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RELEASE NO: 77-100

NASA ENGINEERS STUDY SPIN, STALL PROBLEMS FOR LIGHT PLANES

NASA aeronautical engineers are conducting intensive research on the problems of spins and stalls in light general aviation airplanes. The NASA Research and Technology Advisory Council (RTAC) Panel on General Aviation Technology sees stalls and spins as the most important safety problems facing light plane designers, since they account for 30 per cent of all fatalities in light planes.

In response to requests for expanded, aggressive research on the problem, NASA's Langley Research Center, Hampton, Va., has formulated a program fashioned after highly successful research programs conducted for military designs such as recent fighter airplanes.

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Mailed:  
May 18, 1977
Langley has traditionally been a leader in research to solve or minimize stall-spin problems. The research at Langley dates back to the 1930s, when a 15-foot spin tunnel was put into operation. The tunnel was enlarged to 20 feet in 1941, and has been used since to test more than 400 airplane designs. Today it is the only operational spin tunnel in the United States.

Langley's program objectives include determining aerodynamic characteristics of aircraft designs at high angles of attack, concepts for stall avoidance or "stall proofing," developing emergency spin recovery systems and establishing design guidelines for insuring satisfactory spin characteristics. Development of test techniques, such as radio-controlled models which can be used by the general aircraft industry and consultation services for industry are included.

The program will study several low and high wing designs, as well as single and twin engine configurations. Specialized testing techniques developed at Langley in recent years will augment this research. Free flight tests in the full scale wind tunnel, drop model tests and piloted simulator studies will be performed.
In one new project, researchers are attempting to determine the effects of tail design on spin characteristics. A representative low wing, single engine design has been modified to accommodate several tail configurations for both full scale and model airplane tests.

Four separate tail configurations have been designed and fabricated at Langley, based on extensive spin tunnel model tests. Spin characteristics of the airplane with these four tails will be fully tested, along with changes in loading and mass distribution in wings and fuselage.

Since some of these configurations will have unrecoverable spins (by normal recovery methods), a spin recovery parachute has been designed and built at Langley and is fitted to the airplane. Its first high speed deployment test, conducted in March, was successful.

Following two inflight test deployments and local documentation and checkout flights, spin testing on the first tail configuration will begin at NASA's Wallops Flight Center, Wallops Island, Va., in June.
The test airplane is fully instrumented to record control forces and positions, angles of attack and sideslip, angles of pitch and bank, rates and accelerations about all axes, airspeed, altitude, engine power and other parameters. Some of the more critical parameters will be telemetered for real time observation on the ground.

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