Change in particle flux if the washers in the nose shield would be removed.
(Simulation by M. Shupe)

G

th.n: 11.2 kHz +187%
hi.n: 1.1 kHz +53%
had: 169 Hz +6%
c.r.: 98 Hz +308%
p.r.: 16 Hz +239%

th.n. = thermal neutron rate (neutrons < 100 keV)
hi.n. = high energy neutron rate (neutrons > 100 keV)
had = charged and neutral hadron rate > 20 MeV
c.r. = counting rate
   $= 0.0005n + 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$
p.r. = penetrating particle rate
   $= 0.1 \cdot 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$

F

th.n: 9.3kHz +143%
hi.n: 994 Hz +31%
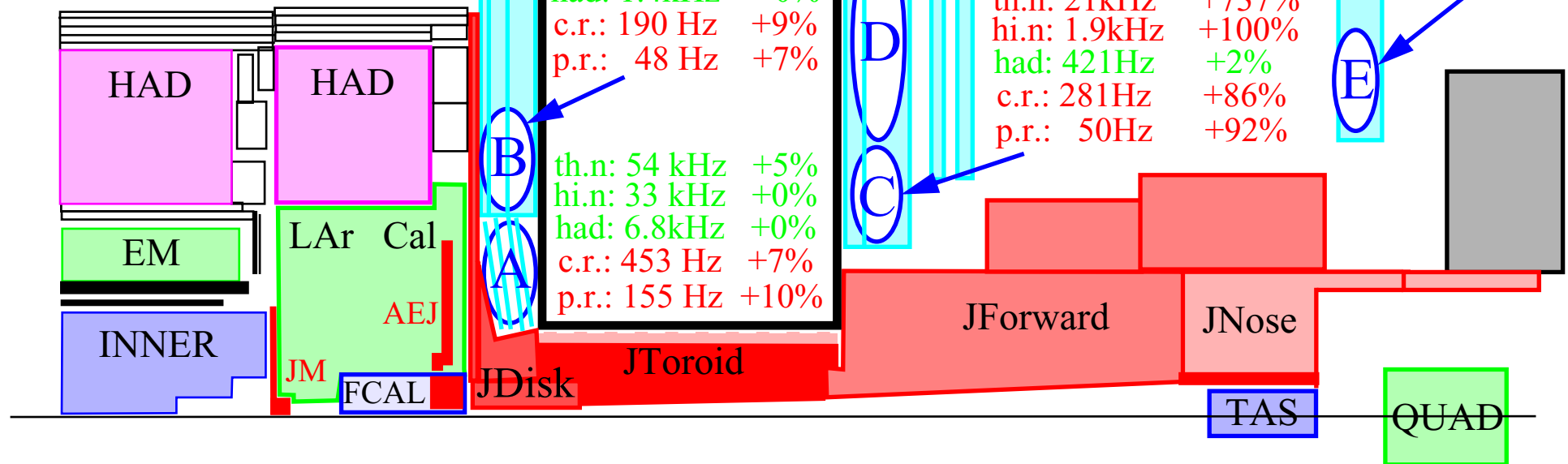had: 145 Hz +2%
c.r.: 77 Hz +209%
p.r.: 14 Hz +121%

th.n: 25 kHz +568%
hi.n: 1.8kHz +113%
had: 345 Hz +3%
c.r.: 211Hz +222%
p.r.: 38 Hz +163%

th.n:148 kHz +7315%
hi.n: 79 kHz +13620%
had: 3.8 kHz +10400%
c.r.: 709 Hz +3576%
p.r.: 158 Hz +3665%

Forward
Toroid

th.n: 33 kHz +6%
hi.n: 11 kHz +0%
had: 1.4kHz +0%
c.r.: 190 Hz +9%
p.r.: 48 Hz +7%

th.n: 21kHz +737%
hi.n: 1.9kHz +100%
had: 421Hz +2%
c.r.: 281Hz +86%
p.r.: 50Hz +92%

D

E

B

th.n: 54 kHz +5%
hi.n: 33 kHz +0%
had: 6.8kHz +0%
c.r.: 453 Hz +7%
p.r.: 155 Hz +10%

C

HAD

HAD

LAr Cal

EM

AEJ

A

INNER

JM

FCAL

JDisk

JToroid

JForward

JNose

TAS

QUAD

1

Change in particle flux if all the outer pieces of the forward shield are removed.
(Simulation by M. Shupe)

G

th.n: 7.2kHz   +80%
hi.n: 892 Hz   +19%
had: 184 Hz   +12%
c.r.:   52 Hz   +115%
p.r.: 9.2 Hz   +99%

th.n. = thermal neutron rate (neutrons < 100 keV)
hi.n. = high energy neutron rate (neutrons > 100 keV)
had = charged and neutral hadron rate > 20 MeV
c.r. = counting rate
      = $0.0005n + 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$
p.r. = penetrating particle rate
      $= 0.1 \cdot 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$

F

th.n: 6.0kHz +62%
hi.n: 854 Hz +9%
had: 151 Hz +3%
c.r.: 44 Hz +84%
p.r.: 9.3Hz +67%

th.n: 18 kHz   +325%
hi.n: 1.7kHz   +63%
had: 423 Hz   +6%
c.r.: 130 Hz   +97%
p.r.: 26 Hz   +77%

th.n: 20kHz +957%
hi.n: 3.6kHz +523%
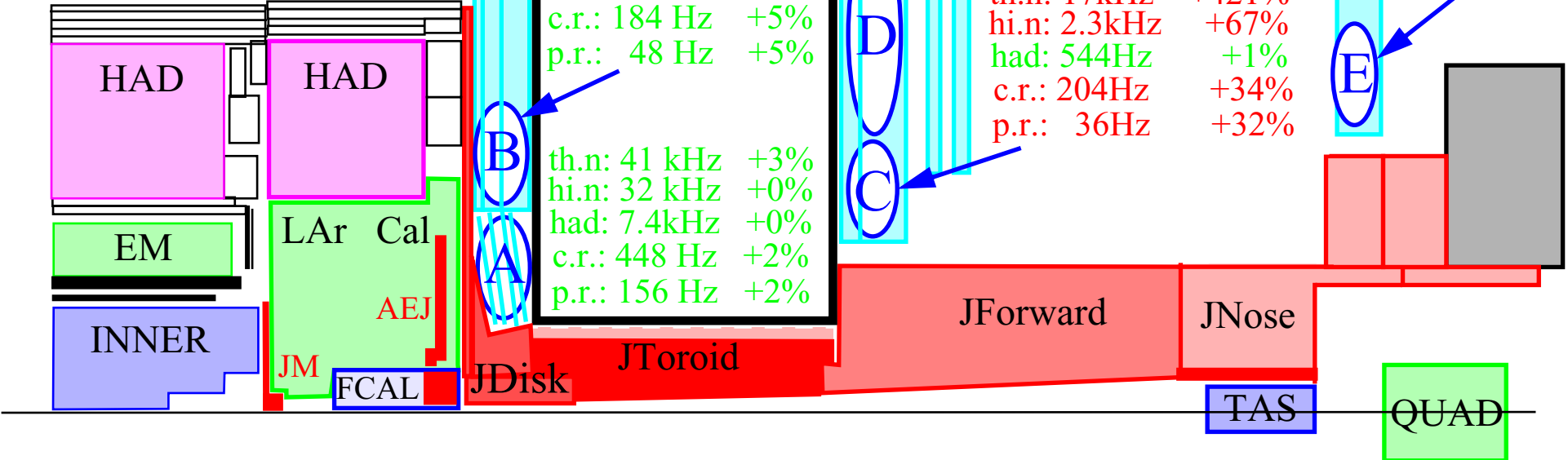had: 289Hz +860%
c.r.: 92 Hz +391%
p.r.: 9.3 Hz   +67%

Forward
Toroid

th.n: 29 kHz   +3%
hi.n: 11 kHz   +0%
had: 1.5kHz   -1%
c.r.: 184 Hz   +5%
p.r.: 48 Hz   +5%

th.n: 17kHz   +421%
hi.n: 2.3kHz   +67%
had: 544Hz   +1%
c.r.: 204Hz   +34%
p.r.: 36Hz   +32%

D

E

th.n: 41 kHz   +3%
hi.n: 32 kHz   +0%
had: 7.4kHz   +0%
c.r.: 448 Hz   +2%
p.r.: 156 Hz   +2%

B

C

A

HAD

HAD

EM

LAr Cal

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JForward

JNose

TAS

QUAD

2

Change in particle flux if the radius of the large octagonal pieces is reduced. (Simulation by M. Shupe)

G

th.n: 4.1 kHz +1%
hi.n: 722 Hz +1%
had: 161 Hz +1%
c.r.: 24 Hz +1%
p.r.: 5 Hz -5%

th.n. = thermal neutron rate (neutrons < 100 keV)
hi.n. = high energy neutron rate (neutrons > 100 keV)
had = charged and neutral hadron rate > 20 MeV
c.r. = counting rate
     $= 0.0005n + 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$
p.r. = penetrating particle rate
     $= 0.1 \cdot 0.0117\gamma + (\mu + p + \pi + 0.25e)/2$

F

th.n: 3.9 kHz +2%
hi.n: 751 Hz -1%
had: 143 Hz +1%
c.r.: 23 Hz -7%
p.r.: 4 Hz -31%

th.n: 3.8 kHz -1%
hi.n: 866 Hz +6%
had: 342 Hz +2%
c.r.: 66 Hz +1%
p.r.: 14 Hz -3%

Forward
Toroid

th.n: 31 kHz -1%
hi.n: 11 kHz -2%
had: 1.5kHz +1%
c.r.: 174 Hz -0%
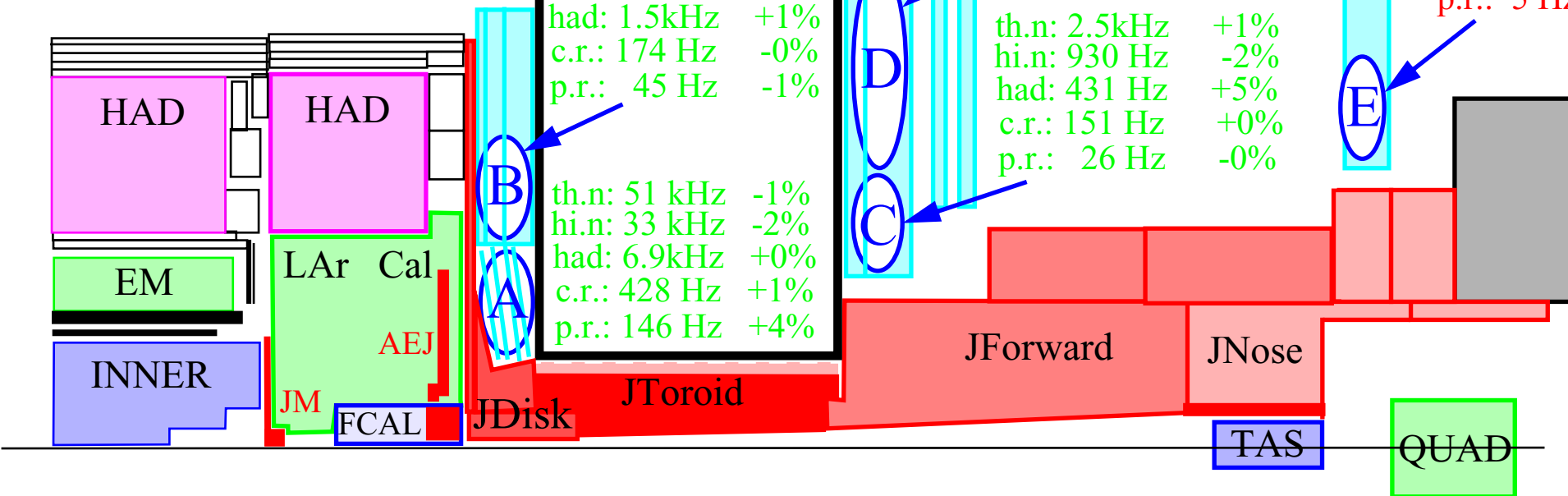p.r.: 45 Hz -1%

th.n: 2.2 kHz +12%
hi.n: 678 Hz +17%
had: 59 Hz +63%
c.r.: 23 Hz +18%
p.r.: 5 Hz +14%

th.n: 2.5kHz +1%
hi.n: 930 Hz -2%
had: 431 Hz +5%
c.r.: 151 Hz +0%
p.r.: 26 Hz -0%

HAD

HAD

D

B

th.n: 51 kHz -1%
hi.n: 33 kHz -2%
had: 6.9kHz +0%
c.r.: 428 Hz +1%
p.r.: 146 Hz +4%

C

A

EM

LAr Cal

E

INNER

AEJ

JM

FCAL

JDisk

JForward

JNose

JToroid

TAS

QUAD

3

Change in particle flux if the small front octagonal pieces are removed.
(Simulation by M. Shupe)

G
th.n: 4.0kHz   +0%
hi.n: 720 Hz   +0%
had: 160 Hz   +0%
c.r.: 24 Hz   -0%
p.r.:   5 Hz   +1%

th.n. = thermal neutron rate (neutrons < 100 keV)
hi.n. = high energy neutron rate (neutrons > 100 keV)
had = charged and neutral hadron rate > 20 MeV
c.r. = counting rate
     = 0.0005n + 0.0117 γ+ (μ + p +π+ 0.25e) /2
p.r. = penetrating particle rate
     =0.1• 0.0117γ+ (μ + p +π+ 0.25e) / 2

F
th.n: 3.8 kHz   -1%
hi.n: 760 Hz   +0%
had: 141 Hz   -1%
c.r.: 24 Hz   -6%
p.r.:   5Hz   -25%

th.n: 3.8 kHz   +1%
hi.n: 871 Hz   +6%
had: 341 Hz   +2%
c.r.: 66 Hz   +0%
p.r.: 14 Hz   -3%

th.n: 2.1 kHz   +6%
hi.n: 587 Hz   +2%
had: 38 Hz   +6%
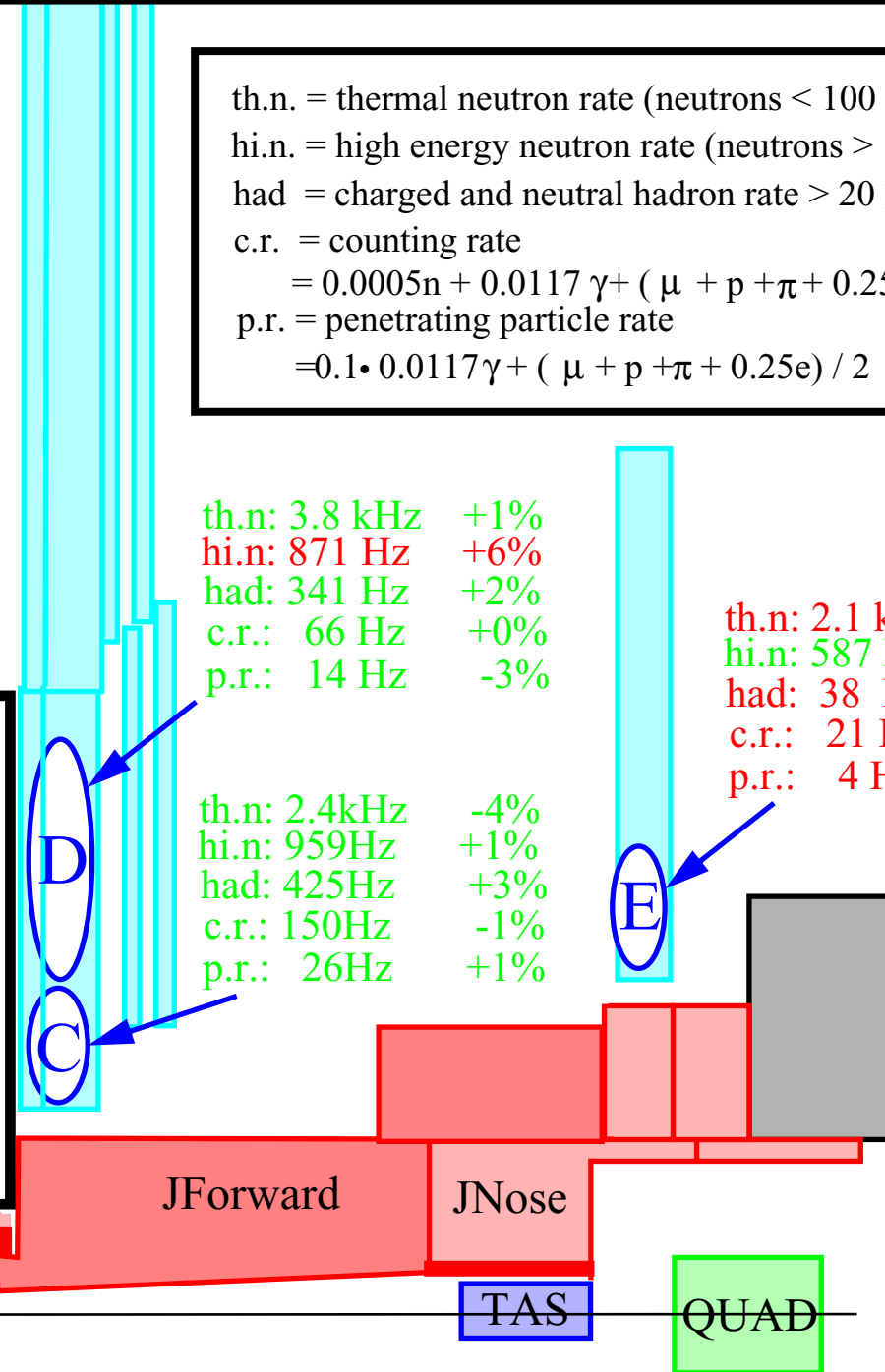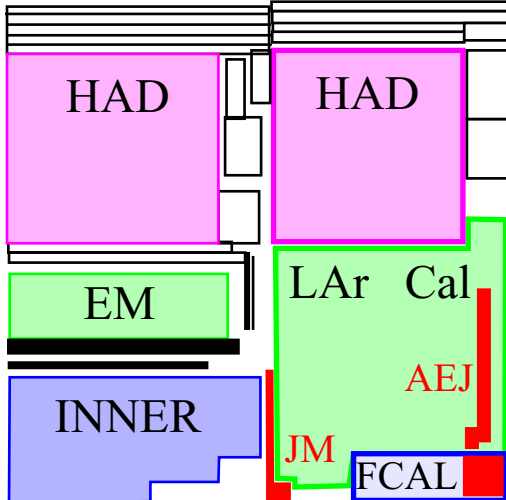c.r.: 21 Hz   +7%
p.r.:   4 Hz   +6%

Forward
Toroid

th.n: 31 kHz   -2%
hi.n: 11 kHz   +0%
had: 1.5kHz   +1%
c.r.: 174 Hz   +0%
p.r.: 44 Hz   -1%

th.n: 2.4kHz   -4%
hi.n: 959Hz   +1%
had: 425Hz   +3%
c.r.: 150Hz   -1%
p.r.: 26Hz   +1%

D

B

C

HAD

HAD

th.n: 51 kHz   +0%
hi.n: 33 kHz   -1%
had: 6.8kHz   +0%
c.r.: 433 Hz   +2%
p.r.: 149 Hz   +6%

A

E

LAr Cal

EM

AEJ

INNER

JM

FCAL

JDisk

JToroid

JForward

JNose

TAS

QUAD

4

Change in particle flux if the radius of the large octagonal pieces is reduced and the front octagonal piece is removed. (Simulation by M. Shupe)

G

th.n: 4.0 kHz   -1%
hi.n: 730 Hz   +2%
had: 162 Hz   +1%
c.r.:   25 Hz   +2%
p.r.:   5 Hz   +5%

th.n. = thermal neutron rate (neutrons < 100 keV)
hi.n. = high energy neutron rate (neutrons > 100 keV)
had = charged and neutral hadron rate > 20 MeV
c.r. = counting rate
       = 0.0005n + 0.0117 γ + (μ + p + π + 0.25e) / 2
p.r. = penetrating particle rate
       = 0.1 • 0.0117 γ + (μ + p + π + 0.25e) / 2

F

th.n: 3.8 kHz   -1%
hi.n: 756 Hz   -0%
had: 142 Hz   +0%
c.r.:   24 Hz   -3%
p.r.:   5 Hz   -17%

th.n: 3.8 kHz   -1%
hi.n: 871 Hz   +6%
had: 341 Hz   +2%
c.r.:   66 Hz   +0%
p.r.:   14 Hz   -3%

th.n: 2.3kHz   -5%
hi.n: 945 Hz   -1%
had: 414 Hz   +1%
c.r.: 153 Hz   +1%
p.r.:   29 Hz   +8%

th.n: 2.2 kHz   +9%
hi.n: 666 Hz   +15%
had: 59 Hz   +63%
c.r.: 24 Hz   +26%
p.r.: 6 Hz   +34%

Forward
Toroid

th.n: 31 kHz   -1%
hi.n: 11 kHz   -1%
had: 1.4kHz   +0%
c.r.: 175 Hz   +0%
p.r.:   45 Hz   -0%

th.n: 52 kHz   +1%
hi.n: 33 kHz   +0%
had: 6.9kHz   +0%
c.r.: 432 Hz   +2%
p.r.: 145 Hz   +3%

D

E

B

C

A

HAD   HAD

LAr   Cal

AEJ

EM

INNER

JM

FCAL

JDisk

JToroid

JForward

JNose

TAS

QUAD

5