

ISR RUNNING-INRun 99, 20 bunches, 22 GeV, Ring 2.Parasitic experiments on Q-shift in stack

54.5 Hz/mm with r.f. acceleration

560 Hz/V on frequency analogue voltage

1 "HP cm"/V on r.f. scan i.e., 1.025 "HP cm"/real cm.

The original 22 FA working line was shifted by $\Delta Q_H = -0.02$, $\Delta Q_V = +0.035$. The resulting line (measured with r.f. beam displacement) is shown in Fig. 1. Third order resonances occur at +25.3 mm and at +36.3 mm. These two resonances can be clearly seen on the aperture scan Fig. 2 (with the frequency analogue voltage as abscissa). What was less easy, was to identify these resonances (or one of them) in the r.f. scans of stacks.

Fig. 3 shows r.f. scans of a series of stacks of different density and current. If one believed that the two dips marked on the photographs were the same pair of resonances all through (?) one would find that they have the same position in stack 2, 3, 4 (as one would expect), and almost the same in stack 5, but that the lower one has shifted inwards in radius by 3 mm in stack 6 and completely out of the stack in stack 7. Assuming further that the upper dip is the $Q_V = 8\frac{2}{3}$ resonance (?), the 1.5 mm outwards shift would correspond roughly to $\Delta Q_V = -0.003$ (for the 1.8 A of stack 6).

On the other hand, if one compares (Fig. 4) stack 6 with stack 8, which is again at the lowest density but which has been moved by ± 2 mm with the magnetic scanner to widen the dip, hypothetically due to $Q_V = 8\frac{2}{3}$, one finds no measurable Q-shift. The lower dip of stack 8 is unexplained.

The experiment should be repeated under better conditions. Perhaps one should start with 4 bunches which gives clean r.f. scans for clean

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working lines then introduce one or two known resonances and identify them properly on the scan. Only then should one increase the density and current in small steps, perhaps continuing to use 4 bunches and suppressed buckets.

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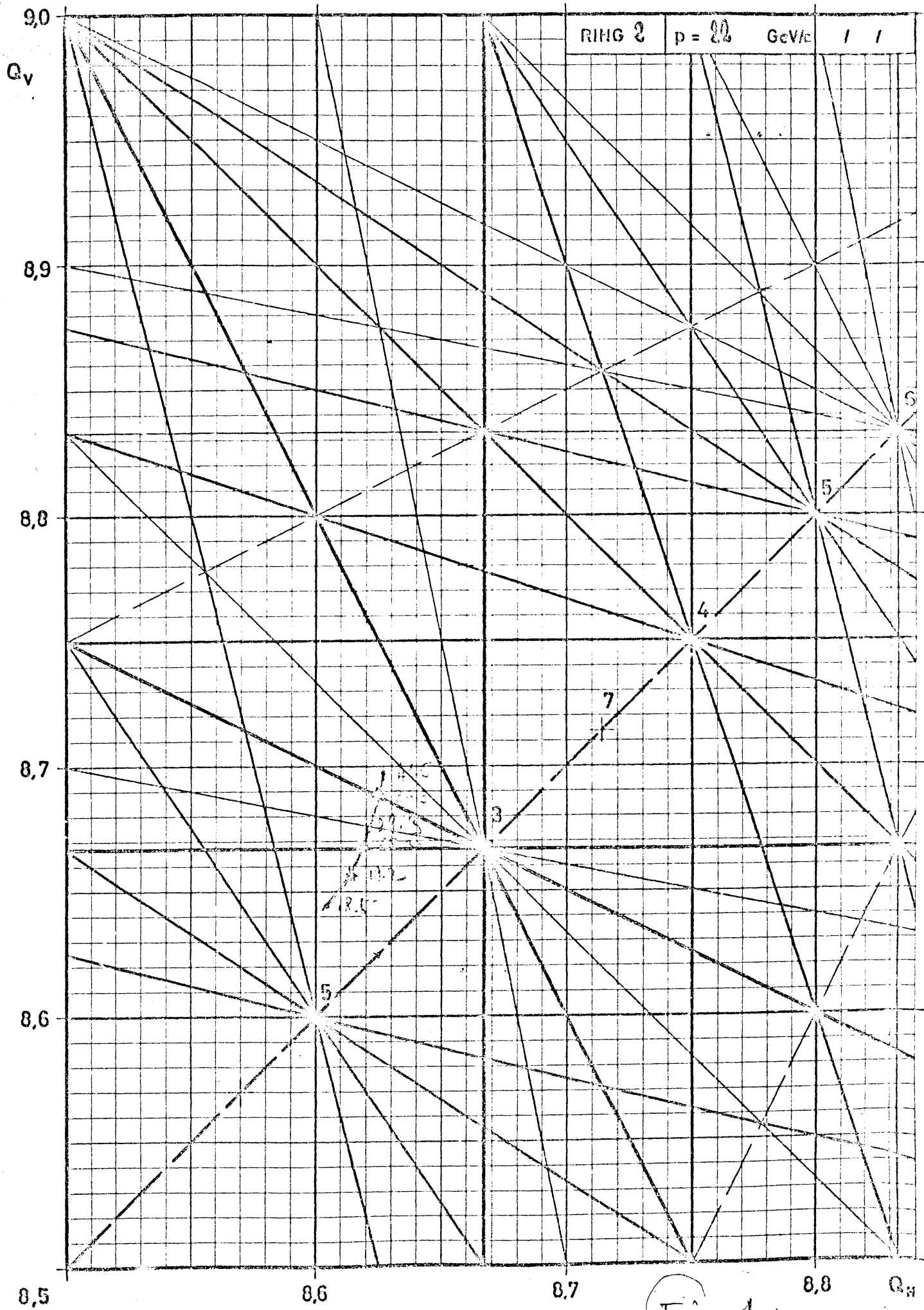
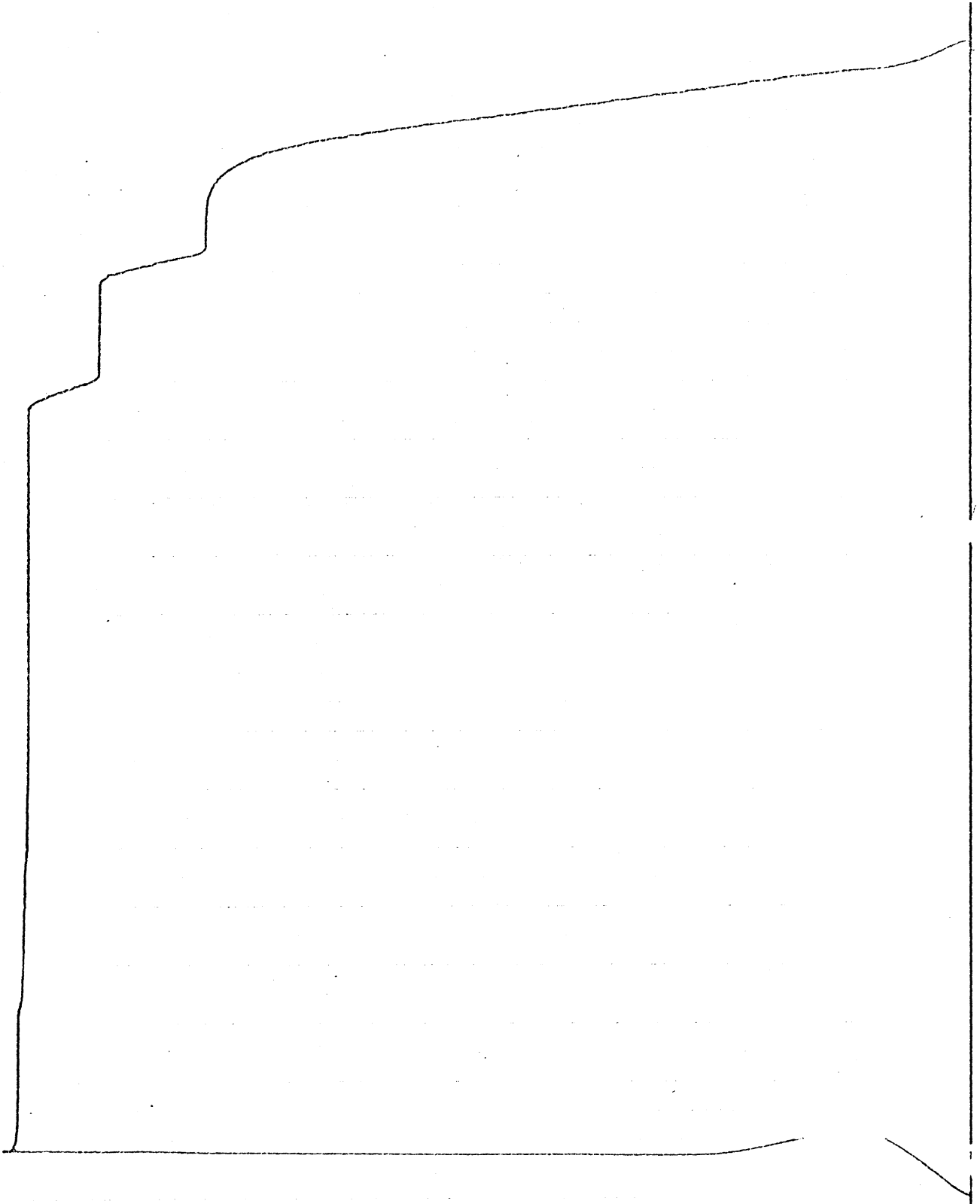


Fig 2





Stack 2
 45 Hz increment
 15 pulses
 1.2 A

12
 10

Stack 3
 45 Hz increment
 12 pulses
 1.0 A

Stack 4
 45 Hz increment
 11 pulses
 0.30 A

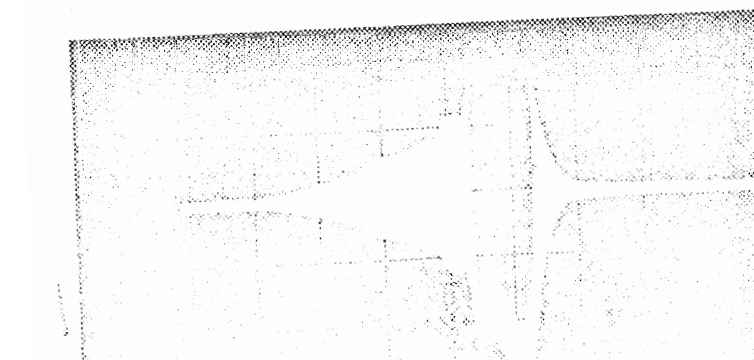
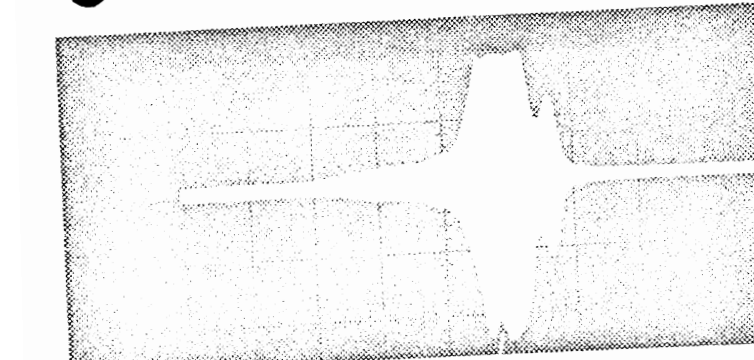
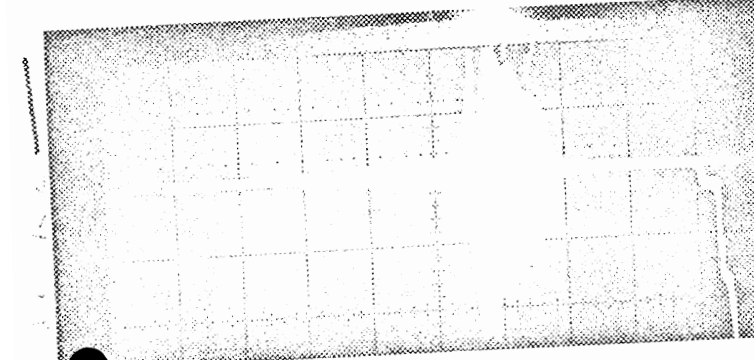
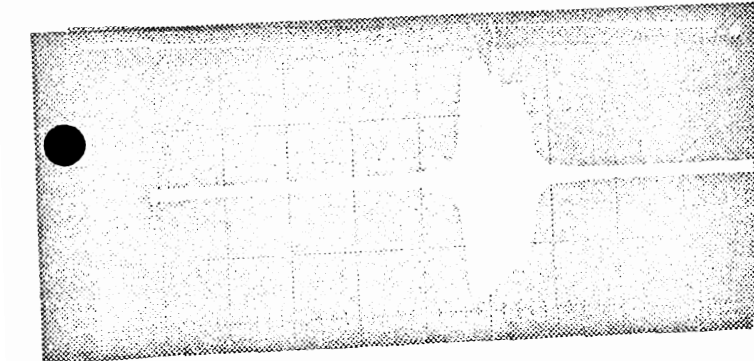
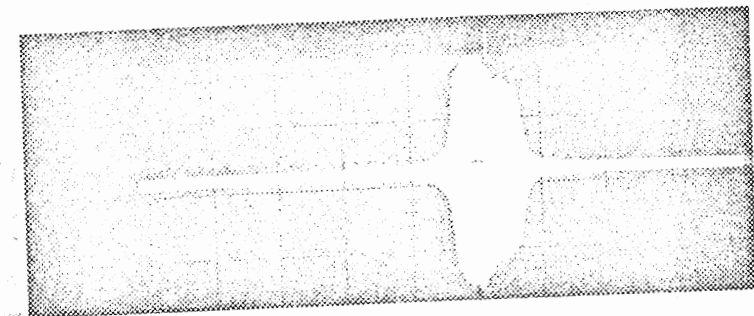
12
 10

Stack 5
 30 Hz increment
 13 pulses
 1.25 A

Stack 6
 22.5 Hz increment
 27 pulses
 1.87 A

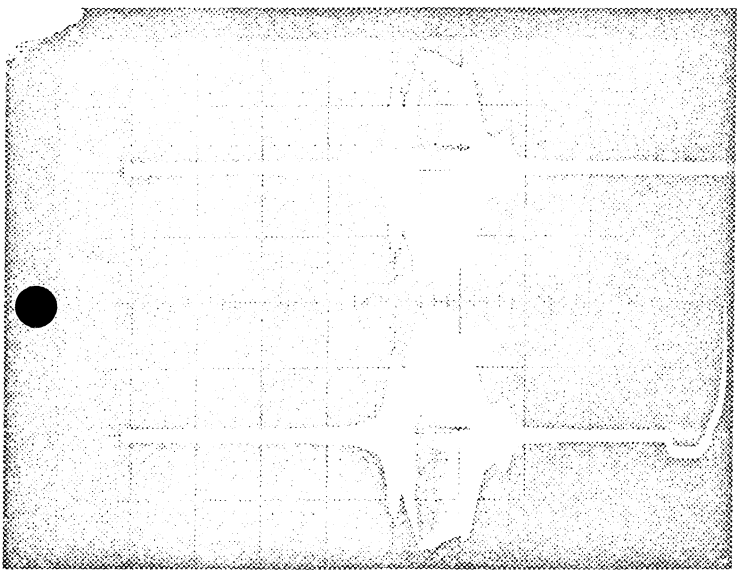
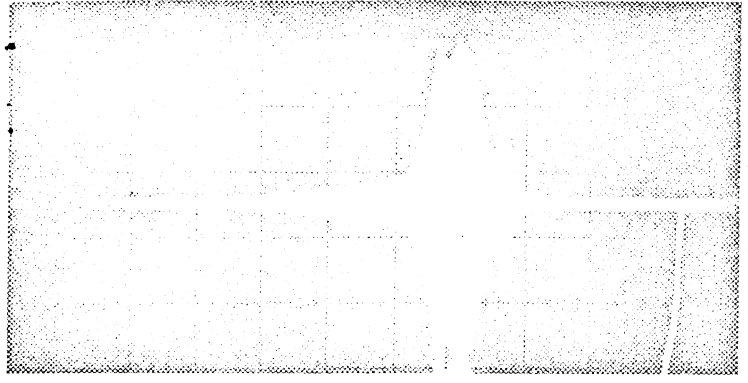
12
 10

Stack 7
 15 Hz increment
 39 pulses
 2.5 A



(Fig 4)

stock 6
as in Fig 3



stock 8
45 Hz increment
20 pulses
1.45 A

stock 8 (by graph on screen)