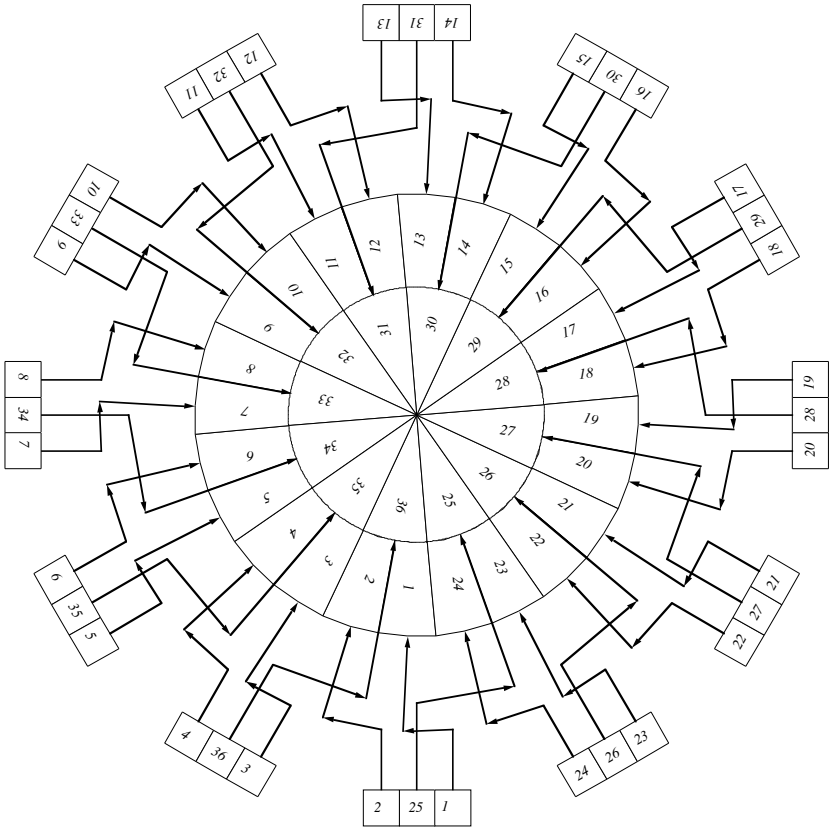
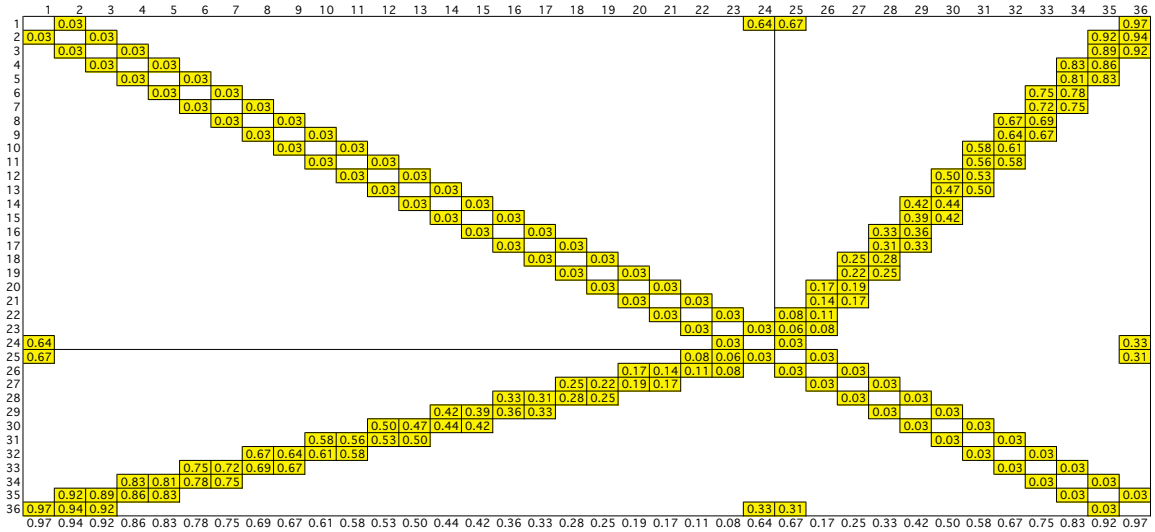
TO: DISTRIBUTION
FROM: C NEUMEYER
SUBJECT: TF TURN-TURN VOLTAGES

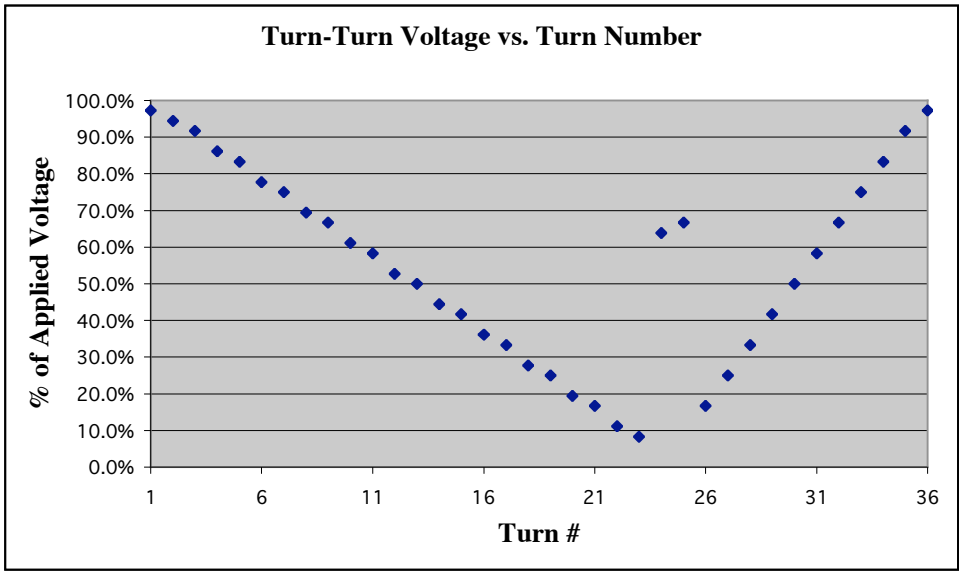
Winding pattern at the top of the machine, viewed from above, is shown in the following figure.



The following matrix shows the voltages between the turns, in per unit of total applied voltage. Row at bottom is the maximum of voltage which turn (identified by column number) faces. Turn 23 sees the minimum turn-turn voltage.

The same result is plotted in the following figure.





Based on these results the following recommendations are made:

1) Following the final ground insulation curing process, low voltage (250V) megger readings should be taken from each turn to the remaining turns jumpered and grounded, to determine the relative leakage currents through the turn insulation.
2) Clocking of center stack, which determines how the turns appear in series sequence, should be optimized so that turns with high leakage readings are placed in positions with minimal turn-turn voltage. Per the results above, turn 23 sees the lowest voltage.
3) Once the clocking plan is established, turn-turn test voltages can be customized based on the series sequence. Since the TF power supply applies E=1kV to the

coil, the base test voltage is 2E+1=3kV. Then, based on the results above, the fraction of the 3kV, and the actual test voltage, to be applied to each turn, with the other turns jumpered and grounded, is given in the following table.

Turn	Vfraction	Vtest
1	0.972	2917
2	0.944	2833
3	0.917	2750
4	0.861	2583
5	0.833	2500
6	0.778	2333
7	0.75	2250
8	0.694	2083
9	0.667	2000
10	0.611	1833
11	0.583	1750
12	0.528	1583
13	0.5	1500
14	0.444	1333
15	0.417	1250
16	0.361	1083
17	0.333	1000
18	0.278	833
19	0.25	750
20	0.194	583
21	0.167	500
22	0.111	333
23	0.083	250
24	0.639	1917
25	0.667	2000
26	0.167	500
27	0.25	750
28	0.333	1000
29	0.417	1250
30	0.5	1500
31	0.583	1750
32	0.667	2000
33	0.75	2250
34	0.833	2500
35	0.917	2750
36	0.972	2917

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