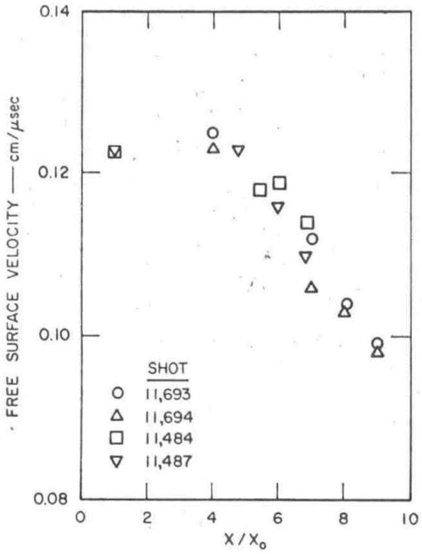

FIG. 3. Free-surface velocity vs shock travel (x/x_0) for 2024-T351 aluminum impacted at 0.125 cm/μsec.

aluminum. If the change in free-surface velocity that is observed is due entirely to an elastic wave, the yield is exceptionally large. It is more likely that there is a Bauschinger effect so that the elastic and plastic waves do not separate, and their combined effects are observed in the experimental results.

Only one experiment was performed with annealed 2024-T351 aluminum. As recorded in Table I, the free-surface velocity of the thin target is the same as the velocity of the flyer plate. This result is consistent with elastoplastic theory if a small yield is used.

Results of attenuation experiments using annealed 1060 aluminum are given in Fig. 4 and in Table I. The average free-surface velocity for thin targets is about

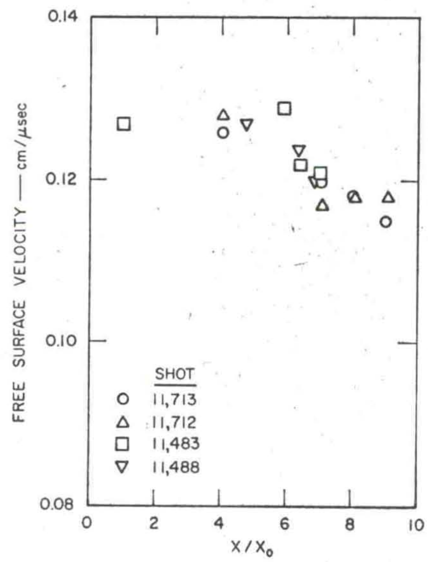

FIG. 4. Free-surface velocity vs shock travel (x/x_0) for 1060 annealed aluminum impacted at 0.125 cm/μsec.

0.127 cm/μsec. This is the same as the average velocity of the flyer plates in the four experiments with 1060 aluminum. Hence this soft aluminum behaves more like a fluid than does 2024-T351 aluminum, for which the free-surface velocity is less than the flyer plate velocity. The data as shown in Fig. 4 also suggest that the elastic relief wave separates from the plastic wave. The evidence for this is the rather abrupt drop in the free-surface velocity starting at about six flyer-plate thicknesses, after which the decrease is slower. More data are needed before an unequivocal conclusion can be drawn. Data should be obtained for targets thicker than nine so that the rate of attenuation due to the plastic wave can be observed.

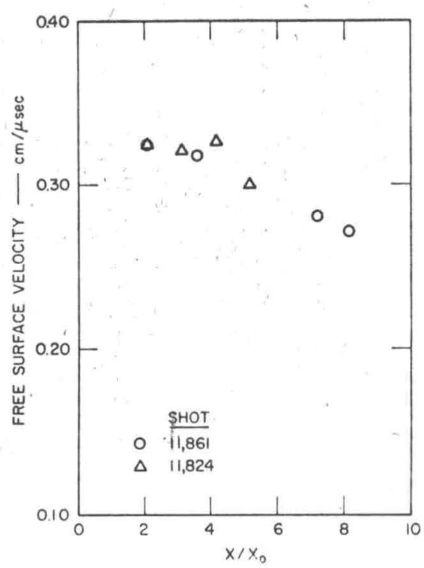

FIG. 5. Free-surface velocity vs shock travel (x/x_0) for 2024-T351 aluminum impacted at 0.32 cm/μsec.

B. 2024-T351 Aluminum (High-Velocity Flyer Plates)

Two experiments were performed with 2024-T351 aluminum in the as-received condition for which the flyer-plate velocity was about 0.32 cm/μsec. This velocity corresponds to a pressure of 345 kbar in aluminum. Results of the shots are given in Fig. 5 and in Table I. The average shim velocity in Shot 11 824 for specimen thicknesses out to 4.1 plate thicknesses is 0.324 cm/μsec. The fact that the free-surface velocity, 0.324 cm/μsec, is slightly greater than the velocity of the flyer plate is one of the interesting results of this experiment. Rigidity must be important because attenuation commences for smaller target thicknesses than predicted by fluid type calculations. The aluminum is heated to a temperature of approximately 500°C so that effects other than those described by simple elastoplastic theory should be expected. One effect appears to be the elimination of the loss of free-surface velocity. If such conjecture is true, experiments at