ASLIB

CRANFIELD RESEARCH PROJECT

FACTORS DETERMINING THE PERFORMANCE OF INDEXING SYSTEMS

VOLUME 1. DESIGN

by

Cyril Cleverdon, Jack Mills and Michael Keen

Part 2. Appendices

An investigation supported by a grant to ASLIB
by the National Science Foundation

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Cranfield
1966

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PART 2

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INTRODUCTION TO APPENDICES

The appendices which follow provide complete information concerning the collection of documents and the set of questions used in the investigation, and are included with the intention that it should be possible for anyone - if they should wish to do so - to repeat the test. The main elements in this are the list of 1,400 documents (Appendix 3C), the list of 279 questions (Appendix 3D), and the complete relevance assessments of all the documents against all the questions (Appendix 3G). Not included is the indexing for each of the documents, since this would have added some seven hundred pages to this volume. However, to anyone interested, copies of the indexing sheets could be made available, either the complete set or any of the subsets which are given in Appendix 3E.. Alternatively, as the indexing has been put on to magnetic tape, a copy of the tape could be supplied.

The later appendices are mainly concerned with various arrangements of the terms used in the indexing of the documents, and illustrate the problems discussed in Chapters 4 and 5 of this volume.

APPENDIX 3A

First letter and enclosures sent to authors of research papers

For some years, with the aid of grants from the National Science Foundation, Washington, work has been undertaken at Cranfield into the efficiency of various techniques for indexing scientific and technical information. This investigation is now moving into a new phase, for which we are seeking the assistance of a number of scientists and engineers, and this letter is addressed to you as the author of a recent research paper.

The basic problem of information retrieval lies in the relationship between the desired recall of relevant documents ("message") and the unwanted recall of non-relevant documents ("noise"). In this respect, we have been able to make rough measurements of the performance of certain existing systems, and in the future work, we shall attempt to refine these measurements and reach a point where systems can be designed to meet given performance and economic requirements.

Before an investigation of this nature can be done, it is necessary to have:

(a) a collection of documents,
(b) a number of questions to be used for searching,
(c) an assessment of the documents in the collection regarding their relevance to each of the search questions.

Briefly, our hope is that we will, with your assistance, be able to meet these requirements in the following way. The collection of documents will consist of the references (apart from books or papers written prior to 1954) contained in approximately 400 recent papers which will be mainly in the field of aerodynamics. We ask you, as author of such a paper, to give us the original problem which

Continued.....

occasioned the research and also some other questions which arose in the course of the work and which might have been responsible for the inclusion of any particular papers in the list of references. We then ask that each reference shall be given an assessment rating for each question.

If you feel that you cannot spare the time to do this, I should be grateful if you would let me know, but I am, of course, hoping that you will be able to assist us and assure you that your help will be most welcome. The preceding paragraph is a general outline of what we wish you to do, but in the enclosed sheets we have given more details and have also included some examples for your guidance. The sheet we ask you to complete and return lists the references in your papers which would be included in the document collection.

As I have said earlier, we hope for and would greatly appreciate your co-operation in helping us to investigate this problem of information retrieval. If it is a subject in which you are interested, I should be pleased to send you a copy of a report that was recently issued on our work so far.

Yours sincerely,

Director,
Aslib Cranfield Project.

INSTRUCTIONS FOR ENTERING QUESTIONS AND RELEVANCE ASSESSMENT

On the front of the attached sheet is entered the title and reference of a paper which you have published fairly recently. Would you please enter at (A) the basic problem, as closely as possible in the form of a search question, which was the reason for the research being undertaken. In addition would you please list any other questions (up to three in number) which, in the course of the work, you did put or might have put to an information service.

A number of the references which were given in your paper are listed on the reverse of the attached sheet, and it is assumed that they are all, in varying degrees, relevant to at least one of your questions. We would ask you to mark on this page in the appropriate column your assessment (1, 2, 3, 4 or 5) of the relevance of each reference in relation to each of the questions that you have listed.

This assessment of relevance should be based on the following definitions :-

Mark as (1) references which are a complete answer to the question. Presumably this would only apply for supplementary questions, i.e. (B), (C) or (D) since if they applied to the main question, there would have been no necessity for the research to be done.

Mark as (2) references of a high degree of relevance, the lack of which either would have made the research impracticable or would have resulted in a considerable amount of extra work.

Mark as (3) references which were useful, either as general background to the work or as suggesting methods of tackling certain aspects of the work.

Mark as (4) references of minimum interest, for example, those that have been included from a historical viewpoint.

Mark as (5) references of no interest.

It is appreciated that it is not easy to do this objectively, for personal considerations tend to influence judgement. If you find that in certain cases you are uncertain as to which rating should be used, then we suggest that your doubts should be shown by giving a combined rating. An instance of this occurs in the example which we enclose of a sheet that has been completed by Dr. J. F. Clarke. In relation to his basic question A, he decided that references 1, 2, 3 and 5 were considered of no interest, and were therefore marked with a rating of '5'; reference 4 was assessed as falling between ratings '2' and '3' and this is indicated by his marking of '2-3'. For question B references 1 and 2 were rated at '1' while for question C, references 3 and 4 received this rating. Reference 4, as will be seen, was considered by Dr. Clarke to have varying degrees of relevance to questions A, B and C, but was not relevant to question D.

A. 73

EXAMPLE

ASLIB CRANFIELD INVESTIGATION INTO

PERFORMANCE OF INDEX LANGUAGES

Please complete and return to:

C. W. Cleverdon,
The College of Aeronautics,
Cranfield, Bletchley,
Bucks., England.

AUTHOR J. F. Clarke

TITLE Reaction-resisted Shock Fronts.

REFERENCE College of Aeronautics Report No. 150, May 1961.

BASIC QUESTION

(A) Has anyone investigated the role of chemical reactions in determining shock wave structure?

(B) Papers on acoustic wave propagation in reacting gases.

(C) Have other types of 'non-viscous' compression waves been investigated analytically or observed experimentally

---

(D) Is there any simple, but realistic, "model" gas which can be used to expedite analysis?

LIST OF REFERENCES

Ref. No.

1. Clarke, J.F. Flow of chemically reacting gas mixtures. College of Aeronautics Report 117.
2. Clarke, J.F. Linearized flow of a dissociating gas. Jnl. Fluid Mech., 7, 1960, pp 577-595.
3. Griffith, W.C. and Kenny, A. Jnl. Fluid Mech. 3, 1957, p.268.
4. Lighthill, M.J. Survey in Mechanics, Ed. by G.K. Batchelor and R.M. Davies, Cambridge University Press, 1956.
5. Lighthill, M.J. Dynamics of a dissociating gas. Jnl. Fluid Mech., 2, 1957, pp 1-32.

ASSESSMENT

Question			
A	B	C	D
5	1	5	3
5	1	5	5
5	5	1	5
2-3	3	1	5
5	5	5	1

APPENDIX 3B

Second letter and enclosures sent to authors of research papers

You may recollect that some months ago you were kind enough to help in our investigation into the efficiency of indexing systems. Since that time we have been engaged in indexing the documents in the collection and preparing for the test programme. In this we shall be using the questions which you, together with some two hundred other authors, compiled for us. You may remember that at that time we also asked you to make a relevance assessment against the questions you gave us, of some of the references included in your paper.

There have been external developments concerning our project during the past few months, and this is largely due to the co-operation which we have received from you and others whose assistance we requested. As you may possibly know, major efforts are being made to develop the use of computers for automatic translation and also for the automatic indexing of documents. The latter work has been proceeding at various levels but a number of groups have been concerned with what is usually known as associative indexing. Briefly, this involves having a computer analyse the key terms used in a collection of documents, and working out, usually by some statistical technique, the most useful associations of terms to be used in searching. For some time the National Science Foundation have been interested in having a collection of documents that can be used as a common corpus by the various groups working in this field, so that a relative assessment can be made of their differing techniques. The collection which we have

compiled has been selected for such a common corpus, with the result that the work which you did for us will be used additionally by groups working at Cambridge and at a number of American Universities or Research Establishments.

In addition, there is a further recently developed technique known as Citation Indexing. This depends on building up an index which allows one to find which papers have quoted an earlier paper. For instance, if one wished to find information on the area rule one might look up the early paper by G. Ward on this subject, and find, from the index, references to all the papers which had quoted it, on the assumption that these papers would have some relevance to the original subject. This is an assumption, the validity of which, we are testing.

As you may have guessed, this preamble is a lead in to ask whether you would be willing to help us further in two ways. In relation to the questions which you provided, you gave a relevance assessment of some or all of the references in your original paper. It is these references which, with those from similar papers, make up our collection of 1,400 documents. The result is that there may be in the total collection additional papers which are relevant to your questions. This could be either because they appeared after your work was published, because you knew of them but did not list them, because you included them in your list of references but we omitted them from our list, or because they did not come to your attention. We have had a number of post-graduate students analysing every document in the collection against each question, with the intention that we should have a matrix which will show the relevance of each document to each question. My instructions to the students were to list anything which might possibly be relevant, so my first request to you is to ask if you will check these assessments that have been done by the students. The papers concerned are listed on the attached sheet, together with the original questions, and I also include abstracts of the papers to help you decide.

The second matter concerns the questions which you prepared for us. Developments in testing indexing systems during the past few months have shown up, in a way not previously recognised, the importance of the actual search programmes. It is usually found that, within a question, certain aspects are more important than others, and this we would like you to indicate as far as possible by giving a "weighting" to each concept, as described in the attached sheets. Finally,

if you can suggest any related terms which you consider could be used as alternatives in searching, we would be grateful if you would give them.

I have set out these additional tasks in the order of their importance. Whilst we would, of course, be pleased if you could supply the answers to all these enquiries, most important is the relevance assessment, and I shall be very grateful if you can find time to deal with this matter.

Director
Aslib Cranfield Project

ASSESSMENT OF ADDITIONAL DOCUMENTS

The first attached sheet is a copy of the form which you originally completed by entering the questions that arose in the course of your research work. These questions were marked A, B, C, and D. The next sheet lists references to additional documents which we have located in the total collection and consider might be relevant to one or more of your questions. The four-figure file number for each document is followed by a letter or letters and these refer to your questions. It is only in relation to the particular question so indicated that we ask for your assessment of the relevance of the document. To assist you in this task we include abstracts of each paper listed.

The assessment of relevance should be, as before, based on the following definitions :-

Mark as (1)	references which are a complete answer to the question. Presumably this would only apply for supplementary questions, i.e. (B), (C) or (D) since if they applied to the main question, there would have been no necessity for the research to be done.
Mark as (2)	references of a high degree of relevance, the lack of which either would have made the research impracticable or would have resulted in a considerable amount of extra work.
Mark as (3)	references which were useful, either as general background to the work or as suggesting methods of tackling certain aspects of the work.
Mark as (4)	references of minimum interest, for example, those that have been included from a historical viewpoint.
Mark as (5)	references of no interest.

WEIGHTING AND NEW TERMS

On the attached sheets are listed the terms as given in your questions. In the box by the side of each term we would ask you to indicate its relative importance by marking 1, 2, or 3. These figures will indicate :-

1. A paper that did not cover this term would be of no use.
2. It is desirable that this term should be covered by the document.
3. This is a term which is not absolutely essential to the enquiry.

It may well be that you will rate each term as one; this would not be surprising but we would not wish to influence your decision in this respect.

Over the remainder of the sheet space is left for you to insert any alternative terms that you consider might be used in the search programme. In this case, however, it is more likely that you would wish to show alternative concepts rather than single terms, so the terms have been grouped into concepts. As examples of alternative terms or concepts, in the context of a question dealing with "pressure gradient", it might be reasonable to substitute "pressure distribution" or "pressure variation"; the concept "suddenly heated wall" might be changed to "rapidly cooled solid". Alternatively, the complete question might be rephrased, an example of this being where the original question was "has anyone investigated relaxation effects on gaseous heat transfer to a suddenly heated wall". Rephrased the question becomes "has anyone investigated conditions at the wall behind a plain reflected shock front in a real gas by theoretical analysis". If you would wish to rewrite your question in this way space is available on the sheet.

QUESTION 249 Is it possible to estimate the transonic drag-rise and buffet boundaries of aerofoils without recourse to experiment

Search Terms	Weight	Alternative Terms or Concepts
Transonic	1	Mixed subsonic/supersonic
Drag	2	
Rise	2	
Buffet	3	Onset of shock induced boundary layer separation
Boundary	3	
Aerofoil	1	Wing section
Theoretical		
Estimation		

Rephrased Question: Is it possible to obtain a theoretical estimate of the transonic drag-rise and onset of shock-induced boundary layer separation Mach numbers for two-dimensional aerofoils

LIST OF ADDITIONAL DOCUMENTS OF POSSIBLE RELEVANCE

Doc. No.		ASSESSMENT Question			
		A	B	C	D
1313	SPREITER, J.R. On alternative forms for the basic equations of transonic flow theory J. Aero. Sc. Jan. 1954				

APPENDIX 3C

LIST OF 1400 DOCUMENTS IN THE TEST COLLECTION

1001 BRENCKMAN,M. Experimental investigation of the aerodynamics of a wing in a slipstream. J. Ae. Scs. 25, 1958, 324.

1002 LI,T.Y. Simple shear flow past a flat plate in an incompressible fluid of small viscosity. J.Ae. Scs. 22, 1955, 651.

1003 GLAUERT,M.B. The boundary layer in simple shear flow past a flat plate. J. Ae. Scs. 24, 1957, 848.

1004 YEN,K.T. Approximate solutions of the incompressible laminar boundary layer equations for a plate in shear flow. J. Ae. Scs. 22, 1955, 728.

1005 WASSERMAN,B. One-dimensional transient heat conduction into a double-layer slab subjected to a linear heat input for a small time internal. J. Ae. Scs. 24, 1957, 924.

1006 CAMPBELL,W.F. One-dimensional transient heat flow in a multilayer slab. J. Ae. Scs. 25, 1958, 340.

1007 Van DRIEST,E.R. and McCAULEY,W.D. The effect of controlled three-dimensional roughness on boundary layer transition at supersonic speeds. J. Ae. Scs. 27, 1960, 261.

1008 KLEBANOFF,P.S. Measurements of the effect of two-dimensional and three-dimensional roughness elements on boundary layer transition. J. Ae. Scs. 22, 1955, 803.

1009 KORKEGI,R.H. Transition studies and skin friction measurements on an insulated flat plate at a Mach number of 5.8. J. Ae. Scs. 23, 1956, 97.

1010 CHAMBRE,P.L. and SCHAAF,S.A. The theory of the impact tube at low pressure. J. Ae. Scs. 15, 1948, 735.

1011 NAPOLITANO,L. Similar solutions in compressible laminar free mixing problems. J. Ae. Scs. 23, 1956, 389.

1012 BISPLINGHOFF,R.L. Some structural and aerelastic considerations of high speed flight. J. Ae. Scs. 23, 1956, 289.

1013 TSIEN,H.S. Similarity laws for stressing heated wings. J. Ae. Scs. 20, 1953, 1.

1014 ASHLEY,H. and ZARTARIAN,G. Piston theory - a new aerodynamic tool for the aeroelastician. J. Ae. Scs. 23, 1956, 1109.

1015 FUNG,Y.C. On two-dimensional panel flutter. J. Ae. Scs. 25, 1958, 145.

1016 MAGER,A. Transformation of the compressible turbulent boundary layer. J. Ae. Scs. 25, 1958, 305.

1017 TING,L. and LIBBY,P.A. Remarks on the eddy viscosity in compressible mixing flows. J. Ae. Scs. 27, 1960, 797.

1018 RHYMING,I.L. The flow field in the diffuser of a radial compressor. J. Ae. Scs. 27, 1960, 798.

1019 ZAKKAY,V. An investigation of the pressure distribution on conical bodies in hypersonic flows. J. Ae. Scs. 26, 1959, 457.

1020 LOVE,E.S. Generalised-Newtonian theory. J. Ae. Scs. 26, 1959, 314.

1021 MASLEN,S.H. On heat transfer in slip flow. J. Ae. Scs. 25, 1958, 400.

1022 OMAN,R.A. and SCHEUING,R.A. On slip-flow heat transfer to a flat plate. J. Ae. Scs. 26, 1959, 126.

1023 SEBAN,R.A. and BOND,R. Skin-friction and heat transfer characteristics of a laminar boundary layer on a cylinder in axial incompressible flow. J. Ae.Scs. 18, 1951, 671.

1024 FAY,J.A. and RIDDELL,F.R. Theory of stagnation point heat transfer in dissociated air. J. Ae. Scs. 25, 1958, 73.

1025 LEES,L. and KUBOTA,T. Inviscid hypersonic flow over blunt-nosed slender bodies. J. Ae. Scs. 24, 1957, 195.

1026 CHENG,H.K. and PALLONE,A.J. Inviscid leading-edge effect in hypersonic flow. J. Ae. Scs. 23, 1956, 700.

1027 COLE,J.D. Newtonian flow theory for slender bodies. J. Ae. Scs. 24, 1957, 448.

1028 FREEMAN,N.C. A note on the explosion solution of Sedov with application to the Newtonian theory of unsteady hypersonic flow. J. Ae. Scs. 27, 1960, 77.

1029 ISAKSON,G. A simple model study of transient temperature and thermal stress distribution due to aerodynamic heating. J. Ae. Scs. 24, 1957, 611.

1030 GERARD,G. and TRAMPOSCH,H. Photo-thermoelastic investigation of transient thermal stresses in a multiweb wing structure. J. Ae. Scs. 26, 1959, 783.

1031 HOFF,N.J. Thermal buckling of supersonic wing panels. J. Ae. Scs. 23, 1956, 1019.

1032 FRIEDRICH,H.R. and DORE,F.J. The dynamic motion of a missile descending through the atmosphere. J. Ae. Scs. 22, 1955, 628.

1033 RESLER,E.J. and SEARS,W.R. The prospects for magneto-aerodynamics. J. Ae. Scs. 25, 1958, 235.

1034 KERREBROCK,J.P. and MARBLE,F.E. Constant-temperature magneto-gasdynamic channel flow. J. Ae. Scs. 27, 1960, 78.

1035 LI,T.Y. and GEIGER,R.E. Stagnation point of a blunt body in hypersonic flow. J. Ae. Scs. 24, 1957, 25.

1036 SERBIN,H. Supersonic flow around blunt bodies. J. Ae. Scs. 25, 1958, 58.

1037 FERRI,A. and LIBBY,P.A. A new technique for investigating heat transfer and surface phenomena under hypersonic flow conditions. J. Ae. Scs. 24, 1957, 464.

1038 SINNOTT,C.S. On the prediction of mixed subsonic/supersonic pressure distributions. J. Ae. Scs. 27, 1960, 767.

1039 SINNOTT,C.S. On the flow of a sonic stream past an airfoil surface. J.Ae.Scs. 26, 1959, 169.

1040 Van DRIEST,E.R. and BOISON,J.C. Experiments on boundary layer transition at supersonic speeds. J. Ae. Scs. 24, 1957, 885.

1041 MORKOVIN,M.V. On transition experiments at moderate supersonic speeds. J. Ae. Scs. 24, 1957, 480.

1042 SCANLAN,R.H. and TRUMAN,J.C. The gyroscopic effect of a rigid rotating propeller on engine and wing vibration modes. J. Ae. Scs. 17, 1950, 653.

1043 POTTER,J.L. and WHITFIELD,J.D. The relation between wall temperature and the effect of roughness on boundary layer transition. J. Ae. Scs. 28, 1961, 663.

1044 BERTRAM,M.H. Tip-bluntness effects on cone pressures at M=6.85. J.Ae.Scs. 23, 1956,898.

1045 CHARWAT,A.F. An investigation of separated flows, Part II: Flow in the ca vity and heat transfer. J. Ae. Scs. 28, 1961, 513.

1046 KLEIN,B. Some comments on the inversion of certain large matrices. J. Ae. Scs. 28, 1961, 432.

1047 SAMSON,S.H. and BERGMANN,H.W. Analysis of low-aspect-ratio aircraft structures. J. Ae. Scs. 27, 1960, 679.

1048 WILLETT,J.E. Supersonic flow at the surface of a circular cone at angle of attack. J. Ae. Scs. 27, 1960, 907.

1049 CHAPMAN,D. and RUBESIN,M. Temperature and velocity profiles in the compressible laminar boundary layer with arbitrary distribution of surface temperature. J. Ae. Scs. 16, 1949, 547.

1050 Van DRIEST,E.R. Investigation of laminar boundary layer in compressible fluids using the Crocco method. NACA TN.2597, 1952.

1051 O'SULLIVAN,W.J. Theory of aircraft structural models subjected to aerodynamic heating and external loads. NACA TN.4115, 1957.

1052 MORGAN,H.G. Procedure for calculating flutter at high supersonic speed including camber deflections, and comparison with experimental results. NACA TN.4335, 1958.

1053 LARSON,H.K. and KEATING,S.J. Transition Reynolds numbers of separated flows at supersonic speeds. NASA TN.D349, 1960.

1054 MORDUCHOW,M. and CLARKE,J.H. Method for calculation of compressible laminar boundary layer characteristics in axial pressure gradient with zero heat transfer. NACA TN.2784, 1952.

1055 MORDUCHOW,M. and GRAPE,R.G. Separation, stability and other properties of compressible laminar boundary layer with pressure gradient and heat transfer. NACA TN.3296, 1955.

1056 EHRET,D.M. An analysis of the applicability of the hypersonic similarity law to the study of the flow about bodies of revolution at zero angle of attack. NACA TN.2250, 1950.

1057 ROSSOW,V.J. Applicability of the hypersonic similarity rule to pressure distributions which include the effects of rotation for bodies of revolution at zero angle of attack. NACA TN.2399, 1951.

1058 AMICK,J.L. Pressure measurements on sharp and blunt 5° and 15° half-angle cones at Mach number 3.86 and angles of attack to 100°. NASA TN.D753, 1961.

1059 BROWN,W.D. and DONOUGHE,P.L. Tables of exact laminar-boundary layer solutions when the wall is porous and fluid properties are variable. NACA TN.2479, 1951.

1060 BOBBITT,P.J. and MALVESTUTO,F.S. Estimation forces and moments due to rolling for several slender tail configurations at supersonic speeds. NACA TN.2955, 1953.

1061 ROSSOW,V.J. On flow of electrically conducting fluids over a flat plate in the presence of a transverse magnetic field. NACA TN.3971, 1957.

1062 COHEN,C.B. and RESHOTKO,E. Similar solutions for the compressible laminar boundary layer with heat transfer and pressure gradient. NACA TN.3325, 1955.

1063 TALBOT,L. Hypersonic viscous flow over slender cones. NACA TN.4327, 1958.

1064 MOORE,F.K. Unsteady oblique interaction of a shock wave with plane disturbances. NACA TN.2879, 1953.

1065 RIBNER,H.S. Convection of a pattern of vorticity through a shock wave. NACA TN.2864, 1953.

1066 GRIFFITH,G.E. and MILTONBERGER,G.H. Some effects of joint conductivity on the temperature and thermal stresses in aerodynamically heated skin-stiffener combinations. NACA TN.3609, 1956.

1067 TOBAK and ALLEN. Dynamic stability of vehicles traversing ascending or descending paths through the atmosphere. NACA TN.4275, 1958.

1068 LOVE,E.S. Some aspects of air-helium simulation and hypersonic approximations. NASA TN.D49, 1959.

1069 KAATTARI,G.E. Predicted shock envelopes about two types of vehicles at large angles of attack. NASA TN.D860, 1961.

1070 NITZBURG,G.E. and CRANDALL,S. A study of flow changes associated with airfoil section drag rise at supercritical speeds. NACA TN.1813, 1949.

1071 MIRELS,H. Laminar boundary layer behind shock advancing into stationary fluid. NACA TN.3401, 1955.

1072 MIRELS,H. Boundary layer behind shock or thin expansion wave moving into stationary fluid. NACA TN.3712, 1956.

1073 LEES,L. and LIN,C.C. Investigation of the stability of the laminar boundary layer in a compressible fluid. NACA TN.1115, 1946.

1074 GOODERUM,P.N. An experimental study of the turbulent boundary layer on a shock tube wall. NACA TN.4243, 1958.

1075 HESS,N.W. Studies of structural failure due to acoustic loading. NACA TN.4050, 1957.

1076 MULL,H.R. and ALGRANTI,J.S. Flight measurement of wall pressure fluctuations and boundary-layer turbulence. NASA TN.D280, 1960.

1077 EGGERS,A.J. A comparative analysis of the performance of long range hypervelocity vehicles. NACA TN.4046, 1957.

1078 REED,W.H. and BLAND,S.R. An analytical treatment of aircraft propeller precession instability. NASA TN.D659, 1961.

1079 JACK,J.R. Effects of extreme surface cooling on boundary layer transition. NACA TN.4094, 1957.

1080 BRASLOW,A.L. Effect of distributed three-dimensional roughness and surface cooling on boundary layer transition and lateral spread of turbulence at supersonic speeds. NASA TN.D53, 1959.

1081 OSTRACH,S. and THORNTON,P. Compressible laminar flow and heat transfer about a rotating isothermal disk. NACA TN.4320, 1958.

1082 ADAMS,E.W. Theoretical investigation of the ablation of a glass-type heat protection shield of varied material properties at the stagnation point of a re-entering IRBM. NASA TN.D564, 1961.

1083 ANDERSON,K. and SINCHTEL,C.D. Discussion of solar proton events and manned space flights. NASA TN.D671, 1961.

1084 LIBBY,PA. and CRESCI,R.J. Experimental investigation of the downstream influence of stagnation point mass transfer. J. Ae. Scs. 28, 1961, 51.

1085 FELDMAN,S. On trails of axisymmetric hypersonic blunt bodies flying through the atmosphere. J. Ae. Scs. 28, 1961, 433.

1086 STRAND,T. Inviscid-incompressible flow theory of static peripheral jets in proximity to the ground. J. Ae. Scs. 1961, 27.

1087 LU, Pau-Chang. Free-convection magnetohydrodynamic flow past a porous flat plate. J. Ae. Scs. 28, 1961, 346.

1088 CRAMER,K.R. Magnetohydrodynamic free-convection pipe flow. J. Ae. Scs. 28, 1961, 736.

1089 CHARWAT,A.F. An investigation of separated flows, Part I: The pressure field. J. Ae. Scs. 28, 1961, 457.

1090 STONECYPHER,T.E. Periodic temperature distributions in a two-layer composite slab. J. Ae. Scs. 27, 1960, 152.

1091 CAMPBELL,W.F. Periodic temperature distribution in a two-layer composite slab. J. Ae. Scs. 27, 1960, 633.

1092 CHRICHLOW,W.J. and HAGGENMACHER,G.W. The analysis of redundant structures by the use of high-speed digital computers. J. Ae. Scs. 27, 1960, 595.

1093 Van DYKE,M.D. The supersonic blunt body problem - Review and extensions. J. Ae. Scs. 25, 1958, 485.

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APPENDIX 3D

List of 279 questions used in the test

Q1 What similarity laws must be obeyed when constructing aeroelastic models of heated high speed aircraft.

Q2 What are the structural and aeroelastic problems associated with flight of high speed aircraft.

Q3 How can one describe the aerodynamic forces and heating rates acting on a high speed aircraft.

Q4 What problems of heat conduction in composite slabs have been solved so far.

Q8 Can a criterion be developed to show empirically the validity of flow solutions for chemically reacting gas mixtures based on the simplifying assumption of instantaneous local chemical equilibrium.

Q9 What chemical kinetic system is applicable to hypersonic aerodynamic problems.

Q10 What theoretical and experimental guides do we have as to turbulent Couette flow behaviour.

Q12 Is it possible to relate the available pressure distributions for an ogive forebody at zero angle of attack to the lower surface pressures of an equivalent ogive forebody at angle of attack.

Q13 What methods - exact or approximate - are presently available for predicting body pressures at angle of attack.

Q14 What would be the effect of a slight gas rarefaction (i.e. velocity and temperature discontinuities at walls) on energy separation in tubes and ducts.

Q15 Papers on internal 'slip flow' heat transfer studies.

Q16 Can the reference enthalpy method be used to predict real-gas laminar-boundary layer skin friction and heat transfer.

Q17 Has the reference enthalpy method been compared with exact calculations for the perfect-gas case over a wide range of free-stream Mach numbers.

Q18 Are real-gas transport properties for air available over a wide range of enthalpies and densities.

Q22 Is it possible to find an analytical, similar solution of the strong blast wave problem in the Newtonian approximation.

Q23 How can the aerodynamic performance of channel flow ground effect machines be calculated.

Q26 What is the basic mechanism of the transonic aileron buzz.

Q27 Papers on shock-sound wave interaction.

Q29 Material properties of photoelastic materials.

Q31 Can the transverse potential flow about a body of revolution be calculated efficiently by an electronic computer.

Q32 Can the three-dimensional problem of a transverse potential flow about a body of revolution be reduced to a two-dimensional problem.

Q33 Are experimental pressure distributions on bodies of revolution at angle of attack available.

Q34 Does there exist a good basic treatment of the dynamics of re-entry, combining consideration of realistic effects with relative simplicity of results.

Q35 Has anyone formally determined the influence of Joule heating, produced by the induced current, in magnetohydrodynamic free convection flows under general conditions.

Q39 Why does the compressibility transformation fail to correlate the high speed data for helium and air.

Q40 Did anyone else discover that the turbulent skin friction is not over sensitive to the nature of the variation of the viscosity with temperature.

Q41 What progress has been made in research on unsteady aerodynamics.

Q49 What are the factors which influence the time required to invert large structural matrices.

Q50 Does a practical flow follow the theoretical concepts for the interaction between adjacent blade rows of a supersonic cascade.

Q51 What is a single approximate formula for the displacement thickness of a laminar boundary layer in compressible flow on a flat plate.

Q52 How is the design of ring or part ring wings by linear theory affected by thickness.

Q53 What application has the linear theory design of curved wings.

Q54 What is the effect of cross sectional shape on the flow over simple delta wings with sharp leading edges.

Q55 Papers on flow visualization on slender conical wings.

Q56 What size of end plate can be safely used to simulate two-dimensional flow conditions over a bluff cylindrical body of finite aspect ratio.

Q57 To find an approximate correction for thickness in slender thin-wing theory.

Q58 How do interference-free longitudinal stability measurements (made using free-flight models) compare with similar measurements made in a low-blockage wind tunnel.

Q59 Have wind tunnel interference effects been investigated on a systematic basis.

Q61 Are there any papers dealing with acoustic wave propagation in reacting gases.

Q62 Has anyone investigated relaxation effects on gaseous heat transfer to a suddenly heated wall.

Q63 Are there any papers which treat heat conduction problems involving gas-phase-excited and surface-excited internal energy modes.

Q64 What is the effect on the base pressure of a body from which a jet issues of varying (a) jet design Mach number, (b) free stream Reynolds number, (c) jet radius/base radius.

Q66 Are there any theoretical methods for predicting base pressure.

Q67 Does transition in the hypersonic wake depend on body geometry and size.

Q68 How can one detect transition phenomena in boundary layers.

Q69 How can one detect transition phenomena in hypersonic wakes.

Q70 What work has been done on estimating forces and moments on cruciform wing-body configurations which are rolling.

Q71 Has anyone investigated and developed a simple model for the vortex wake behind a cruciform wing.

Q72 What is a criterion that the transonic flow around an airfoil with a round leading edge be validly analyzed by the linearized transonic flow theory.

Q74 Can the transonic flow around an arbitrary smooth thin airfoil be analysed in a simple approximate way.

Q79 What are the details of the rigorous kinetic theory of gases. (Chapman-Enskog Theory).

Q80 Has anyone investigated the effect of surface mass transfer on hypersonic viscous interactions.

Q81 What is the combined effect of surface heat and mass transfer on hypersonic flow.

Q82 What are the existing solutions for hypersonic viscous interactions over an insulated flat plate.

Q83 What controls leading-edge attachment at transonic speeds.

Q84 Can the three-point boundary-value problem for the Blasius equation be integrated numerically, using suitable transformations, without iteration on the boundary conditions.

Q85 What are the effects of small amounts of gas rarifaction on the characteristics of the boundary layers on slender bodies of revolution.

Q86 What is the available information pertaining to boundary layers on very slender bodies of revolution in continuum flow (the "transverse curvature" effect).

Q87 What is the available information pertaining to the effect of slight rarifaction on boundary layer flows (the "slip" effect).

Q92 Is there a theory for prediction of aerodynamic force and movement on an oscillating thin airfoil in a real fluid (medium: water and air, angle of attack: small or large.)

Q93 What investigations have been made of the flow field about a body moving through a rarefied, partially ionized gas in the presence of a magnetic field.

Q94 How is the heat transfer downstream of the mass transfer region effected by mass transfer at the nose of a blunted cone.

Q95 To what extent can the available information for incompressible boundary layers be applied to problems involving compressible boundary layers.

Q97 To what extent can readily available steady-state aerodynamic data be utilized to predict lifting-surface flutter characteristics.

Q98 What are the significant steady and non-steady flow characteristics which affect the flutter mechanism.

Q99 Is it possible to determine rates of forced convective heat transfer from heated cylinders of non-circular cross-section, (the fluid flow being along the generators).

Q100 How much is known about boundary layer flows along non-circular cylinders.

Q101 Is there any simple, but practical, method for numerical integration of the mixing problem (i.e. the Blasius problem with three-point boundary conditions.)

Q102 Does there exist a closed-form expression for the local heat transfer around a yawed cylinder.

Q103 How far around a cylinder and under what conditions of flow, if any, is the velocity just outside of the boundary layer a linear function of the distance around the cylinder.

Q104 Where can I find pressure data on surfaces of swept cylinders.

Q105 Can't the static deflection shapes be used in predicting flutter in place of vibrational shapes? If so, can we provide a justification by means of an example.

Q106 Does the boundary layer on a flat plate in a shear flow induce a pressure gradient.

Q107 Can the procedure of matching inner and outer solutions for a viscous flow problem be applied when the main stream is a shear flow.

Q108 Can series expansions be found for the boundary layer on a flat plate in a shear flow.

Q109 What possible techniques are available for computing the injection distribution corresponding to an isothermal transpiration cooled hemisphere.

Q110 What is known regarding asymptotic solutions to the exact boundary layer equations.

Q111 Previous solutions to the boundary layer similarity equations.

Q112 Experimental results on hypersonic viscous interaction.

Q113 What has been done about viscous interactions in relatively low Reynolds number flows, particularly at high Mach numbers.

Q114 What role does the effect of chemical reaction (particularly when out of equilibrium) play in the similitude laws governing hypersonic flows over slender aerodynamic bodies.

Q115 Are there any experimental or exact numerical solution results around that might indicate the significance of nonequilibrium - dissociation effects on small disturbance flow fields.

Q116 How significant is the possible pressure of a dissociated free stream with respect to the realization of hypersonic simulation in high enthalpy wind tunnels.

Q117 Is it possible to use Biot's variational principle for general one dimensional and two dimensional heat conduction problems beyond those treated by Biot.

Q118 Do the discrepancies among current analyses of the vorticity effect on stagnation-point heat transfer result primarily from the differences in the viscosity - temperature law assumed.

Q119 How far can one trust the linear viscosity - temperature solution assumed in some of the analyses of hypersonic shock layer at low Reynolds number.

Q120 How close is the comparison of the shock layer theory with existing experiments in the low Reynolds number (merged-layer) regime.

Q121 Has anyone explained the kink in the surge line of a multi-stage axial compressor.

Q122 Have any aerodynamic derivatives been measured at hypersonic Mach numbers and comparison been made with theoretical work.

Q123 Are methods of measuring aerodynamic derivatives available which could be adopted for use in short running time facilities.

Q124 Can the irrotational-flow pressure distribution, and certain characteristic "sideslip" parameters, be found in closed form in general motion (not symmetrical about vertical plane.)

Q125 What effect has proximity to the ground on the pressure distribution and lift on an aerofoil with flaps.

Q126 What are wind-tunnel corrections for a two-dimensional aerofoil mounted off-centre in a tunnel.

Q127 What is the pressure distribution or load on a split flap on an aerofoil.

Q128 How do Kuchemann's and Multhopp's methods for calculating lift distributions on swept wings in subsonic flow compare with each other and with experiment.

Q129 What experimental measurements exist of span wise and chord wise loadings on swept wings at low subsonic speeds and small incidence.

Q130 What is the present state of the theory of quasi-conical flows.

Q131 References on the methods available for accurately estimating aerodynamic heat transfer to conical bodies for both laminar and turbulent flow.

Q132 What parameters can seriously influence natural transition from laminar to turbulent flow on a model in a wind tunnel.

Q133 Can a satisfactory experimental technique be developed for measuring oscillatory derivatives on slender sting-mounted models in supersonic wind tunnels.

Q134 What are the values of the stability derivatives in pitch and yaw for cambered slender ogee wings.

Q135 What effect has the boundary layer in modifying the basic inviscid flow behind the shock, neglecting effects of leading edge and corner.

Q136 How does a satellite orbit contract under the action of air drag in an atmosphere in which the scale height varies with altitude.

Q137 How is the flow at transonic speeds about a delta wing different from that on a closely-related tapered sweptback wing.

Q138 Recent data on shock-induced boundary-layer separation.

Q139 What interference effects are likely at transonic speeds.

Q140 Given complete freedom in the design of an airplane, what procedure would be used in order to minimize sonic boom intensity, and is there a limit to the degree of minimizing that can be accomplished.

Q141 Can methane-air combustion product be used as a hypersonic test medium and predict, within experimental accuracies, the results obtained in air.

Q142 What is the theoretical heat transfer rate at the stagnation point of a blunt body.

Q143 What is the theoretical heat transfer distribution around a hemisphere.

Q145 Has anyone investigated the unsteady lift distributions on finite wings in subsonic flow.

Q146 What information is available for dynamic response of airplanes to gusts or blasts in the subsonic regime.

Q147 Will forward or apex located controls be effective at low subsonic speeds and how do they compare with conventional trailing-edge flaps.

Q148 Given that an uncontrolled vehicle will tumble as it enters an atmosphere, is it possible to predict when and how it will stop tumbling and its subsequent motion.

Q149 What are the effects of initial imperfections on the elastic buckling of cylindrical shells under axial compression.

Q150 Why does the incremental theory and the deformation theory of plastic stress-strain relationship differ greatly when applied to stability problems.

Q152 Basic dynamic characteristics of structures continuous over many spans.

Q153 Is the information on the buckling of sandwich sphere available.

Q154 Can the load deformation characteristics of a beam be obtained with the material being inelastic and a non uniform temperature being present.

Q155 What is the effect of an internal liquid column on the breathing vibrations of a cylindrical shell.

Q156 Experimental techniques in shell vibration.

Q157 In summarizing theoretical and experimental work on the behaviour of a typical aircraft structure in a noise environment is it possible to develop a design procedure.

Q158 What data is there on the fatique of structures under acoustic loading.

Q159 What are the effects of thermal stress and buckling on the flutter characteristics of elastically restrained nearly square panels.

Q160 What procedures are available for calculating skin temperatures of panels subjected to aerodynamic heating.

Q161 Can increasing the edge loading of a plate beyond the critical value for buckling change the buckling mode.

Q162 Can thermal fatique results, obtained experimentally in engines or laboratory tests, be related to other experimental results, such as creep, mechanical fatigue, plastic deformation.

Q163 Have the effects of an elastic edge restraint been considered in previous papers on panel flutter.

Q164 Has the solution of the clamped plate problem, in the classical theory of bending, been reduced to two successive membrane boundary value problems.

Q165 What data exists on oscillatory aerodynamic forces on control surfaces at transonic Mach numbers.

Q166 What information is there on control surface "buzz" (i.e. single degree of freedom flutter.)

Q167 It is not likely that the airforces on a wing of general planform oscillating in transonic flow can be determined by purely analytical methods. Is it possible to determine the airforces on a single particular planform, such as the rectangular one by such method.

Q168 Is the problem of similarity for representative investigations of aeroelastic effects in heated flow as intractable as previous investigations imply.

Q169 What is the magnitude and distribution of lift over the cone and the cylindrical portion of a cone-cylinder configuration.

Q170 Is there any information on how the addition of a "boat-tail" affects the normal force on the body of various angles of incidence.

Q171 What are the aerodynamic interference effects on the fin lift and body lift of a fin-body combination.

Q173 What is the effect of initial axisymmetric deviations from circularity on the non linear (large-deflection) load-deflection response of cylinders under hydrostatic pressure.

Q175 Are previous analyses of circumferential thermal buckling of circular cylindrical shells unnecessarily involved or even inaccurate due to the assumed forms of buckling mode.

Q176 What papers are there dealing with circumferential buckling either thermal buckling or due to mechanical loading.

Q177 What analytical investigations have been made of the stability of conical shells. How do the results compare with experiment.

Q181 Has any work been done on determining the nature of compressible viscous flow in a straight channel.

Q182 In what areas, other than low density wind tunnel flows, is viscous compressible flow in slender channels a problem.

Q183 Jet interference with supersonic flows - experimental papers.

Q184 Thrust vector control by fluid injection - papers.

Q186 Is there experimental data on base pressure and wake angle for conical bodies in laminar hypersonic flow.

Q187 Is it possible to obtain a reasonably simple analytical solution to the heat equation for an exponential (in time) heat input.

Q189 Has anyone programmed a pump design method for a high-speed digital computer.

Q190 Has anyone derived simplified pump design equation from the fundamental three-dimensional equations for incompressible nonviscous flow.

Q191 Has anyone obtained meridional plane or blade-to-blade plane solutions of pump flow.

Q193 What are the effects of forward facing jets due to pressure ratio, exit mach number, ratio of specific heats, angle of attack, and exit to body diameter ratio.

Q194 What is the static force and moment characteristics and the shape of the bow shock wave on a short blunt 10° semivertex angle cone with a flat base, and also one with a conical afterbody having a semivertex angle of 50° , in helium at M = 15.

Q195 Effects of helium contamination on static pressures on surface of bodies and shock wave shapes in helium at M = 15.

Q196 What are the flutter characteristics of the exposed skin panels of the X-15 vertical stabilizer when subjected to aerodynamic heating.

Q198 What information is available concerning the thermodynamic and transport properties of air for temperature to about 10,000°K and pressures to about 1,000 atmospheres.

Q200 What agreement is found between theoretically predicted instability times and experimentally measured collapse times for compressed columns in creep.

Q201 Theoretical studies of creep buckling.

Q202 Experimental studies of creep buckling.

Q203 Is it possible to correlate the results on the creep buckling of widely different structures within the framework of a single theory.

Q204 What are the experimental results for the creep buckling of columns.

Q205 What are the results for the creep buckling of round tubes under external pressure.

Q206 Have any analytical studies been conducted on the time-to-failure mechanism associated with creep collapse for a long circular cylindrical shell which exhibits both primary and secondary creep as well as elastic deformations under various distributed force systems.

Q207 Which investigations serve to demonstrate the viscoelastic action of creep collapse either by use of different or simplified structural models, or by assuming that the shell material exhibits only certain phases of creep deformations; e.g. steady secondary creep.

Q208 Has the effect of initial stresses, on the frequencies of vibration of circular cylindrical shells, been investigated.

Q209 Has the effect of the change of initial pressure due to deformation, on the frequencies of vibration of circular cylindrical shells been investigated.

Q210 What are the discontinuity stresses at junctions in pressurized structures.

Q211 What analytical solutions are available for stresses in edge-loaded shells of revolution.

Q212 What dome contours minimize discontinuity stresses when used as closures on cylindrical pressure vessels.

Q213 What general solutions for the stresses in pressurized shells of revolution are available.

Q214 Can studies of pure membrane cylinders having no wall bending stiffness but maintaining their shape by virtue of internal pressure provide any insight into the behaviour of pressurized cylinders with finite wall stiffness.

Q215 What are the best experimental data and classical small deflection theory analyses available for pressurized cylinders in bending.

Q216 Does a membrane theory exist by which the behaviour of pressurized membrane cylinders in bending can be predicted.

Q217 What are the equations which define the stability of simply supported corrugated core sandwich cylinders.

Q218 Papers on small deflection theory for buckling of sandwich cylinders.

Q219 Has anyone developed an analysis which accurately establishes the large deflection behaviour of conical shells.

Q223 What is the magnitude of second-order wing-body interference at high supersonic Mach number.

Q224 What is the best theoretical method for calculating pressure on the surface of a wing alone.

Q225 How can the effect of the boundary-layer on wing pressure be calculated, and what is its magnitude.

Q226 How should the Navier-Stokes difference equations be solved.

Q227 Which iterative method for solving linear elliptic difference equations is most rapidly convergent.

Q228 Is there any available information on the aerodynamic loading distribution on wings immersed in high-energy, non-uniform slipstream of the type common to V/STOL aircraft from large scale experimental investigation.

Q229 Items on V/STOL aircraft operating in ground effect.

Q230 Technical report on measurement of ablation during flight.

Q231 What qualitative & quantitative material is available on ablation materials research.

Q232 Have flow fields been calculated for blunt-nosed bodies and compared with experiment for a wide range of free stream conditions and body shapes.

Q233 What are the available properties of high-temperature air.

Q234 What is the magnitude of aerodynamic damping in flexible vibration modes of a slender body of revolution characteristic of launch vehicles.

Q235 Is there any published literature on plastic buckling of orthotropic plates or shells.

Q236 Papers on plastic buckling of isotropic shells and plates.

Q237 How to stabilize thin faces of sandwich construction to carry maximum loads, i.e. stress faces up to yield point of material.

Q238 Has the buckling of orthotropic and stiffened conical shells under external pressure and other loads been investigated.

Q241 Compressive circumferential stresses in a torispherical shell reveal the possibility of buckling under internal pressure. Has anyone investigated for which ranges of shell parameters these stresses are sufficiently large to cause elastic buckling.

Q245 Is there an integral method to give a single and sufficiently accurate method of calculating the laminar separate point for various incompressible and compressible boundary layers with zero heat transfer.

Q246 What accurate or "exact" solutions of the laminar separation point for various incompressible and compressible boundary layers with zero heat transfer are available.

Q247 Can the hypersonic similarity results be applied to the technique of predicting surface pressures of an ogive forebody at angle of attack.

Q249 Is it possible to estimate the transonic drag-rise and buffet boundaries of aerofoils without recourse to experiment.

Q250 What determines the onset of shock-induced boundary-layer separation.

Q251 Are the stable profiles of a compressible boundary layer induced by a moving wave known.

Q252 Are there experimental results on the stability of a compressible boundary layer induced by a moving wave.

Q253 Exact solution methods for calculating the ablative mass loss of a material ablating at high temperatures in a hypersonic flight environment.

Q254 What approximate solutions are known to the direct problem of transonic flow in the throat of a nozzle, i.e. finding the flow in a given nozzle.

Q255 What approximate solutions are known to the indirect problem of transonic flow in the throat of a nozzle, i.e. finding a nozzle which has a given axial velocity distribution.

Q256 Has the problem of self-sustained oscillations of a dynamic system of single degree of freedom with non-linear damping been investigated analytically in a way different from the classical Van der Pol's example. In particular, are any exact solutions known.

Q257 Why do users of orthodox pilot-static tubes often find that the calibrations appear to be:-
(a) significantly different from those formerly specified,
(b) wildly variable at low Reynolds numbers.

Q259 Has a comparison been made between interference-free drag measurements using free-flight models and similar measurements made in a low-blockage wind tunnel.

Q260 Does transonic similarity suggest that leading-edge attachment at transonic speeds is a potential or a viscous flow phenomenon.

Q261 Solution of the Blasius problem with three-point boundary conditions.

Q262 Can the injection of a light weight gas, such as helium into the laminar boundary layer of a high speed flow, reduce the aerodynamic heating encountered during a missile or nose-cone re-entry into the earth's atmosphere.

Q263 What is the process of reflection or absorption of charged particles from the surface of a body moving through a rarefield, partially ionized gas in the presence of a magnetic field.

Q264 References on Lyapunov's method on the stability of linear differential equations with periodic coefficients.

Q265 Obtain all papers and reports that contain shock detachment distance data.

Q266 Work on flow in channels at low Reynolds numbers.

Q267 Some approximate analytical heat conduction solutions using methods other than Biot's principle.

Q268 What mode of stalling can be expected for each stage of an axial compressor.

Q269 Has a criterion been established for determining the axial compressor choking line.

Q270 Do theories exist for predicting the aerodynamic derivatives at hypersonic Mach numbers to include viscous and leading edge bluntness effects.

Q271 Solutions for vortex sheets formed on the trailing and leading edges in the asymmetrical case.

Q272 Has a theory of quasi-conical flows been developed, in supersonic linearised theory, for which the upwash distribution on the lifting surface, apart from being a homogeneous function in the co-ordinate, is permitted to have a quite general functional form.

Q273 How does scale height vary with altitude in an atmosphere.

Q274 Jet interference with supersonic flows - theoretical papers.

Q275 Effects of leading-edge bluntness on the flutter characteristics of some square-planform double-wedge airfoils at Mach numbers less than 15.4.

Q277 What factors have been shown to have a primary influence on sonic boom strength.

Q278 What methods of testing and analysis have been used in investigating the static and dynamic stability characteristics of re-entry bodies in free flight tests.

Q281 Papers on pressure and force distributions on wings.

Q283 Work on small-oscillation re-entry motions.

Q284 Experimental studies on panel flutter.

Q285 How can wing-body, flow field interference effects be approximated rationally.

Q288 Has anyone analytically or experimentally investigated the effects of internal pressure on the buckling of circular-cylindrical shells under bending.

Q289 What basic equations should be used in the analysis of stresses and displacements in oval shells.

Q290 What is the accuracy of certain types of equations used in analysis of stresses and displacements in shells.

Q291 What theoretical and experimental work has been done on the excitation and response of typical structures in a noise environment.

Q292 Is there a design method for calculating thermal fatique endurances of components of various types and sizes in a variety of circumstances.

Q293 Will an analysis of panel flutter based on arbitrarily assumed modes of deformation prove satisfactory, and if so, what is the minimum number of modes that need be considered.

Q294 What is the criterion for true panel flutter, as opposed to small amplitude vibration arising from acoustic disturbances.

Q295 Papers dealing with uniformly loaded sectors.

Q296 General methods of solving clamped plate problems.

Q297 How can the analytical solution of the buckling strength of a uniform circular cylinder loaded in axial compression be refined so as to lower the buckling load.

Q298 In the problem of the buckling strength of uniform circular cylinders loaded in axial compression, does the linear solution help with improving the non-linear one.

Q299 The problem of similarity for representative investigation of aeroelastic effects in a flow with the absence of heating effects.

Q300 How is fatigue damage estimated using the normal long-hand method.

Q301 Is there any information available on the difference in the effects of various edge conditions on the buckling of cylindrical shells.

Q302 What approximate analytical or experimental investigations have been performed relating to the non-linear bending and buckling of conical shells.

Q303 Have non-linear large deflection analyses been conducted for shell shapes other than conical.

Q304 Are asymptotic methods sufficiently accurate in the determination of pre-buckling stresses in torispherical shells, or must we resort to numerical methods.

Q305 What is the effect of an entrance tube on the measurement of pressure and density by a gage placed in a rarefied gas flow.

Q306 What are the nonequilibrium chemical constituents in the viscous shock layer ahead of a blunt re-entry vehicle.

Q310 How is shearing flow between two coaxial cylinders affected by suction or blowing at the cylinder walls.

Q314 How accurate are existing analytical theories in estimating pressure distributions on cones at incidence, at hypersonic speeds.

Q315 Are simple empirical methods of any use for estimating pressure distribution in cones.

Q316 Do viscous effects seriously modify pressure distributions.

Q317 Has anyone investigated theoretically whether surface flexibility can stabilize a laminar boundary layer.

Q318 What is the side force induced on a supersonic nozzle wall when a liquid or gas is ejected from the wall.

Q319 What is the effect of the shape of finite airplane wings on the lift and moment responses to sinisoidal gusts.

Q320 What has been published on the subject of non-steady aerodynamic forces acting on airplane wings due to gusts and/or turbulence.

Q321 How do subsonic and transonic flutter data measured in the new Langley transonic dynamics tunnel compare with similar data obtained in other facilities.

Q322 How do subsonic and transonic flutter data measured in Freon - 12 compare with corresponding data obtained in air.

Q323 How do large changes in new mass ratio quantitatively affect wing-flutter boundaries.

Q327 What is the effect of the shape of the drag polar of a lifting spacecraft on the amount of reduction in maximum deceleration obtainable by continuously varying the aerodynamic coefficients during re-entry.

Q328 What are the differences in range and aerodynamic heating during re-entry which may be associated with the use of different drag polars.

Q330 What are the effects of a highly underexpanded rocket jet exhaust on vehicle static and dynamic stability at hypersonic speeds and high altitudes.

Q331 What are the physical significance and characteristics of separated laminar and turbulent boundary layer flows.

Q332 Has anyone analytically investigated the stabilizing influence of soft elastic cores on the buckling strength of cylindrical shells subjected to non-uniform external pressure.

Q333 What papers are available on the buckling of empty cylindrical shells under non-uniform pressure.

Q335 What effect do thermal stresses have on the compressive buckling strength of ring-stiffened cylinders.

Q336 What is the effect on cylinder buckling of a circumferential stress system that varies in the axial direction.

Q338 Can non-linear shallow shell analysis be reduced to an engineering technique by use of the matrix.

Q339 Is it possible to predict the shape of a shroud which will allow simulation of the nose region flow field for a sphere in hypersonic flow.

Q340 What investigations have been made of the wave system created by a static pressure distribution over a liquid surface.

Q347 Has anyone investigated the effect of shock generated vorticity on heat transfer to a blunt body.

Q348 What is the heat transfer to a blunt body in the absence of vorticity.

Q349 What are the general effects on flow fields when the Reynolds number is small.

Q352 Find a calculation procedure applicable to all incompressible laminar boundary layer flow problems having good accuracy and reasonable computation time.

Q353 Papers applicable to this problem (calculation procedures for laminar incompressible flow with arbitrary pressure gradient).

Q354 What stresses and displacements are found in square plates having two adjacent edges free and the others either clamped or simply supported when they are loaded either by a uniformly distributed load or a concentrated force at the free corner.

Q355 Has anyone investigated the shear buckling of stiffened plates.

Q356 Papers on shear buckling of unstiffened rectangular plates under shear.

Q357 What theoretical methods are available for calculating the pressure distribution and the flow over symmetrical conical bodies with sharp leading edges.

Q358 In what manner does the surface pressure on a supersonic or hypersonic blunted cone approach its asymptotic value.

Q360 In practice, how close to reality are the assumptions that the flow in a hypersonic shock tube using nitrogen is non-viscous and in thermodynamic equilibrium.

Q365 What design factors can be used to control lift-drag ratios at Mach numbers above 5.

APPENDIX 3E

SUBSETS OF DOCUMENTS AND QUESTIONS

In the course of the tests, various subsets were used of the 279 questions (as given in Appendix 3D) and of the 1400 documents (as given in Appendix 3C). The main subsets, which have been referred to in the text of this volume, are listed.

QUESTIONS

SUBSET 1. 35 Questions, each having seven starting terms.

2	82	142	177	285
9	87	145	181	292
34	95	157	189	293
40	113	160	205	294
49	122	165	211	299
67	131	170	219	315
81	132	171	261	338

SUBSET 2. 42 Questions, all dealing with aerodynamics

79	130	167	225	268
100	132	170	226	269
116	136	181	227	272
118	137	182	230	273
119	141	189	250	274
121	145	190	261	317
122	146	223	264	323
123	147	224	266	360
126	148			

QUESTIONS

SUBSET 3.

1	81	138	205	275
2	82	139	206	277
4	83	140	208	283
8	84	141	209	284
9	85	142	210	285
10	86	143	211	288
12	87	145	212	291
13	93	148	213	292
15	94	149	214	293
18	95	150	215	294
22	97	152	216	295
23	98	153	217	296
26	99	154	218	297
27	100	155	219	298
29	101	156	223	299
31	102	157	226	300
32	103	158	227	301
33	104	160	230	303
34	105	161	231	304
35	106	163	232	306
39	107	164	233	314
40	108	165	234	315
41	109	167	241	316
49	110	168	245	317
50	111	169	246	321
51	112	170	247	323
52	113	171	250	327
53	114	173	251	331
54	116	175	252	332
55	118	176	253	333
56	119	177	254	335
57	120	181	255	336
58	121	182	257	338
59	122	183	259	339
61	123	184	261	340
62	126	187	264	347
66	128	189	265	348
67	130	190	266	349
68	131	196	267	352
69	132	200	268	353
71	133	201	269	355
72	135	202	272	356
74	136	203	273	360
79	137	204	274	365
80				

DOCUMENTS

SUBSET 1. 200 documents, all of which are relevant to at least one question in Question Subset 2.

1302	1476	1618	1695	1779	1964	1994	2111
1311	1509	1619	1696	1782	1965	1995	2150
1316	1569	1620	1697	1783	1966	1997	2153
1317	1572	1621	1698	1785	1967	2001	2154
1320	1574	1622	1699	1786	1968	2002	2155
1321	1575	1655	1700	1787	1970	2061	2157
1322	1576	1656	1701	1788	1971	2074	2187
1324	1578	1666	1702	1792	1972	2075	2274
1335	1588	1667	1703	1793	1973	2076	2313
1351	1589	1670	1704	1794	1974	2077	2316
1360	1590	1671	1705	1795	1978	2078	2317
1367	1591	1672	1706	1796	1980	2080	2318
1378	1592	1675	1707	1797	1981	2081	2319
1383	1594	1676	1708	1798	1982	2082	2321
1399	1596	1677	1709	1799	1983	2083	2322
1406	1597	1680	1710	1800	1984	2084	2338
1409	1598	1681	1711	1836	1985	2085	2339
1415	1605	1682	1712	1874	1986	2087	2340
1416	1606	1683	1713	1879	1987	2088	2341
1420	1608	1684	1717	1880	1988	2099	2342
1436	1613	1687	1719	1916	1989	2100	2364
1437	1614	1688	1728	1919	1990	2101	2367
1443	1615	1691	1729	1920	1991	2102	2379
1451	1616	1692	1748	1921	1992	2103	2391
1467	1617	1693	1772	1963	1993	2104	1694

SUBSET 2. Consists of Subset 1, plus the following 150 documents

1014	1225	1309	1439	1562	1686	1811	2213
1016	1231	1310	1440	1566	1714	1922	2243
1021	1234	1314	1446	1567	1746	1923	2247
1022	1252	1315	1447	1570	1749	1924	2252
1023	1253	1326	1448	1571	1775	1925	2280
1025	1255	1329	1449	1573	1780	1927	2304
1033	1265	1332	1460	1577	1784	1969	2305
1062	1271	1375	1464	1609	1789	2062	2309
1068	1274	1376	1466	1612	1790	2096	2326
1082	1283	1377	1468	1625	1801	2097	2344
1094	1296	1379	1469	1629	1802	1098	2345
1101	1297	1380	1470	1643	1803	2108	2346
1160	1298	1381	1475	1659	1804	2110	2347
1161	1299	1382	1478	1660	1805	2112	2355
1163	1304	1390	1492	1661	1806	2114	2377
1164	1305	1391	1502	1662	1807	2115	2378
1180	1306	1401	1514	1663	1808	2185	2380
1187	1307	1421	1527	1664	1809	2198	2393
1208	1308	1431	1553	1668	1810		

APPENDIX 3F

AUTHORS OF BASE DOCUMENTS AND QUESTION COMPILERS

The authors of the base documents are listed according to the country in which they were working at the time the paper was published. Against each author is shown the document number (as given in Appendix 3C) of his paper, and the number or numbers (as given in Appendix 3D) of the questions which he prepared and which were used in the test. Although all the authors prepared search questions, it will be noted that in some cases, none of the questions was used. There were various reasons for this; these are discussed in Chapter 3 of this volume.

AUSTRALIA	Document	Questions
G.A. Bird	1531	92, 263
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APPENDIX 3G

QUESTIONS - RELEVANT DOCUMENTS SETS

This Appendix lists the relevant documents for the 279 questions which are given in Appendix 3D. The document numbers refer to the documents as listed in Appendix 3C.

The questions are divided into the two groups of Basic Questions and Supplementary Questions. The difference in these groups of questions is discussed in Chapter 3; briefly the Basic Question is considered to be representative of the main problem which was the cause of the research being undertaken, while a Supplementary Question is a question which arose in the course of the research.

The Base Document refers to the original paper which was written by the compiler of the question, and as such it would always be expected to have a high relevance to the question. However, in the tests, the Base Document is eliminated in the search or searches to which it applies.

The relevant documents are divided into the four levels of relevance, as given on page 21. The papers are then listed in two groups, the first of which gives the papers which appeared in the list of references of the Base Document. The second group is marked with an asterisk against the document number. These refer to the additional papers which were located by students or by bibliographic coupling, and which were subsequently submitted to the authors for their decisions concerning relevance.

BASIC QUESTIONS

Question No.	Base Document	Relevance 1	Relevance 2	Relevance 3	Relevance 4
1	1486		1184, 1029*, 1031*, 1057*, 1378*, 1859*, 1875*	1012, 1051, 1102, 1185, 1030*, 1037*, 1056*, 1066*, 1095*, 1497*, 1858*, 1876*, 1879*, 1880*	1013, 1014, 1015 1052, 1142, 1195* 1462*
8	1488			1236, 1166*	
10	1491		1099	1115, 1257, 1258	
12	1492		1020	1056, 1057, 1058	1019
14	1534		1021, 1549	1550	
16	1493			1378*	1294*
22	1495			1027, 1028, 1262, 1263	1160, 1020*, 1654*
23	1624		1086, 1194, 1650, 1652		1649
26	1496		1064, 1265		1065, 1311*
31	1498		1266	1106, 1196	
34	1499		1032, 1067, 1164*	1639*, 1715*, 1716* 1717*	1719*, 2379*
35	1500			1087, 1088, 1104, 1267, 1268, 1269, 1270, 1407, 1408	
39	1502	1271	1016, 1413	1414	
41	1892	1900, 1902	1200, 1201, 1601 1901, 1544*, 1597* 1634*, 1687*, 1698* 1700*, 1704*, 1705* 2109*, 2112*, 2141* 2197*, 2256*, 2259* 2272*, 2289*	1899, 1903, 1593* 1749*, 1917*, 1919* 2290*	1199, 1594*, 2333*
49	1756		1046, 1047	1092	
50	1511		1213	1212, 1214, 1215, 1216, 1276, 1277, 1426, 1427	
52	1512		1224	1278, 1428	
54	1513		1250*, 1514*, 1609* 1612*	1225, 1793*	1464, 1465, 1466
56	1751				1776
57	1752		1465	1249, 1777, 1778	1247, 1250
58	1516			1252, 1431	1141
62	1518		1169	1168	
64	1519			1173, 1174, 1179, 1282	1172, 1176
67	1536		1024, 1283, 1552, 1553, 1554, 1555, 1556	1272	1557, 1558
72			1468	1467, 1469, 1470	1775*
80	1525		1305, 1570*	1308, 1481*, 1338* 2185*, 1629*, 1663* 1798*, 1572*	2226*, 2355*

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83	1526		1439	1311, 1316, 1440, 1797*, 1798*	1187, 1314, 1315 1794*, 1265*
84	1527			1320	1478
85	1528		1326, 1629*		1021, 1094, 1022*, 1306*
92	1530			1361, 1441, 1442, 1443, 1445, 1748*	1362, 1363, 1444 1200*,1201*,1593* 1687*,1753*,1919* 2005*
93	1531			1296, 1033*	1446, 1447, 1448 1449, 1208*,1297* 1298*,1299*
94	1123		1084	1024, 1101, 1294, 1364, 1365, 1560	1628*, 1661*
95	1538		1016, 1375, 1460, 1562	1378, 1255*, 1271* 1502*	1376, 1377
97	1753		1380	1749*, 2339*	1014, 1705, 1779 1780, 1379,1643* 1686*
99	1754		1788	1785, 1786, 1787	1023, 1381, 1382 1784, 1789
101	1322		1475	1476*, 1527*	1320*, 1478*
102	1539		1565, 1566	1564, 2159*	1661*
106	1388		1002, 1003, 1128, 1664*, 1629*	1180, 1323, 1324, 1393, 1394, 1659, 1004*, 1384*, 2302*	1418*
113	1629		1021, 1324, 1630*	1094, 1664,1304*, 1570*, 1494*	1128, 1323, 1663 1305*,1309*,1571* 1655*,1388*,1062*
114	1541		1332, 1572, 1578, 1401*, 1625*	1573, 1574, 1421*, 1160*, 2213*, 2304* 1068*, 1571*, 2252*	1025, 1317, 1577 2198*,1655*,2355*
117	1542		1395, 1579, 1580, 1587, 1873*		
118	1630		1667	1324, 1378, 1666, 1670	
121	1543		1588	1589, 1590	
122	1544			1597, 1598	1688*,1708*,1713*
124	1545		1599		1060, 1782*
125	1631			1652, 1245*, 2094* 2095	
128	1632		1676, 1677	1678, 1679, 1205*	
133	1755			1594, 1790	
135	1547		1606, 1611	1562	1050, 1236, 1609 1612, 1406*
136	1548		1613, 1614, 1615	1616, 1617	1618
137	1757		1793, 1794	1797	1795, 1796,1420*
140	1758		1802, 1803	1808, 1809, 1811, 1253*, 2247*	1804, 1805, 1806 1807, 1810,2243*
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147	1638		1713		1708, 1709, 1711 1712
148	1639		1717, 1719	2001*, 2379*	
149	1760		1821, 1822, 1824, 2122*	1820, 1823, 1825, 2051*, 2121*	
153	1761			1826, 1828	
154	1762			1833, 1834, 1835, 1836, 1837	
155	1764			1848	1844, 1845, 1846 1847
157	1640		1725, 1728	1729, 1911*	1720, 1075*, 1909*
159	1766			1391, 1864, 1012*, 1015*	1856, 1857, 1858 1859, 1746*, 1877*
162	1767		1865, 1867	1395, 1866, 1868, 1869, 1870	
163	1894		1015, 1391, 1864*	1914, 1392*, 1627*, 1658*	
164	1641			1731	1730
167	1895	1919	1916	1920, 1921	
168	1184		1051, 1185	1878	1874
175	1769		1829, 1887, 1890, 2146*	1885, 1886, 1888, 1891	1889
177	1898		1932, 1936, 1937, 1938	1957*, 2131*	1931, 1934, 1935
183	1942		1969, 1970, 1971, 1972, 1174*, 1997*	1187, 1973, 1173*, 1176*, 1409*, 1946* 1992*, 1994*, 1995*	1974, 1177*
187	1944		1101, 1164	1981	1982, 1983
189	1945			1985, 1990	
194	1947		1069, 2003, 2004, 2005, 2006, 2007	1999, 2000, 2001	1717
196	1948		1766*	1858, 1859, 2008, 1012*	
200	1950		2014, 2020	2013, 2016, 2017, 2018, 2019	2012
203	1951		2027	2028	
206	1952		2029	2034, 1951*, 2021*	
208	1953	1846, 2036			
210	1954	2038, 2039	2041, 2042		2043, 2044
214	1955		1840, 2045	1763, 1838, 1839, 1841	
217	1956			1889, 2046, 2048, 2050, 1843*	2047, 2049, 2051 1926*, 1822*
219	1957			2057, 2058, 2059, 1930*, 1931*, 1934* 1936*, 1937*, 1938* 2131*	2052

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226	2063			2078, 2083, 2084, 2085	2080, 2081, 2082
228	2064		2090, 2091, 1001* 2170*	1453, 2089, 2092, 2144*, 2162*, 2164* 1484*	
232	2006		1273, 2105, 2106, 2107, 1556, 1025* 1372*, 1410*, 1456* 1626*, 2151*	1093, 1161, 1302, 2011, 1019*, 1035* 1036*, 1044*, 1215* 1354*, 1369*, 1370* 1421*, 1471*, 1557* 1605*, 1655*, 1657* 1689*, 2307*, 1318* 1423*, 2304*, 1160* 1482*, 1572*	1122*, 1666*, 2355*
234	2066			1234, 2108, 2110, 2111, 2112, 1231*	2114, 2115
235	2067			1829, 2116, 2117, 2118, 2119, 2120, 2121, 1743*, 2130*	
237	2069		1822, 2127, 2128	1742, 2050, 2121, 2126, 1826*, 1743*	2051*
238	2070		2131	1936, 2129	2117, 2118
241				2134, 2137, 2138	2135, 2136
245	1489		1054, 2386*	1562*, 1336*	1055, 1996
249	1503		1038, 1039	1206, 1313*	1203, 1204, 1205
256	1515			1130, 1281	
257	1893		1139, 1238	1239, 1904, 1906, 1672*	
262	1529		1340, 1342, 1646*, 2199*	1337, 1338, 1339, 1343, 1344, 1480, 1481, 1353*, 1366*, 1565*	
272	1633			1680, 1681, 1682, 1683	
288	1763			1838, 1839, 1840, 1842, 2045*	1743*
297	1642		1739, 1740, 1742, 1743	1744	1741
305	2139				1010, 1183
306	2140		1552*, 1625*, 2296*	1093, 2151, 1401* 1541*, 2295*, 1318*	1110, 2391*, 1423* 2304*, 1160*, 1369* 1482*
310	2283			1385, 1386	
314	2285		2303, 2304, 2309, 2110*	2306, 2308, 1605*	1602, 1603, 1604 2305, 2310, 1048* 1232*
318	2288		1025, 1654, 2326, 2327, 2328, 1942*	1262, 1974, 1160* 1332*, 1572*	
319	2289		1704, 2331,	2330, 2332, 2333, 2334, 2341*	1779, 2329
321	2290		2338, 2341	2340	

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330	2292	1598*		2349, 2350, 2351 2352	
332	2145		2171	1891, 2172, 2173, 2174	2030*
335	2146		1888, 1889, 2178	1885, 1887, 1886* 1890*, 1769*, 1891* 2173*, 1843*	1841, 2176, 2177
338	2294			1833, 2361, 2362, 2363	
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347	2191	1666, 1667, 2395	2258, 2394	1668*, 1670*, 2204* 2300*, 1037*, 1559* 1630*, 2107*, 2213*	2391
352	2182		2383, 2385	1155, 1241, 2382, 2384, 1150*, 1292* 1376*, 1459*, 2365* 1062*, 2366*	2370, 2386, 1111* 1458*, 1479*,1977*
354	1422		1644	1647, 1648	1424, 1425, 1454 1551
355	2396			1400, 1419, 2387, 2397, 2400	1412, 2392, 2398 2399
365	2188		2379, 2305*, 2304*	1040, 1293, 2309, 2378, 2381, 1225*, 1448*, 1449*, 2124* 2280*, 1433*, 1923* 1924*, 2062*, 2074* 2075*, 2213*	1161, 1421, 2377 2380
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3	1486		1012, 1014, 1142, 1184, 1606*	1051, 1052, 1102, 2147*, 1658*	1015, 1185,1095*
4	1485			1005, 1006, 1090, 1091, 1119, 1144, 1181, 1399	
9	1488	1552*, 2296*		1401, 2297*	
13	1492	1048*,1122* 1354*,1360* 2005*		1020, 1058, 1196* 1197*, 1999*,2112*	
15	1534		1021, 1022, 1550		
17	1493		1050	1260, 1406, 1378* 1606*	
18	1493		1259, 1405	1302*, 1436*, 1437* 1438*, 1998*, 2011*	

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27	1496	1064			1065
29	1497	1463		1462	
32	1498		1106	1196	
33	1498		1196, 1197, 1198		
40	1502	1068			
51	1511	1145,1611*	1376*, 1406*, 1565* 2076*		
53	1512			1224, 1279	
55	1513		1225, 1464, 1514*	1466, 1609*, 1612*	1793
59	1516	1252		1431, 1672*, 1714* 1799*, 1800*	
61	1517	1166,1167		1132	
63	1518	1168			1171
66	1519		1173, 1188*	1172, 1097*, 1121* 1187*, 1242*, 1409* 1487*	
68	1536	1272,1555	1024, 1283, 1552, 1554, 1556	1079*, 1207*, 1418* 1505*, 2257*	1557
69	1536		1024, 1283, 1552, 1553, 1554, 1555, 1556	1272, 1085*, 1976*	1557, 1558
70	1520		1432	1434	1287, 1288, 1289
71	1520	1288,1289	1433		
74	1521	1467,1468 1469		1039*, 1503*, 1775*	
79	1524			1302, 1436	1437
81	1525		1305	1338*, 1344*, 1481* 1623*, 1570*, 1798*	1084*,1123*,2185* 2226*,1629*,1663* 1572*,2355*
82	1525		1304, 1306, 1307, 1309, 1310, 1570* 1572*	1305, 1629*, 1663* 1798*, 2185*, 2355*	1308
86	1528	1094	1023*, 1105*, 1381* 1494*, 1629*	1192	1326, 1063*, 1261*
87	1528		1021, 1022*, 1306*		1326
98	1753		1380	1593*, 1746*, 1914*	1014, 1379, 1705 1779, 1780, 1704 1012*,1015*, 1857*, 1859*
100	1754		1788	1785, 1786, 1787	
103	1539	1566	1567, 2084*	2078*, 2081*	
104	1539	1567		1564, 1566	
105	1627	1390	1391		
107	1388		1664*, 1629*	1180, 1659, 1660	
108	1388	1002,1003 1128,1180	1664*, 1629*	1323, 1324, 1393 1394, 1659, 1389* 1004*, 2302*	
109	1628		1662	1101, 1460, 1661, 1062*	

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110	1540		1458, 1570	1977*, 1062*	1336*
111	1540	1333	1568, 1570, 1062*	1101, 1283, 1565* 1977*, 1307*	1024
112	1540	1569,1571 1572	2355*	1101, 1655*, 2213*	1798*
115	1541		1332, 1574, 1578, 2189*, 1625*	1317, 1575, 1576, 1110*, 1167*, 2295* 1421*, 1160*, 1068* 2252*	2210*, 2198*
116	1541		1576, 1656*	1575	1317, 1574, 1578
119	1630		1378, 1667	1324, 1666, 1670, 2391*, 1329*	
120	1630		1668	1666, 1667, 1670	1329*, 2391*
123	1544	1594,1597		1596, 1598	
126	1631	1672			1799*
127	1631				
129	1632	1675,1678 1679	1205*, 1794*		
130	1633		1680, 1681, 1682, 1683		
131	1546		1606, 1406*	1608, 1142*, 1294* 1962*, 2192*, 2213*	1354*, 1522*, 1873*
132	1546	1608	1406*	1606, 1710*	
134	1755			1791, 1792, 1545*	
138	1757		1794, 1797, 1798, 1256*	1793, 1796, 1291* 1311*, 1335*, 2364*	1800, 2187*, 2367*
139	1757		1252, 1801	1797, 1799, 1800, 2154*	1793, 1794, 1672*
142	1635	1024		1283, 1294*, 1559* 2393*	1689, 1690, 1101* 1354*, 2104*, 2161*, 2395*
143	1635	1283			1662*
146	1637			1699, 1700, 1701, 1702, 1703, 1779* 1681*	1698, 2289*, 2339*
150	1760		1817, 1818, 1819, 1824	1820, 1825	
152	1729	1728	1913	1910	1911
156	1764		1847	1846, 1849	1844, 1845
158	1640		1724, 1726, 1727	1075*, 1909*	1720, 1723
160	1766	1860,1861		1606*, 1980*, 1012*	
161	1766	1862,1863		1031*	2174*
165	1643			1746, 1748, 1749, 1265*	
166	1643			1746, 1748, 1265*	1014*
169	1896	1922		1360, 1605*, 1927*	1492*
170	1896		1360	1605*	
171	1896		1923	1924, 1925	

Question No.	Base Document	Relevance 1	Relevance 2	Relevance 3	Relevance 4
173	1897				1926
176	1769	1885,1886 1887,1888 1890,1891	2146*		
181	1941		1966	1967	
182	1941		1967, 1968	1964, 1965	
184	1942		1974, 2326*	1187, 1969, 1970 1971, 1972, 1973	
186	1943	1979		1474	
190	1945		1985, 1987	1984, 1988, 1989 1990	1986
191	1945	1984,1985 1988,1989 1990	1987		1986
193	1946			1991, 1992, 1993 1994, 1995, 1997	
195	1947	2003,2004			1717
198	1949	1259,1302 2011	1405		
201	1950	2014		2013, 2015, 2016 2017, 1951*, 2023* 2025*, 2026*	2012, 2018, 2019 2020,1952*,2024*
202	1950	2020	2018, 2019	2024*	2012,2016,2022*
204	1951	2018			2017, 2023, 2024 2025,2026,1950* 2016*
205	1951	2021			2022, 2034*
207	1952	2029,2021* 1951*			
209	1953		2031, 2032, 2035		2037
211	1954	2038,2041	2043, 2044	2039, 2042	
212	1954	2042			
213	1954	2043,2044			
215	1955		1763, 1838, 1839 1841	2045, 1743*	1852*
216	1955	1840		2045	
218	1956		1889, 2048, 2050	2046, 2049, 1843*	
224	2062		1687, 2076	2074	2075, 2077
225	2062	2076		2077, 1569*,1572* 1655*	1687
227	2063		2087	2088	
229	2064	2089,2090 2091,2093 2094,2095	2144*	2164*	
230	2065	2103	2100	1983, 2101, 2104	2099
231	2065	1983,2102 2104	2097, 2100, 1274* 1553*	2096, 2098, 2099 2101, 1082*	2103, 1982*
233	2006	1302,2011	1552*	1998*, 2009*, 2010*	1273, 1556

Question No.	Base Document	Relevance 1	Relevance 2	Relevance 3	Relevance 4
236	2067		2119, 2120, 2121		1743*, 1823*
246	1489	1111,1155 1458,1459	1460, 1461	1054, 1562*	
247	1492			1020, 1056, 1057	
250	1503		1311*	1415, 1416, 1798* 2364*, 2367*	1316*, 1335*
251	1504	1071,1072			
252	1504		1040, 1041, 1074 1207, 1272, 1418 1170*, 2264*		
253	1509		1274	1082	
254	1750	1217,1774			
255	1750	1118,1157 1774,1775			
259	1516	1252,1431			1141
260	1526		1312, 1313		
261	1527	1320,1321		1322, 1476	
263	1531			1446, 1447	1449
264	1532	1367,1451			
265	1533	1058,1411 1482	1036		1423*
266	1941		1351, 1966, 1967	1964, 1965	
267	1542	1582,1583 1586,1982*		1584, 1585	1978*
268	1543		1588, 1589	1592, 1772*	1590
269	1543	1591		1590	1588, 1589
270	1544		1201, 1572, 1577 1593	1025*, 2355*, 1068*	1569*,2311*,1540* 1332*
271	1545		1229*	1191, 1600, 1601 1433*, 1782*	
273	1548		1622	1619, 1620, 1621	1617,1616,2150*
274	1942		1973, 1974, 1409*	1997*, 2061*	
275	1634	1685		1686	
277	1758	1803,1808 1809	1802	1807, 1811, 1253*	1804, 1805, 1806 1810,2243*,2247*
278	1759	1813	1032, 1814	2000*	
281	2064	2090,2091 2092		1453, 1443*, 1675* 1676*, 1677*, 1780* 1783*, 1794*, 1484*	
283	1639			1032, 1067, 1715 1716, 1499*,2379*	1717
284	1948		1858, 1859, 1857* 1766*	2008, 1856*	1015*,1285*,1894*
285	2188			2309, 2378, 1923* 1924*, 2062*, 2074* 2075*, 1225*, 2280* 2305*, 2304*	1161, 1421, 2377 2379, 2380
289	1765	1851		1829, 1852	

Question No.	Base Document	Relevance 1	Relevance 2	Relevance 3	Relevance 4
290	1765		1850, 1852, 1853 1854, 1855	1829	1851
291	1640		1721, 1722, 1723 1725, 1728, 1729 1911*	1075*, 1909*	1724, 1726
292	1767		1395, 1866, 1869	1865, 1868, 1870 1872, 1873	1867
293	1894	1015,1391	1285*	1390*, 1864*	
294	1894	1914,1915	1285*, 1857*, 1858*	1015, 1391, 1856* 1948*, 1864*, 1658*	1390*, 2008*
295	1641	1733,1734 1735,1736			
296	1641			1730, 1422*, 1648* 2392*	1731, 1733, 1734 1735, 1736
298	1642			1739, 1742, 1743	
299	1184		1051, 1185, 1874 1875, 1876	1878, 1879, 1880 1202*, 1746*, 1013*	1012*
300	1768		1881	1883, 1884	
301	1769		1887, 1888, 1889	1843*	
302	1957	2052,2057 2058,2059		1743*	
303	1957	2052,2053	2054, 2055, 2056 2060, 1743*, 1744*		
304	2071		2134, 2137, 2138		
315	2285			1058, 2305, 2306 2307, 2310, 1019* 1122*	1602, 1603, 1604 1232*,1323*,1688* 2188*
316	2285		1572, 2311	1063*, 1540*	1602, 1603, 1604 2305,2188*,1307* 2213*,1655*,2355* 1068*
317	2287		2321, 2322		
320	2289		1779, 2331	2329, 2197*, 1637* 1699*	1698, 2330
322	2290		2336	2338, 2341	2335
323	2290		2338, 2339	2340, 2341	1879
328	2291			1163, 2344, 2348 2217*, 2219*	1164, 2345, 2347
331	2292		2351, 2356	2350, 1187*, 1487* 2383*,2385*	1045*,1055*,1316* 2106*,2228*
333	2145		1891, 2172	2173, 2174, 1763*	1769*,2030*,2031* 2033*,2052*,2068*
336	2146	1888	1885, 1887, 1889	2178, 1769*, 2173* 1886*, 1890*, 1843*	2177
348	2191	1024,1101 2393		1666, 1667, 1093* 1559*, 1630*, 1662* 2104*, 2107*, 2204* 2213*, 2300*	2258

Question No.	Base Document	Relevance 1	Relevance 2	Relevance 3	Relevance 4
349	2191	2391	1666, 1667, 2258 2394, 2395	2078*, 2080*, 2081* 2214*, 2198*, 2204* 2300*, 1559*, 1630* 1662*, 2107*, 2213*	
353	2182		1155, 2383, 2385	2382, 1062*, 1292* 1458*, 1459*, 1461* 2365*, 2366*, 1111* 1150*, 1479*	1241, 2370, 2384 2386
356	2396			1400, 2387, 2392 2398	
357	1514	1019,1122 1227			
358	1626	1025,1093 1161,1370 1372	1044, 1371, 1657 1423*, 1482*	1369, 1160*, 1332* 1572*	1318*
360	2286			1656, 2313, 2317 2318, 2319, 2157* 2274*	2316

APPENDIX 5.1

LIST OF INDEX TERMS

This Appendix contains the full list of the single terms used in the indexing of the complete set of 1400 documents. The terms are in alphabetical order; before each term is given a code which relates to the schedules of single terms to be found in Appendix 5.3.

Following each term is given the number of documents in which the term was used for indexing.

It will be noted that several terms do not have a code equivalent; such terms are proper names for which no reasonable place was available in the schedules.

Abel (1)
Z10 Aberration (1)
W35 Ablated (1)
S45 Ablating (6)
S44 Ablating (16)
C70 Able (1)
J5 About (2)
J39 Above (6)
K71 Abrupt (2)
Y39 Absence (1)
X110 Absolute (3)
W40 Absorbed (2)
T8 Absorption (10)
N30 Accelerated (4)
P93 Accelerating (8)
P92 Acceleration (22)
F79 Accelerators (13)
G18 Accelerometer (2)
V109 Acceptance (1)
X14c Accidental (1)
S55 Accommodation (3)
U8 Accumulation (2)
Z3 Accuracy (6)
Z3a Accurate (1)
B33 Acetate (2)
Ackeret (1)
R98 Acoustic (13)
R99 Acoustically (2)
K2d Across (5)
S90a Acting (1)
S90 Action (3)
Q28a Activation (1)
X106 Active (2)
S90b Activity (1)
Y80 Actual (2)
U5 Addition (7)
X65 Additional (2)
S62 Adiabatic (21)
J28 Adjacent (7)
E34b Adjustable (2)
X41 Adjusting (1)
T9 Adsorption (2)
Q12b Advance (2)
Q12c Advancing (2)
X92a Adverse (11)
W5 Aeolotropic (1)
Z13 Aerodynamic (180)
Ob Aerodynamically (1)
Oa Aerodynamics (11)
P30a Aeroelastic (9)
P30 Aeroelasticity (7)
D3 Aerofoil (103)
C36a Aeronautical (1)
C36 Aeroplane (13)
S29 Aerothermochemistry (1)
S24a Aerothermodynamic (1)
P32 Aerothermoelastic (1)
W21a Affected (1)
H34 Aft (2)
N36 After (1)
H32 Afterbody (35)
F75 Afterburner (1)
S79 Afterburning (1)
E84 Aftercooler (1)
P22 Afterflow (1)
J47 Ahead (4)
D12 Aileron (16)
B12 Air (192)
C36 Aircraft (170)
F91 Aircraft-Research-Association (1)
O1a Airflow (1)
D2 Airframe (14)
O84a Airjet (1)
C43 Airliner (1)
R1a Airload (1)
N45 Airspeed (2)
O1b Airstream (1)
Airy (1)
A43 Alclad (2)
A42 Alcoa (1)
Alden (1)
P90 Alfven (1)
V88 Algebraic (4)
V64 Algorithm (1)
M104 Aligned (1)
M105 Alignment (1)
H2a All (1)
X104c Allmovable (4)
X104e Allmoving (1)
R3 Allowable (4)
A39 Alloy (37)
Almen (1)
J25b Alone (1)
K5a Along (13)
T18 Alteration (3)
R112 Alternating (1)
Y196 Alternative (1)
J38 Altitude (41)
A40 Aluminium (42)
J3 Ambient (8)
F90 Ames (1)
B18 Ammonium (2)
M29 Amount (2)
U11 Amplification (6)
L89 Amplitude (17)
Y19a Analogous (1)
V29r Analogue (9)
V29q Analogy (22)
V61a Analyser (2)
V88 Analysis (226)
U89 Analytic (11)
U90 Analytical (17)
G32 Anemometer (6)
J90 Angle (224)
L69a Angled (23)
L69 Angular (10)
L696 Angularly (1)
P60 Anhedral (1)
W4 Anisotropic (1)
W_4a Anisotropy (2)
L33 Annular (8)
L34 Annulus (2)
G43 Antenna (1)
R22 Anticlastic (2)
K34 Antisymmetric (3)
K34 Antisymmetrical (4)
H17 Apex (10)
J24 Apogee (3)
F80 Apparatus (17)
Y79 Apparent (3)
U38 Appearance (2)
X115c Applicability (3)
U81 Application (9)
W21 Applied (15)
N113 Approach (10)
N114 Approaching (4)
Y93a Appropriate (1)
V78 Approximate (94)
V79 Approximating (1)
V79b Approximation (73)
A78 Ar (1)
M72d Arbitrarily (3)
M72c Arbitrary (46)
L64 Arc (19)
L101 Area (32)
A78 Argon (13)
J4 Around (1)
M65z Arrangement (4)
T90 Arrest (1)
L19 Arrow (2)
Y57 Art (2)
X15 Artificial (5)
X15a Artificially (1)
B42 Asbestos (1)
N70 Ascending (1)
N69 Ascent (1)
A.S.M.E. (1)
P53 Aspect (59)
U95 Assessment (3)
X118 Associated (3)
Y79a Assumed (1)
V290a Assuming (1)
V290 Assumption (7)
B45 Astrolite (1)
C1 Astrophysics (1)
K34a Asymmetric (4)
K34 Asymmetrical (2)
M93a Asymptote (1)
M93 Asymptotic (30)
M93b Asymptotically (1)
C77 Atlas (1)
C16 Atmosphere (55)
C16 Atmospheric (21)
A5 Atom (10)
A8b Atomic (5)
W66 Attached (21)
D78 Attachment (9)
J91a Attack (19)
R34 Attenuating (1)
R115 Attenuation (6)
P43 Attitude (5)
R110 Audio (1)
U4 Augmentation (6)
R109 Aural (1)
X416 Auto (1)
V117 Autocorrelation (3)
V118 Autocorrelogram (1)
S84 Autoignition (1)
X40 Automatic (4)
E91 Autopilot (1)
H93 Auxiliary (2)
Y88 Average (10)
V112a Averaging (1)
O48 Avoidance (1)
C51 Avro (1)
J94 Axial (113)
J94a Axially (35)
J56 Axis (36)
K33 Axisymmetric (66)
K33 Axisymmetrical (5)

H31 Back (2)
D100a Backing (1)
K8 Backward (1)
F1 Baffles (1)
Bakanov (1)
B40 Bakelite (1)
P78 Balance (15)
E15 Ball (1)
C83 Ballistic (12)
O58 Ballotini (1)
B2 Balsa (3)
D96 Bands (8)
R111f Bandwidth (1)
D27 Bang-bang (1)
M101 Bank (3)
P47 Banked (1)
D89 Bar (7)
M115 Bare (1)
G7a Barrel (1)
H24 Base (41)
K83a Based (1)
Y91 Basic (9)
Batdorf (8)
D52 Bays (6)
O57 Bead (1)
D101 Beam (26)
Beane (1)
F27 Bearing (3)
R106 Beat (1)
H25 Bed (1)
Bedford (2)
U26 Beginning (2)
S92 Behaviour (39)
J49 Behind (22)
V107 Bei (1)
C63 Bell (1)
F45 Belleville (1)
Belotserkovski (3)
J8 Belt (1)
L68 Bend (3)
R16 Bending (102)
V108 Ber (1)
Bernoulli (2)
Berthelot (1)
Bessel (1)
V51 Bestfit (1)
Beta (1)
J74 Between (13)
K86 Bevelled (1)
Y58a Bibliography (1)
L39 Biconvex (11)
T43 Bifurcation (4)
V90 Biharmonic (3)
O86 Billowing (1)
A39a Bimetallic (1)
A8d Bimolecular (2)
M38 Binary (5)
E35c Binding (1)
Biot (8)
C56 Biplane (2)
Birnbaum (1)
J57 Bisector (1)
X104 Bistable (1)
S54 Black (1)
F21 Blade (38)
F21 Blading (3)
Blasius (13)
O93 Blast (16)
Q58b Bleed (5)
Q58a Bleeding (1)
E3 Block (2)
P12 Blockage (10)
P12a Blocking (1)
F85 Blowdown (8)
E74 Blower (1)
Z16 Blowing (14)
W100 Blown (1)
O44 Blowoff (1)
Q54a Blowout (1)
K75 Bluff (8)
K73 Blunt (44)
K73 Blunted (18)
R37 Blunting (5)
K74 Bluntness (19)
E22 Boattail (1)
K84 Boattailed (1)
K85 Boattailing (2)
E1 Body (288)
S37 Boiloff (1)
F49 Bolt (1)
Boltzmann (2)
R104 Bomb (1)
C45 Bomber (2)
F46a Bond (1)
R102 Boom (13)
N49 Boost (1)
W56 Boosted (1)
E73a Booster (2)
N66 Boosting (2)
L100a Bore (1)
H23 Bottom (3)
C48 Boulton-Paul (1)
J71 Bound (8)
J70 Boundary (512)
M111 Bounded (3)
M112 Bounding (4)
H29 Bow (38)
R20 Bowing (1)
E4 Box (6)
D57a Boxtype (1)
N106 Braking (3)
A48 Brass (5)
O43 Breakdown (28)
T44 Breaking (1)
Q61 Breathing (5)
C30 Bridge (1)
M20 Broad (1)
S76a Btu (1)
B78 Bubble (3)
R52 Buckle (14)
W106 Buckled (13)
R51 Buckling (134)
Budiansky (1)
P40 Buffet (1)
P39 Buffeting (13)
D41 Built (2)
L90 Bulk (1)
D69 Bulkhead (5)
H64 Bump (4)
Y36a Buoyancy (1)
W43 Burned (1)
S78 Burning (4)
J46 Buried (1)
Q60 Burst (2)
O82 Bursting (2)
Busemann (4)
P37 Buzz (10)
D33 Cabin (2)
V31b Calculated (1)
V31a Calculating (1)
V31 Calculation (252)
V99 Calculus (4)
Y100 Calibrated (1)
V29b Calibration (21)
S27 Caloric (4)
S28 Calorically (1)
P69 Camber (19)
L40a Cambered (13)
G37 Camera (1)
F39a Can (1)
C58 Canard (1)
O83 Cancellation (1)
M83 Canted (1)
D102 Cantelever (14)
E41 Cantelevered (6)
F42 Cap (8)
Z4 Capability (2)
S22a Capacitance (2)
Z5 Capacity (10)
P55 Capillary (1)
K83 Capped (1)
C72 Capsule (2)
N74 Capture (1)
C44 Caravelle (3)
A70 Carbon (10)
B14a Carbonate (2)
O56 Carborundum (1)
L12 Caret (2)
T51 Carrying (6)
F4 Cascade (1)
S91c Case (3)
Cassinian (1)
Castiellanos (1)
B55 Castolite (1)
T7 Catalytic (1)
G47 Cathode (1)
Cauchy (1)
X17c Caused (2)
T66a Cavitating (1)
R40 Cavitation (3)
H72 Cavity (4)
G12 Cell (2)
D47 Cellular (3)
B32 Cellulose (2)
C69 Centaur (1)
J51 Central (5)
J51a Centrally (4)
J52 Centre (49)
J51b Centred (1)
J56a Centreline (3)
J99 Centrifugal (8)
J100 Centripetal (1)
B24 Ceramic (3)
U30 Cessation (2)
F38 Chamber (10)
T16 Change (38)
T17 Changing (3)
F64 Channel (22)
Chapman (5)
Y90 Characteristic (72)

S20 Charge (5)
S7 Charged (8)
T5 Charging (1)
Y55 Chart (15)
S96 Chemical (18)
S97 Chemically (10)
T10 Chemisorption (1)
Cheng (1)
M876 Chessboard (3)
Chien (1)
C31 Chimneys (1)
V25b China (1)
B15 Chloride (3)
P11a Choke (1)
P11b Choked (7)
P11 Choking (11)
P65 Chord (25)
K2 Chordwise (34)
T48 Chroming (1)
A56 Chromium (2)
B52 Cincinnati-Testing-Laboratory-Material (1)
N82 Circling (1)
J22 Circuit (2)
G42a Circuitry (1)
L29 Circular (154)
L30 Circularity (1)
Q4a Circulating (1)
0101 Circulation (14)
X32 Circulatory (2)
J60 Circumferential (41)
V79d Circumscribed (1)
C42 Civil (1)
E27 Clamped (35)
T99 Clamping (1)
E42a Clamshell (1)
Y89 Classical (8)
U86 Classification (2)
Clausing (1)
V25a Clay (1)
N71 Climb (1)
K89 Clipped (1)
J102 Clockwise (1)
J33 Close (3)
M109 Closed (23)
J34 Closely (2)
F40 Closures (1)
C21 Cloud (2)
J95 Coaxial (2)
065 Cocurrent (2)
U83 Code (2)
Y17 Coefficient (212)
S68 Cold (12)
Cole (1)
R49 Collapse (16)
R50 Collapsing (12)
U9 Collecting (1)
M55 Collective (1)
031 Collision (1)
M71a Collocation (1)
A61a Columbium (1)
D104 Column (27)
M71 Combination (38)
W28 Combined (45)
X6 Combustible (3)
S78 Combustion (18)
U87 Comparison (4)
V91 Compatibility (3)
S94d Competition (1)
Y5 Complementary (1)
M52 Complete (5)
U30a Completion (1)
W7 Complex (5)
H4 Component (22)
X19a Composed (2)
W8 Composite (13)
W6 Composition (9)
W9 Compound (2)
B54 Compreg (1)
W94 Compressed (10)
P1 Compressibility (28)
040 Compressible (124)
Q38a Compressing (2)
Q38 Compression (64)
X55 Compressive (36)
Q386 Compressively (1)
E74 Compressor (1)
V33 Computation (11)
V34 Computational (1)
V32 Compute (1)
V58 Computer (23)
L37 Concave (7)
W70 Concentrated (8)
T68 Concentration (21)
M117 Concentric (4)
Y43 Concept (7)
Y70a Conceptual (1)
S38 Condensation (6)
B68 Condition (112)
T74 Conducting (30)
T75 Conduction (40)
X48 Conductive (3)
X48a Conductivity (21)
G51 Conductor (1)
E11 Cone (128)
K45 Coned (1)
M66 Configuration (42)
T35 Confluence (1)
V106 Confluent (1)
V97 Conformal (5)
K45 Conical (71)
K45a Conically (1)
M396 Conjugate (1)
X117 Connected (3)
V49 Conservation (7)
Y89a Conservativeness (1)
T156 Considerations (1)
Y24 Consistent (2)
X73 Constant (79)
T93 Constraint (7)
U20 Constriction (1)
U66 Construction (12)
N50 Consumption (2)
J27 Contact (4)
X113 Containment (1)
T39 Contamination (12)
M30 Content (1)
T88a Continuation (1)
X72 Continuity (5)
X70 Continuous (19)
X71 Continuously (1)
030 Continuum (11)
L2 Contour (12)
F71 Contoured (1)
V19 Contracting (2)
V18 Contraction (11)
T15a Contribution (1)
U70 Control (66)
W88 Controlled (7)
U71 Controlling (1)
W61 Convected (1)
T76 Convecting (1)
S50 Convection (27)
X52 Convective (23)
Y89 Conventional (2)
Q15 Convergence (12)
L85 Convergent (15)
Q16 Converging (8)
T29 Conversion (8)
E86 Convertor (1)
L38 Convex (9)
S70 Cool (2)
A30 Coolant (13)
S69 Cooled (21)
E83 Cooler (4)
S42 Cooling (57)
V67 Coordinate (17)
L76 Coplanar (1)
A49 Copper (2)
H46 Core (22)
H74 Corner (22)
E466 Cornered (2)
U73 Correction (18)
X42 Corrective (1)
G23 Corrector (1)
X116 Correlated (1)
V116 Correlation (25)
V60 Correlator (1)
V116a Correlogram (1)
X115b Corresponding (1)
F54 Corridor (8)
L81 Corrugated (7)
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K79a Roundness (1)
U63 Routine (1)
Routt (1)
M100 Row (8)
B6a Rubber (1)
D15 Rudder (4)
V29m Rule (5)
N26 Running (1)
R48 Rupture (4)

A65 SAE (1)
N129 Safety (2)
E68 Sail (1)
B14 Salt (3)
H5a Sample (1)
V113 Sampling (1)
B63 Sand (2)
055 Sandpaper (1)
D43 Sandwich (17)
C74 Satellite (31)
T11 Saturation (2)
C11 Saturn (1)
C35 Saunders-Roe (1)
U80 Saving (2)
L91 Scale (36)
V86 Scaling (2)
T57 Scattering (2)
Q57a Scavenging (1)
Schindel (1)
Schlichting (4)
V17 Schlieren (20)
Schmidt (2)

Schubauer (5)
F61 Scoop (1)
W57 Scooped (1)
U10 Scooping (1)
F2 Screen (4)
F49b Screw (1)
C25 Sea (1)
Seal (1)
U51c Sealing (2)
E25 Sears (1)
N12 Season (2)
N13 Seasonal (1)
Y15 Secant (3)
H85 Second (37)
H85a Secondary (17)
H11 Section (110)
W20 Sectional (14)
H13 Sector (5)
E44 Sectorial (3)
Sedov (1)
B13 Seeded (4)
H14 Segment (11)
U91 Segmentation (1)
E43 Segmented (3)
Seide (1)
Y96 Selected (1)
X41a Self (10)
M31b Semi (3)
V42 Semianalytical (1)
H18 Semiapex (2)
N59 Semiballistic (1)
L51 Semicircular (4)
E18 Semi-ellipsoid (1)
K61 Semi-ellipsoidal (1)
Y68a Semi-empirical (3)
M42 Semi-infinite (19)
V38 Semi-inverse (1)
H84 Semi-major (3)
V45 Semi-numerical (1)
B75a Semi-rarefied (1)
E37 Semi-rigid (2)
P64 Semispan (4)
H18a Semivertex (9)
R125 Sensitivity (1)
G22a Sensor (2)
035 Separated (26)
T62 Separating (5)
046 Separation (132)
M103 Sequential (1)
M95 Series (32)
E89 Servo (1)
Y42c Set (3)
J93 Setting (3)
G2 Settling (5)
H90 Seventh (2)
M28e Severe (2)
M28f Severely (1)
L16 Sextic (1)
V13 Shadowgraph (6)
F13a Shaft (1)
T105a Shakedown (1)
M27 Shallow (20)
M27a Shallowness (1)
F13 Shank (1)
Shanley (1)
K27 Shape (238)
K30 Shaped (10)
K70 Sharp (48)
K70a Sharpness (1)
R11 Shear (124)
W91 Sheared (1)
R12 Shearing (14)
F32b Sheath (1)
081 Shedding (2)
D83 Sheet (25)
D88 Shell (114)
Shesterikov (1)
D37 Shield (6)
E48 Shielded (1)
U51d Shielding (2)
V23 Shift (2)
C33 Ship (1)
096 Shock (296)
R5 Shocking (1)
098a Shockless (1)
M14 Short (21)
R35 Shortening (5)
F32a Shroud (10)
F83a Shrouded (2)
T72 Shuffle (1)
A62 Sicromoz (1)
H35 Side (21)
G46a Sided (1)
H35a Sidedness (1)
P19a Sideforce (1)
N99 Sideslip (12)
G8 Sidewall (2)
P20 Sidewash (8)
R101a Signals (3)
F76 Silencer (1)
A72 Silica (4)
B21 Silicate (1)
V80 Similar (24)
V81 Similarity (26)
V19 Similtude (7)
Y76 Simple (22)
U92c Simplification (4)
Y74 Simplified (4)
Y75 Simply (44)
X23 Simulated (10)
V7a Simulating (1)
V8 Simulation (21)
V61 Simulator (1)
N23 Simultaneous (4)
N24 Simultaneously (1)
V106a Sine (1)
M32 Single (31)
M33 Singly (1)
M34 Singular (4)
Y37 Singularity (8)
070 Sink (4)
N95 Sinking (8)
L66 Sinusoidal (20)
L66a Sinusoidally (2)
R103 Siren (1)
J1b Situation (1)
M65 Six (1)
H89b Sixth (1)
L88 Size (30)
Skan (6)
M81 Skewed (1)
H40 Skin (164)
N60 Skip (4)
N61 Skipping (1)
K97 Skirt (4)
K98 Skirted (1)
D87 Slab (20)
D8 Slab-tail (1)
D23 Slat (1)
M15 Slender (90)
L94 Slenderness (2)
H12 Slices (1)
F29 Slider (1)
M47a Slightly (8)
029 Slip (19)
P24a Sliplines (1)
P24 Slipstream (16)
J92 Slope (42)
M82 Sloped (1)
P36 Sloshing (1)
D24 Slot (6)
L83 Slotted (9)
N27 Slow (1)
N27a Slowly (2)
028a Slug (1)
M25 Small (98)
B83 Smoke (2)
L78 Smooth (19)
V56 Smoothing (1)
R85 Smoothness (1)
R56 Snap (2)
R60 Snapping (2)
C22 Snow (1)
S57 Soaked (1)
Z22 Soaking (1)
B60 Sod (1)
A68 Sodium (5)
R82 Soft (4)
C5 Solar (7)
B69 Solid (46)
V77 Solution (296)
Sommerfield (1)
05 Sonic (52)
S43 Soret (1)
R98 Sound (29)
E66 Sounding (1)
U31 Source (15)
Southwell (2)
C2 Space (23)
C67 Spacecraft (4)
M96 Spaced (7)
C67 Spaceship (1)
M97 Spacing (11)
P61 Span (30)
K2a Spanning (1)
K3 Spanwise (42)
D71 Spar (2)
V18 Spark (1)
Sparrow (1)
H95 Spatial (1)
Y42b Species (1)
Y98 Specific (31)
H56 Specimen (5)
R111a Spectra (9)
R111c Spectral (7)
V11 Spectrography (1)
R111b Spectrum (8)
T85b Specular (3)
P89 Speed (168)
Sphere (44)
K52 Spherical (34)

K53 Spherically (4)
K54 Spheroid (1)
E13 Spike (2)
K47 Spiked (1)
N98 Spin (3)
D36 Spinner (3)
Q7 Spinning (1)
K51 Spiral (4)
O77 Spiralling (1)
D20 Split (4)
F22 Splitter (1)
D26 Spoiler (2)
J15 Spot (2)
Z20 Spray (1)
T56 Spread (7)
T55 Spreading (2)
F44 Spring (14)
B4 Spruce (1)
C79 Sputnik (3)
L14 Square (28)
Squires (1)
SRN 1 (1)
P79 Stability (144)
T102 Stabilization (2)
W81 Stabilized (4)
D28 Stabilizer (4)
T101 Stabilizing (2)
X103 Stable (8)
F17 Stacking (3)
F16 Stage (13)
M98 Stagger (1)
M99 Staggered (1)
M99a Staggering (1)
X94 Stagnant (2)
P10 Stagnation (176)
A64 Stainless (7)
P14 Stall (17)
O37 Stalled (2)
P15 Stalling (8)
Stalmach (1)
D77 Stand (2)
Y87 Standard (3)
O92 Standing (2)
O98 Standoff (20)
Stanton (7)
U28 Start (2)
U27 Starting (8)
B68 State (31)
X98 Static (96)
X98a Statically (7)
J11 Station (2)
X95 Stationary (25)
V112 Statistical (5)
V111 Statistics (2)
F7 Stator (4)
X68 Steady (94)
B11 Steam (1)
A59 Steel (15)
M84 Steep (1)
M84a Steepest (3)
Stefan (1)
H56 Stem (2)
D81 Step (16)
V53 Step-by-step (4)
P55 Stepdown (1)
M99b Stepwise (1)
Stewartson (6)
E38 Stiffened (36)
D100 Stiffener (20)
D99 Stiffening (4)
R77 Stiffness (50)
X97 Still (1)
G13 Sting (9)
V119 Stochastic (1)
W12 Stoichiometric (2)
Stokes (14)
C60 STOL (4)
Stone (1)
Stopping (2)
U67 Storage (4)
D38 Stores (2)
U68 Storing (1)
L57 Straight (18)
L58 Straightness (3)
R28 Strain (64)
R64b Straintime (1)
Stratford (2)
D43 Stratiform (1)
O1 Stream (156)
O64 Streamline (40)
F56 Streamtube (6)
K20 Streamwise (15)
O80 Street (2)
R81 Strength (41)
R1 Stress (196)
E51 Stressed (2)
E2 Stressing (1)
K99 Stretched (1)
R33 Stretching (5)
Q41 Striking (2)
D68 Stringer (14)
V24 Strioscopy (1)
D94 Strip (18)
V12 Stroboscopic (1)
X14 Strong (21)
Strouhal (2)
W1 Structural (28)
D40 Structure (61)
D103 Strut (5)
U85 Study (12)
St. Venant (1)
L65 Subarc (1)
R111 Sub audio (1)
O4 Subcritical (1)
S94b Subject (3)
W87 Subjected (3)
H44 Sublayer (6)
S33 Sublimation (4)
J44 Submerged (1)
O3 Subsonic (106)
Y19c Substitutes (1)
N22 Successive (6)
Z15a Sucking (1)
Z15 Suction (27)
N31 Sudden (7)
F62 Sugar (1)
C5 Sun (1)
Z14 Superaerodynamic (3)
L31 Supercircular (2)
M24 Supercritical (3)
O13 Superfast (1)
W71 Superimposed (2)
V115 Superposition (7)
O12 Super-satellite (2)
O7 Supersonic (352)
O8 Supersonically (1)
O69 Supply (2)
U69 Supplying (1)
D75 Support (17)
E40 Supported (50)
V29e Supporting (5)
U75 Suppression (1)
H37 Surface (300)
E46 Surfaced (1)
P29 Surge (5)
J4 Surrounding (3)
Y57 Survey (15)
B82 Suspension (2)
X72a Sustained (2)
U49a Sustaining (1)
Sutherland (1)
Q62 Swallowing (1)
S47 Sweat (4)
P50 Sweep (15)
P51 Sweepback (13)
P52 Sweepforward (1)
L5 Swept (29)
L6 Sweptback (28)
L8 Sweptforward (3)
O76 Swirl (4)
T82 Switching (1)
K31 Symmetric (54)
K31 Symmetrical (30)
K32 Symmetrically (1)
K30a Symmetry (5)
U92a Synthesis (1)
Y41 System (29)
M72a Systematic (2)

L52a T (1)
D25 Tab (5)
Y55a Table (13)
Y55b Tabulation (1)
D7 Tail (29)
C57 Tailless (1)
F87 Tailored (1)
T22a Tailoring (1)
D9 Tailplane (9)
N65 Take-off (3)
J27a Tangency (1)
Y16 Tangent (18)
K19 Tangential (13)
F33 Tank (7)
V29g Tap (1)
K68 Taper (10)
K65 Tapered (13)
W101a Tapped (1)
Q58 Tapping (1)
Y48d Target (1)
N64 Taxiing (1)
Taylor (12)
V62 Techniques (47)
H63 Teeth (1)
B49 Teflon (7)
V92 Telegraph (1)
N122 Telemetering (1)
N121 Telemetry (3)
G39 Television (1)
Teller (1)
S66 Temperature (272)
V79a Tending (2)

R10 Tensile (10)
R9 Tension (9)
V100 Tensor (1)
V70 Term (6)
H92 Terminal (5)
X23a Terminated (3)
V71 Termwise (1)
F82 Test (236)
F82 Testing (24)
B17 Tetrachloride (2)
Theodorsen (3)
V84 Theorem (10)
V29ha Theoretical (152)
V29h Theory (406)
S24 Thermal (86)
S26 Thermally (5)
P31 Thermo-aeroelastic (1)
T13 Thermo-chemical (1)
G29 Thermocouple (3)
S24 Thermodynamic (23)
S56c Thermoelastic (2)
B45a Thermold (1)
S56b Thermo-mechanical (1)
L56a Theta (1)
M18 Thick (20)
X1 Thickened (1)
O47 Thickening (2)
L95 Thickness (174)
M15 Thin (140)
H86 Third (3)
E24 Thor-Able (1)
M61 Three (9)
M7 Three-dimensional (62)
M7a Three-dimensionality (1)
R57 Threshold (1)
H79 Throat (20)
F78 Throttle (1)
K18 Through (5)
N48 Thrust (45)
D21 Thwaites (3)
P42 Tilt (9)
E31a Tilting (1)
N1 Time (72)
N1 Timewise (1)
A63 Timken (1)
Timken Roller Bearing Co.(1)
H50 Tip (39)
C88 Titan (1)
A51 Titanium (3)
A28 TNT (1)
N127 Tolerance (1)
Tollmien (5)
H16 Top (2)
Torda (2)
K48 Toriconical (2)
K59 Torispherical (4)
K63 Toroidal (5)
P72 Torque (6)
R13 Torsion (25)
R14 Torsional (27)
E20 Torus (4)
M53 Total (59)
K7 Towards (1)
Y60 Traces (1)
U99 Tracing (1)
R32 Tractions (1)
P26 Trail (4)
J50 Trailing (46)
J20 Trajectory (25)
V100b Transcendant (1)
V91a Transcendental (2)
G52 Transducers (1)
T70 Transfer (228)
W60 Transferred (1)
V96 Transform (2)
V95 Transformation (34)
W27 Transformed (3)
N15 Transient (41)
Q22 Transit (1)
O42 Transition (104)
O20 Transitional (10)
P96 Translation (4)
X35 Translational (3)
P97 Translatory (2)
T73 Transmission (5)
O6 Transonic (72)
R124 Transparent (1)
S46 Transpiration (4)
T50 Transport (15)
P80 Transtability (4)
V98a Transversality (1)
K1 Transverse (56)
K2c Transversely (1)
L17 Trapezoidal (1)
P88 Travelling (4)
N67 Traversal (1)
U100 Traverse (3)
N68 Traversing (3)
U62a Treatment (4)
Trefftz (1)
L11a Triangle (2)
L11 Triangular (23)
V110 Trigonometric (7)
P45 Trim (8)
P46a Trimmed (2)
P46 Trimming (2)
O52 Trip (5)
O45 Tripped (1)
O52a Tripping (1)
Y24b True (1)
K90 Truncated (13)
D105 Truss (3)
Tsien (1)
E7 Tube (70)
E7 Tubing
K43 Tubular (3)
V28 Tuft (1)
N92 Tumbling (4)
A55 Tungsten (16)
F84 Tunnel (296)
E80 Turbine (14)
E61 Turbojet (8)
E74 Turbomachine (1)
P27 Turbulence (30)
O21 Turbulent (132)
N80 Turn (1)
T83 Turning (8)
M39a Twin (1)
P57 Twist (10)
W93 Twisted (5)
R15 Twisting (7)
M60 Two (14)
M6 Two-dimensional (168)
M6a Two-dimensions (1)
Y42a Type (23)

J83b U.K. (1)
Y47 Ultimate (2)
M22c Ultra-high (1)
S4 Ultra-violet (1)
J97b Unaxial (1)
P48 Unbanked (1)
K77 Unblunted (1)
M116 Unbounded (2)
W107 Unbuckled (2)
L40b Uncambered (4)
W52a Unchanged (1)
S71 Uncooled (1)
Y33 Uncoupled (5)
J43 Under (4)
O34 Underexpanded (1)
O34a Underexpansion (2)
S94a Undergoing (1)
N117 Undershoot (4)
H38 Undersurface (1)
J45 Underwater (1)
W46 Undissociated (3)
W69 Undisturbed (3)
R75 Unelastic (1)
Y30 Unequal (3)
X84 Unevenness (1)
F37 Unfired (2)
E32a Unflanged (1)
R26 Unfolding (1)
S72 Unheated (1)
J96 Uniaxial (4)
J87 Unidirectional (1)
V29j Unified (2)
X74 Uniform (106)
X74a Uniformity (2)
X74b Uniformly (17)
R97 Unimodal (1)
M59 Unit (11)
M59a Unity (5)
V59c Univac (3)
E33a Unloaded (1)
R26a Unloading (1)
X74d Unperturbed (1)
N63 Unpowered (1)
D61 Unpressurized (1)
W83 Unretarded (1)
O36 Unseparated (1)
O38 Unstalled (1)
P17 Unstalling (1)
X77 Unsteadily (1)
X78 Unsteadiness (3)
X76 Unsteady (41)
E39 Unstiffened (10)
Y33a Unsupported (1)
L10 Unswept (12)
K34a Unsymmetrical (2)
K76 Untapered (4)
L82b Unwrinkled (1)
W74 Unyawed (8)
K12
P19 Upflow (1)
P18a Upload (1)
J40 Upper (28)
F18 Uprating (1)
K21 Upstream (21)
P19 Upwash (9)

Y65 U.R. (1)
U82 Use (1)

L54 V (3)
B76 Vacuum (5)
Y24a Valid (3)
V73 Value (39)
Y99a Valued (1)
F43 Valve (1)
Vandriest (1)
Van Dyke (4)
F21 Vane (9)
F67 Vaneless (1)
C80 Vanguard (1)
Q20 Vanishing (5)
M47c Vanishingly (1)
B74 Vapour (10)
S34 Vapourisation (4)
X86 Variable (30)
T23 Variation (18)
V41 Variational (17)
T24 Varying (12)
Y63 Vector (13)
C32 Vehicle (66)
P89 Velocity (360)
Q57b Venting (1)
F72 Venturis (1)
C8 Venus (3)
U105 Verification (2)
H17 Vertex (1)
M75 Vertical (34)
C65 Vertol (2)
M516 Very (4)
F35 Vessels (9)
R92 Vibrating (4)
R91 Vibration (49)
X37 Vibrational (10)
X38 Vibrationally (3)
X36 Vibratory (5)
J29 Vicinity (3)
Q30 Virtual (2)
O16 Viscid (2)
R71 Viscoelastic (3)
R70 Viscoelasticity (1)
R80 Viscoplastic (1)
P2 Viscosity (44)
O16 Viscous (116)
N126 Visibility (1)
N125 Vision (1)
V9a Visual (1)
V10 Visualisation (9)
Volterra (1)
L103 Volume (15)
L103a Volumetric (1)
O74 Vortex (59)
O75 Vortical (2)
O100 Vorticity (47)
N54 Voyage (1)
C61 VTOL (20)

L55 W (1)
Wagner (2)
H80a Waists (1)
P22 Wake (60)
P23 Wakelike (2)
Walkden (1)
H42 Wall (172)
E48a Walled (11)
Walles (1)
Ward (1)
E94 Warhead (1)
P58 Warp (1)
R15a Warpage (1)
W105 Warped (1)
Warren (1)
W68a Washed (1)
B10 Water (17)
U51b Waterproofing (1)
O90 Wave (244)
R111e Waveform (1)
R111d Wavelength (5)
L82c Waviness (1)
L82 Wavy (2)
X14b Weak (11)
U53b Weakening (1)
E92 Weapon (2)
D73 Web (7)
K38 Wedge (63)
Weierstrass (1)
L105 Weight (33)
V114 Weighting (1)
Weinstein (1)
Weissinger (4)
J28a Wetted (1)
Z21 Wetting (1)
Q8 Whirl (2)
Whitham (3)
H2 Whole (1)
M19 Wide (4)
M19a Widely (1)
L100c Width (19)
C19 Wind (266)
D65 Window (4)
K24 Windward (4)
D4 Wing (252)
C39 Winged (4)
C40 Wingless (1)
D90 Wire (12)
X115a With (1)
I66a Within (1)
Y38 Without (1)
B1 Wood (4)
Q29 Work (5)
Y84 Working (14)
D91 Woven (1)
L82a Wrinkled (1)
R61 Wrinkling (6)

C49 X (1)
A80 Xenon (1)

N85 Yaw (32)
W73 Yawed (17)
N86 Yawing (13)
Y48c Yield (10)
U53c Yielding (1)
Young (3)
E26 Yo-Yo (1)

L55a Z (2)
M57a Zero (73)
O80 Zinc (2)
J10 Zone (8)
N72 Zoom (1)

APPENDIX 5.2

SINGLE-TERM DICTIONARIES

This Appendix lists the 723 search starting terms which occurred in the set of 361 questions. These are shown, in the first column, in the form used by the questioner, and following each starting term are the terms in the three groups of Synonyms, Word-Endings and Quasi-Synonyms, these being denoted by the numbers (1), (2) and (3) respectively. These dictionaries are discussed on pages 66 to 68.

ABLATING	(2) Ablated, Ablation (3) Ablation, Melting
ABLATION	(2) Ablated, Ablating (3) Ablating, Melting
ABOVE	(3) Higher
ABSENCE	(3) Without
ABSORPTION	(2) Absorbed
ACCURACY	(2) Accurate (3) Accurate
ACCURATE	(2) Accuracy (3) Exact, Perfect, Accuracy, True
ACOUSTIC	(1) Sound, (2) Acoustically, (3) Sonic
ACTION	(3) Behaviour, Process
ADJACENT	(3) Near, Close, Proximity
AERODYNAMIC	(2) Aerodynamically, Aerodynamics
AERODYNAMICS	(2) Aerodynamic, Aerodynamically
AEROELASTIC	(2) Aeroelasticity
AEROFOIL	(3) Profile, Lifting x Element, Lifting x Surface
AEROPLANE	(1) Aircraft (3) Air x Vehicle, Flight x Vehicle, Aerodynamic x Body
AEROTHERMODYNAMIC	
AFTERBODY	
AFTERBURNING	(2) Afterburner
AHEAD	(3) Forward, Upstream
AILERON	
AIR	(3) Atmosphere, Atmospheric
AIRCRAFT	(1) Aeroplane, (3) Air x Vehicle, Flight x Vehicle, Aerodynamic x Body
ALTITUDE	(3) Height
AMOUNT	(1) Quantity (3) Magnitude, Size, Total, Dimension
ANALYSIS	(2) Analyser, Analytic, Analytical (3) Analytical x Investigation
ANALYTICAL	(2) Analyser, Analysis, Analytic (3) Analysis
ANGLE	(2) Angled, Angular, Angularly
ANTISYMMETRIC	(1) Antisymmetric, Asymmetric, Asymmetrical, Nonsymmetric (2) Antisymmetric
ANTISYMMETRICAL	(1) Antisymmetric, Asymmetric, Asymmetrical, Non-symmetric (2) Antisymmetric
APEX	(1) Vertex, (3) Top, Head, Crest, Crown, Cap, Semiapex, Semivertex
APPLICATION	(2) Applicability, Applied (3) Use
APPLIED	(2) Applicability, Application
APPROPRIATE	(3) Optimum, Ideal, Perfect
APPROXIMATE	(2) Approximating, Approximation (3) Generalized, Approximation, Simple, Simplified, Simplification, Idealized, Near x Perfect, Imperfect
APPROXIMATION	(2) Approximate, Approximating (3) Simplification
ARBITRARILY	(2) Arbitrary
ARBITRARY	(2) Arbitrarily
AROUND	(3) Circumferential, Adjacent, Peripheral, Bounding, Ambient, Surrounding
ASPECT	
ASSUMED	(1) Given, (2) Assuming, Assumption (3) Prescribed, Imposed
ASSUMPTION	(2) Assumed, Assuming (3) Theory, Theoretical, Hypothesis, Prediction, Principle, Law, Rule
ASYMMETRICAL	(1) Antisymmetric, Antisymmetrical, Asymmetric, Non-symmetric, (2) Asymmetric
ASYMPTOTIC	(2) Asymptote, Asymptotically
ATMOSPHERE	(2) Atmospheric, (3) Air
ATTACHMENT	(2) Attached, (3) Reattachment, Reattaching, Reattached
ATTACK	(3) Incidence
AXIAL	(2) Axially, Axis (3) Parallel
AXISYMMETRIC	(1) Axisymmetrical (2) Axisymmetrical, (3) Axial x Symmetric, Axial x Symmetrical, Axially x Symmetric, Axially x Symmetrical
BASE	(2) Based, Basic (3) Bottom, Undersurface, End
BASIC	(1) Fundamental (2) Base, Based
BEAM	
BEHAVIOUR	(3) Process, Action
BEHIND	(3) Back, Rearward
BENDING	(1) Flexure (2) Bend (3) Deflection
BETWEEN	(3) Mid
BIOT	
BLADE	(1) Vane (2) Blading
BLASIUS	
BLAST	(3) Explosion, Detonation, Gust
BLOCKAGE	(2) Block, Blocking (3) Choking, Stagnation
BLOWING	(2) Blower, Blown
BLUFF	(3) Blunt

BLUNT	(1) Blunted (2) Blunted, Blunting, Bluntness (3) Blunted, Bluff, Rounded
BLUNTED	(1) Blunt (2) Blunt, Blunting, Bluntness (3) Rounded, Bluff
BLUNTNESS	(2) Blunt, Blunted, Blunting (3) Blunt, Blunted, Blunting, Bluff, Round, Rounded, Roundness
BOATTAIL	(2) Boattailed, Boattailing
BODY	(3) Surface, Structure, Fuselage
BOOM	
BOUNDARY	(2) Bound, Bounded, Bounding (3) Threshold, Bound, Limit, Limiting, Onset, Start, Starting, Appearance, Beginning
BOW	(2) Bowing (3) Ahead, Front, Forward, Forebody
BREATHING	(3) Pulse
BUCKLING	(2) Buckle, Buckled
BUFFET	(2) Buffeting (3) Buffeting, Oscillation
BUZZ	(3) Single x Degree x Freedom x Flutter
CALCULATED	(2) Calculating, Calculation, Calculus (3) Estimate, Estimation, Prediction, Assessment
CALCULATING	(2) Calculated, Calculation, Calculus (3) Computation, Determination, Solution, Quantitative x Measurement, Formula , Estimate, Estimation, Prediction, Assessment
CALCULATION	(1) Computation (2) Calculated, Calculating, Calculus (3) Determination, Solution, Quantitative x Measurement, Formula , Estimate, Estimation, Prediction, Assessment
CALIBRATION	(2) Calibrated
CAMBERED	(2) Camber (3) Camber
CAPACITY	(2) Capacitance
CARRYING	(1) Supporting (3) Loaded, Exposed, Subjected
CASCADE	(3) Lattice
CENTRE	(1) Middle (2) Central, Centrally, Centred (3) Central
CESSATION	(1) Stopping (3) Completion, Terminated, Braking, Arrest
CHANGE	(1) Alteration (2) Changing (3) Transition
CHANNEL	(1) Duct (3) Passage, Ducting
CHAPMAN	
CHARACTERISTIC	(1) Property (3) Quality, Nature
CHARGED	(1) Ionized (2) Charge, Charging (3) Dielectric
CHEMICAL	(2) Chemically
CHEMICALLY	(2) Chemical
CHOKED	(2) Choke, Choking
CHOKING	(2) Choke, Choked
CHORDWISE	(2) Chord, (3) Chord
CIRCULAR	(2) Circularity, Circling (3) Round
CIRCULARITY	(2) Circular, Circling (3) Roundness
CIRCUMFERENTIAL	(1) Peripheral
CLAMPED	(2) Clamping
CLASSICAL	(1) Conventional
CLOSED	(2) Closure
CLOSURE	(1) Seal (2) Closed
COAXIAL	(3) Concentric
COEFFICIENT	(3) Factor
COLLAPSE	(2) Collapsing
COLUMN	
COMBINATION	(2) Combined (3) System
COMBUSTION	(1) Burning (2) Combustible
COMPARISON	
COMPONENT	(3) Element, Part
COMPOSITE	(2) Composed, Composition (3) Complex
COMPRESSED	(2) Compressibility, Compressible, Compressing, Compression, Compressive, Compressor, Compressively
COMPRESSIBILITY	(2) Compressed, Compressible, Compressing, Compression, Compressive, Compressor, Compressively
COMPRESSIBLE	(2) Compressed, Compressibility, Compressing, Compression, Compressive, Compressor, Compressively (3) Subsonic, Transonic, Supersonic, Hypersonic
COMPRESSION	(2) Compressed, Compressibility, Compressible, Compressing, Compressive, Compressor, Compressively (3) External x Pressure, External x Load
COMPRESSIVE	(2) Compressed, Compressibility, Compressible, Compressing, Compression, Compressor, Compressively

COMPRESSOR	(1) Blower, Turbomachine (2) Compressed, Compressibility, Compressible, Compressing, Compression, Compressive, Compressively (3) Impeller, Pump
COMPUTATION	(1) Calculation (2) Computational, Compute, Computer (3) Derivation, Mathematical x Technique, Determination
COMPUTER	(2) Computation, Computational, Compute
CONCENTRATED	(2) Concentration
CONDITION	(1) State (3) Problem, Concept
CONDUCTION	(2) Conducting, Conductive, Conductivity, Conductor (3) Heat x Flow
CONDUCTIVITY	(2) Conducting, Conduction, Conductive, Conductor
CONE	(2) Coned, Conical, Conically (3) Conical x Body
CONFIGURATION	(3) Arrangement, System, Shape, Contour, Spatial x Distribution
CONICAL	(2) Cone, Coned, Conically (3) Quasi-Conical, Cone x Shaped
CONSTRUCTION	(3) Surface, Structure, Body
CONTAMINATION	(3) Foreign x Gas x Injection
CONTINUOUS	(2) Continuation, Continuity, Continuously, Continuum (3) Steady, Quasi-Steady
CONTINUOUSLY	(2) Continuation, Continuity, Continuous, Continuum (3) Constant, Steady, Continuous
CONTINUUM	(2) Continuation, Continuity, Continuous, Continuously (3) Steady x State
CONTOUR	(2) Contoured (3) Configuration, Profile, Geometry, Form, Shape
CONTRACTION	(2) Contracting (3) Reduction
CONTROL	(2) Controlled, Controlling (3) Guidance, Reduction, Limitation, Decreasing, Reduced, Decrement, Fall, Limiting, Minimisation, Minimising
CONVECTION	(2) Convected, Convecting, Convective
CONVECTIVE	(2) Convected, Convecting, Convection (3) Convection, Non-Radiating
CONVERGENT	(2) Convergence, Converging
COOLED	(2) Cool, Coolant, Cooler, Cooling (3) Insulated
COOLING	(2) Cool, Coolant, Cooled, Cooler (3) Insulation, Heat x Protection, Heat x Dissipation
COORDINATE	
CORE	(3) Kernal, Centre, Middle
CORNER	(2) Cornered
CORRECTION	(2) Corrective, Corrector (3) Modified, Revised, Evaluation, Assessment, Analysis
CORRELATION	(1) Relation, Relationship (2) Correlated, Correlator, Correlogram (3) Similarity, Similitude, Analogy, Analogue, Coupling.
CORRESPONDING	(3) Similar
CORRIDOR	(1) Passage (3) Path
CORRUGATED	(2) Corrugation
COUETTE	
COUPLED	(2) Couple, Coupling
CREEP	(2) Creeping (3) Plastic x Flow
CRITERION	(3) Parameter, Value, Factor, Requirement, Principle
CRITICAL	(3) Maximum
CROCCO	
CROSS	(2) Crossed, Crossing
CRUCIFORM	(3) Crossing, Crossed, Intersecting, Cross
CURRENT	
CURVATURE	(2) Curve, Curved (3) Arc, Subarc, Curve, Curved
CURVED	(2) Curvature, Curve (3) Arc, Round
CYLINDER	(2) Cylindrical (3) Drum, Cylindrical x Body, Cylindrical x Shell
CYLINDRICAL	(2) Cylinder (3) Tubular, Quasi-Cylindrical, Quasi-Cylinder
DAMAGE	
DAMPING	(2) Damped (3) Reduction, Decrease, Decreasing, Decrement, Reduced
DATA	(3) Result, Output, Statistics, Valve
DECELERATION	(2) Decelerating, (3) Decelerating, Braking, Speed x Reduction, Motion x Arrest
DEFLECTION	(1) Displacement (2) Deflect, Deflected, Deflecting (3) Deviation
DEFORMATION	(1) Strain (2) Deformable, Deformed, Deforming (3) Failure
DEGREE	
DELTA	(1) Triangular (3) Isosceles, Caret
DENSITY	(2) Dense
DERIVATION	(2) Derivative (3) Transformation
DERIVATIVE	(2) Derivation
DESIGN	
DETACHMENT	(2) Detached (3) Separation

DETECTION	(1) Finding (3) Determination, Deduction, Prediction, Observation, Investigation
DETERMINATION	(3) Estimation, Prediction, Finding
DEVELOPMENT	(2) Developable, Developed (3) Formation, Generation, Production, Growth
DEVIATION	(3) Variation, Fluctuation, Change, Deflection
DIAMETER	
DIFFERENCE	(1) Differential (2) Different, Differential, Differentially (3) Differing
DIFFERENT	(2) Difference, Differential, Differentially, Differing (3) Variable, Variation, Varying, Alteration, Change, Deviation
DIFFERENTIAL	(1) Difference (2) Difference, Different, Differentially (3) Differing
DIFFUSION	(2) Diffuse, Diffuser, Diffusivity (3) Joining, Merging, Merger, Merged, Exchange, Impinging, Impingement
DIGITAL	
DIMENSION	(2) Dimensional, Dimensionless
DIRECTION	(2) Direct, Directed, Directional (3) Inclination
DISCONTINUITY	(2) Discontinuous (3) Irregularity
DISPLACEMENT	(1) Deflection (2) Displaced
DISSOCIATED	(2) Dissociating, Dissociation
DISSOCIATION	(2) Dissociated, Dissociating (3) Breakdown, Decomposition
DISTANCE	(2) Distant
DISTRIBUTED	(1) Spread (2) Distribution
DISTRIBUTION	(2) Distributed (3) Field, Gradient, Differential, Fluctuation, Variation, Divergence, Profile, Slope, Load x Input
DISTURBANCE	(1) Perturbation (2) Disturbed, Disturbing (3) Instability, Unsteadiness, Nonequilibrium, Alteration, Change, Interference
DIVERGENCE	(2) Divergent, Diverging (3) Expansion
DOME	(1) Hemisphere
DOUBLE	
DOWNSTREAM	(3 Behind
DRAG	(3) Resistance
DRIVEN	(2) Drive, Driver, Driving (3) Forced
DUCT	(1) Channel (2) Ducted, Ducting (3) Passage, Ducting
DURATION	(2) During (3) Period, Time
DURING	(2) Duration
DYNAMIC	(2) Dynamically
EARTH	
EDGE	(2) Edged, Edgewise (3) Lip, Surface, End, Boundary
EFFECT	(2) Effective, Effectiveness (3) Influence, Phenomena, Action
ELASTIC	(1) Flexible (2) Elastically, Elasticity
ELASTICALLY	(1) Flexibly (2) Elastic, Elasticity
ELECTRON	(2) Electronic
ELECTRONIC	(2) Electron
ELEMENT	
ELLIPTIC	(1) Oval (2) Elliptical, Ellipticity
EMPIRICAL	(3) Experimental, Semi-Empirical, Measured
END	(2) Ended (3) Tip, Edge, Boundary
END PLATE	
ENDURANCE	(3) Strength, Load x Carrying x Capacity, Fatigue x Resistance
ENERGY	
ENGINE	(1) Motor (3) Power x Plant, Propulsion x System, Power Plant
ENSKOG	
ENTHALPY	(3) Heat x Content
ENTRANCE	(1) Inlet (2) Entering, Entry (3) Orifice, Intake
ENTRY	(2) Entering, Entrance (3) Re-entry, Re-entering, Entering, Entrance
ENVIRONMENT	(2) Environmental (3) Surrounding, Condition
EQUATION	(3) Expression, Operator
EQUILIBRIUM	(2) Equilibration, (3) Stability, Quasi-Equilibrium
ESTIMATE	(2) Estimation (3) Prediction, Assessment
ESTIMATION	(2) Estimate (3) Prediction, Assessment
EXACT	(3) Accurate
EXCITATION	(2) Excited, Exciting (3) Exciting, Generation, Production
EXCITED	(2) Excitation, Exciting (3) Generated
EXHAUST	(1) Discharge, Efflux, Emission (2) Exhausting (3) Outflow, Issuing, Leaving, Plume, Exhausting
EXIT	(1) Outlet (2) Exiting
EXPANSION	(2) Expanded, Expanding
EXPERIMENT	(2) Experimental (3) Measuring, Measurement, Test, Investigation, Testing

EXPERIMENTAL (2) Experiment (3) Empirical, Semi-empirical, Measured
EXPONENT (2) Exponential
EXPONENTIAL (2) Exponent
EXPOSED (3) Bare, Open, Loaded, Subjected
EXPRESSION (2) Expressible (3) Equation, Operator
EXTERNAL (1) Outer (2) Externally (3) Outboard, Peripheral
FACE (2) Faced, Facing (3) Surface
FACING (1) Opposite (2) Face, Faced
FACTOR (3) Constant, Variable, Criterion, Value, Function, Parameter
FAILING (2) Failure (3) Defect
FAILURE (2) Failing (3) Instability
FAST (1) Quick, Rapid
FATIGUE
FIELD (1) Region (3) Area, Domain, Regime
FIN (2) Finned (3) Stabilizer
FINDING (1) Detection (3) Estimation, Determination, Prediction
FINITE
FLAP (2) Flapping
FLAT (2) Flattening (3) Plane, Planar
FLEXIBILITY (1) Elasticity (2) Flexible, Flexibly, Flexural, Flexure
FLEXIBLE (1) Elastic (2) Flexibility, Flexibly, Flexural, Flexure (3) Flexural
FLIGHT (2) Flying (3) Flying, Fall, Falling
FLOW (1) Flux, Stream (2) Flowing (3) Motion, Lovement, Moving, Flowing
FLUID (2) Fluidized
FLUTTER (2) Fluttering
FLUX (1) Flow, Stream (3) Transfer
FLYING (2) Flight (3) Flight, Fall, Falling
FORCE (2) Forced, Forcible, Forcing (3) Load, Stress, Pressure, Loading
FORCED (2) Force, Forcible, Forcing
FOREBODY (1) Forepart, Foreplane (3) Nose, Cap, Bow, Head, Front, Leading x Edge
FORM (2) Formation, Formed (3) Shape
FORMULA (2) Formulation (3) Solution, Theory, Principle
FORWARD (3) Leading, Ahead
FREE (1) Independent, Uncoupled (2) Freedom, Freely (3) Without, Negative, Negatively, Ideal, Independence
FREEDOM (1) Independence (2) Free, Freely
FREON
FREQUENCY
FRICTION (2) Frictional (3) Resistance
FUNCTION
GAS (2) Gaseous
GASEOUS (2) Gas
GAUGE (1) Meter (3) Measurement
GENERAL (2) Generalized
GENERATED (1) Formed (2) Generating, Generation, Generator (3) Excited
GENERATORS (2) Generated, Generating, Generation
GEOMETRY (2) Geometric, Geometrical, Geometrically (3) Shape, Profile, Contour, Geometrical, Form, Proportion, Configuration
GIVEN (1) Assumed (3) Prescribed, Imposed
GRADIENT (1) Slope (2) Graded (3) Load, Input, Distribution, Field, Differential, Fluctuation, Exchange, Variation, Divergence, Profile
GRAPHICAL (3) Diagram
GROUND (3) Surface
GROWTH (3) Spread, Increase, Increased, Increasing, Increment, Rise, Jump, Amplification, Spreading,Expansion
GUIDANCE (2) Guide, Guided (3) Control
GUST (3) Air x Current, Air x Blast
HEAT (2) Heated, Heating, Heater, Hot (3) Thermal
HEATED (1) Hot (2) Heat, Heating, Heater, Hot (3) High x Temperature, Elevated x Temperature
HEATING (2) Heat, Heated, Heater, Hot (3) Heat x Input, Heat x Addition, Temperature x Rise
HEIGHT (2) High, Higher, Highly (3) Altitude
HELIUM
HEMISPHERE (1) Dome (2) Hemispheric, Hemispherical, Hemispherically
HIGH (2) Higher, Highly, Height (3) Large

HIGHLY	(2) High, Higher, Height (3) Fully, Entirely
HOMOGENOUS	
HOT	(1) Heated, (2) Heat, Heated, Heating, Heater (3) High x Temperature, Elevated x Temperature
HYDROSTATIC	(3) Stagnant, Stationary x Fluid, Static x Fluid, Dead x Air, Still x Air
HYPERSONIC	(3) Hypervelocity
HYPERVELOCITY	(3) Hypersonic x Flight, Hypersonic x Flow, Hypersonic x Speed, Ultra-High x Mach
IMPERFECTION	(1) Defect (2) Imperfect
INCIDENCE	(2) Incident (3) Attack
INCOMPRESSIBLE	(3) Subsonic, Subcritical
INCREASE	(2) Increased, Increasing (3) Increased, Increasing, Increment, Rise, Spread, Spreading, Growth, Jump, Amplification, Expansion
INCREMENTAL	(1) Additional (2) Increment (3) Increasing
INDUCED	(2) Inductance, Induction (3) Generated, Caused
INELASTIC	(1) Rigid, Unelastic
INFINITE	(2) Infinitely, Infinitesimal, Infinitesimally (3) Unbounded
INFLUENCE	(2) Effect, Phenomena, Action
INITIAL	(1) First (2) Initialed, Initially, Initiation (3) Starting
INJECTION	(2) Injectant, Injected, Injector (3) Addition
INNER	(1) Internal (3) Interior
INPUT	
INSTABILITY	(3) Failure
INSTANTANEOUS	(3) Sudden
INSTRUMENT	(2) Instrumentation (3) Device, Machine, Mechanism, Equipment, Apparatus
INSULATED	(1) Adiabatic, Nonconductive (2) Insulating, Insulation (3) Unheated, Recovery x Temperature x Distribution, Zero x Heat x Transfer
INTEGRAL	(2) Integrated, Integrating, Integration, Integrative
INTEGRATION	(2) Integral, Integrated, Integrating, Integrative, (3) Integral x Method
INTENSITY	(2) Intense (3) Strength, Level, Volume
INTERACTION	(2) Interacting (3) Interference, Interferential, Disturbance, Perturbation
INTERBLADE	
INTERFERENCE	(2) Interferential (3) Interaction, Interacting, Disturbance
INTERNAL	(1) Inner (2) Internally, (3) Interior
INTERVAL	(3) Gap
INVERSION	(2) Inverse, Inverted
INVESTIGATION	(1) Research, Study
INVISCID	(1) Non-viscous (3) Viscosity x Zero
IONIZED	(1) Charged (2) Ion, Ionization, Ionosphere
IRROTATIONAL	(1) Non-rotating (3) Potential
ISENTROPIC	(3) Constant x Entropy
ISOTHERMAL	(3) Constant x Temperature
ISOTROPIC	
ISSUING	(1) Exhausting, Leaving (3) Discharge, Emission, Efflux, Outflow
ITERATION	(2) Iterative (3) Iterative x Process, Finite x Difference x Method, Finite x Difference x Procedure, Finite x Difference x Solution
ITERATIVE	(1) Step-by-step (2) Iteration (3) Finite x Difference
JET	(3) Stream
JOULE	
JUNCTION	(3) Joint, Intersection
KELVIN	
KINETIC	(3) Dynamic, Motion
KINK	(2) Kinking (3) Deviation, Disturbance, Perturbation, Displacement, Deflection, Divergence
LABORATORY	
LAMINAR	(2) Laminarization (3) Smooth
LANGLEY	
LARGE	(3) High, Extensive, Large x Order, Large x Size
LAUNCH	(2) Launched (3) Takeoff, Propelled
LAW	(1) Rule, Principle (3) Hypothesis, Assumption
LAYER	(2) Layered (3) Flow, Stream, Region, Regime
LEADING	(2) Lead (3) Front
LEES	
LENGTH	(2) Lengthwise, Long (3) Span, Extent
LIFT	(2) Lifting
LIGHTWEIGHT	(1) Light
LINE	(2) Linear, Linearization, Linearized, Linearly, Liners (3) Point, Limit, Boundary
LIFTING	(2) Lift (3) Inclined

LINEAR	(1) One-Dimensional (2) Line, Linearization, Linearized, Linearly
LINEARIZED	(2) Line, Linear, Linearization, Linearly, Liners (3) One-Dimensional, Quasi-One-Dimensional
LIQUID	(2) Liquefaction (3) Fluid
LOAD	(1) Loading, Stress (2) Loaded (3) Airload, Force, Pressure
LOADED	(2) Load, Loading (3) Exposed, Subjected, Supporting, Carrying
LOADING	(1) Load, Stress (2) Loaded, Load (3) Airload, Force, Pressure
LOCAL	(2) Locally, Located, Location (3) Ambient, Surrounding, Area, Proximity, Vicinity
LOCATED	(2) Local, Locally, Location (3) Location, Position
LOCATION	(1) Position, Point, Station (2) Local, Locally, Located
LONG	(2) Length, Lengthwise (3) Elongated, Extended
LONGITUDINAL	(1) Lengthwise, Spanwise (2) Longitudinally
LOSS	(2) Losing (3) Transfer, Emission, Removal
LOW	(1) Reduced, Small (2) Lower, Lowest
LOWER	(2) Low, Lowest (3) Base, Bottom, Under
LUNAR	
LYAPUNOV	
MACH	
MACHINE	(3) Vehicle
MAGNETIC	
MAGNETOGASDYNAMIC	(1) Magnetoaerodynamic, Electrogasdynamic, (3) Magnetohydrodynamic, Magnetofluidmechanic, Hydromagnetic, Conducting x Magnetic x Fluid, Conducting x Magnetic x Flow
MAGNETOHYDRODYNAMIC	(1) Hydromagnetic, Magnetofluidmechanic (3) Magnetogasdynamic, Magneto-aerodynamic, Electrogasdynamic, Conducting x Magnetic, x Fluid, Conducting x Magnetic x Flow
MAGNITUDE	(1) Size (3) Amount, Quantity, Total Dimension
MAIN	(1) Major, Primary (3) First
MAINTENANCE	
MASS	(3) Inertia, Weight
MATCHING	(3) Integrating, Integration, Correlation
MATERIAL	(3) Medium
MATHEMATICAL	(3) Computational, Algebraic
MATRIX	(2) Matric
MAXIMUM	(2) Maxima (3) Complete, Extreme, Peak, Total
MAXWELL	(2) Maxwellian
MEASURED	(2) Measurement, Measuring (3) Measurement, Experiment, Experimental, Determination, Exact, Test, Testing
MEASURING	(2) Measured, Measurement (3) Measurement, Determination, Experiment, Test, Testing
MEASUREMENT	(2) Measured, Measuring (3) Measuring, Determination, Experiment, Test, Testing
MECHANICAL	(2) Mechanics, Mechanism
MECHANISM	(2) Mechanical, Mechanics (3) Action, Characteristic, Nature, Problem, Structure
MEDIUM	(3) Environment, Surrounding, Region, Atmosphere, Material
MEMBRANE	(3) Skin, Surface, Shell
MERGED	(1) Combined (2) Merger, Merging (3) Mixed, Integrated, Interacting
MERIDIONAL	(2) Meridian (3) Central, Centre, Centred, Midplane, Median, Axis, Bisector, Midpoint
METHANE	
METHOD	(1) Technique (3) Procedure, Treatment
MINIMISATION	(2) Minimizing, Minimum (3) Minimizing,Reduction, Limitation, Limiting, Removal
MISSILE	(1) Projectile (3) Rocket, Warhead
MIXING	(2) Mixed, Mixture (3) Diffusion, Joining, Merged, Merging, Merger, Exchange, Impinging, Impingement
MIXTURE	(2) Mixed, Mixing
MODE	(2) Modal (3) Type, Form, Shape, Method
MODEL	(3) Specimen, Idealized x Structure, Experiment, Test, Analysis, Theory, Hypothesis, Solution
MODERATE	(3) Low, Small, Reduced
MOLECULAR	(2) Mol, Molecule
MOMENT	(2) Momentary, Momentum (3) Aerodynamic x Influence x Coefficient
MOTION	(3) Moving, Movement, Travelling, Reaction, Reacting, Non-stationary
MOUNTED	(1) Supported (2) Mounting, (3) Support, Suspension, Supporting, Resting, Mounting

MOVING	(1) Non-Stationary, Travelling (2) Movable, Movement
MULTI	(1) Multiple
MULTISTAGE	(3) Multi, Multiple
NATURAL	(2) Nature (3) Self x Induced
NATURE	(2) Natural (3) Property, Characteristic, Quality
NAVIER	
NEARLY	(2) Near, Nearest (3) Near, Quasi, Semi
NEUTRAL	
NEWTONIAN	(2) Newton
NITROGEN	
NOISE	(3) Pressure x Fluctuation, Random x Pressure x Load, Acoustic x Disturbance
NON-CIRCULAR	(2) Non-Circulatory
NON-EQUILIBRIUM	(3) Frozen, Freezing, Instability, Unsteadiness
NON-LINEAR	(2) Non-Linearity
NON-STEADY	(1) Unsteady (3) Quasi-Unsteady, Variable, Varying, Fluctuating, Fluctuation, Variation, Discontinuous, Unsteadiness, Unsteadily, Time x Dependent, Alternating, Sinsusoidal
NON-UNIFORM	(1) Varying (2) Non-Uniformity, Non-Uniformly (3) Non-Linear, Variable, Differential
NON-VISCOUS	(1) Inviscid (3) Viscosity x Zero
NON-ZERO	(3) Non-Negative, Positive
NOSE	(2) Nosed (3) Cap, Head, Front, Forebody, Bow, Forepart, Foreplane, Leading x Edge
NOSED	(1) Headed, Capped (2) Nose
NOZZLE	(3) Duct, Tube, Pipe, Venturi, Orifice, Wind x Tunnel x Contraction
NORMAL	(2) Normally (3) Vertical, Perpendicular, Average, Mean
NUMERICAL	(2) Number
OFF	
OGEE	(2) Ogival, Ogive
OGIVE	(2) Ogee, Ogival (3) Gothic
ONE-DIMENSIONAL	(1) Linear (3) Linearized, Quasi-Onedimensional
ONSET	(3) Beginning, Appearance, Start
OPERATING	(2) Operation, Operational, Operator (3) Operation, Performance
OPTICAL	(3) Visual
OPTIMUM	(2) Optimal, Optimization (3) Ideal, Perfect, Appropriate
ORBIT	(1) Trajectory, Path (2) Orbital, Orbiting
ORDER	(2) Ordered
ORTHOTROPIC	
OSCILLATING	(1) Vibrating (2) Oscillation, Oscillator, Oscillatory (3) Vibrational, Oscillatory
OSCILLATION	(1) Vibration (2) Oscillating, Oscillator, Oscillatory
OSCILLATORY	(1) Vibratory (2) Oscillating, Oscillation, Oscillator, (3) Wavy, Sinsusoidal,
OUTER	(1) External (2) Outermost (3) Outboard, Peripheral, Outlet, Output, Outward
OUTSIDE	(3) External, Peripheral
OVAL	(1) Elliptic
PANEL	(3) Plate
PARAMETER	(3) Constant, Variable, Criterion, Value, Factor, Function
PART	(2) Partial, Partially, Partly (3) Component, Element
PARTIALLY	(1) Partly (2) Partial, Part (3) Part, Semi
PARTICLE	
PERFECT	(2) Perfectly (3) Simple, Ideal, Idealized, Simplified, Approximate, Model, Hypothetical, Pure
PERFORMANCE	(3) Operation, Operating
PERIODIC	(2) Period, Periodically, Periodicity
PERIPHERAL	(1) Circumferential
PHASE	(3) State
PHENOMENA	(2) Phenomenological (3) Effect, Characteristic
PHOTOELASTIC	
PITCH	(2) Pitching
PITOT	
PLANE	(2) Planar (3) Direction, Axis
PLANFORM	(3) Shape
PLASTIC	(2) Plasticity (3) Soft
PLATE	(2) Plating (3) Panel
POINT	(1) Location, Position, Station (2) Pointed, (3) Area
POLAR	(3) Curve

POSITION	(1) Location, Point, Station (2) Positioning
POTENTIAL	(3 Irrotational, Non-Rotating
PRACTICAL	(3) Real, Working, Imperfect, Non-Perfect
PREBUCKLING	(2) Prebuckled
PREDICTION	(3) Estimate, Estimation, Assessment, Determination, Calculation, Deduction
PRESENCE	(3) Ambient, Environment, Environmental, Surrounding, Proximity, Vicinity
PRESSURE	(2) Pressurisation, Pressurized (3) Load, Stress, Force, Loading
PRESSURIZED	(2) Pressure, Pressurization
PRIMARY	(1) Main, Major
PRINCIPLE	(1) Law, Rule (3) Theory, Theoretical, Hypothesis, Prediction, Assumption
PROBLEM	(3) Concept, Condition
PROCEDURE	(3) Method, Technique, Treatment
PRODUCT	(2) Production (3) Result
PRODUCTION	(1) Generation (2) Product (3) Propagation
PROFILE	(3) Distribution, Field, Gradient, Differential, Fluctuation, Variation, Divergence, Slope, Load x Input
PROGRAMME	(2) Programmed, Programming (3) Algorithm
PROPAGATION	(2) Propagating (3) Generation, Production, Originating, Source, Development, Spread, Radiation, Emission, Excitation
PROPELLER	(2) Propellant, Propelled
PROPERTY	(1) Characteristic (3) Quality, Nature
PROXIMITY	(3) Near, Close, Adjacent
PUMP	(3) Blower, Compressor
PURE	(3) Simple, Simplified, Ideal, Idealized, Approximate, Perfect, Model, Hypothetical
QUANTITATIVE	(2) Quantity
QUASI-CONICAL	
RADIUS	(2) Radial, Radially
RANGE	(3) Distance
RAREFACTION	(2) Rarefied (3) Free x Molecular x Flow, Rarefied x Fas x Flow, Semi-Rarefied x Gas x Flow, High x Altitude x Flow, Low x Density x Flow, Wall x Discontinuity x Velocity, Wall x Discontinuity x Temperature
RAREFIED	(2) Rarefaction (3) Semi-Rarefied, Free x Molecule, Free x Molecular
RATE	(3) Speed, Velocity
RATIO	
REACTING	(2) Reaction, Reactive, Reactor (3) Reactive, Active, Action, Activation, Activity
REACTION	(2) Reacting, Reactive, Reactor (3) Energy, Force, Action, Behaviour, Kinetic, Response
REAL	(3) Non-Perfect, Imperfect, True
RECTANGULAR	(2) Rectangle
REDUCTION	(2) Reduced (3) Reduced, Limitation, Limiting, Decreasing, Decrement, Fall, Control, Minimisation, Minimising
RE-ENTRY	(2) Re-entering, Re-Entrant (3) Re-Entering, Entry, Entering, Entrance
REFERENCE	(3) Characteristic
REFINEMENT	(3) Improvement
REFLECTION	(2) Reflected, Reflecting (3) Deflection
REGIME	(1) Domain
REGION	(1) Field (3) Area, Ambient, Regime, Local, Locally, Environment, Presence, Surrounding
REINFORCED	(3) Stiffened
RELATION	(1) Relationship, Correlation (2) Relative, Relatively, Relativistic, (3) Coupling
RELATIONSHIP	(1) Relation, Correlation (2) Relative, Relatively, Relativistic, Coupling
RELAXATION	(2) Relaxational, Relaxing
REQUIRED	(2) Requirement
RESEARCH	(1) Investigation, Study
RESERVOIR	(3) Storage x Vessel
RESPONSE	(3) Reaction
RESTRAINED	(2) Restraining, Restraint (3) Retarded, Controlled
RESTRAINT	(2) Restrained, Restraining (3) Constraint
RESULT	(2) Resultant, Resulting (3) Data, Output, Statistics, Value
RETURN	(3) Descent, Descending, Deceleration, Approach, Homing
REVOLUTION	(1) Rotation
REYNOLDS	
RING	(3) Annular, Round, Rounded

RISE (3) Increase, Increment
ROCKET (3) Missile, Projectile
ROLLING (2) Roll, Rolled
ROUGHNESS (2) Rough (3) Irregularity
ROUND (2) Rounded, Rounding, Roundness (3) Rounded, Blunt, Convex, Semi-circular, Circular, Circularity, Curved, Curvature
ROW (3) Series
RUNNING (3) Operation
SANDWICH (1) Multilayer, Laminate, Stratiform, (3) Lamination
SATELLITE
SCALE (2) Scaling (3) Size, Dimension, Area
SECOND (2) Secondary (3) Two
SECTION (2) Sectional, Sector, Sectorial (3) Segment, Plane, Sector
SECTOR (2) Section, Sectional, Sectorial (3) Section, Plane, Segment
SELF
SEMIVERTEX (3) Top, Head, Crest, Apex, Crown, Cap, Semi-Vertex, Vertex
SENSITIVITY (2) Sensor
SEPARATED (2) Separating, Separation (3) Free, Detached
SEPARATION (2) Separated, Separating (3) Detachment
SERIES (3) Row, Line, Bank
SHALLOW (2) Shallowness
SHAPE (2) Shaped (3) Configuration, Profile, Contour, Geometry, Form
SHARP (2) Sharpness (3) Intermediate
SHEAR (2) Sheared, Shearing (3) Shearing, Longitudinal x Velocity x Gradient
SHEARING (2) Shear, Sheared (3) Shear, Longitudinal x Velocity x Gradient
SHEET (3) Layer, Path, Core, Line, Trail, Field, Street
SHELL
SHOCK (2) Shocking (3) Blast
SHORT (2) Shortening
SHROUD (2) Shrouded
SIDE (2) Sided, Sidedness
SIDESLIP (3) Cross x Load
SIMILAR (2) Similarity, Similitude
SIMILARITY (2) Similar, Similitude (3) Similitude, Correlation, Analogy, Analogue
SIMILITUDE (2) Similar, Similarity (3) Similarity, Correlation, Analogue, Analogy
SIMPLE (1) Simplified, Simplification (2) Simply, Simplified (3) Idealised, Approximate, Perfect, Model, Hypothetical, Ideal, Pure
SIMPLIFIED (1) Simple (2) Simplification, Simply, Simple (3) Idealised, Approximate, Perfect, Model, Hypothetical, Ideal, Pure
SIMPLY (2) Simple, Simplification, Simplified
SIMULATION (2) Simulated, Simulating, Simulator (3) Analogy
SINGLE (2) Singly, Singular, Singularity (3) One
SINUSOIDAL (2) Sinsusoidally, Sine
SIZE (1) Magnitude (3) Dimension
SKIN (3) Membrane, Surface, Shell
SLAB
SLENDER (1) Thin (2) Slenderness (3) Narrow
SLIP
SLIPSTREAM (3) Downwash, Wake, Vortex, Trail, Afterflow
SMALL (1) Low, Reduced (3) Infinitesimal, Infinitesimally, Vanishing, Minimum, Slightly, Negligible
SMOOTH (2) Smoothing, Smoothness (3) Polished
SOFT (3) Plastic
SOLID
SOLUTION (3) Result, Equation, Procedure, Expression
SONIC (2) Sound, Sounding (3) Sound x Speed, Sound x Velocity
SOUND (1) Acoustic (2) Sounding, Sonic
SPACECRAFT (1) Spaceship (3) Space x Vehicle
SPAN (2) Spanning, Spanwise (3) Length, Extent
SPANWISE (1) Longitudinal, Lengthwise (2) Span, Spanning, (3) Longitudinally
SPECIES (2) Specific
SPECIFIC (2) Species (3) Exact, Particular
SPEED (1) Velocity (3) Flow, Flight, Stream, Mach
SPHERE (2) Spherical, Spherically, Spheroid (3) Spheroid, Spherical x Body
SPHERICAL (2) Sphere, Spherically, Spheroid
SPLIT (2) Splitter
SQUARE

STABILITY	(2) Stabilization, Stabilized, Stabilizer, Stabilizing, Stable (3) Equilibrium, Quasi-Equilibrium
STABILIZATION	(2) Stability, Stabilized, Stabilizer, Stabilizing, Stable (3) Stability, Stabilizing, Control, Equilibrium
STABILIZER	(2) Stability, Stabilization, Stabilized, Stabilizing, Stable (3) Fin
STABILIZING	(2) Stability, Stabilization, Stabilized, Stabilizer, Stable (3) Stability, Stabilization, Control, Equilibrium
STABLE	(2) Stability, Stabilization, Stabilized, Stabilizer, Stabilizing (3) Equilibrium, Steady
STAGE	(3) Blading, Blade x Row, Blade x Set
STAGNATION	(2) Stagnant (3) Stationary x Flow, Zero x Velocity
STALLING	(2) Stall, Stalled (3) Flow x Reversal
STANDARD	(3) Normal
STANDOFF	(3) Detachment
STATE	(1) Condition (3) Problem, Concept
STATIC	(2) Statically
STATISTICS	(2) Statistical (3) Result, Data, Output, Value
STEADY	(3) Quasi-Steady, Continuous, Stable, Invariant, Time x Independent
STIFFENED	(2) Stiffener, Stiffening, Stiffness (3) Reinforced
STIFFENER	(2) Stiffened, Stiffening, Stiffness (3) Stiffening
STIFFNESS	(2) Stiffened, Stiffener, Stiffening (3) Rigidity
STING	
STOKES	
STOL	(3) Vtol
STRAIGHT	(2) Straightness (3) Rectilinear
STRAIN	(1) Deformation
STREAM	(1) Flow, Flux
STRENGTH	(2) Strong (3) Intensity, Endurance, Load x Carrying x Capacity, Fatigue x Resistance
STRESS	(1) Load, Loading (2) Stressed, Stressing (3) Strain, Concentrated x Force
STRONG	(2) Strength (3) Intense, Severe
STRUCTURAL	(2) Structure
STRUCTURE	(2) Structural (3) System, Nature, Construction, State, Body, Surface
STUDY	(1) Investigation, Research
SUBJECTED	(2) Subject (3) Bare, Open, Loaded, Exposed
SUBSONIC	(3) Subcritical, Incompressible
SUCTION	
SUDDEN	(3) Rapid, Instantaneous, Fast, Quick
SUPERSONIC	(2) Supersonically (3) Supercritical, High x Speed
SUPPORTED	(1) Mounted (2) Support, Supporting
SURFACE	(2) Surfaced (3) Face, Structure, Body
SURGE	(3) Instability, Unsteadiness, Pressure x Rise
SUSTAINED	(2) Sustaining (3) Supported
SWEPT	(2) Sweep (3) Sweptback
SWEPTBACK	(2) Sweepback (3) Swept
SYMMETRIC	(1) Symmetrical (2) Symmetrical, Symmetrically, Symmetry (3) Regular, Uniform, Steady
SYMMETRICAL	(1) Symmetric (2) Symmetrically, Symmetry, (3) Regular x Shape
SYSTEM	(2) Systematic
TABLE	(3) Chart, Tabulation
TAPERED	(1) Pointed (2) Taper
TECHNIQUE	(1) Method (3) Process, Operation, Procedure
TEMPERATURE	(3) Heat
TEST	(2) Testing (3) Experiment, Measurement
THEORETICAL	(2) Theory (3) Perfect, Ideal, Model
THEORY	(2) Theoretical (3) Theoretical, Hypothesis, Prediction, Assumption, Principle, Law, Rule
THERMAL	(1) Thermodynamic (2) Thermally, (3) Heat
THERMOCHEMICAL	
THERMODYNAMIC	(1) Thermal (3) Heat
THICK	(1) Nonslender (2) Thickened, Thickening, Thickness (3) Broad, Not x Slender, Not x Thin
THICKNESS	(2) Thick, Thickened, Thickening
THIN	(1) Slender (3) Narrow
THREE	
THREE-DIMENSIONAL	(2) Three-Dimensionality
THROAT	(3) Contraction, Contracting x Section, Convergent x Duct

THRUST	(3) Boost, Resultant x Jet x Force
TILT	(2) Tilting
TIME	(2) Timewise (3) Period, Duration
TORISPHERICAL	
TRAILING	(2) Trail (3) Rear, Aft
TRANSFER	(2) Transferred (3) Flow, Flux, Exchange, Transport
TRANSFORMATION	(2) Transform, Transformed (3) Transform, Transformed, Conversion
TRANSIENT	(3) Discontinuous, Random
TRANSITION	(2) Transit, Transitional (3) Change, Breakdown x Laminar x Flow
TRANSITIONAL	(2) Transit, Transition (3) Changing, Breakdown x Laminar x Flow
TRANSONIC	(3) High x Subsonic
TRANSPIRATION	(3) Sweat
TRANSPORT	(3) Distribution, Carrying
TRANSVERSE	(1) Lateral (2) Transversality, Transversely, (3) Chord,Chordwise
TREATMENT	(3) Method, Technique, Procedure
TRIANGULAR	(1) Delta (2) Triangle (3) Isosceles, Caret
TRUE	(3) Accurate, Exact, Real, Perfect, Accuracy
TUBE	(1) Pipe, Tubing (2) Tubular, (3) Head, Probe, Hollow x Cylinder, Hollow x Body, Tubular x Body
TUMBLING	(3) Falling, Plunging, Sinking, Diving
TUNNEL	(3) Tube
TURBULENCE	(2) Turbulent (3) Mixing, Eddy, Velocity x Fluctuation
TURBULENT	(2) Turbulence
TWO-DIMENSIONAL	(2) Two-Dimension (3) Two-Dimension
UNDEREXPANDED	(2) Underexpansion (3) Expanded
UNIFORM	(2) Uniformity, Uniformly (3) Regular
UNIFORMLY	(2) Uniform, Uniformity
UNSTEADY	(1) Non-Steady (2) Unsteadily, Unsteadiness, (3) Alternating, Sinusoidal, Time x Dependent, Quasi-Unsteady, Variable, Varying, Fluctuating, Fluctuation, Variation, Discontinuous, Unsteadily, Unsteadiness
UNSTIFFENED	(3) Flexible, Elastic, Stiffener x Zero, Stiffness x Zero
UPWASH	(1) Upflow (3) Upload
USE	(3) Value, Applicability, Application
VALUE	(2) Valued (3) Data, Output, Result, Statistics
VARIABLE	(2) Variation, Variational, Varying (3) Variation, Varying, Different, Alteration, Change, Deviation
VARIATION	(2) Variable, Variational, Varying (3) Variable, Varying, Different, Differing, Change, Changing, Alteration, Fluctuation, Fluctuating, Deviation
VARIATIONAL	(2) Variable, Variation, Varying
VARYING	(1) Non-Uniform (2) Variable, Variation, Variational
VECTOR	(3) Direction
VEHICLE	(3) Machine, Ship
VELOCITY	(1) Speed (3) Flow, Flight, Stream, Mach
VERTICAL	(2) Vertex (3) Perpendicular, Normal
VERY	(3) Highly
VESSEL	
VIBRATION	(1) Oscillation (2) Vibrating, Vibrational, Vibrationally, Vibratory
VIBRATIONAL	(2) Vibrating, Vibration, Vibrationally, Vibratory (3) Vibrating, Oscillating, Oscillatory
VISCOELASTIC	(2 Viscoelasticity
VISCOSITY	(2) Viscous, Viscid (3) Internal x Friction
VISCOUS	(1) Viscid (2) Viscosity
VISUALISATION	(2) Visual (3) Flow x Survey, Visual x Flow x Investigation
VORTEX	(1) Eddy (2) Vortical, Vorticity (3) Swirl, Spiral, Spiralling x Fluid, Vorticity x Layer, Rotational x Flow, Rotational x Fluid
VORTICITY	(2) Vortex, Vortical (3) Rotation, Spiral, Swirl
VTOL	(3) Stol
WAKE	(1) Afterflow, (3) Trail
WALL	(2) Walled (3) Boundary, Bound, Limit
WALLED	(2) Wall (3) Bounded, Enclosed
WATER	
WAVE	(2) Waviness, Wavy
WEDGE	(3) Triangular, Ramp
WEIGHT	(2) Weighting
WIDTH	(2) Wide, Widely (3) Thickness

WIND	(2) Windward
WING	(2) Winged
WITHOUT	(3) Absence
YAW	(2) Yawed, Yawing
YAWED	(2) Yaw, Yawing
YIELD	(2) Yielding
ZERO	(3) Negative, Negligible, Without, Absence

APPENDIX 5.3

SINGLE TERM HIERARCHIES

The schedules list single terms only, and include all the terms used in indexing the 1,400 documents, with the exception of the proper names.
The single terms are in natural uncontrolled language, and different verbal forms of a word often appear in different places.
Notation is purely ordinal and in no way reflects the relations between the terms represented.
Plus signs indicate synonyms.
Superordinate, subordinate and coordinate relations are shown by indentation.
These hierarchies represent an attempt to interpret hierarchical linkage as an obligatory recall device, that is, an original vocabulary is reduced by condensing species into containing genera, and no option is left in searching. Three stages of reduction are shown in the columns on the right of each page.
Further information on these hierarchies is given on pages 69-73

Summary of main sections

A1 Particles
A15 Materials; fuels, metals, non-metals, aggregates.
B68 State and form of matter
C1 Astronomical and geophysical phenomena
C30 Constructs and structures
C32 Vehicle: aircraft, missiles
D2 Parts: aerofoils, control surfaces.
D40 Structural systems, parts and elements
E1 By shape: bodies
E56 Machines, engines, auxiliary systems
F1 Machine components
F80 Apparatus, equipment: wind tunnels, instruments
H1 Spatial relations; portion, position, direction, shape, dimension, arrangement
N1 Temporal relations: duration, periodicity, rate.
N40 Flying operations, processes, properties.
Oa Aerodynamics
O1 Flow; types, by speed etc.
O64 Flow elements and phenomena, streamlines, vortices, jets, waves.
Q100 Flow attributes: viscosity, forces, loads, stagnation, wake.
P30 Aeroelasticity
P42 Aerodynamic reference parameters; attitude, planform, section etc.
P70 Mechanics
P84 Kinematics
Q32 Force
R1 Behaviour of deformable bodies
R91 Vibration, wave phenomena
S23 Thermodynamic behaviour and properties
S77 Physical-chemical processes
T14 General processes, activities, operations, change (of composition, state, location, direction, dimension, etc.)
U59 Technical operations and processes
U85 Research
V1 Experiment
V30 Mathematical operations
Wa Common properties
X30 Properties of processes (e.g. incipient, continuous, erratic)
X108 General relations
Y40 Abstract concepts, form.

		First Reduction	Second Reduction	Third Reduction
A1	Particles	1	1/8a	1/8a
A3	Electron + Beta	3/4		
A4	Proton			
A5	Atom	5/6		
A6	Isotope			
A7	Ion	7		
A8	Molecule	8/8a		
A8a	Mol			
	(Structure)			
A8b	Atomic	8b/14	8b/14	8b/14
A8c	Molecular			
A8d	Bimolecular			
A9	Homonuclear			
A9a	Nuclear			
A10	Monatomic			
A11	Diatomic			
A12	Polyatomic			
A13	Polymer			
A14	Polycrystalline			
A15	Matter + Material	15	15	15/19a
	(By use)			
A16	Pigment	16	16 + 19	+ 27/35
A17	Lacquer	17/18	17/18	
A18	Phosphorescent			
A19	Ink	19		
A19a	Injectant	19a	19a	
A20	Fuel	20/24	20/24	20/26
A21	Methane			
A22	Ethylene			
A23	Hydrocarbon			
A24	Methanol			
A26	Propellant	26	26	
A27	Explosive	27/28	27/28	
A28	TNT			
A30	Coolant	30	30	
A31	Lubricant	31	31	
A32	Refractory	32	32	
A32a	Oxidizer	32a	32a	
	(By origin)			
A34	Electrodeposit	34/35	34/35	
A35	Electroformed			
	(By constitution)	38/39a	38/39a	38/56
A38	Metal		+48/56	+66/68
A39	Alloy			
A39a	Bimetallic			
A40	Aluminium	40/43	40/43	
A41	Duralumin			
A42	Alcoa			
A43	Alclad			
A44	Nickel	44/47	44/47	
A45	Inconel			
A46	Nimonic			
A47	Rex			
A48	Brass	48		
A49	Copper	49		
A50	Zinc	50		
A51	Titanium	51		
A52	Lead	52		
A53	Magnesium	53		
A54	Molybdenum	54		
A55	Tungsten	55		
A56	Chromium	56		
A57	Ferrous	57	57/65	57/65
A58	Iron	58		
A58a	Gamma	58a		
A59	Steel	59/65		
A60	Mild			
A61	Decarburized			
A61a	Columbium			
A62	Sicromo 2			
A63	Timken			
A64	Stainless			
A65	SAE			
A66	Mercury	66	66/68	
A67	Potassium	67		
A68	Sodium	68		

		First Reduction	Second Reduction	Third Reduction
	[Metal]			
	[Sodium]			
	(Non-metal)			
A70	Carbon	70	70/71	70/75
A71	Graphite	71		
A72	Silica	72/75	72/75	
A73	Fused			
A74	Quartz			
A75	Foamed			
	(Gas)			
A76	Hydrogen	76	76 + 81/84	76/87
A77	Helium	77/80	+ 87	
A78	Argon		77/80	
A79	Krypton			
A80	Xenon			
A81	Iodine	81		
A82	Nitrogen	82/84		
A83	Nitric (oxide)			
A84	Nitrons (oxide)			
A85	Oxygen	85	85	
A86	Freon	86	86	
	(Natural materials)			
B1	Wood	1/5	1/5	1/6b
B2	Balsa			
B3	Plywood			
B4	Spruce			
B5	Pine			
B6	Oil	6	6/6b	
B6a	Rubber	6a		
B6b	Paper	6b		
B8	Glycerine	8	8/9	8/23
B9	Hexachlorethane	9		
B9a	Inorganic (compounds)	9a	9a + 18/23	
B10	Water	10	10/11	
B11	Steam	11		
B12	Air	12/13	12/13	
B13	Seeded			
B14	Salt	14/17	14/17	
B14a	Carbonate			
B15	Chloride			
B16	Iodide			
B17	Tetrachloride			
B18	Amonium	18		
B19	Monoxide	19		
B20	Dioxide	20		
B21	Silicate	21		
B23	Fluorochemical	23		
B24	Ceramic	24	24	24/28
B25	Glass	25/26	25/26	
B26	Glassy			
B27	Fibre	27/28	27/28	
B28	Fibrous			
	(Plastics)			
B30	Nylon	30	30/33+37/38	30/59
B31	Melamine	31	+46/50+55/59	
B32	Cellulose	32/33		
B33	Acetate			
B34	Resin	34	34/36	
B35	Epoxy	35	+39/45a	
B36	Polyester	36		
	(Polyester (plastics))			
B37	Mylar	37		
B38	Paraplex	38		
B39	Phenolic (resins)	39/45a		
B40	Bakelite			
B41	Formica			
B42	Asbestos			
B43	Raybestos			
B44	Refrasil			
B45	Astrolite			
B45a	Thermold J.			
	(Methyl methacrylates)			
B46	Perspex	46/48		
B47	Plexiglass			
B48	Lucite			
B49	Teflon	49		
B50	Polystyrene	50		
	(Reinforced plastics)			
B51	Fibreglass	51/54	51/54	
B52	Cincinnati Testing Laboratory Material			

		First Reduction	Second Reduction	Third Reduction
	[Resin]			
	[Reinforced plastics]			
	[Cincinnati-Testing-Laboratory-Material]			
B53	Papreg			
B54	Compreg			
B55	Castolite	55		
B56	Haveg-Rocketon	56		
B57	Hysol	57		
B58	Lexam	58		
B59	Lockfoam	59		
	(Ground: aggregates by particle size)			
B60	Sod	60/67	60/67	60/67
B63	Sand			
B64	Gravel			
B65	Dirt			
B66	Dust			
B67	Debris			
	(State and form of matter)			
B68	State + Condition	68/68a	68/68a	68/87
B68a	Phase			
B69	Solid	69/69a	69/69a	
B69a	Crystal			
B70	Non solid	70	70	
B71	Fluid	71/72	71/72	
B71a	Liquid			
B72	Moisture			
B73	Gas + Gaseous	73/74	73/74	
B74	Vapour			
B75	Rarified	75	75/76	
B75a	Semi-rarified	75a		
B76	Vacuum	76		
B77	Film	77	77	
B78	Bubble	78	78	
B81	Foam	81/83	81/83	
B82	Suspension			
B83	Smoke			
B85	Grain	85	85	
B87	Plasma	87	87	
	(Astronomical and Geophysical phenomena)			
C1	Astrophysics	1/2	1/4	1/4
C2	Space			
C3	Interplanetary	3		
C4	Luni-solar	4		
C5	Sun + Solar	5	5	5
C6	Planet+Planetary (Non-terrestrial)	6/11	6/13	6/13
C8	Venus			
C9	Mars + Martian			
C10	Jupiter			
C11	Saturn			
C12	Meteor	12/13		
C13	Meteorite + Meteroid			
C14	Earth	14	14	14/15
C15	Moon + Lunar	15	15	
C16	Atmosphere + Atmospheric	16/17	16/18+21/23a	16/23a
C17	Equational			
C18	Ionosphere	18		
	(Atmospheric phenomena)			
C19	Wind	19/20	19/20	
C20	Gust			
C21	Cloud	21/23a		
C22	Snow			
C23	Fog			
C23a	Ice			
C24	Ground	24		
C25	Sea	25		
	(Constructs and Structures)			
C30	Bridge	30	30/31	30/31
C31	Chimney	31		
C32	Vehicle	32	32	32
C33	Ship + Marine + Maritime	33	33	33
C34	Hovercraft	34/35	34/35	34/35
C35	Saunders-Roe SRN1			
C36	Aircraft + Airplane	36/36a	36/36a	36/41+53/58
C36a	Aeronautical (vehicle)			
C38	Non-lifting	38	38	
C39	Winged	39	39/40	
C40	Wingless	40		
C41	Finned	41	41	
C42	Civil	42/44a	42/44a	42/52

		First Reduction	Second Reduction	Third Reduction
	[Vehicle]			
	[Aircraft]			
	[Civil]			
C43	Airliner			
C44	Caracelle			
	(Military)			
C45	Bomber			
C46	Fighter			
C47	F-100			
C48	Boulton-Paul (Delta PIII)			
C49	X-15			
C50	B47A			
C51	Avro (707A)			
C52	P8U3			
	(Winged)			
C53	Monoplane	53/55	53/56	
C54	Parasol			
C55	Fairchild 22			
C56	Biplane	56		
C57	Tailless	57	57/58	
C58	Canard	58		
	(Aircraft)			
C59	Helicopter	59	59	59
C60	STOL	60	60	60/66
C61	VTOL	61/66	61/66	
C62	Curtiss-Wright			
C63	Bell			
C64	Doak			
C65	Vertol			
C66	Hiller			
C66a	Glider	66a	66a	66a
C67	Spacecraft + Spaceship	67+69/71	67+69/72	67/89
C68	Manned	68	68	
C69	Centaur			
C70	Able			
C71	X-15			
C72	Capsule	72		
C73	Launch (vehicle)	73	73	
C74	Satellite	74/81	74/81	
C75	Fuelling			
C76	Midas			
C77	Atlas			
C78	Explorer			
C79	Sputnik			
C80	Vanguard			
C81	Discoverer			
C82	Missile + Projectile	82/83	82/89	
C83	Ballistic			
C84	Guided	84/85		
C85	Homing			
C86	IRBM	86		
C87	ICBM	87		
C88	Titan	88		
C89	Probe	89		
	(Parts of aircraft)			
D2	Airframe	2	2	2+32/38
D3	Airfoil	3	3 + 11	3/11
D4	Wing	4/6	4/6	
D5	Winglike			
D6	Nonweiler			
D7	Tail	7/9	7/9	
D8	Slabtail			
D9	Tailplane			
D11	Foreplane	11		
	(Control surfaces)			
D12	Aileron	12	12	12/13a
D15	Rudder	15	15	
D16	Elevator	16/17	16/17	
D17	Geared			
D18	Elevon	18	18+22	
D19	Flap	19/21a	19/21a	
D20	Split			
D21	Thwaites			
D21a	Programmed (flap)			

		First Reduction	Second Reduction	Third Reduction
	[Programmed (flap)]			
D22	Horn	22		
D23	Slat	23/24	23/24	
D24	Slot			
D25	Tab	25	25	
D26	Spoiler	26/27	26/27	
D27	Bang-bang			
D28	Stabilizer	28+30/31	28/31a	
D29	Fin	29		
D30	Recoverable			
D31	Non-recoverable	31a		
D31a	Mass balanced			
D32	Fuselage	32/33	32/33+38	
D33	Cabin			
D34	Nacelle	34	34	
D35	Cowling	35/36	35/36	
D36	Spinner			
D37	Shield	37	37	
D38	Store	38		
	(Structural systems, parts and elements) (System)			
D40	Structure	40+57a	40/42	40/57b
D41	Built-up	41	+45/46	
D42	Reinforced	42	+54/57b	
D43	Stratiform + Laminate + Sandwich	43/44	43/44	
D43a	Lamination +Multilayer			
D43b	Layered			
D43c	Multilayered			
D44	Multiply			
D45	Honeycomb	45		
D47	Cellular	47/48	47/48	
D48	Multicell			
D50	Multiweb	50/51	50/51	
D51	MW-1			
D52	Bay	52/53	52/53	
D53	Multibay			
D54	Multirib	54		
D55	Multispar	55		
D56	Monocoque	56		
D57	Monolithic	57		
D57a	Boxtype 1	57a		
D57b	Geodetic	57b		
	(By core condition)			
D58	Hollow	58/61	58/61	58/61
D59	Filled			
D60	Pressurized			
D61	Unpressurized			
	(Structural Parts)			
D63	Deck	63	63	63/74a
D64	Doors	64/65a	64/66	
D65	Windows			
D65a	Pane			
D66	Roof	66		
D68	Stringer	68/70a	68/73	
D69	Bulkhead			
D70	Frame			
D70a	Framework			
D71	Spar	71/72		
D71a	Shaft			
D72	Rib			
D73	Web	73		
D74	Fairing	74	74	
D74a	Flange 9	74a	74a	
	(Structural elements)			
D74b	Filler	74b	74b/77	74b/82
D75	Support	75/77	+80/82	
D76	Mounting			
D77	Stand			
D78	Attachment	78	78	
D80	Ramp	80		
D81	Step	81		
D82	Loop	82		
D83	Sheet	83	83	83/88
D84	Plate			
D84a	Endplate	84/84a	84/84a	
D85	Panel	85/86	85/87	
D86	Handley-Page			
D87	Slab	87		
D88	Shell	88	88	

		First Reduction	Second Reduction	Third Reduction
	[Shell]			
D89	Bar	89/93	89/96	89/96
D90	Wire			
D91	Woven			
D92	Rod			
D93	Coupon			
D94	Strip	94/96		
D95	Ribbon			
D96	Band			
D97	Hoop	97	97/100	97/100
D99	Stiffening (ring)	99		
D100	Stiffener	100/100a		
D100a	Backing			
D101	Beam	101/102	101/102	101/105
D102	Cantilever			
D103	Strut	103/104	103/104	
D104	Column	105	105	
D105	Truss			
	(Structures characterized mainly by shape)			
E1	Bodies	1/4+23/26	1/4+23/26	1/4+22/26
E3	Block			
E4	Box			
	(Body of revolution)			
E6	Cylinder	6/6a+9	6/6a+10	6/21
E6a	Quasi-cylinder			
E7	Tube + Pipe + Tubing	7/8	7/8	
E9	Drum			
E10	Disc	10		
E11	Cone	11/13	11/13	
E12	Frustum			
E13	Spike			
E14	Sphere	14/15	14/16	
E15	Ball			
E16	Hemisphere + Dome	16		
E17	Ellipsoid	17/18	17/18	
E18	Semi-ellipsoid			
E19	Ogive	19	19	
E20	Torus	20	20	
E21	Paraboloid	21	21	
E22	Boattail	22	22	
E23	Maikapar			
E24	Thor-Able			
E25	Sears-Haack			
E26	Yo-Yo			
	(Structures by edge, support and junction)			
E27	Clamped	27	27/29	27/42
E27a	Jointed	27a/29		
E28	Pinned			
E29	Pinjointed			
E30	Hinged	30	30/31	
E31	Tilting	31		
E32	Flanged	32/32a	32/32a	
E32a	Unflanged			
E33	Free-free	33/34b	33/34a	
E33a	Unloaded			
E34	Loose			
E34a	Floating			
E34b	Adjustable			
E35	Fixed	35	35/38	
E36	Rigid + Inelastic + Unelastic	36/38	+42	
E36a	Inexorable			
E36b	Rigidly			
E36c	Binding			
E36d	Prescribed			
E36e	Non-elastic			
E37	Semi-rigid			
E38	Stiffened			
E39	Unstiffened	39	39	
E40	Supported + Mounted	40/41	40/41	
E40a	Hooped			
E40b	Framed			
E41	Cantilevered			
E42	Clamshell	42		
	(Structures by various other principles)			
E43	Segmented	43/44a	43/44a	43/51
E44	Sectorial			
E44a	Lobed			
E45	Faced	45/46b	45/46a	
E46	Surfaced			

		First Reduction	Second Reduction	Third Reduction
	[Surfaced]			
E46a	Sided			
E46b	Cornered			
E46c	Edged	46c		
E47	Covered	47/49	47/49	
E48	Shielded			
E48a	Walled			
E49	Ducted			
E51	Stressed	51	51	
E56	Machine + Mechanism* + Plant*	56/57	56/59	56/73a
E57	Mechanism			
E58	Plant	58/59		
E59	Power Plant			
E60	Engine + Motor	60	60	
	(Gas turbine)			
E61	Turbojet	61/62	61/62	
E62	Propulsive (jet)			
	(Direct combustion)			
E63	Rocket	63/69	63/69+73a	
E64	Midcourse			
E65	Retrorocket			
E66	Sounding (rocket)			
E68	Sail (i.e. solar sail)			
E69	Magnetoplasma			
E70	Reactor	70/73	70/73	
E71	Fission			
E72	Fusion			
E73	Nuclear			
E73a	Booster 2	73a		
	(Auxiliary systems)			
E74	Compressor + Blower + Turbomachine	74/76	74/76+79	74/80
E75	Jumo			
E76	Multistage			
E77	Fan	77	77	
E79	Pump	79		
E80	Turbine	80	80	
E82	Exchanger (i.e. Heat exchanger)	82	82/84	82/88+96
E83	Cooler	83/84		
E84	Aftercooler			
E85	Generator	85	85	
E86	Convertor	86	86	
E88	Gyroscope	88	88	
	(Control systems)			
E89	Servo	89/91	89/91	89/91
E90	Relay			
E91	Autopilot			
E92	Weapon	93/94	92/94	92/94
E94	Warhead			
E96	Oscillator	96		
	[Machine components]			
	(Fixed)			
F1	Baffle	1/3	1/3+5/6	1/7
F1a	Foil			
F2	Screen			
F3	Grid			
F4	Cascade	4	4	
F5	Diaphragm	5		
F6	Filter	6		
F7	Stator	7	7	
	(Reciprocating)			
F8	Piston	8	8	8/13a
	(Rotating)			
F10	Rotor	10/13a	10/13a	
F12	Propeller			
F12a	Multipropeller			
F13	Shank			
F13a	Shaft			
	(Parts of compressor)			
F15	Impeller	15	15	15/22a
F16	Stage	16/18	16/18	
F17	Stacking			
F18	Uprating			
F19	Hub	19	19	
F20	Overhang (Section)	20	20	
F21	Blade + Blading + Vane	21/22a	21/22a	
F21a	Guide			
F22	Splitter			
F22a	Multiblade			
F24	Gear	24	24+27/30	24/30b
F26	Decoupling	26	26	
F27	Bearing	27/29		

		First Reduction	Second Reduction	Third Reduction
	[Bearing]			
F28	Journal			
F29	Slider			
F30	Pivot	30	30	
F30a	Crank	30a/30b	30a/30b	
F30b	Flywheel			
	(Container)			
F32	Cover	32/32b	32/39a	32/39a
F32a	Shroud			
F32b	Sheath			
F33	Tank	33/37		
F34	Receiver			
F35	Vessel			
F36	Reservoir			
F37	Unfired			
F38	Chamber	38/39a		
F39	Plenum			
F39a	Can			
F40	Seal + Closure	40/42	40/42	40/45
F41	Plug			
F42	Cap			
F43	Valve	43	43/43a	
F44	Spring	44/45	44/45	
F45	Belleville			
F46	Joint	46/47	46/53	46/53
F46a	Bond			
F47	Fit			
F48	Rivet	48/49b		
F49	Bolt			
F49a	Pin			
F49b	Screw			
	Flexible			
F50	Hinge	50		
F51	Bellows (Joint)	51/52		
F52	Omega (Expansion joint)			
F53	Knuckle	53		
F54	Passage + Corridor	54	54	54/72
F55	Capillary	55	55	
F57	Entrance + Inlet	57/60	57/62	
F58	Opening			
F59	Orifice			
F60	Intake			
F61	Scoop	61/62		
F62	Sugar			
F63	Outlet + Exit	63	63	
F64	Channel + Duct + Ducting	64/65	64/65	
F65	Interblade			
F66	Diffuser	66/67	66/67	
F67	Vaneless			
F68	Nozzle	68/71a	68/71a	
F69	Overexpanding			
F70	Laval			
F71	Contoured			
F72	Venturi	72	72	
F73	Injector	73	73	73/79
F74	Ejector	74	74	
F75	Afterburner	75	75	
F76	Muffler + Silencer	76/77	76/77	
F77	Wideangle			
F78	Throttle	78/79	78/79	
F79	Accelerator			
F80	Apparatus + Equipment + Facility* + Device*	80/81	80/81	80/81+83/83b
F80a	Facility			
F80b	Device			
F81	Laboratory			
F82	Test + Testing (equipment)	82	82	82+84/91
F83	Model	83/83b	83/83b	
F83a	Shrouded			
F83b	Non-separating (model)			
F84	(Wind) Tunnel	84+89/91	84/91	
F85	Blowdown	85		
F87	Tailored	87		
F88	Gun			
F89	NPL			
F90	Ames			
F91	ARA			
	(Parts and components of wind tunnel)			
G2	Settling (chamber)	2	2/7a+12/12a	1/15
G4	Driver (gas) + Driving (gas)	4		

		First Reduction	Second Reduction	Third Reduction
	[Driver (gas) + Driving (gas)]	4		
G5	Heater	5/6		
G6	Drier			
G7	Evacuator	7		
G7a	Barrel	7a		
	(Wall)			
G8	Sidewall	8/9	8/9	
G9	Liner			
G12	Cell	12/12a		
G12a	Dashpots			
	(Model support)			
G13	Sting	13/15	13/15	
G15	Jack			
G17	Instrument + Instrumentation*	17/18+22/22a	17/18+22/22a	17/23
G17a	Instrumentation	+41a+52/53	+41a+52/53	+41a
G18	Accelerometer			+52/53
G20	Radiator	20	20	
G21	Ribbon (Vibrating)	21	21	
G22	Indicator			
G22a	Sensor			
G23	Corrector	23	23	
G24	Measuring	24	24	24/34a
G25	Gauge + Meter	25/29a	25/34a	+41
G26	Extensometer			
G27	Manometer			
G28	Piezometer			
G29	Thermocouple			
G29a	Pickup			
G30	Flowmeter	30/32a		
G30a	Pitot (tubes)			
G31	Pitometer			
G32	Anenometer			
G32a	Potentiometer			
G33	Dampometer			
G34	Theodolite	34/34a		
G34a	Kinetheodolite			
G35	Optical	35	35/40	35/40
G36	Photographic	36/40		
G36a	Photograph			
G37	Camera			
G38	Photomultiplier			
G39	Television			
G40	(Motion) Picture			
G41	Interferometer	41	41	
G41a	Pendulum	41a		
	[Electric, Electronic equipment]			
G42a	Circuitry	42a + 51	42/46	42/51a
G43	Antenna	43	+51/51a	
G44	Radar	44		
G45	Microphone	45		
G46	Cyclotron	46		
G47	Cathode (ray tube)	47		
G48	Oscilloscope	48/49		
G49	Oscillograph			
G51	Conductor			
G51a	Radiotrajectograph			
G52	Transducer			
G52a	Pickup			
G53	Multiplier			
	(Spatial relations of parts)			
H1	Portion	1/2a	1/2a	1/10
H2	Whole			
H2a	All			
H3	Part	3/6	3/6+8/10	
H4	Component			
H5	Element			
H5a	Sample			
H5b	Specimen			
H5c	Piece			
H6	Factor			
H8	Fraction	8/10		
H9	Half			
H10	Quarter			
H11	Section	11/12	11/12	11/14
H12	Slice			
H13	Sector	13	13/14	
H14	Segment	14		
	(By Position)			
	(Vertical plane)			
H16	Top	16+19/22	16/22	16/26a
H17	Apex + Vortex	17/18a		
H18	Semi apex			

		First Reduction	Second Reduction	Third Reduction
	[Semi apex]			
H18a	Semi vertex			
H19	Head			
H20	Crest			
H21	Crown			
H22	Peak			
H23	Bottom	23+25/26a	23+25/26a	
H24	Base	24	24	
H25	Bed			
H26	Foundation			
H26a	Foot			
	(Longitudinal plane)			
H27	Front	27	27/29	27/35a
H28	Forepart + Forebody + Foreplane	28		
H29	Bow	29		
H30	Nose	30	30	
H31	Back	31+33/34	31/34	
H32	Afterbody	32		
H33	Rear			
H34	Aft			
	(Lateral plane)			
H35	Side	35/35a	35/35a	
H35a	Sidedress			
	(Outer)			
H36	Face	36	36 + 39	36/42
H37	Surface	37/38	37/38	
H38	Undersurface			
H39	Interface	39		
H40	Skin	40	40/41a	
H41	Membrane	41/41a		
H41a	Envelope			
H42	Wall	42	42	
H43	Layer	43	43/42	43/47
H44	Sublayer	44		
	(Inner)			
H45	Interior	45/47	45/47	
H46	Core			
H47	Kernel			
	(Extremity)			
H48	End	48	48	48/56
H50	Tip	50	50	
H52	Edge	52/54	52/54	
H53	Rim			
H54	Lip			
H55	Leg	55	55/56	
H56	Stem	56		
	(Prominence)			
H57	Projection	57	57/65	57/65
H58	Protuberance	58/65		
H59	Excrescence			
H60	Pimple			
H61	Ridge			
H62	Corrugation			
H62a	Heap			
H63	Teeth			
H64	Bump			
H65	Lobe			
H65a	Obstacle			
H66	Depression	66/68	66/68	
H67	Notch			
H68	Crack			
H68a	Groove			
H69	Hole + Perforation*	69/73	69/73	
H70	Perforation			
H71	Gap			
H72	Cavity			
H73	Cutout			
	(Connections)			
H74	Corner	74/77+80a	74/77+80a	74/80a
H77	Kink			
H78	Neck	78	78/79	
H79	Throat	79	80	
H80	Knee	80/80a		
H80a	Waist			

		First Reduction	Second Reduction	Third Reduction
	[Spatial relations]			
H95	Spatial	95+1/5	95 + 15	95 + 1/10
J1	Environment			
J1a	Presence			
J1b	Situation			
J2	Environmental			
J3	Ambient			
J4	Surrounding			
J5	About			
	(With similar conditions)			
J6	Regime + Domain	6+9/10	6/10	
J8	Belt	8		
J9	Region + Field			
J10	Zone			
J11	Position + Location + Point + Station	11/11a +83/83b	11/15 +83/83b	11/18 +80/83b
J11a	Located			
J12	Local			
J13	Locally			
J14	Positioning			
J15	Spot	15		
J16	Line	16	16	
J17	Plane	17/18	17/18	
J18	Plateau			
J20	Path + Orbit + Trajectory	20/21+23	20/21+23	20/25
J22	Circuit	22	22	
J23	Course			
J24	Apogee	24	24/25	
J25	Perigee	25		
	(By proximity, distance)			
J25a	Isolated	25a	25a	25a/3b
J25b	Alone			
J26	Proximity	26	26+29	
J27	Contact	27/28a	27/28a	
J27a	Tangency			
J28	Adjacent			
J28a	Wetted			
J29	Vicinity	29		
J30	Near	30/34	30/34	
J31	Nearest			
J32	Nearly			
J33	Close			
J34	Closely			
J34a	Distant	34a/35	34a/35	
J35	Far			
J36	Off	36	36	
	(In vertical plane)			
J37	Level	37	37	37/46
J38	Altitude	38	38	
J38a	Over	38a/40	38a/40	
J39	Above			
J40	Upper			
J41	Below	41/42a	41/42a	
J42	Lower			
J42a	Lowest			
J43	Under	43/46	43/46	
J44	Submerged			
J45	Underwater			
J46	Buried			
	(In horizontal plane)			
J47	Ahead	47	47/48	47/50
J48	Leading	48		
J49	Behind	49/49a	49/50	
J49a	Following			

		First Reduction	Second Reduction	Third Reduction
	[Following]			
J50	Trailing	50		
	(By Centrality)			
J51	Central	51/54	51/55	51/73
J51a	Centrally			
J51b	Centred			
J52	Middle + Centre			
J52a	Mid			
J53	Midpoint			
J54	Midplane			
J56	Axis	56/56a		
J56a	Centreline			
J57	Bisector	57		
J58	Median	58		
J59	Inboard	59	59+61	
J60	Peripheral + Circumferential	60/60a	60/60a	
J60a	Fringe			
J61	Outboard	61		
J62	Outermost	62/64	62/64	
J63	Extremal			
J64	Beyond			
J65	Inner + Internal	65/66a	65/66a	
J65a	In			
J66	Internally			
J66a	Within			
J67	External + Outer	67/68a	67/68a	
J68	Externally			
J68a	Outside			
J70	Boundary	70	70	
J71	Bound	71/73	71/73	
J72	Margin			
J73	Limit			
J74	Between	74/75d	74/75d	74/79
J75	Interstage			
J75a	Interangular			
J75c	Intermolecular			
J75d	Intramolecular			
J76	Intersection	76/77	76/79	
J77	Junction			
J78	Node	78/79		
J79	Nodal			
	[Terrestrial]			
J80	Latitude	80	80	
J81	Meridian	81/81a	81/81a	
J81a	Meridional			
J83	New Mexico			
J83a	France			
J83b	U.K.			
	(Directional relations)			
J84	Direction	84/85	84/89a	84/89a
J85	Orientation			
J86	Directional	86/89a		
J87	Unidirectional			
J88	Direct			
J89	Indirect			
J89a	Non-direct			
J90	Angle	90/91a+93	90/91a+93	90/93
J91	Incidence			
J91a	Attack			
J92	Slope + Gradient	92		
J93	Setting			
J94	Axial + Axially*	94/94a	94/97b	94/102
J94a	Axially			
J95	Coaxial	95/97a		
J96	Uniaxial			
J97	Multi axial			
J97a	Polyaxial			
J97b	Unaxial	97b		
J98	Radial	98/98a	98/98a	
J98a	Radially			
J99	Centrifugal	99	99/100	
J100	Centripetal	100		
J101	Rotary	101/102	101/102	
J102	Clockwise			
K1	Lateral + Transverse + Laterally*	1/2d	1/2d	1/5d
K2	Chordwise + Transversely*			
K2a	Spanning			

		First Reduction	Second Reduction	Third Reduction
	[Spanning]			
K2b	Laterally			
K2c	Transversely			
K2d	Across			
K3	Longitudinal + Lengthwise + Spanwise	3/4	3/4	
K4	Longitudinally			
K5	Edgewise	5/5a	5/5a	
K5a	Along			
K6	Forward	6/7	6/7	6/11
K7	Towards			
K8	Backward	8/9	8/9	
K9	Rearward			
K10	Reverse	10/11	10/11	
K11	Counter			
K12	Up	12	12/14	12/24
K13	Down	13/14		
K14	Incoming	14/16	14/17a	
K15	Inward			
K16	Into			
K17	Outward	17/17a		
K17a	Onto			
K18	Through	18	18	
K19	Tangential	19	19	
K20	Streamwise	20	20/22	
K21	Upstream	21		
K22	Downstream	22		
K23	Leeward	23/24	23/24	
K24	Windward			
K27	Shape	27/30	27/30	27/30
K28	Geometry+Geometrical*+Geometrically*			
K28a	Geometrical			
K28b	Geometrically			
K29	Form			
K29a	Mode			
K30	Shaped			
K30a	Symmetry	30a/32	30a/32	30a/34b
K31	Symmetrical + Symmetric			
K32	Symmetrically			
K33	Axisymmetric + Axisymmetrical	33	33	
K34	Antisymmetric + Antisymmetrical + Asymmetric + Asymmetrical + Non-Symmetric	34/34a	34/34b	
K34a	Unsymmetrical			
K34b	Non-axisymmetric+Non-axisymmetrical	34b		
	(3-dimensional)			
K35	Non-rotational	35/37	35/37	35/38
K35a	Octahedral			
K36	Prismatic			
K37	Pryamidal			
K38	Wedge	38	38	
K39	Revolution + Rotation	39	39/41	39/64
K41	Rotationally	41		
K42	Cylindrical	42/43	42/44	
K43	Tubular			
K44	Quasi-cylindrical	44		
K45	Conical + Coned + Conically*	45/45a	45/45b	
K45a	Conically			
K46	Quasi-conical	46		
K47	Spiked	47	47	
K48	Toriconical	48	48+59+63	
K49	Helix	49/51	49/51	
K50	Helical			
K51	Spiral			
K52	Spherical	52/53	52/53	
K53	Spherically			
K54	Spheroid	54/57	54/57	
K55	Oblate			
K56	Oblateness			
K57	Prolate			
K58	Hemispherical + Hemispheric	58/58b	58/58b	
K58b	Hemispherically			
K59	Torispherical	59		
K60	Ellipsoidal	60/61	60/61	
K61	Semi-ellipsoidal			
K62	Ogival	62	62	
K63	Toroidal	63		
K64	Paraboloidal	64	64	
	(By extremities, edge condition)			
K65	Pointed + Tapered			

		First Reduction	Second Reduction	Third Reduction
	[Pointed + Tapered]	65+68/69	65+68/69	65/86
K66	Crisp	66/67	66/67	
K67	Crisped			
K68	Taper			
K69	Tapering			
K70	Sharp + Sharpness*	70/71	70/71	
K70a	Sharpness			
K71	Abrupt			
K73	Blunt + Blunted + Bluntness*	73/75	73/75	
K74	Bluntness			
K75	Bluff			
K76	Untapered	76/77	76/77	
K77	Unblunted			
K78	Hammerhead	78	78+83	
K79	Round	79/80	79/80	
K79a	Roundness			
K80	Rounded			
K81	Out-of-roundness	81	81	
K83	Headed + Nosed + Capped	82	82	
K83a	Based	83		
K84	Boattailed	83a	83a	
K85	Boattailing	84/85	84/85	
K86	Bevelled	86	86	
K87	Cut	87/90	87/90	87/99
K88	Cropped			
K89	Clipped			
K90	Truncated			
K91	Non-truncated	91	91	
K92	Drooped	92	92	
K93	Extended	93/99	93/99	
K94	Elongated			
K95	Flare			
K96	Flared			
K97	Skirt			
K98	Skirted			
K99	Stretched			
	(2-dimensional)			
L1	Profile	1/3	1/3	1/3
L2	Contour			
L4	Rectilinear	4	4+15/19	4/28
L5	Swept	5	5/9	
L6	Sweptback	6/7		
L8	Sweptforward	8/9		
L10	Unswept	10	10	
L11	Triangular + Delta + Triangle*	11/12	11/12	
L11a	Triangle			
L12	Caret			
L13	Rectangular	13/14	13/14	
L13a	Rectangle			
L14	Square			
L15	Rhombic	15		
L16	Sextic	16		
L17	Trapezoidal	17		
L18	Diamond	18		
L19	Arrow	19		
L20	Polygon	20"24	20/24	
L21	Polygonal			
L22	Hexagonal			
L23	Octagonal			
L24	Dodecagonal			
L25	Equilateral	25/26	25/26	
L26	Isosceles			
L27	Cruciform	27/28	27/28	
L28	Cross			
L28a	Curvilinear	28a/31	28a/31	28a/51
L29	Circular			
L29a	Quasi-circular			
L30	Circularity			
L31	Supercircular			
L32	Non-circular	32	32	
L33	Annular	33/35	33/35	
L34	Annulus			
L35	Ring			
L36	Horseshoe	36	36/37	
L37	Concave	37		
L38	Convex	38/40b	38/40b	
L39	Biconvex			
L40	Lenticular			
L40a	Cambered			
L40b	Uncambered			
L41	Fusiform	41	41	
L42	Oval + Elliptic	42/45	42/45	
L43	Ellipse			

		First Reduction	Second Reduction	Third Reduction
	[2-dimensional]			
	[Curvilinear]			
	[Ellipse]			
L44	Elliptical			
L45	Ellipticity			
L45a	Ogee	45a/45b	45a/45b	
L45b	Gothic			
L46	Parabola	46/47	46/47	
L47	Parabolic			
L48	Hyperbola	48/49	48/49	
L49	Hyperbolic			
L50	Hypelliptic	50	50	
L51	Semi-circular	51	51	
	[Letter]			
L52	I	52/56	52/56	52/56
L52a	T			
L54	V			
L55	W			
L55a	Z			
L56	Lamda			
L56a	Theta			
	[One-dimensional]			
L57	Straight	57/58	57/60	57/72
L58	Straightness			
L60	Out-of-straightness	60		
L61	Curved + Curve* + Curvature*	61/63	61/66a	
L62	Curve			
L63	Curvative			
L64	Arc	64/65		
L65	Subarc			
L66	Sinusoidal	66/66a		
L66a	Sinusoidally			
L67	Bent + Bend*	67/68	67/72	
L68	Bend			
L69	Angular	69/72		
L69a	Angled			
L69b	Angularly			
L70	Orthogonal			
L71	Orthogonally			
L72	Orthogonality			
	(Surface features)			
L73	Flat	73/76	73/76	73/84a
L75	Planar			
L76	Co-planar			
L77	Non-planar	77	77	
L78	Smooth	78	78	
L79	Rough + Roughness*	79/80	79/80	
L80	Roughness			
L81	Corrugated	81/82c	81/82c	
L82	Wavy			
L82a	Wrinkled			
L82b	Unwrinkled			
L82c	Waviness			
L83	Slotted	83/84a	83/84a	
L84	Perforated			
L84a	Drilled			
	(Cross section area)			
L85	Convergent	85	85	85/86
L86	Divergent	86	86	
	(Dimension)			
L87	Dimension	87	87/91	87/91
L88	Magnitude + Size	88/91		
L89	Amplitude			
L90	Bulk			
L91	Scale			
L92	Length	92/93	92/93	92/100c
L92a	Inch			
L93	Distance			
L94	Slenderness	94	94/95+100c	
L95	Thickness	95+100c		
L96	Height	96	96/97	
L97	Depth	97		
L98	Perimeter	98/99	98/99	
L99	Circumference			
L100	Radius	100/100b	100/100b	
L100a	Bore			
L100b	Diameter			
L100c	Width			
L101	Area	101/102a	101/102a	101/102a
L102	Extent			

		First Reduction	Second Reduction	Third Reduction
	[Extent]			
L102a	Extensive			
L103	Volume	103/103a	103/103a	103/103a
L103a	Volumetric			
L104	Mass	104	104/106a	104/107
L105	Weight	105/106a		
L106a	Pound			
L107	Density	107	107	
	[Dimensions (spatial)]			
M8a	Moderate	8a/9	8a/9	8a/12
M9	Medium	10/11	10/12	
M10	Large			
M11	Super			
M12	Macroscopic	12		
M13	Long	13	13	13/14
M14	Short	14	14	
M15	Slender + Thin	15/16	15/17	15/20
M16	Narrow			
M17	Not-so-thin + Not-so-slender	17		
M18	Thick + Non-Slender	18	18/20	
M19	Wide	19/20		
M19a	Widely			
M20	Broad			
	[Dimensions]			
M26	Deep	26	26	
M27	Shallow	27/27a	27/27a	
M27a	Shallowness			
	[Spatial relations]			
	[Arrangement]			
M73a	Horizontal	73a	73a	73a/85
M74	Non-inclined	74	74	
M75	Vertical	75/76c	75/76c	
M76	Perpendicular			
M76a	Perpendicularly			
M76b	Normal			
M76c	Right			
M77	Inclined + Inclination*	77/78	77/78+82/84a	
M78	Inclination			
M79	Oblique	79/81	79/81	
M80	Skew			
M81	Skewed			
M82	Sloped	82/84a		
M83	Canted			
M84	Steep			
M84a	Steepest			
M85	Inverted	85	85	
M86	Lattice	86/87b	86/87b	86/88
M87	Mesh			
M87a	Network			
M87b	Chessboard			
M88	Crossed	88	88	
M90	Opposite + Facing	90/91	90/91	90/94a
M91	Opposed			
M92	Parallel	92	92	
M93	Asymptotic	93/94	93/94a	
M93a	Asymptote			
M93b	Asymptotically			

		First Reduction	Second Reduction	Third Reduction
	[Spatial relations]			
	[Arrangement]			
	[Asymptotically]			
M94	Pre-asymptotic			
M94a	Non-parallel	94a		
M95	Series	95/95a	95/95a	95/108
M95a	Cycle		+100/102	
M96	Spaced	96/97	96/97	
M97	Spacing			
M98	Stagger	98/99b	98/99b	
M99	Staggered			
M99a	Staggering			
M99b	Stepwise			
M100	Row	100/102		
M101	Bank			
M102	Rake			
M103	Sequential	103	103	
M104	Aligned	104/105	104/108a	
M105	Alignment			
M106	Misaligned	106/107		
M107	Misalignment			
M108	Non-aligned	108/108a		
M108a	Crookedness			
M109	Closed	109/110	109/110	109/116
M110	Enclosed			
M111	Bounded	111/112	111/112	
M112	Bounding			
M113	Open	113/115	113/116	
M114	Exposed			
M115	Bare			
M116	Unbounded	116		
M117	Concentric	117	117	117/120a
M118	Heliocentric	118/119	118/119	
M119	Planetcentric			
M120	Eccentric	120/120a	120/120a	
M120a	Eccentrically			
	(Temporal relations)			
N1	Time + Timewise	1	1/5	1/15
N2	Duration	2/5		
N2a	During			
N2b	Running			
N3	History			
N3a	Historical			
N4	Life			
N5	Lifetime			
N6	Period	6	6/13b	6/15a
N7	Millesecond	7		
N8	Day	8/9		
N9	Diurnal			
N10	Night	10/11		
N11	Nocturnal			
N12	Season	12/13		
N13	Seasonal			
N13b	Interval	13b		
N14	Permanent	14	14	
N15	Transient			
N15a	Momentary	15/15a	15/15a	
N16	Periodic	16/19	16/22	16/24
N17	Periodically			
N18	Periodicity			
N19	Intermittent			
N20	Isochronous	20/20a		
N20a	Isochrone			
N21	Cyclic	21		
N22	Successive	22		
N23	Simultaneous	23/24	23/24	
N24	Simultaneously			
N25	Rate	25	25	25/33
N26	Frequency	26	26	
N27	Slow	27/28a	27/33	
N27a	Slowly			
N28	Retarded			
N28a	Gradual			
N29	Fast + Quick + Rapid	29/30		
N30	Accelerated			
N31	Sudden	31/33		
N32	Immediately			
N33	Instantaneous			
N34	Delay	34/35	34/35	34/35
N35	Lag			
N36	After	36/37	36/38	36/38

		First Reduction	Second Reduction	Third Reduction
	[After]			
N37	Post			
N38	Prior	38		
	[Flying operations]			
N40	Performance	40+42/46	40/46	40/51
N41	Range	+50/51	+50/51	+62/63
N42	Reliability	41		
N43	Holding			
N44	Handling			
N45	Airspeed			
N46	Payload			
N47	Propulsion		47/49	
N48	Thrust	48	+62/63	
N49	Boost			
N50	Consumption (of fuel)			
N51	Expenditure (of power)			
	[Flying operations, processes]			
N52	Flight + Flying	52/55	52/55	52/55
N54	Voyage			
N55	Mission			
N56	Orbital (trajectory)	56/58	56/61	56/61
N57	Orbiting			
N58	Re-orbit			
N59	Semi-ballistic (trajectory)	59		
N60	Skip (trajectory)	60/61		
N61	Skipping			
N62	Powered			
N63	Unpowered			
N64	Taxiing	64/68	64/68	64/74
N65	Take-off			
N66	Boosting			
N67	Traversal			
N68	Traversing			
N69	Ascent	69/71	69/72	
N70	Ascending			
N71	Climb			
N72	Zoom			
N73	Escape (from a force field, e.g. gravity)	73/74	73/74	
N74	Capture (by a force field, e.g. gravity)			
N75	Cruising	75/76	75/76	75/99
N76	Cruise			
N77	Manoeuvres + Manoeuvring*	77/77a	77/82+87	
N77a	Manoeuvring	+80/82	+98/101	
N78	Hovering	78/79		
N79	Hover			
N80	Turn			
N82	Circling			
N83	Roll	83/84	83/84	
N84	Rolling			
N85	Yaw	85/86	85/86	
N86	Yawing			
N87	Non-yawing	87		
N88	Pitch	88/89	88/89	
N89	Pitching			
N90	Diving	90/95	90/97	
N91	Plunging			
N92	Tumbling			
N93	Falling			
N94	Fall			
N95	Sinking			
N96	Heaving	96/97		
N97	Heave			
N98	Spin	98		
N99	Sideslip	99		
N102	Return	102	102+113/117a	102/117a
N103	Descending	103/105	103/107	
N104	Descent			
N105	Glide			
N106	Braking	106/107		
N107	Graze			
N108	Entry	108/112	108/112	
N109	Entering			
N110	Re-entry			
N111	Re-entering			
N113	Approach	113/114		
N114	Approaching			
N115	Landing	115/117a		

		First Reduction	Second Reduction	Third Reduction
	[Landing]	115/117a		
N116	Overshoot			
N117	Undershoot			
N117a	Miss			
	(Miscellaneous activities)			
N118	Navigation	118/119	118/119	118/119
N119	Piloting			
N120	Guidance (of space vehicles)	120/122	120/122	120/122
N121	Telemetry			
N122	Telemetering			
	(Agents)			
N123	Human	123/124a	123/124a	123/124a
N124	Pilot			
N124a	Operator			
	(Properties of flight, agents of flight)			
N125	Vision	125/126	125/129	125/129
N126	Visibility			
N127	Tolerance (to acceleration)	127/129		
N128	Hazard			
N129	Safety			
0a	Aerodynamics	0a/0b	0a/0b	0a/02
0b	Aerodynamically			+28/28b
01	Flow + Stream + Flux +Airflow* + Airstream* + Flowing*	1/2+28a/28b	1/2+28a/28b	+32/34a
01a	Airflow			
01b	Airstream			
02	Flowing			
	(By speed)			
03	Subsonic	3/4	3/4	3/4
04	Subcritical			
05	Sonic	5	5	5/13
06	Transonic	6	6	
07	Supersonic	7/9	7/9	
08	Supersonically			
010	Hypersonic	10/13	10/13	
011	Hypervelocity			
012	Supersatellite			
013	Superfast			
	(By viscosity effects)			
014	Frictionless	14/15	14/15	14/15
015	Inviscid + Non-viscous			+24/25
016	Viscous + Viscid	16/17	16/17	16/21
017	Creeping (motion regime)			
018	Laminar	18/19	18/19	
019	Non-turbulent			
020	Transitional	20	20	
021	Turbulent	21	21	
	(By degree of vorticity)			
022	Rotational	22	22	22
024	Irrotational + Non-rotating	24/25	24/25	
025	Potential			
028	Isobaric	28/28b	28/28b	
028	Slug			
028b	Mound			
	(Regimes - by density conditions, etc.)			
029	Slip	29	29/31	29/31
030	Continuum	30		
031	Collision	31		
032	Expanded	32/34a	32/34a	
033	Overexpanded			
033a	Over-expansion			
034	Under expanded			
034a	Underexpansion			
035	Separated	35 + 37	35/38	35/38
036	Unseparated	36 + 38		
036a	Reattached			
037	Stalled			
038	Unstalled			
039	Incompressible	39	39	39/40
040	Compressible	40	40	

[Flow elements and phenomena]

[Boundary layer - Processes and operations]

		First Reduction	Second Reduction	Third Reduction
	[Boundary layer - Processes and operations]			
041	Laminarization	41+43/45a	41+43/45a	41/46a
042	Transition	42	42	
043	Breakdown			
044	Bloweff			
045	Tripped			
045a	Initiation			
046	Separation	46	46	
046a	Reattaching	46a/46b	46a/46b	
046b	Reattachment (B.L. Control)			
047	Thickening	47/50+53	47/53	47/53
048	Avoidance			
049	Inhibition			
050	Retardation			
051	Promotion	51/52a		
052	Trip			
052a	Tripping			
053	Re-establishment			
054	Promoters (of transition)	54/63	54/63	54/63
055	Sandpaper			
056	Carborundum			
057	Bead			
058	Ballotini			
059	Deposit			
059a	Deposited (dirt, etc.)			
060	Insect			
061	Fruitfly			
062	Drosophila			
063	Housefly			
	[Flow elements]			
064	Streamline	64/67	64/68	64/68
065	Cocurrent			
066	Filament			
067	Dividing			
068	Streamtube	68		
069	Supply (stream)	69+72/73a	69+72/73a	69/73a
070	Sink			
071	Doublet			
072	Inflow			
073a	Pocket			
074	Vortex + Eddy	74	74/79	74/79
075	Vortical	75/79		
076	Swirl			
077	Spiralling (fluid)			
078	Co-rotating [vortex]			
079	Image [vortex]			
080	Street	80	80/83a	80/83a
081	Shedding	81/83a		
082	Bursting			
083	Cancellation			
083a	Feeding			
084	Jet	84/84a	84/84a	84/89
084a	Airjet			
085	Jetlike	85/88		
086	Billowing			
087	Plume			
088	Curtain			
089	Cushion	89		
090	Wave	90	90	90/99
091	N(-wave)	91/92+99	91/92+99	
092	Standing			
093	Blast	93/95	93/95+97/98a	
094	Explosion			
095	Detonation			
096	Shock	96	96	
097	Non-relativistic	97/98a		
098	Standoff			
098a	Shockless			
099	Riemann			
	(Flow attributes)			
0100	Vorticity	100	100	100/101
0101	Circulation	101	101	
	[Similarity parameters]			
0102	Mach (number)	102	102	102
0103	Prandtl (number)	103	103	103
0104	Nusselt (number)	104	104	104
0105	Reynolds (number)	105	105	105
	(Fluid attributes)			
P1	Compressibility	1	1	1/2
P2	Viscosity	2	2	

		First Reduction	Second Reduction	Third Reduction
	[Viscosity]			
	(Aerodynamic characteristics)			
	(Loads)			
P3	Lift + Lifting*	3	3/5	3/5
P4	Lifting	4		
P5	Indicial	5		
P6	Drag	6	6	6/9
P7	Foredrag	7/9	7/9	
P8	Coulomb			
P9	Drift			
P9a	Interference	9a	9a	9a/17
P10	Stagnation	10	10	+27/29
P11	Choking	11/12a	11/13	
P11a	Choke			
P11b	Choked			
P12	Blockage			
P12a	Blocking			
P13	Lap	13		
P14	Stall	14/17	14/17	
P15	Stalling			
P16	Destalling			
P17	Unstalling			
P18	Downwash	18	18/21	18/26
P18a	Upload	18a/19		
P19	Upwash + Upflow			
P19a	Sideforce	19a/21		
P20	Sidewash			
P21	Crossflow			
P22	Wake + Afterflow	22/23a	22/26	
P23	Wakelike			
P23a	Isovel			
P24	Slipstream	24/25		
P24a	Sliplines			
P25	Outflow			
P26	Trail	26		
P27	Turbulence	27/28	27/29	
P27a	Proturbulence			
P28	Homologous			
P29	Surge	29		
	(Aerodynamic properties and processes)			
Z12	Gasdynamic	12/14	12/14	12/18
Z13	Aerodynamic			
Z14	Superaerodynamic			
Z15	Suction	15/15a	15/16+18	
Z15a	Sucking			
Z16	Blowing	16		
Z17	Injection	17	17	
Z18	Entrainment	18		
Z19	Hydrodynamic	19/23	19/23	19/23
Z20	Spray			
Z21	Wetting			
Z22	Soaking			
Z23	Hydroballistic			
P30	Aeroelasticity	30/32+35/36	30/32	30/40
P30a	Aeroelastic		+35/40	
P31	Thermoaeroelastic			
P32	Aerothermoelastic			
P33	Flutter	33/34a	33/34a	
P34	Fluttering			
P34a	Precipitation			
P35	Ripple			
P36	Sloshing			
P37	Buzz	37		
P38	Divergence	38		
P39	Buffeting	39/40		
P40	Buffet			
	(Aerodynamic reference parameter)			
P42	Tilt	42	42	42/48
P43	Attitude	43	43/48	
P45	Trim	45/46a		
P46	Trimming			
P46a	Trimmed			
P47	Banked	47/48		
P48	Unbanked			
P49	Planform	49	49/52+54	49/69
P50	Sweep	50/52		
P51	Sweepback			
P52	Sweepforward			
P53	Aspect (ratio)	53	53	
P54	Fineness (ratio)	54		

		First Reduction	Second Reduction	Third Reduction
	[Fineness (ratio)]			
P55	Stepdown (height)	55/58		
P57	Twist			
P58	Warp			
P59	Dihedral	59		
P60	Anhedral	60		
P61	Span	61/64	61/64	
P63	Midspan			
P64	Semispan			
P65	Chord	65/66	65/66	
P66	Midchord			
	(Airfoil section)			
P67	Rooftop			
P68	Peaky			
P69	Camber			
P70	Mechanics (phenomena)	70	70	
	(Statics)			
P71	Moment	71/72	71/72	71/73
P72	Torque			
P73	Couple	73	73	
P74	Equilibrium	74/77	74/78	74/83b
P75	Quasi-equilibrium			
P75a	Non-vanishing			
P76	Non-equilibrium			
P77	Disequilibrium			
P78	Balance	78		
P79	Stability	79	79	
P80	Transtability	80/83	80/83	
P81	Overstability			
P82	Instability			
P83	Disturbance + Perturbation			
P83a	Resistance	83a/83b	83a/83b	
P83b	Resisting			
	(Kinematics)			
P84	Motion + Movement* + Moving* + Non-stationary* + Travelling*	84/88	84/88	84/88
P85	Movement			
P86	Moving			
P87	Non-stationary			
P88	Travelling			
P89	Velocity + Speed	89/90	89/90	89/90
P90	Alfven (speed)			
P92	Acceleration	92/93	92/95	92/95
P93	Accelerating			
P94	Deceleration	94/95		
P95	Decelerating			
P96	Translation	96/97	96/97	96/Q12
P97	Translating			
Q2	Rotating	2/4b	2/4b	
Q4	Pre-rotation		+6/10	
Q4a	Circulating			
Q4b	Recirculating	5	5	
Q6	Gyration	6/10		
Q7	Spinning			
Q8	Whirl			
Q9	Prewhirl			
Q10	Overswing			
Q11	Gyroscopic	11/12	11/12	
Q12	Precession			
	(Kinds of motion by direction)			
Q12b	Advance	12b/12c	12b/12c	12b/12c
Q12c	Advancing			
	(Inwardly)			
Q14	Intersecting	14	14	14/18
Q15	Convergence	15/16	15/16	
Q16	Converging			
Q17	Penetration	17/18	17/18	
Q18	Penetrating			
	(Outwardly)			
Q19	Diverging	19	19/20	19/20
Q20	Vanishing	20		
	(Across, past)			
Q22	Transit	22/23	22/24a	22/24a
Q23	Crossing			
Q24	Passing	24/24a		
Q24a	Pass			
Q25	Dynamic + Dynamically*	25/26	25/26	25/31
Q25a	Dynamically			
Q26	Inertia			
Q27	Momentum	27	27	
Q28	Energy	28		
Q28a	Activation (Energy)	28a/28c	28/28c	
Q28b	Isoerg			
Q28c	Kinetic			
Q29	Work	29/30	29/31	
Q30	Virtual	31		
Q31	Power			
Q32	Force	32/35	32/35a	32/40a

		First Reduction	Second Reduction	Third Reduction
	[Force]	32/35	32/35a	
Q33	Lorenz (force)			
Q34	Pondero (force)			
Q35	Restoring (force)			
Q35a	Gravity	35a		
Q36	Pressure	36/37	36/37	
Q38	Compression	38/39	38/39	
Q38a	Compressing			
Q38b	Compressively			
Q39	Recompression			
Q40	Overpressure	40/40a	40/40a	
Q40a	Pressurization			
Q41	Striking	41+48	41/47a	41/49a
Q41a	Jog	41a/44		
Q42	Impulse			
Q42a	Impulsive			
Q42b	Impulsively			
Q43	Impact			
Q44	Embedded			
Q45	Impinging	45/47a		
Q46	Impingement			
Q47	Re-impingement			
Q47a	Glancing			
Q49	Driving	49/49a	49/49a	
Q49a	Drive			
Q50	Emission	50	50/58b	50/60
Q51	Issuing	51/53		
Q52	Effusion			
Q53	Efflux			
Q54	Discharge	54/57b		
Q54a	Blowout			
Q55	Exiting			
Q56	Exhaust			
Q57	Exhausting			
Q57a	Scavenging			
Q57b	Venting			
Q58	Tapping	58/58b		
Q58a	Bleeding			
Q58b	Bleed			
Q60	Burst	60	60	
Q61	Breathing	61/62	61/62	61/62
Q62	Swallowing			
	(Behaviour of deformable bodies)			
R1	Load + Loading + Stress	1/2+5+26a	1 + 26a	1/26a
R1a	Airload			
R2	Stressing			
R3	Allowable	3/4		
R3a	Permissible			
R4	Failsafe			
R5	Shocking			
R6	Exerted	6/7		
R7	Pre-loading			
R9	Tension	9/10	9/10	
R10	Tensile			
R11	Shear	11/12	11/12	
R12	Shearing			
R13	Torsion + Torsional*	13/14	13/15a	
R14	Torsional			
R15	Twisting	15/15a		
R15a	Warpage			
R16	Bending	16/18	16/23	
R17	Flexural			
R18	Flexure			
R19	Inflection	19/23		
R20	Bowing			
R21	Curling			
R22	Anti-elastic (effect)			
R23	Hogging			
R24	Folding	24/26	24/26	
R26	Unfolding			
R26a	Unloading			
R27	Rheological (behaviour)	27/29	27/29+60/63	27/66
R28	Deformation + Strain			
R29	Deforming			
R30	Deflection + Displacement	30/30a	30/32	
R30a	Droop			
R31	Deflecting	31/32		
R31a	Deflect			
R32	Traction + [edge traction]			
R33	Stretching	33/34	33/34	
R33a	Extending			
R33b	Extension			
R33c	Extensional			

		First Reduction	Second Reduction	Third Reduction
	[Extensional]			
R34	Attenuating			
R35	Shortening	35/36	35/36	
R36	Truncation			
R37	Blunting	37/38	37/38	
R38	Flattening			
R40	Cavitation	40/41a	40/41a	
R40a	Drilling			
R41	Cracking			
R41a	Intercrystalline			
R42	Distortion	42/43	42/43	
R43	Distorting			
R44	Dislocation	44	44/50	
R46	Damage	46/48		
R47	Fracture			
R48	Rupture			
R49	Collapse	49/50		
R50	Collapsing			
R51	Buckling + Buckle*	51/52	51/52	
R52	Buckle			
R53	Forcible	53/59	53/59	
R54	Explosive			
R55	Monocell			
R56	Snap			
R57	Threshold			
R58	Pre-buckling			
R59	Post-buckling			
R60	Snapping			
R61	Wrinkling			
R62	Dimpling			
R63	Kinking			
R64	Creep	64	64	
R64a	Endurance	64a/65	64a/65	
R64b	Straintime			
R65	Fatigue			
R66	Failure	66	66	
	(Mechanical properties) [Flexibility]			
R67	Elasticity + Elastic* +Elastically*	67/69+73/74	67/74	67/77
R68	Elastic + Flexibility*+Flexible*+Flexibly*			
R69	Elastically			
R70	Viscoelasticity	70/71		
R71	Viscoelastic			
R73	Flexible			
R74	Flexibly			
R76	Rigidity	76/77	76/77	
R77	Stiffness			
R78	Plasticity	78/80	78/80	78/83a
R79	Plastic			
R80	Viscoplastic			
R81	Strength	81+83a	81+83a	
R82	Soft	82/83	82/83	
R83	Hard			
R83a	Endgrain	83a		
	(Surface condition)			
R85	Smoothness	85/87	85/87	85/87
R87	Polished			
R88	Porous	88/89	88/90a	88/90a
R89	Permeable	90/90a		
R90	Impermeable			
R90a	Non-porous			
	(Processes)			
R91	Vibration + Oscillation +Vibrating*+Oscillating*			
R92	Vibrating + Oscillating	91/92a	91/92a	91/97
R92a	Flapping			
R93	Harmonic	93/95	93/97	
R93a	Harmonically			
R94	Resonant			
R95	Libration			
R95a	Pulse	95a		
R95b	Non-oscillatory	95b		
R96	Modal	96/97		
R97	Unimodal			
R98	Sound + Acoustic + Acoustically*	98/100	98/100	98/105a
R99	Acoustically			
R100	Panting			
R101	Noise	101/105a	101/105a	
R101a	Signals			
R102	Boom			

		First Reduction	Second Reduction	Third Reduction
	[Boom]			
R103	Siren			
R104	Bomb			
R105	Exploded			
R105a	Quadrupole			
	(Properties and processes of vibration)			
	(Frequencies)			
R106	Beat	106/108	106/111	106/111
R107	L(-band)			
R108	RF			
R109	Aural	109/111		
R110	Audio			
R111	Subaudio			
R111a	Spectra	111a/111c	111a/111f	111a/111f
R111b	Spectrum			
R111c	Spectral			
R111d	Wavelength	111d/111f		
R111e	Waveform			
R111f	Bandwidth			
R112	Alternating	112	112	112/120
R112a	Refraction	112a/112b	112a/112b	
R112b	Diffraction			
R113	Impedance	113		
	(Amplification)			
R114	Resonance	114	114	
R115	Attenuation	115	115	
R116	Damping	116/119	116/119	
R117	Isolation			
R118	Hysteretic			
R119	Phugoid			
R120	Hysteresis	120	120	
R122	Luminosity	122/124	122/125	122/125a
R123	Luminous			
R124	Transparent			
R125	Sensitivity	125		
R125a	Monotonic	125a	125a	
S1	Electromagnetic (wave)+Electromagnetically*			
S2	Electromagnetically	1/2	1/5	1/5
S3	Ray	3/5		
S4	Ultraviolet			
S5	Microwave			
S6	Radioactive	6	6	6/22c
	(Electric and magnetic phenomena)			
S8	Electrical	8/10+16a+21/22c	8/10+12+ 16/17+21/22c	
S9	Electric			
S10	Electrically			
S11	Magnetic	11		
S12	Electronic			
S13	Magnetofluid mechanics + Magnetohydrodynamics + Hydromagnetics	13/15	13/15	
S14	Electrohydrodynamics			
S15	Magnetogasdynamics + Magnetoaerodynamic + Electrogasdynamics			
S16	Photoelectric	16		
S16a	Photoelastic	16a		
S17	Electrostatic	17		
S18	Current	18/19	18/19	
S19	D-C			
S20	Charge	20	20	
S21	Inductance			
S22	Dielectric			
S22a	Capacitance			
S22b	Magnetostriction			
S22c	Pole			
	[Thermodynamic behaviour, properties]			
S23	Heat	23	23/29	23/29
S24	Thermodynamic	24/29		
S24a	Aerothermodynamic			
S25	Thermodynamically			
S26	Thermally			
S27	Caloric			
S28	Calorically			
S29	Aerothermochemistry			
	(Change of state)			
S31	Melting	31/31a	31/38	31/38
S31a	Liquefaction			
S32	Resolidification	32/33+38		
S33	Sublimation			
S34	Vaporisation	34/37		
S35	Evaporation			

		First Reduction	Second Reduction	Third Reduction
	[Evaporation]			
S36	Evaporating			
S37	Boiloff			
S38	Condensation			
	(Heat transfer processes)			
S39	Replenishment	39+56a	39+51/56a	39/56a
S40	Heating	40/41	40/41	
S41	Joule			
S41c	Insulation	41c/41d	41c/41d	
S41d	Insulating			
S42	Cooling	42+48/49	42/49	
	(By mass transfer)			
S43	Soret (effect)	43/45		
S44	Ablation			
S45	Ablating			
S46	Transpiration	46/47		
S47	Sweat			
S48	Regression (of surface)			
S50	Convection	50	50	
S51	Radiant (heat transfer)	51/54		
S52	Non-radiating			
S53	Losing			
S54	Black (body radiation)			
S55	Accommodation	55		
S56	Exothermic (reaction)	56		
S56a	Cycling			
	(Thermal properties and processes)			
S56b	Thermomechanical	56b/56e	56b/56e	56b/65
S56c	Thermoelastic			
S56d	Photothermoelastic			
S56e	Photothermoelasticity			
S57	Soaked	57	57+62/65	
S58	Enthalpy	58		
S60	Entropy	60/61	60/61	
S61	Residue (of heat energy)			
S62	Adiabatic + Non-conductive + Insulated			
S63	Isothermal	62		
S64	Non-isothermal	63/64		
S65	Isentropic	65		
S66	Temperature	66/67+74	66/76a	66/76a
S67	Room			
S68	Cold	68/70		
S69	Cooled			
S70	Cool			
S71	Uncooled	71/72		
S72	Unheated			
S73	Heated	73		
S74	Equicohesive			
	(Measures)			
S75	Kelvin	75/76a		
S76	Fahrenheit			
S76a	BTU			
S77	Oxidation	77/80		77/87
S78	Combustion + Burning			
S79	Afterburning			
S80	Deflagration			
S81	Flame	81/82		
S82	Fire			
S83	Ignition	83/85	83/87	
S84	Autoignition			
S85	Firing			
S86	Extinction	86/87		
S87	Quenching			
	(General processes, physical-chemical processes)			
S90	Action	90/92	90/92	90/94d
S90a	Acting			
S90b	Activity			
S91	Event			
S91a	Occurrence			
S91b	Encounter			
S91c	Case			
S92	Behaviour			
S93	Interaction	93/94	93/94d	
S94	Interacting			
S94a	Undergoing			

		First Reduction	Second Reduction	Third Reduction
	[Undergoing]			
S94b	Subject (to)	94a/94b		
S94c	Counteraction	94c/94d		
S94d	Competition			
S95	Physical	95	95	96/99
S96	Chemical + Chemically*	96/97+T13	96/97+7/7a +13	+1/13
S97	Chemically			
S98	Reaction + Reacting*	98/99	98/99+12	
S99	Reacting			
T1	Decomposition	1	1/6b	
T2	Dissociation	2/3		
T3	Dissociating			
T4	Ionization	4/6a		
T5	Charging			
T6	Freezing			
T6a	Freeze			
T6b	Lagging	6b		
T7	Catalytic	7/7a		
T7a	Non-catalytic			
T8	Absorption	8/10	8/11	
T9	Adsorption			
T10	Chemisorption			
T11	Saturation	11		
T12	Erosion	12		
T13	Thermochemical	13		
	(General processes, activities, operations)			
T14	Influence +Effect*+Contribution*	14	14+16/22a	14/29
T15	Effect +Consideration*	15/15b	15/15b+29	
T15a	Contribution			
T15b	Consideration			
T16	Change	16/18+29		
T17	Changing			
T18	Alteration			
T19	Modification	19/20		
T20	Modifying			
T21	Improvement	21/22a		
T22	Refinement			
T22a	Tailoring			
T23	Variation	23/24	23/28	
T24	Varying			
T25	Fluctuation	25/26		
	Peak to peak			
T26	Fluctuating			
T27	Modulation	27/28		
T28	Modulating			
T29	Conversion			
	(Altering composition)			
T31	Recombination	31	31+35/38	31/39a
T33	Mixing	33/34		
T34	Isoenergetic			
T35	Confluence	35/38		
T36	Merging			
T37	Merger			
T39	Contamination	39		
T39a	Non-concurrence	39a		
	(Altering state)			
T40	Division	40/44	40/44	40/44
T42	Partition			
T43	Bifurcation			
T44	Breaking			
	(Altering state)			
T46	Hardening	46	46	46/48
T47	Plating	47/48	47/48	
T47a	Electroplating			
T48	Chroming			
	(Altering location)			
T50	Transport + Removal*	50/52	50/52	50/52 +70/80
T52	Removal			
T53	Distribution	53/54a	53/54a	53/66a
T54	Maldistribution			
T54a	Redistribution			
T55	Spreading	55/58+61	55/61	
T57	Scattering			

		First Reduction	Second Reduction	Third Reduction
	[Scattering]			
T58	Dispersion			
T59	Dissipation	59/59a		
T59a	Non-dissipation			
T60	Diffusion	60		
T61	Rarefaction			
T62	Separating	62/63	62/63	
T63	Detachment			
T66	Disturbing	66/66a	66/66a	
T66a	Cavitating			
T68	Concentration	68	68	68
T70	Transfer	70	70	
T71	Exchange	71/72+80	71/72+80	
T72	Shuffle			
T73	Transmission	73	73/79	
T74	Conducting	74/75		
T75	Conduction			
T76	Convecting	76		
T78	Radiation	78/79		
T79	Radiating			
T80	Release			
	(Changing direction)			
T81	Redirection + Redirecting*	81/84	81/88	81/88
T81a	Redirecting			
T82	Switching			
T83	Turning			
T83a	Re-entrant			
T84	Deviation			
T85	Reflection	85/86		
T85b	Specular			
T85c	Echoes			
T86	Reflecting			
T87	Reversal	87		
T88	Inversion	88		
	(Retaining)			
T88a	Continuation	88a+89/92	88a/94a	88a/105a
T89	Holding			
T90	Arrest			
T91	Retarding			
T93	Constraint	93/94a		
T94	Restraint			
T94a	Restraining			
T97	Fixing	97	97/100	
T98	Joining	98/100		
T99	Clamping			
T100	Coupling			
T101	Stabilizing	101/103	101/105a	
T101a	Destabilizing			
T102	Stabilization			
T103	Equilibration			
T104	Relaxation	104/105a		
T105	Relaxing			
T105a	Shakedown			
	(Influencing dimension)			
U1	Increasing	1/5a	1/5a+8/12a	1/12
U1a	Rise			
U2	Increase			
U2a	Jump			
U3	Increment			
U4	Augmentation			
U5	Addition			
U5a	Gain			
U6	Expansion	6/7	6/7	
U7	Expanding			
U8	Accumulation	8/10		
U9	Collecting			
U10	Scooping			
U11	Amplification	11/12a		
U12	Magnification			
U12a	Filling			
U13	Decreasing	13/15a+20	13/23a	13/23a
U14	Decrease			
U15	Decrement			
U15a	Drop			
U16	Reduction	16		
U16a	Deficit	16a/16b		
U16b	Loss			
U18	Contraction	18/19		
U19	Contracting			

		First Reduction	Second Reduction	Third Reduction
	[Contracting]			
U20	Constriction			
U21	Minimisation	21/22		
U22	Minimising			
U23	Elimination	23/23a		
U23a	Omission			
U24	Limitation	24/25	24/25	24/25
U25	Limiting			
	(Development)			
U26	Beginning	26/29	26/29	26/30b
U27	Starting + Start*			
U28	Start			
U28a	Onset			
U29	Re-start			
U30	Stopping + Cessation	30/30b	30/30b	
U30a	Completion			
U30b	Rounding (off)			
U31	Source	31/31a	31/31a	31/46
U31a	Providing			
U32	Derivation	32/34+38	32/38	
U33	Originating			
U34	Initiating			
U35	Induction	35		
U36	Generation	36/37		
U36a	Generating			
U37	Formation			
U38	Appearance			
U40	Propagation	40/41	40/45	
U41	Propagating			
U42	Excitation	42/45		
U43	Parasitic			
U44	Exciting			
U45	De-excitation			
U46	Growth	46/48	46/48	46/51d +55
U48	Development			
U49	Conservation	49/51	49/51	
U49a	Sustaining			
U50	Maintenance			
U51	Lubrication	51a/51d	51a/51d	
U51a	Protection			
U51b	Waterproofing			
U51c	Sealing			
U51d	Shielding			
U52	Decay	51/53d	51/53d	52/53d
U53	Degeneration			
U53a	Decaying			
U53b	Weakening			
U53c	Yielding			
U53d	Failing			
U55	Recovery	55	55	
	(Technical operations and processes (general))			
U59	Process	59/61	59/61+67/69	59/63a +67/69
U60	Operation + Operating*			
U61	Operating			
U62	Method + Technique	62/63a	62/63a	
U62a	Treatment			
U63	Routine			
U63a	Procedure			
U64	Design	64/65	64/65	64/66a
U65	Matching			
U66	Construction	66/66a	66/66a	
U66a	Output			
U67	Storage	67/68		
U68	Storing			
U69	Supplying	69		
U70	Control	70/72	70/72+74/75	70/77
U71	Controlling			
U71a	Regulation			
U72	Optimisation			
U73	Correction	73	73	
U74	Prevention	74/75		
U75	Suppression			
U76	Response	76/77	76/77	
U77	Feedback			
U78	Economics	78/80	78/82	78/83
U79	Cost			
U79a	Penalty			

		First Reduction	Second Reduction	Third Reduction
	[Penalty]			
U80	Saving			
U81	Application			
U82	Use			
U83	Code			
U85	Research + Investigation + Study (Operations)	85	85	85
U86	Classification	86/87+92/92a +96	86/87+92/92c +96	86/92c
U87	Comparison			
U88	Analysis	88/91	88/91	
U89	Analytic [operations]			
U90	Analytical			
U91	Segmentation			
U92	Deduction			
U92a	Synthesis			
U92b	Idealization	92b/92c		
U92c	Simplification			
U93	Estimation	93/95	93/95	93/97
U94	Estimate			
U95	Assessment			
U96	Evaluation			
U97	Prediction	97	97	
U98	Determination	98/101	98/101	98/106
U99	Tracing			
U100	Traverse			
U101	Resolution			
U102	Measurement	102/104	102/104	
U103	Quantitative			
U104	Qualitative			
U105	Verification	105/106	105/106	
U106	Proof (test)			
V1	Experiment + Experimental*	1/2	1/2	1/9
V2	Experimental			
V3	Observation	3/7	3/9	
V4	Detection			
V5	Recording			
V6	Counting			
V7	Reading			
V7a	Simulating	7a/9		
V8	Simulation			
V9	Representation			
V9a	Visual (methods) +Visualization*	9a/13 +25a/25b	9a/25b	9a/25b
V10	Visualization			
V11	Spectrography			
V12	Stroboscopic			
V13	Shadowgraph			
V14	Photography	14/16		
V16	Photorecording			
V17	Schlieren	17/18		
V18	Spark			
V19	Interferometry	19/25		
V20	Interferometric			
V21	Interferogram			
V22	Isopycral (chart)			
V23	(fringe) Shift			
V24	Strioscopy			
V25	Interferential			
V25a	Clay			
V25b	China			
	(Model tests)			
V25c	Focal (point method)	25c/28	25c/28	25c/28
V27	Lockheed			
V28	Tuft			
	(Operations)			
V29B	Calibration	29b/29ga	29b/29ga	29b/29ga
V29C	Lighting			
V29E	Supporting + Carrying			
V29F	Jacking			
V29G	Tap			
V29GA	Forcing			
V29H	Theory +Theoretical*+Philosophy*+Descriptive*	29h/29hc	29h/29hc	29h/29r
V29HA	Theoretical			
V29HB	Philosophy			
V29HC	Descriptive			
V29I	Generalized	29i/291	29i/291	
V29J	Unified			
V29K	Linearized			
V29L	Linearization			

		First Reduction	Second Reduction	Third Reduction
	[Linearization]			
V29M	Rule + Law + Principle	29M/29R	29M/29R	30/57
V29N	Hypothesis			+87
V29O	Assumption			
V29OA	Assuming			
V29P	Expression			
V29Q	Analogy			
V29R	Analogue			
V30	Mathematical (operations)	30/34a+43	30/34a+43	
V31	Calculation	+87	+46/51	
V31a	Calculating		+54/56	
V31b	Calculated		+87	
V32	Compute			
V33	Computation			
V34	Computational			
V34a	Formulation			
	(Methods)			
	(Analytical)			
V36	Exact	36/38+42	36/38+42	
V37	Inverse			
V38	Semi-inverse			
	(Approximate)			
V41	Variational	41	41	
V42	Semi-analytical			
V43	Graphical			
V44	Numerical	44/45	44/45	
V45	Semi-numerical			
V46	Interpolation	46/48+51+56		
V47	Interpolative			
V47a	Extrapolated			
V48	(Curve) Fitting			
V49	Plotting	49/50		
V50	Plot			
V51	Bestfit (curve)			
V52	Iteration	52/53	52/53	
V53	Iterative + Step-by-step			
V54	Relaxational	54/55		
V55	Over-relaxational			
V56	Smoothing			
V57	Integration	57	57	
	[Agents in mathematical operations]			
V58	Computer	58/61a	58/64	58/64
V59	Digital			
V59a	Dence			
V59b	Eniac			
V59c	Univac			
V59d	Pace			
V59e	NGTE			
	(Analogue)			
V60	Correlator			
V61	Simulator			
V61a	Analyzer			
	(Operations)			
V62	Programming	62/64		
V63	Programme			
V64	Algorithm			
	(Elements, etc. in mathematics)			
V65	Problem	65	65	65/84
V66	Parameter	66	66/72+74/76	
V67	Co-ordinate	67/68a		
V68	Ignorable			
V68a	Ordinate			
V69	Replacement	69/72+74/76		
V70	Term			
V71	Termwise			
V72	Root			
V73	Value	73	73	
V74	Pivotal (point)			
V74a	Exponent			
V75	Formula			
V76	Quadrature			
V77	Solution	77+82/83	77+82/83a	
V78	Approximate	78/79d	78/79d	
V79	Approximating			
V79a	Tending			
V79b	Approximation			
V79c	Inscribed			
V79d	Circumscribed			
V80	Similar	80/81	80/81	

		First Reduction	Second Reduction	Third Reduction
	[Similar]			
V81	Similarity			
V82	Integrable			
V83	Integrating			
V83a	Integrative			
V84	Theorem	84	84	
V85	Dimensional (analysis)	85/86	85/86	85/86
V86	Scaling (law)			
V87	Multiplication			
V88	Algebraic	88+90/92	88+90/94	88/98a
V89	Equation	89	89	
V90	Biharmonic			
V91	Compatibility			
V91a	Transcendental			
V92	Telegraph			
V93	Polynomial	93		
V94	Matrix	94		
V95	Transformation	95/98a	95/98a	
V96	Transform			
V97	Conformal			
V98	Mapping			
V98a	Transversality (condition)			
	(Analysis)			
V99	Calculus	99/103	99/103	99/103
V100	Tensor			
V100a	Operational			
V100b	Transcendant			
V102	Eigenvalue			
V103	Eigenfunction			
V104	Function	104/109	104/109	104/109
V104a	Logarithmic			
V104b	Exponential			
V105	Hypergeometric			
V106	Confluent			
V106a	Sine (law)			
V107	Bei			
V108	Ber			
V109	(Joint) Acceptance			
V110	Trigonometric	110	110	110
V111	Statistics	111/115+119	111/115+119	111/119
V111a	Probability			
V111b	Coverage			
V112	Statistical			
V112a	Averaging			
V113	Sampling			
V114	Weighting			
V115	Superposition	116/118	116/118	
V116	Correlation + Relation + Relationship			
V116a	Correlogram			
V117	Autocorrelation			
V118	Autocorrelogram			
V119	Stochastic			
	(Common properties)			
Wa	Property + characteristic + Quality*	a/b	a/b	a/20a
Wb	Quality			
W1	Structural	1	1	
W2	Isotropic	2/5	2/5	
W3	Orthotropic			
W4	Anisotropic			
W4a	Anisotropy			
W5	Aelotropic			
W6	Composition	6+7	6/10+13/17	
W7	Complex	7/10		
W8	Composite			
W9	Compound			
W10	Multi-component			
W11	Mixture	11/12	11/12	
W12	Stoichiometric			
W13	Homogeneous	13		
W14	Inhomogeneous	14/16		
W15	Non-homogeneous			
W16	Heterogeneous			
W17	Multiphase			
W19	Integral	19	19	
W20	Sectional	20/20a	20/20a	
W20a	Multi-sectional			

		First Reduction	Second Reduction	Third Reduction
	[Multi-sectional]			
	(Results of action)			
	(Influenced, altered)			
W21	Applied	21/21b	21/21b	21/37
W21a	Affected			
W21b	Processed			
W23	Modulated			
W24	Modified			
W25	Revised	25/26		
W26	Improved			
W27	Transformed	27	27/32a	
W28	Combined + Merged	28/29		
W29	Integrated			
W30	Mixed	30/32a		
W31	Premixed			
W32a	Unchanged			
W33	Bifurcated	33	33+37	
W35	Ablated	35/36	35/36	
W36	Non-ablating			
W37	Filtered	37		
	(State altered)			
W38	Fluidized	38/40	38/40	38/48
W39	Dissolved			
W40	Absorbed			
W42	Ignited	42/43	42/43	
W43	Burned			
W44	Dissociated	44	44/48	
W46	Undissociated	46		
W47	Ionized + Changed	47		
W48	Frozen	48		
	(Dimensions altered)			
W52	Damped	52/54	52/54	52/58
W53	Impeded			
W54	Obliterated			
W55	Increased	55/57	55/57	
W56	Boosted			
W57	Scooped			
	(Position, etc., altered)			
W59	Removed	59/61	59/69	59/72a
W60	Transferred			
W61	Convected			
W62	Distributed + Spread	62/64a		
W63	Dispersed			
W64	Displaced			
W64a	Diffuse			
W65	Detached	65		
W66	Attached	66		
W67	Disturbed	67/68a		
W68	Perturbed			
W68a	Washed			
W69	Undisturbed	69		
W70	Concentrated	70/72a	70/72a	
W70a	Imposed			
W71	Superimposed			
W72	Piled			
W72a	Lumped			
	(Direction altered)			
W73	Yawed	73	73/78	73/78
W74	Unyawed	74		
W76	Reflected	76		
W77	Reversed	77		
	(Held, retained)			
W78a	Prevented	78a/84	78a/84	78a/84
W79	Restrained			
W79a	Restricted			
W81	Stabilized			
W83	Unretarded			
W84	Resisted			
	(Result of various forces)			
W85	Loaded	85/89a	85/89a	85/89a
W86	Forced			
W87	Subjected			
W88	Controlled			
W89	Directed			
W89a	Governed			
	(By direction)			

		First Reduction	Second Reduction	Third Reduction
	[(By direction)]			
W90	Deflected	90/93	90/93	90/93
W91	Sheared			
W92	Inflected			
W93	Twisted			
W94	Compressed	94	94	94/102
W96	Driven	96/98a	96/102	
W97	Propelled			
W98	Launched			
W98a	Projected			
W99	Injected	99/100		
W100	Blown			
W101	Emitted	101/102		
W101a	Tapped			
W102	Extruded			
	(Shape altered)			
W103a	Deformable	103a/105	103a/109	103a/X1
W104	Deformed			
W105	Warped			
W106	Buckled	106/108		
W107	Unbuckled			
W108	Prebuckled			
W111a	Rolled	111a	111a	
X1	Thickened	1	1	
	(Chemical/Physical properties)			
X6	Combustible	6/8	6/11	6/11
X7	Non-flammable			
X8	Non-toxic			
X9	Dry	9/11		
X10	Humidity			
X11	Dewpoint			
X14	Strong	14/14b	14/14b	14/14b
X14b	Weak			
	(Origin, source)			
X14c	Accidental	14c/16a	14c/16a	14c/16a
X15	Artificial			
X15a	Artificially			
X16	Natural			
X16a	Nature			
X17a	Introduced	17a/20+23a/23b	17a/20 +22/23b	18/23b
X17b	Obtained			
X17c	Caused			
X17d	Due			
X18	Generated			
X18a	Initiated			
X19	Formed			
X19a	Composed			
X20	Developed			
X21	Induced	21	21	
X22	Excited	22		
X23	Simulated	23		
X23a	Terminated			
X23b	Ended			
X24	Frictional	24	24	24/28
X25	Mechanical	25/26a	25/26a	
X26	Hydrostatic			
X26a	Pneumatic			
X28	Gravitational	28	28	
	(Properties of processes)			
X30	Eccentricity	30	30	30/35
X32	Circulatory	32/32a	32/35	
X32a	Rotatory			
X33	Non-circulatory	33/35		
X35	Translational	36	36/39	36/39
X36	Oscillatory			
X37	Vibrational	37/39		
X38	Vibrationally			
X39	Vibratory			
X40	Automatic	40/41b	40/42	40/42
X41	Self-adjusting			
X41a	Self			
X41b	Auto			
X42	Corrective	42		

	[Corrective]	First Reduction	Second Reduction	Third Reduction
X44	Dissipative	44/45+53	44/47+53	44/53
X45	Non-dissipative			
X47	Diffusivity	47		
X48	Conductive	48/51+52a	48/52a	
X48a	Conductivity			
X51	Non-conducting			
X52	Convective	52		
X52a	Radiative			
X53	Emissivity			
X55	Compressive	55	55	55
X56	Incipient	56/56a	56	56/67a
X56a	Embryonic			
X57	Progressive	57/58	57/58+63/65	
X58	Cumulative			
X59	Reversibility	59/60	59/60	
X60	Irreversible			
X63	Extensible	63/64		
X63a	Extendible			
X64	Developable			
X65	Incremental	65		
X66	Redundant	66/67a	66/67a	
X67	Residual			
X67a	Remain			
X68	Steady	68/69	68/75	68/75
X69	Quasi-steady			
X70	Continuous	70/72a		
X71	Continuously			
X72	Continuity			
X72a	Sustained			
X73	Constant	73+75		
X74	Uniform	74/74d		
X74a	Uniformity			
X74b	Uniformly			
X74c	Regular			
X74d	Unperturbed			
X75	Invariant			
X75a	Non-uniformly	75a/79	75a/88	75a/88
X75b	Non-uniformity			
X76	Unsteady			
X76a	Quasi-unsteady			
X77	Unsteadily			
X78	Unsteadiness			
X79	Nonsteady			
X80	Discontinuous	80/82		
X81	Discrete			
X82	Discontinuity			
X83	Irregularity	83/85		
X84	Uneveness			
X85	Erratic			
X86	Variable	86		
X88	Non-monotonic	86		
X89	Negatively	89/90	89/92	89/92
X89a	No			
X89b	Not			
X90	Negative			
X90a	Non-negative	90a/91		
X91	Positive			
X92	Neutral	92/92c		
X92a	Adverse			
X92b	Favourable			
X92c	Good			
X93	Rest	93/94+96/97	93/97	93/107
X93a	Resting			
X94	Stagnant			
X95	Stationary	95		
X96	Dead			
X97	Still			
X98	Static	98/98a	98/98a	
X98a	Statically			
X99	Immobile	99/102	99/102	
X99a	Motionless			
X100	Passive			
X101	Non-reactive			
X101a	Non-reacting			
X102	Inert			

		First Reduction	Second Reduction	Third Reduction
	[Inert]			
X103	Stable	103/104a	103/104a	
X104	Bistable	104b/104e	104b/104e	
X104b	Movable			
X104c	Allmovable			
X104d	Immovable			
X104e	Allmoving			
	[Active]			
X106	Active	106/107	106/107	
X107	Reactive	106/107	106/107	
	[General relations]			
X110	Absolute	110	110/112a	110/119
X111	Relative	111/112a		
X112	Relativistic			
X112a	Relatively			
X113	Containment	113	113/119	
X115	Correlation	115/119		
X115a	With			
X115b	Corresponding			
X115c	Applicability			
X116	Correlated			
X117	Connected			
X118	Associated			
X119	Coupled			
	[Sequence and Rank (General relations)]			
H81	Order	81	81+84a/90	81/92
H81a	Preliminary	81a/84	81a/84	
H82	First + Initial			
H82a	Initially			
H82b	Originally			
H83	Primary + Major + Main			
H84	Semi-major			
H84a	Minor	84a/85a		
H85	Second + Secondary			
H86	Third	86/87		
H87	Cubic			
H88	Fourth	88/9		
H89	Quartic			
H89a	Fifth	89a		
H89b	Sixth	89b		
H90	Seventh	90		
H90a	Eighth	90a		
H91	Final	91/92	91/92	
H92	Terminal			
H93	Auxiliary	93	93	93/94
H94	Intermediate	94	94	
	(Dimensional properties)			
M1	Dimensional	1/2a	1/2a+8	1/8
M2	Geometric			
M2a	Dimensionless			
M3	One-dimensional + Linear	3/3b	3/3b	
M3a	Linearly			
M3b	Quasi-one-dimensional			
M4	Non-linear	4/5	4/5	
M5	Non-linearly			
M6	Two-dimensional	6/6a	6/6a	
M6a	Two-dimensions			
M7	Three-dimensional	7/7a	7/7a	
M7a	Three-dimensionality			
M8	Non-dimensional	8	8	
M21	High + Highly*+Higher*+Elevated*	21/22c	21/24	21/27a
M22	Highly			
M22a	Higher			
M22b	Elevated			
M22c	Ultrahigh			
M23	Critical	23/24		
M24	Supercritical			
M25	Low + Small + Reduced	25	25	
	[Magnitude]			
M28	Dense	28	28/28b	28/28b
M28a	Lightly	28a/28g	+28g	+28g
M28b	Heavy	28b		
M28c	Intensity	28c/28d	28c/28f	28c/28f
M28d	Intense			
M28e	Severe	28e/28f		
M28f	Severely			
M28g	Light + Lightweight			
M29	Quantity + Amount	29/30	29/30	29/31b
M30	Content			+65a/65b

		First Reduction	Second Reduction	Third Reduction
	[General relations]			
	[Magnitude]			
	[Content]			
M31	Degree	31/31b	31/31b	
M31a	Percentage			
M31b	Semi			
M32	Single	32/34	32/34	32/29b
M33	Singly			+57/65
M34	Singular			
M35	Multi + Multiple	35	35/39b	
M36	Double	36/39b		
M37	Dual			
M38	Binary			
M39	Pair			
M39a	Twin			
M39b	Conjugate			
M40	Finite	40/41	40/41	40/43d
M41	Limited			
M42	Semi-infinite	42	42	
M43	Infinite	43/43d	43/43d	
M43a	Infinity			
M43b	Infinitely			
M43c	Infinitesimal			
M43d	Infinitesimally			
M44	Minimum	44	44	44/56
M45	Mean	45	45	
M46	Maximum + Maxima	46	46/46b	
M46b	Optimal	46b		
M47	Least	47/47d	47/47d	
M47a	Less-than			
M47b	Negligible			
M47c	Vanishingly			
M47d	Slightly			
M48	Partially + Partly	48/48a	48/48a	
M48a	Partial			
M49	Fully	49/52	49/56	
M50	Full			
M51	Completely			
M51a	Entirely			
M51b	Very			
M52	Complete			
M53	Total	53/55a		
M54	Overall			
M55	Collective			
M55a	Excess			
M56	Extreme	56		
M57	Number	57/57b	57/65	
M57a	Zero	+60/65		
M57b	Non-zero			
M58	One	58/59a		
M59	Unit			
M58a	Unity			
M60	Two			
M61	Three			
M63	Four			
M64	Five			
M65	Six			
M65a	Net	65a/65b	65a/65b	
M65b	Gross			
M65c	Arrangement	65c/68	65c/68	65c/71a
M66	Configuration			
M67	Layout			
M68	Pattern			
M71	Combination	71/71a	71/71a	
M71a	Collocation			
M72	Ordered	72/72b	72/72b	72/73
M72a	Systematic			
M72b	Graded			
M72c	Arbitrary	72c/73	72c/73	
M72d	Arbitrarily			
M73	Random			

		First Reduction	Second Reduction	Third Reduction
	[Random]			
Y1	Equivalence	1/3b	1/3b	1/3b
Y2	Equivalent			
Y3	Equally			
Y3a	Equal			
Y3b	Equality			
Y5	Complementary	5/6b	5/6b	5/17a
Y6	Mutual			
Y6a	Reciprocity			
Y6b	Reciprocal			
Y7	Dependence	7/9	7/9b	
Y8	Dependent			
Y9	Dependant			
Y9a	Incident	9a/9b		
Y9b	Coincident			
Y10	Proportional	10/11	10/11+14/16	
Y11	Proportion			
Y13	Ratio	13	13	
Y14	Modulus	14/16		
Y15	Secant			
Y16	Tangent			
Y17	Coefficient	17	17/17a	
Y17a	Derivative	17a		
Y19	Similitude	19/23	19/24b	19/24b
Y19a	Analogous			
Y19b	Alternative			
Y19c	Substitute			
Y22	Quasi			
Y23	Pseudo			
Y24	Consistent	24/24b		
Y24a	Valid			
Y24b	True			
Y25	Difference	25/26+28/29	25/26+28/31	25/31b
Y26	Different			
Y27	Differential	27	27	
Y28	Differentially			
Y29	Differing			
Y30	Unequal	30/31		
Y31	Inequality			
Y31a	Foreign	31a/31b	31a/31b	
Y31b	Non-similar			
Y32	Independence	32/33a	32/33a+37/37a	32/39
Y33	Independent + Free + Uncoupled			
Y33a	Unsupported			
Y35	Freely	35/36a	35/36a	
Y36	Freedom			
Y36a	Buoyancy			
Y37	Singularity	37/37a		
Y37a	Individual			
Y38	Without	38/39	38/39	
Y39	Absence			
	(Abstract concepts)			
Y40	Phenomena	40/40a	40/40a	40/40a +43/48
Y40a	Phenomenological			
Y41	System	41/42d	41/42d	41/42d
Y42	Group			
Y42a	Type			
Y42b	Species			
Y42c	Set			
Y42d	Member			
Y43	Concept	43		
Y44	Criterion	44/47	44/47	
Y45	Reference			
Y47	Ultimate			
Y48	Best	48	48	
Y48a	Input	48a/48d	48a/48d	48a/48d
Y48b	Output			
Y48c	Yield			
Y48d	Target			
Y49	Data	49/52	49/52	49/52
Y49a	Product			
Y50	Result			
Y51	Resultant			
Y51a	Resulting			

		First Reduction	Second Reduction	Third Reduction
	[Resulting] (Form of information)			
Y52	Record			
Y52a	Description	52a+53/58b	52a/58b	52a/60
Y53	Diagram			
Y55	Chart			
Y55a	Table			
Y55b	Tabulation			
Y57	Survey			
Y57a	Art (state of)			
Y58	Review			
Y58a	Bibliography			
Y58b	Literature			
Y59	Index	59	59/60	
Y60	Trace	60		
	(Curves, etc.)			
Y60a	Polar	60a	60a/65	60a/65
Y61	Hodograph	61/65		
Y62	Isobar			
Y63	Vector			
Y64	Isogon			
Y65	U-R (velocity-distance)			
	[Abstract concepts]			
Y68	Empirical	68/68a	68/68a	68/68a +80/86a
Y68a	Semi-empirical			
Y70	Hypothetical	70/73a+79/79b	70/79b	70/79b
Y71	Ideal			
Y72	Idealized			
Y73	Perfect			
Y73a	Perfectly			
Y74	Simplified	74/76a		
Y75	Simply			
Y76	Simple			
Y76a	Elementary			
Y77	Pure	77		
Y78	Optimum	78		
Y79	Apparent			
Y79a	Assumed + Given			
Y79b	Expressible			
Y80	Actual	80/83	80/86a	
Y81	Practical			
Y82	Imperfect			
Y83	Non-perfect			
Y84	Working	84/85		
Y85	Real			
Y86	Effective	86/86a		
Y86a	Ordinary			
Y86b	General	86b/88	86b/91a	86b/99
Y86c	Normally			
Y87	Standard			
Y88	Average			
Y89	Classical	89/89a		
Y89a	Conservativeness			
Y91	Basic	91/91a		
Y91a	Plain			
Y93	Required	93/94	93/94	
Y93a	Appropriate			
Y94	Requirement			
Y95	Preferential	95/96	95/96	
Y96	Selected			
Y98	Specific	98/98a	98/98a	98/100
Y98a	Particular			
Y99	Measured	99/100	99/100	
Y99a	Valued			
Y100	Calibrated			
Z1	Efficiency	1/2		
Z1a	Efficient			
Z2	Effectiveness			
Z3	Accuracy	3/3a		
Z3a	Accurate			
Z4	Capability	4/5		
Z5	Capacity			
Z6	Deficiency	6/8a		
Z7	Defect			
Z8	Imperfection			
Z8a	Inclusion [in crystal]			
Z9	Error	9/10		
Z10	Aberration			

APPENDIX 5.4

SIMPLE CONCEPT HIERARCHIES

The schedules include the concepts used in the indexing of the sub-set of 200 documents as given in Appendix 3E.
The concepts are in natural uncontrolled language.
Notation is purely ordinal, and in no way reflects the relations between the concepts represented.
Plus signs indicate synonyms.
Certain concepts appeared in the sub-set of test questions, but did not occur in the indexing of the documents. Such concepts have been included and are followed by the letter 'Q'.

Summary of the main sections

	[Bodies, Structures]
A2	Aircraft types
	[Parts of Aircraft]
A79	Airfoils; control surfaces
C57	Other parts: Fuselage, panels, skin, forebody, etc.
E61	Propulsion systems, etc.
E64	Compressors
G5	Ducts: pipes, nozzles
H17x	Bodies
H43	By shape, etc.
J35	Non aerodynamic structures: pivots, beams, etc.
J46	Flight
J48	Interplanetary flight
K6	Performance
K43	Flying operations
L5	Fluids
L25	Gases
L86	Atmosphere
M34	Flow
M42	By speed
M69	By various other characteristics
N64	Boundary layer
O64	Flow elements: streamline, vortices, jets, etc.
P27	Jets
Q33	Waves, shock waves
R22	Aerodynamic forces and loads: lift, drag, moments, pressure, etc.
T27	Aerodynamic processes and properties: control, stability, interference, wake, velocity, flow parameters
U77	Fluid properties: density, viscosity, etc.
U90	Aeroelasticity, flutter
V94	Aerodynamic reference parameters: angle of attack, planform, aspect ratio, section, camber, etc.
W50	Mechanics: motion, force, stress-strain phenomena
X4	Heat
X80	Heat transfer
Y35p	Kinetic theory: dissociation
Y76	Research and investigation
Y82	Experiment
Z1	Wind tunnel
Z98	Theory
ZA9	Mathematics
ZB27	Automatic control theory
ZB45	General properties
ZB73	General processes

A1 Bodies
A2 [Airplane] Q
A3 High speed aircraft
A4 Avro-707A
A5 Aircraft structures
A6 Models of complete aircraft
A7 Tailless a.
A8 Tail-boom a.
A9 Aircraft shapes
A10 Vehicles
A11 Ballistic v. + B. Missile
A12 Winged missile
A13 Long range m.
A14 Missile oscillating in roll
A15 Space v.
A16 Satellite + S.v. + Artificial s.
A17 Earth satellite
A18 Atlas
A19 Discoverer s.
A20 Explorer 1
A22 Explorer 3
A23 Explorer 4
A24 Midas 2
A25 Sputnik 1
A26 Sputnik II
A27 Sputnik III
A28 Sputnik V
A29 Vanguard I
A30 Re-entry v. + R. body
A31 Highly cooled body
A32 Graphite r.e. body
A33 Lifting r.e. configuration
A34 Delta wing r.e. configuration
A35 Sweptback w. r.e. configuration
A36 Blunt r.e.v. + Blunted r.e. configuration
A37 Re-entry glider + R.e. glider configuration + Glide v. + Glider r.e. configuration + Glider v.
A38 Winged r.e.g. configuration
A39 [with] Wing tip panel
A40 Folding
A41 Unfolding
A42 Lifting r.e.g. configuration
A43 [Uncontrolled v.] Q
A44 Skip v.
A45 R.e.v. surfaces
A46 Test v.
A47 Probe v. + P.v. configuration + Space p.
A48 Short p.v.
A49 Sounding p. + S. rocket system
A50 Supersonic v.
A51 'S.' model
A52 Hypersonic v. + H. body

[Vehicle shapes]
A53 Arrowing v.
A54 Blunt body of revolution v.
A55 Blunt nose v.
A56 10° blunted cone v.
A57 Conical afterbody v.
A58 Flat base v.
A59 Propulsion systems
A60 Airbreathing v.
A61 Rocket p. + R.p. system + R. propelled v. + R.v.
A62 Multiple r. engine
A63 Five stage r.s.
A64 Chemical r.
A65 Liquid propellant
A66 Solid propellant + Solid fuel r.e.
A67 Electrical r.
A68 Nuclear energy source
A69 Fusion
A70 Fission
A71 Radioactive isotope
A72 Decay
A73 Arc-heating r.
A74 Magnetoplasma [r.p.]
A75 Ion [r.p.]
A76 Solar heating r.
A77 Midcourse r.
A78 Light wave propulsion + Solar sail

A79 Airfoil
A80 Lifting element
A81 Non-l. airfoil + Non-l. body
A82 Airfoil equation
A83 Two-dimensional a.
A84 Three-d. a.
A85 A. shape
A86 Wedge a.
A87 Single w.a.
A88 Double w.a.
A89 Circular arc a. + C.arc profile
A89a Biconvex a.
A90 Straightline a.
A91 Blunt nosed a.
A92 Blunt trailing edge a.
A93 Symmetrical a.
A94 Rigid a.
A95 NACA 4412 a.
A95a NACA 64A008 a.
A96 Semi-infinite plane
A97 Wing body combination + W.b. arrangement
A98 W.b. interference + W.fuselage i.
A99 [Effect of] Small span curvature of flowfield

B1 Airplane wing + W. + W.body
B2 Linearized w. theory
B3 W. model
B4 W. shapes + Arbitrary planform w. + W.p.
B5 [Simple planform w.] Q
B6 Swept w.
B7 Highly s.w.
B8 W. sweep small
B9 Sweptback w.
B10 S.w. model
B10a 45° sweptback w.
B10b S.w. 50°
B11 60° sweepback w.
B12 S. delta w.
B13 Sweptforward w.
B14 Sweptforward w. tip
B15 Unswept w. + Straight w.
B16 Triangular w. + Delta w.
B17 Near t.w.
B18 Flat t.w.
B19 Clipped d.w.
B20 T.w. with twist
B21 Rectangular w. + R.planform w.
B22 Slender r.w.
B23 Circular planform w.
B24 Curved tip planform w.
B24a Biconvex section w.
B25 Elliptical w. + Elliptic w.
B26 [with] Major/minor axis ratio 5.1
B27 Symmetrical w.
B28 S.w. thickness
B29 Tapered w.
B30 T.w. model
B31 Untapered w.
B32 Cambered w.
B33 Uncambered w.
B34 Twisted w.
B35 W. with parabolic twist
B36 Warren 12 planform
B37 Rigid w.
B38 Elastic w.
B39 Arbitrary stiffness w.
B40 Solid construction w.
B41 Cantilevered w.
B42 C.w. flutter

B43 Cropped w.
B44 Perforated w. + Hole drilled w.
B45 Sharp edge w.
B46 Sharp leading edge w.
B47 Subsonic edged w.
B48 Supersonic edged w.
B49 Two-dimensional w.
B50 Three-d. wing
B51 Long w.
B52 Wide w.
B53 Narrow w.
B54 Slender w. + Thin w.
B55 S.w. theory
B56 Not so slender w. theory
B57 Thick w.
B58 Low aspect ratio w. + L.a.r.
B59 Vanishing l.a.r.w.
B60 W. of very small a.r.
B61 High a.r.w.
B62 Finite a.r.w.
B63 Infinite a.r.w.
B64 Finite w.
B65 Finite span w.
B66 Infinite w.
B67 Infinite s.w.
B68 W. with concentrated weights
B69 W. with flaps
B70 Flat w.
B71 F. plate w.
B72 F. surface w.
B73 Flat w. surface
B74 Model w.
B75 Half w.
B76 H.w. model
[By state]
B77 Oscillating w.
B78 Harmonically o.w.
B79 Slowly o.w.
B80 Fluttering w.
B81 Pitching w.
B82 Rolling w.
B83 Rotating w.
B84 Sinking w.
B85 Lifting w.
B86 Nonlifting w.
B87 Yawed w.
B88 Loaded w.
B89 Inclined w.
B90 Laminar w.
B91 Steady w.
B92 Differentially deflected w.
B93 Spanning [a wind tunnel]
B94 Wing flow pattern + W.f. study
B95 Wing pressure distribution
B96 [Study using] Tangent wedge method
B97 Wing lift

[Characteristics]
B99 W. Chord
C1 W. thickness
C2 W. slope
C3 Plane of w.
[Parts]
C4 W. surface
C8 W. tip
C9 W.t. deflection
C10 Size [of w.t. panel]
C11 Central section + Middle s.
C12 Rear
C13 Root section
C14 R. bending moment
C15 Tail
C16 All movable t.
C17 Horizontal t.
C18 Vertical t.
C19 45° sweptback t.
C20 Unswept t. surface
C21 T. surface
C22 Tailplane [i.e. horizontal stabilizing surface]
C23 T. setting
C24 T. spanload
C25 Control surface
C26 All movable c.s.
C27 [Apex located c.] Q
C28 [Forward located c.] Q
[Rudder]
C29 R. deflection
C30 Differential r.d.
Aileron
C31 Oscillatory a. coefficients
[Elevon]
C32 E. deflection
C33 Differential e.d.
C34 Control flap
C35 Hinged f.
C36 Blowing f.
C37 Jet f.
C38 Thwaites j.f.
C39 Leading edge f.
C40 Trailing edge f.
[Slot]
C41 Slot blowing + High velocity blowing
C42 S. configuration
C43 Control surface tabs
C44 Oscillatory t. coefficient
C45 Trailing edge spoiler
[Vortex generators]
C47 Airjet v.g.
C48 Ramp type v.g.
C49 Twisted strip type v.g.
C50 Wedge type v.g.
C51 Wing type v.g.
C52 Biplane type v.g.
C53 Vane v.g.
[V.g. characteristics]
C54 Generator scale
C55 Blade design
C56 Multiple rows
C56a Control surface buzz

[Other parts]
C57 Fuselage
C58 F. sizes
C59 Panels
C60 F. panels
C61 Stringer p.
C62 Supporting stringers
C63 Stiffener p.
[Skins]
C64 Continuous s.
C65 C. fuselage s.
C66 Fused silica s.
C67 Mild steel s.
C68 Thick s. structure
C69 Thin s. structure
C70 S. thickness
C71 S. temperature
C72 S. flexibility

[Nacelle]
C73 Turbojet nacelle exit
C74 Simulated turbojet n.
[see also Choked convergent nozzle]
C75 External stores
C76 E.s. matrices
C77 Balance chamber
C78 Rocket chamber
[Forebody]
C79 F. length
C80 F. interference
C81 F. drag
C82 Bow
C83 B. shock wave + B. shock
C84 B. s. geometry
C85 Nose

C86 N. region
C87 Body n.
C88 Teflon n. piece
C89 Graphite n.
C90 Concave n.
C91 Spherical segment n.
C92 Modified s.s.n.
C93 Hemispherically nosed body + Hemispherical nose piece
C94 N. bluntness + N. blunting
C95 Blunt n. shapes
C96 Slightly blunted n.
C97 N. incidence
C98 N. drag
[Afterbody]
C99 Conical base a.
D1 Boattail
D2 B. angles
D3 Cylinder a. + Cylindrical a.
D4 Truncated a.
D5 A. surface
D6 A. drag
D7 Flat base
[Face]
D8 Forward flat f.
D9 Surface
D10 Isotropic s.
D11 Homogeneous s.
D12 Flat s.
D13 Adjacent f.s.
D14 Curved s.
D15 Flexible s. + F. boundary + Elastic surface + [S. flexibility] Q
D17 Response coefficient
D18 Elastic constant
D19 Material stiffness
D20 Dissipative f.s.
D21 Nondissipative f.s.
D22 Non dissipating s.
D23 Non-ablating s.
D24 Contact s.
D25 Surface exposed [to fluid]
D26 S. subjected to heat transfer
D27 Insulated s.
D28 S. free of stress
D29 Non catalytic body s.
D30 S. of uniform thickness
D31 Thin s.
D32 Upper s.
D33 Interior s. See also D87 Inner boundary
D34 Intersecting s.
D35 Leeward s. contribution
D36 S. of revolution
D37 Smooth s. of r.
D38 [with] Vertical axis
D39 Motion of particles
D40 [by] Influence of s. reaction
D41 Two dimensional s.
D43 S. conditions [should follow Characteristics after D73]
D44 Lifting s.
D45 L.s. theory
D46 Subsonic l.s.t.
D47 L.s. shape
D48 Upper l.s.
[Characteristics]
D49 S. flow
D50 S.f. pattern
D51 S.wave
D52 S. stresses
D53 S. shear stress
D54 S. drag
D55 S. downwash
D56 S. pressure
D57 S. isobars
D58 S.p. distribution [predicted by]
D59 Impact (Newtonian) theory prediction
D60 Local s.p.
D61 S. temperature
D62 Wall t.
D63 Adiabatic w.t. + A. surface t.
D64 Equilibrium s.t.
D65 Maximum s.t.
D66 S. combustion See also Ablation
D67 S. heat transfer distribution
D68 S. h.t. rate
D69 S. radiation
D70 Surface curvature
D71 Body s. slope
D72 S. material see also D43
S. conditions
D73 Wall
D74 Composite w. + C. slab
D75 Homogeneous w.
D76 W. thickness
D77 Finite thickness w.
D78 Plane w.
D79 Non-parallel w.
D80 Thermally thick w.
D81 Thermally thin w.
D82 Inconel w.
D83 Copper w.
D84 Boundaries
D85 Fixed b.
D86 Moving b.
D87 Inner b.
D89 Mixing b.
D90 Supersonic interface
D91 Wall conditions
D92 Boundary motion
D93 Wall interference
D94 Wind tunnel i. effects
D95 Boundary constraint + Wall c. + Tunnel c.
D96 Zero b.c.
[Effect of]
D97 Moisture condensation + Humidity
D98 Saturation vapour pressure
D99 Constant w. temperature
E1 W. temperature gradient
E2 Heat transfer at the wall
E3 W. heat flux history
[Connecting portions]
Edges
E7 Leeward e.
E8 Windward e.
E9 Leading e.
E10 L.e. shape + L.e. contour + L.e.profile
E11 Blunt l.e. + Bluntness [of l.e.] + L.e. bluntness + Bluntness effects
E12 Tip bluntness [of l.e.]
E13 Sharp l.e.
E14 Sharp nosed l.e.
E15 Elliptic l.e. contours
E16 Parabolic l.e. contours
E17 L.e. sweep 53.5°
E17a L.e. sweepback 53.5°
E18 Subsonic l.e.
E19 Nearly sonic l.e.
E20

E21 Transonic l.e.
E22 Supersonic l.e.
E23 Heat sustaining l.e.
[L.e. characteristics]
E24 L.e. diameter + L.e. radius
E25 L.e. droop
E26 L.e. roughness
E27 L.e. separation
E28 Inboard
E30 L.e. stall
E31 L.e. suction
[L.e. vortices]
E32 Location of l.e.v.
[Proximity to]
E33 Distance from l.e.
E34 Near l.e.
E35 Trailing e.
E36 Blunt t.e.
E37 Thick t.e.
E38 Thickened t.e.
E39 Supersonic t.e.
E40 T.e. pressures
E41 T.e. suction
E42 Sharp edged
E43 Corners
E44 Number and angles of c.
E45 Separation [in] corners
E46 Pivotal point
[Hole]
E47 H. pattern
E48 Spanwise h.p.
E49 Square h.p.
E50 Staggered h.p.
E51 H. diameter
E52 Orifice size
E53 H. drilling
E54 H. filling
E55 Material removed [in hole drilling]
E56 Amount
E57 Soft material [filling up hole]
[Tip]
E58 T. shock wave
E59 Initial t. [s.w.]
E60 T. vortex
E61 Propeller
E62 Models with p.
E63 P. stall flutter

E64 Compressor
E65 Centrifugal c. + Radial flow c. + Radial flow turbomachine
E66 Axial flow c. + Axial c. + A.f. turbomachine
E67 Drum construction
E68 Disk construction
E69 A.f.c. blade
E70 Naca 65(12)10 Blower b.
E71 Jumo 004
E72 Single stage c.
E73 Multi s.c.
E74 Subsonic turbomachines + S.c.
E75 Supersonic turbomachines
E76 Mixed flow c. + M.f. turbomachine
E77 Isentropic c.
E78 High pressure ratio c.
E79 Idealized c.
E80 Pump impeller
E81 Centrifugal i. + Impeller + Pump rotor + Impeller rotor
E82 Mixed flow i. + M.f. pump + M.f. rotor
E83 Axial inlet i. + A.i. pump + A.i. rotor
E84 Rocket propellant i. + R.p. pump + R.p. rotor
E85 Isentropic impeller
[Pump design method] q
E86 [Simplified p. design equation] q
E87 Generalized design curve
[Stage] q
E88 S. characteristics
E89 S. efficiency +
E90 S. performance
E91 Cascade losses
S. matching
Double-valued performance curves
S. stacking
E92 S.s. analysis
E93 Uprating stage one
E94 Uprating stage two
S. temperature rise
T. coefficient
E95 S. flow coefficient
E96 High f.c.
E97 S. interaction
E98 S. stall
E99 Type of s.s.
F1 Front s. unstalled
F2 First s. stalled
F3 Root to tip
F4 [between] Adjacent main blades
F5 Single s.s.
F6 Inlet s.
F7 Inlet conditions
F8 S. loading
F9 Division of l.
F10 Meridional plane force + Forces in m.p.
Rotational forces
F11 Blade bending stress
F12
F13 [Blade]
F14 Rotor b.
F15 Stator b.
F16 Impulse blading
Reaction blading
F17 Adjustable blading
F18 Main b.
B. row
Rotating b.r.
Inlet of b.r.
Vane
Splitter v. + s.
S.v. surfaces
Inlet guide v.
I.g.v. stagger
Adjustable i.g.v.

F19 [Blade characteristics]
F20 Number of b.
F21 B. shape
F22 Arbitrary b.s.
F23 B. curvature
F24 Circular blading
F25 Parabolic shaped b. +
F26 P. blading
F27 Skewed p. blading
F28 Constant reaction b. form
F29 Free vortex b. form
F30 Half vortex b.f.
F31 B. stagger
F32 B. failure
F33 Section characteristics
Air outlet angle
Outlet flow angle
Inlet blade angle
Turning angle
F34 [Angle of attack]
F35 Positive a. of a.
F36 Blade surface velocity
F37 Maximum relative b.s.v.
F38 Trailing surface velocity
F39 Pitchline blade speed
F40
F41
F42
F43
F44
F48
F49
F50
F51
F52
F53
F55
F56
F57
F58
F59

F60 Blowing air jet [effects]

[Location of compressor processes]
F61 Blade to blade
F62 Inlet to outlet
F63 Along hub
F64 Between hub and shroud

F65 Blade tip
F66 Main b. surface
F67 Propeller b. surface
F68 Impeller b. surface
F69 B. driving face + Driving f.
F72 Impeller inlet
F74 Meridional plane

[Other parts]
F75 Hub
F76 H. profile
F77 H. surface
F78 Hub-Shroud profiles
F79 Arbitrary h.s. contour
[Shroud]
F80 S. shape
F81 Improved s. design
F82 S. surface
F83 S. pressure
F84 Vaneless diffuser
[See also Ducts]
F85 Impeller tip
F86 I.t. speed
F87 Annulus area
F89 Inlet baffles

[Flow phenomena]
F90 Absolute flow
F91 Irrotational f.
[Rotational f.]
F92 Inlet whirl
F93 Prewhirl
F94 Upstream f. whirl
F95 Potential f. eddy
F96 P.f.e. formation
F97 Formation of eddy
F98 Mass f.
F99 Weight f.
G1 Maximum w.f.
G2 Overall w.f.

G3 Equivalent w.f. characteristics
G4 W.f. range
G5 W.f. variation
G6 Choked f.
G7 Choking f. coefficient
G8 Choke line + [choking line]
G9 Sonic throat velocity
[Unsteady f.]
G10 Radial maldistribution of f.
G11 Circumferential m. of f.
G12 Flow division
G13 Compressor air bleed
G14 Basic aerothermodynamic relations
G15 Stalling
G16 [Mode of stalling] Q
G17 Part speed operation
G18 Progressive stall
G19 Rotating stall
G20 Progressive r.s.
G21 Abrupt stall
G22 Complete compressor stall

[Phenomena]
G23 Stalling point
G24 Stall limit line
G25 Hysteresis effect
G26 Unstalling h.
G27 Compressor surge See also Rotating stall
G28 S. line

G29 Change in slope + Knee
[Kink] Q
G30 Flow rate
G31 Constant f. angles
G33 [F. streamlines]
G35 Relative stream surface
G35a Streamline spacing
G35b Maximum s.s.
G35c Meridional s.s.

[Performance]
G36 Prescribed velocity distribution
G37 Severe v. gradient
G38 Relative upstream v.
G39 Exit relative v.
G40 Inlet flow speed
G41 Rotational speed
G42 Percentage of design speed
G43 Low speed efficiency
G44 Intermediate speed performance characteristics
G45 Range of operation + Operation
G46 Wide range
G47 Discontinuities in performance + Discontinuity [See also Stall and surge]
G48 Slip [See also Stall and range]
G49 S. factor

[Pressure characteristics]
G50 Pressure ratio characteristics
G51 Peak p.r.
[P. rise]
G52 Head rise
G53 H.r. parameter
G54 Maximum adiabatic temp. rise

[Ducts]
[Pipe]
G55 Circular p.
[P. flow]
G56 Accelerated
G57 [BY] Magnetic field
G58 ["] Electric field
[Channel, Ducts]
G59 [Slender c.] Q
G60 [Straight c.] Q
G61 Converging c.
G62 Diverging c.

G63 Channel walls
G64 C. flow + [Flow in channels] Q
G65 Variation across c.
G66 Large Peclet number
G67 [Nozzles]
G68 Rocket n.
G69 Shock tube n.
[Jet n.]
G70 Sonic j.n.
G71 Supersonic j.n.
G72 Exhaust n.
G73 Compression n.

[Shapes]
G74 Conical n.
G75 Nearly c.n.
G76 Converging n. + Convergent n.
G77 Sonic c.n.
G78 Choked c.n.
G79 Divergent n.
G80 Conically d.n.

G81 Convergent-Divergent n. + Converging-Diverging n.
G82 Supersonic c. - d.n.

G83 Sonic n.
G84 Supersonic n.
G85 S.n. ordinates
G86 Hypersonic n.
G87 Overexpanded n.
G88 Flow regimes

G89 Rounded entry flowmeter
G90 Rounded entry venturis

[Nozzle characteristics]
G91 N. location
G92 N. geometry
G93 N. diameter + Diameter
G94 [Ratio to] Equivalent frictional length
G95 [Ratio to] Total equivalent length
G96 D. Reynolds number
G97 Pipe entry length
G98 Optimum n. shape
G99 Pressure taps
H1 N. entry
H2 Contracting section
H3 Contraction shape
H4 Throat of flow n.
H5 N. throat diameter
H6 Vertical n. position
H7 N. divergence angle
H8 N. exit angle

[Nozzle flow characteristics]
H9 N. flow + F. through a.n.
H10 N. pressure
H11 N. total p.
H12 N. p. ratio
H13 N. expansion of heated air
H14 Rate of flow of fluid
H15 Discharge coefficient
H16 Relaxation effects + Relaxation phenomena
H17 N. stagnation temperature

[Plate]
H18 Flat p.
H19 F.p. model
H20 Local f.p.
H21 Finite f.p.
H22 [F.p. of] Infinite width
H23 Tumbling f.p.
H24 F.p. surface
H25 Perforated plate + Hole drilled plates
H26 Insulated p.
H27 Parallel p.
H28 Semi-infinite p.
H29 Triangular p.
H30 Long plates
H31 Simply supported p.
H32 Differentially deflected p.
H33 Elastic sheet
H34 Rigidly attached sheet
H35 Uniform thickness sheet
H36 Plate thickness ratio
H37 Solid + S. body
H38 Finite s.
H39 Constant material properties
H40 Displacement of s.
H41 Body geometry
H42 B. slope
H43 Symmetrical body
H44 Axisymmetrical b.
H45 Three-dimensional b.
H46 B. of revolution
H47 Elliptical b.o.r.
H48 Semiellipsoid b.o.r.
H49 Slender b.o.r.
H51 Tumbling b.o.r.
H52 Yawed b.o.r.
H55 Cone
H56 Circular c.
H57 C.c. segment
H58 Elliptic c.
H59 E.c. segment
H60 10 degree semivertex angle c.
H61 Blunted c.
H62 Blunt nose c.
H63 Sharp nosed c.
H64 Sphere + Spherical body
H65 S.b. segment
H66 Spheroid model
H67 Prolate m.
H68 Hemisphere
H69 Cone h.
H69a 50° c.h.
H70 Hemispherical segments
H71 Blunted rod
H72 Cylinder
H73 Inconel c.
H74 Circular c.
H75 [Non-circular c.] Q
H76 Cone c. + C.c.bodies
H77 Elliptic c.
H78 E.c. of eccentricity $\frac{1}{2}\sqrt{3}$
H79 Hemispherical c.
H80 C. with h.nose
H81 Ogive c. model
H82 Flat faced c.
H83 C. without corners
H84 Long c.
H85 Infinite c.
H86 [I.c.] moving
H87 Semi-infinite c.
H88 C. of finite thickness
H89 Joukowski profile c.
H90 Polygon cross section [c.]
H91 Locally concave cross section [c.]
H92 Convex cross section [c.]

[By state]
H93 Stationary c.
H94 C. moving
H95 With uniform velocity
H96 Parallel with length
H97 Parallel to length
H98 Duration of time of motion
H99 Oscillating c.
J1 [with] Re-entrant angle greater than $\frac{1}{2}\pi$

[C. characteristics]
J2 C. cross section
J3 Shape
J4 C. surface
J5 Radius of curvature
J6 Downstream portion [of c.]
J7 Displacement area [of c.]
J8 Cylindrical coordinates
J9 Frictional drag on c.
J10 Ogive
J11 Two-dimensional body

[Wedge]
J12 Blunted w.
J13 W. angle
J14 W. shock a.
J15 Rectangular model
J16 Parabolic body arc
J17 Slender cone-cylinder flare
J18 Bluff body
J19 Blunt b.
J20 B. model
J21 Interaction b.b.
J22 Blunt nosed b.
J23 Flat faced b.
J24 Pointed b.
J25 Sharp edged b.
J26 Spiked b.
J27 Spike length
J28 Rigid b.
J29 Slab b.

J30 Slender b. + Thin b.
J31 S.b. theory (see also S.wing theory)
J32 Ward extension
J33 Leeward b.
J34 Windward b.
[Structures - non-aerodynamic]
J35 Fixed s.
J36 Pivot
J37 Crossed flexure p. + Crossed spring p.
J38 Properties
J39 Displaced p.
J40 Strips
J41 Strips crossing point
J42 Centre of rotation
J43 Continuous beams
J44 Single span beams
J45 Aluminium alloy 2024 T4

[Flight]
J46 Supersonic f.
J47 Hypersonic f.
J48 Interplanetary f. + I. missions
J49 Escape from Earth's gravity field
J50 Target planet approach
J51 Capture manoeuvre
J52 Motion prediction
[Entry into planetary atmosphere]
J53 Entering + Entry into p.a. + Re-entry into p.a. + Planetary re-entry
J54 Tumbling entry
J55 Transition from tumbling body motion
J56 Tumbling cessation
J57 Libration onset
J58 Entering Martian atmosphere
J59 Entering Earth's atmosphere + Re-entering E.a. + a. re-entry
J60 Hypersonic re-entry
J61 Terminal phase
J62 Trajectory + Flight t.
J63 Transfer t.
J64 Interplanetary orbit transfer
J65 Change of plane
J66 Generalized trajectory
J67 Flight path angle
J68 Orbit
J69 Satellite o.
J70 Elliptic o.
J71 Circular o.
J72 O. eccentricity
J73 O. High e.
J74 Small e.o. + O.Small e.

[Characteristics]
J75 Velocity vector
J76 Rate of contraction
J77 At perigee
J78 Rate of change with time + Time variation
J79 Rate of decay
J80 Orbital period + Period of revolution
J81 Satellite p.
J82 Rate of change
J83 S. orbital period of revolution decrease
J84 Lifetime
J85 Orbital eccentricity + Eccentricity
J86 Perigee height
J87 P.h. decrease
J88 P.h. oscillation
J89 [By] Solar radiation pressure
J90 [By] Luni-solar gravitational perturbation
J91 Perigee distance
J92 P.d. change
J93 Variation of p.d. with time
J94 Perigee air density + Air d. at p.
J95 Apogee height
J96 Apogee distance change
J97 Semimajor axis
J98 S.a. change
J99 Inclination
K1 Angle between sun and perigee
[Processes]
K2 Satellite o. changes
K3 Contraction + Orbital c.
K4 Motion of s.o. perigee
K5 Node line regression
[Interplanetary flight conditions] see K98/L4
[Flight performance]
K6 Aerodynamic characteristics
K7 Aerodynamic problems
K8 [Dynamic response] Q
K9 Efficiency
K10 Vehicle requirements
K11 Volume
K12 Design flexibility
K13 Growth flexibility
K14 Reliability
K15 Structural requirements
K16 Weight ratio
K17 Payload
K17a 25 lb. p.
K18 Cruising performance
K19 Handling qualities
K20 Manoeuvre margin
[Engine performance]
K21 E. p. requirements
K22 Rocket e. performance
K23 Supersonic e. intake [p.]
K24 E. reliability
K25 E. weight
K26 Duration of power
K27 Restart capability
K28 Maximum velocity
K29 Trajectory velocity requirements
K30 Mass ratio
K31 Thrust
K32 Gross t.
K33 Jet t.
K34 J.t. coefficient
K35 Rocket j.t.
K36 T. vector control
K37 [By] Fluid injection
K38 Gas i.
K39 Liquid i.
K40 Thrust augmentation
K41 T. loss
K42 T. coefficient

[Flight operations]
K43 Low speed problems
K44 Airspeed + Flight velocity
K45 Speed control
K46 Airspeed holding
K47 Speed stability
K48 Acceleration
K49 Variations in a.
K50 A. during boost
K51 Deceleration
K52 [By] Retrorocket
K53 Piloting
K54 Glide path holding
K55 Trajectory correction
[Flight attitude]
K57 Vehicle attitude + V. orientation
K58 Attitude control
K59 Trim attitude
K60 Nose forward a.
K61 Base forward a.
K62 Statically stable a.
K63 Body angle
K64 Pitch

K65 Pitching
K66 P. oscillating
K67 Pitchup
K68 Arbitrary p. rate
K69 Pitch stability
K70 Damping in pitch
K71 Pitch damping coefficient
K72 D. in pitch moment
K73 Rolling oscillation
K74 Bang bang roll control + Non-linear roll c.
K75 Steady roll
K76 Rolling derivative
K77 0^{o} Yaw
K78 30^{o} Yaw
K79 Yaw stability
K80 Yawing derivatives
K81 Yaw control
K82 Plunging oscillation
K83 Sinking + S. motion
K84 Indicial s.m.
K85 S. speed and S. velocity
K86 Sudden change
K87 Spin rate
K88 Sideslip
K89 Mode of rotation of satellite
K90 R. about axis

[Flight conditions]

K91 Altitude
K92 Flight a.
K93 High a. condition
K94 High a. flight
K95 A. of 300 nautical miles
K96 A. of 525 " "
K97 Maximum a.

[Interplanetary flight conditions]

K98 Environmental characteristic
K99 Zero gravity
L1 Radiation
L2 Meteorites
L3 Meteoroids
L4 High vacuum requirements

L5 Fluid
L6 Perfect f.
L7 Compressible f.
L8 Incompressible f.
L9 Viscous f.
L10 Nonviscous f.
L11 Heavy f.
L12 Light f.
L13 F. layer
L14 At rest

[Liquid]

L15 Hydrodynamic problem
L16 Hydrodynamic
L17 Water flow
L18 H. stability
L19 Instability + Wave i.
L20 Buoyancy
L21 Underwater
L22 Oil flow
L23 Surface oil
L24 Flow pattern
L25 [Gases] Q
L26 Ambient g.
L27 Ideal g.
L28 Diatomic model gas
L29 ARDC 1956 Model atmosphere
L30 Real g.
L31 R.g. effect

[By condition]

L32 High temperature g.
L33 Rarefied g. condition
L34 Dissociating g.
L34a Dissociated g.
L35 Ionized g.
L36 Electrically conducting g.
L37 Seeded g.
L38 Initially undissociated g.
L39 Equilibrium g.
L40 Reacting gases + Chemically active g. + Chemically reacting g.
L41 Gas particles
L43 Gas flow
L44 Initiated by strong shock
L45 Low density f.
L46 Rarefied g.f.
L47 First collision regime
L48 Merged layer r.
L49 Incipient m.l.r.
L50 Viscous layer r.
L51 Navier Stokes r.
L52 Dissociated stream
L53 Gas expansion
L54 Air
L55 Compressed a.
L56 Still a.
L57 Heated a.
L58 High temperature a.
L59 500-15000 Degrees Kelvin
L60 Dissociated air
L61 Fully ionized air
L62 Air components
L63 Mol fractions
L64 Energy of a.
L65 [Airflow] Q
L66 Airstream + Air current
L67 Wind speed
L68 Cold air expansion
L69 [Hot air flow] Q
L70 Equilibrium a.f.
L71 Correlated non-s. airflow

[Other gases]

L72 Nitrogen
L73 Atomic n.
L74 Oxygen
L75 Atomic o.
L76 Gas mixture
L77 Nitrogen-oxygen m.

[Fuels]

L78 Ethylene
L79 Methane
L80 Mixed hydrocarbon compound f.
L81 [Fuel] Burned in air
L82 Combustion product gas
L84 Equivalence ratio
L85 Flow properties
L86 [Atmosphere] Q + Atmospheres
L87 Oblate a.
L88 O. rotating a.
L89 Spherically symmetrical a.
L90 Planetary a.
L91 Earth a.
L92 Upper a.
L93 Extreme u.a.
L94 F.I. layer
L96 150-230 Km. attitude
L97 210-660 " "
L98 190-280 " "

[Study of atmosphere]

L99 [By] Satellite observation
M1 Atmospheric model investigation
M2 Rocket measurement
M3 Altitude results

[Atmosphere properties, characteristics]

M4 Scale height
M5 Atmospheric oblateness
M6 Atmospheric rotation
M7 Atmospheric drag + A. resistance + Air drag
M8 [Effect of] Equatorial belt
M9 [" "] Earth rotation
M9d Air drag around orbit
M9x [Pressure] .0001-100 atmospheres
M12 Air density + Atmospheric d.
M13 Air d. profile

M14 D. scale height
M15 Logarithmic curve + L.d.c.
M16 Density results
M17 Variation of d.
M18 Seasonal d.v. + V. with season
M19 V. from day to night
M20 Daytime d.
M21 Diurnal d.v. + Diurnal v.
M22 [effect of] Ultra-violet radiation absorption + Electromagnetic radiation
M23 Nighttime d.
M24 Latitude variations + V. of latitude
M25 Relative variation with height
M26 Solar activity [effect on a.d.]
M27 Standard flux [" " "]
M28 Solar 20 c.m. radiation ["]

[Study of air density]
M29 Gauge on satellite
M30 Singly mounted gauge
M31 Gauge errors

[Influences on atmosphere]
M32 Latitude
M33 Season

M34 Fluid mechanics
M35 Flow + Fluid f.
M36 Flow surveys
M37 F. pattern
M38 F. field
M39 Body f.f.
M40 B.f.f. gradient
M41 Local f.

M42 Low speed f. [<M.0.3]
M43 Mach 0.
M44 Subsonic f. + S. speeds
M45 [S. regime] Q
M46 S. Mach no. + Subcritical M.n.
M47 [Low s. speeds] Q + Low s.f.
M48 High s.s. + High s.f.
M49 Mach 0.5 - 0.6.
M50 M.0.5
M51 M.0.6
M52 M.0.7
M53 Transonic speed + T.f. [M.0.8-1.2]
M53a T.s. range
M53b M.0.6-1.20
M53c M.0.65-2.20
M53d M.0.7-1.1
M53e M.0.8-1.15
M53f M.0.8
M53g M.1
M53h T.f. theory
M53i High speed
M53j Sonic s. + s.f.
M53k Speed of sound
M54 Supersonic s. + S.f.
M54b Low s.s. + Low s.f.
M54c Mach 1.39
M54d M.1.62
M54e M.1.75
M54f M.1.8
M54h [High s.M.no.] Q + High s.f.
M54i M.2
M54j M.2.02
M54k M.2.47
M54m M.2.49
M54n M.2.91
M54p M.3
M54q M. nos. above 3
M54s M.3.3
M54t M.4
M54v S. stream
M54w Ambient s.s.
M54x Local s.f.
M55 Hypersonic speed + Hypervelocity + H. flow [>Mach 5] + [H.Mach no.] Q + High flight M. nos.

M55b Mach 5.8
M55c M.6
M55d M.6.2
M55e M.6.8
M55f M.6.86
M55g M.9.6
M55h M.10
M55i M.12
M55j M.n. up to 14
M55k M.14
M55m M.19.6
M55n M.n. range 16.7-25.4
M55p Escape speed + E. velocity
M55q Re-entry v.
M55s Super satellite speed

M60 [Hypersonic layer] Q
M61 H. approximation
M63 [H. simulation] Q
M64 H. similitude
M65 H. experimental data

M69 Free stream + F.s. flow
M70 F.s. Mach no.
M71 Subsonic f.s.
M72 F.s. with Mach nos. near unity

M73 F.s. pressure ratio
M74 F.s. static pressure
M75 Main stream f.
M76 Supersonic m.s.
M77 M.s. Mach no.
M77a External flow
M77b E.f. conditions

[Boundary layer]
Boundary layer (N64/063)

M78 Laminar f.
M79 Natural l.f.
M80 Turbulent f.
M81 T.f. field

M82 Steady f.
M83 F. past parallel walls
M84 S.f. theory
M85 Potential equations
M86 S. motion characteristics
M87 Uniform f.
M88 U.f. duration
M89 Unsteady f.
M90 Non-steady f.
M91 Kirchoff discontinuities f. theory
M92 Separation induced unsteady effects

M93 Adiabatic f.
M94 Isentropic f.

M95 Equilibrium f.
M96 Non-equilibrium f.
M97 Non-E. stream
M98 Slip f.
M99 Free molecule f. regime

N1 Shear f.
N2 Unbounded f.
N3 Poiseuille f.
N4 Couette f.
N5 Fully developed f.

N6 Accelerating f.
N7 Decelerating f.
N8 Separated f.
N9 Severely s.f.
N10 Intersecting f. fields
N11 Isobaric f.

N12 One-dimensional f.
N13 Quasi one-d.f.
N14 Q. one-d. f. equations
N15 Two-d. f. + Plane f.
N16 Two-d. f. field
N17 Two-d. f. theory
N18 Three-d. f.
N19 Three-d. motion
N20 Three-d. f. theory

N21 Symmetrical f.
N22 Axisymmetric f. [= 3-d. f.]

N23 Perpendicular f. field
N24 F. curvature + Curvature
N25 Conical f. field
N26 C. f. theory
N27 Generalized theory [of conical f.]
N28 [Quasi-c. f.] Q
N29 Q-c.f. field
N30 [Q-c.f. theory] Q
N31 Parabolic f.

N32 Non-viscous f. + Inviscid f.
N33 Frictionless f.
N34 Inviscid f. model
N35 Outer [i.f.m.]
N36 Viscous f. + Viscous + Viscid f.
N37 V. fluid motion + V.m.

N38 Incompressible f. + I. fluid f.
N39 I. fluid motion
N40 I. + theory
N41 Compressible f.
N42 C.f. analysis

N43 Continuum f. field development
N44 C.f. model
N45 C.f. theory

N46 Undirectional motion
N47 Flow parallel to generators + In stream + Parallel to generators
N48 Forward f.
N49 Reversed f.

N50 Pure translational motion + Potential f.
N51 Potential f. theory
N52 Vertical translation
N53 Rotational f.

N54 Non stationary f. + Transient f.
N55 T. electrical f. [analogy]

N56 Low Reynolds no. f.
N57 High " " f.
N58 Newtonian f.
N59 Slug f.
N60 Forced f.
N61 High temperature f.
N62 [Hot f.] Q
N63 Linearized f. analysis
N64 Boundary layer + B.l. flow [should follow M77b]

N65 B.l. theory (see also T57/58)
N68 Polhausen solution
N69 Wall b.l.

N70 Laminar b.l. + L.b.l.f.
N71 Inner l.b.l.
N72 L.b.l. thickness
N73 Turbulent b.l. + T.b.l.f.

N74 Compressible b.l.
N75 Incompressible b.l.

N76 Fully attached f.
N77 Stagnation b.l.
N78 3-dimensional b.l.
N79 Ionized b.l.

N80 Behaviour
N81 F. attachment see also R62
N82 A. line
N83 B.l. growth
N85 Thickening of b.l.
N86 B.l. traverses
N87 B.l. transition + Transitional b.l.
N88 [Natural t.] Q
N89 B.l.t. position
N90 B.l. separation + Flow separation + F. with s. + S. + B.l.f.s.
N91 Stalledf.
N92 Low speed b.l.s.
N93 Shockwave induced b.ls. + S.i.b.l.s. + S.i. + S.i.s.
N94 Forward [s.i.b.l.s.]
N95 Outboard
N96 Laminar b.f.s.
N97 Separation of forward f.
N98 Rearward turbulent s.
N99 Transitional b.l. separation + T. layer regime

01 Turbulent b.l.s.
02 Vortex type b.l.s.

03 Separation onset
04 B.l.s. delay
05 B.l.s. position +
Separation positions
06 Separated region
06a Extent [of s.r.]
07 S. point
08 Spanwise position of s.
09 S. pressure

010 B.l. reattachment + R
011 B.l. viscosity effects
012 B.l. displacement + D.
013 B.l.d. effect
014 B.l. interference
015 B.l. shock wave interaction + With s.w.
016 Generated externally
017 Generated internally
018 [By] Wedge
019 Wedge Generated s.w.
020 Upstream influence
021 B.l. heat transfer
022 Laminar b.l. heating

[B.l. Properties]
023 B.l. profile
024 B.l. thickness
025 [Thick b.l.] Q
026 B.l. momentum t.
027 M.t. [of laminar b.l.]
028 Artificial thickening
029 Displacement t. + B.l.d.t.
030 B.l. form parameter
031 Divergence boundary
032 B.l. stability
033 Tollmien Schlichting theory
034 Shear wave resonances

035 B.l. control
035a Blowing
036 Blowing at knee
037 Slot blowing + High velocity b.
037f/s Blowing etc. (from U66/76)
038 Distributed suction
039 Suction at knee
040 Transition promotion
041 [By] Surface roughness
042 Two dimensional wire
044 Three dimensional disc
045 Spanwise wire
046 Sandpaper
047 Distributed roughness bands + R. band techniques
048 R. band materials
049 B. width
050 Carborundum
051 Ballotini glass bead
052 Sublimation indicator
053 Hexachloromethane

[Properties of roughness elements]
054 Critical r. height
055 R. Reynolds number
056 Degree of tunnel turbulence
057 R. location
058 R. shape
059 Grain size + Particle size

060 Spacing between grains
[B.l. control research in wind tunnels]
061 Complete aerofoil technique
062 Half aerofoil technique + Bump t.
063 Lockheed bump
[Flow elements]
064 Cocurrent streams
065 Streamtube
066 Streamline + Flow s.
067 Filament line
068 Stagnation streamline
069 S. position
070 Normal s. slope
071 Induced by crossflow
072 Induced by change [in] Mass flow density
073
077 S. walls
078 Stream filament theory
079 Stream functions
080 Stokes stream function variable
[Sources, sinks, doublets]
081 Source sink methods
082 Von Karman s.s.m.
083 Doublet superposition
084 Supersonic d. equation
085 Source distribution
086 Doublet distribution
087 Vortices
088 Bound vortex
089 Trailing vortices
090 Horseshoe vortex
091 Elementary h. vortex distribution
092 Vortex system
094 Individual v.
095 Eddy region
097 Stationary vortex pair
098 Karman street
099 Main vortex
P1 Secondary vortex
P2 Chordwise v.
P3 Spanwise v.
P4 Rectangular vortex
P5 Co-rotating v.
P6 Counter rotating v.
[Processes and properties]
P7 Vortex flow
P8 Vortex formation
P11 Vortex growth
P12 Vortex movement
P13 Main vortex displacement
P14 Eddy separation
P15 Vorticity interaction domain
P16 Vorticity interaction theory
P17 Vortex distribution
P18 Eddy frequency
P19 Location of part span vortices
P20 Vortex paths
P21 V. p. location
P22 Vortex sheet position
P23 Vorticity variable
P24 Vorticity contours
P25 Vortex strength
P26 Main v.s.

P27 Jet
P28 J. stream
P29 Free j.
P30 Axisymmetric f.j.
P31 J. exhaust + E.j.
P32 Hot e.j. + Hot j.e.
P33 Hydrogen burned in air
P34 Rocket e.j. + R.e.
P35 Supersonic rocket
P36 Propulsive j.e.
P37 Rocket j. + Rocket [producing j.]
P39 Supersonic retrorocket
P40 Simulated r.
P41 Jet engine [producing j.]
P42 Propulsive j.
P43 Sonic p.j.
P44 Hot p.j.
P45 Reaction j.
P46 Air j.
P47 Subsonic a.j.
P48 Supersonic a.j.
P49 High energy a.j.
P50 Small a.j.
P51 Cold a.j.
P52 Airblowing j.
P53 Cold helium j.
P54 Mixture of cold gases
P55 Hydrogen and carbon dioxide
P56 Two dimensional j.
P57 Axially symmetric nozzle j.
P58 Two-d. nozzle j.
P59 Sonic nozzle j.
P60 Supersonic nozzle j.
P61 High temperature j.
P62 Ehtylene heated j.
P63 Sonic j.
P64 Supersonic j.
P65 Side j.
P66 [Forward facing j.] Q
[see also Direction of emission Q1/7]
P67 [Exit] Q + Jet exit
P68 Propulsive j. exit
P69 Jet exit diameter
P70 [Exit position] Q
P71 J. location
P72 Rocket j.l.
P73 Upstream exhaust
P74 Downstream exhaust
[Location of effects]
P75 Ahead of j.
P76 Downstream of exit
P77 Location within j.
P78 J. energy
P79 J. force
P80 J. Mach no.
P81 J. Reynolds no.
P82 J. total pressure
P83 J. static pressure
P84 J. stagnation pressure + J. stagnation
P85 J. pressure ratio
P86 J. structure
P87 J. wavelength
P88 J. boundary
P89 J.b. curvature
P90 Initial inclination [to exit shock]
P91 J.b. shape
P92 J. size
P93 J. diameter ratio
P94 J. slot width
P95 Specific heat of j.
P96 Exhaust ratio of s.h.
P97 Exhaust density
P98 Exhaust velocity
P99 Jet noise
[Direction of emission]
see also P66
Q1 Exhausting + Issuing
Q2 E. normal + Exiting n. +
E. perpendicularly
Q3 E. laterally
Q4 E. countercurrent
Q5 Spanwise direction
Q6 Beneath wing
Q7 Forward from nose
Q8 Rocket j. firing
Q9 J. viscous scavenging phenomena
Q10 J. interference + J.i.phenomena
Q11 Rocket j.i.
Q12 Jet exhaust i.
Q13 J.i. effects
Q14 Exit shock
Q15 E.s. wave angle

Q16 J.s.w. angle
Q17 J.s.w. apex location
Q18 J. wake
Q19 Propulsive j.w.
Q20 J. mixing
Q21 Compressible j.m.
Q22 Isoenergetic j.m.
Q23 Turbulent j.m.
Q24 Production of species [in reacting gases]
Q25 Net mass rate
Q26 Continuity of species
Q27 Chemical reaction
Q28 Concentration profiles
Q29 [Effect of] Rocket thrust [Study]
Q30 [Use of] Sting balance measurement
Q31 Jet simulation
Q32 [By] Helium s.

[Waves]
Q33 Kelvin Helmholtz w.
Q34 Riemann w.
Q35 Tollmien Schlichting w.
Q36 Reflected w. + Waves reflected
Q37 Reflected from contact surface
Q38 Wave reflection interference
Q39 Flexural w.
Q40 Longitudinal w.
Q42 Compression w.
Q43 C.w. resonances
Q44 Expansion w.
Q45 Reflected head
Q46 Originating
Q47 [at] Main diaphragm [of shock tunnel]
Q48 Shock w. + S.
Q49 Strong s.w.
Q50 Mach w. + M. line
Q51 Infinitesimally thin s.w.
Q52 Forward s.w.
Q53 Rear s.w.
Q54 Terminal s.w.
Q55 Rate of movement
Q56 Outboard s.w.
Q57 Normal s.w.
Q58 Oblique s.w. + O.s.w.system
Q59 Detached s.w.
Q60 Attached s.w. system
Q61 Hypersonic s.w.
Q62 Incident s.
Q63 Oxygen s.w.
Q64 O.s. front
Q65 Nitrogen s.w.
Q66 N.s. front
Q67 Argon s.w.
Q68 Spherical s.
Q69 Cylindrical s.
Q69a Mach cone
Q70 Primary s.
Q71 Reflected s.

[Shock wave phenomena]
Q72 Rankine-Hugoniot s. relations
Q73 Mach angle
Q74 Deflexion angle
Q75 Expansion zone + E. region
Q76 Supersonic e.r.
Q77 Initial e.r. + Prandtl-Meyer region
Q78 Flow behind a.s.w. + Flowfield behind + Region behind shock + Upstream of s.w.
Q79 Behind normal s.
Q80 Ahead of s.w.
Q81 S.w. pattern
Q82 S.w. structure
Q83 S.w. shape
Q84 S. curvature
Q85 S.w. thickness
Q86 S.w. strength + S.s.
Q87 S.w. location + S. positions
Q88 Terminal position
Q89 S.w. position divergence
Q90 Sonic point location + Location of s.p. + Sonic p. + Position
Q91 Stand-off distance + s.s-o.d. + S.detachment distance
Q92 Shock Mach no.
Q93 Range of primary s.m.n.
Q94 High s.m.no.
Q95 Low s.m.no.
Q96 Air s. velocity
Q97 S. equilibrium temperature
Q98 [Shock layer] Q
Q99 Entropy layer
R1 Detached s.l.
R2 Thin s.l.
R3 Thin s.l. theory
R4 Shock wave surface [Properties]
R5 S. layer luminosity
R6 S.l. luminous gas region
R7 Equilibrium s.l.property

[Processes]
R8 S.w. formation
R9 Time of appearance
R10 S.w. development
R11 S.w. movement
R12 S. reflection
R13 R. of primary s.
R14 Attenuation of reflected s.
R15 Attenuation of s.w.
R16 [Analysis by] Conservation of mass equation
R17 Transonic flow attachment
R18 S. displacement
R19 Conical s. separation
R20 S. transition zone
R21 S.w. interaction
R22 Aerodynamic forces + [Airforces] Q
R24 Aerodynamic inertia
R25 A. normal f. + Normal f.
R26 Reaction n.f.
R27 Incremental n.f.
R28 Spanwise coordinate
R29 Axial f.
R30 A. body f.
R31 Centrifugal f.
R33 Side f.
R34 Tangential f.
R35 Retarding f.
R36 Deceleration f.
R37 Newtonian impact f.
R39 Body f.
R40 F. coefficient
R41 Static aerodynamic characteristics
R42 Longitudinal aerodynamic characteristics + Longitudinal aerodynamic coefficients
R43 Axial f.c.
R44 Chord f.c.
R45 Normal f.c.
R46 Incremental n.f.c.
R47 Force determination
R48 Force measurement
R49 Loading + Aerodynamic load + A. loading
R50 Chordwise load + C.loading
R51 Spanwise loading
R52 Uniform s.l.
R53 Subsonic span loads
R54 Total span loads
R55 Symmetrical loading
R56 Model loading
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R61 Unsteady loads
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R63 Load distributions
R65 Lift
R66 Starting l.
R67 Transient l.
R68 Final l.
R69 Maximum l.
R70 Zero l.
R71 Unsteady l.
R72 [U.l. distribution] Q
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R75 Circulatory l.
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R78 Induced l.
R79 Incremental l.
R80 Body l.
R81 Section l.

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R82 Lift effect [see also Vortex system 092]
R83 L. slope
R84 Sectional l.s. + Section l. curve
R85 Distribution of s.
R86 Lift-curve slope
R87 Lift-drag ratio
R88 Maximum l.d.r.
R89 L. vector
R90 Phase angle
R91 Magnitude
R92 L. distribution
R93 [Calculation by] Rounding off rule
R94 Spanwise l.d.
R95 D. of pivoted points
R96 L. interference
R97 Total l. response
R98 Frequency response in l.
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S1 Apparent mass effects
S1a Vertical acceleration
S2 Lift coefficient + Lifting c. + C. of l.
S3 L.c. divergence
S4 Oscillatory l.c.
S5 Asymptotic behaviour
S6 Total l.c. + Coefficient of t.l.
S7 Trim l.c.
S8 No-lift moment coefficient
S9 Indicial l. function + Unsteady l.f.
S10 Wagner i.l.f.
S11 Theodorsen alternating l.f.
S12 Kussner function [Determination, etc.]
S13 Downwash integral equation
S14 Classical wave equation solution
S15 Kirchoff formula
S16 Drag + Retarding force
S17 Friction effects
S18 Model d.
S19 Total d.
S20 Total d. coefficient
S21 Profile d. coefficient
S22 Form d.
S23 Skin friction + S.f.d.
S24 Average s.f. coefficient
S25 Distribution
S26 Viscous d. + V. force
S27 Pressure d. (see also Form d.)
S28 Normal p.d.
S29 Wave d.
S30 Lift dependent d. + Induced d.
S31 L.d.d. component
S32 Induced d. correction
S33 Resultant d.
S34 D. penalty
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S36 [Drag phenomena]
S37 D. coefficient
S38 Profile d.c.
S39 Total d.c.
S40 D. reduction
S41 Minimum-d.design
S42 D. rise
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S44 [Blast + Gust] Q
S45 Sinusoidal gust
S46 Gust penetration
S47 P. of sharp edged g.
S48 P. of s.e. normal g.
S49 Moments + Aerodynamic m.
S50 Pitching m.
S51 Aerodynamic centre
S52 A.c. characteristics
S52a Local s.c.
S53 P.m. coefficients
S54 P.m. curves
S55 P.m. derivatives
S56 P.m. reversal
S57 Rolling m.
S58 Frequency response in moment
Indicial response in moment
S59 M. function
S60 Indicial m.f.
S61 M. vector
S62 M. coefficient
S63 Aerodynamic balance
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S65 Total p.
S66 T. head measurement
S67 T.p. ratio
S68 Static p.
S69 S.p. survey
S70 S.p. ratio
S71 S.p. measurements
S72 S.p. gradient
S73 S.p. distribution
S74 Dynamic p.
S75 Impact p. survey
S76 Base p.
S77 Two-dimensional
S78 B.p. measurement
S79 Kink p.
S80 Stagnation p. + S. point p.
S81 S. pressure coefficient
S82 Flight s.p.
S83 Centre of p.) see
S84 Spanwise c.o.p.) P. char-
S85 Chordwise location) acteristics (S92)
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Constant p.
S87 Oscillating p. field
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S91 see also S85/86
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P. coefficient
P. ratio
P. distribution + P.profile
P. gradient
Self-induced
Streamwise
S92 Body p.d.
S93 Chordwise p.d.
S94 Longitudinal p.d.
S97 Radial p.d.
S98 Sinusoidal p.d.
S99 Deflexion
T1 Travelling p.d.
T2 Prescribed p.d.
T3 Tangential p. gradient
T4 Vanishing p.gradient
T5 Zero p. gradient
T6
T7
T8
T9
T10
T11
T12

T13 P. variation + P. Fluctuation + P. difference
T14 P. divergence
T15 P. reduction + Fall of p.
T16 Base bleed
T17 P. recovery
T18 P.r. reduction
T19 P. rise
T20 Pressure determination
T21 P. measurement
T22 P. plotting
T23 P.p. model
T24 P. tappings
T25 Photorecording manometer
T26 Multiple tube manometer
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T27 Flow development
T28 Control
T29 Longitudinal c.
T30 Vertical plane c.
T31 Lateral c.
T32 Directional c.
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T33 Projection of jet
T34 Jet reaction control + Reaction type j.c.
T35 Stability + Aerodynamic s.
T36 Flow s.
T37 Static s.
T38 S.s. characteristics
T39 S.s. derivatives
[Dynamic s.]
T40 D.s. characteristics
T41 D.s. derivatives
T42 Longitudinal s.
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T44 Directional s.
T45 [Aerodynamic derivatives] Q
+ Stability d.
T46 Direct a.d.
T47 Indirect a.d.
T48 Rotary d.
T49 S. control
T49a [Stabilization] Q
T50 Destabilizing effect
T51 Disturbance + D. to flow
T52 Distortion
T53 Downstream d.
T54 Small flow d.
T55 Infinitely small d.
T56 Small d. theory + Small perturbation theory
T57 Inviscid s.d.t. see also B.L. theory N65
T58 Hypersonic s.d.t. see also B.L. theory N65
T59 Interference + Interaction
T60 Interference load
T61 Aerodynamic interaction effect + Interaction effects + Interference effects
T62 Second order interference
T63 Wake interference effects
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T66 [Interaction between] Parallel streams
T67 Blockage interference
T68 B. effects
T69 Solid b.
T70 Wake b.
T71 B. ratios
T72 B. correction
T73 Mass flow method
T74 Reflection + Reflected
T75 Multiple reflection
T76 Ground effect + Proximity to ground
T77 Adverse g.e.
[Methods of determination, etc., of interference]
T78 Discrete horseshoe vortex [method] + Finite step
T79 Shock expansion method
T79a Blasius equation
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T80 Nonsteady perturbation potential
T81 Perturbation velocity potential
T82 Relaxation time effects
T83 Interaction force
T84 I.f. ratio
T85 Mixing flow + Fluid m. + M. process
T86 Constant pressure m.
T87 Laminar m.
T88 Turbulent m.
T89 Stagnation flow
T90 S. air f.
T91 S. region
T92 Axisymmetric s.r.
T93 S.r. regime I
T93a S.r. regime II
T94 S. point + S.p. flow
T95 Rear s.p.
T96 S. conditions
T97 S. gas state
T98 S. temperature
T99 High s.t.
T99a S.t. from 2400-3800°F
T100 S.p. heating
T101 Flight s. enthalpy
T102 Choking
U1 Choking Mach no.
U4 [Choked tunnel] Q
U5 C. wind t.
U6 C.w.t. tests
U7 Downwash
U8 Induced d.
U9 Total d.
U10 Centre line d.
U11 Steady d. conditions
U12 D. distribution
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U15 U. field
U16 U. distribution
U17 Sidewash
U18 Spanwise outflow
U19 Wake + W. flow
U20 W. width divergence
U21 Development of circulating w.
U22 External slipstream
U23 Turbulent
U24 Surge

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U25 Velocity
U27 Induced v.
U28 Vertical i.v.
U29 Vertical v.
U32 Gas flow v.
U33 V. potential
U34 Symmetric v.p.
U35 Anti-s.v.p.
U36 Acceleration p.
U37 V. distribution + V. variation
U38 V. gradient
U39 V. profile
U40 Linear v.p.
U40a Jeffery-Hamel solution
U41 Quasi-conical v. field
U42 V. measurement
U44 M.f. fluctuation [see also Sound waves]
U45 Mass flow profile
U46 Flow parameters
U47 Mach number
U48 Stream M.n.
U49 Local M.n.
U50 Increasing M.n.
U53 M.n. profile

U54 Prandtl number
U55 Reynolds number
U56 Low R.n.
U56a R.n. less than 40
U56b R.n. 40
U56c R.n. 44
U57 Local mesh R.n.
U58 Hartmann number
U59 Flow coefficient
[Circulation]
U60 C. function
U61 C. control
U62 [by] Laminarization
U63 Reduction of c.
U64 Vorticity
[Injection]
[Characteristics]
U66 Blowing pressure 037f
U67 Injected gas + Injected gas stream 037g
U68 Molecular weight 037h
U69 Specific heat ratio 037i
U70 Accommodation height 037j
U71 Injected liquid 037k
U72 Primary gas 037m
U73 Exothermic reaction 037n
U74 Magnification factor 037p
U75 Small rate of heat addition 037q
U76 Specific impulse 037s
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U77 Density
U78 D. distribution
U79 D. variation + Change of d.
U80 D. ratio
U81 Low d.
U82 Compressibility
U83 C. effects
U84 Viscosity
[Characteristics]
U85 [V.-Temperature law] Q
U86 [Linear v.-t. solution] Q
U87 Viscous effects
U88 Shear
U89 Coefficient of v.
[Aeroelasticity]
U90 Static a.
U91 Oscillatory motion + Oscillating
[see also] W50
U92 Electrical excitation + Electrically excited oscillations
U93 [at] Phase resonance
U94 Electrical self-excitation
U95 [with] Coupled freedoms
U96 Elastic excitation
U97 Slowly propagating o.
U98 Fast propagating o.
U99 Decaying o.
V1 Sinusoidal sinking o.
V2 Continuous o.
V3 Oscillating harmonically
V4 Sinusoidal vertical o.
V5 Asymmetrical o.
V6 Flapping o.
V7 Torsional o.
V8 Bending o.
V9 Sinusoidal o. displacement
V10 Neutral o.
V11 Free o. + Free vibration
V12 Angle of attack o.
V13 Resonant vibration
V14 Inexorable forcing
V15 External rigid drive
V16 Internal rigid drive
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V17 F. oscillations + Flutter
V18 Bending type f.
V19 High speed f.
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V20 F. coefficients
V21 Aerodynamic f. derivatives
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V24 F. frequency
V25 F. speed
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V28 Margins of safety
V29 F. calculation
V30 F. testing + F. tests
V31 Variable medium
V32 F. model
V33 Construction
V34 M. density ratio
V35 M. stiffness [=bending s.]
V36 M. weight ratio
V37 Reduction m. elasticity
V38 Mass loading
V39 Increased
V40 Modal analysis
V41 F. precipitation
V42 Static testing
V43 Modified strip analysis + Rayleigh type a.
V44 Dietze's method
V45 Vibrational modes + Oscillation m.
V46 Uncoupled v.m.
V47 Normal m. + N.m. of v.
V48 Oscillating in elastic m.
V49 Oscillating in rigid m.
V50 Body m.
V51 Rayleigh oscillation m.
V52 Selected m.
V53 Sound waves see also Mass flow fluctuation
V54 Aerodynamic noise
V55 Subjected to + Exposed to + Engine noise
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V57 Sound propagation
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V59 Oscillatory coefficients
V60 O. aerodynamic derivatives
V61 Measurement of reaction
V62 [Measurement by] Logarithmic circuit
V63 Aerodynamic stiffness derivatives + S.d.
V64 Degrees of freedom
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V65 Natural frequencies
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V67 Frequency parameters
V67a F.p. less than .02
V68 F. measurement
[Phase]
V69 P. measurement
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V70 A. measurement
V71 Excitation
V72 Damping
V73 Internal d.
V74 Structural d.
V75 Aerodynamic d.
V76 Phugoid d.
V77 A.d. coefficient
V78 A.d. derivatives + D.d.
V79 Buzz
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V81 D. dynamic pressure
V82 Buffeting
V83 B. boundary
[Research]
V84 Systematic procedure
V85 Kernel function
V86 Piston theory
V87 Reciprocal relations [method]
V88 V. testing + V. tests
V89 Reference material

V90 Dampometer
V91 Displacement pickups
V92 Force pickups
V93 Pressure pickups

[Aerodynamic reference parameters]
V94 [Angle of incidence] Q + Angle of attack + Arbitrary a.of.a + Incidence
V95 A. of a. correction + A.of i.c.
V96 Zero a. of a.
V97 Zero model incidence
V98 Moderate a. of a.
V98a Angle of a. range 0^{o} - 65^{o}
V99 Incidence range 0^{o} - 10^{o}
V99a A. of a. range 4 - 18^{o}
W1 High a. of a. + High incidences + Large a. o. a. see also F54
W2 Uniform a. of a.
W3 Increasing i.
W4 A. of a. distribution
W5 Vertical position [of tail]
W6 Planform
W7 Sweep angle + Sweep
W8 Angle of sweep range of 0-75 degrees
W9 Angle of sweepback
W9a S. a. 55^{o}
W10 S. a. 60^{o}
W11 79.5^{o} s.
W12 Aspect ratio
W13 Zero a.r.
W13a Aspect ratio 1
W13b " " 2
W13c " " 2.823
W13d " " 2.828
W13e " " 6.1
W14 Taper ratio
W14a T.r. .333
W15 Thickness
W16 Thickness/chord ratio
W16c T.c.ratio about 5%
W16d " 6%
W16e " 16%
W16f " 24%
W17 Thickness distribution
W18 Twist
W19 Dihedral angle
W20 A. of d. range 0 - 30 degrees
W20a 4.5^{o} d.a.
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W21 Spanwise
W22 Finite s.
W23 Half-s. model
W24 Part s.
W25 Body size
W26 B. diameter
W27 B.d. ratio
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W28 Chordwise
W29 C.coordinate
W30 Model c.
W31 C. ratio
W32 Camber
W33 Conical c.
W34 C. correction
W35 C. distribution
W36 Centre of gravity location
[Section]
W38 Aerodynamic design
W39 Cross section + Body c.s. + Arbitrary c.s.
W40 Percentage of solid c.s.
W41 Peaky s.
W42 Rooftop s.
W43 Midspan s.
W44 Sectional shape + S. shape
W45 S. thickness
W46 R.A.E. 101 s.
W46a 10% RAE 101 s.
W47 9% RAE 101 streamwise s.
W48 5% RAE 101 streamwise s.
W49 NACA 65A 004 s.

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W50 Motion
W51 Transient m.
W52 Translation
W53 Rotation
W54 Rotational modes
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W56 Momentum deficiency profile
W57 Gravity
W57a Influence of gravity
W58 Forces
W59 Load + Applied f.
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W60 Random p. loading
W61 Compression + C. load
W62 Tension + T. load
W63 Bending + B. load
W64 Thermal stress
W65 Elastic range
W66 Plastic range
W67 Maximum stresses
W68 Loads, Longitudinal
W69 Loads, Concentric axial
W70 Loads, One-dimensional
[Stress-strain phenomena]
W71 Weakening
W72 Compression buckling
W73 Post-buckling
W74 Torque
W75 Rotational stiffness
W76 Bending stiffness
W77 Torsional stiffness
W78 Torsional rigidity
W79 Modules of elasticity
W80 Time dependent
W81 Mode shapes
W82 Stress distribution
W83 S. frequency d.
W84 Spanload d.
W85 Steady state d.
[Method of determining s.d.]
W86 Weissinger method
W87 Downwash matrix
W88 Elasticity matrices
W89 Aerodynamic twist matrices
W90 Structural twist matrices
W91 Plastic analysis
W92 Stress power spectra
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W93 Model response
W94 Statistical superposition
W95 Powell theory
W96 Test specimens
W97 Instrumentation
W98 Material control
W99 Coupon test
X1 Magneto-fluid mechanics
X2 Electric body force
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X4 [Heat equation] Q
X5 Thermal equilibrium
X6 Temperature
X7 Ambient t. + Local stream t.
X8 Flame t.
X9 Room t.
X10 Transient t.
X11 Constant t. + T. uniform
X12 Recovery t.
X13 Elevated t.
X14 Maximum t.
X15 Reduced t.
X16 T. dependent values
X17 T. inversion
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X19 Unit triangle v.

X20 T. distribution + T.profiles + T. history
X21 Transient t.d.
X22 One-dimensional t. gradient
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X24 T. gradients, Transverse
X25 T. Linear gradient
X26 Equilibrium t.
X27 T. measurement
X28 Spectrum line reversal
X29 Double light beam
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X31 Carbon arc
X32 Sodium line reversal + S.l.r. method
X33 Oscillograph
X34 Interference filters
X35 Sodium chloride + Salt
X36 Sodium iodide
X37 Specific heat
X38 S.h. ratio parameters 1.10-1.67
X40 S.h. variation
X41 Conductivity + Thermal c.
X42 Variable c.
X43 Coefficient of t.c.
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X46 Coefficient of t. expansion
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X47 Combustion erosion
X48 Sublimation erosion
X49 S. rate
X51 Ablation + Surface a.
X52 A. rate + Rate of removal
X53 A. r. sensor
X54 Variable capacitance sensor
X55 Effective heat of a.
X56 Ablating materials
X57 Evaporation + Vaporization
X58 Evaporating into main stream
X59 Thermal distributions

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X60 Thermodynamic problem
X61 Thermodynamic properties
X62 [Thermodynamic equilibrium] Q
X63 Enthalpy
X64 Total e.
X65 Intermediate e.
X66 I.e. approximation
X67 Newtonian intermediate e.a.
X68 Mean e.
X69 E. functions
X70 Recovery e.
X71 Stream e.

X72 E. layer
X73 Recovery factor
X74 Effective heat capacity

X75 Entropy
X76 E. gradient

X77 Isentropic exponent
X78 Specific gas constant
X79 Heat transfer
X80 [Heat input] Q
X81 Cooling
X82 Strong surface c.
X83 Radiation c.
X84 Back r.
X85 R. effects
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X90 Shielding mechanism
X91 Polymers (Teflon type)
X92 Teflon material
X93 T. heat shield
X94 Quartz protection shield
X95 Heat sink
X96 Thicker outer skin
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X99 Molybdenum
Y1 Tungsten
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Y2 Convection h. + Convective h. + Convection + C. of heat + Convective heat transfer
Y3 Forced c.h.
Y4 Convective heat transfer rate
Y5 Frictional h.
Y6 Aerodynamic h.
Y7 A. laminar h.
Y8 A.h. rate + H.r.
Y9 Laminar a.h.r.
Y9a Green function [integration with]
Y10 H. at edge
Y11 Local h. rate
Y12 Conduction + Heatflux + Heat flow + Heat Conduction
Y14 Average h. flow
Y15 One-dimensional h.c.
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Y17 Heat flux distribution
Y18 H.c. equations
Y19 Transient h.c.e.
Y20 Diffusion
Y21 [effect of] Charged particles
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Y23 Heat release
Y24 Total h. transfer
Y25 Transient h.t.
Y26 Steady h.t.
Y27 Frozen h.t.
Y28 H.t. coefficient
Y29 H.t. rate
Y30 Large gross h.t.r.
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Y33 Local h. flow rates
Y34 Laminar [local heating r.]
Y35 Laminar h.t. distribution

Y35p Kinetic theory
Y35q K.t. solution
Y35r Energy equations
Y35s Equations of motion
Y35t Momentum e.
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Y35v Perfect gas theory
Y35w Equations of state
Y35x [Chapman-Enskog theory] Q

Y36 Dissociation
Y37 Dissociating fraction + Dissociation f.
Y38 Ambient atom mass fraction
Y39 Amount of d.
Y40 Freestream d.
Y41 D. energy
Y42 Rate of d.
Y43 R. constant
Y44 D. profiles
Y45 D. scaling law
Y46 Model scaling
Y47 D. equilibrium
Y48 E. composition
Y49 Complete e.
Y50 Molecular d.
Y51 Ionization
Y52 I. effect
Y53 I gauge
Y59 Non equilibrium d.
Y60 Deviation from chemical e.
Y61 Non-e. effects
Y62 Frozen flow + F.f. conditions
Y63 Freezing of flow + Freezing of a flow of gas

Y64 Chemically f.f.
Y65 Approaching c.f.f.
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Y54 Atomic r.
Y55 Molecular r.
Y56 Chemical r.
Y57 Rate of r.
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[Collision phenomena]
Y69 Collision
Y70 Local mean free path
Y71 Free molecule limits
Y72 Emitted molecular density distribution
Y73 Transport properties
Y74 Transport processes
Y75 Transport coefficients

Y76 Research and investigation
Y77 Evaluation
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Y80 [Measured] Q
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Y82 Experiment + Experimental investigation + Experimental test + Test
Y83 Experimental determination + Experimental measurement
Y86 Flight test + [During flight] Q + Experimental f.t.
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Y95 Experimental data + E. results + Results + Test data
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Y99 [Facilities] Q
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Z2 W.t. tests + W.t. experiment + W.t. investigation
Z3 W.t. determination + W.t. measurement
Z4 Transonic w.t.
Z5 T.w.t. results
Z6 N.P.L: 18 x 14 w.t.
Z7 Supersonic w.t.
Z8 Hypersonic w.t. + Hypervelocity w.t.
Z9 Hypersonic shock t. + H.s.tube
Z10 H.s.tunnel tests
Z11 Driven
Z12 [by] Ignited mixture
Z13 Stoichiometric m.
Z14 Oxygen and hydrogen m.
Z15 M. with excess of helium
Z16 Hypersonic gun tunnel
Z17 Shock tube + Tube
Z18 S.t. experiment + S. tunnel experiment
Z19 Straight through s. tunnel
Z20 Reflected s. tunnel
Z21 [driven by] Unheated hydrogen driving air
Z22 Constant diameter s.t.
Z23 [High enthalpy w.t.] Q
Z24 Blowdown tunnel tests
Z25 Arc discharge w.t.
Z26 Cascade t. test

Z27 Circular t.
Z28 Closed octagonal t.
Z29 Closed rectangular t.
Z30 [Solid wall t.] Q + S.w.w.t. + S.w.w.t. tests
Z31 Slotted wall w.t. test

Z32 Variable density w.t.
Z33 [Low density w.t.] Q

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Z34 Working section + Test section
Z35 W.s. with open jet
Z36 Closed throat w.s. + Closed tunnel w.s.
Z37 Slotted w.s.
Z38 W.s. size
Z39 Test section wall
Z40 W.t. walls + T.w. + Wall of tube
Z41 [Wall divergence] Q
Z42 Slotted liners
Z43 Modified liners
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Z44 Driving tube
Z45 Upstream of nozzle entry
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Z47h [Hypersonic test medium] Q
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Z55 Apparatus + Equipment
Z56 Support gear
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Z58 Models
Z59 Rigid m.
Z60 Compreg wood m.
Z61 Pine Balsa m.
Z62 Magnesium m.
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Z63 Model flexibility effects
Z64 Model dimensions + M. size
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Z77 [Short running time] Q
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Z81 Tunnel wall pressures
Z82 Bursting pressure ratio
Z83 [with] Removal of damping plate
Z84 Reservoir temperature
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Z85 Corrections

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Z86 Oil flow study
Z87 Oil flow pattern
Z88 Surface o.f.p.
Z89 Photographs + Photographic record + Photographic study
Z90 Photomultiplier
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Z92 Shadowgraph study
Z93 S. measurement
Z94 Hot wire measurement + H.w. anemometer

Z95 Blunt nosed Pitot tube
Z96 Spherical pendulum
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Z98 [Theoretical work] Q + T.study + T. investigation + Theory
Z99 [Assumption] Q
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ZA6 [Rigorous t.] Q
ZA7 Potential t.
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ZA9 Tables + Tabulation
ZA10 Table of values

ZA11 Calculation + C. method + [Calculated] Q + [Calculating] Q + Methods for calculating + Computation
ZA12 Routine method
ZA13 Practical calculation
ZA14 Theoretical c.
ZA15 Estimate + Estimation
ZA16 Approximate c.
ZA17 Formula
ZA18 Asymptotic expansion f.
ZA19 General f.
ZA20 Solution
ZA21 Method of s.
ZA22 Simple s.
ZA23 Approximate s.
ZA24 Accurate s.
ZA25 Exact s.
ZA26 Theoretical s.
ZA27 Second order s.
ZA28 Simularity s.
ZA29 Asymptotic s.
ZA30 Analytical s.
ZA31 Approximate a.s.

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ZA32 Dimensionless form
ZA33 Scale effects

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ZA34 Equations
ZA35 Approximate e.
ZA36 Linear e.
ZA37 Non-l. e.
ZA38 [Three dimensional e.] Q
ZA39 Singular e.
ZA40 Six degrees of freedom e.
ZA41 Elliptic e.
ZA42 Navier Stokes e.
ZA42a [with] No-surface slip
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ZA43 Fourier t.
ZA44 Lorenz t.

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[Calculus]
ZA47 Complete elliptic integral
ZA48 Integration + I. methods + Integrating solution
ZA49 Asymptotic i. method
ZA50 Differential equations
ZA51 Linear d.e.
ZA52 L.d.e. with constant coefficients
ZA53 L.d.e. with periodic coefficients + [Periodic coefficient] Q
ZA54 [Lyapunov's method] Q

[Stability]
ZA55 Asymptotic stability
ZA56 Routh-Hurwitz criterion
ZA57 Phase space + State space
ZA58 Partial d.e.
ZA59 [Difference equation] Q
ZA60 [Navier Stokes d.e.] Q
ZA61 Finite d.e.
ZA62 F.d. methods
ZA63 F.d. approximation
ZA65 Eigenvalue problems
ZA66 Integral equations
ZA67 Generalized i.e.
ZA68 Abel i.e.
ZA69 Birbaum i.e.
ZA70 Possio i.e.
ZA71 Prandtl i.e.
ZA72 Finite part
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ZA73 Time series
ZA75 Convergence
ZA76 C. rates
ZA77 Asymptotic s.
[Boundary values]
ZA78 B.v. problems
ZA79 Blasius problem
ZA80 Rayleigh's problem
ZA81 Boundary conditions + Given b.c.
ZA82 Three point b.c.
ZA83 Time dependent b.c.
ZA84 Function
ZA85 Partition f.

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ZA86 Method + [Theoretical m.] Q
ZA87 Generalized m.
ZA88 Analysis + Analytical m. Q + Analytical study + Theoretical a. + Analytic determination + Determination by a.
ZA89 Analytical estimation
ZA90 Analytical results
ZA92 Approximation
ZA94 Successive a.
ZA95 Closed form
ZA96 Newtonian a.
ZA97 Variational principle
ZA98 V.p. of Biot
ZA99 Perturbation method
ZA99a Orthogonal functions expansion method
ZB1 Graphical a.
ZB2 Numerical determination + N. calculation + N.solution
ZB3 [Iterative method] Q + Iterative solution + Iterative numerical solution
ZB4 [Convergent] Q
ZB4a Finite difference numerical s.
ZB5 Richardson method
ZB6 Second order R.m.
ZB7 Liebmann m.
ZB8 Extrapolated L.m.
ZB9 Relaxation methods
ZB10 [with] Spherical polar coordinate
ZB11 Modified
ZB12 Successive overrelaxation m.
ZB12a Analytic continuation
ZB12b [by] Taylor's series
ZB14 Inversion
ZB15 Linearization
ZB17 Method of characteristics
ZB18 Johannsen and Meyer method
ZB19 Polhausen m.
ZB20 Extension of Stratford m.
ZB21 Newtonian closed-form expression
ZB22 Newtonian coefficient

ZB23 Computer
ZB24 [High speed computer] Q
ZB25 [Digital computer] Q
ZB26 [Programme] Q

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ZB27 Automatic control theory
[See also Stability]
ZB28 Dynamic systems
ZB29 Linear s.
ZB30 Non-linear s.
ZB31 Non-linear mechanics
ZB32 Stationary s.
ZB33 Non-stationary s.

ZB34 Lyapunov's theory
ZB35 Second method of L.

ZB36 Stable regions
ZB37 Transient behaviour
ZB38 Limit cycles
ZB39 Random disturbances

ZB40 Relay servos
ZB41 Nonlinear autopilot
ZB42 Autopilot with feedback

ZB43 Control system optimization
ZB44 Time-optimum control

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ZB45 [General form] Q
ZB46 [Nature] Q
ZB47 Characteristic
ZB48 [Parameters]
ZB49 Variable properties

ZB50 Material properties
ZB51 Configuration
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ZB53 Length
ZB54 L. changes

ZB55 Thickness effect
ZB55c Stability [non-aerodynamic]
ZB55e Effective
ZB56 Combined + Combination
ZB57 Combined effect
ZB58 Attached
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ZB61 Relationship
ZB62 Non-linear relation
ZB63 Ratio
ZB64 Finite rate
ZB65 [Quantitative] Q

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ZB67 Streamwise
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ZB69 Behind
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ZB74 Design
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ZB76 Elimination
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ZB79 [Large change] Q
ZB80 Transition
ZB81 Onset
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ZB84 [Production] Q
ZB85 Derivation
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ZB87 Dynamic behaviour

ZB88 Expansion
ZB89 Reduction

APPENDIX 5.5

ALPHABETICAL INDEX OF CONCEPTS

This Appendix lists all the concept terms used in the indexing of the 200 documents comprising Subset 1, as given in Appendix 3E. For each term in its natural form is given the appropriate notation for its location in the concept term schedules, which appear as Appendix 5.4.

Each concept appears under each key term, so that, for instance, the following entries will be found:

Abel integral equation
Integral equation, Abel
Equation, Abel integral

In addition, this list includes terms which occurred in the set of search questions but which did not appear in the indexing. All such terms are marked by an asterisk.

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" " Moderate
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Ramp-Type
Twisted Strip Type
Vane
Wedge-Type
Wing-Type
Growth P11
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Location of Part Span
Main
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Pattern of Horseshoe
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Argon Shock
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Bow Shock
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Detached Shock
Development Shock
Drag S29
Equation Solution Classical
Expansion
Flexural
Flow Behind a Shock
Formation Shock
Forward Shock
Generated Shock
Hypersonic Shock
Induced Boundary Layer Separation Shock
Infinitesimally Thin Shock
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Interaction Boundary Layer Shock
Interaction Shock
Kelvin Helmholtz
Location Shock
Longitudinal
Mach
Movement Shock
Nitrogen Shock
Normal Shock
Oblique Shock
Outboard Shock
Oxygen Shock
Pattern Shock
Position Divergence Shock
Propulsion Light
Rear Shock
Reflected Q36
Reflection Interference Q38
Resonance Compression
Riemann
Shape Shock
Shock
Sound
Strength Shock
Strong Shock
Structure Shock
Wave Surface
Terminal Shock
Thickness Shock
Tip Shock
Tollmien Schlichting
Upstream of Shock
Wavelength Jet
Weakening W71
Wedge O18
Aerofoil Single
Airfoil A86
Airfoil Double
Angle J13
Blunted
Method Tangent
Shock Angle J14
Type Vortex Generator C50
Weight Engine
Flow F99
Flow Characteristic Equivalent
Flow Maximum
Flow Overall
Flow Range G4
Flow Variation G5
Molecular
Ratio K16
Ratio Model
Tunnel
Wing with Concentrated
Weissenger Method W86
Whirl Inlet
Upstream Flow
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Width Band
Divergence Wake
Infinite
Jet Slot
Wind Speed L67
Wind Tunnel Z1
Arc Discharge
Choked
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Determination Z3
Experiment Z2
High Enthalpy*
Hypersonic
Hypervelocity
Interference Effect D94
Investigation Z2
Low Density*
Measurement Z3
Result Transonic
Solid Wall
Supersonic
Test Z2
Test Choked
Test Slotted Wall
Test Solid Wall
Transonic
Variable Density
Wall Z40
18" x 14" NPL
Windward Body J34
Edge E9
Wing B1
Wing Airplane

Wing Arbitrary Planform
Arbitrary Stiffness
Beneath
Body B1
Body Arrangement A97
Body Combination A97
Body Interference A98
Cambered
Chord B99
Circular Planform
with Concentrated Weight B68
Curved Tip Planform
Cantilevered
Clipped Delta
Cropped
Delta
Differentially Deflected
Elastic
Elliptic
Elliptical
Finite
Finite Aspect Ratio
Finite Span
with Flap B69
Flat
Flat Plate
Flat Surface
Flat Triangular
Flow Pattern B94
Flow Study B94
Flutter Cantilever
Fluttering
Fuselage Interference A98
Half
Harmonically Oscillating
High Aspect Ratio
Infinite Span
Laminar
Lift B97
Lifting
Loaded
Long
Low Aspect Ratio
Model B3
Model Half
Model Sweptback
Model Tapered
Narrow
Near Triangular
Nonlifting
Oscillating
With Parabolic Twist B35
Perforated
Pitching
Plane of
Planform B94
Pressure Distribution B95
Rectangular
Rectangular Planform
Re-Entry Configuration Delta
Re-Entry Configuration Sweptback
Rigid
Rolling
Rotating
Shape B4
Sharp Edge

Wing Sharp Leading Edge
Simple Planform*
Sinking
Slender
Slender Rectangular
Slope
Slowly Oscillating
Solid Construction
Steady
Straight
Subsonic Edged
Supersonic Edged
Surface C4
Surface Flat
Sweep Small B8
Swept
Sweptback
Sweptback Delta
Sweptforward
Symmetrical
Tapered
Theory "Not-so-Slender"
Theory Linearized
Theory Slender
Thick
Thickness C1
Thickness Symmetrical
Thin
Three-Dimensional
Tip C8
Tip Deflection C9
Tip Panel A39
Tip Panel Unfolding
Tip Sweptforward
With Twist Triangular
Triangular
Twisted
Two-Dimensional
Type Vortex Generator C51
Uncambered
Unswept
Untapered
Vanishing Low Aspect Ratio
Vehicle Arrow
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Wide
Yawed
Winged Missile A12
Re-Entry Glider Configuration A38
Wire Anemometer Hot
Measurement Hot
Spanwise
Two-Dimensional
With Feedback Autopilot
Within Jet Location
Without Corner Cylinder
Wood Model Compreg
Work Theoretical*
Working Section Z34
Closed Throat
Closed Tunnel
With Open Jet Z35
With Rigid Boundary Z36
Size
Slotted
0° Yaw K77

30° Yaw	K78
Yaw Control	K81
Stability	K79
Yawed Body of Revolution	H52
Wing	B87
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Zero Angle of Attack	V96
Aspect Ratio	W13
Boundary Constraint	D96
Gravity	K99
Lift	R70
Model Incidence	V97
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Pressure Gradient	T12
Temperature Gradient	X23
Zone Expansion	
Shock Transition	

APPENDIX 5.6

CONTROLLED TERM VOCABULARY

Terms marked with an asterisk represent terms used in the collection of 200 documents (Document Subset 1 of Appendix 3E), and are therefore comparable with the terms in the concept schedules (Appendix 5.4) and rotated index (Appendix 5.5). The remaining terms were used in the additional 150 documents that make up Document Subset 2.

These terms were based on those which appear in the Thesaurus of Engineering Terms of the Engineers Joint Council. Terms which do not appear in this Thesaurus are preceded by a cross.

+ Ablating materials*
Ablation*
Absorption*
Acceleration*
+ Accommodation height*
Accuracy*
Actual time*
Adiabatic conditions*
Adjustment*
+ Aerodynamic balance*
+ Aerodynamic center*
+ Aerodynamic characteristics*
+ Aerodynamic configurations*
+ Aerodynamic forces*
Aerodynamic heating*
+ Aerodynamic loads*
+ Aerodynamics*
Aerothermodynamics*
+ Afterbodies*
Agents*
Ahead*
Ailerons*
Air*
Aircraft*
Air flow*
Airfoils*
Airframes*
Airplanes*
Air resistance*
Airspeed*
Altitude*

Aluminium alloys*
Ammonium compounds
Amplitude*
Analogies*
Analogue computers
Analyzing*
Angle of incidence*
Angles*
Annuli*
Antennas
Applying
Approaches
Approximation*
Arcs*
Area*
Argon*
+ Arrow wings*
Asbestos
Aspect ratio*
Atmosphere
Atmosphere Extra-terrestial*
Atmosphere Terrestial*
Atmosphere Entry*
Atomic properties*
Atoms*
Attenuation*
Attitude*
Attitude control
Automatic control*
Autopilots*
+ Axial distribution
+ Axial flow
+ Axial forces*
Axial flow pumps*
Baffles*
Balances*
Balancing
Ballistic missiles*
Balsa woods*
Bands*
+ Base pressure*
Bases*
Bearing*
Beams (Radiation)*
Beaming*
Bearing (Direction)*
Behaviour*
Bending*
Beveling
Binary systems
Blades*
+ Blasius equation*
Bleeding*
Blocking*
Blowers*
Blowing*
Blunt bodies*
+ Blunt cones*
Blunt cylinders
+ Blunt leading edges*
+ Blunt trailing edges*
+ Bluntness*
+ Boat tails*
Bodies of revolution*
Bombers
Booms*
Booster rockets*
Boundaries*
Boundary layer*
Boundary layer control*
Boundary layer transition*
Braking
Bridging*
Buckling*
+ Buffeting*
Buoyancy*
Bursting*
Calibration
Camber*
+ Cantilever structures*
Cantilever wings*
Capacity
Caps
Carbon Dioxide*
Carbon arcs*
Carbon tetrachloride
+ Cascades*

Catalysis
Catalysts*
Cathode-Ray oscilloscopes
Centre of Gravity*
+ Centre of pressure*
Centres*
Centrifugal compressors*
Centrifugal force*
Ceramics
Chamber*
+ Channels (Fluid flow)*
Characteristics*
Charge
Charged particles*
Chemical equilibrium*
+ Choking*
+ Chord*
Circuits*
+ Circular arc*
+ Circular cone*
+ Circular cross section
+ Circular cylinder*
Circulation*
Clamping
+ Closed throat*
Clouds
Coefficients*
Cold gases*
Combustion*
Commercial planes
Compatability
Components*
Composite materials*
Compositions*
Compressed air*
Compressibility*
Compressible flow*
Compressing*
Compressor blades*
Compressors*
Computation*
Computers*
Concentrating*
Concentration
Condensing
Conduction*
Conductivity*
Conductors
Cones*
Conics
Constraining
Constraints*
Constrictions
Construction*
Contingency*
Continuity equation*
Continuous beams*
+ Continuous panels*
Contraction*
Control surfaces*
Control systems*
Convection*
Convection heating*
Convergence*
Conversion
Coolants
Coolers
Cooling*
Co-ordinates*
Copper*
+ Corners*
Correction*
Correlation*
Corridor
+ Couette flow*
Cracking
Criteria*
Critical Mach No.
Critical velocity*
+ Crocco's equation
Cross flow*
Cross sections*
Crossings*
Curvature*
Curves*
+ Curvilinear co-ordinates
Cycles*
Cylinders*
Damage
Damping*
Data*
Data reduction
Day*
Decay*
Deceleration*
Deceleration rate*
Deflection*
Deformation
Degrees of Freedom*
Delay time*
Delta wings*
Density*
Density ratio*
Depth
Derivation*
Derivatives*
Design*
Detaching*
Detection
Determination*
Development*
Diameters*
Diaphragms*
+ Diatomic gases
Dielectrics
Differences*
Differential equations*
Diffuser*
Diffusion*
Dimensionless numbers*
Dimensions*
Discharge*
Discontinuity*
Disks*
Dispersion*
Displacement*
Dissipation*
Dissociation*
Distance*
Distortion*
Distribution*
Diurnal variations*
Divergence*
Dividers*
Documents*
+ Downstream*
+ Downwash*
Drag*
Driers*
Drilling*
Drive*
Driving*
Drum*
Dry gas*
Ducts
Dynamic characteristics*
Dynamics*
Earth*
Eccentricity*
Eddies*
Edges*
Efficiency*
+ Eigen Functions*
Elasticity*
Electric arcs*
Electric arc heaters

Electric fields*
Electric heating
Electric potential*
Electric propulsion*
Electrical filters
Electrical properties
Electricity*
Electromagnetic induction*
Electromagnetic waves*
Electrons
Electrons density
Electrostatics
Elements*
Elevators
Elevons*
Elimination*
Ellipses*
Elliptic functions*
Emission*
Emissivity*
Energy*
Engine*
Engine noise*
Enthalpy*
Entropy*
+ Entry angle
+ Entry corridor
Environment*
Equations*
Equation of Motion*
Equation of State
Equilibrium*
Equipment*
Equivalence*
Equivalent weight*
Erosion*
Errors*
+ Escape velocity*
Estimation*
Ethylene*
Evaluation*
Evaporation*
Exchanging*
Excitation*
Exhaust gases*
Exhausting*
Expansion
Experimentation*
Exponents*
Exposure*
Expressions*
Extension*
+ Faces*
Failure*
Feedback*
Field
Fighters
Filling*
Filtration*
+ Fineness ratio
Finite difference theory*
+ Finite span*
Fins
Firing*
Fixtures*
Flames*
Flaps*
Flat plate models*
Flatness*
Flaw
Flexibility*
Flexing*
Flight*
Flight paths
Flight testing*
Flow*
Flow equations*
Flow measurement
Flow meters*
Fluctuation
Fluid flow*
Fluid mechanics*
Flux*
Folding*
Fog
Force*
+ Forebodies*
+ Form drag*
Formica
Forming*
Formulas*
Foundation*
Fourier transforms*
Fractions*
+ Free flight models
+ Free molecule flow*
+ Free stream*
Freezing*
Freon*
Frequencies*
Frequency response*
Friction*
Fuel consumption
Fuels*
Functions*
Gas flow*
Gas Injection*
Gases*
Gears*
Generators
Geometry*
Glass
Glass Fibres
Gliders*
Gradients*
Grain size*
Graphite*
Graphs
Gravitation*
Green Function*
Ground effects*
+ Ground height
+ Ground pressure
+ Ground reflection*
+ Ground resonance
Growth*
Guidance*
Guide vanes*
Gust loads*
Gyroscopes*
Hall effect
Harmonics*
Head*
Heat*
+ Heat of ablation*
+ Heat absorption*
Heat shields*
Heat sinks*
Heat transfer*
Heat transfer coefficient*
Heat Transmission*
Heating*
Height*
Helium*
Hemispheres*
High pressure*
High temperature*
+ Hinges*
History*
Holding*
Holes*
Homogeneity*
Homogeneous flow*
+ Hot gas
Hot wire anemometers*
Humidity*

Humidity control
Hydrocarbons*
Hydrodynamics*
Hydrogen*
Hyperbolas
Hyperbolic functions
Hypersonic flight*
Hypersonic flow*
Hypersonic planes*
Hysteresis*
Ideal fluid*
Ideal gas*
Ideal gas law
Ignition*
Impact*
Impedance
Impellers*
Inconel*
Increasing*
Increments*
Indicators*
+ Induction (Aerodynamics)*
Inertia*
Initiation*
Injectant
+ Injected gases*
+ Injected liquids*
Injection
Injectors
Inoculation*
Inorganic salts
Instrumentation*
Insulation*
Intake system*
Integral equations*
Integrals*
Integration*
Intensity
Interference*
Interplanetary flight*
Intersection*
Iodides*
Ion propulsion*
Ionization*
Ionization gages*
Ionosphere*
Ions*
Isobars*
Isolation
Isotropy*
Iteration*
Jet*
Jet Engines*
Jet nozzles*
Jetstreams*
Joining*
Joists*
Jupiter
Junctions
+ Karman-Polhausen approximation
+ Karman Street
Kinetic energy
Kinetic theory*
+ Kirchoff theory*
+ Knees*
Knudsen flow
Kussner function*
Laminar boundary layer*
Laminar flow*
Laminates*
+ Lateral stability*
Latitude*
Launching
Layers*
+ Leading edges*
Legendre polynomials
Length*
Life*
Lift*
Lift dependent drag*
+ Lifting*
Light*
Linear equations*
Linear differential equations*
Linear systems*
Liners*
Lines*
Line spectra*
Liquefaction*
Liquid flow*
+ Liquid injection*
Liquid propellants*
Liquids*
Loading*
Loads*
Logarithms*
+ Longitudinal Jets
+ Longitudinal stability*
Longitudinal waves*
Losses*
+ Low density*
+ Low Reynolds No. *
Luminosity*
+ Lyapunov method*
+ Mach cone*
+ Mach Number*
Magnesium*
Magnetic fields*
Magnetic flux*
Magnetic properties*
Magnetohydrodynamics*
Magnification*
Magnitude*
+ Main stream*
Man
Mars*
Mass*
Mass flow*
Mass transfer
+ Mass transfer cooling
Matching*
Materials*
Materials testing*
Mathematical analysis*
Mathematical models
Matrices*
Maxima*
Mean*
Mean free path*
Measurement*
Measuring instruments*
Mechanics*
Melamine
Melting
+ Merged layer*
Meteorites*
Methane*
Midcourse guidance*
Minima*
Minimization
Missiles*
Mixing*
Mixtures*
+ Modal analysis*
Mode*
Models*
Modulation
Modulus of elasticity*
Molecular weight*
Molecules*
Molybdenum*
Moments*
Momentum*
Momentum transfer
Motion*
Mounting*
+ Multiple*

Multiplier phototubes*
+ Nacelles*
+ Navier-Stokes equation*
+ Negative lift
+ Newtonian flow
Night*
Nitrogen*
Nitrogen compounds
Nodes*
Noise*
+ Non-Equilibrium flow*
Non-linear systems*
Non-uniform flow
+ Normal force*
+ Noses*
Nozzles*
Nuclear fusion*
Nuclear propulsion*
Numerical analysis*
Observation*
Ogives*
One-dimensional*
Openings*
+ Open Throat*
Operations*
Optimization*
Orbits*
Ordinates*
Orientation*
Orifices*
Orthogonal functions*
Oscillations*
Oscillographs*
Outlets*
Output*
Oxygen*
Panels*
Parabolas*
Parameters*
Partial differential equations*
Particles*
Payloads*
Pendulums*
Penetration*
Performance*
Periodic variations*
Permeability*
Perturbation*
Perturbation theory*
Phase*
Phase angle*
Phenolic resins*
Photographs*
Physical property*
Pine wood*
Pipe*
Pipe flow*
Pistons*
Pitch*
Pitot tubes*
Pivots*
Plane geometry*
Planets*
+ Planforms*
Plasma*
Plasticity*
Plastics
Plates*
Plotting*
+ Pointed bodies*
Points*
+ Polar co-ordinates*
Polyamide resins
Polygons*
Polymethyl methacrylate
Polystyrene
Polytetra Fluoroethylene*
+ Porous cone
Porous materials
Position*
Potential energy*
+ Potential flow*
Power*
Power series
Prandtl No. *
Predictions*
Preservation*
Pressure*
Pressure distribution*
+ Pressure drag*
Pressure drop
Pressure gradient*
+ Pressure jumps
Pressure measurement*
Pressure pumps
Pressure reduction*
Prevention
Procedures*
Production*
+ Profile drag
Projectiles
Projection*
Propagation*
Propellers*
Properties*
Propulsion systems
Proving
Pumps*
Purity*
Qualitative analysis
Quartz*
Radar
Radiation*
Radiation effects*
Radioactive decay*
Radioisotopes*
Radii*
Randomization*
Range*
Ratios*
+ Rayleighs Problem*
Reactions (Chemical)*
Reaction kinetics*
Recombination reactions*
Recovery*
Rectangles*
Reduction*
Re-Entry*
Re-entry vehicles*
Regression*
Reflection
Refraction
Reinforced plastics*
Relaxation*
Relaxation method*
Relaxation time*
Reliability*
Relieving*
Removal*
Repeater*
Research*
Reservoirs*
Resistance*
Resistivity*
Resonant frequency*
Response time*
Retarding*
+ Reversal of control
Revisions*
Revolution*
Reynolds No.*
+ Rigid airfoils*
+ Rigid bodies
+ Rigid wings*
Rigidity*

Rocket*
+ Rocket chambers*
Rocket engines*
+ Rocket gliders*
Rocket nozzles*
Rocket planes*
Rocket propellants*
Rocket propulsion*
Rods*
Roll*
Roofs*
Rotation*
Rotor blades*
Rotors*
Roughness*
Rudders*
Safety factor*
Satellites*
+ Satellite velocity*
Saturation*
Scale*
Scattering*
Scavenging*
Screens
Seasonal variations*
Sensors*
Separation*
Series*
Servomechanisms*
Shadow photography
Shape*
Shear flow*
Shearing*
Shear stress*
Sheet*
Shells
Shock*
Shock tubes*
Shock waves*
+ Shroud*
Sides*
+ Sideslip*
+ Sidewash*
Silica*
Silicon carbide*
+ Similarity*
Similarity laws*
Simulation*
+ Sinking*
Sinusoidal functions*
Skewness*
+ Skin*
Skin friction*
+ Skipping*
+ Skip rockets
Skip vehicles*
Slabs*
+ Slender bodies*
+ Slender cones*
+ Slipstream*
Slope*
Slots*
Sodium*
Sodium carbonate
Sodium chloride*
Solar heating*
Solar phenomena*
Solar radiation*
Solar sails*
Solid propellants*
Solids*
Sound waves*
Sounding*
Sounding rockets*
Sound propagation
+ Sources*
Spacecraft*
Space probes*
Spacing*
Span*
Specific heat*
Specification*
Specific impulse*
Spectra*
Specular reflection*
Spheres*
Spikes*
Spirals
Spoilers*
Spreading
Springs*
Squares*
Stability*
+ Stages*
Stagnation point*
+ Stall*
+ Stanton No.
Starting*
Static characteristics*
Static pressure*
Static tests*
Stationary processes*
Statistical methods*
Stator blades*
Steady flow*
+ Steady forces
+ Steady pressure
Steady state*
Steels*
Stiffening*
Stiffness*
+ Sting*
Stopping*
Stoichiometry*
Straightness*
Strain gages
+ Stream function*
+ Streamlines*
Strength*
Stress concentration*
Stresses*
Stretching
Strip*
+ Strip theory
Structures*
Subcritical flow*
Sublimation*
+ Subsonic flow*
Sun*
Supersonic flow*
Supersonic planes*
Supports*
Surfaces*
+ Surface combustion*
+ Surface radiation*
Surface temperature*
Surges*
Surveys*
+ Sweep*
Sweepback*
Swept wing*
Swirling*
Symmetry*
Systems*
Tables*
Tabs*
Tabulation*
+ Tails*
Take off*
Tangent*
+ Taper ratio*
+ Tapered wing
Taylor's Series*
+ Teflon*
Telemetry*
Temperature*
Temperature control
Temperature distribution*

Temperature inversions*
Tensions*
Terminal guidance
Test facilities*
+ Test section*
Testing*
Testing equipment*
Testing machines*
Theories*
Theorems*
Thermal conductivity*
Thermal expansion*
Thermal diffusivity
Thermal insulation
Thermal stresses*
Thermodynamics*
Thickening*
Thickness*
Thin layer
+ Thin wings*
+ Throats*
Thrust*
Thrust vector control*
Time*
Time constant
Time series analysis*
+ Tips*
Titan*
Torque*
Torsion*
+ Total drag*
+ Trailing edges*
Trajectory*
Transferring*
Transformation*
Transition point*
+ Transitional layer*
Transonic flight*
Transonic flow*
Transpiration*
Transverse waves*
Triangles*
Trips*
Tumbling*
Tungsten*
Turbine blades
Turbines*
Turbocompressions*
Turbojet engines*
Turbulence*
Turbulent boundary layer*
Turbulent flow*
Twisting*
+ Two-dimensional*
Two-phase flow*
Ultraviolet radiation*
+ Undershoot
Uniform flow*
+ Uniform pressure*
Unsteady flow*
+ Unsteady lift*
Unsteady state*
Upper atmosphere*
+ Upwash*
Vacuum*
Vanes*
Vaporising*
Vapors
Vapour pressure*
Variability*
Variables*
Variations*
Vectors*
Velocity*
Venturi Meters*
Venus*
Vibrations*
+ Vibrational equilibrium
Viscosity*
Viscous*
Viscous flow*
+ Viscous fluids*
+ Visualisation
Volume*
Vortex*
+ Vortex filament
Vortex generators*
Vortex sheet
+ Vorticity*
+ Wake*
Walls*
Water
Water flow*
Wavelength*
Wave propagation
Waves*
+ Wedges*
Weight*
+ Whitham Theory
Wind*
Wind tunnel*
Wind tunnel models*
Wind tunnel nozzles*
Wind velocity*
Windows
Wing-body configurations*
+ Wing-body-tail configurations*
Wings*
Wires*
Wood*
Yaw*

APPENDIX 6.1

EXAMPLES OF VARIOUS COMPUTER PRINT-OUTS

Original I.B.M. Tape arrangement

The indexing information is arranged in document order, resulting in a linear file of 1,400 documents. The information transferred from the index sheet is recorded in two separate 'blocks' as follows:-

1. List of themes and the concepts which make up each theme, as given in the index sheet.
2. Lists of the concepts, giving the code letter and terms in each concept. The weight is assigned to each term in the concept, but since these weights have been transferred from those assigned to the single terms, the highest weight that any term has received will appear in all its concepts.
   e.g. Concept F = Turbulent (10) Flow(9) Field(9)
   Concept L = Transonic(8) Flow(9)

The tape was prepared from 80-column punched cards, with the information punched on each line as follows:-

Column 1. Punched with figure 1 or 2. This indicates whether the index information given in columns 6-80 refers to Block 1 (themes) or Block 2 (Concepts)

Columns 2-5 The four-figure document reference number.

Columns 6-80 The index information:

If Block 1,
- a. A comma indicates the start of each theme.
- b. The themes are identified by a two figure number, and are punched in order 01, 02, 03, etc.
- c. The concepts which make up each theme are listed by their two-letter code.
- d. An asterisk indicates the end of the final theme.

If Block 2
- a. A comma indicates the start of each concept.
- b. The concepts are identified by a two-letter code and are listed in the following sequence:- blank A to blank Z, AA, BB, CC, etc.
- c. The terms making up each concept are punched in full
- d. Each term is followed by the weight number, enclosed by slashes //
- e. An asterisk indicates the end of the final concept.

```
11419,01 A B C,02 A D E F J,03 A D E G J,04 A D E H J,05 A D E I J*
21419, ASTIFFENED/10/WEB/10/PLATE/10/, BSHEAR/10/LOADING/10/, CINTERMEDIATE/9/
21419VERTICAL/9/STIFFENER/10/DESIGN/9/, DINTERMEDIATE/9/VERTICAL/9/STIFFENER/10/
21419, ESHEAR/10/BUCKLING/8/STRESS/8/, FSTIFFENER/10/FLEXURAL/8/RIGIDITY/8/
21419, GSTIFFENER/10/SPACING/8/, HSINGLE/6/SIDED/6/STIFFENER/10/, IDOUBLE/6/
21419SIDED/6/STIFFENER/10/, JTEST/7/*
11420,01 A C D E F G,02 A C D H I G,03 A C D J G,04 A C D K G,05 A C D L M
11420,06 A C D N K,07 A C D O,08 A C D P,09 A C D Q S G,10 A C D Q T G
11420,11 A C D Q U G,12 A C D R S G,13 A C D R T G,14 A C D R U G,15 B C D E F G
11420,16 B C D H I G,17 B C D J G,18 B C D K G,19 B C D L M,20 B C D N K
11420,21 B C D O,22 B C D P,23 B C D Q S G,24 B C D Q T G,25 B C D Q T G
11420,26 B C D R S G,27 B C D R T G,28 B C D R U G*
21420, ASWEPT/10/WING/10/HIGH/9/ASPECT/9/RATIO/9/, BNARROW/9/DELTA/10/WING/10/
21420, CSHARP/10/EDGED/10/, DHIGH/9/ANGLE/9/ATTACK/9/, EUPPER/9/SURFACE/9/
21420, FTURBULENT/10/FLOW/9/FIELD/9/, GWIND/9/TUNNEL/9/EXPERIMENT/9/, HROOT/8/
21420SECTION, ICONICAL/8/FLOW/9/FIELD/9/, JVORTEX/8/SHEET/8/POSITION/7/
21420, KVORTEX/8/PATH/8/LOCATION/8/, LTRANSONIC/8/FLOW/9/, MDRAG/8/RISE/8/
21420, NLEADING/8/EDGE/8/SEPARATION/8/, OVORTICITY/8/, PSTALLED/8/FLOW/8/
21420, QPRESSURE/8/DISTRIBUTION/8/, RVELOCITY/8/DISTRIBUTION/8/, SSWEEP/8/
21420ANGLE/9/, TANGLE/9/ATTACK/9/, UREYNOLDS/8/*
11421,01 A D F G H,02 B C D F G H,03 A E F G H,04 B C E F G H,05 A D I G H
11421,06 B C D I G H,07 A E I G H,08 B C E I G H,09 A D F J G H,10 B C D F J G H
11421,11 A E F J G H,12 B C E F J G H,13 A D I J G H,14 B C D I J G H
11421,15 A E I J G H,16 B C E I J G H,17 A D F Q S,18 A E F Q S,19 A D I Q S
11421,20 A E I Q S,21 A D P Q R,22 A E P Q R,23 K C D F G H,24 K C E F G H
11421,25 K C D I G H,26 K C E I G H,27 L C D F G H,28 L C E F G H,29 L C D I G H
11421,30 L C E I G H,31 M C D F G H,32 M C E F G H,33 M C D I G H,34 M C E I G H
11421,35 N C D F G H,36 N C E F G H,37 N C D I G H,38 N C E I G H,39 O C D F G H
11421,40 O C E F G H,41 O C D I G H,42 O C E I G H*
21421, ABLUNT/10/NOSED/10/LONG/9/BODYOFREVOLUTION/10/, BBLUNT/10/NODE/8/
21421, CLONG/9/CYLINDRICAL/10/AFTERBODY/10/, DHYPERSONIC/9/AIR/9/FLOW/9/
21421, EHYPERSONIC/9/HELIUM/10/FLOW/9/, FINDUCED/10/PRESSURE/9/, GTHEORETICAL/9/
```

Tape arrangement at Harvard Computation Laboratory.

The indexing information is arranged in document order, and includes only the indexed concepts, ignoring the themes. Each concept consists of the constituent single terms, terminated by a stop; each concept is treated in the same way as the sentences in the full text normally processed by the SMART system, with the running totals of concepts indicated in a right-hand column. The weights assigned at Cranfield are incorporated by repeating the concepts; three levels are recognised, concepts weighted 10 and 9 are recorded three times, concepts weighted 8 and 7 are recorded twice, and concepts weighted 6 and 5 once.

A copy of the print-out for the same document as shown on the previous page, namely 1420, is printed below.

```
HIGH ASPECT RATIO SWEPT WING . HIGH ASPECT RATIO SWEPT WING .                1
HIGH ASPECT RATIO SWEPT WING . NARROW DELTA WING SHARP EDGED .               3
 NARROW DELTA WING SHARP EDGED . NARROW DELTA WING SHARP EDGED               5
. HIGH ANGLE ATTACK . HIGH ANGLE ATTACK . HIGH ANGLE ATTACK                  6
. UPPER SURFACE FLOW FIELD TURBULENT . UPPER SURFACE FLOW FIELD              9
TURBULENT . UPPER SURFACE FLOW FIELD TURBULENT . WIND TUNNEL EXPERI-         11
MENT . WIND TUNNEL EXPERIMENT . WIND TUNNEL EXPERIMENT . ROOT /              13
SECTION, ICONICAL FLOW FIELD . ROOT SECTION, ICONICAL FLOW FIELD             16
. POSITION VORTEX SHEET VORTEX PATH LOCATION . POSITION VORTEX               17
SHEET VORTEX PATH LOCATION . TRANSONIC FLOW . TRANSONIC FLOW                 19
. DRAG RISE LEADING EDGE SEPARATION . DRAG RISE LEADING EDGE SEPARAT-        21
ION . VORTICITY . VORTICITY . STALLED FLOW PRESSURE DISTRIBUTION             23
 . STALLED FLOW PRESSURE DISTRIBUTION . VELOCITY DISTRIBUTION                26
. VELOCITY DISTRIBUTION . SWEEP ANGLE . SWEEP ANGLE . ANGLE                  28
ATTACK . ANGLE ATTACK . ANGLE ATTACK . REYNOLDS . REYNOLDS                   32
                                                                             36
```

Tape arrangement at Cambridge Language Research Unit.

This follows more closely the information on the original tapes, with two sections for each document, the first covering themes, and the second giving the concepts and terms.

An example pf the print-out, for document 1420, is shown below; the description of the print-out is as follows.

Section 1

Line 1. Document number; Section 1 digit; half-word count for document.
Line 2. Theme count; Half-word count for themes.
Line 3. Theme number; Concept letter count; Half-word count for concept letters; Concept letters.

.....
.....

Line n. Section 1 terminator.

Section 2

Line 1. Document number; Section 2 digit.
Line 2. Concept count; Half-word count for concepts.
Line 3. Concept letter; Word count; Half-word count for words; weight number; Half-word count for word; Word.

.....
.....

Line n. Section 2 terminator.

```
1420 1  +270
28 +82
 1        6 + 3  A C D E F G
 2        6 + 3  A C D H I G
 3        5 + 3  A C D J G
 4        5 + 3  A C D K G
 5        5 + 3  A C D L M
 6        5 + 3  A C D N K
 7        4 + 2  A C D O
 8        4 + 2  A C D P
 9        6 + 3  A C D Q S G
10        6 + 3  A C D Q T G
11        6 + 3  A C D Q U G
12        6 + 3  A C D R S G
13        6 + 3  A C D R T G
14        6 + 3  A C D R U G
15        6 + 3  B C D E F G
16        6 + 3  B C D H I G
17        5 + 3  B C D J G
18        5 + 3  B C D K G
19        5 + 3  B C D L M
20        5 + 3  B C D N K
21        4 + 2  B C D O
22        4 + 2  B C D P
23        6 + 3  B C D Q S G
24        6 + 3  B C D Q T G
25        6 + 3  B C D Q T G
26        6 + 3  B C D R S G
27        6 + 3  B C D R T G
28        6 + 3  B C D R U G
/
```

```
1420 2
20 +186
A  5 +14        (10)+ 5 SWEPT          (10)+ 2 WING          ( 9)+ 2 HIGH      ( 9)+ 3 ASPECT
                ( 9)+ 3 RATIO
B  3 + 9        ( 9)+ 3 NARROW         (10)+ 3 DELTA         (10)+ 2 WING
C  2 + 7        (10)+ 3 SHARP          (10)+ 3 EDGED
D  3 + 9        ( 9)+ 2 HIGH           ( 9)+ 3 ANGLE         ( 9)+ 3 ATTACK
E  2 + 7        ( 9)+ 3 UPPER          ( 9)+ 3 SURFACE
F  3 +10        (10)+ 4 TURBULENT      ( 9)+ 2 FLOW          ( 9)+ 3 FIELD
G  3 +10        ( 9)+ 2 WIND           ( 9)+ 3 TUNNEL        ( 9)+ 4 EXPERIMENT
H  4 +15        ( 8)+ 2 ROOT           ( 8)+ 5 SECTION=ICONICAL      ( 9)+ 2 FLOW      ( 9)+ 3 FIELD
J  2 + 8        ( 8)+ 4 VORTEZSHEET    ( 7)+ 3 POSITION
K  3 + 9        ( 8)+ 3 VORTEX         ( 8)+ 2 PATH          ( 8)+ 3 LOCATION
L  2 + 7        ( 8)+ 4 TRANSONIC      ( 9)+ 2 FLOW
M  2 + 5        ( 8)+ 2 DRAG           ( 8)+ 2 RISE
N  3 +10        ( 8)+ 3 LEADING        ( 8)+ 2 EDGE          ( 8)+ 4 SEPARATION
O  1 + 5        ( 8)+ 4 VORTICITY
P  2 + 6        ( 8)+ 3 STALLED        ( 8)+ 2 FLOW
Q  2 + 8        ( 8)+ 3 PRESSURE       ( 8)+ 4 DISTRIBUTION
R  2 + 8        ( 8)+ 3 VELOCITY       ( 8)+ 4 DISTRIBUTION
S  2 + 7        ( 8)+ 3 SWEEP          ( 9)+ 3 ANGLE
T  2 + 7        ( 9)+ 3 ANGLE          ( 9)+ 3 ATTACK
U  1 + 4        ( 8)+ 3 REYNOLDS
*
```

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1966

http://hdl.handle.net/1826/862

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