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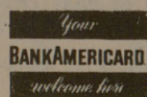
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By **Collins of Texas**

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A&M group designs spoiler to keep aircraft from stalling

A device that gently prevents an airplane from stalling—a cause of many air mishaps—is nearing completion in A&M's Flight Mechanics Laboratory.

Called a stall prevention spoiler by Howard L. Chevalier and his crew at the Space Technology Division facility, the system is being developed to correct one of the serious problems encountered in aerial flight.

An aircraft stalls when its attitude causes loss of lift.

"When a high angle of attack occurs, the air flow separates from the wing," Chevalier explained.

He said that the stall itself is not dangerous to airplane structures, but resulting loss of flying speed, altitude and control is.

What he, aerospace engineering graduate student and pilot Jim Savage of Sudan and pilot Doug Pearson of Oil City, Okla., have done is attach a thin strip of metal—the spoiler—to the lower front edge of the stabilizer.

When the plane approaches stall conditions, the spoiler gradually drops into the air stream from a position flat against the elevator. It forces the nose of the craft down—and away—from stall attitude.

The system, which has been discussed with the Federal Aviation Administration and aircraft manufacturers, deploys the spoiler proportionately as stall attitude increases.

Chevalier conceived the device while at NASA's Ames Research Center in California.

He said that about 23 per cent of all air accidents were attributed to stall-induced situations. A large percentage of agricultural-type planes mishaps can be traced to stall.

"A great deal of flying instruction time is given to showing a student pilot what a stall is and how to recover from it," the veteran pilot commented. "A fool-proof system would eliminate the need."

The system differs from standard anti-stall devices in that it applies corrections as a function of plane attitude. Stall warning horns, for example, sound when high stall conditions are imminent. Then the pilot must react.

The spoiler system is automatic, linked to a stall sensing vane on the wings through a servo motor that would deploy the spoiler regardless of pilot action.

Advantages of the A&M lab-developed system are that it allows maximum maneuverability at all flight attitudes except near stall, is mechanically independent of the control system, does not require changes in standard control systems, can be incorporated into both new and existing airplanes and does not require pilot judgment nor physical reaction.

Work at the A&M Research Annex lab has progressed to linking the entire system together for tests of automatic operation. Almost 30 hours of air time have gone into testing the apparatus on a Piper PA-18. In tests so far, an observed has manually deployed the spoiler, first by listening for the stall-warning horn then by watching meter readings from the vane sensor.

"In these instances, the observer acted as the servo motor," Chevalier explained.

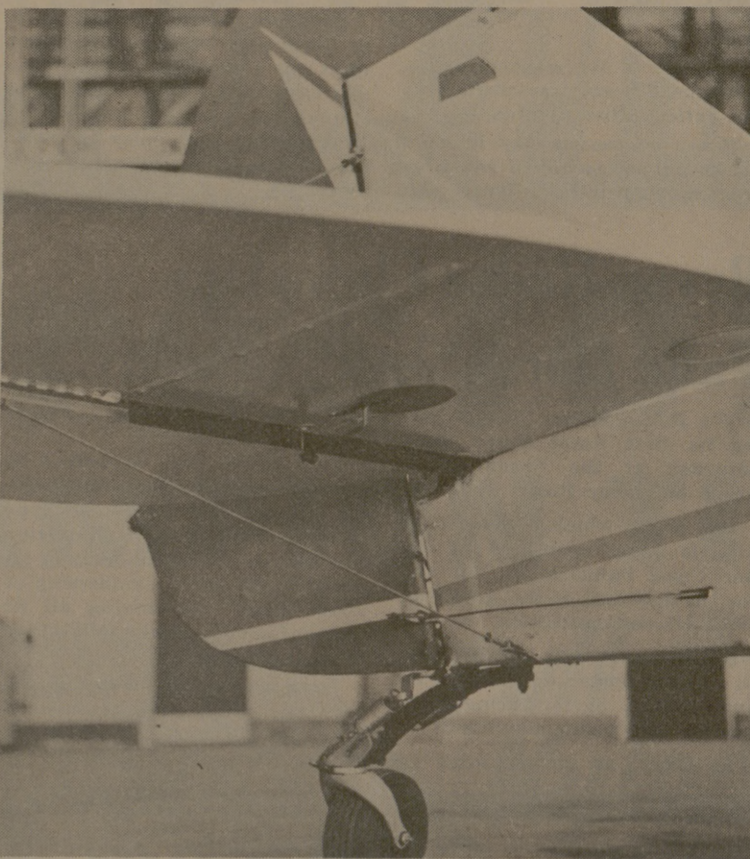
Savage, who is basing his thesis on the system, did analytical work, utilizing in part a report by professor A. E. Cronk, Aerospace Engineering Department head, in predicting spoiler geometries.

A cooperative student, Larry Morse of Bedias, designed the electronics system. Chevalier said the electronics "black box" is light-weight, economical and can be used in almost any plane.

Fabrication of system components was done entirely in the lab and the annex Research and Instrument Shop. Joseph C. Brusse, engineering research associate with the shop, inspected installations.

The Flight Mechanics Lab, which also conducts research in improving aircraft lateral control and aircraft response to atmospheric turbulence, also flies

a Gruman Ag Cat and Beechcraft T-34B from a runway of the former Bryan AFB. A fourth plane, a Beechcraft C-45, is being restored to flight condition.



STALL SPOILER—A stall prevention spoiler, part of which is shown projecting downward from the elevator of a Piper PA-18, developed by the Flight Mechanic Laboratory at Texas A&M.

Cheap transport of moon samples to earth possible

Economical transport to earth of materials extracted from the moon is feasible using a technique practically as old as man's dream of space flight.

The method—described among others, by Edgar Rice Burroughs in his "Venus" series—employs a rocket-powered sled and launch track to assist in lunar liftoff.

Russell A. Keyes, A&M senior aerospace engineering student, has calculated that a channel-type track along which the rocket sled would accelerate and ascent stage could withstand rigors of the

lunar environment.

In the airless lunar atmosphere, cosmic and solar radiation would constantly bombard the launch track. It would be subjected to expanding and contracting forces of extreme temperature differences between the lunar day and night. Lunar temperatures range from -236 degrees to 284 degrees Fahrenheit in 27 days.

"Analysis of the proposed track indicates it is capable of functioning throughout the extremes of the lunar environment," Keyes stated in a course report to Dr. Charles A. Rodenberger, aerospace engineering professor.

He also calculated that vibrational and frictional problems inherent in the operation of such a high speed track can be effectively overcome.

Keyes, a San Antonio College graduate who transferred to A&M, chose "I" beams and "C" channel of cold-rolled steel and 1/2-inch aluminum plating for his general track design and analysis.

His plan is to fix each beam rigidly at one end, restrain side slippage and vertical deflection by a bolt protruding through slots along the lower flange of the beam.

"Despite these restraints placed on it, the beam is able to expand

longitudinally, laterally and vertically," he said. "Because of its ability to expand freely and the slow temperature rate of change which it would undergo, the thermally induced stresses."

Similar bolt slots in the "C" channel make it easily possible for track side members to expand and contract with the lunar temperature variation, he added.

The track, consisting of 8 1/2-foot wide sections, would stretch from 12.3 to 33.4 miles across the lunar surface.

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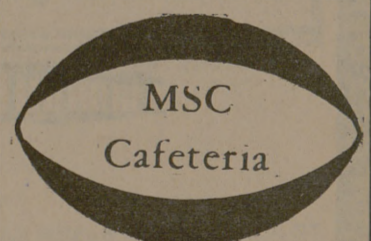
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