

weight ratios. This paper highlighted the need for marriage of a separator with improved efficiency and an engine designed to have a reasonable tolerance to sand and dust.

OPERATIONS AND TESTING—

(Chairman: **Jim Hayden**, U.S. Army Aviation System Test Activity; preprints 470-474.) This session covered a diverse range of subjects and interests. Leading off was a description of results of testing a 2-point longitudinally-displaced sling load attachment device. The use of this system greatly increased the maximum speed capability with light bulky loads and improved load stability in general.

A technique for visualizing tip vortices was described and related to noise research. The discussion of this timely subject was augmented by use of striking motion pictures.

The session moved toward the operational flavor with a presentation on gunship maneuvering investigations. The results of a test program indicated that the best "return to target" times were obtained with a climbing turn; the author concluded that the ability to decelerate is a key factor, and that the climbing turn should be strongly

considered for selection as the standard for "return to target" maneuvers.

The common interest of all testers was discussed by describing one company's new data system. The fully integrated system is oriented toward structural programs.

The final paper, prepared jointly by members of British and U.S. firms, revealed commendable and interesting work on water ditching of helicopters, and studies of the size and type of wave that is critical for specific float-equipped configurations. The work was primarily done with scaled models, but included study of actual ditchings and of wave characteristics. A description was given of specific testing accomplished to win British Air Registration Board certification of one helicopter for over-water flights.

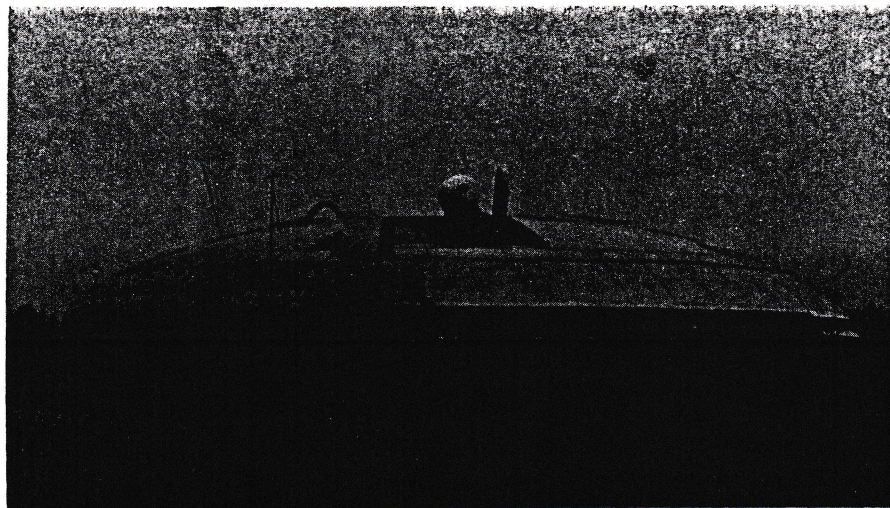
AVIONICS — (Chairman: **Hal Oakes**, Sikorsky; preprints 430-434.)

The papers presented in the Avionics Session gave an example of the problems encountered during the complete life cycle of the avionics system development. The paper *Avionics, The Key to the Future of Army Aviation*, discussed the methods used in establishing and documenting the

Army's requirements, and how in the future the implementation of a total systems approach will solve not only special avionics problems, but also important broad Army objectives. The paper *Night Observation and Weapons Fire Control system* discussed the integration of a moving target detection radar, image intensifier, covert light, and terrain tracking into a self-contained fire control system. In many cases the problems are recognized but there is not enough data available to generate a solution. *An Investigation of Heavy-Lift Helicopter Display Problems*, discussed an R&D program designed to obtain enough data to quantify the display problems of a crane type helicopter and to identify feasible solutions. The paper *Miniature Laser Obstacle Warning Systems for Helicopters*, proposed the integration of "off-the-shelf" hardware and proven techniques into a system capable of providing new capabilities. In the not-too-distant future, the techniques discussed in the paper, *Millimeter Radar for Landing Applications*, may be used to provide V/STOL landing aids.

Rare Birds

No. 7—'Flying Saucer'



Few aircraft built with serious intent have resembled the popular concept of a 'flying saucer' so much as the identical twins (one pictured) constructed by the Canadian firm of Avro Aircraft Ltd. to examine the low-speed practicality of the circular wing/annular nozzle concept. At the time, some 10 years ago, the concept was promising as a way to incorporate VTOL capability into a high-speed design; the annular nozzle was equipped with some rather ingenious flow-control mechanisms intended to produce lifting thrust during hover, horizontal thrust during cruise, and control moments during all phases of flight. Air for the annular jet was pumped by a centrally-mounted 5-ft-diam turbo rotor

driven by the exhaust of three J-69 jet engines. The 'Avrocar,' to use the name applied to these vehicles during wind tunnel and flight tests by NASA Ames and the USAF, performed, but its narrow flight envelope, plus existence of major mechanical problems due to structural fatigue, destroyed confidence in it and further work was abandoned. One was given to the Smithsonian; whereabouts of the other is unknown. Pictures of the vehicle in flight are almost as rare as the bird itself. For this one, *VertiFlite* is indebted to Bradford H. Wick, chief of Ames Full-Scale and Systems Research Div., and Wallace Deckert, also of Ames.

Northeast Clambake Date Announced

On September 19, 1970 (rain or shine) the 14th Annual Northeast Clambake will be held at Davis Hilton's in Moodus, Conn.

Please reserve this date for your family and guests for Food, Fun, Prizes and Helicopters. Additional information will be furnished at a later date.

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Many societies acknowledge individual effort in membership recruitment. The AHS presents a member who sponsors five new members with a handsome 5 $\frac{3}{4}$ -in.-square walnut plaque, faced with a 4-in.-dia. metal medallion duplicating the Society's seal.