

An Anti-Collision Navaid

Recent publicity given to mid-air collisions and near-misses has focused attention on the need for a positive and non-saturable system of air navigation and traffic control. Stavid Engineering Inc., Plainfield, N.J., is the latest entry in the field of air traffic control with a new system under development called Radio Web, for which Stavid holds the licenses for U.S. and Canada. The equipment was developed by the French firm, Radio A.I.R.

The Radio Web System offers a promise for the interim period and the foreseeable future in the handling of increasing traffic loads. It is said to be capable of solving with ease all three common system requirements: air navigation, area and landing pattern traffic control, and air collision warning for both short and long range (beyond line-of-sight) conditions.

The basic Radio Web is designed for small and medium-sized aircraft where cost and weight are of primary importance. This was a major design factor since 90,000 of the 125,000 civil aircraft flying in 1975 will be in the lightplane category. Stavid has developed a modular type of system to take care of all aircraft regardless of size or speed.

For light aircraft, the minimum equipment will contain two control knobs, a null meter, toggle switch, four channel receiver and a timing circuit. At present, the basic system can be expanded to include a continuous graphic presentation of position, track and ground speed; a relative position indicator; and provisions to feed distance and bearing

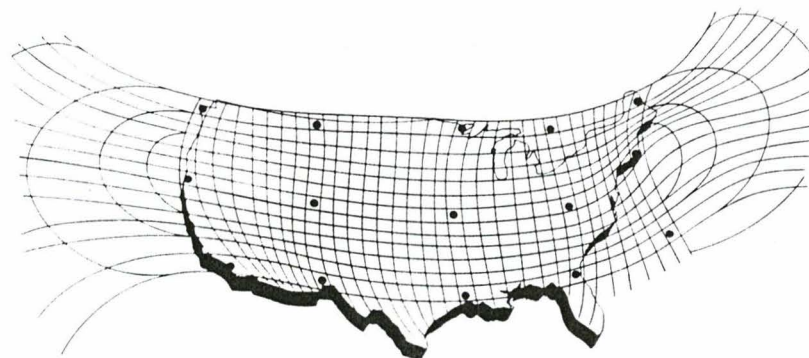
information to the auto-pilot. Further refinements can be added to establish voice communication with the ground, a data link for ground control, and altitude control.

The most versatile of the Radio Web airborne units is the relative position indicator that gives a continuous display of position, track and ground speed and provides a visual and audible warning of compatibly-equipped aircraft at the same altitude or on a possible collision course.

Fifteen ground stations (see drawing at bottom) would effectively control all aircraft with the U.S. to a position accuracy of $\frac{1}{2}$ mile in uncongested areas, and to 200 yards in controlled zones Stavid claims. Radio Web can be used for transoceanic navigation with ground stations placed 2,000 miles apart. Position accuracy under these conditions would be better than five miles.

The ground equipment would comprise 15 ground controllers and a series of transmitting towers arranged approximately in the form of adjacent squares. Radio signals pass between the towers in a sweeping motion. The effect is to create a grid of rectilinear lines that may be superimposed on an area chart for orientation (see sketch at top).

Stavid says its plan of development offers the aviation industry a system to fill an immediate need plus provisions for foreseeable requirements. The company expects the airborne units to weigh from 10 lbs. for the basic system to about 60 lbs. for the most advanced equipment.



made of the latest additions to knowledge of the meteorology of jet streams.

Recent Advances in the Aerodynamic Design of Axial Turbomachinery — by W. H. Robbins and H. W. Plohr, NACA.

The requirements for compressors and turbines for turbojet engines are that they be light, reliable and efficient. These requirements have dictated the need for high-capacity continuous-flow compressors and turbines with high mass flow per unit frontal area, high pressure ratio and high work output per stage, high efficiency, and broad operating range. Considerable effort has been directed toward components design of systems that utilize high relative Mach numbers and high blade loadings effectively. This paper discusses such a system.

Gas Turbine Combustion System Design — by F. D. M. Williams, Orinda Engines Ltd.

The author discusses the design rules and simple analytical approach employed in the process of evolving and evaluating a combustion system design for a specific project, such as an advanced type of jet engine. Reference to the problem of designing a combustion system for an aircraft of high supersonic speeds is made in the paper where a brief coverage of one approach helps to illustrate future trends and their attendant problems.

Stability and Control Characteristics of the Vertical Attitude VTOL Aircraft — by Earle R. Hinz, Ryan Aeronautical Co.

The concept of the vertical attitude VTOL aircraft has become a fully established fact through successful flights of manned research aircraft. One of the major problem areas satisfactorily solved in this development was that of stability and control at low speeds and in hovering. Pertinent aerodynamic characteristics at angles of attack above stall are presented in this paper, and their influence on flight in the transition regime is discussed. Maneuvering control criteria are analyzed to indicate requirements for the low speed regime, and it is shown how a reaction control system may be combined with aerodynamic controls for low speed flight. Thrust control characteristics peculiar to hovering and transition flight are illustrated. Use of stability augmentation is discussed and a comparison made with the requirements of contemporary high performance aircraft. The dynamic flying characteristics in transition are shown through the use of time history studies of take-off and landing maneuvers.

Simulated Flight Training, Its Uses and Limitations — by Captain G. B. Lothian, TCA.

In looking to the future, the author believes that simulation will take over most flight training and proficiency checks. In so doing, it will raise the standard of flight crews and substantially reduce the costs involved. Emphasis is placed on the fact that there is a great deal of development and research to be done in further increasing the fidelity of flying "feel" involved, due to physical motion and visual aids. The opinion is also expressed that a compromise can be reached between the type trainer and full simulation that can substantially reduce the cost per unit which would place smaller airlines in a position

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