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Vibration and Acoustic Fatigue Series: Record of Documents

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1. PREFACE TO VIBRATION AND ACOUSTIC SERIES

The design engineer who is concerned with aerospace vehicles and their equipment faces an ever increasing demand for products with a performance which must be substantiated under stringent conditions of cost and environment. The customers for his products are becoming better educated in the ways of achieving, and what can be achieved by, competitively designed aircraft. Assuming the basic skill of the designer, no other single factor can contribute more to the economic preparation of a satisfactory, competitive engineering design than the data upon which that design is based and the speed with which those data can be found and applied.

The data concerning aircraft fatigue, in common with those relating to many other phenomena of concern to the engineer in industry, are widely scattered and when located are of variable quality and relevance to industrial application. The engineering designer does not, generally speaking, have the facilities required to collect and evaluate all the data available which may be applicable to each aspect of his or her work. Even if he or she had the desire to undertake such a task it may be difficult to allow the time necessary to prepare his or her own 'working tools' at the expense of time spent in the application of unique personal skills, knowledge and experience to the particular job in hand. In any case, the customer will increasingly wish to view the design, not against some locally derived data, but against what can be demonstrated to be the best data which can be ascertained at any given time and which are vouched for by a significant cross section of the engineering and scientific community concerned with both the derivation and application of data in that particular field. It is ESDU's purpose to provide data of this nature relating to vibration and acoustic fatigue as in many other fields. ESDU has prepared this information for both the designer and the designer's customer and, by serving the needs of many, accomplishes the task at much lower cost than could apply to the individual performing it on his or her own behalf.

A qualified staff, with the assistance of many individuals and establishments throughout the world in research, industry and teaching, collects and evaluates the existing data. The staff discard that which is irrelevant or unreliable, correlating and distilling what remains into an authoritative working tool for engineering application. Throughout, their work is guided and monitored by an expert group and *ad hoc* working parties. This Series on structural vibration and acoustic fatigue is prepared under the guidance of the Vibration and Acoustic Fatigue Committee which has the following constitution:

Chairman

Prof R.D. Adams — University of Bristol

Members

Dr N.S. Ferguson	— University of Southampton
Mr S. Georgiou	— SELEX Sensors and Airborne Systems Ltd, Luton
Dr P. Green*	— BAE Systems, Preston, Lancashire
Dr A. Grillenbeck*	— IABG Space Test Center, Germany
Mr A.R. Harris*	— Northrop Grumman, USA
Dr Hilmi Kurt-Elli	— Rolls Royce plc, Derby
Mr D.M.A. Millar*	— Bombardier Aerospace Short Brothers plc, Belfast
Mr C.D. Munger*	— The Boeing Company, USA
Dr M. Nash	— QinetiQ, Farnborough
Dr S.A. Rizzi*	— NASA, Langley Research Center, USA
Dr J. Santiago Prowald*	— European Space Agency (ESTEC), The Netherlands
Mr E. Smyth	— Bombardier Aerospace Short Brothers plc, Belfast
Prof R.G. White	— University of Southampton (Member Emeritus)
Prof J.J. Wijker	— Dutch Space, Netherlands

* Corresponding Member

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The members of staff of ESDU concerned are

Dr J. Anderson	–	Senior Engineer
Dr M. Anderson	–	Consultant
Dr C.B. Chinoy	–	Head of the Aircraft Noise and Structural Dynamics Group

Up to November 1974 the Items on acoustic fatigue formed part of the Fatigue Series, and were accepted for inclusion therein by the Fatigue Committee. Items in the Acoustic Fatigue Series issued between 1972 and 1974 were based on AGARDograph 162 Parts 1 to 4, which was prepared by ESDU staff with financial assistance from Governments of the NATO Nations through the Advisory Group for Aerospace Research and Development (AGARD). This work was initiated and directed by the Acoustic Fatigue Working Group of the AGARD Structures and Materials Panel. As from November 1974 the Items on acoustic fatigue were made available as an optional separate Series. Until July 1976, the acoustic fatigue data remained part of the Fatigue Series and each Item was submitted to the Fatigue Committee for acceptance into the Fatigue Series. On the formation of the Vibration and Structural Dynamics Steering Group, in July 1976, the Acoustic Fatigue Series became a Series in its own right and each Item was submitted to the Steering Group for acceptance into the Acoustic Fatigue Series. Following the disbandment of the Vibration and Structural Dynamics Steering Group, in March 1991, the Acoustic Fatigue Panel became responsible for the acceptance of new data into the Acoustic Fatigue Series. To reflect more closely the content of the Series, and allow for expansion into more general structural dynamics subjects, in January 1993 the title of the Series was changed to Vibration and Acoustic Fatigue. Consequently, the name of the monitoring group responsible for accepting new data into the renamed Series was changed from the Acoustic Fatigue Panel to the Vibration and Acoustic Fatigue Committee.

Unlike many other forms of information data are living, being constantly generated and tested in practice. Likewise ESDU is a living organism which draws its strength not only from the sources of new data but also from those who apply the working tools we provide. Accordingly users of the service are encouraged to regard ESDU as a widely based group of people constantly available to answer questions and discuss the application of data in engineering.

The estimation of noise and sound propagation are subjects considered in a separate ESDU Series on Aircraft Noise. Relevant Data Items from that Series are also included in this Vibration and Acoustic Fatigue Series.

2. AMENDMENT RECORD FOR VIBRATION AND ACOUSTIC FATIGUE SERIES

So that the user may at any time check where previous amendments to the Series have been made, the following is a complete list of those changes. Further details relating to the changes may always be obtained from ESDU.

This amendment record will be reissued periodically.

Item		Change	Dated
66012	Withdrawn	Superseded by Item No. 74037.	Jan. 1972
66013	Amend. A	Replaced by reprint.	Jul. 1984
66014	Withdrawn	Superseded by Derivation and References in later Items, particularly Item No. 74037.	Nov. 1974
66015	Withdrawn	Superseded by Item No. 86025.	Oct. 1986
66016	Amend. A	Replaced by reprint.	Feb. 1978
66017	Amend. A	Replaced by reprint.	Feb. 1978
66018	Amend. A	Replaced by reprint.	Sep. 1978
66019	Withdrawn	Superseded by Item No. 75030.	Nov. 1975
66020	Withdrawn	Superseded by Item No. 72016.	Jun. 1972
66021	Withdrawn	Superseded by Item No. 72005.	Jan. 1972
66022	Withdrawn	Superseded by Item No. 72015.	Jun. 1972
67027	Withdrawn	Superseded by Item No. 72002.	Jan. 1972
67028	Amend. A	Page 1 replaced. Page 3, Section 4.2 last line covered by label.	Oct. 1972
67029	Amend. A	Page 1, Section 2 last paragraph covered by label.	Oct. 1972
72001	Withdrawn	Superseded by Item No. 74037.	Nov. 1974
72003	Amend. A	Pages 2 and 3 reprinted. Reference to superseded Items corrected.	Oct. 1978
72004	Withdrawn	Superseded by Item No. 87002.	May 1987
72005	Amend. A	Pages 4 and 5 replaced.	Oct. 1972
	Amend. B	Page 5 replaced.	Mar. 1974
	Amend. C	Pages 1 and 3 reprinted. Units of f and $G_p(f)$ updated. Reference to superseded Item changed. Text relating to Equations in Section 4.2 changed.	Jul. 1984
	Amend. D	Pages 1 to 6 and 11 to 16 reprinted. Appendix A describing computer program added. Program issued on disk as ESDUpac A7205.	Nov. 1992