

PBAR NOTE 579
4-8 GHZ DEBUNCHER UPGRADE ARRAY DIMENSIONS

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Name	First index is the cell location Second index designates which quarter cell for a kicker or which half cell for a pickup. The number starts from upstream to downstream Third index designates which plane (H=Horz. V=Vert.) and whether it is a kicker (KR) or a pickup (PU) Fourth index designates which band (1=low freq. 4=high freq) and which sub-band(C=center for kicker, L=lower band, U=upperband)
Cell	There are 8 cells in a sector
Plane	Either Horizontal (H) or Vertical (V)
pick/kick location	Either a pickup (PU) or a kicker (KR) Which quarter cell for a kicker or which half cell for a pickup. The number starts from upstream to downstream.
Band	1=low freq. to 4=high freq
Sub-band	C=center for kicker, L=lower band, U=upperband
Center	The center frequency for the band
Span	The span of the band.
A	The output waveguide width
B	The output waveguide height
W	The width of the beam pipe aperture
HC	The height of the beam pipe aperture in the center of the array. The array is defined just where the slots are.
DH	The change in height of the beam pipe along the length of the array.
L	The length of the array. (only including the slots)
XC	The center of the array referenced from the center of the cell.
C1,C2, C3 Beta W	The beta functions along the length of the array where Beta = $C1*x*x + C2*x + C3$ where x is measured from the center of the array W indicates for the width direction, H indicates the height direction.

Table 1. Naming Conventions

1	No half cell tanks
2	To minimize timing lengths sub-bands of the same plane and band should be close to each other.
3	Sub-bands of a given plane must be located in the same cell to keep phase advance error small.
4	Horz. and vert. Bands must be in either the same upstream or downstream section for time savings in the momentum system
5	First pickup tank must be horizontal for mininum interference in the D/A line
6	Low frequency bands should be located in high beta of the plane they are trying to pickup or kick

Table 2. Location Constraints

Sector Name	Band Number	Orientation	A mm	B mm	w mm	h (up) mm	h (down) mm	Delta h mm
1	2	H	47.498	13.589	42.291	48.641	29.210	-19.431
2	2	V	47.498	13.589	40.005	43.561	30.226	-13.335
3	1	V	58.166	16.764	40.513	31.369	48.006	16.637
4	1	H	58.166	16.764	48.387	30.988	49.149	18.161
5	4	H	34.798	10.033	43.561	40.005	27.051	-12.954
6	4	V	34.798	10.033	48.641	42.291	25.400	-16.891
7	3	V	40.386	11.557	49.276	25.400	42.672	17.272
8	3	H	40.386	11.557	44.069	31.369	45.466	14.097

Table 3. Cell End Dimensions in mm.

Sector Name	Band Number	Orientation	A inches	B inches	w inches	h up inches	h down inches	Delta h inches
1	2	H	1.870	0.535	1.665	1.915	1.150	-0.765
2	2	V	1.870	0.535	1.575	1.715	1.190	-0.525
3	1	V	2.290	0.660	1.595	1.235	1.890	0.655
4	1	H	2.290	0.660	1.905	1.220	1.935	0.715
5	4	H	1.370	0.395	1.715	1.575	1.065	-0.510
6	4	V	1.370	0.395	1.915	1.665	1.000	-0.665
7	3	V	1.590	0.455	1.940	1.000	1.680	0.680
8	3	H	1.590	0.455	1.735	1.235	1.790	0.555

Table 4. Cell End Dimensions in inches

Band Name	Start GHz	Stop GHz	Center GHz	Span GHz
1C	3.800	4.900	4.350	1.100
1L	3.800	4.500	4.150	0.700
1U	4.200	4.900	4.550	0.700
2C	4.700	5.800	5.250	1.100
2L	4.700	5.400	5.050	0.700
2U	5.000	5.800	5.400	0.800
3C	5.600	7.000	6.300	1.400
3L	5.600	6.500	6.050	0.900
3U	6.100	7.000	6.550	0.900
4C	6.800	8.200	7.500	1.400
4L	6.800	7.700	7.250	0.900
4U	7.300	8.200	7.750	0.900

Table 5. Frequency Bands

Cell	C1 Beta Horz	C2 Beta Horz	C3 Beta Horz	C1 Beta Vert	C2 Beta Vert	C3 Beta Vert
0	m/mm**2	m/mm	m	m/mm**2	m/mm	m
1	4.0724E-07	-3.3192E-03	9.2189	3.7918E-07	2.5233E-03	6.8354
2	2.8544E-07	1.9100E-03	6.6987	2.6130E-07	-2.1496E-03	8.2481
3	2.4586E-07	-1.7617E-03	7.2235	3.2398E-07	2.9108E-03	9.6247
4	3.6091E-07	3.1897E-03	9.8186	2.8455E-07	-2.7525E-03	10.1707
5	2.8543E-07	-1.9100E-03	6.6988	2.6130E-07	2.1496E-03	8.2481
6	4.0724E-07	3.3191E-03	9.2186	3.7917E-07	-2.5234E-03	6.8356
7	3.2796E-07	-3.0600E-03	10.1871	3.8484E-07	2.5890E-03	6.9528
8	2.6964E-07	2.3841E-03	8.9786	2.5099E-07	-2.1504E-03	8.5902

Table 6. The beta functions along the length of the array where $Beta = C1*x*x + C2*x + C3$ where x is measured from the center of the cell

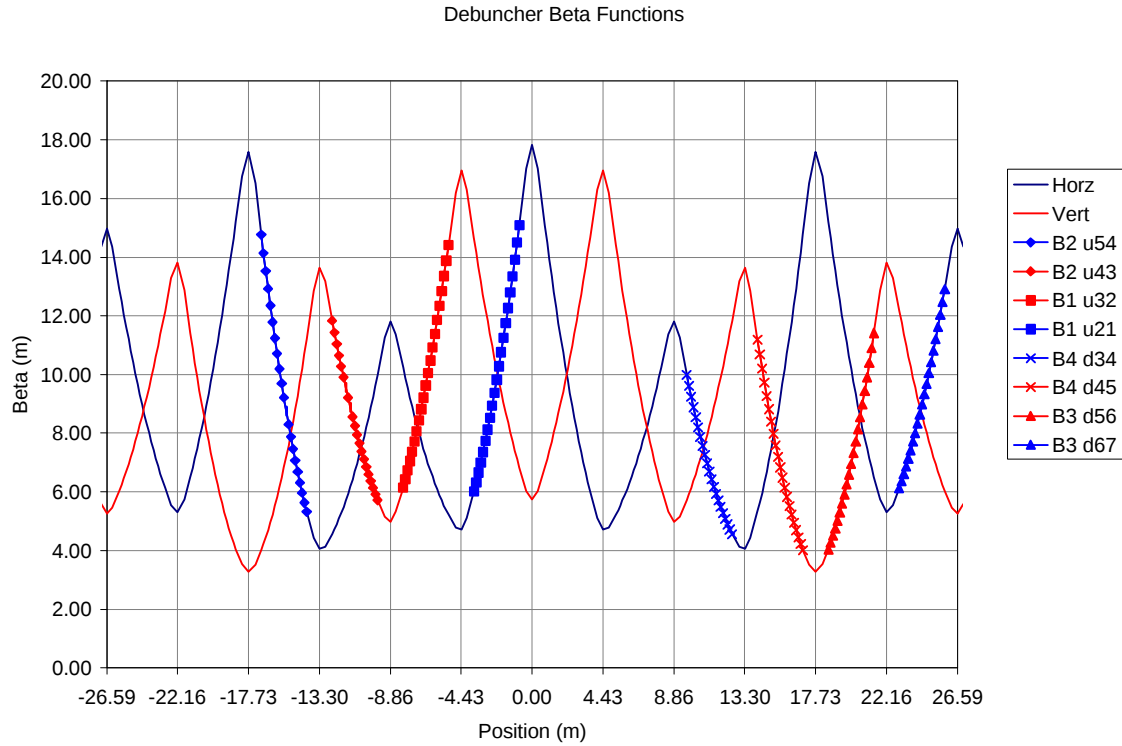


Figure 1. Debuncher Beta Functions

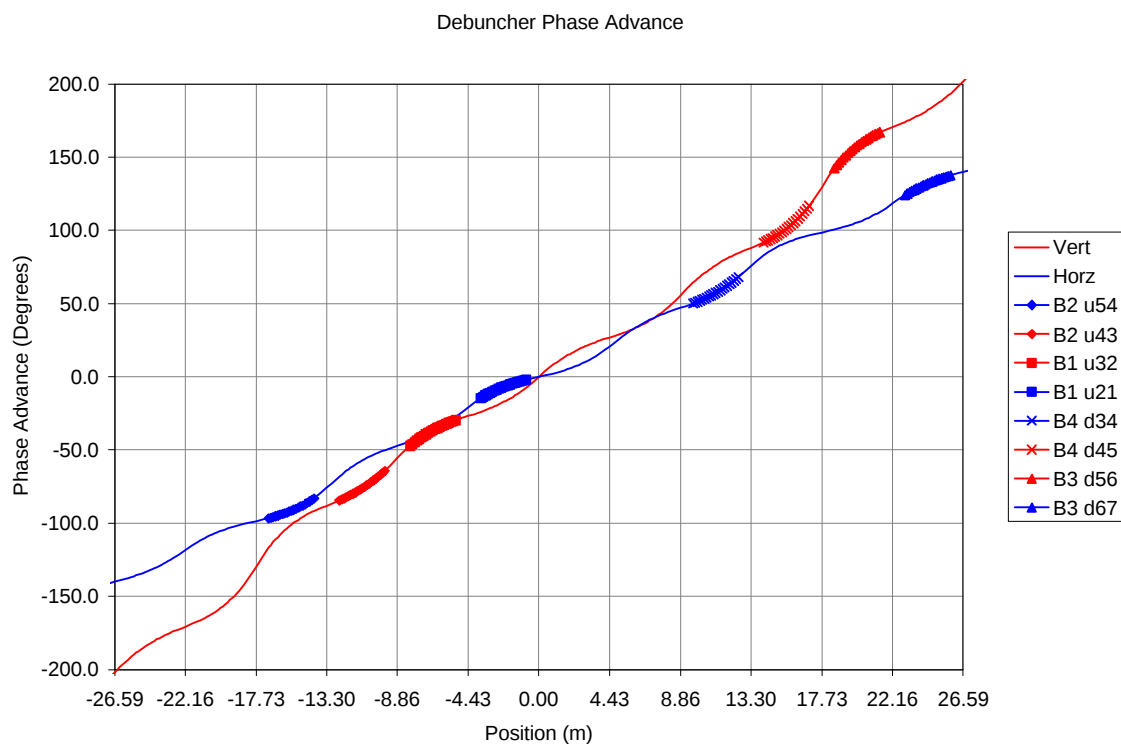


Figure 2. Debuncher Betatron Phase Advance

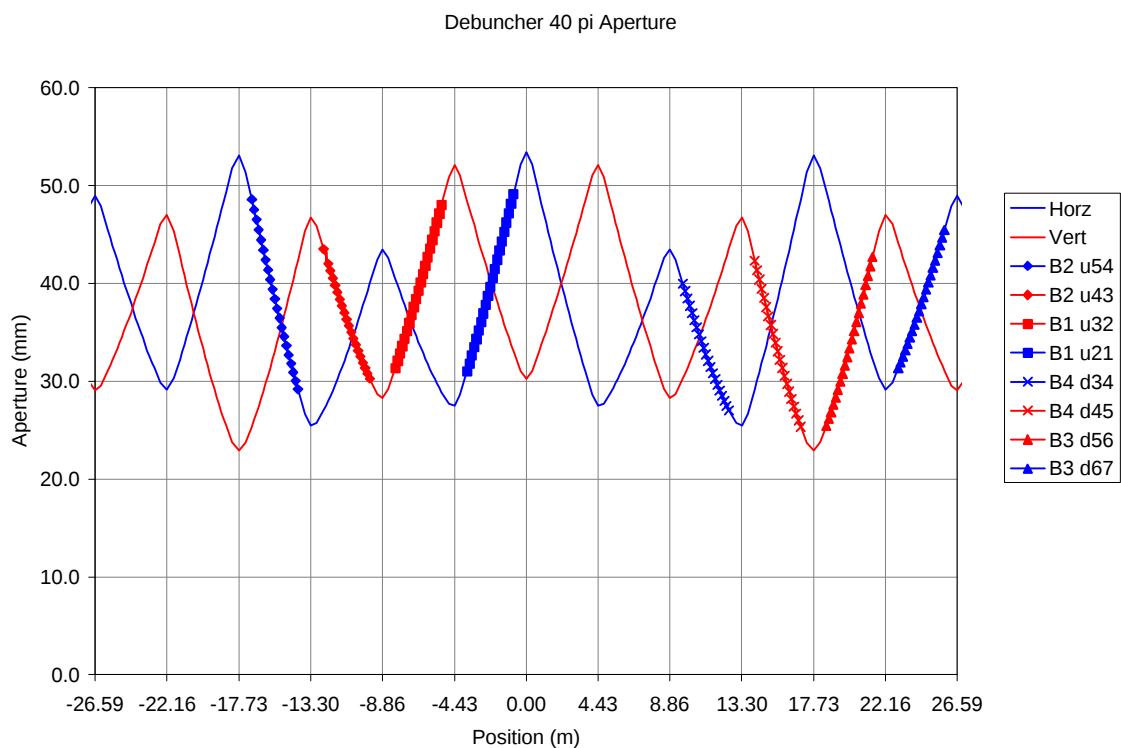


Figure 3. Debuncher 40 p-mm-mrad aperture

Name	Cell	plane	pick/kick	location	Band	Sub-band	Center(GHz)	Span(GHz)
C204_QC1_HKR_B2C	1	H	KR	1	2	C	5.25	1.1
C204_QC2_HKR_B2C	1	H	KR	2	2	C	5.25	1.1
C204_QC3_HKR_B2C	1	H	KR	3	2	C	5.25	1.1
C204_QC4_HKR_B2C	1	H	KR	4	2	C	5.25	1.1
C604_HC1_HPU_B2L	1	H	PU	1	2	L	5.05	0.7
C604_HC2_HPU_B2U	1	H	PU	2	2	U	5.4	0.8
C203_QC1_VKR_B2C	2	V	KR	1	2	C	5.25	1.1
C203_QC2_VKR_B2C	2	V	KR	2	2	C	5.25	1.1
C203_QC3_VKR_B2C	2	V	KR	3	2	C	5.25	1.1
C203_QC4_VKR_B2C	2	V	KR	4	2	C	5.25	1.1
C603_HC1_VPU_B2L	2	V	PU	1	2	L	5.05	0.7
C603_HC2_VPU_B2U	2	V	PU	2	2	U	5.4	0.8
C202_QC1_VKR_B1C	3	V	KR	1	1	C	4.35	1.1
C202_QC2_VKR_B1C	3	V	KR	2	1	C	4.35	1.1
C202_QC3_VKR_B1C	3	V	KR	3	1	C	4.35	1.1
C202_QC4_VKR_B1C	3	V	KR	4	1	C	4.35	1.1
C602_HC1_VPU_B1U	3	V	PU	1	1	U	4.55	0.7
C602_HC2_VPU_B1L	3	V	PU	2	1	L	4.15	0.7
C201_QC1_HKR_B1C	4	H	KR	1	1	C	4.35	1.1
C201_QC2_HKR_B1C	4	H	KR	2	1	C	4.35	1.1
C201_QC3_HKR_B1C	4	H	KR	3	1	C	4.35	1.1
C201_QC4_HKR_B1C	4	H	KR	4	1	C	4.35	1.1
C601_HC1_HPU_B1U	4	H	PU	1	1	U	4.55	0.7
C601_HC2_HPU_B1L	4	H	PU	2	1	L	4.15	0.7
C303_QC1_HKR_B4C	5	H	KR	1	4	C	7.5	1.4
C303_QC2_HKR_B4C	5	H	KR	2	4	C	7.5	1.4
C303_QC3_HKR_B4C	5	H	KR	3	4	C	7.5	1.4
C303_QC4_HKR_B4C	5	H	KR	4	4	C	7.5	1.4
C103_HC1_HPU_B4L	5	H	PU	1	4	L	7.25	0.9
C103_HC2_HPU_B4U	5	H	PU	2	4	U	7.75	0.9
C304_QC1_VKR_B4C	6	V	KR	1	4	C	7.5	1.4
C304_QC2_VKR_B4C	6	V	KR	2	4	C	7.5	1.4
C304_QC3_VKR_B4C	6	V	KR	3	4	C	7.5	1.4
C304_QC4_VKR_B4C	6	V	KR	4	4	C	7.5	1.4
C104_HC1_VPU_B4L	6	V	PU	1	4	L	7.25	0.9
C104_HC2_VPU_B4U	6	V	PU	2	4	U	7.75	0.9
C305_QC1_VKR_B3C	7	V	KR	1	3	C	6.3	1.4
C305_QC2_VKR_B3C	7	V	KR	2	3	C	6.3	1.4
C305_QC3_VKR_B3C	7	V	KR	3	3	C	6.3	1.4
C305_QC4_VKR_B3C	7	V	KR	4	3	C	6.3	1.4
C105_HC1_VPU_B3U	7	V	PU	1	3	U	6.55	0.9
C105_HC2_VPU_B3L	7	V	PU	2	3	L	6.05	0.9
C306_QC1_HKR_B3C	8	H	KR	1	3	C	6.3	1.4
C306_QC2_HKR_B3C	8	H	KR	2	3	C	6.3	1.4
C306_QC3_HKR_B3C	8	H	KR	3	3	C	6.3	1.4
C306_QC4_HKR_B3C	8	H	KR	4	3	C	6.3	1.4
C106_HC1_HPU_B3U	8	H	PU	1	3	U	6.55	0.9
C106_HC2_HPU_B3L	8	H	PU	2	3	L	6.05	0.9

Table 7. Array Names

Name	A	B	W	HC	DH	L	XC
C204_QC1_HKR_B2C	47.498	13.589	42.291	46.0126	-2.9840	436.88	-1037.59
C204_QC2_HKR_B2C	47.498	13.589	42.291	41.3717	-2.9840	436.88	-358.14
C204_QC3_HKR_B2C	47.498	13.589	42.291	36.7308	-2.9840	436.88	321.31
C204_QC4_HKR_B2C	47.498	13.589	42.291	32.0900	-2.9840	436.88	1000.76
C604_HC1_HPU_B2L	47.498	13.589	42.291	43.5664	-7.8696	1152.144	-679.45
C604_HC2_HPU_B2U	47.498	13.589	42.291	34.2846	-7.8696	1152.144	679.45
C203_QC1_VKR_B2C	47.498	13.589	40.005	41.7572	-2.0479	436.88	-1037.59
C203_QC2_VKR_B2C	47.498	13.589	40.005	38.5723	-2.0479	436.88	-358.14
C203_QC3_VKR_B2C	47.498	13.589	40.005	35.3874	-2.0479	436.88	321.31
C203_QC4_VKR_B2C	47.498	13.589	40.005	32.2024	-2.0479	436.88	1000.76
C603_HC1_VPU_B2L	47.498	13.589	40.005	40.0784	-5.4007	1152.144	-679.45
C603_HC2_VPU_B2U	47.498	13.589	40.005	33.7086	-5.4007	1152.144	679.45
C202_QC1_VKR_B1C	58.166	16.764	40.513	33.6195	2.5550	436.88	-1037.59
C202_QC2_VKR_B1C	58.166	16.764	40.513	37.5930	2.5550	436.88	-358.14
C202_QC3_VKR_B1C	58.166	16.764	40.513	41.5666	2.5550	436.88	321.31
C202_QC4_VKR_B1C	58.166	16.764	40.513	45.5402	2.5550	436.88	1000.76
C602_HC1_VPU_B1U	58.166	16.764	40.513	35.7139	6.7380	1152.144	-679.45
C602_HC2_VPU_B1L	58.166	16.764	40.513	43.6611	6.7380	1152.144	679.45
C201_QC1_HKR_B1C	58.166	16.764	48.387	33.4446	2.7890	436.88	-1037.59
C201_QC2_HKR_B1C	58.166	16.764	48.387	37.7822	2.7890	436.88	-358.14
C201_QC3_HKR_B1C	58.166	16.764	48.387	42.1197	2.7890	436.88	321.31
C201_QC4_HKR_B1C	58.166	16.764	48.387	46.4573	2.7890	436.88	1000.76
C601_HC1_HPU_B1U	58.166	16.764	48.387	35.7309	7.3552	1152.144	-679.45
C601_HC2_HPU_B1L	58.166	16.764	48.387	44.4061	7.3552	1152.144	679.45
C303_QC1_HKR_B4C	34.798	10.033	43.561	38.2527	-1.9894	436.88	-1037.59
C303_QC2_HKR_B4C	34.798	10.033	43.561	35.1588	-1.9894	436.88	-358.14
C303_QC3_HKR_B4C	34.798	10.033	43.561	32.0649	-1.9894	436.88	321.31
C303_QC4_HKR_B4C	34.798	10.033	43.561	28.9710	-1.9894	436.88	1000.76
C103_HC1_HPU_B4L	34.798	10.033	43.561	36.6219	-5.2464	1152.144	-679.45
C103_HC2_HPU_B4U	34.798	10.033	43.561	30.4341	-5.2464	1152.144	679.45
C304_QC1_VKR_B4C	34.798	10.033	48.641	40.0062	-2.5940	436.88	-1037.59
C304_QC2_VKR_B4C	34.798	10.033	48.641	35.9720	-2.5940	436.88	-358.14
C304_QC3_VKR_B4C	34.798	10.033	48.641	31.9377	-2.5940	436.88	321.31
C304_QC4_VKR_B4C	34.798	10.033	48.641	27.9035	-2.5940	436.88	1000.76
C104_HC1_VPU_B4L	34.798	10.033	48.641	37.8797	-6.8409	1152.144	-679.45
C104_HC2_VPU_B4U	34.798	10.033	48.641	29.8113	-6.8409	1152.144	679.45
C305_QC1_VKR_B3C	40.386	11.557	49.276	27.7363	2.6525	436.88	-1037.59
C305_QC2_VKR_B3C	40.386	11.557	49.276	31.8616	2.6525	436.88	-358.14
C305_QC3_VKR_B3C	40.386	11.557	49.276	35.9868	2.6525	436.88	321.31
C305_QC4_VKR_B3C	40.386	11.557	49.276	40.1120	2.6525	436.88	1000.76
C105_HC1_VPU_B3U	40.386	11.557	49.276	29.9108	6.9952	1152.144	-679.45
C105_HC2_VPU_B3L	40.386	11.557	49.276	38.1612	6.9952	1152.144	679.45
C306_QC1_HKR_B3C	40.386	11.557	44.069	33.2759	2.1649	436.88	-1037.59
C306_QC2_HKR_B3C	40.386	11.557	44.069	36.6428	2.1649	436.88	-358.14
C306_QC3_HKR_B3C	40.386	11.557	44.069	40.0097	2.1649	436.88	321.31
C306_QC4_HKR_B3C	40.386	11.557	44.069	43.3766	2.1649	436.88	1000.76
C106_HC1_HPU_B3U	40.386	11.557	44.069	35.0506	5.7093	1152.144	-679.45
C106_HC2_HPU_B3L	40.386	11.557	44.069	41.7844	5.7093	1152.144	679.45

Table 8. Array Dimensions in millimeters.

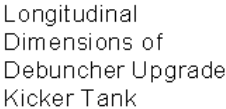


Figure 4. Longitudinal layout of a kicker tank

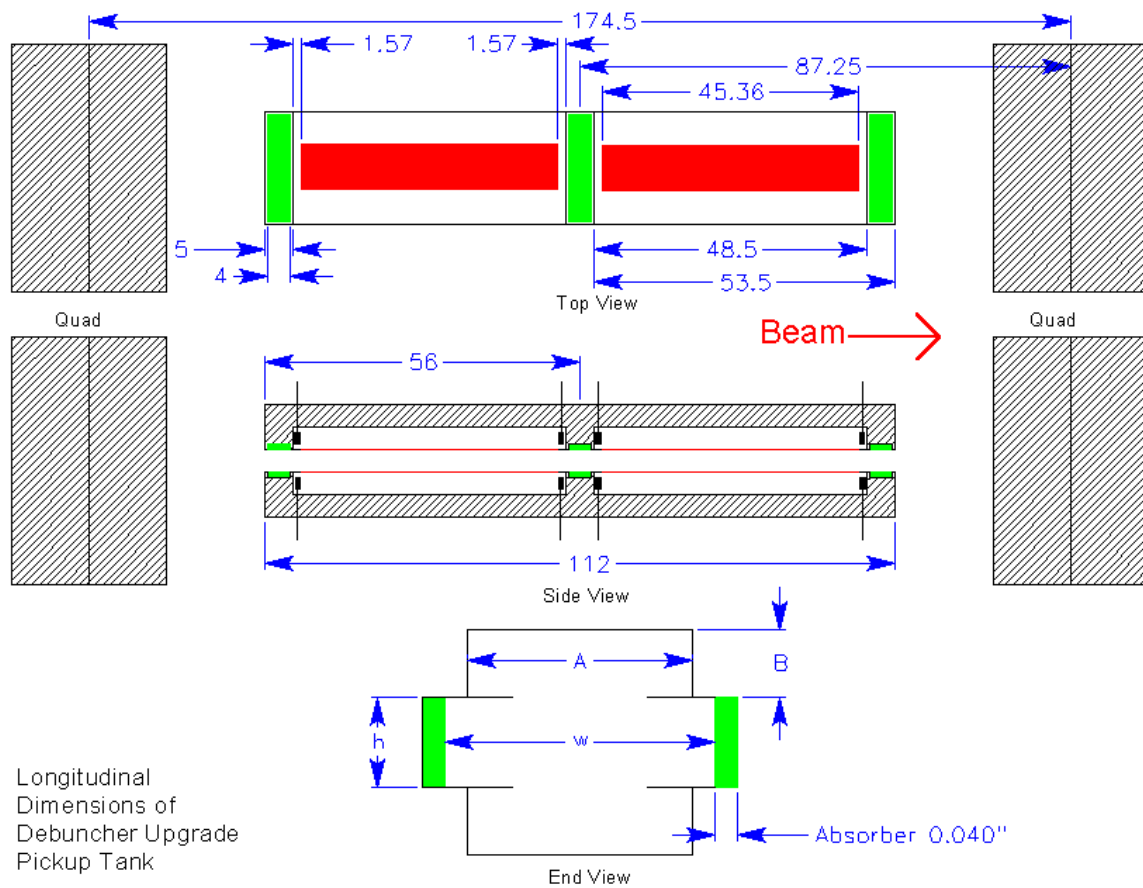


Figure 5. Longitudinal layout of a pickup tank.