Oct 25, 1993 *Same as version D* EXPECTED_TQ8.TABLE6_e

Table 6(e)

Expected values of integral harmonics in 80 mm Tuning Quadrupoles
(used in the insertion region) at 25 Amp (1/4 of full strength) :

[<bn> = mean, d(bn) = uncertainty in mean, sig(bn) = sigma for bn]

n	<bn>	d(bn)	sig(bn)	<an>	d(an)	sig(an)
0	0	25	25	0	50	50
1	0	50	50	0	10	10
2	0	5	5	0	5	5
3	0	25	5	0	25	5
4	0	5	5	0	5	5
5	0.2	5	1	0	5	1
6	0	2	2	0	2	2
7	0	2	2	0	2	2
8	0	2	2	0	2	2
9	-0.7	2	2	0	2	2

Expected harmonics at 50 A (1/2 of full strength):
(Same as above for all harmonics except for)

5	-0.2	5	2
9	-0.8	2	2

Expected harmonics at 100 A (at full strength)
(Same as above except for b5 due to saturation)

5	-0.3	5	2
9	-1.7	2	2

Notes:

0. X in 1st/2nd column of the following lines means that this argument is either not valid any more or not relevant any more. These lines are left here for historical reasons. Similarly, a question mark in the 1st/2nd column of a line would mean that it is under review.

1. This is the first version of table 6, i.e., Table 6(d). Tables 6(a), 6(b) and 6(c) were never created.

2. Since no such magnets are built, these are the estimates only. These numbers come from Pat Thompson. He claims to have found a way to transfer the construction errors in sextupole to the construction errors in the quadrupoles constructed with a similar method.

3. The original table of Pat Thompson contained <b1> of 10,000 (which is the standard definition of harmonics as defined in prime unit). However, in other tables we have set this to zero in an attempt to represent this value as an error, rather than definition. Therefore, to be consistent we are changing Thompson's 10,000 value of <b1> to 0.

4. Thompson's original table gives db1 of 500.
This large value of db1 (500 parts in 10,000 or 5%) represent a large uncertainty in predicting the transfer function now. However, this magnet has an independent power supply and therefore one can change the excitation current to get the desired transfer function. Again after a discussion with the accelerator physicists we change this value from 500 to 50 (or 5% to 0.5% --- 0.5% may be the error in measuring the transfer function), to be consistent with a way this and other tables are used in simulating the field harmonic errors in tracking.

Table 6(e) EXPECTED_TQ8.TABLE6_E