

# Concluding Report of Free-Spinning, Tumbling, and Recovery Characteristics of a 118-Scale Model of the Ryan X-13 Airplane, Coord. No. AF-199



Concluding Report of Free-Spinning,  
Tumbling, and Recovery Characteristics  
of a 1/18-Scale Model of the Ryan X-13  
Airplane, Coord. No. AF-199

NASA Technical Reports Server  
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(Mr. Deangelo Considine)*

## **CONCLUDING REPORT OF FREE-SPINNING, TUMBLING, AND RECOVERY CHARACTERISTICS OF A 118-SCALE MODEL OF THE RYAN X-13 AIRPLANE, COORD. NO. AF-199**



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Bibliogov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 40 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. An investigation has been completed in the Langley 20-foot free-spinning tunnel on a 118-scale model of the Ryan X-13 airplane to determine its spin, recovery, and tumbling characteristics, and to determine the minimum altitude from which a belly landing could be made in case of power failure in hovering flight. Model spin tests were conducted with and without simulated engine rotation. Tests without simulated engine rotation indicated two types of spins: one, a slightly oscillatory flat spin; and the other, a violently oscillatory spin. Tests with simulated engine rotation indicated that spins to the left were fast rotating and steep and those to the right were slow rotating and flat. The optimum technique for recovery is reversal of the rudder to against the spin and simultaneous movement of the ailerons to full with the spin followed by movement of the elevators to neutral after the spin rotation ceases. Tumbling tests made on the model indicated that although the Ryan X-13 airplane will not tumble in the ordinary sense (end-over-end pitching motion), it may instead tend to enter a wild gyrating motion. Tests made to simulate power failure in hovering flight by dropping the model indicated that the model entered what appeared to be a right spin. An attempt should be made to stop this motion immediately by moving the rudder to oppose the rotation (left pedal), moving the ailerons to with the spin (stick right), and moving the stick forward after the spin rotation ceases to obtain flying speed for pullout. The minimum altitude required for a belly landing in case of power failure in hovering flight was indicated to be about 4,200 feet. This item ships from La Vergne, TN. Paperback.

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