

# Technical Comments

## Comments on "Nuclear-Powered Surface Effect Ship Design Problems"

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WHEN an article about a new GEM or SES appears in print,<sup>1</sup> it is a temptation to compare its performance with that of a machine of similar capability that was proposed long ago. In 1937 (before the trans-Atlantic flight of land planes was possible) J. C. Hunsaker<sup>2</sup> of the Massachusetts Institute of Technology described an airship filled with helium which would carry 200 passengers a distance of 3500 miles. Table 1 lists pertinent characteristics and performance. The last item in Table 1 is a measure of efficiency with respect to the load carrying capacity, aerodynamics, and propulsion.

In the light of recent improvements in structural materials and turbofan engines and with application of boundary-layer control, the case of the airship becomes even more promising than indicated in Table 1. If nuclear power is contemplated, considering the length of an airship of  $\pm 1000$  ft,

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Table 1 Information regarding a helium-filled airship

Item	Symbol	Units	Airship (1937)	SES (1965)
Gross weight or lift	$W$	lb	570,000	13,440,000
Pay load	$W_p$	lb	131,000	2,210,000
Horsepower cruise (0.667 hp rated)	$HP_c$	...	3,200	252,000
Cruising speed	$V_c$	mph	77	80
$W_p \times V_c =$				
$375 HP_c =$				
$\left(\frac{W_p}{W}\right)\left(\frac{L}{D}\right)(\eta_p)$				
...	...	...	8.4	1.9

the weight of shielding material could be considerably reduced in comparison with shorter machines. This implies that large rigid airships as a means of economic mass transportation at speeds of 100 mph or higher warrant careful consideration and future studies.

### References

- Montes de Oca, R. A. and Simpson, H. M., "Nuclear-powered surface effect ship design problems," *J. Aircraft* 2, 136-143 (1965).
- Hunsaker, J. C. "The development of trans-Atlantic aircraft," *Lilienthal Society for Aeronautical Research*, Munich, Germany (October 12, 1937).