agreement with ours in the vicinity of $u_p = 1$ km/sec and are 0.07 km/sec higher than ours near $u_p = 2$ km/sec. However, their data were based on the old 2024 aluminum standard. Revision of the necessary impedance match calculations will bring the results into better agreement.

## Reduction of the Hugoniot to a 293 °K Isotherm

Details of this calculation have been discussed earlier.[13] The auxiliary information needed for this reduction is given in Table II. Original references should be consulted for the accuracy of these numbers. The table gives the exact input used in our calculations. The particular numerical code used integrates the equation

$$dT_H = - T_H \frac{\gamma dV}{V} + \frac{(V_0 - V)dP_H + P_H dV}{2 C_V} \tag{2}$$

for the temperature along the Hugoniot. A Debye expression,

$$E_T = 3nkT \; D_3 (\theta (V)/T) \tag{3}$$

$$D_3(x) = \frac{3}{x^2} \int_0^x \frac{z^3 dz}{e^z - 1} \tag{4}$$

$$\gamma = -d \, \ell n \, \theta / d \, \ell n \, V \tag{5}$$

is used for the thermal part of the energy.

With a $\gamma$ that depends only on volume, the appropriate fractional thermal energy and corresponding thermal pressure may be subtracted from the Hugoniot to yield the desired isotherm. The choice of Debye theta at zero pressure and 293 $^{o}$K was dictated by the value of $C_V$ at these conditions, since this is the important quantity in the integration of (2). Since the numerical value for $E(P = 0, T = 273\ ^{o}K) - E(0, 0)$ predicted by this model ($+ 1.76 \times 10^9$ ergs/g) agrees with the value obtained by fitting $C_P(T)$ ($\Delta E = 1.77 \times 10^9$, JANAF Tables)[21] we have some evidence that we have an overall fit for $C_V(T)$ at the lower T region as well.

Probably the largest uncertainty in transforming a Hugoniot to an isotherm comes from ignorance about the way the Gruneisen gamma behaves at high pressures and temperatures. In the few cases where its high pressure behavior has been measured, the assumption that $(\partial E/\partial P)_V$ is constant has been adequate to represent the data within the experimental precision, but other forms for $\gamma(V)$ are not excluded. We have used this assumption to calculate our "base room temperature isotherm". The results, finely spaced for more convenient usage, are given in Table III.

It is of interest to see what effect varying the parameters that went into the calculation will have on the calculated isotherm. The equation

$$\gamma(V) = \frac{t-2}{3} - \frac{1}{2} \frac{d\,\ell n \left\{ d\left[P_K(V)\, V^{2t/3}\right] / dV \right\}}{d\,\ell n\, V} \qquad (6)$$