Equations Used to Determine Discriminator Levels

$$A_1 \text{ (KeV)} = 400 - 0.2\, Y_{A1} + D_{A1}$$

$$A_2 \text{ (KeV)} = 400 - 0.2\, Y_{A1} + 0.6\, Y_{A2} + D_{A2}$$

$$A_3 \text{ (KeV)} = 400 - 0.2\, Y_{A1} + 0.6\, (Y_{A2} + Y_{A3}) + D_{A3}$$

$$A_4 \text{ (MeV)} = 6.0 - 3 \times 10^{-3}\, Y_{A4} + D_{A4}$$

$$A_5 \text{ (MeV)} = 6.0 - 3 \times 10^{-3}\, Y_{A4} + 20 \times 10^{-3}\, Y_{A5} + D_{A5}$$

$$A_6 \text{ (MeV)} = 40.0 - 20 \times 10^{-3}\, Y_{A6} + D_{A6}$$

$$A_7 \text{ (KeV)} = 40{,}000 - 10 \times Y_{A7} + D_{A7}$$

$$B_1 \text{ (KeV)} = 400 - 0.2\, Y_{B1} + D_{B1}$$

$$B_2 \text{ (KeV)} = 1200 - 0.6\, Y_{B2} + D_{B2}$$

$$B_3 \text{ (KeV)} = 1200 - 0.6\, Y_{B3} + D_{B3}$$

$$B_4 \text{ (MeV)} = 6.0 - 3 \times 10^{-3}\, Y_{B4} + D_{B4}$$

$$B_5 \text{ (MeV)} = 6.0 - 3 \times 10^{-3}\, Y_{B4} + 20 \times 10^{-3}\, Y_{B5} + D_{B5}$$

$$B_6 \text{ (MeV)} = 6.0 - 3 \times 10^{-3}\, Y_{A4} + 20 \times 10^{-3}\, Y_{B6} + D_{B6}$$

$$C_1 \text{ (MeV)} = [400 - 0.2\, Y_{B1} + 3.0\, Y_{C2} - 20\, Y_{C1}] \times 10^{-3} + D_{C1}$$

$$C_2 \text{ (MeV)} = (400 - 0.2\, Y_{B1} + 3.0\, Y_{C2}) \times 10^{-3} + D_{C2}$$

$$C_3 \text{ (MeV)} = [400 - 0.2\, Y_{B1} + 3.0\, (Y_{C2} + Y_{C3})] \times 10^{-3} + D_{C3}$$

$$C_4 \text{ (MeV)} = [400 - 0.2\, Y_{B1} + 3.0\, (Y_{C2} + Y_{C3}) + 20\, Y_{C4}] \times 10^{-3} + D_{C4}$$

Note: 1. D_i is a constant to correct for small variations between amplifiers (to be determined).

2. Multiply all equations by $f(T) = (T - 25) * (-1.0005)$ where T is the temperature derived from the performance parameters as described below.

Quantity	APL Signal Name	Read Out Location: Page	Read Out Location: Snapshot
YA1 12bits	931 APL-R4 R4(15,4)=P7	3	2
YA2 "	671 APL-R4 R4(11,4)=P7	2	2
YA3	708 APL-R19 R2(5,12)	2	2
YA4	689 APL-R10	2	0
YA5 12bits	681 APL-R7	2	0
YA6 12bits	155 APL-R5	0	2
YB1	1375 APL-R14	0	0*
YB2	957 APL-R15	3	0
YB3	961 APL-R16	3	1
YB4	713 APL-R22	2	0
YB5	453 APL-R22	1	0
YB6	429 APL-R10	1	0
~~YC1~~	~~431 APL-R12~~	~~1~~	~~2~~
YC2	438 APL-R14	1	2
YC3	436 APL-R13	1	2
YC4 12bits	147 APL-T3	0	2

*Album following the calibration album.

The values of the 16 discriminator levels of the PET telescope can now be calculated via the equations below.

YA7 200 R25 Z2 0 3