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(Reviewed by R.T.P.3)

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ABSTRACTS FROM THE SCIENTIFIC AND TECHNICAL PRESS.

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(Prepared by R.T.P.3.)

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Notices and abstracts from the Scientific and Technical Press are prepared primarily for the information of Scientific and Technical Staffs. Particular attention is paid to the work carried out in foreign countries, on the assumption that the more accessible British work (for example that published by the Aeronautical Research Committee) is already known to these Staffs.

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NOTE.—As far as possible, the country of origin quoted in the items refers to the original source.

A Note on the Effect of Wind Tunnel Size on Pitching Moments. (Th. Troller, Kármán Anniversary Vol. of App. Mechanics, 1941, pp. 231-236.) (114/1 U.S.A.)

The main conclusions are:—

1. The effect of the wind tunnel dimensions on the pitching moment of large streamlined bodies can be of such magnitude as to impair seriously the value of such tests. An analytical method of finding correction factors is not available and appears difficult to obtain.

2. For pitching moment effects on wings spanning the whole stream a simple correction method can be given.

According to the existing aerodynamic theory on wind tunnel effects, there should be an additional curvature of the air stream existing at the position of the wing, caused by the restraining action of the dimensions of the finite air stream. The curvature is of such direction as to increase slightly the lift at a given angle of attack of the wing in a closed tunnel and to decrease the lift in an open air stream. We may assume that the corrective lift force acts at the half-chord point of the aerofoil and therefore has a moment about the quarter-chord point equal to $\Delta Lc/4$.

Test results for the three different conditions are given, and it is assumed that the tests in the variable-density tunnel of the N.A.C.A., due to the small dimension of the model relative to the tunnel diameter, require no wind tunnel correction on pitching moment. There is also given a theoretical curve for model and wind tunnel dimensions corresponding to the tests reported. This theoretical curve is obtained by assuming that a corrective pitching moment is due to Δc_L values as given below for various ratios of the chord to the closed wind tunnel cross section, c = wing chord, k = cross section of air stream.

c/k	0.1	0.2	0.3	0.4	0.5
$\Delta c_L c_L^{\infty}$	0.02	0.043	0.063	0.083	0.100

The corrective pitching moment coefficient is assumed to be equal to $\Delta c_m = -\Delta c_L/4$. The value Δc_m deduced from the curve for the test results in the variable-density tunnel gives the line marked "theoretical."

On applying the results reasonable agreement is obtained. Further refinements of the method are possible. For instance, by substituting for one bound vortex at the quarter-chord point of the wing two or more vortices distributed in a simple manner along the chord it might be possible to obtain better approximations for the wind tunnel correction of still larger wings in a not too complicated manner.

Condenser Scoop Design. (E. F. Hewins and J. R. Reilly, Society of Naval Architects and Marine Engineers. Transactions, Vol. 48, 1940, pp. 277-304.) (114/2 U.S.A.)

It is common practice in the case of high speed steam ships to obtain the necessary cooling water for the condenser by connecting a branch circuit to two holes in the ship's bottom.

The holes may be either at the same distance from the bow but displaced laterally, thus giving rise to an athwartship installation for the condensers, or the holes may be at different longitudinal distances. In either case the object is to produce the maximum possible dynamic head at entry combined with as great a suction head as possible at delivery. For this purpose the entry hole (usually of rectangular section) is connected to a lead-in pipe set at an angle of about 35 degrees with the ship's bottom and sloping towards the rear. This so-called inlet scoop does not project outside the hull. The outlet scoop on the other hand consists of a circular pipe placed at right angles to the hull and provided with a lip on its forward wall which projects into the water.

The author investigates this problem experimentally using an 8 ×8 in. channel passing about 3,000 gallons/minute.

The condenser circuit consisted of 2 in. circular piping with an outlet scoop of the same diameter whilst the rectangular section of the inlet scoop could be varied. This section is flared so as to join up smoothly with the circular pipe.

The flow through the condenser circuit was measured by means of orifice plates and could be varied between 0 and 60 gallons/minute, the maximum flow thus corresponding to only 3 per cent. of the flow in the main channel. Under these conditions, for any inlet scoop, the static head in the inlet pipe was constant for a given flow regardless of type of exit scoop employed. Similar results were obtained with the exit scoop. The two scoops thus act independently and their performance is investigated separately.

Whilst the static head in the outlet scoop increases steadily with the flow through the scoop, the static head in the inlet pipe, after a preliminary increase shows a sharp drop at higher rates of flow. This drop is due to eddy formation at the forward wall of the inlet and could not be prevented by the provision of guide vanes.

Removal of the slowly moving boundary layer by means of a small centrifugal pump was beneficial but led to a loss of about 10 per cent. in the flow. The relatively poor performance of both scoops is mainly due to the fact that they operate within the boundary layer, i.e. a region where there is very marked change in speed with distance from wall. The water filaments entering the scoop have thus very different energy contents and very complicated flow results.

As a result of mixing losses only about 50 per cent. of the free stream dynamic head is available at the inlet scoop. This was illustrated by means of flow patterns obtained by treating the walls of the scoop with a mixture of soot and oil.

If the velocity distribution in the boundary layer is known, it is possible to estimate the average dynamic head available in the scoop, provided the free stream velocity head is known. This problem was investigated by the author making use of pitot and static surveys. The results are incorporated in a series of design charts covering the types of scoop experimented with.

With the help of these charts, full scale installations can be designed.

As an example, the installation on SS. "America" utilises 36 in. piping and passes 40,000 gallons/minute at ship speed of 24 knots.

Inlet and outlet scoops similar to those tested by the author were utilised. Applying the appropriate corrections, the following values are obtained.

It will be noted that the agreement between calculated total head and estimated resistance of circuit under observed flow conditions is satisfactory.

Free stream velocity head	24.5 feet
Thickness of boundary layer at inlet scoop	58.5 inches
Average head available at inlet scoop	13.6 feet
Head produced by inlet scoop	9.6 feet
Thickness of boundary layer at outlet scoop ...	63 inches
Head available at outlet scoop	13.8 feet
Suction head produced by outlet scoop	-5.26 feet
Total head produced	14.96 feet
Observed flow	40,000 gallons
Estimated resistance	15.50 feet

It will be noted that in this design only about half of the free stream dynamic head is available at the inlet scoop and of this a further 30 per cent. is lost before the water reaches the condenser intake. On the other hand the projecting lip at the exit converts about 30 per cent. of the free stream head into suction.

In conclusion it must be emphasised that the author's tests cover only the efficiency of the scoop from the point of view of water circulation. The additional resistance to propulsion of the ship is not considered. According to some Italian tests, this may amount to as much as 10 per cent. of the total ship drag at cruising speed, but appreciably less at maximum speed. On the other hand, the simplicity of the circuit and the absence of any mechanical pumps present enormous advantages.

In the discussion following on the author's paper attention is called to the need of further experiments on the boundary layer effect, including cavitation. It is agreed that boundary layer phenomena are the basis of the operation of the scoop and this is one of the reasons why tests on such circuits cannot be carried out with air as the working medium. This is to be regretted, since the use of air has proved very convenient in other hydraulic investigations.

Calculation of the Second Approximation of the Two-Dimensional Compressible Potential Flow about a Profile by the Janzen-Rayleigh Method. (E. Krahn, L.F.F., Vol. 20, No. 5, 16/6/43, pp. 147-151.) (114/3 Germany.)

The calculation of the second approximation to the compressible two-dimensional adiabatic potential flow about a profile at subsonic speeds by the Janzen-Rayleigh method required the solution of

$$\Delta\phi = (M^2/U^2)\,(u^2 u_x + uv\,(u_y + v_x) + v^2 v_y)$$

where

Δ = Laplace operator.
ϕ = potential of compressible flow.
M = Mach number.
U = incident flow velocity.

Suffixes $_x$ and $_y$ denote partial differentiation.

The function ϕ must be singly determined and finite in the whole region external to the profile (with the exception of the point at infinity).

In addition, the derivatives of ϕ must fulfil the condition of tangential flow at the profile and parallel flow at a great distance from the profile.

This problem has been solved for the circle, the ellipse and the Joukowsky profile, making use of the transformation function of the profile on to the circle together with a knowledge of the potential function of incompressible flow over the whole plane.

Since generally only the velocity distribution at the profile itself is of interest, the author indicates an alternative method in which the calculation is restricted to the region of the profile contour. For this purpose apart from the velocity of incompressible flow at the profile contour only the transformation function of the profile on to the circle and its derivative at the profile need be known, the field outside the profile being neglected.

The method is illustrated by worked out examples covering the case of a cylinder with circulation and an arbitrary profile respectively. Due to the compressibility effects, there is an appreciable increase in lift in both cases.

Contributions to Profile Research—III. Calculation of the Lift Distribution (First Approximation) with a Correction for the Region of the Profile Nose. (F. Kenne, L.F.F., Vol. 20, No. 5, 16/6/43, pp. 152-170.) (114/4 Germany.)

Known methods for the calculation of the velocity distribution about a given profile are based on conformal transformation of the profile on to a circle. Exact solutions are only possible in relatively few cases for which the transformation function is sufficiently simple. Even then the amount of labour involved may be considerable.

For the general case of an arbitrary profile the approximate method of Theodorsen can be employed, which, however, is fairly complicated and moreover suffers from the defect that the amount of labour involved is practically the same whether the profile is relatively thin or thick.

Since most practical profiles are relatively thin and only slightly curved, a method of approximation based on a source-vortex distribution suggests itself, the distribution being such that the profile contour becomes a stream line for parallel incident flow. This method is naturally more accurate for thin than for thick profiles and will give an exact solution in the limiting case of a line profile of zero curvature.

Provided the maximum thickness (chord ratio is less than .2, and the maximum curvature less than .1), the velocity on the profile contour can be put equal to the u component of the total velocity along the x axis as a first approximation. The singularities are distributed along the same x axis.

The author has tabulated the required source distribution and the resultant induced excess velocity for a series of thickness distributions under symmetrical flow conditions. These excess velocity components are multiplied with the corresponding thickness constants (depending on the form parameter of the profile) and when added to the incident flow velocity in the x direction yield the resultant flow of the symmetrical profile at zero incidence.

Profile curvature and incidence are allowed for by an additional vortex distribution which is also given in a tabular form for various curvature characteristics and angles of incidence, making use of data already published by Birnbaum. The excess velocity components given in the table are multiplied by the corresponding curvature constants and added or subtracted from the stream velocity at the profile, depending on whether the suction or pressure side is considered.

The resultant velocities on the profile contour are exact only for the case of an infinitely thin profile. They represent, however, a very good approximation for finite thicknesses except in the region of the nose, where linearity between the different components no longer exists.

In this region the difference in velocity between the true contour and the axis (along which the source/vortex distribution is assumed) must be taken into consideration. This is allowed for by a correction in the distribution such that both the tangent and the curvature of the stream line at the front vortex point agree with those of the profile contour. The calculation is first carried out for the particular angle of incidence corresponding to tangential entry. Since the velocities vary in exact proportion with the incidence, the calculation need only be repeated for one further angle of incidence.

A comparison of the distribution of excess velocity as obtained by direct measurement, conformal transformation and the author's approximate method in the case of a symmetrical profile shows excellent agreement.

In conclusion, the author gives a complete lay-out of the method for the rapid calculation of the velocity distribution for an arbitrary profile which does not necessitate any knowledge of the theory and can be carried out rapidly by any competent computor. Provided the six thickness constants of the profile and the four curvature characteristics of the Birnbaum skeleton are known, a complete drawing of the profile is not required.

Pre-Rotation of Landing Wheel Tyres. (C. A. Mason and W. H. Elliott, S.A.E., National Aeronautics Meeting, April 8-9, 1943.) (Preprint available.) (114/5 U.S.A.)

The average life of a 17.00 × 16 aircraft tyre corresponds to about 3,000 miles, say 800 landings and take-offs, averaging 3½ miles. The rubber lost per mile is over 50 times that of a 6.00 × 16 passenger car tyre (.0057 against .0001).

Part of this wear is due to the fact that on landing the wheel must be accelerated very rapidly from rest to a peripheral speed of the order of 100 m.p.h.

It is obvious that wear would be reduced if the wheel could be spun by some outside agency before contacting the ground. To achieve ground speed (and thus prevent slip) the wheel would have to rotate at over 600 r.p.m. for some time prior to landing. Such high speeds are not feasible, mainly on account of balancing difficulties. If the preliminary peripheral speed is limited to about half initial ground speed, the tread abrasion is reduced by about 25 per cent. and the life of the tyre increased by the corresponding amount. This shows that the possible gain in life is not very great and may be overshadowed by the cost and weight of the pre-spinning equipment.

The simplest method of producing preliminary rotation appears to be direct operation by the relative wind, the tyre being fitted with vanes for this purpose. Flight tests on a B-17C indicate that tyres of this type (manufactured by Goodrich) accelerated to about half landing speed in about two minutes, the aircraft speed being 150 m.p.h.

A set of these tyres weighs 10 lb. more than the standard equipment and the cost is 15 per cent. greater (£29 against £25). Bearing in mind that one lb. of extra weight represents a revenue loss under civil operation of the order of £5, the drive is uneconomical, even if a 20 per cent. increase in tyre life results. (A loss of £28 in a year's operation, assuming 4,200 hours service per year and a standard tyre life of 800 hours.)

The same line of reasoning shows that mechanical pre-rotation can only be economical if the cost including loss of revenue does not exceed £55 per year for the aircraft in question.

The authors state that a motor driven device has been tried by one of the largest American aircraft manufacturers, but no details are available.

New Wind Shield Developments. (A. L. Morse, S.A.E., National Aeronautics Meeting, April 8-9, 1943.) (Preprint available.) (114/6 U.S.A.)

A compressed air catapult is described which enables freshly killed bird carcasses weighing up to 16 lbs. to be projected at speeds up to 400 miles per hour against a wind shield. The experimental panels were plane rectangles, $13\frac{3}{8}$ in. high and $57\frac{5}{8}$ in. wide, the experiments covering the effect of bird weight, speed, angle and point of impact, panel temperature, method of support and type of construction of panel. The impact strength of the panel was expressed in terms of the minimum projectile velocity causing penetration.

The experiments indicate that a $\frac{1}{2}$ in. glass-vinyl laminated windshield consisting of outside layers of semi-tempered glass $\frac{1}{8}$ in. thick with a vinyl plastic interlayer $\frac{3}{8}$ in. thick and preceded by a $\frac{1}{4}$ in. fully tempered de-icing glass with an air gap of $\frac{1}{4}$ in. gives complete security against collision with birds weighing up to 4 lbs. and a high degree of protection with larger birds weighing up to 20 lb.

The net increase in weight over standard double glazed wind shields on a Douglas DC 3, is of the order of 15 lb. and this includes reinforcement of the supporting structure. The optical characteristics are stated to be acceptable.

It is interesting to note that the impact strength of such laminated glass-vinyl shields decrease rapidly with temperature. This is the main reason for adopting the hot air type of de-icer on this screen, the air circulating between the $\frac{1}{2}$ in. panel and the $\frac{1}{4}$ in. tempered glass sheet placed in front.

This ensures that the vinyl plastic interlayer is kept at an optimum temperature of 75° to 120°F. depending on plasticizer content. In order to obtain maximum impact resistance under all conditions, this temperature must be maintained even in the absence of any icing.

The mounting of impact resisting wind shields requires special attention as otherwise the shield may be pulled out of the frame. It is essential that the plastic interlayer should extend beyond the edges of the glass and around the entire periphery to provide means for bolting the panel on to the frame. Any tendency of the bolts to tear out of the plastic can be greatly reduced by moulding a thin strip of aluminium (.025 in.) on to the edge. Maximum restraint should be at the ends of the panel and minimum restraint along the top and bottom edges.

Multi-Purpose Aircraft Design Utilising a Detachable Fuselage (Deysher and Hubbs Plane). (American Aviation, Vol. 6, No. 22, 15/4/43, pp. 46-54.) (114/7 U.S.A.)

A revolutionary multi-purpose aircraft design equally efficient in commercial or war transport, utilizing a detachable "fuselage" which can be hauled to and from an airport by an ordinary truck tractor, is announced by Harvey M. Deyster and his collaborator, Harold K. Hubbs.

The detachable unit, resembling a standard highway trailer, can be loaded at a plant or military base, towed by truck to an airport, attached to a waiting plane, flown to another airport, and the operation reversed. No time is lost in airport loading or unloading. Alternate designs call for twin-boom aircraft which can haul two trailer or fuselage units at once. Furthermore, the inventor claims that his plane can fly satisfactorily without the unit.

In addition to using the carrier as a shipping container, the operator can capitalize on ability of the plane to fly empty by transporting any number of such units in a one-way stream to an area demanding an emergency hospital, mess halls, emergency light and power stations, machine and repair shops, or signal and transmitting equipment. Thus a hospital, with emergency operating equipment and cots, could be set up in a few hours, hundreds of miles distant, and could be removed as quickly.

Aerodynamic Performance of the Towed Glider. (A. Klemin and W. C. Walling, J. Aeron. Sc., Vol. 10, No. 6, June, 1943, pp. 185-196.) (114/8 U.S.A.)

In Part I of this paper the authors enumerate certain simple aerodynamic expressions useful in determining the performance of a glider train (tug + one or identical gliders).

Both the rate of climb and level speed of the train is most simply expressed in terms of so-called fictitious speeds, defined as follows:—

V_{fsa} = fictitious sinking speed of tug $= V/E_a$
V_{fsg} = ,, ,, ,, glider $= V/E_g$
V_{fst} = ,, ,, ,, train $= V_{fsa} + (nW_g/W_a)\,V_{fsg}$
V_{fca} = ,, rate of climb of tug = (brake h.p.$/W_a) \times \eta$

where

V = level flight speed.
$E_a = L/D$ for tug.
$E_g = L/D$ for glider.
W_a = weight of tug.
W_g = weight of glider.
n = weight of glider.
η = propulsive efficiency of tug engine.

We then have

$$\text{actual rate of climb of train} = (V_{fca} - V_{fst})\,\{W_a/(W_a + nW_G)\}$$

at the level flight speed V, $V_{fca} = V_{fst}$.

By plotting both V_{fca} and V_{fst} on a V basis, this speed can be readily determined by the intersection of the curves.

Similarly, the maximum intercept between the two curves will determine the corresponding airspeed for maximum rate of climb whilst the tangent for the origin to the V_{fst} curve determines the speed for maximum range, on the assumption that the specific fuel consumption is independent of V.

Since V must satisfy the expression

$$V = (2w/\rho)^{\frac{1}{2}}\,(1/C_L)^{\frac{1}{2}}$$

where

w = wing loading,

the fictitious sinking speeds also depend on the wing loading, *i.e.*,

$$V_{fs} = (2w/\rho)^{\frac{1}{2}}\,\{C_D/(C_L)^{3/2}\}$$

By plotting the fictitious sinking speeds at various wing loadings both for the tug and the gliders, it is possible to draw some conclusions on the effect of these two factors on the overall performance. Speaking generally, W_g should be less than w_a. If, however, only a single small glider is attached to a fast heavy tug, the cruising speed is affected least by adopting a high wing loading for the glider. Although a reduction of the wing loading of the tug below conventional figure would increase the rate of climb, the accompanying drop in the cruising speed of the train might become dangerous.

From the above it appears that definite conclusions can only be drawn from worked out examples and for this purpose the author selects the Lockheed Lodestar towing one to three gliders each with a payload of the same order as that of the tug for zero range.

The structural weight of the glider is based on that of the Lodestar without engine nacelles.

As the stalling speed of the Lodestar is 93 m.p.h. the minimum level flight speed of the glider train was arbitrarily fixed at 115 m.p.h. This, together with the need of a low landing speed of the disconnected glider, led to a choice of 20 lb./sq. foot for the wing loading of the glider (aspect ratio 12).

Other pertinent data are collected in the following table:—

	Tug.	Glider.
Gross weight (lb.)—		
Take-off	18,500	—
Landing	17,500	13,800
Weight empty	12,000	7,300
Crew and equipment	440	440
Payload	5,060 (up to 400 miles)	6,060
H.P.	2,400 (take-off)	—
	1,400 (cruising)	—
Wing loading	33.6 lb./sq. ft.	20 lb./sq. ft.
Aspect ratio	7.78	12
Profile drag coefficient	.009	.009
Total parasite drag coefficient ...	.021	.0112
Nacelle drag coefficient	.007	—
Normal fuel load	3,860 lb.	—
With extra tanks	5,700 lb.	—
Max. range (normal tanks)	1,800 miles	—
Payload (corresponding)	2,000 lb.	—
Max. range (extra tanks)	2,800 miles	—
Payload (corresponding)	None	—

The comparison of the Lodestar by itself with a glider train falls under the heading of air speed, rate of climb, range and payload.

Naturally, the first three factors must be less for the train than for the tug alone.

On the other hand, the payload is increased to such an extent that the glider train becomes very attractive for certain purposes.

The following presents a selection from the author's calculations. All the data apply to a constant altitude of 5,000 feet.

(1) Max. speed and climb (Lodestar 18,500 lb.) /(Glider 13,800 lb.):—

	Tug alone.	+ 1 G.	+ 2 G.	+ 3 G.
Max. true air speed (m.p.h.) ...	260	200	170	140
Max. rate of climb (feet/min.) ...	1,700	700	300	200

(2) Range and payload (normal fuel tanks):—

	Tug alone.	+ 1 G.	+ 2 G.	+ 3 G.	
Range (m)	1,800	1,100	800	600	Speed for max. range.
Payload (lb.)	2,000	8,000	14,000	20,000	
Speed (m.p.h.)	135	125	120	115	
Range	1,200	950	750	550	Cruising h.p. (1,400).
Payload	2,000	8,000	14,000	20,000	
Speed	225	175	145	120	

(3) Comparison at a given range is facilitated by the following three factors:—

Payload factor P = Payload train/payload of tug.

$$\text{Advantage factor } A = \frac{(\text{Payload} \times \text{air speed})\ \text{train.}}{(\text{Payload} \times \text{air speed})\ \text{tug.}}$$

$$\text{Efficiency factor } E = \frac{(\text{Payload} \times \text{range/fuel})\ \text{for train.}}{(\text{Payload} \times \text{range/fuel})\ \text{for tug.}}$$

The other factors P, A and E do not vary much with range and the following gives average values up to 800 miles:—

	Tug alone.	+ 1 G.	+ 2 G.	+ 3 G.
P	1	2.2	3.4	4.5
A	1	1.9	2.3	2.7
E	1	1.4	1.6	1.6

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(4) It will be noted that for a given range both factors A and E are increased for the train in spite of the decreased air speed and increased fuel consumption. This is due to the large increase in payload (factor P) which overshadows everything else.

(5) This appears at first sight to favour the general utilisation of glider trains for transport work. Difficulties in take-off combined with low rate of climb and horizontal speed added to the relatively restricted range would, however, put up the operative costs very considerably. This will be considered in a subsequent paper by the authors. For military purposes, however, when troops or supplies have to be transported over relatively short distances, the glider train has already proved of enormous advantage.

Future developments will lie in the employment of subsidiary tugs so that the train can be fixed up in the air at a reasonable altitude, refuelling of the tug in the air and the provision of specialised tug engines which are adequately cooled at relatively low air speeds.

Design of Cross Flow Heat Exchangers from Tested Core Sections. (P. A. Scherer, J.S.A.E., Vol. 50, No. 12, Dec., 1942, pp. 542-548.) (114/10 U.S.A.)

Although this paper deals with the general problems of heat exchangers, it is of special interest for the design of intercoolers in the supercharger circuit of aero engines. It is assumed that experimental data on a core section are available. Such data will usually consist of the following:—

(1) Pressure drop for coolant and supercharger air on a mass flow basis.
(2) "Effectiveness" of intercooler on a mass flow basis with coolant air pressure drop as parameter.

The "effectiveness" is defined as:—

$$\frac{\text{Supercharger Temp. in—Supercharger Temp. out}}{\text{Supercharger Temp. in—Coolant Temp. in}}$$

and this coefficient increases with coolant air pressure drop but decreases with increase in mass flow. An average value is about .5, but the coefficient may range from .4 to .7 depending on circumstances.

The full scale intercooler will have to fulfil certain requirements which may including the following:—

Mass flow, pressure drop, absolute pressure, temperature at entry and exit and length of flow.

The author shows how these requirements can be correlated with the experimental data, making use of the Nusselt equation for heat transfer in cross flow.

A worked out example illustrates the method, the following data being given:

(1) Dimensions of intercooler.
(2) Supercharger circuit.
Mass flow rate.
Entry temperature.
Entry pressure.

Coolant circuit.
Entry temperature.
Entry pressure.
Pressure drop.

Using experimental data on the same type of core but different dimensions, the author obtains the following performance data for this intercooler:—

Supercharger circuit.
Exit temperature.
Pressure drop.

Coolant circuit.

Exit temperature.
Mass flow rate.

The Effect of Environment on Aircraft Engine Design and Performance. (L. T. Miller, S.A.E. National Aeronautics Meeting, April 8-9, 1943.) (Preprint available.) (114/11 U.S.A.)

The performance of an internal combustion engine operating at a given r.p.m. depends on a variety of factors of which the chief are the intake and exhaust conditions and the temperature of the engine parts.

Bench tests rarely reproduce conditions as they exist when the engine is operated in an aircraft and may be very misleading when comparing engines of different types. What interests the user is the net thrust horse-power available after the drag (including cooling) and propeller losses have been allowed for. At the same time the weight of the complete installation should be a minimum, and the specific fuel consumption low.

In the past there has been a tendency to judge the possibilities of aircraft engines on test bench performance, it being left to the aircraft designer to provide a suitable mounting and arrange for adequate cooling. Under such conditions the benefits of an inherently light engine structure were often lost by clumsy installation and cooling difficulties. Nowadays, the concept of the aircraft power plant is gaining ground, the unit being designed from the start to function under flight conditions, with all the necessary auxiliaries in position. Light weight of the engine as such, although still of course desirable, is not the single criterion. What matters is the net thrust h.p. delivered per unit weight of the complete installation. Thus a reduction in cooling drag or weight and drag of engine mounting may easily overbalance a heavier specific weight based on test bench results.

In addition, however, to a higher power/weight ratio a low specific fuel consumption is also of importance, since it largely determines the amount of pay load that can be carried. According to the author, much still remains to be done in reducing carburettor metering tolerances and preventing fuel wastage.

With the large power outputs at present in use, even a small percentage saving represents a considerable increase in weight carrying capacity.

Operating Characteristics of Lubrication Systems for an Aircraft Power Plant Installation Under Simulated Altitude Conditions. (Sea level to 40,000 feet.) (H. D. Scrymgeour, S.A.E. National Aeronautics Meeting, April 8-9, 1943.) (Preprint available.) (114/12 U.S.A.)

Following a suggestion by the N.A.C.A. that all new lubricating systems should be bench tested under simulated altitude conditions for foaming and pump capacities, Consolidated Aircraft built a mock up of such a system intended for a new bomber. The system consisted of the following elements:—

(1) Engine sump with one gear type of oil pump delivering 20 gallons per minute (electrically driven).

(2) One gear pump supplying 10 g.p.m. (electrically driven, simulating cabin supercharger circuit).

(3) One gear pump supplying 1.5 g.p.m. (electrically driven simulating exhaust turbine circuit).

(4) An oil tank of approximately the same size as used in the plane provided with an observation window and electrical heaters.

(5) An oil flow measuring tank.

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(6) An auxiliary vacuum pump connected to main tank, measuring tank and engine pump.

The two auxiliary pumps are arranged in parallel and take their supply from the main feed line between tank and engine pump (before engine pump entry).

Lengths of glass piping for visual examination of the oil flow are inserted at the suction entry of each of the pumps, in the main suction pipe below oil tank and in the common delivery pipe before entry into oil tank. Care was taken to copy the proposed dimensions and lay-out of all the suction pipes with mock up. (No attempt was made to obtain similarity on the delivery side, it being assumed that the pump characteristics are entirely determined by conditions at entry.)

The tests were run at a series of constant oil delivery temperatures (85°C., 95° and 75° C. respectively) at gradual increasing vacuum, the pumps having been previously adjusted to give the required deliveries at atmospheric pressure. This adjustment was not changed during the tests.

Reduction of the air pressure causes a liberation of air bubbles in the oil and at very low pressures there is also a tendency to foam.

With the delivery at the relatively low temperature of 75°C., observation showed that some solid oil was present in all the pipe lines up to 40,000 ft.

At the high temperature (95°C.), solid oil disappeared at 35,000 ft. in the return line to the tank and at 40,000 ft. in the supply line just out of the tank and the line to the turbo pump.

The mixture of oil, foam and air can be handled by the engine pump to ensure adequate lubrication under all conditions up to 40,000 ft.

The cabin supercharger oil supply on the other hand was only just sufficient at 40,000 ft., whilst the turbo oil supply was definitely below requirement for the cold oil at 40,000 ft. It is interesting to note that the presence of as little as 1.5 per cent. of water (by volume) increased the foaming considerably, especially at the higher temperature, and this caused the turbo pump to fail at already 15,000 ft.

It is proposed for this reason to increase the oil supply to each of those auxiliaries when the system is installed in an aircraft.

Progress Report on Cold Starting Data of the Automobile Diesel Fuel Division of the Co-operative Fuel Research Committee. (F. C. Burk, S.A.E. War Engg. Production Meeting, Jan. 11-15, 1943.) (Preprint available.) (114/13 U.S.A.)

The experiments were carried out on a 6 cylinder 4 cycle Lanova type combustion chamber Diesel which was installed in a cold chamber and could be cooled down to 30°F. Lubricating oil SAE 30 was used in all the tests. Starting was considered to be satisfactory when the engine continued to run after a period of 30 seconds cranking at a speed varying between 280 and 380 r.p.m. (the lower values corresponding to the lower temperatures).

The five fuels tested had the following characteristics:—

Fuel Ref. No.	Cetane No.	API gravity.	Viscosity SSU.	I.H.P.	A.S.T.M. Distillation °F. 10 %.	50 %.	90 %.	E.P.
1	37.5	30.7	36.1	382	444	508	604	669
4	46.6	44.7	30.4	311	347	394	491	543
5	44.3	28.3	49.8	452	528	608	691	730
6	50.5	34.8	37.0	484	504	516	536	558
7	45.2	34.5	35.2	333	399	514	639	700

The low temperature starting temperature together with cranking times are given below:—

Fuel Ref.	Starting temp. °F. 30 sec. motoring.	70 sec. motoring.
1	58°	52
4	41	33
5	50	38
6	37	31
7	49	40

It will be noted that the starting temperatures vary inversely as the Cetane Numbers of the fuels tested, whilst the variation with other properties (density, viscosity boiling range) did not have any apparent influence on the starting.

Further tests are, however, required before the conclusion can be accepted generally. These tests should include other types of engines, both with and without auxiliary starting devices and cover lower temperatures. Under more strenuous conditions, as the temperature approaches the pour point of the fuel, a relationship between fuel viscosity and ease of starting would be expected. If the four variables, Cetane No., gravity, viscosity and volubility are accepted as possible factors influencing cold starting, the fuels should be selected so that only one of these factors is varied at a time. It was found impossible to do this without the use of special blends or dopes which were excluded from the present programme of tests.

Cold Starting Tests on Diesel Engines. (H. R. Porter, Paper read at War Engineering Production Meeting of the S.A.E., Jan. 11 to 15, 1943.) (114/14 U.S.A.)

Conclusions.

1. The required cranking time is decreased with increase in cranking speed and ambient temperature and decrease in altitude. The lowest ambient temperature investigated was of the order of 20°F.

2. The starting performance of undoped fuels is predicted by the delay cetane number. With increased cetane number, greater ease of starting is obtained. However, with doped fuels, the delay cetane number may or may not predict the starting performance depending on the particular dope used. Thus ethyl nitrate will improve the cetane number but does not affect the starting performance. The addition, however, of bromo cyclo hexane to a fuel doped with ethyl nitrate gives a starting performance in line with the cetane rating although bromo cyclo hexane by itself does not improve the starting.

Chloropicrin, ampl nitrate, sulphur and ethyl disulfide when added to the fuels give a starting performance in line with the new cetane rating.

3. As indicated by tests on one make of engine, laboratory results may be used to predict service starting performance.

4. Various substances, including chlorine, hydrogen sulfide, amyl nitrate ethyl disulfide, and chloropicrin, are effective in aiding starting when added to the intake air. This finding suggests the use of an auxiliary device, especially designed for the purpose, for aiding in starting under severe weather conditions. However, the effect of such dopes on engine maintenance should first be determined.

Cranking Power and Torque Requirements of Diesel Engines at Sub-zero Temperature. (H. L. Knudsen, S.A.E. War Engg. Production Meeting, Jan. 11-15, 1943.) (Preprint available.) (114/15 U.S.A.)

The experiments were carried out on a 6 cylinder Cummins Diesel of 672 c.i. displacement, the friction h.p. being determined at various speeds and temperatures with three different kinds of lubricating oil (Grade SAE 30, SAE 10, SAE 10+30 per cent. paraffin).

The following table gives the motoring h.p. five seconds after starting from rest, the engine temperature being as indicated:—

Temp.	−30 °F.	0 °F.	+30 °F.	Oil.
200 r.p.m.				
Motoring h.p.	52	26	13	SAE 30
	33	15	6	SAE 10
	10	6	3	SAE 10+paraffin
100 r.p.m.				
Motoring h.p.	30	14	5	SAE 30
	22	7	2	SAE 10
	5	2	½	SAE 10+paraffin

These figures apply to motoring with compression release. If the compression is effective, the motoring h.p. is increased by about 2 h.p. at 200 r.p.m. and 1 h.p. at 100 r.p.m., irrespective of temperature.

Immediately on starting, the motoring h.p. is appreciably higher than the figure given in the table. There is a subsequent rapid decrease, a steady state being reached after about five minutes motoring. This steady motoring h.p. is only about ½ to ¼ of the original value, except in the case of the paraffin mixture which shows a much smaller effect, with time especially at the higher temperatures.

Since motoring speeds of at least 100 r.p.m. are necessary for starting, it is clear that the power requirements for cranking at such low temperatures cannot be met by a starting motor circuit of reasonable size and weight even if cold resisting oils of the type SAE 10 are employed.

It appears at first sight that the paraffin/oil mixture presents a simple solution of the problem. Unfortunately this mixture is unsuitable for operation at higher temperatures. The difficulty could be met by substituting petrol for the paraffin, since most of the former would evaporate and leave a lubricant of proper viscosity at operating temperatures. The objection to this is the need for a fresh supply of diluent which must be added while the engine is still operating to ensure a proper distribution of the lubricant in readiness for the next cold start. In the author's opinion this presents a tedious and expensive operation, which might, moreover, damage the engine unless carried out very carefully. For this reason the author suggests the provision of an electrical oil immersion heater as the simplest solution of the cold starting problem. A similar heater is also recommended for the battery, so as to reduce its internal resistance and obtain the normal discharge current.

Effect of Injection Pump on Cold Starting. (M. M. Roensch, Paper read at War Engineering Production Meeting of the S.A.E., Jan. 11-15, 1943.) (114/16 U.S.A.)

Of the many problems to be solved during the development of a Diesel engine for use in trucks, cold starting is by no means the least. During the investigation of some of the variables affecting the starting characteristics, it was indicated that there is no satisfactory substitute for the application of heat prior to cranking. Without a good heater, reliable starting at temperatures below 10°F. is impossible on an engine of this type.

This paper covers the results of a series of cold room tests (−10°F.) to determine the effect on cold starting of the following factors:—

A. The quantity of fuel injected at cranking speed.

B. Two types of injection pumps.

The engine was fitted with a standard 4,000 watt air intake heater which was switched on one minute before the attempted start and left on during the subsequent runs.

The results may be summarized as follows:—

1. For optimum starting, particularly at low cranking speeds, 75 per cent. to 85 per cent. more fuel is required than that delivered by the pump for maximum power, thus indicating the desirability of having some means of increasing fuel delivery for starting purposes.
2. Fuel pumps must have good distribution, even at low cranking speeds, for unless each cylinder will contribute its best power under these conditions cranking speeds will not increase as rapidly as they should and therefore a longer starting time results.

Piston Ring Scuffing as a Criterion of Oil Performance. (G. H. Keller, S.A.E. War Engg. Production Meeting, Jan. 11-15, 1943.) (Preprint available.) (114/17 U.S.A.)

The author confirms the opinion now fairly generally held that laboratory tests are useless for determining the lubricating qualities of an oil employed in a modern big duty aircraft engine. The only satisfactory basis for comparison is the mechanical condition of the engine following a power run under standardised conditions. Since the piston rings offer a difficult lubrication problem, the author proposes to use their condition as a criterion for rating the oil, and for this purpose he devised specially severe test conditions high barrel temperature so that variations in oil characteristics will show up within a period of five hours.

All the tests were run on Wright Cyclone C9GC single cylinder fitted with the normal type of six ring piston. Before each test the barrel was carefully lapped, using an old piston and rings so as to ensure a constant surface finish of the cylinder walls. The lubricating oil is supplied to the cylinder by two jets situated on the cylinder skirt on the thrust and anti-thrust sides respectively. Both these jets direct the oil as a solid stream on the underside of the piston, the walls being lubricated by splash from the underside of the piston. Oil thrown off from the crankpin was prevented from entering the cylinder by means of a close fitting baffle fitted with a slot just large enough to clear the connecting rod.

The engine cam and crankcase formed independent wet sumps from which the oil drained into a cooler and was then circulated by means of a pump to the crankshaft, the two oil jets and camshaft, the rate of flow being measured by sharp edged orifices in the respective pipe lines. The total quantity of oil in circulation was originally two gallons in each case, the oil consumption being measured by weighing the residue after the test. Gauges in the cam and crankcase enabled the oil level to be watched, and the test was stopped should the level fall below a certain minimum indicating abnormal oil consumption.

The normal duration of the test run was five hours, prior to which the engine was run in for a period of three hours at gradually increasing load up to a maximum of 134 b.h.p. at 2,500 r.p.m. This was followed by a five hour run at cruising power (72 b.h.p. at 2,000 r.p.m.) after which the oil system was drained and replenished with the test oil.

During the preliminary runs the following factors were maintained constant:—

Oil inlet temperature	180-190°F.
Crankshaft supply	6.5 lb./min. at 2,000 r.p.m.
Head temperature (rear spark plug gasket)	375-385°F.
Cylinder base temperature	265-285°F.
Oil flow to cylinder jets	7.5-8.5 lb./minute

After the preliminary run, the cylinder barrel was wrapped round with an aluminium radiation shield and the test proper run under the following conditions after a preliminary warming up period of 30 minutes:—

Time	5 hours
R.P.M.	2,500
B.H.P.	134
Cylinder head temperature	400-410°F.
Cylinder base temperature	400-410°F.
Mid-barrel temperature	480-490°F. (average of 6 couples)
Crankshaft supply	5.5-6.5 lb./minute
Oil to cylinder jets	1.25-1.5 lb./minute

The oil inlet temperature and specific fuel consumption were kept at the same values as during the preliminary runs (180°-190°F. and .70-.75 lb. per b.h.p./hour respectively).

The fuel used has an octane rating corresponding to iso-octane + .8 cc. TEL and no trace of detonation was observed.

The relative merits of the oils under test were determined by the following factors:—

(1) Condition of rings and piston.
(2) Oil consumption.
(3) Blow-by.

The author claims that the method gives consistent results and is sufficiently arduous to show up marked difference in the behaviour of various types of high class oils in a relatively short running period. Moreover the grading of the oils is in agreement with that based on the much less strenuous conditions of practice necessitating running periods of several hundred hours before marked differences can be established.

Altogether five lubricating oils were tested by the author. In no case did the laboratory grading (viscosity under oxidation factor, etc.) agree with that of the engine tests.

Finishes for Plywood in the Aircraft Industry (Types and Application). (R. B. Anderson, A.S.M.E. Preprint, April 26-28, 1943.) (114/18 U.S.A.)

The major requirements of a finishing system of the direct coating type for plywood aircraft surfaces are presented. These include moisture resistance, durability to weathering and hard usage, weight factors, application in the aeroplane factory, refinishing in the field, and the need for film smoothness. A review of the various types of finishes is given, covering both the development and service stages. These types can be classified as:—

(a) Cellulose.
(b) Alkyd.
(c) Phenolic.

Of these the phenolic type appears to be the most promising.

The cellulose type is easy to apply and dries quickly. It has, however, a poor moisture resistance and tends to crack and is considered unsatisfactory by the author.

Alkyd type finishes are relatively new and more experience in the field will be required before a definite judgment can be passed. Its moisture resistance appears, however, to be inadequate. The methods of finish applications are considered together with some of the precautions which must be considered.

Problems Affecting the Use of Wood in Aircraft. (R. W. Hess, A.S.M.E. Preprint, April 27-28, 1943.) (114/19 U.S.A.)

On the whole, very little has been done by the wood industry so far to develop the permanent acceptance of wood in face of competition with other materials. Standardization of grade rules and maintenance of low price are not sufficient, bearing in mind the continued and intensive research for improvement in the quality of metal products.

Continued use of wood in aircraft structures and for some other highly stressed applications, in the face of intense competition from other materials, is dependent in part upon the amount of detailed engineering data that is made available in the near future and upon the extent to which the wood materials and wood products are improved in uniformity and quality.

Following is an enumeration of the measures proposed to stimulate wood use in aircraft:—

1. Wood quality improvement.
    a. Segregation of wood (including veneers) into more restricted specific gravity groups.
    b. Reduction of veneer and plywood tolerances.
    c. Complete control of wood moisture content through all stages of manufacture.
2. Basic data analysis.
    a. Study the available strength data of all wood species to determine accurately the various species offering advantages where particular stresses are dominant.
    b. Utilize these woods to obtain greater strength/weight efficiency.
3. Structural design data accumulations.
    a. Conduct the necessary tests to determine the basic structural design data that have not yet been determined for our native wood species. These include Young's moduli (3) shear moduli (3), Poisson's ratios (6), ultimate and yield strengths for various angles to the grain, and typical stress strain curves.
    b. Advance the wood aircraft designs as rapidly as possible, digressing as far from the "conventional" as is necessary to use wood in its most efficient manner.

Theory of the Expanding of Boiler and Condenser Tube Joints Through Rolling. (A. Nadai, A.S.M.E. Preprint, April 26-28, 1943.) (114/20 U.S.A.)

Tubes in industrial water heaters, steam boilers, and condensers of turbines are fitted in the holes of adjoining drums or head plates by expanding the tube ends. These are slightly enlarged by means of small revolving rolls. In one large steam condenser many thousands of such tube joints have to be rolled, and in high-pressure boilers these joints must remain tight under several thousands of pounds pressure at high temperatures. The pressure of the revolving rolls creates a radial plastic distribution of stress in the tube wall and around the hole in the adjoining heavy steel plate. After the tube end has been rolled, a system of residual stresses remains locked up near the joints which is essential for its pressure tightness. These plastic states of stress have been investigated for various types of the stress-strain characteristics of the tube metal and steel of the head plates. Simple rules are used for computing the stresses in a moderately thick-walled tube under external and internal pressure, either in the elastic or in the plastic state of stress.

Creep of Metals at Elevated Temperatures (the Hyperbolic Sine Relation Between Stress and Creep Rate). (P. G. McVetty, A.S.M.E. Meeting, 26-28/4/43.) (Preprint.) (114/21 U.S.A.)

One of the earliest expressions for stress-creep ratio is the Norton formula

$$v = v_1 \, (\sigma/\sigma_1)^n$$

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where

v = creep rate.

σ = applied stress.

$\left.\begin{matrix} v_1 \\ n \end{matrix}\right\}$ = constants depending on material and temperature.

σ_1 = arbitrary constant of the dimension of a stress.

This formula is convenient as giving a straight line when plotted on a log basis, but experience has shown that it over-estimates the stress in the lower creep range. As a result of theoretical considerations, Nadai has proposed a hyperbolic law of the form

$$v = v_0 \sin h\ (\sigma/\sigma_0)$$

where v_0 and σ_0 are constants depending on the material and temperature, which have to be determined from creep tests at two temperatures.

A graphical solution for this purpose is described and a chart is given to facilitate the calculation. The hyperbolic formula is especially useful if the experimental points cover the high stress range ($\sim$ 3,000 psi) and extrapolation is required to very low creep rates. Thus in turbine design, the maximum allowable creep is usually of the order of .1 per cent. per 100,000 hrs. or roughly .001 per cent. per 1,000 hrs. (neglecting higher rate of initial creep). Assuming that only test data at 3,000 and 4,000 psi are available, extrapolation by the power series gives a limiting stress of 1,260 psi for the allowable creep for a certain steel. The hyperbolic formula, on the other hand, is within 10 per cent. of the very much lower experimental value of 300 psi.

Comparison with other available experimental data is equally satisfactory, but since accurate figures are only available for a relatively restricted number of materials and temperatures, more data will be required before the hyperbolic law can be accepted generally.

Operating Temperature and Stresses of Aluminium Aircraft Engine Parts. (E. J. Willis and R. G. Anderson, National Aeronautics Meeting, S.A.E., April 8-9, 1943.) (Preprint available.) (114/22 U.S.A.)

Aircraft engines must be designed to give the maximum possible output at the lowest possible weight.

Further improvements must be based on a more accurate knowledge of the thermal and mechanical stresses met with in operation. The authors classify the engine structural parts made of aluminium under the headings of cylinder head, piston and crankcase, and indicate possible lines of development in each class.

As regards the cylinder head, operative temperatures are most conveniently estimated by a Brinell hardness survey, the connection between hardness, temperature and exposure time having been obtained by a previous calibration.

The stresses under which the head operates are partly of the nature of pre-stresses due to the assembly (shrink fits), and partly cyclic stresses imposed by the combustion cycle and rocker gear operation. Stress concentration because of mating parts or sharp radii are very difficult to allow for. Such concentrations arise specially on the barrel threads and at the top of the barrel. Care should be taken that all threads match correctly at the operating temperature rather than at shrink or room temperature.

The proportion of aluminium head thickness to steel barrel thickness in the vicinity of the joint should be at least in the ratio of 4.2/1. The connection to the exhaust pipe should be in the form of a flange, and studs in the aluminium keeping the exhaust pipe as flexible as possible. Since the cylinder heads flex considerably in relation to each other during actual operation, a flexible joint is necessary.

In the case of liquid cooled cylinders, the head jacket must be made of very ductile material, otherwise the first explosion which the head undergoes may strain the jacket material past its yield point at point of stress concentration and then produce cylinder distortion.

Pistons.

Operating temperatures are again best obtained by a Brinell hardness survey, whilst the corresponding strain distribution are given by a brittle lacquer method.

The strength of the wrist pin and connecting rod have a considerable effect on the piston stresses. The limiting load which the piston will support is determined by the stress concentrating at the inside of the wrist pin boss brought about either by inward deflection of the piston crown or bending of the wrist pin. Short pins of large diameter, in spite of the higher load per unit projected area, are therefore preferable.

Ringland distortion under load is also of great importance. This can be readily measured at room temperature and will generally be slightly less at the working temperature due to redistribution of stress. Most of the stresses in a piston are of a fatigue nature and care must be taken not to exceed the fatigue limit at the operative temperature.

A simple form of testing machine is described in which the full scale temperature distribution in the piston can be imitated, whilst cyclic loads up to 100,000 lbs. can be applied at a frequency of 1,300 cycles/sec. The prevention of piston distortion appears to be the foundation of a successful design.

Crankcase.

The main difficulty in light alloy crankcase is the provision of holding down studs for the cylinder barrel. Care should be taken that any bending stresses in the crankcase do not pass the section in which the studs are placed. Usually the stress distribution in the studs varies considerably. A ring nut for holding down the cylinder, such as used on the German D 601 engines, gives a much more uniform distribution.

Caution in the use of ribs in crankcases cannot be too highly emphasised. Thin round topped ribs in conjunction with a diaphragm should not be used. A better use of the metal results if only ribs are used in the construction, since these can now be made broader and stronger.

Elevated Temperature Ageing of 24S Aluminium Alloy. (P. P. Mozley, J. Aeron. Science, Vol. 10, No. 6, June, 1943, pp. 180-184.) (114/23 U.S.A.)

The ageing of strong Al. alloys at elevated temperatures is not a new process and the possible improvements in physical propertis have been frequently studied.

The fear of corrosion difficulties and lack of precise data on the heat treatment have delayed application of the process.

For this reason the author carried out detailed tests on 24 S alloy as commonly employed in aircraft construction. It appears that optimum results are obtained for this alloy when ageing at 375°F. for eight hours. This treatment will raise the yield point by about 50 per cent. and the ultimate tensile by 10 per cent., whilst the original elongation is approximately halved.

The maximum physical properties obtainable by ageing depends to a considerable extent on the inherent stress distribution due to cold working after solution heat treatment but prior to ageing. For consistent results the amount of cold working should correspond approximately to that required to produce a 1 per cent. permanent set by stretching or 2 per cent. reduction in thickness by rolling.

The corrosion resistance of aluminium covered sheet of 24 S alloy is not seriously affected by the ageing at elevated temperature, provided the thickness of the sheet is greater than .032 in.

The corrosion resistance of bare 24 S alloy is, however, appreciably lowered and elevated temperature ageing in thicknesses below 3-16th in. is not recommended because of the increased tendency of inter-crystalline corrosion.

It will thus be noted that hot temperature ageing of 24 S alloy presents important advantages without any risks of excessive corrosion. The only drawback is the need for a close control of the degree of prior cold-working if consistent results are to be obtained.

Significance of the Secant and Tangent Moduli of Elasticity in Structural Design. (D. S. Wolford, J. of Aeron. Sciences, Vol. 10, No. 6, June, 1943, pp. 169-179.) (114/24 U.S.A.)

The author deals with the problem of designing beams and columns of structural materials that have no well defined yield point and which must be used above their proportional limit.

Under these conditions we have to differentiate between three kinds of modulus of elasticity.

E_0 = Young's modulus (lb. psi) = stress/strain under initial conditions (proportionality).

E_s = secant modulus = stress/strain under actual conditions.

E_t = tangent modulus = slope of stress/strain curve at a particular load under actual conditions.

As is well known, the buckling load P of a freely supported uniform strut is given by the Euler equation $P=\pi^2EI/l^2$ on the assumption that the elastic limit is not exceeded, *i.e.*, $E=E_0$.

Putting $J=i^2F$ where i = radius of gyration of section and $\lambda=L/i$ = slenderness ratio

$$P=\pi^2E_0F/\lambda^2$$

$$i.e.,\ P/F=\text{buckling stress}=\pi^2E_0/\lambda^2.$$

As λ decreases, the buckling stress therefore would increase indefinitely (Euler hyperbola).

As a matter of fact, E_0 will only remain constant till the stress has risen to the proportionality limit. If buckling takes place at this point, the compression stresses along the inner (concave) side of the strut will increase according to the tangent modulus of the section. The outer (stretched fibres), however, will have their compression reduced and will thus operate under E_0 conditions. As a result, the stress distribution is no longer symmetrical about the neutral axis of the section and the strut behaves as if it possessed a so-called " reduced " modulus which is a function of E_0 and E_t.

In the case of a solid rectangular section

$$E_r=4E_tE_0/(\sqrt{E_0}+\sqrt{E_t})^2 \quad . \quad . \quad . \quad . \quad . \qquad (1)$$

whilst for an idealised H section (infinitely thin flanges and no web)

$$E_r=2E_0E_t/(E_0+E_t) \quad . \quad . \quad . \quad . \quad . \quad . \qquad (2)$$

The buckling load of short struts is then given by

$$\sigma_B=\pi^2E_r/\lambda^2$$

where E_r = reduced modulus of section.

So far E_r has only been worked out for a few sections and in view of the large number of different sections employed in practice, the labour involved to cover the whole range would be prohibitive.

The question naturally arises whether some simpler criterion for a material suitability for short columns might be devised.

For this purpose the author carried out complete tension and compression tests on two tempers of 25 gauge ($\sim$ .02″), type 301 (17-7) high tensile stainless steels. These tests were carried out both on longitudinal and transverse specimens, both as cold rolled and after stress relieving. Stress-strain, tangent and secant modulus data were obtained in curve form.

Next, column tests were made on corrugated sheet of the same material.

The specimen varied in slenderness ratio from approximately 30 to 300 and were loaded as columns with knife edge end conditions.

The curves of buckling stress against slenderness ratio were found to be in good agreement with Euler curves based on tangent modulus, showing that for this type of section, at any rate, E_t forms a satisfactory criterion, provided premature crippling due to local unstability is avoided.

The author also shows that for hollow sections with most of the material remote from the neutral axis, E_r under pure bending is identical with the secant modulus E_s. A knowledge of the tangent and secant modulus will thus enable the designer to tackle short column problems with a certain amount of confidence.

It must, however, not be forgotten that the crippling loads given by the formulæ are upper values which are only approached if premature failure due to local instability is prevented, *i.e.*, the failure must be of the Euler type.

Behaviour of Plywood Under Repeated Stresses. (A. G. Dietz and H. Grinsfelder, Trans. A.S.M.E., Vol. 65, No. 3, April, 1943, pp. 187-191.) (114/25 U.S.A.)

The material employed in these tests was aircraft quality birch veneer, 1-16th in. thick. Two kinds of adhesives were employed, the veneer being laid up and bonded as follows:—

a. Phenolic resin film: Two-ply laminated, 3-ply laminated, 3-ply plywood.

b. Urea resin solution: Three-ply plywood.

Both laminated and standard plywood construction were investigated under bending fatigue. Laminated wood (constant grain direction) resembles solid wood in that the bending stress varies uniformly across the section with a maximum shear stress at the centre. In the case of 3-ply plywood, however (varying grain direction) the bending stress is concentrated in the two outer layers where the grain is parallel to the axis, whilst the shear stress reaches a maximum at the glue joints.

Various types of specimen were tested to determine the steps which would most consistently yield fractures free of split and would at the same time provide constant bending stress over a representative cantilever length.

This was finally achieved by adopting a tapered plan form for the specimen, the wider end piece being rigidly clamped whilst the narrower head was attached to the connecting rod of the reciprocating test machine operating at 1,750 r.p.m. Exact dimensions of the test specimen are not given.

To provide standards of comparison, static bending and tension specimen were cut from each sheet of material adjacent to the points from which the fatigue specimens were cut. The static bending specimens were one inch wide and were tested on a span 16 to 20 times the depth of the specimen. Glue lime shear tests were carried out in the standard manner from one inch wide specimen cut from the fatigue specimen after failure and from the bending control specimen. Each fatigue specimen was first calibrated by loading the free end and obtaining a load deflection curve. From this the modulus of elasticity and the stress corresponding to a given deflection were calculated.

The throw of the connecting rod was then adjusted to produce a stress equal to a given fraction of the ultimate static fracture and the number of stress reversals to crack the specimen was noted.

The following represents a summary of the results:—

Statistics Tests (Average Results).

Material.	Density.	Moisture content.	Ultimate.	Prop. limit.	$E \times 10^6$
Phenolic film					
2-ply lam. ...	.67	7-9 %	25,000 lb. psi.	16,500 psi.	2.4 psi.
3-ply lam. ...	.68	,,	23,400	15,000	2.1
3-ply plywood ...	.72	,,	20,600	13,500	2.1
Urea formaldehyde					
3-ply plywood ...	.66	,,	17,400	12,000	2.0

Dynamic Test $R = \frac{\text{Repeated stress modulus of rupture}}{\text{Static modulus of rupture}}$ (Average results)

Material.	*R* for cycles. 500	10^4	10^6	2×10^6
Phenolic film				
2-ply lam.	.5	.41	.28	.25
3-ply lam.	.48	.40	.26	.24
3-ply plywood	.54	.44	.30	.25
Urea formaldehyde				
3-ply plywood	.52	.42	.27	.24

Periodic examination of the specimen during the test runs revealed little tendency for the board to fail and the veneers to separate. After the outer plies had cracked through to the glue line, delamination did occur in a few instances. This tendency was somewhat more prevalent in the plywood than in the laminated materials.

It will be noted that irrespective of construction and type of glue, a life of at least 2×10^6 reversals can be expected, provided the repeated stress does not exceed 25 per cent. of the ultimate static value.

The actual repeated stress value for this life will, however, be highest for the two-ply laminated wood since it possesses the highest ultimate static stress.

High Density Laminated Plywood. (M. Finlayson, Trans. A.S.M.E., Vol. 65, No. 3, April, 1943, pp. 193-199.) (114/26 U.S.A.)

In normal plywood, subdivision and reassembly add little to the aggregate strength of the resultant material. The assembly, however, ensures the absence of local flaws and crooked grain and thus represents the best that can be obtained with wood of a given type. It appears that the resin, as used in normal manufacture, plays only in a minor part in improving the mechanical properties.

A large increase in strength of the wood, however, arises if the veneers are densified during assembly by using pressures much higher than are usual in ordinary plywood manufacture. By controlling the pressure, temperature and moisture content during assembly, any degree of densification up to 1.4 can be readily obtained. The thermosetting adhesive cures whilst the wood is in the compressed condition, and if sufficiently thin veneers are used there is practically no spring back after the material has cooled and is removed from the press. The data on strength characteristics presented by the author refer to the so-called unimpregnated type of high density wood, made from 1/32 in. birch veneer using a film type adhesive (Tego bond). The grain direction of all the plies is parallel (laminated wood). The density of the material varied about .8 and 1.3, depending on the manufacturing process adopted. The boards supplied were approximately 1 in. thick.

The tests show that both the tensile and compressive strength varied directly as the density of the material, the resulting mean line passing through the origin.

The strength for weight ratio is thus constant (24,700 psi under tension and 15,000 psi under compression for wood of unit density).

There is thus no inherent advantage on a weight basis on using the heavier wood. The density should, however, not fall below .8 to ensure adequate bonding (film stronger than wood). On a volume basis, however, the higher density wood presents important advantages.

TENSION.—The high density wood has no yield point and can be loaded up to the breaking limit without the appearance of permanent distortion.

If comparison with metals is carried out at the yield point of the latter, high density laminated wood on a weight basis is about six times as strong as low carbon steel and 50 per cent. stronger than Alclad. Even if we compare ultimate strength in each case, the densified wood still heads the list on a weight basis, as is shown in the following table:—

Material.	Density.	Ultimate.	Ultimate/d.
High density wood ...	.8-1.3	depends on d	24,700
Steel, heat treated ...	7.75	175,000	22,600
Al. alloy	2.81	60,000	21,400
Mg. alloy	1.78	43,000	24,200

COMPRESSION.—The high density wood does not show the same superiority over other materials, but is still well up on the list (15,000 psi against 20,700 for Al. alloy).

TORSION.—The ultimate shear strength under torsion is only about 1/9 that of aluminium. The resistance to torsional shock is however about the same. Thus, if internal damping is neglected, the max. shear stress (developed if a circular shaft of radius r is suddenly given an angular velocity w) is given by

$$f = rw\,(Ed)^{\frac{1}{2}}$$

where

$$E = \text{modulus of rigidity.}$$
$$d = \text{density.}$$

Using the following values:—

	Aluminium.	High Density Wood.
E	4.2×10^6	$.18 \times 10^6$
d	2.85	.95

$$(Ed)^{\frac{1}{2}}\text{ al.}/(Ed)^{\frac{1}{2}}\text{ wood} = 8.4$$

which is approximately the same as the ratio of the shear strength. The high interval damping of the wood presents an additional advantage since it evens out stress peaks.

EFFECT OF MOISTURE.—Exposure to water vapour and especially immersion water causes a considerable change in thickness and smaller changes in the other dimensions. The dimension in the direction of the grain is scarcely altered, whilst the thickness may increase up to 50 per cent. This increase in thickness is accompanied by an increase in weight of the same order. In spite of these large dimensional changes, there is no tendency to delamination.

High density plywood of the type tested must therefore be thoroughly protected by an imperious coating before it can be utilised under conditions of high humidity.

The material has proved an excellent material for aircraft propellers of large power output, a three-bladed 1,750 h.p. propeller weighing about 300 lb. less than a metal propeller of similar output.

In addition to this saving in weight, the high density wood propeller is less sensitive to notches and dents, and has excellent fatigue resistance and damping characteristics.

It is probable that further extensive uses for this material will be found once the large press equipment required will become more generally available.

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Heating Wood with Radio-Frequency Electric Power. (I. P. Taylor, Trans. A.S.M.E., Vol. 65, No. 3, April, 1943, pp. 201-212.) (114/27 U.S.A.).

If an alternating E.M.F. is applied to a perfect condenser, both the current and voltage are permanently out of step by 90° and no power is consumed.

If the dielectric is imperfect (*e.g.*, wood), the circuit behaves as if an "equivalent" resistance R_p were placed in parallel with a perfect condenser of the original capacity. R_p depends on the frequency.

The total current now leads the voltage by less than 90° and has both a resistance and capacity component (i_R and i_C respectively).

The power generated is now given by

$$P = i_R{}^2 R_p \qquad (1)$$

where

$$R_p = 1/2\pi fc \times 1/\cos\theta \qquad (2)$$

C = capacity of condenser.

f = frequency.

$\cos\theta$ = power factor.

The power factor can easily be measured by means of a special meter. It depends mainly on f and also slightly on the type of wood.

The following table represents average values :—

f	Power factor %.
60 cycles/sec.	.05
10 kc.	.8
10^2 kc.	1.3
10^3 kc.	1.8
10^4 kc.	2.6
10^5 kc.	3.4

If

v = volume of wood in cc.

p = specific heat.

c = density.

Δt = temperature rise in °c.

t = time required (sec.).

Then

$$P = \frac{4.18 \times pc \times \Delta t \times v}{t}$$

The author gives P/v as a function of t and Δt for two values of pc (.25 to .35 respectively).

Most woods fall between these limits. Knowing P and calculating R_p from (2), i_R and hence E can be calculated.

In a worked out example

$P = 6{,}000\ w.$

$C = 150\ \mu\mu$ farads.

If $f = 60$ and power factor .05, $R_p = 354 \times 10^6$ and E becomes 1.46×10^6 volts which is clearly impracticable.

On the other hand, if $f = 10^6$ cycles/sec., $R_p = 20{,}200$ and $E = 11{,}000$ volts.

For a given power output E thus varies inversely as the square root of the frequency, and in order to prevent danger of flash-over, as high a frequency as possible should be used.

The upper limit at present is fixed by tube efficiency by the generator and difficulties of current distribution. At the moment, 10-15,000 volts are usually employed.

The following are some of the advantages claimed for the new process of electric heating.

(1) More uniform heating throughout the mass.

(2) Thick sections can be heated quickly and the process can be adapted to hot glued joints.

(3) Presses for such work are simplified.

(4) Freedom from internal stresses, since uniform temperature implies uniform compression.

Disadvantages are mainly due to the need of adequate electrode insulation on the press, and guarding against flash-over. The author describes various methods of overcoming these difficulties. One obvious solution is to use the electric method outside the press simply to bring the material up to the working temperature. It is then inserted into the press and left to cure under the action of steam alone.

This method is adopted in the manufacture of "compreg" wood laminated propellers.

Limits in the Accuracy of the Determination of the True Vertical in an Aircraft by taking the Average of Readings of the Apparent Vertical. (E. Timmel, L.F.F., Vol. 20, No. 5, 16/6/43, pp. 171-174.) (114/31 Germany.)

Astronomical position finding depends on a knowledge of the true vertical; an error of .1° in the latter causing an uncertainty of 11 km. in the position.

No artificial horizon at present in use claims an accuracy of this order and a pendulum or spirit level is ruled out on account of its readings being seriously affected by even small changes in aircraft speed. As a result, the only practical procedure is to average out the apparent vertical readings over a period of time.

The author considers the errors likely to arise in this case, assuming that the aircraft flies on a straight course and that the disturbance acceleration is less than $g/60$ (error of individual apparent vertical readings not more than 1°).

If

b_v = vertical component of disturbance acceleration.
b_H = horizontal component of disturbance acceleration.
α = deflection of apparent vertical,

we have

$$\tan \alpha = \frac{b_H}{(g + b_v)}$$

$$i.e., \quad \alpha = \frac{b_H}{g} - \frac{(b_H \cdot b_v)}{g^2}$$

The error over a period of time T is thus given by

$$\bar{\alpha} = \left(\frac{1}{T}\right)\int_0^T \left(\frac{b_H}{g}\right) dt - \left(\frac{1}{T}\right)\int_0^T \left(\frac{b_H \cdot b_v}{g^2}\right) dt.$$

The author shows that under the specified conditions, the second integral is less than 1′ and can therefore be neglected.

Disturbances b_H can be classified into two groups.

Group I.—These disturbances are accidental and due to changes in the actual flight path from the ideal (constant direction and speed). They continually vary in amount and direction (gusts, swinging of compass, variation in power output), and the mean value over a length of time approaches zero under automatic pilotage or careful hand control.

The actual error is conveniently divided into a longitudinal and lateral component of the deviation from the true vertical. These are given respectively by

$$\alpha_L \text{ (longitudinal)} = \frac{\Delta v_g}{gT}$$

$$\alpha_q \text{ (lateral)} = \frac{v_g \Delta X}{gT}$$

where Δv_g = difference in ground speed in km./h. at beginning and end of interval T (minute).

ΔX = angle of rotation (degrees) of flight path tangent from set course over the interval T (minute).

Expressing α in minutes of arc, the above expression becomes

$$\alpha_L = \left(\frac{\Delta v_g}{T}\right) \times 1.71$$

$$\alpha_q = \left(\frac{v_g \Delta X}{T}\right) \times .03$$

Thus for an error of 6′ in α_L, $\Delta v_g/T$ must not exceed about 4. For a similar error in α_q, $v_g \times (\Delta X/T)$ must not exceed 200, *i.e.*, at 500 km./h., $\Delta X/T$ must not exceed .4° if the average is taken over one minute.

NOTE.—The above expression for α_q neglects the effect of the rotation of the flight path with respect to the great circle. This will be included in Group II, Section 2, below.

GROUP II.—Disturbances under this heading are not accidental and cannot be eliminated by averaging. They result in a steady deflection of the apparent vertical and may be due to any one of the following causes:—

(1) Coriolis acceleration due to rotation of the earth.
(2) Acceleration due to curvature of loxodrome (constant course).
(3) Changes in the wind velocity.

(1) The horizontal component of the acceleration is given by

$$b_c = 2wv_g \sin \phi,$$

where

v_g = ground speed.
ϕ = latitude.
w = angular velocity of the earth = .25°/minute.

The resultant deflection of the apparent vertical is given by bc/g and necessitates a correction in the altitude of a given star by the amount $bc/g \sin \tau$ where τ is the azimuth. At $v_g = 500$ km./h. and $\phi = 52°$, τ must be less than 60° in order to ensure an error of less than 6′ in the altitude observation.

(2) LOXODROME CURVATURE.—The radius of curvature of the loxodrome corresponding to a given course angle ψ is given by

$$r = R/\sqrt{(1 + \sin^2 \psi \tan^2 \phi)}$$

where

R = radius of earth = 6,370 km.
ϕ = latitude.

Limiting ourselves as before to the horizontal component of the acceleration, the lateral deflection of the apparent vertical is given by

$$\alpha_F = \left(\frac{V_g^2}{R_g}\right) \tan \phi \sin \psi$$

producing an error in the altitude of a given star of the amount $\alpha_F \sin \tau$, where τ is the azimuth. Even under the most unfavourable conditions ($\psi = 90°$) α_F will be less than 4′ at speeds up to 800 km./h.

The loxodrome cuts all meridians at an angle equal to the course ψ.

If, however, the course is set by a magnetic compass, the actual path will deviate from a loxodrome due to changes in the magnetic declination. This will require an additional correction depending on the rate of change of the declination with length of flight path.

The error due to this effect is not likely to exceed 1′ for flights in our latitudes, provided the ground speed is less than 500 km./h. and the rate of change of declination less than 1°/100 km.

(3) CHANGE IN WIND VELOCITY.—If the wind along the course changes in magnitude and direction, the aircraft will be accelerated relatively to the ground. Taken over a longer time interval, these accelerations will act in the same

direction and will therefore not cancel out when taking mean values of the apparent vertical.

The apparent vertical will deflect in the opposite direction to the wind speed by an amount which depends on the ground speed as shown below.

Change in Wind Speed per 100 km. flight path.	V_g (km./h.) 300	500	700
1 km./h.	.08′	.13′	.19′
20 km./h.	1.6′	2.6′	3.7′

Under normal conditions the effect is small. Its exact determination will require very accurate weather maps.

Summing up, it appears that averaging the apparent vertical will give results of sufficient accuracy only if the aircraft is flown under very steady conditions (change in ground speed less than 4 km./h., course deviation less than .4° both taken over an interval of 1 minute). This refers to accidental variations.

The constant errors only become important at high latitudes and speeds above 700 km./h.

Determination of TNT Content of Air. (Z.G.S.S., Vol. 38, No. 2, Feb., 1943, p. 32.) (114/32 Germany.)

The atmosphere of TNT plants contains varying amounts of the chemical, both in the form of dust and vapour. This is injurious to the health of the workers and necessitates accurate control. The German Ministry of Production has issued particulars of a chemical process for the rapid and accurate determination of the amount of nitro-aromatics present in the air.

By means of a large aspirator, 50-100 litre of the air under test are passed through three test tubes in series, each containing 10 cc. of methanol. The internal diameters of the test tubes and connecting tubes are 17 mm. and 5 mm. respectively. The rate of flow is adjusted so that no bubbling over occurs and there is no undue loss of methanol by evaporation. Contents of tubes one and two (originally amounting to 26 cc.) are mixed and shaken up with 2 cc. of 2 per cent. caustic soda solution. After a rest period of 10 minutes the resultant colouration is compared photometrically with a series of standards obtained by dissolving known amounts of TNT in 15 cc. of methanol similarly, treated with caustic soda. The matching must be carried out within 20 minutes of the soda addition, otherwise sedimentation produces error. It is stated that quantities as low as .05 mg. TNT can be detected, corresponding to .5 mg./m.3 if 100 litres are passed.

The third test tube should shown no discolouration and thus acts as a check.

It is pointed out that the colour change is not specific to TNT but can also be used for dinitrotoluol and other nitroaromatics. That colour is a rough indication of the amount of TNT vapour in the air is provided by exposing filter paper previously soaked in a 5 per cent. alcoholic solution of KOH and subsequently dried in a clean atmosphere.

Under the influence of the TNT vapour the test paper is at first coloured pink and then turns brown. The time required to produce a given standard tint is a rough indication of the concentration of the vapour.

Rate of Ice Formation. (A. L. London and R. A. Seban, A.S.M.E. Preprint, April 26-28, 1943.) (114/33 U.S.A.)

The problem of ice formation in liquids in contact with boundaries of various geometries has received but little attention in the literature. Perkeris and Slichter (J. Appl. Phys., Vol. 10, 1939, pp. 135-137) derive an approximate solution for the rate of ice formation on the outside of a cylinder for liquid at the freezing point and infinite surface conductance at the inside cylinder surface. In this solution, the inside surface temperature may be any function of the time. Elmer (Refrig. Engg., Vol. 24, 1932, p. 17) derives a similar expression for the rate of ice formation on submerged pipes. Other more exact solutions for slab-ice formation are available, but these are of considerable complexity and limited to a constant free-surface temperature. A new consideration of the problem in general with emphasis on approximate solutions of such form as to be readily applied to typical problems therefore seems appropriate.

The objectives of this paper are to accomplish the following:—

1. Describe a general approximate method of analyzing the problem of freezing in liquids bounded by surfaces of various geometries. "Freezing" is hereafter called "ice formation" but the generality of the method will be apparent.

2. Present solutions for the rate of ice formation for boundary geometries which are of significance in applications, i.e., cylinders, spheres, plane surfaces. These solutions are presented algebraically and graphically and are expressed in terms of dimensionless variables.

3. Estimate the degree of approximation of these solutions.

4. Illustrate the application of the approximate solutions by specific applications in ice manufacture and quick freezing of food products.

The results are stated to be in good agreement with practice.

Limits of Human Heat Regulation. (L. H. Newburgh, L. P. Herrington and A. P. Gagge, J. Aeron. Sci., Vol. 10, No. 6, June, 1943, pp. 197-199.) (114/34 U.S.A.)

The human organism is provided with a complicated mechanism which tends to keep the body temperature constant in spite of the varying production of internal heat or changes in the outside temperature.

Under comfortable conditions, the individual loses heat from the surface of the body at the same rate it is produced internally. The external loss is due to radiation, conduction, convection and evaporation of water and will depend on the skin temperature as well as on the humidity and temperature of the surrounding air. When the skin temperature is equal to the air temperature, heat can only be lost by the evaporation of water (sweat) and this is severely restricted if the relative humidity is high (moist desert heat). Under such circumstances the balance is upset and physical work must be restricted to the utmost if fatal results are to be avoided. If, however, the relative humidity is not above 20 per cent. the usual non-combatant field duties can be carried out for eight hours daily at air temperature up to 125°F. Under these conditions the individual loses about 1 litre of sweat per hour (NaCl content 2 gm. per litre).

The extra-cellular fluid in the body (from which the sweat is derived) contains about 8 gm. of NaCl per litre of water and this salinity must be maintained over relatively close limits for proper functioning of the organism.

Heavy sweating thus not only reduces the total amount of extra-cellular fluid but also affects its composition. Under these conditions it is thus not only necessary to have adequate supplies of drinking water but additional salt must be administered.

Whilst sweating provides an effective method for preventing an undue rise in skin temperature, the corresponding protective mechanism against cold appears much less efficient. There appears to be no automatic increase in the internal heat production of the body to prevent progressive cooling. Shivering only provides a moderate relief and the individual is forced to undergo strenuous exercise combined with adequate clothing if the effect of cold is to be resisted.

In this connection it is important to note that even the warmest unheated flying clothing will not prevent a gradual drop in body temperature when exposed to temperatures below 30°F. Extreme discomfort arises when the skin temperature falls from its normal value of 93°F. to 80°F. on the trunk and 40°F. at the toes. At an ambient temperature of 30°F. these dangerous limits are reached in 20 hrs. and 7 hrs. respectively, whilst at -30°F. the period is reduced to about 3 hrs.

On account of the cramped quarters in an aircraft, adequate remedial exercises are difficult and often impossible for certain members of the crew.

Although electrically heated clothing appears to form an ideal solution, most pilots have an inherent objection to this method (fear of burns?). In addition, it suffers from the drawback of constituting a heavy drain on the electric power supply.

A natural line of development appears to be an increase in the heat insulation of the clothing. This cannot be done by an increase in the thickness of the fabric already in use, since the clothing is already so heavy and bulky that it reduces agility and very markedly becomes a serious risk when effecting an emergency landing on water.

The authors are of the opinion, however, that it should be possible to develop a fabric of reduced thermal conductivity without increase in weight, and research in this direction is strongly recommended.

American Lease Lend Report. (Inter. Avia., No. 869-870, 18/5/43, pp. 18-19.) (114/35 U.S.A.)

The report covers the period 11.3.41 to 1.4.43.

The total aid given by the U.S.A. over this period to its allies amounted to 10.3×10^9 dollars, of which 82 per cent. represented goods (munitions, industrial supplies, food) whilst the remaining 18 per cent. covered services rendered (shipping, ship repairs, training, etc). Of the goods supplied, 55 per cent. have been munitions and 15 per cent. food. Nearly one-third of the munitions were represented by aircraft (1.4×10^9 dollars) over the first three months of this year, the shipment of lease-lend goods was apportioned as follows:—

Great Britain	38 per cent.
Russia	31 per cent.
Africa and Middle East	16 per cent.
Far East	14 per cent.
Other areas	1 per cent.

The total aid rendered over the period under consideration represents about 13 per cent. of the total war expenditure by the U.S.A. over the same period.

Lend-lease and direct purchase of combat aircraft by America's allies have accounted for about one-third of the total American production.

LIST OF SELECTED TRANSLATIONS.

No. 60.

NOTE.—Applications for the loan of copies of translations mentioned below should be addressed to the Secretary (R.T.P.3), Ministry of Aircraft Production, and not to the Royal Aeronautical Society. Copies will be loaned as far as availability of stocks permits. Suggestions concerning new translations will be considered in relation to general interest and facilities available.

Lists of selected translations have appeared in this publication since September, 1938.

AERO AND HYDRODYNAMICS.

TRANSLATION NUMBER AND AUTHOR.		TITLE AND REFERENCE.
1819	Ackeret, J. ... Pfenninger, W.	... *Prevention of Turbulent Boundary Layers of Suction.* (Die Naturwissenschaften, Vol. 29, No. 41, 10/10/41, pp. 622-623.)
1825	Kircheman, D. Vandrey, F.	... *The Influence of the Nozzle on Resistance Measurements in the Free Jet—II.* (Z.A.M.M., Vol. 22, No. 1, Feb., 1942, pp. 15-22.)
1830	Busemann, A.	... *The Resistance Problem in High Speed Flights.* (Schriften d. deutschen Akademie, L.F.F., No. 30, pp. 17-36.)
1832	Guderley, G.	... *Regression Edges in Two-Dimensional Compressible Potential Flow.* (Z.A.M.M., Vol. 22, No. 2, June, 1942, pp. 121-126.)
1833	——	... *Drag Reduction at High Speeds by Inducing Supersonic Vibrations on the Surface.* (Flugsport, Vol. 34, No. 23, 11/11/42, pp. 165-166, Pat. No. 726,324.)

AIRCRAFT AND ACCESSORIES.

1822	Hulten, N. ...	... *Close-Up of the Lagg-3.* (Flug och Motor, Vol. 21, No. 6-7, March-April, 1943, pp. 25-27 and 21-24.)
1823	Horten, G. ...	... *The Horten IV All-Wing Glider.* (Flugsport, Vol. 34, No. 4, 18/2/42, pp. 51-55; and Flugsport, Vol. 34, No. 6, 17/3/42, pp. 63-67.)
1835	Junkers ...	... *Jettisoning Containers for Aircraft, in Particular Jettisoning Fuel Tanks.* (Flugsport, Vol. 33, No. 25, 10/12/41, p. 76, Patent No. 713,321.)
1945	Focke-Wulf	... *An Aircraft Wing with Slotted Flaps.* (Flugsport, Vol. 34, No. 19, 16/9/42, p. 150, Patent No. 723,748.)
1846	Fieseler ...	... *Quick Release Device for Parts, in Particular Jettisoning Undercarriages—Dropped from Aircraft.* (Flugsport, Vol. 34, No. 22, 22/10/42, p. 164, Patent No. 722,027.)
1852	Henschel ...	... *Multi-Engined Landplane with Buoyant Cabin.* (Flugsport, Vol. 32, No. 26, 18/12/40, p. 157, Patent No. 699,351.)

TRANSLATION NUMBER AND AUTHOR.		TITLE AND REFERENCE.
1859	Pintsch ...	... *Retractable Aircraft Searchlight.* (Flugsport, Vol. 32, No. 3, 31/1/40, p. 84, Patent No. 686,222.)
1860	Heinkel, E. ...	... *Lifting Device for Loading Aircraft.* (Flugsport, Vol. 34, No. 26, 23/12/42, pp. 179-180, Patent No. 725,509.)
		MATERIALS AND ELASTICITY.
1826	Theiner, J. ...	... *Strength Characteristics of Woods Used in Captured Russian Aircraft.* (Luftwissen, Vol. 10, No. 4, April, 1943, pp. 103-104.)
1827	Hansen, M. ... Seeman, H. J.	... *Investigations of Aluminium-Zinc Magnesium Wrought Alloys—II.* (Aluminium, Vol. 22, No. 9, 1940, pp. 442-458.)
1831	Schmidt, R. ...	... *The Bending Fatigue Strength of Machined Crankshafts After Straightening, with Notes on the Stress Distribution, Obtained by Extensometer and X-Ray Diffraction Measurements.* (Luftwissen, Vol. 9, No. 9, Sept., 1942, pp. 263-267.)
		INSTRUMENTS.
1829	Gorner, J. ...	... *High Speed Electro-Magnetic Revolution Counter.* (E.T.Z., Vol. 63, No. 35-36, 10/9/42, p. 416.)
1864	Schmidt, U.	... *A Fully Automatic Fuel Flow Meter.* (A.T.Z., Vol. 45, No. 24, Dec., 1942, pp. 670-672.)
		WIRELESS AND ELECTRICITY.
1820	——	... *Calculation of the Process Responsible for the Excitation of Oscillations on a Valve Connected to a Barkhausen-Kurz Circuit.* (Archiv f. Elekt., Vol. 26, 1932, pp. 841-849.)
1824	Schulze, W. M. N.	*Tropical Climates and Communication Technique.* (Elek. Nachrichtentecknik, Vol. 18, No. 6, 1941, pp. 134-138.) (Translated by A.D.R.D.E.)
		MATHEMATICS.
1821	Buchner, H.	... *An Approximate Solution of the Ordinary Linear Differential Equation of the First Order.* (Z.A.M.M., Vol. 22, No. 3, June, 1942, pp. 143-152.)

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

Requests for further information or translations should be addressed to R.T.P.3, Ministry of Aircraft Production.

THEORY AND PRACTICE OF WARFARE.

General Strategy and Tactics.

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
1	10873	G.B.	*The Burman Battle.* (N. Macmillan, Aeronautics, Vol. 8, No. 4, May, 1942, pp. 28-31.)
2	10908	Germany ...	*German Opinions on Aerial Warfare Code Applied to Paratroops and General Use of Parachutes.* (Inter. Avia., No. 859-860, 6/3/43, pp. 1-5.)
3	10946	G.B.	*Mine Sweeper Aircraft (Explodes Magnetic Mines).* (Inter. Avia., No. 861, 17/3/43, p. 8.)
4	10971	G.B.	*Air Force Targets in Sardinia.* (Engineer, Vol. 175, No. 4,560, 4/6/43, pp. 443-445.)
5	10973	G.B.	*Defence of Ships Against Torpedo Attack.* (Engineer, Vol. 175, No. 4,560, 4/6/43, p. 448.)
6	11755	Germany ...	*The Attacks on the Mohne and Eder Damms.* (Inter. Avia., No. 869-870, 18/5/43, pp. 22-23.)

Organisation and Training.

7	10654	G.B.	*Night Flying Training.* (Flight, Vol. 43, No. 1,786, 27/5/43, pp. 552-553.)

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8	10671	France ...	*Fighting French Air Transport.* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 574.)
9	10728	India ...	*The Indian Air Force.* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 384.)
10	10740	G.B.	*R.A.F. Silver Jubilee.* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, pp. 385-386.)
11	10741	G.B.	*Genesis of the R.A.F.* (C. G. Grey, Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 387.)
12	10742	G.B.	*R.A.F. Squadrons*—1918. (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 388.)
13	10743	G.B.	*The R.A.F. in the Years Between Two Wars.* (J. M. Spaight, Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 389.)
14	10745	G.B.	*R.A.F. in the Test of Wars.* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, pp. 392-394.)
15	10746	G.B.	*Twenty-Five Years of Progress in the R.A.F.* (P. Masefield, Aeroplane, Vol. 64, No. 1,662, 2/4/43, pp. 394-396.)
16	10786	G.B.	*Aircraft v. Submarines.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 491-492.)
17	10789	France ...	*French Airmen in Russia.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 495.)
18	10855	U.S.A. ...	*Training of Naval Fire-Fighters.* (A. D. Rathbone, Sci. Am., Vol. 168, No. 4, April, 1943, pp. 150-153.)
19	10875	G.B.	*Natural Formations.* (A. Falorde, Aeronautics, Vol. 8, No. 4, May, 1942, pp. 36-39.)
20	10955	U.S.A. ...	*U.S.A. New Naval Aircraft Type Designations.* (Inter. Avia., No. 861, 17/3/43, p. 14.)
21	10957	G.B.	*R.A.F. Air Transport Command.* (Inter. Avia., No. 861, 17/3/43, p. 17.)
22	10990	U.S.A. ...	*Popular Names of U.S. Military Aircraft.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 98-99.)
23	10992	U.S.A. ...	*World Military Aeroplanes Grouped by Types.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 105-109.)
24	11483	Italy	*Italian Advisory Air Committee.* (Inter. Avia., No. 867, 1/5/43, pp. 29-30.)

Design and Equipment.

25	10628	G.B.	*Parachute Supply Container Dropped by R.A.F. in Jugoslavia (Photograph).* (Flight, Vol. 43, No. 1,794, 13/5/43, p. 490.)
26	10632	Germany ...	*Pneumatic Dinghy Used by the Luftwaffe (Photo).* (Flight, Vol. 43, No. 1,795, 13/5/43, p. 500.)
27	10737	G.B.	*Enemy Parachute Ammunition Container (Photograph).* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 382.)
28	10871	U.S.A. ...	*Asbestos Fittings for Use in Aircraft.* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 185.)

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29	10874	G.B. ...	... *Armoured Aviation.* (Aeronautics, Vol. 8, No. 4, May, 1942, pp. 33-35.)
30	10951	France	... *Moram Fighter Trainer Uses Plymex Method of Construction (Wood Veneers Bonded to Al. Sheet).* (Inter. Avia., No. 861, 17/3/43, p. 12.)
31	10969	G.B. ...	... *A Lifeboat Dropped by Parachute.* (Engineer, Vol. 175, No. 4,560, 4/6/43, p. 439.)
32	11056	U.S.A.	... *Glass-Insulated Portable Shelter for Army Use in the Arctic.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 222.)
33	11088	Germany	... *The High Performance Fighter.* (K. Tank, Luftwissen, Vol. 10, No. 4, April, 1943, pp. 99-102.)
34	11142	Germany	... *Parachute Descent and Time Reserve at Great Heights.* (Gauer and others, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 340.)
35	11185	U.S.A.	... *Variable Intensity Pilot Light.* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 43.)
36	11199	Germany	... *Jettisonable Container for Flares and Other Inflammable Materials. (Pat. series No. 3, 730,495.)* (Arado, Flugsport, Vol. 35, No. 8, 21/4/43, p. 18.)
37	11201	Germany	... *Retractable Support for Jettisoning Loads for Aircraft. (Pat. series No. 3, 730,654.)* (Junkers, Flugsport, Vol. 35, No. 8, 21/4/43, p. 18.)
38	11208	Germany	... *Stowage for Jettisonable Loads. (Pat. series No. 3, 731,051.)* (Sageb, Flugsport, Vol. 35, No. 8, 21/4/43, p. 19.)
39	11245	U.S.A.	... *Fire Fighting Equipment on Pan-American Clipper.* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 259.)
40	11308	Germany	... *Light Aircraft Fitted with Gas Generator.* (Flugsport, Vol. 35, No. 10, 16/6/43, pp. 126-127.)
41	11377	G.B. ...	... *The Duff Norton Aeroplane Jack.* (Airc. Eng., Vol. 15, No. 172, June, 1943, pp. 183-184.)
42	11390	U.S.A.	... *Improved Aircraft Life Rafts (Wright Field Equipment).* (Aviation, Vol. 42, No. 3, March, 1943, pp. 261 and 370.)
43	11405	U.S.A.	... *Field Maintenance and Repair of Fighting Aircraft (Digest).* (N. R. Kearney, J.S.A.E., Vol. 51, No. 5, May, 1943, p. 32.)
44	11450	U.S.A.	... *Fore Part of the Boeing B-17F Dorsal Fin (Drawing).* (Aviation, Vol. 42, No. 4, April, 1943, p. 183.)
45	11459	U.S.A.	... *Aircraft Maintenance Equipment (Hydraulic Jack for Tyre Removal, Portable Engine Test Stand, etc.).* (Aviation, Vol. 42, No. 4, April, 1943, pp. 223-225.)
46	11480	Italy ...	... *Italian Air Force Equipment.* (Inter. Avia., No. 867, 1/5/43, pp. 21-22.)

Armament.

47	10640	G.B. ...	... *Air Gunnery Training.* (Aeroplane, Vol. 64, No. 1,670, 28/5/43, pp. 628-629.)

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48	11810	Germany ...	*German Report of New R.A.F. Explosive Incendiaries.* (Flight, Vol. 43, No. 1,793, 6/5/43, p. 480.)
49	10884	U.S.A. ...	*Armament of Flying Fortress (Boeing B-17E and F).* (Inter. Avia., No. 858, 26/2/43, pp. 7-8.)
50	11093	Germany ...	*A Sound Proof Shooting Range.* (W. Pfeiffer, Luftwissen, Vol. 10, No. 4, April, 1943, p. 118.)
51	11094	Germany ...	*Research on Bombs.* (G. Madelung, Luftwissen, Vol. 10, No. 4, April, 1943, p. 123.)
52	11180	U.S.A. ...	*Boulton Paul Gun Turret Mechanism.* (M. W. Bourdon, Autom. Ind., Vol. 88, No. 7, 1/4/43, pp. 28-33.)
53	11204	Germany ...	*Bomb Stowage.* (*Pat. series No.* 3, 731,050.) (Henschel, Flugsport, Vol. 35, No. 8, 21/4/43, pp. 18-19.)
54	11314	Germany ...	*Gun Installation in Thin Wings.* (*Pat. series No.* 5, 732,734.) (Henschel, Flugsport, Vol. 35, No. 10, 16/6/43, p. 29.)
55	11315	Germany ...	*Gun Mounting in Front of Propeller and Supported on Hub.* (*Pat. series No.* 5, 733,329.) (Junkers, Flugsport, Vol. 35, No. 10, 16/6/43, p. 29.)
56	11453	G.B.	*The Bristol Hydraulically-Operated Power-Driven Gun Turret (Drawing).* (Aviation, Vol. 42, No. 4, April, 1943, p. 187.)
57	11460	U.S.A. ...	*Designing Gun Turrets as Integral Part of Aircraft.* (L. G. Frise, Aviation, Vol. 42, No. 4, April, 1943, pp. 227-231.)
58	11465	U.S.A. ...	*Martin Gun Interrupter on U.S. Combat Planes.* (Aviation, Vol. 42, No. 4, April, 1943, p. 307.)
59	11467	G.B.	*New British Delayed-Action Bomb with Dual Mechanism.* (Aviation, Vol. 42, No. 4, April, 1943, p. 311.)

Military Types of Aircraft (British and Japanese).

60	10615	G.B. and U.S.A. ...	*New Aircraft Types—British and American.* (Aircraft Production, Vol. 5, No. 56, June, 1943, p. 302.)
61	10618	G.B.	*Avro Lancaster II.* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 520.)
62	10619	G.B.	*The Fairey Albacore (Photograph).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 520.)
63	10624	Japan ...	*Mitsubishi S-OO (Recog. Details).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. b.)
64	10626	G.B.	*Hurricane on Catapult Mounting (Photograph).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 537.)
65	10631	G.B.	*Hawker's Latest Fighter—The Typhoon (2,400 h.p. Napier Sabre).* (Flight, Vol. 43, No. 1,794, 13/5/43, pp. 496-498.)
66	10642	Japan ...	*Mitsubishi Navy SHS-OO Single-Seat Fighter Float Planes (Photograph).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 583.)
67	10643	G.B.	*Supermarine Spitfire IX (Photograph).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 582.)

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68	10645	G.B. ...	... *A Fighting Mosquito Squadron.* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, pp. 588-589.)
69	10653	G.B. ...	... *The Airspeed Oxford Trainer.* (Flight, Vol. 43, No. 1,786, 27/5/43, pp. 549-551.)
70	10661	G.B. ...	... *Supermarine Spitfire V.B.'s Flying Over Australian Mainland (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 550.)
71	10668	G.B. ...	... *The Typhoon, its History and Development: The Sopwith Types,* 1914-1918; *Earlier Hawker Types,* 1923-1929; *The Furies,* 1933-1936; *Hurricane to Typhoon,* 1935-1943. (Aeroplane, Vol. 64, No. 1,668, 14/5/43, pp. 559-566.)
72	10669	G.B. ...	... *The Hawker Typhoon I.B. (Napier Sabre Engine).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, pp. 542-543.)
73	10670	G.B. ...	... *The Fairey Swordfish—its Work in Naval Operations.* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, pp. 572-573.)
74	10736	Japan	... *Wreckage of a Mitsubishi SSH-OO Float Plane Fighter (Photo).* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 382.)
75	10744	G.B. ...	... *Some Notable Aeroplanes of the R.A.F.,* 1918-1943 *(Photographs).* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, pp. 390-391.)
76	10748	G.B. ...	... *Pilot's Cockpit of De Havilland Mosquito Bomber (Photograph).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 523.)
77	10749	G.B. ...	... *Supermarine Spitfire VB (Photo).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 525.)
78	10754	G.B. ...	... *De Havilland Mosquito (I-IV).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, pp. 532a-539.)
79	10755	G.B. ...	... *The Bristol Blenheim V.P. Light Bomber (Recognition Details).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, pp. 544-545.)
80	10756	G.B. ...	... *Martin Marauder I (Recognition Details).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, pp. 544-545.)
81	10792	G.B. ...	... *Fairey Albacores with Folded Wings on Flight Deck of Aircraft Carrier "Indomitable" (Photograph).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 498.)
82	10796	G.B. ...	... *The Hawker Typhoon (Photo).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 504-505.)
83	10797	G.B. ...	... *Hurricane* 11*D (Photograph).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 504-505.)
84	10799	G.B. ...	... *The Hawker Typhoon.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 513-515.)
*85	10802	G.B. ...	... *An Airspeed Horsa Military Glider (Photo).* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 379.)
86	10803	G.B. ...	... *Hawker Typhoon (Recognition Details).* (Flight, Vol. 43, No. 1,793, 6/5/43, p. 466.)
87	10804	G.B. ...	... *The Mosquito (from Design Stage to Operational Service).* (Flight, Vol. 43, No. 1,793, 6/5/43, pp. 467-472.)

* See also Glider Section (Items 187-193).

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88	10805	G.B. ...	... *De Havilland Mosquito F.11 Fighter.* (Flight, Vol. 43, No. 1,793, 6/5/43, pp. A-B.)
89	10888	G.B. ...	... *Blenheim V (Bisley) Close Support Bomber.* (Inter. Avia., No. 858, 26/2/42, pp. I and 10.)
90	10889	G.B. ...	... *Lancaster I and II.* (Inter. Avia., No. 858, 26/2/43, pp. 10-11.)
91	10890	G.B. ...	... *Anson V and VI (Vidal Plastic).* (Inter. Avia., No. 858, 26/2/43, pp. 14 and 15.)
92	10896	G.B. ...	... *Lancaster Bomber Converted to Transport (York).* (Inter. Avia., No. 858, 26/2/43, p. 16.)
93	10921	Japan	... *Mitsubishi S-00 Fighter.* (Inter. Avia., No. 856-857, 15/2/43, p. 10.)
94	10935	G.B. ...	... *De Havilland "Mosquito."* (Inter. Avia., No. 856-857, 15/2/43, pp. 11 and 18.)
95	10936	G.B. ...	... *Miles M. 28 Trainer and Liaison Plane.* (Inter. Avia., No. 856-857, 15/2/43, pp. 1 and 18.)
96	10743	G.B. ...	... *Westland Whirlwind Converted into a Fighter Bomber (Whirlibomber).* (Inter. Avia., No. 861, 17/3/43, p. 7.)
97	10945	G.B. ...	... *Fairey Barracuda Torpedo and Dive Bomber.* (Inter. Avia., No. 861, 17/3/43, p. 7.)

Military Types of Aircraft (U.S.A.).

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98	10620	U.S.A.	... *Republic Thunderbolts (P.47).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 520.)
99	10629	U.S.A.	... *U.S. Navy and Marine Wildcats (Photograph).* (Flight, Vol. 43, No. 1,794, 13/5/43, p. 491.)
100	10630	U.S.A.	... *Douglas Skymaster (C-54) Transport (Photo).* (Flight, Vol. 43, No. 1,794, 13/5/43, p. 491.)
101	10636	U.S.A.	... *Grumman Goose I (Recognition Details).* (Flight, Vol. 43, No. 1,794, 13/5/43, p. a.)
102	10637	U.S.A.	... *Chance-Vought Corsair Single-Seat Fighter (Photo).* (Aeroplane, Vol. 64, No. 1,670, 28/5/43, p. 612.)
103	10638	U.S.A.	... *Sikorsky Helicopter (Photo).* (Aeroplane, Vol. 64, No. 1,670, 28/5/43, p. 612.)
104	10641	U.S.A.	... *The Seamew (Curtiss SO3C-1) (Photograph).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 581.)
105	10646	U.S.A.	... *American Aeroplanes in Service—XIII (Silhouettes).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 590.)
106	10647	U.S.A.	... *The Thunderbolt (Recognition Details).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, pp. 591-592.)
107	10649	U.S.A.	... *The Beechcraft D-17R (Recognition Details).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 601.)
108	10655	U.S.A.	... *Fairchild Cornell (Recognition Details).* (Flight, Vol. 43, No. 1,786, 27/5/43, p. a.)
109	10656	U.S.A.	... *Aeronca L-58B Defender.* (Flight, Vol. 43, No. 1,786, 27/5/43, p. b.)
110	10660	U.S.A.	... *Republic P-47 Thunderbolt (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 550.)
111	10662	U.S.A.	... *Photograph of North American Mitchells Taking Off to Raid Tokio.* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 551.)
112	10665	U.S.A.	... *Vultee Vengeance (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 553.)

ITEM NO.	R.T.P. REF.			TITLE AND JOURNAL.
113	10666	U.S.A.	...	*Martin Mariner (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 554.)
114	10750	U.S.A.	...	*North American Mitchells (Photo).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 528.)
115	10751	U.S.A.	...	*Fuselage of Curtiss Warhawk Stowed Inside Cabin of Douglas C-47 Skytrain (Photo).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 528.)
116	10753	U.S.A.	...	*American Aeroplanes in Service—XII (Silhouettes).* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 532.)
117	10788	U.S.A.	...	*Noorduyn Norseman UC-64 (Photo).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 495.)
118	10793	U.S.A.	...	*Douglas A-20C Havoc Bombers Boston IIIe (Photograph).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 498.)
119	10807	U.S.A.	...	*The Lockheed-Vega Ventura.* (Flight, Vol. 43, No. 1,793, 6/5/43, p. 478.)
120	10847	U.S.A.	...	*Fairchild Cornell Trainers (Photographs).* (Pegasus, Vol. 1, No. 2, Feb., 1943, pp. 11-12.)
121	10868	U.S.A.	...	*The Lockheed Constellation.* (Sci. Am., Vol. 168, No. 4, April, 1943, pp. 182-183.)
122	10876	U.S.A.	...	*Lockheed "Constellation" (C-69).* (Aeronautics, Vol. 8, No. 4, May, 1942, pp. 40-41.)
123	10877	U.S.A.	...	*Curtiss Caravan (C-76) (Photograph).* (Aeronautics, Vol. 8, No. 4, May, 1942, pp. 40-41.)
124	10880	U.S.A.	...	*Vought-Sikorsky V.S. 300.* (Aeronautics, Vol. 8, No. 4, May, 1942, pp. 64-65.)
125	10882	U.S.A.	...	*Curtiss Wright Caravan (C-76).* (Inter. Avia., No. 858, 26/2/43, pp. 1 and 7.)
126	10883	U.S.A.	...	*Lockheed C-69 Constellation.* (Inter. Avia., No. 858, 26/2/43, p. 7.)
127	10885	U.S.A.	...	*Curtiss SO3C-1 Scout "Seagull."* (Inter. Avia., No. 858, 26/2/43, p. 8.)
128	10886	U.S.A.	...	*Piper H.E.-1 Ambulance Plane.* (Inter. Avia., No. 858, 26/2/43, pp. 1 and 8.)
129	10909	U.S.A.	...	*Brewster Bermuda Dive Bomber.* (Inter. Avia., No. 859-860, 6/3/43, p. 8.)
130	10910	U.S.A.	...	*Manta Long Range Fighter.* (Inter. Avia., No. 859-860, 6/3/43, p. 7.)
131	10911	U.S.A.	...	*Grumman Avenger Torpedo Plane (Photo).* (Inter. Avia., No. 859-860, 6/3/43, p. 1.)
132	10912	U.S.A.	...	*Curtiss "Seagull" Scout (Photo).* (Inter. Avia., No. 859-860, 6/3/43, p. 1.)
133	10914	U.S.A.	...	*Curtiss C-76 Caravan.* (Inter. Avia., No. 859-860, 6/3/43, pp. 1 and 7-8.)
134	10915	U.S.A.	...	*Martin P.B. M-3 Mariner Patrol Bomber (Photo).* (Inter. Avia., No. 859-860, 6/3/43, p. 1.)
135	10916	U.S.A.	...	*Fairchild AT-14 Trainer.* (Inter. Avia., No. 859-860, 6/3/43, pp. 1 and 8-9.)
136	10917	U.S.A.	...	*Vultee A-31 Dive Bomber (Georgia or Vengeance).* (Inter. Avia., No. 859-860, 6/3/43, pp. 1 and 9.)
137	10924	U.S.A.	...	*Vought Sikorsky Single-Seat Naval Fighter F4U-1 "Corsair."* (Inter. Avia., No. 856-857, 15/2/43, p. 11.)
138	10925	U.S.A.	...	*Republic P-47 Thunderbolt High Level Fighter.* (Inter. Avia., No. 856-857, 15/2/43, p. 11.)

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139	10926	U.S.A. ...	*Lockheed P.38-E Lightning.* (Inter. Avia., No. 856-857, 15/2/43, pp. 11-12.)
140	10927	U.S.A. ...	*North American P-51 "Mustang."* (Inter. Avia., No. 856-857, 15/2/43, p. 12.)
141	10928	U.S.A. ...	*North American B-25 Mitchell Medium Bomber* (Inter. Avia., No. 856-857, 15/2/43, p. 12.)
142	10929	U.S.A. ...	*Curtiss Helldiver S.B.2C-1.* (Inter. Avia., No. 856-857, 15/2/43, p. 12.)
143	10930	U.S.A. ...	*Douglas Dive Bombers.* (Inter. Avia., No. 856-857, 15/2/43, p. 13.)
144	10931	U.S.A. ...	*Cessna C-78 Liaison.* (Inter. Avia., No. 856-857, 15/2/43, pp. 1 and 13.)
145	10932	U.S.A. ...	*Grumman Avenger Torpedo Bomber.* (Inter. Avia., No. 856-857, 15/2/43, p. 13.)
146	10934	U.S.A. ...	*Piper Cub Liaison Plane.* (Inter. Avia., No. 856-857, 15/2/43, pp. 11 and 17.)
147	10940	U.S.A. ...	*Lockheed L-49 Constellation (Photo).* (Inter. Avia., No. 856-857, 15/2/43, p. 1.)
148	10941	U.S.A. ...	*Fairchild AT-13 Trainer (Photo).* (Inter. Avia., No. 856-857, 15/2/43, p. 11.)
149	10942	U.S.A. ...	*Boeing AT-15 Trainer (Photo).* (Inter. Avia., No. 856-857, 15/2/43, p. 11.)
150	10944	U.S.A. ...	*Brewster SB2A-2 Navy Dive Bomber (Photograph).* (Inter. Avia., No. 861, 17/3/43, p. 1.)
151	10954	U.S.A. ...	*Lockheed C-69 Constellation Transport.* (Inter. Avia., No. 861, 17/3/43, pp. 1 and 13-14.)
152	10998	U.S.A. ...	*The Vega PV-1 Patrol Plane (Photograph).* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 134.)
153	10999	U.S.A. ...	*The Goodyear FG-1 Single-Seater Fighter (Photograph).* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 134.)
154	11177	G.B.	*The Halifax Four-Engined Bomber.* (Engineer, Vol. 175, No. 4,562, 18/6/43, p. 490.)
155	11246	U.S.A. ...	*Sikorsky Helicopter (Latest Type).* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 275.)
156	11309	U.S.A. ...	*Republic P.47 Thunderbolt.* (Flugsport, Vol. 35, No. 10, 16/6/43, pp. 127-128.)
157	11469	G.B.	*Avro Anson Mark V.* (Aviation, Vol. 42, No. 4, April 23, p. 313.)

Military Types of Aircraft (U.S.S.R.).

158	10623	U.S.S.R. ...	*Stormovik Il-2C (Recognition Details).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. a.)
159	10948	U.S.S.R. ...	*Russian Fighter Types I-18, I-20, I-26.* (Inter. Avia., No. 861, 17/3/43, pp. 1 and 10.)
160	11095	U.S.S.R. ...	*A Close-up of the LAGG-3 Russian Fighter.* (A. Hulten, Flyg och Motor, Vol. 2, No. 6-7, March-April, 1943, pp. 25-27 and 21-24.)

Military Types of Aircraft (Sweden).

161	10891	Sweden ...	*Swedish Dive Bomber B-17 with Retractable Snow Skids.* (Inter. Avia., No. 858, 26/2/43, pp. 1 and 18.)

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			Military Types of Aircraft (Germany).
162	10644	Germany ...	*Arado Ar 68E as a Fighter Trainer (Photo).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 587.)
163	10664	Germany ...	*Heinkel He. 111 H3 with Bomb Slung Externally Under the Centre Section (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 553.)
164	10752	Germany ...	*Bücker Bestmann Two-Seat Cabin Monoplanes.* (Aeroplane, Vol. 64, No. 1,667, 7/5/43, p. 531.)
165	10881	Germany ...	*Two German Six-Engined Aircraft (Me. 323 and Blohm and Voss 222).* (Aeronautics, Vol. 8, No. 4, May, 1942, p. 87.)
166	10892	Germany ...	*Messerschmitt Me. 109 G-2 High Altitude Fighter.* (Inter. Avia., No. 858, 26/2/43, p. 15.)
167	10893	Germany ...	*Messerschmitt Me. 210 Long Range Fighter.* (Inter. Avia., No. 858, 26/2/43, pp. 15-16.)
168	10894	Germany ...	*Henschell Hs. 129 (Ground Attack Fighter).* (Inter. Avia., No. 858, 26/2/43, p. 16.)
169	10895	Germany ...	*Junkers Ju. 87D Dive Bomber.* (Inter. Avia., No. 858, 26/2/43, p. 16.)
170	10939	Germany ...	*Junkers Ju. 90S Four-Engined Transport (Photo).* (Inter. Avia., No. 856-857, 15/2/43, p. 1.)
171	10949	Germany ...	*Arado Ar. 96, Built by S.I.P.A.* (Inter. Avia., No. 861, 17/3/43, p. 10.)
172	11181	Germany ...	*Germany's Newest Fighter Bomber, Messerschmitt 210 A-I.* (M. W. Bourdon, Autom. Ind., Vol. 88, No. 7, 1/4/43, pp. 34-37.)
173	11182	Germany ...	*German Warplanes (Me. 109 G-2, He. 129 and Ju. 87-D-I).* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 37.)
			Military Types of Aircraft (Italy).
174	10622	Italy	*The Macchi C-202 Single-Seater Fighter (Photograph).* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 526.)
175	10667	Italy	*Savoia-Marchetti SM79 Sparviero Carrying Torpedo (Photograph).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 556.)
176	10791	Italy	*Cant Z 506 B Airone on Air-Sea Rescue Operations (Photograph).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 499.)
			Military Types of Aircraft (France).
177	10739	France ...	*Three French Flying Boats Reported Seized by the Germans.* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 384.)
178	10913	France ...	*Large French Flying Boat (Trials).* (Inter. Avia., No. 859-860, 6/3/43, p. 21.)
179	10920	France ...	*Bloch 157 Single-Seat Fighter.* (Inter. Avia., No. 859-860, 6/3/43, p. 21.)
180	10950	France ...	*Bloch 161 (SO 161) Four-Engined Transport.* (Inter. Avia., No. 861, 17/3/43, pp. 1 and 11-12.)
181	10952	France ...	*SE 200 and Latécoère 631 Giant Flying Boats.* (Inter. Avia., No. 861, 17/3/43, p. 12.)
182	10953	France ...	*French Stratosphere Aircraft Proposed by CAPRA.* (Inter. Avia., No. 861, 17/3/43, p. 13.)

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183	11188	France ..	*Mauboussin M. 300 Trainer.* (Flugsport, Vol. 35, No. 8, 21/4/43, p. 90.)
184	11189	France ...	*Mauboussin M. 400 Transport Biplane.* (Flugsport, Vol. 35, No. 8, 21/4/43, p. 91.)
185	11472	France ...	*Loire-Nieuport Dive Bomber.* (Inter. Avia., Vol. 867, 1/5/43, p. 10.)
186	11501	France ...	*Breguet 500 Transport Plane with High Lift Device (Ce=3 max.).* (Inter. Avia., No. 868, 10/5/43, p. 17.)

Gliders.

187	10794	Germany ...	*Tailless Horten III Glider (Pilot in Prone Position).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 501.)
188	10887	U.S.A. ...	*Piper TG-8 Training Glider.* (Inter. Avia., No. 858, 26/2/43, pp. 1 and 9.)
189	10918	U.S.A. ...	*American Glider Development.* (Inter. Avia., No. 859-860, 6/3/43, pp. 9-10.)
190	10947	Germany ...	*Messerschmitt Me. 323 Power Glider.* (Inter. Avia., No. 861, 17/3/43, p. 9.)
191	11179	U.S.A. ...	*Army CG-4 Heavy Gliders (Photos).* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 23.)
192	11307	France ...	*Castel-Mauboussin Gliders (C30, C301S, C31P, L25S, etc.).* (Flugsport, Vol. 35, No. 10, 16/6/43, pp. 123-126.)
193	11334	Germany ...	*Sail Plane Caudron C800 and C810.* (Flugsport, Vol. 35, No. 9, 19/5/43, pp. 105-107.)

Aircraft Carriers.

194	10658	G.B.	*Escort Carriers for Atlantic Convoys.* (Flight, Vol. 43, No. 1,786, 27/5/43, p. 559.)
195	11231	G.B.	*Ship Flying and Aircraft Carriers—I.* (P. Bethell, Engineering, Vol. 156, No. 4,042, 2/7/43, pp. 1-4.)
196	11278	G.B.	*"Seadromes" in the Atlantic.* (Engineering, Vol. 155, No. 4,041, 25/6/43, p. 508.)
197	11482	G.B.	*British Aircraft Carriers (Losses and Construction).* (Inter. Avia., No. 867, 1/5/43, pp. 26-27.)
198	11757	Switzerland ...	*Floating Air Bases.* (Inter. Avia., No. 869-870, 18/5/43, p. 29.)

AERODYNAMICS AND HYDRODYNAMICS.

General Aerodynamics.

199	10854	U.S.A. ...	*The Influence of Sweep on the Spanwise Lift Distribution of Wings.* (F. Theilheimer, J. Aeron. Sci., Vol. 10, No. 3, March, 1943, pp. 101-104.)
200	11022	Germany ...	*Some Experiments on the Increase in the Maximum Lift of an Aerofoil Undergoing a Change of Incidence at a Constant Angular Velocity.* (N. Scheubel, German Academy of Aeron. Research, Collected Reports No. 1, 1942, pp. 37-45.)
201	11023	Germany ...	*The Activated Flow.* (A. Proll, German Academy of Aeron. Research, Collected Reports No. 1, 1942, pp. 47-62.)

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202	11572	Germany ...	*The Effect of Compressibility on Thin Slightly Cambered Profiles at Subsonic Speeds.* (W. Hantzsche and H. Wendt, Z.A.A.M., Vol. 22, No. 2, April, 1942, pp. 72-86.)

Wind Tunnels.

203	10717	U.S.A. ...	*Wind Tunnel Tests to Determine Stack Heights (Dissipation of Flue Gases).* (H. L. Von Hohenleiten and E. F. Wolf, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 671-683.)
204	10853	U.S.A. ...	*Wind Tunnel Cooling.* (A. N. Tifford, J. Aeron. Sci., Vol. 10, No. 3, March, 1943, pp. 98-100.)
205	10919	U.S.A. ...	*700 m.p.h. Wind Tunnel at Pasadena.* (Inter. Avia., No. 859-860, 6/3/43, p. 14.)
206	11247	U.S.A. ...	*New Light Speed Low Density Refrigerated Wind Tunnel (600 m.p.h., 67°F., 40,000 ft.).* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 276.)

General Hydrodynamics.

210	10716	U.S.A. ...	*The Flow of a Flashing Mixture of Water and Steam Through Pipes.* (M. W. Benjamin and J. G. Miller, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 657-669.)
211	10719	U.S.A. ...	*Correlation of Coefficient of Friction with Drilling Torque and Thrust for Different Types of Cutting Fluids (Advantage of Sulphurised Oil Under Conditions of Seizure).* (A. O. Schmidt and others, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 703-709.)
212	10728	U.S.A. ...	*Heat Transfer Pressure Drop and Fouling Rates of Liquids for Continuous Longitudinal Fins (Laminar Flow).* (A. T. Gunter and W. A. Shaw, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 795-804.)
213	10819	G.B.	*Wave Analysis (Part III).* (K. Browne, Elect. Eng., Vol. 15, No. 184, June, 1942, pp. 31-36.)
214	10844	Switzerland ...	*Flow Investigations on Safety Device Incorporated in Hydraulic Power Installations.* (C. Keller and I. Vaskovic, Escher-Wyss, No. 15-16, 1942-1943, pp. 191-202.)
215	11040	G.B.	*Coefficient of Propulsive Efficiency (Marine Propellers).* (K. C. Burnaby, Engineer, Vol. 175, No. 4,561, 11/6/43, pp. 472-475.)
216	11074	G.B.	*Breakwaters (Contd.).* (R. R. Minikin, Engineering, Vol. 155, No. 4,038, 4/6/43, pp. 441-443.)
217	11163	G.B.	*The Construction of Breakwaters.* (R. R. Minikin, Engineering, Vol. 155, No. 4,040, 18/6/43, pp. 481-482.)
218	11299	U.S.A. ...	*American Wartime Ship Construction.* (Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 4-6.)
219	11571	Germany ...	*Water Seepage Through a Dam and Pressure Distribution Over Base.* (H. Rossbach, Z.A.M.M., Vol. 22, No. 2, April, 1942, pp. 65-72.)

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AIRCRAFT, ACCESSORIES AND AIRSCREWS.

Civil and Experimental Aircraft.

220	10648	G.B. ...	... *The Heston Phœnix (Recognition Details).* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 601.)
221	10659	G.B. ...	... *The Mumford Helicopter (Early Experiments).* (Flight, Vol. 43, No. 1,786, 27/5/43, p. 561.)
222	10735	G.B. ...	... *The Heston Racer (including Photo).* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, pp. 378, 384.)
223	10801	G.B. ...	... *Control of the Heston Racer.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 520.)

General Design and Construction.

224	10657	G.B. ...	... *Early Designs of Tailless Aircraft.* (Flight, Vol. 43, No. 1,786, 27/5/43, pp. 556-557.)
225	11092	Germany	... *Problems of Aircraft Development.* (A. Lippisch, Luftwissen, Vol. 10, No. 4, April, 1943, pp. 113-118.)
226	11382	U.S.A.	... *Use of Glue in Aircraft Construction.* (J. T. Stephen, Aviation, Vol. 42, No. 3, March, 1943, pp. 132-133 and 311-323.)
227	11420	G.B. ...	... *Design for Freight Transport Plane for Perishable Goods (Photograph).* (Metal Industry, Vol. 62, No. 25, 18/6/43, p. 394.)
228	11446	U.S.A.	... *Design Considerations for Plywood Structures. Part IV—Wings.* (L. J. Marhoefer, Aviation, Vol. 42, No. 4, April, 1943, pp. 164-167 and 360-364.)

Stability and Control.

229	11055	U.S.A.	... *Study of Flutter Problems.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 220.)
230	10851	U.S.A.	... *Note on Paper Entitled "Proportioning a Canard for Longitudinal Stability and Safety Against Stall" (Dec., 1942).* (F. V. Foa, J. Aeron. Sci., Vol. 10, No. 3, p. 90.)
231	11264	U.S.A.	... *Torsional and Aileron Flutter.* (Z. Krzwoblocki, J. of Aeron. Sci., Vol. 10, No. 5, May, 1943, pp. 161-168.)
232	11352	Germany	... *Device for the Dynamic Stabilisation of Aircraft. (Pat series No. 4, 733,588.)* (Junkers, Flugsport, Vol. 35, No. 9, 19/5/43, pp. 25-26.)
233	11263	U.S.A.	... *A New Method of Longitudinal Control for Aircraft by Use of an Adjustable Angle of Attack Balance.* (R. J. White, J. of Aeron. Sci., Vol. 10, No. 5, May, 1943, pp. 152-160.)
234	11353	Germany	... *Automatic Device for Limiting the Vertical Acceleration of Aircraft. (Pat. series No. 4, 733,581.)* (Potez, Flugsport, Vol. 35, No. 9, 19/5/43, p. 26.)

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			Take-off.
235	11024	Germany ...	*The Rôle of Composite Aircraft in Comparison with Other Methods of Assisted Take-off.* (W. Hoff, German Academy of Aeron. Research, Report No. I, 1942, pp. 1-35.)
236	11468	Germany ...	*Nazi Rocket Take-offs?* (Aviation, Vol. 42, No. 4, April, 1943, p. 312.)
			Performance and Testing.
237	10713	U.S.A. ...	*Test Stand for Centrifugal and Propeller Pumps.* (G. F. Wislicenus, Trans. A.S.M.E., Vol. 64, No. 6, Aug., 1942, pp. 619-624.)
238	10848	U.S.A. ...	*Manœuvrability Criteria Through Turning Performance.* (J. E. Goode, J. Aeron. Sci., Vol. 10, No. 3, March, 1943, pp. 73-80.)
239	11436	U.S.A. ...	*Flight Testing.* (E. T. Allen, Aviation, Vol. 42, No. 4, April, 1943, pp. 108-112.)
			Post-War Aviation.
240	10627	G.B.	*Air Freight.* (W. A. Patterson, Flight, Vol. 43, No. 1,795, 20/5/43, p. 532.)
241	10663	G.B.	*An Empire Air Council (Lord Bennet's Proposal).* (Aeroplane, Vol. 64, No. 1,668, 14/5/43, p. 551.)
242	10747	G.B.	*The Board of British Overseas Airways Corporation and Air Transport Command.* (Aeroplane, Vol. 64, No. 1,662, 2/4/43, p. 402.)
243	10795	G.B.	*Shipowners and Air Transport.* (R. H. Thorton, Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 502-503.)
244	10798	G.B.	*An International Air Port Plan.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, pp. 506-507.)
245	10800	U.S.A. ...	*U.S.A. and Post-War Bases in the Pacific.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 516.)
246	11269	U.S.A. ...	*Post-War Aviation (Paper Presented at R. Aero. Soc.).* (E. Warner, Engineer, Vol. 175, No. 4,563, 25/6/43, pp. 506-507.)
247	11301	G.B.	*The S.B.A.C. and Civil Aviation.* (Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 10-11 and 17.)
248	11456	U.S.A. ...	*Post-War Preview of European Airways.* (M. A. Garbell, Aviation, Vol. 42, No. 4, April, 1943, pp. 202-203, 337-338.)
249	11471	Switzerland ...	*Flying Boat or Land Plane for Civil Aviation.* (Inter. Avia., No. 867, 1/5/43, pp. 1-5.)
			Propellers.
250	10869	U.S.A. ...	*New Dual Counter-Rotating Propeller (Hamilton).* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 183.)
251	11097	G.B.	*Propeller Sense.* (A.M. Pamphlet 153.)
252	11190	France ...	*Nozzle Propellers and Jet Propulsion (Rateau-Auxionuary).* (Flugsport, Vol. 35, No. 8, 21/4/43, pp. 92-95.)
253	11193	Germany ...	*Method of Attachment for Leading Edge Protection Plate on Wooden Airscrews. (Pat. series No. 3, 730,097.)* (H. Heine, Flugsport, Vol. 35, No. 8, 21/4/43, p. 13.)

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254	11195	Germany	...	*Variable Pitch Propeller with Rapid Decrease in Pitch for Braking Purposes.* (*Pat. series No.* 3, 730,552.) (C. R. Waseige, Flugsport, Vol. 35, No. 8, 21/4/43.)
255	11196	Germany	...	*Combined Throttle and Pitch Change Control.* (*Pat. series No.* 3, 731,340.) (Heinkel, Flugsport, Vol. 35, No. 8, 21/4/43, p. 14.)
256	11197	Germany	...	*Method for Locking Blade of a Hydraulically Operated V.P. Airscrew.* (*Pat. series No.* 3, 730,378 *and* 731,986.) (Escher Wyss, Flugsport, Vol. 35, No. 8, 21/4/43, pp. 14 and 15-16.)
257	11198	Germany	...	*V.P. Operation by Means of an Electric Motor Freely Mounted on Propeller Hub, Torque Reaction being Balanced by Means of a Wind Vane.* (*Pat. series No.* 3, 730,553.) (Argus, Flugsport, Vol. 35, No. 8, 21/4/43, pp. 14-15.)
258	11200	Germany	...	*Variable Speed Blade Setting for V.P. Airscrews.* (*Pat. series No.* 3, 730,554.) (V.D.M., Flugsport, Vol. 35, No. 8, 21/4/43, p. 15.)
259	11202	Germany	...	*Airscrew Blade Pounded with Adjustable Longitudinally Projecting Tip.* (*Pat. series No.* 3, 732,051.) (Junkers, Flugsport, Vol. 35, No. 8, 21/4/43, p. 16.)
260	11203	Germany	...	*Blade Control with Varying Sensitivity.* (*Pat. series No.* 3, 730,900.) (Argus, Flugsport, Vol. 35, No. 8, 21/4/43, p. 16.)
261	11402	U.S.A.	...	*Electronic Method for Endurance of Propeller Components* (*Digest*). (R. M. Guerke and G. P. Knapp, J.S.A.E., Vol. 51, No. 5, May, 1943, p. 35.)
262	11409	U.S.A.	...	*Plastic Bearings for Propeller Shafts* (*Micarta*). (Ind. and Eng. Chem., Vol. 21, No. 8, 25/4/43, p. 560.)
263	11458	U.S.A.	...	*Dynamic Balancing in Propeller Maintenance.* (B. J. Cumnock, Aviation, Vol. 42, No. 4, April, 1943, pp. 214 and 403.)
264	11475	U.S.A.	...	*American Contra-Rotating Airscrews* (*Curtiss General Motors, Hamilton*). (Inter. Avia., No. 867, 1/5/43, pp. 1 and 12-13.)
265	11667	U.S.A.	...	*Anti-Icing Propeller Covers.* (Aero Digest, Vol. 42, No. 5, May, 1943, p. 409.)
				Rotating-Wing Aircraft.
266	11318	Germany	...	*Blade Control for Helicopter Fitted with Two Inclined Rotors, Altitude and Direction.* (*Pat. series No.* 5, 732,735.) (Focke, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 30-31.)
267	11319	Germany	...	*Incidence Distribution for Autogyro Blades.* (*Pat. series No.* 5, 733,011.) (Asboth, Flugsport, Vol. 35, No. 10, 16/6/43, p. 31.)
268	11320	Germany	...	*Pendulum Stabilisation for Autogyros.* (*Pat. series No.* 5, 732,924.) (Wertenson, Flugsport, Vol. 35, No. 10, 16/6/43, p. 31.)
269	11321	Germany	...	*Tethering Device for Helicopters* (*Four Point*). (*Pat. series No.* 5, 733,861.) (A.E.G., Flugsport, Vol. 35, No. 10, 16/6/43, p. 32.)

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270	11569	U.S.A.	...	*A Method of Rapid Estimation of Helicopter Performance.* (Q. Weld, J. Aeron. Sci., Vol. 10, No. 4, April, 1943, pp. 131-135.)
				Windscreens, Cabins.
271	11002	U.S.A.	...	*Testing New Bird-Proof Windshield (Photo).* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 142.)
272	11209	Germany	...	*Oil Hydraulic System for Pressure Control in Pressure Cabin. (Pat. series No.* 3, 731,646.) (Henschel, Flugsport, Vol. 35, No. 8, 21/4/43, p. 17.)
273	11338	Germany	...	*Quick Release Opening for Pressure Cabins. (Pat. series No.* 4, 732,915.) (Arado, Flugsport, Vol. 35, No. 9, 19/5/43, p. 21.)
274	11339	Germany	...	*Anti-Dazzle Device for Nose Cockpits. (Pat. series No.* 4, 732,383.) (Heinkel, Flugsport, Vol. 35, No. 9, 19/5/43, p. 21.)
275	11340	Germany	...	*Anti-Draught Device for Cockpit Windows. (Pat. series No.* 4, 732,705.) (Junkers, Flugsport, Vol. 35, No. 9, 19/5/43, p. 21.)
276	11341	Germany	...	*Sealed Cavity Window for Pressure Cabins. (Pat. series No.* 4, 732,916.) (Junkers, Flugsport, Vol. 35, No. 9, 19/5/43, pp. 21-22.)
277	11396	U.S.A.	...	*Bird-Resisting Windshield (Digest).* (A. L. Morse, J.S.A.E., Vol. 51, No. 5, May, 1943, p. 27.)
				Wings and Flaps, etc.
278	11342	Germany	...	*Improvements in the Effectiveness of Control Surfaces (Air Ejection). (Pat. series No.* 4, 732,536.) (Junkers, Flugsport, Vol. 35, No. 9, 19/5/43, p. 22.)
279	11343	Germany	...	*Flapped Wing with Suction Control at Edge. (Pat. series No.* 4, 733,114.) (H. V. A. Goethinger, Flugsport, Vol. 35, No. 9, 19/5/43, p. 22.)
280	11344	Germany	...	*Suction Control for Wing Flaps. (Pat. series No.* 4, 733,445.) (Arado, Flugsport, Vol. 35, No. 9, 19/5/43, p. 22.)
281	11345	Germany	...	*Variable Camber Flap Control. (Pat. series No.* 4, 732,918.) (Heinkel, Flugsport, Vol. 35, No. 9, 19/5/43, p. 23.)
282	11346	Germany	...	*Sealing Plate for Flaps Capable of Aileron Action. (Pat. series No.* 4, 733,493.) (Heinkel, Flugsport, Vol. 35, No. 9, 19/5/43, p. 23.)
283	11347	Germany	...	*Wing Spoiler (Automatic Action). (Pat. series No.* 4, 733,504.) (D. F. S. Darmstadt, Flugsport, Vol. 35, No. 9, 19/5/43, p. 23.)
284	11348	Germany	...	*One Piece Sheet Metal Wing with Integral Webs (Produced by Folding). (Pat. series No.* 4, 732,594.) (Henschel, Flugsport, Vol. 35, No. 9, 19/5/43, p. 24.)
285	11349	Germany	...	*Wing Structure Consisting of Two Shells Incorporating Flanges for Spars. (Pat. series No.* 4, 732,919.) (Arado, Flugsport, Vol. 35, No. 9, 19/5/43, pp. 24-25.)

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286	11351	Germany ...	*Variable Surface Wing. (Pat. series No.* 4, 732,537.) (J. Gerrin, Flugsport, Vol. 35, No. 9, 19/5/43, p. 25.)
287	11354	Germany ...	*Adjustable Mass Balance for the Control Surfaces of Experimental Aircraft. (Pat. series No.* 4, 732,920.) (Arado, Flugsport, Vol. 35, No. 9, 19/5/43, p. 26.)
288	11355	Germany ...	*Device for the Coarse and Fine Adjustment of Trimming Tabs. (Pat. series No.* 4, 733,543.) (Arado, Flugsport, Vol. 35, No. 9, 19/5/43, p. 27.)

Landing Gear and Brakes.

289	10639	G.B.	*Aeroplane Wheels.* (Aeroplane, Vol. 64, No. 1,670, 28/5/43, pp. 620-629.)
290	11007	U.S.A. ...	*Reducing Brake Drum and Wheel Rim Temperature.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 358.)
291	11059	U.S.A. ...	*Non-Skid Wire Tread for Aircraft Tyres.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 224.)
292	11194	Germany ...	*Device for Mounting Float Seaplanes on a Trolley. (Pat. series No.* 3, 730,216.) (Bachmann, Flugsport, Vol. 35, No. 8, 21/4/43, p. 20.)
293	11206	Germany ...	*Contact Rod Height Indicator for Landing. (Pat. series No.* 3, 731,647.) (Nitzschte, Flugsport, Vol. 35, No. 8, 21/4/43, pp. 19-20.)
294	11322	Germany ...	*Automatic Deflation of Landing Wheel Tyres on Retraction and Subsequent Inflation when Lowered (Smaller Wing Housing). (Pat. series No.* 5, 732,327.) (Messerschmitt, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 32-33.)
295	11323	Germany ...	*Spring Suspension of Snow Skids. (Pat. series No.* 5, 732,538.) (Henschel, Flugsport, Vol. 35, No. 10, 16/6/43, p. 33.)
296	11324	Germany ...	*Interconnection of Throttle and Tail Wheel Swivel Lock. (Pat. series No.* 5, 732,485.) (Henschel, Flugsport, Vol. 35, No. 10, 16/6/43, p. 33.)
297	11325	Germany ...	*Spring Mounting for Tail Wheel (Composite Rubber Metal). (Pat. series No.* 5, 733,131.) (Gotha, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 33-34.)
298	11326	Germany ...	*Interconnection of Rudder and Tail Wheel Swivel Lock. (Pat. series No.* 5, 733,683.) (Fieseler, Flugsport, Vol. 35, No. 10, 16/6/43, p. 34.)
299	11327	Germany ...	*Arrangement of a Central Skid to Facilitate Landing. (Pat. series No.* 5, 732,486.) (Arado, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 34-35.)
300	11328	Germany ...	*Retracting Landing Wheel Mechanism.* (Heinkel, Flugsport, Vol. 35, No. 10, 16/6/43, p. 35.)
301	11329	Germany ...	*Utilisation of Shock Absorber Deflections to Compress Fluid for Operating Brakes. (Pat. series No.* 5, 731,379.) (Elecktron, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 35-36.)
302	11330	Germany ...	*Aerodynamic Tail Brake. (Pat. series No.* 5, 730,606.) (Dornier, Flugsport, Vol. 35, No. 10, 16/6/43, p. 36.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
303	11331	Germany ...	*Snow Brake Applied to Skis.* (*Pat. series No.* 5, 731,811.) (Argus, Flugsport, Vol. 35, No. 10, 16/6/43, p. 36.)
304	11435	Germany ...	*Friction Brake.* (G. Niemann, Symposium of Papers on the Elements of Machine Design (Aachen), pp. 62-64.)

De-icing.

305	11332	Germany ...	*Ice Warming Device* (*Photo-Electric*). (*Pat. series No.* 5, 731,905.) (German Government, Flugsport, Vol. 35, No. 10, 16/6/43, p. 36.)
306	11397	U.S.A. ...	*Double Wind Shield with Hot Air Space* (*Digest*). (R. L. McBrien, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 27-28.)

ENGINES AND ACCESSORIES.

Named Types.

307	10617	G.B.	*The 2,000 h.p. Napier 24-Cylinder, Liquid-Cooled, H Type Sabre Engine* (*Photograph*). (Aircraft Production, Vol. 5, No. 56, June, 1943, p. 302.)
308	10933	U.S.A. ...	*Allison Engine V 1,710 Performance.* (Inter. Avia., No. 856-857, 15/2/43, pp. 13-14.)
309	10937	G.B.	*Bristol Centaurus* (*8-Cylinder Twin-Row Radial* ($\sim$ 2,000 *h.p.*). (Inter. Avia., No. 856-857, 15/2/43, p. 19.)
310	10938	G.B.	*Sabre 24-Cylinder Sleeve Valve Engine Fitted to Typhoon.* (Inter. Avia., No. 856-857, 15/2/43, p. 19.)
311	10993	U.S.A. ...	*American Aircraft Engines* (*Index*). (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 110-111.)
312	10994	U.S.A. ...	*American Gasoline Engines* (*Index*). (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 112-121.)
313	10997	U.S.A. ...	*Small Gasoline Power Units* (*10 h.p. or less*) (*Index of American Types*). (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 126.)
314	11191	Germany ...	*B.M.W. 801 Aero Engine* (*Sectional Drawing*). (Flugsport, Vol. 35, No. 8, 21/4/43, p. 96.)
315	11452	U.S.A. ...	*Diagrammatic Layout of Two-Stage Supercharger in Merlin 61 Engine.* (Aviation, Vol. 42, No. 4, April, 1943, p. 187.)
316	11544	Germany	*German Automatic Supercharging System in Mercedes-Benz D.B. 601A* (*M.A.P. Report*). (Engineer, Vol. 176, No. 4,566, 16/7/43, pp. 48-49.)

Design and Installation.

317	10846	U.S.A. ...	*Advantages of Air-Cooled Radial and Liquid-Cooled Inline Engines Installed in Modern American Aircraft.* (E. M. Lester, Pegasus, Vol. 1, No. 2, Feb., 1943, pp. 4-7 and 12-15.)
318	10976	G.B.	*Surface Finish and the Function of Parts—A Comparison of British and German Aero Engine Parts.* (G. Schlesinger, Engineer, Vol. 175, No. 4,560, 4/6/43, pp. 454-456.)
319	11207	Germany ...	*Tiltable Power Plant for Aircraft.* (*Pat. series No.* 3, 730,943.) (B.M.W., Flugsport, Vol. 35, No. 8, 21/4/43, p. 17.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
320	11211	Germany ...	*Radiators Installed Inside Engine Cowling.* (*Pat. series No.* 3, 730,497.) (Arniot, Flugsport, Vol. 35, No. 8, 21/4/43, p. 18.)
321	11392	U.S.A. ...	*New Materials for Aircraft Engines.* (M. Young and H. H. Haninks, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 157-164.)
322	11403	U.S.A. ...	*Co-Designing Aircraft Power Plants* (*Digest*). (H. Karcher, J.S.A.E., Vol. 51, No. 5, May, 1943, p. 30.)
323	11404	U.S.A. ...	*General Aspects of Aircraft Power Plant Installations* (*Digest*). (T. Hammon, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 31-32.)
324	11434	Germany ...	*Development in Gear Design* (*with Discussion*). (O. Wolf, Symposium of Papers on the Elements of Machine Design (Aachen).)
325	11570	U.S.A. ...	*Pendulum Type Vibration Absorber* (*Discussion*). (A. H. Shieh, J. Aeron. Sci., Vol. 10, No. 4, April, 1943, p. 135.)

Performance and Testing.

326	10516	G.B.	*Prevention of Valve Seizure.* (Engineer, Vol. 175, No. 4,558, 21/5/43, p. 416.)
327	10811	G.B.	*Some Recent Applications to Thermodynamics in Steam Engineering Research* (*Boiler Problems, Cavitation, Flow Through an Orifice De-aeration*). (R. S. Silver and others, Journal of Scientific Instruments, Vol. 20, No. 4, April, 1943, pp. 53-58.)
328	10879	G.B.	*Fuels and Internal Combustion Engine Performance.* (J. L. Beilschmidt, Aeronautics, Vol. 8, No. 4, May, 1942, pp. 48-54.)
329	11001	U.S.A. ...	*Portable Engine Test Stand* (*Photograph*). (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 140.)
330	11268	U.S.A. ...	*Breaking-in an Aero Engine.* (Engineer, Vol. 175, No. 4,563, 25/6/43, p. 505.)
331	11395	U.S.A. ...	*Mock Up Speeded Chevrolet Engine Test-Cell Project* (*Digest*). (P. A. Collins, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 25-26.)
332	11398	U.S.A. ...	*Improving the Fatigue Strength of Engine Parts* (*Digest*). (J. O. Almen, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 28-29.)
333	11671	U.S.A. ...	*High Speed Tests of Conventional Radial Engine Cowlings.* (R. G. Robinson and J. V. Becker, N.A.C.A. Report No. 745.)
334	11745	U.S.A. ...	*The Effect of Environment on Aircraft Engine Design and Performance.* (L. T. Miller, S.A.E. Preprint, Nat. Aeron. Meeting, April 8-9, 1943.)

Diesel and Oil Engines.

335	10995	U.S.A. ...	*American Automotive Diesel and Other Heavy Oil Engines* (*Index*). (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 122-125.)
336	11431	Germany ...	*The Stresses in the Transmission Gear and Bearings of High Speed Diesel Engines.* (D. Schmidt, Symposium of Papers on the Elements of Machine Design (Aachen), pp. 44-47.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Turbines (Gas, Steam, Water).
337	10631	G.B.	*Turbines and the Flying Wing.* (G. G. Smith, Flight, Vol. 43, No. 1,794, 13/5/43, pp. 496-498.)
338	10697	G.B.	*Fabrication of Water Turbines. (H. Stone, Welding, March,* 1943, *pp.* 135-148.) (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 4.)
339	10714	U.S.A. ...	*The Mercury Vapour Process (Combined Mercury and Steam Turbines).* (A. R. Smith and E. S. Thompson, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 625-646.)
340	10715	U.S.A. ...	*The Mercury Boiler.* (R. N. Hackett, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 647-656.)
341	10806	G.B.	*New Gas Turbine Projects.* (Flight, Vol. 43, No. 1,793, 6/5/43, pp. 473-476.)
342	10834	Switzerland ...	*Aerodynamic Test Engines (Closed Circuit).* (J. Ackeret and C. Keller, Escher Wyss, No. 15-16, 1942-1943, pp. 5-19.)
343	10835	Switzerland ...	*Comparison of Aerodynamic (Closed Circuit) Turbines with Gas and Steam Turbines.* (C. Keller, Escher Wyss, No. 15-16, 1942-1943, pp. 20-41.)
344	10836	Switzerland ...	*Rôle of Research in Turbine Design.* (C. Keller, Escher Wyss, No. 15-16, 1942-1943, pp. 42-53.)
345	10837	Switzerland ...	*New Developments in Escher Wyss Steam Turbines.* (F. Flatt, Escher Wyss, No. 15-16, 1942-1943, pp. 54-61.)
346	10841	Switzerland ...	100 *Years Development of Water Turbines.* (J. Moser, Escher Wyss, No. 15-16, 1942-1943, pp. 101-119.)
347	10842	Switzerland ...	*Researches on the Energy Consumed by Water Turbine Controls.* (H. Gerber, Escher Wyss, No. 15-16, 1942-1943, pp. 151-157.)
348	10838	Switzerland ...	*Governors for Steam Turbines.* (A. Luthi, Escher Wyss, No. 15-16, 1942-1943, pp. 84-89.)
349	10898	Switzerland ...	*Investigation of Water Turbines Regulators (from Schweizerische Bauzeitung, Vol.* 120, *No.* 2, 11/7/42.) (H. Gerber, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 5-10.)
350	11091	Germany ...	*The Experimental Determination of the Blade Temperature of Exhaust Gas Turbine Under Load.* (E. Graus, Luftwissen, Vol. 10, No. 4, April, 1943, pp. 110-113.)
351	10712	U.S.A. ...	*Some Problems in the Selection and Operation of Centrifugal Pumps for Oil and Petrol Pipe Lines.* (A. Hollander, Trans. A.S.M.E., Vol. 64, No. 6, Aug., 1942, pp. 607-617.)
			Compressors, Pumps, Generators.
352	10710	U.S.A. ...	*Energy Transfer Between a Fluid and a Rotor for Pump and Turbine Machinery (with Discussion).* (S. A. Moss and others, Trans. A.S.M.E., Vol. 64, No. 6, Aug., 1942, pp. 567-597.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
353	10711	U.S.A. ...	*Comparative Characteristics of Fixed and Adjustable Blade Axial Flow Pumps, including Cavitation (with Discussion).* (J. D. Scoville, Trans. A.S.M.E., Vol. 64, No. 6, Aug., 1942, pp. 599-605.)
354	10721	U.S.A. ...	*Test Characteristics of a Combined Pump Turbine Model with Wicket Gates (with Discussion).* (R. V. Terry and others, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 731-744.)
355	10820	G.B.	*Large Wind Driven Synchronous Generators.* (T. F. Wall, Engineering, Vol. 155, No. 4,031, 28/5/43, pp. 421-423.)
356	11025	Germany ...	*Determination of the Lowest Natural Bending Frequency of Axial Flow Compressor Blades.* (M. Schilhansl, German Academy of Aeron. Research, Report No. 1, 1942, pp. 63-95.)
357	11049	G.B.	*Large Wind Driven Synchronous Generators (Contd.).* (T. F. Wall, Engineering, Vol. 155, No. 4,039, 11/6/43, pp. 461-463.)
358	11273	G.B.	*Large Wind Driven Synchronous Generators—II.* (T. F. Wall, Engineering, Vol. 155, No. 4,041, 25/6/43, pp. 501-503.)
			Cylinders, Bearings.
359	10964	G.B.	*The Quality of High Duty Bearings.* (M. H. Gall, Engineering Inspection, Vol. 7, No. 1, Jan.-March, 1942, pp. 26-30 and 32.)
360	11393	U.S.A. ...	*The Influence of Lubricating Oil Viscosity on Cylinder Wear.* (H. A. Everett, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 165-169.)
361	11401	U.S.A. ...	*Cooling Characteristics of Steel and Al. Tinned Cylinders for In-line Air-Cooled Engines.* (M. Piry, J.S.A.E., Vol. 51, No. 5, May, 1943, p. 37.)
362	11430	Germany ...	*Experiment on the Transmission of Pressure in a Lubricated Bearing.* (W. Pepper, Symposium of Papers on the Elements of Machine Design (Aachen), pp. 42-45.)
			Intercoolers, Oil Intakes.
363	11381	U.S.A. ...	*Intercoolers and Their Performance in Aircraft.* (S. K. Anderson and P. A. Scherer, Aviation, Vol. 42, No. 3, March, 1942, pp. 125-129 and 333-338.)
364	11399	U.S.A. ...	*Aircraft Oil Systems—High Altitude Problems (Digest).* (H. E. Moerman, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 29-30.)
365	11400	U.S.A. ...	*Intake Systems for Aircraft Engines (Digest).* (C. T. Doman, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 36-37.)
366	11683	G.B.	*Engine Oil Filtration and its Effects on Wear in Internal Combustion Engines.* (T. W. Langley, Mech. World, Vol. 114, No. 2,949, 9/7/43, pp. 37-39 and 48.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Starters.
367	10651	G.B. ...	... *An Aeroplane Starter for Electrically Started Aeroplane Engines.* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 602.)
368	11183	U.S.A.	... *Portable Electric Starter Unit for Aircraft.* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 43.)
369	11391	U.S.A.	... *Storage Battery Performance at Low Temperatures (Engine Starting).* (J. H. Little and R. A. Daily, J.S.A.E., Vol. 51, No. 5, May, 1943, pp. 149-156 and 164.)
			FUELS AND LUBRICANTS.
			High Octane and Aviation Fuels.
370	10988	G.B. ...	... *Fuel Research Intelligence Section.* (Fuel Research Station, Summary for Two Weeks ending 8th and 15th May, 1943.)
371	11242	U.S.A.	... *Gas Analysis by Means of Spectrometer (Applied to the Manufacture of High Octane Fuels).* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 254.)
372	11464	U.S.A.	... *New Aviation Fuel Processes.* (Aviation, Vol. 42, No. 4, April, 1943, p. 301.)
			Gaseous Fuels.
373	10821	Germany	... *German Portable Gas Producer Practice.* (Engineering, Vol. 155, No. 4,031, 28/5/43, pp. 423-425.)
374	11045	G.B. ...	... *Producer Gas Tests on a Petrol Engine.* (Engineering, Vol. 155, No. 4,039, 11/6/43, p. 465.)
375	11543	G.B. ...	... *Storage of Liquefied Natural Gas.* (Engineer, Vol. 176, No. 4,566, 16/7/43, p. 48.)
			Lubrication.
376	10760	U.S.A.	... *Lubricants and Their Dimensional Value in Gear Design (Paper Presented to S.A.E.).* (J. O. Almen, Autom. Eng., Vol. 33, No. 435, April, 1943, pp. 147-153.)
377	11018	U.S.A.	... *Boundary Lubrication.* (Metal Progress, Vol. 43, No. 4, April, 1943, pp. 582-584.)
378	11302	G.B. ...	... *Lubricants from Tree Stumps.* (Engineer, Vol. 176, No. 4,564, 2/7/43, p. 11.)
379	11429	Germany	... *Boundary Lubrication (with Extensive Bibliography).* (H. Donandt, Symposium of Papers on the Elements of Machine Design (Aachen), 1935, pp. 33-41.)
380	11432	Germany	... *Lubrication of Railway Axles.* (D. Garhers, Symposium of Papers on the Elements of Machine Design (Aachen), pp. 47-49.)
			Oil Testing.
381	11580	U.S.A.	... *A Versatile Oil-Testing Cell of Novel Design for Use in Determining Electrical Properties of Insulating Oils (Liquid Dielectrics, etc.).* (T. Hayen, Rev. of Sci. Instrum., Vol. 14, No. 5, May, 1943, pp. 141-143.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.

THEORY OF ELASTICITY.

Stresses.

382	10897	G.B. ...	... *Code for Working Stresses—Pt. I.* (J. Marin, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 2-5.)
383	11048	G.B. ...	... *Stress Due to Collapse of Vapour Bubbles in a Liquid (Contd.).* (R. S. Silver, Engineering, Vol. 155, No. 4,039, 11/6/43, p. 474.)
384	11081	G.B. ...	... *Stress Due to Collapse of Vapour Bubbles in a Liquid.* (M. Reiner, Engineering, Vol. 155, No. 4,038, 4/6/43, p. 454.)
385	11166	G.B. ...	... *Stress Due to the Collapse of Vapour Bubbles in a Liquid.* (V. R. Evans, Engineering, Vol. 155, No. 4,040, 18/6/43, p. 494.)
386	11167	G.B. ...	... *Cracking of Loads Under Tensile Load.* (G. Roberts, Engineering, Vol. 155, No. 4,040, 18/6/43, p. 495.)
387	11228	G.B. ...	... *A Note on Stress Systems in Aeleotropic Materials —I and II.* (A. E. Green, Phil. Mag., Vol. 34, No. 233, June, 1943, pp. 416-422.)
388	11425	Germany	... *Influence of Non-Uniform Stress Distribution on the Strength of Materials.* (W. Kunzle, Symposium of Papers on the Elements of Machine Design (Aachen), 1935, pp. 3-16.)
389	11426	Germany	... *Example of Modern Stress Calculation.* (E. Lehr, Symposium of Papers on the Elements of Machine Design (Aachen), 1935, pp. 17-23.)
390	11427	Germany	... *Model Experiments on Stress Distribution in Section Undergoing Torsion and Discussion.* (W. Bautz, Symposium of Papers on the Elements of Machine Design (Aachen), 1935, pp. 23-27 and 28-33.)

Strength of Wooden Beams, etc.

391	10843	Switzerland	... *Strength Investigations on Spiral Diffusions.* (F. Salzmann and A. Suss, Escher Wyss, No. 15-16, 1942-1943, pp. 164-169.)
392	11029	G.B. ...	... *Structure and Breaking Strength of Plastic Mouldings (from Schweizer Archiv., 1943, No. 9, p. 55.)* (G. O. Grimm, Vol. 7, No. 73, June, 1943, pp. 251-257.)
393	11089	Germany	... *Strength Characteristics of Some Wooden Structural Elements Taken from Captured Russian Aircraft.* (J. T. Heiner, Luftwissen, Vol. 10, No. 4, April, 1943, pp. 103-104.)
394	11262	U.S.A.	... *Bending Strength in the Plastic Range.* (F. P. Cozzone, J. of Aeron. Sci., Vol. 10, No. 5, 1943, pp. 137-151.)
395	11574	Germany	... *Stress Distribution in Thin Walled Conical Beams.* (A. Pfluger, Z.A.M.M., Vol. 22, No. 2, April, 1942, pp. 99-116.)
397	11682	G.B. ...	... *The Strength of Timber Beams.* (Mech. World, Vol. 114, No. 2,949, 9/7/43, pp. 35-36.)

ITEM NO.	R.T.P. REF.			TITLE AND JOURNAL.
				Photo-Elasticity.
398	10731	U.S.A.	...	*The Fundamentals of Photo-Elastic Stress Analysis Applied to Dynamic Stresses.* (W. N. Findley, Eastern Photo-Elasticity Conference, 9th Semi-Annual Meeting, 13/5/39, pp. 1-11.)
399	10732	U.S.A.	...	*Gelatin Models.* (T. R. Cuykendall, Eastern Photo-Elasticity Conference, 9th Semi-Annual Meeting, 13/5/39, pp. 13-15.)
400	10733	U.S.A.	...	*Three Dimensional Photo-Elastic Analysis by Scattered Light.* (R. Weller, Eastern Photo-Elasticity Conference, 9th Semi-Annual Meeting, 13/5/39, pp. 19-21.)
401	10734	U.S.A.	...	*Preparation of Photo-Elastic Models.* (M. L. Price, Eastern Photo-Elasticity Conference, 9th Semi-Annual Meeting, 13/5/39, pp. 23-26.)
402	11085	U.S.A.	...	*Theory of Large Elastic Deformations (Rubber).* (L. R. G. Treloar, Nature, Vol. 151, No. 3,839, 29/5/43, p. 616.)
403	11145	G.B. ...	...	*Seeing Strains and Stresses Inside all Material with "Photo-Elasticity."* (British Plastics, Vol. 15, No. 169, June, 1942, pp. 18-20.)
				Creep Tests.
404	10674	G.B. ...	...	*Precision in Creep Testing.* (*J. H. Fellows and others, Metals Technology, Aug.*, 1942, *pp.* 1-15.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 5.)
405	10725	U.S.A.	...	*Report on Tubular Creep Tests (Internal Pressure).* (F. H. Norton and C. R. Soldberg, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 769-777.)
406	10828	U.S.A.	...	100,000 *Hours Creep Tests on Alloy Steels.* (Sci. Am., Vol. 168, No. 2, Feb., 1943, p. 61.)
407	11300	G.B. ...	...	*Creep Resistance of Superheater Tube Steels in Tube and Bar Form.* (J. A. Jones and W. E. Bardgett, Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 6-8.)
				Fatigue Tests.
408	10682	G.B. ...	...	*Behaviour of Spot Welds Under Fatigue Stress.* (*A. M. Unger and others, Weld. J., March,* 1942, *pp.* 1,355-1,425.) (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 2.)
409	10960	G.B. ...	...	*Fatigue Tests on Some Copper Alloys.* (H. R. Anderson and C. S. Smith, Engineering Inspection, Vol. 7, No. 2, April-June, 1942, pp. 15-21.)
410	11254	U.S.A.	...	*Fatigue Failures in Common Machine Parts.* (J. O. Almen, Metal Progress, Vol. 43, No. 5, May, 1943, pp. 737-740.)

MATERIALS (PROPERTIES, FABRICATION, INSPECTION).

A. Properties.

Al. and Mg. Alloys.

411	10759	G.B. ...	...	*The Properties of Various Wrought Al. Alloys.* (Autom. Eng., Vol. 33, No. 435, April, 1943, pp. 145-146.)

ITEM NO.	R.T.P. REF.			TITLE AND JOURNAL.
412	10899	Germany	...	*The Strength of Al.-Mg. Alloys at the Temperature of Liquid Oxygen (from Zeitschrift für die gesamte Kälte-Industrie, Vol.* 49, *No.* 6, 1942, *pp.* 71-72). (H. Maeder, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 10-11.)
413	10922	Japan	...	*A New Magnesium Alloy.* (Inter. Avia., No. 856-857, 15/2/43, p. 10.)
414	10923	Japan	...	*Al. and Mg. Production in Japan.* (Inter. Avia., No. 856-857, 15/2/43, p. 11.)
415	11287	G.B. ...	...	*Protective Treatment of Magnesium Alloys.* (Metal Industry, Vol. 63, No. 1, 2/7/43, p. 8.)
416	11304	G.B. ...	...	*Aluminium in Post-War Reconstruction—I.* (R. Hammond, Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 15-16.)
417	11417	G.B. ...	...	*Metallographic Technique for Magnesium Alloys.* (F. A. Fox and H. T. Hall, Metal Industry, Vol. 62, No. 25, 18/6/43, pp. 391-392.)
418	11656	U.S.A.	...	*High Strength Natural Ageing Al. Alloy.* (H. Brown, Aero Digest, Vol. 42, No. 5, May, 1943, pp. 209-210, 296 and 333.)
				Iron and Steel.
419	10778	U.S.A.	...	*Sources of Hydrogen in Steel and Means for its Elimination.* (C. H. Zapffe, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 397-401.)
420	10780	U.S.A.	...	*Weldability of N.E.* 1,330 *and N.E.* 1,335 (*Laboratory Tests*). (O. E. Harder and C. B. Voldrich, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 409-410.)
421	10782	U.S.A.	...	*Properties of Important Wrought Chromium Nickel-Iron Alloys (Data Sheet).* (Metal Progress, Vol. 43, No. 3, March, 1943, p. 412a.)
422	10965	G.B. ...	...	*The Interpretation of Steel Specifications.* (E. Gregory, Engineering Inspection, Vol. 7, No. 3, Autumn, 1942, pp. 4-7.)
423	11008	U.S.A.	...	*Machinability of National Alloy Steels.* (O. W. Boston, Metal Progress, Vol. 43, No. 4, April, 1943, p. 543.)
424	11011	U.S.A.	...	*Tests on N.E.* 8,630 *Steels for Welded Air Frames.* (M. Hill, Metal Progress, Vol. 43, No. 4, April, 1943, pp. 555-559.)
425	11012	U.S.A.	...	*Properties of Important Wrought Chromium-Iron Alloy (Data Sheet).* (Metal Progress, Vol. 43, No. 4, April, 1943, p. 560a.)
426	11014	U.S.A.	...	*Under-Hardening of Steel—Possible Applications.* (Metal Progress, Vol. 43, No. 4, April, 1943, p. 570.)
427	11076	G.B. ...	...	*Research on Cast Iron.* (Engineering, Vol. 155, No. 4,038, 4/6/43, p. 445.)
428	11248	U.S.A.	...	*Aluminium Covered Sheet Steel.* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 279.)
429	11249	U.S.A.	...	*National Emergency Steels (N.E.* 1,300 *Series).* (Metal Progress, Vol. 43, No. 5, pp. 711-715.)

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430	11253	U.S.A.	...	*Mechanical Properties of N.E., S.A.E., and Other Hardened Steels.* (W. G. Patton, Metal Progress, Vol. 43, No. 5, May, 1943, pp. 726-733.)
				Non-Ferrous Metals.
431	10777	U.S.A.	...	*Substitute for 90 Cu., 10 Sn. Bearings.* (M. F. Garwood and E. H. Stilwill, Metal Progress, Vol. 43, No. 3, March, 1943, p. 396.)
432	10780	U.S.A.	...	*Down Grading Chart for Brass and Bronze Castings.* (C. S. Cole, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 406-408.)
433	10808	Germany	...	*German Copper Shortage.* (Flight, Vol. 43, No. 1,793, 6/5/43, p. 480.)
434	10977	G.B. ...	...	*The Uses of Lead in Wartime.* (Metal Industry, Vol. 62, No. 23, 4/6/43, p. 353.)
435	10980	G.B. ...	...	*Ingot Brass and Bronze.* (W. Romanoff, Metal Industry, Vol. 62, No. 23, 4/6/43, pp. 357-358.)
436	11019	U.S.A.	...	*Influence of Cast Structure on Mechanical Properties of Non-Ferrous Alloys.* (Metal Progress, Vol. 43, No. 4, April, 1943, pp. 586-590.)
437	11064	G.B. ...	...	*Zinc Loss in Brass.* (Metal Industry, Vol. 62, No. 24, 11/6/43, p. 374.)
438	11162	U.S.A.	...	*Physical Properties and Thermal Treatment of K. Monel.* (Review of Sci. Insts., Vol. 14, No. 3, March, 1943, p. 82.)
439	11232	G.B. ...	...	*Sources and Uses of Beryllium.* (Engineering, Vol. 156, No. 4,042, 2/7/43, p. 10.)
440	11286	G.B. ...	...	*Non-Ferrous Secondary Metals.* (F. W. Willard, Metal Industry, Vol. 63, No. 1, 2 July, 1943, pp. 6-8.)
441	11605	U.S.A.	...	*Thermal Expansion of Bronzes (Tin-Zinc, Leaded, Aluminium and Silicon Bronzes).* (P. Hidnert, J. Res. Bur. Stands., Vol. 30, No. 1, Jan., 1943, pp. 75-88.)
				Plastics and Resins.
442	10614	G.B. ...	...	*Manufacturing Technique for Plastic Materials.* (Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 299-301.)
443	10621	Germany	...	*German Production of Artificial Fibre.* (Flight, Vol. 43, No. 1,795, 20/5/43, p. 520.)
444	10650	G.B. ...	...	*Plastic Panels and Dials.* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 602.)
445	10693	G.B. ...	...	*Acrylate and Vinyl Chloride Resin Dispersion.* (A. Renfrew and C. F. Flint, Ind. Chem., April, 1943, pp. 194-198.) (Met. Vick. Tech. News Bull., No. 863, 23/4/43, p. 9.)
446	10701	G.B. ...	...	*Paper Condensers. (M. Brotherton, Bell Laboratory Record, Jan., 1943, pp. 123-126.)* (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 8.)
447	10829	U.S.A.	...	*Flame Proof Plastic Laminated Cotton Cloth (Light Weight).* (Sci. Am., Vol. 168, No. 2, Feb., 1943, p. 62.)
448	10831	U.S.A.	...	*Lignum Insulating Material from Paper Waste.* (Sci. Am., Vol. 168, No. 2, Feb., 1943, pp. 84-85.)

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449	10904	Germany ...	*Strength of Plastic Mouldings from Composite Materials (from Kunststoffe, Vol. 32, No. 1, Jan., 1942, pp. 1-9.)* (H. R. Jacobi, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 21-24.)
450	11026	G.B.	*Metalizing Plastics.* (E. E. Halls, Plastics, Vol. 7, No. 73, June, 1943, pp. 235-243.)
451	11027	G.B.	*Spraying of Plastics.* (Plastics, Vol. 7, No. 73, June, 1943, p. 243.)
452	11028	G.B.	*Synthetic Resins Used in the Mosquito.* (Plastics, Vol. 7, No. 73, June, 1943, p. 246.)
453	11031	Germany ...	*Sawing of Laminated Plastics (from Der Betrieb, Aug., 1942).* (Plastics, Vol. 7, No. 73, June, 1943, p. 258.)
454	11036	G.B.	*Resinoids and Other Plastics as Film Formers. XIX—Electrolyte Aspects of High Polymeric Systems.* (B. J. Brajnikoff, Plastics, Vol. 7, No. 73, June, 1943, pp. 268-276.)
455	11043	G.B.	*The Practical Use of Plastics in Building and Structural Work.* (Chem. and Ind., Vol. 62, No. 24, 12/6/43, p. 226.)
456	11050	U.S.A. ...	*Coal as Raw Material for Plastics, etc.* (J. K. Hunt, Sci. Am., Vol. 168, No. 5, May, 1943, pp. 196-198.)
457	11060	U.S.A. ...	*Soybean Plastics.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 221.)
458	11143	G.B.	*Heatronic Moulding—A New Technique for Rapid Moulding of Thermo-Setting Plastics.* (V. E. Meharg, British Plastics, Vol. 15, No. 169, June, 1942, pp. 6-13.)
459	11144	G.B.	*Plastics in the Services.* (British Plastics, Vol. 15, No. 169, June, 1942, pp. 14-17.)
460	11146	G.B.	*Plastics in Surgery.* (British Plastics, Vol. 15, No. 169, June, 1942, p. 22.)
461	11148	G.B.	*Machinery for "Igelit" Resins.* (British Plastics, Vol 15, No. 169, June, 1943, p. 28.)
462	11149	G.B.	*New Plastics to Make Dies, Jigs and Forming Blocks.* (British Plastics, Vol. 15, No. 169, June, 1943, p. 29.)
463	11152	U.S.A. ...	*Position of Different Type Plastics in U.S.A.* (British Plastics, Vol. 15, No. 169, June, 1943, pp. 40 and 50.)
464	11154	U.S.A. ...	*Saflex-Coated Fabric.* (C. T. King, British Plastics, Vol. 15, No. 169, pp. 43-45.)
465	11156	G.B.	*Plastic Hinges Used in the U.S. Army.* (British Plastics, Vol. 15, No. 169, June, 1943, p. 50.)
466	11160	U.S.A. ...	*Extruded Plastic Tubing for Insulators and Wire Markers.* (Review of Sci. Insts., Vol. 14, No. 3, March, 1943, pp. 81-82.)
467	11171	U.S.A. ...	*Plastic Fuse.* (Ind. and Eng. Chem. (News Ed.), 10/5/43, p. 706.)
468	11187	U.S.A. ...	*Drill Jig Made of Durez Casting Resin.* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 43.)
469	11243	U.S.A. ...	*Thermo Plastic for Dies and Jigs.* (Sci. Am., Vol. 168, No. 6, June, 1943, pp. 254-255.)

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470	11589	G.B. ...	... *Practical Use of Plastics in Building and Structural Work.* (Plastics, Vol. 7, No. 74, July, 1943, p. 286.)
471	11590	Germany	... *Routine Working of Polyvinyl Chloride and Polyisobutylene. (Digest of Kunststoffe, Vol. 32, p. 307, 1942.)* (Klant, Plastics, Vol. 7, No. 74, July, 1943, pp. 287-291.)
472	11592	Germany	... *Curing of Synthetic Resin Wood Adhesives by Resistance Heating. (Mitt d. Fachausschusses für Holzfragen, No. 29, 1941, pp. 65-84.)* (Egner, Plastics, Vol. 7, No. 74, July, 1943, p. 293.)
473	11699	U.S.A.	... *Plastics from Redwoods.* (H. F. Lewis, A.S.M.E. Preprint, April 26-28, 1943.)
			Rubber (Nat. and Syn.).
474	10761	G.B. ...	... *Rubber Mouldings (Relt Mouldings).* (Autom. Eng., Vol. 33, No. 435, April, 1943, p. 154.)
475	10809	Germany	... *Rubber Yielding Plants to Increase German Rubber Supply.* (Flight, Vol. 43, No. 1,793, 6/5/43, p. 480.)
476	10864	U.S.A.	... *U.S. Natural Rubber Production Programme.* (Sci. Am., Vol. 168, No. 4, April, 1943, pp. 172-173.)
477	11147	G.B. ...	... *A New Rubber Substitute (from Soya Bean).* (British Plastics, Vol. 15, No. 169, June, 1943, p. 24.)
478	11158	U.S.A.	... *Machining Rubber on a Lathe.* (S. A. Weissenburger, Rev. of Sci. Insts., Vol. 14, No. 3, March, 1943, p. 77.)
479	11164	G.B. ...	... *Modern Synthetic Rubber (Book Review).* (H. Barron, Engineering, Vol. 155, No. 4,040, 18/6/43, p. 483.)
480	11410	U.S.A.	... *A New Type of Synthetic Rubber (Witcogum).* (Ind. and Eng. Chem., Vol. 21, No. 8, 25/4/43, p. 560.)
481	11593	G.B. ...	... *Resistance of Neoprene to Various Refrigerating Agents.* (Lawrence, Plastics, Vol. 7, No. 74, July, 1943, pp. 293-294.)
482	11606	U.S.A.	... *Synthetic Rubber—Survey.* (H. L. Fisher, Industrial Engineering and Chem. (News Ed.), Vol. 21, No. 10, 25/5/43, pp. 741-750.)
483	11611	U.S.A.	... *Synthetic Rubber for Balloons.* (Ind. and Eng. Chem. (News Ed.), Vol. 21, No. 10, 25/5/43, p. 782.)
484	11619	U.S.A.	... *Hydraulic Efficiency of Rubber Pads.* (W. Tucker, Aviation, Vol. 42, No. 5, May, 1943, pp. 167-169 and 360.)
485	11740	G.B. ...	... *Compounding Natural and Synthetic Rubbers to Resist Low Temperatures.* (The Services Rubber Investigations, Manufacturers' Memorandum No. M.5.)
			Wood and Plywood.
486	10694	G.B. ...	... *The Characteristics of Bakelised Wood. (A. E. L. Jervis, Electrical Times, 15/4/43, pp. 428-431.)* (Met. Vick. Tech. News Bull., No. 863, 23/4/43, p. 10.)

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487	10849	U.S.A.	...	*Fatigue Characteristics of Natural and Resin-Impregnated, Compressed, Laminated Woods.* (F. B. Fuller and T. T. Oberg, J. Aeron. Sci., Vol. 10, No. 3, March, 1943, pp. 81-85.)
488	10858	U.S.A.	...	*New Bonded Plywood (Compregwood).* (Sci. American, Vol. 168, No. 4, April, 1943, pp. 157-158.)
489	10968	G.B. ...	...	*Tests of Glued Laminated Wood Beams Impregnated with Creosote.* (W. A. Oliver, Engineering Inspection, Vol. 7, No. 3, Autumn, 1942, pp. 16-22.)
490	11037	G.B. ...	...	*Plywood Motor Car Body (Photo).* (Plastics, Vol. 7, No. 73, June, 1943, p. 276.)
491	11058	U.S.A.	...	*Dye Made by Chemical Treatment of Sawdust.* (Sci. Am., Vol. 168, No. 5, May, 1943, pp. 223-224.)
492	11151	G.B. ...	...	*The Importance of Moisture Content in Wood.* (British Plastics, Vol. 15, No. 169, June, 1943, p. 27.)
493	11217	G.B. ...	...	*Identification of Indian Timbers.* (Nature, Vol. 151, No. 3,841, 12/6/43, p. 669.)
494	11259	U.S.A.	...	*Timber for Photomicrography.* (Metal Progress, Vol. 43, No. 5, May, 1943, p. 747.)
495	11306	U.S.A.	...	*Prefabricated Plywood and Timber—I. Beam to Replace Steel ("Timbeam").* (Engineer, Vol. 176, No. 4,564, 2/7/43, p. 19.)
496	11478	U.S.A.	...	*Types of American Plywoods.* (Inter. Avia., No. 867, 1/5/43, p. 18.)
497	11704	U.S.A.	...	*Some Observations on Density and Shrinkage of Ponderosa Pine Wood.* (R. A. Cockrell, A.S.M.E. Preprint, April 26-28, 1943.)

Diamonds, Glass Ceramics.

498	10860	U.S.A.	...	*Diamond-Charged Lens Grinding Tools for Precision Optics.* (Sci. American, Vol. 168, No. 4, April, 1943, p. 159.)
499	11033	G.B. ...	...	*Insulating Media for Conduit and Cable (from Schweizer Archiv., No. 9, p. 37, 1943).* (Plastics, Vol. 7, No. 73, June, 1943, p. 259.)
500	11034	Germany	...	*Safety Glass Intermediate (from Kolloid Z., Vol. 98, pp. 117 and 376).* (Plastics, Vol. 7, No. 73, June, 1943, p. 259.)
501	11041	G.B. ...	...	*Foam Glass.* (Engineer, No. 175, No. 4,561, 11/6/43, p. 476.)
502	11080	G.B. ...	...	*Glass Fabric for Electrical Insulation.* (Engineering, Vol. 155, No. 4,038, 4/6/43, p. 452.)
503	11161	U.S.A.	...	*New Compact Ceramic Condenser.* (Rev. of Sci. Insts., Vol. 14, No. 3, March, 1943, pp. 81-82.)
504	11244	U.S.A.	...	*New Glass Process for Complicated Insulators (Cold Moulding followed by Fusing).* (Sci. Am., Vol. 168, No. 6, June, 1943, p. 255.)
505	11337	Germany	...	*Plexiglass—Properties and Fabrication (Ref. Sheet No. 7-8).* (Flugsport, Vol. 35, No. 9, 19/5/43, pp. 112a-b.)

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506	11407	U.S.A. ...	*Extending the Life of Chemical Glassware.* (E. J. Lewis, Ind. and Eng. Chem., Vol. 21, No. 8, 25/4/43, pp. 552-554.)
507	11564	U.S.A. ...	*Glass Jewels for Instrument Bearings.* (Rev. of Sci. Instrum., Vol. 14, No. 4, April, 1943, p. 121.)
508	11586	U.S.A. ...	*A Ceramic "Replacement" Material (Prestite).* (Rev. of Sci. Instrum., Vol. 14, No. 5, May, 1943, p. 155.)
509	11587	U.S.A. ...	*Multiform Glassware for Electrical Insulator.* (Rev. of Sci. Instruments, Vol. 14, No. 5, May, 1943, pp. 155-156.)
510	11596	Germany ...	*Course of Fracture in Plexiglass. (Z. Techn. Physik., Vol.* 21, 1940, *p.* 393.) (Elle and Smith, Plastics, Vol. 7, No. 74, July, 1943, p. 294.)

Solders and Bearing Materials.

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
511	11004	U.S.A. ...	*Bearing Alloys with Low Tin Content.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 186.)
512	11065	G.B.	*Tin Conserving Solders.* (G. F. Read, Metal Industry, Vol. 62, No. 24, 11/6/43, pp. 375-377.)
513	11415	G.B.	*Lead - Arsenic - Antimony Soft Solder.* (R. L. Dowdell and others, Metal Industry, Vol. 62, No. 25, 18/6/42, pp. 389-390.)
514	11421	G.B.	*Brazing and Soldering.* (R. N. Chaplin, Metal Industry, Vol. 62, No. 25, 18/6/43, p. 395.)

Miscellaneous (Cements, Varnishes, etc.).

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
515	10708	G.B.	*Heat-Setting Varnishes. (S. L. Moses, Railway Elect. Eng., Dec.,* 1942, *pp.* 263-266 *and* 281.) (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 9.)
516	10758	G.B.	*Heat Sensitive Crayons.* (Autom. Eng., Vol. 33, No. 435, April, 1943, p. 136.)
517	10763	G.B.	*Cemented Carbides (Review of Development).* (Autom. Eng., Vol. 33, No. 435, April, 1943, pp. 161-164.)
518	10859	U.S.A. ...	*Corrugated Asphalt Siding to Replace Corrugated Steel.* (Sci. Amer., Vol. 168, No. 4, April, 1943, p. 159.)
519	11077	Canada ...	*Canadian War-Time Concrete Pavements.* (Engineering, Vol. 155, No. 4,038, 4/6/43, p. 446.)
520	11153	U.S.A. ...	*Extensive Use of Casein Glues in U.S.A.* (British Plastics, Vol. 15, No. 169, June, 1943, p. 42.)
521	11234	G.B.	*Concrete Pavings in Low Temperatures.* (Engineering, Vol. 156, No. 4,042, 2/7/43, pp. 16-17.)
522	11277	G.B.	*Three-Pin Reinforced Concrete Frame Buildings.* (Engineering, Vol. 155, No. 4,041, 25/6/43, pp. 506-507.)
523	11290	G.B.	*Plaster-Asbestos Moulds.* (Metal Industry, Vol. 63, No. 1, 2/7/43, p. 9.)
524	11584	U.S.A. ...	*A New Laboratory Cement.* (Rev. of Sci. Instrum., Vol. 14, No. 5, May, 1943, p. 154.)
525	11594	Germany ...	*Lacquered Wire in Telephone Engineering (from Electr. Nachs. Techn.,* 1941, *Vol.* 18.) (Wolff and Pohler, Plastics, Vol. 7, No. 74, July, 1943, p. 294.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			B. Fabrication.
			Welding.
526	10676	G.B. ...	... *Stud Welding System.* (*A. M. Candy, Welding Journal, Aug.*, 1942, *pp.* 509-512.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 8.)
527	10677	G.B. ...	... *Redesign of Cast Iron Machine Parts for Welding Construction Reasons and Principles.* (*F. Koenigsberger, Welder, Jan.-June*, 1942, *pp.* 266-269.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 9.)
528	10678	G.B. ...	... *Proposed Specifications for Stainless Steel Arc Welding Electrodes for Welding Steels of High Hardenability.* (*Welding Journal, Aug.*, 1942, *pp.* 513-514.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 11.)
529	10679	G.B. ...	... *Arc Welding Aircraft Tubing.* (*Welding Engineer, Aug.*, 1942, *pp.* 35-37.) (Met. Vick. Tech. News Bull., No. 837, 23/10/43, p. 12.)
530	10680	G.B. ...	... *Current Measurement Improves Welding Technique —Pt. II.* (*C. M. Manyer and H. S. Day, Welding Eng., Aug.*, 1942, *pp.* 39-41.) (Met. Vick. Tech. News Bull., No. 837, 23/10/43, p. 12.)
531	10681	G.B. ...	... *Metallic Arc Welding of Copper Pressure Vessels.* (*G. H. Sandberg, Welding Journal, Aug.*, 1942, *pp.* 507-509.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 7.)
532	10689	G.B. ...	... *New Stud Welding Process.* (*Welding Engineer, Dec.*, 1942, *p.* 42.) (Met. Vick. Tech. News Bull., No. 856, 5/3/43, p. 3.)
533	10690	G.B. ...	... *Welding of Stainless Steel.* (*S. L. Rich, Welding J., June*, 1942, *pp.* 293*S*-296*S*.) (Met. Vick. Tech. News Bull., No. 856, 5/3/43, p. 4.)
534	10691	G.B. ...	... *Device for Measuring Tip Force and Current in Spot Welding.* (*H. Wolfe and R. W. Powell, Welding Journal, June*, 1942, *pp.* 293*S*-296*S*.) (Met. Vick. Tech. News Bull., No. 856, 5/3/43, p. 4.)
535	10692	G.B. ...	... *Clad Steel "Sandwiches" welded by the Carbon Arc.* (*T. S. Fitch and L. W. Townsend, Iron Age*, 18/2/43, *pp.* 54-59.) (Met. Vick. Tech. News Bull., No. 863, 23/4/43, p. 8.)
536	10707	G.B. ...	... *Welding by Unionmelt Process.* (*Westinghouse Engineer, Nov.*, 1942, *pp.* 126-128.) (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 6.)
537	10769	G.B. ...	... *The Reclamation of Cutting Tools by Arc Welding.* (J. R. Treadwell, Machinery, Vol. 62, No. 1,595, 6/5/43, pp. 494-496.)
538	10814	Germany	... *The Gussolite Process for the Temperature Welding of Cast Iron.* (Welding Industry, Vol. 2, No. 5, June, 1934, pp. 163-165.)
539	11021	U.S.A.	... *World's Largest Machine for Spot Welding Aluminium.* (Metal Progress, Vol. 43, No. 4, April, 1943, p. 616.)

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540	11078	G.B. ...	... *Structural Design of Welded Hulls.* (J. Turnbull, Engineering, Vol. 155, No. 4,038, 4/6/43, pp. 447-448.)
541	11150	G.B. ...	... *Spot Welding with Glue.* (British Plastics, Vol. 15, No. 169, June, 1943, p. 27.)
542	11241	U.S.A.	... *Magnesium Welding with the Helium Arc.* (S. R. Winter, Scientific American, Vol. 168, No. 6, June, 1943, pp. 252-254.)
543	11267	U.S.A.	... *Shipyard Layout for Welded Construction.* (Engineer, Vol. 175, No. 4,563, 25/6/43, pp. 504-505.)
544	11296	G.B. ...	... *Removing Welding Flux from Aluminium.* (Metal Industry, Vol. 62, No. 26, 25/6/43, p. 406.)
			Surface Treatment (Plating, etc.).
545	10872	U.S.A.	... *Surbrite—A New Steel Surface Conditioner.* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 185.)
546	10979	G.B. ...	... *Metal Spraying and New Surface Roughening Tool.* (Metal Industry, Vol. 62, No. 3, 4/6/43, p. 356.)
547	11006	U.S.A.	... *Improvement in the Electrolytic Tinplating Process.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 206.)
548	11030	Germany	... *Protective Lacquers for Zinc (from the German).* (Plastics, Vol. 7, No. 73, June, 1943, p. 258.)
549	11066	G.B. ...	... *Black Nickel Deposition.* (E. Schore, Metal Industry, Vol. 62, No. 24, 11/6/43, pp. 378-380.)
550	11172	U.S.A.	... *New Phosphating Treatment (Pre-Treatment with Disoduin Phosphate Containing Traces of Titanium).* (F. W. Van Antwerpen, Ind. and Eng. Chem. (News Ed.), Vol. 21, No. 9, 10/5/43, pp. 710-711.)
551	11255	U.S.A.	... *Electroplating Metals (Data Sheet).* (Metal Progress, Vol. 43, No. 5, May, 1943, p. 741.)
552	11297	U.S.A.	... *Recent Developments in Zinc Plating.* (M. B. Diggin, Metal Industry, Vol. 62, No. 26, 25/6/43, pp. 407-410.)
			Surface Finish (Polishing, etc.).
553	10722	U.S.A.	... *The Foren Mill for Rolling Seamless Tubes.* (E. W. Wrage, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 745-751.)
554	10823	G.B. ...	... *Surface Finish and the Function of Parts (Discussion).* (G. Schlesinger, Engineering, Vol. 155, No. 4,031, 28/5/43, p. 434.)
555	11038	G.B. ...	... *Surface Finish and Function of Parts.* (G. Schlesinger, Engineer, Vol. 175, No. 4,561, 11/6/43, pp. 466-467.)
556	11044	G.B. ...	... *Surface Finish and the Function of Parts.* (G. S. Schlesinger, Engineering, Vol. 155, No. 4,039, 11/6/43, pp. 464-465 and 478-480.)
557	11062	Germany	... *Rolling Mills for Light Metals. (Translation from "Aluminium," Vol. 24, No. 5, 1942, pp. 161-165.)* (W. Kramer, Metal Industry, Vol. 62, No. 24, 11/6/43, pp. 370-372.)
558	11082	G.B. ...	... *Surface Finish and the Function of Parts (Contd.).* (G. Schlesinger, Engineering, Vol. 155, No. 4,038, 4/6/43, pp. 454-455 and 458-460.)

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559	11168	G.B. ...	...	*Surface Finish and the Function of Parts.* (G. Schlesinger, Engineering, Vol. 155, No. 4,040, 18/6/43, pp. 498-499.)
560	11169	G.B. ...	...	*Electrolytic Polishing of Metals.* (S. Wernick, Chem. and Ind., Vol. 62, No. 26, 26/6/43, pp. 238-243.)
561	11256	U.S.A.	...	*A Versatile Metallographic Polishing Process.* (M. Ferguson, Metal Progress, Vol. 43, No. 5, May, 1943, pp. 743-744.)
562	11288	G.B. ...	...	*Polishing, Buffing and Burring.* (H. J. McAlees, Metal Industry, Vol. 63, No. 1, July 2, 1943, p. 9.)
563	11291	Germany	...	*Developments in Rolling Light Metals.* (*Aluminium, Vol. 24, pp. 204-205, 1942.*) (W. Kramer, Metal Industry, Vol. 62, No. 26, 25/6/42, pp. 402-403.)
564	11292	G.B. ...	...	*Developments in Grinding and Polishing.* (Metal Industry, Vol. 62, No. 26, 25/6/43, p. 403.)
565	11428	G.B. ...	...	*Surface Finish and the Function of Parts.* (G. Schlesinger, Preprint of Paper Read at the Inst. of Mech. Engs., 21/5/1943.)
				Heat Treatment.
566	10768	G.B. ...	...	*Electric Furnace Brazing Technique.* (Machinery, Vol. 62, No. 1,595, 6/5/43, pp. 488-491.)
567	10850	U.S.A.	...	*Effect of Cold Work and Heat Treatment on 24 St. Aluminium Alloy.* (B. Mitchell, J. Aeronautical Sci., Vol. 10, No. 3, March, 1943, pp. 86-90.)
568	10906	G.B. ...	...	*Iodine and Potassium Chloride from Metallic Dust from Blast Furnaces.* (P. Dicken and W. Middel, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 27-30.)
569	11015	U.S.A.	...	*Decarburized Zones.* (Metal Progress, Vol. 43, No. 4, April, 1943, pp. 570-571.)
570	11016	U.S.A.	...	*Converting Semi-Muffle Furnace to Full Muffle Type.* (Metal Progress, Vol. 43, No. 4, April, 1943, pp. 571-572.)
571	11020	U.S.A.	...	*Calibration of Platinum Thermocouple at Steel Melting Range.* (Metal Progress, Vol. 43, No. 4, April, 1943, pp. 598-600.)
572	11067	G.B. ...	...	*Heat Treatment of Non-Ferrous Alloys.* (Metal Industry, Vol. 62, No. 24, 11/6/43, p. 386.)
573	11096	G.B. ...	...	*Heat Treatment of the Wrought Aluminium Alloys. Pt. II—Equipment.* (W.L.A.D.A. Information Bulletin, No. 4.)
574	11250	U.S.A.	...	*Quench on Rising or Falling Heat?* (Metal Progress, Vol. 43, No. 5, May, 1943, pp. 715 and 752.)
575	11252	U.S.A.	...	*Heating of Heavy Forging Billets.* (Metal Progress, Vol. 43, No. 5, May, 1943, pp. 724-725.)
576	11276	G.B	...	*The Heat Treatment of Wrought Aluminium Alloys (Issued by the Wrought Light Alloys Development Association).* (Engineering, Vol. 155, No. 4,041, 25/6/43, p. 505.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Corrosion.
577	10001	G.B. ...	... *Sterilization of Cooling Water.* (Plastics, Vol. 7, No. 72, May, 1943, pp. 219-220.)
578	10687	G.B. ...	... *New Methods for Examination of Corroded Metal. (F. H. Champion, Metallurgia, April,* 1943, *pp.* 217-220.) (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 9.)
579	10729	U.S.A.	... *Protecting Buried Metals Against Corrosion.* (S. Thayer, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 805-808.)
580	10730	U.S.A.	... *Application of Cathodic Protection for Corrosion Protection (Submerged Structure).* (R. J. Sullivan, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 809-815.)
581	10824	G.B. ...	... *Marine Corrosion.* (Engineering, Vol. 155, No. 4,031, 28/5/43, pp. 435-436.)
582	11416	G.B. ...	... *Corrosion of Lead.* (Metal Industry, Vol. 62, No. 25, 18/6/42, p. 390.)
			Powder Metallurgy.
583	10702	G.B. ...	... *Powder Metallurgy. (W. D. Jones, Trans. of the North-East Coast Inst. of Engrs. and Shipbuilders, March,* 1943, *pp.* 139-146.) (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 8.)
584	10784	U.S.A.	... *New Powder Metal Press.* (Metal Progress, Vol. 43, No. 3, March, 1943, p. 444.)
585	10907	G.B. ...	... *Powder Metallurgy—Pt. I.* (Eng. Digest, Vol. 4, No. 1, Jan., 1943, p. 31.)
586	10982	G.B. ...	... *Developments in Powder Metallurgy.* (J. Wulf, Metal Industry, Vol. 62, No. 23, 4/6/43, p. 362.)
587	11155	G.B. ...	... *A New Injection Moulding Powder "Lustrac."* (British Plastics, Vol. 15, No. 169, June, 1943, p. 49.)
			Tools.
588	10765	G.B. ...	... *Conservation of Tools by the Macrome Treatment.* (Autom. Eng., Vol. 33, No. 435, April, 1943, p. 169.)
589	10767	G.B. ...	... *Negative Rake on Milling Cutters.* (Machinery, Vol. 62, No. 1,595, 6/5/43, p. 486.)
590	10770	G.B. ...	... *Firth Brown Mitia Carbide Tools.* (Machinery, Vol. 62, No. 1,595, 6/5/43, pp. 497-498.)
591	10771	G.B. ...	... *Carbide Inserted Tooth Milling Cutters Having Negative Rakes.* (Machinery, Vol. 62, No. 1,595, 6/5/43, pp. 501-502.)
592	11005	U.S.A.	... *New Surface Hardening Tools.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 200.)
			Bonding.
593	10652	G.B. ...	... *The Redux Process for Bonding.* (Aeroplane, Vol. 64, No. 1,669, 21/5/43, p. 602.)
594	11419	G.B. ...	... *Bonding of Light Alloys.* (Metal Industry, Vol. 62, No. 25, 18/6/43, p. 394.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Moulding.
595	11535	G.B. ...	... *Uniform Casting for Injection Moulders.* (H. Senior, British Plastics, Vol. 15, No. 170, July, 1943, pp. 82-84.)
596	11595	Germany	... *Device for Regulating Moulding Temperature for Plastics (from Kunststoffe, Vol.* 32, 1942, *p.* 947). (Brandenburger, Plastics, Vol. 7, No. 74, July, 1943, p. 294.)
597	11600	G.B. ...	... *The Manufacture of Precision Mouldings.* (W. M. Halliday, Plastics, Vol. 7, No. 74, July, 1943, pp. 308-313.)
598	11610	U.S.A.	... *Heatronic Moulding of Plastics.* (Ind. and Eng. Chem. (News Ed.), Vol. 21, No. 10, 25/5/43, p. 763.)
599	11633	U.S.A.	... *Original Methods and Tools for Bending and Welding of Steel Tubing.* (Aviation, Vol. 42, No. 5, May, 1943, pp. 236-237 and 394.)
600	11702	U.S.A.	... *The Modern Method of Making Curved Plywood by Omnidirectional Pressure (Flexible Pressure Bag Moulding).* (T. D. Perry, A.S.M.E. Preprint, April 26-28, 1943.)
			C. Inspection.
			X-Ray and Similar Methods of Analysis.
601	10613	G.B. ...	... *Crack Detection by the Hyglo Process.* (Aircraft Production, Vol. 5, No. 6, June, 1943, p. 297.)
602	10675	G.B. ...	... *X-Ray Testing of Welds. (C. B. Clason, Welding Engineer, Aug.,* 1942, *pp.* 27-31.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 6.)
603	10685	G.B. ...	... *Crystallography for Routine Analysis. (C. H. Walker, M.V. Gaz., April,* 1943, *pp.* 167-173.) (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 7.)
604	10686	G.B. ...	... *Annealed Aluminium as Revealed by X-Rays. (E. E. Spillet, J. Inst. Mat., April,* 1943, *pp.* 149-175.) (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 8.)
605	10709	G.B. ...	... *Detecting Surface Flaws in Non-Magnetic Materials. (G. Ellis, Iron Age,* 17/12/42, *pp.* 56-59.) (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 9.)
606	10790	G.B. ...	... *Inspection by Fluorescence (Hyglo Process).* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 495.)
607	10826	G.B. ...	... *Application of the Spectrograph to Steel Work Analysis.* (H. T. Shirley and E. Elliott, Engineering, Vol. 155, No. 4,031, 28/5/43, pp. 437-440.)
608	10903	Germany	... *Microscopic Method of Measuring Surface Roughness (from Die Werkzeugmaschine, Vol.* 6, *No.* 9, *May,* 1942, *pp.* 267-268). (Eng. Digest, Vol. 4, No. 1, Jan., 1943, p. 20-21.)
609	10978	G.B. ...	... *Electrographic Methols of Surface Analysis.* (M. S. Hunter and others, Metal Industry, Vol. 62, No. 23, 4/6/43.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
610	10981	G.B. ...	... *Modern Methods of Metallurgical Analysis—II.* (E. A. Liddiard, Metal Industry, Vol. 62, No. 23, 4/6/43, pp. 359-361.)
611	11052	U.S.A.	... *Ultra-Violet Crack Detector.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 199.)
612	11063	G.B. ...	... *Electrographic Methods of Surface Analysis (Contd.).* (M. S. Hunter and others, Metal Industry, Vol. 62, No. 24, 11/6/43, pp. 373-374.)
613	11083	G.B. ...	... *Applications of the Spectrograph to Steelwork Analysis.* (Engineering, Vol. 155, No. 4,038, 4/6/43, pp. 456-457.)

Mechanical Testing (General Methods).

614	10699	G.B. ...	... *Rapid Non-Destructive Material Testing. (W. A. Knoop, Instruments, Jan., 1943, pp. 14-15.)* (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 7.)
615	10783	U.S.A.	... *Hardness Testing of High Speed Steel at High Temperatures.* (E. C. Bishop and M. Cohen, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 413-416, 442.)
616	10959	G.B. ...	... *Accelerated Testing of Plastics for Weathering Resistance.* (L. K. Merrill and C. S. Myers, Engineering Inspection, Vol. 7, No. 2, April-June, p. 9-14.)
617	10966	G.B. ...	... *Mercury Cracking Tests—Procedure and Control (Detecting Excessive Stresses in Copper Base Alloys).* (H. Rosenthal and A. L. Jamieson, Engineering Inspection, Vol. 7, No. 3, Autumn, 1942, pp. 9-13.)
618	11017	U.S.A.	... *Rapid Identification Tests for Manganese and Sulphur in Steel.* (Metal Progress, Vol. 43, No. 4, April, 1943, p. 572.)
619	11170	U.S.A.	... *Rohm and Haas Laboratory Equipment for Testing Transparent Plastics (Photographs).* (Ind. and Eng. Chem. (News Ed.), Vol. 21, No. 9, 10/5/43, pp. 690-691.)
620	11235	G.B. ...	... *Significance of Mechanical Test Properties of Metals (Contd.).* (H. O'Niell, Engineering, Vol. 156, No. 4,042, 2/7/43, pp. 18-20.)
621	11258	U.S.A.	... *Spot Test for Manganese in Steel.* (Metal Progress, Vol. 43, No. 5, May, 1943, p. 746.)
622	11266	G.B. ...	... *Tensile and Other Mechanical Test Properties of Metals. (Abstract of Paper Presented to Inst. of Mech. Engs)* (H. O'Neill, Engineer, Vol. 175, No. 4,563, 25/6/43, pp. 503-504.)

INSTRUMENTS.

Aircraft.

623	10724	U.S.A.	... *Optimum Settings for Automatic Controllers.* (J. G. Ziegler and N. B. Nichols, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 759-768.)
624	10852	U.S.A.	... *Graphical Analysis of Delay of Response in Air Speed Indicators. (K. J. De Juhasz, J. Aeron.* Sci., Vol. 10, No. 3, March, 1943, pp. 91-97.)

ITEM NO.	R.T.P. REF.			TITLE AND JOURNAL.
625	11311	Germany	...	*Handy Tool for Recessing Ball-Bearing Seats on Aircraft Control Levers.* (Junkers, Flugsport, Vol. 35, No. 10, 16/6/43, p. 128.)
626	11374	G.B. ...	...	*A Radio Flight Test Recorder.* (H. W. Perry, Airc. Eng., Vol. 15, No. 172, June, 1943, pp. 174-177.)
627	11576	U.S.A.	...	*True Air Speed Indicator (Pat. No. 2,318,153).* (R. D. Gibson, U.S.A. Patent Specification.)
				Stress-Strain Gauges.
628	10703	G.B. ...	...	*A Recording Dilatometer. (L. R. Stanton, Iron and Coal Trades Review, 5/2/43, pp. 109-113.)* (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 2.)
629	10706	G.B. ...	...	*A Magnetic Strain Gauge. (B. F. Langer, Westinghouse Engineer, Nov., 1942, pp. 117-122.)* (Met. Vick. Tech. News Bull., Vol. 854, 19/2/43, p. 6.)
630	10812	G.B. ...	...	*Simple Apparatus for Studying Deformation of Soft Materials Under Compression and Tension at Constant Stress.* (G. W. Scott Blair and B. Veinoglov, Journal of Scientific Instruments, Vol. 20, No. 4, April, 1943, p. 58.)
631	10833	U.S.A.	...	*The Porter-Lipp Strain Gauge (Simple Mechanical Type).* (Sci. Am., Vol. 168, No. 2, Feb., 1943, p. 87.)
632	10902	Germany	...	*Machine for Compressing the Surface of Screws to Improve Fatigue Strength (from Die Werkzeugmaschine, Vol. 6, No. 11, 1942, p. 331.)* (Eng. Digest, Vol. 4, No. 1, Jan., 1943, p. 19.)
633	11433	Germany	...	*Accelerometer for Determining Shock Load on Vehicle.* (P. Langer, Symposium of Papers on the Elements of Machine Design (Aachen), pp. 49-50.)
634	11251	U.S.A.	...	*New Pathways in Engineering (New Strain Gauges and Methods of Stress Analysis).* (A. V. de Forest, Metal Progress, Vol. 43, No. 5, May, 1943, pp. 719-723 and 750.)
635	11272	U.S.A.	...	*Sheet and Wire Gauge Reform—the "Preferred Number" System of the American Standards Association.* (Engineer, Vol. 175, No. 4,563, 25/6/43, pp. 504-507 and 511.)
636	11282	G.B. ...	...	*Recording Dilatometer for Metal Specimens.* (L. R. Stanton, Engineering, Vol. 155, No. 4,041, 25/6/43, pp. 518-519.)
				Electrical, Spectrometers, etc.
637	10672	G.B. ...	...	*The Londex Welder Timer. (Electrician, 16/10/42, p. 419.)* (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 3.)
638	10813	G.B. ...	...	*The Electrical Screening of Sparking Apparatus for Use in Spectrographic Analysis.* (D. M. Smith and A. Walsh, Journal of Scientific Instruments, Vol. 20, No. 4, April, 1943, pp. 63-64.)
639	11053	U.S.A.	...	*The Betatron—New Powerful X-Ray Machine.* (A. R. Wildhagen, Sci. Am., Vol. 168, No. 5, May, 1943, pp. 207-209.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
640	11157	U.S.A. ...	*An Improved Current Integrator.* (J. Morris Blair, Rev. of Sci. Insts., Vol. 14, No. 3, March, 1943, pp. 64-67.)
641	11563	U.S.A. ...	*Photo-Electric Glossmeter.* (Rev. of Sci. Instrum., Vol. 14, No. 4, April, 1943, p. 119.)
642	11577	U.S.A. ...	*An Experimental Mass Spectrometer.* (N. D. Coggeshal and E. B. Jordan, Rev. of Sci. Instrum., Vol. 14, No. 5, May, 1943, pp. 125-129.)

Flow Meters.

643	11042	G.B.	*An Instrument to Measure Minute Changes in Specific Inductive Capacity of Cardboard and Hence to Determine its Water Content.* (S. D. Gardiner, J. Soc. Chem. and Ind., Vol. 62, No. 5, May, 1943, pp. 75-76.)
644	11159	U.S.A. ...	*Erratum: An Accurate High Sensitivity Apiezon Oil McLeod Gauge.* (J. Bannon, Rev. of Sci. Insts., Vol. 14, No. 3, March, 1943, p. 77.)
645	11239	U.S.A. ...	*An Improved Meter for the Measurement of Gas Flow Rates.* (W. G. Appleby and W. H. Avery, Ind. and Eng. Chem. (Anal. Ed.), Vol. 15, No. 5, 18/5/43, pp. 349-350.)
646	11240	U.S.A. ...	*Current Methods of Measuring Foam.* (S. Ross, Ind. and Eng. Chem. (Anal. Ed.), Vol. 15, No. 5, 18/5/43, pp. 329-334.)

Miscellaneous (including Optical).

647	10785	U.S.A. ...	*Metal Washing Machine.* (Metal Progress, Vol. 43, No. 3, March, 1943, p. 444.)
648	10813	G.B.	*A Bath for Use in the Graduation and Testing of Thermometers.* (A. Grace and J. A. Hall, Journal of Scientific Instruments, Vol. 20, No. 4, April, 1943, pp. 60-63.)
649	10863	U.S.A. ...	*Split Second Timing by Special Tuning Forks.* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 172.)
650	10870	U.S.A. ...	*A New Low Cost Air Clamp.* (Sci. Amer., Vol. 168, No. 4, April, 1943, p. 184.)
651	10900	G.B.	*Miniature Instruments.* (J. M. Whittenton, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 11-12.)
652	10901	G.B.	*Inkless Recording.* (P. E. Twiss, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 12-16.)
653	11061	U.S.A. ...	*Armour Plate Width Measured from a Distance by Mirrors.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 224.)
654	11294	G.B.	*Calibrating a Microscope.* (Metal Industry, Vol. 62, No. 26, 25/6/43, p. 403.)

PRODUCTION.

Control and Organisation.

655	10635	Germany ...	*German Production Methods.* (Flight, Vol. 43, No. 1,794, 13/5/43, p. 500.)
656	10766	G.B.	*The Willow Run Bomber Plant Production Method, etc.* (Machinery, Vol. 62, No. 1,595, 6/5/43, pp. 477-484.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
657	10787	G.B. ...	... *Production Publicity.* (Aeroplane, Vol. 64, No. 1,666, 30/4/43, p. 494.)
658	10961	G.B. ...	... *Quality, Production and Progress.* (A. N. Appleby, Engineering Inspection, Vol. 7, No. 2, April-June, 1942, pp. 22-24.)
659	10962	G.B. ...	... *The Statistical Control of Quality in Production Engineering.* (R. Royan and H. Rissik, Engineering Inspection, Vol. 7, No. 1, Jan.-March, 1942, pp. 4-19.)
660	10963	G.B. ...	... *Standards for Precision Engineering.* (G. O. Watson, Engineering Inspection, Vol. 7, No. 1, Jan.-March, 1942, pp. 20-24.)
661	10989	U.S.A.	... *Statistical Data on American War Production.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 53-97.)
662	10996	U.S.A.	... *Alphabetical List of Government Agencies.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 124-125.)
663	11236	G.B. ...	... *New Kodak School of Industrial Radiography.* (Elect. Eng., Vol. 15, No. 185, July, 1942, pp. 58-59.)
664	11281	G.B. ...	... *Wage Systems and Incentives.* (T. E. A. K. Jackson, Engineering, Vol. 155, No. 4,041, 25/6/42, pp. 516-517.)
665	11303	G.B. ...	... *Maximum Works Production.* (Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 13-14.)
666	11310	Germany	... *Changes in the German Patent Laws.* (Flugsport, Vol. 35, No. 10, 16/6/43, pp. 131-132.)
667	11406	U.S.A.	... *New Magnesium Production Plant.* (F. J. van Antwerpen, Ind. and Eng. Chem., Vol. 212, No. 8, 25/4/43, pp. 545-547.)
668	11441	U.S.A.	... *Modification Centres for Effecting Changes in Aircraft Design as Dictated by Battle Front Experience (for Consolidated Aircraft).* (S. Hotchkiss, Aviation, Vol. 42, No. 4, April, 1943, pp. 134-136 and 329-333.)
669	11479	G.B. ...	... *Control of Short Brothers by the Government.* (Inter. Avia., No. 867, 1/5/43, pp. 19-20.)

Research and Training.

670	10653	U.S.A.	... *T. P. Wright's Address to the Institute of Aeronautical Sciences.* (Flight, Vol. 43, No. 1,794, 13/5/43, p. 499.)
671	10956	Italy ...	... *Italian National Research Council.* (Inter. Avia., No. 861, 17/3/43, p. 14.)
672	10972	G.B. ...	... *Research in South Africa (Rubber, Road Research, etc.).* (Engineer, Vol. 175, No. 4,560, 4/6/43, p. 447.)
673	10974	China	... *Engineering Developments in China.* (Engineer, Vol. 175, No. 4,560, 4/6/43, pp. 449-451.)
674	11046	G.B. ...	... *Education and Training for Engineers (Contd.).* (Engineering, Vol. 155, No. 4,039, 11/6/43, pp. 476-477.)
675	11084	U.S.A.	... *Organisation of American Scientists for the War.* (K. T. Compton, Nature, Vol. 151, No. 3,839, 29/5/43, pp. 601-606.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
676	11215	U.S.S.R. ...	*Biogeochemical Research in the U.S.S.R.* (A. P. Vinodradov, Nature, Vol. 151, No. 3,841, 12/6/43, pp. 659-661.)
677	11270	G.B.	*Science and the State.* (Engineer, Vol. 175, No. 4,563, 25/6/43, p. 507.)
678	11275	G.B.	*Education and Training for Engineers—II.* (*Report of the Inst. Elect. Engs.*) (Engineering, Vol. 155, No. 4,041, 25/6/43, pp. 504-505.)
679	11298	G.B.	*Engineers and the British Empire—I.* (M. Smith, Engineer, Vol. 176, No. 4,564, 2/7/43, pp. 2-3.)
680	11305	G.B.	*National Research.* (Sir Stafford Cripps, Engineer, Vol. 176, No. 4,564, 2/7/43, p. 17.)
681	11496	U.S.S.R. ...	*Russian Research and Development Awards.* (Inter. Avia., No. 868, 10/5/43, pp. 15-16.)
			Aircraft Production Methods.
682	10608	G.B.	*Small Scale Track Assembly.* (Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 259-261.)
683	10609	G.B.	*Production of the De Havilland Mosquito.* (W. E. Goff, Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 262-273.)
684	10610	G.B.	*Metal Aircraft Units Produced with Woodworking Machinery.* (Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 277-279.)
685	10612	G.B.	*Producing Bomber Castings—Pt. I.* (Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 292-296.)
686	10845	U.S.A. ...	*The Manufacturing Processes of Plastic Planes.* (Pegasus, Vol. 1, No. 2, Feb., 1943, pp. 1-3 and 16.)
687	11316	Germany ...	*Method of Joining Plastic Aircraft Parts by Means of Heat and a Special Cement.* (*Pat. series No.* 5, 732,922.) (Nobel, Flugsport, Vol. 35, No. 10, 16/6/43, pp. 29-30.)
688	11350	Germany ...	*Conveyor System for the Mass Production of Bulky Aircraft Parts.* (*Pat. series No.* 4, 732,868.) (Henschel, Flugsport, Vol. 35, No. 9, 19/5/43, p. 25.)
689	11388	U.S.A. ...	*Wheel Maintenance at American Airlines.* (R. Miller, Aviation, Vol. 42, No. 3, March, 1943, pp. 245-247 and 380.)
			Methods (General).
690	10683	G.B.	*Adapting Automatic Electric Welding to Routine Production.* (*J. M. Keir, Weld. J., March,* 1943, *pp.* 173-179.) (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 3.)
691	10698	G.B.	*Flash Welding—I.* (*L. A. Ferney, Welding, March,* 1943, *pp.* 154-160.) (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 4.)
692	10700	G.B.	*Making Alloy Steel by Arc Welding.* (*J. A. Newman, Steel,* 11/1/43, *pp.* 74-76, 78 *and* 80.) (Met. Vick. Tech. News Bull., No. 859, 26/3/43, p. 7.)

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693	10704	G.B. ...	... *Resistance Welds with Electronic Control. (T. R. Lawson, Westinghouse Engineer, Nov., 1942, pp.* 109-113.) (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 4.)
694	10705	G.B. ...	... *Electrolytic Tin-Plating Lines and Reflowing Methods. (J. R. Erbe, Westinghouse Engineer, Nov.,* 1942, *pp.* 129-130.) (Met. Vick. Tech. News Bull., No. 854, 19/2/43, p. 5.)
695	10775	U.S.A.	... *Network of Shops for Heat Treating Small Armour.* (L. Strouffer, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 390-391.)
696	10832	U.S.A.	... *Rapid Metal Plating in Situ (without Dismantling).* (Sci. Am., Vol. 168, No. 2, Feb., 1943, p. 86.)
697	10867	U.S.A.	... *Templates Rapidly Produced with New Transfer Film (Pliofilm).* (Sci. Am., Vol. 168, No. 4, April, 1943, pp. 177-178.)
698	10975	G.B. ...	... *Recent Advance in the Electro-Metallurgical Industry.* (Engineer, Vol. 175, No. 4,560, 4/6/43, p. 451.)
699	10981	G.B. ...	... *Tube Forming by the Spun End Process.* (Metal Industry, Vol. 62, No. 23, 4/6/43, p. 358.)
700	11010	U.S.A.	... *Ships Welded on a Production Line.* (G. F. Wolfe, Metal Progress, Vol. 43, No. 4, April, 1943, pp. 550-554.)
701	11032	Germany	... *Production Methods for Magnets (Metal Powders Bonded with Synthetic Resin) (from the German).* (Plastics, Vol. 7, No. 73, June, 1943, p. 259.)
702	11035	G.B. ...	... *Co-operation Between User and Moulder in the Production of Precision Mouldings.* (W. M. Halliday, Plastics, Vol. 7, No. 73, June, 1943, pp. 262-267.)
703	11271	G.B. ...	... *Marking Methods and War Production.* (Engineer, Vol. 175, No. 4,563, 25/6/43, pp. 512-514.)
704	11274	G.B. ...	... *Statistical Methods in Industry. (Published by Iron and Steel Industrial Research Council, Brit. Iron and Steel Fed.)* (Engineering, Vol. 155, No. 4,041, 25/6/43, p. 503.)
705	11313	Germany	... *Device for the Cold Bending of Alloy Tubes up to* 20 *mm. Diameter (no Filling Required).* (Junkers, Flugsport, Vol. 35, No. 10, 16/6/43, p. 130.)
706	11317	Germany	... *Method of Preparing Hollow Plastic Sections by Means of an Internal Flexible Air Bag. (Pat. series No.* 5, 732,923.) (Focke-Wulf, Flugsport, Vol. 35, No. 10, 16/6/43, p. 30.)
707	11336	Germany	... *Mobile Unit for Periodic Cleaning of the Lubricating System of Machine Tools.* (Flugsport, Vol. 35, No. 9, 19/5/43, pp. 111-112.)

Inspection, Routine Analysis.

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
708	10958	G.B. ...	... *X-Ray Technique in the Industrial Laboratory.* (H. P. Rooksby, Engineering Inspection, Vol. 7, No. 2, April-June, 1942, pp. 4-8.)
709	10967	G.B. ...	... *Lighting for Inspection.* (R. O. Ackerley, Engineering Inspection, Vol. 7, No. 3, Autumn, 1942, pp. 16-22.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
710	11165	G.B. ...	... *Inspecting Apparatus for Small Parts.* (Engineering, Vol. 155, No. 4,040, 18/6/43, pp. 487 and 490.)
711	11178	G.B. ...	... *Crystallography for Routine Analysis.* (C. H. Walker, Engineer, Vol. 175, No. 4,562, 18/6/43, pp. 492-494.)
			Equipment, Lay-Out.
712	10905	Germany	... *The Most Efficient Layout of Electric Arc Furnace Steel Works. (From Stahl und Eisen, Vol.* 61, *No.* 29, *July,* 1941, *pp.* 685-694.) (H. Müller, Eng. Digest, Vol. 4, No. 1, Jan., 1943, pp. 27-30.)
713	11079	Germany	... *Economising Electrical Energy in German Industry.* (Engineering, Vol. 155, No. 4,038, 4/6/43, p. 450.)
714	11184	U.S.A.	... *New Production Equipment.* (Autom. Ind., Vol. 88, No. 7, 1/4/43, pp. 38 and 60-68.)
			Scrap Salvage.
715	11013	U.S.A.	... *Practical Programmes for Reclamation of Metal Scrap (Symposium of Articles).* (J. L. Cannon and others, Metal Progress, Vol. 43, No. 4, April, 1943, pp. 561-569.)
			Welfare of Workers.
716	10857	U.S.A.	... *Anti-Sabotage Lighting.* (J. A. Summers, Sci. Am., Vol. 168, No. 4, April, 1943.)
717	11003	U.S.A.	... *Accident Prevention in Aircraft Manufacture.* (W. S. Rhodes, Autom. Ind., Vol. 88, No. 6, 15/3/43, pp. 151-154 and 352-354.)
718	11054	U.S.A.	... *Industrial Safety (Research and Development).* (Sci. Am., Vol. 168, No. 5, May, 1943, pp. 216-218.)
719	11057	U.S.A.	... *Feed Control Improves Safety in Magnesium Plant.* (Sci. Am., Vol. 168, No. 5, May, 1943, p. 222.)
720	11212	G.B. ...	... *Hours of Work, Health and Efficiency.* (Nature, Vol. 151, No. 3,841, 12/6/43, pp. 651-652.)
721	11233	G.B. ...	... *Lighting as a Factor in Production.* (Engineering, Vol. 156, No. 4,042, 2/7/43, p. 12.)
722	11235	G.B. ...	... *Safety with X-Rays.* (H. G. Long, Elect. Eng., Gt. Brit., Vol. 15, No. 185, July, 1942, pp. 52-54 and 84.)
			TRANSPORT.
			Tanks, Jeeps, etc.
723	10757	G.B. ...	... *The G.P. War Truck (Jeep).* (Autom. Eng., Vol. 33, No. 435, April, 1943, pp. 131-136.)
724	10772	U.S.A.	... *Some Notes on Armour Plate for Ships and Tanks.* (Metal Progress, Vol. 43, No. 3, March, 1943, pp. 382-387.)
725	10773	U.S.A.	... *Tank Armour.* (G. M. Barnes, Metal Progress, Vol. 43, No. 3, March, 1943, p. 389.)
726	10774	U.S.A.	... *Tank Design.* (Metal Progress, Vol. 43, No. 3, March, 1943, pp. 389, 432, 436.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
727	10776	U.S.A. ...	*Welded Hull for Combat Tank.* (E. Brookes, Metal Progress, Vol. 43, No. 3, March, 1943, pp. 392, 395, 430.)
728	10856	U.S.A. ...	*Army Motor Vehicles for Various Purposes (Instruction Maintenance, etc.).* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 153.)
729	10866	U.S.A. ...	*New Flame Detector for Use in Tanks.* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 174.)
730	11000	U.S.A. ...	*Ford Building Amphibian Jeep.* (Autom. Ind., Vol. 88, No. 6, 15/3/43, p. 138.)
731	11175	G.B.	*Welded Armoured Fighting Vehicles.* (Engineer, Vol. 175, No. 4,562, 18/6/43, pp. 485-486.)
732	11186	Germany ...	*German Mark IV Tank.* (Autom. Ind., Vol. 88, No. 7, 1/4/43, p. 39.)
733	10762	G.B.	*Battery Electric Vehicle.* (Autom. Eng., Vol. 33, No. 435, April, 1943, pp. 155-159.)
734	11192	Germany ...	*Oil Waggons for Carrying Oil Supply for Machine Tools.* (Junkers, Flugsport, Vol. 35, No. 8, 21/4/43, p. 95.)
735	11284	G.B.	*Counter Pressure Brake Testing of Locomotives.* (E. Cattanes, Engineering, Vol. 155, No. 4,041, 25/6/43, p. 514.)

WIRELESS AND ELECTRICITY.

Radio and Television.

736	10987	G.B.	*Wireless Engineer, Abstracts and References.* (June, 1943.)
737	11068	U.S.A. ...	*Radio Progress during* 1942. (Procs., I.R.E., Vol. 31, No. 4, April, 1943, pp. 127-131.)
738	11069	U.S.A. ...	*Frequency Modulation Distortion in Loud Speakers.* (G. L. Beers and H. Belar, Procs., I.R.E., Vol. 31, No. 4, April, 1943, pp. 132-138.)
739	11071	U.S.A. ...	*Radio Frequency Operated High Voltage Supplies for Cathode Ray Tubes.* (O. H. Schade, Procs., I.R.E., Vol. 31, No. 4, April, 1943, pp. 158-163.)
740	11141	U.S.A. ...	*Condenser Scoop Design.* (E. F. Hewins and J. R. Reilly, Soc. of Naval Architects and Marine Engs. (Transactions), Vol. 48, 1940, pp. 277-304.)
741	11174	U.S.A. ...	*Optimum Current Distribution on Vertical Antennas.* (L. La Paz and G. A. Miller, Procs. Inst. Rad. Engs., Vol. 31, No. 5, May, 1943, pp. 214-232.)
742	11210	Germany ...	*Installation of Radio Altimeters in the Wing Structure. (Pat series No.* 3, 731,987.) (Siemens, Flugsport, Vol. 35, No. 8, 21/4/43, p. 20.)
743	11214	G.B.	*Radio Receiver Design (Book Review).* (Nature, Vol. 151, No. 3,841, 12/6/43, p. 657.)
744	11237	G.B.	*Factors Determining the Choice of Carrier Frequency for an Improved Television System.* (B. J. Edwards, Engineering, Vol. 15, No. 185, July, 1942, pp. 60-64.)
745	11238	G.B.	*Measuring Instruments for Radio.* (E. H. W. Banner, Elect. Eng., Vol. 15, No. 185, July, 1942, pp. 76-79.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
			Electricity (General).
746	10673	G.B. ...	... *The Electrical Equipment of the New Deep Shelters.* (*Electrical Review,* 16/10/42, *pp.* 481-484.) (Met. Vick. Tech. News Bull., No. 837, 23/10/42, p. 4.)
747	10818	G.B. ...	... *An Automatic Low Frequency Analyser* (*Electro-biology*). (W. G. Walter, Elect. Eng., Vol. 15, No. 184, June, 1942, pp. 9-13.)
748	10984	G.B. ...	... *Discussion on the Electric Spark in Air.* (J. Inst. Elect. Engs., Vol. 90, No. 29, Pt. I, May, 1943, pp. 197-199 and 200-202.)
749	11072	U.S.A.	... *Network Theory, Filters and Equalizers* (*Pt. I*). (F. E. Terman, Procs., I.R.E., Vol. 31, No. 4, April, 1943, pp. 164-175.)
750	11087	G.B. ...	... *A New Electrical Frequency Divider.* (Nature, Vol. 151, No. 3,839, 29/5/43, pp. 621-622.)
751	11173	Germany	... *Improvement of the Insulating Properties of P.V. Chlorides with the Addition of Silicates.* (I.G. Farben, Frankfurt/Main, D.R.P. 704,301, 28/3/41. Zeit. für Fernmeldetechnik, Vol. 23, Heft 1, 16/1/42, p. 12.)
752	11218	G.B. ...	... *The High Pressure Gas-Filled Cable.* (Nature, Vol. 151, No. 3,841, 12/6/43, p. 669.)
753	11280	G.B. ...	... *High Rupturing Capacity Air-Break-Circuit Breakers.* (Engineering, Vol. 155, No. 4,041, 25/6/43, p. 513.)
754	11312	Germany	... *Wire Rope Connections* (*Electrical Cutting Gives Pointed Ends which are Secured by Passing Through a Tube and Twisting*). (Messerschmitt, Flugsport, Vol. 35, No. 10, 16/6/43, p. 129.)
755	11578	U.S.A.	... *An Electrical Transducer* (*Vibration Recorder*) *Circuit for Use with Capacity Pick-up Devices.* (E. V. Potter, Rev. of Sci. Instrum., Vol. 14, No. 5, May, 1943, pp. 130-135.)
			Electronics.
756	10825	G.B. ...	... *Electron Diffraction.* (G. P. Thompson, Engineering, Vol. 155, No. 4,031, 28/5/43, p. 436.)
757	11073	U.S.A.	... *Electron Method for Soldering Crystal Units in Radio Equipment.* (Procs., I.R.E., Vol. 31, No. 4, April, 1943, p. 40.)
758	11075	G.B. ...	... *Electron Diffraction* (*Contd.*). (G. P. Thompson, Vol. 155, No. 4,038, 4/6/43, pp. 444-445.)
759	11213	G.B. ...	... *High Frequency Thermionic Tubes* (*Book Review*). (Nature, Vol. 151, No. 3,841, 12/6/43, p. 655.)
			Magnetism, etc.
760	10817	G.B. ...	... *Reflexion of Electromagnetic Waves from a Parabolic Ionised Layer.* (O. E. H. Rydbeck, Phil. Mag., Vol. 34, No. 232, May, 1943, pp. 342-348.)
761	10862	U.S.A.	... *Variations in the Earth's Magnetic Field Through the Geologic Ages.* (A. G. McNish, Sci. Am., Vol. 168, No. 4, April, 1943, pp. 166-167.)
762	11221	G.B. ...	... *Recent Advances in the Theory of the Fundamental Particles of Physics.* (H. J. Bhabha, Nature, Vol. 151, No. 3,840, 5/6/43, pp. 628-629.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.

HEAT AND LIGHT (HEAT TRANSFER AND COLOUR VISION).

763	10718	U.S.A. ...	*Radiation Configuration Factors Using Light in Furnace Models (Mutual Visibility of Radiating Elements).* (F. E. England and H. O. Croft, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 691-702.)
764	10723	U.S.A. ...	*The Analysis of a Continuous Process by a Discontinuous Step Method (as Applied to Heat Exchangers).* (J. A. Hrones, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 753-758.)
765	10726	U.S.A. ...	*A Review of Heat Transfer Coefficients and Friction Factors for Tubular Heat Exchangers.* (B. E. Short, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 779-785.)
766	10727	U.S.A. ...	*Condensation of Saturated Freon-12 Vapour on a Bank of Horizontal Tubes.* (F. L. Young and W. J. Wohlenberg, Trans. A.S.M.E., Vol. 64, No. 8, Nov., 1942, pp. 787-794.)
767	10983	G.B.	*The British Climate and the Space-Heating Engineer.* (R. Grierson, J. Inst. Elect. Engs., Vol. 90, No. 29, Pt. I, May, 1943, pp. 187-196.)
768	11086	G.B.	*Conical Refraction.* (S. Melmore, Nature, Vol. 151, No. 3,839, 29/5/43, pp. 620-621.)
769	11176	G.B.	*Reflection as a Factor in Heating.* (M. Fielden, Engineer, Vol. 175, No. 4,562, 18/6/43, pp. 486-487.)
770	11219	G.B.	*The Nature of Entropy.* (M. W. Thring, Nature, Vol. 151, No. 3,841, 12/6/43, p. 672.)
771	11222	G.B.	*Visual Purple and Dark Adaptation.* (R. Granit, Nature, Vol. 151, No. 3,840, 5/6/43, pp. 631-632.)
772	11223	G.B.	*Light and Vision.* (E. N. Willmer, Nature, Vol. 151, No. 3,840, 5/6/43, pp. 632-635.)
773	11227	G.B.	*The Warming of Walls.* (A. F. Dufton, Phil. Mag., Vol. 34, No. 233, June, 1943, pp. 376-377.)
774	11228	G.B.	*A Note on Entropy and Irreversible Processes.* (W. Ehrenberg, Phil. Mag., Vol. 34, No. 233, June, 1943, pp. 396-409.)
775	11230	G.B.	*Additional Note on the Trichromatic Theory of Colour Vision.* (W. Peddie, Phil. Mag., Vol. 34, No. 233, June, 1943, pp. 426-430.)

PHOTOGRAPHY (AERIAL CAMERAS).

776	10611	G.B.	*Aerial Cameras: Design and Operation of Type F.8.* (J. H. Oates, Aircraft Production, Vol. 5, No. 56, June, 1943, pp. 280-289.)

METEOROLOGY (SOLAR ACTIVITY, LIGHTNING EFFECTS, ETC.).

777	10684	G.B.	*Effect of Lightning Currents of Long Duration on Variable Resistance Lightning Arrestors. (S. Szpor, A.S.E. Bull., 31/1/43, pp. 15-21.)* (Met. Vick. Tech. News Bull., No. 864, 30/4/43, p. 4.)
778	10816	G.B.	*The Absorption of Infra-Red Radiation by Water Vapour and Carbon Dioxide.* (M. McCaig, Phil. Mag., Vol. 34, No. 232, May, 1943, pp. 321-342.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
779	10830	U.S.A. ...	*Fundamental Celestial Navigation.* (E. B. Collins, Sci. Am., Vol. 168, No. 2, Feb., 1943, pp. 66-67.)
780	10861	U.S.A. ...	*Astral Navigation for the Aerial Navigators.* (Sci. Am., Vol. 168, No. 4, April, 1943, pp. 164-165.)
781	10865	U.S.A. ...	*New Lightning Shield.* (Sci. Am., Vol. 168, No. 4, April, 1943, p. 174.)
782	11070	U.S.A. ...	*Effects of Solar Activity on the Ionosphere and Radio Communications.* (H. W. Wells, Procs., I.R.E., Vol. 31, No. 4, April, 1943, pp. 147-157.)
783	11225	G.B.	*Protection of Structures Against Lightning.* (Nature, Vol. 151, No. 3,840, 5/6/43, pp. 638-639.)

PHYSIOLOGY AND AVIATION MEDICINE.
(Parachute Baling Out, High Altitude Effects, etc.).

784	10625	G.B.	*Functioning of the Human and Mechanical System Under Simulated Flight Conditions.* (Flight, Vol. 43, No. 1,795, 20/5/43, pp. 528-531.)
785	11116	Germany ...	*The Effect of Extremely Rapid Reduction in Atmospheric Pressure on the Mammalian Organism (Abstract Available).* (R. Kilches, Luftfahrtmedizin, Vol. 7, No. 1, 1942, pp. 35-45.)
786	11117	Germany ...	*The Limits of Circulatory Adjustment in Acute Anoxæmia Experiment (Abstract Available).* (H. Loeschcke, Luftfahrtmedizin, Vol. 7, No. 1, 1942, pp. 1-8.)
787	11118	Germany ...	*Compensated Anaglyphs to Koch's Visual Capacity Testing Apparatus.* (Feulgen, Luftfahrtmedizin, Vol. 7, No. 1, 1942, p. 46.)
788	11119	Germany ...	*The "Reduction Time" as an Index for Oxygen Supply of the Tissues.* (Werz and Reiter, Luftfahrtmedizin, Vol. 7, No. 1, 1942, p. 47.)
789	11120	Germany ...	*The Behaviour of Muscle Tone in Acute Anoxæmia (Abstract Available).* (Schnell, Luftfahrtmedizin, Vol. 7, No. 1, 1942, p. 68.)
790	11121	Germany ...	*Survival Time After Very Sudden Drop in Pressure at Extremely High Altitudes.* (Loutz, Luftfahrtmedizin, Vol. 7, No. 1, 1942, pp. 84-97.)
791	11122	Germany ...	*Intestinal Movements Under the Influence of Anoxæmia (Abstract Available).* (G. A. Weltz and R. v. Werg, Luftfahrtmedizin, Vol. 7, No. 1, 1942, pp. 98-117.)
792	11123	Germany ...	*Suggestions for Defining the Disturbance Thresholds and Phases Through Oxygen Deficiency.* (Diringshofen, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, pp. 149-151.)
793	11124	Germany ...	*The Action of Aerodynamic Forces on Circulation of Personnel Sitting in Aircraft.* (Diringshofen, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, pp. 152-165.)
794	11125	Germany ...	*The Action of Doses of Sugar on the Resistance to Anoxæmia and Acapnia at Great Altitudes.* (Polonowski, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 270.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
795	11126	Germany ...	*Air Transport of Casualties.* (Schmidt, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 279.)
796	11127	Germany ...	*Structural Changes Caused by General Oxygen Lack, Especially in Altitude Diseases.* (Buchner, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 281.)
797	11128	Germany ...	*Acidosis of the Heart Muscle in Oxygen Deficiency.* (Gollinitzer and Meier, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 296.)
798	11129	Germany ...	*Principles for Investigation of the Energetics of the Heart.* (Kramer, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 303.)
799	11130	Germany ...	*The Electrical Phenomena Peripheral Anoxæmia.* (Schaefer, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 314.)
800	11131	Germany ...	*Cerebral Circulation in Altitude Collapse.* (Scneider, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 323.)
801	11132	Germany ...	*The Safety Time Limits in Baling Out (Considerations on Parachute Descents from Great Heights).* (Diringshofen, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 327.)
802	11133	Germany ...	*Blood Investigations in Pilots of a Pursuit Squadron.* (Bucker, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 327.)
803	11134	Germany ...	*Regulation of Blood Pressure Under the Action of Gravity in Changing Direction and its Disturbances.* (S. Dretrich, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 327.)
804	11137	Germany ...	*The Scientific Basis for Height Tolerance Tests by Means of Breathing Definite Gas Mixtures.* (Benzinger and others, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 234.)
805	11138	Germany ..	*The Present Position of Musso's Acapnia Theory.* (Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 257.)
806	11139	Germany ...	*The S.T. Depression of the Electro-Cardiogram as a Symptom of Anærobic Cardiac Metabolism.* (Wendt, Luftfahrtmedizin, Vol. 6, No. 1-4, 23/4/42, p. 264.)

MATHEMATICS AND ASTRO-PHYSICS.

807	10720	U.S.A. ...	*Characteristics of Centrally Supported Journal Bearings (Mathematical Solution of Reynolds Equation).* (E. O. Waters, Trans. A.S.M.E., Vol. 64, No. 7, Oct., 1942, pp. 711-719.)
808	10815	G.B.	*The Evaluation of the Complex Roots of Algebraic Equation.* (A. F. Cornock and S. M. Hughes, Phil. Mag., Vol. 34, No. 232, May, 1943, pp. 314-320.)
809	10839	Switzerland ...	*The Damping of Control Systems Obeying Equations of any Order.* (A. Luthi, Escher Wyss, No. 15-16, 1942-1943, pp. 90-95.)
810	10840	Switzerland ...	*Simple Method for Calculating Critical Pressure Ratios for a Series of Stages (with Application to Stodola's Steam Cone Diagram).* (H. Bollier, Escher Wyss, No. 15-16, 1942-1943, pp. 96-100.)

ITEM NO.	R.T.P. REF.		TITLE AND JOURNAL.
811	11216	G.B.	*Origin of Cosmic Rays.* (R. A. Millikan, Vol. 151, No. 3,841, 12/6/43, pp. 663-664.)
812	11567	U.S.A. ...	*General Equation for the Analysis of Elliptic Rings.* (D. O. Domasch, J. Aeron. Sci., Vol. 10, No. 4, April, 1943, pp. 119-126.)
813	11573	Germany ...	*Applications of the Principle of Parallelisms (Differential Geometry) to the Theory of Thin Shells.* (F. Reutter, Z.A.M.M., Vol. 22, No. 2, April, 1942, pp. 87-98.)