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Noise transmission into aircraft cabins Addendum Estimation of section properties of fuselage stiffeners

Associated software: ESDUpac D0701



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THE PREPARATION OF THIS DATA ITEM

The work on this particular Data Item was monitored and guided by the Cabin Noise Working Party which had the following membership:

Chairman	
Mr D.C. Riordan	— Bombardier Aerospace Short Brothers plc, Northern Ireland
Members	
Dr M. Blakemore	— QinetiQ, Farnborough
Dr M.J. Fisher	— Institute of Sound and Vibration Research, Southampton
Mr P.J. Hopkins	— Rolls-Royce plc, Derby

and was appointed by the Aircraft Noise Committee. The Aircraft Noise Committee first met in 1971 and now has the following membership:

Chairman	
Mr R. Pinker	— Independent
Members	
Mr S. Arrowsmith*	— European Aviation Safety Agency (EASA), Germany
Mr W.D. Bryce	— Bryce Research (Member Emeritus)
Ms C.L. Burley*	— NASA, Langley Research Center, USA
Mr P.J. Hopkins	— Rolls-Royce plc, Derby
Dr P. Joseph	— Institute of Sound and Vibration Research, Southampton
M.P. Lempereur	— Airbus France, Toulouse, France
Mr D. Patience	— BAE SYSTEMS, Farnborough
Mr W.J. Readman*	— European Aviation Safety Agency (EASA), Germany
Dr D. Rhodes	— Civil Aviation Authority, Environmental Research & Consultancy Department (ERCD), London
Mr D.C. Riordan	— Bombardier Aerospace Short Brothers plc, Northern Ireland

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The person with overall responsibility for the work in this subject area is Dr C.B. Chinoy, Head of the Aircraft Noise and Structural Dynamics Group.

ADDENDUM A ESTIMATION OF SECTION PROPERTIES OF FUSELAGE STIFFENERS

A.1 ADDITIONAL NOTATION

A_n	cross-sectional area of n th element of stiffener cross-section
b_n	width of n th element of stiffener cross-section measured parallel to the skin surface
d_n	distance between centroidal axis element n and centroidal axis of entire section*
h_n	height of n th element of stiffener cross-section measured normal to the skin surface
I_{c_n}	second moment of area of element n with respect to its centroidal axis
I_n	second moment of area of element n with respect to the centroidal axis of the entire section*
J_n	torsional constant of element n
k_n	constant required for the calculation of the torsional constant for element n

* The centroidal axes here all run parallel to the width of the cross-section.

A.2 INTRODUCTION

The computer program to estimate cabin noise reduction, Program A0701, requires the input of parameters describing geometric and physical properties of stiffeners used in the cabin fuselage. The user of the program can calculate these parameters using expressions found in the standard literature (References A1 and A2) or less laboriously, by running Program D0701 included in this Addendum, provided that the section cross-sectional area can be divided into a set of cross-sectional elements, each one rectangular in area. Program D0701 can be run to calculate the following four parameters:

- (i) the total cross-sectional area of the stiffeners, A_r or A_s ,
 - (ii) the distance from the centroid of the cross-section of the stiffer to the inner skin,
 - (iii) the second moment of area about the centroidal axis, I_r or I_s
- and
- (iv) the torsional constant, J_r or J_s .