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Approximate Formulæ for the Pressure and Density of the Air at Great Altitudes.
(F. Haber, Z.V.D.I., Vol. 86, No. 25-36, 5/9/42, p. 555.) (111/1 Germany.)

Up to an altitude of 11 km. the standard atmosphere with a temperature gradient of $-6.5°C.$ per km. is represented by

$$\frac{p_H}{p_0} = (1 - 6.5/288\, H)^{5.255} \quad . \quad . \quad . \quad . \quad (1)$$

$$\frac{\rho_H}{\rho_0} = (1 - 6.5/288\, H)^{4.255} \quad . \quad . \quad . \quad . \quad (2)$$

Above 11 km. (Stratosphere) the temperature is assumed constant ($-56.5°C.$) and

$$\frac{p_H}{p_{11}} = \frac{\rho_H}{\rho_{11}} = e^{-.1575\,(h-11)} \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where

H = altitude in km.

$\left.\begin{array}{l} p = \text{pressure} \\ \rho = \text{density} \end{array}\right\}$ of air.

These accurate expressions are rather cumbersome and for many purposes can be replaced by the following simple approximations.

$$\frac{p_H}{p_o} = \left\{\frac{(31-H)}{(31+H)}\right\}^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1a)$$

$$\frac{\rho_H}{\rho_o} = \frac{(20-H)}{(20+H)} \quad . \quad . \quad . \quad . \quad . \quad . \quad (2a)$$

$$\frac{p_H}{p_o} = \frac{\rho_H}{\rho_{11}} = \left\{\frac{(37-H)}{(37+H)}\right\}^2 \quad . \quad . \quad . \quad . \quad . \quad (3a)$$

The above approximations are obviously accurate at the origin.

The errors are generally less than ± 2 per cent., as will appear from the following table:—

1 (*a*)	-2 per cent. at 5 km.
	0 at 9.5 km.
	$+1.5$ at 11 km.
2 (*a*)	$-.5$ per cent. at 3 km.
	0 between 6 and 8 km.
	$+2$ per cent. at 11 km.
3 (*a*)	$+1$ per cent. at 15 km.
	0 at 18 km.
	-4 per cent. at 21 km.

Heat Transfer to a Fluid Flowing Periodically at Low Frequencies in a Vertical Tube. (R. C. Martinelli and others, A.S.M.E. Preprint, April 21-28, 1943.) (111/2 U.S.A.)

There are available in the literature many data for the transfer of heat from a tube to an enclosed fluid flowing with steady, unidirectional motion. Knowledge with respect to the applicability of such steady flow data to the analysis of heat transfer from a pipe to a fluid, the velocity of which is a periodic function of time, is necessary for the solution of certain types of heat-transfer problems. An outstanding example of a system in which such periodic heat transfer occurs is the internal combustion engine, under detonating and non-detonating conditions. The experiments described in this paper are the beginning of a long-range programme on the subject of heat transfer in the cylinders of internal combustion engines and, although the results of the tests are not immediately applicable to engine analysis, some light is shed on the phenomenon.

The results may be summarised as follows: For the type of velocity variation utilised in these experiments it is shown that steady unidirectional flow heat transfer results may be utilised to predict heat transfer performance under conditions of periodic flow:—

(*a*). As a first approximation the steady flow data may be utilised directly, replacing Re_m by $\tilde{R}e_m$ and obtaining $\tilde{N}u_{lm}$ from the steady unidirectional flow curve.

In the above

Re_m = Reynolds modulus for steady unidirectional flow, based on fluid properties at arithmetic average of mixed-mean fluid temperature at entrance and exit, t_m.

$\tilde{R}e_m$ = Reynolds modulus for periodic flow, properties evaluated at t_m.

$\tilde{N}u_{lm}$ = Nusselt modulus for periodic fluid flow, based on logarithmic mean temperature difference between tube wall and fluid, the thermal conductivity being measured at t_m.

(*b*) For a more precise and rational method, the steady unidirectional fluid flow data may be utilised to predict instantaneous magnitudes of the Nusselt modulus at any point in the cycle of velocity variation. The time average Nusselt modulus may then be obtained by graphical integration.

Relationship Between Reynolds Number and Turbulent Velocity Distribution in a Pipe. (L. S. Rhodes, J. App. Mech., Vol. 10, No. 1, March, 1943, pp. 21-22.) (111/3 U.S.A.)

The author assumes that the velocity distribution can be represented by

$$u = CV\left(\frac{y}{R}\right)^{n}$$

where u = velocity at distance y from wall.
R = radius of pipe.
V = mean velocity.
CV = maximum velocity (at centre).

By integrating the flow, it can easily be shown that

$$C = \frac{(n+1)\,(n+2)}{2}$$

The shearing stress at the wall is given by

$$\tau = \left(\frac{D}{4}\right)\left(\frac{dp}{dl}\right); \left(\frac{dp}{dl}\right) = \text{pressure gradient})$$

$$\frac{dp}{dl} = \lambda\,(1/D)\,\tfrac{1}{2}\rho V^2$$

and experiment shows that λ, the so-called friction coefficient is only a friction of the Reynolds number VD/Y, *i.e.*,

$$\lambda = k\left(\frac{VD}{Y}\right)^{m}$$

Therefore

$$\tau = \left(\frac{\lambda}{8}\right)\rho V^2$$

Substituting for λ and V, this becomes

$$\tau = \left(\frac{k\rho^{m+1}D^m}{8\mu^m}\right)\left(\frac{u^{m+2}D^{mn+2n}}{C^{m+2}\,(2\,y)^{mn+2n}}\right)$$

Assuming now that the shear at the wall is identical with the skin friction on a flat plate, τ must be independent of D. (Abstractor's Note rules out laminar flow.)

$$\therefore\; mn + 2n + m = 0,$$

$$i.e.,\; n = \frac{-m}{(2+m)}$$

Thus the velocity distribution corresponding to a given V depends only on "m" which is accurately known from the experiments on friction losses in pipes.

For a given velocity distribution, the kinetic energy passing a given section per second is easily obtained by integration.

This energy is E times the kinetic energy if all the fluid particles moved at the mean speed V where

$$E = \frac{\{\,(n+1)^3\,(n+2)^3\,\}}{\{\,4\,(3n+1)\,(3n+2)\,\}}$$

Then if $n = 1/9$ (flow in cast pipes)

$$E = 1.038.$$

The practical value of E will be somewhat larger, since the above only takes axial motion into account.

Effect of a Rotating Cylinder Placed in the Nose of an Aerofoil on its Aerodynamic Characteristics. (E. B. Wolff and C. Koning, Rykstudiedienst Voor Luchtvaart, Vol. 3, 1925, Rept. 96A; Vol. 4, 1927, Reports 98A, 105A and 130A.) (111/4 Holland.)

The experiments were carried out on an aerofoil of 1,000 mm. span, 200 mm. chord of maximum thickness, 37 mm. approximately in ships to Goettingen 386 (flat bottom surface). The rotating cylinder (diameter 37 mm.) spans the whole of the model, its axis being placed approximately 34 mm. from the nose. The wing is provided with an internal shield surrounding the cylinder with a small gap (.5 mm.).

This shield is cut away at the top and bottom surface of the wing leaving a gap of about 13 mm. where the cylinder replaces the normal wing surface.

The front portion of the shield forming the aerofoil nose is detachable. Without it, the aerofoil shape is altered to one with a cylindrical nose. Under these conditions about half the cylindrical surface now becomes effective as wing contour.

Lift and drag measurements were carried out in the usual manner, both with and without nose for various speed of rotation of the cylinder. The power required to drive the cylinder was not determined. The effect of cylinder clearance (internal shield) was also investigated. The polar diagrams were compared with those obtained with standard or slotted wings or freely rotating cylinders. The principal conclusions may be summarised as follows:—

1. Rotation of the cylinder may raise the critical angle from 14° (corresponding to the normal Goettingen 386 profile) to about 42°. Under these conditions the maximum lift coefficient becomes 2.43 compared with 1.28, *i.e.*, an increase of over 90 per cent.

2. Such large increases in lift are only possible if the detachable nose shield is removed, so that about half the cylinder surface becomes effective. With the nose in position, the shift in the critical angle is reduced to 7° and the maximum lift coefficient is now 1.45, *i.e.*, an increase of 16 per cent. only.

3. To obtain the above results, the ratio of circumferential speed of cylinder to air speed U must be of the order of 4/1 (1,700 r.p.m. for a wind speed of 8 m./sec.). Beyond this speed ratio, the increase in lift is very small. At lower U/V values, the maximum lift coefficient obtainable falls off rapidly 1.8 for $U/V=2$ and 1.4 for $U/V=1.3$.

4. The beneficial results noted above also depend on the maintenance of very close clearance between cylinder and internal shield ($\sim$ .5 mm.). Increasing the gap to 1.5 mm. reduces the lift coefficient appreciably, especially at low U/V values.

   Thus at $U/V=2$, the lift coefficient falls from 1.7 (clearance .5 mm.) to .7 (clearance 1.5 mm.) the incidence being 20° in each case.

5. Whilst there is no doubt that the rotating cylinder enables high lift coefficient to be maintained at incidences well beyond those possible with slotted wings, the corresponding drags are very large ($\sim$ .7). If comparison is made at lift coefficients just possible with slotted wings ($\sim$ 2.1), the drag of the cylinder wing is at least 50 per cent. greater.

6. The author finally compared the polar diagram of the cylinder wing with that obtained for the rotating cylinder alone. In both cases the reference area is the projected area of the cylinder. As was to be expected, for the same drag coefficient the lift coefficient with aerofoil is about 50 per cent. higher than for the free cylinder.

7. A velocity survey with a hot wire anemometer at a distance of 5 mm. from the surface of the aerofoil showed that an appreciable momentum is imparted to the air by the rotation of the cylinder.

8. It was proposed in subsequent experiments to investigate the effect of a change in position of cylinder as well as shape of aerofoil. The effects of surface roughness of the cylinder were also to be determined.

ABSTRACTOR'S NOTE.—No further results were published.

The Motions of a Viscous Fluid Produced by the Slow Rotation of Two Circular Cylinders Placed Eccentrically in the Fluid. (W. Muller. Z.A.M.M., Vol. 22, No. 4, August, 1942, pp. 177-189.) (111/5 Germany.)

The author has investigated in two previous papers the two-dimensional motion produced by the slow rotation of two circular cylinders, finite solutions being obtained both for the stream function and the viscous forces acting on either cylinder (inertia terms are neglected). The first of these papers (Ing. Arch., Vol. 13 (1942), pp. 37-58) deals particularly with the case of a bearing, *i.e.*, the effect on the rotating journal is studied. In the second paper (Ann. Phys., Vol. 41 (1942),pp. 335-354) attention is paid to the torque transmitted by a rotating cylinder on a second cylinder suspended inside it (viscometer problem). The theory is, however, not limited to this case and applies equally well when the cylinders are external to each other or if one cylinder becomes a plane. The present paper deals more particularly with the case of both cylinders rotating either in the same or opposite direction. The system of bipolar curved co-ordinates already previously used is retained as being the most convenient for this type of investigation.

Some special cases of interest are worked out in detail. These include:—

(1) Cylinders rotating in opposite direction, the smaller being placed eccentrically inside the larger and its angular velocity ratio being such that the flow through any cross-section of the annular space between the cylinders is zero.

The corresponding stream lines are given, including the special case when the outer cylinder degenerates into a flat plate.

(2) Investigation of condition for the absence of any force acting on the cylinders, *i.e.*, only torques are transmitted.

In the case of concentric cylinders this torque is given by

$$4\pi u\,(w_1-w_2)\frac{(r_1{}^2r_2{}^2)}{(r_2{}^2-r_1{}^2)}$$

when $\left.\begin{matrix} w_1 \\ w_2 \end{matrix}\right\}$ = angular velocities of two cylinders.

$\left.\begin{matrix} r_1 \\ r_2 \end{matrix}\right\}$ = corresponding radii.

In conclusion, the author indicates a possible method for including inertia terms in the general solution. This would be of interest in the case of journal friction, but the mathematical difficulties have so far not been overcome.

Aerodynamic Forces on a Harmonically Vibrating Wing in a Supersonic Field (Two-Dimensional Case). (S. Borbely, Z.A.M.M., Vol. 22, No. 4, August, 1942, pp. 190-205.) (111/6 Germany.)

The author considers bending and torsional vibrations of a two-dimensional wing, neglecting friction of the air on the assumption that the additional velocities u and v are always small compared with the incident flow velocity U. This implies the following:—

1. The wing incidence and amplitude of vibration are both small, and the frequency of the vibration is low.
2. The wing profile has sharp edges and the inclinations of the tangents to the contour are throughout small.

The author shows that under these conditions the field of flow produced by the vibrating wing is made up of two parts:—

1. A steady field, corresponding to the flow at the mean incidence of the vibrating wing and depending on the curvature and thickness of the profile.

2. An unsteady harmonic field, corresponding to the flow about a two-dimensional plate of the same chord and vibrating symmetrically with regard to the current with the same frequency and amplitude as the original wing.

This field is thus independent of the shape and angle of incidence of the original wing.

The resultant aerodynamic forces acting on the wing can be obtained by superposition of the forces due to the two individual fields. The steady portion has already been investigated by Prandtl, Ackeret and Busemann, and may be considered as known.

The author deals more specifically with the unsteady field associated with the vibrating plate originally at zero incidence. After linearising the general differential conditions and inserting the boundary conditions appropriate to the problem, the field of flow associated with a vibrating pressure point is obtained in terms of Haken (special class of Cauchy) integrals. The complete field is then obtained by combining a suitable number of pressure points. In an appendix the author shows how the same method can also be applied to the steady field. The results are identical with those already obtained by Ackeret. It is interesting to note that while in the case of incompressible flow, the forces on the wing depend on the relative motion of different points in the wing surface (rear and forward neutral point and centre), in the case of supersonic flow the motion of the leading edge alone is of importance.

The Theory of the Lifting Wing. (J. Nikuradse and E. Mohr, L.F.F., Vol. 20, No. 2, 27/2/43, pp. 48-56.) (111/7 Germany.)

The authors demonstrate that under given incident flow conditions, the forces on an aerofoil depend only on the characteristics of the trailing vortex sheet, i.e. on the potential flow due to this sheet at a considerable down-stream distance.

In analogy with the Karman vortex street associated with the two-dimensional problem, it is further assumed that this sheet moves as a rigid surface at a sufficiently large distance from the wing. Under these conditions, the generalised impulse theorem leads to a minimum kinetic energy of the lateral flow, i.e. a minimum of wing drag. In the case of symmetrical flow and a straight trailing edge, this corresponds to an elliptic lift distribution on the wing. The most favourable geometrical shape of the vortex sheet shed by a wing of a given plan and carrying the least energy for a given impulse is thus a flat plane, i.e. the trailing edge of the wing must be straight. This is the only factor which theory indicates as essential. All the other form parameters of the wing must be determined by experiment.

Influence of Cross-Sectional Area of the Surge Chamber on the Fluctuation of the Water Level During Inflow Control of Hydraulic Turbines. (W. Richter, Ing. Archiv., Vol. 13, No. 6, 1943, pp. 331-342.) (111/8 Germany.)

In order to prevent large pressure changes in the piping system of a hydraulic turbine when the rate of water flow is suddenly altered, it is usual to install a damping capacity or surge chamber at the end of the conduit from the reservoir and immediately in front of the head race.

The author obtains the differential equation of the unsteady motion between the reservoir and surge chamber by assuming one-dimensional flow along a stream line and introducing the necessary terms for resistance and damping, which are both assumed to vary as the square of the effective speed. Of special interest is the graphical method of solution by means of a nomogram which gives the change of level associated with a given flow control as a function of the area of cross-section of the surge chamber.

The method is illustrated by a worked-out example both for the case when the flow is stopped suddenlv or reduced gradually.

The advantages of a surge chamber with discontinuous variation in cross-section are discussed.

The method can also be applied if the damping and resistance are assumed to follow other than the square law.

Technical Problems of High Altitude Flight. (G. Caproni, Der Flieger, Vol. 12, No. 5, January, 1939, pp. 168-169.) (111/10 Italy.)

Two types of high altitude flight exist at the moment. In the first the object is to reach the quickest possible altitude and this necessitates designing a machine with a great rate of climb but indifferent speed and controllability. Quite different considerations, however, apply if for economic or military reasons, high speeds are to be achieved at a great altitude. For altitude record purposes, it appears that the biplane offers the best solution for providing the necessary wing area at its lowest weight and the author cites the Caproni 161 as a case in point. High speed flight at a great altitude presents considerably greater difficulties. Here the wing area must be cut down and the engine power required becomes very large. Although supercharging by means of an exhaust turbine represents a feasible solution up to about 10,000 m., the efficiency of this method rapidly diminishes at greater altitudes and this together with the drop in airscrew efficiency necessarily associated with high speed operation explains the interest in the alternative methods of jet propulsion which alone seems to offer any prospects of high speeds being maintained at really great altitudes. Even if, however, the necessary propulsive thrust becomes available very little is as yet known about the wing section and fuselage form required for minimum drag at speeds approaching sonic values.

The author finally touches on physiological problems associated with high altitude flight and states that the Guidonia Institute have developed a pressure suit giving complete satisfaction. The design of a satisfactory pressure cabin on the other hand is still in its infancy. It is interesting to note that according to the author repeated ascents to higher altitudes without adequate protection are harmful in a cumulative sense, the resistance of the pilot diminishing with each flight.

Technique to Shorten Take-offs and Landings. (R. de H. Williams, Aviation, Vol. 42, No. 1, Jan., 1943, pp. 94-95, 313-319.) (111/11 U.S.A.)

The author, who is test pilot of the Bœing Aircraft Company, assumes that the ground friction coefficient remains constant during the run. The calculations apply to a conventional monoplane and ground effect is taken into consideration and yield the following conclusions:—

1. Three point take-off will yield the shortest ground ($\mu > .04$) run on most commonly used surfaces, except very smooth concrete runways ($\mu > .02$). In the latter case, a high tail altitude (zero lift) is beneficial.
2. Minimum landing roll is obtained when the landing is made three point and the roll continued in a tail-high altitude, applying the brakes as much as possible without skidding the tyre or overthrowing the aircraft. (This type of landing should be regarded as an emergency manœuvre only.)

Removing Snow from Runways. (H. L. Hunt, Aviation, Vol. 42, No. 1, Jan., 1943, pp. 98-99, 263, 332, 335-342.) (111/12 U.S.A.)

There are several methods of removing snow from runways, but the most favourable employ machines that pick up the snow and deposit it well away from the used areas. This is achieved by first banking up the snow with special ploughs and subsequently distributing it well away from the used areas. Several types of these machines are described, including a recent model in which plough and motor are combined in one unit. Rotary blowers will blow the snow 50 to 90 ft. with or 40 ft. against a moderate wind. They are useless, however, in case of a storm. The snow should be cleared to the full width of the runway and to beyond the contact lights. Banks at the edge should be sloped not more than 3/100 to prevent damage to plane and prevent forming traps to drifting snow. Rolling the snow outside the cleared areas will reduce drifting. The snow should be cleared as close to its runway as possible. Surface ice can be dealt with by means of special scrapers or rendered skid proof by spreading hot sand. Cinders previously soaked in brine are also used for this purpose. The centre of the runway should be painted with a contrasting stripe to guide its pilots.

Although aircraft can land and take off successfully in 6 to 8 ins. of dry snow, moist snow is very treacherous, especially if low pressure tyres are fitted.

Airport managers agree that the runways should be kept clear of snow at all times; at a Canadian training field, 15 aircraft swerved from the runways during two months, involving damage to the extent of 250,000 dollars. These runways had been compacted by rolling but not cleared of snow. It is reckoned that over three-quarters of this sum could have been saved if equipment allowing complete snow removal had been available on the spot. To be of use, such equipment must be in good condition. Thus on a typical Canadian airport, 52 ins. of snow fell during the month of January alone. Keeping the runways open during the month required that a tractor hauling rollers operated 453 hours, a rotary blower 412 hours, and a plough 386 hours. In one period the tractor operated 12 days, the blower eight days and the plough for nine days in succession with only service stops. The cost of such equipment, although high, is negligible compared with the possible saving in lives and machines.

Rocket Power for Assisted Take-Off. (R. Healey, Aviation, Vol. 42, No. 1, Jan., 1943, pp. 100, 221-223.) (111/13 U.S.A.)

Recent tests carried out in the U.S.A. on commercial powder rockets show that a rocket weighing about 1.5 lb. (.5 lb. of explosive charge) can produce a thrust of about 15 lb. for 3 seconds. Opel in his 1929 tests, is stated to have obtained a thrust of 53 lbs. for 25 seconds with a 10 lb. charge. Other experiments have claimed thrusts up to 600 lb. for 3 seconds with larger charges. Extrapolating from these results, the author concludes that a charge of 12.5 lb. of black powder should be capable of maintaining a thrust of 200 lb. for 5 seconds. By firing ten of these charges simultaneously, followed after 5 seconds by combustion of a further 10 charges, a thrust of 2,000 lb. for 10 seconds would be realised to accelerate the aircraft over the first 50 m.p.h. of its speed range. This would either materially shorten the take-off run for a given load or alternatively enable an excess load to be carried for the same length of runway. It is stated that the Ju 88 is enabled to carry an excess load of 3,000 kg. by making use of this method. It is estimated that the individual weight of the black powder rocket would be of the order of 17.5 lb. (charge weight 12.5 lb.). As the charges become exhausted the casing would be dropped from the aircraft. The average increase in weight during the assisted portion of the take-off will then be less than 200 lb. Using smokeless powder or nitro cellulose explosives, a considerable further reduction in weight of the installation should be possible. On account of its simplicity, this method of assisted take-off deserves attention.

Detachable Fuel Tanks of Moulded Plywood. (Aviation, Vol. 42, No. 1, Jan., 1943, p. 163.) (111/14 U.S.A.)

The Vidal Research Corporation have developed a series of auxiliary fuel tanks made of moulded plywood and ranging from 50 to 160 gallons capacity. These tanks are of streamline shape and installed under the wing or fuselage. They can be quickly jettisoned without interrupting the normal fuel supply A photograph of the tank is given in the article.

In the construction of these tanks, a large number of veneers are employed which are patterned in a special manner so as to render the tank leak proof.

The main difficulty appears to be the dynamic load due to sloshing of the fuel, which necessitates the fitting of specially balanced internal baffles.

Photographic Method for Investigating Short Period Rolls of Photographic Reconnaissance Aircraft. (M. Nagel, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 36-37.) (111/15 Germany.)

Lack of definition of aerial photographs is produced by the motion of the image during the time of exposure. Under bad conditions of visibility, relatively long exposure times must be given and the question naturally arises whether the employment of special low speed aircraft would prove beneficial.

Whilst this would naturally reduce the so-called regular displacement error, other factors, such as course stability and angular velocity of roll of the aircraft during the exposure interval, also affect the image travel and may become more important in the case of low speed aircraft (gust sensitivity).

The author has investigated this problem by taking long exposure photographs of a suitable ground object (4×4 m. white cloth placed at the centre of a large meadow), the camera being mounted rigidly in the aircraft. Sample photographs taken from an altitude of 1,500 m. (exposure 3 seconds) give information as to course stability and roll. Similar records from a lower altitude give the small amplitude displacements due to camera vibration.

It is thus possible to investigate the suitability of various aircraft types for photographic work and also obtain information on the relative skill of different pilots in maintaining course.

The short period rolls affecting image displacement are usually of the order of 1 vibration/sec.

Camera vibrations, mainly induced by the engine, have a much higher frequency ($\sim$20 vibrations/sec.).

These transverse vibrations are difficult to allow for on the final negative and means must be taken to reduce them to the utmost by suitable choice of aircraft and installation of camera.

The regular displacement due to the translation of the aircraft in a straight line on the other hand presents no difficulty to the computor. If necessary it can be considerably reduced by swinging the camera automatically at the required speed so that the image remains almost stationary on the film.

Calculation of Diving Speeds. (E. Kenner, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 51-52.) (111/16 Germany.)

It is assumed that the aircraft dives at a constant angle ϕ, the propeller exerting a constant thrust S. At the beginning of the dive (altitude H) the aircraft has zero vertical velocity. Throughout the dive the weight G and resistance coefficient c_w of the aircraft are constant.

Under these conditions, the speed of the aircraft will accelerate till a certain lower altitude h is reached. Subsequent to this, the diving speed decreases.

The critical altitude h corresponding to maximum diving speed is given by

$$h = H - \frac{(G \sin \phi)}{(F c_w \rho_h)}$$

where ρ_h = density at altitude h.
F = wing area.

Assuming a standard atmosphere

$$\rho_h = \rho_o \left(\frac{b}{b_o} \right)$$

where

$$\left(\frac{b}{b_0}\right)=\left(1-\frac{ah}{T_0}\right)^{1/aR}$$

In the above

a = lapse rate = .0065°C./m.
ρ_0 = standard ground density.
= 1.226 kg./m.^{3} at T_0 = 288°C$_A$.

Similarly h can be expressed as a function of b/b_0 and we then obtain for the critical altitude.

$$\left(\frac{T_0}{a}\right)\left[1-\left(\frac{b}{b_0}\right)^{aR}\right]=H-\left(\frac{G\sin\phi}{Fc_w\rho_0}\right)\left(\frac{b}{b_0}\right)$$

where R = 29.27 = gas constant.

This equation can be solved graphically for (b/b_0) and h determined.

The maximum diving speed v_m then follows by substituting the appropriate value for h in the equation

$$v_m=\left\{\frac{(G\sin\phi+s)}{\rho_0 F c_w}\right\}\times 2g\times\left(1-\frac{ah}{T_0}\right)^{-1/aR}$$

For lower values of h, v slowly diminishes.

A worked out example considers the vertical dive of an aircraft with the following characteristics:—

G = 2,000 kg.
F = 16 m.^{2}.
S = 100 kg.
c_w = .12.

The dive starts at 8,000 m. A maximum velocity of 197.3 m. is reached at an altitude of 6,242. After this the speed drops almost linearly to 140 m./sec. at 1,000 m.

Physiological Problems of Long Distance and Night Flying. (F. Ruff, Luftwissen, Vol. 10, No. 2, Feb., 1943, p. 61.) (Digest of Lilienthal Lecture.) (111/17 Germany.)

Long distance flights subject the crew to considerable fatigue and this will affect fighting capacity should the aircraft be attacked. Three factors accelerate fatigue: cramped quarters, noise and vibration.

The so-called " comfortisation " of military aircraft is at last receiving attention. It is not enough to provide a seat and expect that this necessarily implies rest. Continuous contraction of any muscle to hold the body in a required position must be avoided. Much has been done as regards the pilot in providing adjustable seats and placing all the controls in suitable positions. The remainder of the crew deserves equal attention, especially as regards vibration. Modern research has shown that the frequency of such vibration as well as their amplitude have pronounced physiological effects. Thus for horizontal seat vibrations up to .5/sec. the body executes parallel vibrations as a whole. At .6/sec. the head begins to lag behind and may get into resonance at about 1.6/sec. At higher frequencies the node travels downwards along the spine, till at frequencies above 4/sec. only the seat takes part in the motion. In the case of vertical seat vibrations, eye resonance may be set up and this will render ground observation difficult. Apart from these mechanical effects, continuous exposure to vibration may produce grave disturbances of the nervous system and the failure of reflexes.

The problem of vibration thus deserves the closest attention in assessing the comfort of the crew and their resistance to fatigue.

The effect of noise in producing fatigue is well known and elaborate precautions are taken in civil aircraft to combat noise. In the case of military aircraft, the simplest solution is the provision of comfortable sound insulating helmets fitted with headphones.

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Night flying presents a special problem. The success or failure of a night combat depends largely on which of the two combatants sees the other first. Acuteness of vision under such circumstances varies considerably for different individuals. It must be the object of physiological tests to select suitable candidates and weed out individuals suffering from so-called "nightblindness," i.e. lack of response of the retina rods to low intensity stimulæ. For the normal individual, the rod response will increase up to 100,000 times if the eye is kept unstimulated with maximum pupil diameter over a period of 30-40 minutes. Unfortunately this adaptation is completely destroyed by a bright light, such as a gun flash or tracer ammunition. For well camouflaged aircraft, therefore, night fighting is necessarily restricted to a short gun burst, after which contact is lost through inability of either side to see the other.

Even the internal illumination of the aircraft instruments may have a serious effect in reducing night adaptation. By employing luminescent paints of a suitable colour, the danger to the observer can be considerably reduced.

The importance of frequent tests of the night vision of observers is stressed. Correct diet is of importance in maintaining this faculty.

Calculation of Power Required for Operating a Variable Camber Wing Flap. (K. Wolf, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 53-57.) (111/18 Germany.)

The flap under consideration retracts a distance of 1.275 m., undergoing a simultaneous change in incidence from $+40°$ to $-7°$. The force required to overcome friction and air drag at any position is given. Not counting inertia, this force varies from 1,080 kg. (fully extended) to 60 kg. (retracted) for each flap. Each flap is mounted on two platforms running on rails and inter-connected by a cable and pulley system so as to cause the platforms to move in or out together when the top cable is pulled to the left or right.

This pull is exerted by a tie rod bridging the space between the two flaps and passing through a hollow internally threaded spindle, which in turn is rotated by an electric motor fed by the aircraft system (24 volts D.C.). The author discusses in detail the size of motor and type of gearing required for this method of flap operation, taking into account both inertia effects and starting from rest. All the pertinent factors such as friction in worn gear and temperature rise of motor are fully allowed for, and it is finally concluded that a Bosch reversing motor Type KM/RE800 with a speed range up to 6,000 r.p.m. and a maximum output of 1,000 watt comes nearest to fulfilling the required conditions, the gear ratio between motor and spindle being 10.9/1 and the pitch of the spindle 6 mm.

Under these conditions the current varies from 106 to 21 amps during retraction, the corresponding speed change of the motor being from rest to 6,000 r.p.m. The total time of operation is about 35 seconds.

Since the air forces assist during extension of the flap, the same motor will easily suffice for this purpose.

Methods for Balancing Airscrews. (H. Oschatz, Luftwissen, Vol. 10, No. 3, March, 1943, pp. 69-73.) (111/19 Germany.)

Airscrew unbalance may be due to three causes:—

1. A displacement of the C.G. from the axis of rotation (so called static unbalance).
2. Lack of coincidence of principal axis of inertia with axis of rotation. Even if there is static balance (in which case the axis of rotation cuts the inertia at the C.G.) an unbalanced couple remains.
3. Aerodynamic unbalance due to differences in the aerodynamic blade loads. This causes a couple which rotates with the airscrew and acts about an axis in the plane of rotation and at right angles to the axis of rotation of the airscrew.

Static unbalance is easily cured by the provision of a suitable counterweight in the C.G. plane. Similarly any unbalanced couple can be eliminated by the provision of two equal masses in different planes. In the general case where both defects are present, cure is provided by two unequal masses situated in different planes and dynamic balancing, machines are available for carrying this out rapidly and accurately, providing care is taken to avoid slip stream effects. This necessitates an overhung shaft and stream lining of driving mechanism.

In the absence of aerodynamic unbalance, the balance weights will retain their effect over the whole range of speed and load.

If, however, aerodynamic unbalance is present, the compensation is only possible over a limited range, since the mechanical unbalance produced by the aerodynamic load varies in a complicated manner with effective blade incidence. As a result, the blades although balanced under load may be statically out of balance when the airscrew is at rest.

For this reason, the author considers it essential that the aerodynamics unbalance be measured separately and for this purpose recommends the Hamilton screen method described by Beebe and Mueller, Aero Digest, 1941, No. 2-5. The screen consists of permeable cloth stretched on a conical frame placed behind the propeller, and capable of executing oscillations about a vertical axis. In the absence of aerodynamic unbalance, the force on the screen is steady and the intensity of the screen vibration recorded electrically is then a measure of the unbalance. This is compensated by adjustment of the blade setting, after which the normal dynamic balance is carried out. It is stated that the apparatus responds to differences in setting angle as small as .1°. It is interesting to note that the aerodynamic unbalance couple due to difference of .5° in the setting of one of the blades of a normal three-bladed airscrew (3.5 in. diam. 1,700 r.p.m., 900 h.p., 350 Km/p) produces about the same effect as displacement of the C.G. of the complete propeller by .25 mm. (blade weight 33 kg.).

The effect of unbalance of the airscrew on the structure of the aircraft depends on the nature of the unbalance. According to the American reference already quoted, inertia unbalance, especially those of the static type, induce lateral vibrations, whilst aerodynamic unbalance causes longitudinal vibrations of the aircraft structure.

This has led to the development by the Hamilton Standard Propeller Company of a special vibration recorder for investigating the resonance of certain parts of the aircraft structure both on the ground and in flight. From this changes in airscrew characteristics can be deduced (wear of bearings, erosion of blades, change in blade setting, etc.), and at the same time the static structure of the aircraft checked as a whole.

In carrying out such tests on the ground, care must be taken to place the aircraft against the wind, otherwise errors due to cross wind forces are likely to arise.

The Coupling of Airscrew Blades in Variable Pitch Mechanisms. (W. Nitzsche, Luftwissen, Vol. 10, No. 3, March, 1943, pp. 74-77.) (111/20 Germany.)

Any coupling mechanism must ensure equal and opposite rotation of the blades. The change in setting must be accurate within close limits, operate smoothly and if possible be self-locking.

In order to produce rotation, a couple M must be applied to the blade root and depending on whether this couple is produced by a control force P or a control couple, the author differentiates between PM or MM gears. In each case, either a mechanical linkage or a gear drive may be employed. The mechanical linkage again can be sub-divided into true links; flexible links (belts or chains) or hydraulic linkage. Similarly the gear drive may be of the single pin, cam, screw, pack, worm or spur wheel type.

The author illustrates typical examples of each type of drive.

Mechanical linkage has been found unsatisfactory. They are not self-locking and subject to alternating load (fatigue!). All blade vibrations have to be supported by the mechanism and the bearings of the links or ball cups have to be made large to prevent rapid destruction.

Flexible links (belts) are not sufficiently accurate as regards phasing, whilst chains are likely to break under fatigue.

Hydraulic operation of the coupling mechanism must be ruled out since it is impossible to maintain a given blade setting (leakage, temperature effects hunting). The provision of a separate hydraulic system for this purpose is also objectionable.

This only leaves the gear drives as possible solutions. Pin and slide drives are simple but suffer from the defect that the area of contact is very small, leading to high bearing pressures. Nevertheless several designs based on this principle have been successful in practice. Spur or worm gears have the advantage that a high gear ratio can be obtained which reduces wear and decreases weight. The spur gear with a central crown wheel is very simple and accurate, but unfortunately not self-locking. This leaves the eccentric worm gear of the *MM* or control moment type as the only practical solution.

The Development of Electrical Equipment in Aircraft. (E. Ruhlemann, Luftwissen, Vol. 10, No. 3, March, 1943, pp. 83-85.) (111/21 Germany.)

A statistical analysis of the electrical equipment covering both circuits and apparatus is presented for a typical Dornier twin-engined aircraft for the years 1936, 1938 and 1940 respectively.

The graphs give the following information under six principal groups:—

(1) No. of separate circuits required for certain purposes, such as power generation, lighting, instruments, etc.
(2) Length of circuits as a function of cross-section of core.
(3) Weight of circuits including insulation as a function of cross-section of core.
(4) Number of separate items of equipment classified according to nature, such as power generator, lighting, instruments, control gear, etc.
(5) Power consumption of individual equipment items.
(6) Weight of individual equipment items.

In each case, the totals for any of the above groups is put equal to 100 for the 1936 model. The values for 1938 and 1940 are given in the following table:—

	Year. 1936	1938	1940
No individual circuits	100	147	295
Length of circuits	100	122	235
Weight of circuits (incl. insulation) ...	100	100	187
No. of ind. equipment items	100	140	275
Power consumption	100	122	200
Weight of equipment	100	112	154

Thus whilst the number of equipment items has increased 2.75 times and the power consumed has been doubled over the period 1936-1940, the weight of the circuits has only increased 1.87 times and that of the equipment 1.54 times.

Evidently the individual circuits have been shortened and the average weight and power consumption for equipment items reduced.

From detailed examination of the various items making up the six principal groups, it appears that the following factors have undergone the greatest change over the period under consideration.

(1) Six-fold increase in the number of circuits for military purposes.
(2 Eight-fold increase in the number of military equipment items.
(3) Four-fold increase in the length of .75mm.^{2} wiring.
(4) Two-fold increase in power consumption of electric motors.

The author is of the opinion that a change over from the present D.C. to three phase alternating current is less attractive than it appeared in 1936.

French Views on Power Plant Problems. (C. Waseige, Int. Av., 822, 16/6/42, pp. 17-18.) (111/24 France.)

Owing to the naturally limited output per cylinder, an increase in the number of cylinders to up to 42 cannot be avoided in the design of *high-performance engines;* the output of such engines is expected to attain (probably too conservatively) about 60 h.p. per cylinder, or a total of 2,500 h.p. This power will necessitate a very large airscrew diameter which, with a view to limiting the blade tip speeds, would indicate the use of co-axial, oppositely rotating airscrews. Higher engine outputs will require the *coupling of two engines* jointly driving a pair of oppositely rotating airscrews; when the engines are arranged in tandem, it would seem useful that each of the engines should drive one of the two airscrews, while in the case of engines mounted side-by-side (in a Vee, seen in plan form) their output is better transmitted by a common gear and distributed among the two airscrews; in the event of engine failure, the engine involved is to be disengaged from the transmission gear. For the braking of the aeroplane after the landing an *extremely rapid change of the airscrew pitch* to a negative angle is desirable; two gear ratios must therefore be provided in the pitch changing mechanism of the airscrew. As regarding *engine supercharging,* the lecturer recommends the adoption of a two-stage multi-speed supercharger; the prospects of the exhaust turbine-driven superchargers are limited due to the impairment of the cylinder charge as a result of the back pressure of the exhaust gases; besides the supercharging the sucking off of the exhaust gases by means of blower should be considered. The lecturer does not consider the *direct fuel injection* into the combustion chamber as a decisive advantage but demands the transfer of the carburettor to the compression side of the supercharger. Finally, some problems of engine cooling were alluded to, and preference is given to water cooling under increased pressure to the employment of coolant liquids boiling at higher temperatures.

Correlation of Laboratory Oil Bench Tests with Full-Scale Engine Tests. (C. W. Georgi, J.S.A.E., Vol. 51, No. 2, Feb. 10th, 1943, pp. 52-62.) (111/25 U.S.A.)

Twenty laboratories, co-operating in the Bench Test Sub-committee's programme, ran tests on six reference oils in Underwood apparatus, Lauson single-cylinder engines, and in a number of other types of laboratory oil test devices. The six reference oils had an extensive test background in full-scale engines.

Agreement among laboratories testing the same oils in the same type of apparatus was surprisingly good considering that standardized test conditions were not used and that the test procedures used by the co-operating laboratories varied considerably. Correlation of the laboratory tests with full-scale engine tests was also very good in the majority of instances.

The test data compiled from the co-operative work emphasize the importance of oxidation catalysts and test temperatures on oil deterioration and the degree of correlation between laboratory bench tests and full-scale engine tests. The co-operative test data also indicate suitable test conditions in the various types of bench apparatus which tend to produce the most consistent results indicative of full-scale engine performance as well as indicating inadequate or extreme test conditions which may tend to give misleading results.

Measures for Ensuring Reliability of Aircraft Engines. (H. Kouba, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 38-42.) (111/26 Germany.)

Over the past few years, the specific output (h.p./litre) of aircraft engines has increased by over 40 per cent. whilst the specific weight (kg./h.p.) has decreased by over 16 per cent. As a result of this development, it is obvious that the engine structure must have undergone a severe increase in thermal and dynamic loading and that special measures for ensuring reliability are required.

The author classifies these measures under the heading of design, testing and maintenance.

Reliability may be impaired by faulty handling quite as much as by continuous loading and for this reason the author puts foremost the design of a control system which is as simple and foolproof as possible. Whilst early aircraft engines could be operated satisfactorily by throttle control only, optimum performance of a modern power plant requires the simultaneous adjustment of a larger number of factors such as mixture strength, engine and supercharger r.p.m., boost pressure, ignition timing and propellor blade setting. Since the pilot is normally already fully occupied in flying the machine, the optimum setting of the various controls can hardly be expected and mistakes are bound to occur. The automatic control system as now standardized in the German Air Force prevents serious mistakes and limits the pilot's duties to a single manual control. In the author's opinion, this design feature alone has had most beneficial effects on engine reliability. Amongst other details referred to the necessity of providing localised "weak spots" in the transmission drive to certain auxiliaries is stressed. Should the auxiliary seize up, the transmission will shear at the required point and serious damage will be avoided.

Important auxiliaries, such as magnetos and fuel pumps, are fitted in duplicate. A considerable saving in weight has resulted from the design of special twin units housed in a common casing and driven by a single shaft.

After pointing out that weaknesses in design are only shown up after lengthy practical experience (indifferent handling) the author discusses changes in operative conditions which may enable the engine to function till the parts have been redesigned. This piston trouble can be alleviated by increase in mixture strength or retarding of ignition, insufficient oil supply at low speed remedied by speeding up the minimum idling r.p.m., torsional troubles overcome by keeping clear of resonance speeds, etc.

Details of development tests both on the ground and in the air are given. These culminate in the official type test, during which the new design must carry out power runs of 100-200 hrs. and show no signs of deterioration after dismantling.

In spite of all precautions during manufacture and inspection, it is not safe to count on the type test period as being necessarily trouble-free during actual flying operation of the engine. This is partly due to faulty operation by the pilot (in this connection the benefits of an automatic control have already been mentioned), accentuated by the peculiarities of the engine installation in the aircraft. Faulty inspection prior to final assembly may also play a part. To ensure reliability, it is essential that incipient sources of trouble be recognized and eliminated at an early stage. For this purpose the engine must receive maintenance and periodic overhauls. The engine must be run up to power before every start and any abnormal behaviour during flight noted in the log. Each day, the exterior of the engine must be inspected, especially as regards leakage of fuel and oil pipes and security of locking devices. Major inspections are carried out after 25, 50 or 100 flight hours, depending on engine type. These involve tests of compression, play in valve gear, adjustment of magneto and plugs, cleaning of filters, change of oil and coolant.

Minor and major overhauls follow these inspections at intervals, depending on engines type and employment. Minor overhauls involving only the partial dismantling of the engines are carried out after 50-300 flight hours. (Inspection of piston and valves.)

Complete dismantling of the engine is carried out after 200-1,200 flight hours (bearings and transmission gear). The period which can elapse between major overhauls is evidently a measure of engine development. In this connection it must, however, not be forgotten that the field of utilization plays an important part. Thus an engine mounted in a fighter aircraft necessitating frequent starts at maximum power has a shorter overhaul period than the same engine operating over long distances at cruising speed.

Measurement of Piston Temperatures Under Load. (W. Glaser, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 44-49.) (111/27 Germany.)

It is now generally recognised that tests on the performance of lubricating oils are only of value if they are carried out in an engine operating under load conditions resembling those occurring in practice. Moreover these conditions must be maintained constant over relatively long periods. One of the most important factors requiring control is that of the piston temperature, especially that of the ring grooves. It has been customary up to now to rely on cylinder wall temperatures only, it being assumed that steady wall temperatures imply also a constancy of the ring groove temperature. The piston temperature does, however, not only depend on the wall temperature but also on the amount of cooling by oil splash and on the clearance. This accounts for the fact that oil tests carried out on identical engines and under the same external load conditions may yield very different results and will have to be repeated a large number of times before useful results can be deduced. It is obvious that if the piston temperatures could be measured directly in such tests, greater consistency would result. The most promising method for this purpose appears to be to fit a thermocouple inside the piston, the lead out being by means of contact springs operated by lugs attached to the piston skirt. Contact is made towards the bottom of the stroke for about 70° crank angle and by using a null method, variations in contact resistance are eliminated. Four references to American work are given by the author, the latest being *S.A.E. Journal*, March, 1941.

The method has been developed by the DVL and details of the installation of the thermocouple and design of contact springs are given.

Instead of estimating the couple temperature from the balancing EMF supplied by a Wheatstone bridge, as was done in the U.S.A., a second couple working in opposition to the piston couple is introduced into the circuit. This couple is heated electrically till the balance point is reached, the temperature being read directly on a millivoltmeter connected to a third couple attached to the surface of the second.

The method has been successfully employed on two small test engines of 300 and 500 c.c. swept volume respectively, operating at piston speed of the order of 8m./sec. Further improvements (mainly connected with the installation of the wires inside the piston) enabled satisfactory results to be obtained also on a full scale BMW 132 cylinder (piston speed up to 14 m./sec., ring groove temperature of the order of 330°C.).

Power runs up to 80 hrs. duration have been carried out without trouble and it is stated that temperature changes of the order of ½°C. are easily recorded.

No details of any oil tests are given.

Aircraft Diesel Engines. (Luftwissen, Vol. 10, No. 3, March, 1943, pp. 77-79.) (111/28 Germany.)

The history of the Junkers aircraft Diesel engine may be said to date from the basic Junkers patent (No. 220124) of the year 1907, covering opposed piston operation in general.

The first light-weight experimental type (Model MO.3) was tested in 1914 and developed 180 h.p. at a specific weight of 1.4 kg./h.p.

The MO.3 was followed by FO.2 in 1916, which developed 500 h.p. and was used for experiments covering both oil and petrol injection.

This as well as model FO.3 of 1926 employed five cylinders which was not ideal from the point of view of balance. A smaller 6-cylinder model, FO.4, was therefore developed which passed its type test in 1931, developing 720 h.p. for an engine weight of 800 kg. This model, now known as the Jumo 4, was used by the German Lufthausa in the Junkers G.38 and similar large aircraft, giving entire satisfaction. By 1935, the power output had been increased to 750 h.p. and the specific weight reduced to 1 kg./h.p.

The design of a smaller, high speed unit, the Ju 205 was started in 1932, and the type test in the following year gave a power output of 550 h.p. at a weight of 500 kg. Specific weights below 1 kg./h.p. were thus reached for the first time for a Diesel engine. The same type has now been developed to give over 700 h.p. and has carried out numerous long distance flights on the Ju 86, Do 18, Do 26 and BV.139 aircraft.

Prof. Junkers always regarded the aircraft Diesel as only the first stage in the development of the power plant of the future.

A modification of the opposed piston engine yielding the so-called " free piston " compressor was actively studied in connection with researches on gas turbines.

It was hoped that this would ultimately lead to a practical solution of the jet propulsion problem.

Natural Frequencies of Torsional Systems, including Elastically Mounted Epicyclic Gearing. (W. Benz, L.F.F., Vol. 20, No. 2, 27/2/43, pp. 46-47.) (111/29 Germany.)

The epicyclic gearing has the following characteristics:—

θ_a = moment of inertia of outer casing (internal gear connected to high speed shaft).
θ_t = ditto for planet wheel carrier.
θ_s = ditto for sun wheel.
θ_p = ditto for planet wheel.
m_p = mass of planet wheel.
C_s = stiffness of sun wheel shaft (stationary).
R_a = pitch circle of outer casing gear.
R_i = ditto for sun wheel.
R_p = ditto for planet wheel.

The author shows that this gear is the equivalent of an ordinary spur wheel reduction gear of ratio $R_a/(R_a+R_i)$ connecting two masses θ_1 and θ_2 of which the moments of inertia are respectively:—

$$\theta_1=\theta_a+\frac{\theta_p}{2}\left(\frac{R_a}{R_p}\right)^2$$

$$\theta_2=\theta_t+\left(m_p-\frac{\theta_p}{R_p^2}\right)\left\{\frac{(R_a+R_i)}{2}\right\}^2$$

θ_1 is attached to the high speed shaft and takes the place of the gear casing.

The shaft stiffness between θ_1 and θ_2 depends on the frequency α of the vibrations and is given by

$$(C_s-\theta_i\alpha^2)\left(\frac{R_a^2}{R_i^2}\right)$$

$$\text{where } \theta_i=\theta_s+\frac{\theta_p}{2}\left(\frac{R_i}{R_p}\right)^2$$

This geared system is then reduced to the equivalent line system by multiplying θ_2 by $\{R_a/(R_a+R_i)\}^2$ and decreasing the stiffness of the low speed shaft between θ_2 and the first right hand mass in like proportion.

Production Applications of Flash Welding. (R. Milmoe, J.S.A.E., Vol. 51, No. 2, Feb., 1943, p. 73.) (111/30 U.S.A.)

Flash welding is a type of butt weld in which the two parts to be joined are connected to the secondary terminals of a low-voltage high-current transformer, are then brought into close proximity, and the voltage applied. This results in a flashing between the surfaces heating them to the melting point. The flashing is continued for a predetermined period, the parts being moved together as the material burns away. At the end of the flashing period, the parts are forced together rapidly and the current is turned off, giving a welded structure of a forged nature.

While extensively used by the automobile industry, this process has not found its way into aircraft construction in the past, because the problems here are somewhat different, and in many cases more exacting.

The advantages of the flash welded joint over the fusion welded joint include better physical characteristics (100 per cent. joint strength), lower weights, cheaper and faster production, no warping as a result of welding and less operative skill required. SAE 4130 tubing joints welded in the normalized condition with no further heat treatment, exhibit physical characteristics equal to those of the parent material, when tested in static tension.

Most applications have been on tubular and solid round parts, although the process has been used on other types of sections. Parts include the common end-fitting to tube joint, in which the fitting may be a forging or may be machined from bar stock or another piece of tube.

The major points to be considered, in designing aircraft parts for flash welding, are:—

1. Mating surfaces of parts must be of the same shape and approximately the same cross-sectional area.
2. This cross-sectional area must be constant for a sufficient distance back from the joining surfaces to allow all burn-off to take place in such constant-area section.
3. Best design is for the welding faces to be normal to the centre line of the parts, so that the line of travel is parallel to this centre line.

While it is preferable to design new parts especially for the flash welding process, the author pointed out that it has been found feasible to convert parts which are being arc or gas welded.

Glass Gauges. (F. J. Oliver, The Iron Age, 4/2/43, pp. 35-39, 98.) (111/31 U.S.A.)

Gauges made of glass have been successfully employed by the American Ordnance Department. It is predicted that eventually over 50 per cent. of all fixed steel gauges used in ordnance work will be replaced by glass gauges, for which the following advantages are claimed:—

1. Small thermal conductivity and hence smaller change in dimensions due to handling.
2. Encourage careful handling of gauge by relatively untrained inspectors.
3. Fragility is an advantage. If dropped, the gauge is either smashed or survives unchanged. Steel gauges may become deformed when dropped and thus pass defective work.
4. Less tendency to bind in close fits.
5. Scratches on the glass do not raise any burrs and effective size of gauge is not altered.
6. Glass does not corrode.
7. The abrasive resistance of the glass gauge is at least as great as that of steel.
8. Glass gauges are much less expensive and require less operator and machine hours to produce than steel gauges.
9. Tool steel is saved for other purposes.
10. Smaller weight of glass gauges makes it easier to handle.
11. Transparency is an advantage in many gauging operations.
12. Greasing and degreasing operations are eliminated (storage, checking and stripping).

A number of representative ordnance gauges made of glass are described and illustrated (plug, ring, snap, profile and position gauges).

Chamber gauges for measuring up the entire profile of a complex shape (artillery cartridge case) are in process of development.

Some notes on the moulding of the glass and the grinding process adopted are given.

For lapping or polishing to close limits, range is excellent. By proper selection of wheels and speeds an excellent surface finish can, however, be obtained by grinding alone. Sparking must be avoided, as this is apt to cause microscopic cracks and thus weaken the glass.

Nomogram for Determining the Number of Separate Drawing Operations Required to Produce a Given Ratio of Diameters. (G. Soph and W. Frey, Luftwissen, Vol. 10, No. 2, Feb., 1943, p. 243.) (111/32 Germany.)

If

d = diameter of finished product.
D = diameter of initial product.
n = number of separate draws.

$$\frac{d}{D} = m_a \cdot m_w^{n-1}$$

where m_a = proportional reduction in diameter permissible in first draw.
m_w = ditto for subsequent draws.

From the above

$$n = \frac{\log\left(\frac{d}{D}\Big/ m_a\right)}{\log m_w} + 1.$$

The nomogram has double logarithmic scales and gives the value of n, provided m_a and m_w are known for the material in question.

It is obvious that if $d/D > w_a$, a single drawing operation will give the required result, m_w is usually 10 to 20 per cent. $> m_a$.

Stress Increases in Hollow Thin-Walled Sections Under Torsion. (A. Weigand, Luftwissen, Vol. 10, No. 2, Feb., 1943, pp. 49/50.) (111/33 Germany.)

The sections considered are of approximately elliptical shape such as occur in hollow propeller blades.

If

M = torsion moment applied;
I = torsional rigidity;
l = length of mean line of cross-section of material;
F = area enclosed by mean line;
τ_n = nominal stress;

$$\text{we have } \tau_n = \frac{M}{I} \times \frac{2F}{l}$$

This nominal stress takes no account of the stress concentration at the inner corner. Assuming that the stress function only depends on the radius of curvature of the rounded corner, we may put

$$\frac{d\tau}{d\rho} + \frac{\tau}{\rho} = 2\frac{M}{I}$$

$$i.e., \quad \tau = \frac{M}{I}\rho\frac{c}{\rho}$$

Since the shear flux must be the same in the flat and corner sections,

$$\int_{\rho_0}^{\rho_1} \tau d\rho = \tau_n \cdot t$$

where

ρ_1 = radius of curvature of inner corner.
ρ_2 = ditto of outer corner.

This enables c to be eliminated. Defining $\tau_{max}/\tau_n=\alpha=$ stress concentration coefficient the author finally obtains

$$\alpha=\frac{A}{\log(1+A)}-B\left\{\frac{(1+A/2)}{\log(1+A)}-\frac{A}{1}\right\}$$

where

$$A=\frac{t}{\rho_1}$$

$$B=\frac{lt}{2F}\ (t=\text{wall thickness})$$

For

$l=43$ cm.
$F=48.6$ cm.^{2}.
$t=.4$ cm.
$\rho_1=.1$ cm.
$\alpha=2.20$.

The Distribution of Strains in the Rolling Process. (C. W. MacGreggor and L. F. Coffin, J. App. Mech., Vol. 10, No. 1, March, 1943, pp. 13-20.) (111/34 U.S.A.)

A series of experiments are described in which the complete strain distributions are given for copper bars rolled with a varying number of passes in different directions at a reduction of 20 per cent. per pass.

The following conclusions may be drawn from these experiments:—

1. A comparison of the lateral-compression tests and the rolling experiments on bars coated with a brittle lacquer demonstrated the presence of similarly directed elastic tensile strains in both cases for some distance from the centre lines of the rolls.
2. The network tests showed that the shearing strains were always the greatest in the outside fibres of the bars when they were rolled in the same direction with a number of reductions. In contrast to this, the shearing strains were greatest inside the bar when rolling took place in alternately opposed directions.
3. The method of superposition, described in the paper, may be used to obtain the shape of the vertical profile lines of the bar for various sequences of rolling provided the profiles are known for the same per cent. reductions, each of which is produced by rolling in the same direction.
4. The sequence of the rolling operation does not affect appreciably the magnitudes of the axial, vertical, or lateral normal strains.
5. The sequence of rolling affects in a very marked manner the shearing strains and the shape of the profiles of the vertical lines scribed on the bar. The alternately opposed directions of rolling produce a much less distorted network with very much smaller shearing strains than does the rolling of the bar in one direction only during the various passes.

Oscillations of Suspension Bridges. (H. Reissner, J. App. Mech., Vol. 10, No. 1, March, 1943, pp. 21-22.) (111/35 U.S.A.)

The author has developed a theory of oscillations of stiffened cable systems which is applicable to the design of suspension bridges. Dealing with free oscillations in the first part of the paper the author established a system of linear differential equations with variable coefficients taking into account the horizontal displacements and inertia forces, the change of thrust along the cable, the slope of the cable, and the torsional stiffness of the girder. An approximate integration by the Rayleigh energy method is shown and is numerically exemplified for the lowest antisymmetric mode.

The second part of the paper treating self-excited oscillations has been prepared under the influence of observations, experiments, and conclusions reached in connection with an (official) report on the Tacoma bridge failure. This report demonstrated that the aerodynamic and structural damping—the first acting through the width of the roadway, the second by the internal friction—plays an important part in the safety of a suspension bridge. It showed further that the dangerous oscillations are of somewhat higher frequency than the free oscillations with logarithmic decrement a linear function of the reduced velocity so that not elastic instability under wind forces nor resonance from wind gusts but the bridge as a self-exciting mechanism absorbing energy out of a steady wind flow had to be assumed as the cause of the failure.

This experimental linear decrement law is utilized by the author to derive in conjunction with the dynamic equations formulas intended to serve as the basis for the dynamic requirements for suspension bridges.

Possibility of Reducing the Electrical Contact Resistance of Aluminium and Aluminium Alloys. (C. Wagner and V. Stein, L.F.F., Vol. 20, No. 2, 27/2/43, pp. 33-41.) (111/36 Germany.)

As is well known, aluminium on exposure to the atmosphere is rapidly covered by a thin layer of oxide which has an appreciable electrical resistance. This is apt to give trouble at the terminals and although much can be done by the careful mechanical design of the latter, a reduction of contact resistance would further the more general employment of aluminium in electrical systems and thus serve to conserve copper.

The authors review the various methods available for this purpose, such as:—

1. Copper cladding.
2. Electro-plating.
3. Dipping into molten tin or cadmium.
4. Treatment with $Cu_2\ Cl_2$ vapour.
5. Replacement of $Al_2\ O_3$ by zinc oxide aluminate.

Of the above (1) has the disadvantage of requiring appreciable quantities of Cu, whilst (2) is very uncertain in its action. The dipping process (3) making use of the special metallisation alloy L III developed by Siemens was found very satisfactory. This alloy has the following composition:—

35 per cent. Sn, 35 per cent. Cd, 28 per cent. Zn, 2 per cent. Pb.

Application to finely stranded cables is, however, difficult and the method has the further disadvantage that both Sn and Cd are in short supply. Copper or chrome diffusion by treatment by halogen vapours (4) is of considerable theoretical interest and the process was examined in great detail by its authors. Whilst this process has been very successful in the case of steel, the relatively low melting point of aluminium restricts the maximum working temperature to about 600°C. Under these conditions the vapour pressure of $Cr_2\ Cl_6$ is only of the order of 10^{-3} atmospheres, and the large quantities of gas required render the process uneconomical. Although the vapour pressure of the copper halogen is considerably higher, the deposits were found to be so uneven that the process is of no practical value. Attempts were finally made to obtain layers of Zn O on the surface of the aluminium. As is well known, such layers have a relatively small electrical resistance and attempts were made to produce a stable deposit by saturating CO_2 with Zn Cl_2 at 500°C. and passing the mixture over aluminium kept at about the same temperature. The results obtained varied, but no marked improvement in contact resistance was obtained.

It is thus concluded that the dipping process with Sn-Cd alloy presents the only satisfactory treatment.

The Drawing of Tough Materials Through Convergent Conical Dies. (T. Poschl, Ing. Archiv., Vol. 13, No. 6, 1943, pp. 342-354.) (111/37 Germany.)

In a previous paper the author has investigated the drawing process on the assumption of a purely elastic material. It was concluded that no agreement of the calculated with the observed extension of the material could be achieved as long as the usual elasticity coefficient E was retained. In the present investigation the author introduces the yield point as the most important criterion. Above this point the material is no longer elastic and the resultant changes in shape proceed at a greatly increased rate. The stress-extension equations employed by the author are linear and set off at the yield point (σ_s, $\epsilon = 0$) instead of passing through the origin. The inclination β of the stress/extension line is an indication of the strain-hardening of the material when undergoing large changes in shape, *i.e.*, tan β is the strain-hardening coefficient V. We then have $\sigma = \sigma_s + V\epsilon$. For steel, V is of the order 1,000 kg./cm.^{2} and $\sigma_s/V \simeq 3$. With the help of this modification to the classical elastic theory the author is able to obtain expressions for the stress-distribution in the material while passing through the die, and calculate the corresponding large extensions.

The method is illustrated by means of a worked-out example. Of interest is the rapid increase in the radial stress and extension of the material as it flows through the exit of the die. The compressive stresses, on the other hand, maintain their relatively high value practically unchanged over the length of the die.

The Bending Deflection of a Circular Plate Under Eccentric Loads. (W. Muller, Ing. Arch., Vol. 13, No. 6, 1943, pp. 355-376.) (111/38 Germany.)

After a preliminary discussion on the geometry of bipolar co-ordinates employed, the author considers the following load cases.

1. Single force.
2. Number of single forces arranged symmetrically on a concentric circle.
3. Uniform loading along a concentric circle.
4. Loading along an eccentric circle.

Mathematical expressions for the deflection stress, bending and torsional moments are given and diagrams show the lines of constant deflection in each case.

The method can be extended to cover the case of a load application along a straight line.

Theory of the Closed Circular Spring. (R. Sonntag, Ing. Archiv., Vol. 13, No. 6, 1943, pp. 380-397.) (111/39 Germany.)

A thin circular ring or thin walled cylinder can undergo elastic deformations of considerable extent when loaded along a diameter, i.e. compressed between parallel plates or pulled like a chain link.

The author applies the non-linear elastic theory to the case when the ring is formed from an originally plain strip by the application of two end moments, i.e. the ring in its undiformed state has already an inherent stress with constant bending moment. The accurate solution involves the integration of the non-linear Eulerian differential equation of the second order for the elastic line of an originally straight rod and leads in general to elliptic functions.

The author shows that the spring characteristic (i.e. load/deflection curves) are not in general affected by the presence of the inherent stress system associated with a constant bending moment and that therefore the law of superposition can also be applied in the case of large deformations.

The subject appears to be of practical interest for the design of bending springs containing both large load capacity and considerable deformations.

Vultee Flight Test Recorder. (Aviation, Vol. 42, No. 1, Jan., 1943, p. 163.) (111/43 U.S.A.)

Flight testing necessarily implies the simultaneous reading of a large number of instruments and for this purpose photographic recording is usually employed. This has the disadvantage that the results can only be evaluated after development of the film when the aircraft has returned to its base. The Vultee Aircraft Co. have developed a light-weight wireless transmitter which can send out up to 70 code signals every three-quarters of a minute corresponding to the readings of the same number of instruments fitted to the plane. These readings are recorded by a ground receiver on a sound film and finally decoded into the form of graphs.

The test results can then be worked out whilst the aircraft is still flying and the pilot can be informed by radio of the progress of the work. Manœuvres can thus be extended or curtailed as required and even in the case of an accident or forced landing valuable data cannot be destroyed. The range of the instrument is several hundred miles and the transmitter is stated to be small enough for installation in a single-seater fighter or trainer.

Angular Measurements in Ballistics. (K. Gey, Introduction to Ballistics, 1937, pp. 64-65.) (111/46 Germany.)

In Germany and most other continental countries, the angular deflection of a gun is expressed in "strokes" (German = Striche), 1,600 strokes making a right angle = 90 mathematical degrees.

Sixteen strokes correspond to a so-called "New degree" (German Neugrad), 100 new degrees are equal to a right angle.

The strokes are indicated by the following sign $\sim$

To convert strokes into mathematical degrees divide by 1,000 and multiply by 56.25 (1 stroke = 3.4 minutes)

(1° = 17.78 strokes).

Very occasionally, the ballistic angles are also expressed in so-called "sixteenth degrees" (German = sechszehnte Grad), 1,440 of which make a right angle.

In this case the complete circle corresponds to 5,760 "sixteenth degrees."

To convert sixteenth degrees into mathematical degrees, divide by 1,000 and multiply by 62.5.

Since the number of strokes or "sixteenth degrees" divided by 1,000 gives approximately the number of radians in the corresponding angle, the same number also expresses very nearly the chord in metres at a distance of 1,000 m.

Thus a lateral displacement of 45 m. at 1,500 m. distance corresponds to

$$45 \times \frac{1{,}000}{1{,}500} = 30 \text{ strokes.}$$

Similarly 50 strokes correspond to a displacement of 100 m. at 2,000 m. distance.

This simple conversion of angles into distances and vice versa is the reason for the adoption of this method of angular measurement in ballistics.

Notes on a Controlled Type of One Dimensional Motion (Solution of Second Order Non-Linear Differential Equation). (H. Bilharz, Z.A.M.M., Vol. 22, No. 4, August, 1942, pp. 206-215.) (111/47 Germany.)

The author considers the integrals of the following non-linear equation :—

$$\ddot{x} + 2a\dot{x} + bx + c\,sgn\,(x + \rho\dot{x}) = 0$$

where $x\,(t, \rho)$ is a real function of the independent variable $t \geqq 0$ and of the real parameter ρ, where $-\infty < \rho < \infty$, $a > 0$, $b > 0$, $c > 0$ are constants.

$$sgn\,(x + \rho\dot{x}) = \left\{ \begin{matrix} +1 \\ -1 \end{matrix} \text{for } x + \rho\dot{x} \right\} \begin{matrix} >0 \\ <0 \end{matrix}$$

and determines the sign of the constant c.

It is assumed that $x(t, \rho)$ can be differentiated twice in sections without giving rise to discontinuities. The equation thus represents the straight line motion of unit mass in a generalised field of force and includes the case of combined velocity damping and constant friction. By applying the Trefftz stability criterion the author demonstrates that all periodic solutions of the general equation are stable and that all other stable solutions converge towards this periodic motion for $t \rightarrow \infty$. The investigations are more particularly concerned with the application of automatic control for the stabilisation of dynamic systems with one degree of freedom.

The simpler case with $b = 0$ has already been considered by the author in a previous paper (R.T.P. Translation No. 1,391, " Rolling stability of an aircraft with freedom about its longitudinal axis and automatically controlled intermittent and constant aileron moments.")

It is interesting to note that in this case a lag of its control system may be beneficial.

Determination of Most Favourable Interval for the Numerical Integration of Systems of Differential Equations. (L. Collatz, Z.A.M.M., Vol. 22, No. 4, August, 1942, pp. 216-225.) (11.1/48 Germany.)

The numerical integration of ordinary differential equations of the first and second order by the Adams and Stormer methods is receiving increased attention, especially as regards interpolation processes. Such processes are of considerably greater accuracy than if extrapolation is adopted, whilst the work of calculation is not increased to any considerable extent. Unfortunately the interpolation process is very sensitive to the step interval employed, there being an optimum step " h " for each equation or system of equations. If a smaller step, say $h/2$ is employed, the labour involved is doubled. For a step $2h$, the iteration converges too slowly, and the trials may have to be carried out three or even four times before the numerical results become steady.

The author shows how the natural or optimum step h can be determined in any special case and thus the amount of labour estimated.

It should be emphasised that this step refers to current calculations only. For the initial start, steps of the order $h/2$ or $h/3$ must be employed to obtain the necessary degree of convergence.

The natural step h defined by the author is useful as a guide for the step selection in the Runge-Kutta process.

Evaluation of Time Records by the Simultaneous Employment of Instruments of Different Types. (H. Knobloch, L.F.F., Vol. 20, No. 2, 27/2/43, pp. 42-45.) (111/49 Germany.)

Up to a point, the accuracy of a time-space record can be improved by increasing the number of measuring points and adopting a suitable method for drawing the mean curve.

The author points out that a further increase in accuracy is possible if in addition to the time/space record, information of the change in velocity and acceleration with time is available. This will necessitate the employment of two additional instruments, working independently of each other but correlated on a time basis.

Thus at certain instants t_i, t_k and t_l the following measuring values will be available:—

$$S_i = S(t_i) = \text{path or distance moved.}$$
$$V_k = V(t_k) = \text{velocity.}$$
$$C_l = C(t_l) = \text{acceleration.}$$

The evaluation for the path $\S$ is then carried out by the compensation function

$$x(t) = a_0\phi_0(t) + a_1\phi_1(t) + \text{etc.} + a_n\phi_n(t) = S(t)$$

where $\phi(t)$ are suitable known functions but the coefficients "a" still indeterminate.

These coefficients are determined by the method of least squares, *i.e.*,

$$p\sum_{i}\left[x(t_i)-S_i\right]^2+q\sum_{k}\left[\frac{dx}{dt}(t_k)-V_k\right]^2+r\sum_{l}\left[\frac{d^2x}{dt^2}(t_l)-b_l\right]^2=\text{minimum.}$$

The three factors p, q. r are known and depend on the difference in the dimensions of the measured quantities. An allowance for the relative importance of the records of the different instruments can also be included.

By partial differentiation with regard to "a" and equating to zero, a system of $n+1$ equation is obtained from which the coefficient "a" can be determined.

A considerable simplification results if all the measuring points can be taken at the same time and repeated at constant intervals.

This is illustrated in the special case when only two instruments are employed, *e.g.*, a ground base installation for determining the path s of an aircraft flying horizontally and an accelerometer installed in the aircraft. Certain of the coefficients entering into the calculation are tabulated for ready reference, for a range of measuring points varying from 5 to 27. The case of the accelerometer suffering from a zero error receives special attention. This affects the position, but not the flight speed of the aircraft.

LIST OF SELECTED TRANSLATIONS.

No. 57.

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TRANSLATION NUMBER AND AUTHOR.		TITLE AND REFERENCE.
		AERO AND HYDRODYNAMICS.
1744	——	... *A Vortex Theorem for Steady Iso-Energetic Gas Flow.* (L.F.F., Vol. 19, No. 4, 6/5/42, pp. 145-147.)
1746	Linke, W. ...	... *The Flow Resistance of a Heated Flat Plate.* (L.F.F., Vol. 19, No. 4, 6/5/42, pp. 157-160.)
1752	Reichardt ...	... *Laws of Free Turbulence.* (V.D.I., Forshungsheft, No. 414, May-June, 1942, pp. 1-22.)
1753	Schlichting, A.	... *The Boundary Layer of the Flat Plate Under Conditions of Suction and Air Injection.* (L.F.F., Vol. 19, No. 9, 20/10/42, pp. 293-301.)
		ENGINES AND ACCESSORIES.
1755	Schmidt, U.	... *Influence of Type of Dust on the Performance of Air Filters.* (Z.V.D.I., Vol. 85, No. 39-40, 4/10/41, p. 800.)
1766	Dreyhaupt, F.	... *The Present State of Research on Engine Knock.* (A.T.Z., Vol. 44, No. 21, 10/11/41, pp. 521-523.)
		AIRCRAFT, AIRSCREWS AND ACCESSORIES.
1762	Grammel, R.	... *The Effects of Inertia in the Airscrew of the Aircraft in Curvilinear Flight.* (Schriften Akad. Luftfahrtforschung, No. 36.)

TRANSLATION NUMBER AND AUTHOR.		TITLE AND REFERENCE.
1763	Kalachev, G. ...	*A Contribution to the problem of Dynamic Longitudinal Stability of an Aeroplane.* (Trans. C.A.H.I., No. 235, 1935.)

MATERIAL AND ELASTICITY.

1745	——	*Circular Slide Rule for the Rapid Determination of the Correct Manometer Pressure on Hydraulic Presses Using Rubber Dies.* (Flugsport, Vol. 34, No. 16, 4/8/42, pp. 147-148.)
1748	Durer, A., and others	*Phosphatic Coatings as Aids in the Plastic Working (Cold Drawing) of Metals.* (Z.V.D.I., Vol. 86, No. 1-2, 10/1/42, pp. 15-18.)
1749	Hermans, P. ...	*Quantitative Methods for the Determination of the Degree of Orientation of Stretched Cellulose Fibres (Limits and Mutual Relationship).* (Koll. Zeit., Vol. 97, No. 2, Nov., 1941, pp. 223-231.)
1750	Hermans, P. H. ...	*Some Notes on the Structure and Swelling of Geis.* (Koll. Zeit., Vol. 97, No. 2, Nov., 1941, pp. 231-237.)
1754	Fredenhagen, K. ...	*Mathematical and Physical Importance of the Partial Molar Coefficients and the Deduction of the Duhem-Margules Law of Partial Pressures.* (Z. Electrochem., Vol. 48, No. 3, March, 1942, pp. 136-145.)
1761	Kraft, Alexeyer ...	*Esterification by Chlorocarboric Acid Esters.* (J. Ob. Chim., U.S.S.R., Vol. 2, No. 8, 1932, pp. 726-729.)
1764	Blumrich, S. ...	*Buckling Diagrams for Pine and Beech Struts.* (Flugsport, Vol. 34, No. 24, 25/11/42, Design Memoranda No. 3-4.)
1765	——	*Compacting Steel Swarf by Auto Combustion.* (Stahl und Eisen, Vol. 62, No. 44, 29/12/42, pp. 921-922.)

PHOTOGRAPHY.

1743	Berthold, R. ...	*The Fluorescent Screen Image and its Photographic Reproduction (X-Ray Examination of Materials).* (Luftwissen, Vol. 9, No. 6, 1942, pp. 184-189.)
1760	Wohlrab	*Development of Problems in Aerial Cameras.* (Luftwissen, Vol. 9, No. 2, Feb., 1942, pp. 37-44.)

MISCELLANEOUS.

1751	——	*French Regulations for Wireless Installations on Board Ship.* (Genie Civil, Vol. 99, No. 17, July, 1942, p. 213.)
1756	——	*Vienna Central Charging Station for Battery Vehicles.* (A.T.Z., Vol. 45, No. 9, 10/5/42, pp. 254-255.)
1757	Rosenstiel	*The Solution of the Physiological Problem of High Altitudes (the High Altitude Pressure Suit).* (Rev. Aeron. Internationale, Vol. 7, 1937, pp. 52-54.)

TITLES AND REFERENCES OF ARTICLES AND PAPERS SELECTED FROM PUBLICATIONS REVIEWED IN R.T.P.3.

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Theory and Practice of Warfare.

Organisation and Training.

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3	8284	Germany ...	*Engineer Officer Career in the Luftwaffe.* (Flugsport, Vol. 35, No. 3, 3/2/43, p. 37.)
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5	8415	U.S.A. ...	*Aerial Strength.* (J. A. Ward, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 84-86 and 126, 257-260.)
6	8440	U.S.A. ...	*Military Aircraft of the U.S. Army and Navy Air Forces are now Given Names.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 321.)
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9	8635	U.S.S.R. ...	*Patrol Planes at Sea.* (N. D. Ezhov, U.S. Air Services, Vol. 27, No. 8, Aug., 1942, pp. 28 and 46.)

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19	8878	U.S.A.	... *U.S.A. New Service Designations for Transport and Military Aircraft.* (Inter. Avia., No. 854-855, 3/2/43, pp. 11-12.)

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22	8205	Germany	.. *First Junkers All-Metal Aircraft of 1916-1918.* (A. Klaprott, Luftwelt, Vol. 10, No. 2, 15/1/43, pp. 34-35.)
23	8260	U.S.A.	... *Fleetway BT-12 Trainer (Design Details).* (C. H. Guishead, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 186-187.)
24	8270	U.S.A.	... *Comfortization of Military Aircraft (Part V).* (A. A. Arnhym, Aero Digest, Vol. 41, No. 6, Dec. 1942, pp. 196-208 and 283-287.)
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28	8507	U.S.A.	... *Charting Aircraft Stability.* (C. D. Perkins, Aviation, Vol. 41, No. 5, May, 1942, pp. 123-125 and 256.)
29	8509	U.S.A.	... *Short Stirling Sectional Drawing.* (Aviation, Vol. 41, No. 5, May, 1942, p. 147.)
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59	8293	Germany	... *Hoisting Device for Bombs* (*Bomb Load*). (*Pat. series 47, No.* 727,599.) (Heinkel, Flugsport, Vol. 35, No. 3, 3/2/43, p. 192.)
60	8294	Germany	... *Bomb Stowage in Aircraft.* (*Pat. series 47, No.* 729,522.) (M. W. Neubrandenburg, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 192-193.)
61	8458	U.S.A.	... *Bomb Fin Shipping Case Made of Pressed Wood.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 187.)
62	8620	G.B. ...	... *Parachute Bombs being Loaded on a Hampden Bomber* (*Photo*). (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 62.)
63	8679	G.B. ...	... 8,000 *lb. Bomb Shown Beside a* 500-*Pounder.* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 324.)
64	8716	Germany	... *German Report of the New R.A.F. Flares.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
65	8817	France	... *French Researches on Explosives* (*Digest*): (1) *A New Method for Testing Detonators;* (2) *Combustion and Detonation of Mercury Fulminate;* (3) *Effect of High Gas Pressure on Detonators;* (4) *The Sensitivity of Tetrenitromethane-toluene Mixtures;* (5) *Optical Phenomena Accompanying Detonation;* (6) *Effect of Pressure on Combustion Velocity of Smokeless Powders.* (H. Maraour, Z.G.S.S., Vol. 37, No. 10, Oct., 1942, pp. 189-192.)
66	8827	Germany	... *Internal Ballistics—Effect of Gas Inertia with Special Reference to the Acceleration of the Charge.* (H. Pfriehm, Z.G.S.S., Vol. 38, No. 1, Jan., 1943, pp. 1-4.)

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67	8828	Germany ...	*Effect of Physical State on Detonator of a Powdered Explosive containing Nitro-Glycerine.* (W. Schneider, Z.G.S.S., Vol. 38, No. 1, Jan., 1943, pp. 1-7.)
			Military Types of Aircraft (British).
68	8217	G.B.	*Bristol Beaufighter (Photo and Silhouette).* (Inter. Avia., No. 848-849, 21/12/42, p. 1.)
69	8219	G.B.	*New Model Spitfire with Merlin 61 Engine.* (Inter. Avia., No. 847, 10/12/42, pp. 1 and 8-9.)
70	8223	G.B.	*Spitfire, Mark IX.* (Inter. Avia., No. 851, 12/1/43, p. 7.)
71	8501	G.B.	*British Aircraft (Photos and Silhouettes of Military Planes).* (Aviation, Vol. 41, No. 5, May, 1942, pp. 77-79.)
72	8518	G.B.	*Westland "Whirlwind."* (Aviation, Vol. 41, No. 5, May, 1942, pp. 203-256.)
73	8521	G.B.	*Hurricane with Camouflage Net in Russia (Photo).* (Aviation, Vol. 41, No. 5, May, 1942, p. 222.)
74	8619	G.B.	*Spitfire—IX—Fighters in Flight (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 59.)
75	8624	G.B.	*De Havilland Mosquito Receiving its Bomb Load (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 70.)
76	8625	G.B.	*D.H. Mosquito Approaching a Dive (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 71.)
77	8627	G.B./ Germany ...	*D.H. Mosquito and Junkers Ju. 88E. (Aircraft Recognition).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, pp. 78-79.)
78	8646	G.B.	*Avro Lancaster (Photo).* (Aeronautics, Vol. 7, No. 4, Nov., 1942, p. 54.)
79	8653	G.B.	*D.H. Mosquito Over Malta (Photo).* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 232.)
80	8655	G.B.	*Supermarine Spitfire—IX.* (Aeroplane, Vol. 64, No. 1657, 26/2/43, p. 233.)
81	8659	G.B.	*Handley Page "Hampden" Over Norway.* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 236.)
82	8672	G.B.	*Anti-Tank Hurricanes in Middle East.* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 319.)
83	8681	G.B.	*Walrus Amphibian Biplane.* (Fougueux, Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 324.)
84	8691	G.B.	*De Havilland "Mosquito" (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 350.)
85	8702	G.B.	*Miles Trainer M.18 (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 364.)
86	8745	G.B./U.S.A.	*Fortress Still Flying with Tailplane Severed (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 296.)
87	8749	G.B.	*Typhoons and Whirlwinds at Work (Formation Photo of Whirlwinds).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, pp. 312-313.)
88	8755	G.B.	*D.H. "Mosquito" Made of Wood (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 302.)
89	8791	G.B.	*Supermarine Spitfire—IX (Recognition Details).* (Flight, Vol. 63, No. 1,788, 1/4/43, p. a.)

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90	8792	G.B. ...	*Long Range Hurricane* 11*C for Tropical Use (Recognition Details).* (Flight, Vol. 63, No. 1,788, 1/4/43, p. b.)
91	8799	G.B. ...	*Mosquito and Spitfire Nine.* (Aeronautics, Vol. 8, No. 1, Feb., 1943, pp. 36-41.)
92	8807	G.B. ...	*Spitfire—IX.* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 62.)
93	8880	G.B. and Canada ...	*Avro Anson Trainer, Built in Canada (Plastic Plywood Fuselage).* (Inter. Avia., No. 854-855, 3/2/42, pp. 2 and 18.)
94	8884	G.B. ...	*De Havilland Mosquito Light Bomber.* (Inter. Avia., No. 852-853, 25/1/43, pp. 1 and 8.)
95	8885	G.B. ...	*Hawker Typhoon Fighter.* (Inter. Avia., No. 852-853, 25/1/43, p. 8.)
96	8886	G.B. ...	*Bristol Bisley Light Bomber.* (Inter. Avia., No. 852-853, 25/1/42, pp. 8-9.)
			Military Types (U.S.A.).
97	8167	U.S.A. ...	*Martin "Mariner" Patrol Bomber (Flying Boat).* (Inter. Avia., No. 847, 10/12/42, p. 15.)
98	8169	U.S.A. ...	*Martin B-26 Medium Bomber (Marauder or Martian).* (Inter. Avia., No. 847, 10/12/42, p. 15.)
99	8171	U.S.A. ...	*Ryan Observation Aircraft.* (Inter. Avia., No. 847, 10/12/42, pp. 15-16.)
100	8178	U.S.A. ...	*Lockheed P-38 Lightning.* (Inter. Avia., No. 847, 10/12/42, p. 1.)
101	8179	U.S.A. ...	*Vought-Sikorsky F.4U-1 "Corsair" (Carrier Bomber Fighter).* (Inter. Avia., No. 847, 10/12/42, pp. 1 and 14.)
102	8211	U.S.A. ...	*Republic P-47 "Thunderbolt."* (Inter. Avia., No. 848-849, 21/12/42, p. 15.)
103	8215	U.S.A. ...	*Consolidated PB.27 Coronado (Patrol Bomber) (Photo).* (Inter. Avia., No. 848-849, 21/12/42, p. 1.)
104	8259	U.S.A. ...	*Vultee Vengeance (showing Diving Brakes) (Photo).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, p. 114.)
105	8216	U.S.A. ...	*North American NA-73 Mustang (Photo).* (Inter. Avia., No. 848-849, 21/12/42, p. 1.)
106	8218	U.S.A. ...	*Ryan PT-25 Plywood Trainer (Photo).* (Inter. Avia., No. 848-849, 21/12/42, p. 1.)
107	8264	U.S.A. ...	*Republic P.47 Thunderbolt.* (Aero Digest, Vol. 41, No. 6, Dec., 1942, p. 138.)
108	8282	U.S.A. ...	*Stinson "Sentinel" Observation Plane (Photo).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, p. 380.)
109	8283	U.S.A. ...	*Consolidated "Coronado."* (Flugsport, Vol. 35, No. 4, 17/2/43, pp. 40-41.)
110	8303	U.S.A. ...	*Fairchild AT.13 Trainer.* (Inter. Avia., No. 846, 30/11/42, p. 7.)
111	8304	U.S.A. ...	*Vought-Sikorsky F.4U-1 Carrier Fighter "Corsair."* (Inter. Avia., No. 846, 30/11/42, pp. 7-8.)
112	8305	U.S.A. ...	*Brewster SB.2A-1 Buccaneer Dive Bomber.* (Inter. Avia., No. 846, 30/11/42, p. 8.)

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113	8310	U.S.A.	...	*Vultee Trainer BT-13 now Made of Steel (Expanded Metal and Welding).* (Inter. Avia., No. 846, 30/11/42, p. 10.)
114	8383	U.S.A.	...	*Beech AT-11 Trainer (Photo).* (Inter. Avia., No. 850, 2/1/43, p. 1.)
115	8419	U.S.A.	...	*Douglas "Dauntless" Dive Bombers (Photo).* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 100.)
116	8437	U.S.A.	...	*Lockheed "Lightning" (Photo).* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 233.)
117	8439	U.S.A.	...	*Martin Marauder (Photo).* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 244-245.)
118	8513	U.S.A.	...	*Taylorcraft L-57A Liaison Plane for A.A.F. (Photo).* (Aviation, Vol. 41, No. 5, May, 1942, p. 185.)
119	8515	U.S.A.	...	*Grumman B-44 Used as Instrument Trainer (Photo).* (Aviation, Vol. 41, No. 5, May, 1942, p. 197.)
120	8516	U.S.A.	...	*North American AT.6 Trainer Made of Steel and Wood (Photo).* (Aviation, Vol. 41, No. 5, May, 1942, p. 219.)
121	8517	U.S.A.	...	*Transition Trainers (Beech AT-10, Cessna "Bobcat," Cessna "Crane" Curtiss AT-9) (Photo).* (Aviation, Vol: 41, No. 5, May, 1942, pp. 201 and 255-256.)
122	8548	U.S.A.	...	*The Thunderbolt in Action (Photo).* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 40.)
123	8621	U.S.A.	...	*Boeing Fortress II Bombers on Aerodrome (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 63.)
124	8633	U.S.A.	...	*Boeing "Sea Ranger" (Photograph).* (U.S. Air Services, Vol. 27, No. 8, Aug., 1942, p. 16.)
125	8647	U.S.A.	...	*Curtiss Hell Diver (Photograph).* (Aeronautics, Vol. 7, No. 4, Nov., 1942, p. 61.)
126	8648	U.S.A.	...	*Martin Baltimore (Photo).* (Aeronautics, Vol. 7, No. 4, Nov., 1942, p. 83.)
127	8656	U.S.A.	...	*Boeing B-17FS Bombers in Flight.* (Aeroplane, Vol. 64, No. 1,657, 26/2/42, p. 234.)
128	8662	G.B. and U.S.A.	...	*American and British Trainers.* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 244-247.)
129	8676	U.S.A.	...	*Boeing B-17E (Fortress II) (Photo).* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 321.)
130	8677	U.S.A.	...	*Glenn Martin B-26 "Marauder" Bomber (Photo).* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 322.)
131	8694	U.S.A.	...	*A Vultee Vengeance I Dive Bomber (Air Brakes in Open Position) (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 353.)
132	8699	U.S.A.	...	*The Martin Marauder I (B-26A) (Silhouette).* (Aeroplane, Vol. 64, No. 1,664, 26/3/43, pp. 360-361.)
133	8700	U.S.A.	...	*The Douglas A-24 Dauntless (Recognition Details).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, pp. 362-363.)
134	8701	U.S.A.	...	*The Grumman TBF-1 (Recognition Details).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, pp. 362-363.)
135	8709	U.S.A.	...	*Coastal Command Fortress (Photograph).* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 300.)

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136	8741	U.S.A. ...	*Ryan P.T.-25 Plastic-Bonded Plywood Trainer.* (Aviation, Vol. 41, No. 10, Oct., 1942, pp. 235 and 285-286.)
137	8743	U.S.A. ...	*North American Mitchells Over the Mediterranean (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 295.)
138	8744	U.S.A. ...	*Curtiss A-25 Banshee (Military Dive Bomber) (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 296.)
139	8750	U.S.A. ...	*American Aircraft in Service—VII. Lockheed C-56, "Lodestar"; Fairchild C-61, "Forwarder"; Lockheed C-63, "Noorduyn"; C-64a; Lockheed C-69, "Constellation"; Curtiss C-76, "Caravan."* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 311.)
140	8752	G.B.	*Bristol "Beaufighter" (Photo).* Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 308.)
141	8756	U.S.A. ...	*Consolidated PB2Y-2 "Coronado" (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 303.)
142	8778	U.S.A. ...	*Ventura (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 219.)
143	8781	U.S.A. ...	*Douglas Skymaster C-54 (Recognition Details).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. b.)
144	8789	U.S.A. ...	*Bostons in North Africa (Photograph).* (Flight, Vol. 63, No. 1,788, 1/4/43, p. 327.)
145	8795	U.S.A. ...	*The Ventura for Anti-Submarine Work (Photograph).* (Flight, Vol. 63, No. 1,788, 1/4/43, p. 349.)
146	8805	U.S.A. ...	*Flying Fortress 11s, Boeing B17Es (Photo).* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 54.)
147	8806	U.S.A. ...	*Lockheed P.38 Lightning (Photo).* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 56.)
148	8870	U.S.A. ...	*Lockheed "Ventura" Bomber.* (Inter. Avia., No. 854-855, 3/2/43, pp. 7-8.)
149	8871	U.S.A. ...	*Martin Martian (Marauder) Bomber B-26B.* (Inter. Avia., No. 854-855, 3/2/43, pp. 2 and 8.)
150	8872	U.S.A. ...	*Curtiss S.B. 2C-1 Dive Bomber (Helldiver).* (Inter. Avia., No. 854-855, 3/2/43, p. 8.)
151	8873	U.S.A. ...	*Brewster Types (Bermuda, Blaster and Battler).* (Inter. Avia., No. 854-855, 3/2/43, pp. I and 8-9.)
152	8874	U.S.A. ...	*Bell P-57 Fighter.* (Inter. Avia., No. 854-855, 3/2/43, pp. I and 8-9.)
153	8875	U.S.A. ...	*Vultee-Stinson Liaison Plane "Sentinel" (L-5).* (Inter. Avia., No. 854-855, 3/2/43, pp. 9-10.)
154	8876	U.S.A. ...	*Ryan Trainer PT-25.* (Inter. Avia., No. 854-855, 3/2/43, p. 10.)
			Military Types (U.S.S.R.).
155	8214	U.S.S.R. ...	*Russian LAGG-3 Fighter.* (Inter. Avia., No. 848-849, 21/12/42, p. 18.)
156	8686	U.S.S.R. ...	*A Flight of 11-2 Stormovik Fighter-Bombers (showing After Gun Position) (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 346.)
157	8693	U.S.S.R. ...	*MIG-3 Fighter of the Red Air Fleet (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 352.)

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158	8812	U.S.S.R. ...	*Russian Trainers (Yu.2s) in Action.* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 72.)
			Military Types (Germany).
159	8371	Germany ...	*Junkers Ju. 89 and 905 Long Range Bomber.* (Inter. Avia., No. 850, 2/1/43, p. I and 8-9.)
160	8382	Germany ...	*Henschel Hs. 129 Bomber (Photo).* (Inter. Avia., No. 850, 2/1/43, p. I.)
161	8404	Germany ...	*High Altitude Ju. 86.* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 242.)
162	8405	Germany ...	*Me. 323—Six-Engined "Powered Glider."* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 242.)
163	8642	Germany ...	*German Aircraft Silhouettes (Ju. 286, Ju. 290, He. 116 and Henschel* 129). (Aeronautics, Vol. 7, No. 4, Nov., 1942, p. 35.)
164	8658	Germany ...	*Dornier D.O. 172 in Tripolitania.* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 235.)
165	8678	Germany ...	*Dornier Do. 18K1 Flying Boat (Photo).* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 323.)
166	8688	Germany ...	*The Dornier Do. 217E2 (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 348.)
167	8719	Germany ...	*Messerschmitt Me. 210 (Recognition Details).* (Flight, Vol. 43, No. 1,787, 25/3/43, p. a.)
168	8720	Germany ...	*Henschel Hs. 129 (Recognition Details).* (Flight, Vol. 43, No. 1,787, 25/3/43, p. b.)
169	8740	Germany ...	*Focke-Wulf 190 A3.* (Aviation, Vol. 41, No. 10, Oct., 1942, pp. 233 and 306-308.)
170	8754	Germany and U.S.A. ...	*Arado AR. 196A and Vought Sikorsky OS2U-3 Kingfisher I (Recog. Details).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, pp. 304-305.)
171	8773	Germany ...	*Ju. 52 on the Russian Front (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 220.)
172	8783	Germany ...	*Henschel Hs. 129 (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 229.)
173	8810	Germany ...	*B.V. 222 Flying Boat.* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 71.)
174	8847	Germany ...	*Focke-Wulf F.W. 200C (Photograph).* (Flugsport, Vol. 35, No. 4, 17/2/43, p. 47.)
			Military Types (Italy).
175	8176	Italy	*Reggiane Re. 2001 Single-Seat Fighter.* (Inter. Avia., No. 847, 10/12/42, pp. 13-14.)
176	8226	Italy	*New Italian Aircraft Types (Pressure Cabin Piazzio P. 111 and Development of Fiat G. 50).* (Inter. Avia., No. 851, 12/1/43, p. 13.)
177	8230	Italy	*Piazzo Four-Engine Bomber P. 108.* (Flugsport, Vol. 35, No. 5, 3/3/43, pp. 54-55.)
178	8317	Italy	*Piazzo P. 108 Four-Engined Long Range Bomber.* (Inter. Avia., No. 846, 30/11/42, pp. 1 and 17.)
179	8784	Italy	*Fiat G. 50 (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 229.)
			Military Types (France).
180	8894	France ...	*N.C. 420 Seaplane (Training and Patrol).* (Inter. Avia., No. 852-853, 25/1/43, p. 13.)
181	8895	France ...	*Cannes 1030 Light Bomber.* (Inter. Avia., No. 852-853, 25/1/43, pp. 13-14.)

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182	8711	Mexico ...	... *New Mexican Trainer—Teziutlan.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 304.)
			Military Types (Japan).
183	8623	Japan ...	... *Japanese Para-Troops Descending from Mitsubishi M.C.-20 Bombers (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 65.)
			Troop Transport and Ambulance.
184	8180	U.S.A.	... *Vought-Sikorsky VS-44 Transport Plane.* (Inter. Avia., No. 847, 10/12/42, p. 15.)
185	8222	U.S.A.	... *Curtiss C-76 Transport "Caravan."* (Inter. Avia., No. 851, 12/1/43, p. 7.)
186	8227	Italy ...	... *Italian Ambulance Aircraft (Caproni Ca. 309 and 133, Cant Z. 506 and Savoia-Marchette S.M. 81).* (Inter. Avia., No. 851, 12/1/43, pp. 13-14.)
187	8231	Japan	... *Japanese Transport Flying Boat (Four-Engined) (Photo).* (Flugsport, Vol. 35, No. 5, 3/3/42, p. 55.)
188	8319	U.S.A.	... *Douglas D.C.-4 Four-Engine Transport (Photo).* (Inter. Avia., No. 846, 30/11/42, p. I.)
189	8320	U.S.A.	... *Curtiss C-76 Twin-Engined Transport.* (Inter. Avia., No. 846, 30/11/42, p. 7.)
190	8428	U.S.A.	... *Curtiss "Caravan."* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 186-188.)
191	8433	U.S.A.	... *The Lockheed "Constellation."* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 212-214, 322-323.)
192	8617	Germany	... *Junkers Ju. 290 Heavy Transport (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 58.)
193	8628	U.S.A.	... *Curtiss C-76 Caravan Transport (Photo).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 80.)
194	8631	U.S.A.	... *Martin "Mars" Flying Boat (Photo).* (U.S. Air Services, Vol. 27, No. 8, Aug., 1942, p. 10.)
195	8632	U.S.A.	... *Curtiss "Commando" Military Transport (Photograph).* (U.S. Air Services, Vol. 27, No. 8, Aug., 1942, p. 11.)
196	8663	G.B. ...	... *D.H. "Flamigo" (Transport) and H.P. 52 Hampden I (Recognition Details).* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, pp. 254-255.)
197	8684	U.S.A.	... *Douglas DC-4 "Skymaster" Transport (Photo).* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 340.)
198	8695	France	... *The Brequet 500 Two-Motor Transport Monoplane.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 354.)
199	8718	Germany	... *Ju. 52 Transport Planes (Photograph).* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
200	8742	U.S.A.	... *Hot Air Generator and Hoods on Lockheed 10 Transport (Photo).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 293.)
201	8748	U.S.A.	... *The Lockheed Constellation.* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 314.)
202	8780	U.S.A.	... *Martin Mars (Recognition Details).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. a.)
203	8797	G.B. ...	... *Trooper into Transport.* (No. Macmillan, Aeronautics, Vol. 8, No. 1, Feb., 1943, pp. 28-31.)

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204	8868	U.S.A.	...	*Curtiss C-76 Transport "Caravan."* (Inter. Avia., No. 854-855, 3/2/43, pp. 2 and 7.)
205	8869	U.S.A.	...	*Lockheed L-46 Transport "Constellation" C-69.* (Inter. Avia., No. 854-855, 3/2/43, pp. 1 and 7.)
206	8887	G.B. ...	...	*Transport Aircraft "York" (Conversion of Lancaster).* (Inter. Avia., No. 852-853, 25/1/43, p. 9.)
207	8891	U.S.A.	...	*Lockheed C-69 Transport "Constellation."* (Inter. Avia., No. 852-853, 25/1/43, p. 12.)
208	8892	U.S.A.	...	*Curtiss C-76 "Caravan" Transport.* (Inter. Avia., No. 852-853, 25/1/42, p. 12.)
209	8896	France	...	*Large Flying Boats (Potez Scan 161, S.E. 200 Latécoère 631).* (Inter. Avia., No. 852-853, 25/1/43, p. 14.)
210	8809	U.S.A.	...	*Consolidated C-87 (Transport).* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 67.)
				Gliders.
211	8170	G.B. ...	...	*Large British Glider "Horsawith."* (Inter. Avia., No. 847, 10/12/42, p. 11.)
212	8229	France	...	*High Performance Sail Plane Manboussin C. 302.* (Flugsport, Vol. 35, No. 5, 3/3/43, p. 54.)
213	8307	U.S.A.	...	*15-Seat Glider GG-4a Built by Ford.* (Inter. Avia., No. 846, 30/11/42, p. 9.)
214	8660	U.S.A.	...	*Amphibian Glider being Towed by Consolidated PBY.5.* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 238.)
215	8704	U.S.A.	...	*Increased Freight Capacity with Towed Gliders.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 370.)
216	8774	Germany	...	*German D.F.S. 230 Glider in Tow on Desert Airfield (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 221.)
217	8779	G.B. ...	...	*Horsa Glider (Photograph).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 241.)
218	8804	G.B. ...	...	*Gliding into Battle (Glider Training).* (R. C. Collins, Aeronautics, Vol. 8, No. 1, Feb., 1943, pp. 50-51.)
219	8846	Germany	...	*French Sail Plane "Ailette" C. 3015.* (Flugsport, Vol. 35, No. 4, 17/2/43, pp. 39-40.)
220	8855	France	...	*French Sail Plane "Holste 20-P.1."* (Flugsport, Vol. 35, No. 3, 3/2/43, pp. 29-30.)
221	8882	G.B. ...	...	*Airspeed Horsa Transport Glider (Photo).* (Inter. Avia., No. 854-855, 3/2/43, p. I.)
222	8889	G.B. ...	...	*Airspeed "Horsa" Glider.* (Inter. Avia., No. 852-853, 25/1/42, p. 9.)
223	8897	Germany	...	*Horten IV Flying Wing Glider (Constructional Details).* (G. Horten, Flugsport, Vol. 35, No. 6, 17/3/43, pp. 63-67.)
				Fleet Air Arm.
224	8398	G.B. ...	...	*Fleet Air Arm (Fighter Equipment).* (Alexander, Engineer, Vol. 175, No. 4,549, 19/3/43, p. 229.)
225	8608	U.S.A.	...	*Grumman "Wildcat" (Navy Fighter) (Photograph).* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 3.)

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226	8636	U.S.A. ...	*Navy Vought "Corsair" with Double Wasp Engine (Photo).* (U.S. Air Services, Vol. 27, No. 8, Aug., 1942, p. 32.)
227	8673	G.B.	*Helicopters for Marine Protection.* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 320.)
228	8710	Japan ...	*Japanese Navy 97 Fighter (Photograph).* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 301.)
229	8787	G.B.	*Aircraft in the Navy (Debate in the House of Lords).* (Flight, Vol. 43, No. 1,784, 4/3/43, p. 233.)
230	8890	U.S.A. ...	*Curtiss SOC3-1 "Seagull" (Navy Observation).* (Inter. Avia., No. 852-853, 25/1/43, pp. 11-12.)

Aircraft Carriers, Maintenance Float Platforms.

231	8175	G.B. and U.S.A. ...	*British and American Aircraft Carriers.* (Inter. Avia., No. 847, 10/12/42, pp. 22-24.)
232	8703	G.B.	*Maintenance Platforms Afloat.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 370.)
233	8879	U.S.A. ...	*New American Aircraft Carrier.* (Inter. Avia., No. 852-853, 25/1/43, p. 22.)

A.R.P. and A.A.

234	8153	Germany ...	*Factory Hands Manning A.A. Batteries (Photo).* (Der Adler, No. 2, 26/1/43, p. 40.)
235	8358	U.S.A. ...	*Protection of Foodstuffs Against War Gases.* (S. H. Katz, Ind. and Eng. Chem. (Ind. Ed.), Vol. 35, No. 1, Jan., 1943, pp. 20-23.)
236	8450	U.S.A. ...	*Windowless Black-Out Factory.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 190.)
237	8541	U.S.A. ...	*New Fireproof Plaster as Protection Against Incendiary Bombs.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 28.)
238	8715	Germany ...	*German A.R.P.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
239	8737	U.S.A. ...	*Blimps of the U.S. Coastal Patrol.* (R. G. Picinich, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 207 and 306.)

Aero and Hydrodynamics.

Wind Tunnel Research.

240	8204	Germany ...	*Flight Research and Testing at Various German Aircraft Works (Junkers, etc.).* (C. Cornelius and others, Luftwelt, Vol. 10, No. 2, 15/1/43, pp. 22-33.)
241	8269	U.S.A. ...	*Practical Aerodynamics of the Spin.* (C. H. Tweeny, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 164-166 and 271.)
242	8431	U.S.A. ...	*C.W. Builds 750 m.p.h. Wind Tunnel and High Altitude Test Chamber.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 202.)
243	8570	G.B.	*An Experimental Investigation of Wind Tunnel Interference in the R.A.E. 5 ft. Open Jet Circular Tunnel.* (J. E. Adamson, R. and M., No. 1,897.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
244	8571	G.B. ...	... *Tests on Aerofoil N.A.C.A. 23,012 in the Compressed Air Tunnel.* (D. H. Williams and others, R. and M., No. 1,898.)
245	8696	U.S.A.	... *New American Wind Tunnel (Max. Speed 700 m.p.h.).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 354.)
246	8848	Germany	... *The Application of Wind Tunnel Measurements to Aircraft Models (Scale Effect).* (Flugsport, Vol. 35, No. 4, 17/2/43, pp. 48-51.)
247	8877	U.S.A.	... *North American 300 m.p.h. Wind Tunnel (11 ft. by 7 ft. 8 in.).* (Inter. Avia., No. 854-855, 3/2/43, p. 11.)
			Heat Transfer, Boundary Layer.
248	8201	U.S.A.	... *Theory of Heat Transfer in Smooth and Rough Pipes.* (G. D. Mattioli, Forschung, Vol. 11, No. 4, July-Aug., 1940, pp. 149-158.) (R.T.P. Translation No. T.M. 1,037.) (N.A.C.A. Tech. Memo. No. 1,037, Dec., 1942.)
249	8203	U.S.A.	... *Pressure Distribution in Non-Uniform Two-Dimensional Flow.* (M. Schwabe, Ing. Archiv., Vol. VI, No. 1, Feb., 1935, pp. 34-50.) (R.T.P. Translation T.M. 1,039.) (N.A.C.A. Tech.Memo. 1,039.)
250	8349	U.S.S.R.	... *Heat Transfer and Friction in the Turbulent Boundary Layer of a Compressible Gas at High Speeds.* (F. Frankl and V. Voishel, C.A.H.I., No. 240, Moscow, 1935.) (R.T.P. Trans. No. T.M. 1,032, N.A.C.A. Tech. Memo. 1,032, Oct., 1942.)
251	8568	G.B. ...	... *Wood Smoke as a Means of Visualising Boundary Layer Flow at High Reynolds Number.* (J. H. Preston, J. Roy. Aeron. Soc., Vol. 47, No. 387, March, 1943, pp. 93-102.)
			Hydrodynamics.
252	8587	G.B. ...	... *Tidal Power (1920 to Date).* (Sci. Lib. Bibliog. Series, No. 579.)

Aircraft, Airscrews and Accessories.

Civil and Special Types.

253	8172	Germany	... *German Cargo Aircraft S.O.R.-1.* (Inter. Avia., No. 847, 10/12/42, pp. 11-13.)
254	8210	Germany	... *Ju. 290 Cargo Plane.* (Inter. Avia., No. 848-849, 21/12/42, p. 12.)
255	8212	U.S.A.	... *American Cargo Planes (C-54, C-47, C-67, etc.).* (Inter. Avia., No. 848-849, 21/12/42, p. 16.)
256	8609	U.S.A.	... *Douglas Cargo Carriers.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 23.)
257	8664	G.B. ...	... *Blackburn "Kangaroo" (British Bomber of 1916, Historical Interest).* (Aeroplane, Vol. 64, No. 1,657, 26/2/43, p. 257.)
258	8674	U.S.A.	... *Vought-Sikorsky V.S.-300 Experimental Helicopter.* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 320.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
259	8683	G.B. ...	*Lighter-Borne Sopwith "Camel" (1918 Fighter Plane) (Hist.).* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 341.)
260	8689	G.B. ...	*Heston Racer for World's Speed Record (Photograph).* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 349.)
261	8705	G.B. ...	*The Parnall Pixie, Mark I and II—1923.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 371.)
262	8714	Germany	*German Projects for New Types of Civil Aircraft.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
263	8893	France	*Breguet 500 Commercial Transport.* (Inter. Avia., No. 852-853, 25/1/43, p. 13.)
			Design, Construction and Equipment.
264	8150	U.S.A.	*Elimination of Unnecessary Weight in Aircraft.* (M. Boe, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 154-158.)
265	8241	Germany	*Retractable Undercarriage for Tailless Aircraft.* (Messerschmitt, Flugsport, Vol. 35, No. 5, 3/3/43, p. 204.)
266	8261	U.S.A.	*New Uses of Plastics in Aircraft.* (K. Wordson, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 126-276.)
267	8263	U.S.A.	*Hydraulic Pressure Accumulators.* (N. de Kiss, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 130-138.)
268	8265	U.S.A.	*Nose Wheel Shimmy Dampers.* (C. M. Morgan, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 142-151 and 275.)
269	8271	U.S.A.	*Hydraulic Control Standardisation.* (J. W. Kelly, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 211-218 and 276-279.)
270	8273	U.S.A.	*Remote Control Hydraulic Installations.* (C. G. Hebel, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 228-233.)
271	8276	U.S.A.	*Regulations for Aircraft Electrical Installations (Part II).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 238-246 and 293-294.)
272	8401	G.B. ...	*The "Bristol" Hydraulic System.* (Engineer, Vol. 175, No. 4,549, 19/3/43, pp. 237-239.)
273	8409	G.B. ...	*The "Bristol" Hydraulic System for Aeroplanes.* (Engineering, Vol. 155, No. 4,027, 19/3/43, pp. 225-227.)
274	8417	U.S.A.	*Design Considerations for Long-Range Heavy Cargo Carrying Transport.* (W. R. Lewis, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 92-94 and 246-251.)
275	8423	U.S.A.	*Moulded Shell Construction in Plywood.* (A. Klemin, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 148, 158 and 256.)
276	8432	U.S.A.	*Design Considerations of Aircraft Electrical Systems.* (T. B. Holiday, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 205-210.)
277	8447	U.S.A.	*Flashing Tail Lights for Transport Aircraft.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 350.)

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278	8510	U.S.A. ...	*Rubber Wind Sock for Trailing Aircraft Antennæ.* (Aviation, Vol. 41, No. 5, May, 1942, p. 177.)
279	8549	U.S.A. ...	*"Non-Critical" Materials Used in Airframe Construction (Plywood, Plastics, Mg., etc.).* (Sci. Am., Vol. 168, No. 1, Jan., 1943, pp. 40-41.)
280	8643	G.B.	*Moulded Plastic Plywood Aircraft Construction.* (J. S. Trevor, Aeronautics, Vol. 7, No. 4, Nov., 1942, pp. 40-41.)
281	8675	G.B.	*Uses of Magnesium in Aircraft Construction.* (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 321.)
282	8697	G.B.	*The Bristol Hydraulic System.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, pp. 355-357.)
283	8712	G.B.	*Rotating Wing Aircraft (Historical Development).* (Flight, Vol. 43, No. 1,787, 25/3/43, pp. 305-309.)
284	8722	G.B.	*Bristol Hydraulic System.* (Flight, Vol. 43, No. 1,787, 25/3/43, pp. 314-317.)
285	8731	U.S.A. ...	*The Future of Water Based Aeroplanes.* (F. T. Courtney, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 122-123, 314, 317-322.)
286	8736	U.S.A. ...	*Tail Light Flasher.* (Aviation, Vol. 41, No. 10, Oct., 1942, p. 172.)
287	8763	Germany ...	*The Selection of Suitable Material in Engineering Design.* (E. Eichwald, A.T.Z., Vol. 45, No. 24, 25/12/42, pp. 657-663.)
288	8790	G.B.	*R.A.F. Aircraft,* 1918-1943. (Flight, Vol. 63, No. 1,788, 1/4/43, pp. 329-336 and 342.)
289	8794	G.B.	*Structure of the R.A.F. from* 1918 *to* 1943. (F. A. dV. Robertson, Flight, Vol. 63, No. 1,788, 1/4/43, pp. 343-348.)
290	8800	G.B.	*Wing Tips (Round versus Square).* (W. E. Hick, Aeronautics, Vol. 8, No. 1, Feb., 1943, pp. 42-46.)
291	8801	G.B.	*Schilovsky Non-Rubber Resilient Wheels (Spring Spokes).* (Aeronautics, Vol. 8, No. 1, Feb., 1943, p. 46.)
292	8850	Germany ...	*Metal Shell Structures for Fuselages. (Pat. series* 48, *No.* 699,064.) (Messerschmitt, Flugsport, Vol. 35, No. 4, 17/2/43, p. 197.)
293	8851	Germany ...	*Wooden Shell Structures for Aircraft. (Pat. series* 48, *No.* 720,100.) (Klemm, Flugsport, Vol. 35, No. 4, 17/2/43, p. 197.)
294	8854	Germany ...	*Test Gear for Checking Profile of Aircraft Control Surfaces.* (Fieseler, Flugsport, Vol. 35, No. 4, 17/2/43, p. 198.)
295	8858	Switzerland ...	*Tricycle Landing Gears.* (Inter. Avia., No. 854-855, 3/2/43, pp. 1-5.)
296	8898	Germany ...	*Tailless Aircraft Models.* (Flugsport, Vol. 35, No. 6, 17/3/43, pp. 74-75.)

Performance and Testing.

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
297	8235	Germany ...	*Record Performance of D30 Sailplane (Gliding Angle* 1.37, *Rate of Descent* 58 *cm./sec., Weight* 306 *kg.).* (Flugsport, Vol. 35, No. 5, 3/3/43, p. 61.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
298	8733	U.S.A. ...	*Stratospheric Testing of Aircraft Parts*. (D. Tenney, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 137 and 289-292.)
299	8788	G.B.	*High Altitude Flight—Part III*. (W. Nichols, Flight, Vol. 43, No. 1,784, 4/3/43, pp. 236-239.)
300	8849	Germany ...	*Rules for Model Aircraft Competition (no Airscrew)*. (Flugsport, Vol. 35, No. 4, 17/2/43, p. 51.)

Civil Aviation and Air Cargo.

301	8220	Switzerland ...	*Post War Problems of International Air Services*. (Inter. Avia., No. 851, 12/1/43, pp. 1-4.)
302	8279	U.S.A. ...	*Scientific Cargo Loading*. (E. S. Evans, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 257-258 and 280.)
303	8560	Sweden ...	*Swedish Civil Aviation Plans for After the War*. (Engineer, Vol. 175, No. 4,550, 26/3/43, p. 260.)
304	8629	U.S.A. ...	*Commercial Air Transport and Post War Air Routes*. (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 80.)
305	8685	G.B.	*The Future of European Air Transport*. (Aeroplane, Vol. 64, No. 1,660, 19/3/43, p. 340.)
306	8739	U.S.A. ...	*Estimation of Future Passenger Air Traffic*. (E. A. Van Deusen, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 215-218 and 282-285.)
307	8751	U.S.A. ...	*American Air Transport Prospects*. (C. J. Stanton, Vol. 64, No. 1,659, 12/3/43, pp. 302-303.)
308	8777	G.B.	*The Future of Air Commerce*. (R. H. Thornton, Flight, Vol. 43, No. 1,784, 4/3/43, pp. 226-228.)

Airscrews and Helicopters.

309	8168	G.B.	*Hydulignum Airscrews*. (Inter. Avia., No. 847, 10/12/42, p. 11.)
310	8202	U.S.A. ...	*The Performance of a Vaneless Diffuser Fan*. (V. Polikovsky, M. Nevelson, C.A.H.I. Report, No. 224, Moscow, 1935.) (R.T.P. Translation No. T.M. 1,038.) (N.A.C.A. Tech. Memo. No. 1,038, Dec., 1932.)
311	8209	Switzerland ...	*Escher-Wyss Variable Pitch Airscrew Adapted for Braking and Landing Speeds*. (Inter. Avia., No. 848-849, 21/12/42, pp. 11-12.)
312	8237	Germany ...	*Helicopter Drive, Rotation being Maintained by Induced Blade Variations*. (*Pat. series* 49, *No.* 729,819.) (A.V.A., Flugsport, Vol. 35, No. 5, 3/3/43, pp. 201-202.)
313	8286	Germany ...	*Blade Root Bearing for V.P. Airscrews*. (*Pat. series* 47, *No.* 727,968.) (Junkers, Flugsport, Vol. 38, No. 3, 3/2/43, p. 189.)
314	8287	Germany ...	*Constant Speed Control for V.P. Airscrews*. (*Pat. series* 47, *No.* 729,706.) (Junkers, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 189-190.)
315	8288	Germany ...	*Reversible Hydraulic Control for V.P. Airscrews*. (*Pat. series* 47, *No.* 727,908.) (Junkers, Flugsport, Vol. 35, No. 3, 3/2/43, p. 190.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
316	8289	Germany ...	*Hydraulic Control for V.P. Airscrews.* (*Pat. series* 47, *No.* 728,851.) (Junkers, Flugsport, Vol. 35, No. 3, 3/2/43, p. 190.)
317	8290	Germany ..	*Contra Propeller Drive.* (*Pat. series* 47, *No.* 727,658.) (Barbaron, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 190-191.)
318	8399	U.S.A. ...	*The Vought-Sikorsky Helicopter.* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 230.)
319	8506	U.S.A. ...	*Dynamic Balancing of Propellers.* (E. Kronauer, Aviation, Vol. 41, No. 5, May, 1942, pp. 119-121, 244.)
320	8667	G.B.	*Hydulignum Airscrew.* (Hordern, Richmond Aircraft Co., Ltd., Machinist, Vol. 86, No. 83, 28/11/42, pp. 211-212.)
321	8910	France ...	*Gnome Rhone Variable Pitch Airscrew* (*Controlled and Automatic Type*). (Plein Ciel, No. 52, 1936, pp. 33-36.)
			Patents.
322	8238	Germany ...	*Landing Wheel with Emergency Running Surface* (*in Case of Tyre Failure*). (*Pat. series* 49, *No.* 729,819.) (Messerschmitt, Flugsport, Vol. 35, No. 5, 3/3/43, p. 203.)
323	8239	Germany ...	*Aircraft Shock Absorber.* (*Pat. series* 49, *No.* 728,207.) (Focke-Wulf, Flugsport, Vol. 35, No. 5, 3/3/43, p. 203.)
324	8240	Germany ...	*Twin Wheel Landing Gear.* (*Pat. series* 49, *No.* 728,620.) (V.D.M., Flugsport, Vol. 35, No. 5, 3/3/43, p. 203.)
325	8242	Germany ..	*Tricycle Undercarriage with Adjustable Castoring Angle of Rear Wheels.* (*Pat. series* 49, *No.* 726,614.) (Heinkel, Flugsport, Vol. 35, No. 5, 3/3/43, p. 204.)
326	8243	Germany ...	*Retractable Undercarriage* (*Wheel Retracts into Fuselage*). (*Pat. series* 49, *No.* 726,651.) (Heinkel, Flugsport, Vol. 35, No. 5, 3/3/43, pp. 204-205.)
327	8244	Germany ...	*Retractable Undercarriage.* (*Pat. series* 49, *No.* 727,421.) (Elektron, Flugsport, Vol. 35, No. 5, 3/3/43, p. 205.)
328	8245	Germany .	*Retractable Undercarriage.* (*Pat. series* 49, *No.* 729,167.) (Henschel, Flugsport, Vol. 35, No. 5, 3/3/43, p. 206.)
329	8247	Germany .	*Cover Plates for the Retractable Undercarriage Recess.* (*Pat. series* 49, *No.* 729,222.) (Fieseler, Flugsport, Vol. 35, No. 5, 3/3/43, p. 206.)
330	8248	G.B.	*Cover Plates for Retractable Undercarriage Recess.* (*Pat. series* 49, *No.* 729,820.) (Messerschmitt, Flugsport, Vol. 35, No. 5, 3/3/43, p. 207.)
331	8249	Germany ..	*Sea Rudder for Floats.* (*Pat. series* 49, *No.* 726,615.) (Focke-Wulf, Flugsport, Vol. 35, No. 5, 3/3/43, pp. 207-208.)
332	8250	Germany ..	*Emergency Flotation Gear for Land Planes.* (*Pat. series* 49, *No.* 729,459.) (Arado, Flugsport, Vol. 35, No. 5, 3/3/43, p. 208.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
333	8251	Germany	*Underwater Wings for Assisted Take-off (Avoidance of Cavitation).* (*Pat. series* 49, *No.* 726,616.) (Heinkel, Flugsport, Vol. 35, No. 5, 3/3/43, p. 208.)
334	8291	Germany ...	*Filling Device for Balance Tanks in Hydraulic System.* (*Pat. series* 47, *No.* 728,604.) (Henschel, Flugsport, Vol. 35, No. 3, 3/2/43, p. 191.)
335	8296	Germany ...	*Retractable Aircraft Searchlight.* (*Pat. series* 47, *No.* 728,024.) (Zeiss, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 194-195.)
336	8299	Germany ...	*Jettisoning Device for Aircraft Equipment (Especially Cameras).* (*Pat. series* 47, *No.* 725,914.) (Henschel, Flugsport, Vol. 35, No. 3, 3/2/43, p. 195.)
337	8300	Germany ...	*Optical Device for Reading Aircraft Instruments Outside the Normal Field of Vision.* (*Pat. series* 47, *No.* 725,915.) (Henschel, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 195-196.)
338	8301	Germany ...	*Projection of Aircraft Instrument Readings on to the Wind Screen.* (*Pat. series* 47.) (Arado, Flugsport, Vol. 35, No. 3, 3/2/43, p. 196.)
339	8840	Germany	*Continued Servo Rudder and Trimming Tab Operations.* (*Pat. series* 48, *No.* 728,315.) (Focke-Wulf, Flugsport, Vol. 35, No. 4, 17/2/43, p. 199.)
340	8841	Germany	*Interconnection of Control Surface Lock and Engine Throttle.* (*Pat. series* 48, *No.* 729,818.) (Fieseler, Flugsport, Vol. 35, No. 4, 17/2/43, p. 199.)
341	8842	Germany ...	*Elastic Foot Rest for Rudder Bars.* (*Pat. series* 48, *No.* 729,457.) (Fieseler, Flugsport, Vol. 35, No. 4, 17/2/43, p. 199.)
342	8843	Germany	*Device for Operating Several Control Surfaces in Succession.* (*Pat. series* 48, *No.* 729,818.) (Messerschmitt, Flugsport, Vol. 35, No. 4, 17/2/43, p. 200.)
343	8246	Germany ...	*Locking Device for Servo Motor Pistons.* (*Pat. series* 49, *No.* 729,168.) (Teves, Flugsport, Vol. 35, No. 5, 3/3/43, p. 206.)
344	8852	Germany ...	*Modified Fowler Flap.* (*Pat. series* 48, *No.* 729,783.) (Focke-Wulf, Flugsport, Vol. 35, No. 4, 17/2/43, p. 197.)
345	8853	Germany ...	*Wing or Control Surface Construction.* (*Pat. series* 48, *No.* 728,721.) (Messerschmitt, Flugsport, Vol. 35, No. 4, 17/2/43, pp. 197-198.)
346	8856	Germany ...	*Aircraft Wing with Controlled Projecting Nose.* (*Pat. series* 48, *No.* 729,456.) (Arado, Flugsport, Vol. 35, No. 4, 17/2/43, p. 198.)
347	8857	Germany ...	*Automatic Pilot.* (*Pat. series* 48, *No.* 729,784.) (Askania, Flugsport, Vol. 35, No. 4, 17/2/43, pp. 198-199.)
348	8899	Germany ...	*Aircraft Braking by Means of Propeller (Interconnection of Throttle and Wheel Brakes).* (*Pat. series No.* 1, 1943, *No.* 724,197.) (Messerschmitt, Flugsport, Vol. 35, No. 6, 17/3/43, p. 1.)

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349	8900	Germany	..	*Aircraft Wheel Brakes.* (*Pat. series No.* 1, 1943, *No.* 726,327.) (Argus, Flugsport, Vol. 35, No. 6, 17/3/43, p. 1.)
350	8901	Germany	...	*Electrically Operated Wheel Brakes (Automatic Circuit Brake Operates during Retraction).* (*Pat. series No.* 1, 1943, *No.* 729,376.) (Elektron, Flugsport, Vol. 35, No. 6, 17/3/43, p. 2.)
351	8902	Germany	...	*Aerodynamic Brake for Multi-Engined Aircraft (Rear of Engine Nacelle Opens Out).* (*Pat. series No.* 1, 1943, *No.* 723,604.) (Dornier, Flugsport, Vol. 35, No. 6, 17/3/43, p. 2.)
352	8903	Germany	...	*Balanced Diving Brake Assembly (Above and Below Wing Surface).* (*Pat. series No.* 1, 1943, *No.* 726,413.) (D.F.S.F., Flugsport, Vol. 35, No. 6, 17/3/43, p. 2.)
353	8904	Germany	...	*Earth Anchor for Aircraft.* (*Pat. series No.* 1, 1943, *No.* 726,759.) (Weser, Flugsport, Vol. 35, No. 6, 17/3/43, p. 2.)
354	8905	Germany	...	*High Speed Rail Car for Measuring Aerodynamic Force of Aircraft.* (*Pat. series No.* 1, 1943, *No.* 724,363.) (Bossig, Flugsport, Vol. 35, No. 6, 17/3/43, pp. 2-3.)
355	8906	Germany	...	*Pneumatic Relay for Pilotless Wireless Controlled Aircraft.* (*Pat. series No.* 1, 1943, *No.* 725,771.) (Askania, Flugsport, Vol. 35, No. 6, 17/3/43, p. 3.)
356	8907	Germany	...	*Wireless Control for Aircraft Models (Free Flight within a Certain Zone).* (*Pat. series No.* 1, 1943, *No.* 728,025.) (Argus, Flugsport, Vol. 35, No. 6, 17/3/43, pp. 3-4.)
357	8908	Germany	...	*Barrage Balloon Cable Deflector.* (*Pat. series No.* 1, 1943, *No.* 728,852.) (Junkers, Flugsport, Vol. 35, No. 6, 17/3/43, p. 4.)
				De-Icing.
358	8252	Germany	...	*Wing De-Icing by Electrolysis.* (*Pat. series* 49, *No.* 728,047.) (Dornier, Flugsport, Vol. 35, No. 3, 3/3/43, p. 208.)
359	8418	Canada	...	*Ice on Aircraft (Bibliography).* (Nat. Research Council, No. 1,033, Dec., 1941.)
360	8734	U.S.A.	...	*New Electric Ice Indicator.* (Aviation, Vol. 41, No. 10, Oct., 1942, pp. 138-143.)
				Airfield Equipment and Maintenance.
361	8281	U.S.A.	...	*Air Port Snow Removal.* (W. M. Fletcher, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 85-88 and 290-292.)
362	8295	Germany	...	*Oil Smoke Wind Indicator for Aerodromes.* (*Pat. series* 47, *No.* 728,095.) (Pintsch, Flugsport, Vol. 35, No. 3, 3/2/43, pp. 194-195.)
363	8297	Germany	...	*Automatic Landing Direction Indicator for Aerodromes.* (*Pat. series* 47, *No.* 728,094.) (Pintsch, Flugsport, Vol. 35, No. 3, 3/2/43, p. 195.)

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364	8298	Germany ...	*Landing Lights for Aerodromes. (Pat. series 47, No. 728,095.)* (Pintsch, Flugsport, Vol. 35, No. 3, 3/2/43, p. 195.)
365	8414	G.B.	*Catapult Spool. (Patent* 458,571.) (Blackburn Aircraft, Ltd., Engineering, Vol. 155, No. 4,027, 19/3/43, p. 240.)
366	8613	U.S.A. ...	*Auto Transformer Controls Brightness of Airport Lights.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 35.)
367	8615	U.S.A. ...	*Wind Direction Indicator.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 35.)
368	8637	U.S.A. ...	*Aerial View of "First Flight Strip" (Photo).* (U.S. Air Services, Vol. 27, No. 8, Aug., 1942, p. 36.)
369	8708	G.B.	*Portable Tarmac.* (Aeroplane, Vol. 64, No. 1,661, 26/3/43, p. 368.)
370	8747	G.B.	*Saving Undercarriage Tyres (Description of Correct Treatment and Handling).* (Aeroplane, Vol. 64, No. 1,659, 12/3/43, p. 300.)
371	8822	G.B.	*Aerodrome Abstracts, No. 23-41. Road Research Lab., Compiled by D.S.I.R.* (Vol. II, No. 2, 1943.)

Engines and Accessories.

Named Types.

372	8166	G.B.	*Napier "Sabre" Engine.* (Inter. Avia., No. 847, 10/12/42, p. 9.)
373	8213	U.S.A. ...	*Wright Duplex "Cyclone" (2,000 h.p.).* (Inter. Avia., No. 848-849, 21/12/42, pp. 16-17.)
374	8306	U.S.A. ...	*Guiberson Diesels for Tanks.* (Inter. Avia., No. 846, 30/11/42, pp. 1 and 8.)
375	8438	U.S.A. ...	*The 300 h.p. Gypsy Six Aero Engine.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 242.)
376	8592	G.B.	*The Erren Engine.* (Sci. Lib., Bibliog. Series, No. 584.)
377	8630	G.B.	*Gipsy Major I Aero Engine's Reliability.* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 82.)
378	8881	France ...	*Gnome Rhone Engines, 14 R., 18 R., Double 14 R. (28-Cylinder, 3,200 h.p.), 14 Mars S.).* (Inter. Avia., No. 852-853, 25/1/43, pp. 15-16.)
379	8883	G.B. ...	*Rolls Royce Merlin 61.* (Inter. Avia., No. 852-853, 25/1/43, pp. 1 and 7-8.)

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380	8254	G.B.	*Technical Abstracts issued by the Aero Engine Dept., The Bristol Aeroplane Co., Ltd.* (Vol. VIII, No. 10, March 11th, 1943.)
381	8579	G.B.	*Compression Ignition Engines (256 Abstracts).* (I.A.E. Report, No. 1,941-1,942, December, 1941.)
382	8583	G.B.	*Technical Abstracts issued by Aero Engine Dept., Bristol Aeroplane Co.* (Vol. 8, No. 12, 25/3/43.)
383	8793	G.B.	*Engine Progress, 1918-1943.* (G. Geoffrey Smith, Flight, Vol. 63, No. 1,788, 1/4/43, pp. 337-342.)

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384	8818	G.B. ...	*Technical Abstracts (issued by the Aero Engine Dept., Bristol Aeroplane Co., Ltd.).* (Vol. 8, No. 9, March 4th, 1943.)
385	8825	G.B. ...	*Technical Abstracts issued by the Aero Engine Dept., The Bristol Aeroplane Co., Ltd.* (Vol. 8, No. 11, March 18th, 1943.)
			Installation.
386	8267	U.S.A. ...	*Engine Mount Resonance.* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 152-271.)
			Testing and Maintenance.
387	8181	Germany ...	*Mixture Distribution and Fuel Volatility in Multi-Cylinder Engines (with Some Notes on the Advantages of Fuel Injection).* (F. Penzig, Z.V.D.I., Vol. 85, No. 11, 15/3/41, pp. 273-274.)
388	8255	U.S.A. ...	*American Bosch Induction Vibrator for Engine Starting (Advert.).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, p. 97.)
389	8442	U.S.A. ...	*Preventing Idling Failures in Flight on Four-Cylinder Engines.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 323-324.)
390	8547	U.S.A. ...	*Sound-Proofing in Engine Testing Laboratories (Fibre Glass).* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 41.)
391	8644	G.B. ...	*Combustion Chamber Phenomena.* (E. A. Smith, Aeronautics, Vol. 7, No. 4, Nov., 1942, pp. 42-45.)
392	8721	G.B. ...	*Warming Up the Engine.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 311.)
393	8738	U.S.A. ...	*Location of Ignition Troubles.* (H. N. Walker, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 211, 300-304.)
394	8761	Germany ...	*Operating Diesel Engine on Coal Gas with Spark Ignition.* (E. Raentsch, A.T.Z., Vol. 46, No. 1, 10/1/43, pp. 16-17.)
			Gas Turbines and Engines.
395	8559	G.B. ...	*Position and Development of the Gas Engine.* (J. Jones, Engineer, Vol. 175, No. 4,550, 26/3/43, pp. 256-258.)
396	8863	G.B. ...	*The Position and Development of the Gas Engine.* (J. Jones, Engineer, Vol. 175, No. 4,551, 2/4/43, pp. 276-277.)
397	8929	Switzerland ...	*Brown Boveri Gas Turbine.* (Machinery, Vol. 62, No. 1,583, 11/2/43, p. 150.)
398	8963	G.B. ...	*Position and Development of the Gas Engine (Discussion).* (J. Jones, Engineering, Vol. 153, No. 4,029, 2/4/43, pp. 263-264.)
			Oil Engines, Boilers and Pumps.
399	8223	G.B. ...	*Development of Doxford Marine Oil Engine.* (W. Ker Wilson, Engineering, Vol. 155, No. 4,025, 5/3/43, pp. 181-182.)
400	8268	U.S.A. ...	*Performance of Pressure Loaded Gear Pumps.* (J. M. Roth, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 160-162.)

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401	8344	G.B. ...	*The Development of the Doxford Marine Oil Engine.* (W. Ker Wilson, Engineering, Vol. 155, No. 4,026, 12/3/43, pp. 201-202.)
402	8406	G.B. ...	*The Heat Pump.* (T. F. Wall, Engineering, Vol. 155, No. 4,027, 19/2/43, p. 221.)
403	8410	G.B. ...	*Portable Vertical Oil Fired Boiler.* (Engineering, Vol. 155, No. 4,027, 19/3/43, p. 235.)
			Gears, Spark Plugs.
404	8441	Switzerland ...	*Spark Plugs for Aviation Engines.* (Trade Booklet issued by the firm P. E. M. Delemont, Switzerland, 1942.)
405	8572	G.B. ...	*Piston Ring and Cylinder Wear in Automobile Type Engines (an Examination of Available Literature).* (P. V. Lamarque, I.A.E. Report, No. 1,942-10, 23/9/42.)
406	8581	G.B. ...	*Gears (Collection of Abstracts).* (I.A.E. Report, No. 1,942-1,949.)
407	8582	G.B. ...	*Durability of Gears.* (H. D. Mansion, I.A.E. Report, No. 1,942-12, Dec., 1942.)
408	8930	G.B. ...	*Aero Engine Gearing.* (P. B. Brown and E. V. Farrar, Machinery, Vol. 62, No. 1,583, 11/2/43, pp. 157-158.)
			Cooling System.
409	8308	U.S.A. ...	*Air-Cooling by Ducts.* (*Fairchild Engine Patent* No. 2,280,957.) (Inter. Avia., No. 846, 30/11/42, p. 9.)
410	8540	U.S.A. ...	*New Anti-Freeze for Engine Cooling System.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 26.)
			Fuels and Lubricants.
			General.
411	8159	France ...	*New Pipe Line in France.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 30.)
412	8163	France ...	*France's Difficulty in Finding Petroleum Substitutes.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 38.)
413	8396	U.S.A. ...	*Petroleum Shortage in U.S.A.* (B. T. Brooks and L. O. Snider, Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, pp. 69-72.)
414	8595	G.B. ...	*Summary of Work for Three Weeks ending 20th and 27th February and 6th March.* (Issued by the Fuel Research Intelligence Section.)
415	8821	G.B. ...	*Fuel Research Intelligence Section, Fuel Research Station, E. Greenwich, S.E.10.* (Summary for Two Weeks ending 6th and 13th February, 1943.)
			High Octane Fuel.
416	8459	U.S.A. ...	*New Catalytic Process for Producing Increase in High Octane Aviation Fuel.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 186.)
			Gaseous Fuels.
417	8157	U.S.S.R. ...	*Producer-Gas Developments in Russia.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 29.)

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418	8158	Germany ...	*New Generator Fuel in Germany.* (Petroleum Times, No. 47, No. 1,187, 23/1/43, p. 29.)
419	8162	U.S.A. ...	*Wartime Development of U.S. Helium Resources.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 37.)
420	8165	Eire ...	*Producer-Gas Developments in Eire.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, pp. 30 and 48.)
421	8359	U.S.A. ...	*Pure Hydrocarbons from Petroleum.* (J. Griswold and E. E. Ludwig, Ind. and Eng. Chem. (Ind. Ed.), Vol. 35, No. 1, Jan., 1943, pp. 117-119.)
422	8402	Italy ...	*Methane as Locomotive Fuel in Italy.* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 239.)
423	8451	U.S.A. ...	*Liquefied Petroleum Gas in 1942.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, pp. 188-189.)
424	8760	Germany ...	*New Types of Wood Gas Generators.* (A.T.Z., Vol. 46, No. 1, 10/1/43, pp. 15-16.)
425	8768	Germany ...	*Operation of Motor Buses with Coal Gas (Uncompressed).* (A.T.Z., Vol. 45, No. 24, 25/12/42, p. 672.)
			Lubricating Oils.
426	8390	Brazil ...	*Vegetable Instead of Mineral Oils for Diesel Motors.* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 95.)
427	8393	U.S.A. ...	*Isoversion Process of Oil Refining (Catalytic).* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 108.)
428	8576	G.B. ...	*Aeration and Frothing of Lubricants (Tests on a Centrifugal De-Aerator).* (H. R. Mills, I.A.E. Report, No. 1,941-1,946, June, 1941.)
429	8577	G.B. ...	*Oil Cleaning and Deterioration of Lubricants in Service* (88 *Abstracts*). (I.A.E. Report, No. 1,941-1,947, July, 1941.)
430	8591	G.B. ...	*Reclaiming Used Lubricating Oil* (1930-1942). (Sci. Lib., Bibliog. Series, No. 583.)
431	8597	G.B. ...	*Quarterly Bibliography of Lubrication, No.* 38, *April-June*, 1942. (Science Lib., Bibliog. Series, No. 2.)
432	8606	U.S.A. ...	*Analysis of Used Lubricating Oil (Discussion).* (L. L. Davis, A.S.T.M. Bulletin, No. 119, Dec., 1942, pp. 17-19.)
433	8759	Germany ...	*The Lubrication of Gears, with Special Reference to Condition of Boundary Lubrication.* (A.T.Z., Vol. 46, No. 1, 10/1/43, p. 12.)
			Petrol Cans, Fuel Flow Meter.
434	8164	G.B. ...	*British Petrol Cans Under Criticism.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 48.)
435	8767	Germany ...	*Fully Automatic Fuel Flow Meter (Calibrated Tank Type).* (V. Schmidt, A.T.Z., Vol. 45, No. 24, 25/12/42, pp. 670-672.)
			Theory of Elasticity.
436	8155	G.B. ...	*Stress-Strain Relations in Timber Beams (Douglas Fir).* (A. G. H. Dietz, A.S.T.M. Bulletin, No. 118, Oct., 1942, pp. 19-27.)

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440	8191	U.S.A.	...	*Materials and Devices of Falling Resistance-Temperature Characteristic.* (R. W. Sillars, J. Sci. Instruments, Vol. 19, No. 6, June, 1942, pp. 81-84.)
442	8193	Germany	..	*Comparative Investigations on the Torsional Stiffness of an Automobile Engine Crankshaft.* (K. Haugh, A.T.Z., Vol. 43, No. 16, 25/8/40, pp. 493-502.)
443	8194	Germany	..	*Stress Determination of Crankshaft in the Critical Region Taking Damping into Account.* (J. Geiger, A.T.Z., Vol. 43, No. 16, 25/8/40, pp. 403-406.)
444	8197	G.B. ...	...	*Classification of Rheological Properties of Industrial Materials in the Light of Power-Law Relations between Stress, Strain and Time.* (G. W. Scott Blair, J. Sci. Instruments, Vol. 19, No. 6, June, 1942.)
445	8285	Germany	..	*Buckling Stresses for Cr.-Mo. 60 Steel Tubing (including Dimensions and Weight for a Given Load and Span).* (Flugsport, Vol. 35, No. 3, 3/2/43, pp. 36 a-b.)
446	8370	G.B. ...	...	*Force Required to Pull Out Metal Inserts Moulded in Various Moulding Compositions.* (A. Friedman and M. Cooke-Dallin, British Plastics, Vol. 14, No. 166, March, 1943, pp. 616 and 626.)
447	8407	G.B. ...	..	*The Problem of Combined Stress.* (J. J. Guest, Engineering, Vol. 155, No. 4,027, 19/3/43, p. 222.)
448	8488	G.B. ...	...	*Resilience of Beams and Springs.* (L. P. Dudley, Light Metals, Vol. 6, No. 61, Feb., 1943, pp. 80-86.)
449	8505	U.S.A.	..	*Strength Analysis of Riveted and Bolted Joints.* (W. A. McGowan, Aviation, Vol. 41, No. 5, May, 1942, pp. 105-112.)
450	8556	G.B. ...	...	*Approximate Theory of the Displacements Produced in Encastré Beams Due to Elasticity of the Supports.* (S. T. Newing, Phil. Mag., Vol. 34, No. 230, March, 1943, pp. 162-182.)
451	8565	G.B. ...	...	*Extreme Properties of Matter.* (C. G. Darwin, J. Inst. Civ. Engs., Vol. 19, No. 4, Feb., 1943, pp. 207-223.)
452	8569	G.B. ...	...	*Determination of the Buckling Loads of Struts with Successive Approximations.* (J. Ratzersdorfer, J. Roy. Aeron. Soc., Vol. 47, No. 387, March, 1943, pp. 103-105.)
453	8956	G.B. ...	...	*Swelling in Relation to Permeability of Organic Membrane.* (B. J. Brajnikoff, Plastics, Vol. 7, No. 71, April, 1943, pp. 173-184.)

Materials.

A. Properties.

Iron and Steel.

454	8325	G.B. ...	...	*Calibration of Thermo-Couples Over Liquid Steel Temperature Range.* (C. R. Barber, Engineering, Vol. 155, No. 4,025, 5/3/43, p. 187.)

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455	8345	G.B. ...	*Calibration of Thermo-Couple Over the Liquid Steel Temperature Range.* (C. R. Barber, Engineering, Vol. 155, No. 4,026, 12/3/43, p. 205.)
456	8347	G.B. ...	*Boron as a Steel Alloying Element.* (Engineering, Vol. 155, No. 4,026, 12/3/43, p. 210.)
457	8468	G.B. ...	*Examination of Sheet Metal of a Focke-Wulf* 190 *Recently Captured.* (A. McLeod, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,721-1,723.)
458	8535	U.S.A.	*Chromium Steels for Boiler Plants.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 10.)
459	8553	G.B. ...	*Recovery of Gilding Metal from Clad Steel.* (Metal Ind., Vol. 62, No. 13, 26/3/43, p. 201.)
460	8586	G.B. ...	*High Speed Steel* (1935 *to date*). (Sci. Lib., Bibliog. Series, No. 578.)
			Al. and Mg. Alloys.
461	8314	U.S.A.	*Magnesium Production in the U.S.A.* (Inter. Avia., No. 846, 30/11/42, pp. 11-12.)
462	8490	G.B. ...	*Mechanical Properties of Cu.-Mg.-Al. Alloys.* (Light Metals, Vol. 6, No. 61, Feb., 1943, pp. 101-104.)
463	8550	G.B. ..	*Aluminium and its Alloys in Marine Construction.* (C. O. Taylor, Metal Ind., Vol. 62, No. 13, 26/3/43, pp. 194-196.)
464	8555	G.B. ...	*The Hall Effect and Some Other Physical Constants of Alloys (Al. Silver Series, III).* (Handel Powell and E. J. Evans, Phil. Mag., Vol. 34, No. 230, March, 1943, pp. 145-161.)
465	8765	Germany	*Reduction in the Number of Al. Alloy Specifications.* (A.T.Z., Vol. 45, No. 24, 25/12/42, pp. 667-668.)
466	8766	Germany	*Application of Supersonics in Metallurgy (Tinning of Al. and Preparation of Bronze-Graphite Mixtures).* (A.T.Z., Vol. 45, No. 24, 25/12/42, p. 668.)
467	8866	G.B. ...	*Al. and its Alloys in Marine Construction.* (G. O. Taylor, Metal Industry, Vol. 62, No. 14, 2/4/43, pp. 214-217.)
468	8964	G.B. ...	*Magnesium.* (C. H. Desch, Engineering, Vol. 153, No. 4,029, 2/4/43, pp. 265-266.)
			Non-Ferrous Alloys.
469	8200	G.B. ...	*A Heavy Duty Contact Material (Elkonite D.* 56*) (Silver Nickel).* (Mallory, Ltd., J. Scientific Instruments, Vol. 19, No. 6, June, 1942, p. 94.)
470	8387	U.S.A.	*Ductile Tungsten.* (L. A. Hawkins, Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, pp. 89-90.)
471	8478	G.B. ...	*Fabrication of Beryllium-Copper Sheet and Strip.* (L. B. Hunt, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,697-1,705.)
472	8563	G.B. ...	*Abstracts on Non-Ferrous Alloys.* (Nickel Bulletin, Vol. 15, No. 19, Oct., 1942.)
473	8605	U.S.A.	*Bibliography of Silicon Bronze.* (A.S.T.M. Bulletin, No. 119, Dec., 1942, pp. 31-35.)

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474	8713	Germany	...	*New German Alloy.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
475	8861	Germany	...	*Silver-Manganese Alloys for Electric Resistances.* (A. Schulze, Z. fur Instrum., Vol. 62, No. 9, Sept., 1942, pp. 302-303.)
476	8966	G.B. ...	...	*Copper Containing Se, Te and Bi.* (G. L. Bailey and A. P. C. Hallowes, Engineering, Vol. 153, No. 4,029, 2/4/43, p. 276.)
				Bearing Materials.
477	8762	Germany	...	*Systematic Tests on the Suitability of Bearing Materials.* (E. Heidbrock, A.T.Z., Vol. 45, No. 24, 25/12/42, pp. 652-656.)
478	8769	Germany	...	*Substitute Bearing Alloys in the U.S.A.* (A.T.Z., Vol. 45, No. 24, 25/12/42, pp. 665-667.)
				Plastics.
479	8278	U.S.A.	...	*Cementing Lucite.* (Aero Digest, Vol. 41, No. 6, Dec., 1942, p. 249.)
480	8312	U.S.A.	...	*Moulded Laminated Paper Plastic for Aircraft (McDonnel Aircraft).* (Inter. Avia., No. 846, 30/11/42, pp. 10-11.)
481	8334	G.B. ...	...	*"Bubblfil" Substitute for Kapok.* (Plastics, Vol. 7, No. 70, March, 1943, p. 96.)
482	8335	G.B. ...	...	*Plastic Film and Sheet for Small Coil Insulation.* (E. E. Halls, Plastics, Vol. 7, No. 70, March, 1943, pp. 109-121.)
483	8357	U.S.A.	...	*"Bubblfil" to Replace Kapok in Life Jackets, etc.* (Ind. and Eng. Chem. (Ind. Ed.), Vol. 35, No. 1, Jan., 1943, p. 10.)
484	8368	G.B. ...	...	*Transition Temperature and Cubic Expansion of Plastics Materials.* (F. E. Wiley, British Plastics, Vol. 14, No. 166, March, 1943, pp. 617-624.)
485	8372	G.B. ...	...	*Development of Cellulose Acetate Plastics.* (British Plastics, Vol. 14, No. 166, March, 1943, pp. 602-604.)
486	8373	G.B. ...	...	*New Uses for Plastics (Pump Handles, etc.).* (British Plastics, Vol. 14, No. 166, March, 1943, pp. 598-599.)
487	8375	G.B. ...	...	*Plastics Permanently Used for Aircraft Parts.* (British Plastics, Vol. 14, No. 166, March, 1943, pp. 595-596.)
488	8376	G.B. ...	...	*Tenite, Cellulose Plastic Used in the Manufacture of Nozzle Jets (Fire Fighting).* (British Plastics, Vol. 14, No. 166, March, 1943, p. 594.)
489	8377	G.B. ...	...	*Celluloid for Plastics Surgery.* (British Plastics, Vol. 14, No. 166, March, 1943, p. 593.)
490	8378	G.B. ...	...	*Plastics Dies Used in Aircraft Plants.* (British Plastics, Vol. 14, No. 166, March, 1943, p. 590.)
491	8379	G.B. ...	...	*Lumarith Transparent Aircraft Plastic Prevents Sunburn.* (British Plastics, Vol. 14, No. 166, March, 1943, p. 590.)
492	8384	U.S.A.	...	*Raw Materials for Plastics Manufacture.* (R. H. Ball, Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, pp. 73-76.)

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493	8395	U.S.A. ...	*Nylon as a War Material.* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 121.)
494	8411	G.B.	*Applications of Plastic Materials.* (Engineering, Vol. 155, No. 4,027, 19/3/43, pp. 235-236.)
495	8448	U.S.A. ...	*Peace Time Values from a War Technology (Plastics, Rubber, Drugs, etc.).* (G. Egloff, Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, pp. 141-149.)
496	8453	Germany ...	*Leather Substitutes in Germany.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 165.)
497	8456	U.S.A. ...	*Laminated Plastics.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, pp. 176-177.)
498	8484	G.B.	*Some Recent Advances in Industrial Plastics.* (W. G. Wearmouth, J. Scientific Instruments, Vol. 19, No. 9, Sept., 1942, pp. 129-136.)
499	8495	G.B.	*Plastics in Radio Production.* (J. Inst. Elect. Eng., Vol. 9, Pt. 3, No. 9, March, 1943, p. 26.)
500	8502	U.S.A. ...	*Working Transparent Plastics for Aircraft Installations.* (J. Sasso, Aviation, Vol. 41, No. 5, May, 1942, pp. 86-95.)
501	8539	U.S.A. ...	*Scabbard for Bayonet Made of Plastic* . (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 26.)
502	8545	U.S.A. ...	*Plastic Wear-Resisting Mallet.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 39.)
503	8603	U.S.A. ...	*Acid and Alkali Resistance of Plastics.* (J. Delmonte, A.S.T.M. Bulletin, No. 119, Dec., 1942, pp. 11-15.)
504	8650	U.S.A. ...	*Lignin, Electrical Insulating Plastic.* (Rev. Scient. Insts., Vol. 14, No. 1, Jan., 1943, p. 26.)
505	8823	G.B.	*Plastics, Abstracts of Literature issued by Controller of Chemical Research.* (No. 42, Feb., 1943.)
506	8836	G.B.	*Resistoflex (Resilient Plastic).* (Machinist, Vol. 86, No. 42, 30/1/43, p. 1,154.)
507	8928	G.B.	*Thermo Plastic Replaces Iron Pipe.* (Machinery, Vol. 62, No. 1,583, 11/2/43, p. 149.)
508	8950	G.B.	*Plastics for Gears.* (D. W. Brown, Plastics, Vol. 7, No. 71, April, 1943, pp. 143-150.)
509	8951	G.B.	*Classification of Plastics.* (H. W. Stevens, Plastics, Vol. 7, No. 71, April, 1943, pp. 152-153.)
510	8953	U.S.A. ...	*Saran Tubing (Dow Chemical Company).* (Plastics, Vol. 7, No. 71, April, 1943, p. 159.)
511	8954	G.B.	*Plastic Film and Sheet for Small Coil Insulation.* (E. E. Halls, Plastics, Vol. 7, No. 71, April, 1943, pp. 162-170.)
512	8955	G.B.	*Spraying of Plastic.* (Plastics, Vol. 7, No. 71, April, 1943, p. 170.)
			Rubber (including Synthetic).
513	8156	Canada ...	*Synthetic Rubber from Petroleum in Canada.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, p. 29.)
514	8173	Sweden and Roumania ...	*Synthetic Rubber in Sweden and Roumania.* (Inter. Avia., No. 847, 10/12/42, p. 18.)
515	8258	U.S.A. ...	*Cold Resisting Synthetic Rubber.* (P. A. Anderson, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 184 and 279.)

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516	8328	G.B. ...	... *Development of Rubber Production.* (Engineering, Vol. 155, No. 4,025, 5/3/43, p. 193.)
517	8337	G.B. ...	... *Rubber—Natural and Synthetic.* (S. S. Pickles, Plastics, Vol. 7, No. 70, March, 1943, p. 127.)
518	8356	U.S.A.	... *Measurement of Density of Synthetic Rubbers.* (L. A. Wood and others, J. Res. Bur. of Stands., Vol. 29, No. 6, Dec., 1942, pp. 391-396.)
519	8367	G.B. ...	... *Synthetic Rubber from Soya Beans—"Agripol."* (British Plastics, Vol. 14, No. 166, March, 1943, p. 589.)
520	8374	G.B. ...	... *Synthetic Rubber Brings Improved Characteristics.* (British Plastics, Vol. 14, No. 166, March, 1943, p. 596.)
521	8392	U.S.A.	... *Rubber from Russian Dandelion (Planted in New Jersey).* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 102.)
522	8394	U.S.A.	... *Agripol Synthetic Rubber from Soya Beans.* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 108.)
523	8460	U.S.A.	... *Butadene from Grain Alcohol.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 187.)
524	8461	U.S.A.	... *Rubber from Quayule Crops.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 187.)
525	8462	U.S.A.	... *Neopol (Synthetic Rubber) from Vegetable Oils.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 187.)
526	8463	Mexico	... *Rubber from Mexican Plantations.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/3/43, p. 187.)
527	8476	G.B. ...	... *Rubber Mouldings with a Felt Cord.* (Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, p. 1,674.)
528	8534	U.S.A.	... *Vinyl Acetal Replaces Rubber in Fabrics.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, pp. 9-10.)
529	8919	G.B. ...	... *Soft Plastic as a Rubber Substitute (Ethyl Cellulose).* (Machinery, Vol. 62, No. 1,584, 18/2/43, p. 186.)
			Glass, Ceramics and Diamonds.
530	8198	G.B. ...	... *New Optical Glasses.* (Kodak, Ltd., J. Scientific Instruments, Vol. 19, No. 6, June, 1942, p. 94.)
531	8331	G.B. ...	... *Dielectric or Puncture strength of Porcelain and other Ceramic Materials.* (E. Rosenthal, Electronic Engineering, Vol. 15, No. 181, 8/3/43, pp. 408-411.)
532	8391	Denmark	... *New Glass Insulating Material.* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/42, p. 96.)
533	8446	U.S.A.	... *Sanding Plexiglass Bomber Nose.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 349.)
534	8537	U.S.A.	... *Added Uses of Ceramics in Wartime.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, pp. 27-28.)
535	8538	U.S.A.	... *Wartime Uses of Glass.* (R. A. Miller, Sci. Am., Vol. 168, No. 1, Jan., 1943, pp. 22-24.)
536	8544	U.S.A.	... *"Glasholm" Flexible Heating Elements.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 37.)

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537	8859	Germany ...	*Modern Methods for Cutting Diamonds (including Drilling and Polishing).* (W. Dawihl and O. Fritsch, Z.V.D.I., Vol. 85, No. 11, 15/3/41, pp. 265-268.)
538	8862	G.B.	*Glass to Replace Steel in Gauges for Inspection Work.* (Engineer, Vol. 175, No. 4,551, 2/4/43, pp. 273-275.)
			Resins (including Synthetic).
540	8336	G.B.	*Resin Laminated Densified Wood.* (A. E. L. Jervis, Plastics, Vol. 7, No. 70, March, 1943, pp. 122-127.)
541	8338	G.B.	*Resinoids and Other Plastics as Film Formers.* (B. J. Brajmkoff, Plastics, Vol. 7, No. 70, March, 1943, pp. 131-138.)
542	8366	G.B.	*Synthetic Resin Dispersions and Their Use as Substitutes for Latex.* (C. M. Jackson, British Plastics, Vol. 14, No. 166, March, 1943, pp. 577-582.)
543	8389	Brazil ...	*Resin Produced from a Climbing Plant (Rosinliana).* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 95.)
544	8444	U.S.A. ...	*Phenolic Casting Resin.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 340.)
			B. Fabrication.
			Welding.
545	8224	G.B.	*Semi-Automatic Deck Welder ("Murex").* (Engineering, Vol. 155, No. 4,025, 5/3/43, p. 186.)
546	8339	G.B.	*Welding of Thermo-Plastics.* (Henning, Plastics, Vol. 7, No. 70, March, 1943, pp. 97-102.)
547	8353	G.B.	*Spot Welding of Al. Alloys.* (Metal Industry, Vol. 62, No. 11, 12/8/42, pp. 168-169.)
548	8354	G.B.	*Arc Welding Machine.* (Metal Industry, Vol. 62, No. 11, 12/8/42, pp. 171-172.)
549	8364	G.B.	*Surface Preparation of Al. Alloys for Spot Welding.* (Metal Industry, Vol. 62, No. 12, 19/3/43, pp. 184-185.)
550	8466	G.B.	*Welding and Cutting Equipment.* (H. Ullmer, Sheet Metal Industries, Vol. 17, No. 189, Jan., 1943, pp. 131-135.)
551	8467	G.B.	*Resistance Welding Machine.* (Sheet Metal Industries, Vol. 17, No. 189, Jan., 1943, p. 136.)
552	8470	G.B.	*Stud Welding.* (J. W. Macfarlane, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,729-1,733.)
553	8472	G.B.	*Effect of Grain Size on Weldability.* (Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, p. 1,737.)
554	8473	G.B.	*Light Alloy Resistance Welding in Aircraft Construction.* (*R.T.P. Translation No.* 1,344.) (R. Schnarg, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,738-1,741.)

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555	8475	G.B. ...	... *Repair and Maintenance by Modern Scientific Welding Processes.* (C. W. Brett, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,743-1,746.)
556	8491	G.B. ...	... *Arc Welding and War Productions.* (Prod. and Eng. Bull., Vol. 2, No. 3, Dec., 1942, pp. 131-138.)
557	8492	G.B. ...	... *Methods of Improving Arc Welding Production.* (Prod. and Eng. Bull., Vol. 2, No. 3, Dec., 1942, pp. 99-102.)
558	8524	G.B. ...	... *Report of the Welding Sub-Committee of I.P.E.* (J. Inst. Prod. Engs., Vol. 21, No. 12, Dec., 1942, pp. 491-516.)
559	8562	G.B. ...	... *Technique for the Gas Welding of Rolled Al. and Al. Alloy Castings.* (Welding Research Council Report, No. 229, July, 1942.)
560	8814	G.B. ...	... *Welding Applied to Jigs and Tools.* (Prod. and Eng. Bull., Vol. 2, No. 2, Nov., 1942, pp. 87-91.)
561	8832	G.B. ...	... *Arc Welding (Photographs).* (Machinist, Vol. 86, No. 40, 16/1/42, pp. 1,081-1,082.)
562	8909	Germany	... *Bibliography of Published Information on German Welding Practice.* (1, Welding—General; 2, Welding of Iron and Steel; 3, Welding of Light Alloys; 4, Gas Welding; 5, Electric Welding; 6, Arc Welding; 7, Spot Welding; 8, Testing of Welds.) (R.T.P.3, Bibliography No. 84, March, 1943, Issued by the Ministry of Aircraft Production.)
563	8952	Germany	... *Welding of Thermo-Plastics (from the German).* (Plastics, Vol. 7, No. 71, April, 1943, pp. 154-158.)

Grinding, Machining, Surface Finishing.

564	8266	U.S.A.	... *Machining Lucite (Handling Technique).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 194-195.)
565	8341	G.B. ...	... *Pipe Flange Grinding Machine.* (Engineer, Vol. 175, No. 4,548, 12/3/43, p. 217.)
566	8346	G.B. ...	... *Pipe Flange Grinding Machine.* (Engineering, Vol. 155, No. 4,026, 12/3/43, p. 207.)
567	8350	G.B. ...	... *Some Aspects of Machining.* (A. Behr, Metal Industry, Vol. 62, No. 11, 12/3/43, pp. 162-165.)
568	8474	U.S.A.	... *A New Surface Finishing Process.* (Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, p. 1,742.)
569	8589	G.B. ...	... *Thread Grinding (1930 to date).* (Sci. Lib., Bibliog. Series, No. 581.)
570	8666	G.B. ...	... *Grinding Closely Pitched Serrations on Form Tool.* (A. Scott, Machinist, Vol. 86, No. 83, 28/11/42, p. 210.)
571	8834	G.B. ...	... *Finishing of Sprayed Metals.* (W. C. Reid, Machinist, Vol. 86, No. 40, 16/1/43, pp. 1,084-1,087.)
572	8913	G.B. ...	... *Grinding Wheel Grits, Grades and Bonds.* (Machinery, Vol. 62, No. 1,586, 4/3/43, pp. 241-242.)

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573	8915	G.B. ...	... *Grinding Delors Stellite Tools.* (Machinery, Vol. 62, No. 1,587, 11/3/43, pp. 268-269.)
			Electro-Plating, Anti-Corrosion Coatings, etc.
574	8330	G.B. ...	... *Boiler Tube Corrosion Detector.* (Metro. Vickers, Engineering, Vol. 155, No. 4,025, 5/3/43, p. 200.)
575	8351	G.B. ...	... *Production of Patterns by Electro-Deposition.* (A. K. Laukel, Metal Industry, Vol. 62, No. 11, 12/8/43, pp. 165-166.)
576	8361	U.S.A.	... *Surface Active Agents Manufactured in America (Table).* (Ind. and Eng. Chem. (Ind. Ed.), Vol. 35, No. 1, Jan., 1943, pp. 126-130.)
577	8362	G.B. ...	... *New Methods for Examination of Corroded Metal—I—Qualitative Examination.* (F. A. Champion, Metal Industry, Vol. 62, No. 12, 19/3/42, pp. 178-181.)
578	8365	G.B. ...	... *Electro-Deposited Rust Proofing Coatings.* (H. Silman, Metal, Industry, Vol. 62, No. 12, 19/3/43, pp. 186-188.)
579	8388	G.B. ...	... *Corrosion Prevention of Mg. Alloys.* (Ind. and Eng. Chem., Vol. 2, No. 2, 25/1/43, p. 94.)
580	8464	G.B. ...	... *Methods of Measuring Thickness and Porosity of Metallic Coatings (Magnetic, etc.).* (A. Brenner, Sheet Metal Industries, Vol. 17, No. 189, Jan., 1943, pp. 81-84.)
581	8465	G.B. ...	... *Zinc Plating.* (W. Eckert, Sheet Metal Industries, Vol. 17, No. 189, Jan., 1943, pp. 109-110 and 114.)
582	8469	G.B. ...	... *The Causes of Fishscaling.* (W. W. Higgins, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,724-1,726.)
583	8471	G.B. ...	... *The Elimination of Oxide Films.* (Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, p. 1,737.)
584	8552	G.B. ...	... *New Methods for Examination of Corroded Metal (Quantitative).* (F. A. Champion, Metal Industry, Vol. 62, No. 13, 26/3/43, pp. 202-204.)
585	8554	G.B. ...	... *Metal Cleaning in Wartime.* (Metal Industry, Vol. 62, No. 13, 26/3/43, pp. 199-200.)
586	8558	G.B. ...	... *Reclamation of Worn Parts of Road Motor Vehicles (Metal Spraying, Oxyacetylene Welding, etc.).* (Engineer, Vol. 155, No. 4,550, 26/3/43, pp. 255-256.)
587	8837	G.B. ...	... *Measuring Thickness of Plating on Steel Parts (Magnetic Induction of Air Gap).* (E. S. Gallagher, Machinist, Vol. 86, No. 42, 30/1/43, pp. 1,155-1,161.)
588	8864	G.B. ...	... *Electro-Deposited Rustproofing Coatings.* (H. Silman, Metal Industry, Vol. 62, No. 14, 2/4/43, p. 220.)
589	8865	G.B. ...	... *Process Lines for Electrolytic Tinplate.* (J. Raymond Erbe, Metal Industry, Vol. 62, No. 14, 2/4/43, p. 218.)

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590	8867	G.B. ...	... *Coatings for Cores and Moulds.* (J. A. Ridderhof, Metal Industry, Vol. 62, No. 14, 2/4/43, pp. 210-212.)
591	8922	G.B. ...	... *Electro-Plating of Non-Conducting Materials (Acheson Process).* (Machinery, Vol. 62, No. 1,585, 25/2/43, p. 210.)
592	8533	U.S.A.	... *Recent Developments in Tin-Plating.* (A. P. Peck, Sci. Am. Vol. 168, No. 1, Jan., 1943, pp. 7-9.)
			Heat Treatment and Hardening.
593	8531	G.B. ...	... *Heat Treatment (with Discussion).* (D. C. Harris, J. Inst. Prod. Engs., Vol. 21, No. 9, Sept., 1942, pp. 345-362.)
594	8543	U.S.A.	... *Heat Treating Steel.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 29.)
595	8551	G.B. ...	... *Hardness Changes Accompanying the Ordering of Beta Brass.* (C. S. Smith, Metal Ind., Vol. 62, No. 13, 26/3/43, pp. 197-198.)
596	8758	Germany	... *Single or Double Hardening for Motor Car Transmission Gear Wheels made of Case Hardening Steel.* (H. Glaubitz, A.T.Z., Vol. 46, No. 1, 10/1/43, pp. 9-12.)
597	8830	G.B. ...	... *How to Use Hardness Tests.* (T. H. Gray, Machinist, Vol. 86, No. 40, 16/1/43, pp. 1,075-1,078.)
598	8931	G.B. ...	... *Case Hardening of Steel.* (Machinery, Vol. 62, No. 1,583, 11/2/43, pp. 152-156.)
599	8833	G.B. ...	... *Flame Hardening with Coal Gas (Automatic Set Ups).* (R. F. Apter and H. W. Smith, Machinist, Vol. 86, No. 40, 16/1/43, pp. 1,088-1,090.)
			Drawing, Bonderising and Etching.
600	8341	G.B. ...	... *New Method of Etching on Metals.* (Engineer, Vol. 175, No. 4,548, 12/3/43, p. 217.)
601	8369	G.B. ...	... *Improving the Mould Drawing.* (British Plastics, Vol. 14, No. 166, March, 1943, pp. 607-615.)
602	8573	G.B. ...	... *Deep Drawing Research, Review of Available Literature.* (H. W. Swift, I.A.E. Report, No. 1,941-1,943, April, 1941.)
603	8574	G.B. ...	... *Deep Drawing Research at Sheffield University.* (H. W. Swift, I.A.E. Report, No. 1,941-1,944, April, 1941.)
604	8596	G.B. ...	... *Bonderising.* (Sci. Lib., Bibliog. Series, No. 577.)
			Powder Metallurgy.
605	8355	G.B. ...	... *Powder Metallurgy in America (Methods).* (Metal Industry, Vol. 62, No. 11, 12/3/43, p. 172.)
606	8408	G.B. ...	... *Powder Metallurgy.* (W. D. Jones, Engineering, Vol. 155, No. 4,027, 19/3/43, p. 224.)
607	8425	U.S.A.	... *Powder Metallurgy.* (F. M. Reck, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 170-174.)
608	8725	G.B. ...	... *Powder Metallurgy.* (W. D. Jones, Engineering, Vol. 155, No. 4,028, 26/3/42, pp. 244-245.)
609	8923	G.B. ...	... *Application of Powder Metallurgy.* (W. D. Jones, Machinery, Vol. 62, No. 1,585, 25/2/43, p. 219.)

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			Castings.
610	8363	G.B. ...	... *Foundry Technique for Pressure Castings.* (F. Dunleary, Metal Industry, Vol. 62, No. 12, 19/3/43, pp. 182-183.)
611	8523	G.B. ...	... *Production of Steel Castings (with Discussion).* (F. W. Roe, J. Inst. Prod. Engs., Vol. 21, No. 12, Dec., 1942, pp. 469-490.)
612	8724	G.B. ...	... *Rotary Furnace for Steel Castings.* (F. A. Lemon and H. O'Neil, Engineering, Vol. 155, No. 4,028, 26/3/43, pp. 257-260.)
613	8968	G.B. ...	... *Production of Rotary Furnaces of Steel for Castings.* (F. A. Lemon and H. O'Neil, Engineering, Vol. 153, No. 4,029, 2/4/43, pp. 279-280.)
			Dies, Extrusion and Stamping.
614	8479	G.B. ...	... *Brazed Strippers Lengthens Life of Metal Stamping Dies.* (Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, p. 1,710.)
615	8924	G.B. ...	... *Die Cast Zip Fasteners (Zinc Alloy).* (Machinery, Vol. 62, No. 1,585, 25/2/43, p. 219.)
			C. Inspection.
			Machines and Machine Tools.
616	8182	Germany	... *The Dynamics of Machine Tools (with Extensive Bibliography).* (W. Schmidt, Z.V.D.I., Vol. 85, No. 11, 15/3/41, pp. 249-258.)
617	8199	G.B. ...	... *Jig Borer Microscope.* (E. R. Watts, Ltd., J. Scientific Instrum., Vol. 19, No. 6, June, 1942, p. 94.)
618	8343	G.B. ...	... *Some Textile Finishing Machines.* (K. S. Laurie, Engineer, Vol. 175, No. 4,548, 12/3/43, pp. 218-220.)
619	8348	G.B. ...	... *Textile Finishing Machines.* (K. S. Laurie, Engineering, Vol. 158, No. 4,026, 12/3/43, pp. 218-220.)
620	8412	G.B. ...	... *Textile Finishing Machines.* (K. S. Laurie, Engineering, Vol. 155, No. 4,027, 19/3/43, pp. 237-240.)
621	8413	G.B. ...	... *Recent Developments of Carbide-Tipped Tools.* (Engineering, Vol. 155, No. 4,027, 19/3/43, p. 236.)
622	8424	U.S.A.	... *Machine Tools Keeping the Pace.* (T. Burna, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 163-169.)
623	8445	U.S.A.	... *Speed-Designed Milling Machine.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 342-343.)
624	8481	G.B. ...	... *Universal Crack Detector.* (Metro. Vickers, J. Scientific Instruments, Vol. 19, No. 7, July, 1942, p. 109.)
625	8482	G.B. ...	... *New Electro-Mechanical Gauges for Measuring Strip.* (J. Scientific Insts., Vol. 19, No. 7, July, 1942, p. 111.)
626	8669	G.B. ...	... 3,000 *Ton Hydraulic Press will Bend Armour Plate.* (Machinist, Vol. 86, No. 83, 28/11/42, p. 854.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
627	8670	G.B. ...	... *Sheet Stretching Press to Replace Manually Operated Machines.* (Machinist, Vol. 86, No. 83, 28/11/42, p. 853.)
628	8757	Germany	... *Modern Machine Tools for the Manufacture of Motor Car Engines.* (J. Wullenhaupt, A.T.Z., Vol. 46, No. 1, 10/1/43, pp. 1-8.)
629	8813	G.B. ...	... *Bismuth Alloys in Press Tool Construction.* (Prod. and Eng. Bull., Vol. 2, No. 2, Nov., 1942, pp. 93-96.)
630	8835	G.B. ...	... *Close Tolerance Screw Threads (Wright Aeronautical Corp.).* (P. W. Brown, Machinist, Vol. 86, No. 42, 30/1/43, pp. 1,151-1,154.)
631	8839	G.B. ...	... *Gears and Gear Cutting.* (A. H. Candee, Machinist, Vol. 86, No. 42, 30/1/43, pp. 1,162-1,164.)
632	8916	G.B. ...	... *The Operation of the Frame Gauging System.* (Machinery, Vol. 62, No. 1,584, 18/2/43, pp. 169-173.)
633	8965	G.B. ...	... *"Creep" Process in Gear Cutting.* (Engineering, Vol. 153, No. 4,029, 2/4/43, p. 275.)
			Testing and Test Equipment.
634	8151	Germany	... *New Apparatus for the Non-Destructive Testing of Materials.* (Schweizerische Technische Zeitschrift, 1942, p. 562.)
635	8154	G.B. ...	... *The Electron Microscope and its Uses (Discussion).* (R. B. Barnes and C. J. Barton, A.S.T.M. Bulletin, No. 118, Oct., 1942, p. 12.)
636	8185	U.S.A.	... *A.S.T.M. Standards, Non-Metallic Materials (General).* (Am. Soc. for Testing Materials, Part III, 1942.)
637	8195	Germany	... *The Testing of Holes, Fundamental Considerations.* (Dr. Berndt, A.T.Z., Vol. 43, No. 16, 25/8/40, pp. 407-411.)
638	8360	U.S.A.	... *The Electron Microscope and Cellulose.* (R. B. Barnes and C. J. Burton, Ind. and Eng. Chem. (Ind. Ed.), Vol. 35, No. 1, Jan., 1943, pp. 120-125.)
639	8457	U.S.A.	... *Ultra-Violet Rays in Examination of Metallic Surfaces.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 182.)
640	8483	G.B. ...	... *Electro-Magnetic Induction Micrometers, with Metal Rectifiers.* (R. J. Cox, J. Scientific Instruments, Vol. 19, No. 8, Aug., 1942, pp. 117-120.)
641	8486	G.B. ...	... *Magnetic Material Testing, Using Cathode Ray Oscillograph with Electrostatic Diflexion only.* (K. Kreielsheimer, J. Scientific Insts., Vol. 19, No. 9, Sept., 1942, pp. 137-139.)
642	8487	G.B. ...	... *Cathode Sputtering and Vacuum Evaporation.* (Light Metals, Vol. 6, No. 61, Feb., 1943, pp. 56-79.)
643	8607	U.S.A.	... *Application of Rank Correlation to the Development of Testing Methods (Treatment of Non-Dimensional Qualitative Results).* (E. R. Schwarz and K. R. Fox, A.S.T.M. Bulletin, No. 119, Dec., 1942, pp. 21-24.)

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644	8726	G.B. ...	... *High Speed Cathode Ray Oscillography.* (Engineering, Vol. 155, No. 4,028, 26/3/43, pp. 241-242.)
645	8728	Germany	... *Bibliography of Published Information on Material Testing (German Work Covering the Period 1936-1943).* (1, Material Testing—General; 2, Fatigue; 3, Tensile Testing; 4, Creep; 5, Hardness; 6, Impact Strength; 7, Surface Finish; 8, Wear; 9, Magnetic Testing; 10, Radiographic Methods; 11, Chemical Methods; 12, Stress Optical Methods; 13, Electronic Methods; 14, Spectographic Analysis; 15, Acoustical Methods; 16, Statistical Methods.) (R.T.P.3, Bibliography No. 83, Issued by the Ministry of Aircraft Production, March, 1943.)
646	8961	G.B. ...	... *Solubility of Metals in Mercury (Digest).* (C. H. Prescott, Elect. Eng., Vol. 15, No. 182, April, 1943, p. 483.)

Instruments.

Flight.

647	8430	U.S.A.	... *Vultee Radio Flight Test Recorder.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, p. 201.)
648	8480	G.B. ...	... *Examination of German Aircraft Navigation Instruments.* (F. Postlethwaite, J. Scientific Insts., Vol. 19, No. 7, July, 1942, pp. 97-101.)
649	8546	U.S.A.	... *Portable Flight Recorder.* (A. Klemin, Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 41.)
650	8723	G.B. ...	... *Instructional Films on the Operation of Sperry Gyroscopic Instruments.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 317.)

Mathematical.

651	8234	Germany	... *Slide Rule for the Rapid Determination of Weight of Sheet Metals and Profile of Various Shapes.* (Flugsport, Vol. 35, No. 5, 3/3/43, p. 50.)
652	8590	G.B. ...	... *Reading List on Arithmetical Calculating Machines (1937 to Date).* (Sci. Lib., Bibliog. Series, No. 582.)
653	8652	U.S.A.	... *Micro Scale for Close Work on Aircraft, etc.* (Rev. of Scient. Insts., Vol. 14, Jan., 1943, p. 25.)

Miscellaneous.

655	8604	U.S.A.	... *An Electrical Contact Testing Machine.* (A. M. Sugge, A.S.T.M. Bulletin, No. 119, Dec., 1942, pp. 25-30.)
656	8649	U.S.A.	... *Accurate High Sensitivity Apiezon Oil Gauge.* (J. Bannon, Rev. Scient. Insts., Vol. 14, No. 1, Jan., 1943, pp. 6-10.)
657	8651	U.S.A.	... *Du Mont High Frequency Oscillograph.* (Rev. of Scient. Insts., Vol. 14, No. 1, Jan., 1942, p. 24.)

Production.

Organisation and Control.

658	8207	U.S.A.	... *American War Production.* (Inter. Avia., No. 847, 10/12/42, pp. 1-7.)

ITEM NO.	R.T.P. REF.			TITLE AND JOURNAL.
659	8208	U.S.A.	...	*American War Production.* (Inter. Avia., No. 848-849, 21/12/42, pp. 1-9.)
660	8277	U.S.A.	...	*U.S. Aircraft Missions to G.B. (Factory Survey).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 118-120, 243 and 300-307.)
661	8280	U.S.A.	...	*Performance Quality Control in Manufacture of Hydraulic Parts.* (H. A. Zimmerman, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 261-271.)
662	8302	U.S.A.	...	*S.A.E. Aeronautical Standards.* (Soc. of Automotive Eng. Inc., Nov. 1st, 1942.)
663	8426	U.S.A.	...	*Solving New Production Problems on Standard Automatic Machines.* (H. L. Pope, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 176-180.)
664	8427	G.B. ...	...	*Report of Research Dept. (Inst. Prod. Engs.).* (G. Schlesinger, Surface Finish, Jan., 1942.)
665	8443	U.S.A.	...	*Wartime Production Short Cuts.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 330-336.)
666	8449	U.S.A.	...	*Detroit Engaged on War Productions.* (R. B. Bennet, Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, pp. 153-156.)
667	8454	U.S.S.R.	...	*The Growth of Industry in the U.S.S.R.* (J. G. Tolpin, Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, pp. 166-169.)
668	8455	India	...	*Chemical Industrial Growth in India.* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 169.)
669	8493	G.B. ...	...	*Production Charts as Incentives to Increased Output.* (Prod. and Eng. Bull., Vol. 2, No. 3, Dec., 1942, pp. 115-118.)
670	8525	G.B. ...	...	*Memorandum on the Inspection and Control of Quality Spot Welds in Mild Steel. (Ministry of Supply Welding Memorandum, No. 8.)* (Enclosure.) (J. Inst. Prod. Eng., Vol. 21, No. 12, Dec., 1942.)
671	8529	G.B. ...	...	*Developments in Quality Control. (Technical Bulletin No. 17, I.P.E.)* (J. Inst. Prod. Eng., Vol. 21, No. 10, Oct., 1942.)
672	8532	G.B. ...	...	*Plant and Labour Utilisation (I.P.E.).* (J. Inst. Prod. Engs., Vol. 21, No. 9, Sept., 1942.)
673	8564	G.B. ...	...	*Accuracy in Machine Tools. (How to Measure and Maintain it.)* (G. Schlesinger, Research Dept., Inst. Prod. Engs., 17/11/42.)
674	8566	G.B. ...	...	*Acceptance Test Charts for Machine Tools, Pt. I.* (Prepared by Research Dept., Inst. Prod. Engs., March, 1940.)
675	8567	G.B. ...	...	*Acceptance Test Charts for Machine Tools (Part II).* (Prepared by Research Dept., Inst. Prod. Engs., Dec., 1941.)
676	8717	Japan	...	*Jap. Planning of Economic Resources.* (Flight, Vol. 43, No. 1,787, 25/3/43, p. 310.)
				Training and Education.
677	8232	Germany	...	*Women in Industry (Photo).* (Flugsport, Vol. 35, No. 5, 3/3/42, p. 55.)
678	8327	G.B. ...	...	*The Education and Training of Engineers.* (Engineering, Vol. 155, No. 4,025, 5/3/43, pp. 191-192.)

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679	8340	G.B. ...	*Education and Training of Engineers.* (Engineer, Vol. 175, No. 4,548, 12/3/43, pp. 207-208.)
680	8385	U.S.A.	*Women Chemists in Detroit War Production.* (H. I. Miner, Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, pp. 80-83.)
681	8386	G.B. ...	*Engineering Courses for Women in the U.S.A.* (Ind. and Eng. Chem., Vol. 21, No. 2, 25/1/43, p. 85.)
682	8421	U.S.A.	*Training Workers for Machine Tool Operation.* (J. W. Busman, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 116-125 and 254-256.)
			Methods (General).
683	8526	G.B. ...	*Precision Patterns for Sheet Metal Work. (Technical Bull., No. 19, I.P.E.)* (Enclosure.) (J. Inst. Prod. Engs., Vol. 21, No. 12, Dec., 1942.)
684	8536	U.S.A.	*"Tocco" Hardening Machine Speeds Production.* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 10.)
685	8732	U.S.A.	*The Vidal Process for Moulded Structures.* (E. E. Miller, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 124-127 and 299.)
686	8815	G.B. ...	*Broaches (Inspection and Reconditioning).* (Prod. and Eng., Bull., Vol. 2, No. 2, Nov., 1942, pp. 84-85.)
687	8917	G.B. ...	*Boring Mills for Tank Turret Production.* (Machinery, Vol. 62, No. 1,584, 18/2/43, pp. 178-181.)
			Methods (Aircraft).
688	8262	U.S.A.	*Bomber Fuselage Assembly at De Soto Works.* (F. M. Reck, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 188-192.)
689	8275	U.S.A.	*Gliders Built by Ford.* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 234 and 288-290.)
690	8420	U.S.A.	*Producing Aircraft Parts at the Aluminium Mill.* (M. H. Froelich, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 104-114.)
691	8435	U.S.A.	*Crating the Curtiss P. 40 for Export Shipment.* (Aero Digest, Vol. 42, No. 1, Jan. 1943, pp. 222-227 and 314-316.)
692	8436	U.S.A.	*Lofting Problems of Streamlined Bodies.* (C. M. Hartley and R. A. Liming, Aero Digest, Vol. 42, No. 1, pp. 234-240.)
693	8520	U.S.A.	*Beaufort at End of Assembly Line (Built in Australia) (Photo).* (Aviation, Vol. 41, No. 5, May, 1942, p. 222.)
694	8612	U.S.A.	*Ryan in Production on Navy Scout Plane S.O.R.-1.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 36.)
695	8622	G.B. ...	*Production of Sunderland II Flying Boats (Photos).* (Aeroplane, Vol. 64, No. 1,651, 15/1/43, p. 64.)
696	8730	U.S.A.	*Prefabricating Aircraft Parts at Reynolds.* (Aviation, Vol. 41, No. 10, Oct., 1942, pp. 108-113.)
697	8911	G.B. ...	*Avro Lancaster Production (Drawing and Stretching on Light Alloy Sections).* (Machinery, Vol. 62, No. 1,586, 4/3/43, pp. 225-232.)

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698	8914	G.B. ...	... *Sheet Metal Forming and Pipe Bending in the Production of Lancaster Bombers.* (Machinery, Vol. 62, No. 1,587, 11/3/43, pp. 262-266.)
699	8927	G.B. ...	... *Methods in the Production of Fighter Trainers.* (Machinery, Vol. 62, No. 1,582, 4/2/43, pp. 120-127.)
			Methods (Engines).
700	8429	U.S.A.	... *Mass Production of Allison Engine Parts.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 191-198.)
701	8434	U.S.A.	... *Machining "Cyclone" Cylinders.* (Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 219-220 and 317-318.)
702	8528	G.B. ...	... *Turbine Blade Production (with Discussion).* (J. Henderson, J. Inst. Prod. Engs., Vol. 21, No. 10, Oct., 1942, pp. 363-387.)
703	8912	G.B. ...	... *Operations on Magnesium Parts of Bomber Engines.* (Machinery, Vol. 62, No. 1,586, 4/3/43, pp. 236-242.)
704	8926	G.B. ...	... *Special Equipment in the Production of the Merlin Engine.* (Machinery, Vol. 62, No. 1,582, 4/2/43, pp. 113-117.)
			Methods (Guns and Explosives).
705	8668	G.B. ...	... *Production Operations on 37 mm. H.E. Shell.* (Machinist, Vol. 86, No. 83, 28/11/42, pp. 837-848.)
706	8918	G.B. ...	... *Production of Cartridge Links for Machine Guns.* (Machinery, Vol. 62, No. 1,584, 18/2/43, pp. 184-186.)
707	8921	G.B. ...	... *Production of 20 mm. Practice Shell for Aircraft Cannon.* (Machinery, Vol. 62, No. 1,585, 25/2/43, pp. 197-202.)
			Methods (Rivets, Gears).
708	8236	Germany	... *Steel Sheathed Light Alloy Rivets.* (*Pat. series No.* 49, *No.* 728,571). (Dornier, Flugsport, Vol. 35, No. 5, 3/3/43, p. 201.)
709	8329	G.B. ...	... *High-Speed Helical Gear Production.* (S. A. Couling, Engineer, Vol. 155, No. 4,025, 5/3/43, pp. 197-200.)
710	8477	G.B. ...	... *Rapid Production of Sheet Metal Drums.* (A. G. Arend, Sheet Metal Industries, Vol. 16, No. 187, Nov., 1942, pp. 1,674-1,677.)
711	8611	U.S.A.	... *Explosive Rivets Speed Aircraft Repairs.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 38.)
712	8844	Germany	... *Locking Nut for Holding Sheet Metal in Position Prior to Riveting.* (*Pat. series* 48, *No.* 728,722.) (Gottingen Al. Works, Flugsport, Vol. 35, No. 4, 17/2/43, p. 200.)
713	8845	Germany	... *Adjustable Lock-Nut for Glueing Operations.* (*Pat. series* 48, *No.* 729,521.) (Gotha, Flugsport, Vol. 35, No. 4, 17/2/43, p. 200.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Workers' Welfare.
714	8935	U.S.A. ...	*Industrial Illness Due to Tetryl. Report of 1,258 Cases. L. J. Witkowski and others, J. Amer. Med. Ass., Vol. 119, No. 17, Aug. 22nd, 1942, pp. 1,406-1,409.)* (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 412-413.)
715	8936	U.S.A. ...	*Silicosis Among Naval Foundrymen. (E. W. Brown and W. F. Klien, U.S. Nav. Med. Bull., Vol. 40, No. 1, Jan., 1942, pp. 42-52.)* (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 413-414.)
			Factory Ventilation, etc.
716	8274	U.S.A. ...	*Increasing Plant Illumination (White Cement Floors).* (Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 234 and 288-290.)
717	8503	U.S.A. ...	*Innovations in Aeroplane Plant Design.* (M. M. Valentine, Aviation, Vol. 41, No. 5, May, 1942, pp. 96-97 and 248.)
718	8735	U.S.A. ...	*New Shadowless Lighting in Aircraft Plant.* (Aviation, Vol. 41, No. 10, Oct., 1942, p. 144.)
719	8937	U.S.A. ...	*Industrial Ventilation in War: A Review. (T. Bedford, Bull. of Hygiene, Vol. 18, No. 2, Feb., 1943, pp. 91-100.)* (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 414.)
720	8967	G.B.	*Coal Fired Air Heaters for Workshops.* (Engineering, Vol. 153, No. 4,029, 2/4/43, pp. 277-278.)
			Scrap Salvage.
721	8352	G.B.	*Segregation of Scrap.* (Metal Industry, Vol. 62, No. 11, 12/3/43, p. 167.)
722	8403	G.B.	*Segregating Steel Scrap (Colour Aid).* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 240.)
723	8489	G.B.	*Keeping Down Scrap in the Foundry.* (Light Metals, Vol. 6, No. 61, Feb., 1943, pp. 90-95.)
724	8504	U.S.A. ...	*Conserving Aluminium Scrap.* (J. St. Peter, Aviation, Vol. 41, No. 5, May, 1942, pp. 99-101.)

Road Transport.

			Tractors, Tankers, Trailers, etc.
725	8160	Germany ...	*Germany's Submersible Oil Supply Tanker.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/42, p. 30.)
726	8161	G.B.	*Tanker of the Future.* (Petroleum Times, Vol. 47, No. 1,187, 23/1/43, pp. 32-35.)
727	8326	G.B.	*Cement Tipping Lorries.* (Engineering, Vol. 155, No. 4,025, 5/3/43, p. 190.)
728	8397	G.B.	*Tractor Bulldozer (Photo).* (Engineer, Vol. 175, No. 4,549, 19/3/43, p. 224.)
729	8452	U.S.A. ...	5,000 *Gallon Transport for Liquid Petroleum Gas (Photo).* (Ind. and Eng. Chem., Vol. 21, No. 3, 20/2/43, p. 188.)
730	8580	G.B.	*Vehicle Transmission (Collection of Abstracts).* (I.A.E. Report, No. 1,942-1,948.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
731	8614	U.S.A. ...	*Propeller Trailer Aids, Servicing and Storage of Propellers.* (Am. Av., Vol. 222, No. 10, 15/10/42, p. 35.)
732	8772	Germany ...	*Trailer for Uncompressed Coal Gas.* (A.T.Z., Vol. 45, No. 24, 25/12/42, p. 673.)
			Testing and Repair.
733	8578	G.B.	*Salvage and Repair of Worn and Broken Vehicle Parts.* (W. S. Stevenson, I.A.E. Report, No. 1,941-1,948, Sept., 1941.)
734	8575	G.B.	*Overheating of Tyres and Brakes (Lab. Measurements).* (P. V. Lamarque, I.A.E. Report, No. 1,941-1,945, June, 1941.)
735	8771	Germany ...	*The Testing of Brake Inserts (Road and Laboratory Tests).* (O. M. Ritter, A.T.Z., Vol. 45, No. 23, 10/12/42, pp. 634-640.)
736	8770	Germany ...	*Brakes and Their Testing (Drum Band Combinations).* (B. Koessler, A.T.Z., Vol. 45, No. 23, 10/12/42, pp. 629-634.)

Wireless and Electricity.

Wireless (General).

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
737	8196	G.B.	*A High Gain Audio-Frequency Amplifier for the Investigation of Weak Signals.* (E. A. Rowlands and W. Burns, J. Sci. Instruments, Vol. 19, No. 6, June, 1942, pp. 85-88.)
738	8311	U.S.A. ...	*Calculation of Ground-Wave Field Intensity Over a Finitely Conducting Spherical Earth.* (K. A. Norton, Procs. I.R.E., Vol. 30, No. 12, Dec., 1942, pp. 623-629.)
739	8313	U.S.A. ...	*An Ultra-High Frequency Two-Course Radio Range for Aircraft Use with Sector Identification.* (A. Alford and A. G. Kandoian, Procs. I.R.E., Vol. 30, No. 12, Dec., 1942, p. 664.)
740	8321	U.S.A. ...	*Analysis of the Signal-to-Noise Ratio of Ultra-High Frequency Receivers.* (E. W. Herold, Procs. I.R.E., Vol. 30, No. 12, Dec., 1942, p. 665.)
741	8322	U.S.A. ...	*Direction Finding at Medium High Frequencies and the United Air Lines Ground Stations Direction Finder.* (P. C. Landretta and E. P. Buckthal, Vol. 30, No. 12, Dec., 1942, p. 665.)
742	8332	G.B.	*Experimental Demonstrations for Radio Training Classes. II.—The Valve as an Amplifier.* (T. J. Dehfisch, Electronic Engineering, Vol. 15, No. 181, 8/3/43, pp. 426-429.)
743	8499	G.B.	*Some Problems in Transmission Line Design. (Abstract of Paper.)* (A. Burke, J. Inst. Elect. Engs., Vol. 90, Pt. 1, No. 27, March, 1943, pp. 137-139.)
744	8511	U.S.A. ...	*Aircraft Radio Shielding.* (Aviation, Vol. 41, No. 5, May, 1942, p. 177.)
745	8599	U.S.A. ...	*Operation of a Thyratron as a Rectifier.* (L. A. Ware, Procs. I.R.E., Vol. 30, No. 11, Nov., 1942, pp. 500-502.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
746	8602	U.S.A. ...	*Radiation from Antennas.* (S. A. Shelkanoff and C. B. Feldman, Procs. I.R.E., Vol. 30, No. 11, Nov., 1942, pp. 511-516.)
747	8639	G.B.	*Reduction in Band Width in Frequency Modulation Receivers.* (D. A. Bell, Wireless Engineer, Vol. 19, No. 230, Nov., 1942, pp. 497-502.)
748	8640	G.B.	*Harmonic Distortion in Audio-Frequency Transformers* (3). (N. Partridge, Wireless Engineer, Vol. 19, No. 230, Nov., 1942, pp. 503-507.)
749	8816	G.B.	*Wireless Engineer.* (Index Abstracts and References for 1942.)
750	8826	G.B.	*Wireless Engineer Abstracts and References. Compiled by Radio Research Board.* (March, 1943.)
751	8925	G.B.	*"Wireless Engineer" Abstracts and References.* (April, 1943.)
			Short Waves.
752	8496	G.B.	*Design of Ultra Short Wave Field-Strength Measuring Equipment.* (F. M. Colebrook and A. A. Gordon Smith, J. Inst. Elect. Engs., Vol. 90, Pt. III, No. 9, March, 1943, pp. 28-32.)
753	8494	G.B.	*Study of Propagation Over the Ultra Short Wave Radio Link Between Guernsey and England.* (R. L. Smith-Rose and A. C. Strickland, J. Inst. Elect. Engs., Vol. 90, Pt. 3, No. 9, March, 1943, pp. 12-24.)
			Electricity and Magnetism.
754	8309	U.S.A. ...	*Distortion Tests by the Intermodulation Method.* (J. K. Hilliard, Procs. I.R.E., Vol. 30, No. 12, Dec., 1943, pp. 614-620.)
755	8497	G.B.	*Determination of the Electrical Properties of Soil at a Wave-Length of 5 Metres.* (J. S. McPetrie and J. A. Saxton, J. Inst. Elect. Engs., Vol. 90, Pt. 3, No. 9, March, 1943, pp. 33-35.)
756	8498	G.B.	*Eddy-Current Losses in Single Conductor Paper-Insulated Lead-Covered Unarmoured Cables of a Single-Phase System. (Abstract of Paper.)* (A. H. M. Arnold, J. Inst. Elect. Engs., Vol. 90, Pt. 1, No. 27, March, 1943, pp. 136-137.)
757	8588	G.B.	*Magnetic and Electro Magnetic Clutches and Couplings* (1930 *to date*). (Sci. Lib., Bibliog. Series, No. 580.)
758	8598	U.S.A. ...	*Proposed Standard Conventions for Expressing Elastic and Piezo Electric Properties of Right and Left Quartz.* (W. G. Cady and K. S. van Dyke, Proc. I.R.E., Vol. 30, No. 11, Nov., 1942, pp. 495-499.)
759	8600	U.S.A. ...	*The Q Metre and its Theory (Reactance/Resistance).* (V. V. L., Rad. Proc., I.R.E., Vol. 30, No. 11, Nov., 1942, pp. 502-505.)
760	8601	U.S.A. ...	*Some Aspects of Coupled and Resonant Circuits.* (J. B. Sherman, Procs. I.R.E., Vol. 30, No. 11, Nov., 1942, pp. 505-510.)

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761	8638	G.B. ...	*Current Distribution Along a Straight Wire in a Uniform Field.* (C. W. O. Howe, Wireless Engineer, Vol. 19, No. 230, Nov., 1942, pp. 495-497.)
762	8764	Germany	*What are the Results of Freezing the Electrolyte in Accumulator Batteries?* (E. Bleich, A.T.Z., Vol. 45, No. 23, 10/12/42, pp. 641-645.)
763	8957	G.B. ...	*Amplifying and Recording Technique in Electro Biology (Special Reference to the Brain).* (G. Parr and W. G. Walter, Elect. Eng., Vol. 15, No. 182, April, 1943, pp. 462-464 and 469.)
764	8958	G.B. ...	*Analysis of Period Wave Forms—III.* (K. Browne, Elect. Eng., Vol. 15, No. 182, April, 1943, pp. 472-474.)
765	8959	G.B. ...	*A Differential Electronic Stabiliser for Alternating Voltages (Digest).* (A. Glyne, Elect. Eng., Vol. 15, No. 182, April, 1943, pp. 482-483.)
766	8960	G.B. ...	*Electrical Strength of Freon-Nitrogen Mixtures.* (Elect. Eng., Vol. 15, No. 182, April, 1943, p. 483.)
767	8962	G.B. ...	*The Mechanism of Insulation Breakdown.* (T. F. Wall, Engineering, Vol. 153, No. 4,029, 2/4/43, pp. 261-262.)

Heat and Light.

Induction Heating, Flame Temperature, etc.

768	8184	Germany	*The Calculation of Flame Temperatures.* (J. C. Breinl and W. Lenz, Z.V.D.I., Vol. 85, No. 15, 15/3/41, pp. 259-264.)
769	8422	U.S.A.	*The Design of Cross-Flow Heat Exchangers.* (P. A. Scharer, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 138-146, 251-254.)
770	8831	G.B. ...	*New Uses in Induction Heating.* (R. Legrand, Machinist, Vol. 86, No. 40, 16/1/43, pp. 1,079-1,081.)
771	8838	G.B. ...	*New Uses of Inductive Heating.* (R. Legrand, Machinist, Vol. 86, No. 42, 30/1/43, pp. 1,158-1,161.)
772	8860	Germany	*Thermometer Lag for Sudden, Periodic and Linear Temperature Variation.* (E. Eckert, Z.V.D.I., Vol. 85, No. 11, 15/3/41, pp. 272-273.)

Black Light, Infra Red Rays.

773	8542	U.S.A.	*Map Reading by Invisible (Black Light).* (Sci. Am., Vol. 168, No. 1, Jan., 1943, p. 29.)
774	8920	G.B. ...	*Infra Red Lamp Heating.* (F. E. Rowland, Machinery, Vol. 62, No. 1,584, 18/2/42, pp. 187-188.)

Meteorology.

(Thunderstorms, Vapour Trails, etc.)

775	8221	G.B. ...	*Location of Thunderstorms by Radio Methods.* (Nature, Vol. 151, No. 3,827, 6/3/43, pp. 285-286.)
776	8729	U.S.A.	*Meteorological Characteristics of Thunderstorms.* (G. N. Brancato, Aviation, Vol. 41, No. 10, Oct., 1942, pp. 101-103, 292, 295, 299.)

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777	8257	U.S.A. ...	*The Stars for December.* (W. C. Youngclaus, Aero Digest, Vol. 41, No. 6, Dec., 1942, pp. 102-108 and 392.)
778	8829	Germany ...	*Approximate Vapour Pressure Calculations.* (J. Esser, Z.G.S.S., Vol. 38, No. 1, Jan., 1943, pp. 7-10.)

Physiology.

(Altitude Testing, etc.)

779	8225	Germany ...	*Research Institute of Aeronautical Medicine, Directed by German Air Ministry.* (Inter. Avia., No. 851, 12/1/43, p. 13.)
780	8333	G.B.	*The Encephalophone (for Observing the Potentials of the Human Brain).* (C. A. Beerers and R. Furth, Electronic Engineering, Vol. 15, No. 181, 8/3/43, pp. 426-429.)
781	8416	U.S.A. ...	*Oxygen Makes the Flier.* (F. Fupper, Aero Digest, Vol. 42, No. 1, Jan., 1943, pp. 88-90 and 256.)
782	8485	G.B.	*Portable Apparatus for Continuous Intravenous Anæsthesia or Blood Transfusion.* (A. L. Sims and Sq. Ldr. B. Lucas, J. Scientific Instruments, Vol. 19, No. 9, Sept., 1942, pp. 136-137.)
783	8803	G.B.	*Night Blindness.* (J. Barnet, Aeronautics, Vol. 8, No. 1, Feb., 1943, pp. 75-76.)
784	8932	Germany ...	*Stereoscopic Vision of Moving Objects.* (R. Kilches, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 119-126.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 412.)
785	8933	U.S.A. ...	*The Relation Between Dark Adaptation and the Level of Vitamin A in the Blood.* (C. Haig and A. J. Patck, J. Clinic Investigation, Vol. 21, No. 4, July, 1942, pp. 377-383.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 412.)
786	8934	France ...	*Effects of Sulphonamides in Airmen.* (G. F. Bonnett, Presse Med., 1942, Oct. 3, Vol. 50, No. 44, pp. 612-613.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 412.)
787	8938	Canada ...	*Aviation Med. in the Royal Canadian Air Force.* (G. E. Hall, J. Amer. Med. Ass., Vol. 119, No. 14, Aug. 1st, 1942, pp. 177-181.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 408-409.)
788	8939	Germany ...	*New Results and Problems in Medical Stratosphere Research.* (H. Strughold, Luftwissen, Vol. 9, No. 6, June, 1942, pp. 177-181.) (R.T.P. Transl. No. 1,637.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 409.)
789	8940	U.S.A. ...	*The Effect on the Vital Capacity of a Swift Ascent to a Simulated Altitude of 35,000 feet.* (M. Eckman and A. L. Barach, J. Av. Med., Vol. 13, No. 1, 1942, pp. 36-42.) (Bull. of War Med., Vol. 7, March, 1943, p. 409.)
790	8941	Germany ...	*Pathogenic Effect of Anoxia in High Altitude Sickness.* (F. Buchner, Klin. Woch., Vol. 21, No. 33, Aug. 15th, 1942, pp. 721-725.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 409-410.)

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791	8942	Germany	...	*Training for High Altitudes.* (H. v. Diringshofen and H. Lottig, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 52-66.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 410.)
792	8943	Germany	...	*A New Method of Improving Human Altitude Tolerance in the Decompression Chamber.* (W. Blasius and E. Bauereisen, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 67-82.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 410.)
793	8944	Germany	...	*Effects of Respiration of Pure Oxygen at Ground Level.* (E. Heck, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 105-113.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 410-411.)
794	8945	Germany	...	*The Effect of Breathing Oxygen at Normal Pressure on Performance.* (G. Lehmann and O. Grof, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 183-200.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 411.)
795	8946	Germany	...	*Investigations on Respiration of Low Ratio Oxygen-Nitrogen Mixture. Part I—Continuous Registration of Pulse Rate.* (W. Glock, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 201-212.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 411.)
796	8947	Germany	...	*The Determination of Altitude Tolerance by Respiration of Gas Mixtures.* (T. Benzinger and others, Luftfahrtmedizin, Vol. 6, No. 2-3, 1942, pp. 234-253.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 411.)
797	8948	U.S.A.	...	*The Rôle of the Adrenal Cortex in Acute Anoxia.* (R. A. Lewis and others, J. Clin. Investigation, Vol. 21, No. 1, Jan., 1942, pp. 33-46.) (Bull. of War Med., Vol. 3, No. 7, March, 1943, p. 411.)
798	8949	Germany	...	*The Position of the Respiratory Centre in the Arteriovenous CO_2 Gradient. (E. Heck and H. Loeschcke, Luftfahrtmedizin, Vol. 6, No. 2/3, 1942, pp. 183-200.)* (Bull. of War Med., Vol. 3, No. 7, March, 1943, pp. 410-411.)

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799	8183	Germany	...	*A Simple Method for Determining the c.g. of a Polygon.* (Z.V.D.I., Vol. 85, No. 15, 15/3/41, p. 258.)
800	8727	G.B. ...	...	*Coriolis Theorem.* (A. Block, Engineering, Vol. 155, No. 4,028, 26/3/42, pp. 242-243.)