TABLE II. Explosive data and calculated results. Errors quoted are standard deviations.

Explosive	RDX	TNT	64/36 Composition B	77/23 Cyclot
Explosive density, ρ_x^0, (g/cc)	1.767±0.011	1.637±0.003	1.713±0.002	1.743±0.00
Detonation velocity, D_x, (mm/μsec)	8.639±0.041	6.942±0.016	8.018±0.017	8.252±0.01
24ST aluminum density, ρ_m^0, (g/cc)	2.788±0.008	2.790±0.003	2.791±0.004	2.793±0.00
24ST aluminum free-surface velocity, U_{fs}^*, (mm/μsec)	3.693±0.016	2.462±0.006	3.378±0.004	3.521±0.00
24ST aluminum shock velocity, D_m^*, (mm/μsec)	7.809±0.023	7.001±0.018	7.604±0.019	7.697±0.01
24ST aluminum pressure, P_m^*, (kilobars)	397.3 ±2.4	239.1 ±0.9	354.8 ±1.8	374.4 ±2.0
C-J pressure, P_{cj}, (kilobars)	337.9 ±3.1	189.1 ±1.0	292.2 ±2.6	312.5 ±2.9
C-J particle velocity, U_{cj}, (mm/μsec)	2.213±0.029	1.664±0.011	2.127±0.019	2.173±0.02

The free-surface velocities measured for various thicknesses of 24ST aluminum for the explosives studied are listed in Table I and plotted on Figs. 7 through 10. The error flags shown on these figures are standard deviations of the averages and do not include consistent error estimates. All of the individual data points for each explosive were used in a linear least squares fit to the data. The resulting fits are given on the figures. The use of straight lines fits is only justified by how well the data do fit these lines. The metal thickness corresponding to the explosive reaction zone is not established in these experiments; hence a plate thickness of 1.0 mm is chosen in accordance with the results of Duff and Houston[2] for Composition B. The metal state corresponding to the explosive C-J state is thus given as the 1.0-mm point on the least squares line. These aluminum free-surface velocities (U_{fs}^*) are given in Table II along with measured values of ρ_m^0, ρ_x^0, and D_x; values D_m^* and P_m^* deduced from the measured Hugoniot[8]; and values of P_{cj} and U_{cj} calculated from the other numbers given.

The errors quoted in Table II for ρ_m^0, ρ_x^0, and D_x are the standard deviations of these quantities among the plates and charges used. The error quoted for U_{fs}^* is the standard deviation of the least squares fit; this should include the contribution from an estimated $\pm\frac{1}{2}\%$ error in the individual measurements. The standard deviations quoted for other quantities are deduced from these errors with an additional $\frac{1}{4}\%$ contribution to the D_m error as an estimate of the precision of the Hugoniot data.

If one corrects the Duff and Houston[2] value of P_{cj} (272 Kb) for Composition B of 63% RDX and 1.67 g/cc to the 64.1% RDX and 1.713 g/cc of this paper using the semiempirical corrections; $\delta P_{cj}/P_{cj}=2.30\delta\rho_x^0/\rho_x^0$ and $\delta P_{cj}=1.57$ Kb per % RDX; one obtains a P_{cj} of 290 Kb, a value in excellent agreement with the one reported here.

ACKNOWLEDGMENTS

This work was made possible only through the cooperation of many members of GMX Division of the Los Alamos Scientific Laboratory.