

LIBRARY  
ROYAL AIRCRAFT ESTABLISHMENT  
FEDERAL

R. & M. No. 3350



MINISTRY OF AVIATION

AERONAUTICAL RESEARCH COUNCIL  
REPORTS AND MEMORANDA

# Published Reports and Memoranda of the Aeronautical Research Council

LONDON: HER MAJESTY'S STATIONERY OFFICE

1964

PRICE 3s. 6d. NET

# Published Reports and Memoranda of the Aeronautical Research Council

*Reports and Memoranda No. 3350*

*March, 1964*

This paper lists one hundred titles which have been published in the R. & M. Series of the Aeronautical Research Council.

The Council number is included for the purpose of record only.

The R. & M. Series is published and placed on sale by H.M. Stationery Office.

R. & M. No.	Council No.	Title	Author(s)
3251	21 107	An analysis of some VTOL transition motions. November, 1958.	Gates, S. B. Griggs, C. F.
3252	22 008	Turbulent wall jets with and without external stream. June, 1960.	Bradshaw, P. Gee, M. T.
3253	22 119	The analysis of blade vibration due to random excitation. August, 1960.	Whitehead, D. S.
3254	22 133	Force and moment coefficients for vibrating aerofoils in cascade. February, 1960.	Whitehead, D. S.
3255	20 926	Wind-tunnel tests on the effects of an added mass on the flutter of a model delta wing. Part I. Fixed root flutter tests. Part II. Anti-symmetric flutter tests. Part III. Symmetric flutter tests. September, 1958.	Hall, H. Coles, W. A.
3256	22 084	A note on flutter of asymmetric controls. March, 1960.	Broadbent, E. G. Hartley, E. V.
3257	20 714	Measurements of direct pitching-moment derivatives for two-dimensional flow at subsonic and supersonic speeds and for a wing of aspect ratio 4 at subsonic speeds. January, 1959.	Bratt, J. B. Raymer, W. G. Townsend, J. E. G.
3258	21 055	Some possible effects of transonic speeds on wing-aileron flutter. January, 1959.	Broadbent, E. G. Hartley, Violet E.
3259	22 120	A narrow-band spectral analyser for random waveforms. August, 1960.	Whitehead, D. S.
3260	14 227	A proposed apparatus for measuring oscillatory aerodynamic derivatives. October, 1959.	Sterne, L. H. G.

R. & M. No.	Council No.	Title	Author(s)
3261	16 363	The R.A.E. 4-ft 3-ft experimental low-turbulence wind tunnel. Part IV. Further turbulence measurements. June, 1953.	Schuh, H.
3262	22 559	Interactions between normal shock waves and turbulent boundary layers. February, 1961.	Gadd, G. E.
3263	20 006	Measurements of lift and ground interference on a lifting-fan wing at zero forward speed. March, 1958.	Gregory, N. Walker, W. S.
3264	21 234	Wind tunnel tests and theoretical investigations on the effect of a localised mass on the flutter of a delta wing with fixed root. March, 1959.	Donno, G. F.
3265	22 152	On the flow in a reflected-shock tunnel. August, 1960.	Holder, D. W. Schultz, D. L.
3266	22 759	Stresses produced in an infinite elastic plate by the application of loads travelling with uniform velocity along the bounding surfaces. March, 1961.	Morley, L. S. D.
3267	22 865	The effect of temperature variations in the plane and through the thickness of a circular lenticular plate. March, 1961.	Mansfield, E. H.
3268	21 290	Effects of wing stiffness and inertia changes on the modes and frequencies of a model delta aircraft. April, 1959.	Webb, D. R. B.
3269	20 038	Concept of complex stiffness applied to problems of oscillations with viscous and hysteretic damping. September, 1957.	Neumark, S.
3270	21 987	A study of the effect of leading-edge modifications on the flow over a 50-deg sweptback wing at transonic speeds. May, 1960.	Rogers, E. W. E. Berry, C. J. Townsend, J. E. G.
3271	19 691 22 050	Part I. The flow pattern on a tapered sweptback wing at Mach numbers between 0.6 and 1.6. Part II. Experiments with a tapered sweptback wing of Warren 12 planform at Mach numbers between 0.6 and 1.6. July, 1960.	Hall, I. M. Rogers, E. W. E.
3272	19 925 21 867	A theoretical investigation of the longitudinal stability, control and response characteristics of jet-flap aircraft. Parts I and II. February, 1960.	Taylor, A. S.
3273	21 261	The performance of supersonic turbine nozzles. June, 1959.	Stratford, B. S. Sansome, G. E.

R. & M. No.	Council No.	Title	Author(s)
3274	22 117	Free-flight measurements of the transonic roll-damping characteristics of three related wings of aspect ratio 2·83. April, 1960.	Turner, K. J. Hunt, G. K.
3275	22 537	Theory and tunnel tests of rotor blades for supersonic turbines. December, 1960.	Stratford, B. S. Sansome, G. E.
3276	21 963	Principles of attitude control of artificial satellites. November, 1959.	Ives, N. E.
3277	19 921	The calculation of the rotary lateral stability derivatives of a jet-flapped wing. January, 1958.	Thomas, H. H. B. M. Ross, A. J.
3278	22 437	Some applications of 'not-so-slender' wing theory to wings with curved leading edges. July, 1960.	Squire, L. C.
3279	22 503	On the design of wing-body combinations of low zero-lift drag rise at transonic speeds. October, 1959.	Lord, W. T.
3280	22 617	Measurements of aerodynamic heating on the nose of a delta aircraft at speeds up to $M = 1\cdot65$ . June, 1960.	Nethaway, J. E. Nicholas, O. P.
3281	22 876	An experimental investigation of the structure of a leading-edge vortex. March, 1961.	Earnshaw, P. B.
3282	22 775	The bursting of leading-edge vortices—some observations and discussion of the phenomenon. April, 1961.	Lambourne, N. C. Bryer, D. W.
3283	22 888	On the flexure of thin built-up wings. March, 1961.	Pope, G. G.
3284	20 186	Flutter of an all-moving tailplane. August, 1957.	Broadbent, E. G. Williams, Margaret
3285	20 617	Seaplane impact—a review of theoretical and experimental results. December, 1958.	Arlotte, T. Ward-Brown, P. Crewe, P. R. Edited by Smith, A. G.
3286	22 191	An investigation of the flow about a plane half-wing of cropped-delta planform and 6 per cent symmetrical section at stream Mach numbers between 0·8 and 1·41. September, 1960.	Rogers, E. W. E. Hall, I. M. Berry, C. J.
3287	23 237	A comparison of results in the A.R.A. transonic tunnel on a small and a large model of a slender wing. September, 1961.	Bateman, T. E. B. Haines, A. B.

R. & M. No.	Council No.	Title	Author(s)
3288	21 968	Experiments on a delta wing with jet-assisted lift. May, 1960.	Melbourne, W. H.
3289	19 961	The use of conical camber to produce flow attachment at the leading edge of a delta wing and to minimise lift-dependent drag at sonic and supersonic speeds. September, 1957.	Smith, J. H. B. Mangler, K. W.
3290	20 433	Free-flight measurements of pressure distribution at transonic and supersonic speeds on bodies of revolution having parabolic afterbodies. April, 1958.	Kell, C.
3291	18 967	The mixing of free axially-symmetrical jets of Mach number 1.40. January, 1957.	Johannesen, N. H.
3292	20 981	Further results on the mixing of free axially-symmetrical jets of Mach number 1.40. May, 1959.	Johannesen, N. H.
3293	20 196	Charts of peak amplitudes in incidence and sideslip in rolling manoeuvres due to inertia cross coupling. April, 1958.	Pinsker, W. J. G.
3294	22 683	Measurement of the pitching-moment derivatives for rigid tapered wings of hexagonal planform oscillating in supersonic flow. March, 1961.	Woodgate, L. Maybrey, J. F. M. Scruton, C.
3295	22 982	The leading-edge buckling of a thin built-up wing due to aerodynamic heating. February, 1961.	McKenzie, K. I.
3296	20 782	A preliminary data report on ground pressure disturbances produced by the <i>Fairey Delta 2</i> in level supersonic flight. June, 1958.	Holbeche, T. A.
3297	22 912	Note on the evaluation of solid-blockage corrections for rectangular wind tunnels with slotted walls. June, 1961.	Acum, W. E. A.
3298	22 186	Calculation of stability derivatives for tapered wings of hexagonal planform oscillating in a supersonic stream. September, 1960.	Lehrian, Doris E.
3299	23 019	The aerodynamic forces on an oscillating two-dimensional wing in accelerated supersonic flight. March, 1961.	Davies, D. E.
3300	22 584 22 583	Heat transfer through a constant-property laminar boundary layer. Part I. Calculations based on Lighthill's method. Part II. Calculations based on Stratford's method. February, 1961.	Curle, N.

R. & M. No.	Council No.	Title	Author(s)
3301	22 974	The use of a deep electrolytic tank as a lifting-surface calculator. July, 1961.	Ward, H. S.
3302	23 168	Some mathematical methods in three-dimensional subsonic flutter-derivative theory. February, 1961.	Williams, D. E.
3303	22 596	The design of Michell optimum structures. December, 1960.	Chan, A. S. L.
3304	22 823	The aerodynamics of jet flaps. January, 1961.	Williams, J. Butler, S. F. J. Wood, M. N.
3305	23 110	An experimental investigation of the characteristics of some plane and cambered 65° delta wings at Mach numbers from 0.7 to 2.0. July, 1961.	Squire, L. C. Jones, J. G. Stanbrook, A.
3306	23 329	Experiments at $M = 1.41$ on a thin, conically-cambered elliptic cone of 30° semi-vertex angle. August, 1961.	Rogers, E. W. E. Quincey, V. G. Callinan, J.
3307	23 120	Aerodynamic derivative measurements on a wing with a horn-balanced control surface. March, 1961.	Guyett, P. R. Curran, J. K.
3308	23 470	The numerical solution of an integral equation satisfied by the velocity distribution around a body of revolution in axial flow. November, 1961.	Kershaw, D.
3309	23 517	The buckling of plates tapered in thickness. October, 1961.	Pope, G. G.
3310	23 724	Further experimental investigations of the characteristics of cambered gothic wings at Mach numbers from 0.4 to 2.0. December, 1961.	Squire, L. C.
3311	14 157	N.P.L. aerofoil catalogue and bibliography. March, 1962.	Pankhurst, R. C.
3312	19 593 19 756	Wall corrections for wings oscillating in wind tunnels of closed rectangular section. Parts I and II. January, 1958.	Acum, W. E. A.
3313	20 369	Test on the loss of vertical jet thrust due to ground effect on two simple VTOL planforms, with particular reference to the Short SC1 aircraft. May, 1958.	Wyatt, L. A.
3314	21 040	The stability of an aircraft under automatic throttle control and the cross-coupling effects with elevator control. October, 1958.	Fry, D. E. Watts, M. R.
3315	23 012	Measurements of pitching-moment derivatives for blunt-nosed aerofoils oscillating in two-dimensional supersonic flow. July, 1961.	Pugh, P. G. Woodgate, L.

R. & M. No.	Council No.	Title	Author(s)
3316	23 818	Tip-clearance flow and losses for an isolated compressor blade. June, 1962.	Lakshminarayana, B. Horlock, J. H.
3317	23 483	Measurements of free-stream turbulence in some low-speed tunnels at N.P.L. January, 1962.	Bradshaw, P. Ferriss, D. H.
3318	21 233	The loading of helicopter rotor blades in forward flight. April, 1959.	Willmer, M. A. P.
3319	22 146	Wind-tunnel techniques for the measurement of oscillatory derivatives. August, 1960.	Bratt, J. B.
3320	23 749	The effect of a cylindrical shroud on the performance of a stationary convergent nozzle. January, 1962.	Reid, J.
3321	22 619	Some measurements of shock-wave attenuation in channels of various cross-sections. February, 1961.	Bernstein, L.
3322	23 784	Upwash interference in a rectangular wind tunnel with closed side walls and porous slotted floor and roof. April, 1962.	Holder, D. R.
3323	23 649	A review of research on two-dimensional base flow. March, 1962.	Nash, J. F.
3324	23 973	The buckling of plates tapered in planform. April, 1962.	Pope, G. G.
3325	23 975	The bending under normal loading of plates tapered in planform. April, 1962.	Pope, G. G.
3326	22 856	Theoretical analysis of a gust alleviator used on a <i>Lancaster</i> aircraft and comparison with experiment. January, 1961.	Zbrożek, J. K.
3327	20 666	Simplified loading formulae for pull-out manoeuvres of tailed aeroplanes. June, 1958.	Neumark, S.
3328	23 776	Measurements at Mach numbers up to 2.8, of the longitudinal characteristics of one plane and three cambered slender 'ogee' wings. December, 1961.	Taylor, C. R.
3329	22 947	Wind-tunnel experiments on a rectangular-wing jet-flap model of aspect-ratio 6. June, 1961.	Alexander, A. J. Williams, J.
3330	22 889	Flutter characteristics of a wing carrying a flexibly mounted mass. March, 1961.	Gaukroger, D. R.
3331	23 797	On obtaining solutions to the Navier-Stokes equations with automatic digital computers. May, 1962.	Russell, D. B.

R. & M. No.	Council No.	Title	Author(s)
3332	23 098	The effect of solar radiation pressure on the attitude control of an artificial earth satellite. April, 1961.	Ives, N. E.
3333	23 244	Equilibrium configurations of flying cables of captive balloons, and cable derivatives for stability calculations. June, 1961.	Neumark, S.
3334	23 434	The lateral motion of aircraft, and in particular of inertially slender configurations. September, 1961.	Pinsker, W. J. G.
3335	23 209	A single-parameter theory of vortex flow in turbo-machines. August, 1961.	Whitehead, D. S. Beavers, G. S.
3336	23 219	Flight tests on a hovering jet-lift aircraft (Rolls-Royce Flying Bedstead). May, 1961.	Illingworth, J. K. B.
3337	22 791	A compressor routine test code. January, 1961.	Dimmock, N. A.
3338	23 725	Low-speed wind-tunnel measurements on a thin sharp-edged delta wing with 70° leading-edge sweep, with particular reference to the position of leading-edge-vortex breakdown. November, 1961.	Lawford, J. A. Beauchamp, A. R.
3339	23 950	The airforces on the low-aspect-ratio rectangular wing oscillating in sonic flow. March, 1962.	Davies, D. E.
3340	24 188	Pressure distributions and flow patterns on some conical shapes with sharp edges and symmetrical cross-sections at $M = 4.0$ . June, 1962.	Squire, L. C.
3341	24 063	On the numerical evaluation of the drag integral. October, 1961.	Eminton, Evelyn
3342	24 288	The shear stiffness of a corrugated web. June, 1962.	McKenzie, K. I.
3343	23 930	The forces on a cylinder in shear flow. July, 1962.	Thom, A.
3344	24 000	An analysis of two-dimensional turbulent base flow, including the effect of the approaching boundary layer. July, 1962.	Nash, J. F.
3345	24 060	Dynamics of the deformable aeroplane. Part I. The equations of motion. Part II. A study of the trim state and longitudinal stability of the slender integrated aeroplane configuration. September, 1962.	Milne, R. D.
3346	23 952	An equivalence law relating three- and two-dimensional pressure distributions. May, 1962.	Lock, R. C.

R. & M. No.	Council No.	Title	Author(s)
3347	23 433	A flight study of the sidestep manoeuvre during landing. July, 1961.	Perry, D. H. Port, W. G. A. Morrall, J. C.
3348	23 180	Tests at transonic speeds on wings with wedge sections and sweep varying between 0° and 60°. October, 1961.	Rogers, E. W. E. Berry, C. J. Quincey, V. G.
3349	22 301	A contribution to the theory of aircraft response in rolling manoeuvres including inertia cross-coupling effects. April, 1960.	Thomas, H. H. B. M. Price, P.
3350	—	Published Reports and Memoranda of the Aeronautical Research Council. (Nos. 3251 to 3350.)	—

# Publications of the Aeronautical Research Council

## ANNUAL TECHNICAL REPORTS OF THE AERONAUTICAL RESEARCH COUNCIL (BOUND VOLUMES)

- 1942 Vol. I. Aero and Hydrodynamics, Aerofoils, Airscrews, Engines. 75s. (post 2s. 9d.)  
Vol. II. Noise, Parachutes, Stability and Control, Structures, Vibration, Wind Tunnels. 47s. 6d. (post 2s. 3d.)
- 1943 Vol. I. Aerodynamics, Aerofoils, Airscrews. 80s. (post 2s. 6d.)  
Vol. II. Engines, Flutter, Materials, Parachutes, Performance, Stability and Control, Structures. 90s. (post 2s. 9d.)
- 1944 Vol. I. Aero and Hydrodynamics, Aerofoils, Aircraft, Airscrews, Controls. 84s. (post 3s.)  
Vol. II. Flutter and Vibration, Materials, Miscellaneous, Navigation, Parachutes, Performance, Plates and Panels, Stability, Structures, Test Equipment, Wind Tunnels. 84s. (post 3s.)
- 1945 Vol. I. Aero and Hydrodynamics, Aerofoils. 130s. (post 3s. 6d.)  
Vol. II. Aircraft, Airscrews, Controls. 130s. (post 3s. 6d.)  
Vol. III. Flutter and Vibration, Instruments, Miscellaneous, Parachutes, Plates and Panels, Propulsion. 130s. (post 3s. 3d.)  
Vol. IV. Stability, Structures, Wind Tunnels, Wind Tunnel Technique. 130s. (post 3s. 3d.)
- 1946 Vol. I. Accidents, Aerodynamics, Aerofoils and Hydrofoils. 168s. (post 3s. 9d.)  
Vol. II. Airscrews, Cabin Cooling, Chemical Hazards, Controls, Flames, Flutter, Helicopters, Instruments and Instrumentation, Interference, Jets, Miscellaneous, Parachutes. 168s. (post 3s. 3d.)  
Vol. III. Performance, Propulsion, Seaplanes, Stability, Structures, Wind Tunnels. 168s. (post 3s. 6d.)
- 1947 Vol. I. Aerodynamics, Aerofoils, Aircraft. 168s. (post 3s. 9d.)  
Vol. II. Airscrews and Rotors, Controls, Flutter, Materials, Miscellaneous, Parachutes, Propulsion, Seaplanes, Stability, Structures, Take-off and Landing. 168s. (post 3s. 9d.)
- 1948 Vol. I. Aerodynamics, Aerofoils, Aircraft, Airscrews, Controls, Flutter and Vibration, Helicopters, Instruments, Propulsion, Seaplane, Stability, Structures, Wind Tunnels. 130s. (post 3s. 3d.)  
Vol. II. Aerodynamics, Aerofoils, Aircraft, Airscrews, Controls, Flutter and Vibration, Helicopters, Instruments, Propulsion, Seaplane, Stability, Structures, Wind Tunnels. 110s. (post 3s. 3d.)

### Special Volumes

- Vol. I. Aero and Hydrodynamics, Aerofoils, Controls, Flutter, Kites, Parachutes, Performance, Propulsion, Stability. 126s. (post 3s.)
- Vol. II. Aero and Hydrodynamics, Aerofoils, Airscrews, Controls, Flutter, Materials, Miscellaneous, Parachutes, Propulsion, Stability, Structures. 147s. (post 3s.)
- Vol. III. Aero and Hydrodynamics, Aerofoils, Airscrews, Controls, Flutter, Kites, Miscellaneous, Parachutes, Propulsion, Seaplanes, Stability, Structures, Test Equipment. 189s. (post 3s. 9d.)

### Reviews of the Aeronautical Research Council

1939-48 3s. (post 6d.)

1949-54 5s. (post 5d.)

### Index to all Reports and Memoranda published in the Annual Technical Reports

1909-1947

R. & M. 2600 (out of print)

### Indexes to the Reports and Memoranda of the Aeronautical Research Council

Between Nos. 2351-2449

R. & M. No. 2450 2s. (post 3d.)

Between Nos. 2451-2549

R. & M. No. 2550 2s. 6d. (post 3d.)

Between Nos. 2551-2649

R. & M. No. 2650 2s. 6d. (post 3d.)

Between Nos. 2651-2749

R. & M. No. 2750 2s. 6d. (post 3d.)

Between Nos. 2751-2849

R. & M. No. 2850 2s. 6d. (post 3d.)

Between Nos. 2851-2949

R. & M. No. 2950 3s. (post 3d.)

Between Nos. 2951-3049

R. & M. No. 3050 3s. 6d. (post 3d.)

Between Nos. 3051-3149

R. & M. No. 3150 3s. 6d. (post 3d.)

HER MAJESTY'S STATIONERY OFFICE

*from the addresses overleaf*

© *Crown copyright* 1964

Printed and published by  
HER MAJESTY'S STATIONERY OFFICE

To be purchased from  
York House, Kingsway, London W.C.2  
423 Oxford Street, London W.1  
13A Castle Street, Edinburgh 2  
109 St. Mary Street, Cardiff  
39 King Street, Manchester 2  
50 Fairfax Street, Bristol 1  
35 Smallbrook, Ringway, Birmingham 5  
80 Chichester Street, Belfast 1  
or through any bookseller

*Printed in England*