

hemodynamics, ultrasonic techniques, biomechanics, sensory aids, and heat-transfer phenomena. Presentation of papers should take no more than 15 minutes. Deadline for receipt of abstracts: 15 August. (P. D. Edmonds, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia 19104)

Courses

The Armed Forces Institute of Pathology will conduct a course on the **pathology of laboratory animals**, 20-24 September at AFIP, Washington. The course is designed primarily to fit the needs of veterinary officers in charge of animal colonies in military laboratories; it will provide training in recognizing and interpreting lesions in experimental animals, and in the procurement and maintenance of animal colonies. The course is open to military and a limited number of civilian veterinary, medical, and dental personnel. Deadline for receipt of applications: 1 August. (Director, Armed Forces Institute of Pathology, ATTN: Department of Pathology, Washington, D.C. 20305)

Scientists in the News

The following scientists have been named to join the astronauts training at the NASA Manned Spacecraft Center in Houston, Texas. They will be trained as specialized scientific crew members for the Apollo program.

Owen K. Garriott, associate professor of physics at Stanford.

Edward G. Gibson, senior research scientist at Applied Research Laboratories, Aeronutronic Division, Philco Corporation, Newport Beach, California.

Duane E. Graveline, flight surgeon at the NASA Manned Spacecraft Center.

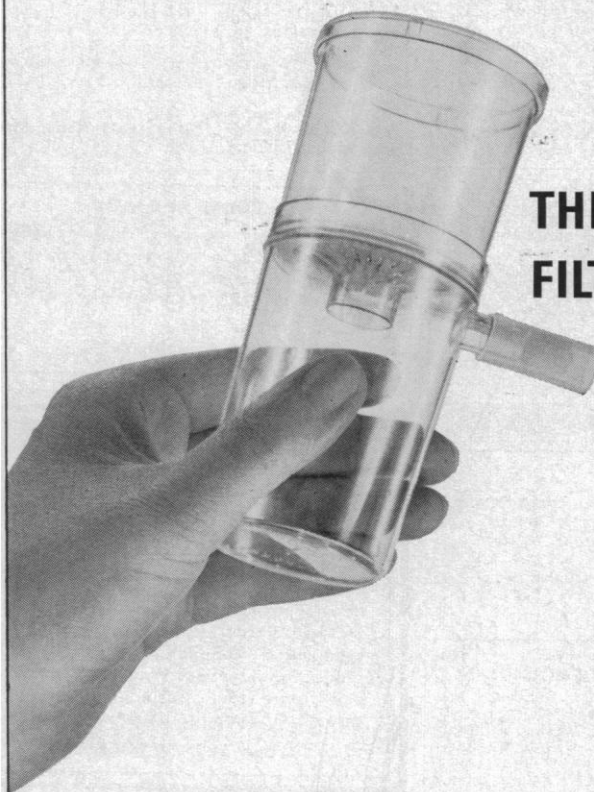
Joseph P. Kerwin, staff flight surgeon for Air Wing Four, Cecil Field Naval Air Station, Florida.

Frank Curtis Michel, assistant professor of space sciences, Rice University.

Harrison H. Schmitt, astrogeologist for the U.S. Geological Survey.

Charles P. Hutter, formerly in charge of the European office of NIH, has become biomedical attaché to the U.S. Mission, Geneva, Switzerland.

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(a) **Pharmacology-Physiology, M.D.**, biostatistician, computer experience; cardiovascular, diabetic research; prefers basic or medical research appointment. (b) **Bacteriology-Dairy Industry Ph.D.**, biochemistry minor; B.V.S.; recent doctorate; seeks research opportunity. For details write Woodward Medical Personnel Bureau, 185 North Wabash Avenue, Chicago, Illinois 60601. X

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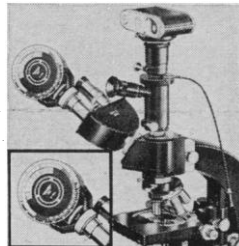
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Strip of postformable aluminum-polyethylene laminate developed by Bell Laboratories (left) shows best stiffness-to-weight ratio compared with equal-weight, -length and -width strips of glass-mat-reinforced polyester (center) and cold-rolled steel. Samples of the laminate after deep-drawing are also shown. Note the uniform thickness possible with this process.



Aluminum-polyethylene structural laminates formed without adhesive

A laminate of polyethylene sandwiched between lightweight metals such as aluminum would have highly desirable strength-to-weight properties. But conventional methods of making

such a laminate by using intermediate adhesive agents are incapable of producing a structural bond.

Recently, however, K. H. Pohl and A. T. Spencer of Bell Laboratories developed a structural-quality aluminum-polyethylene laminate *without* using adhesives. Such a laminate was concurrently predicted by Bell Laboratories' work on adhesion, which indicated that thermoplastics generally considered "unbondable" without surface modification can form strong joints with materials on which they spread spontaneously.

To produce the aluminum-polyethylene laminate, sheet polyethylene is molded between properly prepared sheets of aluminum. No preparation of the polyethylene is required, other than cleaning. The aluminum, however, is roughened, degreased and etched to produce a suitable surface. In a heated press the polyethylene melts, spreads

spontaneously on the aluminum and, on cooling, produces a strong, durable bond.

In addition to its high flexural strength, the laminate has other characteristics which make it desirable for use in electronic equipment and elsewhere. It can be bonded, riveted, bolted, punched and sheared, and unlike reinforced plastics, it can be welded. It can also be bent readily or otherwise postformed at temperatures which soften the polyethylene core and thus allow independent motion of the aluminum skins. A Bell Laboratories-developed process for deep-drawing the laminate, in which the edges remain cool and only the portion to be deformed is heated, produced the samples seen in the illustrations.

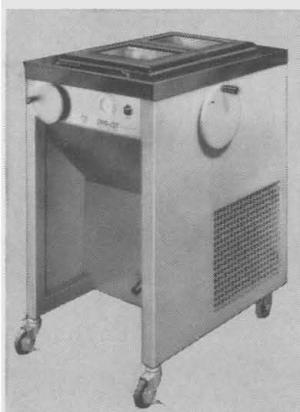
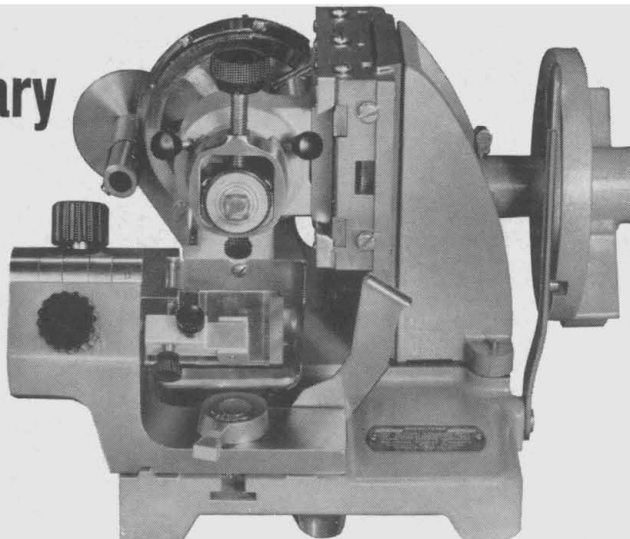


A. T. Spencer (left) and K. H. Pohl, originators of the structural laminate, demonstrate the results of postforming it with a heated die.



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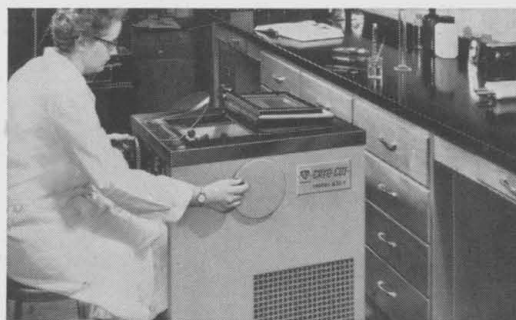


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