JET PROPULSION LABORATORY **INTEROFFICE MEMORANDUM**

TO: Distribution S & I DFM 96-012

FROM: Tim Schofield 1st October 1996

SUBJECT: Accelerometer Housekeeping Conversions

This memo summarizes expressions that convert measured counts into physical parameters for the 13 accelerometer housekeeping channels. These expressions apply to both engineering and science accelerometers. It should be noted that these conversions are based on the theoretical properties of the accelerometer electronics and sensor characteristics. As such they are approximate, but are still useful for assessing instrument health, and should be used in the standard ASI/MET DMD display.

Count to ADC Voltage conversion.

Nominally, the relationship between counts and the voltage input to the accelerometer 14 bit analog to digital converter (ADC) is given by the following expressions.

$$\text{Volts} = \text{Counts} \times 6/2^{14} \qquad (\text{Counts} \leq 8191)$$

$$\text{Volts} = \text{Counts} \times 6/2^{14} - 6 \qquad (\text{Counts} \geq 8192)$$

All the 14 bit measurements are stored in the least significant 14 bits of a 16 bit word, with the 2 most significant bits usually set to zero. However, flags are stored in the most significant 2 bits for channels W-2020, W-2022, L-2020, and L-2022. These should be set to zero before performing the conversions above.

ADC Voltage to physical parameter conversion.

These expressions convert ADC input volts (V_{ADC}) to physical parameters for each accelerometer housekeeping channel. DMD channel numbers are used for identification.

Parameters W-2020, W-2021, W-2022, L-2020, L-2021, L-2022.

These are reference voltages, used for calibrating the accelerometer ADCs. They need no further conversion, so that:

$$\text{Vref (Volts)} = V_{ADC}$$

Parameters W-4001, W-4002, W-4003, L-4050, L-4051, L-4052.

These are accelerometer head temperature monitors. They all share the following conversion.

$$\text{Temperature (K)} = -139.86 \times V_{ADC}$$

Parameters W-4011, W-4012, W-4013, W-4014, W-4015, W-4016, L-4061, L-4062, L-4063, L-4064, L-4065, L-4066.

These are temperature sensors that monitor key elements of the accelerometer boards. They all share the following conversion.

$$\text{Temperature (K)} = +139.86 \times V_{ADC}$$