

**INTEROFFICE MEMORANDUM**

**JET PROPULSION LABORATORY**

**TO:** Dave Gruel S & I DFM 97-001  
**FROM:** Tim Schofield 25th March 1997  
**SUBJECT:** ASI/MET Accelerometer - Data Conversion Expressions.  
**REFERENCE:** (1). AIP data conversion expressions - Revision B, S & I DFM 96-014, 18th December 1996. From: Tim Schofield To: Distribution

This memo gives calibration expressions for the six ASI/MET science and engineering accelerometers, based on the laboratory calibration work of 2/96 and measurements taken in flight during spacecraft spin down of 12/12/96.

A linear, temperature-dependent conversion from counts to acceleration is used for each accelerometer head and gain setting, so that:

$$\text{Acceleration in g's} = (\text{Counts} - A(T)) / B(T)$$

where:  $A(T) = A_0 + A_1 T$  is the accelerometer bias in counts,  
 $B(T) = B_0 + B_1 T$  is the accelerometer scale factor in counts/g,  
 $T$  is head temperature in centigrade,  
 Counts lie in the range -8192 to +8191 (If counts > 8191, counts = counts - 2<sup>14</sup>).  
 $1 \text{ g} = 9.795433 \text{ m.s}^{-2}$ ,

The table below gives  $A_0$ ,  $A_1$ ,  $B_0$ , and  $B_1$  for each head and gain setting. The temperature sensor channel identifications associated with each head are also given. Temperature sensor conversions are given in reference (1).

Head		Sx	Sy	Sz	Ex	E+yz	E-yz
Accelerometer Channel		W-2001	W-2002	W-2003	L-2001L-2002L-2003		
Temperature Sensor		W-4001	W-4002	W-4003	L-4050L-4051L-4052		
40 g Range	$A_0$ Counts	2.75	-0.97	0.83	1.35	-0.02	-0.66
	$A_1$ Counts/°C	-0.023	-0.003	-0.003	-0.005	-0.000	-0.001
	$B_0$ Counts/g	-184.118	-185.581	-183.928	-182.776	-183.450	-183.924
	$B_1$ Counts/g/°C	-0.028	-0.025	-0.030	-0.032	-0.032	-0.029
800 mg Range	$A_0$ Counts	-4.17	8.40	1.58	12.33	-4.93	-6.67
	$A_1$ Counts/°C	-0.012	-0.011	-0.003	0.024	0.043	0.019
	$B_0$ Counts/g	-9008.76	-9031.40	-8978.62	-8938.97	-8933.65	-8976.08
	$B_1$ Counts/g/°C	-0.805	-0.731	-0.822	-0.798	-0.697	-0.729
16 mg Range	$A_0$ Counts	-313.76	408.90	51.90	562.73	-336.07	-287.37
	$A_1$ Counts/°C	-0.284	-0.512	0.095	-0.854	1.336	0.401
	$B_0$ Counts/g	-445743.0	-446319.0	-444297.0	-442228.0	-441730.0	-444094.0
	$B_1$ Counts/g/°C	-34.0	-33.0	-37.0	-35.0	-38.0	-26.0

Notes on the Calibration Table.

(1). Only  $A_0$  on the 16 mg range has been corrected for offset measurements in space, performed at temperatures in the 11-12°C range. The combined effect of temperature differences and offset changes for the other gain settings was generally one count or less.

(2).  $A(T)$  is represented quite poorly by a linear expression for the 16 mg range. Errors can be as high as 2 or 3 counts. Offsets will therefore be most accurate at 11-12°C and will diverge slightly at other temperatures. For the other gain settings, errors are 1 count or less.

(3). So far, 16 mg offsets have remained fairly stable in space. It is likely however that further small adjustments will have to be made.