aerospace

WARNING SYSTEM

Avoiding helicopter collisions

Massed helicopters in flight may be an awe-inspiring sight to ground observers, but to each pilot the proximity of the other aircraft and possibility of mid-air collision present a different picture. The problem is magnified when the pilots are trainees. To minimize the hazard of collision, the Army Aviation Center at Ft. Rucker, Ala., is now installing a new proximity warning system (PWS), developed by Honeywell Aerospace Div., in 222 helicopters. The firm claims reliable operation of the PWS in an air density of up to 50 helicopters in one square mile area.

The concept involves use of cooperative radio transponders and rapid signal processing in a continuous repetition of identification queries and responses among similarly equipped aircraft. Thus, aircraft A continually transmits a two-pulse signal; the interval between the pulses is a function of vehicle altitude. Receiving aircraft B, if within a preset slant range, processes the signal and compares the altitude of aircraft A with its own height. If the two are within 300 feet in vertical height of one another, a reply is sent to aircraft A. The latter processes the signal to determine the slant range of aircraft B by using the time interval from transmission to reply and signal velocity. If the intruder is within a range of 1,000, 2,000 or 3,000 feet—a limit selected by the pilot, a warning is given by blinker light, audible tone, or both. Relative position also can be displayed.

LIFTING PLATFORM

One-man flying unit

Remember the rocket-propelled flying belt developed by Bell Aerospace Corp. and demonstrated globally during the mid-1960's? Intended as a proof-of-principle device, it had only a 12-second lift time. Later, the firm had the Williams Research Corp. develop a small fan-jet to extend the operating range.

Now Williams has an exclusive license from Bell to build the backpack and other lift devices here and in Canada. It recently showed a mockup in Washington of a new one-man flying unit called WASP, for Williams Aerial Systems Platform. Its 67-pound bypass-fanjet engine occupies 1.4 cubic feet and develops 430 pounds of thrust. The platform will carry a man at 60 miles an hour for up to one-half hour and will be available in three to five years, the firm claims. Applications include law enforcement, firefighting and medical aid.

DOMESTIC SATELLITES

Millimeter waves for high capacity

For many years it has been apparent that one answer to the growing problem of radio-spectrum congestion would be to move into the unused millimeter-wave region —10-1 millimeters, or 30-300 gigahertz. Current interest for communications satellites, however, is in the region just below, 15-30 gigahertz, because atmospheric attenuation at higher frequencies becomes severe. Also, improvements in antenna design and in solid-state components now permit use of higher power operation in radio repeaters designed for this range.

In the Oct. 2 SCIENCE, L. C. Tillotson of Bell Telephone Laboratories discusses a design for such a system operating in two bands at 20 and 30 gigahertz, each with a bandwidth of 4 gigahertz. Although expandable, the network could be initiated with a single satellite and 16 ground stations. Total system capacity, he declares, would be 80 billion bits a second, or enough for 640,000 two-way voice-grade circuits. By using sophisticated transmission techniques (four-phase pulse code modulation) and high quality ground antennas, he suggests system expansion by adding some tens of satellites at orbital spacings as narrow as one degree. The resulting network, he asserts, would have a capacity comparable to any competing communications facility, including terrestrial networks.

AIRLINE SAFETY

Fire-retarding shell

Deaths in aircraft often occur as a result of fuel fires following a crash or other landing accident. The Federal Aviation Administration has been trying to develop means of protecting passengers from fire long enough for them to be rescued.

A system developed by scientists at the National Aeronautics and Space Administration's Ames Research Center, Moffett Field, Calif., may be a promising solution. It would provide a fire-resistant protective shell around the passenger compartment, bonded to the aircraft fuselage, protecting the passengers for six to ten minutes. The system uses fire-retardant paints and foams which both release fire-extinguishing vapors and form insulating flame-proof black char.

In a recent test on a C-47, an unprotected section burned up in two minutes; a protected one provided survival conditions for eight minutes.

Problems such as additional weight and cost are still being worked on, and the system itself is going through continued tests.

LANDING SITES

Search for shuttle ports

The coming space shuttle era (SN: 8/29, p. 178) will introduce new recovery techniques. The booster and orbiter will blast off vertically, much the same as Apollo lift-offs, but the landing will be horizontal, and runways capable of handling shuttle traffic will be needed.

The space center at Cape Kennedy could be one shuttle port. But runways and other facilities would have to be added. Since the booster will land on the ground instead of dropping off in the ocean, a launch site near water is no longer a requirement. The National Aeronautics and Space Administration is currently looking at several other possible sites (in addition to the Cape) in the Midwest and West as shuttle ports.

NASA's Flight Research Center at Edwards, Calif., where research on lifting bodies has been conducted for years, will probably see some shuttle activity. But if the Cape is not preserved as at least one shuttle port, chances are that it would become a ghost town after the last of the Skylab flights in 1972-73. It is not likely that NASA will let this happen.

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