

AGS Complex Machine Studies (AGS Studies Report No. 291) Stopband Correction of the AGS Booster Observed Loss by 4th Resonance	
Study Period:	April 19, May 12, 1993
Participants:	C. Gardner, Y. Shoji, C. Whalen
Reported by:	Y. Shoji
Machine:	April 19: User 3; MMPS: high dB/dt injection; low intensity May 12: User3; MMPS: with 1.7 kG flat-porch; low intensity (middle 5 turns, 60 degrees)
Aim:	To see the beam loss by 4th resonances and to know how effective they are.

We observed a beam loss by 4th-order resonances with low intensity beam. They were small but they existed and are observable.

I April 19

We looked to see if there was any loss on the $4Q_x=19$ resonance (excited by 19th harmonic octupole). We observed some loss as shown in Fig.1.

II May 12

We observed a beam loss at $Q_x=4.78$ and $Q_y=4.72$, where no strong resonance existed. Fig.2 shows the beam loss v.s. Q_y . The tunes were set flat through the cycle. But it changed from 150ms to 160ms after T0, where dB/dt was changing from 0G/ms to 70G/ms as shown in Fig.3. The beam loss occurred here and at the injection. We didn't have time for more investigation at that time. The beam loss point in the tune space was pointed with black spots in Fig.4. This was thought to be the loss by $2Q_x+2Q_y=19$. The resonance $Q_x+3Q_y=19$ looked weaker than $2Q_x+2Q_y=19$.

FIGURE CAPTIONS

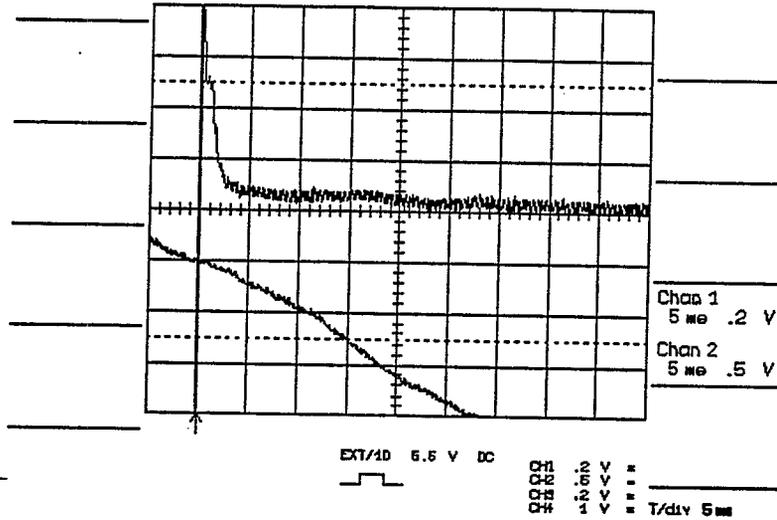
Fig. 1 Beam loss by crossing $4Q_x=19$.

Fig. 2 The beam current dependence on Q_y .

Fig. 3 Measured tune through the cycle. Set values were $Q_x=4.78$ and $Q_y=4.70$.

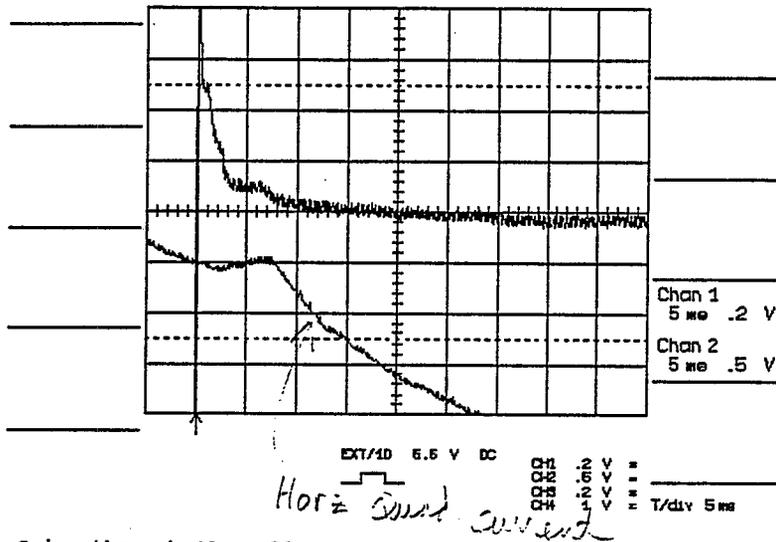
Fig. 4 Location of the observed beam loss in the tune space. The solid lines are 3rd order resonances. The broken lines are 4th order resonances.

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Not going through $4Qx = 19$.

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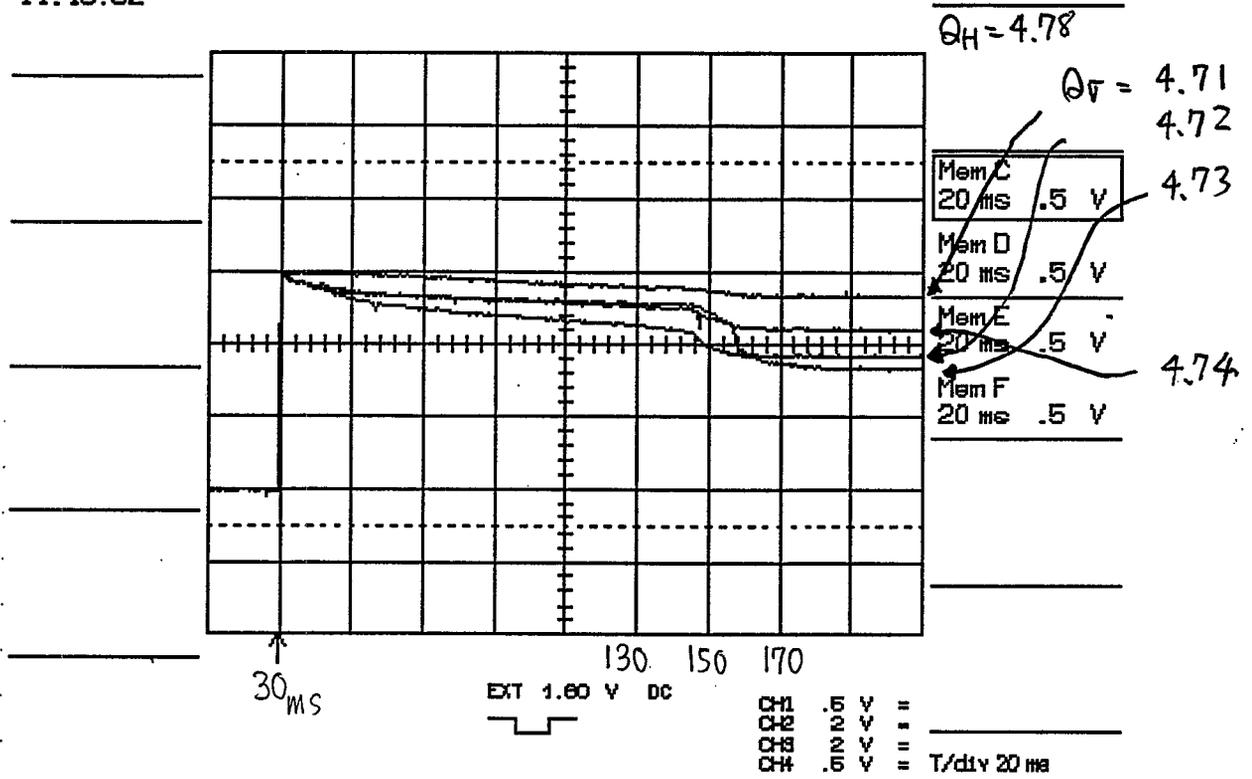


Going through $4Qx = 19$

Fig. 1

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NO or SLOW TRIGGER



$Q_h = 4.78$ $Q_v = 4.71 - 4.74$

Fig. 2

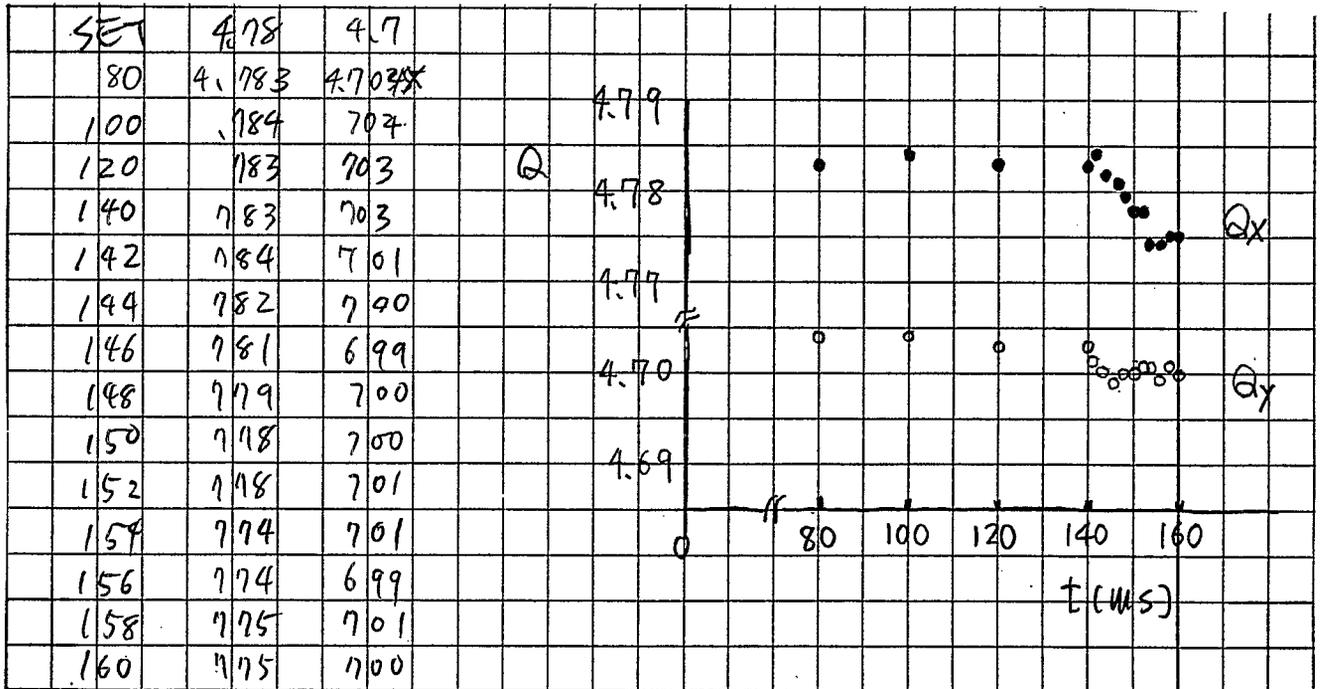


Fig. 3

