FIG. 6. Smear camera record showing seven records of free-run time of a metal plate accelerated by explosive. Free-run time is measured from each pair of the side traces down to the corresponding central plate arrival time.

flash of light of short duration. After the free surface moves the distance d, it closes the central gap and yields another flash of light. The time between these light flashes is the free-run time. The gaps and shims were made as nearly identical as possible so as to maintain identical gap closure time for the side reference traces and the central data trace. All gaps on a single block were machined with one shaped cutter and were usually 0.0035 in. deep. A variety of shim materials were tried and performed satisfactorily, but the flatness and convenient availability of steel feeler gauge stock (in 0.003 to 0.005 in. thicknesses) made it the most used. Good contact of the shim to both the plate and block was assured by holding flatness tolerances over the contact

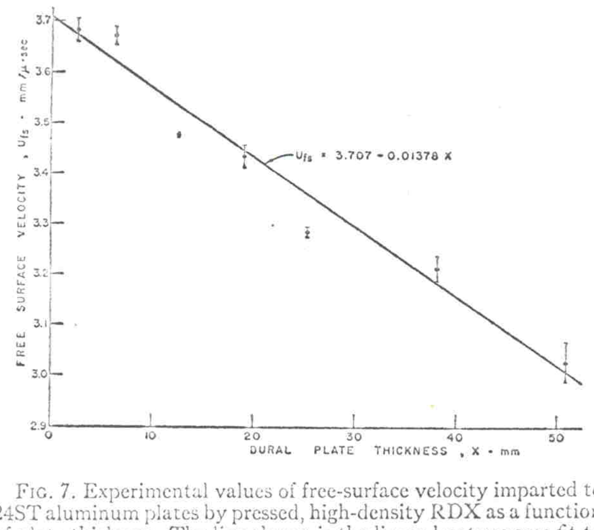

FIG. 7. Experimental values of free-surface velocity imparted to 24ST aluminum plates by pressed, high-density RDX as a function of plate thickness. The line shown is the linear least squares fit to the data.

surfaces to ±0.0002 in. The widths of the central offset in the blocks were chosen such that no disturbance arising at either of the adjacent Plexiglas corners in contact with the plate could perturb either the motion of the central region of the plate section moving across the free-run gap or the gap closure mechanism. The depth of the offset was chosen so that all measurements were taken before shock reverberations could occur. This requirement, in particular, makes precision meas-

TABLE I. Experimental free-surface velocities of various thicknesses of 24ST aluminum for four explosives. Errors quoted are standard deviations of the mean.

24ST aluminum thickness, X (mm)	Free-surface velocity U_{fs} (mm/μsec)	Number of data points
	RDX	
2.51	3.682±0.022	7
6.31	3.671±0.018	7
12.69	3.476±0.005	5
19.09	3.434±0.022	5
25.37	3.284±0.010	5
38.13	3.212±0.025	5
50.80	3.027±0.039	5
	TNT	
2.53	2.470±0.006	7
6.43	2.422±0.009	7
12.73	2.371±0.008	7
19.05	2.363±0.011	7
24.87	2.288±0.006	6
38.10	2.193±0.003	4
50.88	2.157±0.007	8
	64/36 Composition B	
1.85	3.414±0.019	3
2.54	3.389±0.014	5
3.16	3.378±0.013	3
3.77	3.343±0.011	4
5.02	3.335±0.006	9
6.34	3.316±0.010	14
7.61	3.290±0.012	5
8.48	3.281±0.022	4
10.02	3.284±0.005	32
11.31	3.256±0.019	4
12.23	3.240±0.010	4
12.68	3.241±0.005	32
19.14	3.182±0.008	15
23.98	3.156±0.014	8
25.58	3.085±0.007	5
38.33	2.961±0.010	5
50.88	2.860±0.015	10
	77/23 Cyclotol	
1.90	3.545±0.008	3
2.53	3.528±0.013	4
3.13	3.534±0.026	5
3.80	3.494±0.013	4
4.92	3.477±0.013	5
6.32	3.447±0.010	6
7.74	3.451±0.010	5
8.88	3.431±0.024	4
9.92	3.420±0.011	5
11.26	3.426±0.003	6
12.43	3.369±0.015	4
19.05	3.287±0.011	5
24.41	3.280±0.010	6
38.17	3.142±0.003	5
50.85	3.027±0.012	5