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PRELIMINARY FLIGHT EVALUATION OF TWO UNPOWERED MANNED PARAGLIDERS

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SUMMARY

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Towed and free-flight tests were made with unpowered, manned paragliders to study the performance, stability, and control characteristics of a typical paraglider. The paragliders used had maximum lift-drag ratios greater than 3.5 and wing loadings of approximately 4.0 lb/sq ft. The airspeed range was limited by the rearward center-of-pressure shift at angles of attack above and below trim angle of attack. Performance data obtained from flight tests are presented and compared with analytical results. Center-of-gravity shift, accomplished by tilting the wing relative to the fuselage, was used for control. This method of control was adequate for towed and free flight as well as for flare and landing. The pilot's evaluation of the vehicle's handling qualities, and a discussion of development problems are presented.

INTRODUCTION

Paragliders have been proposed for use in the recovery of space vehicles (ref. 1, for example) and for other purposes such as logistics support vehicles and booster recovery vehicles. Paragliders have two significant advantages over other vehicles proposed for these applications. They can be maneuvered to a predetermined landing point and can be landed with near-zero vertical velocity.

To complement wind-tunnel tests and flight tests of paragliders by other facilities (refs. 2 and 3), the NASA Flight Research Center at Edwards, Calif., built and is flying two manned unpowered paragliders. The objective of the program is to achieve manned, controlled free glide flight and to demonstrate the flare and landing capability of a paraglider with a maximum lift-drag ratio less than 3.0 and a wing loading up to 7.0 lb/sq ft.

This paper presents some of the initial results of this investigation in which, for safety reasons, maximum lift-drag ratios greater than 3.5 and wing loadings of approximately 4.0 lb/sq ft were used.