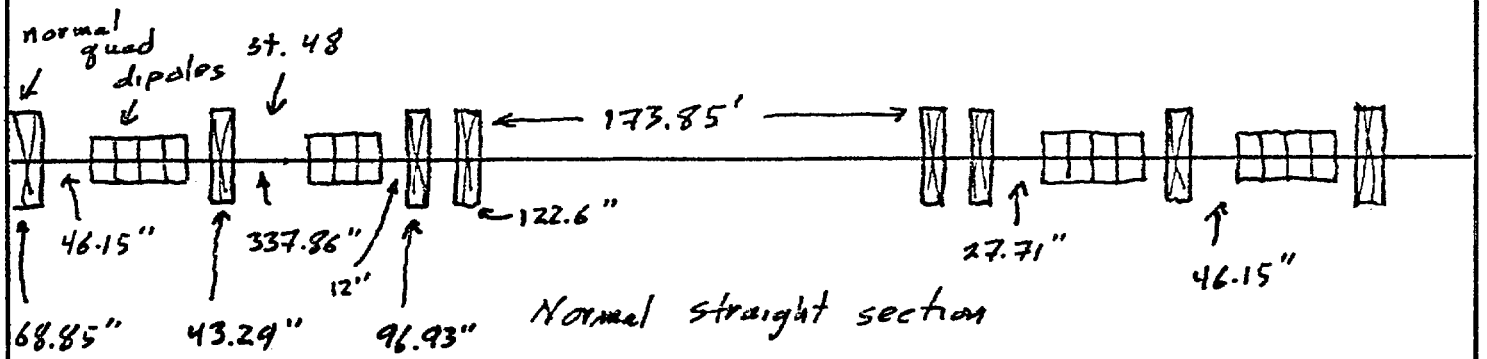
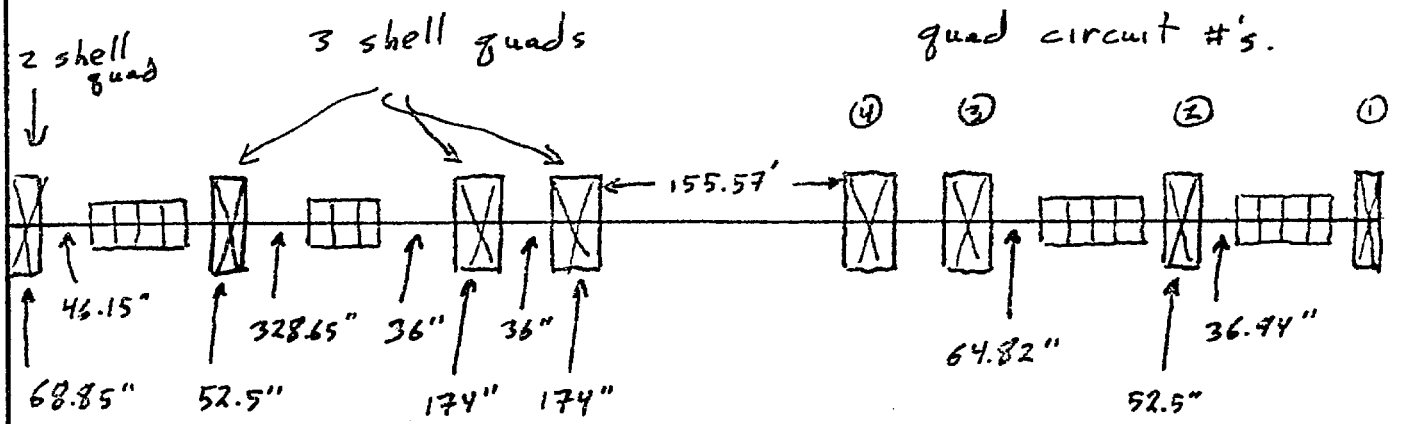
FERMILAB ENGINEERING NOTE	SECTION	PROJECT	SERIAL-CATEGORY	PAGE
			UPC No. 24	1

SUBJECT	NAME	DATE	REVISION DATE
Preliminary Doubler low-β insertion	DE Johnson	11 Dec 78	

A low-β section for the present doubler lattice has been looked into and one is listed below. This, so far, does not include changes of the main part of the doubler in order to keep the tunes constant. Layouts of the normal, and the low-β sections are shown below.



Normal straight section



low-β straight section

SUBJECT: Doubler low-β

NAME: DEJ

DATE: 11 Dec 78

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This insertion uses 4, separately powered quad circuits, # 1-4, antisymmetric across the straight section. The quads are:

Q_1	68.85"	normal, two shell quad.
Q_2	52.5"	special, three shell quad
Q_3	174"	" " " "
Q_4	174"	" " " "

At 1000 GeV, they run at the following strengths:

β^*	Q_1	Q_2	Q_3	Q_4
60 m	-650 Kg/m	812 Kg/m	-511 Kg/m	428 Kg/m
50	-676	863	-549	462
40	-695	913	-603	517
30	-696	955	-674	604
20	-659	972	-758	729
10	-529	880	-842	875
5	-302	657	-877	953
4	-204	563	-883	970
3	-50	440	-887	987
2	192	317	-891	1002
1	633	259	-900	1011

Normal 2-shell quad runs at 729 KG/m = 18.5 KG/in

for the 3-shell quad, 1011 KG/m = 25.7 KG/in

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DATE: 11 Dec 78

REVISION DATE:

Various machine parameters:

β^*	η^*	β_{max}	η_{max}	Q_x	Q_y	ξ_x
60 m	2.15 m	235 m	7.1 m	19.358	19.396	-22
50	1.59	235	7.3	19.399	19.436	-22
38.8	1.31	243	7.5	19.447	19.485	-22
30	—	—	—	unstable		—
20.5	.94	242	8.4	19.556	19.593	-23
10.1	.86	250	9.4	19.598	19.637	-23
4.9	.83	501	10.7	19.618	19.661	-26
3.0	.83	850	12.0	19.649	19.697	-27
1.1	.78	2467	22.0	19.720	19.793	-37

Beam size

β^*	η_x at $\beta_{x\,max}$	β_x at $\eta_{x\,max}$	$\sqrt{\frac{\epsilon_x \beta_x}{\pi} + \left(\eta \frac{\Delta P}{P}\right)^2}$ at β_{max}	" at η_{max}
10.1 m	-.43 m	99 m	± 3.5 mm	± 2.9 mm
4.9	-1.73	95	± 5.0	± 3.1 mm
3.0	-4.3	90	± 6.6	± 3.2
1.1	-22	2467	± 11.9	

for $\epsilon_x = 0.05\pi$ mm-mrad
$\frac{\Delta P}{P} = 0.2‰$ 2×10^{-4} } main ring values at 400 GeV.