The AEC doughterboard of R306.3x “ENDEAVOUR” is equipped with 6 new trimpot to extend the adjustable range of dominants balance.
The resistance value of dominant gain is 20k Ohm for a compensation of 25% around the average point.
Factory default compensation if 10k Ohm, this will provide a range of ±12.5%.
The compensation process used for this test is the following:

MECHANICAL CHECK

Distance FOCUS <-> SEMICONDUCTOR CHAMBER = 1m;
The dose measuring chamber used is a semiconductor type, 3 dominants, from Comet;
The dose measuring chamber is mounted in a 1m focus moving grid bucky;
The collimator is lighting a 30cm X 30 cm area centered in the center of AEC chamber;
No film, no screen below the dose measuring chamber
To check the alignment of the system we shadowed 1 dominant a time to get the same result in 0° and 90° tube rotation, until we got the same result for the same dominant in the 2 position.
The dose measuring chamber was not insulated from the bucky and the cable shield was connected to the MCU assembly (according to on-filed experience, in particulary noisy installation sometimes is needed to insulate the chamber from the bucky using insulating tape and/or disconnecting the cable shiled to mcu frame ground, - thanks to Mr. Tommy McGovern and Mr. Sandro Preti for their suggestions).

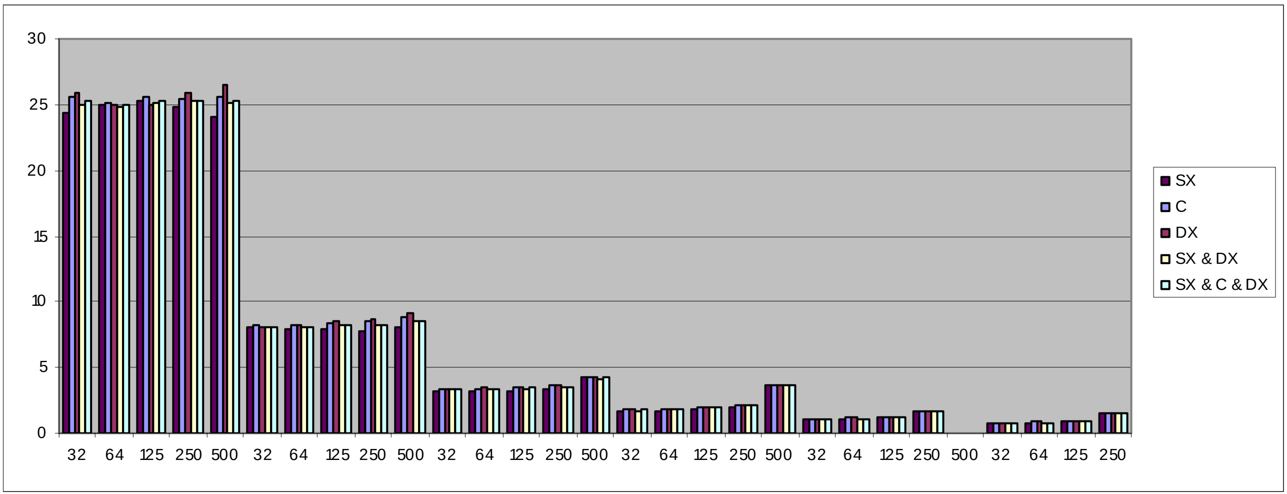
DOMINANT BALANCING

We used a 40cm X 40cm plate of copper 1mm thickness
The starting reference value for the 3 dominants is the value read of the SX + C + DX mAs readout.
We used 70kV – 125mA to get a value of about 8mAs with a time of about 64ms setting AEC gain of “4000”.
Value consideration:

This gain will assure a 2..80 mAs interval range in validation test with 20cm of water
The 125mA will assure in 8mAs a value longer than measuring saturation check time.

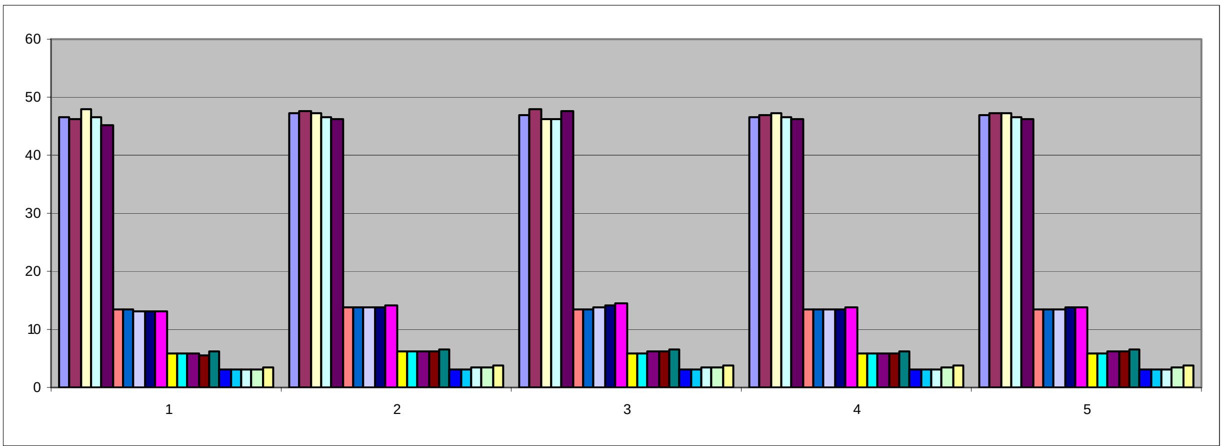
The resistance value after calibration was: SX = 10.67 k Ohm; C = 12.56 k Ohm; DX = 8.97 k Ohm
Test result follows

kV	mA	SX	C	DX	SX + DX	SX + C + DX		NOTE
60	32	24,35	25,63	25,91	25,03	25,27		
60	64	24,91	25,15	24,95	24,83	24,95		
60	125	25,35	25,55	24,95	25,15	25,27		
60	250	24,75	25,39	25,87	25,31	25,35		
60	500	24,03	25,51	26,43	25,15	25,27		
70	32	8	8,199	8	8,039	8,117		
70	64	7,957	8,238	8,199	8,117	8,117		
70	125	7,878	8,316	8,476	8,199	8,199		
70	250	7,796	8,476	8,679	8,238	8,277		
70	500	8,039	8,757	9,078	8,558	8,558		
80	32	3,238	3,359	3,359	3,277	3,316		
80	64	3,199	3,398	3,437	3,277	3,316		
80	125	3,199	3,476	3,519	3,359	3,437		
80	250	3,359	3,597	3,679	3,476	3,558		
80	500	4,199	4,238	4,277	4,156	4,199		
90	32	1,718	1,839	1,796	1,718	1,796		
90	64	1,679	1,878	1,878	1,796	1,839		
90	125	1,839	1,957	2	1,917	1,917		
90	250	2	2,156	2,117	2,078	2,078		
90	500	3,636	3,636	3,597	3,636	3,636	6.6ms	SAT
100	32	1,039	1,117	1,117	1,078	1,078		
100	64	1,078	1,156	1,156	1,117	1,117		
100	125	1,156	1,238	1,277	1,199	1,199		
100	250	1,636	1,679	1,679	1,636	1,636	6.6ms	SAT
100	500							
110	32	0,7578	0,7968	0,7978	0,7578	0,7578		
110	64	0,7578	0,8398	0,8398	0,7578	0,7968		
110	125	0,8789	0,9179	0,9179	0,8789	0,9179	6.6ms	SAT
110	250	1,558	1,597	1,476	1,558	1,519	5.5ms	SAT



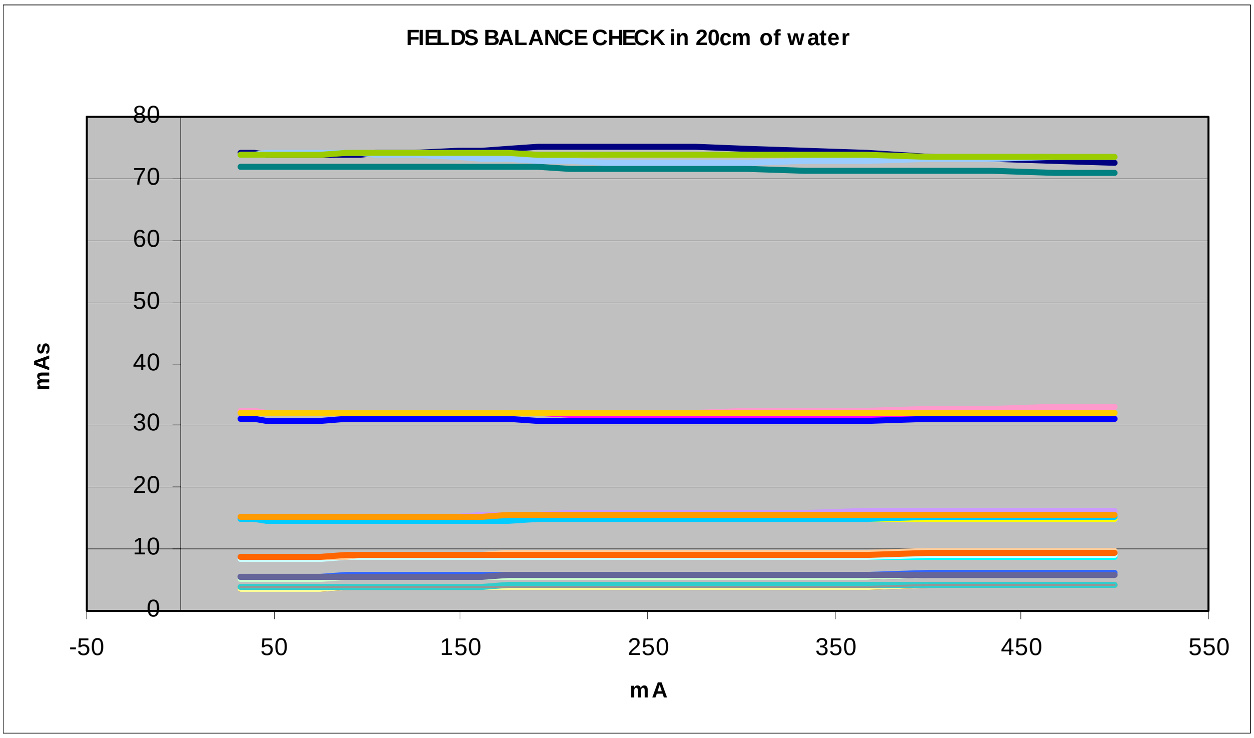
The balance verification have been performed with 2 mm of copper:

kV	mA	SX	C	DX	SX + DX	SX + C + DX
70	32	46,71	47,27	46,91	46,71	46,87
70	64	46,23	47,71	47,91	47	47,19
70	125	47,83	47,27	46,31	47,11	47,15
70	250	46,55	46,67	46,07	46,39	46,39
70	500	45,31	46,15	47,47	46,31	46,31
80	32	13,55	13,79	13,47	13,55	13,59
80	64	13,55	13,79	13,47	13,51	13,59
80	125	13,27	13,75	13,67	13,51	13,59
80	250	13	13,87	14,03	13,55	13,69
80	500	13,23	14,27	14,63	13,91	13,95
90	32	5,875	6,078	5,878	5,839	5,917
90	64	5,757	6,039	5,957	5,878	5,917
90	125	5,757	6,199	6,238	6	6,078
90	250	5,679	6,238	6,277	6	6,039
90	500	6,078	6,558	6,636	6,316	6,437
100	32	2,957	3,177	3,078	3,039	3,039
100	64	2,957	3,199	3,156	3,078	3,078
100	125	3,039	3,316	3,316	3,156	3,199
100	250	3,078	3,398	3,437	3,277	3,277
100	500	3,558	3,796	3,796	3,679	3,718



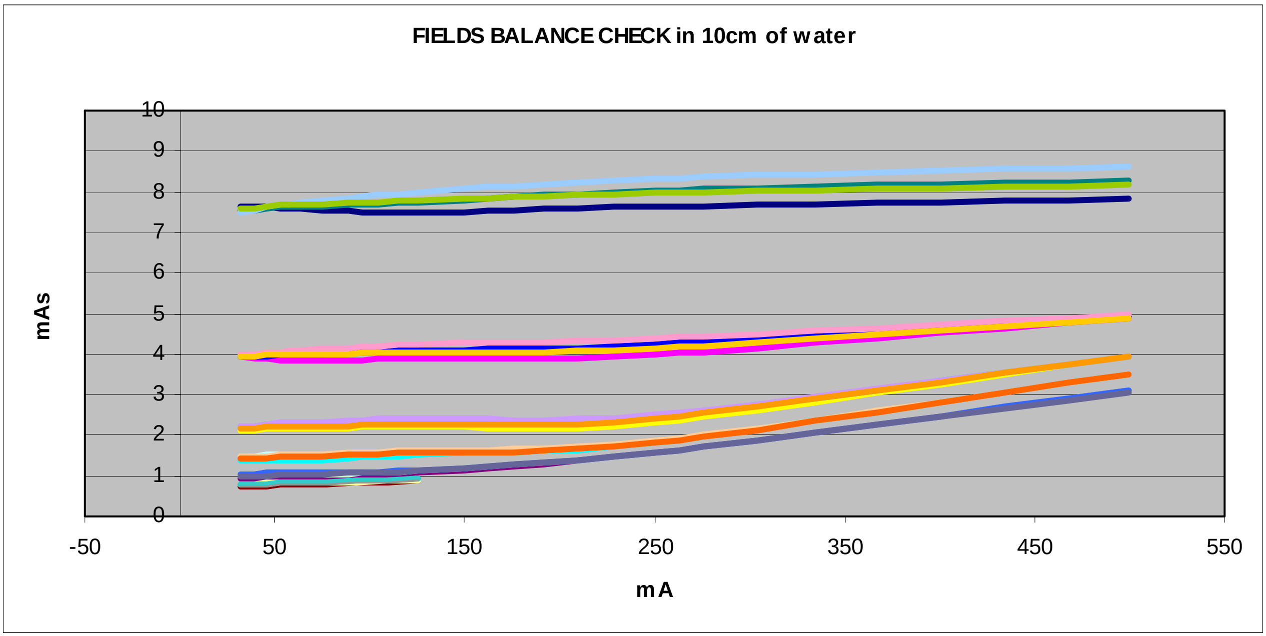
The validation has been performed using 20cm of water:

kV	mA	SX	C	DX	SX + DX	SX + C + DX
60	32	74,04	71,91	73,75	73,87	72,87
60	63	73,75	71,95	74,19	73,87	73,19
60	125	74,31	71,95	73,83	74,07	73,39
60	250	75,23	71,47	72,67	73,87	73
60	500	72,67	70,83	73,67	73,47	72,31
70	32	32,07	31,19	32,31	32,15	31,83
70	63	32	30,91	32,11	32,03	31,63
70	125	32,07	31,11	31,91	32,19	31,83
70	250	31,67	30,71	32,11	31,91	31,47
70	500	31,19	31	33,07	32,11	31,75
80	32	15,35	14,75	15,31	15,27	15,07
80	63	15,31	14,71	15,27	15,31	15,07
80	125	15,19	14,63	15,35	15,23	15
80	250	14,95	14,75	15,83	15,39	15,15
80	500	14,95	15,15	16,19	15,55	15,47
90	32	8,839	8,476	8,796	8,796	8,718
90	63	8,796	8,519	8,839	8,839	8,718
90	125	8,757	8,597	9,156	8,917	8,796
90	250	8,636	8,636	9,277	8,917	8,878
90	500	8,878	9	9,636	9,238	9,117
100	32	5,48	5,28	5,48	5,48	5,44
100	63	5,44	5,28	5,6	5,48	5,44
100	125	5,44	5,4	5,8	5,6	5,56
100	250	5,48	5,52	5,91	5,68	5,6
100	500	5,7	5,8	6,1	5,9	5,88
110	32	3,718	3,636	3,796	3,757	3,679
110	63	3,718	3,636	3,878	3,796	3,718
110	125	3,757	3,757	4	3,839	3,839
110	250	3,839	3,878	4,117	3,957	3,917
110	500	4,078	4,117	4,359	4,199	4,156



To check the response we tested with 10cm of water:

kV	mA	SX	C	DX	SX + DX	SX + C + DX
60	32	7,636	7,558	7,476	7,597	7,636
60	64	7,597	7,636	7,718	7,679	7,636
60	125	7,476	7,757	7,957	7,796	7,796
60	250	7,636	8,039	8,316	7,957	8
60	500	7,839	8,277	8,597	8,156	8,238
70	32	3,957	3,957	4	3,957	3,917
70	64	3,839	4	4,078	4	3,957
70	125	3,878	4,078	4,238	4,039	4,039
70	250	4	4,238	4,398	4,156	4,117
70	500	4,878	4,917	4,957	4,878	4,878
80	32	2,117	2,238	2,238	2,156	2,199
80	64	2,156	2,277	2,316	2,199	2,238
80	125	2,199	2,316	2,437	2,277	2,277
80	250	2,316	2,476	2,519	2,437	2,437
80	500	3,917	3,917	3,917	3,957	3,917
90	32	1,398	1,476	1,476	1,437	1,437
90	64	1,398	1,519	1,519	1,476	1,476
90	125	1,519	1,597	1,636	1,558	1,558
90	250	1,839	1,839	1,878	1,839	1,878
90	500	3,476	3,519	3,519	3,519	3,476
100	32	0,957	1,039	1,039	1	1
100	64	1	1,039	1,078	1,039	1,039
100	125	1,078	1,156	1,156	1,117	1,117
100	250	1,597	1,597	1,597	1,597	1,597
100	500	3,117	3,117	3,117	3,078	3,078
110	32	0,7187	0,7968	0,7968	0,7578	0,7578
110	64	0,7968	0,8398	0,8398	0,7968	0,7968
110	125	0,8789	0,8789	0,9179	0,8789	0,8789



NOTE
For High kV, lo mAs, there were a saturation phenomena in High mA radiography, this is the reason on the high increasing trend of the lo west curves, comparing the 20cm of Water characteristic and this one.
To avoid the possibility to fall into this problem we suggest to use the 1 Point technique choosing a curve that give a good compromise between time and current vs high voltage.

We drawn also Dose vs High Voltage diagram to check the validity of the standard compensation curve fit in navigator software, computed on fixed film darkess at radiography parameters change, confirming the tendency of doubling the dose every 10kV:

kV	mA	SX	C	DX	SX + DX	SX + C + DX
60	32	74,04	71,91	73,75	73,87	72,87
60	63	73,75	71,95	74,19	73,87	73,19
60	125	74,31	71,95	73,83	74,07	73,39
60	250	75,23	71,47	72,67	73,87	73
60	500	72,67	70,83	73,67	73,47	72,31
70	32	32,07	31,19	32,31	32,15	31,83
70	63	32	30,91	32,11	32,03	31,63
70	125	32,07	31,11	31,91	32,19	31,83
70	250	31,67	30,71	32,11	31,91	31,47
70	500	31,19	31	33,07	32,11	31,75
80	32	15,35	14,75	15,31	15,27	15,07
80	63	15,31	14,71	15,27	15,31	15,07
80	125	15,19	14,63	15,35	15,23	15
80	250	14,95	14,75	15,83	15,39	15,15
80	500	14,95	15,15	16,19	15,55	15,47
90	32	8,839	8,476	8,796	8,796	8,718
90	63	8,796	8,519	8,839	8,839	8,718
90	125	8,757	8,597	9,156	8,917	8,796
90	250	8,636	8,636	9,277	8,917	8,878
90	500	8,878	9	9,636	9,238	9,117
100	32	5,48	5,28	5,48	5,48	5,44
100	63	5,44	5,28	5,6	5,48	5,44
100	125	5,44	5,4	5,8	5,6	5,56
100	250	5,48	5,52	5,91	5,68	5,6
100	500	5,7	5,8	6,1	5,9	5,88
110	32	3,718	3,636	3,796	3,757	3,679
110	63	3,718	3,636	3,878	3,796	3,718
110	125	3,757	3,757	4	3,839	3,839
110	250	3,839	3,878	4,117	3,957	3,917
110	500	4,078	4,117	4,359	4,199	4,156