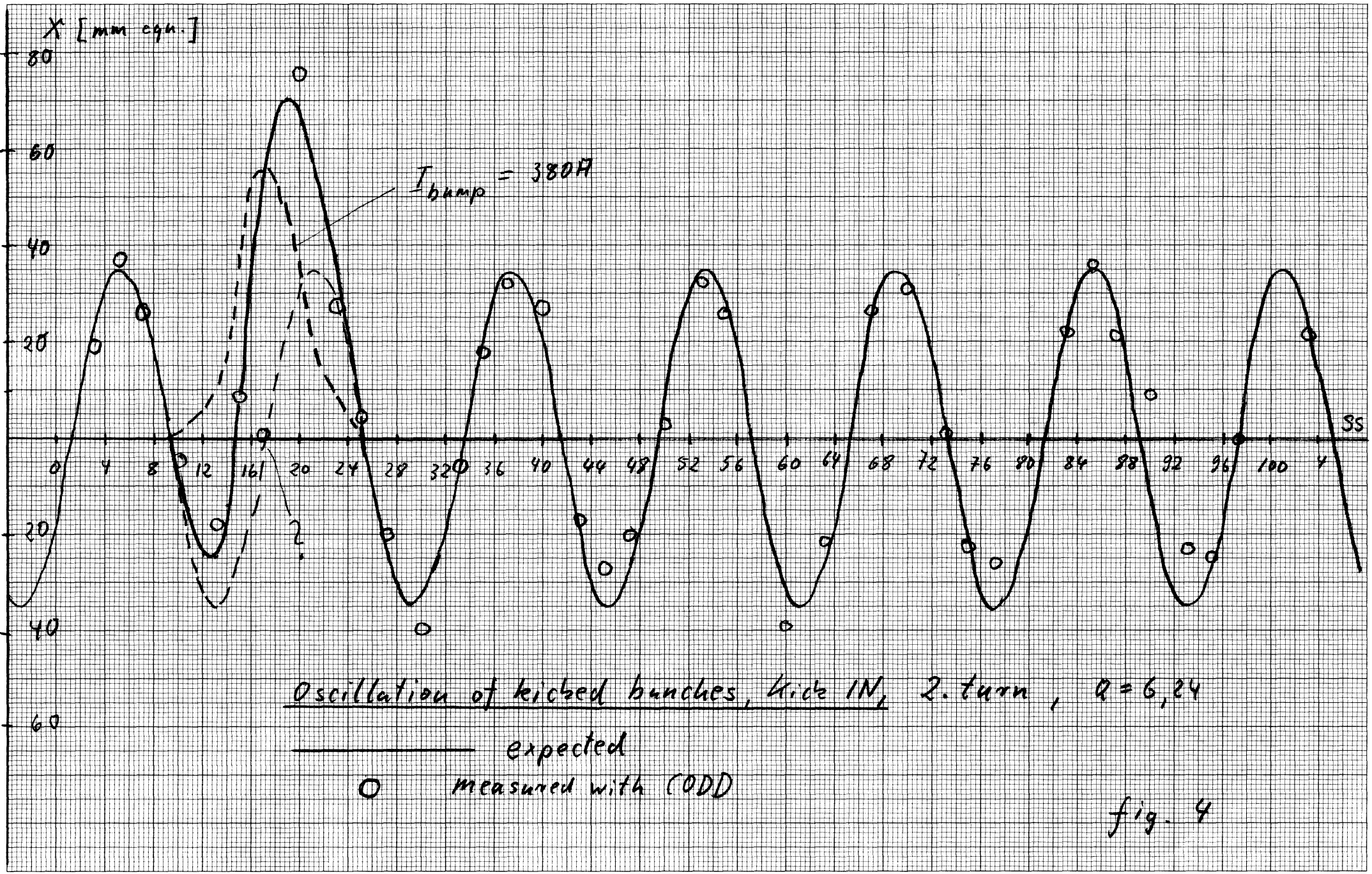


Oscillation of kicked bunches, kick IN, 1. turn, Q = 6,24

——— expected

o measured with CODD

fig. 3



Oscillation of kicked bunches, kick IN, 2. turn, Q = 6,24

——— expected

O measured with CODD

fig. 4

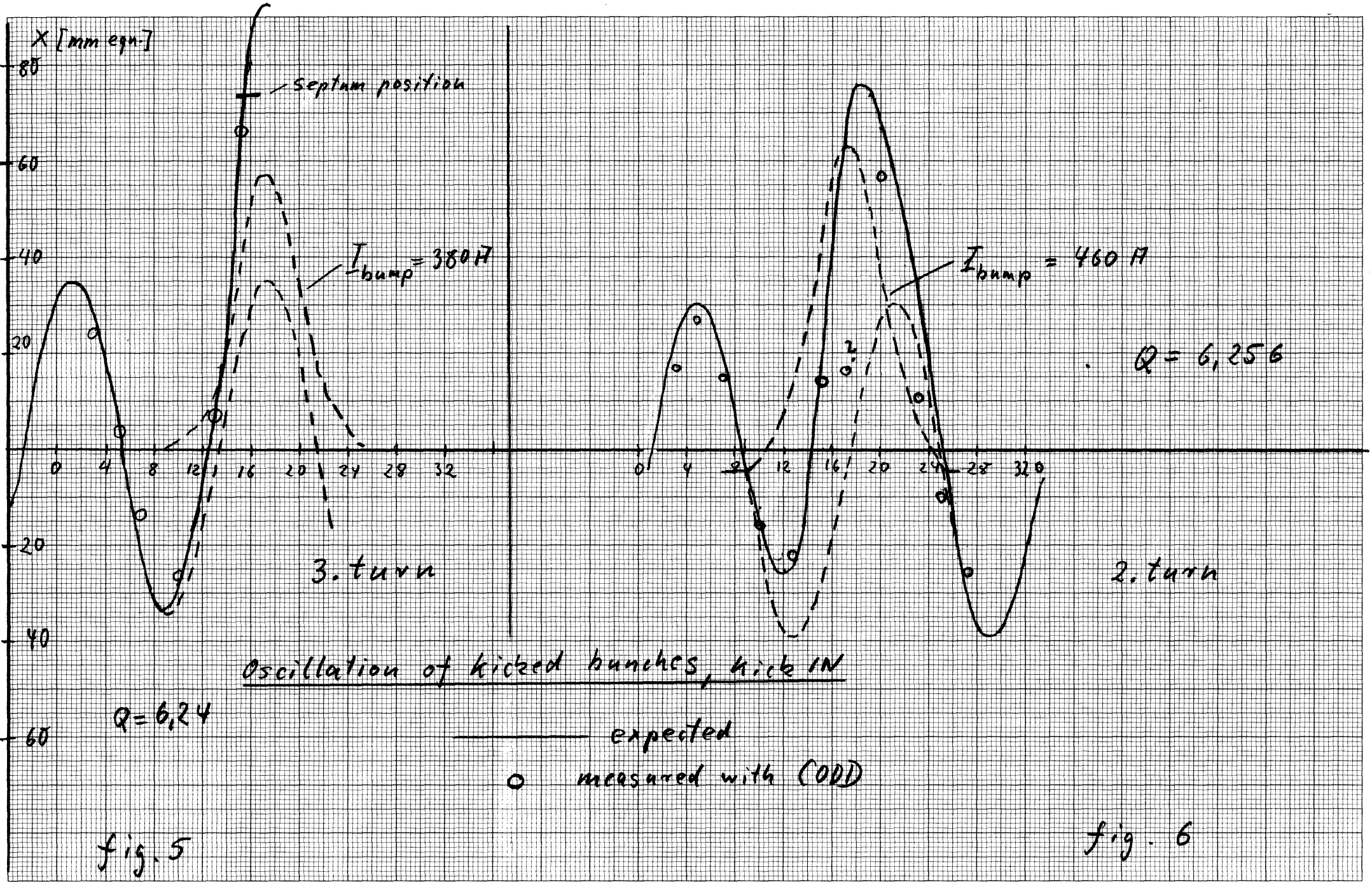


fig. 5

fig. 6