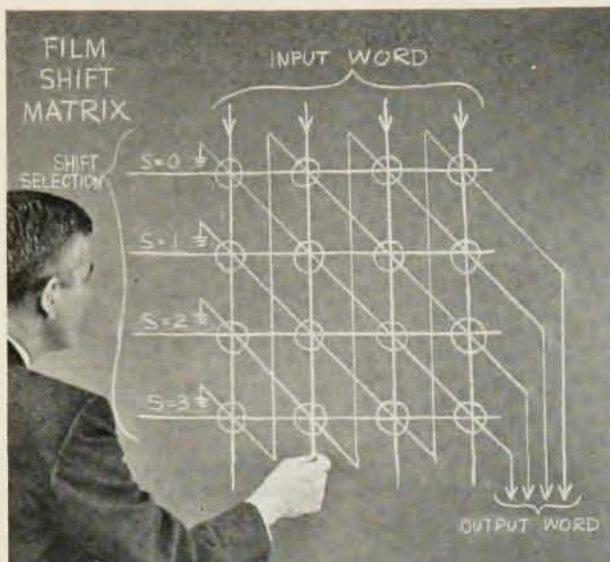




This logic array has been developed in the Remington Rand Univac Mathematics and Logic Research Department. In simplified form, each circle represents a film element that AND's the bits from the horizontal and vertical lines to produce an output on the diagonal line. The input word is therefore left-circularly shifted S places in passing to the output. Such matrices can produce arbitrary right or left shifts, either circular or open-ended, in a single clock period for full length computer words. Film logic arrays open a new field of high speed, high density logic devices.

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with fast-neutron cross sections, neutron capture, and nonneutronic fission. The last two sections are on general fission processes and fission-fragment studies. A total of 66 papers makes this an important review of the basic physics of neutron and fission processes of ultimate interest to engineers as well as physicists.

The format of these volumes is conducive to easy reading (pages measure 8" x 11" and are of heavy glossy stock that enhances the many photographs which are included). It should be noted, too, that each paper has only a minimum number of references; the documentation is not obtrusive, yet there is such a wealth of information imparted as to make the work encyclopedic. These are highly desirable volumes and are recommended as standard source material in nuclear physics.

Impact. The Theory and Physical Behavior of Colliding Solids. By Werner Goldsmith. 379 pp. (Edward Arnold, London) St Martin's Press Inc., New York, 1960. \$17.50. Reviewed by J. M. Walsh, General Atomic Division, General Dynamics Corporation.

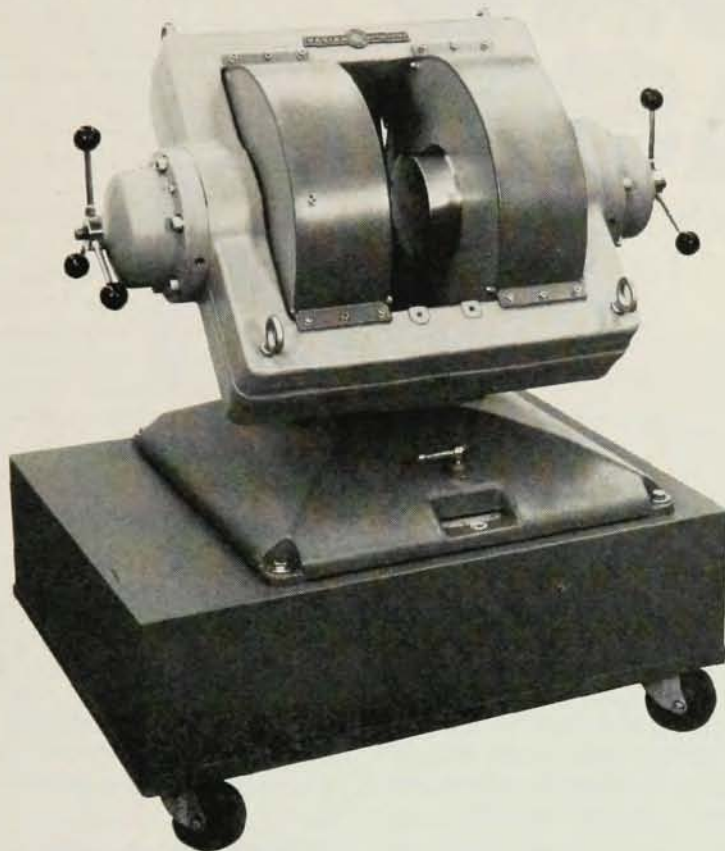
A SUMMARY of the literature, both experimental and theoretical, on the subject of solid-solid collisions is given in *Impact*. The subject is reviewed in its successively more refined approximations, beginning with the elementary case in which all of the deformation and vibrational aspects of the collisions are replaced by a single empirical (and tremendously simplifying) coefficient of restitution. Elastic vibrations arising from impact are then discussed, followed by a chapter on local deformation in the contact region. Collisions that involve extensive plastic deformation are the subject of Chapter 5, which is some thirty percent of the book. Two final chapters are devoted to a more complete coverage of the experimental data from impact tests; special attention is given to the evidence that dynamic strengths surpass the static analogs.

The appearance of this substantial contribution by Professor Goldsmith hardly means that the subject is a well-developed field of applied physics. Rough approximations are still needed to interpret collisions involving large plastic deformation, and areas of extensive experimental study, such as many aspects of bullet-plate interaction, yield only to descriptions which are admittedly phenomenological. Reasons for this seemingly modest level of understanding are not hard to find. The simplest laboratory collision experiments (once the limits of linear elasticity are exceeded) should be analyzed as nonlinear time-dependent flows in two or more space variables. Such calculations are only recently being accomplished for fluids, where one has a nonrelaxing scalar equation of state. For solids, a tensorial equation of state must be used if material strength is to be retained, and this stress-strain relation must be taken as irreversible if plastic deformation is to be explained. Finally, the evidence indicates that a time-dependent equation of state may be desirable in

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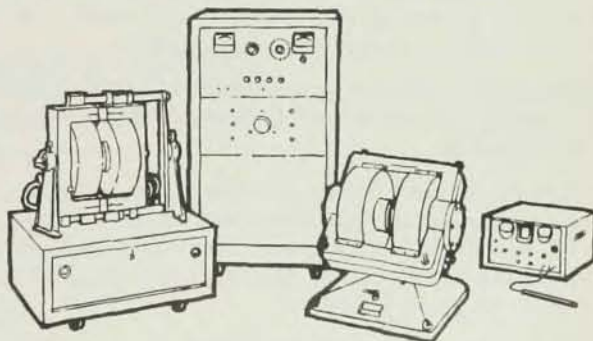


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some applications. In view of such complications, it is not surprising that our understanding of collisions has increased only slowly, and that a general summary must consist largely of tentative conclusions from rough theories of the flow.

The book is a successful exposition of the many contributions to an understanding of collision phenomena. The pertinent models of the flow for each type of collision are described, critically evaluated where possible, and compared with the experimental findings. The discussion is enriched by frequent tables and figures which exhibit properties of real materials.

The author, perhaps judiciously, does not attempt to fit the subject within the framework of a unifying theoretical development. Also, the derivation of fundamental relations, such as the Hertz law of contact, sometimes seems excessively sketchy. However, simple collision theories are frequently illustrated with examples. And the discussion is rounded out by the author's appraisal of the various theoretical attacks.

Finally, the work is not free from the errors that often accompany such a sizable undertaking. Thus, the implications of incompressibility and constant compressibility are occasionally confused, and the well-understood centered rarefaction is treated as a shock in Chapter 5. These and lesser oversights, usually an occasional remark which could be more exact or specific, might have been eliminated by a careful technical editing. The attendant difficulties, however, will not be severe for the research worker in this field.

The book has considerable value both as a contemporary summary of the literature and a guide to the six hundred or so references which are cited.

Hypersonic Flow. Symp. Proc. (Colston Res. Soc., Univ. of Bristol, April 1959). A. R. Collar and J. Tinkler, eds. 432 pp. Academic Press Inc., New York, 1960. Reviewed by Allen I. Ormsbee, University of Illinois.

FIFTEEN papers and attendant discussions concerning a broad range of problems in hypersonic aerodynamics are contained in this volume. Complete descriptions of hypersonic flow facilities and the results of some specific experiments at many of the major installations in the West are included, as well as separate presentations by Mangler and by Van Dyke on the numerical solution to the blunt-body problem for a given shock wave, and papers on Newtonian flow, boundary-layer combustion in shock tubes, nonsteady aerodynamics of wings and panels, hypersonic vehicle design, and hypersonic air-breathing engines.

The disparateness of the subjects treated does not detract from the collection, for it helps to offset somewhat the repetition in descriptive material contained in some of the experimental papers. Every author has the right and the responsibility to be sure that his audience has a clear understanding of the geometry and function of his experiment; however, when reports of several experiments using similar apparatus are published under one cover, it does seem that some equitable arrange-

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