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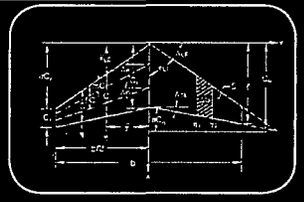
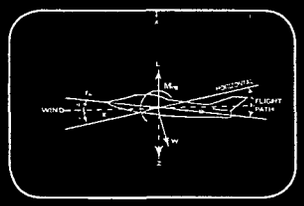
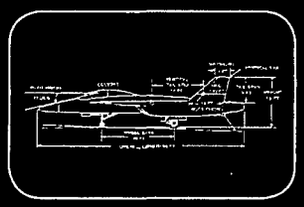
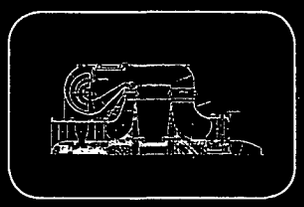
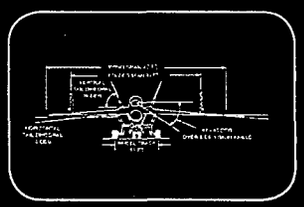
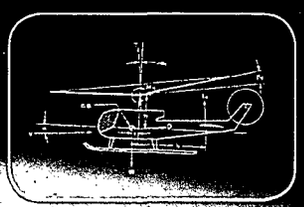
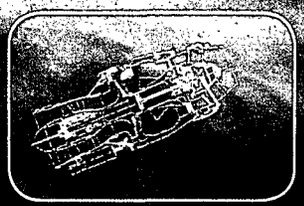
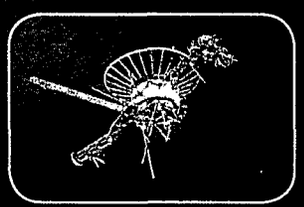

Edited by the Design Guide Subcommittee of the AIAA Design Engineering Technical Committee

Ned Allen
Editor-in-Chief

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AL TOLERANCES, CONTINUED

nbled has restrained fasteners, such as
ermed the "fixed fastener case." Where
and it is desired to use the same posi-
be assembled, the following formula

$$\frac{I - F}{2}$$

SECTION 8

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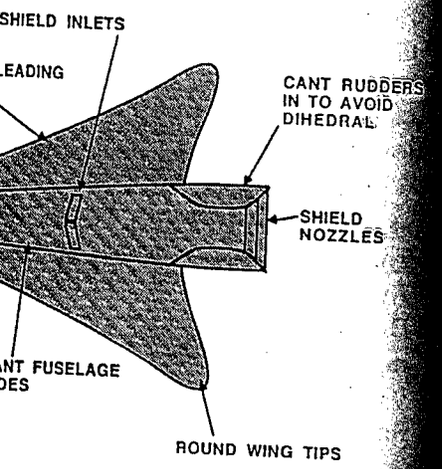

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SECTION 9

AIRCRAFT AND HELICOPTER DESIGN

DESIGN, CONTINUED

PROCESS, CONTINUED

CONTINUED

$$\left(\frac{2a\,P_{av}}{\rho fp}\right)^{1/3}, \text{ km/h}$$

power available to overcome parasitic

$$\left(\frac{2a\,P_{av,hp}}{\rho fp}\right)^{1/3}, \text{ knots}$$

GRAPHY

of Wing Sections, Dover, New York, 1958.
dbook, Helicopter Engineering, Part One: Army Materiel Command, Aug. 1974.
The Boeing Co., Document D6-1460, 1967.
ormance Estimation," Northrop Aircraft, Repr.

and VTOL, Airplane Design, published by

nan, London, 1961.
trol, Wiley, New York, 1959.
by author, 1965.
, METS, Inc., 1975.
ance Stability and Control, Wiley, New York,

tman, London, 1958.
Wing International), PJS Publications, Inc.,

and Control, 1995 Edition, Krieger, Malabar,

logy, Jane's Defence Data, UK, 1989.
Helicopters, Academic, New York, 1964.
esign, Delft Univ., Delft, The Netherlands,

I: Aircraft Design, Johnson Publishing Co.,

SECTION 10

AIR BREATHING PROPULSION DESIGN

The Committee gratefully acknowledges the efforts of the Air Breathing Propulsion Technical Committee, which was responsible for the generation and update of all of the material in this section. Special thanks go to James DeBonis for his help in the preparation of the material, and to the late John Rockensies, who spearheaded this effort, for his careful work and enthusiastic cooperation.

ET ENGINES, CONTINUED

, large total pressure losses result from
eds, and increasing chemical dissocia-
ıbustion ramjet (scramjet) avoids these
ation and thus becoming more efficient.
ombustor after compression in the inlet
is maintained supersonically. The fol-
jet performance using hydrogen fuel.

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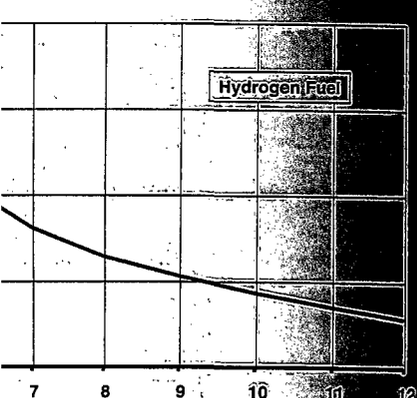

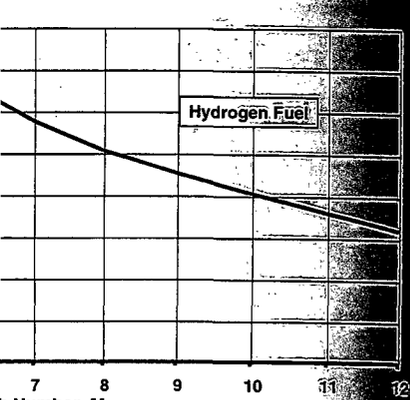

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SECTION 11

SPACECRAFT AND LAUNCH VEHICLE DESIGN